Utility Master Plan

Englewood Water District

Englewood, FL
February 2017

2-22-2017

(SIGNATURE AND DATE)
TERRI S. HOLCOMB, PE
FL. PE LICENSE NO. 55505

ENGLEWOOD WATER
DISTRICT
UTILITY MASTER PLAN

Contents

Tables

Figures

Appendices

1 Executive Summary

1.1 Introduction

Master planning is especially critical for utilities projects because expenditures of capital to develop major infrastructure needs, including new facilities, need to occur several years before the new facilities can be placed into service. This Utility Master Plan assesses the District's water, wastewater, and reclaimed water service and facility needs for the next 20-year planning period from 2016 through 2036.

Utility Master Plan

A Utility Master Plan lays out, in an orderly fashion, a utility system's future infrastructure improvement program

The Utility Master Plan includes the following components:

Section 1 – Executive Summary

Section 2 – Introduction

Section 3 – Existing Facilities & Permit Conditions

Section 4 – Future Water Demands, Wastewater Flows, Reuse and Reject Disposal, and Regulatory Compliance

Section 5 – Capital Improvement Program

Section 6 – Capacity, Management, Operations and Maintenance Framework

Section 7 – Summary and Recommendations

Section 8 – References

Section 9 – Appendices

Preparation of this Utility Master Plan was done in collaboration with members of the Englewood Water District (District) Staff as well as representatives of local government partners including:

- Sarasota County
- Charlotte County
- City of North Port
- West Villages Improvement District; and
- Peace River Manasota Regional Water Supply Authority.

1.2 Existing Facilities and Permit Conditions

1.2.1 General

The District was created in 1959 and is classified as a political sub-division of the State of Florida under Chapter 2004-439. The District owns and operates a public utility that provides water, wastewater, and reclaimed water services within the unincorporated areas of Sarasota and Charlotte Counties generally known as Englewood, Grove City, and Manasota Key. The existing systems are generally composed of the following facilities:

1.2.2 Potable Water System

The District's potable water supply is made up of diverse sources including shallow potable groundwater and deeper brackish supply wells. Different water treatment systems are required for the fresh groundwater supply and the brackish groundwater. Lime softening is used to treat the fresh groundwater and reverse osmosis (RO) treatment is used for the brackish groundwater. In addition to the groundwater supply and treatment facilities, the District also has water storage, brackish water concentrate disposal, and potable water distribution facilities. The District's overall water supply, treatment and distribution facilities include six (6) groundwater wellfields; two (2) Water Treatment Plants with a combined capacity of 6.0 MGD; four (4) finished water storage tanks with a combined capacity of 7.5 million gallons; one (1) Deep Injection Well for brackish concentrate disposal; and over 260 miles of water transmission and distribution pipelines and appurtenances, with emergency interconnections with Sarasota and Charlotte Counties.

1.2.3 Domestic Wastewater and Reuse System

The District's domestic wastewater system starts with an extensive sewer collection system comprised of over 170 miles of gravity, low pressure, vacuum, and pressurized pipelines. In addition, the District maintains approximately 900 manholes, 3,800 vacuum pits, thirteen (13) low pressure stations and six (6) vacuum stations as part of the collection system. Wastewater flows are treated at the District's 3.0 MGD extended aeration Water Reclamation Facility. The wastewater effluent is sent to the 3.5 MGD permitted capacity slow-rate public access reuse system.

1.3 Future Water Demands, Wastewater and Reuse Flows, and Regulatory Compliance

1.3.1 Population Projections

Population projections for the District were developed to establish future water demands and wastewater flows. These estimates were based on information gathered from various sources to compile a comprehensive view of the District's historical and future population estimates. The methodology used to determine the Base Year Population and subsequent 20 year population forecasts is presented in Appendix A.

A trend based population projection was applied to the Base Year Population (2015), with a 1.5%, 1.0% and 0.8% growth rate for the near-term (1-5 year), mid-term (6-10 year) and long-term (11-20 year) planning horizons respectively. The existing and future District populations through 2036 are summarized in the following Table 1-1.

Table 1-1. Population Projections

	Total Population 2015 (Base Year)	Total Population 2016	Total Population 2021	Total Population 2026	Total Population 2031	Total Population 2036
Annual Growth Rate		1.5% (2015-2016)	1.5% (2017-2021)	1.0% (2022-2026)	0.8% (2027-2031)	0.8% (2032-2036)
Population	**36,611**	**37,160**	**40,032**	**42,074**	**44,220**	**46,018**

1.3.2 Water Supply Demands and Treatment Capacity Analysis

The Per Capita Model for forecasting water supply demands was used to determine the District's future water supply demands through 2036. Utilizing historical records of water production data as well as the Historical Functional Population Served reported on the District's Public Supply Annual Reports (PSARs) and 2015 census data, a demand of 70 gallons per capita/day was used. Including the water service to the Bocilla Utilities, the following Table 1-2 summarizes the total projected annual average and maximum day water supply demands for the District.

Table 1-2. Total Projected Water Supply Demands

Year	Projected Population	2011-2015 Average GPCD	Projected Annual Average Water Demands (MGD)	Bocilla Utilities Projected Annual Average Water Demands (MGD)	Total Annual Average Day Water Demands (MGD)	Projected Maximum Day Water Demands (MGD)*
2015	36,611	70	2.563	0.143	2.706	3.518
2016	37,160	70	2.601	0.152	2.753	3.579
2021	40,032	70	2.802	0.162	2.964	3.854
2026	42,074	70	2.945	0.171	3.116	4.051
2031	44,220	70	3.095	0.181	3.276	4.259
2036	46,018	70	3.221	0.191	3.412	4.436

* Historical Annual Average Daily Production to Annual Maximum Day Ratio of 1.3 was used.

Determination of the quantity and timing of projected water supply resources was accomplished by comparing the projected water supply demands shown in Table 1-2 above to the District's existing finished water capacity on an annual basis. Table 1-3 below identifies the current available water supply resources and associated water treatment plant capacities.

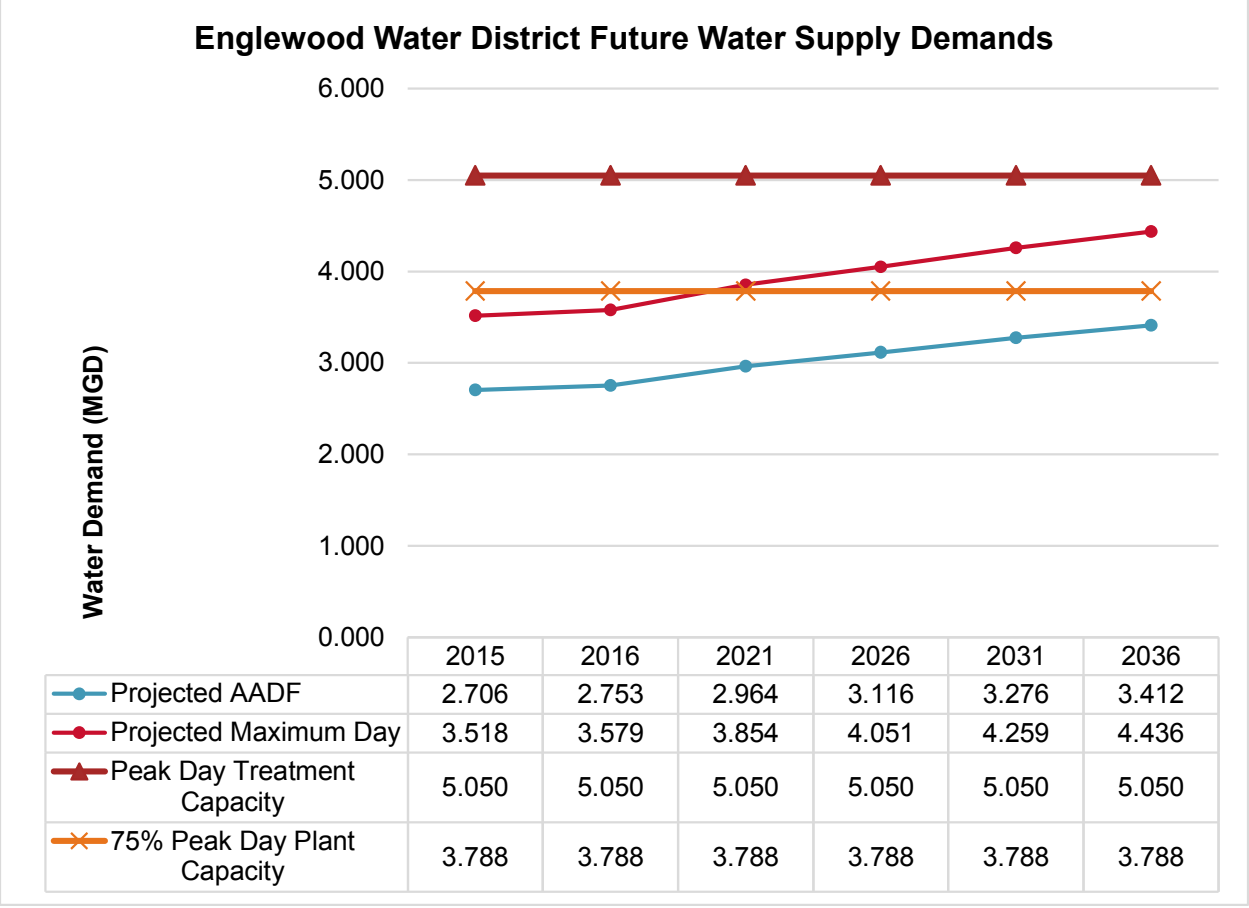
Table 1-3. Available Water Supply Resource Analysis

Supply	Permitted Source AAD (MGD)	Permitted Source Peak Day (MGD)	WTP Efficiency %	Finished Water AAD (MGD)	Finished Water Peak Day (MGD)
RO Wellfields 2,4	4.000	4.400	65	2.600	2.860
Wellfields 1,2,3,and 5	1.360	2.190	100*	1.360	2.190
Total Supply	**5.360**	**6.590**		**3.960**	**5.050**

* For the purpose of this Utility Master Plan, the efficiency of the Lime Softening Plant is considered to be 100%

A comparison of projected water supply demands to the District's current finished water capacity is shown in Figure 1-1.

Figure 1-1. Englewood Water District Future Water Supply Demands and Treatment Capacity



	2015	2016	2021	2026	2031	2036
Projected AADF	2.706	2.753	2.964	3.116	3.276	3.412
Projected Maximum Day	3.518	3.579	3.854	4.051	4.259	4.436
Peak Day Treatment Capacity	5.050	5.050	5.050	5.050	5.050	5.050
75% Peak Day Plant Capacity	3.788	3.788	3.788	3.788	3.788	3.788

In accordance with paragraph 62-555.348(3) (a), Florida Administrative Code (F.A.C.), an initial capacity analysis report must be submitted to the Department of Environmental Protection (DEP) within six months after the month in which the total maximum-day quantity of finished water produced by the District's water treatment plants exceeds seventy-five percent (75%) of the total permitted maximum-day operating capacity of the plants. Utilizing the combined permitted plant peak day capacity of 5.050 MGD from Table 1-3 above, when the District has a finished water peak day of 3.788 MGD, an initial capacity analysis report will need to be submitted to the DEP within six months. Based on the projected water supply demands, the District's Peak Month will near 75% of the current permitted peak day capacity in 2020.

When compared to the District's annual average treatment capacity, water demand projections for the next 20 years indicate that a new water source and treatment capacity will not be needed until after 2036. It is noted that new water supply sources and treatment capacities may take up to 10 years to permit, design and construct. It is recommended that the District include in its capital improvement plan the conceptual planning, permitting, design and construction of a new or expansion of a water supply source by 2026.

1.3.3 Wastewater Flow Projections and Treatment Analysis

To determine future wastewater flows, the population projections were converted to equivalent residential connections (ERCs) based on the average family household size of 2.4 as determined from 2015 Census data.

To estimate the flows associated with each ERC, a comparison was made between the previously published recommendation of 121 GPD/ERC in the District's 2005 Capacity Analysis Report (CH2MHill), and the District's 2015 Annual Average Daily Flows. The Annual Average Daily flow in 2015 was 1.471 MGD (Total 1.587 MGD – Sandalhaven and Charlotte County flows of 0.105 and 0.001 respectively). The estimated 2015 Base Population is 36,611. This equals approximately 40 gpcd. Using 2.4 people per household equates to an estimated flow of 96 GPD/ERC.

Table 1-4. Comparison of GPD/ERC

Source	Flow Rate (GPD/ERC)
2005 Capacity Analysis Report (CH2MHill)	121
2015 AADF/2015 Base Population	96

In developing a recommended flow per ERC for future flow calculations, consideration was given to the anticipated areas of growth within the District along with recognition that not all residences within the District's service area have sewer service, yet those residences were included in the determination of "Base Population" calculation above – skewing the flow rate down.

Several new developments have been identified that are zoned primarily single family residential, which would indicate that the reported household size of 2.4 may increase as more families move into the area.

It was determined to use a conservative approach and apply the previous estimate of 121GPD/ERC to calculate the District's projected wastewater flows.

In addition to the areas within the District's service boundary, additional wastewater flows will be collected from Charlotte County and Utilities, Inc. of Sandalhaven. The District's original bulk sewer agreement with Charlotte County (2005) was for 400,000 gpd, but with the new 2014 Interlocal Agreement, no capacity limit is enumerated. The Utilities, Inc. of Sandalhaven agreement with the District has an amended contract limit of 500,000 gpd, however at the time of this report, the utility has only paid for 300,000 gpd of the allocated capacity.

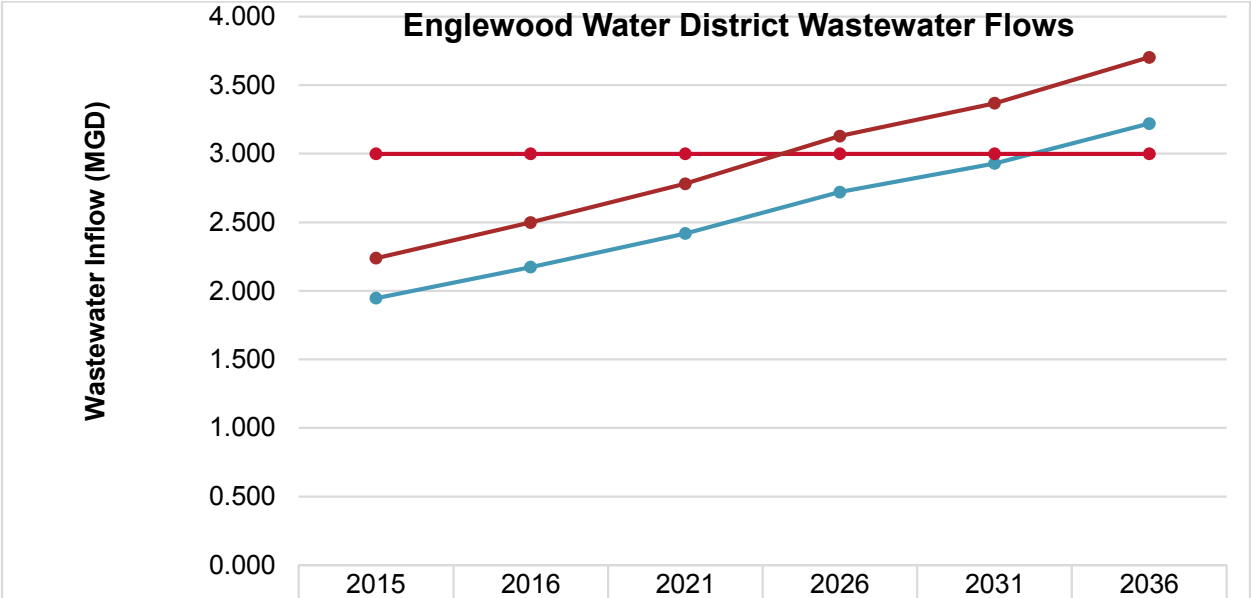
Utilizing the population projections presented in Section 4.0 of this Report, the assumption of 2.4 people per household and 121GPD/ERC, and the established 1.15 ratio of 3-MMADF to AADF, the following table identifies the projected wastewater flows within the District, as well as incremental flows from Charlotte County and Sandalhaven projected to a limit of the original or currently contracted flows.

Table 1-5. Projected Wastewater Flows

Year	Population (District Service Area)	ERC	Projected District Wastewater Flows (AADF) (MGD)	Charlotte County Allocation (MGD)	Sandalhaven Allocation (MGD)	Total Projected AADF (MGD)	Total Projected 3-MMADF (MGD)
2015	36,611	15255	1.846	0.001	0.1	1.947	2.239
2016	37,160	15483	1.873	0.1	0.2	2.173	2.500
2021	40,032	16680	2.018	0.1	0.3	2.418	2.781
2026	42,074	17531	2.121	0.2	0.4	2.721	3.129
2031	44,220	18425	2.229	0.3	0.4	2.929	3.369
2036	46,018	19174	2.320	0.4	0.5	3.220	3.703

As shown below, the District's AADF is projected to exceed the plants current permitted AADF capacity after 2031. It is recommended that the District perform an update to the 2006 Capacity Analysis Report, including the plant loading and biological performance analysis, to determine if the plant can be rerated at a higher flow. Such a rerating could defer the need for facility expansion beyond 2031.

Figure 1-2. Englewood Water District Wastewater Flows



	2015	2016	2021	2026	2031	2036
AADF	1.947	2.173	2.418	2.721	2.929	3.220
Permitted AADF	3	3	3	3	3	3
MMADF	2.239	2.500	2.781	3.129	3.369	3.703

1.4 Capital Improvement Program

The Capital Improvement Program (CIP) will ensure that the District plans for and maintains infrastructure assets in a sound, functioning condition. The CIP has been developed to include the projects necessary to implement the recommended water, wastewater and reclaimed water programs.

Rapid Assessments

To evaluate the District's existing assets, a Rapid Assessment was completed at each of the District's key facilities to determine critical repair and rehabilitation requirements. The scope of this task required visual condition inspections of each above ground facility utilizing professional personnel familiar with the design and operation of reverse osmosis and lime softening water treatment plants, wastewater treatment processes and operation, distribution, collection and pumping system components as well as water supply, aquifer storage and recovery and deep injection wells. Each facility inspected had a dedicated condition assessment team including a licensed utility operator to complete the assessment utilizing industry accepted condition assessment forms.

The intent of the Rapid Assessment is to provide an evaluation of the condition of the District's facilities by conducting field inspections, performing a desktop estimate of remaining life, developing a cost opinion range for equipment renewal, modifications and capital projects for each facility, and providing near-term (Year 1-4), mid-term (Year 5 to 10) and long-term (Year 11-20) capital improvement projects necessary to

meet service demands. The facilities were grouped into the following six facility service types:

- Water Treatment Plants - Reverse Osmosis and Lime Softening
- Water Distribution System
- Wells and Well Fields
- Wastewater Reclamation Treatment Facility
- Wastewater Reclamation Transmission
- Wastewater Collection System – Sewer Lift and Vacuum Stations

A complete list of all resulting projects with cost estimates, brief project descriptions and dependencies is provided in Appendix C - TASK 3 Condition Assessment Report.

The following tables identify the comprehensive list of recommended Improvements by Planning Period.

1.4.1 Near-Term (Year 1 to 4) Improvements

Table 1-6. Year 1-4 Recommended Capital Improvements

Project ID	Improvement	Facility / Location	Cost Estimate
RO-04	Develop a facility one-line electrical diagram	RO Bldg.	$ 35,000
RO-05	Commission a Power Load Analysis and Arc-Flash Study	RO Plant	$ 75,000
RO-07	Upgrade older power distribution and motor control centers	RO Plant	$ 280,000
RO-11	Install new degasifier 2	RO Plant	$ 205,000
RO-18	SCADA and PLC upgrades	RO Plant	$ 120,000
LP-01	Replace raw storage diffuser tray and support structure	RWS Tank	$ 95,000
LP-02	Repair and replace internal coating raw water storage tank	RWS Tank	$ 35,000
LP-03	Plant 3 - ten year rehabilitation	LS Plant	$ 270,000
LP-04	Plant 2 - ten year rehabilitation	LS Plant	$ 295,000
LP-06	Plant 2 - Filter rehabilitation	LS Plant	$ 62,000
LP-08	Develop a facility one-line electrical diagram	LS Plant	$ 25,000
LP-09	Commission a Power Load Analysis and Arc-Flash Study	LS Plant	$ 60,000
LP-11	Upgrade older power distribution and motor control centers	Old HSP Room	$ 177,000
LP-14	Retrofit two (2) Newer High Service Pump motors with VFD' s	New HSP Room	$ 90,000
LP-17	Commission a LSP Facility plan to determine upgrades or decommissioning	LS Plant	$ 150,000

Project ID	Improvement	Facility / Location	Cost Estimate
LP-20	SCADA and PLC upgrades	LS Plant	$ 82,000
WL-01	Install telemetry communications to RO supply water wells	RO WF2	$ 45,000
WRF-06	Blower upgrades phase 1	WRF Plant	$ 385,000
WRF-13	Trace and label power and control wire terminations. Update electrical one-line diagram	WRF Plant	$ 35,000
WRF-16	Re-use Pond Pumping Rehabilitation	Re-Use Pond Pump Station	$ 128,000
LS-02	LS121 Holiday Ventures Capacity Upgrade Study and Facility Plan	LS121-Holiday Ventures	$ 100,000
LS-05	Purchase bypass pump and install on-site bypass pumping	LS121-Holiday Ventures	$ 65,000
CL-01	Replace Beach Road force main	Collection	$ 645,000
CL-04	Manhole rehabilitations - Reline brick manholes with GML	Collection	$ 120,000
CL-06	Install forcemain isolation valve near Elm St.	Collection	$ 67,000
RU-01	Reuse hydraulic analysis and operational review for service improvements	LS121-Holiday Ventures	$ 85,000
RU-03	Rehabilitate re-use booster station at Holiday Ventures	LS121-Holiday Ventures	$ 100,000
DS-06	System modifications to eliminate bottleneck at Roundabout	Water Dist	$ 315,000
DS-07	System modifications to provide redundancy at Forked Creek	Water Dist	$ 230,000
EWD-01	Select, purchase and execute an EAMS / CMMS	EWD (Water ½ Wastewater ½ Program)	$ 72,000
			$ 4,448,000

1.4.2 Mid-Term (Year 5 -10) Improvements

The following Table 1-6 includes those projects recommended to take place in the mid-term timeframe. The total estimated cost is $18,907,000. It is noted that recommended project LS-03, Design and build upgraded LS121 – Holiday Ventures does not have a cost estimate shown. This project (and its associated cost) will be determined as part of a "precursor" project identified in the Near-Term (1-4) Improvement list – LS02, Lift Station 121 – Capacity Upgrade Study and Facility Plan.

Table 1-7. Mid-term (Year 5-10) Recommended Capital Improvements

Project ID	Improvement	Facility / Location	Cost Estimate
RO-06	Upgrade Standby Generator and Power Distribution	RO Plant	$ 965,000
RO-10	Replace degasifier 1	RO Plant	$ 265,000

Project ID	Improvement	Facility / Location	Cost Estimate
LP-05	Plant 1 - ten year rehabilitation	LS Plant	$ 325,000
LP-10	Upgrade HSP standby generator and switchgear	Old HSP Room	$ 58,000
LP-12	Replace HSP buried piping under older HSP Bldg. to tanks	Old HSP Room	$ 142,000
LP-13	Older High Service Pump Replacements (3)	Old HSP Room	$ 172,000
WL-02	Install telemetry communications to LP supply water wells	WF1, WF3, WF5	$ 45,000
WL-04	Rehab, replacement, or abandonment of WF1 supply wells	WF1	$ 45,000
WL-08	Plug and Abandon IMW-1 and SMW-1	WRF Plant	$ 30,000
WRF-04	Plant 4 Rehabilitation - 15 year rehabilitation	Plant 4	$ 350,000
WRF-07	Blower upgrades phase 2	WRF Plant	$ 120,000
WRF-11	Chlorine contact basin expansion	CL2 Contact Basin	$ 220,000
WRF-15	Standby Power / Power Distribution Improvements	WRF	$ 90,000
WRF-17	Install two smaller horsepower variable frequency dive pumps	Effluent Pump Station	$ 195,000
LS-03	Design and build upgraded LS121 - Holiday Ventures	LS121-Holiday Ventures	$ TBD
LS-04	Standby generator replacement (up size for Re-use booster station)	LS121-Holiday Ventures	$ 200,000
LS-08	Instrumentation upgrades - install flow meters or pressure indication	Various	$ 125,000
CL-02	Install new force main from Holiday Ventures to point TBD	Collection	$ 8,500,000
CL-05	North Beach sewer service study and evaluation	Collection	$ 65,000
CL-08	Purchase new CCTV camera and trailer	Collection	$ 120,000
RU-02	Install new re-use storage tank at Holiday Ventures	LS121-Holiday Ventures	$ 950,000
RU-04	Install new re-use forcemain from WRF to new HV storage tank	LS121-Holiday Ventures	$ 1,000,000
DS-04	AC Pipe replacement on Beach - Charlotte County	Water Dist	$ 2,440,000
DS-05	AC Pipe replacement on Beach - Sarasota County	Water Dist	$ 2,330,000
DS-08	Service line extension to Manasota development (2000 homes)	Water Dist	$ 80,000
DS-12	Water Storage Study - needs analysis & conceptual design	Water Dist	$ 75,000
			$18,907,000

1.4.3 Long-Term (Year 11-20) Improvements

The following table includes those projects recommended to take place in the long-term timeframe. The total estimated cost is $4,336,000. It is noted that project RO-15; LP-18 and LP-19 are dependent upon the recommendations of Near-Team (1-4) improvement, LP-17 Facility Plan for the Lime Softening Plant.

Table 1-8. Long-Term (Year 11-20) Recommended Capital Improvements

Project ID	Improvement	Facility / Location	Cost Estimate
RO-13	RO Plant - Capacity Upgrade (new RO skids)	RO Plant	$ 1,630,000
RO-14	RO Plant - Pump modifications	RO Plant	$ 93,000
RO-15	New chemical feed process if lime plant decommissioned	RO Plant	$ TBD
RO-16	Replace Cl2 gas system due to risk / liability decision	RO Plant	$ 125,000
RO-17	Upsize plant raw water piping - eliminate bottleneck for Well F 2	RO Plant	$ 84,000
LP-07	Replace Shelter / Bldg. - Lime Process	Lime Bldg.	$ 59,000
LP-16	Instrument and analyzer upgrades - ten year renewal	LS Plant	$ 35,000
LP-18	Decommission Lime Softening Plant	LS Plant	$ TBD
LP-19	Upgrade Lime Softening Plant	LS Plant	$ TBD
WRF-02	Odor control system rehabilitation at headworks	Headworks	$ 260,000
WRF-05	Plant 1 and 2 Rehabilitation - 15 year rehabilitation	Plant 1 and 2	$ 600,000
WRF-12	Replace Cl2 gas system due to risk / liability decision	CL2 Contact Basin	$ 125,000
VS-08	Standby generator rehabilitation	Various	$ 200,000
LS-13	Potential elimination of LS-113 Englewood Rd	Englewood Road	$ 125,000
CL-07	Sewer extensions to alternate areas	Various Locations	$ TBD
DS-13	Design and build water storage tank(s)	Water Dist	$ 1,000,000
			$ 4,336,000

1.4.4 Project Spanning 20 Year Horizon (Year 1-20) Capital Improvements

The following Table 1-8 includes those projects recommended to take place throughout the 20- year time-frame, to be initiated based on availability of funding. The total estimated cost is $6,050,000.

Table 1-9. 20 Year Horizon (Year 1-20) Recommended Capital Improvements

Project ID	Improvement	Facility / Location	Cost Estimates
WRF-01	Replacement of buried liquid process piping	WRF Plant	$ 205,000
CL-03	Clay pipe re-line / replacement	Collection	$ 5,000,000
DS-02	Line extension program	Water Dist	$ 345,000
DS-09	Looping projects - south service area	Water Dist	$ 200,000
DS-10	Looping projects - north service area	Water Dist	$ 300,000
			$ 6,050,000

1.4.5 Recommended Capital Improvements by System Program

The following table summarizes the total costs between water and wastewater service programs.

Table 1-10. Recommended Capital Improvement Costs

	Near-Term Year 1-4	Mid-Term Year 5-10	Long-Term Year 11-20	Year 1-20	Total
Water Services	$ 2,682,000	$ 6,942,000	$ 3,026,000	$ 845,000	$ 13,495,000
Wastewater Services	$ 1,766,000	$ 11,965,000	$ 1,310,000	$ 5,205,000	$ 20,246,000
Total	**$ 4,448,000**	**$ 18,907,000**	**$ 4,336,000**	**$ 6,050,000**	**$ 33,741,000**

1.4.6 Renewal Funded Projects

The following table summarizes the projects not considered to be part of the capital funded program, but necessary to maintain asset service life. These include projects addressing annual operation and maintenance or replacement and renewal improvements in the near, mid and long-term planning horizons.

Table 1-11. Recommended O&M Renewal Improvement Costs

	Near-Term Year 1-4	Mid-Term Year 5-10	Long-Term Year 11-20	Year 1-20	Total
Water Services	$ 387,000	$ 258,000	$ 82,000	$ 4,190,000	$ 4,917,000
Wastewater Services	$ 304,000	$ 287,000	$ 175,000	$ 1,125,000	$ 1,891,000
Total	**$ 691,000**	**$ 545,000**	**$ 257,000**	**$ 5,315,000**	**$ 6,808,000**

1.5 Capacity, Management, Operations and Maintenance (CMOM) Framework

The District is in the process of developing and adapting a CMOM program to maintain compliance with all rules and regulations as set forth in Florida Administrative Code Chapter 62-604 and ensure that the District's service level objectives and capacity demands are met. It should be noted that a CMOM program is dynamic and staff will continue to update portions of this program.

In order to facilitate the development and on-going administration of the CMOM Program, an abbreviated outline is provided in Section 6 of the Utility Master Plan.

The full document is provided for reference in Appendix D and the working document will be under the control of the District's Wastewater Operations Manager.

1.6 Summary and Recommendations

The District's current potable water sources and treatment facilities have adequate capacity to provide the projected water demands through the 20 year planning horizon. Additional improvements to the water supply and treatment facilities will be required to maintain the systems at their rated capacities. Water transmission and distribution pipelines are adequate to provide acceptable operating conditions through the future demand projections. However, various improvements to the system will be necessary to maintain water quality, pressures and increase reliability of the system.

The District's projected wastewater annual average daily flows will exceed the WRF's current rated capacity by 2032, or in 16 years. In addition, improvements to the WRF's infrastructure will be required to maintain the facility at its existing rated capacity. Wastewater collection infrastructure improvements will be necessary to maintain the integrity and reliability of the system.

The District's existing reclaimed water pumping and storage facilities have adequate permitted capacities to accept effluent flows through the 20 year planning horizon. Reclaimed water transmission, distribution and pump station improvements will be necessary to maintain adequate pressure and increase reliability.

It is recommended that the District implement the capital improvement program, as well as the overall utility system recommendations outlined in Section 7 of this Utility Master Plan.

Table 1-12. Summary of Capital Costs and Project Timing

Facilities	Near-Term (1-4 years)	Mid-Term (5-10 years)	Long-Term (11-20 years)	Years 1-20	Total
Utility Wide	$72,000				$72,000
RO Plant	$715,000	$1,230,000	$1,932,000		$3,877,000
Lime Softening Plant	$1,341,000	$697,000	$94,000		$2,132,000
Water Distribution	$545,000	$4,925,000	$1,000,000	$845,000	$7,315,000
Wells	$45,000	$90,000			$135,000
Water Reclamation Facility & Reuse	$733,000	$2,955,000	$985,000	$205,000	$4,878,000
Lift & Vacuum Stations	$165,000	$325,000	$325,000		$815,000
Collection System	$832,000	$8,685,000		$5,000,000	$14,517,000
Total	**$4,448,000**	**$18,907,000**	**$4,336,000**	**$6,050,000**	**$33,741,000**

Table 1-13. Summary of Operation and Maintenance Costs by System and Timing

	Near-Term Year 1-4	Mid-Term Year 5-10	Long-Term Year 11-20	Year 1-20	Total
Water Services	$ 387,000	$ 258,000	$ 82,000	$ 4,190,000	$ 4,917,000
Wastewater Services	$ 304,000	$ 287,000	$ 175,000	$ 1,125,000	$ 1,891,000
Total	**$ 691,000**	**$ 545,000**	**$ 257,000**	**$ 5,315,000**	**$ 6,808,000**

2 Introduction

2.1 Authorization

The Englewood Water District (District) retained HDR Engineering, Inc. (HDR) to provide professional services to develop a Utility Master Plan. This Utility Master Plan assesses the District's water, wastewater, and reclaimed water service and facility needs for the next 20-year planning period from 2016 through 2036. The Utility Master Plan consists of nine sections as follows:

Utility Master Plan

A Utility Master Plan lays out, in an orderly fashion, a utility system's future infrastructure improvement program.

Section 1 – Executive Summary; provides an overview of the information and recommendations developed in the other sections.

Section 2 – Introduction; provides the background, goals, and scope of this Utility Master Plan.

Section 3 – Existing Facilities & Permit Conditions;

Section 4 – Future Water Demands, Wastewater Flows, Reuse and Reject Disposal, and Regulatory Compliance;

Section 5 – Capital Improvement Program;

Section 6 – Capacity, Management, Operations and Maintenance Framework;

Section 7 – Summary and Recommendations;

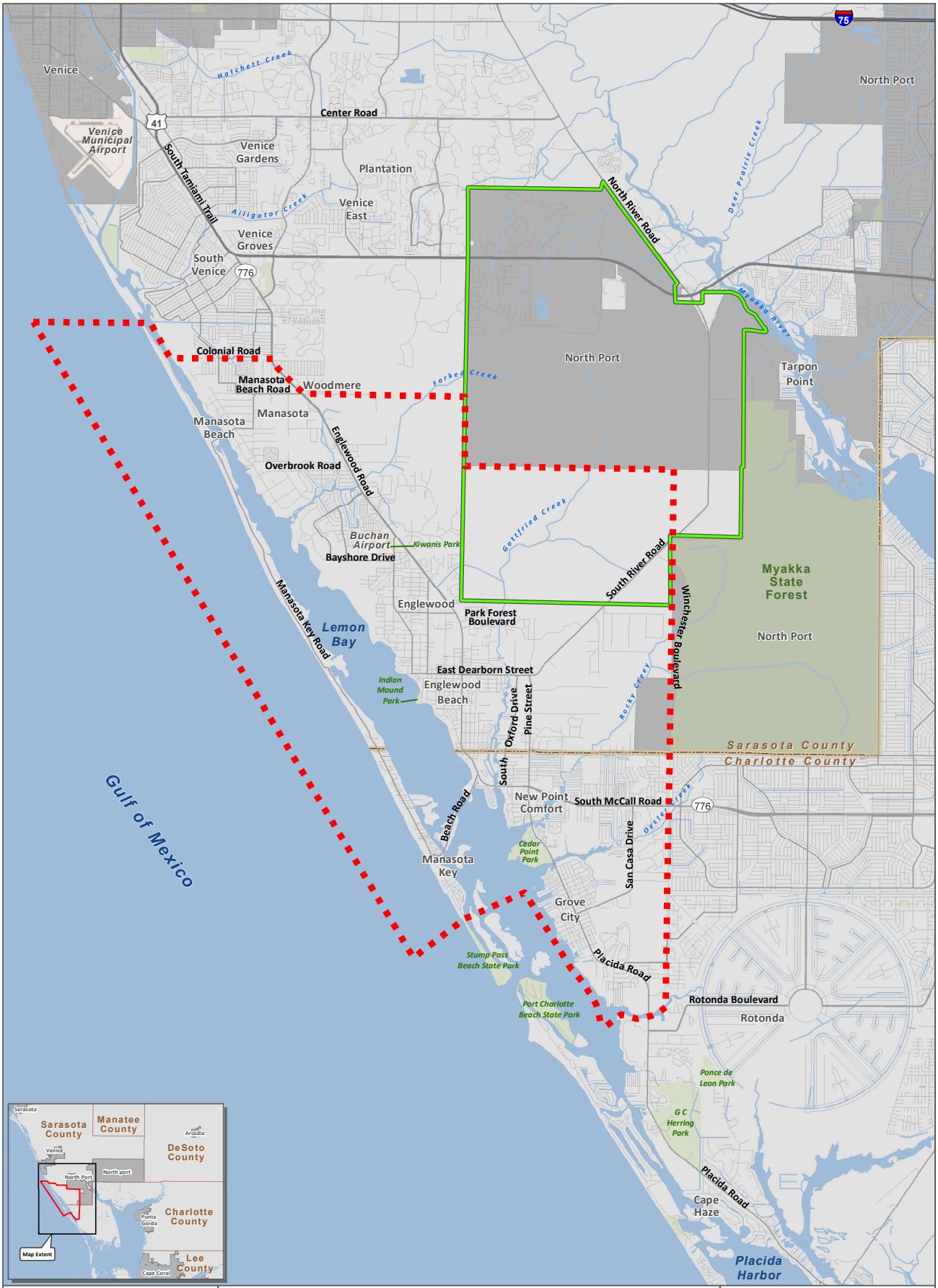
Section 8 – References

Section 9 – Appendices

The goal of this Utility Master Plan is to provide the District with a "road map" to guide their Board and staff on future planning of the utility's infrastructure. The Utility Master Plan documents the District's current facilities and the condition of those facilities, and assesses the need for and timing of improvements to provide adequate and reliable water, sewer and reclaimed water service to the District's customers.

2.2 Background

The District was created in 1959 and is classified as a political sub-division of the State of Florida under Chapter 2004-439. The District owns and operates a public utility that provides water, wastewater, and reclaimed water services within the unincorporated areas of Sarasota and Charlotte Counties generally known as Englewood, Grove City, and Manasota Key. The District's current service area boundary encompasses approximately 44.5 square miles and is illustrated in *Figure 2-1*. Initially the District only provided potable water service to its customers; however, with the acquisition of the West Charlotte Utilities Wastewater Treatment Plant (WCU WWTP) in 1994, the District now provides wastewater collection and treatment for portions of its water customers who are connected to the central sanitary sewer system, as well as reclaimed water thorough a public access irrigation system.



UTILITY MASTER PLAN CURRENT SERVICE AREA BOUNDARY

FIGURE 2-1

PATH: J:\2016\16-077_ENGLEWOOD_UTILITIES_MASTERPLAN_(HOLCOMB)\7.2_WORK_IN_PROGRESS\MAP_DOCS\FINAL\16_077_ENGLEWOOD_LOCATION_MAP_11X17.MXD - USER: HDIXON - DATE: 1/17/2017

The District currently has four (4) interlocal agreements; two (2) for the delivery of potable water to the following bulk customers: Bocilla Utilities for the residents of Don Pedro and Knight/Palm Island in Charlotte County; and Japanese Gardens, a mobile home park in the northwest portion of the service area; and two (2) bulk agreements to provide sewer service to Charlotte County Utilities and Utilities, Inc. of Sandalhaven.

It is noted that the District does not currently have a Water Supply Master Plan; however, a Water Reclamation Facility Expansion Planning Report (CH2MHill) was completed in July 2006.

2.3 Coordination with Local Government Partners

As southwest Florida continues to grow in population, collaboration with local public water and wastewater utilities has become necessary to ensure that planning for adequate and sustainable water resources is being regionally coordinated. As part of the Utility Master Plan development process, District staff met with several public water and wastewater utilities within Sarasota and Charlotte Counties to discuss and coordinate future water resource planning efforts. The following paragraphs summarize those discussions.

Sarasota County

Sarasota County supplies potable water and sanitary sewer service to the unincorporated areas of the county, except for those areas served by the District and residents on private wells or septic systems. In October, 2016 the County adopted their most recent Comprehensive Plan Update. The Public Utilities Element of the Plan consists of chapters addressing the provision of potable water, sanitary sewer, and stormwater management. As part of the potable water sub-element, the County estimated that in 2015 approximately 27,446 people resided in the portion of the District within unincorporated Sarasota County.

The County's current water supply sources include three county brackish groundwater facilities (University Parkway Wellfield; Carlton Wellfield; and Venice Gardens Wellfield) and two additional sources through master agreement contracts with the Peace River Manasota Regional Water Supply Authority and Manatee County.

As part of the County's 10-Year Water Supply Facilities Work Plan (Carollo, December 2015), a summary of average annual water demands, treatment capacity, and permitted quantities was developed for the District. It was determined that the District's facility design and permitted capacities were sufficient to meet the potable water demands of the District through 2025.

There is currently a potable water interconnection between the District and Sarasota County's water system. However, due to pressure differentials between the two systems, additional infrastructure improvements would be required to allow water to be efficiently transferred between the County and the District.

Charlotte County

Charlotte County supplies potable water and sanitary sewer service to the unincorporated areas of the county, except for those areas served by the District and residents on private wells or septic systems. In June, 2011 the County adopted their Charlotte 2050 Comprehensive Plan. The Infrastructure Element addresses the provision of urban services such as potable water, sewer, stormwater, and solid waste disposal, as well as aquifer recharge protection. As part of the potable water sub-element, the County projected that in 2015, 14,234 people would reside in the portion of the District within unincorporated Charlotte County.

The County currently has two water supply sources, a county-owned brackish water wellfield located at their Burnt Store Facility which serves the area located in the southwestern portion of the county and is currently isolated from the remainder of the system; and a master agreement with the Peace River Manasota Regional Water Supply Authority to serve the area north and west of the Peace River.

There is currently a potable water interconnection between the District and Charlotte County's water system. However, due to pressure differentials between the two systems, additional infrastructure improvements would be required to allow water to be efficiently transferred between the County and the District.

In addition, Charlotte County has a 20-year Interlocal Agreement (June 2014) with the District for bulk sewer service for the area known as "Englewood East" through year 2034. The Agreement states that the District shall provide sanitary sewer service to the Englewood East area through a connection to the County's wastewater collection system. The District owns, operates and maintains a master flow meter at this connection and charges the County the applicable bulk service fees. At the end of the 20 year term, the parties have the ability to extend the Agreement on an annual basis. It is noted that there is no capacity limit listed in the Agreement.

City of North Port

The City of North Port supplies potable water and sanitary sewer service to areas within the incorporated City limits as well as annexed areas including the West Villages Improvement District and approximately 3,000 properties outside the City limits. Discussions with City staff indicate that they are in the process of updating the City's 2008 Comprehensive Plan, including the Potable Water and Sanitary Sewer Elements.

The City's current water supply sources include surface water from the Myakkahatchee Creek, groundwater from a brackish water wellfield and an additional source through a master agreement contract with the Peace River Manasota Regional Water Supply Authority. The City anticipates acquiring an additional water supply source, the brackish water wellfield and RO facility currently under design by the West Villages Improvement District, with ownership estimated by 2025.

The District does not currently have a potable water interconnect with the City. However, it was noted during discussions that, given the proximity and timing of the proposed West Villages Improvement District's water supply facilities, there may be

opportunities in the future to coordinate pipeline routing and water transfer studies to identify system connection points.

West Villages Improvement District

The West Villages Improvement District (West Villages) encompasses approximately 11,000 acres in the City of North Port and southwest Sarasota County. They are a limited, single and specialized purpose Local Government entity whose purpose is to provide infrastructure, including community development systems, facilities, services, projects, and improvements to the residents of the West Villages. Currently the residents are provided potable water and sanitary sewer service through connections to the City of North Port's public system. As stated earlier, the West Villages is currently authorized to construct a proposed brackish ground water source and reverse osmosis water treatment facility to provide potable water for the additional projected demands and is anticipated to begin supplying potable water in 2024.

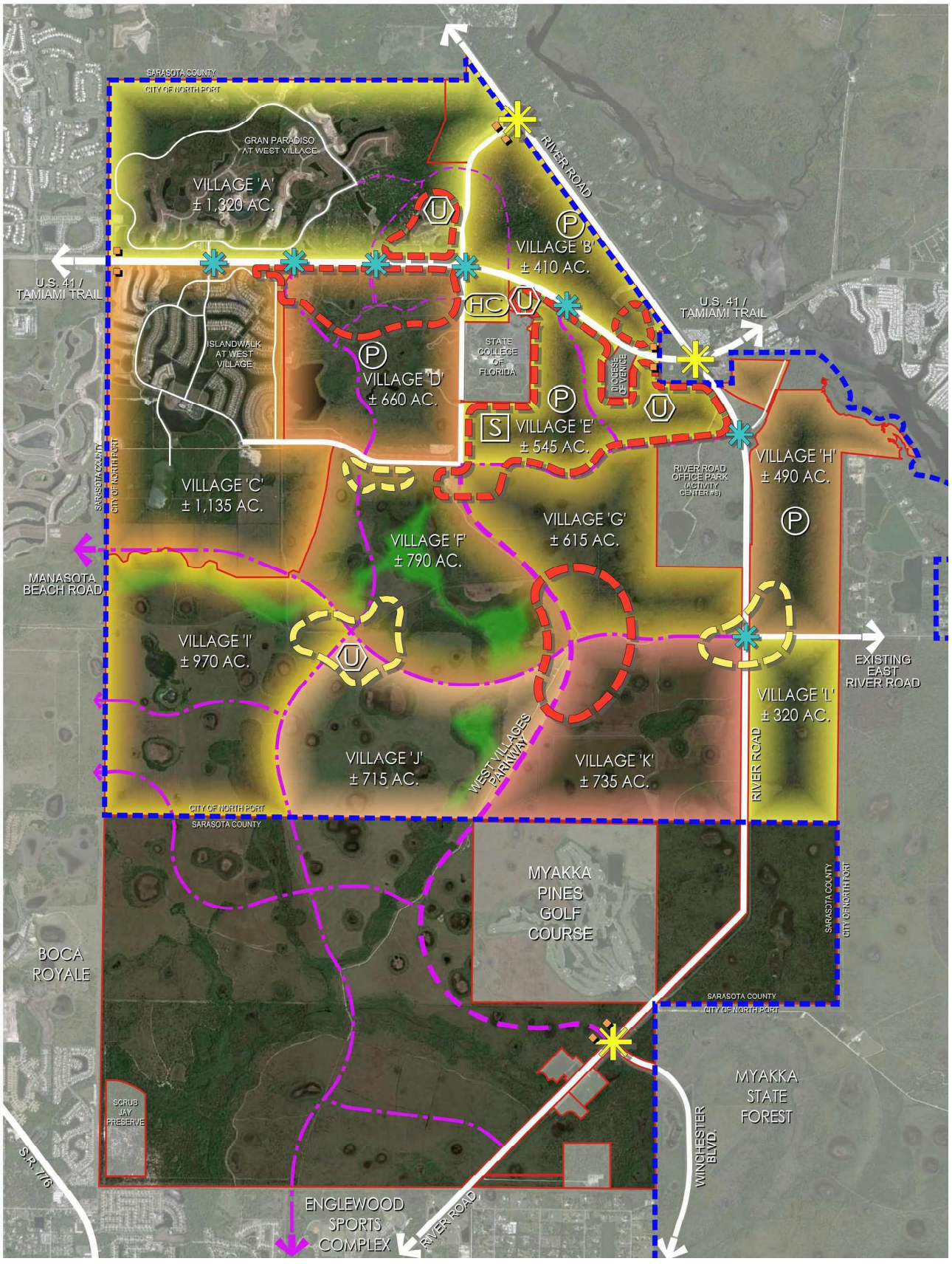
During discussions with representatives of the West Villages, an Index Map was provided that identified the proposed general layout of the ultimate build out of West Villages. Figure 2-2 depicts this Index Map. Although a portion of the development (south of the Myakka Pines Golf Course) is located within the District's current service area, it was stated that the development of this area most likely would occur outside of the District's 20 year planning horizon.

In addition, the District currently provides reclaimed water service to the Gran Paradiso area of the West Villages through a bulk use contract.

Peace River Manasota Regional Water Supply Authority

The Peace River Manasota Regional Water Supply Authority (Authority) is an independent special district, created and existing pursuant to Section 373.713 and 163.01, Florida Statutes, and by an inter-local agreement and operates water production storage and treatment, delivery and ancillary facilities to serve the four-county region of Charlotte, DeSoto, Manatee and Sarasota Counties. Currently the Authority provides potable water to Charlotte, DeSoto and Sarasota Counties, and the City of North Port. The Authority's current water supply source is the Peace River.

As noted in the Authority's 2015 Integrated Regional Water Supply Plan (Atkins 2015), the Authority's 2005 Master Water Supply Contract provides for excess water supplies to be temporarily made available to other Authority Customers through a redistribution pool. Beyond the sharing of Authority and Customer supplies, the sharing of other supplies distributed across the region through interconnections with Partner utilities including the City of Punta Gorda and the District have been implemented in part through the Southwest Water Management District's Water Use Permit (known as the "Operational Flexibility" Water Use Permit). This sharing of other supplies would be accomplished through the "wheeling" of water from one system to another through regional or utility system interconnects. As stated earlier, the District currently has two potable water interconnections, one with Sarasota County and one with Charlotte County. However, due to pressure differentials between the two potable water



N

WEST VILLAGES INDEX MAP

LEGEND

EXISTING ROADWAY
4 LANE W/ MEV. & 8' SIDEWALKS
2 LANE W/ MEV. 8' SIDEWALK & 5' SIDEWALK
2 LANE W/ MEV. & 5' SIDEWALKS
POTENTIAL WEST VILLAGES GATEWAY LOCATIONS
APPROXIMATE SCHOOL LOCATION (S-1/2)
SARASOTA MEMORIAL HOSPITAL - HEALTH CARE SERVICES
APPROXIMATE UTILITIES / PUBLIC FACILITIES LOCATION (U)
APPROXIMATE PARK LOCATIONS (P)
RECREATIONAL / OPEN SPACE / RECREATIONAL TRAIL SYSTEM
POTENTIAL ROADWAY CONNECTION TO ADJACENT COMMUNITY
STATE COLLEGE OF FLORIDA
CITY OF NORTH PORT - CITY LIMITS
APPROXIMATE TOWN CENTER LOCATION (S)
APPROXIMATE VILLAGE CENTER LOCATION (3)
EXISTING TRAFFIC SIGNAL
APPROXIMATE FUTURE FULL MEDIAN OPENINGS; TRAFFIC CONTROL T.B.D.

DATA SOURCES: Information show on this map was provided to Englewood Water District and originally produced by Stantec.

WEST VILLAGES IMPROVEMENT DISTRICT

FIGURE 2-2

PATH: J:\2016\16-077_ENGLEWOOD_UTILITIES_MASTERPLAN_(HOLCOMB)\7.2_WORK_IN_PROGRESS\MAP_DOCS\FINAL\16_077_ENGLEWOOD_BORDER_ONLY_11X17.MXD - USER: HDIXON - DATE: 1/16/2017

systems, additional infrastructure improvements would be required at each connection to allow water to be efficiently transferred.

As the District moves forward in the planning process, coordination with local government partners including consideration of potential future potable water supplies, interconnections, and other utility infrastructure is recommended.

3 Existing Facilities and Permit Conditions

3.1 Potable Water Supply

Water Supply Planning

An important component of water supply planning is the inventory of existing water supply sources and their permitted capacity's.

The District's potable water supply is made up of diverse sources including shallow potable groundwater and deeper brackish water supply wells. Different water treatment systems are required for the fresh groundwater supply and the brackish groundwater. Lime softening is used to treat the fresh groundwater and reverse osmosis (RO) treatment is used for the brackish groundwater. In addition to the groundwater supply and treatment facilities, the District also has water storage, brackish water concentrate disposal, and potable water distribution facilities. The District's overall water supply, treatment and distribution facilities include six (6) groundwater wellfields; two (2) Water Treatment Plants; four (4) finished water storage tanks with a combined capacity of 7.5 million gallons; one (1) Deep Injection Well for brackish concentrate disposal; and over 260 miles of water transmission and distribution pipelines and appurtenances, with emergency interconnections with Sarasota and Charlotte Counties.

3.1.1 Source Water

The District operates four individual wellfields and a combined freshwater and brackish water conjunctive use wellfield, which are permitted for a combined average annual withdrawal of 5.360 MGD and peak month withdrawal of 6.590 MGD under WUP No. 4866.010. Wellfields 1, 2, 3, and 5 provide raw fresh groundwater, which is treated at the District's Lime Softening Plant. Wellfield 4 and RO Wellfield 2, which is conjunctively located within the limits of freshwater Wellfield 2, provide raw brackish groundwater, which is treated at the District's RO Water Treatment Plant. Figure 3-1 is an excerpt from the District's 2016 Annual Wellfield Report (Figure 1-1) and identifies the general location of these water supply sources.

Freshwater Wellfield 1 consists of 25 6-inch diameter production wells that were constructed between 1962 and 1968. These wells are dispersed among a residential neighborhood located immediately west and north of the District's Lime Softening Plant. All 25 wells are cased to depths between 20 feet and 56 feet below land surface (bls), with total depths ranging from 40 feet to 82 feet bls. Generally, those production wells with depths of 40 feet utilize groundwater from the surficial aquifer (SA). Production wells with depths greater than 40 feet use groundwater from permeable zone 1(PZ1) of the intermediate aquifer system (IAS). Freshwater Wellfield 1 withdrawals are limited by the WUP to 400,000 gpd on an annual average day (AAD) basis. Withdrawals from Wellfield 1 between water year (WY) 2010 and

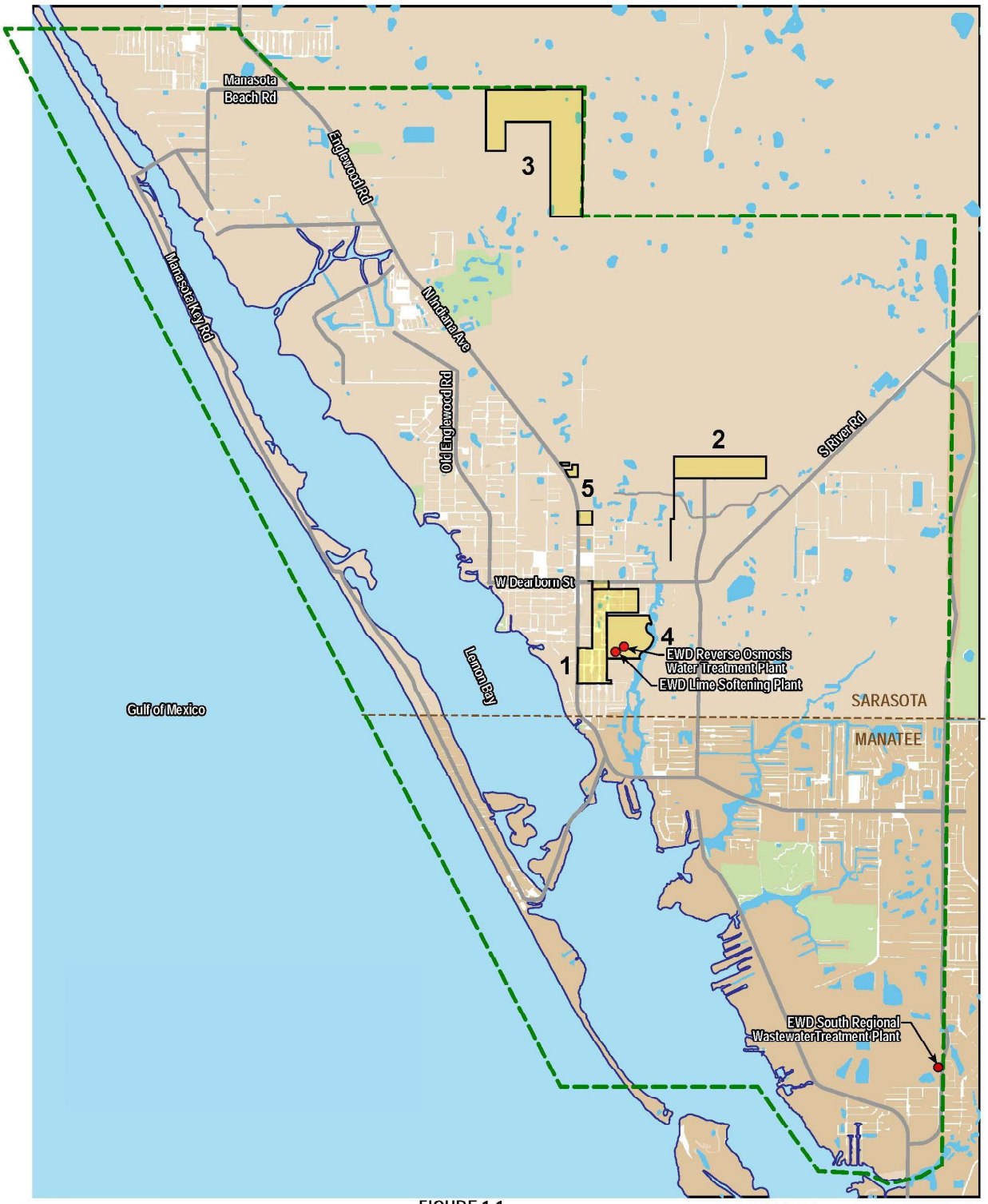


FIGURE 1-1
Englewood Water District Wellfield and Water Treatment Plant Locations
Englewood Water District

ASR US, LLC

F1-1 EWD Wellfield and Plant Locations.ai 11/16/16

N

LEGEND

- Englewood Water District Wellfield
- Englewood Water District Service Boundary
- EWD Treatment Facility Location

EWD Wellfield Locations

FIGURE 3-1

PATH: J:\2016\16-077_ENGLEWOOD_UTILITIES_MASTERPLAN_(HOLCOMB)\7.2_WORK_IN_PROGRESS\MAP_DOCS\FINAL\16_077_ENGLEWOOD_BORDER_ONLY_11X17.MXD - USER: HDIXON - DATE: 1/16/2017

WY 2016 have ranged from 75,220 gpd to 295,805 gpd on an AAD basis. A chloride concentration trigger level (CCTL) of 250 mg/L is established in the WUP for each production well; however, the CCTL has not limited withdrawals from the wellfield. In addition to providing groundwater for public supply use, the withdrawal of groundwater from the shallow aquifers over the past 5 decades has likely resulted in the lowering of the water table in the residential area that encompasses Wellfield 1. Should Wellfield 1 be taken out of service, a higher water table would likely be a result and consequentially there could be a greater potential for flooding in the area.

Freshwater Wellfield 2 and RO Wellfield 2 are located within a parcel of undeveloped land approximately 2 miles north of the EWD Lime Softening Plant. Freshwater Wellfield 2 consists of 18 6-inch diameter production wells that were constructed between 1969 and 1975. All 18 wells are cased to depths between 37 feet and 53 feet bls, with total depths ranging from 53 feet to 90 feet bls. The wellfield utilizes groundwater almost exclusively from PZ1 of the IAS. Withdrawals from freshwater Wellfield 2 are limited by the Wellfield Management Plan (WFMP) which was implemented in 2009 to protect onsite wetlands. Withdrawals at Wellfield 2 since the implementation of the WFMP have ranged from 87,554 gpd to 332,301 gpd on an AAD basis. A CCTL has also been established for this wellfield, which has limited withdrawals from some of the production wells. Future developments, or improvements to/extension of Pine Street may necessitate an evaluation of any impacts to the operation of Wellfield 2.

Freshwater Wellfield 3 consists of 12 8-inch diameter production wells that were constructed in 1980 and are located in the undeveloped north-central part of the District's service area. All 12 production wells are cased to depths between 37 feet and 64 feet bls, with total depths ranging from 61 feet to 125 feet bls. The wellfield utilizes groundwater almost exclusively from PZ1 of the IAS. Withdrawals from freshwater Wellfield 3, like Wellfield 2, are limited by the WFMP. Withdrawals at Wellfield 3 since the implementation of the WFMP have ranged from 41,791 gpd to 349,050 gpd on an AAD basis. A CCTL of 350 mg/L is established in the WUP for each production well; however, the CCTL has not limited withdrawals from the wellfield. Future developments, or infrastructure improvements may necessitate evaluation of any impacts to the operation of Wellfield 3.

Freshwater Wellfield 5 is the newest District wellfield, which was constructed in 2008 and consists of eight 6-inch diameter production wells that withdraw groundwater from PZ1 of the IAS. These wells are dispersed among a residential and commercial area along the east side of Indiana Avenue located north of Wellfield 1 and the Lime Softening Plant. The 8 production wells are cased to depths between 42 feet and 57 feet bls, with total depths ranging from 77 feet to 98 feet bls. Freshwater Wellfield 5 withdrawals are limited by the WUP to 820,000 gpd on AAD basis. A CCTL has also been established for this well field, which has limited withdrawals from some of the production wells. Withdrawals from Wellfield 5 between WY 2010 and WY 2016 have ranged from 145,539 gpd to 367,087 gpd on an AAD basis.

RO Wellfield 2 consists of eight 10-inch diameter production wells interspersed among the eighteen production wells of freshwater WF2. RO Wellfield 2 was designed to

retard the vertical movement of brackish water into PZ1 through the withdrawal of groundwater from underlying PZ3, while at the same time providing an additional supply of feed water and rotational capacity for the RO WTP. The initial eight RO production wells were constructed in the early 1990s and brought online in 1994. The eight wells are cased to depths between 253 feet and 271 feet bls with total depths ranging from 420 feet to 430 feet bls. Since 1996, RO production Wells 2-1 and 2-2 (the two western-most wells) have been used sparingly because of high TDS concentrations. Due to poor water quality produced from these RO supply wells, EWD constructed two replacement wells, 2-9 and 2-10. These wells came online in December 2004 (2-10) and January 2005 (2-9). Wells 2-1 and 2-2 were taken offline and capped.

Combined withdrawals from RO Wellfields 2 and 4 are limited by the WUP to 4,000,000 gpd on an AAD basis. The long-term AAD production from WY 1995 through WY 2016 at RO Well Field 2 was 1,182,501 gpd. The average TDS, chloride, and sulfate concentrations for WY 2016 were 6,250 mg/L, 3,530 mg/L, and 578 mg/L, respectively.

RO Wellfield 4 is located near the RO WTP and immediately east of freshwater WF1. The RO wellfield consists of nine production wells each 12 inches in diameter (that were constructed and brought online between 1982 and 1984). All nine wells are cased to depths between 210 feet and 287 feet bls, with total depths ranging from 372 feet to 430 feet bls that withdraw groundwater from PZ3 of the IAS. The long-term AAD production from WY 1987 through WY 2016 at RO Wellfield 2 was 1,028,769 gpd. The average TDS, chloride and sulfate concentrations for WY 2016 were 9,850 mg/L, 5,237 mg/L, and 639 mg/L, respectively.

3.1.2 Water Treatment, Storage and Distribution Facilities

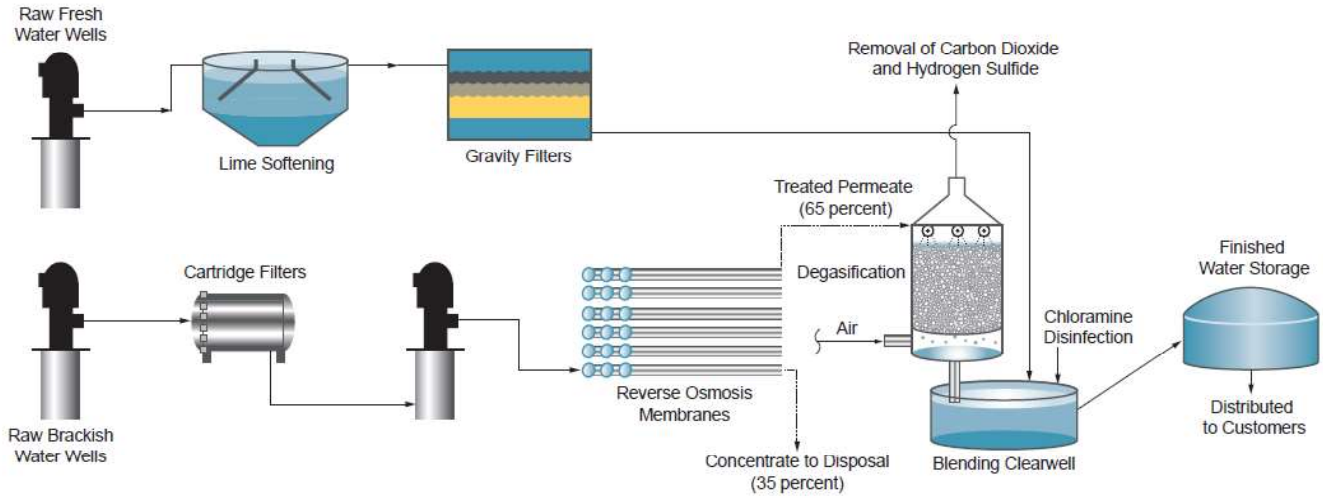
The District currently operates two water treatment plants to treat the fresh and brackish raw water from their groundwater supply wellfields. As stated above, Wellfields 1, 2, 3, and 5 provide raw fresh groundwater which is treated at the District's Lime Softening Plant while Wellfield 4 and RO Wellfield 2, provide raw brackish groundwater that is treated at the District's RO Water Treatment Plant. The finished water from each plant is then blended together prior to distribution. Both treatment plants are co-located at the District's main campus at 201 Selma Avenue, Englewood Florida. Figure 3-2 shows an aerial view of the water treatment facilities. Figure 3-3 illustrates a general schematic of the treatment process for both the lime softening process which is used to treat the fresh groundwater and the reverse osmosis process which is used to treat the brackish groundwater.

WATER TREATMENT PLANT FACILITIES

FIGURE 3-2

PATH: J:\2016\16-077_ENGLEWOOD_UTILITIES_MASTERPLAN_(HOLCOMB)\7.2_WORK_IN_PROGRESS\MAP_DOCS\FINAL\16_077_ENGLEWOOD_WTP_FACILITIES_11X17.MXD - USER: HDIXON - DATE: 1/17/2017

Figure 3-3. General Schematic of the District's Treatment Process



Lime Softening Plant

The Lime Softening Plant was built in 1961 and has a production capacity of 3.0 MGD (million gallons per day). Treatment of the raw water begins with the aeration process. Water from wellfields 1, 2, 3 and 5 is processed through a 5 MGD aerator installed above a 100,000 gallon raw water storage tank. The aeration process removes the hydrogen sulfide and carbon dioxide gases naturally found in ground water, and introduces oxygen into the water which aids in the oxidation of iron and manganese also found naturally in ground water. From there the water is pumped into a large circular tank where it is mixed with a lime solution to "soften" the water. The solution reacts with the calcium and magnesium compounds in the raw water to form insoluble carbonates (sand-like material), which settle to the bottom of the tank where they are mechanically removed. The lime sludge is then pumped to drying lagoons and stored for later disposal.

The softened water enters the top of the gravity filter tanks and flows down through a bed of anthracite coal media which provides removal of remaining particulate matter. From the bottom of the filter, water is collected and pumped to a finished water clearwell where it is blended with water that has been treated at the RO plant.

Reverse Osmosis Plant

Wellfield 4 and RO Wellfield 2, which is conjunctively located within the limits of freshwater Wellfield 2, provide raw brackish groundwater, which is treated at the District's RO Water Treatment Plant. The RO Water Treatment Plant was placed into

service in 1982 and currently has a design flow total of 3.0 MGD. The RO process utilizes semi-permeable membranes which allow freshwater molecules to pass through while retaining dissolved inorganic and organic constituents. Feed water supplied by the wells is pumped into the plant where the water flows through a pre-filter to the suction inlet of a pressure pump at each of the plant's six membrane (Hydranautics) "trains", A-F. Each train has a rated capacity of 0.5 MGD and is composed of a bank of vessels containing the membranes. The water is forced through the membranes by the feed pumps and then, after adding acid for pH adjustment, passes through a degasifier where carbon dioxide and dissolved hydrogen sulfide gases are removed. The degasified water cascades into a clearwell where it is blended with the water from the Lime Softening plant.

State and Federal laws require that potable water be disinfected to kill pathogenic bacteria that may be present. The District adds chloramines, a chlorine/ammonia solution, at the end of the treatment process and prior to distribution to its customers to accomplish this required disinfection. The blended finished water is transferred to the District's finished water storage tanks before entering the distribution system.

Injection Well

Installed in 1985, a 1,800-foot-deep Class I injection well receives the concentrated brine (reject water) from the reverse osmosis plant and injects it into a saline aquifer. Reject water is pumped at a rate of 1,100 gpm (gallons per minute). A second deep injection well serves as a back-up, and is conjunctively used by the District's Water Reclamation Facility.

Finished Water Storage

Four storage tanks with a combined capacity of 7.5 million gallons, plus a 150' elevated tank with 100,000 gallon capacity are maintained. The elevated storage tank is utilized to control pumping and pressure fluctuations at the high service pumping system.

High Service Pumping System

The District's high service pumping system consists of four (4) pumps rated at 800 gpm (4.5 MGD) each and three (3) pumps rated at 3,000 gpm (12.9 MGD) each.

Computerized controls sense the pressure in the system to activate and control the pumps to maintain a constant pressure in the potable water distribution system.

Water Transmission and Distribution Facilities

The District's potable water transmission, distribution and service system is comprised of over 260 miles of pipelines ranging in size from 2" to 30" in diameter. These pipelines are primarily for the transmission and distribution of potable water within the service area, but also include private service laterals, fire lines and hydrant laterals. As identified in the District's GIS database, Table 3-1 below summarizes the pipeline material, length, and type of pipeline for the District's water transmission and distribution facilities.

Table 3-1. District's Water Transmission and Distribution Facilities

Pipeline Type	Pipeline Material							Total Length (Ft)
	AC	Copper	DIP	CI	HDPE	POLY	PVC	
Transmission Line	164,632		170,694	117	8,140	3,748	1,014,015	1,361,346
Service Line		23			9,173	680	5,858	15,734
Fire Line			62			189	4,640	4,891
Discharge Line							335	335
Hydrant Laterals	633						8,517	9,150
Grand Total (Ft)	**165,265**	**23**	**170,756**	**117**	**17,313**	**4,617**	**1,033,365**	**1,391,476**

3.2 Wastewater Collection, Treatment, and Reuse Facilities

3.2.1 Wastewater Collection Systems

The District's wastewater collection system is comprised of three types of sanitary sewer collection methods: gravity flow, low pressure collection, and vacuum collection. All of the wastewater flows are conveyed to the District's Water Reclamation Facility by pressurized forcemains. A brief description of each of the District's sewer collection systems follows:

Gravity Sewer Collection System

The District's gravity collection system is comprised of approximately 54 miles of pipelines including 16 miles of older vitrified clay pipe and approximately 900 manholes. The majority of the collection system, over 68%, is PVC. The following Table 3-2 identifies the material and length of the gravity lines currently identified in the District's GIS database.

Table 3-2. Gravity Sewer Collection

Collection Type	Pipe Material				Total (Ft)
	CIP (Ft)	DIP (Ft)	PVC (Ft)	VCP (Ft)	
Gravity	2,440	1,872	194,144	84,647	283,103

Low Pressure, Vacuum, and Forcemain Collection System

The District's low pressure and vacuum collection systems consist of approximately 3,800 vacuum pits and 13 low pressure stations that collect sewer discharges from residential and commercial service connections. While the low pressure stations pump directly to the forcemain system, a network of piping under vacuum evacuates the vacuum pits and transports the waste to a vacuum station in the service area. There are currently nine vacuum collection areas with over 116 miles of vacuum collection lines ranging in size from 3" to 10" in diameter and a vacuum booster station. Some vacuum collection stations are combined within one location / building at six vacuum station sites. The vacuum stations were placed into service from 1996 to 2004. The following Table 3-3 identifies the material and length of the forcemains currently identified in the District's GIS database. It is noted that the vacuum system improvements currently being installed in the V9-C area have not yet been included in the District's current GIS database.

Table 3-3. Low Pressure, Vacuum, and Forcemain Collection System

Pipeline Material	Pipeline Diameter (inches)										Total (Ft)
	2	3	4	6	8	10	12	14	16	24	
AC			1,162								1,162
DIP			308	4,933	271	316	2,683		435		8,946
HDPE	1,464	2,085	495	2,920	277		10,276		1,244		18,761
POLY	65										65
PVC	6,096	2,014	31,627	51,512	43,251	12,360	69,624	6,281	25,963	7,305	256,033
Grand Total (Ft)	**7,625**	**4,099**	**33,592**	**59,365**	**43,799**	**12,676**	**82,583**	**6,281**	**27,642**	**7,305**	**284,967**

Lift Stations

The District owns, operates and maintains eighty-two (82) submersible pump stations from fractional horsepower motor driven pumps to 70 horsepower motor driven pumps. Some lift stations receive flows from downstream lift stations and are considered critical or master stations due to their consequence of failure on the downstream infrastructure. Less critical (satellite) stations are generally of smaller size and lower flows and only affect their immediate service area if capacity is diminished.

3.2.2 Wastewater Treatment Facility

The District currently owns and operates a 3.00 MGD permitted capacity annual average daily flow (AADF) extended aeration domestic water reclamation facility. The Paul J. Phillips Water Reclamation Facility (WRF) was dedicated November 17, 2005, and named for a former, long-time Board of Supervisors member. Wastewater is collected and pumped to the 160 acre treatment facility property on Telman Road in Charlotte County. The WRF consists of the headworks, an odor control system, four steel circular package plants (U.S. Filter/Davco™), two filter systems, a disinfection system, a sludge dewatering system, and an onsite reclaimed water storage system. The plant is designed to produce effluent that meets drinking water standards, except for total dissolved solids (TDS), odor and color.

Wastewater is received at the headworks wet well and pumped to static screens to remove solids and then is discharged to a surge tank. The contents of the headworks surge tank is then pumped to the Davco™ surge tanks. Equalization pumps then pump to their respective Davco™ Plant 1 to 4 aeration basins. Effluent flow from the Davco™ Plants discharges to a series of three disk filters. After filtration, the filtrate gravity flows to the chlorine contact tank where gaseous chlorine is utilized for disinfection. Discharge from the chlorine contact tank flows to the effluent pump station where the discharge can be directed to the on-site storage system or the reclaimed water distribution system for public use irrigation. Figure 3-4 shows an aerial view of the District's wastewater treatment facilities.

Biosolids

The District manages the biosolids from the WRF in accordance with FDEP rules and regulations. The biosolids are pumped from the wastewater treatment plant to the

centrifuge facility where they are de-watered. Two 50 gpm, one 100 gpm, and one 120 gpm centrifuge provide sludge dewatering prior to disposal. With the application of polymer, the centrifuges are capable of removing 98% of the liquid from the biosolids. The biosolids are trucked to the Charlotte County Bio-Recycling Center Complex in Punta Gorda for further advanced treatment. The liquid portion is pumped back to the plant for re-processing.

The WRF produces an average 18% solids sludge cake, which is then further treated via composting. The composting process naturally produces an FDEP Class AA product. The FDEP Class AA product is most commonly used on golf courses, farms, in parks and playgrounds, on street medians, and in mine reclamation horticulture.

3.2.3 Reclaimed Water System

The District's reclaimed water system consists of the WRF effluent pump station, a 1.0 MG reclaimed water storage tank, an on-site aquifer storage and recovery (ASR) injection well with a permitted storage capacity of 220 MG, a deep injection well (DIW) and one reclaimed water booster station.

The effluent pump station consists of three 1,740 gpm vertical turbine pumps with a firm capacity of 3,480 gpm or 5.01 mgd. The following Table 3-4 identifies the material and length of the reclaimed water forcemains currently identified in the District's GIS database.

Table 3-4. Reuse System Forcemains

Collection Type	Pipe Material			Total (Ft)
	DIP (Ft)	HDPE (Ft)	PVC (Ft)	
Reuse Main	351	8,025	92,772	101,148

Through an existing 3.5 MGD AADF permitted capacity slow-rate public access system, the District supplies reclaimed water for irrigation to customers in accordance with the Florida Department of Environmental Protection (FDEP) permit number FLA014126-032 Land Application R-001. The reuse system consists of users within southwest Sarasota and northwest Charlotte Counties. The District provides reclaimed water to golf courses, a sports complex/recreational area, and a spray field within its service area.

The following Table 3-5 identifies the reclaimed water customers and their associated capacity identified in the District FDEP Wastewater Permit.

PATH: J:\2016\16-077_ENGLEWOOD_UTILITIES_MASTERPLAN_(HOLCOMB)\7.2_WORK_IN_PROGRESS\MAP_DOCS\FINAL\16_077_ENGLEWOOD_WATERRECLAIM_FACILITY_11X17.MXD - USER: HDIXON - DATE: 1/19/2017

Table 3-5. Reclaimed Water Customers and Capacity

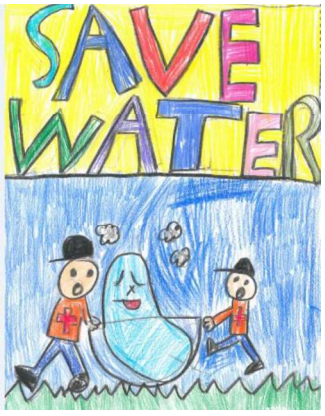
Reclaimed Water Customer Name	Capacity (MGD)
Lemon Bay Golf Club	0.41
Myakka Pines Golf Course	0.33
Oyster Creek Golf Course	0.40
Charlotte Co. Utilities Interlocal (Rotunda)*	0.38
Englewood Sports Complex	0.27
Spray Irrigation at the EWD WRF	0.36
Boca Royale Golf Club	0.40
Gran Paradiso	0.60
Oak Forest	0.07
Foxwood	0.065
Lemon Bay High School	0.019
Oyster Creek Regional Park	0.015
Park Forest Phase I	0.05
Park Forest Phase II	0.05
Park Forest Phase III	0.05
Park Forest Phase IV	0.05
Park Forest Phase V	0.03
Stillwater I and II	0.012
Stillwater III and IV	0.06
Handi Phil	0.001
SITC Inc. (TrustCo Bank Plaza)	0.01
Wal-mart	0.011
Total Reuse Commitments	**3.643**

*District indicates they no longer provide reclaimed service

3.2.4 Conservation Practices and Regulations

The District encourages water conservation both through goals of utilizing 100% of its reclaimed water and by promoting water use efficiency by reducing the overall demand for water in the system. The District accomplishes this by the following means:

- Adopting conservation-oriented water rates that include a usage/conservation surcharge;
- Adhering to the SWFWMD watering restrictions by adopting the Sarasota and Charlotte County ordinances for watering restrictions;
- Performing periodic water audits in association with the District's PSAR to the SWFWMD; and
- Participating in public education and outreach programs like the FSAWWA Drop Savers Water Conservation Poster Contest.



4 Future Water Demands, Wastewater Flows, Reuse and Reject Disposal, and Regulatory Compliance

4.1 Population Projections

Population projections were developed for the District to facilitate the development of anticipated water supply demands and wastewater flow projections through 2036. Various information sources were gathered to compile a comprehensive view of the District's historical and future population estimates. The following referenced materials were used in the development of the population projections:

Base Year Population

An important part of the population forecasting process is the estimation of the actual population at or near the time the study is undertaken. The District's Utility Master Plan used a base year of 2015.

- Bureau of Economic and Business Research – Florida Estimates of Population 2015 (April 1, 2015)
- Bureau of Economic and Business Research – Florida Estimates of Population 2015 (Vol. 49, Bulletin 174, January 2016)
- Department of Commerce – Census Bureau – Methodology, Assumptions, and Inputs for the 2014 National Projections. (August 2016)
- Englewood Water District – Monthly Operating Reports (January 2006 - May 2016)
- Englewood Water District – Consumption Report (March, 2016)
- Southwest Florida Water Management District – 2015 Regional Water Supply Plan (Southern Planning Region)
- Southwest Florida Water Management District – 2015 Regional Water Supply Plan: Public Water Supply Demand Projections
- Southwest Florida Regional Planning Council
- Sarasota County – GIS data set - zoning and land use, and
- Charlotte County – GIS data set - Zoning

In addition to these materials, additional information was compiled during the coordination meetings held with local utility partners. These meetings included:

- City of North Port
- Charlotte County
- Sarasota County
- Peace River Manasota Regional Water Supply Authority. and

- West Villages Improvement District.

The Methodology used to determine the Base Year Population (2015) and subsequent population forecasts is presented in more detail in the "Task 2 – Future Growth Projections, Water Supply Demands and Wastewater Flows" Technical Memorandum in Appendix A of this Utility Master Plan.

To determine the District's 2015 Base Year Population, the following four sources of information were compiled and reviewed.

1. *Published population estimates from the Southwest Florida Water Management District;*
2. *2015 Census Tract and Block Data;*
3. *Completion of the Southwest Florida Water Management District Worksheet B, Service Area Summary; and*
4. *District's published 2015 Public Supply Annual Report (PSAR).*

After comparing these sources, the Base Year Population (2015) for the District was estimated to be 36,611.

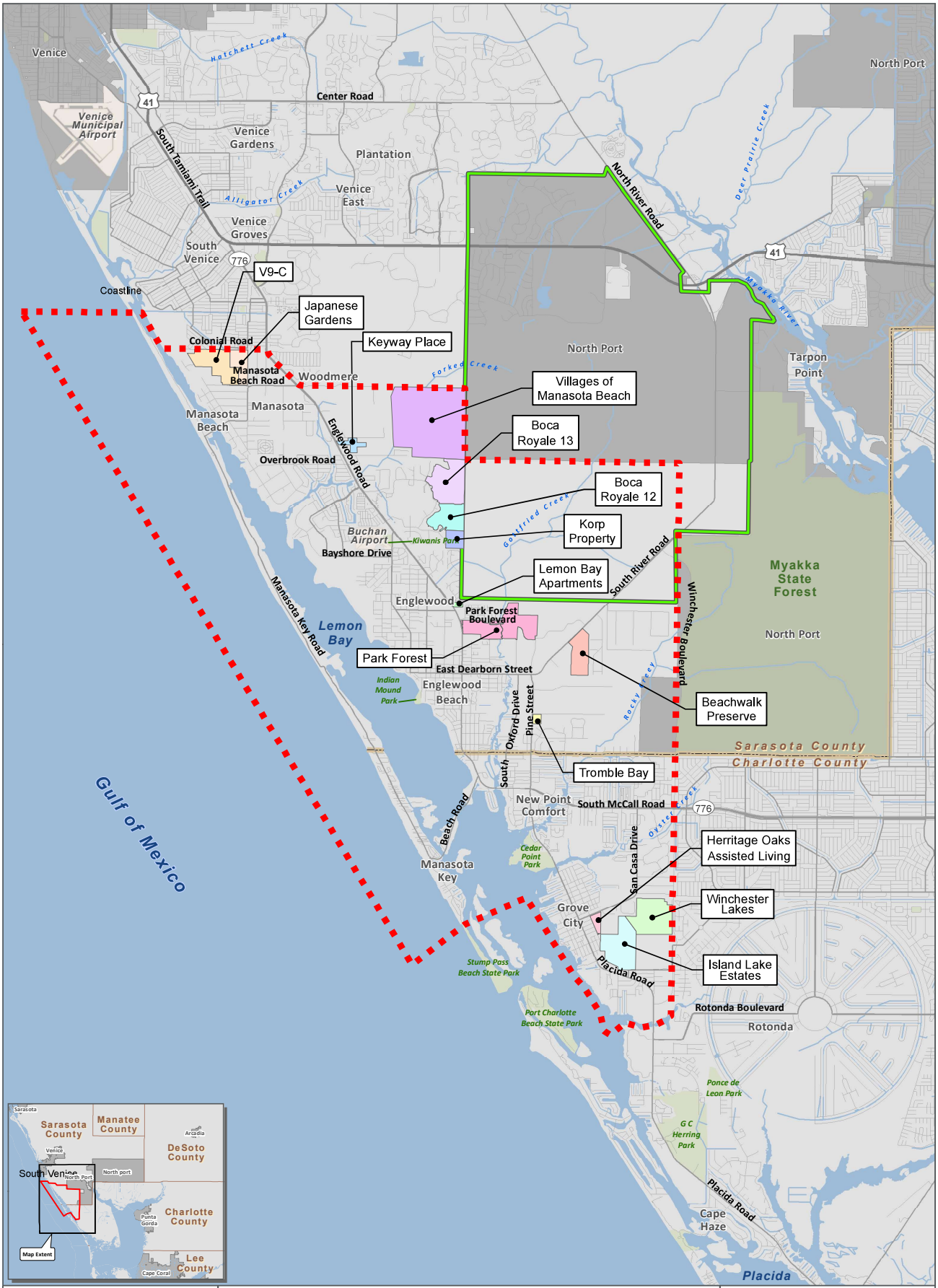
Following the determination of the Base Year Population (2015), evaluations and comparisons of three different data sets were completed to determine "percent growth" or "trend based" projections to be applied to the Base Year Population estimate. The following three sources of information were used in the development of the "percent growth" or "trend-based" population projections for the District:

1. *Projections developed by the University of Florida's Bureau of Economic and Business Research (BEBR) on a County-wide basis;*
2. *Historical water demand and wastewater flow within the District; and*
3. *Projections developed by the Southwest Florida Water Management District (SWFWMD) in the 2015 Regional Water Supply Plan.*

An examination of these data sources predicts that the population within the District's service area is most likely to experience annual increases between 0.12% and 2.4% over the 20 year planning horizon. This growth rate range covers the District's historical growth patterns as well as the BEBR and SWFWMD's projected population growth rates. It is noted that the BEBR and SWFWMD projections have near-term growth rates that are higher and then taper as the planning horizon increases.

Given that the District has identified several existing and/or planned developments within their service area, it is anticipated that they will experience a similar trend of higher growth rates in the near-term as new developments come on-line with a tapering or leveling off of growth as in-fill and build out of the developments occur.

Table 4-1 and Figure 4-1 list the developments, size and their respective locations within the District's service area boundary.



PATH: J:\2016\16-077_ENGLEWOOD_UTILITIES_MASTERPLAN_(HOLCOMB)\7.2_WORK_IN_PROGRESS\MAP_DOCS\FINAL\16_077_ENGLEWOOD_PROPOSED_DEVELOPMENTS_11X17.MXD - USER: HDIXON - DATE: 1/16/2017

Table 4-1. Developments within the District's Service Area

Development		Water	Sewer	Proposed Units	Comments	Assumed Build-out %			
						0-5	5-10	10-15	15+
1	Beachwalk Preserve	X	X	325	Based on the latest Rezone in Feb of 2016	50%	50%		
2	Boca Royale 12	X	X	142	Utilities installed - will begin building houses soon	100%			
3	Boca Royale 13	X	X	120	Utilities being installed	100%			
4	Boca Royale 14	X	X		Nothing officially in works - Possibly Korp Property				
5	Heritage Oaks Assisted Living	X	X	70	70 ERC - currently under construction	100%			
6	Island Lake Estates	X	X	400	Plans submitted for Permitting, Construction to begin soon, Phase 1 to be broken down into sub phases, 60, 42, 42, and 34. Remaining homes may be phased as well. Builder hoping for 5 year buildout.	50%	50%		
7	Japanese Gardens		X	414	807 People- Website states owned by the 414 residents.	100%			
8	Keyway Place	X	X	35	Utilities installed - starting to build houses now	100%			
9	Korp Property (Boca Royale)	X	X	133	Currently in rezone - Boca Royale is pushing for it Possibly Boca 14 or 15	100%			
10	Lemon Bay Apartments	X	X	64	68 units - 64 ERC's Finalizing plans for permitting, Construction soon	100%			
11	Myakka Pines	X	X	877	Per Sarasota County 2050 plan. Villages may do land swap for homes. Will be 25+ years if they do				100%
12	Park Forest 6B	X	X	31	Homes currently being constructed	100%			
13	Park Forest 6C	X	X	39	Utilities being installed. Close to being completed	100%			
14	Park Forest 6D	X	X	11	Utilities being installed. Building will begin immediately after approval	100%			
15	Park Forrest	X	X	53	Agreements show Park Forest has 53 additional units available to build within their neighborhood	50%	50%		
16	Sandalhaven		X		See Bulk Agreements. Paid for 300K gpd.				

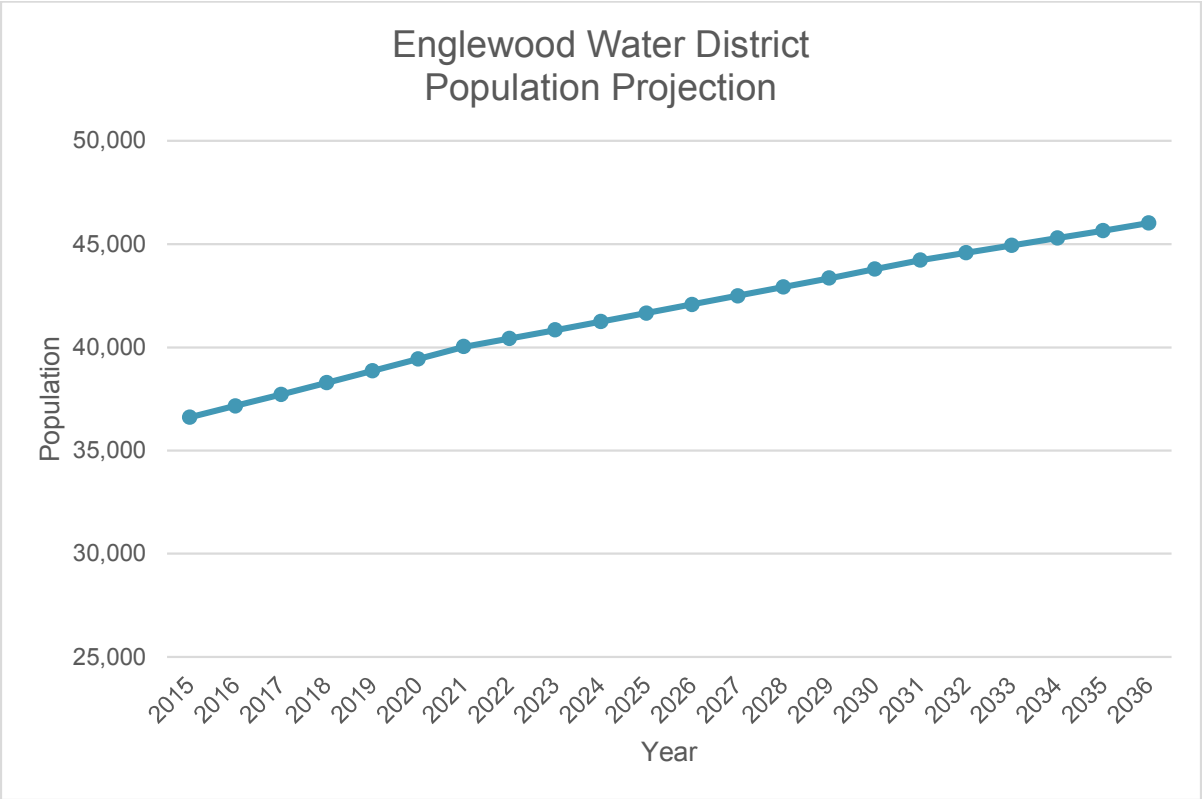
Development		Water	Sewer	Proposed Units	Comments	Assumed Build-out %			
						0-5	5-10	10-15	15+
17	Tromble Bay	X	X	72	Based on the latest rezone petition.	50%	50%		
18	V9-C		X	300	Roughly 300 homes currently. 361 lots in area. Construction done May 2017. Customers 1 year to hook up.	100%			
19	Villages of Manasota Beach	X	X	1563	Based on latest pubic announcement. Well Field 3. Developer is hoping within 10 years.	25%	25%	25%	25%
20	Winchester Lakes	X	X	169	Starting on Plans and Permitting now	25%	50%	25%	
	Total			**4,818**					

Based on this information, a trend based population projection was applied as shown in Table 4-2 and Figure 4-2, with a 1.5%, 1.0%, and 0.8% annual growth rate for the 5-year near-term (2016-2021) 10-year mid-term (2021-2031) and 5-year long term (2031-2036) planning horizons respectively. Utilizing an estimated 2.4 people per household, these growth rates equate to approximately 8,858 additional people living within the District's current service area boundary by 2036.

Table 4-2. Englewood Water District Population Projections

	Total Population 2015 (Base Year)	Total Population 2016	Total Population 2021	Total Population 2026	Total Population 2031	Total Population 2036
Annual Growth Rate		1.5% (2015-2016)	1.5% (2016-2021)	1.0% (2021-2031)	1.0% (2021-2031)	0.8% (2031-2036)
Population	**36,611**	**37,160**	**40,032**	**42,074**	**44,220**	**46,018**

Figure 4-2. Englewood Water District Population Projections

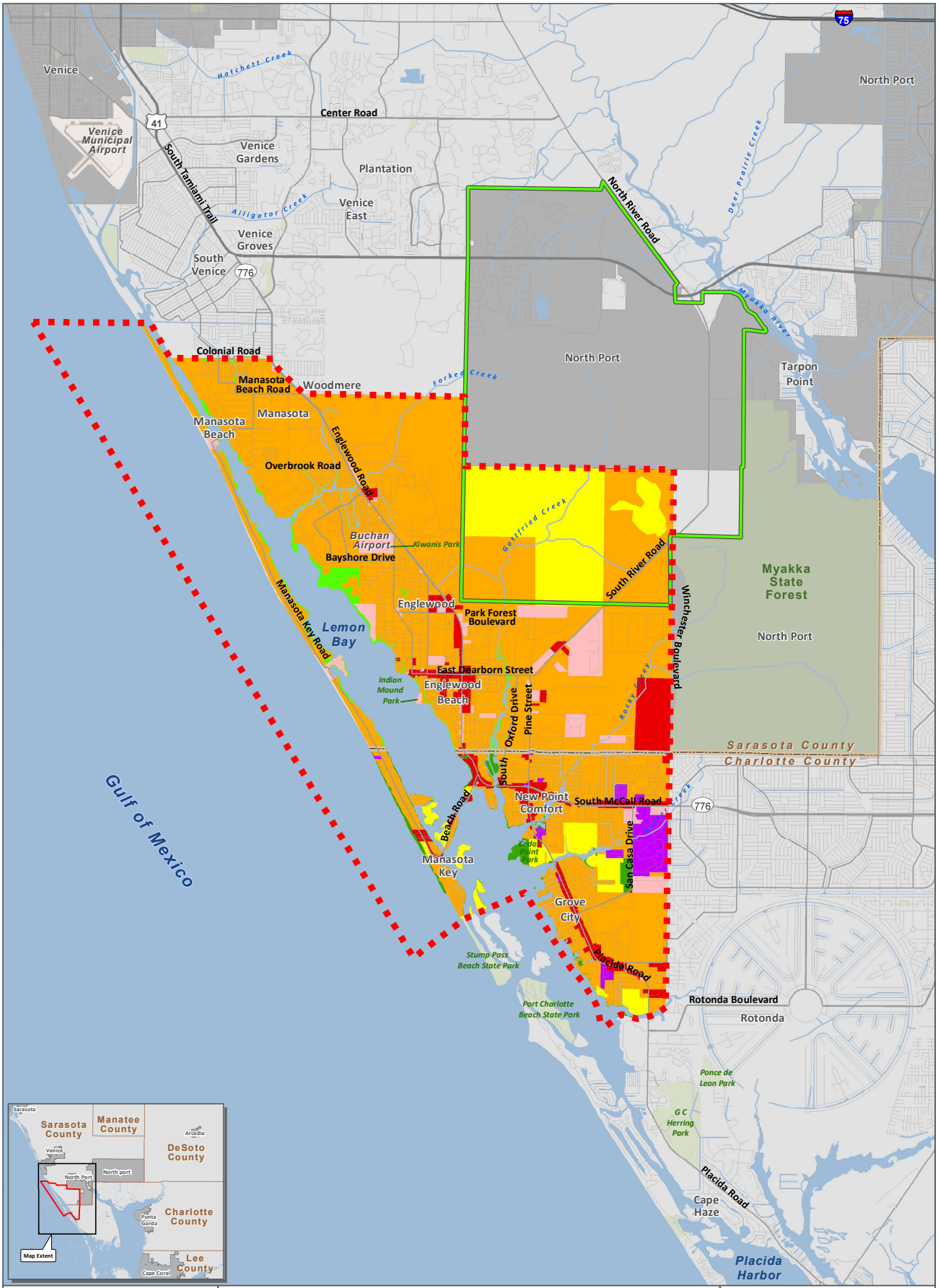


4.2 Water Supply Demands and Resource Analysis

4.2.1 Water Supply Demands

For the purpose of the District's Utility Master Plan, the Per Capita Model for forecasting water supply demands was used. The Per Capita Model calculates the total production or consumption per capita for a historical period and applies the current year per capita consumption to the population projections for future periods. This is the simplest forecasting method and requires only historical production or consumption data, historical population, and forecast of population through the demand forecasting horizon. This approach produces satisfactory results as long as the population forecast is reasonable, and the customer mix does not change substantially.

Review of the District's current zoning information (obtained from Sarasota & Charlotte County public GIS databases) indicates that the majority of the service area, approximately 91%, is zoned either residential (57%) or open space and conservation/rural/parks and recreation (34%). Table 4-3 lists the zoning categories, acreage and percentages within the District's service area and Figure 4-3 illustrates the location of the land use areas. Although there is anticipated population growth within the District over the next 20 years, the percent customer mix is not expected to change substantially. The identified growth is primarily residential.



CURRENT LAND USE

FIGURE 4-3

PATH: J:\2016\16-077_ENGLEWOOD_UTILITIES_MASTERPLAN_(HOLCOMB)\7.2_WORK_IN_PROGRESS\MAP_DOCS\FINAL\16_077_ENGLEWOOD_LOCATION_MAP_11X17_ZONING.MXD - USER: HDIXON - DATE: 1/17/2017

Table 4-3. Land Use/Zoning Categories

Land Use/Zoning	Sum of land (acres)	Percentage Within EWC*
Commercial	1,163.47	4.42
Industrial	936.22	3.56
Mixed Use	397.33	1.51
Open Space and Conservation	2,389.12	9.08
Open Space and Rural	2,691.97	10.24
Parks and Recreation	3,819.44	14.52
Residential	14,901.93	56.66
Grand Total	**26,299.48**	

Utilizing the District's historical (January 2006 to January 2016) records of production data as well as the Historical Population Served reported on the District's Public Supply Annual Reports (PSARs) to the SWFWMD, a determination of per capita usage was calculated and is shown in the following Table 4-4. It is noted that the District's PSARs for years 2006 and 2007 were not available.

Table 4-4. Historical Public Supply Annual Reports

Year	Annual Average Treated to System (MOR's)	Functional Population (PSAR)	Gallons per capita/day (GPCD)
2006	2.7046	N/A	-
2007	2.5444	N/A	-
2008	2.5280	51,863	48.75
2009	2.7125	44,223	61.34
2010	2.2449	41,229	54.44
2011	2.2855	34,413	66.42
2012	2.3299	31,899	73.00
2013	2.3594	37,585	62.77
2014	2.5272*	37,696	67.04
2015	2.4559*	38,071	64.51

*Includes Bocilla Utilities Exported Water

Since 2008, the reported per capita usage has varied from a low of 48.75 gpcd in 2008 to a high of 73 gpcd in 2014. In addition, the SWFWMD's 2015 Regional Water Supply

Plan identified a 5-year (2008-2012) average per capita use rate of 61 GPCD and utilized that gpcd to determine future demands.

The demographics of the District's service area, as evidenced by the 2015 Census Data, indicates that the median age of residents is 61.2 and the average household size is 1.9 people, with the average family size of 2.4 people per family. As stated earlier, the District has identified numerous single family and multi-family developments that are either currently under construction or are anticipated to be constructed within the 20-year planning horizon. As such, it is expected that the current median age will decrease as more families move into the area, and that the average household size will trend towards the Census' reported 2.4 people per family accordingly.

With the anticipated increase in the demographic percentage of family size, and the associated water usage patterns, an average per capita model number of 70 gallons per capita/day, was used to project future water demands. It is noted that Sarasota County utilized a per capita model number of 100 gpcd in their 2015 10-Year Water Supply Facilities Work Plan.

Table 4-5 illustrates the projected annual average water supply demands for the District within its current service boundary in 5-year increments from 2016 to 2036.

Table 4-5. Annual Average Water Demands within the District

Year	Projected Population	GPCD	Projected Annual Average Water Demands (MGD)*
2015	36,611	70	2.563
2016	37,160	70	2.601
2021	40,032	70	2.802
2026	42,074	70	2.945
2031	44,220	70	3.095
2036	46,018	70	3.221

* Not Including Bocilla Utilities

Additional Water Demands

The District currently provides potable water to Bocilla Utilities through a bulk service agreement for the residents of Don Pedro, Knight/Palm Island in Charlotte County. Currently, Bocilla Utilities services approximately 400 residences on the island including private homes, condominiums and a vacation resort. The District's billing records for 2015 indicate that the average daily usage was 143,140 gpd. Aerial photographs of the island suggest that it is approximately 75% built out. Assuming the

Island would be 100% built out with 533 residences at the end of the 20 year planning period, the ultimate water demand is estimated to be 190,734 annual average gallons per day. The additional annual average water demand was distributed evenly across the 20 year planning horizon.

Historical water production data from 2006 through 2015 was used to determine the average monthly peaking factors for peak month demand projections. The peak month demand is defined as the average daily demand during the highest demand month throughout a year. The average maximum month peaking factor from 2006 through 2015 was 1.23. A peaking factor of 1.3 was used for determining peak monthly water demands.

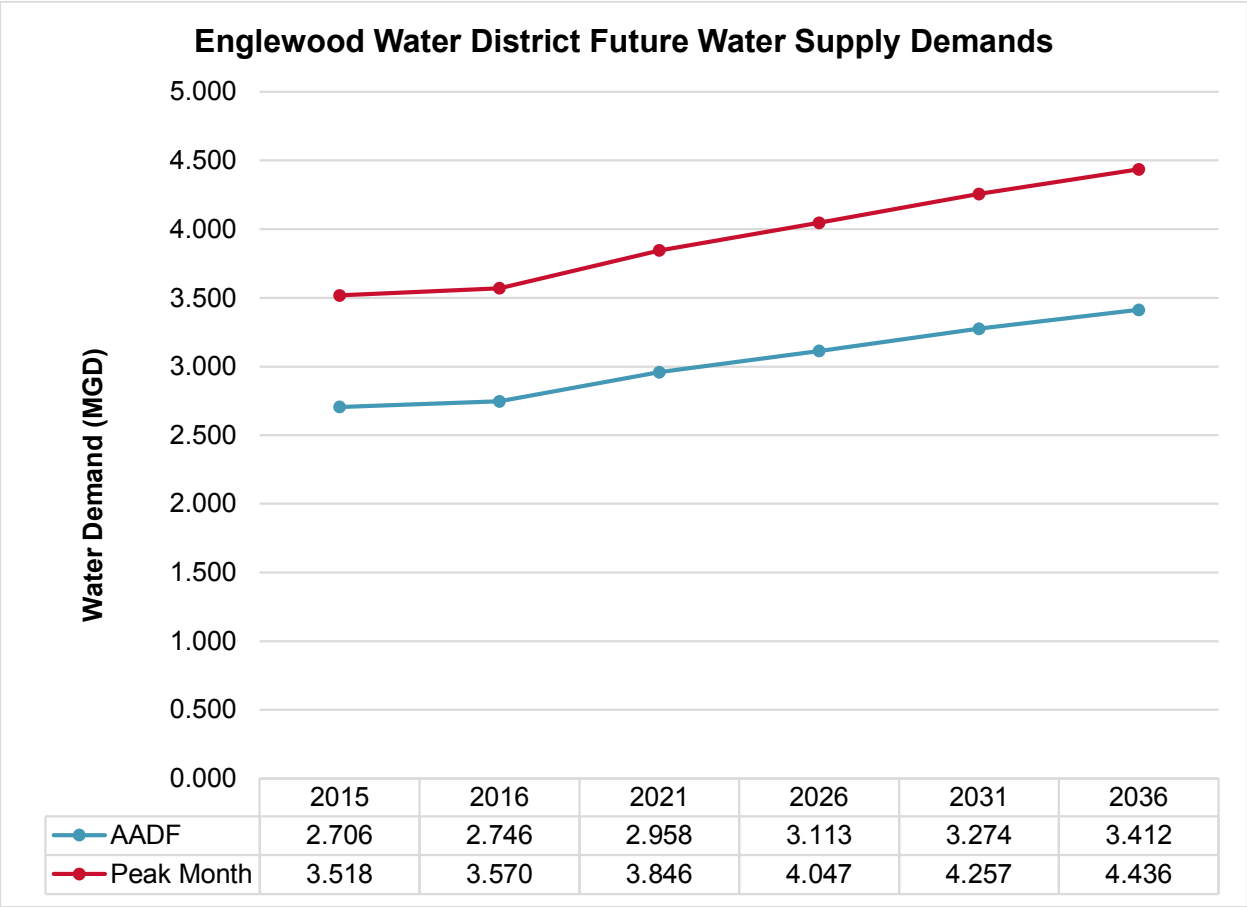
Table 4-6 and Figure 4-4 illustrates the total projected annual average and peak month water supply demands for the District over the 20 year planning period.

Table 4-6. Total Projected Water Supply Demands

Year	Projected Functional Population	2011-2015 Average GPCD	Projected Annual Average Water Demands (MGD)	Bocilla Utilities Projected Annual Average Water Demands (MGD)	Total Annual Average Water Demands (MGD)	Projected Peak Month Water Demands (MGD)*
2015	36,611	70	2.563	0.143	2.706	3.518
2016	37,160	70	2.601	0.145	2.746	3.570
2021	40,032	70	2.802	0.156	2.958	3.846
2026	42,074	70	2.945	0.168	3.113	4.047
2031	44,220	70	3.095	0.179	3.274	4.257
2036	46,018	70	3.221	0.191	3.412	4.436

* Historical Annual Average to Peak Month Ratio of 1.3

Figure 4-4. Englewood Water District Future Water Supply Demands



	2015	2016	2021	2026	2031	2036
AADF	2.706	2.746	2.958	3.113	3.274	3.412
Peak Month	3.518	3.570	3.846	4.047	4.257	4.436

4.2.2 Water Resource and Treatment Analysis

Determination of the quantity and timing of projected water supply resources is accomplished by comparing the projected water supply demands to the utility system's existing finished water capacity on an annual basis. The raw water required to produce the estimated potable water demand is also related to the water treatment recovery efficiency. Water treatment recovery efficiency is a function of the treatment method used. Historical water treatment production data received from the District on the RO water treatment plant generally indicates a treatment efficiency of 65%. In addition, the combined withdrawals from RO Wellfields 2 and 4 are limited by the WUP to 4.000 MGD average annual and 4.400 MGD peak month and well fields 1, 2, 3 and 5 have a permitted average and peak day quantity of 1.360 MGD and 2.190 MGD, respectively. As stated earlier, the CCTL's established in the WUP for specific production wells may also limit withdrawals and raw water production in the future.

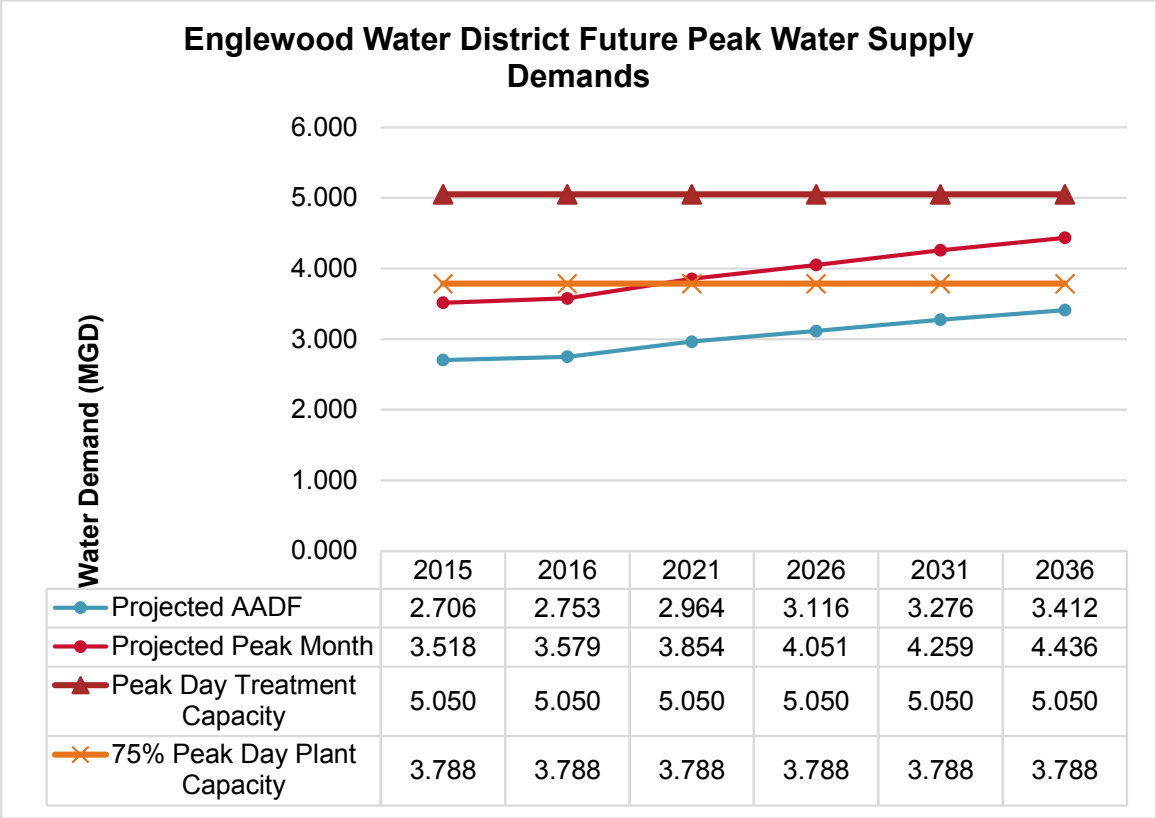
Table 4-7. Available Water Supply Resource Analysis

Supply	Permitted Source AAD (MGD)	Permitted Source Peak Day (MGD)	WTP Efficiency %	Finished Water AAD (MGD)	Finished Water Peak Day (MGD)
RO Wellfields 2,4	4.000	4.400	65	2.600	2.860
Wellfields 1,2,3,and 5	1.360	2.190	100*	1.360	2.190
Total Supply	**5.360**	**6.590**		**3.960**	**5.050**

* For the purpose of this Utility Master Plan, the efficiency of the Lime Softening Plant is considered to be 100%

In accordance with paragraph 62-555.348(3) (a), Florida Administrative Code (F.A.C.), an initial capacity analysis report must be submitted to the Department of Environmental Protection (DEP) within six months after the month in which the total maximum-day quantity of finished water produced by the District's water treatment plants exceeds seventy-five percent (75%) of the total permitted maximum-day operating capacity of the plants. Utilizing the combined permitted plant peak day capacity of 5.050 MGD from Table 4-7 above, when the District has a finished water peak day of 3.788 MGD, an initial capacity analysis report will need to be submitted to the DEP within six months. Based on the projected water supply demands, the District's Peak Month will exceed 75% of the current permitted peak day capacity in 2020.

Figure 4-5. Englewood Water District Future Water Supply Demands

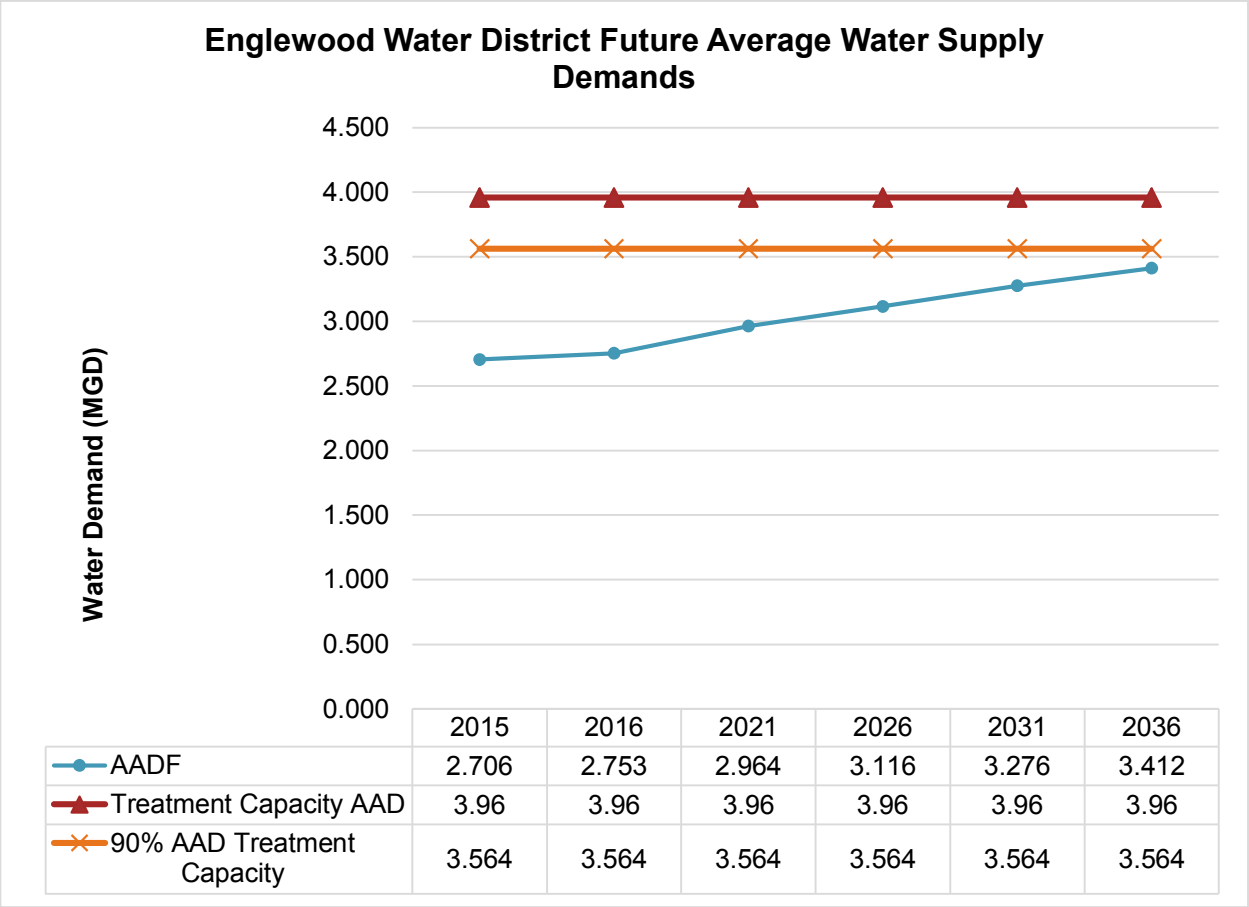


	2015	2016	2021	2026	2031	2036
Projected AADF	2.706	2.753	2.964	3.116	3.276	3.412
Projected Peak Month	3.518	3.579	3.854	4.051	4.259	4.436
Peak Day Treatment Capacity	5.050	5.050	5.050	5.050	5.050	5.050
75% Peak Day Plant Capacity	3.788	3.788	3.788	3.788	3.788	3.788

It is a general industry standard that when establishing the need for additional sources of water supply, new sources should be brought on-line when the projected finished water supply demand reaches 90% of the existing AAD treatment capacity.

As shown in Figure 4-6, water demand projections for the next 20 years indicate that a new water source and associated treatment capacity will need to be brought on-line after 2036. It is noted that new water supply sources and treatment capacities may take up to 10 years to permit, design and construct. It is recommended that the District include in its capital improvement plan the conceptual planning, permitting, design and construction of a new or expansion of the existing water supply source and treatment by 2026.

Figure 4-6. Englewood Water District Future Average Water Treatment Analysis



	2015	2016	2021	2026	2031	2036
AADF	2.706	2.753	2.964	3.116	3.276	3.412
Treatment Capacity AAD	3.96	3.96	3.96	3.96	3.96	3.96
90% AAD Treatment Capacity	3.564	3.564	3.564	3.564	3.564	3.564

Two additional permitting requirements are also applicable to the District's current water supply sources and treatment facilities. First, in accordance with Chapter 163.3177(6)(c), F.S., the District is required to submit a 10-Year Water Supply Facilities Work Plan to the SWFWMD within 18 months of the RWSP update, or by May 17, 2017. Second, the District's current WUP will expire on December 18, 2019.

The District must submit a permit application, no sooner than December 18, 2018, to renew the current WUP.

4.2.3 Water Transmission and Distribution Hydraulic Analysis

The ultimate goal of creating a water transmission and distribution hydraulic model is to provide a tool for the District to conduct ongoing evaluations of their existing and proposed water system infrastructure. A comprehensive hydraulic model can provide valuable information to assist utilities in planning for future service improvements by:

- Locating and sizing future transmission mains;
- Identifying current and future connection conditions for water distribution mains for new developments;
- Identifying opportunities that maximize the efficiency of existing and future facilities; i.e. – where looping of distribution lines may assist pressure; and
- Provide an additional layer of data to the District's existing GIS database.

The District did not have an existing hydraulic model, and thus the data collection and calibration efforts required to build a comprehensive model were beyond the scope of this Utility Master Plan. However, a rudimentary hydraulic model of the District's water distribution system was created in WaterGEMS.

The major components of the water network used to construct the hydraulic model include the following:

- Lime Softening and RO Water Treatment Plants;
- Finished Water Storage Facilities;
- High Service Pumps; and
- Over 100 miles of 6" – 30" diameter pipelines

The high service pumps at the treatment plants are operated to maintain a discharge pressure of approximately 62 psi. Therefore, operating conditions at the high service pump station were simulated by modeling them at a "one-point" design operating condition using the design flow and operating head of the pumps to develop a theoretical curve for each pump.

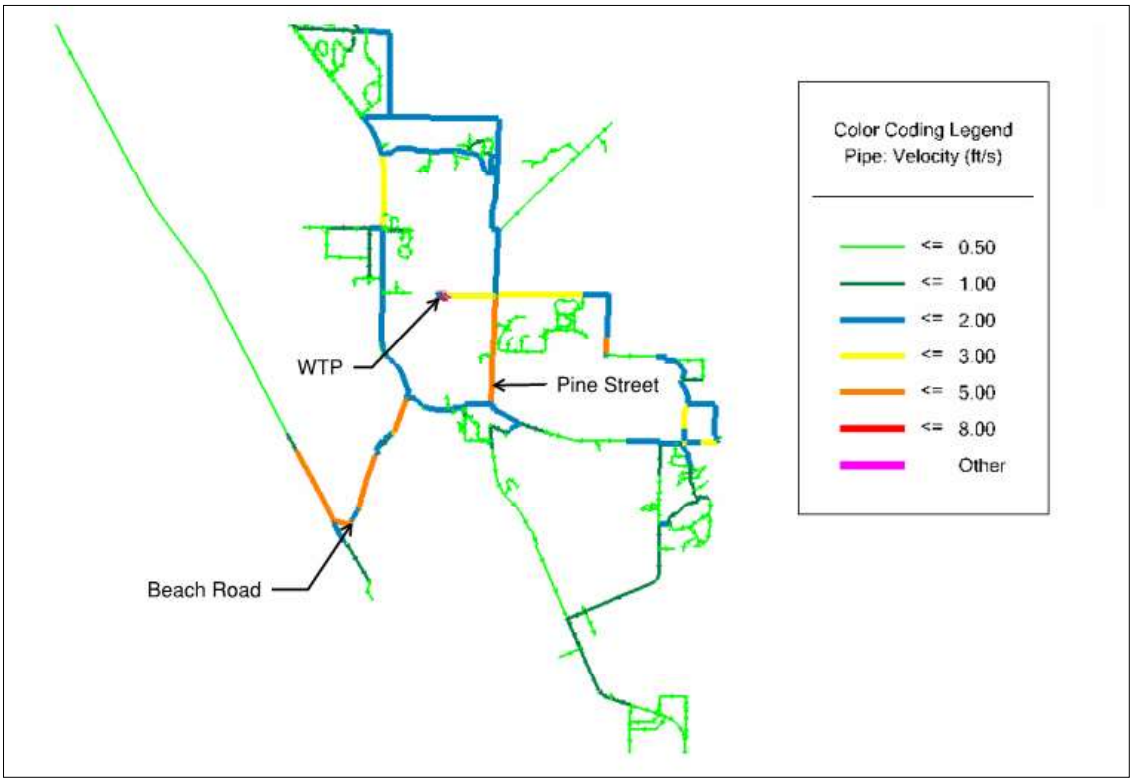
Information on the five water storage tanks at the water treatment facility, including one 500,000 gallon ground tank, one 1M (million) gallon ground tank, one 2M gallon ground tank, one 4M gallon ground tank, and one 100,000 gallon elevated storage tank was collected. Because the purpose of the model is to evaluate the existing water distribution system and determine any capacity improvements due to projected growth and service demands, the tanks were combined into one large tank with capacity equal to the aforementioned storage tanks and supplemented with a "reservoir" to deliver water to the high service pump station and distribution system. The modeled reservoir acts as a continuous water source at a constant surface elevation. This allows modeling of various peaking scenarios without concern for water availability.

Existing demand in the model was populated with customer meter data from March 2016 via GIS files which included the geo-referenced location of each meter and the maximum daily demand in gallons per day (gpd). In addition to meter data, daily logs noting treated water to the distribution system from January 2006 to May 2016 were reviewed to validate the March 2016 meter data. Once imported, meters and their associated demands were assigned to the system junction using Thiessen polygons to assign them to the nearest geographical junction.

The system model was simulated for steady state conditions at the average daily demand and two peaking factors of 1.5 and 2.5 for maximum day and peak hour demands respectively. Because, calibration of the model with physical operating conditions was not available at the time of modeling, the pump station was configured to provide between 70 and 100 pounds per square inch (psi) from the water treatment plant (WTP) to simulate standard operating conditions of typical water distribution systems. The underlying assumption used to develop this base existing model was that the system is currently operational with no major deficiencies other than the bottleneck of flow to Manasota Key noted by District personnel.

The Average Daily Demand (ADD) model simulation showed very little pressure reduction throughout the system, as expected, and confirmed the District's capacity issues on Manasota Key. On the main portion of the system, the pressure reduction from the WTP to the farthest north and south junctions is approximately 11 feet of head equivalent to a 5 psi reduction for both locations. Similarly, the capacity of the distribution piping system appeared adequate with few locations of major head loss gradients greater than 1 foot per 1,000 feet (ft/1,000 ft) and no single pipe velocity greater than 3 feet per second (fps).

Figure 4-7. Pressure and Velocity Results from Existing Model Simulation



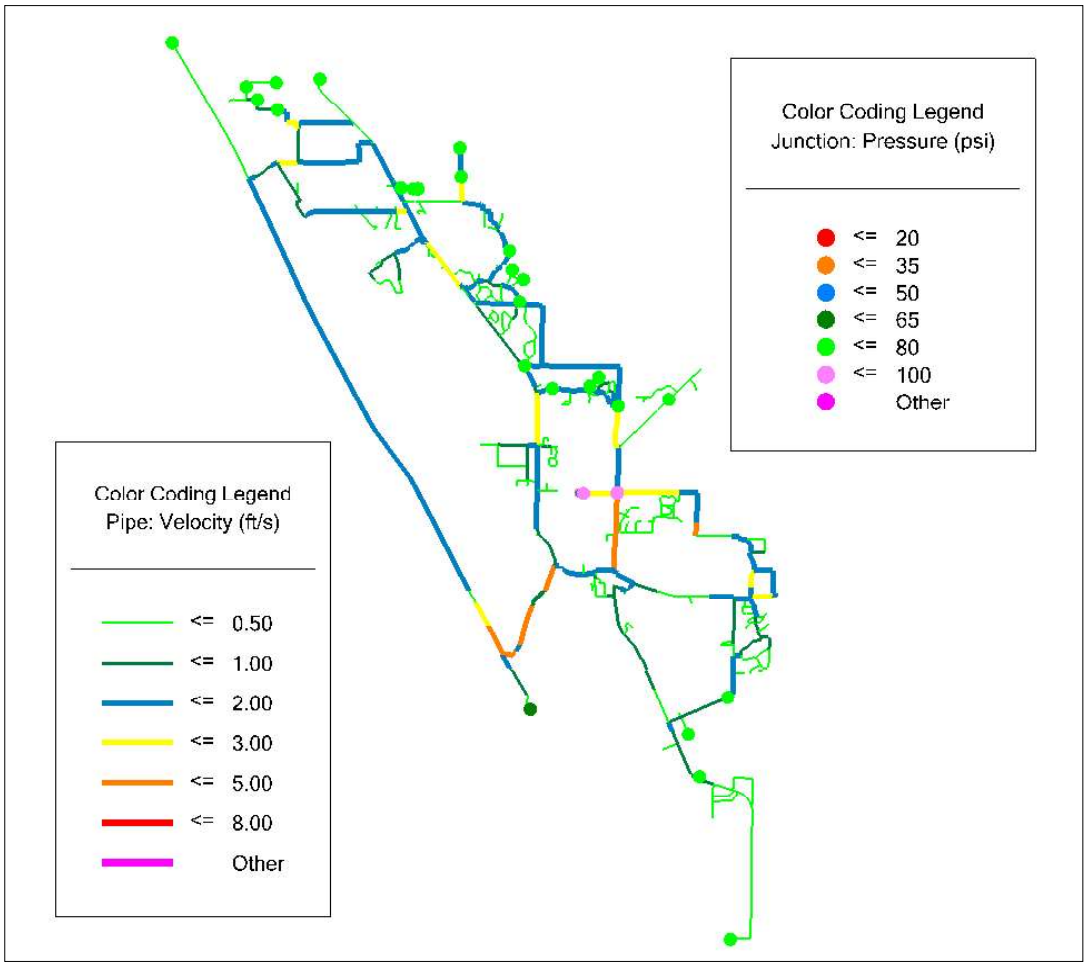
Future demand allocations were assigned in locations where developments have been planned as defined earlier in this report. These demand allocations were input into the model based on anticipated near-term, mid-term and long-term periods of zero to four years, five to ten years, and eleven to twenty years respectively. Future development areas were referenced into the model and the future demand was assigned to the junction nearest the transmission main assumed to deliver flow to the subject development.

For the future model simulations run with ADD, similar results to the existing model demand were experienced with respect to pressure reductions and pipe velocities. Only slight reductions in pressure were noted as compared to the existing model results. Accordingly, only minor velocity increases and hydraulic gradient losses were noted. Similar to the existing model at ADD conditions, no pipe velocities above 3 fps were shown in the results through the 20 year demand projections.

For the future demand model simulations with a maximum day peaking factor of 2.5, the pressure reductions for the three modeled future demand periods were not significant. Results show the average pressure reduction from the existing model to the 20 year future demand projection is approximately 15 psi (35 feet). Based on these results it appears that the existing system will be adequate to handle the future demands in the locations of the anticipated developments with respect to system head losses. The only area of concern is Manasota Key, which according to the results of the existing model, showed increased head losses in the system along Beach Road and moving north on the barrier island. Because the head losses on the existing

system were already fairly significant, any further reductions due to increased demands elsewhere in the system may further compromise the ability to provide service to Manasota Key.

Figure 4-8. Pressure and Velocity Results from Future Demand with PF2.5



As noted, future demands indicated that there are portions of the existing water distribution system that may not have the ideal capacity to provide similar levels of services to what is currently being provided. These areas include Manasota Key and the 30-inch, 16-inch and 12-inch pipelines just downstream of the WTP.

For Manasota Key, the bottle neck along Beach Road may be resolved by increasing the diameter of the pipeline from 10-inches to 16-inches, which would reduce the head losses in that section of the system and improve the capacity to the farther reaches of the barrier island. Additionally, increasing the pipeline diameters of the first few sections north and south on Manasota Key from 8-inches to 10-inches and 6-inches to 8-inches, respectively would help to improve the existing capacity in these areas. These improvements should be considered within the first phase of future demand developments.

Near the WTP, pipe diameter increases to the 16-inch and 12-in water mains should be considered for the five to ten year demand projections. For the approximately 100

foot section of 16-inch water main running north of the connection to the 30-inch feeder line from the WTP, velocities appear to increase beyond acceptable ranges prior to splitting flow to a 12-inch water main to the east and continuing in a 16-inch water main to the north. This section of water main should be replaced with a 30-inch diameter pipeline to improve capacity. Similarly, the 12-inch water main splitting from the same 30-inch water main should be replaced with a 20-inch water main along Pine Street from the connection to the 30-inch line all the way to South McCall Road.

4.3 Wastewater Flow Projections and Treatment Analysis

4.3.1 Wastewater Flow Projections

To determine future wastewater flows, the population projections presented in Section 3.0 were converted to equivalent residential connections (ERCs) based on the average family household size of 2.4 as determined from the 2015 Census tract data.

To estimate the flows associated with each ERC, a comparison was made between the previously published recommendation of 121 GPD/ERC in the District's 2005 Capacity Analysis Report, (CH2MHill) and the District's 2015 Annual Average Daily Flows. The Annual Average Daily flow in 2015 was 1.471 MGD (Total 1.587 MGD – Sandalhaven and Charlotte County flows of 0.105 and 0.001 respectively). The estimated 2015 Base Population is 36,611. This equals approximately 40 gpcd. Using 2.4 people per household equates to an estimated flow of 96 GPD/ERC.

Table 4-8. Comparison of GPD/ERC

Source	Flow Rate (GPD/ERC)
2005 Capacity Analysis Report (CH2MHill)	121
2015 AADF/2015 Base Population	96

In developing a recommended flow per ERC, consideration was given to the anticipated areas of growth within the District along with recognition that not all residences within the District's service area have sewer service, yet those residences were included in the determination of "Base Population" calculation above – skewing the flow rate down.

Several new developments have been identified that are zoned primarily single family residential, which would indicate that the reported household size of 2.4 may increase as more families move into the area.

It was determined to use a conservative approach and apply the previous estimate of 121GPD/ERC to calculate the District's projected wastewater flows.

In addition to the areas within the District's service boundary, additional wastewater flows will be collected from Charlotte County and Utilities, Inc. of Sandalhaven. The District's original bulk sewer agreement with Charlotte County (2005) was for 400,000 gpd, but with the new 2014 Interlocal Agreement, no capacity limit is enumerated. The

Utilities, Inc. of Sandalhaven agreement with the District has an amended contract limit of 500,000 gpd; however at the time of this report, the utility has only funded 300,000 gpd of the allocated capacity.

Utilizing the population projections presented in Section 3.0 of this Report, the assumption of 2.4 people per household and 121GPD/ERC, and the established 1.15 ratio of 3-MMADF to AADF, Table 4-9 identifies the projected wastewater flows within the District, as well as incremental flows from Charlotte County and Sandalhaven projected to a limit of the original or contracted flows.

Table 4-9. Total Projected Wastewater Flows

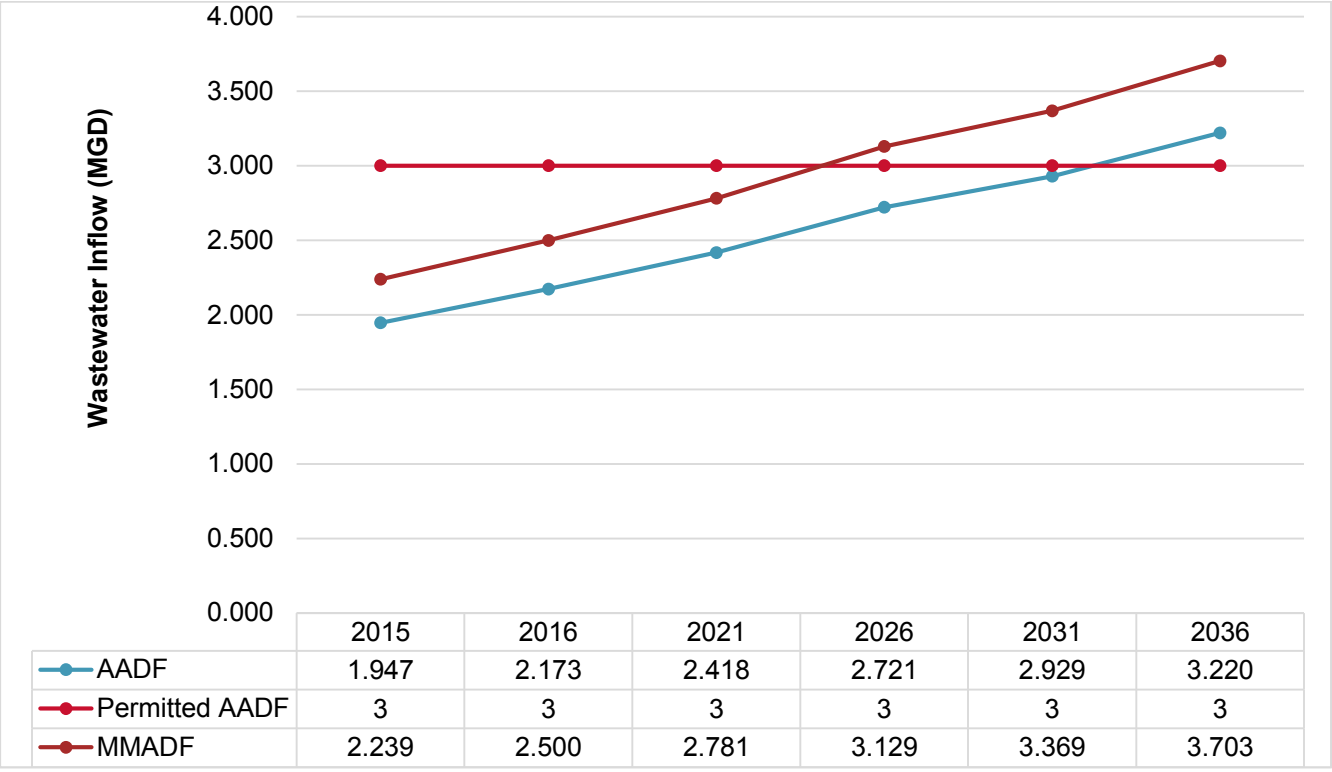
Year	Population (District Service Area)	ERC	Projected District Wastewater Flows (AADF) (MGD)	Charlotte County Allocation (MGD)	Sandalhaven Allocation (MGD)	Total Projected AADF (MGD)	Total Projected 3-MMADF (MGD)
2015	36,611	15255	1.846	0.001	0.1	1.947	2.239
2016	37,160	15483	1.873	0.1	0.2	2.173	2.500
2021	40,032	16680	2.018	0.1	0.3	2.418	2.781
2026	42,074	17531	2.121	0.2	0.4	2.721	3.129
2031	44,220	18425	2.229	0.3	0.4	2.929	3.369
2036	46,018	19174	2.320	0.4	0.5	3.220	3.703

4.3.2 Wastewater Treatment Analysis

The District's 2005 Capacity Analysis Report (CH2MHill) concluded that the District had adequate capacity to manage projected flows through 2016. In accordance with paragraph 62-600.405, Florida Administrative Code (F.A.C.), should a capacity analysis report document that the permitted capacity will not be equaled or exceeded for at least 10 years, an updated capacity analysis report shall be submitted to the DEP at five-year intervals or with the permittee's application for permit renewal.

As shown in Figure 4-9, the District's AADF is projected to exceed the plant's permitted capacity after 2031. It is recommended that the District perform an update to the 2006 Capacity Analysis Report (CAR), including the plant loading and biological performance analysis to determine if additional capacity is available for re-rating without construction of additional facilities. The CAR can be done in conjunction with the District's Domestic Wastewater Facility Permit renewal.

Figure 4-9. Englewood Water District Future Wastewater Treatment Analysis



	2015	2016	2021	2026	2031	2036
AADF	1.947	2.173	2.418	2.721	2.929	3.220
Permitted AADF	3	3	3	3	3	3
MMADF	2.239	2.500	2.781	3.129	3.369	3.703

In addition, the District's current FDEP Domestic Wastewater Facility Permit will expire on July 9, 2018. It is recommended that the District prepare and submit a Domestic Wastewater Facility Renewal Permit application to the FDEP no sooner than July 9, 2017. This permit renewal can be done in conjunction the recommended Capacity Analysis Report.

4.3.3 Forcemain Hydraulic Analysis

The data provided for the sewer model consisted of a GIS file containing the gravity, force main and vacuum sewer systems, including pipeline diameters and lengths. Per the scope of this study, models developed for this project included only the pipelines within the force main system sized 8-inches and larger. The District also provided limited lift station information including the coordinates of each station and the horse power of the pump(s) and general wet well dimensions for a select number of lift stations.

These data were imported into WaterGEMS where it was determined that an insufficient amount of data were available to provide a workable model for the sanitary sewer system. It is recommended that additional information be collected on the existing sanitary sewer system, including pipe invert elevations, identification of critical gravity trunk lines downstream of force mains, wet well dimensions for the entire system, detailed pump curves and operating data such as float switch elevations, known issues in the system, existing operating pressures, infiltration rates and data to develop peaking factors.

4.4 Reuse Flows

4.4.1 Reuse Demand

It is the District's goal to reclaim 100 percent of its wastewater treatment facility effluent for reuse. As previously listed in Table 3-5, there are existing reclaimed water commitments/permitted capacities totaling over 3.6 MGD. Based on the District's Total Projected Wastewater Flows identified in Section 4.3, and the current 3.5 MGD annual average daily flow permitted capacity of the reuse system, there are enough existing reclaimed water commitments to accept the anticipated permitted flows of 3.220 AADF through 2036.

Seasonal management of the District's reclaimed water flows during the wet season is assisted by the use of their 220 MG Class I ASR injection well which is used to manage excess reclaimed water during periods when reuse customers cannot efficiently use available effluent (during wet weather events).

4.4.2 Reuse System Hydraulic Analysis

The District did not have an existing hydraulic model, and thus the data collection and calibration efforts required to build a comprehensive model were beyond the scope of this Utility Master Plan. However, a rudimentary hydraulic model of the District's reclaimed water distribution system was created in WaterGEMS.

The major components of the reclaimed water network used to construct the hydraulic model include the following:

- Wastewater Treatment Plant;
- Effluent Pump Station; and
- Almost 20 miles 6" – 16" diameter pipelines

In addition to GIS data, limited information on the reclaimed pumping system was provided including the design flow (1,740 gpm) and horsepower (150 HP) of the three existing variable frequency drive (VFD) pumps. EWD also noted that the system typically runs at approximately 150 psi from the pump station. With this information, an operating point was input into the model using the design flow and operating head of the pumps to develop a theoretical operating curve for each of the pumps.

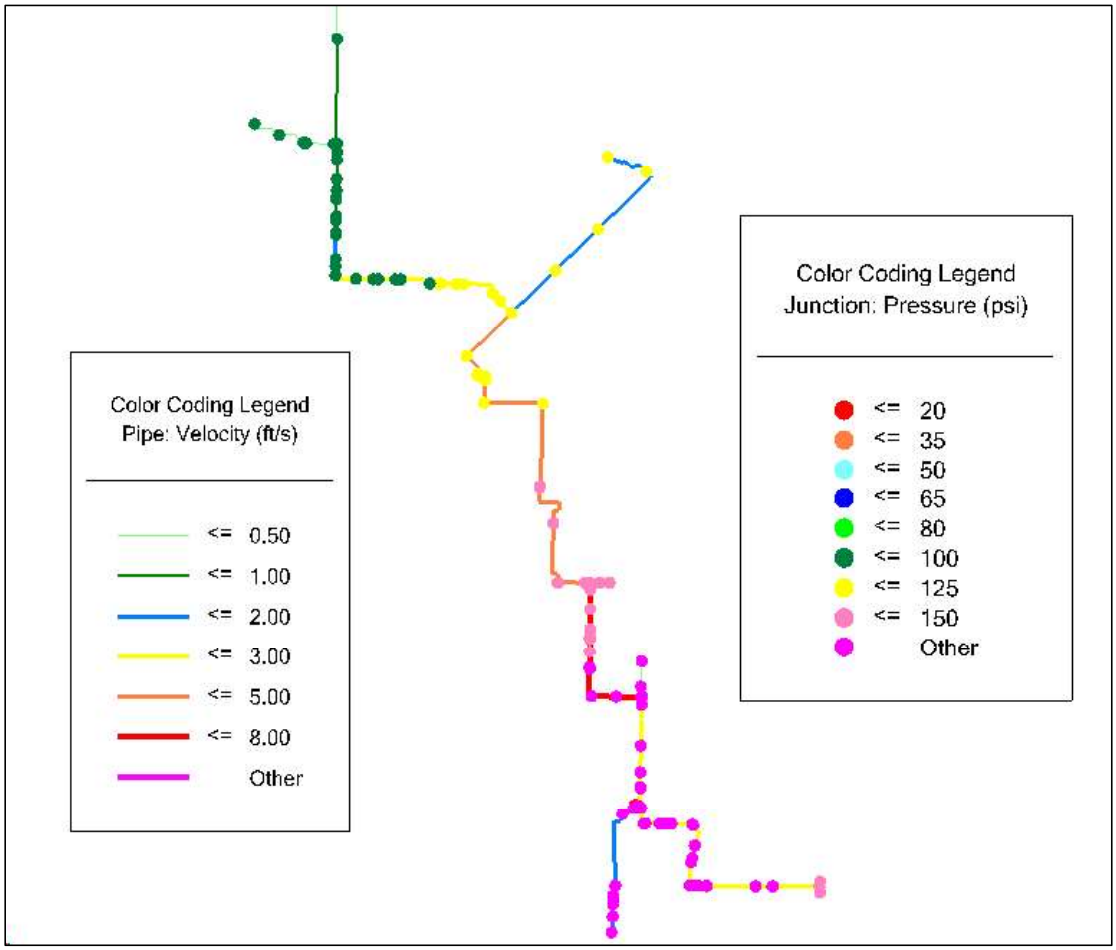
Reclaimed water demands were provided by the District utilizing their 2015 reclaimed water billing data. Average daily usage for each of the nine existing customers was calculated and modeled. This average daily usage was used as the average daily demand (ADD) and was input into the junctions nearest the users' geographic location for model simulations.

The ADD model results showed reduction in pressure from the pump station to the northernmost reaches of the model with the maximum reduction in head from the junction just downstream of the pumping station of approximately 85 feet (37 psi) and occurs at the northernmost node in the system. It is noted that approximately two-thirds of the demands flow to the northern end of the reclaimed system. Pressure

reductions to the south are significantly less based on the results, with a maximum reduction in head of approximately 22 feet (10 psi). Model results also indicate that velocities in this simulation do not exceed 5 fps. The highest velocities were found to be in the 12-inch line along Worth Avenue and San Casa Drive.

Alternatively, when a peaking factor of 1.5 is applied, the model simulation results appear to be a more likely representation of the existing demands experienced by the reclaimed system. With a total steady state flow of 2,808 gpm, results from the model show a total head loss of approximately 164 feet, or a pressure drop of 78 psi. Velocity results from this model simulation show higher velocities in the system north of the pumping station. The highest velocities shown in this scenario are approximately 5 fps in the 12-inch pipeline along Worth Avenue and San Casa drive and approximately 3.5 fps in the 12-inch pipeline from South McCall Road and the Englewood Sports Complex.

Figure 4-10. Pressure and Velocity Results for Existing system with (PF1.5)



In order to address the issue of low pressures along the areas to the north of the pumping station, it is recommended that the District perform a feasibility study on the hydraulic operation of the existing, but non-functioning re-use booster station at Holiday Ventures.

In addition, it is important to note that this system was modeled under steady state conditions. Accordingly, information on the actual hourly demand data could provide insight into the times of highest demands, considering demands may not occur simultaneously. This hourly demand, along with recorded pressures at various locations in the system, could be used to calibrate the system in order to more accurately reflect the actual operating conditions. This information would also be beneficial for the District to implement a schedule of demand in order to spread the demand throughout the day evenly, therefore reducing the demand on the system at one given time.

4.5 Wastewater Collection Alternatives for Unsewered Areas

As noted earlier, not all parcels in the District's current service area are connected to the wastewater collection system. Sanitary systems are essential to protecting the public health and welfare of residents in areas of concentrated population, as well as critical to the environmental and economic health of the area. A brief summary of the various wastewater collection methods is described below.

4.5.1 Gravity Sewer System

A gravity sewer system is used to collect wastewater from multiple sources and convey the wastewater by gravity to a central location.

Collection sewers are typically eight-inch or larger diameter pipe. Pipe diameters increase with increasing volume of water being transported. Pipes are installed with sufficient slope to keep the suspended solids moving through the system.

Properly designed and constructed gravity sewers are a viable collection option for urban areas, but can be expensive for small communities. In its purest form (i.e., uniform slope from service connections to treatment components) gravity is an inexpensive means to convey water. However, the topography is rarely favorable to purely gravity flow, and lift stations must often be included. The cost of gravity sewers may be prohibitive unless there is sufficient population density to justify the installation.

4.5.2 Pressure Sewers

Pressure sewers are a means of collecting wastewater from multiple sources and delivering the wastewater to an existing collection sewer, and/or to a local or regional treatment facility. Pressurized sewers or Force Mains are not dependent on gravity to move wastewater and thus the local topography restrictions will represent no challenge. If gravity flow is not possible throughout the system, pump stations will be employed.

Low Pressure Small Diameter Sewer System (LPS)

A low pressure small diameter sewer system consists of small diameter (minimum 2 inches) forcemains that are typically installed within the road right-of-way (ROW). The

system requires installing individual grinder pumps (GP) or septic tank effluent pumps (STEP) at each property to convey wastewater to the low pressure sewer system.

A grinder pump grinds the solids present in wastewater to a slurry in the manner of a kitchen sink garbage disposal. The septic tank of a STEP system captures the solids, grit, grease, and stringy material that could cause problems in pumping and conveys the liquid through the small diameter piping. In utility-scale STEP installations, it is typically the responsibility of the service provider (i.e. utility agency) to provide the maintenance and cleaning of the septic tank portions of the STEP system as well as the individual pump stations. The tanks and pumping systems are typically installed on the user/customer property with access agreements provided for maintenance and repair access by the service provider. Grinder pumps to serve individual users are usually 2-hp in size, but 1-hp units are also used. Some installations could use up 5-hp motors when serving industrial users. STEP pumps are usually fractional horsepower.

Serviceability of the pumping unit's components is important to both minimize the time lost due to a malfunction and keep the cost of inspection and maintenance to a minimum. A check valve on the service line prevents backflow, which is insured with a redundant check valve at the pumping unit.

The panel is usually installed on the side of the user/consumer and power paid by the user. Existing facilities may need to upgrade electrical mains and power boards. If a malfunction occurs, a high liquid level alarm is activated. This may be a light mounted outside of the user facility, or it may be an audible alarm which can be silenced by the user. The user then notifies the sewer service maintenance provider.

Due to potential power outages, both STEP and GP installations should have reserve holding capacity. Single service GP installations generally provide reserve storage capacity of about 50 gallons. Septic tanks usually have about 100 to 200 gallons. Additional storage capacity may be required based on local conditions. The loss of power in areas that are served by individual wells and cisterns essentially eliminates the possibility for wastewater generation because water supplies become unavailable. The minimum storage capacity required is 50 gallons unless local authorities require additional storage based on local conditions.

Vacuum Sewer System

A vacuum sewer system utilizes a partial vacuum to transport sewage through the collection system. As the name suggests, a vacuum (negative pressure) is drawn on the collection system, with a small diameter vacuum pipeline located typically in the road. Vacuum sewers do not require a septic tank at each wastewater source. All of the domestic wastewater and waste constituents are collected and transported by this collection method. Sewage from one or more homes or businesses could flow by gravity into a small valve pit. A service line connects the valve pit to the main vacuum line. Each valve pit is fitted with a pneumatic pressure-controlled vacuum valve. This valve automatically opens after a predetermined volume of sewage has entered the sump.

Service connections are made to each residence and a holding tank replaces the septic tank (much like the grinder pump system). A vacuum valve located in the holding tank allows rushing air from the service connection to transport the sewage to the central vacuum station. The central vacuum station operates 24-hours a day.

Because of the cost of a vacuum station, vacuum sewers are most appropriate for areas with 200 or more connections. A typical vacuum station can serve from a 15,000-foot radius or around 1,200 connections.

Because the movement of wastewater depends upon the differential pressure created when valves open, long pipe runs with few connections can result in poor performance. The same problem is seen when connections are installed but are not yet in use. As a solution for this, temporary valve pits installed at strategic locations can be fitted with timer-controlled valves that allow air to enter even though wastewater is not being generated by the source.

4.5.3 Evaluation of Sewer Collection Methods

The relative advantages and disadvantages of the effluent sewers discussed above are summarized in Table 4-10 below. This Table is an excerpt from the *Guidance Manual for the Evaluation of Effluent Sewer Systems*, EPRI, Palo Alto, CA, East Kentucky Power Cooperative, Inc., Winchester, KY, and Cooperative Research Network of NRECA, Arlington, VA: 2004. 1009130. To determine the most cost effective sewer collection method for a specific area, it is recommended that the District evaluate each area individually as cost effectiveness of the different collection methods vary with number of parcels served; topography of the area and regulatory drivers.

Table 4-10. Evaluation of Sewer Collection Methods

Collection Alternative	Advantages	Disadvantages
Conventional	• Well established technology. • Collectors contained within the public rights-of-way. • Entire waste stream conveyed from property. • No power required except at lift stations.	• Must maintain uniform grade at gradient sufficient for self cleansing. • Deep excavation and/or many lift stations required in areas of undulating or flat topography. • Self-cleansing velocities not maintained at low flows. • Manholes required at regular spacing • Infiltration/Inflow common through manholes and lift stations.

Collection Alternative	Advantages	Disadvantages
Septic Tank Effluent Gravity	• Variable, flat and inflective gradients allowed to reduce excavation costs • Can be combined with STEP units to avoid deep installation or lift stations • Performance not affected by low flows • Cleanouts in place of manholes • Infiltration/Inflow reduced by fewer manholes and lift stations • Collectors usually installed in public R/W off of road pavement • No power requirement except at lift station • Primary treatment requirements reduced or eliminated	• Interceptor tank located on private property with perpetual easement required • Settleable solids retained on property that require periodic removal • Septic, settled wastewater collected that requires odor control at manholes and lift stations
Septic Tank Effluent Pressure	• Cost of excavation may be reduced by installing collector mains at constant depth, conforming to topography • Performance not affected by low flows • Primary treatment requirements reduced or eliminated • Manholes eliminated • Infiltration/Inflow significantly reduced • Collectors usually installed in rights-of-way off of road pavement • Lift stations eliminated	• Interceptor tanks with pumping unit located on private property with perpetual easement required • Power required at each connection supplied by owner • Property owner's existing electrical panel may require replacement to accept the additional load or to comply with current codes. • Settleable solids retained on property that require periodic removal • Septic, settled wastewater requires odor control at air release valves and treatment plant • Individual service lost with power outage
Grinder Pump (Low Pressure)	• Collector mains may be laid at constant depth to conform to topography. • Conveys entire waste stream from property. • Performance not affected by low flows. • Infiltration/Inflow significantly reduced. • Manholes eliminated. • Collectors usually installed in public R/W off road pavement • Lift stations eliminated	• Vault with grinder pump located on private property with perpetual easement required • Power required at each connection supplied by owner • Property owner's existing electrical panel may require replacement to accept the additional load or to comply with current codes. • Septic wastewater requires odor control at air release valves and treatment plant • Individual service lost with power outage
Vacuum	• Entire waste stream conveyed from property • Wastewater maintained in aerobic state • Performance not affected by low flows • Exfiltration eliminated • Manholes eliminated • Lines and valves installed in R/W off road pavement • No power required at connection	• Collector mains must be installed with "saw-tooth" pattern • Standby power required at central vacuum station to prevent service loss during power outages • Limited number of equipment manufacturers

4.6 Regulatory Compliance

In the wake of the lead and copper crises in the news, utilities are faced with increased scrutiny from regulators, the press, environmental advocates, and the public they serve. It is essential for every utility to understand the current regulatory requirements, the impact of potential future regulations and their vulnerability to regulatory excursions that could impact both the cost of service and public confidence.

4.6.1 Safe Drinking Water Act

Current SDWA rules of particular relevance to the District include the Stage 2 Disinfectant/Disinfection By-Product (D/DBP) Rule, Total Coliform Rule, and the Lead and Copper Rule (LCR). The EPA is working on revisions to the LCR with potential roll-out in 2017. Important elements to the LCR revisions will focus on sampling protocols, copper sampling site criteria, lead service line replacement (potentially on private property), maintaining a proper lead service line inventory, and emphasis on maintaining optimum corrosion control requirements.

4.6.2 Clean Water Act

Overflows of raw sewage and inadequately controlled stormwater discharges from municipal sewer systems can end up in waterways or cause back ups into city streets or homes threatening water quality, human health and the environment. Reducing raw sewage overflows and stormwater discharges is one of EPA's National Enforcement Initiatives. EPA works with the Florida Department of Environmental Protection (FDEP) to protect human health and the environment by ensuring that the regulated community obeys environmental laws/regulations through on-site visits by qualified inspectors, and a review of the information the state requires to be submitted. The District complies with all monitoring and reporting regulations required by the FDEP.

4.6.3 Florida Department of Environmental Protection

The Florida Department of Environmental Protection (FDEP) is the state agency granted regulatory and enforcement powers in chapter 403, Florida Statutes, to control air and water pollution. Accordingly, FDEP is responsible for permitting and compliance activities for public water systems and domestic wastewater facilities in Florida. FDEP, through its South District Office and in conjunction with its delegated local program in Sarasota County, works with the District to regulate and enforce the State's Drinking Water and Domestic Wastewater Programs.

The Florida Administrative Code (FAC) Chapter 62 contains the requirements for public water systems and wastewater facilities. Specific to the District are requirements for Water and Wastewater Capacity Analysis Reports in accordance with Sections 62-555.348(3)(a) and 62-600.405 respectively as well as the renewal of the District's existing Domestic Wastewater Facility Permit.

4.6.4 Southwest Florida Water Management District

The District is located in the southwestern portion of the Southwest Florida Water Management District (SWFWMD). As defined in Chapter 373 of the Florida Statutes (F.S.), the SWFWMD's responsibilities include managing the water supply, protecting water quality and preserving natural systems. The SWFWMD 2015 Regional Water Supply Plan (RWSP) assessed projected water demands and potential sources of water to meet water supply demands for the period from 2015 through 2035. The District's projected potable water supply demands were included in the RWSP.

The SWFWMD requires that, within eighteen (18) months after an update to the RWSP is approved, the District shall submit a 10-Year Water Supply Facilities Work Plan. The 2015 RWSP Update was approved in September 2015 and the District will need to submit a 10-Year Water Supply Facilities Work Plan by May 17, 2017.

The District currently operates their potable water supply wells under an existing Water Use Permit (20 004866.010) which expires on December 18, 2019. An application to renew this permit will need to be submitted to the SWFWMD no sooner than December 18, 2018.

5 Capital Improvement Program

5.1 Introduction

The Capital Improvement Program (CIP) will ensure that the District plans for and maintains infrastructure assets in a sound, functioning condition. The CIP has been developed to include the projects necessary to implement the recommended water, wastewater and reclaimed water programs.

CIP Planning Horizons

Near-Term – years 1 through 4

Mid-Term – years 5 through 10

Long-Term – years 11 through 20

Rapid Assessments

To evaluate the District's existing assets, a Rapid Assessment was completed at each of the District's key facilities to determine critical repair and rehabilitation requirements. The scope of this task required visual condition inspections of each above ground facility utilizing professional personnel familiar with the design and operation of reverse osmosis and lime softening water treatment plants, wastewater treatment processes and operation, distribution, collection and pumping system components as well as water supply, aquifer storage and recovery and deep injection wells. Each facility inspected had a dedicated condition assessment team including a licensed utility operator to complete the assessment utilizing industry accepted condition assessment forms.

The intent of the Rapid Assessment was to provide an evaluation of the condition of the District's facilities by conducting field inspections, performing a desktop estimate of remaining service life, developing a cost opinion range for equipment renewal, modifications and capital projects for each facility, and providing near-term (Year 1-4), mid-term (Year 5 to 10) and long-term (Year 11-20) capital improvement projects necessary to meet service demands. The facilities were grouped into the following six facility service types:

- Water Treatment Plants - Reverse Osmosis and Lime Softening
- Water Distribution System
- Wells and Well Fields
- Wastewater Reclamation Treatment Facility
- Wastewater Reclamation Transmission and
- Wastewater Collection System – Sewer Lift and Vacuum Stations.\

A complete list of all projects with cost estimates, brief project descriptions and dependencies is provided in Appendix C - TASK 3 Condition Assessment Report.

The remainder of this Section is broken out into two divisions: Recommended Improvements by Planning Horizon and Recommended Improvements by Service Program (Water or Wastewater).

5.2 Recommended Capital Improvements by Planning Horizon

The following tables summarize the recommended capital improvements in the near, mid and long-term planning horizons.

5.2.1 Near-Term (Year 1 to 4) Improvements

Table 5-1 includes those capital projects recommended to take place in the short term (Year 1 to 4) timeframe. The total estimated cost is $4,448,000.

Table 5-1. Year 1-4 Recommended Capital Improvements

Project ID	Improvement	Facility / Location	Cost Estimate
RO-04	Develop a facility one-line electrical diagram	RO Bldg.	$ 35,000
RO-05	Commission a Power Load Analysis and Arc-Flash Study	RO Plant	$ 75,000
RO-07	Upgrade older power distribution and motor control centers	RO Plant	$ 280,000
RO-11	Install new degasifier 2	RO Plant	$ 205,000
RO-18	SCADA and PLC upgrades	RO Plant	$ 120,000
LP-01	Replace raw storage diffuser tray and support structure	RWS Tank	$ 95,000
LP-02	Repair and replace internal coating raw water storage tank	RWS Tank	$ 35,000
LP-03	Plant 3 - ten year rehabilitation	LS Plant	$ 270,000
LP-04	Plant 2 - ten year rehabilitation	LS Plant	$ 295,000
LP-06	Plant 2 - Filter rehabilitation	LS Plant	$ 62,000
LP-08	Develop a facility one-line electrical diagram	LS Plant	$ 25,000
LP-09	Commission a Power Load Analysis and Arc-Flash Study	LS Plant	$ 60,000
LP-11	Upgrade older power distribution and motor control centers	Old HSP Room	$ 177,000
LP-14	Retrofit two (2) Newer High Service Pump motors with VFD' s	New HSP Room	$ 90,000
LP-17	Commission a LSP Facility plan to determine upgrades or decommissioning	LS Plant	$ 150,000
LP-20	SCADA and PLC upgrades	LS Plant	$ 82,000
WL-01	Install telemetry communications to RO supply water wells	RO WF2	$ 45,000
WRF-06	Blower upgrades phase 1	WRF Plant	$ 385,000

Project ID	Improvement	Facility / Location	Cost Estimate
WRF-13	Trace and label power and control wire terminations. Update electrical one-line diagram	WRF Plant	$ 35,000
WRF-16	Re-use Pond Pumping Rehabilitation	Re-Use Pond Pump Station	$ 128,000
LS-02	LS121 Holiday Ventures Capacity Upgrade Study and Facility Plan	LS121-Holiday Ventures	$ 100,000
LS-05	Purchase bypass pump and install on-site bypass pumping	LS121-Holiday Ventures	$ 65,000
CL-01	Replace Beach Road force main	Collection	$ 645,000
CL-04	Manhole rehabilitations - Reline brick manholes with GML	Collection	$ 120,000
CL-06	Install forcemain isolation valve near Elm St.	Collection	$ 67,000
RU-01	Reuse hydraulic analysis and operational review for service improvements	LS121-Holiday Ventures	$ 85,000
RU-03	Rehabilitate re-use booster station at Holiday Ventures	LS121-Holiday Ventures	$ 100,000
DS-06	System modifications to eliminate bottleneck at Roundabout	Water Dist	$ 315,000
DS-07	System modifications to provide redundancy at Forked Creek	Water Dist	$ 230,000
EWD-01	Select, purchase and execute an EAMS / CMMS	EWD (Water ½ Wastewater ½ Program)	$ 72,000
			$ 4,448,000

5.2.2 Mid-Term (Year 5 -10) Improvements

Table 5-2 includes those projects recommended to take place in the mid- term timeframe. The total estimated cost is $18,907,000. It is noted that recommended project LS-03, Design and build upgraded LS121 – Holiday Ventures does not have a cost estimate shown. This project has a "precursor" project identified in the Near-Term (1-4) Improvement list – LS02, Lift Station 121 – Capacity Upgrade Study and Facility Plan.

Table 5-2. Mid-term (Year 5-10) Recommended Capital Improvements

Project ID	Improvement	Facility / Location	Cost Estimate
RO-06	Upgrade Standby Generator and Power Distribution	RO Plant	$ 965,000
RO-10	Replace degasifier 1	RO Plant	$ 265,000
LP-05	Plant 1 - ten year rehabilitation	LS Plant	$ 325,000
LP-10	Upgrade HSP standby generator and switchgear	Old HSP Room	$ 58,000

Project ID	Improvement	Facility / Location	Cost Estimate
LP-12	Replace HSP buried piping under older HSP Bldg. to tanks	Old HSP Room	$ 142,000
LP-13	Older High Service Pump Replacements (3)	Old HSP Room	$ 172,000
WL-02	Install telemetry communications to LP supply water wells	WF1, WF3, WF5	$ 45,000
WL-04	Rehab, replacement, or abandonment of WF1 supply wells	WF1	$ 45,000
WL-08	Plug and Abandon IMW-1 and SMW-1	WRF Plant	$ 30,000
WRF-04	Plant 4 Rehabilitation - 15 year rehabilitation	Plant 4	$ 350,000
WRF-07	Blower upgrades phase 2	WRF Plant	$ 120,000
WRF-11	Chlorine contact basin expansion	CL2 Contact Basin	$ 220,000
WRF-15	Standby Power / Power Distribution Improvements	WRF	$ 90,000
WRF-17	Install two smaller horsepower variable frequency dive pumps	Effluent Pump Station	$ 195,000
LS-03	Design and build upgraded LS121 - Holiday Ventures	LS121-Holiday Ventures	$ TBD
LS-04	Standby generator replacement (up size for Re-use booster station)	LS121-Holiday Ventures	$ 200,000
LS-08	Instrumentation upgrades - install flow meters or pressure indication	Various	$ 125,000
CL-02	Install new force main from Holiday Ventures to point TBD	Collection	$ 8,500,000
CL-05	North Beach sewer service study and evaluation	Collection	$ 65,000
CL-08	Purchase new CCTV camera and trailer	Collection	$ 120,000
RU-02	Install new re-use storage tank at Holiday Ventures	LS121-Holiday Ventures	$ 950,000
RU-04	Install new re-use forcemain from WRF to new HV storage tank	LS121-Holiday Ventures	$ 1,000,000
DS-04	AC Pipe replacement on Beach - Charlotte County	Water Dist	$ 2,440,000
DS-05	AC Pipe replacement on Beach - Sarasota County	Water Dist	$ 2,330,000
DS-08	Service line extension to Manasota development (2000 homes)	Water Dist	$ 80,000
DS-12	Water Storage Study - needs analysis & conceptual design	Water Dist	$ 75,000
			$18,907,000

5.2.3 Long-Term (Year 11-20) Improvements

Table 5-3 includes those projects recommended to take place in the long-term timeframe. The total estimated cost is $4,336,000. It is noted that project RO-15, LP-18 and LP-19 are dependent upon the recommendations of Near-Team (1-4) improvement, LP-17 Facility Plan for the Lime Softening Plant.

Table 5-3. Long-Term (Year 11-20) Recommended Capital Improvements

Project ID	Improvement	Facility / Location	Cost Estimate
RO-13	RO Plant - Capacity Upgrade (new RO skids)	RO Plant	$ 1,630,000
RO-14	RO Plant - Pump modifications	RO Plant	$ 93,000
RO-15	New chemical feed process if lime plant decommissioned	RO Plant	$ TBD
RO-16	Replace Cl2 gas system due to risk / liability decision	RO Plant	$ 125,000
RO-17	Upsize plant raw water piping - eliminate bottleneck for Well F 2	RO Plant	$ 84,000
LP-07	Replace Shelter / Bldg. - Lime Process	Lime Bldg.	$ 59,000
LP-16	Instrument and analyzer upgrades - ten year renewal	LS Plant	$ 35,000
LP-18	Decommission Lime Softening Plant	LS Plant	$ TBD
LP-19	Upgrade Lime Softening Plant	LS Plant	$ TBD
WRF-02	Odor control system rehabilitation at headworks	Headworks	$ 260,000
WRF-05	Plant 1 and 2 Rehabilitation - 15 year rehabilitation	Plant 1 and 2	$ 600,000
WRF-12	Replace Cl2 gas system due to risk / liability decision	CL2 Contact Basin	$ 125,000
VS-08	Standby generator rehabilitation	Various	$ 200,000
LS-13	Potential elimination of LS-113 Englewood Rd	Englewood Road	$ 125,000
CL-07	Sewer extensions to alternate areas	Various Locations	$ TBD
DS-13	Design and build water storage tank(s)	Water Dist	$ 1,000,000
			$ 4,336,000

5.2.4 Project Spanning 20 Year Horizon (Year 1-20) Capital Improvements

Table 5-4 includes those projects recommended to take place throughout the 20-year time-frame with the commencement of the project dependent on funding and opportunity. The total estimated cost is $6,050,000.

Table 5-4. 20 Year Horizon (Year 1-20) Recommended Capital Improvements

Project ID	Improvement	Facility / Location	Cost Estimates
WRF-01	Replacement of buried liquid process piping	WRF Plant	$ 205,000
CL-03	Clay pipe re-line / replacement	Collection	$ 5,000,000
DS-02	Line extension program	Water Dist	$ 345,000
DS-09	Looping projects - south service area	Water Dist	$ 200,000
DS-10	Looping projects - north service area	Water Dist	$ 300,000
			$ 6,050,000

5.2.5 Recommended Capital Improvements by System Program

Table 5-5 summarizes the breaks out the total capital costs between water and wastewater service programs.

Table 5-5. Recommended Capital Improvement Costs

	Near-Term Year 1-4	Mid-Term Year 5-10	Long-Term Year 11-20	Year 1-20	Total
Water Services	$ 2,682,000	$ 6,942,000	$ 3,026,000	$ 845,000	$ 13,495,000
Wastewater Services	$ 1,766,000	$ 11,965,000	$ 1,310,000	$ 5,205,000	$ 20,246,000
Total	**$ 4,448,000**	**$ 18,907,000**	**$ 4,336,000**	**$ 6,050,000**	**$ 34,741,000**

5.3 Recommended Capital Improvement by Facility Type

This section provides additional information on the facility projects including a short description of project dependencies, constraints and importance.

5.3.1 Reverse Osmosis Plant

The Reverse Osmosis (RO) Plant was first constructed in 1982 and has been upgraded in phases to the present. Some of the supporting equipment and structures including Trains A and B are at 34 years of service life and showing moderate to severe signs of deterioration and service failure. This is evident in the condition and performance of the plant's standby power and power distribution systems. Projects RO-04 to RO-07 are proposed to address these issues. In addition, the current condition of Degasifier 1 has been rated poor. Degasifier 1 is a single point of failure and losing its functionality will have a direct impact on water quality and present severe operational challenges. Projects RO-10 and RO-11 are proposed to address these issues.

The operation and performance of the RO Plant and the Lime Softening Plant are critical to delivering a drinking water that is safe and meets all water quality objectives including taste. A significant factor to determine future operations of the RO Plant is the age and condition of the Lime Softening Plant. Several of the RO Plant improvement projects scope and timing is dependent on project LP-17 LSP Facility Plan described in Table 5-7.

Table 5-6 includes those projects recommended for the RO Plant. The total estimated cost is $3,877,000.

Table 5-6. RO Plant Recommended Improvements

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
RO-04	Develop a facility one-line electrical diagram	FY 1-4	$ 35,000	Project is necessary to prepare for future work and/or upgrades at the facility. Must be completed before power load analysis and arc-flash study	Cost estimates provided separate for each facility. Consider combining projects RO-04, LP-08 and WRF-13
RO-05	Commission a Power Load Analysis and Arc-Flash Study	FY 1-4	$ 75,000	Project is necessary to prepare for future work and comply with recent adoption of Arc-Flash safety regulations	Cost estimates provided separate for each facility. Consider combining projects RO-05, LP-09 and WRF-14
RO-06	Upgrade Standby Generator and Power Distribution	FY 5-10	$ 965,000	Current dual backup power gensets and switchgear are 30 years old and at or near the end of its useful life.	RO-05 must be performed to gain higher confidence in estimate
RO-07	Upgrade older power distribution and motor control centers	FY 1-4	$ 280,000	Several switchgear and motor control centers are beyond their useful life, obsolete and do not meet current code. Parts and components are not available from manufacturer. Approximately 50% of the equipment will not meet Arc-Flash requirements	Phasing in the removal of old equipment and replacing with new poses significant construction risk for an operating plant. May need to delay until RO-13 is performed. Could be combined with LP-10 and LP-11 if Lime Plant is rehabilitated.
RO-10	Replace degasifier 1	FY 5-10	$ 265,000	Existing degasifier shows severe signs of deterioration and delaminating of fiberglass structure. Equipment is a single point of failure.	Install degasifier 2 before starting work. Consider combining work with project RO-09
RO-11	Install new degasifier 2	FY 1-4	$ 205,000	Degasifier 1 is a single point of failure and is operating at or near capacity. Project provides redundancy and ability to perform required maintenance	Project requires completion before replacing degasifier #1
RO-13	RO Plant - Capacity Upgrade (new RO skids)	FY 11-20	$ 1,630,000	Install like kind RO skids (4) in new section of membrane building. Major pipe fittings and concrete platforms already in place.	Project timing may be influenced by the outcome of the Lime Softening Plant Facility Plan LP-17

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
RO-14	RO Plant - Pump modifications	FY 11-20	$ 93,000	Standardize membrane feed pumping motors, pumps and controls. 6 motors, new motor starters, power leads, no VFD	Consider combining with project RO-13. Project RO-05 must be completed before starting.
RO-15	New chemical feed process if lime plant decommissioned	FY 11-20	$ -	Determine new chemical requirements and perform design and construction of new system	Project may need to be accelerated depending on outcome of the Lime Softening Plant facility plan LP-17.
RO-16	Replace Cl2 gas system due to risk / liability decision	FY 11-20	$ 125,000	Replace with sodium hypochlorite if required by regulatory statute or internal risk management decision	
RO-17	Upsize plant raw water piping - eliminate bottleneck for Well F 2	FY 11-20	$ 84,000	Replace FRP pipe. Some sections have experienced failure. Upsize pipe diameter to meet future plant capacity.	Complete before RO-13
RO-18	SCADA and PLC upgrades	FY 1-4	$ 120,000	Assumes like-kind replacement hardware and software	Minor system improvements and modifications
			$3,877,000		

5.3.2 Lime Softening Plant

The Lime Softening (LS) Plant was first constructed in 1958 and has been upgraded in phases to the present. Some of the supporting equipment and structures including the power distribution and portions of plant piping are 50 years old or older (beyond the end of their respective service life) and showing severe signs of deterioration and service failure. This is evident in the condition and performance of the plant's power distribution and electrical systems. Projects LP-08, LP-09 and LP-11 are proposed to address these issues. In addition, the current condition of the Raw Water Storage Diffuser is in an imminent failed state. The Diffuser is a single point of failure and losing its functionality will have a direct impact on water quality and present severe operational challenges. Projects LP-01 and LP-02 are proposed to prevent this failure.

A Lime Softening Facility Plan (LP-17) needs to be commissioned to consider the economic, water quality and regulatory factors to determine the future disposition of the Plant and the impacts to any planned upgrades to the Reverse Osmosis Plant. It is noted that the recommendations from the Lime Softening Facility Plan (LP-17) will determine the viability and cost estimates for project LP-18 and LP-19 – the decommissioning of or upgrades to the Lime Softening Plant.

Table 5-7 includes those projects recommended for the Lime Softening Plant. The total estimated cost is $ 2,131,200.

Table 5-7. Lime Softening Plant Recommended Improvements

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
LP-01	Replace raw storage diffuser tray and support structure	FY 1-4	$ 95,000	Structure is in an imminent failure state. Unit is a single point of failure. Project requires replacement of whole assembly	Materials estimate includes design and fabrication of new diffuser tray. Diffuser tray is custom to facility and not available for purchase.
LP-02	Repair and replace internal coating raw water storage tank	FY 1-4	$ 35,000	There are no records available to determine the last time the coating has been replaced. Best estimate is the coating is at a minimum 25 years old and beyond the typical 20 years useful life estimate	Recommend combining with LP-01.
LP-03	Plant 3 - ten year rehabilitation	FY 1-4	$ 270,000	Scheduled renewal of plant equipment	Budgeted for 2017
LP-04	Plant 2 - ten year rehabilitation	FY 1-4	$ 295,000	Scheduled renewal of plant equipment	Budgeted for 2020
LP-05	Plant 1 - ten year rehabilitation	FY 5-10	$ 325,000	Scheduled renewal of plant equipment	Dependent of project LP-17
LP-06	Plant 2 - Filter rehabilitation	FY 1-4	$ 62,000	Filter shows signs of underdrain failure. Some indications of filter media disturbance	Budgeted for 2017 - Include cost for replacing underdrain system
LP-07	Replace Shelter / Bldg. - Lime Process	FY 11-20	$ 59,000	Replace sheet metal building including structural support	Dependent on project LP-17.
LP-08	Develop a facility one-line electrical diagram	FY 1-4	$ 25,000	Must be completed before power load analysis and arc-flash study	Cost estimates provided separate for each facility. Consider combining projects RO-04, LP-08 and WRF-13
LP-09	Commission a Power Load Analysis and Arc-Flash Study	FY 1-4	$ 60,000	Project is necessary to prepare for future work and comply with recent adoption of Arc-Flash safety regulations	Cost estimates provided separate for each facility. Consider combining projects RO-05, LP-09 and WRF-14

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
LP-10	Upgrade HSP standby generator and switchgear	FY 5-10	$ 58,000	Propane generator and electrical switchgear are beyond useful life. Replacement may or may not be necessary. Final cost estimate is dependent on LP-09 LS Power Load Analysis	Project dependent on LP-17 LSP Facility Plan and LP-09 Power Load Analysis
LP-11	Upgrade older power distribution and motor control centers	FY 1-4	$ 177,000	Several switchgear and motor control centers are beyond their useful life, obsolete and do not meet current code. Parts and components are not available from manufacturer. Major failures have occurred recently	Could be combined with RO-06 if Lime Plant is rehabilitated.
LP-12	Replace HSP buried piping under older HSP Bldg. to tanks	FY 5-10	$ 142,000	Piping is from original in-service date circa 1950's. Not considered a high consequence if failed.	Project dependent on outcome of LP-17 LSP Facility Plan
LP-13	Older High Service Pump Replacements (3)	FY 5-10	$ 172,000	Replace with variable frequency driven pumps. Additional surge protection equipment required for operation under generator power. Replace with three 50 HP motors / 800 gpm split case horizontal pump	Project dependent on LP-17 LSP Facility Plan and LP-09 Power Load Analysis
LP-14	Retrofit two (2) Newer High Service Pump motors with VFD' s	FY 1-4	$ 90,000	Allows for operation of the New HSP and avoids capacity limitation	Consider coordinating work with project LP-13
LP-16	Instrument and analyzer upgrades - ten year renewal	FY 11-20	$ 35,000	Budget placeholder for renewal of instrumentation over 10 year period.	Project dependent on outcome of LP-17 LSP Facility Plan
LP-17	Commission a LSP Facility plan to determine upgrades or decommissioning	FY 1-4	$ 150,000	Evaluate water production requirements of the LP and RO plants to determine if LP to be upgraded or decommissioned. Include necessary modifications to RO plant if LP decommissioned	Priority project due to this being an early decision point
LP-18	Decommission Lime Softening Plant	FY 11-20	$ -	Project placeholder only	Project dependent on outcome of LP-17 LSP Facility Plan
LP-19	Upgrade Lime Softening Plant	FY 11-20	$ -	Project placeholder only	Project dependent on outcome of LP-17 LSP Facility Plan

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
LP-20	SCADA and PLC upgrades	FY 1-4	$ 82,000	New installation. Monitoring equipment status, display analyzer readings and alarming only	Project dependent on outcome of LP-17 LSP Facility Plan
			$ 2,132,000		

5.3.3 Water Distribution System

One of the most significant operation and service challenges of the water distribution system is maintaining sufficient chlorine residual at the far ends of the north and south service areas. Project DS-12 and DS-13 are proposed to address these issues. Maintaining water quality and chlorine residual at segments of the system that are dead-ended also pose the same challenges. Opportunity projects DS-09 and DS-10 have been proposed to address these issues. In addition, a large portion of the District's service area could be compromised if a redundant distribution pipe is not installed at across Forked Creek as described in project DS-07.

Table 5-7 includes those projects recommended for the Water Distribution System. The total estimated cost is $ 7,315,000

Table 5-8. Water Distribution System Recommended Improvements

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
DS-02	Line extension program	FY 1-20	$ 345,000	Budget placeholder over 20-year planning horizon	Opportunity projects
DS-04	AC Pipe replacement on Beach - Charlotte County	FY 5-10	$ 2,440,000		Opportunity projects
DS-05	AC Pipe replacement on Beach - Sarasota County	FY 5-10	$ 2,330,000		Opportunity projects
DS-06	System modifications to eliminate bottleneck at Roundabout	FY 1-4	$ 315,000	Capacity bottleneck. Field observation and hydraulic modeling confirms	Coordinate with DS-04
DS-07	System modifications to provide redundancy at Forked Creek	FY 1-4	$ 230,000	Project relieves a single point of failure	Must be completed before DS-06
DS-08	Service line extension to Manasota development (2000 homes)	FY 5-10	$ 80,000	Potentially contractor funded	Budget placeholder
DS-09	Looping projects - south service area	FY 1-20	$ 200,000	Relieves dead-end distribution and potential water quality issues	Budget placeholder. Opportunity projects
DS-10	Looping projects - north service area	FY 1-20	$ 300,000	Relieves dead-end distribution and potential water quality issues	Budget placeholder. Opportunity projects

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
DS-12	Water Storage Study - needs analysis & conceptual design	FY 5-10	$ 75,000	Determine need and options for installation of tank(s) at treatment plants or north and south service areas	
DS-13	Design and build water storage tank(s)	FY 11-20	$ 1,000,000	Budget placeholder for storage system improvements	Dependent on outcome of DS-12 Water Tank Study
			$ 7,315,000		

5.3.4 Wellfields and Wells

The District operates and maintains their water supply wellfields and infrastructure in accordance with their approved Wellfield Management Plan. The most recent 2016 Annual Wellfield Report (ASRUs, Inc.) indicated that there were no events during 2016 that affected the approved Wellfield Management Plan. As discussed earlier, Project LP-17, the Lime Softening Plant Facility Plan should incorporate the viability and cost analysis of upgrading the existing plant or decommissioning / retrofitting to treat fresh groundwater and the implications to the hydroperiods in the service area.

Table 5-9 includes those projects recommended for the Wellfields and Wells at this time. The total estimated cost is $135,000.

Table 5-9. Wellfields and Wells Recommended Improvements

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
WL-01	Install telemetry communications to RO supply water wells	FY 1-4	$ 45,000	Equipment monitoring status only	
WL-02	Install telemetry communications to LP supply water wells	FY 5-10	$ 45,000	Equipment monitoring status only	Project dependent on outcome of LP-17 LSP Facility Plan
WL-04	Rehab, replacement, or abandonment of WF1 supply wells	FY 5-10	$ 45,000	Current Inspection indicated WF1 supply wells 6, 7, 8, 9, 10, 16, 17 18, 19, 21, 23, 25, 28, 29, 30 need rehab, replacement or abandonment.	Project dependent on outcome of LP-17 LSP Facility Plan
			$135,000		

5.3.5 Wastewater Reclamation Facility

The Wastewater Reclamation Facility (WRF) was placed into service in 1994. Most assets are within their useful life and the projects listed are to maintain or replace

infrastructure over the 20-year planning horizon. One significant issue is the final disposal of the reclaimed water from the WRF to the re-use system. Since the WRF is dependent on the condition and performance of this system, the re-use projects are included in this section. The main issue is that the re-use system operates at abnormally high pressure resulting in shortened useful life for many of the system components.

Another significant issue at the WRF is a hydraulic bottleneck and capacity limitation at the existing chlorine contact basin. During high rain events, the peak flows through the plant are restricted at the inlet to the basin and the detention time decreases to compliance lower warning limits.

Table 5-10 includes those projects recommended for the Wastewater Reclamation Facility and Re-use System. The total estimated cost is $4,878,000.

Table 5-10. Wastewater Reclamation Facility Recommended Improvements

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
WL-08	Plug and Abandon IMW-1 and SMW-1	FY 5-10	$ 30,000	Plan to plug and abandon monitoring wells following next permitting effort.	
WRF-01	Replacement of buried liquid process piping	FY 1-20	$ 205,000	Plant has experienced buried pipe failures over the last 5 years. Budget is for unplanned pipe failures. Cost estimate based on 1,000 linear feet of 24 inch diameter pipe.	See WRF-11 for related project
WRF-02	Odor control system rehabilitation at headworks	FY 11-20	$ 260,000	Budget placeholder due to short original useful life	
WRF-04	Plant 4 Rehabilitation - 15 year rehabilitation	FY 5-10	$ 350,000	Replace launders, diffusers, gear drives and recoat steel tanks	Estimates based on past rehabilitation costs
WRF-05	Plant 1 and 2 Rehabilitation - 15 year rehabilitation	FY 11-20	$ 600,000	Replace launders, diffusers, gear drives and recoat steel tanks	Estimates based on past rehabilitation costs
WRF-06	Blower upgrades phase 1	FY 1-4	$ 385,000	Replace with high speed energy efficient blower skid with enclosure	Replace with only 3 blowers at $80,000 each
WRF-07	Blower upgrades phase 2	FY 5-10	$ 120,000	Replace with high speed energy efficient blower skid with enclosure	Replace one blower
WRF-11	Chlorine contact basin expansion	FY 5-10	$ 220,000	Construction of "like-kind" contact basin of same size and capacity. Project includes replacement of inlet pipeline bottleneck	

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
WRF-12	Replace Cl2 gas system due to risk / liability decision	FY 11-20	$ 125,000	Replace with sodium hypochlorite if required by regulatory statute or internal risk management decision	Coordinate with water plants due to risk and bulk purchase requirements
WRF-13	Trace and label power and control wire terminations. Update electrical one-line diagram	FY 1-4	$ 35,000	Project to trace and label power and control wire terminations and update electrical one-line diagram	Must be completed before standby power and power distribution improvement project
WRF-15	Standby Power / Power Distribution Improvements	FY 5-10	$ 90,000	Budget placeholder to rehabilitate standby generators and automatic transfer switches as they near end of useful life estimates. Also for determining required connections to effluent pumping to provide redundancy	Project may be delayed into the FY 11-20 time period depending on maintenance history and future condition assessments
WRF-16	Re-use Pond Pumping Rehabilitation	FY 1-4	$ 128,000	Existing pumps and electrical equipment is in an imminent failure state. Work will provide for replacements to meet code and service requirements. Replace two pumps, piping, and power	$50,000 already budgeted for 2017
WRF-17	Install two smaller horsepower variable frequency dive pumps	FY 5-10	$ 195,000	Pumps and piping modifications to pump effluent to Reclaim Water Tank on site	
RU-01	Reuse hydraulic analysis and operational review for service improvements	FY 1-4	$ 85,000	System is operated at high pressures to maintain service to customers. High operating pressures pose operational challenges and increase wear and tear on equipment. Project to determine booster station operation with potential storage tank and forcemain improvements	Consider combining with LS-02 Holiday Ventures Capacity Upgrade Study.
RU-02	Install new re-use storage tank at Holiday Ventures	FY 5-10	$ 950,000	Cost estimate based on 2008 WRF 1 million gallon reuse tank total project cost	Dependent on outcome of RU-01.
RU-03	Rehabilitate re-use booster station at Holiday Ventures	FY 1-4	$ 100,000	Stations has not been operated for extended period and requires rebuild of pumps motors, piping and valves	Dependent on outcome of RU-01.

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
RU-04	Install new re-use forcemain from WRF to new HV storage tank	FY 5-10	$ 1,000,000		Dependent on outcome of RU-01. Consider performing concurrently with CL-02 Install New Forcemain from HV to WRF
			$4,878,000		

5.3.6 Lift Stations and Vacuum Stations

A significant portion of renewal projects for the lift stations and vacuum stations are funded through the O&M Renewal Fund described in Section 5.0 of this chapter.

Failure at the Holiday Ventures Lift Station LS-121 would compromise sewage conveyance to most of the north service area. Due to the criticality or high consequence of failure, several projects are proposed to provide redundancy and increase the reliability of this station. A more detailed evaluation is proposed in project LS-02 Holiday Ventures Capacity Upgrade Study and Facility Plan to determine if reconditioning of the station is sufficient or a full upgrade is required to diminish the potential of failure. LS-03 Design and Build Upgraded LS-121 cost estimate could range from $300,000 for reconditioning to $2,000,000 for a new Master Station.

In the short term, project LS-05 proposes the purchase of a permanent skid mounted bypass pump to provide additional reliability for failure causes other than power loss. This bypass pump can be used for the Beach Road Lift Station in the future if LS-121 is upgraded.

Table 5-11 includes those projects recommended for the Lift Station and Vacuum Stations. The total estimated cost is $815,000 without a cost for LS-03 LS-121 Holiday Ventures Design and Build Upgrade.

Table 5-11. Lift and Vacuum Station Recommended Improvements

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
VS-08	Standby generator rehabilitation	FY 11-20	$ 200,000	Budget placeholder for required rehabilitation by contractor over 20 year planning horizon	

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
LS-02	LS121 Holiday Ventures Capacity Upgrade Study and Facility Plan	FY 1-4	$ 100,000	Determine necessary capacity upgrades: upgrade existing, add new station, duplicate existing station with forcemain? Note: this facility is considered highly critical with a high consequence of failure that compromises service to most of the North service area	Consider capacity upgrade for on-site standby power generator (LS-04)
LS-03	Design and build upgraded LS121 - Holiday Ventures	FY 5-10	$ TBD	Cost Estimate could range from approximately $300,000 for addition of VFD's and piping modifications to rehabilitate the pump station up to $2,000,000 for a new Master Lift Station.	Based on determination of LS121 Capacity Upgrade Study
LS-04	Standby generator replacement (up size for Re-use booster station)	FY 5-10	$ 200,000	Upgrade capacity of generator to provide service for upgraded station. Sizing to be determined in LS121 Upgrade Study LS-02	Size of replacement generator may be dependent on LS-02 and RO-03 Booster Station Rehabilitation.
LS-05	Purchase bypass pump and install on-site bypass pumping	FY 1-4	$ 65,000	Due to criticality of this lift station any structural or piping/valve failure cannot be mitigated. Purchasing an engine driven bypass pump is recommended for rapid return of service.	Will purchase for Holiday Ventures but may use for Beach Rd after upgrade to Holiday Ventures
LS-08	Instrumentation upgrades - install flow meters or pressure indication	FY 5-10	$ 125,000	Project is for SSO indication and conveyance system analysis. Flow meters for master stations. Pressure meters for single stations	Budget placeholder
LS-13	Potential elimination of LS-113 Englewood Rd	FY 11-20	$ 125,000	Lift station wet well is on private property in a pool patio area	Potential opportunity project
			$815,000		

5.3.7 Collections System

Sewage collection piping systems are typically the most capital intensive asset type wastewater utilities own. The District's most critical forcemain is the segment between LS-121 Holiday Ventures and the Water Reclamation Facility. Upon failure, all

conveyance of sewage from the north service area will be severely compromised. Project CL-02 is proposed to provide a redundant forcemain to mitigate this risk.

The District owns 16 miles of vitrified clay pipe that could require replacement and/or relining over the 20-year planning horizon. Project CL-03 is proposed to address this issue as related projects and other opportunities arise.

The recent failure of the Beach Rd forcemain is addressed with a near-term project CL-01 to prevent future failures and avoid regulator oversight.

Table 5-12 includes those projects recommended for the Lift Station and Vacuum Stations. The total estimated cost is $14,517,000.

Table 5-12. Collection System Recommended Improvements

ID	Project	Phase	Total Project Estimate	Project Description	Dependencies and Constraints
CL-01	Replace Beach Road force main	FY 1-4	$ 645,000	Major forcemain with significant peak and daily flows. FM has history of failure at fittings. Pipe is under tidal influence	Per contractor raw estimate provided to EWD
CL-02	Install new force main from Holiday Ventures to point TBD	FY 5-10	$ 8,500,000	Likely paired with RU-04 reuse line from WRF to Holiday Ventures	Assumes approximately 6 miles of 16" PVC Forcemain installed from HV MLS to WRF as a dedicated line.
CL-03	Clay pipe re-line / replacement	FY 1-20	$ 5,000,000	On-going replacements	Opportunity projects over course of 20 year planning horizon.
CL-04	Manhole rehabilitations - Reline brick manholes with GML	FY 1-4	$ 120,000	Project to extend useful life and avoid constructed replacement. Estimates based on 15 manholes	
CL-05	North Beach sewer service study and evaluation	FY 5-10	$ 65,000	Commission study to determine strategy and appropriate infrastructure to extend sewer service to the North Beach area	
CL-06	Install forcemain isolation valve near Elm St.	FY 1-4	$ 67,000	Provides redundant route upon failure of collection system south of Elm St	
CL-07	Sewer extensions to alternate areas	FY 11-20	$ TBD	Service to alternate areas will require evaluation of each area for most cost effective method of sewer collection.	
CL-08	Purchase new CCTV camera and trailer	FY 5-10	$ 120,000	Purchase new replacement CCTV equipment to meet CMOM performance measurement of inspecting 5% of gravity sewers per year.	Current equipment is nearing end of useful life. Purchase may need to be executed in FY 1-4
			$ 14,517,000		

5.4 Summary of Costs and Project Timing

To summarize, recommended capital projects based upon the results of our condition assessment resulted in the following overall costs as summarized in Table 5-13.

Table 5-13. Summary of Costs and Project Timing

Facilities	Near-Term (1-4 years)	Mid-Term (5-10 years)	Long-Term (11-20 years)	Years 1-20	Total
Utility Wide	$72,000				$72,000
RO Plant	$715,000	$1,230,000	$1,932,000		$3,877,000
Lime Softening Plant	$1,341,000	$697,000	$94,000		$2,132,000
Water Distribution	$545,000	$4,925,000	$1,000,000	$845,000	$7,315,000
Wells	$45,000	$90,000			$135,000
Water Reclamation Facility & Reuse	$733,000	$2,955,000	$985,000	$205,000	$4,878,000
Lift & Vacuum Stations	$165,000	$325,000	$325,000		$815,000
Collection System	$832,000	$8,685,000		$5,000,000	$14,517,000
Total	**$4,448,000**	**$18,907,000**	**$4,336,000**	**$6,050,000**	**$33,741,000**

5.5 Operation and Maintenance Replacement and Renewal Funded Projects

The following tables summarize the projects not considered to be a capital funded, but necessary to maintain asset service life. These include projects considered annual operation and maintenance or replacement and renewal improvements in the near, mid and long-term planning horizons. Table 5-14 summarizes and breaks out the total costs between water and wastewater services.

Table 5-14. Recommended O&M Renewal Improvement Costs

	Near-Term Year 1-4	Mid-Term Year 5-10	Long-Term Year 11-20	Year 1-20	Total
Water Services	$ 387,000	$ 258,000	$ 82,000	$ 4,190,000	$ 4,917,000
Wastewater Services	$ 304,000	$ 287,000	$ 175,000	$ 1,125,000	$ 1,891,000
Total	$ 691,000	$ 545,000	$ 257,000	$ 5,315,000	$ 6,808,000

5.5.1 Water Services

Near-Term (Year 1 to 4) Improvements

Table 5-15 includes those O&M funded projects recommended to take place in the near term (Year 1 to 4) timeframe. The total estimated cost is $387,000.

Table 5-15. Year 1-4 Recommended Water O&M Funded Improvements

ID	Project	Total Project Estimate	Project Description	Dependencies and Constraints
RO-01	Rehabilitate RO cartridge rack frame structures	$ 200,000	Support structures show moderate to severe signs of corrosion. Failure will result in loss of service of supported train. Replace mounts, supports, framework and concrete bases as needed	Project timing may be adjusted based on Lime Plant facility plan outcome recommends decommisioning that accelerates RO-13
RO-03	Rehabilitate piping, supports, and valves in utility trench	$ 127,000	Replace pipe and pipe supports as needed with appropriate material (galvanized or stainless)	Consider combining with RO-01 project
RO-08	Re-land and power all PLC and control circuits through UPS	$ 45,000	Upon transfer of electrical power source or power quality issues the PLC and associated instrumentation fault. Powering through a UPS will decrease PLC fault events	Could be combined with RO-18 SCADA upgrade
WL-06	Repairs at WF 3	$ 10,000	Standpipe at well 51. Pump at well 52. Wires pulled at well 54. Meter at well 60.	Project dependent on outcome of LP-17 LSP Facility Plan
WL-07	Submersible pump replacements at WF 5	$ 5,000	6 of 8 wells are equipped with 5 HP pumps. Reducing HP. and pumping rates to reduce potential upconing of poorer quality water as pumps fail	
		$ 387,000		

Mid-Term (Year 5 to 10) Improvements

Table 5-16 includes those O&M funded projects recommended to take place in the mid-term (Year 5 to 10) timeframe. The total estimated cost is $258,000.

Table 5-16. Year 5-10 Recommended Water O&M Funded Improvements

ID	Project	Total Project Estimate	Project Description	Dependencies and Constraints
RO-02	Repair compromised block wall by chemical systems	$ 62,000	Evaluate structural defects if any and repair wall	
RO-09	Repairs to clearwell 1	$ 25,000	Make repairs per LEC inspection report and re-coat internal	Consider combining with RO-10 project
LP-15	Replace above ground filter piping and valves	$ 59,000	Significant portions of piping installed in 1950's and early 1960's nearing the end of its useful life. Replace approximately 300 feet of DI pipe. 8" and 12" diameter. Approx. fifteen 12" gate valves	Project dependent on outcome of LP-17 LSP Facility Plan
WL-05	Submersible pump replacements at WF 1	$ 12,000	Meter replacement at supply wells 13 and 14. Pump replacement at supply wells 26 and 27.	
DS-11	Water tank external painting	$ 100,000	Required to maintain service life	Budget placeholder - ten year cycle
		$ 258,000		

Long Term (Year 11 to 20) Improvements

Table 5-17 includes those O&M funded projects recommended to take place in the long term (Year 11 to 20) timeframe. The total estimated cost is $82,000.

Table 5-17. Year 11-20 Recommended Water O&M Funded Improvements

ID	Project	Total Project Estimate	Project Description	Dependencies and Constraints
RO-12	Instrument and analyzer upgrades - ten year renewal	$ 82,000	Budget placeholder for renewal of instrumentation over 10 year period.	Consider providing funds from CIP when performing project RO-13 to maintain standardization of equipment
		$ 82,000		

20 Year Horizon (Year 1-20) Capital Improvements

Table 5-18 includes those projects recommended to take place throughout the 20-year time-frame with the time of the project dependent on opportunity. The total estimated cost is $4,190,000.

Table 5-18. Year 1-20 Recommended Water O&M Funded Improvements

ID	Project	Total Project Estimate	Project Description	Dependencies and Constraints
RO-19	RO Membrane replacement	$ 350,000	Schedule replacement of RO membranes on 5 to 7 year cycle for 20 year planning horizon	
WL-03	Acidization of RO WF2 production wells. 1 per year ongoing	$ 240,000	Cost is per year with 1 well acidized per year on a rotating basis.	
DS-01	AC Pipe replacement program	$ 1,600,000	Replace as needed over 20 year planning horizon	Opportunity projects
DS-03	Distribution system repairs	$ 2,000,000	Budget placeholder over 20-year planning horizon	Opportunity projects
		$ 4,190,000		

5.5.2 Wastewater Services

Near Term (Year 1 to 4) Improvements

Table 5-19 includes those O&M funded projects recommended to take place in the near term (Year 1 to 4) timeframe. The total estimated cost is $304,000.

Table 5-19. Year 1-4 Recommended Wastewater O&M Funded Improvements

ID	Project	Total Project Estimate	Project Description	Dependencies and Constraints
WRF-08	SCADA upgrade - monitoring, control, alarming at ops building	$ 39,000	Provide communications from plant PLC's to PC based HMI located in the operations room. This will provide better response to alarms and abnormal conditions	
WRF-09	Disk Filter 1 - 10 year rehabilitation	$ 12,000	Budget placeholder to maintain equipment	
VS-01	Inspect and recoat vacuum tanks	$ 70,000	Steel vacuum tanks corrode and develop pin hole leaks. Repair and recoat 4 vacuum tanks	
VS-04	Sewage pump replacements - Phase 1	$ 30,000	Planned replacement with improved non-cavitation pumps	4 pumps @ 4500 ea.
VS-06	Vacuum pump replacements - Phase 1	$ 38,000	Budget placeholder	4 pumps @ 6500 ea.

ID	Project	Total Project Estimate	Project Description	Dependencies and Constraints
LS-01	Standby generator rehabilitation (fuel tank repair)	$ 40,000	Fuel tank shows signs of severe corrosion. Cannot determine condition of inner tank. $10,000 budgeted for inspection by contracted technical expert.	Determine if one of a kind Caterpillar generator meets required capacity for the next ten years. See LS-04 and RU-01 before proceeding with major repairs.
LS-06	Various wet well re-linings - Phase 1	$ 50,000	Prioritized repair cracks and deterioration. Replace existing tar coatings.	Budget placeholder
LS-10	Submersible pump replacements - Phase 1	$ 25,000	Budget placeholder	Replace 10 pumps assorted sizes 20 HP and under
		$304,000		

Mid Term (Year 5 to 10) Improvements

Table 5-20 includes those O&M funded projects recommended to take place in the mid-term (Year 5 to 10) timeframe. The total estimated cost is $287,000.

Table 5-20. Year 5-10 Recommended Wastewater O&M Funded Improvements

ID	Project	Total Project Estimate	Project Description	Dependencies and Constraints
WRF-10	Disk Filter 2 - 10 year rehabilitation	$ 22,000	Budget placeholder to maintain equipment	
VS-05	Sewage pump replacements - Phase 2	$ 45,000	Planned replacement with improved non-cavitation pumps	6 pumps
VS-07	Vacuum pump replacements - Phase 2	$ 95,000	Budget placeholder	10 pumps
LS-07	Various wet well re-linings - Phase 2	$ 75,000	Prioritized repair of cracks and deterioration. Replace existing tar coatings.	Budget placeholder
LS-11	Submersible pump replacements - Phase 2	$ 50,000	Replace 20 pumps assorted sizes 20 HP and under Budget placeholder	Budget placeholder
		$287,000		

Long Term (Year 11 to 20) Improvements

Table 5-21 includes those O&M funded projects recommended to take place in the long term (Year 11 to 20) timeframe. The total estimated cost is $175,000.

Table 5-21. Year 11-20 Recommended Wastewater O&M Funded Improvements

ID	Project	Total Project Estimate	Project Description	Dependencies and Constraints
WRF-03	Screenings platform repair and repaint	$ 50,000	Project to evaluate structural integrity of headworks screenings platform and perform necessary repairs to extend usable life	
LS-12	Submersible pump replacements - Phase 3	$ 125,000	Replace 50 pumps assorted sizes 20 HP and under	Budget placeholder
		$ 175,000		

20 Year Horizon (Year 1-20) Capital Improvements

Table 5-22 includes those projects recommended to take place throughout the 20-year time-frame with the time of the project dependent on opportunity. The total estimated cost is $1,125,000.

Table 5-22. Year 1-20 Recommended Wastewater O&M Funded Improvements

ID	Project	Total Project Estimate	Project Description	Dependencies and Constraints
VS-02	Building renovations - Repair doors, roof, soffits, external paint	$ 157,000	Various building components in poor to failing condition.	Budget placeholder to contract necessary repairs and replacement of doors, roofs, windows.
VS-03	Biofilter rehabilitation	$ 68,000		Budget placeholder for renewal due to biofilter ten year maximum expected life.
LS-09	Electrical cabinet renewal	$ 900,000	Upgrade of lift station electrical panels to include new telemetry and backup power quick connects	Budget placeholder
		$ 1,125,000		

6 Capacity, Management, Operations and Maintenance (CMOM) Framework

6.1 Introduction

The District is in the process of developing and adopting a CMOM program to maintain compliance with all rules and regulations as set forth in Florida Administrative Code Chapter 62-604 and ensure that the District's service level objectives and capacity demands are met. It should be noted that a CMOM program is dynamic and staff will continue to update portions of this program.

What is CMOM?

CMOM is a comprehensive program that establishes goals and objectives for the "proper operation and maintenance" of the wastewater system as required under the Clean Water Act, with a particular focus on the collection system.

In order to facilitate the development and on-going administration of the CMOM Program, an abbreviated outline is provided in this section of the Utility Master Plan.

The full document is provided for reference in Appendix D and the working document will be under the control of the Wastewater Operations Manager.

6.1.1 CMOM Objective

The District will implement and continuously improve a cost-effective CMOM Program based upon best practices for wastewater conveyance and wastewater treatment, maximizing the capacity of the existing and planned facilities to convey and treat wastewater.

6.1.2 Service Area Description and Characteristics

A system description is provided in the full document of the CMOM program and can be referenced in Appendix D.

6.2 Program Goals

The overall program goals of the District's CMOM Program will include:

- Properly manage, operate and maintain, at all times, the parts of the collection system that the permittee owns or over which it has operational control.
- Provide adequate capacity to convey base flows and peak flows.
- Take all feasible steps prevent, and mitigate the impact of, sanitary sewer overflows.
- Provide notification to parties with a reasonable potential for exposure to pollutants associated with an overflow event.

6.2.1 Overall Program Goals

To achieve the overall program goal, the District will pursue the following objectives:

- Continue to comply with regulatory requirements.
- Continue to maintain a safe work environment and facilities and also sustain a competent workforce.

6.2.2 Conveyance Goals

The goal for the conveyance service area, as developed by the District, in accordance with its mission, is to implement and continuously improve a CMOM Program with the intent of eliminating all SSOs except those caused by circumstances as defined by Title 40 of the Code of Federal Regulations (CFR) §122.41(m)(4).

- Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures.
- Continue to establish and document level of protection, design, and performance standards for new conveyance assets constructed in the District service area, and consider documented and predicted changes in climate.
- Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels.

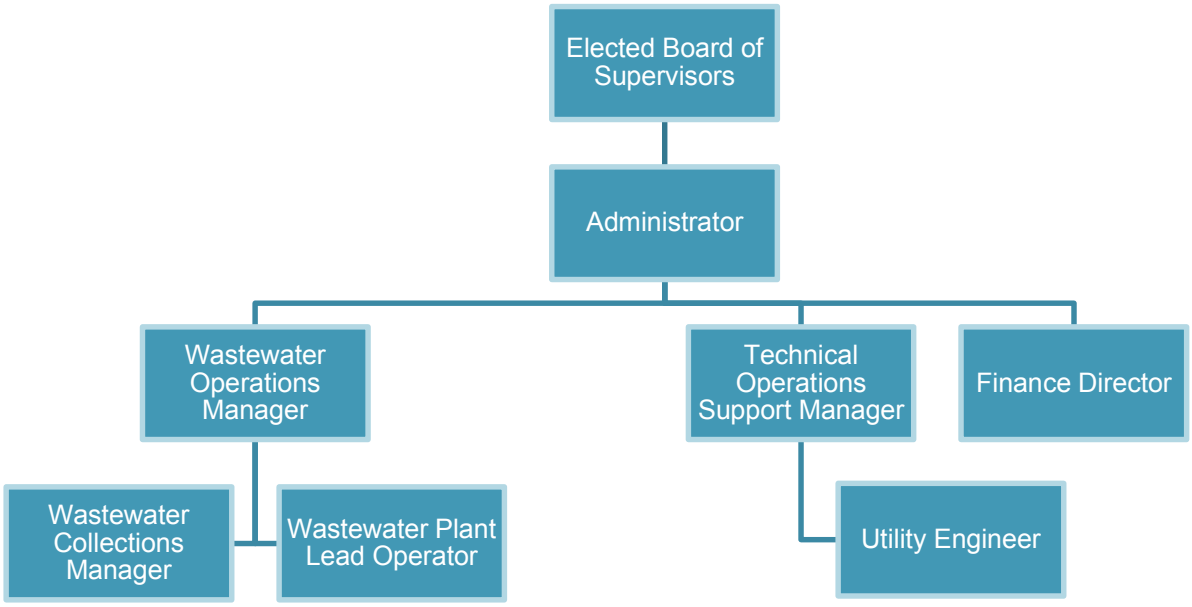
6.2.3 Treatment Goals

- Continue to provide effluent quality that meets or exceeds FDEP re-use requirements and effluent quality goals.

6.3 CMOM Management Programs

6.3.1 Organization

The following chart illustrates the organizational responsibilities and supporting roles to develop, execute and administer the District's CMOM Program. Specific duties and tasks are further defined in individual plans and procedures.



- The District's Administrator is responsible for overall operations and management of District programs and reports to the Elected Board of Supervisors.
- The Wastewater Operations Manager is responsible for the development, execution and administration of the CMOM Program and reports to the District Administrator.
- The Wastewater Operations Manager is supported by the Wastewater Collections Manager and the Wastewater Plant Lead Operator who are responsible for carrying out work directives to comply with CMOM policies and procedures in their respective work crews.
- The Technical Operations Support Manager with the assistance of the Utility Engineer supports the Wastewater Operations Manager in developing demand projections and executing upgrades to maintain system capacity.

6.3.2 Legal Authority

The Englewood Water District is a political subdivision of the State of Florida, codified by Chapter 2004-439 Laws of Florida House Bill No. 1381 providing "for election of a board of supervisors to govern said district; providing powers, authority, and duties of the board; granting to said governing board the authority in the territory defined to construct, acquire, extend, enlarge, reconstruct, improve, maintain, equip, repair, and operate a water system, wastewater system, or wastewater reuse system"

The District has adopted Customer Rules and Regulations (Resolution NO: 15-12-03 B December 3, 2015) in which section 23 describes the conditions customers must meet to connect and make use of the wastewater system.

6.3.3 Training

All job-specific training is primarily carried out in an On-the-Job scenario. Safety training is conducted by the Wastewater Collections Manager and Wastewater Lead Treatment Operator under the supervision of the Wastewater Operations Manager.

Upon development of specific CMOM plans and procedures, the Wastewater Operations Manager will provide formalized training with classroom materials and on-site demonstrations on an annual or biennial basis. Training will be scheduled to ensure all staff can attend and attendance records will be maintained and updated upon successful completion.

Training will be based on District specific plans and standard operating procedures (SOP) such as:

- Sanitary Sewer Overflow Response Plan - yearly
- Overflow Tracking and Reporting - yearly
- Lift Station Power Failure Response - yearly
- Vacuum Station Bypass Pumping - yearly
- Routine Lift Station Inspection SOP – every 2 years
- Routine Vacuum Station Inspection SOP – every 2 years
- Portable Generator Connection SOP - yearly
- Gravity Line Cleaning SOP – every 2 years
- Gravity Line Inspection SOP – every 2 years

Performance Measures

Performance measures will be established and monitored to help meet the following goals:

- Continue to maintain a safe work environment and facilities and also sustain a competent workforce.
- Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures.

Performance Measures to help meet the following goals include:

- Obtain 90% documented attendance on all one-year cycle training.
- Obtain 90% documented attendance on all two-year cycle training.
- New staff will complete all training listed in the CMOM training program within 6-months of hire.

6.3.4 Safety

Current staff practice and follow industry safety practices such as: confined space entry, traffic control, control of hazardous energy lockout/tagout (LOTO), blood borne pathogen protection, chemical handling, and trench safety.

Upon development of specific CMOM plans and procedures the Wastewater Operations Manager will review and revise the work crew safety training practices as needed and will develop a safety training program that schedules and records attendance

Performance Measures

Performance measures will be established and monitored to help meet the following goals:

- Continue to maintain a safe work environment and facilities and also sustain a competent workforce.

Performance Measures to help meet the following goals include:

- Obtain 90% documented attendance on all schedule safety training.
- New staff will complete all training listed in the CMOM training program within 6-months of hire.

6.3.5 Information Management Systems

The Utility Engineer is responsible for overseeing development and maintenance of a Geographical Informational Software (GIS) system to maintain an inventory of the conveyance system that includes location and physical attributes of the assets. In addition, the District currently documents all facility level assets in Excel™ spreadsheets. The current CIP contains a project (project ID# EWD-01) to upgrade the asset inventory Excel spreadsheets and migrate this information into a CMMS/EAM system in the near term.

Strategy

Develop an Information Management System with the capability to accurately document all assets including location, physical attributes, installation dates, repair history and condition data (estimated remaining useful life). This will provide the District improved capabilities to perform System Evaluation and Capacity Assurance Evaluations and develop Renewal and Rehabilitation Plans

Performance Measures

To be determined and updated by the District's Utility Engineer as part of an on-going CMOM program.

6.3.6 Engineering

Design Standards

The District currently has design standards and publishes these for the general public on the District's website. Information contained on the site includes details for gravity pipelines, vacuum pipelines, forcemains, lifts and vacuum stations including most components, valve boxes, electrical control panels and other design standards. The Utility Engineer is responsible for reviewing and revising all design standards and is in process of updating.

As-built Record Plans

The District has most as-built records dating back to the mid-1950's and requires submittal of completed as-built records in their construction project specifications. The District is currently migrating older paper copy as-built records plans into electronic or digital format.

Capacity Assurance Program

The District currently has conducted system capacity and performance evaluations on a case-by-case basis between the previous capacity analysis reports and Wastewater Master Plans. It is the intent of the District to improve their Information Management System and flow monitoring capabilities at the lift stations to support internal evaluations of capacity and performance management.

New Construction and Rehabilitation Inspection Program

The Utility Engineer reviews and approves (or requires re-submittal) of all construction and upgrade projects. Currently on-site construction progress inspections and final project inspections are being completed by the collections and distribution system managers. It is the District's intent to transfer these responsibilities to the Construction Coordinator position in the future.

Strategy for Engineering

The District is in process of updating many of their programs including design standards, as-built records and capacity assurance programs. The goal should be to

- Continue to establish and document level of protection, design, and performance standards for new conveyance assets constructed in the District service area, and consider documented and predicted changes in climate.
- Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels.

Performance Measures

To be determined and updated by the District's Utility Engineer as part of an on-going CMOM program.

6.3.7 Overflow Prevention and Mitigation Programs

These programs are specifically developed to address the general program goals of the District's CMOM Program will include:

- Properly manage, operate and maintain, at all times, the parts of the collection system that the permittee owns or over which it has operational control.
- Provide adequate capacity to convey base flows and peak flows.
- Take all feasible steps prevent, and mitigate the impact of, sanitary sewer overflows.
- Provide notification to parties with a reasonable potential for exposure to pollutants associated with the overflow event.

Lift Station Power Failure Response Plan

The District has installed on-site back-up power generators at all "master" lift stations to diminish the potential of SSO at the site. Back-up power generators are maintained under contract with a local service provider and are maintained per the manufacturer's requirements. Additional maintenance information is contained in the District's wastewater response plan.

The District has reviewed all "satellite" lift stations and has estimated the average and peak flow collection storage time. Identification of all Lift Stations with portable generator power quick connections has been completed. Portable generator transit and connection times have been estimated and any satellite station that has the potential where the transit and connection time equals or exceeds the storage time then that station is a candidate for a site specific Lift Station Overflow Response Plan. The District is also in process of installing portable generator quick connection and has budgeted for the completion of this work in project ID LS-09 Electrical Cabinet Renewal.

In addition, the District has evaluated the Consequence of Failure (CoF) at most of their lift stations and has determined that LS-121 Holiday Ventures is highly critical and requires increased protection from failures other than loss of power. This Utility Master Plan recommends the purchase of one on-site bypass pump sufficient to meet peak flows and is described in project ID LS-05 Purchase Bypass Pump and Install On-site Bypass Pumping.

Vacuum Station Bypass Pumping Plan

The District has the capability to use one its vactor trucks to maintain system operation in the event of a station vacuum tank system failure.

The District includes in their design standards the connection required to perform bypass pumping of the station in the event of sewage pump failures.

An SOP template has been developed for these procedures and can be found in the full document contained in Appendix D.

Sanitary Sewer Overflow Response Plan

The District has adopted the Florida Rural Water Association's "Sanitary Sewer Overflow Response Pan" as of March 2016. This response plan includes action items, procedures and responsibilities specific to the District. The template is in the custody of the Wastewater Operations Manager who has the responsibility to follow the procedures contained within.

A copy of the Sanitary Sewer Overflow Response Plan can be found in the full document contained in Appendix D.

Overflow Tracking and Reporting

Sanitary sewer overflows are tracked formally by the customer service work request system when reported by residents and by the Utility Engineer when discovered by District personnel.

Methods to estimate spill volumes are dependent where the spill occurred within the system; when available flow meters are used to provide a more accurate estimation of the volume. If flow metering is not available then a combination of spill duration, amount recovered, and historical flow rates at the site and other observations are used. The method of estimating an SSO event is described in the Sanitary Sewer Overflow Report Form Appendix B of the Sanitary Sewer Overflow Response Plan.

Reporting of SSO's to the public and regulatory agencies follows the procedures found in the Florida Rural Water Association's "Sanitary Sewer Overflow Response Plan"

In the case of an overflow at the reclamation facility or non-compliance event, the Wastewater Operations Manager completes and submits the WWTP Malfunction / Abnormal Event Report to the appropriate FDEP Abnormal Events email.

Performance Measure for Overflow Prevention and Mitigation Programs

Performance measures will be established and monitored to help meet the following goals:

- Continue to comply with regulatory requirements.
- Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures.
- Minimize the cost of conveyance asset ownership while maintaining necessary stewardship of assets and achieving defined protection levels.
- Continue to provide effluent quality that meets or exceeds FDEP re-use requirements and effluent quality goals.

Performance Measures to help meet the following goals include:

- Limit SSO's over 1,000 gallons to one per year.
- Eliminate all SSO's due to Lift Station or Vacuum Station failure.

- Meet all SSO reporting requirements notifying the public and regulatory agencies as described in the Sanitary Sewer Overflow Response Plan.

6.4 Operations and Maintenance Programs

The District operates 82 lift stations. Larger (master) lift stations receive discharges from smaller (satellite) lift stations.

- There are nine vacuum collection system service areas, with nine vacuum stations located on six different parcels within the District's service area. Each vacuum station is designed with standardized equipment manufactured by Air-Vac. The District also maintains over 3,800 vacuum pits as part of the vacuum collection system.

The Operations and Maintenance Programs are specifically developed to address the general program goals of the District's CMOM Program and will include:

- Properly manage, operate and maintain, at all times, the parts of the collection system that the permittee owns or over which it has operational control.
- Provide adequate capacity to convey base flows and peak flows.

6.4.1 Lift Station Operations

Routine Operations – Master Lift Stations are physically inspected on a once-a-day frequency, with satellite lift stations being inspected on a once-a-week frequency. A field operations staff member performing routine inspections follows a Routine Inspection Checklist Form and once completed, records the information and date/time in the stations log. A copy of the Routine Inspection Checklist Form can be found in the full document contained in Appendix D.

Abnormal Operations - Lift station pump and power failure alarms are monitored by the DFS system and alarm at the Human Machine Interface terminal at the District's headquarters during normal business hours. An alarm dial-out system relays alarms to the on-call collection system operator during non-business hours.

Response procedures for Lift Station failures are outline in the Lift Station Failure Response SOP found in the full document contained in Appendix D.

Performance Measures

- Perform routine inspections at all master lift stations once per week 100% of the time.
- Perform routine inspections at all satellite lift stations once per week 90% of the time.
- Respond to all alarms during non-business hours within 60 minutes 100% of the time.

6.4.2 Vacuum Station Operation

Routine Operations – Vacuum Stations are physically inspected once per day seven days per week. A field operations staff member performing routine inspections follows a Routine Inspection Checklist Form and once completed, records the information and date/time in the stations log. A copy of the Routine Inspection Checklist Form can be found in the full document contained in Appendix D.

Abnormal Operations – Vacuum Station alarms are monitored by the DFS system and alarm at the Human Machine Interface terminal at the District's headquarters during normal business hours. An alarm dial-out system relays alarms to the on-call collection system operator during non-business hours.

Response procedures for Vacuum Station failures are outline in the Vacuum Station Failure Response SOP found in the full document contained in Appendix D.

Performance Measures

- Perform routine inspections at all vacuum stations once per week 100% of the time.
- Perform at least 80 vacuum pit inspections per week to obtain a once per year inspection frequency.
- Respond to all alarms during non-business hours within 60 minutes 100% of the time.

6.4.3 Forcemain Operations

The District currently monitors the right of way of their force mains and has an active "Call Before You Dig" program. All forcemains above waterways are visually inspected once per week. Force main pressures are monitored at most of the master lift stations. This Utility Master Plan recommends installing more flow meters at master lift stations and pressure indication devices at satellite stations (project ID # LS-8) to better identify abnormal events and assist with better conveyance system performance analysis.

Performance Measures

To be determined and updated by the District's Wastewater Operations Manager as part of an on-going CMOM program.

6.4.4 Gravity Line Cleaning and Inspections

The gravity collection system is comprised of approximately 54 miles of pipelines including 16 miles of vitrified clay pipe and approximately 900 manholes. This Utility Master Plan identifies several projects to continue relining or replacement of vitrified clay pipe (project ID CL-03) and reline manholes (project ID CL-04).

The District is in process of developing a program of scheduled gravity line cleaning and inspections. Equipment to accomplish this work is on-site and is already being used for responding to blockages and minor backups. A crew of three collection

system operators under the direction of the Wastewater Collections Manager will target cleaning and inspection of 2.7 miles per year to obtain a complete cleaning and inspection of the system on a 20 year cycle.

Performance Measures

Performance measures will be established and monitored to help meet the following goals.

- Where possible, establish additional practices to prevent SSOs, maintain or improve system performance, and avoid preventable failures.
- Performance Measures to help meet the following goals include;
  - Complete 5% or 14,256 feet of gravity line cleaning and inspection per year.

6.4.5 Vacuum System Inspections

The District can measure system vacuum at each vacuum station. An indication of low vacuum typically means a vacuum pit valve is stuck in the open position. If the cause is determined not to be a stuck open vacuum valve, then the collection crew begins to visually inspect the vacuum system pipe line.

Routine inspections and scheduled cleaning will be determined and documented in this section of the full document at a later date.

7 Summary and Recommendations

7.1 Summary

District Utility Services

The District has provided potable water services since 1961 and sanitary sewer service since 1994 to residents within the unincorporated areas of Sarasota and Charlotte Counties generally known as Englewood, Grove City and Manasota Key.

The District has provided consistent high-quality and economical water and wastewater services to it's customers through times of high growth and fluctuating seasonal demands. Water supply production and wastewater treatment flows have seen a general increase since the end of the great recession in 2009 to levels that are near the 2005 annual averages.

Population projections for the District's service area over the 20 year planning horizon indicate that a near-term (1-5 years) growth rate of approximately 1.5% annually will be experienced as a result of recent increases in proposed developments within the unincorporated areas of southwestern Sarasota and northwestern Charlotte Counties. As build out of these areas occur, mid-term (6-10 years) and long-term (11-20 years) growth rates of 1.0% and 0.8% are anticipated. These projections equate to an estimated population growth of 8,857 additional people by 2036.

The District's current potable water sources and treatment facilities have adequate capacity to provide the projected water demands through the 20 year planning horizon. Additional improvements to the water supply and treatment facilities will be required to maintain the systems at their rated capacities. Water transmission and distribution pipeline improvements will be necessary to maintain water quality, pressures and increase the reliability of the system.

The District's projected wastewater annual average daily flows will exceed the WRF's current rated capacity by 2032, or in 16 years. In addition, improvements to the WRF's infrastructure will be required to maintain the facility at its existing rated capacity. Wastewater collection infrastructure improvements will be necessary to maintain the integrity and reliability of the system.

The District's existing reclaimed water pumping and storage facilities have adequate permitted capacities to accept effluent flows through the 20 year planning horizon. Reclaimed water transmission, distribution and pump station improvements will be necessary to maintain adequate pressures and flows in the system as well as increase reliability.

7.2 Recommendations

The planning period for this Utility Master Plan is 20 years. The following recommendations have been developed to allow the District to meet its potable water, wastewater and reclaimed water service needs through 2036. The major elements of the Utility Master Plan's Capital Improvement Program recommendations are broken

out by system and planning period (near-term, mid-term and long-term) in which they are recommended. In addition, overall utility-wide system recommendations are provided.

7.2.1 Water System Recommendations

Recommended improvements to the District's water system are summarized as follows and have been divided into three categories:

- Water Treatment Plants - Reverse Osmosis and Lime Softening;
- Water Transmission and Distribution System; and
- Wells and Wellfields.

Water Treatment Plants

Near-term (1-4 Years)

- Commission a Lime Softening Plant Facility – Long Term Feasibility Study;
- Complete electrical recommendations at RO and Lime Softening Plants;
- Complete rehabilitation projects at Lime Softening Plant; and
- Complete Infrastructure and SCADA/PLC Upgrades at the RO and Lime Softening Plants.

Mid-term (5-10 Years)

- Complete upgrades to standby generator and power distribution system at RO Plant;
- Complete infrastructure improvements at RO Plant;
- Complete rehabilitation projects at Lime Softening Plant;
- Complete Improvements to high service pump station.

Long-term (11-20 Years)

- Complete upgrade to capacity at RO Plant;
- Complete pump modifications at RO Plant;
- Replace Chlorine gas system at RO Plant;
- Complete Infrastructure improvements at RO Plant;
- Complete instrumentation and analyzer upgrades at Lime Softening Plant;
- Replace lime slaker building at Lime Softening Plant.

Water Transmission and Distribution

Near-term (1-4 Years)

- Complete System modifications to eliminate bottleneck onto Manasota Key;
- Complete system improvements to provide redundancy at Forked Creek.

Mid-term (5-10 Years)

- Complete a water storage/system interconnection needs analysis;
- Complete asbestos cement pipeline replacement on Manasota Key Beach – Sarasota and Charlotte County;
- Complete transmission line improvements in north service area.

Long-term (11-20 Years)

- Complete design and construction of water storage tank.

Wells and Wellfields

Near-term (1-4 Years)

- Install telemetry communications to RO supply wells.

Mid-term (5-10 Years)

- Install telemetry communications to Lime Softening Plant wells;
- Complete rehabilitation; replacement or abandonment of WF1 Supply wells;
- Complete abandonment of 1MW-1 and SMW-1.

Long-term (11-20 Years)

- Complete upgrade to capacity at RO Plant;
- Complete pump modifications at RO Plant;
- Replace Chlorine gas system at RO Plant.

Additional recommendations for the water system include on-going projects scheduled to be implemented throughout the 20-year planning horizon with the commencement of the projects dependent on available funding and opportunity. These projects include distribution system looping and line extensions to improve water quality and pressures in the system.

In addition, regulatory requirements will necessitate the submittal of a 10-Year Facility Work Plan to be submitted to the SWFWMD by May17, 2017 and an application to renew the existing WUP by December 18, 2019.

7.2.2 Wastewater System Recommendations

Recommended improvements to the District's wastewater system are summarized as follows and have been divided into three categories:

- Wastewater Reclamation Treatment Plant;
- Reclaimed Water Transmission and Distribution;
- Wastewater Collection System – Sewer Lift and Vacuum Stations.

Wastewater Reclamation Treatment Plant

Near-term (1-4 Years)

- Complete Phase 1 Blower upgrades;
- Complete electrical recommendations at WRF;
- Complete rehabilitation of re-use pond pumping.

Mid-term (5-10 Years)

- Complete Plant 4 rehabilitation;
- Complete Phase 2 Blower upgrades;
- Complete the expansion of the chlorine contact basin;
- Complete Electrical and mechanical improvements at WRF.

Long-term (11-20 Years)

- Complete rehabilitation to odor control system at headworks;
- Complete Plant 1 & 2 Rehabilitation;
- Replace Chlorine gas system at WRF.

Reclaimed Water Transmission and Distribution

Near-term (1-4 Years)

- Complete hydraulic analysis and rehabilitation improvements to Holiday Ventures Booster Station.

Mid-term (5-10 Years)

- Complete planning, design and construction of new re-use storage and forcemain to Holiday Ventures Booster Station.

Long-term (11-20 Years)

- Complete design and construction of water storage tank.

Wastewater Collection System – Sewer Lift and Vacuum Stations

Near-term (1-4 Years)

- Complete LS121 Holiday Ventures Capacity Upgrade and Facility Plan;
- Purchase and install bypass pumping system;
- Complete forcemain infrastructure improvements;
- Complete manhole rehabilitation program.

Mid-term (5-10 Years)

- Complete planning, design and construction of LS121 – Holiday Ventures based on recommendation of Capacity Upgrade Study;
- Complete replacement of standby generator;
- Complete instrumentation upgrades at lift stations;
- Planning, design and construction of new forcemain from Holiday Ventures to WRF;
- Complete a sanitary sewer service evaluation for north Manasota Beach;
- Complete the purchase of a new CCTV camera and trailer.

Long-term (11-20 Years)

- Decommission LS-113;
- Complete collection system extensions to unserved areas.

Additional recommendations for the wastewater system include on-going projects recommended to take place throughout the 20-year planning horizon with the commencement of the projects dependent on available funding and opportunity. These projects include the re-lining or replacement of existing clay sewer pipes and replacement of the buried liquid process piping at the WRF.

It is also recommended that the District submit an updated Capacity Analysis Report in accordance with FDEP as well as a permit renewal application for the Domestic

7.2.3 Overall Utility System Recommendations

The following recommendations generally relate to the District's overall utility system planning, operation and maintenance practices and are based on discussions with District staff and general industry professional experience.

- With respect to the existing bulk sewer service agreements with Charlotte County and Utilities Inc. of Sandalhaven, it is recommended that the District work with each utility to amend the existing agreements to include a more detailed capacity commitment and sanitary sewer service schedule.

- It is recommended that the District implement and continuously update and improve a cost-effective CMOM Program based upon best practices for wastewater conveyance and treatment and as outlined in Appendix D.
- As the District moves forward in the planning process, collaboration and coordination with local government partners including consideration of potential future potable water supplies, interconnections, and other utility infrastructure is recommended.
- It is recommended that the District evaluate the benefits of purchasing an electronic asset management system (EAMS) or computerized maintenance and management software (CMMS) program.
- The District must submit a 10-Year Water Facility Work Plan to the Southwest Florida Water Management District by May 17, 2017.
- The District must submit an updated Wastewater Capacity Analysis Report to the FDEP.
- A renewal application for the existing WUP must be submitted to the Southwest Florida Water Management District by December 19, 2018.

8 References

ASRUs, Inc. 2016*. Annual Wellfield Management Report*

Atkins. 2015*. Peace River Manasota Regional Water Supply Authority Integrated Regional Water Supply Plan.*

Bureau of Economic and Business Research – *Florida Estimates of Population 2015 (Vol. 49, Bulletin 174, January 2016)*

Carollo Engineers. 2015 *Sarasota County 10-Year Water supply Facilities Work Plan.*

Department of Commerce – Census Bureau. 2016 *Methodology, Assumptions, and Inputs for the 2014 National Projections. (August 2016)*

Environmental Protection Agency (EPA) 2016 https://www.epa.gov/enforcement/water-enforcement#cwa

ERPI. 2004 *Guidance Manual for the Evaluation of Effluent Sewer Systems,* EPRI, Palo Alto, CA, East Kentucky Power Cooperative, Inc., Winchester, KY, and Cooperative Research Network of NRECA, Arlington, VA: 2004. 1009130.

Southwest Florida Water Management District. 2015. *Regional Water Supply Plan.*

Southwest Florida Water Management District. 2011. *How to Quickly Calculate Required and Optional Population Served Estimates for the annual reports and base year estimates using data found in Utility and District Demographics*.