Annual Water Resource Master Plan

September 2019

Prepared By:
JEA Water/Wastewater System Planning
21 West Church Street, T-4
Jacksonville, FL 32202

PREFACE

The core of the Annual Water Resource Master Plan focuses on water and wastewater treatment in addition to the reclaimed water system.

Water Treatment Plants	W-1 to W-71
Wastewater Treatment Facilities	S-1 to S-58
Reclaimed Water System	RW-1 to RW-39

The intent for each section is to stand alone as an individual report; as a result, some figures and text could repeated throughout the document.

Throughout the year, Planning creates technical reports that provide more depth on specific projects or a basis for future planned capital projects. Key selections of these additional documents have been incorporated into the Master Plan appendices along with a detailed evaluation of JEA pump station and the collection and distribution system (Service Grids).

Class III and Class IV Pump Stations	Appendix A
Service Grids	Appendix B

The information contained in this document is a snapshot of the Capital Improvement Plan and subject to change at JEA's discretion. Individual project descriptions were not included in this document however are available from the Capital Budget Index. Many of the numbers and figures presented in the Master Plan are an aggregate of detailed reports done outside the framework of this Master Plan. If additional information is needed, please direct questions to the Planner for that section.

Water Treatment Plants	Mike Dvoroznak
Wastewater Treatment Plants	George Porter
Class III & IV Pump Stations	Craig Jones
Reclaimed Water Facilities	George Porter
Collection and Distribution (Grid)	Susan West

To be consistent with permitting and reporting requirements, most historical data presented in this Master Plan is cut off at the end of the 2018 Fiscal/Calendar Year (both wastewater and reclaimed water is tracked on a Fiscal Year basis and water is tracked on a Calendar Year basis). Compiling of the Master Plan documents starts just after the projections for water, wastewater and reclaimed are completed (early Spring 2019). Therefore, it should be noted that major events occurring in FY19 may not be represented in this Master Plan but will be captured in future reports.

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WATER TREATMENT PLANTS

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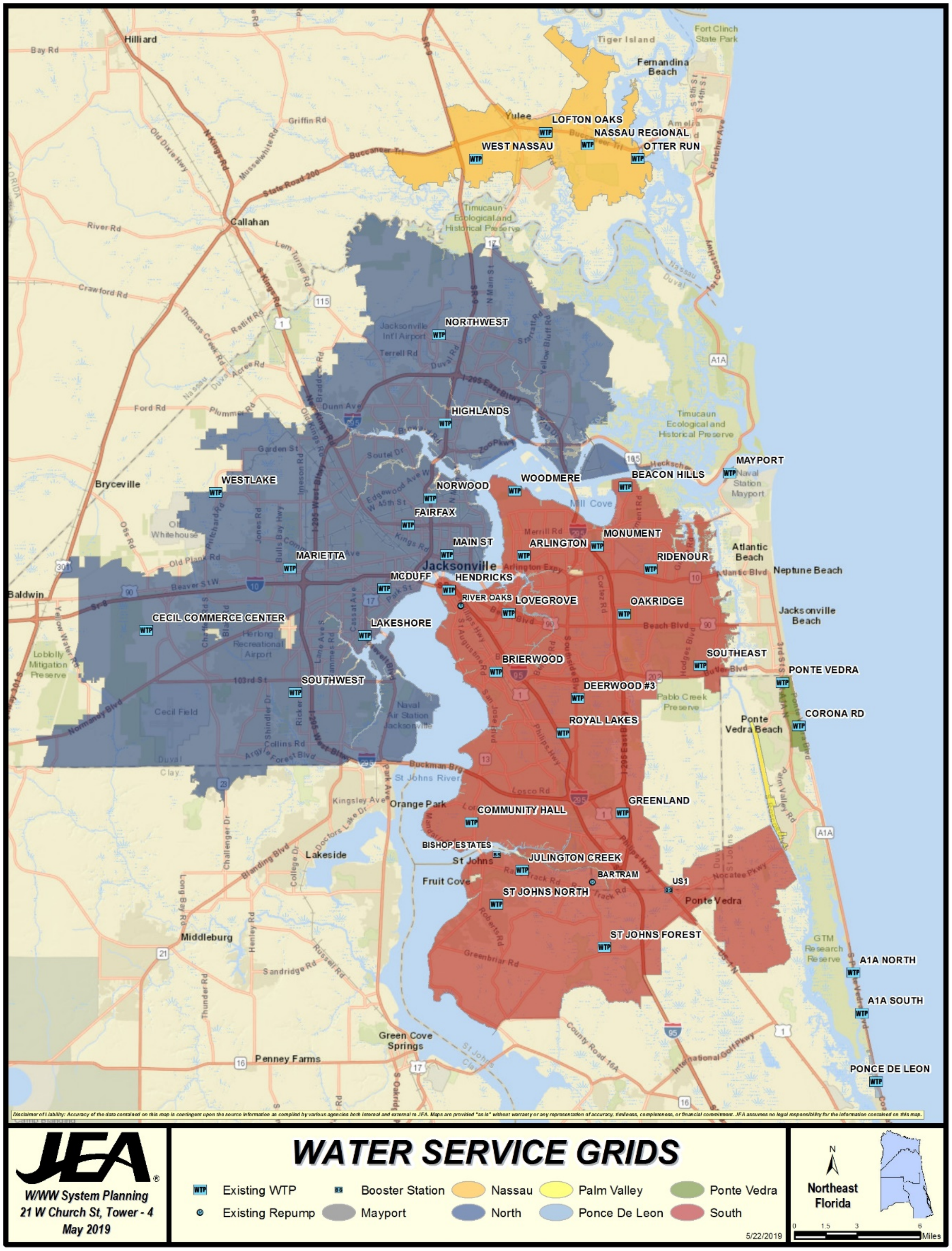
1 Overview

1.1 General Description of JEA Water System

JEA's water distribution system is divided into six distinct service grids serving most of Duval County and parts of St. Johns, Clay and Nassau Counties. These service grids are identified as North, South, Nassau, Ponte Vedra, Ponce de Leon and Mayport. Each service grid contains an interconnected network of Water Treatment Plants (WTPs), transmission and distribution mains. The North and South grids are currently interconnected via 30" and 36" transmission mains that cross the St. Johns River in downtown Jacksonville, commonly referred to as the Total Water Management Plan (TWMP) Mains. The purpose of the TWMP Mains is to transfer water from the North to the South grid. For the purposes of this report JEA considers Main Street WTP to be part of the South Grid as majority of the water produced at the WTP is delivered to the South grid through the TWMP mains. JEA's water distribution grids have grown through the acquisition of several privately owned utilities over the past 15 years, United Water and Florida Water being the largest of these acquisitions. JEA currently operates 38 active WTPs; 10 in the North Grid, 18 in the South Grid, four in the Nassau (Lofton Oaks) Grid, two in the Ponte Vedra Grid, three in the Ponce de Leon Grid and one in the Mayport Grid. At this time, there is one additional WTP planned to be constructed within the next 5 years: River Town in the South Grid. The water system is depicted in Figure 1.

Figure 1 - JEA's Water Service Area



1.2 Water Treatment Process

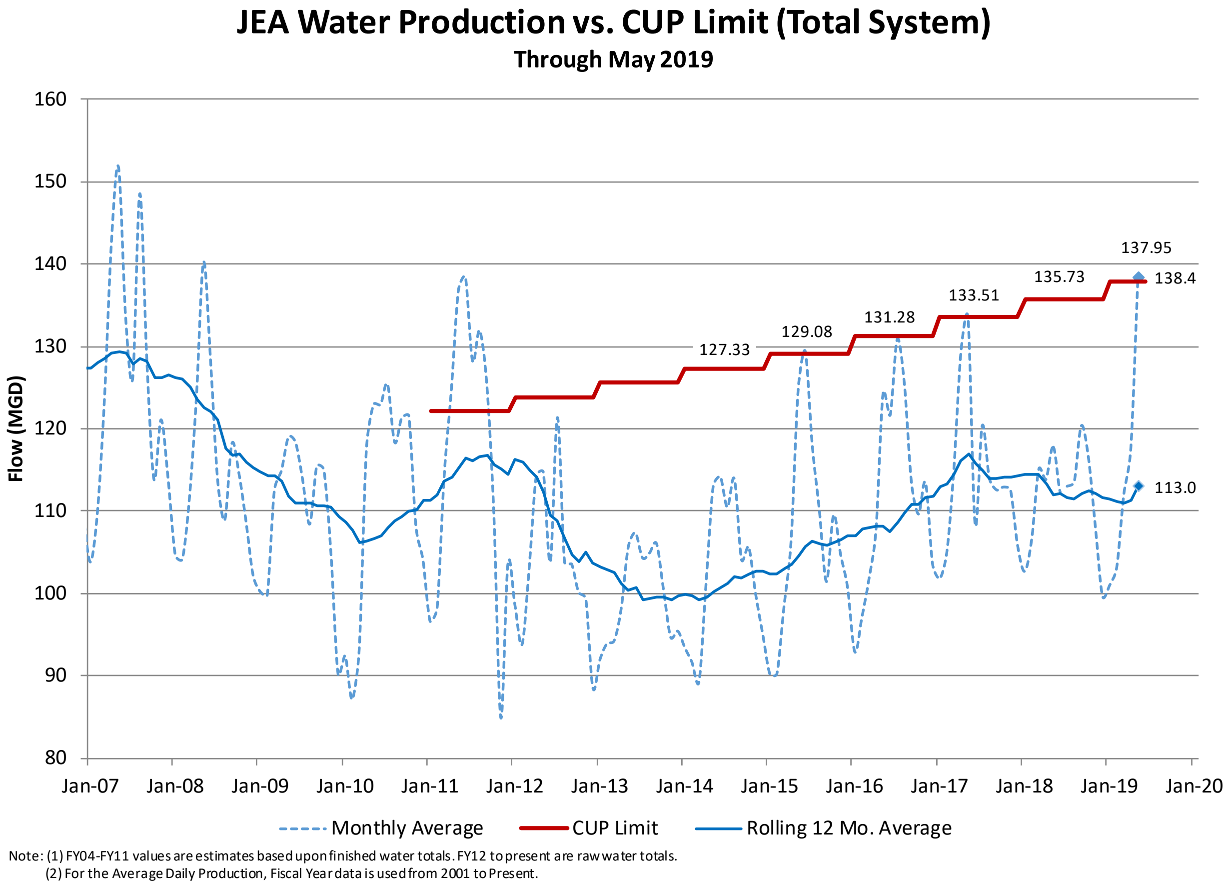
JEA is committed to providing the highest quality water to its customers at the lowest possible cost. Fortunately, the source water that JEA utilizes is of high enough quality that very little treatment is required, making it the lowest cost supply available. JEA's WTPs use deep wells to draw water from the Floridan Aquifer, which is one of the most productive aquifers in the world, capable of providing large amounts of high quality water.

The raw water from the Floridan Aquifer is pumped from the production wells, through a well header system to the individual WTPs. At the plants, the raw water undergoes a series of treatment processes, which is ultimately pumped into the water transmission/distribution system using high service pumps. The first step in the water treatment process removes hydrogen sulfide contained in the raw water. Overall, the majority of JEA’s WTPs utilize cascading tray aerators to volatilize much of the hydrogen sulfide. Roof fans are also added to some facilities to increase the efficiency of this process. In an effort to further improve treated water quality, JEA has employed the use of ozone generators at the Main Street and Greenland WTPs. JEA also utilizes packed towers on a limited basis to effectively remove hydrogen sulfide from the raw water at St. Johns North WTP. The next step in the water treatment process is to detain the water in ground storage tanks. This process allows the water sufficient time for additional hydrogen sulfide conversion to sulfate which settles to the bottom of the reservoirs. After a minimum detention time of approximately four hours in the ground storage tank, JEA utilizes sodium hypochlorite for system wide disinfection. Disinfection is the final step in the treatment process of the potable water prior to it being pumped into the distribution system.

1.3 Water Production vs. CUP Allocation

The monthly and annual average daily production for the overall JEA water system of raw water as compared to the annual Consumptive Use Permit (CUP) limit for the total system is shown in Figure 2. The CY18 annual average potable water produced from the groundwater was 111.6 MGD. It is important to note that JEA customers average a demand of 6.9 MGD of reclaimed water, which directly offsets potable groundwater use. In CY18 the water system had a total water demand of 119 MGD (111.6 + 6.9).

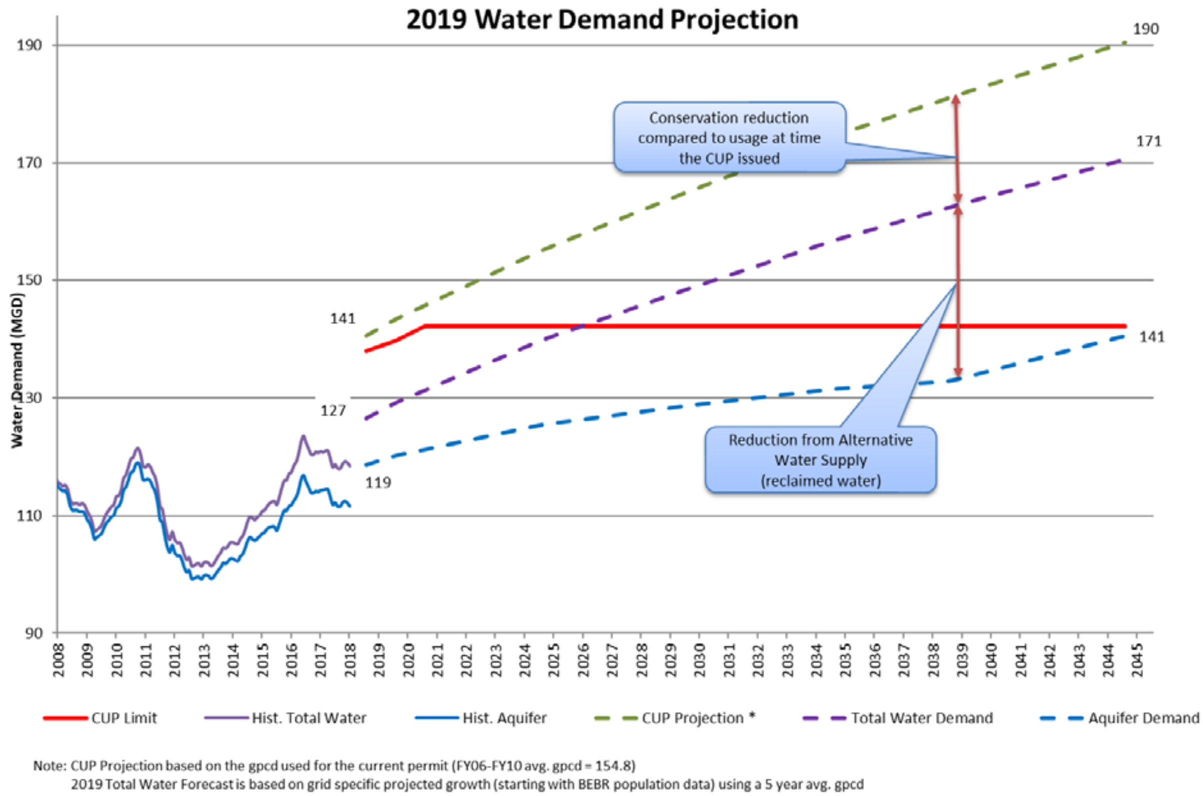
Figure 2 - Historical JEA Water Production



1.4 Future Projected Flows

JEA is committed to proper management of water resources and to providing its customers with a sustainable water supply. JEA renewed its CUP with the St. Johns River Water Management District (SJRWMD) in May 2011. The CUP was renewed for a 20 year period, and will expire in 2031. The projected total water demand and the expected water demand from the Floridan Aquifer are shown in Figure 3. Conservation is represented as the difference between the CUP projection at the per capita demand at the time of the 2011 permit issuance and the current total water demand. Potable offset reclaimed water is used to offset demands on the potable system for irrigation purposes.

Figure 3 - Total Water and Aquifer Demand Projection



1.5 Total Reclaimed Water vs. CUP

Reclaimed water is an integral part of JEA's CUP. According to condition number 12 of the CUP, JEA can increase its annual allocation of groundwater from the Floridan Aquifer if all reclaimed water production goals are met. Refer to the Reclaimed Water section for additional discussion about JEA's reclaimed water program.

1.6 Conservation

Since 2007, the potable gallons per capita day (gpcd) has decreased 22% from over 180 gallons per customer day (gpcd) to around 140 gpcd. Conservation can be attributed to economical and cyclical weather influences along with increased customer awareness triggering a change in behavior. While behavior is difficult to predict, most assume the biggest impact to customer behavior is financial in nature. If focused educational provisions further raised customer awareness of water use by methods such as irrigation audits and system wide messaging campaigns, the effects of conservation could be increased as a result.

Water Conservation is the measured amount of water saved based on a relative benchmark. JEA uses the data from the most recent CUP permit as the benchmark. The potable water per capita when the CUP was issued in 2011 was equal to 154.8 gpcd, calculated by current methodology. The five year historical (2014 – 2018) potable water demand per capita is 140.43 gpcd. To estimate the volume of water conserved, 154.8 gpcd is used as the benchmark and compared to 140.43 gpcd (a decrease of 14.4 gpcd). Using the 2018 estimated population of 890,000, determined from historical JEA water connection data, the calculated water conservation is 12.8 million gallons per day or 4.7 billion gallons annually (14.4 x 890,000).

If internal water system adjustments along with potable offset reclaimed water is not sufficient to meet the expected increase in customer water demand, conservation may prove essential to JEA meeting the annual CUP limits. A comprehensive evaluation is necessary to determine how much additional conservation is available and is included in the Demand-Side Management (DSM) portion of the current Integrated Water Resources Plan (IWRP).

1.7 Integrated Water Resources Plan

JEA uses groundwater from the Floridan Aquifer as the primary water source. JEA has made a significant investment in the reclaimed water system to help reduce the demand on the potable water system. During 2015, JEA revised the reclaimed water system service area and enhanced its rules and regulations to further promote the use of reclaimed water throughout its system. Over the next decade, additional sources of supply may be needed to meet the future demands. JEA continues to emphasize Conservation and Reclaimed Water as essential methods for reducing the dependence on groundwater.

JEA has started an investigation to determining how to meet the future needs of the customers by developing the IWRP. The intent of the IWRP is to develop a holistic, comprehensive, integrated and sustainable plan to manage the supply, production, treatment, transmission and delivery of JEA's water supply for the next 50 years.

The IWRP project goals are as follows:

- Provide certainty for JEA's long-term water supply needs.
- Maximize the use of reclaimed water and minimize wastewater discharges.
- Demonstrate that IWRP recommendations are aligned with JEA's corporate measures of value: Financial, Environmental, Customer and Community Impact.
- Develop targeted and cost-effective DSM strategy, which includes specific recommendations for program implementation including required administration and management.
- Develop specific recommendations for water supply projects, with implementation schedules for the next 5, 10 and 20 years.

Alternative water supplies such as: desalination of brackish, ocean or river water; indirect or direct potable reclaimed water will be evaluated in to provide alternative potable water to JEA's customers. Alternative water supply options are much more costly to construct and operate than JEA's current water treatment facilities and would have an impact on the cost of service. As a result, JEA's water rates would likely need to be increased in order to cover the higher costs. JEA continues to work with the SJRWMD and the Florida Department of Environmental Protection (FDEP) to find the most environmental and financially equitable solution for the JEA community.

A fact sheet for the IWRP can be found in Appendix 1 of the Reclaimed Water section of the AWRMP.

1.8 Water Purification Project

JEA began a research and development study in 2017 to evaluate the most effective treatment technology available for direct/indirect potable reclaimed water. The study duration was one year, in which time industry proven treatment technologies were evaluated: Ozonation followed by biologically active filtration and advanced oxidation (Ozone-BAF-AOP) and ultrafiltration followed by low-pressure reverse osmosis and advanced oxidation processes (US-LPRO-AOP). Over 3,000 water quality samples were collected and analyzed to evaluate the performance of the leading treatment technologies against the EPA's drinking water standards, FDEP's standards for aquifer injection and California's current potable reuse guidelines. While both technologies produced purified water that demonstrated compliance with the water quality goals, the UF-LPRO-AOP process demonstrated better removal efficiency (>99%) of currently unregulated constituents. This process has been selected to for implementation of future phases to develop and alternative water supply for JEA.

An overview of the Water Purification Project can be found in Appendix 2 of the Wastewater Section of the AWRMP.

1.9 N-1 Vulnerability Study

The N-1 vulnerability study was originally completed in 2016 to determine which WTPs provide critical service, as well as to provide insight into the stresses and effects on the water grids in the event that a WTP is taken offline, planned or otherwise. This report was intended to be used to measure the reliability of the water distribution system by assuming one WTP is unavailable in each scenario. An updated study is planned to be done in 2020 with the recently completed Northwest WTP in full operation and other system changes in the distribution system.

Infoworks WS modeling software was used to simulate removal of one water treatment plant at a time to study the effects on flows from other plants and pressures in the grid. The model is calibrated using flows and pressures obtained from the SCADA system over the peak week of the prior year. This week is selected as a peak time for demands and as the time frame that a potentially significant pressure drop in the distribution system could occur.

This study suggests that a loss of certain WTPs in either the North or South Grid, may potentially result in a significant pressure drop. The North Grid would be most impacted by the loss of the Cecil Commerce Center or Southwest WTPs. This issue can be addressed by increasing capacities at one or both of the plants or by buying water from Clay County Utilities and supplementing the grid via tie-ins on the southern section of the North Grid.

The South Grid would be most impacted by the loss of any one of the following WTPs: Brierwood, Community Hall, or Greenland. Opening valves to the western portion of south grid in the event of a WTP failure is expected to abate the effects of losing any of these three plants. In addition, operational changes could be made to increase the efficiency of the distribution system to make the grid less susceptible to pressure losses from single plants going offline.

1.10 iWater

The Integrated Water Supply Testing Evaluation and Rehabilitation (iWATER) program is a compilation of water system projects working together to accomplish the program goals and outcomes indicated below:

- Develop a sustainable, integrated, and long-term water supply master plan; using improved water supply facilities as the foundation
- Develop a hydraulic model from the source to user for operational excellence; the model becomes an operational tool for system optimization
- Minimize JEA's water supply risks on iWATER facilities; improving water quality in South Grid
- Maximize and leverage JEA's investment in the East River Crossing Pipeline; increasing capacity of North Grid

The formal iWATER project was completed during FY19. The work of implementing recommended improvements has been started with the creation of the Southside Integrated Pipes (SIPs) transmission mains and the Well Rehabilitation and Replacement Programs.

The goal of the SIPs mains is to further the reach of the existing TWMP mains to better deliver imported water from the North Grid to the growth centers of the South Grid. Additional discussion of the SIPs mains, including a project map, can be found in the Grid Section of the AWRMP.

The overarching goal of the Well Rehabilitation and Replacement Program is to increase the wellfield production capacity of the South grid WTPs in the event of a disturbance to the Main Street WTP or TWMP/SIPs mains while improving the supplied water quality. Initial phases of the project will require coordination with the Real Estate group, various Water O&M groups and the consultant to do the following:

- Establish and act on a set of quick implementation projects
- Develop an overall Program to investigate and recommend rehabilitation/replacement projects for JEA's groundwater production wells

2 Potable Water System Review by Service Grid

Each water service grid will be discussed in the following sections. Each section will consist of the following:

- System Description
  - A brief summary of the service area and the WTPs/facility within the area.
- Service Area Map
  - A graphical display of each grid's service area and location of each WTP/facility.
- Historical Demand Review
  - A review of the 5-year historical flows (average daily and maximum daily) for the grid. Data from the finished water meters at each WTP are used for this analysis.
- Peaking Factor Determination
  - An analysis of the historical information is conducted to determine the peaking factors for the grid. The Max Daily Flow (MDF) is used to size well fields and is the basis for FDEP permitting. Since The JEA demand projections are on an annual average basis, the MDF

peaking factor is calculated by comparing the max day for each month to the CY annual average flow.

- Demand Projections
  - The forecast uses the 5-year average gross per-capita water usage and the latest University of Florida's Bureau of Economic and Business Research (BEBR) forecast to calculate the future water demands. Each grid section will review the 25+ (through 2045) forecast. The 2019 AWRMP utilizes the 2018 Water and Wastewater Forecast as revised in November 2018, since the BEBR population forecasted for 2019 was not significantly different. A separate 2019 forecast was not generated.
- Capacity Analysis Review
  - WTPs are permitted and designed based on the maximum amount of water the plant can produce over a one day period. Plant capacity will be discussed in terms of Max Day capacity. Capacity calculations are based on the FDEP methodology and compare what's available to the FDEP permitted capacity.

    Other components, such as the CUP permit and the high service pumps, use a different basis for design. For example, the peak hour flowrate is only used to design the capacity of the high service pumps and the CUP is based on an annual average flow.

    Using the established peaking factors in this report, the peak hour flow and the annual average flow is converted to max day flow rate. The following items were analyzed for each WTP in the grid:
    - FDEP Permit Capacity
    - SJRWMD Consumptive Use Permit
    - Well capacity (at Design Flowrate)
    - Well Capacity (at Current Flowrate)
    - High Service Pumps

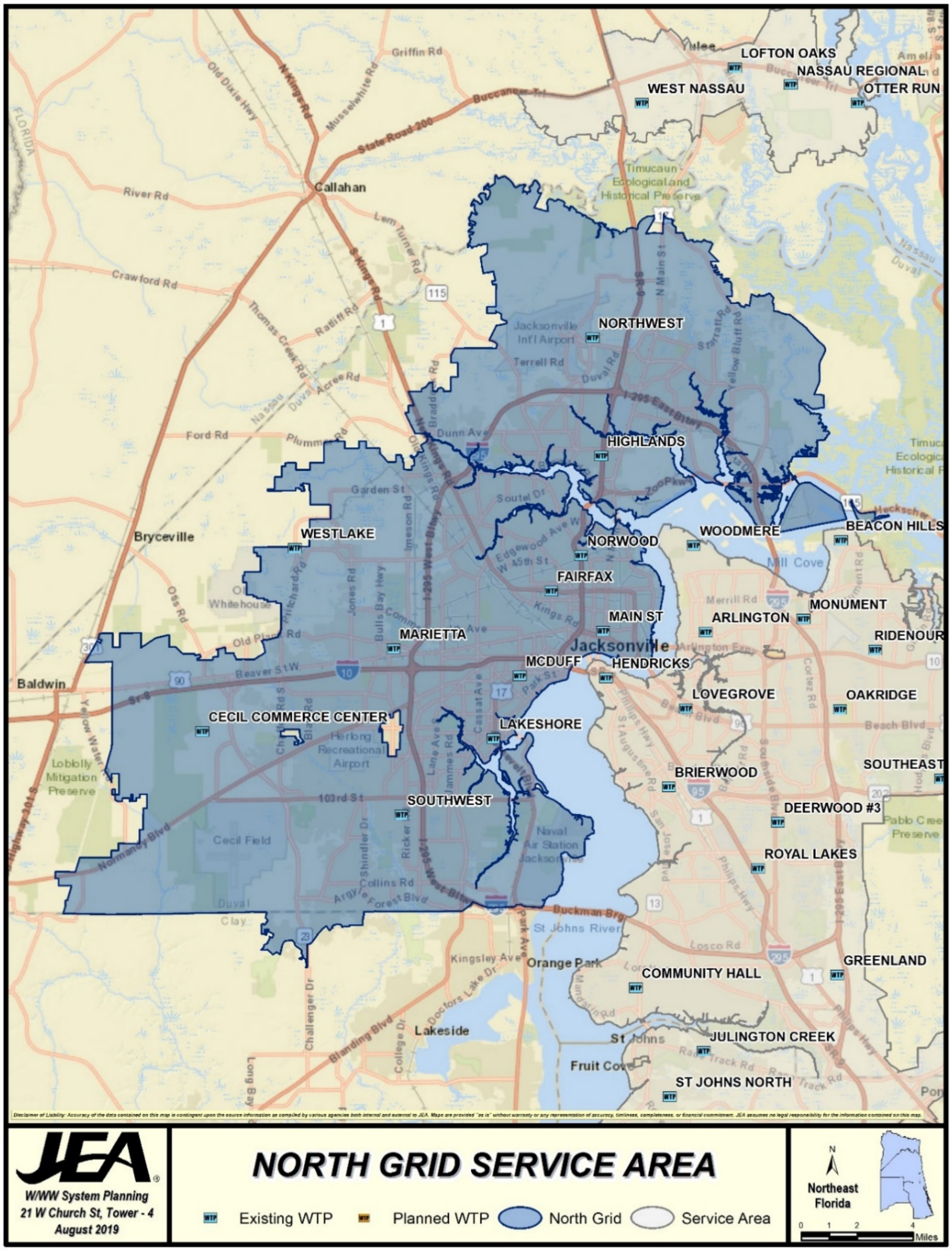
    Finished water storage exists to provide ample water supply during the peak hour water usage. Storage at each facility was reviewed separately and is not listed in the summary table. The storage volume needs to meet one of the two criteria set by FDEP. The first of the two criteria is that the volume of storage equal 25% of the max day flow. The second, looks at equalization storage and fire flow storage needed for a determined duration. The conditions used for this report were:
    - Peak hour flow for 4 hrs. (Peak Hour flow = HSP pumping rate – well pumping rate)
    - Fire flow of 2,500 gpm for 2 hrs. at max day demand condition

- Treatment Plant Review – A brief summary for each WTP and limiting factor(s). Any capacity projects in the 5-year budget are discussed in this section.

2.1 North Grid Potable Water System

The North Grid is JEA's service area north and west of the St. Johns River as shown in Figure 4. The North Grid includes 44 Wells, 10 WTPs, 20 storage tanks with a total of 25 million gallons, and 46 high service pumps. The Main Street WTP, which is located geographically in the North Grid service area, primarily serves the South Grid and is included in the South Grid Section.

Figure 4 - JEA North Grid Service Area



2.1.1 5 year Historical Water Demand Data

Over the past five years the annual average daily flow has been relatively stable, ranging from 41 MGD to 46 MGD. Water demands have been showing a slow upward trend of 1% per year over that time period.

The Maximum Daily flow over the past five years was 60 MGD and occurred in June 2015. Typically May, June or July is the highest demand month of the year. 5-Year Historical Potable Water Demand is shown in Figure 5 and listed Table 1.

Figure 5 - North Grid 5-Year Potable Water Demand

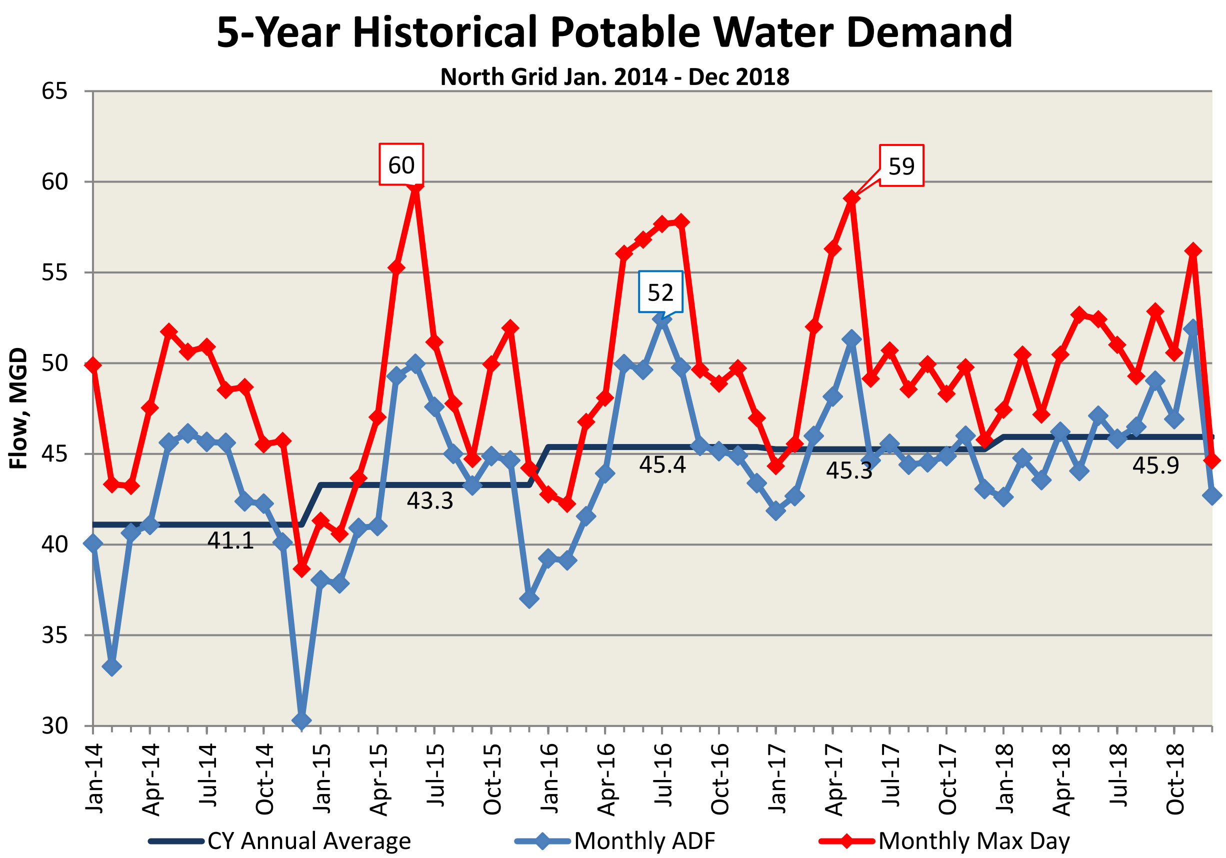


Table 1 - North Grid 5 Year Historical Water Demand Data

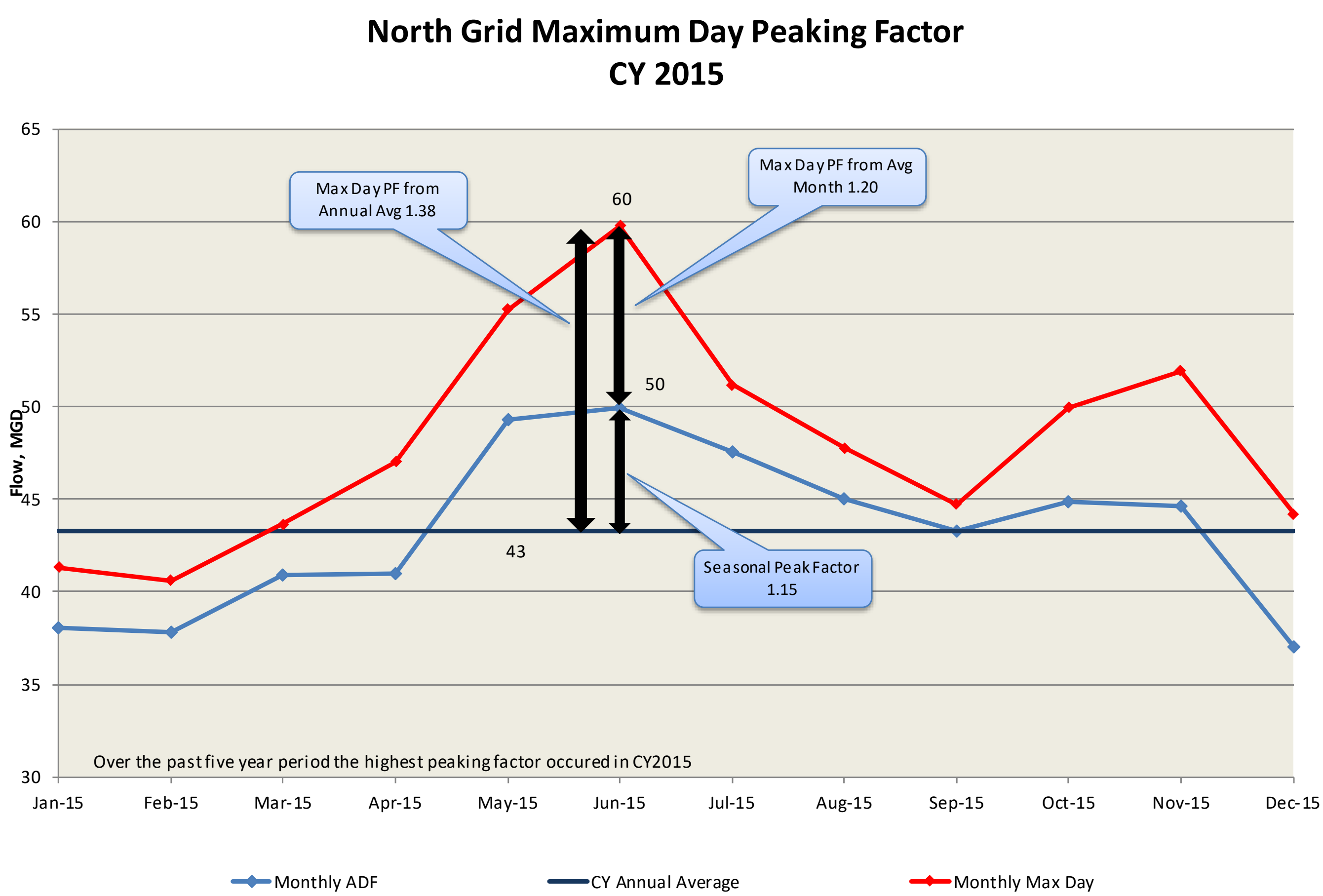
5 Year Historical Water Demand Data							
North Grid Water Demand (Minus South Grid Transfer)							
Date Mo/Year	Monthly ADF (MGD)	CY Avg. (MGD)	Monthly Max Day (MGD)	Date Mo/Year	Monthly ADF (MGD)	CY Avg. (MGD)	Monthly Max Day (MGD)
Jan-14	40.07	41.10	49.89	Jan-17	41.86	45.26	44.33
Feb-14	33.28	41.10	43.32	Feb-17	42.68	45.26	45.55
Mar-14	40.64	41.10	43.23	Mar-17	45.99	45.26	52.01
Apr-14	41.08	41.10	47.54	Apr-17	48.16	45.26	56.31
May-14	45.62	41.10	51.74	May-17	51.32	45.26	59.09
Jun-14	46.14	41.10	50.63	Jun-17	44.64	45.26	49.14
Jul-14	45.66	41.10	50.91	Jul-17	45.56	45.26	50.71
Aug-14	45.61	41.10	48.52	Aug-17	44.40	45.26	48.56
Sep-14	42.38	41.10	48.69	Sep-17	44.53	45.26	49.95
Oct-14	42.26	41.10	45.53	Oct-17	44.88	45.26	48.32
Nov-14	40.12	41.10	45.71	Nov-17	46.00	45.26	49.78
Dec-14	30.31	41.10	38.66	Dec-17	43.07	45.26	45.77
Jan-15	38.05	43.29	41.32	Jan-18	42.62	45.94	47.44
Feb-15	37.85	43.29	40.59	Feb-18	44.77	45.94	50.47
Mar-15	40.92	43.29	43.66	Mar-18	43.56	45.94	47.17
Apr-15	41.02	43.29	47.03	Apr-18	46.22	45.94	50.47
May-15	49.28	43.29	55.27	May-18	44.06	45.94	52.67
Jun-15	49.97	43.29	**59.76**	Jun-18	47.11	45.94	52.43
Jul-15	47.59	43.29	51.16	Jul-18	45.83	45.94	51.02
Aug-15	45.00	43.29	47.78	Aug-18	46.50	45.94	49.28
Sep-15	43.26	43.29	44.72	Sep-18	49.03	45.94	52.86
Oct-15	44.88	43.29	49.94	Oct-18	46.92	45.94	50.57
Nov-15	44.64	43.29	51.94	Nov-18	51.89	45.94	56.19
Dec-15	37.02	43.29	44.22	Dec-18	42.71	45.94	44.63
Jan-16	39.24	45.38	42.76	*5 Yr Min*	*30.31*		*38.66*
Feb-16	39.13	45.38	42.24	*5 Yr Max*	*52.43*		*59.76*
Mar-16	41.56	45.38	46.76	*5 Yr Avg*	*44.19*		*49.16*
Apr-16	43.92	45.38	48.09				
May-16	49.95	45.38	56.03				
Jun-16	49.63	45.38	56.81				
Jul-16	**52.43**	45.38	57.68				
Aug-16	49.76	45.38	57.78				
Sep-16	45.45	45.38	49.65				
Oct-16	45.15	45.38	48.88				
Nov-16	44.90	45.38	49.73				
Dec-16	43.39	45.38	46.97				

Note: **Bold** indicates 5 Yr Max (ADF & MDF)

2.1.2 Peaking Factor - Maximum Daily Flow

Over the Past Five Years the maximum Peak was 1.38 and occurred June, 2015 as shown in Figure 6.

Figure 6 - North Grid Maximum Day Peaking Factor



2.1.3 Projected Flow

The North Grid forecast is depicted in Table 2 and shown graphically in the Figure 7 capacity curves.

Table 2 - North Grid Flow Projection

North Grid Flow Projection			
Year	JEA Total Water Demand (MGD)	North Grid Water Demand (MGD)	Max Day Flow (MGD)
2019	126.53	46.07	63.60
2020	129.16	47.32	65.32
2025	139.82	51.92	71.67
2030	148.53	56.44	77.91
2035	156.80	61.17	84.44
2040	163.89	65.42	90.31
2045	170.63	69.42	95.83

2.1.4 Treatment Plant Capacity

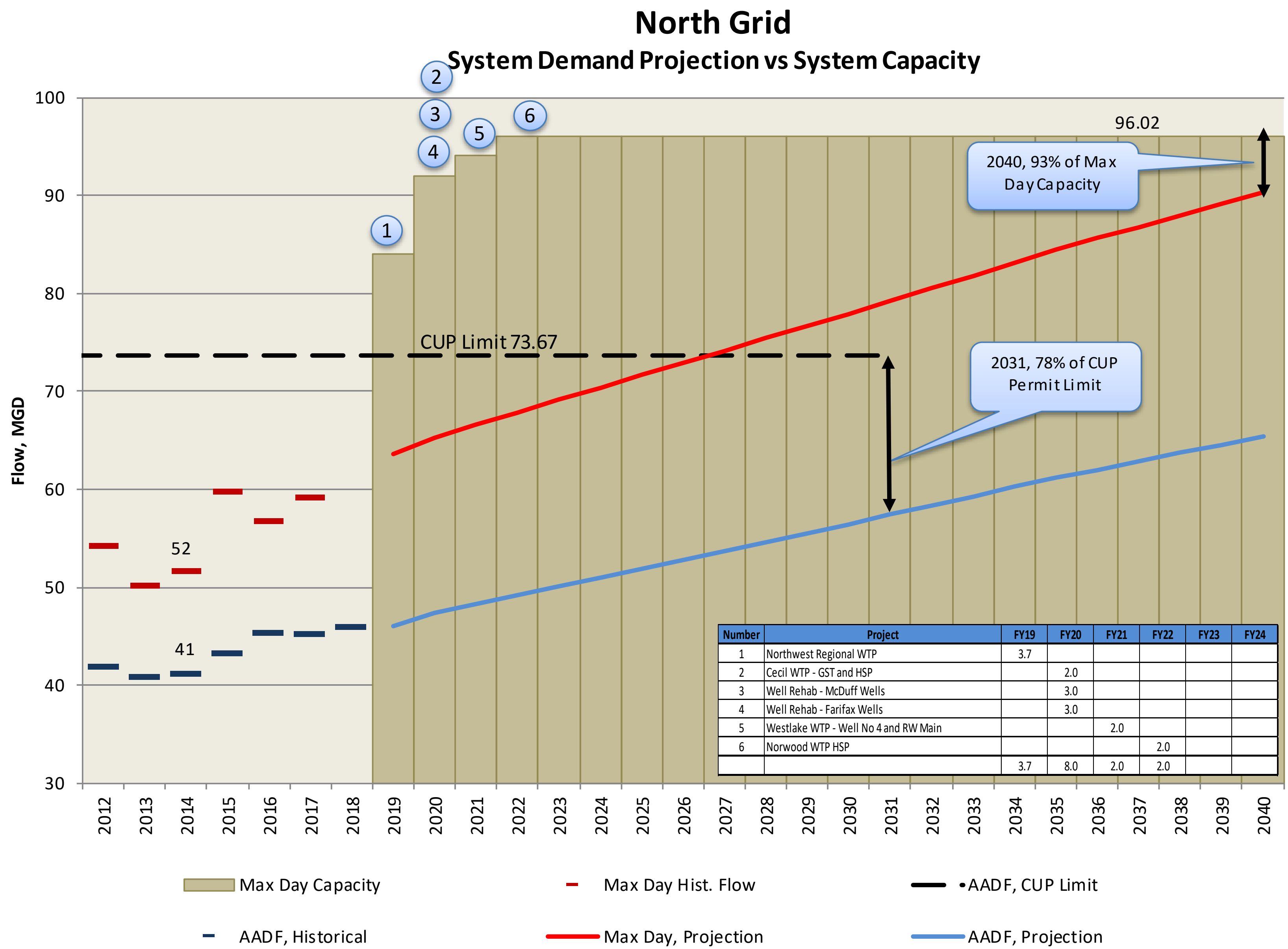
Capacity analysis for each WTP and the grid on whole is performed to determine system limitations a summary for each WTP and the grid as a whole is shown below in Table 3 and graphically for the grid in Figure 7.

Table 3 - North Grid Plant Capacities

Name of Facility	Number of Wells	Design Well Capacity, MGD	Design Well Capacity (Firm), MGD	Total Storage Capacity, MG	Number of High Service Pumps	High Service Pump Capacity, MGD	High Service Pump Capacity (Firm), MGD	FDEP Permitted Capacity, MGD
Cecil Commerce Center	3	10.80	7.20	2	3	15.12	10.08	10.80
Fairfax	7	16.27	12.67	2.5	3	12.24	7.34	13.29
Highlands	6	21.60	18.00	4.1	6	30.24	25.20	14.40
Lakeshore	5	14.98	11.52	2.5	5	16.20	12.96	12.46
Marietta	4	14.98	10.80	2	6	21.60	18.00	12.00
McDuff	6	18.58	14.26	6	6	20.88	17.14	16.06
Northwest	2	7.20	3.60	1	4	14.69	9.79	6.50
Norwood	4	13.61	9.72	1.5	4	11.52	8.64	8.86
Southwest	5	19.44	15.12	3	6	29.51	23.43	18.72
Westlake	2	6.48	2.88	0.5	3	5.36	1.61	3.00
SUMMARY[1]	**44**	**143.94**	**105.77**	**25.1**	**46**	**177.36**	**134.19**	**116.09**

[1]Capacity Analysis Reports for each water facility is available upon request.

Figure 7 - North Grid Demand Projection vs System Capacity



Number	Project	FY19	FY20	FY21	FY22	FY23	FY24
1	Northwest Regional WTP	3.7					
2	Cecil WTP - GST and HSP		2.0				
3	Well Rehab - McDuff Wells		3.0				
4	Well Rehab - Farifax Wells		3.0				
5	Westlake WTP - Well No 4 and RW Main			2.0			
6	Norwood WTP HSP				2.0		
		3.7	8.0	2.0	2.0		

2.1.5 Individual Treatment Plant Summaries

JEA may need to expand its facilities to adequately meet the future demands of the system. Proposed facility expansions and new facilities are planned in order to more evenly distribute the production and pumping capabilities of the gridded system while increasing the overall system reliability and quality.

Cecil Commerce Center

The facilities at this WTP are well balanced, providing a Max Day Capacity of 10.8 MGD. This facility is also JEA's westerly most water plant with little redundancy.

> ***Action:*** *Construct a second ground storage tank. This project is in the current CIP Plan, 407-08.*

Fairfax

The Wells are the limiting factor for this WTP. The WTP is permitted with a MDF of 13.29 MGD; however, the wells are limited to 5.68 MGD due to advanced age and borehole deterioration.

> ***Action:*** *The wells are currently ongoing rehab under the current CIP Plan, 425-05.*

Highlands

The FDEP Permit is the limiting factor for this WTP with an MDF of 14.4 MGD. This plant serves the far north of the North Grid service area and was identified in the N-1 study as a high risk for reliability. To help alleviate the risk, the Northwest WTP was constructed to assist with meeting demands in this growing area. Disinfection By-Products, specifically Total Trihalomethanes (TTHMs), have been an ongoing issue in the far reaches of the Highlands distribution system. JEA has managed these TTHMs with extensive flushing of up to 1 million gallons per day. JEA is investigating an Advanced Treatment method to help lower TTHMs and reduce the dependence on daily flushing.

> ***Action:*** *The Highlands WTP - Alternative Treatment project, 123-03, is planned to start design in FY20.*

Lakeshore

The CUP is the limiting factor for this WTP with an AADF of 1.96 MGD (MDF 3.5 MGD). Due to the reduction in plant capacity due to the CUP permit limit this plant has adequate capacity for all its components.

> ***Action:*** C*apacity expansion not possible due to CUP limits. Continue to monitor well use.*

Marietta

The High Service Pumps were recently upgraded at this WTP to better meet current and future demands from the area.

> ***Action:*** *Continue to monitor demands for any needed improvements.*

McDuff

This WTP is permitted for a MDF of 16.06 MGD with a CUP of 6.05 MGD AADF. The wells had decreased in capacity to 6.35 MGD, down from original design of 18.58 MGD. Five of the six high service pumps (HSPs) are at the end of their service life and are also old standard and should be upgraded to variable speed capability.

> ***Action:*** *The wells are currently being rehabilitated through Project 425-06. Project 642-03 is starting design in FY18 to replace the five oldest high service pumps and upgrade the associated electrical components.*

Northwest
This is the newest WTP in the North Gird, which serves as a redundant WTP to the Highlands WTP in the northern parts of the service grid. Northwest has a permitted capacity of 6.5 MDF.

> ***Action:*** *Complete facility and place in service during FY19, project 124-01.*

Norwood
The High Service Pumps are the limiting factor for this WTP. The WTP is permitted with a MDF 18.72 MGD; however, the HSP can only support a MDF of 7.68 MGD.

> ***Action:*** *Expand the HSP to help balance the WTP's capacity and add redundancy. This project is in the current CIP Plan, 737-02. However, as this is one of the older WTP's in the area, continued well rehabilitation is needed.*

Southwest
The wells are currently the limiting factor at 16.51 MGD.

> ***Action:*** *No expansion is needed within the five year CIP.*

Westlake
This WTP is currently permitted for a MDF of 3.00 MGD. Area growth and additional need for system redundancy is needed.

> ***Action:*** *The current CIP has a plant expansion, 127-03.*

2.1.6 North Grid Current 10 Year Capital Improvement Projects

Table 4 - North Grid Capital Improvement Projects (in thousand $'s)

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
425-06	Well Rehabilitation & Maintenance - McDuff Wells - ENV	$6,982	$2,753	$2,145	$109	$0	$0	$0	$0	$0	$0	$0	$0
407-08	Cecil WTP - Ground Storage Tank and HSP	$4,607	$1,811	$2,429	$0	$0	$0	$0	$0	$0	$0	$0	$0
425-05	Well Rehabilitation & Maintenance - Fairfax Wells	$4,650	$779	$774	$0	$0	$0	$0	$0	$0	$0	$0	$0
642-03	McDuff WTP - HSP Replacement - ENV	$4,685	$581	$2,199	$1,881	$0	$0	$0	$0	$0	$0	$0	$0
825-12	Lakeshore WTP - Reservoir Rehabilitation	$4,029	$453	$362	$0	$610	$2,028	$0	$0	$0	$0	$0	$0
737-02	Norwood WTP - Rehabilitation	$4,180	$382	$1,825	$1,959	$0	$0	$0	$0	$0	$0	$0	$0
123-03	Highlands WTP - Alternative Treatment - ENV	$4,409	$323	$2,623	$1,463	$0	$0	$0	$0	$0	$0	$0	$0
127-04	Westlake WTP - Well No 4 and RW Main	$3,060	$100	$0	$0	$0	$0	$276	$2,003	$681	$0	$0	$0
124-01	Northwest Regional WTP - New 6.0 MGD WTP	$10,148	$92	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
127-03	Westlake WTP - Expansion from 3.0 to 7.0 MGD	$6,500	$0	$0	$0	$0	$0	$50	$150	$500	$5,800	$0	$0
101-24	Marietta WTP - HSP - Upgrade	$2,578	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
		TOTAL	**$7,274**	**$12,357**	**$5,412**	**$610**	**$2,028**	**$326**	**$2,153**	**$1,181**	**$5,800**	**$0**	**$0**

2.2 South Grid Potable Water System

JEA's South Grid serves the area of Duval County that is south and east of the St Johns River and parts of the northern parts of St Johns County that are west of the Intracoastal Waterway. The Main Street WTP is included in this section for the purposes of this analysis. The South Grid includes 77 wells, 18 WTPs (and one planned WTP), 37 storage tanks with a total of 44 million gallons, and 87 high service pumps.

The main challenge in the South Grid is water supply due to fact that the South Grid's demand is greater than its collective CUP allocation. The CUP Issued in 2011 has individual WTP allocations which limit the water supply from the South Grid wells. To meet the current demand approximately 18 MGD is transferred across the river to meet the South Grid needs as shown in Figure 8.

Figure 8 - JEA Water Production vs. the South Grid CUP Limit

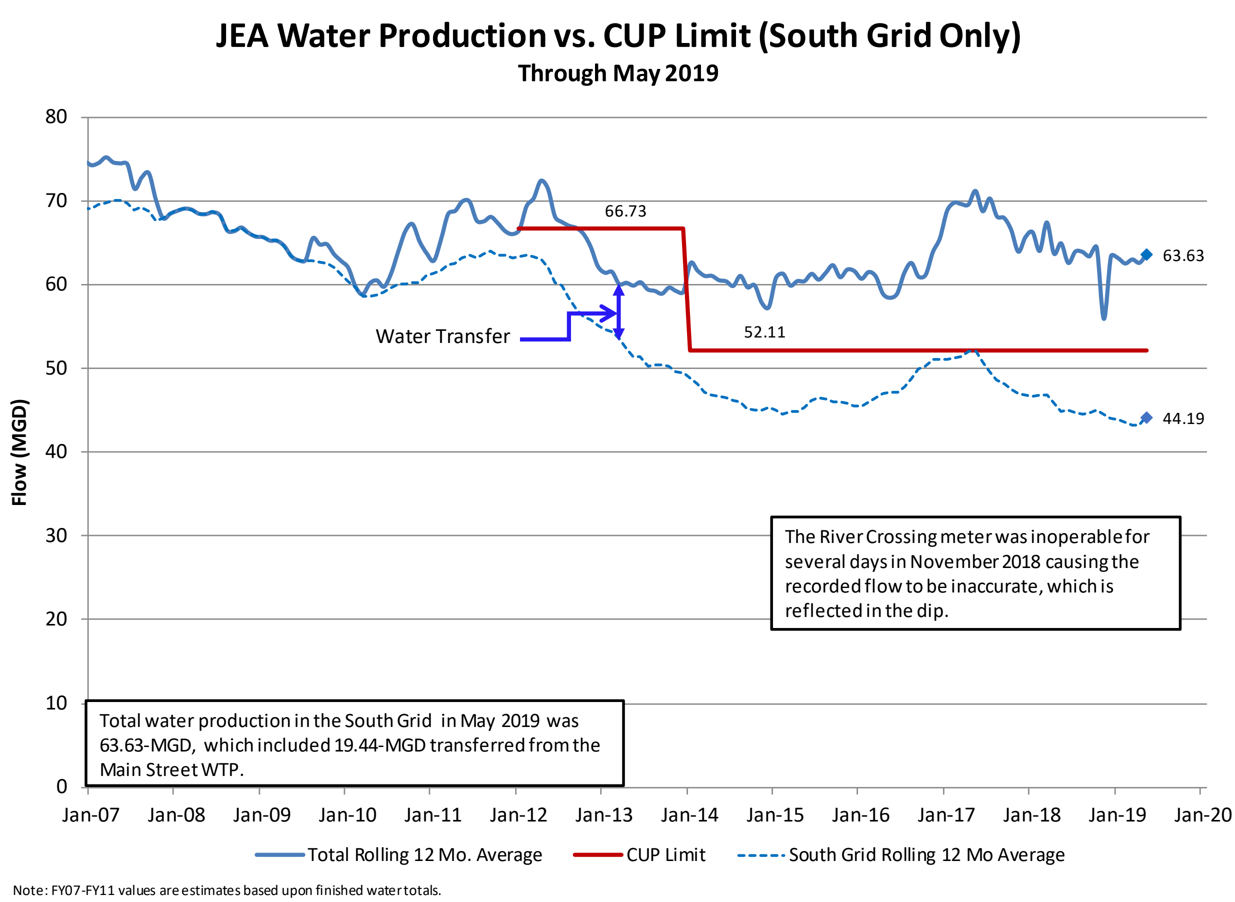
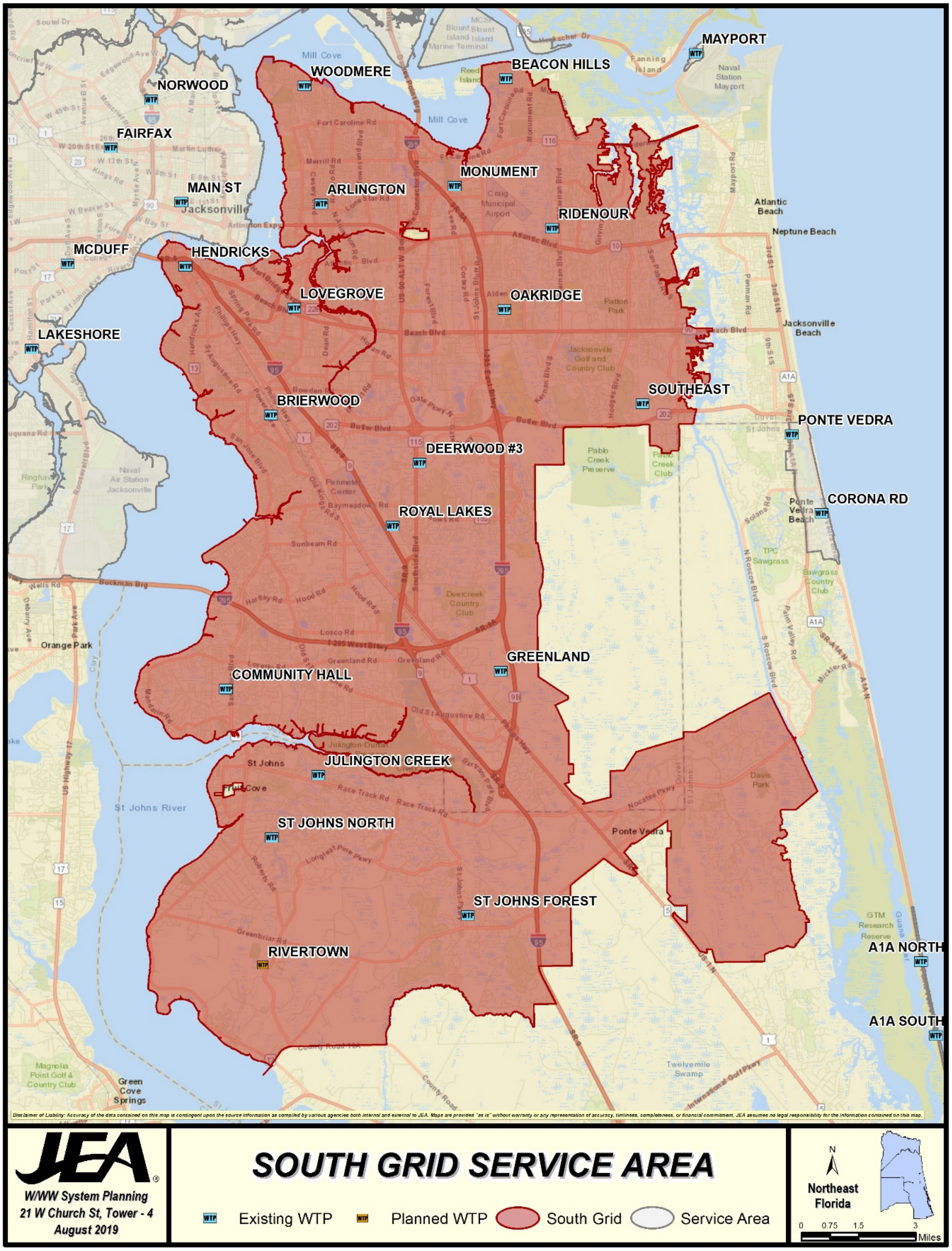


Figure 9 - JEA South Grid Service Area



2.2.1 5 year Historical Water Demand Data

Over the past five years the annual average daily flow has been increasing slightly, ranging from 61 MGD to 68 MGD. The Maximum Daily flow over the past five years was 99 MGD and occurred in June 2015. Typically May, June or July is the highest demand month of the year. 5-Year Historical Potable Water Demand is shown in Figure 10 and listed Table 5.

Figure 10 - South Grid 5-Year Potable Water Demand

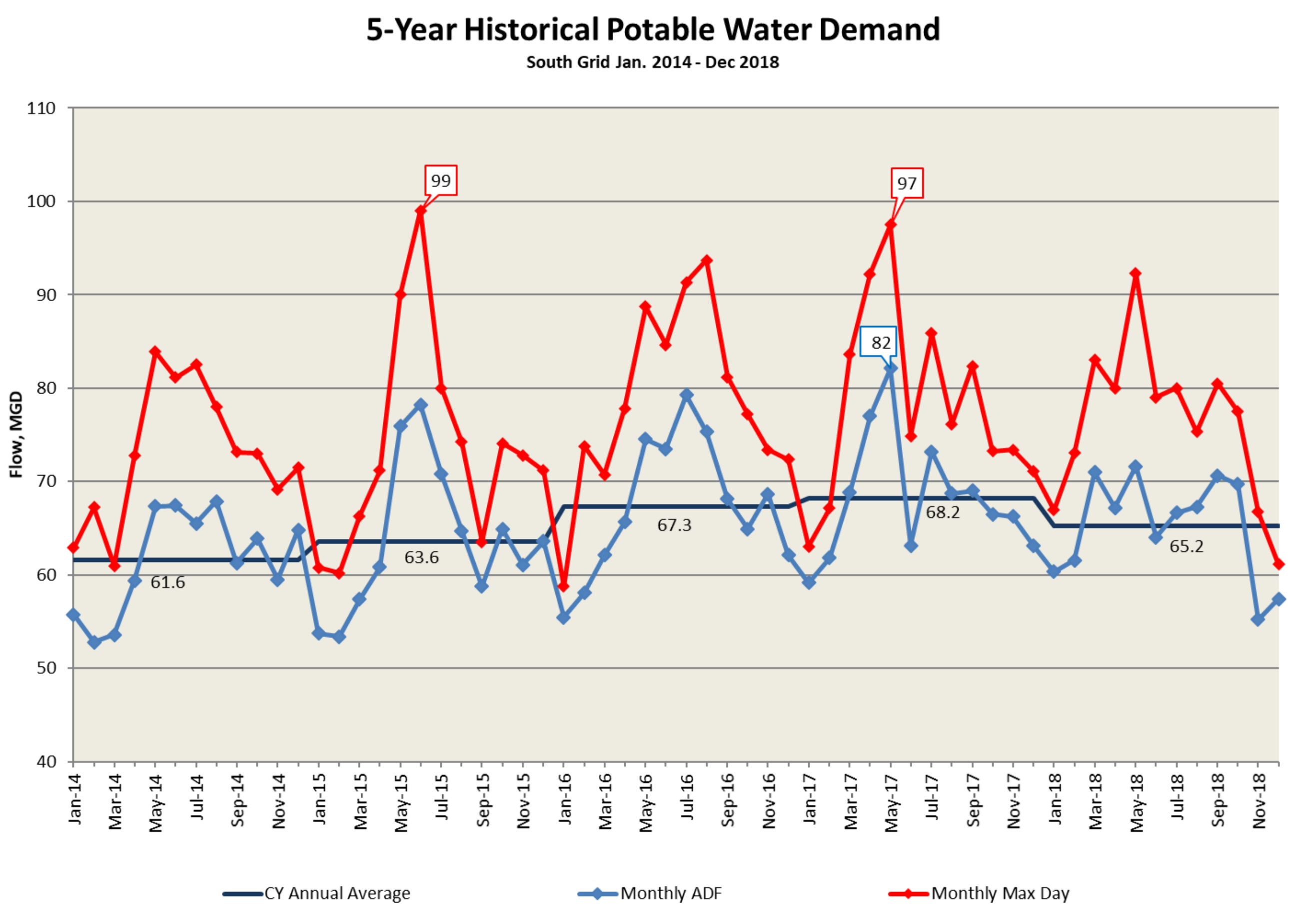


Table 5 - South Grid 5 Year Historical Water Demand Data

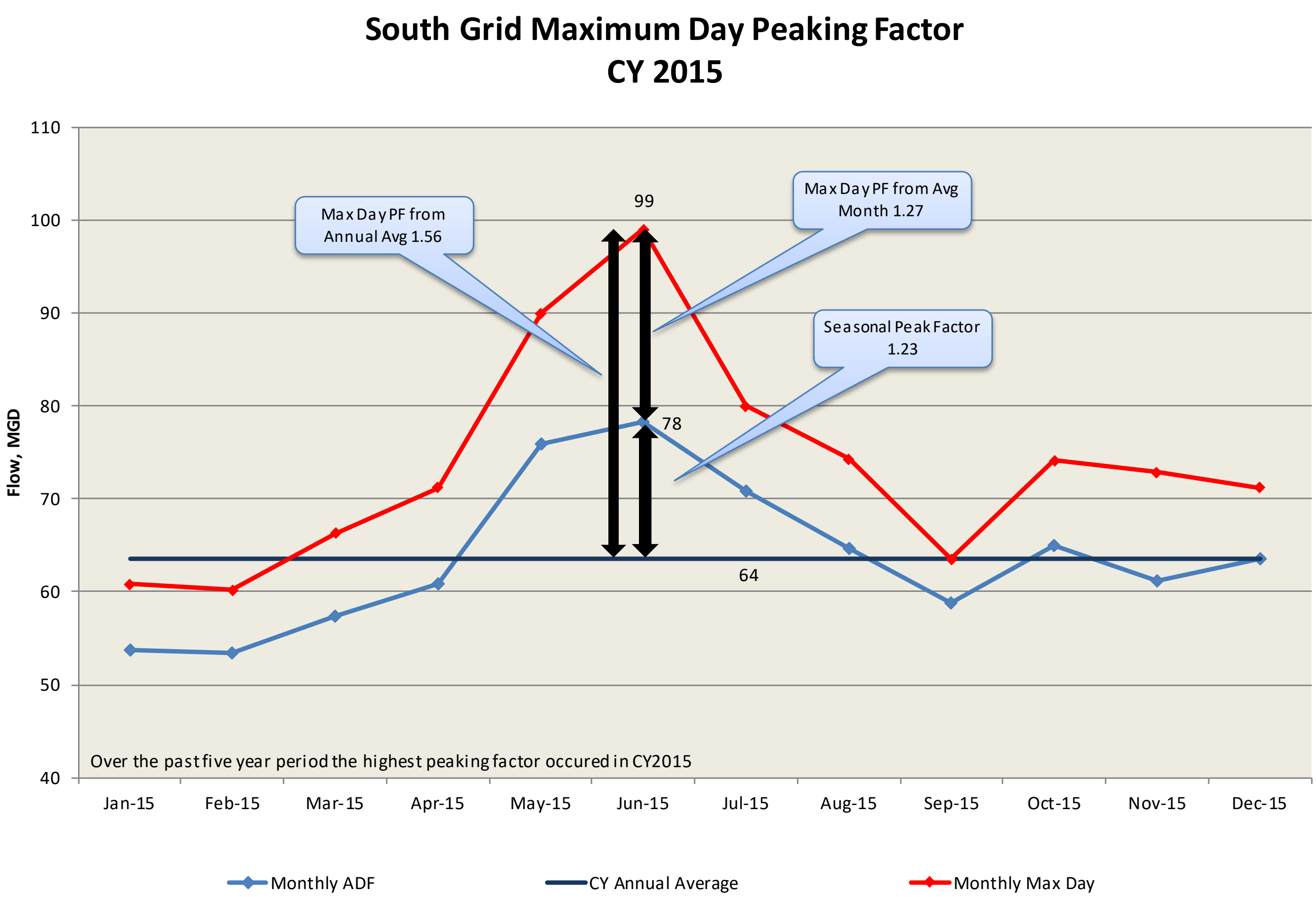
5 Year Historical Water Demand Data								
South Grid Water Demand (Plus TWMP Transfer)								
Date Mo/Year	Monthly ADF (MGD)	CY Avg. (MGD)	Monthly Max Day (MGD)		Date Mo/Year	Monthly ADF (MGD)	CY Avg. (MGD)	Monthly Max Day (MGD)
Jan-14	55.77	61.61	62.91		Jan-17	59.18	68.24	63.08
Feb-14	52.81	61.61	67.24		Feb-17	61.85	68.24	67.17
Mar-14	53.59	61.61	61.00		Mar-17	68.80	68.24	83.60
Apr-14	59.43	61.61	72.78		Apr-17	77.02	68.24	92.21
May-14	67.34	61.61	83.89		**May-17**	**82.11**	68.24	97.48
Jun-14	67.45	61.61	81.15		Jun-17	63.15	68.24	74.90
Jul-14	65.50	61.61	82.52		Jul-17	73.20	68.24	85.86
Aug-14	67.89	61.61	78.00		Aug-17	68.70	68.24	76.15
Sep-14	61.26	61.61	73.17		Sep-17	69.04	68.24	82.37
Oct-14	63.90	61.61	73.03		Oct-17	66.48	68.24	73.25
Nov-14	59.53	61.61	69.17		Nov-17	66.27	68.24	73.38
Dec-14	64.84	61.61	71.46		Dec-17	63.12	68.24	71.08
Jan-15	53.74	63.61	60.80		Jan-18	60.36	65.22	66.92
Feb-15	53.37	63.61	60.18		Feb-18	61.56	65.22	73.07
Mar-15	57.41	63.61	66.32		Mar-18	70.98	65.22	83.02
Apr-15	60.83	63.61	71.17		Apr-18	67.21	65.22	79.95
May-15	75.89	63.61	89.99		May-18	71.64	65.22	92.28
Jun-15	78.22	63.61	**99.00**		Jun-18	64.03	65.22	79.02
Jul-15	70.77	63.61	79.98		Jul-18	66.64	65.22	80.01
Aug-15	64.72	63.61	74.24		Aug-18	67.29	65.22	75.34
Sep-15	58.79	63.61	63.53		Sep-18	70.63	65.22	80.52
Oct-15	64.92	63.61	74.10		Oct-18	69.72	65.22	77.51
Nov-15	61.10	63.61	72.83		Nov-18	55.21	65.22	66.76
Dec-15	63.58	63.61	71.20		Dec-18	57.43	65.22	61.13
Jan-16	55.45	67.32	58.75		*5 Yr Min*	*52.81*		*58.75*
Feb-16	58.06	67.32	73.81		*5 Yr Max*	*82.11*		*99.00*
Mar-16	62.13	67.32	70.76		*5 Yr Avg*	*65.20*		*75.99*
Apr-16	65.65	67.32	77.84					
May-16	74.56	67.32	88.74					
Jun-16	73.51	67.32	84.63					
Jul-16	79.27	67.32	91.36					
Aug-16	75.34	67.32	93.72					
Sep-16	68.12	67.32	81.20					
Oct-16	64.91	67.32	77.19					
Nov-16	68.67	67.32	73.42					
Dec-16	62.12	67.32	72.38					

Note: **Bold** indicates 5 Yr Max (ADF & MDF)

2.2.2 Peaking Factor - Maximum Daily Flow

Over the past five years the maximum peak was 1.56 and occurred June, 2015 as shown in Figure 11.

Figure 11 - South Grid Maximum Day Peaking Factor



2.2.3 Projected Flow

The South Grid Forecast is listed in the Table 6.

Table 6 - South Grid Flow Projection

South Grid Flow Projection					
Year	JEA Total Water Demand (MGD)	South Total Grid Water Demand (MGD)	South Grid Reclaimed water Supply* (MGD)	South Grid Aquifer Supply (AADF) (MGD)	Max Day Flow (MGD)
2019	126.53	75.09	7.81	67.28	104.71
2020	129.16	76.12	8.49	67.63	105.26
2025	139.82	81.68	11.89	69.79	108.62
2030	148.53	85.38	15.29	70.09	109.08
2035	156.80	88.45	18.68	69.77	108.59
2040	163.89	90.85	22.08	68.77	107.03
2045	170.63	93.14	24.80	68.34	106.36

*The South Grid Reclaimed water supply data is based on the 2018 Reclaimed Water Forecast.

2.2.4 Treatment Plant Capacity

Firm capacity is defined as the water plants capacity with largest pump out of service. With a gridded system technically the firm capacity of the grid would be calculated with only the one largest pump out of service. Due to the size of the JEA grid this methodology is not practical. The south grid has approximately 76 wells; if 10% were out due to maintenance, JEA would need 8 additional wells to maintain capacity. Eight of the 18 water plants in the south grid were selected as major plants and only those eight will be calculated with firm capacity. The eight WTPs are Arlington, Brierwood, Deerwood III, Greenland, Main Street, Oakridge, Ridenour and Southeast.

The following summary of treatment plant capacities, the projected demands for the South Grid along with the planned projects to provide sufficient future capacity.

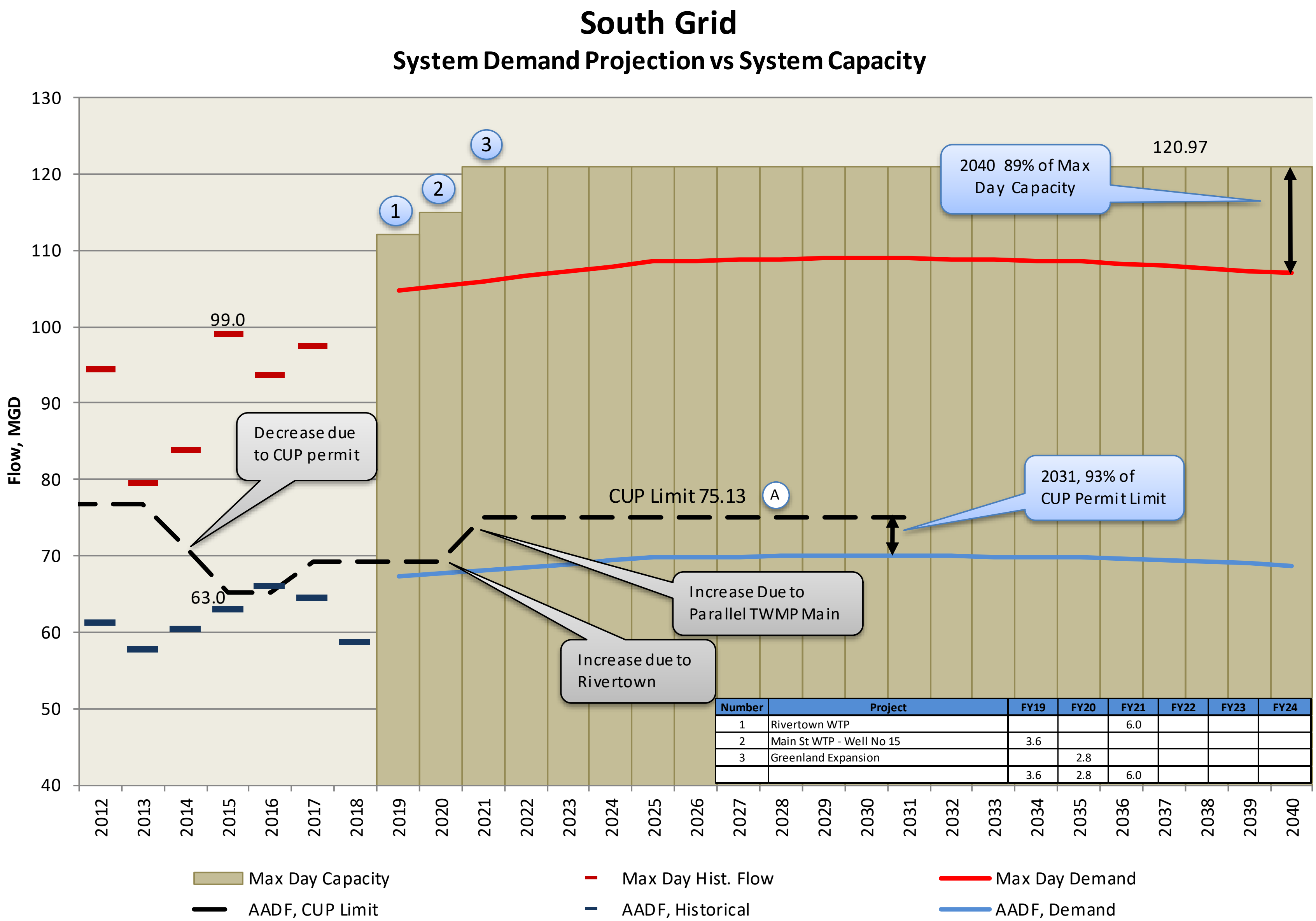
Table 7 - South Grid Plant Capacities

Name of Facility	Number of Wells	Design Well Capacity, MGD	Design Well Capacity (Firm), MGD	Total Storage Capacity, MG	Number of High Service Pumps	High Service Pump Capacity, MGD	High Service Pump Capacity (Firm), MGD	FDEP Permitted Capacity, MGD
Arlington	5	13.32	9.72	3	4	14.40	10.80	9.42
Beacon Hills	2	4.32	2.16	0.3	4	5.40	3.96	2.55
Brierwood	5	13.68	10.08	6	6	24.88	19.89	18.00
Comm Hall	5	13.68	10.08	4.5	6	17.16	12.47	13.03
Deerwood III	8	22.61	19.01	4.5	8	38.59	33.12	22.61
Greenland	2	6.05	3.02	1	4	8.64	5.76	5.76
Hendricks	8	19.37	15.77	2.5	6	24.13	16.57	16.63
JCP	2	4.32	2.16	1.4	5	10.80	8.35	4.32
Lovegrove	3	7.92	4.32	2	4	12.60	9.00	8.31
Main Street	10	26.65	23.05	4	8	29.52	25.78	23.11
Monument	2	5.76	2.88	0.6	3	3.21	1.63	2.47
Oakridge	6	17.57	14.40	4	5	17.14	11.52	16.39
Ridenour	7	22.32	18.72	5	6	36.00	27.36	19.44
River Town[1]	3	6.48	4.32	1.0	4	6.91	4.61	4.00
Royal Lakes	2	7.63	3.60	0.94	4	9.07	5.98	6.98
Southeast	3	10.08	6.48	2	4	18.00	14.40	10.00
St Johns Forest	2	1.81	0.91	1.45	4	5.76	3.60	3.35
St Johns North	3	4.18	2.16	0.5	3	4.15	1.99	3.19
Woodmere	2	4.18	1.15	0.4	3	6.48	4.32	3.54
SUMMARY[2]	**77**	**205.45**	**149.67**	**44.09**	**87**	**285.93**	**216.50**	**189.10**

[1]River Town is a future WTP, facility details not included in the SUMMARY

[2]Capacity Analysis Reports for each water facility is available upon request.

Figure 12 - South Grid Demand Projection vs. System Capacity



Number	Project	FY19	FY20	FY21	FY22	FY23	FY24
1	Rivertown WTP			6.0			
2	Main St WTP - Well No 15	3.6					
3	Greenland Expansion		2.8				
		3.6	2.8	6.0			

Note A: South Grid CUP (75.13) = South WTPS (52.11) + Main St WTP (23.02)

2.2.5 Individual Treatment Plant Summaries

Proposed facility expansions and new facilities are planned in order to more evenly distribute the production and pumping capabilities of the gridded system while increasing the overall system reliability and quality.

Arlington

This WTP primarily serves the local area. The CUP limits a capacity expansion with a limitation of 2.50 MGD AADF. The HSPs were recently upgraded to better meet demands.

> ***Action:*** *Wellfield rehabilitation is needed to maintain maximum day capacity. The Wellfield R&R project will address any needs with a goal of meeting future maximum day demands, 425-14.*

Beacon Hills

The WTP has adequate well and HSP capacity to meet the demands within its service area. Based on the capacity calculations, the minimum storage needed is 0.5 MGal and the plant only has 0.3 MGal. The CUP limit for this WTP is 1.13 MGD AADF.

> ***Action:*** *The proposed project, 438-07, will address the storage limitation as well as rehab the remaining facility. The project is planned to start in FY24.*

Brierwood

The CUP is the limited to an AADF of 3.02 MGD (MDF 5.36). The TWMP mains from the Main Street WTP serve to meet the remaining supply demands at this WTP. Using a peak hour factor of 1.66, the high service pumps would need to be at 29 MGD; however, they are currently rated at 18 MGD (14.4 firm).

> ***Action:*** *A project has been created to address the HSP capacity needs at the WTP with a planned to start design during FY24, 425-13.*

Community Hall

This WTP has a fill line which is fed from the grid, primarily by Brierwood WTP. The CUP limit for this WTP is 1.47 MGD AADF.

> ***Action:*** *Capacity expansion not possible due to CUP limits. Continue to monitor well use.*

Deerwood III

This WTP has a fill line, which is fed from the grid. The CUP limit for this WTP is 7.0 MGD AADF. The service area for the WTP has been limited to reduce its supply needs to meet the CUP. The existing grid fill causes service issues to the area during peak demands. The Southside Integrated Pipes (SIPS) will serve as a dedicated supply line from the existing TWMP mains to the Deerwood III WTP.

> ***Action:*** *Continue to monitor well use. Wellfield rehabilitation is currently underway to improve the water quality delivered to the service area, 425-14.*

Greenland

The Greenland WTP is limited by the capacity of the high service pumps. The CUP is permitted at 4.53 AADF MGD (MDF 8.05). Phase II of the treatment plant is in design, which includes the following: a third well, additional tank and high service pump upgrades. The CUP limit for this WTP is 4.53 MGD AADF.

> ***Action:*** *Complete Phase II, currently identified as project 268-W4 in the CIP.*

Hendricks

This WTP has adequate capacity for all its components. The CUP limit for this WTP is 4.0 MGD AADF.

> ***Action:*** *Capacity expansion not possible due to CUP limits. Continue to monitor well use.*

JCP

This WTP has adequate capacity for all its components. The plant has two ground storage tanks (GSTs), 0.4 MG and 1.0 MG. The largest GST was inspected in November 2017 as part of our program to inspect our tanks once every five years. This latest inspection recommended rehabilitation.

> ***Action:*** *Capacity expansion not possible due to CUP limits. Continue to monitor well use. Rehabilitate the 1.0 MG GST through Project 731-07.*

Lovegrove

This WTP has adequate capacity for all its components. The CUP limit for this WTP is 2.0 MGD AADF.

> ***Action:*** *Capacity expansion not possible due to CUP limits. Continue to monitor well use.*

Main Street

The limiting factor at the Main Street WTP is the existing well field and raw water header pipe. This plant's capacity is calculated slightly different than other facilities due to the operational protocol. Main St. is utilized as a base load plant for the South Grid and it does not typically see a diurnal or seasonal peak. The CUP limits the plant to 23.02 MGD. The existing wells can currently produce nearly 30 MGD with the newly completed Well 15. Additional demands on the supply will necessitate an expansion of the ozone treatment process.

> ***Action:*** *Continue to monitor well production. Ozone treatment expansion, 101-26, is scheduled to start design in FY20.*

Monument

Monument is the smallest WTP in the South Grid. At the current operating protocol, the WTP would not need any expansion. The CUP limit for this WTP is 0.50 MGD AADF.

> ***Action:*** *Monitor wellfield production and quality.*

Oakridge

The high service pump capacity needs an approximate 3MGD expansion to meet firm capacity needs. The wellfield was originally designed for 17.51 MGD and is producing approximately 10 MGD. The wellfield needs additional capacity to meet firm capacity, this could be accomplished by new wells or rehabilitation of the existing wellfield. Currently well rehab is underway. All Improvements will be for reliability not expansion. The CUP limit for this WTP is 5.65 MGD AADF.

> ***Action:*** *Continue to monitor well use. A project for expansion of the HSP is planned to start design in FY22, 096-04.*

Ridenour

This WTP has adequate capacity for all its components. The CUP limit for this WTP is 6.85 MGD AADF. Wellfield rehabilitation has begun to address water quality concerns due to rising chlorides. Additional wells will be needed to meet future maximum day demands.

__Action:__ Continue to monitor well use. The wellfield rehabilitation project to address supply limitations, 425-14.

River Town

Growth and system reliability issues necessitate additional supply in the southern reaches of the South Grid. This WTP has started design with an annual CUP allocation of 1.88 MGD AADF, with a planned Max Day capacity of 4.0 MGD. The original project modeled only two wells. A third well was added to allow Operations to rotate the wells in the wellfield.

__Action:__ Design and construct the new WTP, 825-03.

Royal Lakes

The high service pumps have capacity with all pumps on, however the firm capacity is slightly below the recommended value. One additional well and upsizing two of the four HSP would provide firm capacity for this plant. All Improvements will be for reliability not expansion. The CUP limit for this WTP is 2.34 MGD AADF.

__Action:__ Continue to monitor well use. Project 831-03 is planned to start design in FY22 to address the firm capacity of the WTP.

Southeast

A new high service pump building was constructed to increase the maximum day capacity of the WTP. An additional GST will be needed to increase the overall all reliability of the WTP. The CUP limit for this WTP is 4.50 MGD AADF.

__Action:__ A future project, 150-10, is planned to add a second ground storage tank.

St Johns Forest

The current two wells meet the max day flow with no firm capacity. St. Johns Forest has a fill line from the grid with adequate storage for the fill line. The CUP limit for this WTP is 1.0 MGD AADF.

__Action:__ Construct third well to better meet maximum day demands, project 734-02 will start design FY20.

St Johns North

The WTP is limited by the existing transmission/distribution system. The CUP limit for this WTP is 1.23 MGD AADF.

__Action:__ Evaluate system limitations and recommend piping improvements to increase overall system reliability.

Woodmere

A new storage tank and supply well were completed in FY19, 732-02. The high service pump building will need to be rehabilitated due to its age. The CUP limit for this WTP is 1.35 MGD AADF.

__Action:__ Continue to monitor wellfield production. Begin investigation to replace the existing HSP building.

2.2.6 South Grid Current 10 Year Capital Improvement Projects

Table 8 - South Grid Capital Improvement Projects (in thousand $'s)

Index No	Project Description	Current Estimate	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28
102-26	US1 South Water Repump Facility	$10,037	$9,020	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
732-02	Woodmere WTP - Well No 3 and Storage Tank Replacement	$4,409	$2,365	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
268-W4	Greenland WTP - Expansion from 6.0 to 9.0 MGD	$6,629	$1,918	$4,600	$0	$0	$0	$0	$0	$0	$0	$0	$0
825-03	RiverTown WTP - New 6.0 MGD WTP	$15,605	$1,055	$2,890	$9,732	$1,860	$0	$0	$0	$0	$0	$0	$0
425-10	South Grid Water Quality - Well Improvement - ENV	$3,250	$827	$26	$0	$0	$0	$0	$0	$0	$0	$0	$0
107-06	Main St WTP - Well No 15 - New Lower Fl Aquifer Well	$1,940	$484	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
731-07	Julington Creek WTP - Storage Tank Rehabilitation	$400	$400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
108-02	Arlington WTP - HSP Replacement	$1,346	$143	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
268-W7	Greenland WTP - Sulfide Removal - New	$6,977	$69	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
734-02	St Johns Forest Wells	$1,550	$50	$1,000	$500	$0	$0	$0	$0	$0	$0	$0	$0
101-25	Southeast WTP - HSP and Pump Building - Upgrades	$3,689	$13	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
101-26	Main St WTP - Ozone Generator - Addition	$3,000	$0	$42	$500	$1,800	$658	$0	$0	$0	$0	$0	$0
102-27	Nocatee South Water Repump	$5,000	$0	$0	$200	$800	$3,000	$1,000	$0	$0	$0	$0	$0
150-10	Southeast WTP - Ground Storage Tank	$2,550	$0	$0	$50	$2,000	$500	$0	$0	$0	$0	$0	$0
096-04	Oakridge WTP - HSP Expansion	$1,850	$0	$0	$0	$50	$300	$1,500	$0	$0	$0	$0	$0
831-03	Royal Lakes WTP HSP Expansion	$1,850	$0	$0	$0	$50	$300	$1,500	$0	$0	$0	$0	$0

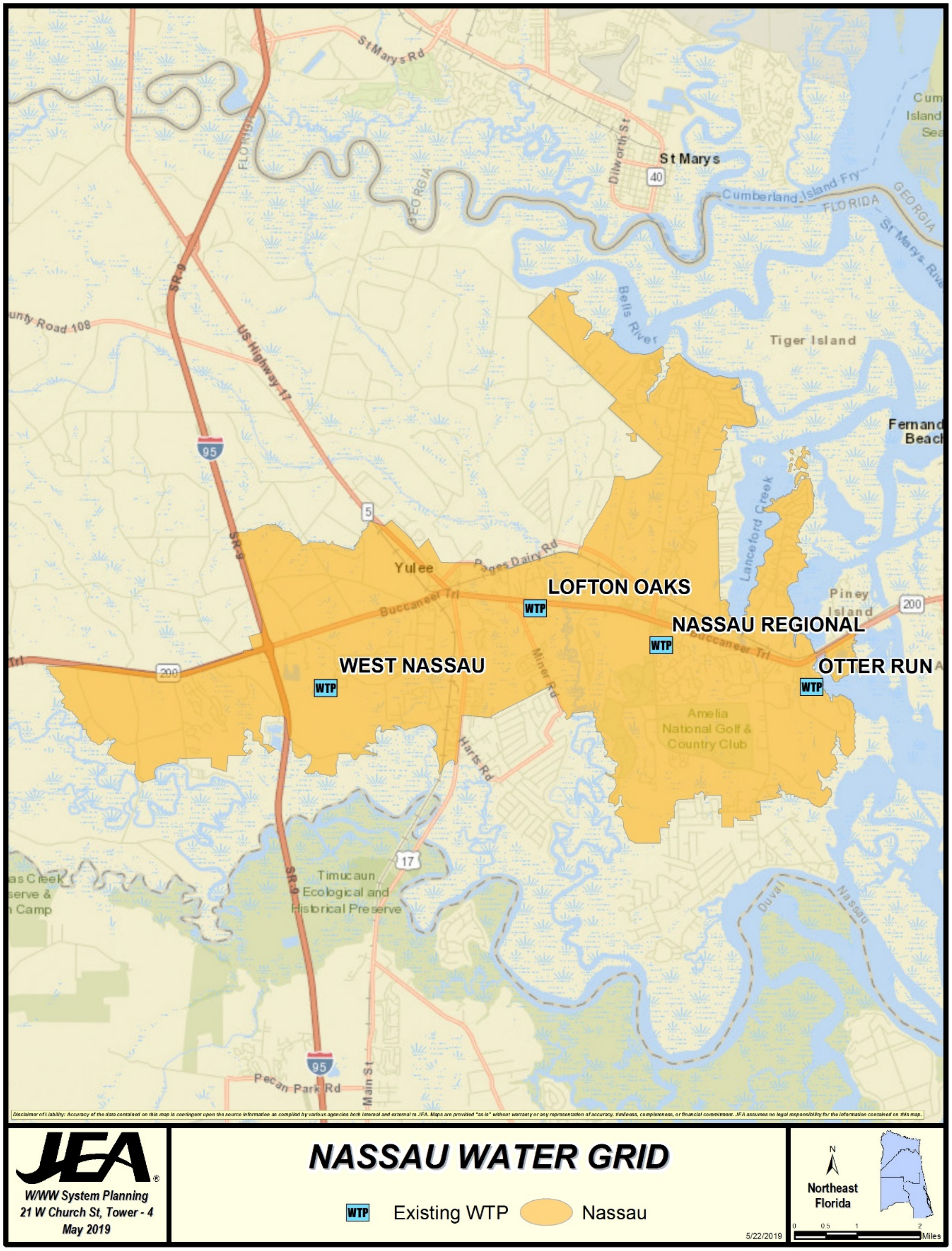
Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
740-01	Lovegrove WTP - HSP and Building Replacement - Expansion	$3,450	$0	$0	$0	$50	$40	$2,500	$500	$0	$0	$0	$0
438-07	Beacon Hills WTP - Ground Storage Tank	$8,830	$0	$0	$0	$0	$0	$530	$5,500	$2,800	$0	$0	$0
425-13	Brierwood WTP - HSP Expansion	$1,850	$0	$0	$0	$0	$0	$50	$300	$1,500	$0	$0	$0
107-08	Main St WTP - Well 13 - W - ENV	$1,623	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
425-07	Brierwood WTP - Well 4 and 5 Backplugging	$588	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
		TOTAL	**$16,344**	**$8,558**	**$10,982**	**$6,610**	**$4,798**	**$7,080**	**$6,300**	**$4,300**	**$0**	**$0**	**$0**

2.3 Nassau Grid Potable Water System

The Nassau Grid (PWS 2454338) is owned, operated and maintained by JEA. The Service Grid consists of 4 interconnected WTPs with a permitted Max Day Capacity of 8.88 MGD. According to the Interlocal Agreement with Nassau County, JEA has the right to serve all developments within Nassau County but not in the municipal boundaries of Fernandina Beach, Callahan and Hilliard. The Lofton Oaks Service Grid currently serves the parts of Nassau County from just west of I-95 to the Intracoastal Waterway and the Duval County line to the St. Mary's River.

This section of the Water Supply Plan specifically discusses the Nassau Grid, which includes 7 wells, 8 storage tanks with a total of 2.19 Mgal, and 12 high service pumps. The service area for the Nassau Grid is shown in Figure 13.

Figure 13 - JEA Nassau Grid Service Area



2.3.1 5 year Historical Water Demand Data

Over the past five years the annual average daily flow has been increasing, ranging from 2.2 MGD to 3.2 MGD. Water demands have been showing an upward trend.

The Maximum Daily flow over the past five years was 4.74 MGD and occurred in May 2017. Typically May, June or July is the highest demand month of the year. 5-Year Historical Potable Water Demand is shown in Figure 14 and listed Table 9. The historical information shown is based on water plant meter data.

Figure 14 - Nassau Grid Maximum Day Peaking Factor

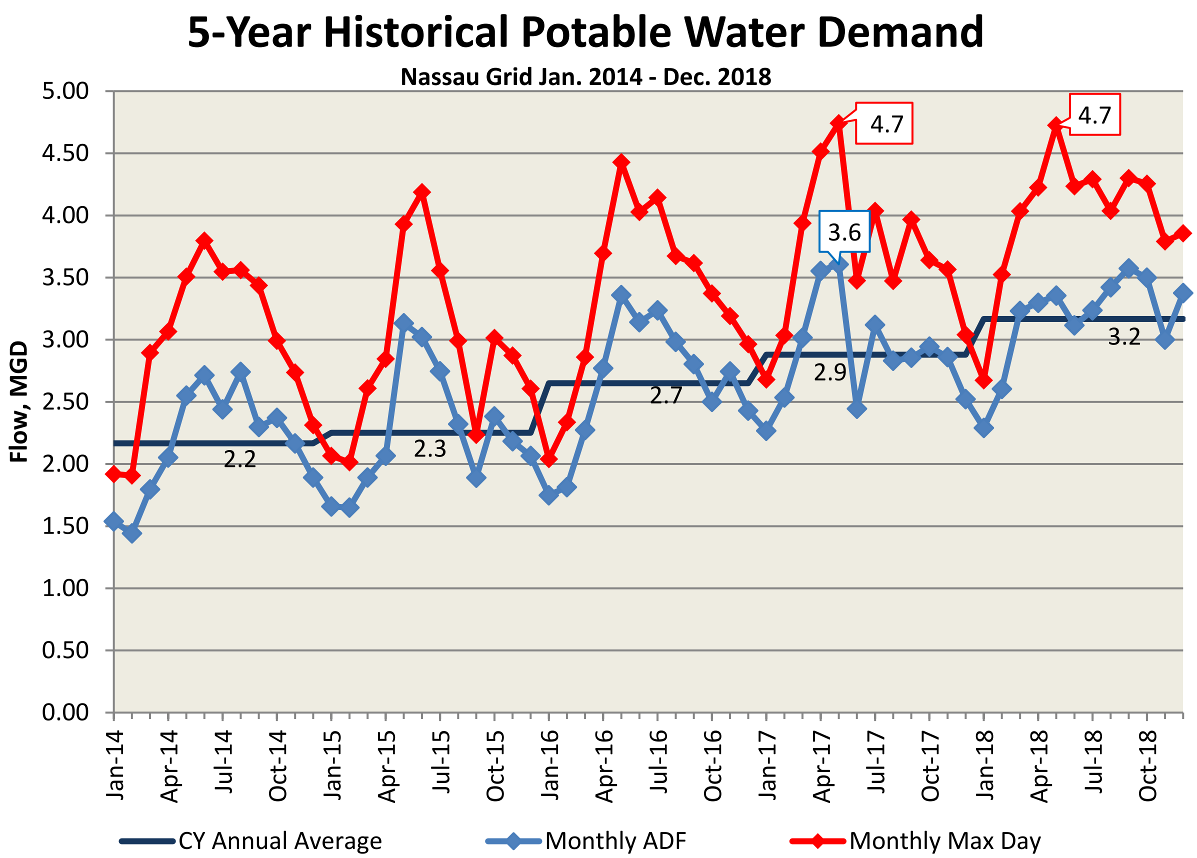


Table 9 - Nassau Grid 5 Year Historical Water Demand Data

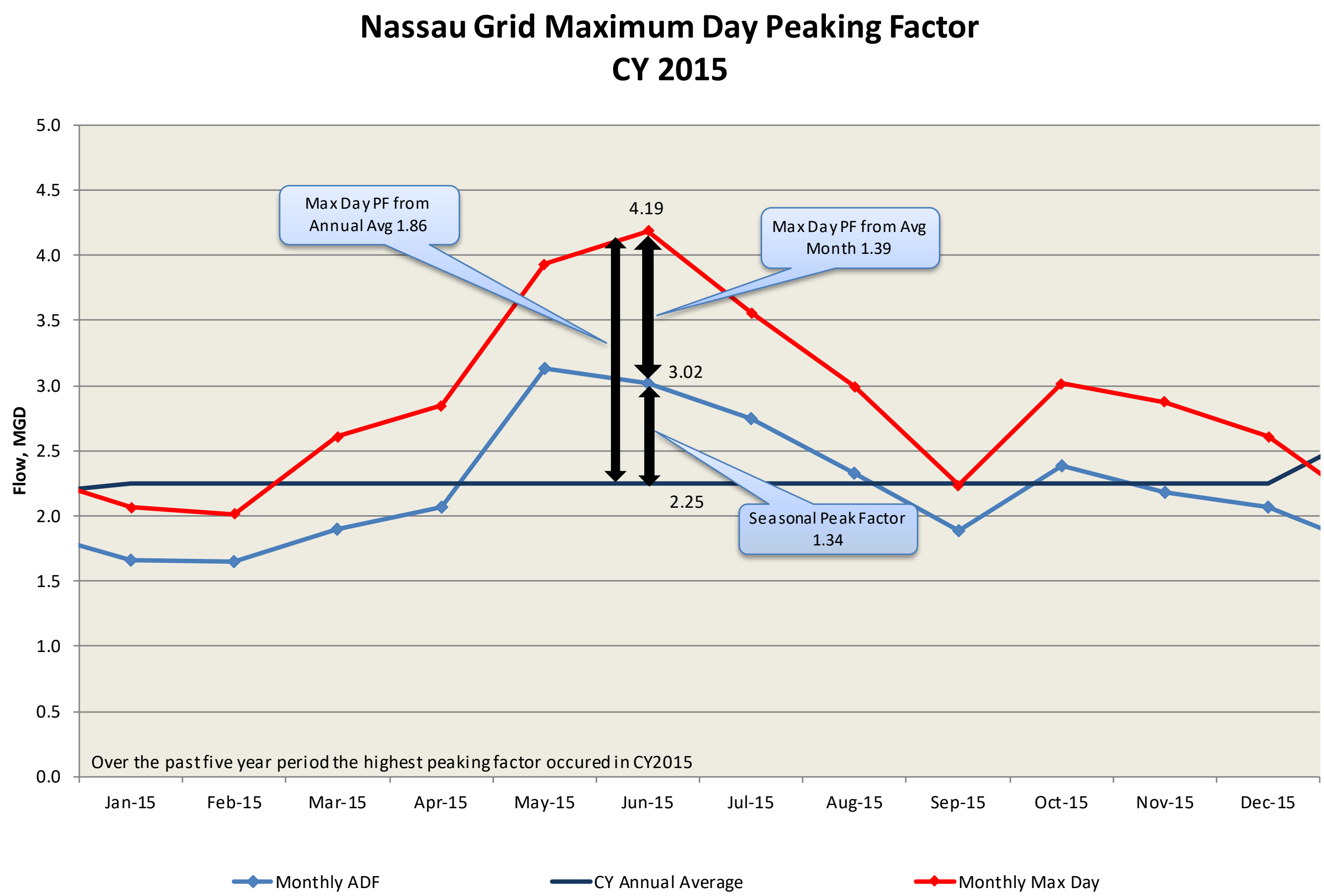
5 Year Historical Water Demand Data							
Nassau Grid Water Demand							
Date Mo/Year	Monthly ADF (MGD)	CY Avg. (MGD)	Monthly Max Day (MGD)	Date Mo/Year	Monthly ADF (MGD)	CY Avg. (MGD)	Monthly Max Day (MGD)
Jan-14	1.54	2.17	1.92	Jan-17	2.27	2.88	2.68
Feb-14	1.44	2.17	1.91	Feb-17	2.53	2.88	3.04
Mar-14	1.80	2.17	2.90	Mar-17	3.02	2.88	3.94
Apr-14	2.05	2.17	3.07	Apr-17	3.55	2.88	4.51
May-14	2.55	2.17	3.51	**May-17**	**3.61**	2.88	**4.74**
Jun-14	2.71	2.17	3.80	Jun-17	2.45	2.88	3.48
Jul-14	2.44	2.17	3.55	Jul-17	3.12	2.88	4.04
Aug-14	2.74	2.17	3.56	Aug-17	2.83	2.88	3.47
Sep-14	2.30	2.17	3.44	Sep-17	2.86	2.88	3.97
Oct-14	2.37	2.17	2.99	Oct-17	2.94	2.88	3.64
Nov-14	2.17	2.17	2.74	Nov-17	2.86	2.88	3.57
Dec-14	1.89	2.17	2.31	Dec-17	2.52	2.88	3.04
Jan-15	1.66	2.25	2.07	Jan-18	2.29	3.17	2.67
Feb-15	1.65	2.25	2.02	Feb-18	2.60	3.17	3.53
Mar-15	1.89	2.25	2.61	Mar-18	3.23	3.17	4.03
Apr-15	2.07	2.25	2.85	Apr-18	3.30	3.17	4.23
May-15	3.13	2.25	3.93	May-18	3.36	3.17	4.73
Jun-15	3.02	2.25	4.19	Jun-18	3.12	3.17	4.24
Jul-15	2.75	2.25	3.56	Jul-18	3.24	3.17	4.29
Aug-15	2.32	2.25	2.99	Aug-18	3.42	3.17	4.04
Sep-15	1.89	2.25	2.23	Sep-18	3.57	3.17	4.30
Oct-15	2.38	2.25	3.01	Oct-18	3.50	3.17	4.26
Nov-15	2.18	2.25	2.87	Nov-18	3.00	3.17	3.79
Dec-15	2.07	2.25	2.61	Dec-18	3.38	3.17	3.86
Jan-16	1.75	2.65	2.04	*5 Yr Min*	*1.44*		*1.91*
Feb-16	1.81	2.65	2.34	*5 Yr Max*	*3.61*		*4.74*
Mar-16	2.27	2.65	2.86	*5 Yr Avg*	*2.62*		*3.38*
Apr-16	2.77	2.65	3.70				
May-16	3.36	2.65	4.43				
Jun-16	3.14	2.65	4.03				
Jul-16	3.24	2.65	4.14				
Aug-16	2.98	2.65	3.67				
Sep-16	2.80	2.65	3.62				
Oct-16	2.50	2.65	3.37				
Nov-16	2.75	2.65	3.19				
Dec-16	2.43	2.65	2.96				

Note: **Bold** indicates 5 Yr Max (ADF & MDF)

2.3.2 Peaking Factor - Maximum Daily Flow

Over the past five years the maximum peak was 1.86 and occurred June 2015 as shown in Figure 15.

Figure 15 - Nassau Grid Maximum Day Peaking Factor



2.3.3 Nassau Grid Projected Flow

The Nassau Grid Forecast is listed Table 10 and Figure 16 below. The forecast uses the 5-year average gross per-capita water usage and the BEBR forecast to calculate the future water demands.

Table 10 - Nassau Grid Flow Projection

Nassau Grid Flow Projection					
Year	JEA Total Water Demand (MGD)	Total Nassau Grid Water Demand (MGD)	Nassau Grid Reclaimed water Supply (MGD)	Nassau Grid Aquifer Supply (AADF) (MGD	Max Day Flow (MGD)
2019	126.53	3.83	0.00	3.83	7.12
2020	129.16	4.17	0.06	4.11	7.64
2025	139.82	4.61	0.36	4.25	7.91
2030	148.53	5.06	0.66	4.40	8.18
2035	156.80	5.50	0.96	4.54	8.44
2040	163.89	5.94	1.26	4.68	8.71
2045	170.63	6.38	1.56	4.82	8.97

2.3.4 Treatment Plant Capacity

Water Plants are permitted and designed based on the maximum amount of water the plant can produce over a one day period. Plant Capacity will be discussed on a max day capacity. Capacity calculations are based on the FDEP methodology and compare what's available to the FDEP permitted capacity.

Finished water storage exists to provide ample water supply during the peak hour water usage. Storage at each facility was looked at in the calculation sheets and will be discussed separately and is not listed in the summary table. The storage volume needs to meet one of the two criteria set by FDEP. The first of the two criteria is that the volume of storage equal 25% of the max day flow. The second, looks at equalization storage and fire flow storage needed for a determined duration. The conditions used for this report were:

- Peak hour flow for 4 hrs. (Peak Hour flow = HSP pumping rate – well pumping rate)
- Fire flow of 1500gpm for 2 hrs. at Max Day Demand Condition.

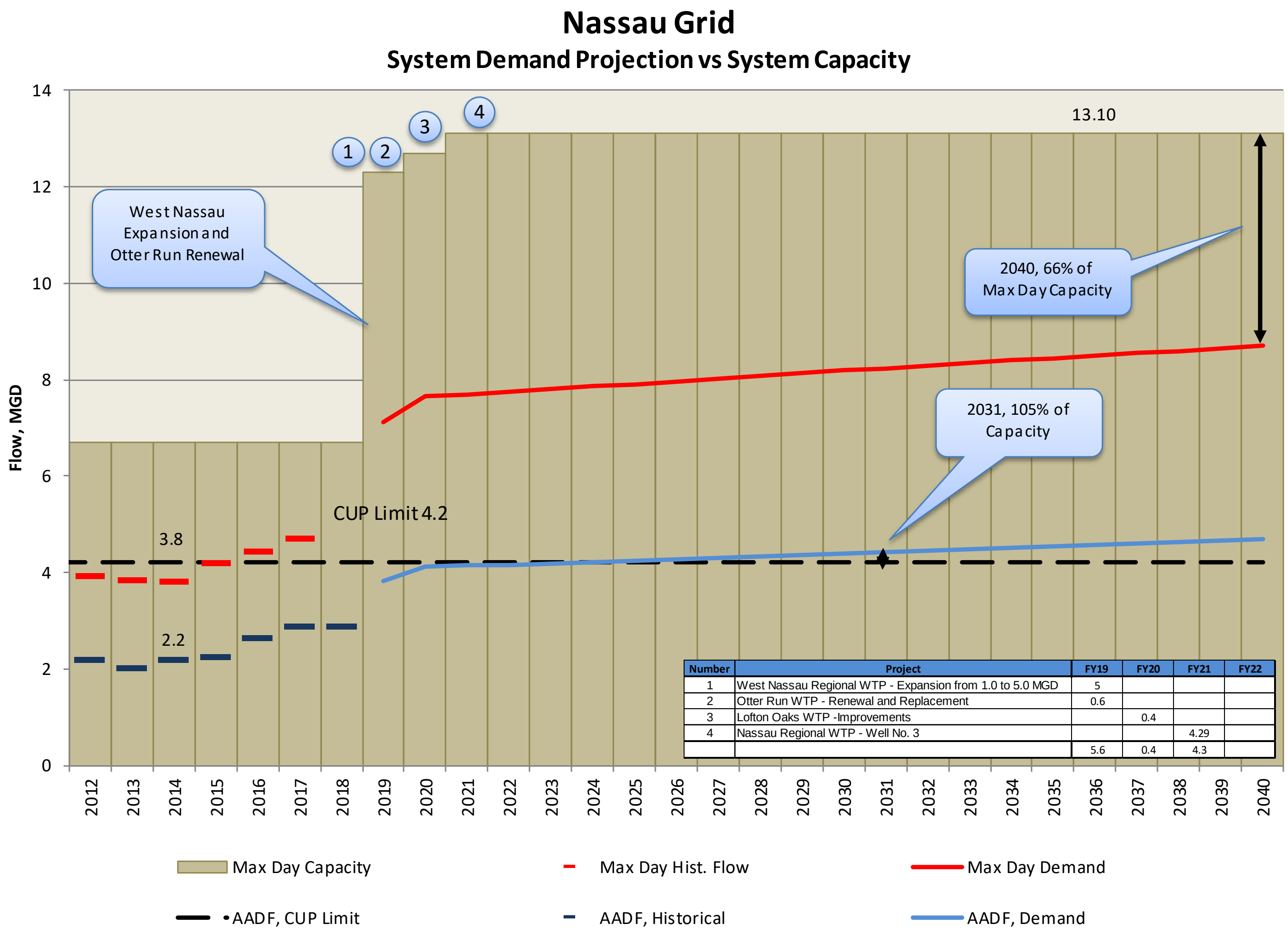
Firm capacity is defined as the water plant capacity with largest pump out of service. With a gridded system, technically the firm capacity of the grid would be calculated with only the largest pump out of service. Due to the size of the JEA grid this methodology is not practical.

Table 11 - South Grid Plant Capacities

Name of Facility	Number of Wells	Design Well Capacity, MGD	Design Well Capacity (Firm), MGD	Total Storage Capacity, MG	Number of High Service Pumps	High Service Pump Capacity, MGD	High Service Pump Capacity (Firm), MGD	FDEP Permitted Capacity, MGD
Nassau Regional	2	5.76	2.88	0.85	3	7.80	3.92	4.29
Lofton Oaks	1	0.94	0.94	0.02	2	0.72	0.36	0.40
Otter Run	2	2.16	1.08	0.07	3	1.37	0.79	0.59
West Nassau	2	7.20	3.60	1.25	4	8.64	5.76	3.60
SUMMARY	**7**	**16.06**	**8.50**	**2.19**	**12**	**18.53**	**10.83**	**8.88**

[1]Capacity Analysis Reports for each water facility is available upon request.

Figure 16 - Nassau Grid Demand Projection vs. System Capacity



Number	Project	FY19	FY20	FY21	FY22
1	West Nassau Regional WTP - Expansion from 1.0 to 5.0 MGD	5			
2	Otter Run WTP - Renewal and Replacement	0.6			
3	Lofton Oaks WTP -Improvements		0.4		
4	Nassau Regional WTP - Well No. 3			4.29	
		5.6	0.4	4.3	

2.3.5 Individual Treatment Plant Summaries

Proposed facility expansions and new facilities are planned in order to more evenly distribute the production and pumping capabilities of the gridded system while increasing the overall system reliability and quality.

West Nassau Regional

A project was recently completed to increase the capacity of the WTP, 137-03. The CUP limit for this WTP is 1.57 MGD AADF.

> ***Action:*** *Continue to monitor wellfield production. As growth continues recommend additional GST and HSP.*

Otter Run

This WTP is currently under construction. The project consist of updating and replacing the existing equipment, but it will maintain the wellfield capacity. The two existing storage tanks will be demolished, and a single tank with a larger aerator will be constructed. The three existing high service pumps will be replaced with two 275-gpm and one 400-gpm pumps operating with a VFD. The CUP limit for the WTP is 0.12 MGD AADF.

> ***Action:*** *Complete current project, 739-01, and monitor well production.*

Lofton Oaks

The equipment at the WTP is approaching the end of its service life. A full plant rehabilitation has been recommended to update the equipment, but it will maintain the permitted wellfield capacity. The storage tank will be removed and replaced with a 75-kgal tank with a 1,000-gpm aerator. The two existing high service pumps will be replaced with VFD pumps. The CUP limit for the WTP is 0.08 MGD AADF.

> ***Action:*** *Complete current project, 130-02, and monitor well production.*

Nassau Regional

An additional well is in design/construction to better meet maximum day demands. The existing high service pumps and piping is above ground and will need to be replaced in the future for increased system reliability. Additional property may be needed to facilitate a plant expansion/replacement.

> ***Action:*** *Continue to work with the Real Estate group about acquiring additional property to facilitate WTP expansion. Continue to monitor overall demands to determine timing. Continue to monitor wellfield production.*

2.3.6 Current 10 Year Capital Improvement Projects

Table 12 - Nassau Grid Capital Improvement Projects (in thousand $'s)

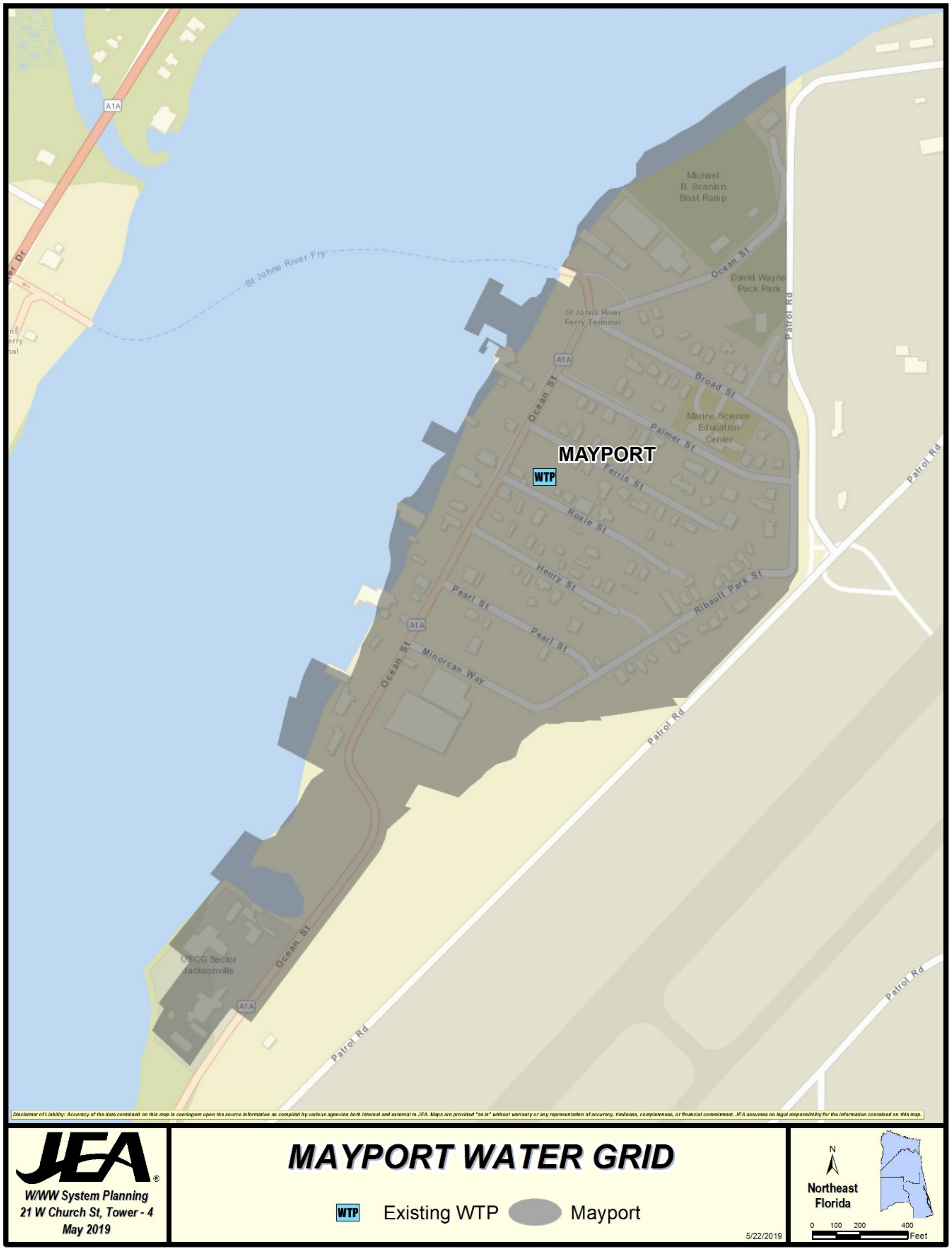
Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
739-01	Otter Run WTP – Renewal and Replacement	$3,306	$1,967	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
137-07	Nassau Regional WTP - Well No. 3	$3,492	$958	$1,721	$146	$0	$0	$0	$0	$0	$0	$0	$0
137-03	West Nassau Regional WTP - Expansion from 1.0 to 5.0 MGD	$8,558	$452	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
130-02	Lofton Oaks WTP - Improvements	$3,578	$403	$3,098	$0	$0	$0	$0	$0	$0	$0	$0	$0
		TOTAL	**$3,780**	**$4,819**	**$146**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

2.4 Mayport Grid Potable Water System

The Mayport Grid (PWS 2160735) is owned, operated and maintained by JEA. The Mayport Service Grid consists of one WTP with a permitted max day capacity of 0.79 MGD. The service grid is located wholly in Duval County, adjacent to NAS Mayport. There is approximately 3 miles of transmission and distribution mains with the service grid.

This section of the Water Supply Plan specifically discusses the Mayport Grid, which includes 2 wells, 1 storage tank with a total of 0.032 Mgal and 3 high service pumps. The service area for the Mayport Grid is shown in Figure 17.

Figure 17 - Mayport Grid Service Area



2.4.1 5 year Historical Water Demand Data

Over the past five years the annual average daily flow has been relatively stable, ranging from 0.07 MGD to 0.04 MGD. Population growth in Mayport is minimal so water demand has shown no increase.

The Maximum Daily flow over the past five years was 0.16 MGD and occurred in January 2014. Typically May, June or July is the highest demand month of the year. The Historical Data is listed in Table 13 and Figure 18 below. The historical information shown is based on water plant meter data.

Figure 18 - Mayport Grid Maximum Day Peaking Factor

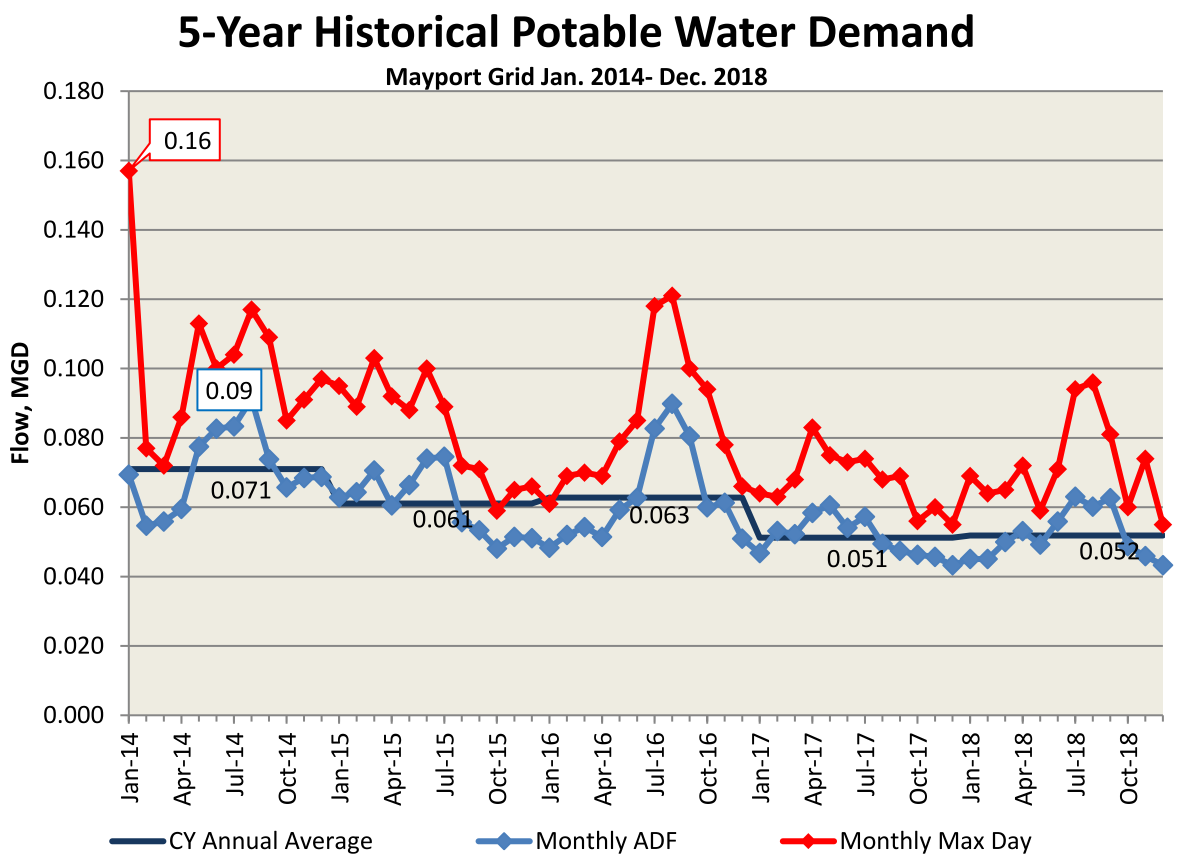


Table 13 - Mayport Grid 5 Year Historical Water Demand Data

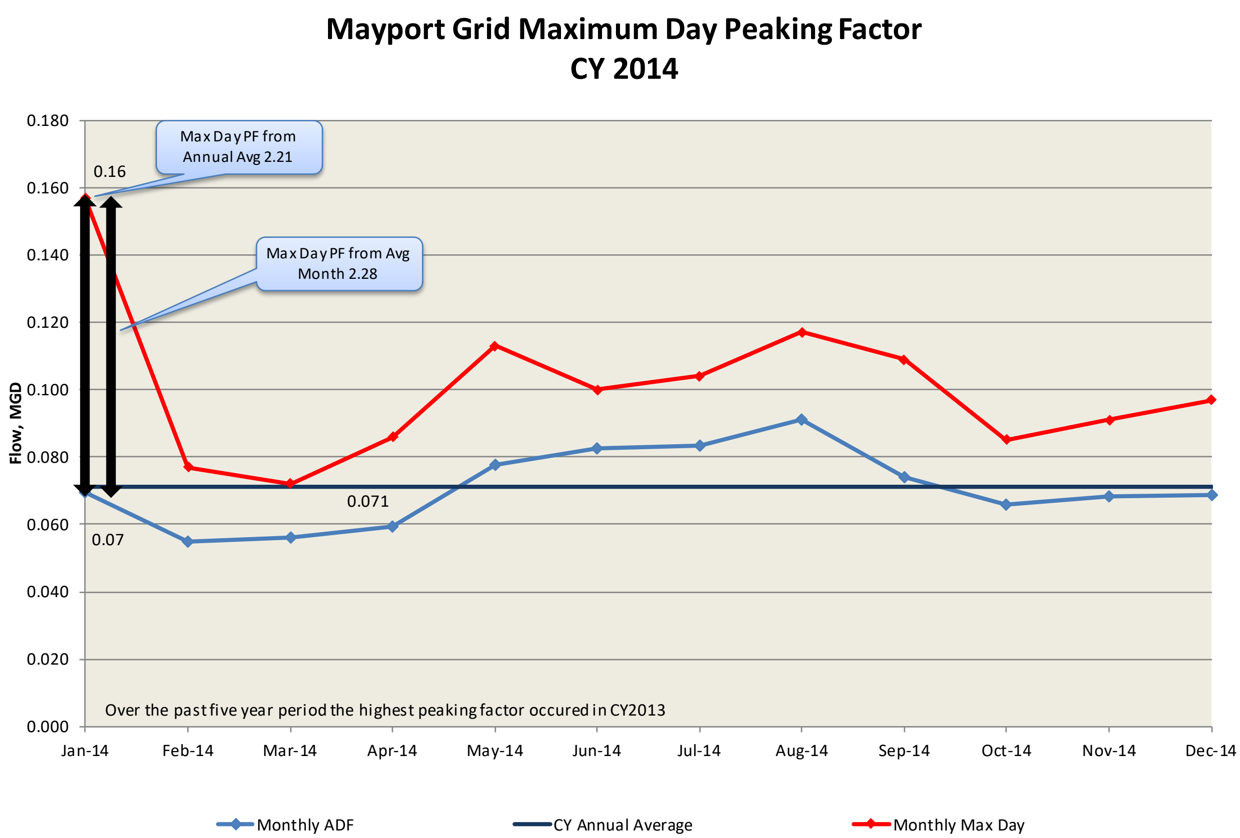
5 Year Historical Water Demand Data								
Mayport Grid Water Demand								
Date Mo/Year	Monthly ADF (MGD)	CY Avg. (MGD)	Monthly Max Day (MGD)		Date Mo/Year	Monthly ADF (MGD)	CY Avg (MGD)	Monthly Max Day (MGD)
Jan-14	0.069	0.071	**0.157**		Jan-17	0.047	0.051	0.064
Feb-14	0.055	0.071	0.077		Feb-17	0.053	0.051	0.063
Mar-14	0.056	0.071	0.072		Mar-17	0.052	0.051	0.068
Apr-14	0.060	0.071	0.086		Apr-17	0.058	0.051	0.083
May-14	0.077	0.071	0.113		May-17	0.061	0.051	0.075
Jun-14	0.083	0.071	0.100		Jun-17	0.054	0.051	0.073
Jul-14	0.083	0.071	0.104		Jul-17	0.057	0.051	0.074
Aug-14	0.091	0.071	0.117		Aug-17	0.049	0.051	0.068
Sep-14	0.074	0.071	0.109		Sep-17	0.047	0.051	0.069
Oct-14	0.066	0.071	0.085		Oct-17	0.046	0.051	0.056
Nov-14	0.068	0.071	0.091		Nov-17	0.046	0.051	0.060
Dec-14	0.069	0.071	0.097		Dec-17	0.043	0.051	0.055
Jan-15	0.063	0.061	0.095		Jan-18	0.045	0.052	0.069
Feb-15	0.064	0.061	0.089		Feb-18	0.045	0.052	0.064
Mar-15	0.071	0.061	0.103		Mar-18	0.050	0.052	0.065
Apr-15	0.061	0.061	0.092		Apr-18	0.053	0.052	0.072
May-15	0.066	0.061	0.088		May-18	0.049	0.052	0.059
Jun-15	0.074	0.061	0.100		Jun-18	0.056	0.052	0.071
Jul-15	0.075	0.061	0.089		Jul-18	0.063	0.052	0.094
Aug-15	0.056	0.061	0.072		Aug-18	0.060	0.052	0.096
Sep-15	0.053	0.061	0.071		Sep-18	0.063	0.052	0.081
Oct-15	0.048	0.061	0.059		Oct-18	0.049	0.052	0.060
Nov-15	0.051	0.061	0.065		Nov-18	0.046	0.052	0.074
Dec-15	0.051	0.061	0.066		Dec-18	0.043	0.052	0.055
Jan-16	0.048	0.063	0.061		*5 Yr Min*	*0.04*		*0.06*
Feb-16	0.052	0.063	0.069		*5 Yr Max*	*0.09*		*0.16*
Mar-16	0.054	0.063	0.070		*5 Yr Avg*	*0.06*		*0.08*
Apr-16	0.051	0.063	0.069					
May-16	0.059	0.063	0.079					
Jun-16	0.063	0.063	0.085					
Jul-16	0.083	0.063	0.118					
Aug-16	**0.090**	0.063	0.121					
Sep-16	0.080	0.063	0.100					
Oct-16	0.060	0.063	0.094					
Nov-16	0.061	0.063	0.078					
Dec-16	0.051	0.063	0.066					

Note: **Bold** indicates 5 Yr Max (ADF & MDF)

2.4.2 Peaking Factor - Maximum Daily Flow

Over the past five years the maximum Peak was 2.21 and occurred January 2014.

Figure 19 – Mayport Grid Maximum Day Peaking Factor



2.4.3 Mayport Grid Projected Flow

The Mayport grid forecast is listed below in Table 14 and Figure 20. The forecast uses the 5-year average gross per-capita water usage and the BEBR forecast to calculate the future water demands.

Table 14 – Mayport Grid Flow Projection

Mayport Grid Flow Projection			
Year	JEA Total Water Demand (MGD)	Mayport Grid Water Demand (MGD)	Max Day Flow (MGD)
2019	126.53	0.07	0.15
2020	129.16	0.07	0.15
2025	139.82	0.07	0.16
2030	148.53	0.07	0.17
2035	156.80	0.08	0.17
2040	163.89	0.08	0.18
2045	170.63	0.09	0.19

2.4.4 Treatment Plant Capacity

Water Plants are permitted and designed based on the maximum amount of water the plant can produce over a one day period. Plant Capacity will be discussed on a max day capacity. Capacity calculations are based on the FDEP methodology and compare what's available to the FDEP permitted capacity.

Finished water storage exists to provide ample water supply during the peak hour water usage. Storage at each facility was looked at in the calculation sheets and will be discussed separately and is not listed in the summary table. The storage volume needs to meet one of the two criteria set by FDEP. The first of the two criteria is that the volume of storage equal 25% of the Max day flow. The second, looks at equalization storage and fire flow storage needed for a determined duration. The conditions used for this report were:

- Peak hour flow for 4 hrs. (Peak Hour flow = HSP pumping rate – well pumping rate)
- Fire flow of 1500gpm for 2 hrs. at Max Day Demand Condition.

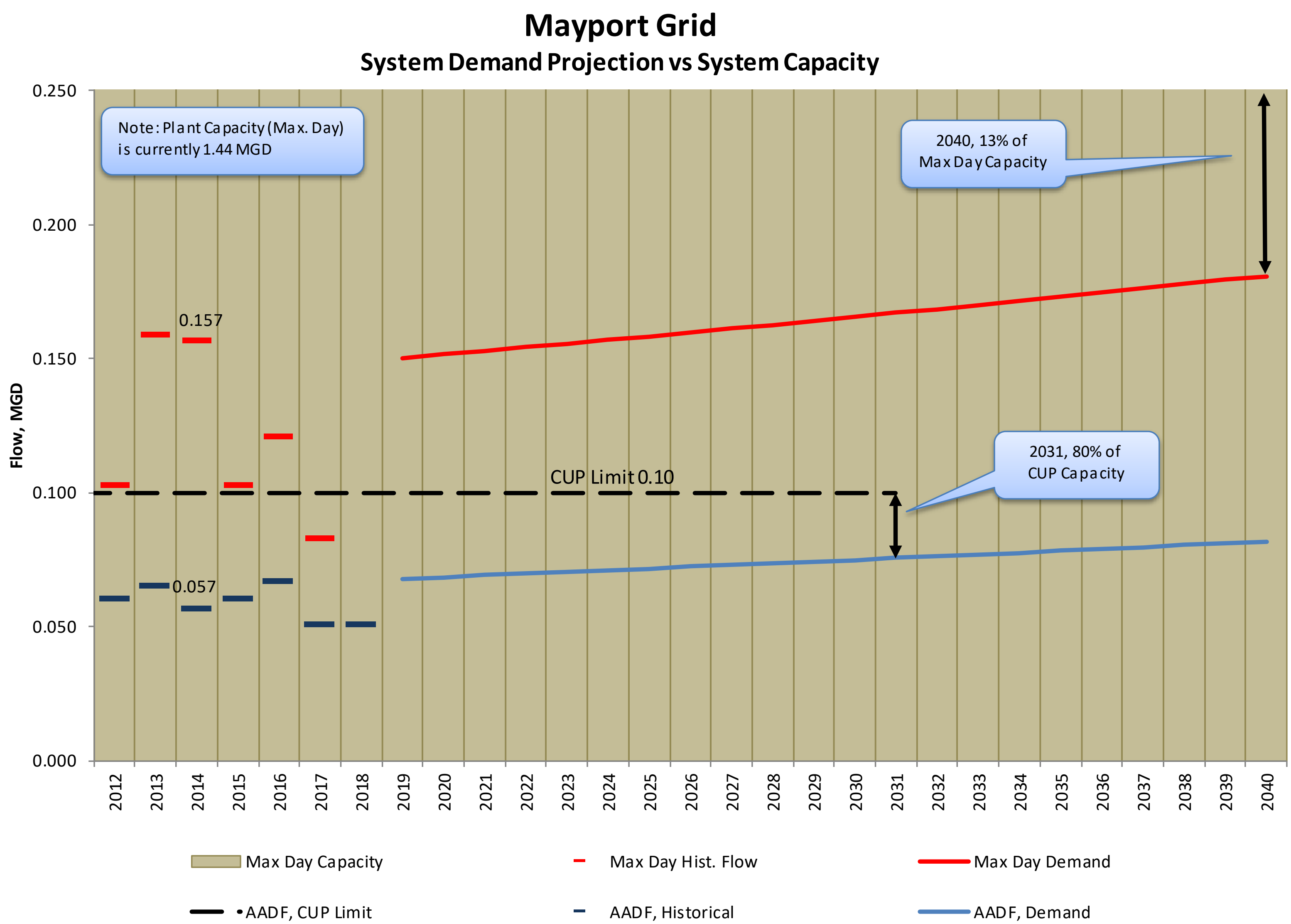
Firm capacity is defined as the water plants capacity with largest pump out of service. With a gridded system, technically the firm capacity of the grid would be calculated with only the one largest pump out of service. Due to the size of the JEA grid this methodology is not practical.

Table 15 – Mayport Grid Plant Capacity

Name of Facility	Number of Wells	Design Well Capacity, MGD	Design Well Capacity (Firm), MGD	Total Storage Capacity, MG	Number of High Service Pumps	Pump Capacity, MGD	Pump Capacity (Firm), MGD	FDEP Permitted Capacity, MGD
Mayport	2	1.44	0.72	0.03	3	1.58	0.86	0.79
SUMMARY	**2**	**1.44**	**0.72**	**0.03**	**3**	**1.58**	**0.86**	**0.79**

[1]Capacity Analysis Reports for each water facility is available upon request.

Figure 20 – Mayport Grid Demand Projection vs. System Capacity



2.4.5 Individual Treatment Plant Summaries

Proposed facility expansions and new facilities are planned in order to more evenly distribute the production and pumping capabilities of the gridded system while increasing the overall system reliability and quality.

Mayport

The projected growth in the service grid don't necessitate a plant expansion. Per analysis a GST expansion will be needed to better meet fire flow demands. Due to the age of the WTP this improvement will coincide with the GST project. The CUP limit for the WTP is 0.10 MGD AADF.

> ***Action:*** *Evaluate the timing of the GST/WTP renewal project, currently expected in FY25.*

2.4.6 Current 10 Year Capital Improvement Projects

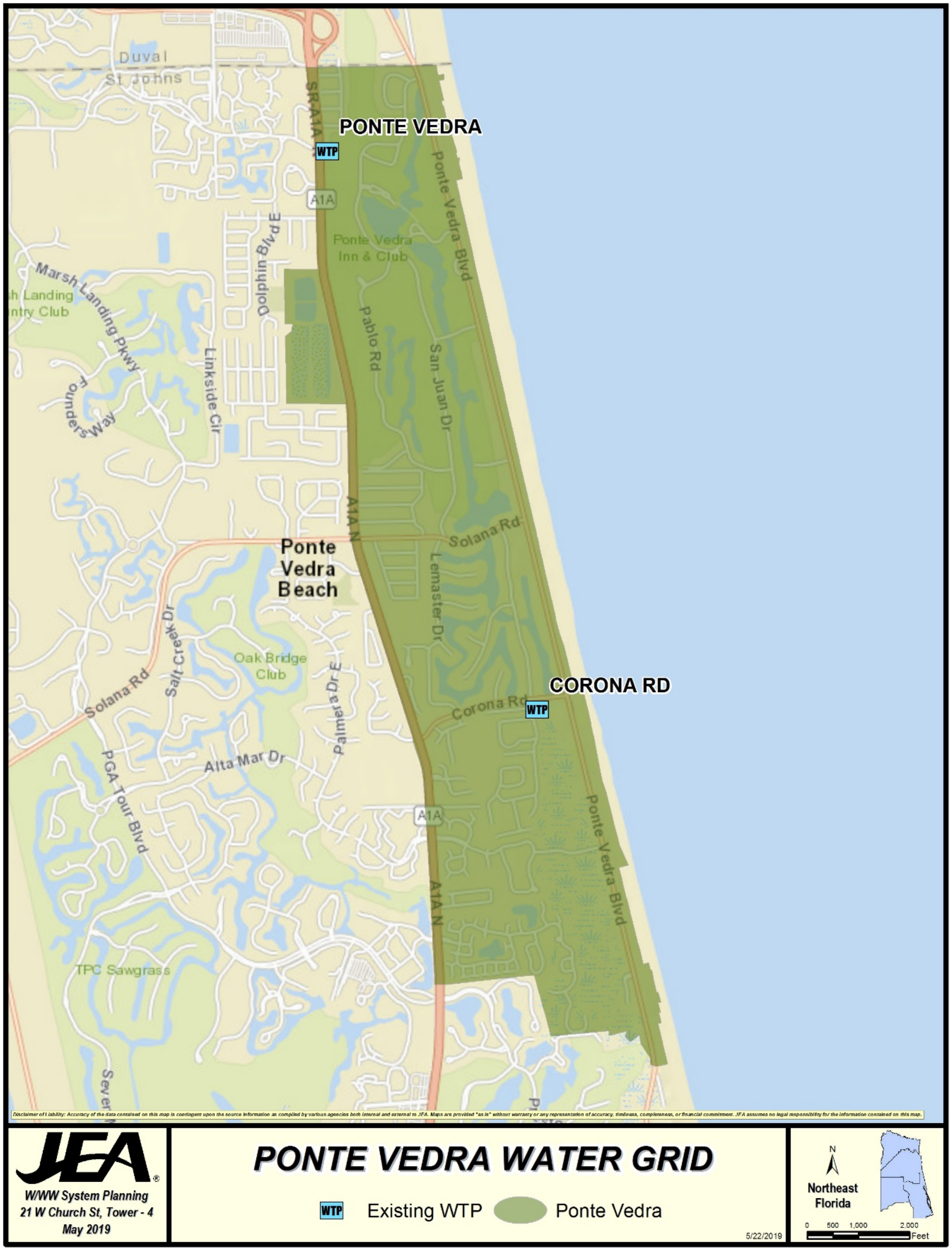
No capital improvements are scheduled for this facility.

2.5 Ponte Vedra Grid Potable Water System

The Ponte Vedra Grid (PWS 2550908) is owned, operated and maintained by JEA. JEA's Ponte Vedra Service Grid is located in northeastern St. Johns County. The Ponte Vedra Service Grid consists of 2 interconnected WTPs with a permitted Max Day capacity of 3.06 MGD. There is approximately 38 miles of transmission and distribution mains within the Service Grid.

This section of the Water Supply Plan specifically discusses the Ponte Vedra Grid, which includes 3 wells, 2 storage tanks with a total of 0.5 Mgal and 5 high service pumps. The service area for the Ponte Vedra grid is shown in Figure 21.

Figure 21 – Ponte Vedra Grid Service Area



2.5.1 5 year Historical Water Demand Data

Over the past five years the annual average daily flow has been relatively stable, ranging from 0.66 MGD to 1.22 MGD. Population growth in Ponte Vedra is minimal and water demands have shown no increase.

The Maximum Daily flow over the past five years was 1.9 MGD and occurred in July 2016. Typically May, June or July is the highest demand month of the year. The Historical Data is listed in the following Table 16 and Figure 22. The historical information shown is based on water plant meter data.

Figure 22 – Ponte Vedra Grid 5-Year Potable Water Demand

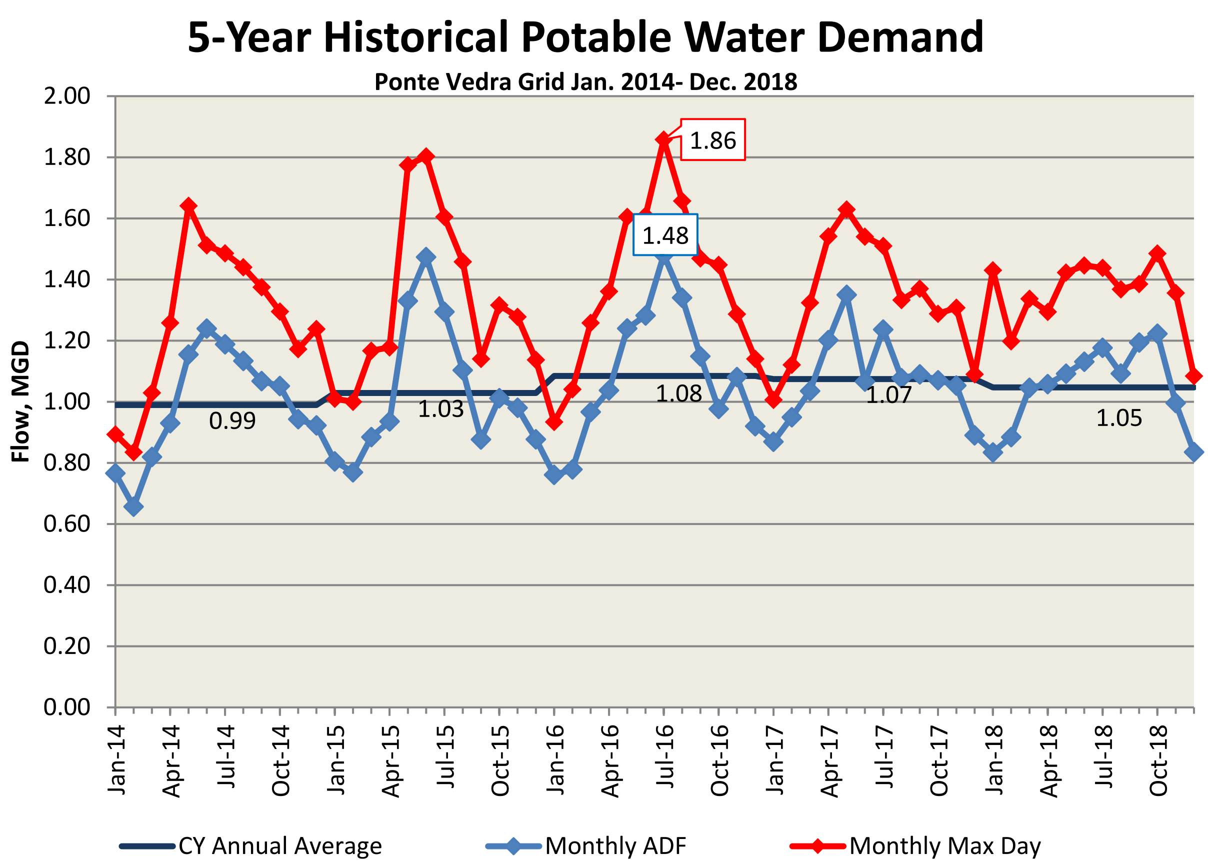


Table 16 – Ponte Vedra Grid 5 Year Historical Water Demand Data

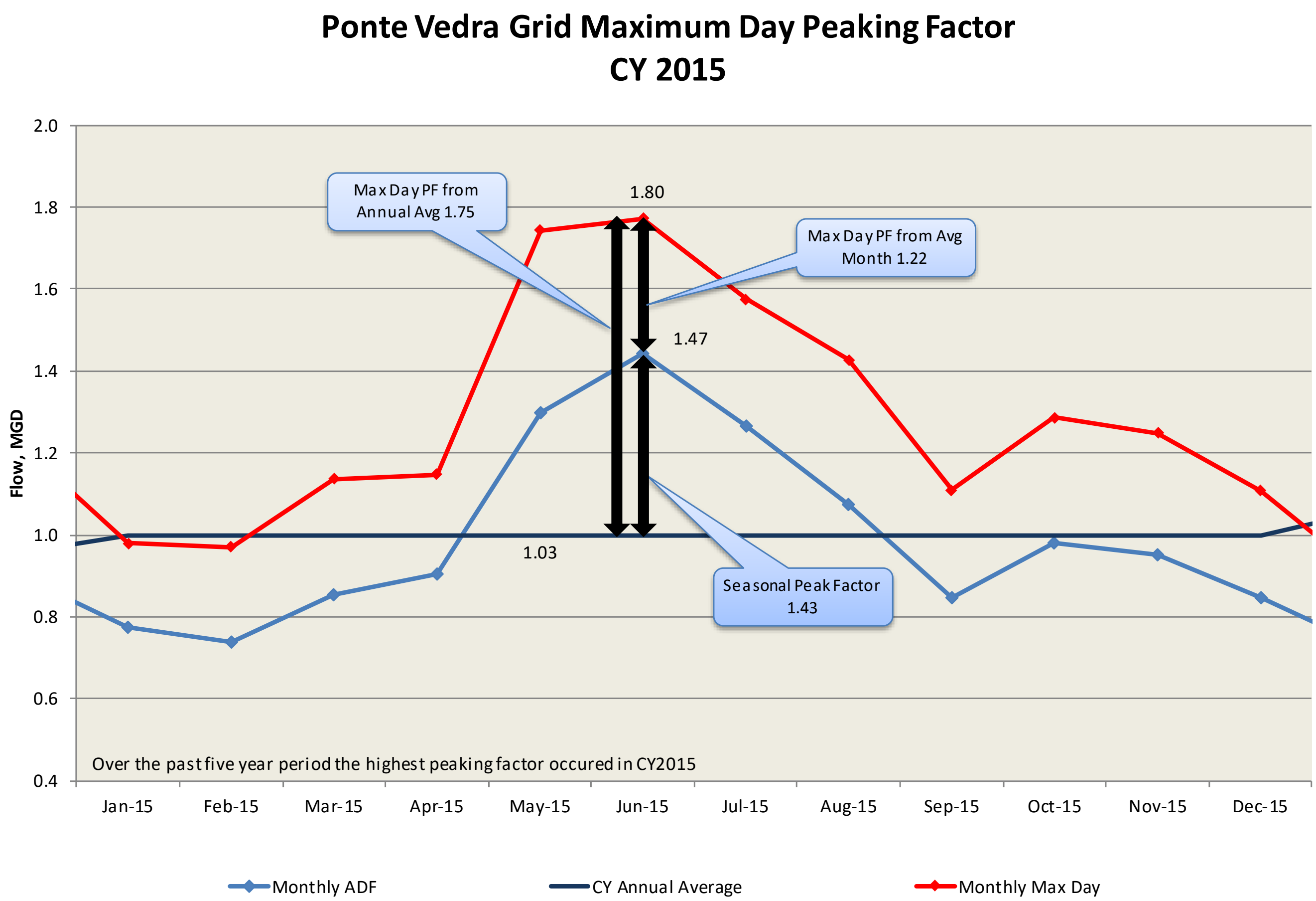
5 Year Historical Water Demand Data								
Ponte Vedra Grid Water Demand								
Date Mo/Year	Monthly ADF (MGD)	CY Avg. (MGD)	Monthly Max Day (MGD)		Date Mo/Year	Monthly ADF (MGD)	CY Avg (MGD)	Monthly Max Day (MGD)
Jan-14	0.77	0.99	0.89		Jan-17	0.87	1.07	1.01
Feb-14	0.66	0.99	0.84		Feb-17	0.95	1.07	1.12
Mar-14	0.82	0.99	1.03		Mar-17	1.04	1.07	1.32
Apr-14	0.93	0.99	1.26		Apr-17	1.20	1.07	1.54
May-14	1.15	0.99	1.64		May-17	1.35	1.07	1.63
Jun-14	1.24	0.99	1.51		Jun-17	1.07	1.07	1.54
Jul-14	1.19	0.99	1.49		Jul-17	1.24	1.07	1.51
Aug-14	1.13	0.99	1.44		Aug-17	1.08	1.07	1.33
Sep-14	1.07	0.99	1.38		Sep-17	1.09	1.07	1.37
Oct-14	1.05	0.99	1.30		Oct-17	1.07	1.07	1.29
Nov-14	0.94	0.99	1.17		Nov-17	1.05	1.07	1.31
Dec-14	0.92	0.99	1.24		Dec-17	0.89	1.07	1.09
Jan-15	0.80	1.03	1.01		Jan-18	0.83	1.05	1.43
Feb-15	0.77	1.03	1.00		Feb-18	0.88	1.05	1.20
Mar-15	0.88	1.03	1.17		Mar-18	1.05	1.05	1.34
Apr-15	0.94	1.03	1.18		Apr-18	1.06	1.05	1.29
May-15	1.33	1.03	1.77		May-18	1.09	1.05	1.42
Jun-15	1.47	1.03	1.80		Jun-18	1.13	1.05	1.45
Jul-15	1.29	1.03	1.61		Jul-18	1.18	1.05	1.44
Aug-15	1.10	1.03	1.46		Aug-18	1.09	1.05	1.37
Sep-15	0.88	1.03	1.14		Sep-18	1.19	1.05	1.39
Oct-15	1.01	1.03	1.32		Oct-18	1.22	1.05	1.49
Nov-15	0.98	1.03	1.28		Nov-18	1.00	1.05	1.36
Dec-15	0.88	1.03	1.14		Dec-18	0.84	1.05	1.08
Jan-16	0.76	1.08	0.93		*5 Yr Min*	*0.66*		*0.84*
Feb-16	0.78	1.08	1.04		*5 Yr Max*	*1.48*		*1.86*
Mar-16	0.97	1.08	1.26		*5 Yr Avg*	*1.04*		*1.33*
Apr-16	1.04	1.08	1.36					
May-16	1.24	1.08	1.61					
Jun-16	1.28	1.08	1.61					
Jul-16	**1.48**	1.08	**1.86**					
Aug-16	1.34	1.08	1.66					
Sep-16	1.15	1.08	1.47					
Oct-16	0.98	1.08	1.45					
Nov-16	1.08	1.08	1.29					
Dec-16	0.92	1.08	1.14					

Note: **Bold** indicates 5 Yr Max (ADF & MDF)

2.5.2 Peaking Factor - Maximum Daily Flow

Over the past five years, the maximum peak was 1.75 and occurred June 2015.

Figure 23 – Ponte Vedra Grid Maximum Day Peaking Factor



2.5.3 Ponte Vedra Grid Projected Flow

The Ponte Vedra Grid Forecast is listed in the Table 17 and Figure 24. The forecast uses the 5-year average gross per-capita water usage and the BEBR forecast to calculate the future water demands.

Table 17 – Ponte Vedra Grid Flow Projection

Ponte Vedra Grid Flow Projection			
Year	JEA Total Water Demand (MGD)	Ponte Vedra Grid Water Demand (MGD)	Max Day Flow (MGD)
2019	126.53	1.08	1.89
2020	129.16	1.08	1.89
2025	139.82	1.11	1.95
2030	148.53	1.13	1.98
2035	156.80	1.15	2.02
2040	163.89	1.15	2.02
2045	165.31	1.15	2.02

2.5.4 Treatment Plant Capacity

Water Plants are permitted and designed based on the maximum amount of water the plant can produce over a one day period. Plant Capacity will be discussed on a max day capacity. Capacity calculations are based on the FDEP methodology and compare what's available to the FDEP permitted capacity.

Finished water storage exists to provide ample water supply during the peak hour water usage. Storage at each facility was looked at in the calculation sheets and will be discussed separately and is not listed in the summary table. The storage volume needs to meet one of the two criteria set by FDEP. The first of the two criteria is that the volume of storage equal 25% of the Max day flow. The second, looks at equalization storage and fire flow storage needed for a determined duration. The conditions used for this report were:

- Peak hour flow for 4 hrs. (Peak Hour flow = HSP pumping rate – well pumping rate)
- Fire flow of 1500gpm for 2 hrs. at Max Day Demand Condition.

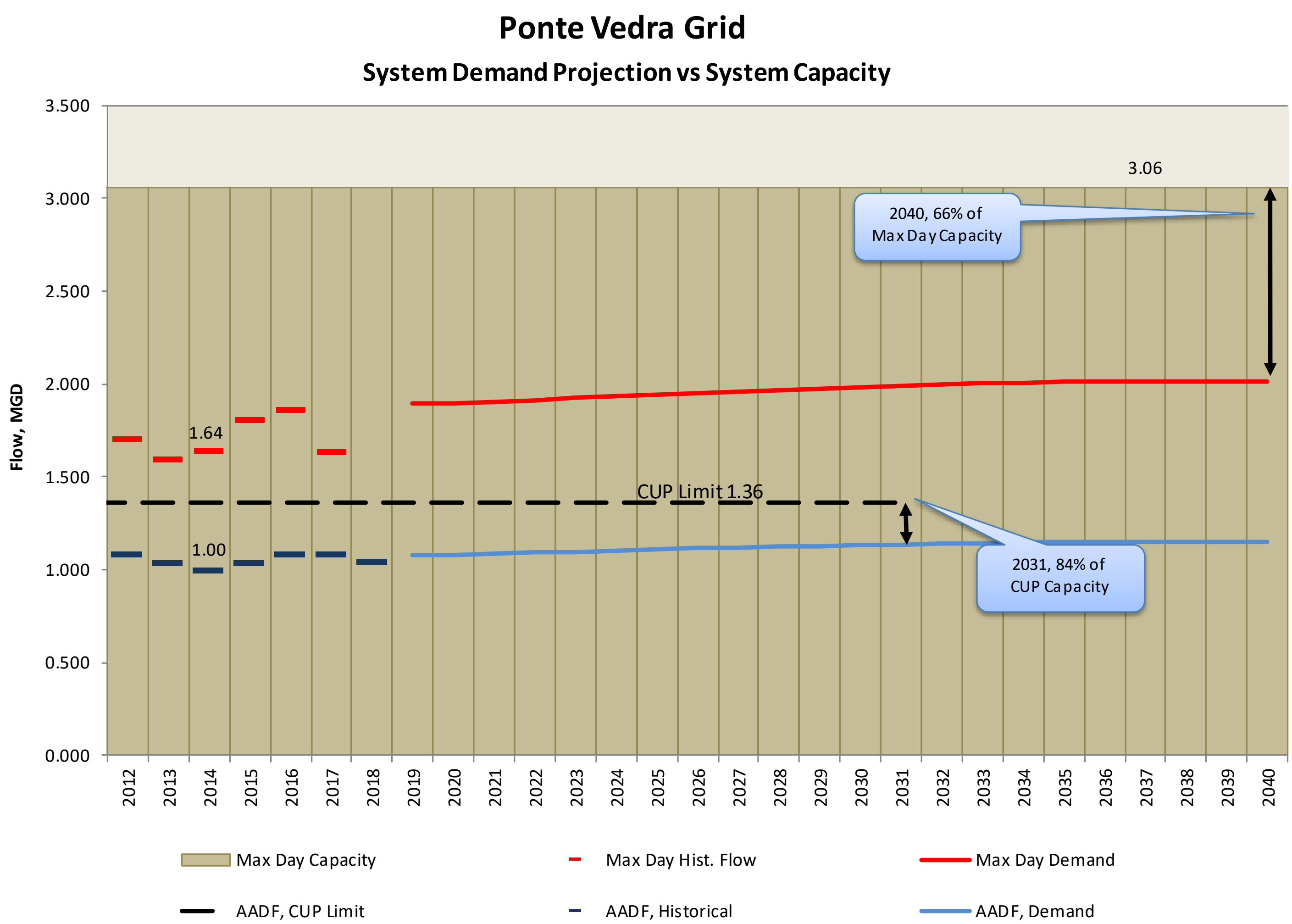
Firm capacity is defined as the water plants capacity with largest pump out of service. With a gridded system, technically the firm capacity of the grid would be calculated with only the one largest pump out of service. Due to the size of the JEA grid this methodology is not practical.

Table 18 – Ponte Vedra Grid Plant Capacities

Name of Facility	Number of Wells	Design Well Capacity, MGD	Design Well Capacity (Firm), MGD	Total Storage Capacity, MG	Number of High Service Pumps	Pump Capacity, MGD	Pump Capacity (Firm), MGD	FDEP Permitted Capacity, MGD
Ponte Vedra N	1	2.59	2.59	0.15	2	2.06	2.06	0.98
Corona Rd	2	5.47	2.59	0.35	3	4.36	2.06	2.08
SUMMARY	**3**	**8.06**	**5.18**	**0.50**	**5**	**6.42**	**4.12**	**3.06**

[1]Capacity Analysis Reports for each water facility is available upon request.

Figure 24 – Ponte Vedra Grid Demand Projection vs System Capacity



2.5.5 Individual Treatment Plant Summaries

Proposed facility expansions and new facilities are planned in order to more evenly distribute the production and pumping capabilities of the gridded system while increasing the overall system reliability and quality.

Ponte Vedra North

Per the capacity analysis for the WTP a GST expansion is needed to meet overall system reliability. The equipment at the WTP is nearing the end of its service life. The CUP limit for the WTP is 0.24 MGD AADF.

> ***Action:*** *Evaluate timing of GST expansion to coincide with timing of full plant rehabilitation. Coordination with the Real Estate group is needed to ensure adequate room for new equipment.*

Corona

There are no capacity related issues at this WTP. The CUP limit for the WTP is 1.12 MGD AADF.

> ***Action:*** *Continue to monitor wellfield production.*

2.5.6 Current 10 Year Capital Improvement Projects

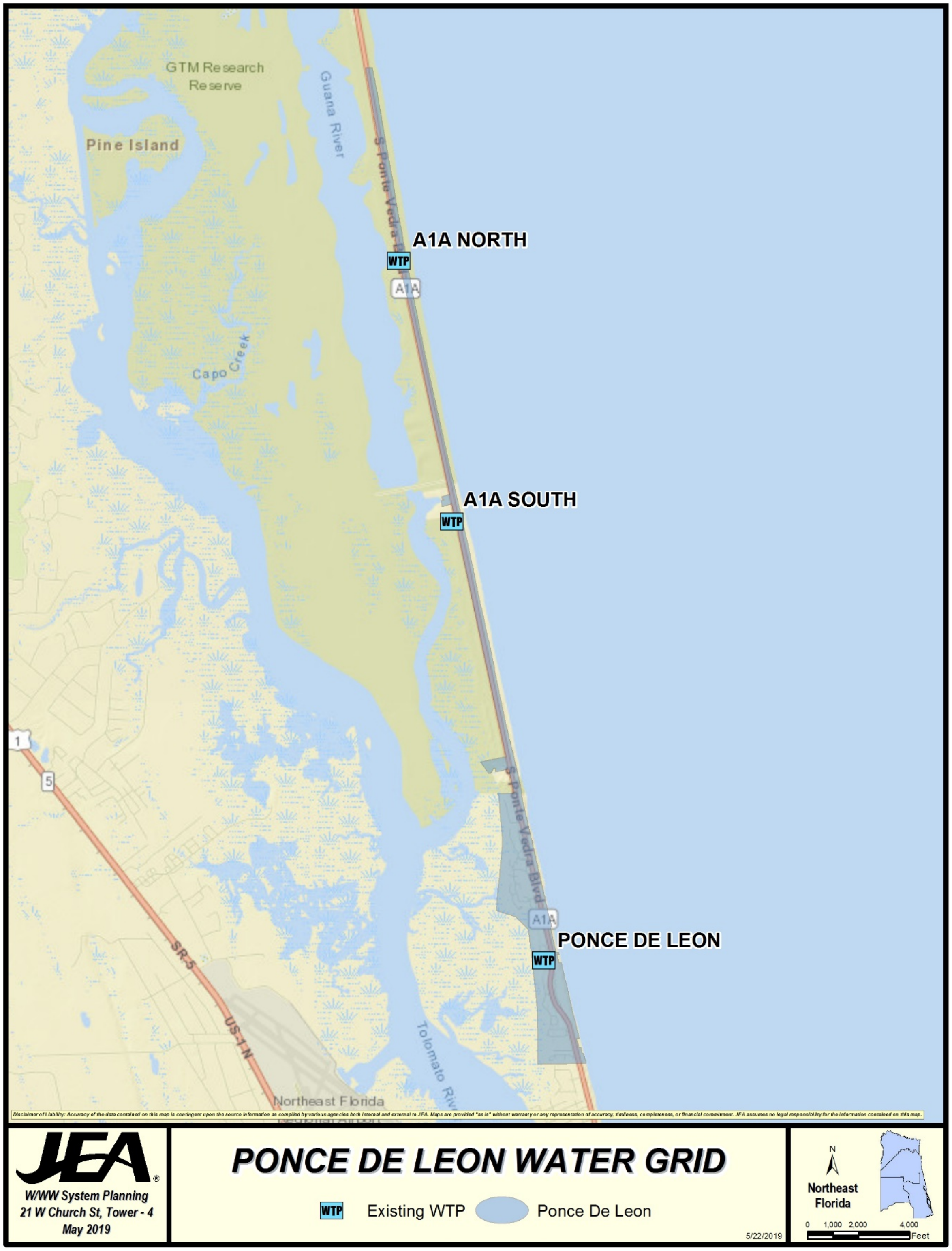
No capital improvements are in the CIP for this grid.

2.6 Ponce de Leon Grid Potable Water System

The Ponce de Leon Grid (PWS 2554334) is owned, operated and maintained by JEA. JEA's Ponce de Leon service grid is located in eastern St. Johns County along Ponte Vedra Blvd from Yellow Bill Lane in the north to Eden Bay Drive in the south. The Ponce de Leon service grid consists of 3 interconnected WTPs with a permitted max day capacity of 1.05 MGD. There is approximately 18 miles of transmission and distribution mains within the Ponce de Leon service grid.

This section of the AWRMP specifically discusses the Ponce de Leon grid, which includes 4 wells, 4 storage tanks with a total of 0.61 Mgal and 8 high service pumps. The service area for the Ponce de Leon Grid is shown in Figure 25.

Figure 25 – Ponce de Leon Grid Service Area



2.6.1 5 year Historical Water Demand Data

Over the past five years the annual average daily flow has been relatively stable, ranging from 0.22 MGD to 0.52 MGD. Population growth in Ponce de Leon is minimal and water demands have shown a slight increase.

The maximum daily flow over the past five years was 0.91 MGD and occurred in August 2016. Typically May, June or July is the highest demand month of the year. The historical data is listed in the following Table 19 and Figure 26. The historical information shown is based on water plant meter data.

Figure 26 – Ponce de Leon Grid 5-Year Historical Potable Water Demand

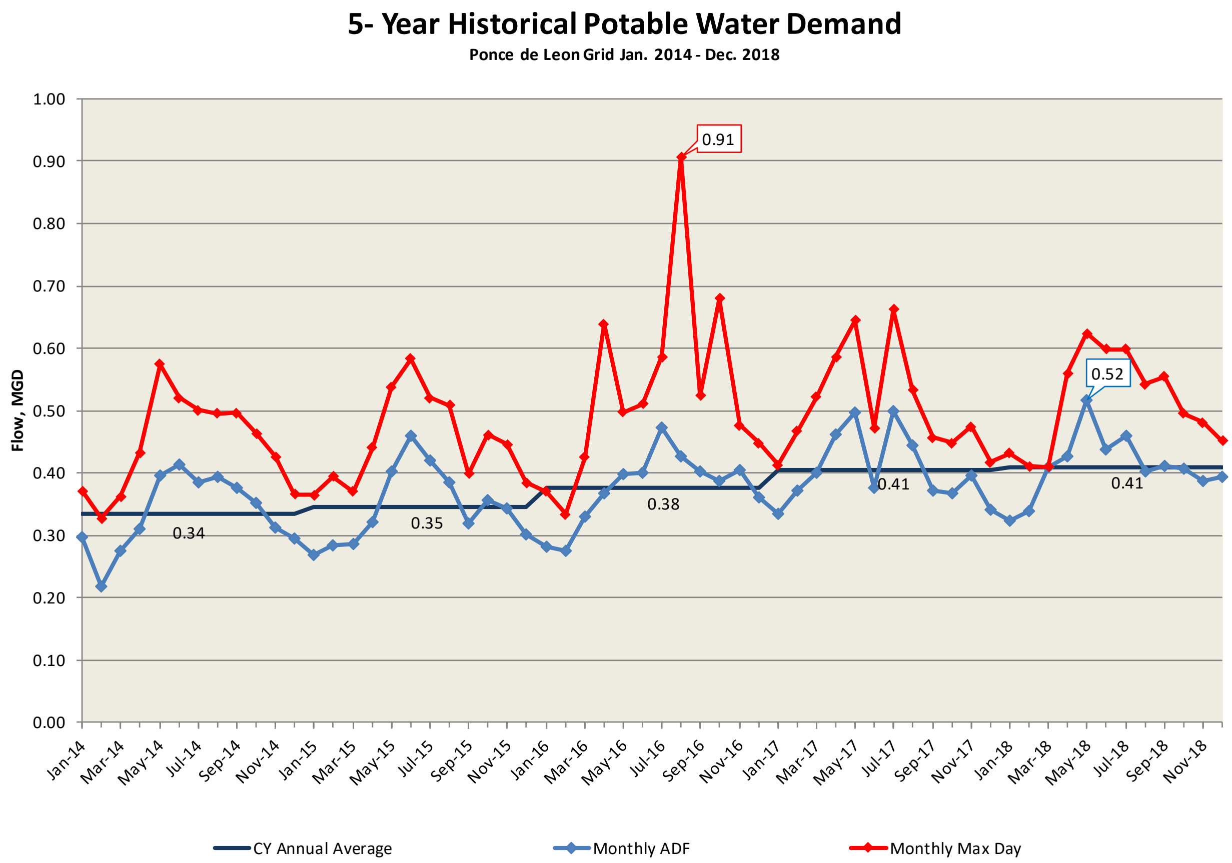


Table 19 – Ponce de Leon Grid 5-Year Historical Water Demand

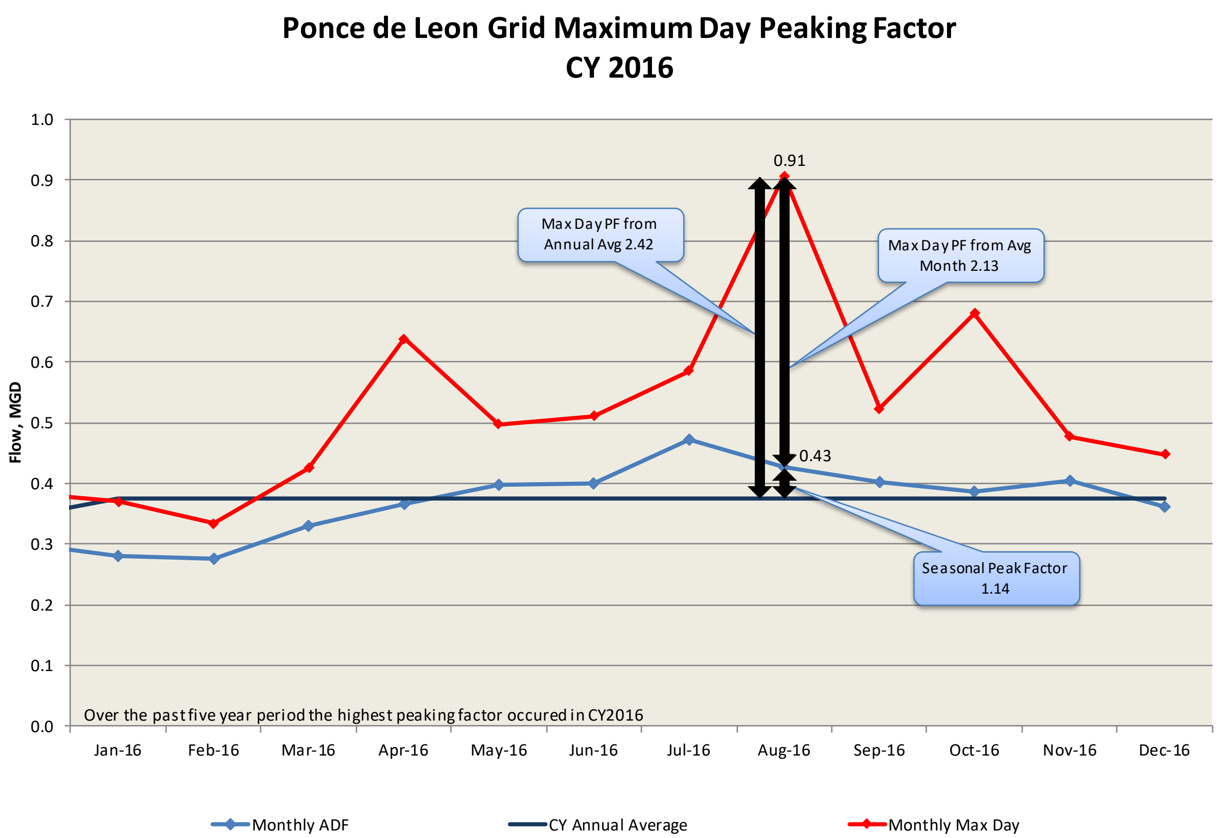
5 Year Historical Water Demand Data								
Ponce de Leon Grid Water Demand								
Date Mo/Year	Monthly ADF (MGD)	CY Avg. (MGD)	Monthly Max Day (MGD)		Date Mo/Year	Monthly ADF (MGD)	CY Avg (MGD)	Monthly Max Day (MGD)
Jan-14	0.30	0.34	0.37		Jan-17	0.33	0.41	0.41
Feb-14	0.22	0.34	0.33		Feb-17	0.37	0.41	0.47
Mar-14	0.28	0.34	0.36		Mar-17	0.40	0.41	0.52
Apr-14	0.31	0.34	0.43		Apr-17	0.46	0.41	0.59
May-14	0.40	0.34	0.57		**May-17**	**0.50**	0.41	0.65
Jun-14	0.41	0.34	0.52		Jun-17	0.38	0.41	0.47
Jul-14	0.38	0.34	0.50		Jul-17	0.50	0.41	0.66
Aug-14	0.39	0.34	0.50		Aug-17	0.44	0.41	0.53
Sep-14	0.38	0.34	0.50		Sep-17	0.37	0.41	0.46
Oct-14	0.35	0.34	0.46		Oct-17	0.37	0.41	0.45
Nov-14	0.31	0.34	0.43		Nov-17	0.40	0.41	0.48
Dec-14	0.30	0.34	0.37		Dec-17	0.34	0.41	0.42
Jan-15	0.27	0.35	0.37		Jan-18	0.32	0.41	0.43
Feb-15	0.28	0.35	0.39		Feb-18	0.34	0.41	0.41
Mar-15	0.29	0.35	0.37		Mar-18	0.41	0.41	0.41
Apr-15	0.32	0.35	0.44		Apr-18	0.43	0.41	0.56
May-15	0.40	0.35	0.54		May-18	0.52	0.41	0.62
Jun-15	0.46	0.35	0.58		Jun-18	0.44	0.41	0.60
Jul-15	0.42	0.35	0.52		Jul-18	0.46	0.41	0.60
Aug-15	0.39	0.35	0.51		Aug-18	0.40	0.41	0.54
Sep-15	0.32	0.35	0.40		Sep-18	0.41	0.41	0.56
Oct-15	0.36	0.35	0.46		Oct-18	0.41	0.41	0.50
Nov-15	0.34	0.35	0.45		Nov-18	0.39	0.41	0.48
Dec-15	0.30	0.35	0.39		Dec-18	0.39	0.41	0.45
Jan-16	0.28	0.38	0.37		*5 Yr Min*	*0.22*		*0.33*
Feb-16	0.28	0.38	0.33		*5 Yr Max*	*0.50*		*0.91*
Mar-16	0.33	0.38	0.43		*5 Yr Avg*	*0.37*		*0.49*
Apr-16	0.37	0.38	0.64					
May-16	0.40	0.38	0.50					
Jun-16	0.40	0.38	0.51					
Jul-16	0.47	0.38	0.59					
Aug-16	0.43	0.38	**0.91**					
Sep-16	0.40	0.38	0.52					
Oct-16	0.39	0.38	0.68					
Nov-16	0.40	0.38	0.48					
Dec-16	0.36	0.38	0.45					

Note: **Bold** indicates 5 Yr Max (ADF & MDF)

2.6.2 Peaking Factor - Maximum Daily Flow

The max daily flow (MDF) is used to size well fields and is the basis for FDEP permitting. Since The JEA demand projections are on an annual average basis, the MDF peaking factor is calculated by comparing the max day for each month to the CY annual average flow. Over the past five years, the maximum Peak was 2.42 and occurred August 2016.

Figure 27 – Ponce de Leon Grid Maximum Day Peaking Factor



2.6.3 Ponce de Leon Grid Projected Flow

The Ponce de Leon Grid Forecast is listed in Table 20 and Figure 28. The forecast uses the 5-year average gross per-capita water usage and the BEBR forecast to calculate the future water demands.

Table 20 – Ponce de Leon Grid Flow Projection

Ponce de Leon Grid Flow Projection			
Year	Total JEA Water Demand (MGD)	Ponce de Leon Grid Water Demand (MGD)	Max Day Flow (MGD)
2019	126.53	0.39	0.94
2020	129.16	0.40	0.97
2025	139.82	0.43	1.04
2030	148.53	0.45	1.09
2035	150.19	0.45	1.09
2040	163.89	0.45	1.09
2045	165.31	0.45	1.09

2.6.4 Treatment Plant Capacity

Water Plants are permitted and designed based on the maximum amount of water the plant can produce over a one day period. Plant Capacity will be discussed on a max day capacity. Capacity calculations are based on the FDEP methodology and compare what's available to the FDEP permitted capacity.

Finished water storage exists to provide ample water supply during the peak hour water usage. Storage at each facility was looked at in the calculation sheets and will be discussed separately and is not listed in the summary table. The storage volume needs to meet one of the two criteria set by FDEP. The first of the two criteria is that the volume of storage equal 25% of the Max day flow. The second, looks at equalization storage and fire flow storage needed for a determined duration. The conditions used for this report were:

- Peak hour flow for 4 hrs. (Peak Hour flow = HSP pumping rate – well pumping rate)
- Fire flow of 1500gpm for 2 hrs. at Max Day Demand Condition.

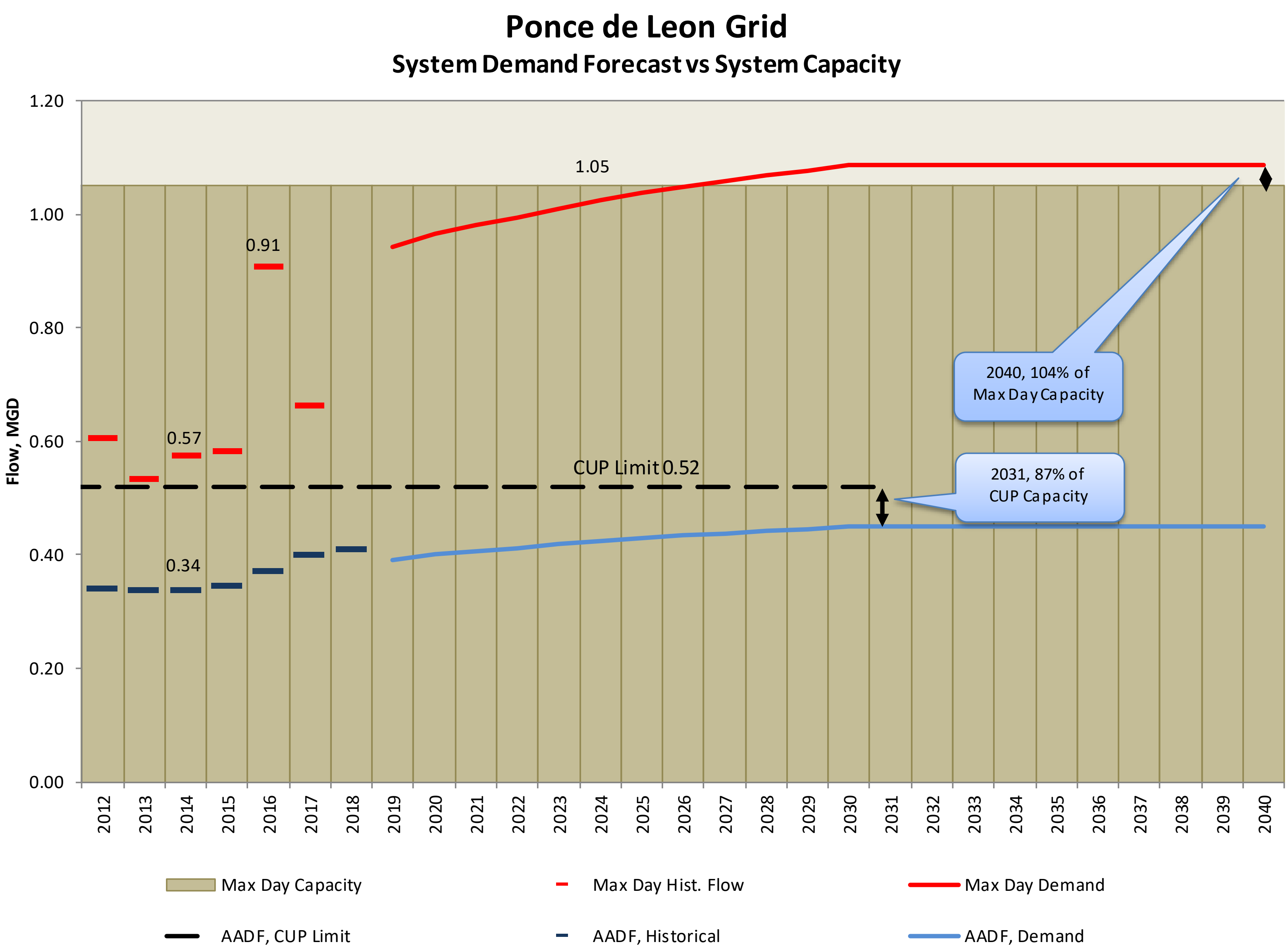
Firm capacity is defined as the water plants capacity with largest pump out of service. With a gridded system, technically the firm capacity of the grid would be calculated with only the one largest pump out of service. Due to the size of the JEA grid this methodology is not practical.

Table 21 – Ponce de Leon Grid Plant Capacities

Name of Facility	Number of Wells	Design Well Capacity, MGD	Design Well Capacity (Firm), MGD	Total Storage Capacity, MG	Number of High Service Pumps	Pump Capacity, MGD	Pump Capacity (Firm), MGD	FDEP Permitted Capacity, MGD
Ponce de Leon	2	1.15	0.43	0.58	3	2.71	1.56	0.87
A1A North	1	0.58	0.58	0.015	2	0.81	0.40	0.09
A1A South	1	0.58	0.58	0.015	3	1.25	0.52	0.09
SUMMARY	**4**	**2.31**	**1.59**	**0.61**	**8**	**4.77**	**2.48**	**1.05**

[1]Capacity Analysis Reports for each water facility is available upon request.

Figure 28 – Ponce de Leon Grid System Demand Forecast vs System Capacity



2.6.5 Individual Treatment Plant Summaries

Proposed facility expansions and new facilities are planned in order to more evenly distribute the production and pumping capabilities of the gridded system while increasing the overall system reliability and quality.

Ponce de Leon

Due to signs of well failure, decreased production and pumping sand, a replacement well for well number 2 was started in FY19. The CUP limit for the WTP is 0.44 MGD AADF

> ***Action:*** *Complete well replacement project. Continue to monitor wellfield production.*

A1A North

There are no capacity related issues with this WTP. The CUP limit for the WTP is 0.04 MGD AADF.

> ***Action:*** *Continue to monitor wellfield production.*

A1A South

There are no capacity related issues with this WTP. The CUP limit for the WTP is 0.04 MGD AADF.

> ***Action:*** *Continue to monitor wellfield production.*

2.6.6 Current 10 Year Capital Improvement Projects

Table 22 – Ponce de Leon Grid Capital Improvement Projects (in thousand $'s)

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
128-07	Ponce De Leon WTP - Well No 2 Replacement	$1,048	$790	$258	$0	$0	$0	$0	$0	$0	$0	$0	$0
		TOTAL	**$790**	**$258**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Appendix 1

2018 Water Demand Projections

JEA 2018

JEA Water, Wastewater, Reclaimed Water Customer Population Projections and Demand Forecasts

Prepared By:
JEA Water/Wastewater Systems Planning

November 2018

Table of Contents

Introduction and Purpose

Water and Sewer System Planning provides consolidated water, wastewater and reclaimed water forecast annually as a reference document for planning capital project needs, water/wastewater management planning, and preparation of annual capacity analysis reports.

In fulfilling our community responsibility, JEA must plan appropriately for continued supply of our products to all customers in our authorized service area whenever and wherever feasible to do so. Sound planning requires forecasting of future demands as well as the costs of meeting those demands which is further addressed by the capital and O&M budgeting processes. Consumptive Use permitting of current and future water supplies also requires forecast of future demand within authorized service areas. Water and Wastewater Facility Permits require periodic capacity analysis reports based on forecasted water demand and wastewater generation. The forecast procedure endeavors to successfully fulfill all of these requirements.

Historical demand patterns can effectively be used to forecast demands only if historical growth patterns are expected remain relatively constant. For the JEA service areas, this has not always been a reasonable assumption. Basing demand on population growth projections, allows for reasonable assumptions to be made regarding anticipated growth patterns using statistical correlation and regression analysis applied to a variety of demographic data including categorical consumption.

The population projections include predictions of five year increments over a planning period through fiscal year 2045. These projections may also be applied as calendar year projections without appreciable error due to the limited precision inherent in any forecasting process of this nature. This document includes a description the methods employed to develop this year's projection of the population served by JEA (i.e. customer population) for each fiscal year along with an estimate of the populations served for each of the past five fiscal years.

This document updates the February 2018 forecast to include distribution of the forecasted demand among the six established JEA water grids and align the demand to calendar years for correlation to Water Management District Consumptive Use Permitting provisions. The methods employed are consistent in concept with those used in the February 2018 forecast.

Population Projection

The water, wastewater and reclaimed water forecasts are typically prepared using 20-25 year county level population projections based on the latest University of Florida's Bureau of Economic and Business Research (BEBR) Medium Population Projections by County. Disaggregation of the county level projections to JEA service areas has been provided through FY 2017 contract work by GIS and Associates (GISA). GISA used data from BEBR provided as an estimate for April 1, 2016 and projections in five year increments from 2020 to 2045 as correlation for their parcel level projections which are also provided in five year increments from 2020 to 2045. The primary time period used for the population analyses is a nominal calendar year; however, customer source data from past time periods is frequently summarized for fiscal year periods from shorter time period data (e.g. monthly). Population projections are in five year time increments consistent with latest available county level projections provided by BEBR. The demand covers a planning period of at least 20 years.

Regarding their population projection, U.S. Census Bureau has stated,

> *"Projections are estimates of the population for future dates. They illustrate plausible courses of future population change based on assumptions about future births, deaths, international migration, and domestic migration. Projected numbers are based on an estimated population consistent with the most recent decennial census as enumerated, projected forward using a variant of the cohort-component method.*
>
> *Several alternative series of projections are produced based on alternative assumptions for future fertility, life expectancy, net international migration, and (for state-level projections) state-to-state or domestic migration. For each of these components of population change--fertility, mortality and net migration--three different assumptions about the future are applied. The series using the middle assumption for each component--generally designated as the "middle series"--is the most commonly used."*

The methods used by BEBR are described in, "Projections of Florida Population by County, 2020–2045, with Estimates for 2017." (2018) The methods used by GISA are described in, "JEA 2017 Population Projections and Methods." (2018) The methods of both BEBR and GISA are consistent with the general approach described above by the U.S. Census Bureau. BEBR County population growth projections are evaluated by determining the county growth for each five year increment and the percent change from previous year projections for each year's revised projections. The percent changes are applied to the disaggregated growth estimates from the GISA study to update the population growth anticipated in the JEA service area.

In late 2009, an analysis of active JEA water and sewer accounts on 09/19/2008 estimated 2.32 persons were served for every active water account and 2.01 persons received JEA sewer services for every active water account. This estimate continues to be used in the periodic metrics provided by Water and Sewer System Planning.

For the last two years the forecast considered two new developments in available source data. The population of a single family household was established by the 2010 census. For our service area, weighted county averages provide by the census suggested that approximately 2.5 persons per single family connections would result in a reasonable value for estimating population served over the previous five year period 2011-2015. In 2016, GISA completed another contract to focus on and evaluate the population equivalent of multifamily service connections. On average, each multifamily service connection serves about 23 units based on this GISA evaluation. Using 2010 census data, the results also indicated that the average population equivalent of a multifamily service unit was about 2.2 persons. Using these values, 2.5 persons for single family connections and 2.2 persons per unit times 23 units (51 persons average) for each multifamily service connections, historic population served has been reevaluated for all years since the analysis year 2011. While this indicated that past estimates using the above multipliers were lower than these values, it was determined that the use of these figures as factor for past demand allocation would not have significantly changed the resultant demand calculations due to offsetting effects. The estimates of population served during the previous five years currently reflects the revised determination of customers per connection consistent with last year's forecast.

Last year additional considerations were evaluated. Household size values provided by the Census Bureau as reported in the American Community 2010-2014 - 5 year estimate were significantly larger than the 2010 census as shown in Table 1 on the next page.

Table 1

County	2010 Average household size	2014 Average household size
Clay	2.76	2.84
Duval	2.47	2.58
Nassau	2.53	2.65
St. Johns	2.49	2.59

However, population estimates prior to the 2010 census determination of population indicated a substantial overestimate of the population. This suggests that the estimated increase *may* also overestimate current population. For our service area, weighted county averages provide by the census may still result in a reasonable value for estimating population served over the new five year period 2013-2017. For this reason, and since the actual values used have offsetting effects on the demand forecast, this year's forecast is based on the same household size values used in prior year forecasts. This consistency also provides for improved comparability to prior year's projections.

The Grid level update has included a further refinement by using the US Census block level data from the 2010 census to evaluate the persons per household for customer connections geographically within each census block for both single family dwellings and multifamily units. For the purpose of this forecast, the potential difference in persons per household between single and multi family units was considered to be effectively addressed by the block level average of persons per household.

Water Service Population

The average number of active single family primary water service connections in fiscal year (FY) 2017 was about 279,000 The average number of active multifamily family primary water service connections in fiscal year FY 2017 was 3,340 or about 76,900 dwelling units. These water service connections were obtained from the JEA billing system by finance. Applying the 2.5 multiplier to single family units gives about 700,000 persons. Applying 2.2 persons to multifamily units gives about 171,000 persons. The total is about 871,000 persons that were served water on average during FY 2017. In the same way, the average number of persons served water in CY 2016 was calculated to be about 854,000 while the GISA estimate of the population in JEA service areas in 2016 was about 957,000. The difference is primarily attributable to population in JEA service areas that is self served. In 2016, this amounts to about 11% of the population. The projected customers assumed a 0.5 percent decrease in the self served population each year until 95% of the service area population is served by JEA. It is assumed that JEA will not be able to serve more than 95% of the service area population during the planning period.

SJCUD purchases water from JEA and discharges wastewater to JEA to serve an areas in St. Johns County adjacent to the JEA service area. These amounts are based on contractural agreement and have been excluded from both the water and wastewater demand forecast.

Table 2, below, lists the *revised* projections of the populations served water for each fiscal year from the present to 2045 based on the Grid level customer projections discussed herein.

Table 2

Year	Water Customers
2013	810,000
2014	820,000
2015	840,000
2016	850,000
2017	870,000
2018	890,000
2019	910,000
2020	930,000
2025	1,000,000
2030	1,070,000
2035	1,130,000
2040	1,180,000
2045	1,230,000

GIS analysis was used to correlate all JEA customer premises and number of units with applicable water service grid and 2010 U. S. Census blocks for population per housing unit as indicated above. This information was used with billing data to estimate the customer population billed or population served for each of the past six calendar years for each water service Grid. The revised Table 2 above reflects this refined approach. Table 3 on the next page provides the Grid level distribution for this historical estime of customer population by Grid and includes projected customer population based an anlysis described below.

Table 3

Population Distribution by Water Grid						
Year	North	South	Nassau	Ponte Vedra (right scale)	Ponce De Leon (right scale)	Mayport (right scale)
2012	324,277	453,855	11,285	4,864	1,262	167
2013	326,976	462,344	11,863	4,876	1,277	170
2014	329,854	470,144	12,866	4,890	1,282	181
2015	335,930	479,572	13,935	4,943	1,299	180
2016	342,199	490,441	15,334	4,997	1,318	184
2017	339,071	507,428	18,729	5,074	1,437	184
2018	348,850	513,662	20,768	5,076	1,440	188
2019	358,629	519,897	22,808	5,078	1,443	192
2020	368,408	526,131	24,848	5,080	1,445	196
2025	404,169	562,969	27,483	5,184	1,583	224
2030	439,397	589,177	30,117	5,289	1,631	288
2035	476,177	610,944	32,751	5,393	1,631	314
2040	509,268	627,939	35,385	5,393	1,631	341
2045	540,402	644,203	38,019	5,393	1,631	345

Planning GIS used the parcel level projections provided by GISA to provide apportioned GISA growth increments based on the latest current and future service area delineations. GISA forecast are based on BEBR projections for the 2016 base year. These were adjusted for the updated BEBR projection base on the 2017 base year. The updated five year growth increments were applied to FY 2017 population served (about 870,000) as distributed. GIS analysis was also used to distribute the BEBR adjusted parcel level population growth projections to each water grid. The distributed five year growth increments were applied to CY 2017 population served for each Grid identified in Table 3 to generate the grid level population projections. Assessment of historical population and trends by grid when compared to the adjusted GISA projections presented some anomalies which required further refinement to accommodate area specific factors. Specifically, adjustments were necessary to the Nassau Grid and the PonteVedra Grid. Increases in customers within existing service area was only applied to North Grid and Nassau Grid. The historical population and the resultant projections are tabulated by Grid in Table 3.

Sewer Service Population

The same basic approach was used for determining a projection of future population receiving sewer service. Table 4 on the next page, lists the projections of the populations receiving sewer service for each fiscal year from the present to 2045.

Table 4

Year	Sewer Customers
2013	710,000
2014	730,000
2015	740,000
2016	760,000
2017	780,000
2018	790,000
2019	800,000
2020	810,000
2025	880,000
2030	930,000
2035	980,000
2040	1,020,000
2045	1,070,000

Water Demand Distribution

Water Demand Distribution was establish using groundwater production for each Grid as delineated in the biannual EN50 reports for the past six calendar years summarized in Table 5.

Table 5

From EN50 summary							
CY	North Grid Total	South Grid Total	Ponte Vedra Grid Total	Ponce de Leon Grid Total	Lofton Oaks Grid Total	Mayport Total	JEA
2012	49.83	58.54	1.08	0.34	2.19	0.06	103.82
2013	49.27	52.66	1.03	0.34	2.01	0.07	99.73
2014	55.50	48.31	1.00	0.34	2.19	0.07	102.68
2015	58.92	48.36	1.03	0.35	2.26	0.06	107.02
2016	56.90	53.76	1.09	0.37	2.65	0.06	111.85
2017	61.37	48.51	1.08	0.40	2.89	0.05	114.30

Grid Demand was estimated from the production data by adjustment to reflect grid reallocation using river crossings, wholesale sales to St. Johns County Utility Department, reclaimed water used to offset potable water demand and normalizing weather effects on water demand.

Water Demand Forecast by Grid

Using the population served by Grid and the estimated grid demand the water demand per capita was calculated for each grid for each of the past five calendar years. The past five calendar years were then averaged for each of the grids to provide a basis for future water demand forecast by grid. Initially, water demand was forecasted for each of the grids using average water demand per capita multiplied times the projected population served based on the assumption that future demand is proportional to population growth.

Inspection of the results indicated that this approach, when applied to the unique nature of the Mayport grid, seemed to generate excessive future demand. Mayport has characteristics, commercial use and transient population, that result in a high demand per capita when applied to the small permanent population. These characteristics are significantly different than any other JEA grid so Mayport warranted a different analytical approach than any other JEA grid. Accordingly, the forecast for Mayport assumes that demand growth is proportion to a normal exponential growth curve based solely on historical demand trend.

The results of the final forecast of water demand per grid are shown in Table 6.

Table 6

Year	North Grid	South Grid	South Grid with SJCUD	Nassau Grid	Ponte Vedra Grid	Ponce de Leon Grid	Mayport	Total Water Demand with SJCUD
2012	42.67	68.96	69.67	2.23	1.10	0.35	0.06	116.07
2013	42.73	65.45	66.15	2.11	1.08	0.35	0.07	112.48
2014	42.84	65.77	66.52	2.25	1.03	0.35	0.07	113.06
2015	43.40	66.36	67.24	2.26	1.03	0.35	0.06	114.33
2016	43.41	70.14	71.23	2.63	1.08	0.37	0.06	118.77
2017	42.61	72.38	73.58	2.88	1.08	0.40	0.05	120.60
2018	44.81	72.47	73.98	3.49	1.08	0.39	0.07	123.82
2019	46.07	73.35	75.09	3.83	1.08	0.39	0.07	126.53
2020	47.32	74.23	76.12	4.17	1.08	0.40	0.07	129.16
2025	51.92	79.43	81.68	4.61	1.11	0.43	0.07	139.82
2030	56.44	83.13	85.38	5.06	1.13	0.45	0.07	148.53
2035	61.17	86.20	88.45	5.50	1.15	0.45	0.08	156.80
2040	65.42	88.60	90.85	5.94	1.15	0.45	0.08	163.89
2045	69.42	90.89	93.14	6.38	1.15	0.45	0.09	170.63

Forecast Demand

The revised demand forecast is based on the updated projected population served and historical per capita demand adjusted for the Grid level water analysis results is shown in Table 7 on the next page. The demand/flow forecast values are in million gallons per day. The water demand is total including reclaimed water.

Table 7

Year	Water Demand[1]	Sewer Flow[1]	Reclaimed Water Flow
2018	122	82	17
2019	125	83	19
2020	127	84	19
2025	138	91	23
2030	146	96	27
2035	155	102	31
2040	162	107	34
2045	168	-	

[1]Excludes SJCUD demand

WASTEWATER TREATMENT FACILITIES

Table of Contents

1 Introduction

The wastewater treatment facilities section of this Annual Water Resource Master Plan provides key information related to the JEA wastewater treatment facilities, historical and projected. JEA currently operates and maintains 11 wastewater treatment facilities in Duval, St. Johns and Nassau Counties with three more facilities planned in the future. Projected flows for the overall combined system and each individual treatment plant service area is presented and discussed. Key projects are identified for each active treatment facility and facilities to be constructed in the near future. Additionally the capital budget for each facility is detailed along with a process inspection summary for each treatment facility.

2 Total Maximum Daily Load

On April 27, 2004, the EPA approved a Total Maximum Daily Load (TMDL) for the Lower St Johns River, setting the maximum amount of nitrogen discharge allowed to the river. Since 2004, JEA has made system wide improvements including: treatment facility phase outs, major wastewater treatment facility (WWTF) process improvements, I&I (inflow and infiltration) reduction and increased reclaimed water production to reduce the amount of nitrogen discharged to the St Johns River. In 2015 the JEA TMDL limit was reduced from 720 to 683.2 tons per year. The reduction was a result of a nitrogen trading credit agreement with the City of Jacksonville. As a utility, JEA has reduced total nitrogen discharges from 1,435 tons in 2001 to 421 tons as of May 2019 (rolling 12 month total), a 71% reduction. Tons of nitrogen discharged in FY18 totaled 550.

Figure 1: Total Nitrogen Discharge to the St Johns River

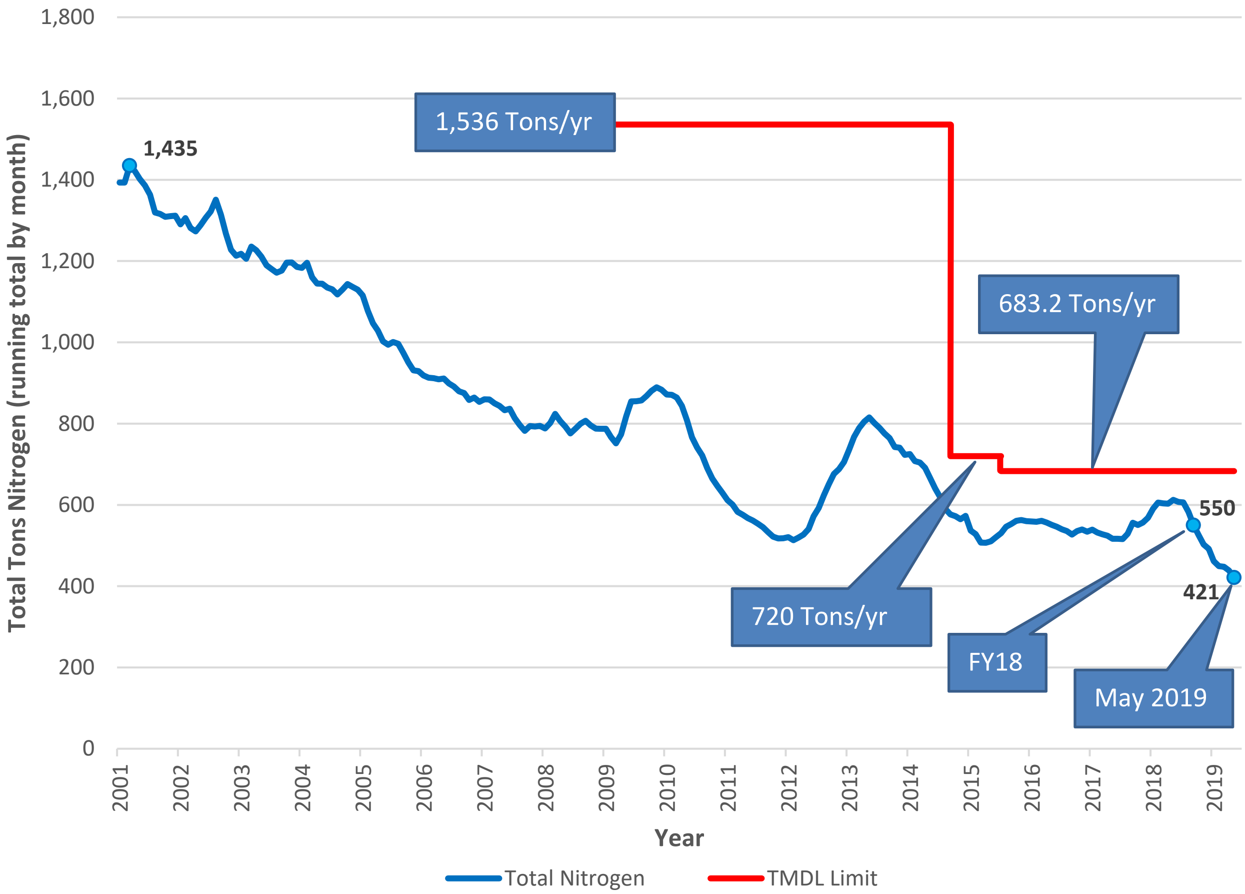
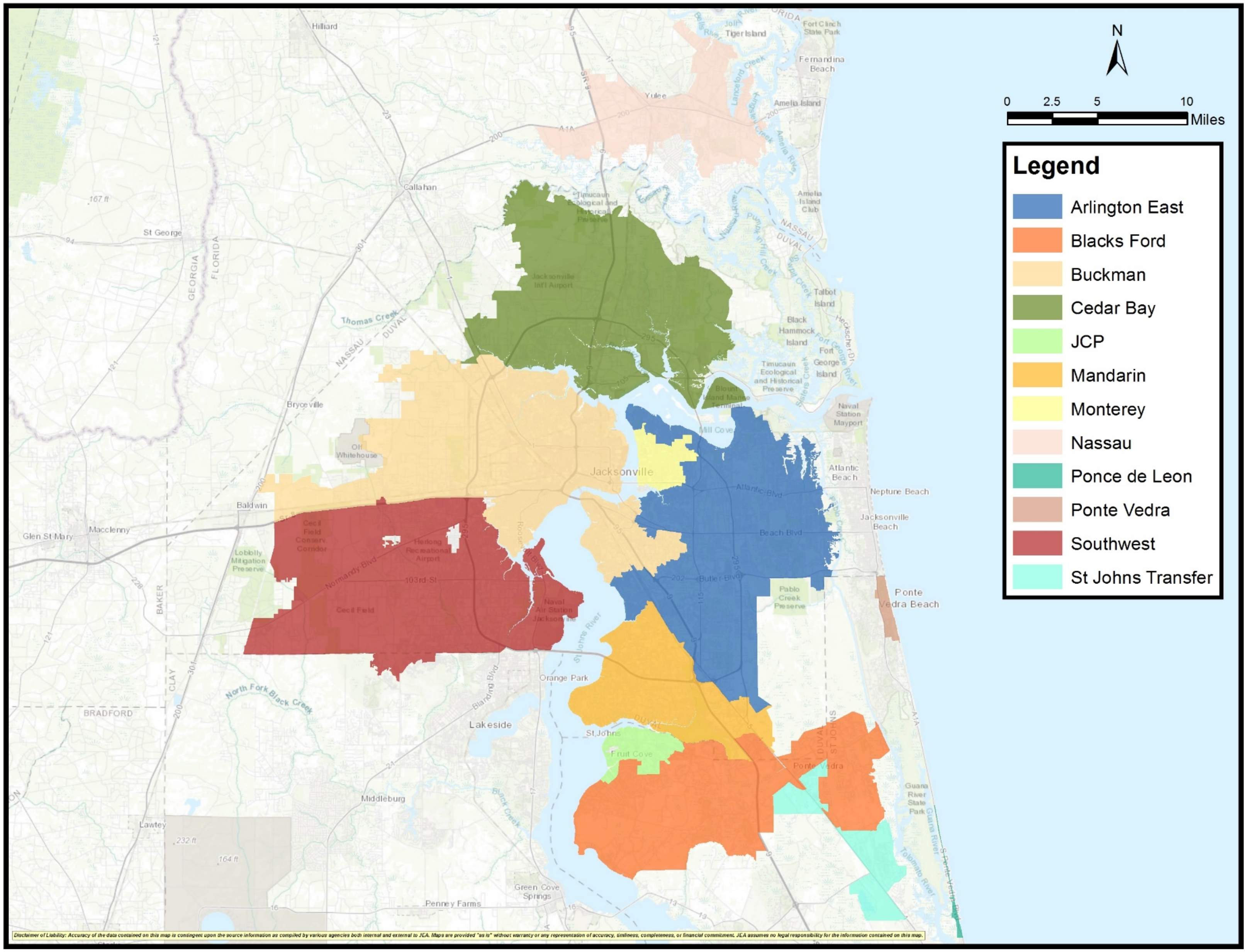


Figure 2: Wastewater Service Areas



3 Five Year Historical Water Demand Data

Over the past five years treated wastewater flows have slightly increased, from 75 mgd to 80 mgd. The highest monthly max day of 203 mgd occurred in September of 2017 as a result of Hurricane Irma. Major weather events typically cause peaks at wastewater facilities. June through September are the highest rainfall months for the year, on average. There is a program underway to study and reduce I&I in regions of the wastewater collection system seeing the greatest influence, a detailed discussion can be found in Appendix 2. Table 1 and Figure 3 below displays Historical Data from FY14 through FY18. The source of historical data is from Wastewater facility flow meters.

Figure 3: Historical Wastewater Flows

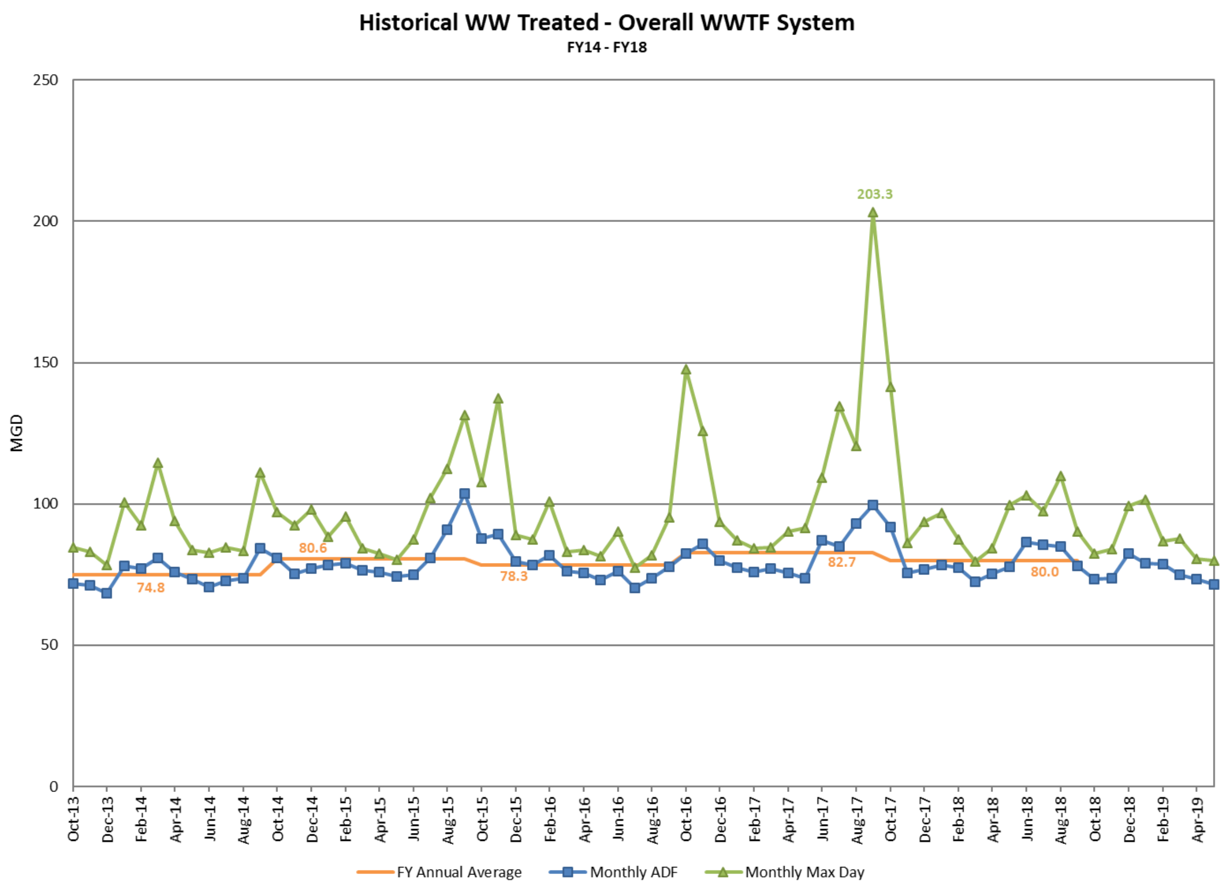


Table 1: System Wide 5 Year Historical Wastewater Flows

Date Mo/Year	Monthly ADF	CY Ann. Avg.	Monthly Max Day
Oct-13	71.73	74.82	84.52
Nov-13	71.16	74.82	83.17
Dec-13	68.49	74.82	78.44
Jan-14	78.01	74.82	100.68
Feb-14	77.18	74.82	92.26
Mar-14	80.95	74.82	114.53
Apr-14	75.75	74.82	94.02
May-14	73.31	74.82	83.74
Jun-14	70.62	74.82	82.89
Jul-14	72.78	74.82	84.71
Aug-14	73.70	74.82	83.35
Sep-14	84.20	74.82	111.22
Oct-14	80.73	80.60	96.95
Nov-14	75.27	80.60	92.53
Dec-14	77.00	80.60	97.89
Jan-15	78.22	80.60	88.21
Feb-15	78.87	80.60	95.48
Mar-15	76.62	80.60	84.26
Apr-15	75.77	80.60	82.30
May-15	74.16	80.60	80.36
Jun-15	74.95	80.60	87.30
Jul-15	81.02	80.60	102.15
Aug-15	90.92	80.60	112.37
Sep-15	103.66	80.60	131.48
Oct-15	87.62	78.32	107.60
Nov-15	89.44	78.32	137.29
Dec-15	79.65	78.32	88.87
Jan-16	78.52	78.32	87.33
Feb-16	81.88	78.32	100.81
Mar-16	76.05	78.32	83.01
Apr-16	75.65	78.32	83.68
May-16	72.94	78.32	81.59
Jun-16	76.19	78.32	90.34
Jul-16	70.33	78.32	77.49
Aug-16	73.64	78.32	81.83
Sep-16	77.89	78.32	95.37

Date Mo/Year	Monthly ADF	CY Ann. Avg.	Monthly Max Day
Oct-16	82.37	82.69	147.70
Nov-16	85.94	82.69	125.72
Dec-16	79.81	82.69	93.65
Jan-17	77.51	82.69	87.15
Feb-17	75.79	82.69	84.32
Mar-17	77.02	82.69	84.59
Apr-17	75.57	82.69	90.36
May-17	73.61	82.69	91.38
Jun-17	87.25	82.69	109.23
Jul-17	85.01	82.69	134.56
Aug-17	92.97	82.69	120.40
Sep-17	99.46	82.69	203.27
Oct-17	91.86	80.04	141.32
Nov-17	75.47	80.04	86.26
Dec-17	76.79	80.04	93.78
Jan-18	78.38	80.04	96.66
Feb-18	77.34	80.04	87.28
Mar-18	72.34	80.04	79.76
Apr-18	75.26	80.04	84.21
May-18	77.86	80.04	99.54
Jun-18	86.41	80.04	102.88
Jul-18	85.63	80.04	97.30
Aug-18	84.94	80.04	110.00
Sep-18	78.20	80.04	90.36
Oct-18	73.43		82.37
Nov-18	73.62		83.88
Dec-18	82.45		99.21
Jan-19	78.86		101.47
Feb-19	78.60		86.82
Mar-19	74.84		87.77
Apr-19	73.21		80.70
May-19	71.56		79.88

5 Year Overview (FY14-18)			
Min	68.49		77.49
Max	103.66		203.27
Avg	79.29		98.36

*units in MGD

4 Projected Flow

Projected wastewater can be found in Table 2 and also in Figure 4 below. Section 6.2 details facility specific projected wastewater data. Five year average gross per-capita water usage and the Bureau of Economic and Business Research (BEBR) was used as a basis to calculate the projected wastewater flows. Appendix 1 provides a detailed overview of how the wastewater projections were determined.

Figure 4: Wastewater & Total System Capacity

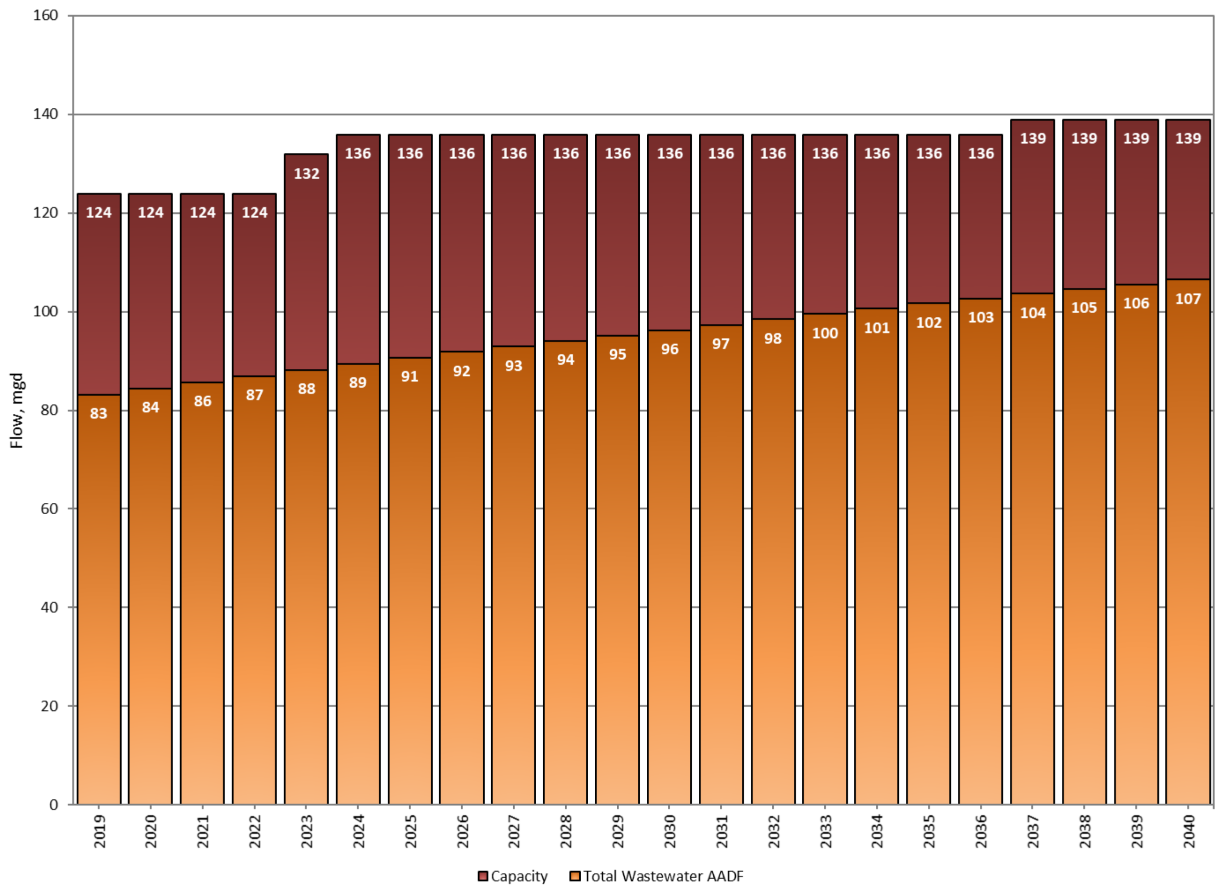


Table 2: Wastewater Projected Flows

Year	Buckman	District 2	Southwest	Greenland	Arlington East	Monterey	Mandarin	Blacks Ford	JCP	Ponte Vedra	Ponce De Leon	Nassau	Total
2019	30.50	5.40	11.29	0.00	20.97	1.70	6.55	4.03	0.80	0.63	0.08	1.19	**83.14**
2020	30.86	5.50	11.47	0.00	21.15	1.71	6.74	4.22	0.80	0.64	0.09	1.23	**84.42**
2021	31.38	5.60	11.63	0.00	21.32	1.72	6.83	4.39	0.80	0.65	0.09	1.28	**85.68**
2022	31.89	5.69	11.79	0.00	21.50	1.73	6.91	4.57	0.80	0.65	0.09	1.32	**86.94**
2023	32.41	5.79	11.94	3.95	19.51	1.74	6.82	3.13	0.80	0.66	0.09	1.36	**88.21**
2024	32.92	5.88	12.10	4.02	19.67	1.75	6.88	3.27	0.80	0.67	0.09	1.41	**89.47**
2025	33.44	5.98	12.26	4.10	19.83	1.76	6.95	3.41	0.80	0.67	0.09	1.45	**90.73**
2026	33.82	6.13	12.41	4.20	19.96	1.76	6.99	3.50	0.80	0.68	0.09	1.49	**91.84**
2027	34.19	6.29	12.57	4.31	20.09	1.77	7.04	3.58	0.80	0.68	0.09	1.52	**92.94**
2028	34.57	6.45	12.73	4.41	20.22	1.78	7.08	3.67	0.80	0.69	0.09	1.56	**94.05**
2029	34.95	6.61	12.88	4.51	20.35	1.79	7.13	3.75	0.80	0.69	0.09	1.60	**95.15**
2030	35.33	6.76	13.04	4.61	20.48	1.80	7.17	3.83	0.80	0.69	0.10	1.63	**96.26**
2031	35.74	6.96	13.17	4.73	20.55	1.81	7.21	3.92	0.80	0.69	0.10	1.66	**97.35**
2032	36.16	7.16	13.31	4.85	20.62	1.81	7.25	4.01	0.80	0.70	0.10	1.70	**98.44**
2033	36.57	7.35	13.44	4.96	20.68	1.81	7.29	4.10	0.80	0.70	0.10	1.73	**99.53**
2034	36.99	7.55	13.57	5.08	20.75	1.82	7.33	4.18	0.80	0.70	0.10	1.77	**100.62**
2035	37.40	7.74	13.71	5.19	20.81	1.82	7.36	4.27	0.80	0.70	0.10	1.80	**101.71**
2036	37.81	7.93	13.80	5.30	20.85	1.82	7.39	4.35	0.80	0.70	0.10	1.83	**102.67**
2037	38.23	8.11	13.89	5.40	20.88	1.83	7.41	4.43	0.80	0.70	0.10	1.87	**103.64**
2038	38.64	8.30	13.98	5.50	20.91	1.83	7.44	4.51	0.80	0.70	0.10	1.90	**104.60**
2039	39.05	8.48	14.07	5.60	20.94	1.83	7.46	4.59	0.80	0.70	0.10	1.94	**105.56**
2040	39.47	8.67	14.16	5.71	20.97	1.84	7.49	4.67	0.80	0.70	0.10	1.97	**106.53**

*units in mgd

5 Capital Improvement Summary

The following capital improvement totals are from the JEA Capital Improvement Plan, categorized by each WWTF. Each of the following sections provide details on the specific projects that make up the totals below.

Table 3: Summary of WWTF Capital Improvements ($s in $1,000s)*

Treatment Facility	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Buckman	$13,481	$23,133	$24,081	$8,061	$9,411	$5,335	$14,490	$14,490	$1,990	$2,090	$740
Arlington East	$6,095	$13,976	$11,914	$4,395	$5,982	$3,148	$1,500	$2,200	$0	$0	$0
Greenland	$7,526	$17,174	$36,662	$49,462	$16,866	$0	$0	$0	$0	$0	$0
Southwest	$4,523	$7,710	$16,000	$25,500	$18,000	$1,095	$0	$0	$0	$0	$0
District 2	$987	$3,583	$141	$0	$0	$300	$3,000	$4,000	$1,600	$0	$0
Mandarin	$1,927	$92	$708	$0	$0	$2,000	$0	$0	$0	$0	$0
Monterey	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Blacks Ford	$5,289	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Nassau Regional	$2,603	$3,087	$8,201	$14,000	$14,000	$6,375	$3,000	$5,625	$0	$0	$0
Julington Creek Plantation	$2,182	$311	$0	$0	$0	$0	$0	$0	$0	$0	$0
Ponte Vedra	$834	$711	$377	$0	$0	$0	$0	$0	$0	$0	$0
Ponce de Leon	$1,021	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TOTAL	**$46,468**	**$69,777**	**$98,084**	**$101,418**	**$64,259**	**$18,253**	**$21,990**	**$26,315**	**$3,590**	**$2,090**	**$740**

*Source: JEA capital budget as of 6/17/19

6 Treatment Plant Capacity Analysis

6.1 Summary of Plant Capacity

The overall wastewater treatment capacity remaining is currently at 36%, with some facilities near or over 80% capacity. Facilities with less than 30% capacity remaining have projects planned or underway to accommodate future growth, with exception to treatment facilities in regions of low growth or close to build out of the service area. The following sections provide more in depth on planned projects and capacity upgrades.

Table 4: WWTF Capacity Summary

Facility	AADF as of May 2018	Permitted Capacity	Percent Capacity Remaining	Non-Coincidental Monthly Max Day
Buckman	25.39	52.50	52%	45.86
Arlington East	20.91	25.00	16%	6.62
Southwest	11.75	14.00	16%	17.31
District 2	5.42	10.00	46%	24.91
Mandarin	7.08	8.75	19%	3.16
Monterey	1.82	3.60	49%	9.88
Blacks Ford	3.52	6.00	41%	4.81
Nassau Regional	1.29	1.55	17%	1.05
Julington Creek	0.75	1.00	25%	0.78
Ponte Vedra	0.49	0.80	39%	0.12
Ponce de Leon	0.05	0.24	78%	1.58
TOTAL	**78.48**	**123.44**	**36%**	**116.08**

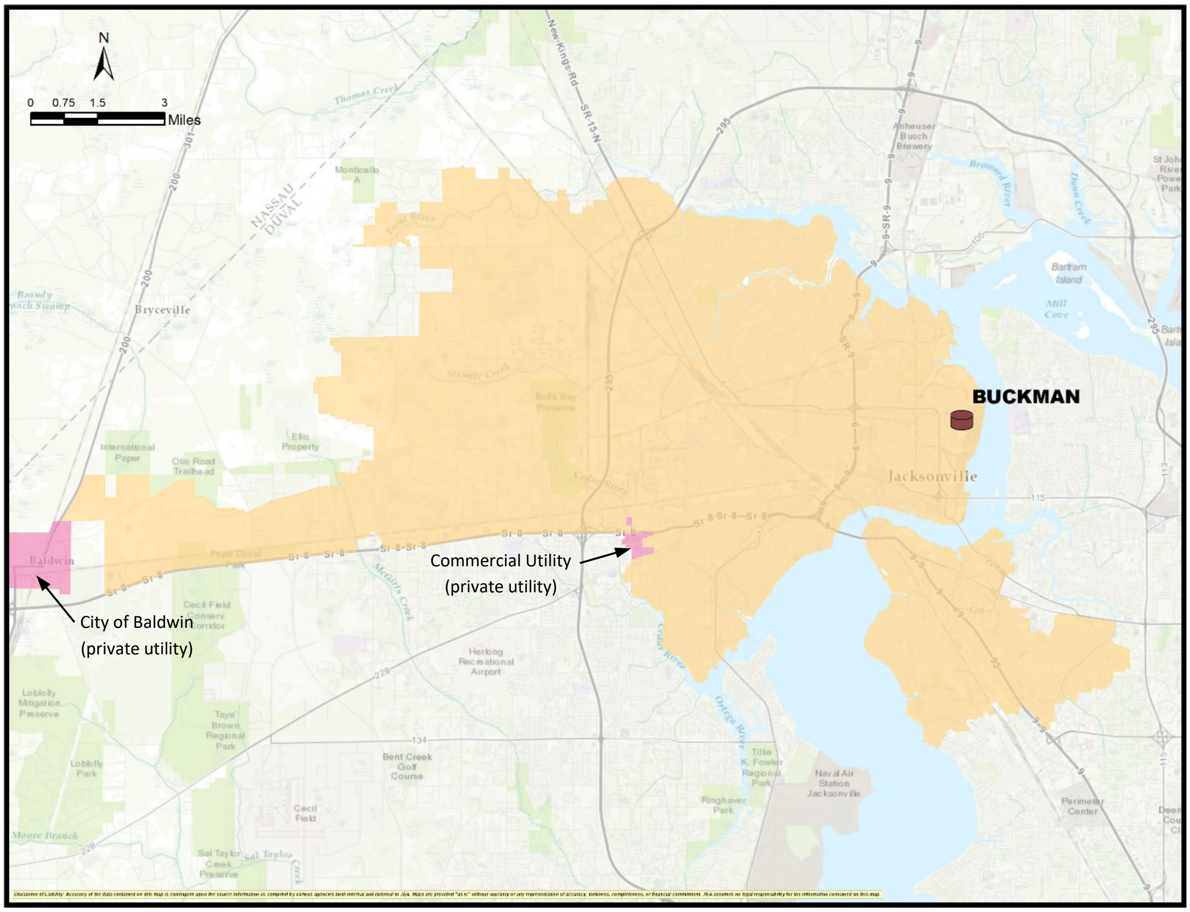
*units in mgd, range of AADF and non-coincidental monthly max day is June 2018 through May 2019

6.2 Individual Treatment Plant Analysis

6.2.1 Buckman WWTF

Buckman is a 52.5 mgd AADF activated sludge WWTF that serves a region well established with commercial and residential customers, with a significant contribution from industrial customers. Buckman WWTF receives the highest volume, on average, of industrial waste compared to all other JEA wastewater treatment facilities.

Figure 5: Buckman Current Service Area



6.2.1.1 Plant Capacity

Figure 6 shows the projected wastewater flow for Buckman WWTF in comparison to the overall facility permitted capacity. The total nitrogen efficiency is impacted when AADF approaches 35 mgd; however, influent has averaged not much higher than 30 mgd during historically wet years and growth in this service area is low. Most influent flow variation is due to inflow and infiltration. Even though historical growth in this area is slow, the future growth is projected increase in the western region of the Buckman service area where a significant amount of land still remains to be developed. Prior to FY40 no major capacity expansions are planned. Section 6.2.1.3 details future planned O&M projects.

Figure 6: Buckman WWTF Projected Flow

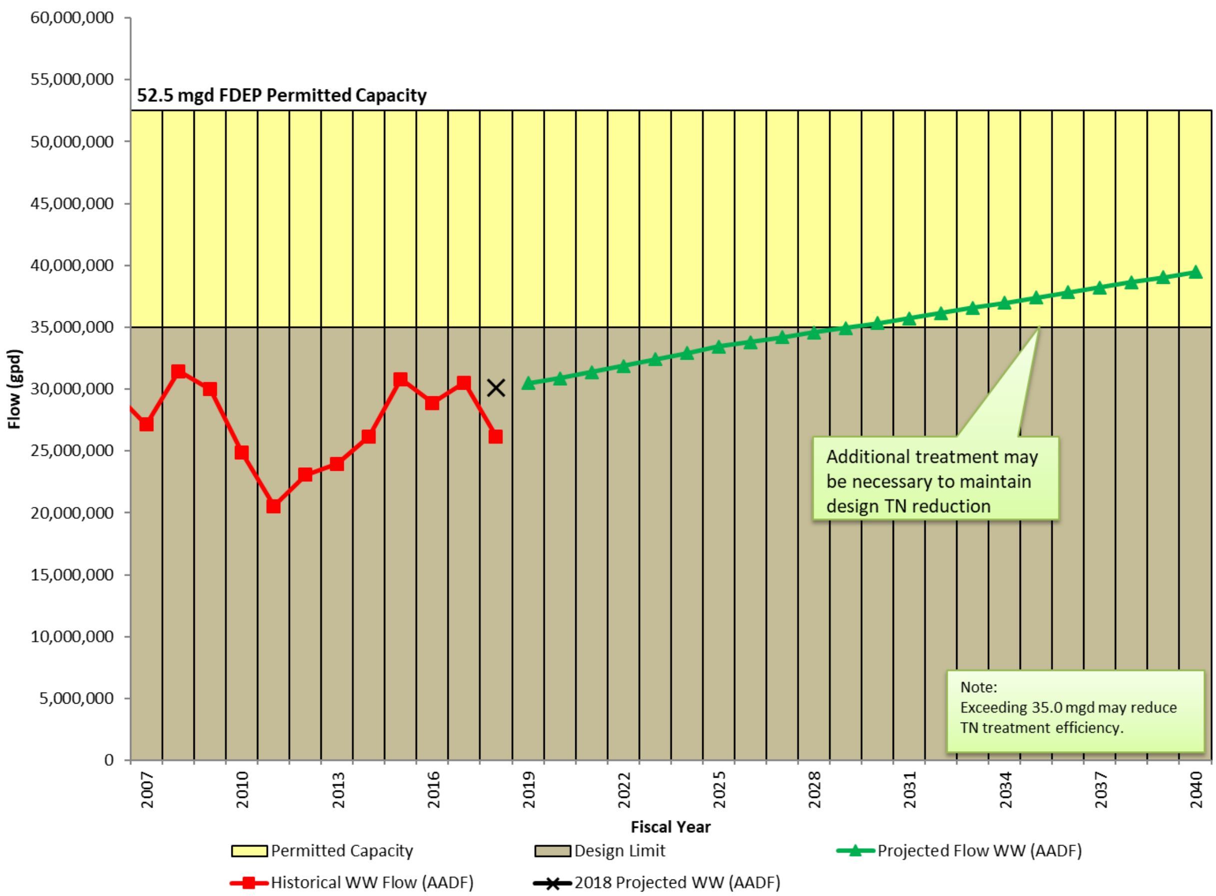


Table 5: Buckman WWTF Flow Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	27.15	31.47	29.97	24.86	20.52	23.06	24.01	26.17	30.79
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
28.90	30.51	26.17		30.50	30.86	33.44	35.33	37.40	39.47

6.2.1.2 Process Inspection

A review of current major facility components revealed the following items listed in the table below are in need of attention. A new biosolids processing facility is in design along with a replacement disinfection system.

Table 6: Process Inspection Summary

TOPIC	DESCRIPTION	ACTION
UPSTREAM SCREENING OF RAW WASTEWATER	Bay St and Tallyrand pump stations are major upstream stations	• Project underway to install a sluice gate at Tallyrand PS (711-36) • Project 180-36 includes a general rehabilitation of Tallyrand PS (screening, splitter box, etc.)
PRIMARY CLARIFIER SOLIDS LOADING	Biosolids received from outside facilities is close to overloading the primary clarifiers	• Plan is to send Arlington East and District 2 biosolids directly to gravity belt thickeners • Rehabilitation work planned for primary clarifiers (711-26)
AERATION	The aeration headers were installed in 2001 and are 16 years old and are approaching the end of their useful life; there have been recent failures of the aeration headers causing uneven air distribution in the affected aeration tank The blower system must be reliable for proper operation to meet nitrogen reduction goals and TMDL requirements	• Turbo blower improvement project complete (711-15) • Blower system improvement project in design (711-46) • Replacement of aeration headers and Installation of new diffusers delayed to start FY23 (711-44)
BIOSOLIDS FACILITY PRODUCTION	The drum dryer system has reached its useful life, installed 2001, initial study determined cake production and hauling is more cost effective than pelletizing the sludge	• Overall project in design • Conveyor system in construction • Multiple projects underway (711-26, 711-41, 711-42, 711-43)
UV DISINFECTION EQUIPMENT AGE	Installed 2001, equipment is due for replacement and has corrosion issues Leachate from landfills is limited to 10 trucks per day, too much leachate will impact the UV transmittance	• In design now (711-34)
I&I	I&I has a heavy influence on flows to Buckman WWTF due to the age of upstream infrastructure	• Study is underway for pump station basins upstream of Arlington East, Buckman and Southwest WWTFs (175-38S)

6.2.1.3 Capital Improvement List & Planned Future Projects

Projects currently identified in the JEA Capital Plan are focused on maintenance and rehabilitation of multiple aspects throughout the treatment facility. The disinfection system and biosolids processing are both undergoing major upgrades.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

Table 7: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
711-36	Buckman WWTF - 1636 Talleyrand Ave - Influent Box Rehabilitation	$3,384	$3,192	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
711-26	Buckman WWTF - Biosolids Conversion - Process Facility	$37,670	$2,694	$11,800	$15,300	$3,261	$4,440	$0	$0	$0	$0	$0	$0
711-46	Buckman WWTF - Blower System Improvements	$11,715	$1,547	$2,640	$5,000	$2,250	$0	$0	$0	$0	$0	$0	$0
711-43	Buckman WWTF - Biosolids Conveyor System Replacement - ENV	$1,512	$1,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
711-01	Buckman WWTF - Biosolids Process Renewal and Replacement	$1,100	$1,100	$800	$800	$740	$740	$740	$740	$740	$740	$740	$740
175-38S	LDP Program - SW Service Area Infiltration and Inflow Analysis and Remediation	$5,098	$1,000	$954	$0	$500	$1,000	$1,095	$0	$0	$0	$0	$0
711-47	Buckman WWTF - Secondary Clarifiers 5 and 6 Rehabilitation	$800	$800	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
711-34	Buckman WWTF - Disinfection System Replacement	$6,881	$664	$4,712	$1,247	$0	$0	$0	$0	$0	$0	$0	$0
711-45	Buckman WWTF - Secondary MCC 19A and 19B Replacement - ENV	$600	$457	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
711-41	Buckman WWTF - Biosolids Conversion - 1MW Gas Scrubber, Electric Generator, Load Transformer, and Circuit	$3,000	$273	$1,950	$717	$0	$0	$0	$0	$0	$0	$0	$0
711-15	Buckman WWTF - Turbo Blower Improvements	$4,104	$225	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

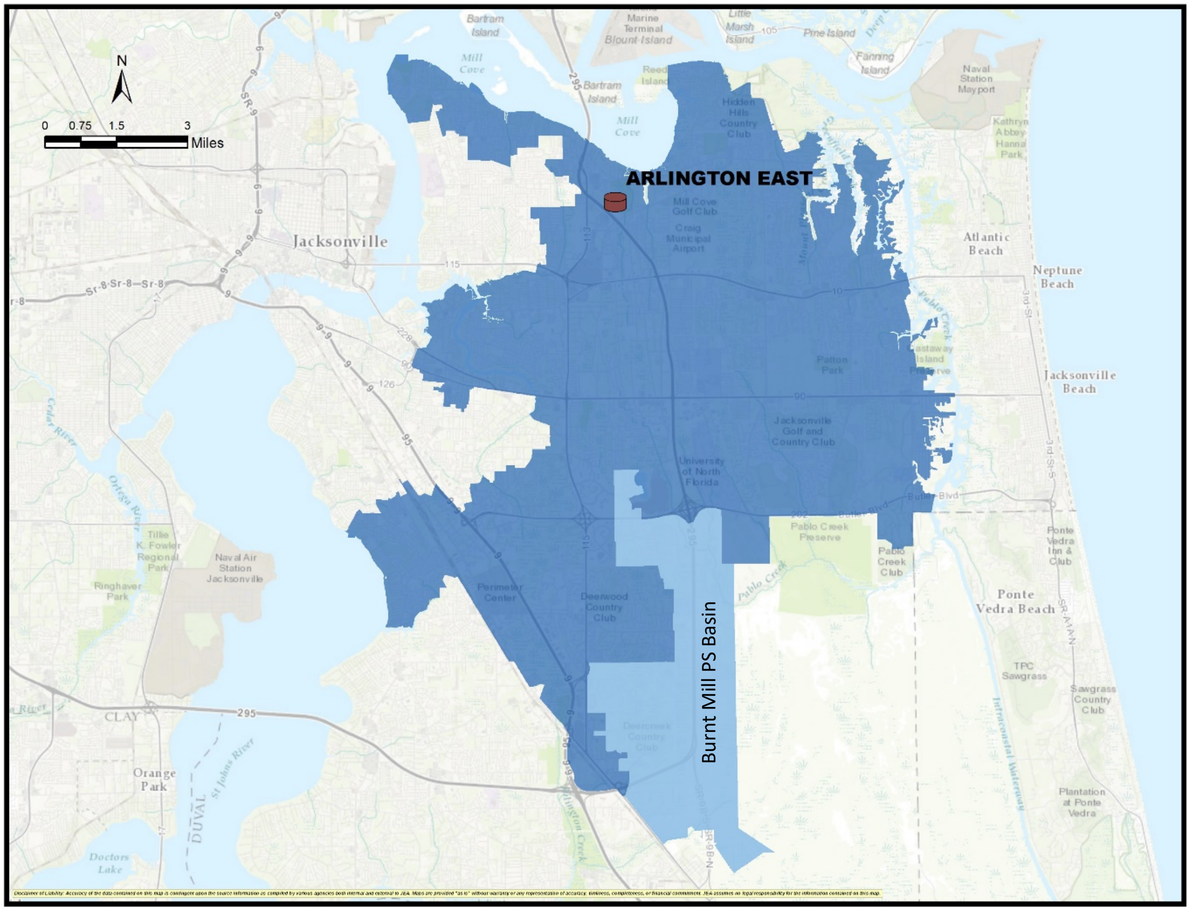
Table 7: Capital Project List (continued)

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
711-31	Buckman WWTF - Aeration System Main Header Replacement	$1,792	$122	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
711-42	Buckman WWTF - Biosolids Conversion - Operations/Maintenance/Warehouse Bldgs	$4,560	$7	$183	$175	$1,310	$2,831	$0	$0	$0	$0	$0	$0
711-48	Buckman WWTF - Primary Clarifier Rehabilitation	$936	$0	$94	$842	$0	$0	$0	$0	$0	$0	$0	$0
711-44	Buckman WWTF - Aeration Basin Air Header and Diffuser Replacement - ENV	$6,000	$0	$0	$0	$0	$400	$500	$1,250	$1,250	$1,250	$1,350	$0
896-BKM2	Buckman WWTF - BNR - Ph 2 (Not Needed if Purified Water)	$28,000	$0	$0	$0	$0	$0	$3,000	$12,500	$12,500	$0	$0	$0
		TOTAL	**$13,481**	**$23,133**	**$24,081**	**$8,061**	**$9,411**	**$5,335**	**$14,490**	**$14,490**	**$1,990**	**$2,090**	**$740**

6.2.2 Arlington East WWTF

Arlington East is a complete mix activated sludge 25.0 mgd AADF facility providing service to commercial and residential customers. Figure 7 shows the current service area for Arlington East.

Figure 7: Arlington East Current Service Area



Although Arlington East WWTF can provide treatment for flows up to 25 mgd, there are some limitations with the treatment of certain nutrients in wastewater with flows greater than 20 mgd (Section 6.2.2.1). A new wastewater facility is planned at Greenland (Section 6.2.3). To help maintain top treatment efficiency, the southeast region of the Arlington East service area (Burnt Mill) will be redirected; sending an estimated 2.2 mgd of wastewater from Arlington East service area to the new Greenland WWTF. This will be accomplished by redirecting the Burnt Mill pump station basin shown in Figure 7 to Greenland WWTF.

6.2.2.1 Plant Capacity

Figure 8 shows the projected wastewater flow for Arlington East WWTF in comparison to the overall facility permitted capacity. Nitrogen reduction efficiency was found to be a problem when flows increase above 20 mgd, a carbon feed system is in place to help maintain effective nitrogen removal. A future project to add an aeration tank and upgrade blowers is planned as an additional measure to also help with nitrogen removal efficiency. Due to land constraints, Arlington East WWTF is limited to 25 mgd capacity.

Figure 8: Arlington East WWTF Projected Flow

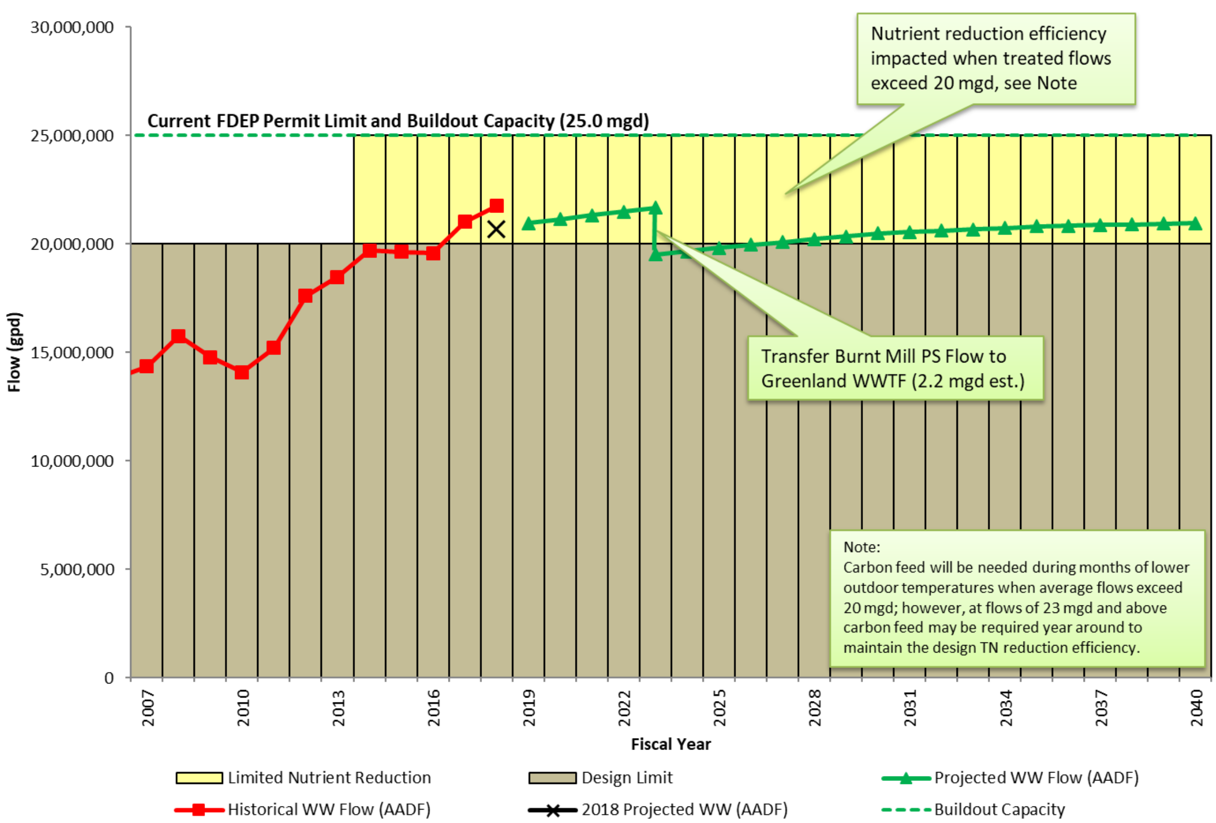


Table 8: Arlington East WWTF Flow Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	14.35	15.76	14.78	14.09	15.21	17.60	18.49	19.70	19.65
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
19.59	21.03	21.76		20.97	21.15	19.83	20.48	20.81	20.97

6.2.2.2 Process Inspection

A review of current major facility components revealed the following items listed in Table 9 below are in need of attention. Major projects planned/underway include existing clarifier rehabilitation, a new influent structure and aeration basin.

Table 9: Process Inspection Summary

TOPIC	DESCRIPTION	ACTION
ODOR CONTROL	Bradley PS will be converted to a booster pump station making the on time completion of odor control upgrades at Arlington East WWTF more critical	• Odor control must be finished prior to the Bradley PS upgrade completion in anticipation of increased odor at Arlington East (417-76, 180-21B) • Both projects underway now
CLARIFIER CAPACITY	Clarifiers limited to 20 MGD treatment capacity, average flows above 20 MGD leads to solids retention problems which impacts the TN reduction and UV Transmittance, no redundancy exists to take a clarifier offline for maintenance	• The new clarifier (#5) was on-line in April 2018, rehabilitation of existing clarifiers 1 – 4 underway (135-09)
SLUDGE TRANSFER TO BUCKMAN	Having only one sludge holding tank provides approximately 2 days of storage if pumping were to go offline, there is no redundancy for existing sludge line to Buckman	• A second sludge line to Buckman paralleling the existing one is planned, easements needed for second line are being acquired, funding for construction of parallel sludge main delayed until FY23 (135-12)
SLUDGE HOLDING TANK CAPACITY	Concern with capacity during extended storm events and as treatment facility approaches 25 MGD	• Evaluation should be done to see if existing sludge pumps can be upgraded to pump a higher capacity in coordination with sludge line to Buckman • Existing sludge pumping station in poor condition, needs replacement in the next five years
ARLINGTON OVERALL TREATMENT CAPACITY	TN efficiency will be impacted as treatment flows rise above 20 MGD, to be managed with carbon feed (intermittent from 20-23 MGD, full time above 23 MGD), confirmed by Hazen's Fall 2017 process evaluation	• Project set up (100-62, see Greenland WWTF) to redirect flow from the Arlington service area to Greenland WWTF, Greenland WWTF design is underway • Improve TN removal efficiency by increasing blower capacity, design underway (135-11, 135-14) • RAS flow meters need replacement
I&I	Peak flows have been an issue since taking on the Royal Lakes and San Jose services areas	• Study is underway for pump station basins upstream of Arlington East, Buckman and Southwest WWTFs (175-38S)

6.2.2.3 Capital Improvement List & Planned Future Projects

Arlington East is the second largest treatment facility (Buckman WWTF is the largest) that discharges to the St Johns River. Major projects underway are focused on improving treatment efficiency and resiliency.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

Table 10: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
135-09	Arlington East WWTF - Secondary Clarifier Addition	$19,340	$2,850	$335	$0	$0	$0	$0	$0	$0	$0	$0	$0
175-38S	LDP Program - SW Service Area Infiltration and Inflow Analysis and Remediation	$5,098	$1,000	$954	$0	$500	$1,000	$1,095	$0	$0	$0	$0	$0
417-77	Arlington East WWTF - Replace Auto-Transfer Switch	$667	$530	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
180-21B	Bradley Road Pump Station Improvements	$10,202	$408	$8,093	$318	$0	$0	$0	$0	$0	$0	$0	$0
417-76	Arlington East WWTF Upgrades - Odor Control	$5,764	$333	$1,498	$3,895	$0	$0	$0	$0	$0	$0	$0	$0
207-22W	Facilities - Arlington East Exterior Yard Lighting	$303	$215	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
135-14	Arlington East WWTF Upgrades - Aeration Basin and Blowers	$14,000	$150	$1,399	$3,478	$3,530	$3,682	$1,753	$0	$0	$0	$0	$0
108-02	Arlington WTP - HSP Replacement	$1,346	$143	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
135-11	Arlington East WWTF Upgrades- Influent Structure	$4,670	$141	$187	$3,914	$365	$0	$0	$0	$0	$0	$0	$0
135-15	Arlington East WWTF - Secondary MCC Replacement	$1,045	$133	$905	$7	$0	$0	$0	$0	$0	$0	$0	$0
135-16	Arlington East WWTF - RAS Valve Control - Project Definition Development	$191	$89	$100	$2	$0	$0	$0	$0	$0	$0	$0	$0

Table 10: Capital Project List (continued)

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
135-13	Arlington East WWTF - Site Lighting Upgrade	$600	$53	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
135-12	LDP Program - Arlington East WWTF - Parallel Sludge Transfer Line	$1,950	$50	$300	$300	$0	$1,300	$0	$0	$0	$0	$0	$0
208-SS19	Security - Arlington East WWTF Fence Upgrade	$205	$0	$205	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-33	Arlington East WWTF - Reclaim Filter - Increase Capacity from 8 to 12 mgd	$4,000	$0	$0	$0	$0	$0	$300	$1,500	$2,200	$0	$0	$0
		TOTAL	**$6,095**	**$13,976**	**$11,914**	**$4,395**	**$5,982**	**$3,148**	**$1,500**	**$2,200**	**$0**	**$0**	**$0**

6.2.3 Greenland WWTF

Greenland WWTF is a new 6 mgd facility planned to be in service by 2023 (Figure 9). The new facility will capture flow from the southern region of the Arlington East service area (Burnt Mill) shown in Figure 7, the Nocatee development in St. Johns County, St. Johns County Utilities and Twin Creeks development. In the future, Twin Creeks Master Pump Station (MPS) will have the flexibility to direct flows from Nocatee development in St. Johns County, St. Johns County Utilities and Twin Creeks development to either Blacks Ford or Greenland WWTF's. The alternative projection in Figure 9 (orange line) shows what the flexibility of Twin Creeks MPS can achieve, with St. Johns County Utilities and Twin Creeks development going to Blacks Ford WWTF instead of Greenland WWTF. Future reclaimed water demands in the Blacks Ford service area will likely drive the need for more wastewater flow to be sent to Blacks Ford WWTF (Figure 9 alternate projection).

Figure 9: Greenland WWTF Projected Flow

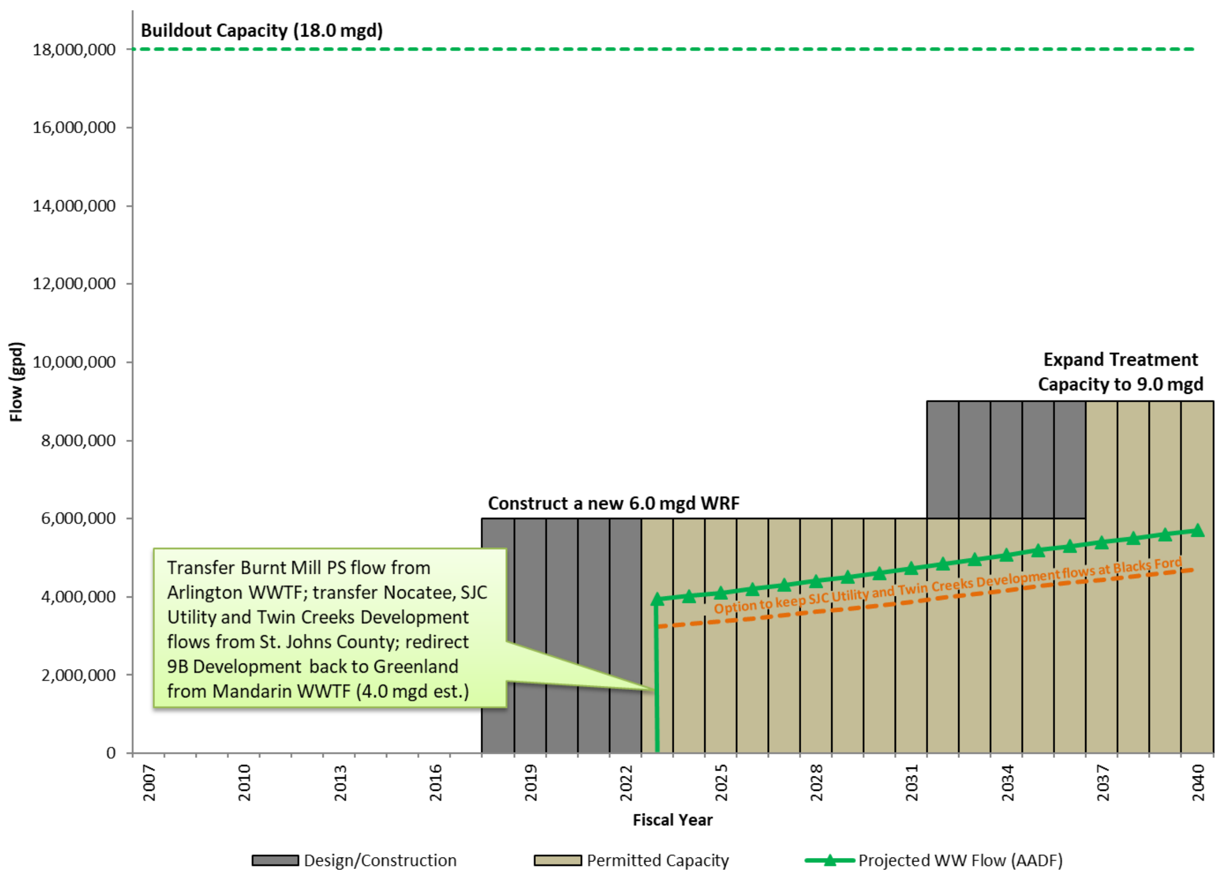
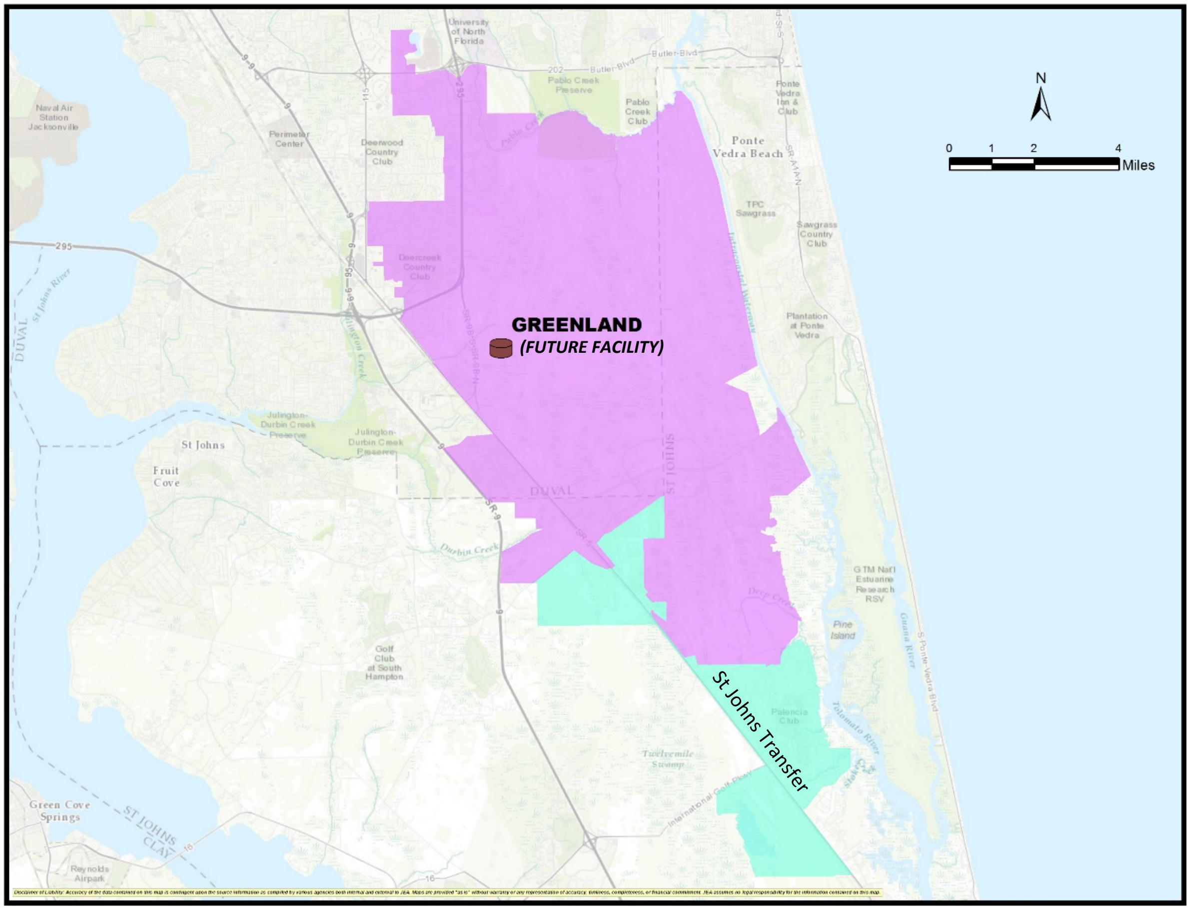


Table 11: Greenland WWTF Flow Summary (fiscal year average, mgd)

Projected	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
	0.00	0.00	4.10	4.61	5.19	5.71
Alt. Projected	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
	-	-	3.36	3.78	4.27	4.70

Figure 10: Greenland Planned Service Area



6.2.3.1 Capital Improvement List & Planned Future Projects

Planned projects for Greenland WWTF are shown below.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

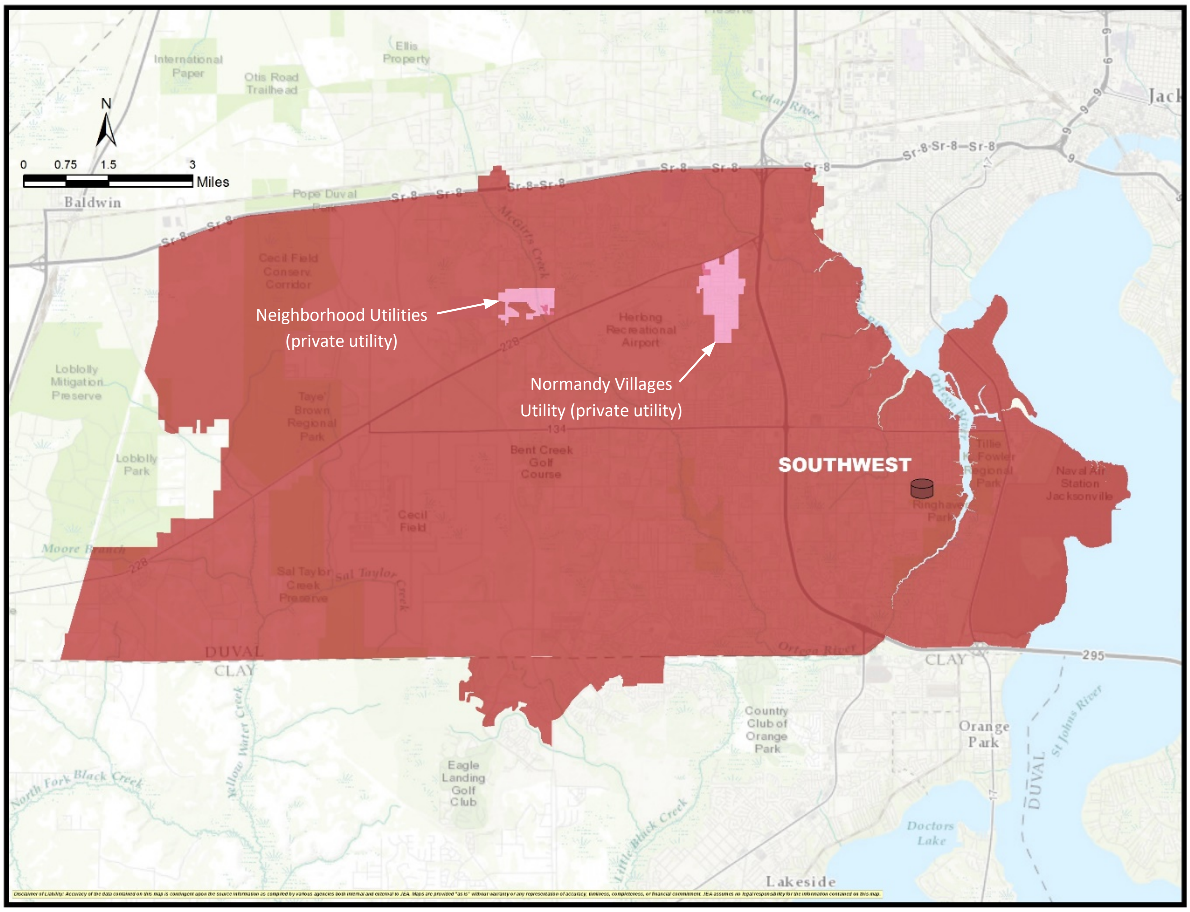
Table 12: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
268-W3	Greenland WWTF - 6.0 mgd	$83,096	$3,416	$12,530	$19,200	$32,000	$15,772	$0	$0	$0	$0	$0	$0
100-58	Greenland - GEC to US-1 - Trans - FM	$3,300	$3,044	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
730-12	US 1 - Greenland WWTF to CR 210 - Trans - New - R	$25,660	$672	$2,840	$10,743	$10,743	$665	$0	$0	$0	$0	$0	$0
100-62	Greenland - Burnt Mill PS to GEC - Trans - FM	$16,064	$394	$1,804	$6,719	$6,719	$429	$0	$0	$0	$0	$0	$0
		TOTAL	**$7,526**	**$17,174**	**$36,662**	**$49,462**	**$16,866**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

6.2.4 Southwest WWTF

Southwest is a 14.0 mgd AADF that provides advanced secondary treatment with nitrogen reduction. Similar to the Buckman service area, Southwest serves a region mostly built out around the facility consisting of a higher density population of mostly residential. The closest major new growth or regions that have the potential for major growth include the western end of Normandy Blvd and the JEA served region of Clay County.

Figure 11: Southwest Current Service Area



6.2.4.1 *Plant Capacity*

Figure 12 shows the projected wastewater flow for Southwest WWTF in comparison to the overall facility permitted capacity. Design is underway for expanding treatment capacity to 18 mgd.

Figure 12: Southwest WWTF Projected Flow

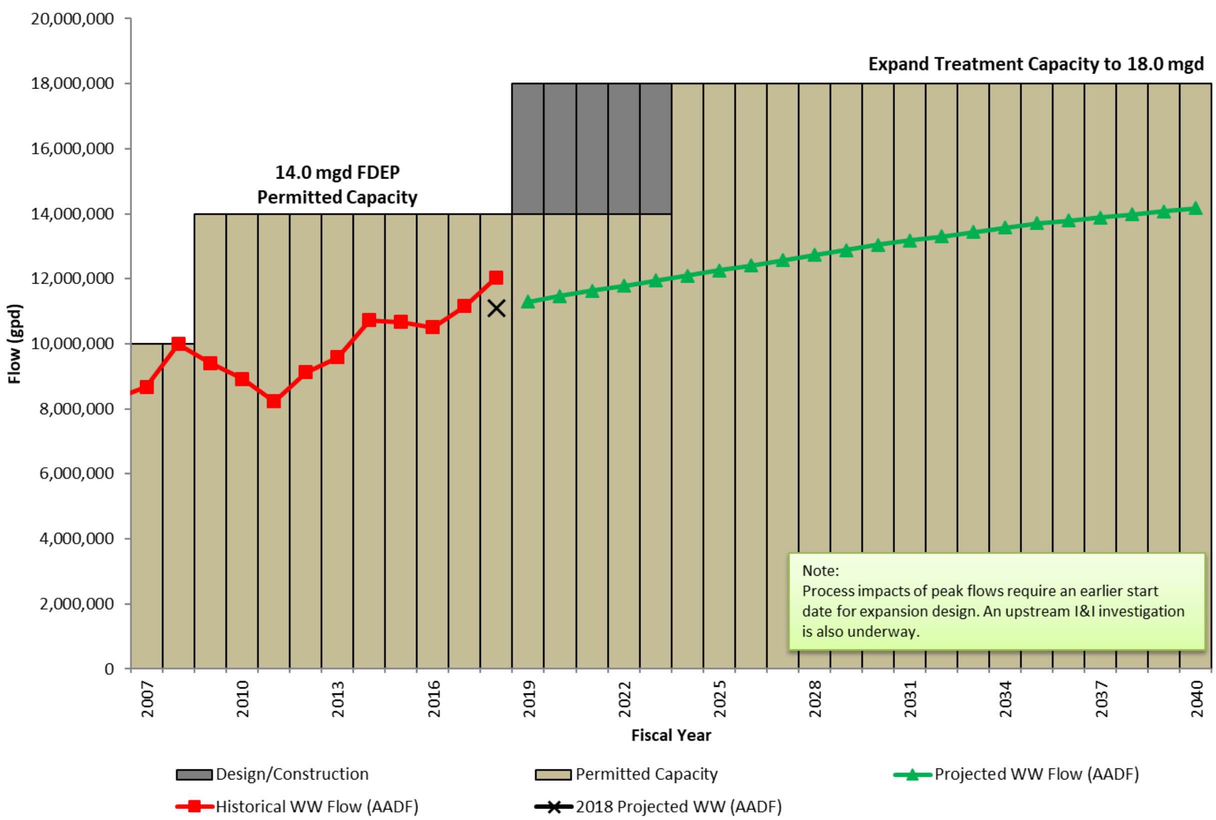


Table 13: Southwest WWTF Flow Summary (fiscal year average, mgd)

Historical	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	8.67	10.00	9.41	8.92	8.22	9.12	9.58	10.73	10.66
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
10.50	11.15	12.04		11.29	11.47	12.26	13.04	13.71	14.16

6.2.4.2 Process Inspection

A review of current major facility components revealed the following items listed in the table below are in need of attention. I&I has been a concern for some time in the Southwest service area; a study with follow up funding for repairs is underway. Expansion of the Southwest wastewater treatment facility capacity is anticipated to be complete by 2023.

Table 14: Process Inspection Summary

TOPIC	DESCRIPTION	ACTION
I&I	Facility has historically seen peak flows in excess of the designed 2.0 x ADF; peaks are attenuated by the East Master PS, however this is not a long term fix as flows increase	• Study is underway for pump station basins upstream of Arlington East, Buckman and Southwest WWTFs (175-38S)
GRIT SETTLING	Screw conveyors and compactors worn out due to abrasion, originally installed 2001	• Replace grit removal system, project complete (150-08)
AERATION	Five aeration basins are in use, two large (3A and 3B), two medium (2A and 2B) and one small (Train 1). Only the small one (Train 1), or one of the two smaller basins can be taken off-line for maintenance; flows are too high to take down either of the two larger basins; stress testing for Trains 3A and 3B is needed, fine bubble diffusers require cleaning/maintenance; blower air intake piping needs work, mixers are in need of repair	• Replace two smaller blowers with larger ones to meet aeration requirements, project complete (150-14) • Stress testing and diffuser work to be scheduled for after expansion is complete due to limited capacity
OVERALL TREATMENT CAPACITY	Three parallel trains are available at this facility, however a full train cannot be taken off-line due to hydraulic limitations (will cause solids wash out)	• Expansion design underway (150-11) • UV upgrades will need to be constructed and in service first since there is an Administrative Order deadline (required to be in service and meeting permit disinfection limit by 9/1/21) • Onsite reclaimed water system not operating properly, interim solution needed or alternatively it could be temporarily supplemented with potable water
SITE MISC	Stairs and ladders rehabilitation project	• Underway

6.2.4.3 Capital Improvement List & Planned Future Projects

Projects currently underway at Southwest WWTF are focused on repairs to the grit removal system and treatment process optimization. I&I investigation and repair is on-going and the overall capacity expansion at Southwest WWTF is in design.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

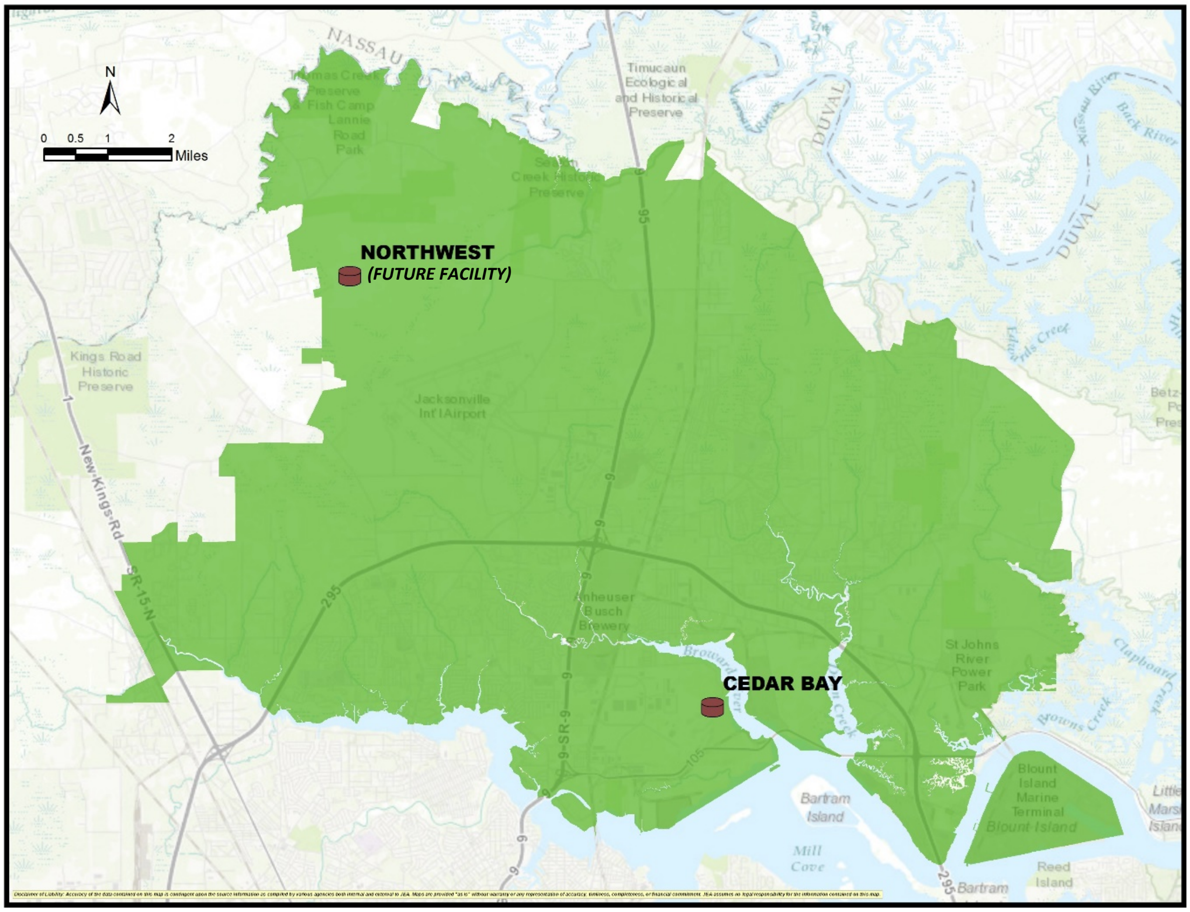
Table 15: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
150-08	Southwest WWTF - Screening Conveyance and Grit Removal System Replacement	$2,023	$1,400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
175-38S	LDP Program - SW Service Area Infiltration and Inflow Analysis and Remediation	$5,098	$1,000	$954	$0	$500	$1,000	$1,095	$0	$0	$0	$0	$0
150-11	Southwest WWTF - Expansion from 14 to 18 mgd	$65,612	$745	$6,756	$16,000	$25,000	$17,000	$0	$0	$0	$0	$0	$0
150-12	Southwest WWTF - Replace Main Breakers	$797	$700	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
150-14	Southwest WWTF - Upgrade Aeration Blowers	$942	$649	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
150-13	Southwest WWTF - Replace RAS Valves	$468	$29	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
		TOTAL	**$4,523**	**$7,710**	**$16,000**	**$25,500**	**$18,000**	**$1,095**	**$0**	**$0**	**$0**	**$0**	**$0**

6.2.5 District 2 WWTF

District 2 (aka Cedar Bay) is a 10.0 mgd AADF WWTF that provides advanced secondary treatment with nitrogen reduction. Large tracts of land are available for development on the western and northwestern reaches of the service are. Residential and commercial development is still progressing in the north end of the service area, new developments are in the planning phase west of I-95 and north of the airport. A preliminary study is currently underway to determine the best location, timing, and phasing of the Northwest WWTF. Northwest WWTF is anticipated to serve the northwest region of the District 2 wastewater service area.

Figure 13: District 2 Current Service Area



6.2.5.1 Plant Capacity

Figure 14 shows the projected wastewater flow for District 2 WWTF in comparison to the overall facility permitted capacity. Sufficient capacity is available to support growth through 2040.

Figure 14: District 2 WWTF Projected Flow

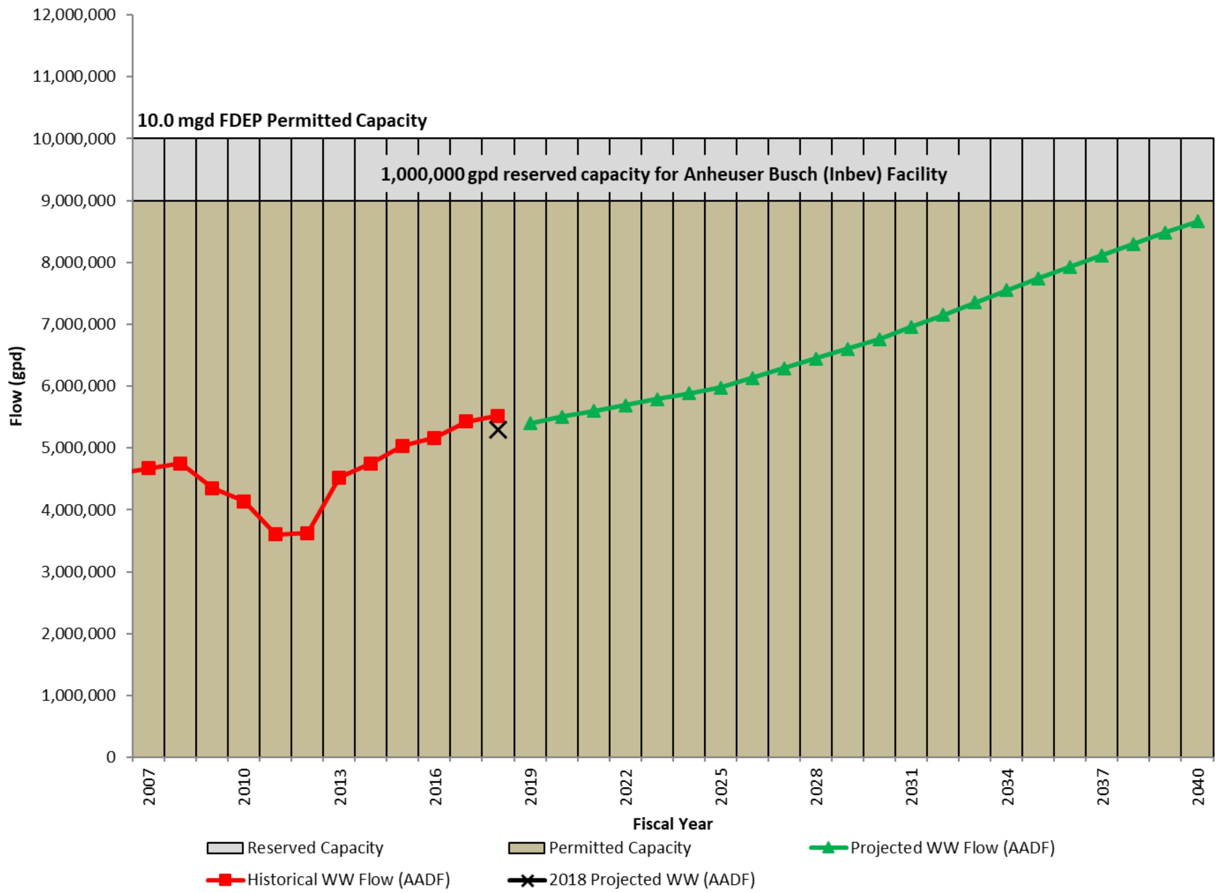


Table 16: District 2 WWTF Flow Summary (fiscal year average, mgd)

Historical	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	4.67	4.75	4.35	4.14	3.61	3.63	4.52	4.75	5.04
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
5.16	5.43	5.52		5.40	5.50	5.98	6.76	7.74	8.67

6.2.5.2 Process Inspection

A review of current major facility components revealed the following items listed in the table below are in need of attention. Major project focus is on primary clarifier rehabilitation, disinfection system improvements and resiliency improvements.

Table 17: Process Inspection Summary

TOPIC	DESCRIPTION	ACTION
OUTFALL/MANATEE BARRIER	Current land rights for barrier are only temporary requiring negotiation of permanent rights or relocation of barrier/outfall	• A permanent easement was purchased from Continental Equities (including a construction easement) • A lease agreement with Marathon is nearly complete • The manatee barrier capacity is limited to roughly 5.7 MGD
PRIMARY CLARIFIERS	Rehabilitation work is needed on the North Plant primary clarifiers #2 and #3, in addition to the headworks as a result of equipment age and damage sustained during Hurricane Matthew	• Under construction (129-15)
DISINFECTION	The existing hypochlorite feed system is not operable and has deteriorated due to chlorine gas in the building that houses the hypochlorite equipment; recent operational problems with the process requires the addition of hypochlorite on the return sludge systems to control filamentous organisms; a new replacement system needs to be installed for controlling filamentous organisms in the process	• O&M is monitoring and has made operational changes to work around issues o Running higher volumes of air reduces the chance of filamentous bacteria, higher TN created as a result • Temporary totes with RAS injection points set up if hypochlorite injection is needed
Emergency Power	Cedar Bay WRF has three centrifugal blowers that supply air to the aeration process; during Matthew and Irma the plant lost both electrical feeds for some period of time; loss of power could impact plant performance if lack of air is sustained for some period of time, but disinfection is lost immediately	• This project falls under the Water & Wastewater System Resiliency program, Task Order #10 • Scope includes a backup power generator system for the WWTF to serve the head works, aeration blowers, ultraviolet disinfection system and other critical facilities • Design started November 2018, Final design expected September 2019

6.2.5.3 Capital Improvement List & Planned Future Projects

The current focus at District 2 WWTF is operational upgrades.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

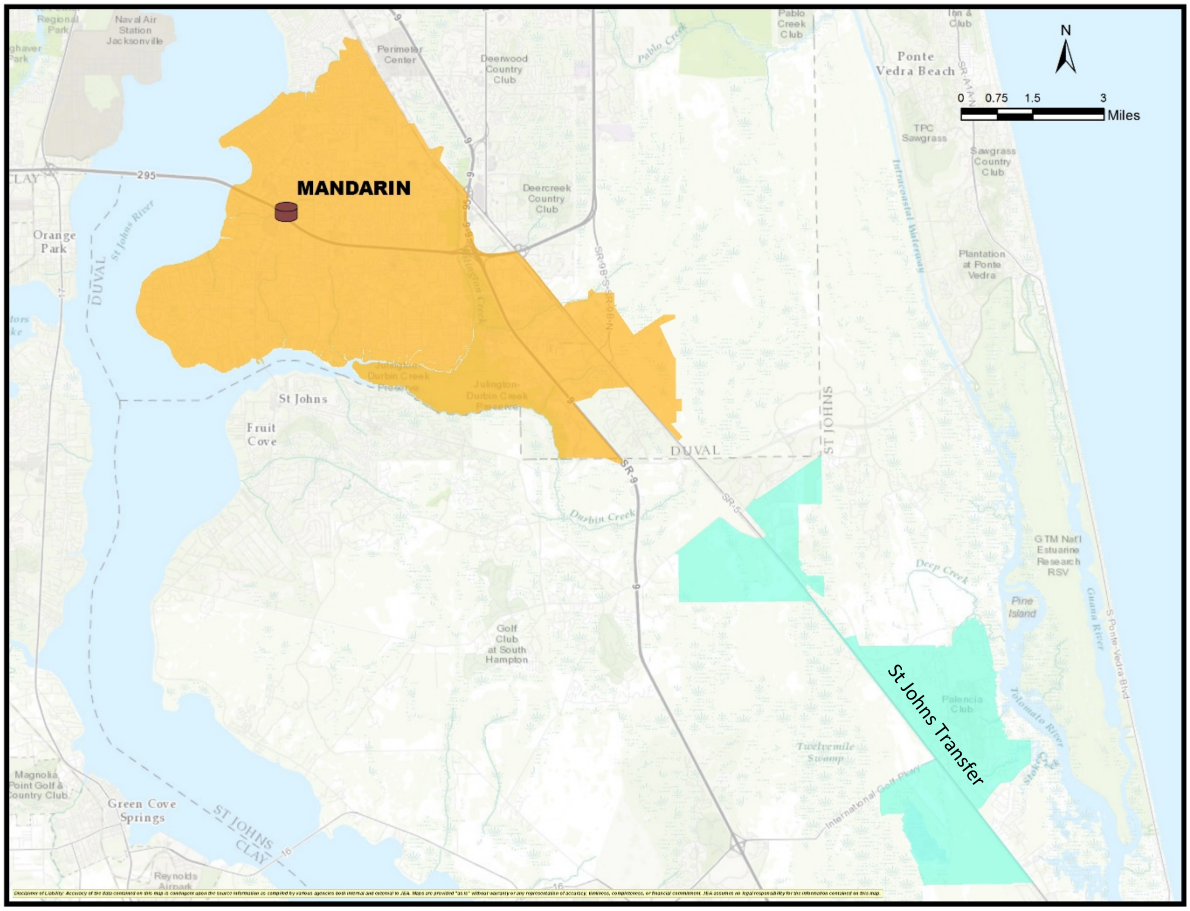
Table 18: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
129-15	District II WWTF - Primary Clarifier No. 2 and 3 Rehabilitation	$4,245	$639	$3,151	$141	$0	$0	$0	$0	$0	$0	$0	$0
129-17	District II WWTF - Hypochlorite Feed System Replacement	$780	$348	$432	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-73	District 2 WWTF RIB - Transmission and Pumping - R	$8,900	$0	$0	$0	$0	$0	$300	$3,000	$4,000	$1,600	$0	$0
		TOTAL	**$987**	**$3,583**	**$141**	**$0**	**$0**	**$300**	**$3,000**	**$4,000**	**$1,600**	**$0**	**$0**

6.2.6 Mandarin WWTF

Mandarin WWTF provides advanced secondary treatment for up to 8.75 mgd AADF of wastewater flow. Nocatee and St. Johns Transfer flows were redirected from Mandarin WWTF to Blacks Ford WWTF in early FY19. Figure 15 shows the new service area for Mandarin, Figure 19 shows Blacks Fords service area including St Johns Transfer.

Figure 15: Mandarin Current Service Area



6.2.6.1 Plant Capacity

Figure 16 shows the projected wastewater flow for Mandarin WWTF in comparison to the overall facility permitted capacity. Treatment capacity at Mandarin WWTF is 8.75 mgd. As mentioned earlier, a portion of the Mandarin service was rerouted to Blacks Ford WWTF in early FY19.

Figure 16: Mandarin WWTF Projected Flow

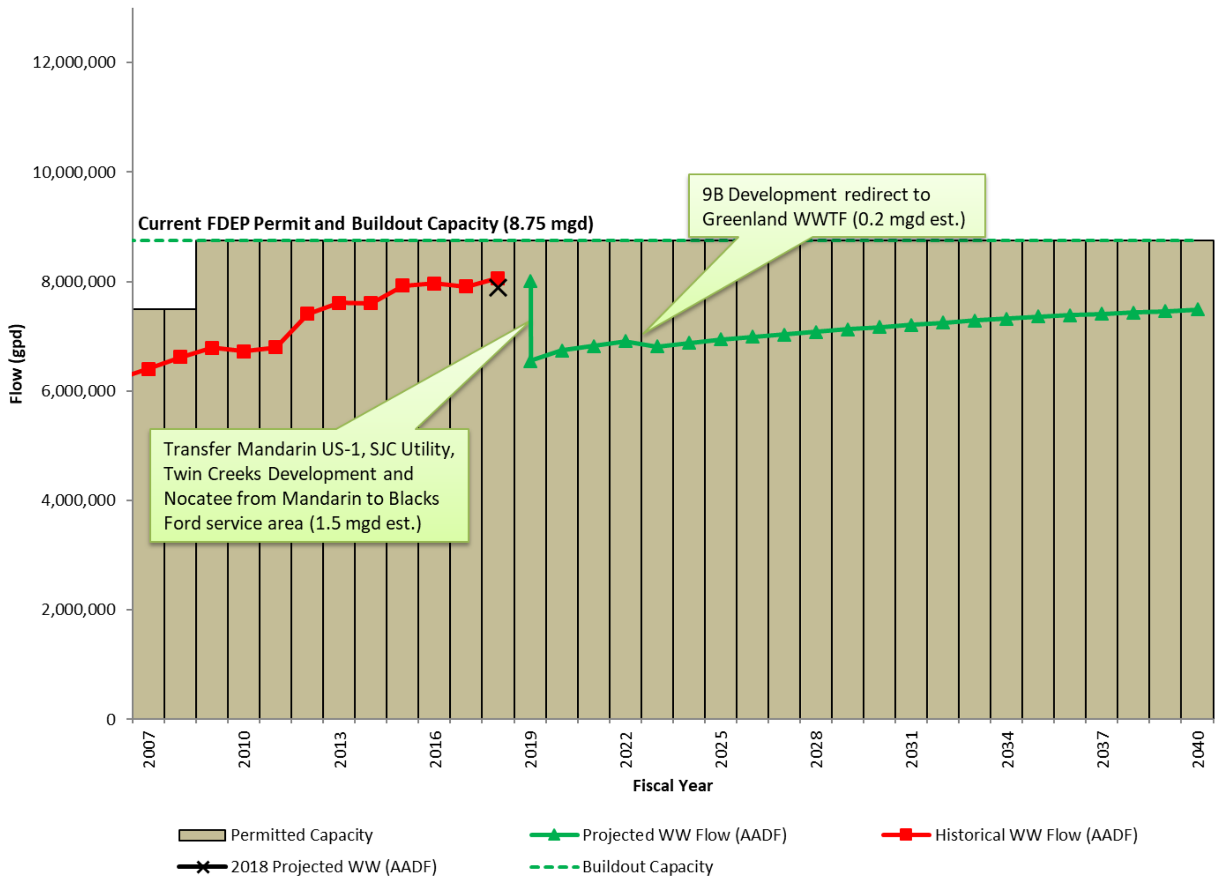


Table 19: Mandarin WWTF Flow Summary (fiscal year average, mgd)

Historical	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	6.40	6.62	6.79	6.72	6.80	7.41	7.62	7.60	7.92
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
7.96	7.91	8.07		6.55	6.74	6.95	7.17	7.36	7.49

6.2.6.2 Process Inspection

A review of current major facility components revealed the following items listed in the table below are in need of attention. Continued monitoring of influent pump station with alternatives under evaluation. Future projects planned for River UV, effluent pumping and waste/sludge tank repair.

Table 20: Process Inspection Summary

TOPIC	DESCRIPTION	ACTION
INFLUENT PUMP STATION	Not enough storage available for more than 10 minutes offline before overflow, grease/solids build-up in influent PS causing maintenance issues	• Chemicals were unsuccessfully used to try and break up grease/solids, so mixers have been installed in all chambers • A pony pump was installed to help with peaks • Short and long term solutions are being evaluated
AERATION BASIN	The expansion joints in the channel downstream of the aeration tanks are 20 years old and have not been replaced. These expansion joints leak and rubber covers over the joints have been installed over the past 5 years to stop leaks. The rubber covers will not last due to UV exposure and also there have been minor leaks in these covers. Failure of the expansion joints will cause environmental non-compliance.	• The scope of work for this project is to replace the existing expansion joints. Included in this work is bypass pumping all the plant flow around the channel between the aeration tanks and secondary clarifiers and installation of temporary bulkheads. Bypass pumping of the recycle flow is required. • Project complete (138-07)
SECONDARY CLARIFIER	No redundancy exists to take a clarifier offline for maintenance; public access reuse would also be offline if a clarifier goes offline; TSS and BOD should be fine if a clarifier goes down, nutrients might be an issue	• Inspections of Clarifiers #1 and #2 completed, no major issues found
BIOSOLIDS	Waste/sludge tank has H2S damaged concrete	• Evaluation to be completed to determine extent of damage
RIVER UV DISINFECTION	Due for rehabilitation, limited capacity due to hydraulic setup	• Primary UV system upgrades nearly complete, will bring reuse delivery capacity up to match WW treatment capacity (138-04) • Repairs needed to River UV next, planned for FY23/24
EFFLUENT PUMPING	Archimedes screw pumps are 30 years old and in need of repair	• Preference is to keep the same type pump in service and repair by FY20/21

6.2.6.3 Capital Improvement List & Planned Future Projects

Reclaimed water delivery capacity improvements are complete. Smaller projects are currently underway to replace end of life equipment.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

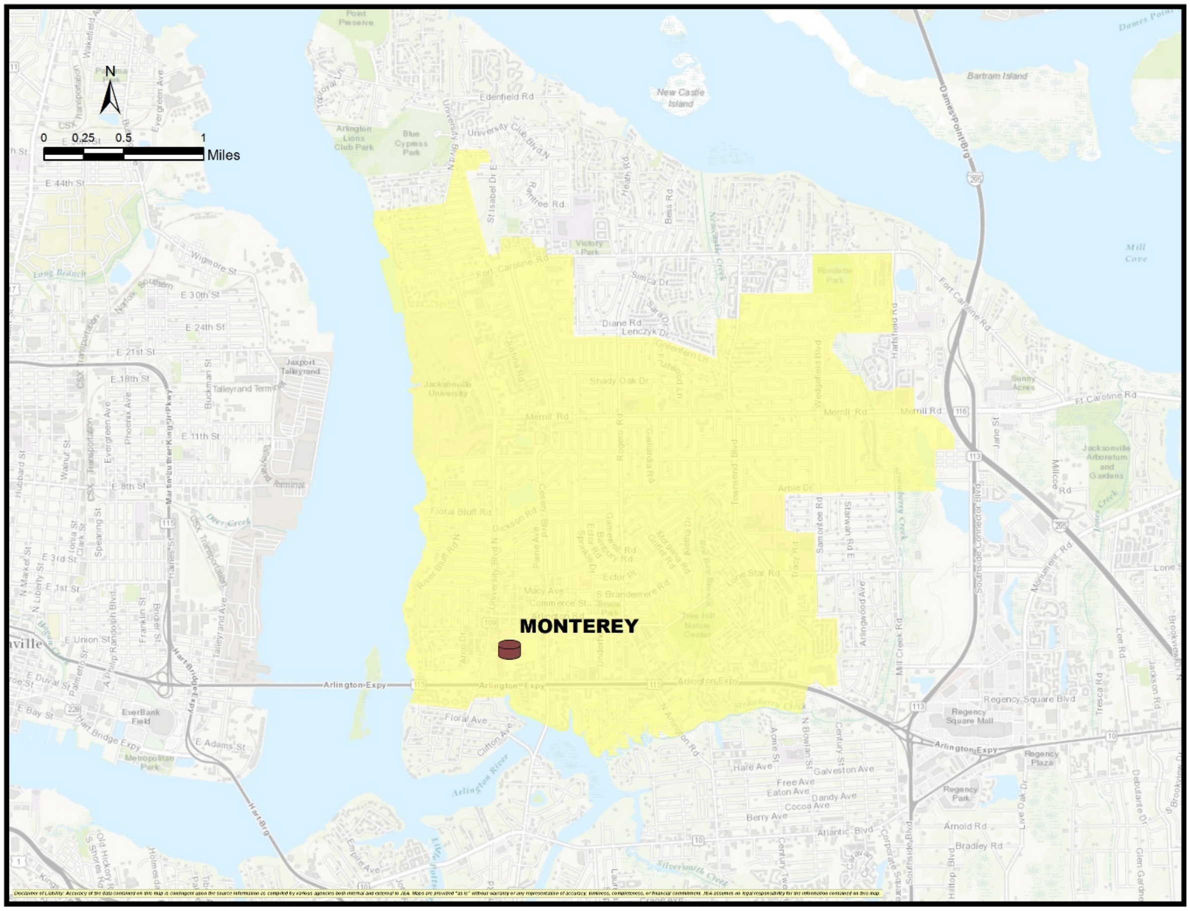
Table 21: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
138-07	Mandarin WWTF - Expansion Joint Replacement	$1,393	$1,303	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
138-04	JP - SJRWMD - Mandarin WWTF - High Level UV Upgrade - (Reimb-33)	$3,105	$424	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
207-30W	Facilities - Mandarin WWTF - Facility Parking and Storage Building	$2,200	$200	$0	$0	$0	$0	$2,000	$0	$0	$0	$0	$0
138-08	Mandarin WWTF - Filter Feed Pump No 1 Replacement	$800	$0	$92	$708	$0	$0	$0	$0	$0	$0	$0	$0
		TOTAL	**$1,927**	**$92**	**$708**	**$0**	**$0**	**$2,000**	**$0**	**$0**	**$0**	**$0**	**$0**

6.2.7 Monterey WWTF

Monterey is an activated sludge 3.6 mgd AADF facility providing service to a mostly residential population. This region is nearly built out.

Figure 17: Monterey Current Service Area



6.2.7.1 Plant Capacity

Figure 18 shows the projected wastewater flow for Monterey WWTF in comparison to the overall facility permitted capacity. Sufficient capacity is available to support the existing as well as minimal growth throughout the projected period. There is flexibility in the infrastructure to allow for some wastewater flow to be redirected to and from Arlington East WWTF.

Figure 18: Monterey WWTF Projected Flow

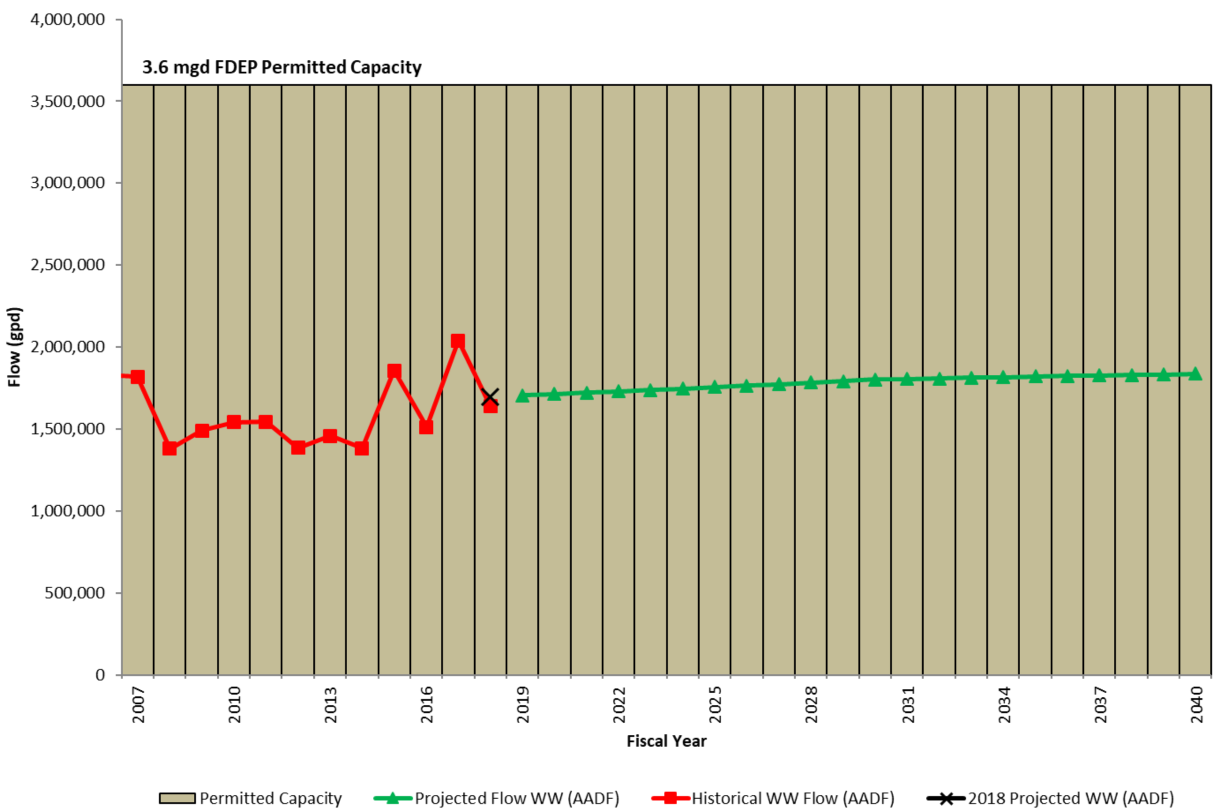


Table 22: Monterey WWTF Flow Summary (fiscal year average, mgd)

Historical	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	1.82	1.38	1.49	1.54	1.54	1.39	1.46	1.38	1.86
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
1.51	2.04	1.64		1.70	1.71	1.76	1.80	1.82	1.84

6.2.7.2 Process Inspection

A review of current major facility components revealed the items listed in the table below are in need of attention. Monterey is an older facility with multiple items in need of repair/replacement. An engineer has been tasked with evaluating the complete WWTF.

Table 23: Process Inspection Summary

TOPIC	DESCRIPTION	ACTION
INFLUENT PUMP STATION	Aging structure requires rehab	• Engineer has been tasked to evaluate the whole WWTF and provide recommendations
BAR SCREEN	Aging structure requires rehab	• Included in Engineering evaluation
SEQUENCING BATCH REACTOR (SBR)	Four SBRs available, only three used (fourth is used for digester), stopped up drain in a SBR basin needs cleaning, blowers are not interconnected (if one goes down air cannot be rerouted from others), new digester needed to make fourth SBR available	• Included in Engineering evaluation
DISINFECTION	Aging structure and replacement parts could become an issue	• Included in Engineering evaluation
BIOSOLIDS	The sludge holding tank is undersized, centrifuge is in poor condition	• Included in Engineering evaluation • Peak shaving storage tank at Twin Creeks MPS could potentially be relocated to Monterey WWTF to serve as a sludge holding tank • Centrifuge needs to be replaced soon

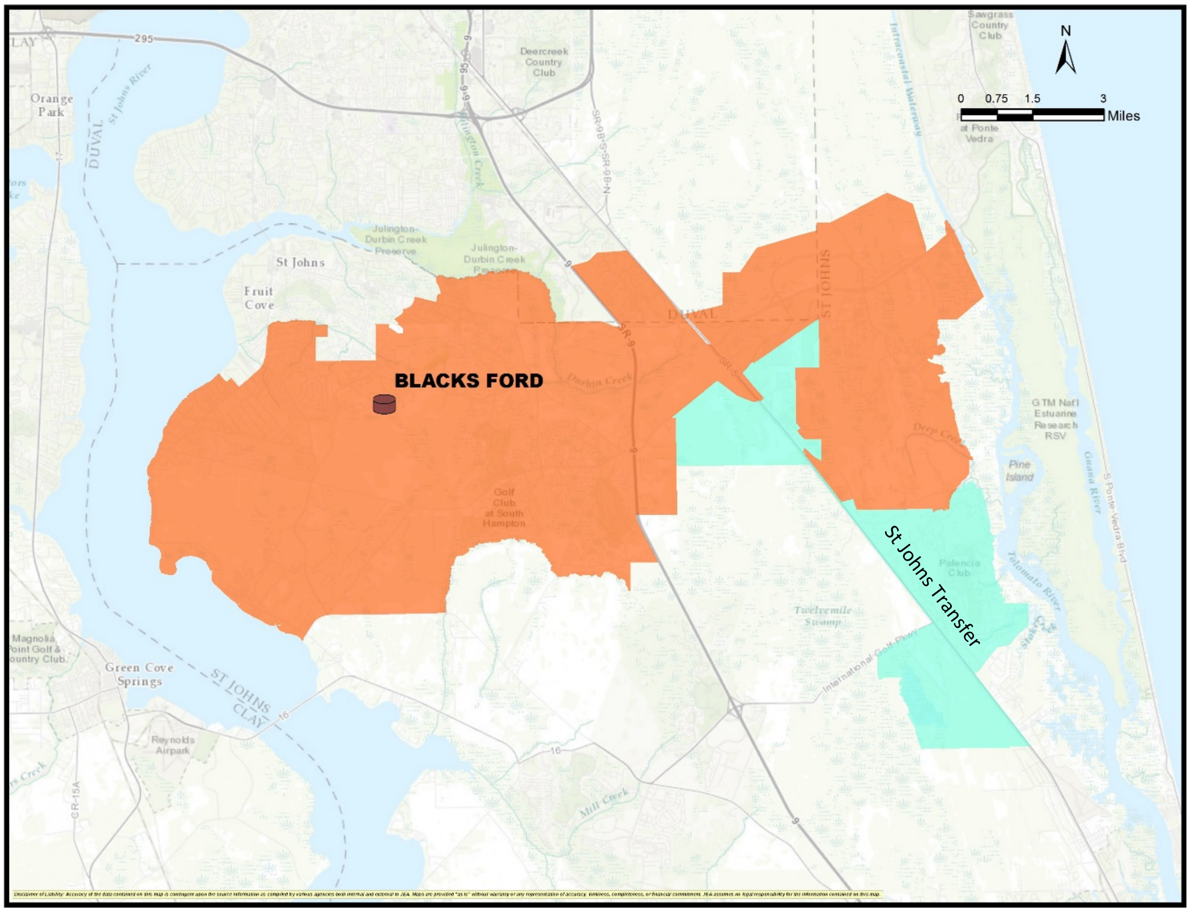
6.2.7.3 Capital Improvement List & Planned Future Projects

No major capital projects are planned at this time; however, a comprehensive inspection of the full treatment facility is currently underway.

6.2.8 Blacks Ford WWTF

In late FY18 Blacks Ford WWTF was converted from a sequential batch reactor activated sludge process to a 5-stage Bardenpho process in an oxidation ditch, permitted to treat up to 6.0 mgd AADF of wastewater flow. Blacks Ford WWTF serves mostly residential customers in the fastest growing region of the JEA service area. In early FY19 Nocatee and St. Johns County Utility flow (St Johns Transfer) was redirected from Mandarin WWTF to Blacks Ford WWTF.

Figure 19: Blacks Ford Current Service Area



6.2.8.1 Plant Capacity

Figure 20 shows the projected wastewater flow for Blacks Ford WWTF in comparison to the overall facility permitted capacity. The new treatment facility was brought online late in FY18 with flows redirected from Mandarin service area in early FY19. Figure 20 shows an alternative wastewater projection (orange color) with St. Johns County Utilities and Twin Creeks development going to Blacks Ford WWTF instead of Greenland WWTF. Using Twin Creeks MPS, flows can be redirected from Greenland WWTF to Blacks Ford WWTF as needed to help support reclaimed water demands as needed.

Figure 20: Blacks Ford WWTF Projected Flow

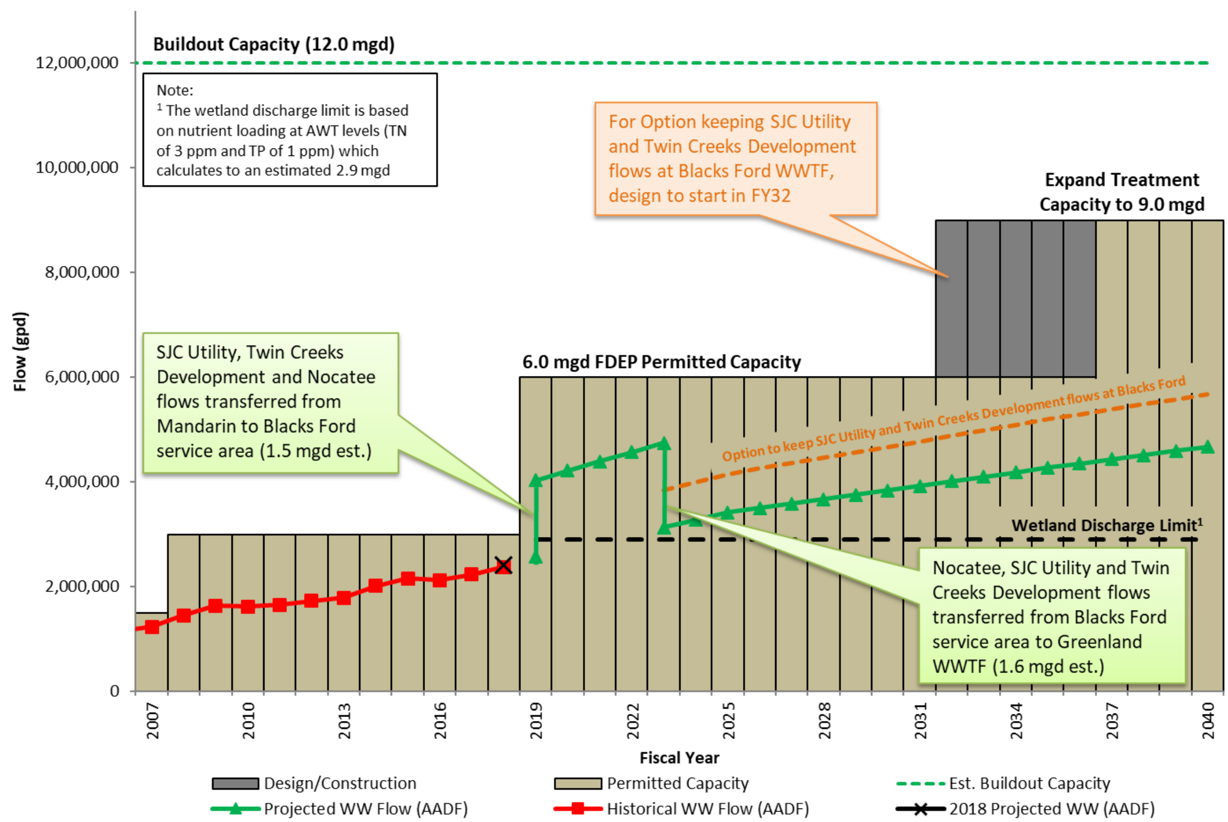


Table 25: Blacks Ford WWTF Flow Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	1.23	1.45	1.64	1.62	1.65	1.73	1.79	2.01	2.15
2016	2017	2018	Projected	2019	2020	2025	2030	2035	2040
2.12	2.23	2.37		4.03	4.22	3.41	3.83	4.27	4.67
			Alt. Projected	2019	2020	2025	2030	2035	2040
				-	-	4.15	4.67	5.20	5.68

6.2.8.2 Process Inspection

A review of current major facility components revealed the following items listed in the table below are in need of attention. Expansion of the Blacks Ford WWTF completed in 2018, some equipment that did not see upgrades as a result of the expansion will be in need of replacement in the next 10 years.

Table 26: Process Inspection Summary

TOPIC	DESCRIPTION	ACTION
WWTF CAPACITY	WWTF expansion from 3.0 to 6.0 mgd	• Project complete (103-01)
BIOSOLIDS - CENTRIFUGE	The current centrifuge will become a backup to the larger one installed as part of the current expansion, by FY20 it will be over 13 years old	• Planned for upgrades in FY22
FILTERS	Due for rehabilitation, very old and in poor condition	• Project scoping underway
UV DISINFECTION	Due for replacement, very old and in poor condition	• Project scoping underway

6.2.8.3 Capital Improvement List & Planned Future Projects

Blacks Ford WWTF expansion to 6 mgd is online.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

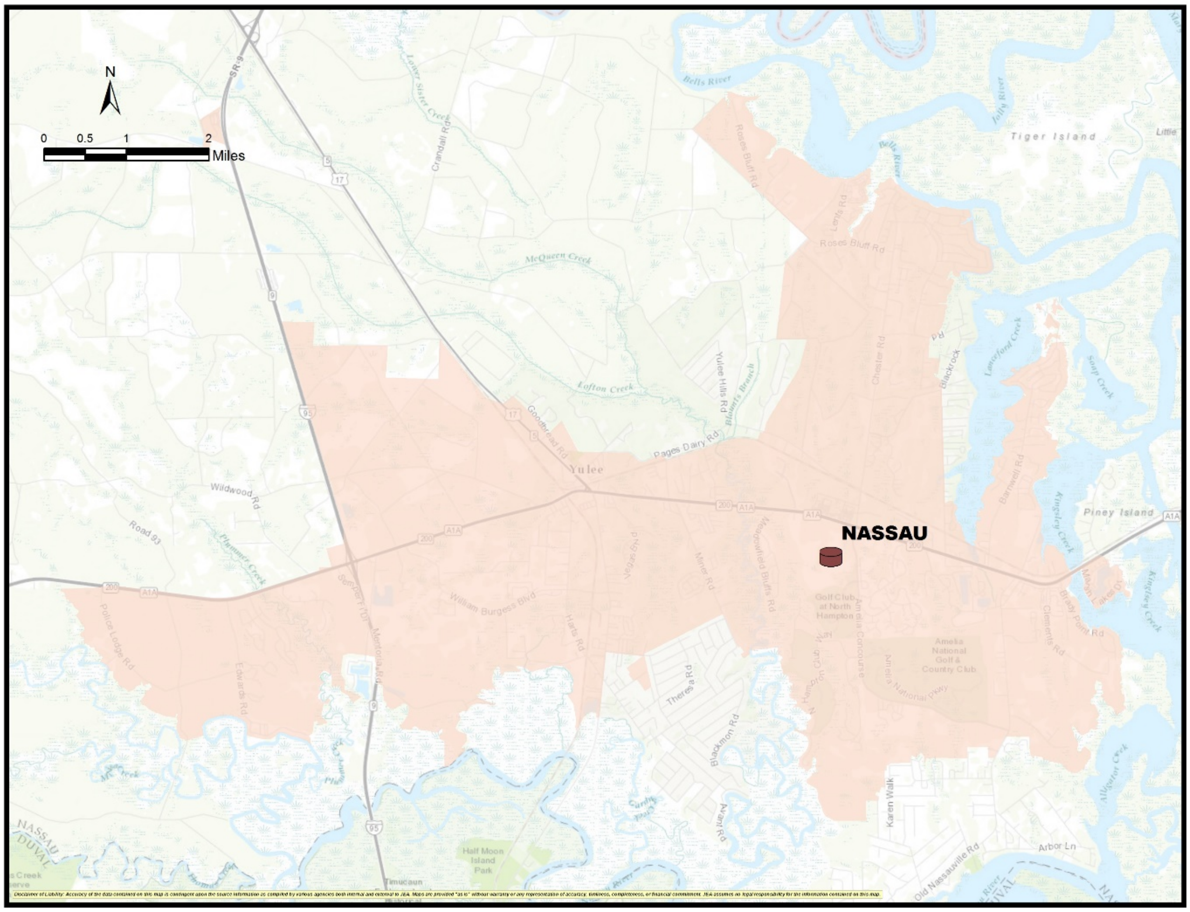
Table 27: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
103-01	Blacks Ford WWTF - Expansion from 3.0 to 6.0 mgd	$67,376	$5,289	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

6.2.9 Nassau Regional WWTF

Nassau Regional is a membrane bioreactor WWTF, designed to treat up to 2.0 mgd AADF of wastewater flow, permitted to treat up to 1.55 mgd. Permitted flow is less than design flow, due to effluent discharge limitations, see Section 6.2.9.1. Flow to the WWTF is from a mix of commercial and residential developments. Large tracts of land are available for development and are expected to grow at a steady pace over the next few years.

Figure 21: Nassau Regional Current Service Area



6.2.9.1 Plant Capacity

Figure 22 shows the projected wastewater flow for Nassau Regional WWTF in comparison to the overall facility permitted capacity. Growth is expected to continue at a moderate pace over the next 10-20 years, requiring a capacity upgrade to the existing treatment facility. Two large developments are planned in Nassau County, 3 Rivers and the East Nassau Community Planning Area (ENCPA); future growth impacts of both developments are captured in the projected flows shown in Figure 22. An evaluation of the current and alternative effluent discharge options is underway along with the design to increase the capacity of the Nassau Regional WWTF.

Figure 22: Nassau Regional WWTF Projected Flow

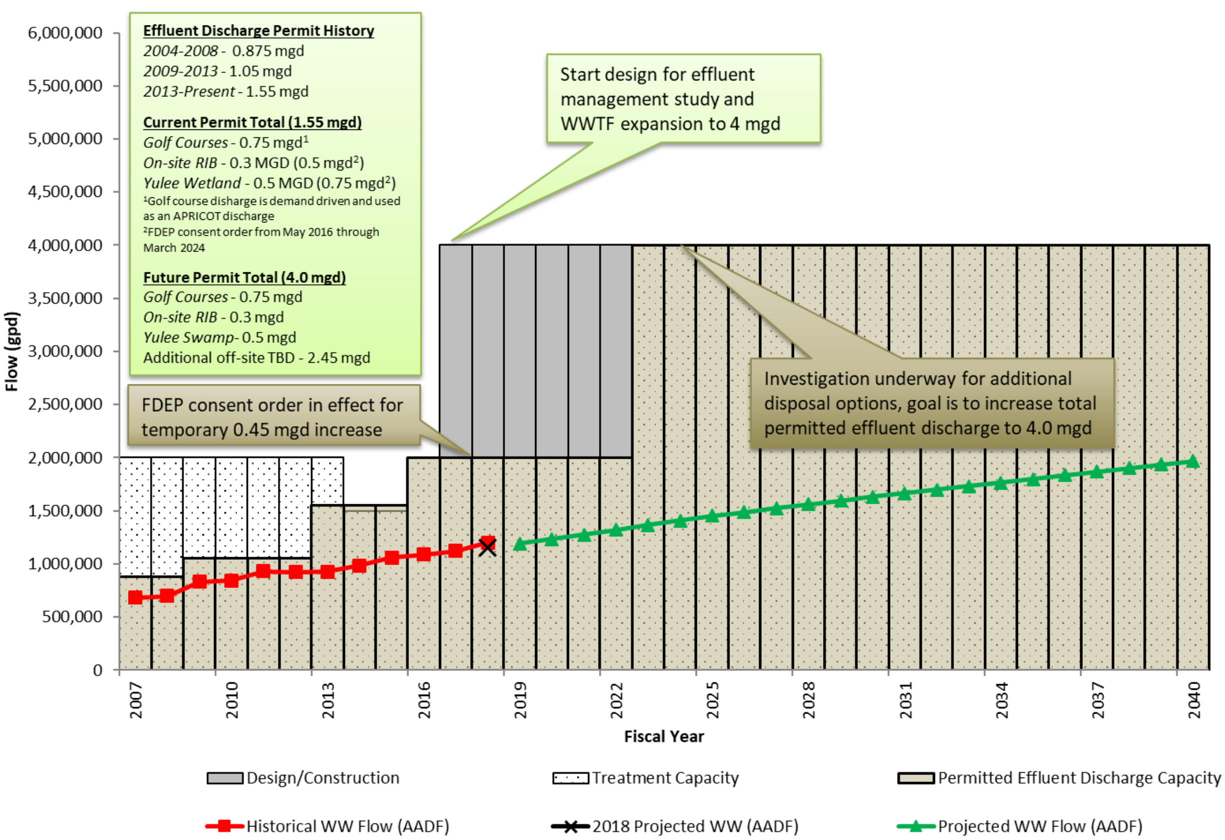


Table 28: Nassau Regional WWTF Flow Summary (fiscal year average, mgd)

Historical	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	0.68	0.70	0.83	0.84	0.93	0.92	0.93	0.99	1.06
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
1.09	1.12	1.20		1.19	1.23	1.45	1.63	1.80	1.97

6.2.9.2 Process Inspection

A review of current major facility components revealed the following items listed in the table below are in need of attention. The current focus is on finding alternative effluent discharge locations/options and design of an expanded treatment facility.

Table 29: Process Inspection Summary

TOPIC	DESCRIPTION	ACTION
TREATMENT	All four MBR units are available and can be operated in parallel as needed; having four units online provides a treatment capacity of 2.0 MGD, however the firm capacity remains 1.5 MGD; Aeration Basin volume limited to treat only 1.6 MGD AADF due to higher influent nutrient concentrations than what was originally designed for (1.6 MGD is the winter limit)	• Additional air will be added as flows approach 1.5 MGD, blower was purchased and installed; one of the other blowers failed after installing the new blower, a new one is on order and expected to be installed by the end of April 2019 • Tank 3 Membrane Replacement planned to be complete by Sep-2019 (870-13)
PUBLIC ACCESS REUSE	Reliable public access reuse cannot be provided with only one UV disinfection unit, the current pumps and with no on-site storage	• The development Village Walk (210 homes) uses a potable jumper to serve new RW irrigation connections until on-site improvements at the WWTF can be completed, Wildlight (Rayonier property near I-95 and SR200) also has potable jumpers in use, other developments are planned in the near term that are tagged for reclaimed water • An upgrade at the WWTF to provide reliable public access RW (second UV disinfection unit, storage tank, pump upgrades), design underway (870-08) • An offsite reclaimed water storage and pumping site is in design now (417-61)
EFFLUENT DISCHARGE/ TREATMENT CAPACITY	Limited discharge capacity and future expected growth is the driver of the planned expansion	• The treatment facility expansion is in a preliminary design phase (870-08) • An evaluation of the current wetland and alternatives is underway (options include: Apricot conversion, offsite wetland, offsite RIB, reclaimed water customers, aquifer recharge, injection well) • On-site drainage improvements will be included in the WWTF expansion design • Correcting RIB berm issues is part of the WWTF expansion scope, damaged berm of Percolation Pond #1 must be completed with notification of completion to FDEP by 12/31/21

6.2.9.3 *Capital Improvement List & Planned Future Projects*

Conversion to public access reclaimed water is in design now. Investigation of effluent disposal sites need for the treatment facility expansion is also underway.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

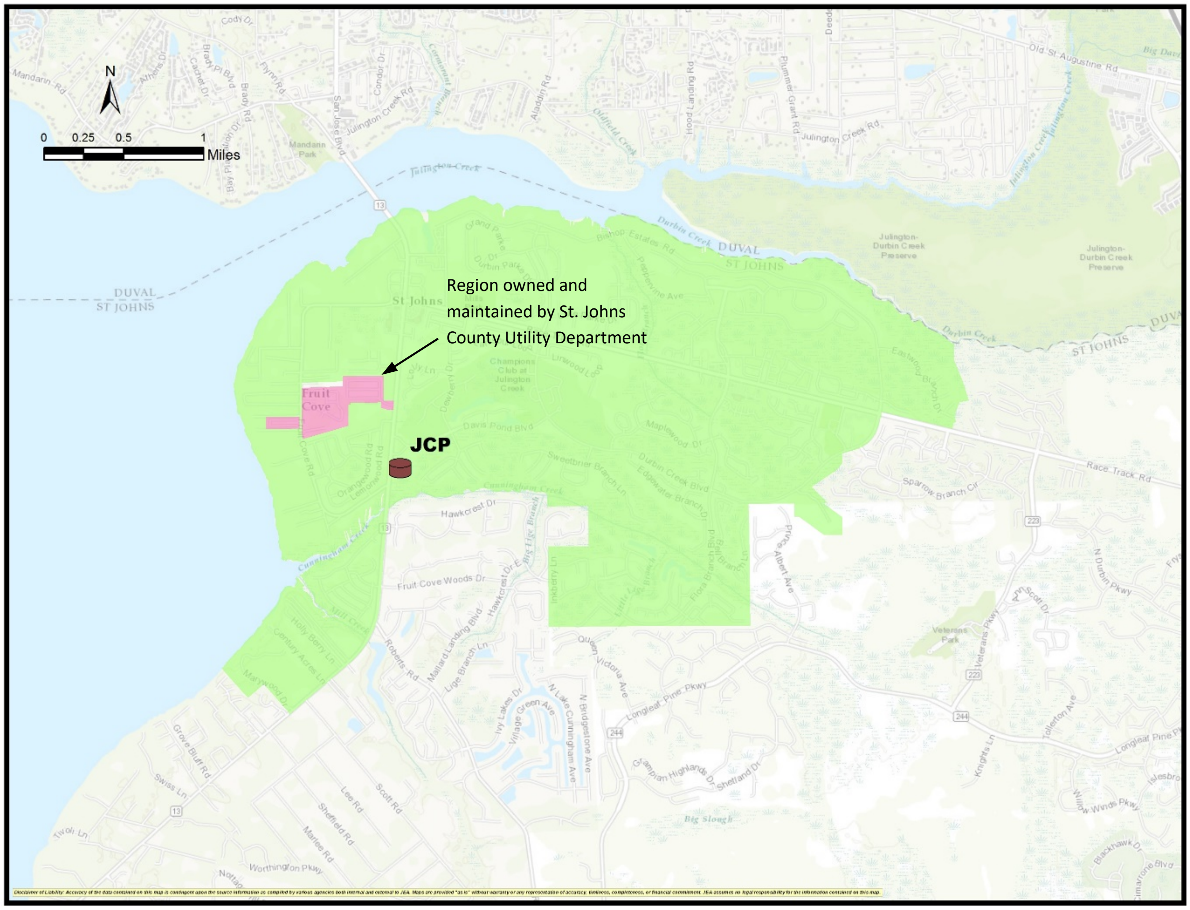
Table 30: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
870-08	Nassau Regional WWTF - Expansion to 4 mgd	$43,121	$1,592	$1,379	$5,758	$14,000	$14,000	$6,000	$0	$0	$0	$0	$0
417-61	Nassau - Radio Av - RW Storage Tank and Booster PS - R	$4,806	$609	$1,708	$2,443	$0	$0	$0	$0	$0	$0	$0	$0
870-13	Nassau Regional WWTF - Tank 3 Membrane Replacement	$402	$402	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-82	Nassau Regional WWTF - SR200 West of I-95 RW Storage Tank and Booster PS - R	$9,000	$0	$0	$0	$0	$0	$375	$3,000	$5,625	$0	$0	$0
		TOTAL	**$2,603**	**$3,087**	**$8,201**	**$14,000**	**$14,000**	**$6,375**	**$3,000**	**$5,625**	**$0**	**$0**	**$0**

6.2.10 Julington Creek Plantation WWTF

Julington Creek Plantation (JCP) is an advanced secondary activated sludge WWTF, permitted to treat up to 1.0 mgd AADF of wastewater flow. JCP serves mostly residential customers in a region mostly built out.

Figure 23: Julington Creek Current Service Area



6.2.10.1 Plant Capacity

Figure 24 shows the projected wastewater flow for JCP WWTF in comparison to the overall facility permitted capacity. A portion of JCP flow was redirected to Blacks Ford WWTF circa 2008 to maintain a balanced flow at the WWTF; the treatment process is the most efficient at flows less than 1.0 mgd.

Figure 24: Julington Creek WWTF Projected Flow

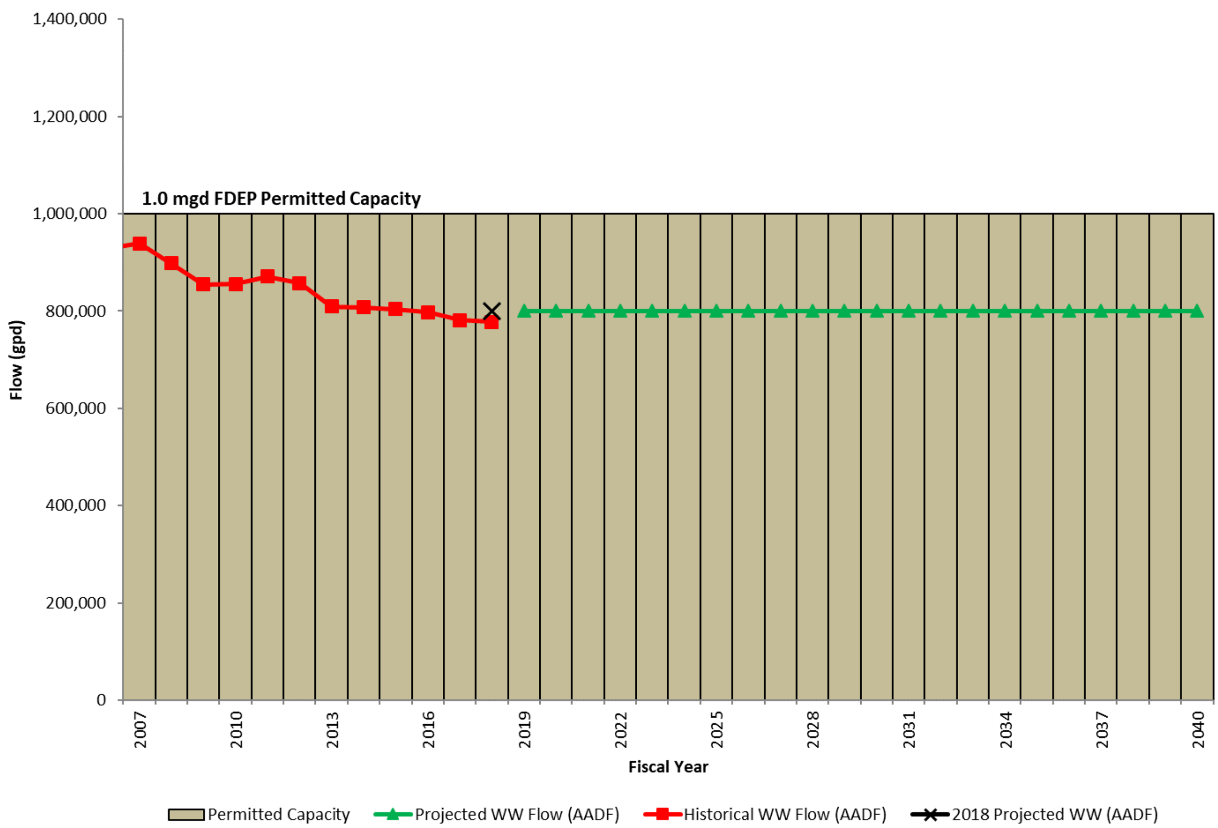


Table 31: Julington Creek WWTF Flow Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	0.94	0.90	0.85	0.86	0.87	0.86	0.81	0.81	0.80
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
0.80	0.78	0.78		0.80	0.80	0.80	0.80	0.80	0.80

6.2.10.2 Process Inspection

A review of current major facility components revealed the following items listed in the table below are in need of attention. The headworks and screening have reached their useful life and are in need of replacement.

Table 32: Process Inspection Summary

TOPIC	DESCRIPTION	ACTION
BAR SCREEN	Due for replacement	• Construction underway (731-04)
HEADWORKS	Aging structure requires rehab due to corrosion issues, flow splitting needs some work also	• Construction underway (731-04)
CLARIFIER	Existing clarifier not very efficient	• Major scope items include: fiberglass pontoons need replacement with UV protected versions, rolling mechanism needed as opposed to the floating system
SCADA	Current system is outdated and in need of replacement/updating, difficult to find replacement parts	• Should be completed by the end of FY19

6.2.10.3 Capital Improvement List & Planned Future Projects

Influent structure and storage tank improvements are underway.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

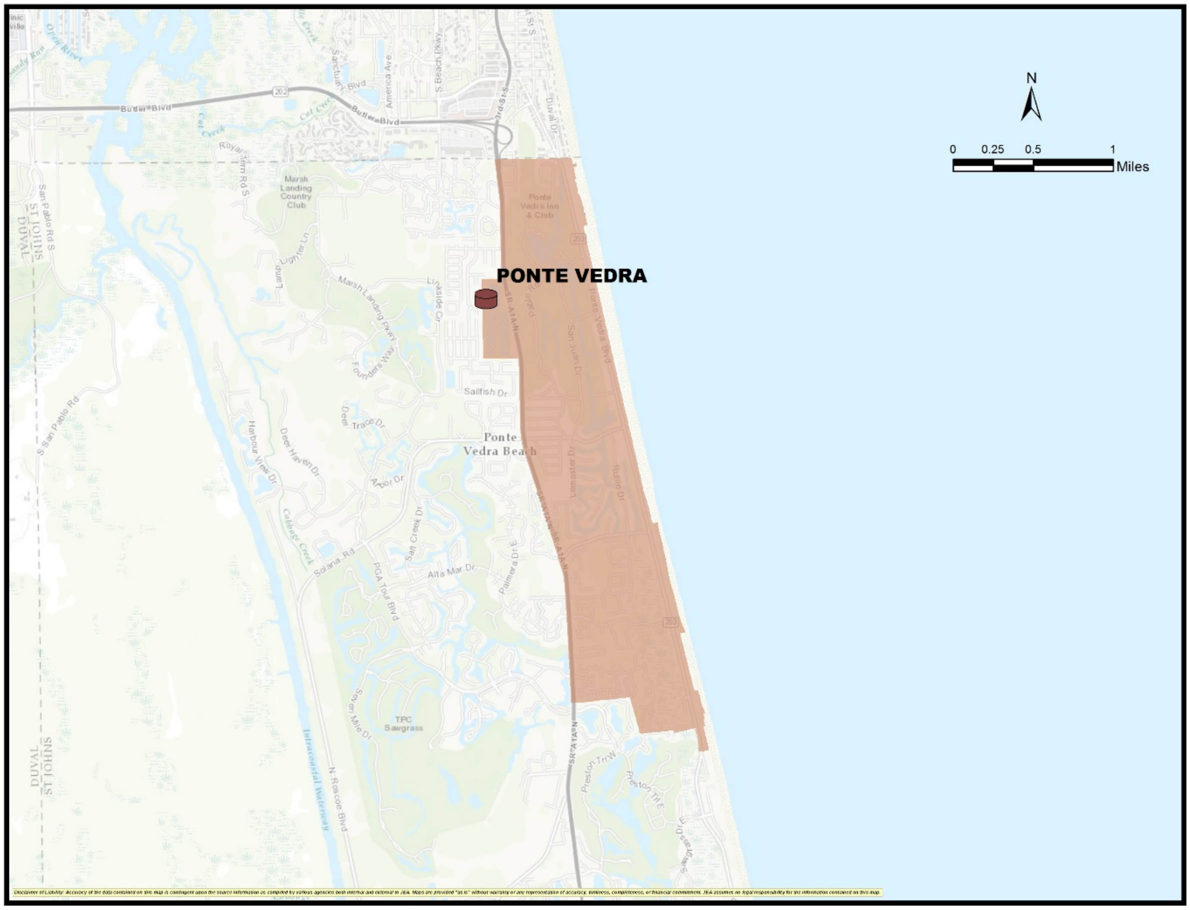
Table 33: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
731-04	Julington Creek WWTF - Influent Structure Rehabilitation	$2,526	$1,702	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
731-07	Julington Creek WTP - Storage Tank Rehabilitation	$400	$400	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
731-06	Julington Creek WWTF and Ponte Vedra WWTF - Electrical Grounding/Lightning Improvements	$391	$80	$311	$0	$0	$0	$0	$0	$0	$0	$0	$0
		TOTAL	**$2,182**	**$311**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

6.2.11 Ponte Vedra WWTF

Ponte Vedra is an activated sludge WWTF, permitted to treat up to 0.8 mgd AADF of wastewater flow, serving mostly residential customers.

Figure 25: Ponte Vedra Current Service Area



6.2.11.1 Plant Capacity

Figure 26 shows the projected wastewater flow for Ponte Vedra WWTF in comparison to the overall facility permitted capacity. This region is mostly built out with very little new growth expected in the future. The reduction of flow FY17-FY18 is due to a faulty meter.

Figure 26: Ponte Vedra WWTF Projected Flow

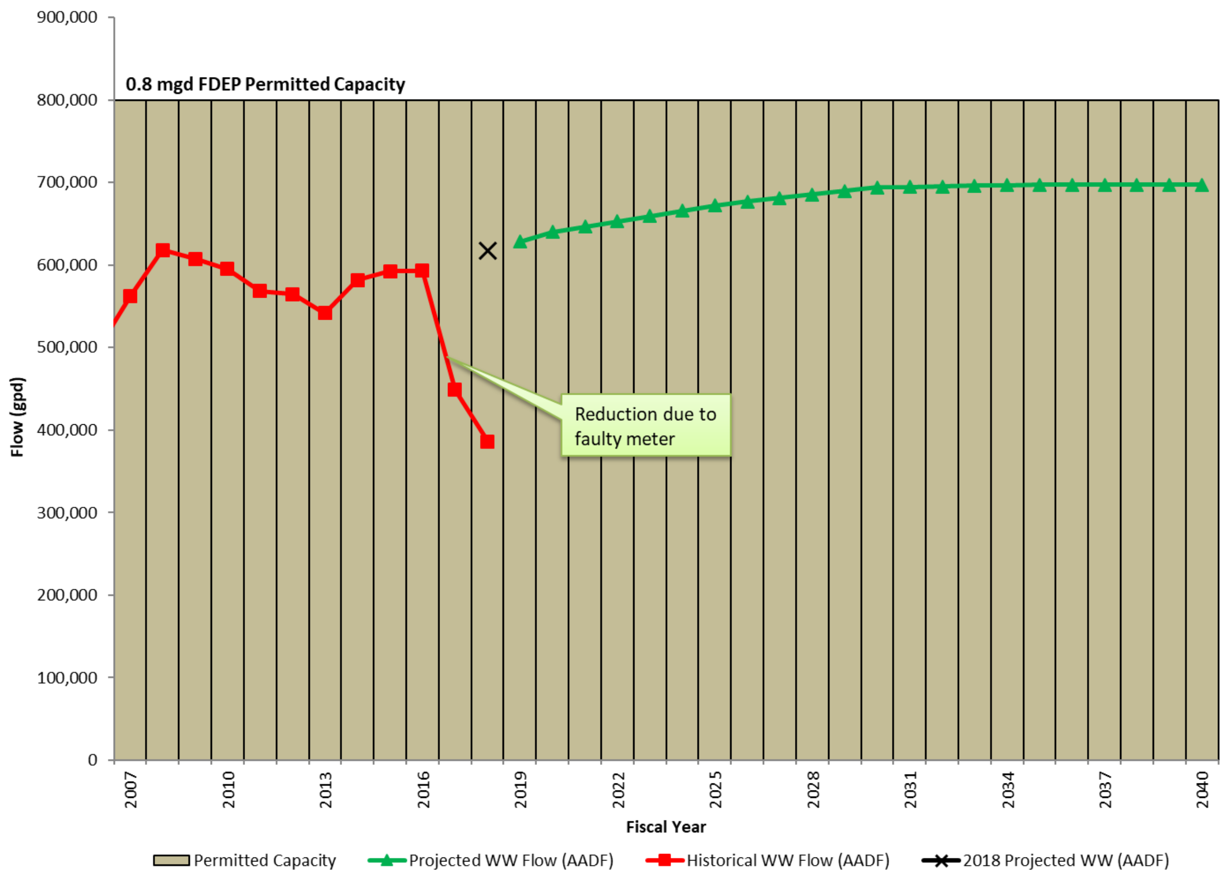


Table 34: Ponte Vedra WWTF Flow Summary (fiscal year average, mgd)

Historical	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	0.56	0.62	0.61	0.60	0.57	0.56	0.54	0.58	0.59
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
0.59	0.45	0.39		0.63	0.64	0.67	0.69	0.70	0.70

6.2.11.2 Process Inspection

A review of current major facility components revealed the following items listed in the table below are in need of attention. An additional process train would allow for operational flexibility. A new filter was recently completed and UV upgrades are planned.

Table 35: Process Inspection Summary

TOPIC	DESCRIPTION	ACTION
SEQUENCING BATCH REACTOR (SBR)	Two SBRs in service now, if one is taken down the facility goes into reject mode for up to three days possibly incurring FDEP fines; a third SBR is needed to allow for rotation and maintenance, this will also provide capacity for high flow occurrences	• Third SBR planned, project scoping underway
FILTERS	Aging sand filter requires rehab (installed with original WWTF in 1999), no redundancy exists to take existing filter offline for maintenance	• Complete (146-05)
DISINFECTION	The disinfection system was installed in 1999 and has had issues with overheating, other modifications are needed to allow for ease of maintenance	• Replace UV disinfection system (146-06)

6.2.11.3 Capital Improvement List & Planned Future Projects

Site improvements and process upgrades are underway.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

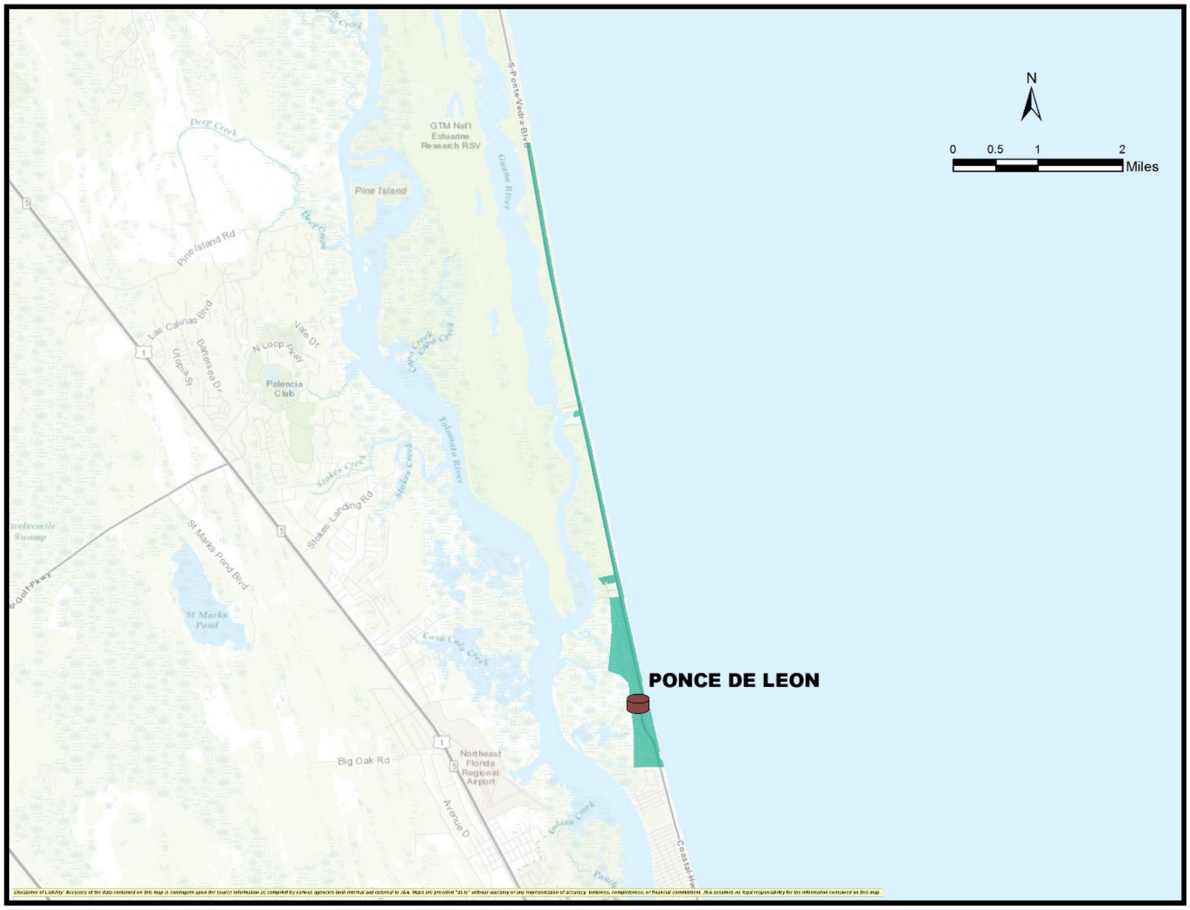
Table 36: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
146-05	Ponte Vedra WWTF - Filter Addition	$858	$536	$322	$0	$0	$0	$0	$0	$0	$0	$0	$0
146-04	Ponte Vedra WWTF - Access Platform Addition and Handrail Replacement	$500	$218	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
731-06	Julington Creek WWTF and Ponte Vedra WWTF - Electrical Grounding/Lightning Improvements	$391	$80	$311	$0	$0	$0	$0	$0	$0	$0	$0	$0
146-06	Ponte Vedra WWTF - UV Disinfection System Improvements	$455	$0	$78	$377	$0	$0	$0	$0	$0	$0	$0	$0
		TOTAL	**$834**	**$711**	**$377**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

6.2.12 Ponce de Leon WWTF

A new extended air treatment facility was placed into service Summer 2019, permitted to treat up to 0.24 mgd AADF of wastewater flow; serving mostly residential customers.

Figure 27: Ponce de Leon Current Service Area



6.2.12.1 Plant Capacity

Figure 28 shows the projected wastewater flow for Ponce de Leon (PDL) WWTF in comparison to the overall facility permitted capacity. This region is mostly built out with very little new growth expected in the future. The reduction of flow FY17-FY18 was due to a faulty meter.

Figure 28: Ponce de Leon WWTF Projected Flow

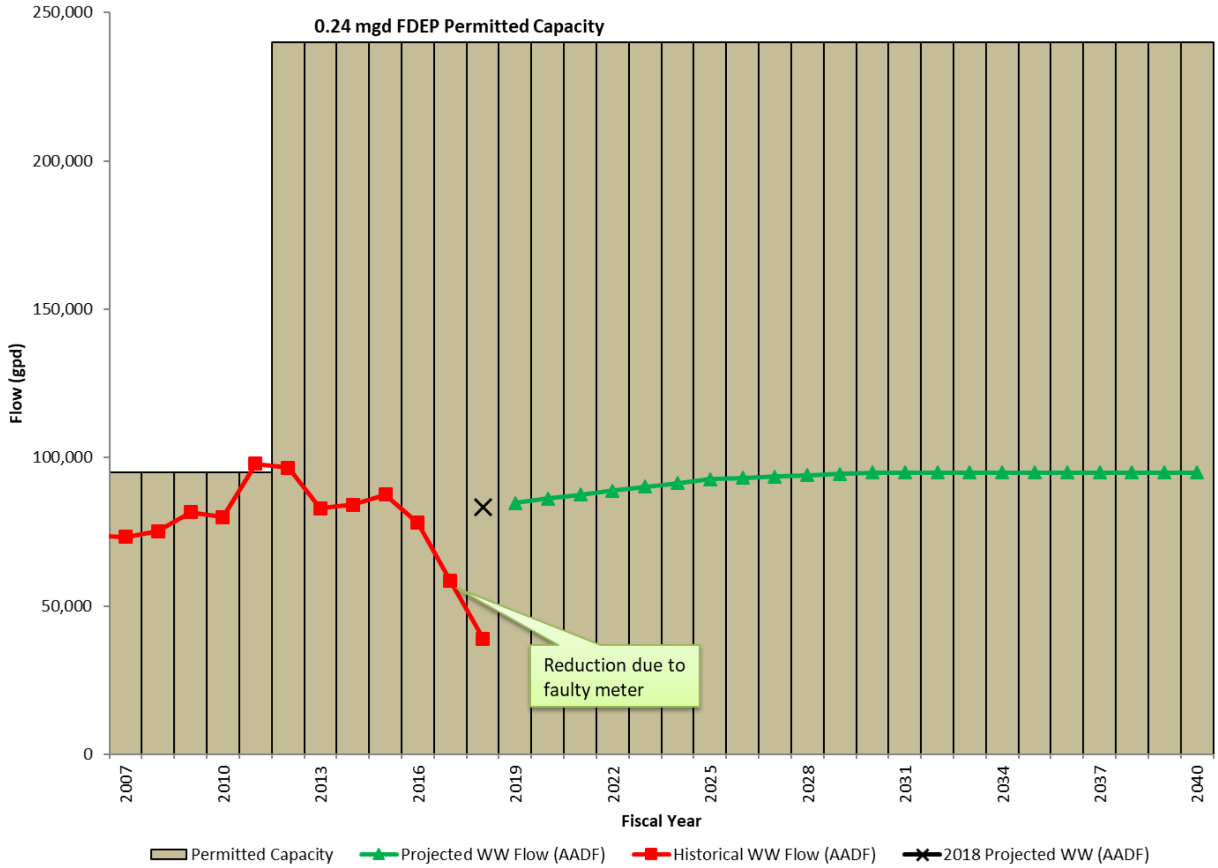


Table 37: Ponce de Leon WWTF Flow Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	0.073	0.075	0.082	0.080	0.098	0.097	0.083	0.084	0.088
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
0.078	0.058	0.039		0.085	0.086	0.093	0.095	0.095	0.095

6.2.12.2 Process Inspection

A review of current major facility components revealed the following items listed in the table below are in need of attention. A package WWTF was constructed to replace the aging existing package WWTF.

Table 38: Process Inspection Summary

TOPIC	DESCRIPTION	ACTION
TREATMENT FACILITY	The existing facility is old and has structural issues, e.g. catwalks and tank integrity	• Construction of package WWTF to replace the current PDL WWTF is complete (128-06) • Clarifier of package WWTF rated to treat up to 270,000 GPD ADF (overall capacity of package WWTF), current PDL FDEP permit limit is 240,000 GPD; since there is no redundancy to the clarifier in the package facility, when treated flows approach 120,000 GPD (half of current permit limit) a second clarifier will be added

6.2.12.3 Capital Improvement List & Planned Future Projects

Replacement of the treatment facility was completed in the Summer of 2019.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

Table 39: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
128-06	Ponce De Leon WWTF - Package Treatment Plant	$2,790	$1,021	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

7 Advanced Treatment – Water Purification Project

In 2018, two advanced water treatment technologies were tested side by side at two different JEA water reclamation facilities (Southwest and Buckman WWTFs). The goal of Phase 1 was to compare water quality, operational reliability, and lifecycle cost at two WWTFs with completely different effluent streams (one facility treats a majority of residential customers while the other treats residential mixed with heavy industrial). The treatment technology selected was ultrafiltration followed by low-pressure reverse osmosis and advanced oxidation.

Phase 2 will take the selected treatment technology from Phase 1 and construct a demonstration facility that can produce up to 1 mgd of purified water. The design for Phase 2 is planned to start in the Fall of 2019.

Phase 3 is anticipated to produce up to 10 mgd of purified water. An overview for all three phases can be found in Appendix 2.

Appendix 1

2018 Wastewater System Flow Projections

2018 WASTEWATER SYSTEM FLOW PROJECTIONS

April 2018

Prepared By:
JEA Water/Wastewater Systems Planning
21 West Church Street
Jacksonville, Florida 32202

Table of Contents

Introduction and Purpose

Water and Wastewater System Planning provides a wastewater forecast annually as a reference document for planning capital project needs, financial planning, and preparation of annual capacity analysis reports. The demand forecasts include predictions in five year increments over a planning period through fiscal year 2040. These forecasts may also be applied as calendar year forecasts without appreciable error due to the limited precision inherent in any forecasting process of this nature. This document includes a description of the methods employed to develop this year's projection of the population served by JEA. Projections have also been provided for each service area, each fiscal year along with the forecasts of anticipated demands per capita served.

Wastewater Service Population

The current overall service population is determined by multiplying the total number of Single Family Residence Service Accounts by 2.5 and the total number of Multifamily Dwelling Units multiplied by 51 (an average of 23 units per connection and 2.2 persons per unit); historical customer data was used to determine these factors.

The table below lists the new projected wastewater population for each fiscal year from the 2012 to 2040.

Fiscal Year	Wastewater Population
2012	704,457
2013	714,760
2014	726,356
2015	741,332
2016	759,039
2017	776,165
2020	**812,527**
2025	**873,978**
2030	**928,994**
2035	**982,412**
2040	**1,028,361**

The projected populations in the table above are based upon several factors. For the current or starting population, the average number of active single family and active multifamily primary sewer service connections in fiscal Year 2017 was 246,187 and 3,151 respectively. Applying the 2.5 and 51 multipliers for single family units and multifamily units respectively, the total number of persons served in FY 2017 was about 776,000 persons. The five year growth rate was applied to the FY2017 population served (776,000) to project the future population estimates.

Note: The growth rate is derived from the University of Florida Bureau of Economic and Business Research (BEBR) medium population growth. BEBR updates the County growth projections annually and Bulletin 180 January 2018 was used as the basis for this projection.

Waste Water Forecast

Historical Population Projections and GPCD

Years	JEA Service Area Population	Wastewater Treated	GPCD
		AADF	
	(1)	(2)	(3)
2013	714,760	69.83	97.7
2014	726,356	74.80	103.0
2015	741,332	80.59	108.7
2016	759,039	78.30	103.2
2017	776,135	82.74	106.6

(1) JEA Wastewater System Population, Based on BEBR forecast, calculated under separate cover.

(2) Historic wastewater treated reported on FDEP DMR, Discharge Monitoring Report.

(3) GPCD - Gallons per Capita Day = Column (2) * 10^6 / Column (1).

Project Wastewater Population and GPCD

Year	JEA Service Area Population	Wastewater Treated	GPCD
		AADF	
	(1)	(2)	(3)
2018	785,764	81.87	104.2
2019	799,127	83.14	104.0
2020	812,527	84.42	103.9
2025	873,978	90.73	103.8
2030	928,994	96.26	103.6
2035	982,412	101.71	103.5
2040	1,028,361	106.53	103.6

(1) JEA Wastewater System Population, Based on BEBR forecast, calculated under separate cover.

(2) Projected wastewater treated.

(3) GPCD - Gallons per Capita Day = Column (2) * 10^6 / Column (1); this is an overall estimate however GPCD is different for each WWTF service area and is based on historical population and treated flow for each specific service area and applied to projected population.

GPCD Estimates by Wastewater Service Area

Area		2012	2013	2014	2015	2016	2017	Average (1)
Arlington East	Population	213,937	217,066	220,588	225,136	230,513	235,714	
	AADF (mgd)	17.60	18.49	19.70	19.65	19.59	21.03	
	GPCD	82	**85**	**89**	**87**	**85**	**89**	**87**
Blacks Ford	Population	31,268	31,725	32,240	32,904	33,690	34,450	
	AADF (mgd)	1.73	1.79	2.01	2.16	2.12	2.23	
	GPCD	55	**56**	**62**	**65**	**63**	**65**	**62**
Buckman	Population	150,319	152,518	154,992	158,188	161,966	165,621	
	AADF (mgd)	23.06	24.01	26.17	30.79	28.90	30.51	
	GPCD	153	157	**169**	**195**	**178**	**184**	**182**
Cedar Bay	Population	47,928	48,629	49,418	50,437	51,642	52,807	
	AADF (mgd)	3.63	4.52	4.75	5.04	5.16	5.43	
	GPCD	76	**93**	**96**	**100**	**100**	**103**	**98**
JCP	Population	10,941	11,101	11,281	11,514	11,789	12,055	
	AADF (mgd)	0.86	0.81	0.81	0.80	0.80	0.78	
	GPCD	78	**73**	**72**	**70**	**68**	**65**	**69**
Mandarin	Population	86,989	88,261	89,693	91,542	93,729	95,843	
	AADF (mgd)	7.41	7.62	7.60	7.92	7.96	7.91	
	GPCD	85	**86**	**85**	**87**	**85**	**82**	**85**
Monterey	Population	23,016	23,352	23,731	24,220	24,799	25,358	
	AADF (mgd)	1.39	1.46	1.38	1.86	1.51	2.04	
	GPCD	60	**62**	**58**	**77**	**61**	**80**	**68**
Nassau	Population	14,559	14,772	15,011	15,321	15,687	16,041	
	AADF (mgd)	0.92	0.93	0.99	1.06	1.09	1.15	
	GPCD	63	**63**	**66**	**69**	**70**	**72**	**68**
Ponce de Leon	Population	1,287	1,306	1,327	1,354	1,387	1,418	
	AADF (mgd)	0.10	0.08	0.08	0.09	0.08	0.06	
	GPCD	75	**64**	**63**	**65**	**56**	**41**	**58**
Ponte Vedra	Population	5,392	5,470	5,559	5,674	5,809	5,940	
	AADF (mgd)	0.57	0.54	0.58	0.57	0.59	0.45	
	GPCD	**105**	**99**	**105**	**101**	**102**	76	**102**
Southwest	Population	118,822	120,560	122,516	125,042	128,028	130,917	
	AADF (mgd)	9.12	9.58	10.73	10.66	10.50	11.15	
	GPCD	77	**80**	**88**	**85**	**82**	**85**	**84**
	Total Population	704,457	714,760	726,356	741,332	759,039	776,165	
	Total Treated Flow	66.37	69.83	74.80	80.59	78.30	82.74	
	Average GPCD	94.2	97.7	103.0	108.7	103.2	106.6	

(1) GPCD used for projected flows by service area is based on a five year average in most cases as determined by historical population and treated flow; however some adjustments are required due to historic variances as a result of I&I or flow redirection (i.e. phase out of San Jose and Royal Lakes to Arlington East, Buckman, Southwest and Cedar Bay are heavily influenced by I&I, Monterey had a recent flow transfer from Arlington East). The actual years averaged are shown in blue text.

JEA 2018 System Wide Wastewater Flow Projections by Service Area

Wastewater Treated by Facility in mgd													
Year	Arlington East	Blacks Ford	Greenland	JCP	Mandarin	Cedar Bay	Buckman	Southwest	Monterey	Nassau	Ponce de Leon	Ponte Vedra	*Total*
2012	17.60	1.73	0.00	0.86	7.41	3.63	23.06	9.12	1.39	0.92	0.10	0.56	66.38
2013	18.49	1.79	0.00	0.81	7.62	4.52	24.01	9.58	1.46	0.93	0.08	0.54	69.83
2014	19.70	2.01	0.00	0.81	7.60	4.75	26.17	10.73	1.38	0.99	0.08	0.58	74.80
2015	19.65	2.15	0.00	0.80	7.92	5.04	30.79	10.66	1.86	1.06	0.09	0.59	80.61
2016	19.59	2.12	0.00	0.80	7.96	5.16	28.90	10.50	1.51	1.09	0.08	0.59	78.30
2017	21.03	2.23	0.00	0.78	7.91	5.43	30.51	11.15	2.04	1.12	0.06	0.45	82.71
2018	21.76	2.37	0.00	0.78	8.07	5.52	26.17	12.04	1.64	1.20	0.04	0.39	79.98
2019	20.97	4.03	0.00	0.80	6.55	5.40	30.50	11.29	1.70	1.19	0.08	0.63	**83.14**
2020	21.15	4.22	0.00	0.80	6.74	5.50	30.86	11.47	1.71	1.23	0.09	0.64	**84.42**
2025	19.83	3.41	4.10	0.80	6.95	5.98	33.44	12.26	1.76	1.45	0.09	0.67	**90.73**
2030	20.48	3.83	4.61	0.80	7.17	6.76	35.33	13.04	1.80	1.63	0.10	0.69	**96.26**
2035	20.81	4.27	5.19	0.80	7.36	7.74	37.40	13.71	1.82	1.80	0.10	0.70	**101.71**
2040	20.97	4.67	5.71	0.80	7.49	8.67	39.47	14.16	1.84	1.97	0.10	0.70	**106.53**

Projected distribution of flow is determined by starting with a known population and disaggregating the population to each specific wastewater service area, by using JEA sewer service points within each service area. Disaggregation of population is done by taking the total population and total service points and using the percentage of the service points for each service area to determine the population for that particular service area. The population is then grown over time using BEBR growth rates and then GPCD, specific to each sewer service area, is applied to determine projected wastewater flow.

Appendix 2

Water Purification Technology

WATER PURIFICATION TECHNOLOGY

THREE-PHASE PROGRAM

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WATER PURIFICATION TECHNOLOGY (WPT)

EXECUTIVE SUMMARY FOR WPT PHASE I – R&D TESTING

Overview: A Groundbreaking and Innovative Three-Phase Program

Potable water demands within JEA's service area are anticipated to increase. Conservation and reclaimed water alone are not enough to ensure a future sustainable supply and therefore alternative water supplies must be considered. JEA has taken a proactive approach by launching a planned, three-phased program to evaluate potable reuse.

The R&D Phase of the WPT Program Proved the Following:

- Purified water is **SAFE**
- Purified water is **RELIABLE**
- Purified water is **COST** effective

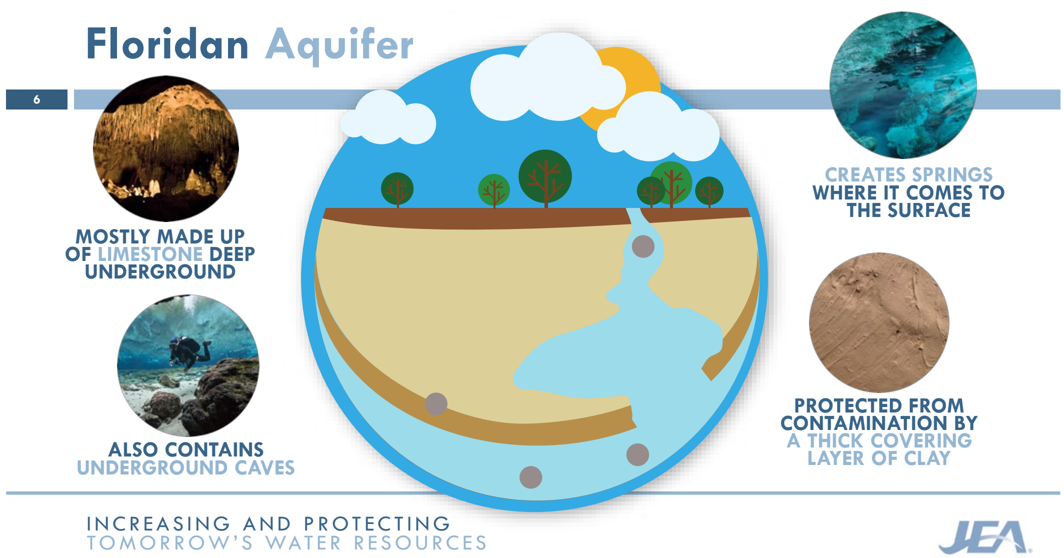
PHASE 1 – **RESEARCH AND DEVELOPMENT**
Tested Two Leading Technologies at Two Water Reclamation Facilities

PHASE 2 – **DEMONSTRATION**
Up to One Million Gallons Per Day
Education and Outreach

PHASE 3 – **COMMERCIAL IMPLEMENTATION**
Potential for Planned Full-Scale

Why JEA is Moving Forward with the WPT Program

Currently all of JEA's Water Supply Source Comes from the Floridan Aquifer



Continued Advancements in Conservation, Along with Proactive and Integrated Planning, Sets the Stage for Meeting Future Demands

While JEA customers do an excellent job of conserving water

CONSERVATION ALONE WILL NOT ASSURE A SUSTAINABLE SUPPLY IN THE FUTURE

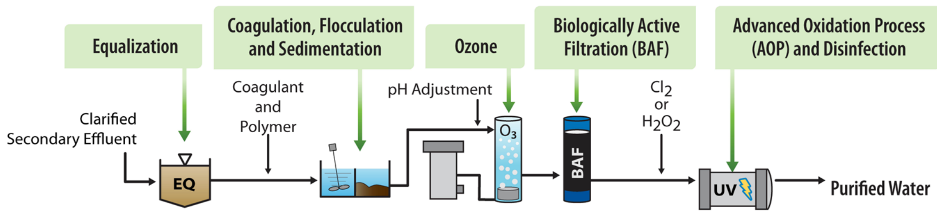
And while we can meet demands now,
a growing population and economy will increase demand in the future.

PHASE 1

RESEARCH AND DEVELOPMENT

Tested Two Leading Technologies

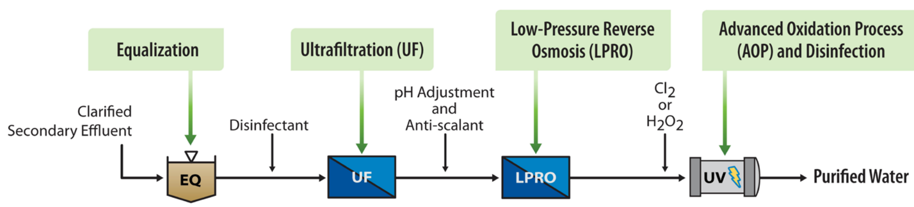
Ozonation followed by Biologically Active Filtration and Advanced Oxidation (Ozone-BAF-AOP)



VS.

SELECTED

Ultrafiltration followed by Low-Pressure Reverse Osmosis and Advanced Oxidation Processes (UF-LPRO-AOP)



Water Purification Technology

Phase I of JEA's planned three-phase water purification program advances the science of water treatment technologies, demonstrating the safety and reliability of the two most common advanced water purification technologies in use globally today.

During Phase I, and in partnership with the SJRWMD, the performance of the two leading water purification technologies were tested for a period of ten months at two different water reclamation facilities (Buckman and Southwest). The performance of each treatment system was evaluated in terms of purified water quality, operational reliability, and lifecycle cost. This project not only advances the state of knowledge for potable reuse, it also allows for more integrated water resource planning and improved public awareness and trust in sustainably sourced, reclaimed water treated to meet current drinking water standards.

SJRWMD provided cost share funding.

Results of Phase I Testing

Water quality goals for Phase I testing were established based on EPA's drinking water standards, FDEP's standards for aquifer injection, and California's current potable reuse guidelines. Throughout the duration of Phase I testing, over 3,000 water quality samples were collected and analyzed to evaluate the performance of UF-LPRO-AOP compared with Ozone-BAF-AOP. While both treatment systems produced purified water that met water quality goals established for the water quality, the UF-LPRO-AOP system demonstrated better removal efficiency (>99 percent) of currently unregulated constituents. The water quality goals and results of JEA's WPT Phase I R&D testing are being used to inform the State of Florida's Potable Reuse Commission (PRC) which is currently working to develop a regulatory framework for potable reuse.

A lifecycle cost analysis revealed the cost of implementing either treatment technology at full-scale was nearly the same. This is because the high energy cost typically associated with operating RO membranes was offset by the higher chemical doses and larger AOP units required to effectively meet the water quality goals using Ozone-BAF-AOP.

Given some operational advantages and the ability to consistently produce higher water quality at a similar cost, **UF-LPRO-AOP** was selected for implementation in future phases. This state-of-the art, multi-barrier treatment approach is both proven and reliable, making it the most widely-used water purification technology throughout the United States and globally.

PHASE 2

DEMONSTRATION

Up to One Million Gallons Per Day

JEA Building an Innovative Community®

Phase II Water Purification Demonstration Facility (UF-LPRO-AOP)

KEY ASPECTS

COST	O&M	CONSTRUCTION	BUILDING SIZE	AREA
$15-20M	$~1M/yr	18 months	11,000 sq. ft.	2-5 acres

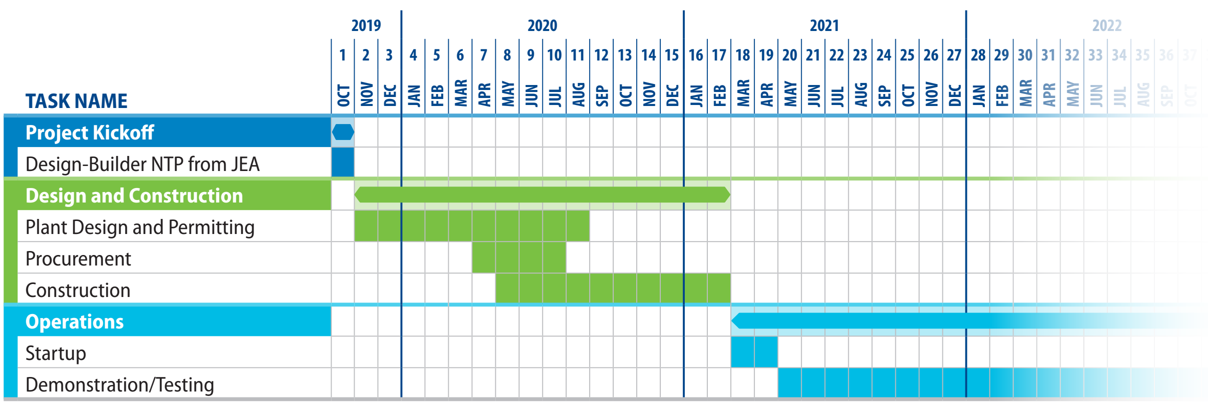
Capable of **producing up to 1.0 mgd**

Learning Center area for public tours and operator training

Offices for personnel, equipment, and conference rooms

Demonstrating Safe and Reliable Alternative Water Supply Through a Collaborative Partnership with the State

PHASE II DEMONSTRATION FACILITY IMPLEMENTATION SCHEDULE – **ALTERNATIVE DELIVERY (DESIGN/BUILD)**



PHASE 3

COMMERCIAL IMPLEMENTATION
Potential for Planned Full-Scale

JEA
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Phase III Water Purification Facility (UF-LPRO-AOP)

KEY ASPECTS

COST	O&M	BEGIN DESIGN	BUILDING SIZE	AREA
$94M	$5M	3 years	32,000 sq. ft.	5-10 acres

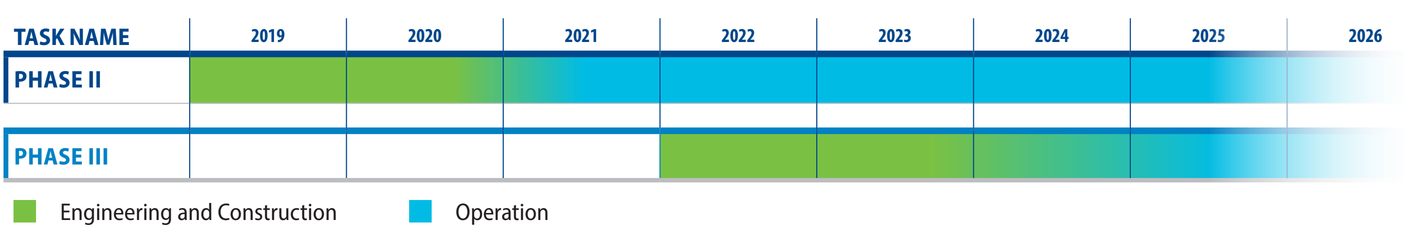
For planning purposes, this facility is assumed to be **10 mgd capacity**

JEA Plans to Lead the State In full Commercial Application of Potable Reuse Results of Phase II Performance Optimization and JEA's Integrated Water Resources Plan (IWRP) Will Identify the Timing, Quantity, and Locational Needs for Implementing Phase III of the WPT Program.

JEA is Expanding Efforts to explore possible solutions

CONSERVATION → RECLAIMED WATER → POTABLE REUSE → SURFACE WATER → DESALINATION

INCREASING COST AND COMPLEXITY →



Public Outreach: Science and Engineering is the Easy Part – Effective Outreach will be the Key to Success

Keeping the community educated and informed is a critical component of potable reuse. Stakeholders must understand what potable reuse is, why it is needed, and what are its benefits. By continuing to inform the community over several years, leading up to and during the Phase II Demonstration testing, it will provide the necessary forum of community discourse to ultimately assure trust and acceptance to move forward with full scale implementation of WPT Phase III. Phase II will build upon Phase I public outreach which included:

- ✓ Public messaging materials, including videos, infographics, and presentations.
- ✓ Workshops with local thought-leader groups.
- ✓ A water-tasting event for JEA staff and invited guests during the 2018 JAX Infrastructure Innovation Summit.
- ✓ More than 250 people toured the purified water facilities including JEA employees, elected officials, community leaders, university students, regulatory agency employees, and plant operators from neighboring counties. Tours were led by JEA staff.
- ✓ Several articles and JEA staff interviews about the Water Purification program that were featured in local media.

CDM Smith

daltonagency

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Reclaimed Water System

Table of Contents

1 Introduction

Reclaimed water has seen substantial growth in the past few years, growing at an average pace of 2,000 connections per year (see Figure 1). The following sections cover historic and projected reclaimed water demands, planned projects to meet future demands, and discusses alternative water projects that could not only increase future reclaimed water production but also reduce effluent discharges to the St Johns River.

Figure 1: Reclaimed Water Customer History

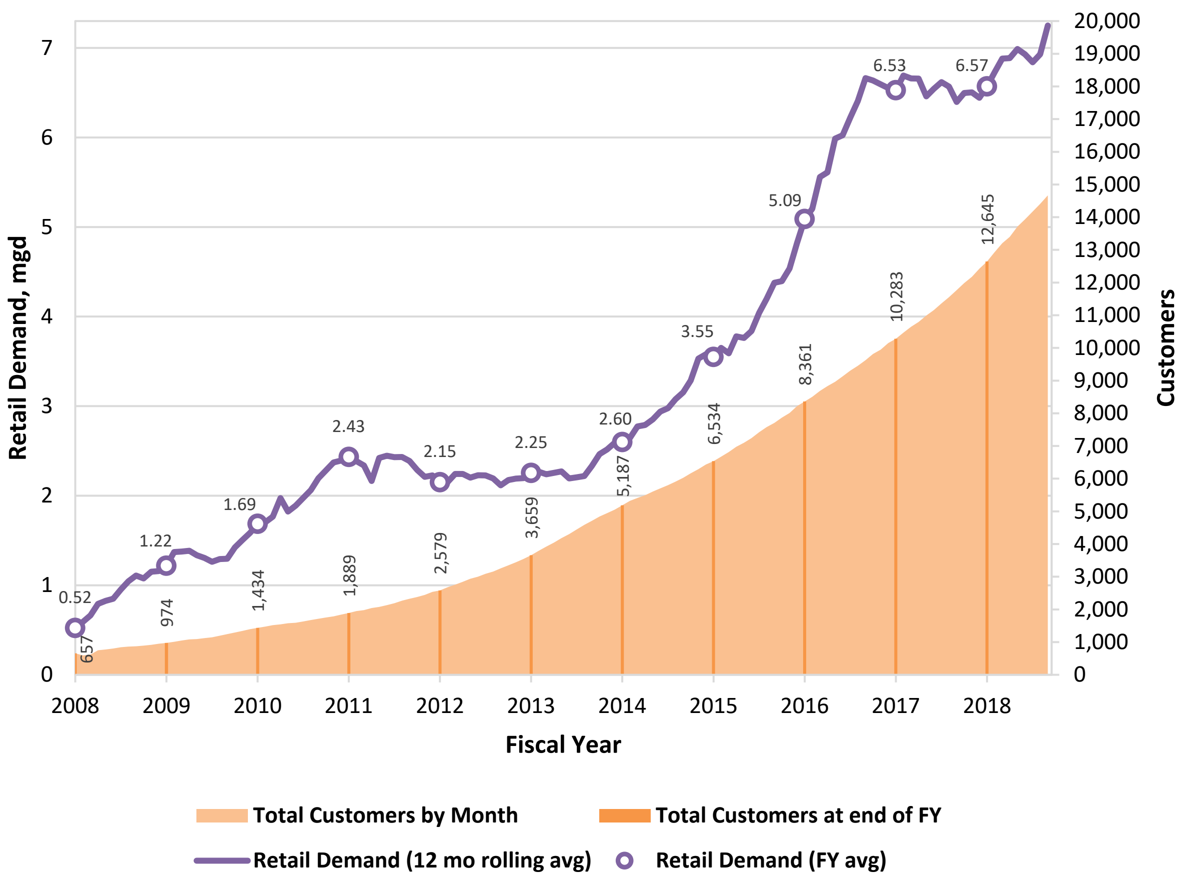


Figure 2 – Overview of JEA Reclaimed Water System (North)

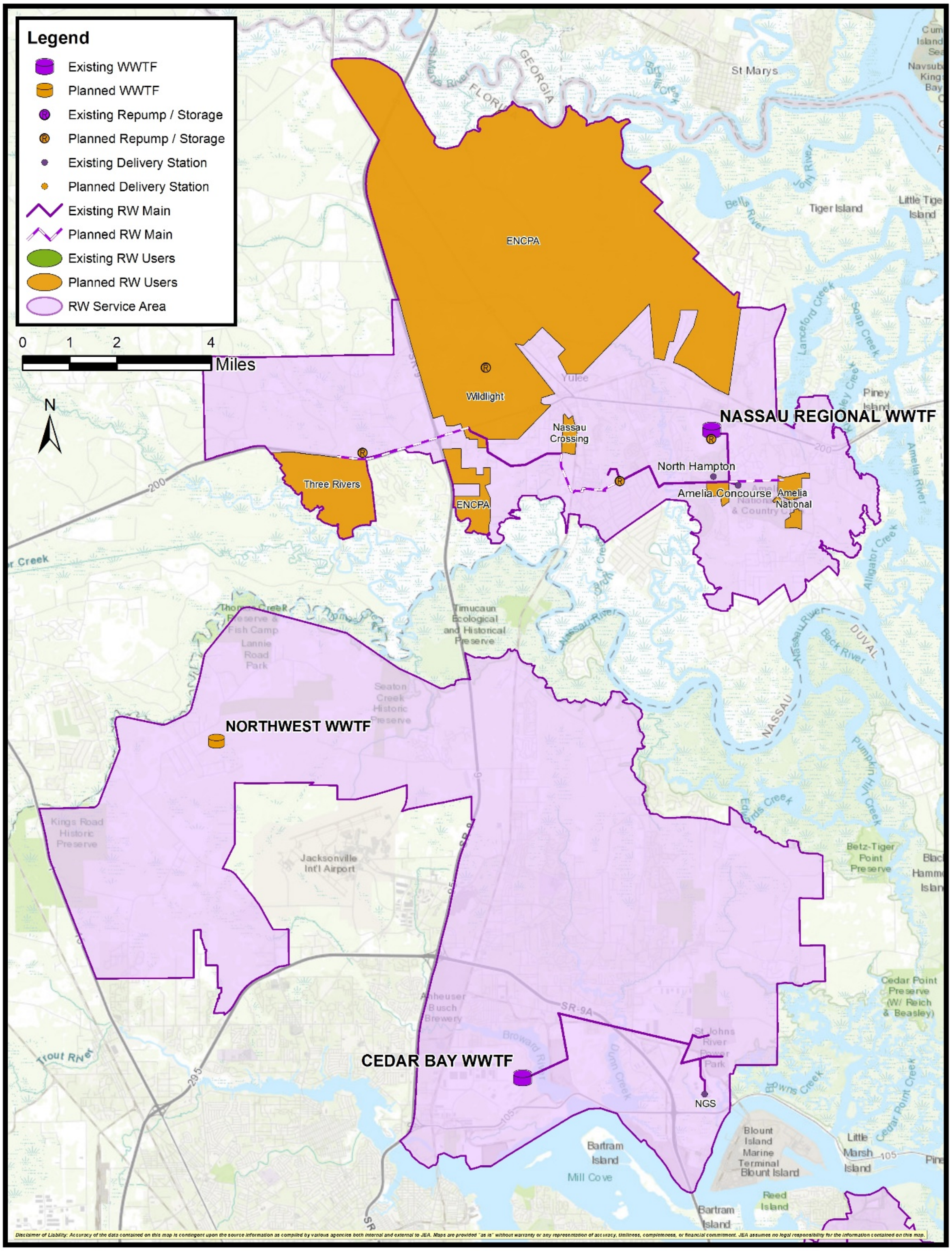
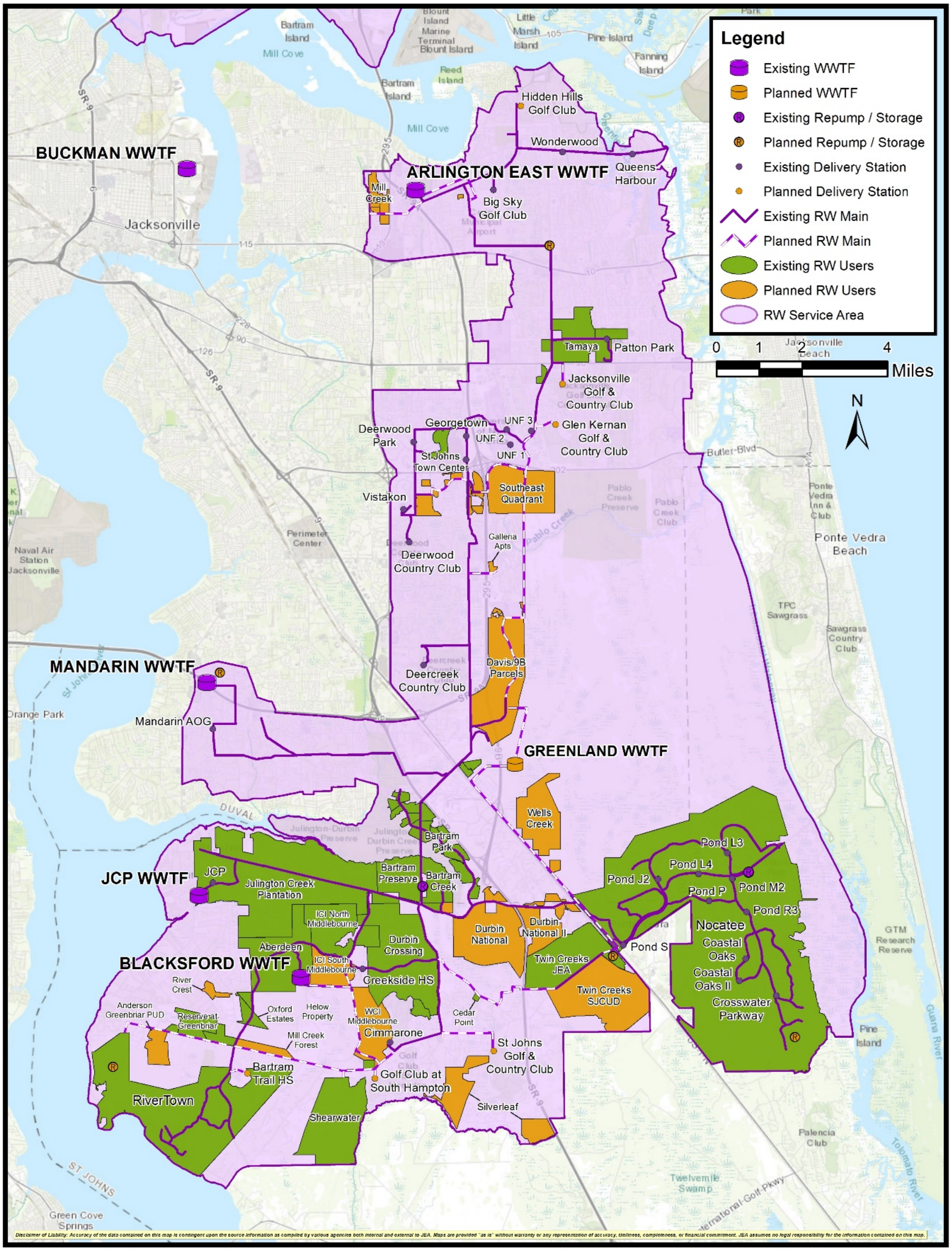


Figure 2 – Overview of JEA Reclaimed Water System (South)



2 Reclaimed Water System

The JEA reclaimed water system serves not only residential customers but also businesses, schools and golf courses. Reclaimed water is available at system pressure to retail customers 24 hours a day, to bulk customers and JEA reclaimed water storage during off-peak periods of the day. Providing a reliable delivery system with a variety of customer types spread over such a large region presents operational challenges that requires continuous monitoring. Planned projects must consider operational limitations, future growth and system changes. The following sections look at retail and bulk demands while also evaluating potential to serve new customers in regions not currently providing public access reclaimed water.

2.1 Customer Potable Water Offsets

JEA has significantly expanded its reclaimed water system, and potable water offsets through use of reclaimed water, over a relatively short period of time. JEA acquired the Julington Creek Plantation (JCP) wastewater treatment facility (WWTF) in 1999, which operates at nearly 100 percent reuse of its effluent with a capacity of 1.0 million gallons per day (mgd). JCP WWTF was JEA's initial reclaimed water program until the construction of 2.0 mgd reclaimed water treatment for public access reclaimed water at the Arlington East WWTF in 1999. Reclaimed water demands in 1999 were less than 0.5 mgd and were primarily located in the region surrounding JCP WWTF.

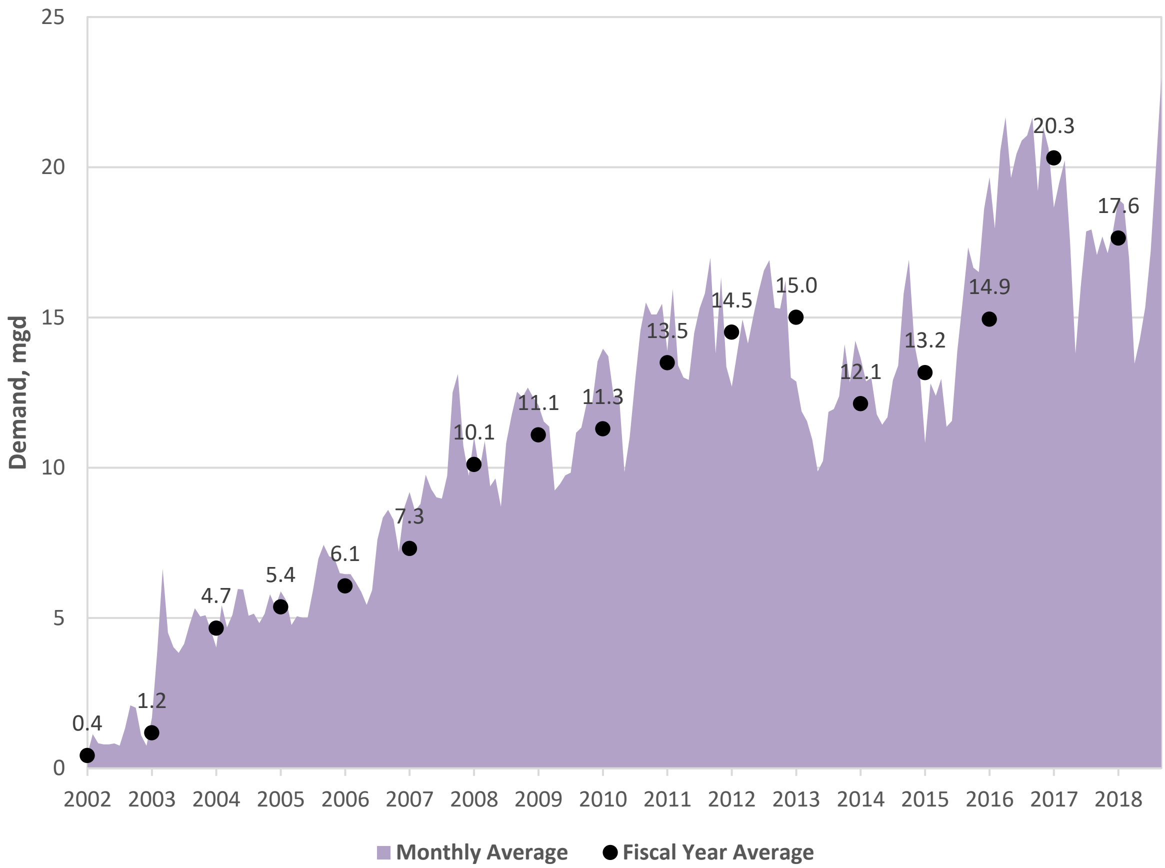
The major backbone of the reclaimed water system was constructed between 2002 and 2008, a 26 mile transmission main between Arlington East and Mandarin WWTFs. Retail customer reclaimed water demand has rapidly increased since the completion of the major north-south reclaimed transmission main in 2008. The first homes in the Nocatee development were connected in 2007; this was the start of potable offset reclaimed water demands within the reclaimed water system. Potable offset/retail reclaimed water customers have grown by an average of 2,000 customers per year over the last three years.

Total reclaimed water demands have increased to an annual average of 18 mgd (FY18) as shown in Figure 3. A reclaimed water demand reduction occurred in 2013 as a result of a major reclaimed water transmission line failure at the Cedar Bay WWTF. Repairs were completed in 2016 and the system was back in service; however, a decision was made in 2017 to decommission the St. Johns River Power Park (SJRPP). As a result of taking SJRPP offline, total reclaimed water demands decreased by 2 mgd.

Total reclaimed water produced is a culmination of water provided to residential, commercial and bulk customers in addition to reclaimed water used internally at WWTFs. Bulk customers receive reclaimed water in a pond or storage tank to then be re-pumped as opposed to retail residential and commercial customers who receive reclaimed water at the meter at a pressure sufficient for irrigation.

JEA currently operates and maintains 11 WWTFs, 10 of which produce reclaimed water, within a wastewater service area covering four counties (Nassau, Duval, St Johns and Clay). The southeast region of JEA's wastewater service area, served by Arlington East, Monterey, Mandarin, Blacks Ford, JCP, Ponte Vedra and Ponce de Leon WWTFs, currently has the greatest offset potable water demand with reclaimed water as opposed to the other regions north and west of the St. Johns River. Section 2.3 covers each WWTF and their respective service area in more detail.

Figure 3: Total Reclaimed Water Demand History



2.1.1 Reclaimed Water Customers

Historically the number of reclaimed water customers has grown at a steady pace, see Figure 1. Retail customers are mainly concentrated in the lower region of the JEA service territory, with Bulk customers scattered from Nassau through St. Johns County.

2.1.2 Retail Customers

The economic downturn in 2008 had a negative impact on residential and commercial growth, but did not impact residential reclaimed water use as demands continued to increase. Major new development is expected in Nassau County, bringing additional retail customers to the northern end of the JEA service area, see Section 2.3.7.

Residential and commercial retail reclaimed water customers offset potable water demands, as they use reclaimed water to meet demands that would otherwise be met by using drinking/potable water for irrigation. Similarly, reclaimed water used onsite at JEA WWTFs replaces potable water normally used for irrigation, wash down water, or pump seal water.

Bulk customers are another type of reclaimed water customer served by JEA. Bulk customers are mostly golf courses, however in some cases there may be commercial customers that receive reclaimed water into ponds to then be re-pumped into a private irrigation system. Bulk customers typically have used backup wells or in the past were primarily using wells for irrigation until reclaimed water became available; therefore, adoption of reclaimed water by bulk customers is considered to offset aquifer water use.

Table 1, below, shows the breakdown of reclaimed water demands by customer type.

Table 1: Reclaimed Water Demand Breakdown by Customer Type in FY18

Demand Type	Customer Type	Demand (mgd)
Retail	Residential & Commercial	7
Bulk	Ponds[1]	2
	Industrial Power[2]	1
Internal/onsite	WWTFs	8
	Total Demand	*18*

[1]Ponds are inclusive of golf courses and any customer that receives reclaimed water into an open water body to be re-pumped on private property.
[2]Uses at Northside Generating Station: spray dryer absorber, dust control, chemical waste treatment system wash down, pump seals

2.1.3 Bulk Customers

As of 2018, JEA had 33 bulk customers using reclaimed water while also providing an offset to aquifer water use. The table below summarizes the current bulk customers and their reclaimed water demands.

Table 2: Reclaimed Water Bulk Customer Summary for FY18

Current Bulk Customers[1]	12 Month Average Demand (gpd)
Amelia National	285,235
North Hampton	73,349
Mill Cove	186,374
Wonderwood	595
Patton Park	4,142
Queens Harbor	0
Georgetown	0
St. Johns Town Center	0
UNF1	63,709
UNF2	31,656
UNF3	0
Mandarin Assembly of God	0
Vistakon	17,927
Deerwood CC	132,534

Table 2: Reclaimed Water Bulk Customer Summary for FY18 (continued)

Current Bulk Customers[1]	12 Month Average Demand (gpd)
Deercreek CC	10,464
Deerwood Park	148
Nocatee Pond L4	182,146
Nocatee Pond S	155,185
Nocatee Pond M2	0
Nocatee Pond R3	438,737
Nocatee Pond P	3,277
Nocatee Pond L3	164,404
Nocatee Pond J2	0
Coastal Oaks	54,559
Coastal Oaks II	59,551
20 Mile Pond	895
Crosswater Pkwy	86,247
Cimarron	0
Julington Creek CC	0
Creekside HS	0
SJRPP (JEA)	390
Northside Generating Station (JEA)	12,052
SJRPP Cooling Tower (JEA)	773,187
Total	*2,736,763*

[1]Ponds/storage basins receive reclaimed water to irrigate common areas and golf courses, with a small collection customers using it in industrial processes.

More potential bulk customers have been identified throughout the JEA service area, Figure 2. The in-service dates for these bulk customers are unknown as they each have specific conditions and require coordination between JEA, SJRWMD and the customer. The table below summarizes potential future bulk customers.

Table 3: Future Potential Reclaimed Water Bulk Customer Summary

Future Potential Bulk Customers	Average Demand (gpd)*
Jacksonville Zoo	274,000
Hidden Hills Country Club	356,000
Jacksonville Golf & Country Club	354,000
Glen Kernan Golf & Country Club	430,000
South Hampton Golf Club	307,000
St Johns Golf & Country Club	351,000
Bartram Trail High School	133,000
Future Nocatee & RiverTown Ponds	TBD
Total	*2,205,000*

*average demands are estimated based on permitted CUP withdrawals

2.2 Total Reclaimed Water Flows

For the fiscal year 2018 the average reclaimed water produced system wide was 18 mgd. Each treatment facility produces reclaimed water based on internal and external demands. The table below summarizes the total reclaimed water produced by month for each facility in mgd.

Table 4: Reclaimed Water Production (Oct-17 through May-19)

	Buckman	Southwest	Cedar Bay	Monterey	Ponce de Leon	Ponte Vedra	Nassau Regional	Arlington East	Mandarin	JCP[1]	Blacks Ford	**TOTAL**
Oct-17	3.58	0.30	3.67	0.00	0.02	0.44	0.53	4.57	3.67	0.87	1.86	**19.50**
Nov-17	3.86	0.28	3.44	0.00	0.04	0.39	0.88	4.92	3.85	0.87	1.71	**20.24**
Dec-17	3.91	0.32	2.86	0.00	0.04	0.40	0.51	4.23	3.32	0.87	1.07	**17.53**
Jan-18	4.17	0.35	0.24	0.00	0.03	0.39	0.46	3.33	2.99	0.88	0.96	**13.80**
Feb-18	4.12	0.47	0.30	0.00	0.04	0.50	0.45	3.88	3.69	0.87	1.72	**16.04**
Mar-18	3.71	0.42	0.37	0.00	0.04	0.39	0.82	4.92	4.29	0.85	2.06	**17.87**
Apr-18	3.87	0.44	0.26	0.00	0.04	0.34	0.91	5.25	4.15	0.88	1.78	**17.93**
May-18	3.26	0.45	0.36	0.00	0.04	0.38	0.83	5.03	4.02	0.90	1.81	**17.08**
Jun-18	3.12	0.42	0.34	0.00	0.06	0.36	0.67	5.14	4.46	0.86	2.28	**17.70**
Jul-18	2.94	0.31	0.39	0.00	0.06	0.45	0.74	5.42	4.17	0.90	1.76	**17.14**
Aug-18	3.40	0.34	0.36	0.00	0.03	0.46	1.05	5.59	4.15	0.89	1.62	**17.90**
Sep-18	3.50	0.39	0.60	0.00	0.03	0.39	1.30	5.78	4.16	0.83	1.95	**18.94**
FY18 Avg	***3.62***	***0.37***	***1.10***	***0.00***	***0.04***	***0.41***	***0.76***	***4.84***	***3.91***	***0.87***	***1.71***	***17.64***
Oct-18	3.04	0.41	0.73	0.00	0.03	0.37	1.06	6.14	4.43	0.83	1.72	**18.77**
Nov-18	3.09	0.18	0.75	0.00	0.07	0.39	0.87	5.21	4.25	0.85	1.31	**16.97**
Dec-18	3.17	0.19	0.40	0.00	0.04	0.41	0.42	3.94	3.21	0.96	0.73	**13.46**
Jan-19	3.35	0.17	0.74	0.00	0.07	0.36	0.59	4.79	1.95	0.93	1.30	**14.26**
Feb-19	3.42	0.27	1.15	0.00	0.06	0.39	0.62	5.66	1.01	0.93	1.84	**15.34**
Mar-19	3.10	0.25	0.91	0.00	0.07	0.34	0.97	5.67	2.80	0.86	2.23	**17.20**
Apr-19	3.26	0.34	0.94	0.00	0.05	0.41	1.07	5.66	4.07	0.91	3.32	**20.02**
May-19	3.25	0.39	1.09	0.00	0.06	0.39	1.38	6.46	4.65	0.89	4.42	**22.99**

[1]Julington Creek Plantation (JCP)

[2]units in mgd

2.3 Service Area Analysis

Six of JEAs WWTFs produce public access reclaimed water and four produce non-public access reclaimed water used strictly at the WWTF and/or within a restricted area. Only one facility, Monterey WWTF, does not produce reclaimed water. The overall reclaimed water production capacity is 41 mgd. Capacity improvements are complete at both Mandarin and Blacks Ford WWTFs, increasing the production capacity by 7.75 mgd between the two WWTFs. Even with the capacity upgrades at Mandarin to provide reclaimed water to the same capacity as what the WWTF is rated to treat in wastewater, there are still hydraulic limitations with offsite piping that prevents the full use of reclaimed water capacity. Projects are planned to improve conveyance of reclaimed water from Mandarin WWTF in the future. Table 5 summarizes the current reclaimed water production capacities at each of JEA's WWTFs.

Table 5: Reclaimed Water Production Capacity by WWTF (mgd)

	Public Access Reuse	**Non-Public Access Reuse**	**No Reuse**
	Arlington East (8.0)	Buckman (7.7)	Monterey (0)
	Mandarin (8.75)	Cedar Bay (6.0)	
	Blacks Ford (6.0)	Southwest (0.8)	
	JCP (1.0)	Ponce de Leon (0.24)	
	Ponte Vedra (0.8)		
	Nassau (1.55)		
Total mgd	*26.10*	*14.74*	*0*

Each of JEAs WWTFs produce reclaimed water specific to the needs of the area served. The South Grid reclaimed water service area (Arlington East, Mandarin, Blacks Ford and JCP WWTFs) has been a focal point of the JEA reclaimed water investment and expansion as a result of the Lower St. Johns River TMDL (circa 2004), the River Accord (circa 2006) and the Total Water Management Plan (TWMP, circa 2007), in addition to residential growth. Arlington East, Mandarin, Blacks Ford and JCP WWTFs were gridded together with a major north/south transmission main to provide reclaimed water to future development in the southern extent of the JEA service area. Regions to the West and North of the St. Johns River historically have not seen residential growth at the rate seen in the South Grid reclaimed water service area. The projected total reclaimed water is estimated to reach 45 mgd by 2040, see Figure 4 and Table 6.

The growth rate for reclaimed water customers has not slowed down and continues to growth at an exponential rate. Demands per connection vary throughout the JEA service area; however, with no slowdown in connections it is anticipated reclaimed water demand will outpace wastewater supply in the South Grid by 2036. Table 6 shows the projected supplemental water needed starting in 2036 to support projected growth; supplemental water is needed for the South Grid reclaimed water system, Section 2.3.8 covers this in more detail. Examples of supplemental water sources include: a shallow augmentation well, reclaimed water from other wastewater facilities outside of the South Grid, storm water ponds, etc. An Integrated Water Resource Plan (IWRP) is underway now, planned for completion by September 2020. The IWRP will look at water supply options needed to support both future drinking Appendix 1 provides a brief overview of the IWRP project.

Figure 4: Total System Reclaimed Water Projection

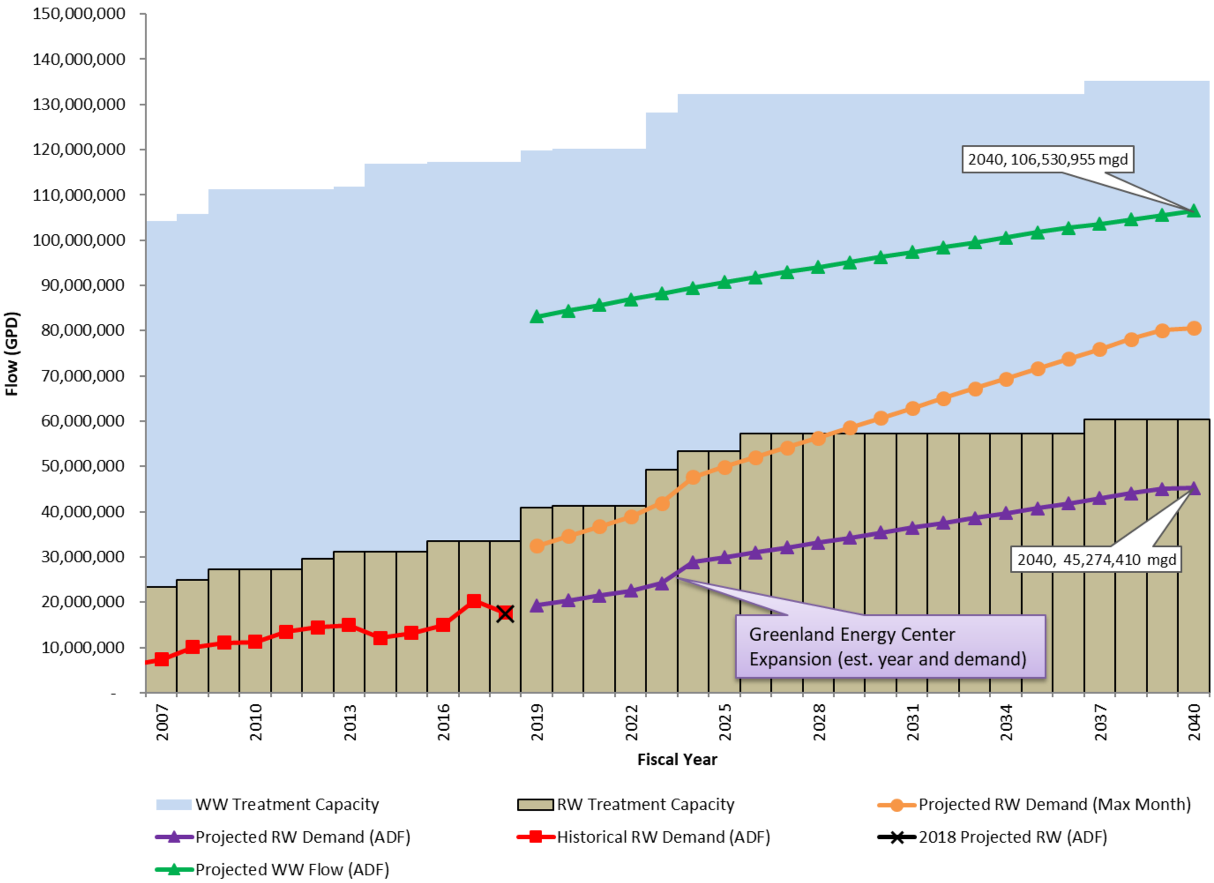


Table 6: Projected Total Reclaimed Water Demand

	Buckman	Southwest	Cedar Bay	Monterey	Ponce de Leon	Ponte Vedra	Nassau Regional	Arlington East	Mandarin	JCP[1]	Blacks Ford	Greenland	Supplemental Water Need	**TOTAL**
2019	3.54	0.33	1.31	0.00	0.06	0.46	0.67	5.87	4.70	0.80	1.55	0.00	0.00	***19.29***
2020	3.54	0.33	1.31	0.00	0.06	0.46	0.73	6.34	5.08	0.80	1.72	0.00	0.00	***20.38***
2021	3.54	0.33	1.31	0.00	0.06	0.46	0.79	6.82	5.47	0.80	1.89	0.00	0.00	***21.46***
2022	3.54	0.33	1.31	0.00	0.06	0.46	0.85	7.29	5.85	0.80	2.06	0.00	0.00	***22.55***
2023	3.54	0.33	1.31	0.00	0.06	0.46	0.91	6.68	3.88	0.80	2.22	3.95	0.00	***24.13***
2024	3.54	0.33	1.31	0.00	0.06	0.46	0.97	10.71	4.22	0.80	2.39	4.02	0.00	***28.82***
2025	3.54	0.33	1.31	0.00	0.06	0.46	1.03	11.15	4.57	0.80	2.56	4.10	0.00	***29.91***
2026	3.54	0.33	1.31	0.00	0.06	0.46	1.09	11.58	4.90	0.80	2.73	4.20	0.00	***31.00***
2027	3.54	0.33	1.31	0.00	0.06	0.46	1.15	12.00	5.23	0.80	2.90	4.31	0.00	***32.08***
2028	3.54	0.33	1.31	0.00	0.06	0.46	1.21	12.42	5.56	0.80	3.06	4.41	0.00	***33.17***
2029	3.54	0.33	1.31	0.00	0.06	0.46	1.27	12.85	5.90	0.80	3.23	4.51	0.00	***34.26***
2030	3.54	0.33	1.31	0.00	0.06	0.46	1.33	13.27	6.23	0.80	3.40	4.61	0.00	***35.34***

Table 6: Projected Total Reclaimed Water Demand (continued)

	Buckman	Southwest	Cedar Bay	Monterey	Ponce de Leon	Ponte Vedra	Nassau Regional	Arlington East	Mandarin	JCP[1]	Blacks Ford	Greenland	Supplemental Water Need	**TOTAL**
2031	3.54	0.33	1.31	0.00	0.06	0.46	1.39	13.69	6.55	0.80	3.57	4.73	0.00	***36.43***
2032	3.54	0.33	1.31	0.00	0.06	0.46	1.45	14.11	6.88	0.80	3.74	4.85	0.00	***37.52***
2033	3.54	0.33	1.31	0.00	0.06	0.46	1.51	14.52	7.21	0.80	3.90	4.96	0.00	***38.60***
2034	3.54	0.33	1.31	0.00	0.06	0.46	1.57	15.14	7.33	0.80	4.07	5.08	0.00	***39.69***
2035	3.54	0.33	1.31	0.00	0.06	0.46	1.63	15.85	7.36	0.80	4.24	5.19	0.00	***40.78***
2036	3.54	0.33	1.31	0.00	0.06	0.46	1.69	16.58	7.39	0.80	4.35	5.30	0.06	***41.86***
2037	3.54	0.33	1.31	0.00	0.06	0.46	1.75	17.31	7.41	0.80	4.43	5.40	0.14	***42.95***
2038	3.54	0.33	1.31	0.00	0.06	0.46	1.81	17.34	7.44	0.80	4.51	5.50	0.94	***44.04***
2039	3.54	0.33	1.31	0.00	0.06	0.46	1.87	17.34	7.46	0.80	4.59	5.60	1.67	***45.04***
2040	3.54	0.33	1.31	0.00	0.06	0.46	1.93	17.34	7.49	0.80	4.67	5.71	1.64	***45.27***

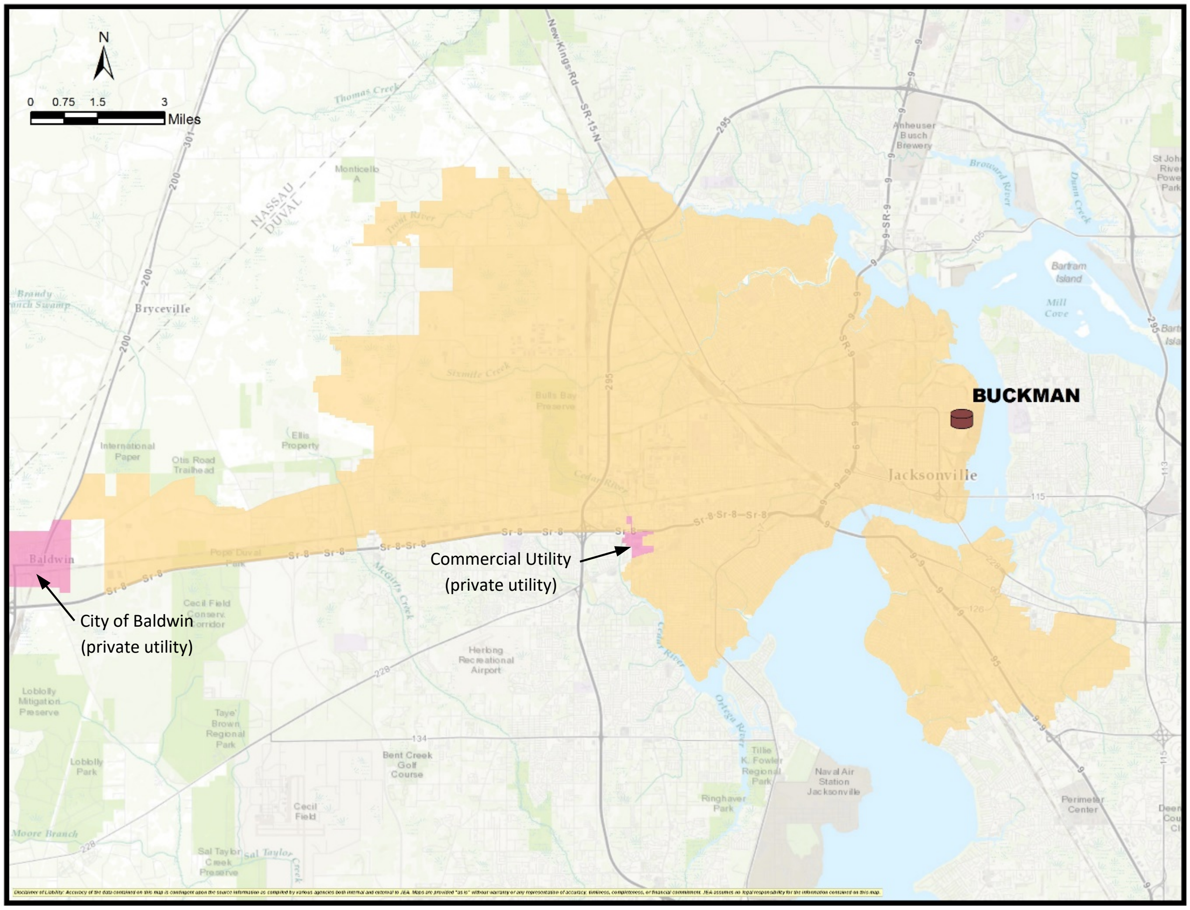
[1]JCP (Julington Creek Plantation)

[2]units in mgd

2.3.1 Buckman

Buckman is the oldest and largest JEA WWTF. The permitted treatment capacity is 52.5 mgd, however the average flow treated has rarely exceeded 35 mgd (circa 1992). Buckman WWTF averaged 26.2 mgd in wastewater flow for FY18. Reclaimed water produced at this facility is non-public access, providing only for internal needs at the WWTF. Onsite reclaimed water use averaged 3.6 mgd in FY18.

Figure 5: Buckman WWTF WW Service Area



At this time there are no regional reclaimed water demands in the Buckman WWTF service area other than at the facility itself. Major new growth would likely occur in the far western region of the service area, over 13 miles from the Buckman WWTF. If a future development is planned with a large reclaimed water demand, a cost benefit analysis will be initiated to determine if the provision of reclaimed water is economically, environmentally or technologically feasible. Each new project will be reviewed on a case-by-case basis.

Reclaimed water demands at Buckman WWTF are driven by onsite use and are projected to average 3.5 mgd. At this time there are no planned projects at Buckman WWTF or within its service area that would result in increased future demand.

Figure 6: Buckman WWTF Projected Reclaimed Water Demand

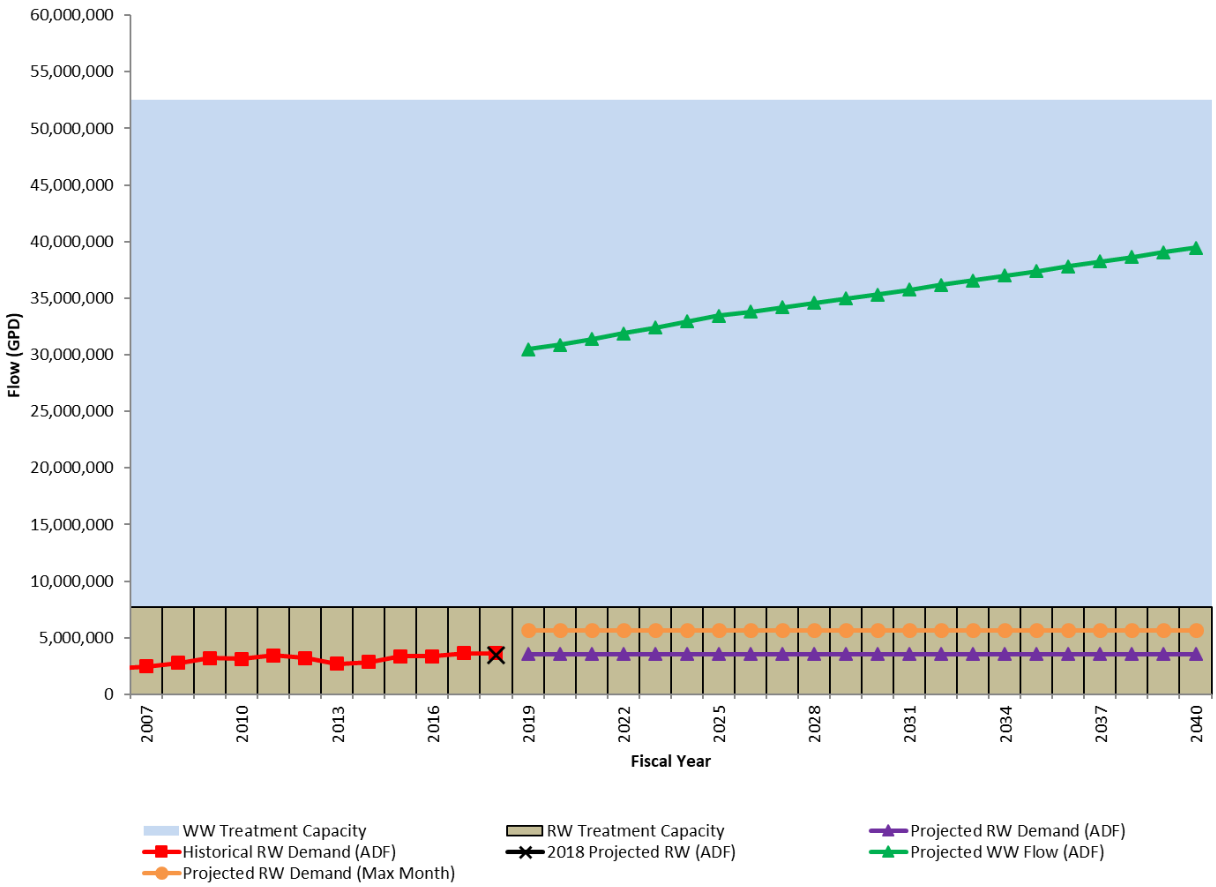


Table 7: Buckman WWTF Reclaimed Water Demand Summary (fiscal year average, mgd)

Historical	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	2.48	2.78	3.21	3.14	3.42	3.22	2.69	2.87	3.36
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
3.37	3.64	3.62		3.54	3.54	3.54	3.54	3.54	3.54

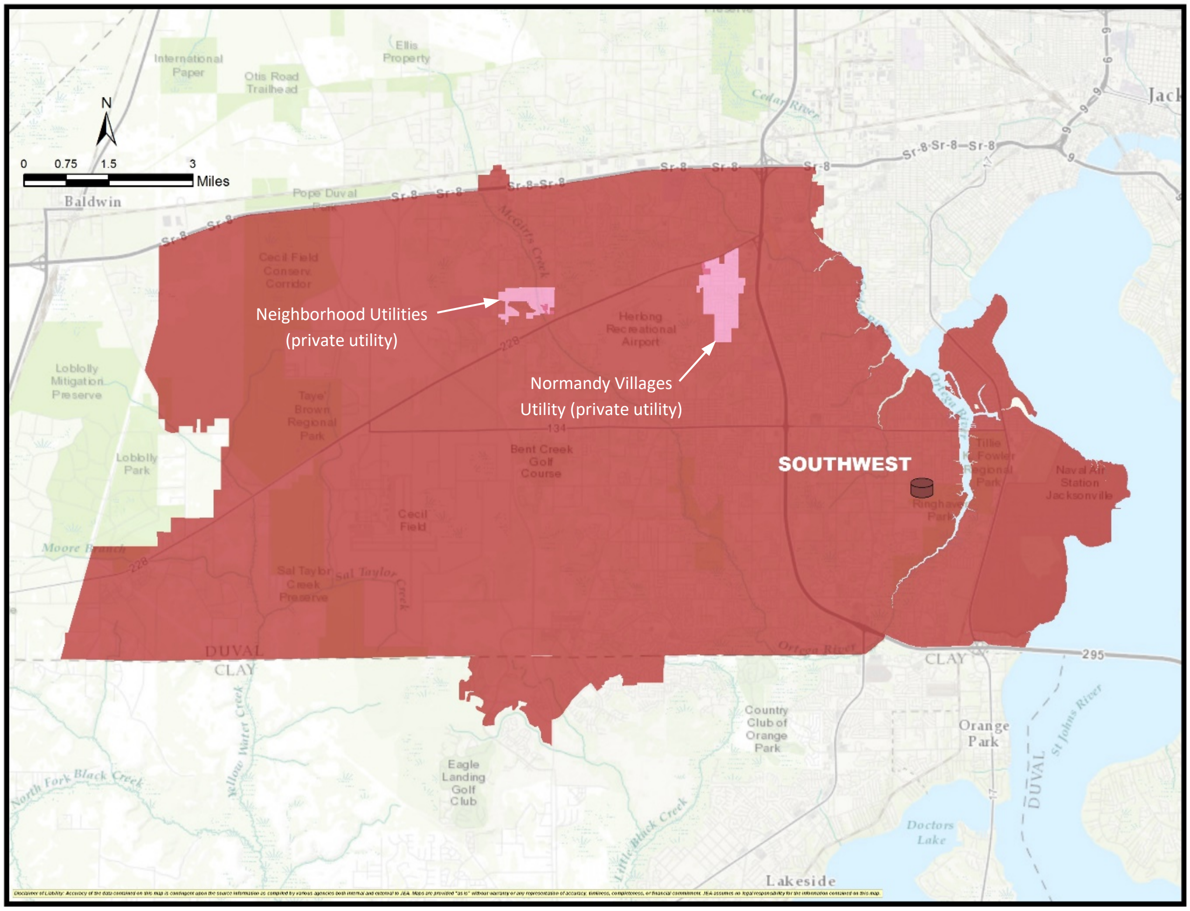
2.3.1.1 Buckman WWTF Reclaimed Water Capital Improvement List

Projects currently identified in the JEA Capital Plan are focused on meeting projected reclaimed water demands with capacity and infrastructure improvements. Buckman WWTF currently only produces reclaimed water to support onsite needs, no projects are planned at this time.

2.3.2 Southwest

Southwest WWTF provides wastewater service for the southwest region of the JEA service area including Cecil Commerce Center, a small portion of northern Clay County and a residential development three miles east of Maxville.

Figure 7: Southwest WWTF WW Service Area



Southwest WWTF averaged 12.0 mgd in wastewater flow for FY18. Reclaimed water produced at this facility is non-public access providing for internal needs at the WWTF. Onsite reclaimed water use averaged 0.4 mgd in FY18.

At this time there are no regional reclaimed water demands in the Southwest WWTF service area other than at the facility itself. The highest potential for establishment of a reclaimed water customer base is west of Cecil Field. The next Phase of the Trails development located off Normandy Blvd close to US-301 is designated to have reclaimed water for irrigation use. Also a potential major development to the southwest of the I-10 and US-301 intersection is planned have over 10,000 reclaimed water customers when it builds out. Schedules for both of these developments have not been determined. Reclaimed water for the western end of the Southwest service area will be provided by a new wastewater facility to be located near US-301, an evaluation is currently underway to determine timing and location of this facility.

If a future development is planned with a large reclaimed water demand, a cost benefit analysis will be initiated to determine if the provision of reclaimed water is economically, environmentally or technologically feasible. Each new project will be reviewed on a case-by-case basis.

Reclaimed water demands at Southwest WWTF are driven by onsite use and are projected to average 0.3 mgd. The projects mentioned earlier near US-301 are only conceptual and are not reflected in the capital budget or in reclaimed water projections. Reclaimed water projections will be updated when a firm schedule is established.

Figure 8: Southwest WWTF Projected Reclaimed Water Demand

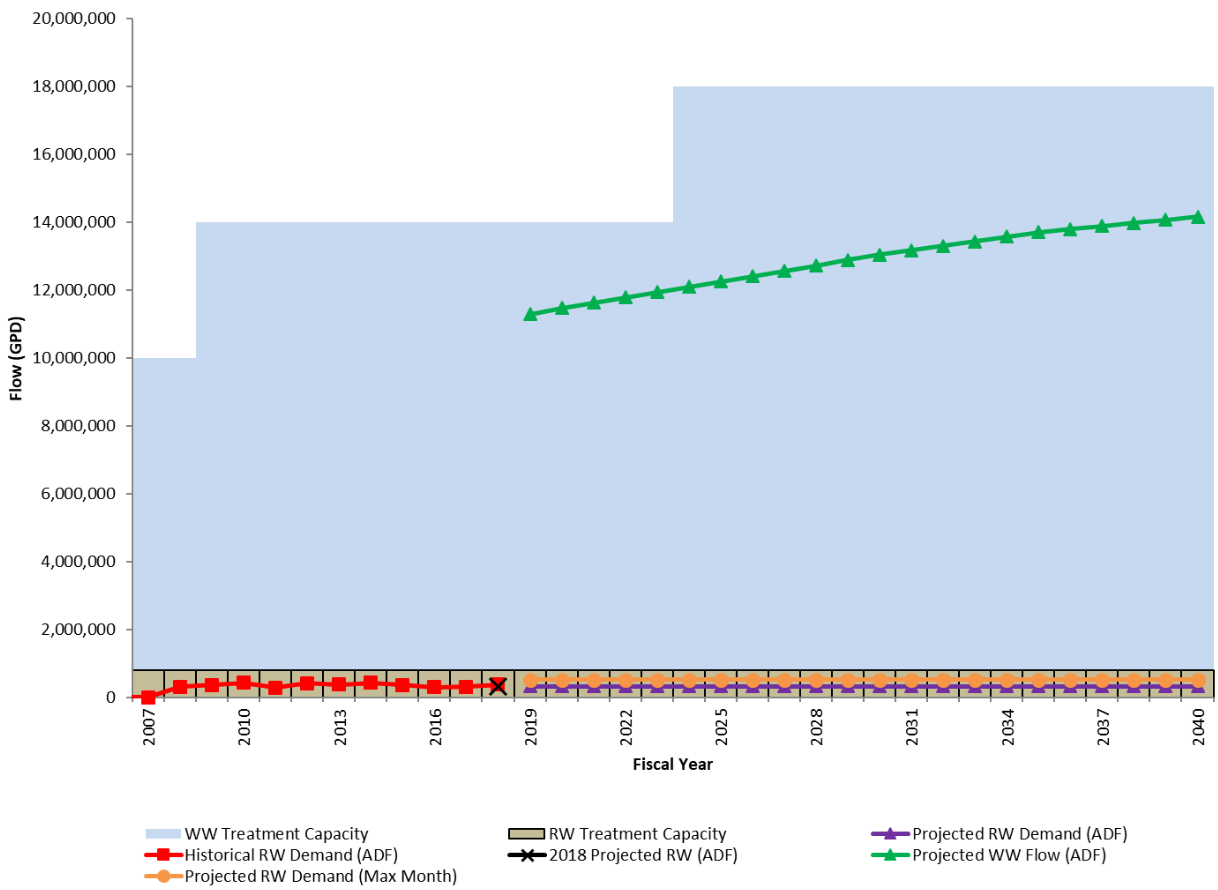


Table 8: Southwest WWTF Reclaimed Water Demand Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	0	0.31	0.36	0.44	0.28	0.42	0.38	0.43	0.36
2016	2017	2018	Projected	2019	2020	2025	2030	2035	2040
0.30	0.32	0.37		0.33	0.33	0.33	0.33	0.33	0.33

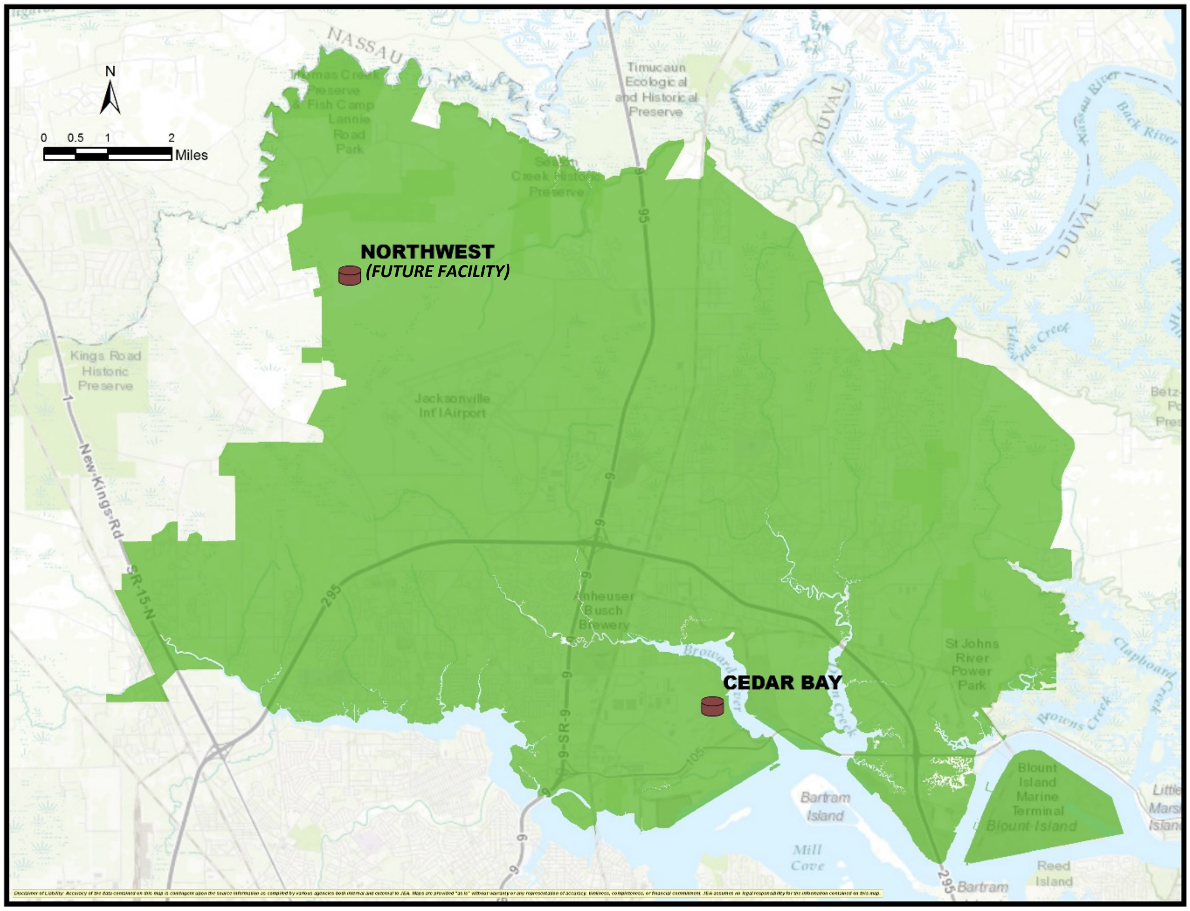
2.3.2.1 Southwest WWTF Reclaimed Water Capital Improvement List

Projects currently identified in the JEA Capital Plan are focused on meeting projected reclaimed water demands with capacity and infrastructure improvements. Southwest WWTF currently only produces reclaimed water to support onsite needs, no projects are planned at this time.

2.3.3 Cedar Bay

Cedar Bay WWTF (District 2) provides wastewater service for the north central region of the JEA service area.

Figure 9: Cedar Bay WWTF WW Service



Cedar Bay WWTF averaged 5.5 mgd and 1.1 mgd in wastewater flow and reclaimed water production respectively for FY18. Reclaimed water produced at this facility is non-public access and is provided for internal needs at the WWTF and is available to be pumped offsite to the Northside Generating Station (NGS) for use in various onsite processes (see Table 1 for details). In 2013 the reclaimed water transmission main to the power facilities failed causing a 2 mgd reduction in reclaimed water demand. Repairs were completed in 2016 and the system was back in service; however, a decision was made in 2017 to decommission the SJRPP. NGS will continue to receive reclaimed water. Between the SJRPP and NGS, SJRPP used a majority of reclaimed water so demands are expected to drop.

With reduced demand at NGS, the 16 inch pipe between Cedar Bay WWTF and NGS is sufficient; however, long term there are plans to expand electric production which will increase reclaimed water demand beyond the current conveyance capacity of the 16 inch pipeline (3.4 mgd). A future project is planned to install a booster pump station on Faye Rd. so pumping capacity can be increased to an estimated 6.5 mgd (Reclaimed Water/Effluent Management Engineering Study, Jacobs, Sept. 2016).

To the east of I-95 there are very little opportunities for reclaimed water connections as the region is mostly built out. Some vacant land remains adjacent to the reclaimed water main that runs between Cedar Bay and NGS; however, most of the planned use is industrial which is typically a very low irrigation demand. The greatest opportunity for future reclaimed water growth can be found to the west of I-95. New developments are in the planning phase west of I-95 and north of the airport. A preliminary study is currently underway to determine the best location, timing, and phasing of the Northwest WWTF. Northwest WWTF is anticipated to serve the northwest region of the District 2 wastewater service area.

If a future development is planned with a large reclaimed water demand, a cost benefit analysis will be initiated to determine if the provision of reclaimed water is economically, environmentally or technologically feasible. Each new project will be reviewed on a case-by-case basis.

Figure 10: Cedar Bay WWTF Projected Reclaimed Water Demand

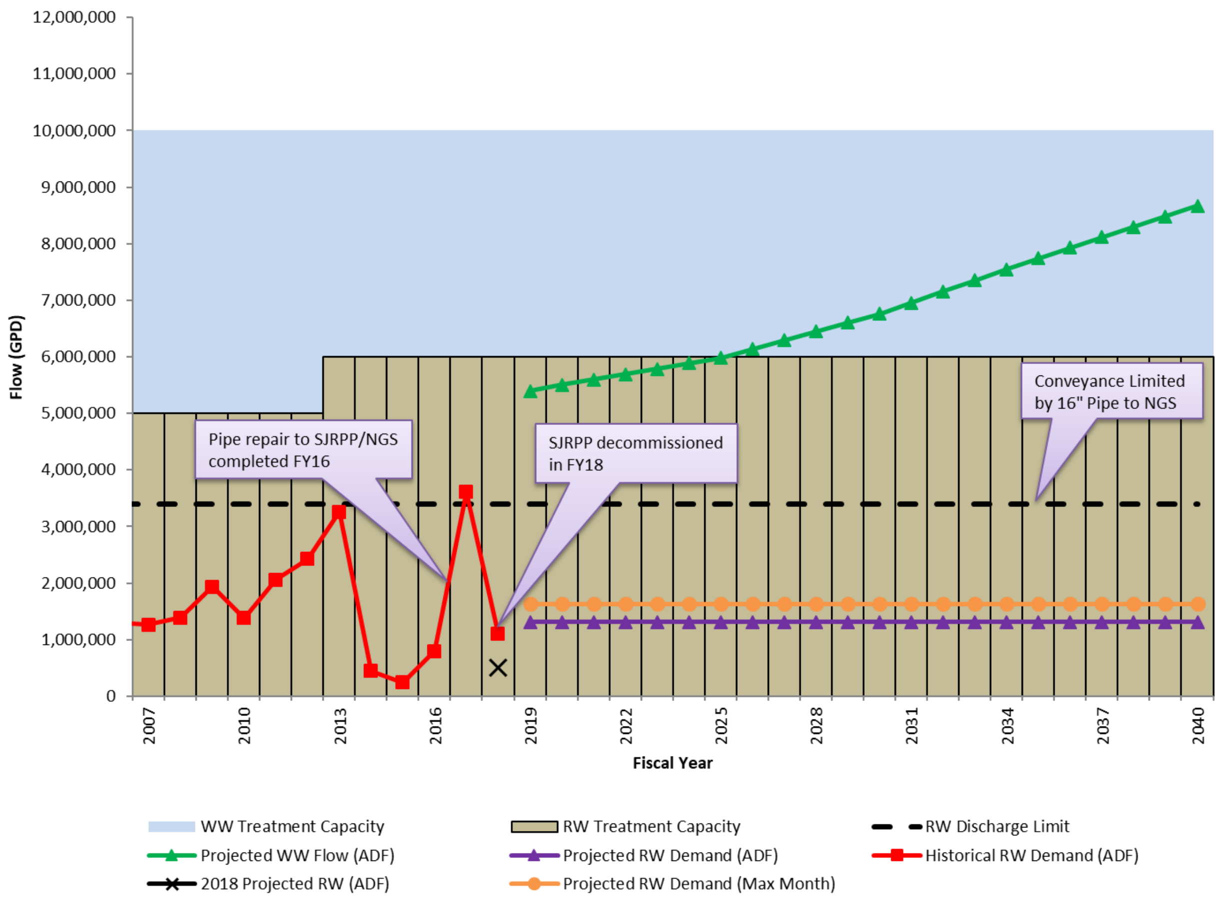


Table 9: Cedar Bay WWTF Reclaimed Water Demand Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	1.26	1.38	1.94	1.38	2.06	2.42	3.26	0.45	0.24
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
0.79	3.61	1.11		1.31	1.31	1.31	1.31	1.31	1.31

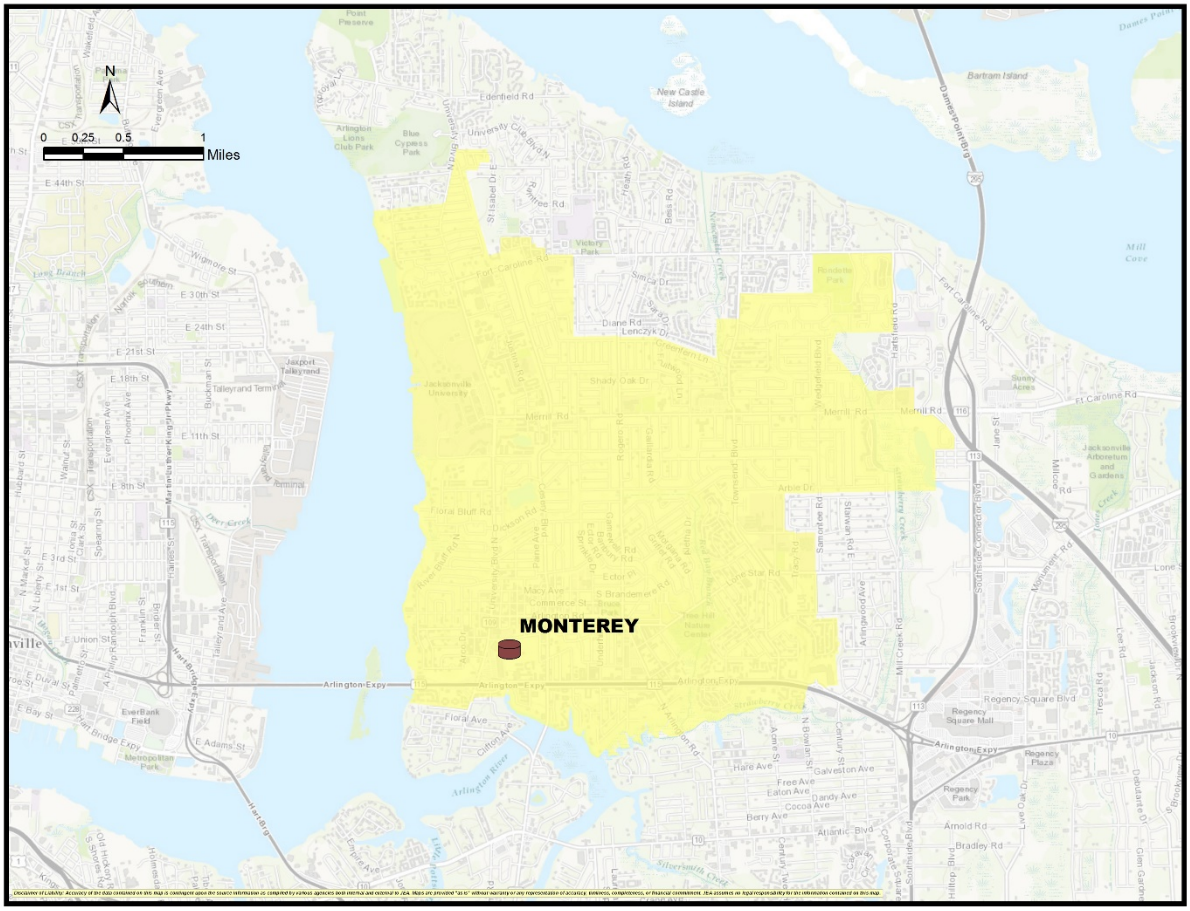
2.3.3.1 Cedar Bay WWTF Reclaimed Water Capital Improvement List

Projects currently identified in the JEA Capital Plan are focused on meeting projected reclaimed water demands with capacity and infrastructure improvements. Cedar Bay WWTF currently produces reclaimed water to support onsite and NGS offsite needs, no projects are planned at this time.

2.3.4 Monterey

Monterey WWTF provides wastewater service for a small region of the JEA service area just west of Arlington East WWTF.

Figure 11: Monterey WWTF WW Service Area



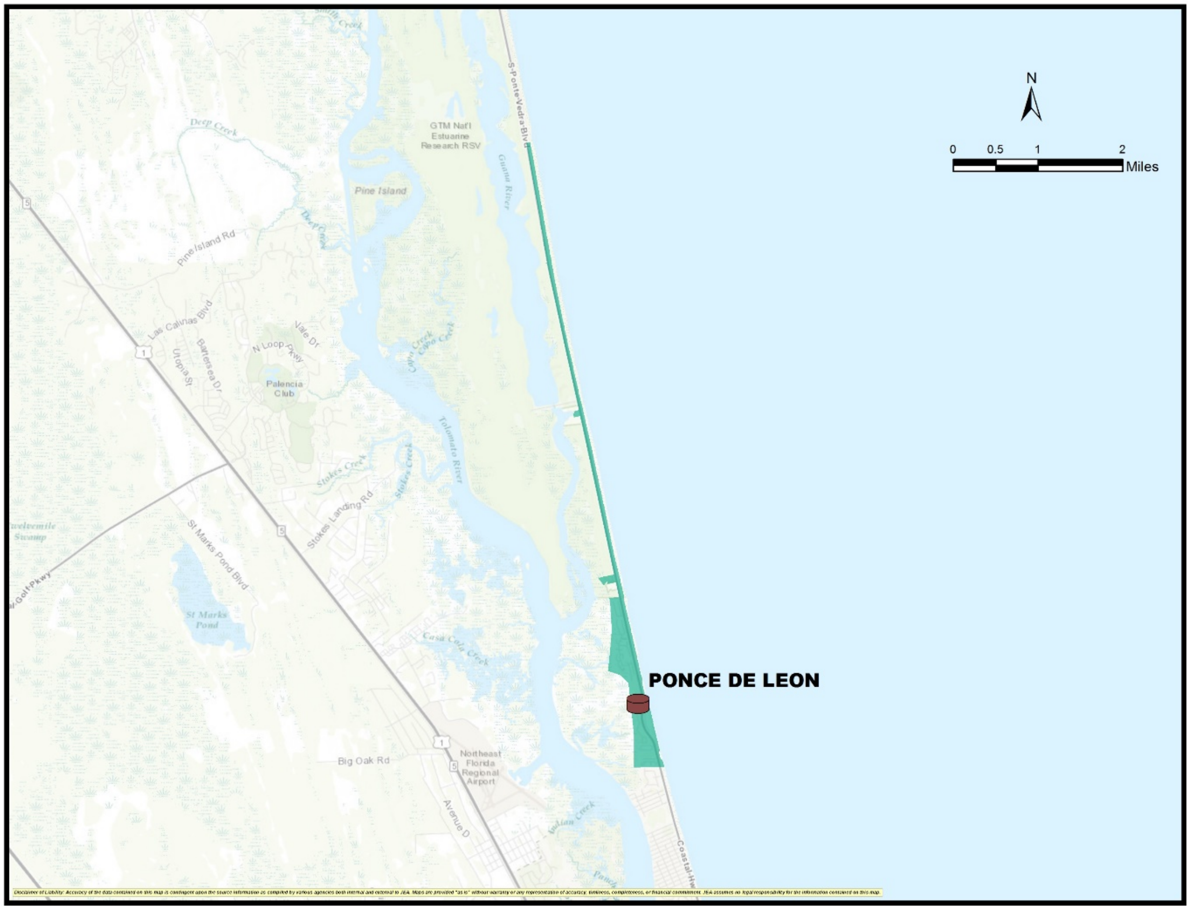
Monterey WWTF averaged 1.6 mgd in wastewater flow for FY18. No reclaimed water is produced at this facility. The service area is nearly built out.

There are no plans for providing reclaimed water to customers surrounding this facility since it would require retrofitting existing neighborhoods and is not economically feasible. In the future this facility could be phased out to Arlington East WWTF.

2.3.5 Ponce de Leon

Ponce de Leon WWTF provides wastewater service for customers just to the northeast of St. Augustine.

Figure 12: Ponce de Leon WWTF WW Service Area



Customers within the Ponce de Leon WWTF service area are mostly residential. The service area is close to build out.

Ponce de Leon WWTF averaged 0.04 mgd in wastewater flow for FY18. All wastewater is treated to non-public access reclaimed water quality and discharged to an onsite RIB, there is no surface water discharge for this facility. Onsite reclaimed water use at the WWTF averaged 0.04 mgd in FY18. The historical downward trend starting FY16 was been recently determined to be a meter reporting error. Future projections will be adjusted to correct for this error.

Table 10: Ponce de Leon WWTF Reclaimed Water Demand Summary (fiscal year average, mgd)

<table>
<tr><td rowspan="2">Historical</td><td>2007</td><td>2008</td><td>2009</td><td>2010</td><td>2011</td><td>2012</td><td>2013</td><td>2014</td><td>2015</td></tr>
<tr><td>0.07</td><td>0.08</td><td>0.08</td><td>0.08</td><td>0.10</td><td>0.10</td><td>0.08</td><td>0.08</td><td>0.09</td></tr>
<tr><td>2016</td><td>2017</td><td>2018</td><td rowspan="2">Projected</td><td>2019</td><td>2020</td><td>2025</td><td>2030</td><td>2035</td><td>2040</td></tr>
<tr><td>0.08</td><td>0.06</td><td>0.04</td><td>0.06</td><td>0.06</td><td>0.06</td><td>0.06</td><td>0.06</td><td>0.06</td></tr>
</table>

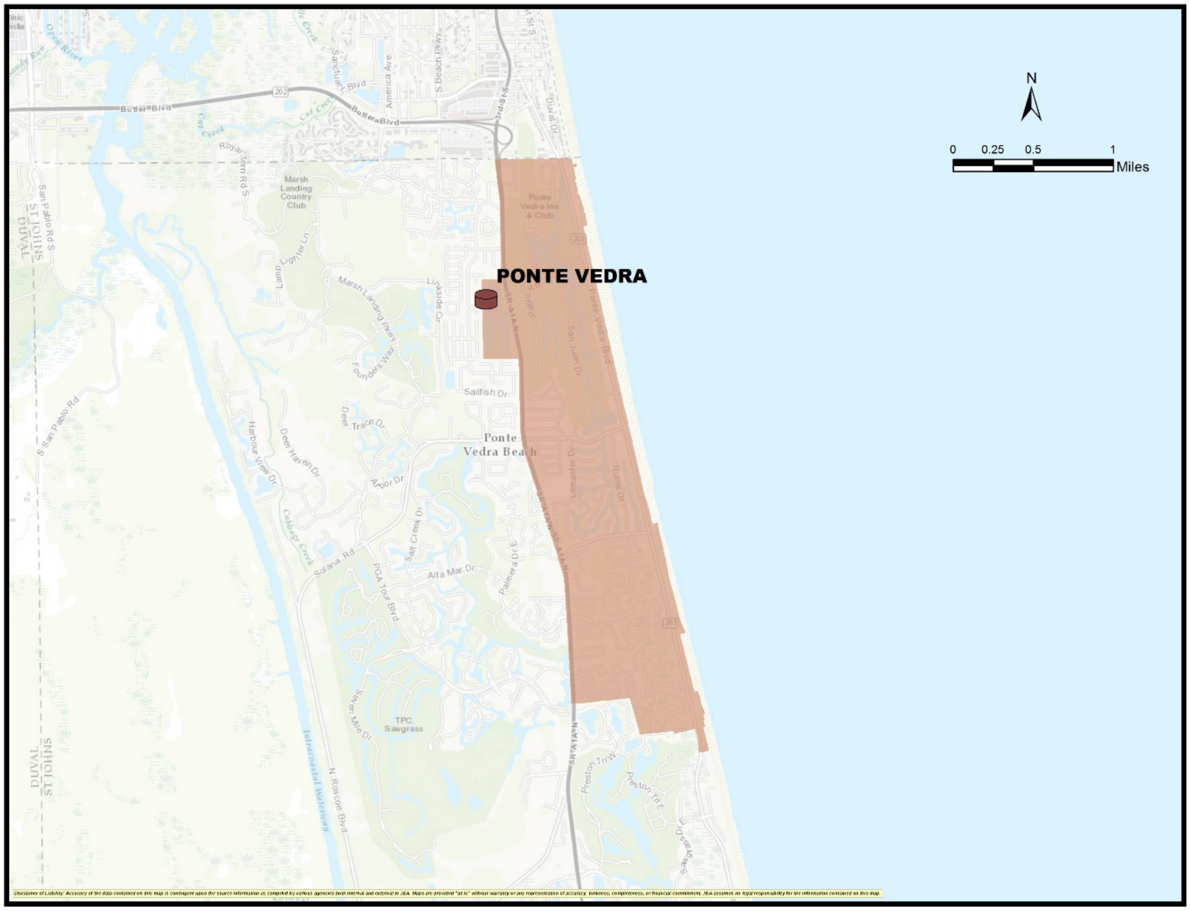
2.3.5.1 Ponce de Leon WWTF Reclaimed Water Capital Improvement List

Projects currently identified in the JEA Capital Plan are focused on meeting projected reclaimed water demands with capacity and infrastructure improvements. Ponce de Leon WWTF currently only produces reclaimed water to support onsite needs, no projects are planned at this time.

2.3.6 Ponte Vedra

Ponte Vedra WWTF provides wastewater service for customers located in the northeastern corner of St. Johns County.

Figure 13: Ponte Vedra WWTF WW Service Area



Ponte Vedra WWTF averaged 0.4 mgd in wastewater flow for FY18. Reclaimed water production at the Ponte Vedra WWTF averaged 0.4 mgd in FY18. Reclaimed water is either discharged to a pond owned by the Ponte Vedra Golf Course or to two onsite percolation/reject ponds. The historical downward trend starting FY16, shown in Figure 14, was recently determined to be a meter reporting error. Future projections will be adjusted to correct for this error.

Figure 14: Ponte Vedra WWTF Projected Reclaimed Water Demand

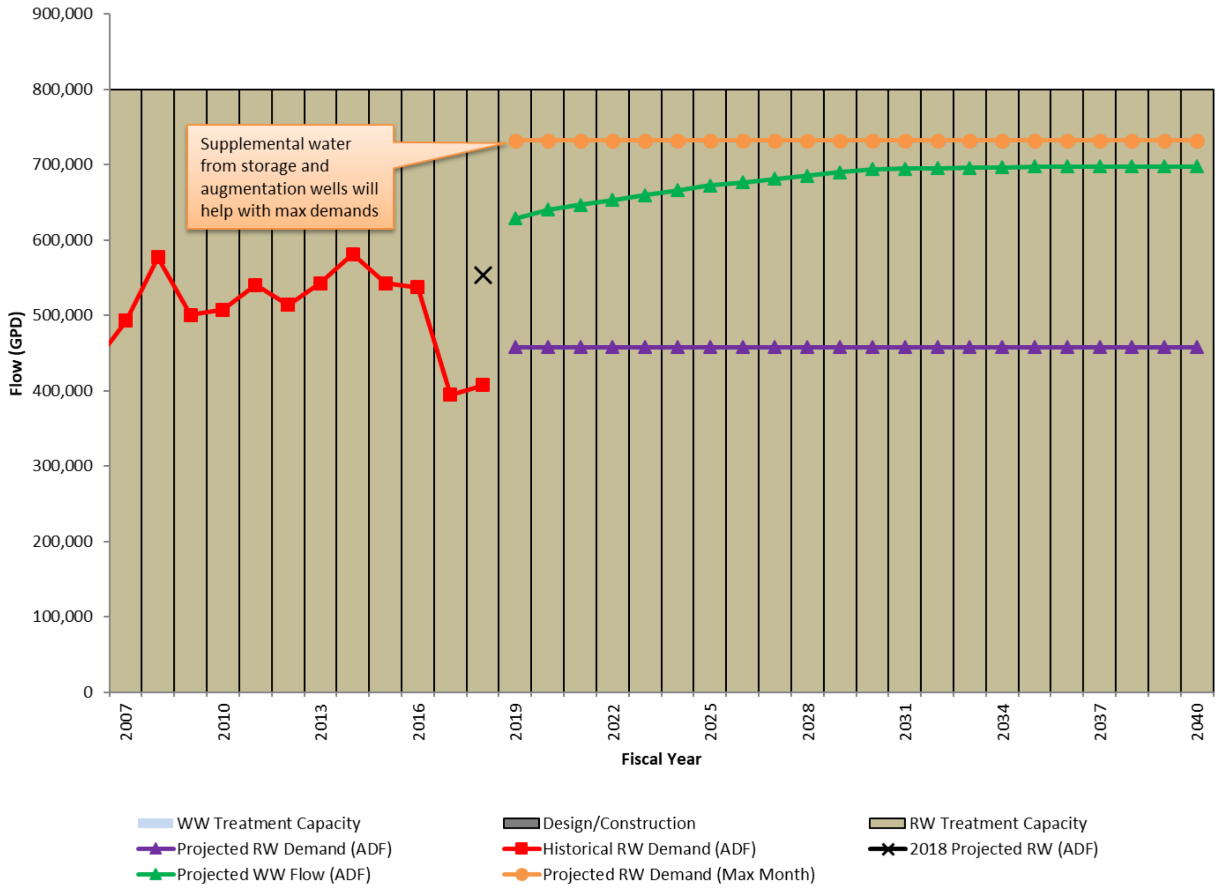


Table 11: Ponte Vedra WWTF Reclaimed Water Demand Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	0.49	0.58	0.50	0.51	0.54	0.51	0.54	0.58	0.54
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
0.54	0.39	0.41		0.46	0.46	0.46	0.46	0.46	0.46

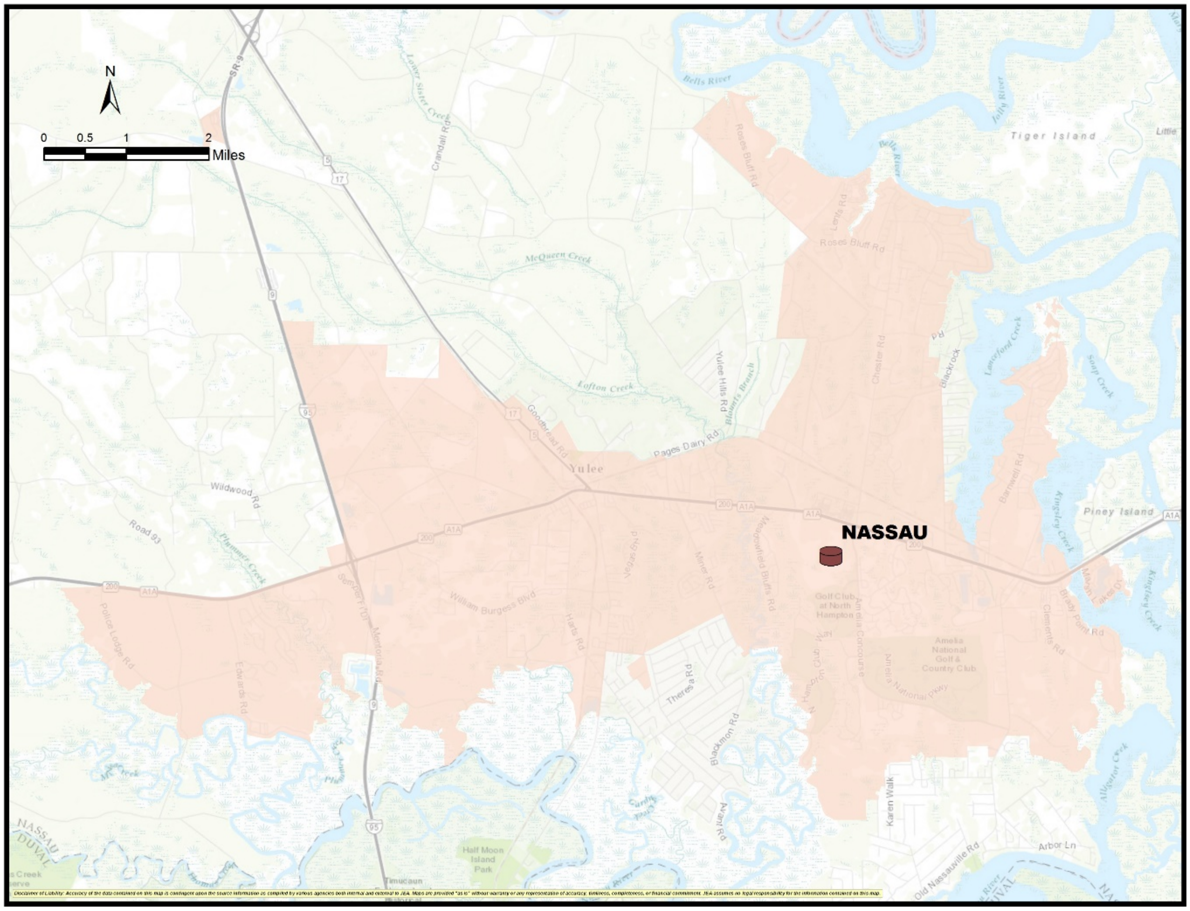
2.3.6.1 Ponte Vedra WWTF Reclaimed Water Capital Improvement List

Projects currently identified in the JEA Capital Plan are focused on meeting projected reclaimed water demands with capacity and infrastructure improvements. Ponte Vedra WWTF currently only produces reclaimed water to support onsite needs and the Ponte Vedra golf course, no projects are planned at this time.

2.3.7 Nassau Regional

Nassau Regional WWTF provides wastewater service for the northern region of the JEA service territory, serving Nassau County.

Figure 15: Nassau Regional WWTF WW Service Area



Nassau Regional WWTF averaged 1.2 mgd in wastewater flow for FY18. Reclaimed water produced by Nassau Regional WWTF is low pressure public access quality and is currently provided to two golf courses. All remaining reclaimed water is discharged into an onsite RIB and an offsite JEA owned wetland. Reclaimed water demand at the Nassau Regional WWTF averaged 0.8 mgd for FY18.

In 2016 the East Nassau Community Planning Area (ENCPA) kicked off construction of first phase, which includes nearly 2,000 single family homes in addition to commercial and retail. Reclaimed water piping construction along Radio Ave. and Harts Rd. is underway and planned for completion by 2020. A reclaimed water storage tank and booster pump station is in design now and is anticipated to be in service by 2021. When complete, these projects will provide reclaimed water to the ENCPA and also be available to any customers along the route. Future projects are planned to extend the reclaimed water main to the west beyond I-95 to serve the 3 Rivers development and surrounding future communities.

Figure 16: Nassau Regional WWTF Projected Reclaimed Water Demand

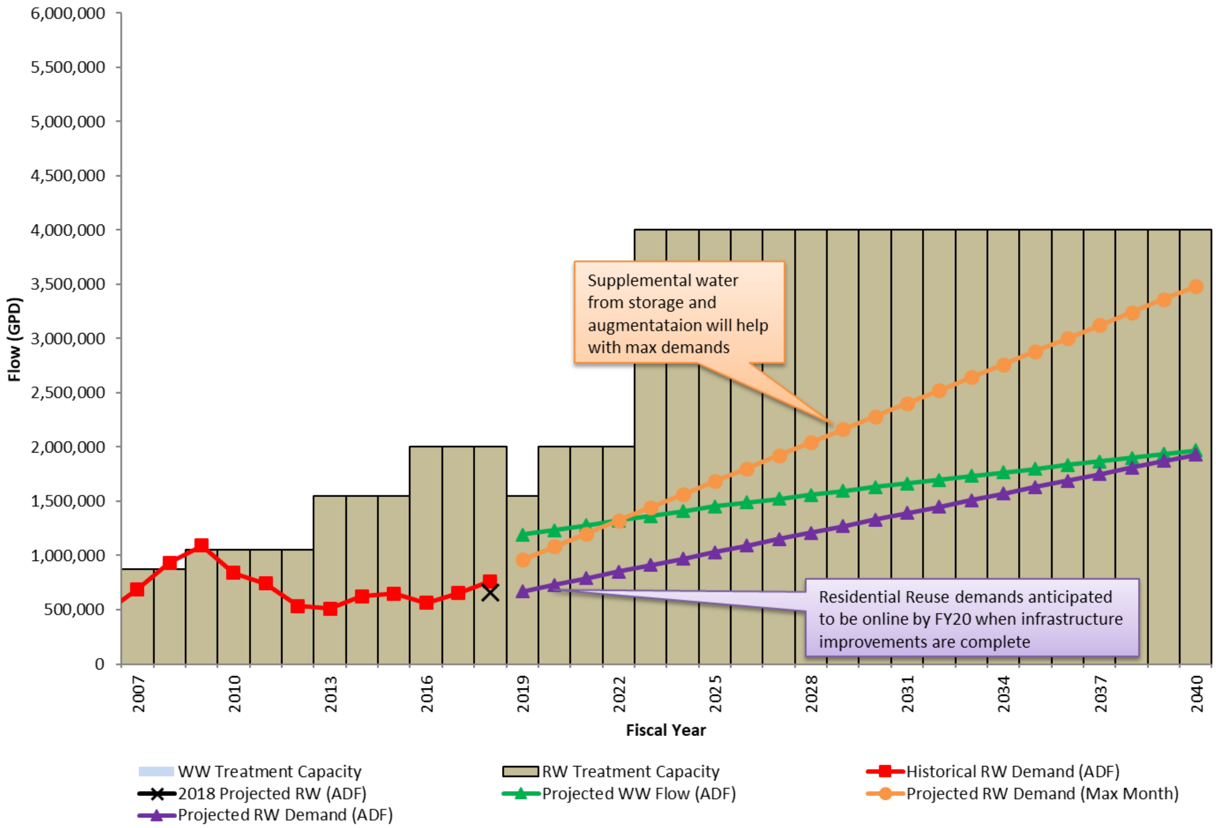


Table 12: Nassau Regional WWTF Reclaimed Water Demand Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	0.69	0.93	1.09	0.84	0.74	0.53	0.51	0.62	0.65
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
0.56	0.65	0.76		0.67	0.73	1.03	1.33	1.63	1.93

2.3.7.1 Nassau Regional WWTF Reclaimed Water Capital Improvement List

Projects currently identified in the JEA Capital Plan are focused on meeting projected reclaimed water demands with capacity and infrastructure improvements.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

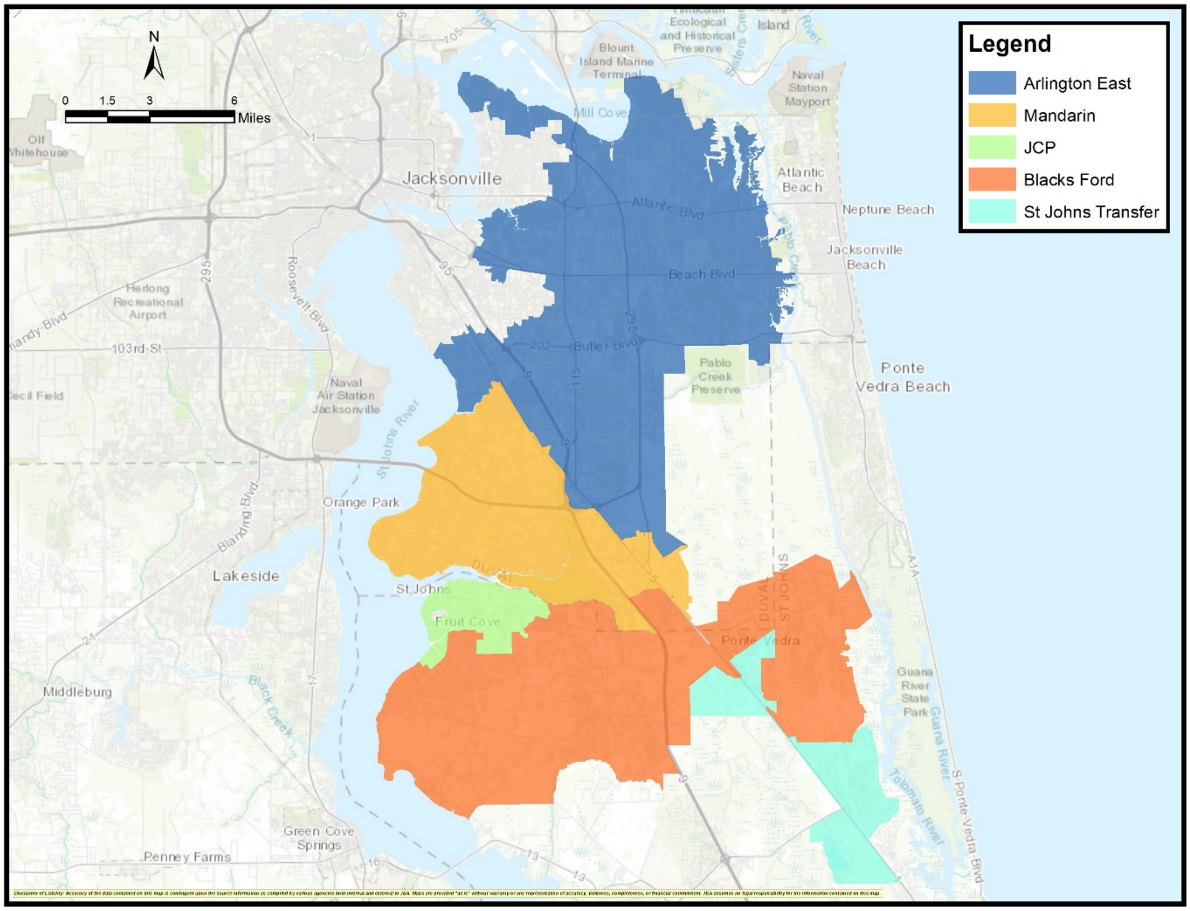
Table 13: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
417-62	Nassau RW Main - Radio Av to Harts Rd - Trans - R	$3,191	$2,409	$472	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-61	Nassau - Radio Av - RW Storage Tank and Booster PS - R	$4,806	$609	$1,708	$2,443	$0	$0	$0	$0	$0	$0	$0	$0
100-48R	JP - SJRWMD - William Burgess Rd - SR200 to Harts Rd - Trans - New - R - ENV - (Reimb-33)	$1,633	$431	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-81	SR200 - William Burgess Blvd to Police Lodge Rd - Trans - R	$3,800	$0	$0	$0	$300	$2,100	$1,400	$0	$0	$0	$0	$0
417-82	Nassau Regional WRF - SR200 West of I-95 RW Storage Tank and Booster PS - R	$9,000	$0	$0	$0	$0	$0	$375	$3,000	$5,625	$0	$0	$0
417-75	T-Line - Amelia Concourse to Amelia National - Trans - R	$800	$0	$0	$0	$0	$0	$144	$510	$146	$0	$0	$0
		TOTAL	**$3,449**	**$2,180**	**$2,443**	**$300**	**$2,100**	**$1,919**	**$3,510**	**$5,771**	**$0**	**$0**	**$0**

2.3.8 South Grid

The South Grid consists of four WWTFs with an interconnected reclaimed water delivery system. Arlington East, Mandarin, JCP and Blacks Ford WWTFs accounts for 58 percent of JEA's reclaimed water delivery capacity. Currently a majority of the overall retail and bulk customers reside within the South Grid. Figure 17 shows the extent of the wastewater service areas for all four WWTFs and Figure 2 shows how the South Grid reclaimed water system is interconnected.

Figure 17: South Grid WW Service Area



Each reclaimed water production facility in the South Grid supports both local and regional demands. If the current growth rate continues and demands do not see a decline, average reclaimed water demands are anticipated to nearly match wastewater flow by 2040. Prior to 2040, circa 2036, supplemental water will be needed due to pipeline capacity limitations from Arlington East WWTF. See Figure 18 and Table 14 showing the supplemental water needs and capacity limitations.

Figure 18: South Grid Projected Reclaimed Water Demand

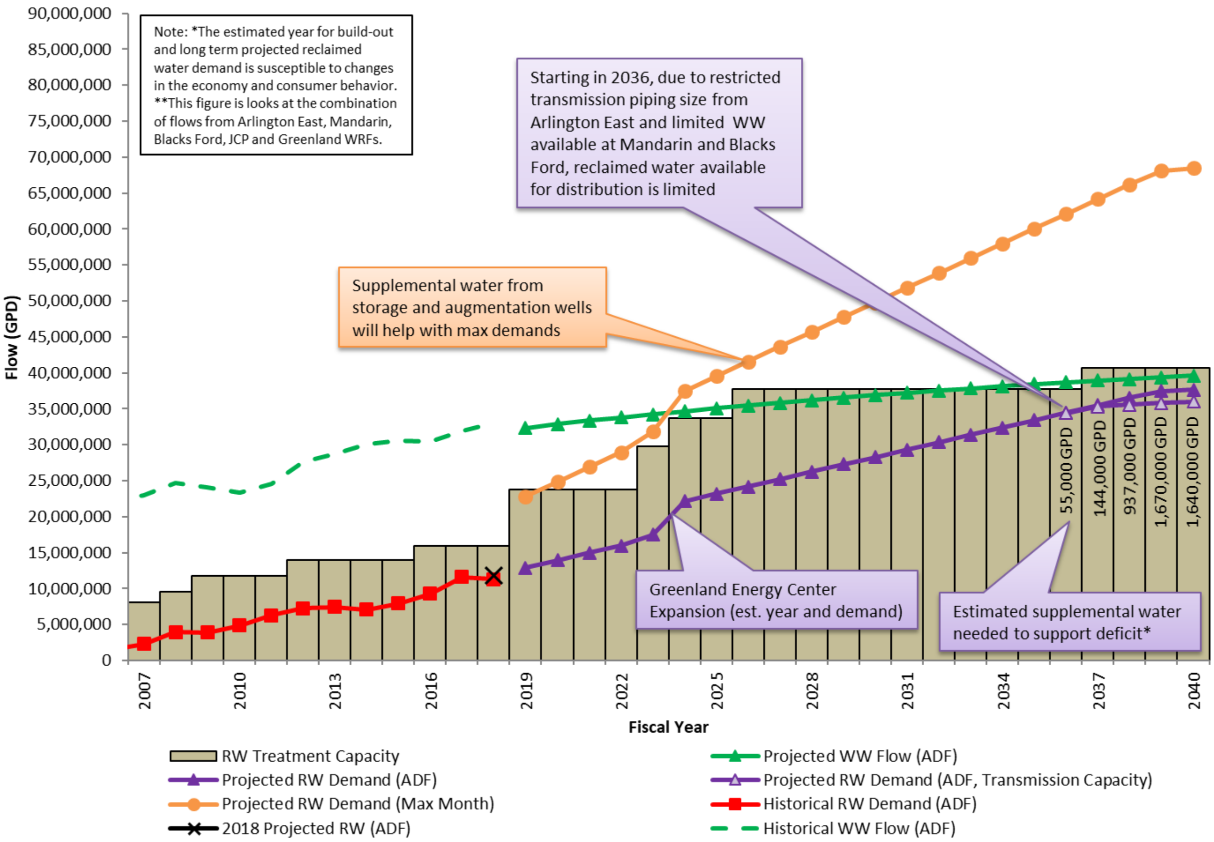


Table 14: South Grid Reclaimed Water Demand Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	2.33	4.00	3.89	4.87	6.32	7.27	7.48	7.10	7.94
2016	2017	2018	Projected	2019	2020	2025	2030	2035	2040
9.31	11.64	11.33		12.92	13.95	23.18	28.31	33.45	36.00

*projected demand is total RW, not restricted by transmission capacity limits

It is anticipated supplemental water will be needed starting 2036; however many factors can influence the timing and quantity of supplemental water. JEA Planning staff will continue monitoring reclaimed water demands for trends and make adjustments to projections so the projects can be in place for key years to support demands.

The Integrated Resource Master Plan (IWRP) kicked off in April 2019 to not only look at meeting future water demands but also maximize reclaimed water use along with providing better water efficiency through a cost-effective demand side management strategy. This project is anticipated to be completed by September of 2020. A fact sheet summarizing the program can be found in Appendix 1.

The following sections look closer at each of the WWTFs that supply reclaimed water to the South Grid network.

2.3.8.1 *Arlington East*

At this time a majority of the local customer base for Arlington East WWTF consists of bulk reclaimed water customers with a small amount of retail. Most of the reclaimed water produced at Arlington East WWTF is pumped south to be used in the South Grid network.

The expansion of Greenland Energy center could occur as early as 2024 (a firm start date has not been determined). Reclaimed water demands at Greenland Energy Center could have a significant impact and require moving some future projects forward to support the demands. Starting 2036, it is projected supplemental water will be needed to support growing reclaimed water demands. Figure 19 shows the deficit for Arlington East WWTF; alternative water could be provided in the future at many different locations within the South Grid to supplement shortfalls in demands. The IWRP will provide the best path forward for providing an economical solution for future supplemental reclaimed water needs in the South Grid.

Figure 19: Arlington East WWTF Projected Reclaimed Water Demand

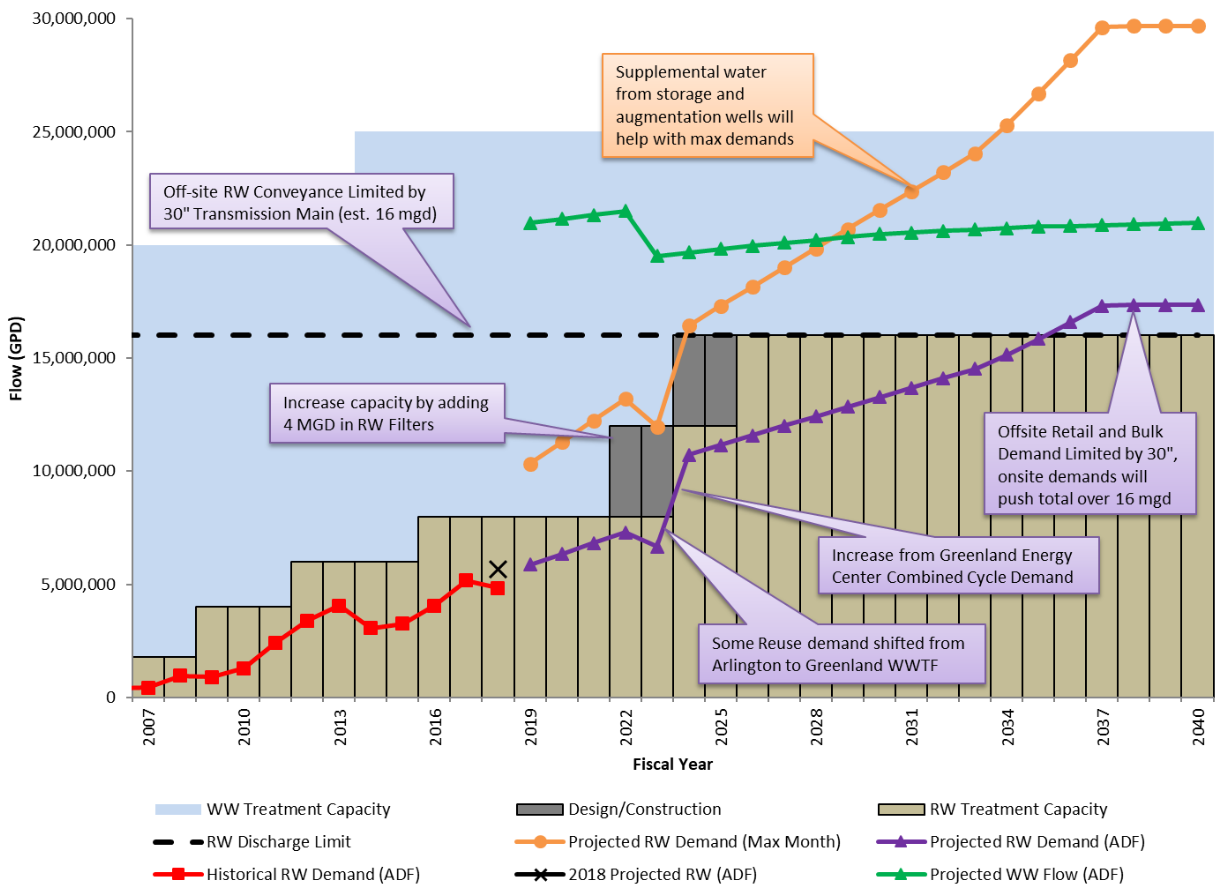


Table 15: Arlington East WWTF Reclaimed Water Demand Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	0.43	0.95	0.90	1.29	2.42	3.40	4.05	3.07	3.26
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
4.06	5.18	4.84		5.87	6.34	11.15	13.27	15.85	17.34

2.3.8.2 Mandarin

Mandarin WWTF capacity upgrades were completed in FY19. Even though the onsite pumps at Mandarin WWTF can supply up to 7 mgd into the South Grid network; current offsite piping restricts capacity to 5 mgd until a parallel pipe is constructed from just north of the Bartram repump to the future Greenland WWTF.

Figure 20: Mandarin WWTF Projected Reclaimed Water Demand

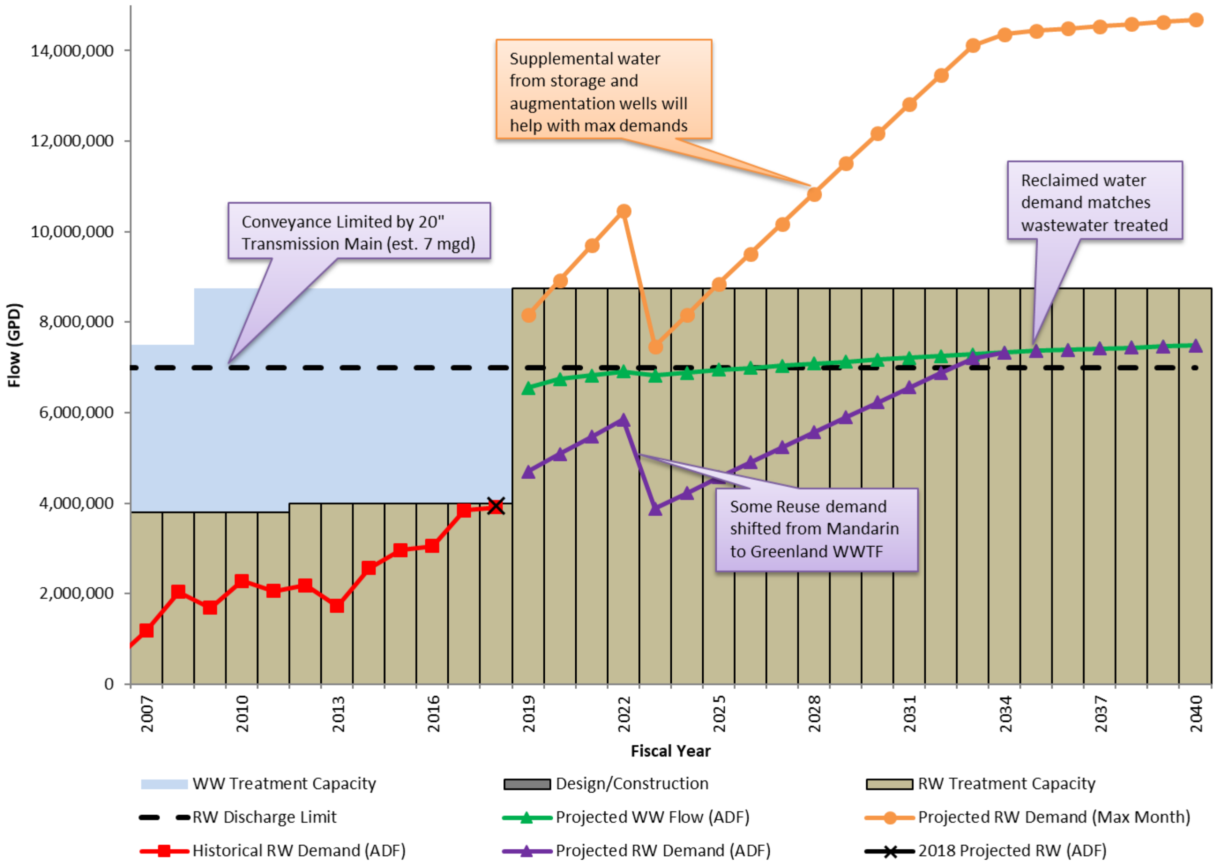


Table 16: Mandarin WWTF Reclaimed Water Demand Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	1.18	2.04	1.69	2.28	2.05	2.18	1.72	2.56	2.96
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
3.05	3.84	3.91		4.70	5.08	4.57	6.23	7.36	7.49

2.3.8.3 Julington Creek Plantation

Local reclaimed water demands within Julington Creek Plantation are high enough that Julington Creek, on average, is a zero discharge facility. Julington Creek is gridded in with the South Grid reclaimed water network.

Figure 21: JCP WWTF Projected Reclaimed Water Demand

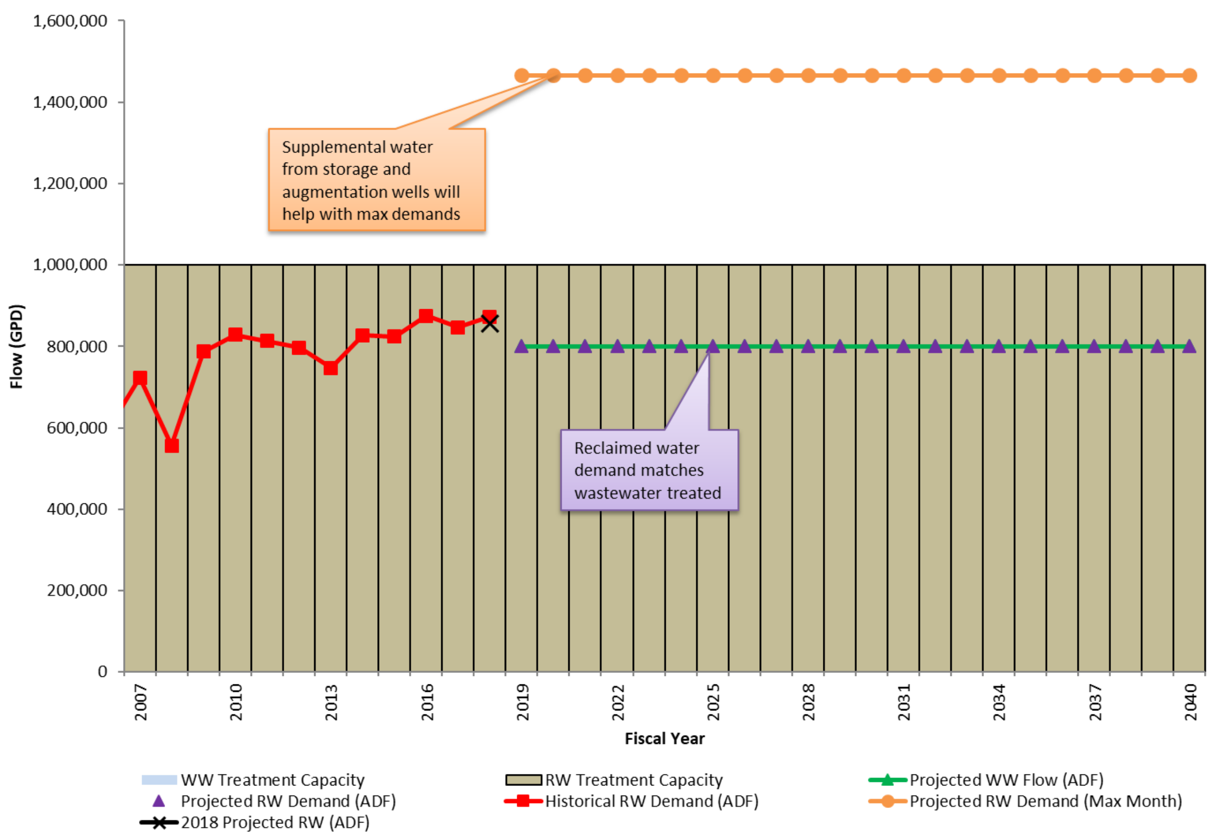


Table 17: JCP WWTF Reclaimed Water Demand Summary (fiscal year average, mgd)

Historical	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	0.72	0.56	0.79	0.83	0.81	0.80	0.75	0.83	0.82
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
0.88	0.85	0.87		0.80	0.80	0.80	0.80	0.80	0.80

2.3.8.4 Greenland

Greenland WWTF is a 6 mgd facility in design, planned to go into service by 2023; this facility will be the central hub for reclaimed water collection and distribution within the South Grid. A study is underway to determine reclaimed water storage and pumping needs for Greenland WWTF while also managing effluent and reclaimed water production during extended wet weather events. There are multiple piping projects planned and underway in support of this new Greenland WWTF shown in Table 20.

Figure 22: Greenland WWTF Projected Reclaimed Water Demand

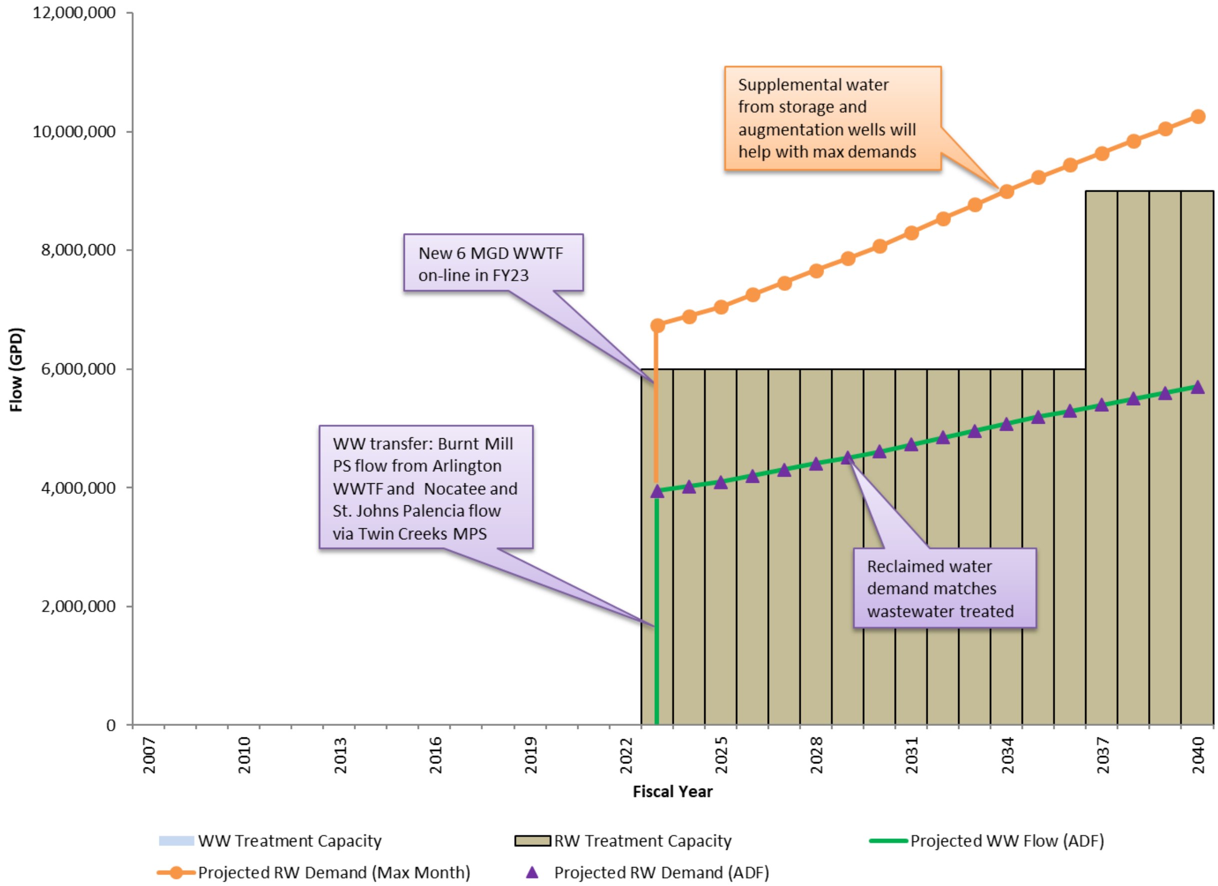


Table 18: Greenland WWTF Reclaimed Water Demand Summary (fiscal year average, mgd)

Historical	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
	0	0	0	0	0	0	0	0	0
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
0	0	0		0	0	4.10	4.61	5.19	5.71

2.3.8.5 Blacks Ford

The Blacks Ford WWTF capacity expansion to 6.0 mgd was completed late FY18. Reclaimed water production capacity now matches the wastewater treatment capacity. Blacks Ford WWTF currently has limited connectivity with the overall South Grid reclaimed water system. Prior to Greenland WWTF going into service, Blacks Ford WWTF will need enough reclaimed water demand to minimize effluent discharges to the wetland/outfall since it has an annual nutrient loading limitation. Figure 23 shows the projected effluent discharge to the wetland. Reclaimed water demands have been increasing, so it is not expected to be a problem with minimizing flow to the wetland. When Greenland WWTF goes into service, a portion of wastewater flows will be shifted from Blacks Ford WWTF to Greenland WWTF. Maintaining a consistent wastewater baseline flow will be critical for Blacks Ford WWTF to provide reliable reclaimed water to customers until a future pipeline is constructed from Twin Creeks to St. Johns Pkwy, allowing reclaimed water to flow from Greenland WWTF into the Blacks Ford service area.

Figure 23: Blacks Ford WWTF Projected Reclaimed Water Demand

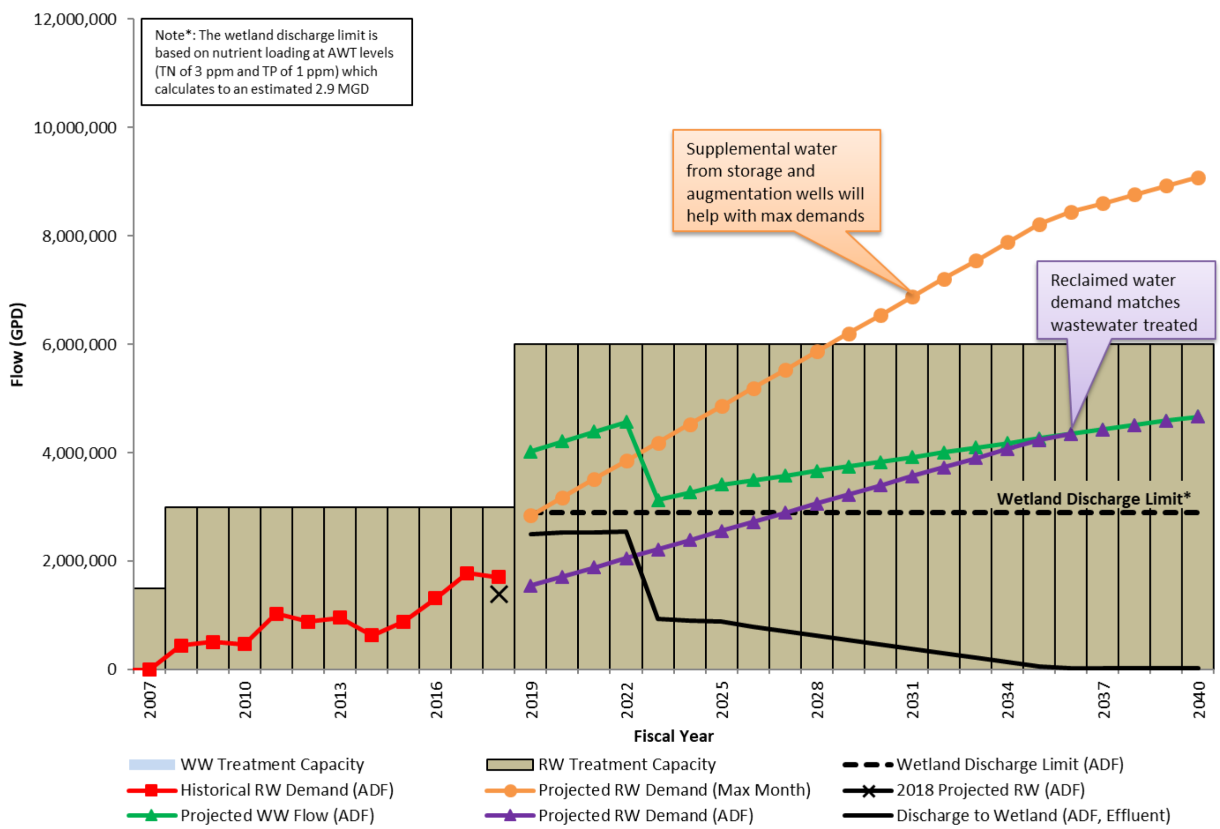


Table 19: Blacks Ford WWTF Reclaimed Water Demand Summary (fiscal year average, mgd)

Historical	2007	2008	2009	2010	2011	2012	2013	2014	2015
	0	0.45	0.51	0.47	1.03	0.89	0.96	0.64	0.89
2016	**2017**	**2018**	**Projected**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**
1.32	1.78	1.71		1.55	1.72	2.56	3.40	4.24	4.67

2.3.8.6 South Grid Reclaimed Water Capital Improvement List

Projects currently identified in the JEA Capital Plan are focused on meeting projected reclaimed water demands with capacity and infrastructure improvements.

The following table shows planned projects through FY29 ($s in $1,000s) and is a snapshot of the capital budget as of 6/17/19.

Table 20: Capital Project List

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
417-48	RG Skinner - North Rd - Trans - R - ENV	$1,750	$1,750	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-10	JP - SJRWMD - Gate Pkwy - Glen Kernan to T-Line - Trans - New - R - (Reimb-28)	$8,662	$1,504	$4,433	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-65	Nocatee South RW Storage Tank and Booster PS - R	$10,005	$1,283	$2,720	$5,818	$0	$0	$0	$0	$0	$0	$0	$0
417-36	RG Skinner - 9B to Parcels 10A - 11 - R - ENV	$1,161	$1,161	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
730-12	US 1 - Greenland WRF to CR 210 - Trans - New - R	$25,660	$672	$2,840	$10,743	$10,743	$665	$0	$0	$0	$0	$0	$0
417-50	Baymeadows Rd - Point Meadows Rd to Old Still PUD - Trans - R - ENV	$735	$623	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-35	RG Skinner - 9B to T-Line - R - ENV	$500	$500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-49	Trednick Pkwy - Millcoe Rd to Mill Creek Rd - Trans - R - ENV	$2,430	$382	$1,941	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-64	Twin Creeks RW Storage Tank and Booster PS - R	$8,952	$367	$1,210	$6,857	$0	$0	$0	$0	$0	$0	$0	$0
167-44R	Nocatee - Conservation Trail Phase 1A and 1B - Reclaim Main - R	$467	$234	$233	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-80	Gate Parkway to Burnt Mill Rd - Trans - R	$1,809	$143	$1,584	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-46	CR210 - South Hampton to Ashford Mills - Trans - R - ENV	$2,350	$87	$203	$1,029	$1,031	$0	$0	$0	$0	$0	$0	$0
167-43R	Rivertown - Main St Extension - Reclaim Main - R	$161	$81	$80	$0	$0	$0	$0	$0	$0	$0	$0	$0

Table 20: Capital Project List (continued)

Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
417-51	CR210 - Old Dixie Hwy to Twin Creeks - Trans - R - ENV	$1,500	$0	$1,500	$0	$0	$0	$0	$0	$0	$0	$0	$0
417-47	Davis - Gate Pkwy to RG Skinner - Trans - R	$9,400	$0	$250	$2,050	$5,993	$1,107	$0	$0	$0	$0	$0	$0
417-53	CR210 - Longleaf Pine Pkwy to Ashford Mills Rd - Trans - R	$5,000	$0	$0	$250	$2,050	$2,700	$0	$0	$0	$0	$0	$0
417-74	Greenbriar Rd - Longleaf Pine Pkwy to Spring Haven Dr - R	$3,500	$0	$0	$100	$660	$990	$100	$660	$990	$0	$0	$0
417-12	RiverTown WTP - New Storage and Pumping System - R	$3,950	$0	$0	$0	$50	$400	$1,000	$2,500	$0	$0	$0	$0
417-44	Station Creek Rd - Beach Bv to Hunt Club Rd N - Trans - New - R	$275	$0	$0	$0	$50	$225	$0	$0	$0	$0	$0	$0
417-72	Veterans Pkwy - Longleaf Pine Pkwy to CR210 - Trans - R	$7,300	$0	$0	$0	$0	$0	$300	$3,000	$4,000	$0	$0	$0
730-16	Nocatee North RW Storage Tank	$3,000	$0	$0	$0	$0	$0	$300	$2,000	$700	$0	$0	$0
417-33	Arlington East WRF - Reclaim Filter - 8 to 12 MGD	$4,000	$0	$0	$0	$0	$0	$300	$1,500	$2,200	$0	$0	$0
417-10A	Monument Rd - AE WRF to St Johns Bluff Rd - Trans - New - R	$3,300	$0	$0	$0	$0	$0	$300	$1,200	$1,800	$0	$0	$0
417-54	CR210 - Twin Creeks to Russell Sampson Rd - Trans - R	$3,000	$0	$0	$0	$0	$0	$300	$1,080	$1,620	$0	$0	$0
422-05	Ridenour WTP - Storage and Repump - R	$3,700	$0	$0	$0	$0	$0	$200	$1,460	$2,040	$0	$0	$0
417-52	Russell Sampson Rd - St. Johns Pkwy to CR210 - Trans - R	$3,008	$0	$0	$0	$0	$0	$200	$920	$1,888	$0	$0	$0
417-42	CR210 - St Johns Pkwy to Leo Maguire Pkwy - Trans - New - R	$1,123	$0	$0	$0	$0	$0	$100	$409	$614	$0	$0	$0
417-39	Bartram Trail HS - Longleaf Pine Pkwy - Trans - New - R	$243	$0	$0	$0	$0	$0	$50	$193	$0	$0	$0	$0
417-43	Glen Kernan Pkwy - Kernan Bv to Royal Troon La - Trans - New - R	$262	$0	$0	$0	$0	$0	$0	$50	$212	$0	$0	$0
		TOTAL	**$8,787**	**$16,994**	**$26,847**	**$20,577**	**$6,087**	**$3,150**	**$14,972**	**$16,064**	**$0**	**$0**	**$0**

Appendix 1

IWRP Project Fact Sheet




JEA Integrated Water Resources Plan (IWRP) and Demand Side Management (DSM) Study Project Fact Sheet

Building Community
an Innovative

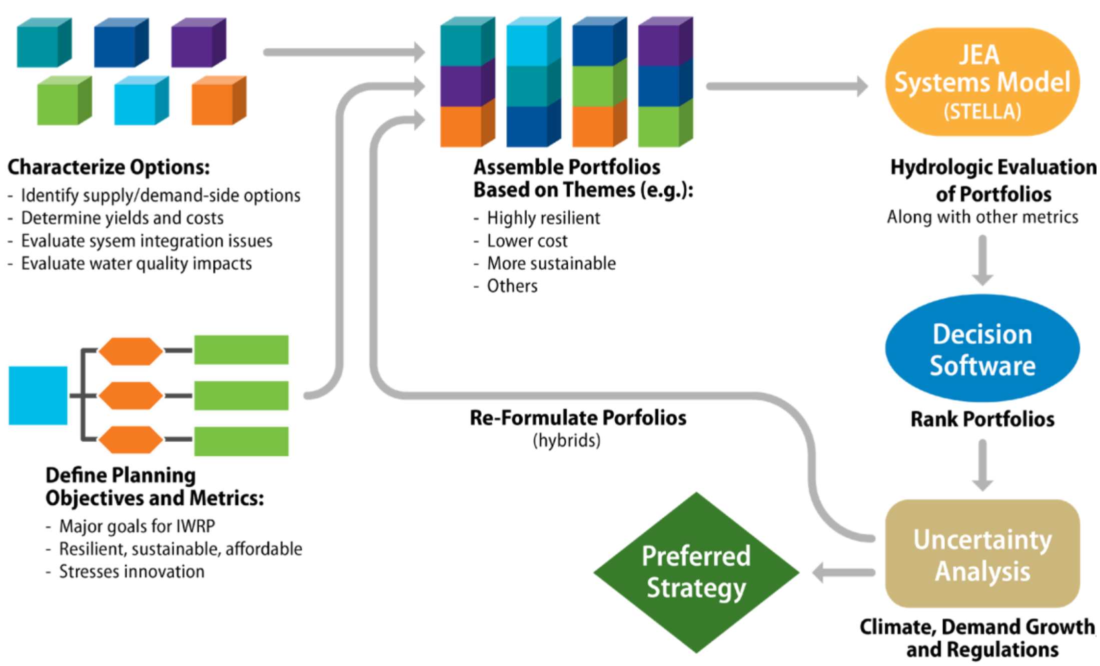
Project Mission Statement:

JEA will prepare an Integrated Water Resource Plan (IWRP) and Demand-Side Management (DSM) Strategy that when implemented results in: (1) water supply certainty in meeting current and future water demands; (2) maximum use of reclaimed water; (3) well-targeted and cost-effective DSM program(s); (4) enhanced resiliency, accounting for future uncertainties; (5) recommendations for specific projects and programs for near-, mid-, and long-term horizons that are aligned with JEA's Corporate Measures of Value – customer, financial, community impact, and environmental.

Integrated Water Resources Plan (IWRP)

JEA's 20-year Consumptive Use Permit (CUP) is nearing critical milestones that require special conditions to be met for the existing 135 million gallons per day (mgd) groundwater allocation (2018) to be incrementally increased over time to a potential maximum of 162.6 mgd (2031). For example, condition 38 of the CUP sets specific reuse goals (31.55 mgd by 2020, 37.36 mgd by 2025, and 43.76 mgd by 2030) assuming those goals are proven to be economically, environmentally, and technically feasible. For context, current actual reclaimed in 2019 is 17 mgd. In addition, there are other issues facing JEA's service area such as meeting future water demands, addressing supply source water quality challenges on the south grid, and participating as a stakeholder in regional minimum flows/levels (MFLs) and total maximum daily loads (TMDLs). Finally, as JEA's service area continues to grow it will be essential that the water system is resilient, environmentally sustainable, and that utility services are provided in an affordable manner. The Development of an IWRP is key to accomplishing these water resources goals.

The IWRP, with a 50-year planning horizon, will characterize various water supply options such as groundwater, water reuse, surface water, desalination, and stormwater capture in terms of supply yield, cost, system requirements and water quality. These options will be combined into integrated portfolios designed to meet planning objectives and then evaluated using a sophisticated computer simulation model and decision software tool. The highest-ranking portfolios will be tested against future uncertainties such as growth, extreme climate, and others in order to develop a robust and resilient strategy for JEA.



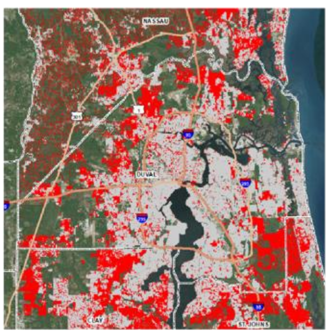
To guide the development of the IWRP, the following planning objectives were developed:

- Water Supply Certainty
- Cost-Effectiveness & Revenue Stability
- Implementation Ease
- System Flexibility
- Environmental Stewardship
- Community Benefits

Demand-Side Management (DSM) Strategy

In parallel to the development of JEA's IWRP, a DSM Strategy will also be developed as part of this project. Water efficiency achieved through a cost-effective DSM strategy can be a useful tool for JEA to accomplish multiple objectives within its IWRP, including (1) a bridge strategy for achieving CUP requirements while potable reuse and traditional reclaimed water projects are being developed; (2) increased sustainability; and (3) increased customer satisfaction. To develop the DSM Strategy, the JEA will utilize an industry leading method for spatially forecasting its water demands; determining major end uses of water and current (or baseline) water use efficiency; development of a DSM Model that can be used to project passive conservation (from plumbing codes) and forecast different levels of future water use efficiency based on latest innovations and proven applications; and by using the DSM Model to evaluate the cost-effectiveness of new DSM measures.

STEP 1

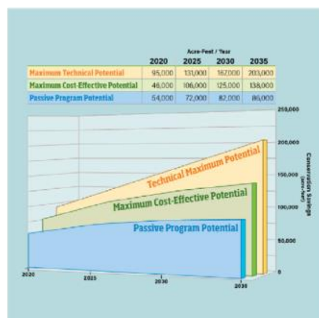


Spatial Forecast of Water Demand through 2070

STEP 2

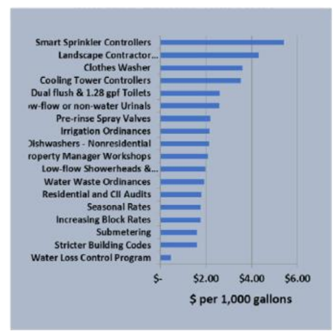
Current End Uses of Demand and Water Efficiency Levels

STEP 3



JEA DSM Tool Development and Passive Conservation

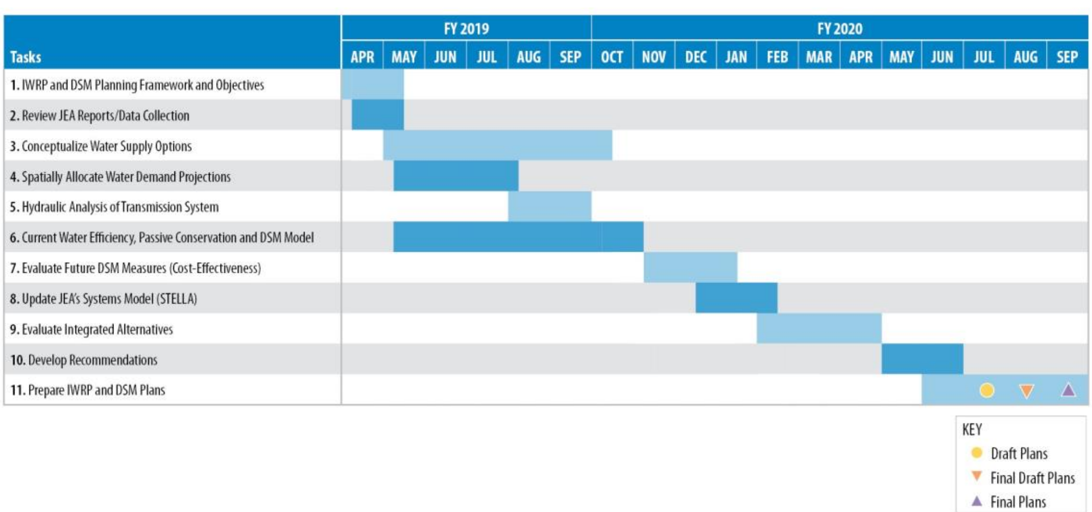
STEP 4



Evaluation of Future DSM and Selection of Strategy

Project Schedule

Kicked-off in April of 2019, it is anticipated that the IWRP and DSM Strategy will be completed by September of 2020. The project tasks are outlined below. Several workshops will be scheduled throughout the course of the project to share progress and receive input from JEA's technical team and leadership.



Appendix A

Class III and Class IV Pump Stations

CLASS III AND IV PUMPSTATIONS

Table of Contents

1 Introduction

This section of the Annual Water Resources Master Plan identifies the Wastewater Class III and IV pumpstation projects in the capital budget. The service area is divided into collection basins based on the wastewater plant treatment area. Limits of the basins are mapped and Capital Improvement Projects (CIP) that are scheduled to begin in the next five years are identified. Project specific information and descriptions are not included with this report, but are available via the Capital Budget Index. Existing projects already underway are included in this section. Current planned grid projects with overall project budgets totaling approximately $80,244,000 are scheduled to start in the next five years.

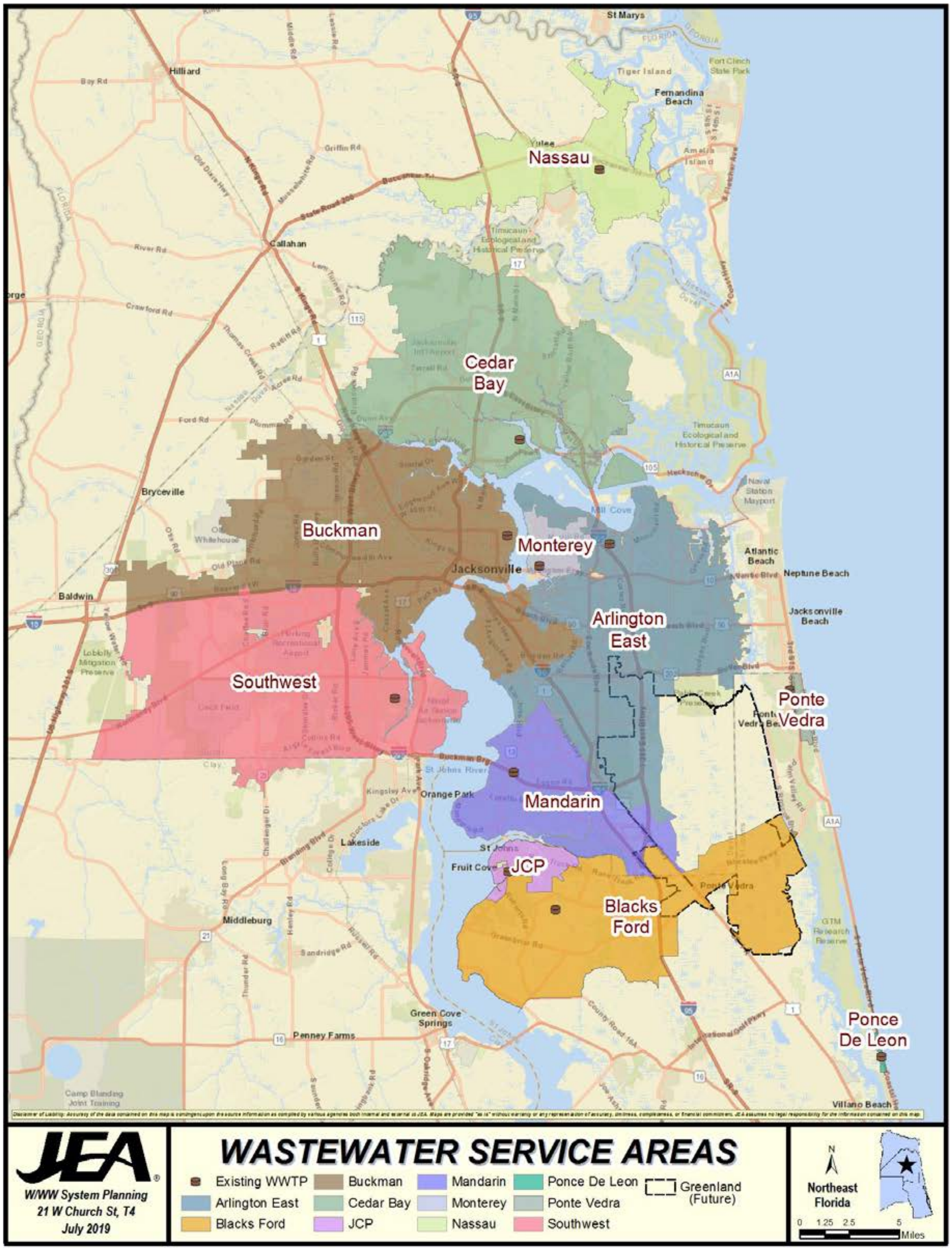
2 Wastewater

2.1 Overall System

JEA's wastewater collection and transmission system is divided into eleven distinct service grids which serve portions of Duval, St. Johns, Nassau and Clay Counties in Northeast Florida. These grids are identified as follows: Buckman, Cedar Bay (District II), Southwest, Arlington East, Monterey, Mandarin, Blacks Ford, JCP, Ponte Vedra, Ponce De Leon, and Nassau. Figure 1 provides a map of the current overall system boundaries. The individual grids are further described in the following sections.

As growth continues within JEA's service territory, three additional service grids will be added as needed. These grids are identified as Dinsmore, Maxville and Greenland. As the new grids are added, existing service grid boundaries may change. Some of the proposed Capital Improvement Projects are located and designed to accommodate future service grid transitions and meet existing needs.

Figure 1. Wastewater Overall Map



2.2 Wastewater Class III and IV Pumpstation Project Planning Criteria

JEA owns and operates 1,442 pumpstations within Duval, Clay, Nassau, and St Johns Counties. Of these 138 are Class III/IV pumpstations. These pumpstations typically re-pump several smaller stations and often convey flow from several thousand homes. By JEA definition a Class III/IV pumpstation has a peaked inflow greater than 1,000 GPM (436 kGPD ADF) or more than two station pumps.

Less than 1% of JEA pumpstations have permanently installed flow meters. Therefore, inflow has to be estimated. Annual Average Daily Flow (AADF) is calculated from water consumption within the pumpstation basin. It is considered a conservative estimate because outdoor usage, such as irrigation, is included. In general, flow contribution is 75% residential (81.5% Single-Family and 18.5% Multi-Family) and 25% non-residential (75.2% Commercial/Retail and 24.8% Industrial/Institutional).

Historical Flow is AADF calculated from water consumption within the pumpstation basin five years prior to the current year. Since these flows are based on water consumption, flow reductions from I&I reduction are not shown.

Future growth is based on population projections by GIS Associates, Inc. They implemented a parcel-level model based on census data, future land-use, land cover, planned developments, and existing infrastructure from county-level forecast of the University of Florida's Bureau of Economic and Business Research (BEBR). The change in population was recorded for 5-yr, 10-yr, and 20-yr forecasts.

Pump capacity is the firm capacity of the station, which is the pump flow rate during peak diurnal conditions with all but the largest pump energized. During this period most of the pumpstation on the manifold are expected to be operating. Pump information is provided by JEA's enterprise asset management system (Oracle eAM). System hydraulics are defined using JEA's hydraulic model (Innovyze Infoworks ICM). In some instances, consultant design calculations or nameplate data are used.

Percent utilization is provided as a metric for available capacity. It is the ratio of peak hour flow divided by the pump capacity. Future utilization is 20-yr forecast for peak hour flow divided by the pump capacity.

2.2.1 Buckman Wastewater Basin

Asset Number	Liftstation Address	ADF (kGPD)	PHF (GPM)	Capacity (GPM)	Historic - 5yr	Current CY 2018	Forecast + 5yr	Forecast + 10yr	Forecast + 20yr
					(PHF/Firm)				
LS-000005	32ND ST E - 94	627	1,400 [W]	2,350 [C]	54.9%	**59.6%**	61.0%	62.0%	62.5%
LS-000006	41ST ST W - 1870	99	300 [W]	1,500 [C]	19.5%	**20.0%**	22.3%	23.8%	24.5%
LS-000013	5TH ST W - 2809	1,209	2,400 [W]	10,000 [C]	16.6%	**24.0%**	29.0%	36.0%	49.0%
LS-000014	5TH ST W - 5233	443	1,000 [W]	800 [C]	42.0%	**125.0%**	130.1%	135.7%	141.3%
LS-000230	BARNES RD - 4437	795	1,700 [W]	2,000 [C]	79.2%	**85.0%**	87.0%	88.2%	88.7%
LS-000246	BAY ST E - 834	2,584	4,600 [W]	19,250 [C]	22.3%	**23.9%**	25.5%	26.4%	26.9%
LS-000365	BEAVER ST W - 9801	65	200 [W]	800	26.6%	**25.0%**	25.3%	25.8%	32.1%
LS-000444	BOULEVARD AV - 1706	429	1,000 [W]	1,700 [C]	62.2%	**58.8%**	61.3%	62.8%	63.5%
LS-000824	[§] ELLIS RD N - 1060	357	800 [W]	500 [C]	41.9%	**160.0%**	168.0%	177.0%	185.9%
LS-000491	[†] EVERGREEN AV - 5301	542	1,200 [W]	8,000	13.8%	**15.0%**	15.3%	15.4%	15.5%
LS-000882	FISH RD - 10301	16	100 [W]	2,000 [S]	3.1%	**5.0%**	6.6%	11.5%	36.3%
LS-001059	HERSCHEL ST - 3806	447	1,000 [W]	3,800 [C]	26.1%	**26.3%**	26.9%	27.3%	27.5%
LS-001098	HOLLYBROOK AV - 210	2,299	4,100 [W]	11,250 [C]	34.2%	**36.4%**	37.9%	38.9%	39.3%
LS-001142	J RAY CR S - 5642	403	900 [W]	2,000	44.7%	**45.0%**	45.2%	45.3%	45.4%
LS-001195	KINGSBURY ST - 4140	980	2,000 [W]	5,400 [C]	34.5%	**37.0%**	38.6%	39.6%	40.0%
LS-001197	KINLOCK DR S - 5730	219	500 [W]	1,450 [C]	33.8%	**34.5%**	41.3%	45.9%	48.1%
LS-001274	LAURA ST N - 1023	399	900 [W]	4,000 [C]	20.4%	**22.5%**	24.0%	24.7%	25.1%
LS-001349	LOFBERG DR - 2588	322	800 [W]	1,800 [C]	45.8%	**44.4%**	45.2%	45.4%	45.4%
LS-001423	MCMILLAN ST - 2304	5,687	8,700 [W]	23,500 [C]	33.6%	**37.0%**	40.8%	44.6%	49.9%
LS-001512	MYRTLE AV - 55	288	700 [W]	2,600 [C]	24.4%	**26.9%**	28.3%	29.3%	29.7%
LS-001607	NORWOOD AV - 6947	194	500 [W]	2,300 [C]	18.7%	**21.7%**	22.4%	22.8%	23.1%
LS-002416	[§] PRITCHARD - 7615	43	100 [W]	1,600 [C]	5.9%	**6.3%**	6.6%	7.2%	8.7%
LS-001863	RHONE DR - 6801	78	200 [W]	1,170 [C]	15.1%	**17.1%**	17.3%	17.4%	17.4%
LS-001897	ROANOKE BV - 4704	335	800 [W]	1,400 [C]	62.1%	**57.1%**	58.1%	58.6%	58.8%
LS-002131	[†] SPRING PARK RD - 4511	1,666	3,200 [W]	6,000 [C]	51.2%	**53.3%**	55.3%	56.1%	56.2%
LS-002189	STANDISH PL - 718	1,531	2,900 [W]	18,500 [C]	14.7%	**15.7%**	16.0%	16.3%	16.4%
LS-002190	STANFORD RD - 5621	436	1,000 [W]	1,000 [C]	95.3%	**100.0%**	104.3%	107.1%	108.2%
LS-002252	TALLEYRAND AV - 1636	7,309	10,700 [W]	46,000 [C]	21.7%	**23.3%**	24.9%	25.8%	26.3%
LS-002359	UTAH AV - 2045	3,874	6,400 [W]	28,500 [C]	21.4%	**22.5%**	24.0%	25.0%	25.4%
LS-002394	WATER ST - 604	475	1,100 [W]	3,500 [C]	26.8%	**31.4%**	34.6%	36.7%	37.7%
LS-002442	WILLOWBRANCH TE - 1818	226	600 [W]	940 [C]	62.1%	**63.8%**	64.4%	64.7%	64.8%
LS-002467	WOODMERE ST - 4211	200	500 [W]	1,400 [C]	35.7%	**35.7%**	36.0%	36.1%	36.2%

[†], Capital Improvement Project scheduled within next 5 years
[‡], O&M Rehabilitation expected within the next 5 years
[§], Conditions expected to change due to other work in the system

[M], measured using temporary or permanent flow monitoring
[W], flow based on average water consumption during CY 2018
[C], calculated using hydraulic model and asset information
[S], specified from nameplate data or design documents

2.2.2 Cedar Bay Wastewater Basin

Asset Number		Liftstation Address	ADF (kGPD)	PHF (GPM)	Capacity (GPM)	Historic - 5yr	Current CY 2018	Forecast + 5yr	+ 10yr	+ 20yr
						(PHF/Firm)				
LS-000598		COLE FLYER RD - 2111	47	130 W	1,190 C	7.4%	**10.9%**	10.9%	10.9%	10.9%
LS-000851		ETHEL RD - 11637	3	100 W	770 C	13.0%	**13.0%**	13.0%	13.0%	13.0%
LS-001027	†	HARTS RD - 11305	3,047	5,200 W	4,190 C	124.1%	**124.1%**	136.1%	149.6%	181.3%
LS-001192	†	KEY HAVEN BV - 10800	551	1,200 W	1,090 C	110.1%	**110.1%**	116.6%	130.1%	187.2%
LS-001441		MENLO AV - 1410	284	700 W	1,490 C	47.0%	**47.0%**	47.2%	47.2%	47.3%
LS-001817	†	PULASKI RD - 12321	1,366	2,700 W	4,790 C	56.4%	**56.4%**	58.9%	64.7%	81.9%
LS-001857	§	RENNEE DR W - 11452	335	800 W	1,030 C	77.7%	**77.7%**	83.6%	88.8%	91.9%
LS-000768	†	W DUVAL RD - 14491	616	1,400 W	2,300 C	60.9%	**60.9%**	67.2%	74.2%	96.7%

†, Capital Improvement Project scheduled within next 5 years
‡, O&M Rehabilitation expected within the next 5 years
§, Conditions expected to change due to other work in the system
M, measured using temporary or permanent flow monitoring
W, flow based on average water consumption during CY 2018
C, calculated using hydraulic model and asset information
S, specified from nameplate data or design documents

2.2.3 Southwest Wastewater Basin

Asset Number		Liftstation Address	ADF (kGPD)	PHF (GPM)	Capacity (GPM)	Historic - 5yr	Current CY 2018	Forecast + 5yr	+ 10yr	+ 20yr
						(PHF/Firm)				
LS-003906		103RD ST - 7544	359	800 W	1,060 C	75.5%	**75.5%**	78.2%	78.8%	78.8%
LS-000045	†	118TH ST - 5104	3,935	6,500 W	15,000 C	43.3%	**43.3%**	45.9%	48.1%	50.1%
LS-000063	§	ACANTHUS DR - 8752	296	700 W	800	87.5%	**87.5%**	89.7%	90.8%	91.0%
LS-000081		ALACHUA AV - 7039	1,489	2,900 W	6,500 S	44.6%	**44.6%**	48.1%	51.9%	56.0%
LS-000119	§	ARGYLE FOREST BV - 8104	2,025	3,700 W	2,320 C	159.5%	**159.5%**	162.8%	165.3%	171.3%
LS-000420	†	BLANDING BV - 7703	909	1,900 W	1,650 C	115.2%	**115.2%**	124.2%	129.6%	132.6%
LS-000924		FURY DR - 8560	1,841	3,400 W	4,600 C	73.9%	**73.9%**	81.2%	90.6%	117.9%
LS-001324		LENOX AV - 7702	1,107	2,200 W	4,050 S	54.3%	**54.3%**	58.9%	64.3%	69.9%
LS-001685		PARKLAND RD - 13437	243	600 W	2,730 C	22.0%	**22.0%**	22.5%	23.0%	26.2%
LS-002133		SPRINGTREE RD - 8431	269	700 W	2,050 C	34.1%	**34.1%**	38.9%	41.9%	43.2%
LS-002255		TAMPICO RD - 5957	515	1,200 W	1,490 C	80.5%	**80.5%**	81.7%	82.2%	82.3%
LS-002277	†	TIMUQUANA RD - 4881	538	1,200 W	2,800	42.9%	**42.9%**	44.0%	44.4%	44.5%
LS-002445	†	WILSON BV - 6217	1,044	2,100 W	2,360 C	89.0%	**89.0%**	92.1%	94.2%	95.2%

†, Capital Improvement Project scheduled within next 5 years
‡, O&M Rehabilitation expected within the next 5 years
§, Conditions expected to change due to other work in the system
M, measured using temporary or permanent flow monitoring
W, flow based on average water consumption during CY 2018
C, calculated using hydraulic model and asset information
S, specified from nameplate data or design documents

2.2.4 Arlington-East Wastewater Basin

Asset Number	Liftstation Address	ADF (kGPD)	PHF (GPM)	Capacity (GPM)	Historic - 5yr	Current CY 2018	Forecast + 5yr	Forecast + 10yr	Forecast + 20yr
					(PHF/Firm)				
LS-000060	ABESS BV - 12733	3,186	5,400 [W]	8,000 [C]	67.5%	**67.5%**	68.2%	68.4%	68.4%
LS-000018	AC SKINNER PY - 7200	938	1,900 [W]	3,770 [C]	50.4%	**50.4%**	54.4%	57.6%	60.9%
LS-000099	ALUMNI WY - 4567	7	100 [W]	1,700	5.9%	**5.9%**	5.9%	5.9%	5.9%
LS-003974	BALBOA RD - 7106	292	700 [W]	1,360 [C]	51.5%	**51.5%**	51.5%	51.6%	51.6%
LS-000244	BAY HARBOUR DR - 4568	837	1,800 [W]	1,250 [C]	144.0%	**144.0%**	145.9%	146.7%	146.9%
LS-000249	† BAYLEAF DR - 8751	277	700 [W]	575	121.7%	**121.7%**	121.7%	121.7%	121.7%
LS-000254	BAYMEADOWS RD - 10702	513	1,200 [W]	750 [C]	151.2%	**160.0%**	160.1%	160.2%	160.3%
LS-000256	† BAYMEADOWS RD - 9247	368	900 [W]	700	119.3%	**128.6%**	134.3%	137.9%	139.4%
LS-000259	BAYMEADOWS RD E - 8036	310	700 [W]	1,290	34.6%	**54.3%**	54.7%	60.5%	70.6%
LS-000370	BELFORT OAKS PL - 6868	97	300 [W]	1,000	31.8%	**30.0%**	30.0%	30.0%	30.0%
LS-000451	BOWLAN ST - 544	249	600 [W]	1,200	45.9%	**50.0%**	51.3%	51.5%	51.6%
LS-000453	† BRADLEY RD - 10477	11,300	15,400 [W]	19,500 [C]	72.8%	**79.0%**	84.5%	89.3%	94.8%
LS-000465	BRIERWOOD RD - 8460	247	600 [W]	870 [C]	73.1%	**69.0%**	69.2%	69.2%	69.2%
LS-000495	§ BURNT MILL RD - 10828	1,601	3,100 [W]	2,100 [C]	134.4%	**147.6%**	154.9%	166.3%	184.3%
LS-000536	CEDAR ISLAND DR - 14600	334	800 [W]	1,130 [C]	71.4%	**70.8%**	76.1%	79.4%	80.6%
LS-000540	CENTRAL PY - 11550	176	400 [W]	1,000	36.3%	**40.0%**	40.0%	40.0%	40.0%
LS-000571	CHETS CREEK BV - 13225	211	500 [W]	800 [S]	64.5%	**62.5%**	62.5%	62.5%	62.5%
LS-000699	DEERCREEK CLUB RD E - 10000	154	400 [W]	1,000	42.3%	**40.0%**	45.2%	53.4%	67.5%
LS-000790	EDENFIELD RD - 5710	387	900 [W]	1,650	55.4%	**54.5%**	57.2%	57.9%	57.9%
LS-000870	FERBER RD - 4147	193	500 [W]	2,000	24.9%	**25.0%**	25.2%	25.2%	25.2%
LS-000915	FT CAROLINE RD - 10797	1,170	2,300 [W]	1,060 [C]	231.2%	**217.0%**	222.5%	224.5%	224.9%
LS-000932	GATE PY N - 9898	436	1,000 [W]	1,150 [C]	78.6%	**87.0%**	92.3%	96.8%	100.4%
LS-000956	GLEN KERNAN PY - 12858	163	400 [W]	1,200	34.1%	**33.3%**	37.2%	37.2%	37.2%
LS-000997	GROVE PARK BV - 487	290	700 [W]	760 [C]	94.1%	**92.1%**	102.8%	109.2%	110.5%
LS-001089	HODGES BV - 1705	1,245	2,500 [W]	3,200	79.9%	**78.1%**	78.5%	78.5%	78.6%
LS-001093	HOLIDAY RD S - 7834	1,183	2,400 [W]	2,800 [C]	84.9%	**85.7%**	90.1%	92.7%	93.3%
LS-001114	HUFFMAN BV - 2798	3,271	5,500 [W]	6,700 [C]	75.8%	**82.1%**	87.3%	90.5%	94.6%
LS-001185	KERNAN BV S - 3431	216	500 [W]	1,330 [C]	42.5%	**37.6%**	38.0%	38.0%	38.0%
LS-001207	† LA VISTA CR - 4181	238	600 [W]	700	92.9%	**85.7%**	85.9%	85.9%	86.0%
VAC-000004	METZ STREET - 130	92	200 [W]	800 [S]	20.2%	**25.0%**	25.6%	25.8%	25.9%
LS-001459	MILL CREEK RD - 1030	200	500 [W]	1,490 [C]	19.1%	**33.6%**	38.3%	45.6%	53.8%
LS-001813	† PRINCETON SQUARE BV W - 8331	527	1,200 [W]	600	184.8%	**200.0%**	200.0%	200.0%	200.0%
LS-001851	REEDY BRANCH DR - 8614	450	1,000 [W]	1,600	66.0%	**62.5%**	64.9%	68.5%	75.3%
LS-001933	RYAR RD - 1531	238	600 [W]	1,750	31.1%	**34.3%**	34.6%	34.7%	34.8%
BPS-001950	SAN CLERC - 4241	929	1,900 [W]	3,040 [C]	59.1%	**62.5%**	63.0%	63.3%	63.5%
LS-002007	SAN PABLO RD S - 4950	79	200 [W]	1,061	9.0%	**18.9%**	20.6%	24.9%	31.4%
LS-002104	SOUTHSIDE BV - 7133	985	2,000 [W]	1,840 [C]	106.7%	**108.7%**	111.2%	114.1%	117.4%
LS-002112	SOUTHSIDE BV - 9041	186	500 [W]	800	64.3%	**62.5%**	62.7%	62.9%	63.1%
LS-002243	SUTTON PARK DR - 13825	334	800 [W]	900 [S]	91.3%	**88.9%**	101.4%	108.6%	110.4%
LS-002289	TOUCHTON RD - 8362	98	300 [W]	1,020	35.9%	**29.4%**	29.7%	29.7%	29.7%
LS-002294	TOWN CENTER PY - 4522	352	800 [W]	920 [C]	67.2%	**87.0%**	123.9%	168.7%	233.3%
LS-002307	† TRESCA RD - 420	372	900 [W]	1,930	46.9%	**46.6%**	48.1%	48.9%	49.2%
LS-002308	TROPIC EGRET DR - 13383	809	1,700 [W]	2,560	70.6%	**66.4%**	66.9%	66.9%	66.9%
BPS-002867	WESTERN WAY - 8617	2,571	4,500 [W]	4,500 [C]	91.3%	**100.0%**	104.4%	109.6%	115.2%

†, Capital Improvement Project scheduled within next 5 years
‡, O&M Rehabilitation expected within the next 5 years
§, Conditions expected to change due to other work in the system

[M], measured using temporary or permanent flow monitoring
[W], flow based on average water consumption during CY 2018
[C], calculated using hydraulic model and asset information
[S], specified from nameplate data or design documents

2.2.5 Monterey Wastewater Basin

Asset Number	Liftstation Address	ADF	PHF	Capacity	Historic - 5yr	Current CY 2018	Forecast + 5yr	Forecast + 10yr	Forecast + 20yr
		(kGPD)	(GPM)	(GPM)	(PHF/Firm)				
LS-000519	[†] CARLOTTA RD N - 8043	380	900 [W]	780 [C]	115.4%	**115.4%**	115.9%	116.1%	116.2%
LS-001452	[†] MERRILL RD - 7732	238	600 [W]	720	83.3%	**83.3%**	88.3%	91.1%	92.3%
LS-001789	[†] POMPANO DR - 5838	173	400 [W]	680	58.8%	**58.8%**	60.1%	60.9%	61.3%
LS-002295	[†] TOWNSEND BV - 3254	258	600 [W]	450	133.3%	**133.3%**	135.1%	135.1%	135.1%

[†], *Capital Improvement Project scheduled within next 5 years*
[‡], *O&M Rehabilitation expected within the next 5 years*
[§], *Conditions expected to change due to other work in the system*
[M], *measured using temporary or permanent flow monitoring*
[W], *flow based on average water consumption during CY 2018*
[C], *calculated using hydraulic model and asset information*
[S], *specified from nameplate data or design documents*

2.2.6 Mandarin Wastewater Basin

Asset Number	Liftstation Address	ADF	PHF	Capacity	Historic - 5yr	Current CY 2018	Forecast + 5yr	Forecast + 10yr	Forecast + 20yr
		(kGPD)	(GPM)	(GPM)	(PHF/Firm)				
LS-000235	[§] BARTRAM PARK BV - 12882	365	900 [W]	2,120 [C]	42.5%	**42.5%**	44.7%	46.6%	48.1%
LS-000237	[§] BARTRAM PARK BV - 14041	97	300 [W]	1,040 [C]	28.8%	**28.8%**	35.9%	45.3%	57.6%
LS-003356	[§] BARTRAM PARK BV - 14802	18	100 [W]	1,140	8.8%	**8.8%**	21.1%	34.7%	56.8%
LS-000263	BAYOU BLUFF DR - 9733	559	1,200 [W]	1,760 [C]	68.2%	**68.2%**	72.9%	76.6%	78.3%
LS-000630	CORKLAN DR - 7250	247	600 [W]	1,890 [C]	31.7%	**31.7%**	32.6%	34.0%	58.1%
LS-001178	KENNEDY LN - 10656	391	900 [W]	1,180 [C]	76.3%	**76.3%**	78.5%	79.1%	79.3%
BPS-001645	[†] OLDFIELD CROSSING - 4193	3,121	5,300 [W]	9,370 [C]	56.6%	**56.6%**	61.9%	67.0%	80.8%
LS-001647	ORANGE PICKER RD - 2520	330	800 [W]	1,370 [C]	58.4%	**58.4%**	63.0%	65.1%	65.5%
LS-002154	ST AUGUSTINE RD - 11220	226	600 [W]	2,400 [C]	25.0%	**25.0%**	25.0%	25.0%	25.0%

[†], *Capital Improvement Project scheduled within next 5 years*
[‡], *O&M Rehabilitation expected within the next 5 years*
[§], *Conditions expected to change due to other work in the system*
[M], *measured using temporary or permanent flow monitoring*
[W], *flow based on average water consumption during CY 2018*
[C], *calculated using hydraulic model and asset information*
[S], *specified from nameplate data or design documents*

2.2.7 Blacksford Wastewater Basin

Asset Number	Liftstation Address	ADF	PHF	Capacity	Historic - 5yr	Current CY 2018	Forecast + 5yr	Forecast + 10yr	Forecast + 20yr
		(kGPD)	(GPM)	(GPM)	(PHF/Firm)				
BPS-000639	CR 210 - 2740	1,395	2,700 [W]	7,000 [C]	37.5%	**38.6%**	44.6%	51.9%	67.5%
LS-004088	CROSSWATER LAKE DR - 245	4	100 [W]	970 [S]	0.0%	**10.3%**	21.1%	31.4%	51.0%
LS-000951	[§] GINNIE SPRINGS RD - 6350	438	1,000 [W]	1,100	96.8%	**90.9%**	91.1%	91.3%	91.4%
LS-002812	HAWKCREST DRIVE - 2369	349	800 [W]	1,500	57.5%	**53.3%**	54.6%	55.3%	55.5%
LS-001139	ISLESBROOK PY - 112	188	500 [W]	1,058	30.8%	**47.3%**	49.2%	50.4%	52.0%
LS-003612	NOCATEE VILLAGE DR - 79	97	300 [W]	1,324	3.5%	**22.7%**	23.0%	23.5%	24.6%
LS-001887	RIVER RUN BV - 1018	138	400 [W]	1,140	13.6%	**35.1%**	36.1%	36.9%	39.0%
LS-004046	SHEARWATER PY - 635	43	100 [W]	1,600 [S]	0.0%	**6.3%**	11.4%	16.2%	24.9%
LS-002186	ST JOHNS PY - 2084	69	200 [W]	980 [S]	0.8%	**20.4%**	23.1%	24.6%	25.1%
BPS-003387	[§] TWIN CREEKS - 106	931	1,900 [W]	2,000	31.0%	**95.0%**	108.1%	121.4%	153.2%

[†], *Capital Improvement Project scheduled within next 5 years*
[‡], *O&M Rehabilitation expected within the next 5 years*
[§], *Conditions expected to change due to other work in the system*
[M], *measured using temporary or permanent flow monitoring*
[W], *flow based on average water consumption during CY 2018*
[C], *calculated using hydraulic model and asset information*
[S], *specified from nameplate data or design documents*

2.3 Wastewater Class III and IV Pumpstation Project Planning Results

2.3.1 Projects in the Capital Budget Plan

Asset Number	Basin	Liftstation Address	CIP Index No.	Project Status	Design (FY)	In-Service (FY)	Cost Estimate ($1000s)	Latest Estimate
LS-000453	Arlington-East	BRADLEY RD - 10477	180-21B	Construction	-	FY22	$10,202	12/7/2015
LS-001207	Arlington-East	LA VISTA CR - 4181	180-63	Planned	FY23	FY24	$1,000	-
LS-002307	Arlington-East	TRESCA RD - 420	180-58	Planned	FY21	FY22	$500	-
LS-000249	Arlington-East	BAYLEAF DR - 8751	180-54	Schematic Design	FY19	FY26	$3,825	2/9/2018
LS-000256	Arlington-East	BAYMEADOWS RD - 9247	180-53	Schematic Design	FY20	FY22	$1,673	2/9/2018
LS-001813	Arlington-East	PRINCETON SQUARE BV W - 8331	180-57	Schematic Design	-	-	$1,500	2/9/2018
BPS-003387	Blacksford	TWIN CREEKS - 106	180-56	Planned	FY21	FY 21	$500	02/09/18
LS-000491	Buckman	EVERGREEN AV - 5301	180-48	Construction	FY18	FY22	$4,555	-
LS-002131	Buckman	SPRING PARK RD - 4511	180-23	Final Design	-	FY22	$5,008	9/7/2018
LS-002252	Buckman	TALLEYRAND AV - 1638	180-36	Planned	FY20	FY23	$7,378	
LS-001027	Cedar Bay	HARTS RD - 11305	180-26	Final Design	-	FY22	$1,615	8/16/2016
LS-001192	Cedar Bay	KEY HAVEN BV - 10800	180-46	Final Design	-	FY22	$4,667	4/19/2019
LS-001817	Cedar Bay	PULASKI RD - 12321	180-40	Schematic Design	-	FY21	$2,980	-
-	Cedar Bay	ROBENA RD	180-43	Final Design				
LS-002466	Cedar Bay	WOODLEY CREEK BV - 10340	180-41	Planned	FY21	FY22	$100	
BPS-001645	Mandarin	OLDFIELD CROSSING - 4193	180-69	Construction	FY19	FY21	$1,352	-
LS-000519	Monterey	CARLOTTA RD N - 8043	180-62	Planned	FY23	FY25	$1,000	-
LS-001452	Monterey	MERRILL RD - 7732	180-61	Schematic Design	FY20	FY23	$1,604	2/12/2019
LS-001789	Monterey	POMPANO DR - 5838	180-60	Schematic Design	FY19	FY23	$3,057	02/09/18
LS-002295	Monterey	TOWNSEND BV - 3254	180-59	Schematic Design	FY19	FY23	$3,931	2/9/2018
-	Nassau	RADIO AV	180-55	Schematic Design				
LS-000119	Southwest	ARGYLE FOREST BV - 8104	180-24	Construction	-	FY21	$6,252	1/0/1900
LS-002277	Southwest	TIMUQUANA RD - 4881	180-50	Final Design	-	FY24	$3,330	-
LS-000045	Southwest	118TH ST - 5104	180-47	Schematic Design	FY19	FY22	$7,005	6/18/2019
LS-000420	Southwest	BLANDING BV - 7703	180-29	Schematic Design	-	-	$0	3/12/2018
LS-002445	Southwest	WILSON BV - 6217	180-45	Schematic Design	FY19	FY22	$0	-
-	Southwest	ROBITZSCH LN	180-68	Schematic Design				

2.3.2 Risk Score for Planned Projects

High-level risk assessment for projects not currently in design or construction.

		Equipment Limitations			Site Issues		Resiliency			
Asset Number	Liftstation Address	Pump	Wetwell	Pipelines	Real Estate	Pipe Route	Hold Time	Adequate Back-up	Flood Zone	Risk Score
LS-000824	§ ELLIS RD N - 1060	5	5	1	3	3	5	3	4	73%
LS-000014	§ 5TH ST W - 5233	5	1	5	4	3	3	3	3	68%
LS-000495	§ BURNT MILL RD - 10828	5	5	5	1	1	3	3	3	65%
LS-000244	BAY HARBOUR DR - 4568	5	5	1	3	1	5	3	1	60%
LS-000915	FT CAROLINE RD - 10797	5	5	1	1	3	5	3	1	60%
LS-000519	† CARLOTTA RD N - 8043	5	3	1	1	2	5	3	3	58%
LS-002104	§ SOUTHSIDE BV - 7133	5	1	3	1	2	5	1	3	53%
LS-001207	† LA VISTA CR - 4181	1	3	1	3	3	3	3	3	50%
LS-002307	† TRESCA RD - 420	1	3	1	1	2	5	3	4	50%
LS-002190	STANFORD RD - 5621	4	1	1	1	3	3	3	4	50%
LS-000997	GROVE PARK BV - 487	4	1	1	1	4	3	3	3	49%
LS-002294	§ TOWN CENTER PY - 4522	4	1	1	2	2	1	3	4	45%
LS-002416	§ PRITCHARD - 7615	1	1	5	2	3	1	1	1	38%

†, Capital Improvement Project scheduled within next 5 years
‡, O&M Rehabilitation expected within the next 5 years
§, Conditions expected to change due to other work in the system

1 Low Risk
3 Moderate Risk
5 High Risk

2.3.2.1 Equipment Limitations

CRITERIA / SCORES	1	2	3	4	5
Item 1-1: Pump	> 20-YR Projection	> 10-YR Projection	> 5-YR Projection	> Current Peak Hour Flow	< Current Peak Hour Flow
Item 1-1 is the current firm capacity of the pumpstation compared to the current and projected peak hour flow.					
Item 1-2: Wetwell	> 10 Min Cycle Time	-	> 5 Min Detention Time	-	Does not meet other criteria
Item 1-2 classifies the capacity of the wetwell. A 10-minute cycle time is required for constant speed pumps and a 5-minute to 15-minute detention time is recommended for variable speed pumps (EPA, Sept 2000, Collection Systems Technology Fact Sheet: Sewers, Lift Station).					
Item 1-3: Pipelines	< 60 PSI FM < 3/4 Full Gravity	-	60 to 80 PSI FM Fully-Full Gravity	-	> 80 PSI FM Surcharged Gravity
Item 1-3 describes the available capacity in the downstream forcemain and upstream gravity system.					

2.3.2.2 Site Issues

CRITERIA / SCORES	1	2	3	4	5
Item 2-1: Real Estate	No Issues	Potential Issue	One Issue	Two Issues	Three or More Issues
Item 2-1 describes a high-level opinion of potential real estate issues. Common issues are: Obstructed/Limited Site Access (based on Condition Assessment), Not enough available area for 2018 JEA Standard Site Layout, and non-JEA owned parcel (such as station built in R/W).					
Item 2-2: Forcemain Route	No Issues	One Issue	Two Issues	Three Issues	Four or More Issues
Item 2-2 includes any potential route issues, such as Railroad Crossings, work in FDOT R/W, River/Wetland Crossings, Limited Access, Crowded Corridors, or Poor Pipeline Condition. Forcemain Route Issue do not imply that the forcemain needs to be replaced, as that is a function of availabity capacity and existing condition.					

2.3.2.3 Resiliency

CRITERIA / SCORES	1	2	3	4	5
Item 3-1: Hold-Time	< 1 Hr Peak Hour Flow	-	1 to 3 Hrs Peak Hour Flow	-	> 3 Hrs Peak Hour Flow
Item 3-1 is a proxy for response time following an outage. Hold-Time is the available storage in the gravity system divided by the peak hour flow during normal dry-weather conditions.					
Item 3-2: Back-Up Sources	No Back-Up	-	One Source	-	Two or More Sources
Item 3-2 detailed the additional requipment redundancy, or back-up, at the station. Back-up is provided from one or more sources: Permanently Installed Diesel-Engine Pump, Permanently Installed Diesel-Engine Generator, or Secondary Power Feed.					
Item 3-3: Flood Risk	Minimal/None	500-YR w/ Sea-Level Rise	500-YR	100-YR	25-YR
Item 3-3 is based on FEMA FIS based flood elevations and future predictions for climate-changed included sea-level rise (SLR) and rainfall by Jacobs (2019). The worst case scenario (500-YR w/ Sea-Level Rise) includes a projected 500-year storm in 2070, with rainfall (24-hour total 21.54 inches), SLR and storm surge with high greenhouse gas emissions (RCP8.5)					

2.3.3 Projects not in the Capital Budget Plan

5th St W – 5233
Downstream improvements from the 5th St W - Imeson Rd to Melson Av (Index No. 112-18) will improve station capacity.

Bay Harbour Dr – 4568
The station is pump-limited with a small wet-well and minimal storage time. However, the forcemain has capacity. No persistent issues are present, the station will continue to be monitored. No upgrades needed at this time.

Baymeadows Rd - 10702
Pumping capacity is decreased while the manifolded station at Hampton Landing Dr – 10526 is pumping. No persistent issues are present, the station will continue to be monitored. No upgrades needed at this time.

Burnt Mill Rd – 10828
This station will be diverted to the new Greenland WRF.

Ellis Rd N – 1060
Due to limited site, an upgrade would be difficult. However, flow can be diverted from the upstream basin by connecting to the existing 16-inch forcemain under Lane Av.

Ft Caroline Rd – 10797
The station is pump-limited with a small wet-well and minimal storage time. However, the forcemain has capacity. No persistent issues are present, the station will continue to be monitored. No upgrades needed at this time.

Grove Park Bv – 487
Due to future growth a pump upgrade maybe needed within the next 10-years. No persistent issues are present, the station will continue to be monitored. No upgrades needed at this time.

Pritchard Rd - 7615
Downstream improvements from the 5th St W - Imeson Rd to Melson Av (Index No. 112-18) will improve station capacity. Flow will be added to the station as part of Highland Chase (2018-0004).

Southside Bv – 7133
Downstream Improvements from the T-Line – JTB to Town Center Py (Index No. 100-46) will improve station capacity.

Stanford Rd – 5621
Due to future growth a pump upgrade maybe needed within the next 10-years. No persistent issues are present, the station will continue to be monitored. No upgrades needed at this time.

Sutton Park Dr - 13825
Due to future growth a pump upgrade maybe needed within the next 10-years. No persistent issues are present, the station will continue to be monitored. No upgrades needed at this time.

Town Center Py – 4522
Downstream Improvements from the T-Line – JTB to Town Center Py (Index No. 100-46) will improve station capacity.

Western Way – 8617
Downstream Improvements from the T-Line – JTB to Town Center Py (Index No. 100-46) will improve station capacity.

2.4 Wastewater Service Basin

2.4.1 Buckman Wastewater Basin

The Buckman Wastewater Service Basin, as depicted in Figure 2, serves a portion of Duval County including the downtown Jacksonville area. Capital Improvement Projects estimated at approximately $16,941,000 are expected to commence in the next 5 years. Projects proposed are planned to relieve current capacity issues and meet future development needs. These projects are shown on Figure 2 and listed with projected budget estimates in Table 1.

2.4.1.1 Capital Improvement Projects

Talleyrand Av – 1638

Equipment is beyond its useful life and needs to be rehabilitated or replaced.

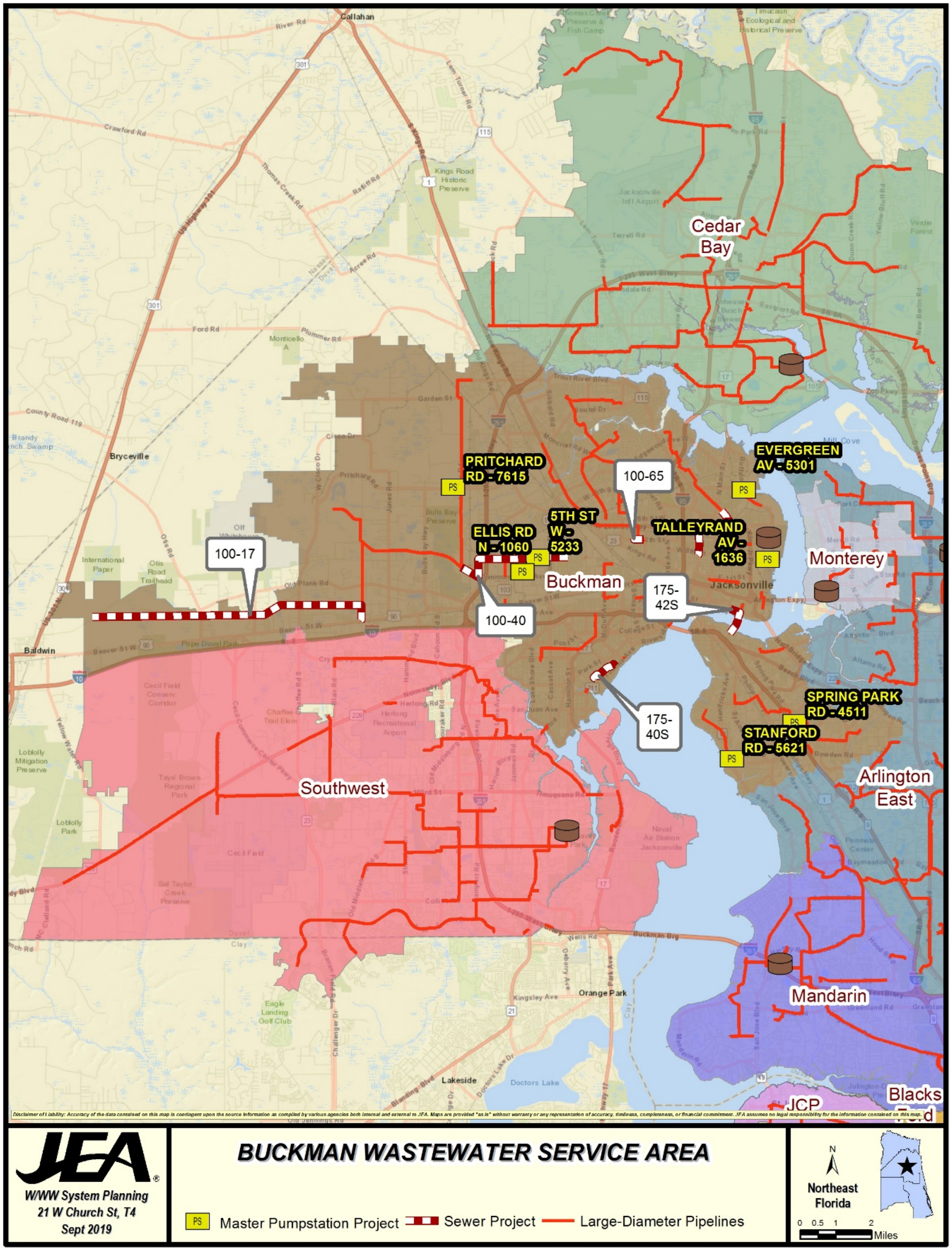
Spring Park Rd – 4511

Equipment is beyond its useful life and needs to be rehabilitated or replaced. Resiliency improvements are included in the scope.

Evergreen Av – 5301 (Buffalo)

Equipment is beyond its useful life and needs to be rehabilitated or replaced. Resiliency improvements are included in the scope.

Figure 2. Buckman Wastewater Basin Map



Refer to Service Grid section for further information on grid projects

Table 1. List of Current Capital Improvement Projects for the Buckman WW Basin

			Approved Funds ($1000s)												
Index No.	Liftstation Address	Project Status	Total	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
180-36	TALLEYRAND AV - 1638	Planned	7,378	-	583	5,120	1,675	-	-	-	-	-	-	-	-
180-23	SPRING PARK RD - 4511	Final Design	5,008	239	3,613	869	-	-	-	-	-	-	-	-	-
180-48	EVERGREEN AV - 5301	Construction	4,555	551	2,455	1,206	-	-	-	-	-	-	-	-	-
WW BASIN TOTAL			16,941	790	6,651	7,195	1,675	-	-	-	-	-	-	-	-

2.4.2 Cedar Bay (District II) Wastewater Basin

The Cedar Bay Wastewater Service Basin (previously identified as District II), as depicted in Figure 3, serves the northside of Duval County. Capital Improvement Projects estimated at approximately $13,181,000 are expected to commence in the next 5 years. Projects proposed were generated from a basin wide study of the existing force mains, pumpstations and future area demands. Existing force mains are aging and experiencing multiple failures. Alternative pumpstation connections were explored to reduce impacts to existing infrastructure and avoid environmental impacts. These projects are shown on Figure 3 and listed with projected budget estimates in Table 2.

2.4.2.1 Capital Improvement Projects

Woodley Creek Bv - 10340

Pump upgrade is needed to re-route flow from the existing, poor-condition ductile iron forcemain along Capper Rd to the Key Haven Bv PS. This project will follow Key Haven Bv - 10800 (Index No. 180-46).

Pulaski Rd - 12321

A conventional station rehabilitation and odor control upgrade.

Harts Rd - 11305

Equipment is beyond its useful life and needs to be rehabilitated or replaced. Flow is expected to decrease following Robena Rd BPS (Index No. 180-43)

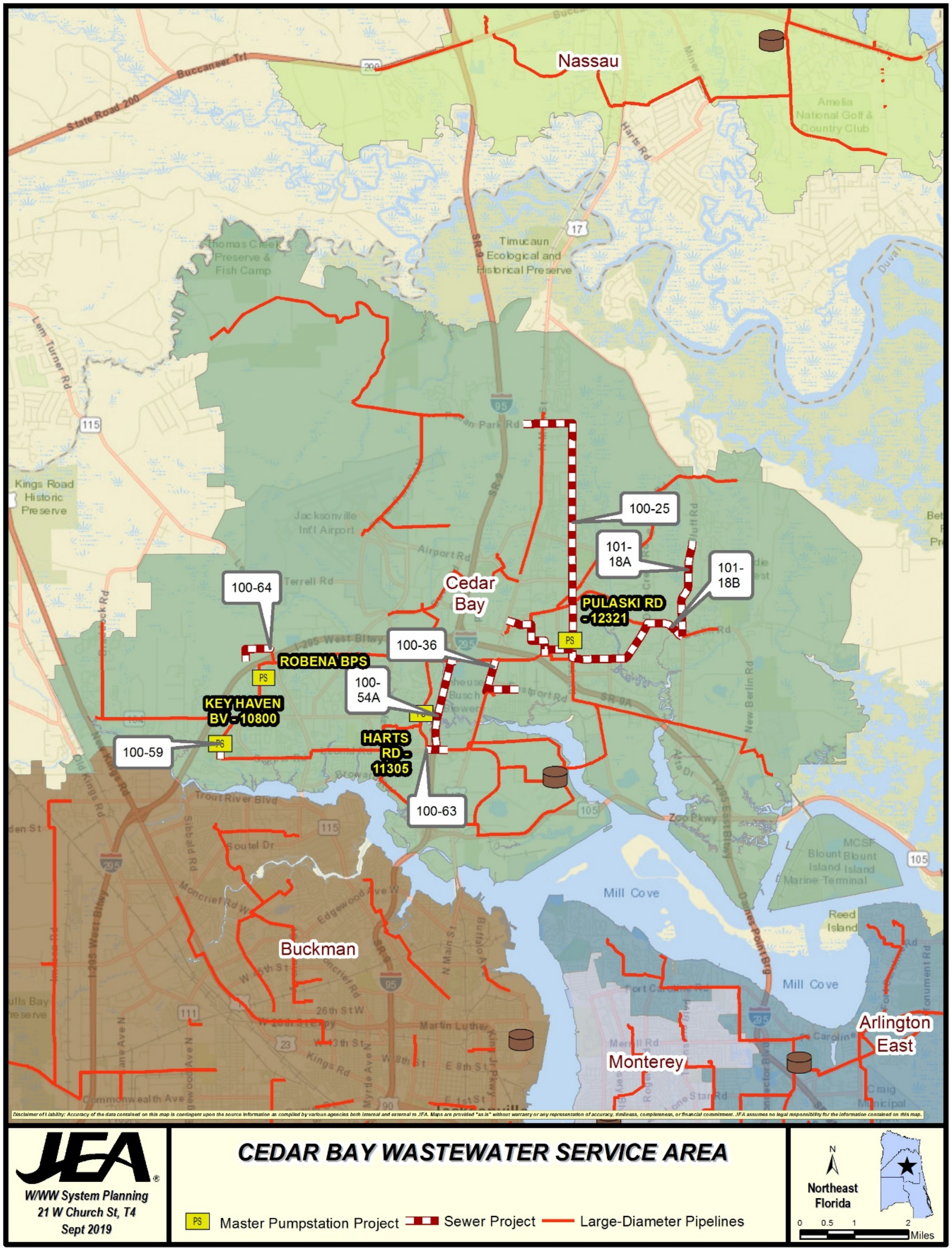
Key Haven Bv - 10800

Equipment is beyond its useful life and needs to be rehabilitated or replaced. Flow will be re-routed off this station as part of Robena Rd BPS (Index No. 180-43).

Robena Rd BPS

A new booster pumpstation to divert flow from Key Haven Bv - 10800 (Index No. 180-46) and convey future development to the new 20-inch forcemain along the transmission easement.

Figure 3. Cedar Bay (District II) Wastewater Basin Map



Refer to Service Grid section for further information on grid projects

Table 2. List of Current Capital Improvement Projects for the Cedar Bay WW Basin

			Approved Funds ($1000s)												
Index No.	Liftstation Address	Project Status	Total	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
180-41	WOODLEY CREEK BV - 10340	Planned	100	-	-	100	-	-	-	-	-	-	-	-	-
180-40	PULASKI RD - 12321	Schematic Design	2,980	274	2,477	-	-	-	-	-	-	-	-	-	-
180-26	HARTS RD - 11305	Final Design	1,615	635	693	205	-	-	-	-	-	-	-	-	-
180-46	KEY HAVEN BV - 10800	Final Design	4,667	360	1,220	2,938	-	-	-	-	-	-	-	-	-
180-43	ROBENA RD	Final Design	3,819	248	2,606	965	-	-	-	-	-	-	-	-	-
WW BASIN TOTAL			13,181	1,517	6,996	4,208	-	-	-	-	-	-	-	-	-

2.4.3 Southwest Wastewater Basin

The Southwest Wastewater Service Basin, as depicted in Figure 4, serves the westside of Duval County and a portion of Clay County. Capital Improvement Projects estimated at approximately $24,737,000 are expected to commence in the next 5 years. Planned projects are to replace aging infrastructure, relieve current capacity issues and meet future development needs. These projects are shown on Figure 4 and listed with projected budget estimates in Table 3.

2.4.3.1 Capital Improvement Projects

118th St - 5104

Equipment is beyond its useful life and needs to be rehabilitated or replaced. Resiliency improvements are included in the scope.

Blanding Bv - 7703

The existing system is over-capacity with equipment beyond its useful life and needs to be rehabilitated or replaced. Due to capacity issues with the upstream gravity, flow will be diverted to a new pumpstation at Robitzsch Ln (Index No. 180-68).

Robitzsch Ln

A new pumpstation to remove flow from the over-capacity gravity system currently in the basin for Blanding Bv 7703 (Index No. 180-29)

Wilson Bv - 6217

Equipment is beyond its useful life and needs to be rehabilitated or replaced. Resiliency improvements are included in the scope.

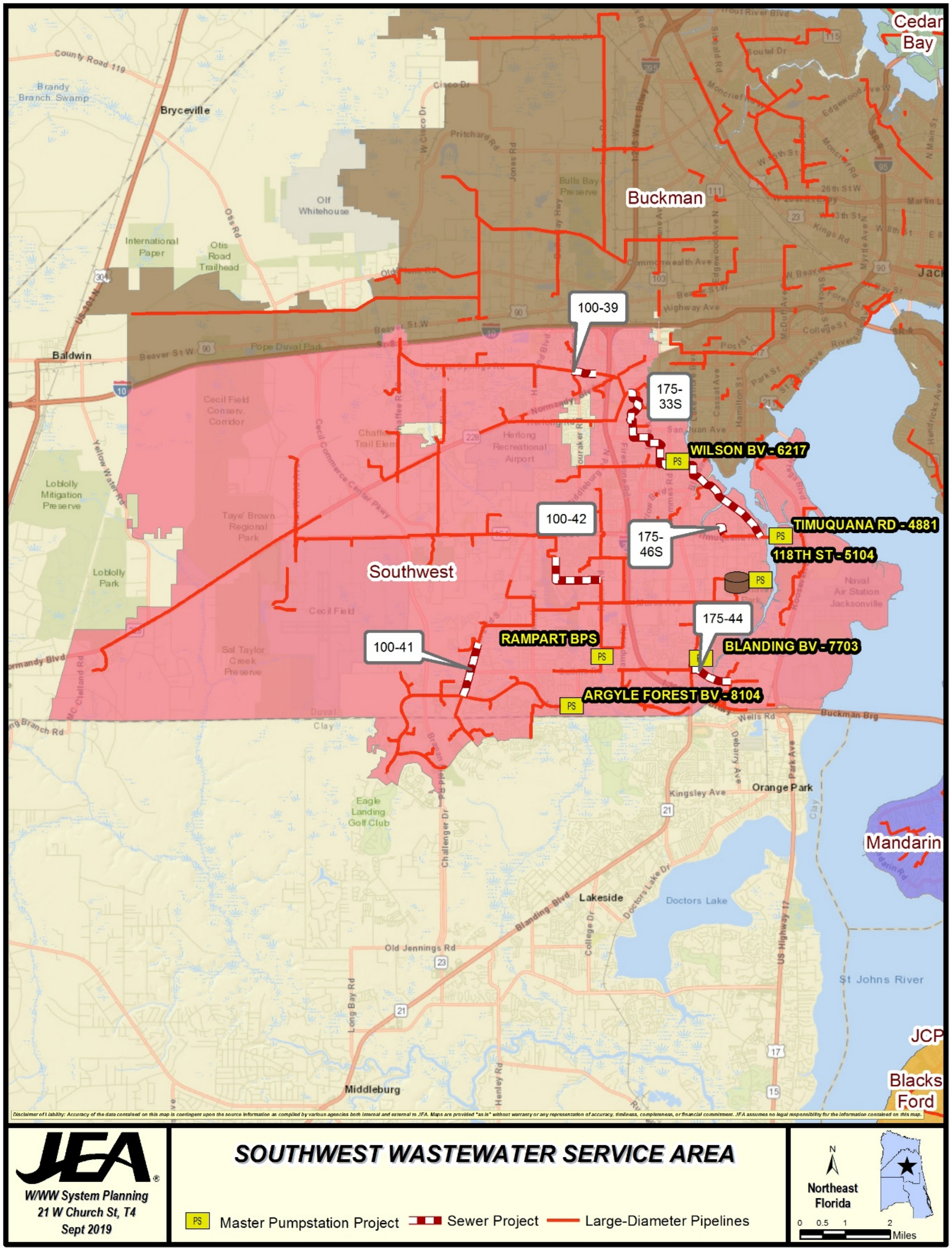
Timuquana Rd - 4881

Equipment is beyond its useful life and needs to be rehabilitated or replaced. Resiliency improvements are included in the scope.

Argyle Forest Bv - 8104

The project will remove flow from the existing over-capacity and difficult to maintain pumpstation at Argyle Forest Bv – 8104 by a new booster pumpstation at Rampart Rd.

Figure 4. Southwest Wastewater Basin Map



Refer to Service Grid section for further information on grid projects

Table 3. List of Current Capital Improvement Projects for the Southwest WW Basin

Index No.	Liftstation Address	Project Status	Approved Funds ($1000s) Total	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
180-47	118TH ST - 5104	Schematic Design	7,005	163	2,536	4,228	5	-	-	-	-	-	-	-	-
180-29	BLANDING BV - 7703	Schematic Design	334	21	161	118	3	-	-	-	-	-	-	-	-
180-68	ROBITZSCH LN	Schematic Design	2,042	86	1,077	876	3	-	-	-	-	-	-	-	-
180-45	WILSON BV - 6217	Schematic Design	5,774	124	2,074	3,499	5	-	-	-	-	-	-	-	-
180-50	TIMUQUANA RD - 4881	Final Design	3,330	199	-	-	26	2,927	-	-	-	-	-	-	-
180-24	ARGYLE FOREST BV - 8104	Construction	6,252	2,908	2,601	-	-	-	-	-	-	-	-	-	-
WW BASIN TOTAL			24,737	3,501	8,448	8,722	43	2,927	-	-	-	-	-	-	-

2.4.4 Arlington East Wastewater Basin

The Arlington East Wastewater Service Basin, as depicted in Figure 5, serves an area in Duval County south of the St. Johns River and includes the Southside Boulevard, Kernan Boulevard, Hodges Boulevard and San Pablo Road area. Capital Improvement Projects estimated at approximately $15,031,000 are expected to commence in the next 5 years. Planned projects are to relieve current capacity issues and meet future development needs. These projects are shown on Figure 5 and listed with projected budget estimates in Table 4.

2.4.4.1 Capital Improvement Projects

La Vista Cr - 4181

Pumpstation is in a high inflow (5,452 GPD/IDM/IN) and infiltration (3,391 GPD/IDM) basin. Resiliency improvements are included in the scope.

Tresca Rd - 420

New pumps are required following the forcemain improvement of Monument Rd – Bradley Rd PS to Arlington-East WWTP (LDP S-19-B). The forcemain project is not currently in the 5-year CIP.

Bayleaf Dr - 8751

The existing station is over-capacity. A site expansion is planned with new higher capacity equipment. Resiliency improvements are included in the scope.

Baymeadows Rd - 9247

The existing station is over-capacity. A site expansion is planned with new higher capacity equipment. Resiliency improvements are included in the scope.

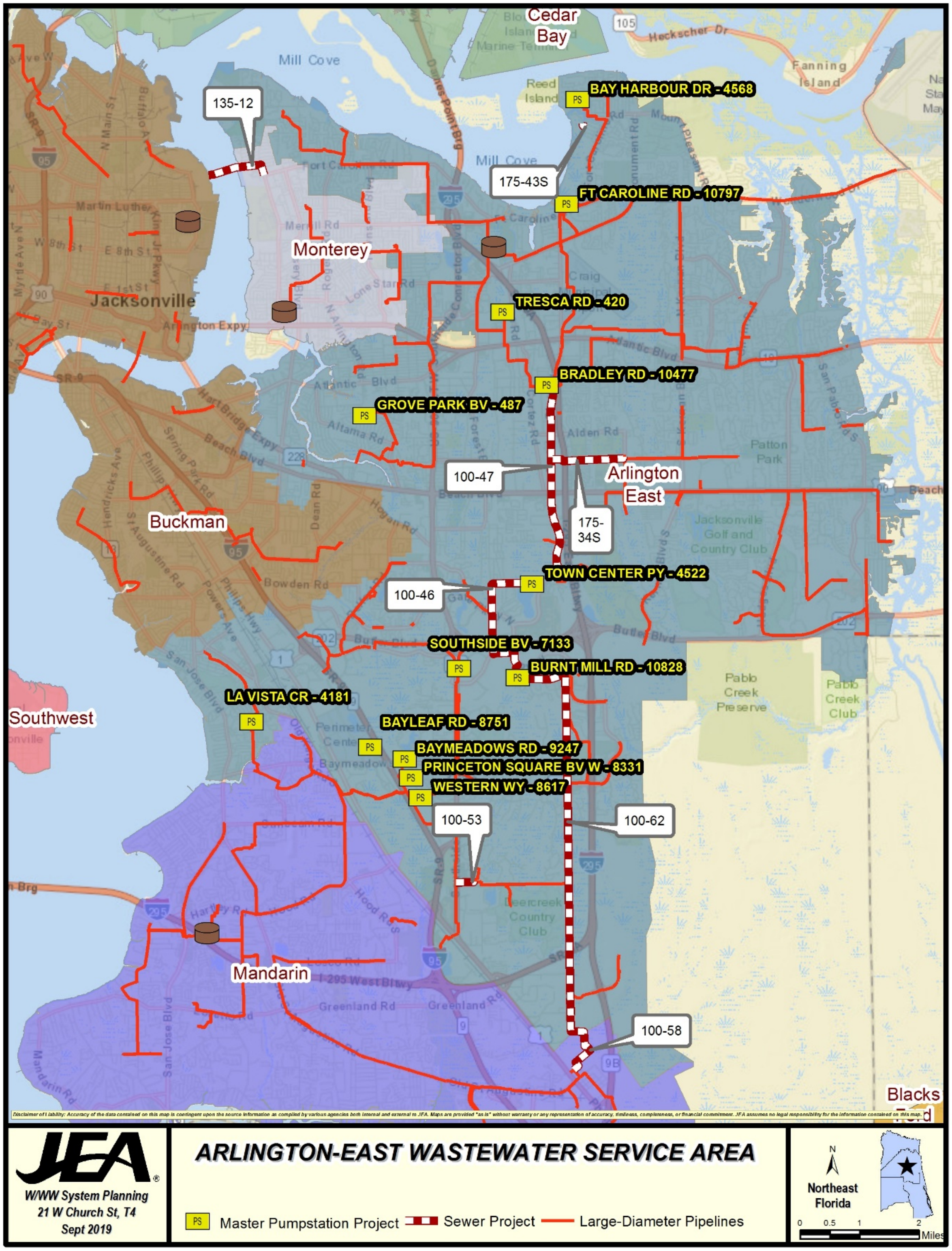
Princeton Square Bv - 8331

The existing station is over-capacity. A site expansion is planned with new higher capacity equipment. Resiliency improvements are included in the scope.

Bradley Rd - 10477

Due to a history of capacity concerns, the station will be converted to a new booster pumpstation at the existing location.

Figure 5. Arlington East Wastewater Basin Map



Refer to Service Grid section for further information on grid projects

Table 4. List of Current Capital Improvement Projects for the Arlington East WW Basin

Index No.	Liftstation Address	Project Status	Approved Funds ($1000s) Total	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
180-63	LA VISTA CR - 4181	Planned	1,000	-	-	-	-	250	750	-	-	-	-	-	-
180-58	TRESCA RD - 420	Planned	500	-	-	500	-	-	-	-	-	-	-	-	-
180-54	BAYLEAF DR - 8751	Schematic Design	3,825	119	621	458	-	-	349	2,276	-	-	-	-	-
180-53	BAYMEADOWS RD - 9247	Schematic Design	1,673	167	796	707	-	-	-	-	-	-	-	-	-
180-57	PRINCETON SQUARE BV W - 8331	Schematic Design	1,500	245	250	1,000	-	-	-	-	-	-	-	-	-
180-21B	BRADLEY RD - 10477	Construction	10,202	408	8,093	318	-	-	-	-	-	-	-	-	-
WW BASIN TOTAL			18,700	939	9,760	2,983	-	250	1,099	2,276	-	-	-	-	-

2.4.5 Monterey Wastewater Basin

The Monterey Wastewater Service Basin, as depicted in Figure 6, is located entirely within Duval County east of the St. Johns River and in the vicinity of Jacksonville University. Capital Improvement Projects estimated at approximately $9,592,000 are expected to commence in the next 5 years. The system may be expanded with the Renew Arlington Community Redevelopment Area (CRA) project, which provides framework to redevelop three major commercial corridors within the Arlington community (University Bv, Merrill Rd, and Arlington Rd) over the next 20 years.

2.4.5.1 Capital Improvement Projects

Carlotta Rd N - 8043

The existing station is over-capacity. A site expansion is planned with new higher capacity equipment. Resiliency improvements are included in the scope.

Merrill Rd - 7732

The existing station is over-capacity with a surcharged gravity system.

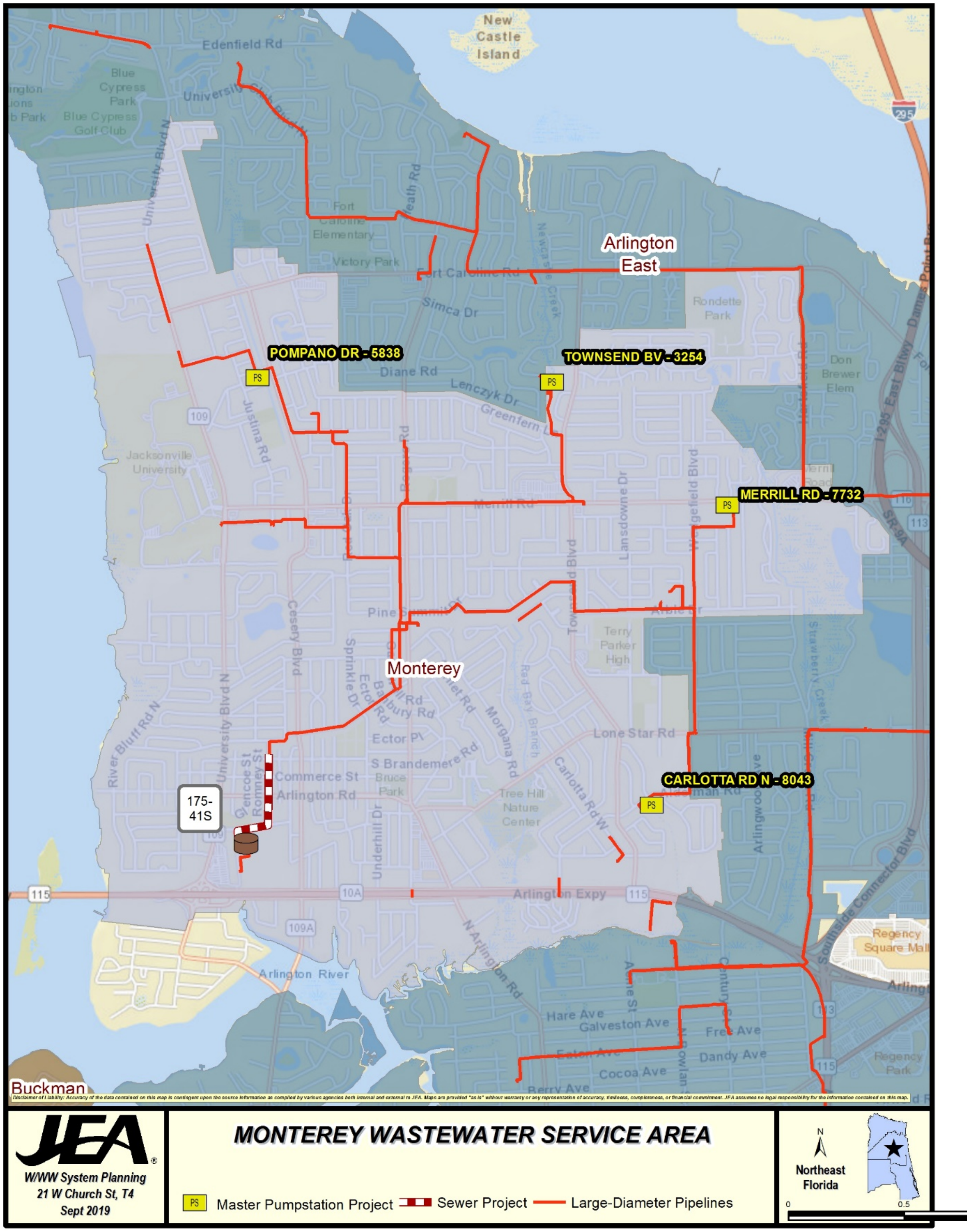
Pompano Dr - 5838

Due to local development, the existing station will be over-capacity. Resiliency improvements are included in the scope.

Townsend Bv - 3254

The existing station is over-capacity. A site expansion is planned with new higher capacity equipment. Resiliency improvements are included in the scope.

Figure 6. Monterey Wastewater Basin Map



Refer to Service Grid section for further information on grid projects

Table 5: List of Current Capital Improvement Projects for the Monterey WW Basin

Index No.	Liftstation Address	Project Status	Approved Funds ($1000s) Total	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
180-62	CARLOTTA RD N - 8043	Planned	1,000	-	-	-	-	250	750	-	-	-	-	-	-
180-61	MERRILL RD - 7732	Schematic Design	1,604	10	218	1,067	309	-	-	-	-	-	-	-	-
180-60	POMPANO DR - 5838	Schematic Design	3,057	95	934	1,076	949	-	-	-	-	-	-	-	-
180-59	TOWNSEND BV - 3254	Schematic Design	3,931	63	522	1,656	1,687	-	-	-	-	-	-	-	-
WW BASIN TOTAL			9,592	168	1,674	3,799	2,945	250	750	-	-	-	-	-	-

2.4.6 Mandarin Wastewater Basin

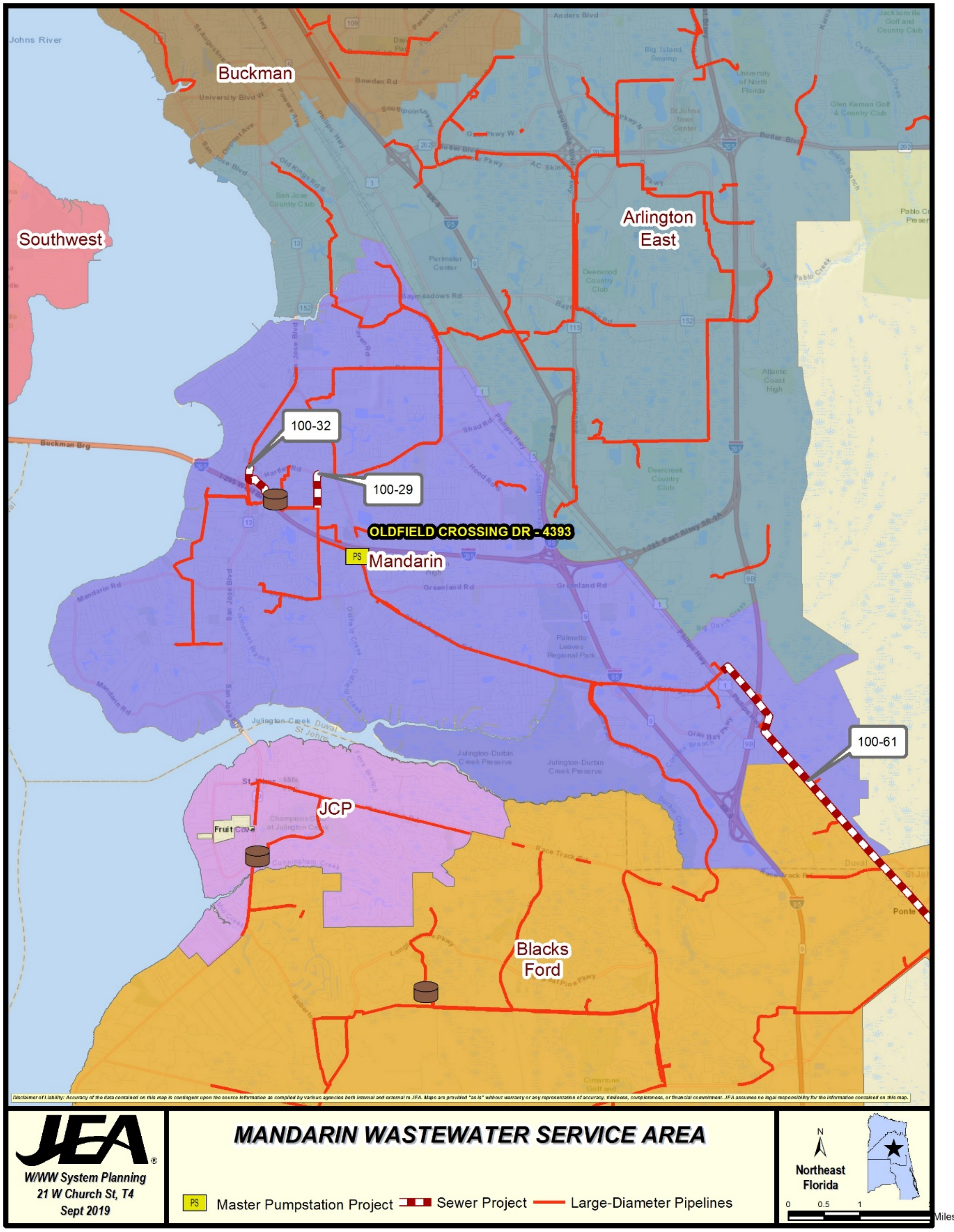
The Mandarin Wastewater Service Basin, as depicted in Figure 7, serves the Mandarin area of Duval County and the area along Nocatee Parkway in Duval and St. Johns Counties. Capital Improvement Projects estimated at approximately $1,352,000 are expected to commence in the next 5 years. These projects are shown on Figure 7 and listed with projected budget estimates in Table 6.

2.4.6.1 Capital Improvement Projects

Oldfield Crossing - 4193

Upgrades to the existing conventional station, which is co-located with the booster station.

Figure 7. Mandarin Wastewater Basin Map



Refer to Service Grid section for further information on grid projects

Table 6. List of Current Capital Improvement Projects for the Mandarin WW Basin

			Approved Funds ($1000s)												
Index No.	Liftstation Address	Project Status	Total	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
180-69	OLDFIELD CROSSING - 4193	Construction	1,352	125	1,179	-	-	-	-	-	-	-	-	-	-
WW BASIN TOTAL			1,352	125	1,179	-	-	-	-	-	-	-	-	-	-

2.4.7 Blacks Ford Wastewater Basin

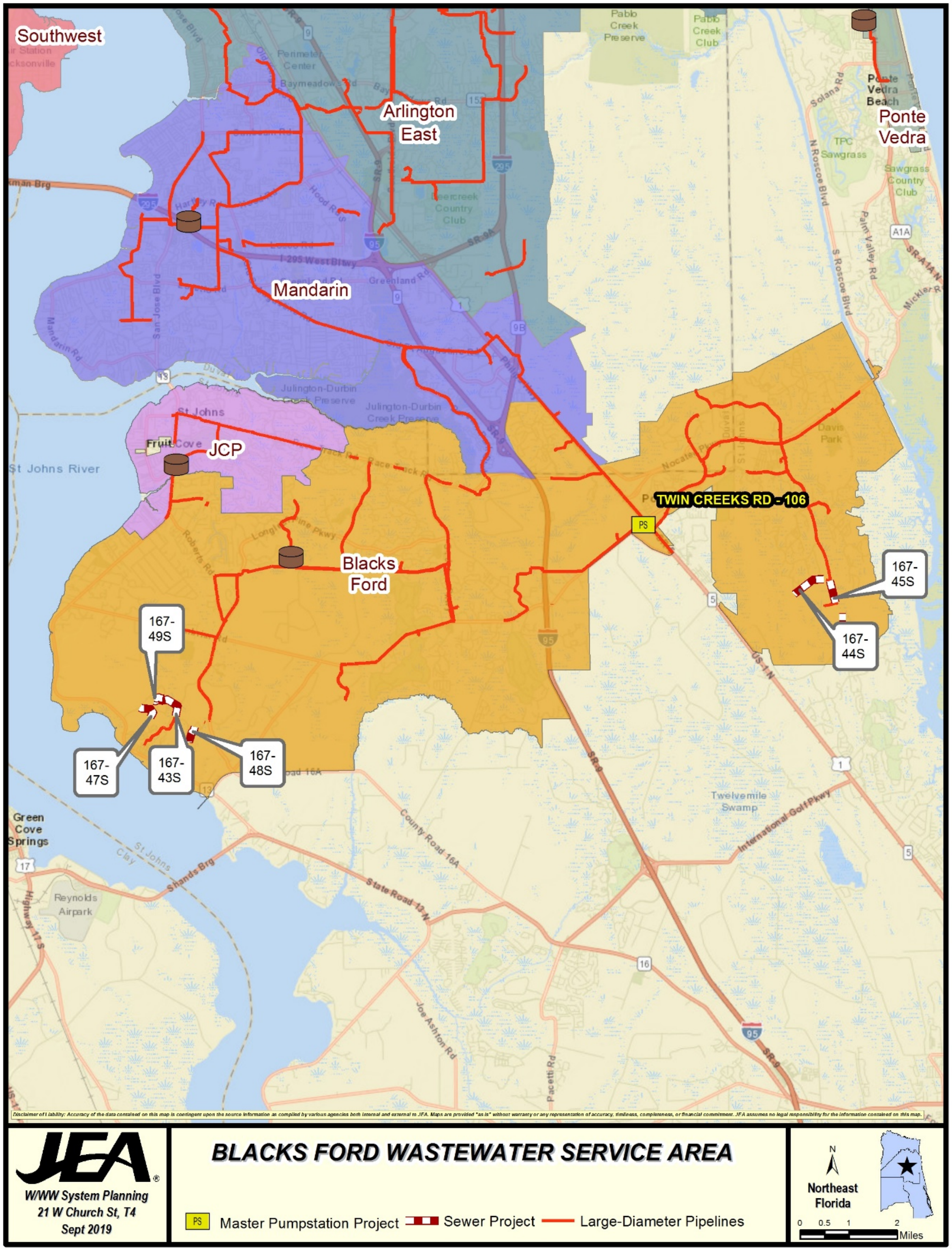
The Blacks Ford Wastewater Service Basin, as depicted in Figure 8, serves a portion of northern St. Johns County and a small section of Duval County north of Race Track Road. Capital Improvement Projects estimated at approximately $500,000 are expected to commence in the next 5 years.

2.4.7.1 Capital Improvement Projects

Twin Creeks - 106

Pump upgrades needed to improve on-site piping and pumps during the flow transfer to Blacks Ford.

Figure 8. Blacks Ford Wastewater Basin Map



Refer to Service Grid section for further information on grid projects

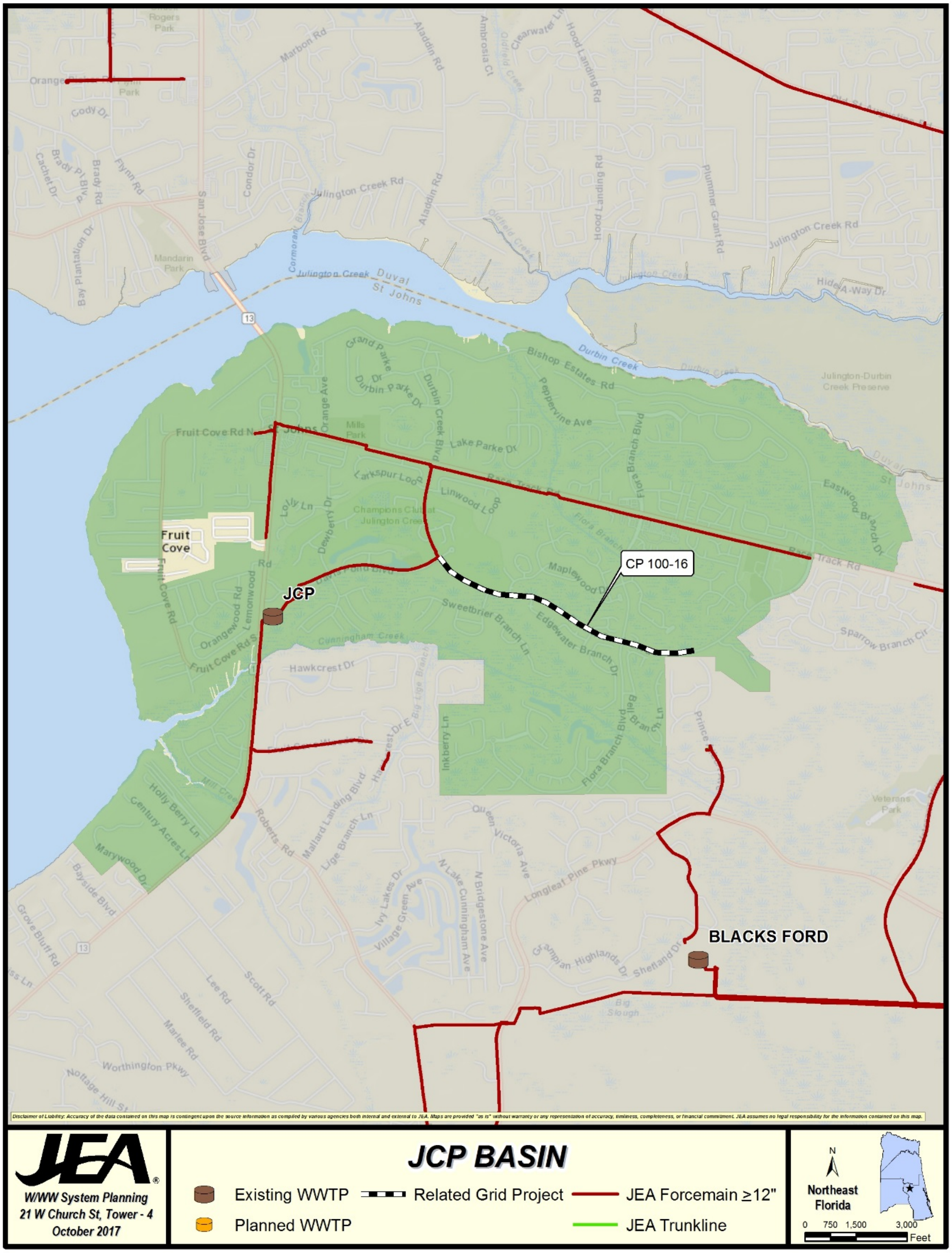
Table 6. List of Current Capital Improvement Projects for the Blacks Ford WW Basin

				Approved Funds ($1000s)												
Basin	**Index No.**	**Liftstation Address**	**Project Status**	**Total**	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**	**FY30**
Blacksford	180-56	TWIN CREEKS - 106	Planned	500	-	-	500	-	-	-	-	-	-	-	-	-
WW BASIN TOTAL			Planned	500	-	-	500	-	-	-	-	-	-	-	-	-

2.4.8 JCP Wastewater Basin

The JCP Wastewater Service Basin, as depicted in Figure 9, is located within St. Johns County in the vicinity of Julington Creek Plantation. There are no budgeted projects in the service basin, however the system may be expanded with new development within the area.

Figure 9. JCP Wastewater Basin Map

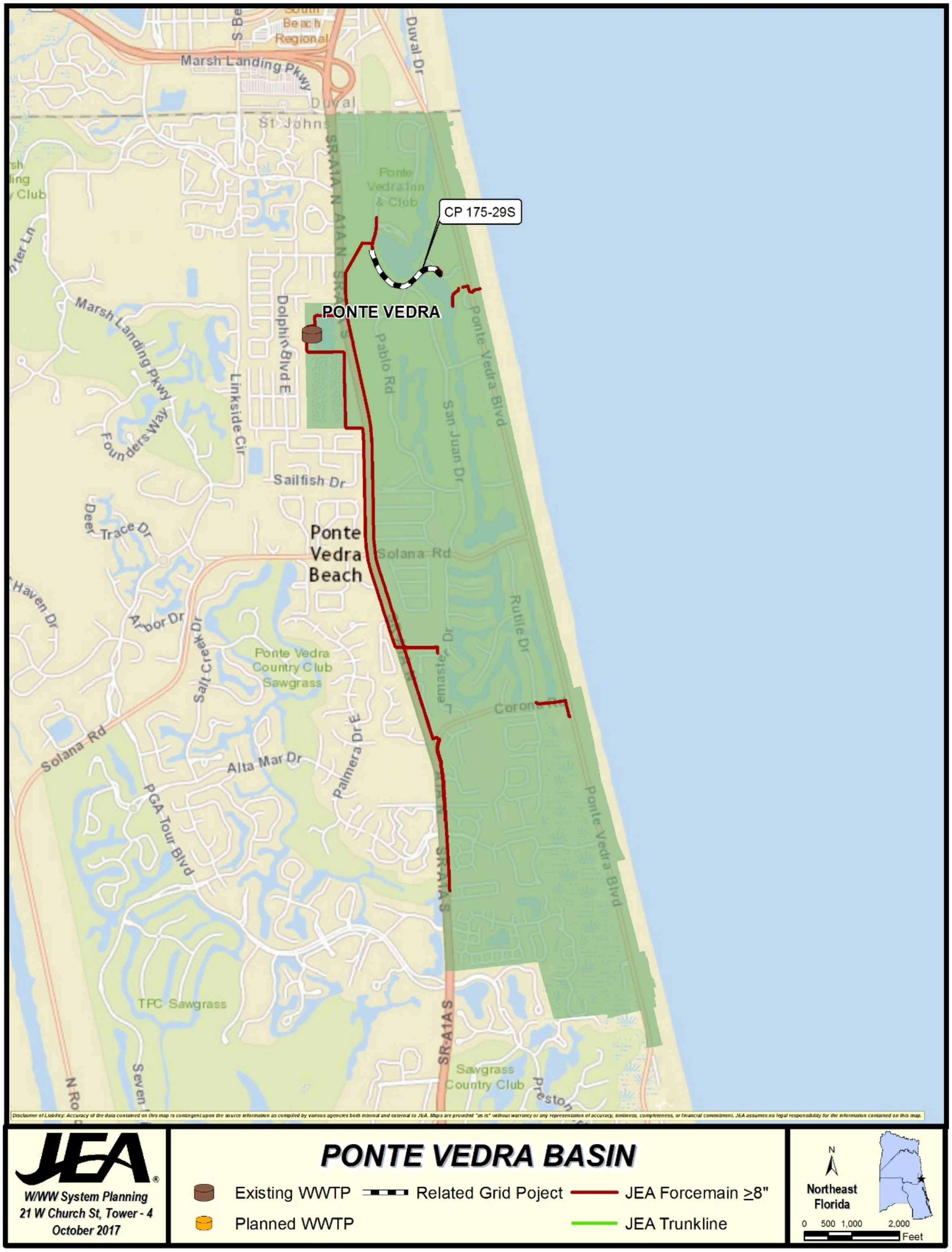


Refer to Service Grid section for further information on grid projects

2.4.9 Ponte Vedra Wastewater Basin

The Ponte Vedra Wastewater Service Basin, as depicted in Figure 10, is located in St. Johns County just south of Duval County from J. Turner Butler Boulevard to PGA Tour Boulevard. This service area extends west from A1A to Ponte Vedra Boulevard. There are no budgeted projects in the service basin, however the system may be expanded with new development within the area.

Figure 10. Ponte Vedra Wastewater Basin Map

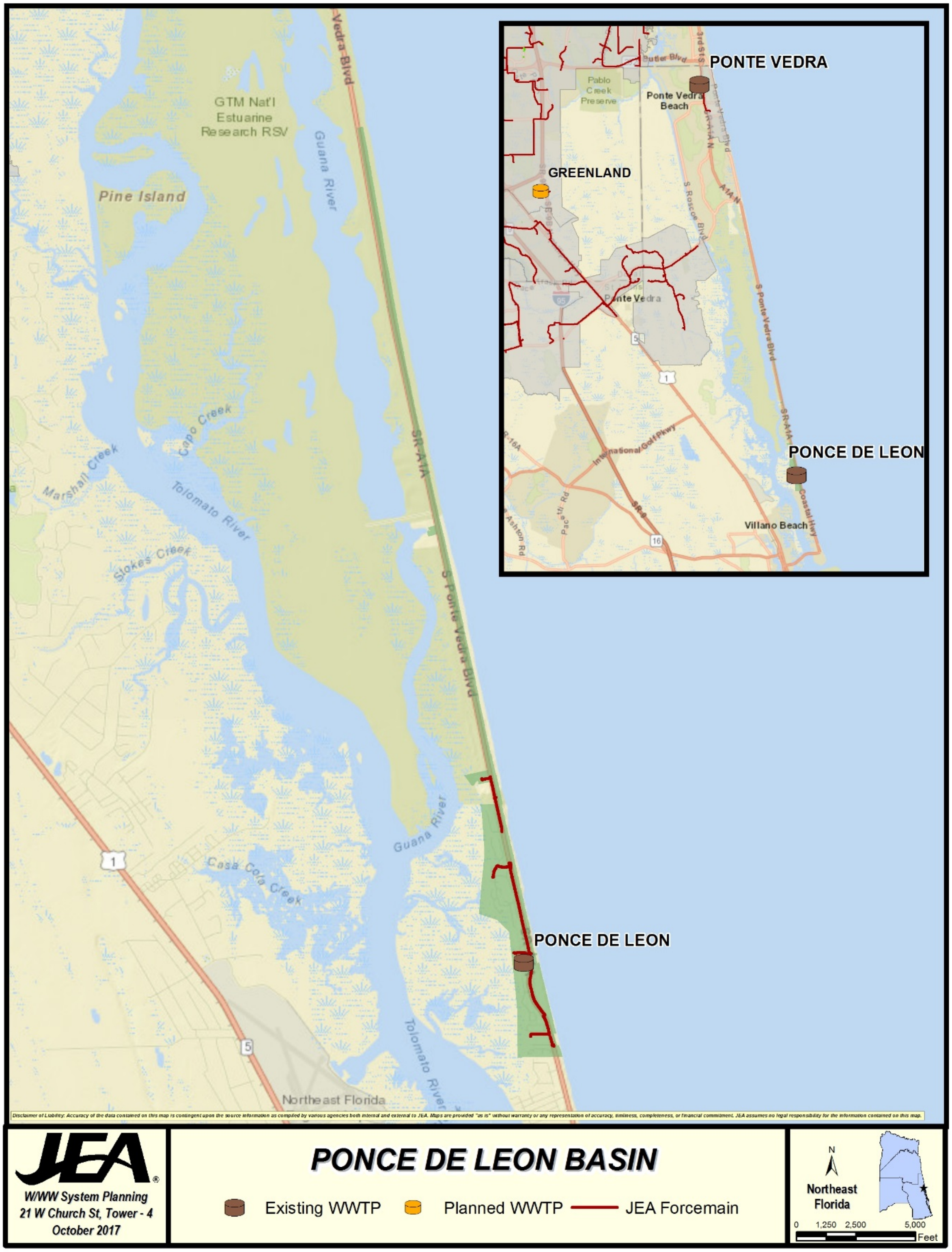


Refer to Service Grid section for further information on grid projects

2.4.10 Ponce De Leon Wastewater Basin

The Ponce De Leon Wastewater Service Basin, as depicted in Figure 11, is located in St. Johns County along the eastern coastline. This service area extends along A1A from Yellow Bill Lane to South Beach Drive. There are no budgeted projects in the service basin, however the system may be expanded with new development within the area.

Figure 11. Ponce De Leon Wastewater Basin Map



2.4.11 Nassau Wastewater Basin

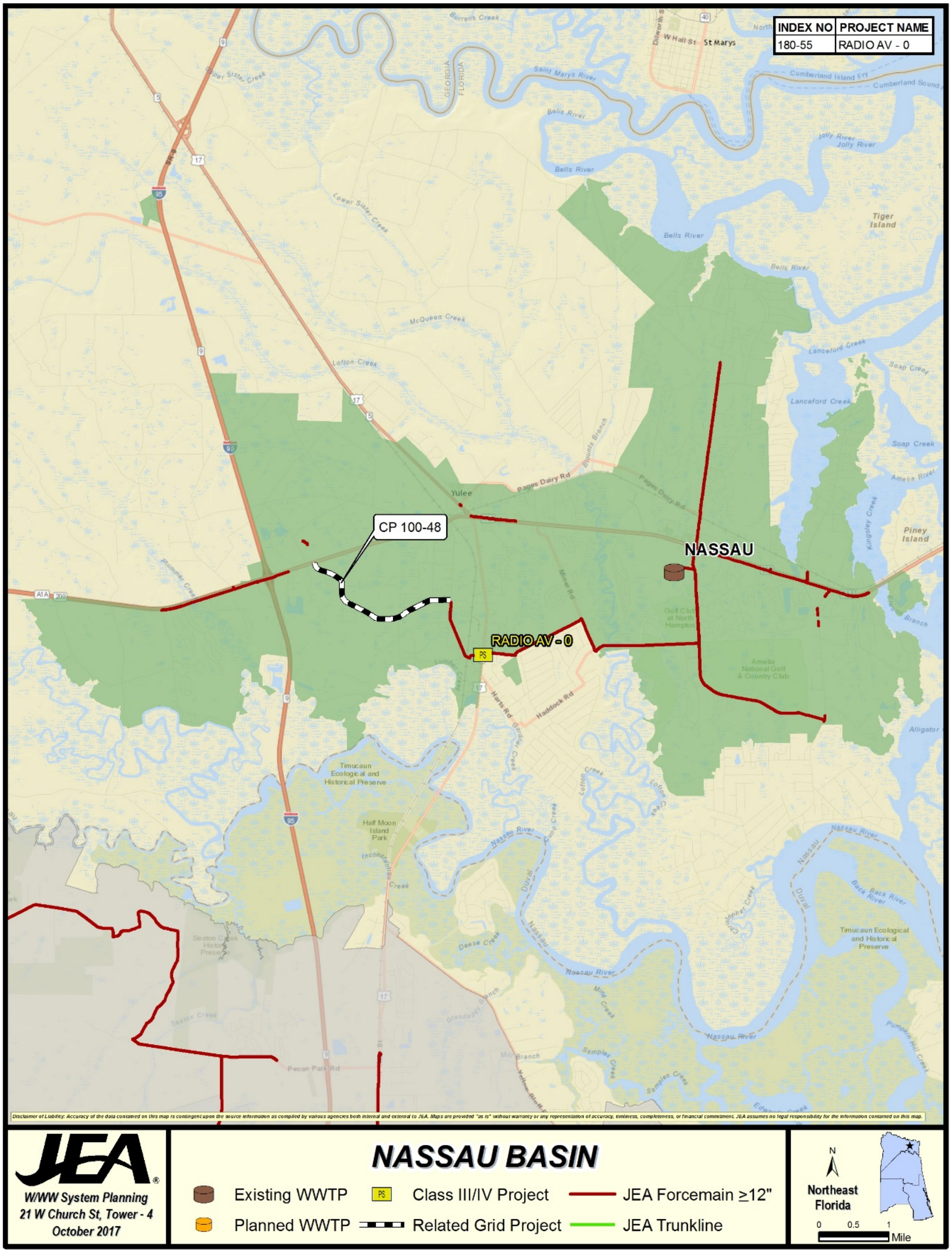
The Nassau Wastewater Service Basin, as depicted in Figure 12, is located in Nassau County. While the Interlocal Agreement between JEA and Nassau County grants JEA the right to serve all developments within Nassau County (outside the municipal boundaries of Fernandina Beach, Callahan and Hilliard), the current service area is located along the State Road 200 corridor with the bulk of the area on the east side of I-95. One such development, the East Nassau Community Planning Area (ENCPA) which is a State-approved Sector Plan, is located between I-95 and Chester Road on the north side of SR 200. The ENCPA will be developed over the course of 50+ years. Capital Improvement Projects estimated at approximately $3,000,000 are expected to commence in the next 5 years. These projects are shown on Figure 12 and listed with projected budget estimates in Table 7.

2.4.11.1 Capital Improvement Projects

Radio Av BPS

To relieve high-head condition at Wildlight and Three Rivers by reducing the hydraulic grade line along the William Burgess corridor. A new booster pumpstation will be installed near the mid-point.

Figure 12. Nassau Wastewater Basin Map



Refer to Service Grid section for further information on grid projects

Table 7. List of Current Capital Improvement Projects for the Nassau WW Basin

			Approved Funds ($1000s)												
Index No.	Liftstation Address	Project Status	Total	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
180-55	RADIO AV	Schematic Design	3,000	-	106	1,494	1,400	-	-	-	-	-	-	-	-
WW BASIN TOTAL			3,000	-	106	1,494	1,400	-	-	-	-	-	-	-	-

Appendix B

Service Grids

SERVICE GRIDS

Table of Contents

1 Introduction

The Service Grids section of the Master Plan identifies the various pipe networks for the water, wastewater and reclaimed water transmission, distribution and collection systems. The discipline areas of water, wastewater and reclaimed water are further divided into service areas based on interconnected water plants, wastewater plant service areas and interconnected reclaimed water transmission mains. Limits of the service areas are mapped, and Capital Improvement Projects (CIP) that are scheduled to begin or are already underway in the next five years are identified. Project specific information and descriptions are not included with this report, but are available via the Capital Budget Index. Current planned grid projects with overall project budgets totaling approximately $386,956,000 are scheduled to be underway during the next ten years (see summary in Table 1). Projects resulting from the JEA Joint Projects group are not included with this report.

Table 1. Project Total Summary by Service (in $1,000s)

	Grid	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Water	Mayport	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Nassau	$6,692	$27	$798	$4,915	$0	$0	$0	$0	$0	$0	$0	$0
	North	$42,178	$1,493	$9,318	$7,023	$5,279	$2,397	$4,267	$7,625	$3,678	$0	$0	$0
	Ponce De Leon	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Ponte Vedra	$3,127	$459	$1,855	$812	$0	$0	$0	$0	$0	$0	$0	$0
	South	$9,257	$2,600	$3,200	$214	$805	$1,785	$0	$0	$0	$0	$0	$0
	SIPS	$100,591	$1,264	$8,828	$25,167	$27,688	$20,735	$12,490	$4,160	$0	$0	$0	$0
	Total	*$161,845*	*$5,843*	*$23,999*	*$38,131*	*$33,772*	*$24,917*	*$16,757*	*$11,785*	*$3,678*	*$0*	*$0*	*$0*
Wastewater	Arlington East	$33,195	$6,590	$4,112	$7,019	$6,719	$1,729	$112	$444	$1,249	$2,570	$0	$0
	Blacks Ford	$878	$371	$371	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Buckman	$39,005	$5,389	$10,156	$9,423	$0	$0	$360	$4,732	$7,190	$0	$0	$0
	District II	$24,281	$6,397	$141	$1,311	$547	$2,033	$3,477	$665	$155	$0	$0	$0
	JCP	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Mandarin	$10,112	$0	$0	$0	$0	$300	$2,500	$3,500	$1,777	$2,035	$0	$0
	Monterey	$1,358	$966	$212	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Nassau	$1,702	$677	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Ponce De Leon	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Ponte Vedra	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	Southwest	$25,334	$8,141	$4,783	$2,743	$1,000	$2,049	$115	$461	$0	$0	$0	$0
	Total	*$135,865*	*$28,531*	*$19,775*	*$20,496*	*$8,266*	*$6,111*	*$6,564*	*$9,802*	*$10,371*	*$4,605*	*$0*	*$0*
Reclaimed	Nassau	$4,600	$0	$0	$0	$300	$2,100	$1,544	$510	$146	$0	$0	$0
	North	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	South	$84,646	$7,137	$13,064	$14,172	$20,527	$5,687	$1,350	$7,512	$11,124	$0	$0	$0
	Total	*$89,246*	*$7,137*	*$13,064*	*$14,172*	*$20,827*	*$7,787*	*$2,894*	*$8,022*	*$11,270*	*$0*	*$0*	*$0*
Total		*$386,956*	*$41,511*	*$56,838*	*$72,799*	*$62,865*	*$38,815*	*$26,215*	*$29,609*	*$25,319*	*$4,605*	*$0*	*$0*

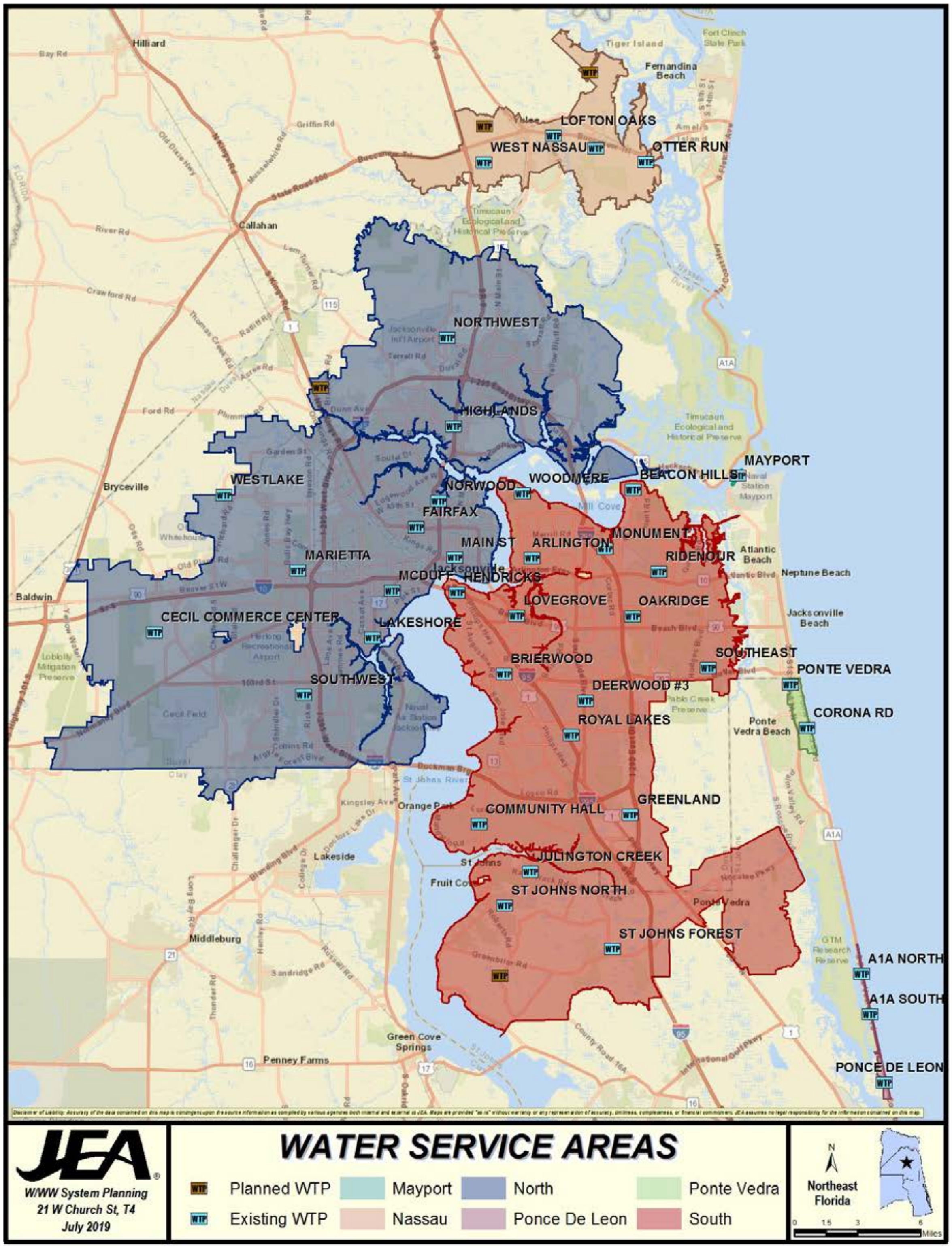
2 Water

2.1 Overall System

JEA's water distribution system is divided into six distinct service grids which provide high quality potable water to portions of Duval, St. Johns, Nassau and Clay Counties in Northeast Florida. These grids are identified as follows: Mayport, Nassau (formerly identified as Lofton Oaks), North, Ponce De Leon, Ponte Vedra and South. Figure 1 provides a map of the water grid service areas. The individual grids are further described in the following sections. As shown in Table 1, Capital Improvement Projects for the water grid with an overall estimated cost of approximately $161,845,000 are expected to be underway in the next ten years.

To meet the projected water demand of the South grid service area and remain in compliance with the St. Johns River Water Management District (SJRWMD) Consumptive Use Permit (CUP), the North and South grids were connected by 30" and 36" transmission mains that cross the St. Johns River in the vicinity of downtown Jacksonville. These interconnections allow treated potable water to be pumped to the South grid where high growth is currently being experienced.

Figure 1. Water Grid Service Areas Overall Map



2.2 Water Distribution and Transmission Project Planning Criteria

Multiple criteria are utilized when identifying and prioritizing water main distribution and transmission projects. The criteria for existing mains in service include age of infrastructure, operating pressure, pressure at customer connection point, chlorine residual, maximum flow velocity, documented failures resulting from material or installation defects, and system reliability and redundancy. Proposed water main sizes and materials are determined based on what is required to correct the existing deficiency as well as to meet the forecasted demands for the area to be served. Projects are prioritized based on severity of deficiency and/or need, location as related to external agency work corridors, and budget availability.

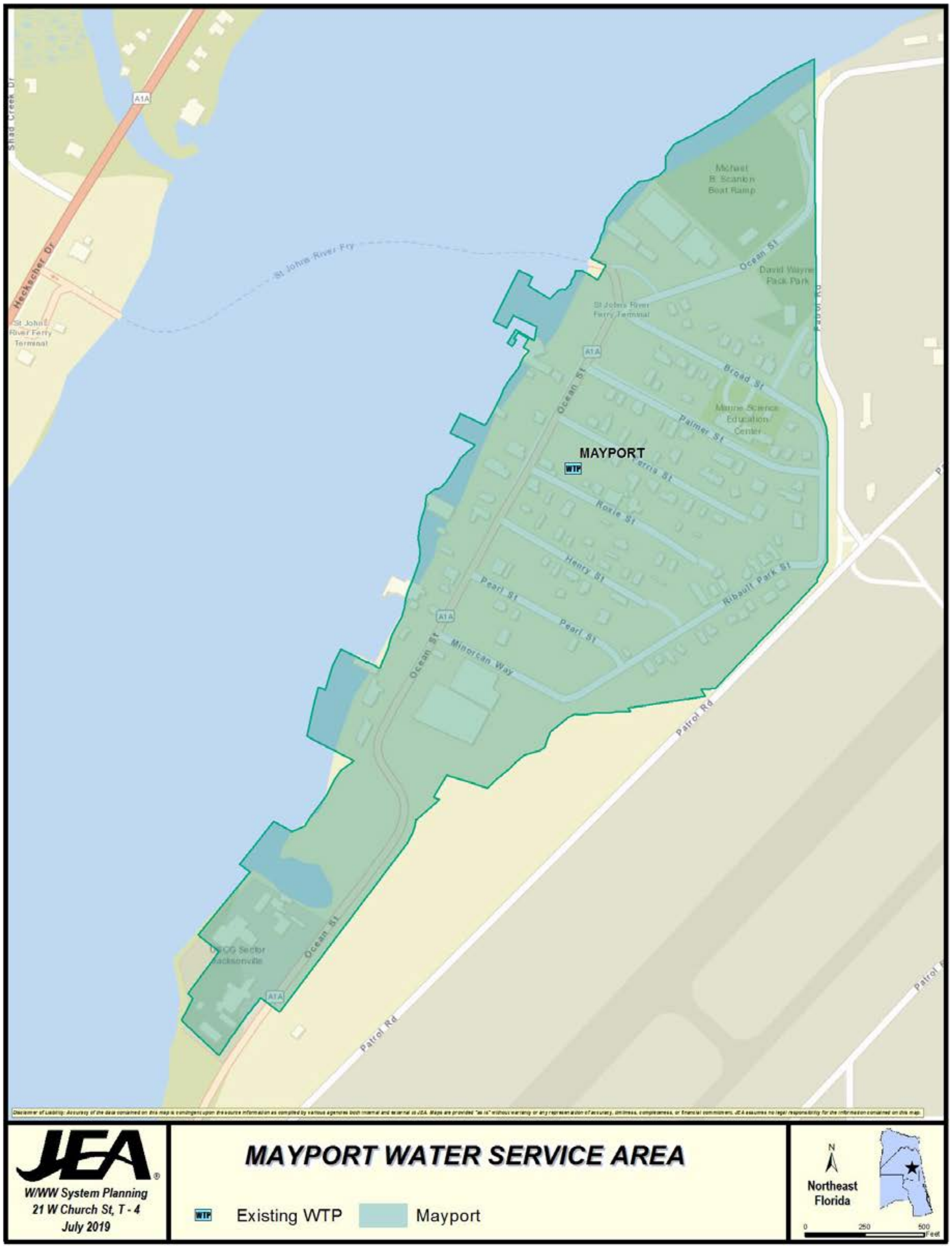
2.3 Water Grid Service Areas

2.3.1 Mayport Water Grid

The Mayport Water Grid, as depicted in Figure 2, is located entirely within Duval County just west of the Mayport Naval Air Station. There are no JEA budgeted transmission or distribution main extensions, however the system could be expanded with new private development within the area.

The Mayport area has been reviewed by the City of Jacksonville for designation as a Community Redevelopment Area (CRA). Results of a preliminary review of the proposed CRA indicate that the existing water system backbone is conceptually of adequate size to service the proposed redevelopment. Any future improvements for service extensions will be private development driven and funded. No JEA budgeted extensions are anticipated.

Figure 2. Mayport Water Grid Service Area Map



2.3.2 Nassau Water Grid

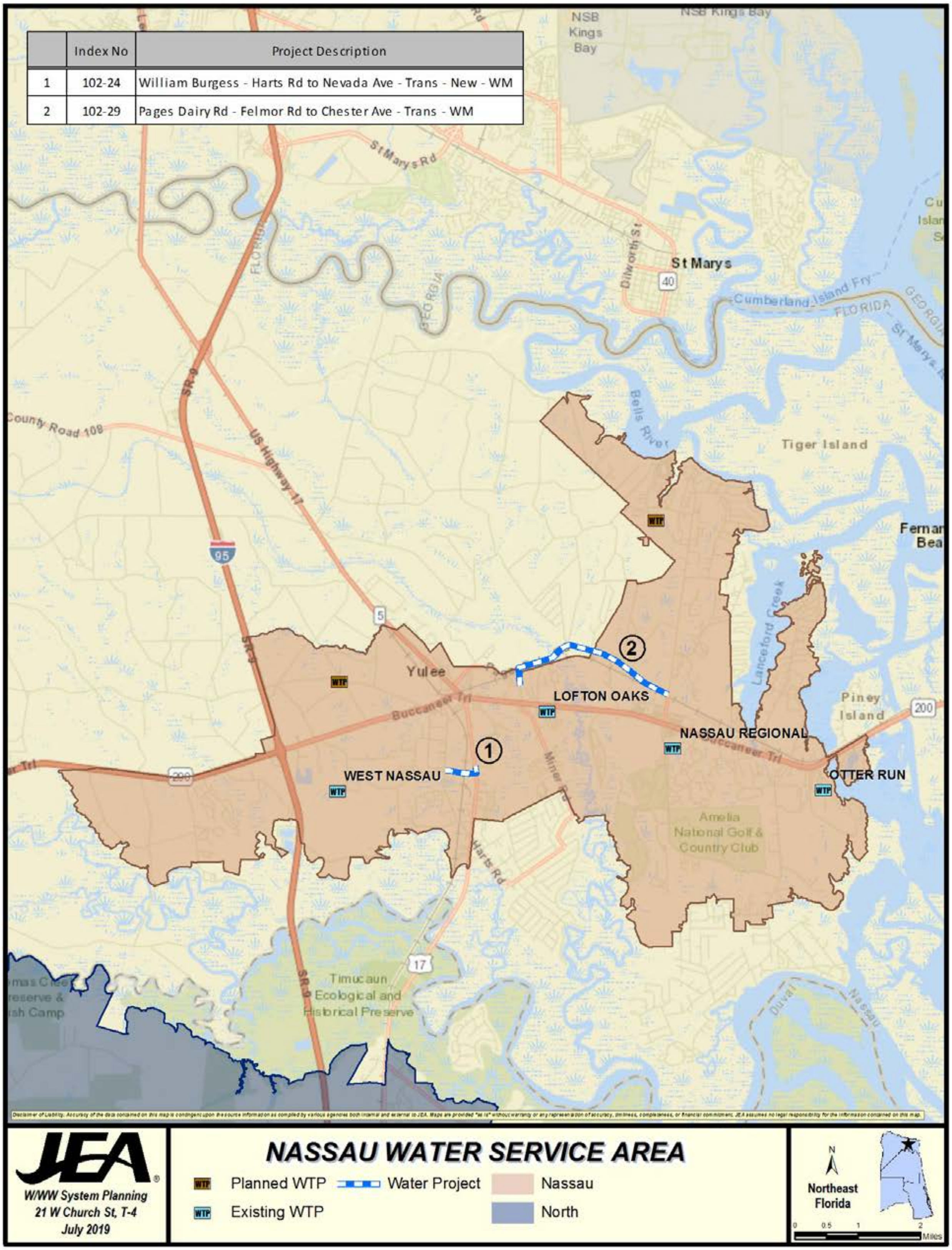
The Nassau Water Grid (previously identified as Lofton Oaks), as depicted in Figure 3, is located in Nassau County. While the Interlocal Agreement between JEA and Nassau County grants JEA the right to serve all developments within Nassau County (outside the municipal boundaries of Fernandina Beach, Callahan and Hilliard), the current service area is located along the State Road 200 corridor with the bulk of the area on the east side of I-95. The majority of future transmission or distribution main extensions for system expansion will be development driven. The Nassau Water Grid is an area dominated by lengthy and in many cases, wide wetland corridors. Because of the environmentally sensitive nature of the wetland strands, crossing and/or bisecting the areas with distribution mains becomes a unique challenge. New developments should minimize dead end systems and loop water mains whenever possible.

Anticipated development areas include the East Nassau Community Planning Area (ENCPA), which is a State-approved Sector Plan located between I-95 and Chester Road on the north side of SR 200. The ENCPA includes approximately 22,675 acres that will be developed over the course of 50+ years. The project will include a maximum of 24,000 residential dwelling units and 11,000,000 square feet of non-residential uses. Transmission mains extended as part of this development may require JEA cost participation for upsizing to meet the projected regional needs. As the ENCPA is developed, new water treatment plants and well sites will be added to support the area development. Raw water main and distribution main corridors will need to be included with the future water system master plans for the development.

While the bulk of the service area is located on the east side of I-95, development has also started to occur west of I-95. The newest development to the west, Three Rivers DRI, may include a maximum of 3,200 residential units; 500,000 sf retail; 250,000 sf industrial; 300 dry storage slips; and 50,000 sf office. This development will also have a long term buildout.

Two projects, totaling $6,692,000, are budgeted in the next ten years to add water main loops between two dead-end pipe networks. These projects are shown on Figure 3 and listed with the projected budget in Table 2.

Figure 3. Nassau Water Grid Service Area Map



	Index No	Project Description
1	102-24	William Burgess - Harts Rd to Nevada Ave - Trans - New - WM
2	102-29	Pages Dairy Rd - Felmor Rd to Chester Ave - Trans - WM

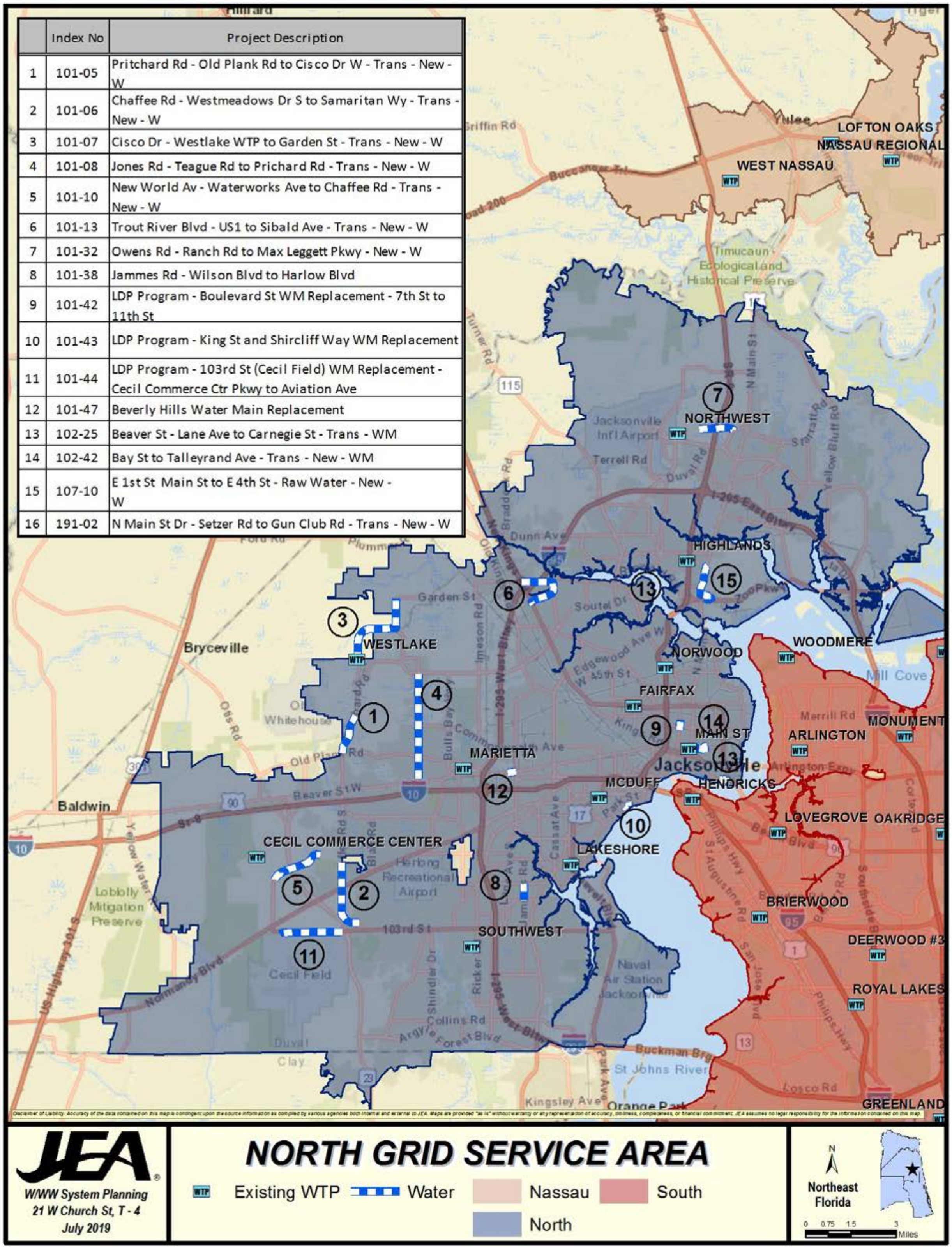
Table 2. List of Current Capital Improvement Projects for the Nassau Water Grid (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	102-24	William Burgess - Harts Rd to Nevada Ave - Trans - New - WM	$952	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	102-29	Pages Dairy Rd - Felmor Rd to Chester Ave - Trans - WM	$5,740	$27	$798	$4,915	$0	$0	$0	$0	$0	$0	$0	$0
		Totals	$6,692	$27	$798	$4,915	$0	$0	$0	$0	$0	$0	$0	$0

2.3.3 North Water Grid

The North Water Grid, as depicted in Figure 4, serves portions of Duval and Clay Counties north and west of the St. Johns River. Several major water transmission improvements are budgeted in the next 10 years that will allow JEA to provide sufficient capacity to meet customer needs and consolidate water treatment plants. Capital Improvement Projects estimated at approximately $42,178,000 are expected to commence within the next 10 years for the North Grid. These projects are shown on Figure 4 and listed with projected budget estimates in Table 3.

Figure 4. North Water Grid Service Area Map



	Index No	Project Description
1	101-05	Pritchard Rd - Old Plank Rd to Cisco Dr W - Trans - New - W
2	101-06	Chaffee Rd - Westmeadows Dr S to Samaritan Wy - Trans - New - W
3	101-07	Cisco Dr - Westlake WTP to Garden St - Trans - New - W
4	101-08	Jones Rd - Teague Rd to Prichard Rd - Trans - New - W
5	101-10	New World Av - Waterworks Ave to Chaffee Rd - Trans - New - W
6	101-13	Trout River Blvd - US1 to Sibald Ave - Trans - New - W
7	101-32	Owens Rd - Ranch Rd to Max Leggett Pkwy - New - W
8	101-38	Jammes Rd - Wilson Blvd to Harlow Blvd
9	101-42	LDP Program - Boulevard St WM Replacement - 7th St to 11th St
10	101-43	LDP Program - King St and Shircliff Way WM Replacement
11	101-44	LDP Program - 103rd St (Cecil Field) WM Replacement - Cecil Commerce Ctr Pkwy to Aviation Ave
12	101-47	Beverly Hills Water Main Replacement
13	102-25	Beaver St - Lane Ave to Carnegie St - Trans - WM
14	102-42	Bay St to Talleyrand Ave - Trans - New - WM
15	107-10	E 1st St Main St to E 4th St - Raw Water - New - W
16	191-02	N Main St Dr - Setzer Rd to Gun Club Rd - Trans - New - W

Table 3. List of Current Capital Improvement Projects for the North Water Grid (in $1,000s)

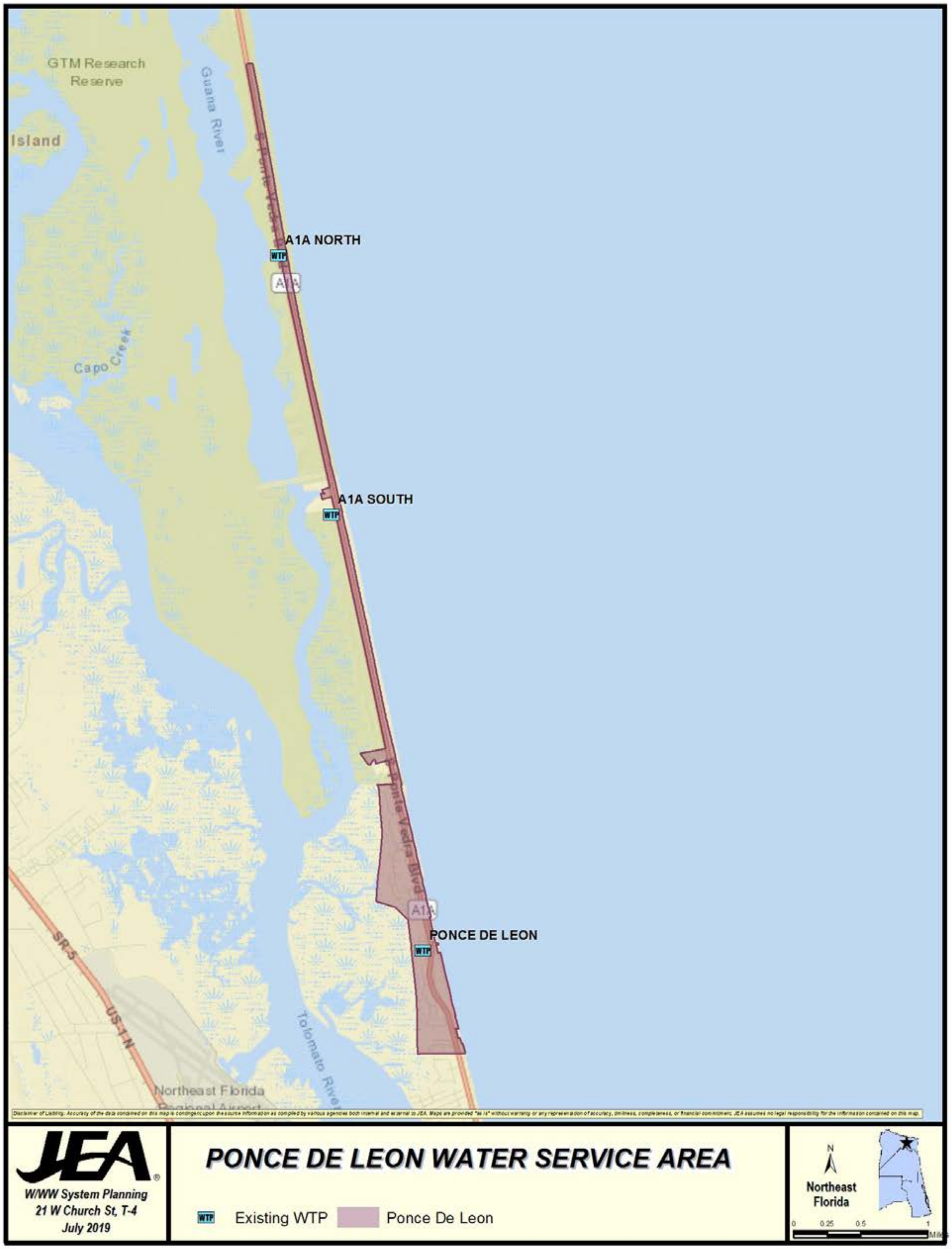
	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	101-05	Pritchard Rd - Old Plank Rd to Cisco Dr W - Trans - New - W	$2,600	$0	$140	$540	$1,920	$0	$0	$0	$0	$0	$0	$0
2	101-06	Chaffee Rd - Westmeadows Dr S to Samaritan Wy - Trans - New - W	$3,457	$29	$4	$0	$190	$730	$1,987	$0	$0	$0	$0	$0
3	101-07	Cisco Dr - Westlake WTP to Garden St - Trans - New - W	$2,965	$0	$0	$0	$0	$220	$850	$1,895	$0	$0	$0	$0
4	101-08	Jones Rd - Teague Rd to Prichard Rd - Trans - New - W	$5,300	$0	$0	$0	$0	$250	$1,000	$4,050	$0	$0	$0	$0
5	101-10	New World Av - Waterworks Ave to Chaffee Rd - Trans - New - W	$1,000	$0	$0	$500	$500	$0	$0	$0	$0	$0	$0	$0
6	101-13	Trout River Blvd - US1 to Sibald Ave - Trans - New - W	$2,026	$0	$0	$0	$0	$0	$150	$580	$1,296	$0	$0	$0
7	101-32	Owens Rd - Ranch Rd to Max Leggett Pkwy - New - W	$1,834	$237	$1,587	$0	$0	$0	$0	$0	$0	$0	$0	$0
8	101-38	Jammes Rd - Wilson Blvd to Harlow Blvd	$1,439	$95	$1,300	$0	$0	$0	$0	$0	$0	$0	$0	$0
9	101-42	LDP Program - Boulevard St WM Replacement - 7th St to 11th St	$520	$87	$433	$0	$0	$0	$0	$0	$0	$0	$0	$0
10	101-43	LDP Program - King St and Shircliff Way WM Replacement	$963	$224	$710	$0	$0	$0	$0	$0	$0	$0	$0	$0
11	101-44	LDP Program - 103rd St (Cecil Field) WM Replacement - Cecil Commerce Ctr Pkwy to Aviation Ave	$5,433	$92	$542	$1,800	$1,800	$1,197	$0	$0	$0	$0	$0	$0
12	101-47	Beverly Hills Water Main Replacement	$4,504	$215	$3,446	$843	$0	$0	$0	$0	$0	$0	$0	$0
13	102-25	Beaver St - Lane Ave to Carnegie St - Trans - WM	$532	$164	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
14	102-42	Bay St to Talleyrand Ave - Trans - New - WM	$1,000	$0	$100	$900	$0	$0	$0	$0	$0	$0	$0	$0
15	107-10	E 1st St Main St to E 4th St - Raw Water - New - W	$4,843	$350	$1,056	$2,440	$869	$0	$0	$0	$0	$0	$0	$0
16	191-02	N Main St Dr - Setzer Rd to Gun Club Rd - Trans - New - W	$3,762	$0	$0	$0	$0	$0	$280	$1,100	$2,382	$0	$0	$0
		Totals	$42,178	$1,493	$9,318	$7,023	$5,279	$2,397	$4,267	$7,625	$3,678	$0	$0	$0

2.3.4 Ponce De Leon Water Grid

The Ponce De Leon Water Grid, as depicted in Figure 5, is located in St. Johns County along the eastern coastline. This service area extends along A1A from Yellow Bill Lane to South Beach Drive. There are no budgeted transmission or distribution main extensions, however the system may be expanded with new development within the area.

A large portion of this water grid extends along AIA with oceanfront lots along one side with the other side dominated by the Guana Area Preserve. Further to the south of the grid, the service area expands to include more typical residential neighborhoods.

Figure 5. Ponce De Leon Water Grid Service Area Map



2.3.5 Ponte Vedra Water Grid

The Ponte Vedra Water Grid, as depicted in Figure 6, is located in St. Johns County just south of Duval County from J. Turner Butler Boulevard to PGA Tour Boulevard. This service area extends landward from A1A to Ponte Vedra Boulevard and is mostly built-out. There is one budgeted water main upgrade, which will replace older cast iron pipe. A few availability requests have been received in the area for small single family or medium sized multi-family residential developments. Portions of the water grid were constructed utilizing asbestos concrete (AC) pipe. As such, the Operations & Maintenance group will replace portions of the pipe where needed. The current project is shown on Figure 6 and listed with projected budget estimate of $3,127,000 in Table 4.

Figure 6. Ponte Vedra Water Grid Service Area Map

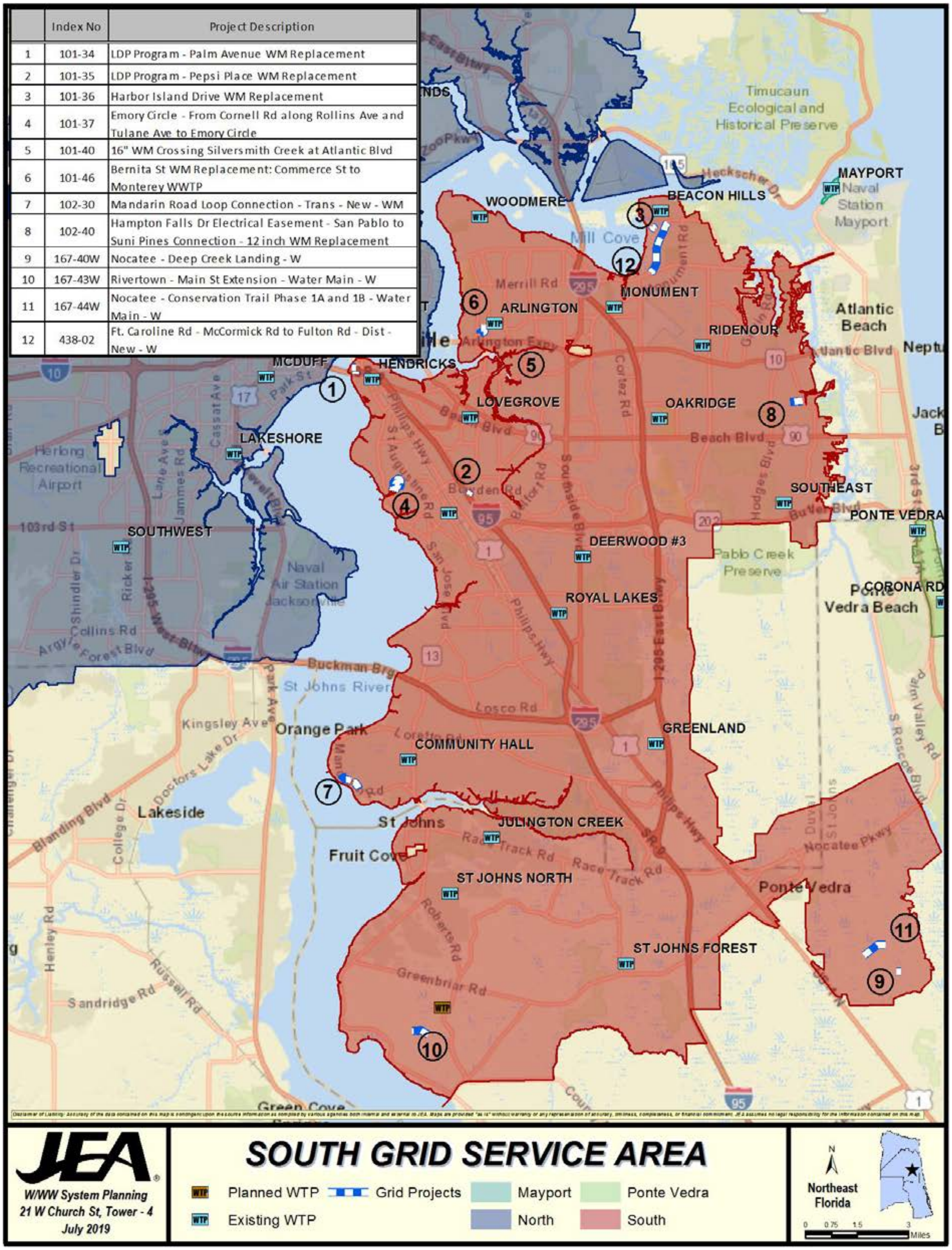
Table 4. List of Current Capital Improvement Projects for the Ponte Vedra Grid (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	101-39	Ponte Vedra Blvd 6" Cast Iron Replacement	$3,127	$459	$1,855	$812	$0	$0	$0	$0	$0	$0	$0	$0
		Totals	$3,127	$459	$1,855	$812	$0	$0	$0	$0	$0	$0	$0	$0

2.3.6 South Water Grid

The South Water Grid, as depicted in Figure 7, serves portions of Duval and St. Johns Counties south and east of the St. Johns River and west of the Intracoastal Waterway. This service grid includes the northern portion of St. Johns County which is experiencing high growth including the Nocatee and RiverTown projects. Projects budgeted in the next 10 years include main extensions associated with Development and Utility Service Agreements for large developments within the South Grid. These projects are shown on Figure 7 and listed with projected budget estimates in Table 5. Capital Improvement Projects estimated at approximately $9,257,000 are expected to be underway in the next 10 years for the South Grid.

Figure 7. South Water Grid Service Area Map



	Index No	Project Description
1	101-34	LDP Program - Palm Avenue WM Replacement
2	101-35	LDP Program - Pepsi Place WM Replacement
3	101-36	Harbor Island Drive WM Replacement
4	101-37	Emory Circle - From Cornell Rd along Rollins Ave and Tulane Ave to Emory Circle
5	101-40	16" WM Crossing Silversmith Creek at Atlantic Blvd
6	101-46	Bernita St WM Replacement: Commerce St to Monterey WWTP
7	102-30	Mandarin Road Loop Connection - Trans - New - WM
8	102-40	Hampton Falls Dr Electrical Easement - San Pablo to Suni Pines Connection - 12 inch WM Replacement
9	167-40W	Nocatee - Deep Creek Landing - W
10	167-43W	Rivertown - Main St Extension - Water Main - W
11	167-44W	Nocatee - Conservation Trail Phase 1A and 1B - Water Main - W
12	438-02	Ft. Caroline Rd - McCormick Rd to Fulton Rd - Dist - New - W

Table 5. List of Current Capital Improvement Projects for the South Water Grid (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	101-34	LDP Program - Palm Avenue WM Replacement	$1,331	$505	$734	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	101-35	LDP Program - Pepsi Place WM Replacement	$262	$113	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	101-36	Harbor Island Drive WM Replacement	$314	$129	$162	$0	$0	$0	$0	$0	$0	$0	$0	$0
4	101-37	Emory Circle - From Cornell Rd along Rollins Ave and Tulane Ave to Emory Circle	$1,570	$245	$1,229	$0	$0	$0	$0	$0	$0	$0	$0	$0
5	101-40	16" WM Crossing Silversmith Creek at Atlantic Blvd	$552	$552	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
6	101-46	Bernita St WM Replacement: Commerce St to Monterey WWTP	$660	$594	$66	$0	$0	$0	$0	$0	$0	$0	$0	$0
7	102-30	Mandarin Road Loop Connection - Trans - New - WM	$284	$43	$237	$4	$0	$0	$0	$0	$0	$0	$0	$0
8	102-40	Hampton Falls Dr Electrical Easement - San Pablo to Suni Pines Connection - 12 inch WM Replacement	$555	$100	$455	$0	$0	$0	$0	$0	$0	$0	$0	$0
9	167-40W	Nocatee - Deep Creek Landing - W	$293	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
10	167-43W	Rivertown - Main St Extension - Water Main - W	$161	$81	$80	$0	$0	$0	$0	$0	$0	$0	$0	$0
11	167-44W	Nocatee - Conservation Trail Phase 1A and 1B - Water Main - W	$475	$238	$237	$0	$0	$0	$0	$0	$0	$0	$0	$0
12	438-02	Ft. Caroline Rd - McCormick Rd to Fulton Rd - Dist - New - W	$2,800	$0	$0	$210	$805	$1,785	$0	$0	$0	$0	$0	$0
		Totals	$9,257	$2,600	$3,200	$214	$805	$1,785	$0	$0	$0	$0	$0	$0

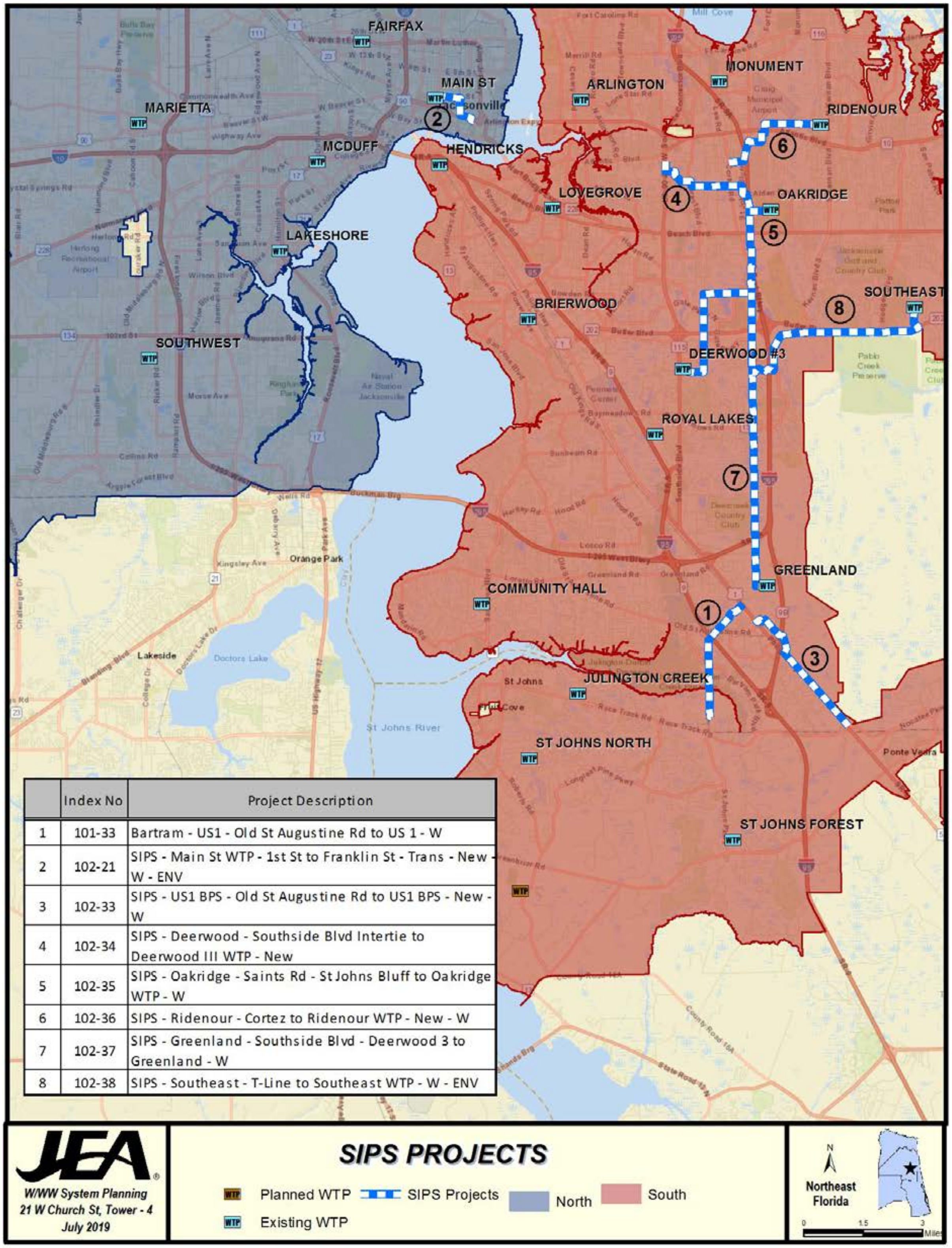
2.4 Southside Integrated Piping System (SIPS)

The North and South Grid are currently interconnected via 30” and 36” transmission mains that cross the St. Johns River in downtown Jacksonville, commonly referred to as the Total Water Management Plan (TWMP) Mains. The purpose of the TWMP Mains was to transfer water from the North to the South grid. Each service grid contains an interconnected network of Water Treatment Plants (WTPs), transmission and distribution mains. The main challenge in the South Grid is water supply due to fact that the South Grid’s demand is greater than its CUP. The CUP Issued in 2011 has individual WTP allocations which limit the water supply from the South Grid wells. To meet the current demand approximately 17 to 20 MGD is transferred across the river to meet the South Grid.

As growth continues on the South Grid, additional water transmission mains will be required to further distribute water from the North Grid to various locations in the South Grid. The purpose of these main extensions is to create a dedicated water transmission network, which is separate from the current water distribution mains. This water transmission network will then be able to supply water to the treatment plants in the South Grid at a more consistent rate and without adverse impact to the distribution system. Current dual use of the water distribution network as an intermittent transmission network increases the likelihood of fluctuating supply pressure conditions in the distribution networks.

The Integrated Water Supply Testing Evaluation and Rehabilitation program (iWater) evaluated the long-term water supply needs and identified the water transmission mains needed to distribute water from the North Grid to the South Grid. These grid projects are identified collectively as the Southside Integrated Piping System (SIPS). As shown on Figure 8 and itemized in Table 6, eight SIPS mains are currently proposed.

Figure 8. SIPS Proposed Projects



	Index No	Project Description
1	101-33	Bartram - US1 - Old St Augustine Rd to US 1 - W
2	102-21	SIPS - Main St WTP - 1st St to Franklin St - Trans - New - W - ENV
3	102-33	SIPS - US1 BPS - Old St Augustine Rd to US1 BPS - New - W
4	102-34	SIPS - Deerwood - Southside Blvd Intertie to Deerwood III WTP - New
5	102-35	SIPS - Oakridge - Saints Rd - St Johns Bluff to Oakridge WTP - W
6	102-36	SIPS - Ridenour - Cortez to Ridenour WTP - New - W
7	102-37	SIPS - Greenland - Southside Blvd - Deerwood 3 to Greenland - W
8	102-38	SIPS - Southeast - T-Line to Southeast WTP - W - ENV

Table 6. List of Current Capital Improvement SIPS Projects (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	101-33	Bartram - US1 - Old St Augustine Rd to US 1 - W	$10,788	$262	$3,548	$3,900	$3,077	$0	$0	$0	$0	$0	$0	$0
2	102-21	SIPS - Main St WTP - 1st St to Franklin St - Trans - New - W - ENV	$9,629	$537	$2,206	$4,400	$2,227	$0	$0	$0	$0	$0	$0	$0
3	102-33	SIPS - US1 BPS - Old St Augustine Rd to US1 BPS - New - W	$10,404	$255	$1,208	$4,317	$4,318	$307	$0	$0	$0	$0	$0	$0
4	102-34	SIPS - Deerwood - Southside Blvd Intertie to Deerwood III WTP - New	$28,400	$210	$1,504	$9,000	$9,536	$8,150	$0	$0	$0	$0	$0	$0
5	102-35	SIPS - Oakridge - Saints Rd - St Johns Bluff to Oakridge WTP - W	$1,870	$0	$0	$0	$140	$538	$1,192	$0	$0	$0	$0	$0
6	102-36	SIPS - Ridenour - Cortez to Ridenour WTP - New - W	$8,750	$0	$0	$200	$800	$3,000	$4,750	$0	$0	$0	$0	$0
7	102-37	SIPS - Greenland - Southside Blvd - Deerwood 3 to Greenland - W	$22,250	$0	$362	$3,350	$7,540	$7,450	$3,548	$0	$0	$0	$0	$0
8	102-38	SIPS - Southeast - T-Line to Southeast WTP - W - ENV	$8,500	$0	$0	$0	$50	$1,290	$3,000	$4,160	$0	$0	$0	$0
		Totals	$100,591	$1,264	$8,828	$25,167	$27,688	$20,735	$12,490	$4,160	$0	$0	$0	$0

3 Wastewater

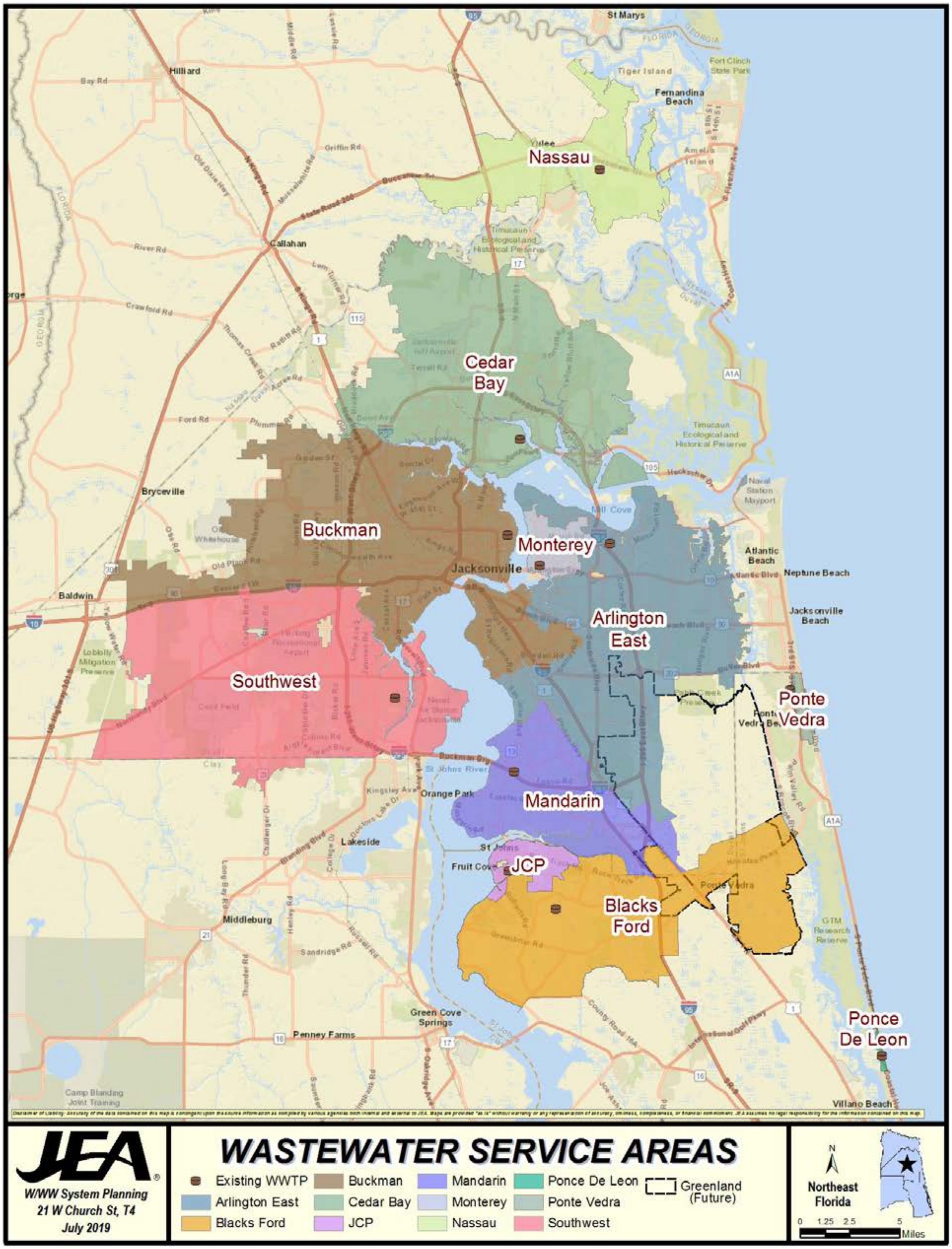
3.1 Overall System

JEA's wastewater collection and transmission system is divided into eleven distinct service grids which serve portions of Duval, St. Johns, Nassau and Clay Counties in Northeast Florida. These grids are identified as follows: Arlington East, Blacks Ford, Buckman, District II (Cedar Bay), JCP, Mandarin, Monterey, Nassau, Ponce De Leon, Ponte Vedra and Southwest. Figure 9 provides a map of the current overall system boundaries. The individual grids are further described in the following sections. As shown in Table 1, Capital Improvement Projects for the wastewater grid with an overall budget estimated to cost approximately $135,865,000 are expected to be proceeding in the next 10 years.

As growth continues within the service territory, additional service grids will be added as needed. As the new grids are added, existing service grid boundaries may change for more efficiency. Some of the proposed Capital Improvement Projects are located and designed to accommodate future service grid transitions in addition to existing needs. Currently, design of the Greenland WRF is underway with an expected construction completion in FY 23. Upon completion, the Greenland service grid will include current portions of the Arlington East, Blacks Ford and Mandarin service areas. However, grid interties between these service areas will remain to provide redundancy and resiliency by allowing transfer of flow between the grids during emergencies and operation and maintenance activities.

The City of Jacksonville and JEA have partnered to address the many septic tank failure areas within Duval County. As these areas are evaluated, the wastewater collection infrastructure will need to be evaluated to determine the improvements required to handle the increased flows. Additional Capital Improvement Projects are expected as a result of these evaluations. The current top three areas are Beverly Hills, Biltmore and Cristobel, all of which are within the Buckman Wastewater Grid.

Figure 9. Wastewater Grid Service Areas Overall Map



3.2 Wastewater Transmission and Collection Project Planning Criteria

Multiple criteria are utilized when identifying and prioritizing wastewater main collection and transmission projects. The criteria for existing mains in service include age of infrastructure, operating pressure (for force mains), installed pipe slope (for gravity mains), maximum flow velocity, documented failures resulting from material or installation defects, and system reliability and redundancy. Gravity main manholes are also evaluated based on age, condition, and accessibility. Proposed main sizes and materials are determined based on what is required to correct the existing deficiency as well as to meet the forecasted demands for the area to be served. Projects are prioritized based on severity of deficiency and/or need, location as related to external agency work corridors, and budget availability. The wastewater projects depicted in this Master Plan are proposed to complement existing projects which are already active in Design, Construction, Septic tank Phase-out, Development or Joint Project participation projects.

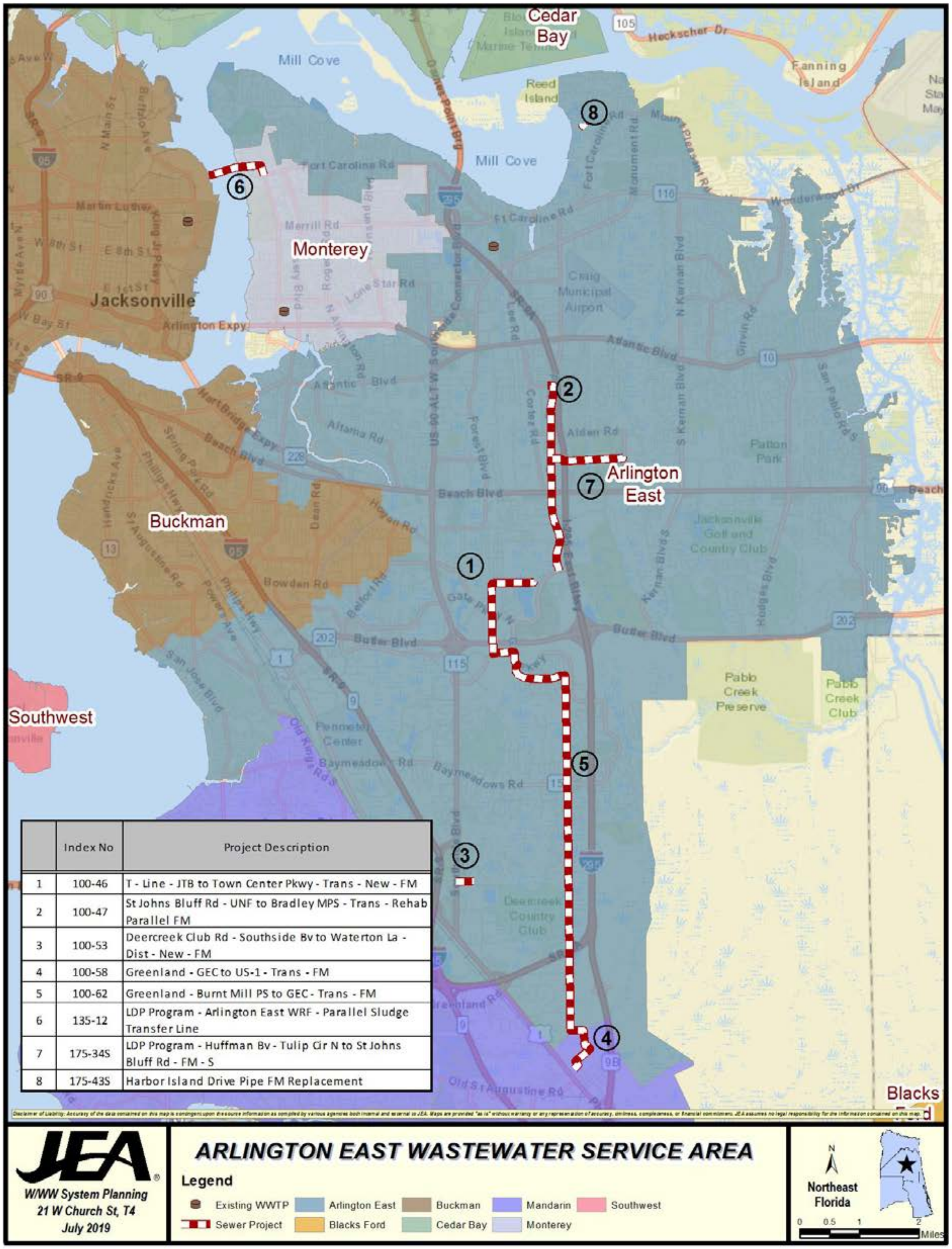
Efforts are underway with the JEA Operations and Maintenance Department to itemize the large diameter force mains and gravity mains. Once project limits are identified, available integrity testing and documented failure data will be compiled. The final project list will then be correlated with projects identified by the Planning Department. Subsequently, a prioritized master repair/replacement list will be compiled and projects will be added to the Capital Improvement Budget.

3.3 Wastewater Grid Service Areas

3.3.1 Arlington East Wastewater Grid

The Arlington East Wastewater Grid, as depicted in Figure 10, serves an area in Duval County south of the St. Johns River and includes the Southside Boulevard, Kernan Boulevard, Hodges Boulevard and San Pablo Road area. Capital Improvement Projects estimated at approximately $33,195,000 are expected to commence in the next 10 years. Planned projects are to relieve current capacity issues and meet future development needs. These projects are shown on Figure 10 and listed with projected budget estimates in Table 7.

Figure 10. Arlington East Wastewater Service Grid Map



	Index No	Project Description
1	100-46	T - Line - JTB to Town Center Pkwy - Trans - New - FM
2	100-47	St Johns Bluff Rd - UNF to Bradley MPS - Trans - Rehab Parallel FM
3	100-53	Deercreek Club Rd - Southside Bv to Waterton La - Dist - New - FM
4	100-58	Greenland - GEC to US-1 - Trans - FM
5	100-62	Greenland - Burnt Mill PS to GEC - Trans - FM
6	135-12	LDP Program - Arlington East WRF - Parallel Sludge Transfer Line
7	175-34S	LDP Program - Huffman Bv - Tulip Cir N to St Johns Bluff Rd - FM - S
8	175-43S	Harbor Island Drive Pipe FM Replacement

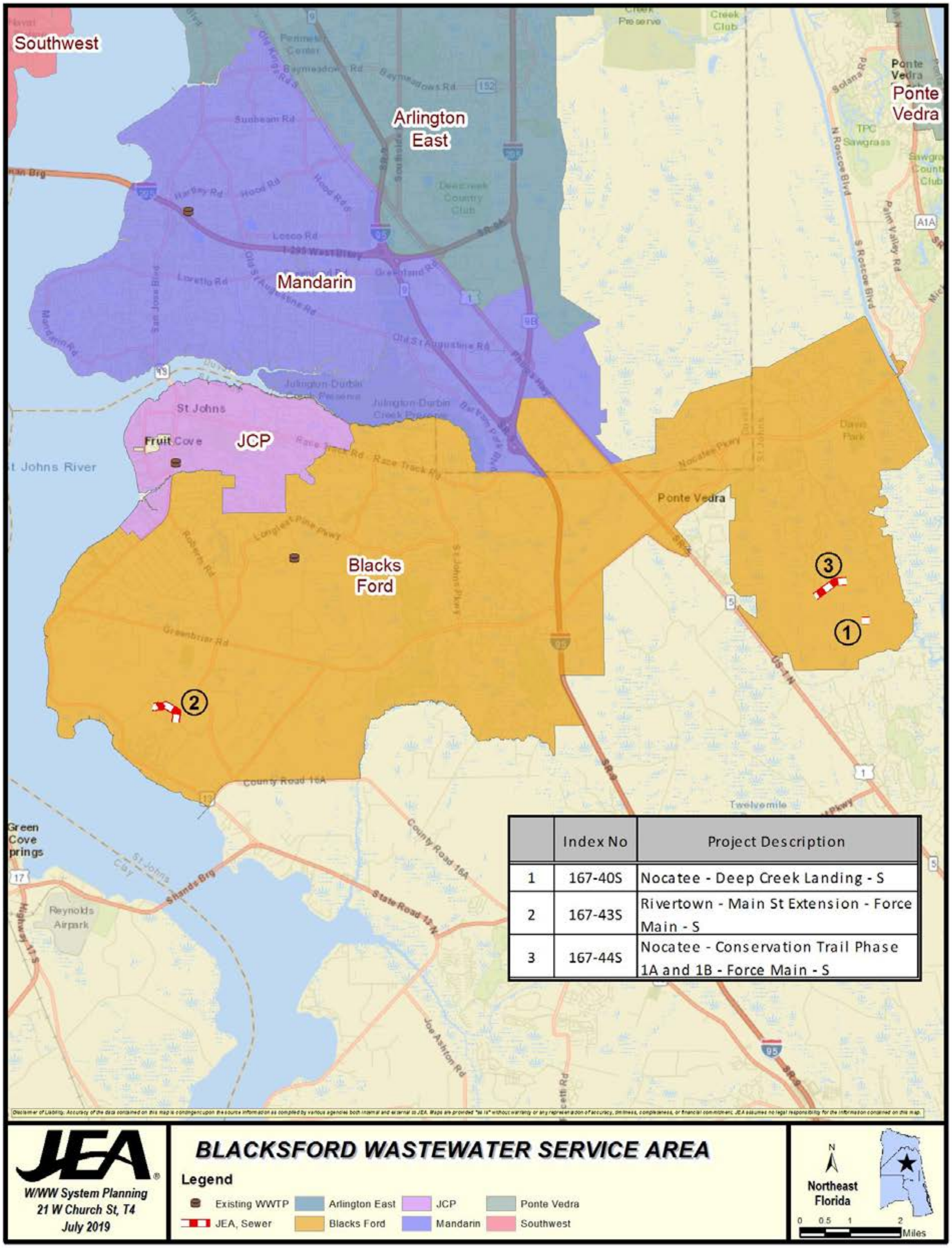
Table 7. List of Current Capital Improvement Projects for the Arlington East Wastewater Grid (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	100-46	T - Line - JTB to Town Center Pkwy - Trans - New - FM	$3,939	$1,673	$1,963	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	100-47	St Johns Bluff Rd - UNF to Bradley MPS - Trans - Rehab Parallel FM	$3,970	$0	$0	$0	$0	$0	$100	$300	$1,000	$2,570	$0	$0
3	100-53	Deercreek Club Rd - Southside Bv to Waterton La - Dist - New - FM	$405	$0	$0	$0	$0	$0	$12	$144	$249	$0	$0	$0
4	100-58	Greenland - GEC to US-1 - Trans - FM	$3,300	$3,044	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5	100-62	Greenland - Burnt Mill PS to GEC - Trans - FM	$16,064	$394	$1,804	$6,719	$6,719	$429	$0	$0	$0	$0	$0	$0
6	135-12	LDP Program - Arlington East WRF - Parallel Sludge Transfer Line	$1,950	$50	$300	$300	$0	$1,300	$0	$0	$0	$0	$0	$0
7	175-34S	LDP Program - Huffman Bv - Tulip Cir N to St Johns Bluff Rd - FM - S	$3,436	$1,350	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
8	175-43S	Harbor Island Drive Pipe FM Replacement	$131	$79	$45	$0	$0	$0	$0	$0	$0	$0	$0	$0
		Totals	$33,195	$6,590	$4,112	$7,019	$6,719	$1,729	$112	$444	$1,249	$2,570	$0	$0

3.3.2 Blacks Ford Wastewater Grid

The Blacks Ford Wastewater Grid, as depicted in Figure 11, serves a portion of northern St. Johns County and a small section of Duval County north of Race Track Road. Capital Improvement Projects estimated at approximately $878,000 are expected to commence in the next 10 years. Planned projects are cost participation projects as part of Development and Utility Service Agreements. These projects are shown on Figure 11 and listed with projected budget estimates in Table 8.

Figure 11. Blacks Ford Wastewater Grid Service Area Map



	Index No	Project Description
1	167-40S	Nocatee - Deep Creek Landing - S
2	167-43S	Rivertown - Main St Extension - Force Main - S
3	167-44S	Nocatee - Conservation Trail Phase 1A and 1B - Force Main - S

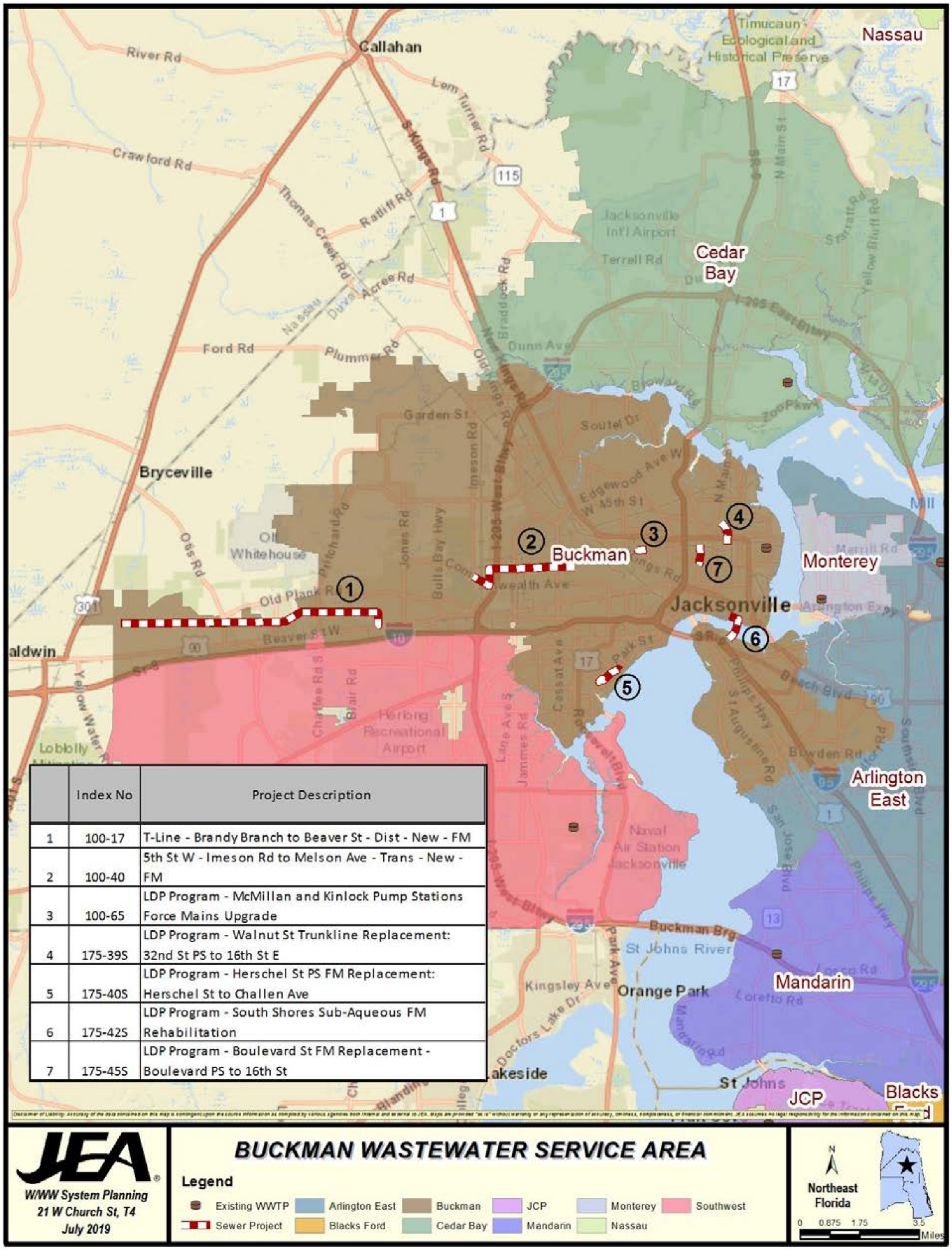
Table 8. List of Current Capital Improvement Projects for the Blacks Ford Wastewater Grid (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	167-40S	Nocatee - Deep Creek Landing - S	$136	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	167-43S	Rivertown - Main St Extension - Force Main - S	$396	$198	$198	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	167-44S	Nocatee - Conservation Trail Phase 1A and 1B - Force Main - S	$346	$173	$173	$0	$0	$0	$0	$0	$0	$0	$0	$0
		Totals	$878	$371	$371	$0	$0	$0	$0	$0	$0	$0	$0	$0

3.3.3 Buckman Wastewater Grid

The Buckman Wastewater Grid, as depicted in Figure 12, serves a portion of Duval County including the downtown Jacksonville area. Multiple Capital Improvement Projects estimated at approximately $39,000,000 are expected to commence or be completed in the next 10 years. Projects proposed are planned to relieve current capacity issues and meet future development needs. These projects are shown on Figure 12 and listed with projected budget estimates in Table 9.

Figure 12. Buckman Wastewater Grid Service Area Map



	Index No	Project Description
1	100-17	T-Line - Brandy Branch to Beaver St - Dist - New - FM
2	100-40	5th St W - Imeson Rd to Melson Ave - Trans - New - FM
3	100-65	LDP Program - McMillan and Kinlock Pump Stations Force Mains Upgrade
4	175-39S	LDP Program - Walnut St Trunkline Replacement: 32nd St PS to 16th St E
5	175-40S	LDP Program - Herschel St PS FM Replacement: Herschel St to Challen Ave
6	175-42S	LDP Program - South Shores Sub-Aqueous FM Rehabilitation
7	175-45S	LDP Program - Boulevard St FM Replacement - Boulevard PS to 16th St

Table 9. List of Current Capital Improvement Projects for the Buckman Wastewater Grid (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	100-17	T-Line - Brandy Branch to Beaver St - Dist - New - FM	$4,850	$0	$0	$0	$0	$0	$360	$1,300	$3,190	$0	$0	$0
2	100-40	5th St W - Imeson Rd to Melson Ave - Trans - New - FM	$12,555	$931	$4,152	$7,469	$0	$0	$0	$0	$0	$0	$0	$0
3	100-65	LDP Program - McMillan and Kinlock Pump Stations Force Mains Upgrade	$476	$357	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4	175-39S	LDP Program - Walnut St Trunkline Replacement: 32nd St PS to 16th St E	$9,029	$2,715	$4,335	$1,854	$0	$0	$0	$0	$0	$0	$0	$0
5	175-40S	LDP Program - Herschel St PS FM Replacement: Herschel St to Challen Ave	$1,589	$431	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
6	175-42S	LDP Program - South Shores Sub-Aqueous FM Rehabilitation	$9,000	$798	$420	$0	$0	$0	$0	$3,432	$4,000	$0	$0	$0
7	175-45S	LDP Program - Boulevard St FM Replacement - Boulevard PS to 16th St	$1,506	$157	$1,249	$100	$0	$0	$0	$0	$0	$0	$0	$0
		Totals	$39,005	$5,389	$10,156	$9,423	$0	$0	$360	$4,732	$7,190	$0	$0	$0

3.3.4 District II (Cedar Bay) Wastewater Grid

The District II Wastewater Grid (previously identified as Cedar Bay), as depicted in Figure 13, serves the northside of Duval County. Capital Improvement Projects estimated at approximately $24,281,000 are expected to commence in the next 10 years. Projects proposed were generated from a basin wide study of the existing force mains, lift stations and future area demands. Existing force mains are aging and experiencing multiple failures. Alternative pipeline corridors were explored to reduce impacts to existing infrastructure and avoid environmental impacts. These projects are shown on Figure 13 and listed with projected budget estimates in Table 10.

Figure 13. District II (Cedar Bay) Wastewater Grid Service Area Map

	Index No	Project Description
1	100-25	T-Line - Park Ave to Pulaski Rd MPS - Easement Acquisitions
2	100-36	District II - Main St - Sara Dr to Noah Rd - FM
3	100-44	District II - Main St to Pulaski Rd- Trans- FM
4	100-54A	District II - T-Line to Busch Dr - Trans - New - FM
5	100-59	LDP Program - District II - Woodley to Key Haven - Trans - FM
6	100-63	LDP Program - Busch Dr - Balmoral Dr to Harts Rd - Trans - FM
7	100-64	Newcomb Rd - T-Line - Trans - New - FM
8	100-66	Eastport Rd - Emuness Rd to Sara Dr - Dist - New - FM
9	101-18A	District II - Yellow Bluff Rd - New Berlin Rd to Victoria Lakes - Trans - New - FM
10	101-18B	District II - New Berlin Rd - Yellow Bluff Rd to Eastport Rd - New - FM

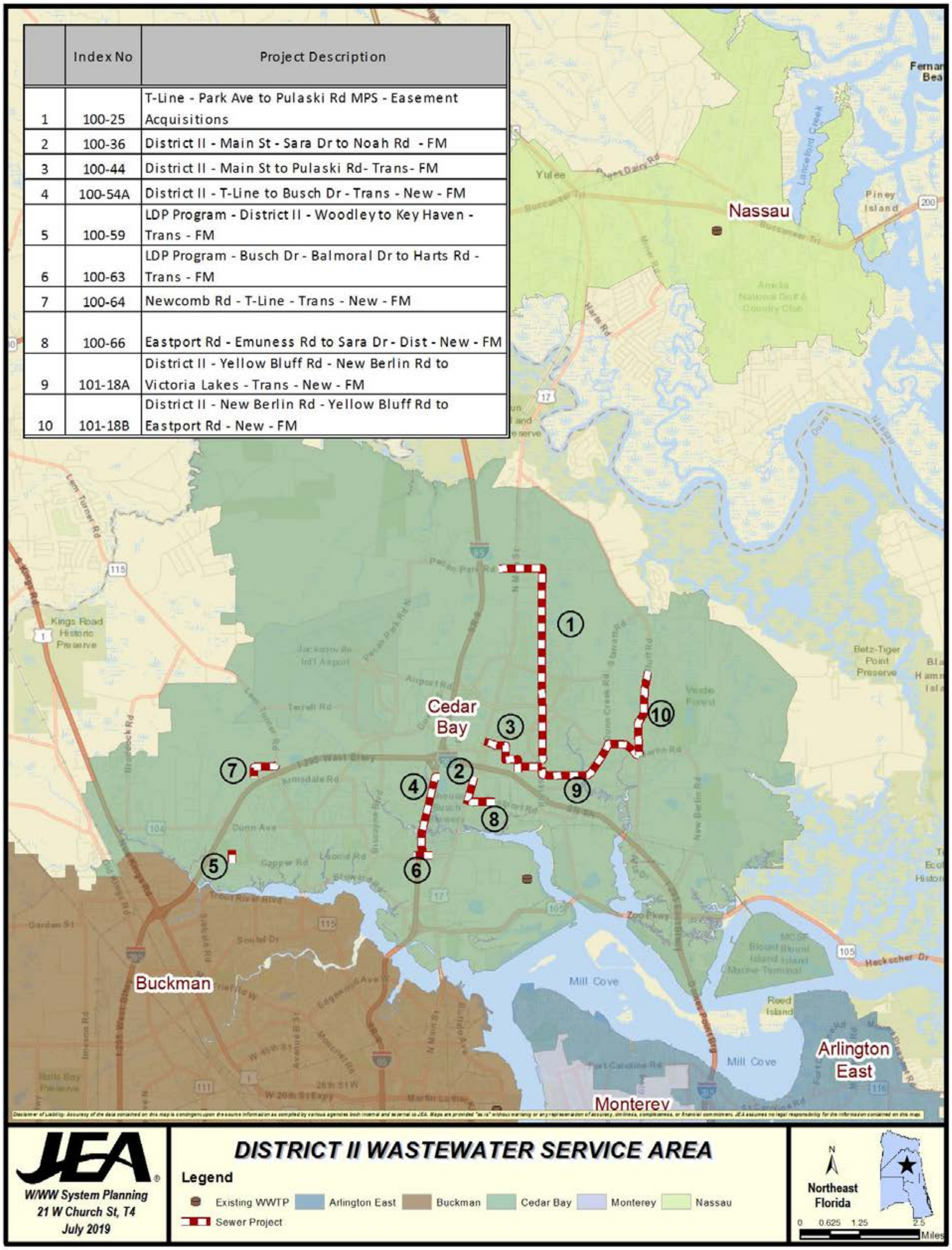


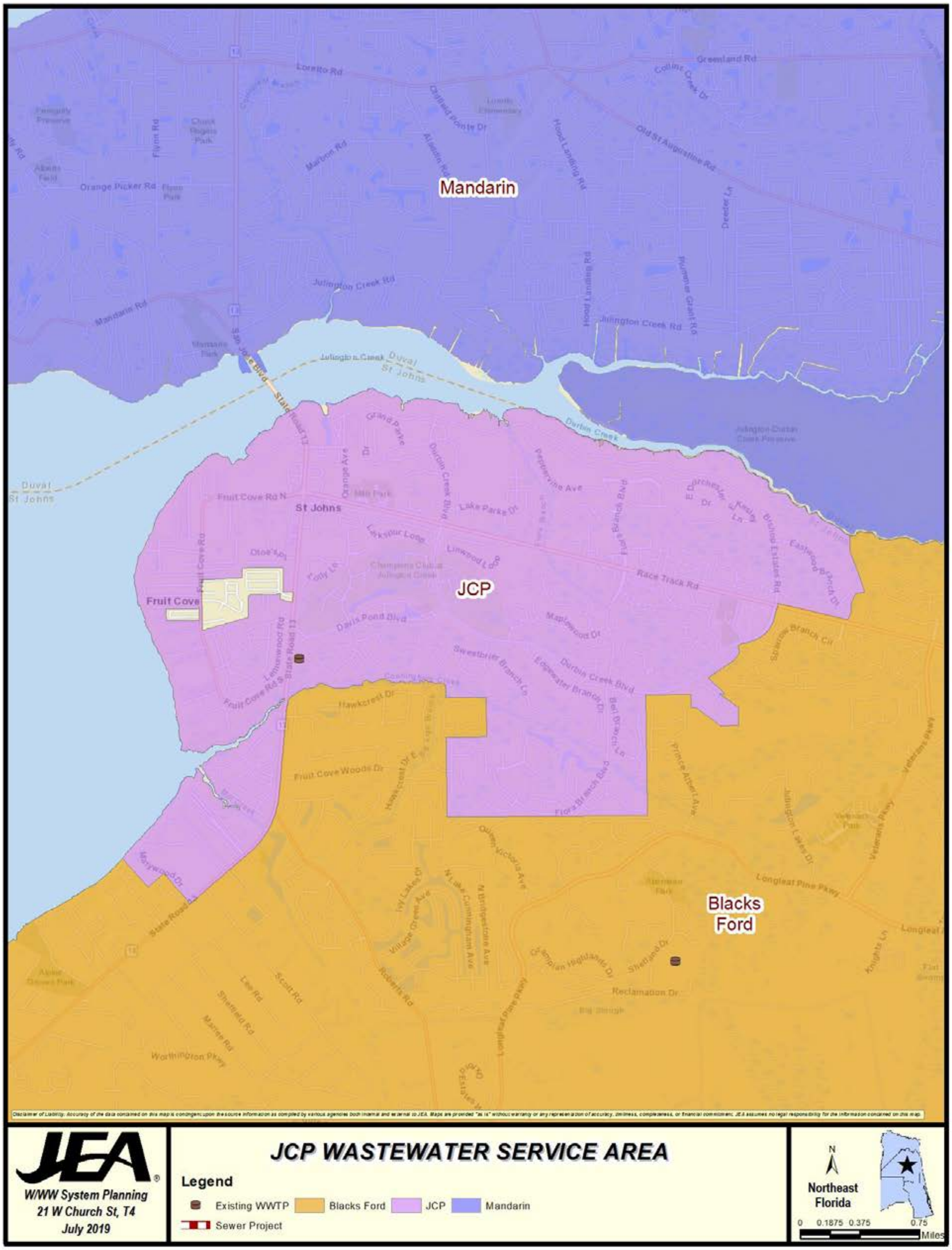
Table 10. List of Current Capital Improvement Projects for the District II Wastewater Grid (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	100-25	T-Line - Park Ave to Pulaski Rd MPS - Easement Acquisitions	$500	$0	$0	$0	$0	$0	$500	$0	$0	$0	$0	$0
2	100-36	District II - Main St - Sara Dr to Noah Rd - FM	$1,870	$758	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	100-44	District II - Main St to Pulaski Rd- Trans- FM	$3,303	$749	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4	100-54A	District II - T-Line to Busch Dr - Trans - New - FM	$10,780	$4,890	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
5	100-59	LDP Program - District II - Woodley to Key Haven - Trans - FM	$190	$0	$0	$190	$0	$0	$0	$0	$0	$0	$0	$0
6	100-63	LDP Program - Busch Dr - Balmoral Dr to Harts Rd - Trans - FM	$550	$0	$0	$0	$0	$20	$130	$400	$0	$0	$0	$0
7	100-64	Newcomb Rd - T-Line - Trans - New - FM	$325	$0	$0	$0	$0	$0	$20	$150	$155	$0	$0	$0
8	100-66	Eastport Rd - Emuness Rd to Sara Dr - Dist - New - FM	$961	$0	$141	$820	$0	$0	$0	$0	$0	$0	$0	$0
9	101-18A	District II - Yellow Bluff Rd - New Berlin Rd to Victoria Lakes - Trans - New - FM	$1,113	$0	$0	$0	$177	$936	$0	$0	$0	$0	$0	$0
10	101-18B	District II - New Berlin Rd - Yellow Bluff Rd to Eastport Rd - New - FM	$4,689	$0	$0	$301	$370	$1,077	$2,827	$115	$0	$0	$0	$0
		Totals	$24,281	$6,397	$141	$1,311	$547	$2,033	$3,477	$665	$155	$0	$0	$0

3.3.5 JCP Wastewater Grid

The JCP Wastewater Grid, as depicted in Figure 14, is located within St. Johns County in the vicinity of Julington Creek Plantation. There are no budgeted projects in the service grid, however the system may be expanded with new development within the area.

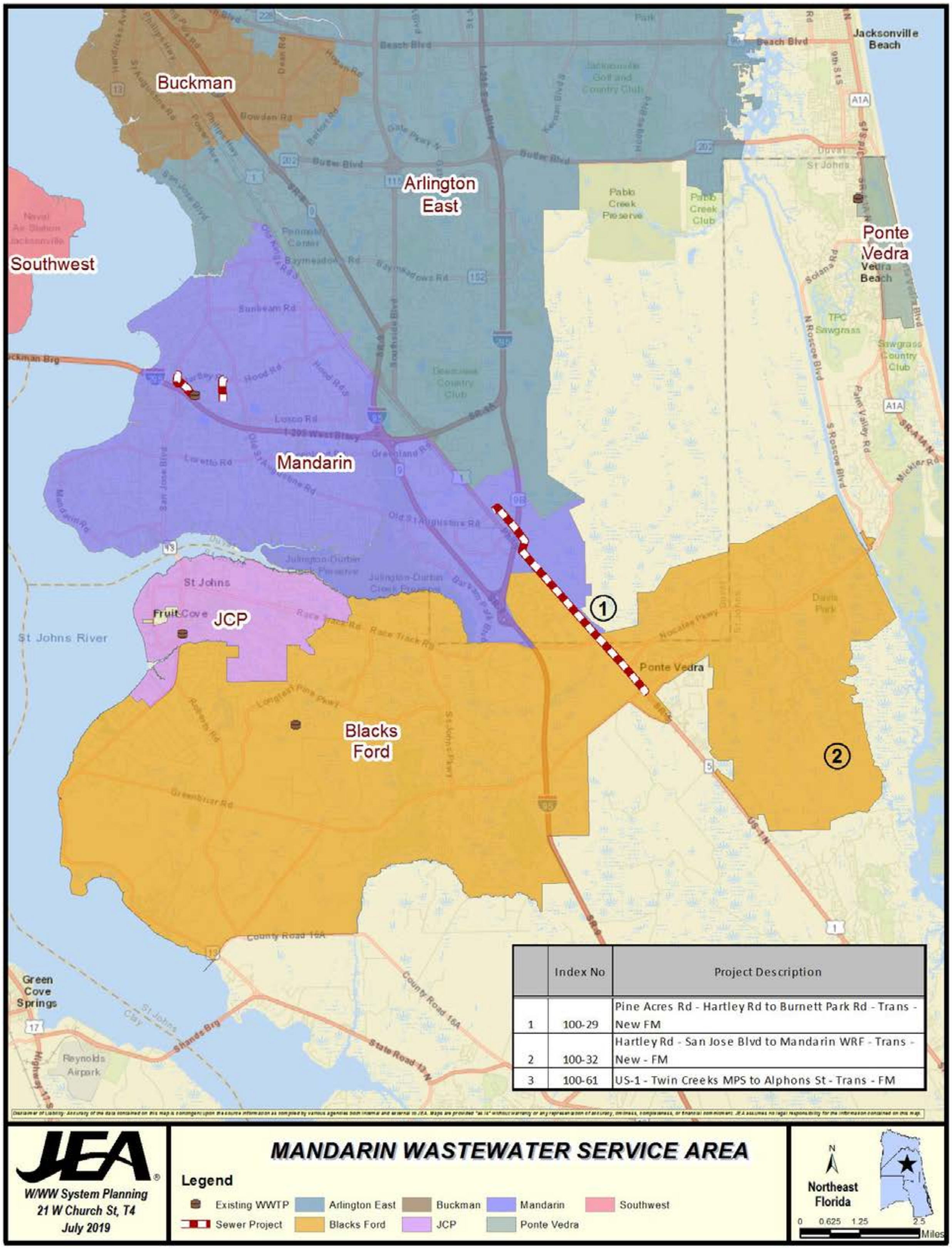
Figure 14. JCP Wastewater Grid Service Area Map



3.3.6 Mandarin Wastewater Grid

The Mandarin Wastewater Grid, as depicted in Figure 15, serves the Mandarin area of Duval County and the area along Nocatee Parkway in Duval and St. Johns Counties. Capital Improvement Projects estimated at approximately $10,112,000 are expected to commence in the next 10 years. These projects are shown on Figure 15 and listed with projected budget numbers in Table 11.

Figure 15. Mandarin Wastewater Grid Service Area Map



	Index No	Project Description
1	100-29	Pine Acres Rd - Hartley Rd to Burnett Park Rd - Trans - New FM
2	100-32	Hartley Rd - San Jose Blvd to Mandarin WRF - Trans - New - FM
3	100-61	US-1 - Twin Creeks MPS to Alphons St - Trans - FM

Table 11. List of Current Capital Improvement Projects for the Mandarin Wastewater Grid (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	100-29	Pine Acres Rd - Hartley Rd to Burnett Park Rd - Trans - New FM	$1,100	$0	$0	$0	$0	$0	$0	$0	$275	$825	$0	$0
2	100-32	Hartley Rd - San Jose Blvd to Mandarin WRF - Trans - New - FM	$1,512	$0	$0	$0	$0	$0	$0	$0	$302	$1,210	$0	$0
3	100-61	US-1 - Twin Creeks MPS to Alphons St - Trans - FM	$7,500	$0	$0	$0	$0	$300	$2,500	$3,500	$1,200	$0	$0	$0
		Totals	$10,112	$0	$0	$0	$0	$300	$2,500	$3,500	$1,777	$2,035	$0	$0

3.3.7 Monterey Wastewater Grid

The Monterey Wastewater Grid, as depicted in Figure 16, is located entirely within Duval County east of the St. Johns River and in the vicinity of Jacksonville University. Projects are expected to be added in coming years as the Monterey Grid is evaluated with respect to current operating conditions and future development expectations. One Capital Improvement Project estimated at approximately $1,358,000 is expected to commence in the next 10 years. This project is shown on Figure 16 and listed with projected budget numbers in Table 12.

Figure 16. Monterey Wastewater Grid Service Area Map

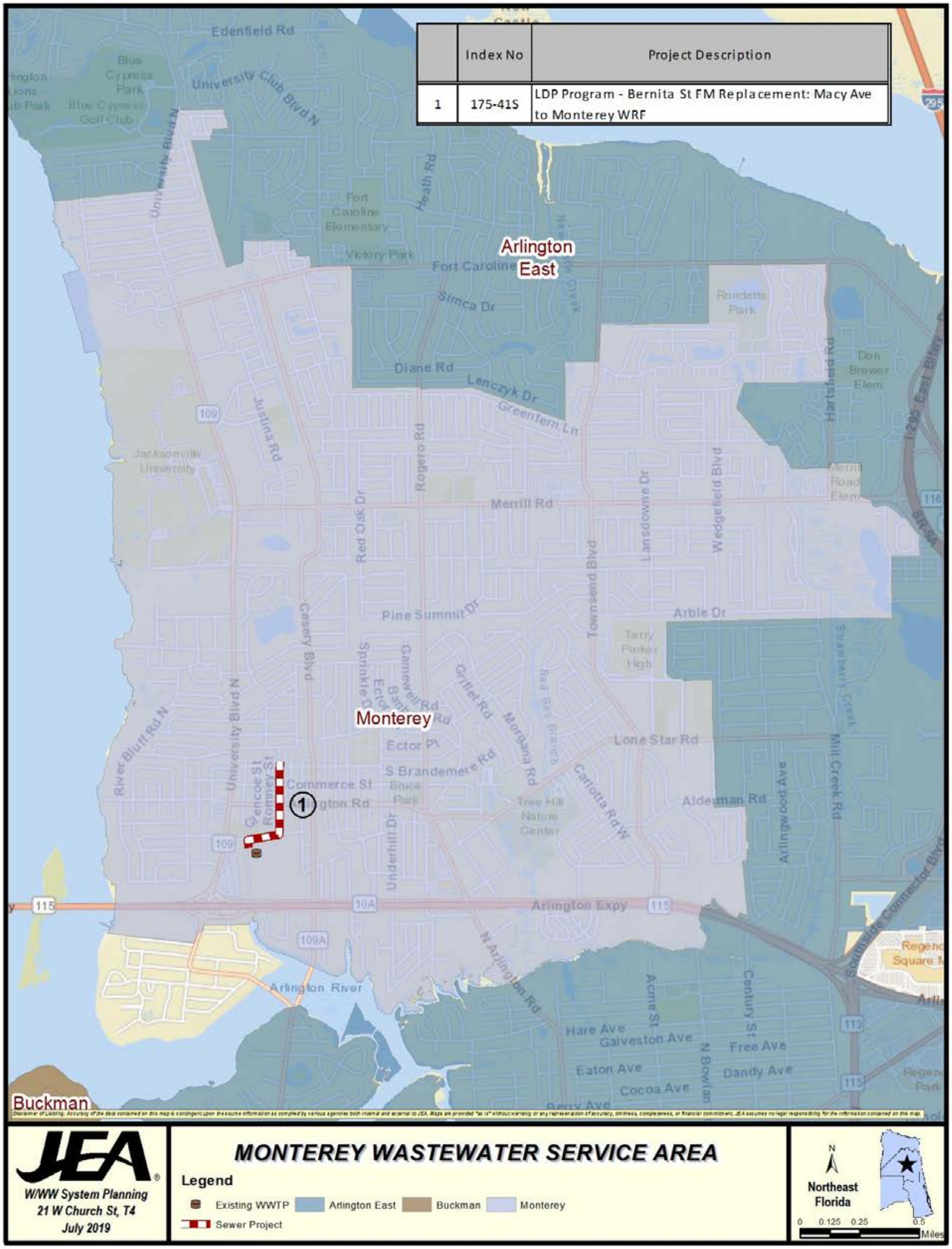


Table 12. List of Current Capital Improvement Projects for the Monterey Wastewater Grid (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	175-41S	LDP Program - Bernita St FM Replacement: Macy Ave to Monterey WRF	$1,358	$966	$212	$0	$0	$0	$0	$0	$0	$0	$0	$0
		Totals	$1,358	$966	$212	$0	$0	$0	$0	$0	$0	$0	$0	$0

3.3.8 Nassau Wastewater Grid

The Nassau Wastewater Grid, as depicted in Figure 17, is located in Nassau County. While the Interlocal Agreement between JEA and Nassau County grants JEA the right to serve all developments within Nassau County (outside the municipal boundaries of Fernandina Beach, Callahan and Hilliard), the current service area is located along the State Road 200 corridor with the bulk of the area on the east side of I-95. One such development, the East Nassau Community Planning Area (ENCPA) which is a State-approved Sector Plan, is located between I-95 and Chester Road on the north side of SR 200. The ENCPA will be developed over the course of 50+ years. Transmission mains extended as part of this development may require JEA cost participation for upsizing to meet the projected regional needs. One Capital Improvement project, with an overall project budget of $1,702,000, is underway as shown in Figure 17 and listed in Table 13.

JEA has partnered with the FDOT to replace the smaller diameter segments of force main along SR200 in conjunction with the FDOT roadway improvements. The Nassau Wastewater Grid is under evaluation now by JEA Planning to master plan the infrastructure needed for the future development areas. To minimize force main high head pressures, master pump station and/or master booster station sites are being considered.

Figure 17. Nassau Wastewater Service Grid Map

	Index No	Project Description
1	100-48	William Burgess Rd - SR200 to Harts Rd - Trans - New - FM

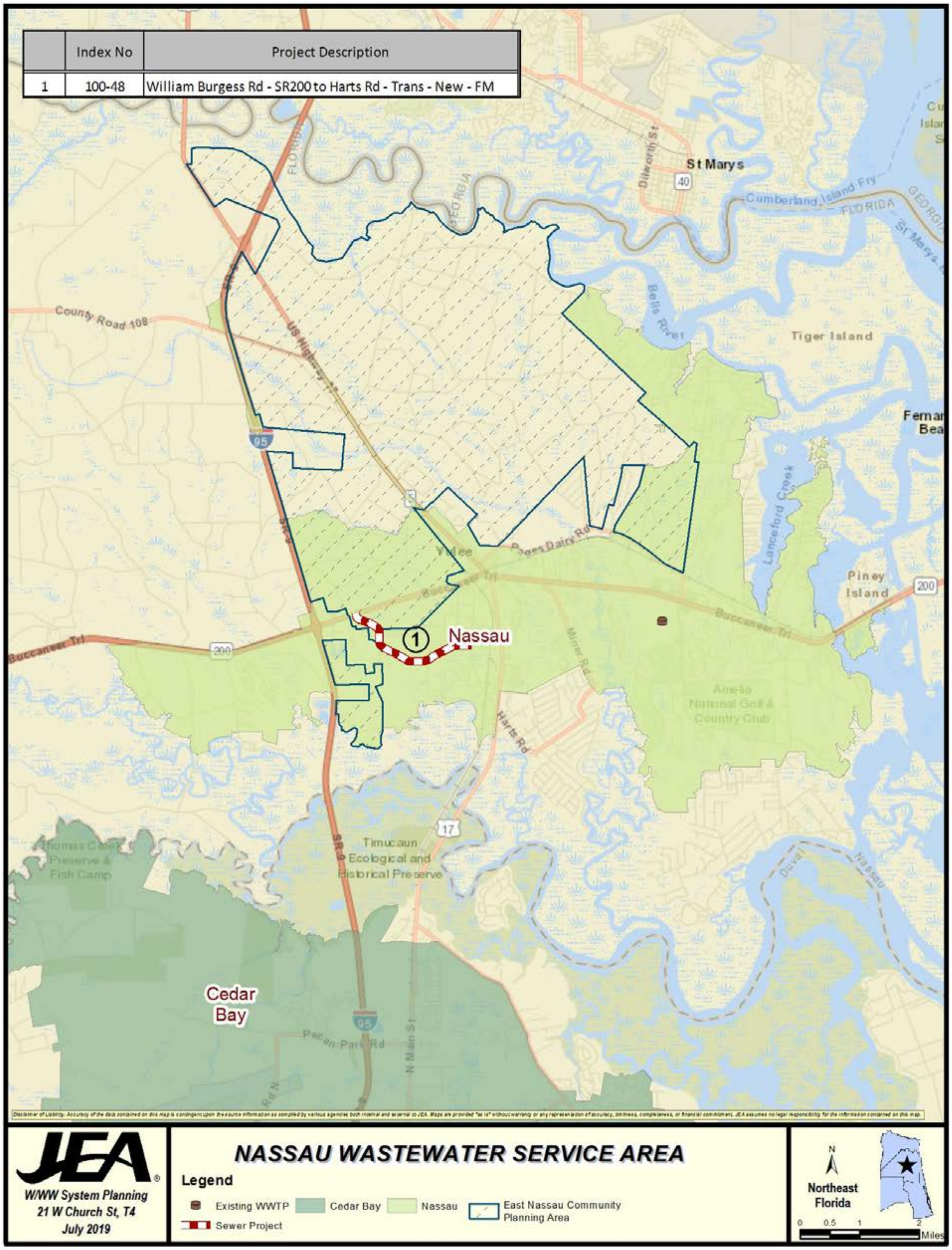


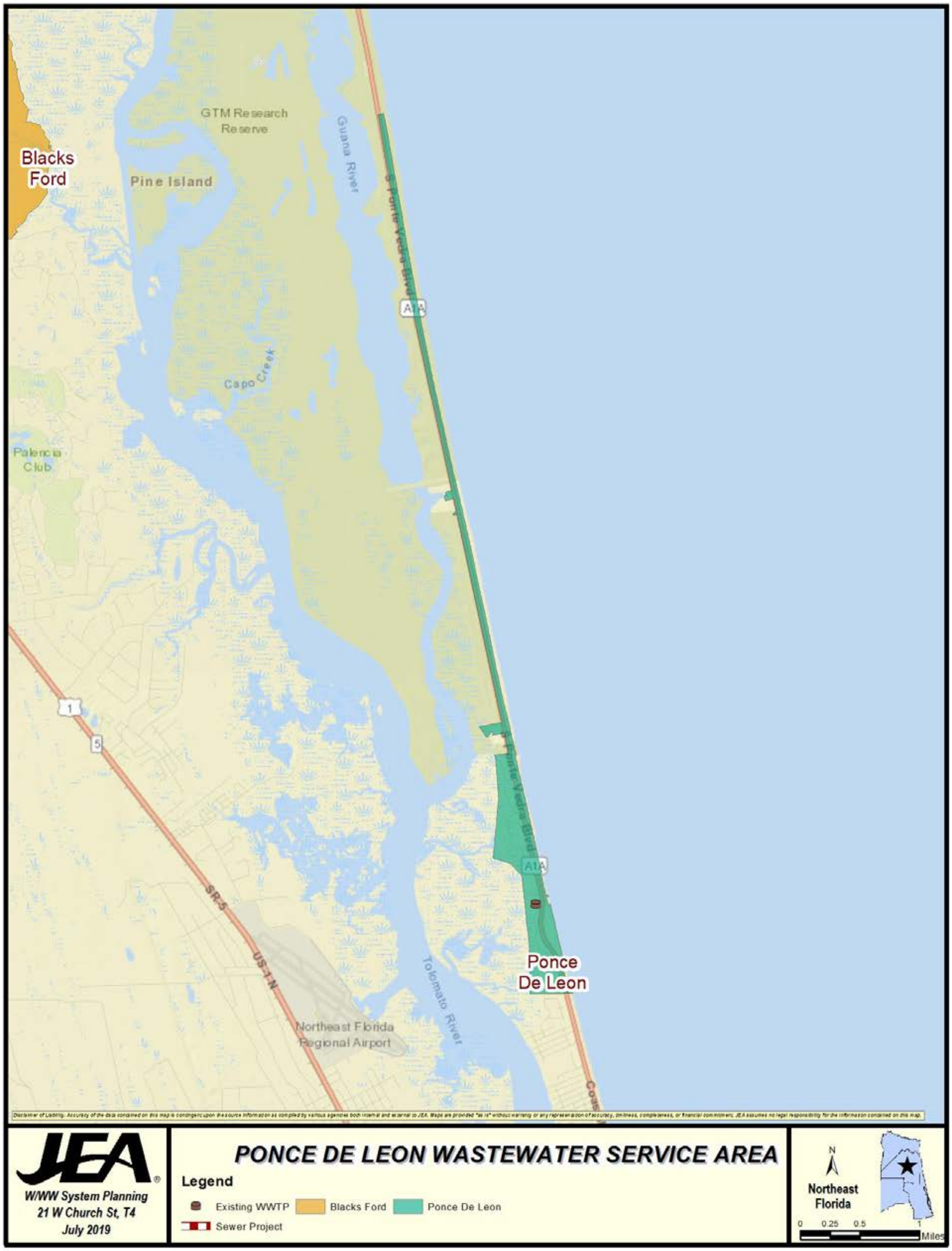
Table 13. List of Current Capital Improvement Projects for the Nassau Wastewater Grid (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	100-48	William Burgess Rd - SR200 to Harts Rd - Trans - New - FM	$1,702	$677	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
		Totals	$1,702	$677	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

3.3.9 Ponce De Leon Wastewater Grid

The Ponce De Leon Wastewater Grid, as depicted in Figure 18, is located in St. Johns County along the eastern coastline. This service area extends along A1A from Yellow Bill Lane to South Beach Drive. There are no budgeted projects in the service grid, however the system may be expanded with new development within the area.

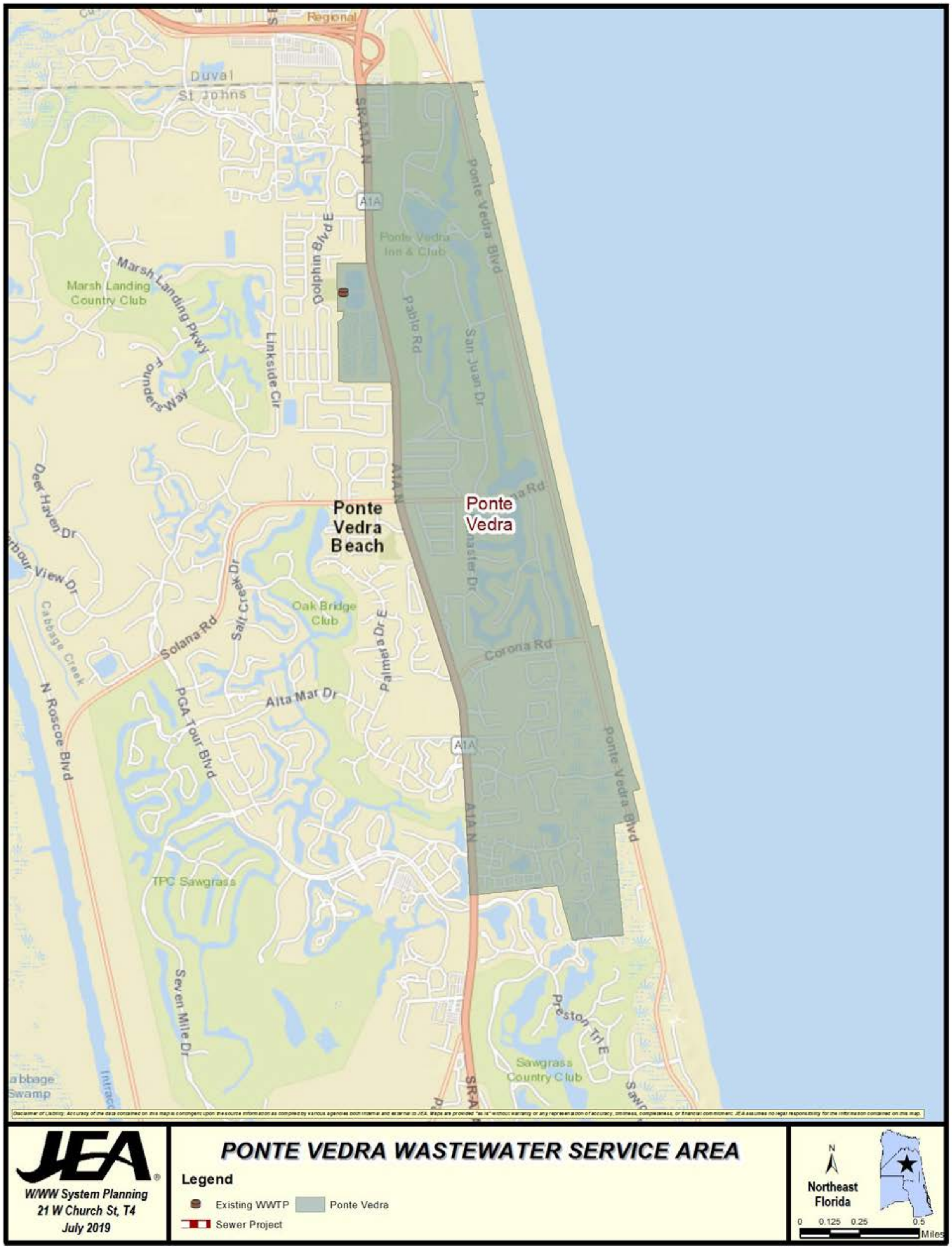
Figure 18. Ponce De Leon Wastewater Grid Service Area Map



3.3.10 Ponte Vedra Wastewater Grid

The Ponte Vedra Wastewater Grid, as depicted in Figure 19, is located in St. Johns County just south of Duval County from J. Turner Butler Boulevard to PGA Tour Boulevard. This service area extends landward from A1A to Ponte Vedra Boulevard. There are no budgeted projects in the service grid, however the system may be expanded with new development within the area.

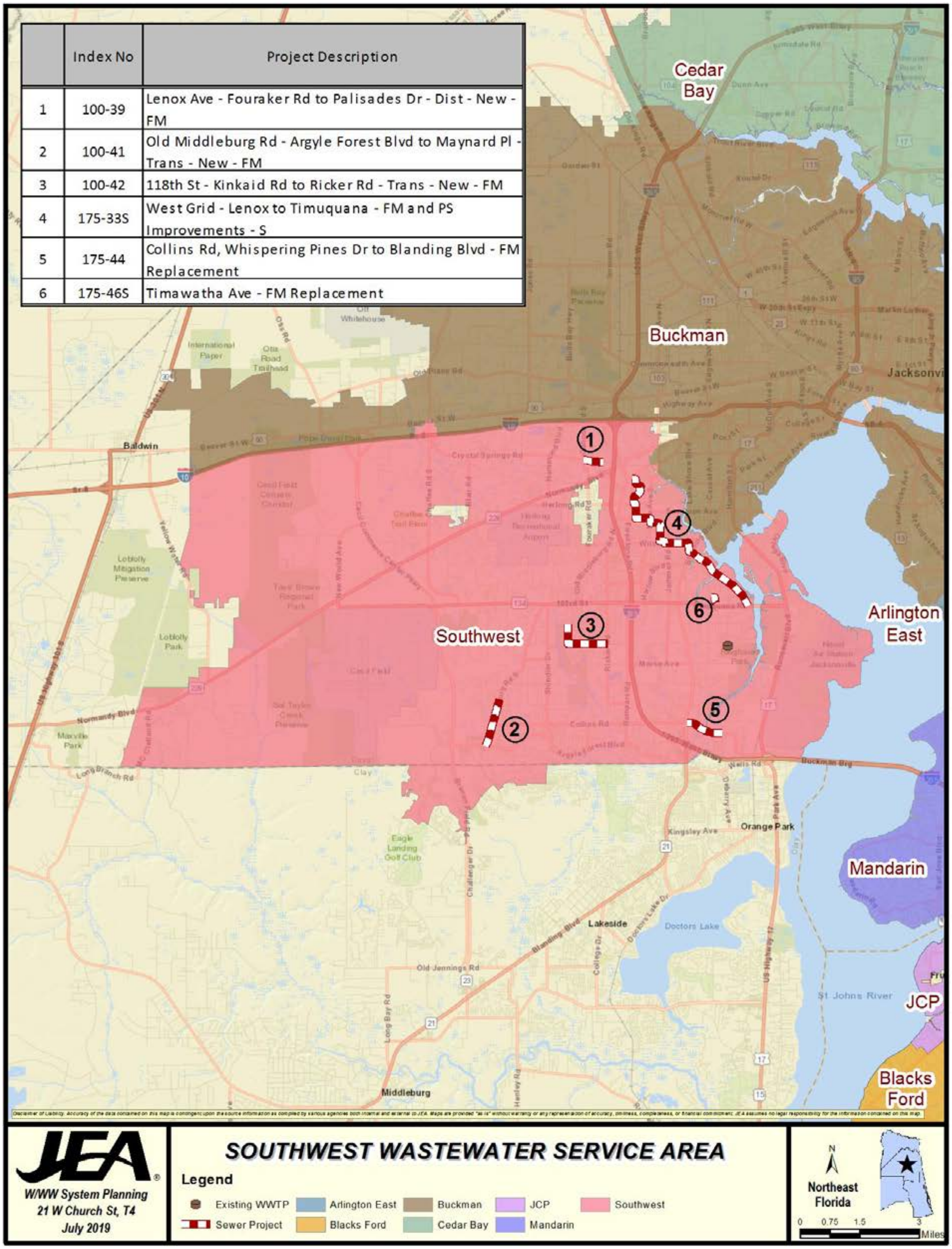
Figure 19. Ponte Vedra Wastewater Grid Service Area Map



3.3.11 Southwest Wastewater Grid

The Southwest Wastewater Grid, as depicted in Figure 20, serves the westside of Duval County and a portion of Clay County. Capital Improvement Projects estimated at approximately $25,334,000 are expected to commence in the next 10 years. Planned projects are to replace aging infrastructure, relieve current capacity issues and meet future development needs. These projects are shown on Figure 20 and listed with projected budget estimates in Table 14.

Figure 20. Southwest Wastewater Grid Service Area Map



	Index No	Project Description
1	100-39	Lenox Ave - Fouraker Rd to Palisades Dr - Dist - New - FM
2	100-41	Old Middleburg Rd - Argyle Forest Blvd to Maynard Pl - Trans - New - FM
3	100-42	118th St - Kinkaid Rd to Ricker Rd - Trans - New - FM
4	175-33S	West Grid - Lenox to Timuquana - FM and PS Improvements - S
5	175-44	Collins Rd, Whispering Pines Dr to Blanding Blvd - FM Replacement
6	175-46S	Timawatha Ave - FM Replacement

Table 14. List of Current Capital Improvement Projects for the Southwest Wastewater Grid (in $1,000s)

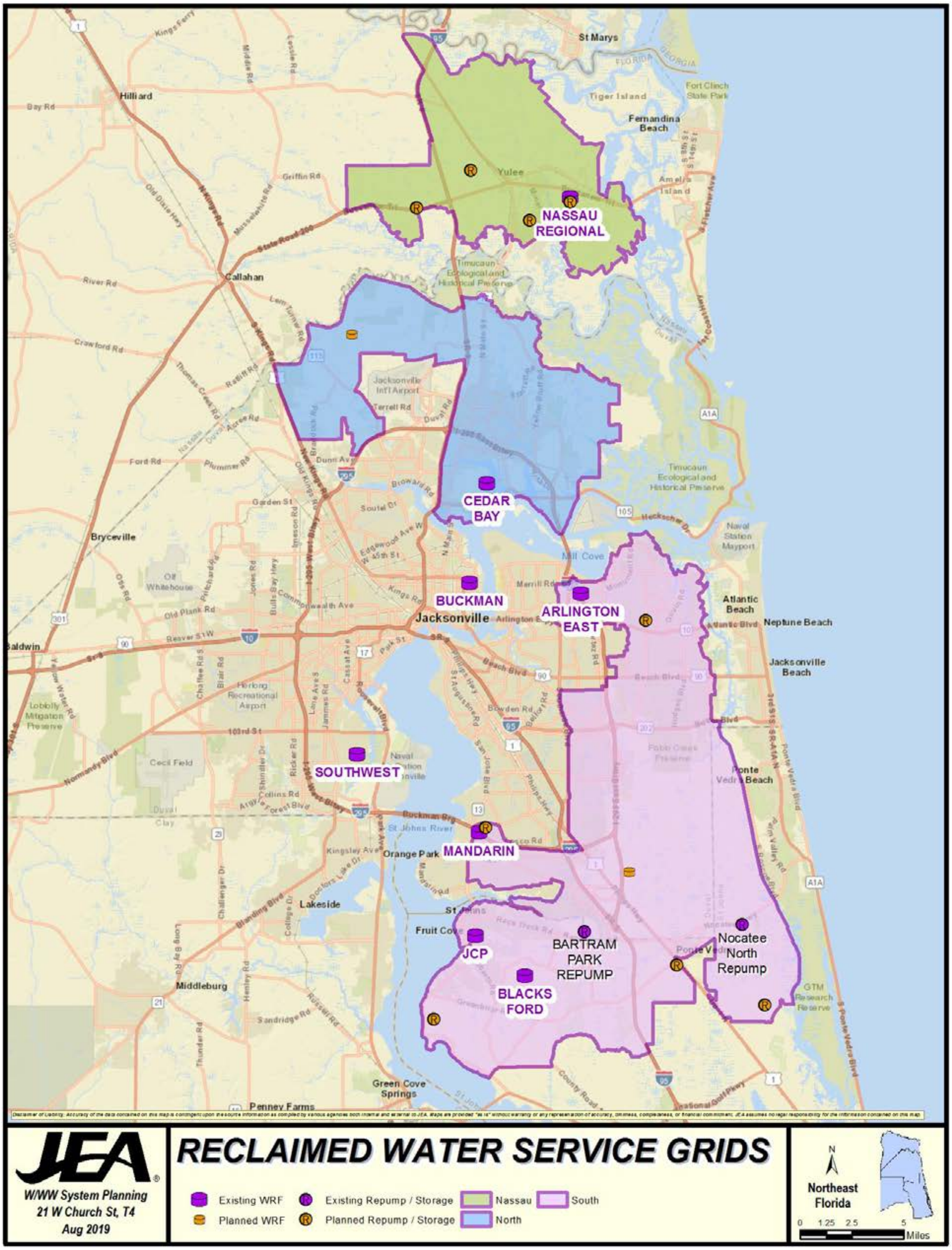
	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	100-39	Lenox Ave - Fouraker Rd to Palisades Dr - Dist - New - FM	$576	$0	$0	$0	$0	$0	$115	$461	$0	$0	$0	$0
2	100-41	Old Middleburg Rd - Argyle Forest Blvd to Maynard Pl - Trans - New - FM	$2,400	$0	$300	$2,100	$0	$0	$0	$0	$0	$0	$0	$0
3	100-42	118th St - Kinkaid Rd to Ricker Rd - Trans - New - FM	$3,399	$0	$0	$350	$1,000	$2,049	$0	$0	$0	$0	$0	$0
4	175-33S	West Grid - Lenox to Timuquana - FM and PS Improvements - S	$17,177	$7,751	$3,437	$0	$0	$0	$0	$0	$0	$0	$0	$0
5	175-44	Collins Rd, Whispering Pines Dr to Blanding Blvd - FM Replacement	$1,385	$390	$942	$0	$0	$0	$0	$0	$0	$0	$0	$0
6	175-46S	Timawatha Ave - FM Replacement	$397	$0	$104	$293	$0	$0	$0	$0	$0	$0	$0	$0
		Totals	$25,334	$8,141	$4,783	$2,743	$1,000	$2,049	$115	$461	$0	$0	$0	$0

4 Reclaimed Water

4.1 Overall System

JEA's reclaimed water distribution system is divided into three distinct service grids: Nassau, North and South. Studies have been completed to evaluate the ability to provide reclaimed water from the Southwest WWTF to the surrounding service area. Figure 21 provides a map of the overall systems. The individual grids are further described in the following sections. As shown in Table 1, Capital Improvement Projects for the reclaimed water grid with total overall budget estimated at approximately $89,246,000 are expected to begin in the next 10 years.

Figure 21. Reclaimed Water Grid Service Areas Overall Map



4.2 Reclaimed Water Distribution and Transmission Project Planning Criteria

Multiple criteria are utilized when identifying and prioritizing reclaimed water main distribution and transmission projects. The criteria for existing mains in service focus on age of infrastructure, operating pressure, pressure at customer connection point, chlorine residual, maximum flow velocity, documented failures resulting from material or installation defects, and system reliability and redundancy. Proposed reclaimed water main sizes and materials are determined based on what is required to correct the existing deficiency as well as to meet the forecasted demands for the area to be served. Projects are prioritized based on severity of deficiency and/or need, location as related to external agency work corridors, and budget availability.

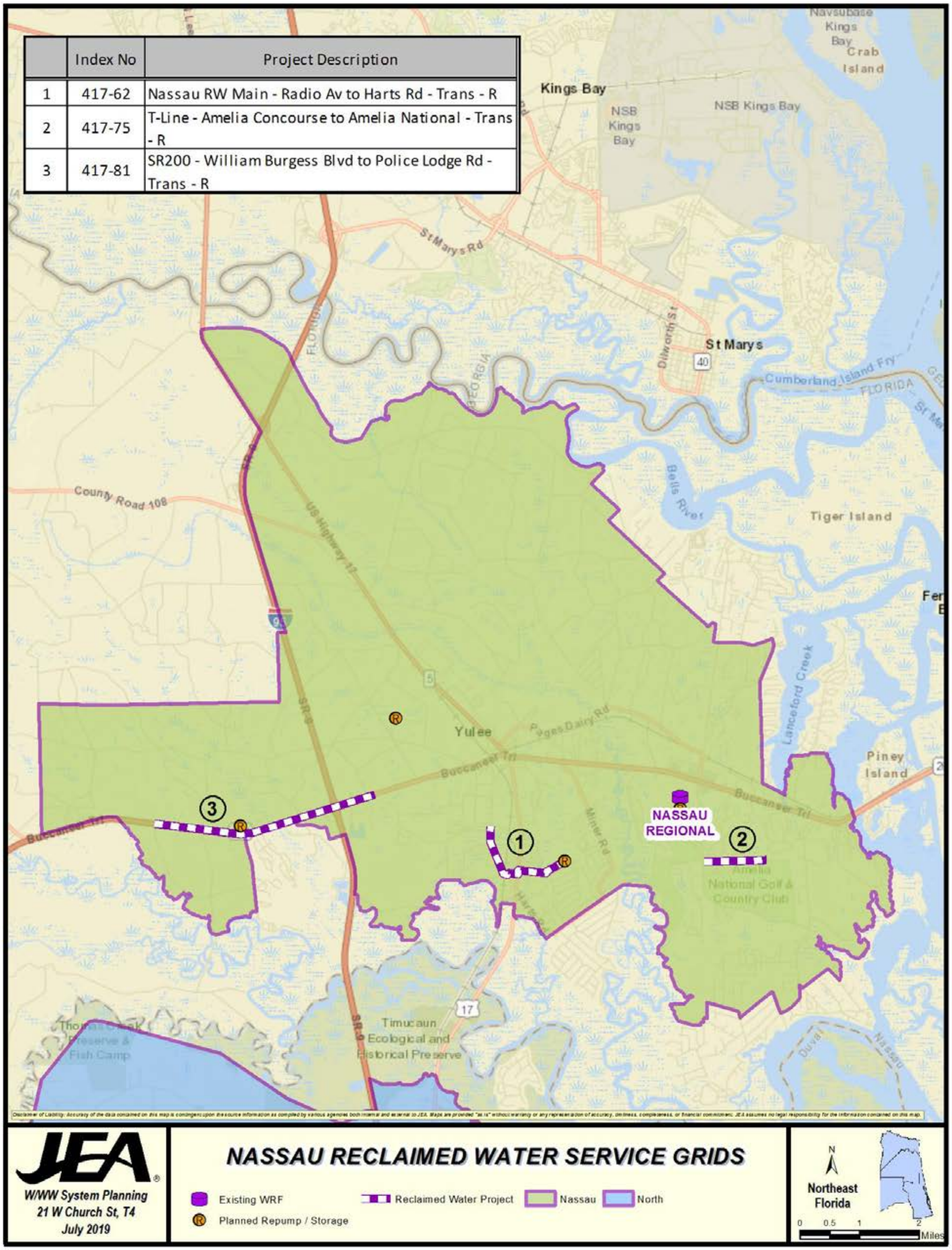
4.3 Reclaimed Water Service Grids

4.3.1 Nassau Reclaimed Water Grid

The Nassau Reclaimed Water Grid is depicted in Figure 22. The service grid limit coincides with the water and wastewater service area boundaries. Projects budgeted in the next 10 years have been added to supply reclaimed water to projected high growth areas within the service grid. These projects are shown on Figure 22 and listed with projected budget numbers in Table 15. Capital Improvement Projects estimated at approximately $4,600,000 are expected to commence in the next 10 years for the Nassau Reclaimed Water Service Grid.

In addition, reclaimed water mains are being included with Joint Project corridors where future growth is expected such as Chester Road. Where practical, new developments are required to install reclaimed water internal to the site.

Figure 22. Nassau Reclaimed Water Grid Service Area Map



	Index No	Project Description
1	417-62	Nassau RW Main - Radio Av to Harts Rd - Trans - R
2	417-75	T-Line - Amelia Concourse to Amelia National - Trans - R
3	417-81	SR200 - William Burgess Blvd to Police Lodge Rd - Trans - R

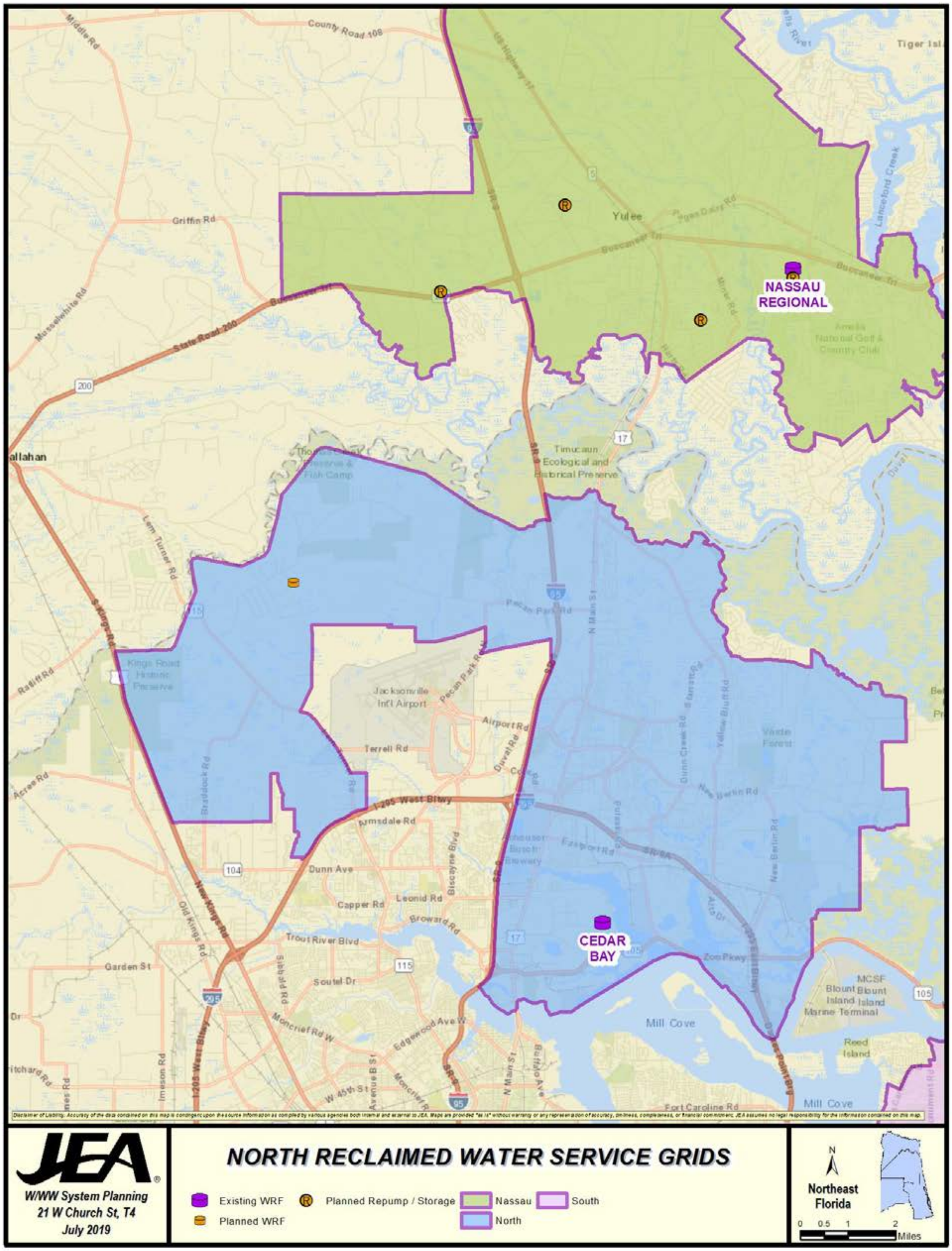
Table 15. List of Current Capital Improvement Projects for the Nassau Reclaimed Water Grid (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	417-62	Nassau RW Main - Radio Av to Harts Rd - Trans - R	$3,191	$2,409	$472	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	417-75	T-Line - Amelia Concourse to Amelia National - Trans - R	$800	$0	$0	$0	$0	$0	$144	$510	$146	$0	$0	$0
3	417-81	SR200 - William Burgess Blvd to Police Lodge Rd - Trans - R	$3,800	$0	$0	$0	$300	$2,100	$1,400	$0	$0	$0	$0	$0
		Totals	$4,600	$0	$0	$0	$300	$2,100	$1,544	$510	$146	$0	$0	$0

4.3.2 North Reclaimed Water Grid

The North Reclaimed Water Grid, as depicted in Figure 23, serves portions of Duval County around the District II (fka Cedar Bay) Wastewater Treatment Facility (WWTF). There are no budgeted projects in the service grid, however the system may be expanded with new development within the area. Currently, reclaimed water produced at this facility is non-public access and is provided for internal needs at the District II WWTF and pumped off-site to the Northside Generating Station (NGS) for use in cooling towers, scrubbers and other non-potable water needs.

Figure 23. North Reclaimed Water Grid Service Area Map



4.3.3 South Reclaimed Water Grid

The South Reclaimed Water Grid, as depicted in Figure 24, serves portions of Duval and St. Johns Counties south and east of the St. Johns River and west of the Intracoastal Waterway. This service grid includes the northern portion of St. Johns County which is experiencing high growth including the Nocatee and RiverTown projects. As a large portion of this grid consists of new development, this area has the most potential for reclaimed water usage as the reclaimed water infrastructure may be installed in conjunction with the initial development. Projects budgeted in the next 10 years include main extensions associated with Development and Utility Service Agreements for large developments within the South Grid. Additional projects have been added to increase the supply of reclaimed water to high growth areas in the southern portion of the service grid. These projects are shown on Figure 24 and listed with projected budget numbers in Table 16. Capital Improvement Projects estimated at approximately $84,646,000 are expected to commence in the next 10 years.

Figure 24. South Reclaimed Water Grid Service Area Map

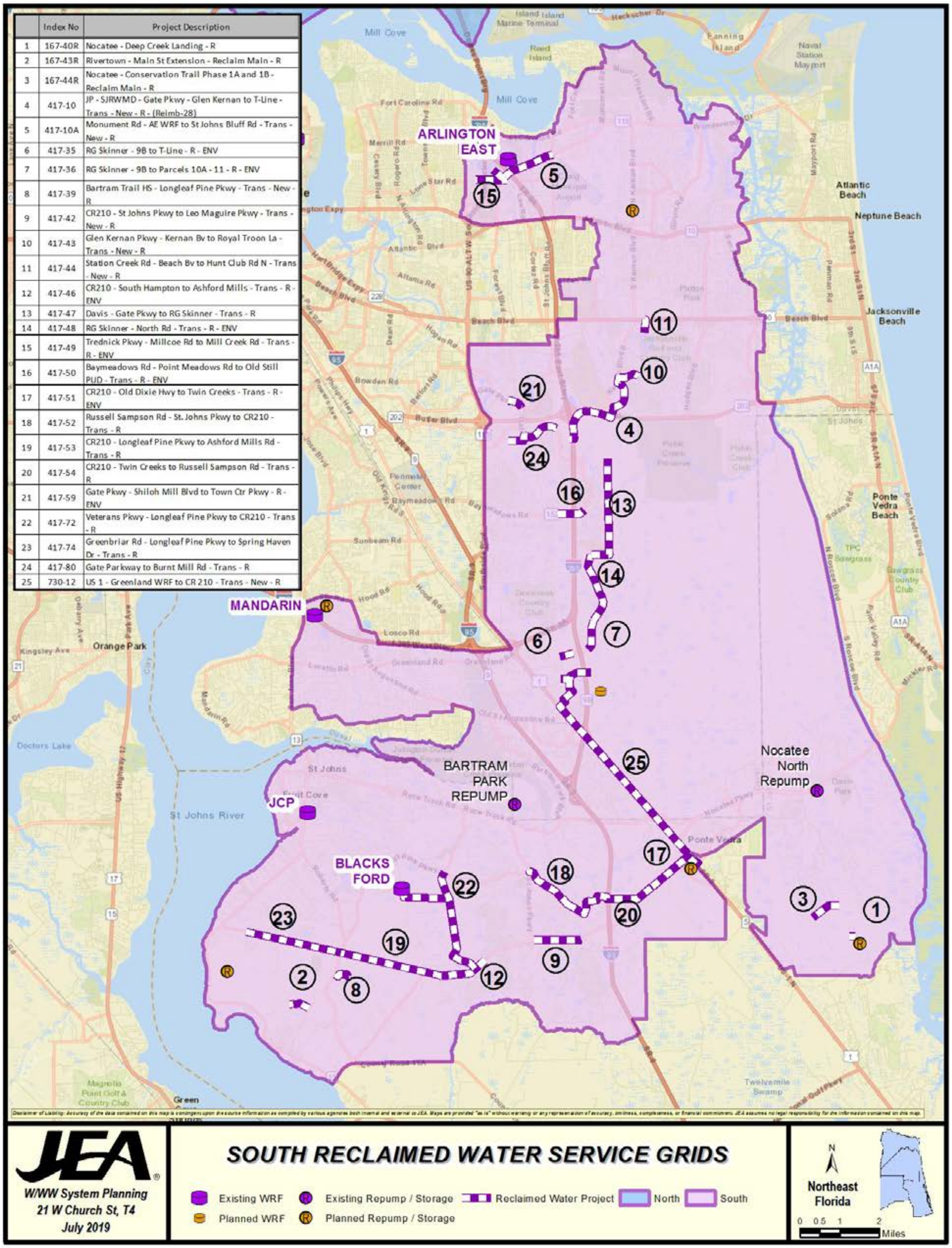


Table 16. List of Current Capital Improvement Projects for the South Reclaimed Water Grid (in $1,000s)

	Index No	Project Description	Current Estimate	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
1	167-40R	Nocatee - Deep Creek Landing - R	$284	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2	167-43R	Rivertown - Main St Extension - Reclaim Main - R	$161	$81	$80	$0	$0	$0	$0	$0	$0	$0	$0	$0
3	167-44R	Nocatee - Conservation Trail Phase 1A and 1B - Reclaim Main - R	$467	$234	$233	$0	$0	$0	$0	$0	$0	$0	$0	$0
4	417-10	JP - SJRWMD - Gate Pkwy - Glen Kernan to T-Line - Trans - New - R - (Reimb-28)	$8,662	$1,504	$4,433	$0	$0	$0	$0	$0	$0	$0	$0	$0
5	417-10A	Monument Rd - AE WRF to St Johns Bluff Rd - Trans - New - R	$3,300	$0	$0	$0	$0	$0	$300	$1,200	$1,800	$0	$0	$0
6	417-35	RG Skinner - 9B to T-Line - R - ENV	$500	$500	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
7	417-36	RG Skinner - 9B to Parcels 10A - 11 - R - ENV	$1,161	$1,161	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
8	417-39	Bartram Trail HS - Longleaf Pine Pkwy - Trans - New - R	$243	$0	$0	$0	$0	$0	$50	$193	$0	$0	$0	$0
9	417-42	CR210 - St Johns Pkwy to Leo Maguire Pkwy - Trans - New - R	$1,123	$0	$0	$0	$0	$0	$100	$409	$614	$0	$0	$0
10	417-43	Glen Kernan Pkwy - Kernan Bv to Royal Troon La - Trans - New - R	$262	$0	$0	$0	$0	$0	$0	$50	$212	$0	$0	$0
11	417-44	Station Creek Rd - Beach Bv to Hunt Club Rd N - Trans - New - R	$275	$0	$0	$0	$50	$225	$0	$0	$0	$0	$0	$0
12	417-46	CR210 - South Hampton to Ashford Mills - Trans - R - ENV	$2,350	$87	$203	$1,029	$1,031	$0	$0	$0	$0	$0	$0	$0
13	417-47	Davis - Gate Pkwy to RG Skinner - Trans - R	$9,400	$0	$250	$2,050	$5,993	$1,107	$0	$0	$0	$0	$0	$0
14	417-48	RG Skinner - North Rd - Trans - R - ENV	$1,750	$1,750	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
15	417-49	Trednick Pkwy - Millcoe Rd to Mill Creek Rd - Trans - R - ENV	$2,430	$382	$1,941	$0	$0	$0	$0	$0	$0	$0	$0	$0
16	417-50	Baymeadows Rd - Point Meadows Rd to Old Still PUD - Trans - R - ENV	$735	$623	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
17	417-51	CR210 - Old Dixie Hwy to Twin Creeks - Trans - R - ENV	$1,500	$0	$1,500	$0	$0	$0	$0	$0	$0	$0	$0	$0
18	417-52	Russell Sampson Rd - St. Johns Pkwy to CR210 - Trans - R	$3,008	$0	$0	$0	$0	$0	$200	$920	$1,888	$0	$0	$0
19	417-53	CR210 - Longleaf Pine Pkwy to Ashford Mills Rd - Trans - R	$5,000	$0	$0	$250	$2,050	$2,700	$0	$0	$0	$0	$0	$0
20	417-54	CR210 - Twin Creeks to Russell Sampson Rd - Trans - R	$3,000	$0	$0	$0	$0	$0	$300	$1,080	$1,620	$0	$0	$0
21	417-59	Gate Pkwy - Shiloh Mill Blvd to Town Ctr Pkwy - R - ENV	$766	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
22	417-72	Veterans Pkwy - Longleaf Pine Pkwy to CR210 - Trans - R	$7,300	$0	$0	$0	$0	$0	$300	$3,000	$4,000	$0	$0	$0
23	417-74	Greenbriar Rd - Longleaf Pine Pkwy to Spring Haven Dr - Trans - R	$3,500	$0	$0	$100	$660	$990	$100	$660	$990	$0	$0	$0
24	417-80	Gate Parkway to Burnt Mill Rd - Trans - R	$1,809	$143	$1,584	$0	$0	$0	$0	$0	$0	$0	$0	$0
25	730-12	US 1 - Greenland WRF to CR 210 - Trans - New - R	$25,660	$672	$2,840	$10,743	$10,743	$665	$0	$0	$0	$0	$0	$0
		Totals	$84,646	$7,137	$13,064	$14,172	$20,527	$5,687	$1,350	$7,512	$11,124	$0	$0	$0