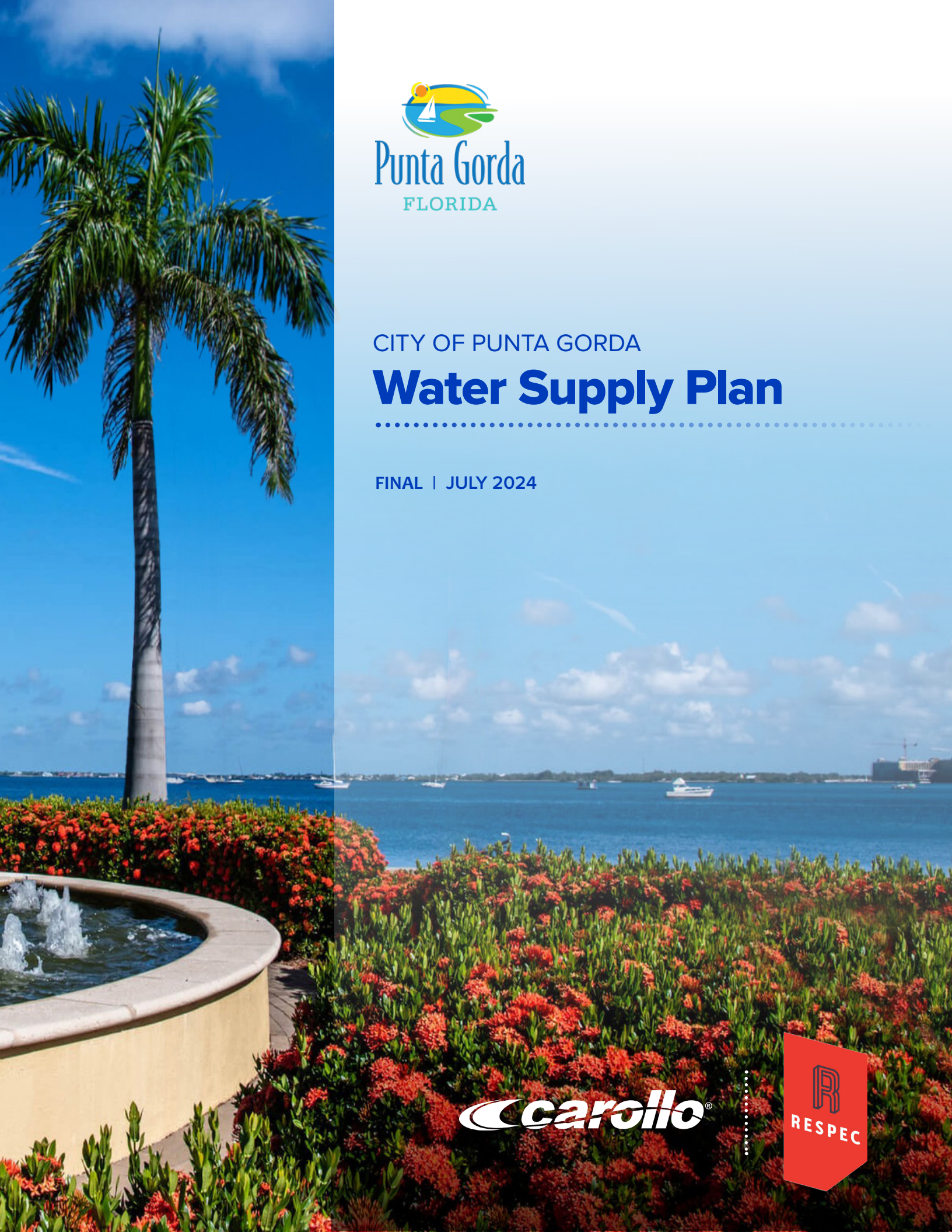

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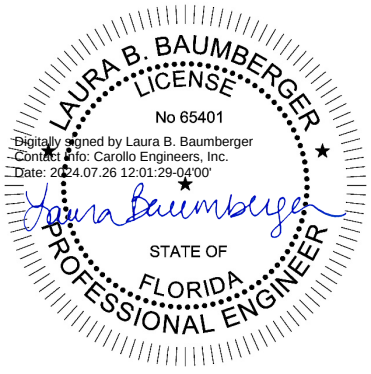

This item has been digitally signed and sealed by Laura B. Baumberger on the date adjacent to the seal.

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Abbreviations

3D	three-dimensional
AACE	American Association of Cost Engineers
AAD	annual average demand
APPZ	Avon Park Permeable Zone
ASR	Aquifer Storage and Recovery
Authority	Peace River Manasota Regional Water Supply Authority
BEBR	Bureau of Economic and Business Research
BG	billion-gallon
Carollo	Carollo Engineers
cfs	cubic feet per second
CIP	capital improvement program
City	City of Punta Gorda
DIW	Deep Injection Well
DOH	Department of Health
DWRM 4.0	District-Wide Regulation Model Version 4.0
DZMW	Dual-Zone Monitor Well
EDC	estimated direct cost
EPA	Environmental Protection Agency
EI&C	electrical, instrumentation, and controls
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
Focus TMR	Focus Telescopic Mesh Refinement
FRP	fiberglass reinforced plastic
ft. bls	feet below land surface
ft/day	feet per day
gal	gallons
GC	general conditions
GIS	geographic information system
gpcd	gallons per capita day
gpd	gallons per day
gpm	gallons per minute
GWV8	Groundwater Vistas 8
hp	horsepower
IAS	Intermediate Aquifer System
LAA	Lower Arcadia Aquifer
LFA	Lower Floridan Aquifer
MCL	maximum contaminant level

MCU	Middle Confining Unit
MDD	maximum day demand
MFL	minimum flow and level
MG	million gallons
mgd	million gallons per day
mg/L	milligrams per liter
MIT	Mechanical Integrity Test
MOR	monthly operating report
MWH	Montgomery Watson Harza
NVP	net present value
O&M	operations and maintenance
OH	overhead
PDR	Preliminary Design Report
PR3	Peace River Reservoir No. 3 Project
PRF	Peace River Facility
PSAR	Public Supply Annual Report
psi	pounds per square inch
PZ2	Permeable Zone 2
PZ3	Permeable Zone 3
RO	reverse osmosis
RO-WELL	Wellfield Remediation Project
rpm	revolutions per minute
SAS	Surficial Aquifer System
SCFM	standard cubic feet per minute
SCU	solids contact unit
SI	specific injectivity
sq ft/day	square feet per day
SS	stainless steel
SWFWMD	Southwest Florida Water Management District
SWSEP	Surface Water System Expansion Project
TDS	total dissolved solids
TMR	Telescopic Mesh Refinement
UAA	Upper Arcadia Aquifer
UFA	Upper Floridan Aquifer
UIC	Underground Injection Control
VFD	variable frequency drive
WCP	well construction permit
WCTP	Well Construction Testing Plan
WFMP	Wellfield Management Plan

WSP	Water Supply Plan
WTP	water treatment plant
WTP-EV	Shell Creek WTP Rehabilitation Project
WTP-ROX	RO WTP Wellfield Expansion Project
WUP	water use permit
WWTP	wastewater treatment plant

CHAPTER 1 INTRODUCTION

Chapter 1 provides the background and objectives for the Water Supply Plan (WSP), as well as a summary of the report chapters, project acknowledgements, and reference materials used for the project.

1.1 Background

Figure 1.1 shows the City of Punta Gorda's (City) potable water service area. The City is experiencing increasing water demand due to development and population growth. Facility limitations and the Southwest Florida Water Management District (SWFWMD) regulatory requirements associated with the Lower Shell Creek minimum flow and level (MFL) have strained available water resources.

This project provides an updated WSP for the City. The plan evaluates current and potential water supply sources to enhance reliable capacity. It reviews the City's water sources, facilities, and water supply limitations, and presents strategies for providing a reliable water supply through 2050.

The plan assesses recent water usage patterns, population growth projections, and future water demand. The water supply review includes raw water sources, water use permit (WUP) withdrawal quantities and constraints, treatment capacity, and the interlocal agreements with the Peace River Manasota Regional Water Supply Authority (Authority). The evaluations completed during this project support the determination of the most effective methods to meet future water supply needs.

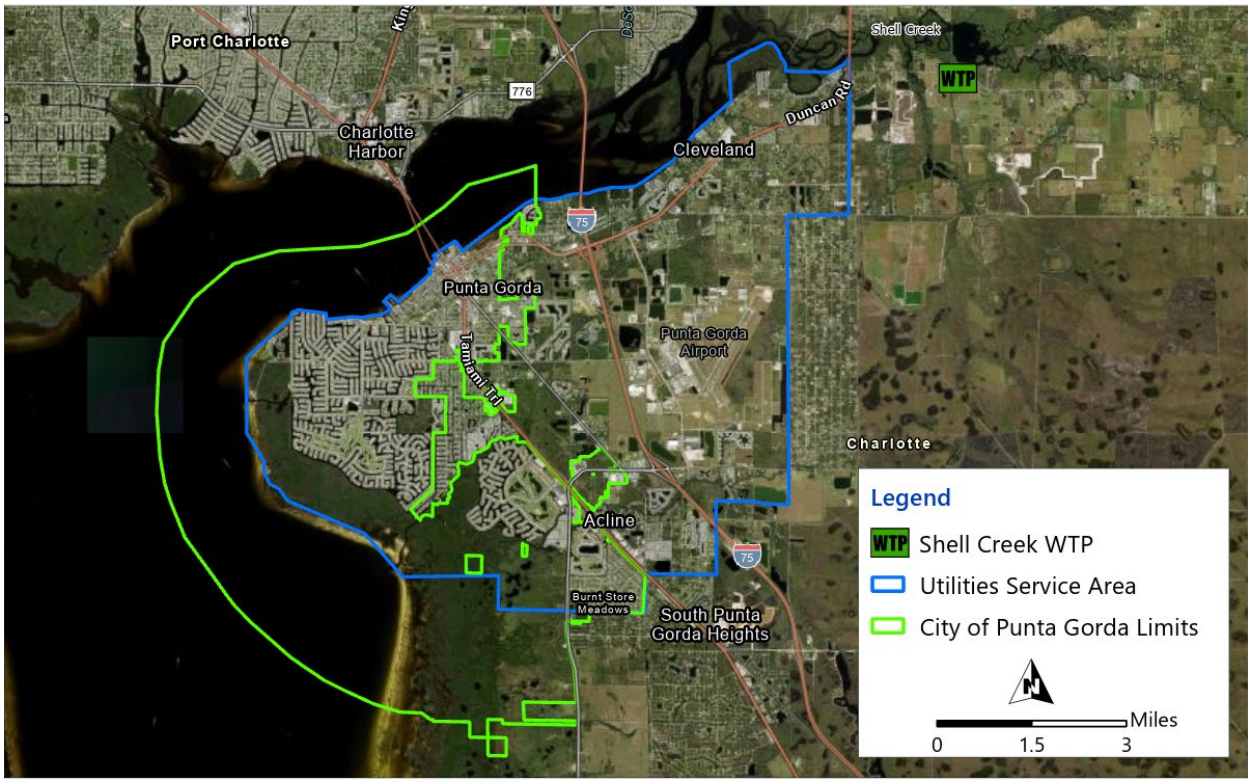


Figure 1.1 Punta Gorda Utilities Service Area

1.2 Project Scope and Objectives

Carollo was retained by the City to assist in developing a WSP to address the City's water needs through 2050. The initial phase involved a review of the City's recent planning documents, WUP, and historical water demand data. Water demand projections were updated through 2050, taking into account recent water use trends, planned developments, and historical data.

Major scope elements include analyzing existing and future water supply options, evaluating the feasibility of expanding the reverse osmosis (RO) WTP, reviewing the City's existing WUP, assessing the Shell Creek Water Treatment Plant (WTP) capacity, available surface water supply and the impact of the MFL on water withdrawal, and potential future supply agreements with the Authority.

Planning-level cost estimates for water supply projects were developed and considered capital, operational, and lifecycle costs. Different water supply portfolio scenarios are presented and discussed to identify the most reliable and cost-effective options.

1.3 Summary of Report Chapters

The WSP is organized into seven chapters. The contents of each chapter are as follows:

Chapter 1 – Introduction: Description of project background and objectives.

Chapter 2 – Population and Water Demand Projections: Discusses City's historical water demand and population to project future annual average and maximum day water demand, while considering weather pattern analysis and multiple methods of demand projections.

Chapter 3 – Groundwater Supply and Reverse Osmosis WTP: Presents the existing groundwater supply, current WUP and production well capacity, the RO WTP, and deep injection well. It also presents a potential future groundwater supply option including a wellfield expansion, required WUP modifications, and RO WTP expansion.

Chapter 4 – Shell Creek Water Supply and WTP: Presents a historical overview and withdrawals from the Shell Creek Reservoir, discusses the current and projected impacts of the MFL restrictions, and provides an analysis of the reliable capacity of the Shell Creek WTP.

Chapter 5 – Regional Water Supply: Presents the option of obtaining water from the Authority, discussing existing agreements with the Authority and potential future water allocation from the Authority.

Chapter 6 – Water Supply Scenarios and Cost Analysis: Provides a capital and lifecycle cost analysis for each future water supply alternative based on conceptual layouts and planning-level criteria.

Chapter 7 – Summary and Conclusions: Provides a comprehensive summary of recommendations for the City's water supply through 2050.

1.4 Acknowledgements

Carollo extends its appreciation to the City of Punta Gorda Utilities Department for their invaluable support and information. Special thanks to the Acting Utilities Director Tom Spencer, Utilities Engineering Manager Steve Adams, Regulatory Compliance Manager Steven Leonard, and the Utilities WTP Supervisor Brian Fuller for their assistance in gathering information, addressing questions, and participating in the development of this plan.

1.5 Project References

The following reference materials and data were used in the development of this WSP:

- City of Punta Gorda Water Supply Study (Carollo, 2015).
- City of Punta Gorda Review of the Proposed Lower Shell Creek MFL (Carollo, 2021).
- Kroll Cost of Capital Recommendations and Potential Upcoming Changes, February 2024.
- Peace River Manasota Regional Water Supply Authority Board Meeting Presentation, April 2024.
- Peace River Manasota Regional Water Supply Authority Interlocal Agreement for Phase 1 Regional Interconnect.
- Peace River Manasota Regional Water Supply Authority Water Systems Interconnect and Water Transfer Contract.
- Shell Creek WTP Reverse Osmosis Addition Basis of Design Report Update (Tetra Tech, 2018).
- SWFWMD Draft Population Projections for 2025 RWSP, obtained July 2023.
- SWFWMD geographic information system (GIS) parcel data, obtained January 2024.
- University of Florida, Bureau of Economic and Business Research (BEBR), April 2023.
- U.S. Census Bureau Population Estimates Program, 2023.
- U.S. Drought Monitor, obtained June 2024.
- Water Distribution System Socorro Analysis (Carollo, 2023).

CHAPTER 2 POPULATION AND WATER DEMAND PROJECTIONS

Chapter 2 presents the City's historical water service area population and water demand, which serve as the framework for projecting future water demand and population. Historical demands were also evaluated to determine peaking factors and gross per capita water use values. An analysis of recent weather patterns was conducted in relation to demand.

Average annual water demand projections were developed using various methods: 1) linear regression of historical water demand, 2) based on historical water use and the BEBR population projections for Charlotte County, 3) based on historical water use and the SWFWMD parcel populations for the City's service area, 4) the District's 2025 Regional WSP projected demands, and 5) planned developments in the City's service area.

2.1 Historical Population and Water Demand Analysis

The following sections summarize the City's historical population and water demand. Review of historical water demands includes an analysis of historical peaking factors and per capita water demand, which is used in various water demand projection methodologies presented in Section 2.2.

2.1.1 Historical Population

The City's historical population for its water service area is provided in Table 2.1 for the past decade.

Table 2.1 Historical Service Area Population

Year	Punta Gorda Water Service Area Population(1)	Annual Percent Increase
2013	35,176	-
2014	35,414	0.7%
2015	35,857	1.3%
2016	36,302	1.2%
2017	37,355	2.9%
2018	38,702	3.6%
2019	39,177	1.2%
2020	39,875	1.8%
2021	40,211	0.8%
2022	41,388	2.9%
2023	41,582	0.5%

Notes:
(1) Functional population from Public Supply Annual Reports (PSARs).

According to data from the U.S. Census Bureau's Population Estimates Program, a 3.9 percent increase in population for Punta Gorda occurred between July 1, 2021 through July 1, 2022. This resulted in Punta Gorda scoring as the fifth fastest-growing metro area in the U.S. and fourth fastest-growing metro area in Florida (*U.S. Census Bureau Population Estimates Program, 2023*). For reference, in the City's previous Water Supply Plan (*Water Supply Study, 2015*), the projected 2023 City service area population was 38,426. The actual 2023 population of 41,582 as reported in the City's PSAR is 8.2 percent higher than what was predicted in 2015.

2.1.2 Historical Water Demands

Historical water demand data since 2004 was compiled. Water production data and transfer quantities to and from the Authority were provided by the City. Since the implementation of the Phase 1A pipeline in 2012, the City and the Authority have exchanged water through the Phase 1A pipeline, and subsequently also through the Phase 1 pipeline, for operational and maintenance purposes. Water transferred to the Authority greater than the amount of water received from the Authority was subtracted from the monthly water production, as this water was not used to meet the City's demand. The net amount of water ultimately received from the Authority is included in the City's demands.

Annual average and maximum month demand from 2004 through 2023 were calculated from the daily amounts provided in the City's daily operating reports, except for 2019 to 2023 which use monthly meter readings to calculate the annual and monthly averages for those years.

Table 2.2 shows the annual average, maximum month, and maximum day demands for the past 20 years.

Table 2.2 20-Year Annual Average, Maximum Month, and Maximum Day Demands

Year	Annual Average Demand (mgd)	Annual Average Annual Growth	Maximum Month Demand (mgd)	Maximum Day Demand (mgd)
2004	4.65	-	5.60	7.94
2005	4.38	-5.8%	5.33	6.85
2006	4.92	12.3%	6.70	8.21
2007	4.58	-6.9%	6.04	7.40
2008	4.12	-10.0%	5.36	7.06
2009	4.19	1.7%	4.97	6.65
2010	4.33	3.3%	5.25	6.47
2011	4.26	-1.6%	4.96	6.44
2012	4.35	2.1%	5.19	6.29
2013	4.22	-3.0%	4.96	6.52
2014	4.42	4.7%	5.27	7.19
2015	4.53	2.5%	5.43	7.49
2016	4.70	3.8%	5.99	6.77
2017	4.94	5.1%	6.18	7.07
2018	5.24	6.1%	6.46	7.89
2019(1)	4.82	-8.0%	5.40	7.48
2020(1)(2)	5.05	4.8%	6.06	8.05

Year	Annual Average Demand (mgd)	Annual Average Annual Growth	Maximum Month Demand (mgd)	Maximum Day Demand (mgd)
2021(1)	5.61	11.1%	7.09	7.98
2022(1)	5.49	-2.1%	6.80	8.77
2023(1)(3)	6.35	15.7%	7.11	9.52

Notes:
(1) Annual average values calculated using monthly meter readings.
(2) July 7, 2020 value removed as outlier.
(3) May 4, 2023 value removed due to water line break.
Abbreviations: mgd – million gallons per day

As seen in Table 2.2, the City experienced a 15.7 percent increase in annual average demand from 2022 to 2023. This increase is notably high when comparing it to the annual population growth in the service area, which was 0.5 percent.

2.1.3 Water Demand Peaking Factors

Annual average, monthly, and maximum day peaking factors were calculated from historical data. Peaking factors were calculated based on finished water production and account for water received from and sent to the Authority, such that the peaking factors reflect only the City's water demand.

2.1.3.1 Monthly Demand Peaking Factors

Monthly water demand peaking factors for the past 10 years are summarized in Table 2.3. Monthly peaking factors are important to consider as they establish the seasonality of demand from customers. Based on the monthly peaking factor analysis, the City's months of highest demand are March and April, with an average monthly peaking factor of 1.13 to 1.14, indicating that the City's demand during these months is typically 13 to 14 percent higher than the annual average. The months of lowest demand are typically August and September, which reflect months of high rainfall and lower irrigation, as well as lower seasonal population.

Table 2.3 Historical Monthly Peaking Factors

Year	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2014	1.02	0.98	1.00	1.02	1.05	0.90	0.89	0.91	0.97	0.99	1.19	1.07
2015	1.10	1.07	1.11	1.20	1.08	0.88	0.60	0.59	1.00	1.14	1.12	1.13
2016	0.93	0.92	1.07	1.12	1.12	0.85	0.90	0.82	0.80	0.98	1.27	1.22
2017	1.14	1.18	1.25	1.25	1.14	0.80	0.79	0.51	0.69	0.94	1.15	1.16
2018	1.01	1.06	1.15	1.20	0.99	0.91	0.85	0.75	0.79	1.01	1.23	1.04
2019	0.98	0.93	1.07	1.12	1.07	0.97	0.79	0.79	1.04	1.11	1.12	1.02
2020	1.02	0.98	1.20	1.07	1.05	0.90	1.03	0.93	0.89	0.93	1.01	0.97
2021	1.00	1.04	1.17	1.18	1.26	0.94	0.76	0.78	0.85	0.98	1.01	1.02
2022	1.03	1.10	1.21	1.24	1.03	0.89	0.88	0.84	0.87	1.01	0.91	0.99
2023	0.91	1.03	1.12	1.04	1.10	1.02	1.03	0.95	0.89	0.97	1.04	0.92
Average Monthly Peaking Factor(1)	1.01	1.03	1.13	1.14	1.09	0.91	0.85	0.78	0.88	1.01	1.11	1.05

Notes:
(1) The average monthly peaking factor is the average from 2016 through 2023.

2.1.3.2 Maximum Month and Maximum Day Peaking Factors

Maximum month and maximum day peaking factors are used for sizing water treatment facility equipment, processes, water distribution system design and operation, and source water supply analysis. Figure 2.1 shows the maximum month and maximum day peaking factors for the past 20 years based on the data presented in Table 2.2.

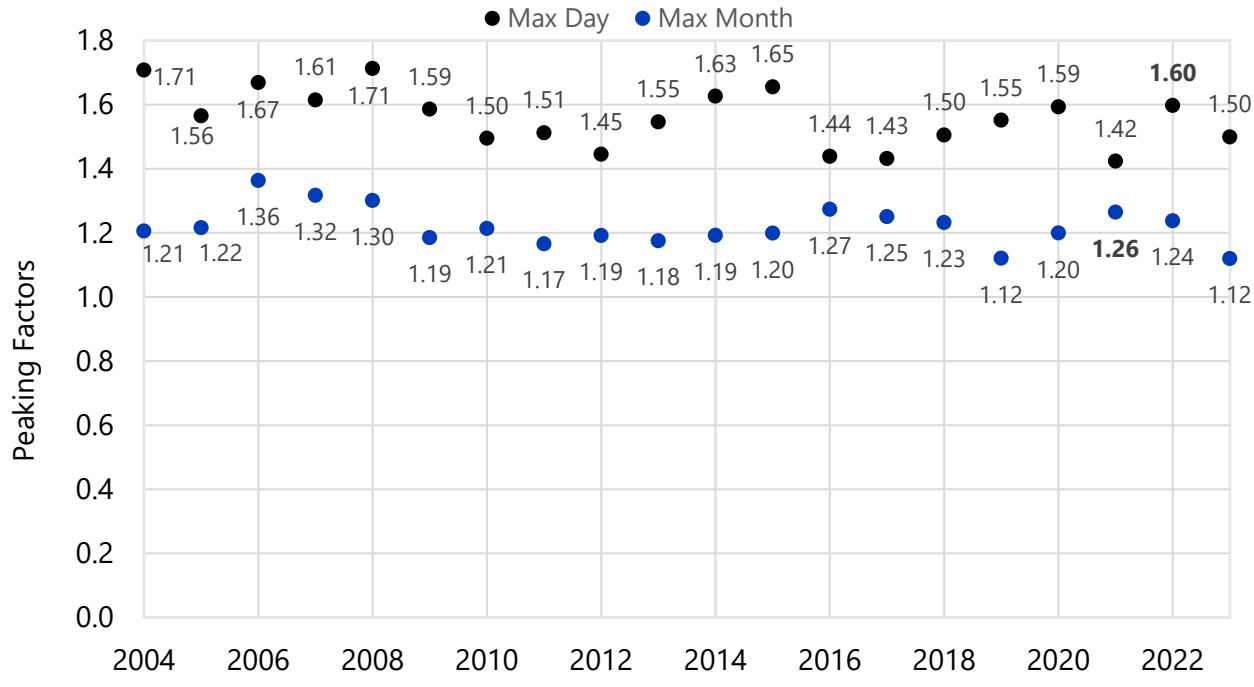


Figure 2.1 Historical Maximum Month and Maximum Day Peaking Factors

The maximum month peaking factor ranged from 1.12 to 1.36, while the maximum day peaking factor ranged from 1.42 to 1.71 over the past 20 years. The highest peaking factors that occurred over the past 5 years were selected for future demand projections since these reflect the City's most recent water use patterns. Over the past 5 years, the highest monthly peaking factor occurred in 2021 at 1.26 and for maximum day peaking factor occurred in 2022 at 1.60. These peaking factors will be used for the selected demand projection method to determine projected maximum month and maximum day demands.

2.1.4 Per Capita Demand Factor

The historical gross per capita water use was calculated to determine the typical water use per person in the City. Note that the gross per capita values include all non-residential uses of water within the City's service area and averages these values amongst the population for calculation purposes. The gross per capita is calculated by dividing the total annual average water production by the functional population and were provided from the City's PSARs. Figure 2.2 provides the previous 10 years of gross per capita water use.

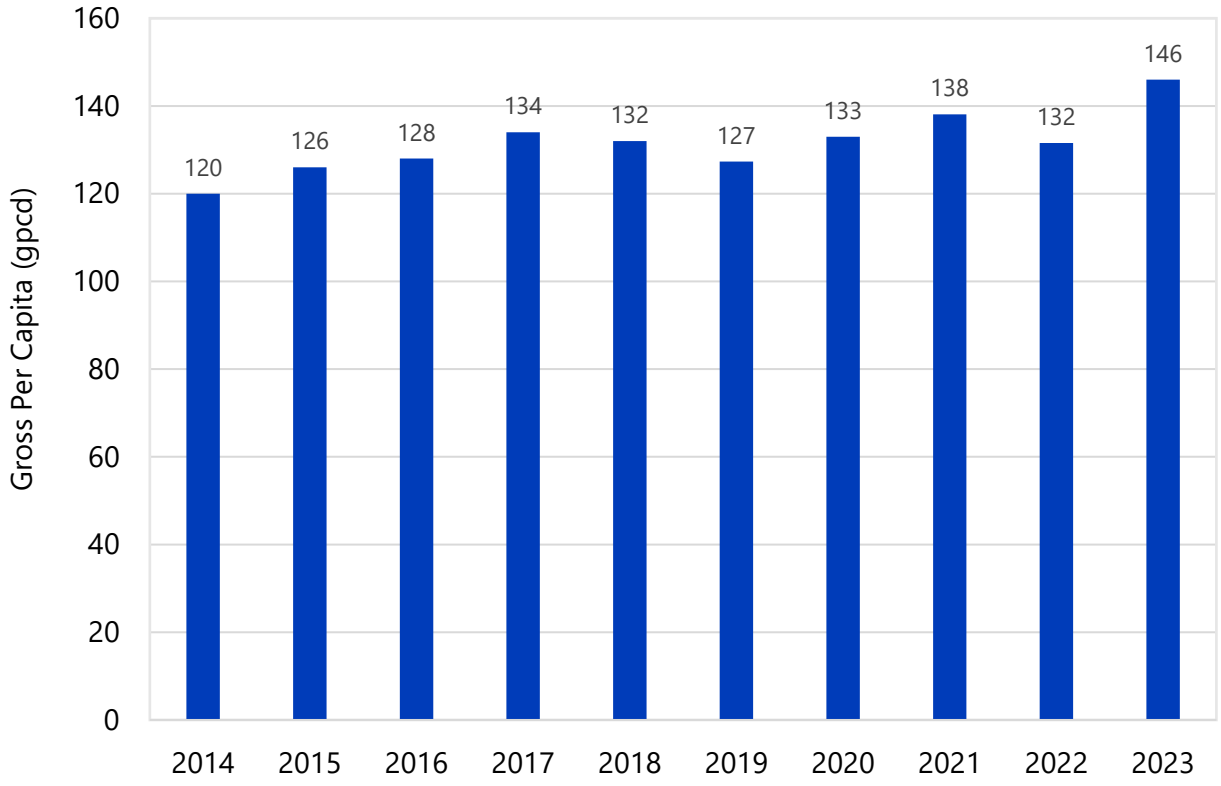


Figure 2.2 Gross Per Capita Water Use

The maximum per capita factor from 2018 to 2022 was selected to be used for the demand projections developed as part of this WSP. This occurred in 2021 with a gross per capita water usage of 138 gallons per capita day (gpcd). This value reflects the City's recent water use trends, but excludes the outlier of 2023 likely caused by severe drought conditions, while still being conservative for planning purposes.

The City experienced significantly higher demands in 2023. The gross per capita water demand factor increased approximately 11 percent and the annual average increased approximately 16 percent from 2022 to 2023. Figure 2.3 illustrates the monthly variation in demand over the past 3 years, illustrating the higher demands in summer 2023 likely due to drought conditions.

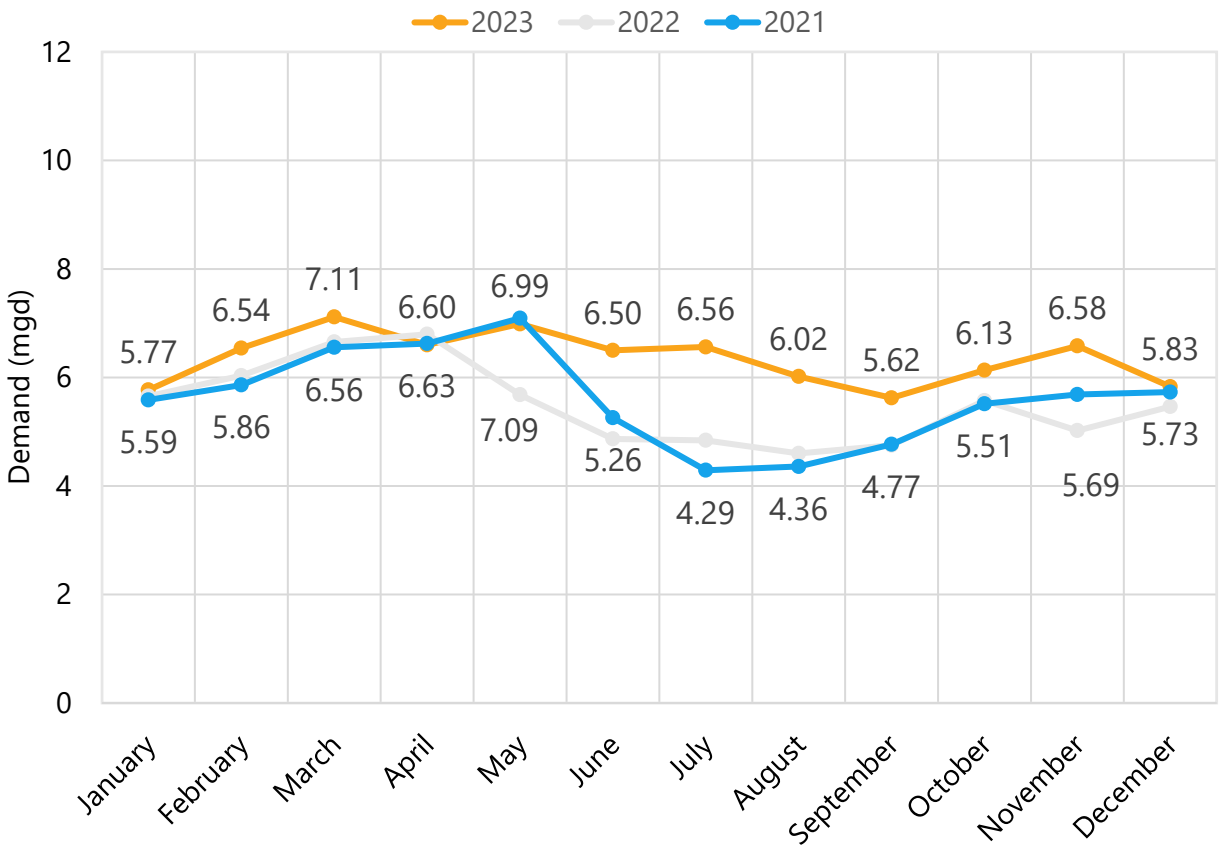


Figure 2.3 Monthly Average Demands for 2021 – 2023

Several weather-related factors were evaluated for the last 3 years to determine any potential impacts on the higher water demands. Table 2.4 provides the monthly average demands, total rainfall, and average temperatures for 2021 to 2023.

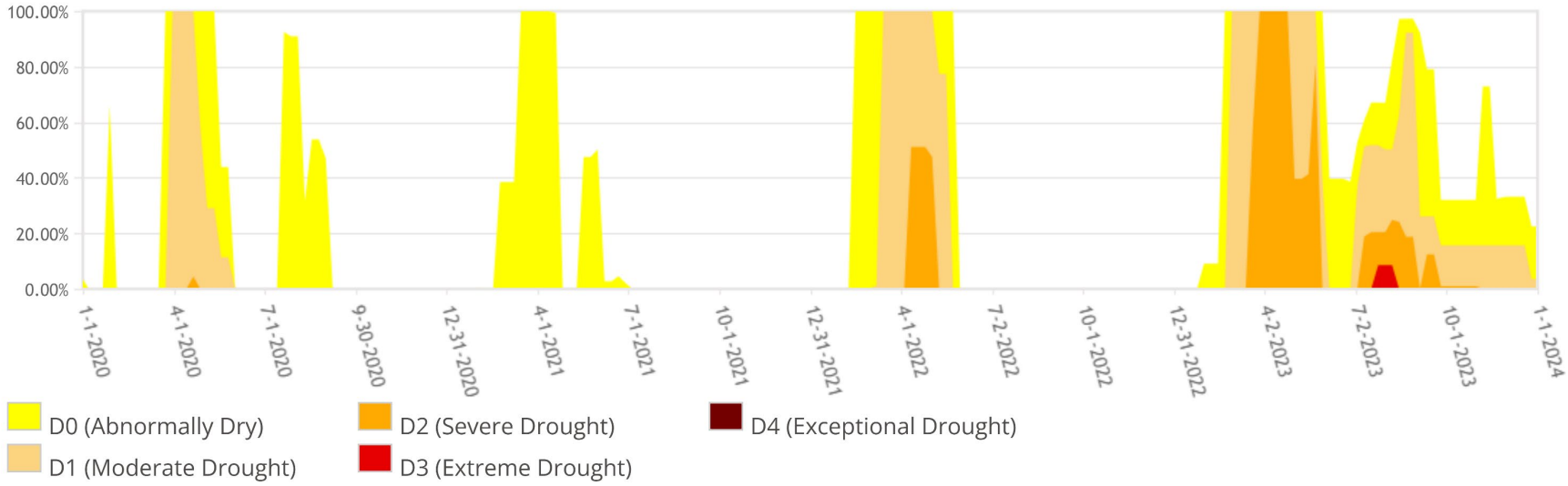
Table 2.4 Monthly Demand Comparison to Rainfall and Temperature (2021 – 2023)

Month	Annual Average Demand (mgd)			Total Rainfall (inches)(1)			Average Temperature (°F)(2)		
	2021	2022	2023	2021	2022	2023	2021	2022	2023
January	5.59	5.66	5.77	0.5	1.8	0.7	62.2	61.6	65.1
February	5.86	6.03	6.54	0.7	0.7	0.0	68.0	65.3	68.9
March	6.56	6.66	7.11	0.5	0.5	0.5	68.5	70.4	71.1
April	6.63	6.80	6.60	1.9	3.0	3.4	73.0	73.4	75.3
May	7.09	5.68	6.99	0.3	7.6	6.1	77.8	78.4	77.8
June	5.26	4.87	6.50	9.5	10.6	6.5	80.1	80.8	81.2
July	4.29	4.84	6.56	17.2	6.6	4.3	81.8	82.6	85.0
August	4.36	4.60	6.02	3.0	7.9	9.0	82.0	82.4	85.2
September	4.77	4.75	5.62	7.2	29.9(3)	2.9	80.7	80.9	82.1
October	5.51	5.57	6.13	3.1	0.3	2.1	77.7	74.8	76.7
November	5.69	5.02	6.58	4.0	5.6	1.2	67.3	73.7	71.1
December	5.73	5.46	5.83	0.4	1.4	4.3	67.1	64.9	66.3
Average	**5.61**	**5.49**	**6.35**	**48.2**	**75.8**	**40.9**	**73.8**	**74.1**	**75.5**
Max	**7.09**	**6.80**	**7.11**	**17.2**	**29.9**	**9.0**	**82.0**	**82.6**	**85.2**

Notes:
(1) Rainfall totals provided by the City's daily reports and supplemented with historical rainfall data.
(2) Temperature is an average of the average daily temperatures reported at the Punta Gorda Cleveland Station.
(3) Hurricane Ian occurred in late September 2022.
Abbreviations: °F – degrees Fahrenheit

As seen in Table 2.4, the changes in total rainfall and average temperature experienced year-over-year appear to impact the City's demands. For rainfall, years with higher rainfall had lower water demands. Note, September 2022 is when Hurricane Ian occurred.

Each year the temperature has on average increased, which could result in higher irrigation demand. Ultimately, lower rainfall and higher temperatures result in drought. As seen in Figure 2.4, which was produced using data from the U.S. Drought Monitor, areas in Charlotte County saw increased amounts of severe and extreme drought in the past 3 years, especially during 2023. Periods of drought are cyclical and not typically sustained for many years. However, it is important to plan water supplies to be able to reliably meet water demands even during times of severe drought.



Source: U.S. Drought Monitor

Figure 2.4 Percent of Charlotte County Areas in U.S. Drought Monitor Categories

2.2 Water Demand Projections

Projecting water demand is necessary for determining a utility's infrastructure needs, which ultimately impacts the capital improvement program (CIP) and determines the timing for future projects to come online to meet these demands. Several demand projection methodologies were employed to evaluate the range of potential annual average demands through 2050. Projections include methodologies based on historical demand (linear regression), County population (BEBR), parcel population (developed by the SWFWMD), and demands from the SWFWMD's Regional Water Supply Plan.

2.2.1 Linear Regression Demand Projections

Historical water demands were plotted for the last 20 years and the last 5 years to develop linear regression models to predict future water demand. The 5-year linear regression had the best fit (R^2=0.8806) and the highest projected demand over the planning period. Section 2.2.6 illustrates the linear regression-based demand projections as compared to other methodologies.

2.2.2 Historical Per Capita Demand and BEBR Population Demand Projections

The City utilized BEBR's population projections, encompassing high, medium, and low estimates, for Charlotte County across multiple future periods. These projections, detailed in Volume 56, Bulletin 195 (April 2023), facilitated calculating percent changes between 2022 and subsequent 5-year increments up to 2050. By applying these percent changes to the City's 2022 functional population and interpolating linearly between each 5-year period, population estimates for intervening years were derived.

Over the 20-year span from 2025 to 2045, the average annual percent change for BEBR's low, medium, and high projections was 0.14 percent, 0.88 percent, and 1.61 percent respectively. These figures were crucial for forecasting the City's future water demand, where each year's population increase, multiplied by the per capita water use of 138 gpcd, was added to the previous year's demand. For instance, to determine the 2026 demand, the population difference from 2025 to 2026 was multiplied by 138 gpcd, yielding an approximate increase of 0.14 mgd, which was added to the 2025 demand of 6.81 mgd to establish the 2026 annual average demand of 6.95 mgd.

Detailed projections for BEBR's low, medium, and high population demands are available in Table 2.5 and visually represented in Section 2.2.6 of the report.

Table 2.5 BEBR Demand Projections

Year	BEBR Low			BEBR Medium			BEBR High		
	County Population	City Population[1]	Demand (mgd)[2]	County Population	City Population[1]	Demand (mgd)[2]	County Population	City Population[1]	Demand (mgd)[2]
2023		41,060	6.35		42,068	6.35		43,028	6.35
2024		40,732	6.31		42,748	6.45		44,669	6.58
2025	192,100	40,404	6.26	206,600	43,428	6.54	221,100	46,309	6.81
2026		40,546	6.28		44,021	6.62		47,341	6.95
2027		40,689	6.30		44,614	6.71		48,373	7.09
2028		40,831	6.32		45,207	6.79		49,405	7.23
2029		40,974	6.34		45,800	6.87		50,437	7.38
2030	195,500	41,116	6.36	220,900	46,393	6.95	246,300	51,469	7.52
2031		41,121	6.36		46,858	7.02		52,389	7.65
2032		41,125	6.36		47,324	7.08		53,308	7.77
2033		41,129	6.36		47,790	7.14		54,228	7.90
2034		41,133	6.36		48,255	7.21		55,147	8.03
2035	195,600	41,137	6.36	232,100	48,721	7.27	268,700	56,067	8.15
2036		41,045	6.35		49,092	7.32		56,885	8.27
2037		40,952	6.34		49,463	7.37		57,704	8.38
2038		40,859	6.33		49,834	7.43		58,522	8.49
2039		40,766	6.31		50,204	7.48		59,340	8.61
2040	193,400	40,674	6.30	241,000	50,575	7.53	288,600	60,159	8.72
2041		40,539	6.28		50,896	7.57		60,920	8.82
2042		40,404	6.26		51,217	7.62		61,682	8.93
2043		40,268	6.24		51,539	7.66		62,443	9.03
2044		40,133	6.23		51,860	7.71		63,205	9.14
2045	190,200	39,998	6.21	248,700	52,181	7.75	307,100	63,966	9.24
2046		39,859	6.19		52,485	7.79		64,707	9.35
2047		39,720	6.17		52,790	7.83		65,448	9.45
2048		39,581	6.15		53,094	7.88		66,190	9.55
2049		39,441	6.13		53,399	7.92		66,931	9.65
2050	186,900	39,302	6.11	256,000	53,703	7.96	325,100	67,672	9.75

Notes:

(1) County population in 2022 was 196,742 and City's was 41,388. City population calculated based on the percent growth of the 5-year County populations.

(2) The City's future water demand projections were calculated by multiplying each year's population increase, based on BEBR projections, by an assumed per capita water use of 138 gpcd. This annual increase was then added to the previous year's water demand to estimate each year's annual average demand.

2.2.3 Historical Per Capita Demand and SWFWMD Parcel Population Demand Projections

Estimated functional populations derived using the SWFWMD methodology were used to determine historical population growth rates. Figure 2.5 shows the SWFWMD parcel population nodes, which provides several types of populations by 5-year increments through 2045.

To determine the demands, the population used was the summation of the functionalized seasonal population (includes permanent residents), the functionalized tourist population, and the functionalized net commuter population. Water demand projections were developed by multiplying the projected functional population annual increase by the 5-year maximum per capita water demand of 138 gpcd. This calculation was used to determine the annual increase in demand, which was then added to the previous year's water demand to estimate each year's annual average demand. Note, population values were extrapolated from 2045 to 2050 using the BEBR medium annualized growth rate from 2045 to 2050 of 57 percent. These projected annual average demands are reflected as "SWFWMD Parcel Population" in Section 2.2.6.

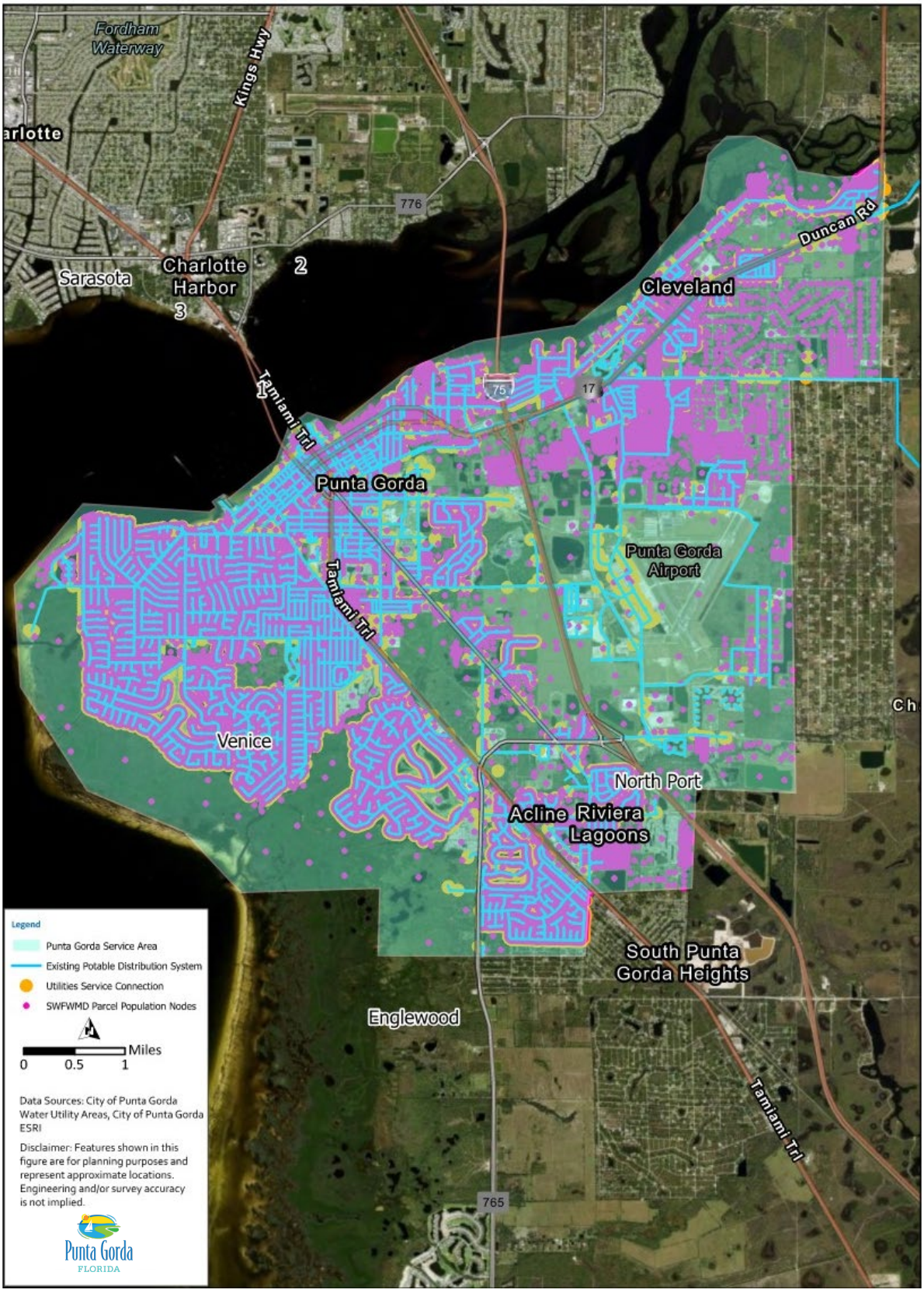


Figure 2.5 SWFWMD Population Nodes in City's Water Service Area

2.2.4 SWFWMD Regional Water Supply Plan Demand Projections

In accordance with Section 373.709, Florida Statues, the SWFWMD updates its *Regional Water Supply Plan* every 5 years. This Plan assesses the region's projected water demand and evaluates potential sources to meet these demands over a 20-year period. The SWFWMD provided a draft of the demand projections for the City (dated on July 17, 2023). These values are based on BEBR populations (Volume 55, Bulletin 192, February 2022), the SWFWMD's Estimated Water Use reports, and a population projection model and GIS service area layer. Section 2.2.6 displays these projected annual average demands as "SWFWMD Draft 2025 Plan."

2.2.5 Planned Development Demand Projections

The City completed a water distribution system analysis that included an inventory of planned future developments. This analysis estimated an additional demand of 461,694 gpd under average day demand conditions will occur because of these developments (*Water Distribution System Socorro Analysis, 2023*). These additional demands are anticipated to be fully online by 2030 and were assumed to equally come online from 2024 through 2030.

2.2.6 Comparison of Demand Projection Methodologies

The estimated water demand projected by the linear regression methods, the BEBR Low, Medium, and High projection methods, the SWFWMD parcel population method, SWFWMD Draft 2025 Plan method, and planned developments method are compared in Figure 2.6. The 5-year linear regression and BEBR Low population projections provide the range of high to low future demands, respectively.

The demand projections based on the City's planned developments are very similar to the BEBR Medium and SWFWMD Parcels based projections, resulting in relative certainty in projections through 2030. Long-term, the SWFWMD Parcels methodology is very similar to the 20-year regression projection, which is typically a good predictor of water demand over an extended period since it eliminates the fluctuations due to periods of economic growth and decline, as well as short-term weather impacts such as drought. Based on these reasons, the SWFWMD Parcels demand projections were selected as the basis of this WSP. The SWFWMD Parcels population uses the projected population of all the properties located within the City's utility service area and includes the functionalized seasonal population as well as tourists and commuters.

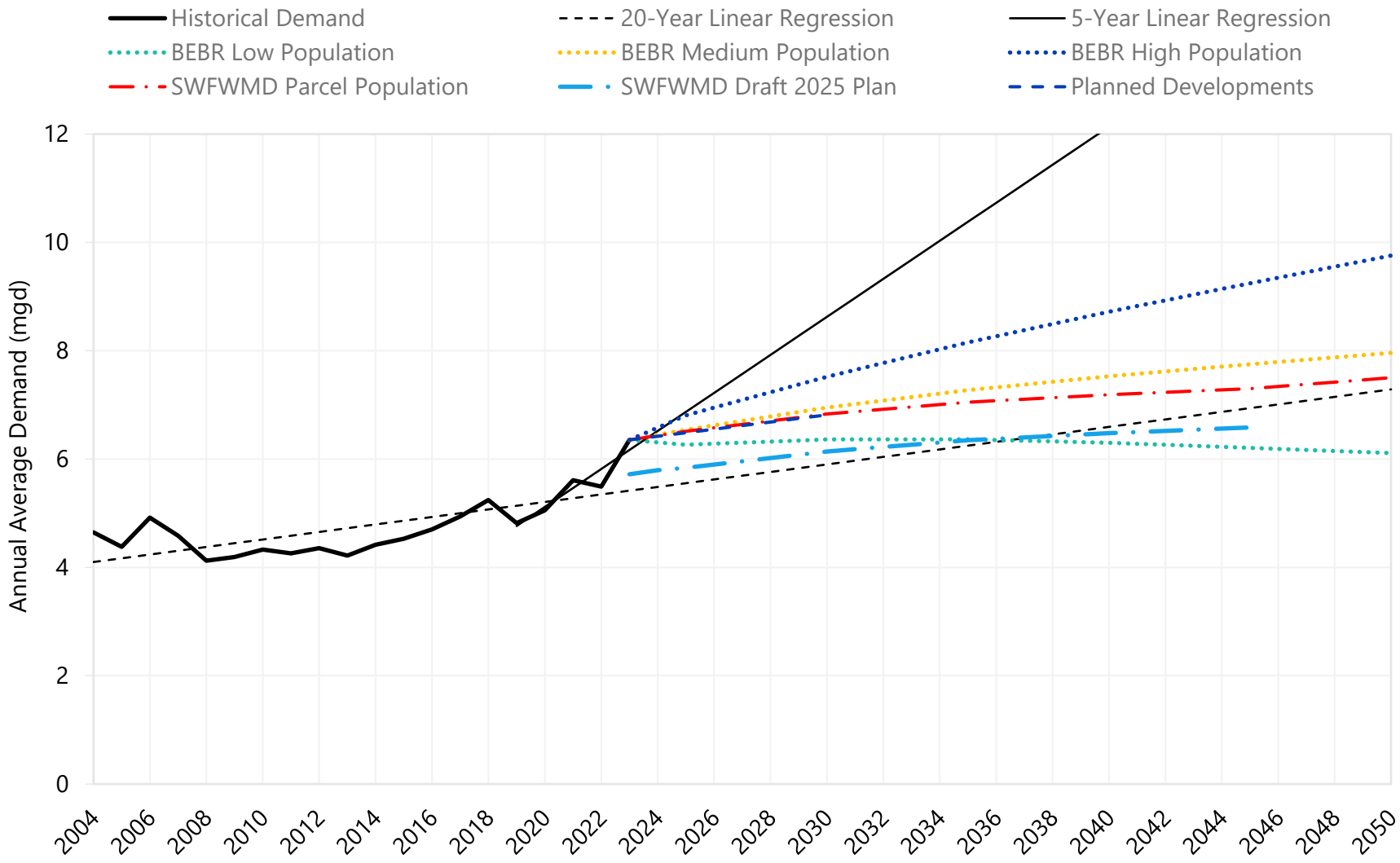


Figure 2.6 Annual Average Demand Projection Comparison

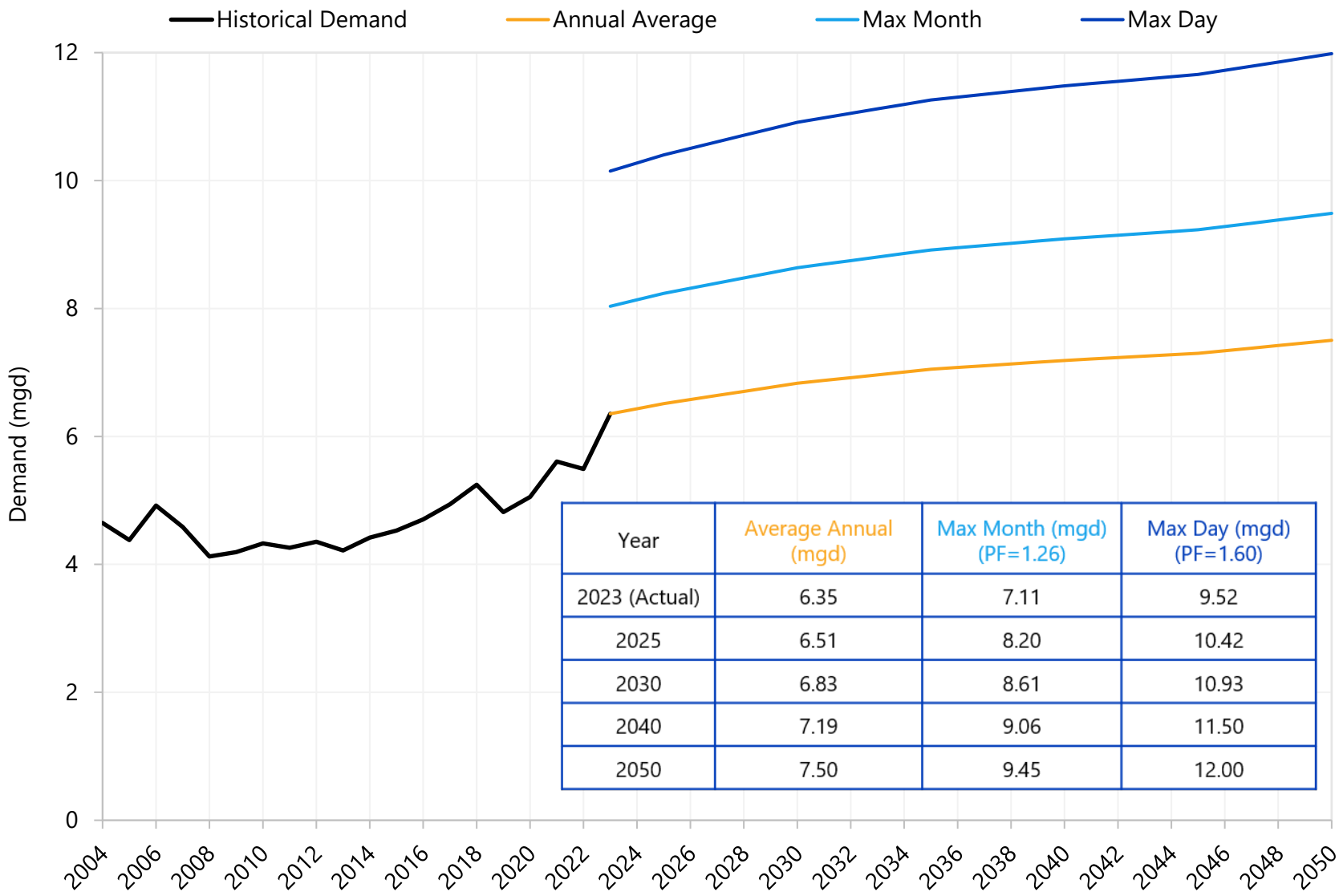
2.2.7 Selected Demand Projection Summary

Table 2.6 lists the population projections and the projected annual average, maximum month, and maximum day demand through 2050 used for the remainder of this WSP. The projected demands are illustrated in Figure 2.7.

Table 2.6 Selected Population and Water Demand Projections

Year	Service Area Population[1]	Annual Average Demand (mgd)	Maximum Month Demand (mgd)[2]	Maximum Day Demand (mgd)[3]
2023[4]	41,582	6.35	7.11	9.52
2024	43,458	6.43	8.10	10.29
2025	45,333	6.51	8.20	10.42
2026	45,794	6.58	8.29	10.53
2027	46,255	6.64	8.37	10.62
2028	46,717	6.70	8.44	10.72
2029	47,178	6.77	8.53	10.83
2030	47,639	6.83	8.61	10.93
2031	47,956	6.88	8.67	11.01
2032	48,273	6.92	8.72	11.07
2033	48,590	6.96	8.77	11.14
2034	48,907	7.01	8.83	11.22
2035	49,225	7.05	8.88	11.28
2036	49,424	7.08	8.92	11.33
2037	49,623	7.11	8.96	11.38
2038	49,822	7.13	8.98	11.41
2039	50,022	7.16	9.02	11.46
2040	50,221	7.19	9.06	11.50
2041	50,383	7.21	9.08	11.54
2042	50,545	7.23	9.11	11.57
2043	50,707	7.26	9.15	11.62
2044	50,869	7.28	9.17	11.65
2045	51,031	7.30	9.20	11.68
2046	51,326	7.34	9.25	11.74
2047	51,620	7.38	9.30	11.81
2048	51,914	7.42	9.35	11.87
2049	52,209	7.46	9.40	11.94
2050[5]	52,503	7.50	9.45	12.00

Notes:
(1) Population includes functionalized seasonal population (includes permanent residents), tourists, and net commuters.
(2) Maximum month demands calculated with 1.26 peaking factor.
(3) Maximum day demands calculated with 1.60 peaking factor.
(4) Actual functional population and water demand.
(5) 2050 City population extrapolated from 2045 using a 0.57 percent annualized growth rate.



Year	Average Annual (mgd)	Max Month (mgd) (PF=1.26)	Max Day (mgd) (PF=1.60)
2023 (Actual)	6.35	7.11	9.52
2025	6.51	8.20	10.42
2030	6.83	8.61	10.93
2040	7.19	9.06	11.50
2050	7.50	9.45	12.00

Figure 2.7 Selected Demand Projections

CHAPTER 3 GROUNDWATER SUPPLY AND PERMITTING

This chapter reviews the City's existing RO WTP, WUP, and groundwater resources. The chapter also outlines a future water supply project alternative to increase the capacity of this source through an expansion of the wellfield and RO WTP.

3.1 Existing RO WTP

The RO WTP currently has a treatment capacity of 4.5 mgd. This includes 4.0 mgd treated through RO and up to 0.5 mgd of bypassed groundwater. The 15,000-square-feet RO WTP facility has offices, laboratories, and treatment equipment. During the treatment process, raw water from supply wells is dosed with antiscalant and filtered through cartridge filtration. High-pressure pumps then convey the water to RO skids. The resulting RO permeate stream is acidified, degasified, and disinfected. The treated water is stored in ground storage tanks where it is blended with water produced by the Shell Creek WTP prior to being pumped to the distribution system.

The RO WTP was built with the plan of future expansion capacity to 9.0 mgd (8.0 mgd RO permeate with 1.0 mgd filtered groundwater blend). The facility layout was designed to accommodate additional membrane skids, pre-treatment filters, and a future degasification unit. The chemical dosing systems, contact chamber, and deep injection well (DIW) were all sized for the facility's ultimate flow.

3.2 Water Use Permit

This section summarizes the current water use permit and historical water demand analysis.

3.2.1 Permitting History and Current Authorization

The City of Punta Gorda is currently authorized by the SWFWMD via WUP No. 20000871.014 to withdraw annual average and peak month daily quantities of 8.088 mgd and 11.728 mgd, respectively, from the Upper Floridan Aquifer (UFA). SWFWMD does not authorize a maximum daily quantity for public supply permits. These quantities are authorized to be met by withdrawing surface water from the Shell Creek Reservoir following a diversion schedule and from 11 brackish groundwater wells (Figure 3.1 and Table 3.1). Special Condition No. 2 authorizes withdrawal flexibility and specifies that the quantities assigned to each individual supply source in the permit are estimates based on projected distribution of pumpage and have been established for water use inventory and impact analysis purposes only.

The quantities identified in the WUP for each individual source assumed a 50/50 split between ground and surface water sources and are not intended to dictate the distribution of pumpage from ground or surface water supply sources. The City is authorized to make adjustments in pumpage distribution as necessary so long as adverse environmental impacts do not result and the total authorized annual average demand and peak month demand quantities are not exceeded. Based on a review of the WUP File of Record, it is clear that the intent of SWFWMD staff was to encourage the use of surface water to the greatest extent possible but allow the City the flexibility to meet demand exclusively with groundwater if deemed necessary.

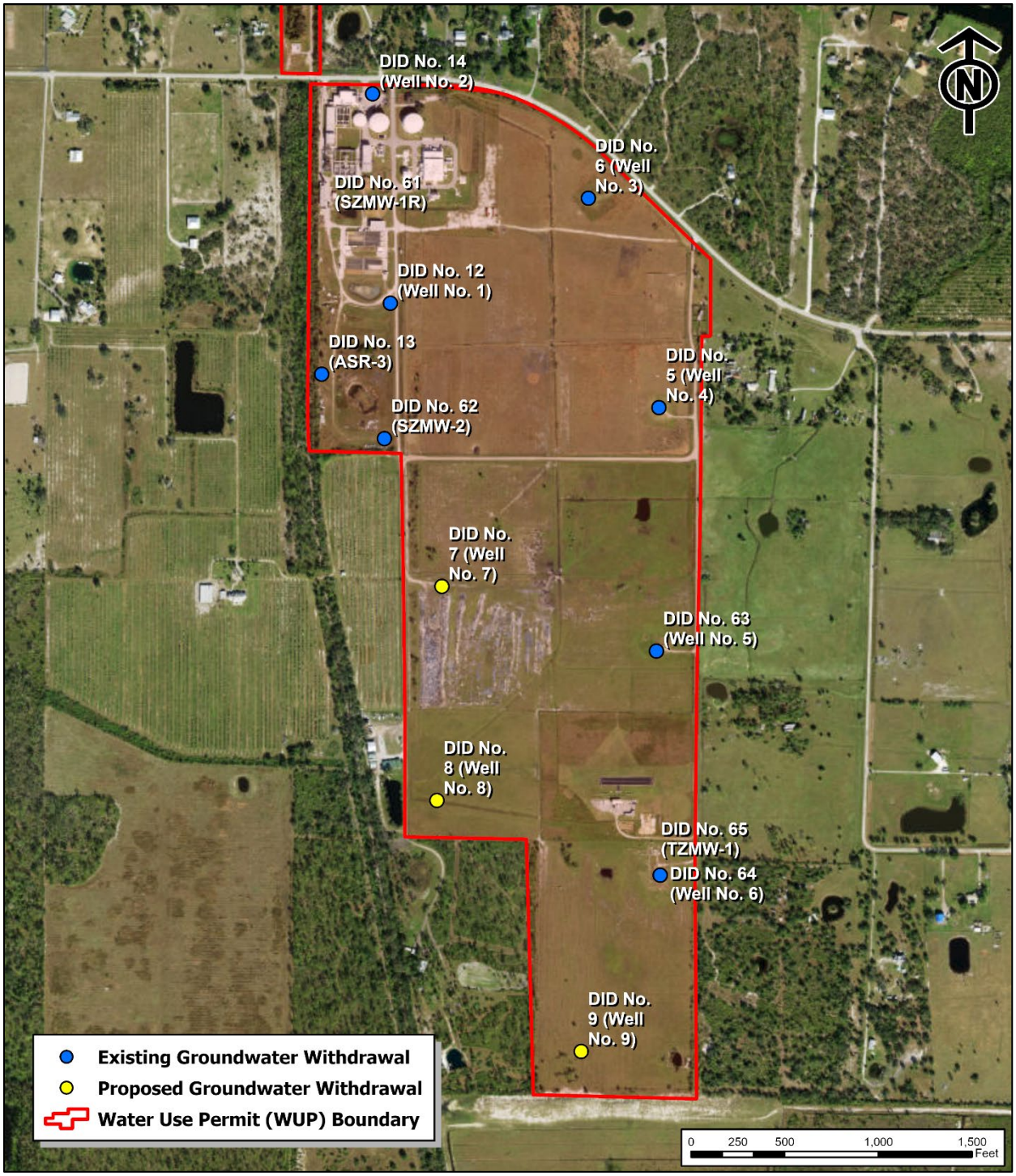


Figure 3.1 Water Use Permit Boundary and Permitted Groundwater Withdrawals

Table 3.1 Permitted Groundwater Withdrawal Table

Owner ID	District ID	Status	Casing Diameter (in)	Cased Depth (ft. bls)	Total Depth (ft. bls)	Pump Capacity (gpm)	Annual Average Daily(1) (mgd)	Peak Month Daily(1) (mgd)
1	12	Active	16	780	998	435	224,700	626,000
2	14	Active	16	800	915	435	224,700	625,000
3	6	Active	16	670	880	870	449,300	1,214,000
4	5	Active	16	670	880	870	449,400	1,214,000
5	63	Active	16	670	884	870	449,300	1,214,000
6	64	Active	15	670	880	870	449,300	1,214,000
7	7	Proposed	16	670	880	870	449,300	1,214,000
8	8	Proposed	16	670	880	870	449,300	1,214,000
9	9	Proposed	16	670	880	870	449,300	1,214,000
ASR-3	13	Inactive	16	810	1,000	435	224,700	626,000
SZMW-2	62	Inactive	16	785	1,000	435	224,700	625,000

Notes:
(1) The annual average and peak month quantities shown are those identified in the WUP Withdrawal Point Quantity Table. Special Condition No. 2 specifies these quantities are estimates only, assumes a 50/50 split between ground and surface water sources, and are not intended to dictate the distribution of pumpage.
Abbreviations: in – inches; ft. bls – feet below land surface

Table 3.2 summarizes the City's WUP history since 1991. It is important to note that the City's WUP authorizes only raw water withdrawals from surface water and groundwater.

Significant revisions of the permit include:

- WUP 20000871.008 renewed the permit for a 20-year duration.
- WUP 20000871.010 modified the permit to add the City's aquifer storage and recovery (ASR) system.
- WUP 20000871.011 discontinued ASR operations and converted the City's ASR wellfield to a brackish water wellfield.
- WUP 20000871.012 was a letter modification to rename several groundwater withdrawals and monitoring wells as well as change the Wellfield Annual Report due date to April 15 each year.
- WUP 20000871.013 was a letter modification issued on December 2, 2021, which added a surface water diversion schedule to be consistent with the Shell Creek MFL.
- WUP 20000871.014 was a letter modification issued on July 18, 2024, which incorporated the City's revised Wellfield Management Plan (WFMP) that was submitted on January 31, 2023, and approved by the District on May 1, 2023. Special Conditions 6 and 7 were modified to update the TDS Concentration Guidance and Trigger Levels specified in the revised WFMP. The expiration date for the permit is July 31, 2027.

Importantly, new MFL requirements for Shell Creek became effective in December 2021. The new MFL will affect the timing and degree to which surface waters from Shell Creek can be relied upon to meet demands and will correspondingly affect the degree to which the City will need to rely upon brackish groundwater in the future. These MFL requirements were incorporated into the City's WUP. More details about the MFL impacts will be discussed in Chapter 4.

Table 3.2 Water Use Permitting History

WUP Revision	Issue Date	Expiration Date	Class	Annual Average Daily Quantity (mgd)	Peak Month Daily Quantity (mgd)
20000871.003	07/09/1991	11/28/1995	Letter Modification	4.220	6.750
20000871.004	08/26/1997	08/26/2007	Renewal	5.358	6.901
20000871.005	07/07/1999	08/26/2007	Letter Modification	5.358	6.901
20000871.006	01/01/2003	08/26/2007	SWUCA Automated Update	5.358	6.901
20000871.007	Withdrawn		Letter Modification	5.358	6.901
20000871.008	07/31/2007	07/31/2027	Renewal	8.088	11.728
20000871.009	07/21/2011	07/31/2027	Letter Modification	8.088	11.728
20000871.010	12/22/2014	07/31/2027	Modification	8.088	11.728
20000871.011	01/08/2018	07/31/2027	Modification	8.088	11.728
20000871.012	10/30/2020	07/31/2027	Letter Modification	8.088	11.728
20000871.013	12/02/2021	07/31/2027	Letter Modification	8.088	11.728
20000871.014	07/18/2024	07/31/2027	Letter Modification	8.088	11.728

3.2.2 Historical Use Analysis

The City is required to submit monthly meter readings and pumpage data to SWFWMD. Based on this information, a historical use analysis was conducted to determine the City's annual average and maximum month actual use quantities.

As of March 2024, the City pumped a 12-month annual average quantity of 7.438 mgd, of which 4.336 mgd was supplied by surface water and 3.102 mgd was supplied by groundwater. The highest 12-month annual average demand usage since wellfield startup was 7.676 mgd for the 12-month period end in December 2023. Of the 7.676 mgd pumped, 4.233 mgd was supplied by surface water and 3.443 mgd was supplied by groundwater as shown in Figure 3.2.

The highest maximum month demand usage since wellfield startup was 9.649 mgd in April 2021. Of the 9.649 mgd pumped, 3.518 mgd was supplied by surface water and 6.131 mgd was supplied by groundwater as shown in Figure 3.3.

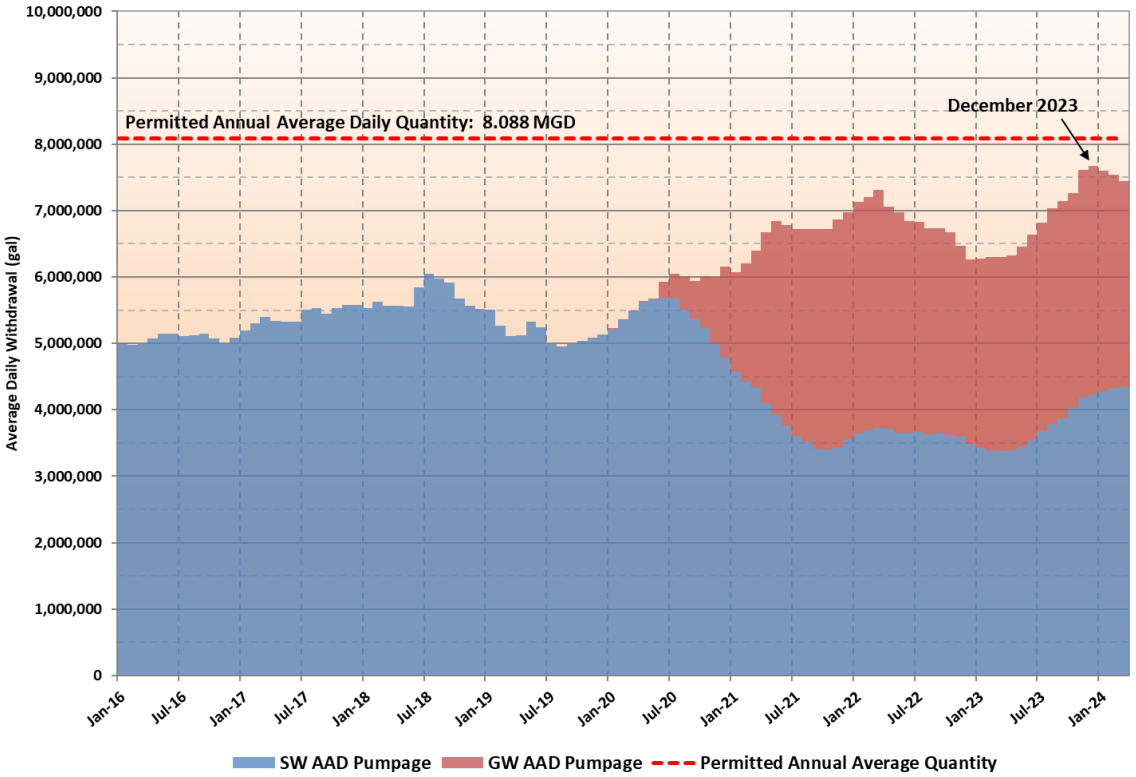


Figure 3.2 Running Annual Average Daily Surface Water and Groundwater Pumpage

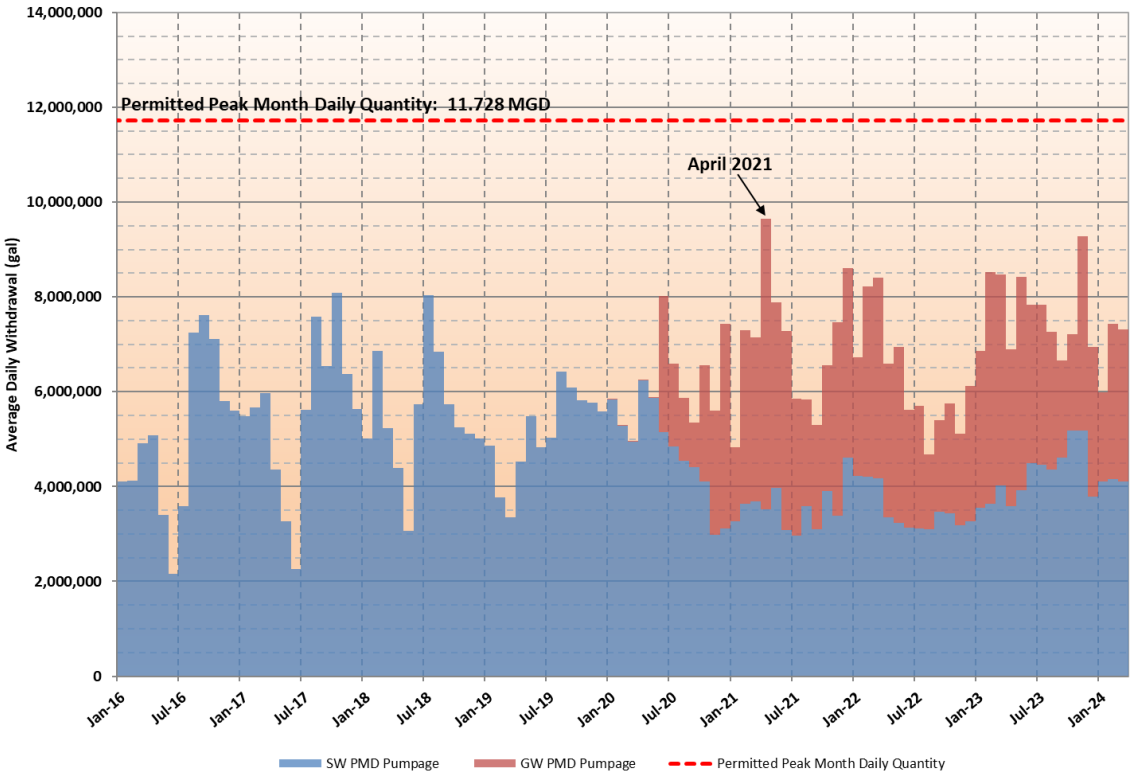


Figure 3.3 Peak Month Daily Surface Water and Groundwater Pumpage

3.2.3 Finished and Raw Water Requirements

Based on the City's updated demand projections calculated in Chapter 2, the finished water requirements for the projected 2050 annual average demand, maximum month demand, and maximum day demand are summarized in Table 3.3. The projected water demands are 7.5 mgd, 9.5 mgd and 12.0 mgd, respectively. Table 3.3 also indicates the treatment efficiency of each treatment facility, as well as the projected amounts assumed to be contributed by surface water and groundwater. These assumptions consider MFL restrictions discussed in Chapter 4. Because the surface water system is at times restricted based on the MFL, the Block 1 quantities are assumed from surface water, with the remainder of the water demand being met by groundwater.

The finished water demand projections require annual average, maximum month, and maximum day raw water withdrawals of 8.95 mgd, 11.3 mgd and 14.4 mgd, respectively, as shown in Table 3.3. This table includes the quantities that would be needed for an expansion of the RO facility to 9 mgd that will be further evaluated in this chapter.

Table 3.3 Summary of Finished and Raw Water Requirements by 2050

Description		Treatment Efficiency	Annual Average (mgd)	Maximum Month (mgd)	Maximum Day (mgd)
Finished Water Demand		**N/A**	**7.50**	**9.5**	**12.0**
Raw Water Demand		**N/A**	**8.95**	**11.3**	**14.4**
Surface Water (Shell Creek WTP)	Finished	90%	3.60	3.06	3.06
	Raw		4.05	3.40	3.40
Groundwater (RO WTP)(1)	Finished	80%	3.90	6.40	9.00
	Raw		4.90	7.90	11.00

Notes:
(1) Includes finished groundwater from the RO WTP and bypass.

The required raw water annual average withdrawal of 8.95 mgd is 0.862 mgd greater than the City's currently permitted annual average quantity of 8.088 mgd. The required raw water maximum month withdrawal of 11.3 mgd is 0.428 mgd less than the City's currently permitted maximum month quantity of 11.728 mgd. As previously stated, SWFWMD does not officially authorize a maximum daily allocation for public supply permits. If the permittee maintains compliance with the permitted annual average and maximum month quantities, the permittee may withdrawal any maximum daily quantity that is required and consistent with other SWFWMD rules (e.g. MFLs).

If the City desired to utilize the brackish wellfield to supply all 7.5 mgd of the 2050 annual average water demand, a groundwater withdrawal of 9.375 mgd would be required based on the RO WTP's 80 percent treatment efficiency. However, it has been determined that a minimum of 4.05 mgd annual average of surface water will be available in any given year even considering MFL restrictions; therefore, the groundwater quantities are based on this amount of available surface water.

3.2.4 Summary and Recommendations

If the City determines that expansion of the RO WTP is feasible, it is recommended that the City develop and submit a WUP modification application that increases the permitted annual average quantity to 8.95 mgd. An increase in the annual average quantity will require submittal and acceptance of updated demand projections and may require updated groundwater flow modeling to support the brackish wellfield raw water quantities. If the City intends to modify the WUP and submit updated demand projections and impact analyses, the City could request an early renewal of the WUP since the expiration date is July 31, 2027. Rule 40D-2.321 Florida Administrative Code (F.A.C.) and Section 1.4.11 of the SWFWMD WUP Applicant's Handbook Part B states that the applicant can request a "renewal with modification" if the modification application is deemed "substantial" by SWFWMD staff. Section 1.4.11 of the Handbook states the following:

> *"an application to modify a WUP shall be deemed by the SWFWMD to be substantial if the amount of effort, time and materials required to be submitted to complete the application and the amount of effort, time and documentation required of District staff to evaluate the submission are similar to that required for a renewal application for the same permit. Upon request by the Applicant, the District shall process the application for modification as a renewal application with modification notwithstanding that it is submitted prior to one year before the permit expiration date."*

3.3 RO WTP Expansion Evaluation

For the RO WTP expansion evaluation, two scenarios were considered. In the first scenario, the aquifer total dissolved solids (TDS) concentration was considered to be stable and will not exceed 2,500 milligrams per liter (mg/L), aligning with the maximum TDS used in the existing RO WTP basis of design report. The second scenario considered the aquifer TDS rising to a maximum of 5,000 mg/L, reflecting a possible groundwater quality degradation. As will be further discussed in this chapter, this scenario requires further refinement based on hydrogeological groundwater models and would necessitate other modifications at the RO WTP.

3.3.1 RO WTP Expansion

In anticipation of future expansion, the original RO WTP design incorporated a layout to accommodate additional membrane skids, pre-treatment filters, and a future degasification unit. The chemical dosing systems, contact chamber, and DIW were all sized to handle the facility's ultimate flow capacity in order to minimize the infrastructure additions required to bring the RO WTP to full capacity.

A detailed list of the necessary infrastructure and equipment is provided in Table 3.4.

Table 3.4 RO WTP Expansion – Required Equipment

Equipment	Details
Production Wells	5 wells with design capacity of 8,710 gpm (1.25 mgd)
Day Tanks	2 tanks required for chemical dosage (1 for caustic and 1 for sulfuric acid)
Cartridge Filter	1 additional cartridge filter (5 microns, 40 inches)
High Pressure Feed Pumps	2 additional high-pressure pumps (1 for each new membrane skid)
RO Skids	2 additional RO skids, 2 stages, 2.0 mgd permeate
Degasifier	1 additional degasifier with centrifugal fan blower, capacity for 4.5 mgd
RO Transfer Pump	1 additional vertical turbine pump (1,200 rpm, 30 hp) for RO transfer
Finished Water Transfer Pump	1 additional vertical turbine (1,200 rpm, 100 hp) for finished water transfer
Additional Piping	Wellfield piping and facility piping

Abbreviations: rpm – revolutions per minute; hp – horsepower

An adapted process flow diagram from the original Basis of Design Report (Tetra Tech, 2010) for the RO WTP is presented in Figure 3.4, identifying the most relevant items in Table 3.4. A cost estimate for the required improvements is presented in Chapter 6.

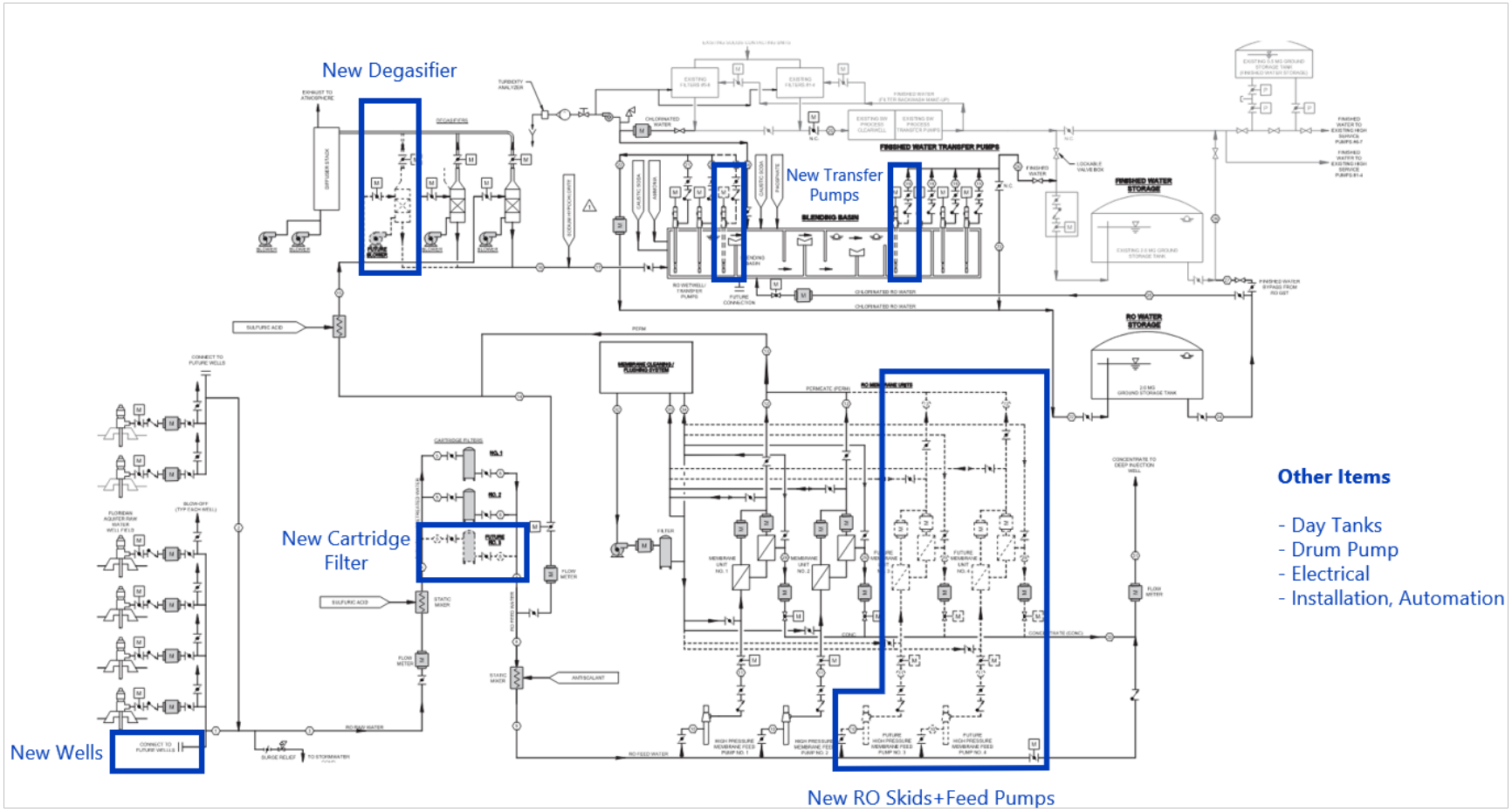


Figure 3.4 Modified Process Flow Diagram for RO WTP Expansion

3.3.2 TDS Data Summary

One of the key benefits of using the RO WTP in addition to providing additional water supply is that the permeate water is used to blend down the TDS of the surface water when it exceeds the City's goal of 450 mg/L. It should be noted that the secondary maximum contaminant level (MCL) for compliance purposes is 500 mg/L.

3.3.2.1 Shell Creek WTP TDS

Monthly lab-certified TDS data were provided for the Shell Creek WTP from January 2003 to March 2024. TDS values prior to the Shell and Prairie Creeks Watershed Management Plan, implemented in 2004, are not considered to be representative of the existing conditions, and were not included in the blending analysis. Historical average and maximum monthly TDS values from the surface water plant are presented in Table 3.5.

Table 3.5 Shell Creek WTP TDS Monthly Average (2004 – 2023)

Month	Average TDS (mg/L)	Maximum TDS (mg/L)
January	582	683
February	618	700
March	600	723
April	611	737
May	609	810
June	604	735
July	499	666
August	419	603
September	315	512
October	359	546
November	461	602
December	508	621

Figure 3.5 shows the historical TDS series for the past 20 years evaluated.

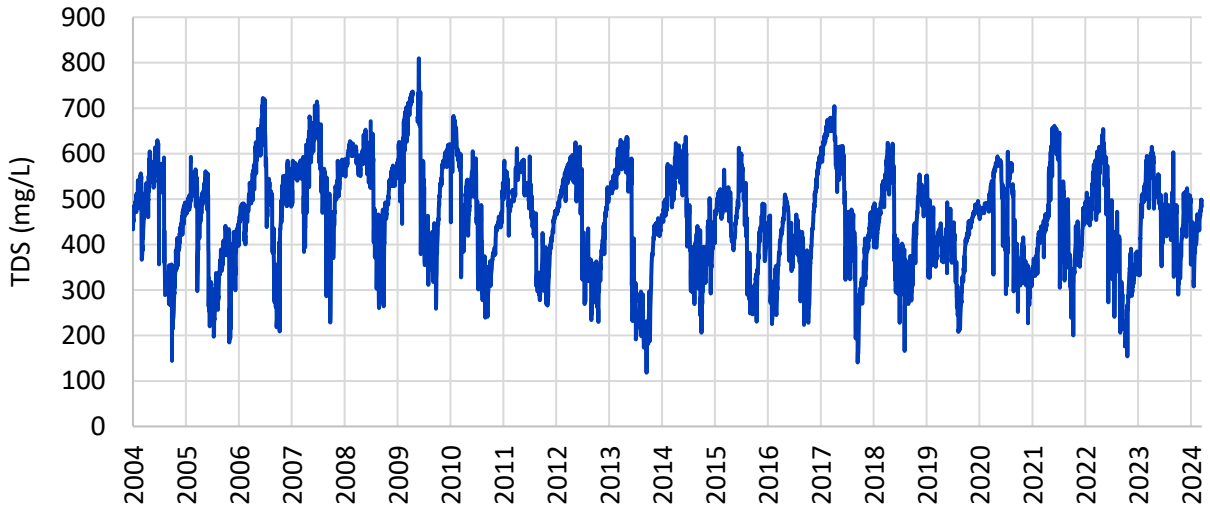


Figure 3.5 Historic TDS Trend (2004 – 2024)

The analysis of TDS data in Table 3.6 presents the percentiles of various Shell Creek WTP TDS concentrations observed over a 20-year period. Given historical trends, a Shell Creek WTP TDS concentration of 700 mg/L (99.3 percentile) was used for the current and future blending evaluation. The values in Table 3.5 and Table 3.6 include the small amount of TDS added during the treatment process at the Shell Creek WTP, indicating finished water TDS values.

Table 3.6 Shell Creek WTP TDS Percentiles (2004-2023)

Percentile	TDS (mg/L)
10	309
25	377
50	466
75	546
90	595
97	648
99	691
99.3	700
99.98	750

3.3.2.2 RO WTP TDS

For RO WTP treated water, a TDS concentration of 70 mg/L was used for current conditions based on the current treatment process, and 90 mg/L was used for the scenario with degraded aquifer quality with TDS of 5,000 mg/L.

3.3.2.3 TDS Goals

While the Environmental Protection Agency's (EPA's) MCL for TDS in drinking water is 500 mg/L, this analysis will use Charlotte County's target goal of 450 mg/L for TDS.

3.3.3 Blending Model Results – No RO WTP Expansion

This section discusses the results of a blending analysis considering a scenario where the City does not expand the RO facility and instead relies on Shell Creek WTP during Blocks 2 and 3 of the MFL. The results, presented in Table 3.7, considered the projected average annual and maximum day demands of 7.5 and 12 mgd, respectively, in 2050 and a blended finished water TDS concentration of 450 mg/L.

Table 3.7 TDS Blending Results – No RO WTP Expansion

Parameter	AAD	AAD	AAD	MDD	MDD
Demand (mgd)	7.5	7.5	7.5	12.0	12.0
Groundwater TDS (mg/L)	2,500	2,500	2,500	2,500	2,500
Shell Creek WTP TDS (mg/L)	700	700	700	700	700
RO Permeate TDS (mg/L)	70	70	70	70	70
Groundwater Supply to RO WTP (mgd)	5.0	3.8	2.5	5.0	5.0
RO Flow (mgd) (80% recovery rate)	4.0	3.0	2.0	4.0	4.0
Groundwater Bypass (mgd)	0.35	0	0	0	0
Shell Creek WTP Flow (mgd)	3.15	4.5	5.5	8.0	6.1
Final TDS (mg/L)	**448**	**448**	**532**	**490**	**450**
Total Supply (mgd)	**7.5**	**7.5**	**7.5**	**12.0**	**10.1**

Abbreviations: ADD – annual average demand; MDD – maximum day demand

The City can meet the average annual demand of 7.5 mgd with a TDS of 450 mg/L by using a minimum of 3.0 mgd from the RO facility and the remainder from Shell Creek WTP, even with a worst-case surface WTP TDS of 700 mg/L. For the maximum daily demand, the City can achieve a TDS of 490 mg/L by using 4.0 mgd from the RO facility and 8.0 mgd from Shell Creek WTP. Although this does not meet the goal of 450 mg/L, it remains below the secondary MCL of 500 mg/L. To produce a blended TDS of 450 mg/L, the maximum quantity that could be produced is 10.1 mgd.

These findings suggest that expanding the RO facility is necessary to meet the maximum day demand of 12.0 mgd while remaining below the 450 mg/L TDS goal, even when in Blocks 2 or 3 of the MFL which do not limit surface water withdrawal.

3.3.4 Blending Model Results – With RO WTP Expansion

For the RO expansion alternatives, the mass balance considers a maximum of 3.0 mgd from Shell Creek WTP, accounting for the MFL Block 1 restrictions. The maximum RO water capacity for the RO WTP is 8.0 mgd at 80-percent recovery rate. Therefore, to reach the 12 mgd demand, at least 1.0 mgd must be sourced through other means, such as direct groundwater blending or increased RO system recovery rate. Table 3.8 summarizes the results considering the current groundwater TDS as well as a higher TDS.

This initial evaluation results show that in a hypothetical situation where the aquifer TDS quality degrades to 5,000 mg/L, it will not be possible to obtain a blended water quality with TDS below 450 mg/L.

Table 3.8 Blending Model Results for RO WTP Expansion at 80 Percent Recovery

Parameter	With Stable Groundwater TDS	Degraded (Higher) Groundwater TDS
Maximum Day Demand (mgd)	12.0	12.0
Groundwater TDS (mg/L)	2,500	5,000
Shell Creek Surface WTP TDS (mg/L)	700	700
RO Permeate TDS (mg/L)	70	90
Groundwater Supply to RO WTP (mgd)	10.0	10.0
RO Flow (mgd) (80% recovery rate)	8.0	8.0
Groundwater Bypass (mgd)	1.0	1.0
Shell Creek Surface WTP Flow (mgd)	3.0	3.0
Final TDS (mg/L)	430	652
Total Supply (mgd)	12.0	12.0

This analysis was refined to calculate the maximum day demand obtainable given the proposed constraints. Results are presented in Table 3.9. In this scenario, for a final blended TDS of 443 mg/L, the maximum day production obtainable is 11.45 mgd.

Table 3.9 Maximum Day Demand Obtainable with Degraded Groundwater TDS

Parameter	Degraded (Higher) Groundwater TDS
Maximum Day Demand (mgd)	**11.45**
Groundwater TDS (mg/L)	5,000
Shell Creek Surface WTP TDS (mg/L)	700
RO Permeate TDS (mg/L)	90
Well Supply (mgd)	10.0
RO Flow (mgd) (80% recovery rate)	8.0
Groundwater Bypass (mgd)	0.45
Shell Creek Surface WTP Flow (mgd)	3.0
Final TDS (mg/L)	**443**
Total Supply (mgd)	**11.45**

Considering the results presented on Table 3.8 and Table 3.9, if the groundwater quality decays to 5,000 mg/L TDS, the facility will not be able to satisfy a maximum day demand of 12.0 mgd if the MFL of 3.0 mgd of surface water is applicable to the facility.

Based on the analysis above, the TDS goal could be met by adding additional RO treatment capacity or increasing the recovery rates during critical times of the year. Table 3.10 shows the results of increasing the RO recovery rate to 85 percent.

Table 3.10 Blending Model Results for RO WTP Expansion for Recovery at 85 Percent

Parameter	Stable Groundwater TDS at 85% Recovery	Degraded Groundwater TDS at 85% Recovery
Maximum Day Demand (mgd)	12.0	12.0
Groundwater TDS (mg/L)	2,500	5,000
Shell Creek Surface WTP TDS (mg/L)	700	700
RO Permeate TDS (mg/L)	70	90
Groundwater Supply to RO WTP (mgd)	9.4	10.0
RO Flow (mgd) (85% recovery rate)	8.0	8.5
Groundwater Bypass (mgd)	1.0	0.5
Shell Creek Surface WTP Flow (mgd)	3.0	3.0
Final TDS (mg/L)	430	447
Total Supply (mgd)	12.0	12.0

At a recovery rate of 85 percent, the system can still maintain a reliable maximum day demand of 12.0 mgd with a TDS concentration below 450 mg/L with aquifer TDS of 5,000 mg/L.

Increasing the RO WTP recovery from 80 to 85 percent may require further evaluation of the current system design. Impacts of increasing the recovery rate include increased membrane fouling and scaling, higher pressure, and energy requirements (potentially being an issue for current pumps), and the need for enhanced pre-treatment (changes in anti-scalant).

3.3.5 RO Expansion Summary and Recommendations

The expansion of the RO facility will allow the City to meet a maximum day demand of 12.0 mgd and maintain the TDS concentration under 450 mg/L. Surface water treatment alone will not be able to meet the requirements in terms of quantity and quality. The RO WTP was designed to be expandable and requires construction of additional treatment capacity and expansion of the wellfield.

3.4 Deep Injection Well Permit

3.4.1 Current Permit Authorization

Underground Injection Control (UIC) Permit No. 0338979-003-UO/1X issued by the Florida Department of Environmental Protection (FDEP) authorizes the City to operate one non-hazardous Class I injection well (IW-1) for the disposal of RO concentrate from the Shell Creek RO WTP (Figure 3.6). This includes treated RO feed water, RO concentrate, monitor well purge water sample drains, and RO membrane cleaning solution. The maximum injection rate for IW-1 is 2,763 gallons per minute (gpm) or 3.97 mgd. IW-1 is constructed with a 20-inch diameter steel casing set to 2,910 feet below land surface (ft. bls), a 11.75-inch diameter fiberglass reinforced plastic (FRP) set to 2,900 ft. bls with a cemented annulus and a total depth of 3,252 ft. bls. The maximum permitted wellhead injection pressure is 107 pounds per square inch (psi). The operating permit requires that a Mechanical Integrity Test (MIT) be performed on IW-1 every 5 years. The next MIT is due to be performed by August 12, 2026.

The DIW system also includes a Dual-Zone Monitor Well (DZMW-1) that is completed in the UFA from 1,856 to 1,964 bls and in the Middle Confining Unit from 2,350 to 2,450 ft. bls. The DZMW's purpose is to monitor for the upward migration of the injectate.

Figure 3.6 Deep Injection Well System

3.4.2 Evaluation of Operating Data

The City is required to submit monthly operating reports (MORs) to the FDEP that includes the following operating data for IW-1:

- Injection Pressure.
- Injection Flow Rate.
- Volume Injected.

3.4.2.1 Wellhead Injection Pressure

The maximum permitted injection pressure is 107 psi. Since the operation permit was issued, the average wellhead pressure was 24.6 psi, and the maximum wellhead pressure was 86.9 psi, as shown in Figure 3.7

and Figure 3.8, respectively. The last specific injectivity (SI) test was conducted on March 25, 2024, at a flow rate of 1,595 gpm which yielded an SI of 87.64 gpm/psi. This SI would yield an increase in wellfield injection pressure of 31.53 psi from the static wellhead pressure for a maximum permitted flow rate of 2,763 gpm. Based on the injection pressure operating data, IW-1 can accept a flow rate of 2,763 gpm and maintain a wellhead pressure below the maximum permitted injection pressure of 107 psi.

3.4.2.2 Injection Flow Rate

Prior to the issuance of the operation permit, IW-1 observed injection flow rates of up to 3,000 gpm during operational testing. However, the maximum permitted injection flow rate is 2,763 gpm. Since the operation permit was issued, the average injection flow rate pressure was 1,748.5 gpm with a maximum injection flow rate of 2,343.6 gpm as shown in Figure 3.9 and Figure 3.10. Based on this data, IW-1 can accept a flow rate up to the maximum permitted injection flow rate of 2,763 gpm.

3.4.2.3 Total Daily Injection Volume

The maximum permitted total daily injection volume is 3.97 mgd. Since the operation permit was issued, the average daily injection volume was 0.7 million gallons (MG) and the maximum daily injection volume was 1.1 MG as shown in Figure 3.11. Based on this data, IW-1 has approximately 3.37 mgd of unused capacity to accept additional injectate.

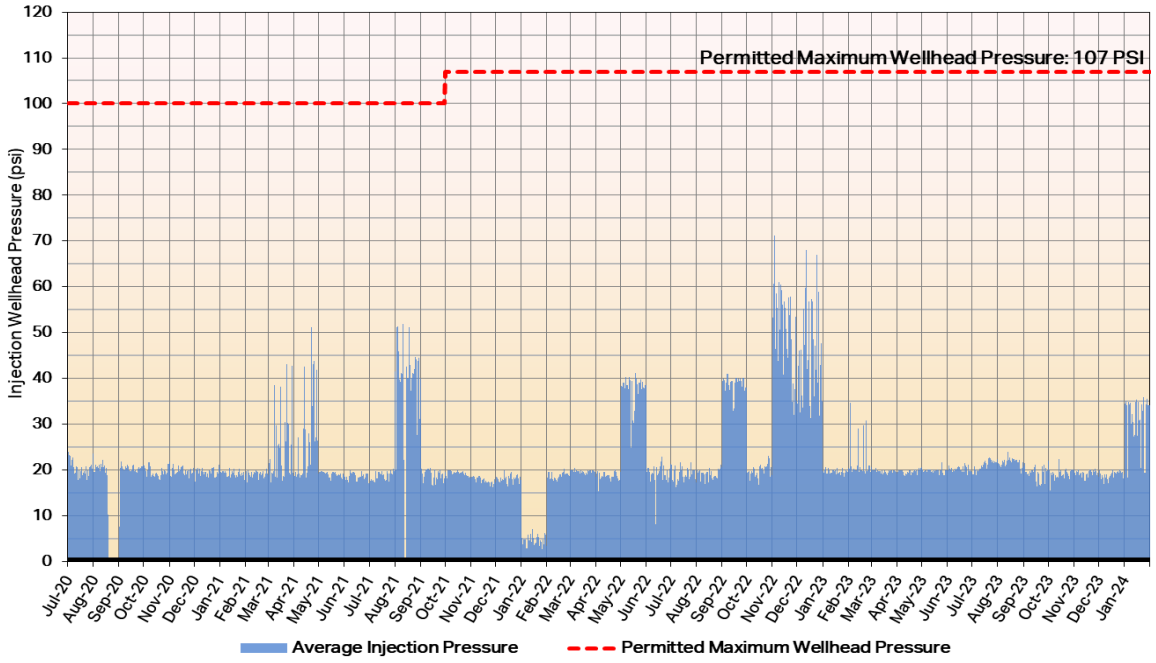


Figure 3.7 IW-1 Average Daily Injection Wellhead Pressure

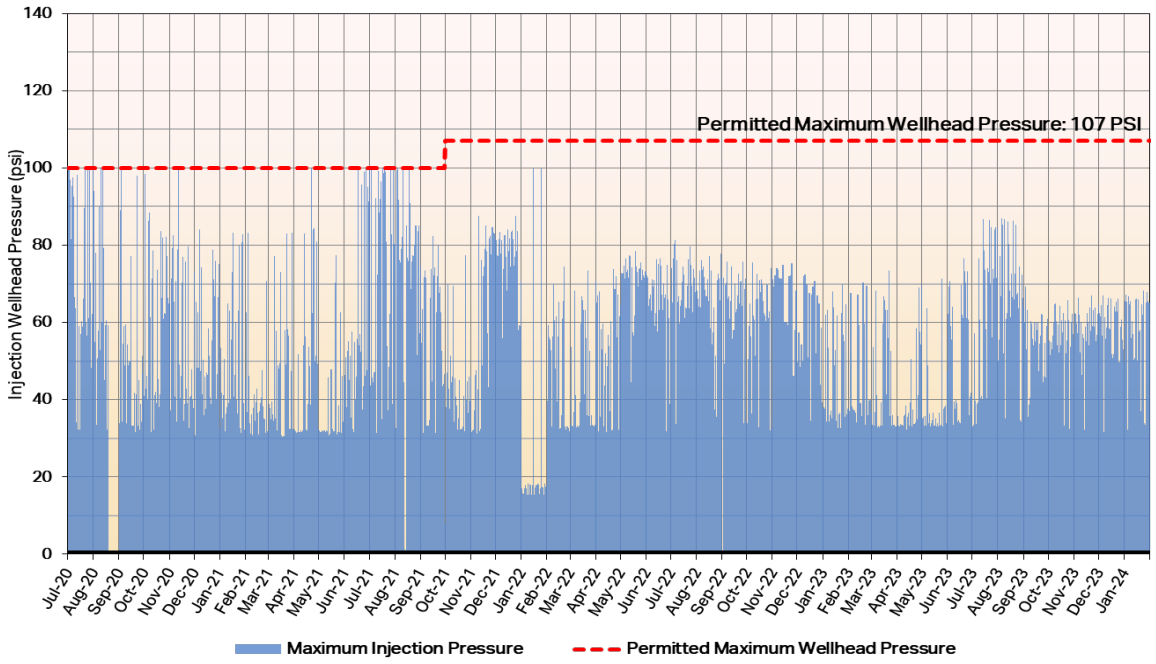


Figure 3.8 IW-1 Maximum Daily Injection Wellhead Pressure

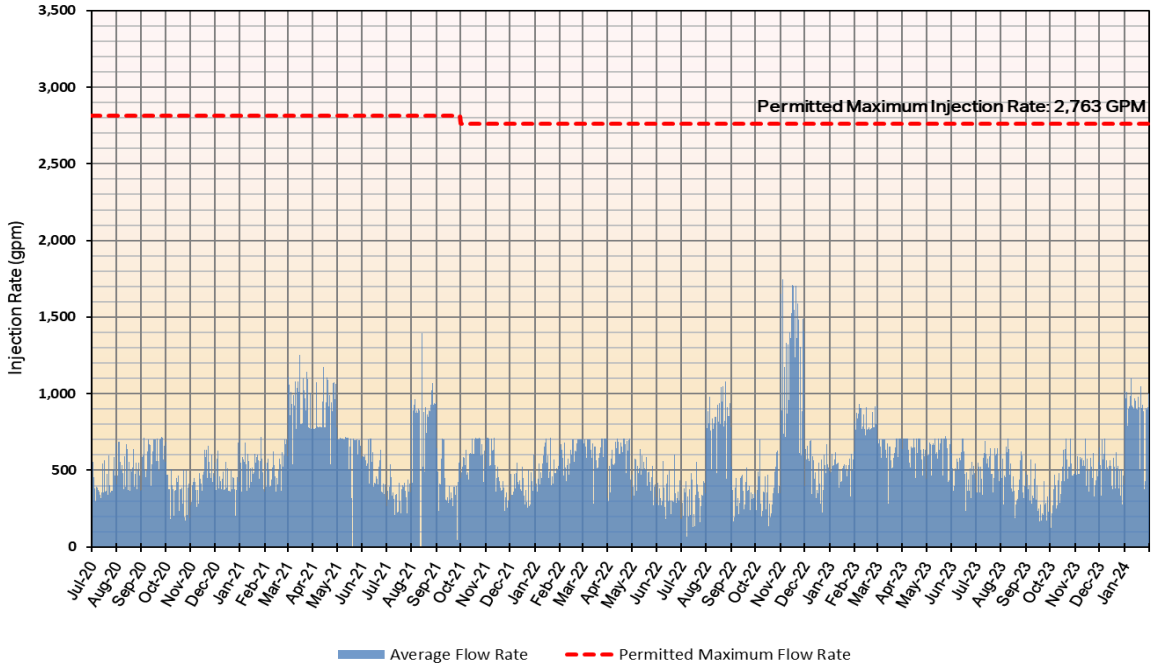


Figure 3.9 IW-1 Average Daily Injection Flow Rate

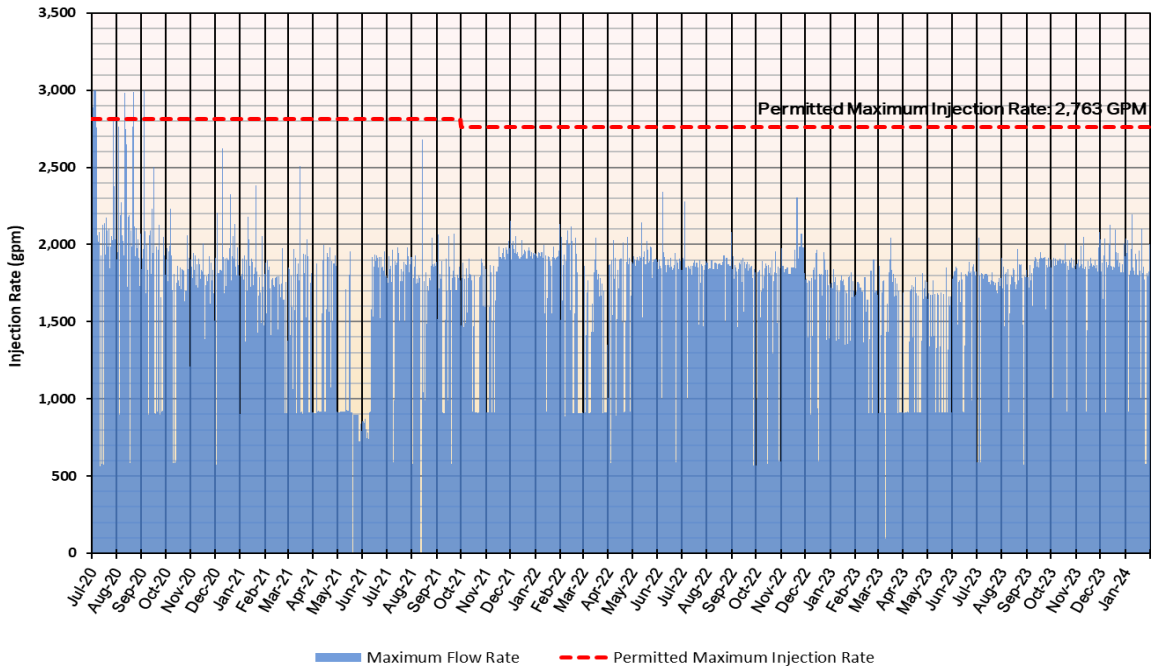


Figure 3.10 IW-1 Maximum Daily Injection Flow Rate

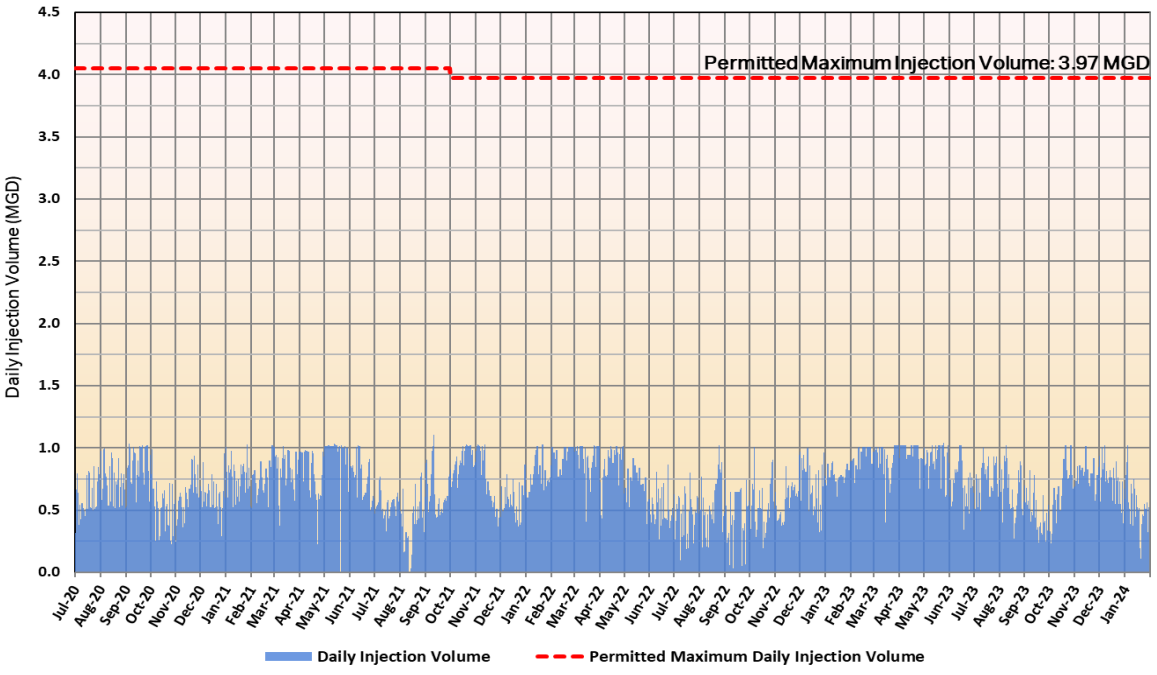


Figure 3.11 IW-1 Daily Total Injection Volume

3.4.3 RO Concentrate Disposal Requirements

The RO concentrate disposal requirements were determined using the maximum day finished water capacity of the RO WTP of 9.0 mgd. This would require a raw water feed from the City's brackish water production wells of 11 mgd. Of the 11.0 mgd withdrawn from the wells, 10 mgd would be sent through the City RO WTP which would yield 8.0 mgd of permeate and 2.0 mgd of RO concentrate. The remaining 1.0 mgd of raw water from the production wells would be blended with the 8.0 mgd of permeate to yield 9.0 mgd of finished water. Therefore, the DIW well system would need the ability to accept up to 2.0 mgd of RO concentrate per day.

3.4.4 DIW Summary and Recommendations

Operating data consisting of wellhead pressure, flow rate, and daily injection volume has been collected at the RO WTP IW-1 during both operational testing and after the issuance of the operating permit. The flow rates prior to the issuance of the operational permit exceeded the permitted maximum flow rate, which may indicate a need for higher flow rates for disposal of other waste streams including RO feed water and monitor well purge water. In addition, an emergency discharge location for the Shell Creek DIW system does not currently exist. While the rapid mechanical (or catastrophic) failure of DIWs is rare and considered an unlikely phenomenon, the current contingency plan if the injection well is not available is to shut down the RO WTP and rely solely on water from Shell Creek WTP and finished water storage. Note that capacity to meet demands may not be available based on the MFL diversion schedule.

Findings and recommendations regarding the existing Shell Creek DIW system are provided below:

- The data indicates that IW-1 can accept the permitted maximum flow rate of 2,763 gpm while maintaining a wellhead pressure below the maximum permitted injection pressure of 107 psi.
- In addition, the operating data shows that IW-1 has approximately 3.37 mgd of unused daily volume capacity to accept additional injectate.
- Based on the maximum day finished water quantity of 9.0 mgd, the RO WTP DIW system is physically capable of accepting the 2.0 mgd of RO concentrate required for an expansion of the RO WTP.
- However, due to the lack of an emergency discharge location and the potential need for the disposal of other waste streams, the City may want to consider designing, permitting, and constructing a secondary DIW as part of the expansion of the RO WTP to increase onsite DIW capacity.
- An alternative to a secondary onsite DIW would be to interconnect the Shell Creek DIW system with the City's Wastewater Treatment Plant (WWTP) DIW system if deemed feasible. As an example, Sarasota County Public Utilities has interconnected several of their DIW systems to provide system flexibility and redundancy. This would require that the City's WWTP DIW operation permit be modified to allow the disposal of both treated wastewater and industrial RO concentrate, if capacity is available. If deemed feasible, this alternative may be significantly more cost-effective than a secondary onsite DIW but would require the design, permitting, and construction of a pipeline to interconnect the two systems. Because a new DIW is not required, it has not been included in the cost estimates presented in Chapter 6.

3.5 Existing and Proposed Well Capacity Analysis

3.5.1 Required Well Capacity for Maximum Day Demand

The expansion of the RO WTP would require an increase in the raw water withdrawal from the City's brackish wellfield. The maximum day finished water requirement from the RO WTP is 9.0 mgd. This would require a raw water feed from the City's brackish water production wells 11 mgd (7,640 gpm). The City's wellfield would include at least two backup production wells to allow for well rotation and well maintenance and rehabilitation activities. WUP 20000871.014 authorizes the City to utilize 11 brackish groundwater production wells. Six of the production wells have been constructed and are currently active (Wells 1 through 6). Two of the production wells (ASR-3 and SZMW-2) were constructed as part of the City's ASR testing program but are not active (no pumps or above-ground infrastructure). In addition, three production wells are currently proposed and permitted but have not been constructed.

3.5.2 Existing (Active) Production Wells

As shown in Table 3.11 and Figure 3.1, the City currently operates six active brackish wellfield production wells that withdrawal groundwater from the UFA. Two of the active production wells, Wells 1 and 2, were constructed over 20 years ago (2002) and were formerly associated with the City's ASR system. Due to their proximity to other production wells, their capacities have been limited to 435 gpm per well to manage well interference and decrease the potential for upconing of more mineralized water from depth. The remaining four active wells, Wells 3 through 6, were constructed between 2016 and 2018 under the City's "brackish groundwater construction and testing program." The individual pump capacities for each of these wells is approximately 870 gpm (double that of Wells 1 and 2). The total combined pumping capacity of the currently active wells is 4,350 gpm or 6,264,000 gallons per day (gpd).

Table 3.11 Summary of Well Capacity for the City's Existing (Active) Production Wells

District ID	User ID	Status	Well Capacity (gpm)	Casing Depth (ft. bls)	Total Depth (ft. bls)
12	1	Existing (Active)	435	780	998
14	2	Existing (Active)	435	800	915
6	3	Existing (Active)	870	670	880
5	4	Existing (Active)	870	670	880
63	5	Existing (Active)	870	670	884
64	6	Existing (Active)	870	670	880
		TOTAL	**4,350**		

3.5.3 Existing (Inactive) Production Wells

As shown in Table 3.12, two of the City's authorized brackish production wells (Wells ASR-3 and SZMW-2) do not currently have pumps or above-ground infrastructure connected to the City's raw water transmission lines. These wells were constructed during the City's "brackish groundwater construction and testing program." Due to their proximity to other production wells and their depth (approximately 1,000 feet), their capacities have also been limited to 435 gpm per well to manage well interference and decrease the potential for upconing of more mineralized water from depth. The total combined pumping capacity of the currently constructed but inactive wells is 870 gpm or 1,252,800 gpd.

Table 3.12 Summary of Well Capacity for the City's Existing (Inactive) Production Wells

District ID	User ID	Status	Well Capacity (gpm)	Casing Depth (ft. bls)	Total Depth (ft. bls)
13	ASR-3	Existing (Inactive)	435	810	1,000
62	SZMW-2	Existing (Inactive)	435	785	1,000
		TOTAL	**870**		

3.5.4 Proposed Production Well Capacity

As shown in Table 3.13, three of the City's authorized brackish production wells (Wells 7 through 9) are currently proposed and have not been constructed. The currently authorized capacity of these wells is based on the capacity of Wells 3 through 6 of 870 gpm per well. Final well capacity will be determined once the wells have been constructed and tested. However, based on their authorized capacities, the total combined pumping capacity of the currently proposed wells is 2,610 gpm or 3,758,400 gpd.

Table 3.13 Summary of Well Capacity for the City's Proposed Production Wells

District ID	User ID	Status	Well Capacity (gpm)	Casing Depth (ft. bls)	Total Depth (ft. bls)
7	7	Proposed	870	670	880
8	8	Proposed	870	670	880
9	9	Proposed	870	670	880
		TOTAL	**2,610**		

3.5.5 Wellfield Summary and Recommendations

As previously discussed, the expansion of the RO WTP would require an increase in the raw water withdrawal from the City's brackish wellfield to 11.0 mgd (7,640 gpm). A summary of the findings and recommendation regarding an expansion of the City's brackish wellfield have been provided below and summarized in Table 3.14.

- The existing active production wells can provide 4,350 gpm or 6,264,000 gpd.
- The currently constructed but inactive wells could provide an additional 870 gpm or 1,252,800 gpd.
- The three currently permitted and proposed wells could provide an additional 2,610 gpm or 3,758,400 gpd for a total onsite well capacity of 7,830 gpm or 11,275,200 gpd.
- The City's wellfield should include at least two backup production wells to provide backup capacity to allow for production wells to be taken offline for well rotation, testing/evaluation, and maintenance/rehabilitation activities.
- The average separation distance of Wells 1 through 9 ranges from 1,020 to 1,548 feet and averages 1,285 feet. Maintaining a separation of at least 1,250 feet would require additional production wells to be located outside of the City's existing property boundary.
- It is recommended that the City construct two additional production wells offsite to add 1,740 gpm (2,505,600 gpd) of additional capacity for a total of wellfield capacity of 9,570 gpm or 13,780,800 gpd.

Table 3.14 Summary of Brackish Wellfield Capacity

Description	Pump Capacity (gpm)	Withdrawal Rate (gpd)
Existing (Active) Production Wells	4,350	6,264,000
Existing (Inactive) Production Wells	870	1,252,800
Proposed Production Wells	2,610	3,758,400
On-Site Well Capacity	**7,830**	**11,275,200**
Two Backup Production Wells	1,740	2,505,600
Total	**9,570**	**13,780,800**

3.6 Brackish Wellfield Water Quality

Groundwater quality data collection and the evaluation of background conditions at the City's brackish wellfield has a complicated history due to the site being used for an ASR testing program prior to its transition to a brackish wellfield. The following section provides a brief history of groundwater quality data collection at the site, observations regarding water quality trends since wellfield startup, recommendations regarding wellfield management and a preliminary prediction regarding future water quality trends.

3.6.1 Groundwater Quality Prior to ASR Operations

It is difficult to ascertain the background groundwater quality at the site prior to ASR cycle testing. The only data that is available is associated with the City's first exploratory ASR Well (ASR-1). ASR-1 was constructed in November 1997 and began injection in July 1998 (24 years ago). ASR-1 is the only well that was constructed prior to initiation of ASR operations, and ASR operations expanded considerably over the following years. Therefore, the data collected from ASR-1 during construction represents the most definitive information available regarding natural background conditions at the City's wellfield. Using the available ASR-1 data, the natural background TDS that existed in the vicinity of Wells 1 through 6 prior to injection can be generally inferred, while recognizing that the groundwater quality of a particular production well is unique and can be strongly influenced by secondary porosity and fracture flow.

An MWH report entitled "Interim Report on Exploratory ASR Well Drilling and Testing at the Shell Creek Water Treatment Plant" was published in April 1998. Section 4 of that report summarizes the testing results that were undertaken for ASR-1. MWH identified two distinct flow zones within the Suwannee Limestone, an upper flow zone (700 to 760 ft. bls) and a lower flow zone (800 to 950 ft. bls). The upper flow zone contributed about 25 percent of total flow between 700 to 1,040 ft. bls, while the lower flow zone contributed about 60 percent [the remaining 10 to 15 percent came from the upper portions of the Ocala Limestone (950 to 1,040 ft. bls)].

Groundwater quality data was collected from the upper flow zone (700 to 780 ft. bls) during a 10-hour packer test (packer inflated at 780 ft. bls). TDS concentrations ranged from 1,860 mg/L at the beginning of the test to 2,090 mg/L at the end of the test.

Data from the MWH report contains TDS water quality data that was collected from 740 ft. bls to 1,040 ft. bls during reverse air drilling. This data is provided in Table 3.15 below. As shown, TDS concentrations for ASR-1 at these depths ranged from 2,020 mg/L to 2,480 mg/L, and averaged 2,185 mg/L. It is notable that the highest recorded TDS concentrations in ASR-1 occurred towards the top of the sampled interval (800 to 830 ft. bls), while the lowest TDS concentration was recorded at the bottom of the sampled interval (1,040 ft. bls). Therefore, TDS concentrations were generally higher at shallower depths of the data collection interval, rather than at greater depths as might be otherwise assumed.

The lack of water quality data available from the City's production wells before ASR operations began represents a dearth of background water quality data that would normally have been available for a new brackish wellfield. Therefore, while the average TDS value for ASR-1 is approximately 2,200 mg/L, it is important to note that TDS concentrations of 2,480 mg/L were encountered during drilling under static (non-pumped) conditions.

Table 3.15 Summary of City's Brackish Wellfield Capacity

Depth (ft. bls)	Total Dissolved Solids (mg/L)	Conductance (µmhos)
740	2,240	4,800
770	2,100	3,640
800	2,480	4,860
830	2,340	3,470
860	2,180	3,480
890	2,060	3,300
920	2,200	3,480
950	2,160	3,670
980	2,040	4,010
1,000	2,220	3,870
1,040	2,020	3,540
Minimum	**2,020**	**3,300**
Maximum	**2,480**	**4,860**
Average	**2,185**	**3,829**

3.6.2 Brackish Wellfield Water Quality Analysis

As discussed in Section 3.6.1, the average TDS concentration prior to ASR operations and wellfield startup was approximately 2,200 mg/L under static conditions. Water quality concentrations include TDS, chloride, and sulfate concentrations from all active production wells (Wells 1 through 6) from wellfield startup. Data is presented the data in time-series graphs in Figure 3.12, Figure 3.13, and Figure 3.14, respectively.

As shown in Figure 3.12, TDS concentrations for Wells 1 and 2 soon after wellfield startup indicated fresher water quality compared to Wells 3 through 6. As previously discussed, Wells 1 and 2 were within the area of influence of the City's previous ASR operations. Several cycle tests (storage and recovery cycles) of the ASR system were performed whereby surplus potable water from the City's Shell Creek Surface WTP was injected and stored within the Suwannee and upper portions of the Ocala Limestones of the UFA. The ASR system was abandoned and converted to a brackish wellfield whereby the storage and recovery zone became a brackish wellfield production zone. Therefore, Wells 1 and 2 began withdrawing fresher water previously stored as part of the ASR system following wellfield startup in July of 2020. As shown in Figure 3.12, by the Spring of 2023, the water quality for Wells 1 and 2 were essentially indistinguishable from the water quality from Wells 3, 5, and 6 indicating that the fresher water associated with previous ASR operations had been exhausted or at least significantly depleted.

It is important to note that the groundwater quality of a particular production well is unique and can be strongly influenced by total depth, secondary porosity, and fracture flow. Typically, a well with a shallower total depth can be expected to yield better water quality; however, that is not always the case. For instance, Wells 1, 3, 5, and 6 appear to have stabilized below the average TDS concentrations before ASR operations of approximately 2,200 mg/L. Wells 3, 5, and 6 have total depths that do not exceed 900 ft. bls and appear to be maintaining a stable TDS concentration. TDS concentrations at Well 1 also appear to have stabilized, yet the total depth of this well is 998 ft. bls. Figure 3.12 shows that Well 4's water quality

began increasing quickly following wellfield startup in July of 2020. Well 4 is cased to 670 ft. bls with a total depth of 880 ft. bls. However, testing and evaluation of this well indicated a vertical fracture at the bottom of the open hole that appeared to be the source of most of the higher water quality concentrations observed from this well. Well 4 is scheduled for back-plugging to isolate the fracture and decrease TDS concentrations. Well 2 has a total depth of 915 ft. bls and does not appear to have stabilized with TDS and chloride concentrations continuing to increase. As shown, water quality is unique to each production well based on depth and second porosity, however shallower total depths typically yield better water quality. It should be expected that the City's production wells will continue to increase in water quality concentrations back to the estimated background TDS concentration of 2,200 mg/L and potentially higher over the next 20 years. Observation of hydrogeologic and geologic transitions and water quality testing during pilot-hole drilling can assist to customize the open-hole interval of each well based on site-specific testing and water quality observations.

3.6.3 Production Well Summary and Recommendations

Because of the nature of the source of groundwater and the hydrogeologic units in the area, the City's brackish wellfield will almost certainly increase in water quality concentrations over time. It is important for the City to employ best management practices to manage wellfield groundwater quality and production. This is accomplished by implementing its WFMP. The City recently revised its WFMP, as required by the City's WUP, and assigned TDS concentration guidance levels to the production wells and TDS concentration trigger levels to its monitor wells. The goal of the WFMP is to prevent significant saline water intrusion and minimize upconing of higher concentration groundwater from underlying permeable zones of the UFA that may adversely impact the City and other legal existing users. Methods for managing the wellfield to provide a sustainable supply of water include well rotation, customizing withdrawal rates of individual wells to optimize withdrawal quantity and quality, maintaining adequate well separation distances to minimize interference and the rate of water quality degradation due to upconing, and implementation of a routine production well maintenance and rehabilitation program.

Recommendations regarding the City's brackish wellfield quality have been provided below:

- It is recommended that the City fully implement their WFMP which will require the construction of additional production wells to provide backup capacity so that production wells can be taken offline and/or withdrawal rates be customized to each well's production capabilities and resulting water quality.
- The City should maintain future well separation distances of 1,250 to 1,500 feet.
- The City should also plan to construct wells with total depths no greater than 900 ft. bls. Careful observation of hydrogeologic and geologic transitions and water quality testing during pilot-hole drilling of the new production wells will allow for a customized open-hole interval of each well based on site-specific testing and water quality observations.
- Even with the full implementation of the City's WFMP, it is likely that the groundwater quality of the City's brackish wellfield will inevitably increase over time. Therefore, the City should prepare for TDS to increase to 3,000 to 5,000 mg/L over the life of the wellfield. If the City does move forward with RO WTP expansion design, it is recommended that solute-transport modeling be included as part of the design effort. Solute-transport modeling can provide a range of water quality predictions to assist in designing an RO WTP to maintain the flexibility needed to treat raw water quality for the next 20 to 30 years.

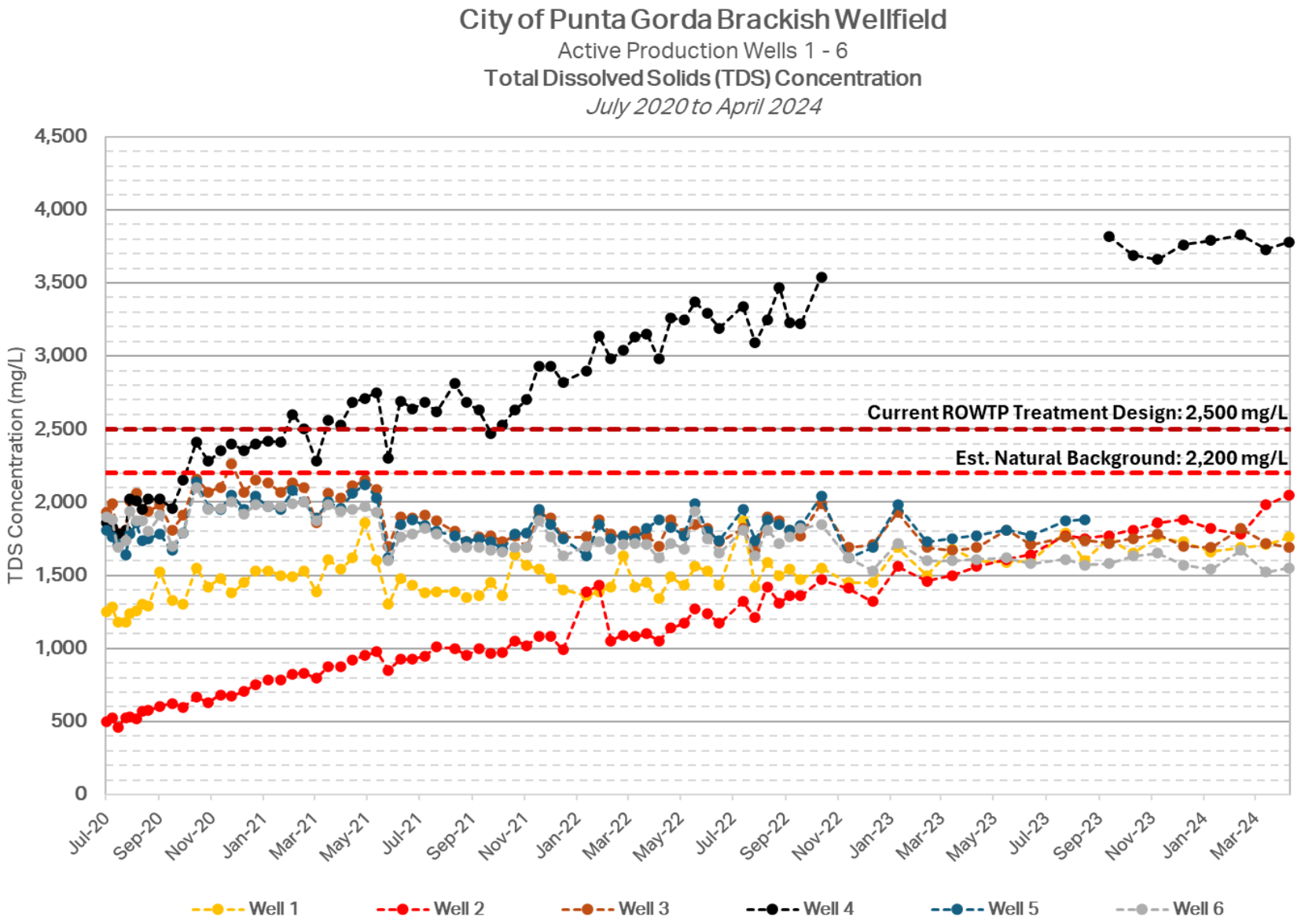


Figure 3.12 Active Production Well TDS Concentrations Since Wellfield Startup

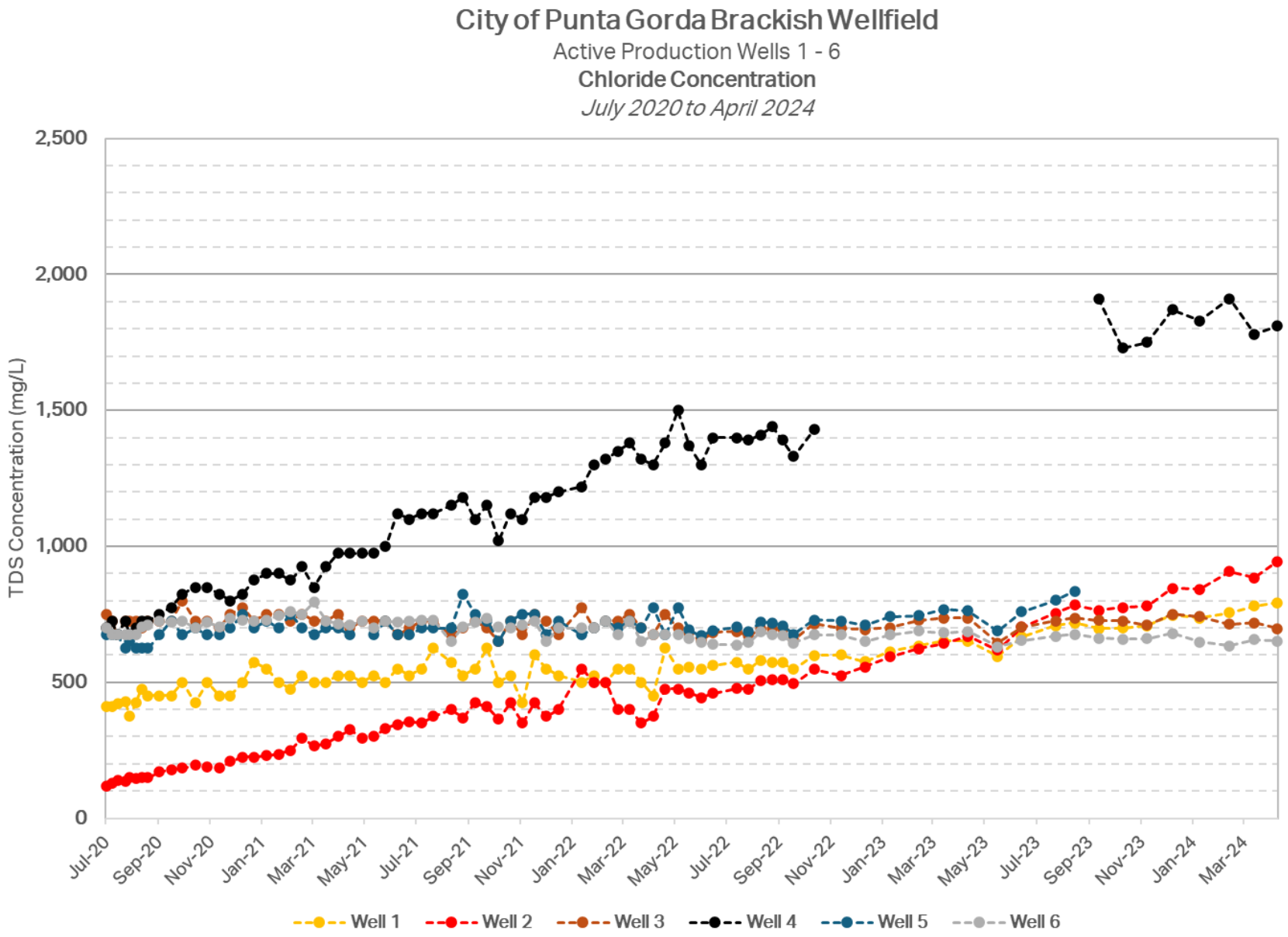


Figure 3.13 Active Production Well Chloride Concentrations Since Wellfield Startup

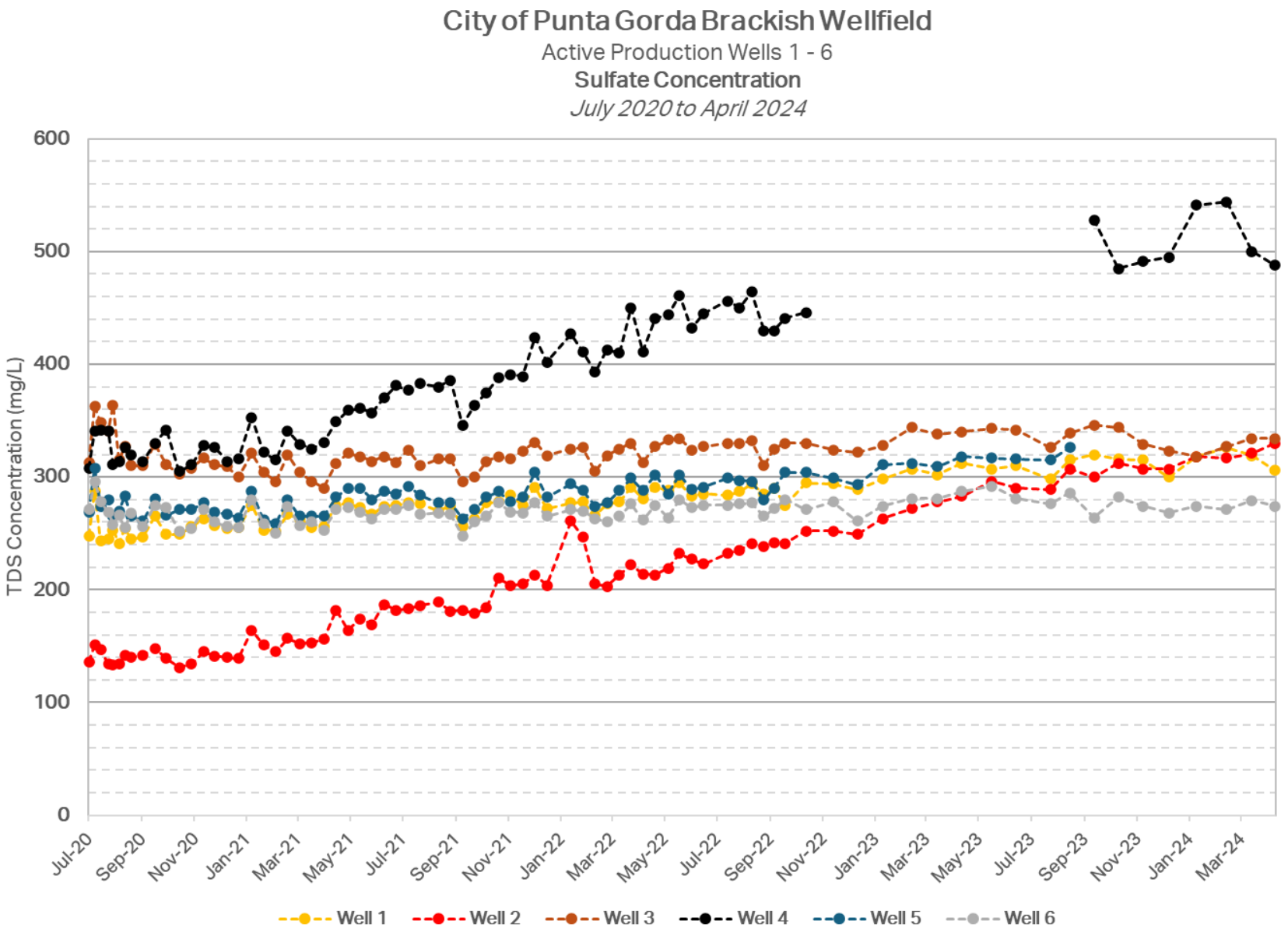


Figure 3.14 Active Production Well Sulfate Concentrations Since Wellfield Startup

3.7 Evaluation of Current and Future Wellfield Design

The evaluation of the current wellfield design and recommendations for locating future production wells included reviewing the historical documentation, conducting a well interference analysis and developing groundwater flow simulations to predict potential impacts due to the required groundwater demands for the expansion of the RO WTP. The results of these analyses served as a base to recommend sites for future production well locations to supply the necessary raw water for the expansion of the RO WTP.

3.7.1 Current Wellfield Design

The current wellfield layout is a result of several iterations of design based on various well separation distances and evaluations. In 2009, the City's Water Master Plan update included a conceptual layout of the wellfield using 1,000 and 1,500-foot well separation distances. However, no hydrogeologic testing had been conducted at the time of this evaluation. In 2010, TetraTech developed the Shell Creek Water Treatment Plant Reverse Osmosis Addition Preliminary Design Report (PDR) and include a preliminary wellfield design based on a minimum well separation distance of 1,000 feet. It should be noted that the PDR wellfield design is identical to the City's current wellfield design.

TetraTech conducted well construction and testing of the City's brackish wellfield in 2015 and 2016. Based the results, TetraTech developed several Summary and Recommendations including the following:

- Aquifer zones Permeable Zone 3 (PZ3) and the production zones of the UFA have comparatively low yields and pumping at the design rate results in moderately high drawdown.
- Lithology and leakance estimates from testing the PZ3 aquifer interval and the UFA intervals suggest the PZ3 interval is the primary source of leakage into the UFA at the site.
- Leakage between the UFA and underlying permeable zones with poor water quality appears to be low based on the difference in water quality between the UFA and Avon Park Permeable Zone (APPZ,) and the similarity in water quality between the PZ3 and UFA intervals.
- Water quality was slightly variable, but without a clear trend during sporadic sampling and testing over a period of nearly a year. It does not appear water quality at the Shell Creek wellfield will be significantly affected by upconing because the unit is separated by a thick confining bed between the UFA production zone and underlying lower quality water.
- It is feasible for the proposed Shell Creek wellfield to sustain a long-term discharge of 1.25 mgd per production well and a wellfield total pumpage of 8.088 mgd on an annual average daily flow basis.
- Based on the results of the PZ3 and Floridan aquifer constant rate discharge tests and water quality testing from the UFA, Tetra Tech recommends future Shell Creek wellfield production wells be similar in design and construction (total depth and final casing depth) to the test/production and observation wells TPW-1 and UFMW-1. Both wells have cased and total depths of 670 feet and approximately 880 ft. bls, respectively.

- Existing aquifer storage and recovery wells, excluding well ASR-1, and storage zone monitoring wells can be pumped at a rate equal to the new wells in the Shell Creek wellfield, but because separation between wells is significantly less, these wells should either be pumped at a rate equal to half of the production wells or only be on a rotation schedule that results in each ASR well being pumped for half as long as the new wells to reduce annual average daily flow pumpage by half.
- Line-shaft turbine or submersible turbine pumps installed in the aquifer storage and recovery and the new Shell Creek wellfield wells should be set as deep as possible to account for the projected drawdown with allowance for regional interferences and possible degradation of aquifer yield.

TetraTech also recommended that the wellfield design be simulated using groundwater flow modeling to assess drawdown interference between the production wells. However, based on a review of the groundwater flow modeling completed as part of the WUP modification, a well interference analysis was never performed. Groundwater flow simulations were developed and submitted in support of the WUP application to determine that the wellfield layout and the requested annual average and peak month daily groundwater quantities of 8.088 mgd and 11.0 mgd would not cause adverse impacts to environmental features, minimum flows and levels or legal existing users of groundwater in proximity to the wellfield. The wellfield design in TetraTech's 2010 PDR was ultimately the design that was authorized by the SWFWMD as part of WUP 20000871.011 which was issued on January 8, 2018.

3.7.2 Groundwater Flow Modeling

Several groundwater flow simulations were run to complete the well interference analysis, determine optimal well spacing and simulate the required groundwater quantities for the expansion using the District-Wide Regulation Model Version 4.0 (DWRM 4.0) to identify the potential for upconing of more mineralized water from underlying aquifers. While solute-Transport modeling is beyond the scope of the report, some inferences can be made using the results of the DWRM 4.0 modeling regarding the potential for upconing. As previously mentioned, if the City decides to move forward with RO WTP expansion, it is recommended that additional groundwater quality time-series analysis using solute-transport modeling be performed to provide a range of potential TDS concentrations that may be realized at the City's wellfield over the next 20 to 30 years.

It should be noted that groundwater flow modeling was submitted by TetraTech in support of the WUP modification. The quantities have already been permitted and found to meet the WUP conditions of issuance.

3.7.2.1 District-Wide Regulation Model Version 4.0

The SWFWMD's DWRM 4.0 using the Focus Telescopic Mesh Refinement (Focus TMR) capabilities of Groundwater Vistas 8 (GWV8) was used for all the groundwater simulations in this section. The DWRM 4.0 is the District's first fully three-dimensional (3D) groundwater flow model and has been discretized into 13 (active) layers that represent both permeable zones and confining units as shown in Figure 3.15. Layers 1, 3, 5, 7, 8, 9, 11, and 13 are permeable zones and Layers 2, 4, 6, 10, and 12 are confining units. SWFWMD staff utilize DWRM 4.0 to assess impacts to environmental features (streams, rivers and wetlands), MFLs and legal existing users. It is the SWFWMD's main tool to assess potential impacts and determine if groundwater withdrawals meet the WUP conditions of issuance.

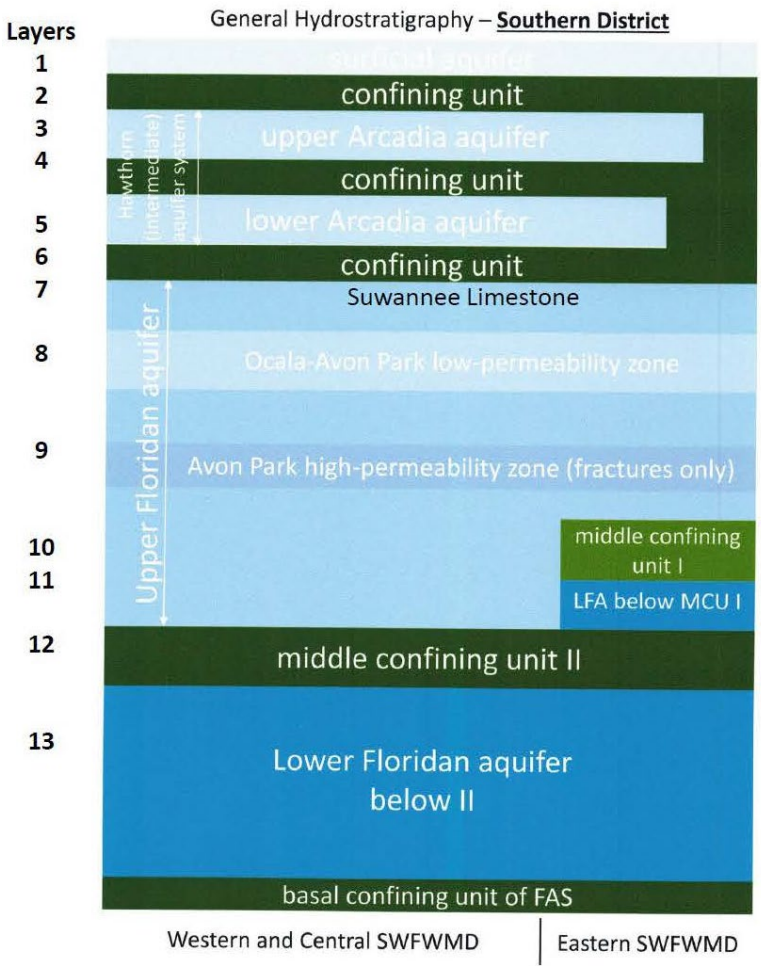


Figure 3.15 District-Wide Regulation Model Version 4.0 Layer Discretization

The permeable zones layers are listed below.

- Layer 1 – Surficial Aquifer System (SAS) – Layer 1.
- Layer 3 – Upper Arcadia Aquifer (UAA) (fka Permeable Zone 2 (PZ-2) of the Intermediate Aquifer System (IAS).
- Layer 5 – Lower Arcadia Aquifer (LAA) (fka PZ-3 of the IAS).
- **Layer 7 – Suwannee Limestone of the UFA**.
- **Layer 8 – Ocala/Avon Park Low Permeability Zone of the UFA**.
- Layer 9 – Avon Park Formation of the UFA.
- Layer 11 – Lower Floridan Aquifer (LFA) below Middle Confining Unit (MCU) I.
- Layer 13 – LFA below MCU II.

It should be noted that the City's production wells are either open to both Layer 7 (Suwannee) and Layer 8 (Ocala) or just the Layer 8 (Ocala).

Groundwater Vistas assigns aquifer parameters to the Focus Telescopic Mesh Refinement (TMR) sub-model based on the calibrated DWRM 4.0 regional model. The default average aquifer parameters and elevation discretization of the Focus TMR sub-model in shown in Table 3.16. The default aquifer parameters and the discretization of the Focus TMR model from that of the regional model were not modified. The Transmissivity value assigned to Layer 7 (Suwannee) in DWRM 4.0 is 2,297 square feet per day (sq ft/day) which is similar to the Transmissivity value used by TetraTech in the DWRM 3.0 of 5,057 sq ft/day.

Table 3.16 DWRM 4.0 Aquifer Parameters in Proximity to the City's Brackish Wellfield

Layer	Hydrostratigraphic Unit	Horizontal Hydraulic Conductivity (ft/day)	Transmissivity (sq ft/day)	Vertical Hydraulic Conductivity (ft/day)	Specific Yield	Specific Storage	Top Elevation (ft NAVD)	Bottom Elevation (ft NAVD)	Thickness (ft)	Extent (ft. bls)
1	SAS	20.00	417	2.00	0.2	N/A	16.72	-4.14	20.85	0 to 20.85
2	Confining Unit	0.00	0	0.00	N/A	1.00E-06	-4.14	-198.65	194.52	20.85 to 215.37
3	UAA (PZ-2)	62.44	6,626	6.24	N/A	1.00E-06	-198.65	-304.78	106.13	215.37 to 321.5
4	Confining Unit	0.00	0	0.00	N/A	1.00E-06	-304.78	-423.56	118.78	321.5 to 440.28
5	LAA (PZ-3)	71.19	6,691	7.12	N/A	1.00E-06	-423.56	-517.55	93.98	440.28 to 534.26
6	Confining Unit	0.00	0.00	0.00	N/A	1.00E-06	-517.55	-734.52	216.97	534.26 to 751.24
7	Suwannee	41.88	2,297	4.19	N/A	1.00E-06	-734.52	-789.37	54.85	751.24 to 806.09
8	Ocala	41.92	13,122	4.19	N/A	1.00E-06	-789.37	-1,102.40	313.03	806.09 to 1,119.12
9	Avon Park	6,149.07	5,006,743	609.38	N/A	1.00E-06	-1,102.40	-1,916.63	814.23	1,119.12 to 1,933.35
10	MCU I (pinch out)	N/A	N/A	N/A	N/A	N/A	-1,916.63	-1,916.63	0.00	1,933.35 to 1,933.35
11	LFA I	12.89	1,289	1.29	N/A	1.00E-06	-1,916.63	-2,016.63	100.00	1,933.35 to 2,033.35
12	MCU II	0.00	0	0.00	N/A	1.00E-06	-2,016.63	-2,342.31	325.68	2,033.35 to 2,359.03
13	LFA II	12.89	21,690	1.29	N/A	1.00E-06	-2,342.31	-4,024.91	1,682.60	2,359.03 to 4,041.63

3.7.2.2 Well Interference Analysis

The City's current brackish wellfield design currently includes eight existing production wells and three proposed production wells as shown in Figure 3.1. The separation distances for Wells 1 through 9 range from 1,020 to 1,548 feet with an average of 1,284 feet as summarized in Table 3.17.

However, if ASR-3 and SZMW-2 are included, the closest separation distance decreases to approximately 480 feet between the two wells which is close enough to cause significant interference. At that distance, pumped wells essentially act as one withdrawal in a low transmissivity aquifer. Therefore, the withdrawal rate at these wells must be maintained at 435 gpm or the wells will need to be rotated to minimize the risk of upconing. In addition, both ASR-3 and SZMW-2 have total depths of 1,000 ft. bls which partially penetrates the Ocala Limestone. The deeper open hole and close separation distance makes these wells more susceptible to upconing of mineralized groundwater from depth.

A well interference analysis was conducted by identifying a 27-hour pumping event that occurred from August 3, 2024, at approximately 6:00 a.m. to August 4, 2024, at approximately 9:00 a.m. Wells 1, 2, 3, 5, and 6 were pumping with a combined withdrawal rate of 3,513 gpm or 5,058,720 gpd. Well 4 was offline during the entire event and functioned as an observation well during this analysis. It should be noted that Well 3 and Well 5 are approximately 1,180 and 1,300 feet from Well 4, respectively. The 10-minute transducer readings from all the City's wells during the event were compiled and the calculated observed drawdown at Well 4 was approximately 2.53 feet at the end of the 27-hour pumping event. Water level and flow rate data for the pumping event for Wells 1 through 6 have been presented in Figure 3.16.

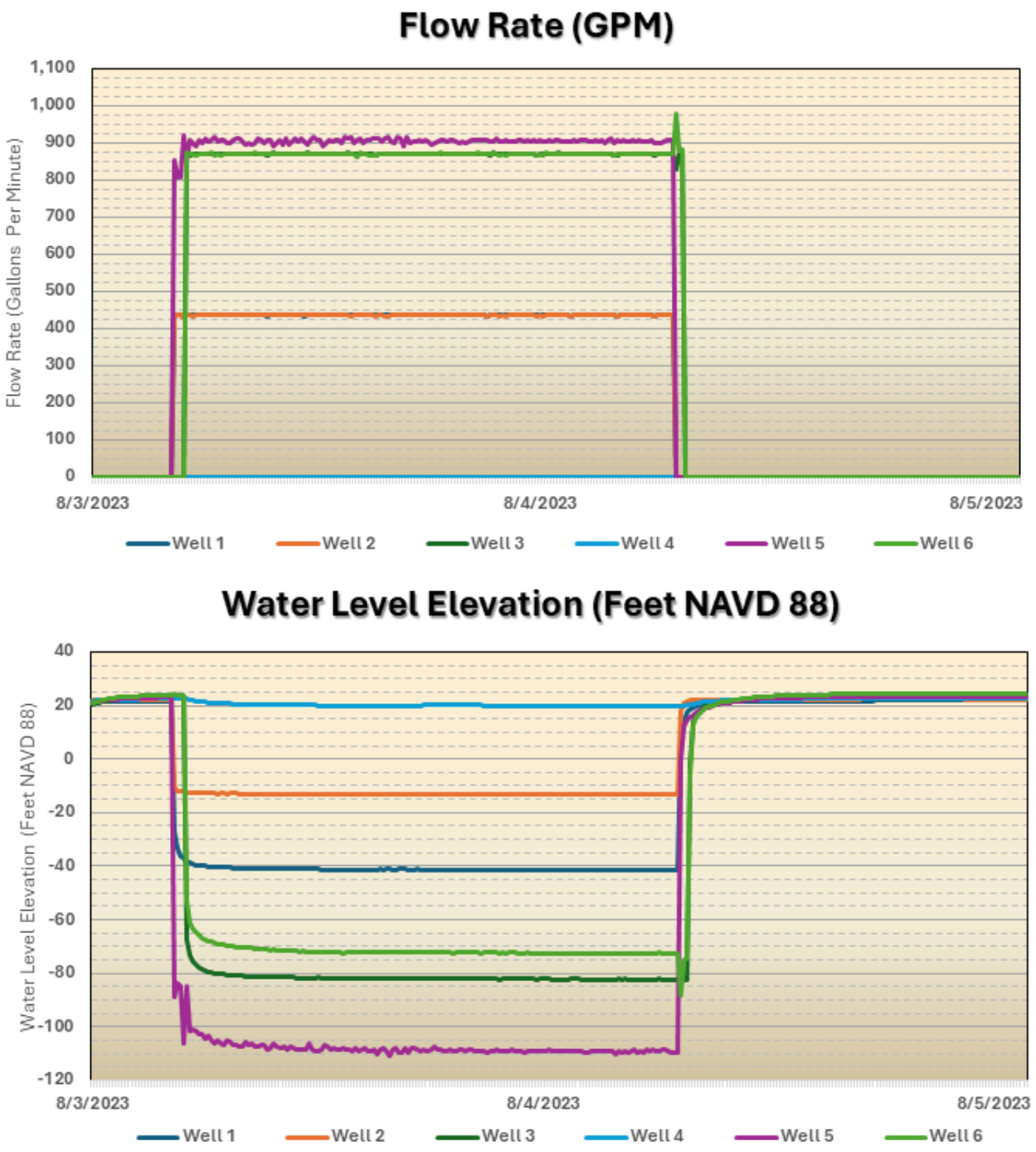


Figure 3.16 Well Interference Analysis (27-hour Pumping Event)

Table 3.17 Summary of Well Separation Distances for Production Wells 1 through 9

Well Pair	Distance (ft)
Well 2 and Well 3	1,280
Well 3 and Well 4	1,180
Well 4 and Well 5	1,300
Well 5 and Well 6	1,200
Well 1 and Well 4	1,540
Well 1 and Well 2	1,120
Well 7 and Well 8	1,140
Well 8 and Well 9	1,548
Well 5 and Well 8	1,420
Well 5 and Well 7	1,200
Well 4 and Well 7	1,500
Well 6 and Well 8	1,250
Well 6 and Well 9	1,020
Minimum	**1,020**
Maximum	**1,548**
Average	**1,284**

The DWRM 4.0 was used to simulate the event using DWRM 4.0's default aquifer parameters. The total drawdown at Well 4 during the simulation was 1.4 feet. The difference between the observed and simulated drawdown was 1.1 feet. There DWRM 4.0 is considered well-calibrated with a residual mean of +3.15 feet for simulated versus observed water levels. In addition, DWRM 4.0 simulates each well as fully penetrating the layer(s) that it assigned. For instance, several of the City's wells partially penetrate the Ocala Limestone which extends from approximately 800 to 1,120 ft. bls. However, DWRM simulates those wells as fully penetrating the Ocala Limestone. In any case, the difference between simulated and observed suggests that the model is reasonably accurate (+/-1 foot) in proximity to the City's brackish wellfield. It should be noted that while Well 3 and Well 5 had over 100 feet of drawdown observed during this event, the observed drawdown at Well 4 was only 2.4 feet which is a typical response in a low-transmissivity aquifer.

3.7.2.3 Groundwater Demand Withdrawal Simulations

As summarized in Table 3.18, three groundwater flow simulations were developed to assess well interference and overall drawdown near the City's wellfield for each of the demand scenarios discussed in Section 3.1. The three groundwater flow simulations include the required annual average demand, maximum month demand, and maximum day demand raw groundwater demands of 4.9 mgd, 7.9 mgd, and 11.0 mgd, respectively. The annual average demand scenario was simulated for 365 days, maximum month demand for 90 days and maximum day demand for 3 days. The raw water demands were assigned to all permitted existing and proposed production wells within the City's current wellfield boundary as presented in Table 3.19.

Table 3.18 Summary of Groundwater Flow Simulations

Simulation Scenario	Transient Duration	Stress Period 2	Stress Period 3	Net Difference
Annual Average Daily	360	0	4,900,000	4,900,000
Maximum Month Daily	90	0	7,900,000	7,900,000
Maximum Day Scenario	3	0	11,000,000	11,000,000

Table 3.19 Summary of Simulated Withdrawal Rates

District ID	User ID	Status	Diameter (in)	Cased Depth (ft. bls)	Total Depth (ft. bls)	Annual Average Daily (gpd)	Peak Month Daily (gpd)	Maximum Daily (gpd)	Simulated Layers
12	1	Existing	16	780	998	272,300	439,000	625,500	7 - 8
14	2	Existing	16	800	915	272,300	439,000	625,500	8 - 8
6	3	Existing	16	670	880	544,400	877,700	1,214,000	6 - 8
5	4	Existing	16	670	880	544,500	877,800	1,214,000	6 - 8
63	5	Existing	16	670	884	544,400	877,700	1,214,000	6 - 8
64	6	Existing	15	670	880	544,400	877,700	1,214,000	6 - 8
7	7	Proposed	16	670	880	544,400	877,700	1,214,000	6 - 8
8	8	Proposed	16	670	880	544,400	877,700	1,214,000	6 - 8
9	9	Proposed	16	670	880	544,400	877,700	1,214,000	6 - 8
13	ASR-3	Existing	16	810	1,000	272,300	439,000	625,500	8 - 8
62	SZMW-2	Existing	16	785	1,000	272,200	439,000	625,500	7 - 8
					Total	**4,900,000**	**7,900,000**	**11,000,000**	

The annual average demand groundwater flow modeling scenario results are provided in Figure 3.17 and Figure 3.18 for Layer 7 (Suwannee) and Layer 8 (Ocala), respectively. The figures show the maximum drawdown due to the City's groundwater withdrawals is approximately 4.0 feet within 100 feet away from a production well. The drawdown decreases to approximately 2.0 feet within approximately 300 feet from the production well. Both the Suwannee and Ocala are considered low-transmissivity permeable zones. As observed during the 27-hour pumping event, the drawdown gradient is very steep at the well but shallows quickly as distance away from the well increases. As shown, the drawdown contours are wrapped tightly around the well nodes, therefore the wells appear to have a good separation distance for this pumping scenario which is the typical pumping scenario during any given year. The static water level in the Suwannee and Ocala are approximately 20 feet above land surface. Therefore, for most of the wellfield, UFA groundwater water levels remaining considerably above land surface. Drawdown is significant at the production wells therefore it recommended that the City implement a routine maintenance and rehabilitation program for their production wells to ensure that biofouling and encrustation of the open hole for each well does not exacerbate drawdown and induce localized upconing of mineralized water from underlying permeable zones.

The peak month demand groundwater flow modeling scenario results are provided in Figure 3.19 and Figure 3.20 for Layer 7 (Suwannee) and Layer 8 (Ocala), respectively. The figures show the maximum drawdown due to the City's groundwater withdrawals is approximately 7.0 feet within 100 feet from a production well. The drawdown decreases to approximately 3.0 feet approximately 250 feet from a production well. As shown, most of the drawdown contours continued to be wrapped tightly around the well nodes, however more drawdown contours begin to coalesce as cones of depression interact with each other as the withdrawal rates increase. The construction of two additional production wells to the south would disperse the drawdown during peak month events and decrease the potential for localized upconing at the wells.

The maximum day groundwater flow modeling scenario results are provided in Figure 3.21 and Figure 3.22 for Layer 7 (Suwannee) and Layer 8 (Ocala), respectively. The figures show the maximum drawdown due to the City's groundwater withdrawals is approximately 9.0 feet within 100 feet from a production well. The drawdown decreases to approximately 4.0 feet within approximately 350 to 400 feet from the production well. The drawdown results for maximum day are based on pumping the existing and proposed production wells at 11.0 mgd for 3 consecutive days. While the maximum day scenario is not a long-term scenario, the construction of two additional production wells to the south would disperse the drawdown during maximum day events and decrease the potential for localized upconing at the wells.

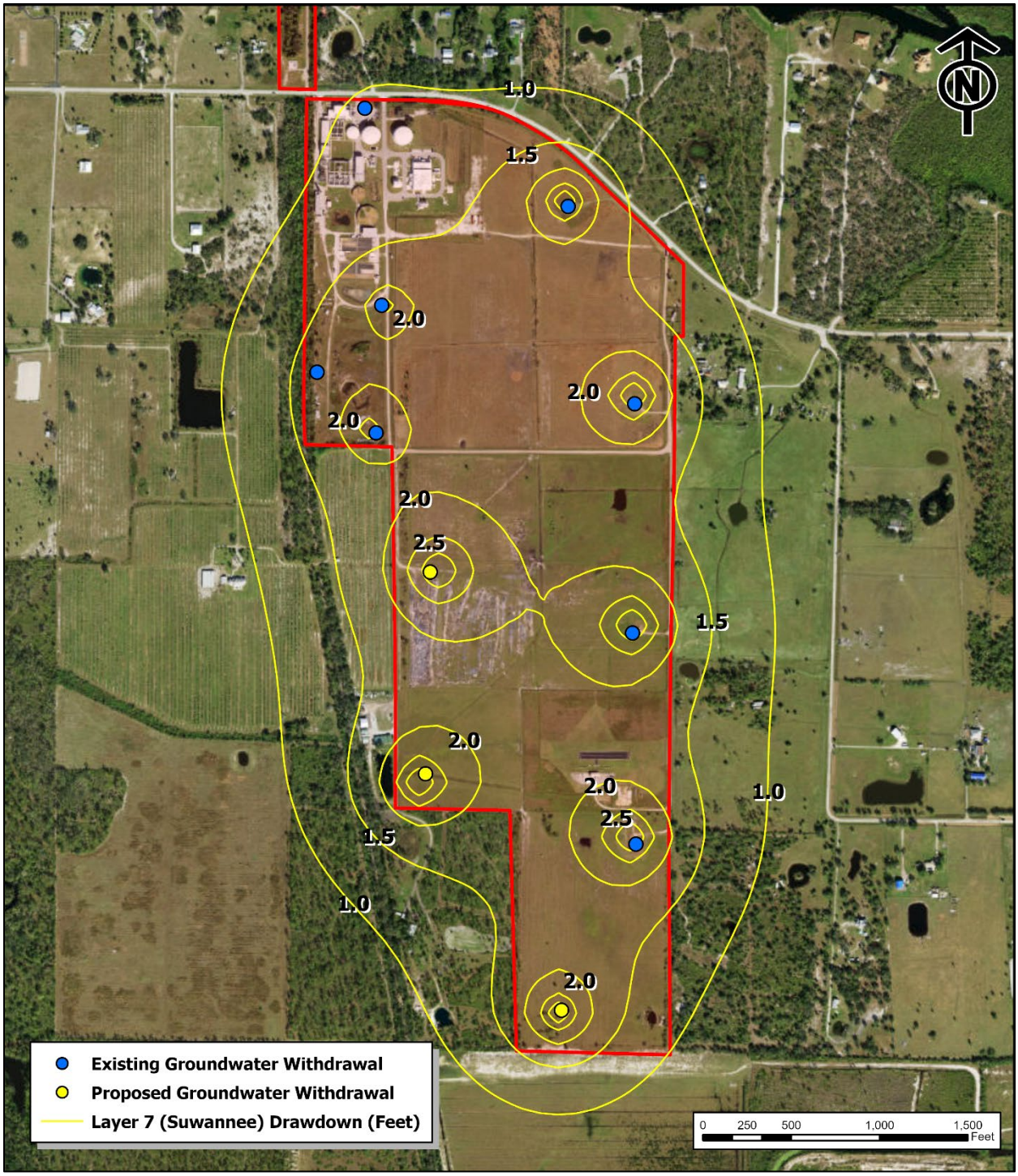


Figure 3.17 Annual Average Daily Scenario (4.9 mgd) – Layer 7 (Suwannee) Drawdown

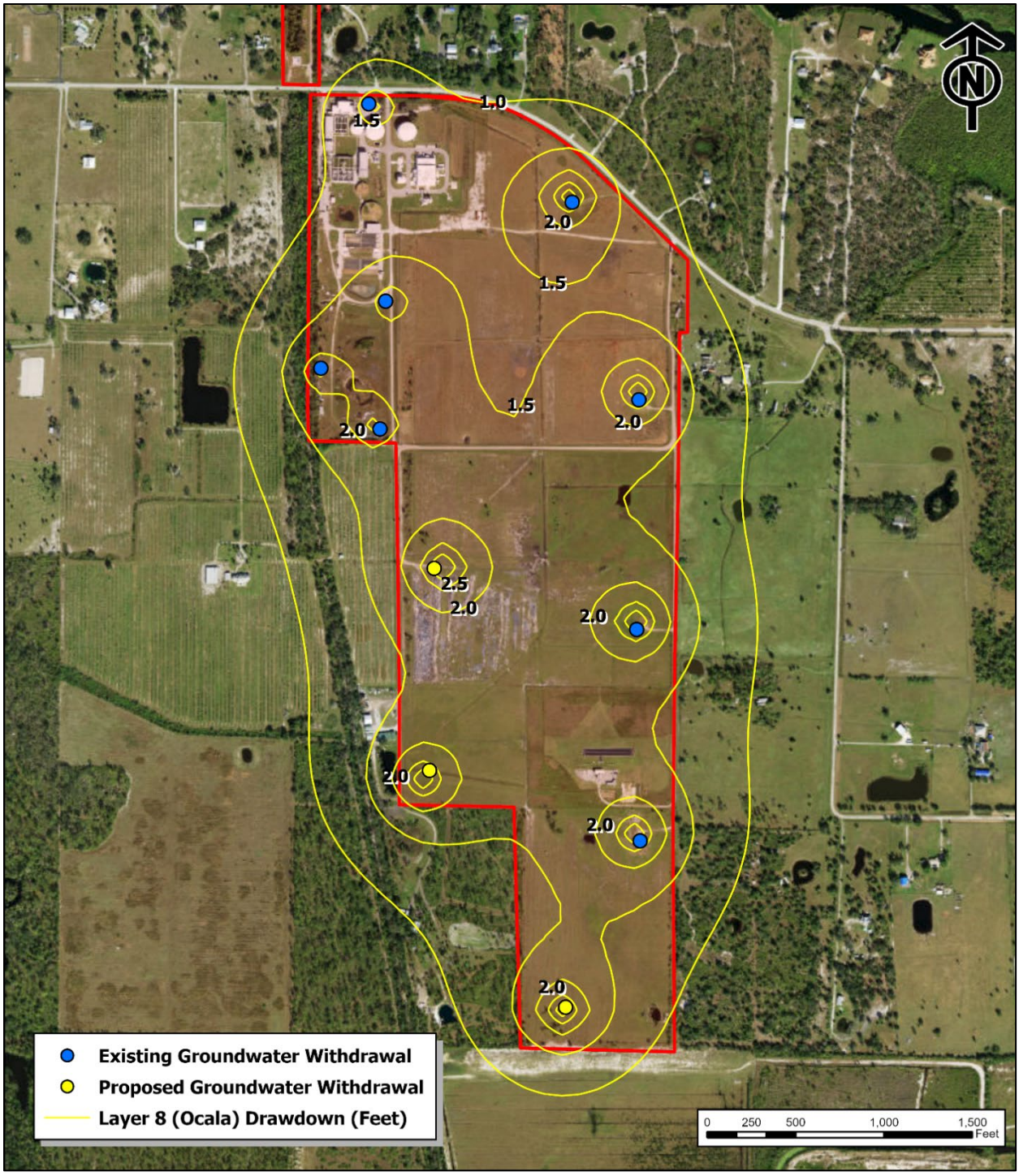


Figure 3.18 Annual Average Daily Scenario (4.9 mgd) – Layer 8 (Ocala) Drawdown

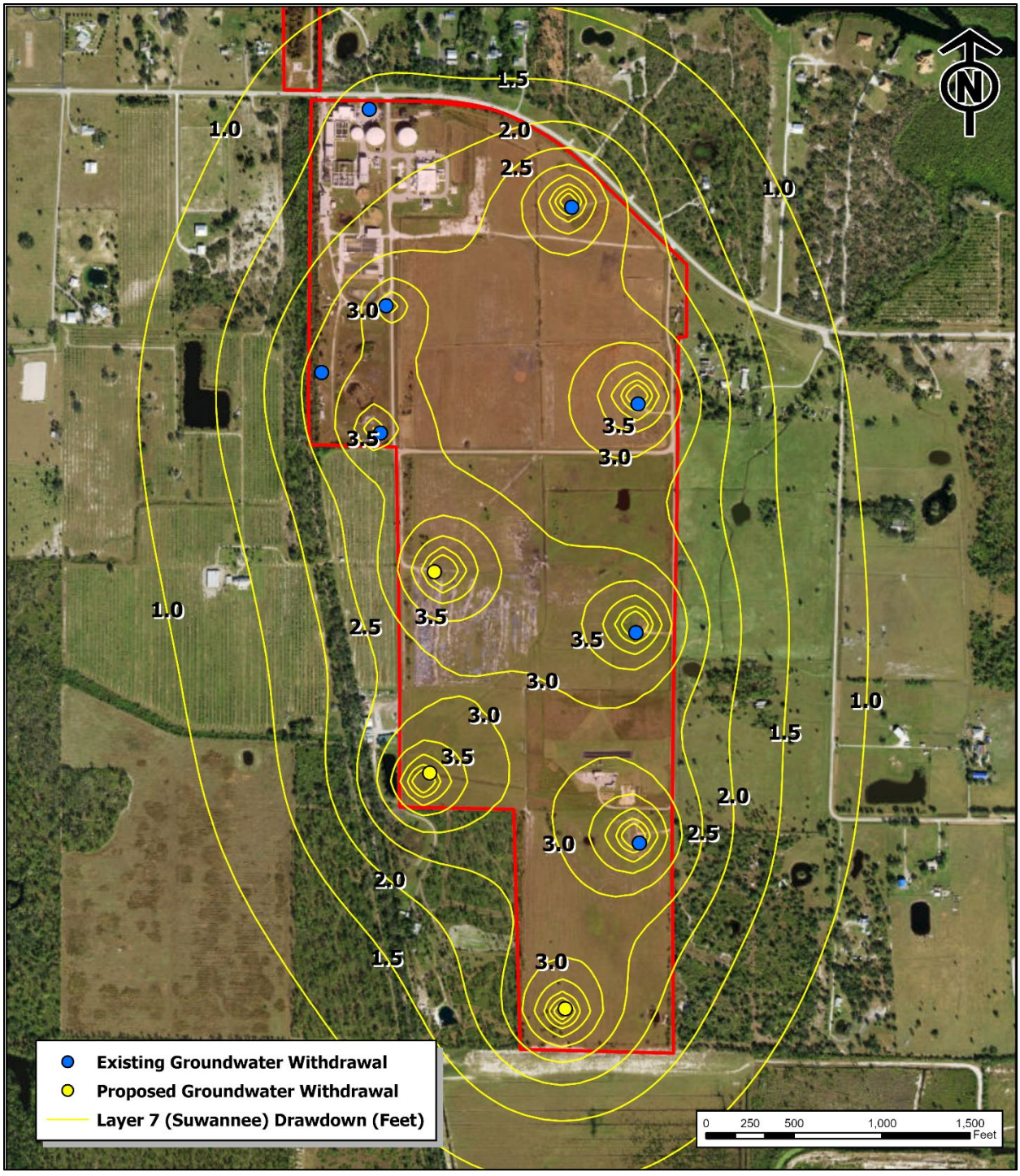


Figure 3.19 Peak Month Daily Scenario (7.9 mgd) – Layer 7 (Suwannee) Drawdown

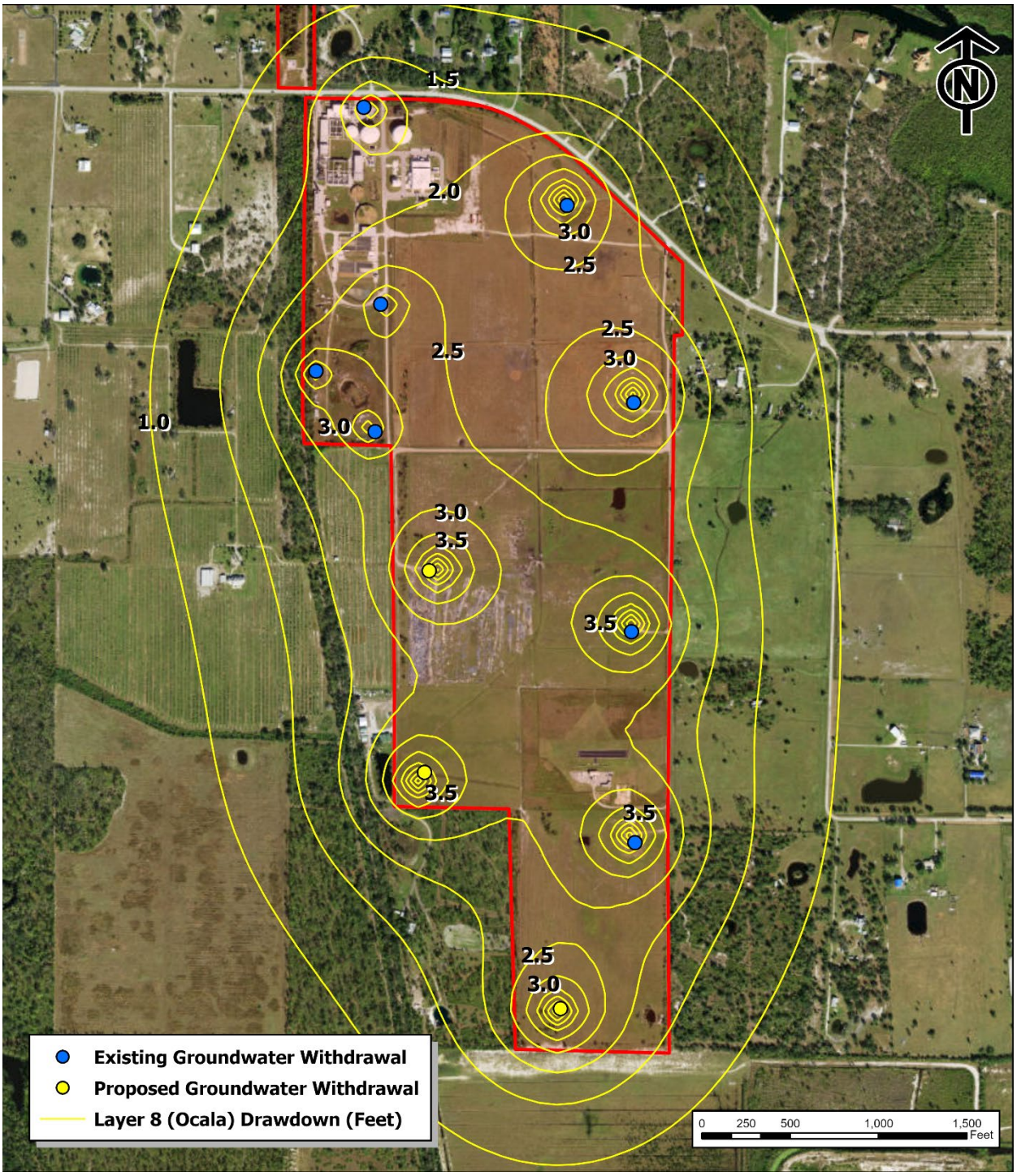


Figure 3.20 Peak Month Daily Scenario (7.9 mgd) – Layer 8 (Ocala) Drawdown

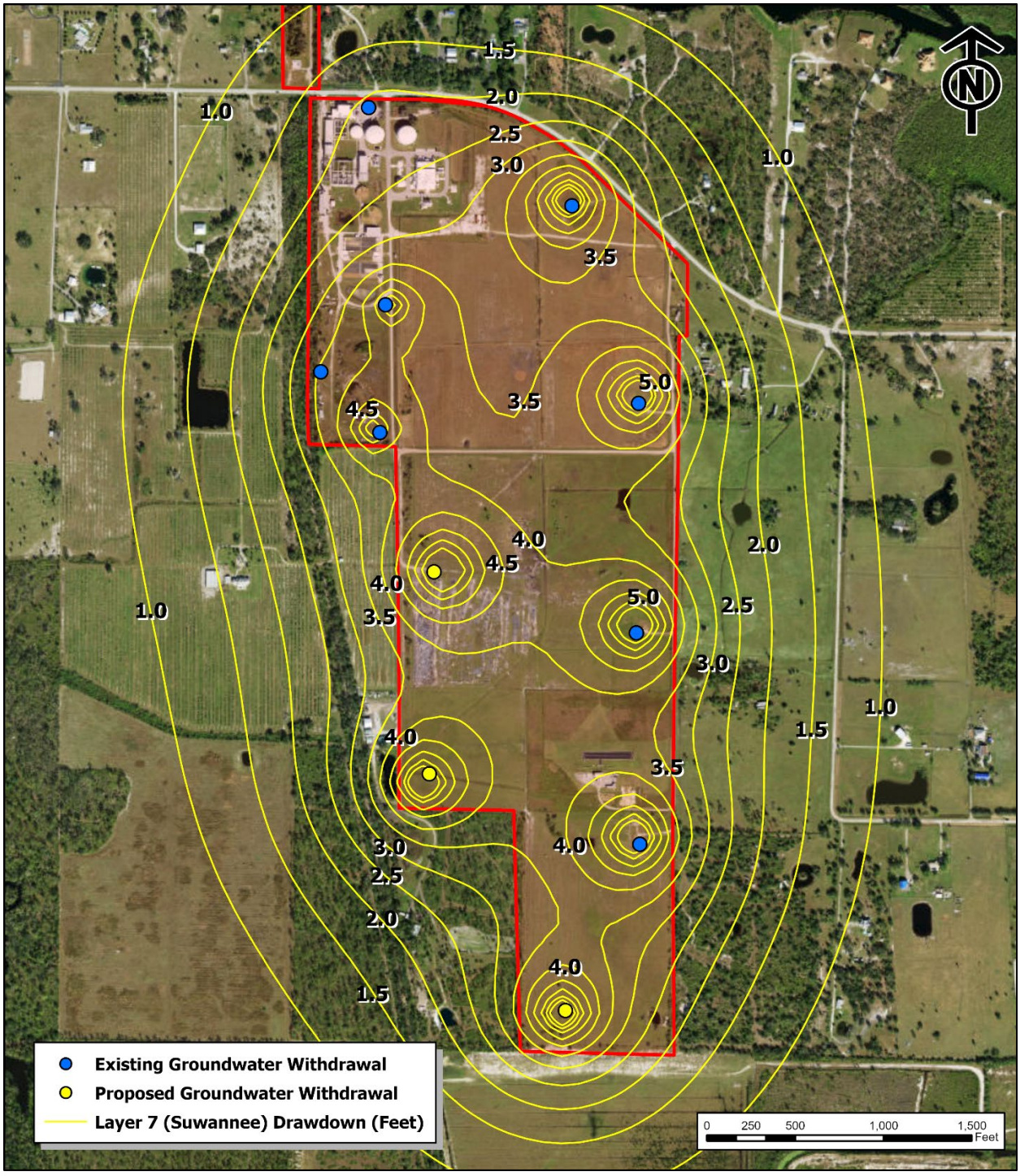


Figure 3.21 Maximum Day Scenario (11.0 mgd) – Layer 7 (Suwannee) Drawdown

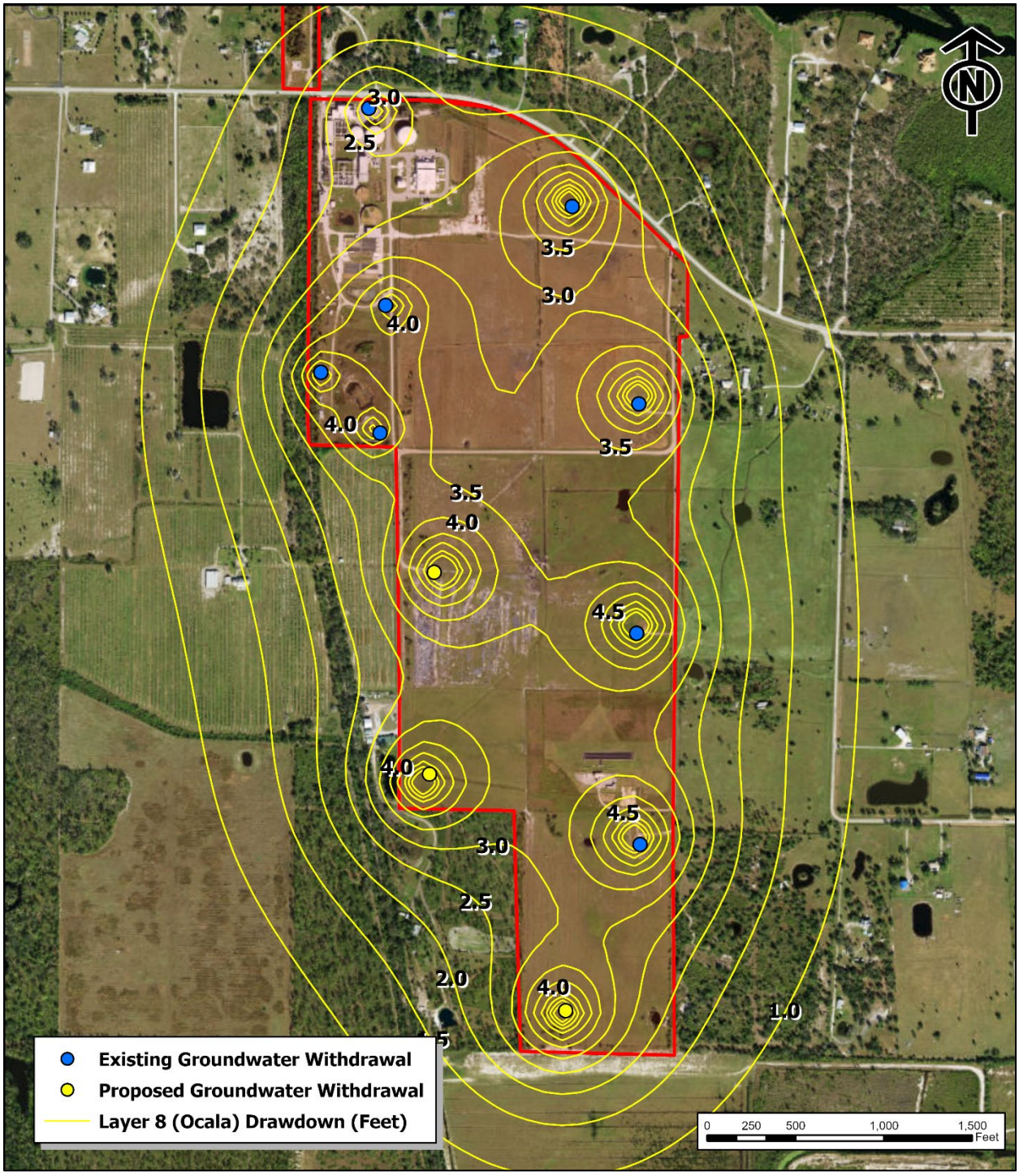


Figure 3.22 Maximum Day Scenario (11.0 mgd) – Layer 8 (Ocala) Drawdown

3.7.3 Future Wellfield Design Recommendations

As recommended in Section 3.4, an additional two production wells would provide a backup source of raw water to allow other production wells to be rotated or taken offline. However, due to the well separation distance recommendations, there is not enough room on the City's existing WTP property to accommodate two additional production wells while providing the well separation distance of at least 1,250 feet. Carollo and RESPEC contacted representatives of Bermont Road Partnership that owns the parcel(s) to the south of the City's property at the Shell Creek WTP. Based on preliminary discussions, the landowner will entertain the placement of two production wells on their property including pipeline easements as shown in Figure 3.23. The potential to place two additional wells on property that borders the Shell Creek WTP is advantageous with regard potential pipeline costs and access for maintenance of the wells and well sites. While land negotiations were beyond the scope of this feasibility study, the landowner's representatives were open to future negotiations with the City regarding easements.

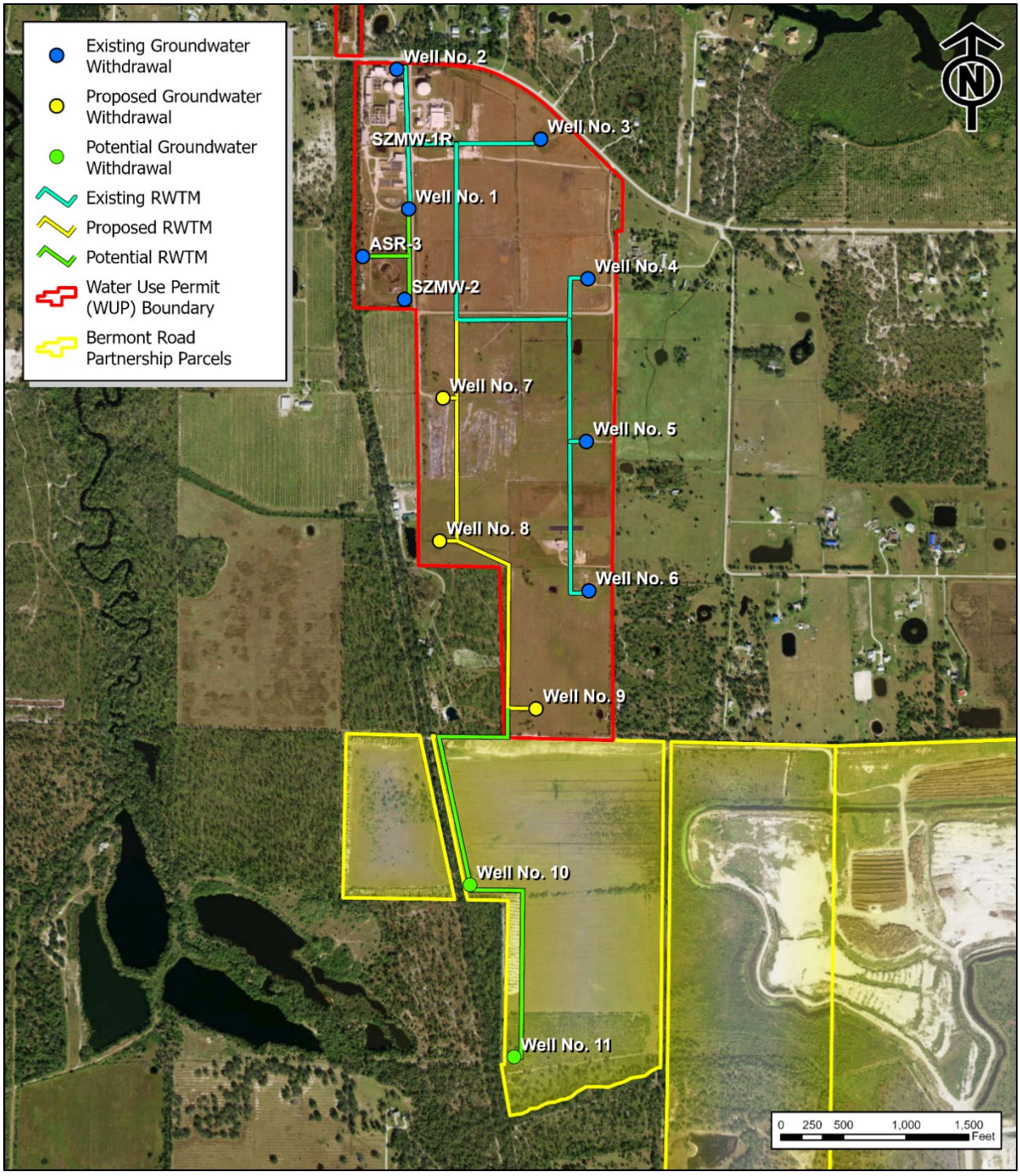


Figure 3.23 Potential Wellfield Configuration with Two Additional Production Wells

3.8 Production Well Construction

3.8.1 Regulatory Requirements

Several agencies regulate the construction of public supply wells in Florida. For this project, those agencies are as follows:

- **SWFWMD**: As previously stated, the City is located within the jurisdiction of the SWFWMD.
  - **WUP**: WUP 20000871.014 authorizes the construction and use of 11 UFA brackish production wells.
  - **Well Construction Permit**: It should be noted that the well contractor will be required to obtain a well construction permit (WCP) prior to beginning construction of any new production wells.
- **FDEP**: The FDEP issues permits for constructing and operating public water supply facilities within the State of Florida.
  - **Setback Requirements**: The existing FDEP regulations include setback requirements from sanitary hazards for public water supply wells, however given the proposed depth of the well casings and the considerable confinement between the surficial and UFA, surface activities are not anticipated to affect the water quality of the production wells. However, prior to final design, Rule 62-555.312 (Location of Public Water System Wells) and Rule 62-555.314 (Location of Public Water System Mains) should be consulted. Typically, a representative from SWFWMD, FDEP, or the local Department of Health (DOH) will conduct a site visit to verify setback requirements if requested.
  - **Public Water System Permitting**: The Authority will be required to apply for and obtain "*A Specific Permit to Construct Public Water System Components*" to obtain authorization from the FDEP to construct the proposed production wells and raw-water transmission mains.
- **Charlotte County Health Department**: The new public supply wells will need to be disinfected after construction and testing and the wells are subject to bacterial clearance.
  - **Disinfection**: In accordance with Rule 62-555.315(6)(a) and (b), a new well must be disinfected to inactivate any microbiological contaminant that may have been introduced into the wells during construction, and to allow the true microbiological character of well water to be determined through a bacteriological survey.
  - **Bacterial Clearance**: Following disinfection of a new well a bacteriological survey of the well shall be conducted that includes the collection of a total of at least 20 samples to be analyzed for the presence of total residual chlorine, total coliform, and *E. coli*. Typically, 2 samples can be collected each day at least 6 hours apart for 10 days.

3.8.2 Drilling Plan

Pilot hole drilling, data collection, and testing will be performed during the construction of each UFA production well. Lithology samples will be collected during pilot hole drilling to accurately determine the geologic formations encountered. Well performance and water quality data will be collected during pilot hole drilling and step-drawdown testing. Geophysical logging will be performed within the pilot hole to provide additional hydrogeologic data. The final well construction specifications are dependent upon the observed hydrogeologic conditions. As previously stated, the WUP requires that the Authority submit a Well Construction and Testing Plan (WCTP) prior to the initiation of production well construction.

Construction and testing activities are anticipated to include the following:

- Pilot hole drilling.
- Collection and identification of drill cuttings.
- Mechanical deviation surveys to check plumbness and alignment.
- Specific capacity testing during reverse air drilling.
- Well development.
- Bore-hole acidization.
- Step-drawdown testing.
- Water quality sample collection and analysis during reverse air drilling and step-drawdown testing.
- Geophysical and video logging.
- Primary and drinking water standard sample collection and analysis.
- Bacterial clearance sampling.

CHAPTER 4 SHELL CREEK WATER SUPPLY AND WATER TREATMENT PLANT

4.1 Surface Water Supply

The Shell Creek Reservoir is the sixth largest surface water system within the boundary of the SWFWMD. The Lower Shell Creek is defined as the portion of Shell Creek that extends from the Hendrickson Dam (constructed in 1964) to its confluence with the Lower Peace River. The Shell Creek Reservoir is fed by two primary tributaries: Shell Creek from the east and Prairie Creek from the northwest. The total drainage area at Hendrickson Dam is 373 square miles, with a surface area of 800 acres and depths of 10 to 12 feet. The Hendrickson Dam impounds the Shell Creek Reservoir, which is the raw water source for the Shell Creek WTP which came online in 1966.

4.1.1 Historical Overview and Withdrawals

Since 1966, the City has been withdrawing water from the Shell Creek Reservoir. Until the City's RO WTP was constructed in 2020, the City's only supply of water was from the Shell Creek Reservoir with the water treated at the City's Shell Creek WTP. Figure 4.1 illustrates the City's historical withdrawals from the reservoir.

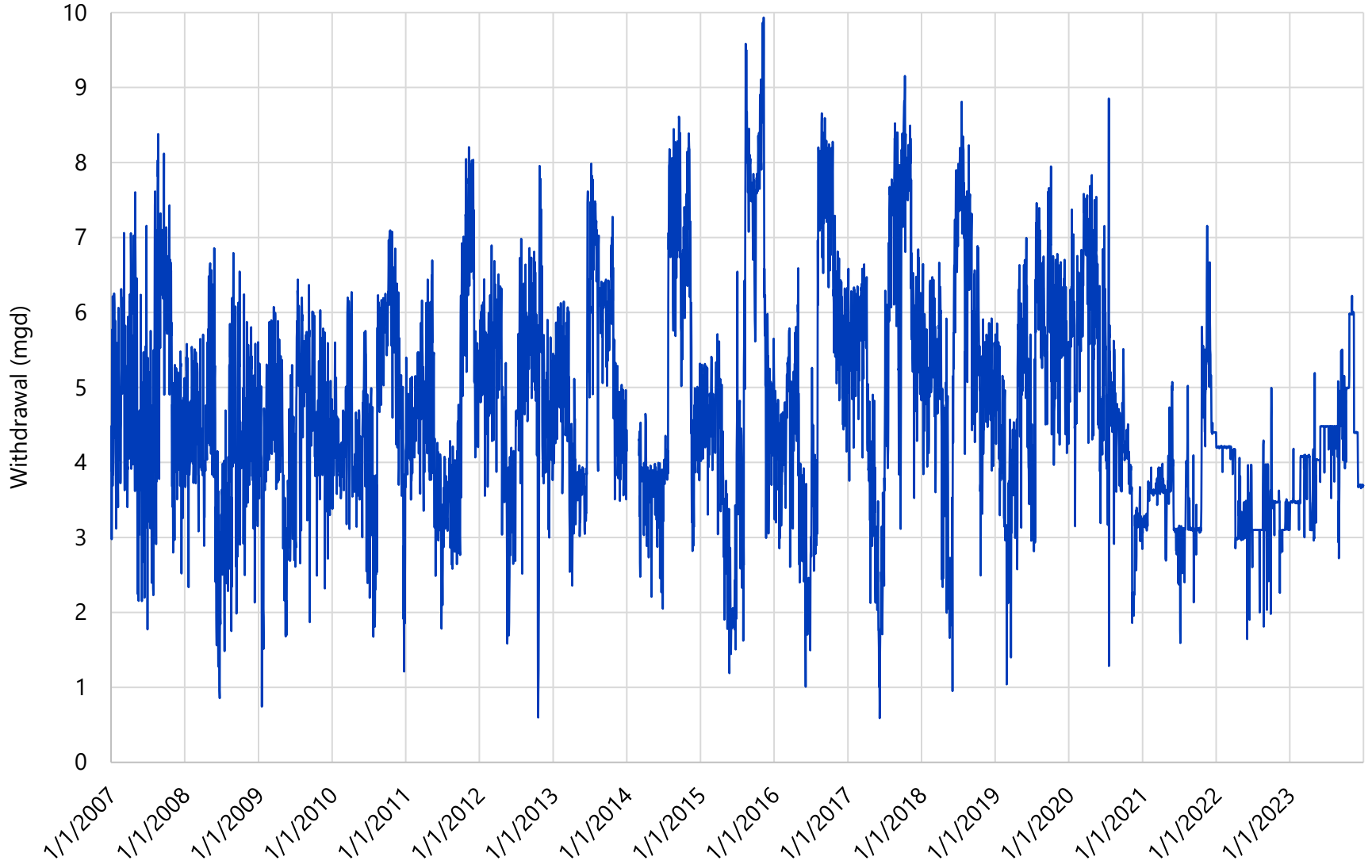


Figure 4.1 Surface Water Withdrawals (2007 – 2023)

4.1.2 Lower Shell Creek MFL

In 2010, the SWFWMD drafted the first proposed Lower Shell Creek MFL; however, a period of data collection took place between 2010 and 2020 to obtain additional hydrologic, bathymetric, hydrodynamic, and ecological information to support a new MFL. In 2021, an MFL for the Lower Shell Creek was implemented. Refer to Review of the Proposed Lower Shell Creek MFL (Carollo, October 2021) for a more detailed overview on the history and evaluation of the City's MFL.

The City's WUP was modified in December 2021 to include surface water withdrawal limits based on the SWFWMD's final MFL for the Lower Shell Creek. Based on the flow block and month of the year, the City can withdraw up to a certain quantity of water from the Shell Creek Reservoir. The three blocks correspond to low (Block 1), medium (Block 2), and high (Block 3) flows for the Lower Shell Creek. The City's WUP, as detailed in Section 3.2.1, outlines the maximum quantities the City may withdraw. These maximum quantities in conjunction with the MFL allocations are adhered to by the City. Table 4.1 shows the MFL maximum allowable withdrawals under the varying conditions.

Table 4.1 City of Punta Gorda Lower Shell Creek MFL

Block	Period	Maximum Allowable Reservoir Withdrawal
Block 1: 0 – 56 cfs (0 – 36.2 mgd)	January – April	4.22 mgd
	May – September	4.05 mgd
	October	3.40 mgd
	November – December	4.42 mgd
Block 2: > 56 – 137 cfs (>36.2 – 88.5 mgd)	All Months	23% of inflow (8.3 – 11.73 mgd) (WUP max month limit of 11.728 mgd)
Block 3: > 137 cfs (> 88.5 mgd)	All Months	40% of inflow (WUP max month limit of 11.728 mgd)

Abbreviations: cfs – cubic feet per second

4.1.3 Impact of Lower Shell Creek MFL on City Water Supply

The following section provides an analysis of historical and projected limitations of supply availability and reliability due to the City's MFL. This analysis includes the City's RO WTP, which was identified as a project in the City's previous Water Supply Study in 2015 and brought online in July 2020. The facility has an existing capacity of 4.0 mgd with the option of blending groundwater bypass for additional capacity. For the purposes of this WSP, it was assumed that the facility can provide up to 0.4 mgd in bypass blending, while still meeting TDS requirements, for an existing total finished water capacity of 4.4 mgd. Refer to Chapter 3 for more information concerning the RO WTP.

4.1.3.1 Recent MFL Impact on Raw Water Withdrawals

As seen in Figure 4.1, the City has been consistently withdrawing from the Lower Shell Creek reservoir. Following the MFL implementation, there has been a noticeable reduction in the City's withdrawals from the reservoir.

Figure 4.2 provides a comprehensive view of the City's daily demands spanning from 2021 through 2023. It juxtaposes these demands against the MFL maximum allowable withdrawal amounts relative to those periods based on the streamflow, and the amount the City ultimately withdrew. Demands often exceeded the amount the City could withdraw from the reservoir based on the MFL restrictions.

Moreover, Figure 4.3 delves into the specifics of the City's withdrawals, pinpointing periods where withdrawals fell within a narrow margin of 5 percent of the maximum allowable limit. For 2023, the City was withdrawing within 5 percent of its limit approximately 22 percent of the time.

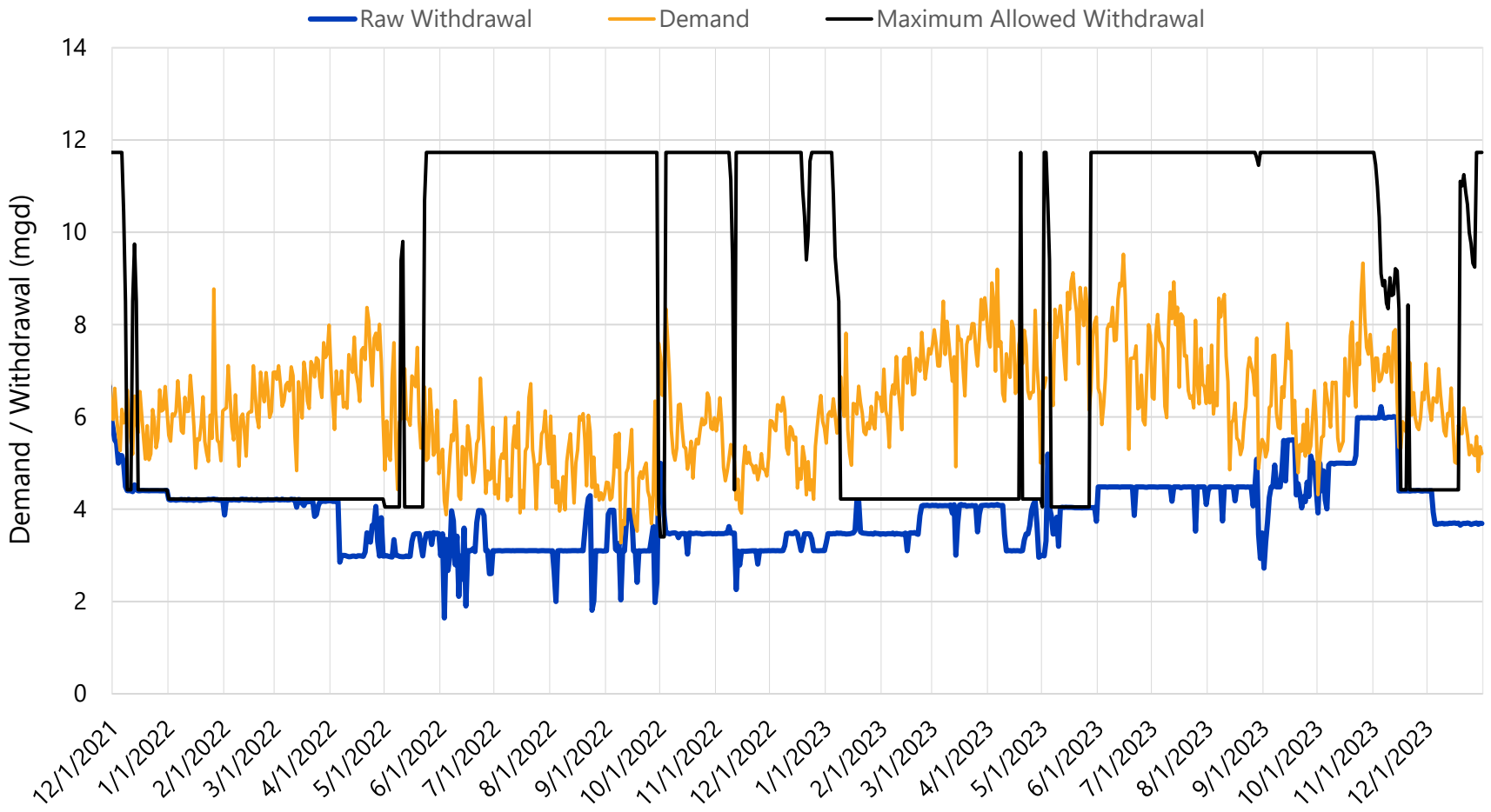


Figure 4.2 Surface Water Withdrawals and Demands since MFL Implementation

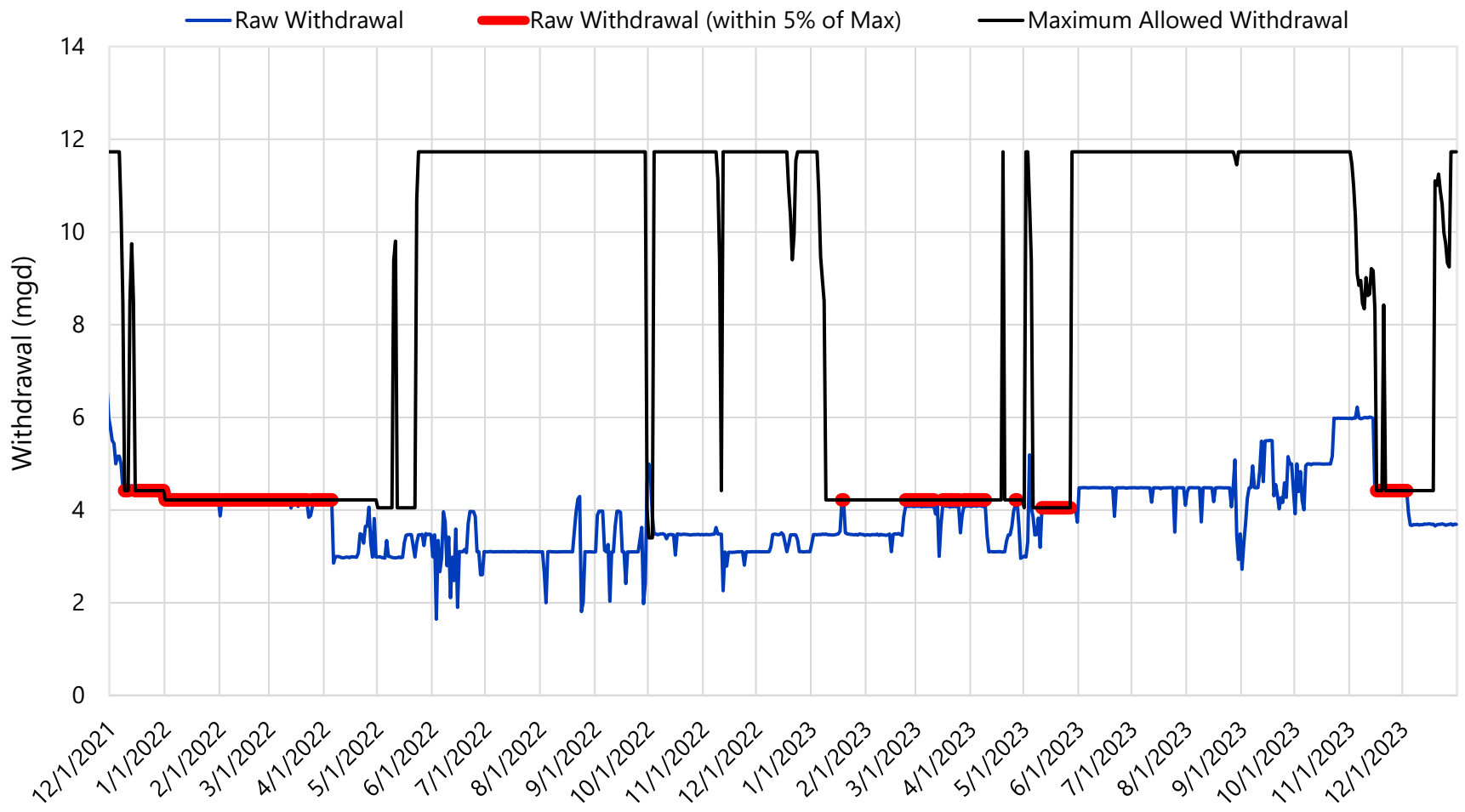


Figure 4.3 Surface Water Withdrawals and Allowable Withdrawals Based on MFL Restrictions Since MFL Implementation

4.1.3.2 Existing MFL Impacts on Meeting Water Demands

The MFL was implemented at the end of 2021, and when comparing the raw withdrawals from 2020 through 2021 to 2022 through 2023, the City withdrew approximately 12 percent less from the Shell Creek Reservoir. However, as discussed in Chapter 2, the City experienced a 26 percent increase in annual average demands from 2020 to 2023. The increasing demands the City has experienced is exacerbated by the more stringent withdrawal conditions of the reservoir due to the MFL. As described previously, the MFL includes three varying blocks, based on flows in Shell Creek. Block 1 is the most limiting of the three, followed by Block 2, then Block 3. Table 4.2 shows the distribution of days in each block per year since 2016.

Table 4.2 Percentage of Days in each Block of MFL

Year	Block 1	Block 2	Block 3
2016	13%	18%	69%
2017	42%	8%	50%
2018	27%	28%	45%
2019	33%	23%	44%
2020	31%	24%	45%
2021	52%	10%	38%
2022	40%	8%	52%
2023	46%	17%	37%
Average	35%	17%	48%

As Block 1 is the most restrictive, a scenario was evaluated to determine hypothetically what quantities of water the City would need to meet its monthly maximum days in 2023 under Block 1 conditions (illustrated below as Figure 4.4). This scenario considers the 2023 maximum daily demand calculated for each month and calculates the quantities of water that can be provided. It assumes the maximum of 4.4 mgd finished water production at the RO WTP: 4.0 mgd produced from both skids online and 0.4 mgd bypass blending. A 10 percent treatment loss through the Shell Creek WTP was assumed based on historical data. Unless otherwise noted, these assumptions are used for all hypothetical analyses presented in this chapter. A similar analysis was conducted in 2020 during the previous evaluation of the MFL; however, for that analysis it was assumed the RO WTP would be operated at 4.0 mgd. This 2020 iteration of the scenario is included for comparison to the previous analysis.

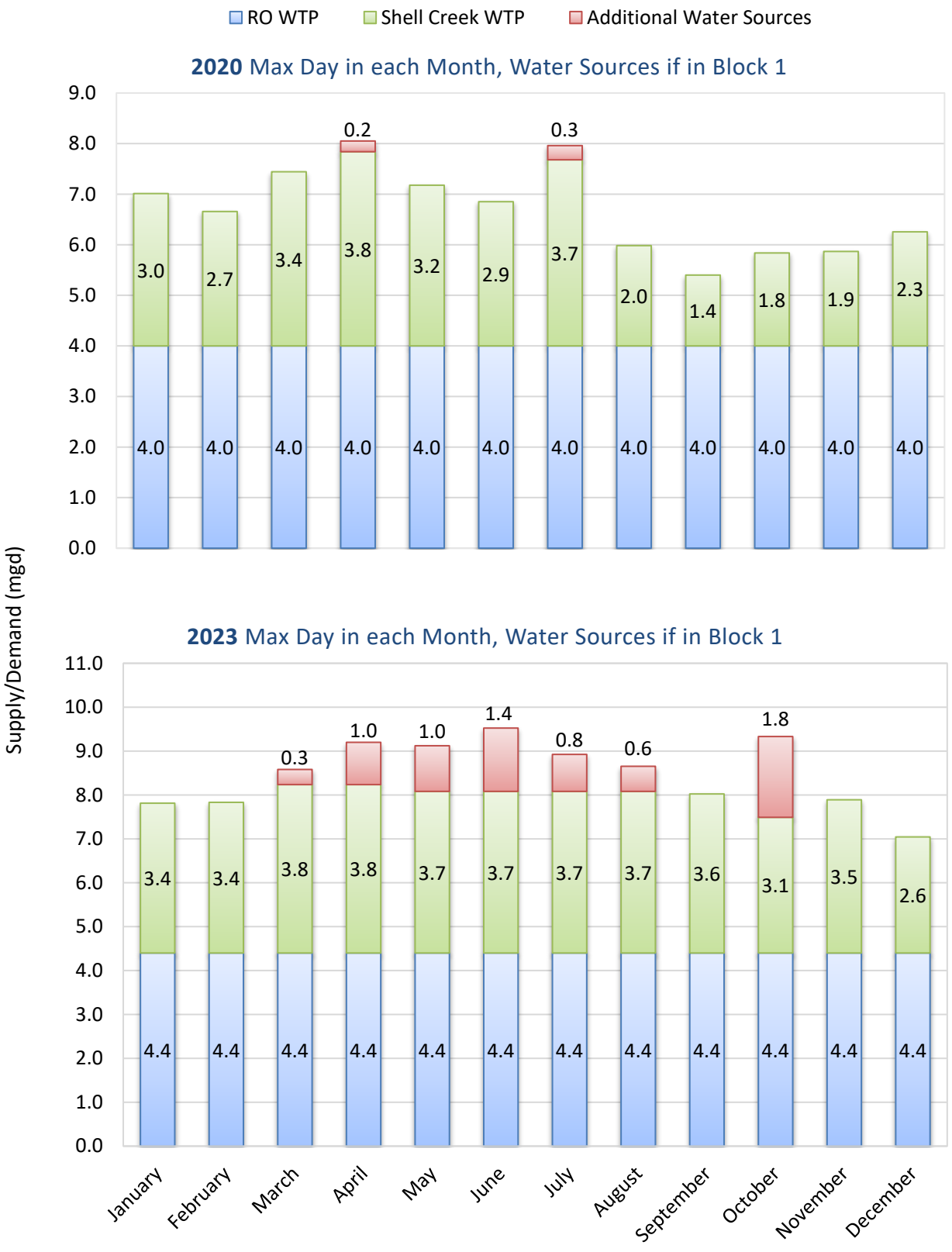


Figure 4.4 2020 and 2023 Highest Demand per Month and Available Water Sources if in Block 1 of MFL

As shown in Figure 4.4, the need for additional water sources in this scenario have increased and span across additional months since 2020. Even with the additional 0.4 mgd from blending, the City would need between 0.3 to 1.8 mgd in additional water if the highest day of demand in each month experienced in 2023 were to occur during Block 1. Note, the City has an existing connection with the Authority to provide water during times of emergency and when it is available, per the terms of the agreement, but because quantities are not guaranteed, it cannot be relied upon routinely. Chapter 5 provides more details and information on the City's agreement with the Authority.

4.1.3.3 Projected MFL Impacts on Meeting Water Demands

There are many compounding factors that influence the City's ability to withdraw and treat water from the Shell Creek Reservoir. A water supply model was developed to evaluate the ability to meeting various projected demand conditions considering the capacity of the RO WTP, the allowable supply from the Shell Creek Reservoir considering the MFL restrictions, and the need for additional water sources. This section analyzes several scenarios under various demand conditions.

The City is experiencing higher than expected demands and has projections to reach 7.50 mgd on an annual average basis by 2050 (see Chapter 2). Figure 4.5 provides a daily water supply analysis for anticipated 2050 daily demands and the sources for the finished water supply. The daily demand values were calculated using the projected annual average demand in 2050 multiplied by the daily peaking factors calculated for 2023. The model also considered the 2023 streamflow conditions for this analysis. The model then determined the available and anticipated sources needed to meet the projected daily demands in 2050. The model first uses the available RO capacity, then the available Shell Creek water based on the streamflow and MFL block, and then the remainder of the demand needing to be met with additional water sources. Note that the model also assumes the Shell Creek WTP produces a minimum finished water of 3.0 mgd to mimic actual operating conditions.

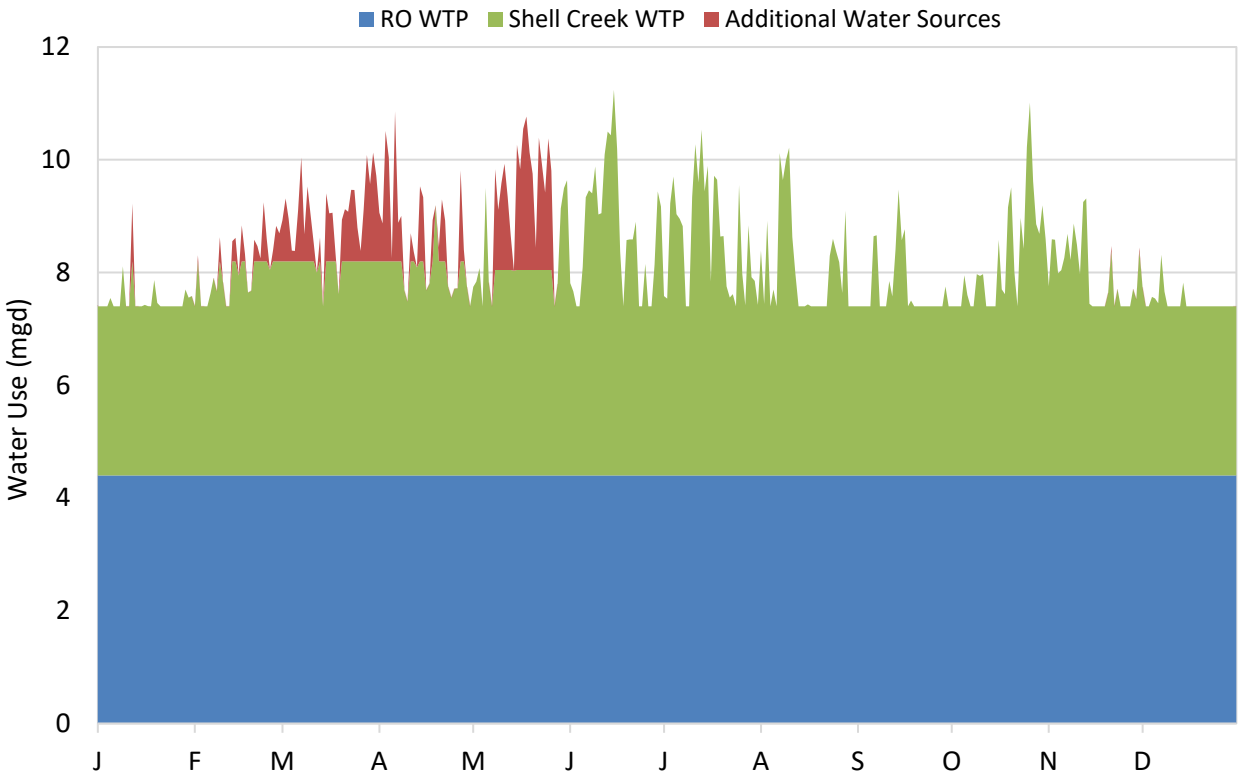


Figure 4.5 Estimated Water Sources Based on Projected 2050 Average Annual Demand and 2023 Peaking Factors with 4.4 mgd RO WTP

As seen in Figure 4.5, with the RO producing 4.4 mgd finished water and the Shell Creek WTP treating the highest quantity of water possible (while accounting for MFL limitations and treatment losses), the City would need an additional water source most days from February through May.

Another daily analysis was conducted with the RO facility operating with one skid (2.0 mgd permeate with no blending) to evaluate the additional water source quantities needed under a scenario in which the RO WTP capacity is operating with one skid out of service based on Class I reliability.

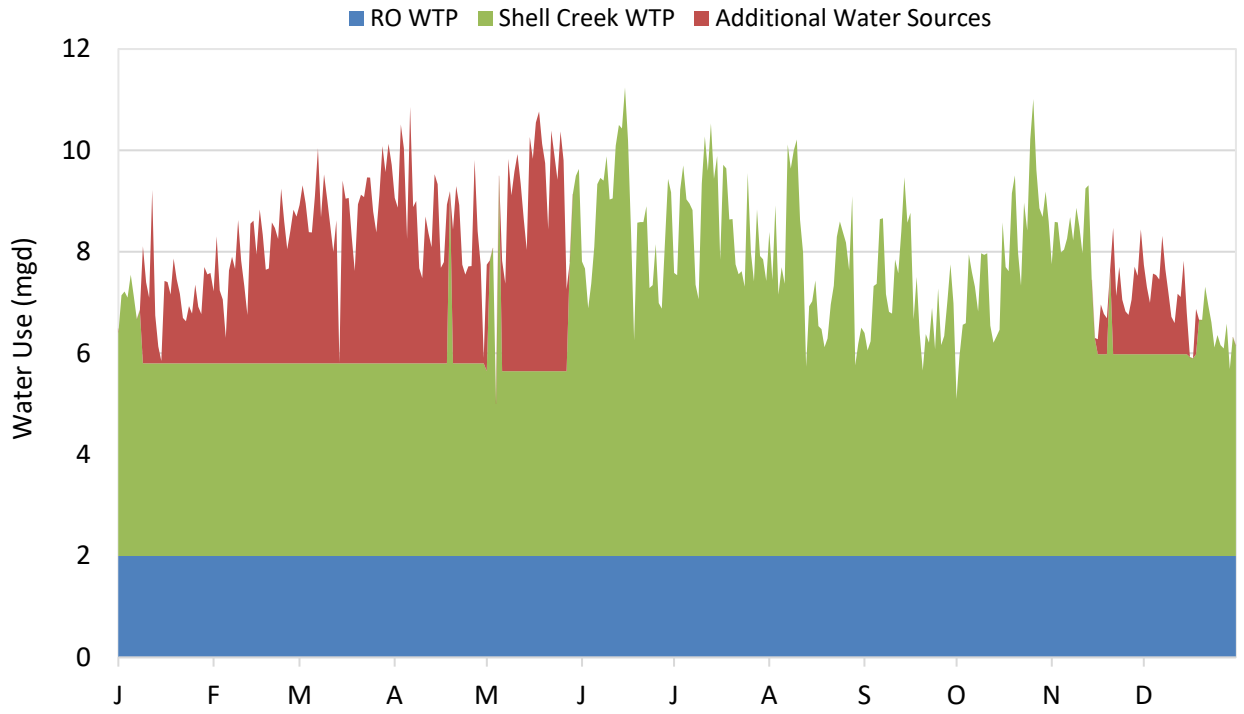


Figure 4.6 Estimated Water Sources Based on Projected 2050 Annual Average Demand and 2023 Peaking Factors with 2.0 mgd RO WTP

With the RO WTP having only one skid online, the amount needed for additional water sources increases and is required for more of the year. Based on this analysis, 17 percent of the overall demands in 2050 will need to be provided by additional sources if only one skid is online, whereas if the RO WTP is consistently able to produce 4.4 mgd, only 3 percent is needed from additional sources overall.

The following scenario evaluates the projected 2050 monthly average demands if under Block 1 conditions. The monthly average demands were calculated using the annual average 2050 projected demand and the average monthly peaking factors for the past 8 years (refer to Table 2.3). With the RO WTP producing 4.4 mgd, the months of March, April, and May are projected to need additional water sources to meet the average monthly conditions; these amounts were 0.4 mgd, 0.4 mgd, and 0.1 mgd, respectively. However, as seen in Figure 4.7, if only one skid were online, every month in 2023 results in demand deficits that cannot be met by the RO WTP and Shell Creek WTP.

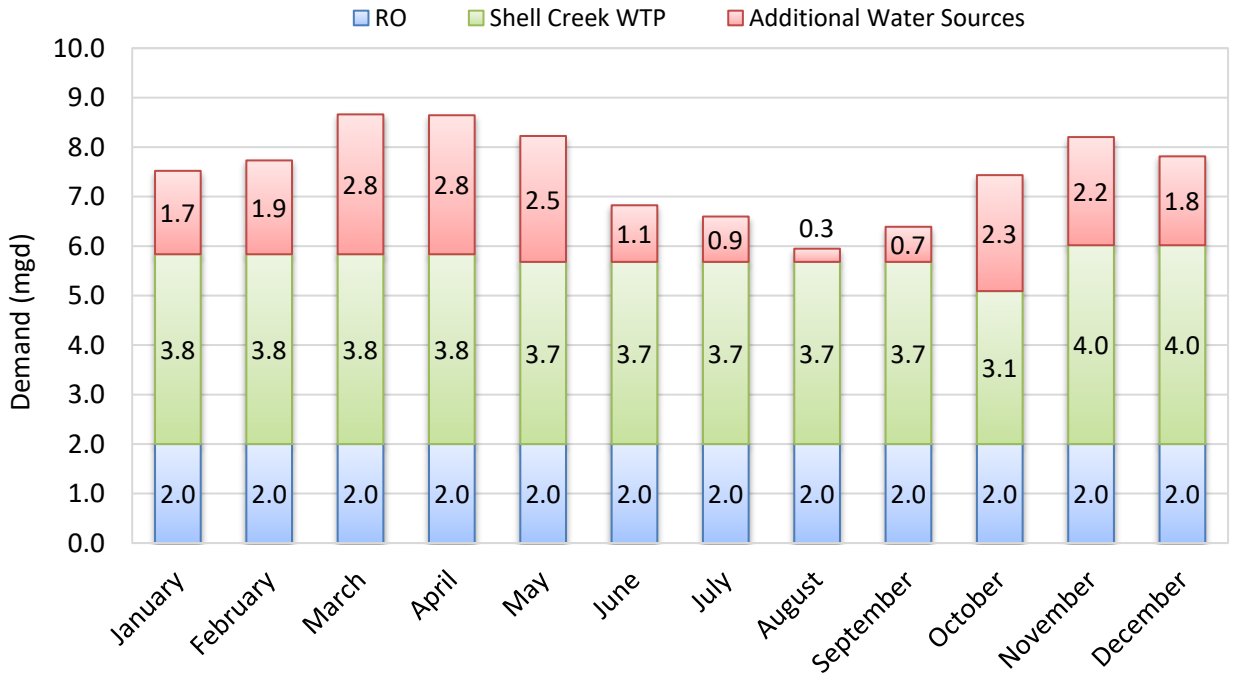


Figure 4.7 Estimated 2050 Monthly Average Demand and Water Sources if in Block 1 of MFL with 2.0 mgd RO WTP

The maximum day demand can be considered the "worst-case" scenario that future planning and design efforts should consider. In Figure 4.8, the 2050 maximum day demand of 12.0 mgd was evaluated for the different Block 1 periods to determine the available water sources. If the maximum day demand were to occur while in Block 1, the amount of additional water needed ranges from 3.8 mgd to 4.5 mgd, even with the RO WTP operating at its peak capacity of 4.4 mgd with no redundancy.

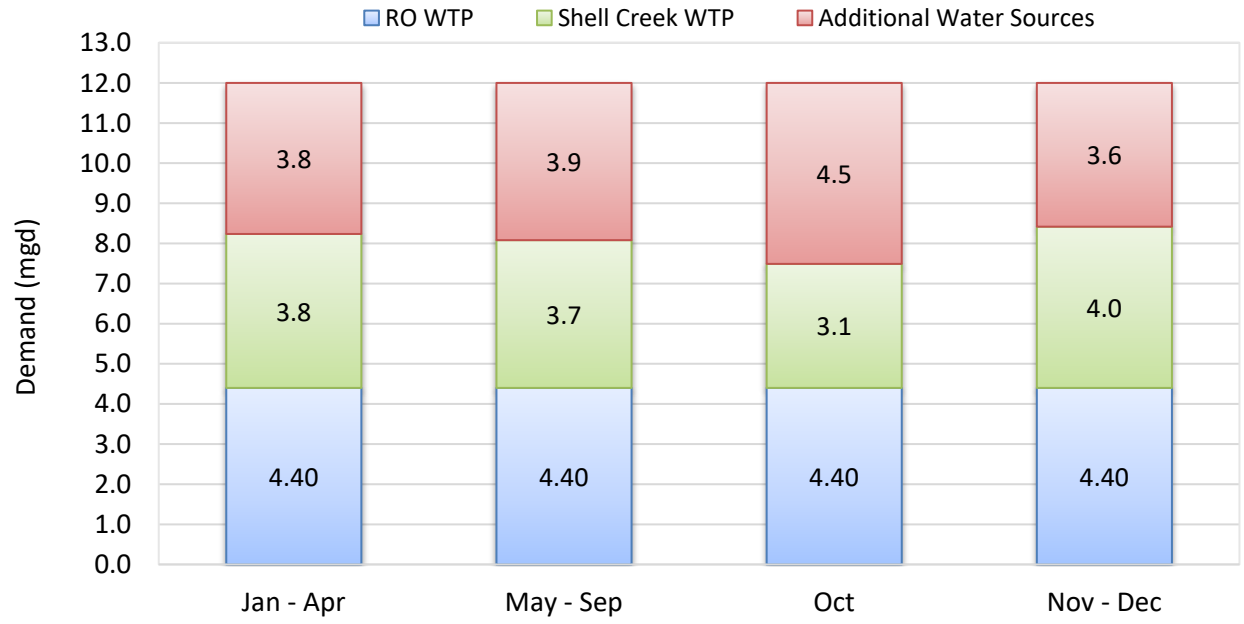


Figure 4.8 Estimated 2050 Maximum Day Demand and Water Sources if in Block 1 of MFL

4.2 Shell Creek WTP

The Shell Creek WTP came online in 1966. The facility (public water system ID 6080051) treats surface water from the Shell Creek Reservoir through conventional treatment consisting of aeration, coagulation, sedimentation, and filtration, with each process consisting of a north and south unit, respectively. Following filtration, the water is conveyed to the blending basin and blended with permeate from the RO WTP and any waters received from the Authority prior to being sent to the onsite storage tanks.

The Shell Creek WTP is permitted at 10 mgd; however, the facility needs rehabilitation, specifically related to its granular media filters and solids contact units (SCUs). The City is planning a rehabilitation project that will likely consist of the following:

- Resurface SCU basins.
- Replace SCU treatment equipment, distribution piping, baffles, launders, and operating equipment.
- Resurface filter basins.
- Replace filter equipment with in-kind equipment.
- Replace electrical system and upgrade instrumentation.

Rehabilitation should take into consideration major unit process condition as well as the allowable withdrawals under the MFL restrictions. The October Block 1 MFL condition is the most limiting for the City's ability to withdraw surface water from the reservoir with an allowable withdrawal of 3.4 mgd. Considering 10 percent treatment losses, the Shell Creek WTP could produce approximately 3.1 mgd under Block 1 in October. Considering Block 1 allowable withdrawals, the City may want to evaluate rehabilitation of only one treatment train. However, when in Blocks 2 and 3, the MFL does not limit production from the Shell Creek WTP, and rehabilitation of the full capacity may be prudent in case the RO WTP needs to be taken offline for any reason. **It is recommended that the Shell Creek WTP be rehabilitated to achieve a reliable capacity of a minimum of 6 mgd**. The City intends to conduct the Shell Creek WTP rehabilitation project as a progressive design-build, in order to confer with both a contractor and engineer the options and resulting costs for a partial or full WTP rehabilitation project. For purposes of the remainder of the WSP, only the Block 1 limited capacity of the WTP is considered for the future scenario planning, since this is the limiting condition that must be planned for to develop a reliable water supply.

CHAPTER 5 REGIONAL WATER SUPPLY

The Authority provides potable water to utilities within the Charlotte, DeSoto, Manatee, and Sarasota County region. Established in 1982, the Authority supports the ongoing water supply needs of the area. The Authority maintains two interconnection pipelines with the City. Historically, the City has relied on the Authority for water during emergency situations and peak demand periods.

The following sections summarize the existing pipelines and interlocal agreements between the City and the Authority, as well as the potential for the City to purchase a permanent allocation of water from the Authority.

5.1 Existing Pipelines and Agreements with the Authority

The Authority has been actively developing the Regional Integrated Loop System over several years. The system consists of a network of transmission lines designed to distribute potable water throughout the four-county region.

The first connection between the City and the Authority was the Phase 1A pipeline. Phase 1A is a 9-mile, 24-inch transmission pipeline that links an Authority distribution station in southern DeSoto County with the City of Punta Gorda's distribution system and was completed in 2013. Specific terms governing water exchange and operational procedures for the Phase 1A interconnect between the City and the Authority were established in the *Water Systems Interconnect and Water Transfer Contract* (September 3, 2013). See Appendix A for the contract. The Phase 1A pipeline was established to improve the regional connectivity and reliability of water supplies.

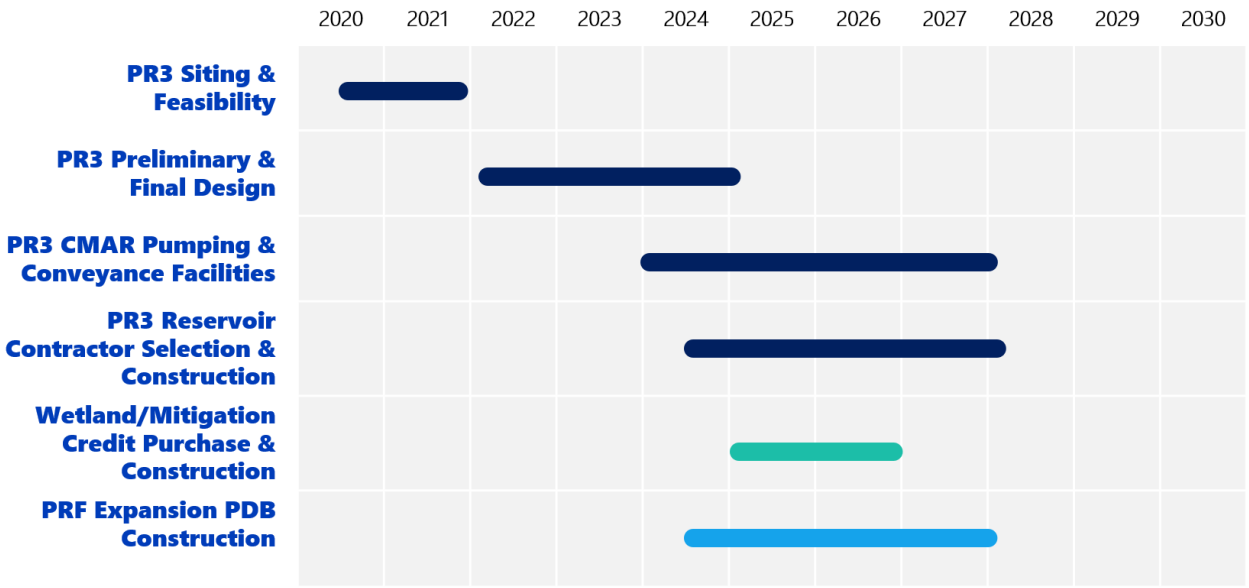
Subsequent amendments were made to this contract, notably on February 17, 2016, which included provisions related to a second interconnect and delivery point – the Phase 1 pipeline – and was further amended on December 4, 2019. In addition, the 2019 amendment increased the annual allowable imbalance from 30 MG to 60 MG and introduced a more flexible schedule for rectifying any imbalances. Water quantities up to 60 MG can be carried over to the next contract year, while any imbalance exceeding this threshold at the end of the fiscal year, whether due to water purchased by the City from the Authority or vice versa through the interconnects, incurs an Interconnect Water Charge.

Construction of the Phase 1 pipeline concluded in 2020. This 6.3-mile, 24-inch transmission main connects the Authority's Peace River Facility (PRF) with the City's Shell Creek WTP. The *Interlocal Agreement for Phase 1 Regional Interconnect* (included in Appendix A), established on December 2, 2015, governs the operation of these pipeline connections, providing access to regional water sources during emergencies and, if available, times of peak water demand.

Generally, the City has a routine exchange of water with the Authority. Water typically is delivered to the City's WTP through the Phase 1 pipeline on U.S. 17, while water is returned to the Authority through the Phase 1A pipeline. This continuous exchange allows the infrastructure to remain in operation, minimizing water age, and providing a reliable source of backup water supply as needed.

5.2 Potential Future Allocation from the Authority

The Authority has been planning a Surface Water System Expansion Project (SWSEP) for many years, which was approved by the Authority's Board in April 2024 and involves two major components: the Peace River Reservoir No. 3 Project (PR3) and the PRF Expansion Project. PR3 will include a new 9-billion-gallon (BG) reservoir, a new river pump station and pipeline, and rehabilitation of an existing reservoir's pump station. The PRF Expansion project provides 24-mgd in new treatment capacity. These two projects result in an additional 18 mgd of annual average daily yield for the Authority. It is projected that the PRF will be online, and Reservoir No. 3 will be constructed, by early 2028. The tentative schedule for the SWSEP, shown as Figure 5.1, shows the first additional capacity becoming available in 2028, although the full reliable yield of 18 mgd will not be available for a few years until the reservoir has been filled.



Source: Adapted from Authority Board Presentation (April 3, 2024)

Figure 5.1 Authority SWSEP Schedule

The City participated in a meeting with the Authority in December 2023 to discuss the potential for the City to participate in the SWSEP and purchase an allocation of this capacity. Therefore, the option to purchase a permanent allocation was included as a future water supply alternative in this WSP. Throughout early 2024, the analyses for this WSP were conducted to compare the cost of the Authority purchase scenario with expansion of the City's RO WTP, as described in Chapter 6. Based on the content of that chapter, the Authority project is anticipated to be more costly to the City than the RO WTP expansion. Therefore, the City elected not to pursue further discussions with the Authority about purchase of a permanent allocation of water through the SWSEP.

During the Authority Board meeting on April 3, 2024, the total customer cost, inclusive of received grant funding received, was reported at $428,049,000 or $23.8/gallon. The SWSEP's 18 mgd of additional supply has been allocated to the Authority's existing customers (see Table 5.1) based on their requests that were pending finalization at the time of this WSP's publication.

Table 5.1 Authority Supply Annual Average Allocations

Customer	Current Allocation (mgd)	Requested SWSEP Allocation (mgd)	Total Current and Requested Allocation (mgd)
Charlotte County	16.100	3.000	19.100
DeSoto County	0.675	1.000	1.675
Manatee County	0.000	0.000	0.000
Sarasota County	15.060	12.000	27.060
City of North Port	2.865	2.000	4.865
Total	**34.700**	**18.000**	**52.700**

Source: Table adapted from Authority Board Presentation (April 3, 2024).

CHAPTER 6 WATER SUPPLY SCENARIOS AND COST ANALYSIS

6.1 Water Supply Scenarios

The City's water demand is projected to reach 7.5 mgd annual average and 12.0 mgd maximum day by 2050. This section delves into two scenarios aimed at meeting these future demands: expanding the existing wellfield and RO WTP or securing a set capacity allocation from the Authority.

6.1.1 Existing Water Supplies and Projected Demand

The annual average and maximum daily projected water demands were analyzed in Chapter 2 to assess their alignment with the City's existing water supplies for future needs. Figure 6.1 and Figure 6.2 illustrate how these projected demands compare to the available supplies.

Both figures depict the capacities of the RO WTP, distinguishing between reliable and redundant capacities. It is assumed that the blending capacity of 0.4 mgd at the RO WTP is operational throughout. The available Shell Creek WTP capacity is illustrated assuming the streamflow is in Block 1, the most restrictive condition, which has occurred 35 percent of the time over the past 8 years. The remaining Shell Creek WTP capacity is identified as unusable due to the MFL withdrawal restrictions.

In Figure 6.1, the analysis of annual average projected demands indicates that the City will consistently require at least one operational skid at the RO WTP. This, coupled with the Shell Creek WTP producing up to the allowable average Block 1 MFL amount with treatment losses, falls short of meeting current demands, necessitating both skids to be operational. This leaves no redundancy in the RO system in case one skid is offline.

Figure 6.2 reflects the available water supplies and projected maximum daily demands, with the Shell Creek WTP capacity at the October MFL limit of 3.1 mgd (factoring in treatment losses). The City requires additional capacity to meet the projected maximum day demand of approximately 10 mgd currently and through the 2050 time period when the maximum day demand is expected to reach 12 mgd.

It is important to note that the Authority was not factored into these figures because it is not a guaranteed water source for the City. However, the Authority will provide water if it is not already committed to other customers.

Overall, these assessments highlight the additional capacity needed for the City's water supply to meet both average and peak demands reliably in the future. Section 6.1.2 will delve deeper into two future water supply options, examining their respective advantages and disadvantages. Subsequent sections will also address the associated costs, providing a comprehensive overview of the considerations involved in planning for the City's water needs.

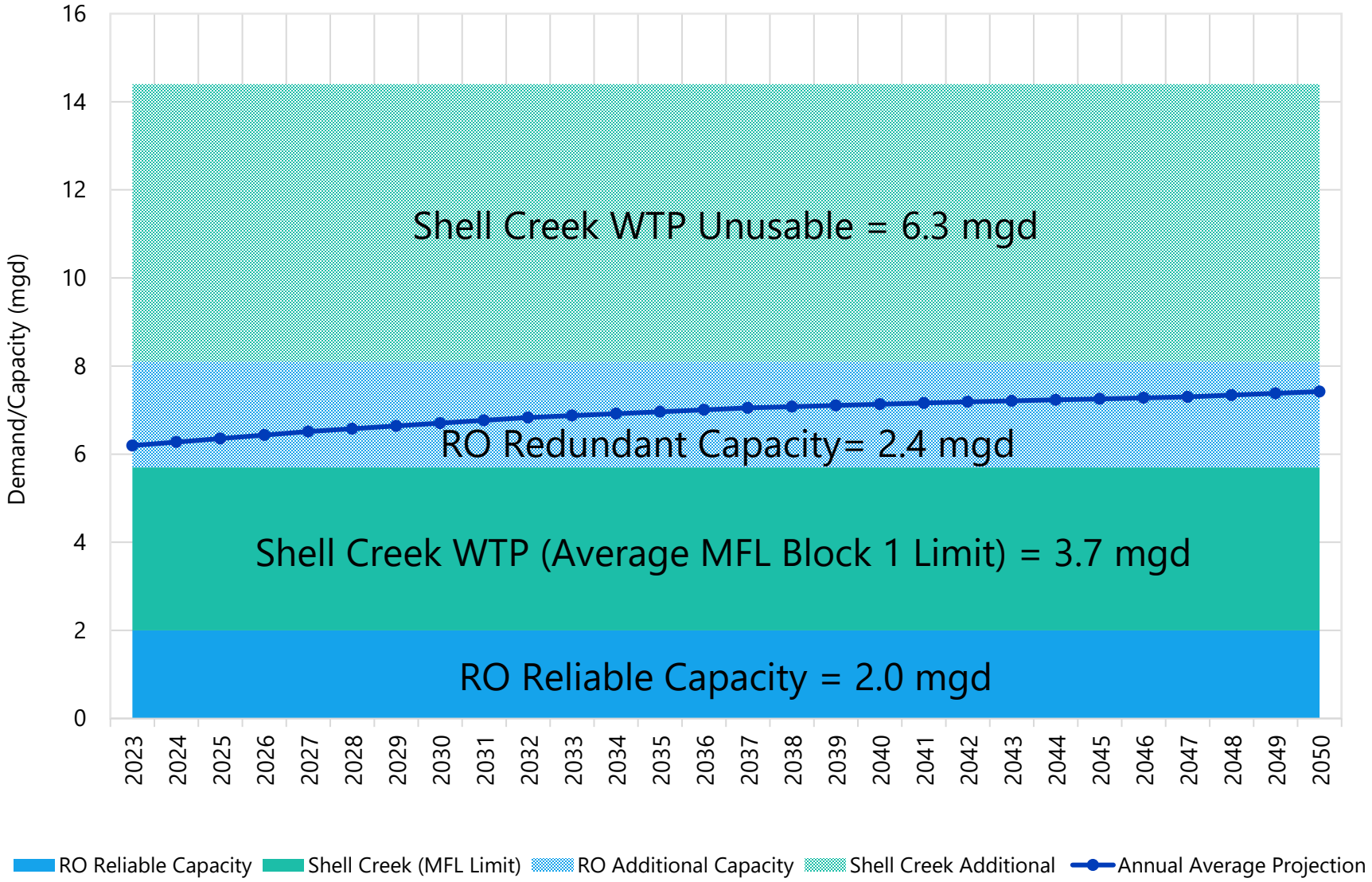


Figure 6.1 Existing Water Supplies and Projected Demands – Annual Average

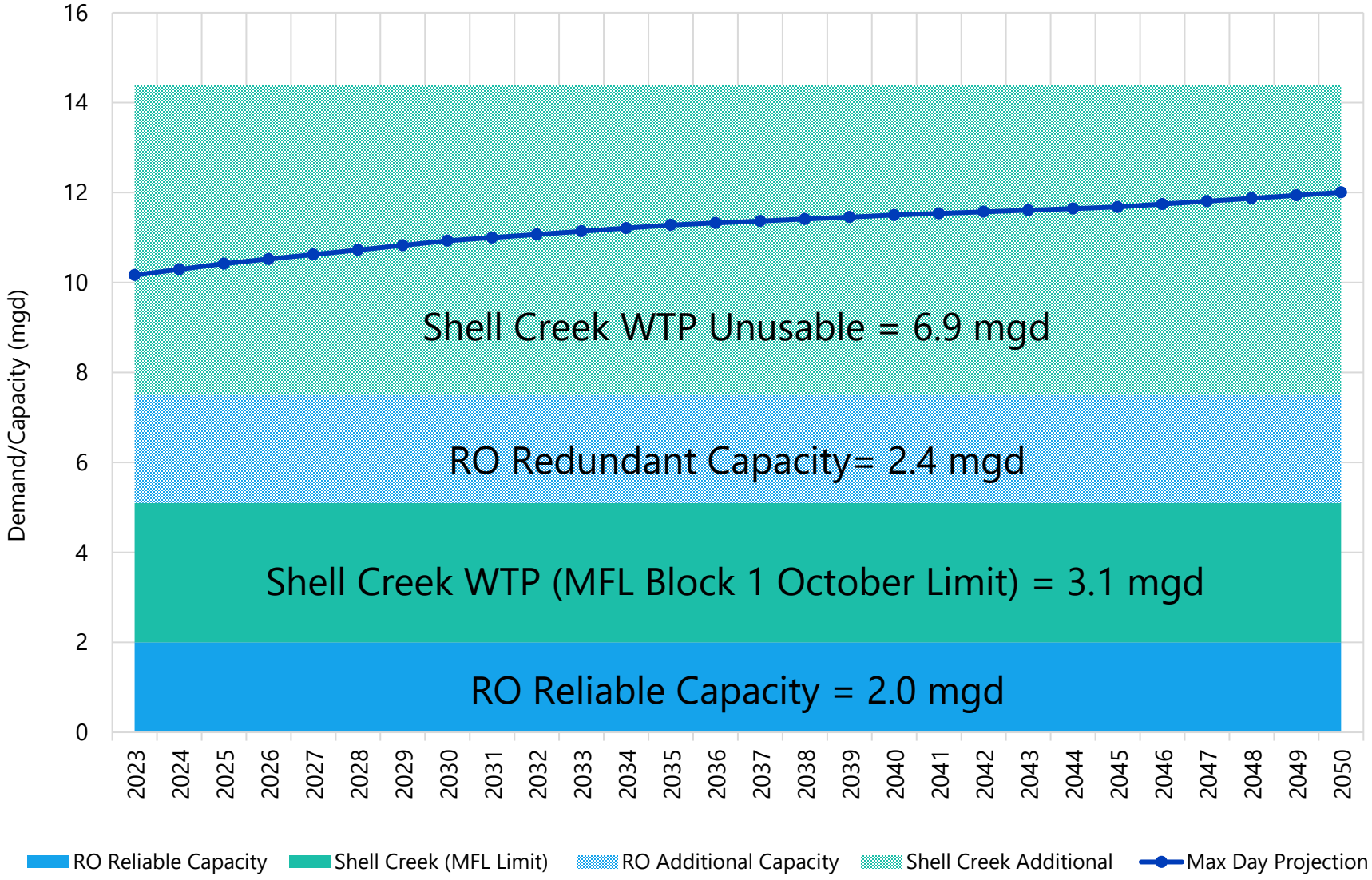


Figure 6.2 Existing Water Supplies and Projected Demands – Maximum Day

6.1.2 Proposed Water Supply Scenarios

The following two scenarios in this section are evaluated on their ability to meet the City's future demands. These scenarios assume the RO WTP's bypass blending is online and functional, the MFL withdrawal limits consider Block 1, and the Shell Creek WTP has been rehabilitated to be a reliable treatment facility and includes 10 percent treatment losses.

6.1.2.1 RO WTP and Wellfield Expansion

The first scenario assumes expanding the RO WTP and wellfield to four skids, achieving a full operational capacity of 9.0 mgd (8 mgd permeate and 1 mgd from bypass blending). Given the City's projected demands, there is an urgent need for the facility and wellfield to undergo design, permitting, and construction to increase capacity and wellfield reliability as soon as possible. Preliminary design work is already planned to begin in 2024 including a preliminary design report for the WTP and wellfield expansion, and final design and specifications for the new onsite wells. The City plans to proceed with drilling of the new wells as soon as possible. The final design phase is anticipated to conclude by early 2026, with construction scheduled until early 2028, at which point the facility would become operational.

Figure 6.3 and Figure 6.4 illustrate the City's water supply sources alongside projected demands under this scenario. According to Figure 6.3, operating the expanded RO WTP with three skids, in conjunction with the Shell Creek WTP capacity in Block 1 of the MFL, will effectively meet annual average demand throughout the planning period.

Figure 6.3 examines the maximum day condition and finds that the fully expanded RO WTP with the Shell Creek WTP operating at its MFL limited state will also be able to meet demand through the planning period. In the event that a skid of the RO WTP is offline, and the October Block 1 limits are in effect, the City would require additional supply. In this event, as the City begins to reach demands exceeding 10 mgd, the City could 1) request water from the Authority if available, 2) potentially use water contained in the City's storage facilities, or 3) implement irrigation restrictions if no Authority or stored water is available. Figure 6.5 illustrates the City's available water sources to meet the projected 2050 maximum day demand at various times throughout Block 1. This chart reflects the reliable capacity of the RO WTP (one skid out of service). With one skid offline, it is estimated that the City would need between 1.2 and 2.2 mgd from alternative sources during these periods.

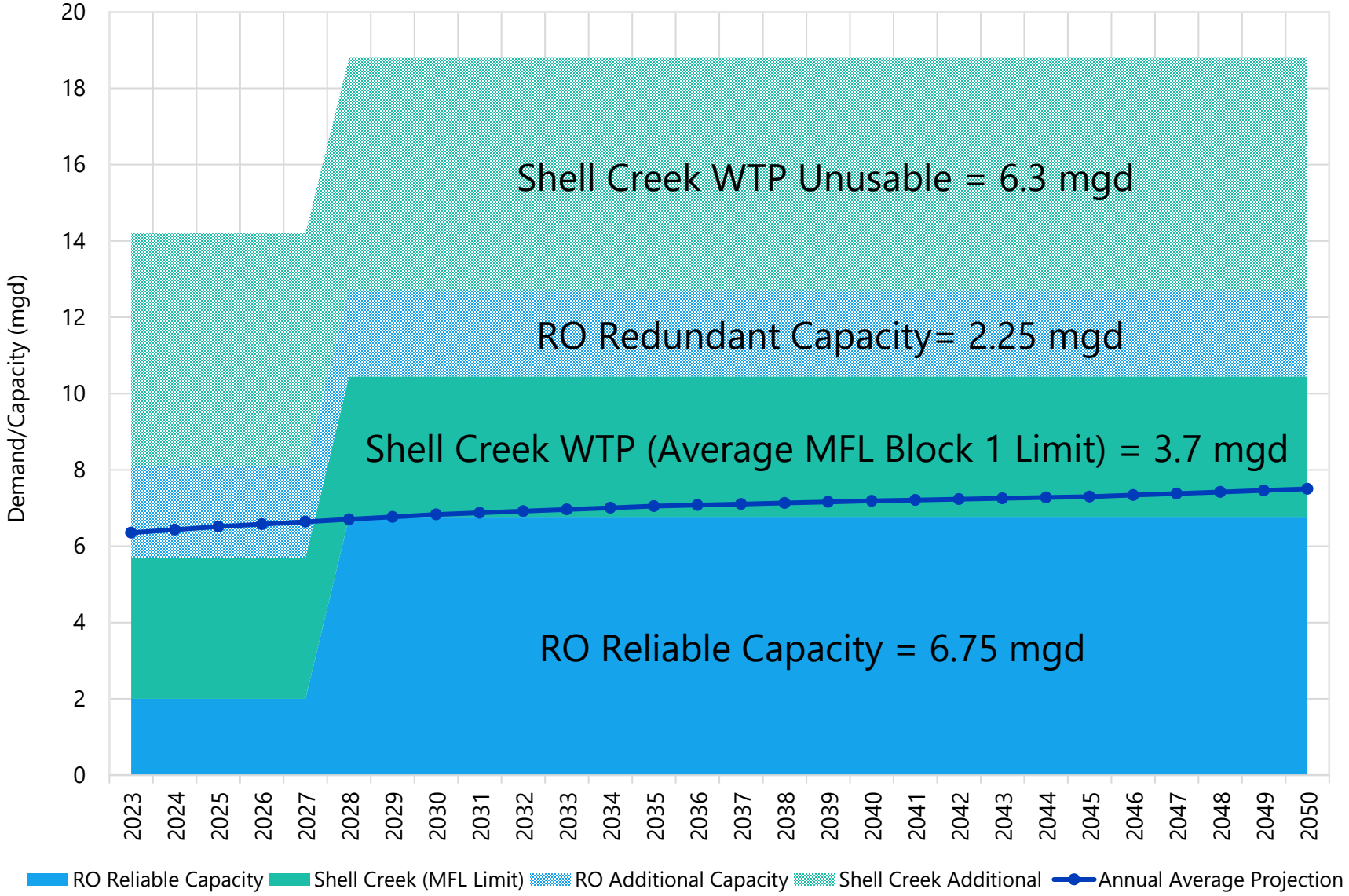


Figure 6.3 RO WTP and Wellfield Expansion Scenario: Water Supplies and Projected Demands – Annual Average

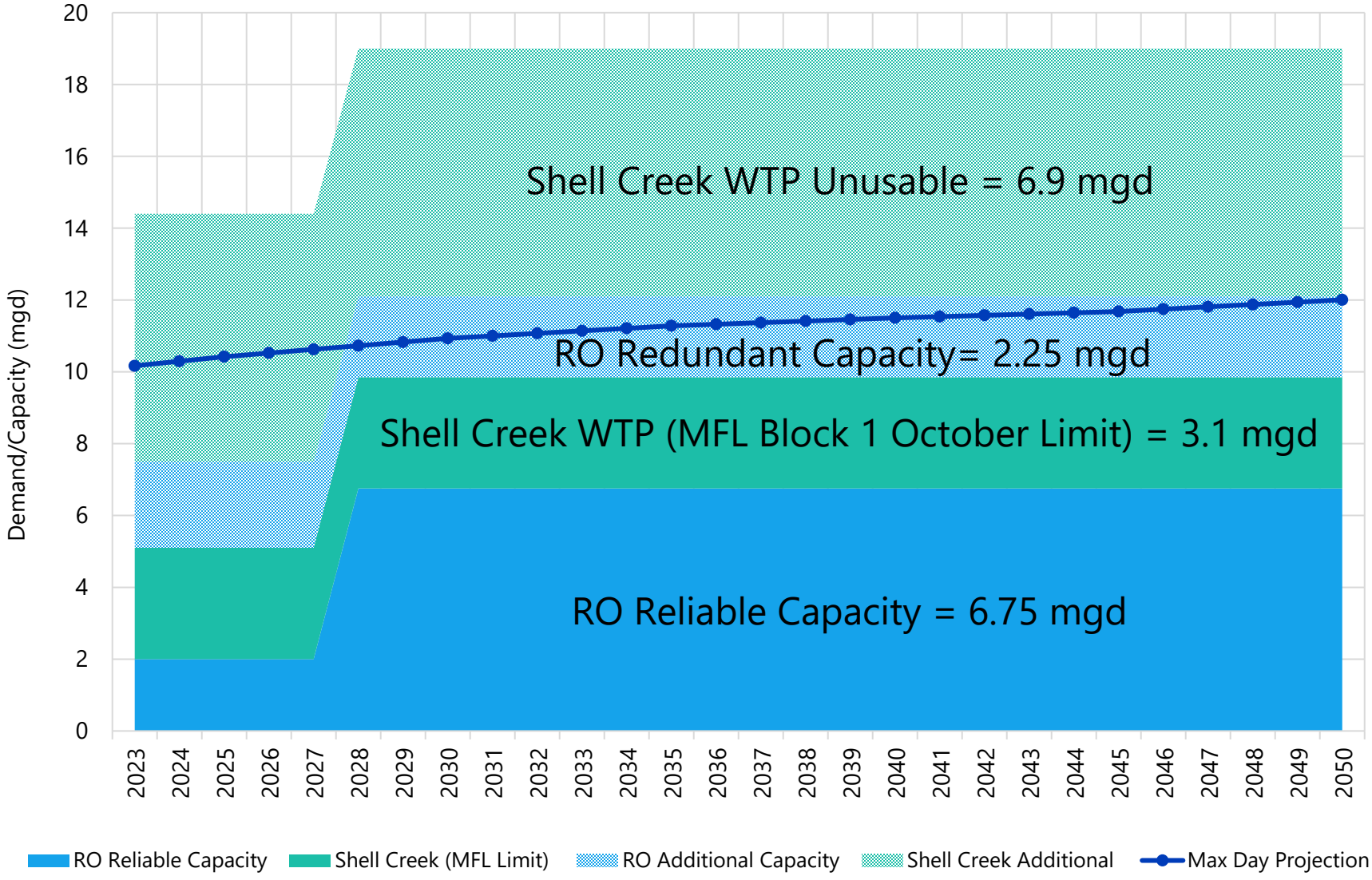


Figure 6.4 RO WTP and Wellfield Expansion Scenario: Water Supplies and Projected Demands – Maximum Day

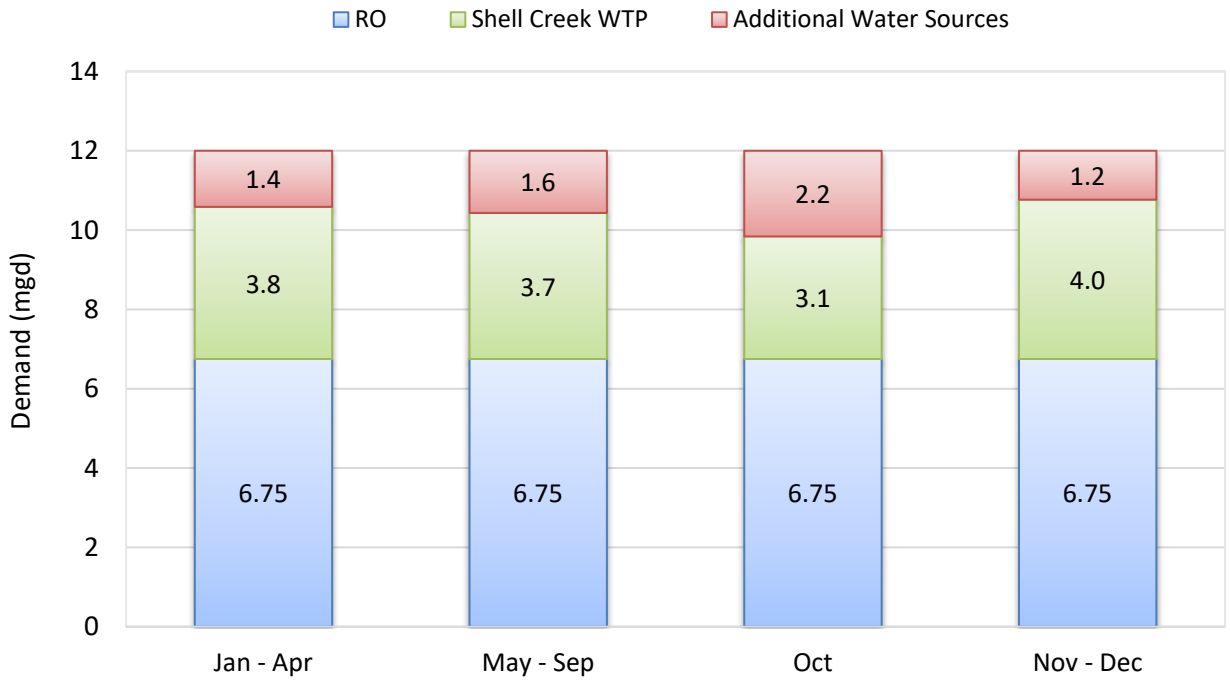


Figure 6.5 RO WTP and Wellfield Expansion Scenario: 2050 Maximum Day Water Sources in Block 1

6.1.2.2 Authority Allocation

The second scenario involves the City obtaining an official allocation of capacity from the Authority. This analysis considers an allocation of 3.3 mgd annual average and 4.6 mgd maximum day basis. These quantities are based on the maximum day quantity needed to meet the projected maximum day demand in 2050, with the 3.3 mgd annual average calculated using the Authority's 1.4 maximum day peaking factor.

The City would enter into an agreement with the Authority, which would involve modifying the existing *Peace River/Manasota Regional Water Supply Authority Master Water Supply Contract*. The City already possesses the necessary infrastructure to accommodate flows from the Authority. The Authority's SWSEP is expected to be completed and operational by early 2028, thereby producing additional capacity for its customers. However, the full yield of the SWSEP will not be available until 2031 due to the filling of the reservoir.

Figure 6.6 and Figure 6.7 illustrate the City's water supply sources alongside projected demands under this scenario. According to Figure 6.6, with the RO WTP operating one skid, the Shell Creek WTP producing at its the average MFL Block 1 amount, and the City receiving the allocated flow from the Authority, the City can effectively meet annual average demand through 2050.

Figure 6.7 analyzes the maximum day conditions and confirms that with the RO WTP operating at full capacity, the Shell Creek WTP operating at its MFL Block 1 limited capacity, and the City using its entire allocation from the Authority, the maximum day demand can be met through the planning period. In the event that a skid of the RO WTP is offline, and the October Block 1 limits are in effect, the City would need to receive additional supply from the Authority.

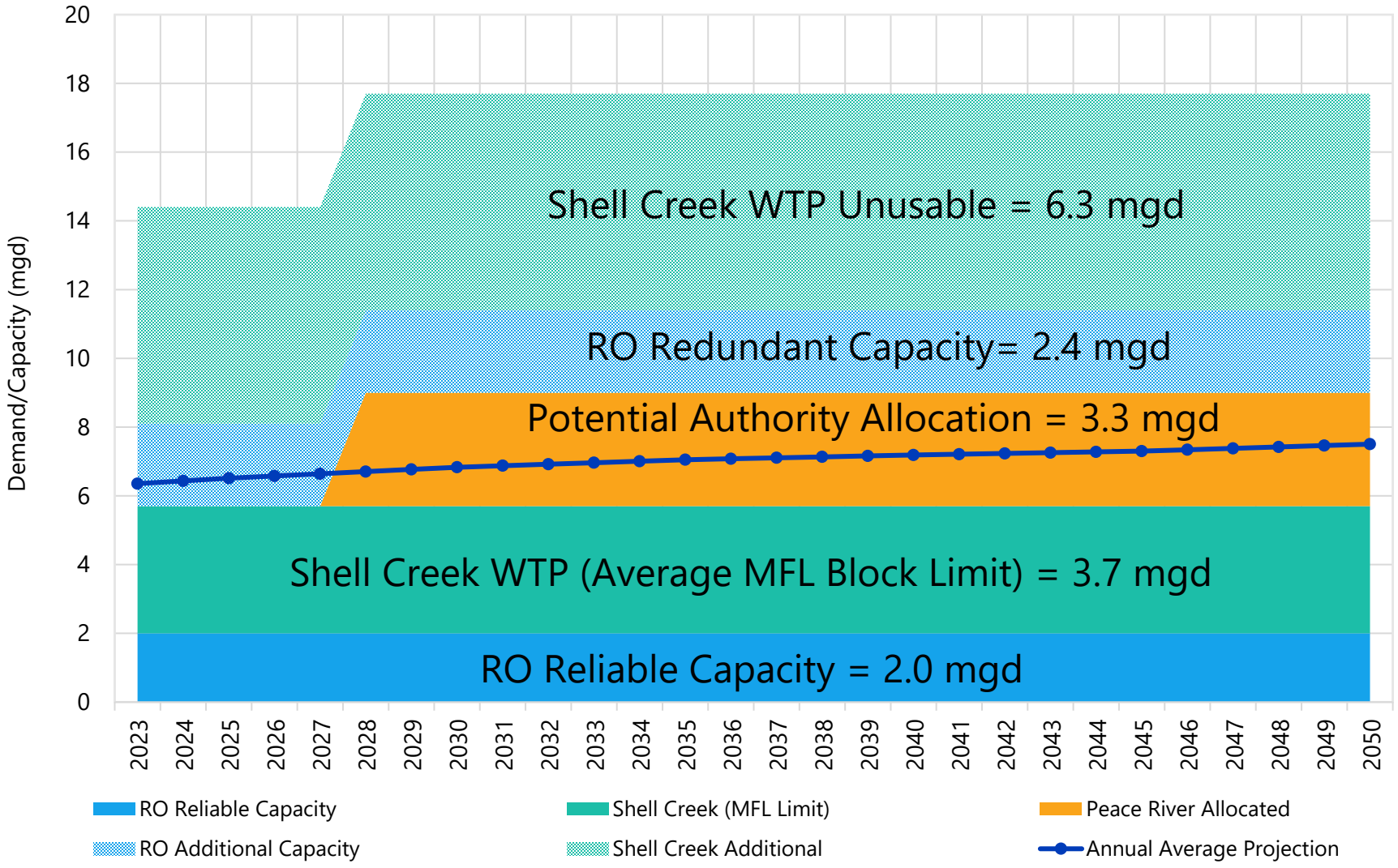


Figure 6.6 Authority Allocation Scenario: Water Supplies and Projected Demands – Annual Average

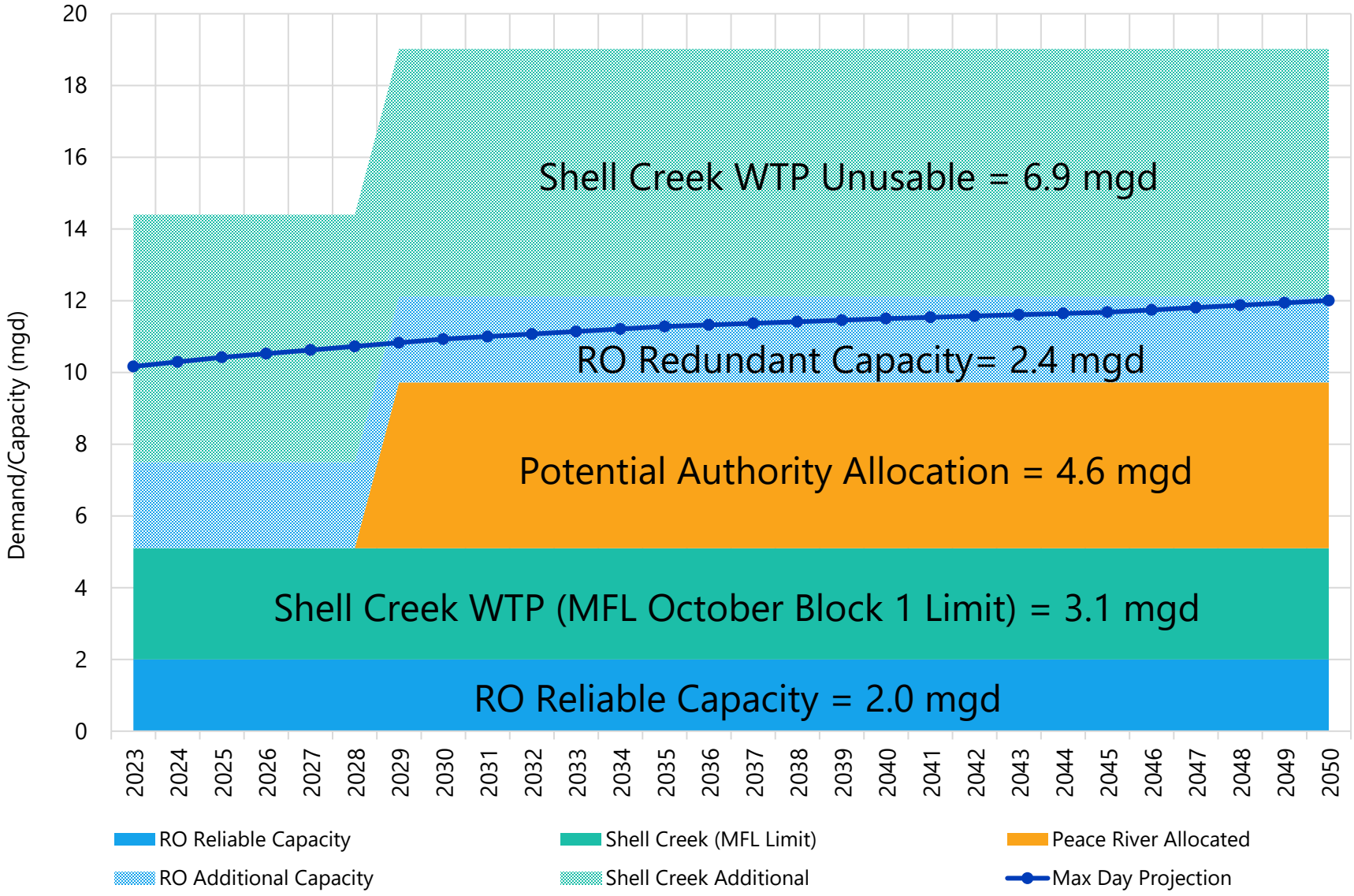


Figure 6.7 Authority Allocation Scenario: Water Supplies and Projected Demands – Maximum Day

6.2 Cost Analysis

Cost estimates for each project alternative are based on conceptual layouts and criteria developed to a planning level of detail. Final project costs will depend on actual market conditions at the time of project implementation, including labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. Consequently, final project costs may vary from the estimates presented in this report.

The following sections document the cost estimating methodology and assumptions used to develop capital and operations and maintenance (O&M) cost estimates for each of the City's potential water supply scenarios.

6.2.1 Cost Estimating Methodology and Assumptions

The level of accuracy for cost estimates varies depending on the level of detail to which the project has been defined. Planning level estimates usually represent a Class 4 or Class 5 level of accuracy, while final plans and specifications present the highest level of accuracy, or Class 1. The American Association of Cost Engineers (AACE) has developed the following guidelines for anticipated cost estimate accuracy based on the type of cost estimate:

Type of Cost Estimate	Anticipated Accuracy
Class 5 (Conceptual)	+100% to -50%
Class 4 (Planning Level)	+50% to -30%
Class 3 (Preliminary Design)	+30% to -15%
Class 2 (50 to 70% Design Completion)	+20% to -10%
Class 1 (Pre-Bid)	+15% to -5%

The cost estimates presented in this WSP are considered Class 5 accuracy level and are presented in 2024 dollars.

This section outlines the assumptions supporting the cost analysis and evaluation of net present value.

Project Life: 2025 through 2050

Financing would start in 2025, with the project life costs considered through the end of the planning period, 2050. Note, for both scenarios the project life costs would go past the 2050 planning period. For the RO WTP and Wellfield Expansion scenario, the project would have a total debt service extending over a 30-year period, to 2054. For the Authority Allocation scenario, the project has an estimated debt service that will end in 2064.

Inflation: NA

While inflation will affect the purchasing power of future cash flows, the effect is expected to be equivalent across both water supply scenarios being evaluated. The chosen approach may need to be further refined in later stages to account for projected inflation rates when estimating absolute costs.

Discount Rate: 9.0 Percent

The discount rate methodology considered was the Build-Up Method. This method constructs the discount rate by considering a normalized risk-free rate (return expected from an investment with minimal risk) estimated as 3.50 percent, and an equity risk premium (additional return demanded by investors for holding equities), estimated at 5.50 percent. By combining these elements, the discount rate considered for this evaluation was 9.00 percent (Kroll, 2024).

Escalation Rate: 4.0 Percent

Several components in the cost analysis were escalated. These include the O&M costs and the Authority charges. A 4 percent escalation rate was applied.

RO WTP Recovery Rate: 80 Percent

Chapter 3 discussed the results of the blending analysis to evaluate the blended water TDS. The chapter presented two possible scenarios considering the RO recovery rate at 80 percent and alternative scenarios with a recovery rate of 85 percent. The current cost analysis considers the system recovery at 80 percent (no additional changes or modifications to the existing RO WTP equipment and operation).

6.2.2 O&M and Water Use Costs

O&M costs include expenses associated with electricity, labor, chemicals, maintenance, parts, and other City overhead costs directly related to water treatment. Costs for the Shell Creek WTP and RO WTP were estimated based on 2023 costs provided by the City. The 2023 O&M costs are presented in Table 6.1.

Table 6.1 City O&M Costs

	Shell Creek WTP	RO WTP	Both Facilities
Chemicals	772,500	$302,800	$1,075,300
Power	$210,300	$489,200	$699,500
Salary(1)	$494,800	$339,300	$834,100
Total	$1,477,700	$1,131,300	$2,609,000
Total Annual Gallons Treated	1,504,381,200	1,031,584,300	2,535,965,500
Total Cost/1000 Gallons	**$0.98**	**$1.10**	$1.03

Notes:
(1) Salary costs are prorated based on the flow treated by each facility.
General Note: Values shown are for 2023.

The $0.98/1,000 gallons (gal) and $1.10/1,000 gal cost will be annually escalated and used for O&M costs related to the Shell Creek WTP and RO WTP, respectively, to determine the net-present value amount per scenario.

Additionally, there are water use costs associated with purchasing water from the Authority. There are two costs associated with this scenario:

- **Base Rate Charge**: This charge is a fixed fee that customers pay based on the amount of water allocated to them. It is independent from the actual amount of water used and covers operational costs, maintenance of infrastructure, and other fixed expenses related to the Authority's water supply system. The last updated value of $1.41/1,000 gal is used for this analysis and escalated annually.
- **Water Use Charge**: This charge is variable and directly correlates to the amount of water received from the Authority. The last updated value of $1.13/1,000 gal is used for this analysis and escalated annually.

6.2.3 Capital Costs

6.2.3.1 RO WTP and Wellfield Expansion Scenario

The original RO WTP design allocated space for future membrane skids, pre-treatment filters, and a degasification unit. This approach, combined with sizing the chemical dosing units, contact chamber, and deep injection well for ultimate flow capacity, eliminates the need for civil construction during an expansion. The expansion will primarily involve acquiring and connecting additional equipment and construction of additional wells. A detailed list of the necessary infrastructure and equipment for expansion of the RO WTP to 8 mgd (9 mgd with bypass blending) is provided in Table 6.2.

Table 6.2 RO WTP Expansion Requirements

Equipment	Details
Production Wells	5 wells with design capacity of 8,710 gpm (1.25 mgd)
Day Tanks	2 tanks required for chemical dosage (1 for caustic and 1 for sulfuric acid)
Cartridge Filter	1 additional cartridge filter (5 microns, 40 inches)
High Pressure Feed Pumps	2 additional high pressure pumps (1 for each new membrane skid)
RO Skids	2 additional RO skids, 2 stages, 2.0 mgd permeate
Degasifier	1 additional degasifier with centrifugal fan blower, capacity for 4.5 mgd
RO Transfer Pump	1 additional vertical turbine pump (1,200 rpm, 30 hp) for RO transfer
Finished Water Transfer Pump	1 additional vertical turbine (1,200 rpm, 100 hp) for finished water transfer
Additional Piping	Wellfield piping and facility piping

In order to facilitate capital planning, cost estimates have been separated into RO WTP expansion costs (Table 6.3) and Wellfield expansion costs (Table 6.4). The sum of the total costs is presented in Table 6.5.

The RO WTP costs include equipment, additional piping and connections, electrical installation, electrical, instrumentation and controls (EI&C), and engineering contingency. The equipment cost was based on quotes obtained from vendors between March and May 2024, whereas piping, electrical installation, and EI&C costs were estimated based on percentages of the total project with similar sizing. For example, the costs for electrical Installation are estimated to be 25 percent of the RO related equipment cost.

After calculating the direct cost subtotal, general conditions (GC) were estimated at 10 percent to cover costs for site management, utilities, and temporary structures. A contingency of 20 percent was then applied to the combined subtotal and GC, resulting in the estimated direct cost (EDC). The general contractor overhead and profit was assumed at 12 percent of the EDC. Sales tax was assumed at 7 percent of 70 percent of the subtotal, given some of the project components can be exempt from tax. Once the total opinion of construction cost was calculated, additional engineering, legal, and administrative fees, were added (15 percent) to cover professional services, permitting, and project management.

For the wellfield costs, a similar calculation method was used. However, the general conditions percentage (10 percent) was applied only to the subtotal of wellhead and piping, and the taxable percentage of the subtotal was estimated to be 50 percent. It should be noted that the costs presented include all five new wells, including two wells that will need to be offsite of the City's property, in order to provide sufficient raw water for the full RO WTP expansion. The City may elect to separate the wellfield costs into two projects, one for the onsite wells and a subsequent project for the offsite wells.

Table 6.3 RO WTP Facility Expansion – Capital Cost Estimate

Description	Qty	Unit Price	Price
Sulfuric Acid Day Tank (200-gal, Polyethylene shell, 316 SS Hardware)	1	$1,650	$1,650
Caustic Storage Day Tank (300-gal, Polyethylene shell, 316 SS Hardware)	1	$1,575	$1,575
Drum Pump (TEFC, 3,450 rpm, 1/4 hp)	1	$2,213	$2,213
RO Skid (Two stages, Two skids, 2.00 mgd permeate each), including:			$5,040,000
▪ One Cartridge Filter (SS housing, 5 microns, 40 inches length, 48-inch diameter)			
▪ Two High Pressure Feed Pumps (Vertical Turbine,1,800 rpm, 350 hp, VFD)			
▪ RO Membranes, pressure vessels, skid frame, piping and valving for two skids			
Degasifier (10.5 feet diameter, 28 feet high, 1 Centrifugal Fan blower 15,000 scfm, 30 hp)	1	$630,000	$630,000
RO Transfer Pump (Vertical Turbine, 1,200 rpm, 30 hp)	1	$186,000	$186,000
Finished water transfer pump (Vertical Turbine, 1,200 rpm, 100 hp)	1	$210,000	$210,000
Additional piping and connections (5% Equipment cost)			$304,000
Electrical (25% RO WTP subtotal)			$2,500,000
Instrumentation and Controls (12% RO WTP subtotal)			$1,200,000
		Subtotal	**$10,075,000**
		General Conditions (GC) (10% Subtotal)	$1,007,500
		Contingency (20% Subtotal + GC)	$2,217,000
		Estimated Direct Cost (EDC)	**$13,300,000**
		General Contractor OH and Profit (12% EDC)	$1,596,000
		Sales Tax (Assumed 7% of 70% of Subtotal)	$494,000
		Total Opinion of Construction Cost	**$15,390,000**
		Engineering, Legal, and Admin. Fees (15%)	$2,309,000
		TOTAL	**$ 17,699,000**

General Note:
All costs presented are considered Level 5 conceptual costs consistent with Estimate Classes defined by AACE, which vary based on the level of design completion and include associated typical published accuracy ranges. In providing opinions of probable construction cost and schedules for potential projects, Carollo makes no warranty that the actual project costs or schedules will not vary from Carollo's opinions, analyses, projections, or estimates.
Abbreviations: SS – stainless steel; VFD – variable frequency drive; scfm – standard cubic feet per minute; OH – overhead

Table 6.4 RO WTP Wellfield Expansion – Capital Cost Estimate

Description	Qty	Unit Price	Price
Production well with design capacity of 870 gpm (1.25 mgd) Drilling, Development, Equipment	5	$938,000	$4,690,000
Wellhead – 5 new wells (civil, mechanical, E&IC)	5	$760,000	$3,800,000
Wellhead – 2 for existing drilled wells not yet in service (civil, mechanical, EI&C)	2	$760,000	$1,520,000
Wellfield Piping			$2,350,000
		Subtotal	**$12,360,000**
		General Conditions GC (10% of Wellhead and Piping)	$767,000
		Contingency (20%)	$2,625,000
		Estimated Direct Cost (EDC)	$15,752,000
		General Contractor OH and Profit (12% of Wellhead and Piping)	$1,215,000
		Tax (Assumed 7% of 50% of Subtotal)	$433,000
		Total Opinion of Construction Cost	**$17,400,000**
		Engineering, Legal, and Admin. Fees (15%)	$2,610,000
		TOTAL	**$20,010,000**

General Note:
All costs presented are considered Level 5 conceptual costs consistent with Estimate Classes defined by AACE, which vary based on the level of design completion and include associated typical published accuracy ranges. In providing opinions of probable construction cost and schedules for potential projects, Carollo makes no warranty that the actual project costs or schedules will not vary from Carollo's opinions, analyses, projections, or estimates.

Table 6.5 RO WTP and Wellfield Expansion – Total Capital Cost

Description	Cost
RO WTP Facility Expansion	$17,699,000
Wellfield Expansion	$20,010,000
TOTAL	**$37,709,000**

6.2.3.2 Authority Allocation Scenario

Acquiring an allocation from the Authority is not expected to necessitate significant new infrastructure for the City; rather, it primarily involves understanding the financial structure and associated costs of such an initiative.

As detailed in Chapter 5, the Authority is currently in the process of designing the SWSEP, which will add an additional capacity of 18 mgd on an annual average basis. The latest capital cost estimate for this project is $23.8 million per MG. With a 3.3 mgd allocation, the City would incur an estimated capital cost of approximately $78.54 million. The amortized annual debt service for this scenario is provided in Appendix B.

6.2.4 Net Present Value and Scenario Comparison

Net present value analyses were performed for both scenarios to account for lifecycle costs considering O&M costs as well as the time value of money. Costs incurred at different points in time can be compared using the net present value to account for the economic return that could be earned on funds in their next best alternative use (e.g., the funds could be earning interest). Adjusting for the time value of money is known as discounting. The real discount rate is approximately the interest rate minus the inflation rate. Thus, the real discount rate reflects only the opportunity value of time.

A real discount rate of 9.0 percent was chosen for the analysis presented herein. The capital costs (expressed in 2024 dollars) were divided over the planning period (e.g., 2025 to 2050) based on the debt service amortization schedule and then annually discounted to the present using the real discount rate. O&M costs for the next 26 years were estimated based on the average annual demand projected during each year. These costs were escalated annually by 4 percent with each annual amount discounted to the present value. The sum of the present value O&M costs over the period was taken to obtain the total 26-year O&M cost. The total 26-year cost for each scenario was estimated by adding the net present value capital cost and the net present value of the 26-year O&M costs. Table 6.6 provides these net present values.

Table 6.6 Scenario Net Present Value Summary

Scenario	Net Present Value of Capital Costs	Net Present Value of O&M and Water Use Costs	Total Net Present Value
RO WTP and Wellfield Expansion	$26,548,000	$44,109,000	**$70,657,000**
Authority Allocation	$33,074,000	$69,832,000	**$102,906,000**

Notes:
(1) This net present value analysis utilizes a 9% discount rate and assumes annual escalations of 4% on O&M and water use costs. Costs are evaluated in 2024 dollars, with the base year set as 2025 through the lifecycle's conclusion in 2050.

Of the two scenarios, the RO WTP and wellfield expansion shows the lowest net present value at approximately $70.66 million, while the Authority allocation scenario results in a net present value of $102.91 million. It is important to note that this net present value analysis did not cover the entire expected duration of capital costs for both projects. Based on the annual debt service provided for the Authority's SWSEP, the City would be responsible for these expenses until 2064. This extends a decade longer than anticipated if the City opts for a 30-year bond for the RO WTP project. Therefore, the Authority allocation scenario is likely to incur higher costs for the City compared to what is indicated by these values alone.

The recommendation is for the City to proceed with the first scenario: the RO WTP and wellfield expansion project. This option not only presents lower expected costs, both in terms of O&M and capital expenditures, but also benefits from the facility's original intended design for eventual expansion.

6.2.5 Capital Improvements Program Projects

Table 6.7 shows the CIP project recommended to start or continue as water supply projects for the City. Costs are based on 2024 dollars and should be escalated for future year budgeting.

The Wellfield Remediation Project (RO-WELL) is already planned in the City's CIP and serves to address limitations in the existing wellfield. The Shell Creek WTP Rehabilitation Project (WTP-EV) is also already included in the City's CIP with an estimated cost of $34.8 million. This cost should be refined based on the scope of the project decided upon after discussion and evaluation with the progressive design-build team.

Costs for the new RO WTP Wellfield Expansion Project (WTP-ROX) are split into multiple years to account for the project phasing and engineering, design, and construction.

Table 6.7 Recommended Capital Improvement Plan

Project Code	Project Title	Project Description	Prior Years	Cost per Fiscal Year				Total
				2025	2026	2027	2028	
WTP-ROX	RO WTP Wellfield Expansion	The RO WTP was originally built in 2020, featuring a groundwater wellfield and RO treatment for 4 mgd operation. The initial construction allowed for future expansion up to 4 mgd. This project aims to enhance water supply by developing additional groundwater sources and installing additional 4 mgd RO processing equipment. Upon completion, the project will expand the facility's capacity by an additional 4 mgd, effectively doubling its current capacity. Beginning in 2025, the project will commence with the design and drilling of new wells for the onsite wellfield expansion. From 2026 to 2028, the focus will shift to designing and constructing the aboveground facilities for the expanded wellfield and RO treatment, including the installation of two additional wells anticipated to be located offsite.		$4,300,000	$26,200,000	$7,200,000		$37,700,000
WTP-EV	Shell Creek WTP Rehabilitation (Filters, SCU)	Progressive design-build project for rehabilitation and construction of the surface water treatment facilities at the Shell Creek WTP. The scope of the design-build contract will include the rehabilitation of existing facilities/buildings and construction of new facilities identified in the design criteria package.	$4,823,000	$30,000,000				$34,823,000
RO-WELL	Wellfield Remediation	This project will enhance the performance of groundwater Wells 3, 4, and 5. Wells 3 and 5 are currently experiencing decreased production, and acid treatment is recommended to improve their output. Well 4 has shown an increase in TDS, and a back plug operation is proposed to isolate the zone with elevated TDS. This work is currently ongoing. During Fiscal Year 2026 and 2027, funds are allocated for well services to address other potential reductions in well production. Should any well experience decreased output, it will undergo evaluation for rehabilitation.	$1,184,429		$500,000	$500,000		$2,184,429
		TOTAL	**$6,007,429**	**$34,300,000**	**$26,700,00**	**$7,700,000**		**$74,707,429**

CHAPTER 7 SUMMARY AND CONCLUSIONS

This WSP provides analysis, observations, and recommendations to address increased water demand and water source availability. Current and potential water supply sources are evaluated to promote a reliable water supply through 2050. Historical water usage patterns, projections of future demands, and an evaluation of both existing and potential water supply options comparing surface water supply, groundwater supply, and acquiring reliable water supply from the Peace River Manasota Regional Water Supply Authority were analyzed holistically to produce a plan for meeting water needs through 2050.

7.1 Population Projections

The City's population has been rapidly increasing, with a 3.9 percent growth between 2021 and 2022, making it the fifth fastest-growing metro area in the U.S. This growth directly impacts water demand, which has also seen a significant rise. Historical data shows an increase from 4.65 mgd in 2004 to 6.35 mgd in 2023 for annual average demand, with maximum day demands reaching up to 9.52 mgd. Comparing 2022 to 2023, the City saw a 15.7 percent increase in annual average demand.

To forecast future scenarios, several methods were employed, including linear regression analysis of historical water demand, population estimates from the BEBR, and parcel population data from the SWFWMD. These projections indicate that by 2050, the City's service area population is projected to reach 52,000 residents, with corresponding water demand forecasted at 7.50 mgd for annual average demand and up to 12.0 mgd for maximum day demand.

These population and water demand projections underscore the need for a plan to provide a sustainable water supply capable of meeting the escalating demand driven by the City's rapid development.

7.2 Groundwater Supply

The City's current water management strategy includes conjunctive use of groundwater from the UFA and surface water from the Shell Creek Reservoir with limits of 8.088 mgd annual average and 11.728 mgd for peak month daily quantities under WUP No. 20000871.014.

The RO WTP with a permitted design treatment capacity of 4.5 mgd (4.0 mgd of RO water with the capability of blending up to 0.5 mgd of filtered groundwater) plays a crucial role in meeting current water demands and quality goals. This WSP assumed a reliable capacity of 4.4 mgd based on TDS blending considerations with the Shell Creek WTP. Groundwater is treated through an RO treatment process. Designed with future expansion in mind, the facility layout can accommodate additional membrane skids, pre-treatment filters, and degasification units, expanding the total treatment capacity to 9.0 mgd.

A blending analysis assessed the feasibility of meeting projected maximum day demand of 12.0 mgd while maintaining TDS below the 450 mg/L goal. Results indicate that if the City does not expand the RO facility and instead were to rely on Shell Creek WTP, the City will not be able to meet an average annual demand of 7.5 mgd and TDS of 450 mg/L. For the maximum daily demand, the City could achieve 490 mg/L by using 4.0 mgd of RO and 8.0 mgd of Shell Creek WTP. This does not meet Charlotte County's quality goal of 450 mg/L, but it is below the secondary MCL of 500 mg/L. The maximum quantity that could be produced with TDS below 450 mg/L is 10.1 mgd (4.0 mgd from RO WTP and 6.1 mgd from the Shell Creek WTP, with no groundwater bypass at the RO WTP).

Considering these findings, this WSP recommends expanding RO WTP to 9.0 mgd increasing the wellfield capacity to 11.0 mgd. The wellfield expansion will use existing active wells, inactive wells, and proposed new wells, with two offsite production wells adding 1,740 gpm to reach a total capacity of 13.78 mgd. Placing these additional wells on the adjacent Bermont Road Partnership property optimizes pipeline costs and maintenance access, given the 1,250-foot separation requirement from existing facilities.

An ongoing concern involves maintaining brackish wellfield quality during increased pumpage rates, requiring the full implementation of the WFMP. Continued monitoring and refinement of the WFMP are recommended.

Currently, the RO concentrate is disposed through a DIW. The DIW system at the Shell Creek RO WTP is authorized by the FDEP to a maximum injection rate of 3.97 mgd and can accept additional injectate, supporting the RO WTP's expansion needs. While DIW failures are uncommon, a DIW failure would result in a RO WTP shut down, and the Shell Creek WTP and storage may not be sufficient to meet the demand. Therefore, it is recommended to design, permit, and construct a secondary DIW at Shell Creek RO WTP or interconnect the Shell Creek DIW system with the City's WWTP DIW system.

7.3 Surface Water Supply and MFL Impacts

The Lower Shell Creek Reservoir is subject to MFL restrictions. The MFL, implemented in 2021, significantly impacts the City's ability to withdraw water. The City, based on the block and period in the year, can only withdraw up to a certain quantity of water from the Lower Shell Creek. The Shell Creek WTP, with a reliable capacity of 3.1 mgd due to treatment losses and MFL Block 1 limitations, requires rehabilitation to ensure continued functionality. The City faces limitations particularly during low flow periods (Block 1), where the most restrictive conditions apply.

Due to stricter MFL conditions, withdrawals have decreased; for example, the City withdrew 12 percent less water from Lower Shell Creek from 2020 to 2023 despite a 26 percent increase in annual average demand. Projections for 2050 indicate the need for additional water sources during peak demands and low flow conditions, with estimated additional water needs ranging from 3.8 to 4.5 mgd. The two scenarios considered to meet future demands include increasing the RO WTP capacity to 9.0 mgd or purchasing water from the Authority. Regardless of scenario, it is recommended that the Shell Creek WTP be rehabilitated to achieve a reliable capacity of 6.0 mgd.

7.4 Authority Supply

Purchasing water from the Authority is a viable option. The City has historically relied on the Authority for water during emergencies and peak demand periods. The Authority has developed the Regional Integrated Loop System, including Phase 1A and Phase 1 transmission pipelines linking the Authority's distribution system with the City's system. The Interlocal Agreements between the two entities govern water exchange and operational procedures, allowing for a reliable "ready-to-serve" system.

The SWSEP, approved in April 2024, includes the PR3 Project and the PRF Expansion Project, adding 18.0 mgd annual average daily yield. For the City to rely on the Authority, it is estimated that the City be allocated an Authority supply of approximately 3.3 mgd to meet projected 2050 demands, with a maximum day allocation of 4.6 mgd.

7.5 Cost Evaluation and Comparison

The WSP compared the costs of two scenarios to meet the City's projected 2050 water demands:

1. Expanding the existing RO WTP and wellfield.
2. Securing allocated capacity from the Authority.

The cost estimates for each scenario were developed using conceptual layouts and planning-level criteria. These estimates are considered Class 5 accuracy level, with an anticipated accuracy range of +100 percent to -50 percent. The evaluation period extends from 2025 to 2050, using a real discount rate of 9.0 percent to account for the time value of money. The analysis also accounted for O&M costs and water use charges, which were escalated at a rate of 4 percent annually. This cost evaluation allowed a detailed comparison of the financial implications of each scenario. Table 7.1 summarizes the overarching cost components for each scenario.

Table 7.1 Cost Comparison between Scenarios

	RO WTP and Wellfield Expansion	Authority Allocation from SWSEP
Total Capacity	9.0 mgd (8.0 mgd permeate and 1.0 mgd from bypass blending).	3.3 mgd annual average and 4.6 mgd maximum day basis.
Capital Costs	▪ RO WTP Facility Expansion: $17.70 million ▪ Wellfield Expansion: $20.01 million Total: $37.71 million	Total: $78.54 million
O&M Costs	Estimated based on 2023 data, escalated annually.	Includes base rate and water use charges, escalated annually.
26-Year Net Present Value (NPV)	$70.66 million	$102.91 million
Implementation	Preliminary and final design phases from 2025 to 2026, with construction completion by early 2028.	New capacity operational by 2028, with full yield available by 2031.

Abbreviations: NPV – net present value

The RO WTP and Wellfield Expansion scenario offers a lower total NPV compared to the Authority Allocation scenario. The scalability of the RO WTP's design and lower operational costs make it a more cost-effective solution. In contrast, the Authority Allocation, while providing substantial additional capacity, will result in higher initial and ongoing costs and depend on external agreements and factors outside of the City's control.

7.6 Recommendations

Overall, the CIP projects recommended for initiation or continuation as vital water supply endeavors for the City:

1. **RO WTP and Wellfield Expansion Project (WTP-ROX)**: Costs for this expansion project are spread across multiple years to accommodate phased engineering, design, and construction, with the overall project estimated at $37.7 million.
2. **Shell Creek WTP Rehabilitation Project (WTP-EV)**: Already a part of the City's CIP, this project is estimated at $34.8 million. This cost estimate will be further refined based on discussions and evaluations with the progressive design-build team to determine the project's scope.
3. **Wellfield Remediation Project (RO-WELL)**: This project is already included in the City's CIP to address limitations in the current wellfield infrastructure.

The recommended water supply projects summarized in Table 7.2 will allow the City to continue serving its customers with reliable water supply while managing costs effectively and providing sustainable infrastructure development.

It is strongly recommended that the City move forward with the RO WTP and Wellfield Expansion project. This option not only meets the MFL requirements but is also the most cost-effective solution in terms of operational costs and initial capital expenditures. Additionally, the existing design of the facility allows for future expansion, enhancing its long-term viability. Moreover, this option allows for a swift implementation schedule, which aligns with the urgent demand forecasts.

Figure 7.1 provides a preliminary implementation schedule for this scenario.

In conclusion, the analysis and projections outlined in this WSP underscore the need for strategic planning to secure a sustainable water supply through 2050. Expanding the RO WTP and wellfield is a cost-effective and scalable solution for the City to fulfill its future water demands and foster sustained growth and development.

Table 7.2 Recommended Capital Improvement Plan

Project Code	Project Title	Project Description	Prior Years	Cost per Fiscal Year				Total
				2025	2026	2027	2028	
WTP-ROX	RO WTP and Wellfield Expansion	The RO WTP was originally built in 2020, featuring a groundwater wellfield and RO treatment for 4 mgd operation. The initial construction allowed for future expansion up to 4 mgd. This project aims to enhance water supply by developing additional groundwater sources and installing additional 4 mgd RO processing equipment. Upon completion, the project will expand the facility's capacity by an additional 4 mgd, effectively doubling its current capacity. Beginning in 2025, the project will commence with the design and drilling of new wells for the onsite wellfield expansion. From 2026 to 2028, the focus will shift to designing and constructing the aboveground facilities for the expanded wellfield and RO treatment, including the installation of two additional wells anticipated to be located offsite.		$4,300,000	$26,200,000	$7,200,000		$37,700,000
WTP-EV	Shell Creek WTP Rehabilitation (Filters, SCU)	Progressive design-build project for rehabilitation and construction of the surface water treatment facilities at the Shell Creek WTP. The scope of the design-build contract will include the rehabilitation of existing facilities/buildings and construction of new facilities identified in the design criteria package.	$4,823,000	$30,000,000				$34,823,000
RO-WELL	Wellfield Remediation	This project will enhance the performance of groundwater Wells 3, 4, and 5. Wells 3 and 5 are currently experiencing decreased production, and acid treatment is recommended to improve their output. Well 4 has shown an increase in TDS, and a back plug operation is proposed to isolate the zone with elevated TDS. This work is currently ongoing. During Fiscal Years 2026 and 2027, funds are allocated for well services to address other potential reductions in well production. Should any well experience decreased output, it will undergo evaluation for rehabilitation.	$1,184,429		$500,000	$500,000		$2,184,429
		TOTAL	**$6,007,429**	**$34,300,000**	**$26,700,00**	**$7,700,000**		**$74,707,429**

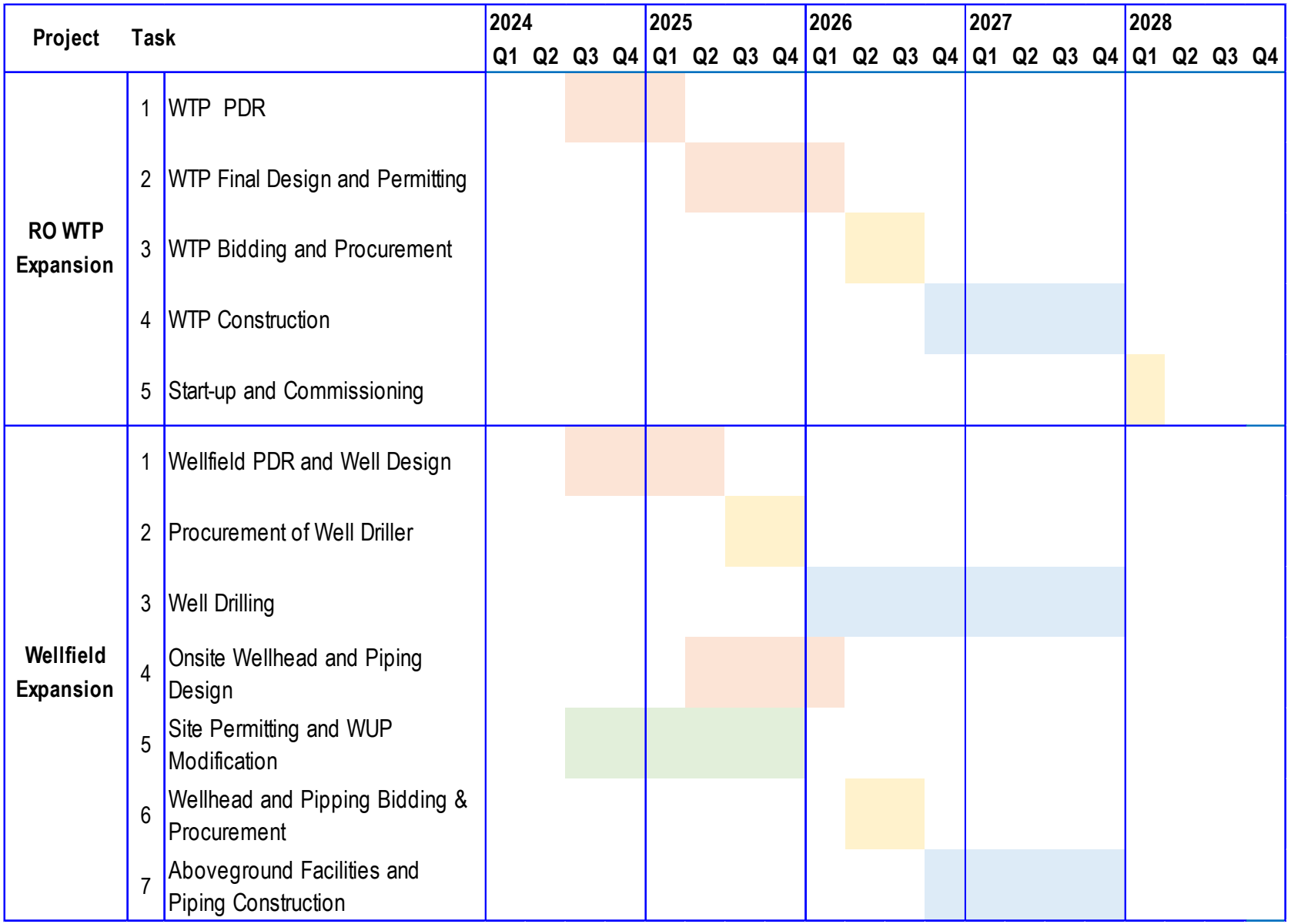


Figure 7.1 Implementation Schedule for RO WTP and Wellfield Expansion

APPENDIX A1

PUNTA GORDA WATER SYSTEMS INTERCONNECT AND TRANSFER CONTRACT WITH AMENDMENTS 1 AND 2

Peace River Manasota
Regional Water Supply Authority
9415 Town Center PKWY, Lakewood Ranch, FL 34202

SECOND AMENDMENT TO WATER SYSTEMS INTERCONNECT AND WATER TRANSFER CONTRACT BETWEEN THE PEACE RIVER MANASOTA REGIONAL WATER SUPPLY AUTHORITY AND THE CITY OF PUNTA GORDA

This SECOND AMENDMENT entered into and effective this 4th day of December, 2019 by and between the PEACE RIVER MANASOTA REGIONAL WATER SUPPLY AUTHORITY, an independent special district created pursuant to Section 373.1962, Florida Statutes, now found at Section 373.713, Florida Statutes, and Section 163.01, Florida Statutes, acting by and through its governing Board of Directors, hereinafter referred to as the "Authority", whose address is 9415 Town Center Parkway, Lakewood Ranch, Florida 34202, and the CITY OF PUNTA GORDA, a municipal corporation of the State of Florida, acting by and through its governing Board of City Commissioners, hereinafter referred to as the "City", whose address is 326 West Marion Avenue, Punta Gorda, Florida 33950, and collectively known as the "Parties".

WITNESSETH:

WHEREAS, the Authority and City entered into the Water Systems Interconnect and Water Transfer Contract Between the Peace River Manasota Regional Water Supply Authority and the City of Punta Gorda effective September 3, 2013 and amended February 17, 2016 ("Agreement"), which provides the procedure for the transfer of water through the interconnect of the Parties' respective water systems; and

WHEREAS, Section 18 of the Agreement provides that it may only be amended by a writing duly executed by the Parties; and

WHEREAS, Section 4 of the Agreement stipulates that the Parties may exchange or purchase water as needed and mutually agreeable; and

WHEREAS, Section 4.1 of the Agreement provides that any annual imbalance exceeding thirty (30) MG for the Contract Year shall be invoiced by the supplying Party to the receiving Party at the Water Rate by October 31 of each year; and

WHEREAS, the City is constructing a new reverse osmosis water treatment facility to improve water quality with completion scheduled for Contact Year 2020; and

WHEREAS, the City experienced water quality issues and construction issues impeding the delivery of water to the Authority during Contract Year 2019 resulting in the City exceeding the annual imbalance provided for in the Agreement; and

WHEREAS, the Parties wish to amend Section 4.1 of the Agreement to allow for annual imbalance of sixty (60) MG.

CHARLOTTE COUNTY CLERK OF CIRCUIT COURT
OR BOOK: 4544 PAGE 1131 PAGE: 1 OF 3
INSTR # 2790381 Doc Type: AGR
Recorded: 2/27/2020 at 1:37 PM
Rec. Fee: RECORDING $27.00
Cashier By: NLANE

NOW THEREFORE, in consideration of the mutual terms and covenants and conditions contained herein, the parties hereby mutually agree to amend the Agreement as follows:

1. Section 4.1 of the of the Agreement is amended:

4.1 Water Exchange. The Parties may exchange potable water during the course of a year to facilitate pipeline readiness or for other mutually agreed upon purposes. Water Exchange is intended to net zero (0) at the end of each Contract Year. However, in any Contract Year where a balance remains, Water Exchange quantities less than or equal to sixty (60) MG shall be carried over into the next Contract Year beginning with the Contract Year 2019. Any annual imbalance exceeding sixty (60) MG for the Contract Year shall be invoiced by the supplying Party to the receiving Party at the Water Rate by October 31 of each year. The receiving Party shall pay the invoice within 30 days of receipt of the invoice. The Parties shall endeavor to make up any annual imbalance less than or equal to sixty (60) MG on a mutually agreeable schedule.

2. The terms, covenants and conditions set forth in the Agreement that have not been specifically amended herein, will continue in existence, are hereby ratified, approved and confirmed, and will remain binding upon the parties hereto.

IN WITNESS WHEREOF, the parties hereto, or their lawful representatives, have executed this FIRST AMENDMENT on the day and year set forth above.

ATTEST:

Patrick J. Lehman, P.E.
Executive Director

PEACE RIVER MANASOTA REGIONAL WATER SUPPLY AUTHORITY

Elton A. Langford, Chair **Date**

APPROVED TO AS FORM:

Douglas Manson
General Counsel for Peace River Manasota Regional Water Supply Authority

BOARD APPROVED

DEC - 4 2019

Peace River Manasota
Regional Water Supply Authority

ATTEST:

Karen Smith, City Clerk

CITY OF PUNTA GORDA

Nancy Prafke, Mayor 2/19/20
Date

APPROVED TO AS FORM:

David Levin
City Attorney for Punta Gorda

Return to: Prepared by
Peace River Manasota Re nal WSA
9415 Town Center Parkway
Lakewood Ranch, FL 34202

FIRST AMENDMENT TO WATER SYSTEMS INTERCONNECT AND WATER TRANSFER CONTRACT BETWEEN THE PEACE RIVER MANASOTA REGIONAL WATER SUPPLY AUTHORITY AND THE CITY OF PUNTA GORDA

This FIRST AMENDMENT entered into and effective this 17 day of February, 2016 by and between the PEACE RIVER MANASOTA REGIONAL WATER SUPPLY AUTHORITY, an independent special district created pursuant to Section 373.1962, Florida Statutes, now found at Section 373.713, Florida Statutes, and Section 163.01, Florida Statutes, acting by and through its governing Board of Directors, hereinafter referred to as the "Authority", whose address is 9415 Town Center Parkway, Lakewood Ranch, Florida 34202, and the CITY OF PUNTA GORDA, a municipal corporation of the State of Florida, acting by and through its governing Board of City Commissioners, hereinafter referred to as the "City", whose address is 326 West Marion Avenue, Punta Gorda, Florida 33950, and collectively known as the "Parties".

WITNESSETH:

WHEREAS, the Authority and City entered into the Water Systems Interconnect and Water Transfer Contract Between the Peace River Manasota Regional Water Supply Authority and the City of Punta Gorda effective September 3, 2013, which provided the procedure for the transfer of water through the interconnect of the Parties' respective water systems; and

WHEREAS, Exhibit 1 of the Agreement provides the locations and structures of the Delivery Point and Interconnect; and

WHEREAS, Section 18 of the Agreement provides that it may only be amended by a writing duly executed by the Parties; and

WHEREAS, the Authority and City entered into the Interlocal Agreement for Phase 1 Regional Interconnect Between the Peace River Manasota Regional Water Supply Authority and the City of Punta Gorda on December 2, 2015, which provides for a new pipeline project between the Parties ("Interconnect Interlocal"); and

WHEREAS, Section 10 of the Interconnect Interlocal requires the Parties to amend the Agreement within ninety (90) days of December 2, 2015 to include the Interconnect and Delivery Point provided for in the Interconnect Interlocal; and

WHEREAS, the Parties wish to amend Exhibit 1 of the Agreement to include a map showing the Interconnect provided for in the Interconnect Interlocal (Exhibit 1 of the Interconnect Agreement).

CHARLOTTE COUNTY CLERK OF CIRCUIT COURT
OR BOOK: 4066 PAGE 1277 PAGE: 1 OF 19
INSTR # 2425425 Doc Type: AGR
Recorded: 3/30/2016 at 2:58 PM
Rec. Fee: RECORDING $163.00
Cashier By: TERESAH

NOW THEREFORE, in consideration of the mutual terms and covenants and conditions contained herein, the parties hereby mutually agree to amend the Agreement as follows:

1. Exhibit 1 of the Interconnect Interlocal is added to Exhibit 1 of the Agreement.

2. The terms, covenants and conditions set forth in the Agreement that have not been specifically amended herein, will continue in existence, are hereby ratified, approved and confirmed, and will remain binding upon the parties hereto.

IN WITNESS WHEREOF, the parties hereto, or their lawful representatives, have executed this FIRST AMENDMENT on the day and year set forth above.

ATTEST:

T. Patrick J. Lehman, P.E.
Executive Director

PEACE RIVER MANASOTA
REGIONAL WATER SUPPLY
AUTHORITY

1/28/16
Christopher G. Constance Date
Chair

APPROVED TO AS FORM:

Douglas Manson
General Counsel for Peace River Manasota
Regional Water Supply Authority

BOARD APPROVED

JAN 28 2016

Peace River Manasota
Regional Water Supply Authority

ATTEST:

Karen Smith, City Clerk

CITY OF PUNTA GORDA

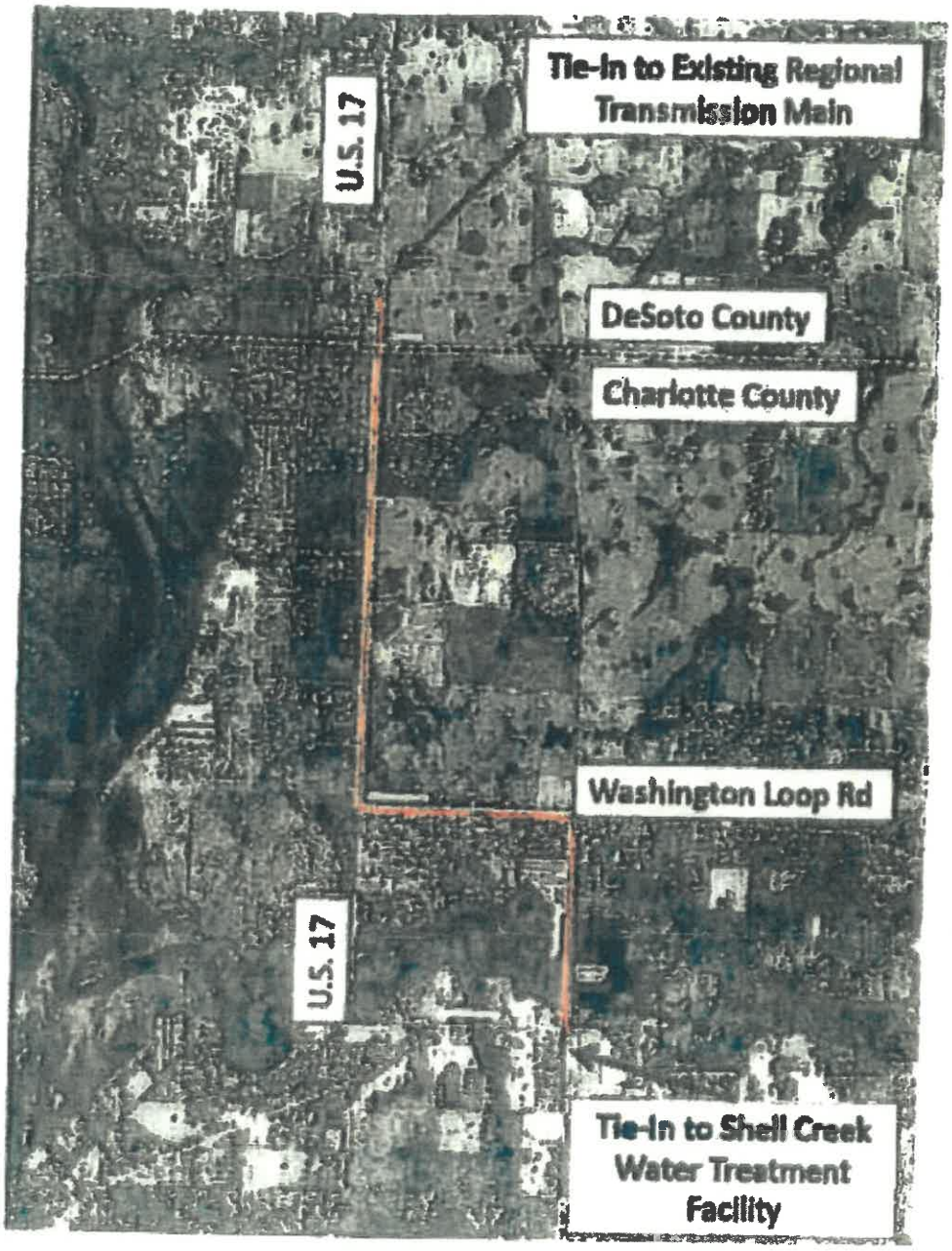
02/17/16
Rachel Keesling, Mayor Date

APPROVED TO AS FORM:

David Levin
City Attorney for Punta Gorda

EXHIBIT 1

Phase 1 Interconnect
Proposed Pipeline Route
(U.S. 17 to Punta Gorda)



WATER SYSTEMS INTERCONNECT AND WATER TRANSFER CONTRACT BETWEEN THE PEACE RIVER MANASOTA REGIONAL WATER SUPPLY AUTHORITY AND THE CITY OF PUNTA GORDA

This Contract, entered into this 3rd day of September, 2013, by and between the PEACE RIVER/MANASOTA REGIONAL WATER SUPPLY AUTHORITY, a regional water supply authority created and existing pursuant to Section 373.1962, Florida Statutes, as subsequently reenacted in Section 373.713, Florida Statutes, and created by interlocal agreement executed pursuant to Section 163.01, Florida Statutes, and other applicable law, acting by and through its Board of Directors, the governing board thereof ("Authority"); and the CITY OF PUNTA GORDA, a municipal corporation of the State of Florida, acting by and through its Board of City Commissioners, the governing board thereof ("City") collectively the "Parties."

WITNESSETH:

WHEREAS, the Parties entered into an Interlocal Agreement Between City of Punta Gorda and Peace River Manasota Regional Water Supply Authority for Water Interconnect dated October 4, 2006; and

WHEREAS, the Parties entered into a Water Supply Contract and Operational Agreement dated March 21, 2007, which addressed the interconnection of the Parties' water supply facilities and terminated the October 4, 2006 agreement; and

WHEREAS, the Authority owns and operates a regional water system including the Peace River Facility as a regional water supply source and regional transmission system that is interconnected to the water utility systems of Charlotte County, DeSoto County, Sarasota County, and the City of North Port; and

WHEREAS, it is the goal of the Authority to seek the interconnection of water systems in the region to the Authority's regional water system for the purpose of facilitating the transfer of

water among utilities under emergency, or other conditions, to provide a reliable and sustainable water supply to the residents of the region; and

WHEREAS, the City owns and operates the City of Punta Gorda Water Treatment Plant and water distribution system serving the residents of the City and unincorporated portions of Charlotte County; and

WHEREAS, the City seeks the interconnection of the City's water system to the Authority's regional water system; and

WHEREAS, the Authority and the City Water Systems are now interconnected to transfer water in either direction in case of emergency conditions and to further assure an adequate public drinking water supply for the Parties in the future; and

WHEREAS, the Parties agree to establish a procedure for the transfer of water through the interconnect of the Parties' respective water systems.

NOW THEREFORE, in consideration of the foregoing, which shall be deemed an integral part of this Contract and of the mutual covenants contained herein, the Parties intending to be legally bound hereby agree as follows:

1. **DEFINITIONS.** In the absence of a clear implication otherwise, capitalized terms used in this Contract and in the attached exhibits shall have the following meanings:

1.1. Authority. The Peace River Manasota Regional Water Supply Authority.

1.2. Authority Available Water. A quantity of potable water available from the Authority for delivery to the City after the Authority has met its obligations to Authority Customers under the Master Water Supply Contract.

1.3. Authority Regional Transmission System. Those facilities, including appurtenant and associated facilities owned by the Authority pertaining to the delivery and measurement

of potable water including but not limited to primary transmission pipes, real property, interest in real property, fixtures, personal property.

1.4. Available Water. Water from either Party meeting the definition of Authority Available Water and/or City Available Water.

1.5. City Available Water. A quantity of water available from the City for delivery to the Authority generally comprised of the surplus of potable water which remains after the City has accounted for its local needs, including customer demands, operational constraints and regulatory capacity.

1.6. City Water System. All real property, interest in real property, fixtures, personal property, wells, buildings, treatment systems, pumps, pipes, storage facilities, reservoir(s), aquifer storage and recovery facilities and appurtenant or associated facilities owned by Punta Gorda and pertaining to the delivery and measurement of potable water.

1.7. Conjunctive Water Use Permit. The Southwest Florida Water Management District water use permit number 20012926.000 and as subsequently renewed or modified.

1.8. Contract Year. The period between execution of this Agreement and September 30, 2013, and each fiscal year (beginning on each October 1, and ending on the immediately following September 30) thereafter during the term of this Contract.

1.9. Delivery Point(s). The physical locations(s) of interconnection between the Authority's Regional Transmission System and the City's Water System shown in Exhibit 1.

1.10. Interconnect(s). The structure(s) installed by the Authority at the Delivery Point(s), that enable(s) water transfer/delivery between the Authority's Regional Transmission System and the City's Water System shown in Exhibit 1.

1.11. Master Water Supply Contract. The Peace River Manasota Regional Water Supply Authority Master Water Supply Contract dated October 5, 2005 and as subsequently amended within operational constraints and regulatory capacity.

1.12. MGD. Million gallons per day.

1.13. MGY. Million gallons per year.

1.14. Party or Parties. Party shall mean a signatory to this Contract. Parties shall mean the City and the Authority.

1.15. Water Exchange. Available Water agreed to be exchanged on a gallon-for-gallon basis during the course of a Contract Year to facilitate pipeline readiness or for other mutually acceptable purposes.

1.16. Water Meter(s). The water meter(s) located at the Delivery Point(s) that measure all water flowing through the Interconnect(s).

1.17. Water Purchase. Available Water agreed to be purchased by either party and paid for on a unit cost basis for metered quantities delivered.

1.18. Water Rate. The unit rate in $/1000 gallons for water purchased by the City from the Authority or by the Authority from the City through the Interconnect(s). Said rate shall be as adopted in the Authority's annual budget and established by resolution for interconnects with government entities not a party to the Master Water Supply Contract for the Contract Year and applicable to both Parties.

1.19. Water Supply Emergency. A loss or reduction in system capacity caused by drought or a sudden, unexpected, unavoidable interruption in water delivery as declared by the Authority Board or the City of Punta Gorda City Council.

2. **TERM.** The term of this Contract shall begin on the date of its complete execution by the Parties and shall end upon completion of the 10th year from the complete execution date. This Contract may be terminated at any time by a written agreement duly executed by both Parties. Unless notice is given at least 45 days prior to the end of the first term, this Contract shall automatically renew for a second 5-year term under the same terms and conditions.

3. **INTERCONNECT(S).** The Interconnect(s) provide(s) water supply connection between the City's Water System and the Authority's Regional Transmission System for an increase in capacity and reliability in both systems.

3.1. Ownership. The Authority is the owner of the Interconnect(s) and Water Meter(s).

3.2. Water Meter(s). The following provisions set forth the Parties' obligations with respect to the Water Meter(s).

3.2.1. Operation. The Authority shall operate and maintain the Water Meter(s) to measure all water flowing in either direction through the designated Delivery Point(s).

3.2.2. Meter Reading and Maintenance. The Authority shall read and maintain the Water Meter(s). The Authority shall maintain complete and accurate records of its water measurements. Water flow measurements recorded by the Authority shall be the exclusive means of determining the quantity of water delivered to the Delivery Point(s) under this Contract. The metering equipment shall be of standard make and type, installed at a readily accessible location, and shall record flow with accuracy sufficient to meet all applicable reporting requirements. The Authority will check the accuracy of the Water Meter(s) annually, provide a report regarding the condition, accuracy and state of the Water Meter(s) and provide for a certified calibration test and any appropriate

recalibration. Upon request and at the expense of the City, the Authority shall make arrangements for a meter test to be conducted by an independent testing facility which shall conform to the manufacture's standards and where appropriate conduct the test as a field test. The City may be present when the Water Meter(s) are checked for accuracy, and the test records shall be made available for inspection by the City upon reasonable request. If the accuracy of the Water Meter(s) is determined to be at least five (5) percent beyond the limits prescribed by the manufacturer, the Water Meter(s) will be assumed to have been inaccurate from the mid-point of the time since the last annual inspection, or the last calibration, or the last independently certified test, or the last six (6) months whichever is less. The following month's billing will be adjusted taking into account the nature of the inaccuracy to show a credit or additional charge for the metered flow for that period.

4. **DELIVERY OF WATER.** The Parties may exchange or purchase water as-needed and mutually agreeable. The Parties agree to deliver water consistent with the following provisions:

4.1. Water Exchange. The Parties may exchange potable water during the course of a year to facilitate pipeline readiness or for other mutually agreed upon purposes. Water Exchange is intended to net zero (0) at the end of each Contract Year. However, in any Contract Year where a balance remains, Water Exchange quantities less than or equal to thirty (30) MG shall be carried over into the next Contract Year. Any annual imbalance exceeding thirty (30) MG for the Contract Year shall be invoiced by the supplying Party to the receiving Party at the Water Rate by October 31 of each year. The receiving Party shall pay the invoice within 30 days of receipt of invoice.

4.2. Annual Available Water and Water Purchase. By February 15th of each year the City shall notify the Authority and the Authority shall notify the City of expected Available Water for the subsequent Contract Year. Based on these data, by March 15th each Party shall notify the other of the intended Water Purchase, and provide an expected monthly quantity schedule for said Water Purchase. By April 15 of each year the Parties shall reach mutual agreement on Water Purchase amounts, or in the event that agreement is not timely reached, the Water Purchase amount for the year shall be left open and reconsidered as needed and mutually agreeable. Water Purchase shall be at the Water Rate for the Contract Year in which quantities are delivered.

4.3. Water Quality. The Parties shall deliver water of good and uniform quality to the Delivery Point(s). The water delivered to the Delivery Point(s) shall be stabilized and shall meet all federal, state or regional regulations and orders relating to drinking water without regard to water quality exemptions, variances or similar regulatory relief authorized at the federal, state or regional government level.

5. **JOINT EFFORTS.** The City and Authority shall cooperate with regard to the following:

5.1. Operation and Maintenance of Interconnect. The Authority and the City shall coordinate operation of the Interconnect for the mutual benefit of both Parties. The Authority shall operate and maintain the Interconnect and pipeline segments to the north of the Interconnect, bearing all costs for such activity. The City shall have limited remote access via supervisory control and data acquisition ("SCADA") software to view operating conditions in the City's system at the Interconnect and have personnel access to the facilities for inspection purposes. The City shall operate and maintain the Interconnect

pipeline segment along Washington Loop road for the mutual benefit of both Parties, conducting routine maintenance at its cost. The City is not to modify this pipeline segment (adding valves, taps, meters, etc.) without prior written consent of the Authority. Major repairs on the Interconnect pipeline segment along Washington Loop will be the responsibility of the Authority and will be coordinated with the City.

5.2. Permits. Each Party agrees to cooperate with the other on support of any permits, including the Conjunctive Water Use Permit, required for maintenance and operation of the Interconnect.

5.3. Existing Permittees.

5.3.1. The Authority recognizes the City is an existing permittee on Shell Creek and the Authority agrees that it will not interfere with the City's permitted water use.

5.3.2. The City recognizes the Authority is an existing permittee on the Peace River and the City agrees that it will not interfere with the Authority's permitted water use.

6. **REPRESENTATIONS OF THE PARTIES.** The Parties make the following representations:

6.1. Each Party is duly organized and existing in good standing under the laws of the State of Florida and is duly qualified and authorized to carry on the governmental functions and operations as contemplated by this Contract.

6.2. Each Party has the power, authority and legal right to enter into and perform its obligations set forth in this Contract, and the execution, delivery and performance by it a) has been duly authorized by its governing body; b) does not require any other approvals by any other governmental officer or body; c) does not require any consent or referendum of the voters; d) will not violate any judgment, order, law or regulation applicable to the

Party; and e) does not constitute a default under, or result in the creation of, any lien, charge, encumbrance or security interest upon the assets of the Party under any agreement or instrument to which it is a Party or by which the Party and its assets may be found or affected.

6.3. This Contract has been duly entered into and delivered by the respective governing bodies and, as of the date of its full execution by all Parties, constitutes a legal, valid and binding obligation of said Party, fully enforceable in accordance with its terms provided the enforceability thereof may be limited by any applicable bankruptcy, insolvency, reorganization or other similar laws affecting creditors' rights generally, or by the exercise of judicial discretion in accordance with general principles of equity.

6.4. There is no action, suit or proceeding, at law or in equity, before or by any court or governmental authority, pending or, to the best of the Party's knowledge, threatened against the Party, wherein any unfavorable decision, ruling or finding would materially adversely affect the performance by the Party of its obligations hereunder or the other transactions contemplated hereby, or which, in any way, would adversely affect the validity or enforceability of this Contract, or any other agreement or instrument entered into by the Party in connection with the transaction contemplated hereby.

7. **NOTICES.** In the event a party hereunder desires or is required to provide any notice to the party, the party desiring or required to provide such notice shall provide it in writing, send it by traceable mail, return receipt requested, postage prepaid or traceable overnight delivery service, to the other party at the addresses listed below:

If to City: Howard Kunik, City Manager
326 West Marion Avenue
Punta Gorda, FL 33950

If to Authority: Patrick J. Lehman, Executive Director
9415 Town Center Parkway
Lakewood Ranch, Florida 34202

Any change of notification address or person shall be in writing and delivered pursuant to this provision.

8. **DISCLAIMER OF THIRD PARTY BENEFITS.** This Agreement is solely for the benefit of the Parties. No right or cause of action shall accrue upon or by reason hereof enure to or for the benefit of any third party.

9. **ASSIGNMENT.** This Agreement shall be binding on the Parties, their representatives, successors and assigns. Neither Party shall assign this Agreement or the rights or obligations hereof to any other person or entity without the prior written consent of the other Party.

10. **INDEMNIFICATION.** Neither Party shall indemnify the other Party. Each Party acknowledges that its legal remedy shall be limited to filing suit against the other Party to this Contract in a court of competent jurisdiction.

11. **APPLICABLE LAW/DISPUTES.** This Contract and the provisions contained herein shall be construed, controlled, and interpreted according to the laws of the State of Florida. Any dispute involving litigation between the Parties is subject to all provisions of Chapter 164, Florida Statutes. The Parties agree that venue for any litigation over this Agreement shall be in Charlotte County, Florida.

12. **DEFAULT AND REMEDY.** Recognizing the region's paramount need for a safe and dependable source of water supply, the Parties agree the remedy for a breach of the Contract shall be specific performance, injunctive relief and any other equitable relief, as well as monetary damages.

13. **RELATIONSHIP OF THE PARTIES.** Nothing herein shall be deemed to constitute any Party a partner or joint venturer, or to create any fiduciary relationship among the Parties.

14. **WAIVER.** Unless otherwise specifically provided by the terms of this Contract, no delay or failure to exercise a right resulting from any breach of this Contract shall impair such right or shall be construed to be a waiver thereof, but such right may be exercised from time to time and as often as may be deemed expedient. Any waiver shall be in writing and signed by the Party granting such waiver. If any representation, warranty or covenant contained in this Contract is breached by any Party and thereafter waived by another Party, such waiver shall be limited to the particular breach so waived and shall not be deemed to waive, either expressly or impliedly, any other breach under this Contract.

15. **AUTHORIZED REPRESENTATIVES.** For purposes of this Contract, the Parties authorized representatives are as follows: the Authority Executive Director and the City Manager. Any Party may change its authorized representative at any time by written notice to the other Party.

16. **SECTION CAPTIONS AND REFERENCES.** The section headings and captions contained herein are included for convenience only and shall not be considered part of this Contract or affect in any manner its construction or interpretation. Except as otherwise indicated, all references herein to sections are to sections of this Contract.

17. **SEVERABILITY.** In the event any provision of this Contract shall, for any reason, be determined invalid, illegal or unenforceable in any respect, the Parties shall negotiate in good faith and agree to such amendments, modifications or supplements to this Contract or such other appropriate actions as shall, to the maximum extent practicable in the light of such

determination, implement and give effect to the intentions of the Parties as reflected herein, and the other provisions of this Contract, as amended, modified, supplemented or otherwise affected by such action, shall remain in full force and effect.

18. **AMENDMENT.** This Contract may only be amended by a writing duly executed by the Parties.

19. **ENTIRE AGREEMENT.** This Contract and exhibits attached shall constitute the entire agreement of the Authority and the City with respect to the Interconnect and shall supersede the Water Supply Contract and Operational Agreement dated March 21, 2007 between the Authority and the City, and the Interlocal Agreement Between City of Punta Gorda and Peace River Manasota Regional Water Supply Authority for Water Interconnect dated October 4, 2006.

20. **FURTHER ASSURANCES.** The Authority and the City shall use all reasonable efforts to provide such information, execute such further instruments and documents and take actions as may be reasonably requested by the other Party and not inconsistent with the provisions of this Contract and not involving the assumption of obligations or liabilities different from, in excess of or in addition to those expressly provided for in this Contract to carry out the intent of this Contract.

21. **CONSENTS.** To the extent that the consent of any Party to this Contract is required as a condition to the action of other Parties, such consent shall not be unreasonably withheld.

22. **RECORDATION OF INTERLOCAL AGREEMENT.** This Contract shall constitute an interlocal agreement pursuant to Section 163.01, Florida Statutes. A true and

correct copy of this Contract and any subsequent amendments shall be recorded by the Authority with the Clerk of the Circuit Court in Charlotte and Manatee Counties.

23. **AMBIGUITY.** The Parties agree that each one has played an equal part in the negotiation and drafting of this Contract, and in the event any ambiguity should be asserted or realized in the interpretation or construction of this Contract, the result of such ambiguity shall be equally assumed and realized by each Party.

24. **SOVERIGN IMMUNITY.** The Parties intend to avail themselves to the benefits of Sections 768.28 and 163.01(9)(c), Florida Statutes, and of other statutes and common law governing sovereign immunity to the fullest extent possible. In accordance with Section 163.01(5)(o), Florida Statutes, therefore the City is not jointly liable for the torts of the officers or employees of the Authority, or any other tort attributable to the Authority, and that only the Authority shall be liable for torts attributable to it or for torts of its officers or employees, and then only to the extent of the waiver of sovereign immunity or limitation of liability specified in Section 768.28, Florida Statutes. Similarly, under Section 163.01(5)(o), Florida Statutes, therefore the Authority is not jointly liable for the torts of the officers or employees of the City, or any other tort attributable to the City, and that only the City shall be liable for torts attributable to it or for torts of its officers or employees, and then only to the extent of the waiver of sovereign immunity or limitation of liability specified in Section 768.28, Florida Statutes. The Parties intend the Authority and the City to have all the privileges and immunities from liability and exemptions from laws, ordinances, rules and common law which apply to the municipalities of the State of Florida. Nothing in this Contract is intended to inure to the benefit of any third-party for the purposes of allowing any claim which would otherwise be barred under the Doctrine of Sovereign Immunity or by operation of law.

25. **GOOD FAITH.** The Parties agree to exercise good faith and fair dealing in respect to all matters relating to this Contract.

IN WITNESS WHEREOF, the Parties have executed this Contract for the purposes expressed.

ATTEST:

Karen Smith City Clerk

CITY OF PUNTA GORDA, FLORIDA

William F. Albers, Mayor

APPROVED AS TO FORM:

David Levin
City Attorney for Punta Gorda

ATTEST:

Patrick J. Lehman, Executive Director

PEACE RIVER/MANASOTA REGIONAL WATER SUPPLY AUTHORITY

Nora Patterson, Chair

APPROVED AS TO FORM:

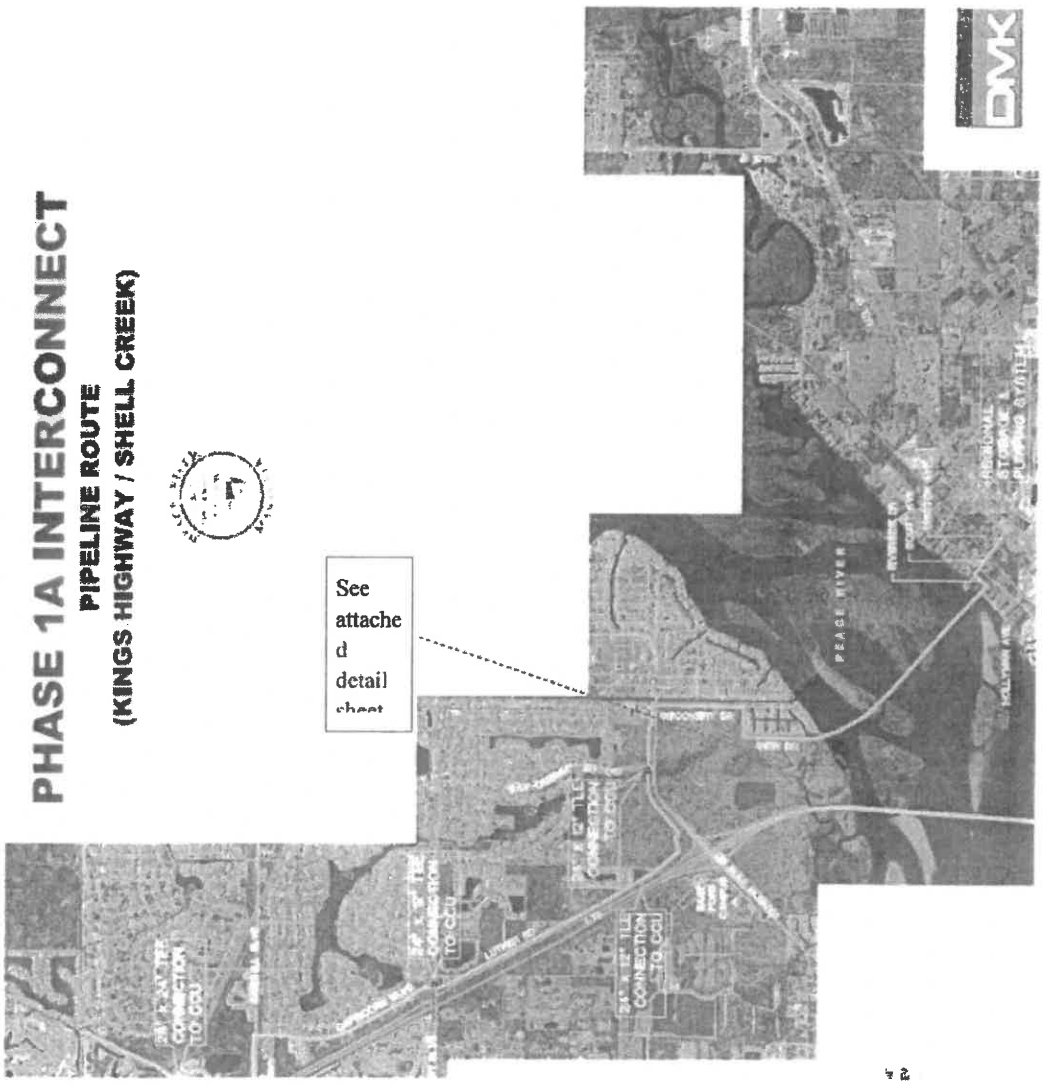
Douglas Manson, General Counsel for the
Peace River/Manasota Regional Water Supply Authority

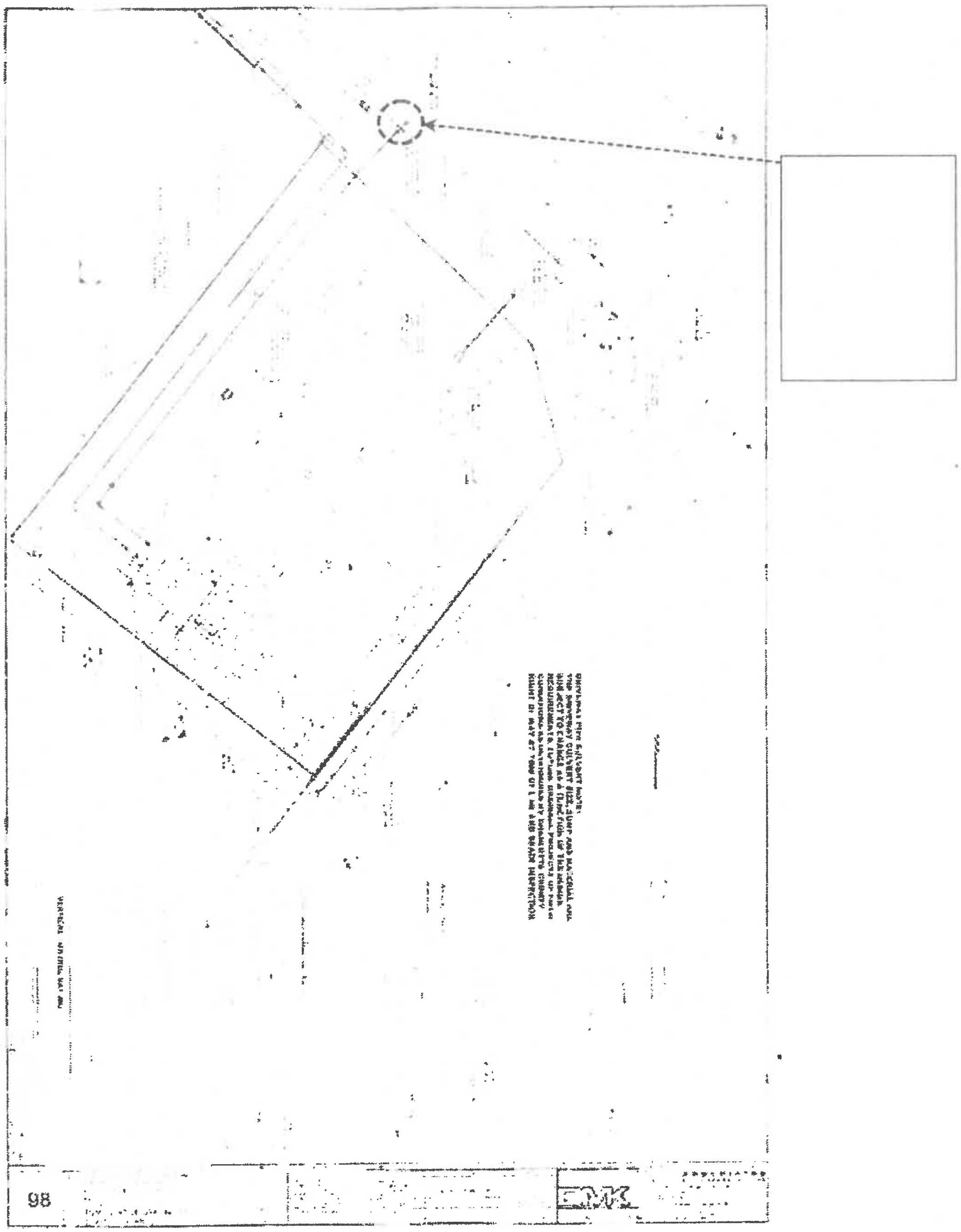
BOARD APPROVED

SEP 3 2013

Peace River Manasota
Regional Water Supply Authority

EXHIBIT 1


PHASE 1A INTERCONNECT
PIPELINE ROUTE
(KINGS HIGHWAY / SHELL CREEK)
See attached detail sheet
DMK
PEASE RIVER
CONNECTION TO CCU
CONNECTION TO CCU
CONNECTION TO CCU



Detail Sh

APPENDIX A2

2015 INTERLOCAL AGREEMENT

PEACE RIVER MANASOTA REGIONAL WATER SUPPLY AUTHORITY
9415 TOWN CENTER PKWY
LAKEWOOD RANCH, FL 34202

CHARLOTTE COUNTY CLERK OF CIRCUIT COURT
OR BOOK: 4033 PAGE 988 PAGE: 1 OF 19
INSTR # 2399398 Doc Type: AGR
Recorded: 12/3/2015 at 11:06 AM
Rec. Fee: RECORDING $163.00
Cashier By: TERESAH

INTERLOCAL AGREEMENT FOR PHASE 1 REGIONAL INTERCONNECT BETWEEN THE PEACE RIVER MANASOTA REGIONAL WATER SUPPLY AUTHORITY AND THE CITY OF PUNTA GORDA

This Interlocal Agreement ("Agreement") is entered into this 2 day of DEC, 2015, by and between the Peace River Manasota Regional Water Supply Authority ("Authority"), an independent special district created pursuant to Section 373.1962, Florida Statutes, now found in Section 373.713, Florida Statutes, and 163.01, Florida Statues, acting by and through its governing Board of Directors, and the City of Punta Gorda ("City"), a Florida municipal corporation, acting by and through its governing City Council.

W I T N E S S E T H :

WHEREAS, both the Authority and City are authorized to enter into interlocal agreements, pursuant to Chapter 163, Florida Statues; and

WHEREAS, the Authority owns and operates a regional water system including the Peace River Facility as a regional water supply source and regional transmission system; and

WHEREAS, the vision of the Authority is to create and maintain a sustainable, reliable interconnected regional water supply system; and

WHEREAS, the City owns and operates the City of Punta Gorda Shell Creek Water Treatment Plant and distribution system serving the residents of the City and certain unincorporated portions of Charlotte County; and

WHEREAS, the City is currently operating under a five (5) year exemption to the secondary drinking water standard for total dissolved solids ("TDS"), which was

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issued by the Florida Department of Environmental Protection ("DEP") on June 22, 2011; and

WHEREAS, the City plans to construct, operate and own a new reverse osmosis water treatment facility ("RO Project") at its Shell Creek Water Treatment Plant Facility, with such reverse osmosis water treatment facility consisting of a four (4) million gallons per day reverse osmosis system to treat brackish groundwater for blending with the City's existing treated surface water facility to meet drinking water quality standard of 500 mg/L TDS; and

WHEREAS, the City has submitted for cooperative funding assistance from the Southwest Florida Water Management District ("SWFWMD") pursuant to which SWFWMD would contribute fifty percent (50%) of the eligible costs of the estimated thirty-two million dollars ($32,000,000) cost of the RO Project pursuant to a Cooperative Funding Agreement ("RO CFA").; and

WHEREAS, the SWFWMD has previously expressed a willingness to provide the requested cooperative funding to the City contingent upon funding being procured for the Pipeline Project; and

WHEREAS, the City has previously expressed a willingness to consent to the Pipeline Project contingent upon receiving the cooperative funding for its RO project; and

WHEREAS, the Authority has submitted for cooperative funding assistance from the SWFWMD for its Pipeline Project, as defined in section 1.19 below; and

WHEREAS, although separate and distinct projects and cooperative funding requests, SWFWMD has stated that cooperative funding for the RO Project and the

Pipeline Project are dependent upon the execution of any necessary contract(s) for the Authority to construct the Pipeline Project to provide a "plant-to-plant" interconnect between the Authority's Water Supply System and the City's Water System, as defined in sections 1.5 and 1.10 below; and

WHEREAS, four million dollars **($4,000,000)** has been appropriated to the City in the State of Florida Budget for Fiscal Year 2015-2016 for the RO Project ("the Appropriation"); and

WHEREAS, the City is negotiating a contract with the DEP that provides for the payment of the four million dollars ($4,000,000) Appropriation to the City and includes expenses associated with the Pipeline Project as a reimbursable expense of the RO Project; and

WHEREAS, the Parties recognize the need for adequate, reliable, and high-quality drinking water supplies to meet local and regional needs; and

WHEREAS, integrating the RO Project and the Pipeline Project enhances water system reliability to the City and the region; and

WHEREAS, the Parties desire to work together to obtain SWFWMD funding for the Integrated Projects, as defined by section 1.12 below; and

WHEREAS, the Authority and City have previously entered into a Water Systems Interconnect and Water Transfer Contract dated September 3, 2013.

NOW THEREFORE, in consideration of the foregoing, which shall be deemed an integral part of this Agreement and of the mutual covenants contained herein, the Parties agree to the following:

1. **DEFINITIONS.** In the absence of a clear implication otherwise, capitalized terms used in this Agreement and in the attached exhibit shall have the

following meaning.

1.1. Agreement Year. The time period between execution of this Agreement and September 30, 2016, and each fiscal year (beginning on each October 1, and ending on the immediately following September 30) thereafter during the term of this Agreement.

1.2. Authority. The Peace River Manasota Regional Water Supply Authority.

1.3. Authority Available Water. A quantity of potable water available from the Authority for delivery to the City after the Authority has met its obligations to Authority Customers under the Master Water Supply Contract.

1.4. Authority Regional Transmission System. Those facilities, including appurtenant and associated facilities, owned by the Authority pertaining to the delivery and measurement of potable water including but not limited to primary transmission pipes, real property, interest in real property, fixtures, personal property.

1.5. Authority Water System. All real property, interest in real property, fixtures, personal property, wells, buildings, treatment systems, pumps, pipes, storage facilities, reservoir(s), aquifer storage and recovery facilities and appurtenant or associated facilities owned by Authority and pertaining to the delivery and measurement of potable water.

1.6. Available Water. Water from either Party meeting the definition of Authority Available Water and/or City Available Water.

1.7. City. The City of Punta Gorda.

1.8. City Available Water. A quantity of potable water available from the City for delivery to the Authority generally comprised of the surplus of water that remains

after the City has accounted for its local needs, including customer demands, operational constraints and regulatory capacity.

1.9. City Shell Creek WTP. The City of Punta Gorda's Shell Creek Water Treatment Plant.

1.10. City Water System. All real property, interest in real property, fixtures, personal property, wells, buildings, treatment systems, pumps, pipes, storage facilities, reservoir(s), aquifer storage and recovery facilities and appurtenant or associated facilities owned by the City and pertaining to the delivery and measurement of potable water.

1.11. Delivery Point(s). The physical location(s) of interconnection between the Authority Regional Transmission System and the City Water System shown in Exhibit 1.

1.12. Integrated Project. The RO Project and the Pipeline Project collectively.

1.13. Interconnect(s). The structure(s) installed by the Authority at the Delivery Point(s) that enable water transfer/delivery between the Authority Regional Transmission System and the City Water System shown in Exhibit 1.

1.14. Master Water Supply Contract. The Peace River Manasota Regional Water Supply Authority Master Water Supply Contract dated October 5, 2005 and as subsequently amended.

1.15. MGD. Million gallons per day.

1.16. MGY. Million gallons per year.

1.17. Operational Flexibility Water Use Permit. The Southwest Florida Water Management District water use permit number 20012926.002 and as subsequently renewed or modified.

1.18. Party or Parties. Party shall mean a signatory to this Agreement. Parties shall mean the City and the Authority.

1.19. Pipeline Project. New transmission pipeline that is approximately six point three (6.3) miles of a minimum twenty-four (24) inch diameter potable water pipeline from the southern terminus of the Authority's Desoto Regional Transmission Main near the Walmart Distribution Center on U.S. 17 in Desoto County south to connect with the City's Shell Creek Water Treatment Plant on Washington Loop Road, which will be constructed, owned and operated by the Authority.

1.20. Phase 1A Pipeline. The Authority's regional pipeline and appurtenant facilities connecting the City's distribution system on US 17 in Cleveland to the Authority Regional Transmission System.

1.21. RO Project. New 4 MGD reverse osmosis system at the City's Shell Creek Water Treatment Plant, which will be constructed, owned and operated by the City that will be used to treat brackish groundwater for blending with the City's existing treated surface water facility to meet drinking water quality standards f 500 mg/L TDS at all times.

1.22. SWFWMD. The Southwest Florida Water Management District.

1.23. TDS. Total Dissolved Solids.

1.24. Water Exchange. Available Water agreed to be exchanged on a gallon-for-gallon basis during the course of an Agreement Year to facilitate pipeline readiness or for other mutually acceptable purposes.

1.25. Water Meter(s). The water meter(s) located at the Delivery Point(s) that measure all water flowing through the Interconnect(s).

1.26. Water Purchase. Available Water agreed to be purchased by either party and paid

for on a unit cost basis for metered quantities delivered.

1.27. Water Rate. The unit rate in $/1000 gallons for water purchased by the City from the Authority or by the Authority from the City through the Interconnect(s). Said rate shall be the distribution pool water rate as adopted in the Authority's annual budget and established by resolution for the Agreement Year and applicable to both Parties.

1.28. Water Supply Emergency. A loss or reduction in system capacity caused by drought or a sudden, unexpected, unavoidable interruption in water delivery as declared by the Authority Board of Directors or the City of Punta Gorda City Council.

1.29. Water Systems Interconnect and Water Transfer Contract. The Agreement executed between the Authority and the City establishing water delivery, payment and operational protocol for the Phase 1A Pipeline dated September 3, 2013 and as subsequently amended.

2. **TERM.**

2.1 The term of this Agreement shall begin on the date of its complete execution by the Parties (the "Effective Date").

2.2 The Agreement shall expire on December 31, 2018 unless extended in writing by both parties or unless terminated as provided for in sections 2.3, 2.4, or 2.5.

2.3 If the Conditions Precedent required by section 4 are not met April 30, 2016, this Agreement shall automatically terminate.

2.4 If the Authority does not receive Charlotte County's written consent for the Pipeline Project in accord with the Master Water Supply Contract (paragraph

22.2) by February 29, 2016, this Agreement shall automatically terminate.

2.5 If the bids submitted to the Authority for the construction of the Pipeline Project result in the Pipeline Project costs exceeding twelve million dollars ($12,000,000), this Agreement may be terminated by either party upon written notice to the other party.

3. **PIPELINE PROJECT.** The Authority will construct, own and operate the Pipeline Project. The Authority shall retain 100% of the hydraulic capacity of the Pipeline Project as defined in the Master Water Supply Contract. The Pipeline Project consists of a new transmission pipeline extending from the Authority Regional Transmission System on U.S. 17 near the DeSoto/Charlotte County line south approximately six point three (6.3) miles and connecting with the City Shell Creek WTP on Washington Loop Road. The Pipeline Project will be designed to deliver water from the Authority Regional Transmission System to an existing storage tank at the City Shell Creek WTP. The Pipeline Project will also enable delivery of water from the City Shell Creek WTP to the Authority Regional Transmission System.

4. **CONDITIONS PRECEDENT.** The following are conditions precedent to the Parties' rights, obligations and liabilities under this Agreement:

4.1 The execution of this Agreement by the Authority and the City.

4.2 The execution of a cooperative funding agreement (CFA) by the SWFWMD and the Authority providing for SWFWMD to contribute fifty percent (50%) of the eligible costs of the estimated twelve million dollars ($12,000,000) cost of the Pipeline Project, with eligible costs provided by the SWFWMD's cooperative funding agreement.

4.3 The execution of the RO CFA by the SWFWMD and the City whereby

SWFWMD contributes fifty percent (50%) of the eligible costs of the estimated thirty-two million dollars ($32,000,000) cost of the RO Project, with eligible costs provided by the SWFWMD's cooperative funding agreement.

4.4 The execution of a funding agreement by the DEP and the City or the DEP, the City and the Authority providing for payment of four million dollars ($4,000,000) to the City and including expenses associated with the Pipeline Project as a reimbursable expense of the RO Project.

5. **COMMITMENT TO PAY.** The City shall pay the Authority six million dollars ($6,000,000) toward the cost of the Pipeline Project as follows:

5.1 Five hundred thousand dollars ($500,000) lump sum at such time as SWFWMD executes the RO CFA with the City.

5.2 Four million dollars ($4,000,000) as follows: The Authority anticipates that the Design of the Pipeline Project will begin in January 2016 and construction of the Pipeline Project will begin on or about January 2017, and invoices will be submitted to the City for reimbursement throughout the Pipeline Project timeframe as follows: A) Subject to the receipt of the Appropriation, the City shall pay all invoices submitted by the Authority for Pipeline Project expenses incurred by the Authority up to the full Appropriation amount, which shall be paid within thirty (30) days after the City receives the Authority invoice; or B) Upon agreement of the DEP, the Authority invoices may be sent directly to DEP for reimbursement directly to the Authority under a three party funding agreement between the City, the Authority and the DEP.

5.3 Subject to the receipt of funds by the City from SWFWMD for the SWFWMD's cooperative funding commitment, an additional One million five hundred thousand

dollars ($1,500,000) will be provided by the City to the Authority after the Appropriation funds have been expended on the Pipeline Project expenses as follows: Invoices will be submitted by the Authority for Pipeline Project expenses to the City for reimbursement which such invoices shall be paid by the City up to the amount of one million five hundred thousand ($1,500,000) within thirty (30) days after the City receives the invoice.

6. **COMMITMENT TO PROVIDE EASEMENTS.** Within one hundred eighty (180) days following execution of this Agreement, the City shall deliver, at no cost to the Authority perpetual non-exclusive utility, ingress/egress and temporary construction easements necessary for the installation and future maintenance of the Pipeline Project and appurtenant facilities. The value of said easements shall not be considered part of the City payment contribution listed in section 5 above.

7. **COMMITMENT TO SUPPLY WATER.** The Authority and City agree to provide treated drinking water in accordance with the Water Systems Interconnect and Water Transfer Contract as follows:

a. The Authority shall provide Authority Available Water through the Pipeline Project and/or Phase 1A Pipeline at the City's request.

b. The City shall provide City Available Water through the Pipeline Project and/or Phase 1A Pipeline at the Authority's request.

8. **COMMITMENT TO PURCHASE WATER.** The City and/or Authority agree to the purchase of water in accordance with the Water Systems Interconnect and Water Transfer Contract.

9. **COMMITMENT TO MAINTAIN INTERCONNECTION READINESS.** The Parties agree to maintain a continued readiness-to-serve status for the

Interconnect(s) and Delivery Point(s) through delivery of adequate quantities of Available Water in accordance with the Water Systems Interconnect and Water Transfer Contract between the Parties.

10. **COMMITMENT TO AMEND THE WATER SYSTEMS INTERCONNECT AND WATER TRANSFER CONTRACT.** The City and the Authority shall amend the Water Systems Interconnect and Water Transfer Contract no later than ninety (90) days from the Effective Date to include the Interconnect(s) and Delivery Point(s) provided for in this Agreement.

11. **WATER QUALITY.** The Parties shall deliver water of good and uniform quality to the Delivery Points(s). The water delivered to the Delivery Point(s) shall be stabilized and shall meet all federal, state or regional regulations and orders relating to drinking water without regard to water quality exemptions, variances or similar regulatory relief authorized at the federal, state or regional government level.

12. **JOINT EFFORTS.** The Parties shall cooperate with regard to the following:

a. Operation and Maintenance. All Parties shall coordinate operation for the mutual benefit of all Parties.

b. Pipeline Project Consent. All Parties will request Charlotte County to provide written consent for the Pipeline Project in accord with the Master Water Supply Contract (paragraph 22.2).

c. Future Planning. The City and Authority will cooperate to evaluate future expansion of the RO Project and explore the potential for additional water supply for the City and Authority.

13. **REPRESENTATIONS OF THE PARTIES.** The Parties make the

following representations:

a. Each Party is duly organized and existing in good standing under the laws of the State of Florida and is duly qualified and authorized to carry on the governmental functions and operations as contemplated by this Agreement.

b. Each Party has the power, authority and legal right to enter into and perform its obligations set forth in this Agreement, and the execution, delivery and performance by it a) has been duly authorized by its governing body; b) does not require any other approvals by any other governmental officer or body; c) does not require any consent or referendum of the voters; d) will not violate any judgment, order, law or regulation applicable to the Party; and e) does not constitute a default under, or result in the creation of, any lien, charge, encumbrance or security interest upon the assets of the Party under any agreement or instrument to which it is a Party or by which the Party and its assets may be found or affected.

c. This Agreement has been duly entered into and delivered by the respective governing bodies and, as of the date of its full execution by all Parties, constitutes a legal, valid and binding obligation of said Party, fully enforceable in accordance with its terms provided the enforceability thereof may be limited by any applicable bankruptcy, insolvency, reorganization or other similar laws affecting creditors' rights generally, or by the exercise of judicial discretion in accordance with general principles of equity.

d. There is no action, suit or proceeding, at law or in equity, before or by any court or governmental authority, pending or, to the best of the Party's knowledge, threatened against the Party, wherein any unfavorable decision, ruling or finding would materially adversely affect the performance by the Party of its obligations hereunder or the other transactions contemplated hereby, or which, in any way, would adversely affect the validity or enforceability of this Agreement, or any other agreement or instrument entered into by the Party in connection with the transaction contemplated hereby.

14. **NOTICES.** In the event a party hereunder desires or is required to provide any notice to the party, the party desiring or required to provide such notice shall provide it in writing, send it by traceable mail, return receipt requested, postage prepaid or traceable overnight delivery service, to the other party at the addresses listed below:

If to City: Howard Kunik, City Manager
326 West Marion Avenue
Punta Gorda, FL 33950

If to Authority: Patrick J. Lehman, Executive Director
9415 Town Center Parkway
Lakewood Ranch, Florida 34202

Any change of notification address or person shall be in writing and delivered pursuant to this provision.

15. **DISCLAIMER OF THIRD PARTY BENEFITS.** This Agreement is solely for the benefit of the Parties. No right or cause of action shall accrue upon or by reason hereof inure to or for the benefit of any third party.

16. **ASSIGNMENT.** This Agreement shall be binding on the Parties, their representatives, successors and assigns. Neither Party shall assign this Agreement or the

rights or obligations hereof to any other person or entity without the prior written consent of the other Party.

17. **INDEMNIFICATION.** Neither Party shall indemnify the other Party. Each Party acknowledges that its legal remedy shall be limited to filing suit against the other Party to this Agreement in a court of competent jurisdiction.

18. **APPLICABLE LAW/DISPUTES.** This Agreement and the provisions contained herein shall be construed, controlled, and interpreted according to the laws of the State of Florida. Any dispute involving litigation between the Parties is subject to all provisions of Chapter 164, Florida Statutes. The Parties agree that venue for any litigation over this Agreement shall be in Charlotte County, Florida, if filed in state court and in the Middle District of Florida if filed in federal court.

19. **DEFAULT AND REMEDY.** Recognizing the region's paramount need for a safe and dependable source of water supply, the Parties agree the remedy for a breach of the Agreement shall be specific performance, injunctive relief and any other equitable relief, as well as monetary damages.

20. **RELATIONSHIP OF THE PARTIES.** Nothing herein shall be deemed to constitute any Party a partner or joint venturer, or to create any fiduciary relationship among the Parties. Nothing within the Agreement or any previous agreement shall be construed to convey any ownership interest in any portion of the Authority Water System, including the Pipeline Project.

21. **WAIVER.** Unless otherwise specifically provided by the terms of this Agreement, no delay or failure to exercise a right resulting from any breach of this Agreement shall impair such right or shall be construed to be a waiver thereof, but such right may be exercised from time to time and as often as may be deemed expedient. Any

waiver shall be in writing and signed by the Party granting such waiver. If any representation, warranty or covenant contained in this Agreement is breached by any Party and thereafter waived by another Party, such waiver shall be limited to the particular breach so waived and shall not be deemed to waive, either expressly or impliedly, any other breach under this Agreement.

22. **AUTHORIZED REPRESENTATIVES.** For purposes of this Agreement, the Parties authorized representatives are as follows: the Authority Executive Director and the City Manager. Any Party may change its authorized representative at any time by written notice to the other Party.

23. **SECTION CAPTIONS AND REFERENCES.** The section headings and captions contained herein are included for convenience only and shall not be considered part of this Agreement or affect in any manner its construction or interpretation. Except as otherwise indicated, all references herein to sections are to sections of this Agreement.

24. **SEVERABILITY.** In the event any provision of this Agreement shall, for any reason, be determined invalid, illegal or unenforceable in any respect, the Parties shall negotiate in good faith and agree to such amendments, modifications or supplements to this Agreement or such other appropriate actions as shall, to the maximum extent practicable in the light of such determination, implement and give effect to the intentions of the Parties as reflected herein, and the other provisions of this Agreement, as amended, modified, supplemented or otherwise affected by such action, shall remain in full force and effect.

25. **AMENDMENT.** This Agreement may only be amended by a writing duly executed by the Parties.

26. **ENTIRE AGREEMENT.** This Agreement and exhibits attached shall constitute the entire agreement of the Authority and the City with respect to the Pipeline Project.

27. **FURTHER ASSURANCES.** The Authority and the City shall use all reasonable efforts to provide such information, execute such further instruments and documents and take actions as may be reasonably requested by the other Party and not inconsistent with the provisions of this Agreement and not involving the assumption of obligations or liabilities different from, in excess of or in addition to those expressly provided for in this Agreement to carry out the intent of this Agreement.

28. **CONSENTS.** To the extent that the consent of any Party to this Agreement is required as a condition to the action of other Parties, such consent shall not be unreasonably withheld.

29. **RECORDATION OF INTERLOCAL AGREEMENT.** This Agreement shall constitute an interlocal agreement pursuant to Section 163.01, Florida Statutes. A true and correct copy of this Agreement and any subsequent amendments shall be recorded by the Authority with the Clerk of the Circuit Court in Charlotte and Manatee Counties.

30. **AMBIGUITY.** The Parties agree that each one has played an equal part in the negotiation and drafting of this Agreement, and in the event any ambiguity should be asserted or realized in the interpretation or construction of this Agreement, the result of such ambiguity shall be equally assumed and realized by each Party.

31. **ATTORNEY FEES.** Should either party employ an attorney or attorneys to enforce any of the provisions of this Agreement, or to protect its interest in any matter arising under this Agreement, or to recover damages for the breach of this Agreement,

each party shall be responsible for its own costs, charges and expenses, including attorneys' fees, expert witness fees, fees and costs on appeal, and the cost of paraprofessionals working under the supervision of an attorney, expended or incurred in connection therewith, whether resolved by out-of-court settlement, arbitration, pre-trial settlement, trial or appellate proceedings. This paragraph does not constitute a waiver of sovereign immunity or extend liability beyond the limits established in Section 768.28, Florida Statutes.

32. **SOVEREIGN IMMUNITY.** The Parties intend to avail themselves to the benefits of Sections 768.28 and 163.01(9)(c), Florida Statutes, and of other statutes and common law governing sovereign immunity to the fullest extent possible. In accordance with Section 163.01(5)(o), Florida Statutes, therefore the City is not jointly liable for the torts of the officers or employees of the Authority, or any other tort attributable to the Authority, and that only the Authority shall be liable for torts attributable to it or for torts of its officers or employees, and then only to the extent of the waiver of sovereign immunity or limitation of liability specified in Section 768.28, Florida Statutes. Similarly, under Section 163.01(5)(o), Florida Statutes, therefore the Authority is not jointly liable for the torts of the officers or employees of the City, or any other tort attributable to the City, and that only the City shall be liable for torts attributable to it or for torts of its officers or employees, and then only to the extent of the waiver of sovereign immunity or limitation of liability specified in Section 768.28, Florida Statutes. The Parties intend the Authority and the City to have all the privileges and immunities from liability and exemptions from laws, ordinances, rules and common law which apply to the municipalities of the State of Florida. Nothing in this Agreement is intended to inure to the benefit of any third-party for the purposes of allowing any

claim which would otherwise be barred under the Doctrine of Sovereign Immunity or by operation of law.

33. **GOOD FAITH.** The Parties agree to exercise good faith and fair dealing in respect to all matters relating to this Agreement.

34. **EXECUTION OF AGREEMENT.** This Agreement shall be executed in two duplicate originals, any of which shall be regarded for all purposes as an original and all of which shall constitute one and the same instrument.

IN WITNESS WHEREOF, the Parties have executed this Agreement for the purposes expressed.

ATTEST:

Karen Smith, City Clerk

CITY OF PUNTA GORDA, FLORIDA

Carolyn Freeland, Mayor

APPROVED AS TO FORM:

David Levin
City Attorney for Punta Gorda

ATTEST:

Patrick J. Lehman, Executive Director

PEACE RIVER/MANASOTA REGIONAL WATER SUPPLY AUTHORITY

John R. Chappie, Chair

APPROVED AS TO FORM:

Douglas Manson, General Counsel for the
Peace River/Manasota Regional Water Supply Authority

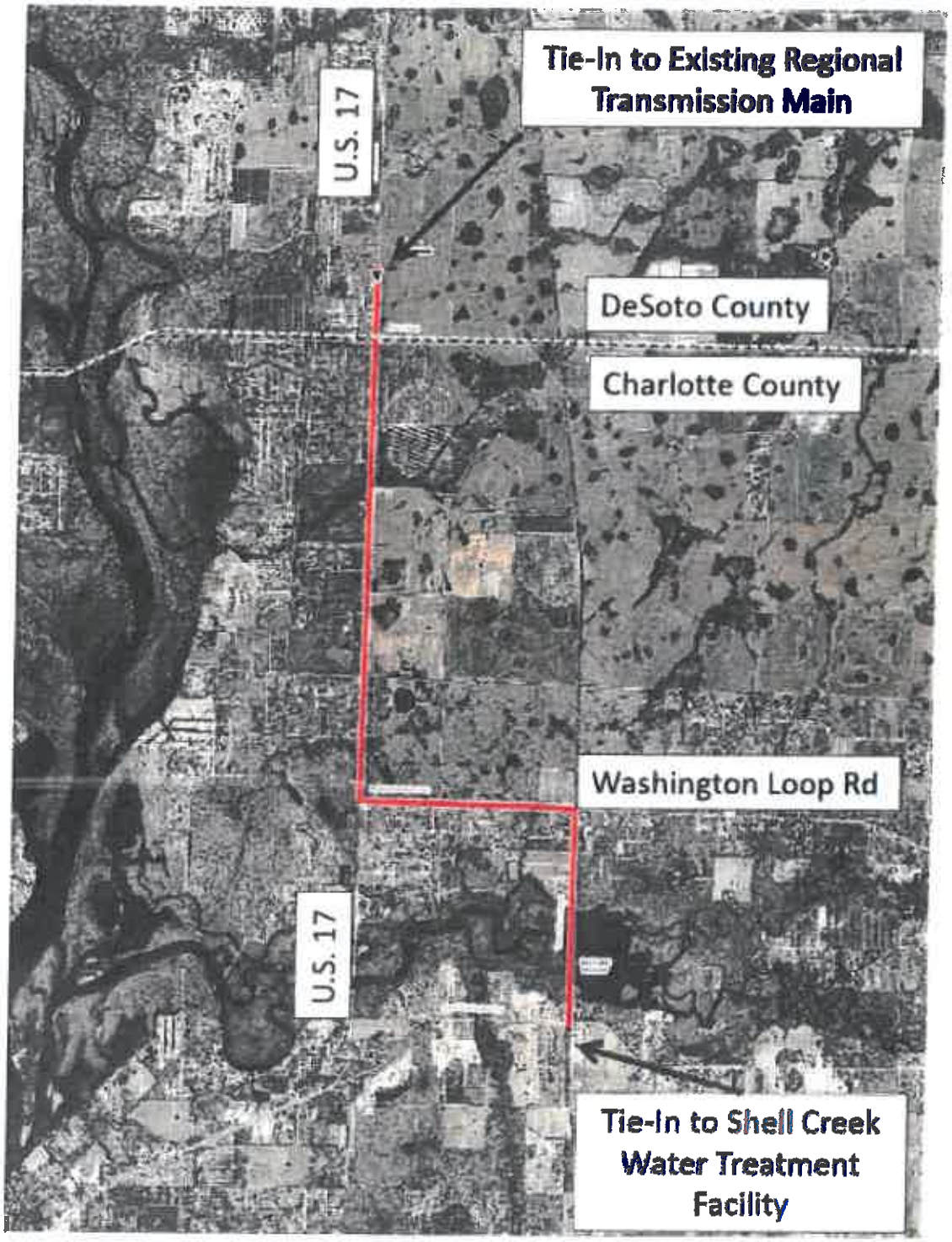
BOARD APPROVED

DEC - 2 2015

Peace River Manasota
Regional Water Supply Authority

EXHIBIT 1

Phase 1 Interconnect
Proposed Pipeline Route
(U.S. 17 to Punta Gorda)



APPENDIX B

COST TABLE

Table B.1 Estimated Annual Costs per Scenario

Year	Annual Average (mgd) Projections	Capital Costs		O&M and Water Use Costs		Capital + O&M and Water Use Costs	
		Scenario 1[1]	Scenario 2[2]	Scenario 1[3]	Scenario 2[4]	Scenario 1	Scenario 2
2025	6.51	$2,453,025	$2,750	$2,644,650	$4,286,090	$5,097,675	$4,288,840
2026	6.58	$2,453,025	$2,750	$2,782,450	$4,491,580	$5,235,475	$4,494,330
2027	6.64	$2,453,025	$2,750	$2,927,030	$4,706,640	$5,380,055	$4,709,390
2028	6.70	$2,453,025	$1,487,380	$3,071,870	$4,924,440	$5,524,895	$6,411,820
2029	6.77	$2,453,025	$1,487,380	$3,223,620	$5,152,130	$5,676,645	$6,639,510
2030	6.83	$2,453,025	$1,487,380	$3,382,600	$5,390,150	$5,835,625	$6,877,530
2031	6.88	$2,453,025	$1,487,380	$3,549,130	$5,638,980	$6,002,155	$7,126,360
2032	6.92	$2,453,025	$1,487,380	$3,723,580	$5,899,080	$6,176,605	$7,386,460
2033	6.96	$2,453,025	$5,380,840	$3,895,740	$6,159,740	$6,348,765	$11,540,580
2034	7.01	$2,453,025	$5,380,840	$4,075,720	$6,431,820	$6,528,745	$11,812,660
2035	7.05	$2,453,025	$5,380,840	$4,263,870	$6,715,810	$6,716,895	$12,096,650
2036	7.08	$2,453,025	$5,380,840	$4,460,540	$7,012,230	$6,913,565	$12,393,070
2037	7.11	$2,453,025	$5,380,840	$4,666,130	$7,321,610	$7,119,155	$12,702,450
2038	7.13	$2,453,025	$5,380,840	$4,870,540	$7,633,360	$7,323,565	$13,014,200
2039	7.16	$2,453,025	$5,380,840	$5,083,830	$7,958,340	$7,536,855	$13,339,180
2040	7.19	$2,453,025	$5,380,840	$5,306,390	$8,297,100	$7,759,415	$13,677,940
2041	7.21	$2,453,025	$6,756,750	$5,538,620	$8,650,230	$7,991,645	$15,406,980
2042	7.23	$2,453,025	$6,756,710	$5,780,940	$9,018,340	$8,233,965	$15,775,050
2043	7.26	$2,453,025	$6,756,890	$6,029,740	$9,397,760	$8,482,765	$16,154,650
2044	7.28	$2,453,025	$6,757,120	$6,289,200	$9,793,100	$8,742,225	$16,550,220
2045	7.30	$2,453,025	$6,757,210	$6,559,760	$10,205,030	$9,012,785	$16,962,240
2046	7.34	$2,453,025	$6,756,980	$6,841,910	$10,634,240	$9,294,935	$17,391,220
2047	7.38	$2,453,025	$6,757,170	$7,136,140	$11,081,470	$9,589,165	$17,838,640
2048	7.42	$2,453,025	$6,756,620	$7,459,970	$11,565,550	$9,912,995	$18,322,170
2049	7.46	$2,453,025	$6,756,980	$7,798,520	$12,070,880	$10,251,545	$18,827,860
2050	7.50	$2,453,025	$6,757,070	$8,152,450	$12,598,380	$10,605,475	$19,355,450

Notes:

(1) RO WTP and wellfield expansion scenario capital cost amortized over a 30-year period, with one borrowing period and a 5% financing rate.

(2) Authority allocation scenario annual debt service provided by the Authority (April 2024).

(3) Assumes RO WTP operating at 4.0 mgd, with remaining demands met by Shell Creek WTP. Refer to Section 6.2.2 for associated O&M costs. These costs were annually escalated by 4%.

(4) Assumes RO WTP operating at 2.0 mgd, Shell Creek WTP operating at 3.0 mgd, and remaining demands met by the Authority. Refer to Section 6.2.2 for associated O&M and water use costs. These costs were annually escalated by 4%.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