10-Year Water Supply Facilities Work Plan (2016-2026 Planning Period)

~~June~~ October 2017

Prepared for:

City of Clearwater

Prepared by:

Tetra Tech, Inc.

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~~June 30~~October 13, 2017

PRESENTED TO

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EXECUTIVE SUMMARY

The city of Clearwater (city) is an incorporated municipality in Pinellas County, located on the central west coast of Florida between the Gulf of Mexico and Tampa Bay. The city currently serves as a Public Water Supplier, providing on average over 11 million gallons per day (MGD) of water to the city and unincorporated areas within its water service area. The city provides over 60% of the supply and treatment capacity to serve the entire service area with city owned facilities. The city has had longstanding interlocal agreements with Pinellas County to purchase potable water to make up the differential. In the city's 2004 Water Master Plan, plans were laid out for the city to increase water production by rehabilitating and expanding existing facilities and constructing new membrane treatment plants to reduce the city's dependency on water from outside sources and ultimately produce potable water at a cost per unit volume that is less than future years' purchase price from Pinellas County. The city has also implemented new reclaimed water service to many existing customers to offset the potable water demand used for irrigation purposes. Additionally, the city is proceeding with groundwater replenishment, a potable reuse program to recharge the aquifer with purified reclaimed water.

To forecast future potable water demand within the city's service area, population projections for the time period of 2016 through 2026 were evaluated. The city's 2008 and 2012 Potable Water Supply Facilities Updates utilized population projection data from the Pinellas County Planning Department (PCPD). Updated PCPD data and population projection data from the Southwest Florida Water Management District (SWFWMD) and the University of Florida's Bureau of Economic and Business Research (BEBR) were utilized to project the city's service area population through 2026. The population projections vary between the PCPD (growth), SWFWMD (minimal growth/stagnant), and BEBR (slight growth). Based on the presented population projections, it seems reasonable to expect that some population growth could occur over the 10-year planning period and that the SWFWMD projections show a reasonable population increase that is in line with historical growth rates. It is recommended that the city monitor water usage in their service area over the next few years to verify if the service area population is likely increasing as projected. For the 10-year planning period (2016 through 2026), it is expected that the average daily demand (ADD) of potable water within the city's service area will be no more than 13 million gallons per day (MGD).

City projects that were completed since the 2012 Potable Water Supply Facilities Master Plan Update include:

1. Wellfield Expansion Program:
    a. Wellfield Expansion for Reverse Osmosis Water Treatment Plant No. 1 (ROWTP 1)
    b. Wellfield Expansion for ROWTP No. 2 (ROWTP 2)
    c. Wellfield Expansion for Water Treatment Plant No. 3 (WTP 3)
2. ROWTP 1 Expansion
3. New ROWTP 2

Future city water facilities include:

1. WTP 3 Improvements - Includes addition of RO treatment (City budget: $8.15M)
2. Groundwater Replenishment Project (potable reuse) – Construction for recharge wells scheduled to begin in 2017; Construction of Advanced Water Purification Plant scheduled to begin in 2018. (Estimated city cost: $16.35M, cooperatively (50%) funded by the Southwest Florida Water Management District)

The city has evaluated the cost of potable water production. The cost of production is based on the city's costs to produce potable water from its water facilities and the cost to purchase potable water from Pinellas County that provides the balance of potable water supply in Clearwater. Pinellas County's adopted wholesale rates are as follows as shown in Table ES-1:

Table ES-1. Adopted Pinellas County Wholesale Rates (cost/1000 gallons)

Fiscal Year	Pinellas County Wholesale Rate
FY 2012	$3.43
FY 2013	$3.56
FY 2014	$3.71
FY 2015	$3.86
FY 2016	$3.92
FY 2017	$3.99
FY 2018	$4.06
FY 2019	$4.13

The city's operating and annualized capital costs for Fiscal Year (FY) 2016 are shown below in Table ES-2:

Table ES-2. City of Clearwater Operating and Annualized Capital Costs (cost/1000 gallons)

Description	Cost
Operating Cost	$1.04
Annualized Capital Cost	$2.02
Total Cost (Operating and Capital)	$3.06

The city of Clearwater is committed to providing high quality potable water to its residents in cost efficient ways. The measures of expanding the city's potable water supply facilities from 2016 through 2026 as described in this document provide for cost effective and reliable water supply and treatment systems for the city's potable water system customers.

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1.0 INTRODUCTION

1.1 BACKGROUND

The city of Clearwater (city) is an incorporated municipality in Pinellas County, located on the central west coast of Florida between the Gulf of Mexico and Tampa Bay. The city currently serves as a Public Water Supplier, providing on average over 11 million gallons per day of water to the city and unincorporated areas. The city provides over 60% of the supply and treatment capacity to serve the entire service area with city owned treatment facilities. The city has had longstanding interlocal agreements with Pinellas County to purchase potable water to make up the differential. In the city's 2004 Water Master Plan, plans were laid out for the city to increase water production by rehabilitating and expanding existing facilities and construct new membrane treatment plants to reduce the city's dependency on water from outside sources and ultimately produce potable water at a cost per unit volume that is less than future years' purchase price from Pinellas County. The city has also implemented new reclaimed water service to many existing customers to offset the potable water demand used for irrigation purposes. The city is proceeding with groundwater replenishment, a potable reuse program to recharge the aquifer with purified reclaimed water. This document is intended to update the progress of these projects, update the projected population and demands for the city's service area, and to summarize projected water production costs for the next 10 year period (2016-2026).

1.1.1 Wellfields/Water Sources

The city of Clearwater utilizes 44 raw water supply wells. Thirty-two of the wells are completed in upper Zone A of the Floridan aquifer to total depths up to approximately 250 feet below land surface (bls). Twelve wells (Wells 2-1 through 2-12) are completed in lower Zone A of the Floridan aquifer to depths ranging from approximately 250 to no more than 500 feet below land surface (bls). The wells and their associated water treatment plant (WTPs) are as follows:

- ROWTP 1 Wells (16 wells) - 23, 31, 48, 51R, 65, 66, 73, 74, 75, 78, 80, 81, 1-1, 1-2, 1-3, 1-4
- ROWTP 2 Wells (17 wells) – 45, 46, 51, 52, 53, 2-1, 2-2, 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-11, and 2-12
- WTP 3 Wells (11 wells) – 56, 58, 63, 68, 69R, 77, 79R, 3-1, 3-2, 3-4, and 3-5

The city holds a Water Use Permit (WUP) from the Southwest Florida Water Management District to withdraw groundwater from the Floridan aquifer. The city of Clearwater recently updated Water Use Permit (No. 20 00981.018). The WUP authorized an annual average withdrawal of 14.3 MGD and a peak month withdrawal of 15.82 MGD. The wellfields had an average withdrawal rate of 7.57 MGD between October 2014 and September 2015, with average withdrawal of 9.44 MGD for the months of June through September 2015.

1.1.2 Water Treatment Plants

The city is authorized through the Florida Department of Environmental Protection (FDEP) as a community water supplier. The city has three water treatment facilities in operation. These facilities are summarized below:

1. Reverse Osmosis Water Treatment Plant No. 1 (ROWTP 1) – This facility is located at 1657 Palmetto just west of Saturn Drive. The source of raw water supply for ROWTP 1 is groundwater

from Upper Zone A of the Floridan aquifer. ROWTP 1 includes a pretreatment process train, reverse osmosis process skids, two 3 million gallon (MG) finished water storage tanks and a high service pumping station. ROWTP 1 has a rated capacity of 4.5 MGD.

2. Reverse Osmosis Water Treatment Plant No. 2 (ROWTP 2) is located at 21133 US Highway 19 North. The sources of water supply for ROWTP 2 is raw water from Upper Zone A and Lower Zone A of the Floridan aquifer wells. ROWTP 2 includes a pretreatment process train, reverse osmosis and ozone processes, two 5 MG finished water storage tanks and a high service pumping station. The city maintains an interconnect with Pinellas County in case of emergency conditions. ROWTP 2 has a rated capacity of 6.25 MGD.

3. Water Treatment Plant No. 3 (WTP 3) is located at 2775 State Road 580, just east of Countryside Boulevard. The sources of water supply for this WTP are raw water from city groundwater wells and finished water from a Pinellas County Interconnect. This facility has minimal chemical treatment capabilities (stabilization and disinfection), aeration, two 5 million gallon finished water storage reservoirs and a high service pump station. WTP 3 typically blends about 20% groundwater with approximately 80% water from the Pinellas County interconnect. WTP 3 has a rated capacity of 9.94 MGD. Improvements to WTP 3 include the addition of pretreatment and reverse osmosis to the facility.

The total rated capacity of the city's water treatment plants is 20.69 MGD.

1.1.3 Interlocal Agreements

The city has had interlocal agreements with neighboring water suppliers for over 50 years. The primary source of water used to supplement city water is supplied by Pinellas County. The most recent Clearwater/Pinellas County interlocal agreement was executed in 2004 and expires in 2039.

The city also has an agreement with the City of St. Petersburg to utilize an emergency interconnect on State Road 60, east of U.S. Highway 19. The exchange of water through this emergency interconnect has not occurred.

Up until 2008, the city traditionally utilized upwards of 70% of the potable water demands through interconnects with the Pinellas County water system. However, the recent expansion and rehabilitation of the wellfields and expansion of the city's water treatment capacity, combined with reuse offsets, conservation, and slight reductions in population show that the city has decreased potable water purchases from Pinellas County. Most recently, the city has reduced the dependence on outside interconnects to 40% through September 2015. **Table 1-1** displays a summary of the historical water usage from well field production and purchased water. With the expansion of the city's RO Plants program (i.e. ROWTP 1 Expansion and new ROWTP 2), the city will supply 10 MGD from city water supply and treatment facilities. Additionally, future improvements to WTP 3 will enable the city to supply the balance of their potable water demands and approach 0% purchased water under normal operating conditions.

Table 1-1. Historical Water Usage from Wellfield Production and Purchased Water

Year	Wellfield Production (MGD)	Purchased Water (MGD)	Total Water Usage (MGD)	Percent of Total Water Purchased
1991	2.87	11.17	14.04	80%
1992	2.33	12.86	15.19	85%
1993	2.68	11.93	14.61	82%
1994	3.79	10.44	14.23	73%
1995	3.79	10.50	14.29	73%
1996	2.93	11.37	14.30	80%
1997	3.44	10.97	14.41	76%
1998	3.14	11.54	14.68	79%
1999	3.07	11.82	14.89	79%
2000	3.05	11.53	14.58	79%
2001	3.07	11.23	14.30	79%
2002	2.27	11.50	13.77	84%
2003	3.85	8.75	12.60	69%
2004	3.62	8.75	12.37	71%
2005	3.57	8.92	12.49	71%
2006	4.17	9.80	13.97	70%
2007	3.49	9.17	12.65	72%
2008	3.07	9.08	12.15	75%
2009	3.71	7.78	11.49	68%
2010	4.15	7.00	11.15	63%
2011	4.95	6.37	11.32	55%
2012	5.93	5.01	10.94	46%
2013	5.41	5.56	10.96	51%
2014	5.13	6.86	11.98	57%
2015*	7.56	5.05	12.61	40%

From 2015 Clearwater Annual Water Report

*Through September 2015

2.0 POPULATION AND WATER DEMAND PROJECTIONS

2.1 INTRODUCTION

The city has historically relied upon the Pinellas County Planning Department (PCPD) population projections, incorporated with their typical per capita usage to project future water demands. In recent years, an economic downturn has resulted in a population decline in the Clearwater service area, which has in effect reduced demands over the last several years. Based on this information, the city investigated several data sources in order to update their 10-Year Water Supply Facilities Work Plan for the period 2016 to 2026. The following is a brief discussion of available population data and the impacts these projections have on projected potable water demands.

2.1.1 Service Area

The Clearwater water service area incorporates several unincorporated areas in addition to the defined city limits. The service area map is depicted in **Figure 2-1**. This service area map includes locations of the production and monitoring wells, raw water mains, treatment plants, storage tanks, and interconnects.

2.1.2 Per Capita Usage

In summarizing the per capita usages from several reports, the following numbers were used:

2015 Annual Water Report:	76 gallons per capita per day (gpcpd)
2008 Facilities Master Plan Update	90.5 gpcpd
SWFWMD Community Planning Pages	89 gpcpd

These numbers show a relatively consistent usage rate which is valid for water projections. In addition to these historical figures, the city is to maintain a water consumption rate of 120 gallons per capita per day or less at a pressure of 40-45 psi according to city Level of Service Standards (city of Clearwater Comprehensive Plan) and the city's WUP.

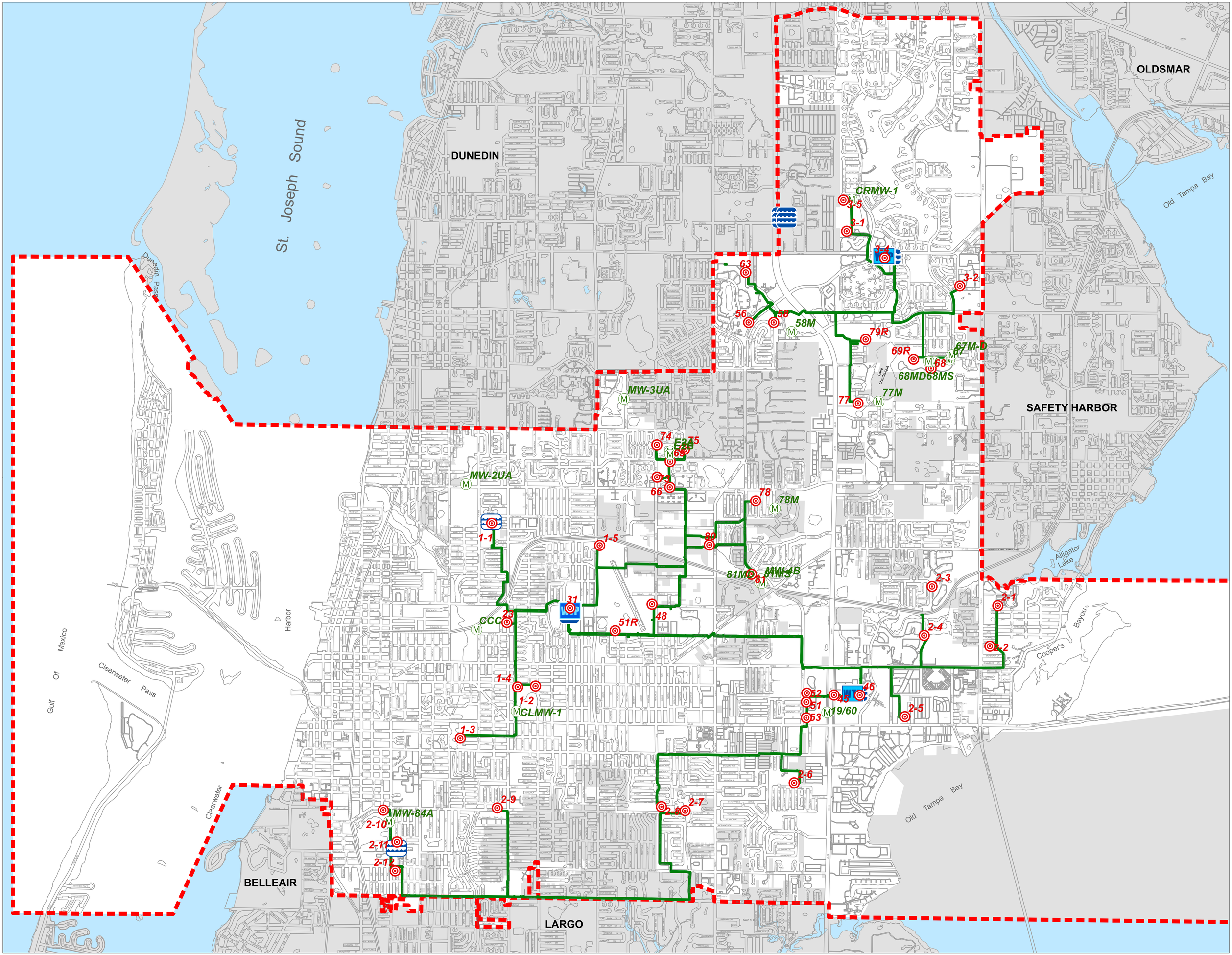
2.1.3 Population Projections

Data Sources

The following data sources were investigated to develop the population projections:

1. Southwest Florida Water Management District (SWFWMD) 2015 Regional Water Supply Plan and the SWFWMD Community Planning Pages website.
2. The University of Florida's Bureau of Economic and Business Research (BEBR) historical population estimates and BEBR Bulletin No. 174 – "Projections of Florida Population by County, 2020–2045, with Estimates for 2015".
3. Pinellas County Planning Department (PCPD) "permanent", "tourist", and "seasonal" population projections based on Traffic Analysis Zones (TAZ), as used to develop the city's 2004 and 2008 population projections.

Figure 2-1. 2016 Facilities Map



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Raw Water Line
Production Well
Monitor Well
WTP #1/RO Plant
WTP #2 & #3
1mil Elev Tank
5mil Gnd Tank
Service Area
County Enclave

Map Gen By: **MBK**

Date: **12/20/2016**

Document Path: V:\GIS\Engineering\Location Maps\2016FacilitiesMap.mxd

The PCPD data incorporates projections for localized traffic zones in Pinellas County which can be used to project a fairly accurate representation of the effective (commuter, resident, and tourist) population in the greater Clearwater water service area. The BEBR estimates are primarily focused on projections for Pinellas County as a whole. The SWFWMD publishes population projections for the greater Clearwater area.

Recent Trends

In general, the city is "built out" and has experienced slow and steady growth over the last 20 years, with typical population increases of less than 1% per year during that period. However, the challenging economic conditions that were fully realized in late 2008 have produced increased vacancies in the city. Also during this period, a net population decline has been realized. BEBR has projected that Pinellas County lost approximately 16,000 residents between the peak population in 2005 and the end of 2010. The most recent population estimations for 2015 show a net increase of approximately 28,400 residents in Pinellas County and a net increase of approximately 3,000 residents in the city (BEBR). These projections coupled with a decline by approximately 7% in the Pinellas County unemployment rate from January 2010 to present indicate that there has been some economic recovery in the Clearwater area.

Population Projections

SWFWMD Population Projections

The SWFWMD has published population projections for the greater Clearwater area on their website. The projections are summarized in **Table 2-1**. In general, the projections show a slightly increasing population. Most of the service area population currently resides inside city limits (approximately 115,000 people), with an additional approximately 17,700 people residing in unincorporated areas. The net growth rate in these projections is approximately 0.01% to 0.02% per year for the 10 year planning window.

Table 2-1 - SWFWMD Population Projections

Year	Population in City Limits	Population in Unincorp. Areas	Total Population
2015	115,457	17,723	133,180
2016	115,476	17,728	133,204
2017	115,495	17,734	133,228
2018	115,513	17,739	133,253
2019	115,532	17,745	133,277
2020	115,551	17,750	133,301
2021	115,564	17,754	133,318
2022	115,576	17,759	133,335
2023	115,589	17,763	133,352
2024	115,601	17,768	133,369
2025	115,614	17,772	133,386
2026	115,623	17,776	133,399
2027	115,633	17,780	133,413
2028	115,642	17,784	133,426
2029	115,652	17,788	133,440
2030	115,661	17,792	133,453
2031	115,666	17,795	133,462
2032	115,671	17,799	133,470
2033	115,677	17,802	133,479
2034	115,682	17,806	133,487
2035	115,687	17,809	133,496

Projections reported in 5 year increments. Data was linearly interpolated for years not specified.

PCPD Estimates for Greater Clearwater Area

Because the city's water service agreement with Pinellas County also includes areas that are unincorporated, the service population more closely matches the area outlined in **Figure 2-1**. Based on this information, population projections for TAZs that are incorporated in the city's water service area were extracted from the data set. For TAZs that are not entirely serviced by the city, adjustments were made to the data to exclude the approximate number of residents that are not served. The results of this effort are summarized herein.

Pinellas County's population estimates for the "Greater Clearwater Area" as shown in **Table 2-2** are extrapolated to be 137,969 for permanent population in the current year of 2016. Furthermore, these TAZ projections also incorporate seasonal and tourist population projections, which are estimated to be 12,262 and 15,465 in 2016. Seasonal residents are defined as residing in the city for less than 6-months, while tourists are generally classified as short term visitors that typically stay in the area for less than 1 month. The functional water service population is defined by the Water Use Caution Area (WUCA) rules and makes adjustments for seasonal residents and tourists in the city. The total functional population is

calculated for 2016 as 149,789 based on the WUCA equation. **Table 2-2** shows the projected service area annual functional populations based on interpolation of the PCPD projection data.

When comparing PCPD projections (Updated October 2009) for 2015-2035 to the SWFWMD projections, the PCPD projections have a much higher growth outlook, with a net population increase of approximately 0.4-0.7% per year expected in the Clearwater service area.

Table 2-2. PCPD Projections

Year	Permanent Population	Seasonal Population	Tourist Population	Functional Population
2015	136,899	12,204	15,440	148,687
2016	137,969	12,262	15,465	149,789
2017	139,038	12,320	15,490	150,890
2018	140,108	12,378	15,515	151,991
2019	141,177	12,436	15,541	153,093
2020	142,247	12,494	15,566	154,194
2021	143,299	12,543	15,585	155,273
2022	144,351	12,592	15,605	156,351
2023	145,403	12,641	15,625	157,429
2024	146,455	12,689	15,644	158,507
2025	147,508	12,738	15,664	159,586
2026	148,182	12,779	15,681	160,283
2027	148,857	12,820	15,699	160,980
2028	149,532	12,861	15,716	161,677
2029	150,207	12,902	15,733	162,374
2030	150,882	12,943	15,751	163,071
2031	151,541	12,976	15,766	163,749
2032	152,200	13,010	15,780	164,426
2033	152,859	13,043	15,795	165,104
2034	153,518	13,076	15,810	165,781
2035	154,177	13,109	15,825	166,459

Projections reported in 5 year increments, Data was linearly interpolated for years not specified.

Functional population as defined by the WUCA is:

$$\frac{[(\text{permanent} + \text{seasonal}) \times 4] + [\text{permanent} \times 8]}{12} + \frac{\text{Tourist}}{2}$$

BEBR Estimates for Pinellas County

In analyzing the most recent Pinellas County population projections from BEBR (Bulletin 174, January 2016), and estimating the service area population at 12.2% of the county's population, the low, medium (most likely prediction), and high population estimates of the next 30 years shows great disparity. This data is summarized in **Table 2-3**.

Table 2-3. Summary of BEBR Projections for Pinellas County Population

City of Clearwater	Estimated	Projection Year			
	2015	2020	2025	2030	2035
Low	115,286	112,472	110,593	108,812	106,726
Medium	115,286	116,693	117,986	118,645	119,035
High	115,286	121,219	125,440	129,210	132,663

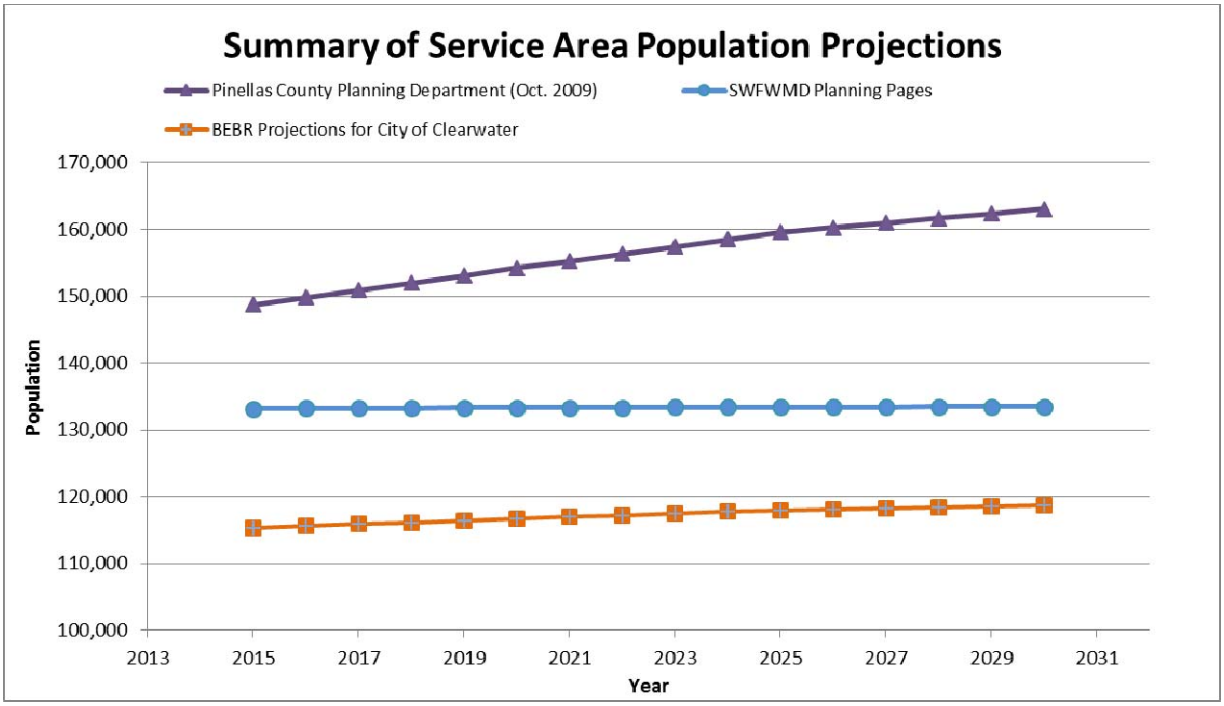
Based on Population projections of Pinellas County, and estimating 12.2% of Pinellas County population is within Clearwater Service Area (% taken from SWFWMD Planning Pages)

These projections show a net population increase ranging from 0.07% to 0.2% per year is projected for Pinellas County and the city of Clearwater for the foreseeable future based on the medium projection, with the potential for population decline based on the low projection.

Projections Summary

In summary, the population projections vary between the PCPD (growth), SWFWMD (minimal growth/stagnant), and BEBR medium projection (slight increase). **Figure 2-2** presents a summary of the population projections detailed above.

Figure 2-2. Population Projections Summary Graph



Based on the presented population projections, population growth is expected over the 10-year planning period. The more recent population projection data is from the SWFWMD planning pages and the BEBR projections and it is suggested that these projections be utilized for planning for population growth.

2.2 WATER CONSUMPTION ESTIMATES

Updated projected water demands were calculated by applying the growth rates found by the SWFWMD projection approach to the current water usage of 12.61 MGD. The updated water demand projections are presented in **Table 2-4** below. Based on these water demand projections, the WUP authorized annual average withdrawal of 14.3 MGD and peak month withdrawal of 15.82 MGD, the 20.69 rated capacity of the city's water treatment plants, the emergency Pinellas County potable water interconnect at ROWTP 2, the Pinellas County potable water interconnect at WTP 3, the city has adequate water supply and potable water capacity for the ten-year planning horizon.

Table 2-4. Potential Demand Scenarios Based on Functional Population Projections

Year	SWFWMD Functional Population	Growth Rate (%)	Updated Projected Water Demands (MGD)
2015	133,180	--	12.61
2016	133,204	0.02%	12.61
2017	133,228	0.02%	12.61
2018	133,253	0.02%	12.62
2019	133,277	0.02%	12.62
2020	133,301	0.02%	12.62
2021	133,318	0.01%	12.62
2022	133,335	0.01%	12.62
2023	133,352	0.01%	12.63
2024	133,369	0.01%	12.63
2025	133,386	0.01%	12.63
2026	133,399	0.01%	12.63
2027	133,413	0.01%	12.63
2028	133,426	0.01%	12.63
2029	133,440	0.01%	12.63
2030	133,453	0.01%	12.64
2031	133,462	0.01%	12.64
2032	133,470	0.01%	12.64
2033	133,479	0.01%	12.64
2034	133,487	0.01%	12.64
2035	133,496	0.01%	12.64

SWFWMD Projections reported in 5 year increments. Data was linearly interpolated for years not specified.

3.0 POTABLE WATER SUPPLY PROJECTS UPDATE

In the 2004 Water Master Plan, the city of Clearwater established a water supply goal of 70% self-reliance on local sources and 30% reliance on the regional system by 2014. The 2008 Potable Water Supply Facilities Master Plan Update described the city's objectives and detailed plans to achieve this goal and was submitted to the SWFWMD in October 2008. The current status of the city's potable water supply projects is described below.

3.1.1 Wellfield Expansion for ROWTP 1 and WTP 3

The groundwater from the wellfields for ROWTP 1 and WTP 3 have intermittently experienced higher level of chlorides, sulfates, and/or total dissolved solids (TDS) over the past years. Wells with groundwater exhibiting higher levels of chlorides, sulfates, and/or TDS have been rested until the water quality improved. Recognizing that the variations in water quality were not causing violations in the city's finished water after blending, the city requested and subsequently received approval from the SWFWMD to modify the WUP and change routine monitoring from the production wells to monitoring wells. In addition, the city requested in the WUP application that the wellfields providing groundwater to ROWTP 1 and WTP 3 be expanded. The wellfield expansion was reviewed and permitted by both the SWFWMD and the Florida Department of Environmental Protection (FDEP).

The Wellfield Expansion Project for ROWTP 1 and WTP 3 added ten new production wells, four relocated wells and three rehabilitated wells (No. 23, No. 68, & No. 69) to the wellfields. Wells construction and rehabilitation was completed in 2011. In conjunction with the Wellfield Expansion Project, construction of raw water pipelines connecting the new wells to the existing raw water system was completed in January 2011.

3.1.2 ROWTP 1 Expansion

The ROWTP 1 capacity was 3.0 MGD prior to the expansion, which was provided by blending 1.0 MGD of media filtered blend water with 2.0 MGD of RO permeate produced from two (2) 1.0 MGD treatment units (skids). In the 2004 Master Plan, the facility was proposed to be expanded to 4.5 MGD by adding an additional 1.0 MGD membrane treatment skid to blend with an additional 0.5 MGD of media filtered blended water. During design of the plant expansion, the city determined to change out the existing membranes with newer high flux membranes to achieve the desired treatment capacity of 3.0 MGD through the RO process with the two existing skids. In addition, this expansion also entailed the demolition of the existing 5 MG storage tank, and the construction of two (2) new 3 MG storage tanks. A Backwash Recycle System was also installed to allow for the reclamation of Dual Media Filter and Arsenic Adsorber Backwash. The final design was developed in 2012. Construction of the ROWTP 1 Expansion began in early 2013 and was completed in 2014.

The expansion of ROWTP 1 included construction of a new RO concentrate discharge pipeline from ROWTP 1 to the ROWTP 2 site. The RO concentrate from ROWTP 1 blends with the ROWTP 2 raw water from the groundwater wells, providing source water supply for ROWTP 2. Both ROWTP 1 concentrate and ROWTP 2 concentrate discharge to the deep injection well at ROWTP 2.

3.1.3 ROWTP 2

ROWTP 2 has a 6.25 MGD treatment capacity, providing approximately 5.0 MGD of finished water to the city's potable water system on an annual average daily basis. The source of raw water supply for RO Plant No. 2 is both groundwater from Upper Zone A and brackish groundwater from Lower Zone A of the

Floridan Aquifer. Twelve new wellfield production sites throughout the city provide the brackish groundwater from Lower Zone A. ROWTP 2 began potable water production in 2015.

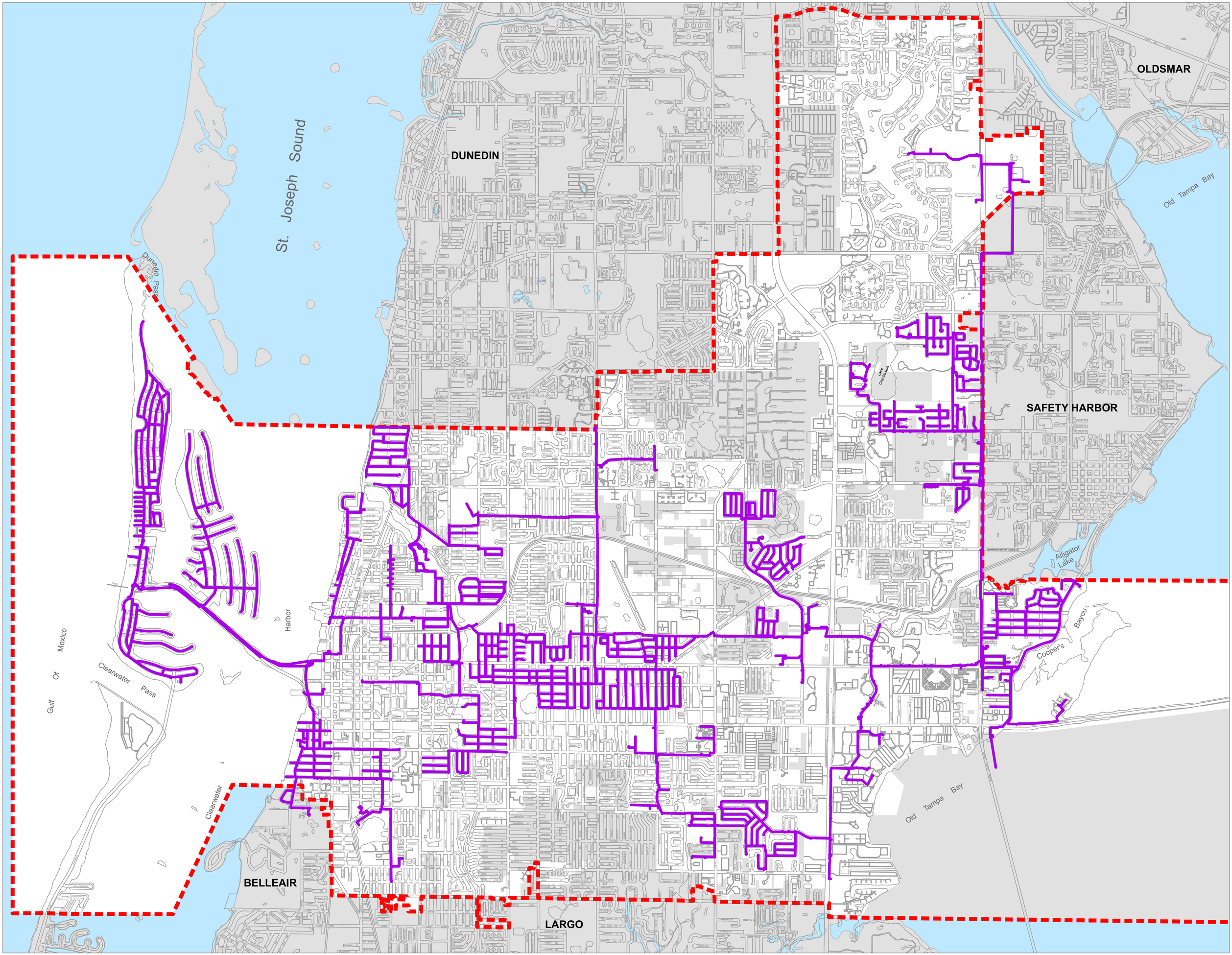
3.1.4 Offset of Water Demands through Expansion of Reuse System

The city has historically provided reclaimed service primarily in the west, southeast, and northeast corridors. Reclaimed water is provided to these areas by the city's Marshall Street, Northeast, and East Water Reclamation Facilities. The most recent reclaimed water system expansion projects includes the Skycrest, Glen Oaks and Clearwater Harbor projects. The city supplies over 4.5 MGD of reclaimed water on an average day. The city constructed reclaimed water projects with the help of cooperative funding agreements from the SWFWMD. Future expansion of the city's reclaimed water system will be resident initiated projects. The city will continue to provide rebates to residents that properly abandon an irrigation well to connect to the city's reclaimed water system. **Table 3-1** lists the areas that have reclaimed water service and **Figure 3-1** illustrates the city's existing reclaimed water distribution system.

Table 3-1. Areas Served by Reclaimed Water

Service Area	Year of Activation
Island Estates	1999
North Clearwater Beach	2001
South Clearwater Beach	2001
NE WRF Storage and Pumping Facility	2002
North Greenwood	2003
Harbor Oaks	2004
Sunset/Seville	2006
Drew/Union	2007
Del Oro Groves	2007
Morningside	2011
Coachman Ridge/Lake Chautauqua	2011
Skycrest	2012
Glen Oaks /Palmetto	2012
Clearwater Harbor	2013

Figure 3-1. 2016 Reclaimed Water Map



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Reclaimed Water Line | Service Area | County Enclave

Map Gen By: **MBK**

Date: **12/20/2016**

Document Path: V:\GIS\Engineering\Location Maps\2016ReclaimedMap.mxd

3.1.5 Groundwater Replenishment Project

The purpose of the Groundwater Replenishment Project is to recharge purified reclaimed water to the Upper Floridan aquifer as part of an indirect potable reuse project. This has many benefits, such as maximizing the beneficial use of the city's reclaimed water supply and improve the hydrogeologic conditions of the Upper Floridan aquifer through recharge while simultaneously reducing the discharge of excess reclaimed water to surface water. The project will also enhance groundwater resources by providing a potential salinity barrier that can offset current and future withdrawals from the city's wellfields. The project includes an Advanced Water Purification Plant (AWPP), four recharge wells, a deep injection well for RO concentrate disposal and associated pipelines.

Since the 2008 Master Plan update, the city evaluated the feasibility of the preliminary treatment processes to purify reclaimed water to meet or be better than drinking water standards and the feasibility of the aquifer recharge system to recharge the Upper Floridan aquifer with up to 3 MGD of purified reclaimed water. Additionally, the city designed and operated a one-year advanced water purification pilot system from June 2013 to June 2014 and tested hydrogeologic conditions of the Upper Floridan aquifer. The advanced water purification treatment process includes ultrafiltration filtration (UF), reverse osmosis (RO), an advanced oxidation process (AOP) with hydrogen peroxide and UV, and stabilization and deoxygenation of the water with membrane contactors to minimize metals mobilization in the aquifer. The full-scale 3 MGD project is in design. Construction of the recharge wells and deep injection well is scheduled to begin in summer 2017 and construction of the AWPP is scheduled to begin in early 2018.

3.1.6 Water Conservation Measures

The city has participated in various water conservation initiatives and programs, ultimately conserving approximately 1.31 MGD of potable water. Water conservation initiatives include enforcement of irrigation restrictions and plumbing upgrades. Water conservation programs utilized by the city include landscape and irrigation evaluations, rain sensor rebates, pre-rinse spray valves, industrial, commercial, and institutional (ICI) facility assessments, and large landscape surveys. Additionally, the city provides funding for water conservation educational materials for 5th grade students.

The city has been providing reclaimed water to residential customers, large outdoor users (including golf courses and city parks), and industrial customers for more than a decade. The city continues to target ICI facilities for potential reclaimed water use through ICI Facility Assessments. 25 ICI Facility Assessments were conducted by the city and reported in the 2010 Regional Water Supply Plan (SWFWMD). Element F of the city's Comprehensive Plan outlies the city's development of the reclaimed water program. The city is committed to implementing their Comprehensive Plan and continued participation in water conservation programs in the future.

4.0 CONCEPTUAL COST ESTIMATES FOR CAPITAL IMPROVEMENTS

The two major water facilities capital improvement projects the city anticipates within the next 10 years are treatment improvements at WTP 3 and the Groundwater Replenishment Project. Based on review of the water quality of the groundwater supplied by the Water Plant No. 3 wellfield, advanced treatment of the groundwater is needed to address the increasing levels of constituents such as arsenic and total dissolved solids (TDS). The estimated costs associated with improvements to WTP 3 and the Groundwater Replenishment Project are outlined in **Table 4-1** below.

Table 4-1. Potable Water Supply Facilities Capital Improvement Program (2016 – 2026)

Project	Estimated Cost
WTP 3 Improvements (pretreatment and RO addition)	$8.15M (CIP Budgeted)
Groundwater Replenishment Project	$16.35M*
Total	**$24.5M**

*City's portion of the project (50%). SWFWMD cooperative funding (50%)

5.0 WATER PRODUCTION COSTS UPDATE

Burton and Associates, financial consultants to the city, has recently performed water production financial analyses for the city. These analyses projected the city's total water production costs per unit water produced for Fiscal Year (FY) 2016, which included capital, operation and maintenance (O&M), debt service, and renewal and replacement (R&R) costs of all existing and proposed water treatment plant facilities. The cost per unit water produced was then compared to the projected cost of purchasing water from Pinellas County. These costs were used as a baseline to update the water production costs for the planning FY 2022.

Pinellas County's adopted wholesale rates are as follows as shown in Table 5-1:

Table 5-1. Adopted Pinellas County Wholesale Rates (cost/1000 gallons)

Fiscal Year	Pinellas County Wholesale Rate
FY 2012	$3.43
FY 2013	$3.56
FY 2014	$3.71
FY 2015	$3.86
FY 2016	$3.92
FY 2017	$3.99
FY 2018	$4.06
FY 2019	$4.13

The city's operating and annualized capital costs for FY 2016 are shown below in Table 5-2:

Table 5-2. City of Clearwater Operating and Annualized Capital Costs (cost/1000 gallons)

Description	Cost
Operating Cost	$1.04
Annualized Capital Cost	$2.02
Total Cost (Operating and Capital)	$3.06

6.0 SUMMARY

The city of Clearwater is committed to providing high quality potable water to its residents in cost efficient ways. The plans to improve the city's water supply facilities from 2016 to 2026 are anticipated as follows:

1. Develop the necessary planning and design for the WTP 3 improvements.
2. Continue to expand the reuse distribution system to serve more customers and increase the offset of potable water for irrigation purposes.
3. Continue the Groundwater Replenishment Project and begin construction of wells in 2017 and Advanced Water Purification Plant construction in 2018.

These measures of expanding the city's water supply facilities from 2016 through 2026 provide a cost effective and reliable water supply and treatment system for the city's residents.