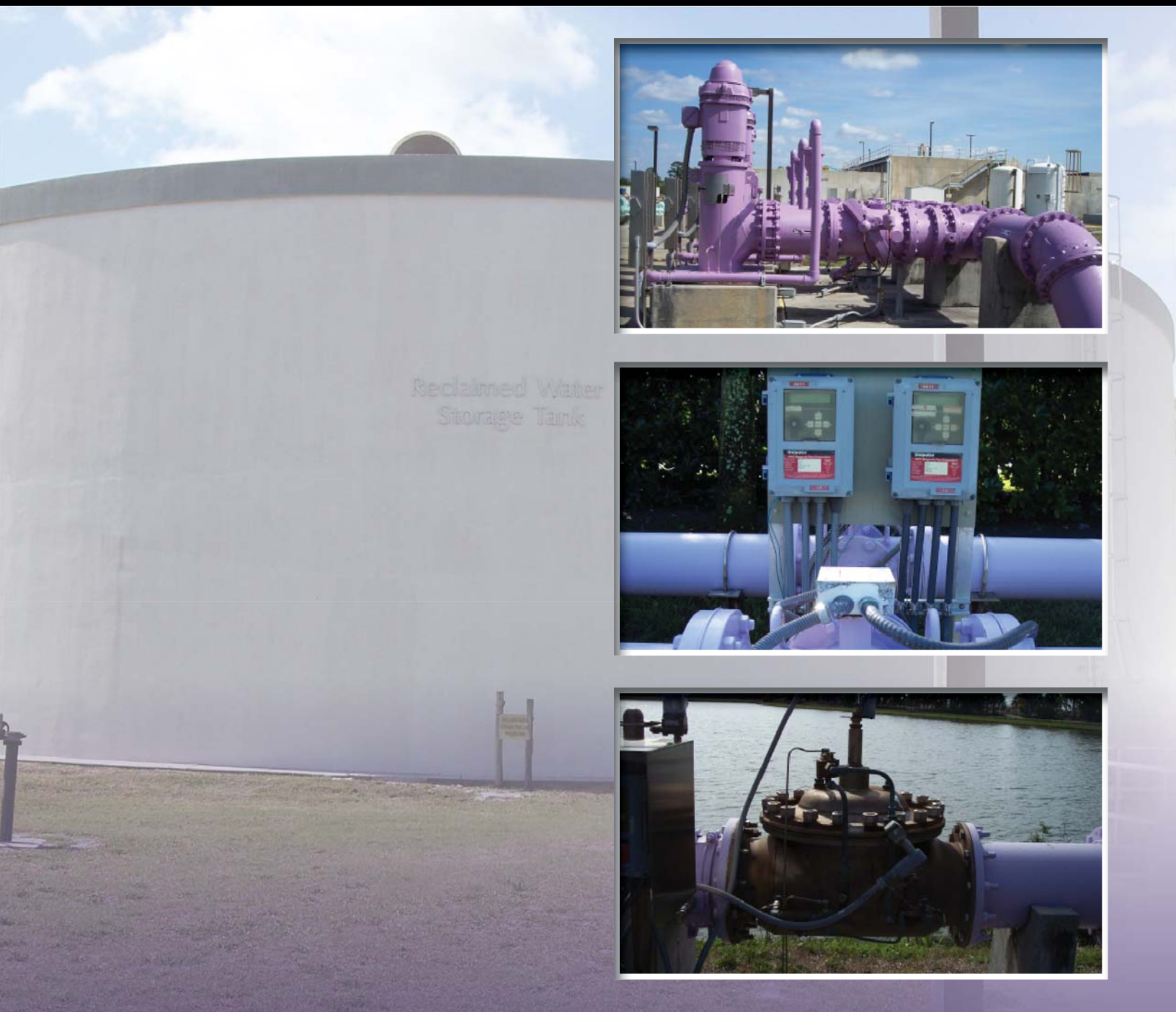
City of Venice
Reclaimed Water Master Plan

October 2012



Reclaimed Water Master Plan

prepared for

City of Venice

October 2012

Prepared By:

McKIM&CREED

378 Interstate Court
Sarasota, FL 34240
(941) 379-3404

Blake Peters 10-18-12

Blake Peters, PE Date
Florida Licensed Professional Engineer
No. 64429

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EXECUTIVE SUMMARY

Introduction

The City of Venice has established the goal of providing utility services that meet the needs of the current and future population while protecting the environment and supporting the City's planning framework. The objective of this master plan is to develop a guide for storing and distributing reclaimed water to meet the needs of existing and future development and supporting the water management needs for the Eastside WRF.

Reclaimed water is a product of wastewater treatment, and the projected wastewater flows represent an upper limit for available reclaimed water supply. Wastewater flow projections for the planning periods 2015, 2020, 2025, and 2030 were determined in the City of Venice Wastewater Master Plan dated June 2012. The projected flows were based on the population growth of Sarasota County and correspondingly the City of Venice as projected by the Bureau of Economic and Business Research, Volume 44, Bulletin 159, June 2011, Projections of Florida Population by County 2010-2040.

All wastewater generated by the City of Venice is treated at the Venice Eastside advanced wastewater treatment facility. The facility had an average annual daily flow of 2.71 mgd in 2011. Of this flow approximately 0.78 mgd was from Sarasota County and the remaining flow was from the City. The City reuses the treated wastewater to provide irrigation water to commercial users, residential users and golf courses to meet their needs and reduce the use of precious groundwater resources. The City also has available other means of disposing of the effluent should there be more reclaimed water available than needed by the community. Those disposal methods include two surface water disposal locations and, through an interconnection agreement with Sarasota County, a deep injection well. This diversification of disposal methods allows the City reliable disposal capacity under varying conditions.

This Master Plan evaluates the existing reclaimed water system, identifies areas of improvement, creates a computer hydraulic model for assessing the pumping, piping and storage system, develops projections for future reclaimed water flows and identifies potential customers, provides preliminary design parameters for short term and long term capital improvement projects to improve the existing system and expand it for future conditions, and projects the potential costs over the next twenty years for the projected improvements. These improvements include recommendations to improve system delivery pressure, and additional storage to optimize reclaimed water availability.

Reclaimed Water Demand Projections and Application Sites

Future reclaimed water demand is anticipated to be heavily weighted in the northeast of the City within the planning and JPA areas. Smaller areas, such as parks and medians, are not projected to use large quantities of reclaimed water but were identified due to the benefits they provide to the general public at large. The goal of identifying potential future users was to provide a mix of these general public beneficial uses of reclaimed water while meeting the City's future reclaimed water disposal needs. The reclaimed water demand projections for the planning years seek to align future reclaimed water supply with projected reclaimed water demand.

Projections of future reclaimed water demand were based on irrigation rates for the land use type and acreage of the property being analyzed. Projections of future reclaimed water demand were developed based on two scenarios. Scenario 1 assumes that only wastewater generated by the City is available for reclaimed water supply. This approach is conservative given that wastewater flow from Sarasota County could potentially decrease or stop due to an operational change by the County to serve additional County population centers. Should this happen the amount of available reclaimed water would decrease along with the potential revenue from the sale of that reclaimed water. Scenario 2 assumes that wastewater flow from Sarasota County will continue to be treated at the Eastside WRF at the projected flow rates and that the

combined City/County wastewater flow will be available for reclaimed water supply in the City's system. Therefore the development of the two scenarios allows the City to consider the required respective improvements and costs with and without County flow.

The application rate of 0.5-inches per week was used for Scenario 1 to represent the low end of projected reclaimed water demand and 1-inch per week was used for Scenario 2 to represent a moderate projected reclaimed water demand. Scenario 2 represents the potential maximum amount of available reclaimed water generated at the Eastside WRF and the increased demands that will be necessary for the beneficial reuse of the reclaimed water. Reclaimed water demands based on Scenario 2 were used in the hydraulic analysis since they represent the maximum demands the system is projected to experience during the planning period. A summary of the projected reclaimed water user demands and the associated planning year is shown in **Tables ES-1** and **ES-2**.

Table ES-1: Scenario 1 - Demand Summary

Existing and Potential Users		Irrigable Demand Per Planning Year (gpd)			
		2015	2020	2025	2030
Existing Individual Users		1,310,000	1,310,000	1,310,000	1,310,000
Existing Bulk Users (Permitted Capacity)		1,350,000	1,350,000	1,350,000	1,350,000
Parks and Medians		-	-	80,322	80,322
Planning and JPA Areas					
I	South Laurel	109,584	219,169	328,753	438,376
J	Shakett Creek	4,784	9,569	14,353	19,139
K	Knights Trail (Subarea 1)	16,368	32,735	49,103	65,476
	Knights Trail (Subarea 1)	48,903	97,806	146,709	195,630
	Knights Trail (Subarea 1)	238	476	714	953
	Knights Trail (Subarea 1)	8,776	17,552	26,328	35,108
L	Gene Green	34,396	68,792	103,188	137,597
1	Knights Trail Park Area (Rustic Rd)	17,291	34,910	52,028	67,856

Table ES-1: Scenario 1 - Demand Summary (Continued)

Existing and Potential Users	Irrigable Demand Per Planning Year (gpd)			
	2015	2020	2025	2030
Large Potable Water Irrigation Users				
Clare Bridge Living Facility	-	-	-	7,071
Wells Fargo Bank, 1306 East Venice Ave	-	-	-	6,633
An Existing Bulk User with Increased Permitted Capacity	-	-	-	50,526
Total	**2,900,341**	**3,141,010**	**3,461,499**	**3,764,686**

Table ES-2: Scenario 2 - Demand Summary

Existing and Potential Users		Irrigable Demand Per Planning Year (gpd)			
		2015	2020	2025	2030
Existing Individual Users		1,310,000	1,310,000	1,310,000	1,310,000
Existing Bulk Users (Permitted Capacity)		2,536,810	2,536,810	2,536,810	2,536,810
Parks and Medians		-	-	160,643	160,643
Planning and JPA Areas					
I	South Laurel	219,169	438,337	657,506	876,752
J	Shakett Creek	9,569	19,137	28,706	38,278
K	Knights Trail (Subarea 1)	32,735	65,470	98,206	130,952
	Knights Trail (Subarea 1)	97,735	195,613	293,419	391,260
	Knights Trail (Subarea 1)	476	953	1,429	1,905
	Knights Trail (Subarea 1)	17,552	35,105	52,657	70,215
L	Gene Green	68,792	137,584	206,377	275,193
1	Knights Trail Park Area (Rustic Rd)	34,582	69,820	104,056	135,713
Large Potable Water Irrigation Users					
Clare Bridge Living Facility		-	-	-	7,071
Wells Fargo Bank, 1306 East Venice Ave		-	-	-	6,633
Total		**4,327,492**	**4,808,830**	**5,449,808**	**5,941,426**

RCW Storage

While the regulations are satisfied for reclaimed water storage with the current reclaimed water storage and disposal system, the actual operation of the reclaimed system and ability of the City to reliably provide reclaimed water to the system's users does require that storage be provided beyond the minimum regulatory requirement. Therefore the City's system was evaluated using the FDEP LandAp2010 water balance model to determine the storage requirements to meet the ten year wet weather recurrence interval. Based on this analysis, in 2011 the City had adequate reclaimed water storage capacity. A majority of the potential future demand is projected to come in planning areas I, J, K, L and JPA area 1. The storage requirements for these future land development areas was calculated individually and assumed to be satisfied by new bulk user ponds within the respective development. The projected additional storage requirement from increased demand within all other areas was assumed to be satisfied by new ground storage tanks. If the City plans to maximize use of all available reclaimed water and minimize alternative disposal options, six new ground storage tanks would be recommended by 2015 to offset the 30.6 MG storage deficiency in 2015. The construction of this amount of new storage is costly and is not actually required to meet permit requirements but would allow greater utilization of reclaimed water. This recommendation would also be prefaced on the projected wastewater flow increases actually occurring and Sarasota County continuing to send estimated quantities of wastewater to the City.

Capital Improvement Program

Table ES-3 summarizes the recommended reclaimed water system improvements that are provided on **Tables 8-4** and **8-5**. The total cost of all improvements over the planning periods is $46,334,000. The cost of reclaimed water piping improvements is $6,795,000. The remaining $39,539,000, although not required, pertains to reclaimed water storage.

Table ES-3: Estimated Capital Improvement Costs by Phasing Period

Type of Improvement	2012-2015	2015-2020	2020-2025	2025-2030	Totals
Reclaimed Water System	$ 2,578,000	$ 1,596,000	$ 2,541,000	$ 80,000	$ 6,795,000
Reclaimed Water Storage	$39,539,000	$ 0	$ 0	$ 0	$39,539,000
Totals	**$42,117,000**	**$ 1,596,000**	**$ 2,541,000**	**$ 80,000**	**$46,334,000**

1.0 INTRODUCTION

1.1 Master Plan Objectives

The City of Venice has established the goal of providing utility services that meet the needs of the current and future population while protecting the environment and supporting the City's planning framework. The objective of this master plan is to develop a guide for storing and distributing reclaimed water to meet the needs of existing and future development and supporting the water management needs for the Eastside WRF. The Reclaimed Water Master Plan will provide the guide for developing a capital improvement program which supports reclaimed water management needs.

1.2 Methodology and Overview

A methodology was developed to complete the master planning process. The first step was data collection which consisted of numerous sources of data. Some of the sources were the City of Venice Comprehensive Plan, GIS data, future land use data, plant operating data, meter data, SCADA data, field investigations, and related engineering reports and studies. A list of references used as part of this master plan is provided in Appendix B.

The second step was to use the data to identify potential reclaimed water users, develop the associated demand projections, and evaluate the reclaimed water system by performing a hydraulic modeling analysis. A field investigation was conducted to gather pressure and flow rates at various locations within the system to calibrate the hydraulic model. Data was also entered into LandAp2010, a water balance program, to calculate the current and projected wet weather storage requirements throughout the planning period.

The final step was to develop future reclaimed water system infrastructure requirements based on the findings. Improvement recommendations were

completed as part of the Master Planning process which consisted of capital improvement projects, cost estimates, and the recommended time period in which those projects should be completed and placed into service. The impact of each improvement on the cost of providing reclaimed water (potential rate impact) was also calculated.

1.3 Existing Service Area

The City of Venice has an approximate area of 16.60 square miles and is bordered by unincorporated Sarasota County on the north, south, and east and the Gulf of Mexico on the west. The wastewater collection, treatment and reclaimed distribution system operate in combination to produce and deliver reclaimed water. Wastewater is directed to the northeast through a system of gravity sanitary sewer mains and lift stations. All wastewater flow is received and treated at the Eastside WRF (WRF) to meet public access reclaimed water quality. The Eastside WRF is currently permitted to treat 6.0 mgd based on a 3 month average daily flow. Sarasota County owns 3.0 mgd of the plant capacity so it sends flow to the plant on an as needed basis. The wastewater connection between the County and City is located just upstream of the plant entrance at the southeast corner of Laurel Rd East and Knights Trail Road. The agreement between the City of Venice and Sarasota County for the treatment of wastewater at the Venice Eastside WRF was originally approved in 1989 (Contract C89-457). That agreement lays out the terms and conditions for the reservation of treatment capacity, disposal obligations for treated effluent, costs for construction and operation of the facility, and applicable quality restrictions. That agreement was modified three times through Amendment 1 in 2000, Amendment 2 in 2002, and the Memorandum of Understanding in 2004. As a result of the Memorandum of Understanding the City of Venice is responsible for the disposal of all the City's wastewater contribution and the first 0.5 MGD of the Sarasota County wastewater treated at the WRF. The County is responsible for the disposal or

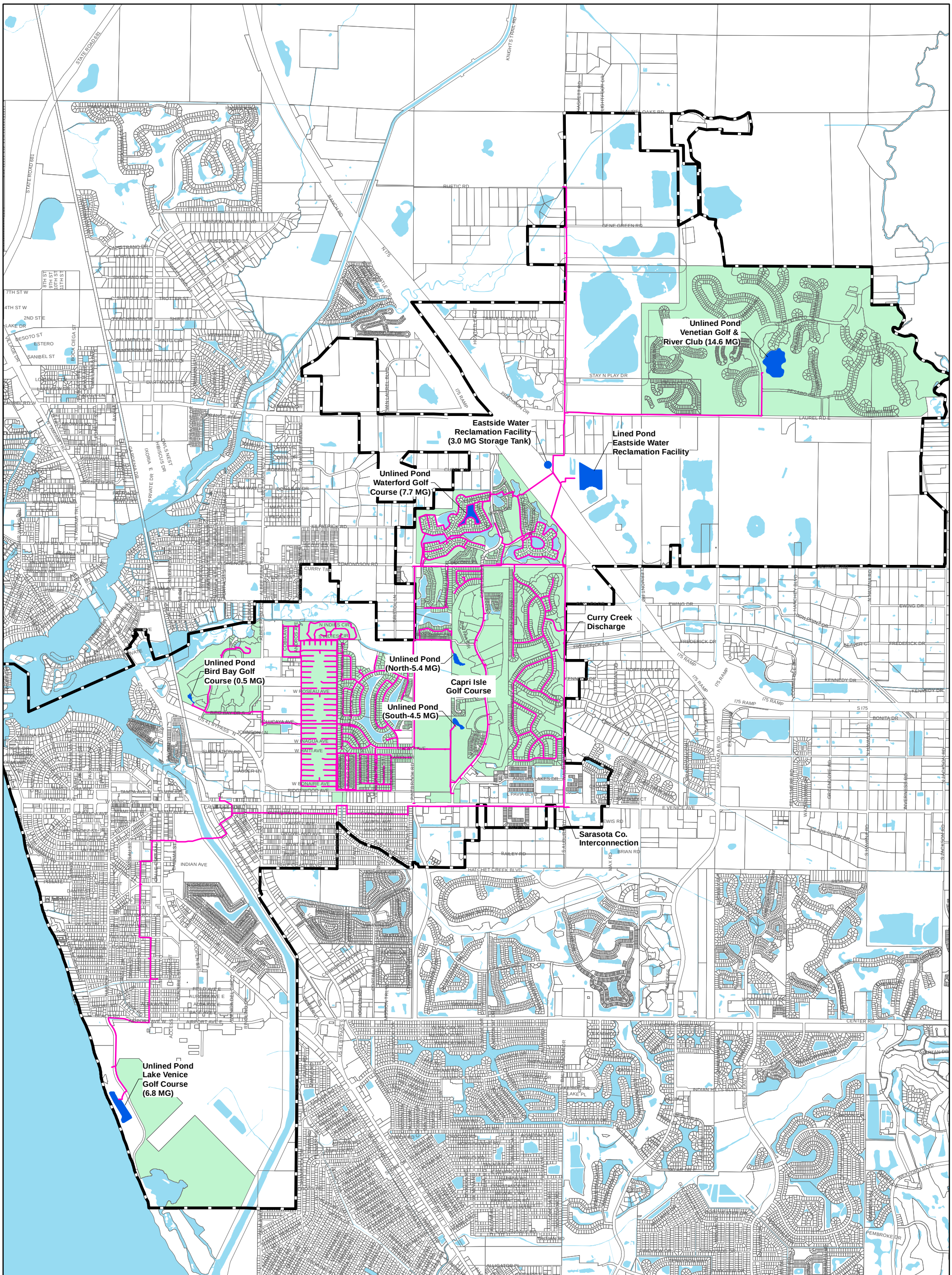
reuse of the remaining 2.5 MGD of the County's wastewater contribution. A separate agreement between the City of Venice and Sarasota County (Contract 99-045) was entered in 1998 for the construction and operation of the reuse interconnection. In the reuse interconnection agreement, the City and the County agreed to construct a metered interconnection between each party's reclaimed water system. The agreement provides for the transfer of reclaimed water between the City and Sarasota County reuse systems.

Effluent disposal from the WRF is either by the public access reclaimed water system or through surface discharge. The surface water discharge locations are at Curry Creek on North Auburn Road south of Sawgrass Blvd. and at the Water Treatment Plant Reverse Osmosis (RO) concentrate discharge point at 200 Warfield Ave North. Surface discharge at Curry Creek has only been used 12 days in the past three years and discharge through blending with the RO concentrate has not occurred. The primary means of effluent disposal is through the reclaimed water system for delivery to bulk users and individual metered users. The bulk users include Lake Venice Golf Club, Capri Isles Golf Course North, Capri Isles Golf Course South, Bird Bay Golf Course, Waterford Golf Course, and Venetian Golf and River Club. These bulk users all have storage ponds and in the case of the first four, the storage ponds are connected to the storm drainage systems and are considered potential intermittent surface water discharge points. A summary of all discharge locations is shown in **Table 1-1**.

Table 1-1: Discharge Summary

Discharge	Location	Permitted Capacity
D-001	Curry Creek	3.0 mgd AADF
D-002	Capri Isle Golf Course North, Stormwater Storage Lake System	Record Only
D-003	Capri Isle Golf Course South, Stormwater Storage Lake System	Record Only
D-004	Bird Bay Golf Course, Stormwater Storage Lake System	Record Only
D-005	Island Beach (Lake Venice Golf Club) Stormwater Storage Lake System	Record Only
R-001	City of Venice Master Reuse System	3.0 mgd AADF
R-002	Sarasota County South Master Reuse System	2.5 mgd AADF
R-003	City of Venice RO Concentrate Disposal System	1.0 mgd AADF

The existing service area for the Venice Reclaimed Water System is shown in **Figure 1-1**. This Figure depicts the existing areas that currently receive reclaimed water. The ultimate reclaimed water service area is the entire area identified on the 2030 Future Land Use Map (FLUM). The ultimate service area is shown in **Figure 1-2**.



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Legend

- Existing Reuse Pipe
- City Boundary
- Reuse Storage
- Existing Service Area

VENICE
CITY ON THE GULF

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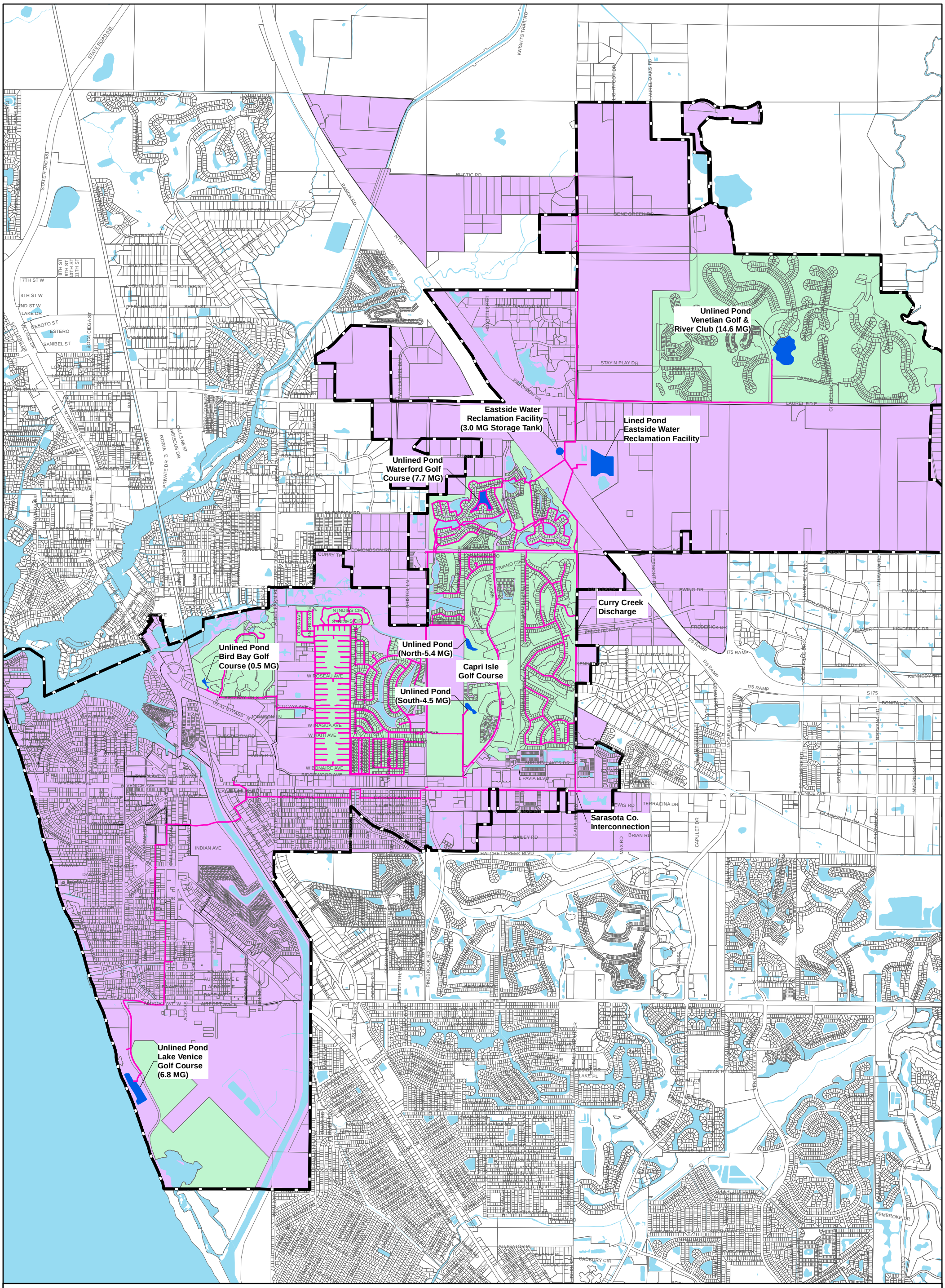
Figure 1-1
Existing Service Area



N
W E
S

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Legend

- Existing Service Area
- Existing Reuse Pipe
- Future Service Area
- Reuse Storage
- City Boundary

VENICE
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Figure 1-2
Ultimate Service Area

2.0 POPULATION AND RECLAIMED WATER DEMAND PROJECTIONS

2.1 Population

As of the 2010 Census, the City's resident population is 20,748 which is 5.5% of Sarasota County's population. The City has tourists and part-time residents that come in the winter months and temporarily boosts the City population. The seasonal population is 3,645 which is 17.6% of the resident population based on the City's 2010 Public Supply Annual Report. The combined resident population and seasonal population are referred to as the functional population.

2.2 Existing Flow Summary

The Eastside WRF had an average annual daily flow of 2.71 mgd in 2011. Of this flow approximately 0.78 mgd was from Sarasota County. The historical flows to the Eastside WRF are summarized in **Table 2-1**.

Over the past three (3) years the WRF has only discharged water from the Venice Reclaimed Water System, 132 days within twelve (12) different months to the Sarasota County South Reclaimed Water System, and 12 days within March and April of 2010 to Curry Creek. No discharge occurred to the Venice RO Concentrate System outfalls. **Table 2-2** summarizes by month the flow from the WRF to the effluent system.

Table 2-1: Historical Flow to the Eastside WRF

Year	Venice Eastside AADF (MGD)	Sarasota County AADF (MGD)[1]	Total AADF (MGD)
2006	1.74	1.10	2.84
2007	1.64	0.67	2.31
2008	1.86	1.16	3.02
2009	1.96	1.16	3.12
2010	2.39	1.28	3.67
2011	1.93	0.78	2.71

1. Per FDEP DMRs and City provided flow summaries.

Table 2-2: Plant Average Monthly Discharge to System

Month-Yr	R001 Venice RCS (mgd)	R002 SC South RWS (mgd)	R003 Venice RO Concentrate System (mgd)	D001 Curry Creek (mgd)
Jan-09	2.895	0.000[1]	0.000	0.000
Feb-09	3.104	0.000	0.000	0.000
Mar-09	3.085	0.000	0.000	0.000
Apr-09	2.938	0.000	0.000	0.000
May-09	2.942	0.000	0.000	0.000
Jun-09	2.576	0.000	0.000	0.000
Jul-09	2.506	0.000	0.000	0.000
Aug-09	2.549	0.000	0.000	0.000
Sep-09	3.190	0.000	0.000	0.000
Oct-09	2.732	0.000	0.000	0.000
Nov-09	2.882	0.000	0.000	0.000
Dec-09	3.501	0.000	0.000	0.000
Jan-10	3.606	0.318	0.000	0.000
Feb-10	3.278	0.835	0.000	0.000
Mar-10	2.714	1.950	0.000	0.581
Apr-10	2.547	2.402	0.000	0.315
May-10	3.205	0.000	0.000	0.000
Jun-10	2.458	0.000	0.000	0.000
Jul-10	2.429	0.000	0.000	0.000
Aug-10	2.173	0.497	0.000	0.000
Sep-10	2.598	1.371	0.000	0.000
Oct-10	2.537	0.001	0.000	0.000
Nov-10	2.601	0.000	0.000	0.000
Dec-10	2.270	0.000	0.000	0.000
Jan-11	2.311	0.000	0.000	0.000
Feb-11	2.723	0.000	0.000	0.000
Mar-11	2.882	0.023	0.000	0.000
Apr-11	2.663	0.332	0.000	0.000
May-11	2.375	0.000	0.000	0.000
Jun-11	1.675	0.000	0.000	0.000
Jul-11	1.688	0.000	0.000	0.000
Aug-11	1.683	0.293	0.000	0.000
Sep-11	1.728	0.545	0.000	0.000
Oct-11	2.185	0.000	0.000	0.000
Nov-11	2.381	0.000	0.000	0.000
Dec-11	2.473	0.000	0.000	0.000

1. The plant discharged 0.001 mgd to SC South RWS on Jan. 1, 2009. This amount is too small to make the average greater than 0.000.

2.3 Bulk User Demands and Patterns

All bulk users have reclaimed water meters and are invoiced by the City for reclaimed water use. Based on the metered flow and invoicing records from the City the actual annual average monthly and peak month demands were determined and provided in **Table 2-3**. The complete data file used to develop the summary table appears in **Appendix C**.

Table 2-3: Summary Bulk User Demands and Peak Use

Customer	Year	Peak Month (mgd)	Annual Avg. (mgd)	Peak Factor
Bird Bay	2009	0.136	0.084	1.62
	2010	0.121	0.077	1.57
	2011	0.115	0.082	1.40
Capri Isles North and South	2009[2]	0.348	0.166	2.10
	2010	0.284	0.154	1.84
	2011	0.216	0.129	1.67
Waterford[1]	2009	1.627	0.703	2.31
	2010	1.966	0.379	5.19
	2011	0.412	0.217	1.90
Venetian Golf and River Club	2009	0.636	0.313	2.03
	2010	0.776	0.410	1.89
	2011	0.505	0.301	1.68
Lake Venice	2009	0.500	0.295	1.69
	2010	0.589	0.374	1.57
	2011	0.555	0.345	1.61

1. Waterford not considered when determining peak factor because flow from plant was shut off for the majority of 2010.
2. For 2009 Capri Isles did not receive flow for month of December, therefore not used to determine peak factor.

The bulk users all receive reclaimed water from the City under the terms of reclaimed water service agreements. These agreements combined with the WRF operating permit and applicable Florida regulations represent the conditions under which reclaimed water is delivered, stored and applied for irrigation. Provided in **Table 2-4** for each bulk user is the allowable reclaimed water

capacity, application area and calculated application rate for applying reclaimed water to the user.

Table 2-4: Summary of Bulk User Application Rates

Customer	Permit		
	Area (acres)	Capacity (mgd)	Application Rate (In/week)
Bird Bay	27	0.11	1.05
Capri Isles North and South	85	0.20	0.61
Lake Venice	200	0.41	0.53
Venetian Golf and River Club	232	0.40	0.44
Waterford	110	0.23	0.54

2.4 Individual User Demands and Patterns

In addition to the bulk users, the City provides reclaimed water to individual users including residential units, park facilities and development master meters. Data was received from the City for the past three years showing the amount of water used by individual users. This data was reviewed and summarized in **Table 2-5** providing information for the actual annual average daily demand, peak month demand and seasonal peak month. Annual average demand ranges from 1.27 mgd to 1.31 mgd. Peak month flow was 1.87 mgd and the seasonal peak factor was 1.52.

Table 2-5: Individual Users

Year	Peak Month (mgd)	Actual Demand Avg (mgd)	Seasonal Monthly Peak Factor
2009	1.47	1.27	1.16
2010	1.87	1.23	1.52
2011	1.72	1.31	1.32

2.5 Correlation to Plant Flows

The City metered use data used for the calculations of demand identified in the subsections above was summarized and compared to the data from the actual flow meter record from the WRF for flow entering the reclaimed water system to be applied to public access reclaimed areas. This evaluation was performed as a check on the quality of the metered use data which came from the City Finance Department records. **Table 2-6** shows the results of metered data from bulk users and individual users compared to the WRF reported flow data. As is evident from the column labeled "Difference" the difference in data from the invoicing records is small (within 6.7% of the WRF reported data). This shows a strong indication that the finance records are reasonably complete, providing a good basis for applying demands across the system for future model and project activities.

Table 2-6: Summary All Users vs. WRF Data

Year	Bulk Users Avg. Daily Flow (mgd)	Individual Users Avg. Daily Flow (mgd)	Total (mgd)	WRF Reported Avg. Daily Flow (mgd)	Difference (mgd)
2009	1.561	1.270	2.831	2.908	0.077
2010	1.394	1.230	2.624	2.701	0.077
2011	1.074	1.306	2.380	2.191	-0.189

2.6 Wastewater Flow Projections

Reclaimed water is a product of wastewater treatment, and the projected wastewater flows represent an upper limit for available reclaimed water supply. Wastewater flow projections for the planning periods 2015, 2020, 2025, and 2030 were determined in the City of Venice Wastewater Master Plan dated July 2012. The projected flows were based on the population growth of Sarasota County and correspondingly the City of Venice as projected by the Bureau of Economic and Business Research, Volume 44, Bulletin 159, June 2011, Projections of Florida

Population by County 2010-2040. Development in the planning and JPA areas, starting in 2015, contributed a significant portion of the future projected flows. The general methodology for projecting wastewater flow in the City of Venice Wastewater Master Plan was based on the 10-Year Water Facilities Work Plan (WSFWP-10), prepared by the City of Venice Utilities and Planning and Zoning Departments. A summary of the Annual Average Daily Flow (AADF) and Maximum Monthly Average Daily Flow (MMADF) is presented in **Table 2-7** below.

Table 2-7: Wastewater Flow Projections

Planning Year	City of Venice	Sarasota County	Total
AADF (mgd)			
2011[1]	1,930,000	780,000	2,710,000
2015	2,635,199	1,460,000	4,095,199
2020	3,019,173	1,650,000	4,669,173
2025	3,398,252	1,790,000	5,188,252
2030	3,764,686	1,790,000	5,554,686
MMADF (mgd)			
2011[1]	2,366,000	1,020,000	3,386,000
2015	5,270,399	2,540,000	7,810,399
2020	6,038,346	2,860,000	8,898,346
2025	6,796,504	3,100,000	9,896,504
2030	7,529,373	3,100,000	10,629,373

1. Based on FDEP DMRs

2.7 Reclaimed Water Demand Projections

Reclaimed water demand projections are based on a combination of existing reclaimed water users and potential future users. In 2011 the annual average reclaimed water demand, with the bulk users supplied at permitted capacity, accounted for 138% of the annual average wastewater flow generated by the City of Venice. This represents an excess of 730,000 gpd of reclaimed water demand that cannot be satisfied by treating wastewater flow generated only by the City. As discussed in **Section 1-3**, the City is responsible for the disposal of the first 0.5

MGD of wastewater from Sarasota County, but is able to use all Sarasota County flow to satisfy demand when available. The City utilizes County wastewater treated at the Eastside WRF to make up for the deficit of reclaimed water supply. **Table 2-8** summarizes reclaimed demand as a percent of wastewater flow with and without wastewater flow from Sarasota County.

Table 2-8: Reclaimed Water Percent of Wastewater Flow - 2011

City Reclaimed Water Demand (gpd)	City Wastewater Flow (gpd)	Sarasota County Wastewater Flow (gpd)	Total Wastewater Flow	Demand as Percent of WW Flow
2,660,000	1,930,000	0	1,930,000	138%
2,660,000	1,930,000	780,000	2,710,000	98%

Projections of future reclaimed water demand were developed based on two scenarios. Scenario 1 assumes that only wastewater generated by the City is available for reclaimed water supply. This approach is conservative given that wastewater flow from Sarasota County could potentially decrease or stop due to an operational change by the County to serve additional County population centers. Should this happen the amount of available reclaimed water would decrease along with the potential revenue from the sale of that reclaimed water. This scenario allows the relationship between City generated reclaimed water and projected demands to be evaluated. Scenario 2 assumes that wastewater flow from Sarasota County will continue to be treated at the Eastside WRF at the projected flow rates provided in **Table 2-7**. This scenario represents the potential maximum quantity of reclaimed water generated at the Eastside WRF and the increased demands that will be necessary for the beneficial reuse of the reclaimed water. Reclaimed water demands based on Scenario 2 were used in the hydraulic analysis discussed in **Section 7** since they represent the maximum demands the system is projected to experience during the planning period.

Projections of future reclaimed water demand were based on irrigation rates for the land use type and acreage of the property being analyzed. The irrigable percentage is a measure of the net land area which would be irrigated by reclaimed water. This measure takes into account buildings, roads, sidewalks and non-irrigated acreage typical for each land use category. **Table 2-9** shows the irrigable percentages and application rates that were used in the reclaimed water demand projections. Application rates vary by location and are influenced by soil-plant relationships and other hydrogeologic conditions. Chapter 62-610.423 of the F.A.C. recommends a maximum application rate of two inches per week with higher rates requiring an engineering report for justification. Based on application rates previously determined for Manatee and Charlotte County, an application rate of 0.5-inches per week and 1-inch per week were assumed to be representative of low and moderate application rates within the City of Venice. The application rate of 0.5-inches per week was used for Scenario 1 to represent the low end of projected reclaimed water demand and 1-inch per week was used for Scenario 2 to represent a moderate projected reclaimed water demand. The maximum application rate of 2-inches per week was not used since it is not a conservative number for master planning and given the lower site specific rates determined for neighboring Counties.

Table 2-9: Reclaimed Water Demand by Land Use Type

Land Use Type	Irrigable Percentage	Scenario 1 Application Rate	Scenario 2 Application Rate
Residential/ Commercial	60%	0.5 in/week	1.0 in/week
Parks[1]	Varies	0.5 in/week	1.0 in/week
Medians	100%	0.5 in/week	1.0 in/week
Bulk Users	Permitted Acreage[3]	Varies[2]	1.0 in/week

1. Irrigable percentage was estimated for each individual park
2. Application rate based on bulk user reclaimed water agreements. See Table 2-4.
3. Irrigable acreage specified in reclaimed water agreement. See Table 2-4.

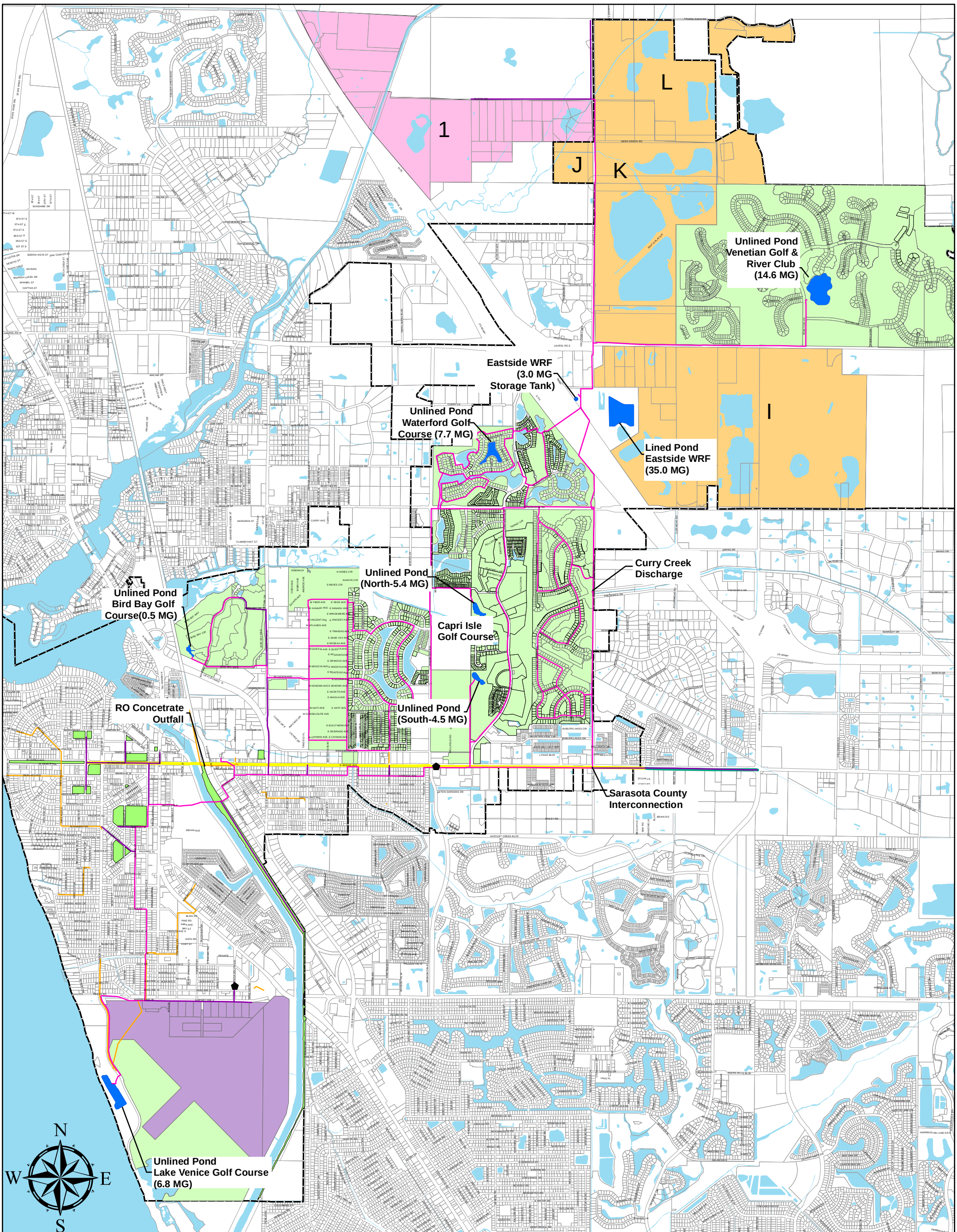
A detailed summary of the projected reclaimed water user demands for each scenario during the associated planning year is shown in **Tables 2-10** and **2-11**. Demand from future development was allocated by the projected percent build out as discussed in **Section 4.3.4**. Parks and medians were not projected to be required until 2025 due to the projected excess of reclaimed water demand although due to their relativity small demand they may be supplied earlier. The projected future users of reclaimed water are shown on **Figure 2-1**.

Table 2-10: Scenario 1 - Demand Summary

Existing and Potential Users		Irrigable Demand Per Planning Year (gpd)			
		2015	2020	2025	2030
Existing Individual Users		1,310,000	1,310,000	1,310,000	1,310,000
Existing Bulk Users (Permitted Capacity)		1,350,000	1,350,000	1,350,000	1,350,000
Parks and Medians		-	-	80,322	80,322
Planning and JPA Areas					
I	South Laurel	109,584	219,169	328,753	438,376
J	Shakett Creek	4,784	9,569	14,353	19,139
K	Knights Trail (Subarea 1)	16,368	32,735	49,103	65,476
	Knights Trail (Subarea 1)	48,903	97,806	146,709	195,630
	Knights Trail (Subarea 1)	238	476	714	953
	Knights Trail (Subarea 1)	8,776	17,552	26,328	35,108
L	Gene Green	34,396	68,792	103,188	137,597
1	Knights Trail Park Area (Rustic Rd)	17,291	34,910	52,028	67,856
Large Potable Water Irrigation Users					
Clare Bridge Living Facility		-	-	-	7,071
Wells Fargo Bank, 1306 East Venice Ave		-	-	-	6,633
An Existing Bulk User with Increased Permitted Capacity		-	-	-	50,526
	Total	**2,900,341**	**3,141,010**	**3,461,499**	**3,764,686**

Table 2-11: Scenario 2 - Demand Summary

Existing and Potential Users		Irrigable Demand Per Planning Year (gpd)			
		2015	2020	2025	2030
Existing Individual Users		1,310,000	1,310,000	1,310,000	1,310,000
Existing Bulk Users		2,536,810	2,536,810	2,536,810	2,536,810
Parks and Medians		-	-	160,643	160,643
Planning and JPA Areas					
I	South Laurel	219,169	438,337	657,506	876,752
J	Shakett Creek	9,569	19,137	28,706	38,278
K	Knights Trail (Subarea 1)	32,735	65,470	98,206	130,952
	Knights Trail (Subarea 1)	97,735	195,613	293,419	391,260
	Knights Trail (Subarea 1)	476	953	1,429	1,905
	Knights Trail (Subarea 1)	17,552	35,105	52,657	70,215
L	Gene Green	68,792	137,584	206,377	275,193
1	Knights Trail Park Area (Rustic Rd)	34,582	69,820	104,056	135,713
Large Potable Water Irrigation Users					
Clare Bridge Living Facility		-	-	-	7,071
Wells Fargo Bank, 1306 East Venice Ave		-	-	-	6,633
	Total	**4,327,492**	**4,808,830**	**5,449,808**	**5,941,426**



Planning Areas

I - South Laurel
J - Shakett Creek
K - Knights Trail
L - Gene Green

JPA/ILSBA Area

1 - Rustic Rd

McKIM&CREED

Legend

Potential Users

- Potable Irrigation High Users
- City of Venice Median
- Sarasota County Median
- Government Use
- City of Venice Parks
- JPA/ILSBA Area
- Planning Area
- Existing Reclaimed Pipe
- Propsed Pipe
- Existing Dry Lines
- Existing Service Area
- Reuse Storage
- City Boundary

VENICE CITY ON THE GULF

Figure 2-1
Potential Reclaimed Water Users

Figure 2-2 shows the projected reclaimed water demand, as provided in **Tables 2-10** and **2-11,** and the projected wastewater flow, as provided in **Table 2-7**, during the planning period. The shape of the reclaimed water demand curve intentionally converges on the City's wastewater generation curve in an effort to align reclaimed water demand with wastewater generation. Reclaimed water demand is projected to account for 100 percent of total wastewater flow by 2030 in Scenario 1 and 107% in Scenario 2 (See **Tables 2-12** and **2-13**). Detail regarding the potential users and application sites discussed above is provided in **Section 4.0**.

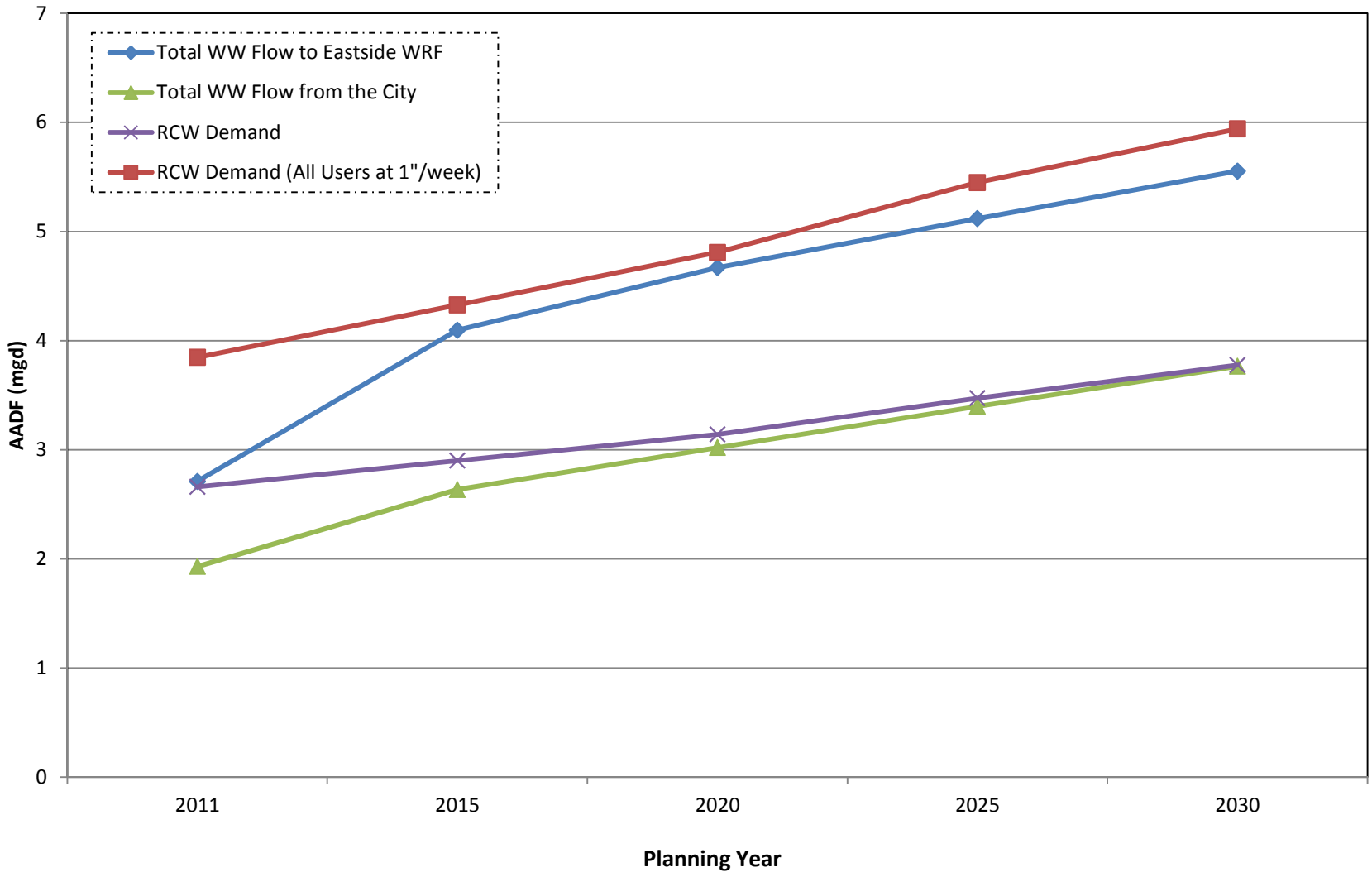
Table 2-12: Scenario 1 - Reclaimed Water Percent of Wastewater Flow – Planning Years

Year	City Reclaimed Water Demand (gpd)	City Wastewater Flow (gpd)	Demand as Percent of WW Flow
2015	2,900,341	2,635,199	110%
2020	3,141,010	3,019,173	104%
2025	3,461,499	3,398,252	102%
2030	3,764,686	3,764,686	100%

Table 2-13: Scenario 2 - Reclaimed Water Percent of Wastewater Flow – Planning Years

Year	City Reclaimed Water Demand (gpd)	City and County Wastewater Flow (gpd)	Demand as Percent of WW Flow
2015	4,327,492	4,095,199	106%
2020	4,808,830	4,669,173	103%
2025	5,449,808	5,188,252	105%
2030	5,941,426	5,554,686	107%

Figure 2-2
Projected Reclaimed Water Demand



3.0 RECLAIMED WATER SYSTEM COMPONENTS

The reclaimed water distribution system consists of storage and pumping facilities located at the WRF, the piping system to deliver the reclaimed water, the delivery control system at the end user locations, and the bulk user storage ponds. The reclaimed water system and all the system components are shown in **Figure 3-1**. Each major component of the system is described in the following subsections.

3.1 Water Reclamation Facility

The City of Venice owns and operates the Eastside WRF located at 3510 East Laurel Road in Venice, FL which treats domestic wastewater received from the City and Sarasota County. The facility has a capacity of 6.0 million gallons per day (mgd) on a 3-month rolling average. A general site plan of the facility is shown in **Figure 3-2**.

The facility consists of preliminary treatment followed by dual five-stage Bardenpho process trains, four clarifiers, three dual media automatic backwash traveling bridge filters, and three chlorine contact chambers fitted with a sodium hypochlorite system and the option to provide aeration in the event surface water discharge is necessary. Sludge is processed by four aerated holding tanks and dewatered using two belt filter presses prior to being transported by contract haulers for stabilization and final disposal.

A process schematic is provided in **Figure 3-3**.

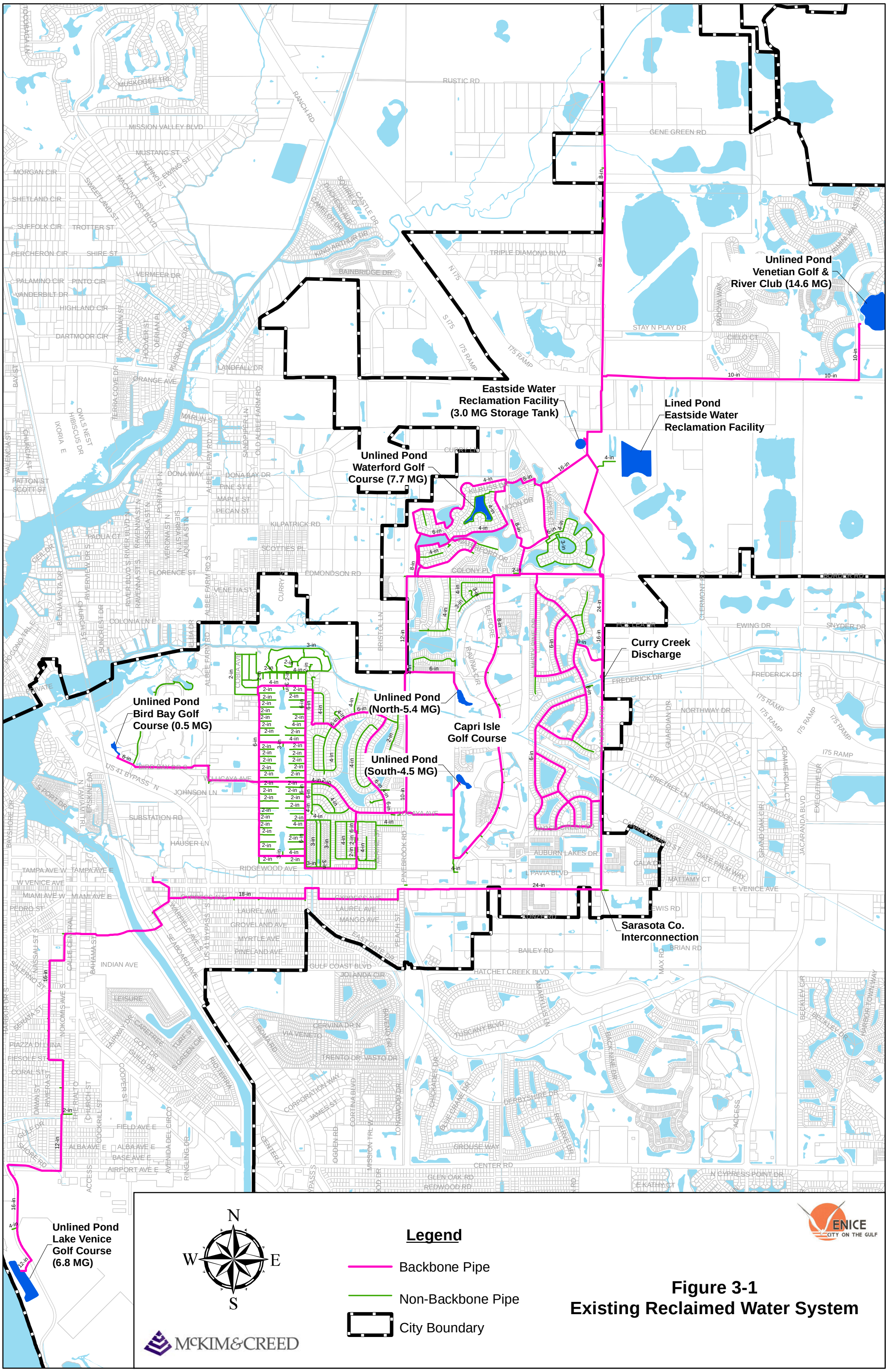


Figure 3-1
Existing Reclaimed Water System

McKIM&CREED
378 Interstate Court
Sarasota, Florida 34240
Phone: (941)379-3404, Fax: (941)379-3530
EB0006691
www.mckimcreed.com

VENICE
CITY ON THE GULF

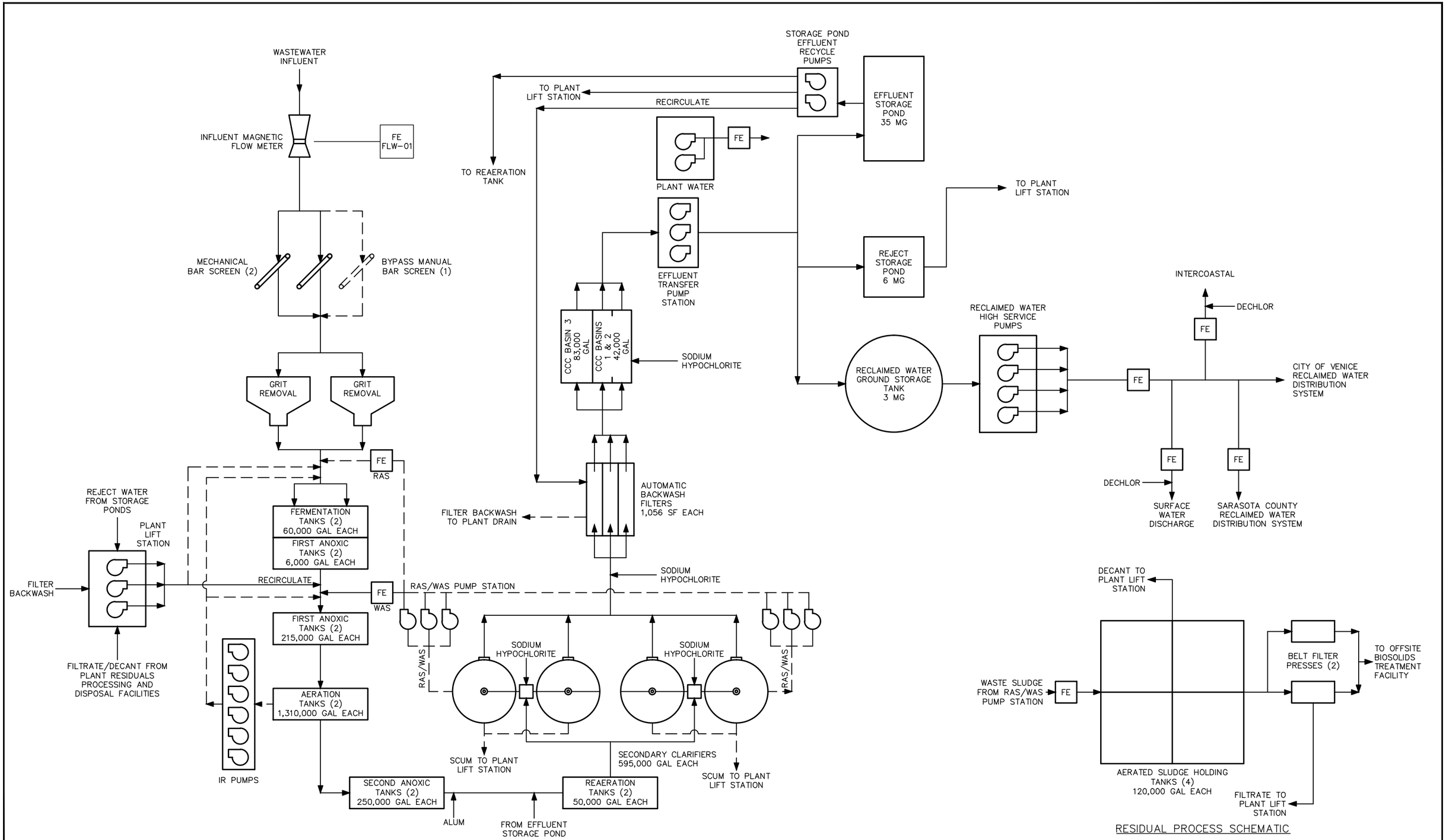
CITY OF VENICE
RECLAIMED WATER MASTER PLAN

EASTSIDE WRF GENERAL SITE PLAN

OCTOBER 2012

FIGURE 3-2

S:\5883\0002\20-Tech\Reports\TM #1\Figures for Markup\Figure 3-2.dwg, 10/16/2012 1:44:02 PM, Blake Peters



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VENICE CITY ON THE GULF

CITY OF VENICE
RECLAIMED WATER MASTER PLAN

EASTSIDE WRF PROCESS FLOW SCHEMATIC

OCTOBER 2012

FIGURE 3-3

S:\5683\0002\20-Tech\Reports\TM #1\Figures for Markup\Figure 3-3.dwg, 10/16/2012 9:02:17 AM, Samantha Jones

Reclaimed water is stored in either a 3 million gallon above-ground concrete storage tank or a 35-million gallon on-site lined storage pond. The City has the option to filter and disinfect the water stored in the pond by returning flow to the beginning of the biological process prior to sending it into the reclaimed water distribution system. Water is returned from the pond for treatment because the algal content of RCW can be substantial and cause problems in the downstream irrigation system if not removed. For disposal, the City has two permitted reclaimed water systems and two surface water discharge points. Substandard effluent is diverted to a 6 million gallon clay-lined reject pond where it can be returned to the plant lift station via gravity. The main reclaimed water system elements in the WRF are; the reclaimed water pumps (high service), the ground level storage tank, the lined reclaimed water storage pond, and the reclaimed water pond return pumps. These facilities are shown in **Table 3-1.**

Table 3-1: Eastside WRF Equipment

Equipment	Quantity	Size/Type
RCW Pumps	4	Flowserve 9LR14A 2,780 gpm each
Covered Tank	1	3 MG
Lined Pond	1	35 MG
Pond Return Pumps	2	Hydromatic S4L 500 gpm each

The City operates the WRF under a permit issued by the Florida Department of Environmental Protection, Permit Number FL0041441. The new WRF permit was issued on December 12, 2011 and has an expiration date of December 11, 2016. A copy of the permit is provided in **Appendix D.**

The reclaimed water storage tank supplies the high service reclaimed water pump station which can discharge into the reclaimed water system and bulk stormwater storage lakes (ponds) or the surface water discharge locations summarized in **Table 1-1.**

3.2 Reclaimed Water Distribution Piping System

The piping system that delivers the reclaimed water is a series of pipes ranging in size from 24 inches down to 2 inches. For purposes of the Master Plan, the reclaimed water system pipes that are over 4 inches and part of the distribution system backbone are incorporated into the system hydraulic model to evaluate the system at its current capacity and under future flow scenarios. Pipe size and quantity information on the main, or backbone, system is provided in **Table 3-2**.

Table 3-2: Piping Information

Pipe Size (in.)	Pipe Length (ft.)	Contribution (%)
4	12,442	5.04
6	51,240	38.85
8	31,586	14.39
10	8,473	0.72
12	14,378	7.19
16	20,018	12.95
18	8,390	9.35
20	37	0.72
24	17,749	10.79

3.3 Reclaimed Water Delivery Control Devices

At each major exit point from the reclaimed water system, a control device exists. These control devices allow for the maintenance of acceptable pressures in the system while allowing reclaimed water to flow to either a bulk user, Sarasota County's reclaimed water system, or a surface water discharge location. Individual users, or those communities behind bulk meters that do not have storage ponds, operate at available line pressure where the control is the actual irrigation system controls for the sprinkler assemblies. **Table 3-3** identifies the bulk delivery system control devices and indicates the type equipment as well as the presence of telemetry for monitoring specific conditions.

Table 3-3: Delivery System Control Devices

Bulk User	Control Devices
Bird Bay	• Pressure Sustaining Valve (Below Grade)
	• Mechanical Flow Meter
	• Mechanical High Level Shut Off Float
	• Solar Powered Telemetry for storm pond overflow level
Capri Isles North and South	• Pressure Sustaining Valve (Below Grade)
	• Mechanical Flow Meter
	• Mechanical High Level Shut Off Float
	• Solar Powered Telemetry for storm pond overflow level
Lake Venice	• Pressure Sustaining Valve (Above Grade)
	• Magnetic Flow Meter
	• Mechanical High Level Shut Off Float
	• Telemetry for flow, pressure and pond overflow level
Venetian Golf and River Club	• Pressure Sustaining Valve (Above Grade)
	• Mechanical Flow Meter
	• Mechanical High Level Shut Off Float
	• No Telemetry
Waterford	• Pressure Sustaining Valve (Below Grade)
	• Mechanical Flow Meter
	• Mechanical High Level Shut Off Float
	• No Telemetry
Curry Creek Surface Discharge	• Pressure Sustaining Valve (Below Grade)
	• Magnetic Flow Meter
	• Manually Close Discharge Valves
	• Telemetry for stream flow rate, pressure, chlorine level, and redox level
	• Sulfur Dioxide Cylinder During Discharge
Sarasota County Interconnect	• 2 Motorized Valves
	• 2 Magnetic Flow Meters
	• 2 Isolation Valves
	• Telemetry for flow and pressure
RO Concentrate Discharge Connection	• Pressure Sustaining Valve (Above Grade)
	• Magnetic Flow Meter
	• Telemetry
	• Pressure, chlorine level, and redox level

3.4 Bulk User Storage Ponds

The reclaimed water system bulk user ponds include ponds that appear in the City WRF permit and isolated ponds at the bulk user locations. There are a total of six (6) ponds for a volume of 39.5 million gallons of user storage. These ponds are identified in **Table 3-4**. Ponds labeled with an asterisk in the Table have storm system overflow structures that, under times of heavy precipitation, would flow into the central storm drainage system resulting in a surface discharge.

Table 3-4: Bulk User Ponds

Storage Type	Name	Volume (mg)
Unlined Pond	Lake Venice Golf Course[1]	6.8
Unlined Pond	Venetian Golf and River Club	14.6
Unlined Pond	Waterford Golf Course	7.7
Unlined Pond	Capri Isle Golf Course North[1]	5.4
Unlined Pond	Capri Isle Golf Course South[1]	4.5
Unlined Pond	Bird Bay Golf Course[1]	0.5

1. Pond discharges to Surface Waters of the State

3.5 System Evaluation

The effluent storage components, major pumping components and delivery system components are summarized with their relative ages (where available) and general conditions in **Tables 3-5** and **3-6**. Photographs of each major component are provided in **Appendix E**.

Table 3-5: Effluent Storage

Unit	Qty.	Capacity	Year Installed	Life Expectancy
RCW GST	1	3 mg	1990	50
RCW Lined Pond	1	35 mg	1990	50
Reject Lined Pond	1	6 mg	2001	50

Table 3-6: Effluent Pumping Major Equipment Summary

Unit	Qty.	Mfg	Model	Flow (gpm/ each)	Head (ft)	Year	Life Exp (years)
RCW Pumps (High Service)	4	Ingersoll-Dresser	8LR14A	2,780	150	2002	20
Effluent Transfer Pumps	3	Ingersoll-Dresser	18 ENH-1	1,200	54	2002	20
Storage Pond Recycle Pumps	2	Hydromatic	S4L	500	-	2002	20

The effluent pumping mechanical equipment has been listed to be in a "Good" general condition in the latest O&M Report. It should be noted that the City is not able to take the 3 MG ground storage tank out of service without taking the complete reuse system off-line. As such, the City is considering the installation of a second ground storage tank with a capacity of 7.5 MG. Recently the City had the ground storage tank inspected by the original manufacturer. The inspection recommended routine repairs both externally and internally to the tank. The City had the external repairs completed as they could be undertaken without taking the tank out of services. Once the second ground storage tank is completed, interior work on the existing tank can be completed. Due to requirement for system reliability, the second ground storage tank is recommended. Data on the age of the bulk user delivery systems was not available for this analysis.

The systems were installed in many cases with the initial developments and their irrigation system improvements. Record plans were not available and, when

contacted, the owners agents were not able to provide additional information. These systems are relatively similar to each other with the main differences being location above grade or below, and the degree of telemetry at the sites. General statements regarding the delivery system and their condition are provided in **Table 3-7**.

Table 3-7: Delivery System Devices Conditions Summary

User	Location	Equipment	Condition
Bird Bay	Underground (in vault) Above ground	Pressure Sus. Valve Mechanical Meter Mechanical Float Telemetry	Poor Poor Good Good
Capri Isles North	Underground (in vault) Above ground	Pressure Sus. Valve Mechanical Meter Mechanical Float Telemetry	Poor Poor Good Good
Capri Isles South	Underground (in vault) Above ground	Pressure Sus. Valve Mechanical Meter Mechanical Float Telemetry	Poor Poor Good Good
Lake Venice	Above ground	Pressure Sus. Valve Magnetic Meter Mechanical Float Telemetry	Good Good Good Good
Venetian Golf & River Club	Above ground	Pressure Sus. Valve Mechanical Meter Mechanical Float Telemetry	Good Good Good Good
Waterford	Underground (in vault)	Pressure Sus. Valve Mechanical Meter Mechanical Float	Poor Poor Good

Table 3-7: Delivery System Devices Conditions Summary (Continued)

User	Location	Equipment	Condition
Curry Creek Surface Discharge	Underground (in vault) Above ground	Pressure Sus. Valve Mechanical Meter Chem. feed system Telemetry	Good Good Good Good
Sarasota County Interconnection	Above ground	Press Sus. Valves Magnetic Meters Isolation Valves Telemetry	Good Good Good Good
RO Concentrate Discharge Connection	Above ground	Pressure Sus. Valve Magnetic Meter Chem Feed System Telemetry	Good Good Good Good

Reported poor conditions generally relate to the equipment being located in below grade vaults subject to flooding and continuous exposure to water. This equipment will have significantly reduced life and possess potential safety issues due to need for confined space entry to make repairs and in some cases read mechanical meters.

4.0 POTENTIAL RECLAIMED WATER USERS AND APPLICATION SITES

4.1 Individual and Bulk Users

Existing users of reclaimed water consist of individual and bulk users. Individual users include residential units, commercial and industrial facilities, and development master meters. In 2011 individual user annual average demand was 1.31 mgd. Individual user demands was assumed to be held constant at this flow throughout the planning period with growth coming from new users as discussed in **Section 4-3**.

The bulk users are golf course facilities that appear in the City's Eastside WRF operating permit along with the isolated ponds at the bulk user locations. There are a total of 6 ponds for a volume of 39.5 million gallons of system storage. The annual average demand from the bulk users are provided in **Table 4-1** below. All bulk users received less flow than the permitted capacity in 2011. The unused capacity averaged 276,000 gpd. It was assumed the flow provided to the bulk users will equal their permitted capacity in future planning periods in Scenario 1.

Table 4-1: Available Bulk User Capacity

Customer	Year	Permitted Capacity (gpd)	Annual Average Reclaimed Water Provided (gpd)	Unused Capacity (gpd)
Bird Bay	2011	110,000	82,000	28,000
Capri Isles North and South	2011	200,000	129,000	71,000
Waterford	2011	230,000	217,000	13,000
Venetian Golf and River Club	2011	400,000	301,000	99,000
Lake Venice	2011	410,000	345,000	65,000
Total		**1,350,000**	**1,074,000**	**276,000**

The permitted irrigation application rate for each bulk user varies as shown in **Table 4-1**. All but Bird Bay are permitted for less than 1-inch per week. Modifying the application rate to 1-inch per week for all bulk users will produce an additional 1,186,810 gpd of reclaimed water demand as shown on **Table 4-2**. A site specific feasibility study is recommended to confirm use of a 1-inch per week application rate and determine the actual maximum rate each site can accept. Even on a site by site basis the potential increase in demand from a single bulk user site is significant. All of the bulk users except Waterford have historically used groundwater wells to augment the RCW supply.

The reclaimed water generated by incoming wastewater flow from Sarasota County was assumed to be used to support the increased demands from these bulk users as specified in Scenario 2. The additional reclaimed water demand from the bulk users is not anticipated to be fully met by the current and projected levels of wastewater flow received from Sarasota County as shown on **Figure 2-2**. Scenario 2 could be modified to allow the City to phase increased reclaimed water to bulk users based on the amount of wastewater provided by Sarasota County. A potential negative to this scenario is that wastewater flow from Sarasota County could potentially decrease or stop due to an operational change by the County.

Table 4-2: Bulk User Capacity

Bulk Users	Permitted		Potential Revised Permit	
	Application Rate (in/week)	Capacity (gpd)	Application Rate (in/week)	Capacity (gpd)
Bird Bay	1.05	110,000	1.00	104,731
Capri Isles North and South	0.20	200,000	1.00	329,708
Lake Venice	0.41	410,000	1.00	775,783
Venetian Golf and River Club	0.40	400,000	1.00	899,908
Waterford	0.23	230,000	1.00	426,681
Total	**2.29**	**1,350,000**	**5.00**	**2,536,810**

4.2 Potential Reclaimed Water Users

Future reclaimed water demand is anticipated to be heavily weighted in the northeast area of the City within the planning and JPA areas. Smaller areas, such as parks and medians, are not projected to use large quantities of reclaimed water but were identified due to the benefits they provide to the general public at large. The goal of identifying potential future users was to provide a mix of these general public beneficial uses of reclaimed water while meeting the City's future reclaimed water disposal needs.

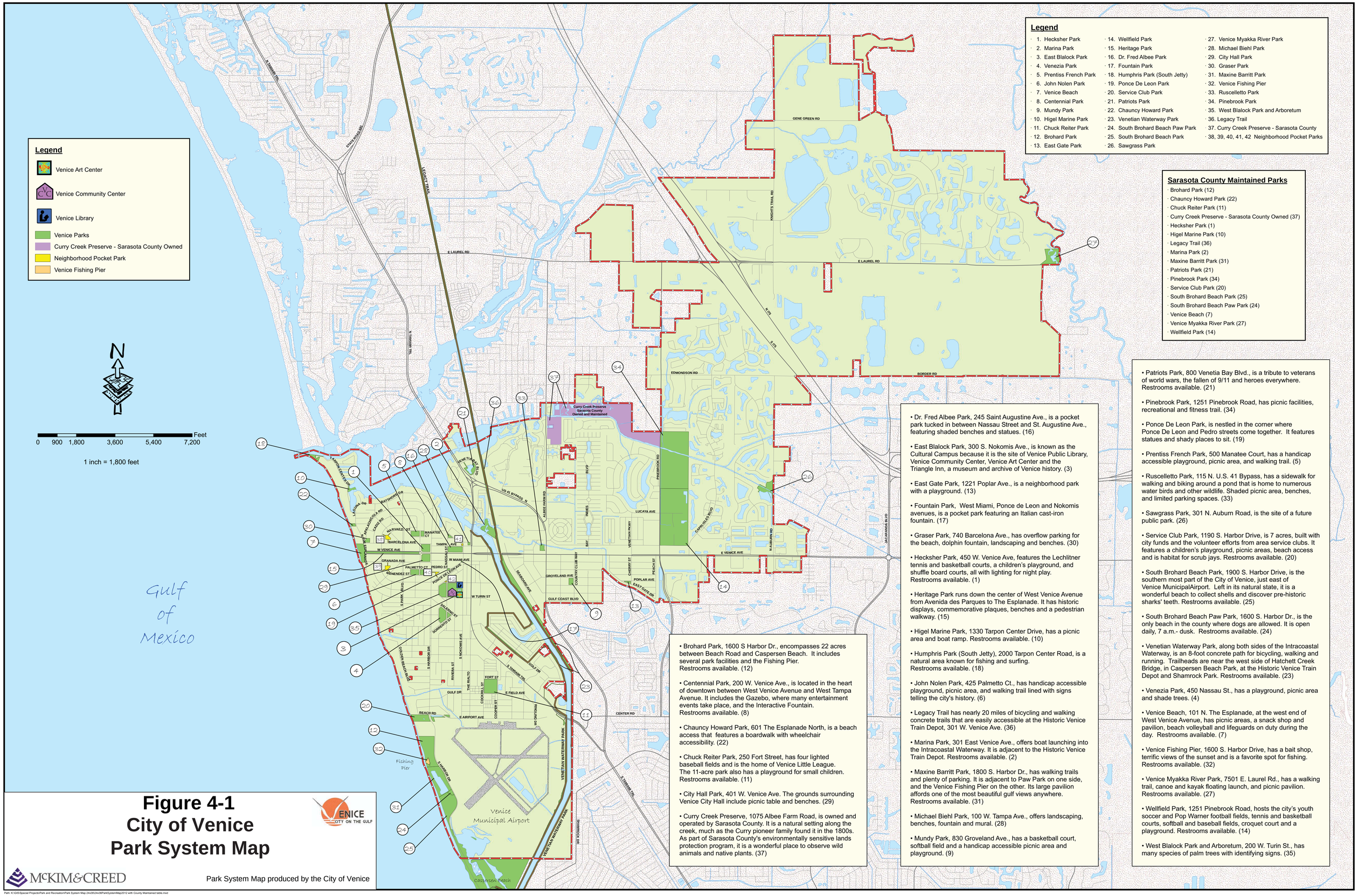
4.2.1 Parks

The City of Venice park system consists of 42 total parks as shown in **Figure 4-1.** Seventeen of these parks are County maintained and 5 are neighborhood pocket parks. Only parks maintained by the City of Venice were considered to be candidates for potential reclaimed water users. Pocket parks were eliminated due to their small size and limited cost effectiveness for utilizing reclaimed water. Parks immediately adjacent or relatively close to an existing reclaimed

water main were identified as potential users. There are several segments of abandoned force main and reclaimed water main "dry lines" of various diameters that could potentially be connected and converted into the reclaimed water system. Parks adjacent to the dry lines were also identified as potential users. A total of 13 parks were selected as future potential reclaimed water user sites and are shown in **Figure 4-2** and summarized in **Table 4-3** along with their projected reclaimed water demand. Medians and other public lands are discussed in the following sections but shown on **Figure 4-2**.

Table 4-3: Scenario 1 - Park Demand Summary (0.5-Inches/Week Application)

Park	Irrigable Demand (gpd)
Prentiss French Park	4,005
Heritage Park	5,220
City Hall Park	1,794
John Nolen Park	4,047
West Blalock Park and Arboretum	5,997
East Blalock Park	6,135
Venezia Park	6,762
Ponce De Leon Park	167
Centennial Park	2,253
Dr. Fred Albee Park	603
Michael Biehl Park	178
Ruscelletto Park	698
Venetian Waterway Park	30,954
Total	**68,814**



Legend

1. Hecksher Park
2. Marina Park
3. East Blalock Park
4. Venezia Park
5. Prentiss French Park
6. John Nolen Park
7. Venice Beach
8. Centennial Park
9. Mundy Park
10. Higel Marine Park
11. Chuck Reiter Park
12. Brohard Park
13. East Gate Park
14. Wellfield Park
15. Heritage Park
16. Dr. Fred Albee Park
17. Fountain Park
18. Humphris Park (South Jetty)
19. Ponce De Leon Park
20. Service Club Park
21. Patriots Park
22. Chauncy Howard Park
23. Venetian Waterway Park
24. South Brohard Beach Paw Park
25. South Brohard Beach Park
26. Sawgrass Park
27. Venice Myakka River Park
28. Michael Biehl Park
29. City Hall Park
30. Graser Park
31. Maxine Barritt Park
32. Venice Fishing Pier
33. Ruscelletto Park
34. Pinebrook Park
35. West Blalock Park and Arboretum
36. Legacy Trail
37. Curry Creek Preserve - Sarasota County
38, 39, 40, 41, 42 Neighborhood Pocket Parks

Sarasota County Maintained Parks

- Brohard Park (12)
- Chauncy Howard Park (22)
- Chuck Reiter Park (11)
- Curry Creek Preserve - Sarasota County Owned (37)
- Hecksher Park (1)
- Higel Marine Park (10)
- Legacy Trail (36)
- Marina Park (2)
- Maxine Barritt Park (31)
- Patriots Park (21)
- Pinebrook Park (34)
- Service Club Park (20)
- South Brohard Beach Park (25)
- South Brohard Beach Paw Park (24)
- Venice Beach (7)
- Venice Myakka River Park (27)
- Wellfield Park (14)

• Patriots Park, 800 Venetia Bay Blvd., is a tribute to veterans of world wars, the fallen of 9/11 and heroes everywhere. Restrooms available. (21)

• Pinebrook Park, 1251 Pinebrook Road, has picnic facilities, recreational and fitness trail. (34)

• Ponce De Leon Park, is nestled in the corner where Ponce De Leon and Pedro streets come together. It features statues and shady places to sit. (19)

• Prentiss French Park, 500 Manatee Court, has a handicap accessible playground, picnic area, and walking trail. (5)

• Ruscelletto Park, 115 N. U.S. 41 Bypass, has a sidewalk for walking and biking around a pond that is home to numerous water birds and other wildlife. Shaded picnic area, benches, and limited parking spaces. (33)

• Sawgrass Park, 301 N. Auburn Road, is the site of a future public park. (26)

• Service Club Park, 1190 S. Harbor Drive, is 7 acres, built with city funds and the volunteer efforts from area service clubs. It features a children's playground, picnic areas, beach access and is habitat for scrub jays. Restrooms available. (20)

• South Brohard Beach Park, 1900 S. Harbor Drive, is the southern most part of the City of Venice, just east of Venice MunicipalAirport. Left in its natural state, it is a wonderful beach to collect shells and discover pre-historic sharks' teeth. Restrooms available. (25)

• South Brohard Beach Paw Park, 1600 S. Harbor Dr., is the only beach in the county where dogs are allowed. It is open daily, 7 a.m.- dusk. Restrooms available. (24)

• Venetian Waterway Park, along both sides of the Intracoastal Waterway, is an 8-foot concrete path for bicycling, walking and running. Trailheads are near the west side of Hatchett Creek Bridge, in Caspersen Beach Park, at the Historic Venice Train Depot and Shamrock Park. Restrooms available. (23)

• Venezia Park, 450 Nassau St., has a playground, picnic area and shade trees. (4)

• Venice Beach, 101 N. The Esplanade, at the west end of West Venice Avenue, has picnic areas, a snack shop and pavilion, beach volleyball and lifeguards on duty during the day. Restrooms available. (7)

• Venice Fishing Pier, 1600 S. Harbor Drive, has a bait shop, terrific views of the sunset and is a favorite spot for fishing. Restrooms available. (32)

• Venice Myakka River Park, 7501 E. Laurel Rd., has a walking trail, canoe and kayak floating launch, and picnic pavilion. Restrooms available. (27)

• Wellfield Park, 1251 Pinebrook Road, hosts the city's youth soccer and Pop Warner football fields, tennis and basketball courts, softball and baseball fields, croquet court and a playground. Restrooms available. (14)

• West Blalock Park and Arboretum, 200 W. Turin St., has many species of palm trees with identifying signs. (35)

• Brohard Park, 1600 S Harbor Dr., encompasses 22 acres between Beach Road and Caspersen Beach. It includes several park facilities and the Fishing Pier. Restrooms available. (12)

• Centennial Park, 200 W. Venice Ave., is located in the heart of downtown between West Venice Avenue and West Tampa Avenue. It includes the Gazebo, where many entertainment events take place, and the Interactive Fountain. Restrooms available. (8)

• Chauncy Howard Park, 601 The Esplanade North, is a beach access that features a boardwalk with wheelchair accessibility. (22)

• Chuck Reiter Park, 250 Fort Street, has four lighted baseball fields and is the home of Venice Little League. The 11-acre park also has a playground for small children. Restrooms available. (11)

• City Hall Park, 401 W. Venice Ave. The grounds surrounding Venice City Hall include picnic table and benches. (29)

• Curry Creek Preserve, 1075 Albee Farm Road, is owned and operated by Sarasota County. It is a natural setting along the creek, much as the Curry pioneer family found it in the 1800s. As part of Sarasota County's environmentally sensitive lands protection program, it is a wonderful place to observe wild animals and native plants. (37)

• Dr. Fred Albee Park, 245 Saint Augustine Ave., is a pocket park tucked in between Nassau Street and St. Augustine Ave., featuring shaded benches and statues. (16)

• East Blalock Park, 300 S. Nokomis Ave., is known as the Cultural Campus because it is the site of Venice Public Library, Venice Community Center, Venice Art Center and the Triangle Inn, a museum and archive of Venice history. (3)

• East Gate Park, 1221 Poplar Ave., is a neighborhood park with a playground. (13)

• Fountain Park, West Miami, Ponce de Leon and Nokomis avenues, is a pocket park featuring an Italian cast-iron fountain. (17)

• Graser Park, 740 Barcelona Ave., has overflow parking for the beach, dolphin fountain, landscaping and benches. (30)

• Hecksher Park, 450 W. Venice Ave, features the Lechlitner tennis and basketball courts, a children's playground, and shuffle board courts, all with lighting for night play. Restrooms available. (1)

• Heritage Park runs down the center of West Venice Avenue from Avenida des Parques to The Esplanade. It has historic displays, commemorative plaques, benches and a pedestrian walkway. (15)

• Higel Marine Park, 1330 Tarpon Center Drive, has a picnic area and boat ramp. Restrooms available. (10)

• Humphris Park (South Jetty), 2000 Tarpon Center Road, is a natural area known for fishing and surfing. Restrooms available. (18)

• John Nolen Park, 425 Palmetto Ct., has handicap accessible playground, picnic area, and walking trail lined with signs telling the city's history. (6)

• Legacy Trail has nearly 20 miles of bicycling and walking concrete trails that are easily accessible at the Historic Venice Train Depot, 301 W. Venice Ave. (36)

• Marina Park, 301 East Venice Ave., offers boat launching into the Intracoastal Waterway. It is adjacent to the Historic Venice Train Depot. Restrooms available. (2)

• Maxine Barritt Park, 1800 S. Harbor Dr., has walking trails and plenty of parking. It is adjacent to Paw Park on one side, and the Venice Fishing Pier on the other. Its large pavilion affords one of the most beautiful gulf views anywhere. Restrooms available. (31)

• Michael Biehl Park, 100 W. Tampa Ave., offers landscaping, benches, fountain and mural. (28)

• Mundy Park, 830 Groveland Ave., has a basketball court, softball field and a handicap accessible picnic area and playground. (9)

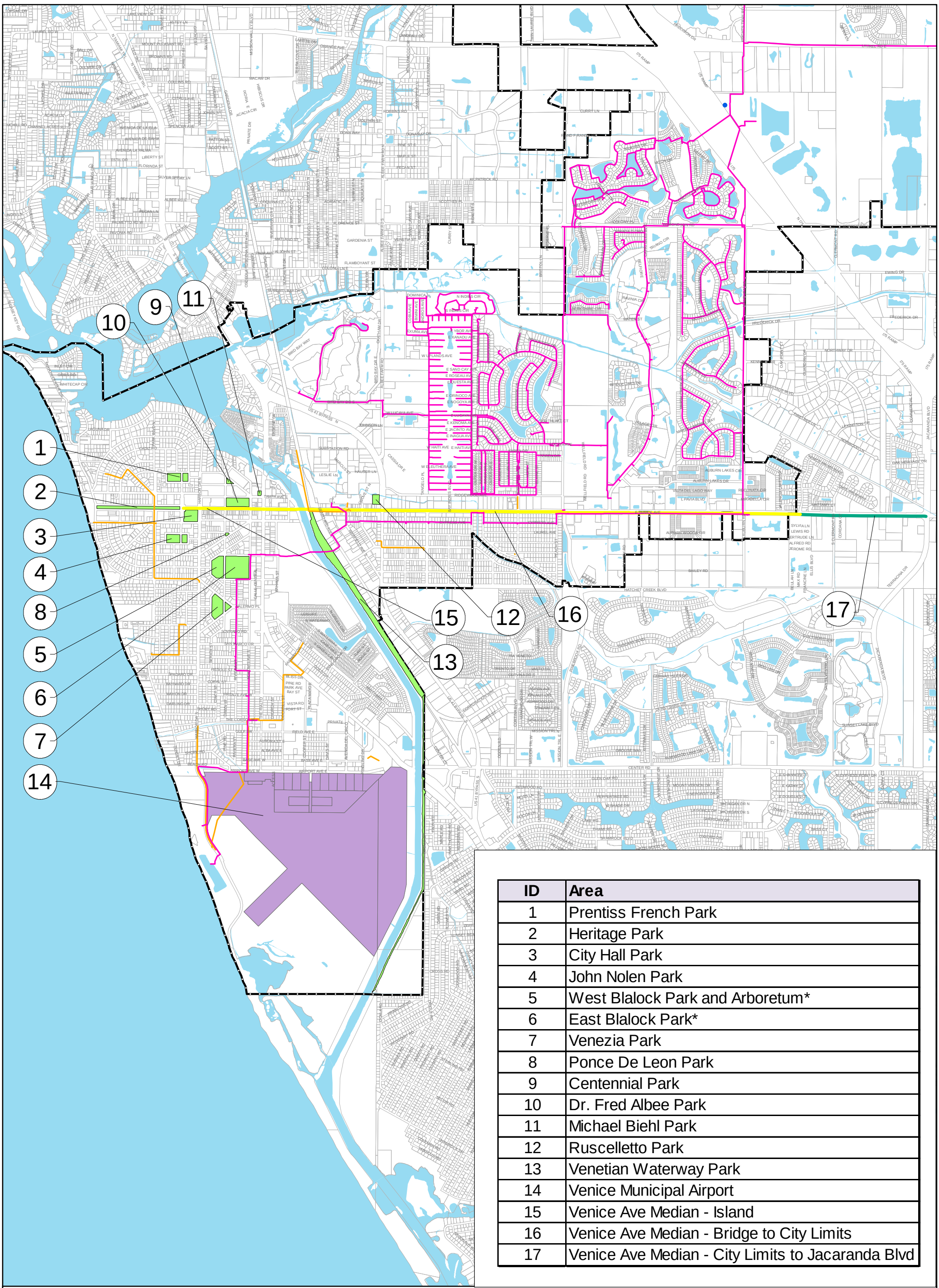
Figure 4-1
City of Venice
Park System Map

VENICE CITY ON THE GULF

McKIM&CREED

Park System Map produced by the City of Venice

Path: K:\GIS\Special Projects\Park and Recreation\Park System Map 24x36\24x36ParkSystemMap2012 with County Maintained table.mxd



ID	Area
1	Prentiss French Park
2	Heritage Park
3	City Hall Park
4	John Nolen Park
5	West Blalock Park and Arboretum*
6	East Blalock Park*
7	Venezia Park
8	Ponce De Leon Park
9	Centennial Park
10	Dr. Fred Albee Park
11	Michael Biehl Park
12	Ruscelletto Park
13	Venetian Waterway Park
14	Venice Municipal Airport
15	Venice Ave Median - Island
16	Venice Ave Median - Bridge to City Limits
17	Venice Ave Median - City Limits to Jacaranda Blvd

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Legend

- Existing Reclaimed Pipe
- Existing Dry Lines
- City of Venice Median
- Sarasota County Median
- City of Venice Parks
- Government Use
- City Boundary

McKIM&CREED

VENICE CITY ON THE GULF

Figure 4-2
Potential Reclaimed Water Users
Parks and Public Areas

Table 4-4: Scenario 2 - Park Demand Summary (1-Inch/Week Application)

Park	Irrigable Demand (gpd)
Prentiss French Park	8,010
Heritage Park	10,440
City Hall Park	3,589
John Nolen Park	8,094
West Blalock Park and Arboretum	11,993
East Blalock Park	12,271
Venezia Park	13,525
Ponce De Leon Park	334
Centennial Park	4,507
Dr. Fred Albee Park	1,206
Michael Biehl Park	356
Ruscelletto Park	1,396
Venetian Waterway Park	61,907
Total	**137,628**

4.2.2 Medians

The East Venice Avenue median is along a major roadway within the City and observed by residents as well as tourists. The beautification of the median by providing irrigation with reclaimed water was identified, by City staff, as a priority for the benefit of the overall public. The areas of the Venice Avenue median identified to be irrigated with reclaimed water consist of three segments: Venice Island, Venice Bridge to the eastern City limit, and from the eastern City limit east to Jacaranda Circle. These three areas are shown on **Figure 4-2** and summarized in **Tables 4-5 and 4-6**.

Table 4-5: Scenario 1 - Median Demand Summary (0.5-Inches/Week Application)

Median Segment	Irrigable Acreage (sf)	Reclaimed Water Demand (gpd)
Venice Island	49,000	2,200
Venice Bridge to City Limits	145,900	6,500
City limits to Jacaranda Circle	63,700	2,900
Total	**258,600**	**11,600**

Table 4-6: Scenario 2 - Median Demand Summary (1-Inch/Week Application)

Median Segment	Irrigable Acreage (sf)	Reclaimed Water Demand (gpd)
Venice Island	49,000	4,400
Venice Bridge to City Limits	145,900	13,000
City limits to Jacaranda Circle	63,700	5,800
Total	**258,600**	**23,200**

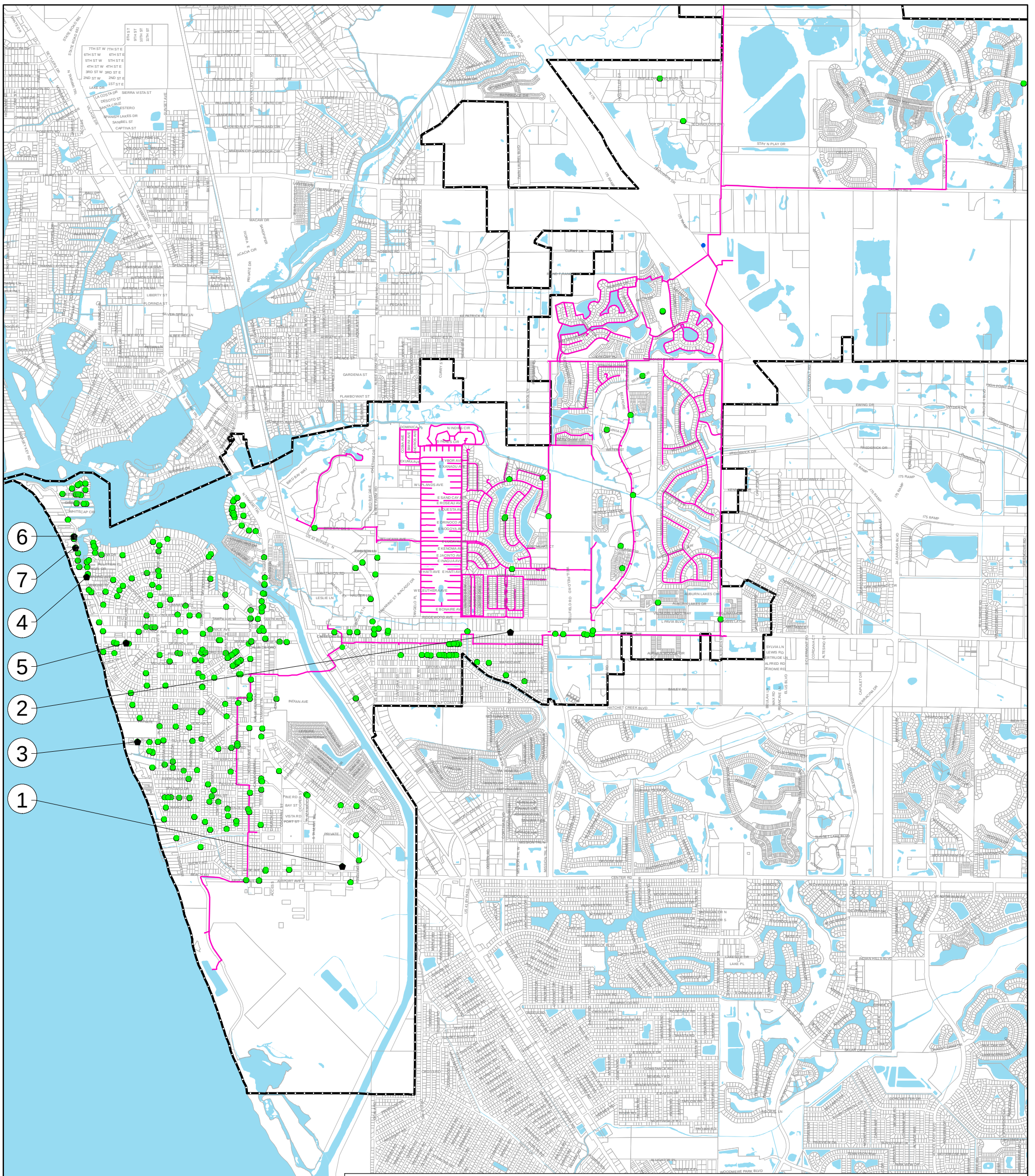
4.2.3 Large Potable Irrigation Users

Users of potable water for irrigation were investigated to determine the number of users, location and demands. **Table 4-7** lists the total potable water irrigation demand from 2009 to 2011. The demands have increased on average 10.5% per year during this three year period. Meter data for 2011 was sorted to identify the users with the most demand and determine their location within the City. **Figure 4-3** shows the locations of the potable water irrigation meters and lists the users with AADF greater than 2,000 gpd. Switching potable water users to reclaimed water provides the additional benefit of reducing potable water demand. Review of **Figure 4-3** shows that the irrigation meters are fairly well spread out throughout the City and not particularly concentrated in any one area. Because of this, only the 7 users with AADF greater than 2,000 gpd were targeted to connect to the reclaimed water system. Users with smaller flows are

less cost effective but opportunities to switch large groups of users from potable to reclaimed water irrigation remains as a possibility. There appears to be several potable water irrigation meters immediately adjacent to existing RCW mains. Some of these users may be subject to conversion to RCW irrigation since the City of Venice Code Section 74-196(b) makes it unlawful to use potable water for irrigation purposes after RCW is available. None of these small potable water irrigation users were assumed to contribute to future demands but the City may want to investigate their conversion to RCW. Based on the close proximity of large potable water irrigation meters to an existing or proposed reclaimed water main, only two large potable water irrigation users were identified as potential reclaimed water users. The locations and demands of these users are provided in **Figure 2-1** and **Table 2-11** respectively.

Table 4-7: Historical Potable Water Irrigation Demand

Year	Total Usage (gal/mo)	Total Usage (gpd)	Total Rainfall (in)
2009	42,875,369	1,409,947	57.8
2010	46,759,922	1,535,348	52.0
2011	52,497,146	1,727,541	46.0
Average	**47,377,479**	**1,557,612**	**51.9**



ID	Address	Yearly Demand (gal)	ADF (gpd)
1	1200 AVENIDA DEL CIRCO	2,580,759	7,071
2	1306 E VENICE AV	2,421,180	6,633
3	624 FLAMINGO DR	1,125,770	3,084
4	811 N THE ESPLANADE	1,048,343	2,872
5	700 GRANADA AV	995,622	2,728
6	1205 TARPON CENTER DR	767,564	2,103
7	1100 TARPON CENTER DR	757,940	2,077

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Legend

Potable Irrigation High Users

Potable Irrigation Meter

Existing Reclaimed Pipe

City Boundary

VENICE CITY ON THE GULF

Figure 4-3
Existing Potable Water Irrigation Meters

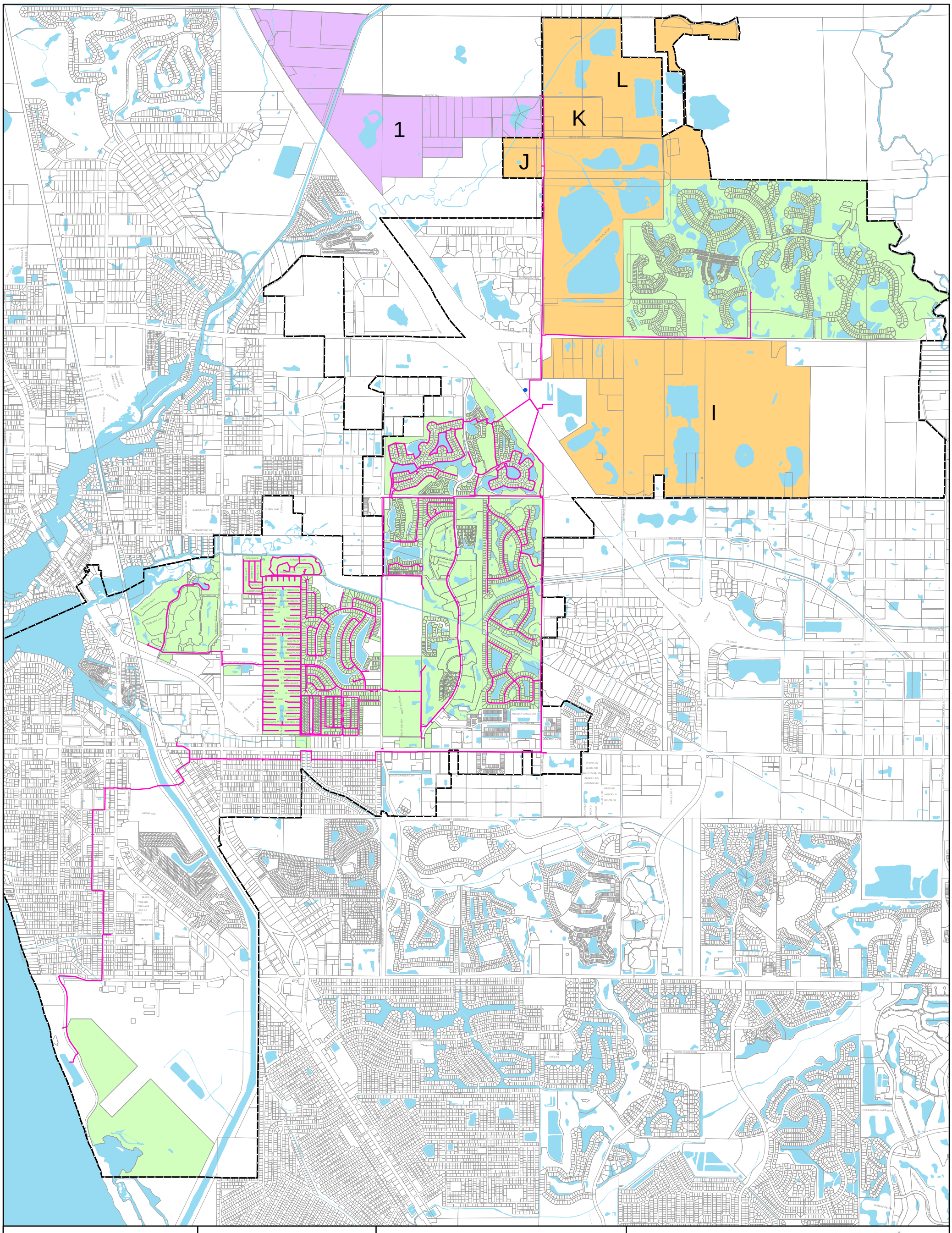
4.2.4 Future Land Development Areas

Future reclaimed water demand is anticipated to be heavily weighted in the northeast area of the City, within the planning and JPA areas, where a majority of the City's future growth is located. Supplying reclaimed water to the future land development areas is anticipated to be more economical than retrofitting existing developed areas within the City. Per the City of Venice Code of Ordinances, development in these areas will be required to connect to the City's reclaimed water system if it is available. Availability is defined as within 100 feet of the property.

Planning area I, J, K, and L and JPA area 1 were identified as potential future reclaimed water users based on their proximity to the existing reclaimed water main (See **Figure 4-4**). The rate of development within these planning areas was assumed to be in accordance with the City of Venice Wastewater Master Plan. **Table 4-8** summarizes the percent developed by planning period. The irrigation demands for each planning period were therefore determined by applying these percentages to the irrigable acreage at build out then applying the application rate of 0.5-inches or 1.0-inch per week based on the applicable scenario (See **Table 4-9** and **4-10**).

Table 4-8: Development Percentage per Planning Year

Area	Planning Year			
	2015	2020	2025	2030
Planning Areas	35.1%	37.3%	39.4%	41.3%
JPA Areas	3.0%	6.1%	9.2%	11.9%



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Planning Areas

I - South Laurel
J - Shakett Creek
K - Knights Trail
L - Gene Green

JPA/ILSBA Area

1 - Rustic Rd

Legend

- Existing Reclaimed Pipe
- Planning Area
- JPA/ILSBA Area
- Existing Service Area
- City Boundary

VENICE CITY ON THE GULF

Figure 4-4
Potential Reclaimed Water Users Future Land Development

Table 4-9: Scenario 1 - Planning and JPA Area Potential Irrigation Demand Summary

Planning and JPA Areas[1]		Irrigable Demand Per Planning Year (gpd)			
		2015	2020	2025	2030
I	South Laurel	109,584	219,169	328,753	438,376
J	Shakett Creek	4,784	9,569	14,353	19,139
K	Knights Trail (Subarea 1)	16,368	32,735	49,103	65,476
	Knights Trail (Subarea 1)	48,903	97,806	146,709	195,630
	Knights Trail (Subarea 1)	238	476	714	953
	Knights Trail (Subarea 1)	8,776	17,552	26,328	35,108
L	Gene Green	34,396	68,792	103,188	137,597
1	Knights Trail Park Area (Rustic Rd)	17,291	34,910	52,028	67,856
Total		**240,341**	**481,010**	**721,177**	**960,134**

1. City of Venice planning and JPA area designations

Table 4-10: Scenario 2 - Planning and JPA Area Potential Irrigation Demand Summary

Planning and JPA Areas[1]		Irrigable Demand Per Planning Year (gpd)			
		2015	2020	2025	2030
I	South Laurel	219,169	438,337	657,506	876,752
J	Shakett Creek	9,569	19,137	28,706	38,278
K	Knights Trail (Subarea 1)	32,735	65,470	98,206	130,952
	Knights Trail (Subarea 1)	97,735	195,613	293,419	391,260
	Knights Trail (Subarea 1)	476	953	1,429	1,905
	Knights Trail (Subarea 1)	17,552	35,105	52,657	70,215
L	Gene Green	68,792	137,584	206,377	275,193
1	Knights Trail Park Area (Rustic Rd)	34,582	69,820	104,056	135,713
Total		**480,610**	**962,019**	**1,442,356**	**1,920,268**

1. City of Venice planning and JPA area designations

4.3 Alternative Disposal Sites

The City of Venice has several options for disposing of reclaimed water other than the existing and potential users discussed previously. These options were not projected for the disposal of reclaimed water for planning purposes but they remain as viable disposal options should they be required.

Reclaimed water up to the 2.5 mgd may be sent to the County in accordance with the Eastside WRF operating permit and interagency agreement. This capacity is generally reserved for cases of unusually high adverse weather related flow. Reclaimed water sent to Sarasota County is understood to generally be sent to the Venice Gardens Deep Injection Well. The Eastside WRF operating permit also allows for blending reclaimed water with RO concentrate, up to 1 mgd, prior to discharge at the outfall and the Curry Creek surface discharge location may be used, up to 3.0 mgd, as long as effluent is treated to advanced wastewater treatment levels. These means of disposal provide the City with significant capacity throughout the entire planning period.

5.0 REGULATORY REVIEW

5.1 Reclaimed Water System Permit

The Venice Reclaimed Water System operates under a section of the WRF facility permit. The permit specifies that the existing Venice reclaimed water system capacity is 3 mgd of slow-rate public access within the boundaries of the City of Venice. The uses are described as residential lawns, golf courses, parks and playgrounds, highway medians, rights-of-way and landscape areas. The permit also specifies the City's capacity is 2.5 mgd through discharge to the Sarasota County South Master Reuse System under an interagency agreement. These capacities are shown in **Table 5-1**.

Table 5-1: Reuse Disposal

Location	Capacity
Venice Reclaimed Water System	3 mgd
Sarasota County South Master Reuse System	2.5 mgd

The City has a surface water discharge at Curry Creek where treated wastewater flow can travel through the reclaimed water system to the location of the Curry Creek discharge. To discharge to surface water the effluent is required to be treated to advanced wastewater treatment levels. The reclaimed water system also has several storage ponds that are considered stormwater storage lakes. The storage ponds are indicated as intermittent discharge due to the presence of a stormwater overflow structure in the storage pond that would allow water from the pond to flow into the County stormwater drainage system which is considered a surface discharge. Treatment levels for discharge to these lakes must meet the public access reclaimed water standard. The surface discharges are shown in **Table 5-2**.

Table 5-2: Surface Water Discharge

Location	Capacity
Curry Creek	3.0 mgd
Capri Isles Golf Course South	Intermittent overflow
Capri Isles Golf Course North	Intermittent overflow
Bird Bay	Intermittent overflow
Island Beach	Intermittent overflow

The permit specifies an additional discharge point which is identified as an internal outfall. The internal outfall is the Venice RO concentrate disposal system. This is the outfall for the water plant reject concentrate. The permit allows the blending of the reclaimed water with the RO concentrate as indicated in **Table 5-3**.

Table 5-3: Internal Outfall

Location	Capacity
Venice RO Concentrate Disposal System	1 mgd

Each of these discharge locations is required to meet specific effluent quality. A summary of the main water quality requirements is shown in the **Table 5-4** for Public Access Reclaimed Water (Venice RWS and Sarasota South RWS), **Table 5-5** for surface water (Curry Creek), and the RO concentrate discharge. A detailed list of all monitoring requirements is provided in the WRF permit in **Appendix D**.

Table 5-4: Public Access Reclaimed Water Limits (Venice RWS and Sarasota South RWS)

Parameter	Units	Limit
BOD, Carbonaceous, 5 day	mg/l, annual average	20
Total Suspended Solids	mg/l, single sample	5
Nitrogen	mg/l, single sample	Report
Phosphorus, Total P	mg/l, single sample	Report
pH	mg/l, single sample	6.0 – 8.5
Coliform, Fecal	mg/l, single sample	25
Total Chlorine Residual	mg/l, single sample	1.0
Turbidity	NTU, single sample	Report

Table 5-5: Surface Water Discharge Limits (Curry Creek and Venice RO Concentrate)

Parameter	Units	Limit
BOD, Carbonaceous, 5 day	mg/l, annual average	5
Total Suspended Solids	mg/l, single sample	5
Nitrogen	mg/l, annual average	3
Phosphorus, Total P	mg/l, annual average	1
pH	mg/l, single sample	6.0 – 8.5
Coliform, Fecal	mg/l, single sample	25
Total Chlorine Residual	mg/l, single sample	1.0
Total Chlorine Residual	mg/l, single sample	0.01
Oxygen, Dissolved (DO)	mg/l, single sample	7

A review of the WRF permit and the pertinent permit conditions was conducted to determine if any conditions or schedules were present that would impact long term planning for the reclaimed water system. No conditions or schedules were found that would have such impacts. The permit conditions are routine for the City reclaimed water system and require applicable monitoring and compliance.

5.2 Groundwater Monitoring Plan

The requirements for groundwater monitoring are provided in the WRF operating permit Section III GROUND WATER REQUIREMENTS. The requirements are for the installation and monitoring of groundwater wells at specific large user sites. The wells generally include an up-gradient well for establishing background groundwater quality, an intermediate well, and a down gradient well located 100 feet from the application site representing the edge of the zone of dilution of discharge for compliance monitoring. The intention of the monitoring program is to assure the groundwater down gradient from the application site meets compliance limits. The wells required by the permit are identified in **Table 5-6**.

Table 5-6: Groundwater Monitoring Wells

Monitoring Well ID	Alternate Well Name and/or Description of Monitoring Location	Depth (feet)	Aquifer Monitored	New or Existing
MWC-05	Capri Isles Golf Course	13	Surficial	Existing
MWI-01	Capri Isles Golf Course	23	Surficial	Existing
MWI-06	Capri Isles Golf Course	21	Surficial	Existing
MWC-06	Capri Isles Golf Course	17.5	Surficial	Existing
MWC-09	Capri Isles Golf Course	15.1	Surficial	Existing
MWC-07	Capri Isles Golf Course	15.5	Surficial	Existing
MWB-02	Lake Venice Golf Course	22	Surficial	Existing
MWI-07	Lake Venice Golf Course	20	Surficial	Existing
MWI-08	Lake Venice Golf Course	22	Surficial	Existing
MWC-08	Lake Venice Golf Course	15	Surficial	Existing
MWB-03	Curry Creek Park	17	Surficial	Existing
MWI-05	Bay Indies Subdivision	17	Surficial	Existing
MWC-04	Bay Indies Subdivision	17	Surficial	Existing

The compliance parameters for the groundwater compliance wells are shown in **Table 5-7**. If the natural groundwater quality, as reported from results of testing

the background well, is higher than the limits in **Table 5-7**, the natural groundwater quality shall be the limitation for compliance.

Table 5-7: Groundwater Quality Limits

Parameter	Permit Level	Sample Type	Monitoring Frequency
Water Level Relative to NGVD	Report	In-Situ	Quarterly
Nitrogen, Nitrate, Total (as N)	10 (mg/L)	Grab	Quarterly
Solids, Total Dissolved (TDS)	500 (mg/l)	Grab	Quarterly
Arsenic, Total Recoverable	10 (ug/l)	Grab	Quarterly
Chloride (as Cl)	250 (mg/l)	Grab	Quarterly
Cadmium, Total Recoverable	5 (ug/l)	Grab	Quarterly
Chromium, Total Recoverable	100 (ug/l)	Grab	Quarterly
Lead, Total Recoverable	15 (ug/l)	Grab	Quarterly
Coliform, Fecal	4 (#/100ml)	Grab	Quarterly
pH	6.5 to 8.5	In-Situ	Quarterly
Sulfate, Total	250 (mg/l)	Grab	Quarterly
Turbidity	Report	In-Situ	Quarterly
Sodium, Total Recoverable	160 (mg/l)	Grab	Quarterly
Specific Conductance	Report	In-Situ	Quarterly
Temperature (C), Water	Report	In-Situ	Quarterly
Oxygen, Dissolved (DO)	Report	In-Situ	Quarterly

A review of the groundwater monitoring data was conducted to assess compliance with water quality parameters. The data evaluated was from 2009 through the third quarter of 2011. Due to changes in the monitoring well system through the installation of new wells and abandonment of old wells, the data before 2009 was not considered. The analysis identified monitoring well locations that indicate levels of water quality parameters above the allowable limits. The associated reclaimed water sites, the parameters with exceeding limits and the number of excedences are presented in **Table 5-8**.

Table 5-8: Groundwater Quality Excedences

Location	Parameter	Times Exceeded
Lake Venice	Total Dissolved Solids	11
	pH	11
	Total Sulfate	11
	Arsenic	4
	Nitrate (N)	4
Bay Indies	Chloride	1
	Sodium	1
	pH	4
Capri Isles	Arsenic	2
	Chloride	1
	pH	2

These apparent excursions may be due to salt water intrusion in the case of Lake Venice and may be the result of grounds keeping activities at the Capri Isles golf course and the Bay Indies residential area. With the exception of nitrates, the parameters of concern are not present in the wastewater and would not be expected to impact down gradient groundwater quality.

5.3 Reclaimed Water Management

Reclaimed water management consists of complying with the WRF permit related to Reuse and Land Application sections, complying with **Section 62-610.320 Operation and Maintenance Requirements and Operating Protocols**, and proper management of the reclaimed storage, pumping system, and distribution systems. The WRF has a good record of compliance with all applicable permit requirements.

The operation and maintenance requirements for the reclaimed water system include:

- Land application systems shall be operated and maintained to achieve wastewater treatment requirements before final release of reclaimed water to the environment. Where permittee provides reclaimed water to

another party a binding agreement is required to assure all requirements are met.

- Groundwater monitoring shall be established and conducted in accordance with the permit requirements
- Permittee shall be responsible for making facilities safe in terms of public health and safety at all times.
- An Operation and Maintenance Manual shall be provided either as a separate section of the WRF manual, or as a stand-alone instruction booklet for all reuse and land application systems. The operation and maintenance instructions shall provide the operator with an adequate description and schedule of routine effluent application rates and cycles, operational procedures during adverse climatic conditions, maintenance of equipment, groundwater monitoring procedures and listing of spare parts to have on hand.
- Operating Protocols. To be covered in **Section 5-4**.

The City reclaimed water system is mainly serviced by the City personnel all of whom are trained and skilled technicians. The City maintains the system up to and including the pressure sustaining valves at each bulk user facility. As such, the City has the trained staff and required parts for operation and repair. Reclaimed water application rates at the major users (predominantly golf courses) are controlled by the turf experts at each facility.

The City's ability to send water to various users is somewhat limited by a lack of adequate reclaimed water supply, particularly during the season of highest demand. This is evident from the previous section of the report showing that on only a few occasions did the City use the Sarasota County Interconnection to dispose of excess reclaimed water. Those events occurred during periods of unusually heavy rainfall.

Flow to the ponds is currently controlled by a pressure sustaining valve and in most cases a mechanical pond level float. In order to better control the amount of flow to the bulk users, it is recommended that a delivery management system at the bulk ponds consisting of a pressure sustaining valve, magnetic meter, automated valve, and telemetry be installed at each bulk user's reclaimed water delivery point. This delivery management system will enable the City to adjust system pressure at opportune times to facilitate reclaimed water delivery to the bulk ponds, fine tune pressure sustaining valve settings for optimum delivery and while maintaining system pressure, actively monitor water use and allow for a valve to close once reclaimed water reaches permitted limits.

5.4 Operating Protocol

The City has a formal Reuse Operating Protocol to assure compliance with FDEP Rule 62-610 F.A.C. This protocol is provided on **Appendix F**. The requirements for the operating protocol are specified under 62-610.320 (6) Operating Protocols. The operating protocol is required to address the following:

- Set points for parameters measured by on-line equipment
- Physical steps and procedures when substandard water is produced
- Physical steps and procedures when treatment returns to normal

The protocol must be periodically reviewed and revised, as appropriate, to ensure satisfactory system performance. The protocol must be submitted to the FDEP with every permit renewal and when any revision occurs.

A review of the City's Reuse Operating Protocol was conducted and all applicable requirements indicated above were found to be present in the document.

5.5 Reclaimed Water Ordinance

The City Code of Ordinances specifically addresses the Reclaimed Water System under Chapter 74 – Utilities- Article IV –RECLAIMED WATER SYSTEM. The ordinance specifies issues of; intent, availability of service, connection to system, requirement for new projects, easement dedications, responsibility for construction, meters, fees, cross connection control, construction specifications, inspections, right-of-entry, responsibilities and other pertinent measures for connection and use of the reclaimed water system. The following is a brief summary of the relevant sections:

Intent of Article: The City intends to make reclaimed water available for irrigation purposes and other authorized uses where the City Council determines that construction of the distribution system is practical and economical.

Availability of Service: Available means that a functioning reclaimed water distribution system is within 100 feet of the property or that it is cost effective for the City to extend the system to within 100 feet of the property.

Connection to system:

- Customers in designated areas may connect to the reclaimed water system when service is available and upon submission of proper application and compliance with all requirements.
- Existing irrigation systems using potable water for irrigation are required to connect to the reclaimed water system within 90 days of the system becoming available.
- Customers using irrigation wells may continue to use the wells for that purpose after reclaimed water is available. The City shall prohibit new irrigation wells when reclaimed water is available.

- All new irrigation systems constructed after the effective date of the ordinance shall be required to connect to the reclaimed water system at the earlier of; when reclaimed water is not available at the time of construction the connection will be required within 90 days of it becoming available, if reclaimed water is available upon completion of construction.

Prerequisites for connection: No connection to the reclaimed water system shall be permitted without a written reuse agreement or a completed application with the City.

Cross connection control: In all premises where reclaimed water is provided the public or private water supply shall be protected by an approved backflow prevention device. No cross connection shall be permitted.

Construction specifications: The ordinance lists specific specifications covering prohibition of reclaimed water in a structure, no above ground hose bibs, clear identification of hose bib connection, prohibition of connection to fire hydrants and fire sprinkler system.

5.6 Future Regulations Evaluation

No specific reclaimed water regulations were identified that would impact the future planning for the Venice RWS. The issue of effluent numeric nutrient limitations has the potential to impact any surface water discharge or any application of effluent that would potentially result in a discharge to surface waters. This issue does not currently directly impact the reclaimed water system as much as it would impact the operation of the wastewater treatment plant and its surface water discharge points. Currently the issue is in litigation and the full impact of the final rule may not be known for some time.

5.7 Existing Bulk User Agreements

The City has agreements will all bulk users of the reclaimed water system. These agreements are required by FDEP to be binding and must assure compliance with applicable F.A.C.'s. The following are excerpts from the required regulations:

62-610.320 Operation and Maintenance Requirements and Operating Protocols.

(b) Where the wastewater treatment plant permittee reuses reclaimed water or disposes of effluent using property owned by another party, a binding agreement between the involved parties is required to ensure that construction, operation, maintenance, and monitoring meet the requirements of Chapters 62-600, 62-620 and 62-610, F.A.C. Such binding agreements are required for all reuse or disposal sites not owned by the permittee. The permittee shall retain primary responsibility for ensuring compliance with all requirements of the Florida Administrative Code.

62-610.468 Access Control and Advisory Signs.

(1) No provisions for access control are needed.

(2) The public shall be notified of the use of reclaimed water. This shall be accomplished by the posting of advisory signs designating the nature of the reuse project area where reuse is practiced, notes on scorecards, or by other methods.

Examples of some of the notification methods which may be used by permittees include posting of advisory signs at entrances to residential neighborhoods where reclaimed water is used for landscape irrigation and posting of advisory signs at the entrance to a golf course and at the first and tenth tees.

(3) Use of purple as a prominent color on advisory signs and written notices related to a reuse project is recommended, but shall not be required.

(4) Advisory signs shall include the following text in English and Spanish: "Do not drink" together with the equivalent standard international symbol.

(5) Advisory signs shall be posted adjacent to lakes or ponds used to store reclaimed water that are not located at the domestic wastewater treatment facilities. Advisory signs shall be posted at decorative water features that use reclaimed water. Advisory signs at storage ponds or decorative water features shall include the following text in English and Spanish: "Do not drink" and "Do not swim" together with the equivalent standard international symbols.

(6) The permittee shall ensure that users of reclaimed water are informed about the origin, nature, and characteristics of reclaimed water; the manner in which reclaimed water can be safely used; and limitations on the use of reclaimed water. Notification is required at the time of initial connection to the reclaimed water distribution system and annually after the reuse system is placed into operation. The details of the public notification program shall be included in the engineering report and with each permit application. A description of ongoing public notification activities shall be included in the annual reuse report required by Rule 62-610.870(3), F.A.C. The public notification program shall include details on written public notification activities, activities related to the news media, use of advisory signs, and other public notification activities

The following is a summary of the relevant points in the reclaimed water agreements concerning references to the applicable regulations, as well as specific responsibilities of all parties regarding ownership and maintenance.

Capri Isles Golf Course

- The City shall own, operate and maintain the reclaimed water distribution system upstream of the point(s) of delivery. The User shall own, operate and maintain all works downstream of the point(s) of delivery.
- The City agrees to pay for the costs associated with providing transmission piping to the storage pond and the installation of a device

which will automatically valve off the delivery pipe when the receiving/storage pond reaches a certain level.

- Exhibit B, Section E, the user shall post signs at points designated by the City in areas using reclaimed water.
- The agreement does not specifically reference requirements of FAC 62-610.468.

Bird Bay Golf Course

- The City shall own, operate and maintain the reclaimed water distribution system upstream of the point(s) of delivery. The User shall own, operate and maintain all works downstream of the point(s) of delivery.
- The City agrees to pay for the costs associated with providing transmission piping to the storage pond and the installation of a device which will automatically valve off the delivery pipe when the receiving/storage pond reaches a certain level.
- Exhibit B, Section E, the user shall post signs at points designated by the City in areas using reclaimed water.
- The agreement does not specifically reference requirements of FAC 62-610.468.

Lake Venice Golf Course

- Section 44, Part A, the user shall post signs at points designated by the City in areas using reclaimed water.
- The agreement does not specifically reference requirements of FAC 62-610.468.

Venetian Golf and River Club

- The City agrees to pay for the costs associated with providing transmission piping to the storage pond and the installation of a device which will automatically valve off the delivery pipe when the receiving/storage pond reaches a certain level.
- Exhibit B, Section E, the user shall post signs at points designated by the City in areas using reclaimed water. The signs will contain the international symbol for both do not drink and do not swim and must meet regulatory approval (FAC 62-610.468).

Waterford

- Upon completion of construction and acceptance by the City, the Owner (Waterford) shall convey title to the reclaimed water distribution system downstream to the individual property lines by good and sufficient instruments along with such utility easements as may be necessary for the proper maintenance and operation of same by the City. Waterford shall transfer to the City a one year warranty from all contractor and suppliers. The distribution system shall be in good operating condition at the time of turnover to the City. The City shall then assume operational and maintenance responsibilities for the system up to the individual property lines.
- From Exhibit A:
  - Venice owns and maintains: residential irrigation distribution system (up to residential meter), feeder line to isolated retention pond and pump stations.
  - Waterford owns and maintains: Golf course irrigation system, isolated retention pond, emergency spillway, and manhole.

- The equipment within the manhole is owned by the City.

- For improved properties, potable water use for irrigation is prohibited.

- Exhibit C, Section 3, Signs, Waterford shall post signs at points designated by the City in areas using reclaimed water.

- The agreement does not specifically reference requirements of FAC 62-610.468

Willow Chase

- Exhibit B, Section E, the user shall post signs at points designated by the City in areas using reclaimed water. The signs will contain the international symbol for both do not drink and do not swim and must meet regulatory approval (FAC 62-610.468).

6.0 RECLAIMED WATER STORAGE

6.1 Introduction to Storage Requirements

The Chapter 62-610 of the F.A.C specifies the requirements for storage related to slow-rate land application systems. The City of Venice Reclaimed Water System is a public access reclaimed water system and is specifically regulated under the requirements of section 62-610.464. These requirements are summarized as follow:

- System storage is not required where another permitted reuse or effluent disposal system is available. If storage is not required, flow equalization or reclaimed storage to match diurnal demand patterns must be evaluated.
- Unless exempt, as indicated above, system storage ponds shall have sufficient capacity to assure retention of reclaimed water under adverse weather conditions, maintenance of equipment, or other conditions that would preclude land application.
- System storage shall be established by determining the volume of storage required for a ten-year recurrence interval using representative area weather data.
- Minimum storage capacity shall be three times the average daily flow of the reclaimed system for which no alternative disposal system is permitted.
- Analytical means (water balance calculations such as the FDEP LANDAP program) shall be used to determine system storage needs.
- A minimum of 20 years of climatic data shall be used in storage volume determinations.

- Reclaimed water storage ponds do not have to be lined.

6.2 Current Reclaimed System Storage Capacity Evaluation

The City's Reclaimed Water System has a combination of facilities for the storage of reclaimed water. These include a ground storage tank and a lined storage pond at the Eastside WRF and numerous storage ponds or lakes at the site of bulk users. The existing reclaimed water system storage facilities are identified in **Table 6-1**. These storage facilities allow the reclaimed water system to meet peak demands and store water during low demand periods. They also reduce the need to discharge effluent to surface water discharge points during periods of high wastewater flow and low irrigation demand. The operating strategy for the City's Reclaimed Water System is to provide maximum utilization of reclaimed water.

Table 6-1: Existing Reclaimed Water Storage

Storage Type	Name	Volume (MG)
Ground Storage Tank	Eastside WRF Ground Storage Tank	3
Lined Pond	Eastside WRF Reclaimed Storage Pond	35
Unlined Pond	Lake Venice Golf Course	6.8
Unlined Pond	Venetian Golf and River Club	14.6
Unlined Pond	Waterford Golf Course	7.7
Unlined Pond	Capri Isle Golf Course North	5.4
Unlined Pond	Capri Isle Golf Course South	4.5
Unlined Pond	Bird Bay Golf Course	0.5
	Total Storage	**77.5**

The City WRF has four main methods of disposal for treated effluent. They are; surface water discharge to Curry Creek (3 MGD), reuse system land application (3 MGD City of Venice System, 2.5 MGD Sarasota County South Master Reuse System), and internal outfall (1 MGD) – Venice reverse osmosis concentrate disposal system. The existence of surface water discharge capacity and Sarasota County reuse system capacity which exceeds the City's WRF capacity means that the City's Reclaimed Water System is exempt from the requirement to provide wet weather storage meeting a ten year wet weather recurrence event. The City's existing 3 MG ground storage tank and 35 MG lined storage pond at the Eastside Facility more than satisfy the diurnal flow requirements of the regulations. However, the City does not have the ability to service the ground storage tank without interrupting the operation of the reclaimed water distribution system. The City currently has plans to install a second 7.5 million gallon ground storage tank which will resolve the situation.

While the regulations are satisfied for storage, the actual operation of the reclaimed system and ability of the City to provide reclaimed water to the systems users does require that storage be provided beyond the minimum regulatory requirement. Therefore the City's system was evaluated using the FDEP LandAp2010 water balance model to determine the storage requirements to meet the ten year wet weather recurrence interval. Satisfying this requirement assures that the majority of the reclaimed water generated by the City will be applied beneficially to the reclaimed water system users and not lost to surface discharge.

LandAp2010 is a water balance tool used to determine wet weather storage requirements and wet-weather discharges for permitted systems. LandAp2010 calculates a monthly water balance using inputs of monthly rainfall, temperature (which is used to determine reference evapotranspiration), crop-specific evapotranspiration coefficients, site hydrologic characteristics, and reclaimed

water hydraulic loading rates to determine storage volume requirements or wet weather discharges. The City's existing operating parameters for 2011 were input in the model to assess the current adequacy of the system reclaimed water storage capacity. **Table 6-2** provides the results of the model output. In 2011 the City had a 0.37 MG deficit of reclaimed water storage capacity. The small deficit shows that the existing reclaimed water storage capacity was adequate based on 2011 flows. Since the City of Venice is responsible for the disposal of the first 0.5 MGD of the Sarasota County wastewater treated at the WRF and has the remaining flow available for reuse, inflow from Sarasota County was considered in calculating the potential amount of storage to optimize use.

Table 6-2: 2011 Reclaimed Water Storage Analysis

Parameter	Units	Value
Reclaimed Flow Available	MGD	2.71
Total Application Area	Acres	1608
LANDAP Recommended Storage	MG	77.87
Existing System Storage Capacity	MG	77.50
Excess/ Deficient Capacity	MG	0.37 (Deficit)

As summarized in **Table 6-1**, 38 MG of the total reclaimed water system storage is at the Eastside WRF. Bulk user ponds consist of the remaining 39.5 MG of storage. In order to evaluate the adequacy of the 38 MG of storage at the Eastside WRF, an alternative 2011 scenario was calculated using LandAp2010. This scenario subtracts the bulk user demands from the LandAp2010 calculation since their storage volume is not applicable to this scenario. **Table 6-3** provides the results of the model output. The City had a 9.91 MG deficit of reclaimed water storage capacity based on this scenario. This shows that the existing reclaimed water storage capacity is technically not adequate for seasonal storage in the absence of the bulk user ponds. The planned addition of a new 7.5 MG storage tank at the WRF would meet the majority of the additional storage requirement.

Table 6-3: 2011 Reclaimed Water Storage Analysis Alternative Scenario

Parameter	Units	Value
Reclaimed Flow Available	MGD	1.61
Total Application Area	Acres	1608
LANDAP Recommended Storage	MG	47.9
Existing System Storage Capacity	MG	38
Excess/ Deficient Capacity	MG	9.91 (Deficit)

6.3 Future System Storage Capacity Requirements

Using the methodology discussed in **Section 6.2,** the storage system capacity requirements were determined for the future planning years. The reclaimed water flow available was based on the wastewater flow projections provided in the **Section 2.6**. The future irrigable acreage was added to the existing irrigable acreage to arrive at the total irrigable acreage and corresponding required storage capacity for each planning year (See **Table 6-4**).

Table 6-4: Irrigable Acreage

Existing and Potential Users	Irrigable Acreage Per Planning Year (Acres)			
	2015	2020	2025	2030
Individual Users	964	964	964	964
Bulk Users (Permitted Capacity)	644	644	644	644
Parks and Medians	0	0	41	41
Future Development				
South Laurel	192	204	215	226
Shakett Creek	8	9	9	10
Knights Trail (Subarea 1)	29	30	32	34
Knights Trail (Subarea 2)	86	91	96	101
Knights Trail (Subarea 3)	0	0	0	0
Knights Trail (Subarea 4)	15	16	17	18

Table 6-4: Irrigable Acreage (Continued)

Existing and Potential Users	Irrigable Acreage Per Planning Year (Acres)			
	2015	2020	2025	2030
Gene Green	60	64	68	71
Knights Trail Park Area (JPA Area 1)	9	18	27	35
Large Potable Water Irrigation Users				
Clare Bridge Living Facility, 1200 Avendia Del Circo	0	0	0	2
Wells Fargo Bank, 1306 East Venice Ave	0	0	0	1
Airport	0	0	0	26
Total Acreage	**2,008**	**2,041**	**2,115**	**2,173**

A majority of the potential future demand is projected to come in planning areas I, J, K, L and JPA area 1. The storage requirements for these future land development areas was calculated individually and assumed to be satisfied by new bulk user ponds. The remaining volume was assumed to be satisfied by new ground storage tanks. **Tables 6-5** and **6-6** summarize the future system storage capacity requirements with and without wastewater flow from Sarasota County respectively. The results show that additional reclaimed water storage would be desirable to meet all seasonal storage requirements when reclaimed water generated by County wastewater flow is included in the calculation. Ground storage tanks to meet the seasonal storage requirements and their potential sites are discussed in the following section.

Table 6-5: LandAp2010 Future Storage Requirements with Flow from Sarasota County

ID	Parameter	2015	2020	2025	2030
A	Reclaimed Water Flow Available (MGD)	4.10	4.67	5.19	5.55
B	TOTAL Irrigable Acreage	2,008	2,041	2,115	2,173
C	**Required Storage from LandAp2010 (MG)**	**121.2**	**140.6**	**157.6**	**169.6**
D	Total Storage in System (MG)[2]	77.5	77.5	77.5	77.5
E	**Additional System Storage Needed (MG)**	**43.7**	**63.1**	**80.1**	**92.1**
F	Required Storage from LandAp2010 - Future Development Areas Only- New Bulk Ponds (MG)	13.1	27.8	44.3	61.0
I	**Storage Balance (MG)[1]**	**30.6**	**35.3**	**35.8**	**31.1**

1. Equals E-F=I (Positive =Required Additional Storage, Negative=Excess Storage)

Table 6-6: LandAp2010 Future Storage Requirements City of Venice Wastewater Inflow Only

ID	Parameter	2015	2020	2025	2030
A	Reclaimed Water Flow Available (MGD)	2.64	3.02	3.40	3.76
B	TOTAL Irrigable Acreage	2,008	2,041	2,115	2,173
C	**Required Storage from LandAp2010 (MG)**	**75.7**	**86.8**	**97.6**	**108.4**
D	Total Storage in System (MG)[2]	77.5	77.5	77.5	77.5
E	**Additional System Storage Needed (MG)**	**-1.8**	**9.3**	**20.1**	**30.9**
F	Required Storage from LandAp2010 - Future Development Areas Only- New Bulk Ponds (MG)	13.1	27.8	44.3	61.0
I	**Storage Balance (MG)[1]**	**-14.9**	**-18.5**	**-24.2**	**-30.1**

1. Equals E-F=I (Positive =Required Additional Storage, Negative=Excess Storage)

6.4 Potential Reclaimed Water Storage Tank Sites

If the City plans to maximize use of all available reclaimed water and minimize alternative disposal options, six new ground storage tanks would be recommended by 2015 to offset the 30.6 MG storage deficiency in 2015 as shown in **Table 6-7**. The construction of this amount of new storage is costly and is not actually required to meet permit requirements but would allow greater utilization of reclaimed water. This recommendation would also be prefaced on the projected wastewater flow increases actually occurring and Sarasota County continuing to send estimated quantities of wastewater to the City. Each ground storage tank was assumed to be 5 MG for purposes of this master plan. Given the City's capacity for reclaimed water disposal, additional ground storage tanks for reclaimed water storage are optional and based on the City's percent utilization goals of reclaimed water. In addition to the six new ground storage tanks a second 7.5 MG ground storage tank at the Eastside WRF is currently planned to be constructed prior to 2015. Four of the six ground storage tanks are anticipated to be located in Wellfield Park as shown on **Appendix A**. The other two ground storage tanks are projected to be located at the Venice Municipal Airport to provide system storage at the south end of the City's system.

Table 6-7: LandAp2010 Future Storage Requirements

ID	Parameter	2015	2020	2025	2030
A	Reclaimed Water Flow Available (MGD)	4.10	4.67	5.19	5.55
B	TOTAL Irrigable Acreage	2,008	2,041	2,115	2,173
C	**Required Storage from LandAp2010 (MG)**	**121.2**	**140.6**	**157.6**	**169.6**
D	Total Storage in System (MG)[2]	77.5	77.5	77.5	77.5
E	**Additional System Storage Needed (MG)**	**43.7**	**63.1**	**80.1**	**92.1**
F	Required Storage from LandAp2010 - Future Development Areas Only- New Bulk Ponds (MG)	13.1	27.8	44.3	61.0
G	Number of New Ground Storage Tanks	6	0	0	0
H	New Ground Storage Tank Volume (MG)[3]	37.5	37.5	37.5	37.5
I	**Storage Balance (MG)[1]**	**6.9**	**2.2**	**1.7**	**6.4**

1. Equals F+H-E (Positive =Excess Storage, Negative=Required Additional Storage)
2. Existing ground storage tank accounted for in total.
3. Proposed 7.5 MG ground storage tank is accounted for in total.

7.0 HYDRAULIC ANALYSIS

7.1 Base Scenario Development

The hydraulic modeling software selected for the Venice reclaimed water system model is InfoSWMM software, an Innovyze product. InfoSWMM was recommended because the City currently utilizes Innovyze software for their water distribution system and wastewater collection system models and the user interface will be similar between the two products. InfoSWMM is fully integrated with ESRI ArcGIS giving the modeler the ability to use tools available within the GIS for more complex evaluation and reporting options.

Model development started with the City's existing GIS information. The City provided GIS shapefiles for the existing reclaimed water system which consisted of transmission and distribution pipes. This information formed the basis of the model. The model was constructed to only include the backbone pipelines. Backbone pipelines were identified as 3-inch diameter and larger. Also non-essential pipelines were discussed with the City and not included as part of the backbone. Non-essential pipes were generally characterized as distribution pipes internal to a residential community. This information along with the following are the basis of the system model: bulk user ponds, lined storage ponds, ground storage tank, and high service pumps (See **Appendix G)**.

The model was analyzed under steady-state conditions which is an instantaneous snapshot of the system. As discussed in **Section 2-7**, reclaimed water demands based on Scenario 2 were used in the hydraulic analysis since they represent the maximum demands the system is projected to experience during the planning period. An average annual daily flow condition and a maximum month peak hour flow condition were evaluated as part of Scenario 2. The average annual daily flow is based on the demands provided in **Table 2-11**.

The maximum month peak hour flow is the demands provided in **Table 2-11** multiplied by the peaking factors discussed in **Section 7.2**.

Meter data was geocoded based on parcel information where available and based on addresses where the parcel information did not match. Demands were assigned to a node on either end of the pipe by weighted average of the distance along the pipe.

The high service pumps at the Eastside WRF are on variable frequency drives (VFDs). The head generated by the pumps was simulated as a fixed reservoir since the model is steady state. Based on the SCADA data, the average high service pump discharge pressure is 55 psi and the maximum is 70 psi. 70 psi was used for the two scenarios. The bulk user ponds were modeled as a node with a demand.

7.2 Peak Factors

Based on field testing, the flow rate to four bulk user ponds was measured. This flow rate replaced the calculated flow rate that was previously entered into the model. Also since the flow rate to fill the pond varies by system pressure and not by actual demand at the bulk user ponds, a peaking factor was not applied to the bulk ponds. The modification to the AADF scenario was a peaking factor of 2.0 was applied to individual users, parks, medians, and future development to simulate the flow rates associated with an assumed 12 hour daily delivery window. Reclaimed water flow from Sarasota County was assumed to be returned over a 24 hour period during the AADF scenario. For the MMADF scenario, the individual user peaking factor of 1.52 was applied to the parks and medians since they were assumed to have similar peak demands. **Table 7-1** summarizes the peak factors used in the hydraulic model.

Table 7-1: Peak Factors

Peak Factors	ADF	MMADF	Comment
Individual Users	2.0	3.04	Assumes 12 hr delivery
Bulk Users	N/A	N/A	N/A
Parks	2.0	3.04	Assumes 12 hr delivery
Medians	2.0	3.04	Assumes 12 hr delivery
Future Development	2.0	3.04	Assumes 12 hr delivery
Sarasota County Interconnect	1.0	1.73	Assumes 24 hr delivery

7.3 Hydraulic Model Standards

As part of the hydraulic modeling of the reclaimed water system, hydraulic standards were utilized as criteria for evaluating the adequacy of the existing transmission and distribution pipes and sizing proposed improvement projects. The hydraulic model standards are shown in **Table 7-2**.

Table 7-2: Hydraulic Model Standards for the Reclaimed Water System

Description	Standard	Comments
Maximum Design Velocity	7 fps	All Pipes
Minimum Pipeline Pressure	40 psi	All Pipes
Hazen Williams Friction Coefficient (C)	120	All Pipes
Max Headloss (psi/1000 LF)	8 psi	All Pipes

7.4 Model Calibration

The hydraulic model was calibrated using two sets of data. First, a field test was conducted to gather pressure and flow rates at various locations within the system. Pressure readings were taken at Bird Bay, Capri Isle South, Lake Venice, and Venetian Golf and River Club bulk ponds as well as the Sarasota County Interconnect and Wellfield Park Fire Hydrant. A series of four tests were performed with a single bulk pond filling during each test while the system pressures were recorded. **Table 7-3** summarizes the results of the field test.

Table 7-3: Field Calibration Results

Location	Test	Flow (gpm)	Pressure (psi)
Bird Bay	1	289	41.5
	2	-	63.8
	3	-	63.8
	4	-	63.8
Capri Isle South	1	-	62.6
	2	458	46.6
	3	-	64.1
	4	-	64.2
Lake Venice	1	-	51.8
	2	-	50.9
	3	1220	22.3
	4	-	52.1
VGRC	1	-	60.4
	2	-	60.3
	3	-	60.5
	4	448	50.9
Eastside WRF	1	708	60
	2	885	60
	3	1,922	60
	4	989	60
Sarasota County Interconnect	1	-	65.6
	2	-	64.8
	3	-	64.2
	4	-	64.9
Wellfield Hydrant	1	-	64.6
	2	-	50.8
	3	-	63.3
	4	-	63.4

The four bulk user pond flow rates recorded from this test were used in the hydraulic model. Capri Isle North, which was not tested, was assumed to have the same flow rate as Capri Isle South given their relatively close proximity. The flow rate at Waterford was assumed to be 500 gpm which is similar to the flow at Capri Isle South and Venetian Golf and River Club. The field tests were simulated in the hydraulic model to compare to the field test results. The pressures recorded at Capri Isle South and the Wellfield Park fire hydrant were

lower than expected while flowing at Capri Isle South. The results are in line with a preliminary investigation by the City that pipe element P715 dead ends east of Pinebrook Road; reducing the benefits of the loop from the west. The pressure recorded at Lake Venice was in general 13 psi lower than the simulated pressure. Potential causes are a faulty pressure gauge or a partially closed valve in the transmission main supplying Lake Venice.

The second set of data used for calibration was the Eastside WRF effluent SCADA data. The objective was to evaluate the average and maximum effluent flow rates, as recorded by SCADA, to see how they compared to the instantaneous flow rates used in the hydraulic model steady state analysis. **Table 7-4** shows SCADA data from the last 12 months and compares it to the existing instantaneous demands inputted into the model. It was assumed that the SCADA AADF is indicative of individual user demands only with the maximum flows representative of times when there are both individual and bulk user demands on the system. The results show that the modeled instantaneous flow rates are a reasonable representation of historical flows.

.

Table 7-4: SCADA Data Summary

Date	Pump Flowrate (gpm)	
	Average	Max
10-Jun	1,687	6,333
Jul-10	1,854	5,429
Aug-10	2,756	6,740
Sep-10	1,762	6,110
Oct-10	1,803	5,735
Nov-10	1,571	4,868
Dec-10	1,601	4,720
Jan-11	1,894	5,695
Feb-11	1,979	5,631
Mar-11	2,080	5,535
Apr-11	1,651	7,838
May-11	1,307	5,592
SCADA Average	**1,842**	**5,808**
Individual Users Only-Simulated	**1,819**	**-**
Individual Users and Bulk Users Combined-Simulated	**-**	**5,192**

7.5 Model Assumptions

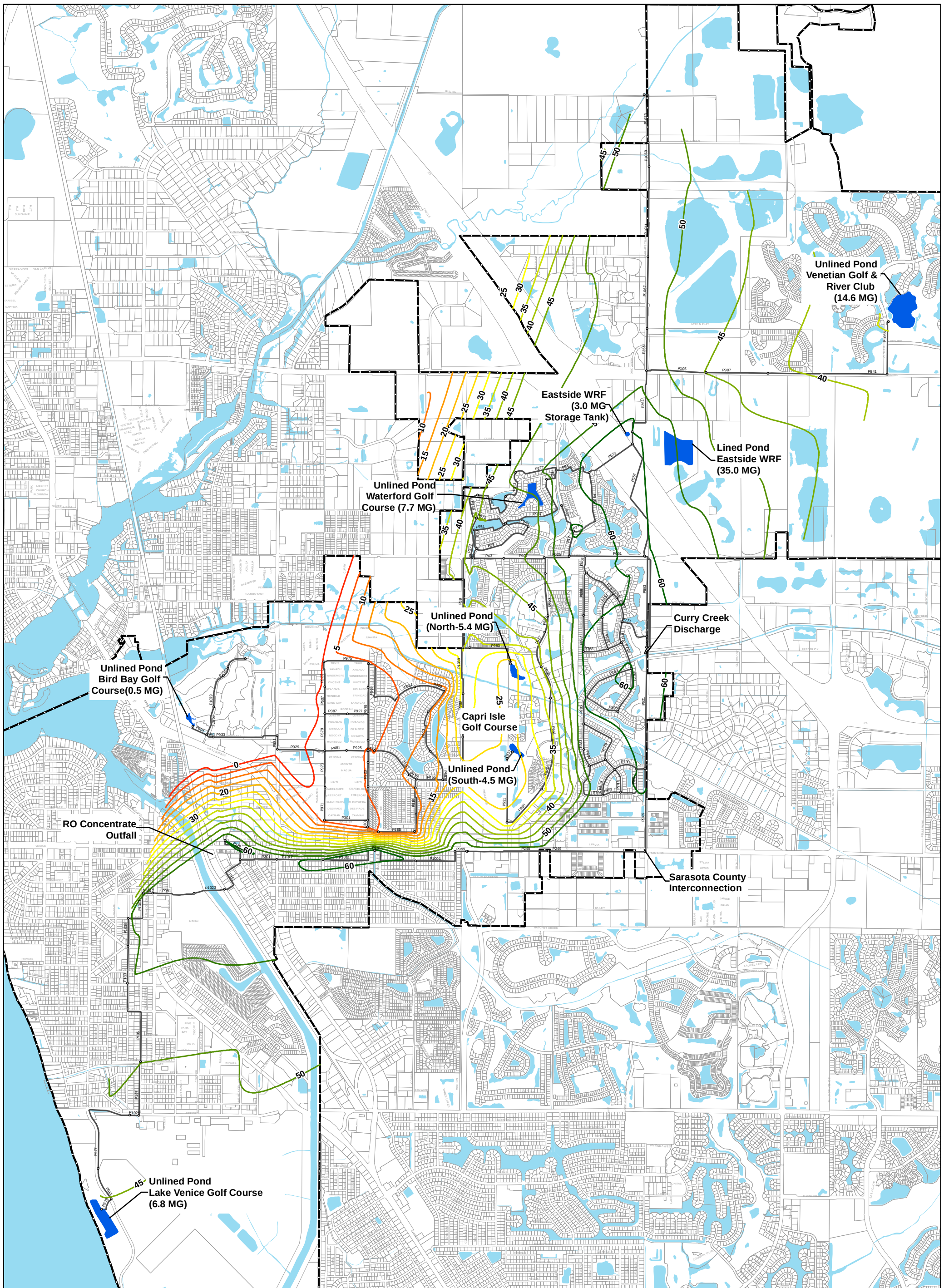
Where there was an absence of data, assumptions were made for generation of the model. The elevations for pipe nodes were imported using 2-ft GIS contours. The existing conditions model also assumes that the interconnect with the County is closed and that there are no discharges to Curry Creek.

7.6 Hydraulic Model Results and Improvement Recommendations

Ten scenarios were evaluated; AADF and MMADF for planning years 2010, 2015, 2020, 2025, and 2030. The deficiencies and recommended improvements are discussed below.

Review of the pipe velocities and headloss during the 2010 AADF scenario did not indicate any system problems. The 2010 MMADF scenario indicated several pipe segments with velocity greater than 6 fps and headloss greater than 8 psi/1,000 LF. The segments with high headloss dropped system pressure

significantly during the MMADF scenario as shown in **Figure 7-1**. The low pressure areas are concentrated west of Capri Isle Boulevard. Review of the system reveals the system lacks looping with the larger diameter transmission main as the system flows west toward Bird Bay. Several loop alternatives were evaluated to boost system pressure. Among them was a 500 LF interconnect at Cherry Street and East Venice Avenue to loop the 18-inch reclaimed water main with the existing 6-inch on Cherry Street. This interconnect provided a moderate increase in pressure but alone was not adequate to increase pressure in the lowest pressure zone areas to 35 psi. It is recommended that a 12-inch reclaimed pipeline be installed from the intersection of US 41 and Albee Farm Road to connect the existing 18-inch reclaimed water pipe to the existing 6-inch reclaimed water pipe at the intersection of Albee Farm Road and West Lucaya Ave. This loop backfeeds the west side of the City's reclaimed water system and was simulated in 2015 to boost pressure to a satisfactory level as shown in **Figure 7-2**. It's also recommended to loop the pipeline through the Bird Bay development by extending a new 8-inch pipeline along Bird Bay Drive and south down Albee Farm Road back to Bird Bay Drive South. The existing 8-inch reclaimed water mains (model element P261 and P105) should also be upsized from 8-inch to 16-inch to accommodate the future demands in the projected planning and JPA areas east of I-75. Based on the demand projections this improvement should be made by 2015 to maintain pressure of at least 40 psi during MMADF. A new 8-inch water main (model element P1075) is recommended along Knights Trail Road north of the intersection with Rustic Road along with a new 12-inch water main (model element P1099) west along Rustic Road to accommodate the future demands in the projected planning areas. A new 16-inch reclaimed water line is recommended along Airport Avenue to serve the two high demand potable water irrigation users, supply water to irrigate the shoulder of Airport Avenue and tie into new ground storage tanks and a booster pump station located within the Venice Municipal Airport.



Legend

- Model Junction
- Model Pipe
- Reuse Storage
- City Boundary

- 0 psi
- 5 psi
- 10 psi
- 15 psi
- 20 psi
- 25 psi
- 30 psi
- 35 psi
- 40 psi
- 45 psi
- 50 psi
- 55 psi
- 60 psi

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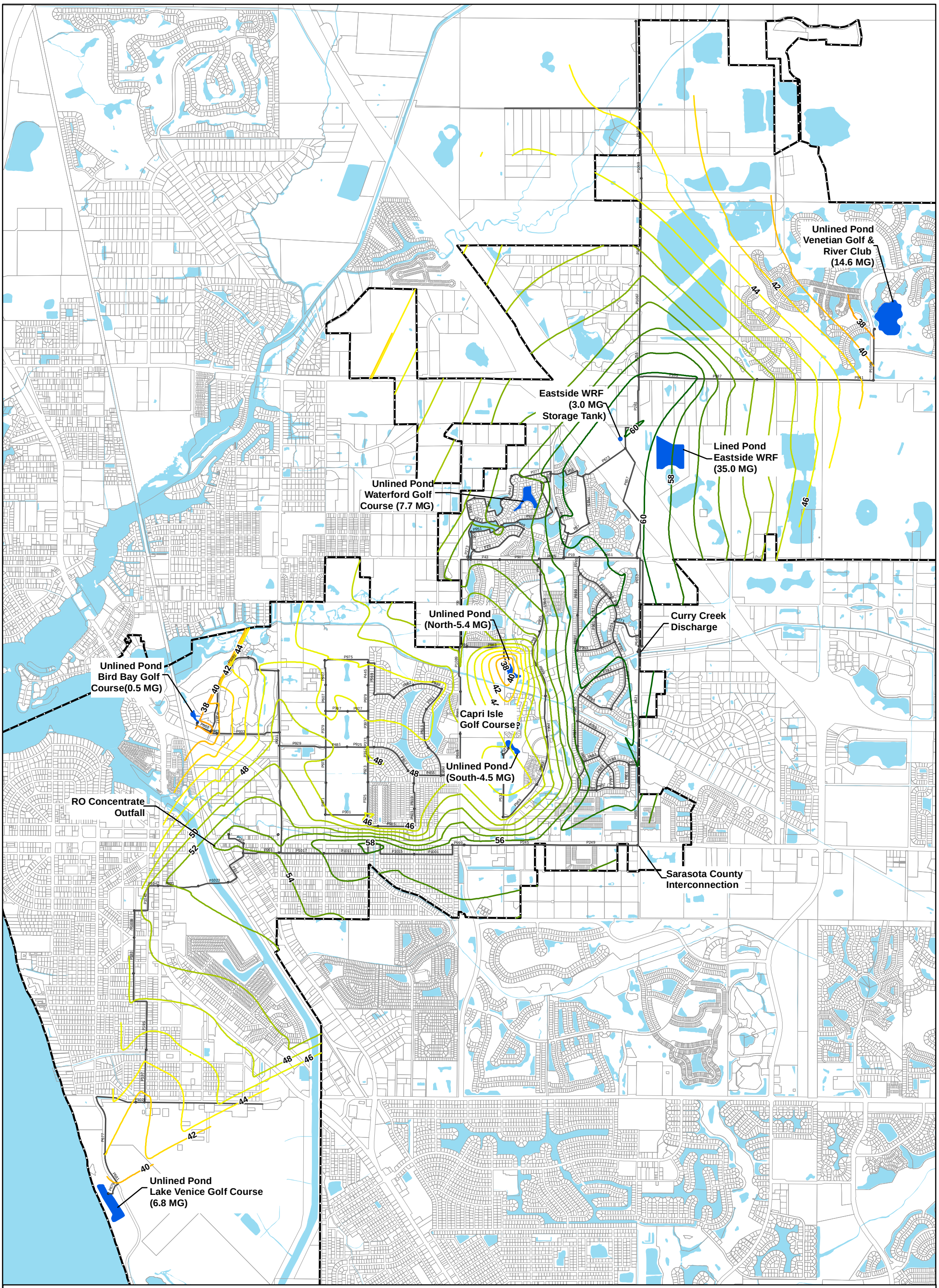
VENICE CITY ON THE GULF

Figure 7-1
Pressure Contours
Max Month Peak Hour Demand
Existing Conditions



Legend

- Model Junction
- Model Pipe
- Reuse Storage
- City Boundary

30 psi, 32 psi, 34 psi, 36 psi, 38 psi, 40 psi, 42 psi, 44 psi, 46 psi, 48 psi, 50 psi, 52 psi, 54 psi, 56 psi, 58 psi, 60 psi

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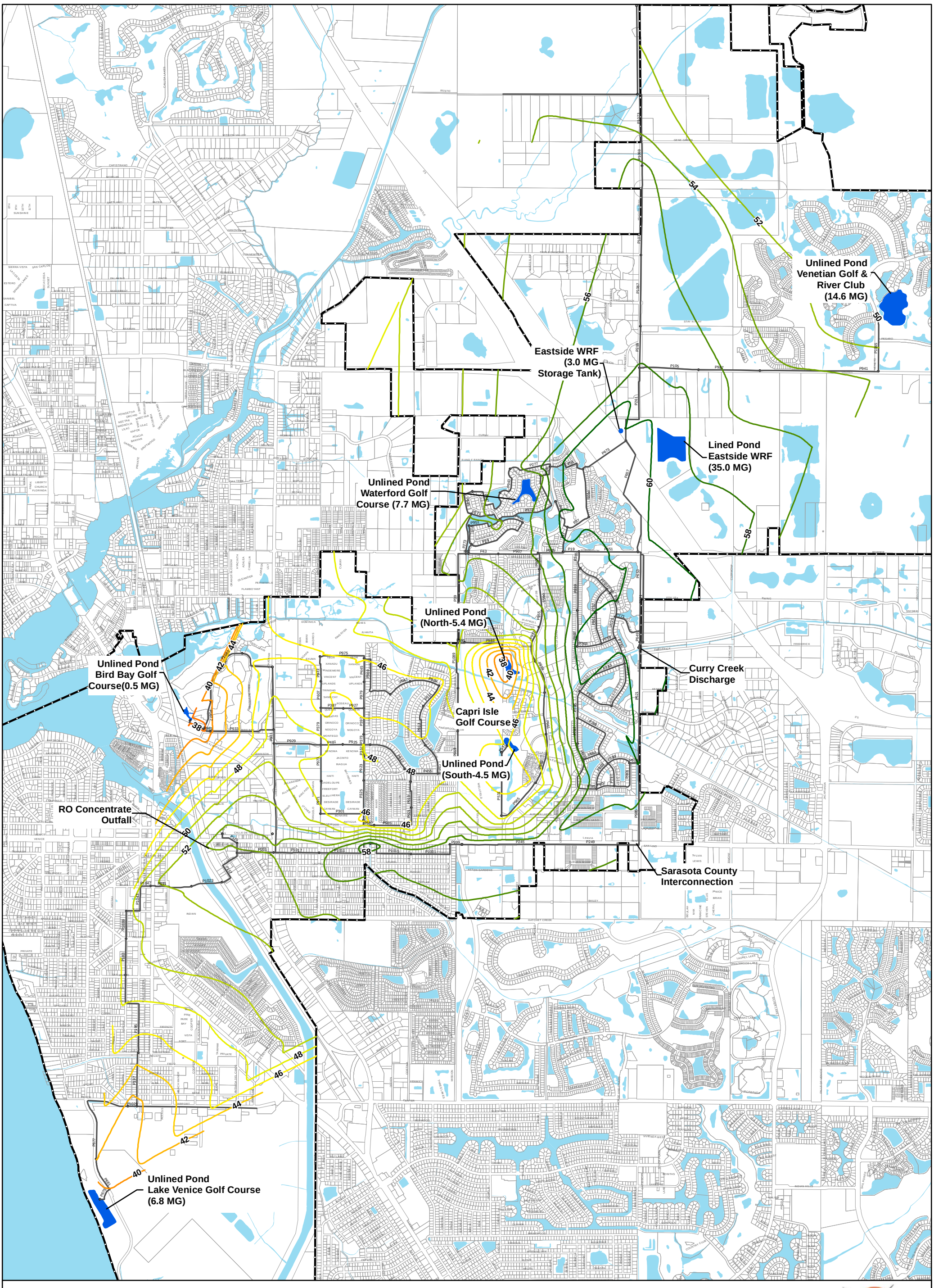
VENICE CITY ON THE GULF

Figure 7-2
Pressure Contours
Max Month Peak Hour Demand
with Improvements
Planning Year 2015

The pressure contours for the 2020 MMADF scenario are shown in **Figure 7-3**. The projected 2020 demand in the planning and zoning areas increase the headloss in the reclaimed water pipe along Laurel Road and drops the pressure below 40 psi. It is therefore recommended the 8-inch reclaimed water pipes (model element P987 and P941) be upsized to 16-inch to maintain 40 psi or greater at Venetian Golf and River Club and the South Laurel and Knights Trail planning areas. Upsizing this reclaimed water pipe will also facilitate providing flow to development in Planning Area I in correlation with the potential extension of Jacaranda Boulevard north to Laurel Road. The additional demand north along Knight's Trail also justifies increasing the 8-inch reclaimed water pipe (model elements P255, P1067 and P1071) to 16-inch diameter in the 2020 planning year.

As the projected demands in the planning and zoning areas increase by 2025, the existing 8-inch reclaimed water pipe along Knights Trail Road, near Gene Green Road and further north is projected to have increased headloss reducing available pressure. The 8-inch reclaimed water pipe, represented by model elements P1069 and P1073, is recommended to be upsized to 16-inches. In 2025 the demands from the parks and median are projected to be required as previously discussed. 8-inch and 4-inch reclaimed water pipe was simulated to extend reclaimed water service to the median along West and East Venice Avenue and to the 13 parks previously identified. Although not modeled in this master plan, a new reclaimed water main along Salerno Street would connect the existing "dry lines" located in the vicinity of West Venice Avenue. Following an evaluation of the dry line condition, since pipe gaskets have the potential to fail after long periods of being dry, the dry lines in this area could be used to supplement the new reclaimed water supply piping. The dry lines could provide additional tie-in locations to feed the West Venice Avenue median, supply the high potable water irrigation user located at 700 Granada Ave, and be utilized for future reclaimed water delivery within the island.



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Legend

- Model Junction
- Model Pipe
- Reuse Storage
- City Boundary

34 psi
36 psi
38 psi
40 psi
42 psi
44 psi
46 psi
48 psi
50 psi
52 psi
54 psi
56 psi
58 psi
60 psi

VENICE CITY ON THE GULF

Figure 7-3
Pressure Contours
Max Month Peak Hour Demand
with Improvements
Planning Year 2020

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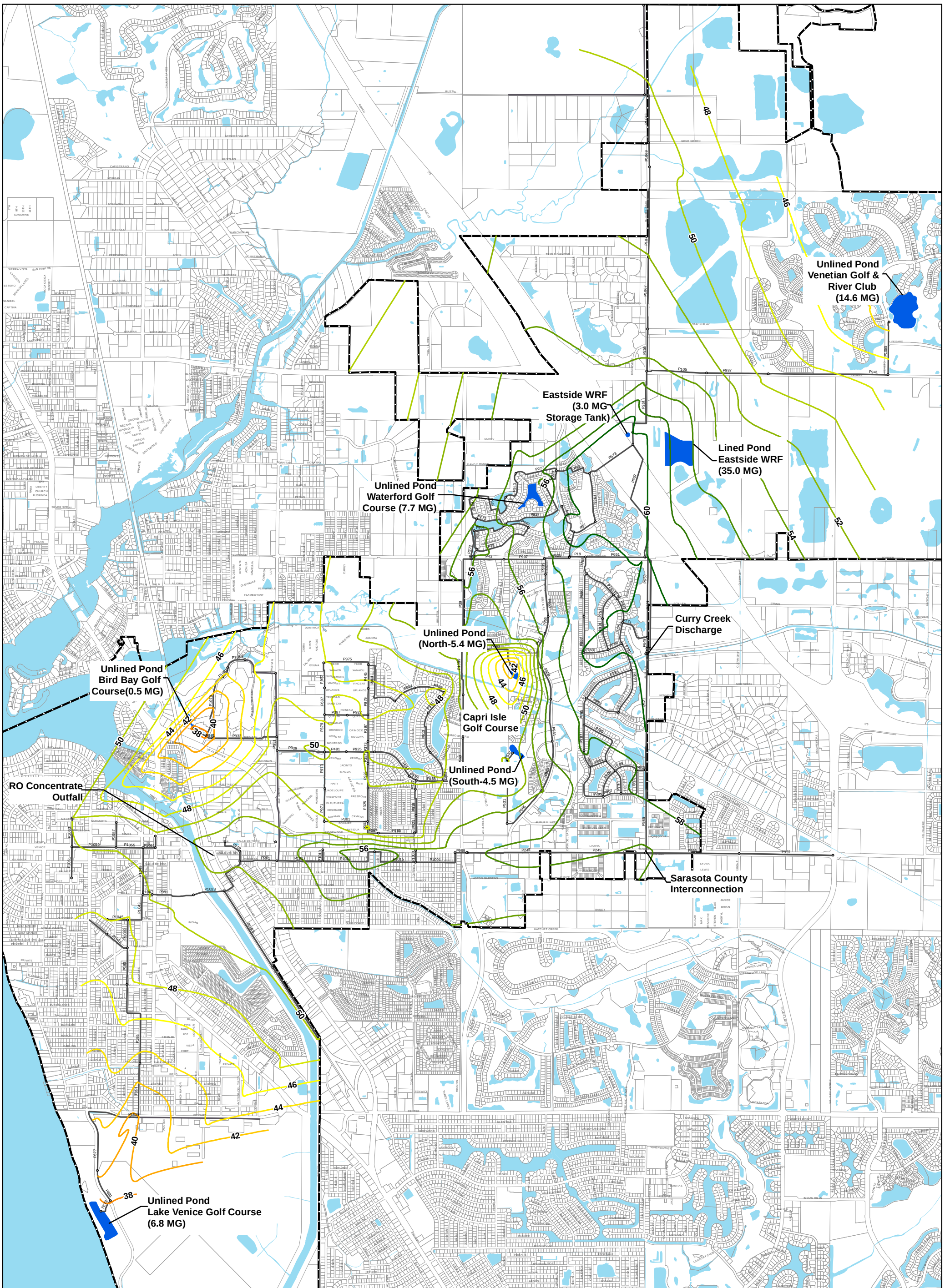
The 2025 pressure contours are shown in **Figure 7-4**. A new 12-inch reclaimed water pipe along Pinebrook Road between the intersections of Lucaya Avenue and East Venice Avenue will facilitate water from the proposed ground storage tanks and booster pump station at Wellfield Park to feed the 24-inch mainline on East Venice Avenue.

In 2030 the additional demand from two high demand potable water irrigation users were simulated in 2030 and found to not require improvements to the existing system. The capacity of the high service effluent pump station at the Eastside WRF was determined to have adequate capacity to meet the projected MMADF demands in 2030. The 2030 pressure contours are shown in **Figure 7-5**.

The improvements to the reclaimed water system east of I-75 are driven by the rate and nature of the development within the planning and JPA areas. It is recommended that the hydraulic model be updated as specific development plans are reviewed by the City to update the timing and extent of the improvements previously discussed.



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Legend

- Model Junction
- Model Pipe
- Reuse Storage
- City Boundary

32 psi
34 psi
36 psi
38 psi
40 psi
42 psi
44 psi
46 psi
48 psi
50 psi
52 psi
54 psi
56 psi
58 psi
60 psi

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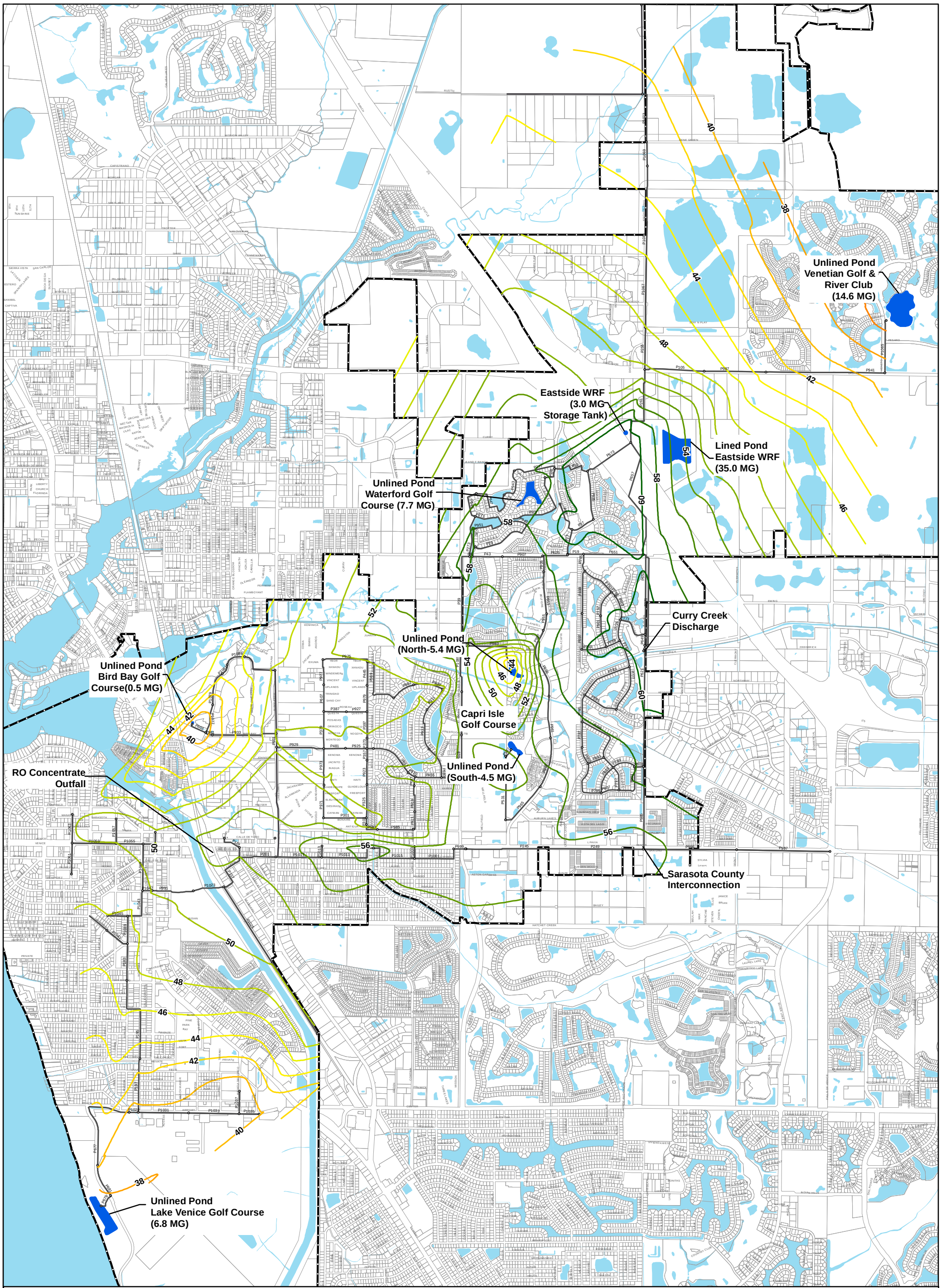
VENICE CITY ON THE GULF

Figure 7-4
Pressure Contours
Max Month Peak Hour Demand
with Improvements
Planning Year 2025



N
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Legend

- Model Junction
- Model Pipe
- Reuse Storage
- City Boundary

30 psi
32 psi
34 psi
36 psi
38 psi
40 psi
42 psi
44 psi
46 psi
48 psi
50 psi
52 psi
54 psi
56 psi
58 psi
60 psi

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VENICE CITY ON THE GULF

Figure 7-5
Pressure Contours
Max Month Peak Hour Demand
with Improvements
Planning Year 2030

8.0 CAPITAL IMPROVEMENT PROGRAM

8.1 Cost Factors

The cost factors used to estimate the reclaimed water system improvement project costs are presented in **Table 8-1** and **8-2**. All of the cost factors include design, administrative, construction, and contingency. **Table 8-3** shows the percentages of construction cost used to estimate the overall cost of the projects. The pipe cost estimates were derived from the contractor bids from 2009 through 2011.

Table 8-1: Pipe - Project Cost Estimates

Pipe Size & Material	Installed Cost (2012-$/LF)
6" PVC	$54
8" PVC	$63
10" PVC	$81
12" PVC	$90
14" PVC	$108
16" PVC	$144
18" PVC	$180
20" PVC	$216
24" PVC	$252

Table 8-2: Directionally Drilled Pipe - Project Cost Estimates

Directional Drill Pipe Size	Equivalent Pipe Size	Installed Cost (2012-$/LF)
6″ HDPE	4″ PVC	$90
8″ HDPE	6″ PVC	$135
10″ HDPE	8″ PVC	$180
12″ HDPE	10″ PVC	$216
14″ HDPE	12″ PVC	$225
16″ HDPE	14″ PVC	$235
18″ HDPE	16″ PVC	$378
20″ HDPE	18″ PVC	$422
24″ HDPE	20″ PVC	$468
30″ HDPE	24″ PVC	$617

Table 8-3: Pipeline Project Costs
Assumed Percentage of Construction Cost

Item	Percent of Construction
Engineering	20%
City Administrative	10%
Valves and Fittings	20%
Contingency	30%

8.2 Project Costs and Recommended Phasing Improvements

Tables 8-4 and **8-5** summarize the cost of each recommended reclaimed water system improvement project discussed in **Section 7**. The improvements listed have been assigned a project identification "R" number. The first digit of the "R" number corresponds to the phase in which it is recommended. The number one (1) is associated with planning year 2015, two (2) with planning year 2020, three (3) with planning year 2025, and four (4) with planning year 2030. **Figure 8-1** shows the locations of all recommended CIP improvements organized by planning year.

A rate impact analysis based on project capital cost assuming a 20 year bonding rate @ 5% interest was performed and included in **Table 8-4** and **8-5**. The rate impact identifies the charge per 1,000 gallons of reclaimed water consumed that would be required to recover the capital expenditure.

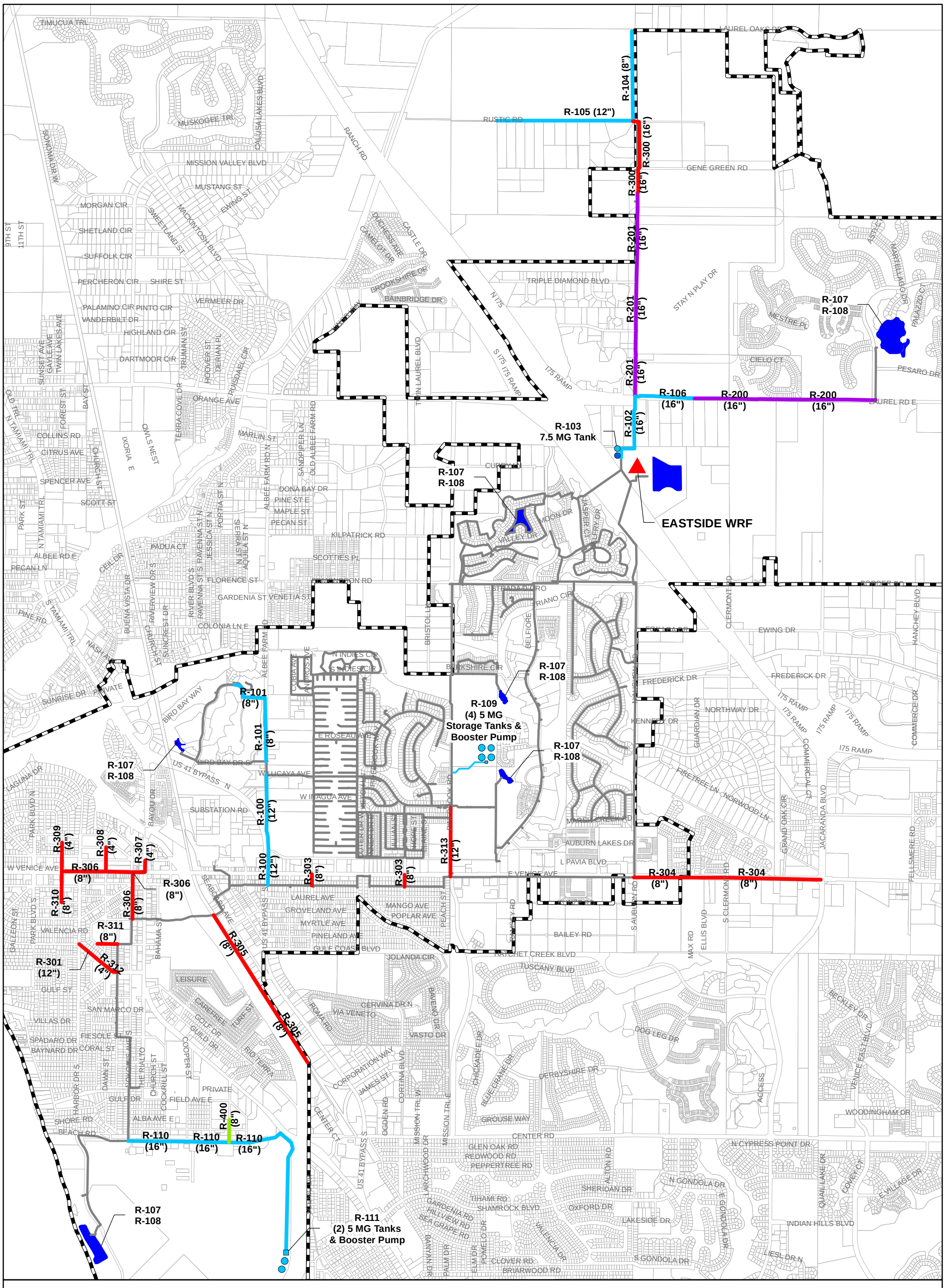


Figure 8-1
CIP Phasing

Table 8-4: Recommended Reclaimed Water System Improvements

Project ID	Project Description	2015	2020	2025	2030	Rate Impact $/1,000 gallons
R-100	Construct 3,296 LF of 12" pipe to create system loop.	$ 567,000				$ 0.037
R-101	Construct 1,829 LF of 8" pipe to create system loop.	$ 187,000				$ 0.012
R-102	Construct 2,146 LF of 16" pipe to replace existing 8" pipe.	$ 310,000				$ 0.002
R-104	Construct 2,564 LF of 8-inch pipe to extend service to future development.	$ 162,000				$ 0.011
R-105	Construct 3,902 LF of 12-inch pipe to extend service to future development.	$ 352,000				$ 0.023
R-106	Construct 1,726 LF of 16" to replace existing 8-inch pipe supplying future development.	$ 249,000				$ 0.016
R-107	Installation of reclaimed water management system for all bulk ponds.	$ 250,000				$ 0.016
R-110	Construct 3,479 LF of 16-inch pipe for Airport irrigation and future ground storage tank.	$ 501,000				$ 0.033
R-200	Construct 5,209 LF of 16" to replace existing 8-inch pipe supplying future development.		$ 751,000			$ 0.038

Table 8-4: Recommended Reclaimed Water System Improvements (Continued)

Project ID	Project Description	2015	2020	2025	2030	Rate Impact $/1,000 gallons
R-201	Construct 5,863 LF of 16" to replace existing 8-inch pipe supplying future development.		$ 845,000			$ 0.042
R-300	Construct 2,186 LF of 16" pipe to replace existing 8-inch pipe supplying future development.			$ 315,000		$ 0.014
R-301	Construct 650 LF of 12-inch pipe to connect existing dry lines to the reclaimed water system.			$ 90,000		$ 0.004
R-303	Construct 661 LF of 8-inch pipe to supply East Venice Ave median.			$ 80,000		$ 0.004
R-304	Construct 5,376 of 8-inch pipe to supply East Venice Ave median.			$ 339,000		$ 0.015
R-305	Construct 5,016 LF of 8-inch pipe to supply Venetian Waterway Park.			$ 317,000		$ 0.014
R-306	Construct 3,731 LF of 8-inch pipe to supply West Venice Ave median and Heritage Park.			$ 672,000		$ 0.030
R-307	Construct 338 LF of 4-inch pipe to supply Michael Biehl Park.			$ 60,000		$ 0.003
R-308	Construct 703 LF of 4-inch pipe to supply Dr. Fred Albee Park.			$ 90,000		$ 0.004

Table 8-4: Recommended Reclaimed Water System Improvements (Continued)

Project ID	Project Description	2015	2020	2025	2030	Rate Impact $/1,000 gallons
R-309	Construct 826 LF of 4-inch pipe to supply Prentiss French Park.			$ 80,000		$ 0.004
R-310	Construct 892 LF of 8-inch pipe to supply John Nolen Park.			$ 161,000		$ 0.007
R-311	Construct 576 LF of 8-inch pipe to supply West Blalock Park and Arboretum and East Blalock Park			$ 75,000		$ 0.003
R-312	Construct 731 LF of 4-inch pipe to supply Venezia Park.			$ 75,000		$ 0.003
R-313	Construct 2,073 LF of 12-inch pipe to create loop for Wellfield Park storage tank.			$ 187,000		$ 0.008
R-400	Construct 370 LF of 8-inch pipe to supply high demand potable water irrigation user.				$ 80,000	$ 0.003
Total		**$ 2,578,000**	**$ 1,596,000**	**$ 2,541,000**	**$ 80,000**	**$ 0.364**

Table 8-5: Recommended Reclaimed Water Storage Improvements

Project ID	Project Description	2015	2020	2025	2030	Rate Impact $/1,000 gallon
R-103	Construct 7.5 MG RCW storage tank at the Eastside WRF.	$ 7,500,000				$ 0.488
R-108	Site hydraulic capacity feasibility study for all bulk	$ 125,000				$ 0.008
R-109	Construct four 5 MG of RCW storage tank with booster pump station and 12-inch pipe at the Wellfield Park Site.	$20,842,000				$ 1.357
R-111	Construct two 5 MG RCW storage tank with booster pump station at the Venice Municipal Airport.	$11,072,000				$ 0.721
Total		**$39,539,000**	**$ 0**	**$ 0**	**$ 0**	**$ 2.574**

8.3 Cost Summary

It is important to note that the summary of capital costs include over 41 million dollars in storage tank additions. These additional tanks are not required based on the existing permitted systems for disposal of reclaimed water in wet weather events. The decision to include some or all of these tanks will depend on the developing needs of reclaimed water customers, potential for cost recovery through increased reclaimed water sales and charges, the realization of the increases in wastewater flow as predicted in the planning section of this master plan, and the continued use by Sarasota County of the Venice Eastside WRF at the projected rates. These storage tank projects and some of the piping system expansion projects should be evaluated at least every 5 years to adjust the City's

capital improvement program to reflect actual needs as growth develops and other factors are considered.

Table 8-6 summarizes the recommended reclaimed water system improvements that were provided on **Tables 8-4** and **8-5**. The total of all improvements over the planning periods is $42,117,000. The cost of improvements not including the nonessential storage tanks is $6,795,000.

Table 8-6: Estimated Capital Improvement Costs by Phasing Period

Type of Improvement	2012-2015	2015-2020	2020-2025	2025-2030	Totals
Reclaimed Water System	$ 2,578,000	$ 1,596,000	$ 2,541,000	$ 80,000	$ 6,795,000
Reclaimed Water Storage	$39,539,000	$ 0	$ 0	$ 0	$39,539,000
Totals	**$42,117,000**	**$ 1,596,000**	**$ 2,541,000**	**$ 80,000**	**$46,334,000**

9.0 OTHER CONSIDERATIONS

9.1 Irrigation at Venice Municipal Airport

Based on the total estimated irrigable area and an application rate of 0.5 inches/week, the demand at the Venice Municipal Airport could be as large as 638,479 gpd. This potential quantity of reclaimed water demand makes the airport a significant disposal option.

The increased demand was entered into the 2030 AADF and MMADF scenarios to evaluate the system impacts. During AADF the system pressure does not drop below 40 psi in the pipeline supplying the airport. During MMADF the combination of bulk users and max month peak hour peaking factors was simulated to drop the system pressure to zero at the airport. The existing reclaimed water pipeline is undersized and would require an upsized or parallel pipe to satisfy these increased demands.

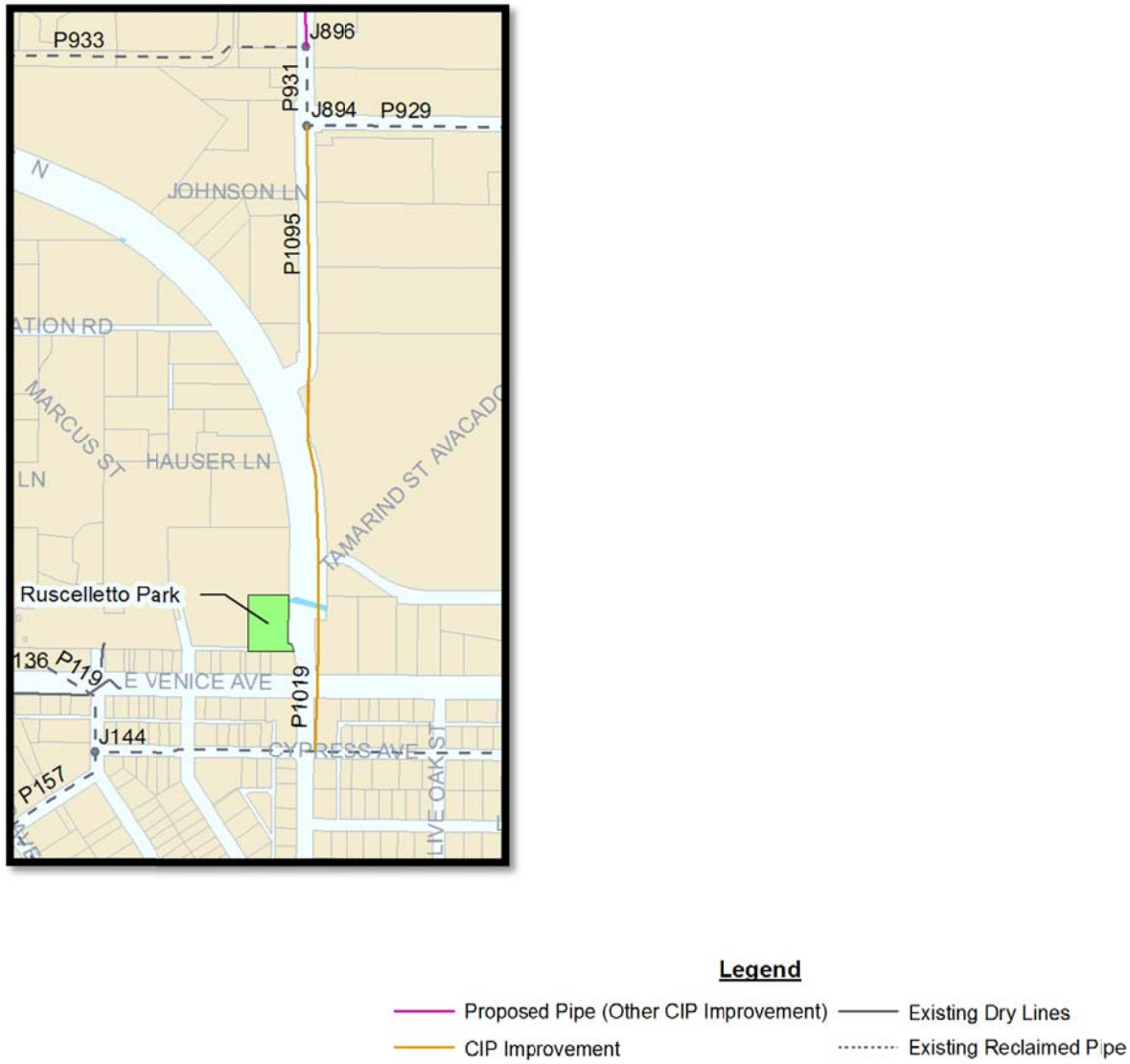
APPENDIX A

CIP Improvement Summaries

Planning Year 2015
Reclaimed Water Distribution System Improvement, R-100

At the intersection of Lucaya Ave and Albee Farm Rd there is an 8-inch reclaimed water main at the intersection of US 41 Bypass and Cypress Ave there is an 18-inch reclaimed water main. It is recommended that a 12-inch reclaimed water main (model element P1095 and P1019) approximately 3,296 feet be constructed to connect the existing mains (1,296 ft open cut and 2,000 ft HDD). This connection will create a system loop that will improve pressures in the Bay Indies and Bird Bay areas.

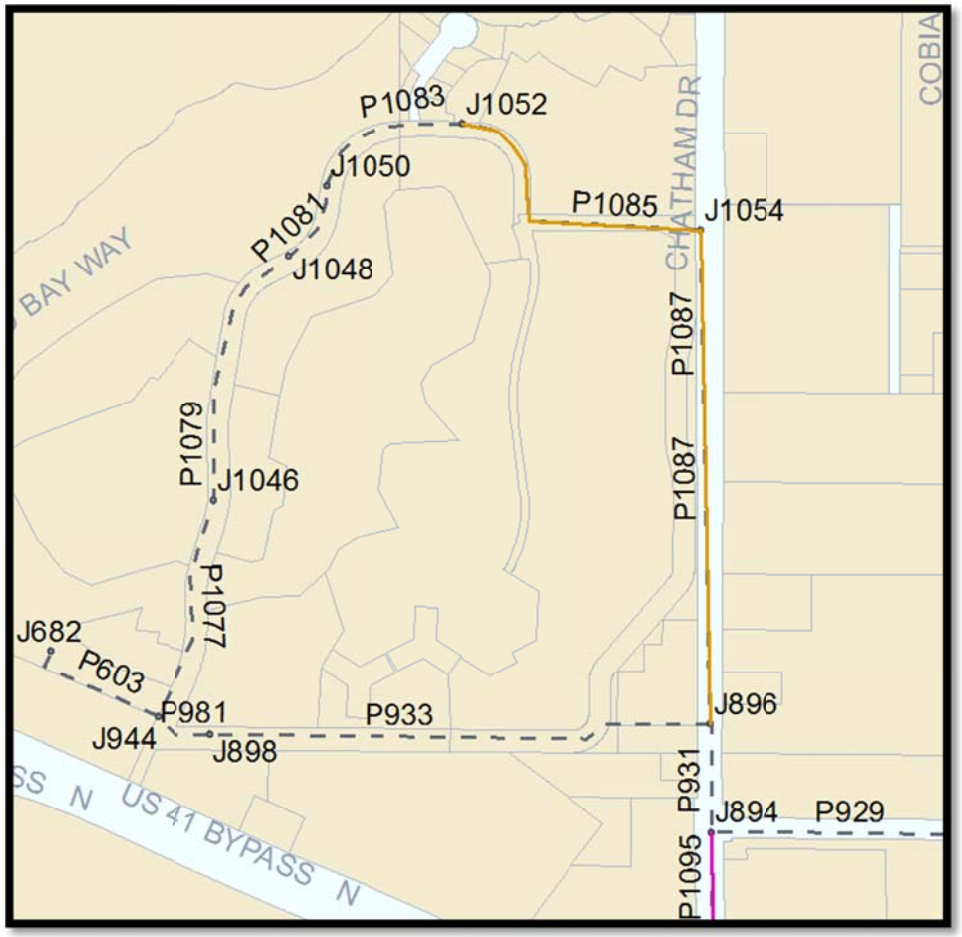
The associated cost with this project is estimated at $567,000, which includes engineering, contingency, and administration cost.



Planning Year 2015
Reclaimed Water Distribution System Improvement, R-101

At the north end of Bird Bay Dr. there is an existing 6-inch reclaimed water main. North of the intersection of Albee Farm Rd and Lucaya Ave is an existing 8-inch reclaimed water main. It is recommended that an 8-inch reclaimed water main (model elements P1087 and P1085) approximately 1,829 feet be constructed by horizontal directional drill to connect these mains. This connection will create a system loop that will improve pressures in the Bay Indies and Bird Bay areas.

The associated cost with this project is estimated at $187,000, which includes engineering, contingency, and administration cost.



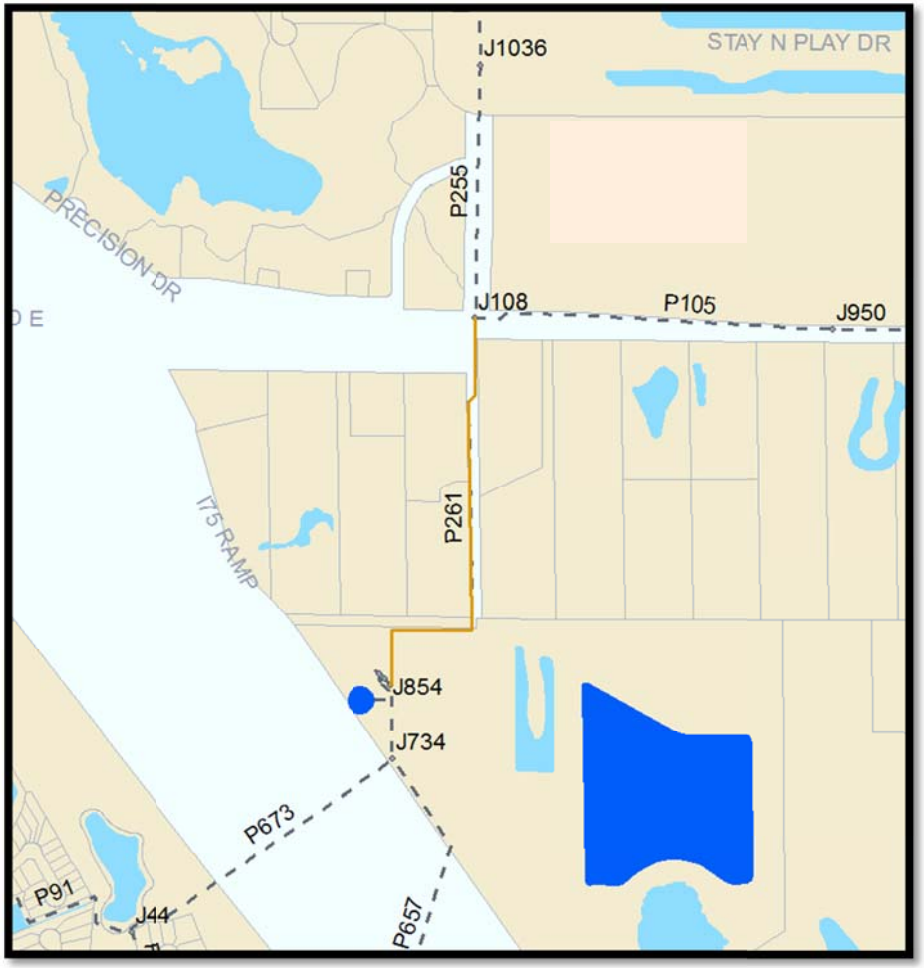
Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2015
Reclaimed Water Distribution System Improvement, R-102

Located at Eastside WRF there is an 8-inch reclaimed water main that continues north to the intersection with Laurel Rd. Based on reclaimed water flow projections, it is recommended that the existing pipe be replaced by open cut with 2,146 feet of 16-inch PVC pipe (model element P261).

The associated cost with this project is estimated at $310,000, which includes engineering, contingency, and administration cost.



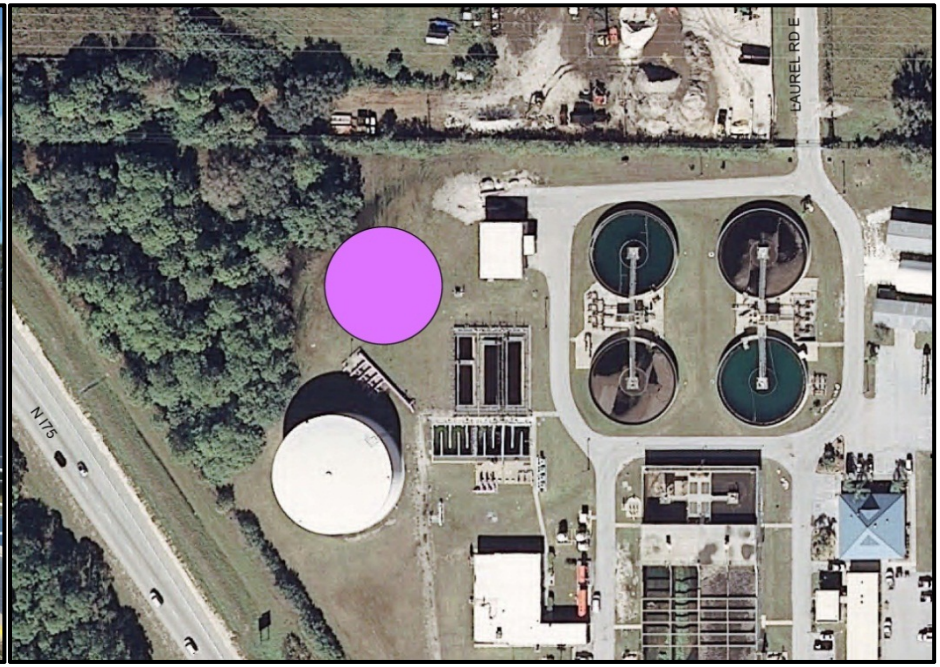
Legend

- Proposed Pipe (Other CIP Improvement)
- CIP Improvement
- Existing Dry Lines
- Existing Reclaimed Pipe

Planning Year 2015
Water Reclamation Facility Improvement, R-103

A 7.5 MG RCW GST would provide additional RCW storage during normal operation and provide operational flexibility should a GST need to be out of service for maintenance. A protocol can be put into place where the new GST tank is to be drained during the early period of a reject event. Once emptied, the tank would be available for reject storage.

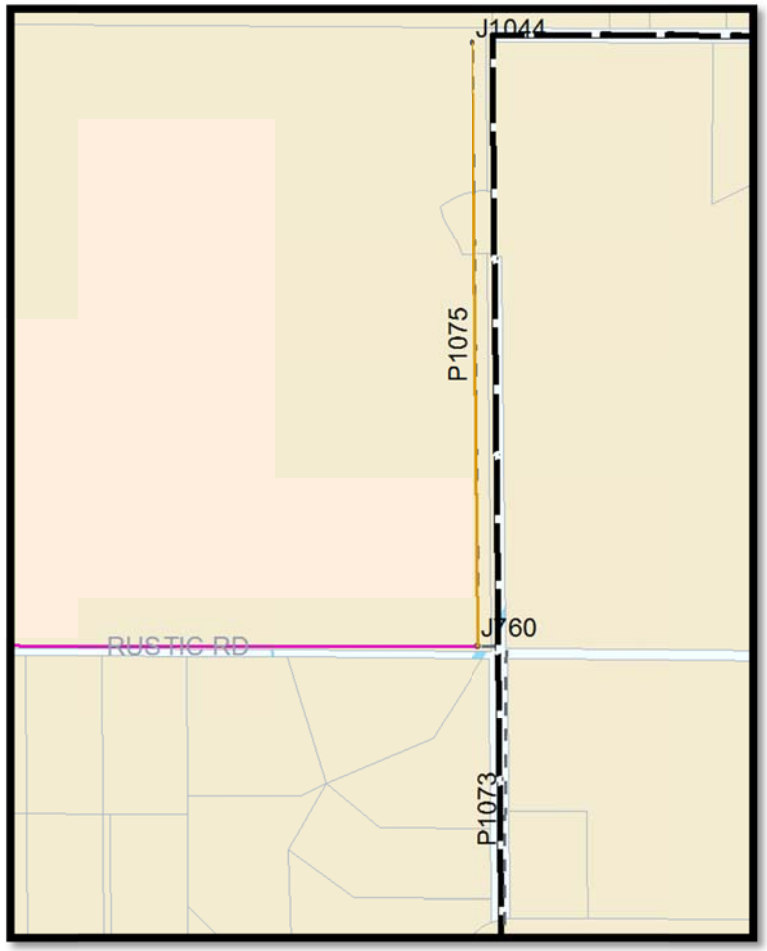
The associated cost with this project is estimated at $7,500,000, which includes engineering, contingency, and administration cost.



Planning Year 2015
Reclaimed Water Distribution System Improvement, R-104

Located at the intersection of Rustic Rd and Knights Trail Rd there is an existing 8-inch reclaimed water main. Based on reclaimed water flow projections of future developments, it is recommended that 2,564 feet of 8-inch PVC pipe (model element P1075) be constructed by open cut north along Knights Trail Rd.

The associated cost with this project is estimated at $162,000, which includes engineering, contingency, and administration cost.



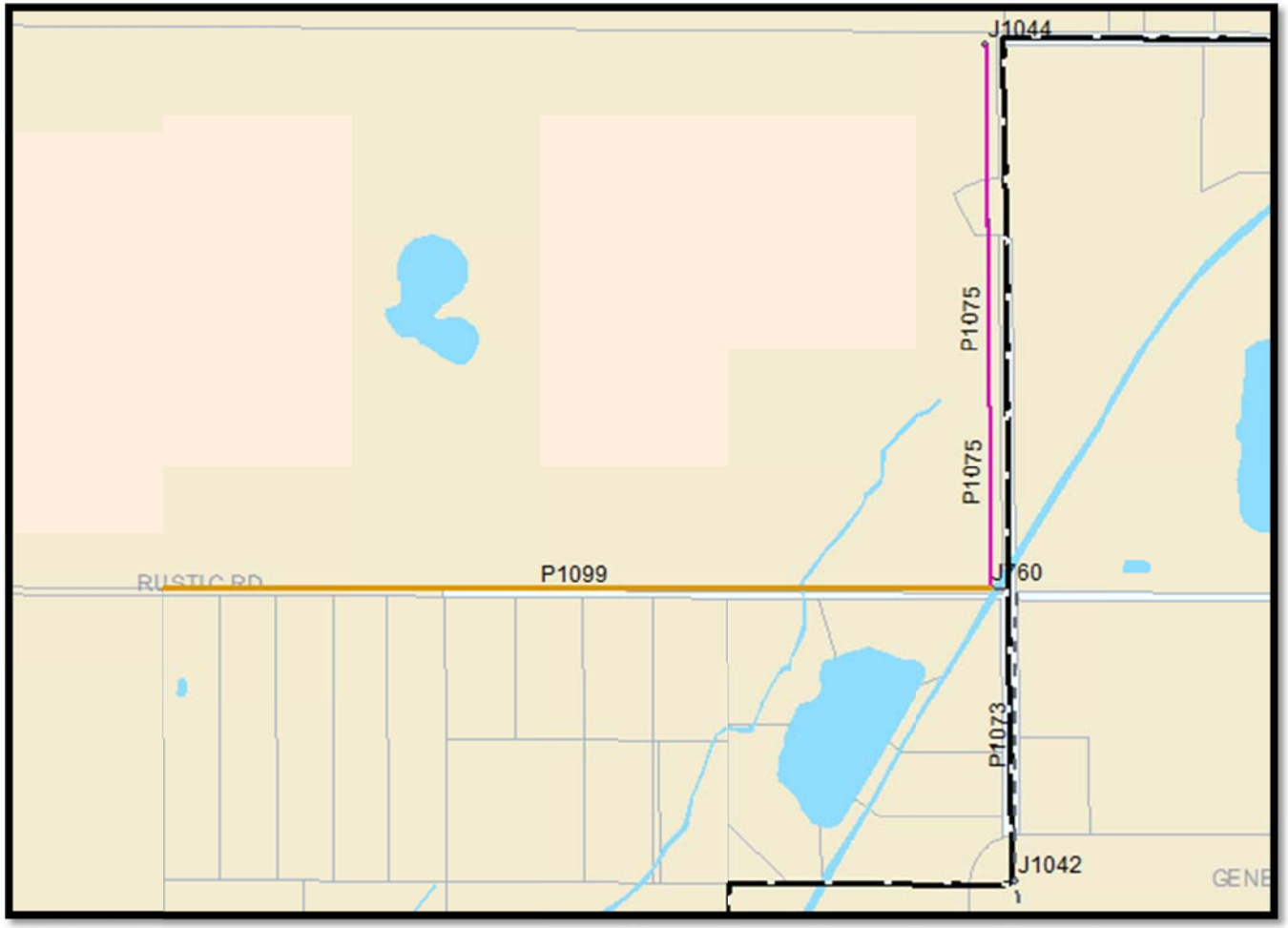
Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2015
Reclaimed Water Distribution System Improvement, R-105

Located at the intersection of Rustic Rd and Knights Trail Rd there is an existing 8-inch reclaimed water main. Based on reclaimed water flow projections of future developments, it is recommended that approximately 3,902 feet of 12-inch PVC pipe (model element P1099) be constructed by open cut west along Rustic Rd to provide reclaimed water service to the midpoint of future development within JPA Area 1.

The associated cost with this project is estimated at $352,000, which includes engineering, contingency, and administration cost.



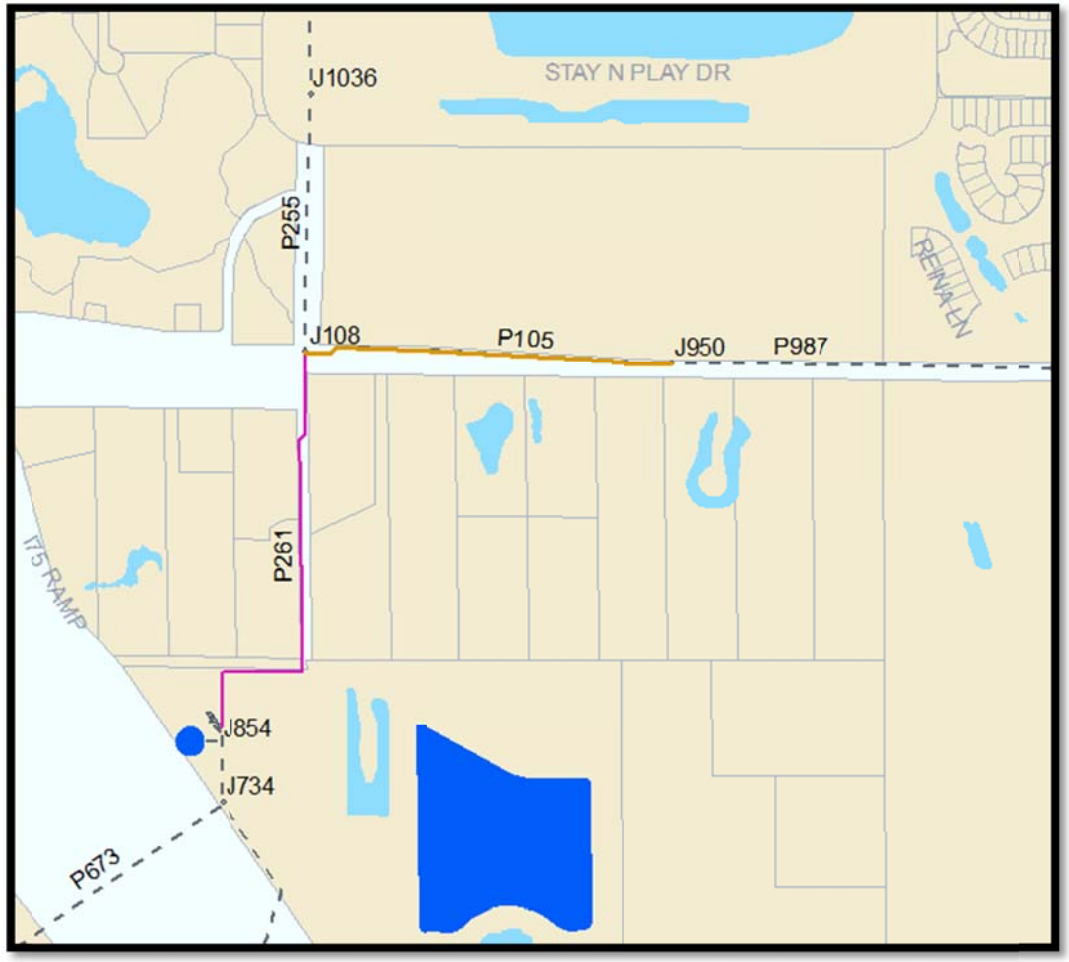
Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2015
Reclaimed Water Distribution System Improvement, R-106

Located at the intersection of Laurel Rd E and Knights Trail Rd there is an existing 8-inch reclaimed water main. Based on reclaimed water flow projections of future developments, it is recommended that the existing pipe be replaced by open cut with 1,726 feet of 16-inch PVC pipe (model element P105).

The associated cost with this project is estimated at $249,000, which includes engineering, contingency, and administration cost.



Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2015
Reclaimed Water Delivery Management System, R-107

There are five bulk users that receive reclaimed water by filling their on-site storage ponds. The flow to the ponds is currently controlled by a pressure sustaining valve and in most cases a mechanical pond level float. In order to better control the amount of flow to the bulk users, it is recommended that a delivery management system consisting of a pressure sustaining valve, magnetic meter, automated valve, and telemetry be installed at each bulk user's reclaimed water delivery point.

The associated cost with this project is estimated at $50,000 per site, which includes engineering, contingency, and administration cost.

Planning Year 2015
Reclaimed Water System Site Hydraulic Capacity Feasibility Study, R-108

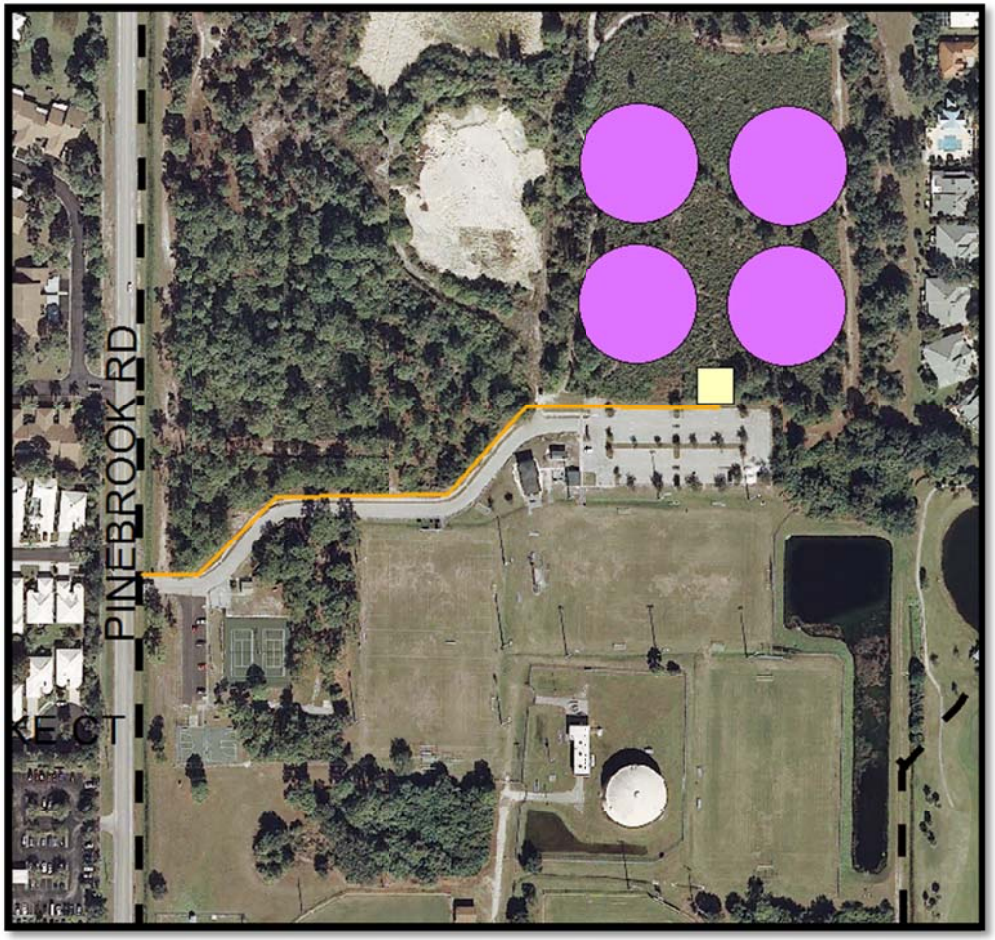
There are five golf courses (bulk users) that receive reclaimed water and are permitted to apply the water to the golf courses at an average rate of 0.63 inches/week. Since the City is responsible to dispose of the first 2 MGD of reclaimed water generated by wastewater receive from Sarasota County, it is recommended that a Hydraulic Capacity Feasibility Study be conducted for each site to determine if the application rate can be increased to 1.0 inch/week. The increase in application rate will maximize the beneficial reuse of the reclaimed water and minimize disposal.

The associated cost with this project is estimated at $25,000 per site, which includes engineering, contingency, and administration cost.

Planning Year 2015
Reclaimed Water Storage System Improvement, R-109

Four 5MG RCW ground storage tanks would provide additional RCW storage during normal operation and for storage required in the future. In addition to the ground storage tanks, there will be a booster pump station and 1085 feet of 12-inch reclaimed water main from the existing main on Pinebrook Rd.

The associated cost with this project is estimated at $20,848,000, which includes engineering, contingency, and administration cost.



Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2015
Reclaimed Water Distribution System Improvement, R-110

At the intersection of Airport Ave W and Nokomis Ave S there is an existing 12 in reclaimed water main. In order to provide reclaimed water to Venice Municipal Airport, which has a potential irrigation demand up to 639,000 gpd and create a feed to a proposed reclaimed water storage tank on the east side of the airport site, it is recommended that a 16-inch PVC pipe (model element P1035, P1033, and P1035) approximately 3,479 feet be constructed by open cut from the existing main east along Airport Ave.

The associated cost with this project is estimated at $501,000, which includes engineering, contingency, and administration cost.

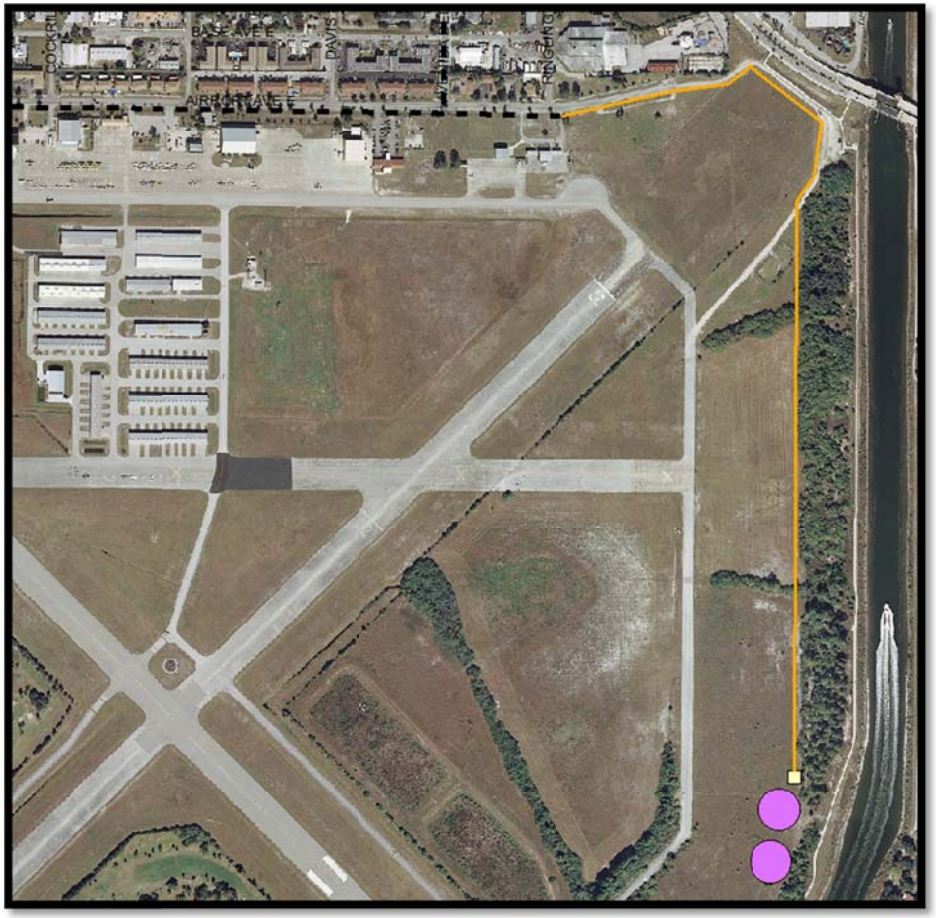
Legend

- Proposed Pipe (Other CIP Improvement)
- CIP Improvement
- Existing Dry Lines
- Existing Reclaimed Pipe

Planning Year 2015
Reclaimed Water Storage System Improvement, R-111

Two 5MG RCW ground storage tanks would provide additional RCW storage during normal operation and for storage required in the future. In addition to the ground storage tanks, there will be a booster pump station and approximately 1,980 feet of 16-inch reclaimed water main from the proposed main on Airport Ave to the GST site would be located within the Venice Municipal Airport.

The associated cost for this project is estimated at $11,072,000, which includes engineering, contingency, and administration cost.



Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2020
Reclaimed Water Distribution System Improvement, R-200

Near the intersection of Laurel Rd E and Mestre Pl there is an existing 8-inch reclaimed water main that continues west to Veneto Blvd. Based on reclaimed water flow projections of future developments, it is recommended that the existing pipe be replaced by open cut with 5,209 feet of 16-inch PVC pipe (model element P987 and P941).

The associated cost with this project is estimated at $751,000, which includes engineering, contingency, and administration cost.

Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2020
Reclaimed Water Distribution System Improvement, R-201

At the intersection of Laurel Rd E and Knights Trail Rd there is an existing 8-inch reclaimed water main. Based on reclaimed water flow projections of future developments, it is recommended that the existing pipe be replaced by open cut with 5,863 feet of 16-inch PVC pipe (model elements P225, P1067, and P1071).

The associated cost with this project is estimated at $845,000, which includes engineering, contingency, and administration cost.

Legend

- Proposed Pipe (Other CIP Improvement)
- CIP Improvement
- Existing Dry Lines
- Existing Reclaimed Pipe

Planning Year 2025
Reclaimed Water Distribution System Improvement, R-300

At the intersection of Laurel Rd E and Knights Trail Rd there is an existing 8-inch reclaimed water main. Based on reclaimed water flow projections of future developments, it is recommended that the existing pipe be replaced by open cut with 2,186 feet of 16-inch PVC pipe (model elements P1069 and P1073).

The associated cost with this project is estimated at $315,000, which includes engineering, contingency, and administration cost.

Legend

- Proposed Pipe (Other CIP Improvement)
- CIP Improvement
- Existing Dry Lines
- Existing Reclaimed Pipe

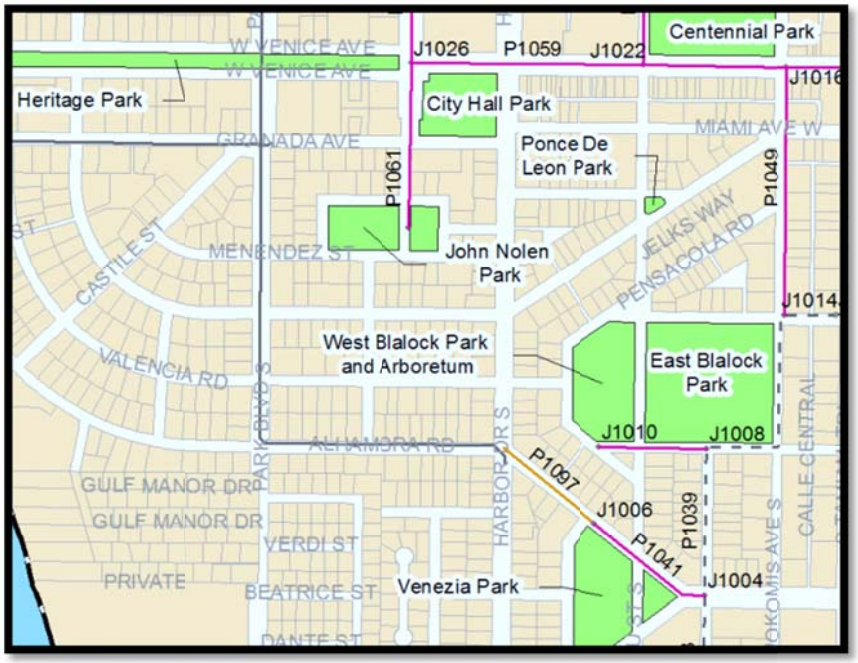
Planning Year 2025
Reclaimed Water Distribution System Improvement, R-301

Located along Granada Ave, Park Blvd, and Alhambra Rd is an abandoned force main. It is recommended that the force main be connected to the existing reclaimed water system in order to provide reclaimed water for irrigation to Venezia Park and Heritage Park, which has a total irrigation demand of 12,000 gpd. In order to provide irrigation a 12-inch HDPE pipe (P1097) approximately 650 feet will be constructed by horizontal directional drill from the existing reclaimed water main along Salerno St west to connect to the abandoned force main.

The associated cost with this project is estimated at $90,000, which includes engineering, contingency, and administration cost.

An alternative to the above connection is the connection of the abandoned force main located at the intersection of Park Blvd and W Venice Ave to the proposed reclaimed water system along W Venice Ave. In order to construct the connection, an 8-inch HDPE pipe approximately 810 feet will be constructed by horizontal directional drill.

The associated cost with this project is estimated at $110,000, which includes engineering, contingency, and administration cost.



Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

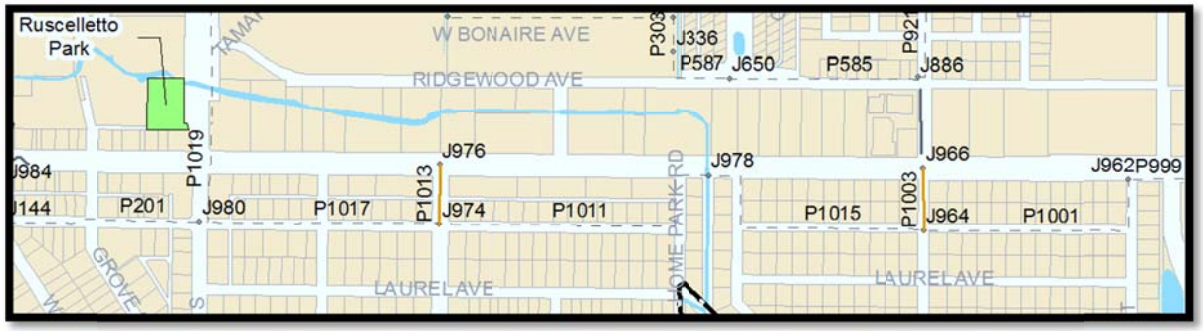
Planning Year 2025
Reclaimed Water Distribution System Improvement, R-303

At the intersection of E Venice Ave and Cherry St in the northeast corner is Wells Fargo Bank. In the year 2011, 6,600 gpd of potable water was used for irrigation. It is recommended that reclaimed water be made available to Wells Fargo Bank for irrigation by constructing approximately 338 feet of 8-inch PVC pipe by open cut (model element P1003) that would connect to the existing main at the intersection of Cypress St and Cherry St.

Located at 115 US 41 Bypass N is Ruscelletto Park with an irrigation demand of 700 gpd. It is recommended that the park's irrigation system be connected to the proposed 12-inch reclaimed water main (model element P1095) located along US 41 Bypass.

Along E Venice Ave from the bridge to the City limits there are medians with an irrigation demand of 6,300 gpd. In addition to the reclaimed water main suggested for Wells Fargo, there will be an additional 8-inch PVC pipe (model element P1013) constructed by open cut along Country Club Way approximately 323 feet long from the existing main along Cypress Ave. These two mains and proposed US 41 Bypass main will provide connection points for irrigation systems within the medians located to the east and west of each new main. There will also be connection points along the existing main that crosses E Venice Ave at Warfield Ave N, the main that runs along E Venice Ave from Home Park Rd to E Gate Dr, and the main that runs east from Peach St and Venice Ave.

The associated cost with this project is estimated at $80,000, which includes engineering, contingency, and administration cost.



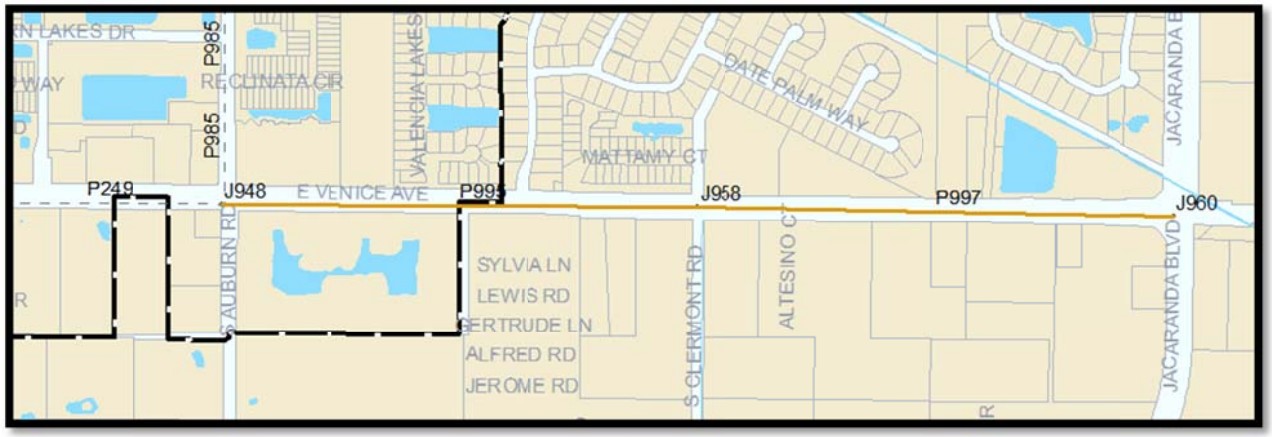
Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2025
Reclaimed Water Distribution System Improvement, R-304

Located along E Venice Ave from Auburn Rd to Jacaranda Blvd there are medians with an irrigation demand of 3,000 gpd. In order to provide irrigation an 8-inch PVC pipe (model elements P995, P997) will be constructed by open cut and extend the main east 5,376 feet to Jacaranda Blvd.

The associated cost with this project is estimated at $339,000, which includes engineering, contingency, and administration cost.



Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2025
Reclaimed Water Distribution System Improvement, R-305

Located southeast of the E Venice Ave Bridge is the Venetian Waterway Park that has an irrigation demand of 40,000 gpd. In order to provide irrigation an 8-inch PVC pipe (model elements P1025 and P1027) will be constructed by open cut approximately 5,016 feet along the park to the point where the park turns south.

The associated cost with this project is estimated at $317,000, which includes engineering, contingency, and administration cost.

Legend

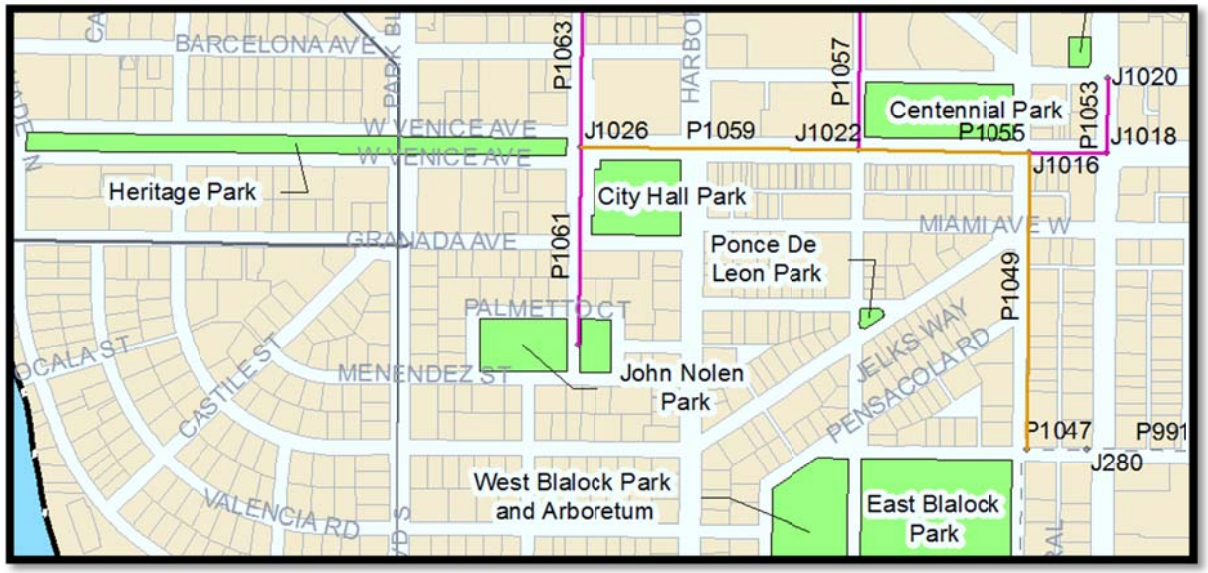
- Proposed Pipe (Other CIP Improvement)
- CIP Improvement
- Existing Dry Lines
- Existing Reclaimed Pipe

Planning Year 2025
Reclaimed Water Distribution System Improvement, R-306

Located at the west side of E Venice Ave Bridge continuing west to Heritage Park there is are medians with an irrigation demand of 2,200 gpd. In order to provide irrigation an 8-inch HDPE pipe (model elements P1015, P1055, P1059) approximately 2,390 feet will be constructed by horizontal directional drill from the intersection of Tamiami Trail and E Venice Ave to the east entrance of Heritage Park. The main that will supply water to the median will be connected to the existing system by the construction of an 8-inch HDPE pipe (model element P1047) by horizontal directional drill. It is approximately 1,341 feet long and located along Nokomis Ave S to W Venice Ave from the existing main located at the intersection of Milan Ave W and Nokomis Ave S.

The 8-inch reclaimed water main that will be constructed along W Venice Ave will also supply reclaimed water for irrigation of Heritage Park which has an irrigation demand of 5,200 gpd.

The associated cost with this project is estimated at $672,000, which includes engineering, contingency, and administration cost.



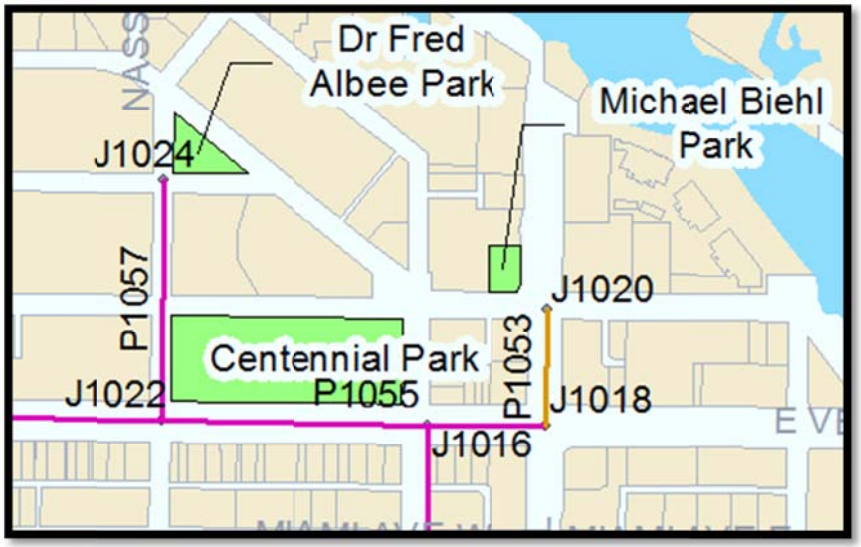
Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2025
Reclaimed Water Distribution System Improvement, R-307

Located at the intersection of N Tamiami Trail and Tampa Ave E is Michael Biehl Park, which has an irrigation demand of 180 gpd. In order to provide irrigation, a 4-inch HDPE pipe (model element P1053) approximately 338 feet will be constructed by horizontal directional drill from the proposed reclaimed water main along W Venice Ave north to the intersection of Tampa Ave E and N Tamiami Trail.

The associated cost with this project is estimated at $60,000, which includes engineering, contingency, and administration cost.



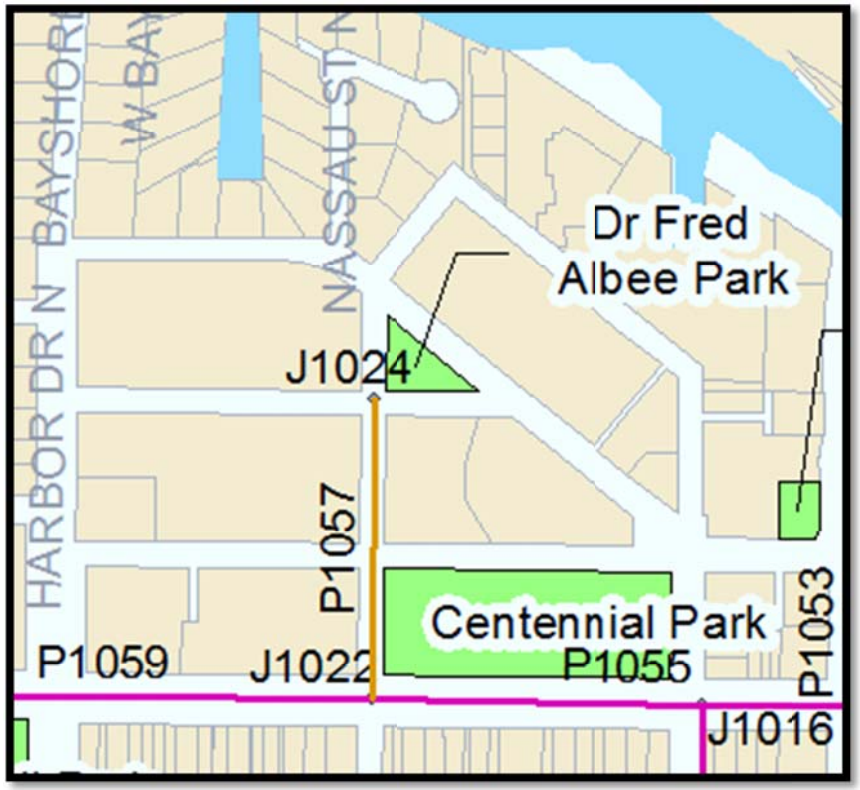
Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2025
Reclaimed Water Distribution System Improvement, R-308

Located at the intersection of Nassau St N and Sarasota St is Dr. Fred Albee Park, which has an irrigation demand of 600 gpd. In order to provide irrigation, a 4-inch HDPE pipe (model element P1057) approximately 703 feet will be constructed by horizontal directional drill from the proposed reclaimed water main along W Venice Ave. Also connected on this proposed reclaimed water main is Centennial Park which has an irrigation demand of 2,250 gpd.

The associated cost with this project is estimated at $90,000, which includes engineering, contingency, and administration cost.



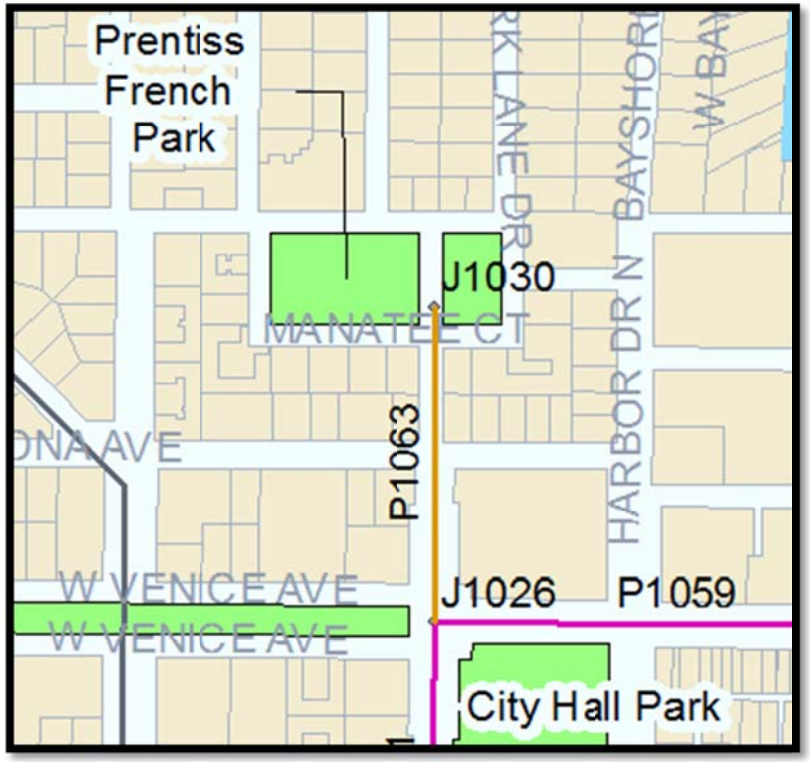
Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2025
Reclaimed Water Distribution System Improvement, R-309

Located at the intersection of Manatee Ct and Avenue Des Parques N is Prentiss French Park, which has an irrigation demand of 4,000 gpd. In order to provide irrigation, a 4-inch HDPE pipe (model element P1063) approximately 826 feet will be constructed by horizontal directional drill from the proposed reclaimed water main along W Venice Ave.

The associated cost with this project is estimated at $80,000, which includes engineering, contingency, and administration cost.



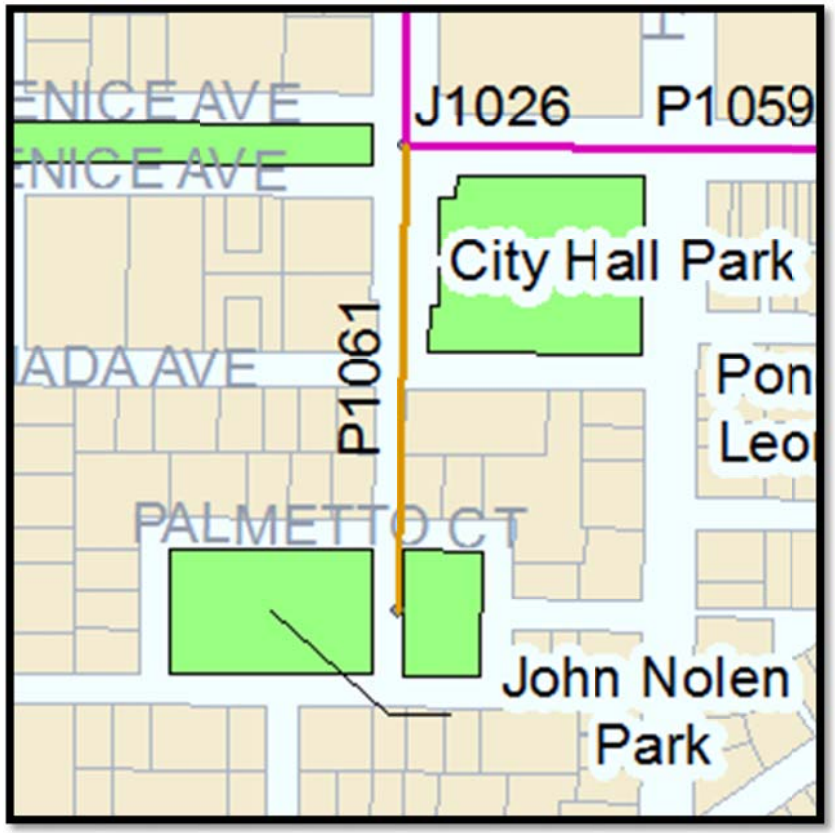
Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2025
Reclaimed Water Distribution System Improvement, R-310

Located at the intersection of Avenue Des Parques S and Palmetto Ct is John Nolen Park, which has an irrigation demand of 4,000 gpd. In order to provide irrigation, an 8-inch HDPE pipe (model element P1061) approximately 892 feet will be constructed by horizontal directional drill from the proposed reclaimed water main along W Venice Ave. Also connected on the proposed reclaimed water main is City Hall Park which has an irrigation demand of 1,800 gpd.

The associated cost with this project is estimated at $161,000, which includes engineering, contingency, and administration cost.



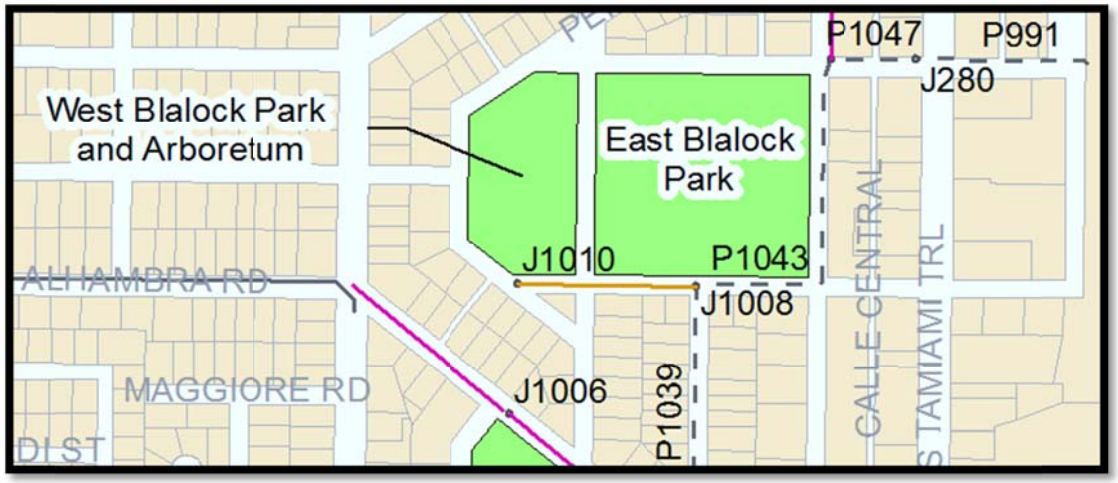
Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2025
Reclaimed Water Distribution System Improvement, R-311

Located at the intersection of Turin St W and Nassau St S is West Blalock Park and Arboretum and East Blalock Park, each has an irrigation demand of 6,000 gpd. In order to provide irrigation an 8-inch PVC pipe (model element P1045) approximately 576 feet will be constructed by open cut from the existing reclaimed water main west along Turin St W.

The associated cost with this project is estimated at $75,000, which includes engineering, contingency, and administration cost.



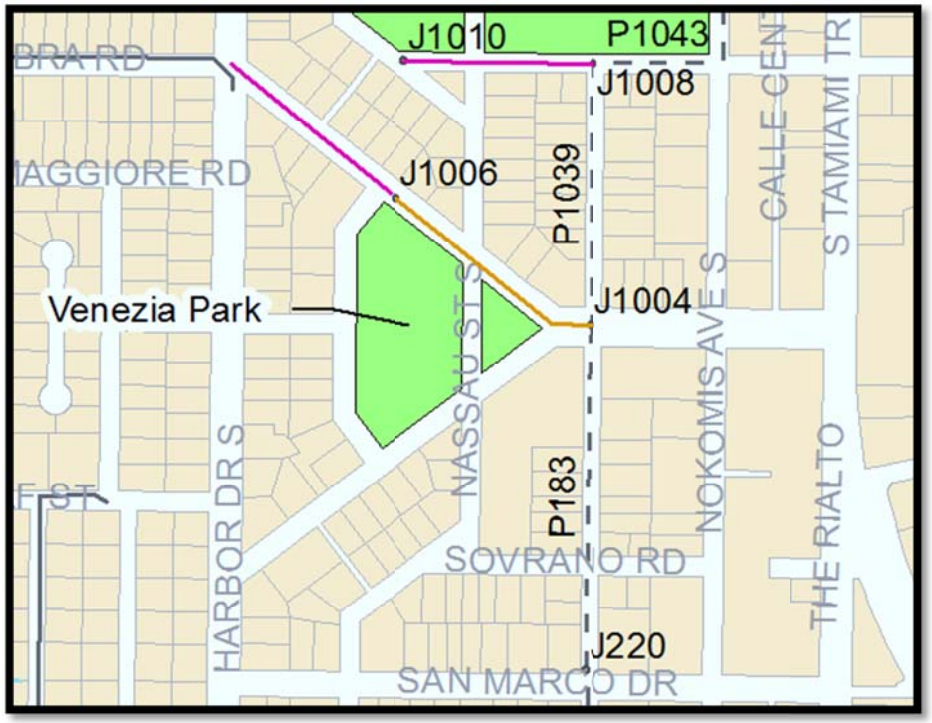
Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2025
Reclaimed Water Distribution System Improvement, R-312

Located at the intersection of Sorrento St, Salerno St, and Palermo Pl is Venezia Park, which has an irrigation demand of 6,700 gpd. In order to provide irrigation, a 4-inch HDPE pipe (model element P1041) approximately 731 feet will be constructed by open cut from the existing reclaimed water main along Riviera St west on Palermo.

The associated cost with this project is estimated at $75,000, which includes engineering, contingency, and administration cost.



Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2025
Reclaimed Water Distribution System Improvement, R-313

Located at the intersection Pinebrook Rd and Lucaya Ave there is a 10-inch reclaimed water main and south near the intersection of Pinebrook Rd and Venice Ave there is an 18-inch reclaimed water main. In the event that a Pinebrook Rd improvement project occurs it is recommended that approximately 2073 feet of 12-inch PVC pipe (model element P1103) be constructed in order to facilitate flow to the southwest area of the system from the proposed ground storage tank and booster pumps station at Wellfield Park.

The associated cost with this project is estimated at $187,000, which includes engineering, contingency, and administration cost.

An alternative to the above connection is the connection of the 24-inch reclaimed water main located at the intersection of E Venice Ave and Capri Isles Blvd to the 8-inch reclaimed water main located near the intersection of Ridgewood Ave and Capri Isles Blvd. Following the installation of a ground storage tank and booster pump station at Wellfield Park, the connection of these two mains by approximately 492 feet of 8-inch HDPE pipe is recommended in order to facilitate flow to the southwest area of the system.

Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

Planning Year 2030
Reclaimed Water Distribution System Improvement, R-400

Located at the intersection of Avenida Del Circo and Base Ave E is Clare Bridge, which has an irrigation demand of 7,000 gpd. In order to provide irrigation, an 8-inch PVC pipe (model element P1037) approximately 370 feet will be constructed by open cut from the proposed reclaimed water main along Airport Ave.

The associated cost with this project is estimated at $80,000, which includes engineering, contingency, and administration cost.

Legend

Proposed Pipe (Other CIP Improvement)
CIP Improvement
Existing Dry Lines
Existing Reclaimed Pipe

APPENDIX B

References and Definitions

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Definitions

10-States	Recommended Standards for Wastewater Facilities
3-MADF	3-Month Rolling Average Daily Flow
AADF	Average Annual Daily Flow
ADF	Average Daily Flow
BEBR	Bureau of Economic Research
C	Celsius
CAR	Capacity Analysis Report
CIP	Capital Improvement Project
City	The City of Venice
Cl	Chlorine
County	Sarasota County
D	Diameter of Pipe
DMR	Daily Monitoring Report
DO	Dissolved Oxygen
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FLUM	Future Land Use Map
fps	Feet per Second
ft	Feet
ft/s	Feet per Second
gal	Gallons
gal/mo	Gallons/Month
GIS	Geographic Information System
gpcpd	Gallons per Capita per Day
gpd	Gallons per Day
gpm	Gallons per Minute
GST	Ground Storage Tank
HDPE	High Density Polyethylene
hp	Horse Power
hr	Hour
in	Inches
in/week	Inches per Week
IR	Internal Recycle
J	Junction (Model Elements)

JPA	Joint Planning Agreement
JPA/ILSBA	Joint Planning and Interlocal Service Boundary Agreement
LF	Linear Foot
M&C	McKim and Creed, Inc.
MDF	Max Daily Flow
MG	Million Gallons
mg/l	Milligram per Liter
MGD	Million Gallons per Day
MMADF	Max Month Average Daily Flow
MTMADF	Max 3-Month Average Daily Flow
NGVD	National Geodetic Vertical Datum
O&M	Operation and Maintenance
P	Pipe (Model Elements)
PDF	Peak Day Flow
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
Qty.	Quantity
R&R	Refurbished and/or Replaced
RCW	Reclaimed Water
RO	Reverse Osmosis
RWS	Reclaimed Water System
SC	Sarasota County
SCADA	Supervisory Control and Data Acquisition
sf	Square Feet
SWFWMD	Southwest Florida Water Management District
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
VFD	Variable Frequency Drive
WRF	Water Reclamation Facility
WSFWP-10	10-Year Water Supply Facilities Work Plan
WW	Wastewater

APPENDIX C

Bulk User Demands and Application Rates / Individual User Demands

Table 5.1 Bulk User Demands (mgd)					
Month-yr	**Bird Bay**	**Capri Isles North and South**	**Lake Venice**	**Venetian Golf and River Club**	**Waterford**
May-08	0.16	0.28	0.16	0.25	0.05
Jun-08	0.08	0.04	0.13	0.29	0.25
Jul-08	0.05	0.09	0.15	0.35	0.56
Aug-08	0.09	0.11	0.18	0.46	0.59
Sep-08	0.06	0.06	0.22	0.34	0.68
Oct-08	0.08	0.15	0.17	0.55	0.00
Nov-08	0.13	0.20	0.26	0.35	0.32
Dec-08	0.11	0.17	0.21	0.46	0.43
Jan-09	0.12	0.22	0.16	0.41	0.00
Feb-09	0.13	0.24	0.19	0.56	0.67
Mar-09	0.14	0.35	0.28	0.41	0.51
Apr-09	0.11	0.30	0.00	0.20	0.80
May-09	0.05	0.20	0.31	0.26	0.98
Jun-09	0.07	0.14	0.40	0.16	0.79
Jul-09	0.07	0.12	0.41	0.15	0.36
Aug-09	0.06	0.10	0.31	0.20	0.47
Sep-09	0.06	0.03	0.30	0.43	1.40
Oct-09	0.07	0.16	0.50	0.15	0.39
Nov-09	0.09	0.14	0.47	0.20	0.44
Dec-09	0.06	0.00	0.21	0.64	1.63
Jan-10	0.05	0.05	0.13	0.73	1.76
Feb-10	0.07	0.07	0.15	0.40	1.97
Mar-10	0.04	0.11	0.19	0.53	0.68
Apr-10	0.07	0.16	0.46	0.54	0.00
May-10	0.10	0.29	0.55	0.52	0.00
Jun-10	0.09	0.23	0.58	0.12	0.00
Jul-10	0.05	0.13	0.38	0.31	0.00
Aug-10	0.06	0.11	0.33	0.38	0.00
Sep-10	0.09	0.10	0.28	0.78	0.00
Oct-10	0.07	0.20	0.46	0.18	0.11
Nov-10	0.11	0.22	0.59	0.19	0.04
Dec-10	0.12	0.18	0.38	0.23	0.00
Jan-11	0.08	0.13	0.25	0.46	0.04
Feb-11	0.12	0.19	0.40	0.51	0.37
Mar-11	0.11	0.22	0.38	0.36	0.34
Apr-11	0.08	0.16	0.41	0.49	0.00
May-11	0.06	0.12	0.49	0.16	0.24
Jun-11	0.04	0.01	0.44	0.00	0.01
Jul-11	0.06	0.04	0.22	0.41	0.13
Aug-11	0.05	0.07	0.41	0.04	0.41
Sep-11	0.07	0.11	0.26	0.31	0.34
Oct-11	0.11	0.15	0.32	0.42	0.33
Nov-11	0.10	0.18	0.54	0.22	0.22
Dec-11	0.09	0.02	0.21	0.00	0.16

Table 5.2 Monthly Application Rates (in/week)					
Month-Yr	**Bird Bay**	**Capri Isles North and South**	**Lake Venice**	**Venetian Golf & River Club**	**Waterford**
May-08	1.59	0.89	0.29	0.28	0.12
Jun-08	0.77	0.13	0.22	0.33	0.62
Jul-08	0.46	0.29	0.26	0.40	1.47
Aug-08	0.94	0.35	0.31	0.53	1.56
Sep-08	0.56	0.18	0.37	0.38	1.71
Oct-08	0.75	0.46	0.30	0.64	0.00
Nov-08	1.22	0.60	0.44	0.39	0.80
Dec-08	1.09	0.53	0.37	0.53	1.14
Avg-08	0.92	0.43	0.32	0.44	0.93
Jan-09	1.21	0.69	0.28	0.47	0.00
Feb-09	1.17	0.69	0.31	0.59	1.58
Mar-09	1.34	1.09	0.50	0.47	1.33
Apr-09	1.05	0.92	0.00	0.23	2.02
May-09	0.44	0.62	0.54	0.30	2.58
Jun-09	0.67	0.41	0.69	0.18	2.00
Jul-09	0.65	0.37	0.73	0.17	0.94
Aug-09	0.58	0.31	0.54	0.22	1.24
Sep-09	0.58	0.08	0.50	0.48	3.56
Oct-09	0.67	0.51	0.88	0.18	1.03
Nov-09	0.86	0.42	0.80	0.22	1.12
Dec-09	0.56	0.00	0.37	0.73	4.27
Avg-09	0.82	0.51	0.51	0.35	1.81
Jan-10	0.54	0.16	0.23	0.85	4.61
Feb-10	0.59	0.21	0.24	0.42	4.66
Mar-10	0.43	0.33	0.34	0.62	1.77
Apr-10	0.70	0.48	0.78	0.60	0.00
May-10	0.97	0.91	0.97	0.60	0.00
Jun-10	0.83	0.68	1.00	0.14	0.00
Jul-10	0.49	0.40	0.67	0.36	0.00
Aug-10	0.59	0.35	0.59	0.43	0.00
Sep-10	0.83	0.31	0.48	0.87	0.00
Oct-10	0.71	0.62	0.81	0.21	0.29
Nov-10	1.03	0.66	1.01	0.21	0.10
Dec-10	1.19	0.57	0.67	0.26	0.00
Avg-10	0.74	0.47	0.65	0.46	0.95
Jan-11	0.81	0.42	0.43	0.53	0.10
Feb-11	1.03	0.53	0.64	0.53	0.88
Mar-11	1.12	0.68	0.67	0.41	0.90
Apr-11	0.72	0.49	0.70	0.55	0.00
May-11	0.63	0.39	0.87	0.18	0.63
Jun-11	0.41	0.02	0.75	0.01	0.02
Jul-11	0.64	0.13	0.39	0.47	0.34
Aug-11	0.53	0.21	0.73	0.05	1.08
Sep-11	0.65	0.35	0.45	0.35	0.86
Oct-11	1.06	0.48	0.57	0.48	0.86
Nov-11	0.97	0.56	0.95	0.25	0.58
Dec-11	0.92	0.49	0.00	0.25	0.43
Avg-11	0.79	0.40	0.59	0.34	0.56

Table 6.1 Individual Usage			
Month-Yr	**Total Usage (mgd)**	**Total Usage (gpm)**	**Avg Monthly Usage (mgd)**
Jan-09	1.37	1896.68	
Feb-09	1.32	1831.74	
Mar-09	1.07	1481.11	
Apr-09	1.30	1810.57	
May-09	1.47	2046.17	
Jun-09	1.06	1470.64	
Jul-09	1.44	2004.92	
Aug-09	1.16	1616.90	
Sep-09	1.26	1753.38	
Oct-09	1.21	1675.28	
Nov-09	1.25	1729.60	
Dec-09	1.33	1842.53	1.27
Jan-10	0.77	1074.41	
Feb-10	0.77	1065.16	
Mar-10	0.70	967.35	
Apr-10	1.03	1429.96	
May-10	1.30	1808.98	
Jun-10	1.87	2590.77	
Jul-10	1.39	1931.92	
Aug-10	1.51	2104.05	
Sep-10	1.23	1702.45	
Oct-10	1.33	1844.18	
Nov-10	1.39	1926.88	
Dec-10	1.48	2053.19	1.23
Jan-11	1.10	1523.02	
Feb-11	1.38	1922.95	
Mar-11	1.14	1579.90	
Apr-11	1.13	1573.58	
May-11	1.41	1954.39	
Jun-11	1.72	2395.65	
Jul-11	1.21	1679.59	
Aug-11	1.18	1632.45	
Sep-11	1.43	1992.61	
Oct-11	1.32	1835.33	
Nov-11	1.33	1842.17	
Dec-11	1.32	1839.84	1.31

APPENDIX D

Eastside WRF Operating Permit

FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
Southwest District Office
13051 North Telecom Parkway
Temple Terrace, Florida 33637-0926

Rick Scott
Governor

Jennifer Carroll
Lt. Governor

Herschel T. Vinyard Jr.
Secretary

STATE OF FLORIDA
DOMESTIC WASTEWATER FACILITY PERMIT

PERMITTEE:

City of Venice

PERMIT NUMBER: FL0041441 (Major)
PA FILE NUMBER: FL0041441-011-DW1P/NR
ISSUANCE DATE: December 12, 2011
EXPIRATION DATE: December 11, 2016

RESPONSIBLE AUTHORITY:
Mr. Lenox E. Bramble, P.E.
Utilities Manager
401 West Venice Avenue
Venice, FL 34285
lbramble@ci.venice.fl.us
(941) 480-3333

FACILITY:

City of Venice Eastside AWWTF
3510 East Laurel Road
Venice, FL 34285
Sarasota County
Water Body Identification (WBID) No. 2009
Latitude: 27° 07' 56" N Longitude: 82° 24' 05" W

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and applicable rules of the Florida Administrative Code (F.A.C.) and constitutes authorization to discharge to waters of the state under the National Pollutant Discharge Elimination System. The above-named permittee is hereby authorized to operate the facilities shown on the application and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

TREATMENT FACILITIES:

Operation of an existing 6.0 MGD three-month rolling average daily flow (3MRADF) Type I advanced wastewater treatment (Bardenpho process) domestic wastewater treatment plant. The plant consists of preliminary treatment followed by dual four-stage Bardenpho process trains, four clarifiers (each with a surface area of 5,675 ft^2), three dual media (sand and anthracite) automatic backwash traveling bridge filters (each with a surface area of 1,056 ft^2) and a liquid chlorination system consisting of three contact chambers with a combined capacity of 167,000 gallons. Aeration is provided at the chlorine contact chambers when surface discharge is necessary. Waste sludge is discharged to four aerated holding tanks and dewatered by two belt filter presses. This plant provides advanced wastewater treatment with high-level disinfection.

Sub-standard effluent that fails to meet the standards for public access irrigation is diverted to a six-million gallon capacity, clay-lined reject pond for return to the headworks of the plant. Reclaimed water is stored in either a 3.0 million gallon above-ground storage tank or is directed to a 35-million gallon on-site lined storage pond. All reclaimed water stored in the lined storage pond can be filtered and disinfected again, if necessary, before being sent to the reuse system.

DISPOSAL:

Surface Water Discharge: An existing 3.0 MGD annual average daily flow (AADF) permitted discharge to Curry Creek (Class III Fresh Water, WBID No. 2009) and thence to Roberts Bay at Discharge Location (D-001) which is an aerated cascade flowing into Curry Creek. The point of discharge is located approximately at latitude 27 ° 6' 55" N, longitude 82 ° 24' 4" W.

Reclaimed water is discharged into stormwater storage lake system, Capri Isles Golf Course North, which intermittently overflows to Curry Creek, D-002.

Reclaimed water is discharged into stormwater storage lake system, Capri Isle Golf Course South, which intermittently overflows to Curry Creek, D-003.

Reclaimed water is discharged into stormwater storage lake system, Bird Bay Golf Course, which intermittently overflows to Roberts Bay, D-004.

Reclaimed water is discharged into stormwater storage lake system, Island Beach, which intermittently overflows to Red Lake, D-005.

REUSE:

Land Application: An existing 3.0 MGD annual average daily flow (AADF) permitted capacity slow-rate public access (R-001) consisting of the boundaries of the City of Venice. Reclaimed water is used for irrigation of public-access areas (residential lawns, golf courses, parks and playgrounds, highway medians and rights-of way and landscaped areas) within the areas identified in Figure 1-1, titled "City of Venice Wastewater Service Area", by Malcolm Pirnie/Arcadis (Attached).

Land Application: An existing 2.5 MGD annual average daily flow (AADF) permitted capacity slow-rate public access (R-002) consisting of discharge to Sarasota County's South Master Reuse System, FLA176303, under an interagency agreement.

INTERNAL OUTFALL:

An existing discharge of reclaimed water limited to 1.0 mgd annual average daily flow discharge location (R-003) of reclaimed water to the Venice Reverse Osmosis Concentrate Disposal system, regulated under Industrial Wastewater Permit No. FL0035335 located approximately at latitude 27° 06' 04" N, longitude 82° 26' 17" W.

IN ACCORDANCE WITH: The limitations, monitoring requirements and other conditions set forth in Pages 1 through 30 of this permit.

I. RECLAIMED WATER AND EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

A. Surface Water Discharges

1. During the period beginning on the issuance date and lasting through the expiration date of this permit, the permittee is authorized to discharge effluent from Outfall D-001 to Curry Creek. Such discharge shall be limited and monitored by the permittee as specified below and reported in accordance with Condition I.D.10:

			Reclaimed Water Limitations		Monitoring Requirements			
Parameter	Units	Max/Min	Limit	Statistical Basis	Frequency of Monitoring	Sample Type	Monitoring Site Number	Notes
Flow (D-001)	MGD	Max	3.0 Report	Annual Average Monthly Average	Continuous	Recording Flow Meter with Totalizer	FLW-02	See Cond.I.A.6
Flow (Curry Creek)	CFS	Min	47.0	Single Sample	Continuous	Recording Flow Meter with Totalizer	FLW-06	See Cond.I.A.4
BOD, Carbonaceous 5 day, 20C	mg/L	Max	5.0 6.25 7.5 10.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Solids, Total Suspended	mg/L	Max	5.0 6.25 7.5 10.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Nitrogen, Total (as N)	mg/L	Max	3.0 3.75 4.5 6.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Phosphorus, Total (as P)	mg/L	Max	1.0 1.25 1.5 2.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Solids, Total Suspended	mg/L	Max	5.0	Single Sample	4 Days/Week	Grab	EFB-01	
Nitrogen, Total as N	Lbs/Year	Max	6370 Report	Annual Total Monthly Total	Monthly	Calculation	EFD-01	See Cond.I.A.5
Oxygen, Dissolved (DO)	mg/L	Min	7.0	Single Sample	7 Days/Week	Grab	EFD-01	
pH	s.u.	Min Max	6.0 8.5	Single Sample Single Sample	Continuous	Meter	EFA-01	See Cond.I.A.3

FACILITY: City of Venice Eastside AWWTF PERMIT NUMBER: FL0041441
PERMITTEE: City of Venice

			Reclaimed Water Limitations		Monitoring Requirements			
Parameter	Units	Max/Min	Limit	Statistical Basis	Frequency of Monitoring	Sample Type	Monitoring Site Number	Notes
Coliform, Fecal	Percent #/100mL	Max	75 25	Monthly Average Single Sample	Monthly 4 Days/Week	Calculation Grab	EFA-01	See Cond.I.A.7
Chlorine, Total Residual (For Disinfection)	mg/L	Min	1.0	Single Sample	Continuous	Meter	EFA-01	See Cond.I.A.8
Total Residual Chlorine (For Dechlorination)	mg/L	Max	0.01	Single Sample	7 Days/Week	Grab	EFD-01	
Dichlorobromomethane	µg/l	Max	22.0 Report	Annual Average Single Sample	Monthly	Calculation Grab	EFD-01	
Dibromochloromethane	µg/l	Max	34.0 Report	Annual Average Single Sample	Monthly	Calculation Grab	EFD-01	
Acute Whole Effluent Toxicity	Percent	Min	100	Single Sample	Quarterly	24-hr FPC	EFD-01	See Cond. I. A. 9

2. Effluent samples shall be taken at the monitoring site locations listed in Permit Condition I. A. 1. and as described below:

Monitoring Location Site Number	Description of Monitoring Location
EFA-01	After disinfection and prior to dechlorination
EFB-01	After filtration and prior to disinfection
EFD-01	Prior to discharge to Curry Creek
FLW-02	Flow meter prior to discharge to Curry Creek
FLW-06	Flow meter in Curry Creek

3. Hourly measurement of pH during the period of required operator attendance may be substituted for continuous measurement. *[Chapter 62-601, Figure 2]*

4. The permittee is allowed to discharge up to 3.0 MGD, calculated as a annual average flow at outfall D001, provided the streamflow in the Curry Creek is 47 cfs or above in the direction toward Roberts Bay, 24 hours prior to discharge.

5. The twelve month annual maximum Total Nitrogen loading shall not exceed 6370 lbs per year. This shall be calculated on a monthly basis by summing the total pounds of nitrogen discharged based on the monthly nitrogen average and flow discharged at D001. If there is no flow discharged in that month the nitrogen loading shall be considered zero.

6. Recording flow meters and totalizers shall be utilized to measure flow and calibrated at least annually. *[62-601.200(17) and .500(6)]*

7. Over a 30-day period, at least 75 percent of the fecal coliform values shall be below the detection limits. No sample shall exceed 25 fecal coliforms per 100 mL. No sample shall exceed 5.0 mg/L of total suspended solids (TSS) at a point before the application of the disinfectant. Note: To report the "% less than detection," count the number of fecal coliform observations that were less than detection, divide by the total number of fecal coliform observations in the month, and multiply by 100% (round to the nearest integer). *[62-600.440(5)(f)]*

8. A minimum of 1.0 mg/L total residual chlorine must be maintained for a minimum contact time of 15 minutes based on peak hourly flow. *[62-600.440(5)(b) and (6)(b)]*

9. Acute Whole Effluent Toxicity Testing

The permittee shall initiate the series of tests described below only during discharge events The permittee shall comply with the following whole effluent toxicity testing requirements and initiate the series of tests described below within 60 days of permit issuance, unless otherwise directed by the Department in writing, to evaluate chronic whole effluent toxicity of the discharge from outfall D-001 to Curry Creek.

a. Effluent limitation

(1) Whole effluent acute toxicity shall not exceed in any routine or in any additional follow-up test an LC50 of less than 100% effluent. [Rules 62-302.200(1), 62-302.500(1)(a)4., 62-4.244(3)(a), and 62-4.241(1)(a) or 2(a), F.A.C.]

b. Monitoring frequency

(1) The "routine" toxicity tests specified shall be conducted *once every three months.*

c. Sampling Requirements

(1) All routine tests will be conducted on four separate grab samples collected at evenly-spaced 6-hour intervals over a 24-hour period and used in four separate tests in order to catch any peaks of toxicity and to account for daily variations in effluent quality. Each sample shall be analyzed for total residual chlorine and pH at the time of sample collection and reported on the chain of custody.

d. Test Requirements

(1) Routine Tests: All routine tests shall be conducted using a control (0% effluent) and a minimum of five dilutions: **100%, 75%, 50%, 25%**, and **12.5%** effluent.

(2) The permittee shall conduct 96-hour acute static renewal multi-concentration toxicity tests using the daphnid, **Ceriodaphnia dubia**, and the bannerfin shiner, **Cyprinella leedsi**, concurrently.

(3) All test species, procedures and quality assurance criteria used shall be in accordance with **Methods for Measuring Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms**, EPA-821-R-02-012, or the most current edition. Any deviation of the bioassay procedures outlined herein shall be submitted in writing to the Department for review and approval prior to use. In the event the above method is revised, the permittee shall conduct acute toxicity testing in accordance with the revised method.
(4) The control water and dilution water shall be moderately hard water as described in EPA-821-R-02-012, Table 7, or the most current edition.

e. Quality Assurance Requirements
(1) A standard reference toxicant (SRT) quality assurance (QA) acute toxicity test shall be conducted with each species used in the required toxicity tests either concurrently or initiated no more than 30 days before the date of each routine or additional follow-up test conducted. Additionally, the SRT test must be conducted concurrently if the test organisms are obtained from outside the test laboratory unless the test organism supplier provides control chart data from at least the last five monthly acute toxicity tests using the same reference toxicant and test conditions. If the organism supplier provides the required SRT data, the organism supplier's SRT data and the test laboratory's monthly SRT-QA data shall be included in the reports for each companion routine or additional follow-up test required.
(2) If the mortality in the control (0% effluent) exceeds 10% for either species in any test, the test for that species (including the control) shall be invalidated and the test repeated. The repeat test shall begin within 14 days after the last day of the invalid test.
(3) If 100% mortality occurs in all effluent concentrations prior to the end of any test and the control mortality is less than 10% at that time, the test (including the control) shall be terminated with the conclusion that the test fails and constitutes non-compliance.
(4) Additional follow-up tests shall be evaluated for acceptability based on the concentration-response relationship, as required by EPA-821-R-02-012, Section 12.2.6.2. or the most current edition., and included with the bioassay laboratory reports.

f. Reporting Requirements
(1) Results from all required tests shall be reported on the Discharge Monitoring Report (DMR) as follows:
(a) Routine Test Results: If an LC50 >100% effluent occurs in the test for the test species, ">100%" shall be entered on the DMR for that test species. If in any of the four a LC50 <100% effluent occurs, the lowest calculated LC50 effluent concentration shall be entered on the DMR for that test species.
(b) Additional Follow-up Test Results: For each additional test required, the calculated LC50 value shall be entered on the DMR for that test species and the 95% confidence limits.
(2) A bioassay laboratory report for the routine test shall be prepared according to EPA-821-R-02-012, Section 12, Report Preparation and Test Review or the most current edition, and mailed to the Department at the address below within 30 days after the last day of the test.
(3) For additional follow-up tests, a single bioassay laboratory report shall be prepared according to EPA-821-R-02-012, Section 12, or the most current edition and mailed within 30 days after the last day of the second valid additional follow-up test.
(4) Data for invalid tests shall be included in the bioassay laboratory report for the repeat test.
(5) The same bioassay data shall not be reported as the results of more than one test.
(6) All toxicity laboratory reports shall be submitted to:

Department of Environmental Protection
Southwest District Office
13051 N. Telecom Parkway
Temple Terrace, FL 33637-0926
Telephone No.: (813) 632-7600

g. Test Failures
(1) A test fails when the test results do not meet the limits in 9.a.(1).
(2) Additional Follow-up Tests:
(a) If a routine test does not meet the acute toxicity limitation in 9.b.(1) above, the permittee shall notify the Department at the address above within 21 days after the last day of the failed routine test and conduct two additional follow-up tests on each species that failed the test in accordance with 9.d.
(b) The first test shall be initiated within 28 days after the last day of the failed routine test. The remaining additional follow-up tests shall be conducted weekly thereafter until a total of two valid additional follow-up tests are completed.

(c) The first additional follow-up test shall be conducted using a control (0% effluent) and a minimum of five dilutions: 100%, 75%, 50%, 25%, and 12.5% effluent. The permittee may modify the dilution series in the second additional follow-up test to more accurately bracket the toxicity such that at least two dilutions above and two dilutions below the target concentration and a control (0% effluent) are run. All test results shall be statistically analyzed according to the Appendices in EPA-821-R-02-012, or the most current edition.

(3) In the event of three valid test failures (whether routine or additional follow-up tests) within a 12-month period, the permittee shall notify the Department within 21 days after the last day of the third test failure.
(a) The permittee shall submit a plan for correction of the effluent toxicity within 60 days after the last day of the third test failure.
(b) The Department shall review and approve the plan before initiation.
(c) The plan shall be initiated within 30 days following the Department's written approval of the plan.
(d) Progress reports shall be submitted quarterly to the Department at the address above.
(e) During the implementation of the plan, the permittee shall conduct quarterly routine whole effluent toxicity tests in accordance with 9.d Additional follow-up tests are not required while the plan is in progress. Following completion or termination of the plan, the frequency of monitoring for routine and additional follow-up tests shall return to the schedule established in 9.b.(1) If a routine test is invalid according to the acceptance criteria in EPA-821-R-02-012, or the most current edition, a repeat test shall be initiated within 14 days after the last day of the invalid routine test.

[62-620.100(3)(j), 62-620.610(18), 62-620.620(1)(g) & 62-302.530(62), F.A.C]

10. Discharge of reclaimed water to the lakes listed in the table below at Capri Isles Golf Course North stormwater storage lake system D-002 shall only occur when the elevation of the water in the lake is less than the corresponding control elevation listed in the table below. A list of all days during a month on which discharges from the lake to the receiving water body occurred shall be attached to the DMR form. For each day on which discharge occurred, the approximate number of hours of discharge shall be noted. *[62-610.830(1) and (3)]*

Monitoring Location Site Number	Name of Storage Lake/Description of Monitoring Location	Control Elevation (ft. NGVD)	Receiving Water Body
STM-36121	Capri Isles Golf Course North	8.72	Curry Creek

11. Discharge of reclaimed water to the lakes listed in the table below at Capri Isle Golf Course South stormwater storage lake system D-003 shall only occur when the elevation of the water in the lake is less than the corresponding control elevation listed in the table below. A list of all days during a month on which discharges from the lake to the receiving water body occurred shall be attached to the DMR form. For each day on which discharge occurred, the approximate number of hours of discharge shall be noted. *[62-610.830(1) and (3)]*

Monitoring Location Site Number	Name of Storage Lake/Description of Monitoring Location	Control Elevation (ft. NGVD)	Receiving Water Body
STM-36122	Capri Isle Golf Course South	8.79	Curry Creek

12. Discharge of reclaimed water to the lakes listed in the table below at Bird Bay Golf Course stormwater storage lake system D-004 shall only occur when the elevation of the water in the lake is less than the corresponding control elevation listed in the table below. A list of all days during a month on which discharges from the lake to the receiving water body occurred shall be attached to the DMR form. For each day on which discharge occurred, the approximate number of hours of discharge shall be noted. *[62-610.830(1) and (3)]*

Monitoring Location Site Number	Name of Storage Lake/Description of Monitoring Location	Control Elevation (ft. NGVD)	Receiving Water Body
STM-36124	Bird Bay Golf Course	12.08	Roberts Bay

13. Discharge of reclaimed water to the lakes listed in the table below at Island Beach stormwater storage lake system D-005 shall only occur when the elevation of the water in the lake is less than the corresponding control elevation listed in the table below. A list of all days during a month on which discharges from the lake to the receiving water body occurred shall be attached to the DMR form. For each day on which discharge occurred, the approximate number of hours of discharge shall be noted. *[62-610.830(1) and (3)]*

Monitoring Location Site Number	Name of Storage Lake/Description of Monitoring Location	Control Elevation (ft. NGVD)	Receiving Water Body
STM-36128	Island Beach	6.95	Red Lake

B. Reuse and Land Application Systems

1. During the period beginning on the issuance date and lasting through the expiration date of this permit, the permittee is authorized to direct reclaimed water to Reuse System R-001. Such reclaimed water shall be limited and monitored by the permittee as specified below and reported in accordance with Condition I.D.10:

			Reclaimed Water Limitations		Monitoring Requirements			
Parameter	Units	Max/Min	Limit	Statistical Basis	Frequency of Monitoring	Sample Type	Monitoring Site Number	Notes
Flow to R-001 Venice MRS	MGD	Max	3.0 Report	Annual Average Monthly Average	Continuous	Recording Flow Meter with Totalizer	FLW-07	See Cond.I.A.4
BOD, Carbonaceous 5 day, 20C	mg/L	Max	20.0 30.0 45.0 60.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Solids, Total Suspended	mg/L	Max	5.0	Single Sample	4 Days/Week	Grab	EFB-01	
Nitrogen, Total (as N)	mg/L	Max	Report	Single Sample	Monthly	24-hr FPC	EFA-01	
Phosphorus, Total (as P)	mg/L	Max	Report	Single Sample	Monthly	24-hr FPC	EFA-01	
pH	s.u.	Min Max	6.0 8.5	Single Sample Single Sample	Continuous	Meter	EFA-01	See Cond.I.B.3
Coliform, Fecal	Percent #/100mL	Max	75 25	Monthly Average Single Sample	Monthly 4 Days/Week	Calculation Grab	EFA-01	See Cond.I.B.5
Chlorine, Total Residual (For Disinfection)	mg/L	Min	1.0	Single Sample	Continuous	Meter	EFA-01	See Cond.I.B.6
Turbidity	NTU	Max	Report	Single Sample	Continuous	Meter	EFB-01	See Cond.I.B.7
Giardia	CYSTS/100 L	Max	Report	Single Sample	Every Two Years	Filtered	EFA-01	See Cond.I.B.10
Cryptosporidium	OOCYSTS/100 L	Max	Report	Single Sample	Every Two Years	Filtered	EFA-01	See Cond.I.B.10

2. Reclaimed water samples shall be taken at the monitoring site locations listed in Permit Condition I. B. 1. and as described below:

Monitoring Location Site Number	Description of Monitoring Location
EFA-01	After disinfection and prior to dechlorination
EFB-01	After filtration and prior to disinfection
FLW-03	Flow meter after the high service pumps
FLW-07	(FLW-03) - (FLW-05 + FLW-04 + FLW-02)

3. Hourly measurement of pH during the period of required operator attendance may be substituted for continuous measurement. *[Chapter 62-601, Figure 2]*

4. Recording flow meters and totalizers shall be utilized to measure flow and calibrated at least annually. *[62-601.200(17) and .500(6)]*

5. Over a 30-day period, at least 75 percent of the fecal coliform values shall be below the detection limits. No sample shall exceed 25 fecal coliforms per 100 mL. No sample shall exceed 5.0 mg/L of total suspended solids (TSS) at a point before the application of the disinfectant. Note: To report the "% less than detection," count the number of fecal coliform observations that were less than detection, divide by the total number of fecal coliform observations in the month, and multiply by 100% (round to the nearest integer). *[62-600.440(5)(f)]*

6. The minimum total chlorine residual shall be limited as described in the approved operating protocol, such that the permit limitation for fecal coliform bacteria will be achieved. In no case shall the total chlorine residual be less than 1.0 mg/L. *[62-600.440(5)(b); 62-610.460(2); and 62-610.463(2)]*

7. The maximum turbidity shall be limited as described in the approved operating protocol, such that the permit limitations for total suspended solids and fecal coliforms will be achieved. *[62-610.463(2)]*

8. The treatment facilities shall be operated in accordance with all approved operating protocols. Only reclaimed water that meets the criteria established in the approved operating protocol(s) may be released to system storage or to the reuse system. Reclaimed water that fails to meet the criteria in the approved operating protocol(s) shall be directed to reject storage for subsequent additional treatment or disinfection. The operating protocol(s) shall be reviewed and updated periodically to ensure continuous compliance with the minimum treatment and disinfection requirements. Updated operating protocols shall be submitted to the Department for review and approval upon revision of the operating protocol(s) and with each permit application. *[62-610.320(6) and 62-610.463(2)]*

9. Instruments for continuous on-line monitoring of total residual chlorine and turbidity shall be equipped with an automated data logging or recording device. *[62-610.463(2) & .865(8)(d)]*

10. Intervals between sampling for Giardia and Cryptosporidium shall not exceed two years. Sampling results shall be reported on DEP Form 62-610.300(4)(a)4 which is attached to this permit. (If additional sampling is required in accordance with the attached form, only one additional sampling event will be required within the two year monitoring frequency) This form shall be submitted to the Department and to DEP's Reuse Coordinator in Tallahassee. *[62-610.463(4)]*

B. Reuse and Land Application Systems

11. During the period beginning on the issuance date and lasting through the expiration date of this permit, the permittee is authorized to direct reclaimed water to Reuse System R-002. Such reclaimed water shall be limited and monitored by the permittee as specified below and reported in accordance with Condition I.D.10:

			Reclaimed Water Limitations		Monitoring Requirements			
Parameter	Units	Max/Min	Limit	Statistical Basis	Frequency of Monitoring	Sample Type	Monitoring Site Number	Notes
Flow to R-002 Sarasota County South MRS	MGD	Max	2.5 Report	Annual Average Monthly Average	Continuous	Recording Flow Meter with Totalizer	FLW-04	See Cond.I.B.14
BOD, Carbonaceous 5 day, 20C	mg/L	Max	20.0 30.0 45.0 60.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Solids, Total Suspended	mg/L	Max	5.0	Single Sample	4 Days/Week	Grab	EFB-01	
pH	s.u.	Min Max	6.0 8.5	Single Sample Single Sample	Continuous	Grab	EFA-01	See Cond.I.B.13
Coliform, Fecal	Percent #/100mL	Max	75 25	Monthly Average Single Sample	Monthly 4 Days/Week	Calculation Grab	EFA-01	See Cond.I.B.5
Chlorine, Total Residual (For Disinfection)	mg/L	Min	1.0	Single Sample	Continuous	Meter	EFA-01	See Cond.I.B.16
Turbidity	NTU	Max	Report	Single Sample	Continuous	Meter	EFB-01	See Cond.I.B.17

12. Reclaimed water samples shall be taken at the monitoring site locations listed in Permit Condition I. B. 11. and as described below:

Monitoring Location Site Number	Description of Monitoring Location
EFA-01	After disinfection and prior to dechlorination
EFB-01	After filtration and prior to disinfection
FLW-04	Flow meter prior to discharge to SCSMRS

13. Hourly measurement of pH during the period of required operator attendance may be substituted for continuous measurement. *[Chapter 62-601, Figure 2]*

14. Recording flow meters and totalizers shall be utilized to measure flow and calibrated at least annually. *[62-601.200(17) and .500(6)]*

15. Over a 30-day period, at least 75 percent of the fecal coliform values shall be below the detection limits. No sample shall exceed 25 fecal coliforms per 100 mL. No sample shall exceed 5.0 mg/L of total suspended solids (TSS) at a point before the application of the disinfectant. Note: To report the "% less than detection," count the number of fecal coliform observations that were less than detection, divide by the total number of fecal coliform observations in the month, and multiply by 100% (round to the nearest integer). *[62-600.440(5)(f)]*

16. The minimum total chlorine residual shall be limited as described in the approved operating protocol, such that the permit limitation for fecal coliform bacteria will be achieved. In no case shall the total chlorine residual be less than 1.0 mg/L. *[62-600.440(5)(b); 62-610.460(2); and 62-610.463(2)]*

17. The maximum turbidity shall be limited as described in the approved operating protocol, such that the permit limitations for total suspended solids and fecal coliforms will be achieved. *[62-610.463(2)]*

18. The treatment facilities shall be operated in accordance with all approved operating protocols. Only reclaimed water that meets the criteria established in the approved operating protocol(s) may be released to system storage or to the reuse system. Reclaimed water that fails to meet the criteria in the approved operating protocol(s) shall be directed to reject storage for subsequent additional treatment or disinfection. The operating protocol(s) shall be reviewed and updated periodically to ensure continuous compliance with the minimum treatment and disinfection requirements. Updated operating protocols shall be submitted to the Department for review and approval upon revision of the operating protocol(s) and with each permit application. *[62-610.320(6) and 62-610.463(2)]*

19. Instruments for continuous on-line monitoring of total residual chlorine and turbidity shall be equipped with an automated data logging or recording device. *[62-610.463(2) & .865(8)(d)]*

C. Internal Outfall

1. During the period beginning on the issuance date and lasting through the expiration date of this permit, the permittee is authorized to discharge effluent from Outfall R-003 to the Venice Reverse Osmosis Concentrate Disposal System. Such discharge shall be limited and monitored by the permittee as specified below and reported in accordance with Condition I.D.10:

			Reclaimed Water Limitations		Monitoring Requirements			
Parameter	Units	Max/Min	Limit	Statistical Basis	Frequency of Monitoring	Sample Type	Monitoring Site Number	Notes
Flow (R-003)	MGD	Max	1.0 Report	Annual Average Monthly Average	Continuous	Recording Flow Meter with Totalizer	FLW-05	See Cond.I.C.4
BOD, Carbonaceous 5 day, 20C	mg/L	Max	5.0 6.25 7.5 10.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Solids, Total Suspended	mg/L	Max	5.0 6.25 7.5 10.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Nitrogen, Total (as N)	mg/L	Max	3.0 3.75 4.5 6.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Phosphorus, Total (as P)	mg/L	Max	1.0 1.25 1.5 2.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Solids, Total Suspended	mg/L	Max	5.0	Single Sample	4 Days/Week	Grab	EFB-01	
pH	s.u.	Min Max	6.0 8.5	Single Sample Single Sample	Continuous	Meter	EFA-01	See Cond.I.C.3
Coliform, Fecal	Percent #/100mL	Max	75 25	Monthly Average Single Sample	Monthly 4 Days/Week	Calculation Grab	EFA-01	See Cond.I.C.5
Chlorine, Total Residual (For Disinfection)	mg/L	Min	1.0	Single Sample	Continuous	Meter	EFA-01	See Cond.I.C.6
Dichlorobromomethane	µg/l	Max	Report Report	Annual Average Single Sample	Monthly	Grab	EFF-001	
Dibromochloromethane	µg/l	Max	Report Report	Annual Average Single Sample	Monthly	Grab	EFF-001	

2. Effluent samples shall be taken at the monitoring site locations listed in Permit Condition I. C. 1. and as described below:

Monitoring Location Site Number	Description of Monitoring Location
EFA-01	After disinfection and prior to dechlorination
EFB-01	After filtration and prior to disinfection
EFF-001	RO concentrate discharge at D-002 of Industrial Wastewater Permit No. FL0035335
FLW-05	Flow meter prior to discharge to City of Venice RO

3. Hourly measurement of pH during the period of required operator attendance may be substituted for continuous measurement. *[Chapter 62-601, Figure 2]*

4. Recording flow meters and totalizers shall be utilized to measure flow and calibrated at least annually. *[62-601.200(17) and .500(6)]*

5. Over a 30-day period, at least 75 percent of the fecal coliform values shall be below the detection limits. No sample shall exceed 25 fecal coliforms per 100 mL. No sample shall exceed 5.0 mg/L of total suspended solids (TSS) at a point before the application of the disinfectant. Note: To report the "% less than detection," count the number of fecal coliform observations that were less than detection, divide by the total number of fecal coliform observations in the month, and multiply by 100% (round to the nearest integer). *[62-600.440(5)(f)]*

6. A minimum of 1.0 mg/L total residual chlorine must be maintained for a minimum contact time of 15 minutes based on peak hourly flow. *[62-600.440(5)(b) and ((6)(b)]*

D. Other Limitations and Monitoring and Reporting Requirements

1. During the period beginning on the issuance date and lasting through the expiration date of this permit, the treatment facility shall be limited and monitored by the permittee as specified below and reported in accordance with Condition I.D.10:

			Reclaimed Water Limitations		Monitoring Requirements			
Parameter	Units	Max/Min	Limit	Statistical Basis	Frequency of Monitoring	Sample Type	Monitoring Site Number	Notes
Flow (Total Plant)	MGD	Max Max	6.0 Report	3MRADF Monthly Average	Continuous	Recording Flow Meter with Totalizer	FLW-01	See Cond.I.D.4
Percent Capacity, (3MRADF/Permitted Capacity) x 100	Percent	Max	Report	Monthly Average	Monthly	Calculation	FLW-01	
BOD, Carbonaceous 5 day, 20C	mg/L	Max	Report	Monthly Average	Weekly	24-hr FPC	INF-01	
Solids, Total Suspended	mg/L	Max	Report	Monthly Average	Weekly	24-hr FPC	INF-01	
Biosolids Quantity (Transferred to BTF)	Dry Tons	Max	Report	Single Sample	Monthly	Calculation	RMP-1	See Cond. I.D.8
Biosolids Quantity (Landfilled)	Dry Tons	Max	Report	Single Sample	Monthly	Calculation	RMP-2	See Cond. I.D.8

2. Samples shall be taken at the monitoring site locations listed in Permit Condition I. D. 1. and as described below:

Monitoring Location	Description of Monitoring Location
FLW-01	Influent flow meter
INF-01	At headworks prior to treatment and ahead of return activated sludge line.
RMP-1	Quantity of biosolids transferred to Biosolids Treatment Facility.
RMP-2	Quantity of biosolids transferred to Landfill.

3. The three-month rolling average daily flow to the treatment plant shall not exceed 6.0 MGD. [62-600.400(3)]

4. Influent samples shall be collected so that they do not contain digester supernatant or return activated sludge, or any other plant process recycled waters. *[62-601.500(4)]*

5. Recording flow meters and totalizers shall be utilized to measure flow and calibrated at least annually. *[62-601.200(17) and .500(6)]*

6. Parameters which must be monitored as a result of a surface water discharge shall be analyzed using a sufficiently sensitive method to assure compliance with applicable water quality standards and effluent limitations in accordance with 40 CFR (Code of Federal Regulations) Part 136. All monitoring shall be representative of the monitored activity. *[62-620.320(6)]*

7. The sample collection, analytical test methods and method detection limits (MDLs) applicable to this permit shall be in accordance with Rule 62-4.246, Chapters 62-160 and 62-601, F.A.C., and 40 CFR 136, as appropriate. The list of Department established analytical methods, and corresponding MDLs (method detection limits) and PQLs (practical quantitative limits), which is titled "FAC 62-4 MDL/PQL Table (April 26, 2006)" and is available at http://www.dep.state.fl.us/labs/library/index.htm. The MDLs and PQLs as described in this list shall constitute the minimum acceptable MDL/PQL values and the Department shall not accept results for which the laboratory's MDLs or PQLs are greater than those described above unless alternate MDLs and/or PQLs have been specifically approved by the Department for this permit. Any method included in the list may be used for reporting as long as it meets the following requirements:

   a) The laboratory's reported MDL and PQL values for the particular method must be equal or less than the corresponding method values specified in the Department's approved MDL and PQL list;
   b) The laboratory reported MDL for the specific parameter is less than or equal to the permit limit or the applicable water quality criteria, if any, stated in Chapter 62-302, F.A.C. Parameters that are listed as "report only" in the permit shall use methods that provide a MDL, which is equal to or less than the applicable water quality criteria stated in 62-302, F.A.C.; and
   c) If the MDLs for all methods available in the approved list are above the stated permit limit or applicable water quality criteria for that parameter, then the method with the lowest stated MDL shall be used.

   Where necessary, the permittee may request approval of alternate methods or for alternative MDLs or PQLs for any approved analytical method. Approval of alternate laboratory MDLs or PQLs are not necessary if the laboratory reported MDLs and PQLs are less than or equal to the permit limit or the applicable water quality criteria, if any, stated in Chapter 62-302, F.A.C. Approval of an analytical method not included in the above-referenced list is not necessary if the analytical method is in accordance with 40 CFR 136 or as deemed acceptable by the Department. *[62-4.246, 62-160]*

8. The permittee shall provide safe access points for obtaining representative influent, reclaimed water, and effluent samples which are required by this permit. *[62-601.500(5)]*

9. In the absence of a laboratory analysis, to estimate the dry tons generated by a facility that transports liquid biosolids, the average value of 1.5% solids may be used. The following formula may be used to convert gallons to dry tons when the estimated percent solids is 1.5%:

   (gallons X 8.34 lb/gal X 0.015) / (2000 lb/ton) = dry tons.

If the percent solids is known, substitute the known % solids for "0.015" in the formula above. The gallons produced and used for the above calculation shall be reported on the Discharge Monitoring Report (DMR), Part B. During months when biosolids are not transferred to a Biosolids Treatment Facility or to a landfill, the permittee should record MNR for Monitoring Not Required on the DMR. *[62-640.650(5)(a)]*

10. Monitoring requirements under this permit are effective on the first day of the second month following permit issuance. Until such time, the permittee shall continue to monitor and report in accordance with previously effective permit requirements, if any. During the period of operation authorized by this permit, the permittee shall complete and submit to the Department Discharge Monitoring Reports (DMRs) in accordance with the frequencies specified by the REPORT type (i.e., monthly, toxicity, quarterly, semiannual, annual, etc.) indicated on the DMR forms attached to this permit. Monitoring results for each monitoring period shall be submitted in accordance with the associated DMR due dates below, unless specified elsewhere in the permit.

REPORT Type	Monitoring Period	Due Date
Monthly or Toxicity	first day of month – last day of month	28th day of following month
Quarterly	January 1 - March 31 April 1 – June 30 July 1 – September 30 October 1 – December 31	April 28 July 28 October 28 January 28
Semiannual	January 1 – June 30 July 1 – December 31	July 28 January 28
Annual	January 1 – December 31	January 28

The permittee may submit either paper or electronic DMRs. The permittee must use the attached DMR as a template, without altering the original format or content unless approved by the Department. Completed DMRs shall be submitted to the Department's Southwest District Office at the address specified in Permit Condition I.D.14 by the twenty-eighth (28th) day of the month following the month of operation. Paper copies postmarked by the 28th meet the intent of this requirement. If submitting electronic DMRs, portable document format (pdf) is preferred. Data submitted electronically is equivalent to data submitted on signed paper DMRs only when bearing an original signature. DMRs shall be submitted for each required monitoring period including months of no discharge.

[62-620.610(18)][62-601.300(1),(2), and (3)]

11. During the period of operation authorized by this permit, reclaimed water or effluent shall be monitored annually for the primary and secondary drinking water standards contained in Chapter 62-550, F.A.C., (except for asbestos, color, and corrosivity). Twenty-four hour composite samples and grab samples where appropriate shall be used to analyze reclaimed water or effluent for the primary and secondary drinking water standards. These monitoring results shall be reported to the Department annually on the DMR under monitoring group number RWS-01. During years when a permit is not renewed, a certification stating that no new non-domestic wastewater dischargers have been added to the collection system since the last reclaimed water or effluent analysis was conducted may be submitted in lieu of the report. The annual reclaimed water or effluent analysis report or the certification shall be completed and submitted in a timely manner so as to be received by the Department by June 28 of each year. Approved analytical methods identified in Rule 62-620.100(3)(j), F.A.C., shall be used for the analysis. If no method is included for a parameter, methods specified in Chapter 62-550, F.A.C., shall be used. *[62-601.300(4)][62-601.500(3)][62-610.300(4)]*

12. The permittee shall submit an Annual Reuse Report using DEP Form 62-610.300(4)(a)2. on or before January 1 of each year. *[62-610.870(3)]*

13. The permittee shall maintain an inventory of storage systems. The inventory shall be submitted to the Department at least 30 days before reclaimed water will be introduced into any new storage system. The inventory of storage systems shall be attached to the annual submittal of the Annual Reuse Report. *[62-610.464(5)]*

14. Unless specified otherwise in this permit, all reports and other information required by this permit, including 24-hour notifications, shall be submitted to or reported to, as appropriate, the Department's Southwest District Office at the address specified below:

Florida Department of Environmental Protection
Domestic Wastewater Program
Southwest District Office
13051 N. Telecom Parkway
Temple Terrace, Florida 33637-0926
Email Address: firstname.lastname@dep.state.fl.us

Phone Number - 813-632-7600
FAX Number - 813-632-7662

All reports and other information shall be signed in accordance with the requirements of Rule 62-620.305, F.A.C. *[62-620.305]*

II. BIOSOLIDS MANAGEMENT REQUIREMENTS

1. Biosolids generated by this facility may be transferred to a Biosolids Treatment Facility (BTF) or disposed of in a Class I solid waste landfill. Transferring biosolids to an alternative biosolids treatment facility does not require a permit modification. However, use of an alternative biosolids treatment facility requires submittal of a copy of the agreement pursuant to Rule 62-640.880(1)(c), F.A.C., along with a written notification to the Department at least 30 days before transport of the biosolids. *[62-620.320(6), 62-640.880(1)(c)]*

2. The permittee shall not be held responsible for treatment and management violations that occur after its biosolids have been accepted by a permitted biosolids treatment facility with which the source facility has an agreement in accordance with subsection 62-640.880(1)(c), F.A.C., for further treatment, management, or disposal. *[62-640.880(1)(b)]*

3. Disposal of biosolids, septage, and "other solids" in a solid waste disposal facility, or disposal by placement on land for purposes other than soil conditioning or fertilization, such as at a monofill, surface impoundment, waste pile, or dedicated site, shall be in accordance with Chapter 62-701, F.A.C. *[62-640.100(6)(b) & (c)]*

4. If the permittee intends to accept biosolids from other facilities, a permit revision is required pursuant to Rule 62-640.880(2)(d), F.A.C. *[62-640.880(2)(d)]*

5. The permittee shall keep records of the quantities of biosolids generated and transferred to another facility, or landfilled. *[62-640.650(4)(a)]*

6. The treatment, management, transportation, use, land application, or disposal of biosolids shall not cause a violation of the odor prohibition in subsection 62-296.320(2), F.A.C. *[62-640.400(6)]*

7. Storage of biosolids or other solids at this facility shall be in accordance with the Facility Biosolids Storage Plan. *[62-640.300(4)]*

8. Biosolids shall not be spilled from or tracked off the treatment facility site by the hauling vehicle. *[62-640.400(9)]*

9. Florida water quality criteria and standards shall not be violated as a result of land application of biosolids from this facility. *[62-640.400(2)]*

10. The permittee shall keep hauling records to track the transport of biosolids between facilities. The hauling records shall contain the following information:

Required of Source Facility	Required of BTF
Date and Time Shipped	Date and Time Received
Amount of Biosolids Shipped	Amount of Biosolids Received
Degree of Treatment (if applicable)	Name and ID Number of Source Facility
Name and ID Number of Biosolids Management Facility or Treatment Facility	Signature of Hauler
Signature of Responsible Party at Source Facility	Signature of Responsible Party at Biosolids Treatment Facility
Signature of Hauler and Name of Hauling Firm	

These records shall be kept for five years and shall be made available for inspection upon request by the Department. A copy of the hauling records information maintained by the source facility shall be provided upon delivery of the biosolids to the biosolids treatment facility. The BTF permittee shall report to the Department within 24 hours of discovery any discrepancy in the quantity of biosolids leaving the source facility and arriving at the biosolids treatment facility. *[62-640.880(4)]*

III. GROUND WATER REQUIREMENTS

Operational Requirements

1. For the Part III Public Access system, all ground water quality criteria specified in Chapter 62-520, F.A.C., shall be met at the edge of the zone of discharge. The zone of discharge shall extend horizontally 100 feet from the application site or to user's site property line, whichever is less, and vertically to the base of the surficial aquifer. *[62-520.200(23)] [62-522.400 and 62-522.410]*

2. The ground water minimum criteria specified in Rule 62-520.400 F.A.C., shall be met within the zone of discharge. *[62-520.400 and 62-520.420(4)]*

3. During the period of operation authorized by this permit, the permittee shall sample ground water in accordance with this permit and the approved ground water monitoring plan prepared in accordance with Rule 62-522.600, F.A.C. *[62-522.600][62-610.463,]*

4. The following monitoring wells shall be sampled in accordance with the monitoring frequencies specified in Permit Condition III.5. for Reuse System R-001. Quarterly sampling must be reasonably spaced to be representative of potentially changing conditions.

Monitoring Well ID	Alternate Well Name and/or Description of Monitoring Location	Depth (Feet)	Aquifer Monitored	New or Existing
MWC-05	Capri Isles GC - 16802 (CI-1)	13	Surficial	existing
MWI-01	Capri Isles GC - 36014 (CI-2)	23	Surficial	existing
MWI-06	Capri Isles GC - 36015 (CI-3)	21	Surficial	existing
MWC-06	Capri Isles GC - (CI-4)	17.5	Surficial	existing
MWC-09	Capri Isles GC - (CI-5)	15.1	Surficial	existing
MWC-07	Capri Isles GC - (CI-1A)	15.5	Surficial	existing
MWB-02	Lake Venice GC - 36011 (MW-1A)	22	Surficial	existing
MWI-07	Lake Venice GC - 36012 (MW-3)	20	Surficial	existing
MWI-08	Lake Venice GC - 37341 (MW-8A)	22	Surficial	existing
MWC-08	Lake Venice GC - (MW-9)	15	Surficial	existing
MWB-03	Curry Creek Park - (BI-1B)	17	Surficial	existing
MWI-05	Bay Indies Subdivision - (BI-1I)	17	Surficial	existing
MWC-04	Bay Indies Subdivision - (BI-1C)	17	Surficial	existing

MWB = Background; MWI = Intermediate; MWC = Compliance

[62-522.600][62-610.463]

5. The following parameters shall be analyzed for each of the monitoring well(s) identified in Permit Condition III.4.

Parameter	Compliance Well Limit	Units	Sample Type	Monitoring Frequency
Water Level Relative to NGVD	Report	FEET	In-situ	Quarterly
Nitrogen, Nitrate, Total (as N)	10	MG/L	Grab	Quarterly
Solids, Total Dissolved (TDS)	500	MG/L	Grab	Quarterly
Arsenic, Total Recoverable	10	UG/L	Grab	Quarterly
Chloride (as Cl)	250	MG/L	Grab	Quarterly
Cadmium, Total Recoverable	5	UG/L	Grab	Quarterly
Chromium, Total Recoverable	100	UG/L	Grab	Quarterly
Lead, Total Recoverable	15	UG/L	Grab	Quarterly
Coliform, Fecal	4	#/100ML	Grab	Quarterly
pH*	6.5 to 8.5	SU	In-situ	Quarterly
Sulfate, Total	250	MG/L	Grab	Quarterly
Turbidity*	Report	NTU	In-situ	Quarterly
Sodium, Total Recoverable*	160	MG/L	Grab	Quarterly
Specific Conductance*	Report	UMHO/CM	In-situ	Quarterly
Temperature (C), Water*	Report	DEG.C	In-situ	Quarterly
Oxygen, Dissolved (DO)*	Report	MG/L	In-situ	Quarterly

*The field parameters shall be sampled per DEP–SOP-001/01, FS 2200 Ground Water Sampling and recorded, (see Figure FS 2200-2 Ground Water Purging Procedure and Form FD 9000-24, Ground Water Sampling Log). The field parameters to be reported on Part D of GW DMR shall be the last sample recorded.

[62-522.600(11)(b)] [62-601.300(3), 62-601.700, and Figure 3 of 62-601][62-601.300(6)] [62-520.300(9)]

6. If the concentration for any constituent listed in Permit Condition III. 5. in the natural background quality of the ground water is greater than the stated maximum, or in the case of pH is also less than the minimum, the representative natural background quality shall be the prevailing standard. *[62-520.420(2)]*

7. In accordance with Part D of Form 62-620.910(10), water levels shall be recorded before evacuating wells for sample collection. Elevation references shall include the top of the well casing and land surface at each well site (NGVD allowable) at a precision of plus or minus 0.1 foot. *[62-610.463(3)(a),]*

8. Ground water monitoring wells shall be purged prior to sampling to obtain representative samples. *[62-601.700(5)]*

9. Analyses shall be conducted on unfiltered samples, unless filtered samples have been approved by the Department's Southwest District Office as being more representative of ground water conditions. *[62-520.300(9)]*

10. Ground water monitoring test results shall be submitted on Part D of Form 62-620.910(10) in accordance with Permit Condition I.D.10. *[62-520.600(11)(b)] [62-601.300(3), 62.601.700, and Figure 3 of 62-601] [62-620.610(18)]*

11. For permit renewal, the permittee shall submit, to the Southwest District Office, the results of sampling monitoring wells specified in the Department-approved monitoring plan for the primary and secondary drinking water parameters included in Chapter 62-550, F.A.C., (excluding asbestos, acrylamide, Dioxin, butachlor, epichlorohydrin, pesticides, and PCBs, unless reasonably expected to be a constituent of the discharge or an artifact of the site). Sampling shall occur no sooner than 180 days before submittal of the renewal application. *[62-520.600(5)(b)]*

12. If any monitoring well becomes damaged or inoperable, the permittee shall notify the Department's Southwest District Office immediately and a detailed written report shall follow within seven days. The written report shall detail what problem has occurred and remedial measures that have been taken to prevent recurrence. All monitoring well design and replacement shall be approved by the Department's Southwest District Office prior to installation. *[62-520.600] [62-620.320(6)]*

13. All piezometers and wells that are not reasonably expected to be used are to be plugged and abandoned in accordance with the subsection 62-532.500(4), F.A.C. The permittee shall submit a written report to the Department's office that issued the permit providing verification of the plugging including the well abandonment log when available. *[62-520.600(6)(k)]*

IV. ADDITIONAL REUSE AND LAND APPLICATION REQUIREMENTS

Part III Public Access System(s) (R-001/ R-002)

1. Use of reclaimed water is authorized within the general service areas identified in Figure 1-1, titled "City of Venice Wastewater Service Area", by Malcolm Pirnie/Arcadis (Attached). The following uses of reclaimed water are authorized within this general service area: Aesthetic Purposes (decorative ponds, pools, and fountains), Athletic Complexes and Parks, Golf Course Irrigation, Golf Courses, Residential Developments, Residential Irrigation. *[62-620.630(10)(d)]*

2. This reuse system includes the following major users (i.e., using 0.1 MGD or more of reclaimed water):

User Name	User Type	Capacity (MGD)	Acreage
Lake Venice Golf Course	Golf Course Irrigation	0.41	200
Venetian Golf & River Club	Golf Course/Residential	0.40	232
Well Field Park	Park	0.27	100
Waterford Golf Course	Golf Course Irrigation	0.23	110
Capri Isles Golf Course North	Golf Course Irrigation	0.20	85
Bird Bay West Golf Course	Golf Course Irrigation	0.11	
Totals		1.62	

[62-610.800(5)][62-620.630(10)(b)]

3. New major users of reclaimed water (i.e., using 0.1 MGD or more) may be added to the reuse system using the general permit described in Rule 62-610.890, F.A.C., if the requirements in this rule are complied with. Application for use of this general permit shall be made using Form 62-610.300(4)(a)1. *[62-610.890]*

4. Cross-connections to the potable water system are prohibited. *[62-610.469(7)]*

5. A cross-connection control program shall be implemented and/or remain in effect within the areas where reclaimed water will be provided for use. *[62-610.469(7)]*

6. The permittee shall conduct inspections within the reclaimed water service area to verify proper connections, to minimize illegal cross-connections, and to verify the proper use of reclaimed water. Inspections are required when a customer first connects to the reuse distribution system. Subsequent inspections are required as specified in the cross-connection control and inspection program. *[62-610.469(7)(h)]*

7. If a cross-connection between the potable and reclaimed water systems is discovered, the permittee shall:

   a. Immediately discontinue potable water and/or reclaimed water service to the affected area.

   b. If the potable water system is contaminated, clear the potable water lines.

   c. Eliminate the cross-connection.

   d. Test the affected area for other possible cross-connections.

e. Within 24 hours, notify the Southwest District Office's domestic wastewater and drinking water programs.

f. Within 5 days of discovery of a cross-connection, submit a written report to the Department detailing: a description of the cross-connection, how the cross-connection was discovered, the exact date and time of discovery, approximate time that the cross-connection existed, the location, the cause, steps taken to eliminate the cross-connection, whether reclaimed water was consumed, and reports of possible illness, whether the drinking water system was contaminated and the steps taken to clear the drinking water system, when the cross-connection was eliminated, plan of action for testing for other possible cross-connections in the area, and an evaluation of the cross-connection control and inspection program to ensure that future cross-connections do not occur. *[62-555.350(3) and 62-555.360][62-620.610(20)]*

8. Maximum obtainable separation of reclaimed water lines and potable water lines shall be provided and the minimum separation distances specified in Rule 62-610.469(7), F.A.C., shall be provided. Reuse facilities shall be color coded or marked. Underground piping which is not manufactured of metal or concrete shall be color coded using Pantone Purple 522C using light stable colorants. Underground metal and concrete pipe shall be color coded or marked using purple as the predominant color. *[62-610.469(7)]*

9. In constructing reclaimed water distribution piping, the permittee shall maintain a 75-foot setback distance from a reclaimed water transmission facility to public water supply wells. No setback distances are required to other potable water supply wells or to any nonpotable water supply wells. *[62-610.471(3)]*

10. A setback distance of 75 feet shall be maintained between the edge of the wetted area and potable water supply wells, unless the utility adopts and enforces an ordinance prohibiting potable water supply wells within the reuse service area. No setback distances are required to any nonpotable water supply well, to any surface water, to any developed areas, or to any private swimming pools, hot tubs, spas, saunas, picnic tables, barbecue pits, or barbecue grills. *[62-610.471(1), (2), (5), and (7)]*

11. Reclaimed water shall not be used to fill swimming pools, hot tubs, or wading pools. *[62-610.469(4)]*

12. Low trajectory nozzles, or other means to minimize aerosol formation shall be used within 100 feet from outdoor public eating, drinking, or bathing facilities. *[62-610.471(6)]*

13. A setback distance of 100 feet shall be maintained from indoor aesthetic features using reclaimed water to adjacent indoor public eating and drinking facilities. *[62-610.471(8)]*

14. The public shall be notified of the use of reclaimed water. This shall be accomplished by posting of advisory signs in areas where reuse is practiced, notes on scorecards, or other methods. *[62-610.468(2)]*

15. All new advisory signs and labels on vaults, service boxes, or compartments that house hose bibbs along with all labels on hose bibbs, valves, and outlets shall bear the words "do not drink" and "no beber" along with the equivalent standard international symbol. In addition to the words "do not drink" and "no beber," advisory signs posted at storage ponds and decorative water features shall also bear the words "do not swim" and "no nadar" along with the equivalent standard international symbols. Existing advisory signs and labels shall be retrofitted, modified, or replaced in order to comply with the revised wording requirements. For existing advisory signs and labels this retrofit, modification, or replacement shall occur within 365 days after the date of this permit. For labels on existing vaults, service boxes, or compartments housing hose bibbs this retrofit, modification, or replacement shall occur within 730 days after the date of this permit. *[62-610.468 & 62-610.469]*

16. The permittee shall ensure that users of reclaimed water are informed about the origin, nature, and characteristics of reclaimed water; the manner in which reclaimed water can be safely used; and limitations on the use of reclaimed water. Notification is required at the time of initial connection to the reclaimed water distribution system and annually after the reuse system is placed into operation. A description of on-going public notification activities shall be included in the Annual Reuse Report. *[62-610.468(6)]*

17. Routine aquatic weed control and regular maintenance of storage pond embankments and access areas are required. *[62-610.414 & 62-610.464]*

18. Overflows from emergency discharge facilities on storage ponds shall be reported as an abnormal event to the Department's Southwest District Office within 24 hours of an occurrence. The provisions of Rule 62-610.800(9), F.A.C., shall be met. *[62-610.800(9)]*

V. OPERATION AND MAINTENANCE REQUIREMENTS

1. During the period of operation authorized by this permit, the wastewater facilities shall be operated under the supervision of an operator certified in accordance with Chapter 62-602, F.A.C. In accordance with Chapter 62-699, F.A.C., this facility is a Category I, Class A facility and, at a minimum, operators with appropriate certification must be on the site as follows:

   A Class C or higher operator 24 hours/day for 7 days/week. The lead operator must be a Class A.

   [62-620.630(3)] [62-699.310] [62-610.462]

2. The lead operator shall be employed at the plant full time. "Full time" shall mean at least 4 days per week, working a minimum of 35 hours per week, including leave time. A certified operator shall be on-site and in charge of each required shift and for periods of required staffing time when the lead operator is not on-site. An operator meeting the lead operator classification level of the plant shall be available during all periods of plant operation. "Available" means able to be contacted as needed to initiate the appropriate action in a timely manner. *[62-699.311(10), (5) and (1)]*

3. The application to renew this permit shall include an updated capacity analysis report prepared in accordance with Rule 62-600.405, F.A.C. *[62-600.405(5)]*

4. The application to renew this permit shall include a detailed operation and maintenance performance report prepared in accordance with Rule 62-600.735, F.A.C. *[62-600.735(1)]*

5. The permittee shall maintain the following records and make them available for inspection on the site of the permitted facility:

   a. Records of all compliance monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation and a copy of the laboratory certification showing the certification number of the laboratory, for at least three years from the date the sample or measurement was taken;

   b. Copies of all reports required by the permit for at least three years from the date the report was prepared;

   c. Records of all data, including reports and documents, used to complete the application for the permit for at least three years from the date the application was filed;

   d. Monitoring information, including a copy of the laboratory certification showing the laboratory certification number, related to the residuals use and disposal activities for the time period set forth in Chapter 62-640, F.A.C., for at least three years from the date of sampling or measurement;

   e. A copy of the current permit;

   f. A copy of the current operation and maintenance manual as required by Chapter 62-600,. F.A.C.;

   g. A copy of the facility record drawings;

   h. Copies of the licenses of the current certified operators; and

   i. Copies of the logs and schedules showing plant operations and equipment maintenance for three years from the date of the logs or schedules. The logs shall, at a minimum, include identification of the plant; the signature and certification number of the operator(s) and the signature of the person(s) making any entries; date and time in and out; specific operation and maintenance activities; tests performed and samples taken; and major repairs

made. The logs shall be maintained on-site in a location accessible to 24-hour inspection, protected from weather damage, and current to the last operation and maintenance performed.

j. Records of biosolids quantities, treatment, monitoring, and hauling for at least five years.

[62-620.350]

VI. SCHEDULES

Section VI is not applicable to this facility.

VII. INDUSTRIAL PRETREATMENT PROGRAM REQUIREMENTS

This facility is not required to have a pretreatment program at this time. *[62-625.500]*

VIII. OTHER SPECIFIC CONDITIONS

1. The permittee shall apply for renewal of this permit at least 180 days before the expiration date of the permit using the appropriate forms listed in Rule 62-620.910, F.A.C., including submittal of the appropriate processing fee set forth in Rule 62-4.050, F.A.C. The existing permit shall not expire until the Department has taken final action on the application renewal in accordance with the provisions of 62-620.335(3) and (4), F.A.C. *[62-620.335(1)-(4)]*

2. Florida water quality criteria and standards shall not be violated as a result of any discharge or land application of reclaimed water or residuals from this facility. *[62-620.320(9) and 62-302.500(2)(e)][62-610.850(1)(a) and (2)(a)]*

3. In the event that the treatment facilities or equipment no longer function as intended, are no longer safe in terms of public health and safety, or odor, noise, aerosol drift, or lighting adversely affects neighboring developed areas at the levels prohibited by Rule 62-600.400(2)(a), F.A.C., corrective action (which may include additional maintenance or modifications of the permitted facilities) shall be taken by the permittee. Other corrective action may be required to ensure compliance with rules of the Department. Additionally, the treatment, management, use or land application of residuals shall not cause a violation of the odor prohibition in Rule 62-296.320(2), F.A.C. *[62-600.410(8) and 62-640.400(6)]*

4. The deliberate introduction of stormwater in any amount into collection/transmission systems designed solely for the introduction (and conveyance) of domestic/industrial wastewater; or the deliberate introduction of stormwater into collection/transmission systems designed for the introduction or conveyance of combinations of storm and domestic/industrial wastewater in amounts which may reduce the efficiency of pollutant removal by the treatment plant is prohibited, except as provided by Rule 62-610.472, F.A.C. *[62-604.130(4)]*

5. Collection/transmission system overflows shall be reported to the Department in accordance with Permit Condition IX. 20. *[62-604.550] [62-620.610(20)]*

6. The operating authority of a collection/transmission system and the permittee of a treatment plant are prohibited from accepting connections of wastewater discharges which have not received necessary pretreatment or which contain materials or pollutants (other than normal domestic wastewater constituents):

   a. Which may cause fire or explosion hazards; or

   b. Which may cause excessive corrosion or other deterioration of wastewater facilities due to chemical action or pH levels; or

   c. Which are solid or viscous and obstruct flow or otherwise interfere with wastewater facility operations or treatment; or

   d. Which result in the wastewater temperature at the introduction of the treatment plant exceeding 40°C or otherwise inhibiting treatment; or

e. Which result in the presence of toxic gases, vapors, or fumes that may cause worker health or safety problems.

[62-604.130(5)]

7. The treatment facility, storage ponds, rapid infiltration basins, and/or infiltration trenches shall be enclosed with a fence or otherwise provided with features to discourage the entry of animals and unauthorized persons. *[62-600.400(2)(b)]*

8. Screenings and grit removed from the wastewater facilities shall be collected in suitable containers and hauled to a Department approved Class I landfill or to a landfill approved by the Department for receipt/disposal of screenings and grit. *[62-701.300(1)(a)]*

9. The permittee shall provide verbal notice to the Department as soon as practical after discovery of a sinkhole within an area for the management or application of wastewater, wastewater residuals (sludges), or reclaimed water. The permittee shall immediately implement measures appropriate to control the entry of contaminants, and shall detail these measures to the Department in a written report within seven days of the sinkhole discovery. *[62-4.070(3)]*

10. The permittee shall provide adequate notice to the Department of the following:

    a. Any new introduction of pollutants into the facility from an industrial discharger which would be subject to Chapter 403, F.S., and the requirements of Chapter 62-620, F.A.C. if it were directly discharging those pollutants; and

    b. Any substantial change in the volume or character of pollutants being introduced into that facility by a source which was identified in the permit application and known to be discharging at the time the permit was issued.

    Adequate notice shall include information on the quality and quantity of effluent introduced into the facility and any anticipated impact of the change on the quantity or quality of effluent or reclaimed water to be discharged from the facility.

    [62-620.625(2)]

IX. GENERAL CONDITIONS

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit are binding and enforceable pursuant to Chapter 403, Florida Statutes. Any permit noncompliance constitutes a violation of Chapter 403, Florida Statutes, and is grounds for enforcement action, permit termination, permit revocation and reissuance, or permit revision. *[62-620.610(1)]*

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviations from the approved drawings, exhibits, specifications or conditions of this permit constitutes grounds for revocation and enforcement action by the Department. *[62-620.610(2)]*

3. As provided in subsection 403.087(7), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor authorize any infringement of federal, state, or local laws or regulations. This permit is not a waiver of or approval of any other Department permit or authorization that may be required for other aspects of the total project which are not addressed in this permit. *[62-620.610(3)]*

4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title. *[62-620.610(4)]*

5. This permit does not relieve the permittee from liability and penalties for harm or injury to human health or welfare, animal or plant life, or property caused by the construction or operation of this permitted source; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department. The permittee shall take all reasonable steps to minimize or prevent any discharge,

reuse of reclaimed water, or residuals use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. *[62-620.610(5)]*

6. If the permittee wishes to continue an activity regulated by this permit after its expiration date, the permittee shall apply for and obtain a new permit. *[62-620.610(6)]*

7. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control, and related appurtenances, that are installed and used by the permittee to achieve compliance with the conditions of this permit. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to maintain or achieve compliance with the conditions of the permit. *[62-620.610(7)]*

8. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit revision, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. *[62-620.610(8)]*

9. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, including an authorized representative of the Department and authorized EPA personnel, when applicable, upon presentation of credentials or other documents as may be required by law, and at reasonable times, depending upon the nature of the concern being investigated, to:

   a. Enter upon the permittee's premises where a regulated facility, system, or activity is located or conducted, or where records shall be kept under the conditions of this permit;

   b. Have access to and copy any records that shall be kept under the conditions of this permit;

   c. Inspect the facilities, equipment, practices, or operations regulated or required under this permit; and

   d. Sample or monitor any substances or parameters at any location necessary to assure compliance with this permit or Department rules.

   [62-620.610(9)]

10. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data, and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except as such use is proscribed by Section 403.111, Florida Statutes, or Rule 62-620.302, Florida Administrative Code. Such evidence shall only be used to the extent that it is consistent with the Florida Rules of Civil Procedure and applicable evidentiary rules. *[62-620.610(10)]*

11. When requested by the Department, the permittee shall within a reasonable time provide any information required by law which is needed to determine whether there is cause for revising, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. The permittee shall also provide to the Department upon request copies of records required by this permit to be kept. If the permittee becomes aware of relevant facts that were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be promptly submitted or corrections promptly reported to the Department. *[62-620.610(11)]*

12. Unless specifically stated otherwise in Department rules, the permittee, in accepting this permit, agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules. A reasonable time for compliance with a new or amended surface water quality standard, other than those standards addressed in Rule 62-302.500, F.A.C., shall include a reasonable time to obtain or be denied a mixing zone for the new or amended standard. *[62-620.610(12)]*

13. The permittee, in accepting this permit, agrees to pay the applicable regulatory program and surveillance fee in accordance with Rule 62-4.052, F.A.C. *[62-620.610(13)]*

14. This permit is transferable only upon Department approval in accordance with Rule 62-620.340, F.A.C. The permittee shall be liable for any noncompliance of the permitted activity until the transfer is approved by the Department. *[62-620.610(14)]*

15. The permittee shall give the Department written notice at least 60 days before inactivation or abandonment of a wastewater facility and shall specify what steps will be taken to safeguard public health and safety during and following inactivation or abandonment. *[62-620.610(15)]*

16. The permittee shall apply for a revision to the Department permit in accordance with Rules 62-620.300 and the Department of Environmental Protection Guide to Wastewater Permitting at least 90 days before construction of any planned substantial modifications to the permitted facility is to commence or with Rule 62-620.325(2) for minor modifications to the permitted facility. A revised permit shall be obtained before construction begins except as provided in Rule 62-620.300, F.A.C. *[62-620.610(16)]*

17. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. The permittee shall be responsible for any and all damages which may result from the changes and may be subject to enforcement action by the Department for penalties or revocation of this permit. The notice shall include the following information:

    a. A description of the anticipated noncompliance;

    b. The period of the anticipated noncompliance, including dates and times; and

    c. Steps being taken to prevent future occurrence of the noncompliance.

    [62-620.610(17)]

18. Sampling and monitoring data shall be collected and analyzed in accordance with Rule 62-4.246, Chapters 62-160 and 62-601, F.A.C., and 40 CFR 136, as appropriate.

    a. Monitoring results shall be reported at the intervals specified elsewhere in this permit and shall be reported on a Discharge Monitoring Report (DMR), DEP Form 62-620.910(10), or as specified elsewhere in the permit.

    b. If the permittee monitors any contaminant more frequently than required by the permit, using Department approved test procedures, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.

    c. Calculations for all limitations which require averaging of measurements shall use an arithmetic mean unless otherwise specified in this permit.

    d. Except as specifically provided in Rule 62-160.300, F.A.C., any laboratory test required by this permit shall be performed by a laboratory that has been certified by the Department of Health Environmental Laboratory Certification Program (DOH ELCP). Such certification shall be for the matrix, test method and analyte(s) being measured to comply with this permit. For domestic wastewater facilities, testing for parameters listed in Rule 62-160.300(4), F.A.C., shall be conducted under the direction of a certified operator.

    e. Field activities including on-site tests and sample collection shall follow the applicable standard operating procedures described in DEP-SOP-001/01 adopted by reference in Chapter 62-160, F.A.C.

    f. Alternate field procedures and laboratory methods may be used where they have been approved in accordance with Rules 62-160.220 and 62-160.330, F.A.C.

    [62-620.610(18)]

19. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule detailed elsewhere in this permit shall be submitted no later than 14 days following each schedule date. *[62-620.610(19)]*

20. The permittee shall report to the Department any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain: a description of the noncompliance and its cause; the period of noncompliance including exact dates and time, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

    a. The following shall be included as information which must be reported within 24 hours under this condition:

        1. Any unanticipated bypass which causes any reclaimed water or effluent to exceed any permit limitation or results in an unpermitted discharge,

        2. Any upset which causes any reclaimed water or the effluent to exceed any limitation in the permit,

        3. Violation of a maximum daily discharge limitation for any of the pollutants specifically listed in the permit for such notice, and

        4. Any unauthorized discharge to surface or ground waters.

    b. Oral reports as required by this subsection shall be provided as follows:

        1. For unauthorized releases or spills of treated or untreated wastewater reported pursuant to subparagraph a.4 that are in excess of 1,000 gallons per incident, or where information indicates that public health or the environment will be endangered, oral reports shall be provided to the Department by calling the **STATE WARNING POINT TOLL FREE NUMBER (800) 320-0519**, as soon as practical, but no later than 24 hours from the time the permittee becomes aware of the discharge. The permittee, to the extent known, shall provide the following information to the State Warning Point:

            a) Name, address, and telephone number of person reporting;

            b) Name, address, and telephone number of permittee or responsible person for the discharge;

            c) Date and time of the discharge and status of discharge (ongoing or ceased);

            d) Characteristics of the wastewater spilled or released (untreated or treated, industrial or domestic wastewater);

            e) Estimated amount of the discharge;

            f) Location or address of the discharge;

            g) Source and cause of the discharge;

            h) Whether the discharge was contained on-site, and cleanup actions taken to date;

            i) Description of area affected by the discharge, including name of water body affected, if any; and

            j) Other persons or agencies contacted.

        2. Oral reports, not otherwise required to be provided pursuant to subparagraph b.1 above, shall be provided to the Department within 24 hours from the time the permittee becomes aware of the circumstances.

    c. If the oral report has been received within 24 hours, the noncompliance has been corrected, and the noncompliance did not endanger health or the environment, the Department shall waive the written report.

    [62-620.610(20)]

21. The permittee shall report all instances of noncompliance not reported under Permit Conditions IX. 17., 18. and 19. of this permit at the time monitoring reports are submitted. This report shall contain the same information required by Permit Condition IX. 20 of this permit. *[62-620.610(21)]*

22. Bypass Provisions

    a. Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass, unless the permittee affirmatively demonstrates that:

        1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; and

        2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

        3. The permittee submitted notices as required under Permit Condition IX. 22. b. of this permit.

    b. If the permittee knows in advance of the need for a bypass, it shall submit prior notice to the Department, if possible at least 10 days before the date of the bypass. The permittee shall submit notice of an unanticipated bypass within 24 hours of learning about the bypass as required in Permit Condition IX. 20. of this permit. A notice shall include a description of the bypass and its cause; the period of the bypass, including exact dates and times; if the bypass has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent recurrence of the bypass.

    c. The Department shall approve an anticipated bypass, after considering its adverse effect, if the permittee demonstrates that it will meet the three conditions listed in Permit Condition IX. 22. a. 1. through 3. of this permit.

    d. A permittee may allow any bypass to occur which does not cause reclaimed water or effluent limitations to be exceeded if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Permit Condition IX. 22. a. through c. of this permit.

    [62-620.610(22)]

23. Upset Provisions

    a. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed contemporaneous operating logs, or other relevant evidence that:

        1. An upset occurred and that the permittee can identify the cause(s) of the upset;

        2. The permitted facility was at the time being properly operated;

        3. The permittee submitted notice of the upset as required in Permit Condition IX. 20. of this permit; and

        4. The permittee complied with any remedial measures required under Permit Condition IX. 5. of this permit.

    b. In any enforcement proceeding, the burden of proof for establishing the occurrence of an upset rests with the permittee.

    c. Before an enforcement proceeding is instituted, no representation made during the Department review of a claim that noncompliance was caused by an upset is final agency action subject to judicial review.

    [62-620.610(23)

Executed in Hillsborough County, Florida.

STATE OF FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION

Jeffry S. Greenwell, P.E.
Water Facilities Administrator
Southwest District

APPENDIX E

Field Conditions Photos

MEMORANDUM

TO: **File**

FROM: **Joe Greeley**

DATE: **12/ 21/ 2011**

RE: **City of Venice Reclaimed Water Master Plan**

PROJECT#: **058830002**

Meeting with Jim Petrosky in the WRF office prior to field visits:

1. Reviewed the PDF's of missing pipe diameters and connectivity issues
2. Asked about the Atlas maps for Reclaimed water. Jim said Damian would have them.
3. Control valve locations. They are adjacent to pond shut-off valves. Probably not available in GIS
4. SCADA tags. We need to provide them what we need and they will provide names. In subsequent e-mails, Brian provided the points but Dan said he would look at the SCADA download and see if the naming convention was intuitive.
5. Level of telemetry at each location:
    a. Capri Isles North, Capri Isles South, and Bird Bay – Level only
    b. Island Pond - Flow rate, pressure, and valve control.
    c. Waterford does not have telemetry, but it will be added in the future.
    d. County Interconnection - Flow rate, Pressure, Flow direction, valve control.
    e. Curry Creek – Flow rate, creek flow rate, pressure, (not currently used but can monitor – chlorine level upstream, Redox level prior to discharge)
    f. RO Concentrate point – Flow, pressure, chlorine level
6. General information regarding set points – Shut off point for feeding reclaimed water to ponds is 8" below pond overflow weir elevation.
7. March and April of 2010 were very high flow months and they did discharge to Curry Creek for a few days during that period.

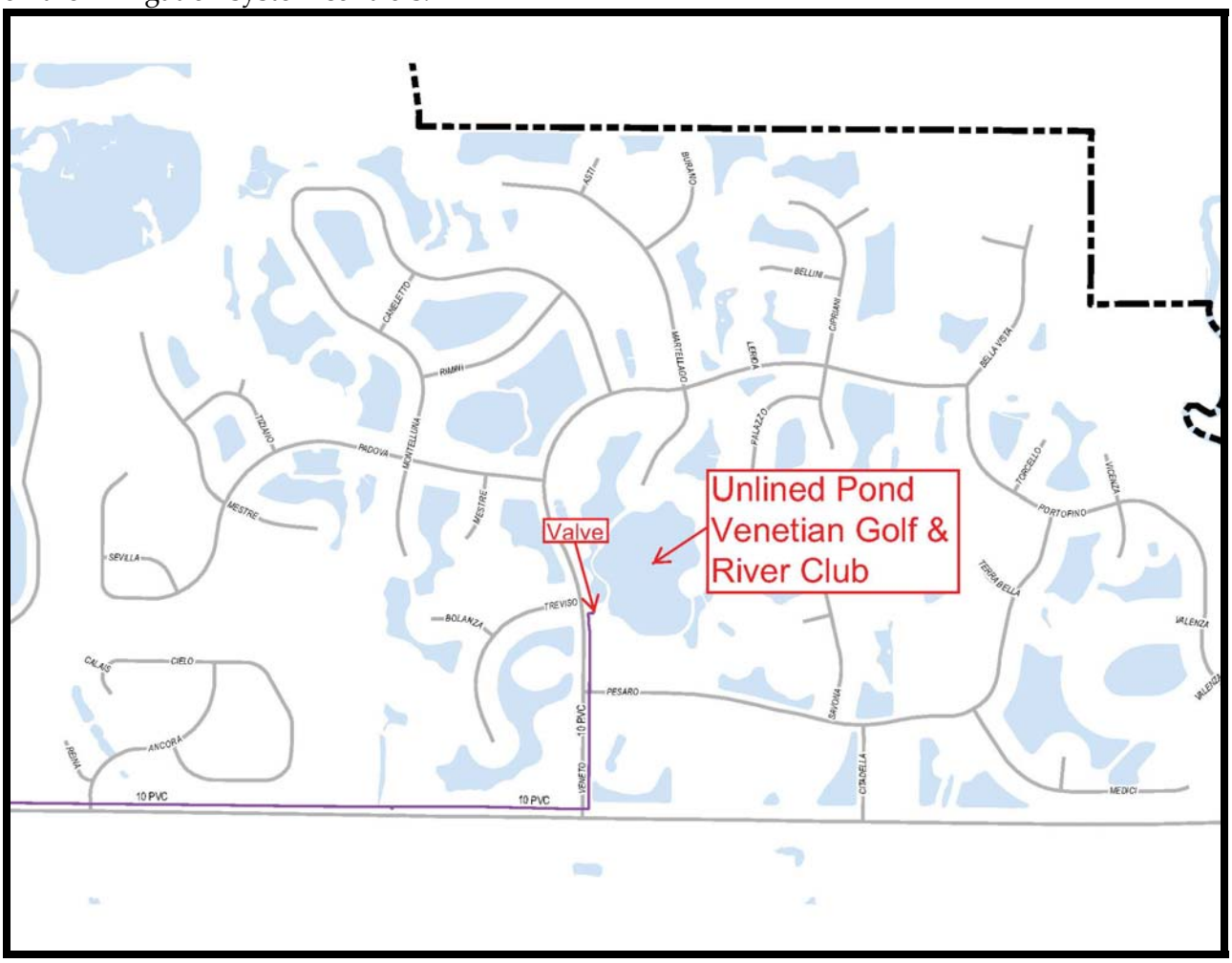
Field Inspections

Venetian Golf and River Club

Pressure guage at 52 psi when we arrived, no flow to pond. Plant pressure guage was 40 psi. Operations increased system pressure to 60 psi and clay valve opened at 60 psi on site of pond.

Jim P indicated that this was an isolated pond at the golf club and was not in the City permit.

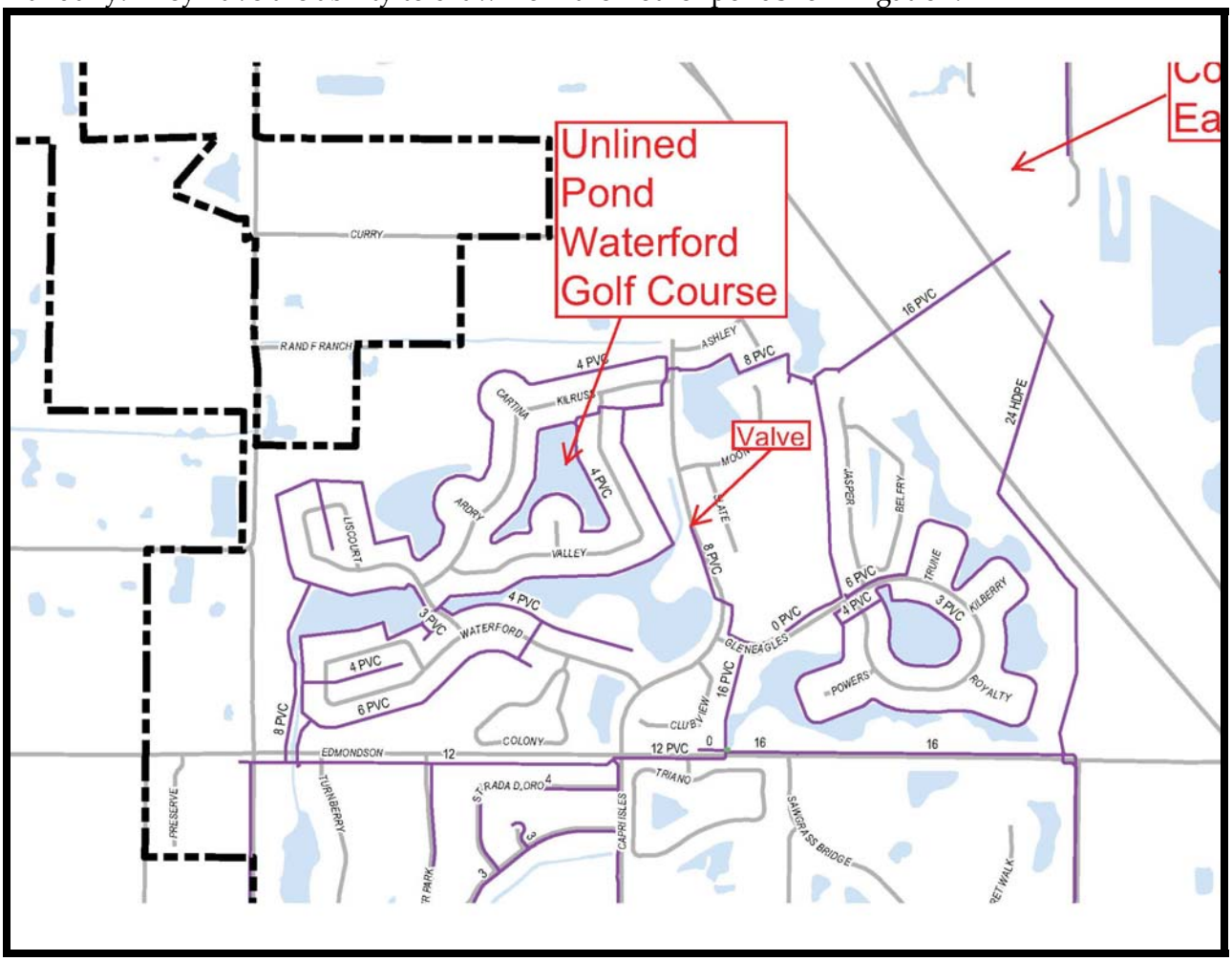
Delivery system included above ground isolation valve, flow meter (mechanical), clay valve and pond level valve. The Golf club typically over rides the pond level float and controls based on their irrigation system controls.



Venetian Golf and River Club Pressure Sustaining Valve, Flow Meter, and Pressure Gauge

Waterford Community

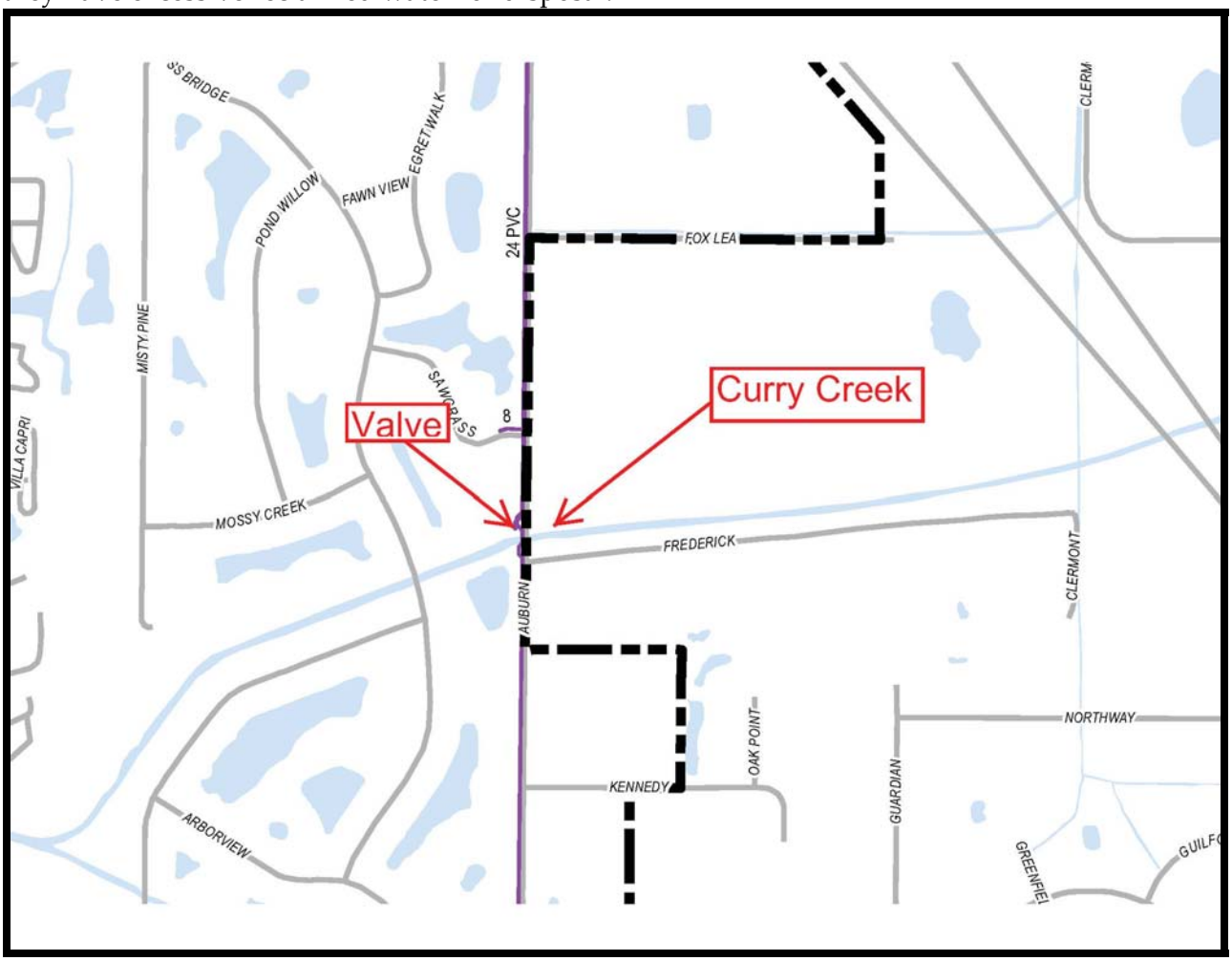
This system is in an underground vault. Jim P. indicates that the pond is not part of their permit. No pressure reading available. The system includes shot off valve, mechanical flow meter, 8" clay valve and a mechanical high level shut-off float. There may be improvements in the near future to the system including telemetry and sensors for pressure, control of the clay valve and addition of a level sensor at the pond weir overflow point. Telemetry may be in two places, at the clay valve pit and at the remote storm pond overflow. The remote system would be solar powered and relay information to the clay valve telemetry unit.
When the City has insufficient water for the reclaimed customers, Waterford is shut off manually. They have the ability to draw from their other ponds for irrigation.



Waterford Vault

Curry Creek Surface Discharge

This is the surface discharge location for the Wastewater Treatment Plant. There is a control and chemical feed system shed. There is telemetry for stream flow rate, pressure, chlorine level, and redox level. The clay valve and magnetic flow meter is in a pit below grade. They bring sulfur dioxide cylinder there when they are going to discharge. There is a clay valve to maintain pressure in the system, but they manually close discharge valves so discharge only occurs when they have excessive reclaimed water for disposal.



Curry Creek Pressure Sustaining Valve

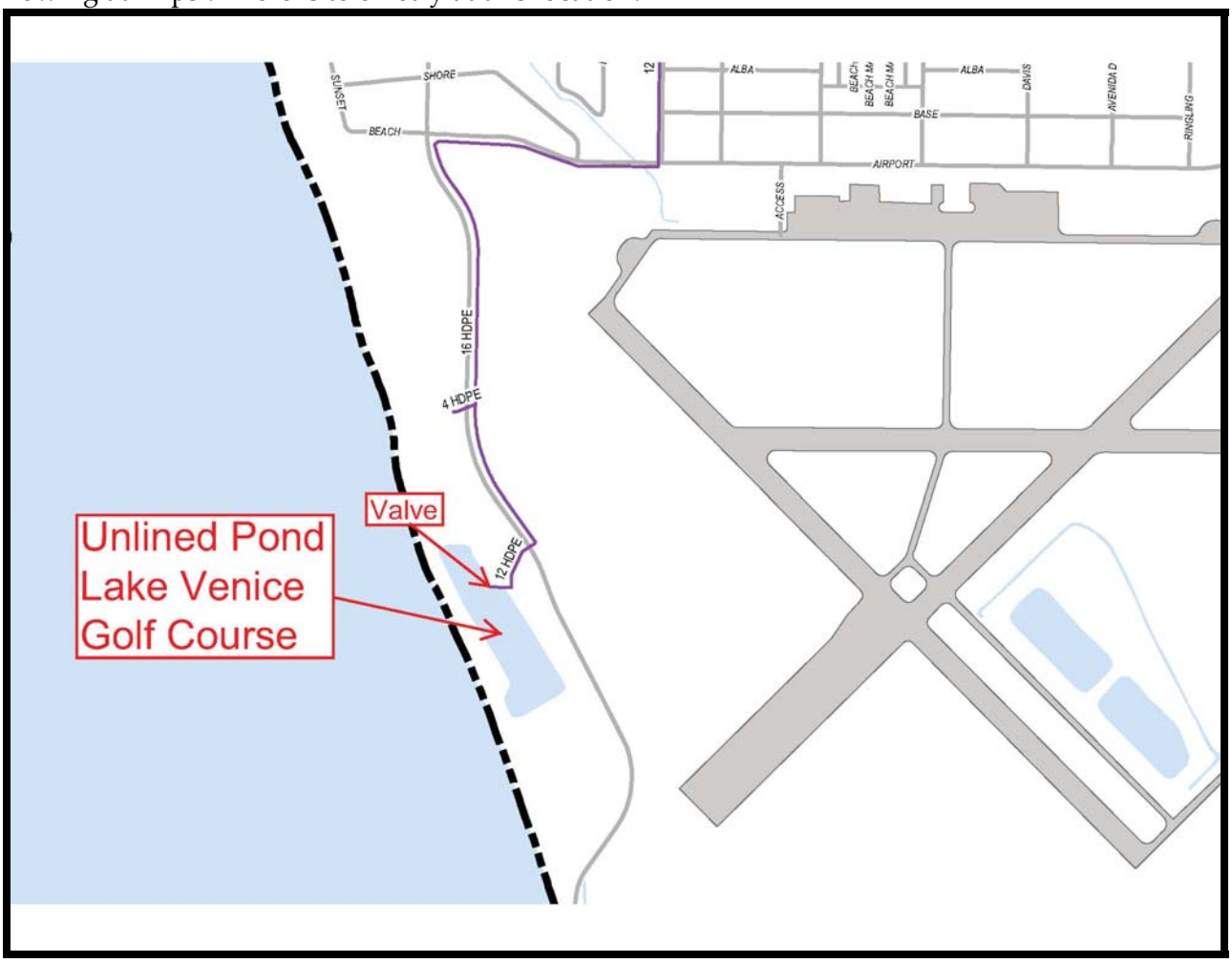
Curry Creek Magnetic Flow Meter

Curry Creek Control and Chemical Feed System Shed

Curry Creek Magnetic Flow Transmitter

Island Pond

At the Island pond there is a shut off valve, 12" clay valve, magnetic flow meter, pressure sensor and pond level indicator. The installation is above grade. The pressure at the valve was 20 psi when we arrived. Jim P had the plant push up the pressure and the clay valve was flowing at 22 psi. There is telemetry at this location.

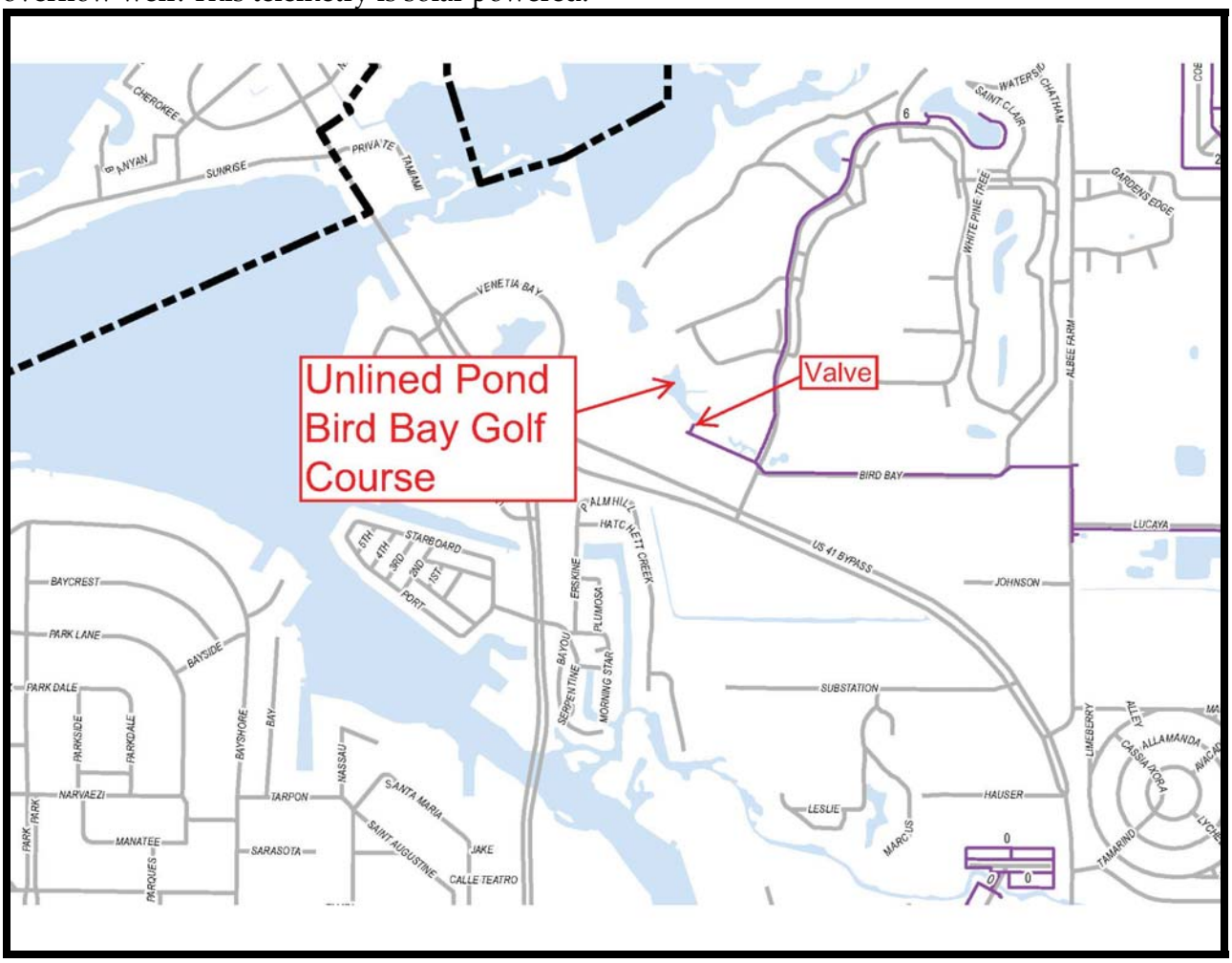


Island Pond Magnetic Flow Meter, Pressure Sensor

Island Pond Pressure Sustaining Valve

Bird Bay Pond

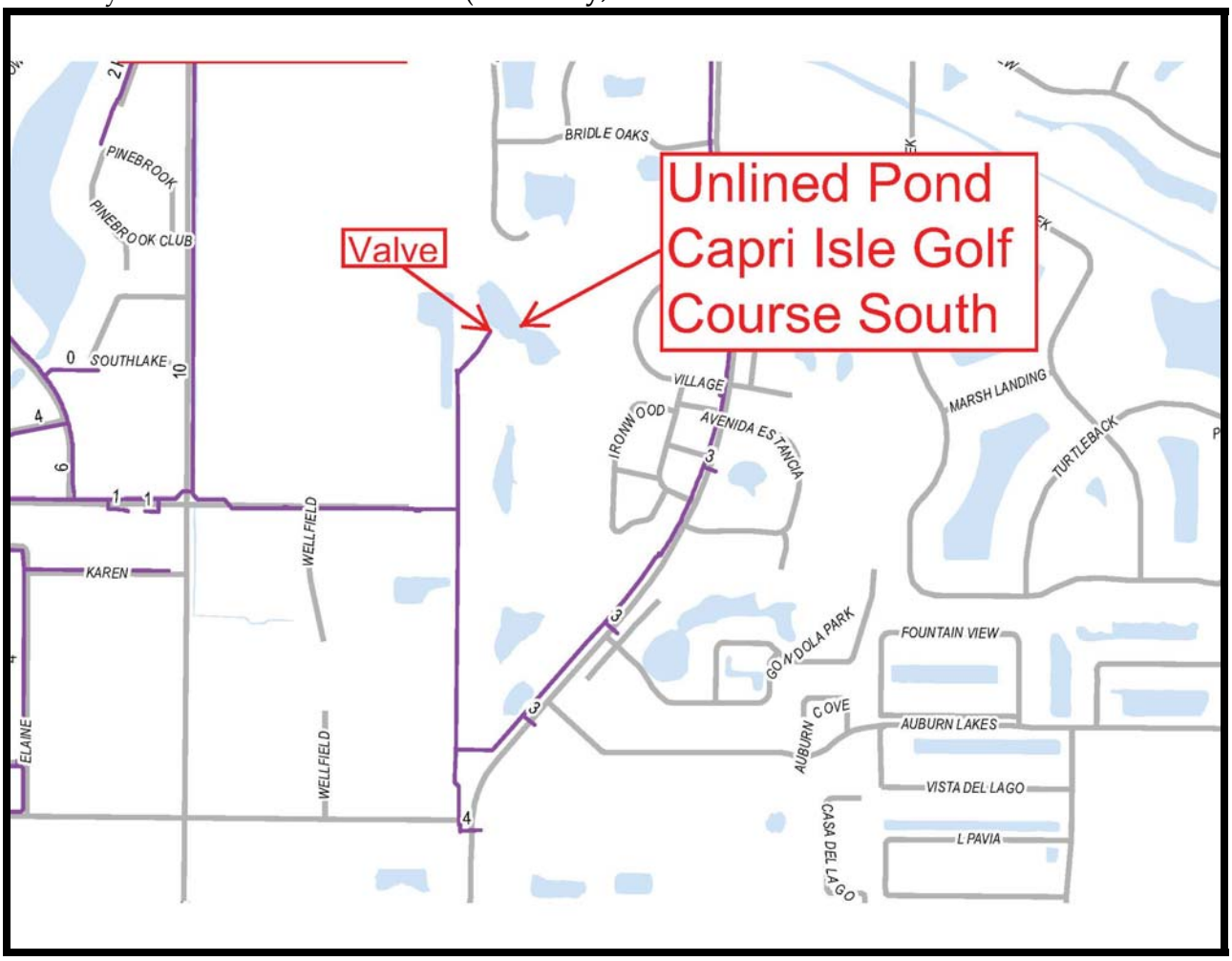
The system is the typical, shut off valve, flow meter (mechanical) 6" cla valve and a float shut off controlling the clay valve. Jim had the plant up the pressure. Once the plant pressure was 40 psi, the local pressure was 35 psi and the clay valve opened. There is telemetry at the pond overflow weir. This telemetry is solar powered.



Bird Bay Pressure Sustaining Valve, and Pressure Gauge

Capri Isles South Pond

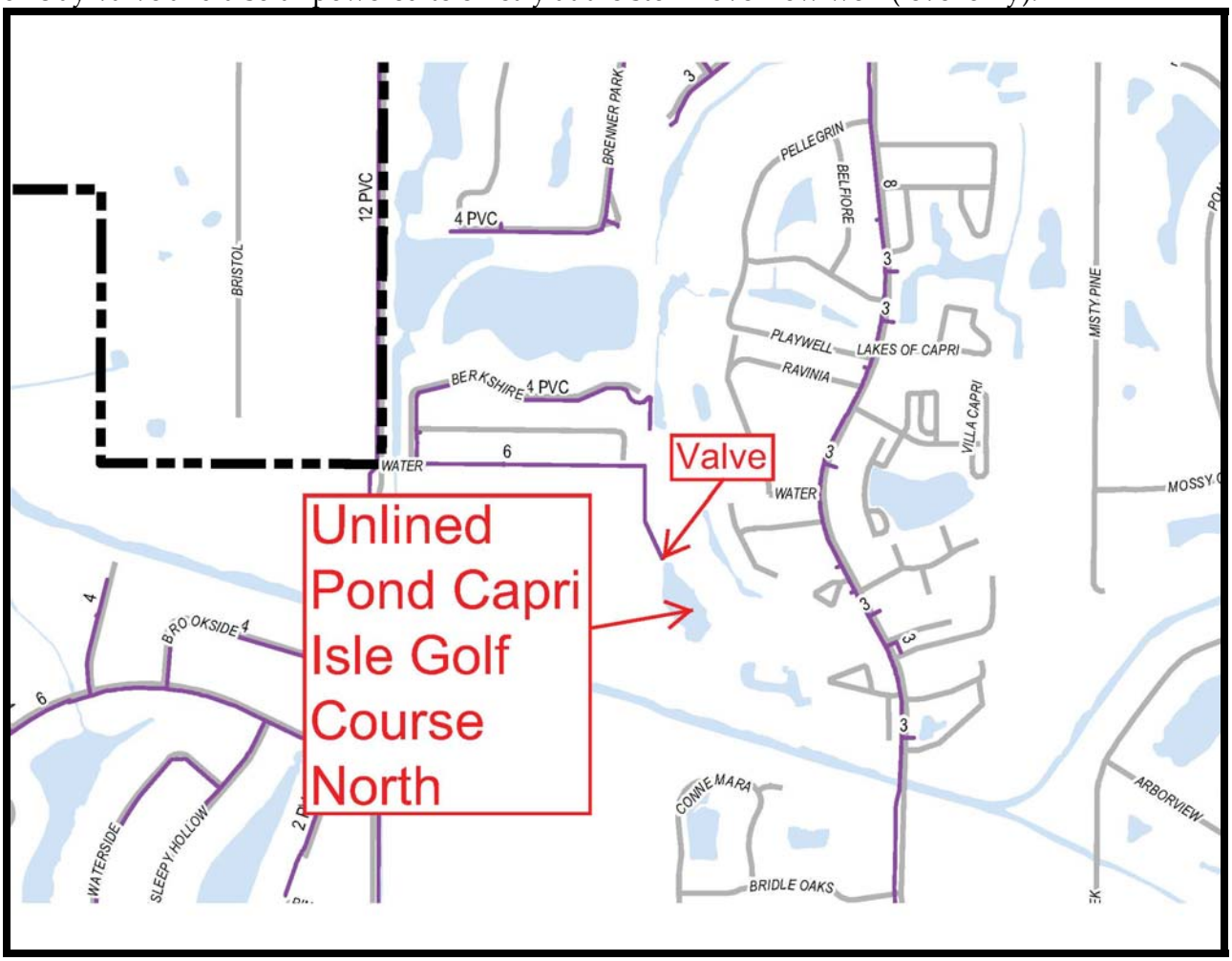
The system is the same Bird Bay, below ground pit. At 39 psi there was no flow. When the WRF increased the pressure the valve opened at 40 psi. There is a 6″ clay valve and a solar powered telemetry at the storm overflow weir (**level only).**



Capri Isles South Pressure Sustaining Valve, and Pressure Gauge

Capri Isles North Pond

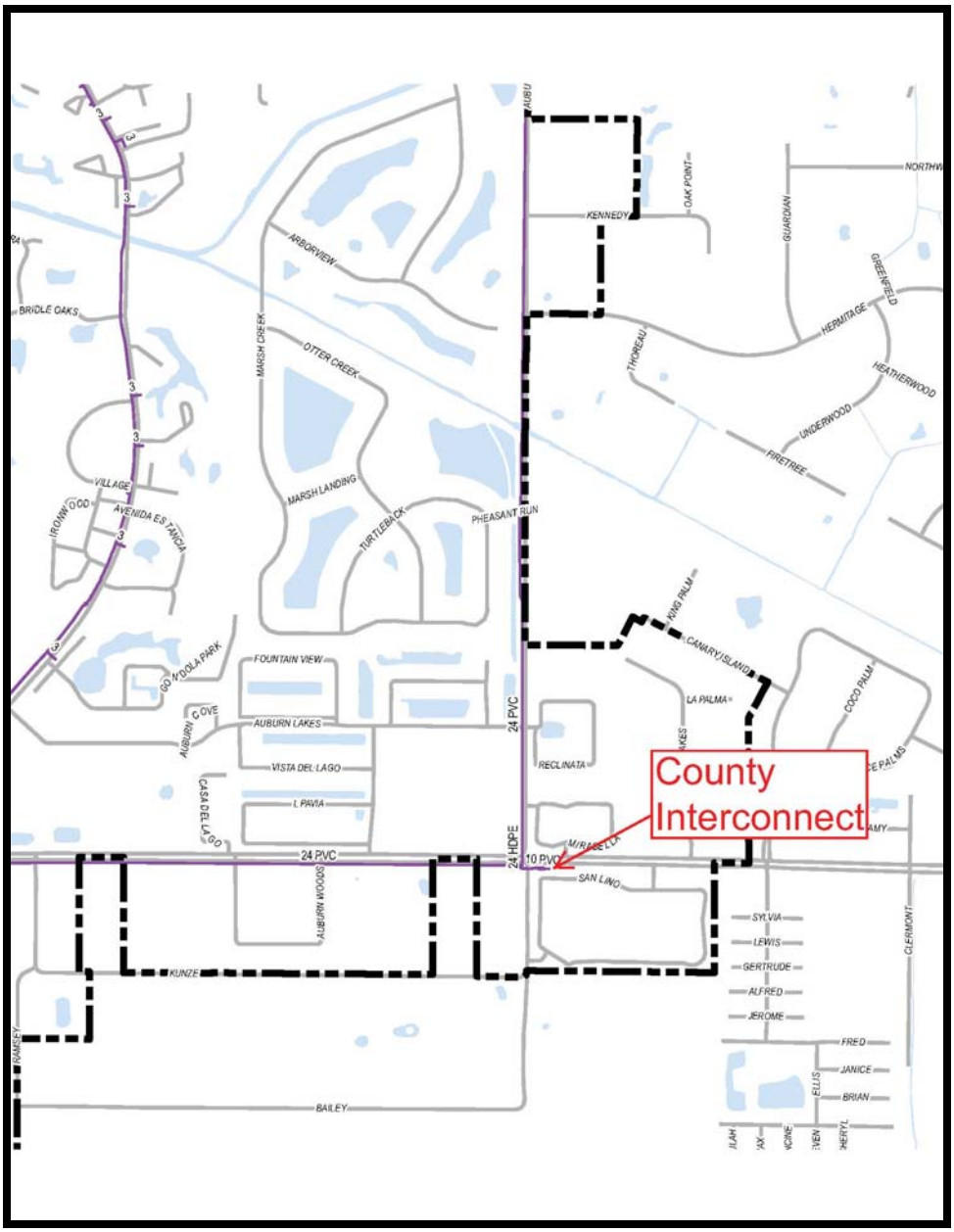
The system is the same Bird Bay, below ground pit. The pressure gauge was broken. There is a 6″ clay valve and a solar powered telemetry at the storm overflow weir (level only).



Capri Isles North Pressure Sustaining Valve

Sarasota County Interconnection

The interconnection is an above ground system with telemetry. There are two sets of magnetic flow meters, pressure gauges, clay valves and isolation valves. They have the ability to set the flow rate in either direction, to the County or from the County. The reading on the Venice pressure gauge was 42.408 psi and the reading on the Sarasota County pressure gauge was 43.490 psi.



Interconnection City of Venice Control Assembly

Interconnection Sarasota County Pressure Gauge

Water Reclamation Facility

Visited the WRF and inspected the ground storage tank, the reclaimed water storage pond, high service pumps and storage pond recycle pumps. All facilities were in good condition.

Eastside WRF Reclaimed Water 3 MG Storage Tank

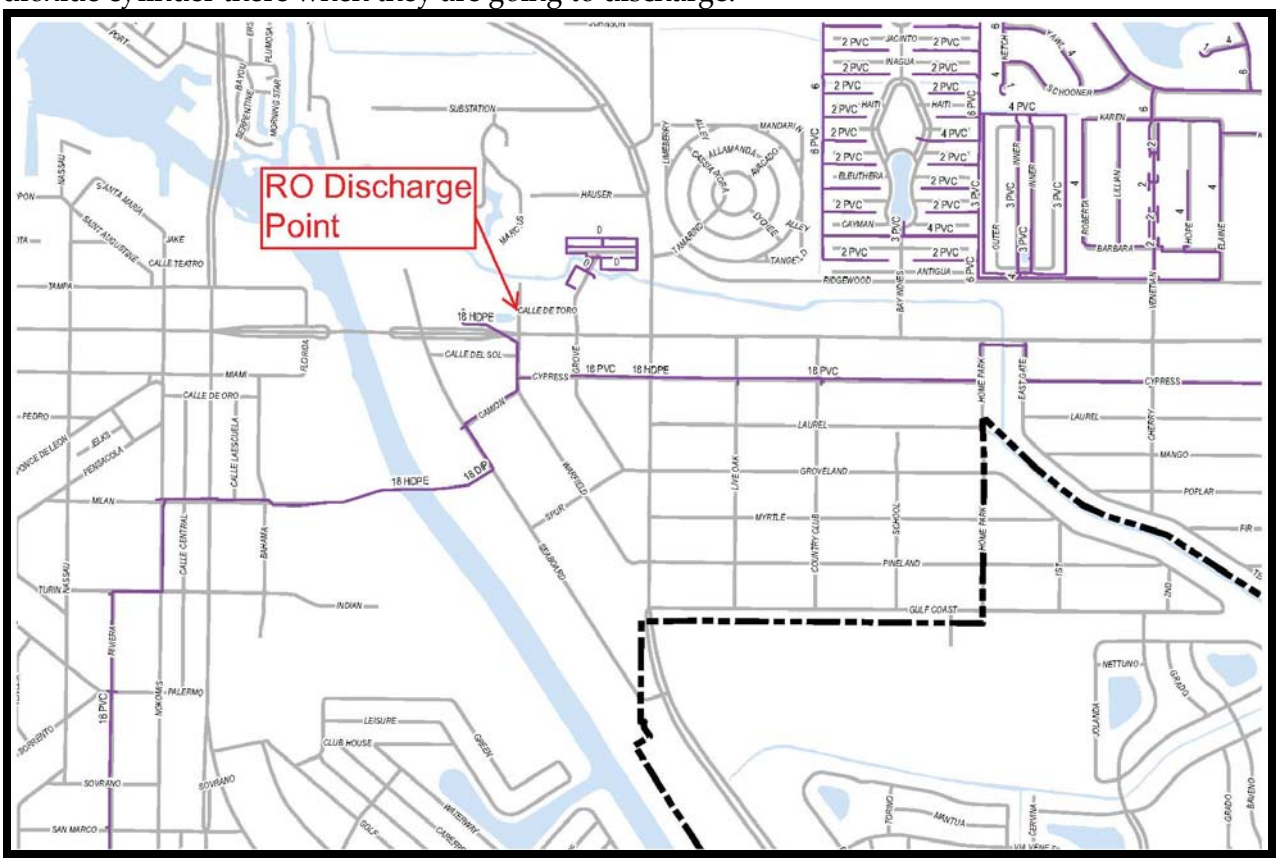
Eastside WRF Reclaimed Water 35 MG Storage Pond

Eastside WRF Reclaimed Water High Service Pumps

Eastside WRF Reclaimed Water Storage Pond Recycle Pumps

RO Discharge

Visited RO plant and inspected the point where reclaimed water is discharged. The set up in the dechlorination house is the same as Curry Creek, however, this has never been used. There was a magnetic meter that was disconnected, a cla valve, and a pressure gauge. They bring sulfur dioxide cylinder there when they are going to discharge.



RO Plant Reclaimed Water Discharge Pressure Sustaining Valve

RO Plant Reclaimed Water Discharge Magnetic Flow Meter, and Pressure Gauge

RO Plant Reclaimed Water Discharge Control and Chemical Feed System Shed

APPENDIX F

Reuse Operating Protocol

CITY OF VENICE WATER RECLAMATION FACILITY
REUSE OPERATING PROTOCOL

The purpose of this protocol is to assure that the requirements contained in Florida Department of Environmental Protection Rule 62-610 F.A.C. are maintained in the reclaimed water system operated by the City of Venice Water Reclamation Facility.

This rule requires that wastewater treatment facilities producing effluent (reclaimed water) for slow-rate land application of areas that are accessible to the public, such as residential lawns, golf courses, cemeteries, parks etc. meet at a minimum, secondary treatment and high level disinfection. High level disinfection is defined as not more than 5 mg/L of suspended solids prior to the application of the disinfectant and less than 1/100ml fecal coliform after disinfection.

To ensure the above criteria are met in the treated effluent, 62-610.463 F.A.C. requires all the agencies operating treatment facilities to include effluent quality monitoring systems and a back up effluent disposal system in the design of wastewater facilities which use effluent for irrigation of publicly accessible areas. Specific items required by the regulations are summarized as follows:

1. A monitoring device for continuous on-line monitoring for turbidity of the treated and filtered effluent.

2. A monitoring device for continuous on-line monitoring of chlorine residual in the final reclaimed water.

3. Facilities for temporary storage of substandard effluent (effluent which doesn't meet turbidity, pH or chlorine residual limits) for subsequent additional treatment or other permitted alternate effluent disposal system.

4. Development of DEP approved operating protocol of the effluent reuse system.

The City of Venice Water Reclamation Facility is a 6 MGD advanced wastewater treatment plant with high level disinfection. Wastewater effluent flows from the re-aeration basin (Process 70) to the clarifier splitter box, where alum can be added to aid in TSS/turbidity removal, when required. From there, effluent is distributed to the clarifiers (Process 80) and then flows through the filters (Process 100) before entering the chlorine contact chamber(s). Finished reclaimed water from the chlorine contact chamber(s) (Process 110) meeting the FDEP permit requirements is sent via transfer pumps (Process 110) to the ground storage tank for system use. Reject reclaimed water from chlorine contact chamber(s) is sent to one of the onsite storage ponds via transfer pumps (Process 110).

The effluent reuse system includes the continuous in-line monitoring systems for turbidity and chlorine residual, an automatic flow diversion control system, and the provisions for reprocessing of reject water. The control of the automatic flow diversion valve is monitored by a SCADA system which will divert all treated effluent not meeting the criteria specified below to the storage pond.

From the historical data a ratio of NTU:TSS has been calculated to aid in gauging effluent water quality. This ratio has rarely been lower than 1.5, except when the TSS is very low (less than 0.5 mg/L). Therefore, the 5 mg/L TSS limit (DEP permit limit) would correspond to a turbidity of about 7.5 NTU. An alarm set point of 2.5 NTU's provides additional safety and time to adjust operations before the effluent is out of compliance.

Figure 1 shows the reclaimed water storage, pumping and on-site piping system. A turbidity meter is located in the common effluent channel upstream of the chlorine contact chamber for continuous suspended solids monitoring. A chlorine residual analyzer is utilized with each of the chlorine contact chambers for continuous monitoring of the residual chlorine in the reclaimed water. These monitoring units are connected and incorporated into the SCADA control/ alarm system, and to a valve control panel in the control building.

The SCADA control and monitoring system will activate an alarm if the turbidity of the filtered effluent equals or exceeds the preset limit, if the chlorine residual equals or falls below the preset minimum and if the Final pH equals or exceeds the preset high or low limits. Also, an additional audible alarm will sound at the control building when a reject condition exists. Additionally, a visual alarm and audible alarm, which is located outside the operations building, will activate when a warning condition exists.

SCADA alarm set points for turbidity are "High" alarm at 2.5 NTU and "High-High" alarm (diversion) at 3.0 NTU. SCADA alarm set points for chlorine are "Low" alarm at 1.5 mg/L total residual chlorine, and "Low-Low" alarm (diversion) at 1.2 mg/L total chlorine residual. SCADA alarm set points for Final pH are "Low" alarm at 6.5 SU, "Low-Low" alarm (diversion) at 6.3 SU, "High" alarm at 8.0 SU, "High-High" alarm (diversion) at 8.3 SU. Once any of these warning set points is breached, the SCADA system will register an alarm and notify the operator. The operator will take immediate action to acknowledge the alarm and take the necessary corrective measures to avert an abnormal event.

Monitored Parameter	**Alarm Set Point**	**Reject Set Point**
Turbidity	2.5 NTU	3.0 NTU
Chlorine Residual	1.5mg/L	1.2mg/L
Final pH Low	6.5 SU	6.3 SU
Final pH High	8.0 SU	8.3 SU

Substandard Turbidity Procedures

The following procedures shall be followed by the operator during substandard turbidity effluent events:

- Turbidity High Alarm

  1. Acknowledge alarm on computer.

  2. Check Alarm

  3. Visually inspect the effluent coming from the filters to determine if the water looks more turbid than usual; and

  4. Take a grab sample and run a bench turbidity meter test to verify alarm.

- Turbidity High Alarm Verified (> 2.5 NTU)

  1. If water is being returned from the storage pond:

     a) Reduce the return flow rate, or
     b) Begin or increase the alum feed rate, or
     c) Stop the return flow

  2. If no pond water is currently being returned, investigate the cause of high turbidity and take corrective actions; and

  3. Check turbidity to see if a trend has developed indicating improvement of effluent quality.

- Turbidity Exceeds Compliance (>3.0 NTU)

If the turbidity cannot be lowered below 3.0 NTU within 30 seconds, the SCADA will divert flow to the reject pond and an alarm will notify the operator that flow is being diverted.

- Noncompliance of Secondary Treatment Standards

If the effluent fails to meet secondary treatment standards flow will be diverted to the reject pond until it is determined that the reclaimed water meets secondary treatment and the high level disinfection standards. In every case, all water from onsite storage ponds, both the reject pond and the wet weather storage pond, shall be processed through the treatment plant to receive adequate subsequent additional treatment to assure it meets appropriate applicable standards before being delivered to public access reuse or other means of final disposal.

- Return to Normal Operation

When the cause for the turbidity alarm has been verified and corrected, the turbidity has dropped below 2.5 for 15 minutes; the turbidity will be manually checked at the end of the CCC to verify that it is less than 2.5 NTU and flow will be restored to the Ground Storage Tank (GST) manually.

- Cleaning Chlorine Contact Chamber

Should the turbidity meter read a turbidity of less than 2.5 NTU and the turbidity reading at the end of the chlorine contact chamber is greater than 3 NTU, steps shall be taken to clean the chlorine contact chamber to remove any settleable solids that may have accumulated. After the chamber has been cleaned, a turbidity reading will be taken at the end of the basin, if the turbidity is less than 2.5 NTU, the chamber can be placed back into service.
Should the turbidity remain greater than 2.5 NTU, the individual contact chamber shall be taken out of service and all sediment vacuumed out. Upon completion of vacuum cleaning, the tank may be put back on line and turbidity checked at the end of CCC, if turbidity is less than 2.5 NTU, flow may be returned to the Ground Storage Tank (GST) manually.

Substandard Chlorine Residual Procedures

Chlorine residual must be maintained above 1.0 mg/L leaving the chlorine contact chamber. The chlorine residual is monitored by the SCADA system, which is provided a continuous signal from the chlorine analyzers, located in the downstream end of the three basins prior to the effluent weir. Since it is not feasible to locate the residual analyzer within the effluent wetwell, the chlorine residual must be maintained above 1.0 mg/L within each CCC. The alarm set point is 1.5 mg/L. A normal chlorine residual above 1.5mg/L is maintained in order to achieve high level disinfection.

- Chlorine Residual Low Alarm

  1. Acknowledge alarm on computer

  2. Collect a grab sample at the chlorine contact chamber to verify the reading.

- Chlorine Residual Low Alarm Verified (<1.5 mg/L)

  If the chlorine residual has been determined to be lower than 1.5 mg/L:

  1. Check the chlorine supply system for a malfunction; and
  2. Increase the feed rate if needed; and
  3. Switch to an alternate chemical storage tank if needed; and
  4. If water is being returned from the storage pond, take the following steps to reduce the chlorine demand:

- Reduce the pond return flow rate, or
- Begin or increase the alum feed rate, or
- Stop the pond return flow

5. Recheck chlorine residual at wetwell discharge (EFA)

- Chlorine Residual Drops to 1.2 mg/L

If the chlorine residual cannot be maintained above 1.2 mg/L for 30 seconds within any of the three chambers, the SCADA system will automatically divert flow to the seasonal storage pond.

Return to Normal Operation

When the cause for the chlorine residual alarm has been verified and corrected, the chlorine residual has exceeded 1.2 mg/L for 15 minutes in the Chlorine Contact Chamber and the chlorine residual in the Wet Well (EFA) has been verified to be above 1.2 mg/L, flow will be returned to the GST manually by the operations staff.

Substandard Final pH Procedures

Final Effluent pH must be maintained between 6.0 and 8.5 SU at the EFA. The pH result is monitored by the SCADA system, which is provided a continuous signal from the pH meter located in the analyzer room.

- pH Alarm

1. Acknowledge alarm on computer

2. Check to see if water is running over the probe and there are no air pockets present.

3. Take a grab sample and run a bench pH test to verify alarm

- pH Alarm Verified

1. Investigate cause

2. SCADA will divert flow to SSP, after 30 seconds, if the pH analyzer reads equal to or below 6.3SU or equal to or above 8.3SU.

ATTENDED HOURS

The City of Venice Water Reclamation Facility is manned 24 hours/day, 7 days/week by a certified operator. This facility is also monitored 24 hours per day by a SCADA computer.

TRAINING

All operators shall be required to read and understand the operating protocol and all subsequent updates. A signed statement shall be included in the training file upon completion of reading and understanding.

INSTRUMENTATION

The following inline and bench scale instruments are used to verify compliance with high-level treatment and disinfection requirements and may be upgraded and/or replaced with a different model as necessary.

Analyzer	Number	Model	Range
In-line Chlorine Residual	3	Hach CL17	0 - 5 mg/L
In-line Turbidity	1	Hach SC 200	0 - 4 NTU
In-line Chlorine Residual after Dechlorination	1	Foxcroft Model FX1000P	0-0.5 mg/L
In-line pH	1	Hach SC 200	0-14 SU
Bench Chlorine Residual	2	Hach DR 820/850	0.0 – 2.2 mg/L
Bench Turbidity	1	Hach 2100P Portable Turbidimeter	0 - 1000 NTU
Bench Dechlorination	1	Hach DR 3800	0 – 1 mg/L
Bench pH	1	Accumet AR25	0-14 SU

CALIBRATION & CROSS CHECK OF READINGS

Turbidity is measured continuously and results provided to SCADA. The meter is checked three times a day against the bench meter and calibrated monthly with EPA approved formazin primary stock standard at 20 NTU . The bench meter readings are verified daily utilizing formazin standards at <0.1, 20, 100 NTU and calibrated weekly with formazin standards at <0.1, 20, 100 and 800 NTU. Monthly verification is done with a formazin secondary standard 1.0 NTU from primary stock.

The pH analyzer measures pH continuously with results recorded by SCADA. The meter is checked 3 times a day against the bench meter. The bench meter is calibrated daily with standard buffer solutions. The pH meter is calibrated monthly against certified standards.

Chlorine analyzers measure residual continuously with results recorded by SCADA. The meter is checked 3 times a day against the bench meter. The bench meter is calibrated daily with gel standards.

If, at any time, the bench meter comparisons are not within 10% of each other, a 2nd sample shall be analyzed and if the readings are still 10% or more out of range, an Instruments and Controls Technician shall be notified, via a Work Order, to inspect and calibrate the meter(s) in question.

Should any of the on-line instruments become inoperable, hourly grab samples will be taken and analyzed using the bench meter until the instrument is repaired and returned to service.

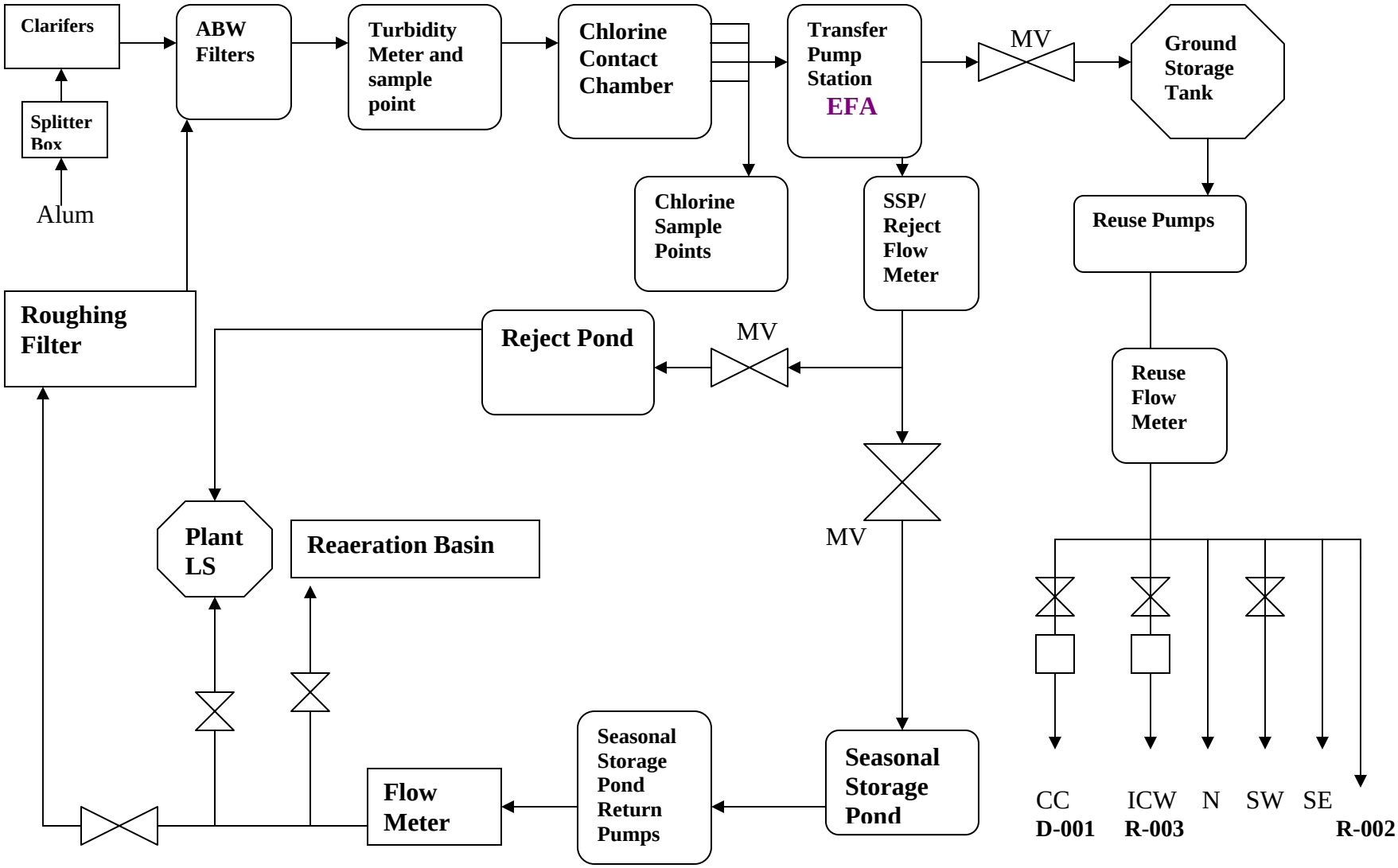
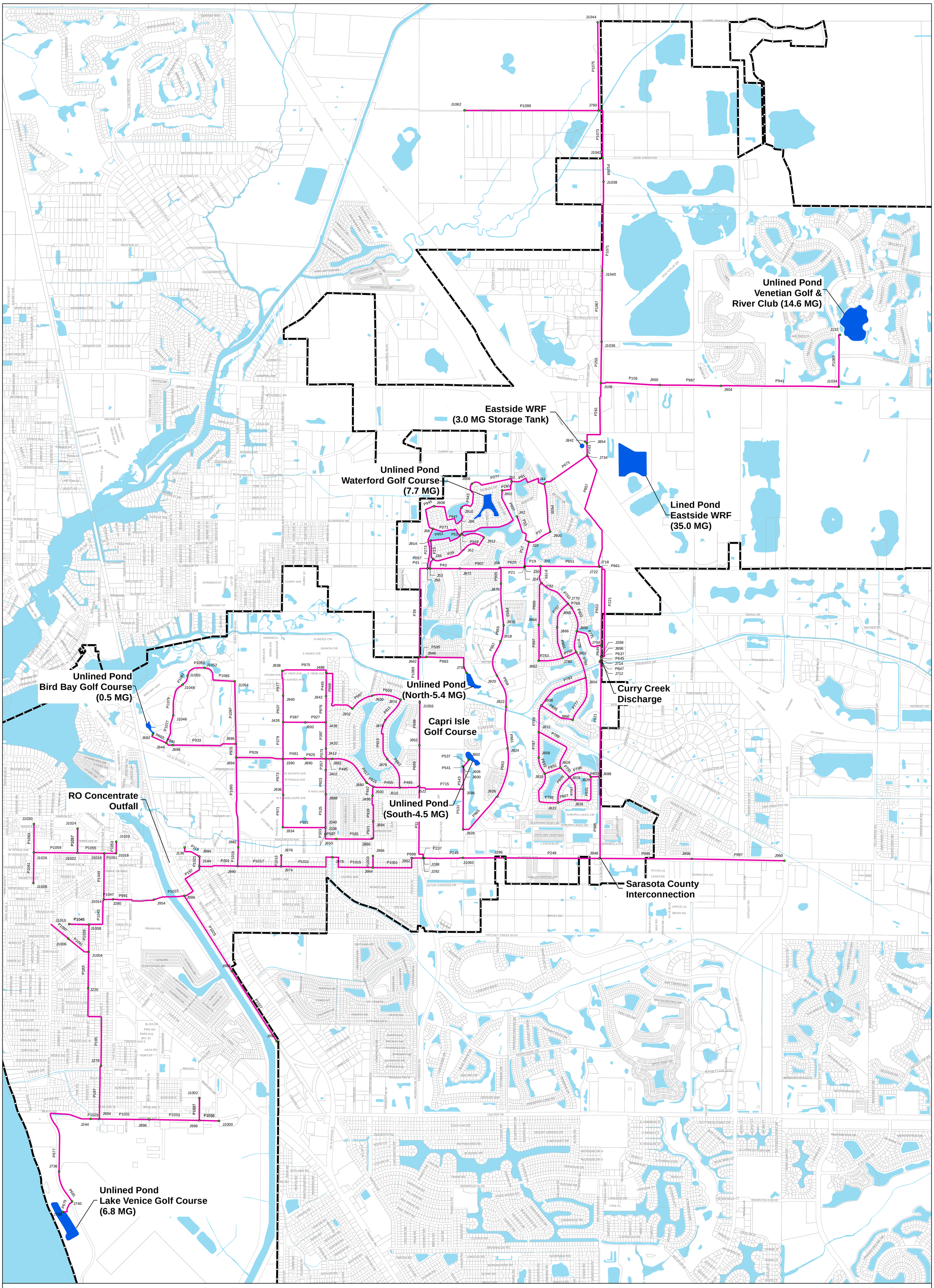


Figure 1 - Venice Eastside Water Reclamation Facility Reclaimed Water System

APPENDIX G

Model Element IDs



N
W E
S

Legend

- Junctions
- Reclaimed Pipe
- Reuse Storage
- City Boundary

McKIM&CREED

VENICE CITY ON THE GULF

City of Venice, FL
Reclaimed Water System
Model Element IDs

1 inch = 1,200 feet

0 1,000 2,000 4,000 6,000 8,000 Feet

APPENDIX H

Hydraulic Model Results - 2010

Existing Average Annual Demand Scenario

Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1052	39.53	10	118.34	46.94
J1046	39.53	12	120.37	46.96
J1048	39.53	9	118.71	47.54
J944	0	13	122.74	47.55
J1050	39.53	8	118.47	47.87
J898	21.35	10	123.36	49.12
J682	0	8	122.74	49.72
J894	1.61	13	130.38	50.86
J428	7.88	13.97	131.7	51.01
J936	6.57	13.05	131.77	51.44
J336	2.18	14.55	133.4	51.49
J436	15.93	13.34	132.43	51.6
J940	6.03	12.46	131.62	51.63
J340	14.67	13.82	133.24	51.75
J938	42.46	12	131.58	51.81
J942	5.48	12.7	132.37	51.85
J892	3.78	12	132.03	52.01
J890	7.59	12	132.38	52.16
J932	33.41	12	132.66	52.28
J420	11.71	12.15	132.84	52.3
J896	9.45	9.27	130	52.31
J650	9.69	13	133.78	52.34
J886	1.66	14	134.88	52.38
J874	15.81	13	133.93	52.4
J488	31.93	11	132.33	52.57
J882	16.55	12	133.4	52.6
J930	17.58	11.1	133.11	52.87
J884	6.37	13.02	135.47	53.05
J934	10.46	9	131.84	53.23
J876	27.05	12	134.89	53.25
J390	8.92	8.39	131.73	53.44
J888	15.67	9.65	133.1	53.49
J402	6.58	9	133.07	53.76
J412	2.81	9	133.06	53.76
J496	3.88	12	136.41	53.91
J878	28.72	12	137.33	54.31
J880	19.32	9.35	136.2	54.96
J500	8.61	9	136.75	55.36
J510	10.26	12	140.03	55.47
J586	0	15	145.06	56.35
J926	32.08	14	145.9	57.15
J522	2.66	12	144.7	57.5
J600	0	12	145.06	57.65
J606	0	12	145.06	57.65
J952	17.95	13	147.04	58.08
J928	16.15	11	145.38	58.22
J602	0	8	145.06	59.39
J908	16.04	15	152.31	59.5
J1056	0	10	148.11	59.84
J854	0	20.5	159.07	60.04
J918	6.17	12	150.96	60.21
J946	12.62	10	149.27	60.34
J68	7.91	13	152.31	60.36
J920	17.51	10	149.29	60.36
J902	70.99	14	153.4	60.4
J922	33.59	8.5	147.98	60.43
J872	26.62	14	153.7	60.53
J662	55.25	9.5	149.27	60.56
J924	49.61	7	146.75	60.56
J906	13.16	14	153.96	60.65
J916	41.56	11.65	151.77	60.71
J870	15.96	14	154.41	60.84

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J948	47.27	18	158.5	60.88
J56	11.54	15	155.55	60.9
J62	8.35	11.66	152.31	60.94
J52	1.04	11	152.42	61.28
J132	1.39	17	158.79	61.44
J904	41.36	17	158.79	61.44
J910	22.09	10.74	152.67	61.5
J36	13.54	10.2	152.38	61.61
J1004	0	16	158.49	61.74
J1008	0	16	158.49	61.74
J24	0	15	157.88	61.91
J1036	0	16	158.93	61.93
J92	72.83	14	156.94	61.94
J734	7.1	16	158.97	61.95
J20	15.37	15	158	61.96
J824	35.41	14	157.21	62.05
J912	31.88	9	152.23	62.06
J66	25.45	9	152.29	62.09
J818	46.26	13.73	157.06	62.1
J914	7.44	9	152.34	62.11
J1014	0	15	158.49	62.17
J816	15.14	13.39	157.06	62.25
J864	18.23	14	157.68	62.26
J828	12.84	14	157.79	62.31
J770	9.42	14	157.82	62.32
J792	18.31	14	157.82	62.32
J30	17.02	14	157.86	62.33
J868	12.52	14	157.85	62.33
J1040	0	15	158.93	62.37
J900	15.44	14	158.13	62.45
J822	15.68	13	157.19	62.48
J826	12.91	13.03	157.25	62.49
J44	0.08	14	158.4	62.57
J1060	0	14	158.5	62.61
J220	0.44	14	158.49	62.61
J288	13.87	14	158.5	62.61
J292	3.39	14	158.5	62.61
J296	6.71	14	158.5	62.61
J962	0	14	158.5	62.61
J988	0	14	158.49	62.61
J990	0	14	158.49	62.61
J108	1.29	14.42	158.93	62.62
J718	15.91	13.94	158.56	62.66
J950	0.08	14	158.82	62.75
J994	0	13.61	158.48	62.77
J1038	0	14	158.93	62.8
J760	0	14	158.93	62.8
J722	11.36	13.53	158.56	62.84
J812	21	12	157.05	62.85
J858	10.54	12	157.05	62.85
J244	0	13.41	158.48	62.86
J804	16.15	12	157.22	62.92
J750	1.68	4	149.27	62.94
J50	26.01	7	152.33	62.97
J278	0	13	158.48	63.04
J738	18.19	13	158.48	63.04
J866	9.53	12	157.72	63.14
J1034	0	13	158.79	63.17
J842	0	13	159.1	63.31
J964	0	12.35	158.5	63.32
J280	4.75	12	158.49	63.47
J954	0	12	158.49	63.47
J986	0	12	158.49	63.48
J862	16.12	10.9	157.66	63.59

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1042	0	12	158.93	63.67
J10	1.87	11	158.01	63.7
J688	6.21	11.5	158.5	63.7
J808	22.54	10	157.07	63.73
J860	13.21	10	157.1	63.74
J144	0.58	11	158.49	63.91
J780	10.93	10	157.67	63.98
J802	9.05	10	157.66	63.98
J740	1.04	10	158.48	64.34
J980	0	10	158.49	64.34
J704	1.41	10	158.53	64.36
J42	0	9	158.01	64.56
J268	0	9.5	158.53	64.58
J696	0	9.5	158.54	64.58
J800	10.43	8.98	158.07	64.6
J714	3.33	9	158.53	64.79
J712	0	8.5	158.53	65.01
J736	0	8	158.48	65.2
J136	0	8	158.49	65.21
J974	0	8	158.49	65.21
J984	0	6.84	158.49	65.71
J978	0	5	158.49	66.51

Existing Annual Average Demand Scenario

Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P465	J510	J522	585.53	8	120	-590.09	3.77	4.67	7.98
P625	J30	J56	736.23	12	120	1,035.34	2.94	2.31	3.13
P455	J500	J510	767.28	8	120	-420.81	2.69	3.27	4.26
P281	J92	J902	485.88	4	120	90.79	2.32	3.54	7.29
P933	J898	J896	1,856.97	6	120	-179.47	2.04	6.63	3.57
P669	J522	J952	1,193.35	10	120	-497.37	2.03	2.34	1.96
P907	J872	J56	1,171.38	12	120	-715.78	2.03	1.85	1.58
P905	J870	J56	477.99	8	120	-308.02	1.97	1.14	2.39
P915	J880	J500	233.27	8	120	-308.08	1.97	0.56	2.39
P43	J52	J872	867.21	12	120	-689.16	1.96	1.28	1.48
P855	J842	J854	37.35	20	120	1,819.46	1.86	0.03	0.74
P953	J916	J870	1,215.97	8	120	-292.06	1.86	2.64	2.17
P917	J882	J880	1,315.64	8	120	-288.75	1.84	2.79	2.12
P883	J510	J878	942.7	6	120	159.02	1.8	2.69	2.86
P1077	J944	J1046	838.18	6	120	158.12	1.79	2.37	2.83
P981	J944	J898	221.21	6	120	-158.12	1.79	0.63	2.83
P41	J50	J52	72.58	12	120	-628.45	1.78	0.09	1.24
P803	J688	J828	257.80	6	120	155.83	1.77	0.71	2.75
P485	J412	J882	180.52	8	120	-272.2	1.74	0.34	1.9
P21	J24	J30	21.64	16	120	1,052.37	1.68	0.02	0.8
P39	J662	J50	2,805.19	12	120	-584.86	1.66	3.05	1.09
P955	J918	J916	499.12	8	120	-250.5	1.6	0.81	1.63
P957	J920	J918	1,067.97	8	120	-244.33	1.56	1.66	1.56
P913	J878	J876	1,235.77	6	120	130.3	1.48	2.44	1.97
P1089	J1056	J662	1,352.62	12	120	-515.32	1.46	1.16	0.86
P989	J952	J1056	1,247.23	12	120	-515.32	1.46	1.07	0.86
P959	J922	J920	969.94	8	120	-226.83	1.45	1.32	1.36
P91	J92	J44	1,212.87	8	120	-212.43	1.36	1.46	1.2
P1079	J1046	J1048	998.79	6	120	118.59	1.35	1.66	1.66
P925	J890	J412	616.15	8	120	-203.28	1.3	0.68	1.11
P743	J734	J854	357.90	24	120	-1,775.34	1.26	0.1	0.29
P277	J92	J906	1,289.97	4	120	48.81	1.25	2.98	2.31
P481	J390	J890	630.9	8	120	-195.69	1.25	0.65	1.03
P961	J924	J922	1,210.78	8	120	-193.23	1.23	1.22	1.01
P929	J894	J390	1,364.47	8	120	-190.53	1.22	1.34	0.98
P661	J718	J722	17.96	16	120	-760.24	1.21	0.01	0.44
P931	J896	J894	398.95	8	120	-188.92	1.21	0.39	0.97
P447	J496	J500	263.4	6	120	-104.12	1.18	0.34	1.3
P911	J876	J874	751.77	6	120	103.25	1.17	0.96	1.28
P919	J884	J496	779.02	6	120	-100.24	1.14	0.95	1.21
P673	J44	J734	1,527.00	16	120	-698.87	1.12	0.57	0.37
P921	J886	J884	543.81	6	120	-93.87	1.07	0.58	1.08
P585	J650	J886	1,054.12	6	120	-92.21	1.05	1.1	1.04
P651	J20	J718	1,713.18	16	120	-649.28	1.04	0.56	0.33
P909	J874	J930	867.88	6	120	87.44	0.99	0.82	0.94
P587	J336	J650	456.76	6	120	-82.52	0.94	0.39	0.85
P19	J20	J24	459.26	16	120	583.32	0.93	0.12	0.27
P799	J828	J824	698.4	6	120	81.98	0.93	0.58	0.84
P963	J926	J924	1,469.50	8	120	-143.62	0.92	0.86	0.58
P303	J336	J340	189.56	6	120	80.34	0.91	0.15	0.81
P943	J906	J910	1,002.15	4	120	35.65	0.91	1.29	1.29
P1081	J1048	J1050	305.64	6	120	79.06	0.9	0.24	0.78
P373	J412	J420	297.67	6	120	76.35	0.87	0.22	0.73
P301	J340	J934	1,238.56	4	120	33.19	0.85	1.4	1.13
P771	J704	J800	958.55	8	120	129.79	0.83	0.46	0.48
P775	J800	J802	619.37	6	120	71.93	0.82	0.41	0.66
P967	J930	J932	717.97	6	120	69.87	0.79	0.45	0.62
P935	J900	J44	1,401.10	16	120	-486.36	0.78	0.27	0.19
P657	J722	J734	3,555.33	24	120	-1,069.37	0.76	0.4	0.11
P17	J24	J10	723.62	16	120	-469.04	0.75	0.13	0.18
P37	J10	J900	707.05	16	120	-470.92	0.75	0.13	0.18
P781	J802	J804	800.54	6	120	65.86	0.75	0.45	0.56

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P397	J436	J420	762.04	6	120	-64.64	0.73	0.41	0.54
P965	J928	J926	1,434.61	8	120	-111.54	0.71	0.52	0.36
P801	J826	J828	1,120.40	6	120	-61.01	0.69	0.54	0.48
P927	J892	J436	598.20	4	120	-25.16	0.64	0.4	0.68
P531	J586	J928	1,171.40	8	120	-95.39	0.61	0.32	0.27
P715	J522	J586	1,316.00	8	120	-95.39	0.61	0.36	0.27
P791	J818	J824	384.84	6	120	-54.11	0.61	0.15	0.39
P975	J938	J488	1,364.38	4	120	-22.59	0.58	0.76	0.55
P765	J20	J792	507.91	6	120	50.59	0.57	0.17	0.34
P387	J428	J892	654.47	4	120	-21.37	0.55	0.33	0.5
P903	J868	J800	732.22	6	120	-47.44	0.54	0.22	0.3
P937	J902	J66	2,551.19	4	120	19.8	0.51	1.11	0.43
P637	J268	J696	7.13	16	120	-297.76	0.48	0	0.08
P1083	J1050	J1052	615.33	6	120	39.53	0.45	0.13	0.22
P645	J268	J714	93.13	16	120	261.61	0.42	0.01	0.06
P969	J932	J488	1,773.44	6	120	36.45	0.41	0.33	0.19
P769	J770	J868	157.17	6	120	-34.92	0.4	0.03	0.17
P267	J36	J52	302.75	8	120	-59.67	0.38	0.03	0.11
P325	J340	J888	967.88	6	120	32.48	0.37	0.15	0.15
P51	J62	J66	60.89	4	120	13.73	0.35	0.01	0.22
P947	J910	J908	1,654.99	4	120	13.56	0.35	0.36	0.22
P757	J770	J866	801.75	6	120	29.46	0.33	0.1	0.13
P807	J822	J826	523.47	6	120	-28.54	0.32	0.06	0.12
P899	J864	J792	1,250.51	6	120	-28.32	0.32	0.15	0.12
P939	J842	RES9006	1	48	120	-1,819.46	0.32	0	0.02
P607	J428	J940	769.49	6	120	25.9	0.29	0.08	0.1
P261	J854	J108	2,146.32	8	120	44.12	0.28	0.14	0.07
P777	J804	J860	1,342.76	6	120	24.79	0.28	0.12	0.09
P783	J808	J804	1,577.35	6	120	-24.93	0.28	0.15	0.09
P795	J816	J822	1,406.49	6	120	-24.87	0.28	0.13	0.09
P105	J108	J950	1,726.29	8	120	42.83	0.27	0.11	0.06
P29	J36	J912	1,776.49	6	120	23.79	0.27	0.15	0.08
P979	J942	J436	760.89	6	120	-23.55	0.27	0.06	0.08
P971	J934	J936	945.14	6	120	22.73	0.26	0.07	0.08
P25	J36	J914	568.49	6	120	22.33	0.25	0.04	0.08
P901	J866	J780	912.76	6	120	19.93	0.23	0.06	0.06
P977	J940	J938	754.64	6	120	19.87	0.23	0.05	0.06
P797	J824	J826	710.33	6	120	-19.56	0.22	0.04	0.06
P221	J696	J722	2,686.05	24	120	-297.76	0.21	0.03	0.01
P445	J488	J942	679.76	6	120	-18.07	0.21	0.03	0.05
P949	J912	J66	712.34	4	120	-8.08	0.21	0.06	0.08
P923	J888	J402	703.71	6	120	16.82	0.19	0.03	0.04
P621	J714	J688	3,397.39	24	120	258.27	0.18	0.03	0.01
P973	J936	J390	1,054.10	6	120	16.16	0.18	0.04	0.04
P951	J914	J62	994.95	6	120	14.89	0.17	0.04	0.04
P987	J950	J904	1,776.99	10	120	42.74	0.17	0.04	0.02
P595	J662	J946	206.15	6	120	14.3	0.16	0.01	0.03
P785	J808	J812	792.95	6	120	13.96	0.16	0.03	0.03
P653	J718	J704	2,356.56	16	120	95.05	0.15	0.02	0.01
P379	J390	J428	1,067.12	6	120	12.4	0.14	0.03	0.03
P809	J824	J822	848.95	6	120	12.01	0.14	0.02	0.02
P893	J858	J816	510.04	6	120	-11.28	0.13	0.01	0.02
P895	J860	J808	1,028.11	6	120	11.57	0.13	0.02	0.02
P357	J402	J412	332.55	6	120	10.24	0.12	0.01	0.02
P273	J68	J50	1,193.53	8	120	-17.58	0.11	0.01	0.01
P897	J862	J864	1,043.35	6	120	-10.09	0.11	0.02	0.02
P271	J68	J62	903.73	6	120	7.19	0.08	0.01	0.01
P763	J780	J862	710.16	6	120	6.03	0.07	0	0.01
P789	J812	J818	1,554.84	6	120	-6.29	0.07	0.01	0.01
P985	J948	J688	2,403.23	24	120	-96.24	0.07	0	0
P649	J704	J268	318.06	16	120	-36.15	0.06	0	0
P1029	J994	J244	257.79	12	120	19.22	0.05	0	0
P195	J220	J278	2,626.00	12	120	19.22	0.05	0.01	0
P197	J278	J994	1,557.06	12	120	19.22	0.05	0	0

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P679	J738	J740	489.39	12	120	-18.19	0.05	0	0
P237	J292	J288	27.24	18	120	-28.39	0.04	0	0
P753	J792	J770	986.19	6	120	3.96	0.04	0	0
P991	J954	J280	1,220.74	16	120	24.42	0.04	0	0
P1001	J964	J962	1,406.37	18	120	-25	0.03	0	0
P1011	J974	J978	1,770.87	18	120	-25.00	0.03	0	0
P1015	J978	J964	1,480.70	18	120	-25.00	0.03	0	0
P1017	J980	J974	1,319.38	18	120	-25	0.03	0	0
P1023	J986	J954	890.63	18	120	24.42	0.03	0	0
P1039	J1004	J1008	797.74	16	120	-19.67	0.03	0	0
P1043	J1008	J1014	1,128.33	16	120	-19.67	0.03	0	0
P1047	J1014	J280	272.16	16	120	-19.67	0.03	0	0
P157	J144	J986	1,305.37	18	120	24.42	0.03	0	0
P183	J220	J1004	1,057.17	16	120	-19.67	0.03	0	0
P201	J144	J980	1,063.76	18	120	-25	0.03	0	0
P245	J288	J1060	2,334.83	24	120	-42.25	0.03	0	0
P245A	J1060	J296	1,197.55	24	120	-42.25	0.03	0	0
P249	J296	J948	2,771.23	24	120	-48.97	0.03	0	0
P677	J736	J244	2,947.41	16	120	-19.22	0.03	0	0
P681	J740	J736	969.74	16	120	-19.22	0.03	0	0
P759	J780	J802	425.59	6	120	2.98	0.03	0	0
P945	J908	J68	914.89	6	120	-2.48	0.03	0	0
P999	J962	J292	335.77	18	120	-25	0.03	0	0
P891	J818	J816	490.57	6	120	1.56	0.02	0	0
P983	J946	J750	1,547.44	6	120	1.68	0.02	0	0
P1065	J1034	J132	1,540.73	10	120	1.39	0.01	0	0
P787	J812	J858	736.39	6	120	-0.74	0.01	0	0
P941	J904	J1034	3,432.11	10	120	1.39	0.01	0	0
P1021	J984	J144	284.05	18	120	0	0	0	0
P1025	J986	J988	2,596.50	8	120	0	0	0	0
P1027	J988	J990	2,420.07	8	120	0	0	0	0
P1067	J1036	J1040	2,066.23	8	120	0.00	0	0	0
P1069	J1038	J1042	696.24	8	120	0.00	0	0	0
P1071	J1040	J1038	2,592.09	8	120	0	0	0	0
P1073	J1042	J760	1,490.48	8	120	0	0	0	0
P119	J136	J984	582	18	120	0	0	0	0
P255	J108	J1036	1,204.92	8	120	0.00	0	0	0
P33	J10	J42	903.69	8	120	0	0	0	0
P537	J600	J602	245.00	8	120	0	0	0	0
P541	J600	J606	14.01	6	120	0	0	0	0
P543	J586	J600	659.76	8	120	0	0	0	0
P603	J682	J944	516.79	6	120	0	0	0	0
P647	J714	J712	78.54	16	120	0	0	0	0

Existing Max Month Peak Hour Demand Scenario

Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J944	240.34	13	-59.82	-31.55
J682	289	8	-64.28	-31.32
J1046	0	12	-59.82	-31.12
J1052	0	10	-59.82	-30.25
J1048	0	9	-59.82	-29.82
J1050	0	8	-59.82	-29.38
J898	32.45	10	-53.96	-27.71
J894	2.45	13	3.99	-3.9
J896	14.36	9.27	0.95	-3.6
J428	11.97	13.97	14.78	0.35
J936	9.99	13.05	14.91	0.81
J940	9.17	12.46	14.77	1
J938	64.54	12	14.77	1.2
J892	5.75	12	17.4	2.34
J890	11.54	12	18.07	2.63
J390	13.56	8.39	14.48	2.64
J934	15.9	9	15.42	2.78
J436	24.22	13.34	20.19	2.97
J942	8.33	12.7	20.18	3.24
J336	3.31	14.55	23.38	3.83
J340	22.29	13.82	22.72	3.86
J420	17.8	12.15	21.21	3.93
J488	48.53	11	20.18	3.98
J932	50.79	12	22.85	4.7
J882	25.16	12	23.18	4.84
J650	14.72	13	25.03	5.21
J888	23.81	9.65	22.05	5.37
J412	4.27	9	21.73	5.52
J402	10	9	21.81	5.55
J930	26.71	11.1	25.01	6.03
J886	2.52	14	29.44	6.69
J874	24.03	13	28.45	6.7
J884	9.68	13.02	31.77	8.12
J876	41.11	12	32.18	8.74
J496	5.9	12	35.42	10.15
J880	29.37	9.35	34.52	10.9
J500	13.09	9	36.71	12.01
J878	43.66	12	40.65	12.41
J510	15.6	12	49.31	16.17
J750	460.55	4	54.57	21.91
J600	0	12	62.93	22.07
J606	0	12	62.93	22.07
J586	0	15	66.22	22.2
J602	458	8	61.71	23.27
J522	4.05	12	66.32	23.54
J928	24.55	11	70.99	25.99
J926	48.76	14	77.49	27.51
J952	27.28	13	78.98	28.59
J1056	0	10	84.64	32.34
J946	19.19	10	86.24	33.03
J924	75.41	7	85.6	34.06
J132	626.11	17	96.24	34.34
J662	83.97	9.5	90.79	35.22
J922	51.06	8.5	94.34	37.19
J1034	0	13	100.87	38.07
J920	26.61	10	102.56	40.11
J904	62.86	17	111.17	40.8
J918	9.38	12	112.37	43.49
J738	1,247.64	13	114.08	43.8
J908	24.39	15	116.44	43.96
J68	12.02	13	116.2	44.72
J950	0.12	14	117.54	44.86

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J62	12.69	11.66	116.42	45.39
J916	63.16	11.65	117.08	45.68
J52	1.59	11	116.64	45.77
J740	1.58	10	116.25	46.04
J36	20.58	10.2	116.57	46.09
J244	0	13.41	120.53	46.42
J912	48.45	9	116.29	46.49
J914	11.31	9	116.49	46.57
J66	38.68	9	116.49	46.58
J994	0	13.61	121.67	46.82
J50	39.53	7	116.01	47.23
J736	0	8	117.31	47.36
J872	40.45	14	124.86	48.04
J910	33.58	10.74	123.5	48.86
J278	0	13	128.59	50.08
J870	24.27	14	130.71	50.57
J906	20	14	132.48	51.34
J1036	0	16	135.89	51.95
J902	107.9	14	133.94	51.97
J1040	0	15	135.89	52.38
J56	17.54	15	136.42	52.61
J108	1.96	14.42	135.89	52.63
J1038	0	14	135.89	52.81
J760	0	14	135.89	52.81
J1042	0	12	135.89	53.68
J1004	0	16	141.4	54.34
J220	0.68	14	140.24	54.7
J1008	0	16	142.27	54.71
J1014	0	15	143.51	55.68
J280	7.22	12	143.8	57.11
J954	0	12	145.15	57.7
J986	0	12	145.71	57.94
J948	71.85	18	152.16	58.13
J92	110.7	14	148.62	58.33
J24	0	15	149.89	58.45
J144	0.88	11	146.52	58.72
J818	70.32	13.73	149.42	58.79
J20	23.36	15	150.73	58.81
J824	53.83	14	149.75	58.82
J30	25.88	14	149.79	58.84
J816	23.01	13.39	149.42	58.94
J42	500	9	145.16	59
J864	27.71	14	150.59	59.18
J822	23.84	13	149.7	59.23
J792	27.83	14	150.71	59.24
J826	19.63	13.03	149.84	59.28
J770	14.31	14	150.88	59.31
J962	0	14	150.92	59.33
J868	19.03	14	151.02	59.37
J828	19.52	14	151.03	59.38
J288	21.07	14	151.14	59.42
J292	5.15	14	151.13	59.42
J980	0	10	147.19	59.44
J812	31.91	12	149.39	59.53
J858	16.02	12	149.39	59.53
J1060	0	14	151.52	59.59
J900	23.47	14	151.61	59.63
J964	0	12.35	150.04	59.66
J296	10.21	14	151.71	59.67
J804	24.54	12	149.75	59.69
J854	0	20.5	158.82	59.94
J136	0	8	146.52	60.02
J866	14.48	12	150.73	60.11
J808	34.25	10	149.44	60.42

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J10	2.85	11	150.46	60.43
J860	20.09	10	149.49	60.44
J984	0	6.84	146.52	60.52
J862	24.51	10.9	150.59	60.53
J44	0.12	14	153.95	60.64
J974	0	8	148.01	60.67
J718	24.18	13.94	154.03	60.7
J722	17.27	13.53	154.09	60.9
J780	16.61	10	150.66	60.95
J802	13.75	10	150.69	60.96
J688	9.43	11.5	152.59	61.13
J734	10.8	16	157.94	61.5
J800	15.85	8.98	151.98	61.96
J704	2.15	10	153.59	62.22
J268	0	9.5	153.58	62.43
J696	0	9.5	153.59	62.43
J978	0	5	149.11	62.44
J714	5.07	9	153.41	62.57
J712	0	8.5	153.41	62.79
J842	0	13	159.1	63.31

Existing Max Month Peak Hour Demand Scenario

Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P625	J30	J56	736.23	12	120	2,673.70	7.58	13.38	18.17
P465	J510	J522	585.53	8	120	-1,185.92	7.57	17.01	29.05
P855	J842	J854	37.35	20	120	6,314.51	6.45	0.28	7.41
P933	J898	J896	1,856.97	6	120	-561.79	6.37	54.91	29.57
P981	J944	J898	221.21	6	120	-529.34	6.01	5.86	26.48
P455	J500	J510	767.28	8	120	-871.45	5.56	12.6	16.42
P907	J872	J56	1,171.38	12	120	-1,922.65	5.45	11.55	9.86
P595	J662	J946	206.15	6	120	479.73	5.44	4.55	22.07
P43	J52	J872	867.21	12	120	-1,882.20	5.34	8.22	9.48
P983	J946	J750	1,547.44	6	120	460.55	5.23	31.67	20.46
P39	J662	J50	2,805.19	12	120	-1,828.65	5.19	25.22	8.99
P41	J50	J52	72.58	12	120	-1,795.05	5.09	0.63	8.69
P669	J522	J952	1,193.35	10	120	-1,237.66	5.06	12.65	10.6
P281	J92	J902	485.88	4	120	195.64	4.99	14.68	30.21
P905	J870	J56	477.99	8	120	-733.51	4.68	5.7	11.93
P953	J916	J870	1,215.97	8	120	-709.24	4.53	13.63	11.21
P261	J854	J108	2,146.32	8	120	691.05	4.41	22.93	10.69
P105	J108	J950	1,726.29	8	120	689.1	4.4	18.35	10.63
P21	J24	J30	21.64	16	120	2,699.57	4.31	0.1	4.55
P915	J880	J500	233.27	8	120	-644.87	4.12	2.19	9.4
P955	J918	J916	499.12	8	120	-646.08	4.12	4.71	9.43
P957	J920	J918	1,067.97	8	120	-636.7	4.06	9.81	9.18
P743	J734	J854	357.9	24	120	-5,623.46	3.99	0.88	2.46
P917	J882	J880	1,315.64	8	120	-615.5	3.93	11.35	8.62
P959	J922	J920	969.94	8	120	-610.09	3.89	8.23	8.48
P485	J412	J882	180.52	8	120	-590.34	3.77	1.44	7.98
P929	J894	J390	1,364.47	8	120	-578.59	3.69	10.49	7.69
P931	J896	J894	398.95	8	120	-576.15	3.68	3.04	7.63
P1089	J1056	J662	1,352.62	12	120	-1,264.94	3.59	6.14	4.54
P989	J952	J1056	1,247.23	12	120	-1,264.94	3.59	5.67	4.54
P961	J924	J922	1,210.78	8	120	-559.03	3.57	8.74	7.22
P1029	J994	J244	257.79	12	120	1,249.22	3.54	1.14	4.44
P195	J220	J278	2,626.00	12	120	1,249.22	3.54	11.66	4.44
P197	J278	J994	1,557.06	12	120	1,249.22	3.54	6.91	4.44
P679	J738	J740	489.39	12	120	-1,247.64	3.54	2.17	4.43
P661	J718	J722	17.96	16	120	-2,200.45	3.51	0.06	3.12
P883	J510	J878	942.7	6	120	298.86	3.39	8.66	9.19
P603	J682	J944	516.79	6	120	-289.00	3.28	4.46	8.63
P925	J890	J412	616.15	8	120	-503.32	3.21	3.66	5.94
P33	J10	J42	903.69	8	120	500.00	3.19	5.3	5.87
P673	J44	J734	1,527.00	16	120	-1,999.85	3.19	3.99	2.61
P481	J390	J890	630.90	8	120	-491.78	3.14	3.59	5.69
P277	J92	J906	1,289.97	4	120	121.54	3.1	16.14	12.51
P963	J926	J924	1,469.50	8	120	-483.62	3.09	8.11	5.52
P537	J600	J602	245.00	8	120	458	2.92	1.22	4.99
P543	J586	J600	659.76	8	120	458.00	2.92	3.29	4.99
P913	J878	J876	1,235.77	6	120	255.2	2.9	8.47	6.86
P987	J950	J904	1,776.99	10	120	688.97	2.81	6.37	3.58
P965	J928	J926	1,434.61	8	120	-434.86	2.78	6.5	4.53
P91	J92	J44	1,212.87	8	120	-427.88	2.73	5.33	4.4
P651	J20	J718	1,713.18	16	120	-1,695.74	2.71	3.3	1.93
P803	J688	J828	257.8	6	120	238.18	2.7	1.56	6.03
P19	J20	J24	459.26	16	120	1,654.04	2.64	0.84	1.84
P531	J586	J928	1,171.40	8	120	-410.3	2.62	4.77	4.07
P943	J906	J910	1,002.15	4	120	101.54	2.59	8.99	8.97
P645	J268	J714	93.13	16	120	1,618.95	2.58	0.16	1.77
P1065	J1034	J132	1,540.73	10	120	626.11	2.56	4.62	3
P657	J722	J734	3,555.33	24	120	-3,612.81	2.56	3.85	1.08
P941	J904	J1034	3,432.11	10	120	626.11	2.56	10.3	3
P935	J900	J44	1,401.10	16	120	-1,571.85	2.51	2.34	1.67
P37	J10	J900	707.05	16	120	-1,548.38	2.47	1.15	1.63
P911	J876	J874	751.77	6	120	214.09	2.43	3.72	4.95

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P447	J496	J500	263.4	6	120	-213.49	2.42	1.3	4.93
P919	J884	J496	779.02	6	120	-207.59	2.36	3.64	4.68
P921	J886	J884	543.81	6	120	-197.91	2.25	2.33	4.28
P937	J902	J66	2,551.19	4	120	87.73	2.24	17.45	6.84
P637	J268	J696	7.13	16	120	-1,395.09	2.23	0.01	1.34
P585	J650	J886	1,054.12	6	120	-195.39	2.22	4.41	4.18
P909	J874	J930	867.88	6	120	190.06	2.16	3.45	3.97
P301	J340	J934	1,238.56	4	120	80.95	2.07	7.3	5.89
P587	J336	J650	456.76	6	120	-180.67	2.05	1.65	3.62
P303	J336	J340	189.56	6	120	177.36	2.01	0.66	3.5
P991	J954	J280	1,220.74	16	120	1,257.12	2.01	1.35	1.11
P1039	J1004	J1008	797.74	16	120	-1,249.90	1.99	0.87	1.09
P1043	J1008	J1014	1,128.33	16	120	-1,249.90	1.99	1.23	1.09
P1047	J1014	J280	272.16	16	120	-1,249.90	1.99	0.3	1.09
P183	J220	J1004	1,057.17	16	120	-1,249.90	1.99	1.16	1.09
P677	J736	J244	2,947.41	16	120	-1,249.22	1.99	3.22	1.09
P681	J740	J736	969.74	16	120	-1,249.22	1.99	1.06	1.09
P967	J930	J932	717.97	6	120	163.35	1.85	2.15	3
P927	J892	J436	598.20	4	120	-71.4	1.82	2.79	4.67
P947	J910	J908	1,654.99	4	120	67.96	1.74	7.05	4.26
P387	J428	J892	654.47	4	120	-65.65	1.68	2.62	4
P17	J24	J10	723.62	16	120	-1,045.53	1.67	0.57	0.79
P975	J938	J488	1,364.38	4	120	-65.34	1.67	5.41	3.96
P771	J704	J800	958.55	8	120	254.51	1.62	1.61	1.68
P1001	J964	J962	1,406.37	18	120	-1,258.00	1.59	0.88	0.62
P1011	J974	J978	1,770.87	18	120	-1,258.00	1.59	1.1	0.62
P1015	J978	J964	1,480.70	18	120	-1,258.00	1.59	0.92	0.62
P1017	J980	J974	1,319.38	18	120	-1,258.00	1.59	0.82	0.62
P201	J144	J980	1,063.76	18	120	-1,258.00	1.59	0.66	0.62
P237	J292	J288	27.24	18	120	-1,263.15	1.59	0.02	0.63
P999	J962	J292	335.77	18	120	-1,258.00	1.59	0.21	0.62
P1023	J986	J954	890.63	18	120	1,257.12	1.58	0.55	0.62
P157	J144	J986	1,305.37	18	120	1,257.12	1.58	0.81	0.62
P775	J800	J802	619.37	6	120	134.07	1.52	1.29	2.08
P799	J828	J824	698.40	6	120	125.35	1.42	1.28	1.84
P373	J412	J420	297.67	6	120	123.06	1.4	0.53	1.78
P969	J932	J488	1,773.44	6	120	112.56	1.28	2.67	1.51
P397	J436	J420	762.04	6	120	-105.26	1.19	1.01	1.33
P903	J868	J800	732.22	6	120	-104.6	1.19	0.96	1.31
P621	J714	J688	3,397.39	24	120	1,613.89	1.14	0.83	0.24
P781	J802	J804	800.54	6	120	98.79	1.12	0.95	1.18
P939	J842	RES9006	1	48	120	-6,314.51	1.12	0	0.11
P801	J826	J828	1,120.40	6	120	-93.31	1.06	1.19	1.06
P221	J696	J722	2,686.05	24	120	-1,395.09	0.99	0.5	0.19
P769	J770	J868	157.17	6	120	-85.57	0.97	0.14	0.91
P985	J948	J688	2,403.23	24	120	-1,366.28	0.97	0.43	0.18
P791	J818	J824	384.84	6	120	-83.07	0.94	0.33	0.86
P249	J296	J948	2,771.23	24	120	-1,294.43	0.92	0.45	0.16
P245	J288	J1060	2,334.83	24	120	-1,284.22	0.91	0.37	0.16
P245A	J1060	J296	1,197.55	24	120	-1,284.22	0.91	0.19	0.16
P51	J62	J66	60.89	4	120	-33.55	0.86	0.07	1.15
P325	J340	J888	967.88	6	120	74.12	0.84	0.67	0.69
P653	J718	J704	2,356.56	16	120	480.52	0.77	0.44	0.19
P971	J934	J936	945.14	6	120	65.05	0.74	0.52	0.55
P973	J936	J390	1,054.10	6	120	55.06	0.62	0.42	0.4
P923	J888	J402	703.71	6	120	50.3	0.57	0.24	0.34
P267	J36	J52	302.75	8	120	-85.56	0.55	0.07	0.22
P379	J390	J428	1,067.12	6	120	-45.32	0.51	0.3	0.28
P807	J822	J826	523.47	6	120	-43.74	0.5	0.14	0.26
P945	J908	J68	914.89	6	120	43.57	0.49	0.24	0.26
P271	J68	J62	903.73	6	120	-41.58	0.47	0.22	0.24
P273	J68	J50	1,193.53	8	120	73.13	0.47	0.2	0.17
P357	J402	J412	332.55	6	120	40.31	0.46	0.07	0.22
P795	J816	J822	1,406.49	6	120	-38.29	0.43	0.29	0.2

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P777	J804	J860	1,342.76	6	120	37.08	0.42	0.26	0.19
P783	J808	J804	1,577.35	6	120	-37.16	0.42	0.31	0.19
P757	J770	J866	801.75	6	120	36.31	0.41	0.15	0.19
P753	J792	J770	986.19	6	120	-34.95	0.4	0.17	0.17
P949	J912	J66	712.34	4	120	-15.5	0.4	0.2	0.28
P29	J36	J912	1,776.49	6	120	32.95	0.37	0.27	0.15
P25	J36	J914	568.49	6	120	32.02	0.36	0.08	0.15
P649	J704	J268	318.06	16	120	223.86	0.36	0.01	0.05
P797	J824	J826	710.33	6	120	-29.93	0.34	0.09	0.13
P715	J522	J586	1,316.00	8	120	47.7	0.3	0.1	0.08
P763	J780	J862	710.16	6	120	26.75	0.3	0.07	0.11
P899	J864	J792	1,250.51	6	120	-25.46	0.29	0.12	0.1
P901	J866	J780	912.76	6	120	21.83	0.25	0.07	0.07
P759	J780	J802	425.59	6	120	-21.53	0.24	0.03	0.07
P951	J914	J62	994.95	6	120	20.72	0.24	0.07	0.07
P785	J808	J812	792.95	6	120	19.91	0.23	0.05	0.06
P765	J20	J792	507.91	6	120	18.34	0.21	0.03	0.05
P809	J824	J822	848.95	6	120	18.39	0.21	0.04	0.05
P893	J858	J816	510.04	6	120	-17.99	0.2	0.02	0.05
P895	J860	J808	1,028.11	6	120	16.99	0.19	0.05	0.05
P789	J812	J818	1,554.84	6	120	-10.04	0.11	0.02	0.02
P979	J942	J436	760.89	6	120	-9.65	0.11	0.01	0.02
P607	J428	J940	769.49	6	120	8.36	0.09	0.01	0.01
P891	J818	J816	490.57	6	120	2.71	0.03	0	0
P897	J862	J864	1,043.35	6	120	2.25	0.03	0	0
P787	J812	J858	736.39	6	120	-1.97	0.02	0	0
P445	J488	J942	679.76	6	120	-1.31	0.01	0	0
P977	J940	J938	754.64	6	120	-0.81	0.01	0	0
P1021	J984	J144	284.05	18	120	0	0	0	0
P1067	J1036	J1040	2,066.23	8	120	0.00	0	0	0
P1069	J1038	J1042	696.24	8	120	0.00	0	0	0
P1071	J1040	J1038	2,592.09	8	120	0.00	0	0	0
P1073	J1042	J760	1,490.48	8	120	0	0	0	0
P1077	J944	J1046	838.18	6	120	0	0	0	0
P1079	J1046	J1048	998.79	6	120	0	0	0	0
P1081	J1048	J1050	305.64	6	120	0	0	0	0
P1083	J1050	J1052	615.33	6	120	0	0	0	0
P119	J136	J984	582	18	120	0.00	0	0	0
P255	J108	J1036	1,204.92	8	120	0	0	0	0
P541	J600	J606	14.01	6	120	0.00	0	0	0
P647	J714	J712	78.54	16	120	0	0	0	0

APPENDIX I

Hydraulic Model Results - 2015

2015 Annual Average Demand Scenario

Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1044	45.48	14	139.72	54.48
J760	0	14	139.9	54.55
J1038	135.84	14	141.06	55.05
J1062	48.04	12	139.86	55.4
J1042	108.84	12	140.29	55.59
J1040	0	15	148.43	57.82
J132	1.39	17	153.52	59.16
J1036	25.04	16	154.31	59.93
J854	0	20.5	159.05	60.03
J336	2.18	14.55	153.34	60.14
J874	15.81	13	151.92	60.19
J428	7.88	13.97	152.93	60.21
J586	0	15	154.11	60.28
J904	41.36	17	156.26	60.34
J944	158.12	13	152.33	60.37
J886	1.66	14	153.37	60.39
J436	15.93	13.34	152.75	60.4
J340	14.67	13.82	153.34	60.46
J942	5.48	12.7	152.4	60.53
J932	33.41	12	151.87	60.61
J876	27.05	12	152.05	60.68
J926	32.08	14	154.1	60.7
J948	47.27	18	158.09	60.7
J940	6.03	12.46	152.59	60.72
J938	42.46	12	152.31	60.8
J650	9.69	13	153.34	60.81
J884	6.37	13.02	153.39	60.82
J1034	304.40	13	153.53	60.89
J936	6.57	13.05	153.64	60.92
J878	28.72	12	152.66	60.95
J908	16.04	15	155.67	60.95
J930	17.58	11.1	151.87	61
J892	3.78	12	152.81	61.01
J1046	0	12	152.88	61.04
J420	11.71	12.15	153.18	61.11
J488	31.93	11	152.14	61.15
J1004	0	16	157.38	61.26
J1008	0	16	157.38	61.26
J882	16.55	12	153.41	61.27
J496	3.88	12	153.44	61.28
J902	70.99	14	155.54	61.33
J952	17.95	13	154.55	61.33
J890	7.59	12	153.58	61.34
J510	10.26	12	153.61	61.36
J906	13.16	14	156.1	61.57
J522	2.66	12	154.12	61.58
J600	0	12	154.11	61.58
J606	0	12	154.11	61.58
J56	11.54	15	157.17	61.6
J872	26.61	14	156.37	61.69
J1014	0	15	157.39	61.7
J894	1.61	13	155.52	61.76
J898	21.35	10	152.54	61.76
J870	15.96	14	156.67	61.82
J68	7.91	13	155.72	61.84
J734	7.1	16	158.95	61.94
J824	35.41	14	156.97	61.95
J928	16.15	11	154.1	62
J818	46.26	13.73	156.85	62.01
J24	0	15	158.19	62.05
J20	15.37	15	158.23	62.06
J918	6.17	12	155.32	62.1

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J220	0.44	14	157.38	62.13
J988	0	14	157.39	62.13
J990	0	14	157.39	62.13
J816	15.14	13.39	156.85	62.16
J828	12.84	14	157.51	62.18
J92	72.83	14	157.56	62.2
J864	18.23	14	157.68	62.25
J888	15.67	9.65	153.35	62.26
J994	0	13.61	157.38	62.29
J108	1.29	14.42	158.22	62.31
J770	9.42	14	157.84	62.32
J1054	0	11	154.85	62.33
J868	12.52	14	157.85	62.33
J792	18.31	14	157.89	62.35
J962	0	14	157.91	62.36
J288	13.86	14	157.94	62.37
J292	3.39	14	157.94	62.37
J916	41.55	11.65	155.59	62.37
J244	0	13.41	157.38	62.38
J822	15.68	13	156.95	62.38
J1060	0	14	158	62.39
J826	12.91	13.03	157.01	62.39
J62	8.35	11.66	155.66	62.4
J296	6.71	14	158.02	62.41
J950	0.08	14	158.05	62.42
J880	19.32	9.35	153.44	62.43
J1052	0	10	154.12	62.45
J30	17.02	14	158.19	62.48
J682	0	8	152.33	62.54
J900	15.44	14	158.37	62.55
J278	0	13	157.38	62.56
J402	6.58	9	153.38	62.56
J738	18.18	13	157.37	62.56
J412	2.81	9	153.41	62.57
J500	8.61	9	153.46	62.59
J718	15.91	13.94	158.44	62.61
J1048	0.00	9	153.52	62.62
J44	0.08	14	158.55	62.63
J934	10.46	9	153.57	62.64
J1056	0.00	10	154.76	62.73
J920	17.51	10	154.78	62.73
J52	1.04	11	155.84	62.76
J812	21	12	156.84	62.76
J858	10.54	12	156.84	62.76
J722	11.36	13.53	158.45	62.79
J910	22.09	10.74	155.66	62.79
J946	12.62	10	154.99	62.82
J804	16.15	12	157.08	62.86
J390	8.92	8.39	153.77	62.99
J280	4.75	12	157.39	63
J954	0	12	157.39	63
J986	0	12	157.39	63
J964	0	12.35	157.79	63.02
J662	55.25	9.5	154.99	63.04
J36	13.54	10.2	155.79	63.09
J1050	0	8	153.72	63.14
J866	9.52	12	157.71	63.14
J896	9.45	9.27	155.14	63.21
J922	33.59	8.5	154.4	63.22
J602	0	8	154.11	63.31
J842	0	13	159.1	63.31
J144	0.58	11	157.39	63.43
J912	31.88	9	155.58	63.51
J66	25.45	9	155.59	63.52

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J688	6.21	11.5	158.16	63.55
J862	16.12	10.9	157.63	63.58
J914	7.44	9	155.72	63.58
J808	22.54	10	156.89	63.65
J860	13.21	10	156.93	63.66
J924	49.61	7	154.15	63.76
J10	1.87	11	158.28	63.82
J982	0	9.74	157.08	63.84
J740	1.04	10	157.37	63.86
J980	0	10	157.39	63.86
J802	9.05	10	157.62	63.96
J780	10.93	10	157.63	63.97
J704	1.41	10	158.35	64.28
J50	26.01	7	155.8	64.48
J268	0	9.5	158.35	64.5
J696	0	9.5	158.35	64.5
J800	10.43	8.98	157.98	64.56
J42	0	9	158.28	64.68
J714	3.33	9	158.32	64.7
J736	0	8	157.37	64.72
J136	0	8	157.39	64.73
J974	0	8	157.5	64.78
J712	0	8.5	158.32	64.92
J984	0	6.84	157.39	65.23
J750	1.68	4	154.99	65.42
J978	0	5	157.66	66.15

2015 Annual Average Demand Scenario

Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P855	J842	J854	37.35	20	120	2,487.06	2.54	0.05	1.32
P255	J108	J1036	1,204.92	8	120	363.24	2.32	3.91	3.25
P1067	J1036	J1040	2,066.23	8	120	338.2	2.16	5.88	2.84
P1071	J1040	J1038	2,592.09	8	120	338.2	2.16	7.37	2.84
P625	J30	J56	736.23	12	120	664.10	1.88	1.01	1.38
P281	J92	J902	485.88	4	120	67.05	1.71	2.02	4.16
P803	J688	J828	257.8	6	120	149.06	1.69	0.65	2.53
P987	J950	J904	1,776.99	10	120	347.14	1.42	1.79	1.01
P929	J894	J390	1,364.47	8	120	220.1	1.4	1.75	1.28
P1069	J1038	J1042	696.24	8	120	202.36	1.29	0.77	1.1
P907	J872	J56	1,171.38	12	120	-455.9	1.29	0.8	0.69
P743	J734	J854	357.9	24	120	-1,775.30	1.26	0.1	0.29
P905	J870	J56	477.99	8	120	-196.67	1.26	0.5	1.04
P941	J904	J1034	3,432.11	10	120	305.79	1.25	2.73	0.8
P933	J898	J896	1,856.97	6	120	-108.19	1.23	2.6	1.4
P43	J52	J872	867.21	12	120	-429.28	1.22	0.53	0.61
P931	J896	J894	398.95	8	120	-188.91	1.21	0.39	0.97
P1019	J980	J982	541.74	12	120	410.62	1.16	0.31	0.57
P1095	J894	J982	2,754.13	12	120	-410.62	1.16	1.56	0.57
P465	J510	J522	585.53	8	120	-179.46	1.15	0.52	0.88
P953	J916	J870	1,215.97	8	120	-180.7	1.15	1.08	0.89
P261	J854	J108	2,146.32	16	120	711.75	1.14	0.83	0.39
P91	J92	J44	1,212.87	8	120	-173.03	1.1	1	0.82
P21	J24	J30	21.64	16	120	681.13	1.09	0.01	0.36
P645	J268	J714	93.13	16	120	665.45	1.06	0.03	0.34
P883	J510	J878	942.7	6	120	90.41	1.03	0.95	1
P41	J50	J52	72.58	12	120	-358.19	1.02	0.03	0.44
P981	J944	J898	221.21	6	120	-86.84	0.99	0.21	0.93
P661	J718	J722	17.96	16	120	-608.84	0.97	0.01	0.29
P637	J268	J696	7.13	16	120	-575.97	0.92	0	0.26
P673	J44	J734	1,527.00	16	120	-572.03	0.91	0.39	0.26
P379	J390	J428	1,067.12	6	120	79.25	0.9	0.84	0.79
P373	J412	J420	297.67	6	120	78.11	0.89	0.23	0.77
P799	J828	J824	698.4	6	120	78.06	0.89	0.53	0.76
P955	J918	J916	499.12	8	120	-139.15	0.89	0.27	0.55
P277	J92	J906	1,289.97	4	120	33.14	0.85	1.45	1.13
P657	J722	J734	3,555.33	24	120	-1,196.17	0.85	0.5	0.14
P957	J920	J918	1,067.97	8	120	-132.98	0.85	0.54	0.5
P51	J62	J66	60.89	4	120	32.82	0.84	0.07	1.11
P765	J20	J792	507.91	6	120	72.41	0.82	0.34	0.67
P781	J802	J804	800.54	6	120	72.62	0.82	0.54	0.67
P1077	J944	J1046	838.18	6	120	-71.28	0.81	0.54	0.65
P1079	J1046	J1048	998.79	6	120	-71.28	0.81	0.65	0.65
P1081	J1048	J1050	305.64	6	120	-71.28	0.81	0.2	0.65
P1083	J1050	J1052	615.33	6	120	-71.28	0.81	0.4	0.65
P1085	J1052	J1054	1,132.42	6	120	-71.28	0.81	0.73	0.65
P39	J662	J50	2,805.19	12	120	-285.58	0.81	0.81	0.29
P669	J522	J952	1,193.35	10	120	-198.09	0.81	0.43	0.36
P775	J800	J802	619.37	6	120	68.05	0.77	0.37	0.59
P397	J436	J420	762.04	6	120	-66.4	0.75	0.43	0.57
P959	J922	J920	969.94	8	120	-115.47	0.74	0.38	0.39
P771	J704	J800	958.55	8	120	114.73	0.73	0.37	0.38
P913	J878	J876	1,235.77	6	120	61.69	0.7	0.61	0.49
P607	J428	J940	769.49	6	120	58.66	0.67	0.35	0.45
P979	J942	J436	760.89	6	120	-59.4	0.67	0.35	0.46
P801	J826	J828	1,120.40	6	120	-58.16	0.66	0.5	0.44
P481	J390	J890	630.9	8	120	102.59	0.65	0.2	0.31
P935	J900	J44	1,401.10	16	120	-398.92	0.64	0.18	0.13
P651	J20	J718	1,713.18	16	120	-387.30	0.62	0.21	0.12
P1089	J1056	J662	1,352.62	12	120	-216.04	0.61	0.23	0.17
P17	J24	J10	723.62	16	120	-381.61	0.61	0.09	0.12
P37	J10	J900	707.05	16	120	-383.48	0.61	0.09	0.12

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P445	J488	J942	679.76	6	120	-53.91	0.61	0.26	0.39
P925	J890	J412	616.15	8	120	95	0.61	0.17	0.27
P989	J952	J1056	1,247.23	12	120	-216.04	0.61	0.21	0.17
P1073	J1042	J760	1,490.48	8	120	93.52	0.6	0.39	0.26
P977	J940	J938	754.64	6	120	52.63	0.6	0.28	0.37
P791	J818	J824	384.84	6	120	-49.58	0.56	0.13	0.33
P1001	J964	J962	1,406.37	18	120	-435.62	0.55	0.12	0.09
P1011	J974	J978	1,770.87	18	120	-435.62	0.55	0.16	0.09
P1015	J978	J964	1,480.70	18	120	-435.62	0.55	0.13	0.09
P1017	J980	J974	1,319.38	18	120	-435.62	0.55	0.12	0.09
P105	J108	J950	1,726.29	16	120	347.23	0.55	0.18	0.1
P237	J292	J288	27.24	18	120	-439	0.55	0	0.09
P999	J962	J292	335.77	18	120	-435.62	0.55	0.03	0.09
P961	J924	J922	1,210.78	8	120	-81.88	0.52	0.25	0.21
P943	J906	J910	1,002.15	4	120	19.98	0.51	0.44	0.44
P455	J500	J510	767.28	8	120	-78.78	0.5	0.15	0.19
P19	J20	J24	459.26	16	120	299.52	0.48	0.04	0.08
P621	J714	J688	3,397.39	24	120	662.12	0.47	0.16	0.05
P1087	J1054	J896	1,828.73	8	120	-71.28	0.45	0.29	0.16
P267	J36	J52	302.75	8	120	-70.05	0.45	0.05	0.15
P939	J842	RES9006	1.00	48	120	-2,487.06	0.44	0	0.03
P221	J696	J722	2,686.05	24	120	-575.97	0.41	0.1	0.04
P903	J868	J800	732.22	6	120	-36.25	0.41	0.14	0.18
P899	J864	J792	1,250.51	6	120	-34.95	0.4	0.22	0.17
P911	J876	J874	751.77	6	120	34.64	0.39	0.13	0.17
P757	J770	J866	801.75	6	120	33.47	0.38	0.13	0.16
P969	J932	J488	1,773.44	6	120	-32.15	0.36	0.26	0.15
P985	J948	J688	2,403.23	24	120	-506.85	0.36	0.07	0.03
P249	J296	J948	2,771.23	24	120	-459.58	0.33	0.07	0.02
P653	J718	J704	2,356.56	16	120	205.63	0.33	0.09	0.04
P973	J936	J390	1,054.10	6	120	-29.34	0.33	0.13	0.12
P245	J288	J1060	2,334.83	24	120	-452.87	0.32	0.05	0.02
P245A	J1060	J296	1,197.55	24	120	-452.87	0.32	0.03	0.02
P25	J36	J914	568.49	6	120	28.06	0.32	0.07	0.11
P29	J36	J912	1,776.49	6	120	28.45	0.32	0.21	0.12
P387	J428	J892	654.47	4	120	12.71	0.32	0.13	0.19
P777	J804	J860	1,342.76	6	120	27.87	0.32	0.15	0.11
P783	J808	J804	1,577.35	6	120	-28.61	0.32	0.19	0.12
P301	J340	J934	1,238.56	4	120	-12.31	0.31	0.22	0.18
P807	J822	J826	523.47	6	120	-26.90	0.31	0.06	0.11
P273	J68	J50	1,193.53	8	120	-46.6	0.3	0.09	0.07
P1075	J760	J1044	2,563.66	8	120	45.48	0.29	0.18	0.07
P915	J880	J500	233.27	8	120	-46.03	0.29	0.02	0.07
P357	J402	J412	332.55	6	120	-24.24	0.28	0.03	0.09
P447	J496	J500	263.4	6	120	-24.14	0.27	0.02	0.09
P769	J770	J868	157.17	6	120	-23.73	0.27	0.01	0.08
P901	J866	J780	912.76	6	120	23.95	0.27	0.08	0.09
P795	J816	J822	1,406.49	6	120	-22.63	0.26	0.11	0.08
P971	J934	J936	945.14	6	120	-22.77	0.26	0.07	0.08
P975	J938	J488	1,364.38	4	120	10.17	0.26	0.17	0.13
P785	J808	J812	792.95	6	120	20.73	0.24	0.05	0.07
P271	J68	J62	903.73	6	120	20.54	0.23	0.06	0.06
P919	J884	J496	779.02	6	120	-20.26	0.23	0.05	0.06
P927	J892	J436	598.2	4	120	8.93	0.23	0.06	0.1
P951	J914	J62	994.95	6	120	20.62	0.23	0.06	0.06
P753	J792	J770	986.19	6	120	19.16	0.22	0.06	0.06
P797	J824	J826	710.33	6	120	-18.35	0.21	0.04	0.05
P909	J874	J930	867.88	6	120	18.83	0.21	0.05	0.05
P945	J908	J68	914.89	6	120	-18.15	0.21	0.05	0.05
P963	J926	J924	1,469.50	8	120	-32.27	0.21	0.05	0.04
P923	J888	J402	703.71	6	120	-17.66	0.2	0.03	0.05
P897	J862	J864	1,043.35	6	120	-16.72	0.19	0.05	0.04
P895	J860	J808	1,028.11	6	120	14.66	0.17	0.04	0.03
P917	J882	J880	1,315.64	8	120	-26.71	0.17	0.03	0.03

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P595	J662	J946	206.15	6	120	14.3	0.16	0.01	0.03
P921	J886	J884	543.81	6	120	-13.89	0.16	0.02	0.03
P759	J780	J802	425.59	6	120	13.62	0.15	0.01	0.03
P1099	J1062	J760	3,902.73	12	120	-48.04	0.14	0.04	0.01
P585	J650	J886	1,054.12	6	120	-12.23	0.14	0.03	0.02
P649	J704	J268	318.06	16	120	89.49	0.14	0	0.01
P809	J824	J822	848.95	6	120	11.41	0.13	0.02	0.02
P531	J586	J928	1,171.40	8	120	15.97	0.1	0.01	0.01
P715	J522	J586	1,316.00	8	120	15.97	0.1	0.01	0.01
P937	J902	J66	2,551.19	4	120	-3.94	0.1	0.06	0.02
P949	J912	J66	712.34	4	120	-3.43	0.09	0.01	0.02
P893	J858	J816	510.04	6	120	-7.4	0.08	0	0.01
P485	J412	J882	180.52	8	120	-10.16	0.06	0	0
P1029	J994	J244	257.79	12	120	19.22	0.05	0	0
P195	J220	J278	2,626.00	12	120	19.22	0.05	0.01	0
P197	J278	J994	1,557.06	12	120	19.22	0.05	0	0
P679	J738	J740	489.39	12	120	-18.18	0.05	0	0
P947	J910	J908	1,654.99	4	120	-2.11	0.05	0.01	0.01
P787	J812	J858	736.39	6	120	3.14	0.04	0	0
P789	J812	J818	1,554.84	6	120	-3.41	0.04	0	0
P991	J954	J280	1,220.74	16	120	24.42	0.04	0	0
P1023	J986	J954	890.63	18	120	24.42	0.03	0	0
P1039	J1004	J1008	797.74	16	120	-19.67	0.03	0	0
P1043	J1008	J1014	1,128.33	16	120	-19.67	0.03	0	0
P1047	J1014	J280	272.16	16	120	-19.67	0.03	0	0
P157	J144	J986	1,305.37	18	120	24.42	0.03	0	0
P183	J220	J1004	1,057.17	16	120	-19.67	0.03	0	0
P201	J144	J980	1,063.76	18	120	-25	0.03	0	0
P587	J336	J650	456.76	6	120	-2.55	0.03	0	0
P677	J736	J244	2,947.41	16	120	-19.22	0.03	0	0
P681	J740	J736	969.74	16	120	-19.22	0.03	0	0
P325	J340	J888	967.88	6	120	-1.99	0.02	0	0
P983	J946	J750	1,547.44	6	120	1.68	0.02	0	0
P1065	J1034	J132	1,540.73	10	120	1.39	0.01	0	0
P763	J780	J862	710.16	6	120	-0.6	0.01	0	0
P967	J930	J932	717.97	6	120	1.26	0.01	0	0
P1021	J984	J144	284.05	18	120	0	0	0	0
P1025	J986	J988	2,596.50	8	120	0	0	0	0
P1027	J988	J990	2,420.07	8	120	0	0	0	0
P119	J136	J984	582.00	18	120	0	0	0	0
P303	J336	J340	189.56	6	120	0.37	0	0	0
P33	J10	J42	903.69	8	120	0	0	0	0
P537	J600	J602	245	8	120	0	0	0	0
P541	J600	J606	14.01	6	120	0	0	0	0
P543	J586	J600	659.76	8	120	0	0	0	0
P603	J682	J944	516.79	6	120	0.00	0	0	0
P647	J714	J712	78.54	16	120	0	0	0	0
P891	J818	J816	490.57	6	120	-0.09	0	0	0
P965	J928	J926	1,434.61	8	120	-0.19	0	0	0

2015 Max Month Peak Hour Demand Scenario

Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J750	460.55	4	89.68	37.13
J132	626.11	17	103.11	37.31
J944	240.34	13	99.43	37.45
J682	289	8	94.97	37.68
J738	1,247.64	13	101.77	38.47
J898	32.45	10	101.54	39.66
J1046	0	12	103.96	39.85
J740	1.58	10	103.94	40.7
J1034	462.69	13	107.74	41.05
J244	0	13.41	108.22	41.08
J994	0	13.61	109.37	41.49
J736	0	8	105	42.03
J1048	0	9	109.36	43.49
J1044	69.13	14	114.38	43.5
J760	0	14	114.77	43.66
J1062	73.02	12	114.68	44.49
J600	0	12	114.98	44.62
J606	0	12	114.98	44.62
J1050	0	8	111.01	44.63
J1038	206.48	14	117.28	44.75
J278	0	13	116.28	44.75
J586	0	15	118.27	44.75
J1042	165.44	12	115.62	44.9
J874	24.03	13	116.69	44.93
J1052	0	10	114.34	45.21
J932	50.79	12	116.61	45.33
J876	41.11	12	116.94	45.47
J942	8.33	12.7	117.84	45.56
J428	11.97	13.97	119.16	45.58
J436	24.22	13.34	118.61	45.61
J336	3.31	14.55	119.85	45.62
J930	26.71	11.1	116.61	45.72
J938	64.54	12	117.74	45.82
J602	458	8	113.76	45.83
J886	2.52	14	119.87	45.88
J940	9.17	12.46	118.37	45.89
J340	22.29	13.82	119.85	45.94
J878	43.66	12	118.18	46.01
J488	48.53	11	117.25	46.04
J892	5.75	12	118.8	46.28
J926	48.76	14	120.81	46.28
J650	14.72	13	119.85	46.3
J884	9.68	13.02	119.89	46.31
J420	17.8	12.15	119.51	46.52
J936	9.99	13.05	120.79	46.69
J496	5.9	12	119.96	46.78
J882	25.16	12	119.99	46.79
J510	15.6	12	120.15	46.86
J928	24.55	11	119.27	46.91
J890	11.54	12	120.53	47.02
J522	4.05	12	120.95	47.21
J1054	0	11	120.46	47.43
J888	23.81	9.65	119.85	47.75
J952	27.28	13	123.44	47.85
J880	29.37	9.35	119.99	47.94
J402	10	9	119.93	48.06
J412	4.27	9	119.99	48.09
J500	13.09	9	120	48.1
J946	19.19	10	121.35	48.25
J934	15.9	9	120.59	48.35
J390	13.56	8.39	121.14	48.85
J894	2.45	13	125.94	48.94

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1004	0	16	129.09	49
J896	14.36	9.27	122.89	49.23
J220	0.68	14	127.93	49.37
J1008	0.00	16	129.96	49.38
J1056	0	10	124.62	49.66
J924	75.41	7	123.19	50.34
J1014	0	15	131.2	50.35
J662	83.97	9.5	125.9	50.43
J922	51.06	8.5	126.38	51.08
J1040	0	15	133.3	51.26
J988	0	14	133.4	51.74
J990	0.00	14	133.4	51.74
J904	62.86	17	136.44	51.75
J280	7.22	12	131.5	51.78
J920	26.61	10	129.73	51.88
J908	24.39	15	135.84	52.36
J954	0	12	132.85	52.36
J986	0	12	133.4	52.6
J918	9.38	12	133.92	52.83
J68	12.02	13	135.83	53.22
J144	0.88	11	134.21	53.39
J982	0	9.74	133.41	53.59
J62	12.69	11.66	135.84	53.81
J916	63.16	11.65	135.96	53.86
J980	0	10	134.88	54.11
J52	1.59	11	136.1	54.2
J36	20.58	10.2	136.02	54.52
J872	40.45	14	139.85	54.53
J136	0	8	134.21	54.69
J912	48.45	9	135.7	54.9
J66	38.68	9	135.84	54.96
J914	11.31	9	135.92	55
J910	33.58	10.74	137.85	55.08
J984	0	6.84	134.21	55.19
J902	107.9	14	141.44	55.22
J906	20	14	142.14	55.52
J870	24.27	14	142.44	55.65
J50	39.53	7	135.83	55.82
J974	0	8	137.23	55.99
J1036	38.06	16	146.06	56.36
J56	17.54	15	145.24	56.43
J964	0	12.35	143.01	56.62
J948	71.85	18	149	56.76
J976	0	6	137.23	56.86
J962	0	14	145.52	56.99
J292	5.15	14	146.12	57.25
J288	21.07	14	146.16	57.27
J1060	0	14	147.21	57.72
J296	10.21	14	147.75	57.95
J824	53.83	14	148.05	58.09
J818	70.32	13.73	147.87	58.12
J816	23.01	13.39	147.87	58.27
J828	19.52	14	148.98	58.49
J822	23.84	13	148.02	58.5
J826	19.63	13.03	148.11	58.53
J978	0	5	140.38	58.66
J858	16.02	12	147.87	58.87
J812	31.91	12	147.89	58.88
J24	0	15	151.65	59.21
J864	27.71	14	150.68	59.22
J804	24.54	12	148.86	59.3
J20	23.36	15	151.95	59.34
J92	110.7	14	151.03	59.37
J770	14.31	14	151.1	59.41

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J868	19.03	14	151.14	59.42
J792	27.83	14	151.21	59.45
J30	25.88	14	151.6	59.62
J42	500	9	146.73	59.68
J808	34.25	10	148.2	59.88
J854	0.00	20.5	158.74	59.9
J860	20.09	10	148.36	59.95
J688	9.43	11.5	150.15	60.08
J866	14.48	12	150.77	60.13
J900	23.47	14	152.94	60.2
J950	0.12	14	152.93	60.2
J718	24.18	13.94	153.42	60.44
J862	24.51	10.9	150.56	60.51
J722	17.27	13.53	153.46	60.63
J108	1.96	14.42	154.56	60.72
J802	13.75	10	150.5	60.88
J780	16.61	10	150.55	60.9
J44	0.12	14	154.79	61
J10	2.85	11	152.04	61.11
J734	10.8	16	157.85	61.47
J704	2.15	10	152.51	61.75
J800	15.85	8.98	151.52	61.76
J268	0	9.5	152.44	61.94
J696	0	9.5	152.46	61.95
J714	5.07	9	152.06	61.99
J712	0	8.5	152.06	62.21
J842	0	13	159.1	63.31

2015 Max Month Peak Hour Demand Scenario

Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P855	J842	J854	37.35	20	120	7,329.32	7.49	0.36	9.77
P595	J662	J946	206.15	6	120	479.73	5.44	4.55	22.07
P983	J946	J750	1,547.44	6	120	460.55	5.23	31.67	20.46
P625	J30	J56	736.23	12	120	1,789.71	5.08	6.36	8.64
P987	J950	J904	1,776.99	10	120	1,151.66	4.7	16.49	9.28
P941	J904	J1034	3,432.11	10	120	1,088.80	4.45	28.71	8.36
P645	J268	J714	93.13	16	120	2,542.17	4.06	0.38	4.08
P743	J734	J854	357.90	24	120	-5,623.46	3.99	0.88	2.46
P281	J92	J902	485.88	4	120	155.43	3.97	9.58	19.73
P933	J898	J896	1,856.97	6	120	-337.36	3.83	21.35	11.5
P931	J896	J894	398.95	8	120	-576.15	3.68	3.04	7.63
P907	J872	J56	1,171.38	12	120	-1,273.15	3.61	5.39	4.6
P1029	J994	J244	257.79	12	120	1,249.22	3.54	1.14	4.44
P195	J220	J278	2,626.00	12	120	1,249.22	3.54	11.66	4.44
P197	J278	J994	1,557.06	12	120	1,249.22	3.54	6.91	4.44
P679	J738	J740	489.39	12	120	-1,247.64	3.54	2.17	4.43
P255	J108	J1036	1,204.92	8	120	552.12	3.52	8.5	7.05
P43	J52	J872	867.21	12	120	-1,232.70	3.5	3.76	4.33
P981	J944	J898	221.21	6	120	-304.91	3.46	2.11	9.53
P1067	J1036	J1040	2,066.23	8	120	514.06	3.28	12.76	6.18
P1071	J1040	J1038	2,592.09	8	120	514.06	3.28	16.01	6.18
P603	J682	J944	516.79	6	120	-289	3.28	4.46	8.63
P637	J268	J696	7.13	16	120	-2,027.74	3.24	0.02	2.68
P41	J50	J52	72.58	12	120	-1,139.50	3.23	0.27	3.74
P33	J10	J42	903.69	8	120	500.00	3.19	5.3	5.87
P905	J870	J56	477.99	8	120	-499.02	3.19	2.79	5.85
P39	J662	J50	2,805.19	12	120	-1,105.48	3.14	9.93	3.54
P953	J916	J870	1,215.97	8	120	-474.76	3.03	6.48	5.33
P537	J600	J602	245.00	8	120	458	2.92	1.22	4.99
P543	J586	J600	659.76	8	120	458.00	2.92	3.29	4.99
P661	J718	J722	17.96	16	120	-1,831.95	2.92	0.04	2.22
P21	J24	J30	21.64	16	120	1,815.59	2.9	0.05	2.18
P237	J292	J288	27.24	18	120	-2,220.80	2.8	0.05	1.79
P1001	J964	J962	1,406.37	18	120	-2,215.65	2.79	2.5	1.78
P1011	J974	J978	1,770.87	18	120	-2,215.65	2.79	3.15	1.78
P1015	J978	J964	1,480.70	18	120	-2,215.65	2.79	2.64	1.78
P1017	J980	J974	1,319.38	18	120	-2,215.65	2.79	2.35	1.78
P999	J962	J292	335.77	18	120	-2,215.65	2.79	0.6	1.78
P673	J44	J734	1,527.00	16	120	-1,735.69	2.77	3.07	2.01
P657	J722	J734	3,555.33	24	120	-3,876.97	2.75	4.39	1.24
P1019	J980	J982	541.74	12	120	957.65	2.72	1.47	2.71
P1095	J894	J982	2,754.13	12	120	-957.65	2.72	7.47	2.71
P261	J854	J108	2,146.32	16	120	1,705.87	2.72	4.18	1.95
P955	J918	J916	499.12	8	120	-411.59	2.63	2.04	4.09
P957	J920	J918	1,067.97	8	120	-402.22	2.57	4.19	3.92
P1065	J1034	J132	1,540.73	10	120	626.11	2.56	4.62	3
P1077	J944	J1046	838.18	6	120	-224.43	2.55	4.53	5.4
P1079	J1046	J1048	998.79	6	120	-224.43	2.55	5.4	5.4
P1081	J1048	J1050	305.64	6	120	-224.43	2.55	1.65	5.4
P1083	J1050	J1052	615.33	6	120	-224.43	2.55	3.33	5.4
P1085	J1052	J1054	1,132.42	6	120	-224.43	2.55	6.12	5.4
P929	J894	J390	1,364.47	8	120	379.06	2.42	4.79	3.51
P959	J922	J920	969.94	8	120	-375.61	2.4	3.35	3.45
P803	J688	J828	257.80	6	120	203.74	2.31	1.16	4.52
P91	J92	J44	1,212.87	8	120	-354.21	2.26	3.76	3.1
P277	J92	J906	1,289.97	4	120	88.08	2.25	8.89	6.89
P935	J900	J44	1,401.10	16	120	-1,381.37	2.2	1.85	1.32
P37	J10	J900	707.05	16	120	-1,357.89	2.17	0.9	1.28
P669	J522	J952	1,193.35	10	120	-514.49	2.1	2.49	2.09
P961	J924	J922	1,210.78	8	120	-324.54	2.07	3.19	2.64
P991	J954	J280	1,220.74	16	120	1,257.12	2.01	1.35	1.11
P1039	J1004	J1008	797.74	16	120	-1,249.90	1.99	0.87	1.09

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P1043	J1008	J1014	1,128.33	16	120	-1,249.90	1.99	1.23	1.09
P1047	J1014	J280	272.16	16	120	-1,249.90	1.99	0.3	1.09
P183	J220	J1004	1,057.17	16	120	-1,249.90	1.99	1.16	1.09
P677	J736	J244	2,947.41	16	120	-1,249.22	1.99	3.22	1.09
P681	J740	J736	969.74	16	120	-1,249.22	1.99	1.06	1.09
P1069	J1038	J1042	696.24	8	120	307.59	1.96	1.66	2.39
P105	J108	J950	1,726.29	16	120	1,151.78	1.84	1.62	0.94
P621	J714	J688	3,397.39	24	120	2,537.10	1.8	1.91	0.56
P715	J522	J586	1,316.00	8	120	282.18	1.8	2.68	2.03
P651	J20	J718	1,713.18	16	120	-1,095.02	1.75	1.47	0.86
P943	J906	J910	1,002.15	4	120	68.08	1.74	4.29	4.28
P985	J948	J688	2,403.23	24	120	-2,323.93	1.65	1.15	0.48
P249	J296	J948	2,771.23	24	120	-2,252.08	1.6	1.25	0.45
P201	J144	J980	1,063.76	18	120	-1,258.00	1.59	0.66	0.62
P245	J288	J1060	2,334.83	24	120	-2,241.87	1.59	1.05	0.45
P245A	J1060	J296	1,197.55	24	120	-2,241.87	1.59	0.54	0.45
P963	J926	J924	1,469.50	8	120	-249.14	1.59	2.37	1.62
P1023	J986	J954	890.63	18	120	1,257.12	1.58	0.55	0.62
P157	J144	J986	1,305.37	18	120	1,257.12	1.58	0.81	0.62
P1089	J1056	J662	1,352.62	12	120	-541.77	1.54	1.28	0.94
P989	J952	J1056	1,247.23	12	120	-541.77	1.54	1.18	0.94
P19	J20	J24	459.26	16	120	960.54	1.53	0.31	0.67
P883	J510	J878	942.7	6	120	134.14	1.52	1.96	2.08
P781	J802	J804	800.54	6	120	133.22	1.51	1.65	2.06
P465	J510	J522	585.53	8	120	-228.26	1.46	0.8	1.37
P221	J696	J722	2,686.05	24	120	-2,027.74	1.44	1	0.37
P1087	J1054	J896	1,828.73	8	120	-224.43	1.43	2.43	1.33
P379	J390	J428	1,067.12	6	120	125.93	1.43	1.98	1.85
P17	J24	J10	723.62	16	120	-855.05	1.36	0.39	0.54
P775	J800	J802	619.37	6	120	117.76	1.34	1.01	1.64
P373	J412	J420	297.67	6	120	116.54	1.32	0.48	1.61
P939	J842	RES9006	1	48	120	-7,329.32	1.3	0	0.14
P965	J928	J926	1,434.61	8	120	-200.37	1.28	1.55	1.08
P765	J20	J792	507.91	6	120	111.11	1.26	0.75	1.47
P771	J704	J800	958.55	8	120	196.18	1.25	0.99	1.04
P481	J390	J890	630.90	8	120	189.76	1.21	0.62	0.98
P937	J902	J66	2,551.19	4	120	47.52	1.21	5.61	2.2
P799	J828	J824	698.4	6	120	105.43	1.2	0.93	1.33
P653	J718	J704	2,356.56	16	120	712.75	1.14	0.91	0.39
P925	J890	J412	616.15	8	120	178.21	1.14	0.53	0.87
P397	J436	J420	762.04	6	120	-98.74	1.12	0.9	1.18
P531	J586	J928	1,171.40	8	120	-175.82	1.12	0.99	0.85
P607	J428	J940	769.49	6	120	91.46	1.04	0.79	1.03
P979	J942	J436	760.89	6	120	-91.27	1.04	0.78	1.02
P913	J878	J876	1,235.77	6	120	90.48	1.03	1.24	1
P445	J488	J942	679.76	6	120	-82.94	0.94	0.58	0.86
P977	J940	J938	754.64	6	120	82.29	0.93	0.64	0.84
P1073	J1042	J760	1,490.48	8	120	142.15	0.91	0.85	0.57
P801	J826	J828	1,120.40	6	120	-78.79	0.89	0.87	0.78
P947	J910	J908	1,654.99	4	120	34.5	0.88	2.01	1.21
P649	J704	J268	318.06	16	120	514.43	0.82	0.07	0.21
P903	J868	J800	732.22	6	120	-62.57	0.71	0.37	0.51
P791	J818	J824	384.84	6	120	-60.07	0.68	0.18	0.47
P757	J770	J866	801.75	6	120	56.04	0.64	0.33	0.41
P783	J808	J804	1,577.35	6	120	-55.99	0.64	0.65	0.41
P899	J864	J792	1,250.51	6	120	-56.48	0.64	0.52	0.42
P785	J808	J812	792.95	6	120	54.34	0.62	0.31	0.39
P301	J340	J934	1,238.56	4	120	-23.93	0.61	0.74	0.6
P777	J804	J860	1,342.76	6	120	52.69	0.6	0.5	0.37
P969	J932	J488	1,773.44	6	120	-52.16	0.59	0.64	0.36
P267	J36	J52	302.75	8	120	-91.61	0.58	0.08	0.25
P387	J428	J892	654.47	4	120	22.50	0.57	0.36	0.55
P973	J936	J390	1,054.10	6	120	-49.82	0.57	0.35	0.33
P911	J876	J874	751.77	6	120	49.37	0.56	0.25	0.33

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P455	J500	J510	767.28	8	120	-78.53	0.5	0.15	0.19
P769	J770	J868	157.17	6	120	-43.54	0.49	0.04	0.26
P901	J866	J780	912.76	6	120	41.56	0.47	0.22	0.24
P971	J934	J936	945.14	6	120	-39.83	0.45	0.21	0.22
P975	J938	J488	1,364.38	4	120	17.75	0.45	0.48	0.35
P1075	J760	J1044	2,563.66	8	120	69.13	0.44	0.39	0.15
P357	J402	J412	332.55	6	120	-37.64	0.43	0.06	0.2
P927	J892	J436	598.20	4	120	16.75	0.43	0.19	0.32
P29	J36	J912	1,776.49	6	120	35.8	0.41	0.32	0.18
P25	J36	J914	568.49	6	120	35.22	0.4	0.1	0.18
P807	J822	J826	523.47	6	120	-35.33	0.4	0.09	0.18
P895	J860	J808	1,028.11	6	120	32.6	0.37	0.16	0.15
P447	J496	J500	263.40	6	120	-30.67	0.35	0.04	0.14
P759	J780	J802	425.59	6	120	29.21	0.33	0.05	0.12
P897	J862	J864	1,043.35	6	120	-28.77	0.33	0.13	0.12
P949	J912	J66	712.34	4	120	-12.65	0.32	0.13	0.19
P923	J888	J402	703.71	6	120	-27.64	0.31	0.08	0.11
P753	J792	J770	986.19	6	120	26.81	0.3	0.1	0.11
P795	J816	J822	1,406.49	6	120	-26.85	0.3	0.15	0.11
P909	J874	J930	867.88	6	120	25.34	0.29	0.08	0.1
P919	J884	J496	779.02	6	120	-24.77	0.28	0.07	0.09
P797	J824	J826	710.33	6	120	-23.84	0.27	0.06	0.08
P951	J914	J62	994.95	6	120	23.91	0.27	0.09	0.09
P915	J880	J500	233.27	8	120	-34.76	0.22	0.01	0.04
P1099	J1062	J760	3,902.73	12	120	-73.02	0.21	0.09	0.02
P809	J824	J822	848.95	6	120	15.37	0.17	0.03	0.04
P921	J886	J884	543.81	6	120	-15.09	0.17	0.02	0.04
P787	J812	J858	736.39	6	120	13.51	0.15	0.02	0.03
P585	J650	J886	1,054.12	6	120	-12.57	0.14	0.03	0.03
P485	J412	J882	180.52	8	120	19.77	0.13	0	0.01
P945	J908	J68	914.89	6	120	10.11	0.11	0.02	0.02
P51	J62	J66	60.89	4	120	3.81	0.1	0	0.02
P789	J812	J818	1,554.84	6	120	8.92	0.1	0.02	0.01
P271	J68	J62	903.73	6	120	-7.42	0.08	0.01	0.01
P303	J336	J340	189.56	6	120	-5.46	0.06	0	0.01
P763	J780	J862	710.16	6	120	-4.26	0.05	0	0
P273	J68	J50	1,193.53	8	120	5.51	0.04	0	0
P325	J340	J888	967.88	6	120	-3.82	0.04	0	0
P893	J858	J816	510.04	6	120	-2.51	0.03	0	0
P917	J882	J880	1,315.64	8	120	-5.39	0.03	0	0
P587	J336	J650	456.76	6	120	2.15	0.02	0	0
P891	J818	J816	490.57	6	120	-1.33	0.02	0	0
P967	J930	J932	717.97	6	120	-1.37	0.02	0	0
P1013	J974	J976	323.36	8	120	0	0	0	0
P1021	J984	J144	284.05	18	120	0.00	0	0	0
P1025	J986	J988	2,596.50	8	120	0.00	0	0	0
P1027	J988	J990	2,420.07	8	120	0	0	0	0
P119	J136	J984	582	18	120	0.00	0	0	0
P541	J600	J606	14.01	6	120	0	0	0	0
P647	J714	J712	78.54	16	120	0.00	0	0	0

APPENDIX J

Hydraulic Model Results - 2020

2020 Annual Average Demand Scenario

Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1044	90.94	14	149.18	58.57
J760	0	14	149.82	58.85
J944	158.12	13	149.67	59.22
J336	2.18	14.55	151.35	59.27
J428	7.88	13.97	150.85	59.31
J132	1.39	17	154	59.36
J874	15.81	13	150	59.36
J948	1,193.10	18	155.03	59.37
J436	15.93	13.34	150.73	59.53
J886	1.66	14	151.42	59.54
J340	14.67	13.82	151.35	59.59
J586	0	15	152.57	59.61
J1062	96.96	12	149.67	59.65
J942	5.48	12.7	150.39	59.66
J932	33.41	12	149.93	59.77
J904	41.36	17	154.99	59.79
J940	6.03	12.46	150.52	59.82
J876	27.05	12	150.16	59.86
J1046	0.00	12	150.21	59.89
J938	42.46	12	150.26	59.91
J650	9.69	13	151.36	59.95
J1004	0	16	154.43	59.98
J1008	0	16	154.43	59.98
J884	6.37	13.02	151.45	59.98
J936	6.57	13.05	151.5	59.99
J854	0	20.5	158.96	60
J926	32.08	14	152.57	60.04
J892	3.78	12	150.76	60.13
J878	28.72	12	150.83	60.16
J930	17.58	11.1	149.94	60.16
J420	11.71	12.15	151.17	60.24
J488	31.93	11	150.15	60.29
J1042	217.68	12	151.25	60.34
J1014	0	15	154.43	60.41
J882	16.55	12	151.41	60.41
J890	7.59	12	151.49	60.44
J908	16.04	15	154.51	60.45
J496	3.88	12	151.53	60.46
J1036	50.08	16	155.66	60.51
J510	10.26	12	151.85	60.6
J894	1.61	13	152.86	60.6
J898	21.35	10	149.87	60.61
J1040	0.00	15	154.93	60.63
J1038	271.68	14	154.02	60.67
J952	17.95	13	153.11	60.71
J220	0.44	14	154.42	60.85
J988	0	14	154.43	60.85
J990	0	14	154.43	60.85
J902	70.99	14	154.47	60.87
J522	2.66	12	152.57	60.91
J600	0	12	152.57	60.91
J606	0	12	152.57	60.91
J824	35.41	14	154.73	60.98
J994	0	13.61	154.42	61.01
J962	0	14	154.87	61.04
J288	13.86	14	154.9	61.05
J292	3.39	14	154.9	61.05
J818	46.26	13.73	154.66	61.06
J1060	0	14	154.95	61.07
J296	6.71	14	154.97	61.08
J1034	608.8	13	154	61.09
J244	0	13.41	154.42	61.1

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J56	11.54	15	156.08	61.13
J828	12.84	14	155.12	61.15
J906	13.16	14	155.12	61.15
J1054	0	11	152.18	61.17
J872	26.61	14	155.22	61.19
J816	15.14	13.39	154.66	61.21
J738	18.18	13	154.41	61.27
J278	0	13	154.42	61.28
J1052	0	10	151.45	61.29
J68	7.91	13	154.55	61.33
J870	15.96	14	155.53	61.33
J928	16.15	11	152.57	61.34
J950	0.08	14	155.58	61.34
J682	0	8	149.67	61.38
J822	15.68	13	154.71	61.4
J888	15.67	9.65	151.35	61.4
J108	1.29	14.42	156.14	61.41
J826	12.91	13.03	154.75	61.41
J1048	0	9	150.85	61.47
J918	6.17	12	154.02	61.54
J24	0	15	157.17	61.6
J20	15.37	15	157.18	61.61
J880	19.32	9.35	151.53	61.61
J864	18.23	14	156.23	61.63
J402	6.58	9	151.38	61.69
J412	2.81	9	151.4	61.7
J770	9.42	14	156.4	61.7
J868	12.52	14	156.4	61.7
J280	4.75	12	154.43	61.71
J954	0	12	154.43	61.71
J964	0	12.35	154.77	61.71
J986	0	12	154.43	61.71
J934	10.46	9	151.45	61.72
J500	8.61	9	151.57	61.78
J792	18.31	14	156.58	61.78
J858	10.54	12	154.66	61.81
J812	21	12	154.68	61.82
J916	41.55	11.65	154.34	61.82
J734	7.1	16	158.7	61.83
J62	8.35	11.66	154.5	61.89
J92	72.83	14	156.87	61.91
J1050	0	8	151.05	61.98
J30	17.02	14	157.17	62.03
J390	8.92	8.39	151.6	62.05
J804	16.15	12	155.21	62.05
J896	9.45	9.27	152.47	62.05
J718	15.91	13.94	157.26	62.1
J1056	0	10	153.37	62.12
J920	17.51	10	153.41	62.14
J144	0.58	11	154.43	62.15
J900	15.44	14	157.57	62.21
J52	1.04	11	154.65	62.24
J946	12.62	10	153.65	62.25
J722	11.36	13.53	157.27	62.28
J910	22.09	10.74	154.52	62.3
J44	0.08	14	157.98	62.38
J688	6.21	11.5	155.62	62.45
J662	55.25	9.5	153.66	62.46
J866	9.52	12	156.23	62.49
J36	13.54	10.2	154.61	62.57
J740	1.04	10	154.41	62.57
J980	0	10	154.43	62.58
J982	0	9.74	154.17	62.58
J922	33.59	8.5	152.97	62.6

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J602	0	8	152.57	62.64
J808	22.54	10	154.86	62.77
J860	13.21	10	154.95	62.81
J862	16.12	10.9	156.12	62.93
J912	31.88	9	154.42	63.01
J66	25.45	9	154.45	63.02
J914	7.44	9	154.55	63.07
J924	49.61	7	152.66	63.12
J802	9.05	10	156.06	63.29
J780	10.93	10	156.11	63.31
J842	0	13	159.1	63.31
J10	1.87	11	157.37	63.42
J736	0	8	154.41	63.44
J136	0	8	154.43	63.45
J974	0	8	154.53	63.49
J704	1.41	10	156.81	63.61
J268	0	9.5	156.77	63.81
J696	0	9.5	156.78	63.82
J800	10.43	8.98	156.47	63.91
J714	3.33	9	156.58	63.95
J984	0	6.84	154.43	63.95
J50	26.01	7	154.61	63.96
J712	0	8.5	156.58	64.16
J42	0	9	157.37	64.29
J750	1.68	4	153.65	64.84
J978	0	5	154.66	64.85

2020 Annual Average Demand Scenario

Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P855	J842	J854	37.35	20	120	4,301.39	4.39	0.14	3.64
P645	J268	J714	93.13	16	120	1,754.57	2.8	0.19	2.05
P1069	J1038	J1042	696.24	8	120	405.58	2.59	2.77	3.98
P261	J854	J108	2,146.32	16	120	1,380.25	2.2	2.82	1.31
P637	J268	J696	7.13	16	120	-1,376.68	2.2	0.01	1.31
P743	J734	J854	357.9	24	120	-2,921.13	2.07	0.26	0.73
P625	J30	J56	736.23	12	120	690.23	1.96	1.09	1.48
P281	J92	J902	485.88	4	120	73.56	1.88	2.4	4.94
P657	J722	J734	3,555.33	24	120	-2,119.03	1.5	1.44	0.4
P803	J688	J828	257.8	6	120	128.52	1.46	0.5	1.92
P465	J510	J522	585.53	8	120	-215.62	1.38	0.72	1.24
P907	J872	J56	1,171.38	12	120	-472.14	1.34	0.86	0.73
P905	J870	J56	477.99	8	120	-206.55	1.32	0.55	1.14
P673	J44	J734	1,527.00	16	120	-795	1.27	0.72	0.47
P43	J52	J872	867.21	12	120	-445.53	1.26	0.57	0.66
P621	J714	J688	3,397.39	24	120	1,751.24	1.24	0.96	0.28
P933	J898	J896	1,856.97	6	120	-108.19	1.23	2.6	1.4
P953	J916	J870	1,215.97	8	120	-190.58	1.22	1.2	0.98
P931	J896	J894	398.95	8	120	-188.91	1.21	0.39	0.97
P1073	J1042	J760	1,490.48	8	120	187.9	1.2	1.43	0.96
P661	J718	J722	17.96	16	120	-730.98	1.17	0.01	0.41
P91	J92	J44	1,212.87	8	120	-183.06	1.17	1.11	0.91
P929	J894	J390	1,364.47	8	120	183.93	1.17	1.26	0.92
P255	J108	J1036	1,204.92	16	120	727.34	1.16	0.48	0.4
P985	J948	J688	2,403.23	24	120	-1,616.52	1.15	0.59	0.24
P21	J24	J30	21.64	16	120	707.25	1.13	0.01	0.38
P765	J20	J792	507.91	6	120	98.97	1.12	0.6	1.19
P1067	J1036	J1040	2,066.23	16	120	677.26	1.08	0.73	0.35
P1071	J1040	J1038	2,592.09	16	120	677.26	1.08	0.91	0.35
P41	J50	J52	72.58	12	120	-378.6	1.07	0.04	0.49
P883	J510	J878	942.7	6	120	93.93	1.07	1.02	1.08
P1019	J980	J982	541.74	12	120	374.46	1.06	0.26	0.48
P1095	J894	J982	2,754.13	12	120	-374.46	1.06	1.31	0.48
P781	J802	J804	800.54	6	120	93.17	1.06	0.85	1.06
P105	J108	J950	1,726.29	16	120	651.63	1.04	0.57	0.33
P987	J950	J904	1,776.99	16	120	651.54	1.04	0.58	0.33
P981	J944	J898	221.21	6	120	-86.84	0.99	0.21	0.93
P221	J696	J722	2,686.05	24	120	-1,376.68	0.98	0.49	0.18
P935	J900	J44	1,401.10	16	120	-611.86	0.98	0.41	0.29
P941	J904	J1034	3,432.11	16	120	610.19	0.97	1	0.29
P17	J24	J10	723.62	16	120	-594.55	0.95	0.2	0.28
P37	J10	J900	707.05	16	120	-596.42	0.95	0.2	0.28
P955	J918	J916	499.12	8	120	-149.03	0.95	0.31	0.62
P277	J92	J906	1,289.97	4	120	36.67	0.94	1.75	1.36
P669	J522	J952	1,193.35	10	120	-224.37	0.92	0.54	0.45
P957	J920	J918	1,067.97	8	120	-142.86	0.91	0.62	0.58
P373	J412	J420	297.67	6	120	78.96	0.9	0.23	0.78
P39	J662	J50	2,805.19	12	120	-311.86	0.88	0.95	0.34
P379	J390	J428	1,067.12	6	120	74.88	0.85	0.76	0.71
P775	J800	J802	619.37	6	120	72.84	0.83	0.42	0.67
P1077	J944	J1046	838.18	6	120	-71.28	0.81	0.54	0.65
P1079	J1046	J1048	998.79	6	120	-71.28	0.81	0.65	0.65
P1081	J1048	J1050	305.64	6	120	-71.28	0.81	0.2	0.65
P1083	J1050	J1052	615.33	6	120	-71.28	0.81	0.4	0.65
P1085	J1052	J1054	1,132.42	6	120	-71.28	0.81	0.73	0.65
P959	J922	J920	969.94	8	120	-125.35	0.8	0.44	0.45
P653	J718	J704	2,356.56	16	120	488.03	0.78	0.45	0.19
P397	J436	J420	762.04	6	120	-67.24	0.76	0.44	0.58
P939	J842	RES9006	1.00	48	120	-4,301.39	0.76	0	0.06
P799	J828	J824	698.4	6	120	66.16	0.75	0.39	0.56
P913	J878	J876	1,235.77	6	120	65.21	0.74	0.68	0.55
P51	J62	J66	60.89	4	120	28.15	0.72	0.05	0.83

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P455	J500	J510	767.28	8	120	-111.43	0.71	0.28	0.36
P1089	J1056	J662	1,352.62	12	120	-242.32	0.69	0.29	0.21
P771	J704	J800	958.55	8	120	108.72	0.69	0.33	0.35
P989	J952	J1056	1,247.23	12	120	-242.32	0.69	0.27	0.21
P979	J942	J436	760.89	6	120	-57.84	0.66	0.33	0.44
P607	J428	J940	769.49	6	120	56.7	0.64	0.33	0.42
P649	J704	J268	318.06	16	120	377.89	0.6	0.04	0.12
P943	J906	J910	1,002.15	4	120	23.51	0.6	0.6	0.6
P445	J488	J942	679.76	6	120	-52.36	0.59	0.25	0.36
P961	J924	J922	1,210.78	8	120	-91.76	0.59	0.31	0.25
P1075	J760	J1044	2,563.66	8	120	90.94	0.58	0.64	0.25
P977	J940	J938	754.64	6	120	50.67	0.57	0.26	0.34
P801	J826	J828	1,120.40	6	120	-49.51	0.56	0.37	0.33
P237	J292	J288	27.24	18	120	-402.84	0.51	0	0.08
P899	J864	J792	1,250.51	6	120	-44.92	0.51	0.34	0.27
P1001	J964	J962	1,406.37	18	120	-399.45	0.5	0.1	0.07
P1011	J974	J978	1,770.87	18	120	-399.45	0.5	0.13	0.07
P1015	J978	J964	1,480.70	18	120	-399.45	0.5	0.11	0.07
P1017	J980	J974	1,319.38	18	120	-399.45	0.5	0.1	0.07
P999	J962	J292	335.77	18	120	-399.45	0.5	0.03	0.07
P481	J390	J890	630.9	8	120	75.06	0.48	0.11	0.18
P785	J808	J812	792.95	6	120	41.28	0.47	0.19	0.23
P915	J880	J500	233.27	8	120	-72.18	0.46	0.04	0.16
P1087	J1054	J896	1,828.73	8	120	-71.28	0.45	0.29	0.16
P757	J770	J866	801.75	6	120	39.27	0.45	0.17	0.21
P783	J808	J804	1,577.35	6	120	-39.87	0.45	0.35	0.22
P911	J876	J874	751.77	6	120	38.16	0.43	0.15	0.2
P925	J890	J412	616.15	8	120	67.46	0.43	0.09	0.14
P267	J36	J52	302.75	8	120	-65.89	0.42	0.04	0.14
P777	J804	J860	1,342.76	6	120	37.15	0.42	0.26	0.19
P753	J792	J770	986.19	6	120	35.75	0.41	0.18	0.18
P791	J818	J824	384.84	6	120	-35.84	0.41	0.07	0.18
P651	J20	J718	1,713.18	16	120	-227.04	0.36	0.08	0.05
P447	J496	J500	263.4	6	120	-30.64	0.35	0.04	0.14
P901	J866	J780	912.76	6	120	29.75	0.34	0.12	0.13
P917	J882	J880	1,315.64	8	120	-52.85	0.34	0.12	0.09
P759	J780	J802	425.59	6	120	29.38	0.33	0.05	0.13
P969	J932	J488	1,773.44	6	120	-28.64	0.32	0.21	0.12
P245	J288	J1060	2,334.83	24	120	-416.71	0.3	0.05	0.02
P245A	J1060	J296	1,197.55	24	120	-416.71	0.3	0.02	0.02
P249	J296	J948	2,771.23	24	120	-423.42	0.3	0.06	0.02
P29	J36	J912	1,776.49	6	120	26.6	0.3	0.18	0.1
P897	J862	J864	1,043.35	6	120	-26.69	0.3	0.11	0.1
P919	J884	J496	779.02	6	120	-26.76	0.3	0.08	0.11
P25	J36	J914	568.49	6	120	25.74	0.29	0.06	0.1
P903	J868	J800	732.22	6	120	-25.46	0.29	0.07	0.1
P1099	J1062	J760	3,902.73	12	120	-96.96	0.28	0.15	0.04
P973	J936	J390	1,054.10	6	120	-25.08	0.28	0.1	0.09
P895	J860	J808	1,028.11	6	120	23.94	0.27	0.09	0.09
P963	J926	J924	1,469.50	8	120	-42.15	0.27	0.09	0.06
P273	J68	J50	1,193.53	8	120	-40.72	0.26	0.07	0.06
P387	J428	J892	654.47	4	120	10.31	0.26	0.08	0.13
P357	J402	J412	332.55	6	120	-22	0.25	0.02	0.07
P807	J822	J826	523.47	6	120	-21.91	0.25	0.04	0.07
P909	J874	J930	867.88	6	120	22.35	0.25	0.07	0.08
P485	J412	J882	180.52	8	120	-36.3	0.23	0.01	0.05
P921	J886	J884	543.81	6	120	-20.39	0.23	0.03	0.06
P271	J68	J62	903.73	6	120	18.19	0.21	0.05	0.05
P301	J340	J934	1,238.56	4	120	-8.04	0.21	0.1	0.08
P585	J650	J886	1,054.12	6	120	-18.73	0.21	0.06	0.05
P951	J914	J62	994.95	6	120	18.31	0.21	0.05	0.05
P971	J934	J936	945.14	6	120	-18.5	0.21	0.05	0.05
P975	J938	J488	1,364.38	4	120	8.21	0.21	0.12	0.08
P19	J20	J24	459.26	16	120	112.71	0.18	0.01	0.01

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P795	J816	J822	1,406.49	6	120	-15.82	0.18	0.06	0.04
P923	J888	J402	703.71	6	120	-15.43	0.18	0.03	0.04
P797	J824	J826	710.33	6	120	-14.69	0.17	0.02	0.03
P927	J892	J436	598.2	4	120	6.53	0.17	0.03	0.06
P945	J908	J68	914.89	6	120	-14.62	0.17	0.03	0.03
P595	J662	J946	206.15	6	120	14.3	0.16	0.01	0.03
P769	J770	J868	157.17	6	120	-12.94	0.15	0	0.03
P787	J812	J858	736.39	6	120	12.05	0.14	0.02	0.02
P949	J912	J66	712.34	4	120	-5.27	0.13	0.03	0.04
P763	J780	J862	710.16	6	120	-10.56	0.12	0.01	0.02
P809	J824	J822	848.95	6	120	9.60	0.11	0.01	0.02
P587	J336	J650	456.76	6	120	-9.04	0.1	0.01	0.01
P789	J812	J818	1,554.84	6	120	8.23	0.09	0.02	0.01
P303	J336	J340	189.56	6	120	6.86	0.08	0	0.01
P937	J902	J66	2,551.19	4	120	2.57	0.07	0.03	0.01
P965	J928	J926	1,434.61	8	120	-10.07	0.06	0.01	0
P1029	J994	J244	257.79	12	120	19.22	0.05	0	0
P195	J220	J278	2,626.00	12	120	19.22	0.05	0.01	0
P197	J278	J994	1,557.06	12	120	19.22	0.05	0	0
P679	J738	J740	489.39	12	120	-18.18	0.05	0	0
P967	J930	J932	717.97	6	120	4.78	0.05	0	0
P531	J586	J928	1,171.40	8	120	6.09	0.04	0	0
P715	J522	J586	1,316.00	8	120	6.09	0.04	0	0
P947	J910	J908	1,654.99	4	120	1.42	0.04	0.01	0
P991	J954	J280	1,220.74	16	120	24.42	0.04	0	0
P1023	J986	J954	890.63	18	120	24.42	0.03	0	0
P1039	J1004	J1008	797.74	16	120	-19.67	0.03	0	0
P1043	J1008	J1014	1,128.33	16	120	-19.67	0.03	0	0
P1047	J1014	J280	272.16	16	120	-19.67	0.03	0	0
P157	J144	J986	1,305.37	18	120	24.42	0.03	0	0
P183	J220	J1004	1,057.17	16	120	-19.67	0.03	0	0
P201	J144	J980	1,063.76	18	120	-25	0.03	0	0
P677	J736	J244	2,947.41	16	120	-19.22	0.03	0	0
P681	J740	J736	969.74	16	120	-19.22	0.03	0	0
P891	J818	J816	490.57	6	120	-2.19	0.02	0	0
P893	J858	J816	510.04	6	120	1.51	0.02	0	0
P983	J946	J750	1,547.44	6	120	1.68	0.02	0	0
P1065	J1034	J132	1,540.73	10	120	1.39	0.01	0	0
P1021	J984	J144	284.05	18	120	0	0	0	0
P1025	J986	J988	2,596.50	8	120	0	0	0	0
P1027	J988	J990	2,420.07	8	120	0	0	0	0
P119	J136	J984	582.00	18	120	0	0	0	0
P325	J340	J888	967.88	6	120	0.24	0	0	0
P33	J10	J42	903.69	8	120	0	0	0	0
P537	J600	J602	245	8	120	0	0	0	0
P541	J600	J606	14.01	6	120	0	0	0	0
P543	J586	J600	659.76	8	120	0	0	0	0
P603	J682	J944	516.79	6	120	0.00	0	0	0
P647	J714	J712	78.54	16	120	0	0	0	0

2020 Max Month Peak Hour Demand Scenario

Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J750	460.55	4	89.64	37.11
J944	240.34	13	99.44	37.45
J682	289	8	94.98	37.69
J738	1,247.64	13	101.79	38.47
J898	32.45	10	101.55	39.67
J1046	0	12	103.97	39.85
J740	1.58	10	103.96	40.71
J244	0	13.41	108.24	41.09
J994	0	13.61	109.39	41.5
J736	0	8	105.02	42.04
J1048	0	9	109.37	43.49
J600	0	12	114.95	44.61
J606	0	12	114.95	44.61
J1050	0	8	111.02	44.64
J586	0	15	118.25	44.74
J278	0	13	116.3	44.76
J874	24.03	13	116.68	44.92
J1052	0	10	114.34	45.21
J932	50.79	12	116.59	45.32
J876	41.11	12	116.92	45.46
J942	8.33	12.7	117.82	45.55
J428	11.97	13.97	119.15	45.57
J436	24.22	13.34	118.6	45.61
J336	3.31	14.55	119.83	45.62
J930	26.71	11.1	116.59	45.71
J602	458	8	113.73	45.81
J938	64.54	12	117.72	45.81
J886	2.52	14	119.86	45.87
J940	9.17	12.46	118.36	45.89
J340	22.29	13.82	119.83	45.93
J878	43.66	12	118.16	46
J488	48.53	11	117.24	46.03
J892	5.75	12	118.79	46.27
J926	48.76	14	120.78	46.27
J650	14.72	13	119.83	46.29
J884	9.68	13.02	119.88	46.3
J420	17.8	12.15	119.5	46.52
J936	9.99	13.05	120.78	46.68
J496	5.9	12	119.95	46.77
J882	25.16	12	119.97	46.78
J510	15.6	12	120.13	46.85
J928	24.55	11	119.24	46.9
J890	11.54	12	120.51	47.02
J522	4.05	12	120.92	47.2
J1054	0	11	120.47	47.43
J888	23.81	9.65	119.83	47.74
J952	27.28	13	123.41	47.84
J880	29.37	9.35	119.97	47.93
J402	10	9	119.91	48.06
J412	4.27	9	119.97	48.09
J500	13.09	9	119.98	48.09
J946	19.19	10	121.31	48.23
J934	15.9	9	120.58	48.35
J390	13.56	8.39	121.13	48.85
J894	2.45	13	125.94	48.94
J1004	0	16	129.11	49.01
J896	14.36	9.27	122.9	49.24
J220	0.68	14	127.95	49.38
J1008	0.00	16	129.98	49.39
J1056	0	10	124.59	49.65
J132	626.11	17	132.32	49.97
J924	75.41	7	123.15	50.33

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J1014	0	15	131.22	50.36
J662	83.97	9.5	125.86	50.42
J922	51.06	8.5	126.34	51.06
J988	0	14	133.42	51.75
J990	0	14	133.42	51.75
J280	7.22	12	131.52	51.79
J1044	138.22	14	133.59	51.82
J920	26.61	10	129.69	51.86
J908	24.39	15	135.8	52.34
J954	0	12	132.87	52.37
J760	0	14	134.98	52.42
J986	0	12	133.42	52.61
J918	9.38	12	133.87	52.81
J1062	147.38	12	134.65	53.14
J68	12.02	13	135.78	53.2
J144	0.88	11	134.24	53.4
J982	0	9.74	133.43	53.59
J1034	925.38	13	136.95	53.71
J62	12.69	11.66	135.79	53.79
J916	63.16	11.65	135.91	53.84
J980	0	10	134.9	54.12
J52	1.59	11	136.05	54.18
J904	62.86	17	142.55	54.4
J36	20.58	10.2	135.97	54.5
J872	40.45	14	139.8	54.51
J1042	330.87	12	138.08	54.63
J136	0	8	134.24	54.7
J912	48.45	9	135.65	54.88
J66	38.68	9	135.79	54.94
J914	11.31	9	135.88	54.98
J910	33.58	10.74	137.8	55.05
J902	107.9	14	141.38	55.19
J984	0	6.84	134.24	55.2
J906	20	14	142.08	55.5
J870	24.27	14	142.39	55.63
J50	39.53	7	135.78	55.8
J974	0	8	137.25	56
J1038	412.95	14	144.1	56.37
J56	17.54	15	145.19	56.41
J964	0	12.35	143.04	56.63
J948	47.27	18	149.03	56.77
J1040	0	15	146.08	56.8
J962	0	14	145.54	57
J1036	76.12	16	147.66	57.05
J950	0.08	14	145.68	57.06
J292	5.15	14	146.14	57.26
J288	21.07	14	146.19	57.28
J1060	0	14	147.24	57.73
J296	10.21	14	147.78	57.96
J824	53.83	14	148.05	58.08
J818	70.32	13.73	147.87	58.12
J108	1.96	14.42	148.71	58.19
J816	23.01	13.39	147.87	58.27
J828	19.52	14	148.99	58.49
J822	23.84	13	148.02	58.5
J826	19.63	13.03	148.11	58.53
J978	0	5	140.4	58.67
J858	16.02	12	147.86	58.87
J812	31.91	12	147.89	58.88
J24	0	15	151.59	59.18
J864	27.71	14	150.64	59.21
J804	24.54	12	148.83	59.29
J20	23.36	15	151.9	59.32
J92	110.7	14	150.95	59.34

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J770	14.31	14	151.06	59.39
J868	19.03	14	151.11	59.41
J792	27.83	14	151.16	59.43
J30	25.88	14	151.54	59.6
J42	500	9	146.68	59.65
J854	0	20.5	158.64	59.86
J808	34.25	10	148.19	59.88
J860	20.09	10	148.34	59.94
J688	9.43	11.5	150.16	60.08
J866	14.48	12	150.73	60.11
J900	23.47	14	152.88	60.17
J718	24.18	13.94	153.37	60.42
J862	24.51	10.9	150.52	60.5
J722	17.27	13.53	153.41	60.61
J802	13.75	10	150.47	60.86
J780	16.61	10	150.52	60.89
J44	0.12	14	154.71	60.97
J10	2.85	11	151.98	61.09
J734	10.8	16	157.76	61.43
J704	2.15	10	152.48	61.74
J800	15.85	8.98	151.48	61.74
J268	0	9.5	152.41	61.92
J696	0	9.5	152.43	61.93
J714	5.07	9	152.04	61.98
J712	0	8.5	152.04	62.2
J842	0	13	159.1	63.31

2020 Max Month Peak Hour Demand Scenario

Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P855	J842	J854	37.35	20	120	8,320.82	8.5	0.46	12.35
P595	J662	J946	206.15	6	120	479.73	5.44	4.55	22.07
P983	J946	J750	1,547.44	6	120	460.55	5.23	31.67	20.46
P625	J30	J56	736.23	12	120	1,789.10	5.08	6.36	8.63
P261	J854	J108	2,146.32	16	120	2,721.94	4.34	9.93	4.62
P645	J268	J714	93.13	16	120	2,518.93	4.02	0.37	4.01
P281	J92	J902	485.88	4	120	155.35	3.97	9.58	19.71
P743	J734	J854	357.9	24	120	-5,598.88	3.97	0.87	2.44
P1069	J1038	J1042	696.24	8	120	616.47	3.93	6.02	8.65
P933	J898	J896	1,856.97	6	120	-337.36	3.83	21.35	11.5
P931	J896	J894	398.95	8	120	-576.15	3.68	3.04	7.63
P907	J872	J56	1,171.38	12	120	-1,272.71	3.61	5.38	4.59
P1029	J994	J244	257.79	12	120	1,249.22	3.54	1.14	4.44
P195	J220	J278	2,626.00	12	120	1,249.22	3.54	11.66	4.44
P197	J278	J994	1,557.06	12	120	1,249.22	3.54	6.91	4.44
P679	J738	J740	489.39	12	120	-1,247.64	3.54	2.17	4.43
P43	J52	J872	867.21	12	120	-1,232.25	3.5	3.75	4.33
P981	J944	J898	221.21	6	120	-304.91	3.46	2.11	9.53
P603	J682	J944	516.79	6	120	-289.00	3.28	4.46	8.63
P41	J50	J52	72.58	12	120	-1,139.05	3.23	0.27	3.74
P637	J268	J696	7.13	16	120	-2,010.74	3.21	0.02	2.64
P33	J10	J42	903.69	8	120	500.00	3.19	5.3	5.87
P905	J870	J56	477.99	8	120	-498.86	3.18	2.79	5.84
P39	J662	J50	2,805.19	12	120	-1,104.89	3.13	9.92	3.54
P953	J916	J870	1,215.97	8	120	-474.59	3.03	6.48	5.33
P537	J600	J602	245	8	120	458	2.92	1.22	4.99
P543	J586	J600	659.76	8	120	458	2.92	3.29	4.99
P661	J718	J722	17.96	16	120	-1,828.73	2.92	0.04	2.21
P21	J24	J30	21.64	16	120	1,814.98	2.9	0.05	2.18
P237	J292	J288	27.24	18	120	-2,221.56	2.8	0.05	1.79
P1001	J964	J962	1,406.37	18	120	-2,216.41	2.79	2.5	1.78
P1011	J974	J978	1,770.87	18	120	-2,216.41	2.79	3.15	1.78
P1015	J978	J964	1,480.70	18	120	-2,216.41	2.79	2.64	1.78
P1017	J980	J974	1,319.38	18	120	-2,216.41	2.79	2.35	1.78
P999	J962	J292	335.77	18	120	-2,216.41	2.79	0.6	1.78
P673	J44	J734	1,527.00	16	120	-1,731.33	2.76	3.06	2
P657	J722	J734	3,555.33	24	120	-3,856.75	2.74	4.35	1.22
P1019	J980	J982	541.74	12	120	958.41	2.72	1.47	2.72
P1095	J894	J982	2,754.13	12	120	-958.41	2.72	7.48	2.72
P955	J918	J916	499.12	8	120	-411.43	2.63	2.04	4.09
P105	J108	J950	1,726.29	16	120	1,614.43	2.58	3.03	1.76
P987	J950	J904	1,776.99	16	120	1,614.35	2.58	3.12	1.76
P957	J920	J918	1,067.97	8	120	-402.05	2.57	4.19	3.92
P1065	J1034	J132	1,540.73	10	120	626.11	2.56	4.62	3
P1077	J944	J1046	838.18	6	120	-224.43	2.55	4.53	5.4
P1079	J1046	J1048	998.79	6	120	-224.43	2.55	5.4	5.4
P1081	J1048	J1050	305.64	6	120	-224.43	2.55	1.65	5.4
P1083	J1050	J1052	615.33	6	120	-224.43	2.55	3.33	5.4
P1085	J1052	J1054	1,132.42	6	120	-224.43	2.55	6.12	5.4
P941	J904	J1034	3,432.11	16	120	1,551.48	2.48	5.6	1.63
P929	J894	J390	1,364.47	8	120	379.82	2.42	4.81	3.53
P959	J922	J920	969.94	8	120	-375.44	2.4	3.35	3.45
P803	J688	J828	257.8	6	120	204.33	2.32	1.17	4.54
P91	J92	J44	1,212.87	8	120	-354.06	2.26	3.76	3.1
P277	J92	J906	1,289.97	4	120	88.01	2.25	8.88	6.88
P935	J900	J44	1,401.10	16	120	-1,377.15	2.2	1.83	1.31
P37	J10	J900	707.05	16	120	-1,353.68	2.16	0.9	1.27
P669	J522	J952	1,193.35	10	120	-513.90	2.1	2.48	2.08
P961	J924	J922	1,210.78	8	120	-324.38	2.07	3.19	2.63
P991	J954	J280	1,220.74	16	120	1,257.12	2.01	1.35	1.11
P1039	J1004	J1008	797.74	16	120	-1,249.90	1.99	0.87	1.09
P1043	J1008	J1014	1,128.33	16	120	-1,249.90	1.99	1.23	1.09

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P1047	J1014	J280	272.16	16	120	-1,249.90	1.99	0.3	1.09
P183	J220	J1004	1,057.17	16	120	-1,249.90	1.99	1.16	1.09
P677	J736	J244	2,947.41	16	120	-1,249.22	1.99	3.22	1.09
P681	J740	J736	969.74	16	120	-1,249.22	1.99	1.06	1.09
P1073	J1042	J760	1,490.48	8	120	285.6	1.82	3.1	2.08
P715	J522	J586	1,316.00	8	120	282.35	1.8	2.68	2.04
P621	J714	J688	3,397.39	24	120	2,513.86	1.78	1.88	0.55
P255	J108	J1036	1,204.92	16	120	1,105.55	1.76	1.05	0.87
P651	J20	J718	1,713.18	16	120	-1,097.78	1.75	1.47	0.86
P943	J906	J910	1,002.15	4	120	68.01	1.74	4.28	4.27
P1067	J1036	J1040	2,066.23	16	120	1,029.43	1.64	1.58	0.76
P1071	J1040	J1038	2,592.09	16	120	1,029.43	1.64	1.98	0.76
P985	J948	J688	2,403.23	24	120	-2,300.10	1.63	1.13	0.47
P249	J296	J948	2,771.23	24	120	-2,252.83	1.6	1.25	0.45
P201	J144	J980	1,063.76	18	120	-1,258.00	1.59	0.66	0.62
P245	J288	J1060	2,334.83	24	120	-2,242.63	1.59	1.05	0.45
P245A	J1060	J296	1,197.55	24	120	-2,242.63	1.59	0.54	0.45
P963	J926	J924	1,469.50	8	120	-248.97	1.59	2.37	1.61
P1023	J986	J954	890.63	18	120	1,257.12	1.58	0.55	0.62
P157	J144	J986	1,305.37	18	120	1,257.12	1.58	0.81	0.62
P1089	J1056	J662	1,352.62	12	120	-541.18	1.54	1.28	0.94
P19	J20	J24	459.26	16	120	964.15	1.54	0.31	0.68
P989	J952	J1056	1,247.23	12	120	-541.18	1.54	1.18	0.94
P883	J510	J878	942.7	6	120	134.09	1.52	1.96	2.08
P781	J802	J804	800.54	6	120	132.64	1.51	1.63	2.04
P939	J842	RES9006	1.00	48	120	-8,320.82	1.48	0	0.18
P465	J510	J522	585.53	8	120	-227.51	1.45	0.8	1.37
P1087	J1054	J896	1,828.73	8	120	-224.43	1.43	2.43	1.33
P221	J696	J722	2,686.05	24	120	-2,010.74	1.43	0.98	0.37
P379	J390	J428	1,067.12	6	120	126.02	1.43	1.98	1.86
P17	J24	J10	723.62	16	120	-850.83	1.36	0.39	0.54
P775	J800	J802	619.37	6	120	117.67	1.34	1.01	1.63
P373	J412	J420	297.67	6	120	116.5	1.32	0.48	1.6
P965	J928	J926	1,434.61	8	120	-200.21	1.28	1.55	1.08
P765	J20	J792	507.91	6	120	110.27	1.25	0.74	1.45
P771	J704	J800	958.55	8	120	196.43	1.25	1	1.04
P481	J390	J890	630.9	8	120	190.35	1.21	0.62	0.98
P937	J902	J66	2,551.19	4	120	47.44	1.21	5.59	2.19
P799	J828	J824	698.4	6	120	105.77	1.2	0.94	1.34
P925	J890	J412	616.15	8	120	178.8	1.14	0.54	0.87
P653	J718	J704	2,356.56	16	120	706.77	1.13	0.9	0.38
P397	J436	J420	762.04	6	120	-98.69	1.12	0.9	1.18
P531	J586	J928	1,171.40	8	120	-175.65	1.12	0.99	0.85
P607	J428	J940	769.49	6	120	91.50	1.04	0.79	1.03
P979	J942	J436	760.89	6	120	-91.28	1.04	0.78	1.02
P913	J878	J876	1,235.77	6	120	90.43	1.03	1.24	1
P445	J488	J942	679.76	6	120	-82.95	0.94	0.58	0.86
P977	J940	J938	754.64	6	120	82.33	0.93	0.64	0.84
P801	J826	J828	1,120.40	6	120	-79.04	0.9	0.88	0.78
P1075	J760	J1044	2,563.66	8	120	138.22	0.88	1.39	0.54
P947	J910	J908	1,654.99	4	120	34.43	0.88	2	1.21
P649	J704	J268	318.06	16	120	508.19	0.81	0.07	0.21
P903	J868	J800	732.22	6	120	-62.91	0.71	0.38	0.51
P791	J818	J824	384.84	6	120	-60.46	0.69	0.18	0.48
P899	J864	J792	1,250.51	6	120	-56.18	0.64	0.52	0.42
P757	J770	J866	801.75	6	120	55.84	0.63	0.33	0.41
P783	J808	J804	1,577.35	6	120	-55.67	0.63	0.64	0.41
P301	J340	J934	1,238.56	4	120	-24	0.61	0.75	0.6
P785	J808	J812	792.95	6	120	53.76	0.61	0.3	0.38
P777	J804	J860	1,342.76	6	120	52.43	0.59	0.49	0.37
P969	J932	J488	1,773.44	6	120	-52.21	0.59	0.64	0.36
P267	J36	J52	302.75	8	120	-91.61	0.58	0.08	0.25
P387	J428	J892	654.47	4	120	22.55	0.58	0.36	0.55
P973	J936	J390	1,054.10	6	120	-49.89	0.57	0.35	0.33

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P911	J876	J874	751.77	6	120	49.32	0.56	0.25	0.33
P455	J500	J510	767.28	8	120	-77.82	0.5	0.14	0.19
P769	J770	J868	157.17	6	120	-43.88	0.5	0.04	0.26
P901	J866	J780	912.76	6	120	41.36	0.47	0.22	0.24
P971	J934	J936	945.14	6	120	-39.9	0.45	0.21	0.22
P975	J938	J488	1,364.38	4	120	17.79	0.45	0.49	0.36
P357	J402	J412	332.55	6	120	-37.63	0.43	0.06	0.2
P927	J892	J436	598.2	4	120	16.81	0.43	0.19	0.32
P1099	J1062	J760	3,902.73	12	120	-147.38	0.42	0.33	0.08
P29	J36	J912	1,776.49	6	120	35.81	0.41	0.32	0.18
P25	J36	J914	568.49	6	120	35.22	0.4	0.1	0.18
P807	J822	J826	523.47	6	120	-35.47	0.4	0.09	0.18
P895	J860	J808	1,028.11	6	120	32.34	0.37	0.15	0.15
P447	J496	J500	263.4	6	120	-30.61	0.35	0.04	0.14
P759	J780	J802	425.59	6	120	28.71	0.33	0.05	0.12
P897	J862	J864	1,043.35	6	120	-28.47	0.32	0.12	0.12
P949	J912	J66	712.34	4	120	-12.64	0.32	0.13	0.19
P795	J816	J822	1,406.49	6	120	-27.05	0.31	0.15	0.11
P923	J888	J402	703.71	6	120	-27.63	0.31	0.08	0.11
P753	J792	J770	986.19	6	120	26.27	0.3	0.1	0.1
P909	J874	J930	867.88	6	120	25.29	0.29	0.08	0.09
P919	J884	J496	779.02	6	120	-24.71	0.28	0.07	0.09
P797	J824	J826	710.33	6	120	-23.94	0.27	0.06	0.09
P951	J914	J62	994.95	6	120	23.92	0.27	0.09	0.09
P915	J880	J500	233.27	8	120	-34.12	0.22	0.01	0.04
P809	J824	J822	848.95	6	120	15.42	0.17	0.03	0.04
P921	J886	J884	543.81	6	120	-15.03	0.17	0.02	0.04
P787	J812	J858	736.39	6	120	13.19	0.15	0.02	0.03
P585	J650	J886	1,054.12	6	120	-12.51	0.14	0.03	0.03
P485	J412	J882	180.52	8	120	20.41	0.13	0	0.02
P945	J908	J68	914.89	6	120	10.05	0.11	0.02	0.02
P51	J62	J66	60.89	4	120	3.88	0.1	0	0.02
P789	J812	J818	1,554.84	6	120	8.65	0.1	0.02	0.01
P271	J68	J62	903.73	6	120	-7.34	0.08	0.01	0.01
P303	J336	J340	189.56	6	120	-5.53	0.06	0	0.01
P325	J340	J888	967.88	6	120	-3.82	0.04	0	0
P763	J780	J862	710.16	6	120	-3.96	0.04	0	0
P273	J68	J50	1,193.53	8	120	5.37	0.03	0	0
P587	J336	J650	456.76	6	120	2.22	0.03	0	0
P893	J858	J816	510.04	6	120	-2.83	0.03	0	0
P917	J882	J880	1,315.64	8	120	-4.75	0.03	0	0
P967	J930	J932	717.97	6	120	-1.42	0.02	0	0
P891	J818	J816	490.57	6	120	-1.20	0.01	0	0
P1021	J984	J144	284.05	18	120	0	0	0	0
P1025	J986	J988	2,596.50	8	120	0	0	0	0
P1027	J988	J990	2,420.07	8	120	0	0	0	0
P119	J136	J984	582.00	18	120	0.00	0	0	0
P541	J600	J606	14.01	6	120	0	0	0	0
P647	J714	J712	78.54	16	120	0	0	0	0

APPENDIX K

Hydraulic Model Results - 2025

2025 Annual Average Demand Scenario

Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J132	1.39	17	148.69	57.06
J1044	136.4	14	146.98	57.62
J904	41.36	17	150.79	57.97
J760	0	14	148.33	58.21
J1038	407.52	14	148.64	58.34
J1040	0	15	150.57	58.74
J1034	913.2	13	148.69	58.79
J1062	144.52	12	148.01	58.94
J1036	75.12	16	152.1	58.97
J1042	326.52	12	148.44	59.12
J950	0.08	14	151.98	59.79
J854	0	20.5	158.98	60.01
J108	1.29	14.42	153.13	60.1
J944	158.12	13	152.16	60.3
J1006	9.4	17	156.45	60.42
J948	47.27	18	157.54	60.46
J336	2.18	14.55	154.57	60.67
J428	7.88	13.97	153.98	60.67
J874	15.81	13	153.37	60.82
J1004	0	16	156.53	60.89
J1008	8.52	16	156.53	60.89
J436	15.93	13.34	153.92	60.91
J1046	0	12	152.7	60.97
J886	1.66	14	154.71	60.97
J340	14.67	13.82	154.56	60.98
J942	5.48	12.7	153.62	61.06
J1010	8.32	15.33	156.53	61.18
J940	6.03	12.46	153.69	61.19
J932	33.41	12	153.26	61.21
J586	0	15	156.39	61.26
J938	42.46	12	153.45	61.29
J1014	0	15	156.53	61.33
J936	6.57	13.05	154.58	61.33
J876	27.05	12	153.57	61.34
J650	9.69	13	154.59	61.35
J908	16.04	15	156.66	61.38
J884	6.37	13.02	154.79	61.43
J892	3.78	12	153.94	61.5
J902	70.99	14	156.1	61.57
J926	32.08	14	156.13	61.59
J930	17.58	11.1	153.27	61.61
J420	11.71	12.15	154.36	61.62
J990	43	14	156.23	61.63
J894	1.61	13	155.35	61.68
J878	28.72	12	154.37	61.69
J898	21.35	10	152.37	61.69
J988	0	14	156.38	61.69
J488	31.93	11	153.4	61.7
J1028	5.62	14	156.45	61.73
J220	0.44	14	156.53	61.76
J56	11.54	15	157.59	61.78
J824	35.41	14	156.59	61.79
J890	7.59	12	154.61	61.79
J882	16.55	12	154.62	61.8
J906	13.16	14	156.71	61.84
J818	46.26	13.73	156.48	61.85
J734	7.1	16	158.87	61.9
J994	0	13.61	156.52	61.92
J496	3.88	12	154.93	61.93
J966	1.8	14	156.99	61.96
J816	15.14	13.39	156.48	62
J828	12.84	14	157.09	62

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J244	0	13.41	156.52	62.01
J962	1.8	14	157.13	62.02
J24	0	15	158.17	62.03
J288	13.86	14	157.17	62.03
J292	3.39	14	157.16	62.03
J872	26.61	14	157.16	62.03
J20	15.37	15	158.17	62.04
J1060	0	14	157.3	62.09
J870	15.96	14	157.29	62.09
J296	6.71	14	157.38	62.12
J864	18.23	14	157.48	62.17
J510	10.26	12	155.5	62.18
J278	0	13	156.52	62.19
J738	18.18	13	156.52	62.19
J822	15.68	13	156.58	62.21
J826	12.91	13.03	156.63	62.22
J952	17.95	13	156.59	62.22
J770	9.42	14	157.64	62.24
J868	12.52	14	157.65	62.24
J1054	0	11	154.67	62.25
J92	72.83	14	157.67	62.25
J792	18.31	14	157.74	62.28
J68	7.91	13	156.75	62.29
J1052	0	10	153.94	62.37
J30	17.02	14	158.16	62.47
J682	0	8	152.16	62.47
J718	15.91	13.94	158.26	62.53
J900	15.44	14	158.33	62.54
J1048	0	9	153.35	62.55
J600	0	12	156.39	62.56
J606	0	12	156.39	62.56
J1030	5.56	12	156.42	62.58
J1026	9.76	12	156.46	62.59
J1022	3.12	12	156.48	62.6
J812	21	12	156.48	62.6
J858	10.54	12	156.48	62.6
J1018	3.02	12	156.49	62.61
J44	0.08	14	158.51	62.61
J280	4.75	12	156.53	62.63
J918	6.17	12	156.55	62.63
J954	0	12	156.54	62.63
J986	0	12	156.55	62.63
J522	2.66	12	156.56	62.64
J964	0	12.35	156.99	62.67
J722	11.36	13.53	158.26	62.71
J804	16.15	12	156.78	62.73
J888	15.67	9.65	154.55	62.79
J62	8.35	11.66	156.67	62.83
J916	41.55	11.65	156.68	62.84
J1020	0.24	11.29	156.49	62.92
J928	16.15	11	156.24	62.93
J866	9.52	12	157.5	63.05
J1050	0	8	153.55	63.06
J958	0	12	157.54	63.06
J144	0.58	11	156.56	63.07
J880	19.32	9.35	154.91	63.07
J934	10.46	9	154.56	63.07
J402	6.58	9	154.57	63.08
J412	2.81	9	154.59	63.08
J896	9.45	9.27	154.97	63.13
J910	22.09	10.74	156.5	63.16
J52	1.04	11	156.88	63.21
J500	8.61	9	154.99	63.26
J842	0	13	159.1	63.31

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J688	6.21	11.5	157.7	63.35
J390	8.92	8.39	154.64	63.37
J920	17.51	10	156.31	63.4
J740	1.04	10	156.52	63.49
J862	16.12	10.9	157.42	63.49
J808	22.54	10	156.56	63.5
J980	0	10	156.57	63.51
J1056	0	10	156.62	63.53
J860	13.21	10	156.61	63.53
J982	0.96	9.74	156.37	63.53
J36	13.54	10.2	156.83	63.54
J946	12.62	10	156.65	63.54
J1016	0.24	9.82	156.49	63.55
J1024	0.84	9.38	156.48	63.74
J662	55.25	9.5	156.65	63.76
J10	1.87	11	158.25	63.8
J802	9.05	10	157.39	63.86
J780	10.93	10	157.41	63.87
J960	3.94	10	157.54	63.93
J66	25.45	9	156.58	63.95
J912	31.88	9	156.58	63.95
J922	33.59	8.5	156.17	63.98
J914	7.44	9	156.75	64.02
J704	1.41	10	158.09	64.17
J602	0	8	156.39	64.3
J736	0	8	156.52	64.35
J136	0	8	156.56	64.37
J268	0	9.5	158.08	64.38
J696	0	9.5	158.09	64.38
J974	0	8	156.69	64.43
J800	10.43	8.98	157.75	64.46
J714	3.33	9	158.02	64.57
J924	49.61	7	156.12	64.61
J42	0	9	158.25	64.67
J712	0	8.5	158.02	64.79
J984	1.8	6.84	156.56	64.87
J50	26.01	7	156.87	64.94
J976	1.8	6	156.69	65.29
J978	0	5	156.86	65.8
J750	1.68	4	156.64	66.14

2025 Annual Average Demand Scenario

Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P855	J842	J854	37.35	20	120	3,932.44	4.02	0.12	3.08
P261	J854	J108	2,146.32	16	120	2,047.39	3.27	5.86	2.73
P255	J108	J1036	1,204.92	16	120	1,090.08	1.74	1.02	0.85
P465	J510	J522	585.53	8	120	-264.4	1.69	1.06	1.8
P803	J688	J828	257.8	6	120	144.01	1.63	0.61	2.38
P1067	J1036	J1040	2,066.23	16	120	1,014.96	1.62	1.54	0.74
P1071	J1040	J1038	2,592.09	16	120	1,014.96	1.62	1.93	0.74
P645	J268	J714	93.13	16	120	962.35	1.54	0.06	0.67
P105	J108	J950	1,726.29	16	120	956.03	1.53	1.15	0.67
P987	J950	J904	1,776.99	16	120	955.94	1.53	1.18	0.67
P281	J92	J902	485.88	4	120	58.42	1.49	1.57	3.22
P941	J904	J1034	3,432.11	16	120	914.59	1.46	2.11	0.61
P625	J30	J56	736.23	12	120	487.22	1.38	0.57	0.78
P743	J734	J854	357.9	24	120	-1,885.04	1.34	0.12	0.32
P637	J268	J696	7.13	16	120	-790.04	1.26	0	0.47
P933	J898	J896	1,856.97	6	120	-108.19	1.23	2.6	1.4
P931	J896	J894	398.95	8	120	-188.91	1.21	0.39	0.97
P883	J510	J878	942.7	6	120	99.75	1.13	1.14	1.2
P91	J92	J44	1,212.87	8	120	-157.7	1.01	0.84	0.69
P455	J500	J510	767.28	8	120	-154.38	0.99	0.51	0.67
P51	J62	J66	60.89	4	120	38.6	0.99	0.09	1.5
P981	J944	J898	221.21	6	120	-86.84	0.99	0.21	0.93
P1069	J1038	J1042	696.24	16	120	607.44	0.97	0.2	0.29
P905	J870	J56	477.99	8	120	-149.24	0.95	0.3	0.63
P657	J722	J734	3,555.33	24	120	-1,332.00	0.94	0.61	0.17
P765	J20	J792	507.91	6	120	82.78	0.94	0.43	0.85
P1019	J980	J982	541.74	12	120	326.64	0.93	0.2	0.37
P237	J292	J288	27.24	18	120	-737.01	0.93	0.01	0.23
P907	J872	J56	1,171.38	12	120	-326.45	0.93	0.43	0.37
P1095	J894	J982	2,754.13	12	120	-325.68	0.92	1.01	0.37
P373	J412	J420	297.67	6	120	78.54	0.89	0.23	0.77
P781	J802	J804	800.54	6	120	77.68	0.88	0.61	0.76
P1075	J760	J1044	2,563.66	8	120	136.4	0.87	1.36	0.53
P673	J44	J734	1,527.00	16	120	-545.94	0.87	0.36	0.24
P929	J894	J390	1,364.47	8	120	135.16	0.86	0.71	0.52
P43	J52	J872	867.21	12	120	-299.83	0.85	0.27	0.32
P661	J718	J722	17.96	16	120	-530.59	0.85	0	0.22
P799	J828	J824	698.40	6	120	75.13	0.85	0.5	0.71
P953	J916	J870	1,215.97	8	120	-133.27	0.85	0.62	0.51
P1077	J944	J1046	838.18	6	120	-71.28	0.81	0.54	0.65
P1079	J1046	J1048	998.79	6	120	-71.28	0.81	0.65	0.65
P1081	J1048	J1050	305.64	6	120	-71.28	0.81	0.2	0.65
P1083	J1050	J1052	615.33	6	120	-71.28	0.81	0.4	0.65
P1085	J1052	J1054	1,132.42	6	120	-71.28	0.81	0.73	0.65
P913	J878	J876	1,235.77	6	120	71.03	0.81	0.79	0.64
P21	J24	J30	21.64	16	120	504.25	0.8	0	0.2
P1103	J292	J522	2,209.04	12	120	277.15	0.79	0.6	0.27
P379	J390	J428	1,067.12	6	120	69.47	0.79	0.66	0.62
P775	J800	J802	619.37	6	120	67.76	0.77	0.36	0.59
P397	J436	J420	762.04	6	120	-66.83	0.76	0.44	0.57
P771	J704	J800	958.55	8	120	109.42	0.7	0.34	0.35
P939	J842	RES9006	1.00	48	120	-3,932.44	0.7	0	0.05
P277	J92	J906	1,289.97	4	120	26.44	0.68	0.96	0.74
P621	J714	J688	3,397.39	24	120	959.01	0.68	0.32	0.09
P915	J880	J500	233.27	8	120	-105.4	0.67	0.08	0.33
P801	J826	J828	1,120.40	6	120	-56.03	0.64	0.46	0.41
P41	J50	J52	72.58	12	120	-223.22	0.63	0.01	0.18
P935	J900	J44	1,401.10	16	120	-388.16	0.62	0.18	0.13
P979	J942	J436	760.89	6	120	-54.76	0.62	0.3	0.4
P607	J428	J940	769.49	6	120	53.95	0.61	0.3	0.39
P17	J24	J10	723.62	16	120	-370.85	0.59	0.08	0.12
P37	J10	J900	707.05	16	120	-372.72	0.59	0.08	0.12

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P955	J918	J916	499.12	8	120	-91.72	0.59	0.13	0.25
P999	J962	J292	335.77	18	120	-456.48	0.58	0.03	0.1
P1001	J964	J962	1,406.37	18	120	-454.68	0.57	0.13	0.09
P1011	J974	J978	1,770.87	18	120	-452.88	0.57	0.17	0.09
P1015	J978	J964	1,480.70	18	120	-452.88	0.57	0.14	0.09
P1017	J980	J974	1,319.38	18	120	-451.08	0.57	0.12	0.09
P985	J948	J688	2,403.23	24	120	-808.80	0.57	0.16	0.07
P221	J696	J722	2,686.05	24	120	-790.04	0.56	0.17	0.06
P445	J488	J942	679.76	6	120	-49.28	0.56	0.22	0.33
P917	J882	J880	1,315.64	8	120	-86.08	0.55	0.3	0.23
P957	J920	J918	1,067.97	8	120	-85.55	0.55	0.24	0.22
P249	J296	J948	2,771.23	24	120	-757.59	0.54	0.17	0.06
P977	J940	J938	754.64	6	120	47.92	0.54	0.23	0.31
P245	J288	J1060	2,334.83	24	120	-750.88	0.53	0.14	0.06
P245A	J1060	J296	1,197.55	24	120	-750.88	0.53	0.07	0.06
P791	J818	J824	384.84	6	120	-46.19	0.52	0.11	0.29
P911	J876	J874	751.77	6	120	43.99	0.5	0.2	0.26
P267	J36	J52	302.75	8	120	-75.57	0.48	0.05	0.18
P447	J496	J500	263.4	6	120	-40.36	0.46	0.06	0.23
P1073	J1042	J760	1,490.48	16	120	280.92	0.45	0.1	0.07
P1087	J1054	J896	1,828.73	8	120	-71.28	0.45	0.29	0.16
P653	J718	J704	2,356.56	16	120	283.13	0.45	0.16	0.07
P485	J412	J882	180.52	8	120	-69.53	0.44	0.03	0.15
P899	J864	J792	1,250.51	6	120	-38.56	0.44	0.26	0.21
P959	J922	J920	969.94	8	120	-68.04	0.43	0.14	0.15
P1099	J1062	J760	3,902.73	12	120	-144.52	0.41	0.32	0.08
P919	J884	J496	779.02	6	120	-36.48	0.41	0.15	0.19
P39	J662	J50	2,805.19	12	120	-140.8	0.4	0.22	0.08
P531	J586	J928	1,171.40	8	120	63.4	0.4	0.15	0.13
P715	J522	J586	1,316.00	8	120	63.40	0.4	0.17	0.13
P757	J770	J866	801.75	6	120	35.22	0.4	0.14	0.18
P651	J20	J718	1,713.18	16	120	-231.55	0.37	0.08	0.05
P273	J68	J50	1,193.53	8	120	-56.41	0.36	0.12	0.1
P29	J36	J912	1,776.49	6	120	31.29	0.36	0.25	0.14
P783	J808	J804	1,577.35	6	120	-31.37	0.36	0.22	0.14
P25	J36	J914	568.49	6	120	30.74	0.35	0.08	0.14
P903	J868	J800	732.22	6	120	-31.23	0.35	0.1	0.14
P777	J804	J860	1,342.76	6	120	30.16	0.34	0.18	0.13
P921	J886	J884	543.81	6	120	-30.11	0.34	0.07	0.13
P943	J906	J910	1,002.15	4	120	13.28	0.34	0.21	0.21
P585	J650	J886	1,054.12	6	120	-28.45	0.32	0.12	0.12
P909	J874	J930	867.88	6	120	28.18	0.32	0.1	0.12
P937	J902	J66	2,551.19	4	120	-12.57	0.32	0.48	0.19
P965	J928	J926	1,434.61	8	120	47.24	0.3	0.11	0.07
P753	J792	J770	986.19	6	120	25.92	0.29	0.1	0.1
P785	J808	J812	792.95	6	120	25.78	0.29	0.08	0.1
P807	J822	J826	523.47	6	120	-25.67	0.29	0.05	0.1
P901	J866	J780	912.76	6	120	25.69	0.29	0.09	0.1
P945	J908	J68	914.89	6	120	-24.85	0.28	0.08	0.09
P1025	J986	J988	2,596.50	8	120	43	0.27	0.16	0.06
P1027	J988	J990	2,420.07	8	120	43	0.27	0.15	0.06
P271	J68	J62	903.73	6	120	23.65	0.27	0.08	0.08
P649	J704	J268	318.06	16	120	172.3	0.27	0.01	0.03
P951	J914	J62	994.95	6	120	23.3	0.26	0.08	0.08
P969	J932	J488	1,773.44	6	120	-22.81	0.26	0.14	0.08
P1041	J1004	J1006	731.29	4	120	9.4	0.24	0.08	0.11
P481	J390	J890	630.9	8	120	38.12	0.24	0.03	0.05
P795	J816	J822	1,406.49	6	120	-20.96	0.24	0.09	0.07
P897	J862	J864	1,043.35	6	120	-20.33	0.23	0.07	0.06
P669	J522	J952	1,193.35	10	120	-53.31	0.22	0.04	0.03
P759	J780	J802	425.59	6	120	18.97	0.22	0.02	0.06
P947	J910	J908	1,654.99	4	120	-8.8	0.22	0.16	0.1
P961	J924	J922	1,210.78	8	120	-34.45	0.22	0.05	0.04
P19	J20	J24	459.26	16	120	133.4	0.21	0.01	0.02

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P357	J402	J412	332.55	6	120	-18.71	0.21	0.02	0.05
P587	J336	J650	456.76	6	120	-18.77	0.21	0.02	0.05
P769	J770	J868	157.17	6	120	-18.71	0.21	0.01	0.05
P973	J936	J390	1,054.10	6	120	-18.64	0.21	0.06	0.05
P1089	J1056	J662	1,352.62	12	120	-71.26	0.2	0.03	0.02
P387	J428	J892	654.47	4	120	7.65	0.2	0.05	0.07
P797	J824	J826	710.33	6	120	-17.45	0.2	0.03	0.05
P989	J952	J1056	1,247.23	12	120	-71.26	0.2	0.03	0.02
P303	J336	J340	189.56	6	120	16.59	0.19	0.01	0.04
P895	J860	J808	1,028.11	6	120	16.95	0.19	0.05	0.05
P925	J890	J412	616.15	8	120	30.53	0.19	0.02	0.03
P1049	J1014	J1016	1,341.19	8	120	28.4	0.18	0.04	0.03
P1055	J1016	J1022	776.2	8	120	24.9	0.16	0.02	0.02
P201	J144	J980	1,063.76	18	120	-124.44	0.16	0.01	0.01
P595	J662	J946	206.15	6	120	14.3	0.16	0.01	0.03
P157	J144	J986	1,305.37	18	120	122.06	0.15	0.01	0.01
P1063	J1026	J1030	826.4	4	120	5.56	0.14	0.03	0.04
P923	J888	J402	703.71	6	120	-12.13	0.14	0.02	0.02
P971	J934	J936	945.14	6	120	-12.07	0.14	0.02	0.02
P975	J938	J488	1,364.38	4	120	5.46	0.14	0.05	0.04
P1059	J1022	J1026	1,264.80	8	120	20.94	0.13	0.02	0.02
P991	J954	J280	1,220.74	16	120	79.06	0.13	0.01	0.01
P1047	J1014	J280	272.16	16	120	-74.31	0.12	0	0.01
P809	J824	J822	848.95	6	120	10.97	0.12	0.02	0.02
P967	J930	J932	717.97	6	120	10.6	0.12	0.01	0.02
P1023	J986	J954	890.63	18	120	79.06	0.1	0	0
P927	J892	J436	598.2	4	120	3.87	0.1	0.01	0.02
P963	J926	J924	1,469.50	8	120	15.16	0.1	0.01	0.01
P1043	J1008	J1014	1,128.33	16	120	-45.91	0.07	0	0
P893	J858	J816	510.04	6	120	-5.84	0.07	0	0.01
P1029	J994	J244	257.79	12	120	19.22	0.05	0	0
P1039	J1004	J1008	797.74	16	120	-29.07	0.05	0	0
P1045	J1008	J1010	575.62	8	120	8.32	0.05	0	0
P195	J220	J278	2,626.00	12	120	19.22	0.05	0.01	0
P197	J278	J994	1,557.06	12	120	19.22	0.05	0	0
P679	J738	J740	489.39	12	120	-18.18	0.05	0	0
P763	J780	J862	710.16	6	120	-4.2	0.05	0	0
P787	J812	J858	736.39	6	120	4.7	0.05	0	0
P1061	J1026	J1028	892.47	8	120	5.62	0.04	0	0
P301	J340	J934	1,238.56	4	120	-1.61	0.04	0.01	0
P325	J340	J888	967.88	6	120	3.54	0.04	0	0
P183	J220	J1004	1,057.17	16	120	-19.67	0.03	0	0
P677	J736	J244	2,947.41	16	120	-19.22	0.03	0	0
P681	J740	J736	969.74	16	120	-19.22	0.03	0	0
P995	J948	J958	2,685.52	8	120	3.94	0.03	0	0
P997	J958	J960	2,691.48	8	120	3.94	0.03	0	0
P1051	J1016	J1018	348.96	8	120	3.26	0.02	0	0
P1057	J1022	J1024	703.14	4	120	0.84	0.02	0	0
P983	J946	J750	1,547.44	6	120	1.68	0.02	0	0
P1003	J964	J966	338.55	8	120	1.8	0.01	0	0
P1013	J974	J976	323.36	8	120	1.8	0.01	0	0
P1053	J1018	J1020	338.58	4	120	0.24	0.01	0	0
P1065	J1034	J132	1,540.73	10	120	1.39	0.01	0	0
P949	J912	J66	712.34	4	120	-0.58	0.01	0	0
P1021	J984	J144	284.05	18	120	-1.8	0	0	0
P119	J136	J984	582	18	120	0	0	0	0
P33	J10	J42	903.69	8	120	0	0	0	0
P537	J600	J602	245	8	120	0	0	0	0
P541	J600	J606	14.01	6	120	0	0	0	0
P543	J586	J600	659.76	8	120	0	0	0	0
P603	J682	J944	516.79	6	120	0	0	0	0
P647	J714	J712	78.54	16	120	0	0	0	0
P789	J812	J818	1,554.84	6	120	0.08	0	0	0
P891	J818	J816	490.57	6	120	0.00	0	0	0

2025 Max Month Peak Hour Demand Scenario

Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J738	1,247.64	13	98.23	36.93
J944	240.34	13	99.75	37.59
J682	289	8	95.29	37.82
J740	1.58	10	100.4	39.17
J244	0	13.41	104.68	39.55
J898	32.45	10	101.86	39.8
J750	460.55	4	96.21	39.95
J994	0	13.61	105.82	39.95
J1046	0	12	104.28	39.98
J736	0	8	101.46	40.5
J278	0	13	112.74	43.22
J132	626.11	17	117.13	43.39
J1048	0	9	109.68	43.62
J1050	0	8	111.33	44.77
J1052	0	10	114.65	45.35
J1006	14.29	17	125.37	46.96
J1034	1,388.06	13	121.75	47.12
J1004	0	16	125.55	47.47
J874	24.03	13	122.55	47.47
J428	11.97	13.97	123.7	47.54
J1054	0	11	120.77	47.57
J436	24.22	13.34	123.59	47.77
J932	50.79	12	122.26	47.77
J942	8.33	12.7	122.96	47.78
J220	0.68	14	124.39	47.83
J1008	12.95	16	126.44	47.85
J336	3.31	14.55	124.97	47.85
J938	64.54	12	122.58	47.92
J940	9.17	12.46	123.07	47.93
J876	41.11	12	123.03	48.11
J1010	12.65	15.33	126.44	48.14
J340	22.29	13.82	124.95	48.15
J930	26.71	11.1	122.3	48.18
J886	2.52	14	125.39	48.26
J488	48.53	11	122.5	48.31
J892	5.75	12	123.61	48.36
J936	9.99	13.05	124.97	48.5
J650	14.72	13	125.05	48.55
J420	17.8	12.15	124.52	48.69
J884	9.68	13.02	125.58	48.77
J1014	0	15	127.75	48.85
J878	43.66	12	124.85	48.9
J890	11.54	12	125.03	48.97
J882	25.16	12	125.09	49
J894	2.45	13	126.25	49.07
J1044	207.33	14	127.31	49.1
J1028	8.54	14	127.58	49.21
J904	62.86	17	130.84	49.33
J896	14.36	9.27	123.21	49.37
J496	5.9	12	125.95	49.38
J600	0	12	127.02	49.84
J606	0	12	127.02	49.84
J888	23.81	9.65	124.94	49.96
J586	0	15	130.31	49.97
J510	15.6	12	127.43	50.01
J1030	8.45	12	127.51	50.05
J990	65.36	14	129.55	50.07
J1026	14.84	12	127.58	50.08
J1022	4.74	12	127.63	50.1
J1018	4.59	12	127.66	50.12
J988	0	14	129.88	50.21
J934	15.9	9	124.94	50.24

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J402	10	9	124.97	50.25
J412	4.27	9	125.01	50.27
J280	7.22	12	128.08	50.3
J760	0	14	130.25	50.37
J1020	0.36	11.29	127.66	50.43
J880	29.37	9.35	125.9	50.5
J390	13.56	8.39	125.06	50.55
J1038	619.43	14	130.91	50.66
J500	13.09	9	126.11	50.74
J1062	219.68	12	129.56	50.94
J954	0	12	129.6	50.96
J602	458	8	125.8	51.04
J1016	0.36	9.82	127.66	51.06
J946	19.19	10	127.87	51.07
J522	4.05	12	130.01	51.13
J952	27.28	13	131.2	51.21
J986	0	12	130.23	51.23
J1024	1.28	9.38	127.62	51.24
J1042	496.31	12	130.48	51.34
J1040	0	15	135.1	52.04
J144	0.88	11	131.23	52.1
J982	1.46	9.74	131.09	52.58
J1056	0	10	131.78	52.77
J950	0.12	14	135.82	52.79
J980	0	10	132.05	52.88
J1036	114.18	16	138.44	53.05
J662	83.97	9.5	132.42	53.26
J136	0	8	131.23	53.39
J984	2.74	6.84	131.23	53.9
J926	48.76	14	138.44	53.92
J908	24.39	15	139.71	54.04
J966	2.74	14	139.88	54.54
J108	1.96	14.42	140.66	54.7
J974	0	8	134.3	54.73
J68	12.02	13	139.71	54.9
J928	24.55	11	138.39	55.2
J964	0	12.35	139.88	55.26
J62	12.69	11.66	139.7	55.48
J962	2.74	14	142.29	55.59
J976	2.74	6	134.3	55.59
J948	71.85	18	146.52	55.69
J292	5.15	14	142.87	55.84
J872	40.45	14	142.89	55.85
J288	21.07	14	142.92	55.86
J52	1.59	11	139.93	55.87
J902	107.9	14	143.01	55.9
J36	20.58	10.2	139.86	56.18
J1060	0	14	143.93	56.3
J910	33.58	10.74	140.83	56.36
J906	20	14	144.09	56.37
J918	9.38	12	142.21	56.42
J912	48.45	9	139.54	56.56
J66	38.68	9	139.68	56.62
J920	26.61	10	140.68	56.62
J296	10.21	14	144.71	56.64
J914	11.31	9	139.77	56.66
J922	51.06	8.5	139.56	56.79
J916	63.16	11.65	142.99	56.91
J924	75.41	7	138.74	57.08
J870	24.27	14	145.87	57.14
J56	17.54	15	147.17	57.27
J978	0	5	137.34	57.34
J824	53.83	14	146.36	57.35
J818	70.32	13.73	146.23	57.41

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J50	39.53	7	139.72	57.51
J816	23.01	13.39	146.23	57.56
J828	19.52	14	147.16	57.7
J822	23.84	13	146.33	57.77
J826	19.63	13.03	146.41	57.79
J858	16.02	12	146.23	58.16
J812	31.91	12	146.29	58.19
J958	0	12	146.52	58.29
J804	24.54	12	147.6	58.76
J864	27.71	14	149.94	58.9
J770	14.31	14	150.36	59.08
J868	19.03	14	150.38	59.09
J960	5.99	10	146.51	59.15
J24	0	15	151.64	59.21
J792	27.83	14	150.65	59.21
J688	9.43	11.5	148.18	59.22
J808	34.25	10	146.77	59.26
J20	23.36	15	151.8	59.28
J860	20.09	10	146.98	59.36
J92	110.7	14	151.31	59.49
J30	25.88	14	151.61	59.63
J42	500	9	146.71	59.67
J866	14.48	12	149.97	59.78
J854	0	20.5	158.51	59.8
J718	24.18	13.94	152.69	60.12
J862	24.51	10.9	149.73	60.15
J900	23.47	14	152.88	60.18
J722	17.27	13.53	152.72	60.31
J802	13.75	10	149.59	60.49
J780	16.61	10	149.7	60.53
J44	0.12	14	154.66	60.95
J10	2.85	11	152.01	61.1
J704	2.15	10	151.46	61.3
J734	10.8	16	157.58	61.35
J800	15.85	8.98	150.6	61.36
J714	5.07	9	150.83	61.46
J268	0	9.5	151.36	61.47
J696	0	9.5	151.38	61.48
J712	0	8.5	150.83	61.67
J842	0	13	159.1	63.31

2025 Max Month Peak Hour Demand Scenario

Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P855	J842	J854	37.35	20	120	9,526.31	9.73	0.59	15.87
P261	J854	J108	2,146.32	16	120	3,736.05	5.96	17.84	8.31
P595	J662	J946	206.15	6	120	479.73	5.44	4.55	22.07
P983	J946	J750	1,547.44	6	120	460.55	5.23	31.67	20.46
P645	J268	J714	93.13	16	120	3,032.03	4.84	0.53	5.65
P625	J30	J56	736.23	12	120	1,473.21	4.18	4.44	6.02
P743	J734	J854	357.9	24	120	-5,790.26	4.11	0.93	2.6
P933	J898	J896	1,856.97	6	120	-337.36	3.83	21.35	11.5
P637	J268	J696	7.13	16	120	-2,377.90	3.79	0.03	3.6
P931	J896	J894	398.95	8	120	-576.15	3.68	3.04	7.63
P281	J92	J902	485.88	4	120	143.77	3.67	8.3	17.07
P1029	J994	J244	257.79	12	120	1,249.22	3.54	1.14	4.44
P195	J220	J278	2,626.00	12	120	1,249.22	3.54	11.66	4.44
P197	J278	J994	1,557.06	12	120	1,249.22	3.54	6.91	4.44
P679	J738	J740	489.39	12	120	-1,247.64	3.54	2.17	4.43
P531	J586	J928	1,171.40	8	120	-545.37	3.48	8.07	6.89
P981	J944	J898	221.21	6	120	-304.91	3.46	2.11	9.53
P1101	J928	J1060	825.47	8	120	-537.72	3.43	5.54	6.71
P105	J108	J950	1,726.29	16	120	2,077.16	3.31	4.84	2.8
P987	J950	J904	1,776.99	16	120	2,077.03	3.31	4.98	2.8
P603	J682	J944	516.79	6	120	-289.00	3.28	4.46	8.63
P941	J904	J1034	3,432.11	16	120	2,014.17	3.21	9.09	2.65
P33	J10	J42	903.69	8	120	500	3.19	5.3	5.87
P907	J872	J56	1,171.38	12	120	-1,124.82	3.19	4.28	3.66
P43	J52	J872	867.21	12	120	-1,084.37	3.08	2.96	3.42
P537	J600	J602	245.00	8	120	458	2.92	1.22	4.99
P543	J586	J600	659.76	8	120	458	2.92	3.29	4.99
P657	J722	J734	3,555.33	24	120	-4,091.44	2.9	4.85	1.37
P41	J50	J52	72.58	12	120	-993.58	2.82	0.21	2.9
P237	J292	J288	27.24	18	120	-2,181.40	2.75	0.05	1.73
P1001	J964	J962	1,406.37	18	120	-2,173.52	2.74	2.42	1.72
P1011	J974	J978	1,770.87	18	120	-2,170.78	2.74	3.03	1.71
P1015	J978	J964	1,480.70	18	120	-2,170.78	2.74	2.54	1.71
P999	J962	J292	335.77	18	120	-2,176.25	2.74	0.58	1.72
P1017	J980	J974	1,319.38	18	120	-2,168.05	2.73	2.26	1.71
P465	J510	J522	585.53	8	120	-428.48	2.73	2.58	4.41
P661	J718	J722	17.96	16	120	-1,696.26	2.71	0.03	1.93
P673	J44	J734	1,527.00	16	120	-1,688.03	2.69	2.92	1.91
P39	J662	J50	2,805.19	12	120	-936.14	2.66	7.3	2.6
P255	J108	J1036	1,204.92	16	120	1,656.93	2.64	2.22	1.84
P1065	J1034	J132	1,540.73	10	120	626.11	2.56	4.62	3
P1077	J944	J1046	838.18	6	120	-224.43	2.55	4.53	5.4
P1079	J1046	J1048	998.79	6	120	-224.43	2.55	5.4	5.4
P1081	J1048	J1050	305.64	6	120	-224.43	2.55	1.65	5.4
P1083	J1050	J1052	615.33	6	120	-224.43	2.55	3.33	5.4
P1085	J1052	J1054	1,132.42	6	120	-224.43	2.55	6.12	5.4
P1067	J1036	J1040	2,066.23	16	120	1,542.75	2.46	3.34	1.62
P1071	J1040	J1038	2,592.09	16	120	1,542.75	2.46	4.19	1.62
P21	J24	J30	21.64	16	120	1,499.09	2.39	0.03	1.53
P935	J900	J44	1,401.10	16	120	-1,354.71	2.16	1.78	1.27
P1019	J980	J982	541.74	12	120	758.9	2.15	0.96	1.76
P1095	J894	J982	2,754.13	12	120	-757.44	2.15	4.84	1.76
P621	J714	J688	3,397.39	24	120	3,026.97	2.15	2.65	0.78
P803	J688	J828	257.8	6	120	189.29	2.15	1.02	3.94
P991	J954	J280	1,220.74	16	120	1,340.17	2.14	1.52	1.25
P1047	J1014	J280	272.16	16	120	-1,332.95	2.13	0.34	1.23
P91	J92	J44	1,212.87	8	120	-333.2	2.13	3.36	2.77
P37	J10	J900	707.05	16	120	-1,331.24	2.12	0.87	1.23
P905	J870	J56	477.99	8	120	-330.85	2.11	1.31	2.73
P1043	J1008	J1014	1,128.33	16	120	-1,289.78	2.06	1.31	1.16
P1039	J1004	J1008	797.74	16	120	-1,264.18	2.02	0.89	1.12
P277	J92	J906	1,289.97	4	120	78.73	2.01	7.22	5.6

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P985	J948	J688	2,403.23	24	120	-2,828.24	2.01	1.66	0.69
P183	J220	J1004	1,057.17	16	120	-1,249.90	1.99	1.16	1.09
P677	J736	J244	2,947.41	16	120	-1,249.22	1.99	3.22	1.09
P681	J740	J736	969.74	16	120	-1,249.22	1.99	1.06	1.09
P953	J916	J870	1,215.97	8	120	-306.58	1.96	2.88	2.37
P249	J296	J948	2,771.23	24	120	-2,750.41	1.95	1.81	0.65
P245A	J1060	J296	1,197.55	24	120	-2,740.20	1.94	0.78	0.65
P201	J144	J980	1,063.76	18	120	-1,409.15	1.78	0.82	0.77
P157	J144	J986	1,305.37	18	120	1,405.53	1.77	1	0.77
P883	J510	J878	942.7	6	120	155.15	1.76	2.57	2.73
P1023	J986	J954	890.63	18	120	1,340.17	1.69	0.62	0.7
P221	J696	J722	2,686.05	24	120	-2,377.90	1.69	1.34	0.5
P939	J842	RES9006	1.00	48	120	-9,526.31	1.69	0	0.23
P781	J802	J804	800.54	6	120	147.67	1.68	1.99	2.49
P455	J500	J510	767.28	8	120	-257.73	1.65	1.32	1.72
P765	J20	J792	507.91	6	120	140.58	1.6	1.15	2.27
P245	J288	J1060	2,334.83	24	120	-2,202.48	1.56	1.01	0.43
P955	J918	J916	499.12	8	120	-243.42	1.55	0.77	1.55
P943	J906	J910	1,002.15	4	120	58.73	1.5	3.26	3.25
P957	J920	J918	1,067.97	8	120	-234.04	1.49	1.54	1.44
P1069	J1038	J1042	696.24	16	120	923.32	1.47	0.43	0.62
P1087	J1054	J896	1,828.73	8	120	-224.43	1.43	2.43	1.33
P669	J522	J952	1,193.35	10	120	-345.15	1.41	1.19	1
P373	J412	J420	297.67	6	120	118.41	1.34	0.49	1.65
P653	J718	J704	2,356.56	16	120	837.45	1.34	1.23	0.52
P651	J20	J718	1,713.18	16	120	-834.63	1.33	0.89	0.52
P775	J800	J802	619.37	6	120	117.55	1.33	1.01	1.63
P1075	J760	J1044	2,563.66	8	120	207.33	1.32	2.95	1.15
P17	J24	J10	723.62	16	120	-828.39	1.32	0.37	0.51
P959	J922	J920	969.94	8	120	-207.43	1.32	1.12	1.15
P913	J878	J876	1,235.77	6	120	111.49	1.27	1.83	1.48
P379	J390	J428	1,067.12	6	120	103.05	1.17	1.36	1.28
P771	J704	J800	958.55	8	120	181.16	1.16	0.86	0.9
P397	J436	J420	762.04	6	120	-100.61	1.14	0.93	1.22
P929	J894	J390	1,364.47	8	120	178.85	1.14	1.19	0.87
P915	J880	J500	233.27	8	120	-177.75	1.13	0.2	0.86
P799	J828	J824	698.4	6	120	97.07	1.1	0.8	1.14
P19	J20	J24	459.26	16	120	670.70	1.07	0.16	0.35
P1089	J1056	J662	1,352.62	12	120	-372.44	1.06	0.64	0.47
P989	J952	J1056	1,247.23	12	120	-372.44	1.06	0.59	0.47
P649	J704	J268	318.06	16	120	654.13	1.04	0.1	0.33
P961	J924	J922	1,210.78	8	120	-156.37	1	0.83	0.68
P917	J882	J880	1,315.64	8	120	-148.38	0.95	0.81	0.62
P937	J902	J66	2,551.19	4	120	35.86	0.92	3.33	1.3
P979	J942	J436	760.89	6	120	-81.22	0.92	0.63	0.82
P607	J428	J940	769.49	6	120	80.50	0.91	0.62	0.81
P445	J488	J942	679.76	6	120	-72.89	0.83	0.46	0.67
P801	J826	J828	1,120.40	6	120	-72.7	0.82	0.75	0.67
P977	J940	J938	754.64	6	120	71.33	0.81	0.49	0.65
P911	J876	J874	751.77	6	120	70.38	0.8	0.47	0.63
P485	J412	J882	180.52	8	120	-123.23	0.79	0.08	0.44
P785	J808	J812	792.95	6	120	68.79	0.78	0.48	0.6
P447	J496	J500	263.4	6	120	-66.88	0.76	0.15	0.57
P899	J864	J792	1,250.51	6	120	-66.23	0.75	0.71	0.56
P783	J808	J804	1,577.35	6	120	-63.94	0.73	0.83	0.53
P757	J770	J866	801.75	6	120	60.94	0.69	0.39	0.48
P919	J884	J496	779.02	6	120	-60.98	0.69	0.38	0.48
P1073	J1042	J760	1,490.48	16	120	427.01	0.68	0.22	0.15
P777	J804	J860	1,342.76	6	120	59.19	0.67	0.61	0.46
P947	J910	J908	1,654.99	4	120	25.15	0.64	1.12	0.68
P1099	J1062	J760	3,902.73	12	120	-219.68	0.62	0.69	0.18
P921	J886	J884	543.81	6	120	-51.3	0.58	0.19	0.35
P267	J36	J52	302.75	8	120	-89.2	0.57	0.07	0.24
P791	J818	J824	384.84	6	120	-50.52	0.57	0.13	0.34

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P715	J522	J586	1,316.00	8	120	-87.37	0.56	0.31	0.23
P585	J650	J886	1,054.12	6	120	-48.78	0.55	0.34	0.32
P903	J868	J800	732.22	6	120	-47.77	0.54	0.23	0.31
P753	J792	J770	986.19	6	120	46.52	0.53	0.29	0.29
P901	J866	J780	912.76	6	120	46.46	0.53	0.27	0.29
P909	J874	J930	867.88	6	120	46.35	0.53	0.25	0.29
P963	J926	J924	1,469.50	8	120	-80.96	0.52	0.3	0.2
P759	J780	J802	425.59	6	120	43.87	0.5	0.11	0.26
P895	J860	J808	1,028.11	6	120	39.1	0.44	0.22	0.21
P897	J862	J864	1,043.35	6	120	-38.53	0.44	0.22	0.21
P1025	J986	J988	2,596.50	8	120	65.36	0.42	0.35	0.14
P1027	J988	J990	2,420.07	8	120	65.36	0.42	0.33	0.14
P29	J36	J912	1,776.49	6	120	35.56	0.4	0.32	0.18
P51	J62	J66	60.89	4	120	15.71	0.4	0.02	0.28
P587	J336	J650	456.76	6	120	-34.05	0.39	0.08	0.16
P25	J36	J914	568.49	6	120	33.05	0.38	0.09	0.16
P1041	J1004	J1006	731.29	4	120	14.29	0.36	0.17	0.24
P807	J822	J826	523.47	6	120	-31.77	0.36	0.08	0.14
P303	J336	J340	189.56	6	120	30.74	0.35	0.03	0.14
P969	J932	J488	1,773.44	6	120	-31.15	0.35	0.25	0.14
P769	J770	J868	157.17	6	120	-28.73	0.33	0.02	0.12
P949	J912	J66	712.34	4	120	-12.89	0.33	0.14	0.2
P357	J402	J412	332.55	6	120	-27.42	0.31	0.04	0.11
P1049	J1014	J1016	1,341.19	8	120	43.17	0.28	0.08	0.06
P387	J428	J892	654.47	4	120	10.58	0.27	0.09	0.14
P973	J936	J390	1,054.10	6	120	-23.83	0.27	0.09	0.08
P481	J390	J890	630.90	8	120	38.41	0.25	0.03	0.05
P787	J812	J858	736.39	6	120	21.67	0.25	0.05	0.07
P795	J816	J822	1,406.49	6	120	-21.95	0.25	0.1	0.07
P951	J914	J62	994.95	6	120	21.74	0.25	0.07	0.07
P1055	J1016	J1022	776.2	8	120	37.85	0.24	0.04	0.05
P797	J824	J826	710.33	6	120	-21.3	0.24	0.05	0.07
P1063	J1026	J1030	826.4	4	120	8.45	0.22	0.07	0.09
P967	J930	J932	717.97	6	120	19.64	0.22	0.04	0.06
P965	J928	J926	1,434.61	8	120	-32.2	0.21	0.05	0.04
P1059	J1022	J1026	1,264.80	8	120	31.83	0.2	0.05	0.04
P923	J888	J402	703.71	6	120	-17.42	0.2	0.03	0.05
P789	J812	J818	1,554.84	6	120	15.21	0.17	0.06	0.04
P925	J890	J412	616.15	8	120	26.87	0.17	0.02	0.03
P975	J938	J488	1,364.38	4	120	6.79	0.17	0.08	0.06
P763	J780	J862	710.16	6	120	-14.02	0.16	0.02	0.03
P809	J824	J822	848.95	6	120	14.02	0.16	0.03	0.03
P971	J934	J936	945.14	6	120	-13.84	0.16	0.03	0.03
P927	J892	J436	598.2	4	120	4.83	0.12	0.02	0.03
P273	J68	J50	1,193.53	8	120	-17.91	0.11	0.01	0.01
P1045	J1008	J1010	575.62	8	120	12.65	0.08	0	0.01
P271	J68	J62	903.73	6	120	6.65	0.08	0.01	0.01
P325	J340	J888	967.88	6	120	6.39	0.07	0.01	0.01
P893	J858	J816	510.04	6	120	5.65	0.06	0	0.01
P1061	J1026	J1028	892.47	8	120	8.54	0.05	0	0
P301	J340	J934	1,238.56	4	120	2.06	0.05	0.01	0.01
P891	J818	J816	490.57	6	120	-4.59	0.05	0	0
P995	J948	J958	2,685.52	8	120	5.99	0.04	0	0
P997	J958	J960	2,691.48	8	120	5.99	0.04	0	0
P1051	J1016	J1018	348.96	8	120	4.96	0.03	0	0
P1057	J1022	J1024	703.14	4	120	1.28	0.03	0	0
P1003	J964	J966	338.55	8	120	2.74	0.02	0	0
P1013	J974	J976	323.36	8	120	2.74	0.02	0	0
P1053	J1018	J1020	338.58	4	120	0.36	0.01	0	0
P945	J908	J68	914.89	6	120	0.77	0.01	0	0
P1021	J984	J144	284.05	18	120	-2.74	0	0	0
P119	J136	J984	582	18	120	0.00	0	0	0
P541	J600	J606	14.01	6	120	0	0	0	0
P647	J714	J712	78.54	16	120	0.00	0	0	0

APPENDIX L

Hydraulic Model Results - 2030

2030 Annual Average Demand Scenario

Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J132	1.39	17	141.61	53.99
J1044	181.88	14	138.66	54.02
J760	0	14	140.97	55.02
J1038	543.4	14	141.48	55.24
J904	41.36	17	145.19	55.55
J1062	188.47	12	140.45	55.66
J1034	1,217.60	13	141.61	55.72
J1042	435.36	12	141.14	55.96
J1040	0	15	144.75	56.22
J1036	100.16	16	147.35	56.92
J950	0.08	14	147.17	57.7
J108	1.29	14.42	149.09	58.35
J854	0	20.5	158.94	59.99
J944	158.12	13	151.7	60.1
J998	0	17	155.9	60.18
J1006	9.4	17	156.01	60.23
J336	2.18	14.55	153.79	60.33
J428	7.88	13.97	153.24	60.34
J948	47.27	18	157.4	60.4
J874	15.81	13	152.51	60.45
J436	15.93	13.34	153.15	60.58
J1002	9.82	16	155.89	60.62
J886	1.66	14	153.89	60.62
J340	14.67	13.82	153.79	60.65
J1004	0	16	156.09	60.7
J1008	8.52	16	156.1	60.71
J942	5.48	12.7	152.83	60.72
J1046	0	12	152.25	60.77
J932	33.41	12	152.43	60.85
J940	6.03	12.46	152.93	60.86
J876	27.05	12	152.69	60.96
J938	42.46	12	152.68	60.96
J1010	8.32	15.33	156.1	61
J650	9.69	13	153.81	61.01
J936	6.57	13.05	153.86	61.01
J586	0	15	155.89	61.05
J884	6.37	13.02	153.95	61.06
J908	16.04	15	156.11	61.14
J1014	0	15	156.12	61.15
J892	3.78	12	153.17	61.17
J930	17.58	11.1	152.43	61.24
J878	28.72	12	153.42	61.28
J420	11.71	12.15	153.59	61.29
J488	31.93	11	152.6	61.35
J902	70.99	14	155.77	61.43
J882	16.55	12	153.84	61.46
J890	7.59	12	153.87	61.47
J990	43	14	155.86	61.47
J894	1.61	13	154.89	61.48
J898	21.35	10	151.91	61.49
J996	70.18	14	155.9	61.49
J988	0	14	156.01	61.53
J1028	5.62	14	156.04	61.55
J496	3.88	12	154.06	61.55
J220	0.44	14	156.08	61.56
J926	32.08	14	156.18	61.61
J994	0	13.61	155.91	61.66
J56	11.54	15	157.32	61.67
J906	13.16	14	156.34	61.68
J824	35.41	14	156.46	61.73
J510	10.26	12	154.5	61.74
J244	0	13.41	155.91	61.75

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J952	17.95	13	155.58	61.78
J818	46.26	13.73	156.35	61.8
J872	26.61	14	156.71	61.83
J734	7.1	16	158.81	61.88
J966	11.02	14	156.84	61.89
J1000	0	13	155.9	61.92
J738	18.18	13	155.91	61.92
J828	12.84	14	156.96	61.94
J278	0	13	155.98	61.95
J816	15.14	13.39	156.35	61.95
J20	15.37	15	158.04	61.98
J24	0	15	158.03	61.98
J962	1.8	14	157.05	61.98
J870	15.96	14	157.07	61.99
J292	3.39	14	157.1	62
J288	13.86	14	157.1	62.01
J1060	0	14	157.14	62.02
J68	7.91	13	156.18	62.04
J1054	0	11	154.22	62.06
J296	6.71	14	157.22	62.06
J864	18.23	14	157.36	62.12
J522	2.66	12	155.39	62.13
J822	15.68	13	156.45	62.16
J826	12.91	13.03	156.5	62.16
J1052	0	10	153.49	62.17
J92	72.83	14	157.51	62.18
J770	9.42	14	157.52	62.19
J868	12.52	14	157.53	62.19
J792	18.31	14	157.62	62.23
J682	0	8	151.7	62.27
J1048	0	9	152.89	62.35
J600	0	12	155.89	62.35
J606	0	12	155.89	62.35
J1030	5.56	12	156.01	62.4
J1026	9.76	12	156.04	62.41
J30	17.02	14	158.03	62.41
J1022	3.12	12	156.07	62.42
J1018	3.02	12	156.08	62.43
J280	4.75	12	156.13	62.45
J888	15.67	9.65	153.79	62.46
J954	0	12	156.16	62.46
J986	0	12	156.17	62.47
J718	15.91	13.94	158.15	62.49
J900	15.44	14	158.22	62.49
J812	21	12	156.35	62.55
J858	10.54	12	156.35	62.55
J44	0.08	14	158.41	62.57
J62	8.35	11.66	156.11	62.59
J918	6.17	12	156.45	62.59
J964	0	12.35	156.85	62.61
J722	11.36	13.53	158.15	62.66
J804	16.15	12	156.66	62.68
J880	19.32	9.35	154.05	62.7
J1020	0.24	11.29	156.08	62.74
J402	6.58	9	153.81	62.74
J412	2.81	9	153.83	62.75
J934	10.46	9	153.83	62.75
J916	41.55	11.65	156.55	62.78
J1050	0	8	153.09	62.87
J500	8.61	9	154.11	62.87
J144	0.58	11	156.2	62.91
J896	9.45	9.27	154.51	62.93
J52	1.04	11	156.3	62.96
J910	22.09	10.74	156.04	62.96

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J928	16.15	11	156.34	62.98
J866	9.52	12	157.38	62.99
J958	0	12	157.39	63
J390	8.92	8.39	153.94	63.07
J1056	0	10	155.68	63.12
J946	12.62	10	155.79	63.17
J740	1.04	10	155.91	63.22
J36	13.54	10.2	156.25	63.29
J688	6.21	11.5	157.57	63.29
J842	0	13	159.1	63.31
J980	1.8	10	156.22	63.36
J1016	0.24	9.82	156.08	63.37
J982	0.96	9.74	155.99	63.37
J920	17.51	10	156.27	63.38
J662	55.25	9.5	155.8	63.39
J862	16.12	10.9	157.29	63.43
J808	22.54	10	156.43	63.45
J860	13.21	10	156.48	63.47
J1024	0.84	9.38	156.06	63.56
J912	31.88	9	156.02	63.7
J66	25.45	9	156.02	63.71
J10	1.87	11	158.13	63.75
J914	7.44	9	156.18	63.77
J802	9.05	10	157.27	63.81
J780	10.93	10	157.29	63.82
J960	3.94	10	157.39	63.87
J922	33.59	8.5	156.16	63.98
J602	0	8	155.89	64.08
J736	0	8	155.91	64.09
J704	1.41	10	157.98	64.12
J136	0	8	156.2	64.21
J974	0	8	156.4	64.3
J268	0	9.5	157.97	64.33
J696	0	9.5	157.97	64.33
J800	10.43	8.98	157.64	64.41
J714	3.33	9	157.9	64.52
J42	0	9	158.13	64.62
J924	49.61	7	156.14	64.62
J50	26.01	7	156.28	64.68
J984	1.8	6.84	156.2	64.71
J712	0	8.5	157.9	64.74
J976	1.8	6	156.4	65.17
J978	0	5	156.64	65.71
J750	1.68	4	155.79	65.77

2030 Annual Average Demand Scenario

Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P855	J842	J854	37.35	20	120	4,687.05	4.79	0.16	4.27
P261	J854	J108	2,146.32	16	120	2,710.99	4.33	9.85	4.59
P255	J108	J1036	1,204.92	16	120	1,449.27	2.31	1.73	1.44
P1067	J1036	J1040	2,066.23	16	120	1,349.11	2.15	2.6	1.26
P1071	J1040	J1038	2,592.09	16	120	1,349.11	2.15	3.27	1.26
P105	J108	J950	1,726.29	16	120	1,260.43	2.01	1.92	1.11
P987	J950	J904	1,776.99	16	120	1,260.34	2.01	1.97	1.11
P941	J904	J1034	3,432.11	16	120	1,218.99	1.95	3.59	1.04
P803	J688	J828	257.8	6	120	143.74	1.63	0.61	2.37
P281	J92	J902	485.88	4	120	61.94	1.58	1.74	3.59
P645	J268	J714	93.13	16	120	989.02	1.58	0.07	0.71
P625	J30	J56	736.23	12	120	544.76	1.55	0.7	0.95
P465	J510	J522	585.53	8	120	-240.91	1.54	0.89	1.52
P743	J734	J854	357.9	24	120	-1,976.06	1.4	0.13	0.35
P1069	J1038	J1042	696.24	16	120	805.71	1.29	0.34	0.49
P637	J268	J696	7.13	16	120	-810.62	1.29	0	0.49
P933	J898	J896	1,856.97	6	120	-108.19	1.23	2.6	1.4
P1101	J928	J1060	825.47	8	120	-189.58	1.21	0.8	0.97
P931	J896	J894	398.95	8	120	-188.91	1.21	0.39	0.97
P1075	J760	J1044	2,563.66	8	120	181.88	1.16	2.31	0.9
P907	J872	J56	1,171.38	12	120	-395.57	1.12	0.62	0.53
P883	J510	J878	942.7	6	120	96.82	1.1	1.07	1.14
P43	J52	J872	867.21	12	120	-368.95	1.05	0.4	0.46
P91	J92	J44	1,212.87	8	120	-164.24	1.05	0.91	0.75
P929	J894	J390	1,364.47	8	120	158.65	1.01	0.96	0.7
P1019	J980	J982	546.65	12	120	350.13	0.99	0.23	0.42
P1095	J894	J982	2,617.92	12	120	-349.17	0.99	1.1	0.42
P657	J722	J734	3,555.33	24	120	-1,392.35	0.99	0.66	0.19
P981	J944	J898	221.21	6	120	-86.84	0.99	0.21	0.93
P51	J62	J66	60.89	4	120	36.32	0.93	0.08	1.34
P765	J20	J792	507.91	6	120	82.26	0.93	0.43	0.84
P673	J44	J734	1,527.00	16	120	-576.61	0.92	0.4	0.26
P661	J718	J722	17.96	16	120	-570.36	0.91	0	0.26
P21	J24	J30	21.64	16	120	561.78	0.9	0.01	0.25
P373	J412	J420	297.67	6	120	78.97	0.9	0.23	0.78
P781	J802	J804	800.54	6	120	77.95	0.88	0.61	0.76
P905	J870	J56	477.99	8	120	-137.65	0.88	0.26	0.54
P455	J500	J510	767.28	8	120	-133.83	0.85	0.39	0.51
P799	J828	J824	698.4	6	120	74.97	0.85	0.5	0.71
P41	J50	J52	72.58	12	120	-294.65	0.84	0.02	0.31
P939	J842	RES9006	1.00	48	120	-4,687.05	0.83	0	0.06
P379	J390	J428	1,067.12	6	120	71.97	0.82	0.7	0.66
P1077	J944	J1046	838.18	6	120	-71.28	0.81	0.54	0.65
P1079	J1046	J1048	998.79	6	120	-71.28	0.81	0.65	0.65
P1081	J1048	J1050	305.64	6	120	-71.28	0.81	0.2	0.65
P1083	J1050	J1052	615.33	6	120	-71.28	0.81	0.4	0.65
P1085	J1052	J1054	1,132.42	6	120	-71.28	0.81	0.73	0.65
P953	J916	J870	1,215.97	8	120	-121.69	0.78	0.52	0.43
P775	J800	J802	619.37	6	120	68.11	0.77	0.37	0.59
P913	J878	J876	1,235.77	6	120	68.1	0.77	0.73	0.59
P397	J436	J420	762.04	6	120	-67.26	0.76	0.44	0.58
P277	J92	J906	1,289.97	4	120	29.47	0.75	1.17	0.91
P531	J586	J928	1,171.40	8	120	-114.6	0.73	0.45	0.38
P715	J522	J586	1,316.00	8	120	-114.6	0.73	0.5	0.38
P1001	J964	J962	1,406.37	18	120	-569.19	0.72	0.2	0.14
P237	J292	J288	27.24	18	120	-574.37	0.72	0	0.15
P999	J962	J292	335.77	18	120	-570.99	0.72	0.05	0.14
P1011	J974	J978	1,770.87	18	120	-558.17	0.7	0.25	0.14
P1015	J978	J964	1,480.70	18	120	-558.17	0.7	0.21	0.14
P1017	J980	J974	1,270.41	18	120	-556.37	0.7	0.17	0.14
P621	J714	J688	3,397.39	24	120	985.68	0.7	0.33	0.1
P771	J704	J800	958.55	8	120	110.21	0.7	0.34	0.36

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P935	J900	J44	1,401.10	16	120	-412.29	0.66	0.2	0.14
P979	J942	J436	760.89	6	120	-56.37	0.64	0.32	0.42
P17	J24	J10	723.62	16	120	-394.98	0.63	0.09	0.13
P37	J10	J900	707.05	16	120	-396.85	0.63	0.09	0.13
P607	J428	J940	769.49	6	120	55.28	0.63	0.31	0.4
P801	J826	J828	1,120.40	6	120	-55.92	0.63	0.46	0.41
P39	J662	J50	2,805.19	12	120	-216.47	0.61	0.48	0.17
P1073	J1042	J760	1,490.48	16	120	370.35	0.59	0.17	0.12
P985	J948	J688	2,403.23	24	120	-835.74	0.59	0.17	0.07
P445	J488	J942	679.76	6	120	-50.89	0.58	0.24	0.35
P221	J696	J722	2,686.05	24	120	-810.62	0.57	0.18	0.07
P915	J880	J500	233.27	8	120	-89.61	0.57	0.06	0.24
P249	J296	J948	2,771.23	24	120	-784.53	0.56	0.18	0.06
P977	J940	J938	754.64	6	120	49.24	0.56	0.25	0.33
P245A	J1060	J296	1,197.55	24	120	-777.82	0.55	0.08	0.06
P1099	J1062	J760	3,902.73	12	120	-188.47	0.53	0.52	0.13
P669	J522	J952	1,193.35	10	120	-128.97	0.53	0.19	0.16
P791	J818	J824	384.84	6	120	-46.01	0.52	0.11	0.29
P955	J918	J916	499.12	8	120	-80.13	0.51	0.1	0.2
P267	J36	J52	302.75	8	120	-73.26	0.47	0.05	0.17
P911	J876	J874	751.77	6	120	41.05	0.47	0.17	0.23
P957	J920	J918	1,067.97	8	120	-73.96	0.47	0.18	0.17
P653	J718	J704	2,356.56	16	120	290.02	0.46	0.17	0.07
P1087	J1054	J896	1,828.73	8	120	-71.28	0.45	0.29	0.16
P917	J882	J880	1,315.64	8	120	-70.28	0.45	0.2	0.16
P899	J864	J792	1,250.51	6	120	-38.44	0.44	0.26	0.21
P1089	J1056	J662	1,352.62	12	120	-146.92	0.42	0.11	0.08
P245	J288	J1060	1,137.30	24	120	-588.24	0.42	0.04	0.04
P651	J20	J718	1,713.18	16	120	-264.43	0.42	0.11	0.06
P943	J906	J910	1,002.15	4	120	16.31	0.42	0.3	0.3
P989	J952	J1056	1,247.23	12	120	-146.92	0.42	0.11	0.08
P447	J496	J500	263.4	6	120	-35.61	0.4	0.05	0.18
P757	J770	J866	801.75	6	120	35.26	0.4	0.14	0.18
P965	J928	J926	1,434.61	8	120	58.83	0.38	0.16	0.11
P481	J390	J890	630.90	8	120	55.83	0.36	0.06	0.1
P783	J808	J804	1,577.35	6	120	-31.52	0.36	0.22	0.14
P903	J868	J800	732.22	6	120	-31.68	0.36	0.11	0.14
P919	J884	J496	779.02	6	120	-31.73	0.36	0.11	0.14
P959	J922	J920	969.94	8	120	-56.46	0.36	0.1	0.1
P25	J36	J914	568.49	6	120	29.67	0.34	0.07	0.13
P29	J36	J912	1,776.49	6	120	30.05	0.34	0.23	0.13
P485	J412	J882	180.52	8	120	-53.73	0.34	0.02	0.09
P777	J804	J860	1,342.76	6	120	30.29	0.34	0.18	0.13
P273	J68	J50	1,193.53	8	120	-52.17	0.33	0.11	0.09
P925	J890	J412	616.15	8	120	48.24	0.31	0.05	0.08
P785	J808	J812	792.95	6	120	26.05	0.3	0.08	0.1
P753	J792	J770	986.19	6	120	25.51	0.29	0.1	0.1
P807	J822	J826	523.47	6	120	-25.60	0.29	0.05	0.1
P901	J866	J780	912.76	6	120	25.73	0.29	0.09	0.1
P909	J874	J930	867.88	6	120	25.24	0.29	0.08	0.09
P921	J886	J884	543.81	6	120	-25.36	0.29	0.05	0.1
P969	J932	J488	1,773.44	6	120	-25.75	0.29	0.17	0.1
P195	J220	J278	2,626.00	12	120	99.22	0.28	0.11	0.04
P197	J278	J994	1,557.06	12	120	99.22	0.28	0.06	0.04
P649	J704	J268	318.06	16	120	178.39	0.28	0.01	0.03
P1025	J986	J988	2,596.50	8	120	43	0.27	0.16	0.06
P1027	J988	J990	2,420.07	8	120	43	0.27	0.15	0.06
P19	J20	J24	459.26	16	120	166.81	0.27	0.01	0.03
P585	J650	J886	1,054.12	6	120	-23.7	0.27	0.09	0.08
P201	J144	J980	1,112.73	18	120	-204.44	0.26	0.02	0.02
P1047	J1014	J280	272.16	16	120	-154.31	0.25	0.01	0.02
P157	J144	J986	1,305.37	18	120	202.06	0.25	0.03	0.02
P271	J68	J62	903.73	6	120	22.44	0.25	0.07	0.08
P945	J908	J68	914.89	6	120	-21.82	0.25	0.07	0.07

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P951	J914	J62	994.95	6	120	22.23	0.25	0.07	0.07
P973	J936	J390	1,054.10	6	120	-21.92	0.25	0.08	0.07
P991	J954	J280	1,220.74	16	120	159.06	0.25	0.03	0.02
P1041	J1004	J1006	731.29	4	120	9.4	0.24	0.08	0.11
P795	J816	J822	1,406.49	6	120	-20.87	0.24	0.09	0.07
P357	J402	J412	332.55	6	120	-20.19	0.23	0.02	0.06
P387	J428	J892	654.47	4	120	8.82	0.23	0.06	0.1
P897	J862	J864	1,043.35	6	120	-20.21	0.23	0.07	0.06
P937	J902	J66	2,551.19	4	120	-9.05	0.23	0.26	0.1
P769	J770	J868	157.17	6	120	-19.16	0.22	0.01	0.06
P759	J780	J802	425.59	6	120	18.89	0.21	0.02	0.06
P1023	J986	J954	890.63	18	120	159.06	0.2	0.01	0.01
P1043	J1008	J1014	1,128.33	16	120	-125.91	0.2	0.02	0.02
P797	J824	J826	710.33	6	120	-17.4	0.2	0.03	0.05
P895	J860	J808	1,028.11	6	120	17.07	0.19	0.05	0.05
P1049	J1014	J1016	1,341.19	8	120	28.4	0.18	0.04	0.03
P1039	J1004	J1008	797.74	16	120	-109.07	0.17	0.01	0.01
P963	J926	J924	1,469.50	8	120	26.75	0.17	0.04	0.03
P971	J934	J936	945.14	6	120	-15.35	0.17	0.04	0.04
P975	J938	J488	1,364.38	4	120	6.79	0.17	0.08	0.06
P1055	J1016	J1022	776.2	8	120	24.9	0.16	0.02	0.02
P183	J220	J1004	1,057.17	16	120	-99.67	0.16	0.01	0.01
P587	J336	J650	456.76	6	120	-14.01	0.16	0.01	0.03
P595	J662	J946	206.15	6	120	14.30	0.16	0.01	0.03
P923	J888	J402	703.71	6	120	-13.61	0.15	0.02	0.03
P947	J910	J908	1,654.99	4	120	-5.78	0.15	0.07	0.04
P961	J924	J922	1,210.78	8	120	-22.87	0.15	0.02	0.02
P1063	J1026	J1030	826.4	4	120	5.56	0.14	0.03	0.04
P1031	J994	J996	1,453.22	16	120	80	0.13	0.01	0.01
P1059	J1022	J1026	1,264.80	8	120	20.94	0.13	0.02	0.02
P303	J336	J340	189.56	6	120	11.83	0.13	0	0.02
P927	J892	J436	598.2	4	120	5.04	0.13	0.02	0.03
P301	J340	J934	1,238.56	4	120	-4.89	0.12	0.04	0.03
P809	J824	J822	848.95	6	120	10.95	0.12	0.02	0.02
P967	J930	J932	717.97	6	120	7.67	0.09	0.01	0.01
P1003	J964	J966	338.55	8	120	11.02	0.07	0	0.01
P893	J858	J816	510.04	6	120	-5.8	0.07	0	0.01
P1033	J996	J998	1,450.67	8	120	9.82	0.06	0.01	0
P1037	J998	J1002	645.85	8	120	9.82	0.06	0	0
P1029	J994	J244	257.79	12	120	19.22	0.05	0	0
P1045	J1008	J1010	575.62	8	120	8.32	0.05	0	0
P679	J738	J740	489.39	12	120	-18.18	0.05	0	0
P763	J780	J862	710.16	6	120	-4.09	0.05	0	0
P787	J812	J858	736.39	6	120	4.74	0.05	0	0
P949	J912	J66	712.34	4	120	-1.82	0.05	0	0.01
P1061	J1026	J1028	892.47	8	120	5.62	0.04	0	0
P677	J736	J244	2,947.41	16	120	-19.22	0.03	0	0
P681	J740	J736	969.74	16	120	-19.22	0.03	0	0
P995	J948	J958	2,685.52	8	120	3.94	0.03	0	0
P997	J958	J960	2,691.48	8	120	3.94	0.03	0	0
P1051	J1016	J1018	348.96	8	120	3.26	0.02	0	0
P1057	J1022	J1024	703.14	4	120	0.84	0.02	0	0
P325	J340	J888	967.88	6	120	2.05	0.02	0	0
P983	J946	J750	1,547.44	6	120	1.68	0.02	0	0
P1013	J974	J976	323.36	8	120	1.8	0.01	0	0
P1053	J1018	J1020	338.58	4	120	0.24	0.01	0	0
P1065	J1034	J132	1,540.73	10	120	1.39	0.01	0	0
P1021	J984	J144	284.05	18	120	-1.8	0	0	0
P1035	J998	J1000	575.73	8	120	0	0	0	0
P119	J136	J984	582	18	120	0	0	0	0
P33	J10	J42	903.69	8	120	0	0	0	0
P537	J600	J602	245.00	8	120	0	0	0	0
P541	J600	J606	14.01	6	120	0	0	0	0
P543	J586	J600	659.76	8	120	0	0	0	0

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P603	J682	J944	516.79	6	120	0	0	0	0
P647	J714	J712	78.54	16	120	0	0	0	0
P789	J812	J818	1,554.84	6	120	0.32	0	0	0
P891	J818	J816	490.57	6	120	0.07	0	0	0

2030 Max Month Peak Hour Demand Scenario

Junction Report

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J132	626.11	17	98.4	35.27
J738	1,247.64	13	97.37	36.56
J998	0	17	104.95	38.11
J944	240.34	13	101.54	38.36
J1002	14.93	16	104.95	38.54
J682	289	8	97.08	38.6
J740	1.58	10	99.54	38.8
J1034	1,850.75	13	103.02	39
J244	0	13.41	103.82	39.18
J996	0	14	104.96	39.41
J994	0	13.61	104.96	39.58
J1000	0	13	104.95	39.84
J736	0	8	100.6	40.12
J898	32.45	10	103.65	40.58
J1044	276.46	14	107.96	40.71
J1046	0	12	106.07	40.76
J750	460.55	4	102.29	42.59
J760	0	14	112.98	42.89
J278	0	13	112.03	42.91
J904	62.86	17	116.35	43.05
J1062	286.49	12	111.84	43.26
J1038	825.97	14	114.08	43.37
J1042	661.75	12	113.35	43.91
J1048	0	9	111.47	44.4
J1050	0.00	8	113.12	45.55
J1040	0	15	121.18	46.01
J1052	0	10	116.44	46.12
J1006	14.29	17	124.95	46.78
J1004	0	16	125.13	47.28
J950	0.12	14	123.58	47.48
J220	0.68	14	123.94	47.64
J1008	12.95	16	126.04	47.68
J1010	12.65	15.33	126.03	47.97
J1036	152.24	16	126.83	48.02
J1054	0	11	122.56	48.34
J1014	0	15	127.37	48.69
J428	11.97	13.97	127	48.97
J1028	8.54	14	127.2	49.05
J436	24.22	13.34	126.98	49.24
J942	8.33	12.7	126.52	49.32
J336	3.31	14.55	128.39	49.33
J874	24.03	13	126.89	49.35
J940	9.17	12.46	126.52	49.42
J932	50.79	12	126.17	49.47
J938	64.54	12	126.16	49.47
J340	22.29	13.82	128.31	49.61
J936	9.99	13.05	127.97	49.79
J892	5.75	12	126.98	49.82
J894	2.45	13	128.04	49.85
J1030	8.45	12	127.13	49.89
J488	48.53	11	126.19	49.91
J1026	14.84	12	127.21	49.92
J990	65.36	14	129.23	49.93
J1022	4.74	12	127.25	49.94
J930	26.71	11.1	126.35	49.94
J1018	4.59	12	127.29	49.96
J886	2.52	14	129.42	50.01
J988	0	14	129.55	50.07
J650	14.72	13	128.63	50.1
J420	17.8	12.15	127.8	50.11
J876	41.11	12	127.69	50.13
J280	7.22	12	127.72	50.14

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J896	14.36	9.27	125	50.15
J1020	0.36	11.29	127.29	50.26
J890	11.54	12	128.1	50.31
J108	1.96	14.42	130.6	50.34
J882	25.16	12	128.47	50.47
J884	9.68	13.02	129.85	50.62
J954	0	12	129.27	50.81
J1016	0.36	9.82	127.29	50.9
J1024	1.28	9.38	127.25	51.07
J986	0	12	129.91	51.09
J878	43.66	12	130.29	51.25
J888	23.81	9.65	128.24	51.39
J496	5.9	12	130.62	51.4
J934	15.9	9	127.97	51.55
J402	10	9	128.24	51.67
J412	4.27	9	128.25	51.67
J390	13.56	8.39	127.99	51.82
J144	0.88	11	130.93	51.96
J880	29.37	9.35	130.47	52.48
J982	1.46	9.74	131.15	52.61
J510	15.6	12	133.61	52.7
J980	2.74	10	131.8	52.78
J500	13.09	9	130.91	52.83
J600	0	12	133.97	52.85
J606	0	12	133.97	52.85
J586	0	15	137.26	52.98
J136	0	8	130.93	53.26
J946	19.19	10	133.96	53.71
J984	2.74	6.84	130.93	53.76
J966	16.75	14	138.72	54.04
J602	458	8	132.75	54.05
J952	27.28	13	138.25	54.27
J974	0	8	133.74	54.48
J522	4.05	12	138.04	54.61
J926	48.76	14	140.19	54.68
J964	0	12.35	138.73	54.76
J962	2.74	14	140.91	54.99
J948	71.85	18	145.26	55.14
J292	5.15	14	141.44	55.22
J288	21.07	14	141.51	55.25
J976	2.74	6	133.74	55.35
J908	24.39	15	142.99	55.46
J1060	0	14	142.21	55.55
J1056	0	10	138.37	55.62
J662	83.97	9.5	138.51	55.9
J296	10.21	14	143.13	55.95
J928	24.55	11	140.16	55.96
J68	12.02	13	143	56.33
J902	107.9	14	144.55	56.57
J872	40.45	14	145.27	56.88
J62	12.69	11.66	142.96	56.89
J978	0	5	136.46	56.96
J824	53.83	14	145.52	56.99
J918	9.38	12	143.62	57.03
J818	70.32	13.73	145.41	57.05
J906	20	14	145.89	57.15
J816	23.01	13.39	145.41	57.2
J52	1.59	11	143.2	57.28
J920	26.61	10	142.19	57.28
J828	19.52	14	146.25	57.31
J822	23.84	13	145.49	57.41
J826	19.63	13.03	145.56	57.42
J922	51.06	8.5	141.16	57.48
J916	63.16	11.65	144.34	57.49

ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
J910	33.58	10.74	143.49	57.52
J36	20.58	10.2	143.13	57.6
J870	24.27	14	147.07	57.66
J958	0	12	145.26	57.74
J56	17.54	15	148.31	57.76
J858	16.02	12	145.42	57.81
J924	75.41	7	140.42	57.81
J812	31.91	12	145.49	57.84
J912	48.45	9	142.79	57.97
J66	38.68	9	142.92	58.03
J914	11.31	9	143.03	58.08
J804	24.54	12	147	58.5
J960	5.99	10	145.25	58.6
J864	27.71	14	149.63	58.77
J688	9.43	11.5	147.2	58.8
J770	14.31	14	150.02	58.94
J868	19.03	14	150.03	58.94
J50	39.53	7	143.06	58.95
J808	34.25	10	146.07	58.96
J860	20.09	10	146.32	59.07
J792	27.83	14	150.43	59.12
J24	0	15	151.72	59.24
J20	23.36	15	151.81	59.28
J866	14.48	12	149.61	59.63
J92	110.7	14	151.67	59.65
J30	25.88	14	151.7	59.66
J42	500	9	146.77	59.7
J854	0	20.5	158.38	59.74
J718	24.18	13.94	152.4	59.99
J862	24.51	10.9	149.36	60
J722	17.27	13.53	152.43	60.18
J900	23.47	14	152.92	60.19
J802	13.75	10	149.18	60.31
J780	16.61	10	149.32	60.37
J44	0.12	14	154.65	60.94
J704	2.15	10	151	61.09
J10	2.85	11	152.08	61.13
J800	15.85	8.98	150.2	61.19
J714	5.07	9	150.26	61.21
J268	0	9.5	150.87	61.26
J696	0	9.5	150.9	61.27
J734	10.8	16	157.44	61.29
J712	0	8.5	150.26	61.43
J842	0	13	159.1	63.31

2030 Max Month Peak Hour Demand Scenario

Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P855	J842	J854	37.35	20	120	10,566.65	10.79	0.72	19.23
P261	J854	J108	2,146.32	16	120	4,744.71	7.57	27.78	12.94
P595	J662	J946	206.15	6	120	479.73	5.44	4.55	22.07
P645	J268	J714	93.13	16	120	3,276.23	5.23	0.61	6.52
P983	J946	J750	1,547.44	6	120	460.55	5.23	31.67	20.46
P743	J734	J854	357.9	24	120	-5,821.94	4.13	0.94	2.62
P637	J268	J696	7.13	16	120	-2,552.87	4.07	0.03	4.11
P105	J108	J950	1,726.29	16	120	2,539.85	4.05	7.02	4.07
P987	J950	J904	1,776.99	16	120	2,539.72	4.05	7.23	4.07
P941	J904	J1034	3,432.11	16	120	2,476.86	3.95	13.33	3.88
P933	J898	J896	1,856.97	6	120	-337.36	3.83	21.35	11.5
P931	J896	J894	398.95	8	120	-576.15	3.68	3.04	7.63
P465	J510	J522	585.53	8	120	-573.22	3.66	4.43	7.56
P625	J30	J56	736.23	12	120	1,273.79	3.61	3.39	4.6
P195	J220	J278	2,626.00	12	120	1,264.15	3.59	11.92	4.54
P197	J278	J994	1,557.06	12	120	1,264.15	3.59	7.07	4.54
P1029	J994	J244	257.79	12	120	1,249.22	3.54	1.14	4.44
P679	J738	J740	489.39	12	120	-1,247.64	3.54	2.17	4.43
P255	J108	J1036	1,204.92	16	120	2,202.91	3.52	3.77	3.13
P981	J944	J898	221.21	6	120	-304.91	3.46	2.11	9.53
P281	J92	J902	485.88	4	120	132.33	3.38	7.12	14.64
P237	J292	J288	27.24	18	120	-2,655.80	3.35	0.07	2.49
P603	J682	J944	516.79	6	120	-289.00	3.28	4.46	8.63
P1067	J1036	J1040	2,066.23	16	120	2,050.66	3.27	5.66	2.74
P1071	J1040	J1038	2,592.09	16	120	2,050.66	3.27	7.1	2.74
P33	J10	J42	903.69	8	120	500	3.19	5.3	5.87
P657	J722	J734	3,555.33	24	120	-4,163.05	2.95	5.01	1.41
P537	J600	J602	245	8	120	458	2.92	1.22	4.99
P543	J586	J600	659.76	8	120	458	2.92	3.29	4.99
P907	J872	J56	1,171.38	12	120	-934.43	2.65	3.04	2.59
P673	J44	J734	1,527.00	16	120	-1,648.10	2.63	2.79	1.83
P1001	J964	J962	1,406.37	18	120	-2,060.45	2.6	2.19	1.56
P999	J962	J292	335.77	18	120	-2,063.19	2.6	0.52	1.56
P1011	J974	J978	1,770.87	18	120	-2,043.70	2.58	2.71	1.53
P1015	J978	J964	1,480.70	18	120	-2,043.70	2.58	2.27	1.53
P1017	J980	J974	1,270.41	18	120	-2,040.96	2.57	1.94	1.53
P1065	J1034	J132	1,540.73	10	120	626.11	2.56	4.62	3
P1077	J944	J1046	838.18	6	120	-224.43	2.55	4.53	5.4
P1079	J1046	J1048	998.79	6	120	-224.43	2.55	5.4	5.4
P1081	J1048	J1050	305.64	6	120	-224.43	2.55	1.65	5.4
P1083	J1050	J1052	615.33	6	120	-224.43	2.55	3.33	5.4
P1085	J1052	J1054	1,132.42	6	120	-224.43	2.55	6.12	5.4
P43	J52	J872	867.21	12	120	-893.97	2.54	2.07	2.39
P661	J718	J722	17.96	16	120	-1,592.90	2.54	0.03	1.71
P455	J500	J510	767.28	8	120	-379.32	2.42	2.7	3.52
P621	J714	J688	3,397.39	24	120	3,271.16	2.32	3.06	0.9
P41	J50	J52	72.58	12	120	-801.96	2.27	0.14	1.95
P985	J948	J688	2,403.23	24	120	-3,079.70	2.18	1.94	0.81
P991	J954	J280	1,220.74	16	120	1,355.10	2.16	1.55	1.27
P1047	J1014	J280	272.16	16	120	-1,347.88	2.15	0.34	1.26
P249	J296	J948	2,771.23	24	120	-3,001.86	2.13	2.13	0.77
P935	J900	J44	1,401.10	16	120	-1,335.14	2.13	1.73	1.24
P245A	J1060	J296	1,197.55	24	120	-2,991.66	2.12	0.92	0.76
P37	J10	J900	707.05	16	120	-1,311.67	2.09	0.85	1.2
P1043	J1008	J1014	1,128.33	16	120	-1,304.71	2.08	1.34	1.18
P21	J24	J30	21.64	16	120	1,299.67	2.07	0.03	1.18
P803	J688	J828	257.8	6	120	182.03	2.07	0.95	3.67
P39	J662	J50	2,805.19	12	120	-725.39	2.06	4.55	1.62
P905	J870	J56	477.99	8	120	-321.82	2.05	1.24	2.59
P1039	J1004	J1008	797.74	16	120	-1,279.11	2.04	0.91	1.14
P183	J220	J1004	1,057.17	16	120	-1,264.82	2.02	1.18	1.12
P883	J510	J878	942.7	6	120	178.3	2.02	3.33	3.53

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P1101	J928	J1060	825.47	8	120	-314.78	2.01	2.06	2.49
P531	J586	J928	1,171.40	8	120	-313.4	2	2.89	2.47
P91	J92	J44	1,212.87	8	120	-312.84	2	2.99	2.46
P677	J736	J244	2,947.41	16	120	-1,249.22	1.99	3.22	1.09
P681	J740	J736	969.74	16	120	-1,249.22	1.99	1.06	1.09
P1069	J1038	J1042	696.24	16	120	1,224.69	1.95	0.73	1.05
P245	J288	J1060	1,137.30	24	120	-2,676.88	1.9	0.71	0.62
P953	J916	J870	1,215.97	8	120	-297.56	1.9	2.73	2.24
P939	J842	RES9006	1.00	48	120	-10,566.65	1.87	0	0.27
P221	J696	J722	2,686.05	24	120	-2,552.87	1.81	1.53	0.57
P201	J144	J980	1,112.73	18	120	-1,424.07	1.8	0.87	0.79
P157	J144	J986	1,305.37	18	120	1,420.46	1.79	1.02	0.78
P277	J92	J906	1,289.97	4	120	69.8	1.78	5.78	4.48
P1075	J760	J1044	2,563.66	8	120	276.46	1.76	5.02	1.96
P765	J20	J792	507.91	6	120	154.78	1.76	1.38	2.72
P781	J802	J804	800.54	6	120	154.93	1.76	2.18	2.72
P1019	J980	J982	546.65	12	120	614.15	1.74	0.65	1.19
P1095	J894	J982	2,617.92	12	120	-612.7	1.74	3.11	1.19
P915	J880	J500	233.27	8	120	-270.75	1.73	0.44	1.88
P1023	J986	J954	890.63	18	120	1,355.10	1.71	0.64	0.72
P1103	J292	J522	2,209.04	12	100	587.47	1.67	3.4	1.54
P917	J882	J880	1,315.64	8	120	-241.37	1.54	2	1.52
P913	J878	J876	1,235.77	6	120	134.64	1.53	2.59	2.1
P955	J918	J916	499.12	8	120	-234.39	1.5	0.72	1.44
P653	J718	J704	2,356.56	16	120	899.74	1.44	1.4	0.6
P957	J920	J918	1,067.97	8	120	-225.02	1.44	1.43	1.34
P1087	J1054	J896	1,828.73	8	120	-224.43	1.43	2.43	1.33
P485	J412	J882	180.52	8	120	-216.22	1.38	0.22	1.24
P775	J800	J802	619.37	6	120	118.13	1.34	1.02	1.65
P17	J24	J10	723.62	16	120	-808.82	1.29	0.35	0.49
P373	J412	J420	297.67	6	120	111.83	1.27	0.44	1.49
P943	J906	J910	1,002.15	4	120	49.8	1.27	2.4	2.4
P959	J922	J920	969.94	8	120	-198.41	1.27	1.03	1.06
P649	J704	J268	318.06	16	120	723.36	1.15	0.13	0.4
P771	J704	J800	958.55	8	120	174.23	1.11	0.8	0.83
P447	J496	J500	263.4	6	120	-95.49	1.08	0.29	1.11
P397	J436	J420	762.04	6	120	-94.02	1.07	0.82	1.08
P651	J20	J718	1,713.18	16	120	-668.98	1.07	0.59	0.34
P911	J876	J874	751.77	6	120	93.53	1.06	0.8	1.07
P799	J828	J824	698.40	6	120	92.88	1.05	0.74	1.05
P919	J884	J496	779.02	6	120	-89.59	1.02	0.77	0.99
P379	J390	J428	1,067.12	6	120	86.48	0.98	0.99	0.92
P961	J924	J922	1,210.78	8	120	-147.34	0.94	0.74	0.61
P715	J522	J586	1,316.00	8	120	144.60	0.92	0.78	0.59
P921	J886	J884	543.81	6	120	-79.91	0.91	0.43	0.8
P1073	J1042	J760	1,490.48	16	120	562.95	0.9	0.37	0.25
P585	J650	J886	1,054.12	6	120	-77.38	0.88	0.79	0.75
P785	J808	J812	792.95	6	120	76.05	0.86	0.58	0.73
P1099	J1062	J760	3,902.73	12	120	-286.49	0.81	1.13	0.29
P899	J864	J792	1,250.51	6	120	-70.95	0.81	0.8	0.64
P607	J428	J940	769.49	6	120	69.69	0.79	0.48	0.62
P801	J826	J828	1,120.40	6	120	-69.63	0.79	0.69	0.62
P909	J874	J930	867.88	6	120	69.5	0.79	0.54	0.62
P19	J20	J24	459.26	16	120	490.85	0.78	0.09	0.19
P979	J942	J436	760.89	6	120	-68.89	0.78	0.46	0.61
P783	J808	J804	1,577.35	6	120	-67.94	0.77	0.93	0.59
P587	J336	J650	456.76	6	120	-62.66	0.71	0.23	0.51
P757	J770	J866	801.75	6	120	62.91	0.71	0.41	0.51
P777	J804	J860	1,342.76	6	120	62.45	0.71	0.68	0.51
P445	J488	J942	679.76	6	120	-60.55	0.69	0.32	0.48
P977	J940	J938	754.64	6	120	60.52	0.69	0.36	0.48
P303	J336	J340	189.56	6	120	59.35	0.67	0.09	0.46
P51	J62	J66	60.89	4	120	26.27	0.67	0.04	0.73
P753	J792	J770	986.19	6	120	56	0.64	0.41	0.41

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P937	J902	J66	2,551.19	4	120	24.43	0.62	1.64	0.64
P267	J36	J52	302.75	8	120	-90.43	0.58	0.07	0.25
P759	J780	J802	425.59	6	120	50.56	0.57	0.15	0.34
P925	J890	J412	616.15	8	120	-87.95	0.56	0.14	0.23
P669	J522	J952	1,193.35	10	120	-134.40	0.55	0.21	0.17
P901	J866	J780	912.76	6	120	48.43	0.55	0.29	0.32
P791	J818	J824	384.84	6	120	-45.78	0.52	0.11	0.28
P481	J390	J890	630.9	8	120	-76.41	0.49	0.11	0.18
P897	J862	J864	1,043.35	6	120	-43.24	0.49	0.27	0.26
P967	J930	J932	717.97	6	120	42.78	0.49	0.18	0.25
P895	J860	J808	1,028.11	6	120	42.36	0.48	0.25	0.25
P1089	J1056	J662	1,352.62	12	120	-161.68	0.46	0.14	0.1
P903	J868	J800	732.22	6	120	-40.25	0.46	0.16	0.22
P963	J926	J924	1,469.50	8	120	-71.94	0.46	0.24	0.16
P989	J952	J1056	1,247.23	12	120	-161.68	0.46	0.13	0.1
P1025	J986	J988	2,596.50	8	120	65.36	0.42	0.35	0.14
P1027	J988	J990	2,420.07	8	120	65.36	0.42	0.33	0.14
P29	J36	J912	1,776.49	6	120	36.43	0.41	0.33	0.19
P947	J910	J908	1,654.99	4	120	16.22	0.41	0.5	0.3
P301	J340	J934	1,238.56	4	120	15.42	0.39	0.34	0.27
P25	J36	J914	568.49	6	120	33.41	0.38	0.09	0.16
P1041	J1004	J1006	731.29	4	120	14.29	0.36	0.17	0.24
P807	J822	J826	523.47	6	120	-29.97	0.34	0.07	0.13
P949	J912	J66	712.34	4	120	-12.02	0.31	0.12	0.17
P787	J812	J858	736.39	6	120	25.62	0.29	0.07	0.1
P1049	J1014	J1016	1,341.19	8	120	43.17	0.28	0.08	0.06
P325	J340	J888	967.88	6	120	21.64	0.25	0.07	0.07
P951	J914	J62	994.95	6	120	22.11	0.25	0.07	0.07
P1055	J1016	J1022	776.2	8	120	37.85	0.24	0.04	0.05
P273	J68	J50	1,193.53	8	120	-37.03	0.24	0.06	0.05
P769	J770	J868	157.17	6	120	-21.22	0.24	0.01	0.07
P797	J824	J826	710.33	6	120	-20.03	0.23	0.04	0.06
P1063	J1026	J1030	826.4	4	120	8.45	0.22	0.07	0.09
P795	J816	J822	1,406.49	6	120	-19.44	0.22	0.08	0.06
P929	J894	J390	1,364.47	8	120	34.1	0.22	0.06	0.04
P763	J780	J862	710.16	6	120	-18.74	0.21	0.04	0.05
P789	J812	J818	1,554.84	6	120	18.52	0.21	0.08	0.05
P1059	J1022	J1026	1,264.80	8	120	31.83	0.2	0.05	0.04
P271	J68	J62	903.73	6	120	16.85	0.19	0.04	0.04
P809	J824	J822	848.95	6	120	13.31	0.15	0.02	0.03
P965	J928	J926	1,434.61	8	120	-23.17	0.15	0.03	0.02
P357	J402	J412	332.55	6	120	-12.17	0.14	0.01	0.02
P387	J428	J892	654.47	4	120	4.82	0.12	0.02	0.03
P973	J936	J390	1,054.10	6	120	-10.47	0.12	0.02	0.02
P1003	J964	J966	338.55	8	120	16.75	0.11	0	0.01
P893	J858	J816	510.04	6	120	9.6	0.11	0.01	0.02
P1033	J996	J998	1,450.67	8	120	14.93	0.1	0.01	0.01
P1037	J998	J1002	645.85	8	120	14.93	0.1	0.01	0.01
P975	J938	J488	1,364.38	4	120	-4.02	0.1	0.03	0.02
P945	J908	J68	914.89	6	120	-8.16	0.09	0.01	0.01
P969	J932	J488	1,773.44	6	120	-8	0.09	0.02	0.01
P1045	J1008	J1010	575.62	8	120	12.65	0.08	0	0.01
P891	J818	J816	490.57	6	120	-6.02	0.07	0	0.01
P1061	J1026	J1028	892.47	8	120	8.54	0.05	0	0
P995	J948	J958	2,685.52	8	120	5.99	0.04	0	0
P997	J958	J960	2,691.48	8	120	5.99	0.04	0	0
P1051	J1016	J1018	348.96	8	120	4.96	0.03	0	0
P1057	J1022	J1024	703.14	4	120	1.28	0.03	0	0
P1013	J974	J976	323.36	8	120	2.74	0.02	0	0
P1031	J994	J996	1,453.22	16	120	14.93	0.02	0	0
P923	J888	J402	703.71	6	120	-2.17	0.02	0	0
P927	J892	J436	598.20	4	120	-0.92	0.02	0	0
P1053	J1018	J1020	338.58	4	120	0.36	0.01	0	0
P971	J934	J936	945.14	6	120	-0.48	0.01	0	0

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)
P1021	J984	J144	284.05	18	120	-2.74	0	0	0
P1035	J998	J1000	575.73	8	120	0	0	0	0
P119	J136	J984	582.00	18	120	0.00	0	0	0
P541	J600	J606	14.01	6	120	0	0	0	0
P647	J714	J712	78.54	16	120	0.00	0	0	0

APPENDIX M

LandAp2010 Results

2011 Alternative Scenario

LandAp2010 v1.0

Select Station: VENICE (89176)

Crop Coefficient: Warm Season Grass (South FL)

Wetted Area: 964 *Acres*

- (●) Wet-Weather Storage
- ( ) Wet-Weather Discharge

Calculate

"----------Output----------"

Required Storage	47.91	*MG*
Required Days of Storage	29.30	
Year of 10-yr Return Period	1968	
Annual Avg. Daily Flow (AADF)	0.06	*in/day*

Minimum required storage based on 10-year return period

Detailed Results in New Sheet | Nitrogen Balance in New Sheet | Clear Results

Hydraulic Loading Rate (MGD)		Hydrologic Site Capacity (in/wk)		Runoff Coefficient	
( ) Constant	1.7 *MGD*	(●) Constant	1.4 *in/wk*	(●) Constant	0.2
(●) Monthly		( ) Monthly		( ) Monthly	
JAN	1.81	JAN	1.00	JAN	0.10
FEB	1.22	FEB	1.00	FEB	0.10
MAR	1.58	MAR	1.00	MAR	0.10
APR	1.81	APR	2.00	APR	0.10
MAY	1.03	MAY	1.00	MAY	0.20
JUN	1.54	JUN	1.00	JUN	0.30
JUL	2.18	JUL	1.00	JUL	0.30
AUG	1.52	AUG	2.00	AUG	0.30
SEP	2.03	SEP	1.00	SEP	0.20
OCT	1.60	OCT	1.00	OCT	0.10
NOV	1.69	NOV	2.00	NOV	0.10
DEC	1.62	DEC	1.00	DEC	0.10
			1.000		
Average Flow	1.64 *MGD*	Average HSC	1.40 *in/wk*	Average SRO Coeff	0.20

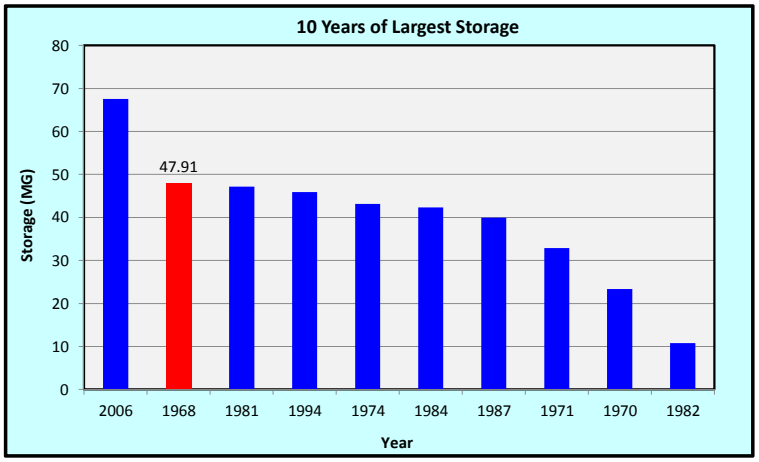
This sheet contains the main inputs and outputs of LandAp2010
Site-specific values for all parameters should be input by the user

- Input Fields
- Output Fields
- Cells containing comments

RANKED DATA

RANK	RETURN PERIOD	YEAR	Storage (MG)	Storage Days	RAIN
1	25.00	2006	67.57	41.32	49.2
2	12.50	1968	47.91	29.30	61.0
3	8.33	1981	47.20	28.86	37.2
4	6.25	1994	45.91	28.08	48.3
5	5.00	1974	43.15	26.39	51.7
6	4.17	1984	42.32	25.88	47.9
7	3.57	1987	39.93	24.42	57.1
8	3.13	1971	32.88	20.11	50.6
9	2.78	1970	23.33	14.27	45.1
10	2.50	1982	10.79	6.60	59.2
11	2.27	1977	3.14	1.92	45.7
12	2.08	1979	3.04	1.86	40.7

The years listed above are limited to those with non-zero Storage/Discharge values.
For detailed information press Detailed Result Button.



2011

LandAp2010 v1.0

Select Station: VENICE (89176)

Crop Coefficient: Warm Season Grass (South FL)

Wetted Area: 1608 *Acres*

- (●) Wet-Weather Storage
- ( ) Wet-Weather Discharge

Calculate

"----------Output----------"		
Required Storage	77.87	*MG*
Required Days of Storage	28.75	
Year of 10-yr Return Period	1981	
Annual Avg. Daily Flow (AADF)	0.06	*in/day*

Minimum required storage based on 10-year return period

Detailed Results in New Sheet | Nitrogen Balance in New Sheet | Clear Results

Hydraulic Loading Rate (MGD)		Hydrologic Site Capacity (in/wk)		Runoff Coefficient	
( ) Constant	1.7 *MGD*	(●) Constant	1.4 *in/wk*	(●) Constant	0.2
(●) Monthly		( ) Monthly		( ) Monthly	
JAN	2.76	JAN	1.00	JAN	0.10
FEB	2.80	FEB	1.00	FEB	0.10
MAR	2.99	MAR	1.00	MAR	0.10
APR	2.95	APR	2.00	APR	0.10
MAY	2.11	MAY	1.00	MAY	0.20
JUN	2.04	JUN	1.00	JUN	0.30
JUL	3.05	JUL	1.00	JUL	0.30
AUG	2.51	AUG	2.00	AUG	0.30
SEP	3.13	SEP	1.00	SEP	0.20
OCT	2.92	OCT	1.00	OCT	0.10
NOV	2.99	NOV	2.00	NOV	0.10
DEC	2.24	DEC	1.00	DEC	0.10
			1.000		
Average Flow	2.71 *MGD*	Average HSC	1.40 *in/wk*	Average SRO Coeff	0.20

This sheet contains the main inputs and outputs of LandAp2010
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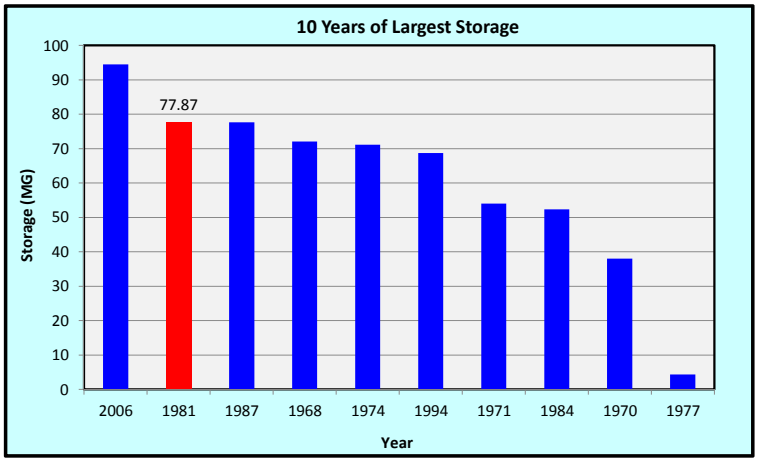
- Input Fields
- Output Fields
- Cells containing comments

RANKED DATA

RANK	RETURN PERIOD	YEAR	Storage (MG)	Storage Days	RAIN
1	25.00	2006	94.51	34.90	49.2
2	12.50	1981	77.87	28.75	37.2
3	8.33	1987	77.66	28.67	57.1
4	6.25	1968	72.06	26.61	61.0
5	5.00	1974	71.12	26.26	51.7
6	4.17	1994	68.72	25.38	48.3
7	3.57	1971	53.99	19.94	50.6
8	3.13	1984	52.38	19.34	47.9
9	2.78	1970	38.06	14.05	45.1
10	2.50	1977	4.38	1.62	45.7
11	2.27	1982	2.03	0.75	59.2

The years listed above are limited to those with non-zero Storage/Discharge values.
For detailed information press Detailed Result Button.



2015

LandAp2010 v1.0

Select Station: VENICE (89176)

Crop Coefficient: Warm Season Grass (South FL)

Wetted Area: 2008 *Acres*

◉ Wet-Weather Storage
○ Wet-Weather Discharge

Calculate

"----------Output----------"		
Required Storage	121.25	*MG*
Required Days of Storage	29.63	
Year of 10-yr Return Period	1987	
Annual Avg. Daily Flow (AADF)	0.08	*in/day*

Minimum required storage based on 10-year return period

Detailed Results in New Sheet | Nitrogen Balance in New Sheet | Clear Results

Hydraulic Loading Rate (MGD)		Hydrologic Site Capacity (in/wk)		Runoff Coefficient	
○ Constant	1.7 *MGD*	◉ Constant	1.4 *in/wk*	◉ Constant	0.2
◉ Monthly		○ Monthly		○ Monthly	
JAN	4.17	JAN	1.00	JAN	0.10
FEB	4.24	FEB	1.00	FEB	0.10
MAR	4.51	MAR	1.00	MAR	0.10
APR	4.46	APR	2.00	APR	0.10
MAY	3.19	MAY	1.00	MAY	0.20
JUN	3.09	JUN	1.00	JUN	0.30
JUL	4.61	JUL	1.00	JUL	0.30
AUG	3.80	AUG	2.00	AUG	0.30
SEP	4.73	SEP	1.00	SEP	0.20
OCT	4.42	OCT	1.00	OCT	0.10
NOV	4.51	NOV	2.00	NOV	0.10
DEC	3.39	DEC	1.00	DEC	0.10
			1.000		
Average Flow	4.09 *MGD*	Average HSC	1.40 *in/wk*	Average SRO Coeff	0.20

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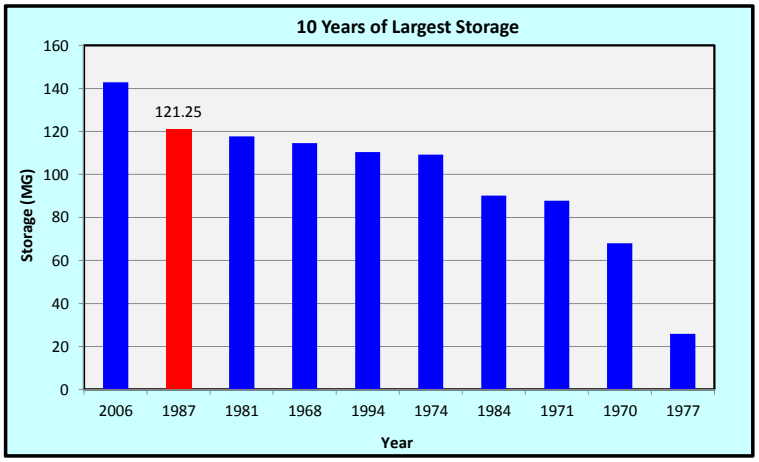
Site-specific values for all parameters should be input by the user

- Input Fields
- Output Fields
- Cells containing comments

RANKED DATA

RANK	RETURN PERIOD	YEAR	Storage (MG)	Storage Days	RAIN
1	25.00	2006	142.80	34.90	49.2
2	12.50	1987	121.25	29.63	57.1
3	8.33	1981	117.67	28.75	37.2
4	6.25	1968	114.62	28.01	61.0
5	5.00	1994	110.45	26.99	48.3
6	4.17	1974	109.24	26.69	51.7
7	3.57	1984	90.20	22.04	47.9
8	3.13	1971	87.85	21.47	50.6
9	2.78	1970	67.95	16.60	45.1
10	2.50	1977	25.90	6.33	45.7
11	2.27	1998	24.03	5.87	50.5
12	2.08	1979	21.15	5.17	40.7
13	1.92	1982	18.61	4.55	59.2

The years listed above are limited to those with non-zero Storage/Discharge values.
For detailed information press Detailed Result Button.



2020

LandAp2010 v1.0

Select Station: VENICE (89176)

Crop Coefficient: Warm Season Grass (South FL)

Wetted Area: 2041 *Acres*

◉ Wet-Weather Storage
○ Wet-Weather Discharge

Calculate

"----------Output----------"

Required Storage	140.56	*MG*
Required Days of Storage	30.12	
Year of 10-yr Return Period	1987	
Annual Avg. Daily Flow (AADF)	0.08	*in/day*

Minimum required storage based on 10-year return period

Detailed Results in New Sheet | Nitrogen Balance in New Sheet | Clear Results

Hydraulic Loading Rate (MGD)		Hydrologic Site Capacity (in/wk)		Runoff Coefficient	
○ Constant	1.7 *MGD*	◉ Constant	1.4 *in/wk*	◉ Constant	0.2
◉ Monthly		○ Monthly		○ Monthly	
JAN	4.76	JAN	1.00	JAN	0.10
FEB	4.83	FEB	1.00	FEB	0.10
MAR	5.14	MAR	1.00	MAR	0.10
APR	5.09	APR	2.00	APR	0.10
MAY	3.63	MAY	1.00	MAY	0.20
JUN	3.52	JUN	1.00	JUN	0.30
JUL	5.25	JUL	1.00	JUL	0.30
AUG	4.33	AUG	2.00	AUG	0.30
SEP	5.39	SEP	1.00	SEP	0.20
OCT	5.04	OCT	1.00	OCT	0.10
NOV	5.14	NOV	2.00	NOV	0.10
DEC	3.87	DEC	1.00	DEC	0.10
			1.000		
Average Flow	4.67 *MGD*	Average HSC	1.40 *in/wk*	Average SRO Coeff	0.20

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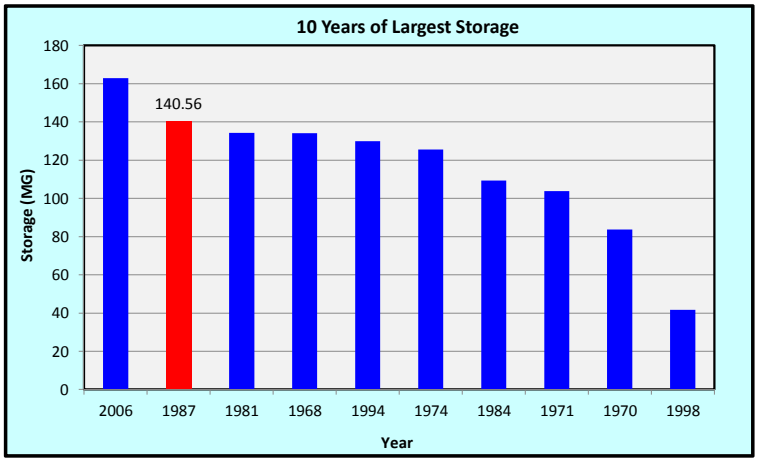
Site-specific values for all parameters should be input by the user

- Input Fields
- Output Fields
- Cells containing comments

RANKED DATA

RANK	RETURN PERIOD	YEAR	Storage (MG)	Storage Days	RAIN
1	25.00	2006	162.83	34.90	49.2
2	12.50	1987	140.56	30.12	57.1
3	8.33	1981	134.17	28.75	37.2
4	6.25	1968	134.06	28.73	61.0
5	5.00	1994	129.83	27.82	48.3
6	4.17	1974	125.60	26.92	51.7
7	3.57	1984	109.36	23.44	47.9
8	3.13	1971	103.86	22.26	50.6
9	2.78	1970	83.63	17.92	45.1
10	2.50	1998	41.73	8.94	50.5
11	2.27	1977	40.89	8.76	45.7
12	2.08	1979	39.06	8.37	40.7
13	1.92	1982	30.38	6.51	59.2
14	1.79	1973	3.48	0.75	43.1

The years listed above are limited to those with non-zero Storage/Discharge values.
For detailed information press Detailed Result Button.



2025

LandAp2010 v1.0

Select Station: VENICE (89176)

Crop Coefficient: Warm Season Grass (South FL)

Wetted Area: 2115 *Acres*

◉ Wet-Weather Storage
○ Wet-Weather Discharge

Calculate

"----------Output----------"

Required Storage	157.60	*MG*
Required Days of Storage	30.40	
Year of 10-yr Return Period	1987	
Annual Avg. Daily Flow (AADF)	0.09	*in/day*

Minimum required storage based on 10-year return period

Detailed Results in New Sheet | Nitrogen Balance in New Sheet | Clear Results

Hydraulic Loading Rate (MGD)		Hydrologic Site Capacity (in/wk)		Runoff Coefficient	
○ Constant	1.7 *MGD*	◉ Constant	1.4 *in/wk*	◉ Constant	0.2
◉ Monthly		○ Monthly		○ Monthly	
JAN	5.28	JAN	1.00	JAN	0.10
FEB	5.37	FEB	1.00	FEB	0.10
MAR	5.72	MAR	1.00	MAR	0.10
APR	5.65	APR	2.00	APR	0.10
MAY	4.04	MAY	1.00	MAY	0.20
JUN	3.91	JUN	1.00	JUN	0.30
JUL	5.84	JUL	1.00	JUL	0.30
AUG	4.81	AUG	2.00	AUG	0.30
SEP	5.99	SEP	1.00	SEP	0.20
OCT	5.60	OCT	1.00	OCT	0.10
NOV	5.72	NOV	2.00	NOV	0.10
DEC	4.30	DEC	1.00	DEC	0.10
			1.000		
Average Flow	5.18 *MGD*	Average HSC	1.40 *in/wk*	Average SRO Coeff	0.20

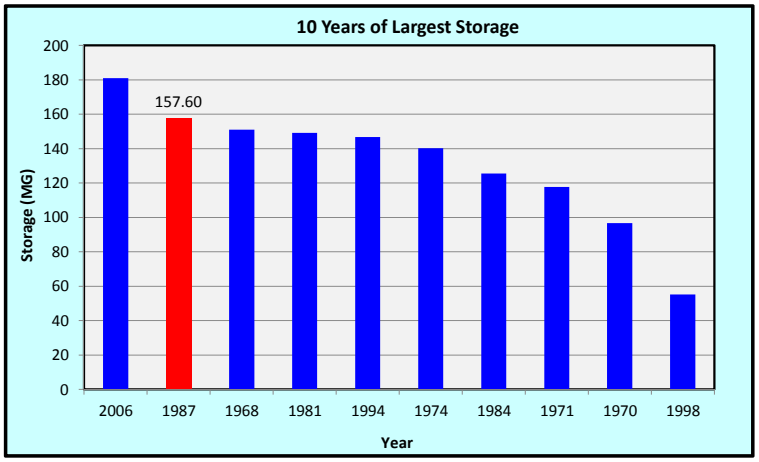
This sheet contains the main inputs and outputs of LandAp2010
Site-specific values for all parameters should be input by the user

- Input Fields
- Output Fields
- Cells containing comments

RANKED DATA

RANK	RETURN PERIOD	YEAR	Storage (MG)	Storage Days	RAIN
1	25.00	2006	180.93	34.90	49.2
2	12.50	1987	157.60	30.40	57.1
3	8.33	1968	151.04	29.13	61.0
4	6.25	1981	149.08	28.75	37.2
5	5.00	1994	146.65	28.28	48.3
6	4.17	1974	140.20	27.04	51.7
7	3.57	1984	125.53	24.21	47.9
8	3.13	1971	117.67	22.70	50.6
9	2.78	1970	96.72	18.65	45.1
10	2.50	1998	55.19	10.65	50.5
11	2.27	1979	52.60	10.14	40.7
12	2.08	1977	52.43	10.11	45.7
13	1.92	1982	42.90	8.27	59.2
14	1.79	1973	14.65	2.83	43.1
15	1.67	1980	7.96	1.54	41.7
16	1.56	1966	2.76	0.53	45.9

The years listed above are limited to those with non-zero Storage/Discharge values.
For detailed information press Detailed Result Button.



2030

LandAp2010 v1.0

Select Station: VENICE (89176)

Crop Coefficient: Warm Season Grass (South FL)

Wetted Area: 2173 *Acres*

◉ Wet-Weather Storage
○ Wet-Weather Discharge

Calculate

"----------Output----------"	
Required Storage	169.58 *MG*
Required Days of Storage	30.55
Year of 10-yr Return Period	1987
Annual Avg. Daily Flow (AADF)	0.09 *in/day*

Minimum required storage based on 10-year return period

Detailed Results in New Sheet | Nitrogen Balance in New Sheet | Clear Results

Hydraulic Loading Rate (MGD)		Hydrologic Site Capacity (in/wk)		Runoff Coefficient	
○ Constant	1.7 *MGD*	◉ Constant	1.4 *in/wk*	◉ Constant	0.2
◉ Monthly		○ Monthly		○ Monthly	
JAN	5.66	JAN	1.00	JAN	0.10
FEB	5.75	FEB	1.00	FEB	0.10
MAR	6.12	MAR	1.00	MAR	0.10
APR	6.05	APR	2.00	APR	0.10
MAY	4.32	MAY	1.00	MAY	0.20
JUN	4.19	JUN	1.00	JUN	0.30
JUL	6.25	JUL	1.00	JUL	0.30
AUG	5.15	AUG	2.00	AUG	0.30
SEP	6.42	SEP	1.00	SEP	0.20
OCT	5.99	OCT	1.00	OCT	0.10
NOV	6.12	NOV	2.00	NOV	0.10
DEC	4.60	DEC	1.00	DEC	0.10
			1.000		
Average Flow	5.55 *MGD*	Average HSC	1.40 *in/wk*	Average SRO Coeff	0.20

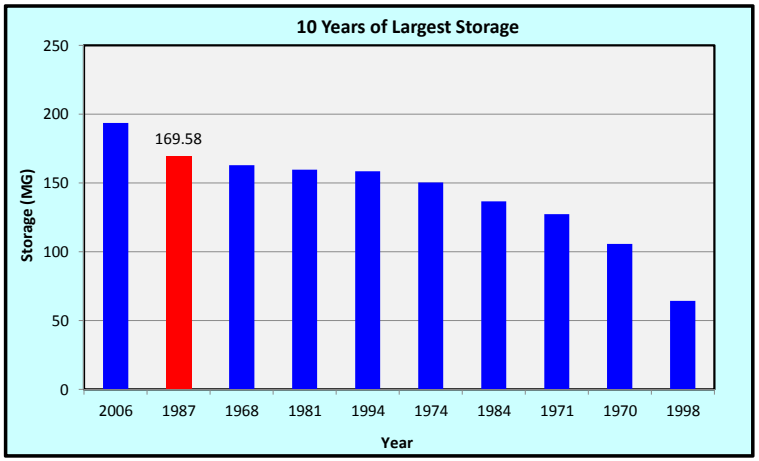
This sheet contains the main inputs and outputs of LandAp2010
Site-specific values for all parameters should be input by the user

- Input Fields
- Output Fields
- Cells containing comments

RANKED DATA

RANK	RETURN PERIOD	YEAR	Storage (MG)	Storage Days	RAIN
1	25.00	2006	193.71	34.90	49.2
2	12.50	1987	169.58	30.55	57.1
3	8.33	1968	162.95	29.36	61.0
4	6.25	1981	159.61	28.75	37.2
5	5.00	1994	158.44	28.54	48.3
6	4.17	1974	150.49	27.11	51.7
7	3.57	1984	136.78	24.64	47.9
8	3.13	1971	127.34	22.94	50.6
9	2.78	1970	105.81	19.06	45.1
10	2.50	1998	64.36	11.60	50.5
11	2.27	1979	61.81	11.13	40.7
12	2.08	1977	60.30	10.86	45.7
13	1.92	1982	51.84	9.34	59.2
14	1.79	1973	22.13	3.99	43.1
15	1.67	1980	15.95	2.87	41.7
16	1.56	1966	9.91	1.78	45.9

The years listed above are limited to those with non-zero Storage/Discharge values.
For detailed information press Detailed Result Button.



2011 City Wastewater Flow Only

LandAp2010 v1.0

Select Station: VENICE (89176)

Crop Coefficient: Warm Season Grass (South FL)

Wetted Area: 1608 *Acres*

◉ Wet-Weather Storage
○ Wet-Weather Discharge

Calculate

"----------Output----------"		
Required Storage	60.28	*MG*
Required Days of Storage	31.21	
Year of 10-yr Return Period	1981	
Annual Avg. Daily Flow (AADF)	0.04	*in/day*

Minimum required storage based on 10-year return period

Detailed Results in New Sheet | Nitrogen Balance in New Sheet | Clear Results

Hydraulic Loading Rate (MGD)		Hydrologic Site Capacity (in/wk)		Runoff Coefficient	
○ Constant	*MGD*	◉ Constant	1.4 *in/wk*	◉ Constant	0.2
◉ Monthly		○ Monthly		○ Monthly	
JAN	1.74	JAN		JAN	
FEB	2.12	FEB		FEB	
MAR	2.04	MAR		MAR	
APR	2.16	APR		APR	
MAY	1.76	MAY		MAY	
JUN	1.50	JUN		JUN	
JUL	2.37	JUL		JUL	
AUG	1.94	AUG		AUG	
SEP	2.11	SEP		SEP	
OCT	1.86	OCT		OCT	
NOV	1.91	NOV		NOV	
DEC	1.67	DEC		DEC	
			1.000		
Average Flow	1.93 *MGD*	Average HSC	1.40 *in/wk*	Average SRO Coeff	0.20

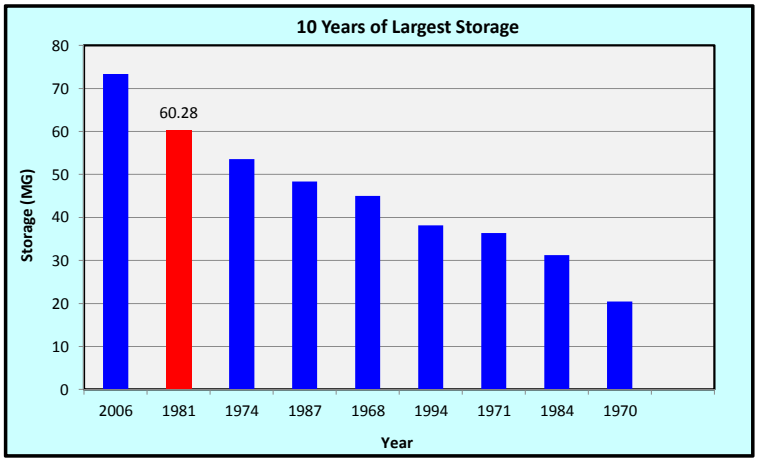
This sheet contains the main inputs and outputs of LandAp2010
Site-specific values for all parameters should be input by the user

- Input Fields
- Output Fields
- Cells containing comments

RANKED DATA

RANK	RETURN PERIOD	YEAR	Storage (MG)	Storage Days	RAIN
1	25.00	2006	73.34	37.97	49.2
2	12.50	1981	60.28	31.21	37.2
3	8.33	1974	53.53	27.72	51.7
4	6.25	1987	48.36	25.04	57.1
5	5.00	1968	45.02	23.31	61.0
6	4.17	1994	38.13	19.74	48.3
7	3.57	1971	36.40	18.85	50.6
8	3.13	1984	31.21	16.16	47.9
9	2.78	1970	20.46	10.60	45.1

The years listed above are limited to those with non-zero Storage/Discharge values.
For detailed information press Detailed Result Button.



2015 City Wastewater Flow Only

LandAp2010 v1.0

Select Station: VENICE (89176)

Crop Coefficient: Warm Season Grass (South FL)

Wetted Area: 2008 *Acres*

◉ Wet-Weather Storage
○ Wet-Weather Discharge

Calculate

"----------Output----------"		
Required Storage	75.72	*MG*
Required Days of Storage	28.75	
Year of 10-yr Return Period	1981	
Annual Avg. Daily Flow (AADF)	0.05	*in/day*

Minimum required storage based on 10-year return period

Detailed Results in New Sheet | Nitrogen Balance in New Sheet | Clear Results

	Hydraulic Loading Rate (MGD)		Hydrologic Site Capacity (in/wk)		Runoff Coefficient	
	○ Constant ◉ Monthly	*MGD*	◉ Constant ○ Monthly	1.4 *in/wk*	◉ Constant ○ Monthly	0.2
JAN	2.68		JAN		JAN	
FEB	2.73		FEB		FEB	
MAR	2.90		MAR		MAR	
APR	2.87		APR		APR	
MAY	2.05		MAY		MAY	
JUN	1.99		JUN		JUN	
JUL	2.96		JUL		JUL	
AUG	2.44		AUG		AUG	
SEP	3.04		SEP		SEP	
OCT	2.84		OCT		OCT	
NOV	2.90		NOV		NOV	
DEC	2.18		DEC		DEC	
				1.000		
Average Flow	2.63	*MGD*	Average HSC	1.40	*in/wk*	Average SRO Coeff 0.20

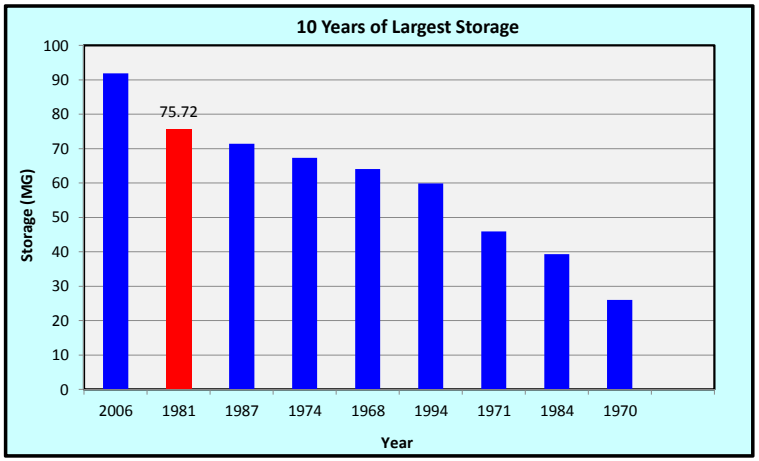
This sheet contains the main inputs and outputs of LandAp2010
Site-specific values for all parameters should be input by the user

- Input Fields
- Output Fields
- Cells containing comments

RANKED DATA

RANK	RETURN PERIOD	YEAR	Storage (MG)	Storage Days	RAIN
1	25.00	2006	91.90	34.90	49.2
2	12.50	1981	75.72	28.75	37.2
3	8.33	1987	71.39	27.11	57.1
4	6.25	1974	67.29	25.55	51.7
5	5.00	1968	64.04	24.32	61.0
6	4.17	1994	59.87	22.73	48.3
7	3.57	1971	45.90	17.43	50.6
8	3.13	1984	39.30	14.92	47.9
9	2.78	1970	26.00	9.87	45.1

The years listed above are limited to those with non-zero Storage/Discharge values.
For detailed information press Detailed Result Button.



2020 City Wastewater Flow Only

LandAp2010 v1.0

Select Station: VENICE (89176)

Crop Coefficient: Warm Season Grass (South FL)

Wetted Area: 2041 *Acres*

◉ Wet-Weather Storage
○ Wet-Weather Discharge

Calculate

"----------Output----------"		
Required Storage	86.76	*MG*
Required Days of Storage	28.75	
Year of 10-yr Return Period	1981	
Annual Avg. Daily Flow (AADF)	0.05	*in/day*

Minimum required storage based on 10-year return period

Detailed Results in New Sheet | Nitrogen Balance in New Sheet | Clear Results

	Hydraulic Loading Rate (MGD)		Hydrologic Site Capacity (in/wk)		Runoff Coefficient	
	○ Constant	*MGD*	◉ Constant	1.4 *in/wk*	◉ Constant	0.2
	◉ Monthly		○ Monthly		○ Monthly	
JAN	3.08		JAN		JAN	
FEB	3.12		FEB		FEB	
MAR	3.33		MAR		MAR	
APR	3.29		APR		APR	
MAY	2.35		MAY		MAY	
JUN	2.28		JUN		JUN	
JUL	3.40		JUL		JUL	
AUG	2.80		AUG		AUG	
SEP	3.49		SEP		SEP	
OCT	3.26		OCT		OCT	
NOV	3.33		NOV		NOV	
DEC	2.50		DEC		DEC	
				1.000		
Average Flow	3.02	*MGD*	Average HSC	1.40 *in/wk*	Average SRO Coeff	0.20

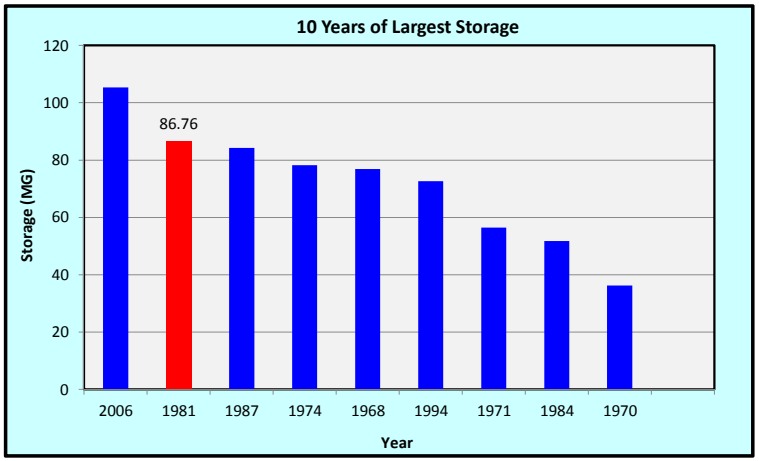
This sheet contains the main inputs and outputs of LandAp2010
Site-specific values for all parameters should be input by the user

- Input Fields
- Output Fields
- Cells containing comments

RANKED DATA

RANK	RETURN PERIOD	YEAR	Storage (MG)	Storage Days	RAIN
1	25.00	2006	105.29	34.90	49.2
2	12.50	1981	86.76	28.75	37.2
3	8.33	1987	84.20	27.91	57.1
4	6.25	1974	78.19	25.91	51.7
5	5.00	1968	76.89	25.49	61.0
6	4.17	1994	72.66	24.08	48.3
7	3.57	1971	56.44	18.71	50.6
8	3.13	1984	51.82	17.18	47.9
9	2.78	1970	36.22	12.00	45.1

The years listed above are limited to those with non-zero Storage/Discharge values.
For detailed information press Detailed Result Button.



2025 City Wastewater Flow Only

LandAp2010 v1.0

Select Station: VENICE (89176)

Crop Coefficient: Warm Season Grass (South FL)

Wetted Area: 2115 *Acres*

◉ Wet-Weather Storage
○ Wet-Weather Discharge

Calculate

"----------Output----------"		
Required Storage	97.65	*MG*
Required Days of Storage	28.75	
Year of 10-yr Return Period	1981	
Annual Avg. Daily Flow (AADF)	0.06	*in/day*

Minimum required storage based on 10-year return period

Detailed Results in New Sheet | Nitrogen Balance in New Sheet | Clear Results

	Hydraulic Loading Rate (MGD)		Hydrologic Site Capacity (in/wk)		Runoff Coefficient	
	○ Constant ◉ Monthly	*MGD*	◉ Constant ○ Monthly	1.4 *in/wk*	◉ Constant ○ Monthly	0.2
JAN	3.46		JAN		JAN	
FEB	3.52		FEB		FEB	
MAR	3.74		MAR		MAR	
APR	3.70		APR		APR	
MAY	2.64		MAY		MAY	
JUN	2.56		JUN		JUN	
JUL	3.82		JUL		JUL	
AUG	3.15		AUG		AUG	
SEP	3.92		SEP		SEP	
OCT	3.67		OCT		OCT	
NOV	3.74		NOV		NOV	
DEC	2.81		DEC		DEC	
				1.000		
Average Flow	3.40	*MGD*	Average HSC	1.40	*in/wk*	Average SRO Coeff 0.20

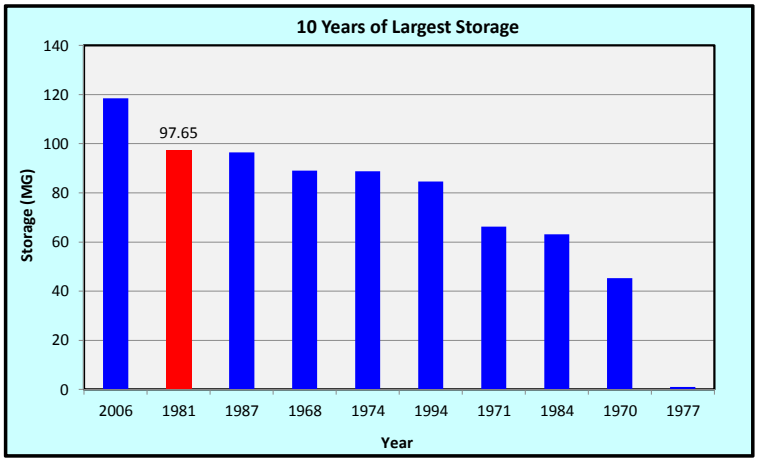
This sheet contains the main inputs and outputs of LandAp2010
Site-specific values for all parameters should be input by the user

- Input Fields
- Output Fields
- Cells containing comments

RANKED DATA

RANK	RETURN PERIOD	YEAR	Storage (MG)	Storage Days	RAIN
1	25.00	2006	118.51	34.90	49.2
2	12.50	1981	97.65	28.75	37.2
3	8.33	1987	96.46	28.41	57.1
4	6.25	1968	89.02	26.21	61.0
5	5.00	1974	88.77	26.14	51.7
6	4.17	1994	84.63	24.92	48.3
7	3.57	1971	66.24	19.50	50.6
8	3.13	1984	63.10	18.58	47.9
9	2.78	1970	45.28	13.33	45.1
10	2.50	1977	0.99	0.29	45.7

The years listed above are limited to those with non-zero Storage/Discharge values.
For detailed information press Detailed Result Button.



2030 City Wastewater Flow Only

LandAp2010 v1.0

Select Station: VENICE (89176)

Crop Coefficient: Warm Season Grass (South FL)

Wetted Area: 2173 *Acres*

◉ Wet-Weather Storage
○ Wet-Weather Discharge

Calculate

"----------Output----------"	
Required Storage	108.44 *MG*
Required Days of Storage	28.82
Year of 10-yr Return Period	1987
Annual Avg. Daily Flow (AADF)	0.06 *in/day*

Minimum required storage based on 10-year return period

Detailed Results in New Sheet | Nitrogen Balance in New Sheet | Clear Results

Hydraulic Loading Rate (MGD)		Hydrologic Site Capacity (in/wk)		Runoff Coefficient	
○ Constant	*MGD*	◉ Constant	1.4 *in/wk*	◉ Constant	0.2
◉ Monthly		○ Monthly		○ Monthly	
JAN	3.83	JAN		JAN	
FEB	3.89	FEB		FEB	
MAR	4.15	MAR		MAR	
APR	4.10	APR		APR	
MAY	2.93	MAY		MAY	
JUN	2.84	JUN		JUN	
JUL	4.23	JUL		JUL	
AUG	3.49	AUG		AUG	
SEP	4.35	SEP		SEP	
OCT	4.06	OCT		OCT	
NOV	4.15	NOV		NOV	
DEC	3.12	DEC		DEC	
			1.000		
Average Flow	3.76 *MGD*	Average HSC	1.40 *in/wk*	Average SRO Coeff	0.20

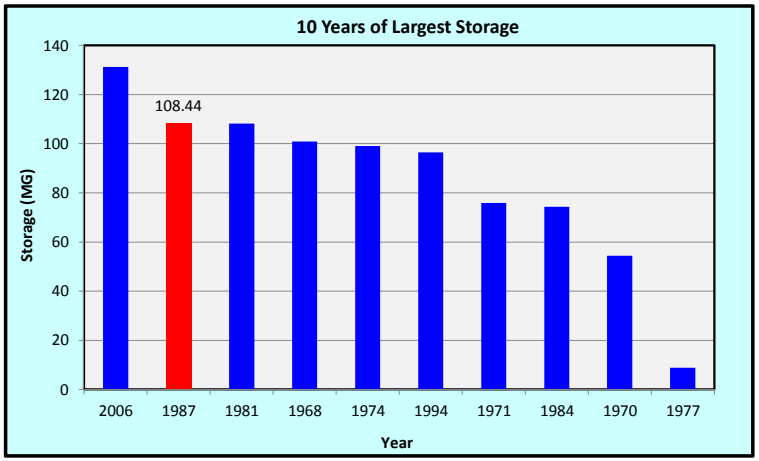
This sheet contains the main inputs and outputs of LandAp2010
Site-specific values for all parameters should be input by the user

- Input Fields
- Output Fields
- Cells containing comments

RANKED DATA

RANK	RETURN PERIOD	YEAR	Storage (MG)	Storage Days	RAIN
1	25.00	2006	131.28	34.90	49.2
2	12.50	1987	108.44	28.82	57.1
3	8.33	1981	108.18	28.75	37.2
4	6.25	1968	100.93	26.83	61.0
5	5.00	1974	99.05	26.33	51.7
6	4.17	1994	96.42	25.63	48.3
7	3.57	1971	75.91	20.18	50.6
8	3.13	1984	74.36	19.77	47.9
9	2.78	1970	54.37	14.45	45.1
10	2.50	1977	8.87	2.36	45.7
11	2.27	1982	5.06	1.34	59.2
12	2.08	1998	3.23	0.86	50.5

The years listed above are limited to those with non-zero Storage/Discharge values.
For detailed information press Detailed Result Button.



APPENDIX N

Groundwater Monitoring Data

Groundwater Monitoring Well Data

2009			Capri Isles MWB-01	Capri Isles MWI-01	Capri Isles MWC-06	Capri Isles MWC-07	Capri Isles MWC-01	Lake Venice MWB-02	Lake Venice MWI-08	Lake Venice MWC-02	Lake Venice MWC-03	Lake Venice MWC-08	Bay Indies MWB-03
Quarter	Parameter	Permit Level	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement
1st	Water Level Relative to NGVD	Report	11.58	11.76	***	***	11.76	11.07	***	7.75	7.19	***	***
	Nitrogen, Nitrate, Total (as N)	10 (mg/L)	0.01	0.02	***	***	0.02	0.03	***	3.76	0.01	***	***
	Solids, Total Dissolved (TDS)	500 (mg/l)	**1530**	**612**	***	***	**612**	72	***	**876**	**736**	***	***
	Arsenic, Total Recoverable	10 (ug/l)	7	2	***	***	2	2	***	**18**	**21**	***	***
	Chloride (as Cl)	250 (mg/l)	270	88	***	***	88	4	***	108	165	***	***
	Cadmium, Total Recoverable	5 (ug/l)	1	1	***	***	1	1	***	1	1	***	***
	Chromium, Total Recoverable	100 (ug/l)	3	1	***	***	1	1	***	2	1	***	***
	Lead, Total Recoverable	15 (ug/l)	1	1	***	***	1	1	***	1	1	***	***
	Coliform, Fecal	4 (#/100ml)	<1	<1	***	***	<1	<1	***	<1	<1	***	***
	pH	6.5 to 8.5	**5.4**	6.8	***	***	6.8	6.9	***	**5.4**	**4.3**	***	***
	Sulfate, Total	250 (mg/l)	**582**	138	***	***	138	6	***	**570**	**376**	***	***
	Turbidity	Report	1.5	0.6	***	***	0.6	1.9	***	0.8	5.4	***	***
	Sodium, Total Recoverable	160 (mg/l)	150	41.2	***	***	41.2	2.43	***	86.4	129	***	***
	Specific Conductance	Report	1694	1044	***	***	1044	200	***	1143	1131	***	***
	Temperature (C), Water	Report	21.9	21.1	***	***	21.1	24.6	***	25	21.9	***	***
	Oxygen, Dissolved (DO)	Report	8.5	0.1	***	***	0.1	0.25	***	0.03	0.01	***	***
2nd	Water Level Relative to NGVD	Report	11.68	11.66	***	***	5.84	10.47	***	7.35	7.99	***	3.2
	Nitrogen, Nitrate, Total (as N)	10 (mg/L)	0.01	0.05	***	***	0.01	0.01	***	7.16	0.01	***	**0.01**
	Solids, Total Dissolved (TDS)	500 (mg/l)	**1760**	388	***	***	**656**	108	***	**804**	**852**	***	**508**
	Arsenic, Total Recoverable	10 (ug/l)	**5.2**	2.6	***	***	2.6	2.6	***	2.6	20	***	2.6
	Chloride (as Cl)	250 (mg/l)	292	48	***	***	95	5	***	146	171	***	86
	Cadmium, Total Recoverable	5 (ug/l)	0.7	0.7	***	***	0.7	0.7	***	1.2	0.7	***	0.7
	Chromium, Total Recoverable	100 (ug/l)	2.6	1.8	***	***	1.8	1.8	***	1.8	1.8	***	13
	Lead, Total Recoverable	15 (ug/l)	3	3	***	***	3	3	***	3	3	***	4
	Coliform, Fecal	4 (#/100ml)	<1	<1	***	***	<1	<1	***	<1	<1	***	<1
	pH	6.5 to 8.5	**6.4**	6.6	***	***	7	6.7	***	**5.4**	**4.2**	***	6.6
	Sulfate, Total	250 (mg/l)	**718**	**253**	***	***	198	8	***	**363**	**358**	***	212
	Turbidity	Report	0.91	0.52	***	***	0.81	1.84	***	0.59	6.8	***	1.29
	Sodium, Total Recoverable	160 (mg/l)	150	38	***	***	50	3	***	82	130	***	30
	Specific Conductance	Report	1884	1070	***	***	881	230	***	1145	1251	***	778
	Temperature (C), Water	Report	21.9	23	***	***	22.6	25.4	***	26.3	24.2	***	23.5
	Oxygen, Dissolved (DO)	Report	0.15	0.09	***	***	0.13	0.09	***	0.13	0.13	***	0.03
3rd	Water Level Relative to NGVD	Report	11.98	11.76	***	***	6.74	11.27	***	8.25	9.69	***	3.8
	Nitrogen, Nitrate, Total (as N)	10 (mg/L)	0.01	0.01	***	***	0.01	0.01	***	7.99	0.01	***	0.01
	Solids, Total Dissolved (TDS)	500 (mg/l)	**1520**	**816**	***	***	**668**	72	***	**696**	**920**	***	**736**
	Arsenic, Total Recoverable	10 (ug/l)	3.8	2.6	***	***	2.6	2.8	***	2.6	**27**	***	2.6
	Chloride (as Cl)	250 (mg/l)	**253**	49	***	***	98	4	***	136	186	***	109
	Cadmium, Total Recoverable	5 (ug/l)	0.2	0.44	***	***	0.33	0.2	***	0.34	0.2	***	0.23
	Chromium, Total Recoverable	100 (ug/l)	5.5	0.67	***	***	0.6	1	***	1.2	0.6	***	0.71
	Lead, Total Recoverable	15 (ug/l)	2.9	2.9	***	***	2.9	2.9	***	2.9	2.9	***	2.9
	Coliform, Fecal	4 (#/100ml)	<1	<1	***	***	<1	<1	***	<1	<1	***	<1
	pH	6.5 to 8.5	**5.9**	6.6	***	***	6.9	6.6	***	**5.2**	**4.1**	***	**6.4**
	Sulfate, Total	250 (mg/l)	**1020**	**309**	***	***	244	34	***	89	**551**	***	**370**
	Turbidity	Report	2.4	0.51	***	***	1.33	3.62	***	1.1	1.55	***	4.55
	Sodium, Total Recoverable	160 (mg/l)	150	38	***	***	53	3.3	***	95	140	***	46
	Specific Conductance	Report	1897	1155	***	***	898	199	***	1031	1303	***	977
	Temperature (C), Water	Report	27.5	28.4	***	***	29	29.9	***	31	32.3	***	31.1
	Oxygen, Dissolved (DO)	Report	0.04	1.42	***	***	1.77	0.11	***	0.07	0.75	***	0.38
4th	Water Level Relative to NGVD	Report	11.98	12.36	***	***	6.24	11.57	***	7.65	7.89	***	4
	Nitrogen, Nitrate, Total (as N)	10 (mg/L)	0.01	0.01	***	***	0.02	0.01	***	6.29	0.01	***	0.01
	Solids, Total Dissolved (TDS)	500 (mg/l)	**772**	**684**	***	***	**1620**	104	***	**800**	**888**	***	**556**
	Arsenic, Total Recoverable	10 (ug/l)	2.5	2.5	***	***	3.9	2.5	***	3.6	**29.3**	***	2.5
	Chloride (as Cl)	250 (mg/l)	51	106	***	***	**282**	3	***	162	179	***	65
	Cadmium, Total Recoverable	5 (ug/l)	0.3	0.3	***	***	0.3	0.3	***	0.8	0.3	***	0.3
	Chromium, Total Recoverable	100 (ug/l)	0.8	0.7	***	***	5	1.4	***	1.8	1.4	***	0.6
	Lead, Total Recoverable	15 (ug/l)	0.9	0.9	***	***	0.9	0.9	***	0.9	0.9	***	0.9
	Coliform, Fecal	4 (#/100ml)	<1	<1	***	***	<1	<1	***	<1	<1	***	<1
	pH	6.5 to 8.5	**6**	6.6	***	***	6.9	6.9	***	**5.2**	**4**	***	**6.4**
	Sulfate, Total	250 (mg/l)	230	**267**	***	***	**832**	6	***	**366**	**489**	***	**302**
	Turbidity	Report	0.52	0.36	***	***	1.26	2.25	***	0.35	1.11	***	1.08
	Sodium, Total Recoverable	160 (mg/l)	38.4	50.7	***	***	142	1.74	***	92.3	109	***	30.9
	Specific Conductance	Report	2440	1112	***	***	1018	220	***	1196	1418	***	842
	Temperature (C), Water	Report	28	27.4	***	***	27.8	28.5	***	26.7	24.6	***	28.6
	Oxygen, Dissolved (DO)	Report	1.4	1.4	***	***	2.8	2	***	2.4	1.2	***	1.5

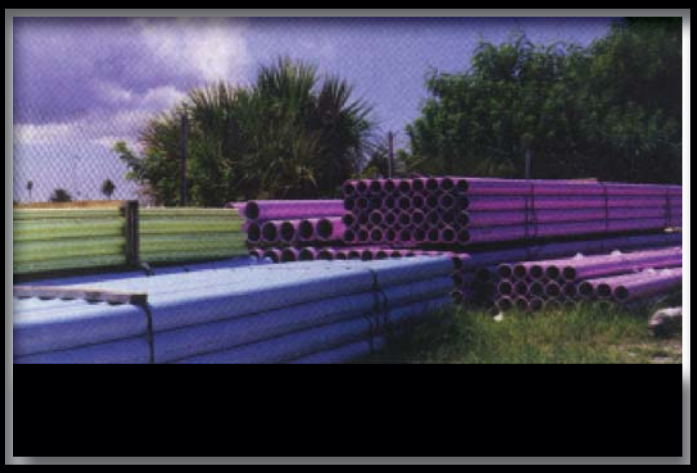
Groundwater Monitoring Well Data

	2010		Capri Isles MWB-01	Capri Isles MWI-01	Capri Isles MWI-06	Capri Isles MWC-06	Capri Isles MWC-07	Lake Venice MWB-02	Lake Venice MWI-08	Lake Venice MWI-02	Lake Venice MWC-08	Bay Indies MWB-03	Bay Indies MWI-05	Bay Indies MWC-04
Quarter	Parameter	Permit Level	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement
1st	Water Level Relative to NGVD	Report	12.38	11.96	6.64	***	***	12.47	9.09	8.85	***	5.3	10.34	8.68
	Nitrogen, Nitrate, Total (as N)	10 (mg/L)	0.01	0.01	0.04	***	***	0.04	0.01	7.06	***	0.11	0.01	0.29
	Solids, Total Dissolved (TDS)	500 (mg/l)	1630	808	1120	***	***	144	948	860	***	660	1930	240
	Arsenic, Total Recoverable	10 (ug/l)	2.6	2.6	2.6	***	***	2.6	24	2.6	***	2.6	2.6	2.6
	Chloride (as Cl)	250 (mg/l)	264	45	179	***	***	6	200	214	***	80	490	39
	Cadmium, Total Recoverable	5 (ug/l)	0.46	0.2	0.3	***	***	0.2	0.2	1.2	***	0.2	0.2	0.2
	Chromium, Total Recoverable	100 (ug/l)	5.2	0.7	0.6	***	***	0.6	0.6	1.7	***	0.6	12	4.8
	Lead, Total Recoverable	15 (ug/l)	2.9	2.9	2.9	***	***	2.9	2.9	2.9	***	2.9	4.3	2.9
	Coliform, Fecal	4 (#/100ml)	<1	<1	<1	***	***	<1	<1	<1	***	<1	<1	<1
	pH	6.5 to 8.5	6.1	6.6	6.8	***	***	6.9	4.2	5.2	***	6.4	6.6	5.6
	Sulfate, Total	250 (mg/l)	999	264	493	***	***	12	460	382	***	313	661	105
	Turbidity	Report	0.37	0.28	2.68	***	***	1.51	1.74	0.74	***	1.64	9.9	8.88
	Sodium, Total Recoverable	160 (mg/l)	160	38	93	***	***	4	140	110	***	34	360	32
	Specific Conductance	Report	1517	1235	1599	***	***	258	1519	1370	***	1013	1729	470
	Temperature (C), Water	Report	23.7	22	22.5	***	***	26.1	21.9	27.4	***	22.8	19.5	22.8
	Oxygen, Dissolved (DO)	Report	1	1	0.8	***	***	1.7	0.8	1.3	***	0.9	1.2	2.9
2nd	Water Level Relative to NGVD	Report	12.18	12.16	6.64	***	***	12.97	8.75	8.79	***	6.6	10.54	8.78
	Nitrogen, Nitrate, Total (as N)	10 (mg/L)	0.02	0.02	0.02	***	***	0.03	7.49	0.01	***	0.01	0.04	0.32
	Solids, Total Dissolved (TDS)	500 (mg/l)	1850	768	1200	***	***	192	920	916	***	716	1280	360
	Arsenic, Total Recoverable	10 (ug/l)	2.6	2.6	2.6	***	***	2.6	2.6	2.6	***	2.6	2.6	2.6
	Chloride (as Cl)	250 (mg/l)	296	40	183	***	***	10	201	186	***	77	253	36
	Cadmium, Total Recoverable	5 (ug/l)	0.2	0.2	0.2	***	***	0.2	1.2	0.2	***	0.2	0.2	0.2
	Chromium, Total Recoverable	100 (ug/l)	4.6	0.88	0.6	***	***	0.6	1.9	0.75	***	0.6	18	4.4
	Lead, Total Recoverable	15 (ug/l)	2.9	2.9	2.9	***	***	2.9	2.9	2.9	***	2.9	5.4	2.9
	Coliform, Fecal	4 (#/100ml)	<1	<1	<1	***	***	<1	<1	<1	***	<1	<1	<1
	pH	6.5 to 8.5	6.4	6.6	6.9	***	***	7	5.3	4.1	***	6.5	6.8	5.8
	Sulfate, Total	250 (mg/l)	616	242	502	***	***	17	350	496	***	333	423	123
	Turbidity	Report	0.84	0.71	0.25	***	***	1.46	1.29	0.37	***	1.26	17.42	6.59
	Sodium, Total Recoverable	160 (mg/l)	150	36	98	***	***	7.9	120	130	***	42	260	31
	Specific Conductance	Report	1605	1202	1553	***	***	344	1659	1391	***	1040	1790	555
	Temperature (C), Water	Report	23.4	22	22.1	***	***	22.4	23.4	21.2	***	22.1	20	22.9
	Oxygen, Dissolved (DO)	Report	3.7	1.9	1.82	***	***	9.03	0.89	1.26	***	1.65	3.4	1.71
3rd	Water Level Relative to NGVD	Report	11.88	11.26	6.24	***	***	11.97	8.39	8.55	***	4.2	9.74	7.38
	Nitrogen, Nitrate, Total (as N)	10 (mg/L)	0.06	0.06	0.06	***	***	0.06	0.06	12.2	***	0.06	0.06	0.06
	Solids, Total Dissolved (TDS)	500 (mg/l)	1540	800	976	***	***	124	948	780	***	892	1304	716
	Arsenic, Total Recoverable	10 (ug/l)	1.36	2.13	1.19	***	***	4.1	38.8	4.37	***	0.91	3.33	2.88
	Chloride (as Cl)	250 (mg/l)	238	40	133	***	***	8.64	182	157	***	96.7	271	25.2
	Cadmium, Total Recoverable	5 (ug/l)	0.9	0.9	0.9	***	***	0.9	0.9	1.6	***	0.9	0.9	0.9
	Chromium, Total Recoverable	100 (ug/l)	6.1	2	2	***	***	2	2	2.7	***	2	4.8	7.6
	Lead, Total Recoverable	15 (ug/l)	0.67	0.67	0.67	***	***	0.67	0.67	0.67	***	0.67	0.67	0.67
	Coliform, Fecal	4 (#/100ml)	<1	<1	<1	***	***	<1	<1	<1	***	<1	<1	<1
	pH	6.5 to 8.5	5.9	6.5	6.9	***	***	6.8	4.1	5.1	***	6.3	6.8	5.3
	Sulfate, Total	250 (mg/l)	646	232	334	***	***	9.53	416	286	***	441	342	119
	Turbidity	Report	0.53	0.28	0.84	***	***	1.38	0.89	2.73	***	0.92	4.47	5.86
	Sodium, Total Recoverable	160 (mg/l)	156	35.2	78.6	***	***	3.32	138	114	***	52.2	235	28.5
	Specific Conductance	Report	1450	1165	1340	***	***	206	1310	1099	***	1145	1658	396
	Temperature (C), Water	Report	26.6	26.4	28.2	***	***	30.1	28.9	31.7	***	27.1	26.1	28.8
	Oxygen, Dissolved (DO)	Report	0.8	0.71	0.53	***	***	1.4	0.55	0.91	***	0.21	0.17	0.36
4th			Capri Isles MWC-05											
	Water Level Relative to NGVD	Report	11.48	11.36	5.64	***	***	12.27	8.09	8.85	***	3.80	9.34	7.18
	Nitrogen, Nitrate, Total (as N)	10 (mg/L)	0.05	0.01	0.06	***	***	0.15	0.06	9.56	***	0.06	0.06	0.06
	Solids, Total Dissolved (TDS)	500 (mg/l)	1580	804	1084	***	***	208	932	664	***	596	1136	476
	Arsenic, Total Recoverable	10 (ug/l)	2.6	2.6	0.7	***	***	1.6	35.9	3.1	***	0.7	0.7	2.0
	Chloride (as Cl)	250 (mg/l)	273	47	160	***	***	13.7	189	129	***	67.8	238	28.1
	Cadmium, Total Recoverable	5 (ug/l)	0.2	0.2	0.9	***	***	0.9	0.9	0.9	***	0.9	0.9	0.9
	Chromium, Total Recoverable	100 (ug/l)	5.5	0.9	2.0	***	***	2.0	2.0	3.2	***	2.0	6.3	7.3
	Lead, Total Recoverable	15 (ug/l)	2.9	2.9	0.7	***	***	0.7	0.7	0.7	***	0.7	0.7	0.7
	Coliform, Fecal	4 (#/100ml)	<1	<1	<1	***	***	<1	<1	<1	***	<1	<1	<1
	pH	6.5 to 8.5	6.3	6.8	6.8	***	***	6.9	4.0	5.2	***	6.7	6.9	5.5
	Sulfate, Total	250 (mg/l)	847	276	398	***	***	19.5	409	261	***	263	325	262
	Turbidity	Report	0.6	0.5	0.6	***	***	0.9	0.4	0.7	***	0.5	1.7	3.9
	Sodium, Total Recoverable	160 (mg/l)	160.0	33.0	82.8	***	***	6.9	130.0	94.2	***	29.9	187.0	26.4
	Specific Conductance	Report	1998	1124	1194	***	***	346	1411	1005	***	836	1530	596
	Temperature (C), Water	Report	26.5	25.6	25.7	***	***	27.7	28.4	30.1	***	26.8	24.5	28.0
	Oxygen, Dissolved (DO)	Report	0.29	0.40	0.66	***	***	0.67	0.41	0.46	***	0.37	0.38	0.35

Groundwater Monitoring Well Data

2011			Capri Isles MWI-01	Capri Isles MWI-06	Capri Isles MWC-05	Capri Isles MWC-06	Capri Isles MWC-07	Lake Venice MWB-02	Lake Venice MWI-08	Lake Venice MWI-02	Lake Venice MWC-08	Bay Indies MWB-03	Bay Indies MWI-05	Bay Indies MWC-04
Quarter	Parameter	Permit Level	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement	Sample Measurement
1st	Water Level Relative to NGVD	Report	11.26	5.24	11.28	***	***	10.37	7.89	8.45	***	2.90	9.34	5.70
	Nitrogen, Nitrate, Total (as N)	10 (mg/L)	0.02	0.03	0.04	***	***	0.01	0.01	10	***	0.01	0.01	0.07
	Solids, Total Dissolved (TDS)	500 (mg/l)	804	1000	1310	***	***	188	952	688	***	628	1220	400
	Arsenic, Total Recoverable	10 (ug/l)	2.6	2.6	2.6	***	***	2.6	24.0	2.6	***	2.6	2.6	2.6
	Chloride (as Cl)	250 (mg/l)	46	148	235	***	***	7	193	145	***	94	268	26
	Cadmium, Total Recoverable	5 (ug/l)	0.2	0.2	0.2	***	***	0.2	0.2	0.8	***	0.2	0.2	0.2
	Chromium, Total Recoverable	100 (ug/l)	1.1	0.7	5.1	***	***	0.6	0.8	2.3	***	0.6	1.5	18.0
	Lead, Total Recoverable	15 (ug/l)	2.9	2.9	2.9	***	***	2.9	2.9	2.9	***	2.9	2.9	4.4
	Coliform, Fecal	4 (#/100ml)	<1	<1	<1	***	***	<1	<1	<1	***	<1	<1	<1
	pH	6.5 to 8.5	6.9	7.1	5.9	***	***	6.9	4.4	5.6	***	6.8	7.1	5.5
	Sulfate, Total	250 (mg/l)	232	389	720	***	***	18	499	429	***	341	616	188
	Turbidity	Report	0.3	0.3	0.4	***	***	2.0	3.1	2.3	***	1.1	1.7	4.1
	Sodium, Total Recoverable	160 (mg/l)	32.0	82.0	140.0	***	***	6.4	130.0	89.0	***	34.0	190.0	23.0
	Specific Conductance	Report	1088	1330	1799	***	***	288	1393	1021	***	953	1776	508
	Temperature (C), Water	Report	23.7	21.0	23.6	***	***	24.2	23.3	23.8	***	21.1	20.9	24.6
	Oxygen, Dissolved (DO)	Report	0.51	0.89	0.41	***	***	0.87	0.70	0.79	***	0.64	0.51	0.72
2nd	Water Level Relative to NGVD	Report	11.86	6.84	11.98	2.71	12.76	11.87	8.59	11.95	1.93	4.90	10.04	13.28
	Nitrogen, Nitrate, Total (as N)	10 (mg/L)	0.01	0.03	0.01	0.07	0.01	0.01	0.01	14.9	0.01	0.48	0.01	0.01
	Solids, Total Dissolved (TDS)	500 (mg/l)	804	888	1400	1500	1430	172	928	784	1230	748	936	348
	Arsenic, Total Recoverable	10 (ug/l)	2.6	2.6	2.6	3.8	110.0	2.6	24.0	2.6	2.6	2.6	2.6	2.6
	Chloride (as Cl)	250 (mg/l)	88	195	239	269	211	172	232	191	201	83	201	28
	Cadmium, Total Recoverable	5 (ug/l)	0.2	0.2	0.2	0.5	0.2	0.2	0.2	0.8	0.2	0.2	0.2	0.2
	Chromium, Total Recoverable	100 (ug/l)	0.7	0.6	7.9	0.6	1.0	1.0	1.3	2.1	1.2	0.6	2.4	5.8
	Lead, Total Recoverable	15 (ug/l)	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
	Coliform, Fecal	4 (#/100ml)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	pH	6.5 to 8.5	6.9	7.1	6.1	6.7	6.7	7.0	4.4	5.5	7.0	6.7	7.2	5.6
	Sulfate, Total	250 (mg/l)	257	311	556	588	526	9	327	284	453	309	237	142
	Turbidity	Report	0.3	3.5	1.0	1.3	0.9	1.7	1.9	0.3	0.4	0.8	2.4	3.2
	Sodium, Total Recoverable	160 (mg/l)	33.0	69.0	140.0	120.0	100.0	4.9	140.0	99.0	130.0	42.0	170.0	23.0
	Specific Conductance	Report	1144	1220	1886	1845	1005	1134	1072	1248	1309	1012	1380	411
	Temperature (C), Water	Report	24.7	25.8	23.4	24.4	25.0	24.8	23.2	23.5	24.8	23.4	22.1	27.4
	Oxygen, Dissolved (DO)	Report	0.37	0.41	0.42	0.40	0.49	1.34	1.52	1.27	0.93	0.17	0.18	0.11
3rd	Water Level Relative to NGVD	Report	12.36	7.84	12.58	3.71	13.26	11.97	9.19	10.35	2.33	6.60	11.04	8.58
	Nitrogen, Nitrate, Total (as N)	10 (mg/L)	0.01	0.01	0.01	0.31	0.01	0.01	0.01	6.35	0.02	0.02	0.01	0.05
	Solids, Total Dissolved (TDS)	500 (mg/l)	812	892	1190	1610	1380	132	808	644	1230	720	1260	224
	Arsenic, Total Recoverable	10 (ug/l)	2.6	2.6	2.6	5.3	83.0	2.6	27.0	16.0	2.6	2.6	2.7	3.4
	Chloride (as Cl)	250 (mg/l)	59	140	243	212	176	5	229	158	190	73	348	20
	Cadmium, Total Recoverable	5 (ug/l)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.2	0.2	0.2	0.2
	Chromium, Total Recoverable	100 (ug/l)	1.4	0.7	4.8	1.0	1.8	1.1	0.7	2.2	0.7	0.6	2.0	5.8
	Lead, Total Recoverable	15 (ug/l)	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
	Coliform, Fecal	4 (#/100ml)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	2	1
	pH	6.5 to 8.5	6.9	7.1	5.6	6.8	6.7	7.0	4.3	6.0	7.0	6.5	7.0	5.8
	Sulfate, Total	250 (mg/l)	193	364	542	682	713	13	297	230	484	387	345	76
	Turbidity	Report	0.3	1.1	0.4	1.0	0.8	1.3	0.5	0.8	0.5	0.8	3.7	2.8
	Sodium, Total Recoverable	160 (mg/l)	33.0	72.0	140.0	130.0	110.0	4.6	130.0	100.0	130.0	44.0	230.0	18.0
	Specific Conductance	Report	1088	1200	1629	1880	1710	248	1250	996	1598	923	1606	290
	Temperature (C), Water	Report	24.9	25.2	27.4	26.1	27.8	28.6	26.7	27.7	27.9	27.8	25.5	29.7
	Oxygen, Dissolved (DO)	Report	0.82	1.12	2.23	1.91	0.82	2.69	1.68	2.78	1.73	0.79	0.91	0.75
4th	Water Level Relative to NGVD	Report												
	Nitrogen, Nitrate, Total (as N)	10 (mg/L)												
	Solids, Total Dissolved (TDS)	500 (mg/l)												
	Arsenic, Total Recoverable	10 (ug/l)												
	Chloride (as Cl)	250 (mg/l)												
	Cadmium, Total Recoverable	5 (ug/l)												
	Chromium, Total Recoverable	100 (ug/l)												
	Lead, Total Recoverable	15 (ug/l)												
	Coliform, Fecal	4 (#/100ml)												
	pH	6.5 to 8.5												
	Sulfate, Total	250 (mg/l)												
	Turbidity	Report												
	Sodium, Total Recoverable	160 (mg/l)												
	Specific Conductance	Report												
	Temperature (C), Water	Report												
	Oxygen, Dissolved (DO)	Report												

City of Venice
Reclaimed Water Master Plan
October 2012



Prepared by :

McKIM&CREED

378 Interstate Court
Sarasota FL, 34240

ph 941.379.3404
fx 941.379.3530

www.mckimcreed.com