City of Clearwater
10-Year Water Supply Facilities Work Plan (2022-2032 Planning Period)

CITY PROJECT NO. 22-0003-UT

July 2022

McKIM & CREED

CLEARWATER
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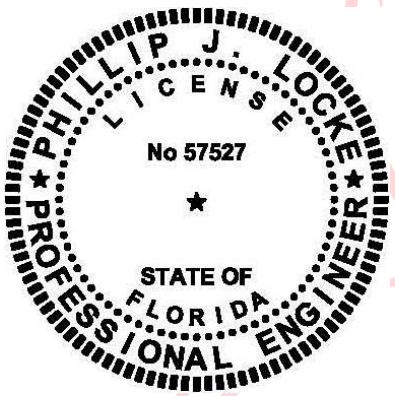

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PHILLIP J. LOCKE

ON THE DATE ADJACENT TO THE SEAL

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EXECUTIVE SUMMARY

The City of Clearwater (City) delivers approximately 11.24 million gallons per day (MGD) of potable water to population of approximately 118,000 citizens in the City via nearly 620 miles of water transmission and distribution mains. The City withdraws groundwater from local public water supply wells and then processes the raw water through three water treatment plants (WTPs). Two of these plants currently use reverse osmosis (RO) for treatment of the groundwater. The third plant treats the groundwater and then blends with potable water purchased from Pinellas County Utilities (PCU) before further treatment and distribution. According to the City's 2021 Annual Water Report, the City produced approximately 6.24 MGD of potable water and purchased the remaining daily demand of 5.0 MGD from PCU. To maximize groundwater production and minimize water purchases, the City plans to restore and maintain the design capacity at the RO treatment plants, construct a RO process at the third plant, and increase source water by constructing additional groundwater production wells. Currently, the City is evaluating alternatives to achieve compliance with Senate Bill 64 (SB 64). These alternatives include expanding the reclaimed water (RCW) system and implementing a potable reuse system that would reduce the City's reliance on the existing groundwater supply system and reduce surface water discharges of highly treated low nutrient effluent water. Additionally, as part of the City's Greenprint 2.0 initiative, the City is considering implementation of goals for water system sustainability and resiliency. Goals may address groundwater resource protection, wind and flood protection, redundancy, potable reuse, and water conservation / education programs for the City's residents.

The intent of this work plan is to identify alternative and traditional water supply development as well as conservation and reuse projects that are needed to meet the City's future demands within the 10-yr planning period (2022-2032). In accordance with the Interlocal Agreement between the City and PCU that will expire on September 30, 2035, the 2018 contractual rate of $4.06 per 1,000 gallons increases 1% per year until 2023. The 2023 contractual rate will be $4.30 per 1,000 gallons (see **Table ES-1**).

Table ES-1: Contractual Pinellas County Wholesale Rates

Fiscal Year	Pinellas County Wholesale Rate (per 1,000 gallons)
2018	$4.06
2019	$4.14
2020	$4.17
2021	$4.21
2022	$4.26
2023	$4.30

The City's operating and annualized capital costs for FY 2020 are shown in **Table ES-2**.

Table ES-2: Operating and Annualized Capital Cost (per 1,000 gal)

Description	Costs[1]
Operating Cost	$1.36
Annualized Capital Cost	$2.19
Total Cost	$3.55

1) *City of Clearwater – Water System FY2020 Budget*

An analysis of population and water demand projections resulted in an expected increase in water usage by 0.25 MGD within the 10-year planning period (2022-2032) from 11.26 MGD (based on the functional population of 144,718) in the year 2022 to 11.51 MGD (based on functional population of 149,301) in the year 2032. This projected increase was used to identify the required water source and infrastructure needs to increase the capacity of the City's water system.

An evaluation of the City's Water Supply and Distribution System was conducted to determine the necessary improvements to meet future water needs according to the City of Clearwater's 2022 WMP. **Table ES-2** lists the CIPs for the 5-year planning period (2022 to 2027).

Table ES-2: Summary of Recommended Supply and Treatment System CIPs and Schedules

CIP Project Name	Estimated Cost[1]	Implementation Period (FY)
Wellfield#1 Improvements	$18,638,000	2026-2030
Wellfield#2 Improvements	$29,627,000	2022-2025
Wellfield#3 Improvements	$16,203,000	2026-2030
ROWTP#1 - Residuals Management System Improvements	$2,553,000	2022-2025
ROWTP#2 - Process Improvements for 2-Skid Operations	$12,442,000	2022-2025
ROWTP#2 - Blending and Process Improvements	$11,744,000	2026-2030
WTP#3 - Ground Storage Tank and Pinellas County Utility Interconnect Improvements	$1,906,000	2022-2025
WTP#3 – Convert WTP #3 to RO Process	$49,518,000	2026-2030
Total	**$142,631,000**	**-------**

1) *Based on 2022 construction costs*

The City is dedicated to producing drinking water that meets state and federal standards. The City is also committed to improving their water facilities to achieve goals in source water protection, water conservation, sustainability, and resiliency.

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1. Background

1.1. Introduction

The City of Clearwater (City) delivers approximately 11.24 million gallons per day (MGD) of potable water to population of approximately 118,000 citizens in the City via nearly 620 miles of water transmission and distribution mains. The City withdraws groundwater from local public supply wells and then processes the raw water through three water treatment plants (WTPs). Two of these plants currently use reverse osmosis (RO) for treatment of the groundwater. The third plant draws and treats the groundwater then blends the water with potable water purchased from Pinellas County Utilities (PCU) before further treatment and distribution. According to the City's 2021 Annual Water Report, the City produced approximately 6.24 MGD of potable water and purchased the remaining daily demand of 5.0 MGD from PCU. To maximize groundwater production and minimize water purchases, the City plans to restore and maintain the design capacity at the RO treatment plants, construct a RO process at the third plant, construct additional groundwater wells and implement sustainable and resilient features into the water supply and treatment system infrastructure. The intent of this work plan is to identify alternative and traditional water supply development as well as conservation and reuse projects that are needed to meet the City's future demands within the 10-yr planning period (2022-2032).

1.2. Wellfield Water Sources

The City obtains raw water from 44 groundwater production wells. The production wells are located within three wellfields (WFs). Wellfield 1 (WF#1) includes 16 production wells located in the western and central portion of the City. Wellfield 2 (WF#2) includes 17 production wells located along the southern and southeastern portion of the City. Wellfield 3 (WF#3) includes 11 production wells located in the northeast portion of the City. The active production wells associated with each WF are shown in **Table 1-1.**

Table 1-1: Active Clearwater Production Wells

WF#1	WF#2	WF#3
23	45	56
31	46	58
48	51	63
65	52	68
66	53	69R
73	2-1	77
74	2-2	3-1
75	2-3	3-2
78	2-4	3-4
80	2-5	3-5
1-1	2-6	79R
1-2	2-7	-------
1-3	2-8	-------
1-4	2-9	-------
1-5	2-10	-------
51R	2-11	-------
-------	2-12	-------

1.3 Water Treatment Plants

The City currently operates three WTP facilities within the City. These facilities are summarized below:

a. **Reverse Osmosis Water Treatment Plant No. 1 (ROWTP#1):** Located at 1657 Palmetto Street, west of Saturn Drive, ROWTP#1 is designed to produce 4.50 MGD. Groundwater in the Floridan Aquifer Upper Zone A (UZA) is drawn from sixteen production wells. Groundwater is transferred to ROWTP#1 for treatment. Prior to the RO process the raw water is directed into two separate process streams. One stream is an arsenic removal system, and the other stream is to pre-treat water prior to the RO process. 80% of the water produced by RO is blended into drinking water. The remaining RO concentrate is transferred to the City's second RO treatment plant for recycling or disposal. The treated water is then stored into two 3.0 MG ground storage tanks before disinfection, corrosion and distribution.

b. **Reverse Osmosis Water Treatment Plant No. 2 (ROWTP#2):** Located at 21133 US Highway 19 North, ROWTP#2 is designed to produce 6.25 MGD. Groundwater in the Lower Floridan Aquifer Zone A (LZA) is drawn from 12 production wells, as well as groundwater in the UZA from four production wells. The raw water is intended to be blended with RO concentrate received from ROWTP#1. The blended water is then treated by three RO process trains. Permeate from the RO process is treated with ozone to remove sulfide and blended with filtered fresh groundwater or wholesale water. Blended water is stored in one 5.0 MG ground storage tank and one 2.5 MG ground storage tank before disinfection, corrosion control and distribution.

c. **Water Treatment Plant No. 3 (WTP#3):** Located at 2775 State Road 580, east of Countryside Boulevard, WTP#3 produces a blend of treated fresh groundwater from WF#3 and purchased potable water from Pinellas County Utilities (PCU). The groundwater is dosed with sodium hypochlorite to achieve 4-log

inactivation then passes through a tray aerator for hydrogen sulfide removal before storage and blending with two 5.0 MG ground storage tanks. The stored water is treated for disinfection and corrosion control prior to distribution. WTP#3 currently produces approximately 4.90 MGD of potable water with a design capacity of 9.38 MGD.

1.4 Interlocal Agreement and Interconnects

The City has an interlocal agreement with PCU. The agreement was executed in 2004 and expires in 2039. Five active PCU interconnects connect to the City's distribution system and are referred to herein as WTP3 Interconnect, Sand Key Interconnect, Interconnect 1 (SR60/Belcher), Interconnect 3 (Belcher/Druid), and ROWTP#2 Interconnect. Flow is provided from the PCU system through these interconnects when pressures in the City's system drops below an established setpoint pressure. WTP#3 has an additional interconnect between the PCU distribution system and the WTP#3 piping between the east and west ground storage tanks. Similarly, ROWTP#2 also has an interconnect that can supply PCU water into the treatment plant for blending fresh raw water.

1.5 Comparison of City Water Production and Purchased Water

The average daily purchase (ADPU) of water from Pinellas County needed to meet total demands between the years 2016 and 2021 was about 38.5%, ranging from 35% to 44%. This range is below the ADPU between the years 1998 and 2015. However, the water import percentage increased in the year 2021, mainly due to the 6.80% reduction in the City's wellfield production. The improvements proposed for the City's water supply and treatment systems are intended to reduce dependency on these outside interconnects. **Table 1-2** displays a summary of the historical water usage from wellfield production and PCU purchased water.

Table 1-2: 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
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%
2016	7.56	4.21	11.77	36%
2017	6.69	5.26	11.95	44%
2018	7.69	4.42	12.11	37%
2019	7.66	4.16	11.82	35%
2020	7.37	4.33	11.70	37%
2021	6.87	4.96	11.83	42%

2 Population and Water Demand Projections

The City's per capita potable water usage has stabilized because of conservation measures and more efficient plumbing fixture use. However, the City's projected population growth is expected to have an impact on future water demands. Data sources were evaluated as a basis for the development of the population projections from agencies as follows:

1. The University of Florida's Bureau of Economic and Business Research (BEBR)
2. The Southwest Florida Water Management District (SWFWMD)
3. The Pinellas County Planning Department (PCPD)

The PCPD population projection information was based on Traffic Analysis Zone (TAZ) data. The TAZ data relates detailed functional population and consumptive data among a common platform to provide for increasingly accurate demand projections. Also, the TAZ projections provide the following:

1. High resolution data
2. Data sets to be bounded within the area of interest
3. Relevant subset data for corroboration with available City and public records
4. GIS integrated format that allows for direct comparisons with consumptive use data.

Population projections developed using TAZ data allow for the proper allocation of population and consumptive use data using functional population. These projections were compiled by PCPD in 2009 and considers permanent, seasonal, and tourist populations to create a functional population projection as defined by the Water Use Caution Area (WUCA) rules as summarized in the equation below. The WUCA equation was developed to define a functionalized population for water demand calculations. Due to the area's reliance on groundwater sources and the issues associated with that reliance, the City is classified within the Northern Tampa Bay Water Use Caution Area (NTBWUCA) in accordance with Florida Administrative Code (FAC) rule 40D-2.801.

$$Functional\ Population\ = \frac{[(permanent + seasonal)\ x\ 4 + [permanent\ x\ 8]}{12} + \frac{tourist}{2}$$

PCPD TAZ data was obtained from the *City of Clearwater 10-Year Water Supply Facilities Work Plan (2016–2026 Planning Period)* (Tetra Tech, 2015) and was compiled by PCPD in 2009. The functional population is the effective population being served over the course of a day. The functional population projection for the City over the planning period is shown in **Figure 2-1**.

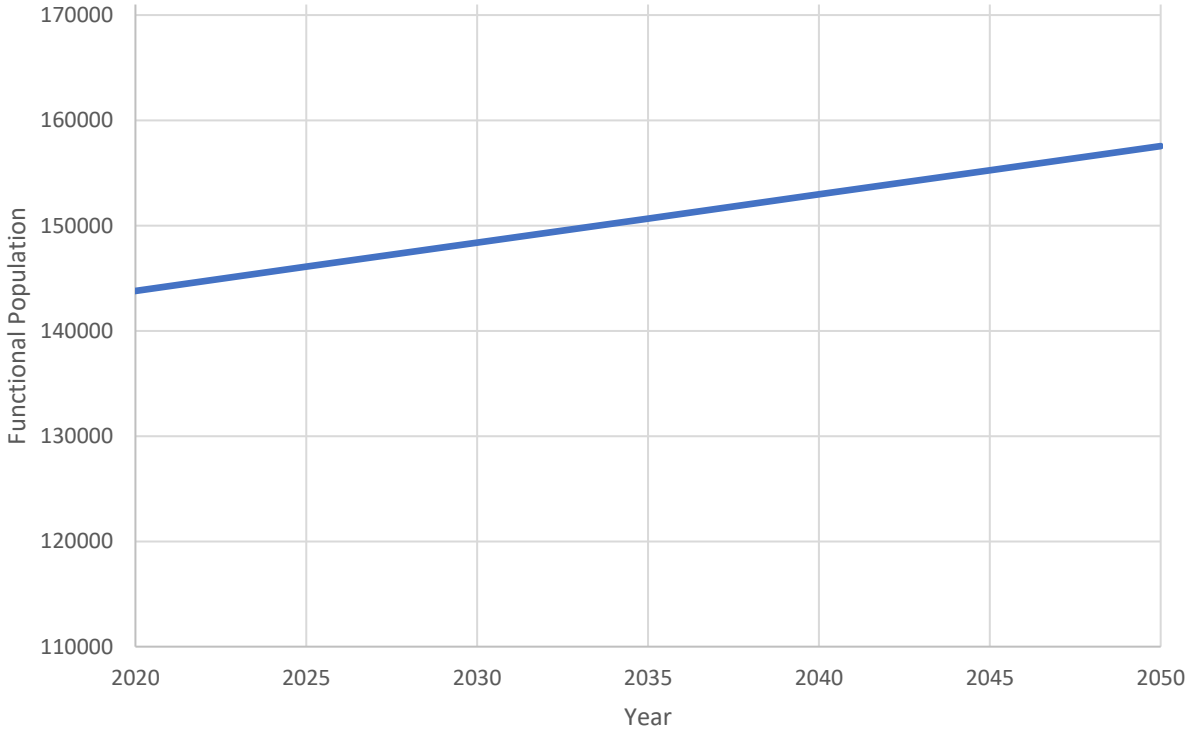

Figure 2-1: City of Clearwater Functional Population Projection

SWFWMD provides a population projection baseline by providing increased resolution over BEBR projections, functionalized population data, and constraining the population projection boundary to the potable water use

service area of the City. Though the PCPD also shares many of these attributes, the PCPD population projection considers high growth estimates from 2009 when many jurisdictions had over predicted growth.

The City's expected functional population for the year 2022 is 144,718 and the expected growth rate percentage for the planning period is approximately 0.30%.

2.3 Service Area Definition

To determine current and future potable water demands, population projections were evaluated over the City's actual potable water use area (shown in **Figure 2-2**). GIS files provided by the City indicated that the City's potable water service area included several unincorporated areas outside of the defined City limits. It is estimated that approximately 2,271 water utility customers are in these unincorporated areas.

2.4 Per Capita Usage

A multi-step process involving consumptive use billing data provided by the City and the aforementioned TAZ data was used to quantify the City's per capita potable water usage. Specifically, the City's 2015 potable water billing data was used to align with the values presented in the TAZ. The 2015 billing data includes approximately 42,000 records for standard potable, potable irrigation, and reclaimed consumption. **Table 2-1** shows the estimated usage in gallons per unit along with the average values across the system; per capita for total population (POP) and general quarters population (GQPOP); housing unit for total hotel/motel units (THU); employee for total employee (TOTEMP); and student for SCHOOL.

Table 2-1: Calculated Potable Water Usage[1]

POP	GQPOP	THU	TOTEMP	SCHOOL
62.12	51.50	139.96	27.89	7.94

1) *Gallons per capita per day (gpcd)*

2.5 Demand Projections

To project the future potable water demands for the City's potable water service area, the following sources were utilized:

- Population projections from BEBR, PCPD, and Forward Pinellas
- Monthly metered water consumption records for individual City customers during 2014-2021
- Daily City water production and PCU interconnect flows for 2017-2021
- City water production and PCU interconnect flows for 2017-2018

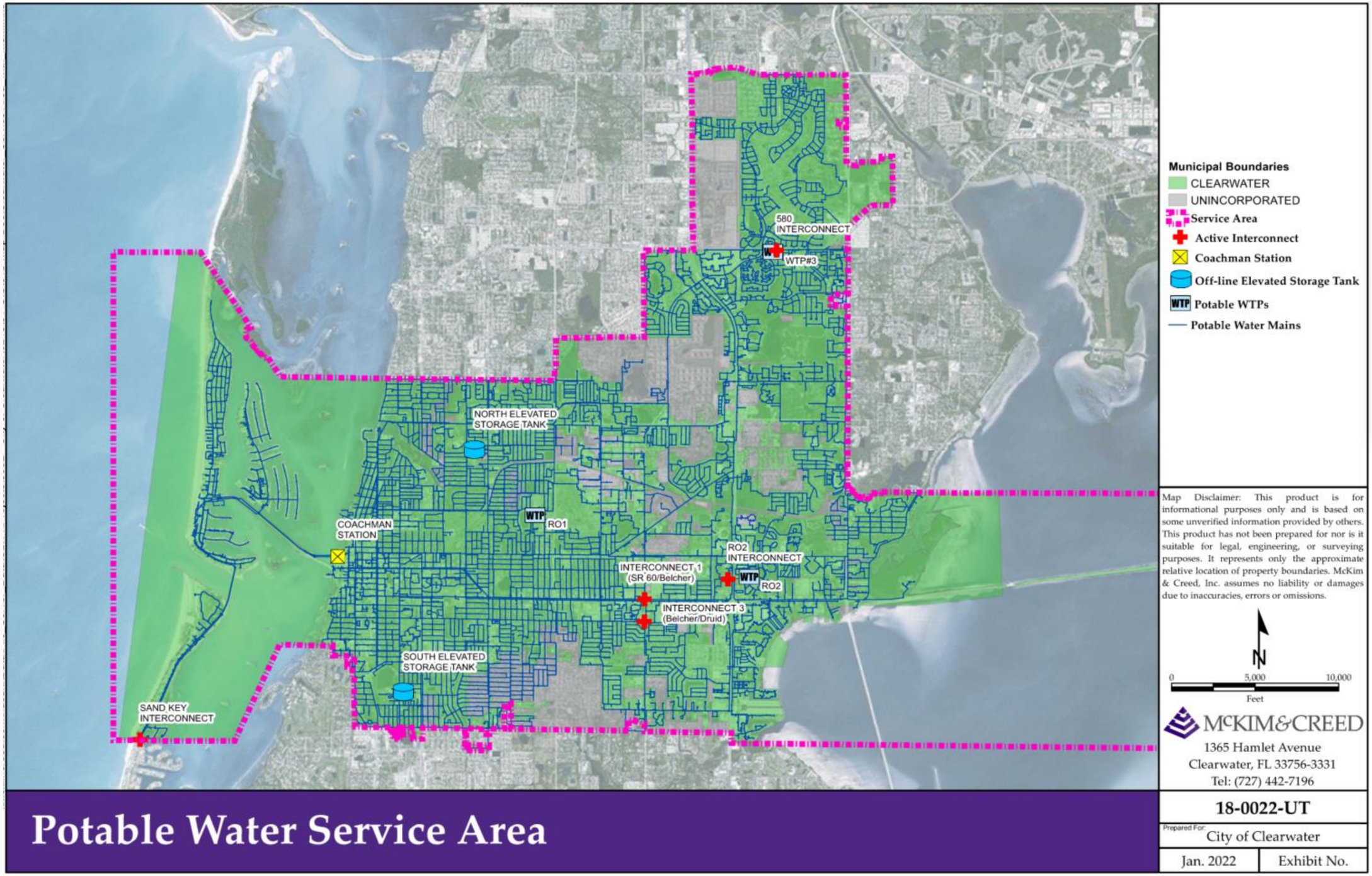

Figure 2-2: Potable Water Service Area

2.5.1 Recent City Usage Trends

The total annual potable water demand for the City is based on metering finished water flows from the City's three WTPs, Pinellas County interconnects, and other uses not included in customer billing (i.e., includes losses due to flushing, leaks, and hydrant flows). Demand has decreased since the late 2000s and has been relatively stable since around 2012 (see **Table 2-2**), despite an increase in population. Reductions in per capita water use may be attributed to conservation measures, use of reclaimed water (RCW) for irrigation, more efficient plumbing fixtures, operational considerations, and public education.

Table 2-2: Recent Historical Average Demand Data

Year	Total Annual Demand (MG)	Average Daily Demand (MGD)
2006	4,936	13.49
2007	4,583	12.56
2008	4,421	12.08
2009	4,220	11.56
2010	4,171	11.43
2011	4,201	11.51
2012	4,069	11.15
2013	3,906	10.70
2014	4,252	11.65
2015	4,005	10.97
2016	3,988	10.90
2017	4,041	11.07
2018	4,030	11.04
2019	3,898	10.68
2020	3,894	10.64
2021	4,103	11.24

2.5.2 Water Demand Projections

As shown in **Table 2-3**, the average potable water demand is projected to increase to approximately 11.96 MGD by 2050. This projected increase was used to identify the required water source and infrastructure needs to increase the capacity of the City's water system.

Table 2-3: Comparison of Current and Future Demand Projections

Year	Functional Population	Per Capita Demand (GPD)	Average Day Demand (MGD)
2018	142,884	77.3	11.04
2019	143,342	77.3	10.68
2020	143,801	77.2	10.64
2021	144,259	77.2	11.24
2022	144,718	77.1	11.26
2023	145,176	77.1	11.29
2024	145,634	77.0	11.31
2025	146,093	77.0	11.34
2026	146,551	77.0	11.36
2027	147,009	76.9	11.39
2028	147,468	76.9	11.41
2029	147,926	76.8	11.44
2030	148,385	76.8	11.46
2031	148,843	76.7	11.49
2032	149,301	76.7	11.51
2033	149,760	76.6	11.54
2034	150,218	76.6	11.56
2035	150,676	76.6	11.59
2036	151,135	76.5	11.61
2037	151,593	76.5	11.64
2038	152,052	76.4	11.66
2039	152,510	76.4	11.69
2040	152,968	76.3	11.71
2041	153,427	76.3	11.74
2042	153,885	76.3	11.76
2043	154,343	76.2	11.79
2044	154,802	76.2	11.81
2045	155,260	76.1	11.84
2046	155,719	76.1	11.86
2047	156,177	76.0	11.89
2048	156,635	76.0	11.91
2049	157,094	75.9	11.94
2050	157,552	75.9	11.96

Data was linearly interpolated from year 2022 to 2050

3 Potable Water Supply and Treatment Projects Update

Under the City's 2022 Water Master Plan (2022 WMP), evaluations were performed of the City's water supply and treatment system including groundwater production wells, WTPs, pumping systems, and storage. Downhole video logs and pumping tests were performed on production wells to document existing conditions

and to develop recommended pumping rates. Condition evaluations were performed on the production wells' civil, mechanical, electrical and instrumentation systems. Water quality projections were developed for existing and proposed production wells. The projections were used to develop recommendations for water treatment process improvements and to confirm compliance with drinking water regulations, including primary standards, secondary standards and the Lead and Copper Rule. Condition and process evaluations were also conducted for the WTPs including the high service pump stations and storage tanks. The evaluation results were used to determine improvements needed to the current water supply system for future water demands. The following sections summarizes the Capital Improvement Projects (CIPs) identified in the WMP for implementation.

3.3 Wellfield No. 1 Improvements Project (WMP CIP#1)

Currently, 16 groundwater production wells and associated raw water mains supply water to ROWTP#1 for treatment. When two or more wells are offline for maintenance or repairs, ROWTP#1 production is reduced by approximately 50-percent. Six new production wells are needed to maintain the ROWTP#1 design production through 2050. These proposed wells will provide for the sustainable production at ROWTP#1 of 3.9 MGD when wells need to be maintained or repaired, improve resiliency of the ROWTP#1 Supply system, and provide the ability to rotate well production to mitigate increased groundwater salinity levels.

3.4 Wellfield No. 2 Improvements Project (WMP CIP#2)

Currently, 16 groundwater production wells supply ground water for treatment to ROWTP#2. The current groundwater supplied is less than needed for the City to operate ROWTP#2 at full capacity. Ten new production wells are needed to maintain the design production through 2050. These proposed wells will provide for the sustainable production of 5.0 MGD at ROWTP#2 when wells need to be maintained or repaired, improve the resiliency of the ROWTP#2 supply system, and provide the ability to rotate well production to mitigate increased groundwater salinity levels. It is important to note that this project, WMP CIP#2, that this project is currently in progress.

3.5 Wellfield No. 3 Improvements Project (WMP CIP#3)

The City operates Water Treatment Plant #3 (WTP#3) and treats approximately 0.5 MGD of groundwater that is blended with potable water purchased from PCU. Currently, there are 11 active production wells in the wellfield. Several of the existing wells are out of service and other wells produce water with salinity levels that WTP#3 is not designed to treat. Additionally, the City plans to modify the existing WTP#3 to a RO process with a design production capacity of approximately 2.7 MGD. Six new production wells are needed to provide the design production through 2050. These proposed wells will provide for the sustainable production at RO3 of 1.9 MGD when wells need to be maintained or repaired, improve the resiliency of the RO3 supply system, and provide the ability to rotate well production to mitigate increased groundwater salinity levels.

3.6 Reverse Osmosis Treatment Plant No. 1 (ROWTP#1) Improvements Project

3.6.1 ROWTP#1-Residuals Management System Improvements (WMP CIP#7)

ROWTP#1 includes a residuals management system designed to remove solids that result from the treatment process. The system is also used to recycle filter backwash water that saves approximately 150,000 GPD of

groundwater. The current operations require the dewatering process to be manually operated. The backwash residual pumps are undersized and there is no ability to monitor or control the polymer system The residuals management system needs improvements to make operations more efficient, save costs, and allow plant staff to perform other activities while the system is in operation.

3.6.2 ROWTP#1-New Brackish Water RO System (WMP CIP#8)

The salinity in the groundwater supplied to ROWTP#1 is projected to double by 2050. The existing RO system needs to be updated to effectively treat raw water to using higher pressures and to accommodate the more corrosive water. This project is needed to maintain the design projection capacity of 4.5 MGD and to sustain the production of 3.9 MGD of potable water on an annual average basis.

3.7 Reverse Osmosis Treatment Plant No. 2 (ROWTP#2) Improvements Project

3.7.1 ROWTP#2-Process Improvements for 2-Skid Operations Project (WMP CIP#10)

ROWTP#2 was designed to produce 6.5 MGD. Since commissioning, production at ROWTP#2 has been limited to approximately 2.5 MGD. The limiting factors include high levels of bromide, increased salinity in the groundwater, and insufficient raw water quantities. Due to this limited production, the City has been purchasing additional potable water from PCU to make up for this shortfall of ROWTP#2 production. Improvements are needed to upgrade treatment processes, increase ROWTP#2 finished water production, and reduce costs associated with PCUD water purchases. It is important to note that this project, WMP CIP#10, that this project is currently in progress.

3.7.2 ROWTP#2-Blending and Process Improvements Project (WMP CIP#11)

The groundwater total dissolved solids (TDS) levels are projected to reach approximately 5,000 mg/L by 2035 and additional improvements are needed at ROWTP#2 to treat this higher salinity water. This project is needed so that ROWTP#2 can increase production to meet the design production capacity of 6.25 MGD.

3.8 Water Treatment Plant No. 3 (WTP#3) Improvements

3.8.1 WTP#3-Ground Storage Tanks and PCU Interconnect Improvements Project (WMP CIP#14)

The City's existing WTP#3 includes two 5-million-gallon (MG) ground storage tanks (GSTs). Several items in the east GST need to be addressed; the aerator is no longer needed and is in poor condition; spalling has occurred in the tanks, and access to the tank floor creates a safety concern. The West GST does not include baffles that would improve flow characteristics. Also, several abandoned vaults on the site contain connected electrical equipment that needs to be removed. Some of the yard piping is nearly 15 feet below grade and have inaccessible nonfunctional valves that need to be replaced. It is important to note that this project, WMP CIP#14, that this project is currently in progress.

3.8.2 Convert WTP #3 to RO Treatment Process (WMP CIP#15)

The salinity level in the WTP #3 groundwater supply is projected to nearly double by 2050 and the existing treatment process is not designed to treat water with the projected salinity level. The existing high service pump station (HSPS) is beyond the expected service life and the HSPS building is only rated for a Category 2 hurricane wind-load. The HSPS building contains several systems that are abandoned, and the existing electrical systems need to be consolidated and updated to meet building codes. This project will allow the City to maintain operations of three (3) water treatment plants, providing improved resiliency. Once this project is implemented, the WTP#3 design production will increase to approximately 2.7 MGD. Additionally, the plant will provide a sustainable production of 1.9 MGD and reduce the dependance on PCU water in this area. This project also provides improved flexibility as the proposed RO3 will be designed to be integrated with a potential future potable reuse project.

This project includes the recommendations from the City 's WTP #3 RO Addition - Draft Preliminary Design Report (Tetra Tech 2017), with added improvements identified in the 2022 WMP. The project includes all survey, preliminary and final design, permitting, site/civil work, equipment and construction of pretreatment filtration, chemical, and cartridge filtration systems, three (3) RO process trains, a new RO process building, post-treatment systems, and associated electrical, instrumentation, and control systems. The existing HSPS pumps will be replaced with new energy efficient pumps, and the HSPS building improvements include removing abandoned equipment, installing new electrical, instrumentation and control systems, strengthening the building foundation and walls, replacing the roof, windows, doors, and louvers, and replacing the siding and overhead doors. The project also includes a Class I injection well system at the City's Northeast Water Reclamation Facility (NEWRF) and a proposed 6-inch RO concentrate pipe needed to connect RO3 to the proposed injection well.

4 Capital Improvement Project Cost Estimates

Under the WMP, the City separated the proposed major water facilities CIPs needed within the next ten years into two categories. These include the supply and treatment system, and the distribution system. The following sections summarize the cost estimates for the planned and recommended potable water supply system CIPS and planning schedules for the next ten years.

4.3 Summary of Recommended Supply and Treatment System CIPS

CIPs for the City's groundwater production wells, raw water piping and WTPs are recommended for implementation. The City plans to implement CIP Wellfield #2 Improvements in fiscal year 2022 so that City potable water production can be increased as soon as possible. The City is also considering implementing CIP ROWTP#2 - Process Improvements for 2-Skid Operations in parallel with CIP ROWTP#2 - Blending and Process Improvements. This approach would reduce overall costs and result in ROWTP#2 meeting the design capacity of 6.25 MGD as soon as possible. It is noted that the City has engaged a consultant and has initiated CIP ROWTP#2 - Process Improvements for 2-Skid Operations as well as CIP WTP#3-Ground Storage Tanks and PCU Interconnect Improvements Project.

Table 4-1 provides a summary of the recommended supply and treatment system CIPs, cost estimates, and implementation periods.

Table 4-1: Summary of Recommended Supply and Treatment System CIPs and Schedules

CIP Project Name	Estimated Cost[1]	Implementation Period (FY)
Wellfield#1 Improvements	$18,638,000	2026-2030
Wellfield#2 Improvements	$29,627,000	2022-2025 [2]
Wellfield#3 Improvements	$16,203,000	2026-2030
ROWTP#1 - Residuals Management System Improvements	$2,553,000	2022-2025
ROWTP#2 - Process Improvements for 2-Skid Operations	$12,442,000	2022-2025 [2]
ROWTP#2 - Blending and Process Improvements	$11,744,000	2026-2030
WTP#3 - Ground Storage Tank and Pinellas County Utility Interconnect Improvements	$1,906,000	2022-2025 [2]
WTP#3 – Convert WTP #3 to RO Process	$49,518,000	2026-2030
Total	**$142,631,000**	**-------**

1) *Based on 2022 construction costs*
2) *Project is already in progress*

5 Water Conservation Measures and Sustainability

The City's Comprehensive Plan includes an element for the conservation, use, and protection of natural resources. The City has recently published the Greenprint Sustainability Plan (Clearwater Greenprint 2.0 - https://www.myclearwater.com/government/city-departments/greenprint-clearwater-s-sustainability-plan) (Greenprint Plan, 2021). Groundwater is a critical natural resource that must be protected to ensure the City's ability to utilize groundwater for potable water production over the planning period and beyond.

5.3 Potable Water Conservation

The City has successfully implemented potable water conservation measures including low-flow fixtures, residential irrigation schedules RCW use for irrigation, and public education. The City developed and began construction of their RCW system approximately 20 years ago. Since the RCW system and other conservation measures have been implemented, potable water usage dropped from approximately 14 MGD (97 gallons per capita per day (gpcd)) to approximately 11 MGD (77 gpcd) over the last 20 years. Correspondingly, the per capita daily water usage has decreased over the past 20 years but has stabilized. However, the City is considering expanding the RCW system as part of compliance with the recently enacted SB64, which includes a requirement for the majority of municipalities in Florida to eliminate non-beneficial surface water discharge by January 1, 2032. It is anticipated that if the RCW system is expanded, the average daily per capita potable water usage will decrease. The City is currently developing a RCW Master Plan (21-0018-UT) that will determine the per capital potable water reduction that would be realized by an expanded City RCW / Potable Reuse system.

5.4 Offset of Water Demand through Expansion of the RCW System

The City constructed RCW projects with the help of cooperative funding agreements from the SWFWMD, which has committed to a long-term goal to beneficially reuse 75 percent of all flows from wastewater treatment plants. To meet this goal, SWFWMD is continuing to provide funding through the Cooperative Funding Initiative

program. The city is evaluating alternatives to expand their RCW system to help achieve SB64 compliance and is currently working on an RCW Master Plan (project number 21-0018-UT). Future expansion of the City's RCW system will be resident initiated projects through a petitioning process: https://www.myclearwater.com/home/showpublisheddocument/9727/637570355956270000. The City may also want to continue with a previously implemented program to provide rebates to residents that properly abandon an irrigation well to connect to the City's RCW system. The City currently provides RCW to the services areas as shown in **Table 5-1.**

Table 5-1: RCW Service Areas[1]

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

1. *City of Clearwater 10-year Water Supply Facilities Work Plan (2016-2026 Planning Period) by TetraTech.*

5.5 Groundwater Resource Protection

The Greenprint Plan defines sustainability as "meeting current need without compromising the ability of future generations to meet their own needs" (Greenprint Plan, 2021). Over time, the salinity of the City's groundwater supply has increased and is projected to continue increasing. Several approaches were evaluated to minimize degradation of water quality in the local aquifer while protecting these sources for the long-term. Some of the considerations are noted as follows:

1. Construct Additional Groundwater Production Wells – Using additional wells reduces the average pumping rate per well and thus reduces the rate of salinity increase.
2. Develop Updated Groundwater Management Plan - Plan will include monitoring of well pumping rates and TDS. Pumping rates can be adjusted to mitigate TDS increases.
3. Implement Potable Reuse System – Utilizing highly-treated (polished) wastewater as a source to supplement groundwater supplies would reduce groundwater withdrawals.

The City has previously evaluated systems designed to partially replenish groundwater supplies by utilizing advanced systems to "polish" highly treated wastewater effluent and then injecting the polished water into the ground. The recently enacted SB64 includes a requirement for most municipalities in Florida to eliminate nonbeneficial surface water discharge by January 31, 2032. SB64 is intended to promote the beneficial reuse of highly treated and polished wastewater effluent. While the initial phases of implementation outlined for water supply and treatment system CIPs do not include such reuse due to near term regulatory questions, the proposed plan can accommodate potable reuse in the future to further manage water resources effectively.

5.6 Potable Reuse

The City is considering implementing a potable reuse system at some point in the future. The 2022 WMP includes evaluations of both indirect and direct potable reuse systems. The City had planned to construct a Groundwater Replenishment Project to polish highly treated wastewater to drinking-water standards and injecting this water into the UZA. In November 2018, the City elected to delay the project in order to complete the 2022 WMP. The City may wish to consider moving forward with a potable reuse system in the future to help achieve compliance with SB64 and to help manage valuable groundwater supplies. This is consistent with the City's approved SB64 plan that considers potable reuse as a means of compliance.

5.7 Other Water Conservation Measures and Sustainability Efforts

The City has a program that provides water conservation devices available free to all City of Clearwater residents at the Utilities Customer Service department (UCS). Faucet aerators, toilet bladders, dye kits, shower heads and water leak rulers (i.e., devices that show how much water small leaks waste) are some of the devices that are provided to customers water customers at UCS.

The City has also implemented an education program to all 5th graders attending a school within city limits. The classroom teacher instructs a lesson on water conservation and each student is given a take home activity in which the student learns how to determine flow rates. The take-home activity also includes conservation devices and online lessons are provided.

6 Water Production Cost Update

PCU supplies part of the potable water for the City in accordance with the Agreement between the City and PCU that will expire on September 30, 2035. The agreement includes the 2018 contractual rate of $4.06/1,000 gallons with an annual increase of 1% per year until 2023, when the rate will be $4.30/1,000 gallons (see **Table 6-1**). Rates beyond 2023 are unknown at this point and will need to be established prior to 2024.

Table 6-1: Contractual PCU Wholesale Rates

Fiscal Year	Pinellas County Wholesale Rate per 1,000 gallons
2018	$4.06
2019	$4.14
2020	$4.17
2021	$4.21
2022	$4.26
2023	$4.30

The City's operating and annualized capital costs for FY 2020 are shown in **Table 6-2**.

Table 6-2: Operating and Annualized Capital Cost (per 1,000 gal)

Description	Costs[1]
Operating Cost	$1.36
Annualized Capital Cost	$2.19
Total Cost	$3.55

1) *City of Clearwater – Water System FY2020 Budget*

7 Summary

The City is dedicated to producing drinking water that meets state and federal standards. The City is committed to improving their water facilities to achieve goals in source water protection, water conservation, and community education. To serve the needs of water users throughout the 10-yr planning period, the City is planning on the following supply and treatment system improvements:

1. Construct additional groundwater production wells to meet future water demands and allow other groundwater wells to recharge.
2. Maintain design capacity and sustain production by installing a new brackish water RO system at ROWTP#1
3. Increase operations efficiency and save costs with ROWTP#1 residuals management system improvements
4. Restore the design capacity at ROWTP#2 with blending and process operations
5. Rehabilitate the existing GSTs at WTP#3
6. Construct a new RO treatment system at WTP#3 to increase the current capacity
7. Maintain potable water interconnects with PCU to augment City-supplied water and provide system resiliency

When these improvements are implemented, the City will gain the following benefits:

1. Increased community resilience by providing additional wells and an additional water treatment plant, consistent with top priorities of Greenprint 2.0
2. Supports Greenprint 2.0 sustainably goal by lower energy usage compared to options requiring greater quantities of water from PCU sources
3. Increased flexibility to integrate future potable reuse system to align with the goals of SB64.