FINAL

2023 LONG-TERM MASTER WATER PLAN

Report

TAMPA BAY WATER NO. WA-011; 20220633
B&V PROJECT NO. 413437

PREPARED FOR

Tampa Bay Water

8 NOVEMBER 2023

Professional
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ABBREVIATIONS & ACRONYMS

AAF	Alkalinity Adjustment Facility
AAY	Annual Average Yield
Agency	Tampa Bay Water
AMI	Advanced Metering Infrastructure
AR	Aquifer Recharge
ASR	Aquifer Storage and Recovery
AWTP	Advanced Wastewater Treatment Plant
AWRF	Advanced Water Reclamation Facility
AWTP	Advanced Wastewater Treatment Plant
AWWA	American Water Works Association
BUDW	Brandon Urban Dispersed Wells
CCL	Contaminant Candidate List
CCL 1	Contaminant Candidate List 1
CCL 2	Contaminant Candidate List 2
CCL 3	Contaminant Candidate List 3
CCL 4	Contaminant Candidate List 4
CCL 5	Contaminant Candidate List 5
CCR	Consumer Confidence Report
CCT	Corrosion Control Treatment
CEC	Constituents of emerging concern
CIP	Capital Improvement Plan
CWUP	Consolidated Water Use Permit
cVOC	Carcinogenic VOC
D/DBPR	Disinfectants and Disinfection By-Products Rule
District	Southwest Florida Water Management District
DNA	Deoxyribonucleic Acid
DPR	Direct Potable Reuse
EC+	E.coli-positive
EDC	Endocrine-disrupting compounds
ESWS	Enhanced Surface Water System

FBRR	Filter Backwash Recycling Rule
FDEP	Florida Department of Environmental Protection
FFL	Florida Friendly Landscaping
GAC	Granular active carbon
gpd	Gallons per day
GWR	Groundwater Rule
HAA5	Haloacetic acids
HAL	Health advisory levels
HSPS	High Service Pump Station
IHM	Integrated Hydrologic Model
IPR	Indirect Potable Reuse
IESWTR	Interim Enhanced Surface Water Treatment Rule
INTB	Integrated Northern Tampa Bay
IOC	Inorganic chemicals
IPP	Industrial Pretreatmant Program
IPR	Indirect Potable Reuse
kgal	Thousand gallons
LCR	Lead and Copper Rule
LCRI	Lead and Copper Rule Improvements
LCRR	Lead and Copper Rule Revision
LFA	Lower Florida Aquifer
LRAA	Locational running annual average
LT1ESWTR	Long Term 1 Enhanced Surface Water Treatment Rule
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
LTMWP	Long-term Master Water Plan
MAR	Managed Aquifer Recharge
MCL	Maximum contaminate level
MCLG	Maximum contaminate level goal
MDBP	Microbial and Disinfection Byproducts
MF	Multi-Family
MFL	Minimum flows and levels

MF/UF	microfiltration / ultrafiltration
MG	Million gallon
mgd	million gallons per day
mg/L	Milligram per liter
MIA	Most Impacted Area
MRDL	Maximum residual disinfectant level
NDMA	N-nitrosodimethylamine
NPDWR	National Primary Drinking Water Rules
NR	Non-residential
NTU	Nephelometric Turbidity Units
NGVD	National Geodetic Vertical Datum
O&M	Operations and Maintenance
OROP	Optimized Regional Operations Plan
PAR	Public Access Reuse
PCP	Personal care products
PhAC	Pharmaceutically active compounds
PCE	tetrachloroethylene
PFAS	Per- and polyfluoroalkyl substances
POC	Point of connection
POE	Point of entry
PRC	Potable Reuse Commission
PRMRWSA	Peace River Manasota Regional Water Supply Authority
psi	Pounds per square inch
PQL	Practical qualification level
PWS	Public water systems
QMRA	Quantitative Microbial Risk Assessment
RAA	Running annual average
RCD	Rolling cumulative deficit
RDP	Resource Development Plan
RDX	Royal Demolition eXplosive
RMD	Rolling median deficit

RO	Reverse osmosis
RSWTP	Regional Surface Water Treatment Plant
RTCR	Revised Total Coliform Rule
SCADA	Supervisory Control and Data Acquisition
SCHI	South-Central Hillsborough Intertie
SCHRWF	South-Central Hillsborough Regional Wellfield
SDWA	Safe Drinking Water Act
SF	Single-family
SHARE	South Hillsborough Aquifer Recharge Expansion
SHARP	South Hillsborough Aquifer Recharge Program
SUVA	Specific UV absorbance
SWRE	System-Wide Reliability Evaluation
SWUCA	Southern Water Use Caution Area
SWFWMD	Southwest Florida Water Management District
SWTP	Surface Water Treatment Plant
SWTR	Surface Water Treatment Rule
TC+	Total coliform-positive
TCE	Trichloroethylene
TCR	Total Coliform Rule
TDS	Total dissolved solids
TECO	Tampa Electric Company
TOC	Total organic carbon
TTHM	Total Trihalomethane
μg/L	Micrograms per Liter
UCMR	Unregulated Contaminant Monitoring Rule
UFA	Upper Florida Aquifer
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Services
UV/AOP	Ultraviolet light/advanced oxidation process
WDPA	Water demand planning area
WF	Wellfield

WSMP	Water Shortage Mitigation Plan
WTP	Water treatment plant
WUP	Water Use Permit
VOC	Volatile organic carbon

Executive Summary: Long-Term Master Water Plan Priorities

The Long-term Master Water Plan (LTMWP) ensures that Tampa Bay Water prepares for the provision of adequate supplies over a 20-year planning horizon. The Long-term Master Water Plan not only begins the planning process, but it is also required by the 1998 Reinstated and Amended Interlocal Agreement to be updated every 5 years to ensure Tampa Bay Water has enough water supply over the 20-year horizon.

When to Build

At a high level, the plan identifies when new supplies will need to built by considering demand forecasts, water shortage mitigation strategies, and demand management.

What to Build

The plan also begins the process of identifying what to build by considering new water supply projects, optimization of existing assets and facilities, where to deliver and how, and public input.

Additionally, the plan evaluates impacts of adding additional water sources to Tampa Bay Water's system through an Agency staffing evaluation, hydraulic analysis, regulatory review, asset inventory and more.

Projected Water Demands

Tampa Bay Water has the unequivocal obligation to meet the drinking water demands of its six member governments which include Hillsborough, Pasco and Pinellas counties and the cities of New Port Richey, St. Petersburg and Tampa. Tampa Bay Water and the member governments provide water to more than 2.5 million people. To ensure it meets its obligations, Tampa Bay Water forecasts regional water demands for each member, including the City of Tampa, which self-supplies up to 82 million gallons per day (mgd) from the Hillsborough River to meet its demands.

The regional water demands are anticipated to increase by approximately 50 mgd through the year 2043.

Tampa Bay Water's Board voted to expand the system by 2028 via increasing the Regional Surface Water Plant capacity by a minimum of 10 mgd.

Demand projections show that between 2033 and 2043, an additional 25 mgd will be needed. This can be brought online incrementally to align supply with demand to prevent overburdening the rate with supply that is not yet needed.

The 2033 water supply is recommended to be between 10 to 20 mgd.

Concept Development

- A methodical process, based on scientific and defensible principals, was used for water supply option identification, evaluation and screening, to identify and develop water supply concepts, without bias to one water supply over another, to meet the regions demands for the 20-year planning cycle.

- Concept development began with the Universe of Options, including over 100 options, and included three evaluation and screening steps (Coarse, Fine and Short-List screening) to conclude with the recommended projects to move into the Feasibility Study phase of water supply selection.

- New water supply options were evaluated and scored based on three equally weighted Tampa Bay Water Board-approved selection criteria categories, Environmental Sustainability, Project Cost and Reliability, which were further broken down into specific sub-criteria.

- Based on the Short-List evaluation and scoring, seven projects were recommended to undergo feasibility studies.

Short-List Recommendations

Tampa Bay Water and the project team are recommending a short-list of seven water supply project concepts for inclusion in the upcoming feasibility study phase of the long-term master water planning process. These seven short-list concepts represent the top-ranked options for further study and consideration to meet the region's water needs by 2033. The projects are recommended for detailed feasibility studies, then, as part of the Water Supply Selection, the projects will once again be compared to each other and ranked so that the Tampa Bay Water Board may select the 2033 Water Supply.

A. Eastern Pasco Wellfield (with fresh and/or brackish groundwater)

B. Consolidated Water Use Permit Increase

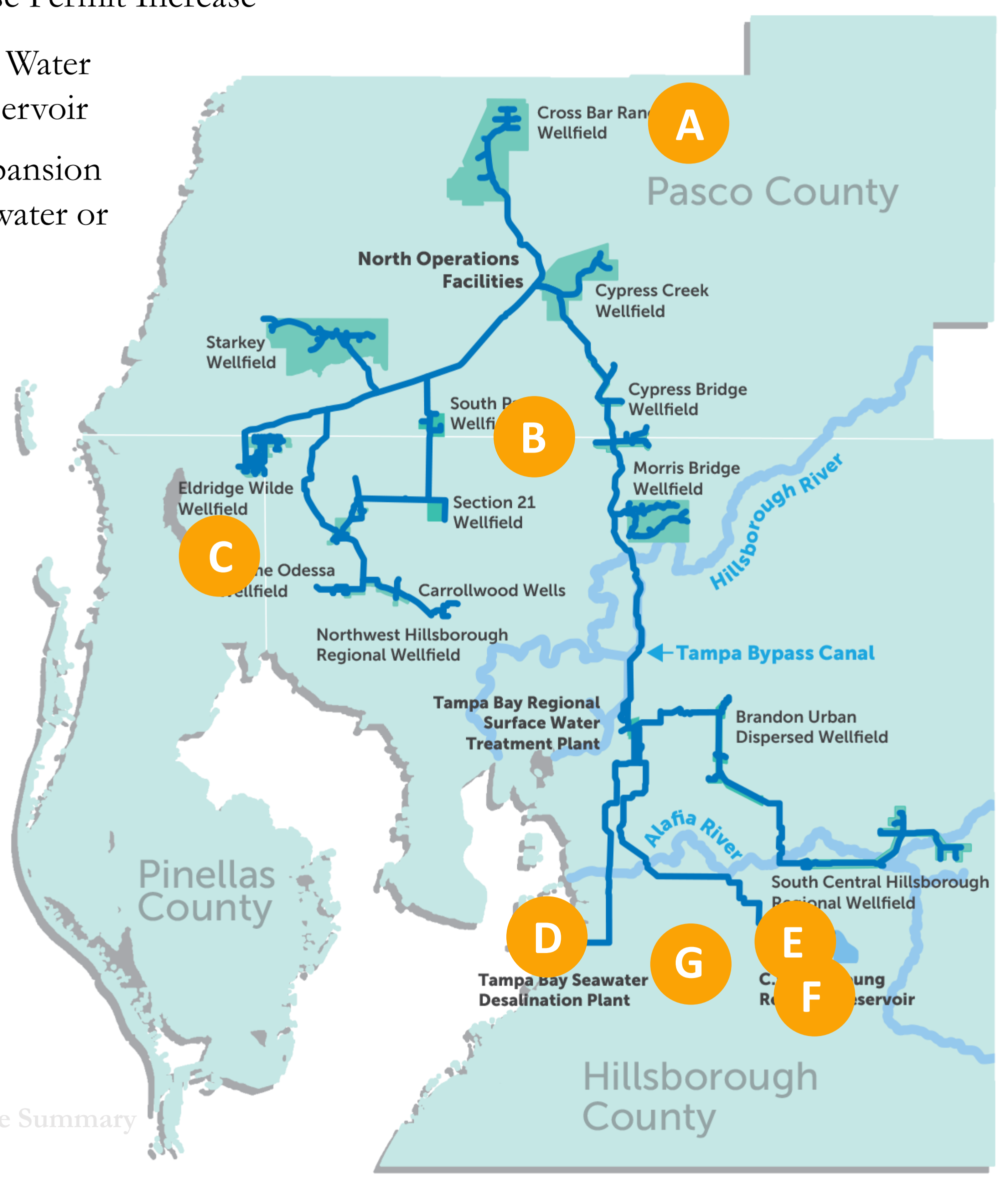
C. North Pinellas Surface Water Treatment Plant & Reservoir

D. Desalination Plant Expansion (with brackish groundwater or seawater)

E. Surface Water Treatment Plant at Regional Reservoir via Alafia Withdrawals

F. South Hillsborough Surface Water Treatment Plant & Reservoir

G. South Hillsborough Wellfield via Aquifer Recharge



Developmental Alternatives

Developmental alternatives are water supply options that may require sophisticated technologies, that do not have a current regulatory framework for permitting, or that require more long-term analysis and study. As technology advances and processes develop, the cost of an alternative may decline or permitting uncertainties may be resolved.

The evaluation of the developmental alternatives will run concurrent with the feasibility program. Tampa Bay Water will work with the Member Governments to define the availability of the reclaimed source and assess the reclaimed water for water quality and other parameters, and better understand the permitting and regulatory framework, pilot technologies, and talk to the public extensively. When, or if, project concepts under this program become clearly defined and are considered feasible options, they can become part of the water supply selection process.

- The Florida Department of Environmental Protection (FDEP) is developing new rules for potable reuse that include revising existing IPR regulations contained in Chapter 62-610, Florida Administrative Code (FAC), Part V – Groundwater Recharge and Indirect Potable Reuse and developing new regulations for DPR in a new Chapter 62-565, FAC Potable Reuse. The timeline for adoption of the revisions and new regulations has not been published but the FDEP has stated that they expect to have the rules adopted before the end of 2024.

- As alternatives were developed and evaluated for the 2023 LTMWP update, and potable reuse was considered as a source, it was determined that potable reuse was a candidate for becoming a Developmental Alternative.

- The Development Alternatives will start with a Source Water Assessment including characterize the reclaimed water quality; evaluate the water control controls currently in place; initiate pilot testing or a demonstration facility; engage, inform and educate the community on reclaimed as a possible source; and stay abreast of regulatory updates.

- This process will yield a short list of potable reuse projects for more detailed evaluations.

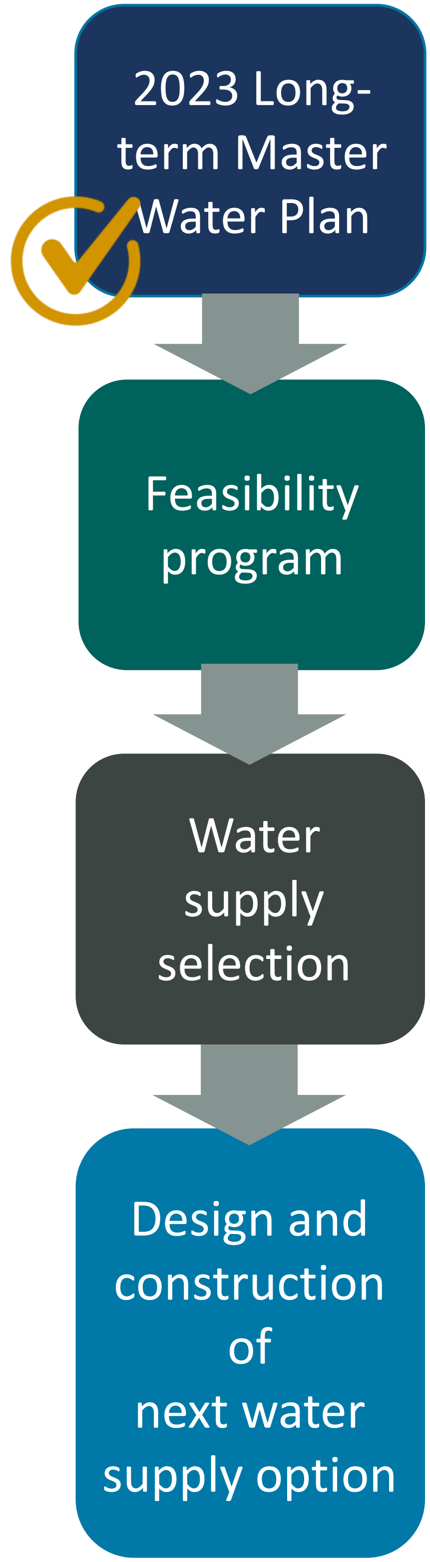
Public Engagement

With the 2023 Long-term Master Water Plan Update, Tampa Bay Water continued its long-running practice proactive public engagement consistent with the American Water Works Association's policy statement on public involvement and customer communications. As such, Tampa Bay Water sought to engage stakeholders through several efforts.

The purpose of these engagement efforts was not to reach consensus or approval, but rather to obtain input from stakeholders early in the planning process to inform the scope for the shortlisted projects. Key findings include:

- Drinking water quality continues to be a concern with just over half of residents (53%) drink household tap water, down 3% from 2018. Waning confidence in the current water supply will complicate public acceptance of an alternative supply that has more complex water quality concerns than the existing sources.
- Protecting the environment is a priority for residents. Stakeholders in all forums expressed concern about any activity that could harm the aquifer, lakes, wetlands, rivers or springs.
- There is an opportunity to help inform and educate stakeholders through clear, consistent, easily accessible information on water supply sources, the wholesale water supply system, local utility water supply systems, water quality standards and how the current water supplies compare to those standards.
- Government trust plays a role in public acceptance. Participation or confirmation from independent third parties, like universities or the Department of Health, can bolster public trust and support.
- Health and safety are the top concerns cited by residents for reclaimed water

Next Steps



As the 2023 Long-term Master Water Plan is completed, if approved by the Board of Directors, the next step for the seven short-list projects is to enter into the feasibility study phase, where a more detailed technical and economic analyses will be completed to increase the level of certainty regarding yield, water quality and costs, and determine if there are any roadblocks that may remove the project from consideration.

The feasibility study analyses may include:
Modeling,

- Analyzing regulatory and permitting requirements,
- Conducting pilot studies,
- Identifying potential properties,
- Engaging with the public,
- Preparing of conceptual design, and
- Defining capital and operating costs

Then, the short-listed projects will enter the Water Supply Selection process and water supply configurations of one or more projects will be developed to meet the future demands.

The Water Supply Selection process will recommend the project or configuration of multiple projects for Board consideration / approval to move forward into design and construction to meet the future demands.

The Developmental Alternatives will be evaluated in parallel to the Feasibility Studies, though are expected to have a longer duration. When or if project concepts under this program become clearly defined and are considered feasible options, they can become part of the water supply selection process.

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1.0 Introduction

Tampa Bay Water is a regional water supply authority created in 1998 to provide wholesale water for its six-Member Governments: Hillsborough, Pasco and Pinellas counties, and the cities of New Port Richey, St. Petersburg and Tampa. Tampa Bay Water's Long-term Master Water Plan (LTMWP) documents how Tampa Bay Water meets its unequivocal obligation to provide quality water to the Member Governments now and in the future and includes several main components as presented in **Figure 1-1**. The 1998 Amended and Restated Interlocal Agreement (referred to as the Interlocal Agreement) requires the LTMWP to be updated every five years. The LTMWP ensures that Tampa Bay Water (Agency) prepares for the provision of adequate supplies over a 20-year planning horizon. Since 1998, Tampa Bay Water completed four revisions of its LTMWP; 1996, 2008, 2013 and 2018. This document, entitled 2023 Long-term Master Water Plan, is the fifth and latest update.

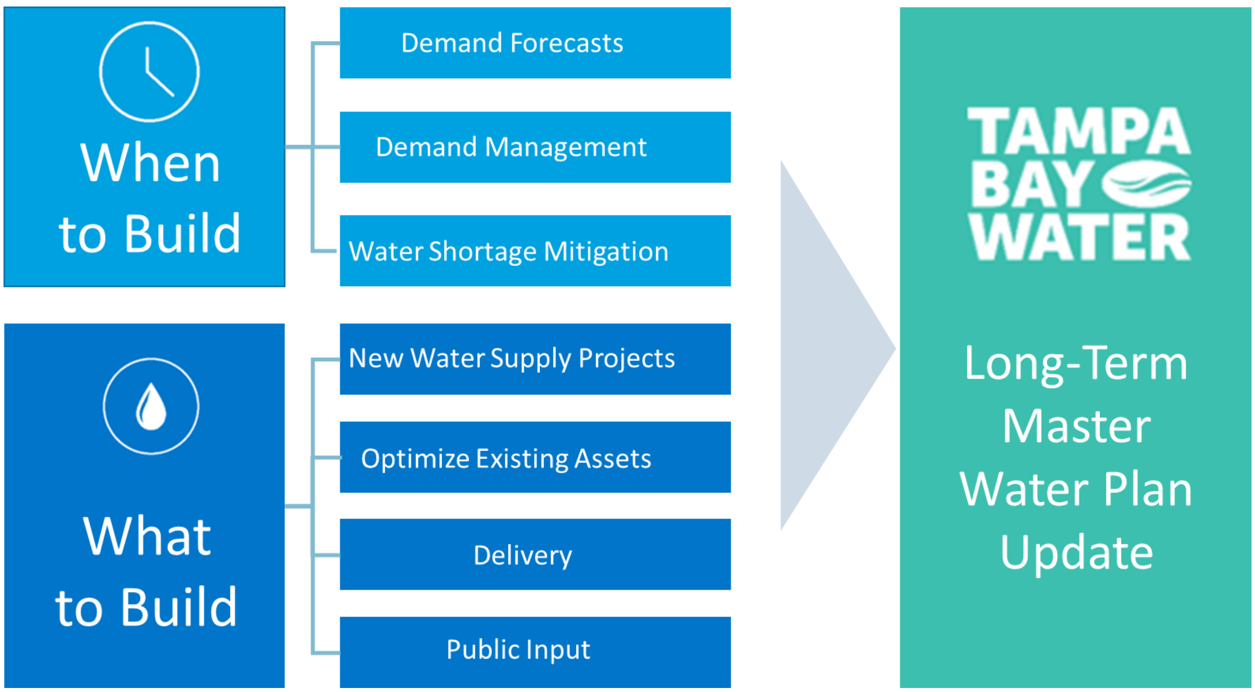

Figure 1-1 Major Components of the LTMWP

1.1 Objectives of 2023 Long-term Master Water Plan

The objectives of this 2023 LTMWP are to meet the requirements set forth in Section 2.09 of the 1998 Interlocal Agreement. These objectives are summarized in **Table 1-1** along with the sections of the report containing the required information.

Table 1-1 2023 Long-term Master Water Plan Required Section Objectives

Requirement	Report Section
Review and generally inventory all existing Agency Water Supply Facilities	Section 2
Identify current customers, projects, and future customers	Section 3
Review all current Tampa Bay Water environmental permits, existing regulations and projected regulations	Section 6
Evaluate present and future sources of water and treatment requirements for those sources in terms of capacity, reliability and economy	Section 7
Identify all proposed new water supply facilities	Sections 7 and 11
Update the list of proposed Water Supply Facilities required to meet the anticipated Quality Water needs of the Member Governments for the next 20 years	Sections 7 and 11
Provide for hydraulic analysis of the Agency's Water Supply Facilities, both existing and proposed	Section 8
Evaluate Agency staffing	Section 9
Identify a capital improvements program for the Agency	Section 13

1.2 Review of Governing Agreements

Two agreements were established in 1998 to direct the governance and operations of Tampa Bay Water: the Interlocal Agreement and the Master Water Supply Contract. Tampa Bay Water follows the requirements established by these documents in meeting its commitments to the Member Governments.

1.2.1 Amended and Restated Interlocal Agreement

The Interlocal Agreement outlines critical production requirements for Tampa Bay Water, as follows:

- "If the actual delivery of Quality Water by the Authority to the Member Governments during any twelve-month period exceeds 75 percent of the aggregate permitted capacity of the Authority's production facilities, the General Manager shall report to the Board and recommend that the Authority initiate preparation of Primary Environmental Permit applications necessary to ensure an adequate supply. The Authority shall initiate any such applications expeditiously." (Section 3.03 C.1)

- "If the actual delivery of Quality Water by the Authority to the Member Governments during any twelve-month period exceeds 85 percent of the aggregate permitted capacity of the Authority's production facilities, the General Manager shall report to the Board and recommend that the Authority file Primary Environmental Permit applications to ensure adequate supply. The Authority shall file any such applications expeditiously." Section 3.03 C.2)

Meeting these production requirements is essential in Tampa Bay Water's decision-making process, while planning for its future water supplies. Tampa Bay Water annually updates its Long-term Demand Forecasting models which estimates the future demand across seven Water Demand

Planning Regions of Tampa Bay Water's six-Member Governments, and is further detailed in Section 2 and 3 of this Report. The forecasting model uses specific weather and socioeconomic models that generate separate demand projections for each of the planning regions. The model accounts for events of extreme drought, as well as normal hydrological events. The results of the modeling show that Tampa Bay Water's existing supply should meet the region's demands until approximately 2028 when the expansion of the Regional Surface Water Treatment Plant will occur. The year 2033 will require the next water expansion. The projects in this 2023 Master Water Plan have sufficient capacity to meet Tampa Bay Water's long-term 20-year needs. For planning purposes, and per the Interlocal Agreement, choosing a future project(s) and beginning the preparation of water use permits is based on the supply capacity under average hydrologic conditions since these projects are developed to meet long-term water supply needs and not seasonal drought events or rare significant drought years. The details of the design capacities and storage requirements should consider sustainable capacities. This Plan does not select the next water supply for Tampa Bay Water. The projects recommended to the Board for this 2023 LTMWP will be further developed following Plan approval and as part of the Feasibility Studies to assist the Board in choosing the next project or projects to implement.

1.2.2 Master Water Supply Contract

The Master Water Supply Contract outlines Tampa Bay Water's obligations to supply Quality Water to the Member Governments. Section 8 states that Tampa Bay Water:

- "shall sell and deliver sufficient Quality Water to the Member Governments to meet their need for Quality Water." Quality Water is defined as water meeting the Water Quality Standards required for delivery to Member Governments as defined in "Exhibit D" of the Master Water Supply Contract.

- "shall be in default hereunder should it fail to provide each Member Government a supply of Quality Water sufficient to meet its needs, except where the Authority's failure to supply the Quality Water needs of each government is due to force majeure."

The Master Water Supply Contract also describes specific details of water delivery which must be met by Tampa Bay Water, including:

- Points of connection to each Member Government ("Exhibit C").

- Water quality standards for water delivered to Member Governments ("Exhibit D").

- Procedures for developing new or modified points of connection.

1.3 Water Supply Expansion History

Each year, the Agency updates the regional water demand forecast, which is used in estimating the quantity and timing of its Members' future water supply needs. Taking into consideration hydrologic variability and uncertainty, droughts, and El Niño/La Niña phenomena, the Agency carefully evaluates the demand/supply relationship each year. Every five years, potential new water supply sources are evaluated as part of the LTMWP and depending on the needs analysis, the Agency performs feasibility studies on different potential water supply projects that could meet the region's future quality water demands. The timing of new water supply implementation is crucial because

Section 3.03 of the 1998 Interlocal Agreement requires that the Agency initiate preparation of water use permits once the regional demand reaches 75% of available permitted supply.

Tampa Bay Water has accomplished major facility and operational improvements since its creation in 1998, when its water supply was 100% dependent on groundwater. The original Master Water Plan included a phased approach to developing new water supplies in four separate configurations over a 20-year horizon. In 1998, the Tampa Bay Water Board of Directors approved System Configuration I water supply projects for implementation. This configuration was driven by the agreement between Tampa Bay Water, its Member Governments and the Southwest Florida Water Management District (the District) to reduce groundwater pumping at 11 regional wellfields by developing 91 million gallons per day (mgd) of new, alternative water supplies. System Configuration I, which included two surface water intakes, a surface water treatment plant, a seawater desalination facility, a 15.5-billion-gallon reservoir and several large diameter pipelines, was completed in 2005. In 2007, Tampa Bay Water's Board of Directors approved Configuration II of the Master Water Plan, which added 17 mgd to the system by expanding the Regional Surface Water Treatment plant and adding pumping capacity and transmission capability enhancement of the Tampa Bay Water's C.W. Bill Young Regional Reservoir. The System Configuration II program was completed in December 2011. The existing Tampa Bay Water system is presented in **Figure 1-2**.

By 2028, Tampa Bay Water will complete an additional expansion of the Regional Surface Water Treatment Plant, which was a recommendation from the 2018 LTMWP. This expansion has been included as a planned improvement within the 2023 LTMWP.

The completion of Configurations I and II resulted in a diversified interconnected water supply portfolio that is drought resistant and responsive to climate variations and environmental sustainability. This interconnected system consists of groundwater, surface water and desalinated water, with facilities as summarized in **Table 1-2**.

Table 1-2 Summary of Tampa Bay Water's Supply System

Groundwater Facilities	Surface Water Facilities	Transmission and Distribution
• 12 wellfields • 160 wells • 6 groundwater treatment facilities • 2 groundwater hydrogen sulfide removal facilities	**Freshwater Facilities** • 2 river withdrawal pump stations • 1 re-pump station • 1 15.5 billion-gallon surface water storage reservoir • 1 surface water treatment plant • 1 booster pump station • 1 reservoir pump station • 1 augmentation pump station (Harney Canal) **Desalination Facilities** • 1 seawater desalination plant	• 4 booster pumping stations • 18 points of connection subject to Member Government expectations for Exhibit C and D • 2 points of connection for emergency conditions • ~115 miles of raw water pipeline • ~156 miles of finished water pipeline • 1 alkalinity adjustment facility at the Regional Facilities Site • 4 interconnections where Tampa Bay Water can purchase water from its Members

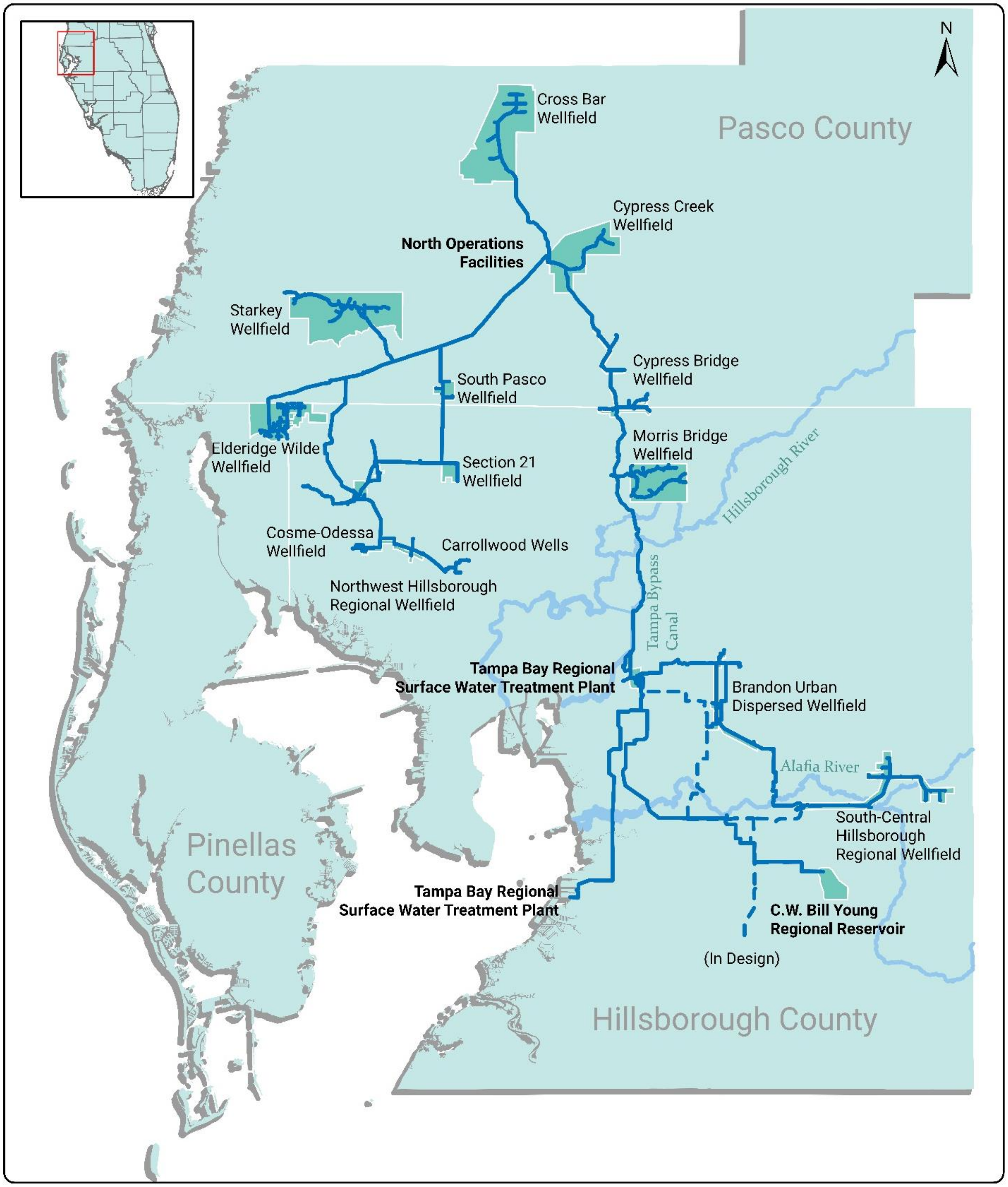

Figure 1-2 Regional Water Supply Major Facilities and Delivery System

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2.0 Existing Water Source and Facility Summary

Tampa Bay Water has constructed a renal water delivery system that is comprised of groundwater sources, surface water sources, an off-stream surface water storage reservoir, a seawater desalination facility, several pumping facilities and piping to distribute water to the six member governments. The location of the major facilities is shown in Figure 2-1. The Regional System facilities currently in service are summarized below in Table 2-1. This section provides an overview of the major system facilities throughout Tampa Bay Water's System.

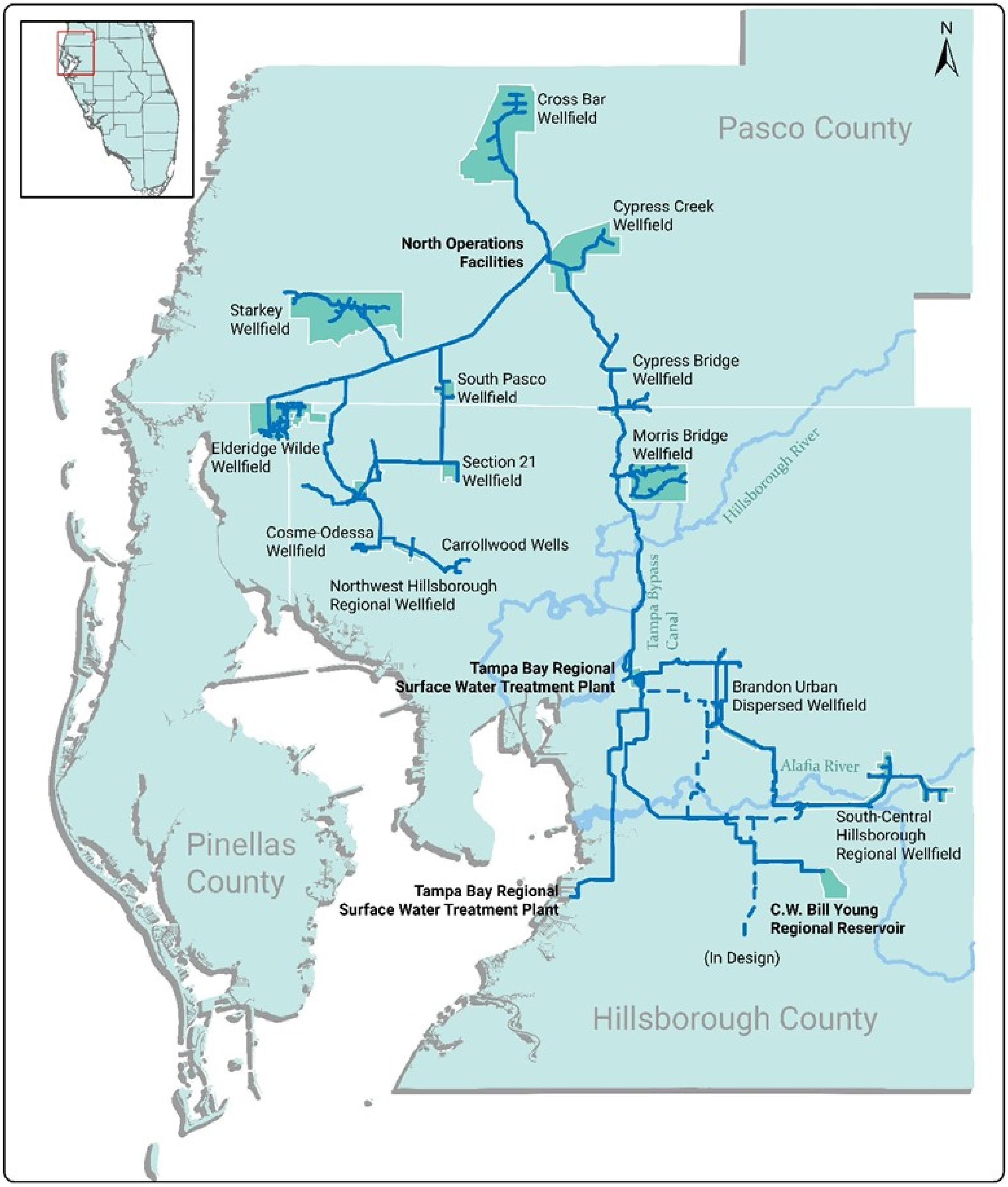

Figure 2-1 Regional Water Supply Major Facilities and Delivery System

Table 2-1 Regional System Facilities Currently in Service by Source

Groundwater Facilities	Surface Water Facilities	Transmission and Distribution
• 12 wellfields • 160 wells • 6 groundwater treatment facilities • 2 groundwater hydrogen sulfide removal facilities	**Freshwater Facilities** • 2 river withdrawal pump stations • 1 re-pump station • 1 15.5 billion-gallon surface water storage reservoir • 1 surface water treatment plant • 1 booster pump station • 1 reservoir pump station • 1 augmentation pump station (Harney Canal) **Desalination Facilities** • 1 seawater desalination plant	• 4 booster pumping stations • 18 points of connection subject to Member Government expectations for Exhibit C and D • 2 points of connection for emergency conditions • ~115 miles of raw water pipeline • ~156 miles of finished water pipeline • 1 alkalinity adjustment facility at the Regional Facilities Site • 4 interconnections where Tampa Bay Water can purchase water from its Members

2.1 Capacity Definitions

Tampa Bay Water has defined capacities for major facilities within the current Regional System. The facility capacity terms are defined in **Table 2-2**.

Table 2-2 Capacity Terms for Major Facilities

Capacity Term	Definition
Rated Capacity	Design or permitted capacity of a facility
Minimum Capacity	Minimum capacity at which a facility can be operated
Sustainable Operating Capacity	Continuous sustainable operating capacity of a facility, also includes peak day and greater than five days operational capacity

- The term "permitted capacity" refers to the average annual Water Use Permit limit on source withdrawal.

- Rated Capacity, a term used by regulatory agencies in issuing drinking water permits, is based on the design treatment capacity of the facility and successful completion of performance testing to verify its capabilities. The term "Rated Capacity" used in this evaluation uses either the design or permitted capacity to determine the maximum amount of water the facility can produce.

- The minimum operational capacity is the lowest amount of water that a facility can pump or treat during a 24-hour period. When there is insufficient source water to meet the minimum operational flow requirements or the need for the water to be reduced below the minimum operational capacity, the facility is taken out of service. The facility is returned to service when either the demand increases, or sufficient source water returns to maintain production at or above operational minimum rates. Operational minimum capacities are determined based on design, hydraulic limitations, and operational limitations.

- The sustainable operating capacity generally represents the five-day amount of water that can move through a facility dependably and meet demands at the daily time scale at that flow rate. Sustainable operating capacity is based on performance and operational experience. Factors considered in determining sustainable capacity include chemical feed systems, facility hydraulics, normal maintenance activities, source water quality, and industry standards.

The following sub-sections describe Tampa Bay Water's existing water sources and facilities by water source and/or facility type.

2.2 Groundwater Source Capacity

Currently, groundwater sources account for approximately half of the total sustainable supply permitted for Tampa Bay Water, including the Consolidated Water Use Permit (CWUP) limited to 90 million gallons per day (mgd). **Figure 2-1** shows the locations and general infrastructure layout of the existing Tampa Bay Water wellfields (WF). **Table 2-3** shows the rated (i.e., permitted or design), minimum and sustainable capacities for these wellfields.

In general, each of Tampa Bay Water's existing wellfields includes a number of water supply wells equipped with vertical turbine or submersible well pumps, discharge piping and valves, instrumentation and controls, and raw water mains to carry the supply to a treatment facility. The quality of the untreated groundwater pumped directly from the wellfields meets most state and federal primary and secondary drinking water standards. Generally, the water requires only disinfection and stabilization (to control corrosivity) prior to distribution to customers. In some cases, Tampa Bay Water treats the groundwater and blends it with other regional water supplies prior to delivery to a Member Government point of connection. In other cases, raw groundwater is delivered to Member Government treatment facilities where it is treated for local distribution. Selected wellfields and/or individual wells include auxiliary generators. Most of the wellfields are connected to the Regional System through their nearby water treatment plants (WTP).

Tampa Bay Water groundwater sources include twelve wellfields, two of which consist of individual well systems (Carrollwood and Brandon Urban Dispersed Wells (BUDW)). Ten wellfields are managed under the CWUP, although the North Pasco wellfield has been removed from service. The South-Central Hillsborough Regional Wellfield (SCHRWF), BUDW, and Carrollwood Wells have individual water use permits. All groundwater sources are managed to meet Tampa Bay Water's delivery requirements for regional demands. The Optimized Regional Operations Plan (OROP), initiated in 1999, is a custom-built application which incorporates an optimization model and utilizes output from various surface and ground water models, current hydrologic and pumpage data, and a set of operating constraints to manage production from the ten wellfields under the CWUP, the BUDW, and the Carrollwood Wells through the development of weekly well rotation schedules. **Appendix A** includes additional details of each of the wellfields listed in **Table 2-3.**

Table 2-3 Rated and Sustainable Capacities of the Existing Wellfields

Wellfield	Number of Wells	Rated Capacity			Sustainable Capacity	
		WUP	Design	Minimum	Peak Day	>5 Days
		mgd	mgd	mgd	mgd	mgd
Brandon Urban Dispersed Wells (BUDW)	5	6.0	9.3	1.5	6.0	5.5
Carrollwood Wells	3	0.82	2.9	0.6	1.2	0.8
South-Central Hillsborough Regional WF	17	24.95[1]	45.0	8.0	45.0	45.0
Cosme/Odessa WF	19	CWUP[2]	22.0	3.0	20.0	19.0
Cross Bar WF	17	CWUP	45.0	6.5	43.0	38.5
Cypress Bridge WF	10	CWUP	30.0	5.0	20.0	17.5
Cypress Creek WF	13	CWUP	38.0	5.0	35.0	30.0
Eldridge Wilde WF	24	CWUP	45.0	5.0	36.0	25.0
Morris Bridge WF	20	CWUP	40.0	5.0	20.0	17.5
NW Hillsborough WF	6	CWUP	18.0	1.5	16.5	15.0
Section 21 WF	6	CWUP	23.0	4.0	21.0	18.5
South Pasco WF	8	CWUP	28.0	4.0	26.5	12
Starkey WF	12	CWUP	23.5	1.5	19.5	8.0
TOTAL	**160**	**121.77**	**369.7**	**50.6**	**142.2**	**141.3**

[1] Permit quantity will revert to 24.1 mgd when the new South Hillsborough pipeline is completed (estimated late 2028)

[2] CWUP = Consolidated Water Use Permit, this is the average water use permitted from Tampa Bay Water's consolidated wellfields, which is currently set at 90 mgd as a 12-month rolling average.

2.3 Groundwater Treatment Facilities

Tampa Bay Water operates six groundwater WTPs: Morris Bridge WTP, Lake Bridge WTP, Cypress Creek WTP, South Pasco WTP, BUDW Site 5 WTP, and BUDW Site 7 WTP. The groundwater WTPs provide chemical treatment and disinfection of raw groundwater. In addition, Tampa Bay Water operates two hydrogen sulfide removal facilities: an ozone facility at the SCHRWF and force draft packed tower aeration system at the Eldridge-Wilde Wellfield. The treated groundwater is either delivered to a Member Government or blended with regional water for delivery to downstream points of connection. **Table 2-4** shows the rated, minimum and sustainable capacities for these facilities. Additional details of each of these treatment facilities can be found in **Appendix A**.

Table 2-4 Rated and Sustainable Capacities of the Groundwater Treatment Facilities

Facility	Rated Capacity			Sustainable Capacity	
	Permitted Capacity	Design	Minimum	Peak Day	>5 Days
	mgd	mgd	mgd	mgd	mgd
Permit Water Treatment Plants connect to Consolidated Water Use Wellfields					
Cypress Creek WTP	83.0	83.0	11.0	78.0	68.5
Keller Hydrogen Sulfide Removal Plant	45.0	45.0	10.0	30.0	25.0
Lake Bridge WTP/Wellfield Chloramination	44.9	30.0	4.5	20.0	17.5
Morris Bridge WTP	30.0	40.0	5.0	20.0	17.5
South Pasco WTP	30.0	30.0	3.5	26.5	12.0
Other Water Treatment Plants					
Brandon Urban Dispersed Well 5 WTP	6.2	6.2	1.0	5.0	3.0
Brandon Urban Dispersed Well 7 WTP	3.0	3.1	0.5	1.0	1.0
Lithia Ozone Hydrogen Sulfide Removal Plant	45.0	45.0	8.0	40.0	35.0
TOTAL	**287.1**	**282.3**	**43.5**	**220.5**	**179.5**

2.4 Surface Water Treatment Facilities

2.4.1 Tampa Bay Regional Surface Water Treatment Plant and High Service Pump Station

The Tampa Bay Regional Surface Water Treatment Plant (Regional Surface Water Treatment Plant) is located in central Hillsborough County near East Columbus Drive and U.S. Highway 301. The plant treats surface water from the Tampa Bypass Canal, Alafia River, Hillsborough River, and the C.W. Bill Young Regional Reservoir. The finished water is pumped to three 7.5-million-gallon ground storage tanks for storage and blending with desalinated water. An expansion is currently under way to add capacity to the Regional Surface Water Treatment Plant.

Treatment at the surface water facility includes the following (see **Figure 2-2**):

- pH adjustment;
- High-rate ballasted sedimentation process, sulfuric acid and ferric sulfate for enhanced coagulation, flocculation and sedimentation;
- Ozone for primary disinfection;
- Biologically active filtration for turbidity reduction (particle removal), taste and odor control, and removal of biodegradable organic carbon;
- Chlorination (followed by ammonia addition after blending with desalinated water) for secondary disinfection; and
- Carbon dioxide or sodium hydroxide addition in the finished water for pH and alkalinity adjustment.

Potable water from the Regional Surface Water Treatment Plant is blended with finished water from the Tampa Bay Seawater Desalination Plant in ground storage tanks at the Regional Facility Site. Chloramination of the blended treated supplies occurs at the Regional Facilities Site prior to pumping the treated water into the regional distribution system.

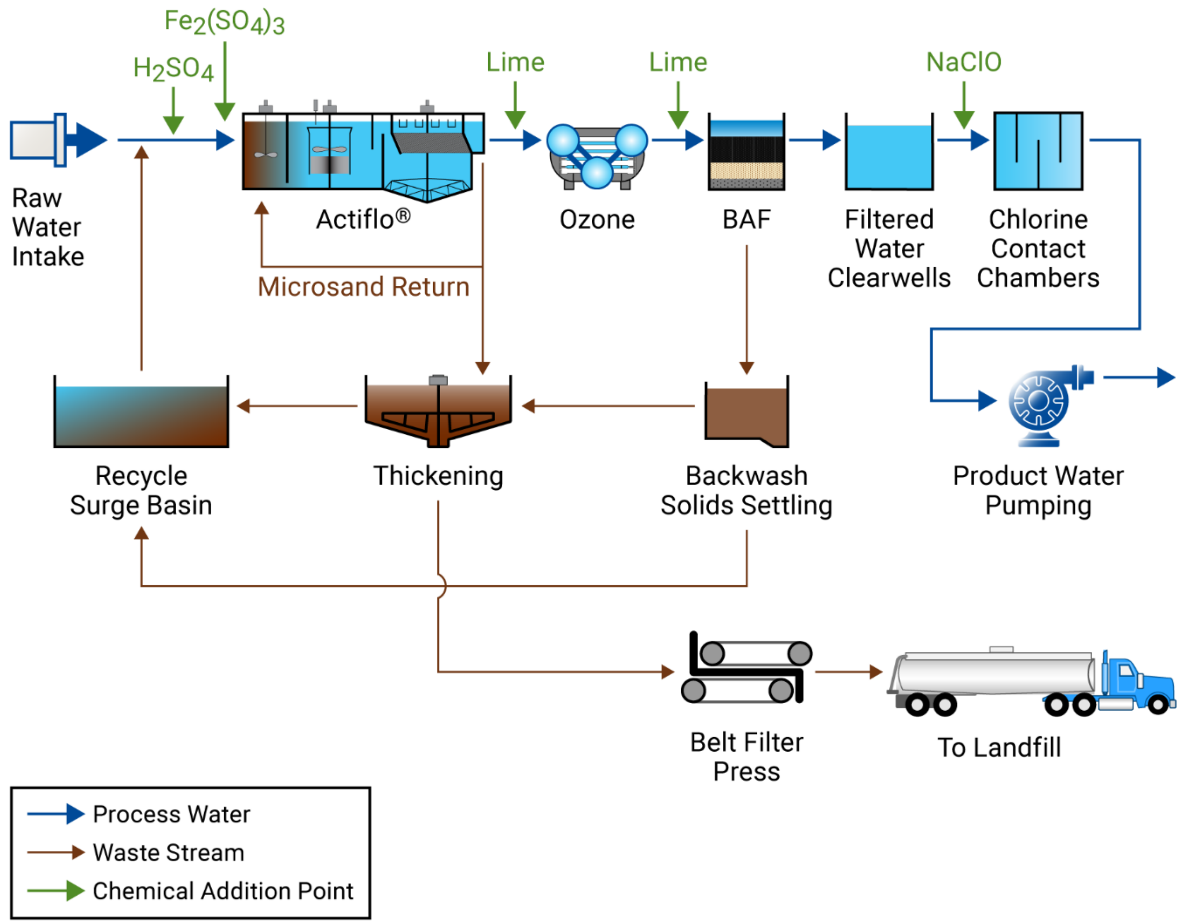

Figure 2-2 Process Flow Diagram for the Regional Surface Water Treatment Plant

2.4.2 High Service Pump Station

The Regional High Service Pump Station (HSPS) delivers the blended desalinated water and treated surface water from the ground storage tanks into the regional transmission system. The High Service Pump Station currently has seven high service pumps.

2.4.3 Enhanced Surface Water System

Tampa Bay Water's surface water facilities are collectively known as the Enhanced Surface Water System (ESWS). These facilities consist of a pump station on the Tampa Bypass Canal, a pump station on the Alafia River, the Regional Surface Water Treatment Plant, a Regional repump pump station, the South-Central Hillsborough Intertie Booster pump station, the Alafia River Pump Station, the Offstream Reservoir pump station, the C.W. Bill Young Regional Reservoir and associated transmission mains (**Figure 2-3**). The Regional Surface Water Treatment Plant is located at the Regional Facilities Site along with the Regional High Service Pump Station. **Table 2-5** shows the rated, minimum and sustainable capacities for the Enhanced Surface Water System facilities. Additional details of Tampa Bay Water's surface water facilities can be found in **Appendix A**.

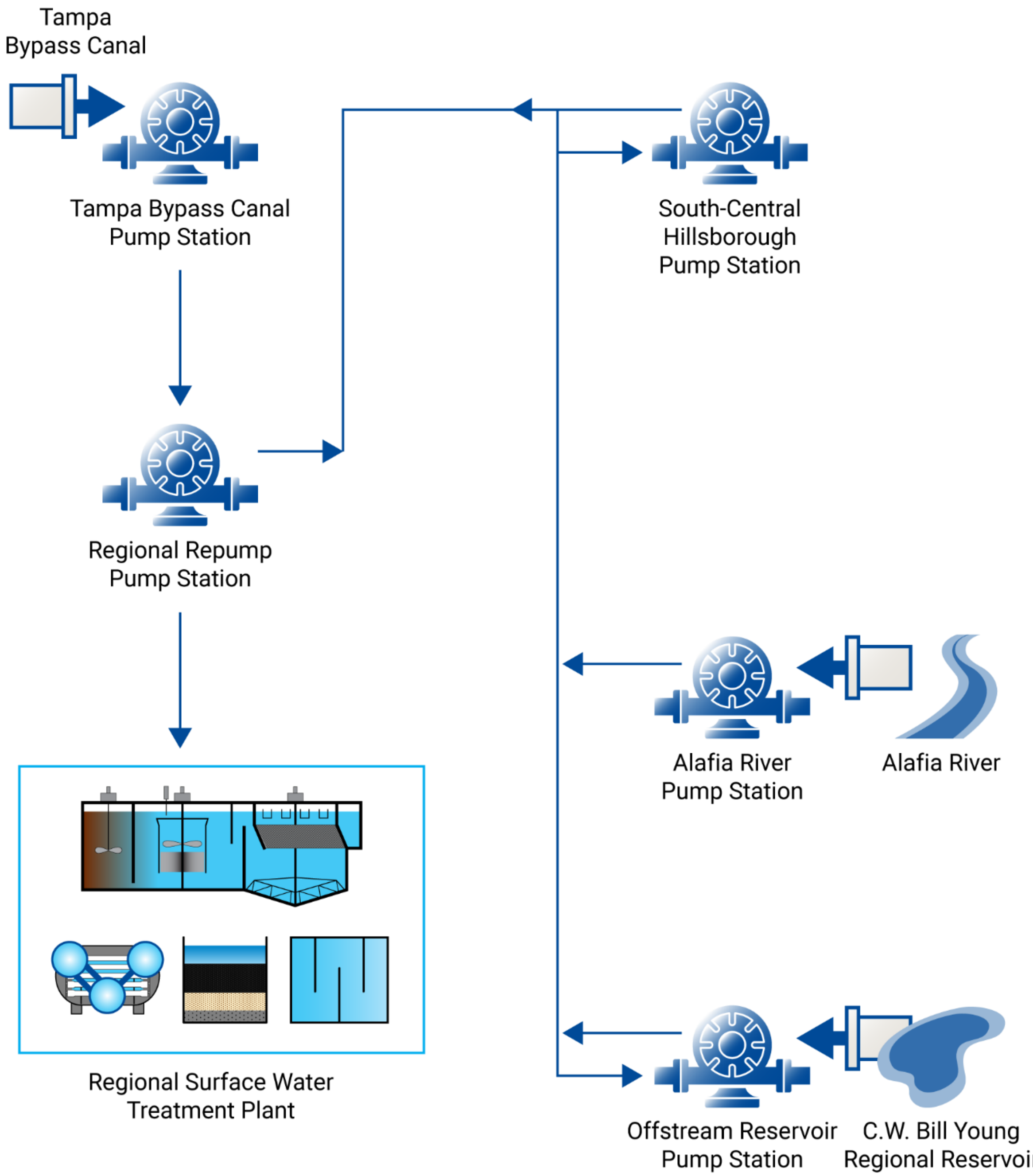

Figure 2-3 Components and Flow Directions in Enhanced Surface Water System

Table 2-5 Rated and Sustainable Capacities of the Surface Water Treatment Facilities and Enhanced Surface Water System

Facility	Operating Conditions	Rated Capacity			Sustainable Capacity	
		WUP mgd	Design mgd	Minimum mgd	Peak Day mgd	>5 Days mgd
Regional Surface Water Treatment Plant	-	120	120	20	120	90
High Service Pump Station	-	-	159	20	133	140
Cypress Creek PS	-	-	179	18	110	140
Morris Bridge PS	-	30	45	5	15	12.5
Tampa Bypass Canal Pump Station	High Head	258.0	257.0	15.0	257.0	240.0
	Low Head	258.0	282.0	15.0	258.0	250.0
Alafia Pump Station	all	60.0	60.0	4.0	60.0	43.0
Regional Repump Station	Alafia on @ 52 mgd	-	135.0	25.0	135.0	127.0
	High Head Alafia Off	-	145.0	25.0	145.0	137.0
	Low Head Alafia Off	-	160.0	25.0	160.0	153.0
	SCH Pump Station On	-	182.0	25.0	182.0	171.0
South-Central Hillsborough Intertie Booster Station	To Reservoir	-	182.0	110.0	182.0	145.0
	From Reservoir (PS off)	-	130.0	75.0	120.0	90.0
	From Reservoir (PS on)	-	100	60	100	90
Harney Pump Station	all	40.0	55.0	18.00	38.0	36.5
Offstream Reservoir Pump Station	Influent	-	120.00	40.00	100.00	100.00
	Effluent/Gravity Limit	-	120.0	40.0/20.0	100.0	100.0
	Effluent Alafia @ 52 mgd	-	62.0	20.0	62.0	46.0
	Effluent Alafia off	-	100.0	20.0	100.0	85.0

2.4.4 Tampa Bypass Canal and Hillsborough River Surface Water Supply

Tampa Bypass Canal Structure S-161 is utilized to divert a percentage of high flows from the Hillsborough River to the Tampa Bypass Canal. This diverted river flow, as well as flow originating from the Tampa Bypass Canal itself, is withdrawn from the middle and/or lower pool of the Tampa Bypass Canal at a single pumping facility located on the east side of the Tampa Bypass Canal (adjacent to flood control structure S-162).

The pump station delivers raw water through two miles of 84-inch diameter pipeline to raw water storage tanks at the Regional Facilities Site. Raw water is either sent to the Regional Surface Water Treatment Plant for treatment or pumped to the Regional Reservoir via the re-pump station for storage. Withdrawal of water from the Tampa Bypass Canal and diversions from the Hillsborough River are in accordance with the Tampa Bypass Canal Water Use Permit.

2.4.5 Alafia River Water Supply and Pump Station

The Alafia River Pump Station is located near the Bell Shoals Road bridge over the Alafia River. The pump station delivers raw water to the Regional Surface Water Treatment Plant through the 72-inch diameter South-Central Hillsborough Intertie to the Regional Surface Water Treatment Plant or to the Regional Reservoir through its transmission main.

2.4.6 C. W. Bill Young Regional Reservoir

The C.W. Bill Young Regional Reservoir (Regional Reservoir) is located on 5,200 acres in southeastern Hillsborough County. The Regional Reservoir is an approximately 1,100-acre surface, off-stream earthen embankment with an average height of 48 feet above natural grade. It impounds approximately 15.5-billion gallons (47,500 acre-feet) of raw water from the Hillsborough and Alafia rivers and Tampa Bypass Canal. The circumference at the top of the reservoir berm is approximately five miles.

The off-stream reservoir is an integral part of the Enhanced Surface Water System. It stores captured surface water during high flow periods in accordance with Water Use Permit (WUP) withdrawal rules. The reservoir is connected to the South-Central Hillsborough Intertie (SCHI) via the 8-mile long, 84-inch diameter, bi-directional Reservoir Transmission Main. Previously, raw water from the reservoir was piped to the Regional Surface Water Treatment Plant for treatment by gravity. In 2011, Tampa Bay Water completed construction of the off-stream reservoir pump station to allow increased drawdown capacity from the reservoir to the treatment plant, beyond what gravity flow allows.

2.4.7 Enhanced Surface Water System Raw Water Pumping and Transmission Facilities

The Enhanced Surface Water System includes a number of pumping and transmission facilities, which are summarized in this section.

- South-Central Hillsborough Intertie: The SCHI is a bi-directional, 72-inch diameter pipeline that delivers raw water from the Alafia River Pump Station and the Regional Reservoir to the Regional Surface Water Treatment Plant for treatment. It can also convey raw water from the Tampa Bypass Canal and Hillsborough River sources to the Regional Reservoir for storage through the connection to the Reservoir Transmission Main.

- Regional Reservoir Transmission Main: The Regional Reservoir Transmission Main is a bi-directional, 84-inch diameter pipeline that connects the Regional Reservoir to the Alafia River Intake and pump station and the South-Central Hillsborough Intertie. This pipeline conveys raw surface water from the Tampa Bypass and Alafia River pump stations to the Regional Reservoir for storage and conveys stored regional reservoir water to the Regional Surface Water Treatment Plant via the South-Central Hillsborough Intertie.

- Re-pump Station: The re-pump station is located at the Regional Facility Site and allows water from the Tampa Bypass Canal to be pumped to the Regional Reservoir through the South-Central Hillsborough Intertie/Reservoir Transmission Main.

- South-Central Hillsborough Intertie Booster Pump Station: This facility is located along the South-Central Hillsborough Intertie. The South-Central Hillsborough Intertie Booster Pump station increases the pumping capacity of raw water from the Re-pump Station to the Regional Reservoir. In addition, the booster pump station can flow in the opposite direction increasing the flow of raw water from the Regional Reservoir to the Surface Water Treatment Plant.

- Off-stream Reservoir Pump Station: The function of the Off-stream Reservoir Pump Station is to pump raw water from the Regional Reservoir to the Regional Surface Water Treatment Plant when higher flows than could be delivered by gravity are required.

- Harney Pump Station: The Harney Pump Station (also known as the Tampa Bypass Canal at Harney Road Pump Station) is utilized only to augment the City of Tampa's raw water supply by pumping water from the Tampa Bypass Canal middle pool to the Hillsborough River Reservoir at Structure S-161. Water is only pumped from the Tampa Bypass Canal when necessary to augment river flow into the City's reservoir. Tampa Bay Water has a WUP with the Southwest Florida Water Management District (SWFWMD) which sets forth the criteria for when augmentation is allowed. The station is located in central Hillsborough County along the Tampa Bypass Canal at Harney Road.

2.5 Seawater Desalination Facilities

The Tampa Bay Seawater Desalination Plant, located adjacent to Tampa Electric Company's (TECO) Big Bend Power Station on Tampa Bay, is designed to produce potable water and convey it to the Regional Facilities Site. The facility utilizes reverse osmosis (RO) technology to treat seawater drawn from the condenser cooling water discharge of TECO's power station.

Table 2-6 shows the rated, minimum and sustainable capacities for this facility and **Figure 2-4** is a process flow diagram for this facility.

The RO system has seven independent trains, each comprised of a transfer pump, cartridge filter, associated high pressure pump, an energy recovery turbine and reverse osmosis membranes. The facility has an additional second pass train to re-treat the back permeate from four trains of the initial seven trains. The second pass was expanded in 2012 to re-treat the back permeate from six trains. Facilities at the Seawater Desalination Plant include:

- Intake/discharge facilities – intake pumps, cooling water pumps, concentrate discharge;

- Pretreatment facilities – initial intake oxidation treatment, traveling screens, chemical mixing, coagulation, flocculation, sedimentation, up flow sand filters, diatomaceous earth filters, and micron filtration (cartridge filters);

- Reverse osmosis facilities – semi-permeable membranes (first pass);

- Second Pass – nanofiltration (10 percent of first pass)

- Post-treatment facilities – lime addition and carbon dioxide addition as needed for stabilization, and chlorination; and

- Storage/finished water transmission – storage, transfer pumping, transmission pipeline.

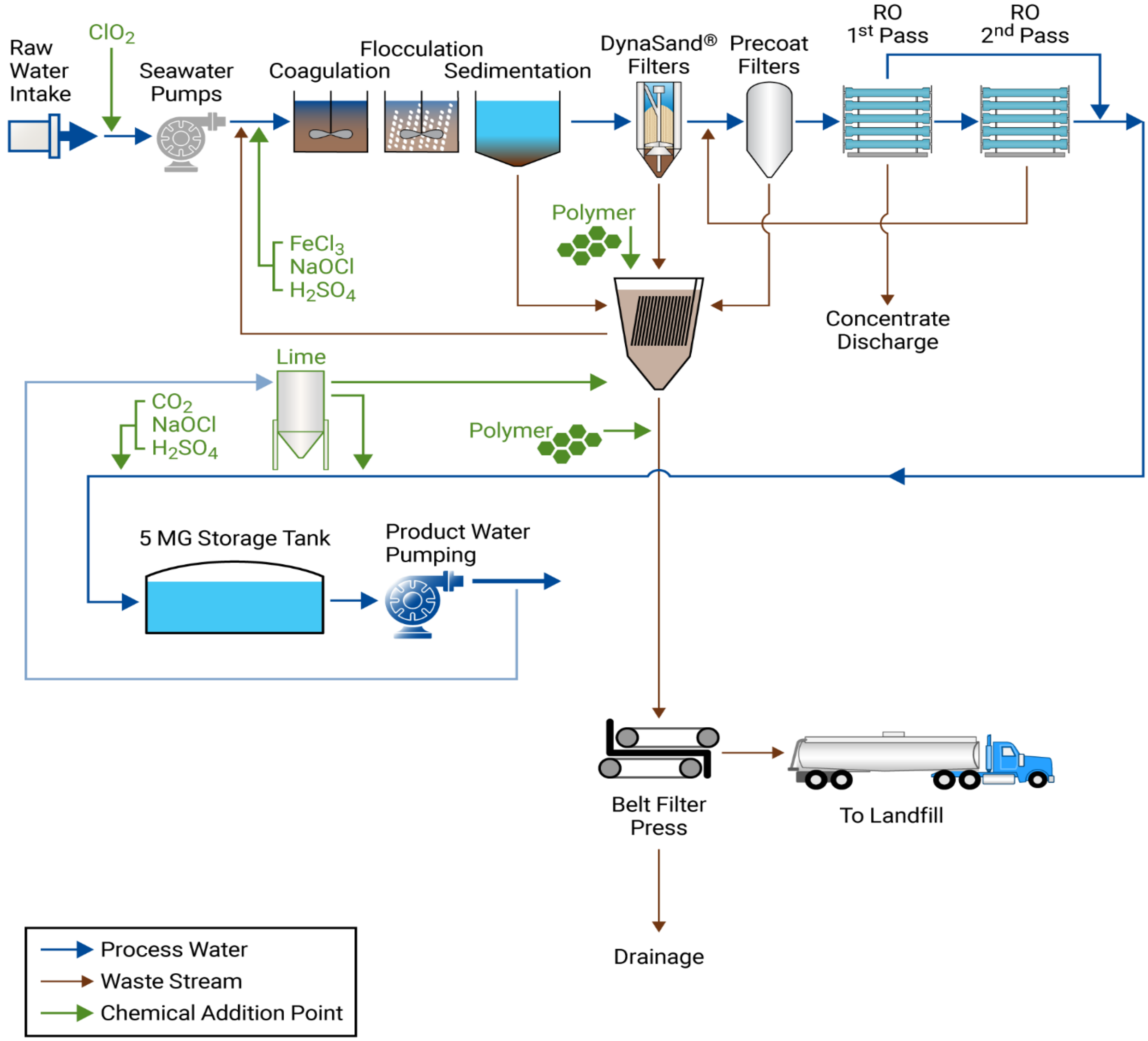

Figure 2-4 Process Flow Diagram for the Seawater Desalination Plant

Table 2-6 Capacities of the Desalination Plant

Facility	Operating Conditions	Rated Capacity			Sustainable Capacity	
		PWS	Design	Minimum	Peak Day	>5 Days
		mgd	mgd	mgd	mgd	mgd
Desalination Facility	Intake water temp >90 degrees F	28.75	28.75	8.00	20.0	20.0
	Intake water temp <90 degrees F	28.75	28.75	8.00	18.0	18.0

2.6 Booster Pump Stations

Tampa Bay Water operates treated water booster pump stations located throughout the transmission system. These include the U.S. 41 Booster Pump Station, the Odessa Booster Pump Station, the Lake Bridge Booster Pump Station which flows to Pasco County at these three points of connection, and the Brandon Booster Station which provides water to the Hillsborough County Lithia WTP. **Table 2-7** shows the permitted, design, minimum and sustainable capacities for these facilities. In addition, the Odessa Booster pump station can have chemicals added to the facility to bring water back from the Starkey Wellfield.

Table 2-7 Rated and Sustainable Capacities of the Booster Pumping Stations

Facility	Rated Capacity			Sustainable Capacity	
	PWS	Design	Minimum	Peak Day	>5 Days
	mgd	mgd	mgd	mgd	mgd
Odessa Booster Pump Station	17.0	26.4	1.5	17.0	17.0
U.S. 41 Booster Pump Station	18.0	24.6	1.2	18.0	18.0
Lake Bridge Booster Pump Station	17.5	25.2	2.5	17.5	17.5
Brandon Booster Station	-	20.0	0.0	22.5	20.0

2.7 Cypress Creek Operational Control Center

The Cypress Creek Facility is the main operational control center of Tampa Bay Water's Regional System; however, the system can also be operated from the Regional High Service Pump Station or the Lithia H2S Facility for redundancy. The Cypress Creek center is located in central Pasco County in the western portion of the Cypress Creek Wellfield property. The major components of the Cypress Creek Facility include:

- Treatment building for chemical feed and storage;

- Three 5-million-gallon pre-stressed concrete ground storage tanks;
- High service pump station;
- Emergency generators;
- Operations building;
- Laboratory building;
- Storage/maintenance/warehouse buildings; and
- Infrastructure and Emergency Management building.

The Infrastructure and Emergency Management building houses staff offices for operations, maintenance, instrumentation and controls, engineering and construction departments. The building was designed and constructed with a Hurricane Category 5 rating and serves as a command center during emergency events.

Tampa Bay Water's entire Supervisory Control and Data Acquisition (SCADA) system consists of remote terminal units located at metering sites, well pump stations, water treatment facilities, booster pumping stations, and storage tanks. Communication between the remote terminal units and the SCADA system is through leased telephone lines, as well as Tampa Bay Water-owned copper wire and fiber optic cables. The SCADA system-host computers can access any remote terminal unit to monitor and historically archive 'real-time' operating conditions, as well as implement control strategies to start and/or stop pumps, change local operating limits, or respond to alarm events.

The SCADA system has been expanded to include monitoring of Tampa Bay Water's regional facilities, and data collection from chloramine and pH monitoring sites located throughout the water transmission system. The system is also interconnected with Tampa Bay Water's enterprise data management network. This allows data collection for use in predictive system modeling and water resource allocation efforts within Tampa Bay Water.

2.8 Potable Water Transmission Mains

Tampa Bay Water's distribution system includes several major potable water transmission mains that deliver treated water supplies to Member Government points of connection. These major transmission pipelines are shown in **Figure 2-5** and are summarized in **Table 2-8**. Descriptions of each major potable transmission main are also presented in **Appendix A**. In addition to the major transmission mains listed in **Table 2-8**, there are raw water collection mains within each wellfield to collect water from the individual wells and convey the water to a Tampa Bay Water or Member Government treatment facility. The raw water collection mains are also described in **Appendix A** (Groundwater Sources).

Table 2-8 Major Potable Transmission Mains

Transmission Main	Diameter (inches)	Material	Length (miles)	Location/Function
North-Central Hillsborough Intertie	84	Steel	13.6	Potable water from Regional Surface Water Treatment Plant to Morris Bridge TM
Brandon Transmission Main	30 and 36	Ductile Iron	16.8	Potable water from Regional Facility Site to Brandon/South-Central Connector
Brandon/South-Central Connector	30	Ductile Iron	6.3	Potable water from Brandon TM to Lithia WTP
Morris Bridge Transmission Main	64	Ductile Iron	3.9	Potable water from NCHI to Cypress Bridge TM
Cypress Bridge Phase A Phase B	 66 64	Steel/ Ductile Iron	 5.7 4.4	Potable water from Morris Bridge TM to Cypress Creek TM
Cypress Creek Transmission Main	84, 72, 66, 64 and 66	Pre-stressed concrete cylinder pipe / Steel / Ductile Iron	17.6	Potable water from Cypress Creek WTP to Keller Connector
Keller Connector	66, 64	Steel/ Ductile Iron	1.5	Potable water from Cypress Creek TM to Keller WTP
South Pasco Transmission Main	42, 36 and 30	Prestressed concrete cylinder pipe / Reinforced concrete pipe / Ductile Iron	13.9	Potable water from Cypress Creek TM to Lake Park and Cosme WTP
West Pasco Transmission Main	36 and 42	Ductile Iron / Steel	7.8	Potable water from Cypress Creek TM to Little Road and Maytum WTPs
Cosme Transmission Main	64	Steel	8.4	Potable water from Cypress Creek TM to Cosme WTP
Northwest Hillsborough Transmission Main	36	Ductile Iron	2.3	Potable water from Cosme TM to Northwest Hillsborough WTP
Seawater Desalination Transmission Main	42	Ductile Iron	14.5	Potable water from Tampa Bay Desalination Facility to Regional Facility Site
South Hillsborough Pipeline (proposed)	Up to 72	Ductile Iron and steel	26	Potable water from Tampa Bay Water Regional Facility Site to Lithia WTP and Balm POC
NOTE: South Hillsborough Pipeline information based on pre-Basis of Design planning level information. Details subject to change through detailed design and construction through 2028.				

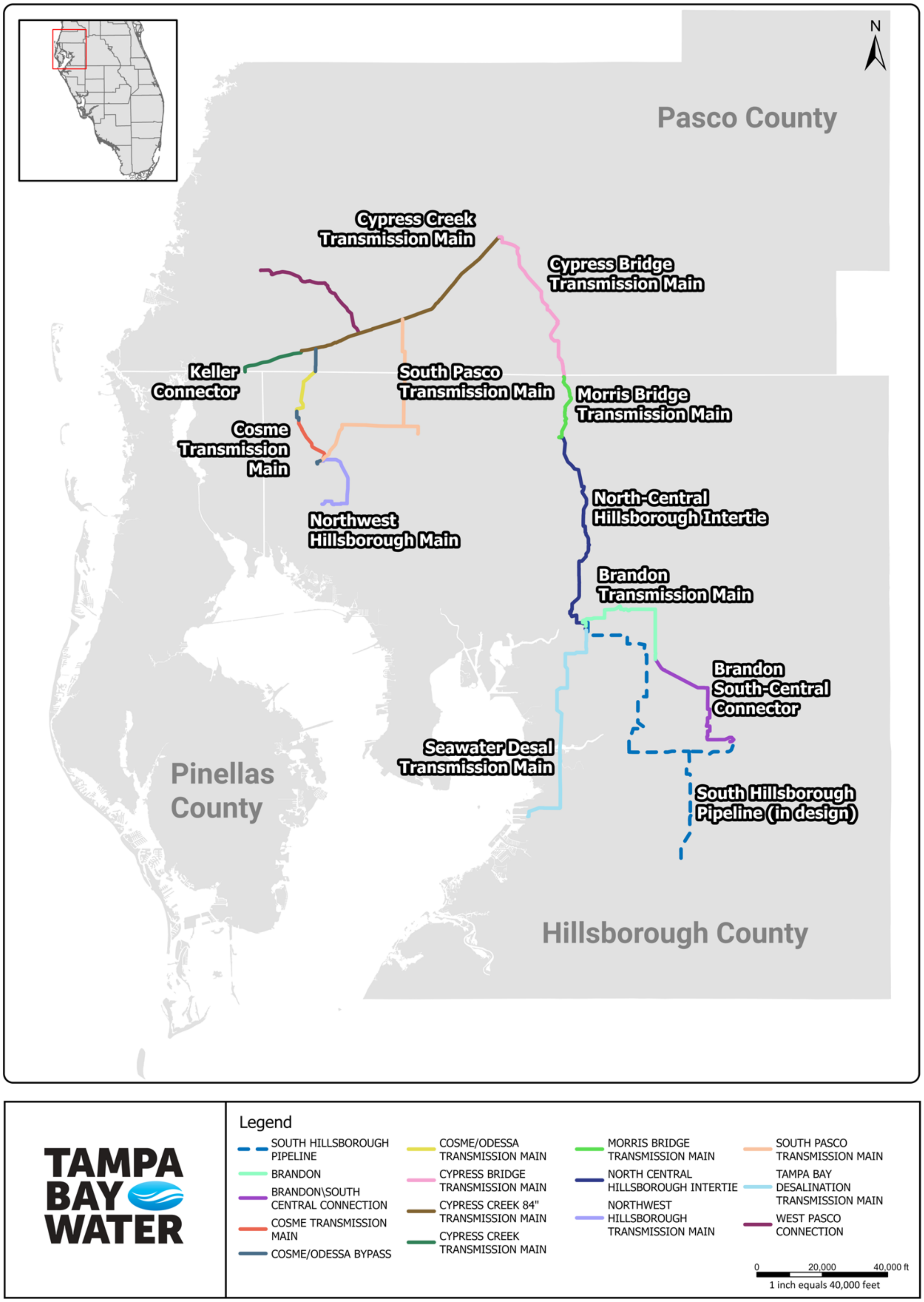

Figure 2-5 Tampa Bay Water Potable Transmission Mains

2.9 Supply Capacity from Member Government Interconnects

The regional supply system includes five interconnects where Tampa Bay Water can purchase finished water from Member Governments. These are described below and summarized in **Table 2-9**.

2.9.1 Tampa/Hillsborough Interconnect

The Tampa/Hillsborough Interconnect (THI) was a metered connection that allowed surplus treated water from the City of Tampa to be purchased by Tampa Bay Water and delivered into Hillsborough County's Northwest County distribution system. The Tampa/Hillsborough Interconnect has been decommissioned.

2.9.2 U.S. 301 Interconnect

The U.S. 301 Interconnect enables the City of Tampa to sell surplus treated water to Tampa Bay Water to be delivered to the storage tanks at the Regional High Service Pump Station and allows for Tampa Bay Water to provide emergency water to the City of Tampa, per Section 3.08B of the Amended and Restated Interlocal Agreement. **Table 2-9** shows the rated design, minimum and sustainable capacities for this facility.

2.9.3 Maytum WTP Supply Interconnection

Tampa Bay Water and New Port Richey entered into a surplus finished water agreement as part of the West Pasco Infrastructure Project. This project provided a pipeline connection that delivers finished water from the Regional System to the Maytum and Little Road WTPs. Also, Tampa Bay Water provided piping modifications and a new pumping station at the Maytum WTP to purchase excess treated groundwater from New Port Richey and pump to the Pasco County Little Road WTP. Previous system planning efforts identified several scenarios where surplus water from the Maytum WTP could be pumped to Pasco County's Little Road WTP.

2.9.4 Lithia WTP Emergency Interconnection

Tampa Bay Water and Hillsborough County entered into an emergency agreement to allow Tampa Bay Water to deliver finished water directly into the Hillsborough County distribution system. Hillsborough County staff at the Lithia WTP control and set the flow rate to meet Hillsborough County needs.

2.9.5 Lake Park WTP Emergency Supply Interconnection

Tampa Bay Water and Hillsborough County entered into an emergency surplus water agreement to allow for Hillsborough County to deliver surplus finished water supply back into the Tampa Bay Water Regional Transmission System. Previous system analyses identified several scenarios where surplus water from the Lake Park WTP could be sent to the Cosme WTP; which in turn could be used to supplement the delivery of potable water supply to the City of St. Petersburg (and to Pinellas County via existing emergency interconnects with St. Petersburg). Hillsborough County staff at the Lake Park WTP control and set the flow rate to meet Tampa Bay Water's request.

2.9.6 Northwest Hillsborough WTP Emergency Supply Interconnection

Tampa Bay Water and Hillsborough County entered into an emergency surplus water agreement to allow Hillsborough County to deliver surplus finished water supply back into the Tampa Bay Water Regional Transmission System. Previous system analyses identified several scenarios where surplus water from the

Northwest Hillsborough WTP could be used to supplement the delivery of potable water supply to the City of St. Petersburg (and to Pinellas County via existing emergency interconnects with St. Petersburg). Hillsborough County staff at the Northwest Hillsborough WTP control and set the flow rate to meet Tampa Bay Water's request.

Table 2-9 Rated and Sustainable Capacities from Member Government Interconnects

Facility	Rated Capacity		Sustainable Capacity	
	Minimum	Design	Peak Day	> 5 Days
	mgd	mgd	mgd	mgd
US 301 Emergency Flow to Tampa	3.0	30.0	30.0	30.0
US 301 Flow to Tampa Bay Water	2.0	15.0	5.0	5.0
Maytum WTP Supply Interconnection	-	7.5	-	-
Lithia WTP Supply Interconnection	1.9	19.0	15.0	14.0
Lake Park WTP Emergency Supply Interconnection	-	15	-	-
Northwest Hillsborough WTP Emergency Supply Interconnection	-	15	-	-

3.0 Existing and Projected Customers and Water Demands

Tampa Bay Water has the unequivocal obligation to meet the drinking water demands of its six member governments which include Hillsborough, Pasco and Pinellas counties and the cities of New Port Richey, St. Petersburg and Tampa. This relationship was established in accordance with the Amended and Restated Interlocal Agreement, the Master Water Supply Contract and per Chapter 373.1962 of the Florida Statutes.

Tampa Bay Water provides regional water demand forecasts for its six member governments. The regional demand forecasts include the total water demand for each member, including the City of Tampa, which self-supplies up to 82 mgd from the Hillsborough River to meet their demands as provided in Section 3.08 of the Amended and Restated Interlocal Agreement. Tampa Bay Water's demand forecasts include the quantity necessary to meet the City of Tampa future demand above this 82 mgd capacity. Future supply and reliability analysis to meet projected demand for the region considers hydrologic condition where the City of Tampa may not be able to self-supply 82 mgd. The Agency's Long-term Demand Forecasting models are designed primarily for the purpose of longer-term planning and forecasting over 20-30-year time horizons. The models provide monthly and annual water demand forecasts for the seven water demand planning areas (WDPAs) of the six member governments through the 2050 planning horizon with this Master Water Plan update containing the demand projections from 2023 – 2043 in accordance with Section 2.09 of the Amended and Restated Interlocal Agreement. The WDPAs, illustrated in **Figure 3-1,** reflect the current service area boundaries for the six member governments including wholesale customers. Separating the regional system into demand planning areas assists Tampa Bay Water by identifying siting and capacity requirements of future supply development projects which ensures that adequate supply will be made available to member governments in the areas of future growth.

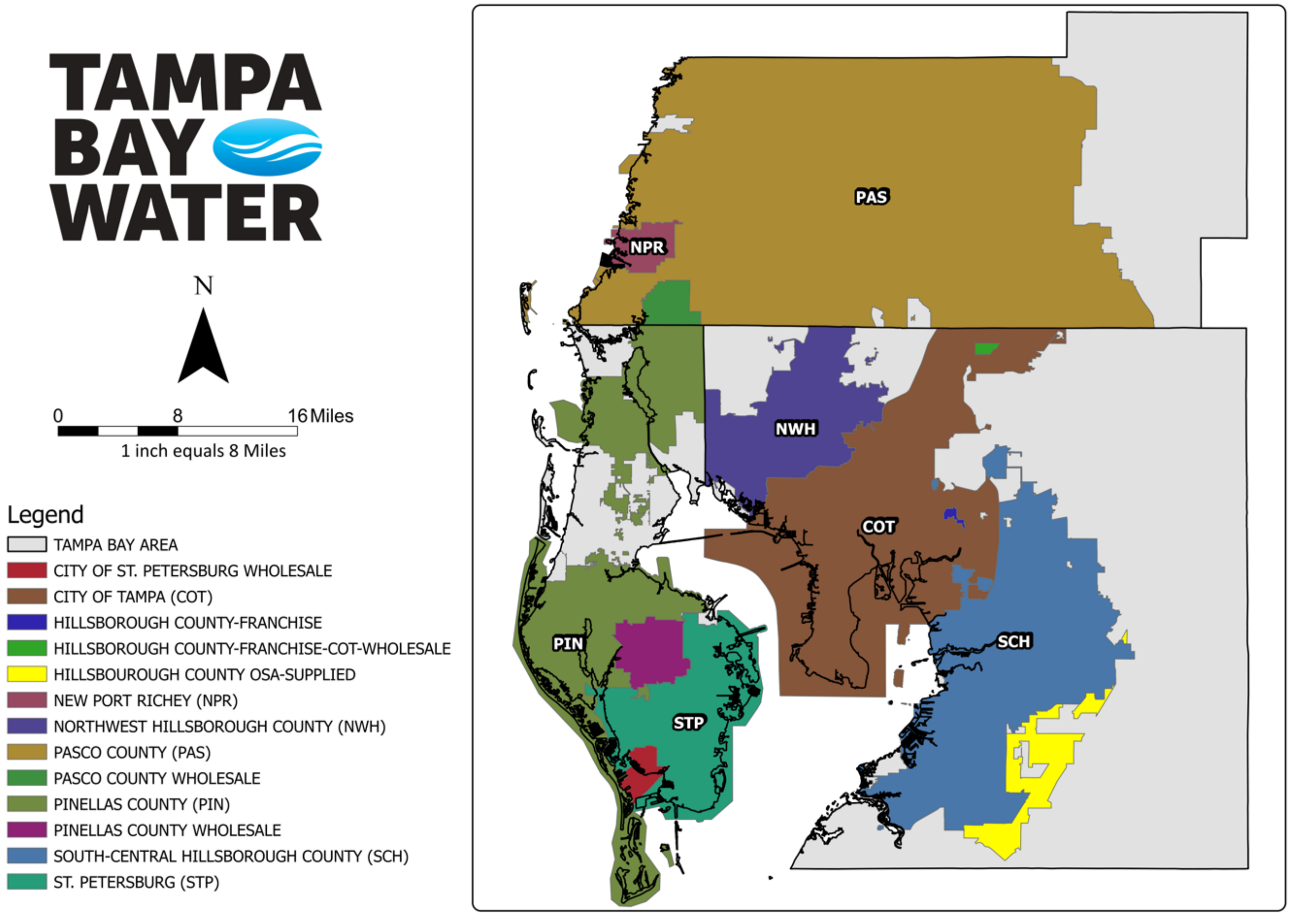

Figure 3-1 Member Government Water Demand Planning Areas

3.1 Meeting Member Government Water Demands

Tampa Bay Water and the member governments provide water to more than 2.5 million people. Member government service area coverage is summarized in **Table 3-1** and **Figure 3-1**. Potable water is supplied by Tampa Bay Water's regional system which includes groundwater, surface water, and seawater sources. In addition, some members have limited self-supply sources.

Tampa Bay Water ensures that short-term and long-term demands are met through utilization of its Optimized Regional Operations Plan (OROP), Regional System Performance Evaluation Model, Source Rotation and Operational Planning models, and the Demand Forecasting System, respectively. Forecasted surface water flows, current groundwater levels, rainfall data and current demands are input into a customized computer model used to generate information to update the OROP on a weekly basis. Through use of the OROP, supply sources can be utilized in a manner which meets real time demands, minimizes environmental impacts to regional water resources and meets the requirements set forth in the Consolidated Water Use Permit (CWUP).

Long-term demand forecasting is performed using the Demand Forecasting System to predict expected future demand on a spatial and temporal basis. The Regional System Performance Evaluation Model combines long-term probabilistic demand forecasts with supply uncertainty and operational protocols to determine the sustainable supply through 2050, the current planning horizon; however, this Master Water Plan update contains the demand projections from 2023 – 2043 in accordance with Section 2.09 of the Amended and Restated Interlocal Agreement. The model is also used to quantify the system performance in meeting demands through the forecast horizon and in determining yield and reliability of potential water supply projects.

Table 3-1 Summary of Member Government Service Area

Member Government	Service Area Summary
Hillsborough County	Hillsborough County supplies water to unincorporated area residents that are outside the service areas of the cities of Tampa, Temple Terrace, and Plant City. The County has no wholesale customers. Hillsborough County contains two service areas: Northwest Hillsborough and South-Central Hillsborough.
Pasco County	The Pasco County Water System supplies retail water to residents throughout the unincorporated areas of the county, as well as wholesale water to several private utilities, including Forest Hills, Orchid Lake, Virginia City, Southern State Utilities, and Jasmine Lakes Utilities Corporation.
Pinellas County	The Pinellas County Water System provides retail water to unincorporated Pinellas County, including some municipalities, and approximately six (6) wholesale customers within the county. These customers include Belleair, Clearwater, Pinellas Park, and Safety Harbor.
City of New Port Richey	The City of New Port Richey supplies retail water to residents within its corporate limits and a portion of unincorporated Pasco County. The City also supplies wholesale water to the City of Port Richey.
City of St. Petersburg	The City of St. Petersburg Water Demand Planning Area includes the City of St. Petersburg, Gulfport, and South Pasadena Water System (wholesale customers), as well as some unincorporated areas within Pinellas County including Bear Creek, Lealman, Gandy, and Bay Pines.
City of Tampa	The Tampa Water Department provides water to the City of Tampa and some unincorporated areas of Hillsborough County. The City of Tampa self-supplies up to 82 mgd from the Hillsborough River and Sulfur Springs. The Tampa Bypass Canal (middle pool) is also used to augment the Hillsborough River during low flow periods. Tampa Bay Water provides water to the City during low river flow and high demand periods as needed.

3.1.1 Historic Usage by Member Governments

Table 3-2 identifies the historic total demand for each of Tampa Bay Water's member governments which is illustrated in **Figure 3-2**, and **Table 3-3** identifies the quantity of water provided to member governments by Tampa Bay Water each water year since Tampa Bay Water was formed in 1998 which is illustrated in **Figure 3-3**. The years listed are Water Years, which begin on October 1 of the previous calendar year and end on September 30 of the indicated year.

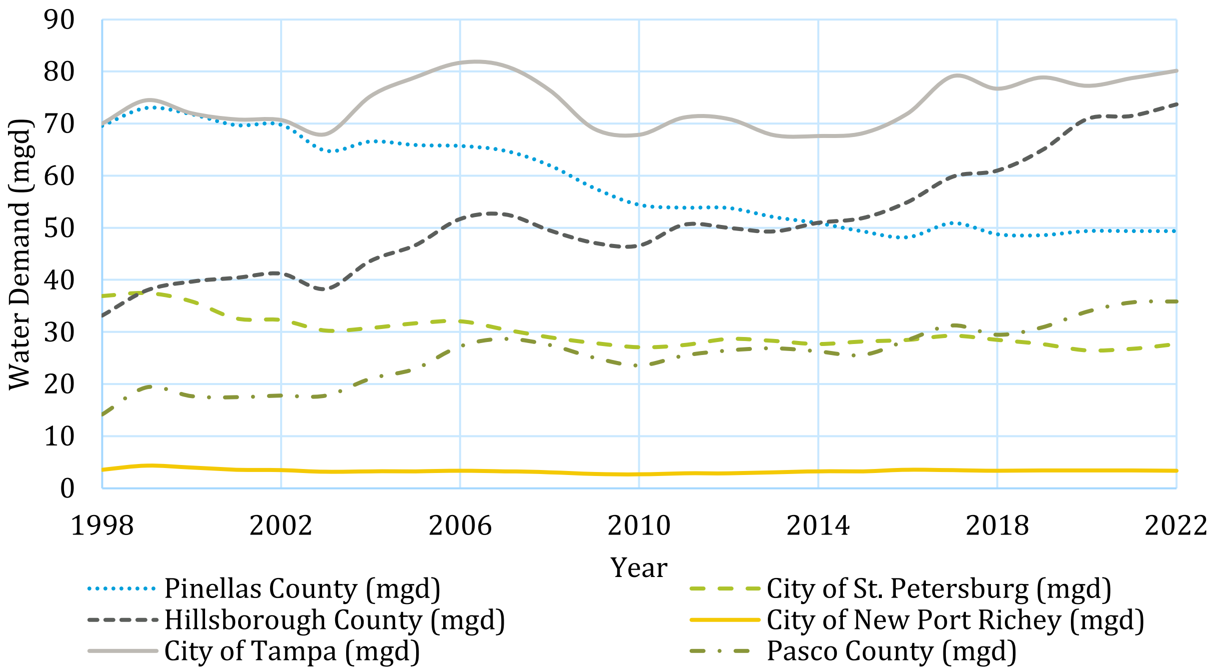

Figure 3-2 Tampa Bay Water Member Governments Historic Demands

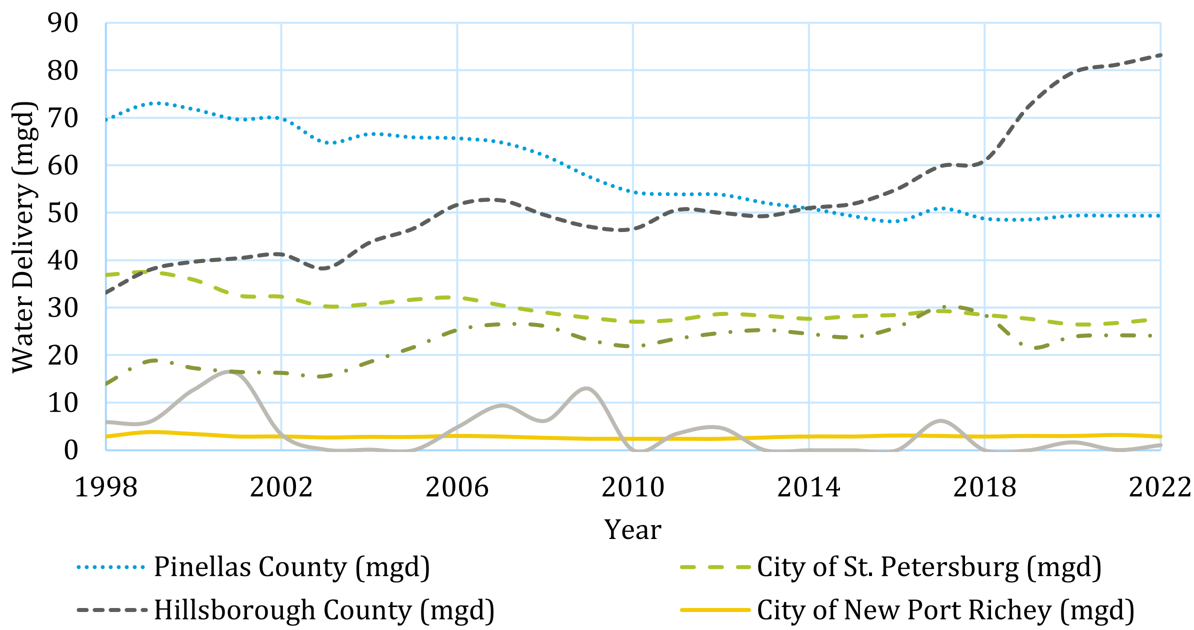

Figure 3-3 Tampa Bay Water Historic Delivery to Member Governments

Table 3-2 Historic Regional Water Demands in Tampa Bay Water Service Area

Water Year	Pinellas County (mgd)	City of St. Petersburg (mgd)	Hillsborough County (mgd)	City of New Port Richey (mgd)	City of Tampa (mgd)	Pasco County (mgd)	Regional Total (mgd)
1998	69.6	36.9	33.2	3.6	70.0	14.2	227.5
1999	73.0	37.5	38.0	4.4	74.5	19.4	246.8
2000	71.8	35.9	39.7	4.0	72.0	17.7	241.0
2001	69.7	32.6	40.4	3.6	70.8	17.5	234.5
2002	69.8	32.3	41.2	3.5	70.7	17.8	235.3
2003	64.8	30.3	38.3	3.2	68.0	17.8	222.5
2004	66.6	30.8	43.7	3.3	75.3	21.1	240.7
2005	65.9	31.7	46.7	3.3	78.9	23.0	249.5
2006	65.7	32.1	51.7	3.4	81.7	27.3	261.9
2007	64.8	30.5	52.6	3.3	81.1	28.7	260.9
2008	62.0	29.0	49.5	3.1	76.4	27.5	247.4
2009	57.6	27.9	47.1	2.8	69.0	25.1	229.6
2010	54.4	27.1	46.6	2.7	67.9	23.6	222.4
2011	53.9	27.5	50.6	2.9	71.2	25.5	231.5
2012	53.8	28.7	50.0	2.9	70.9	26.5	232.8
2013	52.1	28.3	49.3	3.1	67.8	26.9	227.7
2014	50.9	27.7	51.0	3.3	67.6	26.3	226.8
2015	49.3	28.2	51.9	3.3	68.2	25.6	226.5
2016	48.2	28.5	55.0	3.6	72.0	28.5	235.8
2017	50.9	29.3	59.8	3.5	79.1	31.3	253.7
2018	48.8	28.5	61.0	3.4	76.7	29.5	247.8
2019	48.6	27.7	64.9	3.47	78.88	30.9	254.5
2020	49.4	26.5	70.9	3.45	77.24	33.9	261.4
2021	49.4	26.8	71.5	3.44	78.71	35.7	265.6
2022	49.4	27.7	73.7	3.37	80.15	35.9	270.2

Table 3-3 Historic Water Delivery to Current Customers

Water Year	Pinellas County (mgd)	City of St. Petersburg (mgd)	Hillsborough County (mgd)	City of New Port Richey (mgd)	City of Tampa (mgd)	Pasco County (mgd)	Total Delivery (mgd)
1998	69.6	36.9	33.2	2.9	5.9	14.0	162.6
1999	73.0	37.5	38.0	3.8	6.0	18.8	177.0
2000	71.8	35.9	39.7	3.4	12.7	17.3	180.7
2001	69.7	32.6	40.4	2.9	16.1	16.5	178.2
2002	69.8	32.3	41.2	2.9	3.3	16.3	165.8
2003	64.8	30.3	38.3	2.7	0.1	15.6	151.8
2004	66.6	30.8	43.7	2.8	0.1	18.6	162.6
2005	65.9	31.7	46.7	2.8	0.0	21.7	168.8
2006	65.7	32.1	51.7	3.0	4.8	25.3	182.6
2007	64.8	30.5	52.6	2.9	9.4	26.5	186.6
2008	62.0	29.0	49.5	2.6	6.2	26.1	175.5
2009	57.6	27.9	47.1	2.4	12.9	23.2	171.1
2010	54.4	27.1	46.6	2.4	0.0	21.9	152.3
2011	53.9	27.5	50.6	2.4	3.5	23.5	161.4
2012	53.8	28.7	50.0	2.4	4.7	24.7	164.3
2013	52.1	28.3	49.3	2.7	0.0	25.3	157.8
2014	50.9	27.7	51.0	2.9	0.0	24.5	157.1
2015	49.3	28.2	51.9	2.9	0.0	23.8	156.1
2016	48.2	28.5	55.0	3.1	0.0	25.9	160.8
2017	50.9	29.3	59.8	3.0	6.2	30.1	179.3
2018	48.8	28.5	61.0	2.9	0.0	28.5	169.6
2019	48.6	27.7	72.4	3.0	0.00	21.7	173.4
2020	49.4	26.5	79.5	3.0	1.67	23.9	184.0
2021	49.4	26.8	81.2	3.2	0.04	24.2	184.8
2022	49.4	27.7	83.2	2.9	1.03	24.1	188.3

3.1.2 Future Customers and Future Demands

There are no plans to expand Tampa Bay Water's customer base. Water demand projections presented in this section are based on meeting the future needs of the six member governments. As a wholesale water utility, Tampa Bay Water supplies the daily water demands of its member governments. Meeting peak hour and fire flow demands are a local distribution issue, and the member governments must develop and operate sufficient storage, pumping, and distribution facilities to meet their peak hour and fire flow demands.

The Master Water Supply Contract between Tampa Bay Water and the member governments specifies the points of connection at which water is to be supplied to each member government's system as well as the pressure requirement at each point of connection. The specific quantity of water to be provided to each member government is not specifically identified in the contract. The quantity of water to be supplied is determined by the projected needs of the member governments.

3.2 Demand Forecasting System Approach

The Demand Forecasting System was commissioned in December 2001 to quantify how socioeconomic, meteorological, and policy conditions influence potable water demand. Tampa Bay Water updated its Long-term Demand Forecasting models in 2008. Since 2009, annual updates of deterministic models have been implemented to capture trends in socioeconomic changes and estimate the corresponding demand. Tampa Bay Water also implemented a probabilities demand forecasting model that provides a range of future scenarios. The first version of this probabilistic model was developed in 2010, followed by a revision in 2017 as part of the Master Planning modeling support effort. The models were updated as more socioeconomic data became available. Uncertainties in the socioeconomic and weather variables were incorporated into the modeling approach to attach a confidence level on the estimated demand. Since 2020, the probabilistic demand forecast models have been updated annually. As described in the Long-term Demand Forecasting Model documentation (Hazen and Sawyer, 2019), retail demand is modelled using three sector specific econometric models, single-family, multi-family and non-residential. Non-residential includes all commercial and light industrial water customers for each member government. This sector includes hotels, restaurants, schools, office complexes for example. Each model generates demand forecasts based on the Water Demand Planning Area, specific weather, and socioeconomic projections. Sector specific models therefore satisfy the need for modelling retail demand on a member-by-member basis. From these results, sector specific results can be aggregated as needed into various time periods and geographic delineations.

Tampa Bay Water engaged the services of Hazen and Sawyer to complete a probabilistic regional demand forecast for the water demand planning areas, which is used for the forecasting effort. Documentation of this work is provided in the Long-term Demand Forecasting Model (Hazen and Sawyer, 2019). Probabilistic demand forecasting is performed to assess the potential variation in predictions of actual future demand from the point forecast given the point-projected ("expected") future values of socioeconomic conditions and the observed historical variability in these conditions from year to year. The resulting probabilistic forecast therefore reflects a superposition of historical year-to-year variability in explanatory and driver variables, and resulting demand, on the point forecast. The probabilistic demand forecast was produced using probabilistic socioeconomic and weather projection ensembles. For this update to the Long-term Master Water Plan, the probabilistic demand forecasts were used in the System-wide Performance Evaluation Model to develop the baseline sustainable yield of the current regional water delivery system and to evaluate project yield and reliability of the various project concepts under evaluation. This model links the long-term demand projections with surface water availability simulations through common simulations of weather.

3.3 Demand Forecasting System Results

The demand forecasts presented in this Long-term Master Water Plan update are based on the current model and results presented to Tampa Bay Water's Board of Directors in December 2022, **Appendix B**, as the update for 2023 is not yet available. Since Tampa Bay Water updates its long-term demand forecasts annually, the timing of any new water supply projects will be updated annually to ensure that Tampa Bay Water meets the member government demands during this planning horizon.

Tampa Bay Water service area demand projections for the planning horizon 2023-2043 presented in this section are based on deterministic demand modelling using the existing long-term demand forecasting models. The projected member government water demands for this planning horizon are shown in **Figure 3-4** and **Table 3-4**.

As described in previous sections, several of Tampa Bay Water's member governments self-supply a portion of their demands. The City of Tampa has a permit to withdraw up to 82 mgd annually from the Hillsborough River, provided the water is available in the river. Annual and seasonal flow in the Hillsborough River can vary substantially from year to year and during times of drought, river flow can be well below normal for months. In determining how much water Tampa Bay Water should plan to deliver, the Agency takes the projected regional demand and subtracts the amount of water that is self-supplied by the members and adds back 6 mgd to account for the flow uncertainty of the Hillsborough River (this is the annual budgeted quantity for the City of Tampa). This calculation is performed assuming normal hydrologic conditions. The result of this calculation is shown in **Table 3-5** for the planning horizon. The amount of water projected for Tampa Bay Water to deliver on an average annual basis through the current planning horizon, based on the 50^{th} percentile probability, is also shown in **Figure 3-5** and **Table 3-5**.

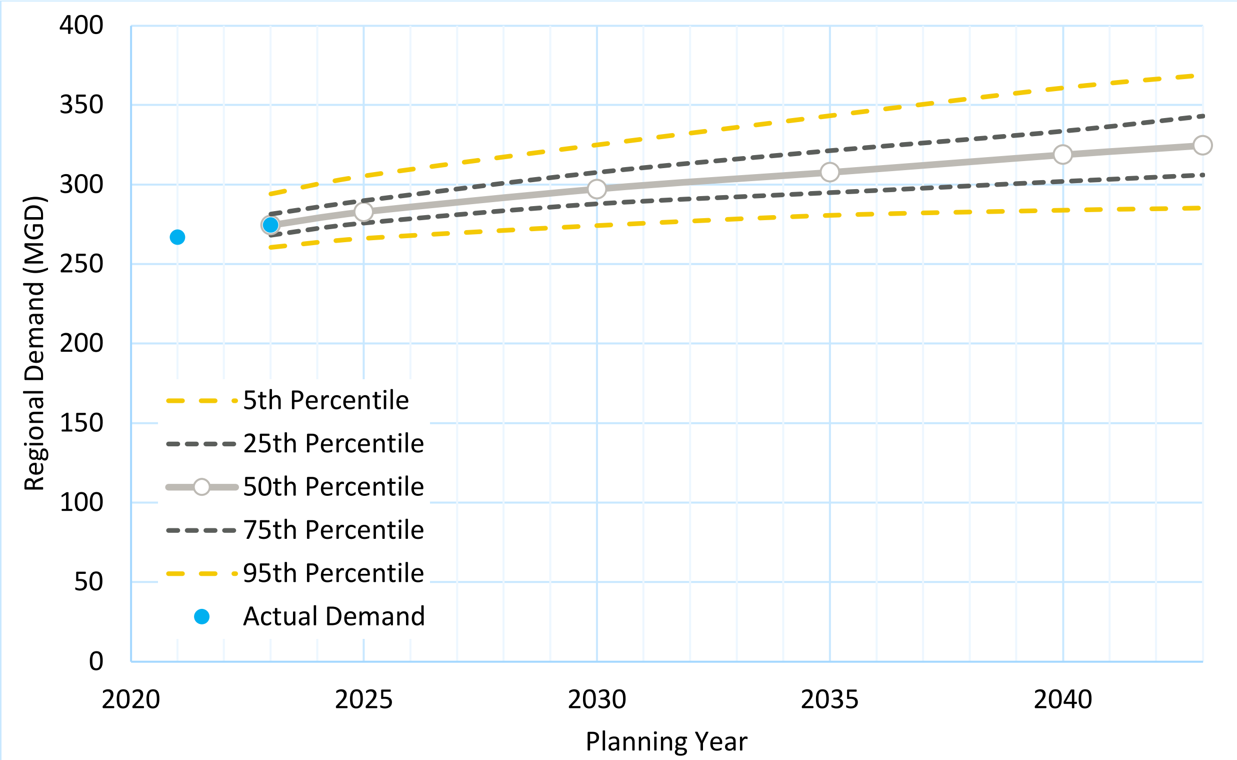

Figure 3-4 Tampa Bay Water 2022 Probabilistic Regional Demand Forecast

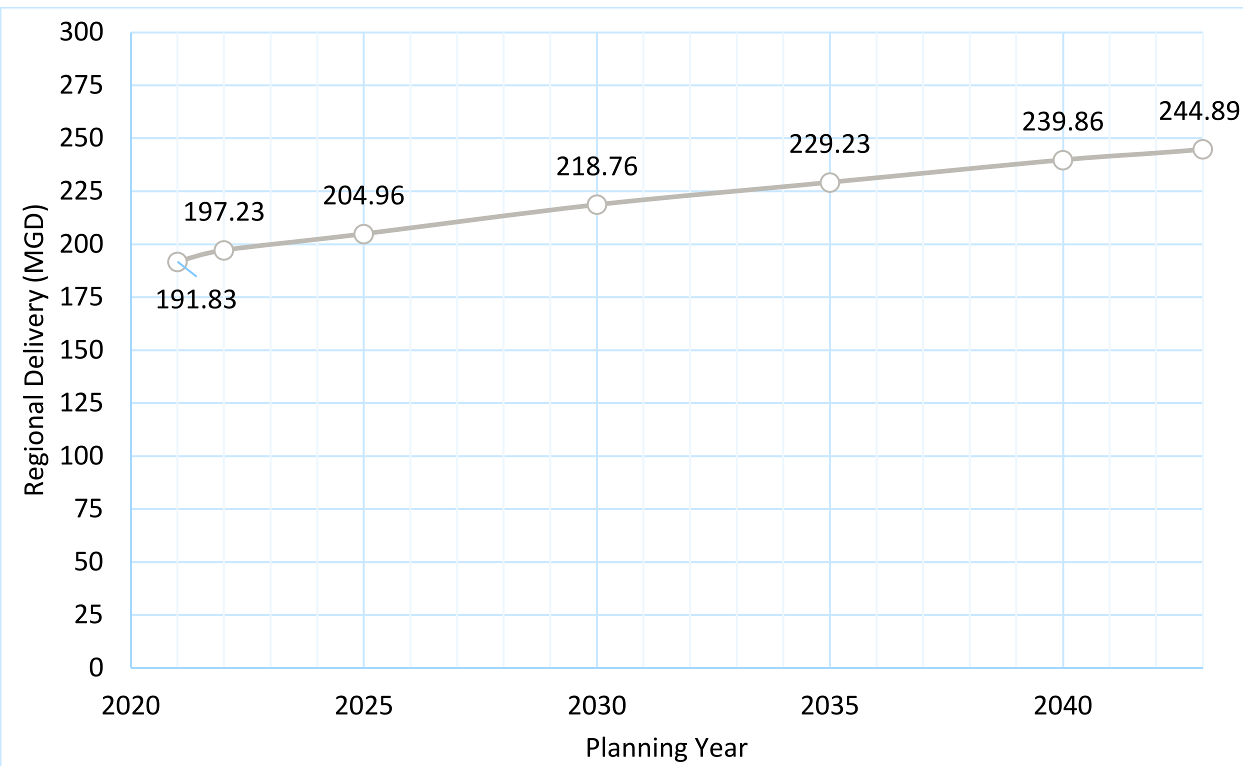

Figure 3-5 Tampa Bay Water 2022 Regional Delivery Forecast – 50th Percentile

Table 3-4 Projected Water Demands for Tampa Bay Water Member Governments

Water Year	Percentile	Pasco County (mgd)	City of New Port Richey (mgd)	Northwest Hillsborough County (mgd)	South Hillsborough County (mgd)	City of Tampa (mgd)	Pinellas County (mgd)	City of St. Petersburg (mgd)	Total Demand (mgd)
2022*	**NA**	**35.23**	**3.34**	**21.79**	**51.54**	**78.86**	**49.19**	**26.94**	**266.89**
2023	5th	34.18	3.24	19.49	47.58	76.32	47.94	25.37	260.49
	25th	35.60	3.34	20.25	50.96	79.42	49.95	26.08	268.31
	50th	**36.96**	**3.45**	**21.05**	**53.09**	**81.50**	**52.27**	**26.61**	**274.54**
	75th	38.09	3.58	21.94	55.15	83.75	53.91	27.16	281.53
	95th	39.74	3.81	23.06	58.18	87.00	56.05	28.14	294.16
2025	5th	35.22	3.3	20.03	49.3	78.62	48.42	25.52	266.15
	25th	37.01	3.42	20.93	53.22	81.74	50.44	26.36	275.9
	50th	**38.57**	**3.55**	**21.78**	**55.5**	**84.18**	**52.68**	**26.9**	**282.82**
	75th	39.95	3.69	22.7	57.38	86.6	54.29	27.47	289.93
	95th	42.05	3.94	24.12	61.22	89.92	56.34	28.39	305.41
2030	5th	37.1	3.41	20.92	52.47	82.11	48.47	25.48	274.29
	25th	39.81	3.57	22.06	56.93	86.22	50.82	26.56	287.87
	50th	**41.55**	**3.72**	**23.24**	**59.45**	**88.77**	**53**	**27.23**	**297.18**
	75th	43.42	3.88	24.33	62.42	92.06	54.82	27.91	307.6
	95th	46.34	4.17	25.94	67.24	96.51	57.02	28.88	324.99
2035	5th	38.64	3.45	21.42	54.4	84.27	48.44	25.44	280.66
	25th	41.62	3.64	22.8	59.5	88.99	50.97	26.5	294.9
	50th	**43.83**	**3.85**	**24.21**	**62.68**	**92.47**	**53.12**	**27.27**	**307.77**
	75th	46.47	4.04	25.68	66.41	96.63	55.05	28.21	321.3
	95th	50.08	4.35	27.7	72.71	102.07	57.59	29.42	343.3
2040	5th	39.48	3.47	21.59	55.71	85.87	48.57	25.19	283.96
	25th	43.36	3.71	23.46	61.62	91.63	51.08	26.5	301.99
	50th	**45.94**	**3.94**	**25.23**	**65.89**	**96.17**	**53.37**	**27.52**	**318.82**
	75th	49.2	4.18	27.01	70.13	100.76	55.55	28.49	333.57
	95th	53.32	4.51	29.37	76.91	106.96	58.24	29.88	360.9
2043	5th	40.03	3.47	21.74	56.61	86.78	48.55	25.30	285.25
	25th	44.23	3.74	23.77	62.96	92.89	51.21	26.56	306.03
	50th	**46.91**	**4.00**	**25.80**	**67.48**	**97.77**	**53.48**	**27.65**	**324.60**
	75th	50.74	4.26	27.80	72.58	103.17	55.88	28.83	343.21
	95th	55.56	4.61	30.31	79.64	109.80	59.06	30.27	368.84

Table 3-5 Projected Tampa Bay Water Annual Average Delivery, 50th Percentile

Water Year	Drought Safety Factor	Pasco County (mgd)	City of New Port Richey (mgd)	Northwest Hillsborough County (mgd)	South Hillsborough County (mgd)	City of Tampa (mgd)	Pinellas County (mgd)	City of St. Petersburg (mgd)	Total Delivery (mgd)
Self-Supply[1]	**-**	**1.9**	**0.3**	**0**	**0**	**82**	**0**	**0**	**-**
2023	6	35.06	3.15	21.05	53.09	0	52.27	26.61	197.23
2025	6	36.67	3.25	21.78	55.5	2.18	52.68	26.9	204.96
2030	6	39.65	3.42	23.24	59.45	6.77	53	27.23	218.76
2035	6	41.93	3.55	24.21	62.68	10.47	53.12	27.27	229.23
2040	6	44.04	3.64	25.23	65.89	14.17	53.37	27.52	239.86
2043	6	45.01	3.7	25.8	67.48	15.77	53.48	27.65	244.89

1. Delivery requirements are equal to member government demands minus their ability to self-supply. Demand requirements are based on current model and results presented to Tampa Bay Water's Board of Directors in December 2022.

3.4 Interlocal Agreement Requirements/Recommended Planning and Management Activities

The Interlocal Agreement requires that Tampa Bay Water actively monitor the members' demands and the permitted capacity of Tampa Bay Water facilities as outlined below:

- 3.03.C. The General Manager shall actively monitor the relationship between the quantity of Quality Water actually delivered by the Authority to the Member Governments and the aggregate permitted capacity of the Authority's production facilities.

- 3.03.C.(1). If the actual delivery of Quality Water by the Authority to the Member Government during any twelve-month period exceeds 75 percent of the aggregate permitted capacity of the Authority's production facilities, the General Manager shall report to the Board and recommend the Authority initiate preparation of Primary Environmental Permit applications necessary to ensure adequate supply. The Authority shall initiate any such applications expeditiously.

- 3.03.C.(02). If the actual delivery of Quality Water by the Authority to the Member Governments during any twelve-month period exceeds 85 percent of the aggregate permitted capacity of the Authority's production facilities, the General Manager shall report to the Board and recommend that the Authority file Primary Environmental Permit applications to ensure adequate supply. The Authority shall file any such applications expeditiously.

3.5 Estimated New Supply Need Over Planning Horizon

The amount of new supply needed during the next planning horizon (2023-2043) is a combination of demand projections, existing supply, hydrologic uncertainty, system reliability and Interlocal Agreement requirements. Tampa Bay Water recognizes that annual demand projections are uncertain. To account for these uncertainties, the Agency uses probabilistic demand projections covering a range of future scenarios based on low to high population projections expected in the region. In addition, other socio-economic uncertainties such as income and price of water are included in these projections. When estimating future supply needs and reliability, Tampa Bay Water combines these demand projections with supply availability models that account for climate variability and varying hydrologic conditions. As a result, future supply needs have an associated reliability because of uncertainty in hydrologic conditions and the resulting surface water availability. Based on system wide reliability modelling conducted for the 2018 Long-term Master Water Plan Update, Tampa Bay Water will need 25 mgd to 35 mgd of additional supply through the year 2040 at the 95th percentile confidence level. Expected 2043 Tampa Bay Water delivery is approximately 245 mgd at the 50th percentile of projected demand.

3.5.1 Prolonged Drought Planning

Surface water in Tampa Bay Water's regional system plus the City of Tampa's Hillsborough River source constitutes about 50% of the total existing supplies. The Hillsborough River, Tampa Bypass Canal, and Alafia River are dependent on seasonal and annual rainfall to provide enough flow above the permit-established minimum flow requirements to meet regional water supply needs. These systems are subject to sustained reductions in available water during prolonged drought periods. The Tampa Bay region has sustained two significant drought periods over the past 20 years: 1999-2001 and 2006-2009. In addition, 2017 was one of driest years in recent times. Tampa Bay Water constructed a surface water reservoir that provides the region with a buffer against normal dry seasons and can sustain the regional surface water treatment plant for about one year if all river flows fall below withdrawal thresholds. If, however, a drought was to persist beyond one year, and no river flow was available to replace lost storage, then it would be difficult to continue meeting demands even under mandatory watering restrictions and other demand management and supply augmentation actions. In the event of prolonged drought, Tampa Bay Water has developed a Water Shortage Mitigation Plan as discussed in **Section 4** that addresses demand management and supply augmentation actions to mitigate the short-term impacts during these extreme hydrologic periods.

3.5.2 Supply Capacity Definitions

As part of this Long-term Master Water Plan update, Tampa Bay Water has identified three supply capacities to be used in planning for future supplies:

- aggregate permitted capacity -- reflects the total permitted capacity of Tampa Bay Water's regional system and complies with the Interlocal Agreement terms to define this quantity.
- sustainable water supply – the amount that can be sustainably supplied based on hydrologic uncertainty, permitting requirements and operational constraints, and
- hydrologic dry supply conditions – regional water supply available during hydrologic dry events in which supply from the Hillsborough River drops below the City of Tampa's permitted annual average rate of 82 mgd and Tampa Bay Water's surface water treatment

plant relies on stored reservoir water for up to a period of one year. These three supply capacities are shown in **Figure 3-6**.

The exact timing of when new supplies need to be online will continue to be evaluated during the next several years as demand forecasts are updated annually and supply feasibility projects are completed. However, based on the most recent analysis of sustainable system capacity based on system wide reliability modelling conducted for the 2018 Long-term Master Water Plan update, drought supply capacities and projected water supply planning demands through the year 2043, Tampa Bay Water has determined that approximately 38 mgd of new supplies need to be developed by 2043. The expansion of the Regional Surface Water Treatment Plant is planned to be completed by the year 2028 and will add 10 to 12.5 mgd of sustainable capacity to the system reducing the needed demand to approximately 25 to 28 mgd. Based on the current projections and expansion plan it appears additional new supply will need to come online around the early to mid 2030's. The exact timing and quantity of the next supply project, beyond surface water expansion, will be determined as part of the next water supply selection process, anticipated to be around 2026. The system wide reliability modelling will be updated past the year 2043 as feasibility studies for selected projects are completed.

An additional water supply(s) between 10 to 20 million gallon per day by2033 is recommended. This is less than the approximately 25 mgd required to meet 2043 demands, but it allows Tampa Bay Water to build future water supply to be in line with the growing demand projections, so that the rate is not overburdened with costs for an oversized system.

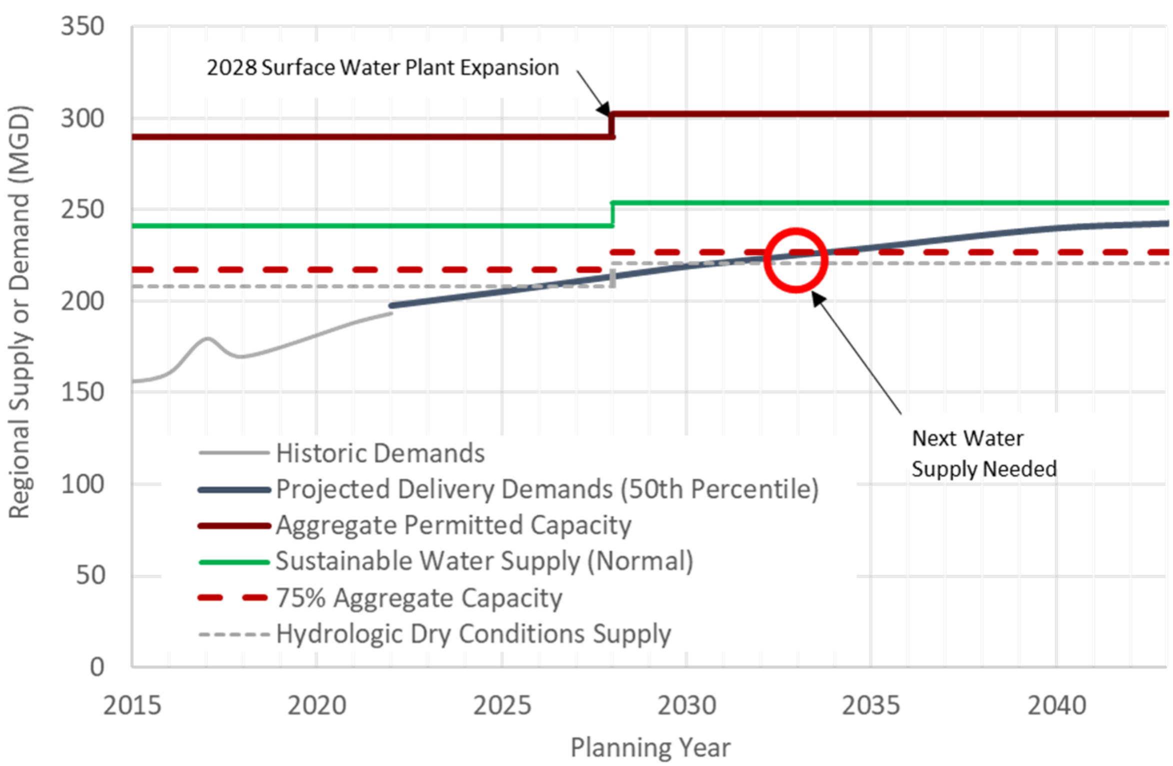

Figure 3-6 Regional Delivery versus Available Supplies

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4.0 Water Shortage Mitigation Plan

The purpose of the Water Shortage Mitigation Plan (WSMP) is to provide Tampa Bay Water and its Member Governments a strategy for identifying and responding to water supply shortages caused by extended hydrologic drought conditions. The WSMP does not affect or manage long-term demand, but rather is a plan for Tampa Bay Water to meet Member Governments water needs during extended hydrologic droughts with its existing regional system in an environmentally sustainable manner. Implementation of this plan enhances the Agency's ability to meet demands during infrequent extended drought events, avoiding infrastructure investment specifically for these shorter-term events that would seldom be used. Thus, the WSMP allows the Long-term Master Water Plan to focus on long-term water supply needs for the future.

The WSMP defines four incremental stages of water shortage, as well as hydrologic and supply-based triggers for determining entry and exit conditions for each defined stage. Recommended supply management actions, potential demand management actions, and a communications plan are included to guide the selection of appropriate actions for minimizing the impacts of water shortage in areas served by Tampa Bay Water Member Governments. The plan includes seasonally-varying reservoir target levels that are responsive to intra-annual hydrologic variability and proactive three-month-advance supply and demand projections used as leading indicators for Stage III and Stage IV shortage declarations. The WSMP stipulates that updates will occur at least once every five years, consistent with the Long-term Master Water Plan updates, District rule changes, and/or when new experience is gained.

Since Board approval and implementation of the updated WSMP in April 2017, there have been no significant changes in Tampa Bay Water's infrastructure and no District Water Shortage Rule changes. In addition, there has been no opportunity to assess the Stage III and Stage IV triggers since there has not been a drought event of this severity since the updated plan was approved in 2017. Stage III and Stage IV declarations are based on probabilistic demand and supply predictions and model simulations and Tampa Bay Water has not had an opportunity to assess the effectiveness of the triggers and associated responses.

4.1 Hydrologic and Supply Shortage Trigger Identification

Nearly 50 percent of potable water supplies in the Tampa Bay Water service area, including the City of Tampa's self-supply from the Hillsborough River, are derived from surface water sources. These surface water sources are the first and most adversely impacted during hydrologic drought events; therefore, decline in surface water flow is indicative of impending water supply shortage conditions.

The WSMP consists of four water shortage stages of increasing severity, and each is defined by its corresponding hydrologic- and/or supply-based triggers that establish both entry and exit conditions. Two types of triggers were developed for the WSMP, which include:

- Hydrologic triggers, used to provide early warning of a potential drought; and
- Supply shortage triggers, used to describe the severity of surface water supply shortage.

The hydrologic triggers are based on the hydrologic indicators listed below. Evaluation for each indicator is conducted on the first day of each month. See Tampa Bay Water's 2017 Water Shortage Mitigation Plan for calculation details and examples of these hydrologic triggers:

- **Rainfall**: characterized by the 12-month rolling cumulative deficit rainfall (RCD-rainfall); calculated based on the past 12 months of rainfall from a network of rainfall reporting stations across the Tampa Bay Water service area.

- **Streamflow**: characterized by the rolling median deficit flow (RMD-flow); expressed as the median of the previous 12 monthly streamflow surpluses or deficits at the Hillsborough River USGS Morris Bridge gauge.

  The supply shortage triggers are based on streamflow conditions plus forecasted reservoir stage, which is used to determine reservoir storage. The three-month-ahead forecasts of reservoir stage are obtained through a simulation model that incorporates streamflow forecasts, relevant operational constraints, and current field measurement of reservoir stage:

- **Surface Water Storage**: characterized by reservoir water surface elevation (Reservoir Elev); expressed as water level (feet NVGD) in the C.W. Bill Young Regional Reservoir measured on the last day of the previous month, corresponding to remaining days of supply. Numerical values for the indicators were developed to trigger entering and exiting each stage based on various combinations of RCD-rainfall, RMD-flow, and Reservoir Level.

4.2 Water Shortage Mitigation Plan Stages

The first two WSMP stages are defined by hydrologic indicators, while the last two WSMP stages are defined by stream flow conditions and three-month-ahead forecasts of reservoir levels, which indicate reservoir storage.

STAGE I: ***Drought Alert*** is the first indication of a potential water shortage condition. In Stage I, there is a shortage in rainfall or streamflow (but not necessarily both). Stage I conditions indicate that hydrologic conditions are either deteriorating and could lead to a potential supply shortage or have improved from more severe conditions.

STAGE II: ***Drought Warning*** is the next level indicating severe hydrologic conditions; if these conditions continue, a water shortage condition could occur. In Stage II, there is a shortage in both rainfall and streamflow, but reservoir storage is not impacted. This stage indicates that a loss of surface supply availability may occur requiring increased use of reservoir storage. For exiting this stage, either rainfall deficit has diminished, or the streamflow deficit has reached 5 million gallons per day (mgd) or less.

STAGE III: ***Regional Supply Shortage*** condition indicates an extreme water supply situation. In Stage III, a shortfall in streamflow and a shortfall in reservoir storage exist. This stage indicates surface water supply is compromised due to dry hydrologic conditions and may be lost altogether if those conditions persist. For exiting this stage, the reservoir storage must have recovered as indicated by a reservoir level at the 35th percentile or greater.

STAGE IV: ***Water Supply Crisis*** (Stage IV) is the most critical water shortage condition. In this situation, a prolonged shortage in streamflow has required extended use of reservoir storage. Forecasted reservoir level at three-month-ahead is at or below the 10th percentile, resulting in near or total exhaustion of reservoir storage. When this stage occurs, increased reliance on other water sources and consistent District water shortage phase adoption will likely occur soon. For exiting this stage, reservoir storage must have recovered as indicated by an increase in the reservoir level to the 25th percentile or greater.

Once the hydrologic triggers signal a given diminished hydrologic condition and subsequent water supply shortage, the corresponding water shortage stage is triggered, initiating the implementation of supply management actions by Tampa Bay Water as described in the WSMP. Demand management actions implemented by the Member Governments, as described in the WSMP are triggered by and correspond to the provisions of any applicable emergency water shortage order or executive director order issued by the District.

4.3 Water Shortage Mitigation Plan Updates

Since the implementation of the revised WSMP in 2017, Tampa Bay Water has only been in a Stage I condition. Both Stage I and Stage II were the same triggers and adaptation action measures as the prior generation of WSMP. Therefore, Tampa Bay Water recommends continuing the implementation of the current WSMP until significant changes in infrastructure are completed, District Water Shortage Rules are modified, or the agency is able to implement the full range of triggers and responses in the updated plan to assess their effectiveness.

References

Tampa Bay Water, 2017. Water Shortage Mitigation Plan, Report April 2017.

Wang, H., Asefa, T., Bracciano, B., Adams, A., and Wanakule, N. 2019. Proactive water shortage mitigation integrating system optimization and input uncertainty, Journal of Hydrology, https://doi.org/10.1016/j.jhydrol.2019.01.071, 2019

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5.0 Demand Management Plan

Tampa Bay Water's Demand Management Plan describes the role of water demand management in the Tampa Bay area qualitatively and quantitatively. The Demand Management Plan is a strategy within the Agency's Strategic Plan to deliver quality water and enhance system reliability and sustainability. Tampa Bay Water is required by Board Resolution No. 2013-006 to evaluate and update the Demand Management Plan every five years with the most recent update completed in 2023 (**Appendix C**).

Through efficient use of available supplies and use of targeted implementation strategies, water use efficiency can help manage peak and average day water demands in conjunction with reducing long-term future water supply requirements. Cost-effective alternatives to new supply development and other valuable benefits can be realized through demand-side management including optimization of existing facilities, deferred capital investment costs, improved public perception, and environmental stewardship and protection. The 2023 Demand Management Plan describes current demand management activities across the region and forecasts potential demand reductions through 2030. This chapter provides a summary of the plan.

5.1 Profile of Regional Water Demand

Water demands in the Tampa Bay area have increased over time, reaching 270 million gallons per day (mgd) in 2022, which included all water delivered by Tampa Bay Water to the member governments and water that was self-supplied by the members. Population growth is a consistent driver of increasing total water demand. Seasonal variations in precipitation, as shown in **Figure 5-1**, also affect how much water is used by residents; during the dry season (March through mid-June), demands peak due to minimal precipitation and demands decrease once the rainy season begins in mid-June.

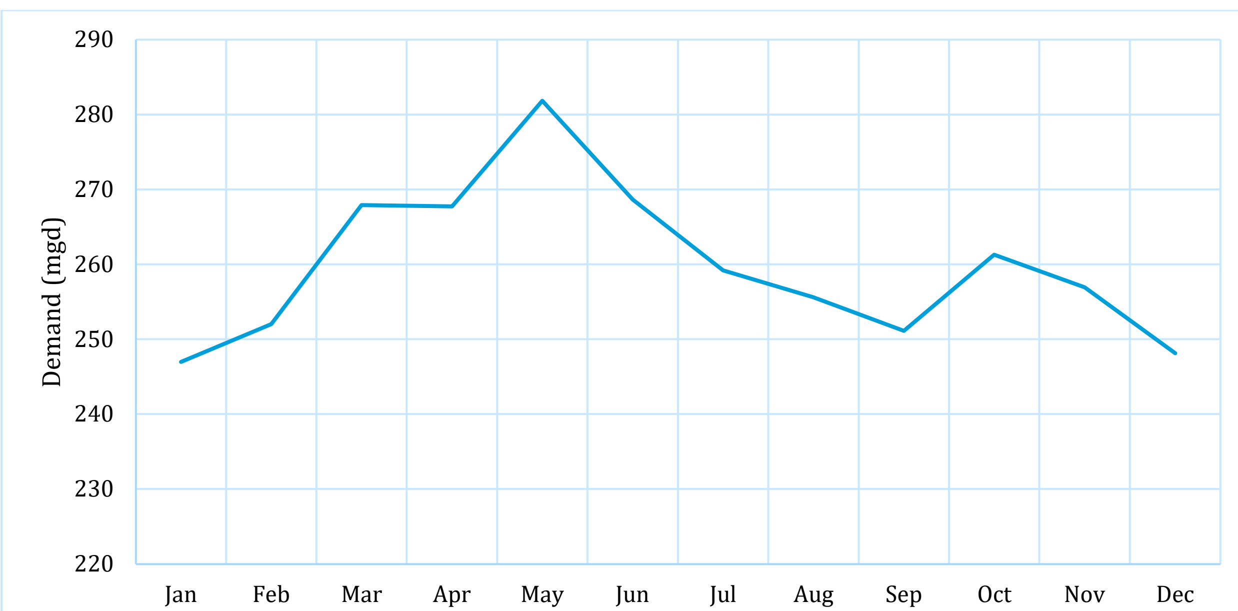

Figure 5-1 Average Regional Demand per Month, based on 2017 -2022 data

Across the members' service areas, the single-family sector accounts for 90 percent of water account holders but only 52 percent of the total regional water demand. The multifamily sector accounts for only 4 percent of accounts but contributes 21 percent of total water demand because most of these properties are master metered (i.e., one water meter for multiple dwelling units). Similarly, the non-residential sector accounts for just 6 percent of all accounts but makes up 20 percent of total water demand. Wholesale supplies account for the final 7 percent of water demand.

Understanding demand trends by sector, member, and region is important to demand forecasting. Per capita water use is one way to analyze water use trends by member and across the region. Across the region per capita water use rate has been relatively constant over the last ten years, at about 102 gallons per capita per day; however, the trends within each member government vary considerably, as shown in **Table 5-1** Some members' per capita water use increased, some decreased, such that when calculated as a region, the per capita rate of water use has remained fairly flat.

Table 5-1 also shows the change in household water use, comparing 2021 (the most recent complete data available) with household usage in 2002 and 2013. While household demands have declined since 2002 for every member, household demands have gone up compared with demands in 2013 in some member regions. The regions in which both household and per capita water use have increased since 2013 are South-Central Hillsborough, North-West Hillsborough, and Pasco Counties. By contrast, the regions in which both household and per capita water use have decreased since 2013 are New Port Richey and St. Petersburg. The City of Tampa and Pinellas County's per household water use has increased since 2013, but the per capita water usage decreased. The causes of these changes may be attributed to availability of reclaimed water to offset potable water use for irrigation, long-term investment in water conservation programs, proportion of new vs. old homes and buildings, the types of homes being built, wholesale water deliveries, water losses in the distribution system, and more. As household and per capita water use increase, the overall demand within these service areas increases; an increase in per-capita water use rate is an indicator of the potential for increased water conservation measures to reduce total demand.

Table 5-1 Changes in water use per household and per capita, by member government

	Per Capita Water Use Change 2021 compared with 2013	Single Family Household Water Use Change 2021 compared with 2002	Single Family Household Water Use Change 2021 compared with 2013
South-Central Hillsborough	11%	11%	18%
North-West Hillsborough	25%	-2%	10%
City of Tampa	-11%	-15%	8%
Pasco	7%	-11%	7%
City of New Port Richey	-7%	-30%	-9%
Pinellas	-7%	-19%	3%
City of St. Petersburg	-10%	-24%	-6%

5.2 Goals for Demand Management

The goal of Tampa Bay Water's demand management activities is to reduce water use in a cost-effective manner, compared with the cost of new water supply development. The benefits of these efforts extend beyond financial savings; they reduce the strain on the environment, allow for the optimization of existing facilities, defer capital investment costs, improve public perception, and can result in direct benefits to residents such as reduced water bills.

Several factors play a part in regional water demand reductions. Passive water conservation helps reduce water demands over time as old, inefficient fixtures wear down and are replaced with new, efficient ones. Population growth, weather and macro-economic changes can influence water usage upward or downward. Member Governments can also influence water usage through a variety of ways: retail water rates, conservation programming, reclaimed water availability to offset potable water use for irrigation, landscape ordinances, and Advanced Metering Infrastructure (AMI) are examples of programs implemented by the member governments. It is difficult to quantify the impacts of each of these influences, but it is important to acknowledge the variety of factors that contribute to water demand trends in the Tampa Bay area.

5.2.1 Member Governments and Florida Friendly Landscaping Activities

Member Governments have historically been the primary point of contact with customers regarding demand management activities. Those efforts continue today, and typical activities include the distribution of indoor retrofit kits, rain sensors, and hose nozzles to residents. Members also provide education and assistance to customers through phone consultations, landscape consultations, public events, newsletters, and websites. Watering restriction enforcement is active in all three counties and may result in warnings or fines to residents for improper watering. Historically, the development of reclaimed water has contributed to large potable water use reductions. New reclaimed water connections continue to be made in some member government service areas. In addition, several members have either started to convert their water meters to AMI or are considering this program. Water demand reductions can result from AMI installations, particularly if residents are notified of leaks, high bills, or if they are provided with water usage education. Lastly, member government policies on landscaping and new construction can have impacts on water demands.

Florida-Friendly Landscaping™ is a state-wide program within the University of Florida Institute of Food and Agricultural Sciences designed to teach Florida-Friendly Landscaping™ practices. This program is delivered through the County Extension Services, and these programs are financially supported by Tampa Bay Water. Two or more Florida Friendly Landscape™ staff work in each Hillsborough, Pasco and Pinellas County Extension Service. Florida Friendly Landscape ™ staff educate residents and businesses about landscaping practices that result in water conservation, reduction of non-point source pollution, rainwater harvesting, and the protection of the natural environment. This education may be imparted through site visits, group classes, landscape assistance, and other initiatives.

5.2.2 Tampa Bay Water Wise

The Tampa Bay Water Wise program is a water conservation rebate program managed by Tampa Bay Water staff, guided by a working group comprised of member government staff, and the program is co-funded by the Southwest Florida Water Management District (District). A third-party rebate processor was hired to manage applications, the program website, and marketing. The program was launched in March 2020 and offers a variety of residential, multi-family and commercial rebates. A summary of the rebates and water savings achieved from March 30, 2020, through September 30, 2022, is provided in **Table 5-2**.

Figure 5-2 shows the water savings from the program each year over a two-and-a-half-year period, where only the second half of 2020 was included. There is a clear increase in water savings year over year, with a cumulative total of 0.15 mgd. This result is lower than the quantity originally anticipated during this time frame of 2.75 mgd.

Table 5-2 Rebates issued and water savings achieved through Tampa Bay Water Wise

Rebate Measures	Quantity	Water Savings (GPD)
Residential Rebates		
$100 Homeowner Toilet	982	34,370
$40 Homeowner Toilet	536	5,360
Smart Irrigation Controller	31	4,805
Shallow Well	2	516
Commercial Rebates		
Customizable Rebate	4	43,096
Commercial Toilet/Urinal	5	180
$75 Multi-Family Toilet	915	63,063
$40 Multi-Family Toilet	-	-
Florida Water Star – Single Family	-	-
Cooling Tower	-	-
Pre-Rinse Spray Valve	-	-
Dishwasher	-	-
TOTALS	**2,475**	**151,390**

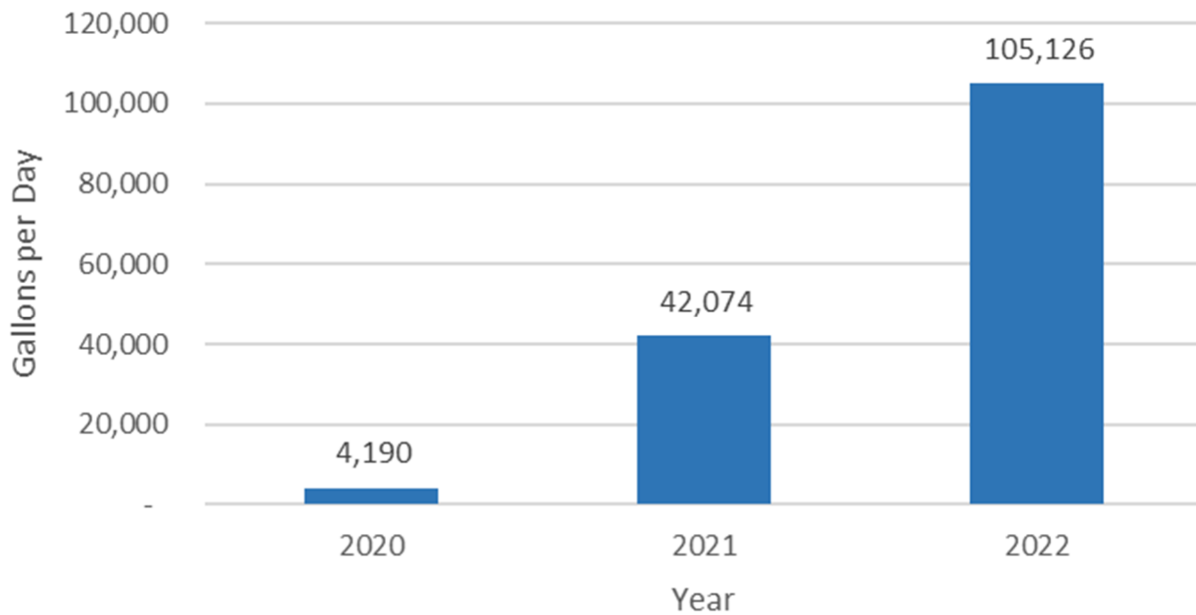

Figure 5-2 Tampa Bay Water Wise Yearly Water Savings

The costs and benefits of the Tampa Bay Water Wise program were evaluated using the Alliance for Water Efficiency's Water Conservation Tracking tool. The total expenditures for this program over the 2.5-year period totaled $1.4 million dollars, which includes the start-up costs, resulting in a cost of $1.41 per thousand gallons ($/kgal) saved.

The projected savings for the Tampa Bay Water Wise program have shifted since the 2018 Long-Term Master Water update to better align with the program's actual performance. The original goal was to save 11 mgd by 2030. The revised forecast was developed using much of the data originally developed but assumes an overall lower participation rate and therefore lower water savings through 2030. This forecast goes out only to 2030 to align with the original, anticipated duration of this program.

Figure 5-3 shows two projections to reflect the uncertainty of the program's water savings trajectory over time. The projections for this program extend only to 2030 since the program was originally envisioned to last only 10 years. The higher savings projection shown in **Figure 5-3** has been adopted as the revised goal for the program and reaches 3.8 mgd of water savings by 2030. Under this scenario, the program's total expenses would be about $15.7 million dollars, and the cost per thousand gallons would be $0.68 of water saved. The future costs for this program were based on the current fees and costs, along with an increased annual marketing budget which was approved by the working group in early 2023.

The lower water savings projection was developed to illustrate the scenario in which minimal growth in the program occurs beyond what was saved in 2022. This scenario also includes the increased budget for marketing, and under this scenario the program would save 1.4 mgd by 2030 and would cost $0.87/kgal of water saved.

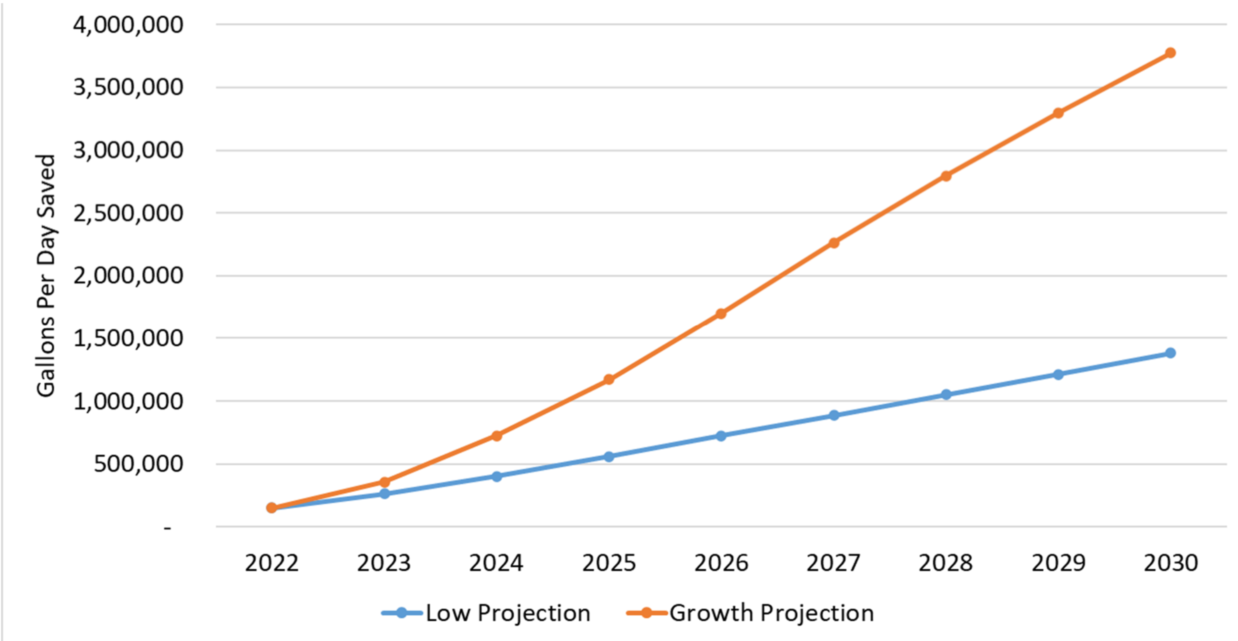

Figure 5-3 Projected water savings over time from the Tampa Bay Water Wise program

5.3 Additional Demand Management Opportunities

Tampa Bay Water will continue to invest in demand management activities by supporting the Florida Friendly Landscaping™ program, coordinating with Member Governments, and implementing the Tampa Bay Water Wise rebate program. There are additional opportunities to explore that can further contribute to demand reductions. Some of these opportunities are outside of Tampa Bay Water's direct control but could potentially be supported by Tampa Bay Water, pending further investigation.

Expanded Irrigation Efficiency Assistance – Home and business irrigation evaluations are currently conducted by Florida-Friendly Landscaping™ staff and some member governments' staff. This work typically occurs one site at a time, which is time intensive but an effective way to educate customers and create lasting water savings. This is one way to address outdoor water usage, which is a primary focus of demand management efforts. In addition, since peak season outdoor water demands impact Tampa Bay Water's system delivery capacity requirements, reducing outdoor water use could be beneficial to Tampa Bay Water as an agency.

Public Information and Education – Education, information, and inspiration are perhaps among the most important elements of successful, long-term conservation programs. Education on the importance of water conservation can help customers make water-wise decisions when making purchases or managing their water use. It is difficult, however, to reliably quantify any associated water savings.[i]

Conservation Messaging with AMI – Several member governments are in the process of converting to AMI meters throughout their service area. With the increased frequency of water usage data that is available (such as every 15 minutes instead of once per month), this data provides an opportunity to communicate with customers when a leak is first detected, and to provide target water usage levels based on typical, similar properties (single-family homes in particular). Several software platforms exist to aid utilities with the management of this data and communication with customers.[ii]

Land Use and New Construction – Population growth has been a clear driver of increased water demands over the years and the recent population increase in the Tampa Bay region over the last few years is projected to continue. As the region grows, land use planners and water managers can leverage a variety of land-use related water conservation methods for new construction that can aid in long-term conservation efforts. These methods are wide ranging and can include regulatory or incentivized measures.

System Water Loss Control – Managing water loss in the distribution system is an essential, proactive practice to address inefficiencies of water loss and revenue loss.[iii] As a result of a pilot effort initiated by Tampa Bay Water in 2018-2019[iv], a statewide Florida Water Loss Program was launched by the Florida Section American Water Works Association (FSAWWA) in partnership with Cavanaugh and E Source and is funded by the Florida Department of Environmental Protection (FDEP). This program is a significant first step toward the proactive management of water losses. Five of the six member governments are enrolled in this program as of March 2023. This effort may result in the reduction of water losses, and there may be additional steps that can be taken at the conclusion of the program in 2025.

5.4 Summary of Findings and Recommendations

As the population of the Tampa Bay area continues to grow, demand management has an important role to play in Tampa Bay Water's long-term objectives by reducing unnecessary water use and improving the efficiency with which water is used across residential, multi-family and commercial sectors. In 2020, Tampa Bay Water began pursuing active water savings through the regional rebate program, Tampa Bay Water Wise. In the first 2.5 years, the program saved 0.15 mgd, at a cost of $1.41/kgal. The program's cost per thousand gallons is expected to trend downward as more water savings are achieved and it is expected to be cost competitive with the cost of new supplies in 2030.

While many demand management activities are underway in the region, there remain new opportunities to explore that may help to reduce water usage during the dry season or reduce demands year-round. Demand management is a long-term investment and part of Tampa Bay Water's long-term strategy that will play a beneficial role in our region for years to come.

[i] "Public and consumer education programs," Alliance for Water Efficiency, accessed October 6, 2022, https://www.allianceforwaterefficiency.org/resources/topic/public-and-consumer-education-programs.

[ii] "Advanced Metering Infrastructure," U.S. Environmental Protection Agency, WaterSense Program, accessed March 27, 2023, https://www.epa.gov/watersense/advanced-metering-infrastructure.

[iii] American Water Works Association. *Water audits and loss control programs 4th Edition,* (2009) pp. 1–8.

[iv] Cavanaugh/WSO prepared for Tampa Bay Water and Florida Department of Environmental Protection, *Florida Water Loss Pilot Technical Assistance Program* (2019).

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6.0 Regulatory Outlook for Drinking Water Supplies

The Safe Drinking Water Act (SDWA) was enacted in 1974 to regulate the nation's public drinking water supplies and protect public health. It was amended in 1986 and 1996 to improve protection of drinking water quality as well as include coverage for sources of drinking water: rivers, lakes, springs, and groundwater. The current SDWA mandate includes source water protection, water treatment, finished water distribution, and public information.

Under the SDWA, the United States Environmental Protection Agency (USEPA) is authorized to establish enforceable standards for drinking water which include natural and man-made constituents and minimal treatment requirements. These regulations establish health-based maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs) for specific drinking water constituents and identify the approved testing methods for each contaminant. MCLs are enforceable primary drinking water regulations. MCLGs are non-enforceable public health goals which establish the level of a contaminant in drinking water below which there is no known or expected risk to public health. "Primacy" is the authority that allows a state to implement and enforce the SDWA within the jurisdiction of that state. The USEPA can delegate primacy to a state if the state provides assurance that it will adopt drinking water standards at least as stringent as the federal standards and can appropriately enforce those standards. In Florida, the Florida Department of Environmental Protection (FDEP) has primacy authority to enforce the SDWA. This section summarizes the pertinent regulations that may affect Tampa Bay Water's existing and future water supplies.

This section will describe Federal Drinking Water requirements and State Regulations for potable reuse.

6.1 Current Federal Regulatory Requirements

Drinking water standards are designated as either primary or secondary. Primary standards are enforceable limits established to protect public health and apply to all public water systems. A public water system (PWS) is a system that provides water to 25 or more people for at least 60 days each year or serves 15 or more service connections. Regulated constituents include microbial contaminants, disinfectants, disinfection byproducts (DBPs), radionuclides, organic chemicals, and inorganic chemicals. Secondary standards are non-enforceable guidelines related to aesthetic qualities such as color, taste, and odor. Secondary maximum contaminant limits (SMCLs) are not considered to pose a risk to human health; however, states may choose to adopt them as enforceable standards. Florida requires notification if compliance with the SMCLs are not maintained.

Under the authority of the SDWA, the USEPA has promulgated regulations that are applicable to public water systems. They include:

- Amendments to the SDWA (National Primary Drinking Water Regulations), 1986 and 1996
- Surface Water Treatment Rule (SWTR), 1989
- Total Coliform Rule (TCR), 1989
- Lead and Copper Rule (LCR), 1991
- Interim Enhanced Surface Water Treatment Rule (IESWTR), 1998
- Stage 1 Disinfectants and Disinfection By-Products Rule (Stage 1 D/DBPR), 1998

- Radionuclides Rule, 2000
- Arsenic Rule, 2001
- Filter Backwash Recycling Rule (FBRR), 2001
- Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR), 2002
- Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), 2006
- Stage 2 Disinfectants and Disinfection By-Products Rule (Stage 2 D/DBPR), 2006
- Groundwater Rule (GWR), 2006
- Revised Total Coliform Rule (RTCR), 2013

Figure 6-1 illustrates the cumulative nature of the regulation of drinking water constituents in the United States.

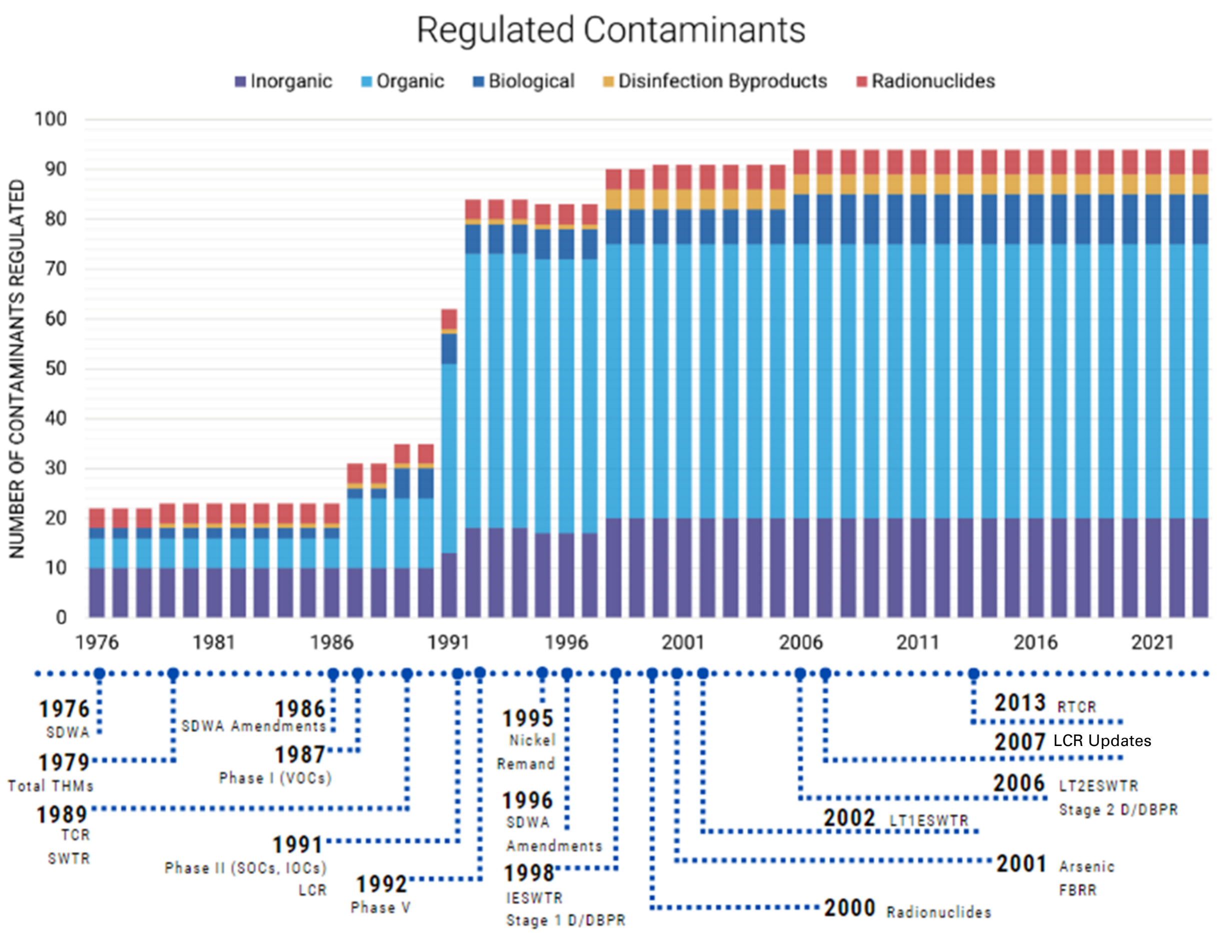

Figure 6-1 Regulatory Timeline for Drinking Water Rules and Constituents in the United States

6.1.1 Surface Water Treatment Rules

Treatment requirements for surface water supplies are designed to protect against potential waterborne diseases caused by viruses, bacteria, and protozoa, including *Giardia lamblia, Cryptosporidium, and Legionella*. The initial SWTR required PWS to achieve 3-log (99.9%) removal/inactivation of *Giardia lamblia* and 4-log (99.99%) removal/inactivation of viruses. Under the initial SWTR, PWSs are required to filter and disinfect surface water supplies. In very rare cases, some PWSs may not require filtration if other criteria for source water quality and watershed protection are met. In general, the initial SWTR required:

- Combined filter effluent (CFE) turbidity monitoring and maintaining CFE less than or equal to 0.5 Nephelometric Turbidity Units (NTU) to demonstrate the adequacy of the filtration process, where CFE represents the blended filtered water produced from all individual filters in operation.
- Primary disinfection for inactivation of *Giardia lamblia* and viruses
- Maintenance of a minimum residual disinfectant in the distribution system (i.e., Tampa Bay Water's transmission system).

The USEPA implemented IESWTR as an incremental step to improve the control of microbial pathogens, particularly *Cryptosporidium*, in systems that serve 10,000 persons or more. The IESWTR imposed stricter standards for individual and combined filter effluent turbidity as a means for verifying treatment performance for removal of *Cryptosporidium*. The combined filter effluent turbidity standards were reduced from the 0.5 NTU to 0.3 NTU measured every 4 hours at a minimum. Turbidity performance requirements specified under IESWTR assume compliance with 2-log *Cryptosporidium* when the combined filter effluent is less than 0.3 NTU at least 95% of the time and not to exceed 1 NTU at any time (previously under SWTR, combined filter effluent could not exceed 5 NTU at any time). Additionally, IESWTR required continuous monitoring of individual filters at 15-minute intervals. Finally, IESWTR required covers on all new finished water storage facilities and sanitary surveys for all surface water systems regardless of size.

LT1ESWTR extended the provisions and protection of the IESWTR to systems less than 10,000 persons. LT2ESWTR was promulgated to further enhance public protection against illness caused by microbial pathogens, specifically *Cryptosporidium*, in drinking water beyond what was required by the IESWTR. The LT2ESWTR rule implemented a risk-based approach to *Cryptosporidium* treatment as shown in **Table 3-1**. The LT2ESWTR included source water quality monitoring for *Cryptosporidium* bin classification, since bin classification is based on the concentration of *Cryptosporidium* detected in the raw water supply. Requirements for *Cryptosporidium* treatment are based on bin classification, and approved treatment techniques and log inactivation credits are defined in the microbial toolbox guidance manual.

Table 6-1 LT2ESWTR Bin Classification and *Cryptosporidium* Treatment Requirements

Bin Classification	Average Raw Water *Cryptosporidium*, oocyst/L	Additional *Cryptosporidium* Inactivation/Removal		
		Conventional Filtration	Direct Filtration	Alternative Filtration Technology
1	< 0.075	None	None	None
2	0.075 to <1.0	1.0-log (1)	1.5-log (1)	As determined by FDEP to achieve 4.0-log (1)
3	1.0 to < 3.0	2.0-log (2)	2.5-log (2)	As determined by FDEP to achieve 5.0-log (2)
4	≥ 3.0	2.5-log (2)	3.0-log (2)	As determined by FDEP to achieve 5.5-log (2)

Notes:
1. **Systems may use any technology or combination of technologies from the microbial toolbox.**
2. **Systems must achieve at least 1-log of the required treatment using ozone, chlorine dioxide, UV, membranes, bag/cartridge filters, or bank filtration.**

6.1.2 Groundwater Rule

The intent of the 2006 GWR was to reduce the potential incidence of illness caused by microbial contamination in public water systems that utilize groundwater sources. Under this rule, groundwater systems must undergo sanitary surveys at least once every three years and take corrective actions for any deficiencies identified. A groundwater system must provide a minimum of 4-log virus inactivation/removal or be subject to triggered source water monitoring in the event of a total coliform positive observation in the distribution system. Triggered source water sampling includes at least one sample from each source that was in use at the time of the positive total coliform result. The triggered source water samples must be analyzed for the presence of fecal indicators also.

6.1.3 Total Coliform Rule and the Revised Total Coliform Rule

The intent of the TCR and RTCR is to protect public health through the reduction of potentially harmful pathogens in the distribution system by monitoring the presence or absence of coliform bacteria. Coliform bacteria serve as indicator organisms to signal the presence of microbial contamination. *E. coli* serves as an indicator of potential fecal contamination. The RTCR reflected a shift in compliance requirements, focusing more on the presence/absence of *E. coli* in the distribution system. Under the RTCR, any total coliform-positive (TC+) samples are required to be further analyzed for *E. coli*, and additional "recollect" samples must be taken from sites specifically related to the initial total coliform-positive sample. RTCR required any *E. coli*-positive (EC+) samples to be reported to the state no later than the end of the next business day. Systems with violations are required to conduct assessments to "find and fix" the source of contamination.

The RTCR set a non-enforceable maximum contaminant level goal (MCLG) of zero for total coliforms and an enforceable MCL of zero for *E. coli*. Any observation of *E. coli* in distribution system water is an acute MCL violation that would trigger a boil water order. The RTCR also established a performance metric for total coliform observations:

- Level 1 Assessment is required if more than 5% of routine/repeat samples collected in the same month are TC+. A Level 1 Assessment is a detailed review of system operational practices and may be conducted by the utility staff.
- Level 2 Assessment is required if the system has a second exceedance of the 5% TC+ threshold in a rolling 12-month period, or if *E. coli* is detected in the distribution system. The Level 2 Assessment is conducted by the state or a state-approved entity.

6.1.4 Disinfectants and Disinfection By-Product Rules

The 1979 Total Trihalomethane (TTHM) Rule established an MCL of 0.100 mg/L for four trihalomethanes (chloroform, bromoform, dichlorobromomethane, and dibromochloromethane). The MCL for TTHMs became more stringent under the Stage 1 D/DBPR (1998) from 0.100 mg/L to 0.080 mg/L. Stage 1 D/DBPR added MCLs for five regulated haloacetic acids (HAA5), chlorite, and bromate. At the time, compliance with MCLs for TTHM and HAA5 was based on the running annual average (RAA) of quarterly measurements from distribution system monitoring sites. Compliance with MCLs for chlorite and bromate is monitored at the point of entry (POE) to the distribution system. Stage 1 D/DBPR also established Maximum Residual Disinfectant Levels (MRDL) for chlorine, chloramine, and chlorine dioxide. A summary of MCLs and MCLGs established under Stage 1 D/DBPR is provided in **Table 6-2**.

Table 6-2 Stage 1 D/DBPR Disinfection Byproduct MCLGs and MCLs

Disinfection Byproduct	MCLG (mg/L)	MCL (mg/L)
TTHM	N/A	0.080
HAA5	N/A	0.060
Chlorite (monitored at POE)	0.8	1.0
Bromate (monitored at POE)	0	0.010

The Stage 1 D/DBPR required systems to monitor source water and finished water total organic carbon (TOC) and source water alkalinity to demonstrate adequate control of DBP precursors. Stage 1 D/DBPR required enhanced coagulation and enhanced softening systems to comply with TOC removal requirements based on source water quality TOC and alkalinity as defined in **Table 6-3**. Compliance with TOC removal requirements is computed based on the RAA of monthly TOC removal, averaged quarterly. Systems may qualify for exemption from TOC removal requirements if they meet alternative conditions for source/finished water TOC, DBP formation, or specific UV absorbance (SUVA).

Table 6-3 TOC Removal Required for Stage 1 D/DBPR Compliance

Source Water TOC, mg/L	Source Water Alkalinity, mg/L as $CaCO_3$		
	0-60	> 60 to 120	> 120
> 2.0 to 4.0	35%	25%	15%
> 4.0 to 8.0	45%	35%	25%

Source Water TOC, mg/L	Source Water Alkalinity, mg/L as $CaCO_3$		
	0-60	> 60 to 120	> 120
> 8.0	50%	40%	30%

Stage 2 D/DBPR was promulgated in 2006 in tandem with the LT2ESWTR to further reduce potential health risks associated with DBP formation in drinking water. The Stage 2 D/DBPR maintained the MCLs for TTHM and HAA5 established under Stage 1 D/DBPR while imposing stricter requirements for monitoring compliance based on the locational running annual average (LRAA) of individual distribution system monitoring sites. This approach intended to reduce the potential for exposure to higher concentrations of DBPs in localized areas of a distribution system.

6.1.5 Lead and Copper

The Lead and Copper Rule (LCR), promulgated in May 1991, established action levels (ALs) for lead and copper. The action levels stipulate that lead and copper concentrations must be less than 0.015 mg/L and 1.3 mg/L, respectively, in ninety percent of the first-draw samples collected at taps within the distribution system. Selected sampling sites must be single-family residences which contain copper pipes with lead solder installed after 1982, which contain lead pipes, or which are served by a lead service line. LCR included implementation of state-specified optimal treatment for medium and large utilities, which established water quality parameters to minimize lead and copper concentrations at consumer taps and required annual monitoring to verify compliance with the lead and copper ALs. Lead and Copper Rule Revisions

On December 22, 2020, the USEPA finalized the first major update to the LCR in nearly 30 years. The finalized Lead and Copper Rule Revisions (LCRR) were promulgated in the Federal Register on January 15, 2021, with a focus on switching from a reactive to proactive approach to improve water quality at the customers' tap. The compliance deadline for the LCRR was January 16, 2024, when it was initially published (United States Environmental Protection Agency, 2021).

On March 10, 2021, EPA announced the delay of the effective date for the LCRR so the agency could seek further public input, especially from communities that are most at-risk of exposure to lead in drinking water. Following virtual hearings in April and stakeholder meetings in June, the EPA delayed the effective date for the LCRR to December 16, 2021, with a corresponding extension of the LCRR's compliance deadline to October 16, 2024.

The LCRR is focused on better protecting children and communities from the potential risks of lead exposure by identifying areas most impacted by lead contamination and developing plans to mitigate the risk. Provisions of the LCRR are detailed below.

Lead and Copper Action Levels

- The existing lead action level of 15 µg/L was retained
- A new lead trigger level of 10 µg/L was added.
- The copper action level remains at 1.3 mg/L.
- Specific actions are required for water systems that exceed the action levels or trigger levels based on the population served by the water system.

Lead Trigger Level

The new lead trigger level of 10 µg/L was included to prompt water systems to take proactive actions to reduce lead levels prior to exceeding the lead action level (15 µg/L). If the 90th percentile lead concentration exceeds the new trigger level of 10 µg/L, the PWS is required to complete the following:

- Conduct a corrosion control study to either recalibrate and optimize their existing corrosion control treatment (CCT) or develop a CCT (i.e., small/medium systems that did not previously treat for corrosion).
- Complete annual LCR monitoring at the specified number of sites.
- Conduct public outreach on ways to minimize lead leaching (i.e., corrosion of lead-containing plumbing or fixtures).
- Work with the FDEP to set an annual goal for replacing lead service lines (LSLs), when applicable.

Corrosion Control Treatment

- Calcium hardness is no longer an accepted CCT.
- Orthophosphate is the only accepted phosphate-based corrosion inhibitor.
- Water quality parameter monitoring data related to calcium hardness is eliminated.
- CCT studies must test adjustments in pH and alkalinity and apply orthophosphate dosages of 1 and 3 mg/L as PO_4.
- If a system has LSLs and is required to optimize CCT, pipe loop testing must be conducted with LSLs harvested from the distribution system.

Service Lines

- PWSs must develop a publicly available LSL inventory on both the PWS's and the customer's point of service connection (including current or historical downstream galvanized iron service lines referred to as "galvanized requiring replacement" and "lead status unknown" service lines).
- PWSs must develop an LSL replacement plan if the system contains any known LSLs, "lead status unknown" service lines, or "galvanized requiring replacement" service lines.
- If the 90th percentile lead level exceeds the action level, then the PWS must fully replace LSLs at a rolling two-year average of 3% annually for at least 4 consecutive 6-month monitoring periods.
- PWSs must replace the water system-owned portion of an LSL when a customer chooses to replace their portion of the LSL within 45 days.
- PWSs must replace system-owned lead connectors (i.e., pigtails, goosenecks, swings) whenever encountered and offer to replace customer-owned lead connectors.
- PWSs must include all LSLs in the LSL replacement plan regardless of the measured lead concentration at the customer's tap. For example, if a sample collected from a tap serviced by an LSL has a lead concentration less than 15 µg/L, the LSL must still be included in the replacement plan.
- Partial LSL replacements are no longer allowed except in rare circumstances.

Sampling

- LCRR compliance sampling includes a new Tier structure that requires monitoring at sites with LSLs, if available.
- The new Tier structure includes five Tiers, and a PWS must select available locations from Tier 1 (i.e., LSLs at single family residences) before including Tier 2 sites (i.e., LSLs at multi-family residences) in the compliance sampling set.
- If more samples are collected than the required number of compliance samples, the PWS must include the highest results in the calculation of 90th percentile.
- LCRR compliance maintains 1st liter sampling at all sites and adds 5th liter sampling at sites with LSLs. At sites with LSLs, the 1st liter would be tested for copper, and the 5th liter would be tested for lead. The 1st liter sample is intended to capture stagnant water within home faucets and plumbing, which is more likely to contain copper. The 5th liter sample is intended to capture water samples from the service line, which are expected to have higher concentrations of lead.
- Pre-flushing and removal of aerators is prohibited, and the use of wide-mouth bottles is required.
- PWSs must "find-and-fix" individual sites with tap lead levels greater than the action level by conducting additional sampling to locate the lead source and working with their Primacy Agency to identify if corrective actions are needed.

Notification

- PWSs must notify all customers within 24 hours of a lead action level exceedance (90th percentile lead level is calculated to be greater than 15 µg/L). This is now classified as a Tier 1 notification.
- PWSs must notify individual customers within 3 days if their individual tap sample was greater than 15 µg/L.

School and Childcare Testing

- PWSs must test for lead at 20 percent of elementary schools (pre-school – 8thgrade) and 20 percent of childcare facilities annually for 5 years.
- PWSs must conduct sampling at secondary schools on request for 1 testing cycle (5 years) and conduct sampling on request of all schools and childcare facilities thereafter.
- Sample results and public education materials must be provided to each sampled location and Primacy Agency.

6.1.6 Radionuclides

The Radionuclides Rule was first promulgated by the USEPA in 1976 to regulate three groups of radionuclides:

- Beta and photon emitters
- Combined radium-226 and -228
- Gross alpha radiation

Revisions to the Radionuclides Rule were published in 2000, incorporating a new MCL for uranium. A summary of the regulated constituents, non-enforceable MCLGs, and enforceable MCLs is provided in **Table 6-4**. USEPA has considered regulating radon in drinking water, announcing its intention to evaluate in 1999, but no additional advances have been made in more than two decades.

Table 6-4 Radionuclide Rule MCLGs and MCLs

Regulated radionuclide	MCL	MCLG
Beta/photon emitters	4 mrem/yr	0 mrem/yr
Gross alpha particle	15 pCi/L	0 pCi/L
Combined radium-226/228	5 pCi/L	0 pCi/L
Uranium	30 µg/L	0 µg/L

Notes:
1. mrem/yr = millirem per year, where millirem is the dose of absorbed energy adjusted to be equivalent for different kinds of radiation.
2. pCi/L = picoCuries per liter, which is a measure of the radioactivity per unit volume of water.

6.1.7 Arsenic

The Arsenic Rule was published in 2001 to reduce the arsenic drinking water MCL from 50 micrograms per liter (µg/L) to 10 µg/L. Compliance monitoring for arsenic follows the standard monitoring requirements for inorganic chemicals (IOCs), where surface water systems are required to monitor once per year and groundwater systems are required to monitor once every three years. A system with an arsenic measurement above the MCL must collect quarterly samples. The public water supplier can maintain compliance with the MCL if the RAA of quarterly compliance samples remains below the MCL.

6.1.8 Filter Backwash Recycling Rule

The FBRR was published in June 2001 and requires recycled filter backwash water, thickener supernatant, and liquids from dewatering processes be routed to the head of the water treatment plant prior to the first point of chemical addition to allow full treatment by the facility's treatment processes. The intent was to ensure the same level of inactivation/removal of potential pathogens is provided on recycled filter backwash water and mitigate potential impacts to finished water quality.

6.1.9 Consumer Confidence Report Rule

As directed by the 1996 SDWA Amendments, all public water systems serving more than 500 persons are required to prepare annual reports to inform their users of the quality of the delivered water. The reports must contain specific information on water system information, source water, an explanation of terms such as MCLs and MCLGs, compliance data on the levels of currently regulated contaminants in the treated water, information on the levels of unregulated contaminants for which monitoring is required, information regarding potential health effects of the contaminants, and other required educational information. As part of the required educational information, the public water supplier is required to provide additional information on lead, nitrate, and arsenic if the following conditions are met:

- Nitrate is detected above 5 mg/L (50% of the MCL)
- Arsenic is detected above 5 µg/L (50% of the MCL)

- Lead is detected above the action level of 10 μg/L in more than 5% of homes

In March 2023, the USEPA announced proposed revisions to the Consumer Confidence Report (CCR) Rule. The proposed revisions focus on improving clarity of communications particularly around lead levels and sensitivities of different populations to specific contaminants (e.g., infants, children, elderly, and immunocompromised persons), encourages electronic delivery methods, increases the frequency of reporting from once per year to twice per year, enhances ability to request translations for non-English speakers, and requires states to submit compliance monitoring data to USEPA. The public comment period for the proposed CCR Rule Revisions closed in May 2023. The CCR Rule Revisions are expected to be finalized by March 2024.

6.2 Regulatory Process

The USEPA utilizes the Six-Year Review process to assess whether modification of existing regulations or implementation of new regulations. The purpose of the review, referred to as the Six-Year Review, is to identify those contaminants regulated by NPDWRs for which current health effects assessments, changes in technology, and/or other factors provide a health or technical basis to support a regulatory revision that will maintain or strengthen public health protection. The SDWA defines "contaminant" as any physical, chemical, biological or radiological substance or matter in water. For a contaminant to become regulated under the SDWA, the following criteria must be met:

- The contaminant may, or is likely to, have an adverse effect on human health;
- The contaminant is known to occur in drinking water at a frequency and in high enough concentrations to be of public health concern; and
- In the sole judgment of the USEPA Administrator, the regulation of the contaminant presents a meaningful opportunity for health risk reduction for persons served by public water systems.

The regulatory process allows the drinking water community to gather sufficient data to understand occurrence, health effects, and treatability of known and suspected contaminants. It also allows for the development of cost-benefit analyses to determine the costs for achieving reduced health risks.

In addition to the Six-Year Review, SDWA requires USEPA to publish a Contaminant Candidate List (CCL) every five years identifying contaminants that are currently not subject to any proposed or promulgated regulations but are known or anticipated to occur in PWSs. The Unregulated Contaminant Monitoring Rule (UCMR) program was developed in coordination with the CCL program to collect data and support the analysis of contaminant occurrence and to support the regulatory determination process. The Six-Year Review, CCL, and UCMR are the primary mechanisms employed by USEPA for the regulatory determination process under SDWA and is summarized in **Figure 6-2**.

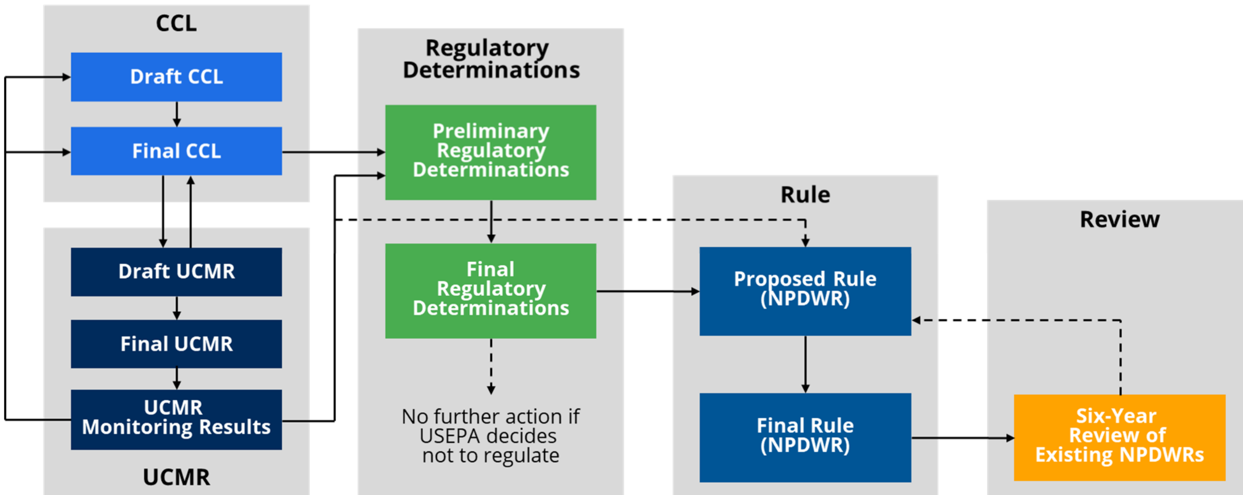

Figure 6-2 SDWA Regulatory Review and Determination Process

If a positive regulatory determination is made from this regulatory review process, USEPA is required to publish the proposed MCL and MCLG within 24 months of making the positive regulatory determination. The USEPA then has 18 months to publish a final MCLG and promulgate a final MCL. PWSs must achieve compliance 3 years after the regulation is promulgated unless the compliance deadline is extended to allow for necessary capital improvements.

6.2.1 Contaminant Candidate List

The SDWA requires USEPA to publish a CCL every five years identifying contaminants that are currently not subject to any proposed or promulgated NPDWR but are known or anticipated to occur in PWSs. USEPA uses the CCL to prioritize contaminants for regulatory decision-making, information collection, research, and occurrence investigations. USEPA is required to make a regulatory determination for at least five contaminants on the CCL every five years. The regulatory determination process considers available data on health effects and drinking water occurrence, as well as availability of suitable analytical protocols. If USEPA makes a determination that regulation of a contaminant in the CCL is warranted, the USEPA must develop and promulgate a NPDWR based on the timeline established by the 1996 SDWA Amendments. Contaminants for which sufficient data or methods are not available to support a regulatory determination may be carried forward from the current CCL to the next. Contaminant Candidate List 1

The Contaminant Candidate List 1 (CCL 1) was published in 1998 and included nine chemical contaminants. In 2003, the Agency announced its decision that no regulatory action was needed for the nine contaminants, as there was not a meaningful opportunity for health risk reduction for persons served by PWSs. Therefore, CCL 1 resulted in negative regulatory determinations for acanthamoeba, naphthalene, hexachlorobutadiene, aldrin, dieldrin, metribuzin, sodium, manganese, and sulfate.

6.2.1.1 Contaminant Candidate List 2

The Contaminant Candidate List 2 (CCL 2) was published in 2005 and included 51 contaminants (42 chemical and 9 microbial contaminants). In 2008, regulatory determinations were published in the Federal Register indicating regulatory action was not appropriate for 11 of the contaminants listed in CCL 2:

- Boron
- Dacthal (DCPA) Mono Degradate
- Dacthal (DCPA) Di Acid Degradate
- 1,1-Dichloro-2,2-bis(p-chlorophenyl)ethylene (DDE)
- 1,3-Dichloropropene
- 2,4-Dinitrotoluene
- 2,6-Dinitrotoluene
- s-Ethyl dipropylthiocarbamate (EPTC)
- Fonofos
- Terbacil
- 1,1,2,2-Tetrachloroethane

6.2.1.2 Contaminant Candidate List 3

USEPA implemented a new process to develop Contaminant Candidate List 3 (CCL 3) which was different than the process used for CCL 1 and CCL 2. This new process considered evaluations from previous CCLs and included input from the public, substantial expert input, and recommendations from various groups, including the National Academy of Science's National Research Council, the National Drinking Water Advisory Council, and the Science Advisory Board. In September 2009, USEPA published CCL 3. They included 116 unregulated contaminants including, microbial pathogens, inorganic compounds, synthetic organic chemicals, disinfection byproducts, hormones, and pharmaceuticals.

Final regulatory determinations for specific contaminants on CCL 3 were published in the Federal Register in 2016, while regulatory determinations for other contaminants in CCL 3 have not been made. With these actions, USEPA made final determinations not to regulate four unregulated compounds including dimethoate, 1,3-dinitrobenzene, terbufos, and turbufos sulfone. After previously issuing a preliminary positive determination to regulate strontium, USEPA delayed the final regulatory determination to consider additional data and determine whether there is a meaningful opportunity for public health risk reduction by regulating strontium in drinking water. A final regulatory determination for strontium is still pending. Regulatory determinations for other contaminants listed on CCL 3 were not made because they did not meet one or more of several criteria including availability of nationally representative finished water occurrence data, a completed health risk assessment, or a widely available analytical method.

6.2.1.3 Contaminant Candidate List 4

USEPA announced the Contaminant Candidate List 4 (CCL 4) in 2016, which included 97 chemicals or chemical groups and 12 microbial contaminants. The list contains industrial and commercial chemicals, pesticides, biological toxins, disinfection byproducts, pharmaceuticals, and microbial pathogens. Contaminants on CCL 4 included contaminants from CCL 3 for which a regulatory determination had not been made as well as manganese and nonylphenol, which were nominated by the public. In 2021, USEPA issued final regulatory determinations for contaminants in CCL 4 with positive regulatory determinations for Perfluorooctane sulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) and negative regulatory determinations for six other contaminants: 1,1-dichloroethane, acetochlor, methyl bromide (bromomethane), metolachlor, nitrobenzene, and Royal Demolition eXplosive (RDX).

6.2.1.4 Contaminant Candidate List 5

USEPA announced the Contaminant Candidate List 5 (CCL 5) in 2022, which included 81 contaminants or contaminant groups. The list contains 66 chemical contaminants, one group of cyanotoxins, one group of disinfection byproducts, one group of per- and polyfluoroalkyl substances (PFAS) chemicals, and 12 microbial contaminants.

- The group of cyanotoxins includes, but is not limited to, anatoxin-a, cylindrospermopsin, microcystins, and saxitoxin
- The group of disinfection byproducts includes 18 unregulated haloacetic acids, haloacetonitriles, halonitromethanes, iodinated trihalomethanes, nitrosamines, chlorate, and formaldehyde
- The group of PFAS compounds includes 18 PFAS chemicals which are based on structural definitions for carbon chain lengths and functional groups
- Microbial contaminants include 8 bacteria, 3 viruses, and 1 protozoa

Since USEPA has to make regulatory determinations for at least 5 contaminants identified in CCL 5, it is possible that some of the contaminants listed in CCL 5 may result in positive regulatory determination, leading to future proposed regulations for cyanotoxins, additional DBPs, additional PFAS compounds, and/or microbial contaminants.

6.2.1.5 Contaminant Candidate List 6

In February 2023, USEPA requested nominations of chemicals, microbes, or other substances for consideration in the Draft CCL 6. The submission period closed in April 2023, and USEPA is reviewing nominations and contaminant data for development of the Draft CCL 6.

6.2.2 Unregulated Contaminant Monitoring Rule

The UCMR was promulgated through the 1996 SDWA Amendments as a means for the USEPA to consistently inform the regulatory process about constituents not presently regulated under the SDWA. For each cycle, the USEPA must decide whether to regulate at least five of the constituents using a specific regulatory determination process which is summarized in **Figure 6-2**.

The goals of the UCMR are to:

- generate national occurrence data on five-year cycles for up to 30 selected constituents per cycle;
- provide a platform for testing more recently developed sampling procedures and approved analytical methods for constituents; and
- screen constituents using new or specialized analytical methods.

The constituents investigated in each UCMR are selected from the CCL in the same regulatory review cycle (see **Figure 6-2**). The 1996 SDWA Amendments require the USEPA to review data collected under the UCMR program and announce whether they will proceed with rulemaking for at least five of the constituents. A positive regulatory determination means the constituent will move forward into rulemaking, while a negative determination indicates that no additional rulemaking will proceed on the constituent at that time. USEPA is not required to make regulatory determinations on all contaminants included in the CCL. As such, some contaminants on past CCLs lack a positive or negative regulatory determination and are still considered to be under review.

The UCMR and CCL process have gone through four full cycles. The most recent regulatory determination arose from CCL 4, which resulted in a positive regulatory determination for PFOA and PFOS in March 2021. In March 2023, USEPA announced the proposed regulations for PFOA and PFOS as well as four other PFAS compounds (PFNA, PFHxS, PFBS, and GenX) to be regulated as a group based on a hazard index calculation. Additional information on proposed PFAS regulations is provided in **Section 6.3.2**.

USEPA published the UCMR 5 in December 2021, requiring sample collection for 30 chemical contaminants (29 PFAS compounds and lithium). Monitoring under UCMR 5 will take place between 2023 and 2025.

6.2.3 Health Advisories

In addition to the primary and secondary drinking water standards, the SDWA authorizes the USEPA to develop non-enforceable health advisories (HAs) for unregulated drinking water contaminants that can cause human health effects and are known or anticipated to occur in drinking water. Has are based on the concentration of a contaminant in drinking water at which adverse health effects and/or aesthetic effects are not anticipated to occur over specific exposure durations (e.g., 1 day, 10 days, a lifetime) for varying sub-populations (i.e., infants, children, the elderly and immunocompromised persons). HAs document the potential health effects, analytical methods, and treatment technologies for specific contaminants. While HAs are not enforceable standards, they provide information and guidance to primacy agencies for determination on whether local action is needed to address potential public health impacts. USEPA has HA levels for approximately 200 contaminants based on non-cancer health effects for different durations of exposure (one-day, ten-day) as well as the underlying reference dose (RfD) supporting the lifetime HAs or, if applicable, the cancer risk values for drinking water contaminants. Tampa Bay Water closely monitors HAs and shares this information with Member Governments. Member Government staff and their Board members have historically relied on Agency staff to address concerns, provide occurrence information, and treatability assessments.

6.3 Proposed Regulations

6.3.1 Lead and Copper Rule Improvements

On December 16, 2021, the LCRR become effective, and the EPA also provided a notification that another rule that will be titled the "Lead and Copper Rule Improvements (LCRI)" is under development. The EPA noted that they expect to publish the proposed LCRI in 2023 to achieve a final LCRI prior to the LCRR compliance date of October 16, 2024.

6.3.2 Proposed PFAS Regulations

PFAS are a class of thousands of man-made chemicals that are used in the manufacture of industrial and consumer products, including firefighting foams, water- and oil-resistant coatings, cookware, food packaging, medical devices, cosmetics, lubricants, inks and paints. PFAS chemicals consist of a carbon chain (an alkyl group) that is highly substituted with fluorine atoms and contains other functional groups, such as carboxylic acids, sulfonic acids, and ethers. Their properties make them heat stable, non-biodegradable (i.e., stable in the environment), and bioaccumulative. They are also highly mobile in water and not easily removed by conventional treatment processes (coagulation, sedimentation, filtration, disinfection).

On March 14, 2023, USEPA announced a proposed regulation for six PFAS compounds shown in **Table 6-5**. The public comment period for the proposed PFAS regulations closed on May 30, 2023. More than 120,000 comments were received by EPA. The rule is expected to be finalized in early 2024 after the completion of Tampa Bay Water's LTMWP. PWSs will need to comply with the PFAS regulations three years after the final rule is published. The MCLs for all but one PFAS compound are at or near the practical quantification limit (PQL).

Table 6-5 Proposed PFAS Regulations

PFAS Compound	MCL	MCLG	PQL
Perfluorooctanoic acid (PFOA)	4 ppt	0	4 ppt
Perfluorooctanoic sulfonate (PFOS)	4 ppt	0	4 ppt
Perfluorohexane sulfonic acid (PFHxS)	Hazard Index (HI) of 1.0, where		3 ppt
HFPO-DA (GenX Chemicals)	$HI = \frac{[GenX]}{10} + \frac{[PFBS]}{2000} + \frac{[PFNA]}{10} + \frac{[PFHxS]}{9}$		5 ppt
Perfluorononananoic acid (PFNA)			4 ppt
Perfluorobutanoic acid (PFBS)	[x] = concentration in ppt		3 ppt

6.4 Potential Regulations

6.4.1 Revisions to Microbial and Disinfection Byproducts Rule

In January 2017, EPA announced its intent to reevaluate regulations for chlorite, HAAs, TTHMs, heterotrophic bacteria, *Cryptosporidium*, *Giardia lamblia*, *Legionella*, and viruses with potential revisions to the Microbial and Disinfection Byproducts (MDBP) Rules. The MDBP rules include SWTR, IESWTR, LT1ESWTR, and Stage 1 & 2 DBPR. Revisions to the MDBP rules will consider newly available data, information, and technologies and will evaluate information on unregulated DBPs, including chlorate and nitrosamines for which data was collected under UCMR 4.

6.4.2 Cyanotoxins

Cyanotoxins are produced by *Cyanobacteria* algae cells. Cyanotoxins are generally contained within the cells and released during an algal bloom mostly due to cell lysis (i.e., cell rupture) when the cells die. Cyanotoxins are a chemically diverse group, with over 100 cyanobacterial metabolites identified as cyanotoxins and are classified as neurotoxins, hepatoxins, or contact irritants. The most commonly detected cyanotoxins are cylindrospermopsin, microcystins, and anatoxin-a.

Their presence in water supplies cause numerous problems for water treatment plants but are most notorious for the metabolites they produce: taste and odor compounds and toxins. Taste and odor compounds such as 2-methyl isoborneol (MIB) and geosmin are indirectly addressed through the secondary MCL for odor. The primary modes of toxicity for algal toxins fall into three categories: (1) hepatotoxins that adversely affect the liver; (2) neurotoxins that affect the nervous system; and (3) dermatoxins which cause skin and mucous irritations.

In 2015, the USEPA issued health advisories for cylindrospermopsin and microcystins as shown in **Table 6-6**. As noted previously, HAs are non-enforceable health standards, which provide technical guidance to assist tribes, state, and local governments on public health from contaminants. The 10-day HA establishes the concentration that is not expected to cause adverse non-carcinogenic effects for up to 10 days of exposure based on consumption of 1 liter per day of water. In addition to the HA levels, the USEPA has also released relatively detailed guidance on monitoring, treatment, and public communication related to cyanotoxins in drinking water supplies.

Table 6-6 Cyanotoxin Non-enforceable Health Advisory Levels

Cyanotoxin	Pre-school children 10-day HA (µg/L)	School-aged children 10-day HA (µg/L)
Cylindrospermopsin	0.7	3.0
Microcystins	0.3	1.6

Cyanotoxins were included in UCMR 4, but the USEPA has not yet made a regulatory determination for cyanotoxins. If USEPA decides to regulate cyanotoxins, a rule will typically involve a two-year development period and a draft and public comment period ending that may require an additional two to seven years.

6.4.3 Strontium

Strontium occurs in drinking water supplies due to dissolution of naturally occurring mineral deposits, and due to its commercial and industrial uses in pyrotechnics, steel production, as a catalyst, and as a lead scavenger. While a preliminary decision to regulate strontium was published in the Federal Register on October 20, 2014, USEPA delayed the final regulatory determination for strontium and has not established a timeline for the final regulatory determination.

6.4.4 Perchlorate and Chlorate

The USEPA announced its intent to issue a perchlorate regulation in 2011. Several states subsequently established a perchlorate MCL including California (6 µg/L) and Massachusetts (2 µg/L). Nevada has an action level of 18 µg/L. Sources of perchlorate include munitions, rocket fuel, industrial sites, and hypochlorite. USEPA completed its regulatory determination review for perchlorate in July 2020. USEPA was considering an MCL of 18 µg/L, 90 µg/L, or withdrawing the 2011 determination to regulate perchlorate but ultimately decided not to regulate perchlorate because it was not found in drinking water with a frequency and at levels of public health concern to support a meaningful opportunity for health risk reduction. Subsequent to this re-evaluation, the U.S. Court of Appeals for the District of Columbia Circuit ruled the EPA must regulate perchlorate in its decision dated May 9, 2023.

In addition to perchlorate, chlorate ($ClO3^-$) is another constituent that occurs in drinking water facilities that use bulk hypochlorite or onsite-generated hypochlorite. In hypochlorite solutions, chlorate may form during manufacture, transport, or storage, and increases in concentration correlate with the increase of time and/or temperature. Chlorate was included on the CCL 3 and UCMR 3. Chlorate may become regulated in the future, as it is being evaluated as part of the potential revisions of the MDBP Rules.

6.4.5 Volatile Organic Compounds

There are currently eight regulated VOCs: 1,2-Dichloroethane (Ethylene dichloride), 1,2-Dichloropropane, Benzene, Carbon Tetrachloride, Dichloromethane (Methylene chloride), Tetrachloroethylene (PCE), Trichloroethylene (TCE), and Vinyl chloride. Under a proposed Carcinogenic VOC Rule (cVOC), USEPA planned to regulate the 8 additional VOCs: aniline, benzyl chloride, 1,3-butadiene, 1,1dichloroethane, nitrobenzene, oxirane methyl, 1,2,3trichloropropane, and urethane. Under the proposed cVOC Rule, USEPA intended to regulate these additional cVOCs as a group along with the 8 cVOCs for which MCLs were already established. The ultimate form of the proposed cVOC regulation remains to be determined, and a regulatory determination for additional VOCs is still pending.

6.4.6 Emerging Disinfection Byproducts

Emerging DBPs consist of many constituents that are produced from the reactions between disinfectants, such as chlorine and chloramines, and natural organic matter. Emerging DBPs include unregulated haloacetic acids, haloacetonitriles, halonitromethanes, iodinated trihalomethanes, nitrosamines, chlorate, formaldehyde, and other organic halogens. Due to the uncertainty in their concentrations, occurrence, and toxicity, there continues to be debate regarding potential public health relevance.

Chloramines reduce concentrations of regulated DBPs relative to free chlorine. However, unregulated nitrosamines, in particular N-nitrosodimethylamine (NDMA), have been found to strongly correlate with chloramine use, certain polymers (e.g., POLYDADMAC) and ion exchange resins (e.g., MIEX). Nitrosamines are DBPs that form from the oxidation of precursors in chlorinated and chloraminated waters. Five nitrosamines were included in the CCL 3 and a broader group of unregulated DBPs were included in CCL 5. USEPA is considering a specific nitrosamine rule, but it has not published a regulatory plan. California has established a notification level of 10 ng/L, and Massachusetts has established a regulatory limit of 10 ng/L in drinking water. Nitrosamines may become regulated in future and are being evaluated as part of the potential revisions to the MDBP rules.

6.4.7 Manganese

Manganese is a naturally occurring element found in air, soil, and water. It currently has a secondary MCL of 0.05 mg/L. Research related to the prevalence and potential health impacts associated with manganese in drinking water supplies is still ongoing. Manganese continues to be included in CCLs, having made an appearance on CCL 1, CCL 4, and CCL 5. Manganese was included in UCMR 4 and was observed to have a median concentration of 2.8 µg/L across samples collected.

In 2019 Health Canada established a health-based regulation for manganese in drinking water. Health Canada's maximum acceptable concentration (MAC) is essentially equivalent to the USEPA's MCL, and their aesthetic objective (AO) level is similar to the USEPA's non-enforceable secondary MCL. Health Canada established a concentration of 0.12 mg/L and aesthetic objective level of 0.02 mg/L for manganese. Given the decision by Health Canada to regulate manganese and its reoccurrence on CCLs, it is likely that the USEPA will review manganese for potential regulatory determination and/or re-evaluate the secondary MCL for manganese. However, the potential regulatory horizon for manganese is uncertain.

6.4.8 Chromium VI

Studies and publications of the Environmental Working Group have renewed interest in chromium VI. Chromium is a naturally occurring metal in rocks, plants, humans, soil and volcanic dust, and animals. It is mostly present as chromium III, chromium VI, and the metal form of chromium, the latter two of which are produced in industrial processes. Major sources of chromium include steel and pulp mills and natural deposit erosion.

The USEPA currently regulates the total concentration of chromium in drinking water with an MCL of 0.1 mg/L. California regulates the total chromium concentration at 10 μg/L. Chromium VI was included in UCMR 3and is likely to be considered for regulatory development in the future.

6.4.9 Constituents of Emerging Concern

Another group of constituents that may be regulated in the future are constituents of emerging concern (CECs), also known as microconstituents, micropollutants, or trace organics. These constituents include pharmaceutically active compounds (PhACs), personal care products (PCPs), endocrine-disrupting compounds (EDCs), and other unregulated synthetic organic compounds. Sources of endocrine-disrupting compounds as well as other emerging constituents include domestic waste, agricultural runoff, industrial sources, and solid waste. There are currently no federal or state regulations that specifically address PhACs, PCPs or EDCs. The UCMR3 included seven steroid hormones considered EDCs. USEPA has not indicated the intent for regulatory determinations or other actions in response to the presence of these low-level CECs. The possibility for future regulation, nevertheless, exists.

6.5 Potable Reuse Regulations

6.5.1 Current Indirect Potable Reuse Regulations

Water reuse is regulated at the state level, although when considered for a drinking water supply (potable reuse) Federal drinking water regulations will apply. While potable reuse is gaining viability as a potential source of water supply in Florida, state rules are currently under revision, which leads to regulatory uncertainty.

Table 6-7 summarizes the existing regulations related to water reuse, aquifer recharge and indirect potable reuse.

Table 6-7 Florida Administrative Code Chapter 62 Regulatory Summary

Section	Title	Description
520	Groundwater Classes, Standards, and Exemptions	Classifies groundwater and dictates the dimensions of zones of discharge for each class of groundwater. Provides regulatory information on water quality criteria exemption for discharges to groundwater.
524	New Potable Water Well Permitting in Delineated Areas	Regulates well construction, water quality testing, permit requirements, and inspections for areas within which ground water contamination is known to exist or which encompasses vulnerable areas or areas where a subsidy for restoration or replacement of contaminated drinking water supplies is provided.

Section	Title	Description
528	Underground Injection Control	This includes all injection wells defined in subsection 62-528.300(1), F.A.C., as Class I, III, IV or V wells. Class II wells are regulated by the Florida Geological Survey under Chapter 377, F.S., and Chapters 62C-26 through 62C-30, F.A.C
610	Reuse of Reclaimed Water and Land Application	Provides design and Operations and Maintenance criteria for land application systems that may discharge to Class G-I, G-II, and F-I ground waters, and requirements for Ground Water Recharge and Indirect Potable Reuse.

6.5.2 Proposed Direct Potable Reuse Regulations

In 2018, the Florida Potable Reuse Commission (PRC) was formed as a consensus panel of eleven water utility, industry, agricultural, environmental and health professionals. The PRC published the "Framework for Implementation of Potable Reuse in Florida" in January 2020 to advise elected officials and regulatory agencies on legislation, rule development and incentives. During the 2020 Florida Legislative session, the Clean Waterways Act (Senate Bill 712/House Bill 1091) was passed and signed into law by the governor. The Act includes language that directed FDEP to initiate rule revisions based on the recommendations of the PRC by December 2020.

In December 2020, FDEP began focusing revisions on four sections of Chapter 62:

- 625 – Pretreatment Requirements
- 610 – Reclaimed Water
- 550 – Drinking Water Standards
- 555 – Permitting, Construction, O&M of Drinking Water Systems

Since December 2020, there have been several rounds of revisions with the current efforts focused on developing a new chapter in the drinking water regulations, Chapter 62-565 titled "Potable Reuse" and revisions to existing Chapter 62-610. Pretreatment requirements are being addressed in Chapter 62-565. Minor revisions may be proposed to Chapters 62-550 and 62-555 to reference the new Chapter 62-565, but the new chapter will address the majority of the requirements for potable reuse.

Based on the draft regulations, major requirements for implementing potable reuse are:

- Source water characterization, to include one year of monitoring of pathogens and emerging constituents.
- Enhanced source control.
- Pilot testing.
- Monitoring and operations plan.

As part of the source water characterization, Quantitative Microbial Risk Assessment (QMRA) is also proposed to identify the log-reduction required from treatment processes to achieve a goal of 10^{-4} risk of infection from pathogens. The log reduction identified in the QMRA or one of the following log reduction goals must be met, whichever is higher:

- 12-10-10 – log reduction for enteric viruses, *Giardia lamblia* cysts, and *Cryptosporidium* oocytes respectively as measured from raw wastewater to finished drinking water, or
- 8-6-5.5 log reduction for enteric viruses, *Giardia lamblia* cysts, and *Cryptosporidium* oocytes respectively for wastewater facilities that meet high level disinfection, as measured from treated wastewater to finished drinking water.

FDEP has not announced a schedule for finalizing the rules but has previously stated that their goal is to have final rules ready by the 2024 state legislative session. Completion of the rules will add more clarity in evaluating the feasibility of implementing potable reuse projects.

The draft release by FDEP dated May 18, 2023, includes rule sections as outlined in **Table 6-8**.

Table 6-8 Draft Chapter 62-565 Summary

Section	Title	Description
100	General	Defines the scope of the Chapter.
200	Definitions	Provides definitions, including several new terms to Florida rules that are specific to potable reuse, such as Advanced Treated Water, Advanced Treatment Water Facility, Critical Control Point, Direct Potable Reuse, Emerging Constituents and Surrogate Parameters.
300	Forms and References	Presents a list of forms and references relevant to this Chapter.
400	Signatories to Permit Applications and Reports	Presents requirements for signing permit applications.
500	Requirements for Potable Reuse Systems	Presents detailed requirements for potable reuse including the following: ▪ Off-spec storage ▪ Pathogen requirements ▪ Monitoring requirements ▪ Reporting requirements ▪ Pilot testing ▪ Engineering report requirements ▪ Design and construction ▪ Operation and maintenance
600	Procedure to Obtain Permits	Presents standards for issuing or denying permits, revisions, renewals, transfers, suspension or revocation, recordkeeping, public notice, public comments, general conditions and guidance for specific conditions.
700	Compliance for Advanced Treatment Water Facilities and Potable Reuse Systems	Sets the framework for establishing compliance and noncompliance, enforcement actions and inspections.

7.0 Water Supply Concept Development

A methodical process of water supply option identification, evaluation and screening has been proposed to identify and develop water supply concepts to meet the regions demands for the next 20 years. The results of said identification, evaluation, and screening of the numerous water supply options initially considered for the 2023 Long-Term Master Water Plan (LTMWP) are summarized herein.

7.1 Water Supply Source Definitions

The following terminology, abbreviations and descriptions will be used for the different types of water sources and uses described herein.

- Seawater – saltwater from the Gulf of Mexico, Tampa Bay, or tributaries.
- Fresh Surface Water – fresh surface water diverted from a river, lake or canal and typically stored in a reservoir.
- Fresh Groundwater – fresh groundwater (water with a total dissolved salts/solids concentration less than 500 milligrams per liter (mg/L)) from the Upper Floridan Aquifer.
- Brackish Groundwater – brackish groundwater (water with a total dissolved salts/solids concentration of 500 to 10,000 mg/L) from the Upper Floridan Aquifer (UFA). Total Dissolved Solids (TDS) may be higher than 10,000 mg/L but less than seawater (35,000 mg/L) in wells near the coast.
- Reclaimed Water – treated wastewater effluent that has received at least secondary treatment and basic disinfection and is used for beneficial purposes. Examples of beneficial purposes are identified in more detail below:
  - Direct Potable Reuse (DPR) – reclaimed water further treated by advanced treatment technologies so that it can be used to directly augment a potable water supply system, either at the influent to a water treatment plant or directly into the potable water distribution system.
  - Indirect Potable Reuse (IPR)/Aquifer Recharge (AR) – reclaimed water that is further treated and injected into the aquifer using recharge wells where the water intermixes with the underground source of drinking water that is withdrawn at a different location from production wells.
  - IPR/Surface Water Augmentation – reclaimed water that is further treated and used to augment a surface water body (including reservoirs) where the water intermixes with the native surface water before being withdrawn from an intake and sent to a surface water treatment plant before being used as a potable water supply.
  - Water Supply Withdrawal Credits (via beneficial use of reclaimed water supply) – various uses of reclaimed water to provide an environmental benefit while also generating a credit for withdrawing water from a fresh water source for potable water supply. The combination of the beneficial reuse and withdrawal credit must provide an overall net-benefit to the environment, which typically would require the reclaimed water quantity used for the environmental benefit to be greater than the quantity of the withdrawal credit granted for the freshwater source. Examples of water supply withdrawal credits being generated through the beneficial use of reclaimed water supply are provided below:

    - Salinity Barrier/Aquifer Recharge – reclaimed water used for recharging an aquifer to restore higher water levels to provide a salinity (lateral salt-water intrusion) barrier for a freshwater aquifer. This is different than IPR/AR concepts in that the reclaimed water injected into the aquifer for recharge is not intended for future withdrawal or to migrate within the aquifer towards a potable water supply production well/wellfield. The amount of reclaimed water needed for aquifer recharge would be greater than the amount of fresh groundwater withdrawal credits granted in order to provide a net-benefit to the aquifer.
    - Downstream Surface Water Augmentation – Surface water withdrawals can be limited due to potential downstream impacts from reduced flows and levels. Credits for additional surface water withdrawals can be obtained if reclaimed water is introduced downstream of a surface water supply intake to mitigate these impacts.
    - Wetland Rehydration – For wellfields that are limited in withdrawal capacity due to potential impacts to wetlands, the potential impacts can be mitigated by providing reclaimed water supply to an area near or directly to the impacted wetlands. This can allow for increased withdrawals (credits) from the nearby wellfields.
    - Agricultural Well Replacement - Taking agricultural irrigation wells out of service by providing reclaimed water for irrigation can free up groundwater for Tampa Bay Water use. The location of the agricultural site in relation to a wellfield will determine the credits.
  - The use of reclaimed water and stormwater as a non-potable supply for irrigation and other urban uses such as augmenting decorative fountains, car washing, air conditioner cooling, or washdown water, referred to as public access reuse (PAR), is not considered herein as a regional potable water supply source; however, these beneficial uses of reclaimed water are viable means to manage water demands and have been implemented by many of Tampa Bay Water's Member Governments. PAR typically has varying seasonal demands that can impact the availability of reclaimed water for other uses. Excess reclaimed water is typically available during wet/low irrigation demand seasons, with less being available during the dry/high irrigation demand seasons.
- Seasonal storage can be provided via reservoirs and through aquifer storage and recovery (ASR). These storage options do not create new supply and are tools to manage the availability of the various sources of water. ASR involves the injection of water (groundwater, surface water or reclaimed water) into the aquifer for storage and later withdrawal and recovery from the same well for use.

7.2 Universe of Options

A comprehensive database that encompasses the numerous potential water supply options that have been considered in previous LTMWPs as well as options recently suggested by the Member Governments, Tampa Bay Water staff, and the public was developed. The numerous potential water supply options included in this database are referred to as the Universe of Options. The previous master plans and reports referenced to create the updated Universe of Options database include the following:

- 1996 Resource Development Plan (RDP)
- 2001 Long-Term Water Supply Planning, 2002 Short List
- 2003 Developmental Study
- 2008 Long-Term Water Supply Plan
- 2008 Project Concept Shortlist Process – Ranking and Criteria
- 2013 Long-Term Master Water Plan
- 2018 Long-Term Master Water Plan

Ideas from all six Member Governments, the Southwest Florida Water Management District (District), and Tampa Bay Water staff were solicited during meetings with each entity. Entities were asked to provide input on any existing projects and to present new options or ideas for incorporation into the database. Options not already captured within the Universe of Options database were added. The database was then updated with information regarding the project's description, evaluation summary, source type, concept development history and feasibility issues. The database was further developed by providing information on project location and the relevant city and county. Relevant data from two previous studies completed by Black & Veatch, "The Screening Evaluation: City of Tampa Reclaimed Water for New Water Supply Concepts", and "2022 New Water Supply Configuration Alternatives Selection Process" were also included within the Universe of Options projects. These two studies are included as **Appendix D** and **Appendix E**.

A total of 347 options were initially included within the Universe of Options database. Of those options, 159 projects were characterized as PAR options rather than water supply options and were dismissed during a preliminary screening.

A total of 188 options remained and out of those options, 67 options were deemed impractical based on the criteria of location and availability of the proposed water supply. Projects that were located outside the tri-county area of Hillsborough, Pasco and Pinellas counties were removed as potential water supply projects since local options were considered more feasible for implementation. Continued availability of the water supply was also evaluated, since many of the projects identified in the earlier master plans have been implemented or are no longer available due to source degradation, the attainment of withdrawal limits, or regulatory changes.

The development of the Universe of Options therefore produced 121 options for consideration which were moved to the next step of the water supply shortlisting process: coarse screening evaluations. All water supply sources (seawater, fresh surface water, fresh groundwater, brackish groundwater, potable reuse, withdrawal credits and other) were represented within the Universe of Options database as summarized in **Figure 7-1** below. The descriptions, locations, and preliminary treatment assumptions for each of the 121 options can be found in **Appendix F**.

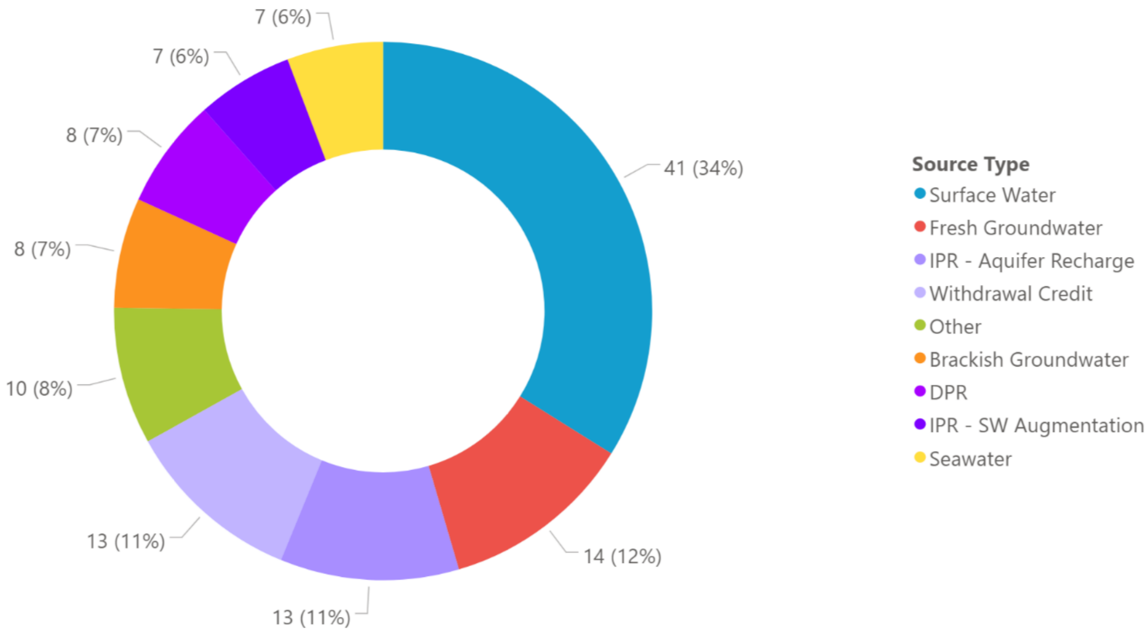

Figure 7-1 Universe of Options Water Source Options Summary (by Count)

7.3 Evaluation Process and Screening Criteria

A methodical process of water supply option identification, evaluation and screening has been used for the current LTMWP update to meet the Interlocal Agreement requirements as illustrated in **Figure 7-2**.

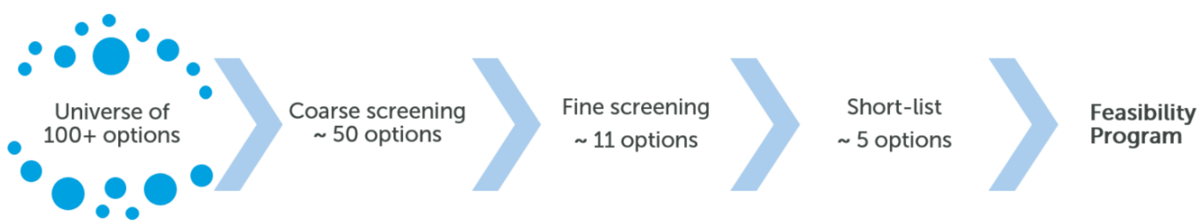

Figure 7-2 Water Supply Options Shortlist Process

New water supply options were evaluated and scored based on three equally weighted Tampa Bay Water Board-approved selection criteria categories, which are further broken down into specific sub-criteria. The criteria categories include:

- Environmental Stewardship
- Project Cost
- Reliability

The sub-criteria were weighted within each category based on a workshop consensus with Tampa Bay Water cross-functional staff at each screening stage. Although the criteria varied slightly at each screening stage, the main three criteria categories of Environmental Stewardship, Project Cost, and

Reliability were always maintained. The criteria applied during the Short-list screening evaluation are shown in **Table 7-1**. For each sub-criterion, a score of one through five was available, with one being the worst and five being the best score.

Specific evaluation criteria for Coarse Screening and Fine Screening can be found in **Appendix G** and **Appendix H**, respectively.

Table 7-1 Short-List Evaluation Criteria

Criteria	Definition	Numeric Score				
		1 (worst)	2	3 (medium)	4	5 (best)
Category: Environmental Stewardship – 33%						
Environmental Sustainability 20%	Extent to which the concept positively or negatively impacts the natural environment and promotes sustainability of water and biological resources including conservation of water resources and protection of natural systems including downstream water quantity and quality; natural habitat and/or listed species (endangered/threatened species), and minimization of energy consumption and thus carbon footprint.	• Concept has high potential to result in adverse impacts to water resources and/or natural systems • Limited protection of downstream water quantity or quality • Limited protection of natural habitats and/or listed species • High energy consumption		• Concept has some potential for adverse impacts to water resources and/or natural systems • Moderate protection of downstream water quantity and quality • Moderate protection of natural habitats and/or listed species • Moderate energy consumption		• Concept is unlikely to result in adverse impacts and may have a positive impact to water resources and/or natural • Strong protection of downstream water quantity and quality • Strong protection of natural habitats, and/or listed species • Low energy consumption
Ease of Permitting 6%	Extent to which concept has challenging supporting documentation requirements (modeling, assessments, etc.), and amount of mitigation that may be required.	• Concept is anticipated to involve highly challenging permitting requirements and extensive supporting documentation • If approved, the concept may require substantial mitigation		• Concept is anticipated to involve moderately challenging permitting requirements and typical supporting documentation • If approved, the concept may require mitigation		• Concept may result in a net environmental benefit • Concept is anticipated to involve limited permitting requirements and supporting documentation • The concept may require little or no mitigation
Public Reception 7%	How the public is expected to receive the given water supply concept and the type of public outreach required to support the concept.	• Anticipated negative reception of concept • Significant, long-term and sustained public outreach required		• Anticipated neutral reception of concept; or equal amounts of positive/negative reception • Sustained public outreach required		• Anticipated positive reception of concept • Minimal public outreach required
Category: Project Cost – 33%						
Life Cycle Cost 20%	Total cost of concept per 1,000 gallons including estimated capital cost and annual operation & maintenance expenditures considering a 30-year period	• $/1,000 gallons = Greater than $11.00		• $/1,000 gallons = $5.00 - $8.00		• $/1,000 gallons = Less than $1.00
Expansion Potential 6%	Ease with which concept is able to be implemented in phases or expanded in the future.	• Poor supply expansion potential		• Some supply expansion potential		• Good supply expansion potential
Cost Risk Factors + Implementation Schedule 7%	Potential for concept to increase in capital or O&M costs due to schedule delays, supply chain issues (equipment or chemicals), future regulatory changes that mandate more stringent water quality requirements (e.g., PFAS), and constructability risks	• High potential for significant schedule delays due to supply chain issues • Proposed treatment process would likely need to be significantly modified in order to meet potential future regulatory changes • Significant constructability challenges and risks • Implementation Schedule is challenging to meet new water supply deadline		• Moderate potential for schedule delays due to supply chain issues • Proposed treatment process would likely need some modifications or enhancements to meet potential future regulatory changes • Moderate constructability challenges and risks • Implementation Schedule will meet new water supply deadline		• Low potential for schedule delays due to supply chain issues • Proposed treatment process would likely be sufficient to meet potential future regulatory changes • Low constructability challenges and risks • Implementation Schedule is short and can easily meeting new water supply deadline
Category: Reliability – 34%						
Yield Reliability 20%	Extent to which concept has long-term yield reliability, has impacts to supply capacity and quality by seasonal variations (e.g., drought vs wet weather conditions and resulting water quality changes, etc.), is resilience to natural disasters, sea level rise and climate change, can quickly recover from events or conditions that negatively impact yield, and is reliant on third parties to ensure source water supply availability (quantity and duration).	• Uncertain or low long-term yield reliability • Significant impacts to supply capacity and quality based on seasonal or long-term variations • Limited resilience to natural disasters, sea level rise and/or climate change • Requires a significant amount of time to recover from events or conditions that negatively impact yield • Potential reliance on third party to ensure source water supply availability (quantity and duration)		• Moderate long-term yield reliability • Moderate impacts to supply capacity and quality based on seasonal or long-term variations • Moderate resilience to natural disasters, sea level rise and/or climate change • Moderate resilience or requires a moderate amount of time to recovery from events or conditions that negatively impact yield • Potential reliance on third party to ensure source water supply availability (quantity and duration)		• High long-term yield reliability • Minimal impacts to supply capacity and quality based on seasonal or long-term variations • High resilience to natural disasters, sea level rise and climate change • Strong resilience or ability to recovery quickly from events or conditions that negatively impact yield • No reliance on third party to ensure source water supply availability (quantity and duration)
Regional System Reliability Impacts 14%	Extent to which concept increases ability to maintain level of service; ability of concept to provide service/relief during emergency events (main break, drought, etc.), and degree of impact to reliability (regional vs isolated).	• Does not increase system reliability • Does not improve system performance under emergency scenario conditions • Impact is isolated to one member government		• Moderately increases system reliability, • Moderately improves some emergency scenario conditions • Impact supports more than one member government		• Significantly increases system reliability, • Significantly improves some emergency scenario conditions • Impact is regional

7.4 Coarse Screening Evaluation

The Coarse Screen Evaluation reduced the number of options included in the Universe of Options down to 54. The 54 options were grouped into 16 project concepts, which consist of a combination of multiple options based on similarities in water supply type and/or location. The 16 concepts included 9 sub-concepts, for a total of 25 concepts. These concepts were considered in the next steps of the water supply short-list process, fine screening. All water supply sources (seawater, fresh surface water, fresh groundwater, brackish groundwater, potable reuse, withdrawal credits and other) were represented within the coarse screening results as summarized in **Figure 7-3** below. The concepts remaining after Coarse Screening are identified below and include a brief description.

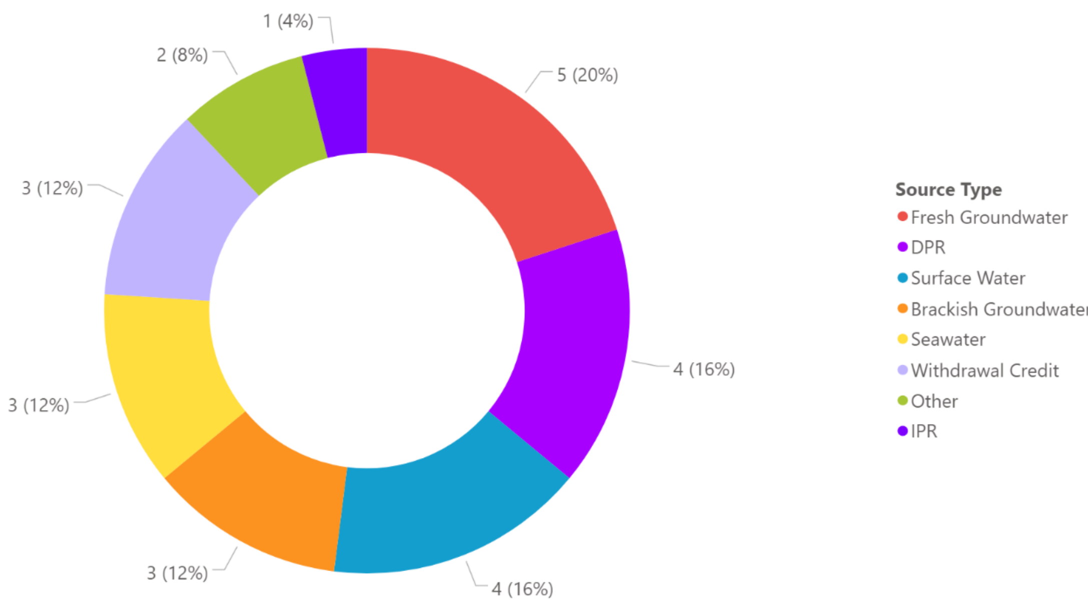

Figure 7-3 Coarse Screening Water Source Options Summary (by Count)

The 25 concepts remaining after the fine screening evaluation process are listed below:

- Concept 1 – Gulf Coast Desalination
- Concept 2 – Pasco Brackish Wellfield
- Concept 3a & 3b – St Petersburg Desalination / Brackish Plant
- Concept 4 – Existing Desalination Plant Expansion
- Concept 5a & 5b – Existing Desalination Plant Expansion with Reclaimed Water / Brackish Water
- Concept 6 – North Pinellas Surface Water Treatment Plant via ASR/MAR
- Concept 7 – New Surface Water Plant via Lake Thonotosassa
- Concept 8 – New Surface Water Treatment Plant at the Regional Reservoir via Increased Alafia River Withdrawals

- Concept 9 – New Surface Water Treatment Plant and Reservoir via New Supplies
- Concept 10 – Eastern Pasco Wellfield
- Concept 11 – Interconnect with Polk Regional Water Cooperative
- Concept 12 – Interconnect with Peace River Manasota Regional Water Supply Authority
- Concept 13a & 13b – Transfer of Existing Groundwater Permits
- Concepts 14a, 14b & 14c – Increase Consolidated Water Use Permit, Increase CWUP via Aquifer Recharge and Increase CWUP via Supplementing Natural Systems
- Concepts 15a, 15b & 15c – Direct Potable Reuse from Hillsborough County, Pinellas County and the City of Tampa
- Concepts 16a, 16b, & 16c – South Hillsborough Wellfield, South Hillsborough Wellfield via IPR and South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge

7.5 Fine Screening Evaluation

The Fine Screen Evaluation reduced the number of concepts for consideration in the next steps of the water supply short-listing process from 25 to 11. The 11 remaining water supply concepts involve a variety of different source water types as illustrated in **Figure 7-4** below. These remaining concepts were further developed and evaluated based on both economic and non-economic considerations using the short-list screening criteria developed in the next phase of the Master Plan.

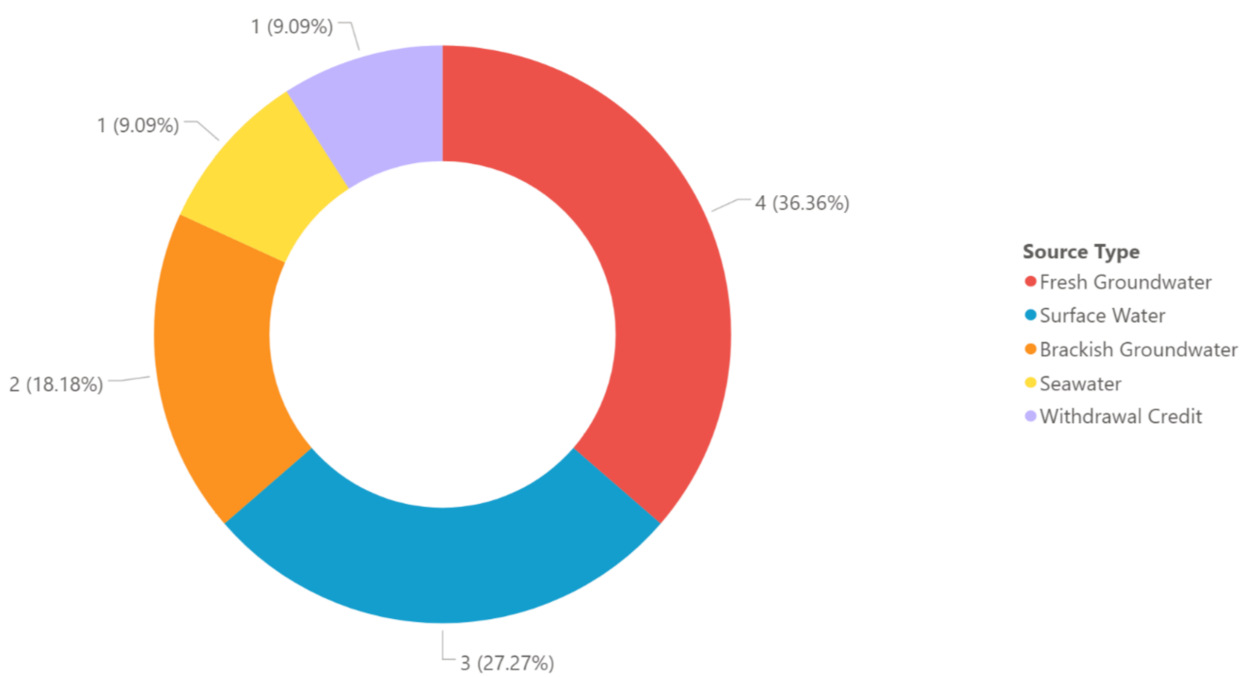

Figure 7-4 Fine Screening Water Source Options Summary (by Count)

The 11 concepts remaining after the fine screening evaluation process are listed below:

- Concept 2 – Pasco Brackish Wellfield
- Concept 4 – Existing Desalination Plant Expansion
- Concept 5b – Existing Desalination Plant Expansion with Brackish Water
- Concept 6 – North Pinellas Surface Water Treatment Plant and Reservoir
  - It should be noted that during the Fine Screening evaluation, Concept 6 was revised to include a storage reservoir rather than an ASR/MAR configuration due to feasibility concerns.
- Concept 8 – New Surface Water Treatment Plant at the Regional Reservoir via Increased Alafia River Withdrawals
- Concept 9 – New Surface Water Treatment Plant and Reservoir via New Supplies
- Concept 10 – Eastern Pasco Wellfield
- Concepts 13a & 13b – Transfer of Existing Groundwater Permits
- Concept 14a – Increase Consolidated Water Use Permit
- Concept 16b – South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge

7.6 Short-List Screening Evaluation

7.6.1 Concept Refinements

The remaining water supply options following the fine screening process were further developed and evaluated to establish the recommended shortlisted projects for the next Feasibility Study Program. The additional evaluations considered in this phase are identified below:

- Yield range development: Minimum and maximum finished water yields were developed based on best- and worst-case operating scenarios.
- Site constraints: Approximate dimensions for treatment plant processes were developed to confirm the appropriate site dimensions. Locations of concept components was reviewed on aerial, property and zoning maps to confirm the general feasibility.
- Cost estimates: Cost estimates were further refined to include type of pipeline installation, concept specific O&M costs, updated treatment process equipment and recoveries, land acquisition costs based on site type. Additionally, a 4% annual escalation to the midpoint of construction was applied to the Infrastructure Capital Cost, and a 10% Owner's Allowance was applied to the Subtotal of Project Cost.
- Additional correspondence with the District: Additional meetings and correspondence with the District staff were conducted to better estimate surface water yields and plan for future Maximum Flow Levels (MFL).
- Well production yields and locations: Groundwater production yields and potential locations were further revised based on available data. Hydrogeological data evaluated included: Hydrostratigraphic diagrams, packer test data, drill stem capacity and water quality testing data, the District Regional Observation and Monitor- Well Program (ROMP) data, and well pump test data.

- Concept duration: An approximate schedule for determining a project duration from feasibility to operation was established for each concept.
- Third Party communication: For applicable projects, communication was made with third parties who would impact the feasibility of a concept. This included a virtual meeting with Pinellas County to discuss their proposed use of Lake Tarpon discharge water and email correspondence with the Mosaic Company to assess their availability of excess groundwater for transfer to Tampa Bay Water.

7.6.2 Concept Summaries

Below are brief summaries of each concept. Additional details and information regarding each concept, including concept summary sheets, are included within **Appendix I**.

- **Concept 2 - Pasco Brackish Wellfield**

  The Pasco Brackish Wellfield consists of constructing a new wellfield and groundwater treatment plant in western Pasco County that would produce an estimated finished water yield between 2.8 and 8 mgd. The brackish water from either the lower portion of the Upper Floridan Aquifer (UFA) (approximately 700 feet below surface) or the Lower Floridan Aquifer (LFA) (approximately 1500 feet below surface) would be withdrawn through approximately 6 wells, each with an assumed max production capacity of 2.0 mgd. The new groundwater treatment plant would require reverse osmosis (RO) treatment with a 50% bypass to meet TDS treatment objectives. This concept includes a deep injection well for disposing of the RO concentrate.

  Upon further investigation into the hydrogeology, review of the limited regional well data, and estimated availability of brackish water in the County, the project is no longer recommended. It is predicted that the wells in this concept would have low transmissivity and significant saltwater intrusion. Although a western location is not viable for a brackish wellfield, it is likely that an eastern Pasco County implementation is probable. The potential for a brackish wellfield in eastern Pasco County is recommended to be explored in conjunction with Concept 10, Eastern Pasco County Wellfield, defined herein, during the feasibility phase as described in **Section 7.7**.

- **Concept 4 – Existing Desalination Plant Expansion**

  Concept 4 would increase the finished water annual average yield of the existing Tampa Bay Water Seawater Desalination Plant by 10 to 12 mgd. The existing desalination plant is located adjacent to the Tampa Electric Company (TECO) Big Bend Power Plant in Apollo Beach and ties into the Tampa Bay Water regional system at the Regional Facilities Site. The desalination plant expansion would include upgrades and expansion of the pretreatment processes, RO treatment trains, post-treatment processes, residuals handling, concentrate discharge, and finished water transmission. A feasibility study of this concept was completed in March 2022 and serves as the basis for the required infrastructure improvements and plant expansion.

- **Concept 5b – Existing Desalination Plant Expansion with Brackish Water**

  Concept 5b considers expansion of the existing Tampa Bay Seawater Desalination Plant by blending pretreated seawater with brackish groundwater from the Upper Floridan Aquifer to augment the existing desalination plant. The existing desalination plant is located adjacent to the

Tampa Electric Company (TECO) Big Bend Power Plant in Apollo Beach and ties into the Tampa Bay Water regional system at the Regional Facilities Site. Brackish water would be obtained from approximately 24 new groundwater production wells, with estimated withdrawal rates between 1 and 1.4 mgd, sited off Big Bend Road. Augmenting the desalination plant influent flow with brackish groundwater would require improvements to the existing seawater desalination facility as well as a facility expansion to produce an additional finished water annual average yield between 5.7 and 11.3 mgd. At times, the brackish wellfield may be capable of delivering more brackish water supply to the desalination plant to offset seawater supply while maintaining the overall finished water yield between 5.7 and 11.3 mgd.

Blending brackish water with seawater supply will reduce the influent TDS delivered to the SWRO system and reduce the feed pressure and energy consumption of the SWRO process. The concept would require optimization of the existing seawater desalination plant to increase the sustainable operating capacity to 27.5 mgd before expansion can be considered. Overall infrastructure considerations include optimization of existing pretreatment with membrane filtration, upgrades to the residuals and solids handling systems, expansion of the SWRO and BWRO system, conversion to liquid lime for post-treatment, expanded capacity of chemical systems, finished water transmission (via booster pumping station), and deep injection wells for concentrate disposal.

- **Concept 6 – North Pinellas Surface Water Treatment Plant**

The North Pinellas Surface Water Plant consists of harvesting excess surface water from the Lake Tarpon outfall canal along with other potential sources including Chesnut Park, Canal Park, East Lake, Channel "A", and Brushy Creek. The surface water supply would be sent to a new off-stream, 800 MG reservoir for seasonal storage in northeastern Pinellas County. The supply would then be treated at a new SWTP in North Pinellas County, near the Eldridge-Wilde Wellfield and S.K Keller WTP, with similar treatment processes as the existing Regional SWTP, including ozone and biologically active filtration (BAF). The new SWTP would meet Exhibit D requirements and is estimated to produce a finished water annual average yield of 3.1 to 9.4 mgd. This range considers potential Pinellas County withdrawals in the minimum and no third party withdraws in the maximum. The finished water would tie into the existing Tampa Bay Water regional system near the northern end of the Keller Transmission Main.

- **Concept 8 – New Surface Water Treatment Plant at the Regional Reservoir via Increased Alafia River Withdrawals**

Concept 8 involves constructing a new surface water treatment plant near the existing C.W Bill Young Regional Reservoir in Hillsborough County to treat additional surface water supply provided by increased Alafia River withdrawals. Modifications to the existing water use permit would be required to increase the allowable mid to high range withdrawals from the river. To achieve an estimated 9 mgd additional river withdrawal, the pumps at the existing Alafia Pump Station would need to be upsized. This concept would rely on the existing Enhanced Surface Water System for raw surface water transmission and seasonal storage. The concept would also involve the construction of a new finished water pump station and transmission pipeline to deliver the treated supply to the regional transmission system. The new surface water treatment plant will have treatment processes similar to the existing surface water treatment plant and would meet Exhibit D requirements. This concept is estimated to provide a finished water annual average yield of 2.3 to 8.5 mgd and will tie into the South Hillsborough Pipeline.

This concept also evaluated the potential for specific fluoride treatment at the new surface water treatment plant. Although specific studies evaluating the fluoride levels within the reservoir and contributing sources would need to be performed, it is estimated that a percentage of the influent flow would need to be treated by RO. Provisions for fluoride treatment may allow Tampa Bay Water to increase the annual average finished water yield from this concept with an expected increase in total project cost per 1,000 gallons of 36 percent.

- **Concept 9 – New Surface Water Treatment Plant and Reservoir via New Supplies**

Concept 9 involves the development of new surface water supplies from sources in southern Hillsborough County including the Little Manatee River and Bullfrog Creek. This concept requires the construction of a new surface water seasonal storage reservoir in conjunction with a new surface water treatment plant to provide a finished water annual average yield range of 0.9 to 16.3 mgd. A new 700 MG reservoir and surface water treatment plant would be located near State Road 674 in Wimauma. The new surface water treatment plant would include similar treatment processes as the existing Regional Surface Water Treatment Plant, would meet Exhibit D requirements and would connect into the regional transmission system at the southern end of the proposed new South Hillsborough Pipeline.

- **Concept 10 – Eastern Pasco Wellfield**

The Eastern Pasco Wellfield concept would involve the construction of a new wellfield and groundwater treatment plant located in Pasadena Hills outside of the existing Consolidated Water Use Permit (CWUP) and outside of the Hillsborough River Basin. The wellfield would consist of approximately 12 new withdrawal wells (including two redundancy wells), each with an estimated production rate of 1 mgd that would withdraw fresh groundwater from the Lower Floridan Aquifer (approximately 700 feet below the surface). Groundwater supplies are expected to have a total dissolved solids (TDS) less than 500 mg/L that will be treated at a newly constructed groundwater treatment plant with ozone. This concept is expected to produce a finished water annual average yield between 6 and 18 mgd. The finished water would be connected to the regional transmission system with a new point of connection to the Cypress Bridge Transmission Main.

- **Concept 13 – Transfer of Existing Groundwater Permits**

Concept 13 includes two sub concepts. Concept 13a involves transferring groundwater permits from large fresh groundwater users in Pasco County, notably Tanler Water Company, to Tampa Bay Water. Concept 13b involves transferring groundwater permits from large fresh groundwater users in South Hillsborough County to Tampa Bay Water. The concept includes the identification of existing water use permit holders (such as industrial and agricultural businesses and property owners) that may no longer need an existing water use permit. Large user credits would be purchased and transferred to Tampa Bay Water to allow for the withdrawal of groundwater from existing or new wells in the area. The groundwater supply that is made available would be treated at new groundwater treatment facilities with ozone treatment.

For Concept 13a (Pasco County), a finished water annual average yield of up to 3.4 mgd is currently estimated from the existing Tanler Water Company wells. The finished water supply would be delivered into the existing Regional Transmission system at Cypress Bridge. If obtaining transferred groundwater permits becomes opportunistic to include with Concept 10, Tampa Bay Water may opt to do so. However, due to the lower predicted yield, location of the potential transfer permits, and high life cycle cost, the concept is no longer considered at this time.

Concept 13b (Hillsborough County) initially identified Mosaic as a potential permit supplier of up to 15 mgd. However, discussions with Mosaic disclosed that they did not anticipate any water available for transfer. Therefore, Concept 13b will not be pursued any further, although the transferring of permits within Hillsborough County could be considered opportunistically within Concept 16b during the feasibility evaluations, as described in **Section 7.7**.

- **Concept 14a – Increase Consolidated Water Use Permit**

Concept 14a involves increasing the permitted withdrawal quantity associated with Tampa Bay Water's existing CWUP. This increase would be contingent on providing evidence that a higher permitted withdrawal rate could be achieved without negatively impacting the environmental recovery that occurred due to the CWUP withdrawal reduction from 158 mgd to 90 mgd. This concept would primarily rely on the existing wellfields and groundwater treatment facilities for supply and treatment. Concept 14a is expected to have a finished water annual average yield between 5 to 20 mgd.

- **Concept 16b – South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge**

Concept 16b involves obtaining a Water Use Permit for a new wellfield in southern Hillsborough County based on providing evidence of a net-benefit to the aquifer associated with the construction and operation of a reclaimed water aquifer recharge system by the reclaimed water provider in southern Hillsborough County to form a salinity barrier. Concept 16b is based on using the Hillsborough County SHARP (South Hillsborough Aquifer Recharge Program) system or a potential similar aquifer recharge system supplied from the City of Tampa. An agreement would be needed to use the aquifer recharge system to generate credits to withdraw a certain quantity of fresh groundwater from a new production wellfield located further inland (east) of the aquifer recharge wells. The permitted groundwater withdrawal rate would be lower than the aquifer recharge rate to provide a net-benefit to the aquifer. The new wellfield would be constructed off Balm Riverview Road in Wimauma and contain up to 8 wells (including one backup and two for rotational capacity), each with an assumed production rate of 2.07 mgd. The supply would be treated at a new groundwater treatment plant, sited in the same location as the new wellfield, with ozone treatment processes. The finished water supply would be delivered into the Tampa Bay Water Regional System at the southern end of the South Hillsborough Pipeline. A feasibility study for this concept was completed in December 2021 and this provided an estimated finished water annual average yield of 6.2 mgd which is encompassed in the expected yield range of 2.9 to 9.1 mgd.

7.6.3 Short-List Evaluation Results

Similar to the Coarse and Fine Screening evaluations, the Short-listing evaluations produced an overall score between one and five for each of the concepts. **Figure 7-5** below illustrates the distribution of scoring from highest to lowest. More detailed tables, which include the scoring of the bulleted items within the Short-list Evaluation Criteria, are presented in **Appendix J**.

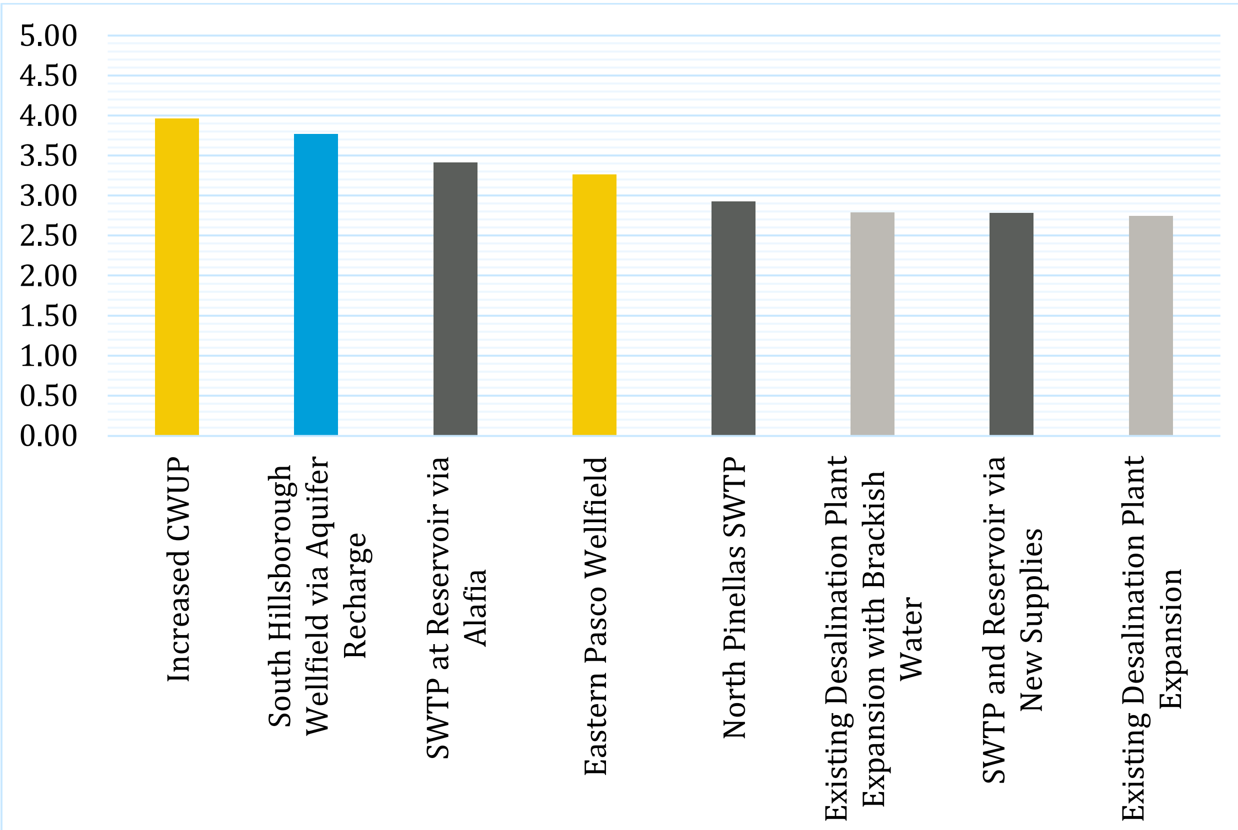

Figure 7-5 Short-List Concept Scoring Summary

Table 7-2 Short-List Evaluation Scoring Summary

#	Concept Title	Finished Water Yield Range (mgd)	Life Cycle Cost	Environmental Sustainability	Regulatory / Ease of Permitting	Public Reception	Life Cycle Cost	System Integration and Expansion Potential	Cost Risk Factors	Yield Reliability	Regional System Reliability Impacts	Weighted Score
4	Existing Desalination Plant Expansion	10 – 12	$ 13.17	2.67	3.50	4.00	1.00	1.00	3.25	3.60	3.67	2.75
5b	Existing Desalination Plant Expansion with Brackish Water	5.5 – 11.5	$ 11.99	3.00	3.00	3.50	2.00	1.00	2.75	3.00	3.67	2.79
6	North Pinellas SWTP	3 – 9.5	$ 10.92	4.33	4.00	2.00	2.00	3.00	2.50	3.00	2.33	2.93
8	New SWTP at Reservoir via Alafia	2.5 – 8.5	$ 4.47	3.33	3.00	4.00	4.00	2.00	2.50	3.40	3.67	3.41
9	New SWTP, Reservoir and Supplies	1 – 16.5	$ 12.61	3.00	3.00	3.00	1.00	4.00	2.25	3.40	3.67	2.78
10	Eastern Pasco Wellfield	3 – 6	$ 8.25	3.33	2.00	3.00	3.00	3.00	2.50	4.00	3.67	3.26
14a	Increased CWUP	5 – 20	$ 0.50	3.67	2.00	3.00	5.00	3.00	4.50	4.00	4.33	3.97
16b	South Hillsborough Wellfield via Aquifer Recharge	3 – 9	$ 3.83	4.00	4.00	3.00	4.00	4.00	3.50	3.60	3.67	3.77

7.7 Projects for Feasibility

Based on the Short-List evaluation and scoring, the final projects recommended for feasibility include the following seven concepts:

A. Eastern Pasco Wellfield (with fresh and/or brackish groundwater)
B. Consolidated WUP Increase
C. North Pinellas Surface WTP & Reservoir
D. Desalination Plant Expansion (with brackish groundwater or seawater)
E. Surface WTP at Regional Reservoir via Alafia Withdrawals
F. South Hillsborough Surface WTP & Reservoir
G. South Hillsborough Wellfield via Aquifer Recharge

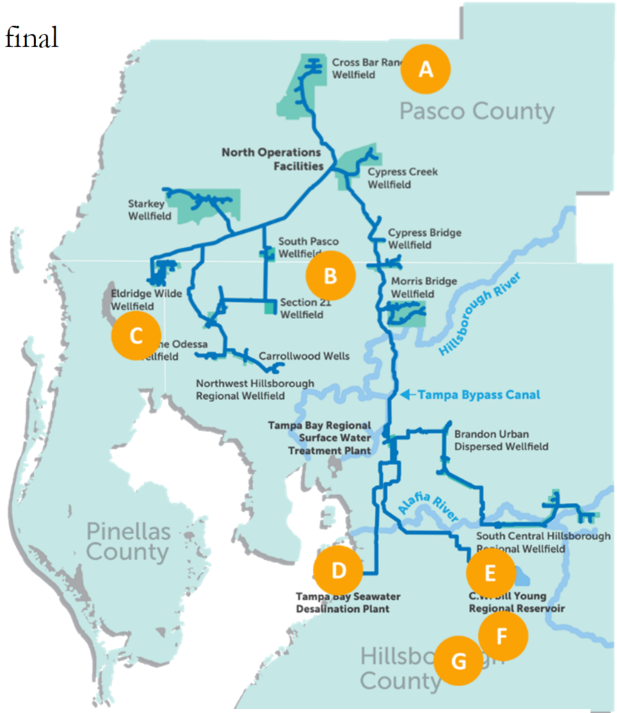

Figure 7-6 Feasibility Project Locations

These projects are further defined in Section 11 – Recommendations for Feasibility. The combination of these projects provides a minimum finished water yield of 25 mgd which meets the goal of 10 to 20 mgd water supply expansion for 2033. It also provides for a maximum finished water yield of 90 mgd which could support the water delivery requirements of Tampa Bay Water through the 20-year planning horizon of 2043 Items to note include:

- The Eastern Pasco Wellfield includes both fresh and brackish groundwater supplies based on the data provided from the District regarding the potential availability of brackish groundwater in Eastern Pasco County. This concept would include parallel treatment trains which would blend before being pumping into the Regional System.
- Due to limited space at the existing Desalination Plant, expansion would be limited to either seawater or brackish groundwater. It is requested that the feasibility project focuses on expanding the Desalination Plant with Brackish Groundwater since the expansion with seawater has already undergone feasibility in 2022.
- The Western Pasco Brackish Wellfield and Transfer of Existing Permits in Pasco County were eliminated from consideration due to the low yield and high life cycle costs associated with each concept. However, should the location of the Eastern Pasco County Wellfield project end up being in close proximity to wells available for transfer, then they should be incorporated into the Feasibility Project.
- Finally, the Transfer of Existing Permits in Hillsborough County was eliminated from consideration due to additional information provided by Mosaic and the resulting lack of available water supply.

8.0 System Analysis

Tampa Bay Water regularly performs hydraulic analyses for its regional supply and transmission system to study current system operating conditions and how best to integrate new water supply concepts into the Regional System to meet the future supply needs and potentially alleviate emergency conditions due to loss of supplies. This section provides an overview of the system analyses and the potential effect of future water supply concepts on system hydraulics.

8.1 Systems Analysis Tools

Tampa Bay Water uses a number of computer modeling and analysis tools to evaluate its system. A summary of the system analysis tools that are currently used is provided below:

- **Regional Supply and Transmission System and Enhanced Surface Water System Hydraulic Models** – The hydraulic models use the ArcGIS based InfoWater Pro software. The hydraulic model of Tampa Bay Water's Regional Finished Water Transmission System is used to study current and projected future system operations and evaluate potential system improvement options. The hydraulic model of Tampa Bay Water's Enhanced Surface Water System (ESWS) component is used to determine hydraulic limitations for the existing raw water transmission system infrastructure and evaluate potential future expansions of the system.

- **Regional System and ESWS Surge Models** – Surge models for Tampa Bay Water's Regional System and ESWS transmission systems were developed in Bentley's HAMMER software. The models are used to predict potential system transient control issues and evaluate options to mitigate or reduce potential transient control problems.

- **Hydraulic Grade Spreadsheets** – These Microsoft Excel spreadsheets graph the hydraulic grade of Tampa Bay Water's major pipelines based on supply input and demand output. The tools have been upgraded to include approximations for chemical usage and electricity. These estimates can be used for annual budgeting purposes.

- **ESWS Operational Model** – A stochastic model of Tampa Bay Water's ESWS. The model is used to estimate supply availability based on climate-related seasonal and long-term drought and heavy rainfall periods, for the existing supply sources, storage, and transmission system infrastructure, and evaluate potential yield and reliability of future expansions of the system.

- **Regional System Performance Model** – This model includes the ESWS Operation Model, probabilistic demand projections, operating rules and constraints for the groundwater, surface water and desalination facilities to evaluate the performance and reliability of Tampa Bay Water's regional water supply and delivery system.

8.2 Previous Hydraulic and Systems Analyses

8.2.1 Hydraulic Analysis of the Regional Transmission System

The Regional Transmission System model has been calibrated to the existing system infrastructure. It incorporates the major components of the Regional Transmission System, including the supply sources, storage, pumps, piping, demands, and their associated diurnal flow patterns. The model has been used to assess whether pumps and pipe sizes are adequate to convey supply for projected future Member demands at the required system pressures, without exceeding the design pressures of the pipelines. The results of the previous hydraulic modeling analyses indicated the following:

- System pressures during peak future flow scenarios (in year 2035) were predicted to reach up to 168 pounds per square inch (psi), which is approaching the maximum working pressure of the pipeline of 175 psi. The maximum system pressures should continue to be monitored and further analysis should be completed as updated demand projections become available.

- Providing additional finished water storage capacity or adding pipeline capacity between the Morris Bridge Booster Pump Station and the Cypress Creek Pump Station could increase the hydraulic capacity and reliability of the Regional Transmission System; however, these improvements would also result in increased water age. Additional water age and water quality modeling should be performed prior to making decisions to add more capacity and/or transmission pipelines to the system.

8.2.2 Surge Modeling

Tampa Bay Water operates large finished and raw water transmission systems with a limited number of water supply inputs and water demand outlets, which can be susceptible to significant transient pressure events, also known as water hammer or surge pressures and vacuum conditions. In order to mitigate surge pressure events, Tampa Bay Water has implemented a variety of operating strategies, control systems, and surge mitigation devices throughout its systems. The transmission mains are furnished with combination air/vacuum relief valves to reduce the potential for water column separation and associated pressure surges and vacuums conditions that can occur during transient causing events, such as power outages at pumping facilities or the unintentional rapid closing of a valve.

Transient surge models have been developed for the Tampa Bay Water Regional System and the ESWS. The Regional System surge model was updated in 2022 for the Brandon Booster Pump Station project, and the ESWS model was updated in 2017. In addition to recent design projects like the Brandon Booster Pump Station project, the Regional and ESWS models were used for planning studies to analyze potential transient pressure control issues and evaluate options to mitigate transient pressure problems for both current and future system operating conditions in 2015 and 2017, respectively.

In order to ensure that the recommended surge mitigation devices and strategies have been implemented and continue to function as intended, Tampa Bay Water has developed a comprehensive database for the surge mitigation features throughout the system. The database serves as an inventory of the surge mitigation features and also includes information regarding recommended settings and maintenance requirements for each. Tampa Bay Water staff periodically review the surge mitigation features throughout the system to document field consistency with the recommendations indicated in the database.

8.2.3 2035 System Hydraulic and Emergency Scenario Analysis

Tampa Bay Water completed the *Tampa Bay Water 2035 System Hydraulic and Emergency Scenario Analysis* in 2015. This analysis was performed to:

- Determine if the existing transmission system has sufficient hydraulic capacity to handle projected average and maximum day demand conditions through the year 2035.
- Evaluate if the system has sufficient operational flexibility and capacity to meet water demands during emergency scenarios such as:
    - System wide commercial power outage conditions.
    - Pipeline failures at 14 locations.
    - Facility shutdowns at 3 locations.
- Re-evaluate recommended improvements from the previous 2025 System Analysis (that had not been implemented yet) to determine if these improvements are still necessary and recommend additional improvements to increase the reliability and delivery capacity of the Regional System.
- Compare Tampa Bay Water's contract requirements and level of service to five similar wholesale supply utilities.
- Evaluate the expected reliability of facilities to produce supply based on planned maintenance and unplanned outages of the major equipment and components at each facility.

The 2045 System Hydraulic and Emergency Scenario Analysis will be completed by 2025.

8.3 System Analysis for Future Water Supply Project Concepts

8.3.1 System Analysis for Future Water Supply Project Concepts

As part of Tampa Bay Water's current Long-term Master Water Plan (LTMWP) process, several potential water supply concepts were developed. These water supply concepts are described in **Section 7** of this report. Preliminary hydraulic analyses were completed to define estimated sizing requirements for the water transmission infrastructure proposed with each of the future water supply concepts. The results of these hydraulic analyses are reflected in the pipeline and pump station sizing estimates that are described for the various project concepts, which are further described in **Appendix H**.

In addition to the hydraulic analyses performed to define estimates for the sizing of the pump stations and pipelines associated with the future water supply concepts, preliminary assessments were also completed to identify the anticipated hydraulic impacts associated with integrating the new supply capacity into the existing Regional Transmission System. **Table 8-1** identifies the locations where the new water supply sources are proposed to be connected to the existing Regional System and summarizes the anticipated impacts to the existing Regional Transmission System. The proposed locations for connecting the new supply options to the existing Tampa Bay Water Regional System are also presented in **Figure 8-1**.

As part of the water supply concept feasibility studies, it is recommended that additional hydraulic analyses be completed to further evaluate how the implementation of the potential new water supply sources could impact the operation of the Regional Transmission System. The future analyses should consider the seasonal differences in demand and supply availability, the diurnal fluctuation in demand at delivery locations and the projected system demand conditions through the year 2045. The analyses should specifically investigate whether the new supplies will improve or exacerbate the hydraulic restrictions in the Morris Bridge Transmission Main and Cypress Bridge Transmission Main. Previous recommendations also included investigation of the Brandon Transmission Main and Brandon South-Central Connector. Due to the recent upgrades to the Brandon Transmission System and the new South Hillsborough Pipeline, investigations should confirm if there are still hydraulic restrictions in these Transmission Mains. The analyses should also evaluate the need for increased operational flexibility and identify potential system operating restrictions. Results of the future analyses will help define the need for the future transmission system improvements as demand projections increase and additional supply sources are added.

Table 8-1 Estimated Hydraulic Impacts of Future Water Supply Projects

<table>
<tr><th>ID</th><th>Water Supply Concepts</th><th>Approx. New Supply Capacity (mgd)</th><th>Location Where New Supply Enters the Regional System & Estimated Impacts to Existing System Hydraulics</th></tr>
<tr><td>A</td><td>Eastern Pasco Wellfield</td><td>12</td><td>Cypress Bridge Transmission Main – The addition of water supply north of Morris Bridge and North-Central Hillsborough Intertie will reduce pressures from the Regional High Services Pump Station (at the Regional Facilities Site).</td></tr>
<tr><td>B</td><td>Consolidated WUP Increase</td><td>10</td><td>Existing Wellfields – exact location of the increased supply will depend on future operations. However, it is generally expected that increasing groundwater withdrawal will decrease supply reliance (and pressure) from the Regional Facilities Site.</td></tr>
<tr><td>C</td><td>North Pinellas Surface WTP & Reservoir</td><td>4.5</td><td>Keller Transmission Main – The additional water supply capacity in the western portion of the system would result in reducing the pressures throughout the majority of the Regional Transmission System (from the Regional Facilities Site to the Cypress Creek WTP, to the Pinellas Regional point of connection (POC)).</td></tr>
<tr><td>D</td><td>Desalination Plant Expansion</td><td>11.5</td><td>Tampa Bay Seawater Desalination Plant – Increasing the Desalination Plant production would result in higher discharge flowrates and pressures from both the Product Water Pump Station (at the Desalination Plant) and the Regional High Services Pump Station (at the Regional Facilities Site). The average increase in pressure at the Regional High Services Pump Station is anticipated to be limited due to the projected increases in water demands in South Hillsborough County.</td></tr>
<tr><td>E</td><td>Surface WTP at Regional Reservoir via Alafia Withdrawals</td><td>6</td><td rowspan="3">New South Hillsborough County Pipeline - The addition of water supply into the new pipeline will reduce pressures from the Regional Facilities Site into the new South Hillsborough County Pipeline. If more yield is produced from any of these supply projects than is demanded from the new South Hillsborough Pipeline POC, the remaining supply capacity that is delivered into the Regional System could result in reversal of the normal flow direction. Additional hydraulic analyses to study the effect of flow reversal should be performed as the operations for the new South Hillsborough Pipeline and POC are further developed.</td></tr>
<tr><td>F</td><td>South Hillsborough Surface WTP & Reservoir</td><td>4</td></tr>
<tr><td>G</td><td>South Hillsborough Wellfield via Aquifer Recharge</td><td>6</td></tr>
</table>

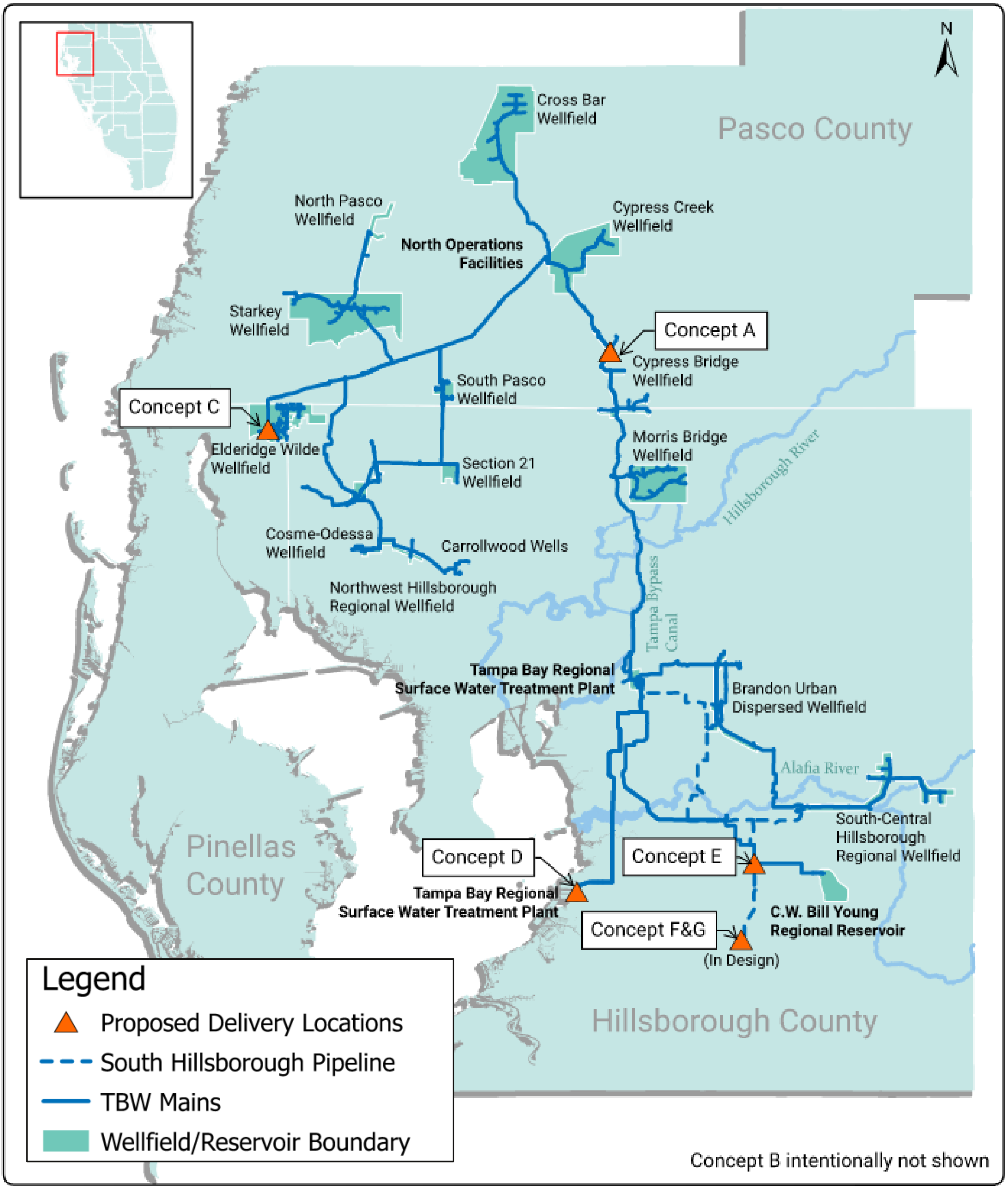

Figure 8-1 Water Supply Project Concepts Entry Locations to the Regional System

8.3.2 Future System Surge Analysis

Tampa Bay Water's future plans for continuing to maintain adequate surge protection throughout the system include:

- Completing the 2045 System Hydraulic and Emergency Scenario Analysis
- Completing updates to the surge mitigation feature database, including field observations and testing to document the settings and functionality of the surge mitigation devices and control systems. Any discrepancies between the recommendations and the field observations will be further evaluated and addressed as necessary.
- Evaluation of the integration of future water supply sources to the existing system and changes to system operating conditions to allow for proactive implementation of appropriate surge mitigation devices and operating strategies.

These efforts will support Tampa Bay Water's ability to continue providing a safe and reliable potable water supply to its Member Governments.

8.4 System Reliability and Emergency Scenario Planning

The Member Governments rely on Tampa Bay Water to provide them with a reliable supply of potable water throughout the year. The previously mentioned *Tampa Bay Water 2035 System Hydraulic and Emergency Scenario Analysis* included a number of analyses to develop and evaluate options to improve system reliability. The analyses resulted in several recommendations that will improve Tampa Bay Water's ability to maintain reliable service during potential widespread power outage conditions that can occur during inclement weather conditions such as hurricanes. The analysis also provided recommendations for improvements that would increase the system's ability to continue delivering adequate water supply to each of the Member Governments during a variety of other emergency conditions such as pipeline failures or facility outage events.

There are numerous potential facility or pipeline outage events that could occur in a water supply and transmission system at any given time. Tampa Bay Water's system was evaluated to determine which system outage scenarios result in the greatest operational challenges. The following water supply deficiencies resulting from potential system outage scenarios were identified:

- Demands in South Hillsborough County were projected to grow rapidly and would exceed the available supplies. Therefore, any system outage scenarios that impact the infrastructure associated with delivering water to South Hillsborough County could result in temporary deficiencies in the amount of water supply delivered to South Hillsborough County.
- Pipe Breaks at four locations along the Cypress Creek Transmission Main between the Cypress Creek Water Treatment plant and the Pinellas County Regional Delivery POC could temporarily impact the ability to meet required flowrates and delivery pressure requirements for some of the Pinellas County and Pasco County POCs.
- A pipe break on the South-Central Hillsborough Regional Wellfield Transmission Main could result in a temporary supply deficiency to Hillsborough County.

- A facility outage at the D. L. Tippin WTP could result in a temporary water supply deficiency for the City of Tampa.

The impacts that the various future water supply concepts would have on the reliability of the system during critical facility and pipeline outage scenarios were considered and are summarized in **Table 8-2**.

Table 8-2 Impact to System Reliability and Emergency Scenario Planning

ID	Water Supply Projects	Impact to System Reliability and Emergency Scenario Planning
A	Eastern Pasco Wellfield	New Water Supply in Pasco County would improve the reliability of supply to Pasco County in anticipation of projected rapid growth. However, the location of the project does not provide relief to impacted areas if the pipe breaks at the four locations along the Cypress Creek Transmission Main.
B	Consolidated WUP Increase	New water supply from a Consolidated WUP increase improves reliability by providing increased supply to impacted areas if the pipe breaks at the four locations along the Cypress Creek Transmission Main. The new water supply increases reliability along the entire Regional Transmission System, thus increasing reliability in the South Hillsborough and Pasco County demand areas.
C	North Pinellas Surface WTP & Reservoir	Additional supply capacity in this portion of the Regional System would improve the ability to maintain delivery pressures and flowrates to several POCs on the western side of the Regional System during a Cypress Creek Transmission Main pipe break scenario.
D	Desalination Plant Expansion	Expansion of the existing Desalination Plant provides additional capacity in South Hillsborough County, however the supply from the Desalination Plant is currently delivered north to the Regional Facilities Site for blending with surface water supply before entering the Regional Water Transmission System. The additional supply capacity at the Regional Facilities Site does not improve the ability to deliver water to the areas downstream of Cypress Creek Transmission Main failures.
E	Surface WTP at C.W. Bill Young Regional Reservoir via Alafia withdrawals	New Water Supply in South Hillsborough County would improve the reliability of supply to South Hillsborough County in anticipation of the projected rapid growth. The additional supply capacity in this area would also improve the ability to meet water demands during some of the critical facility and pipeline outage scenarios that have been identified, including a South-Central Hillsborough Regional Wellfield Collection Main Pipe Break scenario.
F	South Hillsborough Surface WTP & Reservoir	
G	South Hillsborough Wellfield via Aquifer Recharge	

9.0 Evaluation of Agency Staffing

Tampa Bay Water (Agency) manages and operates its regional water supply system with an appropriate level of staffing to fulfill the mission of Tampa Bay Water while maintaining a responsible fiscal program to serve the Member Governments. To ensure that its staffing levels remain consistent with Tampa Bay Water's goals and strategic plan, Tampa Bay Water reviews staffing levels through formal performance audits and management studies every five years, as required in Section 2.10 of the Amended and Restated Interlocal Agreement. The latest Management and Performance Audit was presented and received by the Board in August 2020. In December 2020, the Board was also presented with Tampa Bay Water's Succession Plan strategy to help reduce staffing risks, maintain business continuity, retain a collaborative culture, document knowledge transfer, and recognize staff with high potential for development and engagement as future leaders.

Additionally, a compensation study is conducted every three years to ensure Tampa Bay Water compensation remains competitive within the current market and attracts and maintains talented professional staff. Tampa Bay Water's salaries and pay scale are reviewed by an outside consulting firm which compares the current plan with other similarly sized organizations. The latest compensation study was approved by the Tampa Bay Water Board in August 2023.

Figure 9-1 shows the current organization structure and staffing positions per division. At this time, Tampa Bay Water maintains 162 full-time equivalent positions to meet the 2022 Strategic Plan Goals and Mission Statement, and the recommendations from the 2020 Management and Performance Audit. This is a modest increase of seven full-time positions since the 2018 Long-term Master Water Plan (LTMWP) or an increase of only 4.3 percent during the past 5 years.

9.1 2022 - 2027 Strategic Plan

The latest Strategic Plan was approved by the Tampa Bay Water Board of Directors in January 2022. The plan describes six strategic goals, that include objectives, strategies, tactics, and key performance indicators necessary to carry out the policies set by the Board and strategic direction from the Amended and Restated Interlocal Agreement and Master Water Supply Contract. The six goals include:

1. Enhance System Reliability and Sustainability
2. Continuously Improve Agency Operations
3. Optimize Future Financial Stability
4. Enhance Our Relationship with Stakeholders
5. Ensure an Engaged, Skilled and Adaptable Workforce
6. Safeguard Agency Infrastructure

The Strategic Plan is developed as a five year look ahead for Tampa Bay Water and is updated annually.

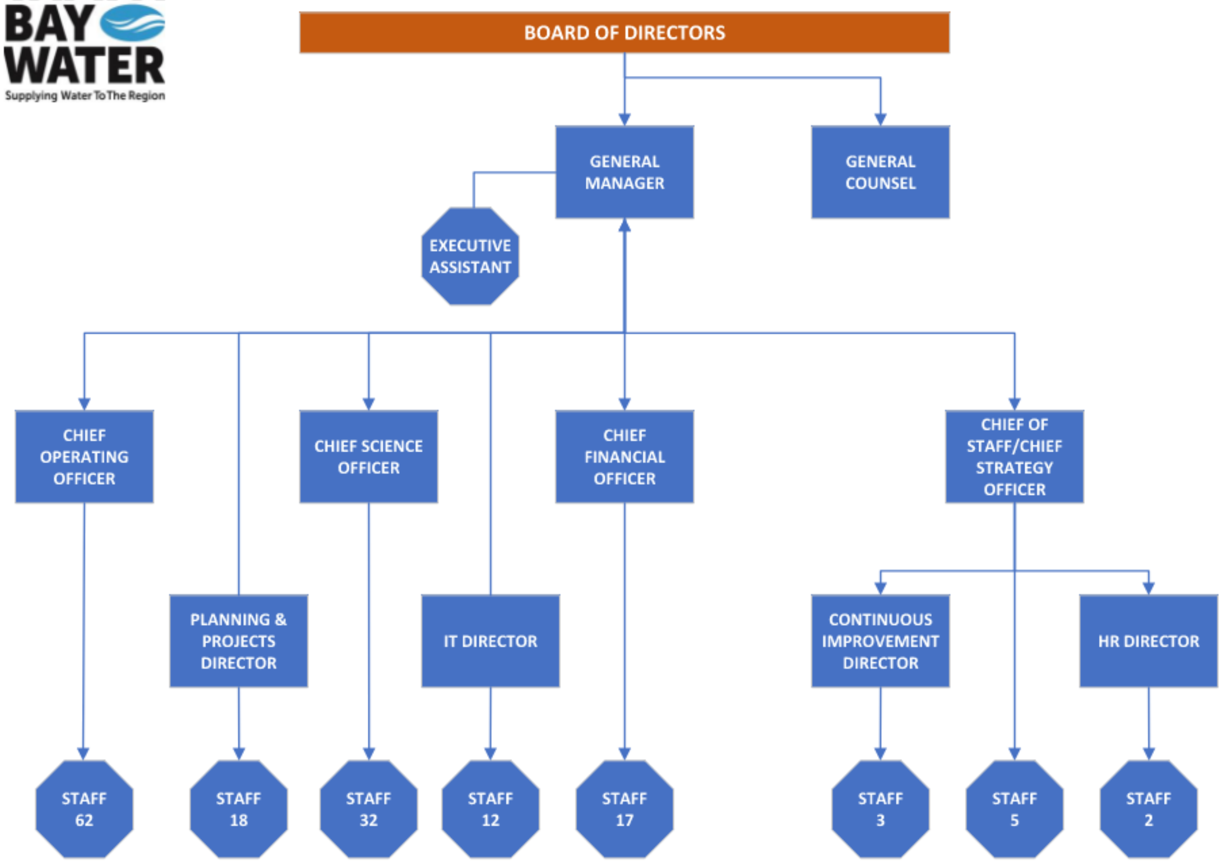

Figure 9-1 Tampa Bay Water Organization Chart

9.2 2018 Long-term Master Water Plan

The 2018 LTMWP highlighted three feasibility studies for new water supply concepts; an expansion of the existing Regional Surface Water Treatment Plant, expansion of the existing Seawater Desalination Treatment Plant, and a new groundwater wellfield and treatment plant using aquifer recharge credits from the South Hillsborough Aquifer Recharge Project/Expansion (via SHARP credits). The 2018 LTMWP also identified an additional 10 million gallons per day (mgd) of new water supply and treatment capacity needed by 2028 to meet the region's future water supply needs. Following the results of these studies and using a Board-approved ranking framework and criteria, the Board approved the expansion of the existing Regional Surface Water Treatment Plant at the August 2022 meeting. This selection is not anticipated to impact the current Tampa Bay Water organizational structure; however, the contract operator may need additional staff to operate and maintain the additional treatment train. This falls outside of Tampa Bay Water's staffing responsibility and is covered under the operating contract for this facility.

9.3 2023 Long-term Master Water Plan

The 2023 LTMWP identifies an additional 10 to 20 mgd of new water supply and treatment capacity that will be needed by 2033 to meet the region's future water supply needs. The 2023 LTMWP highlights seven feasibility studies for new water supply concepts:

A. Eastern Pasco Wellfield
B. Consolidated Water Use Permit (CWUP) Increase
C. North Pinellas Surface Water Treatment Plant & Reservoir
D. Desalination Plant Expansion
E. Surface Water Treatment Plant at the Regional Reservoir via Alafia River withdrawals
F. South Hillsborough Surface Water Treatment Plant and Reservoir
G. South Hillsborough Wellfield via Aquifer Recharge Credits

9.4 Estimated Staffing Needs for Future Supply Options

The addition of new or expanded facilities to the existing Regional System is anticipated to result in additional staffing needs for Tampa Bay Water. **Table 9-1** provides a preliminary opinion of the additional staffing requirements associated with each of the future water supply options. The table does not associate the staffing by specific disciplines (i.e., operators, maintenance, electrical, instrumentation, supervisory control and data acquisition (SCADA), laboratory, etc.) but as a cumulative total of all disciplines for each project. A more detailed analysis to finalize the staffing requirements will be performed during the feasibility study program.

Table 9-1 Preliminary Estimates of Staffing Needs for Future Water Supply Facilities

Project	Additional Finished Annual Average Yield, mgd	Additional Rated Capacity, mgd	Preliminary Estimate of Additional O&M Staff
A. Eastern Pasco Wellfield	12	18	10
B. Increase Consolidated Water Use Permit	10	0	0
C. North Pinellas Surface Water Treatment Plant and Reservoir	4.5	9	14
D. Desalination Plant Expansion (with brackish or seawater)	11.5	16	5
E. Surface Water Treatment Plant at the Regional Reservoir via Alafia Withdrawals	6	9	11
F. New South Hillsborough Surface Water Treatment Plant and Reservoir with New Surface Water Supply Sources	4	8	12
G. New South Hillsborough Wellfield and Treatment Plant via Aquifer Recharge	**6**	**9**	**9**

A. Eastern Pasco Wellfield – Additional operations and maintenance staff will be required to supplement Tampa Bay Water's North Region for the new facilities and systems associated with this project. This project will contain two treatment trains that will treat both brackish and fresh groundwater supplies and will include the following components: groundwater production wells, wellfield collector and finished water pipelines, ozone treatment, cartridge filters, reverse osmosis (RO) membranes, storage tank, finished water pumps, and RO deep well injection pumps. The maintenance activities will also include electrical, instrumentation, and SCADA networks. No additional staff is anticipated for the control and monitoring of these systems from Tampa Bay Water's control center, but this could be influenced by available staff to meet the regulatory requirements at the other groundwater treatment plants. Additional laboratory staff may also be required to manage the groundwater and finished water quality monitoring.

Operation of the new groundwater treatment plant will also require additional staff. Since the facility can be controlled and monitored via an electronic control system, the staffing requirements may be reduced with Florida Department of Environmental Protection (FDEP) approval.

B. Consolidated Water Use Permit Increase – An increase to the CWUP will not require additional operation and maintenance staff since the increase is only related to quantity of flow, and the current infrastructure would remain the same.

C. North Pinellas Surface Water Treatment Plant and Reservoir – Additional Tampa Bay Water maintenance staff will be required in the North Region for the new facilities and systems associated with this project, including raw and finished water pipelines, raw water pumping station, raw water reservoir, and finished water storage and pumping. No additional staff is anticipated for the control and monitoring of these systems from Tampa Bay Water's control center, but this could be influenced by the available staff to meet the regulatory requirements at the other groundwater treatment plants. Additional laboratory staff may also be required for the raw and finished water quality monitoring.

Operation of the new treatment facility and systems will require 24/7 coverage based on continuous monitoring and sampling for process control, the frequency of filter backwashes, and compliance with the Surface Water Treatment Rule and residuals management will be a key consideration for this project. The process components for the new facility are similar to the Regional Surface Water Treatment Plant. It is anticipated that the new facility could be operated by an external contract operator while Tampa Bay Water manages the daily (weekly) production rates through the contract operator.

D. Desalination Plant Expansion (with brackish or seawater) – The operation and maintenance of the existing Desalination Plant is currently performed by a contract operations and maintenance firm. A 10 mgd expansion of the existing facility is anticipated to require some additional staff to supplement the current staffing level provided by the contract operator. The operation and maintenance requirements for the pretreatment modifications are also anticipated to increase the maintenance activities as compared to the existing processes. The current operating structure appears adequate to control and monitor the existing and proposed processes via SCADA. No additional laboratory staff is anticipated for water quality testing efforts.

Additional maintenance staff is also anticipated to supplement Tampa Bay Water's South Region for maintaining the brackish water infrastructure including pumps and motors, equipment, instrumentation, pipelines, and SCADA network along with laboratory personnel to manage the water quality testing from the wellfield. No additional staff is anticipated for monitoring and control of the wellfield from Tampa Bay Water's control center, but this could be influenced by available staff to meet the regulatory requirements at the other groundwater treatment plants.

Note: Future water supply projects that involve expansion of existing facilities that currently use a contract operations and maintenance firm would require modifications and renegotiation of the existing service agreement to handle the operations and maintenance requirements associated with the additional infrastructure proposed.

E. Surface Water Treatment Plant at the Regional Reservoir via Alafia River Withdrawals – Additional Tampa Bay Water maintenance staff will be required in the South Region for the new facilities and systems associated with this project, including the finished water storage, pumping, and piping systems, and delivery into the Regional System. The existing Enhanced Surface Water System (ESWS) will deliver source water from the C.W. Bill Young Regional Reservoir to the new facility. No additional staff is anticipated for the control and monitoring of the existing ESWS and the additional finished water pumping system from Tampa Bay Water's control center, but this could be influenced by the available staff to meet the regulatory requirements at the other groundwater treatment plants. Additional laboratory staff may also be required for the finished water quality monitoring.

Operation of the new treatment facility and systems will require 24/7 coverage based on the continuous monitoring and sampling for process control, the frequency of filter backwashes, and compliance with the Surface Water Treatment Rule and residuals management will be a key consideration for this project. The process components for the new facility are similar to the Regional Surface Water Treatment Plant. It is anticipated that the new facility could be contract operated while Tampa Bay Water manages the daily (weekly) production rates through the contract operator.

F. South Hillsborough Surface Water Treatment Plant and Reservoir – Additional Tampa Bay Water maintenance staff will be required in the South Region for the new facilities and systems associated with this project, including raw and finished water pipelines, raw water pumping station, raw water reservoir, and finished water storage and pumping. No additional staff is anticipated for the control and monitoring of these systems from Tampa Bay Water's control center, but this could be influenced by the available staff to complete the regulatory requirements at the other groundwater treatment plants. Additional laboratory staff may also be required for the raw and finished water quality monitoring.

Operation of the new treatment facility and systems will require 24/7 coverage based on the continuous monitoring and sampling for process control, the frequency of filter backwashes, and compliance with the Surface Water Treatment Rule. The process components are similar to the Regional Surface Water Treatment Plant and residuals management will be a key consideration for this project. It is anticipated that this new facility could be contract operated while Tampa Bay Water manages the daily (weekly) production rates through the contract operator. After operating experience is gained with this facility and because of the lower production rates, the facility could be re-evaluated for reduced staffing based on safety and reliability considerations.

G. South Hillsborough Wellfield via Aquifer Recharge – Additional operations and maintenance staff will be required in the South Region for the new facilities and systems associated with this project, including the groundwater production wells, pipelines, storage tank, pumping stations, and treatment facilities. No additional staff is anticipated for the control and monitoring of these systems from Tampa Bay Water's control center, but this could be influenced by the available staff to meet regulatory requirements at the other groundwater treatment plants. Additional laboratory staff may also be required to manage the water quality testing from the individual wells and finished water production, subject to the requirements of the water use permit.

Operation of the new groundwater treatment plant is anticipated to require 24/7 coverage based on ozone treatment for hydrogen sulfide removal, similar to the Lithia Hydrogen Sulfide Removal Facility. After operational experience is gained, the facility could always be re-evaluated for reduced staffing based on safety and reliability considerations.

10.0 Public Engagement Program

With the 2023 Long-term Master Water Plan (LTMWP) Update, Tampa Bay Water continued its long-running practice of engaging the public in the LTMWP. Since 1995, the regional water supply wholesaler has incorporated transparent, proactive public outreach into the decision-making process. Public engagement for the LTMWP is conducted in concert with the project concept evaluations. In the early stages of the LTMWP update, when projects are conceptual and loosely defined, engagement is more general, focusing on potential sources and concepts as well as the planning process. Once project concepts are better developed and projects are selected for detailed planning and feasibility studies, more project-specific outreach occurs.

Tampa Bay Water's proactive approach is consistent with the American Water Works Association's (AWWA) policy statement on public involvement and customer communications, which states, "AWWA recognizes that communication should be a two-way dialogue with customers, community members, public officials and stakeholders. This dialogue should involve a broad range of topics and issues of importance to consumers and stakeholders—including quality, availability and reliability of the resource, conservation, source water protection, infrastructure investment and costs for service." The policy statement also states, "Opportunities for input and involvement are essential to public understanding and acceptance of utility programs and projects… Opportunities for involvement must, however, be meaningful, inclusive and clearly linked to the decision-making process."

Building on the 2018 LTMWP, Tampa Bay Water sought to engage stakeholders through several efforts:

- A statistically valid public opinion survey
- Secondary research conducted by the Southwest Florida Water Management District (District)
- Multiple meetings with technical, environmental and economic ad-hoc committees
- Focus groups among Member Government water customers
- Presentations to key stakeholder groups and
- A telephone town hall meeting with Zoom simulcast.

Input received is summarized in the following sections with documentation provided in **Appendix K.**

10.1 Public Engagement Program Purpose

Tampa Bay Water's public engagement process for the 2023 LTMWP update was designed to garner input on a variety of technical, environmental, economic, social and community considerations for further evaluation in later phases of project exploration and development. The purpose of these engagement efforts was not to reach consensus or approval on the process, the sources under consideration or the project concepts. Instead, the engagement process was designed to obtain input from stakeholders early in the planning process to inform the scope of work for the feasibility studies that will be completed for the shortlisted projects and to help guide additional outreach that will be needed in subsequent phases of the water supply selection process.

Tampa Bay Water convened three different ad-hoc committees and five focus groups to obtain input during development of its 2023 LTMWP update. The purpose of the technical, environmental and economic ad-hoc committees, as well as the five focus groups, was the same:

- To discuss stakeholders' opinions about water supply sources under consideration to meet future demands and
- To solicit input to help Tampa Bay Water understand concerns of various stakeholder groups for each source water option under consideration.

10.2 Public Engagement Efforts - Summary

10.2.1 2021 Public Opinion Survey

From Aug. 20, 2021, to Sept. 3, 2021, Downs & St. Germain Research conducted an internet survey of 1,200 randomly selected households in the Tampa Bay Water service area. The margin of error for responses from the tri-county service area is 2.8 percentage points and 4.9 percentage points for each county. If 100 identical studies were conducted, results from 95 of those studies would be within 2.8 percentage points of the results that would be obtained if all residents in the Tampa Bay Water service area were interviewed. Following are key findings from the 2021 survey related to the LTMWP:

- 84% of respondents believe there should be more comprehensive rules and regulations to protect the region's water resources.
- Residents are more willing to drink tap water that comes from groundwater from the Floridan Aquifer (81%) or from river water (66%); more than half of residents are willing to drink tap water from seawater (56%), but only 1 in 3 residents (36%) are willing to drink tap water from reclaimed water.
- When asked about different ways to clean and use reclaimed water as a source of drinking water, about 41% are willing to drink reclaimed water that has been cleaned to drinking water standards, put back into groundwater, reservoirs, or rivers, and then withdrawn and treated again to drinking water standards before being sent to homes and businesses. About 1 in 3 residents (32%) are not willing to drink this water.
- About half of residents (49%) of Tampa Bay Water's service area believe environmental stewardship is the most important consideration when deciding whether to accept a new water supply, up 10% points from 2018. This is followed by reliability at 38% and project cost at 12%.

The full 2021 public opinion survey report can be found in **Appendix K**.

10.2.2 Secondary Research

In January 2023, Tampa Bay Water requested a cross-tabulation report of data collected by Taproot on behalf of the District in March of 2020. The Statewide Potable Water Reuse Survey, funded through the Florida Department of Environmental Protection (FDEP), has been cited as showing support for personal uses of reclaimed water, including lawn watering, car washing and industrial use. Tampa Bay Water sought a cross-tabulation report to determine attitudes of water customers in Tampa Bay Water's service area.

However, the project team found that the data collected and presented for Hillsborough, Pinellas and Pasco counties could not be considered representative of the respective county populations, or the tri-county as a whole, due to the small sample sizes (the original survey sought to collect data at the District level, not at the county level).

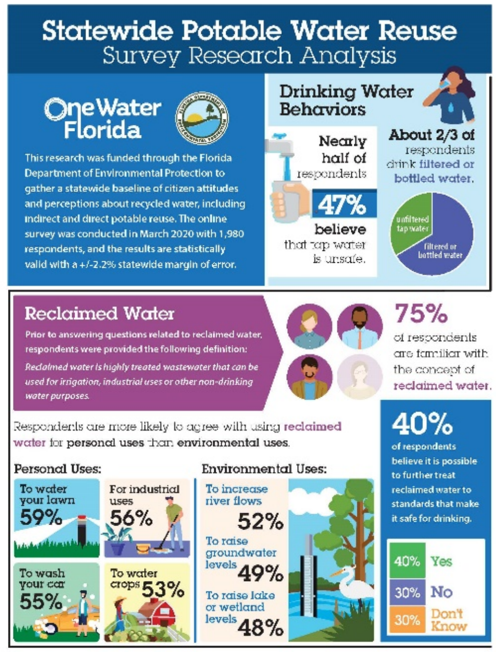

Figure 10-1 Statewide Potable Water Reuse Survey

Additionally, the project team could not determine if respondents in the tri-county region are supplied drinking water by Tampa Bay Water's members due to the question-and-answer structure. Respondents were asked to select the sources of their drinking water, but possible answers included supply sources, such as reservoirs, desalinated seawater and springs, with possible providers, such as wells or drinking water from my utility. Respondents could "pick all that apply." Therefore, the project team could not determine if the respondents were served by a utility, the kind of utility (private or municipal) or from a domestic well. Nor could the project team determine whether a respondent drinks tap water from a utility or tap water from a personal domestic well due to the question and response structure.

Based on the above information, and additional information shown in **Appendix K**, the project team concluded that the cross-tabulation report could not be seen as representative of the views of residents in Hillsborough, Pasco, and Pinellas counties, either in total or individually, and that Tampa Bay Water's 2021 public opinion survey provides the latest statistically valid views among Member Government customers, both at the regional and county level.

10.2.3 Ad-Hoc Committee Meetings

Technical, environmental, and economic ad-hoc committees were convened to solicit input from key stakeholders that could help shape feasibility studies for selected projects. For the ad-hoc committees, Tampa Bay Water provided information on its long-term planning process and asked each group:

Figure 10-2 Members of the technical ad-hoc committee met in January 2023

- What concerns do you have about a specific source or project concept?
- What questions need to be answered during the future feasibility study phase to address those concerns?

- What additional data or information is needed to address your concerns and questions in making future conclusions regarding the suitability of different source water options or project concepts?

Meeting minutes showing lists of attendees and input received are provided in **Appendix K**. Following is a snapshot of input provided by the committees:

- **Overall**
  - Need to consider a project's susceptibility to climate change, sea level rise and saltwater intrusion, in terms of availability and water quality, in analysis.
  - Consider power use/carbon footprint and cost in decision-making.
  - Current and future regulations for Per- and polyfluoroalkyl substances (PFAS, [forever chemicals]), pharmaceutical/personal care products and other emerging contaminants should be incorporated into project evaluations and planning, both short-term and long-term.
  - Data collection, testing, analyzing and communication over time, long-term, for all source options is important; modify approach in response to what we learn; need holistic perception of the public for all sources.
  - Potable reuse, and all potential sources, need to stay part of the LTMWP due to uncertainty in the future.
  - Protecting the environment is important; project selection should contemplate impacts on resources, including rivers, lakes, wetlands, the aquifer and more.
  - Better communication is needed for the current tap water supply, which some residents feel is not safe. Customers need more information to understand their water systems and water quality. Consider apps or dashboards that make this information more accessible/understandable.
  - Developmental alternatives should be funded and research started sooner rather than later to ensure longer term data collection and to begin and maintain transparent dialogue with stakeholders.

- **Desalination & Brackish Water Supplies**
  - Reliability and resiliency with respect to sea level rise, algae blooms and other chemicals that could be released into Tampa Bay.
  - Cost in terms of dollars and power consumption/carbon footprint are concerns.
  - Waste disposal is a concern.

- **Surface Water Supplies**
  - Ecological and environmental impacts should be considered.
  - Changes in weather patterns/precipitation should be taken into consideration.
  - Consider tracking how land use changes could affect water quality.

- **Fresh Groundwater & Other Supplies**
  - Any new wellfield should be part of Tampa Bay Water's rotational scheme to avoid impacts.

  - Don't give away any gains made in the environmental recovery effort at the Consolidated Permit wellfields.

- **Potable Reuse/Developmental Alternatives**
  - Safeguards are needed to protect the aquifer before reclaimed water is stored there (safeguards before injection versus monitoring); also need to understand the effects on other permit holders and sinkhole formation.
  - Need to understand the capacity of the aquifer to store reclaimed water.
  - Safety of drinking water is a priority; customers need to know that it is safe to drink.
  - Need data on what contaminants are in wastewater, not just human waste, but also industrial waste. Need to understand and search for what's in it now and whether the treatment process will address it.
  - Public opinion needs to be part of the data collected for this source. Singapore had five years of study with a focus on water quality and transparency with the public. They posted data on a public dashboard that was an important community tool.
  - Need to continue monitoring and sharing results even if the result is no-detect or zero.
  - Accessibility shouldn't be limited to online, as some stakeholders may never access that information. Trusted influential sources are important to helping reach these stakeholders.
  - Messaging about potable reuse is important. Consider messages explaining that reuse would be a small percentage of the overall water supply, reliability and sustainability.
  - Need to expand access to non-potable reclaimed for lawn watering to reduce demand.
  - Reverse osmosis (RO) treatment should be part of any reclaimed option, but disposal of RO concentrate needs to be addressed.

10.2.4 Focus Group Research

On March 22 and 23, 2023, Downs & St. Germain Research conducted focus groups comprising water customers from:

- Pinellas County residents (including St. Petersburg)
- Pasco County residents (including New Port Richey)
- Hillsborough County residents (including Tampa)
- Hispanic/Latino residents from all Member Governments
- African American residents from all Member Governments

The focus group goals were to understand:

- Perceived safety of each source under consideration.
- Whether each participant would be willing to drink water from a particular source if it had been cleaned to drinking water standards.
- What additional information would be needed to allay water customer concerns for those sources they currently deemed as unsafe or questionable?

Figure 10-3 African American residents from Tampa Bay Water's Member Governments share their opinions during a focus group

The full focus group report can be found in **Appendix K**. The following are key findings from this qualitative research:

- Participants viewed water from the Floridan Aquifer, lakes and rivers as the safest sources for drinking. Desalination was also generally viewed as acceptable, however, participants expressed concern for contaminants in Tampa Bay (chemicals, oil spills, red tide, etc.)
- The majority of participants expressed a strong negative reaction to the idea of drinking reclaimed water, expressing skepticism that it can ever be made clean enough for consumption.
- Most focus group participants were skeptical of tap water quality. While they expressed interest in water quality information, the majority have not sought out information on their own.
- Participants displayed a marked lack of trust in external sources when gauging the safety of drinking water. They stated that they prefer to rely on their own senses to assess quality and potential risk.
- The primary concern for participants was determining the standards of cleanliness that should be expected for different sources of water. Many participants expressed confusion about what level of cleanliness was acceptable and desired. Overall, participants were unsure about the standards currently in place, whether the standards were the same for all sources, and expressed a desire for greater clarity.

10.2.5 Speakers Bureau

In 2023, Tampa Bay Water's speaker's bureau focused primarily on the LTMWP. To educate and inform audience members, the project team developed two PowerPoints (one long and one short) that highlighted the long-term planning process, long-term demand and discussed potential new sources to meet those needs (**Appendix K**). After each presentation, staff answered questions from attendees and kept a record of questions asked and input received (**Appendix K**).

10.2.6 Telephone Town Hall Meeting

In an effort to reach general residents in Tampa Bay Water's service area, the project team held a telephone town hall meeting with a Zoom simulcast on Sept. 14, 2023. The meeting was promoted via emails to 42 area chambers of commerce, homeowners' associations, and community development districts; Tampa Bay Water social media posts (Facebook, Twitter and LinkedIn); news release on Tampa Bay Water's web site and during speakers' bureau presentations. More than 17,000 outbound calls to residents were made to solicit participation on the night of the meeting. The telephone town hall was interactive, with staff presenting on the planning process and projects by source, followed by a live question-and-answer session. An average of approximately 1,500 residents stayed on the call for 10 minutes, and approximately 150 residents stayed on the call for the duration of the meeting. The full report from the telephone town hall meetings is available in **Appendix K**.

10.3 Findings and Implications with Respect to Potential New Sources

The LTMWP public engagement effort provided valuable insights for the project team and Tampa Bay Water. The totality of input received is presented to help inform Tampa Bay Water's board of directors as it selects projects for further evaluation and possible implementation. The input was also factored into the project scoring with existing sources ranked higher than new alternative sources from a public acceptance perspective. Key findings include:

- Stakeholders are tuned in to water crises that have occurred in Florida (algae blooms, Piney Point, wastewater spills) and across the country (Philadelphia chemical spill; Flint, Michigan). This top-of-mind awareness informs stakeholder concerns for existing and new sources alike.
- Quality of the existing supply continues to be a concern among residents. Just over half of residents (53%) drink household tap water, down 3% from 2018. Those who do not drink tap water cite taste, appearance, quality when compared to bottled, smell and safety as reasons why they do not. Waning confidence in the current water supply will complicate public acceptance of an alternative supply that has more complex water quality concerns than the existing sources.
- Protecting the environment is a priority for residents. Stakeholders in all forums expressed concern about any activity that could harm the aquifer, lakes, wetlands, rivers or springs.
- There is an opportunity to help inform and educate stakeholders through clear, consistent, easily accessible information on water supply sources, the wholesale water supply system, local utility water supply systems, water quality standards and how the current water supplies compare to those standards.
    - Transparency is key with this effort; it should go beyond the existing consumer confidence reports, which were largely unknown and unread by focus group participants.
    - Stakeholders in the ad-hoc committees and focus groups discussed online dashboards with easy-to-understand infographics, live data, emails with links when new information is available.
    - An online dashboard could also be used to share data and pilot information on developmental alternatives.
    - Efforts will be needed to provide information to those who lack internet access or who need assistance accessing the information.
- Government trust plays a role in public acceptance. Participation or confirmation from independent third parties, like universities or the Department of Health, can bolster public trust and support.
- Given the concern for water quality and uncertainty about standards, it is not surprising that residents favor existing sources (groundwater, river water and desalinated seawater)

over reclaimed water. Health and safety are the top concerns cited by residents for reclaimed water.

- Conservation and growth are also factors that residents cite when discussing the need for new water supplies. Reducing demand and eliminating waste is important to residents. Residents want to know that the resource is being used wisely and efficiently and see conservation as an important step before new supplies are built.

All of the input received for this LTMWP update will be used to tailor scopes of work for the next phase of project development for those selected by the Board in November 2023. Input will also be used to develop key messages, educational elements, outreach programs and more to ensure residents are fully informed and engaged as the projects move through final design. Input gathered in the next phase will be presented to Tampa Bay Water's board of directors to inform its decision in selecting the next water supply for the Tampa Bay region.

11.0 Overview of Short-Listed Concepts and Recommended Feasibility Studies

A short-list of seven water supply project concepts have been recommended for inclusion in the upcoming feasibility study phase of the long-term master water planning process, as described in **Section 7** of this report. These seven short-listed concepts represent the top-ranked options for consideration as the next water supply projects to be implemented by year 2033 to meet the growing water demands in the region. Prior to being considered for selection as a future water supply project, the short-listed concepts will undergo further development and evaluations as part of the feasibility study phase. This section of the report provides additional details regarding the seven short-listed water supply project concepts and describes the proposed focus areas and goals of the feasibility studies recommended to further develop and evaluate each short-listed concept.

11.1 Summary of Short-listed Project Concepts

An overview of the proposed short-listed project concepts including annual average yield (AAY) and cost estimates is presented in **Table 11-1**.

The cost estimates presented for each short-listed water supply project concept are based on the approach and assumptions listed below.

- Total Capital Cost estimates are calculated by first developing a project Construction Cost Subtotal that considers the primary infrastructure components and land acquisition required for the project; and then applying the following factors to the Construction Cost Subtotal to calculate the Total Capital Cost estimate for the project concept:
    - Project Contingency: 30%
    - Contractor Overhead and Profit: 20%
    - Escalation to Mid-Point of Construction (2031): Based on 4% annual inflation rate through year 2031
    - Engineering, Legal, and Administrative Costs: 25%
    - Owner’s Allowance Budget: 10%

- Annual O&M Cost estimates include energy, chemicals, labor, and other costs associated with the operations and maintenance of the infrastructure and facilities associated with the production of the additional potable water supply provided by the project concept.

- Life Cycle Costs for each project concept are calculated based on considering the Annual O&M Costs, the Total Capital Costs and financing costs (based on an interest rate of 5% over a 30-year term). The Life Cycle Costs consider the estimated annual average potable water supply yield for each project concept and are presented in a $/1,000-gallon unit cost for comparison purposes.

Detailed breakdowns of the cost estimate for each short-listed project concept are presented in **Appendix L.**

Table 11-1 Overview of Short-listed Project Concepts

Project		Previous Concept Number	Source Water	Annual Average Finished Water Yield[1]	Capital Cost ($M)	Life Cycle Cost[2] ($/1,000 gallons)
A	Eastern Pasco County Wellfield	10	Fresh Groundwater and Brackish Groundwater	9 mgd (range: 3 to 17 mgd)[3]	$373	• $8.33
B	Consolidated Water Use Permit (CWUP) Increase	14a	Fresh Groundwater	10 mgd (range: 5 to 20 mgd)	$0	$0.50
C	North Pinellas County SWTP and Reservoir	6	Lake Tarpon Discharge Canal and other tributaries	4.5 mgd (range: 3 to 9.5 mgd)	$249	$10.92
D	Desalination Plant Expansion	4	Seawater	10 mgd (range: 10 to 12 mgd)	$624	$13.17
		5b	Brackish Groundwater	11.5 mgd (range: 5.5 to 11.5 mgd)	$583	$11.99
E	SWTP at Regional Reservoir via Alafia Withdrawals	8	Alafia River	6 mgd (range: 2.5 to 8.5 mgd)	$129	$4.47
F	South Hillsborough SWTP and Reservoir	9	Little Manatee River, Bullfrog Creek	4 mgd (range: 1 to 16.5 mgd)	$253	$12.61
G	South Hillsborough Wellfield via Aquifer Recharge	16b	Fresh Groundwater via Recharge Credits	6 mgd (range: 3 to 9 mgd)	$114	$3.83

1. *The finished water annual average yield is the basis of the reported cost estimates, and the estimated yield range is included in parentheses. Yield will be confirmed in the feasibility phase.*
2. *Life cycle costs includes Capital, O&M and financing at an interest rate of 5% over a 30-year term.*
3. *Estimated finished annual average yield is representative of combined fresh and brackish wellfields.*

11.2 Eastern Pasco County Wellfield

The Eastern Pasco Wellfield project would withdraw and treat brackish and/or fresh groundwater from a newly constructed wellfield and groundwater treatment plant in Pasco County. Two general locations for the wellfield and groundwater treatment plant are preliminarily being considered: the greater Zephyrhills area of Pasco County and west of I-75 in the northern portion of Pasco County. The fresh groundwater wells would pump water from the upper portion of the Lower Floridan Aquifer (LFA) (approximately 700 feet below surface) and the brackish wells would pump from the middle portion of the LFA (approximately 1,500 feet below surface). The brackish wells are anticipated to contain a total dissolved solids (TDS) up to 10,000 milligrams per liter (mg/L) which would require a reverse osmosis (RO) treatment process. The freshwater would be treated using ozone. The estimated finished water annual average yield of 3 to 17 mgd would tie into the existing Tampa Bay Water Regional System at the Cypress Bridge Transmission Main. A preliminary site map of this project is presented in **Figure 11-1**.

The potential for obtaining and transferring existing groundwater withdrawal permits in eastern Pasco County from current permit holders to Tampa Bay Water could also be considered opportunistically based on proximity of the existing wells and the final wellfield location to add to the capacity of this water supply concept. To date, one existing water use permit holder in northeast Pasco County has been identified for a potential transfer of an existing groundwater withdrawal permit with an annual average quantity limit of 3.5 mgd.

11.2.1 Major Components

The major infrastructure components for the Eastern Pasco Wellfield project are outlined below, with three scenarios identified. It is assumed that the fresh and brackish water wellfields would have separate wellfield collection piping systems but could be located in close proximity to each other. Location and wellfield layout plans will be further developed as part of the feasibility study.

- Combined Brackish and Fresh Groundwater Wellfields and Treatment Plants
  - Brackish wellfield with six production wells and 2-mile, 24-inch diameter raw water supply pipeline
  - Freshwater wellfield with four production wells and 3.5-mile, 16-inch diameter raw water supply pipeline
  - Brackish groundwater treatment facility including RO treatment trains
  - Deep injection well for concentrate disposal located at the proposed treatment facility
  - Fresh groundwater treatment plant including ozone treatment for hydrogen sulfide removal for fresh groundwater supply
  - Finished water storage tank
  - Finished water pump station
  - 13-mile, 30-inch diameter transmission pipeline to the Cypress Bridge Transmission Main
- Brackish Groundwater Wellfield and Treatment Plant
  - Brackish wellfield comprised of six production wells and 2-mile, 24-inch diameter raw water supply pipeline to treatment plant.
  - Brackish groundwater treatment plant including RO treatment trains
  - Deep injection well for concentrate disposal located at the proposed RO treatment facility

  - Finished water storage tank
  - Finished water pump station
  - 13-mile, 24-inch diameter transmission main to the Cypress Bridge Transmission Main
- Fresh Groundwater Wellfield and Treatment Plant
  - Freshwater wellfield comprised of four production wells and 3.5-mile, 16-inch diameter raw water supply pipeline to treatment plant
  - Groundwater treatment plant including ozone treatment for hydrogen sulfide removal
  - Finished water storage tank
  - Finished water pump station
  - 13-mile, 16-inch diameter transmission main to the Cypress Bridge Transmission Main

11.2.2 Special Considerations

  - None

11.2.3 Cost Estimate and Annual Average Yield

Cost estimates and annual average yield for potable water supply are included below for each of the three scenarios considered: combined brackish and freshwater wellfield; a brackish water only wellfield; and freshwater only wellfield.

Table 11-2 Eastern Pasco Combined Brackish and Fresh Groundwater Wellfields

SUMMARY	ESTIMATED VALUES
Total Capital Cost	$373,025,000
Annual Operation and Maintenance Cost	$2,461,000
Total Life Cycle Project Cost per 1,000 Gallons	$8.33
Annual Average Yield – Finished Water Supply	9 mgd

Table 11-3 Eastern Pasco Brackish or Fresh Groundwater Only Wellfields

SUMMARY	ESTIMATED VALUES	
	Brackish Water Only	Freshwater Only
Total Capital Cost	$296,271,000	$169,898,000
Annual Operation and Maintenance Cost	$1,756,000	$991,000
Total Life Cycle Project Cost per 1,000 Gallons	$11.01	$8.25
Annual Average Yield – Finished Water Supply	5 mgd	4 mgd

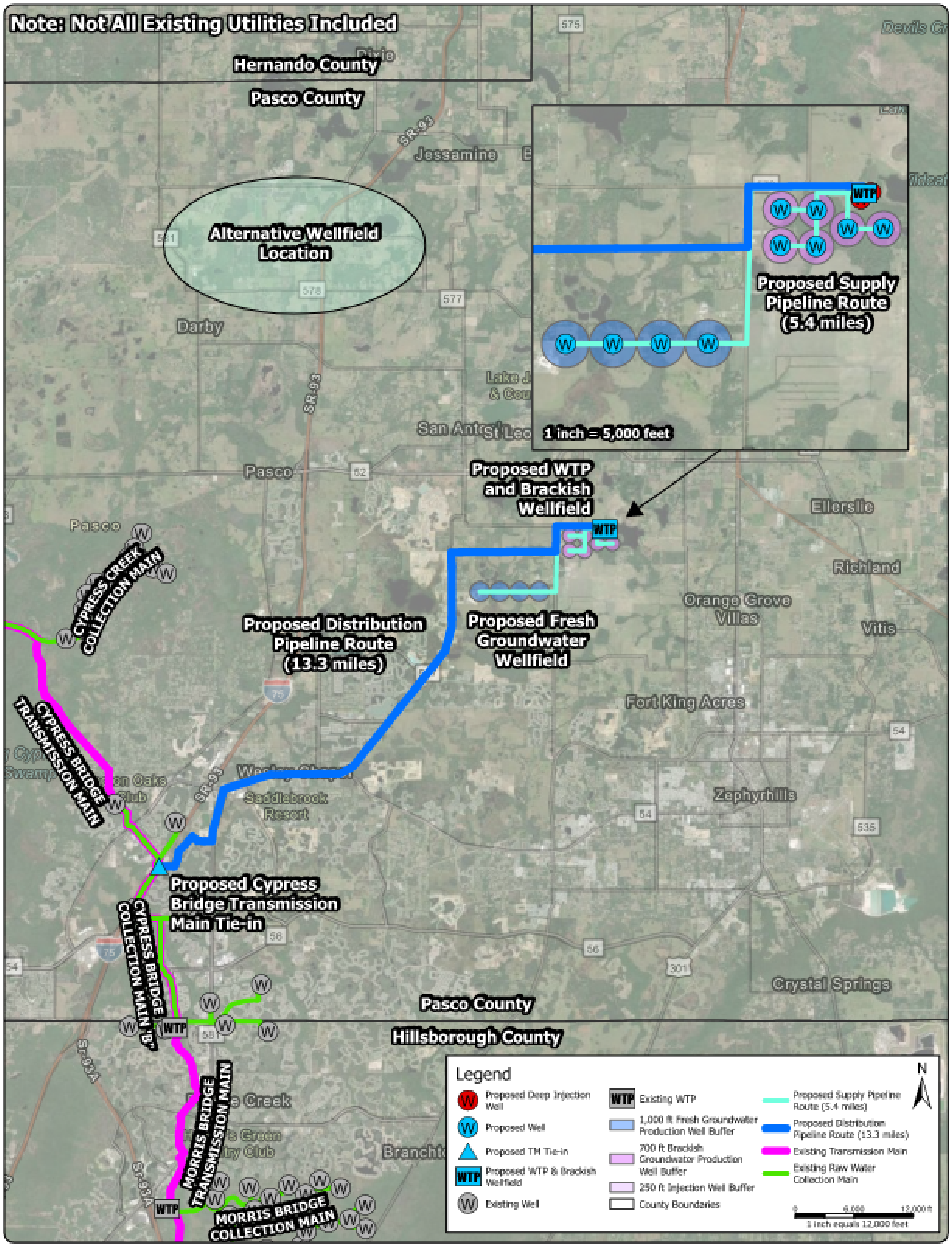

Figure 11-1 Eastern Pasco County Wellfield Location

11.3 Consolidated Water Use Permit Increase

The Consolidated Water Use Permit (CWUP) Increase project would increase the permitted withdrawal quantity associated with Tampa Bay Water's existing CWUP based on providing evidence that a higher permitted withdrawal rate could be achieved without negatively impacting the environmental recovery that occurred due to the CWUP withdrawal rate reduction from 158 mgd to 90 mgd. The fresh groundwater would be withdrawn from existing wellfields and treated at existing groundwater treatment facilities to provide an estimated 5 to 20 mgd increase in annual average yield.

11.3.1 Major Components

Improvements to the existing groundwater treatment systems may be constructed if deemed necessary to maximize rotational capacity of the ten existing wellfields that are part of the CWUP. No additional water transmission infrastructure is anticipated.

11.3.2 Special Considerations

- None

11.3.3 Cost Estimate and Annual Average Yield

Table 11-4 CWUP Increase

SUMMARY	ESTIMATED VALUES
Total Capital Cost	$0
Annual Operation and Maintenance Cost	$1,838,000
Total Life Cycle Project Cost per 1,000 Gallons	$0.50
Annual Average Yield – Finished Water Supply	10 mgd

11.4 North Pinellas Surface Water Treatment Plant & Reservoir

The North Pinellas Surface Water Treatment (SWTP) Plant and Reservoir project consists of harvesting excess surface water from the Lake Tarpon outfall canal along with other potential sources including Chesnut Park, Canal Park, East Lake, Channel "A", and Brushy Creek with the supply stored in an 800-million gallon (MG) reservoir and treated at a new SWTP in North Pinellas County. The estimated finished water annual average yield of 3 to 9.5 mgd would tie into the existing Tampa Bay Water regional system near the northern end of the Keller Transmission Main.

11.4.1 Major Components

The major infrastructure components for the North Pinellas SWTP and Reservoir project are outlined below with a preliminary site map presented in **Figure 11-2**.

- Surface water intake and pump station
- 9-mile, 20-inch diameter raw water pipeline to raw water reservoir
- 800-million-gallon raw water reservoir
- Surface water treatment facility including biologically active filtration and ozone treatment
- Finished water storage tank
- Finished water pump station
- 0.1-mile, 20-inch diameter transmission main to the Keller Transmission Main

11.4.2 Special Considerations

- None

11.4.3 Cost Estimate and Annual Average Yield

Table 11-5 North Pinellas SWTP & Reservoir

SUMMARY	ESTIMATED VALUES
Total Capital Cost	$248,888,000
Annual Operation and Maintenance Cost	$1,417,000
Total Life Cycle Project Cost per 1,000 Gallons	$10.92
Annual Average Yield – Finished Water Supply	4.5 mgd

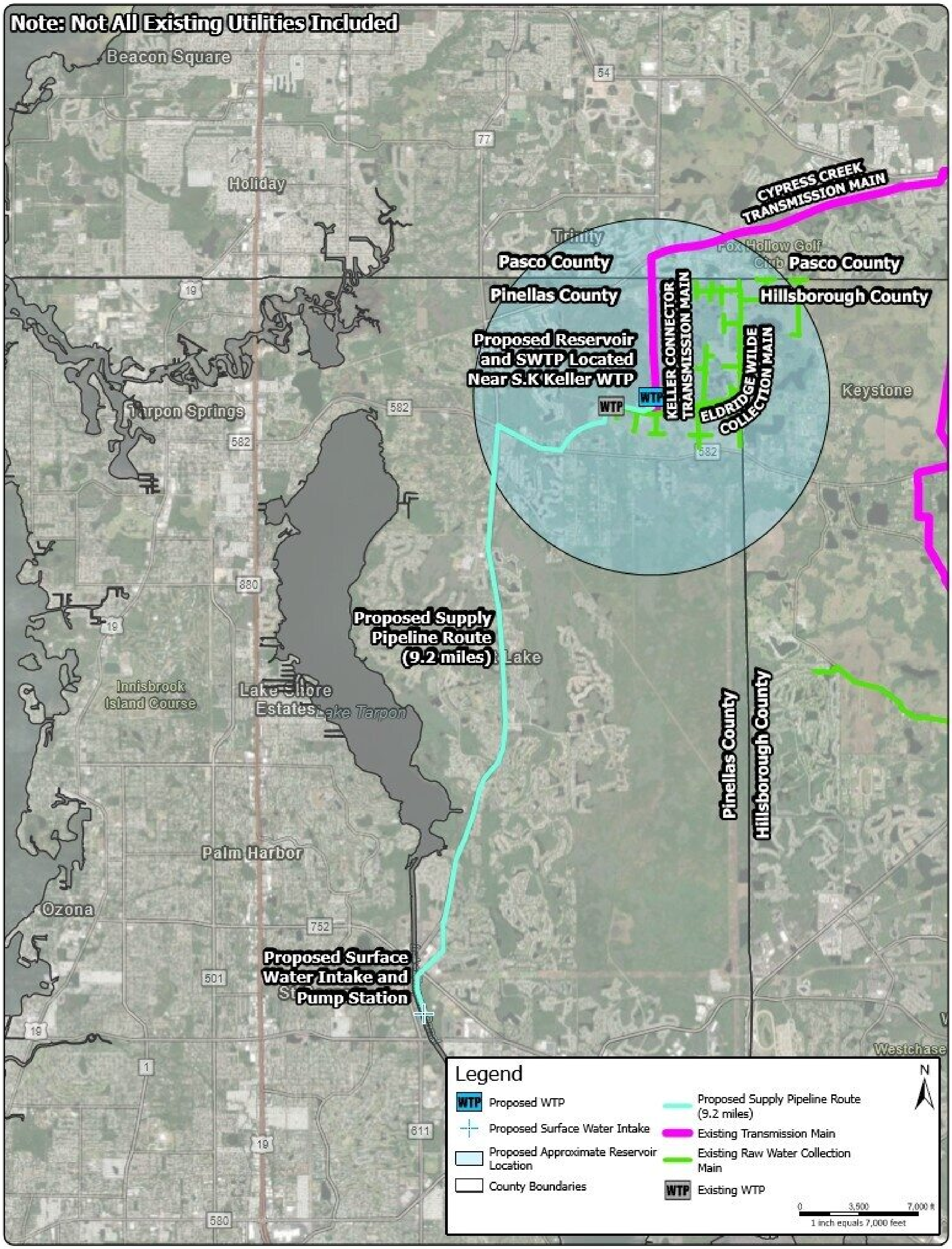

Figure 11-2 North Pinellas SWTP & Reservoir Location

11.5 Desalination Plant Expansion

Due to site constraints, the Desalination Plant Expansion project would expand the existing desalination plant with either additional seawater or brackish groundwater and not both sources. An expansion with seawater would consist of upgrades to the existing infrastructure to add an additional 10 to 12 mgd to the finished water annual average yield. An expansion with brackish water would consist of constructing a new wellfield, sited off Big Bend Road, to withdraw supply from the lower portion of the Upper Floridan Aquifer. The brackish water supply would be blended with the pretreated seawater and treated through the expanded, existing infrastructure to increase the finished water annual average yield by 5.5 to 12 mgd.

It is recommended to conduct a feasibility study on the brackish groundwater option only as a feasibility study regarding the expansion with seawater has already been conducted. It is anticipated that only revision of the cost estimates will be necessary for the previously completed feasibility study.

11.5.1 Major Components

The major infrastructure components for the Desalination Plant Expansion are outlined below, with both scenarios identified. A preliminary site map for the brackish groundwater option is presented in **Figure 11-3**.

- Desalination Plant Expansion with Seawater Supply
  - Seawater intake pumps and pipeline
  - Expansion/modifications to the existing pretreatment and chemical facilities
  - Additional RO treatment trains
  - Deep injection well for concentrate disposal
  - Booster station for transmission of finished water to the Regional High Service Pump Station
- Desalination Plant Expansion with Brackish Supply
  - Twenty-four well wellfield and 11-mile, 36-inch diameter raw water supply pipeline
  - Expansion/modifications to the existing pretreatment and chemical facilities
  - Additional RO treatment trains
  - Deep injection well for concentrate disposal
  - Booster station for transmission of finished water to the Regional High Service Pump Station

11.5.2 Special Considerations

A feasibility study (Tampa Bay Water Desalination Plant Expansion Feasibility Study) was previously completed in 2022 for the expansion with seawater.

11.5.3 Cost Estimate and Annual Average Yield

Table 11-6 Cost Estimate – Desalination Plant Expansion with Seawater Supply

SUMMARY	ESTIMATED VALUES
Total Capital Cost	$623,545,000
Annual Operation and Maintenance Cost	$17,602,000
Total Life Cycle Project Cost per 1,000 Gallons	$13.17
Annual Average Yield – Finished Water Supply	10 mgd

Table 11-7 Cost Estimate – Desalination Plant Expansion with Brackish Supply

SUMMARY	ESTIMATED VALUES
Total Capital Cost	$582,896,000
Annual Operation and Maintenance Cost	$16,073,000
Total Life Cycle Project Cost per 1,000 Gallons	$11.99
Annual Average Yield – Finished Water Supply	11.5 mgd

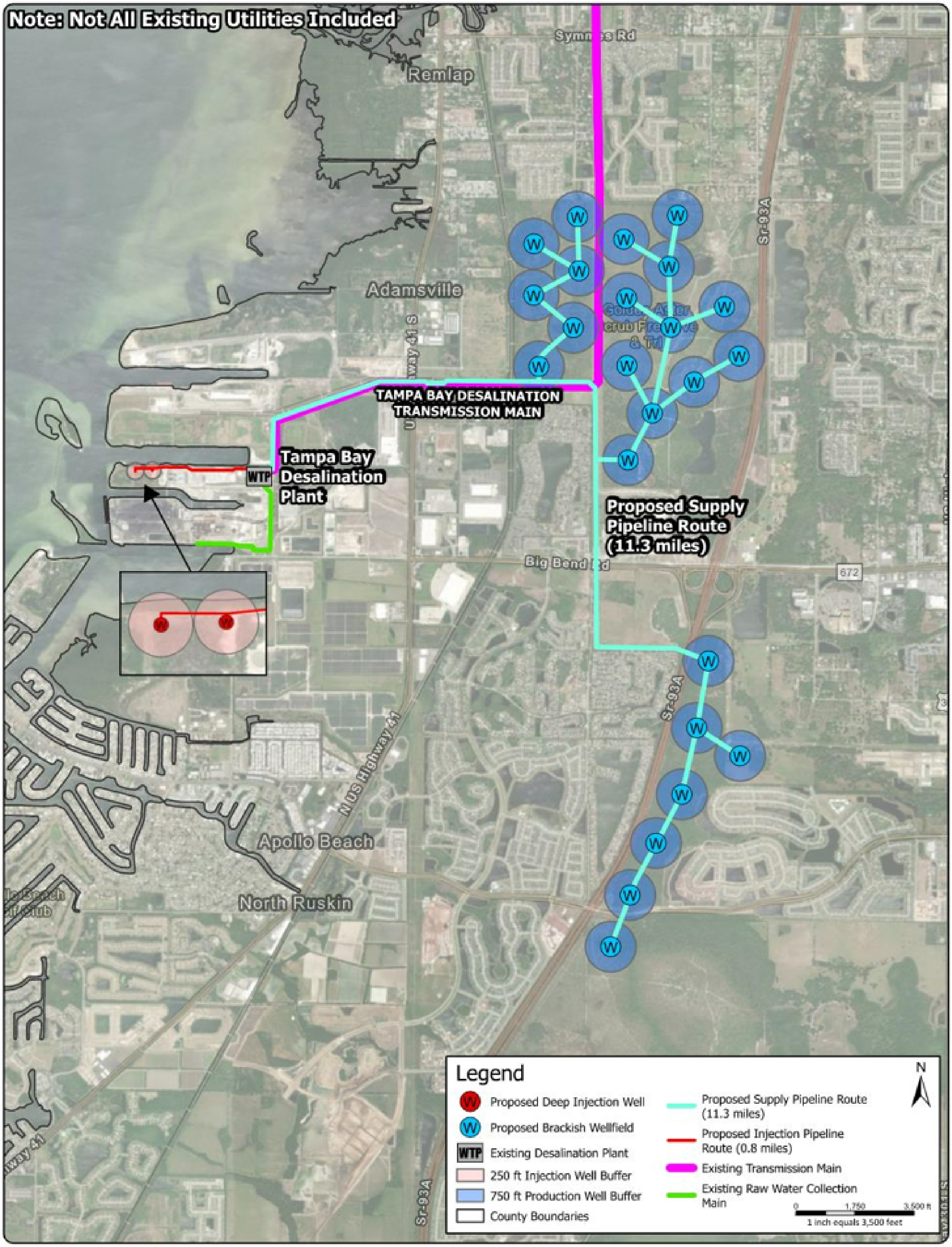

Figure 11-3 Desalination Plant Expansion with Brackish Water Location

11.6 Surface Water Treatment Plant at Regional Reservoir via Alafia Withdrawals

A SWTP at the Regional Reservoir via Alafia Withdrawals would include modifying the existing water use permit to increase the allowable mid to high range withdrawals from the Alafia River that would be treated at a new treatment facility near the existing C.W. Bill Young Regional Reservoir. The additional river withdrawal is estimated to provide a finished water annual average yield of 2.5 to 8.5 mgd that will tie into the South Hillsborough Pipeline and would utilize the existing Enhanced Surface Water System (ESWS) for raw surface water transmission and storage.

11.6.1 Major Components

The major infrastructure components for the SWTP at the Regional Reservoir via Alafia Withdrawals project are outlined below with a preliminary site map presented in **Figure 11-4**.

- Upgraded pumps at the existing intake pump station
- 0.1-mile, 20-inch diameter raw water supply pipeline
- Surface water treatment facility including BAF and ozone treatment
- Finished water storage tank
- Finished water pump station
- 4.5-mile, 20-inch diameter transmission main to the South Hillsborough Pipeline

11.6.2 Special Considerations

The feasibility study should specifically address the need for fluoride treatment. If fluoride treatment is to be included in the implementation of this project upon further investigation, it is estimated that approximately 25% of the plant influent would need to be treated by reverse osmosis. The treatment addition would increase the total project cost per 1,000 gallons by approximately 35%.

11.6.3 Cost Estimate and Annual Average Yield

Table 11-8 SWTP at Regional Reservoir via Alafia Withdrawals

SUMMARY	ESTIMATED VALUES
Total Capital Cost	$128,944,000
Annual Operation and Maintenance Cost	$1,633,000
Total Life Cycle Project Cost per 1,000 Gallons	$4.47
Annual Average Yield – Finished Water Supply	9 mgd

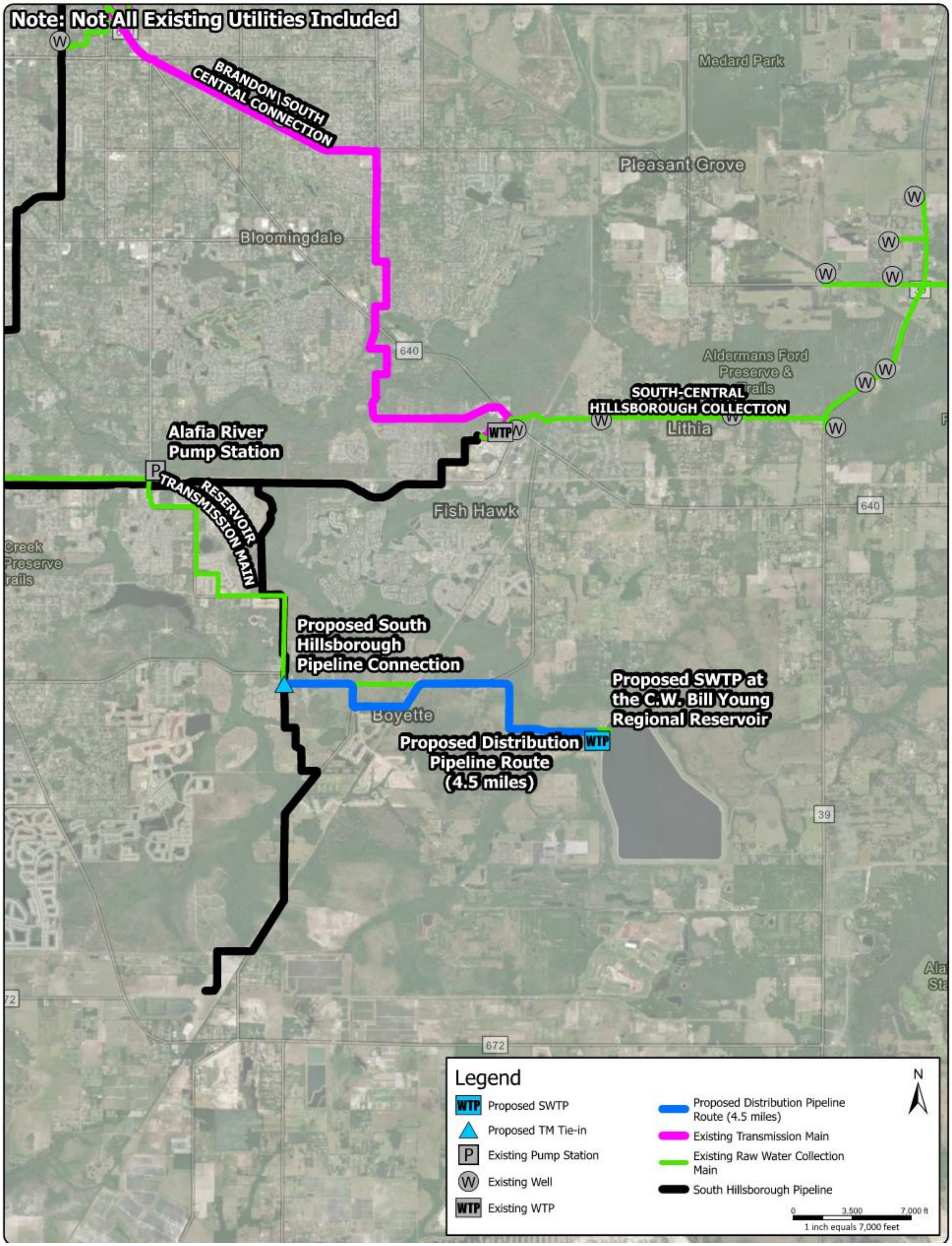

Figure 11-4 SWTP at the Regional Reservoir via Alafia Withdrawals Location

11.7 South Hillsborough Surface Water Treatment Plant & Reservoir

The South Hillsborough SWTP and Reservoir project involves the development of Little Manatee River and Bullfrog Creek as new surface water supplies that would be stored and treated at a newly constructed, 700-MG reservoir and treatment facility. An estimated finished water annual average yield range of 1 to 16.5 mgd would connect into the regional transmission system at the southern end of the proposed new South Hillsborough Pipeline.

11.7.1 Major Components

The major infrastructure components for the South Hillsborough Surface Water Treatment Plant and Reservoir project are outlined below with a preliminary site map presented in **Figure 11-5**.

- Intake pump stations at both Bullfrog Creek and Little Manatee River
- 7-mile, 10-inch diameter raw water supply pipeline from Bullfrog Creek, a 3-mile, 16-inch diameter raw water supply pipeline from Little Manatee River, and a 4-mile, 18-inch diameter combined raw water supply pipeline to the proposed treatment plant
- 700-million-gallon raw water reservoir
- Surface water treatment plant including BAF and ozone treatment
- Finished water storage tank
- Finished water pump station
- 6-mile, 18-inch diameter transmission main to the South Hillsborough Pipeline

11.7.2 Special Considerations

Connection to the existing regional reservoir should be included in the feasibility study, although a cost for that connection is not included in the current cost estimate.

11.7.3 Cost Estimate and Annual Average Yield

Table 11-9 South Hillsborough SWTP & Reservoir

SUMMARY	ESTIMATED VALUES
Total Capital Cost	$252,514,000
Annual Operation and Maintenance Cost	$1,258,000
Total Life Cycle Project Cost per 1,000 Gallons	$12.61
Annual Average Yield – Finished Water Supply	4 mgd

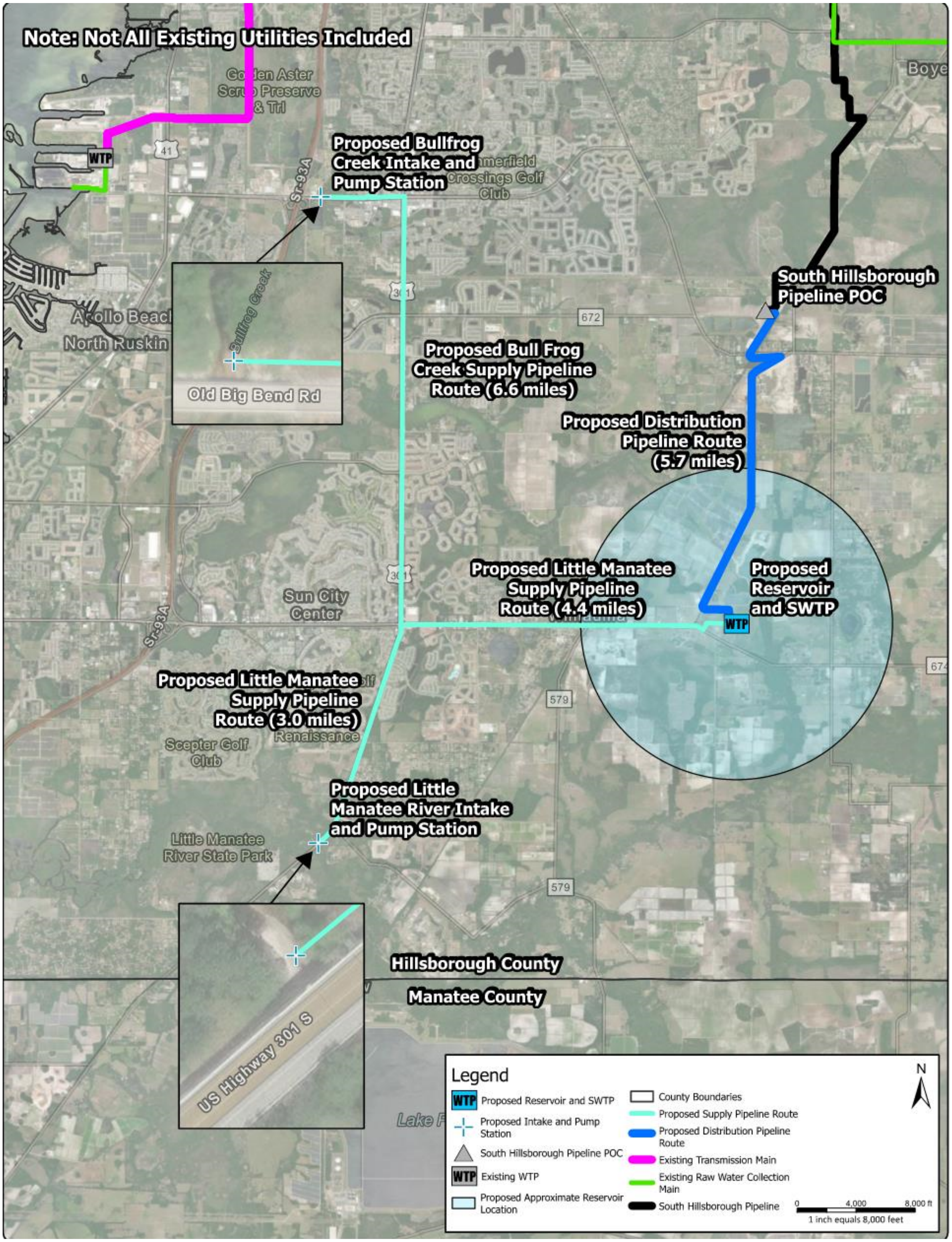

Figure 11-5 South Hillsborough SWTP & Reservoir Location

11.8 South Hillsborough Wellfield via Aquifer Recharge

The South Hillsborough Wellfield via Aquifer Recharge project involves obtaining a Water Use Permit for a new wellfield in southern Hillsborough County based on providing evidence of a net-benefit to the aquifer associated with constructing and operating a reclaimed water aquifer recharge system in southern Hillsborough County to form a salinity barrier. The aquifer recharge system would be used to generate credits to withdraw a certain quantity of fresh groundwater from a new production wellfield located further inland (east) of the aquifer recharge wells. The permitted groundwater withdrawal rate would be lower than the aquifer recharge rate to provide a net-benefit to the aquifer. Reclaimed water from either Hillsborough County or the City of Tampa would be used to generate the credits. The fresh groundwater would be treated at a new treatment plant sited in the same location as the new wellfield with an estimated finished water annual average yield of 3 to 9 mgd delivered at the southern end of the South Hillsborough Pipeline.

It is recommended to use the previous feasibility study for the South Hillsborough Wellfield via Aquifer Recharge project as the South Hillsborough Wellfield via South Hillsborough Aquifer Recharge project Credits Feasibility Study completed in 2022 by WSP USA, Inc. **Figure 11-6** is from this previously completed feasibility study report and shows the proposed locations for the production wells and water treatment plant associated with this project concept.

11.8.1 Major Components

The major infrastructure components for the South Hillsborough Wellfield via Aquifer Recharge project are outlined below with the feasibility study site map presented in **Figure 11-6**.

- Wellfield with eight production wells attached to a 4.1-mile long collection main
- Groundwater treatment plant including ozone treatment
- Finished water storage tank
- Finished water pump station
- 0.1-mile, 20-inch diameter finished water transmission main to the South Hillsborough Pipeline

11.8.2 Special Considerations

The project can be implemented with aquifer recharge with reclaimed water supplied from either Hillsborough County or the City of Tampa. The option of obtaining groundwater withdrawal credits based on Hillsborough County expanding its existing SHARP aquifer recharge system was previously evaluated as part of the 2022 feasibility study. The option of obtaining groundwater withdrawal credits from an aquifer recharge system in South Hillsborough County that uses City of Tampa reclaimed water supply could offer a similar approach but would require further evaluations and coordination, which is not proposed as part of the current 2023 Long-term Master Water Plan Update and subsequent feasibility study program. At this time, it is assumed that the entity providing the reclaimed water supply for the aquifer recharge system would maintain the responsibility for constructing and operating the reclaimed water recharge system to generate the groundwater withdrawal permit for the South Hillsborough Wellfield.

The estimated capital cost and annual O&M costs presented in this report do not include costs for the reclaimed water aquifer recharge system or the purchase of the groundwater withdrawal credits generated from the aquifer recharge system.

11.8.3 Cost Estimate and Annual Average Yield

Table 11-10 South Hillsborough Wellfield via Aquifer Recharge

SUMMARY	ESTIMATED VALUES
Total Capital Cost	$113,337,000
Annual Operation and Maintenance Cost	$1,285,000
Total Life Cycle Project Cost per 1,000 Gallons	$3.83
Annual Average Yield – Finished Water Supply	6 mgd

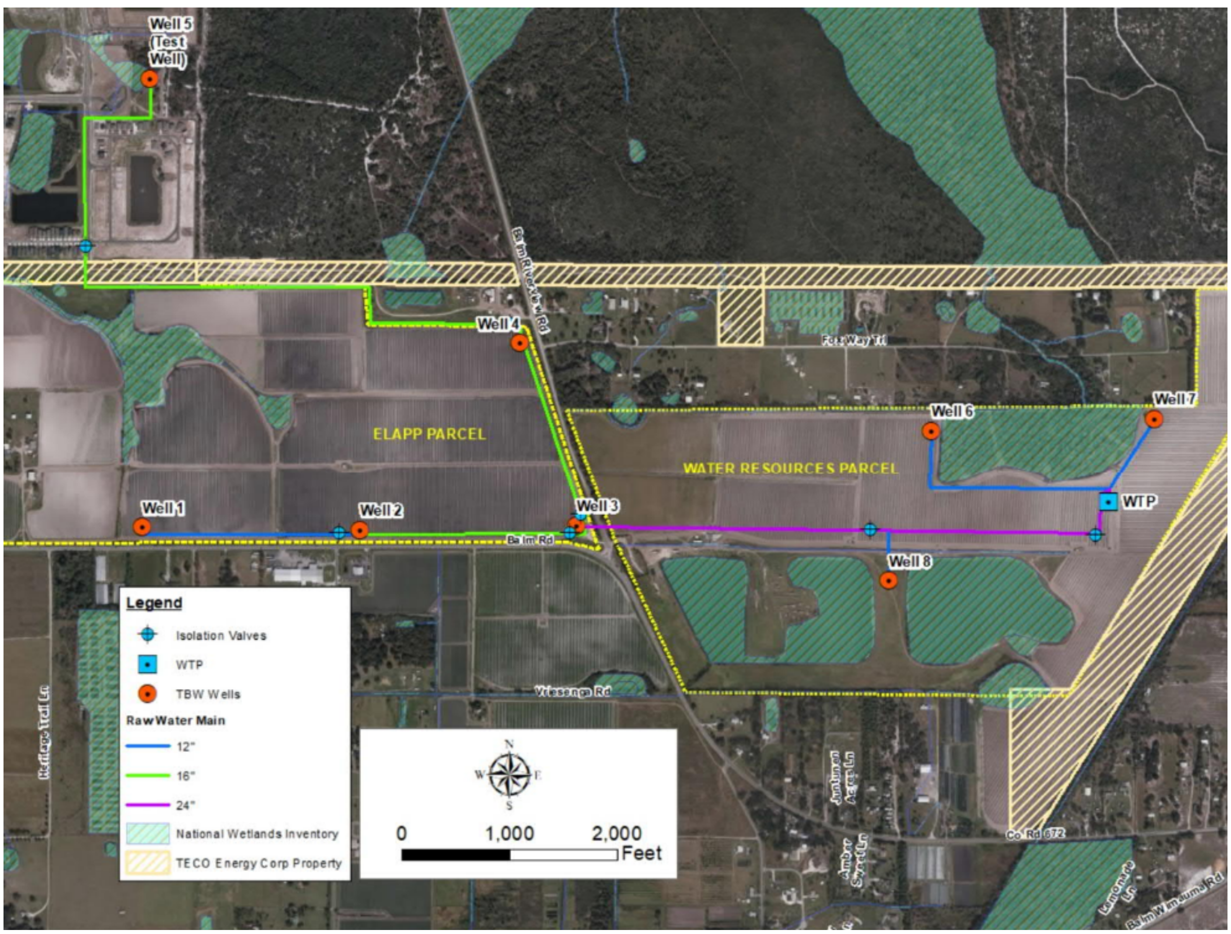

Figure 11-6 South Hillsborough Wellfield via Aquifer Recharge Location

11.9 Feasibility Study Recommendations for Short-Listed Concepts

The Short-List evaluation process provided insight into aspects of each proposed project that require more investigation, testing, or modeling. Additional recommended feasibility components for each proposed project are presented in **Table 11-11**.

Table 11-11 Feasibility Study Recommendations for Short-Listed Water Supply Project Concepts

Short-Listed Project Concept	Feasibility Study Components
A. Eastern Pasco County Wellfield	• Yield and water quality analysis from test wells to investigate the implementation of fresh and/or brackish groundwater wellfields and include constituents related to RO system design as well as emerging contaminants and those with proposed regulations • Conduct RO membrane projections to establish basic RO system design parameters and estimate recovery based on anticipated groundwater quality • Additional groundwater modeling to identify any hydrogeological effects to the surrounding area, including Integrated Northern Tampa Bay (INTB) modeling of the Integrated Hydrologic Model (IHM), System-Wide Reliability Evaluation (SWRE), Optimized Regional Operation Plan (OROP) and the District Wide Regulation Model (DWRM4) model • Pipeline routing study • Siting of the proposed wellfield(s) • Public information/engagement
B. Consolidated Water Use Permit Increase	• Additional groundwater modeling to confirm yield estimates and identify any hydrogeological effects to the surrounding area including INTB and SWRE • Public information/engagement
C. North Pinellas County SWTP and Reservoir	• Available yield analysis including SWRE and INTB modeling • Coordination with Pinellas County to understand their planned withdrawal from Lake Tarpon and impacts to available flow and depth in the discharge canal • Evaluation of Brushy Creek as an additional supply source • Conduct a permitting review related to planned withdrawals and the existing minimum flows and levels (MFL) at Lake Tarpon • Pipeline routing study • Siting of the proposed SWTP and proposed 800-MG reservoir • A preliminary operational & management plan for the reservoir • Public information/engagement
D. Desalination Plant Expansion	• Yield and water quality analysis from one brackish test well to include constituents related to RO system design as well as emerging contaminants and those with proposed regulations • Additional groundwater modeling to confirm yield estimates and identify any hydrogeological effects to the surrounding area, including existing South Hillsborough Aquifer Recharge Project (SHARP) wells, including SWRE • Evaluation of brackish and seawater blending location within the treatment process • Conduct RO membrane projections to establish basic RO system design parameters and estimate recovery based on anticipated groundwater quality

Short-Listed Project Concept	Feasibility Study Components
	• Pilot testing to confirm assumptions for the level of pretreatment required for brackish supplies and assess operational impacts to the SWRO process (RO feed pressure, energy recovery device operations, benefit of alternative membranes) • Pipeline routing study • Siting of the proposed brackish wellfield • Public information/engagement
E. SWTP at Regional Reservoir via Alafia Withdrawals	• Additional hydraulic evaluations at the existing Alafia River pump station to confirm adequacy of existing and upgraded conveyance infrastructure • Available yield analysis including SWRE modeling • Additional reservoir and source water blending analyses to confirm water quality considerations (fluoride, phosphate) and treatment process requirements • Pipeline routing study • Confirm siting of the proposed SWTP referenced in the 2022 feasibility study • Confirm and update cost estimates presented in the 2022 feasibility study • Public information/engagement
F. South Hillsborough SWTP and Reservoir	• Detailed investigation into the connection of the proposed reservoir with the existing C.W. Bill Young Regional Reservoir • Available yield analysis including SWRE modeling • Pipeline routing study • Siting of the proposed SWTP and proposed 700-MG reservoir • A preliminary operational & management plan for the reservoir • Public information/engagement
G. South Hillsborough Wellfield via Aquifer Recharge	• Feasibility study completed in 2022, therefore no additional feasibility studies are required. • Agreement with supplier of reclaimed water/groundwater credits • Permitting requirement of <0.049 feet drawdown impact to Hillsborough River Groundwater Basin • Public information/engagement

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12.0 Developmental Alternatives

Developmental alternatives are water supply options that may require sophisticated technologies, that do not have a current regulatory framework for permitting, or that require more long-term analysis and study. As technology advances and processes develop, the cost of an alternative may decline or permitting uncertainties may be resolved. The original 1998 Long-term Water Master Plan (LTMWP) included three developmental alternatives, seawater desalination, high flow surface water treatment and brackish groundwater, all of which were ultimately developed.

As alternatives were developed and evaluated for the 2023 LTMWP update, and potable reuse was considered as a source, it was determined that potable reuse was a candidate for becoming a Developmental Alternative. Through the supply concept process, four coarse screening options scored highly for environmental sustainability, system integration and expansion potential, yield reliability and Regional System reliability impacts but did not advance to fine screening due to uncertainties related to regulation, permitting, public reception, lifecycle costs and cost risk factors.

While these options did not receive high enough rankings to move forward to fine screening and feasibility assessments, with further development, their viability could increase, making them more feasible for consideration as future water supply options. This is particularly true of the indirect potable reuse (IPR) and direct potable reuse (DPR) concepts. Through further development, many of the uncertainties that resulted in the lower scores may be addressed.

The potable reuse concepts that were included as part of the Coarse Screening Evaluation include the following and are described in more detail in **Appendix G**:

- Concept 5a – Desalination Expansion via Direct Potable Reuse
- Concept 14b – Increase CWUP via Aquifer Recharge
- Concepts 15a, 15b, and 15c – Direct Potable Reuse
- Concept 16c – South Hillsborough Wellfield via Indirect Potable Reuse

These concepts include IPR through aquifer recharge in the vicinity of a wellfield with the intent of augmenting or supplementing the groundwater supply with advanced treated water or DPR by supplementing the existing water treatment plants with advanced treated water. Reclaimed water may be provided from the Hillsborough County South Reclaimed System, Pinellas County South Cross Bayou Advanced Water Reclamation facility or the City of Tampa H.F. Curren Advanced Wastewater Treatment Plant.

The following sections describe each of the constraints and the developmental needs associated with these concepts.

12.1 Regulatory

The Florida Department of Environmental Protection (FDEP) is developing new rules for potable reuse that include revising existing IPR regulations contained in Chapter 62-610, Florida Administrative Code (FAC), Part V – Groundwater Recharge and Indirect Potable Reuse and developing new regulations for DPR in a new Chapter 62-565, FAC Potable Reuse. The timeline for adoption of the revisions and new regulations has not been published but the FDEP has stated that they expect to have the rules adopted before the end of 2024.

Clear regulatory guidance and regulations will allow Tampa Bay Water to fully evaluate the permitting challenges, treatment requirements, and costs for potable reuse; however, because the regulations will be new, it can be expected that there will be some moderate permitting challenges as FDEP begins implementing the new regulations.

12.2 Cost

Due to the robust treatment requirements for potable reuse, the lifecycle costs for those water supply options tend to be on the higher end of the spectrum. On top of that, due to the uncertainty with regulations and source water quality, conservative assumptions were made in the development of cost estimates for the potable reuse concepts. With further development and refinement of the concepts the cost estimates can be updated to provide a better representation of actual costs. These costs would be based on better defined regulatory requirements, an understanding of source water quality, results of pilot testing, aquifer evaluations and other investigations.

12.3 Public Reception

Tampa Bay Water convened separate technical, environmental, and economic ad-hoc committees and five focus groups to obtain input during the development of the 2023 LTMWP update, as discussed in **Section 10**. Each group was asked:

- What concerns do you have about a specific source or project concept?
- What questions need to be answered during the future feasibility study phase or developmental phase to address those concerns?
- What additional data or information is needed to address your concerns and questions in making future conclusions regarding the suitability of different source water options or project concepts?

Further evaluation of the potable reuse concepts provides the opportunity to address some of public concerns with transparent data, answer questions and obtain additional information to respond to the public input. With further public outreach, these concepts could receive a more neutral or positive public reception. Some of the specific concerns regarding potable reuse that were expressed in the ad-hoc meetings and focus groups are summarized in **Table 12-1** below and grouped by common topics.

Table 12-1 Public Reception Questions

Category	Question/Comments
Water Quality	• There is a need to demonstrate that reclaimed water can be cleaned sufficiently to remove all known regulated and unregulated or emerging contaminants of concern to safe levels. • With some treatment processes such as reverse osmosis (RO), beneficial nutrients and minerals may be stripped from the water along with the harmful contaminants. What is being done to make sure the beneficial constituents are in the water? • Can there be better source control to limit the contaminants that get in the wastewater? • Per- and polyfluoroalkyl substances (PFAS) should continue to be incorporated in evaluations and planning (for all concepts, not just potable reuse). • Concerns were expressed about deoxyribonucleic acid (DNA) that may make it through treatment processes as well as antibiotic resistant bacteria and genes, viruses, and pharmaceuticals • There is a general fear of unknown contaminants.
Environmental Concerns	• What safeguards are proposed to ensure treatment requirements are met before treated reclaimed water is injected? • Are measures being taken to ensure that the treated reclaimed water injected is compatible with the ground water quality in the aquifer? • How is concentrate from RO systems being managed? If deep injection wells are used for concentrate/brine disposal, what is being done to ensure there is adequate storage volume in the injection zone?
Availability of Supply	• Has there been coordination with large wastewater utilities regarding availability of supply? • Will reclaimed water still be available for landscape irrigation?
Public Education	• Transparency is important. Data and results need to be shared with the public in a way that is understandable and that reaches a large audience. Some may not have access to or seek information on the internet. • More public education is needed in general about all water supplies in order to understand the need for potable reuse. • It is important to frame the percentage of reclaimed water that will be part of the water supply. The public may not understand that it is blended with groundwater or other sources and may only be a small percentage of the overall supply.
Economics	• Will the potable reuse concepts increase the cost of water to the consumer?

12.4 Developmental Alternatives Approach

To provide more information and address some of the uncertainty associated with the potable reuse concepts, the tasks described in the following sections are proposed. After further development, the concepts can be reassessed to determine if they should be considered as a feasible water supply.

The two steps for the Developmental Alternatives approach for potable reuse are illustrated in **Figure 12-1**. The first step in the approach specific to potable reuse is to answer the questions common to all of the potable reuse concepts. The second step mirrors the more traditional feasibility program where each concept will be evaluated in detail and detailed cost estimates will be prepared.

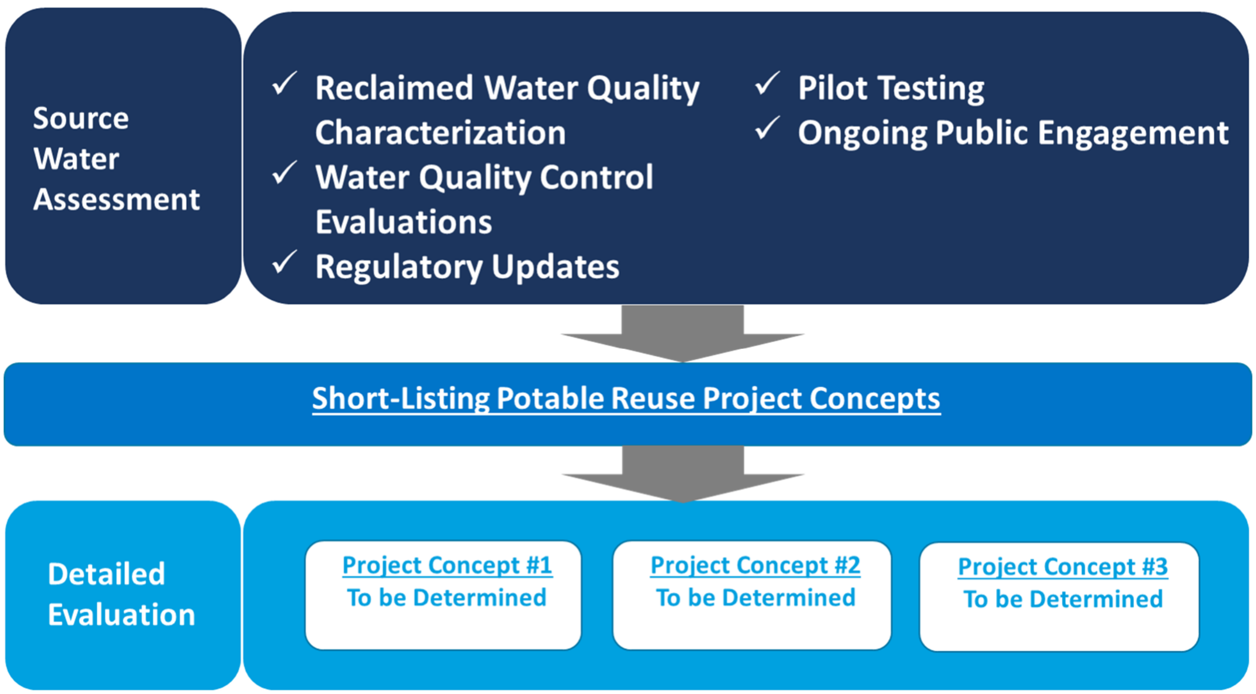


Figure 12-1 Developmental Alternatives Approach for Potable Reuse

12.5 Source Water Assessment

During the first step, Tampa Bay Water will coordinate with each Member Government interested in contributing reclaimed water for potable reuse projects. Much of the assessment below will require close collaboration between Tampa Bay Water and the Member Governments. At the time of this Report, three of the member governments had acknowledged an interest in participating; Hillsborough County, Pinellas County and City of Tampa.

12.5.1 Source Water Evaluation

An important step in implementing potable reuse is characterization of the reclaimed water quality for chemical constituents and pathogens, referred to as source water evaluation or characterization. This characterization is required in selecting appropriate treatment technologies to be used in pilot testing and full-scale operation. Source water evaluation could be implemented by Tampa Bay Water or by the Member Governments supplying the reclaimed water for advanced water treatment.

Source water evaluation is required in the current drafts of the potable reuse rules and will likely be included in the final adopted rules. The draft regulations call for a 12-month source water evaluation of chemicals or constituents that are known or believed to be present based on available data, constituents that have a primary or secondary drinking water standard, and those that may be difficult to remove or are precursors to disinfection byproduct formation.

Pathogen sampling of raw wastewater is also a requirement of the draft regulations. The requirements are for a minimum of 12 samples over a period of at least 12 months to characterize the occurrence of *Giardia lamblia, Cryptosporidium* oocytes, and enteric viruses. Water reclamation facilities with existing non-potable reuse systems may have current requirements for pathogen monitoring and these results can be used to help meet all or part of this sampling requirement as long as the treatment processes at the water reclamation facility have not been modified.

In addition to the pathogen monitoring, a Quantitative Microbial Risk Analysis (QMRA) can be conducted to help identify log reduction requirements for meeting the acute health risk for gastroenteritis for consumers drinking the water to 1 in 10,000 annually. In current drafts of the regulations, QMRA is required for DPR only, but it could be a beneficial analysis for both IPR and DPR to help provide assurance to the public that the treatment will meet stringent pathogen requirements. The QMRA will help define log removal goals for pathogens and in selecting treatment processes to achieve these goals.

Tasks associated with Source Water Evaluation include the following:

- Review existing monitoring data from the water reclamation facilities including annual reuse monitoring and any specialized monitoring of chemicals and pathogens.
- Develop a 12-month sampling plan of chemical constituents of the reclaimed water (the source water) for each water reclamation facility. Additional sampling may be included for raw wastewater entering the water reclamation facility and potentially within the collection system including wholesale contributions to be considered for use in the next task, Enhanced Source Control Evaluation.
- Review existing pathogen monitoring data if available and conduct additional sampling of reclaimed water from each water reclamation facility as needed for any data gaps.
- Conduct a QMRA for each water reclamation facility.
- Provide a summary of sampling results that can be used in pilot testing to help identify target pathogens and chemical surrogates.

12.5.2 Enhanced Source Control Evaluation

The purpose of an enhanced source control program is to identify constituents that may enter a wastewater collection system and could pass through or disrupt treatment processes. Industrial pretreatment programs (IPPs) that are based on identifying and monitoring specific categorical users as outlined in Chapter 62-625, FAC, are required for many existing non-potable reuse programs and are also listed as a requirement in the draft potable reuse regulations. It is likely that each of the water reclamation facilities being considered for the potable reuse concepts has an existing IPP.

For DPR systems, additional requirements for a comprehensive IPP source control program are required. The additional requirements include a source investigation which includes an environmental fate and transport assessment for chemical constituents beyond those listed as categorical users that could impact or pass through a treatment system.

Tasks for an enhanced source control evaluation would include the following:

- Review existing IPPs for each water reclamation facility and listed categorical users.
- Review data from source water evaluations to identify potential constituents of concern.
- Evaluate collection system monitoring data from the source water evaluations to better identify potential sources of specific parameters of concern.
- Identify other dischargers of interest using the FDEP Division of Waste Management Compliance and Enforcement Tracking of Hazardous Waste protocol.
- Recommend parameters for additional source control.
- Identify framework for outreach programs to industrial and residential users.
- Prepare an Enhanced Source Control plan.

12.5.3 Regulatory Update and Summary

This task involves providing a review of the proposed draft regulations for potable reuse once the regulations have been finalized. The review will include identification of specific considerations for implementing the potable reuse concepts. Task items are summarized below:

- Provide review and written comments on draft regulations prior to adoption by FDEP.
- Identify specific considerations in the draft regulations that could impact the implementation of the potable reuse concepts.
- Meet with FDEP if needed to discuss any specific implications or concerns with proposed regulations.
- Produce a memorandum summarizing permit requirements for the potable reuse concepts based on the adopted regulations.

12.5.4 Pilot Testing

Pilot testing is proposed to be required of all potable reuse facilities to provide an affirmative demonstration that finished water will be of sufficient quality to protect public health and environmental quality and that the proposed treatment and disinfection processes in the potable reuse system are capable of meeting the treatment and disinfection requirements contained in the rules. Pilot testing can accomplish additional goals in addressing uncertainty of the potable reuse concepts. Pilot testing can:

- Evaluate treatment technologies to meet specific treatment goals and limits and provide assurance to the public that the water is safe.
- Provide the ability to test "what ifs" and conduct special evaluations of parameters or pathogens of concern.
- Provide educational opportunities through site visits and tours to give the public a better understanding of the treatment technologies.
- Meet permitting requirements for potable reuse implementation.
- Provide additional data to refine cost estimates.

Pilot testing requirements are outlined in the draft revisions to Chapter 62-610, FAC and the new draft Chapter 62-565, FAC. A pilot testing plan of study is required to be approved by FDEP before pilot testing commences. One year of pilot testing is required, but the length can be reduced under certain circumstances and particularly if the treatment technologies have previously been tested at other water reclamation facilities on reclaimed water with similar water quality.

As currently written, the draft regulations require pilot testing of reclaimed water from each water reclamation facility that is being considered for potable reuse, although some utilities that are looking at multiple potable reuse facilities at different water reclamation facilities in their service area are working with FDEP so that multiple pilot tests will not be required.

The plan of study for pilot testing must:

- Include results of the source water evaluation.
- Identify and establish treatment and disinfection processes.
- Identify proposed treatment processes to meet reclaimed water limitations.
- Identify and evaluate emerging constituents and surrogates in the reclaimed water and removal by the proposed treatment processes based on the results of the source water evaluation.
- Identify and evaluate reducing target pathogens and surrogates from the treatment processes.
- Identify mechanisms of pathogen removal by treatment processes.
- Evaluate how the treatment processes will achieve primary and secondary drinking water standards.
- Identify and evaluate challenges related to treatment processes.
- Identify operational monitoring parameters to measure performance.
- Identify critical control points.
- Identify proper means of stabilization and remineralization of the finished water to make it safe for human consumption or aquifer recharge.
- Evaluate and estimate the cost of operation and maintenance and conceptual site plan.
- Describe the monitoring and reporting requirements for the pilot program.

Tasks for pilot testing would include the following:

- Meet with FDEP to discuss a plan of study. With the potential for three water reclamation facilities being considered in the Tampa Bay Water area, options for testing at one facility or using a mobile pilot system that can be used for testing at each facility can be considered.
- Develop plan of study including list of goals and objectives to address treatment related concerns raised by the ad-hoc committees.
- Submit permit modification for each water reclamation facility where pilot testing is to occur.
- Develop educational/community outreach components of pilot testing to allow for better understanding of treatment processes and goals.
- Implement pilot testing in accordance with regulations.
- Provide report documenting pilot testing results and recommendations.

12.5.5 Public Engagement and Communication

A public awareness component should be included in each of the previous tasks to ensure that there is transparency and opportunity for the public to be involved and understand the evaluations. Focus groups and surveys should be conducted at designated intervals to assess whether acceptance is improving with increased understanding. The ad-hoc committees and public engagement groups that were part of the development of the 2023 LTMWP update would remain engaged throughout this process and on developing project concepts using available reclaimed water.

12.6 Concept Refinement and Detailed Evaluation

As the Source Water Assessment steps are completed, a short-listing of project concepts will be completed where Tampa Bay Water will determine whether any concepts should advance to the Detailed Evaluation level for further consideration. This will include a reassessment of the ease of permitting, the technologies needed to meet treatment goals, refined cost estimates and reevaluation of public acceptance.

The Concepts will then enter into the Detailed Evaluation phase, which includes the same goals and tasks as a concept undergoing a Feasibility Study. At the completion of the Detailed Evaluation, the concept may join the Water Supply Selection Process.

13.0 Capital Improvements Program and Implementation Plan

Tampa Bay Water maintains an updated list of capital projects in its Capital Improvements Program (CIP) Plan to plan, schedule, and budget workload and organizational finances for the next ten years. This Plan contains capital projects that vary in their current project lifecycle from planning, professional services selection, design, bidding, construction/execution, and project closeout. Capital projects also have varying delivery methods and funding sources.

13.1 Existing Implementation Plan Summary

Water supply projects represent an integral part of Tampa Bay Water's CIP. There are several steps to properly transition from the water supply planning phase for water supply projects, to defining project specifics necessary for successful implementation. The 2023 Long-Term Master Water Plan (LTMWP) implementation timeline is shown in **Figure 13-1.**

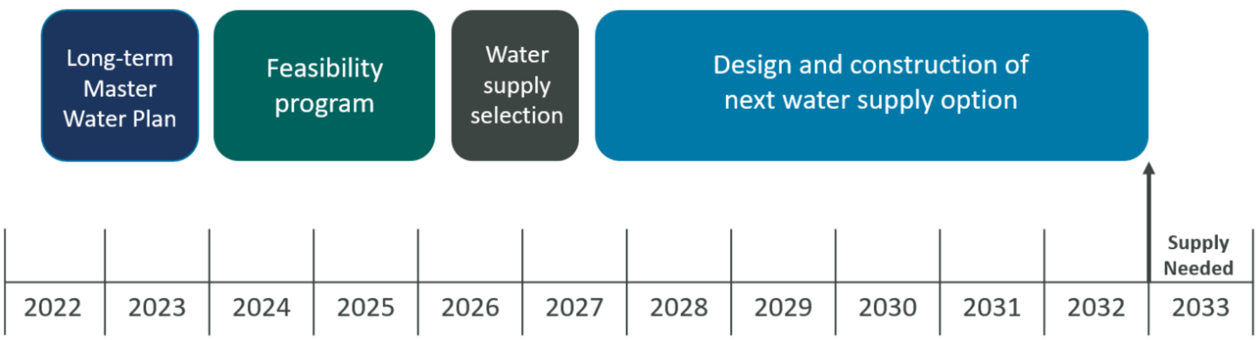


Figure 13-1 Water Supply Configuration Development & Implementation Timeline

A placeholder project or projects may be included in the CIP for the LTMWP recommendations to show the anticipated budget and required timing for the next water supply project(s). It is expected that these placeholder projects will be refined as the LTMWP implementation timeline, detailed above, progresses. Considerations such as project consolidation with other planned capital projects and recommended delivery methods to align with the project's schedule, funding, and level of risk should be assessed.

13.2 Implementation Plan

Section 11 presents the shortlisted projects for additional feasibility study as part of the 2023 LTMWP to meet the initial phase of the regional water supply needs. These projects include:

A. Eastern Pasco County Wellfield

B. Consolidated Water Use Permit (CWUP) Increase

C. North Pinellas County Surface Water Treatment Plant and Reservoir

D. Desalination Plant Expansion

E. Surface Water Treatment Plant at Regional Reservoir via Alafia Withdrawals

F. South Hillsborough County Surface Water Treatment Plant and Reservoir

G. South Hillsborough Wellfield via Aquifer Recharge

The goal of additional feasibility studies is to evaluate the concepts and select one or more of the above projects for implementation to meet the regional water supply needs. It is likely that a combination of the short-listed projects will be required to meet the 2043 water supply needs.

13.2.1 Timing and Phasing Under Current Demand Projections

The current demand projections as discussed in **Section 3** and presented below in **Figure 13-2** indicate that up to 10 million gallons per day (mgd) of new regional water supplies is required by 2028, an additional 10 to 20 mgd by 2033, and an additional 30 to 40 mgd would be required to meet the projected needs for the entire region within the 20-year planning horizon in year 2043. As part of the 2022 Water Supply Selection project, the Expansion of the Regional Surface Water Treatment Plant was selected to meet the 2028 demand needs by adding 10 to 12.5 mgd of supply to the region. The implementation of one or more of the shortlisted projects referenced above will provide additional supply to meet the 2033 demand needs to satisfy the 2033 projections.

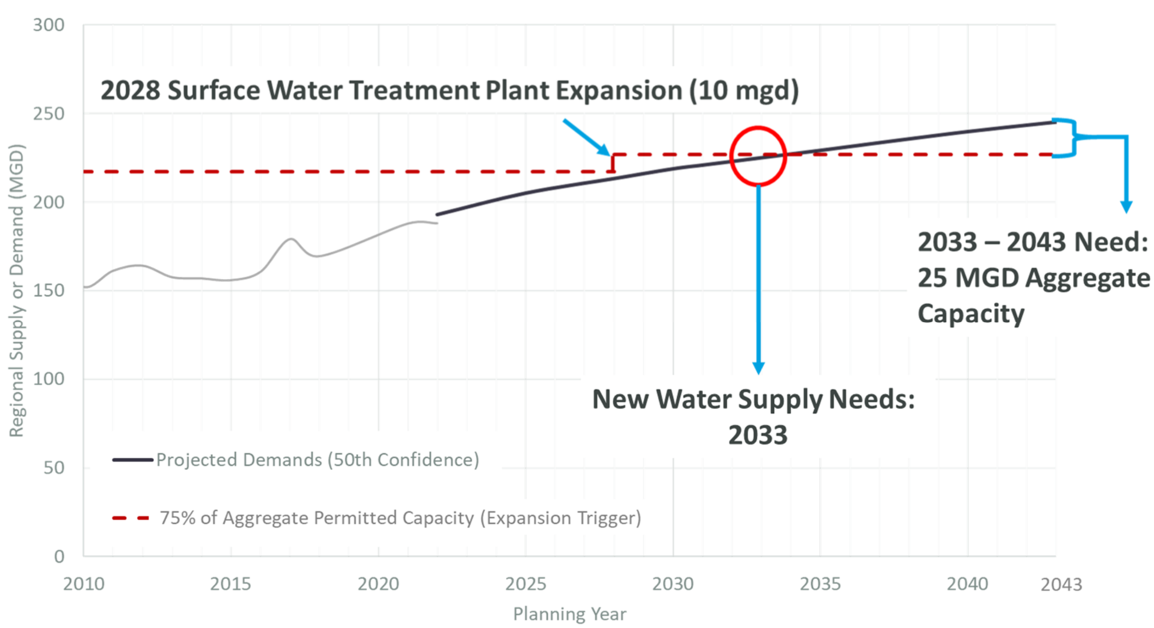
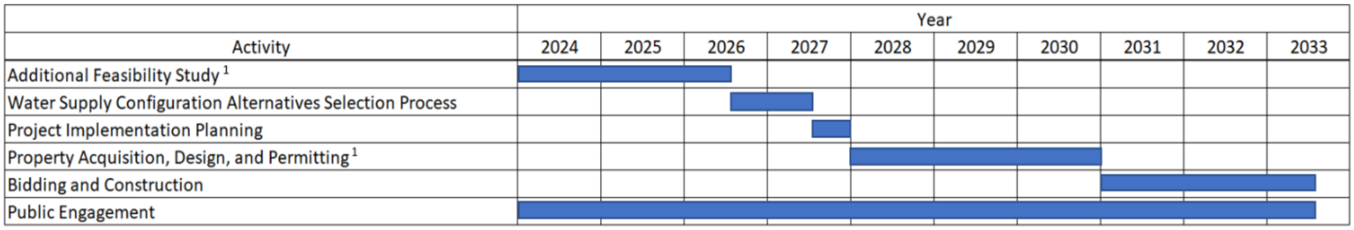


Figure 13-2 Regional Supply and Projected Demands used in the 2023 LTMWP Planning Process

The typical timing to plan, design, permit and construct a new water supply project through a traditional design-bid-build process is 8 to 10 years, depending on the project. The estimated timing for additional feasibility, water supply selection, project implementation planning, property acquisition, detailed design, permitting, and construction for the 2033 configuration of a new regional water supply project is presented in **Figure 13-3**. Based on this preliminary schedule, a decision for which of the shortlisted projects to proceed with should be made no later than June 2027, before detailed design is initiated.



1. The estimated duration of this activity includes time associated with Tampa Bay Water soliciting and selecting firms to provide the services associated with this activity.

Figure 13-3 Preliminary Schedule for Implementation of 2033 Regional Water Supply Project

13.3 Summary

Each of the short-listed projects proposed for further consideration in the feasibility program may be candidates for implementation as water supply projects to address the regional demands forecasted for 2033 or the future by 2043.

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14.0 Recommendation Summary

Tampa Bay Water's 2023 Long-term Master Water Plan (LTMWP) update encompasses several major components as discussed throughout this report and summarized in **Figure 14-1**. This section summarizes the recommendations for each of these major components as it relates to meeting the long-term water supply needs of the Tampa Bay Water region through 2043 and identifies the next steps for implementation.

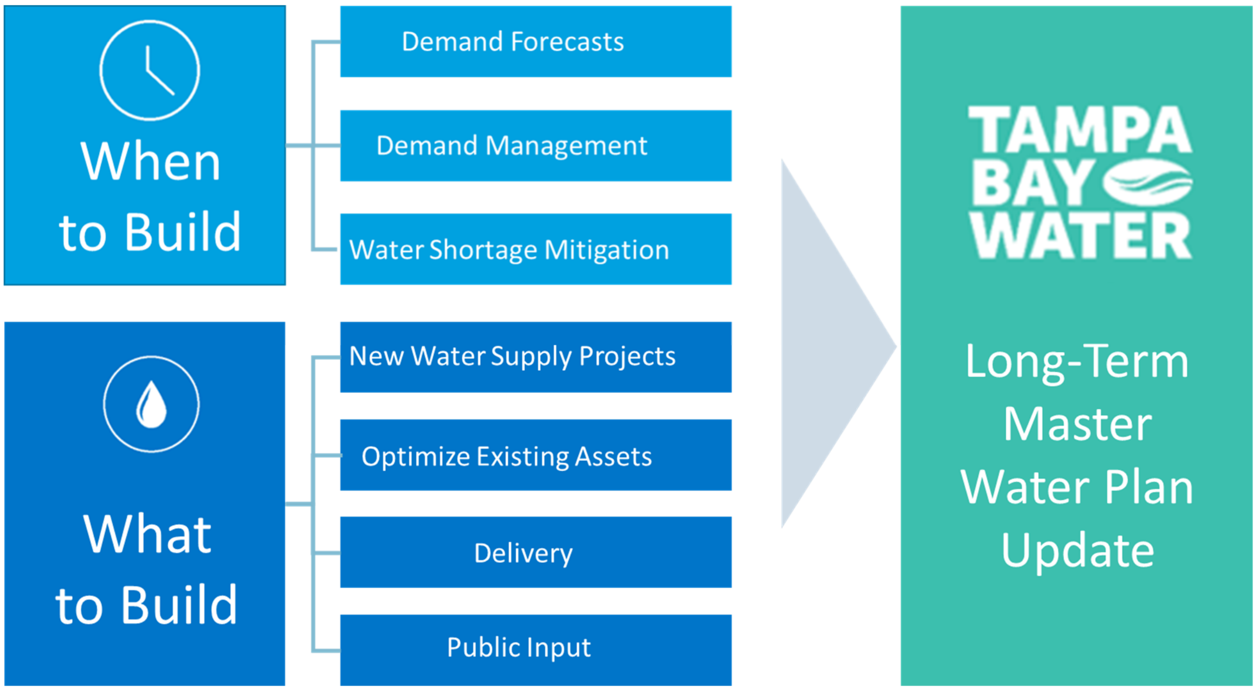

Figure 14-1 Major Components of the LTMWP

14.1 Short-List Recommendations

Tampa Bay Water and the project team are recommending a short-list of seven water supply project concepts for inclusion in the upcoming feasibility study phase of the long-term master water planning process. These seven short-list concepts represent the top-ranked options for further study and consideration to meet the region's water needs by 2033. The projects are recommended for detailed feasibility studies, then, as part of the Water Supply Selection, the projects will once again be compared to each other and ranked so that the Tampa Bay Water Board may select the 2033 Water Supply Configuration.

A. Eastern Pasco Wellfield (with fresh and/or brackish groundwater)
B. Consolidated Water Use Permit Increase
C. North Pinellas Surface Water Treatment Plant & Reservoir
D. Desalination Plant Expansion (with brackish groundwater or seawater)
E. Surface Water Treatment Plant at Regional Reservoir via Alafia Withdrawals
F. South Hillsborough Surface Water Treatment Plant & Reservoir
G. South Hillsborough Wellfield via Aquifer Recharge

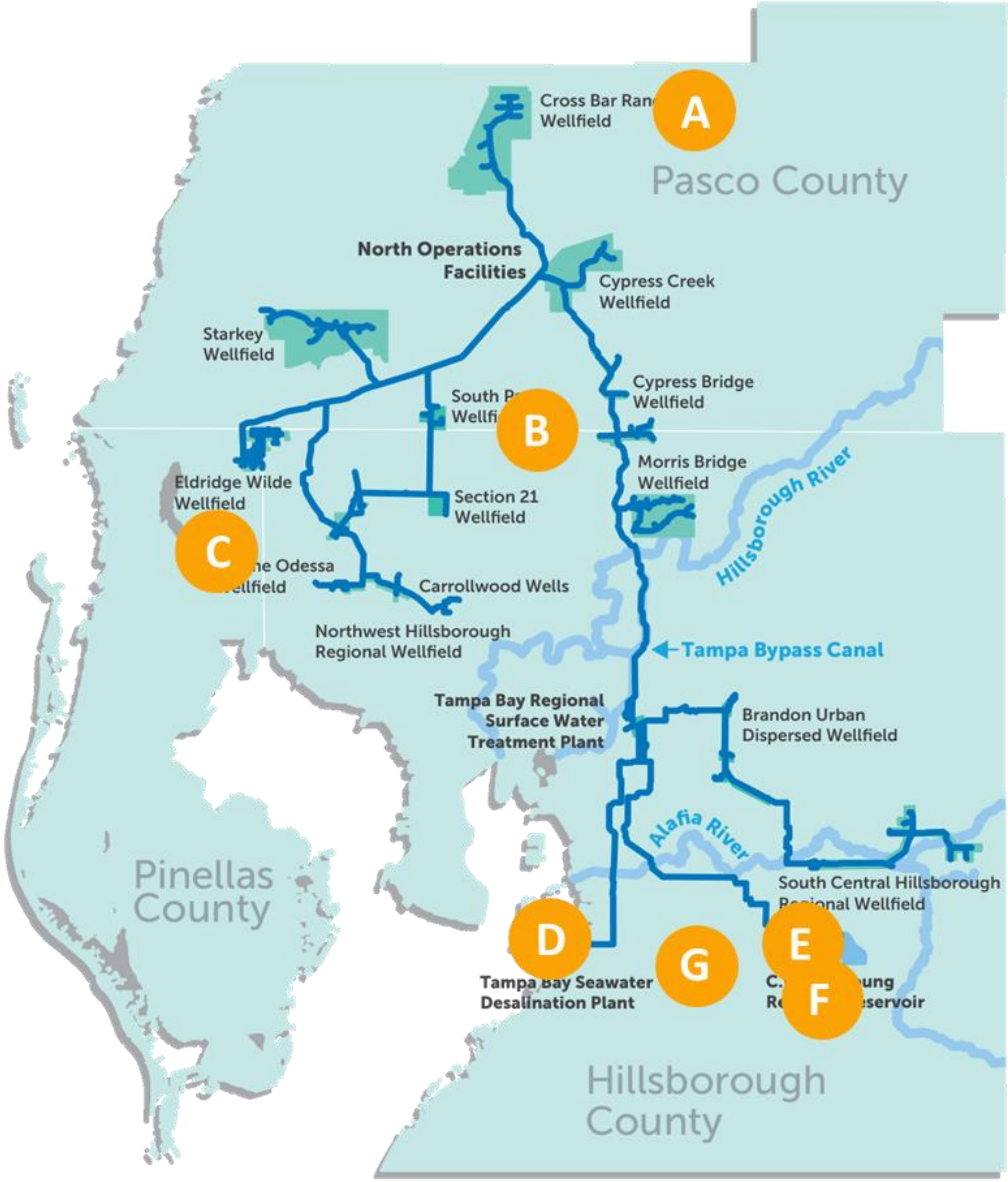

Figure 14-2 Short-Listed Water Supply Concepts

14.2 Specific Recommendations for Each Master Plan Component

The specific recommendations for each major LTMWP component are presented in **Table 14-1**.

Table 14-1 Master Plan Recommendations

Category	Recommendation
Water Shortage Mitigation Plan	"Tampa Bay Water recommends continuing the implementation of the current WSMP until significant changes in infrastructure are completed, District Water Shortage Rules are modified, or we are able to implement the full range of triggers and responses in the updated plan to assess their effectiveness."
Demand Management	"There are still additional opportunities to explore that can further contribute to demand reductions." (Expanded Irrigation Efficiency Assistance, Public Information and Education, Conservation Messaging with AMI, Land Use and New Construction, System Water Loss Control)
System Analysis	"The maximum system pressures should continue to be monitored and further analysis should be completed as updated demand projections become available."
System Analysis	"As the water supply concepts are studied for feasibility, it is recommended that additional hydraulic analyses be completed to further evaluate how the implementation of the potential new water supply sources could impact the operation of the Regional Transmission System..."
Public Engagement	"There is an opportunity to help inform and educate stakeholders through clear, consistent, easily accessible information on water supply sources, the wholesale water supply system, local utility water supply systems, water quality standards and how the current water supplies compare to those standards…" *(recommended future efforts listed to share information)*
Feasibility Studies	Desalination Expansion: • "It is only recommended to conduct a feasibility study on the brackish groundwater option as the expansion with seawater has already been conducted." • Yield and water quality analysis from one brackish test well to include constituents related to RO system design as well as emerging contaminants and those with proposed regulations • Additional groundwater modeling to confirm yield estimates and identify any hydrogeological effects to the surrounding area, including existing South Hillsborough Aquifer Recharge Project (SHARP) wells • Evaluation of brackish and seawater blending location within the treatment process • Conduct RO membrane projections to establish basic RO system design parameters and estimate recovery based on anticipated groundwater quality • Pilot testing to confirm assumptions for the level of pretreatment required for brackish supplies and assess operational impacts to the SWRO process (RO feed pressure, energy recovery device operations, benefit of alternative membranes) • Pipeline routing study • Siting of the proposed brackish wellfield • Public information/engagement
Feasibility Studies	Eastern Pasco Wellfield: "It is assumed that the fresh and brackish wells would be separate wells on a co-located wellfield. This will need to be confirmed as part of the feasibility study."

Category	Recommendation
Feasibility Studies	Consolidated Water Use Permit Expansion • Additional groundwater modeling to confirm yield estimates and identify any hydrogeological effects to the surrounding area including INTB and System-Wide Reliability Evaluation (SWRE). • Public information/engagement
Feasibility Studies	North Pinellas County Surface Water Treatment Plant and Reservoir • Available yield analysis including SWRE and INTB modeling to understand impacts to lake levels • Coordination with Pinellas County to understand their planned withdrawal from Lake Tarpon and impacts to available flow and depth in the discharge canal • Evaluation of Brushy Creek as an additional supply source • Conduct a permitting review related to planned withdrawals and the existing minimum flows and levels (MFL) at Lake Tarpon • Pipeline routing study • Siting of the proposed SWTP and proposed 800-MG reservoir • A preliminary operational & management plan for the reservoir • Public information/engagement
Feasibility Studies	Surface Water Treatment Plant at the Regional Reservoir via Increased Alafia Withdrawals • Additional hydraulic evaluations at the existing Alafia River pump station to confirm adequacy of existing and upgraded conveyance infrastructure • Available yield analysis including SWRE and INTB modeling • Additional reservoir and source water blending analyses to confirm water quality considerations (fluoride, phosphate) and treatment process requirements • Pipeline routing study • Confirm siting of the proposed SWTP referenced in the 2022 feasibility study • Public information/engagement
Feasibility Studies	New Surface Water Treatment Plant and Reservoir Via New Supplies • Detailed investigation into the connection of the proposed reservoir with the existing C.W. Bill Young Regional Reservoir • Available yield analysis including SWRE and INTB modeling • Pipeline routing study • Siting of the proposed SWTP and proposed 700-MG reservoir • A preliminary operational & management plan for the reservoir • Public information/engagement
Feasibility Studies	South Hillsborough Wellfield via Aquifer Recharge Credits • Feasibility study completed in 2021, therefore no additional feasibility studies are required. • Agreement with supplier of reclaimed water/groundwater credits

Category	Recommendation
	• Public information/engagement
Developmental Alternatives	Conduct Developmental Alternatives analyses in two steps: 1. Source Water Assessment and 2. Detailed Evaluation.
CIP and Implementation Plan	"Considerations such as project consolidation with other planned CIP projects and recommended delivery method to align with the project's schedule, funding, and level of risk should be assessed."
CIP and Implementation Plan	"…the next water supply project(s) should be selected no later than December 2027, followed by detailed design."

14.3 Next Steps

As the 2023 Long-term Master Water Plan is completed, if approved by the Board of Directors, the next step for the seven short-list projects is to enter into the feasibility study phase, where a more detailed technical and economic analyses will be completed to increase the level of certainty regarding yield, water quality and costs, and determine if there are any roadblocks that may remove the project from consideration.

The feasibility study analyses may include:

- Modeling,
- Analyzing regulatory and permitting requirements,
- Conducting pilot studies and installing test wells,
- Identifying potential properties,
- Engaging with the public,
- Preparing of conceptual design, and
- Defining capital and operating costs

Then, the short-listed projects will enter the Water Supply Selection process and water supply configurations of one or more projects will be developed to meet the future demands.

The Water Supply Selection process will recommend the project or configuration of multiple projects for Board consideration/approval to move forward into design and construction to meet the future demands.

The Developmental Alternatives will be evaluated in parallel to the Feasibility Studies, though are expected to have a longer duration. When or if project concepts under this program become clearly defined and are considered feasible options, they can become part of the water supply selection process.

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Appendix A. 2023 Special District Facilities Report Final

Special District Public Facilities Report

May 30, 2023

TAMPA BAY WATER
Supplying Water To The Region

Tampa Bay Water
Special District Public Facilities Report Facility
Status as of May 30, 2023

Pursuant to Subsection 189.415, Florida Statutes

TABLE OF CONTENTS

TAMPA BAY WATER
SPECIAL DISTRICT PUBLIC FACILITIES REPORT
PURSUANT TO SUBSECTION 189.415, FLORIDA STATUTES

May 30, 2023

Beginning March 1, 1991, pursuant to state law enacted in the 1989 legislative session, [Chapter 89-169, Laws of Florida (Chapter 189, F.S.)], special districts such as Tampa Bay Water are required to file special district public facilities reports with each local government in which the special districts are located. The purpose of the report is to provide local governments with information that may be pertinent to the development and updating of the local governments' comprehensive plans.

TAMPA BAY WATER

HISTORY

Tampa Bay Water was first established as the West Coast Regional Water Supply Authority on October 25, 1974, as a result of state enabling legislation (74-114, Laws of Florida) and a five-party agreement among Hillsborough, Pinellas, and Pasco counties and the cities of St. Petersburg and Tampa. It was the first such entity organized under the provisions of Chapter 373, Florida Statutes – Water Resources. The City of New Port Richey joined the agency in 1984. In 1998, Tampa Bay Water was formed by the six Member Governments and is governed by the Amended and Restated Interlocal Agreement and Master Water Supply Contract.

LONG-TERM MASTER WATER PLAN

Tampa Bay Water's Board of Directors approved the original Master Water Plan in December 1995. The Tampa Bay Water Board of Directors approves projects for implementation that are environmentally sustainable, technically sound, and economically feasible. In November 1998, the Board approved System Configuration I of the Master Water Plan for implementation. This $680 million program was co-funded by the Southwest Florida Water Management District (District) in the amount of $183 million and included the addition of surface water and desalinated seawater to the Tampa Bay Water system.

System Configuration II of the Master Water Plan was completed in 2011. This program involved expanding the treatment and pumping capacity of Tampa Bay Water's Regional Surface Water Treatment system. Capital costs totaled $226 million; The District, regional Basin Boards, and the State of Florida co-funded $122 million of the total cost.

The original Master Water Plan also included public information and involvement along with a demand management component to reduce anticipated potable demand across the region. Tampa Bay Water worked closely with its member governments to ensure that projected annual average potable demand was reduced by 10 million gallons per day by 2000, and that a total potable demand reduction of 18 million gallons per day (mgd) was achieved by 2005 through demand management and conservation activities. Additional reduction of projected demand by 6 mgd due to active potable conservation programs was achieved through 2018, for a total of at least 24 mgd water savings for the region (actual demand reductions can occur through both active and passive savings). The Board also approved the implementation of the regional 2018 Demand Management Program, now called the Tampa Bay Water Wise program. Tampa Bay Water Wise identifies potential demand management initiatives to save 3.8 mgd by 2030 and delay the need to build new supplies.

As required in the Agency's governing documents, the Long-term Master Water Plan is updated every five years. The latest update to the Long-Term Master Water Plan was completed in 2018 and identified that:

- Approximately 20 million gallons per day (mgd) of new supplies need to be developed during this 20-year planning horizon; and
- Approximately 10 mgd of this 20 mgd will need to be online by 2028.

With approval of the Long-term Master Water Plan 2018, the Board directed the Agency to conduct feasibility studies on the top-three ranked projects for future water supply. Those projects were:

- South Hillsborough Wellfield (via SHARP Credits)
- Desalination Water Treatment Plant Expansion with Existing Source Water
- Surface Water Treatment Plant Expansion with Existing Source Water

Detailed feasibility evaluations on these projects are now complete. Using the results of the detailed feasibility studies, Integrated Program Manager Consultant, Black & Veatch, evaluated multiple configurations using the three options. Using the Board approved ranking framework and criteria, Black & Veatch evaluated and scored the three top-ranked project configurations consisting of:

- Surface Water Treatment Plant Expansion with Existing Source Water
- New Surface Water Treatment Plant
- Desalination Water Treatment Plant Expansion with Existing Source Water

In August 2022, the Board selected the Expansion of the Existing Surface Water Treatment Plant, System Configuration III of the Master Water Plan, which is scheduled for implementation by 2028. The next update to the Long-term Master Water Plan is currently underway and will be completed by December 2023. The 2023 Long-term Master Water Plan will identify a short-list of potential new water supply projects to be considered for future feasibility studies.

TABLE I
EXISTING WATER SUPPLY FACILITIES

Facility	Current Permitted/Rated/ or Design Capacity (mgd)	Current Water Use Permit	Location
Cosme-Odessa Wellfield	Consolidated Permit Wellfield*	Consolidated Water Use Permit Issued January 25, 2022. Expires January 25, 2032. Permittee - Tampa Bay Water.	Northwest Hillsborough County, along Racetrack Road and Gunn Highway 19 wells
Cross Bar Ranch Wellfield	Consolidated Permit Wellfield*	Consolidated Water Use Permit Issued January 25, 2022. Expires January 25, 2032. Permittee - Tampa Bay Water.	North-Central Pasco County, east of US 41, north of SR 52 and south of CR 578 17 wells
Cypress Bridge Wellfield	Consolidated Permit Wellfield*	Consolidated Water Use Permit Issued January 25, 2022. Expires January 25, 2032. Permittee - Tampa Bay Water.	South-Central Pasco County, Wesley Chapel Area, and North-Central Hillsborough County in the vicinity of I-75 and CR 581 10 wells
Cypress Creek Wellfield	Consolidated Permit Wellfield*	Consolidated Water Use Permit Issued January 25, 2022. Expires January 25, 2032. Permittee - Tampa Bay Water.	Central Pasco County, east of US 41 and CR 583, south of SR 52, north of SR 54 13 wells, pump station site and storage facilities
Morris Bridge Wellfield	Consolidated Permit Wellfield*	Consolidated Water Use Permit Issued January 25, 2022. Expires January 25, 2032. Permittee - Tampa Bay Water.	North-Central Hillsborough County 20 wells
Eldridge-Wilde Wellfield	Consolidated Permit Wellfield*	Consolidated Water Use Permit Issued January 25, 2022. Expires January 25, 2032. Permittee - Tampa Bay Water.	Northeast corner of Pinellas County and northwest corner of Hillsborough County at the Pasco County line 24 wells.
Northwest Hillsborough Regional Wellfield	Consolidated Permit Wellfield*	Consolidated Water Use Permit Issued January 25, 2022. Expires January 25, 2032. Permittee - Tampa Bay Water.	Northwest Hillsborough County, along Gunn Hwy and south of CR 589 6 wells
Section 21 Wellfield	Consolidated Permit Wellfield*	Consolidated Water Use Permit Issued January 25, 2022. Expires January 25, 2032. Permittee - Tampa Bay Water.	Northwest Hillsborough County, in Lake Park at the southwest corner of the intersection of Dale Mabry Highway and Van Dyke Road 6 wells

Facility	Current Permitted/Rated/ or Design Capacity (mgd)	Current Water Use Permit	Location
South-Central Hillsborough Regional Wellfield	24.95	Water Use Permit 20004352.009 issued May 19, 2020. Expires June 26, 2040. Permittee - Tampa Bay Water	Southeast Hillsborough County, in the vicinity of Thompson, Keysville and Nichols Roads, and CR 39 17 wells
South Pasco Wellfield	Consolidated Permit Wellfield*	Consolidated Water Use Permit Issued January 25, 2022. Expires January 25, 2032. Permittee - Tampa Bay Water.	South-Central Pasco County, south of SR 54 8 wells
Starkey Wellfield	Consolidated Permit Wellfield*	Consolidated Water Use Permit Issued January 25, 2022. Expires January 25, 2032. Permittee - Tampa Bay Water.	West Pasco County, between SR 54 and SR 587 12 wells.
Brandon Urban Dispersed Wells	6	Water Use Permit 20011732.005 issued August 7, 2019. Expires August 7, 2039. Permittee-Tampa Bay Water	South-Central Hillsborough County, south of I-4, north of Durant Road, Seffner, FL 5 wells
Carrollwood Wells	0.82	Water Use Permit 20005886.004 issued October 11, 2010. Expires October 11, 2030. Permittee - Tampa Bay Water	Northwest Hillsborough County, east of Dale Mabry Highway, north of Busch Blvd. 3 wells
Cypress Creek Pump Station and Water Treatment Plant	179	Not Applicable	Central Pasco County, east of US 41 and SR 583, south of SR 52
Morris Bridge Booster Station	30	Not Applicable	Northern Hillsborough County, east of I-75 and CR 581
South-Central Hillsborough Intertie Booster Station	180	Not Applicable	South-Central Hillsborough County on Boyette Road between Carr Road and Bell Shoals Road
Off-stream Reservoir Pump Station	120	Not Applicable	South Hillsborough County at Regional Reservoir Site
Regional Surface Water Treatment Plant	90 operating /120 rated	Not Applicable	Central Hillsborough County, south of Columbus Drive extension between US 301 and Falkenburg Road
Regional High Service Pump Station	135	Not Applicable	Central Hillsborough County, south of Columbus Drive extension between US 301 and Falkenburg Road
Repump Station	180	Not Applicable	Central Hillsborough County, south of Columbus Drive extension between US 301 and Falkenburg Road
Lake Bridge Water Treatment Plant	44.9	Not Applicable	North-Central Hillsborough County east of Interstate 75 at Hillsborough-Pasco County Line

Facility	Current Permitted/Rated/ or Design Capacity (mgd)	Current Water Use Permit	Location
South Pasco Water Treatment Plant	30	Not Applicable	South Pasco County
Eldridge-Wilde H2S Removal Facility (AKA Keller H2S Water Treatment Plant)	45	Not Applicable	Northeast Pinellas County
Tampa Bypass Canal @ Harney Road Pumping Station	40	Water Use Permit 20006675.006 issued May 26, 2011. Expires May 26, 2031. Permittee - Tampa Bay Water	Central Hillsborough County. Tampa Bypass Canal at Harney Road
Tampa/Hillsborough Interconnect Pump Station	15	Not Applicable	Northwest Hillsborough County, north Tampa area
Brandon Urban Dispersed Wells Water Treatment Facility for wells 2,4,5R, and 6	9.24	Not Applicable	South-Central Hillsborough County, north of SR 60 and east of Kingsway Road
Brandon Urban Dispersed Wells Water Treatment Facility for well 7	3	Not Applicable	South-Central Hillsborough County, north of Durant Road. and west of Miller Road
Tampa Bypass Canal Water Supply	258	Water Use Permit 20011796.002. Issued August 28, 2007. Expires December 31, 2030. Permittee - Tampa Bay Water	Tampa Bypass Canal at Martin Luther King Boulevard in Hillsborough County
Alafia River Pump Station	60	Water Use Permit 20011794.002. Issued November 27, 2012. Expires November 27, 2032. Permittee - Tampa Bay Water	Bell Shoals Road at the Alafia River in Hillsborough County
Tampa Bay Regional Water Treatment Facilities	120	Not Applicable	Central Hillsborough County, south of Columbus Drive extension between US 301 and Falkenburg Road
Tampa Bay Seawater Desalination Plant	28.75	Not Applicable	Apollo Beach area, Hillsborough County
C.W. Bill Young Regional Reservoir	15.5 billion gallons	Not Applicable	South Hillsborough County between CR 39 and Boyette Road
Lithia Hydrogen Sulfide Treatment Plant (SCHIP Phase 3)	50	Not Applicable	South-Central Hillsborough County west of Lithia Pinecrest Rd and north of Fishhawk Blvd. Adjacent to and west of the Lithia Water Treatment Plant

Facility	Current Permitted/Rated/ or Design Capacity (mgd)	Current Water Use Permit	Location
US 41 Pump Station	25	Not Applicable	East Pasco County
Morris Bridge Water Treatment Plant	40	Not Applicable	North-Central Hillsborough County, East of I-275
Keller Water Treatment Plant	45	Not Applicable	North Pinellas County
Tampa Hillsborough Interconnection	15	Not Applicable	North Hillsborough County, West of I-275
Tampa Bypass Canal Pump Station	280	Water Use Permit 20006675.006 issued May 26, 2011. Expires May 26, 2031. Permittee – Tampa Bay Water	On Maritn Luther King Jr Boulevard in Central Hillsborough County

TABLE II
EXISTING PIPELINES

Facility	Diameter	Material*	Length	Location	Comments
Cypress Creek Transmission Main	84” 84” 72” 66” 64” 60”	WSP PCCP PCCP PCCP DIP PCCP PCCP	28,845’ 36,385’ 492’ 4,210’ 21,000’ 460’ 11,458’	The route follows the abandoned CSX railroad line corridor southwest from the Cypress Creek Wellfield in the Land O' Lakes area of Pasco County, crossing under SR 54, through the Trinity Communities development to Pinellas County. The Trinity line was rebuilt as 21,000’ of 64” DIP in 1996/1997. 4,210’ of 66” cement pipe plus replacement of 40,000’ of Interpace pipe have been completed. 28,845’ of 84” PCCP was replaced with 84” WSP in February 2007.	These mains carry treated water from the Cypress Creek Water Treatment Plant in Pasco County to Central and West Pasco County distribution systems, Pinellas County's transmission system, and the St. Petersburg/South Pasco Wellfield Connector. Water comes from Cypress Creek, Cross Bar Ranch, Morris Bridge, Cypress Bridge Wellfields, Desalination Treatment Plant and the Regional Surface Water and groundwater treatment plants. The original construction was completed in 1975. Full replacement of the pipeline was completed in 2007.
Cross Bar Ranch Transmission Main and Wellfield Collection Lines	60” 36” 30” 24” 16”	PCCP PCCP PCCP PCCP PCCP	50,096’ 1,582’ 2,620’ 1,185’ 20,602’	The transmission main route generally follows a southeast direction, carrying raw water from the Cross Bar Ranch Wellfield, crossing under SR 52, and then connecting to the Cypress Creek Water Treatment Plant. The wellfield collection system contains 16” to 36” pipe connectors.	This main carries raw water from the Cross Bar Ranch Wellfield to the Cypress Creek Water Treatment Plant. Both of these facilities are in Pasco County. The line was constructed in 1980.
Cypress Bridge Transmission Main and Collection Mains	66” 64” 48” 36” 30” 24” 20” 18” 16”	WSP DIP DIP DIP DIP DIP DIP DIP DIP	30,000’ 23,000’ 24’ 11,945’ 3,381’ 750’ 1,760’ 30,808’ 4,900’	The transmission main (66” and 64”) pipeline route travels southeast from the Cypress Bridge Wellfield north of the Tampa Executive Airport, under I-75, then south to the Lake Bridge Water Treatment Plant. The collection mains collect raw water from the Cypress Bridge Wellfield for transmission.	This transmission main connects the Cypress Bridge Wellfield to the Lake Bridge Water Treatment Plant in Hillsborough County and to the Cypress Creek Water Treatment Plant. The collection mains collect well water for treatment at the Lake Bridge Water Treatment Plant. Construction was completed in 1996.

* PCCP	Prestressed Cylindrical Concrete Pipe
WSP	Welded Steel Pipe
DIP	Ductile Iron Pipe
RCP	Reinforced Concrete Pipe
CI	Cast Iron
HDPE	High Density Polyethylene
SS	Stainless Steel

Note: Facilities listed do not include information on pipeline appurtenances such as valves, electronic monitoring equipment, and flow measuring devices.

Facility	Diameter	Material*	Length	Location	Comments
North Pasco Wellfield Transmission Main	36” 16”	DIP DIP	17,800’ 2,700’	The route travels south from the North Pasco Wellfield, along the Florida Power powerline corridor to the Starkey Wellfield.	These pipelines carried raw water from the North Pasco Wellfield to the Starkey Wellfield. Water was then delivered to New Port Richey's George Maytum Water Plant and Pasco County's Water Treatment Plant. This north Pasco Wells and pipeline is no longer in service.
Keller Connector Transmission Main	64” 66”	DIP WSP	8,129’	The pipeline connects the Cypress Creek Transmission Main at the Pinellas/Pasco County border and travels due south to a junction that feeds a county 42 inch into the Keller facility and a county 60 inch that continues into the county system.	The pipeline carries treated water from the Cypress Creek Water Treatment Plant in Pasco County to Pinellas County’s Keller facility and the county distribution system.
Northwest Hillsborough Pipeline	42”	DIP HDPE	9,800’ 900’	Located in Northwest Hillsborough County. Begins at Hillsborough County’s Northwest Hillsborough Water Treatment Plant and continues east to the Upper Tampa Bay Trail, and north to the Gunn Highway and Manhattan Drive intersection.	The pipeline carries regional water and connects the Northwest Hillsborough Transmission Main and Hillsborough County’s Northwest Hillsborough Water Treatment Plant.
Northwest Hillsborough Collection Main	36” 30” 24” 16”	PCCP PCCP PCCP DIP	390’ 10,700’ 4,400’ 13,052’	Located in Northwest Hillsborough County. The pipeline route travels northwest, beginning at the Carrollwood Wells located near Lake Carroll, proceeding south along Dale Mabry Highway, then proceeding west, paralleling Gunn Highway (CR 587) from Mullis City Road to Manhattan Drive, then south along the Upper Tampa Bay Trail and west to Sheldon Road (CR 589).	These mains carry raw water from the Carrollwood Wells and Northwest Hillsborough Regional Wellfield to Sheldon Road Transmission Main. Construction was completed in 1985.
Northwest Hillsborough Transmission Main	36” 36”	PCCP DIP	16,910’ 10,500’	Located in Northwest Hillsborough County. Begins at the Gunn Highway and Manhattan Drive intersection and continues north to Racetrack Road and St. Petersburg’s Cosme Water Treatment Plant.	This pipeline network (1) carries treated water in either direction and connects the Northwest Hillsborough Pipeline and Cosme transmission main, and (2) collects groundwater from Northwest Hillsborough Regional wells 1-6.
South-Central Hillsborough Regional Wellfield Transmission Mains and Collection Mains	54” 48” 42” 36” 30” 24” 20” 16”	PCCP PCCP PCCP DIP DIP DIP PCCP DIP	31,000’ 11,600’ 1,350’ 1,500’ 2,500’ 1,400’ 4,700’ 14,500’	The pipeline travels west from the Keysville area of southern Hillsborough County, south of SR 60, north of Lithia-Pinecrest Road to the Lithia Water Treatment Plant.	These mains carry raw water from the South-Central Hillsborough Regional Wellfield to the Lithia Water Treatment Plant.

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WSP	Welded Steel Pipe
DIP	Ductile Iron Pipe
RCP	Reinforced Concrete Pipe
CI	Cast Iron
HDPE	High Density Polyethylene
SS	Stainless Steel

Note: Facilities listed do not include information on pipeline appurtenances such as valves, electronic monitoring equipment, and flow measuring devices.

Facility	Diameter	Material*	Length	Location	Comments
Starkey Wellfield Transmission Main and Collection Mains	42" 36" 30" 24" 16" 12" 8"	PCCP DIP PCCP DIP DIP DIP DIP	26,548' 4,100' 6,000' 2,629' 21,655' 325' 575'	Collects water in the Starkey Wellfield and travels west from the Starkey Wellfield to Decubellis Rd.	The collection main carries raw water from the Starkey Wellfield to Pasco County's Water Treatment Plant and New Port Richey's Water Treatment Plant.
Tampa Bypass Canal/ Harney Transmission Main	42" 30"	DIP DIP	670' 6'	Moves water from east to west along the south side of the Tampa Bypass Canal across Flood Control Structure #161.	These pipelines carry raw surface water from the Tampa Bypass Canal Pump Station across Flood Control Structure #161 into the Hillsborough River Reservoir. The line was completed in 1991.
South Pasco Transmission Main	42" 36" 30" 42"	RCP PCCP PCCP Steel	59,580' 4,200' 3,136' 6,685'	Travels south from the Cypress Creek 84" Transmission Main to the Lake Park Water Treatment Plant and the Cosme Water Treatment Plant.	Links the South Pasco Wellfield and Cypress Creek Transmission Main, then the Lake Park Water Treatment Plant and the Cosme Water Treatment Plant.
North-Central Hillsborough Intertie	84"	WSP	65,000'	The pipeline route travels south from Morris Bridge along the Tampa Bypass Canal levee, then through Sabal Park to the Regional Water Treatment Plant.	This Transmission Main conveys treated and blended surface water, groundwater, and desalinated seawater from the Regional Water Treatment Plant to the regional system near Morris Bridge.
South-Central Hillsborough Intertie	72" 48"	WSP DIP	67,330' 640'	The pipeline route travels south from the Tampa Bay Water Regional Facilities site at U.S. 301/E. Columbus Ave. adjacent to Falkenburg Road, then west in the TECO easement to the Alafia River pump station located at Bell Shoals Road and the Alafia River in Hillsborough County.	This Transmission Main conveys raw water from the Tampa Bypass Canal and Hillsborough River sources to the C.W. Bill Young Regional Reservoir. It also conveys raw water from the Alafia River pump station and the C.W. Bill Young Regional Reservoir to the Tampa Bay Water Regional Surface Water Treatment Plant (SWTP).
Alafia Pump Station Piping and Blowoff Piping at Long-Flat Creek	48" 30" 20" 16" 10"	WSP SS SS SS SS	190' 80' 15' 40' 22'	Hillsborough County at the Alafia River Pump Station and near the Regional Reservoir	To allow for emergency drawdown of the water elevation of the C. W. Bill Young Regional Reservoir
Tampa Bay Desalination Plant Pipeline	42"	DIP	74,000'	Located in Hillsborough County in a TECO easement from TECO's Big Bend Station to the southeast corner of Broadway & US 301, then north to the Tampa Bay Water Regional Facilities site.	Transmission of desalinated seawater to Tampa Bay Water's Regional Facilities site.

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WSP	Welded Steel Pipe
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RCP	Reinforced Concrete Pipe
CI	Cast Iron
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SS	Stainless Steel

Note: Facilities listed do not include information on pipeline appurtenances such as valves, electronic monitoring equipment, and flow measuring devices.

Facility	Diameter	Material*	Length	Location	Comments
Gunn Highway Well Collection Main	24” 20” 16”	PCCP PCCP PCCP	18,500’ 1,300’ 2,650’	The pipeline route travels south on Gunn Highway from about one mile north of Van Dyke Road to the Cosme Water Treatment Plant.	This collection main links dispersed wells in the Cosme-Odessa Wellfield to the collector main for the facility.
Eldridge-Wilde Collection Mains	42” 36” 30” 24” 20” 16” 12” 10” 8”	RCP RCP & DIP RCP & DIP RCP & DIP CI & DIP CI & DIP CI & DIP CI & DIP CI & DIP	10,650’ 3,050’ 6,405’ 2,830’ 5,250’ 8,330’ 6,969’ 3,017’ 600’	Located in Northeast Pinellas County and Northwest Hillsborough County	The collection mains connect 34 wells in the Eldridge-Wilde Wellfield to Pinellas County’s Keller Water Treatment Plant.
Cosme Treated Water Bypass	48”	Steel	1,600’	Cosme Water Treatment Plant	Deliver treated water from the Cosme 66” Transmission Main to the Cosme Water Treatment Plant discharge piping.
Cosme-Odessa Collection Mains	42” 36”	PCCP PCCP	6,600’ 6,600’	Located within the Cosme-Odessa Wellfield Property.	These are the collection main transmission lines for the Cosme-Odessa Wellfield.
Morris Bridge Wellfield Collection Main	48” 36” 30” 24” 20” 16” 12”	PCCP PCCP PCCP PCCP DIP DIP DIP	6,460’ 12,431’ 10,110’ 4,410’ 2,150’ 8,860’ 11,560’	Located in the Morris Bridge Wellfield.	The collection main links the Morris Bridge Wellfield to the Morris Bridge Booster station and the City of Tampa water treatment plant on Bruce B. Downs Blvd.
Brandon Transmission Main	36” 30”	DIP DIP	28,000’ 30,000’	This pipeline begins near Miller and Durant Roads, traveling north on Durant, Lithia-Pinecrest and Kingsway. From Kingsway, it heads west along Wheeler and Broadway, then south along I-75, then west on Columbus to the Regional Water Treatment Plant.	This finished water Transmission Main connects the Tampa Bay Water Regional Facilities site and Hillsborough County’s Lithia Water Treatment Plant via the Brandon South-Central Connection.
BUD 5R Collection Main	16”	DIP	5534’	Interconnect replacement production well BUD 5R	South Central Hillsborough County; well is located in Ridge Crest Subdivision. Collection main runs along Wheeler Road from Seffner Valrico Road to Rutherford Drive.

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CI	Cast Iron
HDPE	High Density Polyethylene
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Note: Facilities listed do not include information on pipeline appurtenances such as valves, electronic monitoring equipment, and flow measuring devices.

Facility	Diameter	Material*	Length	Location	Comments
Cypress Creek Wellfield Collection Mains	48” 42” 36” 30” 24” 16” 12”	PCCP PCCP PCCP PCCP PCCP PCCP DIP	7,119’ 7,203’ 4,606’ 4,384’ 4,523’ 1,418’ 330’	Located within the Cypress Creek Wellfield.	These mains collect raw water within the Cypress Creek Wellfield.
South Pasco Wellfield Collection Mains	42” 24” 20” 16” 12”	PCCP DIP DIP DIP DIP	6,264’ 3,092’ 2,053’ 1,355’	Located within the South Pasco Wellfield.	These pipelines collect raw water within the South Pasco Wellfield.
Tampa Bypass Canal Transmission Main	84”	PCCP	9,629’	Located between the Tampa Bypass Canal Pump Station and the Tampa Bay Water Regional Facilities site.	This Transmission Main transports surface water to the Tampa Bay Water Regional Facilities site for treatment at the Tampa Bay Water Surface Water Treatment Plant.
Section 21 Collection Mains	24” 12”	DIP DIP	2,855’ 4,138’	Located within the Section 21 Wellfield.	These mains collect raw water within the Section 21 Wellfield.
Cosme Transmission Main	66”	WSP	43,900’	Located in Northwest Hillsborough County.	This transmission main connects the Regional System to the Cosme Water Treatment Plant.
Brandon/South-Central Connection	30”	DIP	33,300’	Located in South-Central Hillsborough County. From the end of the Brandon TM at Durant and Miller Roads east to Pearson Rd.; south to Stearns Rd; east to Stearns Park Rd.; south across Lithia Pinecrest Rd to Adelaide Ave.; west to Spring Rd.; south through Lithia Springs Park to Lithia Spring Rd.; east to Lithia Pinecrest Rd.; south to Lithia WTP	This transmission main connects the Brandon Transmission Main at Miller and Durant Roads to the Lithia Water Treatment Plant site.
Regional Reservoir Transmission Main	84”	WSP	42,240’	Located in South Hillsborough County. Follows Boyette Rd. north from the Reservoir to the South-Central Hillsborough Intertie at Boyette and Bell Shoals Roads	Connects the C.W. Bill Young Regional Reservoir to the Alafia River Intake & Pump Station and the South-Central Hillsborough Intertie.
South-Central Hillsborough System Interconnect	30” 24”	DIP DIP	1,380’ 60’	Located in South-Central Hillsborough County at the Lithia Water Treatment Plant.	This yard piping allows treated regional water to be provided to Hillsborough County at their Lithia Water Treatment Plant site.
West Pasco Infrastructure Transmission Main	42” 36”	DIP Steel DIP Steel	11,927’ 5,196’ 18,893’ 855’	Located in western Pasco County.	This transmission main connects the 84” Cypress Creek Transmission Main to Little Road and New Port Richey.

* PCCP	Prestressed Cylindrical Concrete Pipe
WSP	Welded Steel Pipe
DIP	Ductile Iron Pipe
RCP	Reinforced Concrete Pipe
CI	Cast Iron
HDPE	High Density Polyethylene
SS	Stainless Steel

Note: Facilities listed do not include information on pipeline appurtenances such as valves, electronic monitoring equipment, and flow measuring devices.

Facility	Diameter	Material*	Length	Location	Comments
Carrollwood Collection Main	10" 12" 10" 12"	DIP DIP HDPE HDPE	2,835' 13,596' 1,379' 3,266'	Located in Northwest Hillsborough County. From the Carrollwood Wells to Floyd Rd.; west to Hudson Ln.; south to Gunn Hwy.; northwest to Gunn Highway Collection Main at Northwest Hillsborough Well No. 6.	This transmission main connects the Carrollwood wells to the Northwest Hillsborough collector main.
Central Pasco Infrastructure	42" 36" 30" 24" 6"	DIP DIP DIP DIP DIP	178' 764' 433' 585' 225'	Located in Central Pasco County.	Increase capacity of delivery to Pasco County system.
Point of Connection Improvement for Central Hillsborough County	36" 30"	DIP DIP	106' 52'	Located at the Tampa Bay Water Regional Facility Site in Hillsborough County	Connection point to provide water to Hillsborough County from regional system.
Point of Connection Addition for City of Tampa	36" 4"	DIP DIP	188' 65'	Located at the Tampa Bay Water Regional Facility Site in Hillsborough County	Connection point to provide emergency water supply from regional system to City of Tampa.
Northwest Hillsborough Well #7 Connection	24" 24" 16" 12" 12"	DIP HDPE DIP DIP HDPE	4,630' 5,311' 700' 1,705' 383'	Northwest Hillsborough County	Interconnects NWH Well #7 to the Section 21 Wellfield pipeline.
System Interconnect: South-Central Hillsborough Infrastructure Pipeline (Phase 2)	24" 24" 20" 20" 12" 10" 10"	DIP HDPE DIP HDPE DIP DIP HDPE	1,774' 992' 8,772' 6,110' 266' 3,156' 2,097'	Pipeline has two branches originating from the Brandon Urban Dispersed Wellfield. The first branch travels from Lithia-Pinecrest Rd. east on Dew Bloom Rd. and north on Oakwood Ave. to Centennial Lodge Dr. The second branch travels from Kingsway Road east on Wheeler Rd., south on Seffner-Valrico Rd., west on Clay Ave. and south on Oakwood Ave. to Centennial Lodge Dr.	The pipeline interconnects Brandon Urban Dispersed Wells (BUDW) 2, 4 and 6 to the BUDW 5 Water Treatment Plant and then carries potable water to the Brandon Transmission Main.
Odessa Emergency Bypass	36"	DIP	9,210'	Located in Central Pasco County	Connects West Pasco Transmission Main to the Odessa Booster Station
Eastshore 36" /COT 36"	36"	DIP	5,280'	From 301 & Columbus Dr. to Regional Water Lane	Ties City of Tampa to Regional Point of Connection & Surface Water Treatment Plant Discharge

* PCCP — Prestressed Cylindrical Concrete Pipe
WSP — Welded Steel Pipe
DIP — Ductile Iron Pipe
RCP — Reinforced Concrete Pipe
CI — Cast Iron
HDPE — High Density Polyethylene
SS — Stainless Steel

Note: Facilities listed do not include information on pipeline appurtenances such as valves, electronic monitoring equipment, and flow measuring devices.

TABLE III
FACILITIES TO BE BUILT, IMPROVED, OR EXPANDED THROUGH 2029

Project Name	Function	Potential Capacity (mgd)	Projected Construction Start – End Dates	Location	Financing
South Pasco Wellfield Treatment Improvements	Treatment	28	FY's 2026-2027	South Pasco Wellfield, Pasco County	Revenue Bonds
Southern Hillsborough County Supply Expansion: Booster Pump Station – Brandon Booster Station	Booster Pump Station	20	FY's 2022-2024	Southern Hillsborough County	Capital Improvement Fund (CIF) & SWFWMD Co-funding
Southern Hillsborough County Supply Expansion: Pipeline-Segments A and B	Transmission Main	60-65	FY's 2026-2029	Southern Hillsborough County	Capital Improvement Fund (CIF) & Revenue Bonds, Uniform Rate Funds, SWFWMD Co-funding, and Hillsborough County Contribution
System Configuration III - Regional Surface Water Treatment Plant Expansion with Existing Source Water	Potable Water Supply	10-15	FY's 2024-2027	Hillsborough County	Revenue Bonds
South Hillsborough Production Well	Potable Water Supply	2.3	FY's 2023-2025	Southern Hillsborough County	Revenue Bonds

TABLE IV
PROPOSED FACILITY RENEWAL AND REPLACEMENT THROUGH 2032

Project Name	Location	Date Schedule to Begin - End
Alafia Pump Station Motors	Alafia River Pump Station, Hillsborough County	FYs 2025-2028
BUD 5 Chemical Piping Replacement	Brandon Urban Dispersed Wells and Water Treatment Plants, Hillsborough County	FYs 2023-2026
BUD Wells Pumps and Motors Replacement	Brandon Urban Dispersed Wells and Water Treatment Plants, Hillsborough County	FYs 2024-2026
C.W. Bill Young Regional Reservoir-Compressors Replacement	C.W. Bill Young Regional Reservoir, Hillsborough County	FYs 2022-2024
C.W. Bill Young Regional Reservoir-Dissolved Air Lines Replacement	C.W. Bill Young Regional Reservoir, Hillsborough County	FYs 2022-2024
Carrollwood Pumps and Motors Refurbishment	Carrollwood Wellfield, Hillsborough County	FYs 2025-2028
Carrollwood Wells Electrical Improvement	Carrollwood Wellfield, Hillsborough County	FYs 2026-2028
Cosme-Odessa Wellfield Improvements	Cosme-Odessa Wellfield, Hillsborough County	FYs 2023-2026
Cypress Bridge Wellfield Improvements	Cypress Bridge Wellfield, Hillsborough and Pasco Counties	FYs 2019-2024
Cypress Creek Pump Station Variable Frequency Drives	Cypress Creek Pump Station, Pasco County	FYs 2022-2025
Cypress Creek Roads and Security Upgrades	Cypress Creek, Pasco County	FYs 2026-2029
Cypress Creek Water Treatment Plant 72-Inch Valve	Cypress Creek Water Treatment Plant, Pasco County	FYs 2022-2026
Cypress Creek Water Treatment Plant Chemical Piping Replacement	Cypress Creek Water Treatment Plant, Pasco County	FYs 2022-2025
Cypress Creek WF Pumps and Motors	Cypress Creek Wellfield, Pasco County	FYs 2022-2027
Cypress Creek Water Treatment Plant Stationary Generators	Cypress Creek Water Treatment Plant, Pasco County	FYs 2023-2024
Cypress Creek Water Treatment Plant Yard Piping Valves	Cypress Creek Water Treatment Plant, Pasco County	FYs 2023-2027
Eldridge Wilde Wellfield Treatment Improvements	Keller Hydrogen Sulfide Removal Facility, Pinellas County	FYs 2027-2032
Eldridge-Wilde Wellfield Pumps and Motors Replacement	Eldridge-Wilde Wellfield, Hillsborough and Pinellas Counties	FYs 2016-2023
Harney Pump Station Pumps and Motors Replacement	Harney Pump Station, Hillsborough County	FYs 2017-2027
High Service Pump Station Ball Valve Replacement	Regional High Service Pump Station, Hillsborough County	FYs 2016-2026
High Service Pump Station Chemical Piping Replacement	Regional High Service Pump Station, Hillsborough County	FYs 2017-2024
Lake Bridge Chemical Piping Replacement	Lake Bridge Water Treatment Plant, Hillsborough County	FYs 2016-2023
Lake Bridge Pumps and Motors	Lake Bridge Water Treatment Plant, Hillsborough County	FYs 2025-2028
Morris Bridge Booster Station Pumps 1 and 2 Replacement	Morris Bridge Booster Station, Hillsborough County	FYs 2024-2027

Note: Projects have multiple funding sources including Renewal and Replacement, Revenue Bonds, Energy Funds, and Capital Improvement Funds.

Project Name	Location	Date Schedule to Begin - End
Morris Bridge Chemical Piping Replacement	Morris Bridge Booster Station, Hillsborough County	FYs 2022-2026
Morris Bridge Underground Powerline	Morris Bridge Wellfield, Hillsborough County	FYs 2023-2027
Morris Bridge Wellfield Improvements	Morris Bridge Wellfield, Hillsborough County	FYs 2014-2025
Northwest Hillsborough Wellfield Improvements	Northwest Hillsborough Wellfield, Hillsborough County	FYs 2022-2028
Odessa Booster Station Pumps Replacement	Odessa Booster Station, Pasco County	FYs 2025-2028
Repump Station Generator	Regional Facilities Site, Hillsborough County	FYs 2028-2030
Repump Station Variable Frequency Drives	Regional Facilities Site, Hillsborough County	FYs 2024-2027
South Pasco Wellfield and Treatment Improvements	South Pasco Wellfield and Treatment Plant, Pasco County	FYs 2016-2027
South Pasco Wellfield Underground Commercial Powerline	South Pasco Wellfield and Treatment Plant, Pasco County	FYs 2022-2026
Starkey Wellfield Improvements	Starkey Wellfield, Pasco County	FYs 2014-2029
Surface Water Treatment Plant: Renewal and Replacement Program-Placeholder	Surface Water Treatment Plant, Hillsborough County	FYs 2022-2030
Tampa Bay Desalination Plant Belt Filter Press Replacement	Tampa Bay Desalination Water Treatment Plant, Hillsborough County	FYs 2028-2030
Tampa Bay Desalination Plant Piping Replacement	Tampa Bay Desalination Water Treatment Plant, Hillsborough County	FYs 2026-2028
Tampa Bay Desalination Variable Frequency Drives Replacement	Tampa Bay Desalination Water Treatment Plant, Hillsborough County	FYs 2017-2026
Tampa-Hillsborough Interconnect Pump Station	Tampa-Hillsborough Interconnect Pump Station, Hillsborough County	FYs 2028-2030
Tampa Bypass Canal (MLK) Pumps Refurbishment	Tampa Bypass Canal Pump Station, Hillsborough County	FYs 2023-2026

TABLE V- POTENTIAL FACILITIES AVAILABLE TO MEET 20-YEAR WATER SUPPLY NEEDS

Project	Function	Project Type	Potential Capacity	Location	Potential Financing
Tampa Bay Water is currently updating the Long-term Master Water Plan which will identify a short-list of potential new water supply projects that will be considered for future feasibility studies. The 2023 Long-term Master Water Plan will be completed by December 2023.	Potable water supply	System Configuration and Supply Planning	10-20mgd	Multiple	To Be Determined

OVERALL FINANCING FOR EXPANSION PROJECTS

Tampa Bay Water has financed projects through Utility System Revenue Bonds that are secured by a pledge of and lien upon the net revenues derived from the operation of Tampa Bay Water's utility system. Tampa Bay Water is not limited to this method of financing. Tampa Bay Water has also utilized variable rate demand bonds and the Florida Local Government Finance Commission Commercial Paper Loan Program to finance several of its projects on a short-term basis. Certain projects may be funded through rate collection and through capital contributions. Tampa Bay Water has also been successful in securing funds for projects through the Partnership Agreement with the Southwest Florida Water Management District (District). Historically, the District, State and Federal sources have provided funding for the planning and design of alternative water supply projects. Table VI identifies the projects with current grants or co-funding agreements, including the expected funds to be received. Tampa Bay Water plans to seek co-funding for future water supply facilities.

TABLE VI- SWFWMD GRANT FUNDED/CO-FUNDED PROJECTS

Project No.	Project Name	Grant Total
01609	Southern Hillsborough County Supply Expansion: Booster Pump Station (Brandon Booster Station)	$5,325,000
01610/01616	South Hillsborough Pipeline (Segments A & B)	$145,054,000
07010	Regional Facility Site Pump Station Expansion	$1,200,000
07072	Tampa Bypass Canal Gates Automation	$ 516,000
Totals		$152,095,000

Appendix B. Demand Forecast 2022

Demand Forecast Annual Evaluation and Update

November 2022

Tampa Bay Water has completed the annual demand forecast evaluation for Water Year 2021/2022 and has updated the long-term demand forecast for the agency's seven water demand planning areas to the year 2050.

Tirusew Asefa, Ph.D., P.E., D.WRE, F. ASCE, Tampa Bay Water
Solomon Erkyihun, Ph.D., Tampa Bay Water
Jack Kiefer, Ph.D., Hazen and Sawyer

TAMPA BAY WATER
Supplying Water To The Region

Demand Forecast Annual Evaluation and Update

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Acknowledgments

Receipt of member government billing data allows the agency to use actual data in its development of annual forecasting efforts. Without the provision of these data, the accuracy of the demand forecasts would be severely impacted. The following agencies, along with their identified representatives either coordinating or providing these data, are deeply appreciated by Tampa Bay Water. Thank you!

- Hillsborough County- John McCary
- Pasco County- Dave Hernandez
- Pinellas County- Stanley Pasek/Cristiane Smith/Vertex Group
- City of New Port Richey- Mike Miller
- City of St. Petersburg- Joann Maitri/Lindsey Denzer (wholesale)
- City of Tampa, Chuck Weber

1. Introduction

Tampa Bay Water provides water demand forecasts for its six Member Governments to project and support decisions about the amount of water supply needed within Tampa Bay Water's service area. The Long-Term Demand Forecasting (LTDF) models are designed primarily for the purpose of longer-term planning and forecasting, over 20 to 30-year time horizons. The models follow monthly and yearly time steps, which provide the capability of predicting water use over shorter intervals.

Since 2009, Tampa Bay Water has updated its long-term demand forecast annually to capture changes in socioeconomic trends. This report utilized the LTDF model developed in 2017. In 2019, the probabilistic forecast model was developed to incorporate input data and model uncertainties in the demand forecast. The Agency's 2022 update includes additional member government billing data coupled with updated socioeconomic forecasts on the LTDF models. This model expands the modeling dataset and provides a richer set of potential predictor variables for demand, which are used to develop the LTDF model equations relating these variables and demand (Hazen and Sawyer, 2019). The water demand forecast presented in this report is the fifth update of the 2017 model.

The primary purposes of providing annually updated forecasts for the seven water demand planning areas (WDPAs) of the six-member governments are:

1. Annual budgeting and source allocation – near-term forecasting up to five years into the future.
2. Long-range water supply planning – forecasting median water demands with confidence intervals for at least 30 years into the future.

Development of annual forecasts and comparison with actual water use can assist Tampa Bay Water in learning how to adapt to changes in water use and related weather and socioeconomic conditions. A set of procedures have been developed to conduct an annual evaluation of the predictive capability of the demand forecast models. The updated model predictions incorporate the most recent actual water use data through March 2022 and revised socioeconomic conditions. Tampa Bay Water conducted the base year 2021/2022 (April 2021 to March 2022) update with recommendations provided by Hazen and Sawyer, who was previously contracted to develop the demand models and supported Tampa Bay Water in developing the modeling and forecasting datasets. The April 2021 to March 2022 period will be referred to hereafter as the Base Year.

Retail demand is modeled using three sector-specific models: Single Family (SF), Multi Family (MF) and Non-Residential (NR) econometric models (Hazen and Saywer, 2019). Each model generates demand forecasts based on specific weather and socioeconomic projections for each of the Water Demand Planning Areas (WDPAs) with uncertainties generated from the model input variables and the models themselves. Sector-specific models satisfy the need for modeling retail demand on a member-by-member basis. From these results, sector-specific results can be aggregated as needed into various time periods and geographic delineations.

Tampa Bay Water's annual demand forecasting evaluation procedure is used to perform a comparison between the forecasted and actual retail water use for each WDPA. Figure 1 shows the Water Demand Planning Areas. The analysis compares observed water use for the most recent water year equivalent timeframe having a complete data set against the predicted water use for the same year equivalent period calculated as the average of the probabilistically generated demand forecast realizations. This analysis verifies the predictive capability of the demand forecast models and provides information regarding the uncertainty of the socioeconomic projections. Tables 9 through 12 show the performance assessments of the sectoral models.

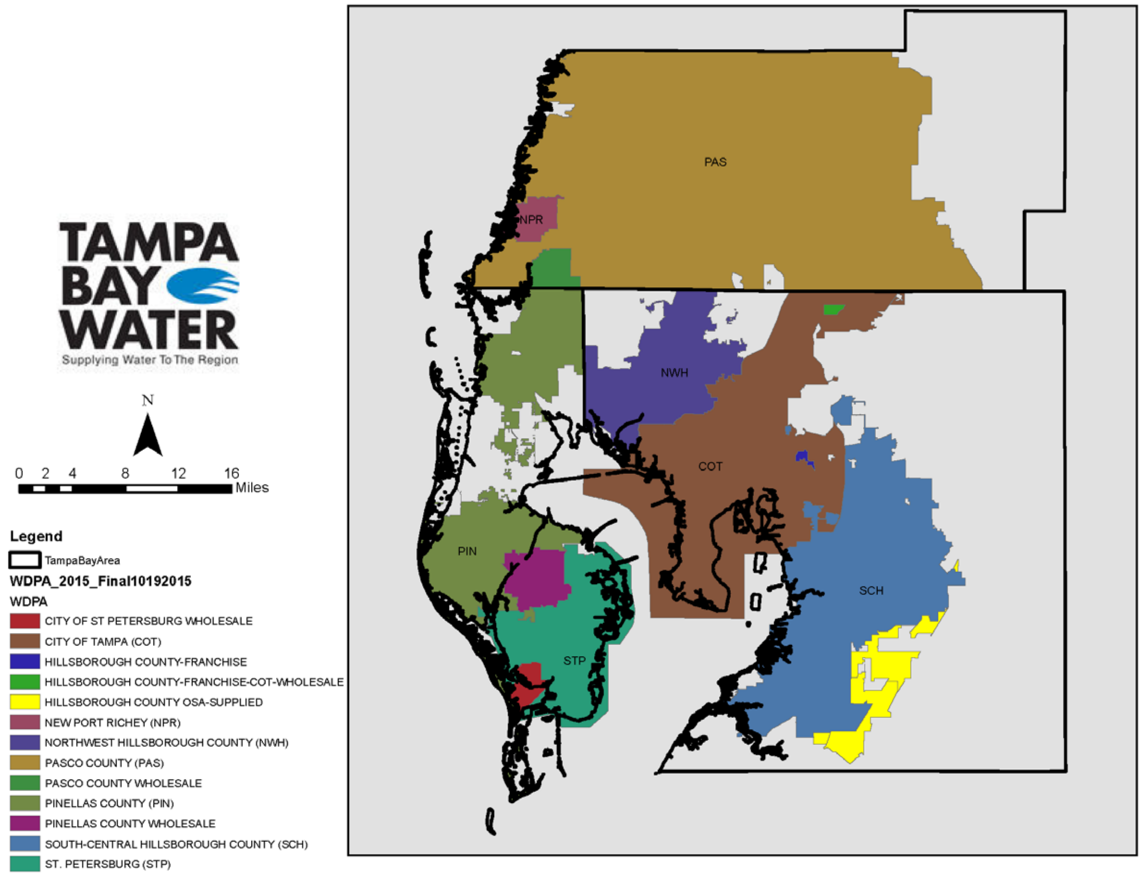

Figure 1. Water Demand Planning Areas

2. Model Predicted Versus Actual Variables for The Base Year

The forecasting models relate water consumption to weather and socioeconomic factors which influence the use of water (e.g., rainfall, temperature, price, income, housing density, persons per household, growth in housing units in the SF and MF sectors, NR square footage, and breakdown of the NR square footage into subsectors). The evaluation of the models requires the collection and processing of recent input data for all the models' factors in the Base Year. For this evaluation, April 2021 to March 2022 was used as the most recent billing data except for the City of Tampa. The City of Tampa billing data was extended from October 2021 to March 2022 to match with the Base Year by using a relationship established between the total billing data and total supply.

The most recent Base Year data needed to complete the annual evaluation include:

- Member government water use data by customer account, including wholesale water delivered by members to their wholesale customers and their self-supply
- Tampa Bay Water delivery and total demand data by WDPA
- The Base Year actual daily temperature and rainfall data (for a list of rainfall and temperature stations used, see Hazen and Sawyer, 2019)
- Updated water rate schedules for each member in effect during the Base Year
- Updated property appraiser data for 2022 (consisting of parcels with land use characteristics, acreage, and characteristics of buildings located on those parcels) and association of water use accounts with the parcels they serve
- Most recent socioeconomic data derived from updated sources including the US Census - American Community Survey (ACS), University of Florida Bureau of Economic and Business Research (BEBR), Moody's Analytics, and population and housing unit projection by the Florida Department of Transportation (FDOT) at Traffic Analysis Zones (TAZ)
    - Single-family (SF) and multi-family (MF) housing units (sector drivers)
    - Persons Per Household (PPH - explanatory variable)
    - Median Household Income (explanatory variable)
    - Housing Density (explanatory variable)
    - Reclaimed Fraction: proportion of accounts with reclaimed water connection (explanatory variable)
    - NR indoor square footage (sector driver)
    - Distribution of total NR indoor square footage in each of ten NR subsectors (explanatory variable)

It is important to note here that the BEBR population projections are provided with three scenarios: low, medium, and high. The low and high projection scenarios correspond to the 12.5 and 87.5 percentile confidence levels of the projection distributions at a given year. In this update, the maximum and minimum demand forecasts are designed to correspond to the 87.5 and 12.5 percentiles of the BEBR population projection. Studying past projections, particularly average forecast deviations from the actual estimate, we found that the total BEBR population projection was consistently underestimating the actual estimate. To account for this, average population projection bias was calculated for 1, 2, …, 10 years as a deviation of the projected population from the actual estimate. The deviations are determined for the available historical BEBR data since 2012. The 2022 BEBR population for example, was bias-corrected by the 1-year correction factor since the base year estimate for the 2022 data is 2021. Similarly, the 2023 population is corrected by the 2nd year factor and so on. After 2030, the correction factor was kept constant at the 10th year correction factors until the end of the planning period in 2050.

2.1. Base Year Model Drivers (SF and MF Housing Units and NR Indoor Square Footage)

The forecasting methodology employs a "**rate-of-use-times-driver**" approach for calculating sectoral demands. Each sector-specific model calculates average monthly demand, or **rate of use**, per water consuming entity, or **driver unit.** A different driver unit is defined for each sector (SF, MF and NR). The SF sectoral model calculates retail demand per SF housing unit, with the number of SF housing units serving as a driver unit. Likewise, the MF sectoral model calculates retail demand per MF housing unit, with the number of MF housing units serving as a driver unit. The NR sectoral model calculates retail demand per 1000 square feet (ksf) of indoor area, with numbers of ksf serving as a driver unit. A forecast of demand for any given sector is a simple product of predicted rate of use and the predicted number of driver units.

Table 1 shows driver totals for the three sectors in the Base Year.

- SF housing units are determined based on the number of housing units on SF parcels associated with **active** accounts in Tampa Bay Water's service area. The total number of regional SF housing units was 543,076. The SCH WDPA has the largest number of SF housing units among the water demand planning areas (112,857 that correspond to 20.78% of total regional SF housing estimated based on the Base Year data). COT is the second largest, with 18.97% of total regional SF housing units.

- MF housing units are determined based on the number of housing units on MF parcels associated with active accounts in Tampa Bay Water's service area. The total number of regional MF housing units in the Base Year was 304,667. The Pinellas County WDPA has the largest number of MF housing units among the water demand planning areas (86,542 which is 28.41% of the estimated total MF housing units).

- NR thousands of square feet (ksf) are determined based on the indoor square footage on NR parcels associated with active accounts in Tampa Bay Water's service area. The total regional NR ksf in the Base Year was estimated at 610,408. The City of Tampa has the largest ksf among the water demand planning areas (265,481 that accounts for 43.49% of total estimated ksf).

Table 1. Base Year Driver Units

	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
SF Dwelling Units	**109,448**	**7,501**	**48,187**	**112,859**	**103,041**	**86,542**	**75,497**	**543,076**
MF Dwelling Units	**21,426**	**5,075**	**23,504**	**33,053**	**84,157**	**78,113**	**59,339**	**304,667**
NR (units of 1000 ft^2)	**52,587**	**6,861**	**30,821**	**70,948**	**265,481**	**90,883**	**92,827**	**610,408**

2.2. Explanatory Variables

Each sectoral model has a set of explanatory variables that explains the monthly rate of water use by sector and WDPA. Examples of explanatory variables include rainfall, temperature, real median household income, real marginal price, persons per household, fraction of reclaimed water use, housing unit density, and the NR sub-sector fraction (or percentage) of the total NR ksf. By conducting regression analyses on historic water use, weather, and socioeconomic data, coefficients for each explanatory variable are estimated to measure the relationship between the explanatory variable and the per unit sector water use, which vary by month and by geographic area (such as WDPAs)[1] .

[1] For a detailed discussion of the development of the long-term demand forecast models and their coefficients, see Hazen and Sawyer, 2019.

2.2.1. Persons Per Household

Information used to determine the Base Year SF and MF persons per household (PPH) was obtained from the American Community Survey (ACS). This source provides estimates of SF and MF households and residents at a small geographic scale (Block Group). These data are then mapped to WDPAs (a larger geographic scale) and summed to determine SF and MF population, number of households, and subsequently the PPH is calculated at the WDPA level.

Table 2 shows the Base Year SF and MF Person Per Households. SF PPH ranges from 2.29 for the New Port Richey WDPA to 2.79 for the Northwest Hillsborough WDPA. MF PPH ranges from 1.69 for the Pinellas WDPA to 2.27 for the South Central Hillsborough WDPA. These values exhibit a similar pattern to values encountered in prior forecast updates.

Table 2. Base Year SF and MF Persons Per Household

	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
SF	**2.53**	**2.29**	**2.79**	**2.78**	**2.66**	**2.38**	**2.55**	**2.57**
MF	**2.01**	**1.8**	**2.16**	**2.27**	**2.06**	**1.69**	**1.71**	**1.96**

2.2.2. Real Median Household Income

The Base Year median household income was obtained from the ACS. This source provides estimates of the total number of households within various income ranges at a small geographic scale (Block Group). These data are then mapped to WDPAs (a larger geographic scale) and summed to determine the number of households within income ranges at a WDPA level. These range totals are then used to estimate Median Household Income in each WDPA. Finally, to account for the effects of inflation, Median Household Income estimates are then adjusted to 2015 dollars[2] to determine values for *Real* Median Household Income using Consumer Price Index data from the Bureau of Labor Statistics. Note that Real Median Household Income is not differentiated by SF or MF sector; it is determined across the geographic areas for the residential sector.

Table 3 shows Real Median Household Income by WDPA. Values range from $33,471 in New Port Richey to $63,160 in Northwest Hillsborough.

[2] The sectoral models are developed with 2015 dollars as the basis. This adjustment is required to be consistent with the model input requirement.

Table 3. Base Year Real Median Household Income and Real Marginal Price by WDPA, in 2015 dollars

WDPA	Real Median Household Income	Real Marginal Price of Water and Sewer at 8001 gallons monthly consumption
PAS	50,319	8
NPR	33,471	8
NWH	63,160	9
SCH	58,463	9
COT	44,932	9
PIN	51,096	9
STP	49,356	14
TBW	50,114	9

2.2.3. Real Marginal Price (RMP)

Information to determine values for Real Marginal Price (RMP) for each WDPA is taken from Member Government rate structures in effect during the Base Year. First, marginal price is determined by summing three components:

- the SF volumetric water rate (price per thousand gallons of consumption of potable water for the residential sector) at the rate tier containing 8001 gallons per month[3]
- the SF volumetric sewer rate (price per thousand gallons of consumption of potable water for the residential sector)[4]
- any volumetric Tampa Bay Water "pass through" charges.

RMP is meant to portray the incremental cost of consumption. Note that fixed charges or total charges at tiers below those containing 8001 gallons are not used in determining the RMP for the demand forecasts. In addition, only the SF RMP is used in model development as well as forecasting future water demands and is therefore considered an instrument for capturing

[3] In cases where tiers are not defined, the single volumetric price per thousand gallons is used. In cases where rates are differentiated by customer location, the "In Retail Service Area" rate is used.

[4] No Member Governments have differentiated sewer rates at the level of 8001 gallons potable consumption per month. In cases where rates are differentiated by customer location, the "In Retail Service Area" rate is used.

pricing trends. The SF RMP is applied in all three sectors. RMP is only differentiated between WDPAs[5] and is projected to increase by 0.8% annually.

Table 3 also shows Real Marginal Price by WDPA for the Base Year. Values range from $8 per kgal in Pasco to $14 per kgal in St. Petersburg.

2.2.4. SF and MF Housing Densities

SF and MF Housing density variables are defined as the average number of housing units per acre and are based on 2022 property appraiser unit and acreage data for parcels associated with SF- and MF-classified accounts. These data are shown in Table 4. Values for SF Density range from 2.52 units per acre in Pasco to 5.05 units per acre in St. Petersburg. Values for MF Density ranges from 5.38 units per acre in Pasco to 56.01 units per acre in the City of New Port Richey.

Table 4. Base Year SF and MF Housing Densities

WDPA	SF Housing Density (Units/Acre)	MF Housing Density (Units/Acre)
PAS	**2.52**	**5.38**
NPR	**5.01**	**56.01**
NWH	**3.07**	**7.60**
SCH	**3.27**	**8.32**
COT	**4.58**	**17.51**
PIN	**3.24**	**9.67**
STP	**5.05**	**7.56**

2.2.5. Fraction of SF, MF, and NR Water Use Locations with Reclaimed Service[6]

Reclaimed water use is accounted for in the demand forecast models by WDPA and sector. The parameter is the fraction of accounts that use or have access to reclaimed water. Data for fraction of the Base Year SF and NR water use locations with reclaimed water service are taken from member government billing data. Within each sector and WDPA, the reclaimed

[5] This convention of using SF rates as an instrument for price was adopted as a matter of modeling convenience. In reality, water rates may differ between sectors now and in the future, but as rates rise in general, they should rise for other sectors as well.

[6] The MF sector does contain accounts with access to reclaimed water. However, the reclaimed fraction variable was found to be a significant variable only in the SF and NR sector models of the revised LTDFS.

fraction is derived as the proportion of all water use locations that have at least one reclaimed connection[7]. Base year Reclaimed Fractions are shown in Table 5.

Table 5. Base Year fraction of reclaimed water locations (SF, MF and NR)

	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
Percentage of SF Locations with Reclaimed	15.59%	2.83%	27.09%	10.29%	4.12%	24.95%	14.94%	14.26%
Percentage of MF Locations with Reclaimed	0.65%	0.43%	10.79%	0.97%	4.24%	35.78%	5.43%	8.33%
Percentage of NR Locations with Reclaimed	0.75%	6.46%	21.77%	13.99%	3.77%	19.22%	9.41%	10.77%

2.2.6. NR Square Footage Fractions in Subsectors

Tampa Bay Water's 2013 Demand Management Plan (DMP) defined ten specific NR subsectors (DMP Subsectors) most critical to tracking and addressing water conservation potential through active conservation efforts and passive efficiency increases. The LTDF models adopt these same subsectors as classifications for describing how total NR square footage is distributed and represents a proxy for measuring differences in the mix of commercial, industrial, and institutional activity across the region. The fraction of total NR square footage within each DMP subsector is determined for the Base Year using property appraiser data for parcels linked to NR-classified accounts as follows:

- NR parcels linked to Base-Year accounts are further classified into DMP subsectors using land use information
- Total indoor square footage for each DMP subsector and WDPA is determined by summing indoor square footage across parcels in that subsector and WDPA, and
- Sub-sectoral fractions are determined by dividing square footage for each subsector and WDPA by total NR square footage for the WDPA.

Table 6 contains square footage fractions by WDPA and DMP sector for the Base Year.

[7] The concept of "water use locations" is discussed in Hazen and Sawyer, 2019.

Table 6. DMP Subsector Square Footage Fractions for the Base Year

WDPA	Education	Government	Health Care	Heavy Manufacturing	Hotels, motels	Light Manufacturing	Office Buildings	Restaurants and Fast Food Outlets	Retail Stores	Retirement	Other
PAS	0.1669	0.0396	0.0934	0.0096	0.0151	0.0339	0.0509	0.0116	0.2473	0.0104	0.3212
NPR	0.1369	0.0552	0.1299	0.0000	0.0354	0.0015	0.0901	0.0175	0.1887	0.0545	0.2903
NWH	0.1370	0.0232	0.0470	0.0071	0.0062	0.0190	0.1294	0.0115	0.2738	0.0328	0.3129
SCH	0.1763	0.0256	0.0731	0.0239	0.0096	0.0157	0.0648	0.0121	0.2222	0.0289	0.3477
COT	0.0708	0.0937	0.0501	0.0179	0.0399	0.0322	0.1685	0.0079	0.0860	0.0037	0.4294
PIN	0.0800	0.0835	0.0447	0.0211	0.0698	0.1501	0.1115	0.0121	0.1254	0.0486	0.2532
STP	0.0984	0.0611	0.0705	0.0128	0.0254	0.0832	0.2182	0.0082	0.1229	0.0423	0.2570
TBW	0.1238	0.0546	0.0727	0.0132	0.0288	0.0480	0.1191	0.0115	0.1809	0.0316	0.3160

2.2.7. Efficiency Factors

The efficiency factor is an indexed annual value that reflects estimates of the degree of market penetration of new high-efficiency water fixtures in the SF sector by WDPA due to natural fixture deterioration and replacement. Market saturation levels for 2014 are given an index value of 1, while greater saturation levels are given lower index values (less water used based on more efficient technology) following assumed market penetration rates from 2015 to 2050.

This demand update incorporates water savings due to passive efficiency increases. The efficiency factors can be reduced to values less than 1 based on the agency's Demand Management Plan study. This will allow evaluating the effects of passive replacement of future efficient fixtures on future demand projections.

2.2.8. Weather Variables (Rainfall and Temperature)

Input data for the weather variables include both Base Year weather data and long-term average weather data for the model parameters. All weather data are log transformed as inputs into the long-term demand forecasting models. Details are explained in Hazen and Sawyer, 2019.

Table 7 shows departure of the Base Year actual monthly rainfall from the long-term average. The table also highlights the spatial variability of rainfall in Tampa Bay Water's service areas. Green shading indicates that the actual rainfall was above the long-term average. Red shading indicates that the actual rainfall was less than the long-term average. As shown in Table 7, annual rainfall indicates that the WDPAs received slightly above average rainfall in the Base Year period: however, departures from normal rainfall vary by month. May 2021 was the driest month and July 2021 was the wettest month in the Base Year period. All service areas from December 2021 to February 2022 consistently received lower than average rainfall.

Table 7. Base Year actual minus long-term average rainfall (inches)

Year	PAS	NPR	NWH	SCH	COT	PIN	STP
4/30/2021	1.090	2.064	1.337	0.964	0.985	1.205	-0.282
5/31/2021	-2.486	-2.659	-2.343	-1.790	-2.311	-1.986	-2.414
6/30/2021	1.787	3.251	3.914	1.780	1.777	2.619	-0.214
7/31/2021	5.574	4.857	1.702	1.486	3.319	1.427	4.422
8/31/2021	4.157	1.048	-0.202	-1.899	1.742	1.026	3.340
9/30/2021	1.312	1.113	1.563	1.661	1.620	2.264	1.590
10/31/2021	-0.377	-0.139	-0.446	-0.153	0.081	-0.278	0.621
11/30/2021	1.398	1.332	1.809	1.877	1.382	1.718	1.190
12/31/2021	-1.625	-1.644	-1.577	-1.437	-1.456	-1.105	-1.565
1/31/2022	-1.357	-1.014	-1.211	-1.155	-0.945	-0.913	-0.747
2/28/2022	-1.890	-1.869	-1.731	-1.403	-1.552	-1.250	-1.561
3/31/2022	0.317	1.741	0.353	-0.445	0.422	0.003	0.114
Average	**0.658**	**0.673**	**0.264**	**-0.043**	**0.422**	**0.394**	**0.374**

Notes: Negative numbers means actual rainfall was less than long-term average for each month. Red shading indicates rainfall less than average (darker the shading = less rainfall). Green shading indicates rainfall greater than average (darker the shading = more rainfall). The Base Year rainfall total departures are positive indicating that all WDPAs have received above average rainfall except for SCH during the one-year period from April 2021 to March 2022. The departures from long term average for all WDPAs are close to the long-term average with values range from 0.043 below average in SCH to 0.67 in NPR.

Table 8 shows the departure of maximum temperature from the long-term average maximum temperatures in each WDPA. In general, temperature was recorded to be above the long-term average values. In the Base Year, all WDPAs experienced close to average maximum temperatures on an annual average basis.

Results shown in Tables 7 and 8 indicate that the Base Year weather conditions were close to long-term average, slightly wetter (except for SCH) and slightly hotter than the long-term average values for all WDPAs. Wetter conditions tend to decrease water demand due to reduced outdoor water use for lawn maintenance. Hotter than average temperature conditions trigger increased water use. The base year weather combinations (slightly wetter and hotter than average conditions) favor a slight increase in water demand.

Table 8. Base Year actual minus long-term average of maximum temperatures (Fahrenheit)

Year	PAS	NPR	NWH	SCH	COT	PIN	STP
4/1/2021	-0.014	-0.010	-0.010	-0.003	-0.010	-0.012	-0.010
5/1/2021	0.018	0.018	0.018	0.039	0.016	0.027	0.017
6/1/2021	0.003	0.003	0.004	0.015	0.003	-0.004	0.003
7/1/2021	-0.002	0.004	0.006	0.007	0.003	0.000	0.003
8/1/2021	0.003	0.004	0.005	0.010	0.002	0.000	0.003
9/1/2021	-0.009	-0.006	-0.005	0.001	-0.004	-0.011	-0.004
10/1/2021	0.018	0.022	0.021	0.028	0.030	0.021	0.029
11/1/2021	-0.046	-0.038	-0.032	-0.033	-0.050	-0.043	-0.049
12/1/2021	0.075	0.097	0.107	0.087	0.074	0.087	0.074
1/1/2022	-0.014	-0.001	0.001	-0.003	0.005	-0.014	0.004
2/1/2022	0.026	0.035	0.042	0.033	0.026	0.018	0.026
3/1/2022	0.021	0.029	0.052	0.044	-0.050	0.029	-0.043
Average	**0.007**	**0.013**	**0.017**	**0.019**	**0.004**	**0.008**	**0.004**

Notes: Negative numbers mean actual temperatures were cooler than long-term daily maximum averages. Green shading indicates temperature cooler than average (darker green = much cooler). Red shading indicates temperature warmer than average (darker red = much warmer). The Base Year average temperatures for all WDPAs were warmer than average during the April 2021 – March 2022 one-year period.

Seasonal differences between actual weather and long-term normal weather are used to predict future water use. Since long-term normal weather is assumed in all future months throughout the forecast period, observed water use in any future year will differ from the forecast, in part, due to actual weather conditions for that year.

Warmer and drier than normal weather conditions lead to higher water use (high extreme), while cooler and wetter than normal conditions lead to lower water use (low extreme). The current Base Year weather conditions (close to average) lie somewhere within these two extremes. indicating minimal influence of weather conditions on water demand. The overall demand, however, will be determined by the overall effects of other variables that influence water use.

3. Base Year Predicted Versus Actual Water Use Results

The demand forecast models are verified each year by comparing the prior year demand forecast to the actual observation in the Base Year. Then, the accuracies of the prior year predictions are assessed by replacing prior-year projections for driver units and explanatory variables with the Base Year observations and noting how prediction accuracy changed with these substitutions.

This process allows the model to be verified each year by measuring the total deviation of the prior year's forecast from the demands that eventually occurred. This process also notes the portions of this overall deviation that arose from inaccuracy in projection inputs versus inaccuracy in the model itself. Tables 9 through 12 show the predictive performance of the prior year forecast by comparing the predicted and observed water demands in the 2022 forecast Base Year (April 2021 – March 2022).

This process is used to evaluate two questions

1. Should the coefficients of the demand models be updated?
2. Should the models be calibrated to the new Base Year prior to updating the long-term forecast?

The forecast model for the SF sector, shown in Table 9, captured the regional water demand with a forecast deviation of -3.21 MGD (under-estimated actual demand) which is -2.63% of the total observed SF water demand. Since this model is developed as one regional water demand forecast model, deviations across all the service areas are not in the same order of accuracy. The largest percent deviation was observed in the City of New Port Richey at -20.16 % (-0.26 MGD) followed by the City of St. Petersburg at -10.91% (-1.11 MGD).

With increased population and households in the service area, the SF water demand show an increase from last year. The SF sector was recalibrated last year due to increased water demand in the SF residential sector. This increase in demand was because of the COVID-19 situation and greater remote work from home. The COVID-19 effect can be seen as an outlier and may trigger the need to adjust the calibration parameters to reflect the most recent demand pattern in this sector.

Table 9. SF Demand Observations and Model Predictions for the Base Year (MGD)

WDPA	Observed	Estimated	Estimated minus Observed	Percent Error
PAS	23.43	23.40	-0.03	-0.14%
NPR	1.28	1.02	-0.26	-20.16%
NWH	12.30	12.35	0.05	0.41%
SCH	33.82	32.05	-1.76	-5.21%
COT	24.66	24.68	0.02	0.08%
PIN	16.38	16.26	-0.12	-0.73%
STP	10.13	9.02	-1.11	-10.91%
TBW	122.00	118.79	-3.21	-2.63%

The total MF demand forecast (Table 10) is estimated to have an overall deviation of 4.18% which is higher than the SF sector deviation. The MF model overestimated the Base Year regional demand by 2.05 mgd.

Table 10. MF Demand Observations and Model Predictions for the Base Year (MGD)

WDPA	Observed	Estimated	Estimated minus Observed	Percent Error
PAS	2.52	2.52	-0.01	-0.21%
NPR	0.54	0.64	0.10	18.29%
NWH	3.52	3.73	0.21	5.96%
SCH	5.99	6.51	0.52	8.67%
COT	19.00	19.07	0.07	0.38%
PIN	8.60	10.34	1.75	20.30%
STP	8.80	8.21	-0.59	-6.72%
TBW	48.98	51.02	2.05	4.18%

The NR sector is estimated with an overall error percentage of 19.23% (Table 11). The Base Year NR sector water demand is estimated to be 9.71 mgd higher than the observed demand. This is a significantly high value, and this coefficient needs to be corrected to the current Base Year values to minimize the deviation. The City of Tampa constitutes the highest deviation with 5.51 mgd.

Calibration factors derived from lower demand in the non residential sector during the COVID-19 situation resulted in an over-estimation of the of the water demand this year when businesses returned to normal operation.

Table 11. NR Demand Observations and Model Predictions for the Base Year (MGD)

WDPA	Observed	Estimated	Estimated minus Observed	Percent Error
PAS	5.13	6.94	1.81	35.27%
NPR	0.48	0.60	0.11	23.56%
NWH	2.62	2.04	-0.58	-21.99%
SCH	5.31	6.61	1.30	24.47%
COT	22.93	28.44	5.51	24.04%
PIN	7.17	8.22	1.05	14.58%
STP	6.84	7.35	0.51	7.38%
TBW	50.49	60.20	9.71	19.23%

Table 12 illustrates the overall accuracy of the forecast model by comparing the sum of the three sector estimates, retail demand, with the corresponding observed total retail demand in the Base Year. The total predicted demand was overestimated by 3.86% (8.55mgd) higher than the observed total . The majority of this deviation comes from the NR sector.

Table 12. Base Year Total Retail Demand Observations and Model Predictions (mgd)

WDPA	Observed	Estimated	Estimated minus Observed	Percent Error
PAS	31.09	33.00	1.9	6.15%
NPR	2.30	2.25	0.0	-1.94%
NWH	18.44	18.13	-0.3	-1.71%
SCH	45.11	45.17	0.1	0.12%
COT	66.59	68.46	1.9	2.81%
PIN	32.15	34.83	2.7	8.31%
STP	25.77	24.58	-1.2	-4.62%
TBW	221.46	226.42	4.96	2.24%

According to Tables 9-12, model prediction error is on the high side, especially in the NR and SF sectors. The 2021 model estimated the current Base Year SF, MF, NR and total retail water demands with -2.63%, 4.18%, 19.23% and 3.86% errors respectively. This demonstrates the need for the model's calibration factors to be updated to better estimate the current Base Year and forecasted characteristics of water use influencing factors.

The 2022 BEBR population projection data shows a significant increase of the Pasco County population when compared with their 2021 projection. Additionally, the city of Tampa's Water Year 2021 billing data was updated due to inconsistencies found in the billing data in the 2021 water year. Because of this, the calibration factors for the COT and PAS were adjusted based on the 2022 data leaving the rest to be estimated without the need to recalibrate.

Modelling errors are inevitable for larger areas with varying socio-economic conditions. Additional errors also come from uncertainties exhibited in the forecast of socio-economic variables. The uncertainty exhibited in the source data, such as the significant deviation of the BEBR population projection from last year, brought most of the deviations causing higher error percentage enough to trigger the need to recalibrate the model. Further consideration of the input variables through the probabilistic demand forecast modeling process ensures that the process captures both data and model-induced error uncertainties for incorporation in the Base Year forecast. The next section presents an overview of the probabilistic demand forecast modeling approach implemented to generate the future state of water demand with a range of uncertainties.

4. Probabilistic Projections and Forecast

This section provides a summary of the probabilistic demand forecast approach used in this update.

Uncertainties in the modeling results come from the uncertainties in the model input parameters and the inherent error residuals of the models themselves. The future state of water demand in Tampa Bay Water's service areas cannot be predicted with absolute certainty as there are explanatory and driver variables involved in the demand estimate and their future values are not known with certainty. These combined uncertainties will capture the water demand forecasts among the WDPAs with some percentage of uncertainty.

The procedure developed to determine the explanatory and driver variables for the deterministic forecast approach (the approach used in our previous updates) was expanded based on assumptions about the range over which any given variable can vary (including their possible combinations) to incorporate uncertainty in input data. Model error residual, on the other hand, was quantified by producing a complete WDPA-level model residual (or errors) of model predictions from WDPA-level observations and using a probabilistic approach to sample these residuals during forecasting to account for model uncertainty.

A principal design criterion in developing these mechanisms was to ensure, at each step, that the median of any probabilistic forecast would agree with deterministic forecast results.

Where applicable and supported by observations and/or reasonable assumptions, Monte Carlo procedures were implemented to capture cross-correlations between variables as needed.

In the sections that follow, probabilistic input variable procedures (explanatory and driver) are described first, then the model error evaluation (hindcasting and model uncertainty) evaluationsare described. Finally, the full probabilistic forecast is presented incorporating both forms of uncertainty.

4.1. Probabilistic Explanatory and Driver Procedures

Probabilistic projection methods were developed for most (but not all) explanatory and driver variables, including:

- Drivers: SF units, MF units, NR square footage,
- Socioeconomic explanatory variables including:

    - SF and MF persons per household,
    - Real median household income, and
    - Real marginal price of water and sewer,

- Weather variables, and
- SF, MF, and NR efficiency factors.

Due to a lack of suitable uncertainty information, probabilistic projections were not generated for reclaimed fractions, sub-sectoral square footage fractions, or housing density. Only point projections were used for these three variables in probabilistic forecasting.

4.2. Probabilistic Projections from Moody's and BEBR Sources

Procedures developed for the point forecast are generally followed in the probabilistic model. The procedure entails generating all parameters except for price of water using Moody's and BEBR data sources at the county level. The county-level information is then translated to the WDPA-level using FDOT TAZ-level projections. In all cases, variables were point-projected by growing base-year estimates using annual change rates derived from BEBR/Moody's/FDOT amalgamations.

Of the original projected data sources, BEBR and Moody's Analytics contained additional information that either directly expressed or indirectly implied quantitative projection uncertainty.

- The BEBR population projections consisted of low, medium, and high scenarios. According to source documentation, the standard "medium" projection reflected the central tendency for future population, while the high-to-low interval contained the central 75% of likely population outcomes, as indicated by BEBR's internal statistical review of past projections and real outcomes.

- In addition to their projected data, Moody's Analytics provided variables spanning as far back as 1980 (1970 for some variables). Historical data exhibited short-term (annual) fluctuations, often around discernable long-term trends in these variables.

To incorporate uncertainty in driver variables and all selected socioeconomic variables except price, point procedures were expanded to include uncertainty in BEBR and Moody's projections. Population projection scenarios from BEBR and fluctuations from Moody's historical data were used to generate possible source data projections from which WDPA-level model input variables can be generated through the probabilistic approach yielding distributions of explanatory and driver variables. Each of the generated input variables are used to estimate water demand projections by using the point forecast approach. To generate projections of SF and MF dwelling units, NR square footage, SF and MF persons per household, and real median household income, the point projection procedures were then applied, replacing the original single deterministic BEBR and Moody's data with values from multiple samples from the distributions already defined.

4.3. Probabilistic Projections from Other Sources

Probabilistic projection variables not derived from Moody's and BEBR sources included real marginal price, sectoral efficiency factors, temperature departure, and precipitation departure. Price and efficiency factors were projected with independent procedures and were not intercorrelated with one another.

Real Marginal Price. Because of the joint sensitivity of the demand forecast to price and income, several options were possible for specifying uncertainty in price by WDPA and year.

Price was projected for each WDPA and year assuming future values follow a normal distribution with standard deviations corresponding to 3% of the mean and zero cross-correlations (independent sampling) among WDPAs.

Efficiency Factors. The elements of the efficiency factor projection logic which were potentially subject to uncertainty include: distribution of toilets by gallon per flush (gpf) cohort and WDPA, average toilet lifetime, and 1.6 gpf vs 1.28 gpf market fractions in each future year.

The uncertainty is captured by varying market fractions over time, while accepting base-year gpf cohort toilet counts as given and assuming no uncertainty in average lifetimes.

Weather Variables. Unlike other variables which were specified annually in point and probabilistic forecasts, weather departures were the only variables specified by month/year. Weather variability was simulated nonparametrically by sampling historical monthly WDPA weather departures from the long-term weather data then randomly pairing those samples with annual-scale samples of drivers and other explanatory variables.

4.4. Model Uncertainty Simulation in Probabilistic Forecasts

Model residual characteristics from the historical time series of model errors were used to represent model uncertainty in probabilistic forecasts. As with weather, a nonparametric sampling approach was taken wherein 12-month contiguous periods of residuals were sampled from the historical record, e.g., October 2001-September 2002 for all WDPAs as one sample, November 2001-October 2002 for all WDPAs as another, etc. Each 12-month residual sample was randomly assigned to a corresponding sample of driver and explanatory variables for a forecast year.

4.5. Probabilistic Forecast

The probabilistic forecast was therefore composed of multiple samples of predicted demands for each forecast year and month, determined from:

- Sectoral driver unit, sectoral PPH, and median household income samples for each WDPA (annual time steps), jointly sampled to retain correlations among WDPAs and variables,
- Real marginal price samples for each WDPA (annual time steps), sampled independently among WDPAs and independently from other variables,
- Point (or deterministic) projections for reclaimed fractions, NR sub-sectoral square footage fractions, and sectoral housing densities (annual time steps),
- 12-month samples of monthly historical weather for each WDPA (monthly time steps), jointly sampled between weather variables and WDPAs to retain weather correlations and persistence but independently sampled from other variables,
- 12-month samples of monthly total retail residual fractions for each WDPA (monthly time steps), jointly sampled between WDPAs to retain residual correlations and persistence but independently sampled from other variables, and
- Point forecast assumptions for wholesale and unbilled demands.

Each monthly demand sample was formed by applying explanatory and driver variables from the corresponding month and year to sectoral models, summing to produce monthly total retail demand for each WDPA, and then applying wholesale and unbilled assumptions for the final demand estimate.

The mean and median of the Probabilistic Demand Forecast values agreed well with the point forecast.

Due to the growing degree of driver uncertainty with time, model uncertainty has a larger contribution to overall uncertainty in early years. Uncertain drivers produced growing demand uncertainty with time following the BEBR population projection pattern that grows wider with time.

5. Long-Term Demand Forecast Update

The median long-term forecast of demand (i.e., for the years after the Base Year from 2022 - 2050) was produced using revised socio-economic projections and corresponding assumptions when they were not available. The revised median long-term demand forecast will be presented to the Board of Directors, generally each December, and used to estimate how much water Tampa Bay Water budgets for delivery in the upcoming water years.

Data sources used for the Base Year evaluation were:

- Updated American Community Survey (ACS) 5-year average observations over 2016-2020, including statistical estimates at block group level aggregated to WDPA for:
  - Total, Single-family, and Multi-family Population
  - Occupied Single-family and Multi-family Housing Units
  - Median Household Income
- University of Florida Bureau of Economic and Business Research (BEBR) (2022 to 2050 with estimates for 2021)
  - Total population by County
- MOODY'S County-level projections for 2021-2050
  - Total population and households
  - Single-family and multi-family housing stock
  - Total employment and employment by various subsectors
  - Median household income
- FDOT TAZ-level projections for 2015, 2035, and 2045 (updated 2020)
  - Total dwelling units
  - Total population
  - Total employment and employment by various subsectors
- Tampa Bay Water/Members
  - Historical marginal price for water and sewer at 8001 gallons per month for single family residential use (for each member)
  - Base Year consumption and accounts by sector (derived from property appraiser) and WDPA
  - Base Year wholesale and total delivery by WDPA

An interpolated BEBR estimate of total population in Hillsborough, Pasco, and Pinellas counties for 2022 is estimated to be 3.03 million. The total population served by Tampa Bay Water is approximately 2.57 million people, about 84.8 % of the total population. The regional population growth rate through the year 2050 based on BEBR projections is about 1.02 % per year. As shown on Figure 2, population in Pinellas County is projected to grow the least at 0.3% per year through the forecast period through 2050, population for Hillsborough County is projected to increase at 1.26% per year through the forecast period, while population in Pasco County is projected to increase at the highest percentagerate at a 1.57% growth rate per year.

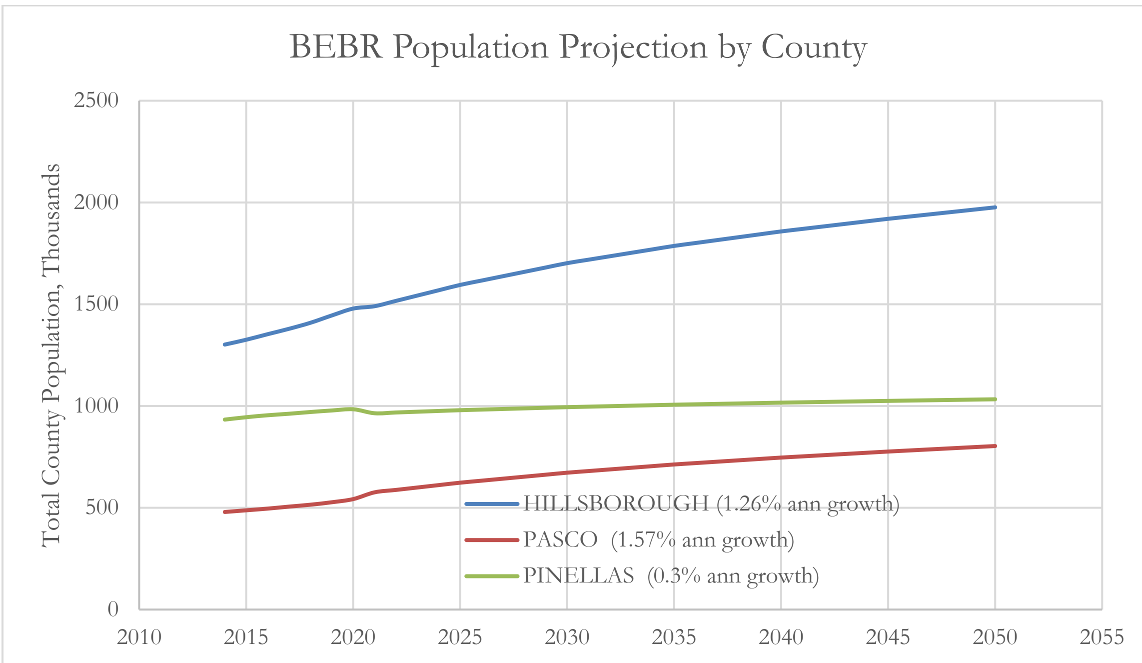

Figure 2. Total County Population Projections.

5.1. Update of Model Variable Projection Data

This section presents results of driver and explanatory variable projections used to develop the updated Base Year long-term demand forecast.

Model input variables, particularly the socioeconomic projection data, are collected first. Explanatory variables are derived from the collected data to determine the unit use of water in each sector (SF, MF and NR) and WDPA. The numbers of units (drivers) for each sector (SF, MF and NR) and WDPA are also projected from the same source data. The unit use of water coupled with the associated drivers generates the calculation of future water demand.

5.1.1. Single-family and Multi-family Units

SF and MF Housing units are projected by growing base-year unit totals according to growth rates derived from BEBR county population projections; Moody's County-level population, number of households, SF and MF sectoral stock projections; historical population and household from American Community Survey (ACS); and FDOT population and housing unit projections by Traffic Analysis Zones (TAZ).

County level population and household projections from data sources listed above are subject to go through a process developed to split the total household and population into the SF and MF populations and households, and further into the seven WDPAs. Population projections between the three sources (BEBR, Moody's, and TAZ) can be similar or different at the rate population grows. A mismatch in the projections between sources can potentially cause uneven split between the SF and MF population and households, but the total estimates remain the same. Based on the data collected this year from BEBR, the Pasco County population was estimated to grow at a much higher rate. This high growth rate coupled with the sectoral household proportion from Moody's data influenced the SF sector units to grow at a much higher rate causing the MF sector units to reduce over time.

The 2022 projections of single-family and multi-family units by WDPA are shown on Figures 3 and 4 and Tables 13 and 14.

- SF housing units are projected to grow from 543,076 units in 2022 to 747,218 units in 2050, a change of 204,142 units (total change of 37.59%, 1.1% per year compounded)

- MF housing units are projected to grow from about 304,667 units in 2022 to 392,170 units in 2050, a change of about 87,503 units (total change of 28.72%, 0.88% per year compounded)

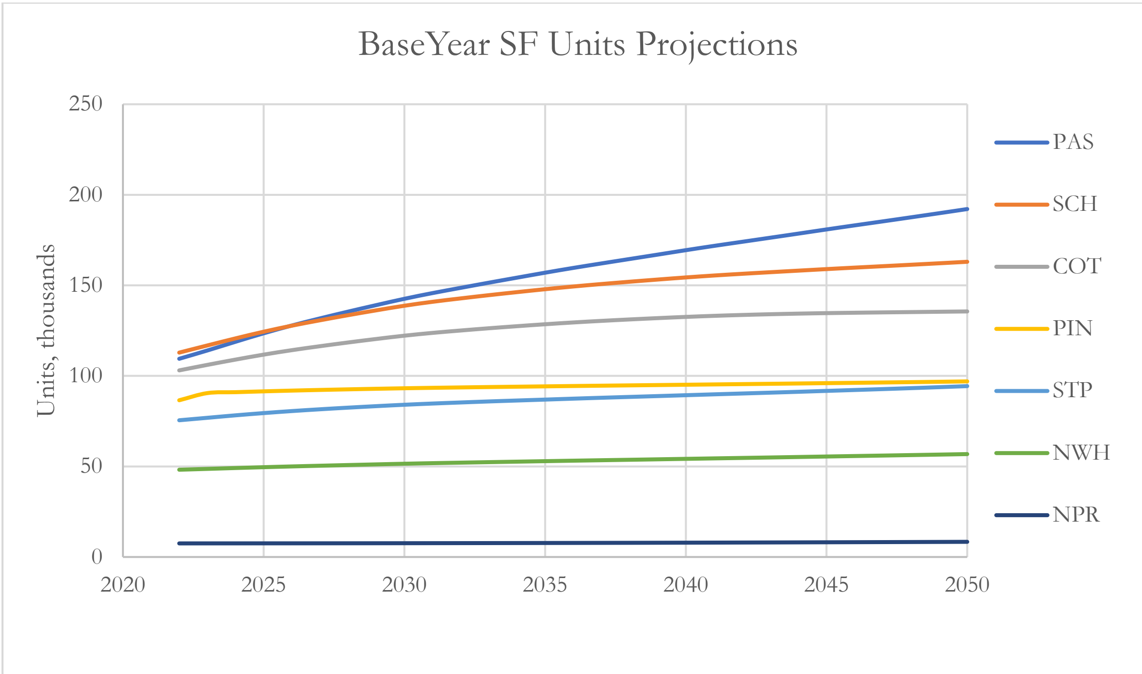

Figure 3. Single-Family Units Projections by WDPA

Table 13. Starting and Ending-year Projections of SF Housing Units for the Base Year Forecast

	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
2022	**109,448**	**7,501**	**48,187**	**112,859**	**103,041**	**86,542**	**75,497**	**543,076**
2050	**192,123**	**8,372**	**56,816**	**163,007**	**135,588**	**96,964**	**94,348**	**747,218**
Change	**82,675**	**871**	**8,629**	**50,147**	**32,547**	**10,422**	**18,851**	**204,142**
% Change	**75.54%**	**11.61%**	**17.91%**	**44.43%**	**31.59%**	**12.04%**	**24.97%**	**37.59%**
Growth Rate	**2.11%**	**0.39%**	**0.59%**	**1.33%**	**0.81%**	**0.27%**	**0.78%**	**1.10%**

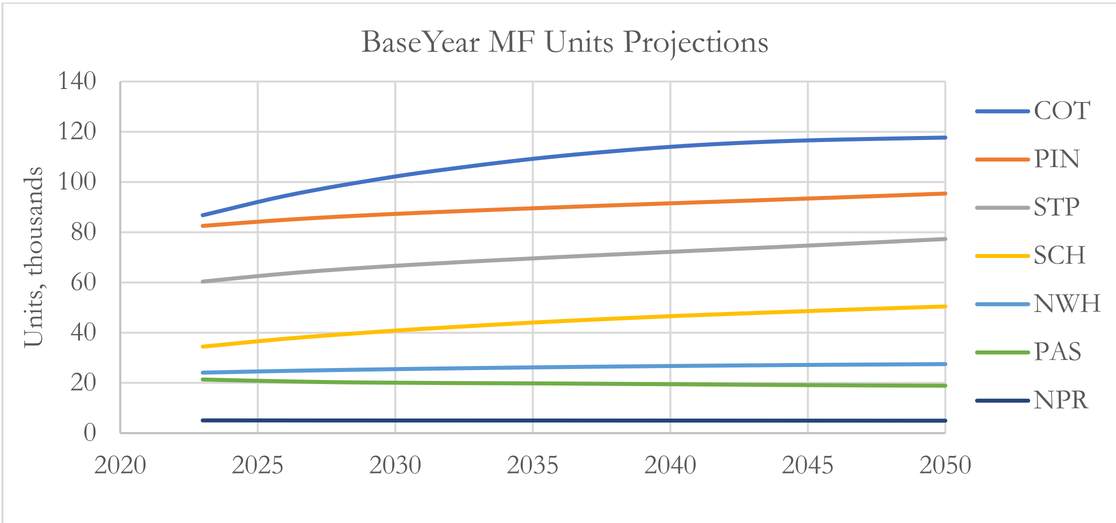

Figure 4. Multi-Family Units Projections by WDPA

Table 14. Starting and Ending-year Projections of MF Housing Units for the Base Year Forecast.

	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
2022	**21,426**	**5,075**	**23,504**	**33,053**	**84,157**	**78,113**	**59,339**	**304,667**
2050	**18,892**	**4,956**	**27,484**	**50,437**	**117,693**	**95,405**	**77,303**	**392,170**
Change	**-2534**	**-119**	**3980**	**17384**	**33535**	**17292**	**17964**	**87503**
% Change	**-11.83%**	**-2.34%**	**16.93%**	**52.59%**	**39.85%**	**22.14%**	**30.27%**	**28.72%**
Growth Rate	**-0.30%**	**-0.10%**	**0.69%**	**1.55%**	**1.18%**	**0.54%**	**0.96%**	**0.88%**

Figure 5 illustrates the projected regional trend, showing projected total SF and MF units over 2022-2050 along with annual average growth rates. In this figure, projections of SF housing units are shown to grow annually at 1.15%, while projections of MF housing units are shown to grow at 0.91% annually over the forecast period. This reflects a projection of new development becoming relatively more dominated by SF dwellings in the future regionally. Prior forecasts have shown similar trends.

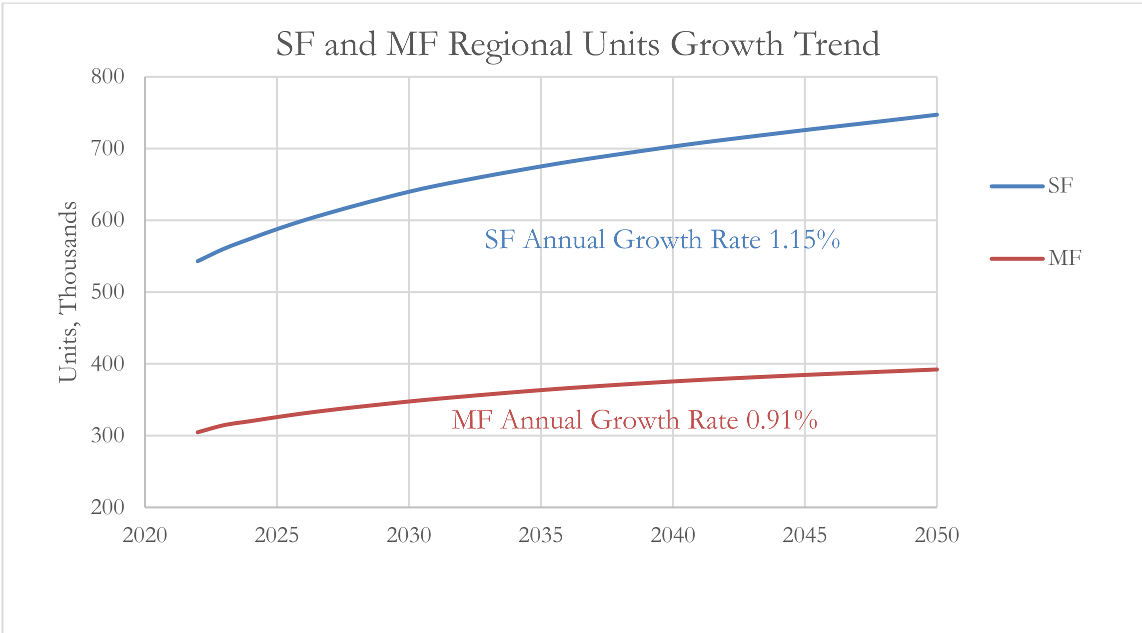

Figure 5. Total Regional Projected SF and MF Housing Units Projections with Annual Average Growth Rates

Figure 6 shows a comparison of total (SF + MF) projected dwelling units in the current Base Year forecast with the projections used in the Base Year 2020/2021 forecast.

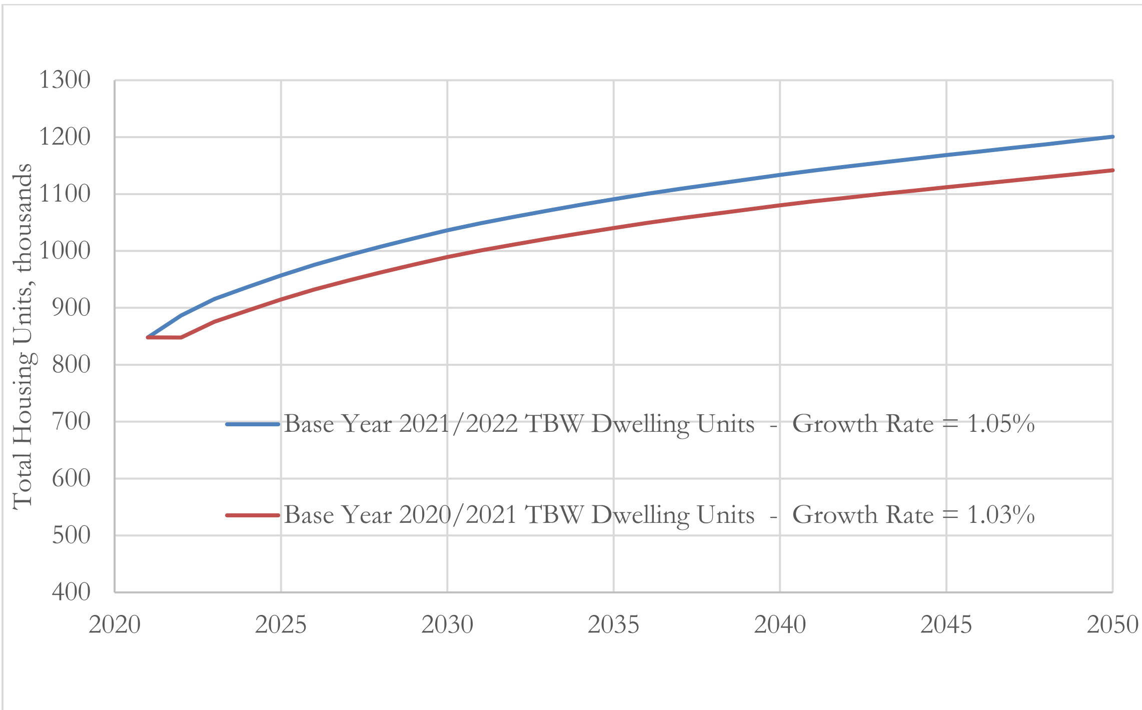

Figure 6. Projections of Total Housing Units in Tampa Bay Water Service Area

The Base Year 2020/2021 Forecast (red line in Figure 6) shows the projected annual growth rate for total number of housing units in the Tampa Bay region was 1.03%. The current Base Year (2021/2022) forecast (blue line in Figure 6) has a slightly higher growth rate with an overall annual growth rate of 1. 05%. Due to changes in the block group classification, the 2020/2021 growth rate was recalculated to compare with the current Base Year.

5.1.2. Non-Residential Square Footage Projections

The Base Year projections of NR square footage (in thousands of square feet or ksf) by WDPA are shown in Figure 7 and Table 15. These projections were developed by growing the Demand Management Plan sub-sectoral square footage totals for the Base Year according to sub-sectoral employment projections compiled from Moody's Analytics and the Florida Department of Transportation, then summing to total square footage. Agency-wide, square footage is projected to grow from about 610,408 ksf in 2022 to 752,888 ksf in 2050, a change of about 142,480 ksf (total change of 23.34%) which is 0.73% per year compounded, lower than the prior year (2010/2021) estimate of 0.82%.

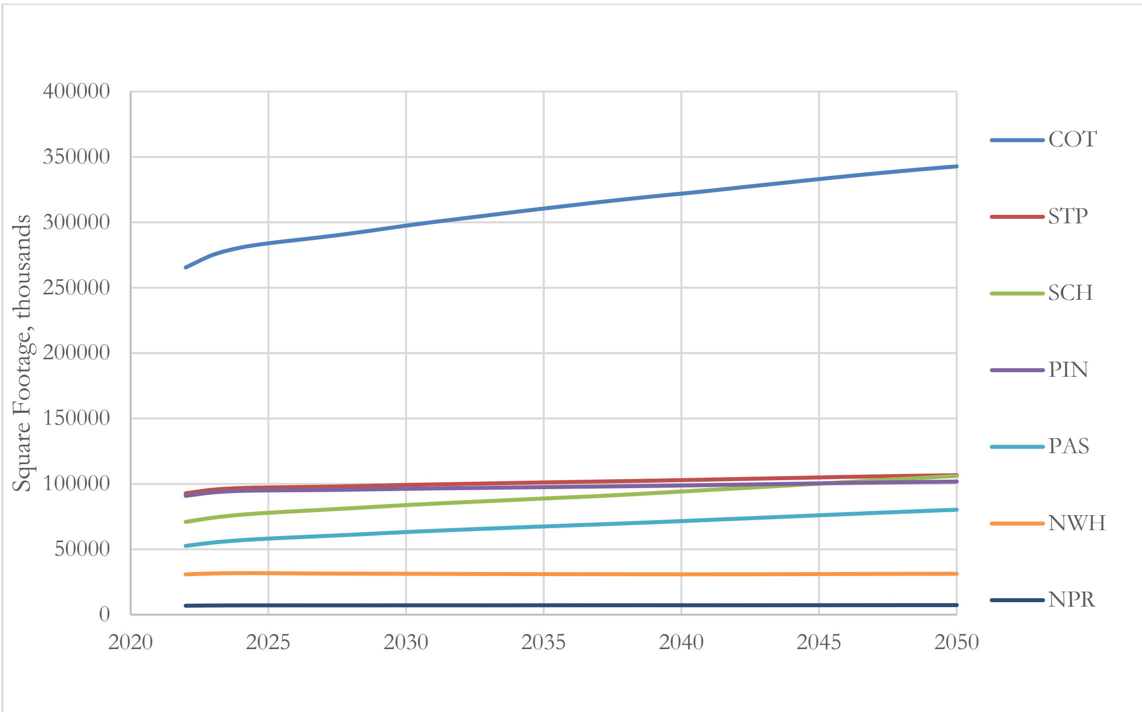

Figure 7. NR Square Footage Projection by WDPA

Table 15. Starting and Ending-year Projections of NR ksf for the Base Year Forecast

	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
2022	52,587	6,861	30,821	70,948	265,481	90,883	92,827	610,408
2050	80,258	7,317	31,295	106,109	342,759	101,785	106,658	752,888
Change	27,671	456	474	35,162	77,278	10,902	13,832	142,480
% Change	52.62%	6.64%	1.54%	49.56%	29.11%	12.00%	14.90%	23.34%
Growth Rate	1.47%	0.22%	0.05%	1.40%	0.88%	0.39%	0.48%	0.73%

5.1.3. Real Median Household Income Projections

Projected real median household income levels for the forecast period are shown in Figure 8 and Table 16. Projected incomes are derived by growing base-year estimates according to Moody's Analytics projections of median income growth for each county and then adjusting to constant dollar terms by assuming 3.2% long-term inflation. At this assumed rate of inflation, real median household income growth rates across the WDPAs ranges between 0.45% and 0.66 % annually. With the same assumed inflation rate, the current estimated growth rate gap between low and high is relatively lower when compared to the prior year estimates which ranged between 0.33% to 84% within WDPAs.

5.1.4. Real Marginal Price of Water and Sewer Projections

Projected real marginal price of water and sewer for the forecast period are shown in Figure 9 and Table 17. Projected prices are derived by growing base-year estimates by 0.8% per year in real dollar terms, which reflects the average annual inflation-adjusted growth rate in real marginal price across all WDPAs over the period 2011-2021. This growth rate is updated from the 1.28% rate that has been used in the previous demand forecast updates.

5.1.5. SF and MF Persons Per Household Projections

SF and MF Persons Per Household (PPH) were projected by:

- deriving annual rates of change in SF and MF PPH from
  - BEBR county population projections,
  - Moody's County-level population, household, and SF and MF sectoral stock projections, and
  - FDOT population and housing unit projections by TAZ (all in tandem with development of dwelling unit projections), then
- applying those rates of change to Base Year SF and MF PPH estimates by WDPA

Results of updated projections of persons per household for the single-family and multi-family sectors for each WDPA are shown in Figures 10 and 11 and Tables 18 and 19.

The PPH projections are estimated to decline from 2.57 in 2022 to 2.35 in 2050, at annual rate of -0.32% for SF sector and from 1.96 in 2022 to 1.79 in 2050 at annual rate of -0.33% for the MF sector.

5.1.6. SF and MF Housing Density Assumptions

Projected SF and MF housing densities are held constant at Base-Year values (Table 4). Over short-term projection periods, average densities for the WDPAs are not likely to rapidly change as most residential units in existence at the end of such periods will have already been in existence in the Base Year. This prevents large changes in WDPA-average density from new incremental development. Until additional information becomes available to project how and when development density will change in the future, the assumption of fixed density is used in this forecast.

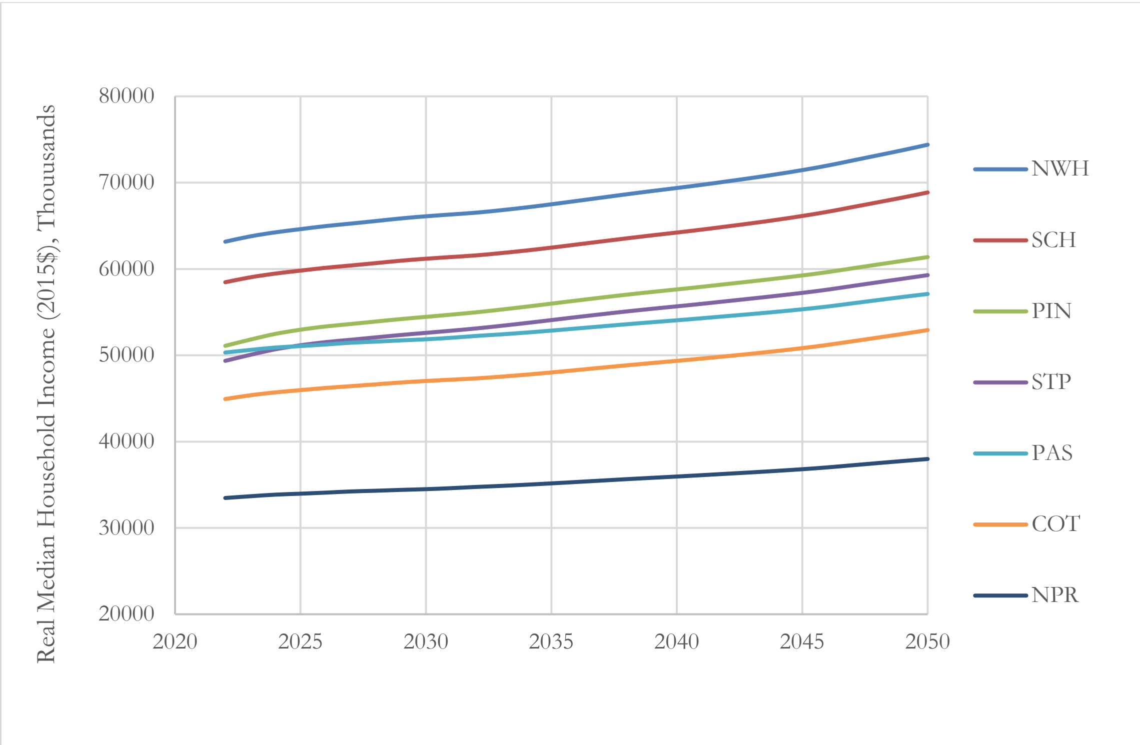

Figure 8. Base Year 2021/2022 Real Median Household Income Projection by WDPA

Table 16. Starting and Ending-year Projections of Real Median Household Income for the Base Year Forecast adjusted to the 2015 dollars at assumed 3.2 percent inflation rate.

	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
2022	50319	33471	63160	58463	44932	51096	49356	50114
2050	57106	37985	74393	68861	52923	61375	59286	56719
Change	6787	4514	11233	10398	7991	10280	9930	6605
% Change	13.49%	13.49%	17.78%	17.78%	17.78%	20.12%	20.12%	13.18%
Growth Rate	0.45%	0.45%	0.59%	0.59%	0.59%	0.66%	0.66%	0.44%

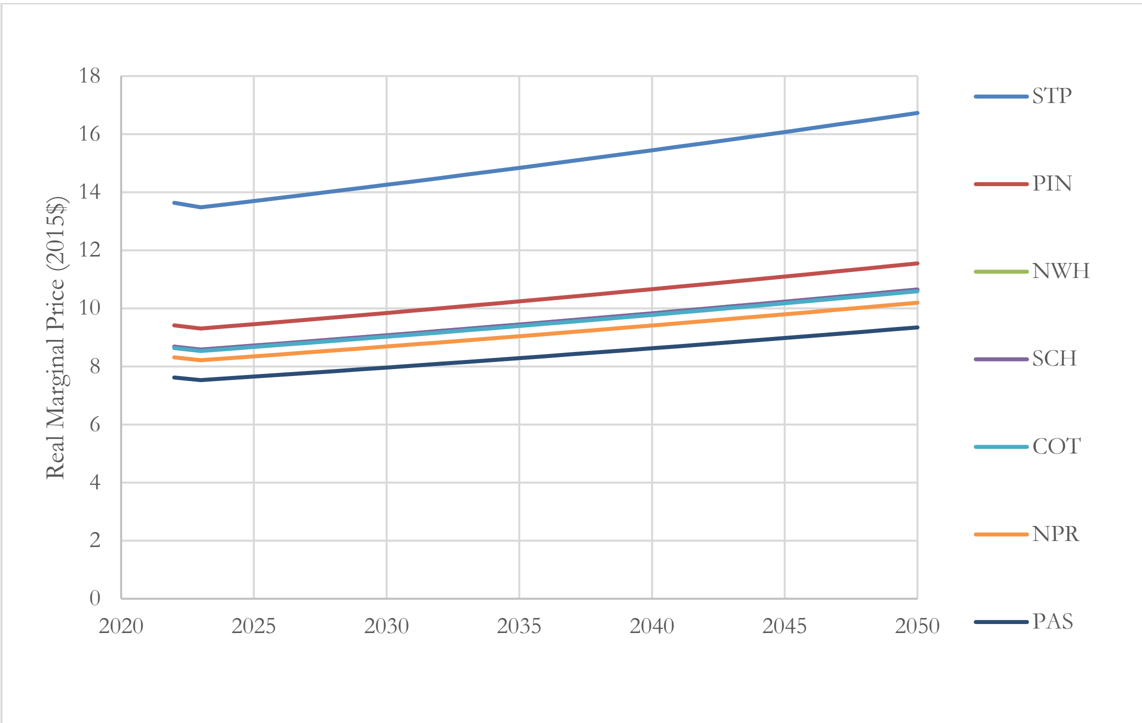

Figure 9. Projections of Real Marginal Price by WDPA (2015 dollars)

Table 17. Starting and Ending-year Projections of Real Marginal Price of Water and Sewer for the Base Year Forecast (2015 dollars)

	PAS	NPR	NWH	SCH	COT	PIN	STP
2022	**8**	**8**	**9**	**9**	**9**	**9**	**14**
2050	**9**	**10**	**11**	**11**	**11**	**12**	**17**
Change	**2**	**2**	**2**	**2**	**2**	**2**	**3**
% Change	**22.67%**	**22.67%**	**22.67%**	**22.67%**	**22.67%**	**22.67%**	**22.67%**
Growth Rate	**0.8%**	**0.8%**	**0.8%**	**0.8%**	**0.8%**	**0.8%**	**0.8%**

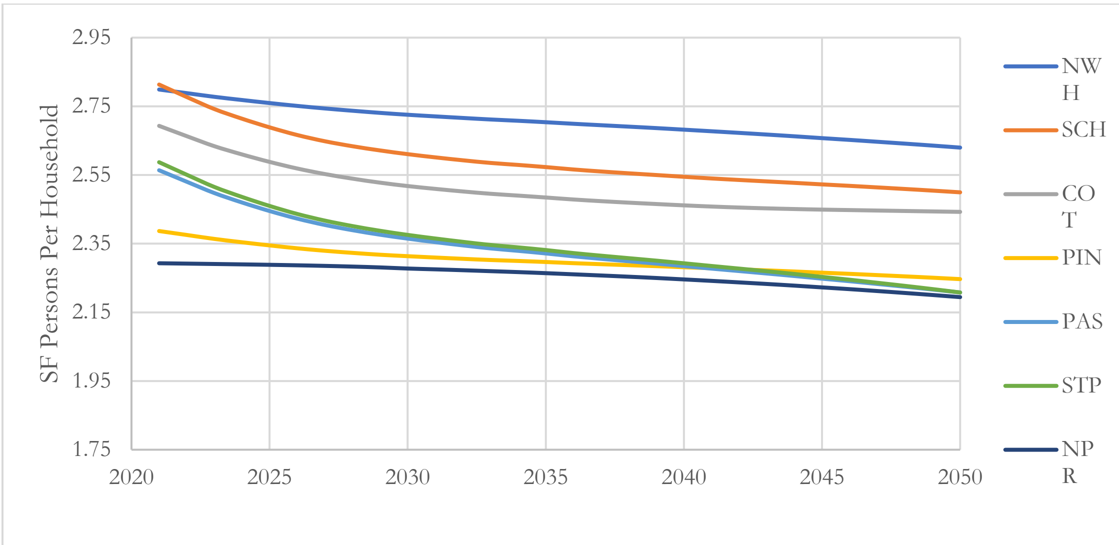

Figure 10. Projections of SF Persons Per Household by WDPA

Table 18. Starting and Ending-year Projections of SF Persons Per Household for the Base Year Forecast

	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
2022	**2.53**	**2.29**	**2.79**	**2.78**	**2.66**	**2.38**	**2.55**	**2.57**
2050	**2.21**	**2.19**	**2.63**	**2.50**	**2.44**	**2.25**	**2.21**	**2.35**
Change	**-0.32**	**-0.10**	**-0.16**	**-0.28**	**-0.22**	**-0.13**	**-0.34**	**-0.22**
% Change	**-12.75%**	**-4.26%**	**-5.69%**	**-9.99%**	**-8.28%**	**-5.41%**	**-13.44%**	**-8.61%**
Growth Rate	**-0.49%**	**-0.16%**	**-0.21%**	**-0.38%**	**-0.31%**	**-0.20%**	**-0.51%**	**-0.32%**

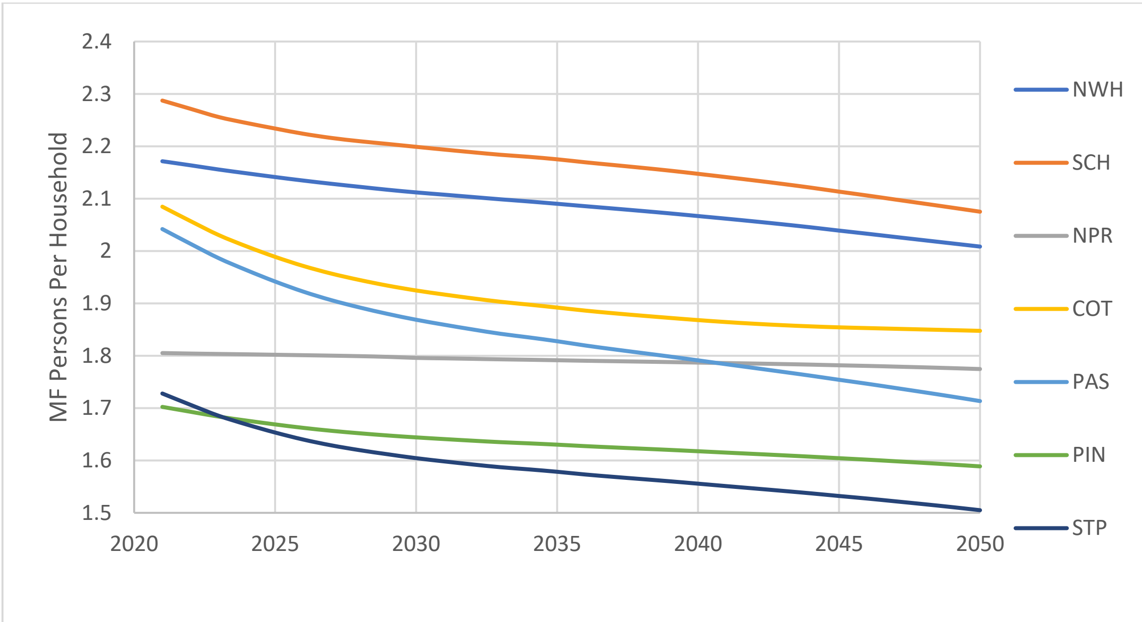

Figure 11. Projections of Multi-Family Persons Per Household by WDPA

Table 19. Starting and Ending-year Projections of MF Persons Per Household for the Base Year Forecast

	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
2022	**2.01**	**1.80**	**2.16**	**2.27**	**2.06**	**1.69**	**1.71**	**1.96**
2050	**1.71**	**1.77**	**2.01**	**2.08**	**1.85**	**1.59**	**1.51**	**1.79**
Change	**-0.30**	**-0.03**	**-0.16**	**-0.20**	**-0.21**	**-0.10**	**-0.20**	**-0.17**
% Change	**-14.91%**	**-1.64%**	**-7.17%**	**-8.65%**	**-10.19%**	**-6.16%**	**-11.79%**	**-8.73%**
Growth Rate	**-0.58%**	**-0.06%**	**-0.27%**	**-0.32%**	**-0.38%**	**-0.23%**	**-0.45%**	**-0.33%**

5.1.7. Projections of Fraction of SF and NR Water Use Locations with Reclaimed Service

Projected fractions of SF, MF, and NR water use locations with reclaimed service are shown in Tables 20, 21 and 22. In all WDPAs except Pasco, the fraction of SF and NR water use locations with reclaimed service is projected to decline over time. This reflects an assumption that no new customer reclaimed connections will occur beyond those in existence in the Base Year, even as new potable water customers are established as the region develops. This assumption was made based on:

- limited availability of additional reclaimed supply for some WDPAs due to slow projected growth, and

- high likelihood of other, non-customer reclaimed projects in the future (e.g. various forms of supply augmentation) for other WDPAs.

In these cases, projections for the SF and NR sectors were made by holding the number of reclaimed locations constant at Base Year levels for each of the WDPAs and then growing the number of non-reclaimed locations from the Base Year at the same rates as projected SF dwelling units and NR square footage.

In the Pasco WDPA, projected reclaimed fractions for SF and NR sectors were held constant at Base Year values. This assumption implies that, as the WDPA grows, it will extend reclaimed service to customers at rates that maintain existing proportion of customers that have access reclaimed service. The assumption is based on,

- Pasco WDPA will likely have additional reclaimed supply available as that WDPA grows, and
- there are currently no plans for application of future reclaimed supply in non-customer applications.

Table 20. Starting and Ending-year Projections of SF Reclaimed Fractions

	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
2022	**0.155**	**0.028**	**0.271**	**0.103**	**0.042**	**0.255**	**0.149**	**0.152**
2050	**0.155**	**0.025**	**0.230**	**0.070**	**0.031**	**0.227**	**0.113**	**0.122**
Change	**0.000**	**-0.003**	**-0.041**	**-0.033**	**-0.011**	**-0.028**	**-0.036**	**-0.030**
% Change	**0.00%**	**-10.62%**	**-14.97%**	**-32.49%**	**-25.51%**	**-10.85%**	**-24.14%**	**-19.99%**
Growth Rate	**0.00%**	**-0.40%**	**-0.58%**	**-1.39%**	**-1.05%**	**-0.41%**	**-0.98%**	**-0.79%**

Table 21. Starting and Ending-year Projections of MF Reclaimed Fractions

	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
2022	0.007	0.004	0.112	0.010	0.043	0.367	0.054	0.085
2050	0.007	0.004	0.097	0.007	0.029	0.315	0.038	0.071
Change	0.000	0.000	-0.016	-0.003	-0.014	-0.052	-0.016	-0.014
% Change	0.00%	1.86%	-13.91%	-30.56%	-32.13%	-14.04%	-29.05%	-16.67%
Growth Rate	0.00%	0.07%	-0.53%	-1.29%	-1.37%	-0.54%	-1.22%	-0.65%

Table 22. Starting and Ending-year Projections of NR Reclaimed Fractions

	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
2022	0.015	0.067	0.216	0.137	0.039	0.192	0.093	0.108
2050	0.015	0.065	0.212	0.091	0.030	0.178	0.081	0.096
Change	0.000	-0.002	-0.004	-0.046	-0.009	-0.014	-0.012	-0.013
% Change	0.00%	-3.45%	-1.74%	-33.55%	-23.01%	-7.33%	-13.37%	-11.54%
Growth Rate	0.00%	-0.13%	-0.06%	-1.45%	-0.93%	-0.27%	-0.51%	-0.44%

5.1.8. Projections of Fraction of NR Square Footage in DMP Subsectors

Projections of fractions of NR square footage in DMP subsectors were developed in tandem with the NR square footage driver projections themselves (Section 5.1.2). In the NR square footage procedure, projections of square footage are developed for each DMP subsector within the WDPA, then summed across subsectors to project total square feet. To project sub-sectoral square footage fractions, projected subsector square footage was simply divided by projected total square footage. Projections summarized in Table 23 show the percentages of the employment sub sectors weighted to the total employment; each has a different influence on water demand.

5.1.9. Weather Projections

Long-term normal weather is assumed for all months and years in the forecast period except for the Base Year, where observed monthly weather values were used.

Table 23. Starting and Ending-year Projections of DMP Sub sectoral Square Footage Fractions

WDPA	Year	Education	Government	Health Care	Heavy Manufacturing	Hotels, motels	Light Manufacturing	Office Buildings	Restaurants and Fast Food Outlets	Retail Stores	Retirement	Other
PAS	2022	0.167	0.040	0.093	0.010	0.015	0.034	0.051	0.012	0.247	0.010	0.321
	2050	0.180	0.047	0.101	0.007	0.019	0.025	0.061	0.015	0.234	0.011	0.300
	Change	0.013	0.007	0.007	-0.002	0.004	-0.009	0.010	0.003	-0.013	0.001	-0.021
NPR	2022	0.137	0.055	0.130	0.000	0.035	0.002	0.090	0.017	0.189	0.055	0.290
	2050	0.145	0.043	0.138	0.000	0.041	0.001	0.105	0.020	0.182	0.058	0.267
	Change	0.008	-0.012	0.008	0.000	0.005	0.000	0.015	0.003	-0.007	0.003	-0.023
NWH	2022	0.137	0.023	0.047	0.007	0.006	0.019	0.129	0.011	0.274	0.033	0.313
	2050	0.146	0.024	0.050	0.007	0.007	0.018	0.157	0.013	0.231	0.035	0.312
	Change	0.009	0.001	0.003	0.000	0.001	-0.001	0.028	0.001	-0.042	0.002	-0.001
SCH	2022	0.176	0.026	0.073	0.024	0.010	0.016	0.065	0.012	0.222	0.029	0.348
	2050	0.175	0.032	0.073	0.020	0.013	0.010	0.085	0.016	0.224	0.029	0.324
	Change	-0.001	0.006	0.000	-0.004	0.003	-0.006	0.020	0.004	0.002	0.000	-0.023
COT	2022	0.071	0.094	0.050	0.018	0.040	0.032	0.169	0.008	0.086	0.004	0.429
	2050	0.071	0.098	0.050	0.016	0.047	0.028	0.200	0.009	0.075	0.004	0.402
	Change	0.000	0.004	0.000	-0.002	0.007	-0.004	0.031	0.001	-0.010	0.000	-0.028
PIN	2022	0.080	0.083	0.045	0.021	0.070	0.150	0.111	0.012	0.125	0.049	0.253
	2050	0.079	0.088	0.044	0.019	0.085	0.131	0.128	0.015	0.117	0.048	0.248
	Change	-0.001	0.004	-0.001	-0.003	0.015	-0.019	0.016	0.003	-0.009	-0.001	-0.005
STP	2022	0.098	0.061	0.071	0.013	0.025	0.083	0.218	0.008	0.123	0.042	0.257
	2050	0.096	0.064	0.069	0.011	0.030	0.073	0.249	0.010	0.107	0.041	0.251
	Change	- 0.002	0.003	-0.002	-0.001	0.005	-0.011	0.031	0.002	-0.016	-0.001	-0.006
TBW	2022	0.12	0.05	0.07	0.01	0.03	0.05	0.12	0.01	0.18	0.03	0.32
	2050	0.13	0.06	0.07	0.01	0.03	0.04	0.14	0.01	0.17	0.03	0.30
	Change	0.03	0	0.01	0	0	-0.02	0.08	0	-0.03	0	-0.05

5.2. Updated Long-term Demand Forecast Results

Uncertainties in the demand models and the updated input parameters described in the previous section were used to generate 1000 long-term demand forecasts by using the probabilistic demand forecast procedure described in section 4.

This section presents the Base Year long-term probabilistic demand forecast and comparisons of the median projection to the forecast performed last year using the same model.

Figure 12 presents the median retail (SF + MF + NR) water demand of the Base Year 2021/2022 and Base Year 2020/2021 forecasts. For both the current and previous Base Year forecasts, the effects of continued growth in housing units and NR square footage outweigh the effects of slow projected income growth relative to growth in projected prices and overall declining persons per household.

Total projected water demand includes wholesale water and unbilled water use in addition to retail use. Pinellas County WDPA has the largest wholesale water use among all WDPAs, though wholesale use occurs to some extent in all WDPAs except Northwest and South-Central Hillsborough WDPA's. Unbilled use for each WDPA represents the difference between:

- the total of retail and wholesale water use within the WDPA, and
- the total of water delivered to the WDPA by Tampa Bay Water and any self-supply by the WDPA.

Wholesale demand for each WDPA is projected to remain at the Base Year values throughout the forecast period (i.e. no growth or decline in MGD), while unbilled demand in each forecast year is assumed to be the same percent of the billed demand as in the Base Year. This allows for growth in the amount of unbilled demand as the total retail and wholesale usage in a WDPA grows.

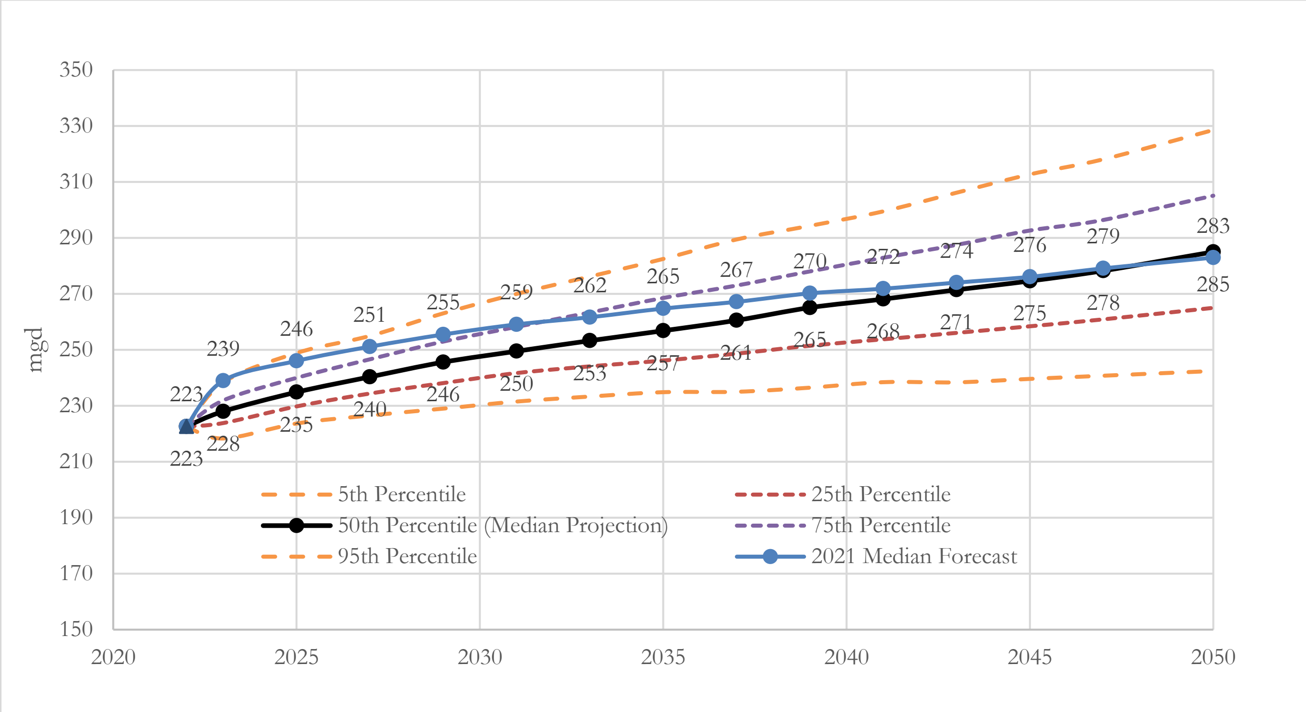

Figure 12. Comparison of retail water demand projections for Tampa Bay Water service areas between the 2021 median forecast (2020/2021 Base Year) and the current forecast (2021/2022 Base Year) with confidence intervals.

Figure 12 shows the 2021/2022 retail demand projection from the probabilistic forecast with consideration of passive efficiency and confidence intervals ranging from 5% to 95%, coupled with the interquartile (25%/75%) range. The 50% retail demand is the median estimate shown by the solid black line and the 2020/2021 Base Year median retail demand is shown by the solid blue line.

Throughout the first half of the 2010-decade, large changes occurred in the amount of water Pinellas County delivered to wholesale customers, as several former wholesale customers developed their own supplies and ceased or dramatically reduced wholesale purchases. As of this update, the only remaining wholesale customer that may cease wholesale purchases from Pinellas County in the future is the City of Clearwater. While the City of Clearwater's wholesale demand was originally projected to come off-line in WY2015, bulk purchases of about 5mgd have continued through and beyond the Base Year.

Figure 13 provides the forecasts for each component (retail, unbilled, and wholesale water use) of the total regional water demand through the 2050 forecast period. Unbilled water use percentages are assumed constant based on the most recent water year demand data.

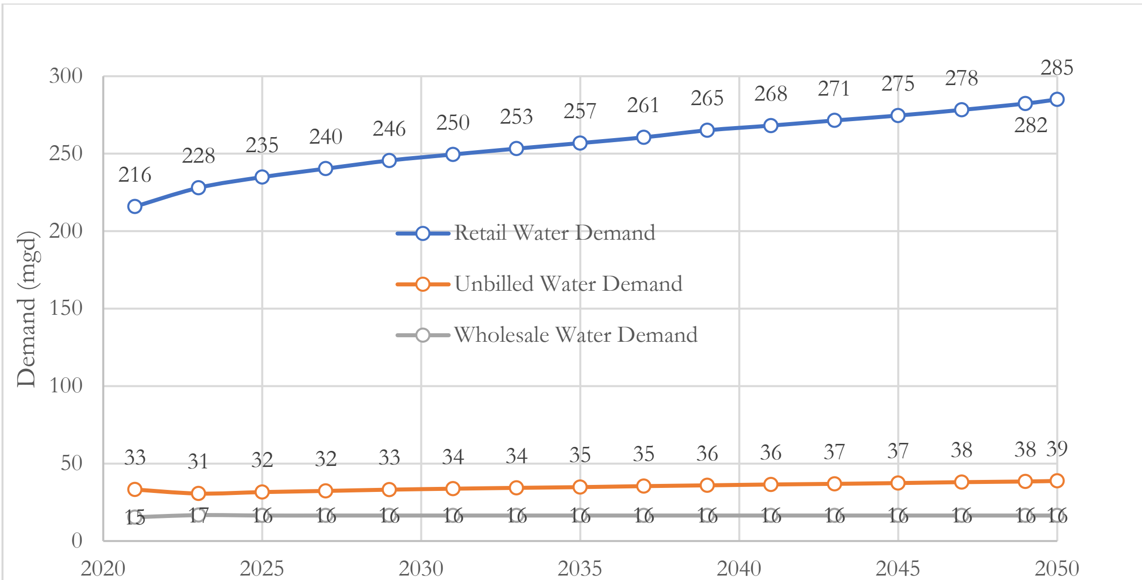

Figure 13. Median Retail, Unbilled and Wholesale Water Use Projections

Figure 14 shows the regional historic demand from 2000 through 2020, the Base Year 2020/2021 forecast, and the current Base Year 2021/2022 forecast. The new total regional forecast (black line in Figure 14) shows similar growth in demand in the first 3 to 5 years of the forecast period as the previous year median forecast followed by higher growth in the latter period. Reasons behind this trend are the same as mentioned for retail demand and are discussed in a previous technical report (Hazen and Sawyer, 2019).

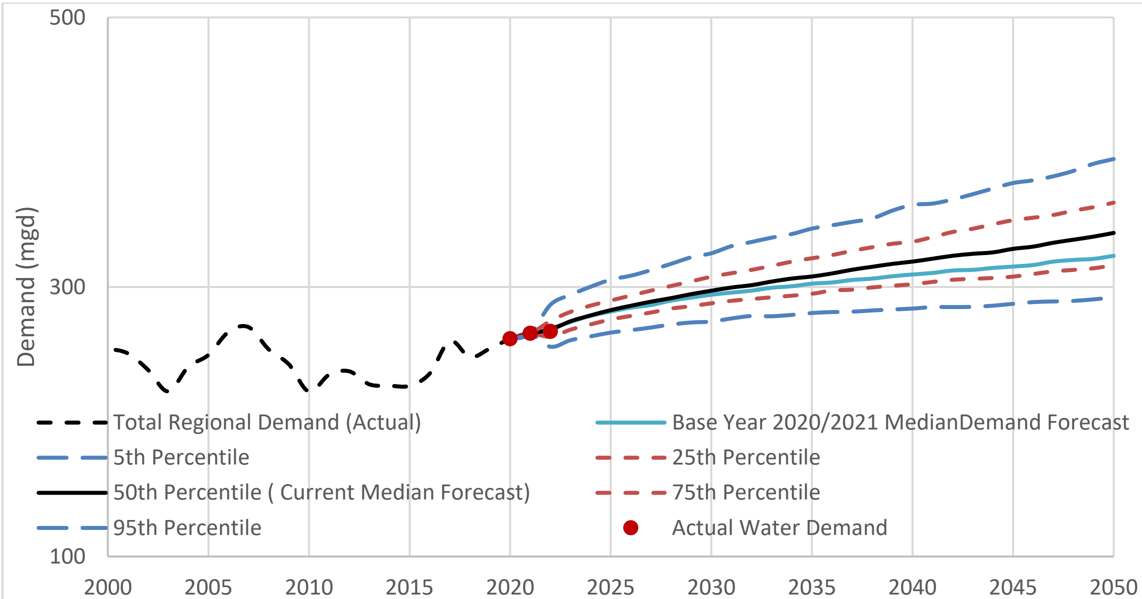

Figure 14. Historic Demand, 2021 forecast (Base Year 2020/2021) and the current probabilistic (Base Year 2021/2022) regional demand forecast

The projected section of the probabilistic forecast is shown in Figure 15 and Table 24 provides projected water use for selected years from 2022 through 2050 for each water demand planning area and regional demand.

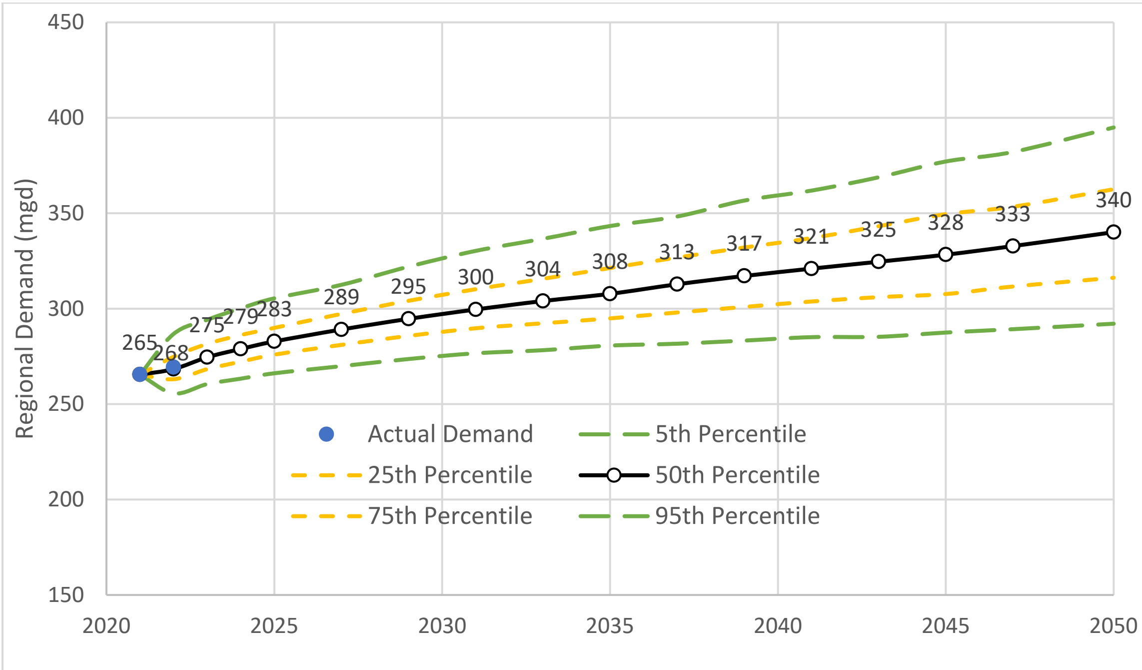

Figure 15. Tampa Bay Water Updated Probabilistic Regional Demand Forecast, Base Year 2021/2022

Table 24 shows the range of demand forecast with confidence intervals ranging from the 5th to 95th percentiles for selected future years. The orange shading is the observed demand of Water Year 2022. The median regional demand is projected to be 328 mgd by 2045. Given the current outlook of the socio-economic projections, the forecast interval varies between 287 mgd at the 5th percentile level and about 377 mgd at 95th percentile for the year 2045.

Table 24. Updated Probabilistic Regional Demand Forecast 2022-2050, Base Year 2021/2022

Water Year	Percentile	PAS	NPR	NWH	SCH	COT	PIN	STP	TBW
2022*	**NA**	**35.23**	**3.34**	**21.79**	**51.54**	**78.86**	**49.19**	**26.94**	**266.89**
2023	5th	34.18	3.24	19.49	47.58	76.32	47.94	25.37	260.49
	25th	35.60	3.34	20.25	50.96	79.42	49.95	26.08	268.31
	50th	36.96	3.45	21.05	53.09	81.50	52.27	26.61	274.54
	75th	38.09	3.58	21.94	55.15	83.75	53.91	27.16	281.53
	95th	39.74	3.81	23.06	58.18	87.00	56.05	28.14	294.16
2025	5th	35.22	3.30	20.03	49.30	78.62	48.42	25.52	266.15
	25th	37.01	3.42	20.93	53.22	81.74	50.44	26.36	275.90
	50th	38.57	3.55	21.78	55.50	84.18	52.68	26.90	282.82
	75th	39.95	3.69	22.70	57.38	86.60	54.29	27.47	289.93
	95th	42.05	3.94	24.12	61.22	89.92	56.34	28.39	305.41
2030	5th	37.10	3.41	20.92	52.47	82.11	48.47	25.48	274.29
	25th	39.81	3.57	22.06	56.93	86.22	50.82	26.56	287.87
	50th	41.55	3.72	23.24	59.45	88.77	53.00	27.23	297.18
	75th	43.42	3.88	24.33	62.42	92.06	54.82	27.91	307.60
	95th	46.34	4.17	25.94	67.24	96.51	57.02	28.88	324.99
2035	5th	38.64	3.45	21.42	54.40	84.27	48.44	25.44	280.66
	25th	41.62	3.64	22.80	59.50	88.99	50.97	26.50	294.90
	50th	43.83	3.85	24.21	62.68	92.47	53.12	27.27	307.77
	75th	46.47	4.04	25.68	66.41	96.63	55.05	28.21	321.30
	95th	50.08	4.35	27.70	72.71	102.07	57.59	29.42	343.30
2040	5th	39.48	3.47	21.59	55.71	85.87	48.57	25.19	283.96
	25th	43.36	3.71	23.46	61.62	91.63	51.08	26.50	301.99
	50th	45.94	3.94	25.23	65.89	96.17	53.37	27.52	318.82
	75th	49.20	4.18	27.01	70.13	100.76	55.55	28.49	333.57
	95th	53.32	4.51	29.37	76.91	106.96	58.24	29.88	360.90
2045	5th	40.35	3.47	21.84	57.35	87.33	48.35	25.30	287.49
	25th	44.89	3.77	23.94	63.64	93.90	51.46	26.60	307.68
	50th	47.70	4.03	26.11	68.67	99.13	53.77	27.77	328.28
	75th	51.69	4.32	28.41	74.22	104.93	56.21	29.05	349.52
	95th	56.91	4.67	31.00	81.49	111.90	59.15	30.38	377.11
2050	5th	41.10	3.49	22.18	59.85	87.44	48.87	25.44	292.12
	25th	46.44	3.84	24.68	66.62	94.37	52.15	27.04	316.19
	50th	50.00	4.15	27.24	72.61	100.88	54.64	28.36	340.09
	75th	54.87	4.48	29.87	78.96	107.47	57.25	29.82	362.56
	95th	60.64	4.87	32.84	88.25	115.34	60.38	31.29	394.92

* Observation

6. References

1. Hazen and Sawyer, 2019, Tampa Bay Water Long-Term Demand Model Redevelopment and Base-Period 2014-2016 Forecasts
2. Tampa Bay Water, Demand Forecast Annual Evaluation and Update, November 2019

Appendix C. Demand Management Plan 2023

DEMAND MANAGEMENT PLAN 2023

TAMPA BAY WATER

Tampa Bay Water

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I. Introduction

Tampa Bay Water and its member governments meet the water demands of more than 2.5 million people in the Tampa Bay area. Residential demands account for about 73 percent of billed water consumption, and the remainder is associated with commercial, government and industrial water usage. The Agency has been actively involved in quantifying and forecasting water demands, which includes future, potential changes in demand due to water use efficiency efforts. Member governments have implemented water efficiency programs since the adoption of the original demand management plan in 1997 (as part of the West Coast Regional Water Supply Authority). In 2020 Tampa Bay Water partnered with the member governments and the Southwest Florida Water Management District to actively pursue demand reductions through a regional water conservation rebate program.

As Tampa Bay Water's reliance on surface water and other alternative water sources continues to increase, the avoided cost of new water supply infrastructure through anticipated demand management has become a more critical element of the water supply planning process. Avoiding or delaying the cost of more expensive alternative water supply development helps mitigate rate impacts to Tampa Bay Water's member governments and their customers.

Tampa Bay Water's Demand Management Plan describes the role of demand management in the Tampa Bay area qualitatively and quantitatively. Demand management is considered one component of the agency's strategic goals to increase reliability of its existing water supply and delivery system to our member governments. Tampa Bay Water is required to evaluate and update the Demand Management Plan every five years.

Demand-side management efforts are intended to serve as a complementary component to traditional water supply planning processes in order to meet current and future water demands. This Demand Management Plan includes:

- A depiction of how and when water is used;
- An overview of existing demand management efforts;
- A forecast of the impact of future demand reduction activities, and evaluation of the benefits and costs;
- Identification of additional demand-side measures that are worthy of further investigation.

Through efficient use of available supplies and use of targeted implementation strategies, water use efficiency can help manage peak and average day water demands in conjunction with reducing long-term future water supply requirements. Cost-effective alternatives to new supply development and other valuable benefits can be realized through demand-side management including optimization of existing facilities, deferred capital investment costs, improved public perception, and environmental stewardship and protection. This Demand Management Plan describes current demand management activities across the region and forecasts potential demand reductions though 2030.

II. Water Demand Trends

Understanding water demands is key to achieving Tampa Bay Water's unequivocal obligation to provide water to the region. It enables the identification of drivers and trends in water use, which helps us plan for additional infrastructure and focus our demand management activities. This section provides an overview of water demand trends across the region.

A. Regional Demand Trends

Figure 1 illustrates how the water deliveries in the Tampa Bay area have increased over time, reaching 270 million gallons per day (MGD) in 2022. The water demands depicted include all water delivered by Tampa Bay Water to the member governments and water that is self-supplied by the members. Regional water demands have increased along with population growth over the ten-year period shown in Figure 1. While the population has grown in a mostly linear fashion, water demand deviates from a linear trend due to annual variations in weather and economic cycles. The slight decrease in demand in 2015 was due to an exceptionally rainy year and the one-year increase in 2017 was due to an exceptionally dry year which led to increased watering of outdoor landscapes. A longer history of water demand fluctuations can be found in Figure 10.

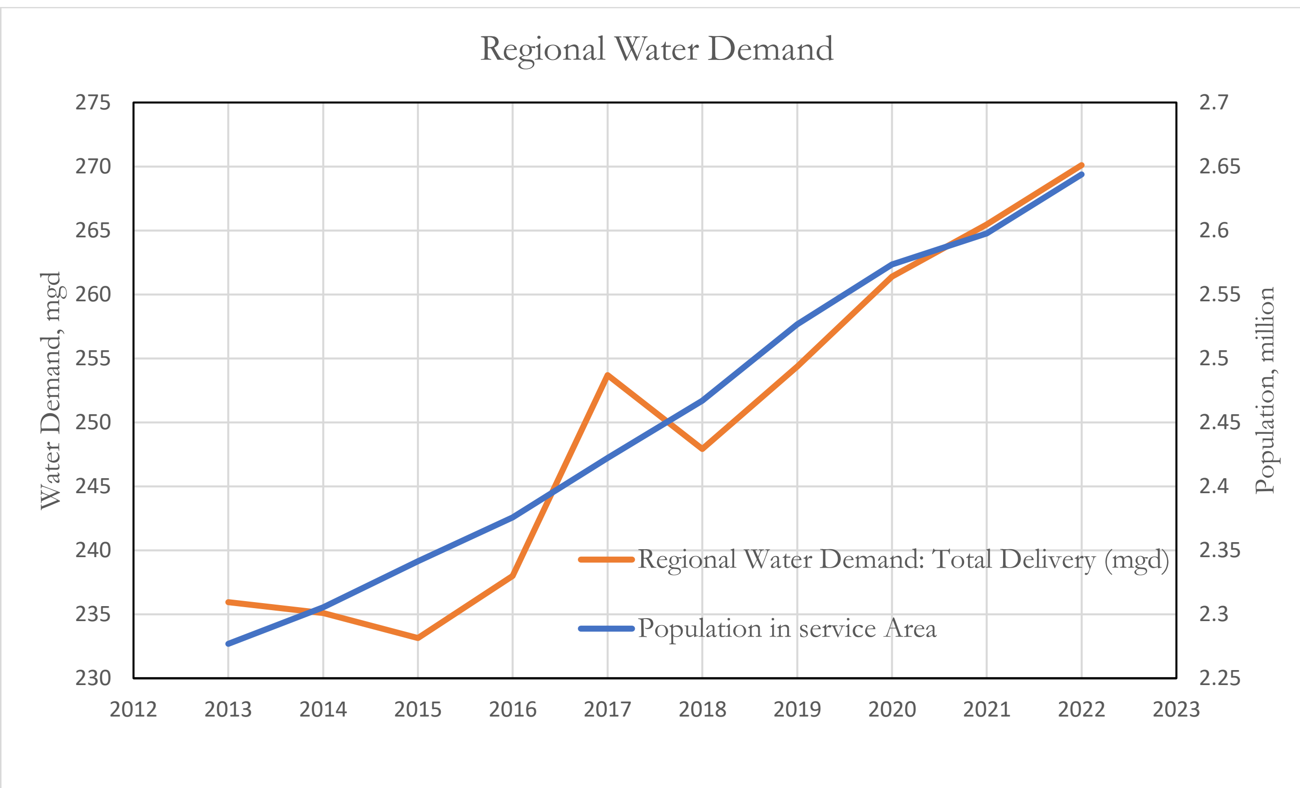

Figure 1. Total water demand and population in Tampa Bay Water's service area.

Although total water deliveries across the region have increased over time, Figure 2 shows that the water use per capita has remained relatively flat over the last decade, decreasing only 1% from 2013 levels. Water use per capita includes all water demands delivered by Tampa Bay Water and potable self-supplied water, across all sectors, and is divided by the permanent population. This method does not account for the temporary population (part-year residents), and it does not include the volume of reclaimed water used. In addition, any water that is sold by a member government to another region ("wholesale") is included in this water demand and has not been separated out.

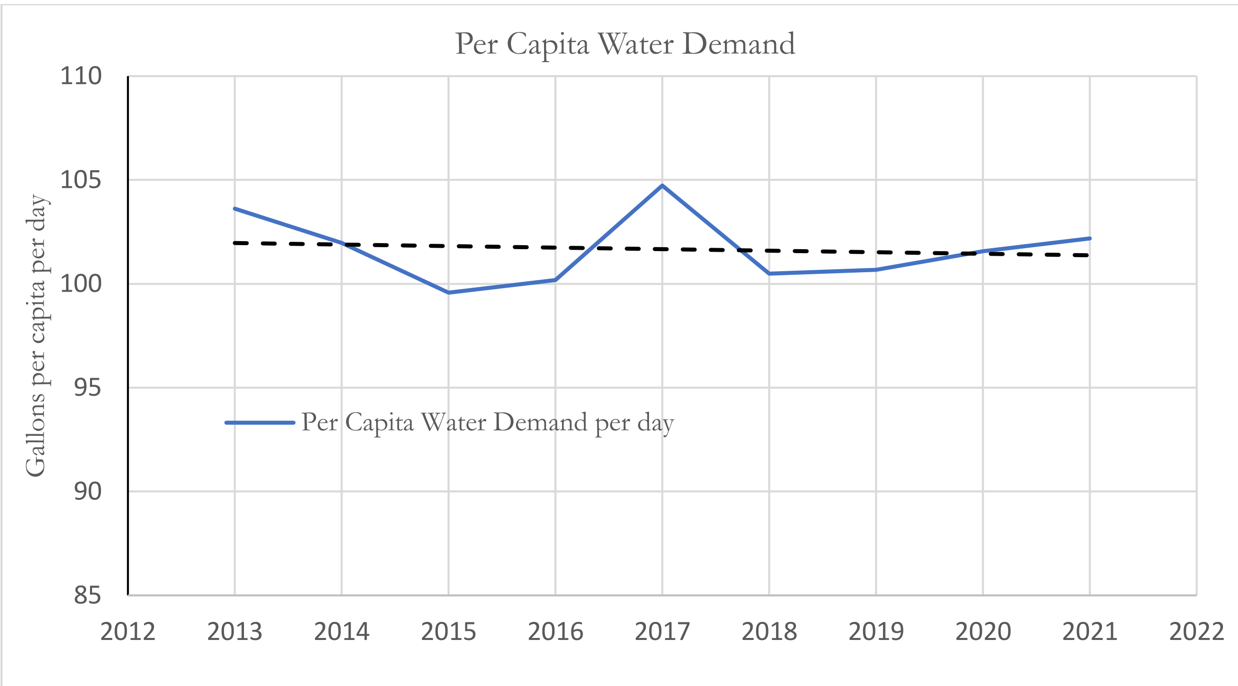

Figure 2. Region-wide per capita water demand over the last decade.

While regional per capita water use is relatively constant, the trends within each member government appear to vary considerably as shown in Figure 3. It is important to note that temporary residents are not included, such as "snowbirds" who reside in Florida only in the winter months and college/university students who may be here for the academic year only. This, and other factors, make direct comparison of per capita water usage between each member difficult. Acknowledging these limitations, Figure 3 shows per capita water use has decreased over time in New Port Richey, Tampa, Pinellas and St Petersburg. Per capita water usage has increased in Pasco, and in both planning regions of Hillsborough County (south-central and northwest). Of note, both of those counties have been experiencing substantial growth in recent years. In Pinellas and St. Petersburg, the total potable water deliveries (in million gallons) have decreased since 2013 despite population growth in those regions. These reductions are due in part to reduced wholesale delivery by the member governments, increased use of reclaimed water, and sustained conservation programming. Regionally, the decreases in some member areas are offset by the increases in other member areas (Figure 3), resulting in a relatively flat regional per capita demand over the last ten years (Figure 2).

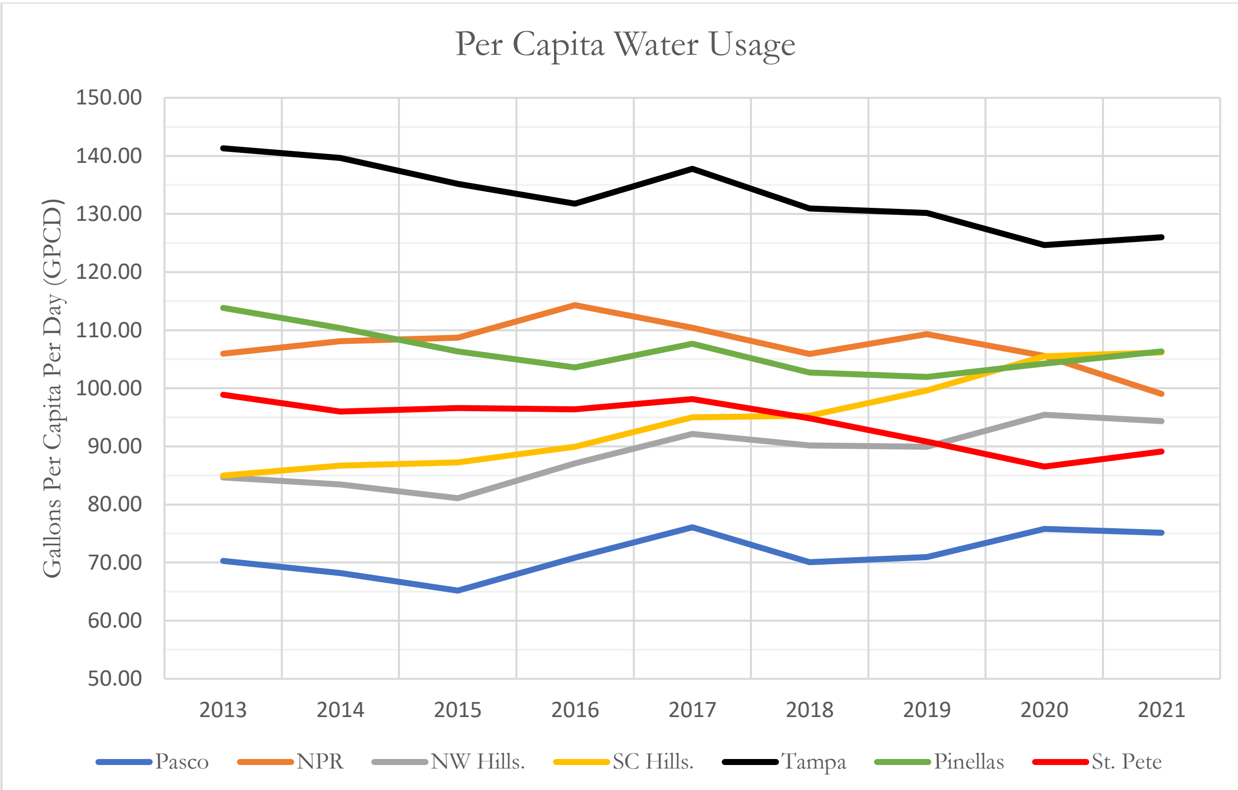

Figure 3. Per capita water usage in each water demand planning area.

Another important trend in water demands is the seasonal variation within the year in response to weather. Figure 4 illustrates the average regional demand per month, based on the most recent six years. In December and January, water demands are lowest - weather is cooler and plant water needs are lower during the winter months. As spring arrives, water usage begins to increase as rainfall decreases and the temperatures begins to rise. The peak in May coincides with the dry season in the Tampa Bay area when residents and businesses increase outdoor watering due to the lack of rain and higher temperatures. As the summer begins, the temperatures are high, but the rainy season begins, so residents tend to reduce their outdoor watering. In October and November, the frequent rain begins to subside resulting in a smaller peak in water demand. In December, the weather turns cooler and the cycle repeats. This trend indicates that residents are generally responsive to precipitation and weather changes, and the seasonal fluctuations in water demand are relatively predictable based on typical weather patterns.

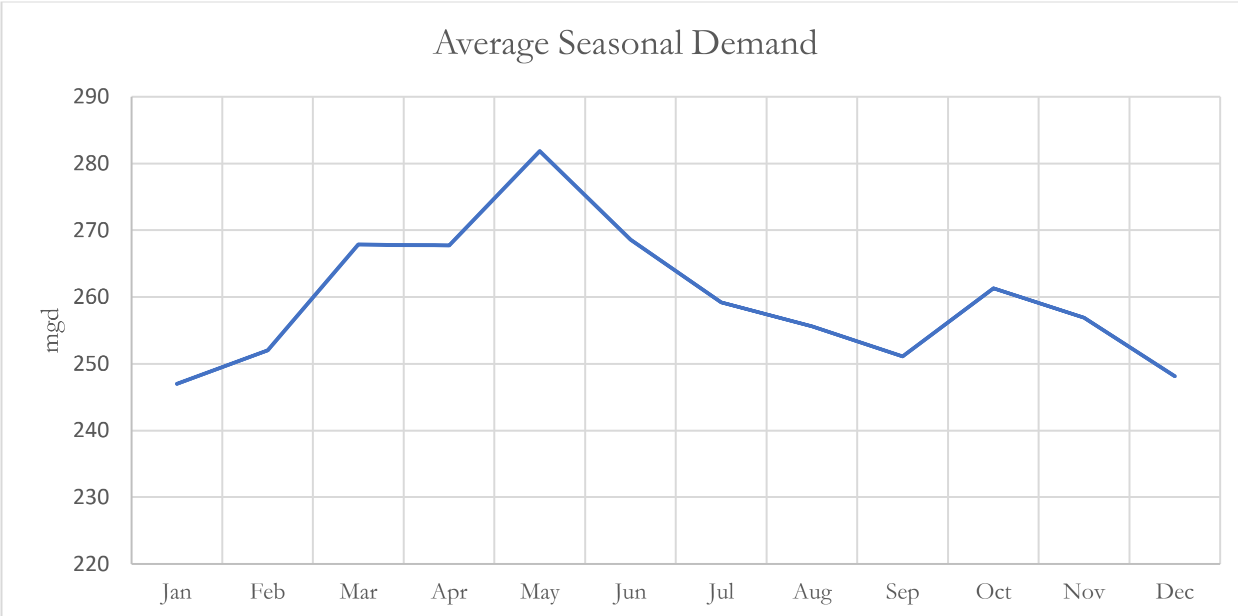

Figure 4. Average regional demand (million gallons per day) for each month in Tampa Bay Water's service area based on 2017 -2022 data.

B. Water Demands by Sector

Figure 5 and Figure 6 illustrate that the vast majority (90%) of account holders are in the single-family residential sector: however, they account for about 52% of the total water demands. By contrast, the multi-family and commercial sectors account for a small percentage of accounts (4% and 6% respectively) but account for 21% and 20% of total water demands, respectively. Multi-family and commercial accounts are often master-metered buildings serving multiple residents or businesses. The number of wholesale accounts is so small in comparison with the other sectors that it accounts for less than 1% of account holders, but 7% of water demands. One implication for demand management efforts is that a focus on the multi-family and commercial sectors could be an efficient way to achieve larger demand reductions per-account. The single-family sector is very important to engage with since is it represents over half of total water demands, but it will take many more points of contact to achieve similarly sized water savings in that sector.

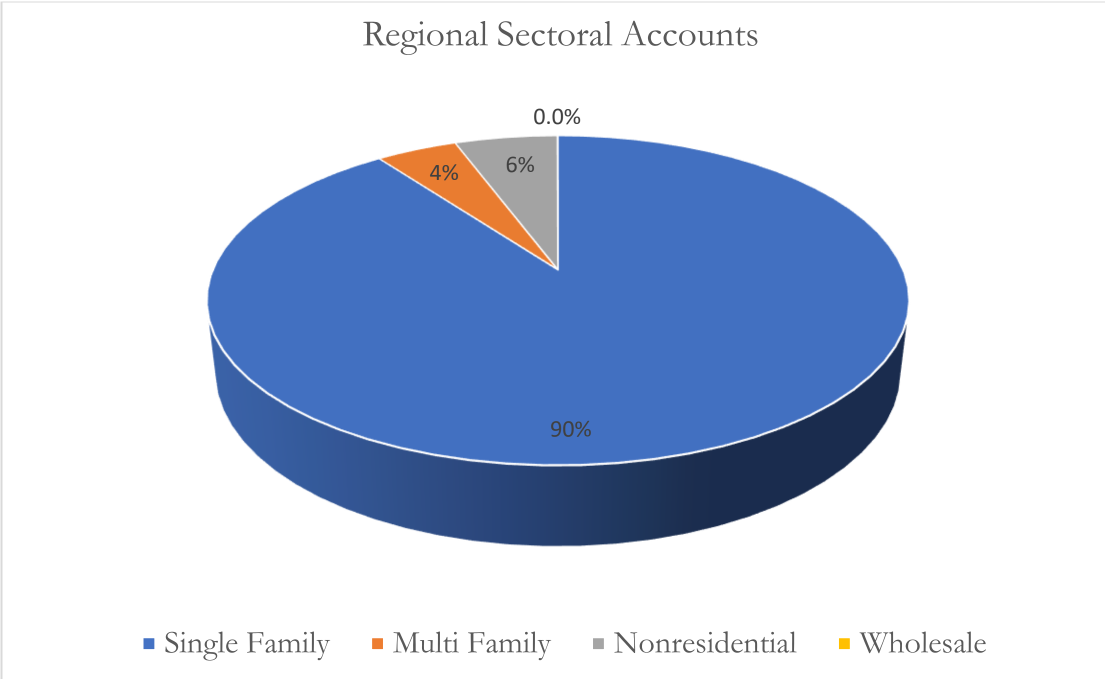

Figure 5. Percentage of water account holders by sector.

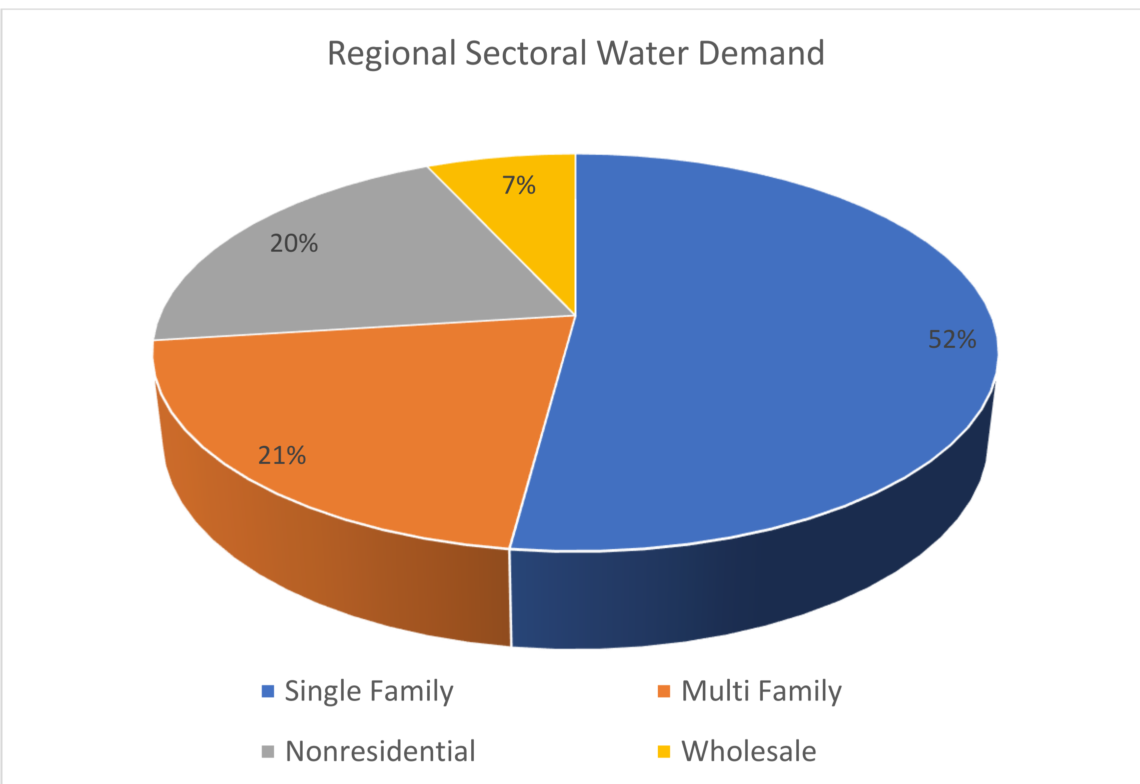

Figure 6. Percentage of water demands by sector.

Figure 7, Figure 9, and Figure 9 illustrate the gallons per day used by single-family households (not per capita water use) by member government. This data includes water delivered by Tampa Bay Water as well as member self-supplied potable water. It does not include the volume of reclaimed water used. These charts show data from before 2013 because they do not rely on population data, which was only available in a consistent manner starting in 2013.

Figure 7 illustrates the trend of household demand over time in the two planning regions of Hillsborough County and in the City of Tampa. Water demand per household in South Central Hillsborough has increased by 11% since 2002, and in Northwest Hillsborough demand decreased by 2%. In the City of Tampa, household water use has decreased by 15%.

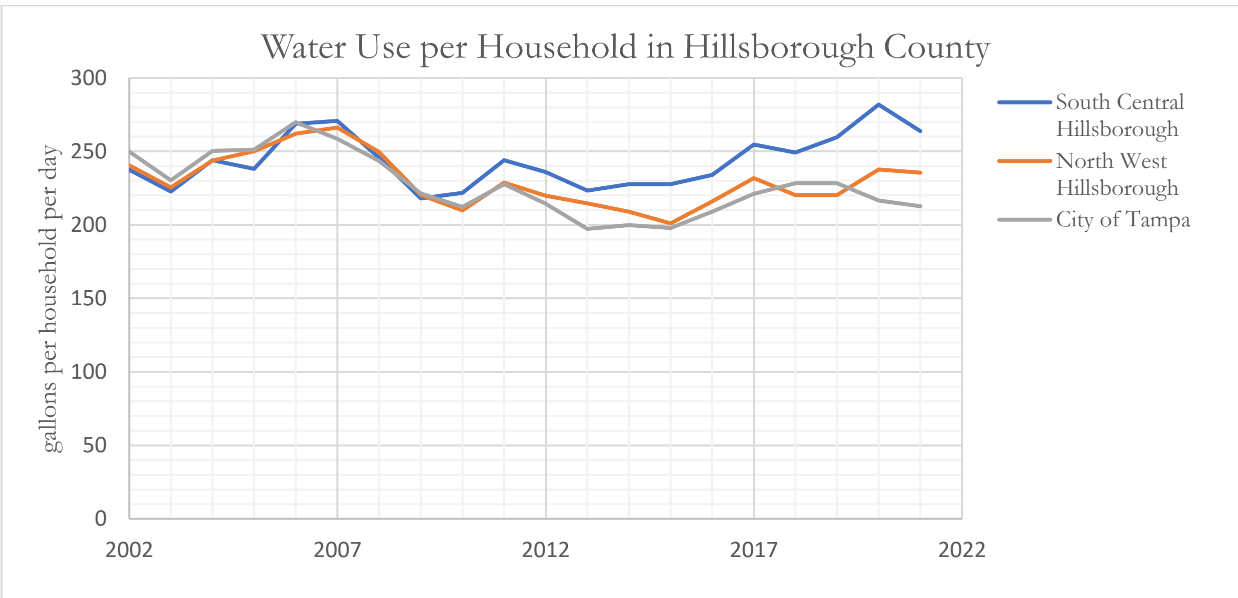

Figure 7. Single-family household daily water used in Hillsborough County and Tampa.

Figure 8 shows average single-family household water used daily in Pasco County and New Port Richey. In Pasco County, household water demand has decreased by 11% since 2002, and in New Port Richey demand has decreased by 30%.

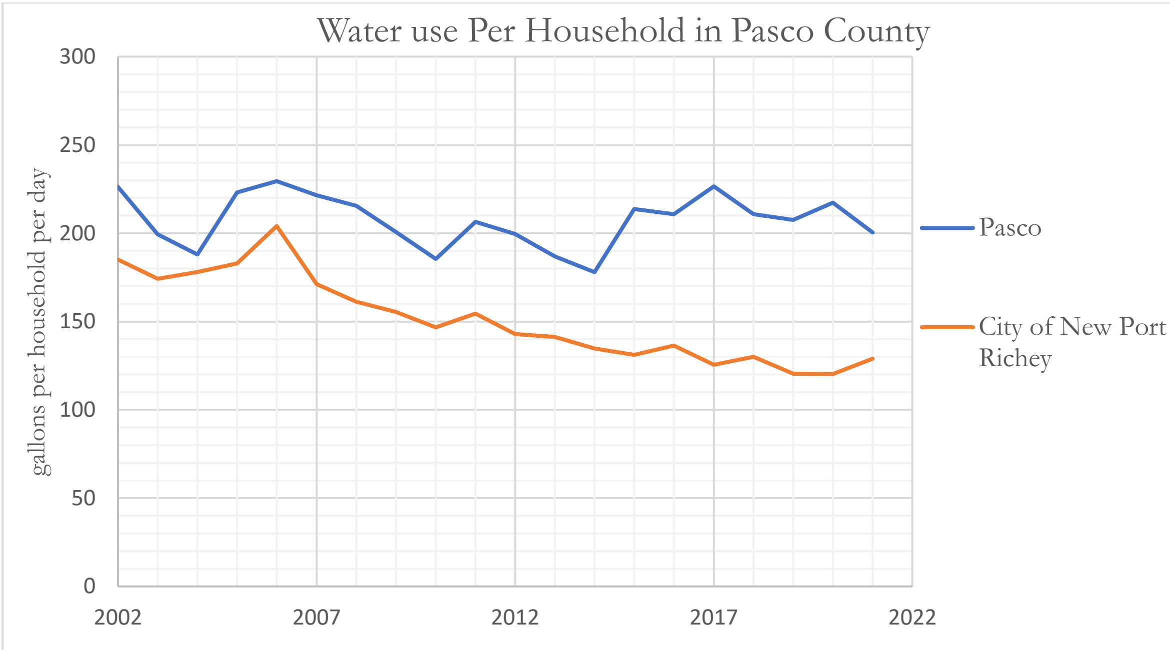

Figure 8. Single-family household daily water used in Pasco County and New Port Richey.

Figure 9 illustrates single-family water use in households served by Pinellas County and St. Petersburg. In Pinellas County, household water demand has decreased by 19% since 2002, and in St. Petersburg demand has decreased by 24%.

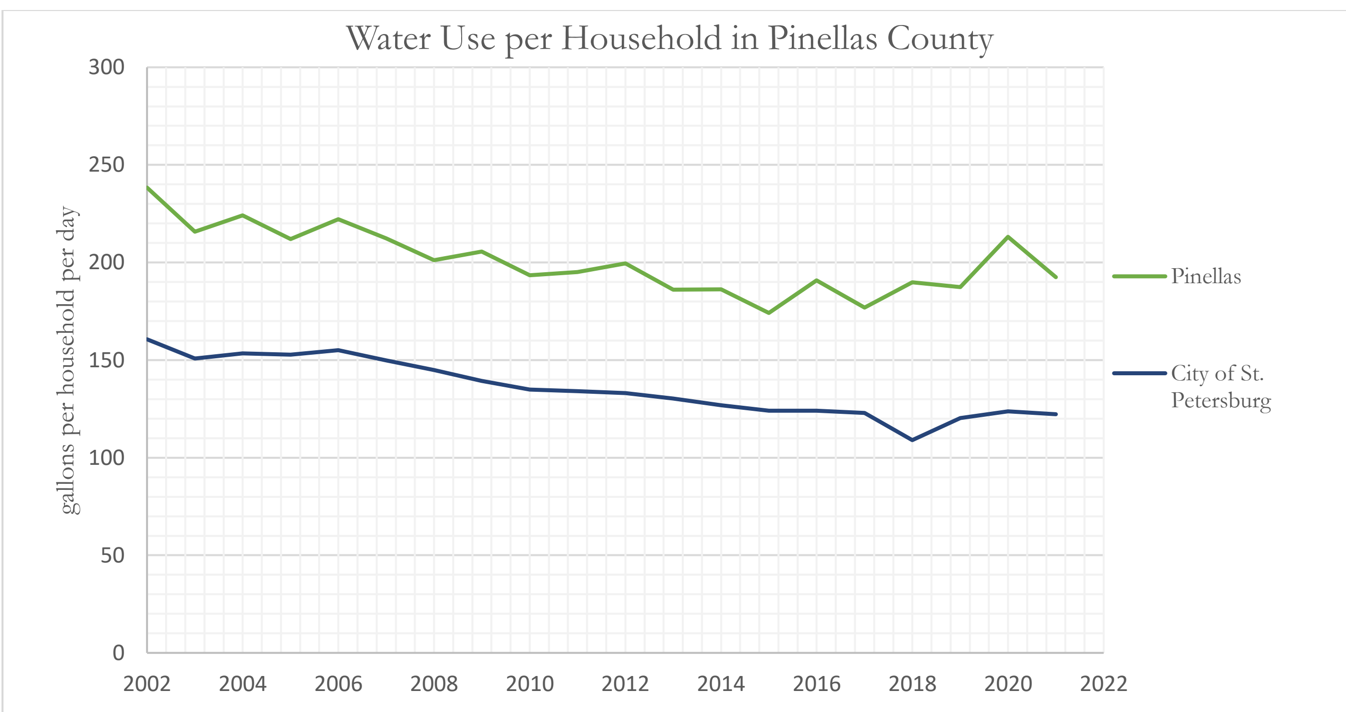

Figure 9. Single-family household daily water used in Pinellas County and St. Petersburg.

While the majority of household demands have declined over the last two decades, when looking only at the last decade (since 2013), the picture looks quite different. Table 1 below shows the change in household water use from 2002 and 2013 compared with 2021, and the change in per capita demand since 2013.

Table 1. Changes in water use per household and per capita, by member government.

	SF Household Water Use Change since 2002	SF Household Water Use Change since 2013	Per Capita Water Use Change since 2013
South Central Hillsborough	11%	18%	25%
North West Hillsborough	-2%	10%	11%
City of Tampa	-15%	8%	-11%
Pasco	-11%	7%	7%
City of New Port Richey	-30%	-9%	-7%
Pinellas	-19%	3%	-7%
City of St. Petersburg	-24%	-6%	-10%

Though the trends in water usage per household and per capita vary quite a bit among members, they can be grouped into three main categories. The regions in which both household and per capita water use have increased since 2013 are South Central Hillsborough, North West Hillsborough, and Pasco County. By contrast, the regions in which both household and per capita water use have decreased since 2013 are New Port Richey and St. Petersburg. The City of Tampa and Pinellas County's per household water use has increased since 2013, but the per capita water usage decreased.

There are several factors which contribute to these trends. Hillsborough and Pasco counties have experienced substantial growth and new home construction over the last 5 and 10 years. Household water use tends to be higher in newly constructed homes, where new-in ground irrigation systems are installed. Higher water use is in part due to the plant establishment period which requires more water, and also because new homeowners may be unfamiliar with managing their irrigation systems and may be unaware if they are overwatering. By contrast, many older homes were not originally built with in ground irrigation systems, and billing data analysis has shown that within one to two years the water usage will drop down in new homes to be more in line with established customers in that service area. In addition, access to reclaimed water will decrease household and per capita potable water use, and household access to reclaimed water varies across members.

Per capita water use is influenced by many factors: non-residential water use, multi-family water use, household water use, population growth, changes in wholesale water deliveries, water losses in the distribution system, availability of reclaimed water and more. Any one of these factors, a combination thereof, can be the primary driver of the changes shown in this table. Further analyses would be needed to specify and quantify the extent to which these factors have driven changes in per capita water use in each member area.

C. Demand Forecast

Tampa Bay Water's Demand Forecast Annual Evaluation and Update (2022) provides the outlook for regional water demands in the future. Given the uncertainty of future population and socio-economic projections, Tampa Bay Water develops a range of future scenarios to bracket the most likely future water demand scenarios. Figure 10 shows the variations in regional water demand from 2000 – 2020. Water demands significantly decreased with economic events like the Great Recession (2007 – 2009) and years with high rainfall (2015). Population growth began to ramp up in 2015 which has caused demand to increase in the subsequent years. This demand projection shows a range of scenarios going out to 2050, but they all indicate increased water demand from present day. The goal of all demand management efforts in this decade is to lower the future demand trajectory from what it would have been if no active demand management measures were in place.

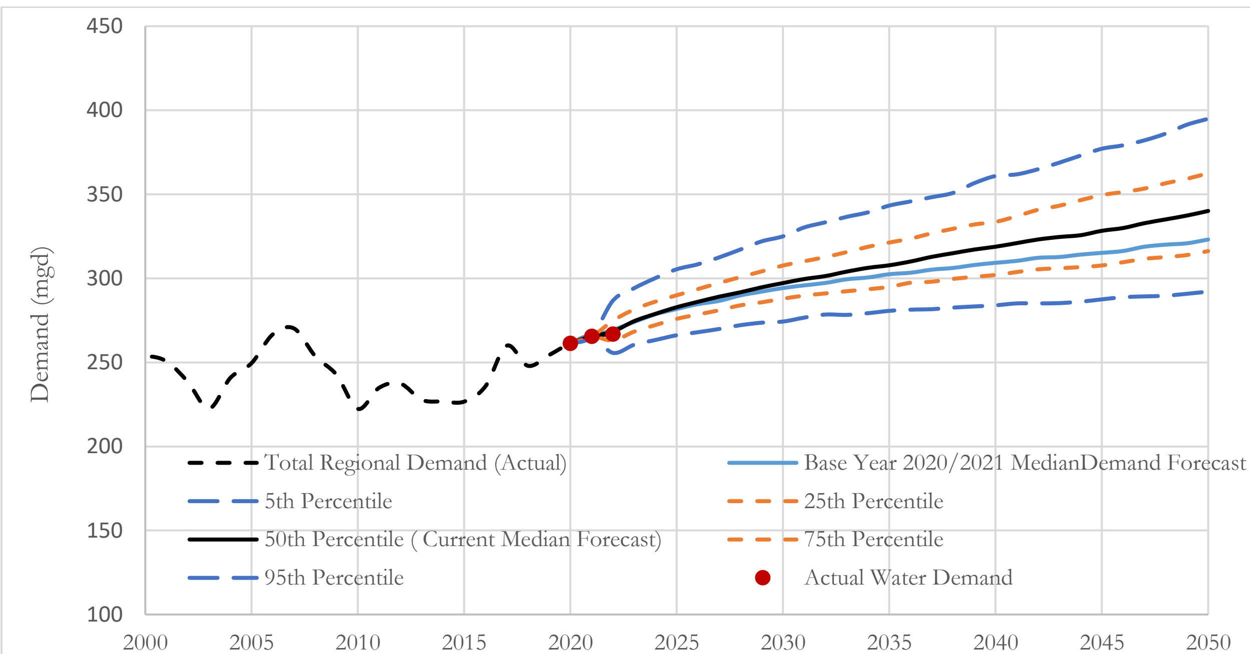

Figure 10. Historic Demand, 2021 forecast (Base Year 2020/2021) and the current probabilistic regional demand forecast (Base Year 2021/2022).

D. Summary

The water demands in Tampa Bay Water's service area show some clear trends; regionally, water demands have increased along with population growth, and weather has a significant impact on how much water is used by residents. There are also many differences when looking at each member government's water per capita use rate and per household water use trends. There are several factors that contribute to the variability of these trends, including availability of reclaimed water population growth, new home construction, long-term investment in water conservation, and more. Further analyses can help to uncover the degree to which each factor is driving change in water usage trends, but the implications for demand management are that outdoor watering needs to be a primary area of focus, and there are conservation opportunities across the residential and non-residential sectors to reduce inefficient water usage.

III. Demand Management

A. Goals for Demand Management

The goal of Tampa Bay Water's demand management activities is to reduce water use in a cost-effective manner, compared with the cost of new water supply development. The benefits of these efforts extend beyond financial savings; it reduces the strain on the environment, it allows for the optimization of existing facilities, it can defer capital investment costs, improve public perception, and can result in direct benefits to residents such as through reduced water bills.

In 2019, Tampa Bay Water established quantifiable goals for the Tampa Bay Water Wise rebate program, aiming for 11 million gallons per day (MGD) of water savings by 2030. This program would help to delay the need for new supply development and would do so at lower cost on a per thousand gallons (kgal) basis than a new water supply source. At the end of fiscal year 2022, the program had been active for two and a half years and achieved 0.15 MGD in water savings. Given the progress, the programs' target water savings was shifted downward to 3.8 MGD by 2030. The impact of the Tampa Bay Water Wise program is measured through pre- and post-water use analysis at each site where a rebate is issued. This means that the program aim to measure and verify actual water savings, and not solely rely on presumed water savings.

It is important to acknowledge that other factors beyond the Tampa Bay Water Wise program will play a role in demand trends as well. Passive water conservation helps reduce water demands as old, inefficient fixtures wear down and are replaced with new, efficient ones. Members governments also influence water usage through a variety of ways: retail water rates, conservation programming, reclaimed water use to offset potable water use, landscape ordinances, and Advanced Metering Infrastructure (AMI). And of course, population growth, weather and macro-economic changes can influence water usage upward or downward. While we can quantify the impacts on the Tampa Bay Water Wise program, we cannot always quantify the impact of these other factors that contribute to overall water demand in the Tampa Bay area.

B. Regional Demand Management Activities

Member Government Activities

Member governments have historically been the primary point of contact with customers regarding demand management activities. While it is beyond the scope of this demand management plan to describe in detail the activities of each member government, it is important to recognize the variety of water conservation activities that member governments undertake. Typical activities include the distribution of indoor plumbing retrofit kits, rain sensors, and hose nozzles to residents. Members also provide education and assistance to customers through phone consultations, landscape consultations, public events, newsletters, websites, and more. Watering restriction enforcement is active in all three counties and may result in warnings or fines to residents for improper watering. Historically, the development of reclaimed water systems has contributed to large potable water use reductions, and new reclaimed water connections continue to be made in some service areas. In addition, several members have either started to convert their water meters to automatic metering infrastructure (AMI) or are considering it. Water demand reductions can result from AMI installations, particularly if residents are notified of leaks, high bills, or if they are provided with water usage education. Lastly, member governments' policies on landscaping and new construction can have impacts on water demands.

Florida Friendly Landscaping™ Activities

Florida-Friendly Landscaping™ is a state-wide program within the University of Florida Institute of Food and Agricultural Sciences (IFAS) Extension designed to teach Florida-Friendly Landscaping™ (FFL) practices. This program is delivered through the County Extension Services, and these programs are financially supported by Tampa Bay Water. Two or more Florida Friendly Landscape™ staff work in each Hillsborough, Pasco and Pinellas County Extension Service.

FFL staff educate residents and businesses about landscaping practices that result in water conservation, reduction of non-point source pollution, and the protection of the natural environment. This education is imparted through site visits, group classes focusing on lawn care, rainwater harvesting, landscape design, and more. FFL staff estimate water savings based on changes they recommend to irrigation system settings, and other methods that have been developed by the University of Florida.

Tampa Bay Water Wise Rebates

The Tampa Bay Water Wise program is a water conservation rebate program managed by Tampa Bay Water staff, guided by staff from the member governments, and co-funded by the Southwest Florida Water Management District (District). The program launched in March 2020, and offers a variety of residential, multi-family and commercial rebates.

Program Background

In 2013, the Tampa Bay Water Board requested that Tampa Bay Water evaluate demand management implementation strategies to determine ways to ensure that if active demand management was selected by the Board, it could be implemented and would help meet the Agency's unequivocal water supply obligations. Agency staff developed a list of potential demand management best management practices that could save up to 11 million gallons per day (mgd) by 2030 at about 20% - 25% of the cost to develop new water supplies. This approach was intended to defer the need to develop new supplies to a later date, all within a cost-effective strategy. The plan was approved by the Board in December 2018 as part of the Long-term Master Water Plan update. In addition, the Board approved funding for a demand management program through the Agency, and to apply for matching cooperative funding from the District. The Board directed staff to work with members to develop implementation strategies for the program that would help to secure water savings while remaining consistent with the Interlocal Agreement.

Program Structure & Implementation

The Tampa Bay Water Wise program offers three types of rebates for homeowners: toilet retrofits, smart irrigation controllers, and shallow wells. Non-residential rebates are offered for toilet and urinal retrofits, cooling towers, commercial kitchen equipment and customized projects. In addition, rebates are offered to builders of newly constructed single-family and multi-family buildings that meet Florida Water Star standards. Rebates are available to customers of all six member governments provided that the members opt-in, and that the customer qualifies. The details of the program can be found on the website www.TampaBayWaterWise.org.

The Tampa Bay Water Wise program is managed by Tampa Bay Water staff, but the program is steered by a Working Group comprised of staff from all six member governments, the District, and Tampa Bay Water staff. This group evaluates the progress of the program, contributes to program development, reviews marketing plans, and considers program changes. Throughout the implementation of the program, the Working Group adopted several program modifications to better tailor the rebates offered to meet the needs of the various customers. The program is relatively nimble and has continuously incorporated new ideas into the outreach efforts, messages, and rebate options.

The rebates are administered by a third-party contractor, Electric and Gas Industries Association (EGIA). EGIA manages the website, reviews, and processes the applications, issues rebate checks to customers, and manages the regional marketing efforts. The University of Florida provides technical assistance to the program through rebate eligibility determination, water savings analyses, targeted marketing analytics, and other technical assistance.

The regional promotion and marketing for this program was designed to establish a recognizable marketing presence while also meeting the needs of the individual six members. The regional marketing efforts include the website, signage in retail stores, brochures, paper and digital promotion to contractors, search engine optimization, digital ads (search engine and social media), traditional media (print, TV, billboards) as well as direct outreach to contractors, multi-family building owners/managers, and community/HOA associations. Members also help to promote the program to their customers through their typical communication channels such as bill stuffers, newsletters, website pages, and/or social media.

Program Results

A summary of the rebates and water savings achieved since the program launched is provided in Table 2. Between March 30, 2020 through September 30th, 2022, over 0.15 MGD were saved over 2.5 years. A few rebate categories have substantially higher water savings, namely the $100 homeowner toilet rebate, the customizable rebate, and the multi-family toilet rebate. Most of the water savings here reflect presumed water savings per device because there has not yet been statistically sufficient data to measure the savings through billing data analysis. However, the savings from four, large multi-family projects were verified through billing data, and that is reflected here. Two of those projects were in the multi-family toilet rebate category and two were in the customizable rebate category. All four had higher water savings than originally presumed (3 – 7 times higher per property), underscoring the potential for substantial water savings in the multi-family sector.

Table 2. Rebates issued and water savings achieved through Tampa Bay Water Wise since launch.

Rebate Measures	Quantity	Water Savings (GPD)
Residential Rebates		
$100 Homeowner Toilet	982	34,370
$40 Homeowner Toilet	536	5,360
ET/SMS Irrigation Controller	31	4,805
Shallow Well	2	516
Commercial Rebates		
Customizable Rebate	4	43,096
Commercial Toilet/Urinal	5	180
$75 Multi-Family Toilet	915	63,063
$40 Multi-Family Toilet	-	-
Florida Water Star – Single Family	-	-
Cooling Tower	-	-
Pre-Rinse Spray Valve	-	-
Dishwasher	-	-
TOTALS	**2,475**	**151,390**

Figure 11 portrays the water savings from the program over the first 2.5 years which shows an increase in water savings year over year, with a cumulative total of 0.15 MGD. This result is lower than what was originally anticipated during this time frame, 2.75 MGD.

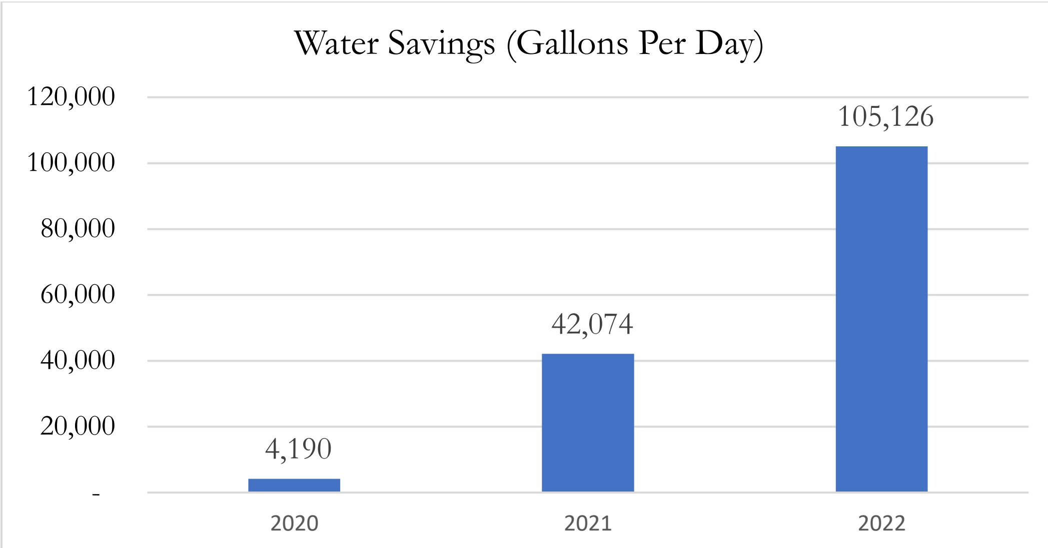

Figure 11. The water savings over 2.5 years of rebate program implementation.

Program Analysis

The costs and benefits of the Tampa Bay Water Wise program were evaluated with the Alliance for Water Efficiency's Water Conservation Tracking tool. The total expenditures for this program were $1.4 million dollars, resulting in a cost per thousand gallons of $1.41/kgal. The original long-term goal for this program was to achieve 11 million gallons per day of water savings at a cost that is 20%- 25% the cost of new supplies. The original estimated cost was $0.50/kgal for the program. While the actual program cost of $1.41/kgal is higher than the original projection it is still competitive with the cost of new supply development. Moreover, this cost is anticipated to be reduced as the program grows and proportionately more dollars are directed to rebates rather than program start up and implementation costs. Based on the program's performance through 2022, and the future water savings projection described in the following section (C.), the program appears to be on-track in terms of its cost effectiveness but is expected to achieve less water savings than the original goal. Several factors played into the program's water saving results:

Program ramp up time – The goal of achieving 11 MGD over 10 years was allocated evenly over ten years with each year projected to achieve 1.1 MGD. However, this was a simplified model which didn't account for the necessary ramp up time for a new program.

Covid-19 – This program launched in March 2020 at the same time as the onset of the Covid-19 pandemic. This delayed our promotional efforts and made it difficult, particularly in the first 12 months of implementation, to execute the program's marketing campaign (e.g., in-person events, in-store marketing, etc.). As more in-person events resumed throughout 2021, there were more opportunities for marketing and promotion.

Program participation rates – The forecasted program participation rates were much higher than what occurred in the first two and a half years of this program. While the Water Demand Management Plan Update 2018 provided a thorough and comprehensive look at the markets in which our rebate program would be operating, ultimately this program is aiming to influence human behavior which can be difficult to predict. Throughout the program's development over the first 2.5 years, the working group and staff made numerous changes to the program rules and offerings to better adapt to the needs of the market. These efforts will continue as needed.

C. Future Regional Demand Management Opportunities

This section provides a forecast of the water savings that might be achieved by the Tampa Bay Water Wise program and identifies additional opportunities to explore that may benefit demand reduction goals. Some of the identified opportunities are not within Tampa Bay Water's direct purview but could potentially be supported through some form of partnership. It is expected that conservation activities by the members and the FFL staff will continue to contribute to demand reductions.

Tampa Bay Water Wise

The projected savings for the Tampa Bay Water Wise program have shifted since the 2018 Long Term Master Water update to better align with the program's actual performance. The revised forecast still relies on the market data developed in 2018 but assumes an overall lower participation rate, and therefore lower water savings, through 2030. This forecast goes out only to 2030 to align with the original, anticipated duration of this program.

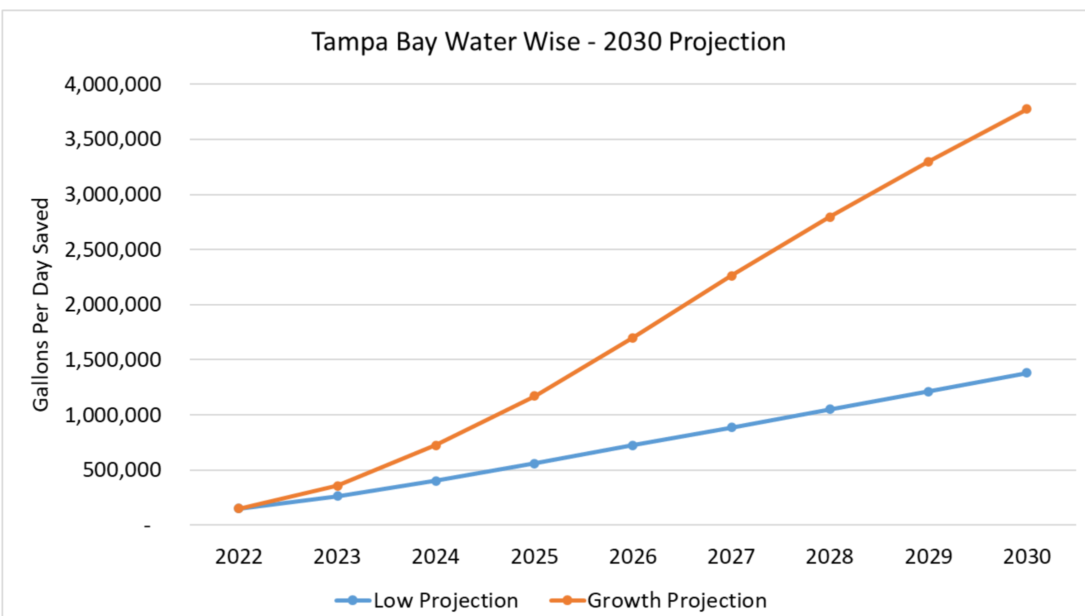

Figure 12. Projected water savings from the Tampa Bay Water Wise program over the anticipated duration of this program.

Figure 12 shows two projections to reflect the uncertainty of the program's water saving trajectory over time. The higher "growth" projection has been adopted as the revised goal for the program and would achieve 3.8 MGD by 2030. Under this scenario, the program's total expenses would be about $15.7 million dollars and the cost per thousand gallons would be $0.68/kgal. The costs for this program are based on historic costs, which is subject to change in the future. The costs do include the increased budget for marketing which was approved by the working group in early 2023.

The lower projection was developed to illustrate the scenario in which minimal growth in the program occurs beyond what was saved in 2022. This scenario also includes the increased budget for marketing to serve as a type of risk assessment. Under this scenario, the program would save 1.4 MGD by 2030 and would cost $0.87/kgal.

In summary, the revised goal for the Tampa Bay Water Wise program is to reach 3.8 MGD savings (or more) by 2030 and to do so at a cost that is 20- 25% the cost of new supplies. Based on the cost projections presented here, there is reason to believe these costs may still be 20% - 25% of the cost of new supplies in 2030. The cost of those new supplies is, at this time, still unknown. The projections for this program extend to 2030 since the program was originally envisioned to last 10 years.

Additional Demand Management Opportunities

Tampa Bay Water will continue to invest in demand management activities by supporting the Florida Friendly Landscaping™ program, by coordinating with member governments, and by implementing the Tampa Bay Water Wise rebate program. There are still additional opportunities to explore that can further contribute to demand reductions. The list provided here is intended to highlight opportunities to investigate further and may reflect a potential to expand an existing effort or begin a new one. These opportunities have been selected based on the demand trends in the region, and because they are widely recognized around the county for their effectiveness in reducing water demands. Some of these opportunities are outside of Tampa Bay Water's direct control but could potentially be supported by Tampa Bay Water though some form of partnership.

Expanded Irrigation Efficiency Assistance – Irrigation evaluations are currently conducted by FFL staff and some member government staff for homeowners and commercial customers. Since outdoor water demands impact Tampa Bay Water's system delivery capacity requirements, expanded efforts could be beneficial to the agency. These efforts can be targeted at high demand customers. Homeowners typically use 30 to 60 percent of their water outdoors[i], but for high demand customers it can be a much larger percentage. Irrigation evaluations, paired with education of a motivated customer, ensure optimal efficiency during irrigation system operation and helps to conserve water resources, reduce homeowner bills, and contributes to a healthy landscape.[ii] Many of these efforts are currently directed at homeowners, which is time intensive (even if conducted virtually), but they are key to reducing peak season watering demands. A billing data analysis of water savings that result from these evaluation – and the persistence of those water savings – would help to define the expected water savings that can result from an expanded effort. Ultimately the volume of water saved will be related to the extent of over irrigation, the motivation of the customer, and a reasonable expectation of the water savings from any implemented changes.

Public Information and Education – Education, information, and inspiration are perhaps among the most important elements of successful, long-term conservation programs, but are difficult to correlate with any measurable water savings.[iii] Conservation efforts in general are reliant upon residents taking action to reduce their water use through behavioral changes and fixture replacement. Education on the importance of water conservation can help customers make water-wise decisions when making purchases or managing their water use. These efforts can be especially impactful to residents new to the region, who are unfamiliar with the climate patterns and the realities of water management in Florida. A diverse education and engagement effort can include social marketing, school education, public outreach, and other educational efforts aimed at raising awareness, fostering behavioral change, and promoting investments in efficient fixtures.[iv]

Conservation Messaging with AMI – Several member governments are in the process of converting to Automatic Metering Infrastructure (AMI) meters throughout their service area. With the increased frequency of water usage data that is available (such as every 15 minutes instead of once per month), this data provides an opportunity to communicate with customers when a leak is detected and to provide target water usage levels based on typical, similar properties (single-family homes in particular). Several software platforms exist to aid utilities with the management of this data and communication to customers. This can be an effective way to reduce water demands by providing the right information, in the right way, at the right time.[v]

Land Use and New Construction – Population growth has been a clear driver of increased water demand over the years and the recent population increase in the Tampa Bay region over the last few years is evidence that this trend is continuing. As the region grows, land use planners and water managers can evaluate a variety of land-use related water conservation methods for new construction that can aid in long-term conservation efforts. These methods are wide ranging and can include regulatory or incentivized measures. For example, local budlings code requirements related to indoor and outdoor efficiency standards and can be tied to existing programs such WaterSense new homes[vi] or Florida Water Star. Incentives for developers and builders can include expedited permitting, density bonuses, fee reductions, along with many other options. Landscape codes can include requirements or incentives related to plant selection type, maximums on high volume irrigated areas, soil amendment[vii] and more. Some of these requirements are already in place by member governments, and enforcement is also a key component of ensuring the policy has the intended effect. Information can be provided to new homeowners to educate them about their irrigation controllers, seasonal plant water needs, water rates and more. Long term-term efforts to deepen coordination between land use planners and water managers can influence long term planning projections, comprehensive plan goals, and more.[viii]

System Water Loss Control – Managing water loss in the distribution system is an essential proactive practice to address inefficiencies of water and revenue loss.[ix] Controlling losses includes system water auditing, apparent loss tracking, real loss leakage and pressure management, infrastructure maintenance, leak detection and repair. Water savings from water loss management programs depends entirely on the ongoing level of loss and will vary from system to system. As a result of a pilot effort initiated by Tampa Bay Water in 2018-2019[x], a statewide Florida Water Loss Program was launched by the Florida Section Water Works Association in partnership with Cavanaugh and E-Source and is being funded by the Florida Department of Environmental Protection. This program is a significant first step toward proactive management and five of the six member governments are enrolled in it as of March 2023. This effort may be beneficial in reducing water loss and demands and there may be additional steps to take at the conclusion of the program in 2025.

IV. Summary of Findings and Recommendations

Tampa Bay Water's unequivocal obligation to supply water to the region necessitates comprehensive water demand analyses and forecasting, development of new supply projects, and investment in demand management strategies to reduce the demand as cost effectively as possible. Over the last two decades water demands in Tampa Bay Water's service area have risen and fallen year over year. Water demands are impacted by several factors including population growth, weather, macro-economic trends, demand management activities, and more. As the population of the Tampa Bay area continues to grow, demand management has an important role to play in Tampa Bay Water's long-term objectives by improving the efficiency with which water is used across residential, multi-family and commercial sectors.

Member governments have invested in conservation education and assistance for decades. Tampa Bay Water has supported their efforts and supported the Florida Friendly Landscaping™ program for decades. More recently, Tampa Bay Water began pursuing active water savings through the regional rebate program Tampa Bay Water Wise, which now aims to save 3.8 million gallons per day by 2030, at a lower cost than new supply development. And yet there remain new opportunities which may help to further reduce water demand across the region. Demand management is a long-term investment and part of Tampa Bay Water's long-term strategy that will play a beneficial role for years to come.

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[ix] AWWA. (2009). Introduction: Auditing Water Supply Operations and Controlling Losses. In *Water audits and loss control programs* (4th ed., pp. 1–8). essay, American Water Works Association.

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Appendix D. Screening Evaluation: City of Tampa Reclaimed Water for New Water Supply Concepts

DRAFT

SCREENING EVALUATION: CITY OF TAMPA RECLAIMED WATER FOR NEW WATER SUPPLY CONCEPTS

Integrated Program Management Consultant

(Contract No. 2022-001)

BV PROJECT NO. 411258
BV FILE NO 40.000

PREPARED FOR

Tampa Bay Water

31 AUGUST 2022

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AADF	Annual Average Daily Flow
AOP	Advanced Oxidation Process
AWP	Advanced Water Purification
AWTP	Advanced Wastewater Treatment Plant
BAF	Biologically Active Filtration
BV	Black & Veatch
CIP	Clean-In-Place
DAF	Dissolved Air Floatation
DPR	Direct Potable Reuse
ELA	Engineering, Legal, and Administrative
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
GFD	Gallons per Square Foot per Day
HFCAWTP	Howard F. Curren Advanced Wastewater Treatment Plant
IPR	Indirect Potable Reuse
lbs	Pounds
LCC	Life Cycle Cost
LOX	Liquid Oxygen
LPHO	Low-Pressure High-Output
LTMWP	2023 Long Term Master Water Plan
lb/d	Pounds per Day
MF	Microfiltration
MGD	Million Gallons per Day
mg/L	Milligrams per Liter
mJ/cm^2	Millijoules per Square Centimeter
NDMA	N-nitrosodimethylamine
OH&P	Overhead and Profit
POC	Point of Connection
PRC	Potable Reuse Commission
P/S DW	Primary and Secondary Drinking Water Standards
RO	Reverse Osmosis
SB	Senate Bill
SHARP	Southern Hillsborough Aquifer Recovery Program
SF	Square Feet
SWTP	Surface Water Treatment Plant
TBC	Tampa Bypass Canal

TDS	Total Dissolved Solids
TECO	Tampa Electric Company
TOC	Total Organic Carbon
TOX	Total Organic Halogen
UIC	Underground Injection Control
UV	Ultraviolet

Executive Summary

Tampa Bay Water is exploring potential potable water supply concepts to meet future needs. Concurrently, the City of Tampa (City) is proceeding with planning efforts related to the future use of its reclaimed water supply. This study involves the initial screening of concepts for Tampa Bay Water to beneficially use 20 million gallons per day (MGD) of the City's reclaimed water to help meet future water supply needs. Tampa Bay Water and the City have discussed several reclaimed water options and have narrowed the list to the following six concepts for further development and initial screening:

- Concept 1: South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge
- Concept 2: Supplement the Regional Reservoir with Reclaimed Water
- Concept 3: South Hillsborough Wellfield & Supplement Regional Reservoir with Reclaimed Water
- Concept 4: Supplement Tampa Bypass Canal with Reclaimed Water
- Concept 5: Desal Concentrate Discharge System Expansion with Reclaimed Water
- Concept 6: Desal Plant Expansion with Reclaimed Water Supply

Evaluation of these six water supply concepts consisted of the following environmental, social, and financial components:

- Approximate potable water yield on an annual basis from groundwater withdrawal or supplemented surface water supply.
- Legislative drivers and regulations that could impact implementation of the reuse concepts.
- Infrastructure component needs for conveyance and treatment including new construction and expansion or modification to existing infrastructure.
- Key feasibility aspects and stakeholder coordination.

The results from the evaluation were captured in a series of summary sheets for each concept. For each concept, these summary sheets contain an overview diagram, the total anticipated additional yield, key infrastructure required to facilitate integration of the concept into the regional system, regulatory, feasibility and stakeholder elements, high-level planning cost estimates, and a map showing existing infrastructure including the approximate or potential location of new required infrastructure. Summary concept sheets are provided in **Appendix A.**

To determine what concepts could be evaluated in more detail, they were subject to a coarse screening evaluation. The coarse screening involved the use of eight different criteria that capture impacts with respect to the Tampa Bay Water Board approved evaluation criteria: environmental stewardship, costs, and reliability. **Table ES-1** and **Table ES-2** below, show the cost estimates and the coarse screening results of each water supply concept.

Table ES-1 Cost Estimates[1]

Concept Number	Concept Description	30-year LCC ($)	Yield (MGD)	Cost per 1000 gal
1	South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge	$720,421,000	8.85	$7.43
2	Supplement the Regional Reservoir with Reclaimed Water	$1,748,967,000	16	$9.98
3	South Hillsborough Wellfield & Supplement Regional Reservoir with Reclaimed Water	$2,253,494,000	13	$15.83
4	Supplement Tampa Bypass Canal with Reclaimed Water	$866,972,000	2	$39.59
5	Desal Concentrate Discharge System Expansion with Reclaimed Water	$672,867,000	1.7	$36.15
6	Desal Plant Expansion with Reclaimed Water Supply	$2,101,520,000	10	$19.19

Note: LCC = Life Cycle Cost, MGD = Million Gallons Daily

[1]Refer to Section 4.1 for cost estimate assumptions

Table ES-2 Coarse Screening Evaluation Results

Ranking	Concept Number	Concept Description	Total Score	Total Weighted Score
1	2	Supplement the Regional Reservoir with Reclaimed Water	3	0.38
2	1	South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge	2	0.19
3	3	South Hillsborough Wellfield & Supplement Regional Reservoir with Reclaimed Water	0	-0.40
4	4	Supplement Tampa Bypass Canal with Reclaimed Water	-3	-0.44
5	6	Desal Plant Expansion with Reclaimed Water Supply	-5	-0.62

Ranking	Concept Number	Concept Description	Total Score	Total Weighted Score
6	5	Desal Concentrate Discharge System Expansion with Reclaimed Water	-5	-0.70
Note: Concepts are listed in order of highest ranking to lowest.				

Concept 2 and Concept 1 have the most favorable scores suggesting that these concepts have benefits relative to other concepts with respect to environmental stewardship, project costs, and reliability. The higher cost per 1000 gallons of Concept 3, which was the combination of Concept 1 and 2, is the reason Concept 3's score is lower than the Concept 2 and 1 scores. The low and negative scores of Concepts 3 through 6 indicate their disadvantages relative to the other concepts.

The coarse screening evaluation identified Concept 2 Supplement the Regional Reservoir with Reclaimed Water and Concept 1 South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge as the most favorable options to be further consider and evaluated.

The next steps and integration of concepts into the 2023 Long Term Master Water Plan (LTMWP) update process are:

- 2023: Considering these options as part of the 2023 LTMWP Update process
- 2024 – 2026: Feasibility studies for shortlisted options
- 2027: Ranking and selection of next LTMWP Projects for implementation
- 2028 – 2030: Property acquisition, design and permitting
- 2031 – 2033: Bidding and construction
- 2033: Start-up and commissioning of new supply, treatment, and transmission infrastructure

1.0 Introduction and Background

Tampa Bay Water is exploring potential potable water supply concepts to meet future needs. Concurrently, the City of Tampa (City) is proceeding with planning efforts related to the future use of its reclaimed water supply. This study involves the initial screening of concepts for Tampa Bay Water to beneficially use 20 MGD of the City's reclaimed water supply to help meet future water supply needs. The six concepts described in the following sections were evaluated as part of this project. Six concepts were considered. For each concept, the evaluation consisted of the following components:

- Approximate potable water yield, which is the amount of the 20 MGD that can successfully be recovered, on an annual basis from groundwater withdrawal or supplemented surface water supply
- Legislative drivers and regulations that could impact implementation of the reuse concepts
- Infrastructure components needs for conveyance and treatment including new construction and expansion or modification to existing infrastructure.
- Key feasibility aspects and stakeholder coordination

Water supply concepts are described in detail in the following sections and summarized in **Appendix A.**

1.1 Concept 1: South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge

This concept, presented in **Figure 1-1**, includes pumping City reclaimed water into new aquifer recharge wells, which would be located near the existing South Hillsborough Aquifer Recharge Project (SHARP) Injection Wells. This concept would provide a salinity barrier near the coast and result in increased capacity at the inland Tampa Bay Water South Hillsborough wellfield. Similar to the SHARP project, the intent is that injected water will maintain a salinity barrier and not migrate to the water supply wells. This would provide a net benefit to the aquifer and generate additional credits for groundwater withdrawals. Because reclaimed water is injected into a high salinity aquifer (greater than 3,000 milligrams per liter (mg/L) total dissolved solids (TDS)) that will not be used for potable purposes, advanced water purification (AWP) is not required. It is estimated that with 20 MGD injected as a salinity barrier, this concept would produce a yield of 8.85 MGD. This estimated yield was based on available hydrogeological data and interpretation of the groundwater modeling scenarios presented in the 2018 Long-term Master Water Plan. In the plan, modeled withdrawals were limited to values that maintained a 10 percent net benefit to the Southern Water Use Caution Area aquifer, as well as less than 0.049 feet of net drawdown on the minimum level of the Highland Ridge Lakes in Polk County to meet the Southwest Florida Water Management District's Water Use Permit conditions for issuance. Major components of this concept include the following:

- 20 MGD firm capacity pump station at the Howard F. Curren Advanced Wastewater Treatment Plant (HFCAWTP)
- 8 Recharge wells
- 5 Water supply wells
- Groundwater treatment plant with ozone treatment
- Pipelines from HFC AWTP to new aquifer recharge wells and from the South Hillsborough water supply wells to the new groundwater treatment plant

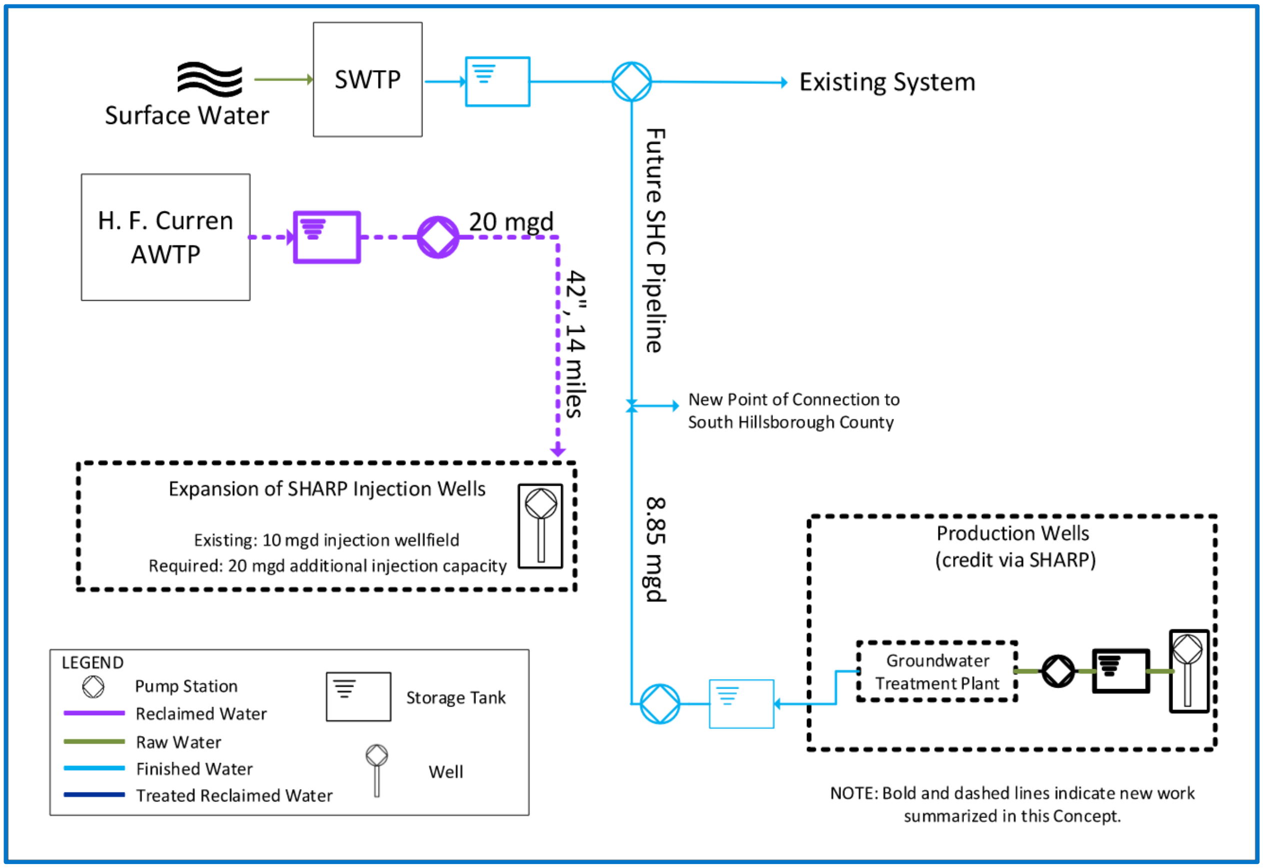


Figure 1-1 Summary Depiction of Concept 1: South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge

1.2 Concept 2: Supplement the Regional Reservoir with Reclaimed Water

This concept, presented in **Figure 1-2**, includes pumping City reclaimed water to a new AWP facility and then to the existing C.W. Bill Young Regional Reservoir (reservoir). From the reservoir, water would then be treated at a new water treatment plant and pumped back into the South Hillsborough County water distribution network at a designated point of connection (POC). This concept would be considered as indirect potable reuse (IPR). It is estimated that this concept would produce a yield of 16 MGD due to the recovery rate of the proposed treatment process being 80 percent, with the remaining 20 percent of the flow being either recycled or disposed of. Major components of this concept include the following:

- 20 MGD firm capacity pump station at HFCAWTP
- AWP Facility with microfiltration (MF), reverse osmosis (RO), and ultraviolet light (UV)/advanced oxidation process (AOP) treatment
- New Surface Water Treatment Plant (SWTP), to be located near the reservoir
- Pipelines from HFCAWTP to the AWP facility, from the AWP facility to the reservoir, from the reservoir to the new SWTP, and from the new SWTP to the POC

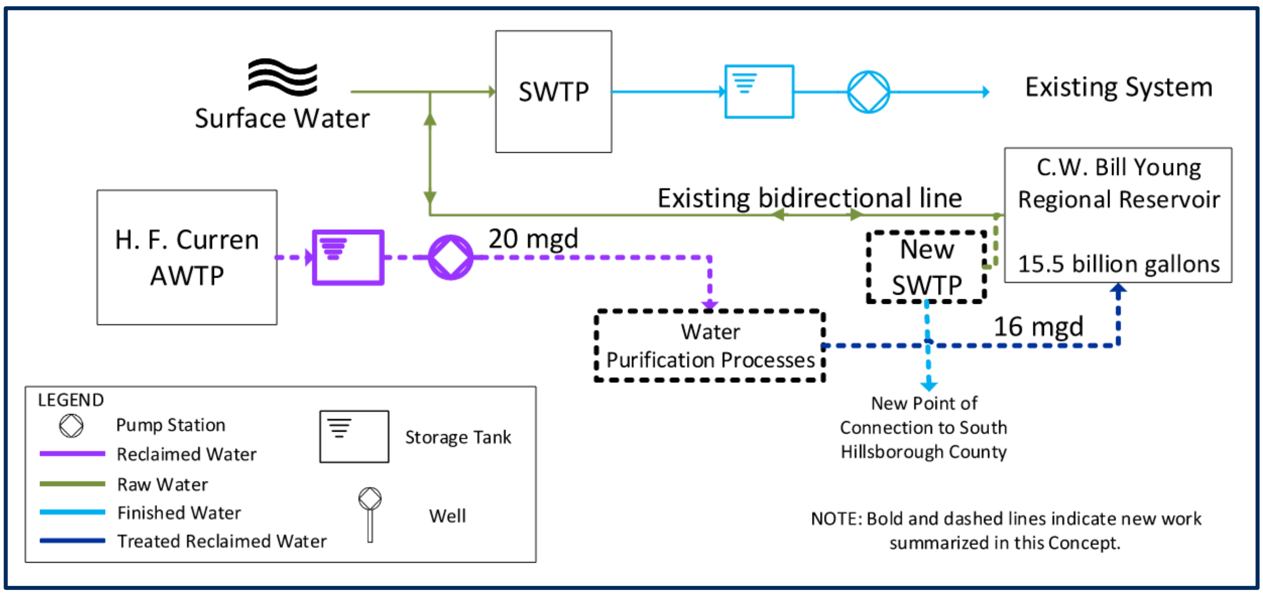


Figure 1-2 Summary Depiction of Concept 2: Supplement the Regional Reservoir with Reclaimed Water

1.3 Concept 3: South Hillsborough Wellfield & Supplement Regional Reservoir with Reclaimed Water

This concept, presented in **Figure 1-3**, includes the implementation of both Concepts 1 and 2, which allows for seasonal flexibility regarding where the reclaimed water can be sent. It is estimated that this concept would produce an average yield of 13 MGD. Major components of this concept include the following:

- 20 MGD firm capacity pump station at HFCAWTP
- 8 Recharge wells
- 5 Water supply wells
- Groundwater treatment plant with ozone treatment
- Pipelines from HFCAWTP to new aquifer recharge wells and from water supply wells to the new groundwater treatment plant
- AWP Facility with MF, RO, and UV /AOP treatment
- New SWTP, to be located near the reservoir
- Pipelines from HFCAWTP to the AWP facility, from the AWP facility to the reservoir, from the reservoir to the new SWTP, and from the new SWTP to the POC

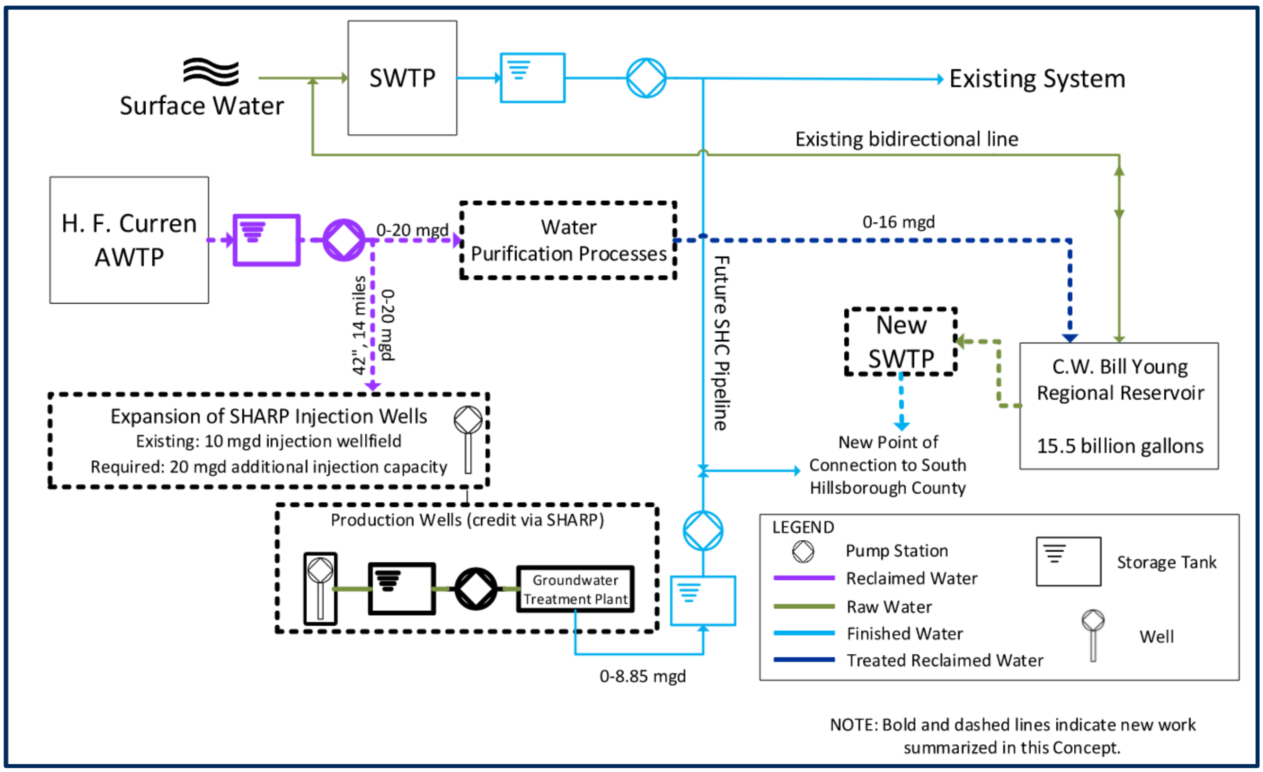


Figure 1-3 Summary Depiction of Concept 3: South Hillsborough Wellfield & Supplement Regional Reservoir with Reclaimed Water

1.4 Concept 4: Supplement Tampa Bypass Canal with Reclaimed Water

This concept, presented in **Figure 1-4**, includes pumping City reclaimed water to a new AWP facility and then to the Tampa Bypass Canal (TBC), upstream of the current Tampa Bay Water intake point. This concept would be considered IPR. It is estimated that this concept would produce a yield of 1 to 2 MGD. This yield is based on the results from three screening realizations that indicated how much water can be safely withdrawn from the TBC under dry, normal, and wet hydrologic conditions. These evaluations were conducted in the 2018 Long-term Master Water Plan. Major components of this concept include the following:

- 20 MGD firm capacity pump station at HFCAWTP
- AWP with MF, RO, and UV/AOP treatment
- Pipelines from HFCAWTP to the AWP facility, and from the AWP facility to the TBC Outfall

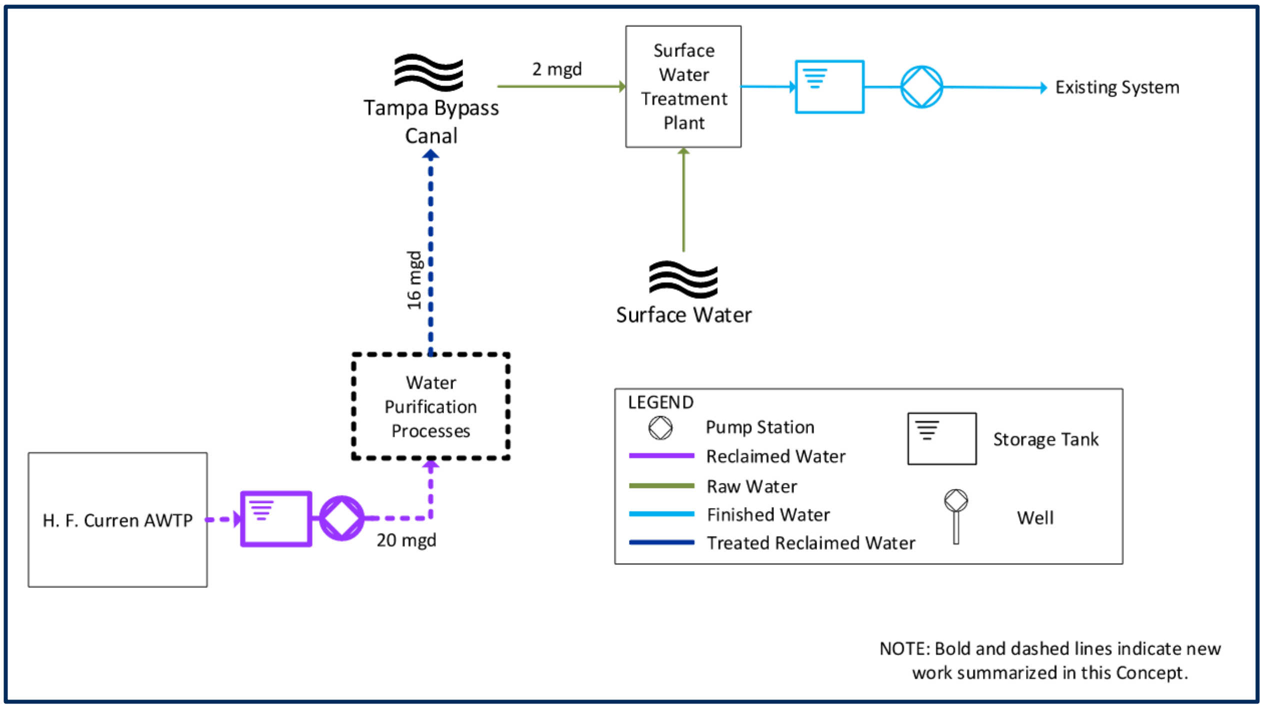


Figure 1-4 Summary Depiction of Concept 4: Supplement Tampa Bypass Canal with Reclaimed Water

1.5 Concept 5: Desal Concentrate Discharge System Expansion with Reclaimed Water

This concept, presented in **Figure 1-5**, is based on using the City's reclaimed water to augment the RO concentrate discharge at the Tampa Bay Seawater Desalination Plant (Desal Plant). Currently, the Desal Plant withdraws seawater from the Tampa Electric Company's (TECO) Big Bend Power Plant's cooling water tunnels, where the seawater is then treated in the Desal Plant and the resulting RO concentrate is blended with the cooling water effluent from the power plant before being discharged into Tampa Bay. However, TECO will be changing how their cooling water tunnels will be used, which would impact the availability of this blending water for the desal plant in the future. The reclaimed water would be used to meet the dilution ratio requirements of the concentrate prior to discharge. It is estimated that this concept would produce a yield of 1.7 MGD since the diluted concentrate would allow the Desal Plant to withdraw additional seawater while still meeting dilution requirements. Note that under this concept, the Desal plant would still be limited to withdrawing seawater only while the TECO tunnels are operating, which could potentially impact the Desal Plant's ability to receive the reclaimed water for blending. Major components included in this concept include the following:

- 20 MGD firm capacity pump station at HFCAWTP
- 5 MG Blending tank and 40 MGD firm capacity pump station at the Desal Plant
- Discharge structure at Desal Plant
- Pipeline from HFCAWTP to the Desal Plant

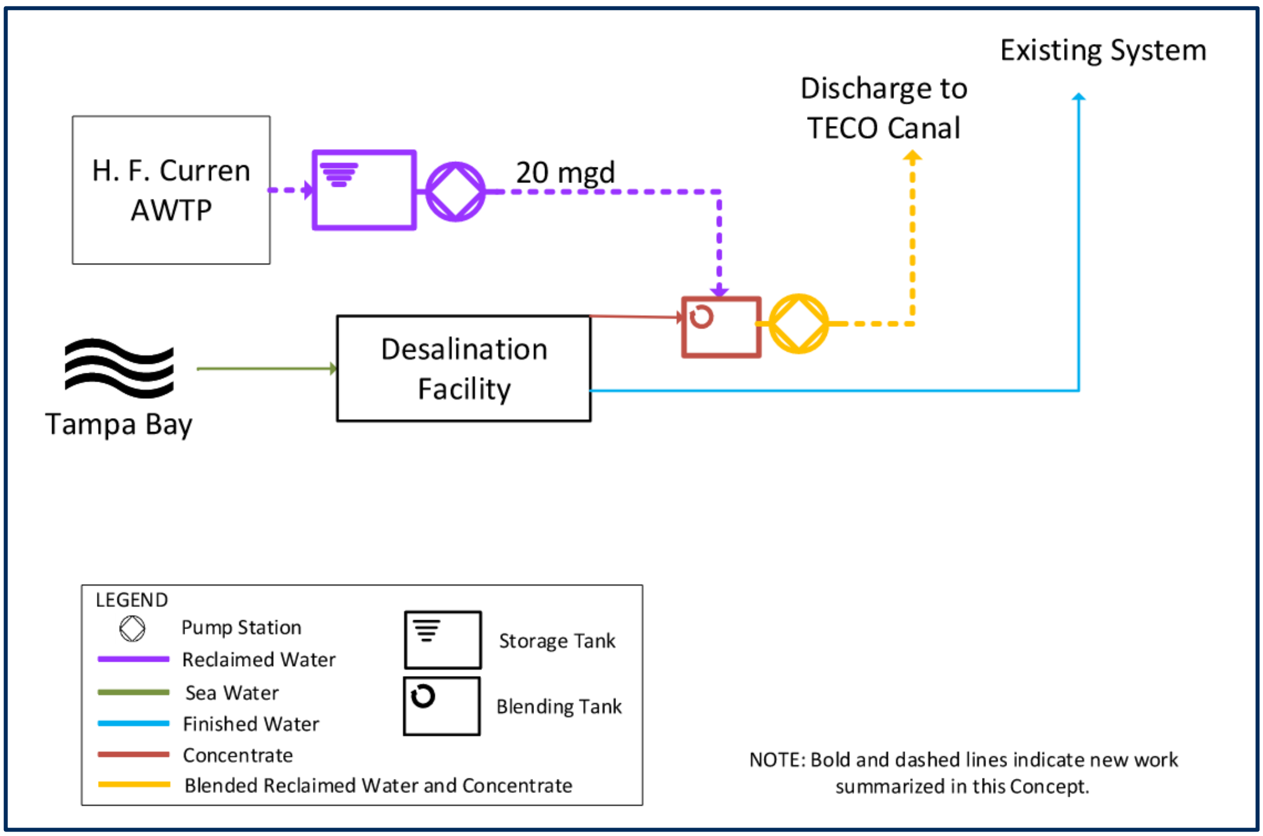


Figure 1-5 Summary Depiction of Concept 5: Desalination Concentrate Discharge System Expansion with Reclaimed Water

1.6 Concept 6: Desal Plant Expansion with Reclaimed Water Supply

This concept, presented in **Figure 1-6**, includes pumping City reclaimed water to the Desal Plant and is the only direct potable reuse (DPR) concept considered as part of this evaluation effort. The reclaimed water would be treated at the Desal Plant that is expanded to treat the existing 50 MGD of seawater influent as well as the additional 20 MGD of reclaimed water. It is estimated that this concept would produce a yield of 10 MGD based on the current recovery rate of 50 percent. Major components of this concept include the following:

- 20 MGD firm capacity pump station at HFCAWTP
- Expanded Desal Plant, including pre-treatment, RO, liquid lime conversion, and a UV/AOP system
- Pipeline from HFCAWTP to the Desal Plant

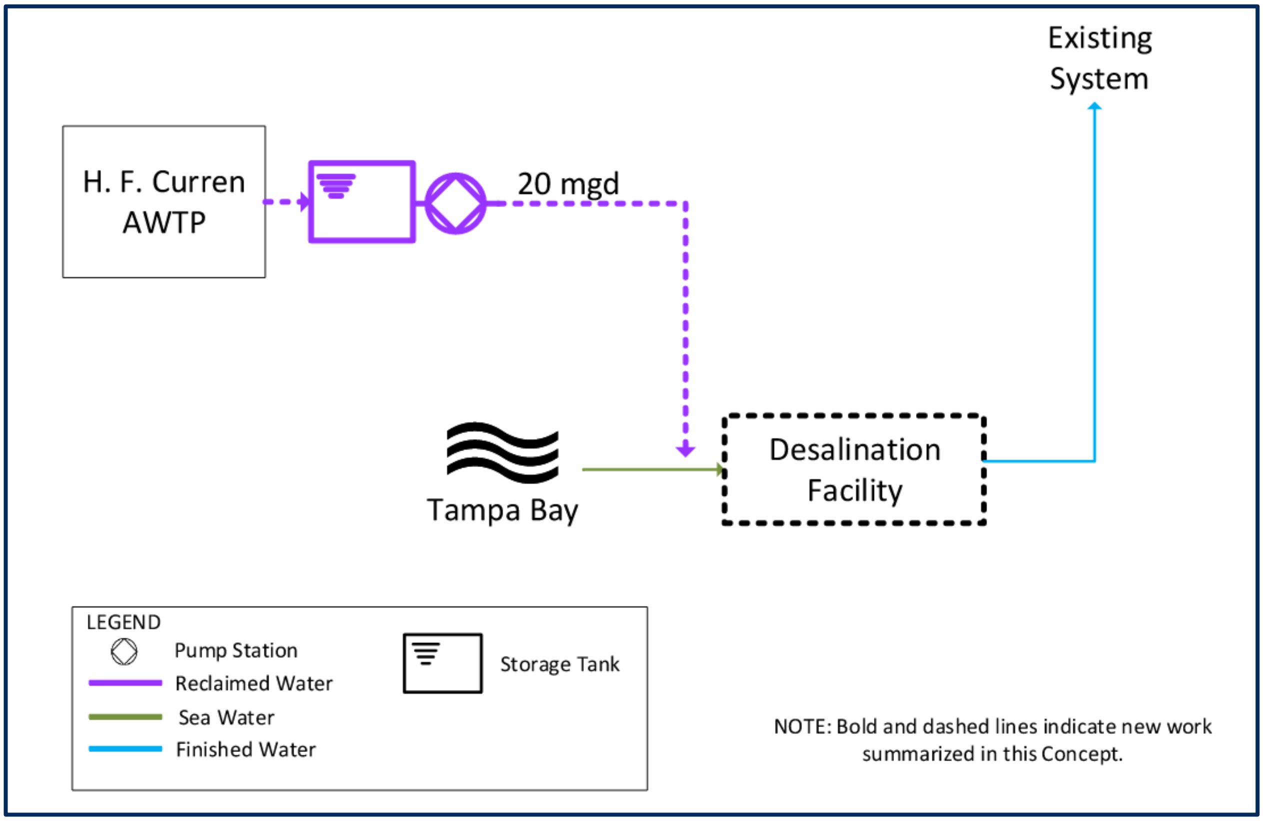


Figure 1-6 Summary Depiction of Concept 6: Desalination Plant Expansion with Reclaimed Water Supply

1.7 Ongoing Projects/Activities

Projects within the operational area of the six concepts are identified below. Coordination with these stakeholders and others may be required in the execution of any of these six concepts.

- TECO's Big Bend Modernization Project
- South Hillsborough Supply Expansion Pipeline
- Tampa Bay Seawater Desal Plant Intake Phase II Pump Station
- Regional SWTP Expansion
- 2023 Long Term Master Water Plan Update

2.0 Legislation and Regulations

This section presents a summary of legislative drivers and regulations that could impact implementation of the reuse concepts described in this report. Florida Senate Bill 64 (SB 64) is a legislative driver for utilities, including the City of Tampa, to make more water available for reuse. The bill, described in more detail in the following subsection, calls for the elimination of non-beneficial discharges to surface waters.

Regulations for reuse are also summarized in the following sections. Chapter 62-610, Florida Administrative Code (FAC) is the primary regulation governing reuse in Florida. This rule is currently undergoing revisions along with several other FAC chapters based on direction from the Florida State Legislature in the Clean Waterways Act in 2020 (Senate Bill 712/House Bill 1091). This legislation directed the Florida Department of Environmental Protection (FDEP) to initiate rule revisions based on the recommendations of the Florida Potable Reuse Commission's (PRC's) 2020 report "Advancing Potable Reuse in Florida: Framework for the Implementation of Potable reuse in Florida." As of this writing, FDEP has issued drafts of the following chapters in response to the legislation:

- Chapter 62-625, FAC – Pretreatment Requirements
- Chapter 62-610, FAC – Reclaimed Water
- Chapter 62-550, FAC – Drinking Water Standards
- Chapter 62-555, FAC – Permitting, Construction, O&M of Drinking Water Systems

The draft revisions to Chapter 62-610, FAC focus on updating Florida's current regulations for groundwater recharge and IPR. The revisions to Chapters 62-550, FAC and 62-555, FAC are primarily focused on additions for DPR. The most recent FDEP schedule for rule adoption was based on Chapter 62-610, FAC updates being complete this summer and the remainder by summer 2023; however, the schedule for 62-610, FAC has been delayed with the next public hearing scheduled for Dec. 2022 and no specific date for final adoption.

The City of Tampa has 20 MGD available for potential use by Tampa Bay Water from the HFCAWTP that currently falls under the SB 64 non-beneficial surface water discharge category, which will need to be reused beneficially to be compliant with the law. Of the six concepts presented in this report, two involve providing a salinity barrier, three involve IPR, and one involves DPR. The following sections outline the relevant regulations for permitting each of the concepts.

2.1 Senate Bill 64 Overview

SB 64 requires that domestic wastewater utilities eliminate non-beneficial surface water discharges by January 1, 2032. It was passed in June of 2021 and can be found in section 403.064(17) of the Florida Statues. SB 64 required Florida utilities with a surface water discharge to submit a plan to FDEP by November 1, 2021, describing how the discharge would be eliminated by January 1, 2032.

The law states that FDEP shall approve a plan that meets one or more of the following conditions:

1. The plan will result in eliminating the surface water discharge.
2. The plan will result in meeting the requirements of section 403.086(10) Florida Statutes (Ocean Outfall Legislation).
3. The plan does not provide for the complete elimination of the surface water discharge but does provide an affirmative demonstration that any of the following conditions apply to the remaining discharge:

a. The discharge is associated with an IPR project.
b. The discharge is a wet weather discharge that occurs in accordance with an applicable department permit.
c. The discharge is to a stormwater management system and is subsequently withdrawn by a user for irrigation purposes.
d. The utility operates domestic wastewater treatment facilities with reuse systems that reuse a minimum of 90 percent of a facility's annual average flow, as determined by the department using monitoring data for the prior 5 consecutive years, for reuse purposes authorized by the department.
e. The discharge provides direct ecological or public water supply benefits, such as rehydrating wetlands or implementing the requirements of minimum flows and minimum water levels or recovery or prevention strategies for a water body.

The options presented herein provide the City of Tampa an opportunity to eliminate 20 MGD of discharge to Tampa Bay in compliance with SB 64. The concepts that include a new surface discharge are proposed to meet the IPR exception noted in 3.a above (Concepts 2, 3 and 4).

2.2 Indirect Potable Reuse

Chapter 62-610, FAC, Part V provides regulations for Groundwater Recharge and IPR. These regulations are currently undergoing revision and were originally scheduled to be finalized by summer 2022 but have been delayed until later in the year or early 2023. The current rule does not define groundwater recharge as IPR, but this is expected to be revised with the proposed rule changes. IPR is currently defined as "the planned discharge of reclaimed water to surface waters to augment the supply of water available for drinking water and other uses." Reclaimed water used to augment surface water bodies is more specifically regulated under Rule 62-610.554, FAC. This rule governs reuse systems where reclaimed water from domestic wastewater sources is discharged into Class I waters (potable water supplies). This regulation would apply to Concepts 2, 3, and 4, where reclaimed water would be purified using advanced treatment and then routed to either the reservoir or the TBC. To protect public health and abide by regulatory requirements, the reclaimed water would need to meet the principal treatment and disinfection requirements contained in subsection 62-610.563(2), FAC (secondary treatment and high level disinfection) and full treatment drinking water standards requirements in 62-610.563(3)(b), FAC The water would need to meet the following criteria:

- The primary and secondary drinking water standards outlined in sub-subparagraph 62-610.563(3)(b)1.a., FAC Note that in this case, the primary drinking water standards for asbestos shall not apply.
- The primary drinking water standards for bacteriological parameters applied as the disinfection standard as described in subsection 62-550.310(3), FAC. In this case, public notification requirements shall not apply.
- The primary drinking water standard for sodium should be applied as a maximum annual average permit limitation. The multipliers established in subparagraph 62-600.740(1)(b)2., FAC, shall be used to establish maximum monthly and single sample maximum permit limits for sodium.
- The fecal coliform limitations associated with high-level disinfection shall not apply.

- If the ambient water quality in the receiving Class I water does not meet the drinking water standards, the Department shall establish alternate reclaimed water limits at the level in the receiving water. In no case shall the alternate limits exceed the Class I water standards. Alternative limits will be applied as single sample maxima.
- Total organic carbon (TOC) shall not exceed 3.0 mg/L as the monthly average limitation. No single sample shall exceed 5.0 mg/L.
- Total organic halogen (TOX) shall not exceed 0.2 mg/L as the monthly average limitation. No single sample shall exceed 0.3 mg/L.
- The treatment shall include processes which serve as multiple barriers for control of organic compounds and pathogens.
- Discharges to surface waters shall meet reclaimed water or effluent limits established by procedures contained in Chapter 62-650, FAC, and the requirements of the antidegradation policy contained in Rules 62-4.242 and 62-302.300, FAC
- No mixing zones shall be allowed.
- The reclaimed water shall be sampled and analyzed for TOC in accord with subsection 62-610.568(4), FAC

Based on the most recent drafts of Chapter 62-610, FAC, it is not expected that this language regarding levels of treatment will change significantly for IPR under the current rule revisions.

2.3 Salinity Barrier System

Reclaimed water used to create a freshwater barrier to impede landward or upward migration of salt water into fresh water sources is governed by Rule 62.610.562 for Salinity Barrier Systems. This rule would apply to Concept 1 which includes aquifer recharge wells to provide a salinity barrier.. It is proposed for Concept 1 that reclaimed water will be injected into a Class G-IV groundwater that contains greater than 3,000 mg/L TDS. The reclaimed water injected must meet the principal treatment and disinfection requirements described in Rule 62-610.563(2), FAC (secondary treatment and high-level disinfection). The reclaimed water does not have to comply with full treatment and disinfection standards before injection. All groundwater standards must be met at the edge of the zone of discharge. Should injection be into an aquifer with less than 3,000 mg/L TDS or migrate into an aquifer with less than 3,000 mg/L TDS, additional levels of treatment may be required.

2.4 Industrial Reuse

Florida regulates reclaimed water used for industrial purposes in Part VII of Chapter 62-610, FAC. This regulation governs reuse systems where reclaimed water from domestic wastewater sources is used for cooling water, wash water, or process water at industrial facilities, which would apply to the water used in Concept 5, where reclaimed water is blended with concentrate discharges into the TECO canal by the Desal Plant and is used as cooling water at the TECO Big Bend Power plant. The industrial permit for the TECO Big Bend Power Plant discharge of cooling water to surface waters may require modification for the fraction of reclaimed water that is part of the cooling water stream. There is regulatory uncertainty with how FDEP would treat the cooling water discharge from the TECO Big Bend Power plant regarding SB 64. Because reclaimed water would be such a small fraction of the cooling water stream (approximately 1 to

3 percent) it is not expected that treatment beyond the AWT provided at the HFCAWTP would be required for this type of reuse.

2.5 Direct Potable Reuse

Currently, Florida does not have regulations that specifically address DPR. New rules for DPR are being developed under the current proposed rule revisions for Chapter 62-610, FAC, along with Chapters 62-625, FAC (Pretreatment Requirements), 62-610 (Reclaimed Water), 62-550, FAC (Drinking Water Standards), and 62-555, FAC (Permitting, Construction, O&M of Drinking Water Systems). Utilities in Florida that have investigated DPR (which include JEA and the cities of Altamonte Springs and Daytona Beach) have used the Chapter 62-610, FAC, regulations as guidance in pilot and demonstration testing, along with proposed regulations and guidance from other states (Texas and California). There have been no full-scale DPR systems permitted in Florida. For this evaluation, the existing regulations for IPR are used as guidance for developing Concept 6; however, it is possible that FDEP will require additional processes for pathogen reduction for DPR systems should the Florida rules more closely follow the California draft regulations. Drafts of the new regulations have also indicated that lower TOC concentrations (below the 3.0 mg/L prescribed for IPR) will likely be required, which could necessitate including RO in the process treatment scheme.

2.6 Underground Injection Control

Injection wells are permitted under the Underground Injection Control (UIC) program. The UIC program is regulated by the USEPA, which has delegated its authority to the FDEP for the oversight and permitting of Class I, II, IV, and V injection systems in Florida. These are regulated under rules codified in Chapter 62-528, FAC. Concepts 1, 2, 3 and 4 each require injection wells. Concept 1 requires injection wells to provide a salinity barrier and would be categorized as Class V, Group 2 wells. Concepts 2, 3 and 4 require deep injection wells for disposal of RO concentrate and are categorized as Class I Industrial wells.

3.0 Treatment Requirements

A preliminary analysis was conducted to select the reclaimed water and drinking water treatment process for each of the concepts. These treatment processes were based on the concepts presented in the 2018 Long-term Master Water Plan. This analysis was based on the limited water quality data provided and is subject to change as more data becomes available. Cost estimates were based on conceptual models and previous project experience. The specific details and relevant treatment requirements for each process are summarized below **Table 3-1** below summarizes the treatment types and regulatory requirements assumed for each concept.

Table 3-1 Treatment Technique Summary

Concept Number	Reclaimed Water Treatment	Drinking Water Treatment	Regulations
1	N/A	New Groundwater Ozone Treatment Plant	P/S DW, Salinity Barrier, UIC
2	New AWP Facility	New SWTP	P/S DW, IPR, Discharge to Class I Surface Waters, UIC
3	New AWP Facility	New Groundwater Ozone Treatment Plant, New SWTP	P/S DW, Salinity Barrier, IPR, Discharge to Class I Surface Waters, UIC
4	New AWP Facility	Uses excess capacity at existing SWTP	P/S DW, IPR, Discharge to Class I Surface Waters, UIC
5	N/A	N/A	Industrial Reuse
6	Desalination Plant Expansion	Desalination Plant Expansion	P/S DW, Proposed DPR Standards

Concept Names:

1. South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge
2. Supplement the Regional Reservoir with Reclaimed Water
3. South Hillsborough Wellfield & Supplement Regional Reservoir with Reclaimed Water
4. Supplement Tampa Bypass Canal with Reclaimed Water
5. Desal Concentrate Discharge System Expansion with Reclaimed Water
6. Desal Plant Expansion with Reclaimed Water Supply

P/S DW = Primary and Secondary Drinking Water Standards – note that these are included in the IPR and the proposed DPR standards and would be required for finished water from the groundwater and SWTPs

3.1 Advanced Water Purification Facility

An AWP facility is proposed to treat the reclaimed water from the HFCAWTP in Concepts 2, 3, and 4 to meet IPR requirements. Conceptually, this system would be designed to treat 20 MGD average annual daily flow (AADF) of influent and would be composed of MF, RO, and UV/AOP. For conceptual development purposes, it is proposed that overall, the system would operate at an 80 percent recovery rate and produce 16 MGD of product water and 4 MGD of reject concentrate. **Figure 3-1** provides a proposed process flow diagram for the facility.

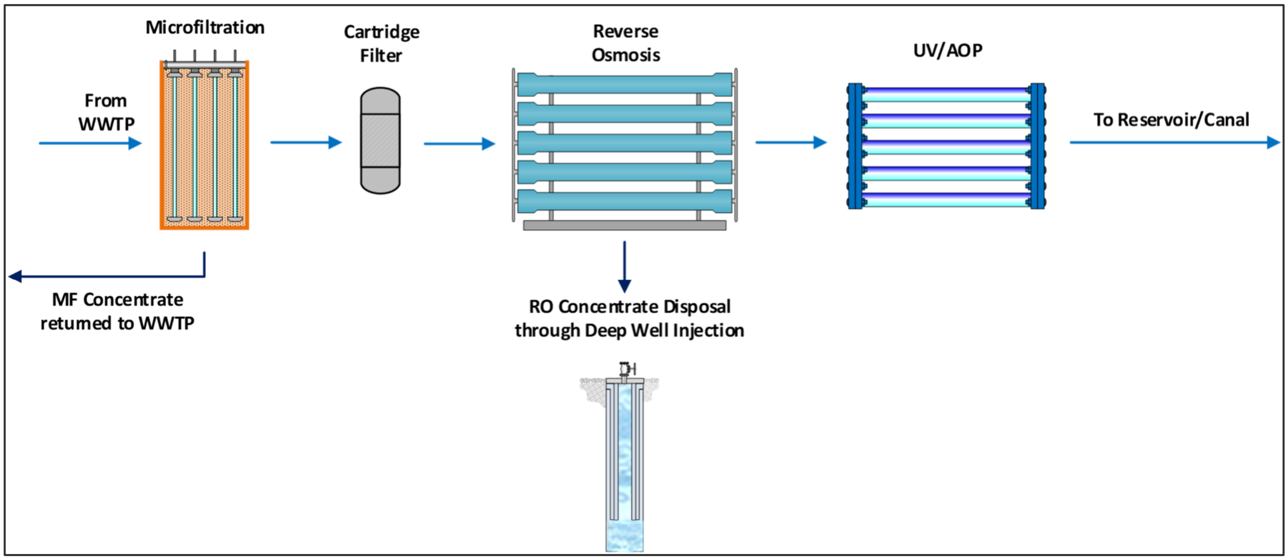


Figure 3-1 AWP Process Flow Diagram

The MF system is used to remove suspended particles and pathogens through a mechanical sieving process. For conceptual development purposes, it is assumed that the system would be designed to operate at a 93 percent recovery rate and would be composed of polymeric membranes. The system would operate at a flux of 25 gallons per square foot per day (GFD), and contain nine trains, with 288 slots per skid, and 260 modules per skid installed. The MF system would also contain a feed tank and a clean-in-place (CIP) system composed of a makeup tank, a heater, pumps, air systems, compressors, blowers, flush tanks, and neutralization tanks. Citric acid and sodium hypochlorite would be used as acid/base chemicals in the CIP process. The MF concentrate would be handled by discharging to the sewer collection system.

The RO system is used to remove pathogens as well as dissolved constituents and colloidal solids, including salts and trace organics, through size exclusion and solution/diffusion. For conceptual development purposes, it is assumed that the RO system would be designed to operate at an 85 percent recovery rate, with a feed TDS concentration of 1,600 mg/L and a target permeate TDS concentration of 100 mg/L. The RO system would operate at a flux of 12 GFD, be composed of six trains (5 operating, one standby), with each train containing three stages with 16, 8, and 4 pressure vessels each (28 total), with 6 modules per pressure vessel, and 400 square feet (SF) of membrane area per module. The membranes are assumed to have a service life of five years, with 144 modules replaced per year. The RO system would also contain a feed and permeate tank, a cartridge prefiltration system, antiscalant and sulfuric acid injection systems, and a CIP system composed of a makeup tank, a heater, pumps, flush tanks, and neutralization tanks. Citric acid and sodium hypochlorite would be used as acid/base chemicals in the CIP process. The RO concentrate would be disposed of through an industrial deep injection well, with one additional monitoring well.

The UV/AOP system is used to destroy or alter pathogens, 1,4-dioxane, NDMA, and other trace organics. For conceptual development purposes, it is assumed that the UV/AOP system would be designed to treat

16 MGD, and would contain three reactors (2 duty, one standby), that are equipped with low-pressure high-output (LPHO) UV lamps, and would use chlorine as the oxidant for the AOP process as well as to provide a secondary disinfectant residual of 1 mg/L to prevent bio-growth in the pipes. In addition, for concept development purposes 9500 SF of office and lab space was included.

3.1.1 Pathogen Control

Pathogen control using a multi-barrier treatment approach is a fundamental component of all potable reuse projects. While different states have taken different approaches to establish pathogen removal targets for potable reuse projects, in general, the industry has accepted target pathogen removal based on achieving lower than 1 in 10,000 annual risk of infection (Reguli, Rose, Haas, & Gerba, 1991). Chapter 62-610, FAC does not currently address pathogen risk levels for IPR; however, these may be established with proposed rule revisions. FDEP is required to follow recommendations of the Florida PRC, a group of utilities and stakeholders that drafted recommendations for developing potable reuse rules in Florida, in developing potable reuse rule revisions. The 1 in 10,000 annual risk level is consistent with the recommendations of the PRC in Florida.

The preliminary recommended pathogen reduction targets for Concepts 2, 3, and 4 are provided in **Table 3-2.** The target pathogen removals are the same for all potable reuse alternatives considered; however, while the water produced from the AWP Facilities for Concepts 2 and 3 will be treated at a new SWTP, the water from Concept 4 would be treated at the existing SWTP. These target pathogen goals are based on reductions from point of raw wastewater to the point of potable water delivery and were established using a safety factor to provide a safeguard against "outbreak conditions" (Florida Potable Reuse Commission, 2019, Trussell et al., 2013). For all alternatives, the proposed approach meets or exceeds the target goals.

Table 3-2 Proposed Pathogen Control Approach (IPR via purified water input to reservoir/canal followed by additional treatment at SWTP)

Pathogen	Goal	AWTP[1]	MF[2]	RO[3]	UV-AOP[4]	Chlorine Disinfection[5]	Ozone-BAF @ SWTP	Total
Virus	12	2	0	2	6	2	5	17
Giardia	10	0	4	2	6	0	4	16
Cryptosporidium	10	0	4	2	6	0	3	15

1. Minimum removal/inactivation needed from HFCAWTP.
2. California grants virus log removals in the range of 0 to 4, depending on the membrane module. It also notes that there are no integrity test methods for verifying virus log removal. To allow maximum flexibility in selection various membrane modules, 0 log removal is assumed for MF.
3. Demonstration of proposed pathogen removal by RO will require surrogate monitoring other than conductivity due to influent water limitations and measurement sensitivity.
4. 6 log reduction of virus (including adenoviruses and 6 log reduction of protozoa), based on validated UV dose 276 mJ/cm^2. UV AOP doses for potable reuse typically exceeds 500 mJ/cm^2.
5. Additional log reduction could be gained through chlorine contact time (CT) provided by environmental storage in the reservoir/bypass canal. Additional log reduction credits could also be gained from travel time in the conveyance pipes from the Purification Facility to the reservoir/bypass canal and from the reservoir/bypass canal to the SWTP prior to blending.

3.2 Groundwater Ozone Treatment

An ozone-based groundwater treatment facility has been proposed to treat the water withdrawn from the aquifer in Concepts 1 and 3. These concepts involve treating traditional groundwater sources. Although more withdrawal capacity is made available by provision of a salinity barrier, the reclaimed water is not expected to migrate to the supply wells, so additional purification is not required. For conceptual development purposes, it is assumed that the system would be designed for 8.85 MGD average AADF and would be an ozone treatment facility with a residual sodium hypochlorite dose added for secondary disinfection. **Figure 3-2** provides a proposed process flow diagram for the plant.

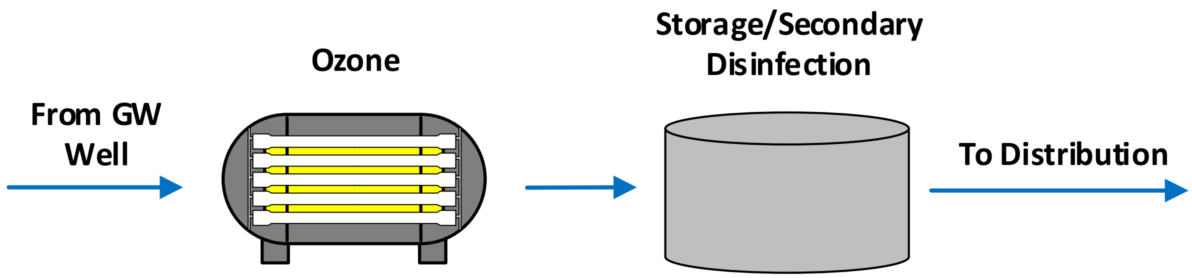


Figure 3-2 Groundwater Ozone Treatment Plant Process Flow Diagram

The ozone system is used to achieve a reduction in pathogenic microorganisms, hydrogen sulfide, and trace organics. The system is composed of an oxygen storage tank, a generation system, an injection system, a contact chamber, and calcium thiosulfate injection system for residual ozone destruction. The oxygen would be delivered in bulk liquid form and would be stored in two liquid oxygen (LOX) tanks. The ozone system is a side stream injection system composed of two generators with an annual generation capacity of 1,500 lb/day of ozone, three vaporizers, and four injection skids that inject an ozone dose ranging from 6.7 to 3.3 mg/L. The ozone would be dispersed using a pipeline contactor with residual ozone destruction through calcium thiosulfate injection. In terms of annual cost, it is assumed that the plant would consume around 1.2M lbs of LOX per year, with an estimated price of $0.08 per lb.

After undergoing treatment, a residual dose of 2 - 4 mg/L of sodium hypochlorite would be added for secondary disinfection purposes before sending the water to an aboveground storage tank. In addition, for concept development purposes, 2500 SF of office and lab space was included. For this concept, it is important that the amount of groundwater injected be constantly monitored to ensure that the plume of injected water does not migrate to any nearby drinking water wells. This is because the injected water has not undergone advanced water purification treatment and is thus not suitable for potable consumption.

3.3 New Surface Water Treatment Plant

A new SWTP has been proposed that could treat water sourced from the reservoir. This plant would be able to treat the equivalent of the amount of water that is added to the reservoir by the AWP Facility used in Concepts 2 and 3. For conceptual development purposes it is assumed that this system would be designed to treat up to 16 MGD of AADF for potable use and replicates the treatment process at the existing Regional SWTP, which is composed of Actiflo, ozone, biologically active filtration (BAF), and chlorination. **Figure 3-3** provides a proposed process flow diagram for the facility.

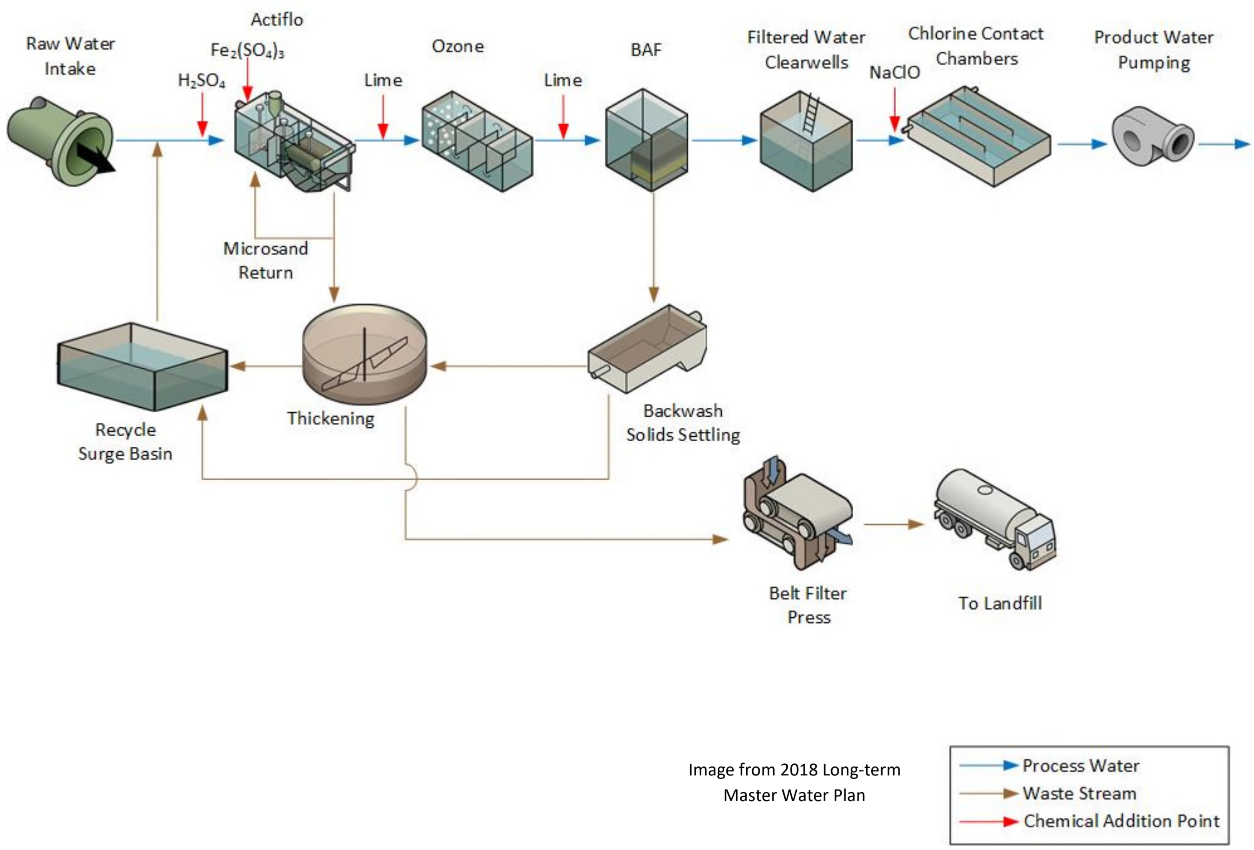


Image from 2018 Long-term Master Water Plan

Figure 3-3 New Surface Water Treatment Plant Process Schematic

Outside of the main treatment processes outlined above, this system would require the construction of an additional intake on the reservoir and a flow control facility for the raw water before it can enter the new SWTP. A lime treatment system would be installed pre- and post-ozone for water softening and pH adjustment purposes. In addition, a sludge thickening/dewatering/drying system would need to be installed to handle the residuals from the Actiflo process and the backwashing solids from the BAF system. Finally, a storage tank would be installed to store the finished water prior to distribution. In addition, for concept development purposes 4800 SF of office and lab space was included.

3.4 Desalination Plant Expansion

An expansion to the Seawater Desal Plant is proposed in Concept 6 that would treat a combination of seawater from Tampa Bay and the reclaimed water from the HFCAWTP to meet direct potable reuse requirements. The current plant is sized for 50 MGD of influent and is designed to treat only seawater. The current treatment process is composed of conventional sedimentation, Dyna-sand filters, diatomaceous earth precoat filters, a two-pass RO system, and post-treatment, as shown in **Figure 3-4**.

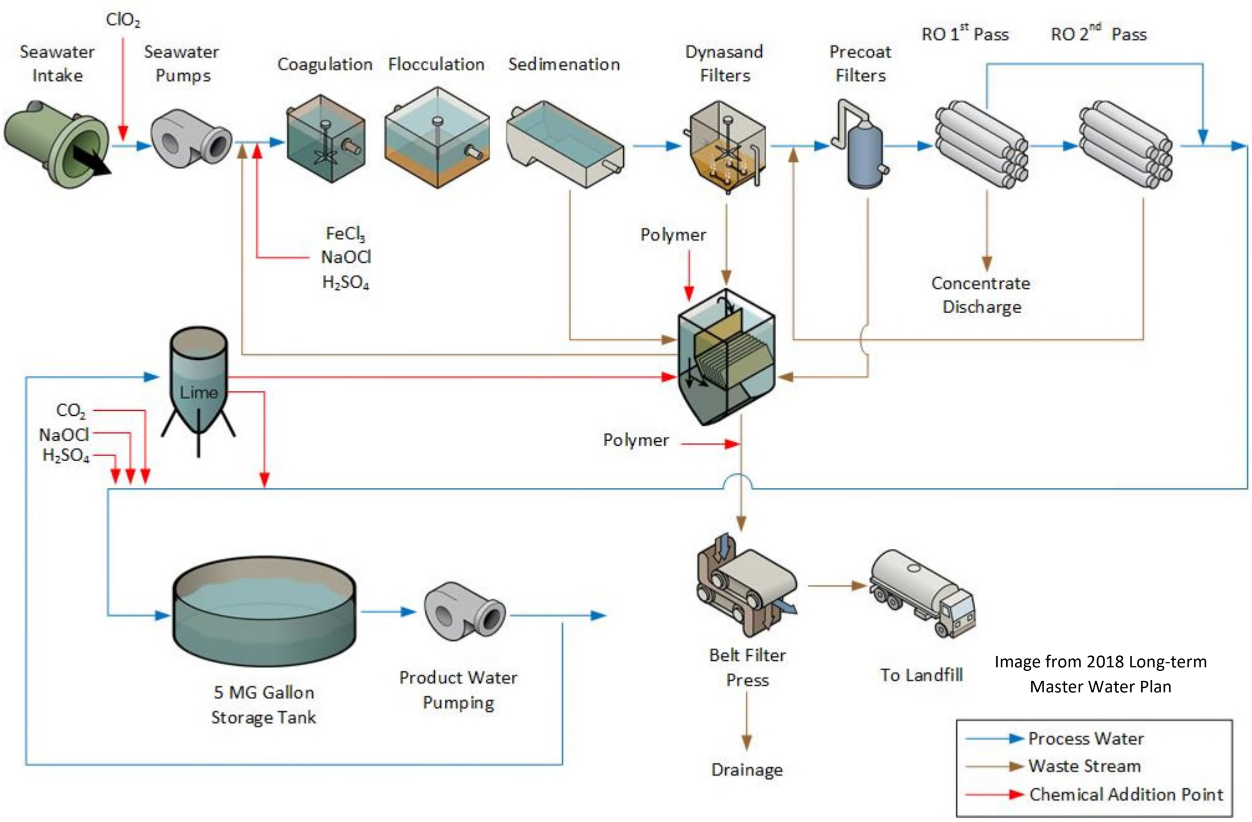


Figure 3-4 Process Flow Diagram for the Existing Treatment Process at the Tampa Bay Seawater Desalination Plant

The proposed expansion to the plant would add 20 MGD of additional influent capacity and would also involve reconfiguring the treatment process to be able to treat the combined reclaimed water/seawater influent. The seawater and reclaimed water would be blended in a pipe before entering the facility. The proposed treatment train consists of dissolved air flotation (DAF), MF, RO, and UV/AOP. In this case, the DAF/MF would replace the existing pretreatment system. MF and the UV/AOP system would allow for enhanced disinfection of the reclaimed water. The RO system would need to be expanded in order to accommodate the additional flow requirements, and the membranes currently used in the plant would need to be evaluated to see if they can accommodate the different influent water characteristics. If they cannot readily treat the new mixed influent, they would need to be replaced with the appropriate membranes. The high-pressure feed pumps would need to be reconfigured to run at lower pressure levels due to the dilution effect caused by mixing the two water streams. In addition, upgrading the plant would also involve adding one turbocharger per train for energy recovery, converting the post-treatment to liquid lime, adding additional capacity to the lamella, and installing a new belt filter press. **Figure 3-5** shows the potential expanded process flow diagram for the facility with processes shown in red representing the proposed new processes.

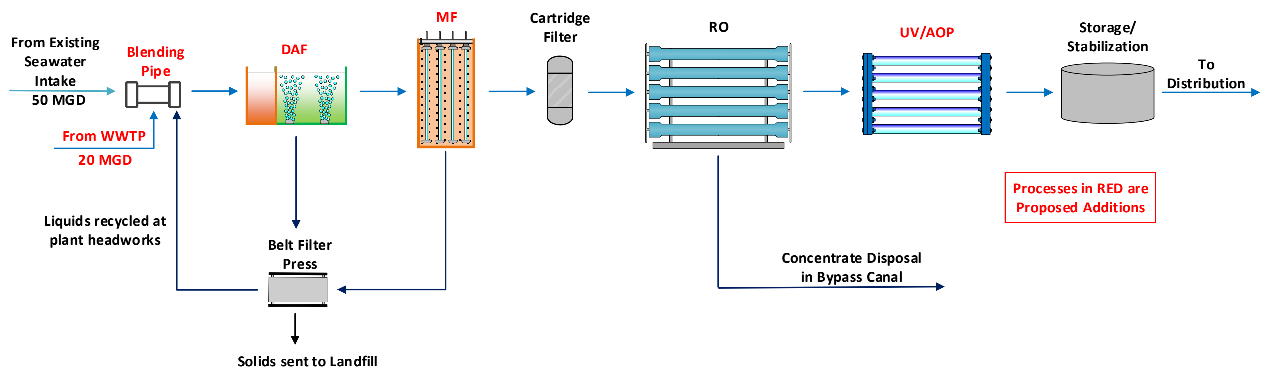


Figure 3-5 Process Flow Diagram for Proposed Treatment Process at the Tampa Bay Seawater Desalination Plant.

3.4.1 Pathogen Control:

Like the IPR system, the upgraded seawater Desal Plant would also require a significant degree of pathogen control to protect public health and meet anticipated regulatory requirements. The preliminary recommended pathogen reduction targets for DPR for Concept 6 are provided in **Table 3-3**. These target pathogen goals are based on reductions from point of raw wastewater to the point of potable water delivery and were established using a safety factor to provide a safeguard against "outbreak conditions" (Trussell et al., 2013). For all alternatives, the proposed approach meets or exceeds the current target goals. It is possible that the FDEP will require additional processes for pathogen reduction for DPR systems, should the Florida rules more closely follow the California draft regulations. Due to the unique makeup of the influent water going into this facility, the numbers presented in this table below may be inaccurate due to the mixing of the reclaimed water influent with seawater. To gain clarification on the expected log removal values, one option would be to conduct a quantitative microbial risk assessment to see how each process would impact the pathogenic concentrations of the mixed influent water.

Table 3-3 Proposed Pathogen Control Approach (DPR via reclaimed water and seawater input to reconfigured seawater desalination plant)

Pathogen	Goal	AWTP[1]	MF[2]	RO[3]	UV-AOP[4]	Chlorine Disinfection[5]	Total[6]
Virus	12	2	0	2	6	2	12
Giardia	10	0	4	2	6	0	12
Cryptosporidium	10	0	4	2	6	0	12

1. Minimum removal/inactivation needed from HFCAWTP.
2. California grants virus log removals in the range of 0 to 4, depending on the membrane module. It also notes that there are no integrity test methods for verifying virus log removal. To allow maximum flexibility in the selection of various membrane modules, 0 log removal is assumed for MF.
3. Demonstration of proposed pathogen removal by RO will require surrogate monitoring other than conductivity due to influent water limitations and measurement sensitivity.
4. 6 log reduction of virus (including adenoviruses and 6 log reduction of protozoa, based on validated UV dose 276 mJ/cm^2. UV AOP doses for potable reuse typically exceeds 500 mJ/cm^2.
5. Additional log reduction could be gained through chlorine contact time (CT) provided by an engineered storage or travel time in the conveyance pipe from the HFCAWTP to the Seawater Desalination Plant prior to blending.
6. Additional log removal may be required based on Florida's development of new regulations for DPR anticipated by mid-2023.

4.0 Reuse Concepts Costs and Considerations

4.1 Infrastructure Cost Estimates

Conceptual costs were estimated for each of the six concepts and are summarized below. Capital and operating costs are in 2022 dollars and a total 30-year lifecycle cost per 1,000 gallons. Costs per 1,000 gallons are based on the estimated potable water supply yield for each concept.

Table 4-1 Conceptual Cost Estimate Summary

Concept Number	Total Project Cost	Contingency, OH&P*, & ELA*	Financing Cost	Annual O&M Cost	30-year LCC ($)	Yield (MGD)	$ per 1000 gal
1	$193,600,000	$183,920,000	$277,441,000	$2,182,000	$720,421,000	8.85	$7.43
2	$412,800,000	$392,160,000	$591,567,000	$11,748,000	$1,748,967,000	16	$9.98
3	$547,000,000	$519,650,000	$783,884,000	$13,432,000	$2,253,494,000	13	$15.83
4	$214,200,000	$203,490,000	$306,962,000	$4,744,000	$866,972,000	2	$39.59
5	$188,500,000	$179,075,000	$270,132,000	$1,172,000	$672,867,000	1.7	$36.15
6	$317,000,000	$ 301,150,000	$454,280,000	$34,303,000	$2,101,520,000	10	$19.19

Concept Names:

1. South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge
2. Supplement the Regional Reservoir with Reclaimed Water
3. South Hillsborough Wellfield & Supplement Regional Reservoir with Reclaimed Water
4. Supplement Tampa Bypass Canal with Reclaimed Water
5. Desal Concentrate Discharge System Expansion with Reclaimed Water
6. Desal Plant Expansion with Reclaimed Water Supply

*OH&P = Overhead Profit, ELA = Engineering, Legal, and administrative

4.1.1 Assumptions

The conceptual capital costs shown in the previous table includes the following assumptions:

- Costs are in 2022 dollars
- Contingency: 30 percent of construction subtotal
- Contractor overhead, profit, and general conditions (OH&P): 20 percent of construction subtotal + contingency
- Engineering, legal, and administrative (ELA): 25 percent of construction subtotal + contingency + contractor OH&P

The following bond financing assumptions were used to estimate the 30-year costs:

- Bond financing rate of 5 percent
- Bond term of 30 years

The following costs have been excluded from the cost estimates:

- Owners Allowance
- Escalation to midpoint of construction
- Escalation of future Operations and Maintenance (O&M) costs

4.2 Stakeholder Considerations

There are multiple stakeholders associated with each of the six concepts, as summarized in **Table 4-2**. Below is a list of potential stakeholders:

- City of Tampa:

  Provider of the 20 MGD of reclaimed water, from the City's wastewater HFCAWTP

- Hillsborough County:

  The county owns and operates the SHARP wellfields which are near the new aquifer recharge wells proposed as a salinity barrier for Concepts 1 and 3.

- TECO:

  The power company operates the Big Bend Powerplant, located adjacent to the Tampa Bay Water Desal Plant. Cooling water from TECO is currently used for blending of Desal Plant concentrate, however, the power plant plans to reduce its quantity of cooling water, which will impact the Desal Plant concentrate discharge operation.

- FDEP:

  Responsible for environmental permitting and compliance monitoring.

Table 4-2 Stakeholders Considerations by Concept

Concept Number	Concept Description	City of Tampa	Hillsborough County	TECO	FDEP
1	South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge	X	X		X
2	Supplement the Regional Reservoir with Reclaimed Water	X			X
3	South Hillsborough Wellfield & Supplement Regional Reservoir with Reclaimed Water	X	X		X
4	Supplement Tampa Bypass Canal with Reclaimed Water	X			X
5	Desal Concentrate Discharge System Expansion with Reclaimed Water	X		X	X
6	Desal Plant Expansion with Reclaimed Water Supply	X		X	X

Additional project stakeholders to consider for all project concepts include Southwest Florida Water Management District (SWFWMD), the Tampa Bay Water Board and other Member Governments, local environmental groups, and the public.

5.0 Screening Criteria and Scoring

In collaboration with Tampa Bay Water and City of Tampa, a total of eight screening criteria were reviewed and established to evaluate the 6 concepts. **Table 5-1** lists the screening criteria grouped in 3 different categories and provides an explanation of the numeric scoring for each criterion. The scores are between -1 and 1, with a score of 1 being the most favorable. Each criterion was assigned a weighting factor based on discussions and input from Tampa Bay Water, City of Tampa, and BV subject matter experts. **Table 5-1** shows the weighting used in this evaluation. As indicated in **Table 5-1**, Regulatory Requirements, Total Cost per 1000 gallons, and Yield Quantity were deemed most important and weighted higher than other criteria.

Based on discussions with Tampa Bay Water during the concept review workshops, each concept was subsequently scored by BV using the screening criteria and corresponding weightings. **Table 5-2** shows the results of the concept scoring and **Table 5-3** presents the resulting ranking of concepts. A higher Total Weighted Score is indicative of favorability.

As shown in the following tables, concepts with environmental benefits and/or no negative impacts, and high or moderate yield reliability scored more favorably, with Concept 2 scoring a 1 or 0 on all criteria. Concepts with permitting rules and regulations not fully established and higher costs per 1,000 gallons scored the lowest. Concept 5, Desal Concentrate Discharge System Expansion with Reclaimed Water scored lower than Concept 6, Desal Plant Expansion with Reclaimed Water Supply because of the lower Yield Quantity estimated of 1.7 MGD as compared to 10 MGD for Concept 5. The higher cost per 1000 gallons of Concept 3, which was the combination of Concept 1 and 2, is the reason why Concept 3's score is a lot lower than the Concept 2 and 1 scores.

Concept 2 and Concept 1 have the most favorable scores suggesting that these concepts have benefits relative to other concepts with respect to environmental stewardship, project costs, and reliability.

Concepts 3 through 6 low and negative scores indicate that they have disadvantages relative to the other concepts.

Table 5-1 Coarse Screening Criteria

Criteria	Weight Percent	Numeric Score Explanation		
		1	0	-1
Category: Environmental Stewardship				
Environmental Sustainability	10	Environmental benefits and/or no negative impacts to environmental systems and source waters.	Potential for some minor impacts to environmental systems and source waters.	Likely to result in impacts to environmental systems and/or source waters resulting in mitigation requirements.
Regulatory Requirements	15	Rules and regulations in place for all anticipated permits and concept is not anticipated to encounter significant permitting challenges.	Rules and regulations in place for all anticipated permits but the concept is anticipated to involve moderate permitting challenges with potential policy changes.	Existing permitting rules and regulations required by concept are not established and concept is anticipated to involve challenging permits that require policy changes.
Public Reception	13	Anticipated positive reception of concept; minimal public outreach required.	Anticipated neutral reception of concept; or equal amounts of positive/negative reception; public outreach required.	Anticipated negative reception of concept; significant public outreach required.
Category: Project Costs				
Total Cost per 1000 gallons (1)	16	Low-range, \$0 –\$5.00 /1,000 gal.	Mid-range, \$5.01-\$10.00 /1,000 gal.	High-range, \$10.01+ / 1,000 gal.
Implementation and Feasibility	7	Easy system integration, good expansion potential, good potential for phased construction.	Reasonable system integration, some expansion potential, some potential for phased construction.	Difficult system integration, poor expansion potential, poor potential for phased construction.
Category: Reliability				
Yield Reliability	13	High reliability of long-term yield, minimal impacts on supply capacity based on seasonal or long-term variations (i.e., drought vs. wet weather conditions), strong ability to accept 20 MGD baseload of reclaimed water supply, minimal impacts from potential climate change.	Moderate reliability of long-term yield, moderate impacts on supply capacity based on seasonal or long-term variations, some challenges with accepting a 20 MGD baseload of reclaimed water supply at times, some vulnerabilities to potential climate change.	Uncertain long-term yield reliability, significant impacts on supply capacity based on seasonal or long-term variations, unable to accept consistent 20 MGD baseload of reclaimed water supply throughout the year, impacts anticipated from potential climate change.
Yield Quantity	15	High yield, 80% or greater of 20 MGD baseload. (16 MGD +)	Moderate yield, 79% - 60% of 20 MGD baseload. (15.8 MGD - 12 MGD)	Low yield, 59% or lower of 20 MGD baseload. (less than 12 MGD)

Criteria	Weight Percent	Numeric Score Explanation		
		1	0	-1
Contractual Agreements and Risk Factors (2)	11	Limited dependence on other entities (e.g., member governments, TECO, etc.), minimal supply chain reliability risks. Estimated contract duration with stakeholders for water supply components = 30 years or greater.	Moderate dependence on other entities (e.g., member governments, TECO, etc.), moderate supply chain reliability risks. Estimated contract duration with stakeholders for water supply components = 20 to 29 years.	Strong dependence on other stakeholders (e.g., member governments, TECO, etc.), significant supply chain reliability risks. Estimated contract duration with stakeholders for water supply components = 0-19 years

Table 5-2 Concepts Scoring Based on Coarse Screening Criteria

Criteria	Weight Percent	Concept Numeric Scoring					
		1	2	3	4	5	6
Environmental Sustainability	10	1	1	1	0	0	0
Regulatory Requirements	15	1	0	0	0	-1	-1
Public Reception	13	1	0	0	0	0	-1
Total Cost per 1000 gallons	16	0	0	-1	-1	-1	-1
Implementation and Feasibility	7	1	0	0	0	0	-1
Yield Reliability	13	0	1	1	-1	-1	0
Yield Quantity	15	-1	1	0	-1	-1	0
Contractual Agreements and Risk Factors	11	-1	0	-1	0	-1	-1
TOTAL SCORE	**100**	**2**	**3**	**0**	**-3**	**-5**	**-5**
TOTAL WEIGHTED SCORE		**0.19**	**0.38**	**-0.04**	**-0.44**	**-0.70**	**-0.62**

Table 5-3 Ranking of Concepts

Ranking	Concept Number	Concept Description	Total Score	Total Weighted Score
1	2	Supplement the Regional Reservoir with Reclaimed Water	3	0.38
2	1	South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge	2	0.19
3	3	South Hillsborough Wellfield & Supplement Regional Reservoir with Reclaimed Water	0	-0.4
4	4	Supplement Tampa Bypass Canal with Reclaimed Water	-3	-0.44
5	6	Desal Plant Expansion with Reclaimed Water Supply	-5	-0.62
6	5	Desal Concentrate Discharge System Expansion with Reclaimed Water	-5	-0.70
Note: Concepts are listed in order of highest ranking to lowest.				

6.0 Conclusions

The coarse screening evaluation resulted in the identification of Concept 2 Supplement the Regional Reservoir with Reclaimed Water and Concept 1 South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge as the most favorable options to be further consider and evaluated.

Next steps and integration of concepts into the 2023 Long Term Master Water Plan (LTMWP) update process are:

- 2023: Considering these options as part of the 2023 LTMWP Update process
- 2024 – 2026: Feasibility studies for shortlisted options
- 2027: Ranking and selection of next LTMWP Projects for implementation
- 2028 – 2030: Property acquisition, design and permitting
- 2031 – 2033: Bidding and construction
- 2033: Start-up and commissioning of new supply, treatment, and transmission infrastructure

7.0 References

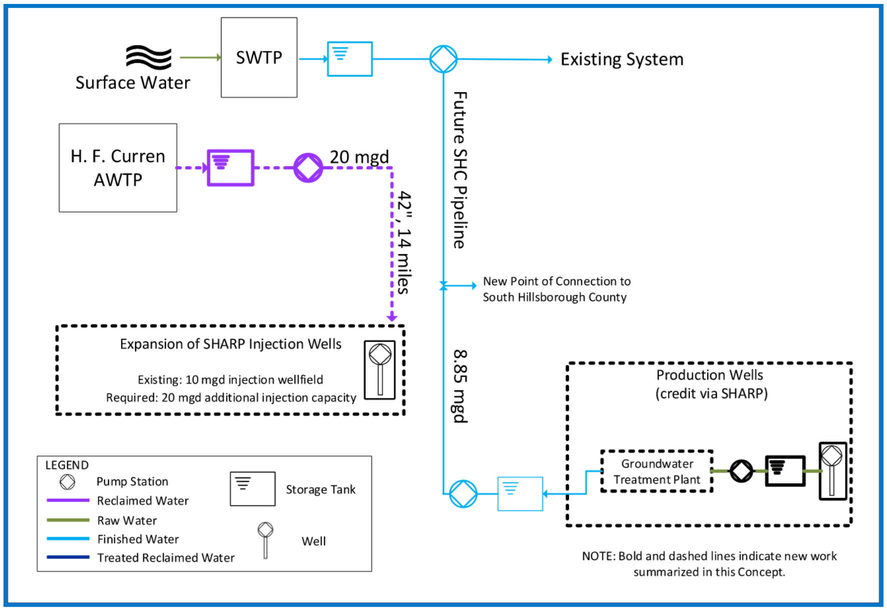
Florida Potable Reuse Commission. *Framework for the Implementation of Potable Reuse in Florida*. WateReuse Research Foundation: Arlington, VA, (2020).

Regli, S., Rose, J. B., Haas, C. N. & Gerba, C. P. Modeling the Risk From Giardia and Viruses in Drinking Water. *J - Am Water Work Assoc* **83**, 76–84 (1991).

Trussell, R. R., Salveson, A., Snyder, S., Trussell, R. S., Gerrity, D., & Pecson, B. *Potable Reuse: State of Science Report and Equivalency Criteria for Treatment Trains.* WateReuse Research Foundation: Arlington, VA, (2013).

Appendix A. Concept Summary Sheets and Maps

Concept 1: South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge



Approximate Potable Water Yield

- 20 mgd of aquifer recharge with reclaimed water supply provides an estimated groundwater withdrawal yield of 8.85 mgd on an annual average basis.

Primary Infrastructure Components

- Reclaimed water transmission system from H.F. Curren AWTP to aquifer recharge wells.
- Reclaimed water aquifer recharge wells.
- Water supply wellfield and groundwater treatment plant.

Anticipated Regulatory Requirements

- Aquifer recharge wells will inject into the Avon Park Formation; classified as Class G-IV groundwater (FAC 62-520.410).
- The reclaimed water injected must meet the principal treatment and disinfection requirements described in (FAC 62-610.563(2)).
- Assumes the recharged reclaimed water does not migrate inland to the withdrawal wells based on a 20 to 8.85 mgd recharge to withdrawal ratio.

Key Feasibility Aspects and Stakeholder Considerations

- Agreement between Tampa Bay Water and City of Tampa would be needed for the 20 mgd reclaimed water supply.
- The Southwest Florida Water Management District (SWFWMD) would determine if groundwater withdrawal credits will be granted for the aquifer recharge system and groundwater modeling that indicates a net benefit to the aquifer. The approach for this concept could also involve contracting with Hillsborough County to expand its existing SHARP system with 20 mgd of reclaimed water supply from the City of Tampa.
- New aquifer recharge wells may need to be constructed between existing Hillsborough County SHARP recharge wells due to the potential decrease in groundwater withdrawal yield that may be made available if water is injected too far north or south of the existing SHARP wells.

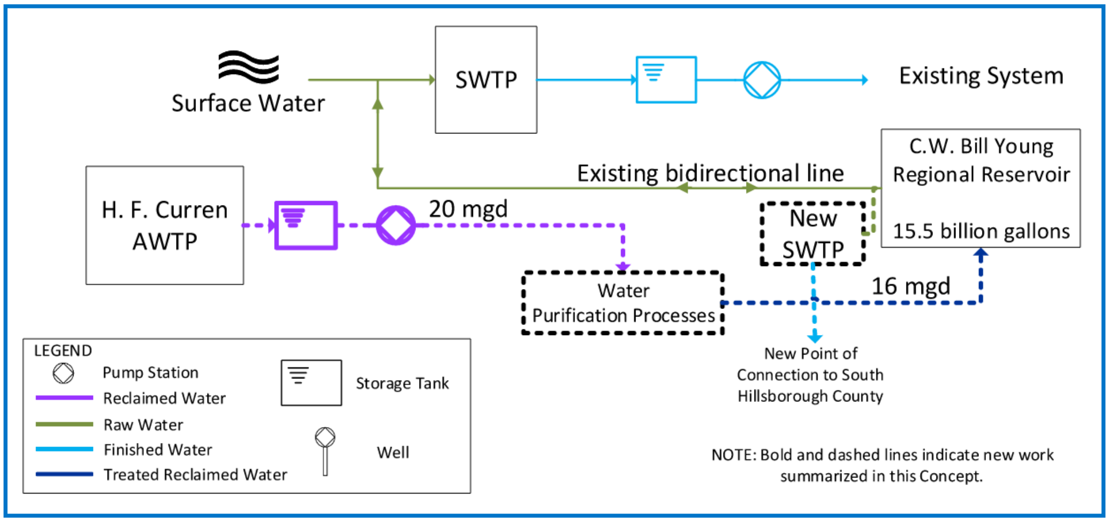
INFRASTRUCTURE	EST. COST
Reclaimed Water Pump Station at H.F. Curren AWTP	
5 MG Reclaimed Water Storage Tank	$5,192,000
20 MGD Firm Capacity Pump Station (25 MGD design capacity)	$16,517,000
Land Acquisition / Easement	$200,000
Aquifer Recharge Wells at or near SHARP	
Aquifer recharge system – 8 recharge wells	$23,100,000
Land Acquisition / Easement	$800,000
Wellfield and Treatment Plant in South Hillsborough Co.	
Withdrawal Wellfield; 5 UFA production wells (design capacity of 2.07 mgd per well; total wellfield capacity of 10.4 MGD)	$5,321,000
Groundwater Treatment Plant (w/ Ozone Treatment)	$14,554,000
11 mgd Firm Capacity Pump Station (15 MGD design capacity)	$9,921,000
5 MG Ground Water Storage Tank	$4,996,000
Land Acquisition / Easement	$2,200,000
Transmission Pipelines	
80,000 linear feet of 42-inch diameter pipeline from H.F. Curren to SHARP Wellfield	$84,000,000
21,800 linear feet of 12-inch to 24-inch diameter raw water mains (from withdrawal wells to groundwater treatment plant)	$9,270,000
Land Acquisition / Easement	$17,488,000
Total Costs[1]	
Subtotal of Construction Costs	$193,600,000
Contingency	$58,080,000
Contractor Overhead & Profit	$50,336,000

Subtotal of Construction, Contingency and OH&P	$302,016,000
Engineering, Legal and Administrative	$75,504,000
Total Capital Cost	$377,520,000
$/1,000 gallons cost, based on annual production yield	
Total Cost[2] $/1,000 gallons	**$7.43**

Notes:

1. Costs include 30 percent for contingency,20 percent for contractor overhead & profit, and 25 percent for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5 percent interest rate.

Concept 2: Supplement the Regional Reservoir with Reclaimed Water



Approximate Potable Water Yield

- 20 mgd of reuse produces an approximate yield of **16 mgd** that can be sent to the C.W. Bill Young Regional Reservoir (Regional Reservoir) to supplement surface water supplies.
- This would supplement existing surface water supplies to help ensure sufficient supply to the region in dry months.

Primary Infrastructure Components

- Reclaimed water transmission system from H.F. Curren AWTP to Regional Reservoir.
- Water purification treatment plant.
- Surface water treatment plant.
- Finished water transmission system.

Anticipated Regulatory Requirements

- Reclaimed water used to augment Class I surface waters is required to undergo full treatment and disinfection; must meet primary and secondary drinking water standards (FAC 62-610.554).
- Monthly average TOC of 3.0 mg/L, no sample over 5.0 mg/L and monthly average TOX of 0.2 mg/L, no sample over 0.3 mg/L
- If the ambient water quality in the receiving Class I water does not meet the drinking water standards, alternate reclaimed water limits may be established (FAC 62-610.554).
- Regulations are under revision to address potable reuse (indirect and direct) and additional requirements may apply.

Key Feasibility Aspects and Stakeholder Considerations

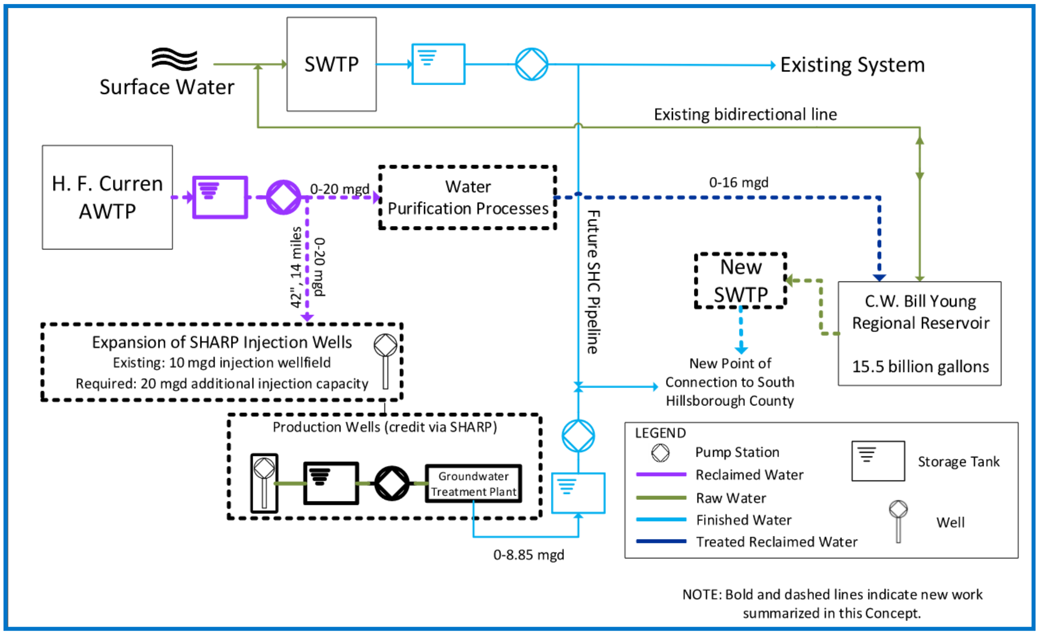
- Agreement between Tampa Bay Water and City of Tampa would be needed for the 20 mgd reclaimed water supply.
- Cost of membrane concentrate management should be considered for this concept.
- A new SWTP near the reservoir is assumed to be needed.
- Not having a 20 mgd baseload complicates the City meeting SB64 requirements.
- Purification Facility locations were considered at the H.F. Curren AWTP and near the Regional Reservoir, however the facility could be located anywhere between the AWTP and Reservoir.

INFRASTRUCTURE	EST. COST
Reclaimed Water Pump Station at H.F. Curren AWTP	
5 MG Reclaimed Water Tank	$5,192,000
20 MGD Firm Capacity Pump Station (25 MGD design capacity)	$16,517,000
Land Acquisition/ Easement	$200,000
New Treatment Facility (for effluent)	
Effluent Purification Facility (w/ Microfiltration, Reverse Osmosis, and UV Advanced Oxidation Process)	$96,525,000
16 MGD Firm Capacity Pump Station (20 MGD design capacity)	$13,440,000
Land Acquisition / Easement	$1,250,000
New Surface Water Treatment Plant (SWTP)	
New SWTP	$72,505,000
Transmission line to new Point of Connection (POC)	$18,839,000
Transmission Pipelines[1]	
Pipelines (if purification facility is located at H.F. Curren)	
115,000 linear feet of 36-inch diameter pipeline from purification facility to Regional Reservoir	$103,500,000
Land Acquisition / Easement	$19,406,000
Pipelines (if purification facility is located near Regional Reservoir)	
100,000 linear feet of 42-inch diameter pipeline from H.F. Curren to purification facility	$120,750,000
42,000 linear feet of 36-inch diameter pipeline from purification facility to Regional Reservoir	$37,800,000
Land Acquisition / Easement	$29,728,000
Total Costs[2]	
Subtotal of Construction Costs	$412,800,000
Contingency	$123,840,000
Contractor Overhead & Profit	$107,328,000
Subtotal of Construction, Contingency and OH&P	$643,968,000
Engineering, Legal and Administrative	$160,992,000
Total Capital Cost	$804,960,000
$/ 1000 gallon cost, based on annual production yield	
Total Cost[3] $/1000 gallon	**$9.98**

Notes:

1. For concepts where different locations of facilities were considered, the more expensive cost was incorporated into the cost estimate and $/1000 gallon rate.
2. Costs above include 30 percent contingency,20 percent contractor overhead & profit, and 25 percent engineering, legal and administrative costs.
3. Total $/1000 gallon costs include both capital and O&M costs, a 30-year term, and a bond financing interest rate of 5 percent.

Concept 3: South Hillsborough Wellfield & Supplement Regional Reservoir with Reclaimed Water



Approximate Potable Water Yield

- Yield would vary depending on where water is sent:
  - 20 mgd of aquifer recharge with reclaimed water supply provides an estimated groundwater withdrawal yield of **8.85 mgd** on an annual average basis.
  - 20 mgd of reuse produces an approximate yield of **16 mgd** that can be sent to the C.W. Bill Young Regional Reservoir (Regional Reservoir) to supplement surface water supplies.

Primary Infrastructure Components

- Reclaimed water transmission system from H.F. Curren AWTP to aquifer recharge wells.
- Reclaimed water aquifer recharge wells.
- Water supply wellfield and groundwater treatment plant.
- Water purification treatment plant.
- Surface water treatment plant.
- Finished water transmission system.

Anticipated Regulatory Requirements

- Expansion of SHARP System:
  - Aquifer recharge wells will inject into the Avon Park Formation; classified as Class G-IV groundwater (FAC 62-520.410).
  - The reclaimed water injected must meet the principal treatment and disinfection requirements described in (FAC 62-610.563(2)).
  - Assumes the recharged reclaimed water does not migrate inland to the withdrawal wells based on a 20 to 8.85 mgd recharge to withdrawal ratio.
- Supplementation of Reservoir:
  - Reclaimed water used to augment Class I surface waters is required to undergo full treatment and disinfection; must meet primary and secondary drinking water standards (FAC 62-610.554).
  - If the ambient water quality in the receiving Class I water does not meet the drinking water standards, alternate reclaimed water limits may be established (FAC 62-610.554).

- Monthly average TOC of 3.0 mg/L, no sample over 5.0 mg/L and monthly average TOX of 0.2 mg/L, no sample over 0.3 mg/L.
- Regulations are under revision to address potable reuse (indirect and direct) and additional requirements may apply.

Key Feasibility Aspects and Stakeholder Considerations

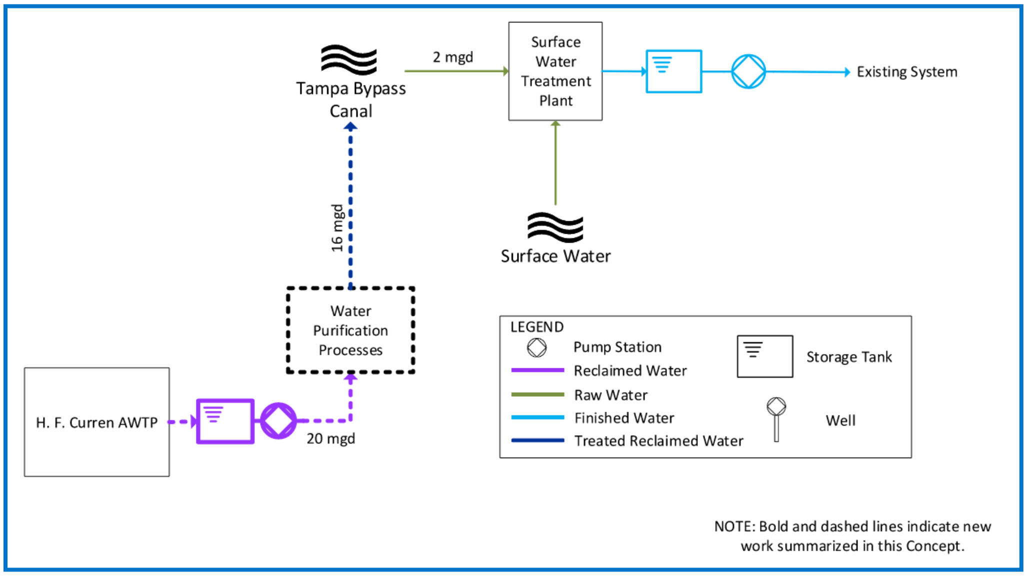
- Agreement between Tampa Bay Water and City of Tampa would be needed for the 20 mgd reclaimed water supply.
- Agreement between Tampa Bay Water and City of Tampa would be a credits system defined through groundwater modeling; potential to be a three-party contract if Hillsborough County was included.
- Purification Facility locations were considered at the H.F. Curren AWTP and near the Regional Reservoir, however the facility could be located anywhere between the AWTP and Reservoir.
- Construction of the South Hillsborough County Pipeline would connect proposed Groundwater Treatment Plant to existing Tampa Bay Water system.
- New aquifer recharge wells may need to be constructed between existing wells due to decrease in yield if water is injected too far north or south of the existing SHARP wells.
- Cost of membrane concentrate management should be considered for this concept.
- Yield may vary depending on where reuse is being sent (SHARP vs. reservoir).
- A new SWTP near the reservoir is assumed to be needed.

INFRASTRUCTURE	EST. COST
Reclaimed Water Pump Station at H.F. Curren AWTP	
5 MG Reclaimed Water Storage Tank	$5,192,000
20 MGD Firm Capacity Pump Station (25 MGD design capacity)	$16,517,000
Land Acquisition / Easement	$200,000
Aquifer Recharge Wells at or near SHARP	
Aquifer recharge system – 8 recharge wells	$23,100,000
Land Acquisition / Easement	$800,000
Wellfield and Treatment Plant in South Hillsborough Co.	
Withdrawal Wellfield; 5 UFA production wells (design capacity of 2.07 mgd per well; total wellfield capacity of 10.4 MGD)	$5,321,000
Groundwater Treatment Plant (w/ Ozone Treatment)	$14,554,000
11 mgd Firm Capacity Pump Station (15 MGD design capacity)	$9,921,000
5 MG Ground Water Storage Tank	$4,996,000
Land Acquisition / Easement	$2,200,000
New Treatment Facility (for effluent)	
Effluent Purification Facility (w/ Microfiltration, Reverse Osmosis, and UV Advanced Oxidation Process)	$96,525,000
16 MGD Firm Capacity Pump Station (20 MGD design capacity)	$13,440,000
Land Acquisition / Easement	$1,250,000
New Surface Water Treatment Plant (SWTP)	
New SWTP	$72,505,000
Transmission line to new Point of Connection (POC)	$18,839,000
Transmission Pipelines[1]	
Pipelines associated with wells and groundwater treatment plant	
50,000 linear feet of 42-inch diameter pipeline from the proposed pipeline from H.F. Curren, to SHARP Wellfield	$52,500,000
21,800 linear feet of 12" to 24" diameter raw water mains (from withdrawal wells to groundwater treatment plant)	$9,270,000
Land Acquisition / Easement	$11,582,000
Pipelines to Reservoir (if purification facility is located at H.F. Curren)	
115,000 linear feet of 36-inch diameter pipeline from purification facility to Regional Reservoir	$103,500,000
Land Acquisition / Easement	$19,406,000
Pipelines to Reservoir (if purification facility is located near Regional Reservoir)	
100,000 linear feet of 42-inch diameter pipeline from H.F. Curren to purification facility	$120,750,000
42,000 linear feet of 36-inch diameter pipeline from purification facility to Regional Reservoir	$37,800,000
Land Acquisition / Easement	$29,728,000
Total Costs	
Subtotal of Construction Costs	$547,000,000
Contingency	$164,100,000
Contractor Overhead & Profit	$142,220,000
Subtotal of Construction, Contingency and OH&P	$853,320,000
Engineering, Legal and Administrative	$213,330,000
Total Capital Cost	$1,066,650,000
$/1,000 gallons cost, based on annual production yield	
Total Cost[3] $/1000 gallon	$15.83

Notes:

1. For concepts where different locations of facilities were considered, the more expensive cost was incorporated into the cost estimate and $/1000 gallon rate.
2. Costs above include 30 percent contingency,20 percent contractor overhead & profit, and 25 percent engineering, legal and administrative costs.
3. Total $/1000 gallon costs include both capital and O&M costs, a 30-year term, and a bond financing interest rate of 5 percent.

Concept 4: Supplement Tampa Bypass Canal with Reclaimed Water



Approximate Potable Water Yield

- 20 mgd of reuse produces an approximate yield of 16 mgd that is available to discharge to the TBC.
- This discharge to the TBC will result in an increase in yield of **1-2 mgd** on an annual average basis based on three screening realizations which represented dry, normal, and wet hydrologic conditions.
- Potential for revised yield based on ongoing evaluation by Tampa Bay Water and the City of Tampa regarding their water supply systems.

Primary Infrastructure Components

- Reclaimed water transmission system from H.F. Curren AWTP to Tampa Bypass Canal.
- Advanced Water Purification Facility.

Anticipated Regulatory Requirements

- Reclaimed water used to augment Class I surface waters is required to undergo full treatment and disinfection; must meet primary and secondary drinking water standards (FAC 62-610.554).
- Outfall point into the TBC cannot be within 500 ft of intake point (FAC 62-610.571).
- Monthly average TOC of 3.0 mg/L, no sample over 5.0 mg/L and monthly average TOX of 0.2 mg/L, no sample over 0.3 mg/L.
- Regulations are under revision to address potable reuse (indirect and direct) and additional requirements may apply.
- If the ambient water quality in the receiving Class I water does not meet the drinking water standards, alternate reclaimed water limits may be established (FAC 62-610.554).

Key Feasibility Aspects and Stakeholder Considerations

- Agreement between Tampa Bay Water and City of Tampa would be needed for the 20 mgd reclaimed water supply.
- Cost of membrane concentrate management should be considered for this concept.
- When water is discharged into the TBC, it becomes water of the state, which may require district approval.
- Expansion of the SWTP may need to be considered.

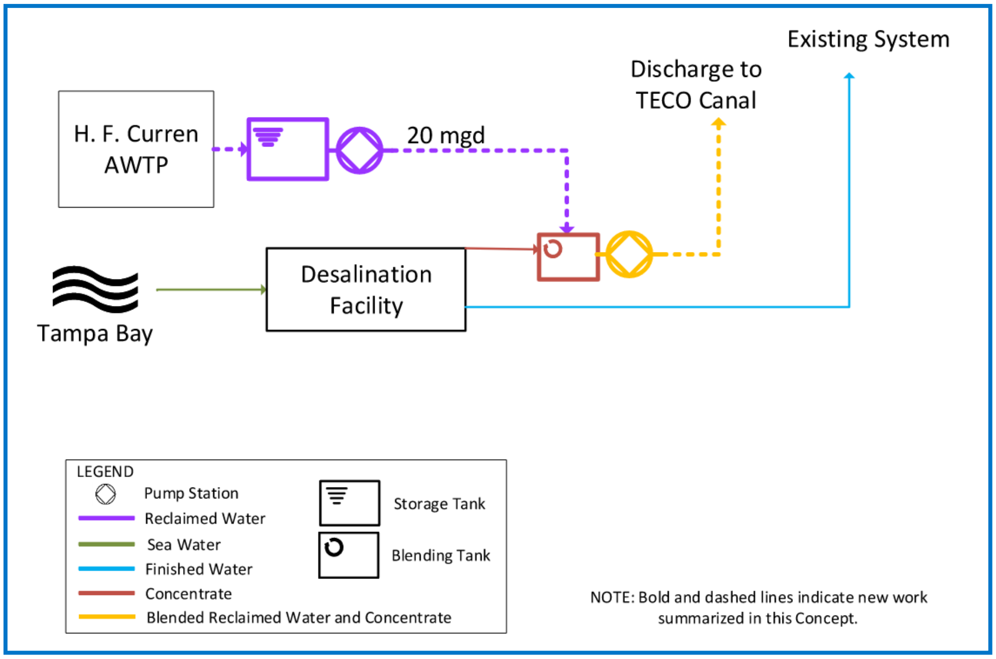
INFRASTRUCTURE	EST. COST
Reclaimed Water Pump Station at H.F. Curren AWTP	
5 MG Reclaimed Water Tank	$5,192,000
20 MGD Firm Capacity Pump Station (25 MGD design capacity)	$16,517,000
Land Acquisition / Easement	$200,000
New Treatment Facility (for effluent)	
Effluent Purification Facility (w/ Microfiltration, Reverse Osmosis, and UV Advanced Oxidation Process)	$96,525,000
16 MGD Firm Capacity Pump Station (20 MGD design capacity)	$13,440,000
Land Acquisition / Easement	$1,250,000
Transmission Pipelines[1]	
Pipelines (if purification facility is located at H.F. Curren)	
65,000 linear feet of 36-inch diameter pipeline from H.F. Curren to TBC Outfall	$58,500,000
Land Acquisition / Easement	$10,969,000
Pipelines (if purification facility is located between H.F. Curren and TBC outfall)	
35,000 linear feet of 42-inch diameter pipeline from H.F. Curren to purification facility and 30,000 linear feet of 36-inch diameter pipeline from facility to TBC Outfall	$68,250,000
Land Acquisition / Easement	$12,797,000
Total Costs[2]	
Subtotal of Construction Costs	$214,200,000
Contingency	$64,260,000
Contractor Overhead & Profit	$55,692,000
Subtotal of Construction, Contingency and OH&P	$334,152,000
Engineering, Legal and Administrative	$83,538,000

Total Capital Cost	$417,690,000
$/1,000 gallons cost, based on annual production yield	
Total Cost[3] $/1000 gallon	$39.59

Notes:

1. For concepts where different locations of facilities were considered, the more expensive cost was incorporated into the cost estimate and $/1000 gallon rate.
2. Costs above include 30 percent contingency, 20 percent contractor overhead & profit, and 25 percent engineering, legal and administrative costs.
3. Total $/1000 gallon costs include both capital and O&M costs, a 30-year term, and a bond financing interest rate of 5 percent.

Concept 5: Desal Concentrate Discharge System Expansion with Reclaimed Water



Approximate Potable Water Yield

- This concept would produce a yield of **1.7 mgd.**
- Production at the Tampa Bay Seawater Desalination Water Treatment Plant (Desalination Plant) may increase with the additional yield for concentrate discharge.

Primary Infrastructure Components

- Reclaimed water transmission system from H.F. Curren AWTP to Desalination Plant.
- Discharge structure.

Anticipated Regulatory Requirements

- City of Tampa discharge to the Desalination Plant would be permitted under Chapter 62-610, Part VII, Industrial Reuse.
- Discharges from the Desalination Plant to the bay through a new outfall structure will require a new NPDES permit.

Key Feasibility Aspects and Stakeholder Considerations

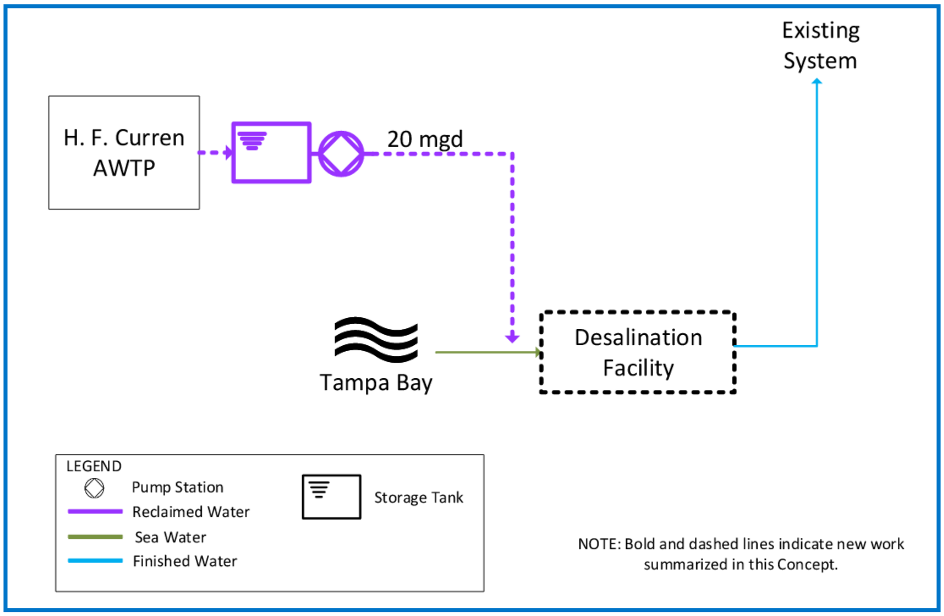
- Agreement between Tampa Bay Water and City of Tampa would be needed for the 20 mgd reclaimed water supply.
- Will require NPDES permit modification.
- Significant public involvement; engagement of environmental groups.
- Provides independent (from TECO) concentrate discharge system alternative.
- Infrastructure siting will require easement/ coordination with TECO.
- Reuse benefit may be difficult to justify to FDEP.
- Desalination Plant site has significant constraints on space availability.
- May not be able to accept 20 mgd daily due to the noncontinuous operation of the Desalination Plant.

INFRASTRUCTURE	EST. COST
Reclaimed Water Pump Station at H.F. Curren AWTP	
5.0 mg Reclaimed Water Tank	$5,192,000
20 mgd Firm Capacity Pump Station (25 mgd design capacity)	$16,517,000
Land Acquisition/ Easement	$200,000
Upgrades at the Desalination Plant	
5.0 mg Blending Tank	$5,311,000
40 mgd Firm Capacity Pump Station (50 mgd design capacity)	$32,636,000
Discharge Structure (to canal/bay)	$2,106,000
Transmission Pipelines	
90,000 linear feet of 42-inch diameter pipeline from H.F. Curren to Desalination Plant	$94,500,000
10,000 linear feet of 48-inch diameter pipeline from pump station to discharge structure	$12,000,000
Land Acquisition/ Easement	$19,969,000
Total Costs[1]	
Subtotal of Construction Costs	$188,500,000
Contingency	$56,550,000
Contractor Overhead & Profit	$49,010,000
Subtotal of Construction, Contingency and OH&P	$294,060,000
Engineering, Legal and Administrative	$73,515,000
Total Capital Cost	$367,575,000
$/1,000 gallons cost, based on annual production yield	
Total Cost[2] $/1000 gal	**$36.15**

Notes:

1. Costs above include 30 percent contingency,20 percent contractor overhead & profit, and 25 percent engineering, legal and administrative costs.
2. Total $/1000 gallon costs include both capital and O&M costs, a 30-year term, and a bond financing interest rate of 5 percent.

Concept 6: Desal Plant Expansion with Reclaimed Water Supply



Approximate Potable Water Yield

- This concept produces a yield increase of **10 mgd.**

Primary Infrastructure Components

- Reclaimed water transmission system from H.F. Curren AWTP to Tampa Bay Seawater Desalination Water Treatment Plant (Desalination Plant).
- Desalination Plant expansion.

Anticipated Regulatory Requirements

- Requirements for direct potable reuse are not yet defined but are being addressed in draft regulations (FAC 62-550 and 62-555) released last year and expected for adoption in 2023.
  - 10-10-12 log reduction for Cryptosporidium, Giardia, and viruses with credits given for WRF, purification facility, and drinking water facility.
    - If FDEP follows California approach, additional log reduction may be required.
  - Multibarrier approach for pathogens and chemicals.

Key Feasibility Aspects and Stakeholder Considerations

- Agreement between Tampa Bay Water and City of Tampa would be needed for the 20 mgd reclaimed water supply.
- May not be able to accept 20 mgd daily due to the noncontinuous operation of the Desalination Plant.
- Reclaimed water and seawater to be blended in pipe.
- May require the use of different RO membranes due to change in influent water quality.
- Will require permit modification.
- Significant public involvement; engagement of environmental groups.
- Desalination Plant site has significant constraints on space availability.

INFRASTRUCTURE	EST. COST
Reclaimed Water Pump Station at H.F. Curren AWTP	
5 mg Reclaimed Water Tank	$5,192,000
20 mgd Firm Capacity Pump Station (25 mgd design capacity)	$16,517,000
Land Acquisition/ Easement	$200,000
At Desalination Plant	
Plant Expansion, including Pre-treatment, RO, liquid lime conversion, 35 mgd lamella capacity, and UV/AOP system	$182,784,000
Transmission Pipelines	
90,000 linear feet of 42-inch diameter pipeline from H.F. Curren to Desalination Plant	$94,500,000
Land Acquisition	$17,719,000
Total Costs[1]	
Subtotal of Construction Costs	$317,000,000
Contingency	$95,100,000
Contractor Overhead & Profit	$82,420,000
Subtotal of Construction, Contingency and OH&P	$494,520,000
Engineering, Legal and Administrative	$123,630,000
Total Capital Cost	$618,150,000
$/1,000 gallons cost, based on annual production yield	
Total Cost[2] $/1000 gallon	**$19.19**

Notes:

1. Costs above include 30 percent contingency,20 percent contractor overhead & profit, and 25 percent engineering, legal and administrative costs.
2. Total $/1000 gallon costs include both capital and O&M costs, a 30-year term, and a bond financing interest rate of 5 percent.

Appendix E. 2022 New Water Supply Selection Process Technical Memorandum

FINAL DRAFT

2018 LONG-TERM MASTER WATER PLAN: 2022 NEW WATER SUPPLY CONFIGURATION ALTERNATIVES SELECTION PROCESS

Integrated Program Management Consultant

(Contract No. 2022-001) – Work Assignment #7

B&V PROJECT NO. 411604
B&V FILE NO. 40.0000

PREPARED FOR

TAMPA BAY WATER
Supplying Water To The Region

Tampa Bay Water

31 AUGUST 2023

BLACK & VEATCH

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LIST OF ABBREVIATIONS

District	Southwest Florida Water Management District
DWRM3	District Wide Regulation Model Version 3
ELAPP	Environmental Land Acquisition and Protection Program
IPMC	Integrated Program Management Consultant
LTMWP	Long Term Master Water Plan
MGD	Million Gallons per Day
MIA	Most Impacted Area
POC	Point of Connection
RO	Reverse Osmosis
Reservoir	C.W. Bill Young Regional Reservoir (reservoir)
SHARP	South Hillsborough Aquifer Recharge Project
WTP	Water Treatment Plant
SWUCA	Southern Water Use Caution Area
TECO	Tampa Electric Company
WRD	Hillsborough County Water Resources Department

1.0 Introduction and Objectives

Tampa Bay Water is a regional water supply authority that supplies wholesale potable water supply to its six member governments: Hillsborough County, Pasco County, Pinellas County, New Port Richey, St. Petersburg and Tampa. In order to ensure compliance with its contractual obligation to plan, develop and deliver reliable high-quality drinking water supply to its six member governments, the utility completes a Long-term Master Water Plan (LTMWP) update every five years.

The last LTMWP update was completed in 2018 and considered a 20-year planning horizon. The 2018 LTMWP update identified the need to add between 10 to 20 million gallons per day (mgd) of additional water supply capacity by year 2028 to keep up with the growing water needs in the region. The 2018 LTMWP update also identified the following three top-ranked water supply options for further study and consideration to meet the water supply capacity needs by year 2028:

1. South Hillsborough Wellfield (with groundwater withdrawals enabled by the net benefit from the South Hillsborough Aquifer Recharge Project - SHARP)
2. Surface Water Treatment Plant Capacity Expansion (with existing source water supplies)
3. Tampa Bay Seawater Desalination Plant Expansion and Optimization

Feasibility studies were completed for these three water supply options to further define technical and regulatory feasibility, projected increase in overall regional water supply system yield, costs, risks, reliability, and a variety of other non-economic factors to consider when evaluating and comparing the water supply options. The next steps in the planning process involved developing and evaluating the water supply configuration alternatives composed of one or more of the three top-ranked water supply options, followed by a scoring and ranking process to define the new water supply configuration alternative that was recommended to move forward into the implementation phase.

As part of the Integrated Program Management Consultant (IPMC) contract, Tampa Bay Water requested Black & Veatch to provide professional services to support Tampa Bay Water staff in working with the Member Governments and Tampa Bay Water Board on the selection and approval process for the next Master Water Plan water supply project(s). This report documents the process and results from the 2022 Master Water Plan project(s) selection process and concludes the 2018 Master Water Plan planning cycle.

2.0 Background from 2018 LTMWP Update

The 2018 LTMWP Update defined potential future water supply options that could be implemented by year 2028 to allow Tampa Bay Water to meet the projected increase in water demands from its six member governments. Thirteen water supply options were developed and put through a coarse screening and a fine screening process to define a short-list of the top ranked options to consider for more detailed feasibility studies and potential implementation.

2.1 Coarse Screening

The coarse screening process was completed to help eliminate some options from further consideration if determined to be impractical or less attractive than the other options being considered. The criteria used for the coarse screening process were consistent with the criteria used in previous versions of the LTMWP process and are listed below:

- Total cost per 1,000 gallons
- Yield reliability
- Environment and source water protection
- Implementation, feasibility, and risk
- Regulatory and contractual requirements, and public reception

Each option was scored based on the criteria above and the results of this coarse screening process was a refined list of nine water supply options recommended for further evaluation as part of the fine screening process.

2.2 Fine Screening

A fine screening process was used to further narrow down the list of water supply options to a short-list of three top-ranked project options for inclusion in the feasibility program. The fine screening evaluation considered a scoring and ranking framework that was based on the three primary Tampa Bay Water Board-approved selection criteria for Master Water Plan projects: environmental stewardship, cost, and reliability. Each of these primary selection criteria were divided into sub-criteria that were weighted based on input from Tampa Bay Water staff and other stakeholders.

This process resulted in three top-ranked options recommended for more detailed evaluation as part of the process for selecting the next projects to meet the growing water demands of the region. The three short-listed options are listed below and illustrated in

Figure 2-1.

- South Hillsborough Wellfield (with groundwater withdrawals enabled by the net benefit from the South Hillsborough Aquifer Recharge Project - SHARP)
- Surface Water Treatment Plant Capacity Expansion (with existing source water supplies)
- Tampa Bay Seawater Desalination Plant Expansion and Optimization

Feasibility studies were completed for each of the short-listed options. The feasibility studies included conceptual design, consideration of impacts and compatibility with the existing system, and cost estimates. Each option is summarized in the following section.

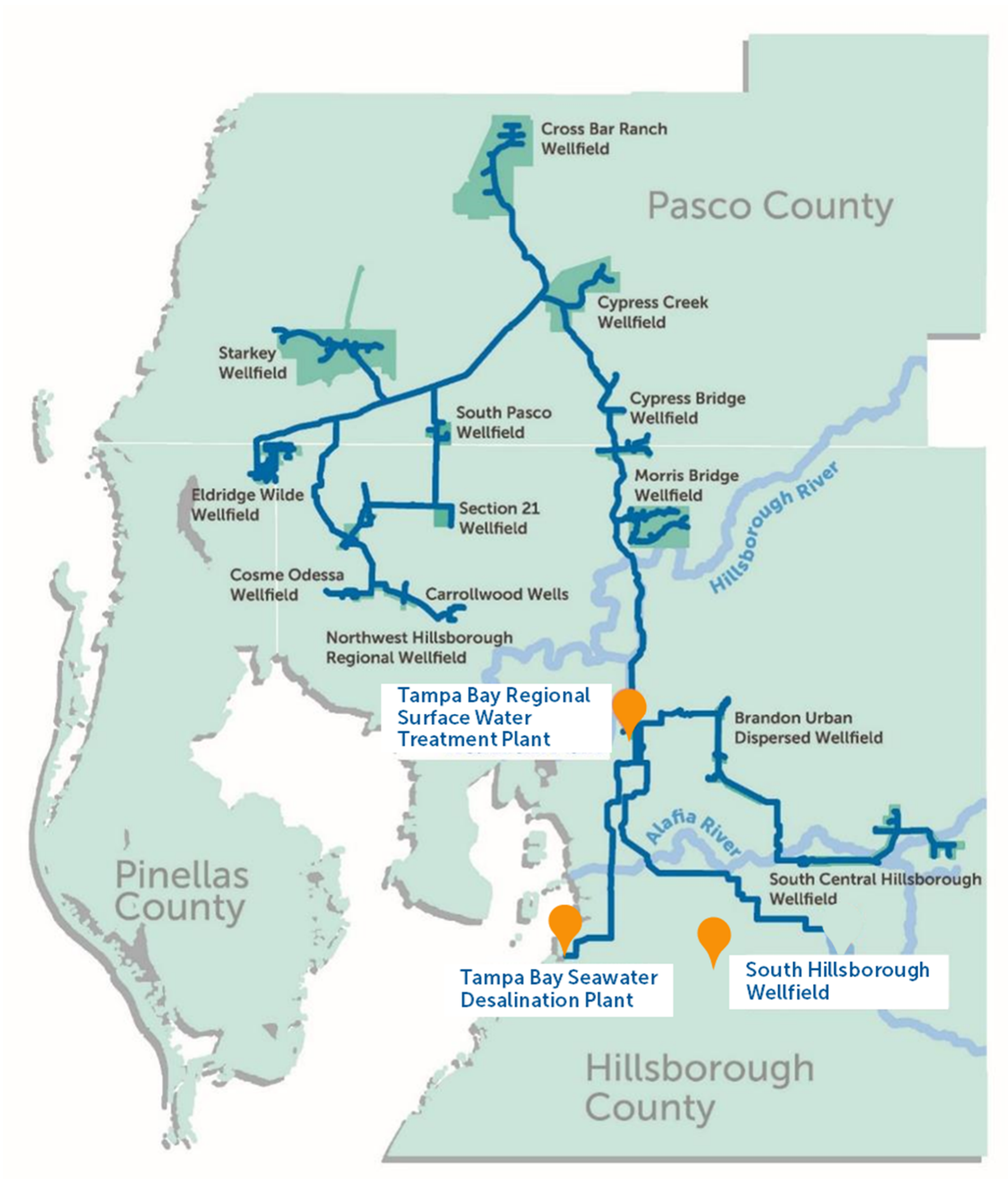

Figure 2-1 Short-listed Options from 2018 LTMWP Update

3.0 Short-listed Options from 2018 LTMWP Update

3.1 South Hillsborough Wellfield

The proposed South Hillsborough Wellfield is located in southern Hillsborough County and is subject to special requirements by the Southwest Florida Water Management District (District) because of its location in the Most Impacted Area (MIA) of the Southern Water Use Caution Area (SWUCA). New water use permits for projects that involve groundwater withdrawal in this area must demonstrate consistency with the Net Benefit concept that requires an approach that will offset the drawdown plus provide at least a 10 percent net benefit to the aquifer to support recovery in the MIA. This project would use groundwater withdrawal credits generated from the recharge of the Upper Floridan Aquifer via the Hillsborough County South Hillsborough Aquifer Recharge Project (SHARP), which involves coastal aquifer recharge with reclaimed water supply.

The proposed South Hillsborough Wellfield concept includes eight production wells and a groundwater treatment facility located on two parcels owned by Hillsborough County, as shown in **Figure 3-1.** Four production wells are proposed on the western parcel, which is under the management of the Hillsborough County Environmental Land Acquisition and Protection Program (ELAPP). Three production wells and the water treatment facility are proposed for the eastern parcel on a Hillsborough County Water Resources Department (WRD) property located east of Balm Riverview Road, known as the AgMart Property. In addition, an existing test well located north of the western parcel is planned to be converted to a production well, which results in a total of eight planned production wells.

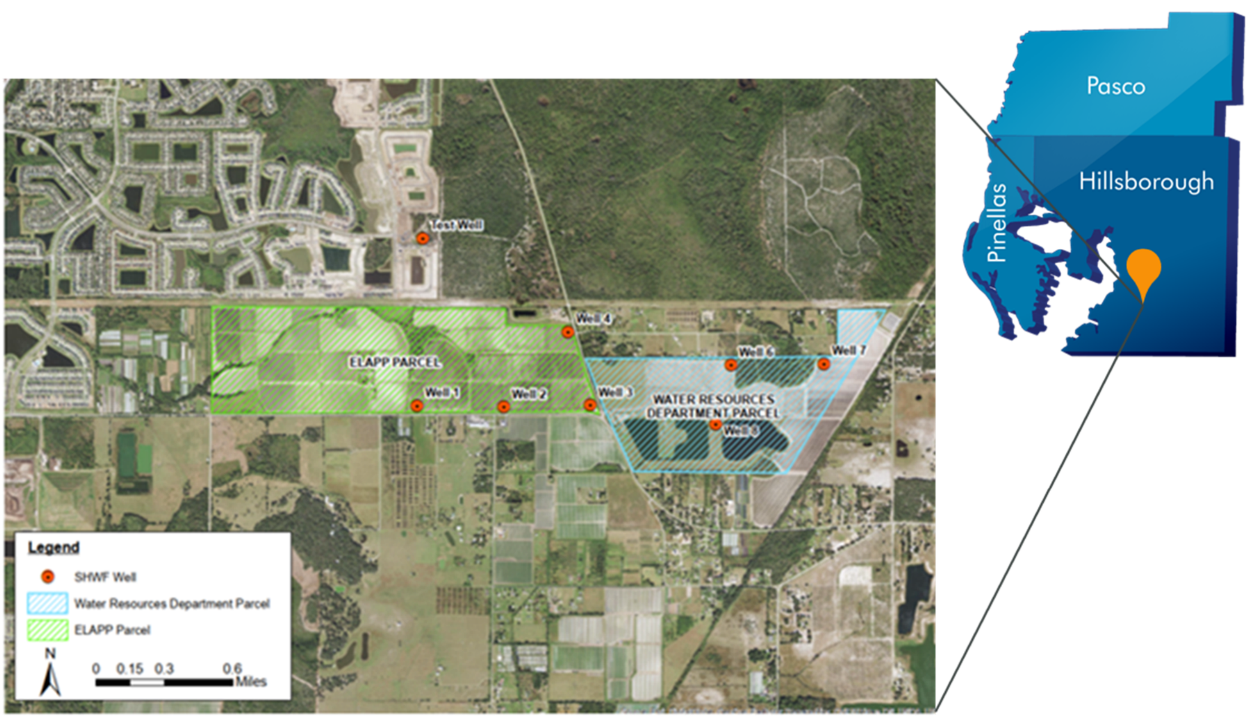

Figure 3-1 Location Map for the South Hillsborough Wellfield via SHARP Option

The feasibility study evaluated the impact of the recovery in the Upper Floridan Aquifer within the MIA with the District Wide Regulation Model Version 3 (DWRM3). Model results showed that 10 million gallons per day (MGD) of recharge via five SHARP wells would allow for a 6.15 MGD annual average withdrawal from the wellfield while also accommodating the 10 percent net benefit requirement.

The conceptual design of the project includes eight 2.07 MGD wells, pumps and wellhouses; 4.4 miles of raw water mains, and a water treatment plant to treat the water prior to conveying it to a new Hillsborough County point of connection (POC). An ozone treatment process was preliminarily selected as the proposed water treatment technology based on the source water characteristics from the test well site. The treatment facility was proposed to have an initial design treatment capacity of 9.3 MGD with space available to handle potential future expansions.

A phased project approach was also considered, with a potential first phase that would be limited to two to three production wells to provide an annual average water supply yield of 2.35 MGD based on a 5 MGD SHARP injection rate. This first phase is also proposed to omit an ozone treatment facility and limit water treatment upstream of the POC to chemical feed systems, as shown on **Figure 3-2**. Additional groundwater sampling and water quality analysis would be needed to confirm if chemical feed systems without ozone treatment would be sufficient for the treatment approach proposed for the first phase of the project.

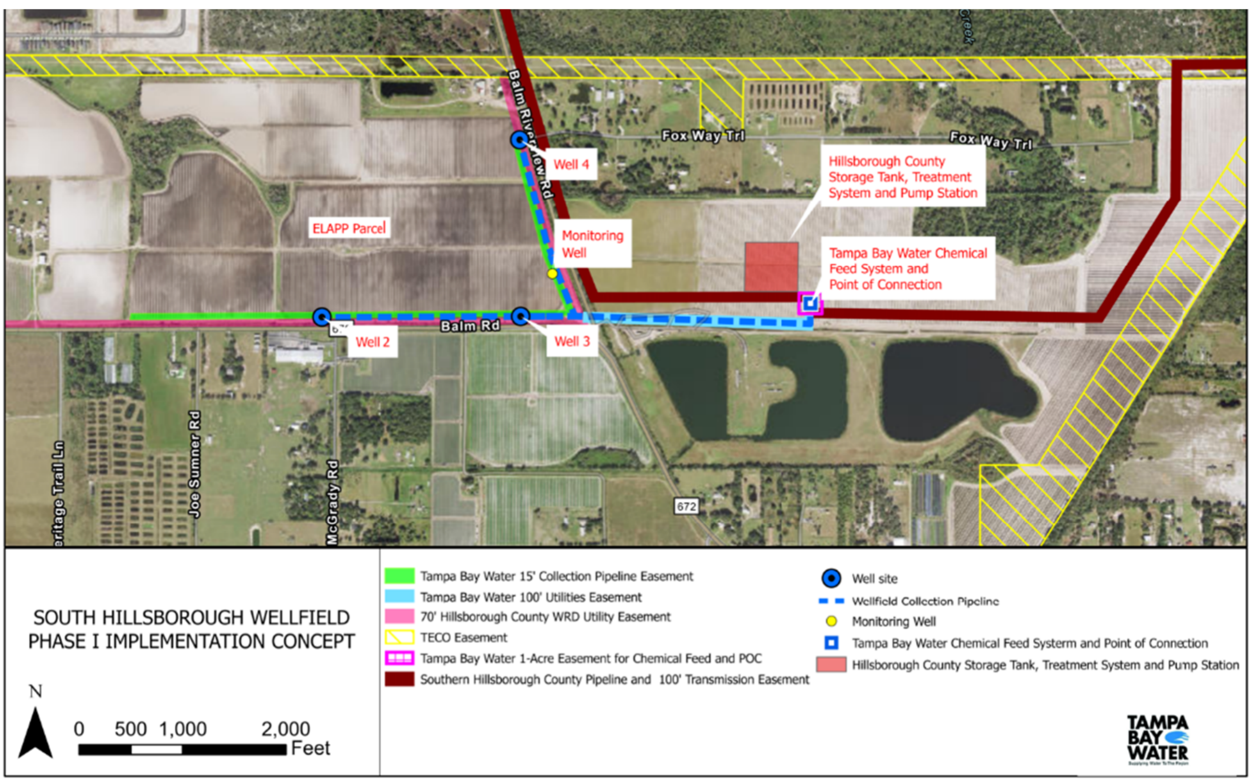

Figure 3-2 Phase 1 South Hillsborough Wellfield Option

A second phase would include the ozone treatment process and all eight wells to provide the annual average yield of 6.15 MGD. Conceptual level cost opinions were developed for both the Phase 1 only and the full capacity project options, which are summarized in **Table 3-1.** The cost opinion does not include the cost of reclaimed water credits, which at the time of the feasibility study were still being negotiated.

Table 3-1 Cost Opinion for the South Hillsborough Wellfield Options

Treatment	Lifecycle Cost Category	Phase 1 (Chemical Feed Treatment) 2.35 MGD	Full Project Implementation (Ozone Treatment) 6.15 MGD
Ground Water	Capital Cost[1]	$14,125,000	$60,980,000
	Annual Operations and Maintenance Cost[2]	$661,000	$2,490,000
	Cost per 1,000 Gallons	$1.72	$2.68
	30-Year Lifecycle Cost	$44,340,000	$180,500,000

[1] *Capital cost opinion based on 2021 costs and does not include escalation to current market conditions or escalation to the estimated mid-point of project construction.*

[2] *Does not include cost for groundwater withdrawal credits generated via SHARP.*

3.2 Surface Water Treatment Plant Capacity Expansion

The second project option was the expansion of surface water treatment plant capacity to increase the annual average potable water supply yield from the existing surface water supply sources by approximately 10 MGD. Two sub-options were evaluated for this expansion:

A. Expanding the existing Regional Surface Water Treatment Plant (WTP)

B. New Surface WTP near the C.W. Bill Young Regional Reservoir

Both options would make use of the existing permitted surface water supplies from the Hillsborough and Alafia rivers and Tampa Bypass Canal, along with the seasonal storage provided by the C. W. Bill Young Regional Reservoir. The feasibility study determined that both location options for expanding the surface water treatment plant capacity are feasible and subject to the same availability and quality constraints.

3.2.1 Option A: Existing Regional Surface WTP Capacity Expansion

Option A includes expanding the existing Regional Surface WTP in the available space within the existing property. The expansion includes the addition of another treatment train with the same unit processes and equipment technologies as the four existing treatment trains at the plant. The new infrastructure is proposed to be constructed in a manner that minimizes disruption to the operation of the existing plant during construction. **Figure 3-3** and **Figure 3-4** show the layout of the proposed new infrastructure within the existing WTP site.

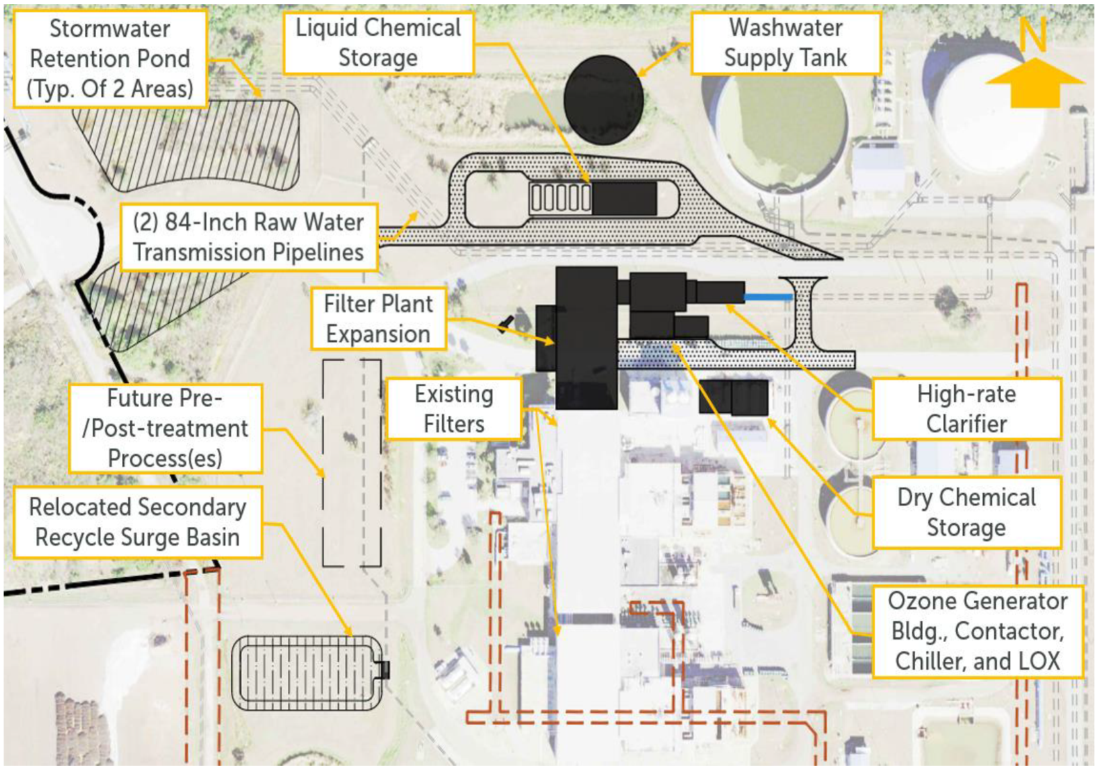

Figure 3-3 North Partial Site Plan (Source: Regional Surface Water Treatment Expansion Feasibility Study, Hazen, September 2021)

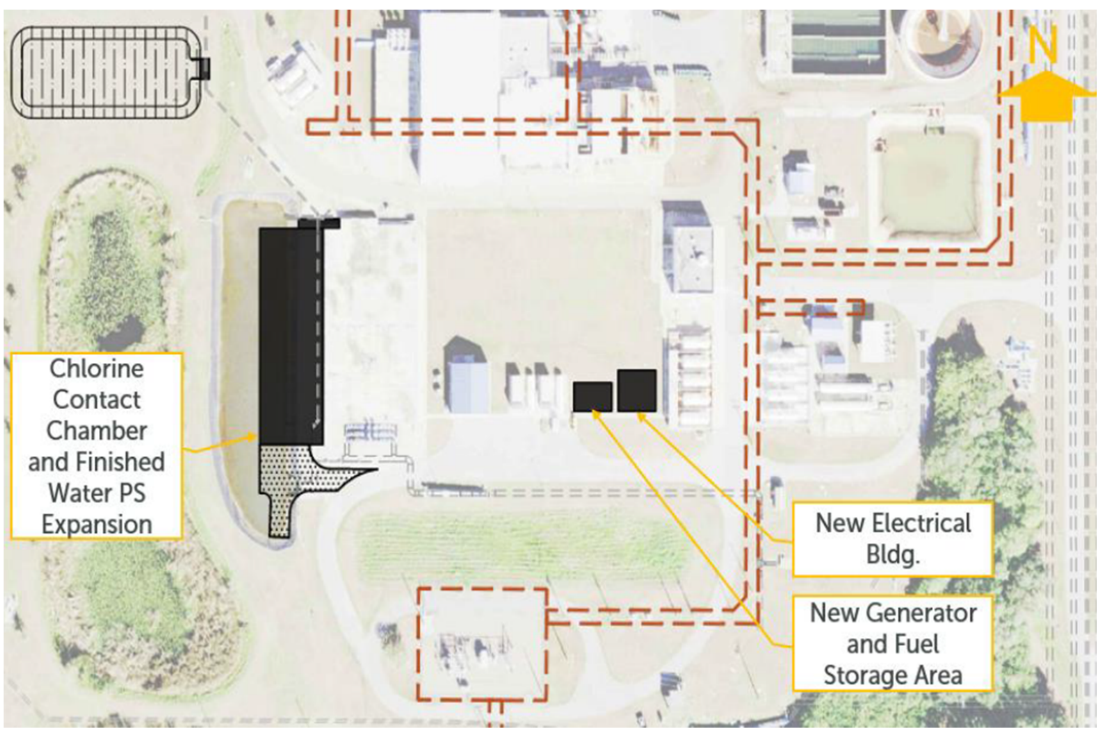

Figure 3-4 South Partial Site Plan (Source: Regional Surface Water Treatment Expansion Feasibility Study, Hazen, September 2021)

3.2.2 Option B: New Surface WTP

Option B includes building a new surface WTP near the existing C.W. Bill Young Regional Reservoir (Reservoir). The preliminary site location next to the Reservoir and conceptual layout plans of the facility were designed to minimize land acquisition, minimize risks to reservoir features, and use the reservoir static head to delivery water to the potential new WTP without needing a transfer pump station. The footprint of the facility allows for future capacity expansions and the addition of potential future pre and/or posttreatment processes.

The proposed new surface WTP (**Figure 3-5**) assumes a similar treatment process as the existing Regional Surface WTP and a transmission main to deliver the potable water supply to a future Point of Connection in South Hillsborough County (at a Hillsborough County Water Resources Department property located east of Balm Riverview Road, known as the AgMart Property) (**Figure 3-6**).

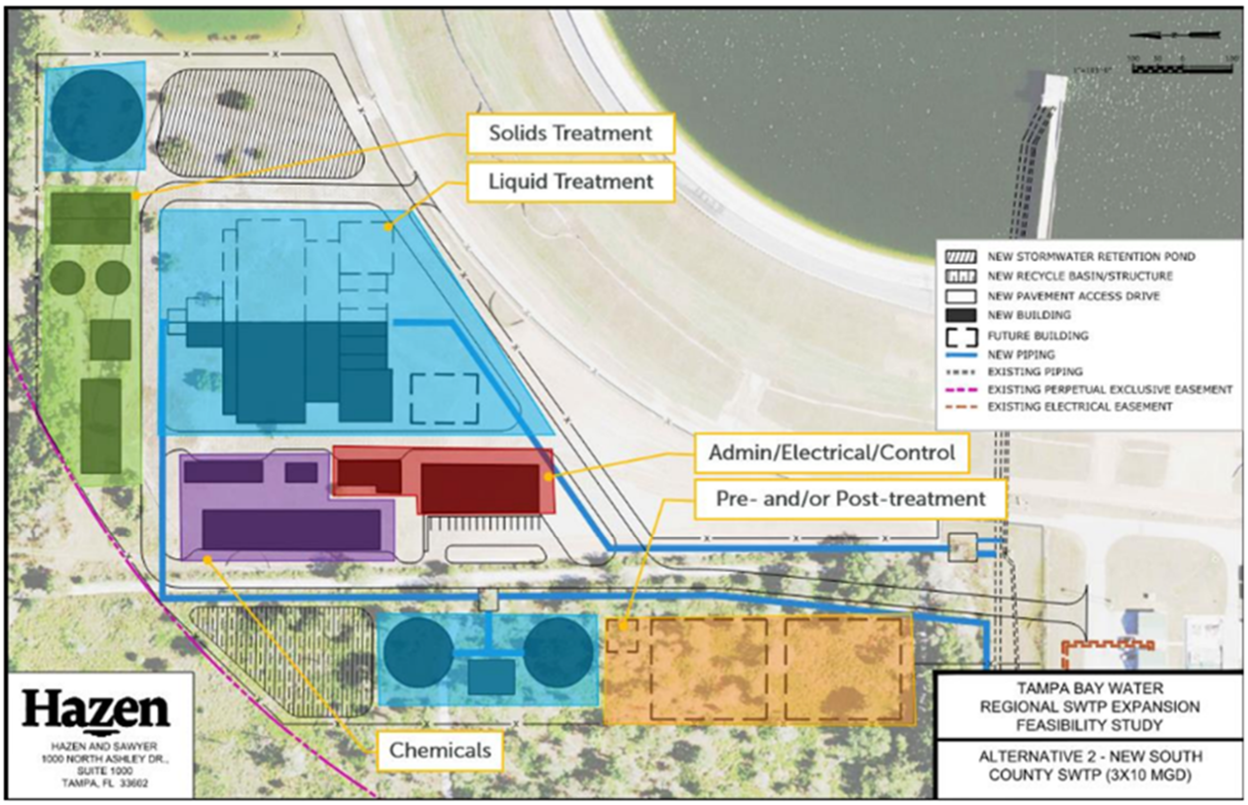

Figure 3-5 Conceptual Site Plan for New Surface WTP Near the Reservoir

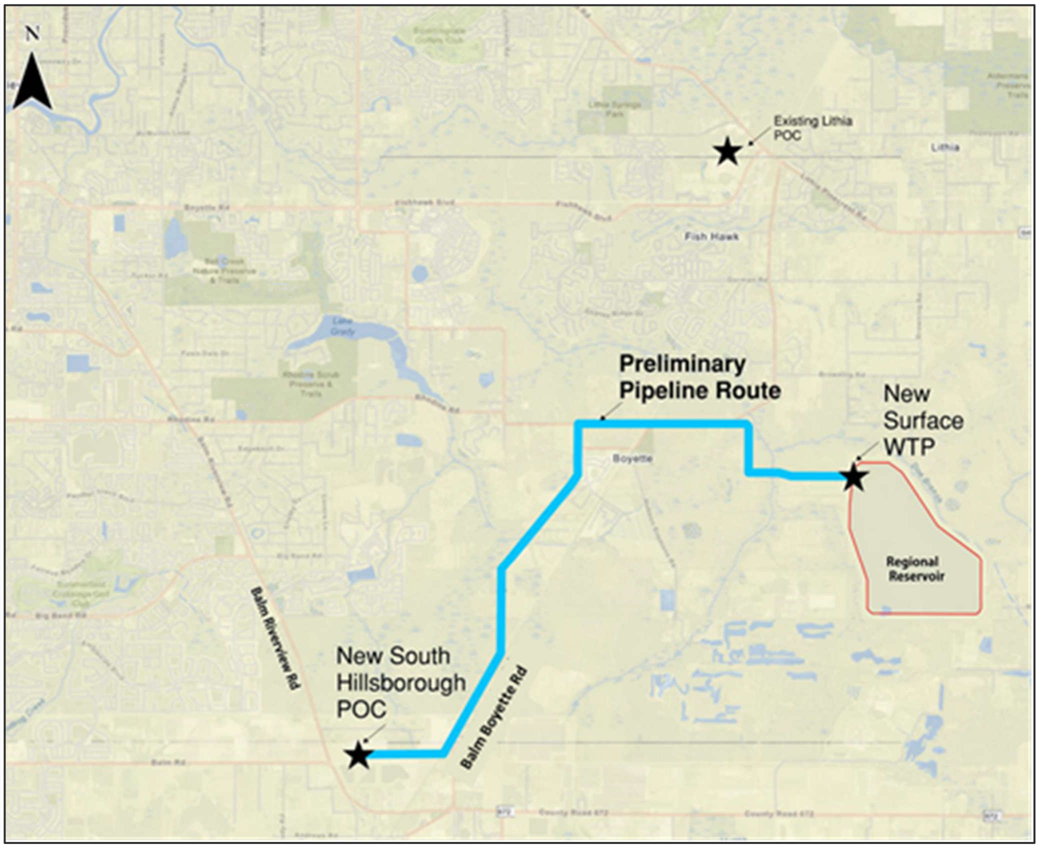

Figure 3-6 Preliminary Transmission Main Route for New Surface WTP Option

Table 3-2 summarizes the estimated cost information for the surface water treatment capacity expansion options A and B.

Table 3-2 Cost Opinion for the Surface Water Treatment Plant Capacity Expansion Options

Treatment	Lifecycle Cost Category	Option A (Existing Regional Surface WTP)	Option B (New Surface WTP)
		10 MGD	10 MGD
Surface Water	Capital Cost[1]	$90,690,000	$145,600,000
	Annual Operation & Maintenance Cost	$3,743,000	$4,644,000
	Cost per 1,000 Gallons	$2.46	$3.58
	30-Year Lifecycle Cost	$269,630,000	$391,930,000

[1] Capital cost opinion based on 2021 costs and does not include escalation to current market conditions or escalation to the estimated mid-point of project construction.

3.3 Tampa Bay Seawater Desalination Plant Expansion and Optimization

The Tampa Bay Seawater Desalination Plant was originally constructed in 2002 and has a maximum permitted design capacity of 28.75 MGD and an estimated sustainable annual average production capacity of approximately 17.1 MGD based on seasonal variations and requirements related to water quality, operations, maintenance, permits, the current contract operations agreement for the facility, and Tampa Electric Company (TECO) coordination. The seawater supply and concentrate discharge systems for the facility are connected to the TECO cooling water tunnels and require the TECO cooling water pumps to be operated to produce potable water supply from the desalination plant. **Figure 3-7** is a diagram that illustrates the existing desalination plant treatment processes.

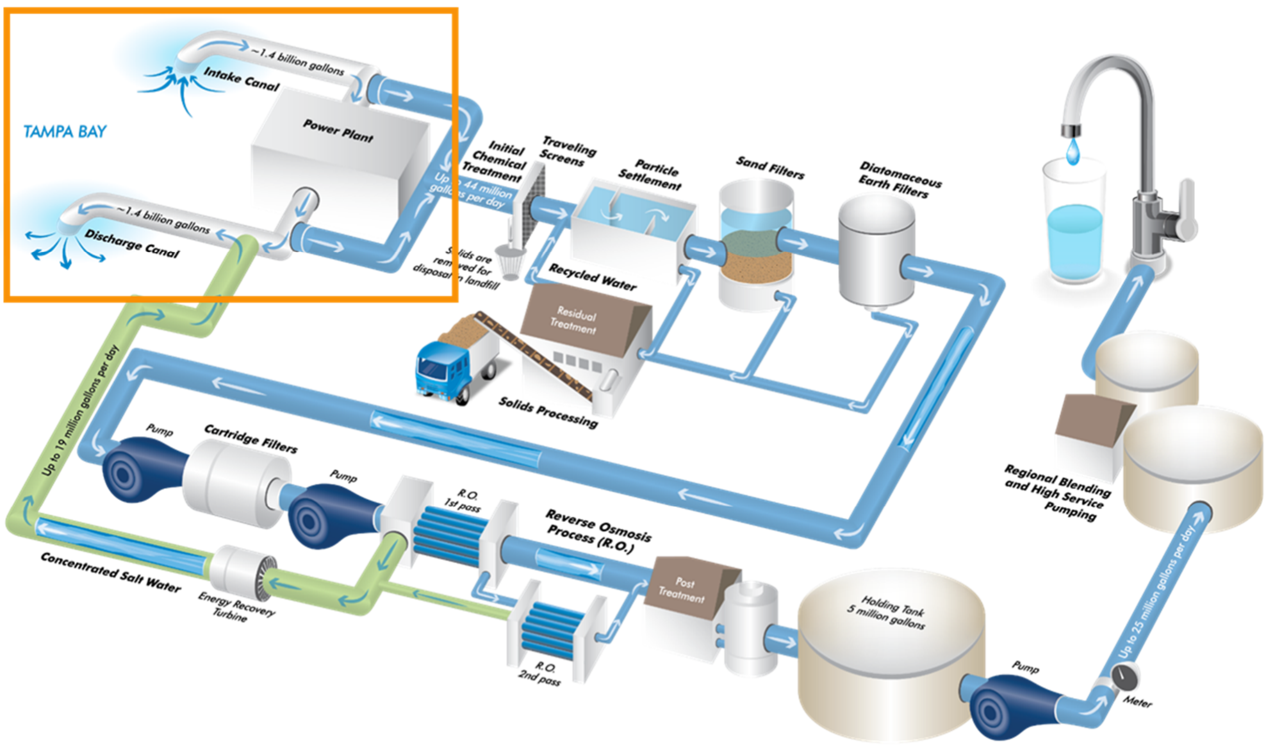

Figure 3-7 Tampa Bay Seawater Desalination Plant Process Flow Diagram

The Tampa Bay Seawater Desalination Plant Expansion and Optimization option consists of optimizing and expanding the capacity of the existing facility to provide an estimated 10.4 MGD of additional annual average water supply capacity. The optimization and expansion concept would involve constructing a larger seawater supply pipeline, new and expanded pre-treatment system processes and filters, adding additional reverse osmosis (RO) treatment trains, new energy recovery systems for the RO process, post-treatment system improvements and expansion, expansion of the product water pump station, new deep injection well system for expanding the concentrate discharge system, and expanding the residuals handling systems. **Figure 3-8** shows the conceptual layout of the proposed improvements.

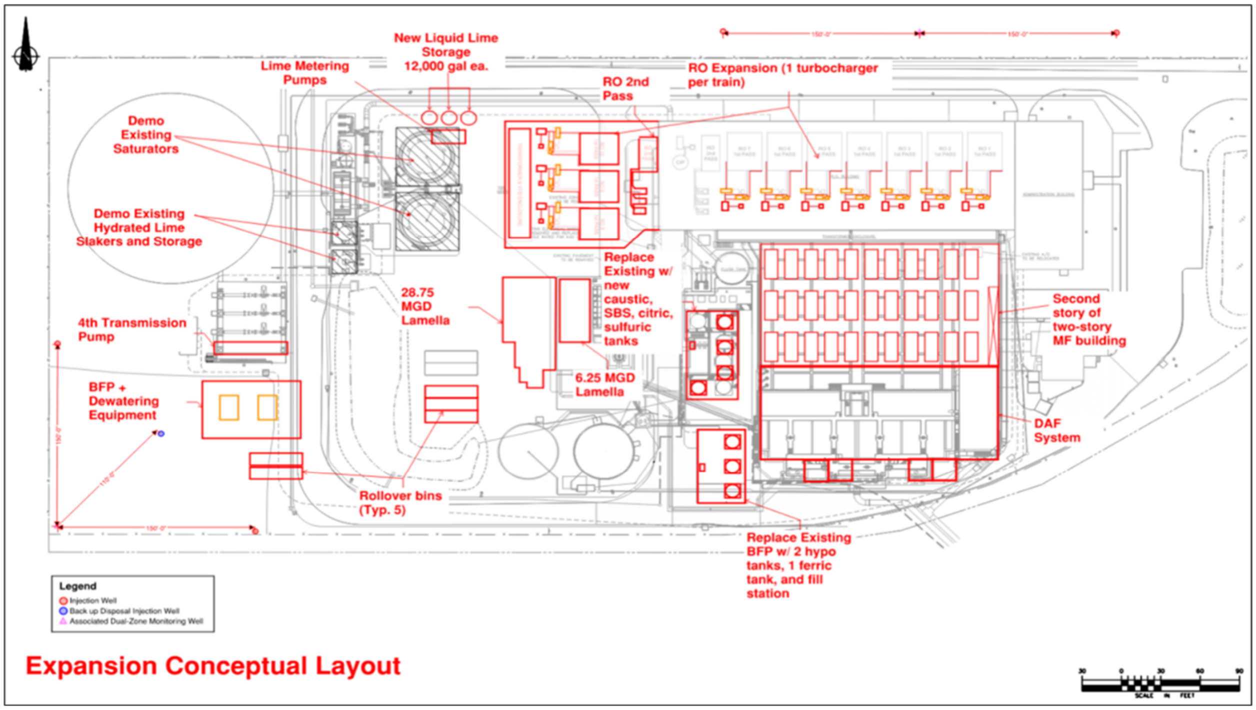

Figure 3-8 Tampa Bay Seawater Desalination Plant Expansion and Optimization Conceptual Layout

Table 3-3 below provides a cost summary for the Tampa Bay Seawater Desalination Plant Expansion and Optimization option.

Table 3-3 Cost Opinion for the Tampa Bay Seawater Desalination Plant Expansion and Optimization Option

Treatment	Lifecycle Cost Category	Plant Expansion 10.4 MGD
Seawater Desalination	Capital Cost[1]	$310,000,000
	Annual Operation & Maintenance Cost	$14,600,000
	Cost per 1,000 Gallons	$8.56
	30-Year Lifecycle Cost	$974,820,000

[1] Capital cost opinion based on 2021 costs and does not include escalation to current market conditions or escalation to the estimated mid-point of project construction.

4.0 Water Supply Configuration Alternatives

Water supply configuration alternatives that could provide between 10 to 20 MGD of additional water supply capacity for the region were developed by combining one or more of the three short-listed water supply options (or sub-options) together. A total of nine configuration alternatives were developed for further consideration as the next water supply expansion program for the Tampa Bay region. **Table 4-1** summarizes the configuration alternatives developed and the associated increase in water supply capacity/yield provided by each**.**

Table 4-1 Water Supply Configurations

	Surface Water Treatment Plant Capacity Expansion		Tampa Bay Seawater Desalination Plant Expansion and Optimization	South Hillsborough Wellfield*		
Configuration	Expand Existing	New SWTP	Plant Expansion	Phase I	Full Project	Combined Yield
1	10					10
2		10				10
3			10.4			10.4
4	10			2.35		12.35
5		10		2.35		12.35
6			10.4	2.35		12.75
7	10				6.15	16.15
8		10			6.15	16.15
9			10.4		6.15	16.55

At the time of the selection process, negotiations between Hillsborough County and Tampa Bay Water regarding the terms (compensation and duration) for the SHARP reclaimed water credits required for the South Hillsborough Wellfield options were not completed. Due to the time-critical nature of the water supply configuration selection process, Tampa Bay Water determined that if an agreement on the terms for the SHARP reclaimed water credits could not be reached by June 2022, any configuration alternatives that included the South Hillsborough Wellfield option (Phase I or Full Project) would be removed from consideration as part of the 2022 new water supply selection process. Negotiations were not completed by the June 2022 deadline and the configuration alternatives that included the South Hillsborough Wellfield option were removed from the evaluation process.

Figure 4-1 provides a flowchart that illustrates the decision process that was followed to narrow down the configurations being evaluated.

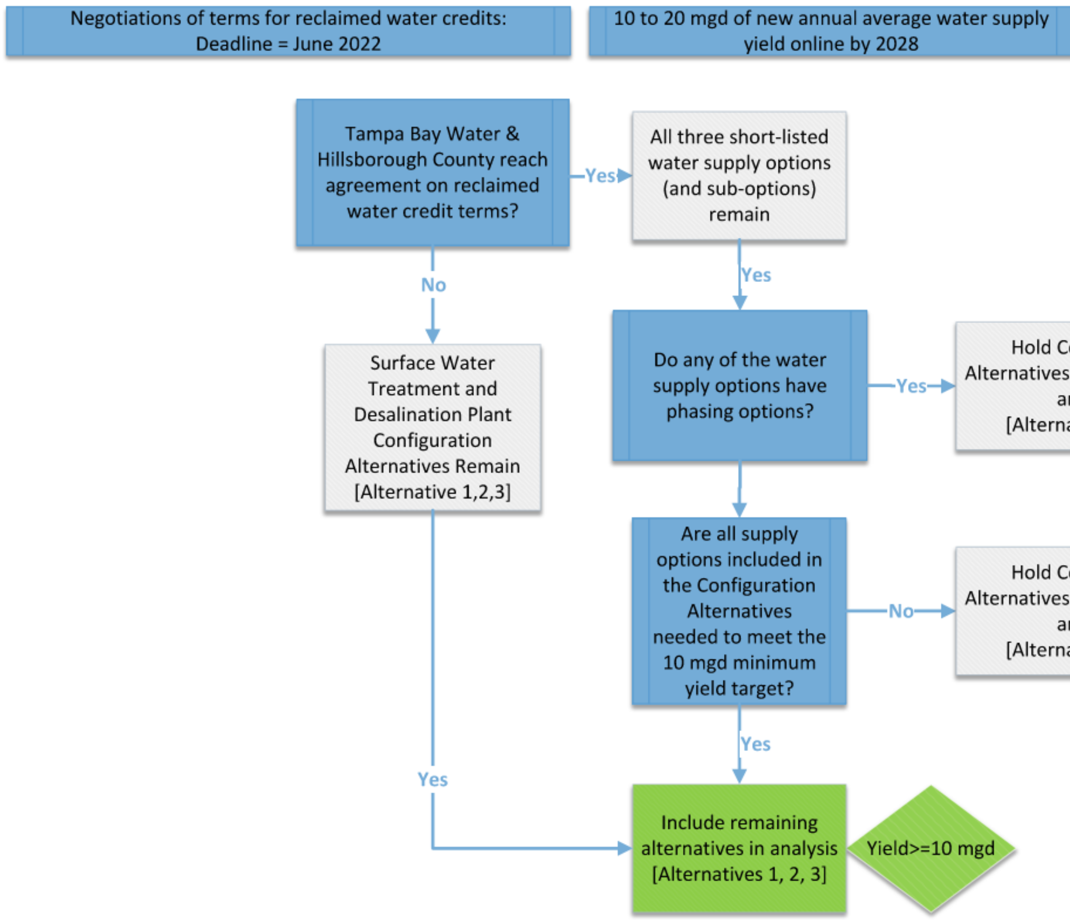

Figure 4-1 Flowchart for Actions and Decisions

After going through the decision process to narrow down the alternatives, the three configuration alternatives listed in **Table 4-2** below were selected to move forward for further consideration.

Table 4-2 Summary of Proposed Configuration Alternatives for Further Evaluation

Configuration	Alternative	Added Yield[1] (MGD)	Capital Cost[2]	Cost per 1,000 Gallons
A	Existing Regional Surface Water Treatment Plant Capacity Expansion	10	$90,690,000	$2.46
B	New Surface Water Treatment Plant	10	$145,600,000	$3.58
C	Tampa Bay Seawater Desalination Plant Expansion and Optimization	10.4	$310,000,000	$8.56

[1] Additional annual average water supply capacity/yield provided by alternative based on median year conditions.

[1] Capital cost opinion based on 2021 costs and does not include escalation to current market conditions or escalation to the estimated mid-point of project construction.

5.0 Public Engagement

In July 2022, Tampa Bay Water held two telephone town hall meetings. Both were publicized by online advertising, social media and in-person meetings. Telephone Town Hall Meeting, the company that conducted the meetings, also sent out 5,000 text messages and dialed 10,000 phone numbers for each meeting to invite residents to attend. In general, residents supported expansion of an existing facility over building a new facility.

Black & Veatch and Tampa Bay Water used the information gathered from these telephone town hall meetings along with other previous public engagement efforts to support the evaluation of the remaining water supply configuration alternatives being considered for implementation. The brief synopsis of these meetings is provided below.

5.1 Town Hall Meeting #1: July 12, 2022

A telephone town hall meeting with a Zoom virtual meeting simulcast option was held to target Hillsborough County residents. The participants in the call averaged more than 150 residents for the first 17 minutes; approximately 48 remained on the call for 30 minutes, and 44 residents remained on the call for the full hour of the meeting. Approximately 34 residents attended via Zoom.

- Attendees were asked which new water supply option they prefer:
  - 34% preferred expanding the existing desalination plant;
  - 25% preferred expanding the existing regional surface water treatment plant
  - 16% preferred a new surface water treatment plant
  - 25% replied no opinion or don’t know.
- Questions and comments relating to the Long-term Master Water Plan included:
  - Why is expansion of the seawater desalination plant not the recommended option?
  - Project cost and funding questions, including impacts to water rates or taxes
  - Suggestions to control growth and require new growth to pay for infrastructure required to serve growth
  - What are the impacts to water pressure and water quality?

5.2 Town Hall Meeting #2: July 19, 2022

An additional telephone town hall meeting was held to target Pasco and Pinellas County residents; it averaged approximately 131 residents for the first 17 minutes, approximately 50 residents remained on the call for 23 minutes, and 45 residents remained on the call for the full meeting duration.

- Attendees were asked which new water supply option they prefer:
  - 32% preferred expanding the existing regional surface water treatment plant
  - 23% preferred expanding the existing desalination plant
  - 5% preferred building a new surface water treatment plant
  - 41% replied no opinion or don’t know.
- Questions and comments relating to the Long-term Master Water Plan included:
  - Suggestion to build a desalination plant on the Gulf of Mexico
  - Suggestions to control growth and require new growth to pay for infrastructure required to serve growth
  - Questions and comments regarding water quality
  - Suggestion to reduce water wasted for flushing
  - Suggestion to consider options that will reduce flooding near Cypress Creek Wellfield

6.0 Selection Criteria

The key criteria considered to score and rank the water supply configuration alternatives being considered were consistent with the Tampa Bay Water's Board-approved selection criteria for the master water planning process:

1. Environmental Stewardship
2. Costs
3. Reliability

Each of these three key criteria was given equal weighting and further broken down into specific sub-criteria, as described in **Table 6-1**.

The description and weighting of each sub-criterion were similar to what was used as part of the previous 2018 Long-term Master Water Plan Update process for short-listing water supply options, but some updates were made to better differentiate key aspects of the alternatives based on feedback gathered from the planning team during a workshop conducted on April 27, 2022. A score of 1 to 5 was assigned to each sub-criteria, with 1 being the lowest or least favorable score, and 5 being the highest possible score for the most favorable alternative with regards to the sub-criteria being considered.

Table 6-1 Selection Criteria for Water Supply Configuration Alternatives

Criteria	Measure	Weighting	Explanation of Numerical Scores: 1	2	3	4	5
Category: Environmental Stewardship [33% Weighting]							
Ease of permitting	Ease with which configuration can be permitted considering local, state, and federal requirements, future regulations, and existing precedents	10%	Configuration is difficult to permit under existing rules and/or requires changes to existing rules or new rules		Configuration is permittable, but requires significant supporting documentation		Configuration is easily permitted under current rules with limited supporting documentation
Environmental sustainability	Environmental sustainability of configuration based on the sustainability evaluations described in the 2018 Sustainability Assessment Technical Memorandum	13%	Configuration is ranked least favorably in the Sustainability Assessment		Configuration is ranked moderately in the Sustainability Assessment		Configuration is ranked most favorably in the Sustainability Assessment
Public reception	How the public is expected to receive the given water supply configuration	10%	Anticipated negative initial reception of concept by the public, with significant public outreach required		Anticipated neutral reception of concept by the public (or generally equal amounts of positive/negative reception), with public outreach required.		Anticipated positive reception of concept by the public, with minimal public outreach required.
Category: Cost [33% Weighting]							
Life cycle cost	Total cost of configuration per 1,000 gallons, including capital, and operation/maintenance expenditures over a 30-year period	20%	Configuration has the highest estimated life cycle cost		Configuration has a moderate estimated life cycle cost		Configuration has the lowest estimated life cycle cost
Ability to phase	Ability to implement configuration in phases and/or expand in the future	5%	Configuration cannot be practically phased and has limited potential for future expansion (resulting in limited ability to "right size" the current project to minimize rate impacts)		Configuration has some potential for phased implementation or future expansion of some components.		Configuration can be easily phased or expanded in the future in practical increments (to minimize rate impacts)
Cost risk factors	Potential for configuration to be affected by unforeseen schedule delays, supply chain delays, construction issues and/or contractual issues that affect cost	8%	Highest potential for various risks that can negatively impact capital costs and $/1,000 gallon unit costs		Moderate potential for various risks that can negatively impact capital costs and $/1,000 gallon unit costs		Lowest potential for various risks that can negatively impact capital costs and $/1,000 gallon unit costs
Category: Reliability [34% Weighting]							
Source water supply resiliency	Ability of configuration to resist and/or recover from loss of water supply (average yield) due to drought or catastrophic event and/or dependance on other entities for continued water supply	8%	Source water supplies that are anticipated to be periodically affected by drought, catastrophic events and/or other factors and entities; and may take a significant amount of time to recover from events that temporarily impact source water supply availability		Source water supplies have the potential to be intermittently affected by drought, catastrophic events and/or other factors and entities; and could recover within a short to medium duration of time from events that temporarily impact source water supply availability		Source water supplies have minimal potential to be affected by drought, catastrophic events and/or other factors and entities; and could recover quickly from events that temporarily impact source water supply availability
Climate / Coastal Hazards Vulnerability index	Vulnerability of configuration to extreme or unplanned conditions based on evaluation in 2018 Vulnerability Assessment Technical Memorandum	8%	Configuration is ranked least favorably in the Vulnerability Assessment		Configuration is ranked moderately in the Vulnerability Assessment		Configuration is ranked most favorably in the Vulnerability Assessment
Regional system operational impacts	Extent to which configuration is compatible with the regional system's existing operations and maintenance requirements; ability to maintain level of service; ability of configuration to provide service/relief / flexibility during emergency events (i.e., not isolated to supply a single POC)	8%	Configuration does not increase system reliability and/or enhance level of service during potential emergency scenario conditions		Configuration moderately increases system reliability and/or enhances level of service during some potential emergency scenario conditions		Configuration significantly increases system reliability and/or enhances level of service under multiple potential emergency scenario conditions
Contractual requirements	The extent to which the configuration aligns with the terms of existing governance documents and agreements and/or requires new governance documents and agreements; and consideration of the extent to which the configuration is dependent on contractual agreements with stakeholders for the water supply yield (quantity and duration)	10%	Configuration requires new contract documents or significant changes to existing documents. Duration of water supply agreement is < 20 years.		Configuration requires moderate changes to existing contract documents but requires no new contract documents. Duration of water supply agreement is 20 to 29 years.		Configuration requires no changes to existing contract documents, nor requires new contract documents. Duration of water supply agreement is >30 years.

7.0 Evaluation and Ranking of Configuration Alternatives

Each configuration alternative was evaluated using the selection criteria outlined in Section 5.0. A score was applied to each criterion and was multiplied by the weighting to obtain its weighted score. The weighted points were then summed for each configuration to determine the total score per alternative. The following section details the considerations behind the scores for each alternative.

7.1 Ease of Permitting

The Existing Regional Surface Water Treatment Plant Capacity Expansion was given the most favorable score of 5.0 because it involves continued use of water supply sources within the existing permitted withdrawal limits, with a minimal potential for permitting challenges.

The New Surface WTP alternative will involve additional permitting requirements and supporting documentation needs based on construction of a new facility on a greenfield site and potential location adjacent to the existing reservoir along with permitting needs related to a new transmission pipeline that would be needed to connect the New Surface WTP to the Tampa Bay Water Regional System. However, similar to the alternative involving the Existing Regional Surface WTP Capacity Expansion, the New Surface WTP alternative does not require new water supply withdrawal permits and is considered highly permittable with limited regulatory challenges and was given a score of 4.0.

The Tampa Bay Seawater Desalination Plant Expansion and Optimization was given a lower score (of 3.0) than the two surface water treatment capacity expansion alternatives because it would involve some challenging regulatory aspects related to the existing NPDES permit and potential need for additional permits related to the seawater supply and concentrate discharge system improvements required for facility expansion. Additional permitting and coordination efforts with TECO would also be anticipated as part of this alternative but are considered permittable and consistent with existing regulations.

7.2 Environmental Sustainability

The Existing Regional Surface WTP Capacity Expansion and Tampa Bay Seawater Desalination Plant Expansion and Optimization were given a favorable score of 4.0 for the Environmental Sustainability criterion as described in the Sustainability Assessment Technical Memorandum included with the Tampa Bay Water 2018 LTMWP update. The Existing Regional Surface WTP Capacity Expansion has a low carbon footprint and minimal land development impacts since it would be completed at an existing developed site. However, the Existing Regional Surface WTP Capacity Expansion involves the use of a freshwater source and has medium energy use, which prevents it from being scored higher under this sub-criterion.

The Tampa Bay Seawater Desalination Plant Expansion and Optimization does not require a freshwater source, however, it involves high energy consumption for treatment and generates a brine concentrate discharge as part of the treatment process, which prevent it from being scored higher under the environmental sustainability sub-criterion.

The New Surface WTP was determined to have a slightly lower score (of 3.0) compared to the alternatives that involve expanding existing treatment facilities because of the land development impacts associated with the new treatment facility and transmission pipeline.

7.3 Public Reception

The Existing Regional Surface WTP Capacity Expansion was scored 5.0 as it is anticipated to be considered a favorable alternative by the majority of the public with limited opposition. According to a previous 2018 statistically valid public opinion survey, approximately 79% of respondents were willing to drink treated water from this surface water supply source. This configuration is expected to have little to no public challenges because it does not involve an increase to the existing water withdrawal permits and the construction activities are limited to an existing facility site.

The New Surface WTP received a score of 3.0 since it is anticipated to have neutral public reception. Public interest and outreach efforts are anticipated to be much higher compared to the Existing Regional Surface WTP Capacity Expansion, since this alternative would require specific outreach to property owners in the vicinity of the proposed new facility and the pipeline route. However, the history of similar projects in the region suggests that public acceptance can be obtained for this alternative.

The Tampa Bay Seawater Desalination Plant Expansion and Optimization was also scored 3.0 as it is anticipated to have neutral public reception. According to a previous 2018 survey, approximately 75% respondents were willing to drink treated water from this seawater supply source. However, this alternative would require specific outreach efforts to environmental groups due to location on the bay and the associated concentrate discharge requirements related to the treatment process.

7.4 Life Cycle Cost

Opinion of probable construction costs and annual operation and maintenance costs were developed for each configuration in their respective feasibility studies. Using an assumed loan term of 30 years, an interest rate of 4%, and the additional yield provided by each configuration, these cost estimates were translated to a life cycle cost per unit of water (i.e., cost per 1,000 gallons). For this sub criteria, the scoring was based on the following:

- 5 < $2.00 per 1,000 gallon
- 4 $2.00 - $2.99 per 1,000 gallon
- 3 $3.00 to $4.99 per 1,000 gallon
- 2 $5.00 to $9.99 per 1,000 gallon
- 1 $10.00 and above per 1,000 gallon

The Existing Regional Surface WTP Capacity Expansion was given a favorable score of 4.0 with an estimated cost of $2.46 per 1,000 gallons, while the New Surface WTP had a slightly lower score of 3.0 with an estimated cost of $3.58/1,000 gallons, and the Tampa Bay Seawater Desalination Plant Expansion and Optimization had a less favorable score of 2.0 with an estimated cost of $8.56 per 1,000 gallons.

7.5 Ability to Phase

This sub-criterion evaluates the ability for future phases to be implemented. The New Surface WTP received a score of 4.0 since it includes a site that would easily accommodate future treatment capacity expansions. The new pipeline proposed as part of this project would likely be oversized to accommodate for future expansion, and the construction is not anticipated to require any significant facility/ system shutdowns.

The Existing Regional Surface WTP Capacity Expansion received a lower score of 2.0 for this sub-criterion given that the opportunity for additional future treatment capacity expansion at this site is less attractive as existing site spacing becomes more limited. Some partial and full facility shutdowns would also be required since this alternative involves for construction activities at an existing treatment facility.

The Tampa Bay Seawater Desalination Plant Expansion and Optimization also received a lower score of 2.0 for this sub-criterion due to significant limitations in available site space, which would make it difficult to accommodate any additional future expansions. Due to the limited site space, the construction activities for this alternative are also anticipated to require a full facility shutdown for an extended period of time.

7.6 Cost Risk Factors

The Existing Regional Surface WTP Capacity Expansion received a favorable score of 4.0 for the cost risk factors sub-criterion based on the consideration that Tampa Bay Water has experience with a previous expansion of this facility and operations and maintenance of the treatment processes being added or expanded. A higher score was not given based on the understanding that this alternative will involve some constructability challenges and coordination requirements since the improvements involve work at an active water treatment facility that must remain in service throughout the construction of the improvements.

The New Surface WTP alternative received a slightly lower score of 3.0 since the new facility and pipeline have some risks associated with property and easement requirements for the new pipeline that would be constructed to connect the new facility to the regional transmission system. There are also some cost risks associated with operations and maintenance staffing for the new facility, which could involve procuring a contract operator for these services.

The Tampa Bay Seawater Desalination Plant Expansion and Optimization received a lower score of 2.0 based on the history of reliability issues and greater maintenance requirements with the infrastructure systems due to the highly corrosive nature of seawater and the coastal location, along with coordination risks associated with co-location of the Desalination Plant facility and systems with the TECO Big Bend Power Plant.

7.7 Source Water Supply Resilience

The Tampa Bay Seawater Desalination Plant Expansion and Optimization was given a score of 3.0 for the source water supply resilience sub-criterion. Since seawater supply is considered a drought-proof source, this contributes to this alternative scoring high in this category; however, the desalination plant’s dependence on TECO operating its cooling water tunnels at the Big Bend Power Plant to allow for the seawater supply withdrawal (and concentrate discharge system) create some reliability issues with this alternative. The potential for significant algal (red tide) events in Tampa Bay can also temporarily reduce the capacity of the facility during these events.

The Existing Regional Surface WTP Capacity Expansion received a score of 2.0 for source water supply resiliency because the surface water supply system is susceptible to long-term drought conditions. The Existing Regional Surface WTP Capacity Expansion would also result in a more significant portion of the overall region's water supply being tied to a single treatment facility, which would have a greater impact to the overall regional system supply capacity if this single facility is temporarily out of service.

The New Surface WTP was given a slightly higher score of 3.0 compared to the Existing Regional Surface WTP Capacity Expansion since a new water treatment facility in the proposed South Hillsborough location (versus expanding the existing Regional Surface WTP) would provide some additional resilience to the supply available from the Enhanced Surface Water System by concentrating more capacity at a single treatment facility/location. Similar to the alternative of the Existing Regional Surface WTP Capacity Expansion, the source water reliability for a New Surface WTP would still be susceptible to long-term drought conditions.

7.8 Climate/ Coastal Hazards Vulnerability Index

In this evaluation, vulnerability is defined by a configuration's sensitivity and resilience to extreme or unplanned conditions based on evaluations described in the 2018 Vulnerability Assessment Technical Memorandum that was included with the Tampa Bay Water 2018 LTMWP update.

The Existing Regional Surface WTP Capacity Expansion was given the most favorable score of 5.0 since the supply sources and treatment facilities are located inland with minimal vulnerabilities to coastal hazards.

The Tampa Bay Seawater Desalination Plant Expansion and Optimization was given the lowest score of 1.0 since the facility is located in an area with very high vulnerability to coastal hazards and does not include features that would protect it from catastrophic damage from a severe storm surge event in the area. There is also limited ability to harden the existing facility (as part of an expansion project) to become less vulnerable to coastal hazards.

The New Surface WTP alternative was not evaluated in the 2018 Vulnerability Assessment, but it was determined that the same score of 5.0 applied to both the Existing Regional Surface WTP Capacity Expansion and the New Surface WTP since both are located inland with minimal vulnerabilities to coastal hazards.

7.9 Regional System Operational Impacts

The New Surface WTP was scored a 4.0 for this criterion, which is higher than the score for the other two alternatives. This higher score was based on the considerations that this alternative would add an additional location where treated water supply connects into the Regional Transmission System. It also provides an additional water supply delivery system for the proposed new Hillsborough County POC, which can enhance the reliability of the water supply delivery to this POC.

The Existing Regional Surface WTP Capacity Expansion was given a score of 3.0 since the facility is already integrated into the regional system and provides water supply capacity to multiple Member Government Points of Connection (POCs). An expansion of this facility is generally consistent with the concept of adding capacity in a location where population growth and increased water demands are occurring. This alternative is also considered to have some synergies with the proposed addition of a new South Hillsborough Pipeline that will be constructed to allow Tampa Bay Water to supply water from the Regional Facilities Site down to a new South Hillsborough County POC. One drawback of the Existing Regional Surface WTP Capacity Expansion is that it will result in a larger portion of the total regional system water supply capacity being tied to a single facility, which can make regional system operations more challenging under scenarios that involve a temporary planned or unplanned shutdown of the existing Regional Surface WTP.

The Tampa Bay Seawater Desalination Plant Expansion and Optimization was also given the same score as the Existing Regional Surface WTP Capacity Expansion alternative (of 3.0) for similar reasons as described above.

7.10 Contractual Requirements

The Existing Regional Surface WTP Capacity Expansion and the New Surface WTP were given the highest score of 5.0 for this sub-criterion since both involve the use of existing permitted water supply sources and neither is anticipated to require additional agreements with other entities. A New Surface WTP connected to the existing Regional System would align with the terms of existing governance documents and agreements. An additional facility contract operations agreement may be needed if a contract operator is proposed for the New Surface WTP alternative.

The Tampa Bay Seawater Desalination Plant Expansion and Optimization was given a less favorable score of 3.0 since the seawater supply and concentrate discharge systems associated with the Desalination Plant would require coordination and reliance on TECO’s operation of its cooling water tunnels. TECO has recently been making significant changes to its cooling water tunnels, which have resulted in some impacts to the capacity and reliability of the Desalination Plant’s existing seawater supply and concentrate discharge systems.

8.0 Scoring Results

The final three configuration alternatives were scored for each sub-criterion and ranked based on total weighted score as summarized in **Table 8-1**. A score of 1 to 5 was assigned to each sub-criteria, with 1 being the lowest or least favorable score, and 5 being the highest possible score for the most favorable alternative with regards to the sub-criteria being considered.

Table 8-1 Scores for Individual Criteria

Criteria	Existing Regional Surface WTP Capacity Expansion	New Surface WTP	Tampa Bay Seawater Desalination Plant Expansion and Optimization
Environmental Stewardship			
Ease of Permitting	5	4	3
Environmental Sustainability Index	4	3	4
Public Reception	5	3	3
Cost			
Life Cycle Cost	4	3	2
Ability to Phase	2	4	1
Cost Risk Factors	4	3	2
Reliability			
Source Water Supply Resilience	2	3	3
Climate / Costal Hazards Vulnerability Index	5	5	1
Regional System Operational Impacts	3	4	3
Contractual Requirements	5	5	3
Total Weighted Score	**81**	**72**	**52**

Based on the process followed and described throughout this report, the configuration alternatives were ranked as follows:

1. Existing Regional Surface WTP Capacity Expansion – Total score = 81
2. New Surface WTP – Total score = 72
3. Tampa Bay Seawater Desalination Plant Expansion and Optimization – Total score = 52

Figure 8-1 illustrates the breakdown of the evaluation and ranking results.

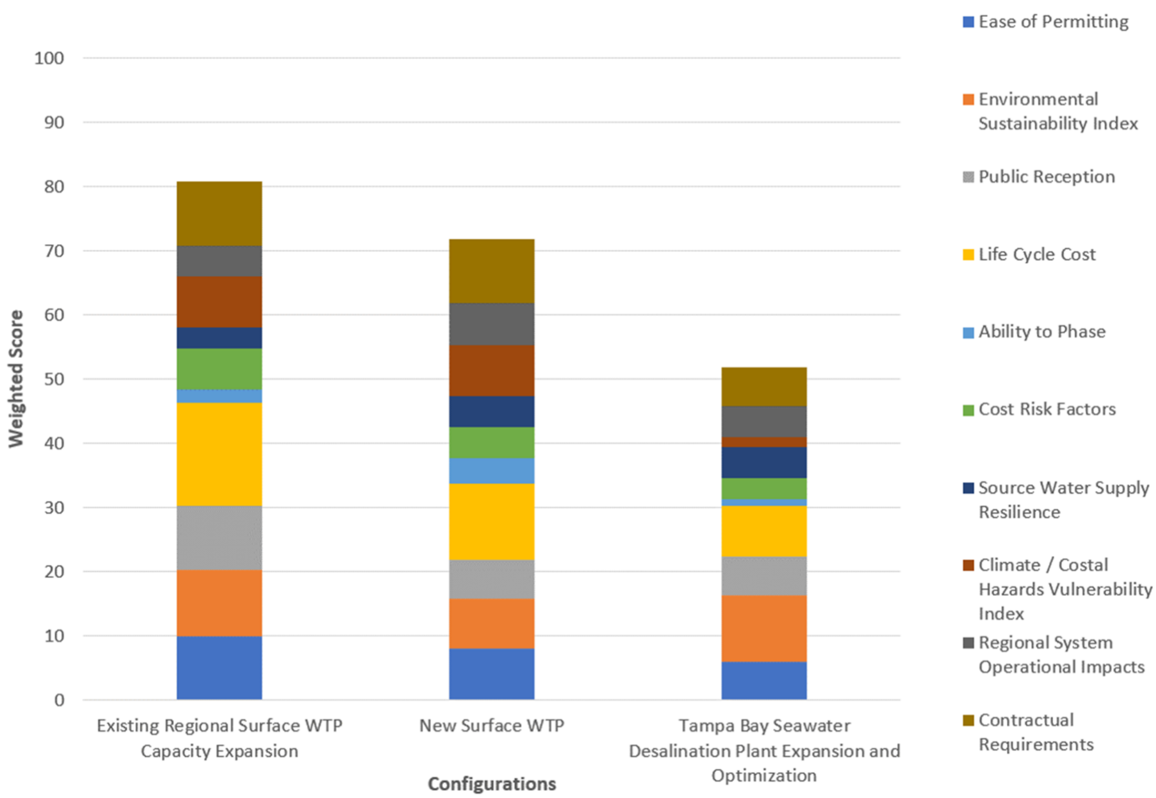

Figure 8-1 Scoring Results for Top Ranked Configurations

9.0 Conclusions and Next Steps

The results of the new water supply alternatives selection process described in this report indicate that the Existing Surface Water Treatment Plant (WTP) Capacity Expansion is the top-ranked alternative for implementation by year 2028 to allow Tampa Bay Water to continue meeting the growing water needs in the region. The Existing Surface WTP Capacity Expansion had the highest overall score (81) compared to the other short-listed alternatives considered, which are a New Surface WTP (with a score of 72) and the Tampa Bay Seawater Desalination Plant Expansion and Optimization (with a score of 52). The Existing Surface WTP Capacity Expansion alternative had higher scores than the New Surface WTP and Tampa Bay Seawater Desalination Plant Expansion and Optimization alternatives in two of the three primary selection criteria: Environmental Stewardship and Cost; and had the second highest score for the Reliability criteria.

Representatives from Tampa Bay Water's six Member Governments and the Tampa Bay Water Board of Directors were provided with updates and a forum to provide comments and questions throughout the new water supply alternatives selection process. These included the following meetings and presentations for Member Government representatives and the Tampa Bay Water Board Members:

- March 2022 – Kickoff Meeting/Presentations on the Water Supply Alternatives Selection Process
- May 2022 – Presentations on the Water Supply Configuration Alternatives Development
- June 2022 - Presentations on Draft Results of Water Supply Alternatives Selection Process

At the August 2022 Tampa Bay Water Board Meeting, Tampa Bay Water staff recommended the Existing Surface WTP Capacity Expansion as the next water supply alternative to meet future water demands. The Tampa Bay Water Board approved the plan to proceed with moving forward with the plans for implementing the Existing Surface WTP Capacity Expansion Project, which is estimated to increase the Tampa Bay Water annual average water supply capacity/yield by 10 to 12.5 million gallons per (MGD) based on median year conditions.

9.1 Next Steps

The following next steps are recommended for Tampa Bay Water to move forward with the implementation process for the Tampa Bay Regional Surface Water Treatment Plant Capacity Expansion Project:

1. Define the proposed project delivery method and implementation plans
2. Further define the details of the proposed scope of work that will be included in the project, such as the potential inclusion of specific process area improvements that may enhance the reliability and resiliency of the facility.
3. Develop a preliminary project implementation schedule including engineer and contractor procurement process, design, permitting, construction and commissioning phases.
4. Develop updated budgetary cost estimate for the project including: escalating costs to account for inflation to the current market conditions and through the estimated mid-point of construction; consideration of additional costs associated with any updates to the project scope of work and proposed delivery method; and addition of an Owner's Allowance budget.

Appendix F. Universe of Options Technical Memorandum

FINAL

UNIVERSE OF OPTIONS TECHNICAL MEMORANDUM

2023 Long-Term Master Water Plan

TAMPA BAY WATER PROJECT NO. 09016
BV PROJECT NO. 413437
BV FILE: TASK 4

PREPARED FOR

TAMPA BAY WATER
Supplying Water To The Region

Tampa Bay Water

6 JANUARY 2023

BLACK & VEATCH

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Agency	Tampa Bay Water
AOP	Advanced Oxidation Process
AR	Aquifer Recharge
ASR	Aquifer Storage and Recovery
AWTP	Advanced Wastewater Treatment Plant
BAF	Biologically Active Filtration
DAF	Dissolved Air Flotation
DPR	Direct Potable Reuse
ELA	Engineering, Legal, and Administrative
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
GAC	Granular Activated Carbon
Interlocal Agreement	Amended and Restated Interlocal Agreement
gpd	Gallons per Day
IPR	Indirect Potable Reuse
JEA	Jacksonville Electric Authority
LTMWP	Long-term Master Water Plan
MAR	Managed Aquifer Recharge
Member Governments	Hillsborough, Pasco and Pinellas counties & cities of New Port Richey, St. Petersburg, and Tampa
MF	Microfiltration
mgd	Million Gallons per Day
mg/L	Milligrams per Liter
O&M	Operations and Maintenance
OH&P	Overhead and Profit
PAR	Public Access Reuse
RDP	Resource Development Plan
RO	Reverse Osmosis
SHARP	South Hillsborough Aquifer Recovery Program
SIX®	Suspended Ion Exchange

SWFWMD	Southwest Florida Water Management District
SWTP	Surface Water Treatment Plant
TDS	Total Dissolved Solids
TECO	Tampa Electric Company
TM	Technical Memorandum
TOC	Total Organic Carbon
TOX	Total Organic Halogen
UF	Ultrafiltration
USDW	Underground Source of Drinking Water
UV	Ultraviolet Light Disinfection
UV/AOP	Ultraviolet Light Disinfection and Advanced Oxidation
WRF	Water Reclamation Facility
WWTP	Wastewater Treatment Plant

1.0 Introduction and Background

Tampa Bay Water (Agency) is a regional water supply authority created in 1998 to supply wholesale drinking water to its six-member governments: Hillsborough, Pasco and Pinellas counties and the cities of New Port Richey, St. Petersburg, and Tampa. Tampa Bay Water's Long-term Master Water Plan (LTMWP) documents how Tampa Bay Water meets its unequivocal obligation to provide quality water to the member governments now and in the long-term future. The 1998 Amended and Restated Interlocal Agreement (referred to as the Interlocal Agreement) requires the LTMWP be updated every five years. Thus, the LTMWP ensures that the Agency prepares for the provision of adequate supplies over a 20-year planning horizon.

The objectives of the LTMWP are to meet the requirements set forth in Section 2.09 of the Interlocal Agreement, which include:

- Identification of current customers, projects, and future customers;
- Review and general inventory of all existing Agency water supply facilities;
- Identification of a capital improvement program for the Agency;
- Review of all current Tampa Bay Water environmental permits, existing regulations and projected regulations;
- Identification of all proposed new water supply facilities;
- Evaluation of Agency staffing;
- Hydraulic analysis of the Agency's water supply facilities, both existing and proposed;
- Evaluation of present and future sources of water and treatment requirements for those sources in terms of capacity, reliability, and economy; and
- Update of the list of proposed water supply facilities required to meet the anticipated quality water needs of the member governments for the next 20 years.

This technical memorandum (TM) focuses on meeting the last objective bullet, Update of the list of proposed water supply facilities required to meet the anticipated quality water needs of the member governments for the next 20 years. A methodical process of water supply option identification, evaluation and screening has been proposed to meet the Interlocal Agreement objective as illustrated in **Figure 1**. Specifically, this TM summarizes the preparation and contents of the Universe of Options which begins the water supply shortlist process. Preliminary treatment and cost assumptions are also identified in this TM, since they will be considered during the coarse screening next step.

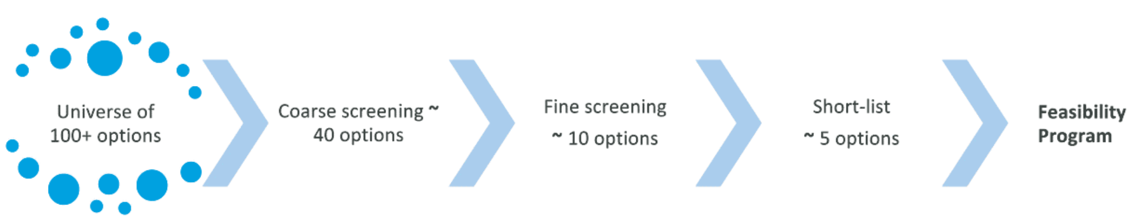

Figure 1 Water Supply Options Shortlist Process

2.0 Water Supply Source Definitions

The following terminology, abbreviations and descriptions will be used for the different types of water sources and uses described herein.

- Seawater – saltwater from the Gulf of Mexico, Tampa Bay, or tributaries.
- Fresh Surface Water – fresh surface water diverted from a river, lake or canal and typically stored in a reservoir.
- Fresh Groundwater – fresh groundwater (water with a total dissolved salts/solids concentration less than 500 mg/L) from the Upper Floridan.
- Brackish Groundwater – brackish groundwater (water with a total dissolved salts/solids concentration of 500 to 10,000 mg/L) from the Avon Park Permeable zone (when present) or the Lower Floridan aquifers.
- Reclaimed Water – treated wastewater effluent that has received at least secondary treatment and basic disinfection and is used for beneficial purposes water flowing out of a domestic wastewater treatment facility. Examples of beneficial purposes are identified in more detail below:
  - Direct Potable Reuse (DPR) – reclaimed water treated by advanced treatment technologies so that it can be used to directly augment a water supply either at the influent to a water treatment plant or directly into the distribution system.
  - Indirect Potable Reuse (IPR)/Aquifer Recharge (AR) – reclaimed water that is used to recharge an aquifer where the water intermixes with the groundwater that supplies wellfields.
  - IPR/Surface Water Augmentation – reclaimed water used to augment the supply in surface waters that undergo treatment before being used as a potable water supply, including augmentation of reservoirs.
  - Water Supply Withdrawal Credits – various uses of reclaimed water that do not result in consumption of the water but provide benefits, such as mitigating impacts, so that additional water supply (referred to as credits) can be allocated at wellfields. There are several options that could allow for the allocation of credits:
    - Salinity Barrier/Aquifer Recharge – reclaimed water used to recharge an aquifer to provide a barrier to intrusion of salt water into freshwater supplies. This is different from IPR/AR in that the water is not injected into nor is it intended to migrate to an underground source of drinking water used to supply wellfields. Credits can be obtained to allow for additional wellfield withdrawals based on the mitigation of this impact.
    - Downstream Surface Water Augmentation – Surface water supplies can be limited due to potential downstream impacts from reduced flows and levels. Credits for additional surface water withdrawals can be obtained if reclaimed water is discharged downstream of the water supply intake to mitigate these impacts.
    - Wetlands Rehydration – For wellfields that are limited in withdrawal capacity due to potential impacts to wetlands, the potential impacts can be mitigated by applying reclaimed water to groundwater near or directly to the impacted wetlands. This can allow for increased withdrawals (credits) from the nearby wellfields.

    - Agricultural Well Replacement - Taking agricultural irrigation wells out of service by providing reclaimed water for irrigation can free up groundwater for Agency use. The location of the agricultural site in relation to a wellfield will determine the credits.

  - The use of reclaimed water and stormwater as non-potable supply for irrigation and other urban uses such as augmenting decorative fountains, car washing, air conditioner cooling, or washdown water, referred to as public access reuse (PAR), is not considered herein as a regional water supply; however, this use is a viable means to manage water demands and has been implemented by many of the member governments. PAR typically has varying seasonal demands that can impact the availability of reclaimed water for other uses. Excess reclaimed water is available during wet/low demand seasons, with very little available during the dry/high demand seasons.

- Seasonal storage can be provided via reservoirs and through aquifer storage and recovery (ASR). These storage options do not create new supply and are tools to manage the availability of the various sources of water. ASR involves the injection of water (groundwater, surface water or reclaimed water) into the aquifer for storage and later withdrawal and recovery from the same well for use.

3.0 Universe of Options Summary

The Universe of Options contains general information that provides an overview of what each option entails as well as any pertinent information from previous LTMWP considerations.

3.1 Creation of the Universe of Options

The Universe of Options was created as an inventory database to encompass all potential project concepts that have been considered in previous LTMWPs as well as concepts recently suggested by the Member Governments, Tampa Bay Water staff, and the public. The referenced master plans and reports include the following:

- 1996 Resource Development Plan (RDP)
- 2001 Long Term Water Supply Planning, 2002 Short List
- 2003 Developmental Study
- 2008 Long-term Water Supply Plan
- 2008 Project Concept Shortlist Process – Ranking and Criteria
- 2013 Long-term Master Water Plan
- 2018 Long-term Master Water Plan

Ideas from Member Governments, the Southwest Florida Water Management District (SWFWMD, District), and Tampa Bay Water staff were solicited during individual meetings with each entity. Entities were asked to provide input on any existing projects of which they may be aware and to present new concepts or ideas for incorporation into the database. Concepts not already captured within the Universe of Options were then added.

The database was then populated with information regarding the project description, evaluation summary, source type, concept development history and feasibility issues. The database was further developed by providing information on project location and relevant city/county.

3.2 Pre-Coarse Screening Reduction

A total of 347 options were initially included within the Universe of Options database. Of those options, 159 projects were characterized as public access reuse concepts rather than water supply options and were dismissed as water supply options as part of a preliminary screening.

A total of 188 options remained and out of those options, 67 options were deemed impractical based on the criteria of location and availability of the proposed water supply. Projects that were located outside the tri-county area of Hillsborough, Pasco and Pinellas counties were removed as potential water supply projects since local equivalent concepts were considered more feasible for implementation. Continuing availability of the water supply was also evaluated, since many of the projects identified in the earlier master plans have been implemented or are no longer available due to source degradation, the attainment of withdrawal limits or regulatory changes. The 121 remaining, feasible water supply concepts are those that will be presented in the subsequent sections.

3.3 Universe of Options Database Contents

The 121 remaining viable water supply projects are spatially shown in **Figure 2**. The colors on the map denote the various water source types. The projects shown on the map in the Gulf of Mexico are considered regional concepts and do not yet have a specific location assigned. The following sections summarize the options by water source type.

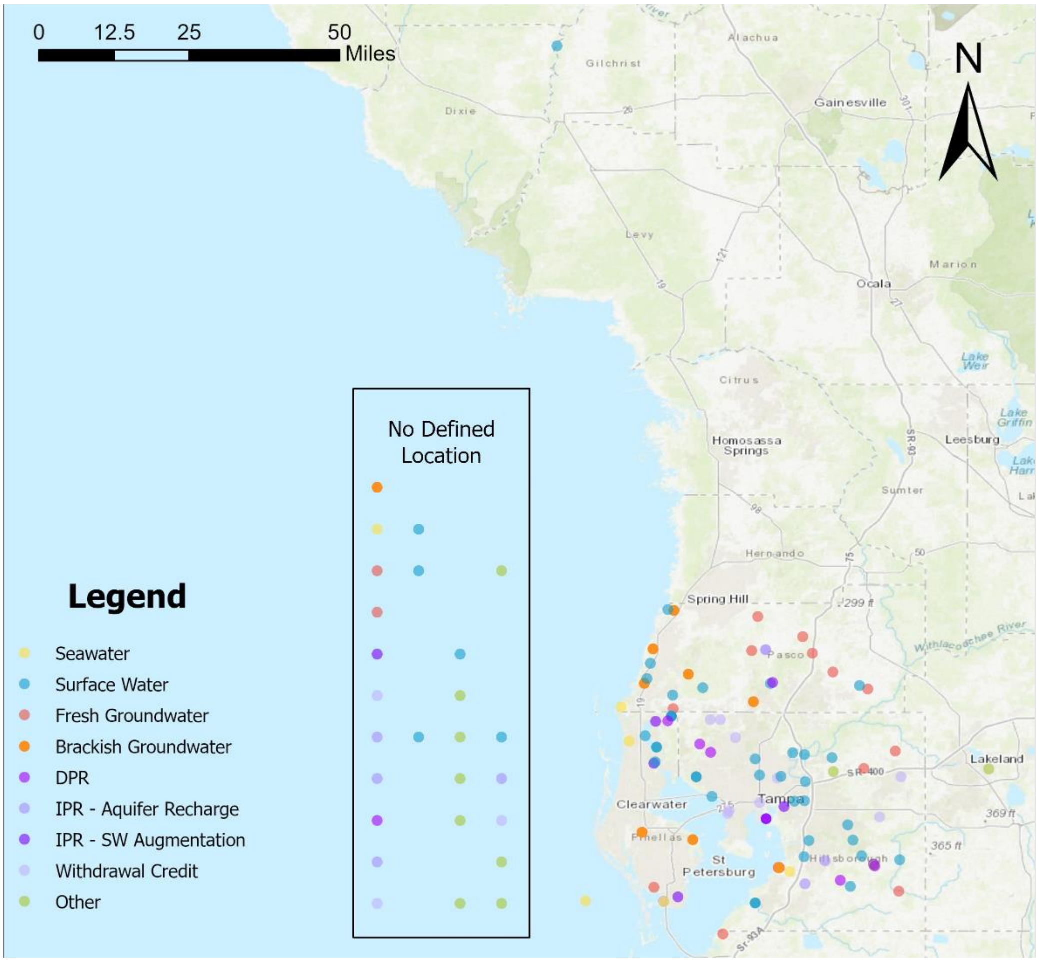

Figure 2 **Universe of Options Summary Map**

3.3.1 Seawater Desalination

Within the database, there are seven seawater desalination water supply projects including constructing new desalination plants, seawater distillation, and expanding the existing desalination facility. Two notable concepts include the Tampa Bay Desalination Plant expansion and Gulf Coast Desalination Plant projects.

The Tampa Bay Desalination Plant is currently co-located with the Tampa Electric Company's (TECO's) Big Bend Power Station and uses TECO's cooling water as a seawater source as well as to dilute desalination concentrate before release into the bay. The proposed expansion project would allow for 10 million gallons per day (mgd) of additional yield and includes the following upgrades: seawater supply system capacity expansion, complete replacement of the pretreatment processes with dissolved air flotation (DAF) and membrane filtration units with increased capacity, expansion of the reverse osmosis units, post-treatment, and residuals management process, and increased transfer pumping for distribution. This project was shortlisted in the 2018 LTMWP, but was not selected for construction and therefore is being reconsidered in the 2023 LTMWP.

Previous studies describe the Gulf Coast Desalination Plant to be designed as a second reverse osmosis desalination plant rated at 25 mgd and co-located with the Anclote Power Plant owned by Duke Energy. As with the Tampa Bay Desalination Plant, the co-location would allow for power and dilution water from the power plant to the proposed desalination plant. The plant would be designed to intake raw water from the Anclote Power Plant cooling water canal and feed it through treatment, finished water delivery, and residuals management. The finished water would ultimately be delivered to the Pinellas County regional point of connection near the Keller Water Treatment Plant.

A suggestion of building a desalination plant at the old Albert Whitted Water Reclamation Facility (WRF) was recently provided by one of the Member Governments. If the option is shortlisted, the design of the plant would likely follow that of the current Tampa Bay Desalination Plant and be rated for 20 to 30 mgd.

3.3.2 Fresh Surface Water

The Universe of Options database includes 39 fresh surface water projects that propose the utilization of rivers, lakes, creeks, springs, and stormwater as water sources. The fresh surface water projects consider a plethora of options including the Alafia River Expansion and Tampa Bay Water's Enhanced Surface Water System Phase C concepts.

The Alafia Expansion concept includes the increase of allowable withdrawals from the river at the existing intake and pump station, which could result in an additional annual average of 10 mgd. The project has a potential of three different configurations.

- The first configuration includes an expansion to the existing pump station, a new surface water treatment facility located adjacent to the C.W. Bill Young Regional Reservoir, and finished water delivery to the Lithia Point of Connection and/or the Regional System.
- The second configuration includes an expansion of the existing pump station, a new reservoir located adjacent to the existing reservoir, a new surface water treatment plant located in south Hillsborough County, and finished water delivery to the Lithia Point of Connection and/or the Regional System.
- The third configuration includes an expansion to the existing pump station, a new reservoir located adjacent to and interconnected with the existing reservoir, and a new surface water treatment plant located in south Hillsborough County with finished water pumped to a new Tampa Bay Water point of connection in north-central Hillsborough County.

The Enhanced Surface Water System: Enhancement Phase C is another freshwater concept that would be the second, and last, installment of the Enhanced Surface Water System project. Phases A and B, which included higher flow permit modifications for the Hillsborough River and the Tampa Bypass Canal, were previously selected for implementation. Phase C will continue this work by implementing a higher flow permit modification for the Alafia River paired with a new reservoir to account for wet weather flows from the river.

A suggestion of building another reservoir to store available surface water was provided by one of Tampa Bay Water's Board Members with one of the Member Governments suggesting siting a new reservoir near the Keller Water Treatment Plant. Therefore, an additional reservoir is to be considered as a separate, stand-alone project in the Universe of Options.

3.3.3 Fresh Groundwater

There are 14 fresh groundwater water supply options that include constructing new wells and utilizing existing wellfields as options, specifically including the Thonotosassa Wells and Cypress Bridge II concepts.

The Thonotosassa Wells project would consist of constructing new groundwater wells in the Thonotosassa area as well as an adjacent chloramination facility, finished water storage tank, and high service pump station. A new transmission line would deliver the treated groundwater directly into the existing North-Central Hillsborough Intertie with Hillsborough County to add an additional 10 mgd to the regional system. If the option surpasses the coarse screening process, water quality and pressure data will be gathered and evaluated for the general wellfield location through the fine screening process.

The Cypress Bridge II project is designed to increase water supply into Tampa Bay Water's regional water supply system through the construction of four dispersed production wells and a new transmission line in south-central Pasco County. Each newly constructed well is anticipated to have a capacity of 1 to 2 mgd therefore producing an additional 4 to 8 mgd of water supply to the region. The groundwater pumped from the wells is then chemically treated within the Cypress Bridge pipeline at the Lake Bridge Water Treatment Plant. If the option surpasses the coarse screening process, water quality data will be gathered and evaluated for the project location through the fine screening process.

Pasco County expressed concern with implementing more groundwater withdrawal due to the County's hydrogeology history. There are concerns with impacting the recovery progress already achieved. Fresh groundwater projects shortlisted and considered for implementation in Pasco County will be evaluated to determine any potential impacts to the hydrogeology in the area through modeling and site evaluation efforts.

3.3.4 Brackish Groundwater

There are eight brackish groundwater projects in the Universe of Options including Rock Mine Lake and Small Footprint Reverse Osmosis Plant concepts.

Rock Mine Lake is located near Belcher Mines Park in Pasco County, adjacent to an existing linear wellfield. The option is designed to withdraw water from the adjacent wellfield and treat it at a desalination plant to provide Pasco County with additional potable water supply. The project would require a new pipeline to an existing point of connection with the regional system or a new point of connection with Pasco County. The project would be expected to provide an additional 7.2 mgd of water supply to the area.

The Small Footprint Reverse Osmosis Plant project is an option that can be configured for implementation in Pasco County, Pinellas County, the City of St. Petersburg, or the City of New Port Richey. The concept would include constructing a new reverse osmosis plant, with a capacity of approximately 5 mgd, that would treat brackish groundwater withdrawn from the wells in the project implementation area.

A suggestion of building a new brackish groundwater wellfield using the Lower Floridan aquifer in Pasco or Pinellas counties was also provided by two of the Member Governments.

3.3.5 Direct Potable Reuse

There are currently eight direct potable reuse (DPR) water supply options in the database to be considered including reclaimed water from the South Hillsborough County Reclaimed Water System, building a new pipeline from the City of Tampa's Howard F. Curren Advanced Wastewater Treatment Plant (AWTP) and designing a Pinellas County WTP DPR configuration.

The South Hillsborough County Reclaimed Water System is in close proximity to three Tampa Bay Water facilities where a DPR facility could be co-located: Tampa Bay Seawater Desalination Plant, Tampa Bay Regional Surface Water Treatment Plant, and the C.W. Bill Young Regional Reservoir. Additionally, the County is building a new South County One Water Advanced Wastewater Treatment Facility near the reservoir. Preliminary discussions included 5 to 15 mgd of supply available in 2026.

The City of Tampa has requested the evaluation of using 20 mgd from the Howard F. Curren AWTP for DPR. The Curren AWTP is near the Regional Surface Water Treatment Plant, which may make transmission of the reclaimed water more feasible. The City of Tampa also expressed interest in the use of the 20 mgd of reclaimed water from the Curren AWTP for IPR implementations as well.

A Pinellas County DPR is included as well, which entails building a reclaimed water reservoir near the Keller Water Treatment Plant to store reclaimed water during the wet season to support potable reuse projects in the area.

3.3.6 Indirect Potable Reuse

The Universe of Options database includes 20 IPR projects which are separated into seven IPR surface water augmentation projects and 13 IPR aquifer recharge projects. The surface water augmentation projects contain concepts such as lake, river, canal, and reservoir augmentations, including augmenting Lake Maggiore with reclaimed water. The aquifer recharge projects contain groundwater injection and wellfield rehydration concepts, including the South Hillsborough Potable Reuse Wellfield aquifer recharge with reclaimed water concept.

Lake Maggiore is located near Boyd Hill Park in the City of St. Petersburg. The option would include augmenting the lake with reclaimed water as well as constructing a new surface water treatment plant at the Albert Whitted Water Reclamation Facility. The concept would augment natural stormwater flow into the lake to provide Lake Maggiore with a stable water supply source and elevation. After augmentation with advanced treated water from City of St. Petersburg wastewater facilities, the lake water would then be withdrawn and pumped to a new surface water treatment plant constructed at the Albert Whitted Water Reclamation Facility. Ultimately, the project concept would increase water quality in Lake Maggiore, mitigate flooding near the lake by collecting stormwater, and potentially provide a salinity barrier for the lake while increasing water supply by an estimated 5 mgd.

The South Hillsborough Potable Reuse Wellfield via aquifer recharge with reclaimed water concept would include constructing a new groundwater wellfield in the Balm/Riverview area. The aquifer recharge wells would be recharged with 20 mgd of reclaimed water via a transmission system from the H. F. Curren AWTP or Hillsborough County's reclaimed system. The recharge would ultimately provide an estimated groundwater withdrawal yield of 8.85 mgd annually.

Four Member Governments suggested recharging Tampa Bay Water's existing groundwater wellfields using indirect potable reuse.

3.3.7 Withdrawal Credits

Thirteen projects in the database are identified as withdrawal credit options and include concepts such as wetland augmentation, salinity barriers, and aquifer recharge, notably Downstream Augmentation of the Hillsborough River, Section 21 Wellfield Rehydration, and the South Hillsborough Wellfield via South Hillsborough Aquifer Recharge Project (SHARP) Credits projects.

Downstream Augmentation of the Hillsborough River would include utilizing reclaimed water from the City of Tampa's H. F. Curren Advanced Water Treatment Plant to augment the flow in the Hillsborough River downstream of the Tampa Dam. The design would also include a one-to-one upstream withdrawal from the river therefore categorizing it as a withdrawal credit option. The project was shortlisted in 2004 with conceptual support from both the City of Tampa and the District with the understanding that minimum flows on the river would be met which will continue to hold true if selected for implementation in the 2023 LTMWP. A similar approach could also be considered for implementation at the Alafia River.

The Section 21 Wellfield, located on City of St. Petersburg property in northwest Hillsborough County, is owned by Tampa Bay Water and regulated by SWFWMD. The project concept entails restoring the wetlands at the Section 21 Wellfield with reclaimed water to allow for increased groundwater withdrawals from the existing wells.

The South Hillsborough Wellfield (via SHARP Credits) project was shortlisted in the 2018 LTMWP, but it was not selected for construction. The project is to be reconsidered for implementation in the 2023 LTMWP. Hillsborough County currently operates recharge wells along the eastern shore of Tampa Bay, where it injects reclaimed water via SHARP. SHARP generates a net benefit to the aquifer, such that groundwater withdrawal credits could be purchased to enable increased groundwater pumping. The project would increase water supply by 7.5 mgd on the assumption that 10 mgd of reclaimed water is available for aquifer recharge. Finished water would then be delivered to Hillsborough County via a new point of connection near a new proposed groundwater treatment facility.

3.3.8 Miscellaneous "Other" Options

There are currently 12 "Other" projects in the database. The "Other" source type is defined as projects that do not easily fit into any of the seven categories identified. Examples of "Other" projects include interconnects with other regional water authorities and deep tunnel storage. Many of these options are attributed to customer or public input.

Interconnects with other regional water supply authorities is a concept included in the Universe of Options. Although the concept would require significant coordination with other entities in the area, it has the potential to increase water supply reliability for multiple parties. The SWFWMD suggested including an interconnection with Manatee County / Peace River Manasota Regional Water Supply Authority.

Deep tunnel storage requires constructing storage reservoirs or tunnels underground instead of at the surface. For successful implementation, the concept must be associated with a specific water source for a more defined water supply option.

4.0 Preliminary Assumptions for Treatment and Infrastructure Requirements

Preliminary treatment and infrastructure assumptions for coarse screening of the Universe of Options have been developed. These assumptions will be consistent for each water supply source and will establish the general water supply and treatment system considerations and transmission infrastructure requirements to be included for each water supply option.

4.1 Treatment and Infrastructure Requirements

For the purpose of coarse screening, the types of treatment required for each of the supply source options are based primarily on regulatory and contract (Exhibit D) requirements, and the Regional Water Quality Study (Phase 2) recommendation to achieve 2.0 mg/L total organic carbon (TOC)by the mid-2030's. The alternatives for drinking water supply do not expressly consider treatment systems to address potential contaminants of emerging concern (CECs) that may be present in water source supplies. For example, the US EPA has established lifetime health advisories (LHAs) for per- and polyfluoroalkyl substances (PFAS) compounds and is expected to propose MCLs for certain PFAS compounds. While some treatment processes, such as reverse osmosis and granular activated carbon, are capable of removing PFAS compounds and other CECs, they are not included specifically for PFAS removal and will need to be evaluated further during the feasibility program. Regulations for IPR are undergoing revision and regulations for DPR are being developed by the Florida Department of Environmental Protection (FDEP). The treatment described in the following sections for IPR and DPR are based on initial drafts of these regulations, requirements in other states, and engineering experience with similar systems.

4.1.1 Seawater

The existing treatment scheme used by the Tampa Bay Water Seawater Desalination Plant includes coagulation/flocculation/sedimentation and filtration prior to treatment by reverse osmosis (RO) membranes. The *Tampa Bay Water Desalination Plant Expansion Feasibility Study* (Black & Veatch, March 19, 2022) included pilot testing to optimize the existing system. Recommendations were to replace the pretreatment system (prior to the RO membranes) with dissolved air flotation (DAF) and microfiltration/ultrafiltration (MF/UF). These processes, illustrated in **Figure 3,** will be used to evaluate expansion and new seawater sources.

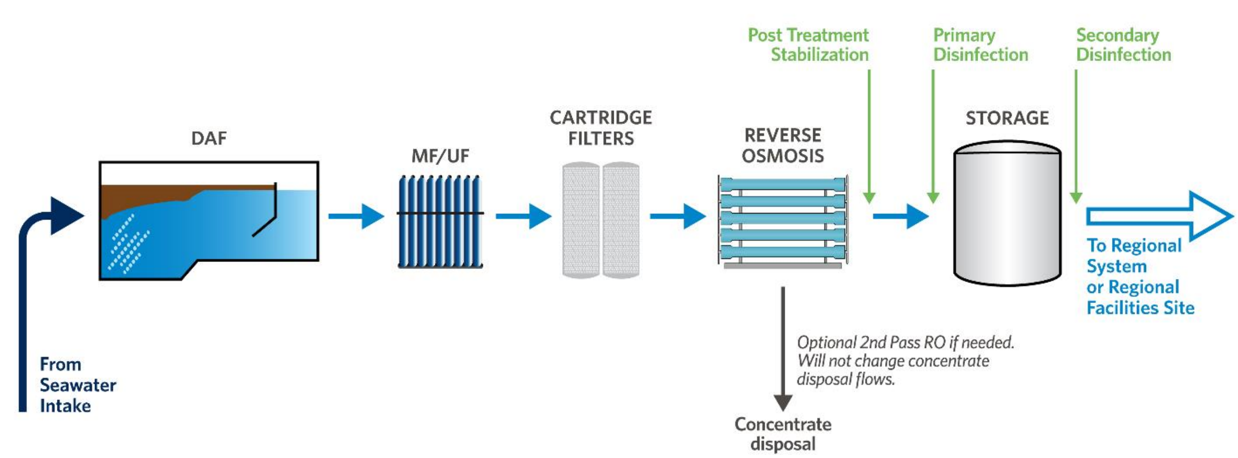

Figure 3 **Seawater Treatment Process**

4.1.2 Fresh Surface Water

The proposed treatment scheme for fresh surface water is based on Tampa Bay Water's existing surface water treatment facility with the suspended ion exchange (SIX®) process added which has been recommended in the Regional Water Quality Study for future implementation of surface water treatment. The treatment train includes SIX®, Actiflo, ozone, biologically active filtration (BAF), and chlorination.. The process is illustrated in **Figure 4**.

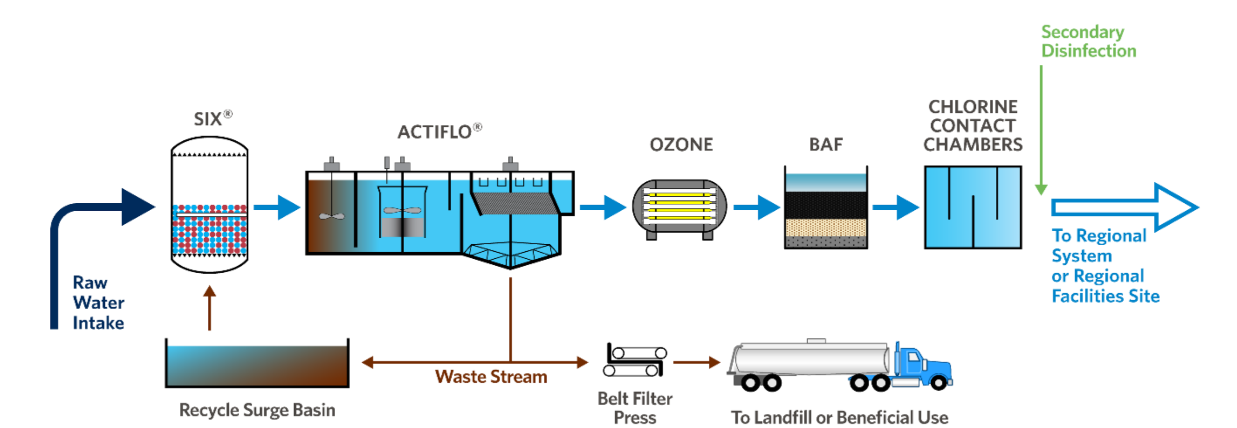

Figure 4 **Fresh Surface Water Treatment Process**

4.1.3 Fresh Groundwater

The process used by Tampa Bay Water for treating groundwater varies based on site-specific groundwater quality. For groundwater sources with high hydrogen sulfide concentration, ozone treatment is utilized. For groundwater sources with high TOC, GAC is proposed to reduce the TOC to 2.0 mg/L. For the purpose of coarse screening the options, it is assumed that both ozone and GAC will be provided to address hydrogen sulfide and TOC, respectively. In later screening processes where more site-specific water quality data is available, the process may be modified. The process is illustrated in **Figure 5**.

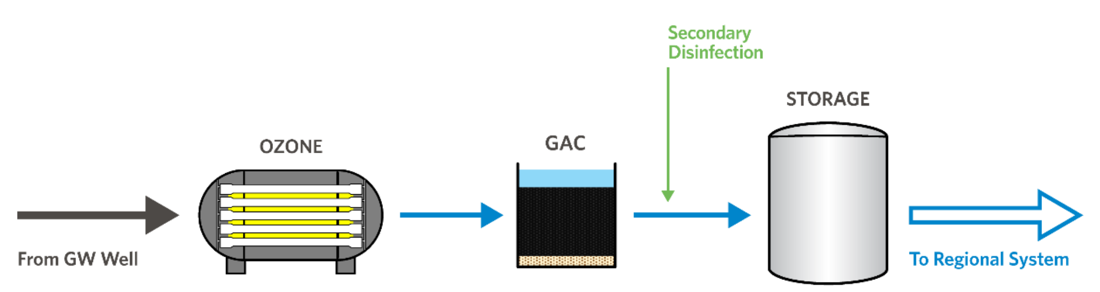

Figure 5 Fresh Groundwater Treatment Process

4.1.4 Brackish Groundwater

The proposed treatment scheme for evaluating brackish groundwater concepts is similar to other facilities in the region consisting of a blend of RO and raw water followed by disinfection, as illustrated in **Figure 6**.

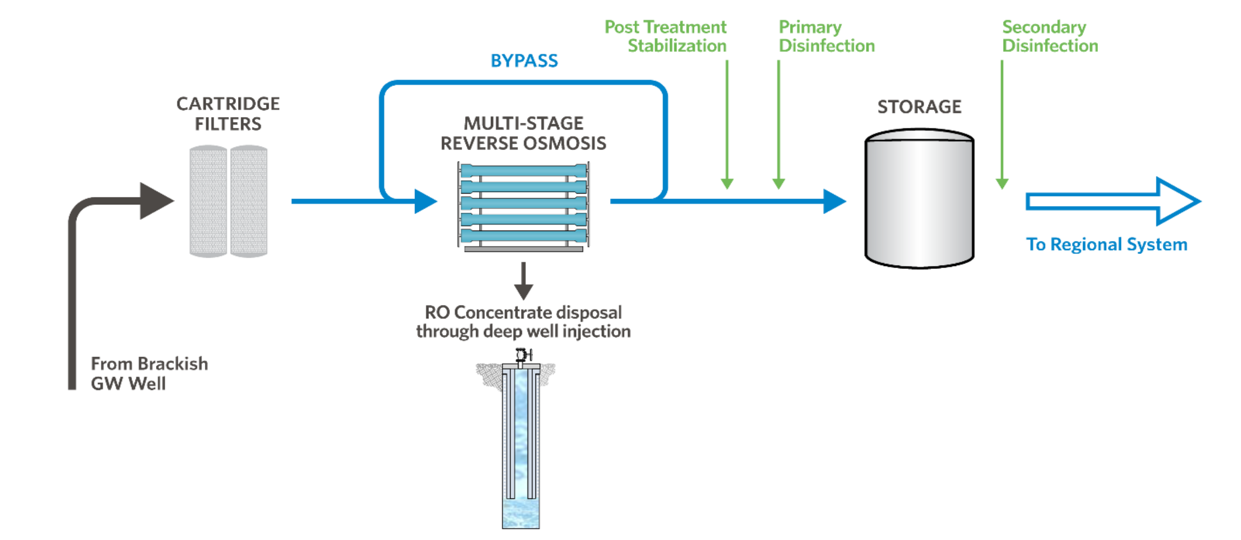

Figure 6 Brackish Groundwater Treatment Process

4.1.5 Indirect Potable Reuse

Treatment requirements for IPR are outlined in Part V of Chapter 62-610, Florida Administrative Code (FAC). The rule addresses aquifer recharge of Class F-1, G-1 or G-II groundwaters and augmentation of Class I surface waters. The rule is currently undergoing revision to update the requirements for IPR. Drafts of the rule revisions show little change to the IPR treatment requirements, which are based on what is defined in Chapter 62-610, FAC as Principal Treatment and Disinfection followed by Full Treatment and Disinfection:

- Principal Treatment and Disinfection:
  - Secondary treatment and high-level disinfection.
  - Reclaimed water shall not contain more than 5.0 mg/L of total suspended solids prior to application of disinfectant.
  - Total nitrogen limited to 10.0 mg/L maximum annual average.

- Full Treatment and Disinfection
  - Meeting primary and secondary drinking water standards.
  - TOC concentration shall not exceed 3.0 mg/L as a monthly average and 5.0 mg/L as a single sample.
  - Total organic halogen (TOX) shall not exceed 0.2 mg/L as a monthly average or 0.3 mg/L as a single sample.
  - Treatment processes must provide multiple barriers for control of organic compounds and pathogens.
  - For aquifer recharge projects, alternate TOC and TOX limits may be approved based on an additional treatment barrier provided by travel through the aquifer.

Florida's draft rule revisions to Chapter 62-610, FAC recommend pathogen log removal of 12 for virus, 10 for *Giardia*, and 10 for *Cryptosporidium* for both IPR and DPR. Reduction credits can be spread across the wastewater treatment plant, water purification facility, groundwater retention, and drinking water treatment, but must achieve the 12, 10, 10 log removal of virus, *Giardia* and *Cryptosporidium* respectively before entering the distribution system.

There are two example treatment processes that have been piloted by Florida utilities to meet the Full Treatment and pathogen removal requirements. These process configurations are illustrated in **Figure 7** and **Figure 8**.

- A carbon-based system (**Figure 7**) consisting of ozone, BAF, UF, GAC and ultraviolet light (UV).
- A membrane-based system (**Figure 8**) consisting of microfiltration/UF, RO, and UV/advanced oxidation process (AOP).

Carbon-based systems have been demonstrated to meet the Full Treatment and Disinfection Requirements (Altamonte Springs and Jacksonville Electric Authority (JEA)) and avoid the high energy requirements of RO membranes and the cost to dispose of the concentrated waste stream; however, these systems remove little to no total dissolved solids (TDS) and therefore should be limited to reclaimed water supplies that have TDS concentrations below the secondary drinking water standard of 500 mg/L. The membrane-based systems also meet the treatment requirements, remove TDS, and typically achieve a much lower TOC concentration than carbon-based systems. The membrane-based process will be utilized for coarse screening of the IPR options, but the carbon-based system may be considered for further development of options that remain after the coarse screening process.

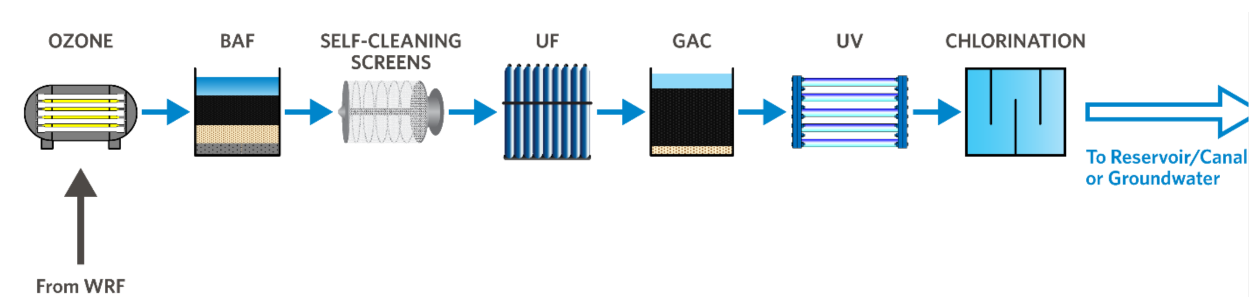

Figure 7 Reclaimed Water IPR – Carbon-based Treatment Process

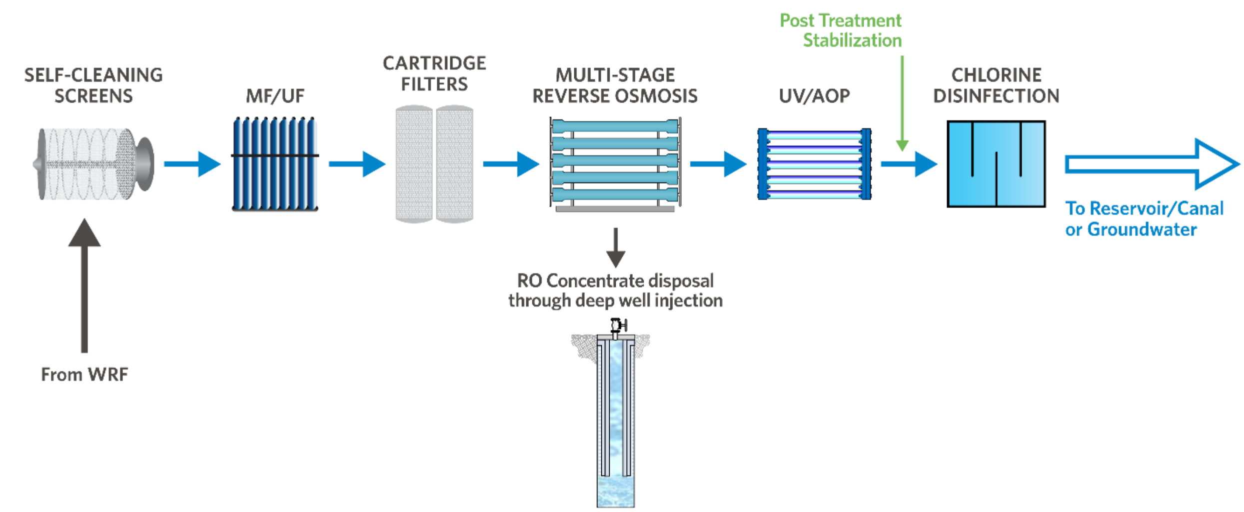

Figure 8 Reclaimed Water IPR – Membrane-based Treatment Process

4.1.6 Direct Potable Reuse

Treatment requirements for DPR are not defined in current state regulations. New rules are being developed but are not anticipated to be finalized until summer 2023. Recent drafts of the rules call for similar levels of treatment as required for IPR, including the same pathogen reduction goals; however, TOC limits of 0.5 mg/L have been proposed. A membrane-based treatment system is recommended to achieve these potentially lower TOC limits. Colorado has recently adopted new rules that may guide the development of regulations in other states such as Florida. These regulations require an additional chemical treatment barrier to the typical IPR treatment train. The process proposed for screening concepts is the same MF/UF – RO –UV/AOP process as defined for IPR with the addition of GAC to provide the additional treatment barrier. This process is illustrated in **Figure 9** .

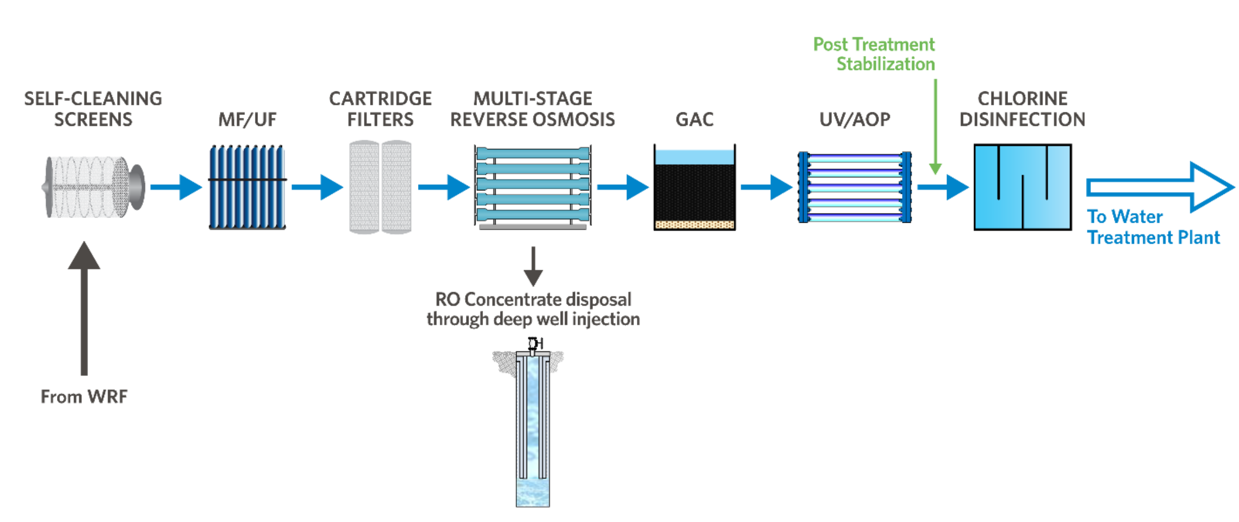

Figure 9 Reclaimed Water – DPR Treatment Process

4.1.7 Water Supply Withdrawal Credits

Water supply withdrawal credits can be obtained when reclaimed water is used to mitigate an impact of groundwater or surface water withdrawals or by abandoning an agricultural well by providing reclaimed water for crop irrigation. Four opportunities for obtaining credits are included in the options for additional water supply:

- Salinity Barrier/Aquifer Recharge.
- Downstream Surface Water Augmentation.
- Wetlands Rehydration.
- Agricultural Well Replacement.

4.1.7.1 Salinity Barrier/Aquifer Recharge

If wellfield capacity is limited due to potential impacts of saltwater intrusion, injecting reclaimed water as a barrier to the migration of salt water can allow for additional wellfield pumping. Rule 62-610.562, FAC addresses treatment requirements for aquifer recharge systems that provide a salinity barrier to prevent the landward or upward migration of salt water into Class F-1, G-I or G-II groundwaters. For the purpose of this evaluation, the salinity barrier concept will involve injection into an aquifer with greater than 3,000 mg/L TDS. This requires that the reclaimed water meet the Principal Treatment and Disinfection requirements (see description as part of the treatment required for IPR). This level of treatment is typical of most wastewater facilities in the region, so no additional treatment will be proposed for salinity barrier/aquifer recharge concepts. Cost components of a salinity barrier option would be injection wells near the coast, a new groundwater treatment facility and water supply credits for the water made available from the injection of reclaimed water.

4.1.7.2 Downstream Surface Water Augmentation

Downstream surface water augmentation involves using reclaimed water to maintain stream flows downstream of a point of withdrawal for drinking water. The reclaimed water does not directly become part of the drinking water supply, so it is not considered IPR. Treatment requirements will be based on site specific criteria of the receiving waters and will at a minimum require advanced waste treatment. Cost components will include the infrastructure for transmission of reclaimed water to the site of augmentation and construction of a discharge structure and acquiring water supply credits for the additional water made available from the downstream augmentation.

4.1.7.3 Wetlands Rehydration

For wellfields where withdrawal capacity is limited due to impacts to wetlands, reclaimed water can be utilized to rehydrate the wetlands and mitigate impacts. This can involve a discharge directly to the wetlands or groundwater recharge adjacent to or near the potentially impacted wetlands. Treatment requirements will be site specific but at a minimum will likely require advanced waste treatment. For coarse screening purposes, it will be assumed that the discharge is directly to a wetland. Other infrastructure costs will be the transmission main to the wetland system.

4.1.7.4 Agricultural Well Replacement

Reclaimed water can be provided to agricultural users in place of their irrigation wells. By taking agricultural wells offline, additional groundwater capacity can be made available. This option does not require additional treatment beyond what is required for irrigation reuse. Infrastructure costs would include the transmission main from the water reclamation facility to the agricultural sites.

4.2 Capital Cost Assumptions

Conceptual unit capital cost estimates were developed for each of the water supply options described in the previous subsection and are summarized in **Table 1**. These are planning-level costs that were developed specifically for use in the coarse screening of the Universe of Options. After coarse screening, more detailed option-specific estimates will be developed. Average equipment costs were collected from budgetary and firm pricing information for similar facilities ranging in size from 7.5 mgd to 40 mgd, however, most references were in the 10 mgd to 20 mgd range.

Tampa Bay Water's cost estimating tool for pipelines is currently being updated. This tool will be used in the coarse screening process to estimate any transmission costs associated with the options.

Additional factors used in the development of the conceptual capital costs are shown in **Table 1**.

Table 1 Treatment Conceptual Unit Capital Costs

Supply Source	Unit Cost	
Seawater Desalination	$16.3	/ gpd
Fresh Surface Water	$5.2	/ gpd
Groundwater	$3.3	/ gpd
Brackish Groundwater	$3.9	/ gpd
DPR	$9.8	/ gpd
IPR (membrane based)- Aquifer Recharge	$9.2	/ gpd
IPR (membrane based)- Surface Water Augmentation	$8.3	/ gpd
Salinity Barrier (Groundwater + Injection Wells Costs)	$4.2	/ gpd

The following recovery considerations were used in the development of the conceptual costs:

- 90% recovery for brackish groundwater RO
- 80% recovery for DPR RO
- 55% recovery for seawater RO
- 95% recovery for MF/UF
- 98% recovery for clarification/filtration processes

Table 2 Cost Factors for Conceptual Capital Costs

Cost Factor	Assumption
Equipment installation	20 percent of equipment subtotal
Facility building cost	$275/square foot
Office building cost	$650/square foot
Basin costs	$1.5/gallon
Contingency	30 percent of construction subtotal
Contractor overhead and profit (OH&P)	20 percent of construction subtotal
Engineering, legal, and administrative (ELA)	25 percent of construction subtotal

5.0 Conclusions and Next Steps

The development of the Universe of Options has produced a large number of concepts for consideration which will move to the next steps of the water supply shortlist process, coarse screening. All seven water supply sources (seawater, fresh surface water, fresh groundwater, brackish groundwater, potable reuse, withdrawal credits and other) are represented within the Universe of Options database as summarized in **Figure 10** below. Input solicited from Tampa Bay Water Staff, all six Member Governments and the SWFWMD was combined with historic water supply options mined from the previous LTMWPs including input from the public. This comprehensive database allows for a thorough and exhaustive review of the options available to Tampa Bay Water for the next regional water supply.

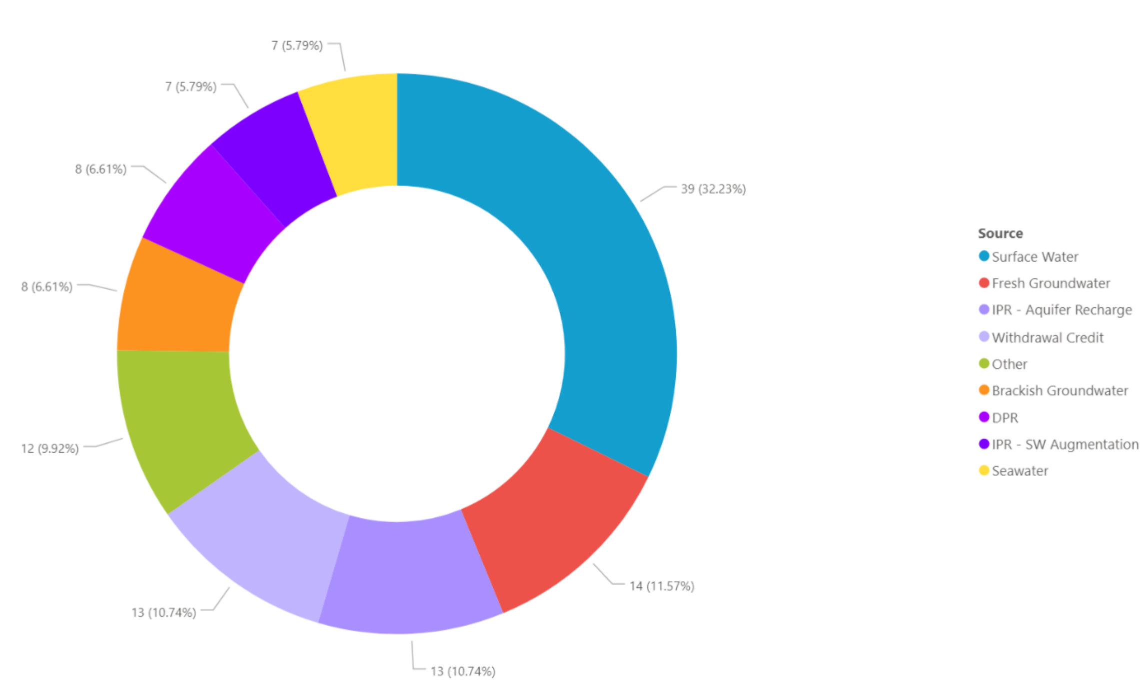

Figure 10 Water Source Options Summary (by Count)

The next steps in the shortlist process include:

- Define the coarse screening framework and criteria.
- Evaluate all 121 viable options within the database using the coarse screening framework and criteria.
- Reduce the number of water supply options to approximately 40 options.
- Document the coarse screening process and outcome in a technical memorandum.

Appendix A. Universe of Options Database

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
SEAWATER								
D- 1	Gulf Coast Anclote Seawater Desalination Plant	Co-located with the Anclote Power Plant in SW Pasco County	Pasco County	• SWFWMD 2006 • Tampa Bay Water Developmental Study	Seawater	Develop a facility that could produce up to 25 mgd of potable water for use in Tampa Bay Water's distribution system. The facility would be co-located with the existing Anclote Power Plant, which is located in southwestern Pasco County and owned and operated by Progress Energy.	Yes	• High Energy Consumption • High Cost • Treatment Aspects • Regulatory Requirements
D- 2	Desalination WTP at the Albert Whitted WRF	Albert Whitted WRF	City of St. Petersburg	• City of St. Petersburg 2022	Seawater	This alternative would build a new desalination WTP at the Albert Whitted site.	Yes	
D- 3	Big Bend Distillation	Off of Big Bend Road in Apollo Beach area	Hillsborough County	• Public Workshop in Tampa - 4/16/2007	Seawater	Using low pressure steam from the power plant to supply evaporators for distilling water	Yes	• High Cost • Low Yield • Implementation
D- 4	Saltwater Distillation	Regional	Regional	• WCRWSA Resource Development Plan 1996Tampa Bay Water Long List 2001	Seawater	Produce distilled water for potable use	Yes	• High Cost
D- 5	Gulf Seawater	near Port Manatee	Manatee County	• SWFWMD 2001	Seawater	Port Manatee Site	No	• Location outside of tri-county area
D- 6	Gulf Seawater	near Venice Airport in Sarasota County	City of Venice	• SWFWMD 2001	Seawater	Venice Airport Site	No	• Location outside of tri-county area
D- 7	Tampa Bay (Big Bend) Desalination Plant Expansion	Apollo Beach	Hillsborough County	• SWFWMD 2001 • SWFWMD 2006 • Tampa Bay Water Short List 2002 Existing Plant Operations • Tampa Bay Water Pilot Testing • Tampa Bay Water 2018 Shortlist	Seawater	This concept provides for a 10 mgd expansion to the existing 25 mgd Tampa Bay WaterDesalination Plant. The facility has been commissioned since early 2008, providing approximately 10% of the Tampa Bay region's drinking water supply when running at full capacity.	Yes	• High Energy Consumption • High Cost • Treatment Aspects
D- 8	Offshore Discharges / Springs in the Gulf of Mexico: Crystal Beach Spring, Tarpon Springs, Cedar Island Springs, Jewfish Hole, Unnamed Spring No. 4	Tarpon Springs/ Palm Harbor Area	Pinellas County	• Citizen Input 1997 WCRWSA Resource Development Plan 1996 • Tampa Bay Water Short List 2002 • SWFWMD 2006	Seawater	Harvest brackish water springs discharging in the Gulf of Mexico; SWFWMD completed a study in 2003; Florida Geological Survey Bulletin No. 31 (1998) mapped brackish springs in the Gulf.	Yes	• Too Speculative • High Cost • High Study Cost • Environmental Impacts • Many Unknowns • Low Yield
D- 9	Seawater Desalination Vessel	Regional	Regional	• Individual Input 2007	Seawater	Sea vessel that is a self-contained desalination plant.	Yes	• High Cost • Implementation • Regulatory Requirements

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
SURFACE WATER								
SW-1	6-Mile Creek Springs	SR 400 to the N, N US Hwy 301 to the E, Adamo Dr to the S, N 50th St to the west	City of Tampa	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	Yes	• High Cost • Low Yield • Implementation
SW-2	Aripeka Springs	Northwest corner of Pasco County, near Belcher Mines Park	Pasco County	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	Yes	• High Cost • Low Yield
SW-3	Blue Sink (Ewanowski Springs)	In Carrollwood between 597 and N Florida Ave, near Curiosity Creek	City of Tampa	• Public Workshop in Tampa - 4/16/2007 • Recovery Strategy for the Lower Hillsborough River 2007	Surface Water	Use water from the Springs to supplement water flow to the Hillsborough River	Yes	• Was not available as a water supply (SWFWMD Implementation)
SW-4	Buckhorn Springs	In the Brandon/Bloomingdale area, south of Durant Rd	Hillsborough County	• Individual Input 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Utilization of existing springs within the Alafia Watershed with treatment	Yes	• Would impact permitted Alafia River withdrawals
SW-5	Chassahowitzka Springs	southwestern Citrus County, just north of the county line, off of Commercial Way	Hernando County	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	No	• Law/Regulatory • Location outside of tri-county area
SW-6	Crystal Springs	West Citrus County near Homosassa Springs off of S Suncoast Blvd	Citrus County	• Individual Input 2001 • Tampa Bay Water Long List 2002	Surface Water	Utilization of existing springs with treatment	No	• Location outside of tri-county area • Regulatory Requirements
SW-7	Eureka Springs	Between Us 301 and I-75 off of Eureka Springs Rd	Hillsborough County	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	Yes	• High Cost • Low Yield
SW-8	Health Spring	Regional	Regional	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	No	• High Cost • Low Yield
SW-9	Homosassa Springs	Southwest Citrus County	Citrus County	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	No	• Law/Regulatory • Location outside of tri-county area
SW-10	Horseshoe Springs	7 miles north of Port Richey	City of New Port Richey	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	Yes	• High Cost • Low Yield
SW-11	Isabella Springs	Regional	Regional	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	No	• High Cost • Low Yield

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
SW-12	Lettuce Lakes Springs	near Lettuce Lake Pkwy	Hillsborough County	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	Yes	• Regulatory Requirements
SW-13	Magnolia Springs	The City of Magnolia Springs	Clay County	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	No	• Location outside of tri-county area • High Cost • Low Yield
SW-14	Reverse Osmosis - Sulphur Springs	Sulphur Springs, east of Egypt Lake-Leto	City of Tampa	• WCRWSA Resource Development Plan 1996 • Recovery Strategy for the Lower Hillsborough River 2007	Surface Water	RO treatment of springs water providing year round potable supply, with interconnection to regional system.	Yes	• Source was unavailable at the time
SW-15	Salt Springs	near Lake George, northwest of Ocala	Marion County	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	No	• Law/Regulatory • Location outside of tri-county area • High Cost • Low Yield • Implementation
SW-16	Seven Springs	near SR 54	Pasco County	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	Yes	• High cost • Low Yield • Implementation
SW-17	Silver Springs	off of E Hwy 40 in Ocala	Marion County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Utilization of existing springs with treatment	No	• Law/Regulatory • Location outside of tri-county area • High Cost • Low Yield • Implementation
SW-18	Water Supply from Springs	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Optimize use of high quality springs water	Yes	
SW-19	Weeki-Wachee Springs	South Hernando County, off of Commercial Way (US 19) and Cortez Blvd	Hernando County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Short List 2002	Surface Water	Surface water withdrawal from Weeki-Wachee Springs in a joint venture with Withlacoochee Regional Water Supply Authority. Project would include a new surface water treatment plant as well as distribution to Hernando and Pasco counties.	No	• Law/Regulatory • Location outside of tri-county area • High Cost • Implementation
SW-20	Lithia Springs	Off of Lithia Springs Rd in Fish Hawk	Hillsborough County	• Tampa Bay Water 2022	Surface Water	Utilization of existing springs with treatment	No	• Already looked at as a potential source • High Cost • Low Yield • Regulatory Requirements

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
SW-21	Alafia River - Agricultural Exchange	Bell Shoals Road at the Alafia River in Hillsborough County	Hillsborough County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001 • Tampa Bay Water Short List 2002 • Tampa Bay Water Developmental Study 2003	Surface Water	Convey river water to agricultural users, and transfer water use permits to South Central Hillsborough Regional Wellfield	No	• Not defined
SW-22	All Rivers	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Utilize flows in all rivers for supply while maintaining minimum instream flows	Yes	• Low yield • Regulatory Requirements
SW-23	Anclote River - Starkey Ecosystem Enhancement Project	In northern Odessa, N of SR 54, W of 589, S of Ridge Rd	Pasco County	• SWFWMD 2001 • Tampa Bay Water Short List 2002 • SWFWMD 2006 • Tampa Bay Water Developmental Studies	Surface Water	Direct piping to impacted wetlands on Starkey Wellfield to allow increased groundwater withdrawals.	No	• Source already in use
SW-24	Braden River	North of the southern Manatee County line, south of E SR 70, just off of I-75	Manatee County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Distributed to City of Bradenton's public supply system	No	• Location outside of tri-county area • Implementation • Regulatory Requirements
SW-25	Crystal River	West Citrus County near Homosassa Springs off of S Suncoast Blvd	Citrus County	• Individual Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Surface water withdrawal for use as a regional water supply.	Yes	• Cannot be a stand-alone project as stated
SW-26	Little Manatee River	Located within Little Manatee River State Park, west of US Highway 301 N, delivered to Lake Parrish located southeast of US Highway 301 N and south of the southern Hillsborough County border	Hillsborough County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Agricultural Supply (increase inflows to Lake Parrish, direct pipeline to agriculture users) / (increase inflows to Lake Parrish, treated water ASR, aquifer conveyance to agriculture users)	Yes	• Low Yield • Implementation • For agricultural use
SW-27	Little Manatee River	Located within Little Manatee River State Park, west of US Highway 301 N	Hillsborough County	• RDP SWFWMD 2001 • Tampa Bay Water Short List 2002 • SWFWMD 2006 • Balm Civic Association 2022	Surface Water	This project would include diversion of surplus water flows for storage in the Tampa Bay Water regional reservoir.	No	• Low Yield
SW-28	Manatee River	East of County Rd 675 near SR 64 E	Manatee County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Aquifer conveyance to agricultural ground-water users or base flow maintenance	No	• Location outside of tri-county area • Peace River
SW-29	Manatee River	East of County Rd 675 near SR 64 E	Manatee County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Divert flow from Manatee River, ASR/Off Stream Reservoir, Distributed to PR/MRWSA public supply system / Diverted to PR/MRWSA public supply system	No	• Location outside of tri-county area

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
SW-30	Myakka River	flows through the western side of T. Mabry Carlton, Jr. Memorial Reserve northeast of Venice, FL	Sarasota County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Aquifer conveyance to agricultural ground-water users	No	• Location outside of tri-county area
SW-31	Myakka River	flows through the western side of T. Mabry Carlton, Jr. Memorial Reserve northeast of Venice, FL	Sarasota County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Distributed to PR/MRWSA public supply system (surface storage, raw water ASR, potable treatment, and pipeline distribution)	No	• Already looked at as a potential source • High Cost • Low Yield • Regulatory Requirements
SW-32	Pithlachascotee River	East of SR 589 and west of US highway 41	Pasco County	• SWFWMD 2001 • Tampa Bay Water Short List 2002 • SWFWMD 2006 • Tampa Bay Water Developmental Studies	Surface Water	Pump surface water during wet weather to Starkey or N. Pasco wellfields to rehydrate wetlands - increase wellfield yields.	Yes	• High Cost • Low Yield • Recharge opportunities are too infrequent
SW-33	Regional Peace River Water Supply	Harbour Heights near Port Charlotte	Charlotte County	• SWFWMD 2001 • Tampa Bay Water Short List 2002	Surface Water	This project would consist of a new regional water supply developed with PR/MRWSA, Hardee and Polk County, and Tampa Bay Water.	No	• Location outside of tri-county area
SW-34	South Prong of Alafia River	In the area of S County Road 39, E Keysville Rd, and Lithia Pinecrest Rd	Hillsborough County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Surface water to be stored in phosphate settling pits and later injected into non-potable aquifer for recharge and eventual use by agricultural or industrial users.	Yes	• High cost • Low Yield • Regulatory Requirements • Implementation
SW-35	Suwannee River	Begins at the Suwanee Sound, SW of Gainesville, and flows north toward Fort Union/Suwanee Springs area	Dixie County/Gilchrist County/Levy County	• SRWMD 2005 • Tampa Bay Water Short List 2002 • Black & Veatch 2022	Surface Water	Multiregional partnership with Dixie, Gilchrist, & Levy counties for the use of Suwannee River as a surface water supply. Levy County is the proposed withdrawal location.	Yes	• Regulatory Requirements • Implementation
SW-36	Tatum Sawgrass area - Upper Myakka River	Near Myakka Rd and Clay Gully Rd	Manatee County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Aquifer conveyance to agricultural ground-water users	No	• Location outside of tri-county area
SW- 37	Alafia Expansion	City of Riverview, Boyette area, NW of C.W Bill Young Reservoir	Hillsborough County	• SWFWMD 2006 • Tampa Bay Water Comprehensive Project List 2008	Surface Water	Increasing the allowable mid- to high-range withdrawals from the river at the existing Alafia River intake and pump station	Yes	• Permitting
SW-38	All Lakes	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Potential high flow augmentation source	No	• Not defined

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
SW-39	Lake Rousseau Source Development	on the boundary of Levy County to the north-west, Marion County to the north-east, and Citrus County to the south	Citrus County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Development of a multiregional supply partnership with Withlacoochee Regional Water Supply Authority, Citrus and Hernando counties	No	• Location outside of tri-county area • Regulatory Requirements • Implementation
SW-40	Lake Tarpon	Between US Highway 19 N and E Lake Road, just south of Keystone Rd (Tarpon Springs)	Pinellas County	• RDP SWFWMD 2001 • Tampa Bay Water Short List 2002	Surface Water	Collect and treat surface water from the lake during planned diversion periods, provide high rate high volume storage, then recover the stored water. To accomplish this an intake structure, pre-treatment facility, ASR storage wells, post treatment facility, and transmission facilities would be required.	Yes	• Low yield • SWIM • Priority Water Body
SW-41	Surface Water Supply from Lake Thonotosassa	near Fort King Hwy	Hillsborough County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Raw water supply, treatment, and distribution to the potable water supply.	Yes	• Regulatory Requirements
SW-42	Shelly Lakes	in Wimauma, south of CR 672	Hillsborough County	• Balm Civic Association Resident Input 2022	Surface Water	Utilization of existing lakes with treatment. The lakes are spring-fed, routinely flood, and owner would like to sell	Yes	
SW-43	Bullfrog Creek	South of the Alafia River mouth in Riverview, south of Gibsonton Dr and north of Symmes Rd	Hillsborough County	• SWFWMD 2001 • Tampa Bay Water Short List 2002 • SWFWMD 2006	Surface Water	Pump surface water during periods of high flows. Surface water diversion from Bullfrog Creek includes a pump station and transmission to Tampa Bay Water's regional system.	Yes	• High Cost • Low Yield
SW-44	Channel "A" Water Resource Services	located between Oldsmar and Tampa, just north of West Hillsborough Avenue, on the Channel A drainage canal, originally known as Brushy Creek	Hillsborough County	• SWFWMD 2006	Surface Water	Surface water withdrawal and storage	Yes	• Low Yield
SW-45	Channel "A" Treated for Potable Water Use	located between Oldsmar and Tampa, just north of West Hillsborough Avenue, on the Channel A drainage canal, originally known as Brushy Creek	Hillsborough County	• SWFWMD 2001 • Tampa Bay Water Short List 2002	Surface Water	Withdraw surface water from Channel "A" and treat for potable supply.	Yes	• Low Yield • Regulatory Requirements
SW-46	Charlie Creek	On the county line of Hardee and Polk County, west of W Bereah Rd	Hardee County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Aquifer conveyance to agricultural ground-water users / Piped to adjacent agricultural users	No	• Location outside of tri-county area
SW-47	Cypress Creek	Central Pasco County, east of US 41 and SR 583, south of SR 52	Pasco County	• SWFWMD 2001 Tampa Bay Water Long List 2001 SWFWMD 2006	Surface Water	Aquifer Recharge	Yes	• High cost • Low yield • Implementation
SW-48	Frog Creek (stormwater)	near Bishop Harbor Rd and Bayshore Rd, intersecting Us Hwy 41 N and I-275	Manatee County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Distributed to PR/MRWSA public supply system / Distributed to MARS system	No	• Location outside of tri-county area

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
SW-49	Gamble Creek	Between County Rd 675 and Golf Course Rd	Manatee County	• SWFWMD 2001 • Tampa Bay Water Long List 2001	Surface Water	Distributed to MARS system	No	• Location outside of tri-county area
SW-50	Josephine Creek	East of US Hwy 27 S near Lake Istokpoga	Highlands County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Highlands Ridge Lake Level Augmentation (treated water ASR & aquifer conveyance); Divert water from Lake Istokpoga in South Florida Water Management District	No	• Location outside of tri-county area
SW-51	Joshua Creek	Northeast of Arcadia, east of NE Hwy 17	DeSoto County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Aquifer conveyance to agricultural ground-water users/Piped to Joshua Water Control District	No	• Location outside of tri-county area
SW-52	Myakkahatchee Creek	North of I-75 in North Port	Sarasota County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Distributed to PR/MRWSA public supply system	No	• Location outside of tri-county area
SW-53	Prairie Creek	off of SE County Rd 234 and south of SE Hawthorne Rd near Newnans Lake	Alachua County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Aquifer conveyance to agricultural ground-water users	No	• Location outside of tri-county area
SW-54	Shell Creek	south of Cape Coral near Punta Rassa	Lee County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Distributed to City of Punta Gorda's public supply system / Aquifer conveyance to agricultural ground-water users	No	• Location outside of tri-county area
SW-55	Upper Horse Creek	Northwest corner of Hardee County	Hardee County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Aquifer conveyance to agricultural, public supply, & industrial ground-water users	No	• Location outside of tri-county area
SW-56	Upper Saddle Creek	Near Saddle Creek Rd and Morgan Combee Rd	Polk County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	Aquifer conveyance to agricultural, public supply, & industrial ground-water users	No	• Location outside of tri-county area
SW-57	Zephyr Creek	Zephryhills	Pasco County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Surface Water	This project includes a pipeline from Zephyr Creek, treatment, and distribution as potable water.	Yes	• High Cost • Low yield
SW-58	Cisterns	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Capture storm water for local use to augment other supply	Yes	• Difficult to implement on a regional scale

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
SW-59	Dechannelize Storm Water Runoff	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Increase efficiency of stormwater replenishing aquifers; develop with other stormwater options	No	• Permitting
SW-60	IMC Clay Settling Ponds (stormwater)	Regional	Regional	• SWFWMD 2001 • Tampa Bay Water Long List 2001	Surface Water	Aquifer conveyance to agricultural, public supply, & industrial ground-water users	No	• Permitting
SW-61	Increase Storm Water Capture - Increase Recharge to Aquifers	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Increase efficiency of capturing stormwater runoff to replenish aquifers	No	• Incorporated in other projects
SW-62	Rapid Infiltration Basins	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Increase efficiency of stormwater replenishing aquifers	No	• Difficult to implement on a regional scale
SW-63	Skim and Store Surface Water Flood Flows	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Increase efficiency of capturing stormwater runoff to replenish reservoirs	No	• Already in progress, during wet weather events, intake is turned off due to bad water quality
SW-64	Storm Water Capture and Treatment	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Treat stormwater instead of allowing it to run off	No	• Incorporated in other projects
SW-65	Tampa Bay Aquavoirs™	Regional	Regional	• Citizen Input 2001 • Tampa Bay Water Long List 2001	Surface Water	Utilization of stormwater	No	• High Cost • Low Yield • Implementation
SW-66	Rainy wells or horizontal collector wells	Regional	Regional	• Black & Veatch 2022	Surface Water		Yes	
SW-67	Enhancements: Phases C&D	Hillsborough River near Del Rio	City of Tampa	• SWFWMD 2006 • Tampa Bay Water Ongoing Studies and Project Development Efforts	Surface Water	This option consists of the phased enhancement of Tampa Bay Water's Enhanced Surface Water System (ESWS). Phase C includes a second potential storage reservoir for Alafia River water and Phase D includes downstream augmentation of the Hillsborough River.	Yes	• Moderate cost
SW-68	Peace Creek Canal Off- stream Reservoir and Aquifer Recharge Project	Located in Bartow near Hwy 17 N and Hwy 60 E	Polk County	• SWFWMD 2006 • Tampa Bay Water Long List 2001	Surface Water	Watershed Management Plan evaluating approximately 13,000 acres of lakes and 13,000 acres of wetland areas for surface water storage potential.	No	• Law/Regulatory • Location outside of tri-county area
SW-69	Phosphate Industry Reservoir(s) using Surface Water in Wet Season (Mosaic)	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Phosphate mines would use surface water in lieu of existing groundwater pumping.	No	• Must be associated with a surface water source

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
SW-70	Storing and Pumping Storm Water between Basins	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Increase efficiency of capturing stormwater runoff to replenish reservoirs	No	• Incorporated in other projects
SW-71	Upper Peace River Aquifer Recharge and Industrial Supply	Located in Bartow near Hwy 17 N and Hwy 60 E	Polk County	• SWFWMD 2006 • Tampa Bay Water Long List 2001	Surface Water	This option involves storing excess flows from the upper Peace River in clay settling areas which are shown to be hydraulically connected to the Peace River. This recharged water could be used to offset future agricultural or industrial (power plant) groundwater uses in the area.	No	• Law/Regulatory • Location outside of tri-county area
SW-72	Anclote River - Starkey Wetlands Restoration	Anclote River in Pasco County between Starkey Park Bike Trail and Night Star Trail	Pasco County	• SWFWMD 2006 • Tampa Bay Water Developmental Studies	Surface Water	Aquifer recharge or piped to impacted wetlands on Starkey wellfield.	No	• As configured, project is not a water supply
SW-73	Chesnut Park ASR	From Lake Tarpon, north Pinellas County between US Highway 19 N and E Lake Rd S, to Chesnut Park off of E Lake Rd	Pinellas County	• North Pinellas County ASR and MAR Feasibility Study 2019	Surface Water	Excess surface water will be recharged into the existing ASR well and stored during wet-season months.	Yes	
SW-74	Chesnut Park MAR	From Lake Tarpon, north Pinellas County between US Highway 19 N and E Lake Rd S, to Chesnut Park off of E Lake Rd	Pinellas County	• North Pinellas County ASR and MAR Feasibility Study 2019	Surface Water	Involves one to multiple MAR wells adjacent to Lake Tarpon that would be used during wet-season months to recharge the aquifer with excess surface water from Lake Tarpon.	Yes	
SW-75	Canal Park MAR	From Lake Tarpon, north Pinellas County between US Highway 19 N and E Lake Rd S, to Canal Park south of Tampa Rd between Belcher Rd and County Rd 39	Pinellas County	• North Pinellas County ASR and MAR Feasibility Study 2019	Surface Water	Surface water flowing from Lake Tarpon would be drawn off the canal before it passes the canal's control structure in the area.	Yes	
SW-76	East Lake Shallow MAR	The Wellhead Protection Zone is in northeast Pinellas and bounded by Pasco County on the north; Hillsborough County on the east; East Lake Road on the west; and the Florida Power right-of-way on the south. From Lake Tarpon, north Pinellas County between US Highway 19 N and E Lake Rd S	Pinellas County	• North Pinellas County ASR and MAR Feasibility Study 2019	Surface Water	The option consists of constructing multiple recharge wells within the existing East Lake Wellfield that will recharge the same permeable unit that the production wells withdraw from with excess surface water from Lake Tarpon during the wet-season months.	Yes	
SW-77	East Lake Deep MAR	The Wellhead Protection Zone is in northeast Pinellas and bounded by Pasco County on the north; Hillsborough County on the east; East Lake Road on the west; and the Florida Power right-of-way on the south. From Lake Tarpon, north Pinellas County between US Highway 19 N and E Lake Rd S	Pinellas County	• North Pinellas County ASR and MAR Feasibility Study 2019	Surface Water	The option consists of constructing multiple recharge wells within the existing East Lake Wellfield that will recharge a deeper, more saline aquifer below the permeable zone that the production wells withdraw from with excess surface water from Lake Tarpon.	Yes	

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
SW-78	Aqueduct from N. Florida	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Transmission of treated or non-treated surface water to the Tampa Bay Water service area.	Yes	• High cost • Regulatory Requirements
SW-79	Dam Courtney Campbell	North of Old Tampa Bay near Oldsmar and Town & Country	City of Tampa	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Dam fresh water north of Courtney Campbell Causeway.	Yes	• High Cost • Regulatory Requirements • Implementation • Environmental Protection
SW-80	Importation (General)	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Surface Water	Potential sources identified: Weeki-Wachee Springs; Homosassa River; Crystal River; Silver Springs; Manatee River; Peace River; Lake Rousseau	Yes	• Incorporated in other projects
SW-81	Morris Bridge Sink	water from Morris Bridge Sink for diversion through the Tampa Bypass Canal to the base of the dam on the Hillsborough River	Hillsborough County	• Tampa Bay Water Long List 2001 • Tampa Bay Water Developmental Studies • Recovery Strategy for the Lower Hillsborough River 2007	Surface Water	Transfer of surface water to Tampa Bypass Canal (middle pool) from Morris Bridge Sink	Yes	• Not enough supply available
SW-82	Riverbank Filtration	Regional	Regional	• Individual Input 2007	Surface Water	This surface water/shallow groundwater treatment technique utilizes riverbanks as natural preliminary treatment filters. Lateral wells are used for water withdrawal.	No	• Not a water source
SW-83	Tampa Bay Water - Second Reservoir	near Alafia River	Hillsborough County	• Black & Veatch 2022	Surface Water		Yes	• Permitting • Implementation
SW-84	New SWTP at the Existing Reservoir	C. W. Bill Young Reservoir	Hillsborough County	• Tampa Bay Water LTMWP 2022	Surface Water	Construct a new SWTP at the existing C.W. Bill Young Reservoir	Yes	• Reservoir storage impacts • Regulatory requirements
FRESH GROUNDWATER								
G- 1	Additional Potable Ground-Water from Existing Wellfields	Across northern Tampa Bay	Pasco County/Hillsborough County/Pinellas County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Fresh Groundwater	Increasing the allowable annual average withdrawal rate of the existing combined permit for the 11-Consolidated Wellfields covered in the Combined Permit. A regional increase in groundwater production could be found to be compatible with water resource recovery goals set forth by SWFWMD.	Yes	• Permitting • Implementation

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
G- 2	Additional Potable Ground-Water from Outside Multi-Jurisdictional Area	Central Florida/Orlando Area	Orange County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Fresh Groundwater	Central Florida, Crystal Springs, and other locations	No	• Location outside of tri-county area • Yield issues
G- 3	Additional Potable Ground-Water Wellfields in Multi-Jurisdictional Area	Zephyrhills area	Pasco County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Fresh Groundwater		Yes	• Incorporated with other projects
G- 4	Agricultural Interconnects/Co-Use with Existing Permitted Users/ Fresh groundwater from AG wells	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Short List 2002 • Tampa Bay Water Developmental Study • 2003 Black & Veatch 2022	Fresh Groundwater	Utilization of agricultural and/or industrial excess permitted capacity or reclaimed exchange.	Yes	• High Cost • Low Yield • Regulatory Requirements • Implementation
G- 5	Central Pasco Regional Wellfield	South of Pasco-Hernando County line, between US-41 and Bellamy Brothers Blvd. in North-Central Pasco County, north of SR-52	Pasco County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Fresh Groundwater	Several lakes are located east of the potential wellfield including Middle Lake, Lake Iola, and Lake Jessamine. Groundwater withdrawals using dispersed wells at limiting flows should allow for a safe yield which will not adversely affect lake, wetland, or surficial aquifer levels. For this analysis, it was assumed that an average annual withdrawal of 8.0 million gallons per day could be achieved.	Yes	• Regulatory Requirements • Environmental Effects • Low Yield • High Cost
G- 6	Cypress Bridge II	250 sq-mile study area in south-central Pasco County and/or north-central Hillsborough County off of I-75, south of SR-52	Pasco County	• Individual Input 2001 • Tampa Bay Water Long List 2001 • Tampa Bay Water • Project Development Studies	Fresh Groundwater	The project components potentially include four dispersed water production wells and a raw water transmission main to connect the new water supply wells to Tampa Bay Water's regional water supply system. Each well would have an expected capacity of 1 to 2 million gallons per day. Therefore, approximately 4 to 8 million gallons per day of additional drinking water supply could be added to the regional water supply system.	Yes	• High Cost • Low Yield • Regulatory Requirements
G- 7	Green Swamp Wellfield	Near Colt Creek State Park	Pasco County/Sumter County	• PAC Input 2001 • Tampa Bay Water Long List 2001 • Tampa Bay Water Long List 2008	Fresh Groundwater	Eliminate development in recharge area for Hillsborough River	No	• Location outside of tri-county area • Regulatory Requirements • Low Yield • Implementation
G- 8	Mulberry/Piney Point	Northwest Manatee County located just south of County Line Rd between Piney Point Rd and US Highway 41	Manatee County	• Individual Input 2001 • Tampa Bay Water Short List 2002	Fresh Groundwater	Utilization of existing groundwater use permit	Yes	• Low yield • Outside of Tampa Bay Water Jurisdiction

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
G- 9	Thonotosassa Wells/Two Rivers Ranch Wellfield	Northeast corner of Hillsborough County	Hillsborough County	• PAC Input 2007 (City of Tampa)	Fresh Groundwater	This project would build new groundwater production wells on City of Tampa property in the Thonotosassa area. Tampa Bay Water would seek to acquire appropriate easements with the City of Tampa prior to site development. The potential groundwater wells would include chloramination facilities adjacent to the new wellfield and delivery of treated water via a new tie-in to the North-Central Hillsborough Intertie. This could add approximately 10 million gallons per day of groundwater supply to the Regional System.	No	• Permitting • Low yield • Drawdown is high • Flow change to the Hillsborough River exceeds SWFWMD WUP requirements
G- 10	City of Gulfport Well	Southwest St. Petersburg, northeast of St. Pete Beach	City of St. Petersburg	• City of Gulfport 2001 • Tampa Bay Water Short List 2002	Fresh Groundwater	Utilization of one existing 4-inch artesian well.	Yes	• High Cost • Low Yield • Low Quality • Conflicted with St. Petersburg's deep well injection
G- 11	Cone Ranch & Dispersed Wells	Cone Ranch property, NE Hillsborough County along State Highway 39 & Knights Griffin Rd.	Hillsborough County	• Individual Input 2001 • Tampa Bay Water Long List 2001 • Tampa Bay Water • Project Development Studies • Hydrogeologic Model • Water Quality Testing	Fresh Groundwater	This concept evaluation is based on a previous feasibility study. The study included analysis of over 10 years of field data used to characterize site environmental and hydrological systems and to report results of a groundwater model used for predicting impacts associated with potential groundwater withdrawals. The concept includes a dispersed wellfield and groundwater treatment facility on the 20-square mile Cone Ranch property owned by Hillsborough County.	Yes	• High cost • Permitting • Currently under negotiation (may become not feasible if exchange is completed by Tampa Bay Water)
G- 12	Cypress Bridge Wellfield Expansion	South-Central Pasco County, east of US 41, north of SR 52 and south of CR 578	Pasco County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Fresh Groundwater	Feasibility study. The study included expansion of existing wellfields.	Yes	• Regulatory Requirements
G- 13	East Pasco Regional Wellfield	Central Pasco County, just off of I-75 and just south of SR-52	Pasco County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Short List 2002	Fresh Groundwater	analysis of over 10 years of field data used	Yes	• Regulatory Requirements • Too close to Cypress Creek • Not within interest of wellfield cutbacks
G- 14	Phosphate Plant Wells	Next to Lake Branch Alafia River that is east of S County Road 39 and west of the east Hillsborough County State line, between South Prong Alafia River and Boggy Branch River	Hillsborough County	• SWFWMD 2001 • Tampa Bay Water Short List 2002	Fresh Groundwater	Utilization of three privately owned wells at the former Mobil Big Four mine plant (2-30 inch wells and 1-12 inch well).	Yes	• No separate WUP was available for modification as a public water supply
G- 15	Inter-Regional Wellfield in Cooperation with Withlacoochee Regional Water Supply Authority	Approximate site location designated southwest of the I-75 intersection with State Highway 50. Near Spring Lake	Hernando County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Short List 2002	Fresh Groundwater	Construction of an inter-regional wellfield with a new pipeline and booster stations to transfer the water to the Tampa Bay regional system.	No	• Location outside of tri-county area • Regulatory Requirements • Implementation

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
G- 16	Southeast Hernando County Interregional Wellfield	southeast Hernando County wellfield location	Hernando County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Short List 2002	Fresh Groundwater	Development of wellfield in southeast Hernando County with treatment at Cypress Creek WTP; cooperative agreement with Withlacoochee Regional Water Supply Authority.	No	• Location outside of tri-county area
G- 17	Lake County Interregional Groundwater Facility	Lake County area, northwest of Orlando	Lake County	• Individual Input 2001 • Tampa Bay Water Short List 2002	Fresh Groundwater	Construction of a new inter-regional groundwater facility in Lake County. The project would utilize the Tampa Bay Water Treatment Facility site.	No	• Location outside of tri-county area • Regulatory Requirements • High Cost • Implementation
G- 18	Surficial Aquifer Supply	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Fresh Groundwater	Utilize the surficial aquifer	Yes	• Susceptibility to drought and limited capacity
G-19	City of Tarpon Springs: Brackish Groundwater	City of Tarpon Springs Reverse Osmosis Water Facility	Pinellas County	• City of Tarpon Springs 2022	Fresh Groundwater	Use of brackish groundwater drawn from the Upper Floridan Aquifer and intermediate layer	No	• Source already in use; source is degrading
G-20	Upper Floridan Aquifer Brackish Wellfield	North of central Hillsborough County in Pasco County	Pasco County	• Black & Veatch 2022	Fresh Groundwater	Use of Upper Floridan Aquifer	Yes	
G-21	Consolidated WUP Increase	Regional	Regional	• Tampa Bay Water 2022	Fresh Groundwater	Increase the CWUP permit and transfer the 0.8 mgd Carrollwood Wells permit and the 0.25 mgd Eagles Wells permit capacity to the permit increase as well.	Yes	
BRACKISH GROUNDWATER								
BG-1	Lower Floridan Aquifer Brackish Wellfield	Lower, central Pasco County	Pasco County	• Black & Veatch 2022 • Pasco County 2022 • Pinellas County 2022	Brackish Groundwater	Use of Lower Floridan Aquifer	Yes	
BG- 2	East Lake Brackish Wells	Brooker Creek Reserve off of Keystone Road (Tarpon Springs)	Pinellas County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Short List 2002 • Tampa Bay Water Developmental Study 2003	Brackish Groundwater	Withdrawal of brackish groundwater by placing three- existing wells at the East Lake well field (currently the Brooker Creek Preserve) back into service and constructing a new R/O plant near the Keller Water Treatment Plant Site.	No	• Source is degrading • High Salinity • High Cost • Low yield
BG- 3	Rock Mine Lake	Located near Belcher Mines Park, west of US Highway 19 and off of Aripeka Rd	Pasco County	• Individual Input 2001 • Tampa Bay Water Short List 2002 • Tampa Bay Water Developmental Study 2003	Brackish Groundwater	Utilizing water withdrawn from a linear wellfield adjacent to Rock Mine Lake to provide potable water supply in Pasco County. A small footprint desalination plant would be required.	Yes	• Environmental and Source Water Protection • High Cost • Regulatory Requirements • Low yield

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
BG- 4	Reverse Osmosis - Brackish Water	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Brackish Groundwater	Provide RO treatment at various suitable locations, with interconnection to regional system	Yes	• Incorporated with other projects
BG- 5	Small Footprint Reverse Osmosis (5 mgd +) - Pasco County	Western Pasco County	Pasco County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Short List 2002 • Tampa Bay Water Developmental Study 2003	Brackish Groundwater	Reverse osmosis treatment of surface water, seawater, or brackish water for potable use. Potential sites identified: Pasco Resource Recovery Site, Bayonet Point, Virginia City, Old Belcher Mine Infrastructure requirements would include the development of production, monitor, and concentrate disposal wells, a small footprint reverse osmosis treatment facility, alkalinity adjustment facility, an above ground storage tank, high service pump station, pipeline for raw water delivery to the reverse osmosis facility, and transmission main for finished water delivery to the closest Tampa Bay Water point of connection. Brackish groundwater would be withdrawn from the Lower Floridan aquifer at an approximate depth of 700 feet below land surface.	Yes	• High Energy Consumption • Permitting • High Cost
BG- 6	Small Footprint Reverse Osmosis (5 mgd +) Pinellas County	Potential Sites - Lake Tarpon along U.S. 19, areas on the Pinellas County Resource Recovery waste to energy property, areas on Paul L. Bartow Power Plant property on Weedon Island, & Area "H" (southern part of the county, ~2.5mi. NW of downtown St. Pete)	City of St. Petersburg	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Short List 2002 • Tampa Bay Water Developmental Study 2003	Brackish Groundwater	Reverse Osmosis treatment of surface water, seawater, or brackish water for potable use. Lake Tarpon/US19, Pinellas Resource Recovery Site, Weedon Island Power Plant Site	Yes	• High Energy Consumption • High Cost
BG- 7	Small Footprint Reverse Osmosis (5 mgd +) Holiday Waterworks	Near Cross Bayou Blvd in New Port Richey	City of New Port Richey	• Individual Input 2001 • Tampa Bay Water Short List 2002 • Tampa Bay Water Developmental Study 2003 • Individual Input 2007	Brackish Groundwater	Use of existing wells or new wells within the vicinity of Holiday Waterworks.	Yes	• High Cost • Low Yield
BG- 8	Conversion of existing seawater desal plant to brackish water feed	Off of Big Bend Road in Apollo Beach area	Hillsborough County	• Tampa Bay Water 2022	Brackish Groundwater	Augment the existing Tampa Bay Water (Big Bend) Desalination Plant feed with brackish water. Conversion will reduce reliance on TECO intakes which will reduce the risk of lost production when TECO units are offline.	Yes	
BG- 9	Charlotte County	In the area of Punta Gorda, Englewood, and North Port surrounding the Charlotte Harbor (North Ft. Myers)	Charlotte County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Brackish Groundwater	Utilization of brackish groundwater for regional use.	No	• Location outside of tri-county area
BG- 10	Offshore Discharges / Springs in the Gulf of Mexico	Northwest Pasco County in the area of Bayonet Point/Werner-Boyce Salt Springs State Park	City of New Port Richey	• Citizen Input RDP • Tampa Bay Water Long List 2001 • Tampa Bay Water Short List 2002	Brackish Groundwater	Harvest brackish water springs discharging in the Gulf of Mexico; SWFWMD has completed a study; Florida Geological Survey Bulletin No. 31 (1998) mapped brackish springs in the Gulf	Yes	• Too Speculative • High Cost • Location • High Study Cost • Environmental Impacts • Many Unknowns • Low yield

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
RECLAIMED WATER								
R- 1	Reverse Osmosis using Reclaimed Water as Source	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	DPR	Provide reverse osmosis treatment of reclaimed wastewater suitable for direct potable reuse	Yes	• Incorporated with other projects
R-2	Desal Plant Expansion with Reclaimed Water Supply	From H.F Curren AWTP (between Maritime Blvd and Gatx Dr) to Tampa Bay Water desal plant (off of Big Bend Rd near the Big Bend Power Station)	City of Tampa Hillsborough County	• Tampa Reuse Study 2022 • Black & Veatch 2022	DPR	Reclaimed water transmission system from H. F. Curren AWTP to Tampa Bay Seawater Desalination Water Treatment Plant, including desalination plant expansion.	Yes	• Regulatory • Large Energy Footprint
R-3	Reclaimed water at Tampa Bay Regional SWTP DPR	From H.F. Curren AWTP (North of Gatx Dr, east of Maritime Blvd, west of Guy N Verger Blvd)	City of Tampa	• Black & Veatch 2022	DPR	SWTP supplemented with reclaimed water from nearby reclamation facilities.	Yes	• Impacts of Reservoir Storage • Large Energy Footprint for RO • No geographical diversity in supplies • Poor potential for phased construction • Regulatory Requirements •
R-4	St. Petersburg WTP DPR	Cosme WTP	City of St. Petersburg	• Black & Veatch 2022	DPR	Reclaimed water from nearby facilities would be treated at an advanced water treatment facility connected to the regional system that would deliver the treated water to the Cosme WTP	Yes	
R-5	Pinellas County WTP DPR	S.K. Keller WTP	Pinellas County	• Black & Veatch 2022 • Pinellas County 2022 • Pasco County 2022	DPR	Reclaimed water from nearby facilities would be treated at an advanced water treatment facility connected to the regional system that would deliver the treated water to the Keller WTP. A new reclaimed water reservoir to be built adjacent to the existing S. K. Keller WTP to store reclaimed water during the wet season to be used as an intake source.	Yes	
R-6	Cypress Creek DPR	near Big Cypress Swamp	Pasco County	• Black & Veatch 2022	DPR	Creek supplemented with reclaimed water from nearby reclamation facilities.	Yes	
R-7	South Hillsborough SWTP DPR	near the intersection of Balm Riverview Rd and Balm Boyette Rd	Hillsborough County	• Black & Veatch 2022	DPR	SWTP supplemented with reclaimed water from nearby reclamation facilities.	Yes	
R-8	Northwest Hillsborough County Fawn Ridge DPR	near Citrus Park Mall	Hillsborough County	• Black & Veatch 2022	DPR	Fawn Ridge to be supplemented with reclaimed water from nearby reclamation facilities.	Yes	
R- 9	City of Tampa Howard F. Curren Reclaimed Water Groundwater Injection for Potable Use	North of Gatx Dr, east of Maritime Blvd, west of Guy N Verger Blvd	City of Tampa	• SWFWMD 2001 • Tampa Bay Water Long List 2001	IPR - Aquifer Recharge	Indirect use of reclaimed wastewater for potable water supply	Yes	• High Cost • Regulatory Requirements • Implementation

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
R- 10	Northwest Hillsborough County Groundwater Recharge with Reclaimed Water	Regional	Regional	• WCRWSA Resource Development Plan 1996 • SWFWMD 2001 • Tampa Bay Water Short List 2001 • Hillsborough County 2022 • City of Tampa 2022 • Pinellas County 2022 • City of New Port Richey 2022	IPR - Aquifer Recharge	Utilizing surplus reclaimed wastewater to rehydrate wellfields to allow expanded groundwater pumping.	Yes	
R-11	East Lake Wells/Mid-Pinellas IPR Wellfield	East of Lake Seminole in Pinellas County	Pinellas County	• WCRWSA Resource Development Plan 1996 • SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006 • Tampa Bay Water Developmental Studies	IPR - Aquifer Recharge	This project would develop new brackish ground water wells from the Upper Floridan aquifer in central Pinellas County with reclaimed water injections.	Yes	• High Salinity • High Cost • Low Yield
R- 12	Cross Bay Reclaimed Water Repurification Project	City of St Petersburg Albert Whitted WRF (in east St. Petersburg) to Wimauma	City of St. Petersburg	• SWFWMD 2001 • Tampa Bay Water Long List 2001	IPR - Aquifer Recharge	Wastewater reclamation through rehydration of the Floridan aquifer - City of St Petersburg Albert Whitted WRF to Wimauma	Yes	• High Cost • Low Yield
R- 13	Natural Treatment/Aquifer Recharge	Regional	Regional	• SWFWMD 2001 • Tampa Bay Water Long List 2001	IPR - Aquifer Recharge	Recharge	Yes	• Poor potential for phased construction • Public acceptance of potable reuse
R-14	South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge	Boyette area, west of I-75 and US 301	Hillsborough County	• Tampa Reuse Study 2022 • Black & Veatch 2022	IPR – Aquifer Recharge	20 mgd of aquifer recharge with reclaimed water supply to provide an estimated groundwater withdrawal yield of 8.85 mgd on an annual average basis.	Yes	
R-15	Aquifer Recharge	South of Paseo Al Mar Blvd near Sun City Center area	Hillsborough County	• SWFWMD 2006 • Tampa Bay Water Long List 2001 • Tampa Bay Water Concept Shortlist 2009	IPR - Aquifer Recharge	Involves recharging the Floridian aquifer system with reclaimed water and constructing a remote groundwater withdrawal for potable supply such that a net benefit to Floridian aquifer system potentiometric surface can be achieved.	Yes	• Permitting • High Cost • System Integration Aspects • Treatment Aspects
R-16	East Lake Shallow MAR	The Wellhead Protection Zone is in northeast Pinellas, and bounded by Pasco County on the north; Hillsborough County on the east; East Lake Road on the west; and the Florida Power right-of-way on the south	Pinellas County	• North Pinellas County ASR and MAR Feasibility Study 2019	IPR - Aquifer Recharge	This option consists of constructing multiple recharge wells within the East Lake Wellfield that would recharge the same aquifer of the decommissioned water supply wells with excess reclaimed water during the wet-season months.	Yes	
R-17	East Lake Deep MAR	The Wellhead Protection Zone is in northeast Pinellas, and bounded by Pasco County on the north; Hillsborough County on the east; East Lake Road on the west; and the Florida Power right-of-way on the south	Pinellas County	• North Pinellas County ASR and MAR Feasibility Study 2019	IPR - Aquifer Recharge	This option consists of constructing multiple MAR wells within the vicinity of the existing East Lake Wellfield that will recharge a deeper more saline aquifer (greater than 3,000 mg/L TDS) below the permeable zone that the production wells withdraw from with excess reclaimed water during the wet-season months.	Yes	

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
R-18	4G Ranch IPR	35 miles north of Tampa, in Pasco County near Conner Preserve	Pasco County	• Tampa Bay Water 2022	IPR - Aquifer Recharge	The 176-acre built wetland receives excess reclaimed water from five plants in the area. Most of the reclaimed is used for irrigation and industrial processes, though 10 mgd is returned to the aquifer through RRIBS. The wetland naturally denitrifies the reclaimed water to improve the quality of the water that will recharge the aquifer and later be treated for potable use	Yes	
R- 19	City of Tampa Howard F. Curren AWWTP to Pasco Wellfields	North of Gatx Dr, east of Maritime Blvd, west of Guy N Verger Blvd	City of Tampa	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Short List 2002	IPR - Aquifer Recharge	Surplus WWTP effluent used to provide rehydration water to existing wellfields, Starkey, Cross Bar Ranch, Cypress Creek.	Yes	• High Cost • Regulatory Requirements • Implementation
R- 20	Wastewater Reuse to Recharge Wellfields	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	IPR - Aquifer Recharge	Utilizing reclaimed wastewater to rehydrate wellfields to allow expanded groundwater pumping	Yes	• Incorporated with other projects
R-21	Consolidated WUP Increase	Regional	Regional	• Black & Veatch 2022	IPR - Aquifer Recharge		Yes	
R- 22	Dry-Weather Augmentation using Reclaimed Water Sources	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	IPR - SW Augmentation	Use reclaimed wastewater to enhance surface water supplies during periods of low flow	Yes	• Incorporated with other projects
R- 23	Lake Maggiore-Fed with Reclaimed Water/Surface Water WTP from Lake Maggiore at the Albert Whitted WRF	near Boyd Hill Park	City of St. Petersburg	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Short List 2002 • City of St. Petersburg 2022	IPR - SW Augmentation	This option augments natural stormwater flow into the lake with reclaimed water and would provide a stable water supply source with stable lake elevation. This alternative would require advanced treatment of reclaimed water. The advanced treated water would be discharged to Lake Maggiore to augment existing water supply. Water would be withdrawn from Lake Maggiore and treated by a new surface WTP built at Albert Whitted WRF or a suitable location (indirect potable reuse).	Yes	• Low yield • High Cost • Regulatory Requirements • Environmental Protection
R- 24	City of Tampa-Howard F. Curren Reclamation: Distillation	North of Gatx Dr, east of Maritime Blvd, west of Guy N Verger Blvd	City of Tampa	• Individual Input 2001 • Tampa Bay Water Short List 2002	IPR - SW Augmentation	Surplus wastewater reclamation with distillation; convey reclaimed water to Hillsborough River or Tampa Bypass Canal	Yes	• High Cost • Regulatory Requirements • Implementation
R- 25	Tarpon Canal Reclaimed System Augmentation	At S-551 near Oldsmar, FL	Hillsborough County	• SWFWMD 2001 • Tampa Bay Water Long List 2001	IPR - SW Augmentation	Augmentation	Yes	
R-26	Supplement Tampa Bypass Canal with Reclaimed Water	Tampa Bypass Canal at Martin Luther King Boulevard in Hillsborough County	City of Tampa	• Tampa Reuse Study 2022	IPR - SW Augmentation	Use of 20 mgd of reclaimed water to produce a yield of 16 mgd to discharge into the Tampa Bypass Canal.	Yes	
R-27	Supplement the Regional Reservoir with Reclaimed Water	From H.F Curren AWTP (between Maritime Blvd and Gatx Dr) to Bill Young Reservoir (south Hillsborough County between CR 39 and Boyette Road)	City of Tampa	• Tampa Reuse Study 2022 • Black & Veatch 2022	IPR - SW Augmentation	Use of reclaimed water to supplement the regional reservoir. It includes conveying 16 mgd to the Bill Young Regional Reservoir to supplement surface water supplies.	Yes	• Awaiting City Council decision (if denied, project will become infeasible)

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
R-28	Proposed Reservoir to Proposed Odessa Storage Tank and Pumping Facility	Proposed Reservoir in north Pinellas County to Odessa storage tank and pump station in Pasco County; Keystone/Tarpon Springs Rd and Gunn Highway	Pinellas County	• Pinellas County Reclaimed Water Interconnection Study Report June 2012 (District Project H012)	IPR - SW Augmentation	There may be an opportunity to increase the use of reclaimed water if the reclaimed water transmission and distribution systems could be interconnected among the now separate utilities.	Yes	
R- 29	Alderman Ford Lake (Medard Res.) - Fed with Reclaimed Water	Alderman Ford Lake near Fish Hawk/Lithia area in east Hillsborough County with Pleasant Grove Reservoir (Medard Res.) located southeast of Valrico and northeast of Fish Hawk	Hillsborough County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Withdrawal Credit	Indirect use of reclaimed wastewater for potential agricultural use, with water use permit exchange	Yes	• Low Yield • High Cost • Regulatory Requirements • Implementation • Environmental Protection
R- 30	Augment Lakes in NW Hillsborough with Reclaimed Water	Northwest Hillsborough County, Keystone/Lutz area	Hillsborough County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Withdrawal Credit	Utilize lakes as storage for surface water treatment plants or wellfield rehydration	Yes	• Low Yield • High Cost • Regulatory Requirements • Implementation • Environmental Protection
R- 31	Downstream Augmentation of Alafia River	Hillsborough County west of I-75, north of Boggy Creek	City of Tampa Hillsborough County	• SWFWMD 2001Tampa Bay Water • Short List 2002 Tampa Bay Water Developmental Study • 2003 SWFWMD 2006	Withdrawal Credit	Augmenting the flow of the Alafia River with surplus Howard F. Curren WWTP reclaimed water, at a point downstream of the withdrawal point for potable source. This augmentation would be designed to allow the increase of withdrawal from the Alafia River.	Yes	• Permitting • High Cost • System Integration Aspects • Treatment Aspects • Source Water Vulnerability • Implementation
R- 32	Manatee River Downstream Aug.	Bradenton area	Manatee County	• SWFWMD 2001 • Tampa Bay Water Long List 2001	Withdrawal Credit	Streamflow	No	• Location outside of tri-county area
R-33	Downstream Augmentation of Hillsborough River	Hillsborough River near Del Rio	City of Tampa	• SWFWMD 2006 • Tampa Bay Water Long List 2001 • Tampa Bay Water Concept Shortlist 2008	Withdrawal Credit	Utilization of reclaimed water from the City of Tampa's Howard F. Curren AWTP to augment flows in the Hillsborough River downstream from the Tampa Dam in conjunction with a 1-for-1 withdrawal upstream	No	• Permitting • High Cost • System Integration Aspects • Treatment Aspects • Source Water Vulnerability
R- 34	Hillsborough County South Central Regional Reclaimed Water	Regional	Regional	• SWFWMD 2001 • SWFWMD 2001	Withdrawal Credit	Utilize Hillsborough County reclaimed supply, storing in phosphate mine wells, and used by industrial users with groundwater supply exchange.	Yes	• Was not a supply at the time
R- 35	NW Hillsborough Wetland Augmentation	near Keystone/Lutz area	Hillsborough County	• SWFWMD 2001 • Tampa Bay Water Long List 2001 • SWFWMD 2006	Withdrawal Credit	Augmentation	Yes	

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
R- 36	Plant City Wetland	City of Plant City	Hillsborough County	• SWFWMD 2006	Withdrawal Credit	Rehydration / Wetland Restoration	Yes	
R- 37	Section 21 Wellfield Rehydration	In the Greater Northdale/ Egypt Lake-Leto area in Hillsborough County (owned by St. Petersburg)	City of St. Petersburg	• SWFWMD FY 2006	Withdrawal Credit	Restoring wetlands at the Section 21 Wellfield in northwest Hillsborough County with reclaimed water to allow increased groundwater withdrawals.	Yes	• High Cost • Low Yield • Regulatory Requirements • Implementation • Environmental Protection
R- 38	4G Ranch to Augment Tampa Bay Water Wellfields	35 miles north of Tampa, in Pasco County near Conner Preserve	Pasco County	• Tampa Bay Water 2022	Withdrawal Credit	The 176-acre built wetland receives excess reclaimed water from five plants in the area. Within this project, additional capacity can be used as an augment to increase Tampa Bay Water's nearby wellfields	Yes	
R-39	Desal Concentrate Discharge System Expansion with Reclaimed Water	From H.F Curren AWTP (between Maritime Blvd and Gatx Dr) to Tampa Bay Water desal plant (off of Big Bend Rd near the Big Bend Power Station)	City of Tampa Hillsborough County	• Tampa Reuse Study 2022 • Black & Veatch 2022	Withdrawal Credit	Reclaimed water transmission system from H. F. Curren AWTP to Desalination Plant and discharge structure to allow for increased production from facility.	Yes	
R-40	Reclaimed Water Salinity Barrier Systems	Regional	City of St. Petersburg	• 2019 Integrated Water Resources Master Plan	Withdrawal Credit	Would use reclaimed water to mitigate saltwater intrusion in coastal areas. Would increase freshwater supply at existing wellfields and/or to a new wellfield.	Yes	
R- 41	Punta Gorda Saltwater Barrier	South of Port Charlotte near Charlotte Park	Charlotte County	• SWFWMD 2001 • Tampa Bay Water Long List 2001	Withdrawal Credit	Reclaimed water is injected near the coast as a saltwater intrusion barrier to prevent the inland migration of seawater to wellfields in the Punta Gorda area.	No	• Location outside of tri-county area
R-42	Additional Surface Water available from the City of Tampa PURE concept	City of Tampa	City of Tampa	• Black & Veatch 2022	Withdrawal Credit		Yes	
R-43	Consolidated WUP Increase - Withdrawal	Regional	Regional	• Black & Veatch 2022	Withdrawal Credit		Yes	
R- 44	South Hillsborough Wellfield (via SHARP Credits)	Along the eastern shore of Tampa Bay	Hillsborough County	• Tampa Bay Water Shortlist 2018	Withdrawal Credit		Yes	
OTHER								
O- 1	Import Water from Polk County Regional Water Co-op/Lakeland/Sumter County/Manatee County (Peace River)	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Individual Input 2001 • Tampa Bay Water Long List 2001 • Black & Veatch 2022	Other	Interregional project to provide surplus water	No	• Polk County already in a water shortage; no water supply to spare
O- 2	Importation with Tankers (Ships or Trucks or Rail)	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Import water from other locations	Yes	• High cost

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
O- 3	Interconnects with other Regional Water Supply Authorities	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Interconnections with other regional suppliers	Yes	• Significant coordination with multiple entities
O- 4	Air Condensation	Regional	Regional	• Citizen Input • Tampa Bay Water Long List 2001 • Tampa Bay Water 2022	Other	Condense airborne moisture for drinking water	Yes	• High Cost
O- 5	Aquifer Storage and Recovery (General)	C. W. Bill Young Regional Reservoir located between Doe Branch and Long Flat Creek off of Boyette Rd	Hillsborough County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Capture surface water during periods when supply exceeds demand, treat, and pump it into an aquifer, and withdraw it as groundwater during periods of low surface water flows and high demand	Yes	• Must be associated with a surface water source
O- 6	Cisterns for individual homes	Regional	Regional	• Sun Center Citizen Input • Tampa Bay Water Long List 2001	Other	Stormwater captured for outside watering/shower (particularly in coastal areas)	Yes	
O- 7	Clay (and Biosolids) Soil Augmentation for Soil Moisture Retention	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Reduce surface runoff; site specific option	Yes	
O- 8	Condensate from Cooling Tower Steam Output	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Cooperative effort with industry	No	• Most cooling water towers do their own condensation and recycling within the plant
O- 9	Deep Tunnel Storage	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Construct underground storage reservoir or tunnel instead of at surface	Yes	• Must be associated with a surface water source • High Cost
O- 10	Films to Reduce ET losses	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Cover reservoirs to capture water normally lost through natural process of evaporation	No	• Previous implementation proven to have little long-term benefits
O- 11	Icebergs	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Tow icebergs from North Atlantic to freshwater basin to augment available supply in region	Yes	• High Cost
O- 12	Offshore Storage of Fresh Water/Portable Water	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Construct reservoir in Gulf instead of on land	No	• Must be associated with a surface water source • High Cost

Label	Concept	Location	Relevant City/County	Concept Development History	Source Type	Description	Feasible (Y/N)	Project Considerations
O- 13	Produce Water with Oil Production	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Supply would require additional treatment for brine water	No	• No oil drilling rigs close by
O- 14	Reduce evapotranspiration losses from Hillsborough River	Hillsborough River near Del Rio	Hillsborough County	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Cover river/reservoir to capture water normally lost through natural process of evaporation	No	• Evaporation and precipitation rates are approximately equal on average; film would need to accommodate inflow through film
O- 15	Regulatory Relief - Clarify Intent	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Reduce the planned permitted wellfield withdrawal cutbacks	No	
O- 16	Sealing Unconfined Discharges	Regional	Regional	• WCRWSA Resource Development Plan 1996 • Tampa Bay Water Long List 2001	Other	Prevent groundwater flow from water supply aquifers to discharge to the Gulf	No	• Viable only in specific instances; no feasible applications currently known
O- 17	Seek relief from the SWUCA and MIA	Regional	Regional	• Tampa Bay Water 2022	Other	Seek relief from the SWUCA and MIA, due to measured recovery in the area, which would enable a wellfield without the need for SHARP credits	Yes	
O- 18	Cooperative projects with Polk County and its Master Water Plan projects	various locations throughout Polk County	Polk County	• Tampa Bay Water 2022	Other	Interregional project to provide surplus water	Yes	
O- 19	Large freshwater users to use reclaimed water	Regional	Regional	• Tampa Bay Water 2022	Other	Would reduce demand for potable supply	Yes	
O-20	Skulee Farms at Lake Thonotosassa	just south of Lake Thonotosassa	Hillsborough County	• Tampa Bay Water / HR Tampa Bay LLC	Other	Aquifer conservation	Yes	
TOTAL FEASIBLE PROJECTS								**121**
TOTAL PROJECTS								**188**

Appendix G. Coarse Screening Technical Memorandum

FINAL

COARSE SCREENING TECHNICAL MEMORANDUM

Long-Term Master Water Plan

TAMPA BAY WATER PROJECT NO. 09016
BV PROJECT NO. 413437
BV FILE: TASK 5

PREPARED FOR

Tampa Bay Water

30 MARCH 2023

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LIST OF ABBREVIATIONS

Actiflo	Microsand ballasted clarification
AOP	Advanced Oxidation Process
ASR	Aquifer storage and recovery
AWG	Atmospheric Water Generating System
AWP	Advanced Water Purification
AWTP	Advanced Wastewater Treatment Plant
BAF	Biologically Active Filtration
BWRO	Brackish Water Reverse Osmosis
CCI	Construction Cost Index
CEC	Contaminants of Emerging Concern
DAF	Dissolved Air Flotation
DPR	Direct Potable Reuse
ELA	Engineering, Legal, and Administrative
ENR	Engineer News Record
FAC	Florida Administrative Code
FAT	Full Advanced Treatment
GAC	Granular Activated Carbon
IPR	Indirect Potable Reuse
LTMWP	Long Term Master Water Plan
MAR	Managed aquifer recharge
MFL	Minimum Flow Level
mgd	Million Gallons per Day
mg/L	Milligrams per Liter
MIA	Most impacted area
O&M	Operations and Maintenance
OH&P	Overhead and Profit
PFAS	per- and polyfluoraoalkyl substances
PRMRWSA	Peace River Manasota Regional Water Supply Authority
PURE	Purify Usable Resources for the Environment

RO	Reverse Osmosis
SHARP	Southern Hillsborough Aquifer Recovery Program
SIX	Suspended Ion Exchange
SWRO	Seawater Reverse Osmosis
SWUCA	Southern Water Use Caution Area
SWTP	Surface Water Treatment Plant
TOC	Total Organic Carbon
TM	Technical Memorandum
UV	Ultraviolet
WRF	Water reclamation facility
WUP	Water Use Permit

1.0 Introduction and Background

Tampa Bay Water is a regional water supply authority created in 1998, which provides wholesale water for its six-member governments: Hillsborough, Pasco and Pinellas counties, and the cities of New Port Richey, St. Petersburg and Tampa. Tampa Bay Water's Long-term Master Water Plan (LTMWP) documents how Tampa Bay Water meets its unequivocal obligation to provide quality water to the member governments now and in the long-term future. The Amended and Restated Interlocal Agreement (referred to as the Interlocal Agreement) requires the Master Water Plan be updated every five years. Thus, the LTMWP ensures that Tampa Bay Water prepares for the provision of adequate supplies over a 20-year planning horizon.

The objectives of the LTMWP are to meet the requirements set forth in Section 2.09 of the Interlocal Agreement, which include:

- Identification of current customers, projects, and future customers;
- Review and list a general inventory of all existing Tampa Bay Water Supply Facilities;
- Identification of a capital improvement program for Tampa Bay Water;
- Review of all current Tampa Bay Water environmental permits, existing regulations and projected regulations;
- Identification of all proposed new water supply facilities;
- Evaluation of Tampa Bay Water staffing;
- Hydraulic analysis of Tampa Bay Water's Water Supply Facilities, both existing and proposed;
- Evaluation of present and future sources of water and treatment requirements for those sources in terms of capacity, reliability, and economy; and
- Update of the list of proposed Water Supply Facilities required to meet the anticipated quality water needs of the member governments for the next 20 years.

This technical memorandum (TM) focuses on meeting the last objective bullet, "Update of the list of proposed Water Supply Facilities required to meet the anticipated quality water needs of the member governments for the next 20 years." A methodical process of water supply option identification, evaluation and screening was proposed to meet the Interlocal Agreement objective as illustrated in **Figure 1**. Specifically, this TM summarizes the coarse screening evaluation of the Universe of Options to reduce the number of options to approximately 50.

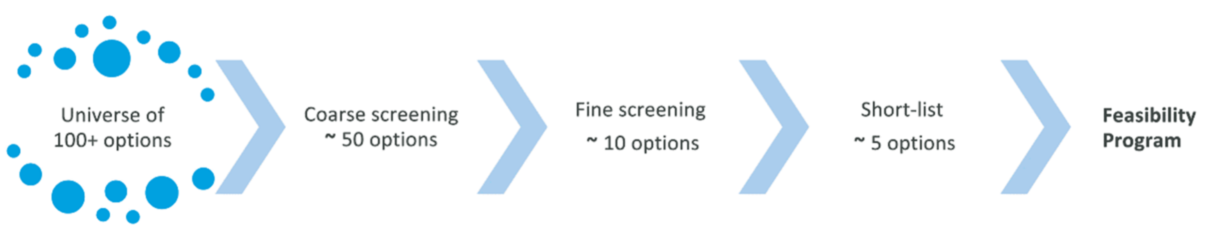

Figure 1 Water Supply Options Shortlist Process

2.0 Coarse Screening Process, Criteria, and Results

The Coarse Screening process began by evaluating all 121 viable options identified in the Universe of Options TM. Options were evaluated and scored based on three equally weighted, Board approved selection criteria, which are further broken down into eight specific sub-criteria. The criteria were weighted within each category based on a workshop consensus with Tampa Bay Water staff. Upon further investigation during the Coarse Screening Evaluation, some options were identified that contained elements that made them infeasible and were therefore removed from the coarse screening evaluation. All other options were scored and ranked.

2.1 Options Removed During Evaluation Due to Infeasibility

During the Coarse Screening evaluation, four options were eliminated early on due to circumstances that made them infeasible, which decreased the options from 121 to 117. The eliminated options included the following: Cone Ranch Wellfield, City of Tampa PURE Project, Surface Water Treatment Plant (SWTP) Expansion and a new SWTP without new sources.

Cone Ranch Wellfield was removed from further consideration based on current negotiations between Tampa Bay Water and Hillsborough County, who owns the property. The options related to the City of Tampa's Purify Usable Resources for the Environment (PURE) concept, specifically augmenting the Hillsborough River, were also removed. The models indicated that the PURE concept would increase the reliability of the existing surface water source but would not increase the availability of the water supply[1]. It is noted that IPR and DPR concepts leveraging City of Tampa reclaimed water remained in consideration for coarse screening. The expansion of the Surface Water Treatment Plant was removed as this project was previously selected for implementation by the Board of Directors, and design and construction activities will already be taking place. A new SWTP added to the existing system without additional water supply sources was also deemed infeasible due to the limited capacity and resources of the existing surface water supply systems. Therefore, the option including a new SWTP at the existing reservoir was removed. These options have been removed from the database results in **Appendix A**.

2.2 Criteria Selection and Evaluation Process

The criteria ranking workshop weighting results are shown in **Table 1**. The table also includes the description of each criterion's numeric score. For each criterion, a score of one, three or five was available, with one being the worst and five being the best score. For this coarse screening phase, intermediate scores of two and four were not provided.

During a workshop with Tampa Bay Water staff, held on November 21, 2022, it was agreed upon that the three main criteria categories would be weighted equally, thereby remaining consistent with past LTMWPs and Board direction. After that was established, the criteria in each category were voted on by staff, using a pairwise approach, to assign weights within the three main categories.

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[1] Subsequent to the coarse screening evaluation, Tampa Bay Water received a request from the City of Tampa to consider water supply options that include all or a portion of the City's 50 million gallons/day of reclaimed water. These options will be addressed separately in a developmental alternatives program to be described in future technical memoranda.

Each option was assigned a score for each criterion. That score was multiplied by the individual weighting and then again by the category weight, then summed together to determine the overall Coarse Screening score for each option. After each option was scored, the results were evaluated to determine which options would proceed to the Fine Screening Evaluation and which would be eliminated from further evaluation.

Table 1 Evaluation Criteria and Weighting

Criteria		Weighting	Numeric Score 1 (worst)	3 (medium)	5 (best)
Category: Environmental Stewardship – 33%					
Environmental Sustainability	Extent to which the option positively or negatively impacts the environment or requires mitigation, and efficiency of finished water produced	10%	• Likely to result in impacts to environmental systems and/or source waters resulting in mitigation requirements • Low finished water efficiency ratio	• Potential for some minor impacts to environmental systems and source waters • Moderate finished water efficiency ratio	• Environmental benefits and/or no negatives impacts to environmental systems and source waters • High finished water efficiency ratio
Regulatory / Ease of Permitting	Ease with which the option can be permitted considering local, state, and federal requirements, future regulations, and existing precedents	14%	• Existing permitting rules and regulations required by concept are not established • Concept is anticipated to involve challenging permits that require policy changes	• Rules and Regulations in place for all anticipated permits • Concept is anticipated to involve moderate permitting challenges with potential policy changes	• Rules and Regulations in place for all anticipated permits • Concept is not anticipated to encounter significant permitting challenges
Public Reception	How the public is expected to receive the given water supply option	9%	• Anticipated negative reception of concept • Significant public outreach required	• Anticipated neutral reception of concept or equal amounts of positive/negative reception • Public outreach required	• Anticipated positive reception of concept • Minimal public outreach required
Category: Cost – 33%					
Implementation and Feasibility	Ease of which the option integrates into existing system and is able to be expanded for long-term (including potential to treat contaminants of emerging concern (CECs) in the future) thus minimizing impacts on rates	19%	• Difficult or complex integration with existing system • Poor expansion potential	• Reasonable or moderate integration with existing system • Some expansion potential	• Easy integration to existing system • Good expansion potential

Criteria		Weighting	Numeric Score		
			1 (worst)	3 (medium)	5 (best)
Total Cost per 1,000 Gallon	- Total cost per 1,000 gallons, including capital and operations/maintenance expenditures over a 30-year period based on anticipated annual average yield	14%	• Greater than $7.00 per 1,000 gallons • High impacts on rates	• $3.50 - $7.00 per 1,000 gallons • Medium impacts on rates	• Less than $3.50 per 1,000 gallons • Low impact on rates
Category: Reliability – 34%					
Yield Reliability	Extent to which the option has long-term yield reliability, is impacted by seasonal variations (drought vs wet weather conditions and resulting water quality changes), and is impacted by potential climate change	14%	• Uncertain long-term yield reliability • Significant impacts on supply capacity -based on seasonal or long-term variations • Impacts anticipated from potential climate change	• Moderate reliability of long-term yield • Moderate impacts on supply capacity-based on seasonal or long-term variations • Some vulnerabilities to potential climate change	• High reliability of long-term yield • Minimal impacts on supply capacity based on seasonal or long-term variations • Minimal impacts from potential climate change
Regional System Impacts	Extent to which the option increases ability to maintain level of service; ability of the option to provide service/relief during emergency events	11%	• Does not increase system reliability • Does not satisfy emergency scenario conditions	• Moderately increases system reliability • Moderately improves some emergency scenario conditions	• Significantly increases system reliability • Significantly improves most emergency scenario conditions
Contractual Requirements	The extent to which the option aligns with the terms of existing agreements, contracts, and governance documents	9%	• Option requires new contract documents / types of contracts or • Significant changes to existing documents	• Option requires moderate changes to existing contract documents, but • Requires no new contract documents / types of contracts	• Option requires no changes to existing contract documents, or • No new contract documents / types of contracts
Total		**100%**			

2.3 Coarse Screening Evaluation

The eight criteria are described in more detail in the following sections with discussion on justification for the scoring by source water type.

2.3.1 Environmental Stewardship - Environmental Sustainability

The Environmental Sustainability criterion evaluated the extent to which the option positively or negatively impacts the environment or requires mitigation, as well as the finished water efficiency ratio or overall plant recovery (i.e., fraction of finished water produced relative to raw water supplied). Options that scored a one were likely to result in impacts to environmental systems or source waters and have a low finished water efficiency ratio. Options that scored a three consisted of projects that had potential for minor impacts to environmental systems or source waters and have a moderate finished water efficiency ratio. Options that scored a five consisted of projects that had environmental benefits or no negative environmental impacts and/or had a high finished water efficiency ratio. Finished water efficiency ratios were evaluated by the following thresholds:

- Low ranges from 0% to 60%
- Moderate ranges from 60% to 85%
- High ranges from 85% to 100%

Seawater

Options involving seawater desalination were all scored as a three for environmental sustainability. While seawater desalination options do not require mitigation, they are associated with having high energy consuming unit processes and pumping systems and may have potential environmental impacts on marine life associated with the concentrate discharge. Seawater desalination has a low finished water efficiency ratio of approximately 57%.

Surface Water

Surface water supply options were generally scored as a one or three with a few options scoring as a five. Although surface water withdrawals are heavily permitted, additional withdrawals have the potential to negatively impact the environment, or mitigation may be required. In general, the surface water source type has a high finished water efficiency ratio of approximately 94%, although other factors, such as environmental impacts and mitigation can affect the individual scores. Options including withdrawals from the Hillsborough River or Alafia River were given a score of one, due to high potential of mitigation required. Options withdrawing from a new surface water source were given a score of five, as there are less existing withdrawals on the source, and the potential for environmental impacts is less than a source with existing demands.

Fresh Groundwater

Options involving fresh groundwater supply were scored as a one for environmental sustainability. This rating is primarily due to the environmental impacts of increased groundwater withdrawals on local water supplies and wetlands. Utilization of fresh groundwater sources can result in mitigation requirements. Although fresh groundwater has a high finished water efficiency ratio of approximately

98%, the potential impacts to the environment and subsequent mitigation account for the lower score in this criterion.

- **Brackish Groundwater**

All brackish source water options were scored as a three for environmental sustainability. Utilization of brackish groundwater sources could potentially impact the natural state of the environment with relatively low impact on wetlands and lakes due to the assumed depths of the wells. Brackish source water has a high finished water efficiency ratio of approximately 88%.

- **Potable Reuse and Withdrawal Credits**

Options related to potable reuse and withdrawal credits include source options involving direct potable reuse (DPR), indirect potable reuse (IPR) via surface water augmentation and aquifer recharge, surficial aquifer recharge via wetlands and natural treatment systems, and withdrawal credits/expansion of permitted withdrawals.

All DPR options were scored as a five for environmental sustainability. DPR options reduce stress on environmental systems and reduce dependence on new and existing source water supplies (surface water, fresh groundwater, brackish groundwater, seawater). DPR options have a moderate finished water efficiency ratio of approximately 74%. Since the DPR treatment scheme includes reverse osmosis (RO), the process will generate a concentrate waste stream, which will be disposed of via deep injection. Deep well injection is assumed to be feasible and will have limited environmental impacts.

The majority of IPR options were scored as a three for environmental sustainability, while a few options were scored as a five. IPR options involving surface water augmentation and aquifer recharge scored a three due to the potential for perceived minor impacts to the environment, such as chemical reactions between the treated and surface waters, as well as the moderate finished water efficiency ratio of approximately 71-74%. The options that scored as a five involve a relatively high flow increase of surface water augmentation from new and/or existing reservoirs. The IPR treatment scheme also includes RO, which generates a concentrate waste stream, which will be disposed of via deep well injection. Deep well injection is assumed to be feasible and will have limited environmental impacts.

Similar to DPR and IPR, options involving withdrawal credits generally were scored at a three or a five, depending on specific considerations. Withdrawal credit options that replenish and pull from surface water sources or involve groundwater recharge scored a three. Withdrawal credit options involving wetland augmentation and rehydration of the surficial aquifer via natural/environmental systems scored a five. The finished water efficiency ratio for withdrawal credits varies depending on the proposed configuration. Withdrawal credit options have a finished water efficiency ranging from 25% to 98%, depending on the specific supplementation and withdrawal strategy.

2.3.2 Environmental Stewardship - Regulatory / Ease of Permitting

The Regulatory and Ease of Permitting criteria evaluated the ease with which an option could be permitted considering local, state, and federal requirements, future regulations, and existing precedents. Generally, options where the required existing permitting rules and regulations were not established, or where the option was anticipated to involve challenging permits that would require policy changes, were given the lowest score of one. Options where rules and regulations were in place for all anticipated permits, but moderate permitting challenges with potential policy changes were anticipated, were given a three. And options where all rules and regulations were in place for all anticipated permits, and significant permitting challenges were not anticipated, were given the highest score of five.

Seawater

The expansion of the existing Desalination Plant was given a score of five, since permits for the facility are existing, and significant challenges associated with obtaining modifications to the existing permits is not anticipated. New desalination plants were given a score of three, as well as any new distillation plants. All regulations and permits do exist, but some challenges with permitting, including the permitting of any intakes, is anticipated.

Seawater source options outside of those mentioned above were given a score of one. These options include the harvesting of spring water in the Gulf of Mexico, an offshore desalination vessel, and distillation using steam from a co-located power plant.

Surface Water

Surface water scores ranged from one to five. Options involving aquifer recharge as storage options were generally given a score of five. General surface water options were given a score of three, since permits do exist, but challenges in obtaining withdrawal permits would be anticipated. Options involving springs were given a score of one due to permitting challenges related to the Spring Protection Act. Scores of one were given to concepts involving the Hillsborough River, streams already at their minimum flow level (MFL), streams that would include coordination with several entities and limited supply information, and dams.

Fresh Groundwater

Fresh groundwater sources were generally given a score of three. Options involving the increase of a consolidated water use permit were given a score of one since the withdrawal amount would need to be increased. Additionally, options outside of the Tampa Bay Water service area were also given a one, due to the extensive coordination required to permit and use that water.

Brackish Groundwater

Brackish Groundwater sources were given a score of three. There are existing pathways for permits, but withdrawals in addition to existing water use permit amounts would need to be approved. It is anticipated that brackish groundwater withdrawals would involve less effort to permit than fresh groundwater.

Potable Reuse and Withdrawal Credits

All DPR options were given a score of one. Although regulations are being developed, there is no finalized regulation in the State of Florida for DPR.

All IPR options were scored as a three. There are existing regulations and permits for both IPR with groundwater and IPR with surface water, however, some challenges with obtaining the necessary permits are anticipated.

Withdrawal credit options including wetland and aquifer augmentation were generally scored as a three. The South Hillsborough Wellfield via South Hillsborough Aquifer Recharge Project (SHARP) credits was scored as a five since permitting for the SHARP wells has already been completed and the regulators have expressed support. The option to blend Tampa Bay Water's Seawater Desalination Plant concentrate discharge with reclaimed water received a score of one, due to the unclear path in permitting this discharge.

2.3.3 Environmental Stewardship - Public Reception

Public Reception criteria is how the public is anticipated to receive the given water supply option. Options that scored a one were generally options that included new facilities and new treatment technologies that would require a significant amount of public outreach. Options that scored a three have an anticipated neutral reception of the option or equal amounts of positive and negative reception. Options that scored a five would have an anticipated positive reception of the option and would only require minimal public outreach.

- **Seawater**

  All Seawater options were scored as a five. Seawater is a source type that the public is comfortable with and perceive as a consistent reliable source. Public outreach would be required for seawater source types, particularly related to concentrate discharge, but Tampa Bay Water has extensive experience with this from the existing Desalination Plant.

- **Surface Water**

  Surface water options were generally scored as a three or five. Surface water is a source type that is familiar to the public, however there is a lot of interest and concern about the health of local streams, rivers, lakes, springs, wetlands, reservoirs and creeks. Options that included withdrawals from springs scored as a three and are anticipated to require public outreach. Options that included new transmission of treated or non-treated surface water, diversion of surface water flows, new storage facilities, and construction of aquifer storage and recovery (ASR) wellfields scored as a five, with minimal public outreach anticipated.

- **Fresh Groundwater**

  Fresh groundwater options were all scored as fives. Fresh groundwater is a source type familiar to the public. Public outreach would be required to assure the public that there would be no impacts to wetlands and over pumping would be avoided.

- **Brackish Source Water**

  Brackish source water options were mostly scored as a five. Brackish source water options that scored as fives consisted mostly of expansion of current facilities, specifically providing new RO treatment to existing facilities. Options that scored as threes would require new facilities and potential environmental concerns that would lead to additional public outreach more than other options that scored a five.

- **Potable Reuse and Withdrawal Credits**

All DPR and IPR options were given scores of one. It is anticipated that the public is unfamiliar with this supply source and reception would require significant outreach.

The scores for withdrawal credit options were project specific and varied between one to five. The Consolidated Water Use Permit (WUP) Increase is an example of an option that scored as a five. This option includes the use of reclaimed water to mitigate wetland impacts and allows for the withdrawal of additional groundwater. Minimal public outreach is anticipated. The South Hillsborough Wellfield via SHARP credits option was scored as a three. Although this option has already been presented to the public, it is anticipated that additional outreach will be required due to the injection of groundwater. The Section 21 Wellfield Rehydration concept scored a one due to the anticipated concern of the reclaimed water being close to a groundwater source.

2.3.4 Cost - Implementation and Feasibility

The implementation and feasibility criteria are the ease of which an option integrates into an existing system and can be expanded for the long-term. Options that scored a one were generally those that would be difficult or complex to integrate with an existing system and had poor expansion potential. Options that scored a three would have a reasonable or moderate integration with the existing system and some expansion potential. Options that scored a five would typically have easy integration into the existing system and good expansion potential.

- **Seawater**

New seawater desalination options were mostly given scores of one for implementation and feasibility due to the level of complexity of desalination facilities and complications related to integration with existing systems (including distribution system blending considerations and co-location with power plant infrastructure). Higher scores were designated for seawater desalination options involving expansion of the existing desalination plant since integration issues are minimized.

- **Surface Water**

Surface water options with poor expansion potential were typically scored as a one for implementation and feasibility. Surface water supply options involving new reservoirs or aquifer recharge scored a five due to greater potential for future expansion. Additionally, these options may require implementation of additional treatment technologies to address total organic carbon (TOC) to a lesser degree than groundwater sources; as well as per- and polyfluoroalkyl substances (PFAS) and other contaminants of emerging concern (CECs), pending future regulatory changes.

- **Fresh Groundwater**

All fresh groundwater supply options were given scores of one for implementation and feasibility. While the water quality and infrastructure for fresh groundwater supplies are easy to integrate into the existing system, they have poor potential for future expansion. Additionally, these options may require implementation of additional treatment technologies to address (TOC) to a greater extent than surface water; as well as per- and polyfluoroalkyl substances (PFAS) and other contaminants of emerging concern (CEC), pending future regulatory changes.

- **Brackish Groundwater**

  Most brackish groundwater supply options were scored as a three since the system would require some considerations for distribution system blending due to potential increased corrosivity of finished water from RO based treatment systems. Additionally, options along the coast and in Pinellas County have limited potential for future expansion since there are several existing wellfields in use which are reportedly facing increased water quality degradation and operational challenges.

- **Potable Reuse and Withdrawal Credits**

  DPR options were generally given scores of three or five for implementation and feasibility, depending on option specifics. Similar to brackish options, DPR options require careful consideration for blending to minimize the potential for increased corrosivity of finished water from RO-based treatment processes. DPR options have greater potential for future expansion, although the extent to which expansion is feasible depends on the proximity of reclaimed water providers relative to the proposed advanced water treatment facilities, and Tampa Bay Water drinking water treatment facilities.

  IPR options were typically given scores of either one or three for implementation and feasibility, depending on configuration details. Like the brackish groundwater and DPR options, IPR options require some considerations for distribution system blending due to potential increased corrosivity of finished water from RO-based processes, though the options have greater potential for future expansion.

  Withdrawal credit options scored similarly to DPR options, with most scoring as either a three or a five for implementation and feasibility. Withdrawal credit options involve expanded use of an existing water source (surface water or groundwater) resulting in easy integration into existing systems and provide significant expansion potential.

  Most of the reuse options have an inherent potential for future expansion, although the extent to which expansion is feasible depends on proximity to reclaimed water providers, proximity to discharge to environmental buffers (surface water or aquifer recharge wellfields), and proximity to water treatment facilities. In some cases, the distances between reclaimed water supply, advanced water treatment facility, environmental buffer, and drinking water treatment facility can create considerable implementation challenges.

2.3.5 Total Cost per 1,000 Gallons

The Coarse Screening life cycle costs reported as total cost per 1,000 gallons of potable water produced is inclusive of capital costs and operations and maintenance (O&M) expenditures over a 30-year period. These costs are preliminary and will be refined in each of the next steps of the LTMWP. The basis for scoring of total cost per 1,000 gallons is based on the following criteria.

- Options with total cost greater than $7.00 per 1,000 gallons were given a score of one.

- Options with total cost between $3.50 and $7.00 per 1,000 gallons were given a score of three.
- Options with total cost less than $3.50 per 1,000 gallons were given a score of five.

The capital costs are estimated at a Class V level (-50% up to +100%) and are inclusive of wellfields, intake structures, raw water transmission pipelines, treatment facilities and supporting infrastructure, finished water storage and pumping, and transmission pipelines to the nearest point of connection. Capital costs are based on the proposed design capacity of each option and include considerations for land acquisition and project financing. Conceptual O&M costs were developed based on the level of treatment required for each source type. The total cost per 1,000 gallons is calculated based on the average annual yield defined for each option. Additional details on the basis of estimate for developing the total cost per 1,000 gallons for each source type and option is outlined in **Appendix B**.

Seawater

Capital costs for seawater desalination options were developed based on the treatment processes outlined in **Appendix C**. O&M costs for seawater desalination were estimated to be $2.25 per 1,000 gallons. Options involving thermal desalination have considerably higher capital and O&M costs due to increased cost of treatment facilities and energy consumption. In cases where desalination facilities are being co-located with power plants, the capital costs are adjusted to reflect utilization of existing intake/outfall structures. In general, pipeline costs were estimated based on distances from the proposed desalination plant location to the nearest point of connection. All seawater desalination options received a score of one.

Surface Water

Capital costs for surface water options were developed based on the treatment processes outlined in **Appendix C**. Pipeline costs were estimated based on distances from the surface water source to the nearest point of connection. O&M costs for surface water treatment are estimated to be $0.75 per 1,000 gallons. While the capital and O&M costs for treating surface water supplies is relatively low, the total project cost is influenced greatly by the pipeline costs, especially for options involving springs with relatively low yield/supply and long pipelines. Scoring of total cost per 1,000 gallons for surface water supply options ranged from one to five.

Fresh Groundwater

Capital costs for fresh groundwater treatment options were developed based on the major treatment processes outlined in **Appendix C**. Pipeline costs were estimated based on distances from the proposed wellfield locations to the nearest point of connection. O&M costs for fresh groundwater treatment are estimated to be $0.50 per 1,000 gallons. While the capital and O&M costs for treating the fresh groundwater is relatively low, the total project cost is influenced greatly by the pipeline costs, especially in cases where the source water is far from the nearest point of connection. The total cost per 1,000 gallons for fresh groundwater options typically received a score of one or three, depending on wellfield location and associated pipeline costs.

Brackish Groundwater

Brackish groundwater capital costs were developed based on the major treatment processes outlined in **Appendix C**. Pipeline costs were estimated based on distances from the proposed wellfield locations to the nearest point of connection. O&M costs for brackish groundwater treatment are estimated to be $1.00 per 1,000 gallons. Scoring of total cost per 1,000 gallons for brackish groundwater options ranged from one to five and were heavily influenced by pipeline distances and associated pipeline costs. Additionally, the option involving brackish water blending to expand the existing seawater desalination plant received a score of one due to the high capital and O&M costs associated with seawater desalination.

Potable Reuse and Withdrawal Credits

Capital costs for DPR treatment options were developed based on the major treatment systems defined in **Appendix C**. Pipeline costs were estimated based on distances from the water reclamation facility (WRF) to the proposed advanced water treatment facility and drinking water treatment plant. In general, O&M costs are assumed to be $1.75 per 1,000 gallons treated. Scoring of the total cost per 1,000 gallons for DPR options generally received a score of one. Costs for the reclaimed water were not considered as part of these estimates.

Capital costs for IPR treatment options were developed based on the major treatment systems defined in **Appendix C**. IPR options involving surface water augmentation include the capital cost of surface water treatment facilities, pipeline costs from the identified wastewater source, and the appropriate IPR treatment systems. The total O&M cost is inclusive of IPR and surface water treatment and is estimated to be approximately $2.15 per 1,000 gallons. IPR options involving aquifer recharge include the capital cost of groundwater treatment facilities in addition to the IPR treatment systems. The total O&M cost is inclusive of IPR and groundwater treatment and is estimated to be approximately $1.90 per 1,000 gallons. Total cost per 1,000 gallons for IPR options typically received a score of one or three.

The withdrawal credit options had a wide range of considerations related to the level of treatment required, resulting in a wide range of total cost per 1,000 gallons. Some options involve expansion of groundwater withdrawal permits and utilization of existing wellfields and treatment facilities to provide increased water supply and only consider O&M costs. In other cases, the withdrawal credits rely on recharge and rehydration of surficial aquifer via wetlands and natural treatment systems to enable increased groundwater withdrawals. In cases where reclaimed water is being discharged downstream of the withdrawal point, the options consider only the cost of surface water treatment. Only one option (R-30) involves surface water augmentation upstream of the treatment facility and therefore includes costs associated with IPR for augmentation and surface water treatment for withdrawal flows. Scoring of total cost per 1,000 gallons for options involving withdrawal credits varied considerably (ranging from one to five) and was evaluated on a case-by-case basis.

2.3.6 Reliability - Yield Reliability

The yield reliability criterion is the extent to which an option has long-term yield reliability, is impacted by seasonal variation, including drought or wet weather conditions, and is impacted by potential climate change. Options that scored a one were typically those that had uncertain long-term yield reliability, significant impacts on supply capacity based on seasonal or long-term variations, or impacts anticipated from potential climate change. Options that scored a three were those that had moderate long-term yield reliability, moderate impacts on supply capacity based on seasonal or long-term variations, or some vulnerabilities to potential climate change. Options that scored a five typically had high reliability of long-term yield, minimal impacts on supply capacity based on seasonal or long-term variations, and minimal impacts from potential climate change.

- **Seawater**

  Seawater options were given a score of five. Outside of specific site restrictions or limitations, such as being experienced at the existing Desalination facility, seawater is reliable in the long-term and is not as susceptible to seasonal changes as other source types. Impacts from seasonal water quality concerns such as red tide will need to be managed in the designs.

- **Surface Water**

  Surface water options were typically scored as either a one or a three due to the moderate to high environmental impacts on supply availability. Springs and stormwater were generally scored as a one since yields would be highly susceptible to drought and seasonal changes. Options sourcing from rivers were typically scored at either a one or a three depending on the predicted yield. Lower yield options received a score of one, as rivers with lower supply capacities would be more susceptible to environmental changes than rivers with moderate to higher supply capacities, which received a score of three. Supply from lakes received a score of three since there is some anticipated susceptibility to potential long-term environmental changes. Water sourced from creeks generally received a score of three since many of the options include pumping from creeks into a storage vessel, providing a buffer to decrease environmental vulnerabilities of the stored supply. Lastly, surface water aquifer storage and recovery (ASR) and managed aquifer recharge (MAR) options were evaluated and received a score of three.

- **Fresh Groundwater**

  Options with fresh groundwater sources typically received a score of one or three due to the moderate to high impacts on over pumping during dry weather and long-term variations due to climate change. Options that were previously noted in past master water plans to have susceptibility to drought, changing hydrogeologic conditions associated with other existing wellfields in the area, low predicted yields, and environmental hazards received a score of one. Other options that had no previously known reliability issues received a score of three.

- **Brackish Source Water**

  Options with brackish source water generally received a score of one or three. Options that received a score of one were those that had low yield reliability, as identified in previous long term master water plans. Options with greater reliability scored a three. Although brackish wells are typically not affected seasonally, there are long term reliability concerns related to climate change, as water quality may degrade due to saltwater intrusion from sea level rise.

- **Potable Reuse and Withdrawal Credits**

  DPR, IPR and withdrawal credit options typically received a score of three since the availability of excess reclaimed water is moderately affected by seasonality and environmental factors. Generally, WRFs have higher excess reclaimed water supply in the wet season than in the dry season which would therefore decrease reliability of the source water in the dry months unless sufficient storage is provided.

2.3.7 Reliability - Regional System Impacts

The regional system impacts criterion describes the extent to which an option increases the ability to maintain level of service and also provides service and or relief during emergency events. Options that scored a one were those that neither increased system reliability nor satisfied emergency scenario conditions. Those that moderately increased system reliability and moderately satisfied emergency scenario conditions scored a three. Options that significantly increased system reliability and significantly improved most emergency scenario conditions scored a five.

To determine the regional system impacts for each project option, annual average yield and location of the anticipated supply were considered. Locations with less points of connection to the regional system would benefit more from an option, even if the option contained less yield. Therefore, scores were based on the location of the option to reflect the additional water supply to be added in the context of the integration into the regional system.

- **Hillsborough County and City of Tampa**

  Hillsborough County and the City of Tampa are the most integrated into the regional pipeline system with several points of connection and have a higher resiliency to asset failures. However, the population and demand growth in southern Hillsborough County is currently the highest in the region. Therefore, scoring for options in this area was mostly based on finished water yield. Generally, options located in Hillsborough County or the City of Tampa that have an annual average yield of less than 8 million gallons per day (mgd) scored a one, options between 8 and 15 mgd scored a three, and options greater than 15 mgd scored a five.

- **Pasco County and City of New Port Richey**

  Pasco County and the City of New Port Richey are moderately integrated into the regional pipeline system with some points of connection. Pasco County has the second highest population and demand growth. Options located in Pasco County or the City of New Port Richey that have an annual average yield of less than 5 mgd scored a one, options between 5 and 10 mgd scored a three, and options greater than 10 mgd scored a five.

  It can be noted that projects with no defined location were scored based on the criteria outlined for Pasco County and the City of New Port Richey under the assumption that those project options would be implemented in a location that is moderately integrated into the regional pipeline system.

- **Pinellas County and City of St. Petersburg**

  Pinellas County and the City of St. Petersburg are not as integrated into the regional pipeline system with only one point of connection each. Therefore, increasing system reliability and improving emergency conditions can be done with lower yield project options. Options located in Pinellas County and the City of St. Petersburg that have an annual average yield less than 3 mgd scored a one, options between 3 and 8 mgd scored a three, and options greater than 8 mgd scored a five.

2.3.8 Reliability - Contractual Requirements

The Contractual Requirements criteria is the extent to which the option aligns with the terms of the Amended and Restated Interlocal Agreement, Master Water Supply Contract and other existing contracts and governance documents. Options that received a score of one require new contract documents, new types of contracts or significant changes to existing documents. Options that received a score of three require moderate changes to existing contract documents, but do not require new contracts. Options that received a score of five are not anticipated to require changes to existing contracts or contract type, or require new contract documents.

- **Seawater**

  All seawater source type options received a score of three. Tampa Bay Water has existing agreements with a power utility for property lease. However, moderate changes to existing contracts and/or new similar types of contracts may be necessary, depending on the project option.

- **Surface Water**

  All surface water source type options were received a score of five. No new agreements or contract types would be necessary.

- **Fresh Groundwater**

  All fresh groundwater source type options received scores of five. No new agreements or contract types would be necessary.

- **Brackish Groundwater**

  All brackish groundwater source type options received scores of five. No new agreements or contract types would be necessary.

- **Potable Reuse and Withdrawal Credits**

  All DPR, IPR, and Withdrawal Credit source water options received a score of one. All projects involving reclaimed water would at minimum require one new type of contract and/or agreement between Tampa Bay Water and the reclaimed water supplier.

3.0 Evaluation Results

The Coarse Screening Evaluation produced an overall score between one and five for each of the 117 project options. **Figure 2** illustrates the distribution of scoring from highest to lowest.

Upon reviewing the results distribution and options, the top 54 options were selected for further evaluation as part of the Fine Screening Evaluation. The 54 options were grouped into 16 project concepts, which can consist of a combination of multiple options based on similarities in water supply type and/or location. The 16 concepts are summarized in the section below and include the following breakdown of water supply types.

- Seawater Options: 4
- Surface Water Options: 17
- Fresh Groundwater Options: 2
- Brackish Groundwater Options: 7
- IPR Options: 5
- DPR Options: 5
- Withdrawal Credits Options: 7
- "Other" Options: 7

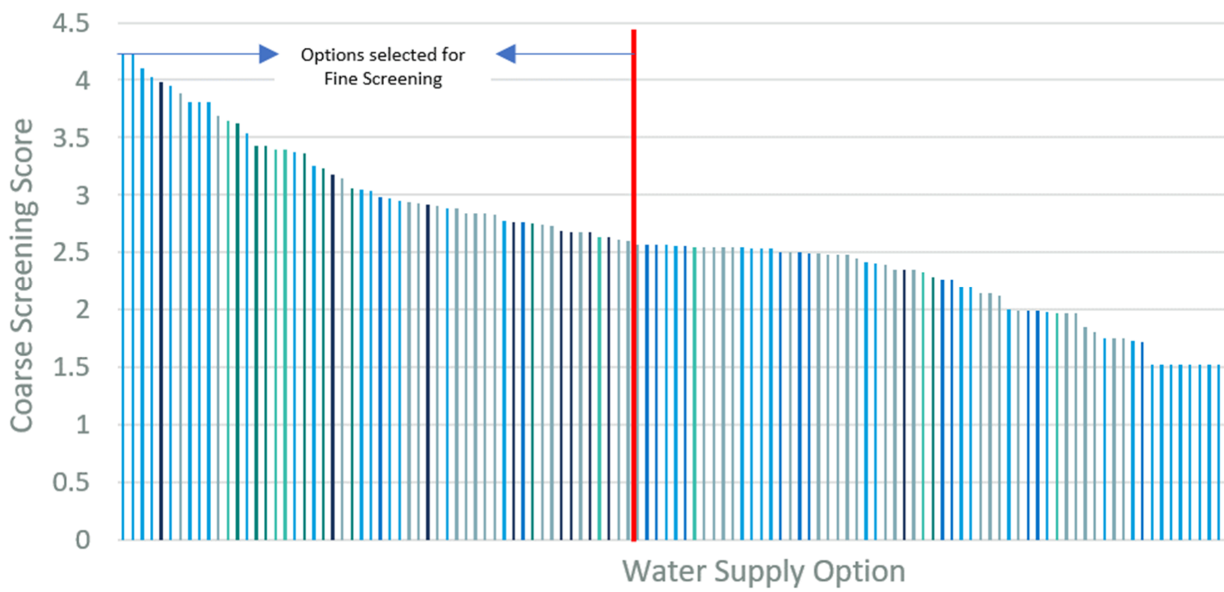

Figure 2 **Source Water Options Scoring Summary**

3.1 Concept 1 – Gulf Coast Desalination

The Gulf Coast Desalination concept would construct a new desalination plant, rated for 25 mgd, that would be co-located with the Anclote Power Plant in Pasco County. The plant would be designed to intake seawater from the Anclote Power Plant cooling water canal and feed it through treatment, finished water delivery, and residuals management including concentrate disposal.

3.2 Concept 2 - Pasco Brackish Water Wellfield

The Pasco Brackish Water Wellfield involves the construction of a new wellfield in Pasco County that sources brackish water from the Lower Floridan Aquifer. The brackish water is to be treated at a new RO facility with concentrate disposal via deep well injection. Brackish groundwater would be withdrawn from the Lower Floridan aquifer at an approximate depth of 700 feet below land surface. Potential brackish water supply locations would include Western Pasco County, Lower Central Pasco County, New Port Richey, and Rock Mine Lake.

3.3 Concept 3 – St. Petersburg Plant

Concept 3 includes two sub-concepts. Concept 3a is a St. Petersburg Desalination Plant which involves the construction of a new seawater desalination plant in eastern St. Petersburg. The plant would be rated for 20 to 30 mgd. Note that facility could also potentially be co-located with the Duke Energy Bartow Power Plant if the property is available.

Concept 3b is a St. Petersburg Brackish Plant which involves the construction of a new 5 mgd RO facility located in eastern St. Petersburg. The plant would source brackish groundwater from new wells near Lake Maggiore.

3.4 Concept 4 – Existing Desalination Plant Expansion

The Existing Desalination Expansion concept would allow for 10 mgd of additional yield through upgrades to the pretreatment process, RO units, post-treatment process, residuals management process including concentrate disposal, and distribution pumping.

3.5 Concept 5 – Existing Desalination Plant Blending

Concept 5 includes two sub-concepts. Concept 5a is the Existing Desalination Plant Blending with Reuse which would augment the existing Desalination Plant seawater influent feed with reclaimed water.

Concept 5b is the Existing Desalination Plant Blending with Brackish Water which would augment the existing desalination plant seawater influent feed with brackish water. The additional flow, in either variation, would require expansion to the pretreatment and chemical systems, additional RO trains, concentrate disposal, pretreatment residuals management system, and distribution pumping.

3.6 Concept 6 – North Pinellas SWTP via ASR/MAR Storage

The North Pinellas SWTP involves the construction of multiple recharge wells at a single site to store excess surface water during the wet-season months for later recovery. Surface water could be sourced from Lake Tarpon and would be stored in an ASR or Managed Aquifer Recharge (MAR) configuration. Water withdrawn from the wells would be treated at a new surface water treatment plant in North Pinellas County.

3.7 Concept 7 – New SWTP via Lake Thonotosassa

The New SWTP supplied by Lake Thonotosassa concept would involve a new 20 mgd surface water treatment plant constructed in Hillsborough County to treat raw water sourced from Lake Thonotosassa. The infrastructure requirements would also include surface water intake pumps, a new finished water storage tank, and a new finished water pump station.

3.8 Concept 8 – New SWTP at the Regional Reservoir via Increased Alafia Withdrawal

The New SWTP at the Regional Reservoir via Increased Alafia withdrawal concept would require the construction of a new SWTP plant at the existing C.W. Bill Young Reservoir in Hillsborough County to treat raw water withdrawn from the Alafia River. Modifications to the existing water use permit would be required to increase the allowable mid to high range withdrawals from the river to create more available supply.

3.9 Concept 9 – New SWTP and New Reservoir via New Supplies

The new SWTP and New Reservoir via New Supplies concept would require the construction of a new reservoir in conjunction with a new surface water treatment plant that would store and treat surface water supplies from new sources such as Little Manatee River, Shelly Lakes, or Bullfrog Creek.

3.10 Concept 10 – Eastern Pasco Wellfield

The Eastern Pasco Wellfield concept would incorporate the construction of a new Eastern Pasco Regional Wellfield, outside of the existing consolidated water use permit, to increase the groundwater supplies to the region. Water would be treated at a new groundwater treatment plant and distributed through the Cypress Creek Pump Station.

3.11 Concept 11 – Interconnect with Polk Regional Water Cooperative

An Interconnect with Polk Regional Water Cooperative concept would involve an interconnect where Tampa Bay Water would purchase finished water. A new transmission main would be constructed from the regional transmission system to approximately the City of Lakeland to connect to the Cooperative's water system.

3.12 Concept 12 – Interconnect with PRMRWSA

An Interconnect with Peace River Manasota Regional Water Supply Authority (PRMWSA) concept would involve an interconnect where Tampa Bay Water would purchase finished water. A new transmission main would be constructed from the regional transmission system to approximately the Manatee County border to connect to PRMRWSA's water system. It is anticipated that PRMRWSA already has plans to extend their transmission main into Manatee County.

3.13 Concept 13 – Transfer Groundwater Permits

Concept 13 includes two sub-concepts. Concept 13a involves transferring groundwater permits from large fresh groundwater users in Pasco County, including industrial and agricultural users. Concept 13b involves transferring groundwater permits from large fresh groundwater users located in Hillsborough County, also including industrial and agricultural users. Ideally, this concept identifies permits which may no longer be needed based on reduced mining or agriculture operations. Large user WUP credits would be purchased and transferred to Tampa Bay Water to allow for the withdrawal of groundwater from existing user wells, or new wells at a nearby location. The groundwater would be treated at a new groundwater facility near the existing wells.

3.14 Concept 14 – Increased Consolidated WUP

Concept 14 includes three sub-concepts. Concept 14a, Increased Consolidated WUP, would include modifications to the existing water use permit to allow for increased groundwater withdrawal. However, no supplementation would take place in conjunction with the increased groundwater withdrawal.

Concept 14b, an Increased Consolidated WUP – Pinellas County Reuse via Recharge, includes modifications to the existing water use permit to allow for increased groundwater withdrawal. Supplementation in the form of aquifer recharge with reclaimed water from a Pinellas County WRF would take place in conjunction with the increase in groundwater withdrawal.

Concept 14c, an Increase Consolidated WUP – Natural Systems Reuse via Recharge, also includes modifications to the existing water use permit, to allow for increased groundwater withdrawal. Supplementation in the form of natural recharge with wetlands, rapid infiltration basins, or percolation ponds would take place, outside of the existing Pasco County 4G wetlands project, to mitigate the impacts of groundwater withdrawal on wetland systems and allow for an increase in groundwater withdrawal.

3.15 Concept 15 – Direct Potable Reuse

Concept 15 is a DPR concept that would supplement existing SWTPs with reclaimed water in three different sub-concept configurations. Concept 15a is DPR implementation supplementing the existing Regional SWTP with reclaimed water treated to potable use standards from the Hillsborough County reuse system including Falkenburg Road AWTP.

Concept 15b is DPR implementation in Pinellas County, supplementing the S.K Keller WTP with reclaimed water treated to potable use standards from South Cross Bayou WRF.

Concept 15c is DPR implementation supplementing the existing SWTP with reclaimed water treated to potable use standards from the H.F Curren Advanced Wastewater Treatment Plant (AWTP).

3.16 Concept 16 – South Hillsborough Wellfield

Concept 16 includes the construction of the South Hillsborough Wellfield in three sub-concepts. Concept 16a is the South Hillsborough Wellfield, which would include building a new wellfield and groundwater plant in southern Hillsborough County. No supplementation would take place in conjunction with the groundwater withdrawal. Relief from the Southern Water Use Caution Area (SWUCA) and Most Impacted Area (MIA) would be sought, due to measured recovery in the area.

Concept 16b is the South Hillsborough Wellfield via SHARP, which would include building a new wellfield and groundwater plant in southern Hillsborough County. The groundwater would be made available from aquifer recharge providing a salinity barrier as part of the SHARP Program.

Concept 16c, South Hillsborough Wellfield via Indirect Potable Reuse, would include an advanced water purification (AWP) plant, two wellfield components (injection with reclaimed water supply from the H.F. Curren AWTP or Hillsborough County reuse system, and withdrawal wells down gradient from the injection, which would withdraw the reclaimed water) and a new groundwater treatment facility for potable use.

4.0 Conclusions and Next Steps

The Coarse Screen Evaluation has reduced the large number of concepts included in the Universe of Options to 16 concepts, including 8 additional sub-concepts, for consideration in the next steps of the water supply shortlist process, fine screening. All seven water supply sources (seawater, fresh surface water, fresh groundwater, brackish groundwater, potable reuse, withdrawal credits and other) are represented within the coarse screening results as summarized in **Figure 3** below. This comprehensive evaluation allows for a thorough and exhaustive review of the options available to Tampa Bay Water for the next regional water supply.

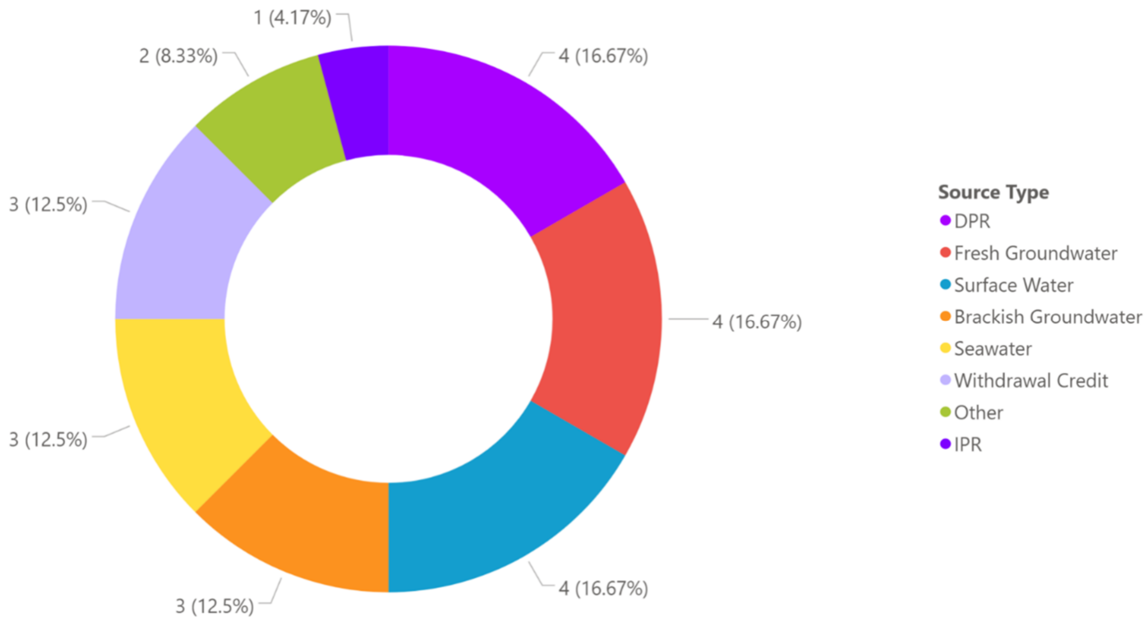

Figure 3 Water Source Options Summary (by Count)

The next steps in the shortlist process include:

- Define the Fine Screening Framework and Criteria.
- Evaluate the 16 concepts from the coarse screening process using the Fine Screening Framework and Criteria.
- Reduce the number of water supply concepts to approximately 10 concepts.
- Document the Fine Screening process in a technical memorandum.

Appendix A. Coarse Screening Evaluation Scoring

Label	Concept	Location	Relevant City/County	Source Type	Description	Evaluation Summary	Environmental Sustainability (10%)	Regulatory/ Ease of Permitting (14%)	Public Reception (9%)	Implementation / Feasibility (20%)	Total Cost per 1,000 Gallon (14%)	Yield Reliability (14%)	Regional System Impacts (11%)	Contractual Requirements (9%)	Annual Average Yield (mgd)	Life Cycle Cost ($/1000 gal)	Total Score
SEAWATER																	
D- 1	Gulf Coast Anclote Seawater Desalination Plant	Co-located with the Anclote Power Plant in SW Pasco County	Pasco County	Seawater	Develop a facility that could produce up to 25 mgd of potable water for use in Tampa Bay Water's distribution system. The facility would be co-located with the existing Anclote Power Plant, which is located in southwestern Pasco County and owned and operated by Progress Energy.	This option progressed as Concept 1 - Gulf Coast Desalination.	3	3	5	3	1	5	5	3	11.1	$9.85	3.40
D- 2	Desalination WTP at the Albert Whitted WRF	Albert Whitted WRF	City of St. Petersburg	Seawater	This alternative would build a new desalination WTP at the Albert Whitted site.	This option progressed as Concept 3a - St. Petersburg Desalination Plant.	3	3	5	3	1	5	5	3	13.32	$14.78	3.40
D- 3	Big Bend Distillation	Off of Big Bend Road in Apollo Beach area	Hillsborough County	Seawater	Using low pressure steam from the power plant to supply evaporators for distilling water	Feasibility and implementation challenges and high $/1000 gallon cost make this option currently impractical. Current distillation technology is generally more expensive on a life cycle cost basis than membrane desalination.	3	1	3	1	1	5	3	3	8.88	$10.36	2.33
D- 4	Saltwater Distillation	Regional	Regional	Seawater	Produce distilled water for potable use	High $/1000 gallon cost. Current distillation technology is generally more expensive on a life cycle cost basis than membrane desalination.	3	3	3	1	1	5	3	3	8.88	$12.63	2.61
D- 7	Tampa Bay (Big Bend) Desalination Plant Expansion	Apollo Beach	Hillsborough County	Seawater	This concept provides for a 10 mgd expansion to the existing 25 mgd Tampa Bay Water Desalination Plant. The facility has been commissioned since early 2008, providing approximately 10% of the Tampa Bay region's drinking water supply when running at full capacity.	This option progressed as Concept 4 - Existing Desalination Plant Expansion.	3	5	5	5	1	5	1	3	4.44	$9.08	3.64
D- 8	Offshore Discharges / Springs in the Gulf of Mexico: Crystal Beach Spring, Tarpon Springs, Cedar Island Springs, Jewfish Hole, Unnamed Spring No. 4	Tarpon Springs/ Palm Harbor Area	Pinellas County	Seawater	Harvest brackish water springs discharging in the Gulf of Mexico; SWFWMD completed a study in 2003; Florida Geological Survey Bulletin No. 31 (1998) mapped brackish springs in the Gulf.	This option is similar to BG-10, feasibility and implementation challenges and uncertain yield reliability make this option currently impractical.	3	1	3	1	1	1	5	3	8.88	$11.45	1.98
D- 9	Seawater Desalination Vessel	Regional	Regional	Seawater	Sea vessel that is a self-contained desalination plant.	Feasibility and implementation challenges and high $/1000 gallon cost make this option currently infeasible.	3	1	3	1	1	5	5	3	11.1	$15.53	2.54
SURFACE WATER																	
SW-1	6-Mile Creek Springs	SR 400 to the N, N US Hwy 301 to the E, Adamo Dr to the S, N 50th St to the west	City of Tampa	Surface Water	Utilization of existing springs with treatment	Low environmental sustainability, regulatory/permitting challenges and low yield make this option currently impractical.	1	1	3	1	1	1	1	5	0.098	$12.74	1.53
SW-2	Aripeka Springs	Northwest corner of Pasco County, near Belcher Mines Park	Pasco County	Surface Water	Utilization of existing springs with treatment	Low environmental sustainability, regulatory/permitting challenges, high $/1000 gallon cost and low yield make this option currently impractical.	1	1	3	1	1	1	1	5	0.294	$32.30	1.53
SW-3	Blue Sink (Ewanowski Springs)	In Carrollwood between 597 and N Florida Ave, near Curiosity Creek	City of Tampa	Surface Water	Use water from the Springs to supplement water flow to the Hillsborough River	Water is no longer available as a water supply, making this option infeasible.	1	1	3	1	1	1	1	5	2.94	$9.10	1.53
SW-4	Buckhorn Springs	In the Brandon/Bloomingdale area, south of Durant Rd	Hillsborough County	Surface Water	Utilization of existing springs within the Alafia Watershed with treatment	Low environmental sustainability, regulatory/permitting challenges and low yield make this option currently impractical.	1	1	3	1	1	1	1	5	1.96	$8.56	1.53
SW-7	Eureka Springs	Between Us 301 and I-75 off of Eureka Springs Rd	Hillsborough County	Surface Water	Utilization of existing springs with treatment	Low environmental sustainability, regulatory/permitting challenges, high $/1000 gallon cost and low yield make this option currently impractical.	1	1	3	1	1	1	1	5	0.098	$21.15	1.53
SW-10	Horseshoe Springs	7 miles north of Port Richey	City of New Port Richey	Surface Water	Utilization of existing springs with treatment	Low environmental sustainability, regulatory/permitting challenges, high $/1000 gallon cost and low yield make this option currently impractical.	1	1	3	1	1	1	1	5	0.392	$17.69	1.53
SW-12	Lettuce Lakes Springs	near Lettuce Lake Pkwy	Hillsborough County	Surface Water	Utilization of existing springs with treatment	Low environmental sustainability, regulatory/permitting challenges, high $/1000 gallon cost and low yield make this option currently impractical.	1	1	3	1	1	1	1	5	0.392	$12.43	1.53
SW-14	RO - Sulphur Springs	Sulphur Springs, east of Egypt Lake-Leto	City of Tampa	Surface Water	RO treatment of springs water providing year-round potable supply, with interconnection to regional system.	Low environmental sustainability and current inability to permit makes this option impractical.	1	1	3	1	3	1	1	5	3.92	$5.00	1.81
SW-16	Seven Springs	near SR 54	Pasco County	Surface Water	Utilization of existing springs with treatment	Low environmental sustainability, regulatory/permitting challenges, high $/1000 gallon cost and low yield make this option currently impractical.	1	1	3	1	1	1	1	5	0.049	$23.44	1.53
SW-18	Water Supply from Springs	Regional	Regional	Surface Water	Optimize use of high-quality springs water	Low environmental sustainability and regulatory/permitting challenges make this option currently impractical.	1	1	3	1	3	3	5	5	70.56	$3.90	2.51

Label	Concept	Location	Relevant City/County	Source Type	Description	Evaluation Summary	Environmental Sustainability (10%)	Regulatory/ Ease of Permitting (14%)	Public Reception (9%)	Implementation / Feasibility (20%)	Total Cost per 1,000 Gallon (14%)	Yield Reliability (14%)	Regional System Impacts (11%)	Contractual Requirements (9%)	Annual Average Yield (mgd)	Life Cycle Cost ($/1000 gal)	Total Score
SW-20	Lithia Springs	Off of Lithia Springs Rd in Fish Hawk	Hillsborough County	Surface Water	Utilization of existing springs with treatment	Regulatory and permitting challenges, along with low yield and feasibility and implementation challenges make this option currently impractical.	3	1	3	1	1	1	1	5	0.98	$9.91	1.73
SW-23	Anclote River – Starkey Ecosystem Enhancement Project	In northern Odessa, N of SR 54, W of 589, S of Ridge Rd	Pasco County	Surface Water	Direct piping to impacted wetlands on Starkey Wellfield to allow increased groundwater withdrawals	Low environmental sustainability and regulatory/permitting challenges make this option currently impractical.	3	1	5	1	3	1	3	5	5.88	$4.72	2.41
SW-26	Little Manatee River	Located within Little Manatee River State Park, west of US Highway 301 N, delivered to Lake Parrish located southeast of US Highway 301 N and south of the southern Hillsborough County border	Hillsborough County	Surface Water	Agricultural Supply (increase inflows to Lake Parrish, direct pipeline to agriculture users) / (increase inflows to Lake Parrish, treated water ASR, aquifer conveyance to agriculture users)	This option was combined with others into Concept 9 - New SWTP and New Reservoir via New Supplies.	1	1	5	5	3	1	3	5	13.72	$6.19	2.98
SW-27	Little Manatee River	Located within Little Manatee River State Park, west of US Highway 301 N	Hillsborough County	Surface Water	This project would include diversion of surplus water flows for storage in the regional reservoir	Supply from Little Manatee River is considered along with other in Concept 9 - New SWTP and New Reservoir via New Supplies.	1	1	5	5	1	1	1	5	0.392	$24.05	2.50
SW-32	Pithlachascotee River	East of SR 589 and west of US highway 41	Pasco County	Surface Water	Pump surface water during wet weather to Starkey or N. Pasco wellfields to rehydrate wetlands - increase wellfield yields.	Low yield and yield certainty along with high $/1000 gallon cost make this option currently impractical.	5	1	5	1	1	1	1	5	0.49	$15.25	2.12
SW-34	South Prong of Alafia River	In the area of S County Road 39, E Keysville Rd, and Lithia Pinecrest Rd	Hillsborough County	Surface Water	Surface water to be stored in phosphate settling pits and later injected into non-potable aquifer for recharge and eventual use by agricultural or industrial users.	This option was combined with others into Concept 9 New SWTP and New Reservoir via New Supplies.	1	3	5	5	3	1	1	5	3.234	$6.01	3.05
SW-35	Suwannee River	Begins at the Suwanee Sound, SW of Gainesville, and flows north toward Fort Union/Suwanee Springs area	Dixie County/Gilchrist County/Levy County	Surface Water	Multiregional partnership with Dixie, Gilchrist, & Levy counties for the use of Suwannee River as a surface water supply. Levy County is the proposed withdrawal location.	Low environmental sustainability, regulatory/ permitting challenges and high $/1000 gallons make this option currently infeasible.	1	1	5	1	1	3	5	5	19.6	$28.24	2.42
SW-37	Alafia Expansion	City of Riverview, Boyette area, NW of C.W Bill Young Reservoir	Hillsborough County	Surface Water	Increasing the allowable mid- to high-range withdrawals from the river at the existing Alafia River intake and pump station	This option progressed as Concept 8 - New SWTP at the Bill Young Reservoir via Increased Alafia Withdrawal.	1	3	5	5	5	3	5	5	98	$3.17	4.03
SW-40	Lake Tarpon	Between US Highway 19 N and E Lake Road, just south of Keystone Rd (Tarpon Springs)	Pinellas County	Surface Water	Collect and treat surface water from the lake during planned diversion periods, provide high-rate high volume storage, then recover the stored water. To accomplish this an intake structure, pre-treatment facility, ASR storage wells, post treatment facility, and transmission facilities would be required.	This option was combined with others into Concept 6 North Pinellas County SWTP.	5	3	5	1	1	3	3	5	3.626	$7.61	2.89
SW-41	Surface Water Supply from Lake Thonotosassa	near Fort King Hwy	Hillsborough County	Surface Water	Raw water supply, treatment, and distribution to the potable water supply.	This option progressed as Concept 7 - New SWTP via Lake Thonotosassa.	1	1	5	5	3	3	1	5	2.94	$4.43	3.06
SW-42	Shelly Lakes	in Wimauma, south of CR 672	Hillsborough County	Surface Water	Utilization of existing lakes with treatment. The lakes are spring fed, routinely flood, and owner would like to sell	This option was combined with others into Concept 9 New SWTP and New Reservoir via New Supplies.	3	1	5	5	3	3	1	5	1.96	$6.22	3.26
SW-43	Bullfrog Creek	South of the Alafia River mouth in Riverview, south of Gibsonton Dr and north of Symmes Rd	Hillsborough County	Surface Water	Pump surface water during periods of high flows. Surface water diversion from Bullfrog Creek includes a pump station and transmission to Tampa Bay Water's regional system.	This option was combined with others into Concept 9 New SWTP and New Reservoir via New Supplies.	3	3	5	5	5	3	1	5	3.332	$3.43	3.81
SW-44	Channel "A" Water Resource Services	located between Oldsmar and Tampa, just north of West Hillsborough Avenue, on the Channel A drainage canal, originally known as Brushy Creek	Hillsborough County	Surface Water	Surface water withdrawal and storage	This option was combined with others into Concept 6 North Pinellas County SWTP.	5	3	5	1	3	3	5	5	19.6	$4.85	3.38
SW-45	Channel "A" Treated for Potable Water Use	located between Oldsmar and Tampa, just north of West Hillsborough Avenue, on the Channel A drainage canal, originally known as Brushy Creek	Hillsborough County	Surface Water	Withdraw surface water from Channel "A" and treat for potable supply.	This option was combined with others into Concept 6 North Pinellas County SWTP.	1	3	5	1	3	3	5	5	19.6	$4.85	2.97
SW-47	Cypress Creek	Central Pasco County, east of US 41 and SR 583, south of SR 52	Pasco County	Surface Water	Aquifer Recharge	This option was combined with others into Concept 10 Eastern Pasco Wellfield.	1	3	5	1	3	3	1	5	4.214	$4.37	2.55
SW-57	Zephyr Creek	Zephryhills	Pasco County	Surface Water	This project includes a pipeline from Zephyr Creek, treatment, and distribution as potable water.	Low yield and yield certainty along with high $/1000 gallon cost make this option currently impractical.	1	3	5	1	1	1	1	5	0.49	$15.09	1.99
SW-58	Cisterns	Regional	Regional	Surface Water	Capture storm water for local use to augment other supply	Similar to O-06. High $/1000 gallon cost make this option economically infeasible.	3	3	5	1	1	1	1	5	0.098	$62.81	2.20
SW-66	Rainy wells or horizontal collector wells	Regional	Regional	Surface Water		Low yield and high $/1000 gallon cost make this option currently economically infeasible.	3	3	5	1	1	1	1	5	0.098	$28.61	2.20

Label	Concept	Location	Relevant City/County	Source Type	Description	Evaluation Summary	Environmental Sustainability (10%)	Regulatory/ Ease of Permitting (14%)	Public Reception (9%)	Implementation / Feasibility (20%)	Total Cost per 1,000 Gallon (14%)	Yield Reliability (14%)	Regional System Impacts (11%)	Contractual Requirements (9%)	Annual Average Yield (mgd)	Life Cycle Cost ($/1000 gal)	Total Score
SW-67	Enhancements: Phases C	Hillsborough River near Del Rio	City of Tampa	Surface Water	This option consists of the phased enhancement of Tampa Bay Water's Enhanced Surface Water System (ESWS). Phase C includes a second potential storage reservoir for Alafia River water.	This option was combined with others into Concept 9 New SWTP and New Reservoir via New Supplies.	3	3	5	5	3	3	5	5	22.54	$3.55	3.95
SW-73	Chesnut Park ASR	From Lake Tarpon, north Pinellas County between US Highway 19 N and E Lake Rd S to Chesnut Park off of E Lake Rd	Pinellas County	Surface Water	Excess surface water will be recharged into the existing ASR well and stored during wet-season months.	This option was combined with others into Concept 6 North Pinellas County SWTP.	3	5	5	5	1	3	1	5	1.96	$7.53	3.53
SW-74	Chesnut Park MAR	From Lake Tarpon, north Pinellas County between US Highway 19 N and E Lake Rd S to Chesnut Park off of E Lake Rd	Pinellas County	Surface Water	Involves one to multiple MAR wells adjacent to Lake Tarpon that would be used during wet-season months to recharge the aquifer with excess surface water from Lake Tarpon.	This option was combined with others into Concept 6 North Pinellas County SWTP.	3	5	5	5	3	3	5	5	9.8	$5.02	4.23
SW-75	Canal Park MAR	From Lake Tarpon, north Pinellas County between US Highway 19 N and E Lake Rd S to Canal Park south of Tampa Rd between Belcher Rd and County Rd 39	Pinellas County	Surface Water	Surface water flowing from Lake Tarpon would be drawn off the canal before it passes the canal's control structure in the area.	This option was combined with others into Concept 6 North Pinellas County SWTP.	3	5	5	5	3	3	5	5	9.8	$5.47	4.23
SW-76	East Lake Shallow MAR	The Wellhead Protection Zone is in northeast Pinellas and bounded by Pasco County on the north; Hillsborough County on the east; East Lake Road on the west; and the Florida Power right-of-way on the south. From Lake Tarpon, north Pinellas County between US Highway 19 N and E Lake Rd S	Pinellas County	Surface Water	The option consists of constructing multiple recharge wells within the existing East Lake Wellfield that will recharge the same permeable unit that the production wells withdraw from with excess surface water from Lake Tarpon during the wet-season months.	This option was combined with others into Concept 6 North Pinellas County SWTP.	3	5	5	5	3	3	1	5	2.94	$4.45	3.81
SW-77	East Lake Deep MAR	The Wellhead Protection Zone is in northeast Pinellas and bounded by Pasco County on the north; Hillsborough County on the east; East Lake Road on the west; and the Florida Power right-of-way on the south. From Lake Tarpon, north Pinellas County between US Highway 19 N and E Lake Rd S	Pinellas County	Surface Water	The option consists of constructing multiple recharge wells within the existing East Lake Wellfield that will recharge a deeper, more saline aquifer below the permeable zone that the production wells withdraw from with excess surface water from Lake Tarpon.	This option was combined with others into Concept 6 North Pinellas County SWTP.	3	5	5	5	3	3	1	5	2.94	$4.45	3.81
SW-78	Aqueduct from N. Florida	Regional	Regional	Surface Water	Transmission of treated or non-treated surface water to the Tampa Bay Water service area.	Feasibility and implementation challenges, low yield and inter basin transfer of water supply make this option currently impractical.	1	3	5	1	3	3	1	5	4.9	$5.09	2.55
SW-79	Dam Courtney Campbell	North of Old Tampa Bay near Oldsmar and Town & Country	City of Tampa	Surface Water	Dam fresh water north of Courtney Campbell Causeway.	Low environmental sustainability and regulatory/permitting challenges make this option currently impractical.	1	1	3	1	3	3	5	5	49	$5.87	2.51
SW-80	Importation (General)	Regional	Regional	Surface Water	Potential sources identified: Weeki-Wachee Springs; Homosassa River; Crystal River; Silver Springs; Manatee River; Peace River; Lake Rousseau	Low environmental sustainability and regulatory/permitting challenges make this option currently impractical. An interconnect with Peace River Manasota Regional Water Supply is included in Concept 12.	1	1	3	1	3	3	5	5	19.6	$4.03	2.51
SW-81	Morris Bridge Sink	water from Morris Bridge Sink for diversion through the Tampa Bypass Canal to the base of the dam on the Hillsborough River	Hillsborough County	Surface Water	Transfer of surface water to Tampa Bypass Canal (middle pool) from Morris Bridge Sink	This option was combined with others into Concept 9 New SWTP and New Reservoir via New Supplies.	1	1	5	5	3	1	1	5	3.822	$3.82	2.77
SW-83	Tampa Bay Water - Second Reservoir	near Alafia River	Hillsborough County	Surface Water		This option was combined with others into Concept 9 New SWTP and New Reservoir via New Supplies.	1	3	5	5	5	5	3	5	9.8	$2.75	4.1
FRESH GROUNDWATER																	
G- 1	Additional Potable Groundwater from Existing Wellfields	Across northern Tampa Bay	Pasco County/Hillsborough County/Pinellas County	Fresh Groundwater	Increasing the allowable annual average withdrawal rate of the existing combined permit for the 11-Consolidated Wellfields covered in the Combined Permit. A regional increase in groundwater production could be found to be compatible with water resource recovery goals set forth by SWFWMD.	This option was combined with others into Concept 14a - Increased Consolidated WUP.	1	1	5	1	5	3	3	5	9.80	$1.76	2.76
G- 3	Additional Potable Groundwater Wellfields in Multi-Jurisdictional Area	Zephyrhills area	Pasco County	Fresh Groundwater		This option was combined with others into Concept 10 Eastern Pasco Wellfield.	1	3	5	1	3	3	1	5	2.35	$6.76	2.55

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G- 4	Agricultural Interconnects/Co-Use with Existing Permitted Users/ Fresh groundwater from AG wells	Regional	Regional	Fresh Groundwater	Utilization of agricultural and/or industrial excess permitted capacity or reclaimed exchange.	This option was incorporated with others into Concept 13 – Transfer Groundwater Permits	1	3	5	1	3	3	1	5	1.96	$5.20	2.55
G- 5	Central Pasco Regional Wellfield	South of Pasco-Hernando County line, between US-41 and Bellamy Brothers Blvd. in North-Central Pasco County, north of SR-52	Pasco County	Fresh Groundwater	Several lakes are located east of the potential wellfield including Middle Lake, Lake Iola, and Lake Jessamine. Groundwater withdrawals using dispersed wells at limiting flows should allow for a safe yield which will not adversely affect lake, wetland, or surficial aquifer levels. For this analysis, it was assumed that an average annual withdrawal of 8.0 million gallons per day could be achieved.	This option was incorporated with others into Concept 10 Eastern Pasco Wellfield.	1	3	5	1	3	1	1	5	3.92	$4.31	2.27
G- 6	Cypress Bridge II	250 sq-mile study area in south-central Pasco County and/or north-central Hillsborough County off of I-75, south of SR-52	Pasco County	Fresh Groundwater	The project components potentially include four dispersed water production wells and a raw water transmission main to connect the new water supply wells to Tampa Bay Water's regional water supply system. Each well would have an expected capacity of 1 to 2 million gallons per day. Therefore, approximately 4 to 8 million gallons per day of additional drinking water supply could be added to the regional water supply system.	This option was incorporated with others into Concept 10 Eastern Pasco Wellfield.	1	3	5	1	3	1	3	5	5.22	$4.86	2.48
G- 8	Mulberry/Piney Point	Northwest Manatee County located just south of County Line Rd between Piney Point Rd and US Highway 41	Manatee County	Fresh Groundwater	Utilization of existing groundwater use permit	This project is located outside of Tampa Bay Water Service Area and will not be further pursued at this time.	1	1	5	1	1	1	1	5	1.31	$11.73	1.72
G- 10	City of Gulfport Well	Southwest St. Petersburg, northeast of St. Pete Beach	City of St. Petersburg	Fresh Groundwater	Utilization of one existing 4-inch artesian well.	High $/1000 gallon cost, low yield, and feasibility and implementation challenges make this option currently impractical.	1	3	5	1	1	1	1	5	0.33	$38.28	1.99
G- 12	Cypress Bridge Wellfield Expansion	South-Central Pasco County, east of US 41, north of SR 52 and south of CR 578	Pasco County	Fresh Groundwater	Feasibility study. The study included expansion of existing wellfields.	This option was combined with others into Concept 10 Eastern Pasco Wellfield.	1	3	5	1	5	3	3	5	5.22	$2.29	3.04
G- 13	East Pasco Regional Wellfield	Central Pasco County, just off of I-75 and just south of SR-52	Pasco County	Fresh Groundwater	analysis of over 10 years of field data used	This option was combined with others into Concept 10 Eastern Pasco Wellfield.	1	3	5	1	3	1	3	5	7.84	$3.64	2.48
G- 14	Phosphate Plant Wells	Next to Lake Branch Alafia River that is east of S County Road 39 and west of the east Hillsborough County State line, between South Prong Alafia River and Boggy Branch River	Hillsborough County	Fresh Groundwater	Utilization of three privately owned wells at the former Mobil Big Four mine plant (2–30-inch wells and 1-12 inch well).	Low yield but can be reviewed as part of Concept 13 - Transfer Groundwater Permits	1	3	5	1	3	1	1	5	1.41	$4.87	2.27
G- 18	Surficial Aquifer Supply	Regional	Regional	Fresh Groundwater	Utilize the surficial aquifer	Feasibility and implementation challenges and low environmental sustainability make this option currently impractical.	1	3	5	1	1	1	1	5	0.47	$15.98	1.99
G-20	Upper Floridan Aquifer Brackish Wellfield	North of central Hillsborough County in Pasco County	Pasco County	Fresh Groundwater	Use of Upper Floridan Aquifer	This option was combined with others into Concept 2 Pasco Brackish Wellfield.	1	3	5	1	5	1	1	5	3.53	$2.98	2.55
G-21	Consolidated WUP Increase	Regional	Regional	Fresh Groundwater	Increase the CWUP permit and transfer the 0.8 mgd Carrollwood Wells permit and the 0.25 mgd Eagles Wells permit capacity to the permit increase as well.	This option was combined with others into Concept 14a - Increased Consolidated WUP.	1	1	5	1	5	5	1	1	0.69	$2.27	2.49
BRACKISH GROUNDWATER																	
BG-1	Lower Floridan Aquifer Brackish Wellfield	Lower, central Pasco County	Pasco County	Brackish Groundwater	Use of Lower Floridan Aquifer	This option was combined with others into Concept 2 Pasco Brackish Wellfield.	3	3	3	5	3	5	1	5	3.0	$5.80	3.63
BG- 3	Rock Mine Lake	Located near Belcher Mines Park, west of US Highway 19 and off of Aripeka Rd	Pasco County	Brackish Groundwater	Utilizing water withdrawn from a linear wellfield adjacent to Rock Mine Lake to provide potable water supply in Pasco County. A small footprint desalination plant would be required.	This option was combined with others into Concept 2 Pasco Brackish Wellfield.	3	3	3	3	3	5	1	5	4.3	$7.00	3.24
BG- 4	RO - Brackish Water	Regional	Regional	Brackish Groundwater	Provide RO treatment at various suitable locations, with interconnection to regional system	This option was combined with others into Concept 2 - Pasco Brackish Wellfield.	3	3	5	3	1	5	1	5	3.0	$10.96	3.15

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BG- 5	Small Footprint RO (5 mgd +) - Pasco County	Western Pasco County	Pasco County	Brackish Groundwater	RO treatment of surface water, seawater, or brackish water for potable use. Potential sites identified: Pasco Resource Recovery Site, Bayonet Point, Virginia City, Old Belcher Mine. Infrastructure requirements would include the development of production, monitor, and concentrate disposal wells, a small footprint RO treatment facility, alkalinity adjustment facility, an above ground storage tank, high service pump station, pipeline for raw water delivery to the RO facility, and transmission main for finished water delivery to the closest Tampa Bay Water point of connection. Brackish groundwater would be withdrawn from the Lower Floridan aquifer at an approximate depth of 700 feet below land surface.	This option was combined with others into Concept 2 Pasco Brackish Wellfield.	3	3	5	3	3	5	1	5	3.0	$3.77	3.43
BG- 6	Small Footprint RO (5 mgd +) Pinellas County	Potential Sites - Lake Tarpon along U.S. 19, areas on the Pinellas County Resource Recovery waste to energy property, areas on Paul L. Bartow Power Plant property on Weedon Island, & Area "H" (southern part of the county, ~2.5mi. NW of downtown St. Pete)	City of St. Petersburg	Brackish Groundwater	RO treatment of surface water, seawater, or brackish water for potable use. Lake Tarpon/US19, Pinellas Resource Recovery Site, Weedon Island Power Plant Site	This option progressed as Concept 3b - St. Petersburg Brackish Plant.	3	3	5	3	1	5	3	5	3.0	$10.96	3.36
BG- 7	Small Footprint RO (5 mgd +) Holiday Waterworks	Near Cross Bayou Blvd in New Port Richey	City of New Port Richey	Brackish Groundwater	Use of existing wells or new wells within the vicinity of Holiday Waterworks.	This option was combined with others into Concept 2 Pasco Brackish Wellfield.	3	3	5	3	3	5	1	5	2.4	$6.44	3.43
BG- 8	Conversion of existing seawater desal plant to brackish water feed	Off of Big Bend Road in Apollo Beach area	Hillsborough County	Brackish Groundwater	Augment the existing Tampa Bay Water (Big Bend) Desalination Plant feed with brackish water. Conversion will reduce reliance on TECO intakes which will reduce the risk of lost production when TECO units are offline.	This option progressed as Concept 5b - Existing Desalination Blending with Brackish.	3	3	5	1	1	5	1	5	2.2	$12.57	2.76
BG- 10	Offshore Discharges / Springs in the Gulf of Mexico	Northwest Pasco County in the area of Bayonet Point/Werner-Boyce Salt Springs State Park	City of New Port Richey	Brackish Groundwater	Harvest brackish water springs discharging in the Gulf of Mexico; SWFWMD has completed a study; Florida Geological Survey Bulletin No. 31 (1998) mapped brackish springs in the Gulf	This option is similar to D-08, feasibility and implementation challenges and uncertain yield reliability make this option currently impractical.	3	3	3	1	3	1	1	5	3.0	$6.06	2.28
RECLAIMED WATER																	
R- 1	RO using Reclaimed Water as Source	Regional	Regional	DPR	Provide RO treatment of reclaimed wastewater suitable for direct potable reuse	This option has progressed to Concept 15a - DPR Hillsborough County, Concept 15b DPR Pinellas County, and Concept 15c DPR City of Tampa.	5	1	1	5	1	3	5	1	10.7	$9.89	2.88
R-2	Desal Plant Expansion with Reclaimed Water Supply	From H.F Curren AWTP (between Maritime Blvd and Gatx Dr) to Tampa Bay Water desal plant (off of Big Bend Rd near the Big Bend Power Station)	City of Tampa Hillsborough County	DPR	Reclaimed water transmission system from H. F. Curren AWTP to Tampa Bay Water Seawater Desalination Water Treatment Plant, including desalination plant expansion.	This option has progressed to Concept 5a - Existing Desalination Blending with Reuse.	5	1	1	5	1	3	3	1	5.3	$15.40	2.67
R-3	Reclaimed water at Tampa Bay Regional SWTP DPR	From H.F. Curren AWTP (North of Gatx Dr, east of Maritime Blvd, west of Guy N Verger Blvd)	City of Tampa	DPR	SWTP supplemented with reclaimed water from nearby reclamation facilities.	This option has progressed to Concept 15a - DPR Hillsborough County, Concept 15b DPR Pinellas County, and Concept 15c DPR City of Tampa.	5	1	1	5	1	5	3	1	3.2	$8.18	2.96
R-4	St. Petersburg WTP DPR	Cosme WTP	City of St. Petersburg	DPR	Reclaimed water from nearby facilities would be treated at an advanced water treatment facility connected to the regional system that would deliver the treated water to the Cosme WTP	Low yield reliability makes this option currently impractical.	5	1	1	3	3	1	5	1	30.4	$5.67	2.49
R-5	Pinellas County WTP DPR	S.K. Keller WTP	Pinellas County	DPR	Reclaimed water from nearby facilities would be treated at an advanced water treatment facility connected to the regional system that would deliver the treated water to the Keller WTP. A new reclaimed water reservoir to be built adjacent to the existing S. K. Keller WTP to store reclaimed water during the wet season to be used as an intake source.	This option has progressed to Concept 15b - DPR Pinellas County.	5	1	1	5	1	1	5	1	11.7	$7.17	2.60
R-6	Cypress Creek DPR	near Big Cypress Swamp	Pasco County	DPR	Creek supplemented with reclaimed water from nearby reclamation facilities.	Low yield reliability and yield make this option currently impractical.	5	1	1	3	1	1	3	1	1.1	$19.18	2.00
R-7	South Hillsborough SWTP DPR	near the intersection of Balm Riverview Rd and Balm Boyette Rd	Hillsborough County	DPR	SWTP supplemented with reclaimed water from nearby reclamation facilities.	This option has progressed to Concept 15a - DPR Hillsborough County	5	1	1	5	1	3	3	1	2.7	$9.24	2.67
R-8	Northwest Hillsborough County Fawn Ridge DPR	near Citrus Park Mall	Hillsborough County	DPR	Fawn Ridge to be supplemented with reclaimed water from nearby reclamation facilities.	This option has progressed to Concept 15a - DPR Hillsborough County	5	1	1	5	1	1	3	1	5.5	$9.89	2.39
R- 9	City of Tampa Howard F. Curren Reclaimed Water Groundwater Injection for Potable Use	North of Gatx Dr, east of Maritime Blvd, west of Guy N Verger Blvd	City of Tampa	IPR - Aquifer Recharge	Indirect use of reclaimed wastewater for potable water supply	This option progressed to Concept 16c - South Hillsborough Wellfield via IPR.	3	3	1	3	3	3	5	1	19.0	$6.71	2.84

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R- 10	Northwest Hillsborough County Groundwater Recharge with Reclaimed Water	Regional	Regional	IPR - Aquifer Recharge	Utilizing surplus reclaimed wastewater to rehydrate wellfields to allow expanded groundwater pumping.	This option was combined with others into Concept 16c - South Hillsborough Wellfield via IPR.	3	3	1	3	1	3	3	1	5.1	$7.65	2.36
R-11	East Lake Wells/Mid-Pinellas IPR Wellfield	East of Lake Seminole in Pinellas County	Pinellas County	IPR - Aquifer Recharge	This project would develop new brackish ground water wells from the Upper Floridan aquifer in central Pinellas County with reclaimed water injections.	This option was combined with others to make Concept 14b - Increased CWUP - Pinellas County Reuse via Recharge.	3	3	1	1	1	3	3	1	3.2	$7.91	1.97
R- 12	Cross Bay Reclaimed Water Repurification Project	City of St Petersburg Albert Whitted WRF (in east St. Petersburg) to Wimauma	City of St. Petersburg	IPR - Aquifer Recharge	Wastewater reclamation through rehydration of the Floridan aquifer - City of St Petersburg Albert Whitted WRF to Wimauma	City of St Petersburg Albert Whitted WRF is no longer in operation.	3	3	1	1	1	3	3	1	7.6	$16.26	1.97
R- 13	Natural Treatment/Aquifer Recharge	Regional	Regional	IPR - Aquifer Recharge	Recharge	This option was combined with others into Concept 14c - Increased Consolidated WUP - Natural Systems Reuse via Recharge.	3	3	1	1	5	3	5	1	12.7	$2.52	2.73
R-14	South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge	Boyette area, west of I-75 and US 301	Hillsborough County	IPR – Aquifer Recharge	20 mgd of aquifer recharge with reclaimed water supply to provide an estimated groundwater withdrawal yield of 8.85 mgd on an annual average basis.	This option was combined with others to make Concept 16c - South Hillsborough Wellfield via IPR.	3	3	1	3	1	3	5	1	5.6	$9.70	2.57
R-15	Aquifer Recharge	South of Paseo Al Mar Blvd near Sun City Center area	Hillsborough County	IPR - Aquifer Recharge	Involves recharging the Floridian aquifer system with reclaimed water and constructing a remote groundwater withdrawal for potable supply such that a net benefit to Floridian aquifer system potentiometric surface can be achieved.	This option was combined with others into Concept 6 North Pinellas County SWTP.	3	3	1	3	3	3	3	1	12.7	$6.65	2.63
R-16	East Lake Shallow MAR	The Wellhead Protection Zone is in northeast Pinellas, and bounded by Pasco County on the north; Hillsborough County on the east; East Lake Road on the west; and the Florida Power right-of-way on the south	Pinellas County	IPR - Aquifer Recharge	This option consists of constructing multiple recharge wells within the East Lake Wellfield that would recharge the same aquifer of the decommissioned water supply wells with excess reclaimed water during the wet-season months.	This option was combined with others into Concept 6 North Pinellas County SWTP.	3	3	1	3	3	3	5	1	13.3	$6.75	2.84
R-17	East Lake Deep MAR	The Wellhead Protection Zone is in northeast Pinellas, and bounded by Pasco County on the north; Hillsborough County on the east; East Lake Road on the west; and the Florida Power right-of-way on the south	Pinellas County	IPR - Aquifer Recharge	This option consists of constructing multiple MAR wells within the vicinity of the existing East Lake Wellfield that will recharge a deeper more saline aquifer (greater than 3,000 mg/L TDS) below the permeable zone that the production wells withdraw from with excess reclaimed water during the wet-season months.	This option was combined with others into Concept 6 North Pinellas County SWTP.	3	3	1	3	3	3	5	1	13.3	$6.75	2.84
R-18	4G Ranch IPR	35 miles north of Tampa, in Pasco County near Conner Preserve	Pasco County	IPR - Aquifer Recharge	The 176-acre built wetland receives excess reclaimed water from five plants in the area. Most of the reclaimed is used for irrigation and industrial processes, though 10 mgd is returned to the aquifer through RRIBS. The wetland naturally denitrifies the reclaimed water to improve the quality of the water that will recharge the aquifer and later be treated for potable use	This option is already in operation and is a beneficial reuse system not directly resulting in additional regional potable water supply.	3	3	1	3	1	3	5	1	12.7	$9.83	2.57
R- 19	City of Tampa Howard F. Curren AWWTP to Pasco Wellfields	North of Gatx Dr, east of Maritime Blvd, west of Guy N Verger Blvd	City of Tampa	IPR - Aquifer Recharge	Surplus WWTP effluent used to provide rehydration water to existing wellfields, Starkey, Cross Bar Ranch, Cypress Creek.	Feasibility and implementation challenges and high $/1000 gallon cost make this option currently impractical.	3	3	1	1	1	3	3	1	11.4	$12.05	1.97
R- 20	Wastewater Reuse to Recharge Wellfields	Regional	Regional	IPR - Aquifer Recharge	Utilizing reclaimed wastewater to rehydrate wellfields to allow expanded groundwater pumping	This option was combined with others into Concept 14c - Increased Consolidated WUP - Natural Systems Reuse via Recharge.	3	3	1	3	1	3	5	1	12.7	$7.41	2.57
R-21	Consolidated WUP Increase	Regional	Regional	IPR - Aquifer Recharge		This option has progressed as part of Concept 14a - Increased CWUP.	3	3	1	1	3	3	5	1	12.7	$5.81	2.45
R- 22	Dry-Weather Augmentation using Reclaimed Water Sources	Regional	Regional	IPR - SW Augmentation	Use reclaimed wastewater to enhance surface water supplies during periods of low flow	High $/1000 gallon cost and contractual challenges make this option currently impractical.	3	3	1	3	1	3	3	1	6.34	$13.86	2.36
R- 23	Lake Maggiore-Fed with Reclaimed Water/Surface Water WTP from Lake Maggiore at the Albert Whitted WRF	near Boyd Hill Park	City of St. Petersburg	IPR - SW Augmentation	This option augments natural stormwater flow into the lake with reclaimed water and would provide a stable water supply source with stable lake elevation. This alternative would require advanced treatment of reclaimed water. The advanced treated water would be discharged to Lake Maggiore to augment existing water supply. Water would be withdrawn from Lake Maggiore and treated by a new surface WTP built at Albert Whitted WRF or a suitable location (indirect potable reuse).	High $/1000 gallon cost and feasibility and implementation challenges make this option currently impractical.	3	3	1	1	1	3	1	1	1.585	$13.51	1.76
R- 24	City of Tampa-Howard F. Curren Reclamation: Distillation	North of Gatx Dr, east of Maritime Blvd, west of Guy N Verger Blvd	City of Tampa	IPR - SW Augmentation	Surplus wastewater reclamation with distillation; convey reclaimed water to Hillsborough River or Tampa Bypass Canal	High $/1000 gallon cost and technology make this option currently impractical. Current distillation technology is generally more expensive on a life cycle cost basis than membrane desalination.	3	3	1	3	1	3	1	1	6.34	$9.68	2.15
R- 25	Tarpon Canal Reclaimed System Augmentation	At S-551 near Oldsmar, FL	Hillsborough County	IPR - SW Augmentation	Augmentation	High $/1000 gallon cost makes this option currently economically infeasible.	3	3	1	1	1	3	1	1	0.13	$42.34	1.76

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R-26	Supplement Tampa Bypass Canal with Reclaimed Water	Tampa Bypass Canal at Martin Luther King Boulevard in Hillsborough County	City of Tampa	IPR - SW Augmentation	Use of 20 mgd of reclaimed water to produce a yield of 16 mgd to discharge into the Tampa Bypass Canal.	High $/1000 gallon cost and limited supply yield make this option currently impractical.	3	3	1	3	1	3	1	1	5.07	$14.42	2.15
R-27	Supplement the Regional Reservoir with Reclaimed Water	From H.F Curren AWTP (between Maritime Blvd and Gatx Dr) to Bill Young Reservoir (south Hillsborough County between CR 39 and Boyette Road)	City of Tampa	IPR - SW Augmentation	Use of reclaimed water to supplement the regional reservoir. It includes conveying 16 mgd to the Bill Young Regional Reservoir to supplement surface water supplies.	High $/1000 gallon cost and relatively low yield make this option currently impractical.	5	3	1	3	1	3	3	1	5.07	$18.71	2.56
R-28	Proposed Reservoir to Proposed Odessa Storage Tank and Pumping Facility	Proposed Reservoir in north Pinellas County to Odessa storage tank and pump station in Pasco County; Keystone/Tarpon Springs Rd and Gunn Highway	Pinellas County	IPR - SW Augmentation	There may be an opportunity to increase the use of reclaimed water if the reclaimed water transmission and distribution systems could be interconnected among the now separate utilities.	High $/1000 gallon cost and contractual challenges make this option currently impractical.	5	3	1	3	1	3	3	1	6.66	$19.03	2.56
R- 29	Alderman Ford Lake (Medard Res.) - Fed with Reclaimed Water	Alderman Ford Lake near Fish Hawk/Lithia area in east Hillsborough County with Pleasant Grove Reservoir (Medard Res.) located southeast of Valrico and northeast of Fish Hawk	Hillsborough County	Withdrawal Credit	Indirect use of reclaimed wastewater for potential agricultural use, with water use permit exchange	High $/1000 gallon costs and contractual challenges make this option currently impractical.	3	3	1	5	1	3	1	1	6.6	$9.91	2.54
R- 30	Augment Lakes in NW Hillsborough with Reclaimed Water	Northwest Hillsborough County, Keystone/Lutz area	Hillsborough County	Withdrawal Credit	Utilize lakes as storage for surface water treatment plants or wellfield rehydration	High $/1000 gallon costs and contractual challenges make this option currently impractical.	3	3	1	5	1	3	1	1	6.6	$12.34	2.54
R- 31	Downstream Augmentation of Alafia River	Hillsborough County west of I-75, north of Boggy Creek	City of Tampa Hillsborough County	Withdrawal Credit	Augmenting the flow of the Alafia River with surplus Howard F. Curren WWTP reclaimed water, at a point downstream of the withdrawal point for potable source. This augmentation would be designed to allow the increase of withdrawal from the Alafia River.	Contractual challenges, implementation challenges due to anticipated upgrades at associated facilities and high $/1000 gallon costs make this option currently impractical.	3	3	1	1	1	3	1	1	5.115	$8.02	1.76
R- 34	Hillsborough County South Central Regional Reclaimed Water	Regional	Regional	Withdrawal Credit	Utilize Hillsborough County reclaimed supply, storing in phosphate mine wells, and used by industrial users with groundwater supply exchange.	This option was combined with others into Concept 13 – Transfer Groundwater Permits.	3	3	3	5	1	3	3	1	5.61	$13.24	2.94
R- 35	NW Hillsborough Wetland Augmentation	near Keystone/Lutz area	Hillsborough County	Withdrawal Credit	Augmentation	This option was combined with others into Concept 14c - Increased Consolidated WUP - Natural Systems Reuse via Recharge.	5	3	3	5	1	3	1	1	4.95	$9.47	2.93
R- 36	Plant City Wetland	City of Plant City	Hillsborough County	Withdrawal Credit	Rehydration / Wetland Restoration	Low yield and high $/1000 gallon cost make this option currently impractical.	5	3	3	3	1	3	1	1	0.495	$13.35	2.54
R- 37	Section 21 Wellfield Rehydration	In the Greater Northdale/ Egypt Lake-Leto area in Hillsborough County (owned by St. Petersburg)	City of St. Petersburg	Withdrawal Credit	Restoring wetlands at the Section 21 Wellfield in northwest Hillsborough County with reclaimed water to allow increased groundwater withdrawals.	This option was combined with others into Concept 14c - Increased Consolidated WUP - Natural Systems Reuse via Recharge.	3	3	1	5	1	3	3	1	4.95	$12.86	2.75
R- 38	4G Ranch to Augment Tampa Bay Water Wellfields	35 miles north of Tampa, in Pasco County near Conner Preserve	Pasco County	Withdrawal Credit	The 176-acre built wetland receives excess reclaimed water from five plants in the area. Within this project, additional capacity can be used as an augment to increase Tampa Bay Water's nearby wellfields	This option was combined with others into Concept 14b - Increased Consolidated WUP - Pinellas County Reuse via Recharge.	3	3	1	3	5	3	3	1	6.6	$2.49	2.91
R-39	Desal Concentrate Discharge System Expansion with Reclaimed Water	From H.F Curren AWTP (between Maritime Blvd and Gatx Dr) to Tampa Bay Water desal plant (off of Big Bend Rd near the Big Bend Power Station)	City of Tampa Hillsborough County	Withdrawal Credit	Reclaimed water transmission system from H. F. Curren AWTP to Desalination Plant and discharge structure to allow for increased production from facility.	Regulatory and permitting challenges along with low yield and high $/1000 gallon cost make this option currently impractical.	3	1	5	1	1	3	1	1	0.561	$10.70	1.86
R-40	Reclaimed Water Salinity Barrier Systems	Regional	City of St. Petersburg	Withdrawal Credit	Would use reclaimed water to mitigate saltwater intrusion in coastal areas. Would increase freshwater supply at existing wellfields and/or to a new wellfield.	This option was combined with others into Concept 14b - Increased Consolidated WUP - Pinellas County Reuse via Recharge.	5	3	1	3	3	3	3	1	6.6	$4.11	2.84
R-43	Consolidated WUP Increase - Withdrawal	Regional	Regional	Withdrawal Credit		This option was combined with others into Concept 14a - Increased Consolidated WUP.	3	3	5	5	5	3	5	1	10	$1.86	3.89
R- 44	South Hillsborough Wellfield (via SHARP Credits)	Along the eastern shore of Tampa Bay	Hillsborough County	Withdrawal Credit		This option progressed as Concept 16b - South Hillsborough Wellfield via SHARP.	5	5	3	5	3	3	3	1	10	$6.04	3.69
OTHER																	
O- 2	Importation with Tankers (Ships or Trucks or Rail)	Regional	Regional	Other	Import water from other locations	High $/1000 gallon cost. Currently economically impractical based on scale and technology.	3	3	1	1	1	5	5	3	10	$65.87	2.63
O- 3	Interconnects with other Regional Water Supply Authorities	Regional	Regional	Other	Interconnections with other regional suppliers	This option progressed a Concept 12 - Interconnect with Peace River Manasota Regional Water Supply Authority.	5	5	5	3	3	5	5	1	10	$4.26	3.98
O- 4	Air Condensation	Regional	Regional	Other	Condense airborne moisture for drinking water	High $/1000 gallon cost makes this option currently economically infeasible.	5	1	3	1	1	1	5	5	20	$101.46	2.35

Label	Concept	Location	Relevant City/County	Source Type	Description	Evaluation Summary	Environmental Sustainability (10%)	Regulatory/ Ease of Permitting (14%)	Public Reception (9%)	Implementation / Feasibility (20%)	Total Cost per 1,000 Gallon (14%)	Yield Reliability (14%)	Regional System Impacts (11%)	Contractual Requirements (9%)	Annual Average Yield (mgd)	Life Cycle Cost ($/1000 gal)	Total Score
O- 5	Aquifer Storage and Recovery (General)	C. W. Bill Young Regional Reservoir located between Doe Branch and Long Flat Creek off of Boyette Rd	Hillsborough County	Other	Capture surface water during periods when supply exceeds demand, treat, and pump it into an aquifer, and withdraw it as groundwater during periods of low surface water flows and high demand	Source of water is not identified with this option, so this would need to be considered in association with a specific source option as an ASR component.	3	3	3	3	1	3	1	5	1.31	$16.26	2.68
O- 6	Cisterns for individual homes	Regional	Regional	Other	Stormwater captured for outside watering/shower (particularly in coastal areas)	This option is similar to SW-58. A high $/1000 gallon cost makes this option currently economically infeasible.	5	5	3	1	1	3	1	5	0.1	$62.81	2.77
O- 9	Deep Tunnel Storage	Regional	Regional	Other	Construct underground storage reservoir or tunnel instead of at surface	High $/1000 gallon cost and not currently economically feasible. Source of water is not identified with this option, so this would need to be considered in association with a specific source option.	3	3	3	1	1	5	1	5	2	$27.81	2.57
O- 11	Icebergs	Regional	Regional	Other	Tow icebergs from North Atlantic to freshwater basin to augment available supply in region	High $/1000 gallon cost, current technology and uncertain yield reliability make this option currently economically infeasible.	3	1	3	1	1	1	1	1	0.1	$791,667.79	1.39
O- 17	Seek relief from the SWUCA and MIA	Regional	Regional	Other	Seek relief from the SWUCA and MIA, due to measured recovery in the area, which would enable a wellfield without the need for SHARP credits	This option progressed as Concept 16a - South Hillsborough Wellfield.	5	1	3	3	3	3	3	3	6.53	$4.01	2.92
O- 18	Cooperative projects with Polk County and its Master Water Plan projects	various locations throughout Polk County	Polk County	Other	Interregional project to provide surplus water	This option progressed as Concept 11 - Interconnect with Polk Regional Water Cooperative.	3	3	5	3	3	3	3	3	9	$4.93	3.18
O- 19	Large freshwater users to use reclaimed water	Regional	Regional	Other	Would reduce demand for potable supply	This option was combined with others into Concept 13 – Transfer Groundwater Permits	3	5	1	1	3	3	3	3	6.53	$4.01	2.69
																TOTAL PROJECTS	117

Appendix B. Basis of Total Project Cost Estimates

Conceptual total project cost estimates ($/1,000 gallons) were developed for each of the options identified in **Appendix B**. Capital cost estimates are based on the anticipated design capacity of each option. Conceptual O&M cost estimates were developed based on the level of treatment required for each source type. The total cost per 1,000 gallons is calculated based on the average annual yield defined for each option. The total project costs are planning level conceptual cost estimates developed specifically for use in the coarse screening evaluation. During the fine screening evaluation, more refined conceptual cost estimates will be developed based on concept specific considerations.

Scope of Facilities

Capital cost estimates were developed based on the treatment schemes identified for each source water type as described in **Appendix B**. Capital costs are inclusive of the following major facilities:

- Raw water supply (wellfields, surface water intakes, pump stations, and pipelines, as applicable)
- Treatment systems, as required for each source type
- Chemical storage and feed, as required for each source type
- Finished water storage and pumping
- Transmission pipelines to nearest point of connection
- Solids handling facilities, as required for each source type
- Administration building and general facilities

Mass Balance Assumptions

The treatment capacity for each system is based on mass balance calculations, which account for the recovery of individual unit processes. A summary of mass balance assumptions used to size treatment capacities for the various options in the Coarse Screening evaluation is provided in **Table 2**.

Table 2 Assumptions for Mass Balance Calculations

Treatment Process	Recovery
Clarification processes (DAF, Actiflo)	98%
Fluidized bed ion exchange	98%
Media filtration (conventional, biological)	98%
Membrane filtration	95%
BWRO system (IPR/DPR)	80%
BWRO system (brackish groundwater)	90%
SWRO system	55%

Facility Footprints & Land Acquisition

Most options require land acquisition to accommodate the proposed treatment facility. Conceptual facility footprints were developed for each source type based on reference projects involving similar treatment systems. The conceptual facility footprints are inclusive of treatment systems identified in **Appendix B** as well as general site facilities (administrative building, laboratory, maintenance/workshop, electrical rooms, etc.). Conservative siting options were assumed in the Coarse Screening Evaluation. Assumptions for siting and cost of land will be refined as part of the future feasibility program for the short-listed concepts. A summary of the assumptions applied to overall facility footprints is provided in **Table 3**. A summary of unit costs for land acquisition is provided in **Table 4**.

Table 3 Assumptions for Facility Footprints

Source Type	Footprint (acres/mgd)
Seawater	0.49
Surface water	0.61
Fresh groundwater	0.30
Brackish groundwater	0.76
Indirect potable reuse	1.03
Direct potable reuse	1.03
Constructed wetlands / natural treatment systems	12

Table 4 Assumptions for Cost of Land Acquisition

Location Type	Unit Cost ($/acre)
Urban areas (treatment facilities)	1,500,000
Rural areas (wetlands)	45,000

Equipment Costs

Cost estimates for treatment facilities were developed based on historical equipment costs, leveraging a combination of budgetary and firm pricing information from recent projects. Unit costs for equipment systems were adjusted using a power factor to account for economy of scale. The following considerations were made to account for economy of scale.

$$Factored\ Cost\ =\ Cost\ (\$) * (Q_2/Q_1)^x$$

where:

- x = power factor (0.9)
- Q_1 = capacity of reference system
- Q_2 = capacity of proposed system

Historical costs were escalated to October 2022 costs using the Engineering News Record (ENR) Construction Cost Index (CCI). Equipment installation is assumed to be 20% of the equipment cost. A summary of the equipment costs is provided in **Table 5**. Costs presented in this table have been adjusted to a 20 mgd equivalent capacity using a power factor. Equipment costs associated with specific options vary based on water supply availability and design capacity of associated treatment systems.

Table 5 Unit Costs for Equipment Systems

Equipment System	Unit Cost ($/gpd)
Dissolved air flotation	0.09
Microsand ballasted clarification (Actiflo)	0.07
Media filtration (includes filter ancillary systems)	0.25
GAC adsorbers (includes backwash system)	0.20
Membrane filtration system	0.40
Intermediate storage and pumping systems	0.08
BWRO system	0.80
SWRO system	1.62
Thermal desalination	2.85
Fluidized bed ion exchange system	0.15
Ozone	0.28
UV/AOP system	0.37
Finished water storage	0.20
Liquid chemical storage and feed systems (per chemical)	0.01
Aquifer recharge	0.34
Concentrate disposal	0.36
Solids handling	0.30

Pipeline Costs

Pipeline costs were estimated using a base unit cost of 25 $/in/lf. This cost was compared to Tampa Bay Water's internal costing tool to ensure consistency. The unit costs also include a 30% contingency and 20% contractor overhead and profit adders, with a 25% engineering, legal, and administration adder applied to that value. Pipe capacity was estimated using the Hazen Williams formula, assuming a maximum flow velocity of 7 ft/s, with a Hazen C-value of 120, representing new iron or steel pipe. Estimated pipeline lengths were developed based on the distance from the source water (wellfield, reclaimed water, surface water) to the nearest point of connection within the existing Tampa Bay Water Regional System, unless the option identified a specific point of connection. Straight distances between source water and the point of connection were factored by 1.5 to account for unknowns with respect to pipe routing and easements. Pipeline construction costs are presented in **Table 6**.

Table 6 Unit Prices for Piping

Pipe Size	Flow, mgd		
inches	Minimum	Maximum	Unit Cost ($/mile)
12	1.02	3.55	$ 2,970,000
14	1.38	4.84	$ 3,465,000
16	1.81	6.32	$ 3,960,000
18	2.28	8.00	$ 4,455,000
20	2.82	9.87	$ 4,950,000
24	4.06	14.22	$ 5,940,000
30	6.35	22.21	$ 7,425,000
48	16.25	56.86	$ 11,880,000
54	20.56	71.97	$ 13,365,000

Other General Cost Assumptions

A summary of other general assumptions used to prepare the conceptual capital cost estimates are summarized in **Table 7**.

Table 7 Other General Cost Considerations

Cost Factor	Assumption
Direct Costs	
Equipment installation	20% of equipment cost
Basin costs	$1.50/gallon
Facility building cost	$275/square foot
Office building cost	$650/square foot
Indirect Costs	
Contingency	30 percent of construction subtotal
Contractor overhead and profit (OH&P)	20 percent of construction subtotal
Engineering, legal, and administrative (ELA)	25 percent of construction subtotal
Project Financing	
Interest rate	4 percent (Note 1)
Loan period	30 years
Notes: 1. Interest rates for project financing will be updated to 5 percent during the Fine Screening Evaluation.	

O&M Costs

O&M costs were developed for each of the source water type based on references from recent projects with similar treatment schemes. O&M costs are based on the estimated annual average yield for each option. A summary of the O&M costs applied to each source water type is provided in **Table 8**. O&M cost estimates prepared for options involving IPR, DPR, and withdrawal credits do not include the cost of bulk reclaimed water supply. Assumptions for the cost of bulk reclaimed water and withdrawal credits will be incorporated in the Fine Screening Evaluation.

Table 8 Assumptions for O&M Costs by Source Water Type

Source Water Type	O&M Cost ($/1,000 gal)
Seawater (SWRO)	2.25
Seawater (Thermal)	2.48
Surface water	0.75
Fresh groundwater	0.50
Brackish groundwater	1.00
Indirect potable reuse	1.75
Direct potable reuse	1.75

While the infrastructure systems and associated capital costs are based on the design capacity of the system, the annual O&M costs and total project costs are calculated based on the annual average yield or the anticipated annual average flow rate being treated through the system. A ratio of annual average yield to design capacity was established for each source type as shown in **Table 9**.

Table 9 Ratio of Annual Average Yield to Design Capacity by Source Water Type

Source Water Type	Ratio of Annual Average Yield to Design Capacity
Seawater	44%
Surface water	49%
Fresh groundwater	65%
Brackish groundwater	60%
Indirect potable reuse	32%
Direct potable reuse	53%

Options with Deviations from Standard Assumptions

Surface Water

Nine of the options designated as surface water supplies deviated from the treatment scheme and/or required additional infrastructure systems based on the project description and considerations. The options and corresponding modifications are listed in **Table 10**.

Table 10 Special Considerations for Surface Water Options

Option ID	Description	Special Considerations
SW-14	RO – Sulphur Springs	Treated as brackish groundwater source and utilizes BWRO treatment scheme
SW-58	Cisterns	Estimated based on precipitation and collection at individual homes
SW-73	Chestnut Park ASR	Includes cost of aquifer recharge
SW-74	Chestnut Park MAR	Includes cost of managed aquifer recharge
SW-75	Canal Park MAR	Includes cost of managed aquifer recharge
SW-76	East Lake Shallow MAR	Includes cost of managed aquifer recharge
SW-77	East Lake Deep MAR	Includes cost of managed aquifer recharge
SW-79	Dam Courtney Campbell	Includes construction of a dam/reservoir
SW-84	Tampa Bay Water to Build a Second Reservoir	Includes construction of a dam/reservoir

Fresh Groundwater

There were 15 options included in the fresh groundwater category; none of which had special considerations or deviations from the standard groundwater treatment scheme.

Brackish Groundwater

Only one brackish groundwater option (BG-8: Blending Brackish Water with Existing Desal Feed) required special considerations. Option BG-8 considers a 10 mgd expansion of the existing seawater desalination plant by blending brackish water supplies into the existing desalination plant influent. The total cost for this option was based on the capital and O&M costs for seawater desalination with a slight reduction in O&M expenditures to account for reduced energy consumption.

Seawater Desalination

Several of the options designated as seawater deviated from the membrane-based treatment scheme. The options, project descriptions, and corresponding modifications are listed in **Table 11**.

Table 11 Special Considerations for Seawater Options

Option ID	Description	Special Considerations
D-1	Gulf Coast Anclote Seawater Desalination Plant	Utilizes Anclote Power Plant discharge canal for seawater intake and concentrate discharge
D-3	Big Bend Distillation	Utilizes thermal desalination technologies in place of membrane desalination. Option is based on a lower recovery rate, higher unit capital cost, and higher O&M cost.
D-4	Saltwater Distillation	Utilizes thermal desalination technologies in place of membrane desalination. Option is based on a lower recovery rate, higher unit capital cost, and higher O&M cost.
D-7	Tampa Bay (Big Bend) Desalination Plant Expansion	Costs reflective of 2022 Feasibility Study
D-9	Seawater Desalination Vessel	Costs based on 2009 Feasibility Study

Direct Potable Reuse

Only one DPR option (R-2: Desalination Plant Expansion with Reclaimed Water Supply) required special considerations. Option R-2 considers a 10 mgd expansion of the existing seawater desalination plant by blending reclaimed water supplies into the existing desalination plant influent. The total cost for this option was based on the capital and O&M costs for seawater desalination with a slight reduction in O&M expenditures to account for reduced energy consumption. However, it is anticipated that increased capital costs will be required to incorporate UV/AOP to meet DPR treatment requirements.

Indirect Potable Reuse

The IPR category includes two main treatment schemes: IPR with surface water augmentation and IPR with aquifer recharge. IPR options involving surface water augmentation include the capital and O&M costs associated with the IPR treatment scheme and surface water treatment scheme. Similarly, IPR options involving aquifer recharge include the capital and O&M costs associated with the IPR treatment scheme and surface water treatment scheme. Deviations from this approach are summarized **in Table 12**.

Table 12 Special Considerations for IPR Options

Option ID	Description	Special Considerations
R-13	Natural Treatment/Aquifer Recharge	Capital cost based on constructed wetlands for aquifer recharge and O&M costs based on fresh groundwater treatment and wetland management
R-24	City of Tampa Howard F. Curren Reclamation: Distillation	Utilizes thermal desalination treatment scheme as described in previous sections

Withdrawal Credits

There is no standardized approach for options identified as withdrawal credits, given the various considerations involved. An overview of special considerations for each option is provided in **Table 13**.

Table 13 Special Considerations for Withdrawal Credit Options

Option ID	Description	Special Considerations
R-29	Alderman Ford Lake (Medard Res.) - Fed with Reclaimed Water	Capital and O&M costs based on surface water treatment, since discharge is downstream of WTP intake
R-30	Augment Lakes in NW Hillsborough with Reclaimed Water	Capital and O&M costs based on IPR treatment of reclaimed water and surface water treatment for water withdrawn downstream
R-31	Downstream Augmentation of Alafia River	Capital and O&M costs based on surface water treatment, since discharge is downstream of WTP intake
R-35	NW Hillsborough Wetland Augmentation	Capital costs for wetland construction and O&M costs for groundwater treatment (groundwater is intended to be withdrawn from an existing wellfield and treated through an existing facility)
R-36	Plant City Wetland	Capital costs for wetland construction and O&M costs for groundwater treatment (groundwater is intended to be withdrawn from an existing wellfield and treated through an existing facility)
R-37	Section 21 Wellfield Rehydration	Capital costs for wetland construction and O&M costs for groundwater treatment (groundwater is intended to be withdrawn from an existing wellfield and treated through an existing facility)
R-38	4G Ranch to Augment Tampa Bay Water Wellfields	Capital costs for expansion of an existing wetland and O&M costs for groundwater treatment (groundwater is intended to be withdrawn from an existing wellfield and treated through an existing facility)
R-40	Construct Reclaimed Water Salinity Barrier System	Capital and O&M costs associated with groundwater treatment
R-43	Consolidated WUP Increase - Withdrawal	Capital and O&M costs associated with groundwater treatment
R-44	South Hillsborough Wellfield (via SHARP Credits)	Capital and O&M costs associated with groundwater treatment

Other Options

There are 10 unique options included in the other options category. These options generally did not fit into any of the previous categories and therefore required option-specific assumptions. Each of the options is outlined below.

Table 14 Special Considerations for Other Options

Option ID	Description	Special Considerations
O-2	Importation with Tankers	It is assumed that water would be imported as treated drinking water. Transportation costs were developed based on shipping distance of 300 miles and rail rate of $0.05 per ton-mile. It was assumed that the only required infrastructure would be a 30 MG finished water reservoir.
O-3	Interconnections with Other Regional Water Supply Authorities	The cost of importing of treated water via an interconnection with other regional water supply authorities was estimated based on local wholesale water rates and the construction of a transmission pipeline.
O-4	Air Condensation	The air condensation option was estimated based on information available from SkyH2O. Assumptions are based on the specifications from one atmospheric water generating system (AWG). These specifications include a water production rate of 2,780 gpd per unit, energy consumption of 1.1 kWh/gallon, and a unit cost of $395,000. Costs associated with power consumption were based on local rates.
O-5	Aquifer Storage and Recovery	This option utilizes the surface water treatment schematic and assumptions. It also includes costs associated with aquifer recharge and recovery.
O-6	Cisterns for Individual Homes	The cisterns option was estimated based on the median home size in the Tampa area (impervious surface area), annual precipitation data, the cost of purchasing and installing cisterns at individual homes, and the cost of home RO treatment. The yield for this option was set to 0.1 mgd.
O-9	Deep Tunnel Storage	The deep tunnel storage option assumes that excess surface water is available for deep tunnel storage in lieu of a surface reservoir. The option utilizes the surface water treatment scheme and assumptions. There were not any sources identified large enough to apply this concept in a cost-effective manner.
O-11	Icebergs	The iceberg option was estimated based on high-level information available including the distance from Antarctica to Tampa, the cost associated with towing vessels based on the duration of the trip, and the expected yield from the iceberg melt. It was assumed that there were no costs associated with treating the melted iceberg.
O-17	Seek Relief from SWUCA and MIA	The option of seeking relief from either the SWUCA or MIA assumes that additional groundwater is available based on the measured aquifer recovery in the surrounding areas. This option assumes that 10 mgd of

Option ID	Description	Special Considerations
		groundwater is available and utilizes the fresh groundwater treatment scheme and assumptions.
O-18	Cooperative Projects with Polk County and their Master Water Plan Projects	This option assumes that a cooperative project with Polk County would provide approximately six mgd of brackish groundwater near Winter Haven. The brackish groundwater treatment scheme and assumptions are used.
O-19	Large Fresh Water Users to Use Reclaimed Water	The conversion of large freshwater users to reclaimed water assumes that reclaimed water is readily available, and the fresh water use permits would be transferred or purchased by TBW. The fresh groundwater treatment scheme and assumptions are used.

Appendix C. Coarse Screening Water Supply Options

The Coarse Screening evaluation reviewed the viable 117 options from the Universe of Options database. Options were grouped by source type to establish basic supply, treatment, and transmission infrastructure considerations. The following sections provide a general overview of treatment considerations associated with each source type. However, specific considerations to environmental stewardship, cost, and reliability may vary depending on the option being evaluated.

Seawater

Options involving seawater desalination consider a similar treatment scheme to that of the existing Tampa Bay Water Seawater Desalination facility, which includes coagulation/flocculation/clarification, filtration, seawater reverse osmosis (SWRO) membrane system, second pass brackish water reverse osmosis (BWRO) system with 20% bypass, post-treatment stabilization, and disinfection. Options for seawater supply include co-locating desalination facilities with existing power plants to leverage existing outfall discharges, as well as desalination facilities with independent intake/outfall structures in the Gulf of Mexico and Tampa Bay. A few seawater alternatives consider thermal desalination technologies, such as multiple effect distillation, instead of membrane desalination. While thermal desalination requires a less extensive pretreatment process, it is typically less cost effective due to the higher energy consumption, larger facility footprint, need for a steam source, and lower finished water efficiency ratio.

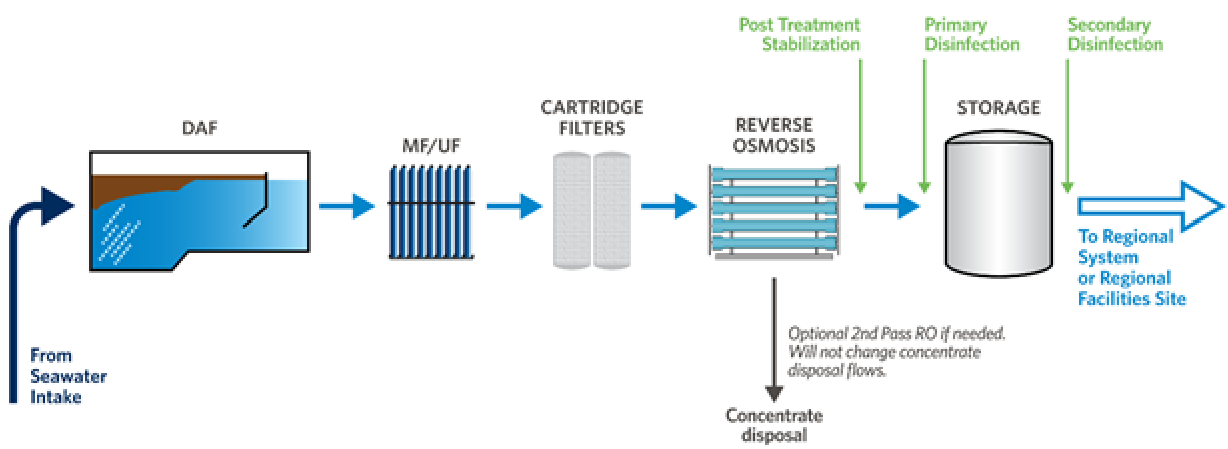

Figure 4 Seawater Process Flow Diagram

Surface Water

Surface water supply options consider a modified treatment scheme to Tampa Bay Water's existing Regional Surface Water Treatment Plant (SWTP) to account forTOC removal. The process includes suspended ion exchange (SIX), microsand ballasted clarification (Actiflo), ozone, biologically active filtration (BAF), and disinfection. While Tampa Bay Water is considering the need for the future addition of granular activated carbon (GAC) adsorption for treatment of PFAS substances, it is currently not considered in the surface water treatment scheme due to regulatory uncertainty. This can be added once the regulatory limits are set.

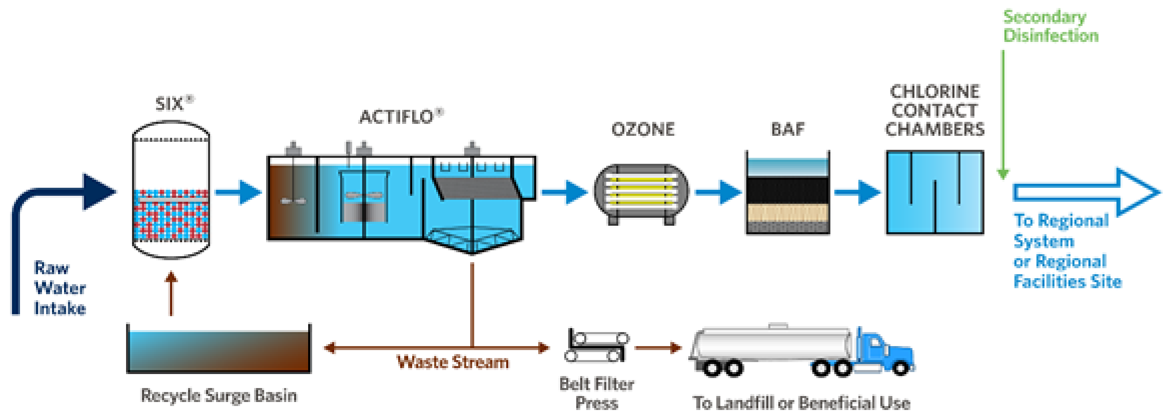

Figure 5 Surface Water Process Flow Diagram

Fresh Groundwater

Fresh groundwater supply options consider the use of ozone for oxidation of hydrogen sulfide, GAC adsorption for TOC removal, and primary/secondary disinfection. Since raw water quality data for specific groundwater supplies was not reviewed as part of the Coarse Screening evaluation, it is assumed both ozone and GAC treatment will be required for all fresh groundwater supplies.

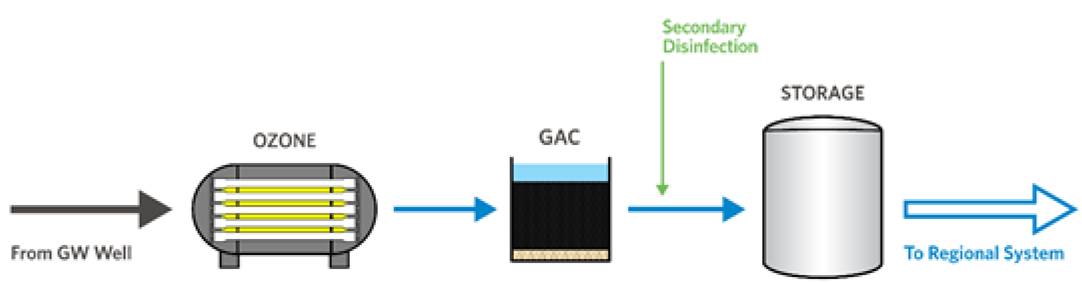

Figure 6 Fresh Groundwater Process Flow Diagram

Brackish Groundwater

Brackish groundwater supply options consider various sources and locations for development of new brackish wellfields. In general, the treatment scheme considers a BWRO membrane system with 20% bypass, post-treatment stabilization, and disinfection. Concentrate disposal is assumed to be deep well injection.

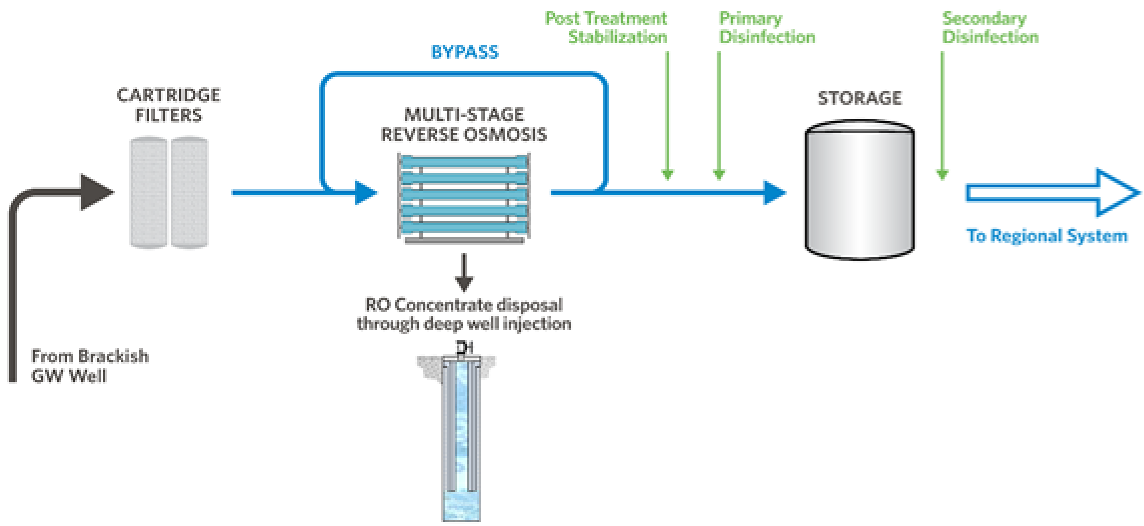

Figure 7 **Brackish Groundwater Process Flow Diagram**

Indirect Potable Reuse

Indirect potable reuse (IPR) options consider advanced treatment of reclaimed water supplies as defined in Part V of Chapter 62-610, Florida Administrative Code (FAC) for both aquifer recharge and surface water augmentation. In general, the membrane-based or full advanced treatment (FAT) process is considered for IPR options. The FAT scheme considers membrane filtration, reverse osmosis (RO), ultraviolet (UV)/advanced oxidation process (AOP), post-treatment stabilization, and disinfection. The advanced treated water is then released to an environmental buffer via aquifer recharge (groundwater) or discharged to a reservoir/canal (surface water). IPR options involving aquifer recharge consider groundwater treatment for the water withdrawn from the aquifer (refer to the groundwater section above for groundwater treatment assumptions). IPR options involving surface water augmentation consider surface water treatment for the water withdrawn from the reservoir/canal (refer to the surface water section above for surface water treatment assumptions).

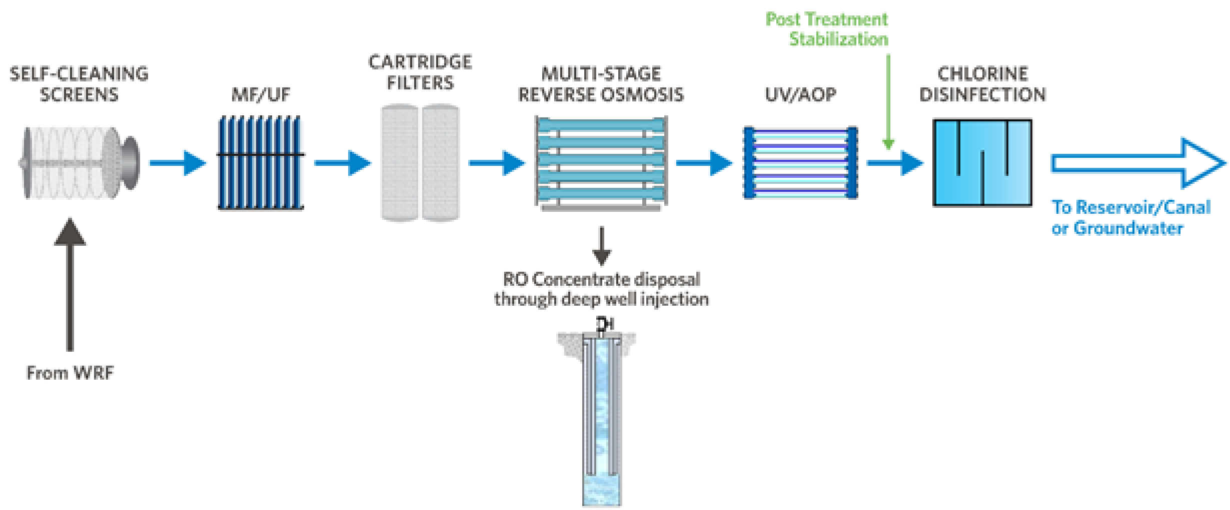

Figure 8 Membrane Based Indirect Potable Reuse Process Flow Diagram

Direct Potable Reuse

Direct potable reuse (DPR) options consider the FAT process with a GAC adsorption process to meet anticipated DPR regulatory requirements for TOC of 0.5 milligrams per liter (mg/L). The overall treatment scheme includes membrane filtration, RO, GAC adsorption, UV/AOP, post-treatment stabilization, and disinfection. The primary difference between DPR and IPR is the absence of an environmental buffer. In the case of DPR, the advanced treated water is conveyed directly to the drinking water treatment plant where it undergoes further treatment before entering the distribution system. Treatment schemes are subject to state regulatory requirements for DPR, which are currently being developed and are expected to be released in the summer of 2023.

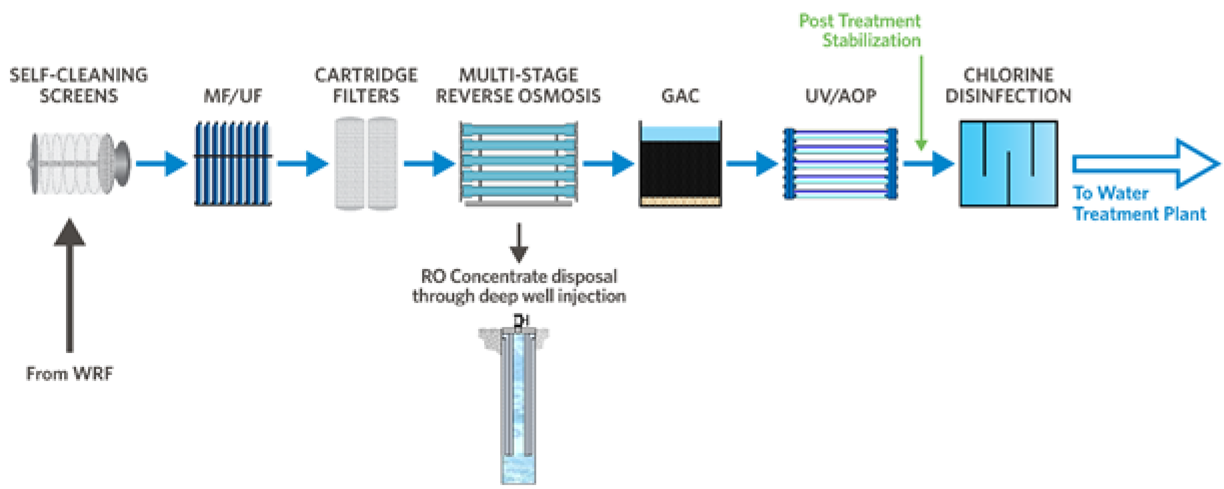

Figure 9 **Direct Potable Reuse Process Flow Diagram**

Withdrawal Credits

Water supply withdrawal credits can be obtained when reclaimed water is used to mitigate an impact of groundwater or surface water withdrawals, or by abandoning an agricultural well by providing reclaimed water for crop irrigation. Treatment considerations for withdrawal credits vary depending on whether the water being withdrawn is located upstream or downstream of the point of mitigation. In cases where reclaimed water is being discharged downstream of the drinking water treatment plant intake, the option considers expansion of surface water treatment infrastructure based on the treatment scheme described in the surface water section above. In cases where the surface water intake is downstream of the discharge point, IPR level treatment as defined in the IPR section above is considered. Some withdrawal credit options evaluate expansion of existing groundwater withdrawal credits where existing infrastructure already has capacity to support the additional water supply and treatment. Finally, there are a group of withdrawal credit options involving wetland augmentation and rehydration of the surficial aquifer via natural/environmental systems.

Appendix H. Fine Screening Technical Memorandum

FINAL – REV 1

FINE SCREENING TECHNICAL MEMORANDUM

Long-Term Master Water Plan

TAMPA BAY WATER PROJECT NO. 09016
BV PROJECT NO. 413437
BV FILE: TASK 6

PREPARED FOR

Tampa Bay Water

14 JUNE 2023
REVISED 25 SEPTEMBER 2023

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List of Abbreviations

404 Permit	Clean Water Act Section 404
AOP	Advanced Oxidation Process
ASR	Aquifer Storage and Recovery
AWRF	Advanced Water Reclamation Facility
AWTP	Advanced Wastewater Treatment Plant
BAF	Biologically Active Filtration
BWRO	Brackish Water Reverse Osmosis
CCI	Construction Cost Index
CWUP	Consolidated Water Use Permit
DAF	Dissolved Air Floatation
DIW	Deep Injection Well
DPR	Direct Potable Reuse
ELA	Engineering, Legal, and Administrative
ENR	Engineering News Record
ERP	Environmental Resource Permit
GAC	Granular Activated Carbon
I&C	Instrumentation and Controls
IHM	Integrated Hydrologic Model
IPR	Indirect Potable Reuse
LFA	Lower Floridan Aquifer
LTMWP	2023 Long-term Master Water Plan
MF	Microfiltration
MFL	Minimum Flows and Levels
mgd	Million Gallons per Day
MIA	Most Impacted Area
mg/L	Milligrams per Liter
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
OH&P	Overhead and Profit
PFAS	Per – and Polyfluoroalkyl Substances
POC	Point of Connection
PRMRWSA	Peace River Manasota Regional Water Supply Authority
PRWC	Polk Regional Water Cooperative
RO	Reverse Osmosis
SIX	Suspended Ion Exchange
SHARP	South Hillsborough Aquifer Recharge Project
SWFWMD	Southwest Florida Water Management District
SWRO	Surface Water Reverse Osmosis
SWTP	Surface Water Treatment Plant
SWUCA	Southern Water Use Caution Area

TDS	Total Dissolved Solids
TECO	Tampa Electric Company
TM	Technical Memorandum
UIC	Underground Injection Control
UV	Ultraviolet
WRF	Water Reclamation Facility
WTP	Water Treatment Plant
WUP	Water Use Permit

1.0 Introduction and Background

Tampa Bay Water, a regional water supply authority created in 1998, provides wholesale potable water supply for its six member governments: Hillsborough, Pasco and Pinellas counties, and the cities of New Port Richey, St. Petersburg, and Tampa. Tampa Bay Water has an unequivocal obligation to provide quality water to the member governments now and in the long-term future. Tampa Bay Water's Amended and Restated Interlocal Agreement (referred to as the Interlocal Agreement) requires the Long-term Master Water Plan (LTMWP) be updated every five years. Thus, the LTMWP ensures that Tampa Bay Water prepares for the provision of adequate supplies over a 20-year planning horizon.

The objectives of the LTMWP are to meet the requirements set forth in Section 2.09 of the Interlocal Agreement, which include:

- Identification of current customers, projects, and future customers;
- Review and general inventory of all existing Tampa Bay Water supply facilities;
- Identification of Tampa Bay Water's Capital Improvements Program;
- Review of all current Tampa Bay Water environmental permits, existing regulations and projected regulations;
- Identification of all proposed new water supply facilities;
- Evaluation of Tampa Bay Water staffing;
- Hydraulic analysis of Tampa Bay Water's water supply facilities, both existing and proposed;
- Evaluation of present and future sources of water and treatment requirements for those sources in terms of capacity, reliability, and economy; and
- Update the list of proposed water supply facilities required to meet the anticipated quality water needs of the member governments for the next 20 years.

This technical memorandum (TM) focuses on meeting the last objective bullet, "Update the list of proposed water supply facilities required to meet the anticipated quality water needs of the member governments for the next 20 years." A methodical process of water supply option identification, evaluation and screening has been proposed to meet the Interlocal Agreement requirement as illustrated in **Figure 1**. Prior to this document, the Universe of Options TM (finalized January 6, 2023) and the Coarse Screening Evaluation TM (finalized March 30, 2023) were completed. This TM summarizes the Fine Screening evaluation of the water supply concepts that remained after the Coarse Screening evaluation of the numerous water supply options initially considered.

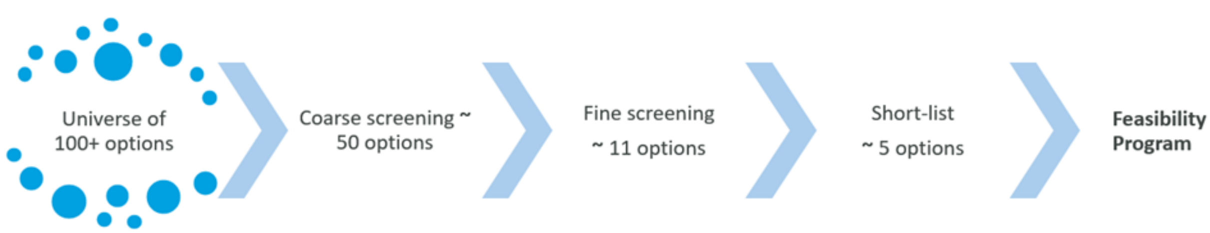


Figure 1 Water Supply Options Shortlist Process

2.0 Concepts Remaining After Coarse Screening Evaluation

A brief summary of each of the 25 concepts and sub-concepts remaining after the coarse screening evaluations are provided below. Additional details and figures regarding each concept are also provided in project concept summary sheets in **Appendix A**. The water supply yields, treatment process assumptions and other concept details provided in **Appendix A** are current estimates based on the existing information available and will be further refined through each screening phase of the Long Term Master Water Plan.

2.1 Concept 1 – Gulf Coast Desalination

The Gulf Coast Desalination concept consists of constructing a new seawater desalination facility that would produce a finished water annual average yield of 25 million gallons per day (mgd) for use in Tampa Bay Water's regional system. The facility could be a stand-alone facility or co-located with the existing Anclote Power Plant, which is located in southwestern Pasco County and owned and operated by Duke Energy. Finished water would tie into the existing Regional Transmission System at the northern end of the Keller Transmission Main.

2.2 Concept 2 – Pasco Brackish Wellfield

The Pasco Brackish Wellfield consists of constructing a new wellfield and groundwater treatment plant in western Pasco County that would produce an estimated finished water annual average yield of 4.3 mgd. The brackish water from either the lower portion of the Upper Floridan Aquifer (UFA) (approximately 700 feet below surface) or the Lower Floridan Aquifer (approximately 1500 feet below surface) is to be treated at a new, small footprint reverse osmosis (RO) facility and include a deep injection well for disposing of the concentrate discharge generated from the treatment process. The most probable brackish water supply locations are in western Pasco County. Finished water would tie into the Regional System at the Cypress Creek/Keller Transmission Main.

2.3 Concept 3 – St. Petersburg Desalination/Brackish Plant

Concept 3 includes two sub-concepts. Concept 3a involves the construction of a new seawater desalination plant in eastern St. Petersburg that would produce a finished water annual average yield of up to 30 mgd. The new plant would tie into a new point of connection (POC) with the existing St. Petersburg distribution system, which would reduce St. Petersburg's demand from the Tampa Bay Water regional system.

Concept 3b consists of constructing a new reverse osmosis facility to treat brackish groundwater from the lower portion of the Upper Floridan Aquifer in eastern St. Petersburg and would produce a finished water annual average yield of 4.3 mgd. For this planning effort, the new brackish water supply wells are assumed to be located northwest of Lake Maggiore. The potable water supply generated from this concept would be delivered to a new POC with the existing St. Petersburg water distribution system, which would reduce St. Petersburg's demand from the Tampa Bay Water regional system.

2.4 Concept 4 – Existing Desalination Plant Expansion

This concept would increase the finished water annual average yield of the existing Tampa Bay Water Seawater Desalination Plant by 10.4 mgd. The existing desalination plant is located adjacent to the Tampa Electric Company (TECO) Big Bend Power Plant in Apollo Beach and ties into the Tampa Bay Water regional system at the Regional Facilities Site. The desalination plant expansion would include upgrades and expansion of the pretreatment processes, reverse osmosis (RO) treatment trains, post-treatment processes, residuals and concentrate handling systems, and finished water pumping systems. A feasibility study of this concept was completed in March 2022.

2.5 Concept 5 – Existing Desalination Plant Expansion via Reuse/Brackish Water Blending

Concept 5 includes two sub-concepts. Concept 5a considers expansion of the existing Tampa Bay Seawater Desalination Plant by blending the seawater supply with reclaimed water. Augmenting the desalination plant influent flow with reclaimed water from the City of Tampa or Hillsborough County would require a facility expansion and treatment process modifications to provide an additional finished water annual average yield of 9.9 mgd. The concept would require expansion and modifications to the pretreatment system, reverse osmosis treatment trains, chemical systems, and finished water pumping and transmission system (including a booster pumping station). Additionally, this concept includes provisions for ultraviolet light/advanced oxidation process (UV/AOP) to meet contaminant and pathogen reduction requirements typically required for direct potable reuse (DPR) systems. Blending reclaimed water with seawater supply will reduce the influent total dissolved solids (TDS) to the reverse osmosis treatment system and reduce the feed pressure and energy consumption for the reverse osmosis treatment process; however, the addition of a UV/AOP and the purchase of bulk reclaimed water supply will result in some additional operations and maintenance (O&M) costs.

Concept 5b considers expansion of the existing Tampa Bay Seawater Desalination Plant by blending pretreated seawater with brackish groundwater from the lower portion of the Upper Floridan Aquifer to augment the existing Tampa Bay Seawater Desalination Plant. Augmenting the desalination plant's influent flow with brackish groundwater, obtained via new groundwater production wells in southern Hillsborough County, would require a facility expansion to produce an additional finished water annual average yield of 5 mgd. The concept would require expansion and modifications to the reverse osmosis treatment systems, chemical systems, and finished water pumping and transmission systems (including a booster pumping station). Blending brackish water with seawater supply will reduce the influent TDS to the reverse osmosis treatment system and reduce the feed pressure and energy consumption of the reverse osmosis treatment process. Another benefit of brackish water blending is an increase in the reverse osmosis system recovery rate, which will result in a greater amount of finished water being produced per each unit volume of feed water supplied to the desalination plant. The higher recovery rate also results in a reduction in the concentrate discharge produced per unit volume of feed water.

2.6 Concept 6 – North Pinellas Surface Water Treatment Plant

The North Pinellas Surface Water Treatment Plant (SWTP) consists of harvesting excess surface water from the Lake Tarpon outfall canal along with other potential sources including Chesnut Park, Canal Park, East Lake, Channel "A", and Brushy Creek. The surface water supply would be sent to a new off-stream reservoir for seasonal storage and treatment at a new SWTP in North Pinellas County with similar treatment processes as the existing Regional SWTP. The new SWTP would include provisions for Total Organic Carbon (TOC) removal and is currently estimated to produce a finished water annual average yield of 8.5 mgd. The finished water would tie into the existing Tampa Bay Water regional system near the northern end of the Keller Transmission Main.

2.7 Concept 7 – New Surface Water Treatment Plant via Lake Thonotosassa

The New SWTP via Lake Thonotosassa concept would involve a new SWTP constructed in Hillsborough County near Lake Thonotosassa and is expected to produce a finished water annual average yield of 2 mgd. The new SWTP would include similar treatment processes as the existing Regional SWTP with additional provisions to manage TOC removal and a pump station and pipeline to convey finished water supply to the existing Tampa Bay Water regional system at the North-Central Hillsborough Intertie.

2.8 Concept 8 – New Surface Water Treatment Plant at the Regional Reservoir via Increased Alafia Withdrawal

Concept 8 involves constructing a new SWTP near the existing C.W. Bill Young Regional Reservoir in Hillsborough County to treat additional surface water supply provided through increased withdrawals from the Alafia River. Modifications to the existing water use permit would be required to increase the allowable mid to high range withdrawals from the river to create more available supply. This concept would rely on the existing Enhanced Surface Water System for raw surface water supply, transmission and seasonal storage. In addition to constructing a new SWTP, the concept would also involve the construction of a new finished water pump station and transmission pipeline to deliver the treated supply to the regional transmission system. The new SWTP would include similar treatment processes as that of the existing Regional SWTP with additional provisions to enhance TOC removal. This concept is currently estimated to provide a finished water annual average yield of 6.4 mgd.

2.9 Concept 9 – New Surface Water Treatment Plant and Reservoir via New Supplies

Concept 9 involves the development of new surface water supplies from sources in southern Hillsborough County including the Little Manatee River and Bullfrog Creek. This concept requires the construction of a new surface water seasonal storage reservoir in conjunction with a new SWTP to provide a finished water annual average yield of 11.4 mgd. The new SWTP would be located in southern Hillsborough County and would connect into the regional transmission system at the southern end of the proposed new South Hillsborough Pipeline. The new SWTP would include similar treatment processes as the existing Regional SWTP with additional provisions to enhance TOC removal.

2.10 Concept 10 – Eastern Pasco Wellfield

The Eastern Pasco Wellfield concept would involve the construction of a new wellfield in Eastern Pasco County outside of the existing Consolidated Water Use Permit (CWUP). Fresh groundwater supply would be treated at a new groundwater treatment plant using ozone and GAC filters to produce a finished water annual average yield of 10 mgd. The finished water would be connected into the regional transmission system in the vicinity of the Cypress Creek Pump Station and/or to a new point of connection with Pasco County northeast of the Cypress Creek Pump Station.

2.11 Concept 11 – Interconnect with Polk Regional Water Cooperative

An Interconnect with the Polk Regional Water Cooperative (PRWC) system could allow for additional supply that may be available from PRWC to be sent to the Tampa Bay Water regional transmission system. This concept would require the construction of a new transmission main from the PRWC planned water system (near the City of Lakeland) to the east side of Tampa Bay Water's existing regional transmission system (along the North-Central Hillsborough Intertie). For the purpose of this planning effort, it is assumed that the interconnect would provide 5 mgd of annual average supply to the Tampa Bay Water system. However, it is understood that the feasibility of this concept would be dependent upon the long-term availability of supply capacity and a commitment from PRWC to supply water to the Tampa Bay Water regional system.

2.12 Concept 12 – Interconnect with Peace River Manasota Regional Water Supply Authority

An Interconnect with the Peace River Manasota Regional Water Supply Authority (PRMRWSA) system could allow for additional supply from PRMRWSA to be sent north to supplement the Tampa Bay Water regional system. This concept would require the construction of a new transmission main from the PRMRWSA system (in Manatee County) to Tampa Bay Water's regional transmission system in southern Hillsborough County. For the purpose of this planning effort, it is assumed that the interconnect would provide 6 mgd of annual average supply to the Tampa Bay Water system. However, it is understood that the feasibility of this concept would be dependent upon the long-term availability of supply capacity and a commitment from the PRMRWSA to supply water to the Tampa Bay Water regional system.

2.13 Concept 13 – Transfer of Existing Groundwater Permits

Concept 13 includes two sub-concepts. Concept 13a involves transferring groundwater permits from large fresh groundwater users in Pasco County to Tampa Bay Water. Concept 13b involves transferring groundwater permits from large fresh groundwater users in South Hillsborough County to Tampa Bay Water. This concept includes the identification of existing water use permit holders (such as industrial and agricultural businesses and property owners) that may no longer need an existing water use permit due to a variety of reasons, including reduced mining or agriculture operations. Large user Water Use Permit (WUP) credits would be purchased and transferred to Tampa Bay Water to allow for the withdrawal of groundwater from existing or new wells in the area.

The groundwater supply that is made available through either of these sub-concept would be treated at new groundwater treatment facilities. It is assumed that the new groundwater treatment facilities would include ozone and GAC filter treatment processes. The finished water supply would be delivered into the existing Regional Transmission system. For Concept 13a (Pasco County), an annual average yield of up to 3.5 mgd is currently assumed, with the finished water supply being delivered to the Regional System at the Cypress Creek Pump Station. For Concept 13b (South Hillsborough County), an annual average yield of up to 15 mgd is currently assumed, with the finished water supply being delivered to the Regional System at the southern end of the proposed new South Hillsborough Pipeline.

2.14 Concept 14 – Increase Consolidated Water Use Permit

Concept 14 includes three sub-concepts. Concept 14a involves increasing the permitted withdrawal quantity associated with Tampa Bay Water's existing CWUP based on providing evidence that a higher permitted withdrawal rate could be achieved without negatively impacting the environmental recovery that occurred due to the CWUP withdrawal rate reduction from 158 mgd to 90 mgd. This concept would primarily rely on the existing wellfields and groundwater treatment facilities for supply and treatment; however, additional groundwater treatment system improvements may be included if determined necessary to maximize the rotational capacity of the 10 wellfields that are part of the CWUP. For the purpose of this initial planning effort, it is assumed that the additional annual average water supply yield from the concept could be up to 20 mgd.

Similar to Concept 14a, Concept 14b involves increasing the permitted withdrawal rate of the existing CWUP but also includes a reclaimed water aquifer recharge system in northern Pinellas County to form a salinity barrier with the intention of protecting the freshwater aquifer to allow for additional groundwater withdrawals from the CWUP wellfields located further inland. The reclaimed water supply for the aquifer recharge system would be supplied from Pinellas County. The aquifer recharge system would include the construction of a new reclaimed water recharge wellfield in northern Pinellas County.

For the purpose of this initial planning effort, it is assumed that adding the reclaimed water aquifer recharge system could allow for up to 6.3 mgd of additional annual average water supply yield from the CWUP.

Concept 14c is similar to Concept 14b but involves the use of reclaimed water to supplement natural groundwater recharge from percolation from surficial systems (such as wetlands, rapid infiltration basins or percolation ponds) down to the water table. Supplementation in the form of natural recharge with reclaimed water would be intended to mitigate the potential impacts of additional groundwater withdrawals from the CWUP on natural systems, such as wetlands. The reclaimed water supply for the natural recharge system would be supplied from Hillsborough or Pinellas County. The concept would include the construction of a reclaimed water surficial recharge system in northwest Hillsborough County or northern Pinellas County. For the purpose of this initial planning effort, it is assumed that adding the reclaimed water surficial recharge system could allow for up to 0.2 mgd of additional annual average water supply yield from the CWUP.

2.15 Concept 15 – Direct Potable Reuse

Concept 15 is a direct potable reuse (DPR) concept that uses treated reclaimed water supply to supplement the source water supply at existing water treatment plants. Three sub-concept configurations were developed. Each DPR concept consists of a treatment process designed to meet DPR treatment objectives for contaminant and pathogen removal, which meet and exceed the requirements for drinking water standards. As such, concepts considering DPR treatment are described as meeting drinking water standards herein.

Concept 15a is DPR concept in Hillsborough County that supplements the existing Tampa Bay Water Regional SWTP with reclaimed water supply that is treated to drinking water standards. The reclaimed water supply used for this concept is assumed to be from the Hillsborough County southern reclaimed water system or Falkenburg Road Advanced Wastewater Treatment Plant (AWTP). A new advanced water treatment facility would be constructed to treat 15 mgd of reclaimed water supply to drinking water standards using MF/UF, RO, UV/AOP, and GAC filter treatment processes. The treated water would be pumped to the Regional SWTP for additional treatment and provide a finished water annual average yield of 10.5 mgd.

Concept 15b is a DPR concept in Pinellas County that would supplement the S.K. Keller Water Treatment Plant (WTP) with reclaimed water supply that is treated to drinking water standards. The reclaimed water supply used for this concept is assumed to be from the Pinellas County reclaimed water system or South Cross Bayou AWRF. A new reservoir would be constructed for seasonal storage of the reclaimed water supply and a new advanced water treatment facility would be added to treat 8 mgd of reclaimed water supply to drinking water standards using MF/UF, RO, UV/AOP, and GAC filter treatment processes. The treated water would be pumped to the S.K. Keller WTP for additional treatment and provide a finished water annual average yield of 5.8 mgd.

Concept 15c is a DPR concept in Hillsborough County that supplements the existing Tampa Bay Regional SWTP with reclaimed water supply that is treated to drinking water standards. The reclaimed water supply used for this concept is assumed to be from the H.F. Curren Advanced Wastewater Treatment Plant (AWTP). A new advanced water treatment facility would be constructed to treat 20 mgd of reclaimed water supply to drinking water standards using MF/UF, RO, UV/AOP, and GAC filter treatment processes. The treated water would be pumped to the Regional SWTP for additional treatment and provide a finished water annual average yield of 14 mgd.

2.16 Concept 16 – South Hillsborough Wellfield

Concept 16 includes the construction of a new wellfield and groundwater treatment plant in southern Hillsborough County. The finished water supply would be delivered from the groundwater treatment plant into the Tampa Bay Water Regional System at the southern end of the proposed new South Hillsborough Pipeline. There are three South Hillsborough Wellfield sub-concepts that were developed. Each sub-concept is based on a different approach for obtaining the groundwater withdrawal permit for the proposed South Hillsborough Wellfield.

Concept 16a involves obtaining a water use permit for a new wellfield in southern Hillsborough County based on requesting relief from the Southern Water Use Caution Area (SWUCA) and Most Impacted Area (MIA) withdrawal restrictions by SWFWMD. Withdrawn water would be treated with ozone and GAC filter treatment processes at the new groundwater treatment plant. It is understood that the feasibility of this concept would be dependent upon SWFWMD making a determination that measured recovery in the SWUCA and MIA have been achieved. For the purpose of this initial planning effort, it is assumed that the annual average water supply yield from the concept could be up to 6.1 mgd.

Concept 16b is the South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge concept. This concept involves obtaining a water use permit for a new wellfield in southern Hillsborough County based on providing evidence of a net-benefit to the aquifer associated with constructing and operating a reclaimed water aquifer recharge system in southern Hillsborough County to form a salinity barrier. The aquifer recharge system would be used to generate credits to withdraw a certain quantity of fresh groundwater from a new production wellfield located further inland (east) of the aquifer recharge wells. The permitted groundwater withdrawal rate would be lower than the aquifer recharge rate to provide a net-benefit to the aquifer. Withdrawn water would be treated with ozone and GAC filter treatment processes at the new groundwater treatment plant. Concept 16b is based on using the Hillsborough County SHARP (South Hillsborough Aquifer Recharge Program) system or a potential similar aquifer recharge system supplied from City of Tampa reclaimed water to support the acquisition of the groundwater withdrawal permit needed for the new wellfield. A feasibility study for this sub-concept was completed in December 2021 and provided an estimated finished water annual average yield of 6.1 mgd.

Concept 16c is the South Hillsborough Wellfield via Indirect Potable Reuse (IPR) concept. This concept is similar to Concept 16b but involves the reclaimed water supply being treated to drinking water standards at an advanced water treatment plant prior to aquifer recharge, along with locating the aquifer recharge wells in closer proximity to (or surrounding) the new wellfield so that the aquifer recharge supply is eventually withdrawn from the production wells. The water withdrawn from the production wellfield would also be sent to a new groundwater treatment facility for additional treatment using MF/UF and UV/AOP processes before delivery into the Tampa Bay Water Regional System. This sub-concept is considered an IPR concept, whereas Concepts 16b is considered a water supply withdrawal credits concept. The reclaimed water supply for Concept 16c would be from the City of Tampa H.F. Curren AWTP or the Hillsborough County reclaimed water system. For the purpose of this initial planning effort, it is assumed that the annual average water supply yield from the concept would be 9.3 mgd.

3.0 Fine Screening Criteria and Evaluation Process

The Fine Screening process began by evaluating the 25 concepts and sub-concepts identified in **Section 2.0**. The concepts were evaluated and scored based on three, equally weighted, Board-approved selection criteria categories, which are further broken down into nine specific sub-criteria. The sub-criteria were weighted within each category based on a workshop consensus with Tampa Bay Water's cross-functional staff.

The fine screening evaluation criteria and associated weightings are shown in **Table 1**. For each sub-criterion, a score of one through five was available, with one being the worst and five being the best score. During a workshop with Tampa Bay Water staff held on February 22, 2023, the weightings were established. The sub-criteria in each category were voted on by staff, using a pairwise approach, to assign weights within the three main categories.

During the fine screening evaluation, each concept was assigned a score for each bulleted item within the nine sub-criteria. The scores for each of the bulleted items within the criterion were averaged to create a score for that criterion. That score was then multiplied by the sub-criteria weighting and category weight, then summed to calculate the total average Fine Screening score for each concept.

Table 1 Evaluation Criteria and Weighting

Criteria	Definition	Weighting	Numeric Score				
			1 (worst)	2	3 (medium)	4	5 (best)
Category: Environmental Stewardship – 33%							
Environmental Sustainability	Extent to which the concept positively or negatively impacts the natural environment and promotes sustainability of water and biological resources including conservation of water resources and protection of natural systems including downstream water quantity and quality; natural habitat and/or listed species (endangered/threatened species), and minimization of energy consumption and thus carbon footprint.	14%	• Concept has high potential to result in adverse impacts to water resources and/or natural systems • Limited protection of downstream water quantity or quality • Limited protection of natural habitats and/or listed species • High energy consumption		• Concept has some potential for adverse impacts to water resources and/or natural systems • Moderate protection of downstream water quantity and quality • Moderate protection of natural habitats and/or listed species • Moderate energy consumption		• Concept is unlikely to result in adverse impacts and may have a positive impact to water resources and/or natural • Strong protection of downstream water quantity and quality • Strong protection of natural habitats, and/or listed species • Low energy consumption
Regulatory / Ease of Permitting	Extent to which concept is consistent with existing local, state, and federal regulations, has challenging supporting documentation requirements (modeling, assessments, etc.), and amount of mitigation that may be required.	15%	• Concept is inconsistent with existing policies, rules, and regulations • Concept is anticipated to involve highly challenging permitting requirements and extensive supporting documentation • If approved, the concept may require substantial mitigation		• Concept is generally consistent with existing policies, rules, and regulations • Concept is anticipated to involve moderately challenging permitting requirements and typical supporting documentation • If approved, the concept may require mitigation		• Concept is consistent with existing policies, rules, and regulations, and may result in a net environmental benefit • Concept is anticipated to involve limited permitting requirements and supporting documentation • The concept may require little or no mitigation
Public Reception	How the public is expected to receive the given water supply concept and the type of public outreach required to support the concept.	4%	• Anticipated negative reception of concept • Significant, long-term and sustained public outreach required		• Anticipated neutral reception of concept; or equal amounts of positive/negative reception • Sustained public outreach required		• Anticipated positive reception of concept • Minimal public outreach required
Category: Project Cost – 33%							
Life Cycle Cost	Total cost of concept per 1,000 gallons including estimated capital cost and annual operation & maintenance expenditures considering a 30-year period	14%	• $/1,000 gallons = Greater than $17.25		• $/1,000 gallons = $8.50 - $13.00		• $/1,000 gallons = Less than $4.50
System Integration and Expansion Potential	Ease with which concept integrates into existing system, thus maximizing investment, including the potential for additional improvements to the regional system to be required to support the concept, complexity of operations and maintenance (O&M) (e.g., technology familiarity, location, etc.), and concept is able to be implemented in phases or expanded in the future.	13%	• Difficult or complex integration with existing system requiring significant improvements to the regional system • Complex O&M requirements such as treatment technology familiarity, distance from existing facilities and reliance on third parties for access • Poor supply expansion potential		• Reasonable or moderate integration with existing system requiring moderate improvements to the regional system • Moderate O&M requirements such as treatment technology familiarity, distance from existing facilities and reliance on third parties for access • Some supply expansion potential		• Easy integration to existing system requiring minimal improvements to the regional system • Easy O&M requirements such as treatment technology familiarity, distance from existing facilities and no reliance on third parties for access • Good supply expansion potential

Criteria	Definition	Weighting	Numeric Score				
			1 (worst)	2	3 (medium)	4	5 (best)
Cost Risk Factors	Potential for concept to increase in capital or O&M costs due to schedule delays, supply chain issues (equipment or chemicals), future regulatory changes that mandate more stringent water quality requirements (e.g., PFAS), and constructability risks	6%	• High potential for significant schedule delays due to supply chain issues • Proposed treatment process would likely need to be significantly modified in order to meet potential future regulatory changes • Significant constructability challenges and risks		• Moderate potential for schedule delays due to supply chain issues • Proposed treatment process would likely need some modifications or enhancements to meet potential future regulatory changes • Moderate constructability challenges and risks		• Low potential for schedule delays due to supply chain issues • Proposed treatment process would likely be sufficient to meet potential future regulatory changes • Low constructability challenges and risks
Category: Reliability – 34%							
Yield Reliability	Extent to which concept has long-term yield reliability, has impacts to supply capacity and quality by seasonal variations (e.g., drought vs wet weather conditions and resulting water quality changes, etc.), is resilience to natural disasters, sea level rise and climate change, can quickly recover from events or conditions that negatively impact yield, and is reliant on third parties to ensure source water supply availability (quantity and duration).	14%	• Uncertain or low long-term yield reliability • Significant impacts to supply capacity and quality based on seasonal or long-term variations • Limited resilience to natural disasters, sea level rise and/or climate change • Requires a significant amount of time to recover from events or conditions that negatively impact yield • Potential reliance on third party to ensure source water supply availability (quantity and duration)		• Moderate long-term yield reliability • Moderate impacts to supply capacity and quality based on seasonal or long-term variations • Moderate resilience to natural disasters, sea level rise and/or climate change • Moderate resilience or requires a moderate amount of time to recovery from events or conditions that negatively impact yield • Potential reliance on third party to ensure source water supply availability (quantity and duration)		• High long-term yield reliability • Minimal impacts to supply capacity and quality based on seasonal or long-term variations • High resilience to natural disasters, sea level rise and climate change • Strong resilience or ability to recovery quickly from events or conditions that negatively impact yield • No reliance on third party to ensure source water supply availability (quantity and duration)
Regional System Reliability Impacts	Extent to which concept increases ability to maintain level of service; ability of concept to provide service/relief during emergency events (main break, drought, etc.), and degree of impact to reliability (regional vs isolated).	8%	• Does not increase system reliability • Does not improve system performance under emergency scenario conditions • Impact is isolated to one member government		• Moderately increases system reliability, • Moderately improves some emergency scenario conditions • Impact supports more than one member government		• Significantly increases system reliability, • Significantly improves some emergency scenario conditions • Impact is regional
Contractual Requirements/ Risks	The extent to which the concept aligns with the terms of the Amended and Restated Interlocal Agreement, Master Water Supply Contract, requires amendments to governance documents, or requires new governance documents/agreements or new contracts	12%	• Significant changes to Governance documents • Concept requires new contract documents / types of contracts or • Low likelihood of third party approving a long-term agreement (applicable concepts only)		• Concept requires moderate changes to Governance contract documents, but • Requires no new contract documents / types of contracts • Moderate likelihood of third party approving a long-term agreement (applicable concepts only)		• Concept requires no changes to existing Governance documents, or • No new contract documents / types of contracts with a long-term agreement in-place • High likelihood of third party approving a long-term agreement (applicable concepts only)
Total		**100%**					

4.0 Fine Screening Evaluation Results

The Fine Screening Evaluation produced an overall score between one and five for each of the twenty-five project concepts. **Figure 2** illustrates the distribution of scoring from highest to lowest. The Fine Screening results, including the scores for each criterion and the total average score for each concept, are provided in order of highest to lowest in **Table 2** below. More detailed tables, which include the scoring of the bulleted items within the criteria, are presented in **Appendix B.** More detailed information related to how costs were estimated for each of the concepts is included in **Appendix C**.

Upon reviewing the distribution of concept results, the top eleven concepts, with final average scores of 3.15 and greater, were selected for further consideration as part of the subsequent Short-List Evaluation step of the 2023 LTMWP Update. These eleven concepts include a range of different source water supply types, as listed below:

- Seawater Options: 1
- Surface Water Options: 3
- Fresh Groundwater Options: 5
- Brackish Groundwater Options: 2
- Withdrawal Credit Options: 1

A sensitivity analysis was conducted to evaluate the fine screening results using the criteria weightings from coarse screening compared to those established in fine screening. The analysis results concluded that the top concepts did not change between applying the coarse and fine screening weightings, though the order of the concepts did shift. Therefore, it was ultimately decided to continue with the top eleven projects, using the fine screening criteria weightings, for the Short-List Evaluation process.

The concepts that will proceed to the Short-List Evaluation are listed below.

- Concept 10 - Eastern Pasco Wellfield
- Concept 14a - Increased Consolidated Water Use Permit (CWUP)
- Concept 13a - Transfer Existing Groundwater Permits – Pasco
- Concept 13b - Transfer Existing Groundwater Permits – Hillsborough
- Concept 2 - Pasco Brackish Wellfield
- Concept 16b - South Hillsborough Wellfield via Aquifer Recharge
- Concept 8 - New Surface Water Treatment Plant at Regional Reservoir via Increased Alafia Withdrawals
- Concept 6 - North Pinellas Surface Water Treatment Plant
- Concept 5b - Existing Desalination Plant Expansion with Brackish Water
- Concept 4 - Existing Desalination Plant Expansion
- Concept 9 - New Surface Water Treatment Plant and Reservoir via New Supplies

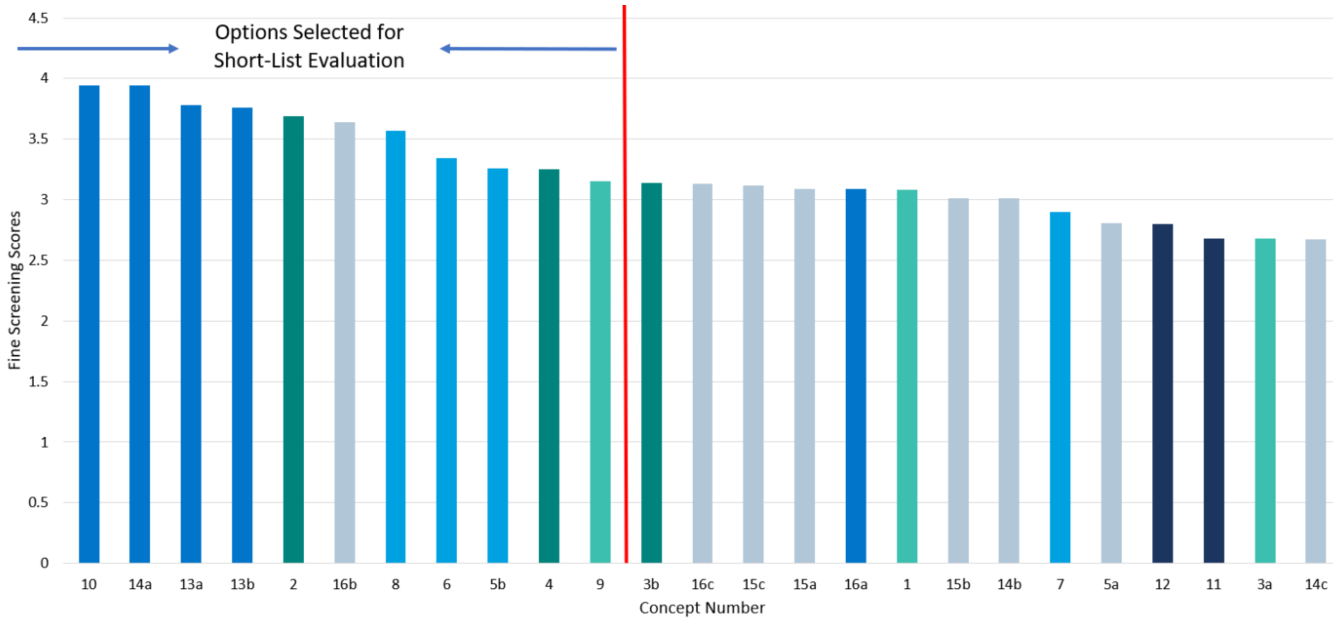


Figure 2 **Fine Screening Options Scoring Summary**

Table 2 Fine Screening Evaluation Results Summary

Concept ID	Concept Name	Finished Water Yield, MGD	$/1,000 gal	Environmental Sustainability	Regulatory/ Ease of Permitting	Public Reception	Life Cycle Cost	System Integration and Expansion Potential	Cost Risk Factors	Yield Reliability	Regional System Reliability Impacts	Contractual Requirements/ Risks	Average Score
10	Eastern Pasco Wellfield	10.0	$4.79	3.67	3.33	3.00	4.00	4.33	4.33	3.80	3.67	5.00	3.94
14a	Increased CWUP	9.8	$0.50	3.67	2.33	3.00	5.00	3.78	4.33	4.00	4.33	5.00	3.94
13a	Transfer Existing Groundwater Permits - Pasco	3.5	$8.11	5.00	4.67	4.00	3.00	3.37	4.33	3.40	3.33	3.00	3.78
13b	Transfer Existing Groundwater Permits - Hillsborough	15.0	$6.63	5.00	4.67	4.00	3.00	3.74	3.67	3.40	3.00	3.00	3.76
2	Pasco Brackish Wellfield	4.3	$8.44	3.33	3.67	3.00	3.00	3.31	3.67	4.00	4.00	5.00	3.69
16b	South Hillsborough Wellfield via Aquifer Recharge	6.1	$5.40	4.00	4.00	3.00	4.00	4.00	3.67	3.60	3.00	2.67	3.64
8	New SWTP at Regional Reservoir via Increased Alafia Withdrawals	6.4	$5.74	3.33	3.33	4.00	4.00	2.96	3.00	3.40	3.00	5.00	3.57
6	North Pinellas SWTP	8.3	$12.23	4.33	4.00	2.00	2.00	3.00	3.00	3.00	2.33	5.00	3.34
5b	Existing Desalination Plant Expansion with Brackish Water	5.0	$9.32	3.00	3.33	3.50	3.00	2.37	3.33	3.00	3.67	4.67	3.26
4	Existing Desalination Plant Expansion	10.4	$11.18	2.67	3.67	4.00	2.00	2.56	3.33	3.60	3.67	4.67	3.25
9	New SWTP and Reservoir via New Supplies	11.4	$11.17	3.00	3.00	3.00	2.00	2.94	2.67	3.60	3.00	5.00	3.16
3b	St Petersburg Brackish Plant	4.3	$7.26	3.00	4.00	2.00	3.00	2.87	3.67	2.60	2.33	4.00	3.14
16c	South Hillsborough Wellfield via IPR	9.3	$13.02	4.00	3.67	2.00	2.00	3.00	3.00	3.80	3.00	2.67	3.13
15c	DPR - City of Tampa	14.0	$6.62	4.33	2.67	1.00	3.00	3.31	2.67	3.20	3.67	2.67	3.12
15a	DPR - Hillsborough County	10.5	$9.65	4.33	2.67	1.00	3.00	3.13	3.00	3.00	3.67	2.67	3.09
16a	South Hillsborough Wellfield	6.2	$3.41	2.33	1.00	2.00	4.00	3.52	4.67	2.80	3.00	5.00	3.09
1	Gulf Coast Desalination	25.0	$11.06	2.33	3.67	3.00	2.00	2.87	2.33	3.60	4.00	4.00	3.08
15b	DPR - Pinellas County	5.8	$7.73	4.33	2.67	1.00	3.00	2.74	2.67	2.60	4.33	2.67	3.01
14b	Increase CWUP via a Pinellas County Reclaimed Water Aquifer Recharge Wellfield	6.3	$12.78	4.00	3.00	3.00	2.00	3.13	3.00	2.80	4.33	2.67	3.01
7	New SWTP via Lake Thonotosassa	2.0	$7.58	2.00	3.33	2.00	3.00	2.59	2.67	2.20	2.67	5.00	2.90
5a	Existing Desalination Plant Expansion with Reuse Water	9.9	$13.46	3.33	3.00	2.50	2.00	2.43	2.33	3.20	3.67	2.67	2.81
12	Interconnect with PRMRWSA	6.0	$9.86	3.33	2.00	4.00	3.00	2.74	3.33	2.40	3.00	2.67	2.80
11	Interconnect with PRWC	5.0	$9.31	3.33	2.00	4.00	3.00	2.61	3.33	1.80	2.83	2.67	2.68
3a	St Petersburg Desalination Plant	30.0	$11.16	1.67	2.33	2.00	2.00	2.41	2.67	4.40	2.33	4.00	2.68
14c	Increase CWUP via a Reclaimed Water Aquifer Recharge with Natural Systems	0.2	$23.45	3.33	3.00	3.00	1.00	3.13	3.00	2.20	4.33	2.67	2.67

5.0 Conclusions and Next Steps

The Fine Screen Evaluation has reduced the 25 concepts to 11 concepts for consideration in the next steps of the water supply short-list process. Five of the seven initial water supply sources are represented within the fine screening results summarized in **Figure 3**. The remaining concepts will be further developed and evaluated based on both economic and non-economic considerations using the short-list screening framework and criteria, developed in the next phase of the Master Water Plan update.

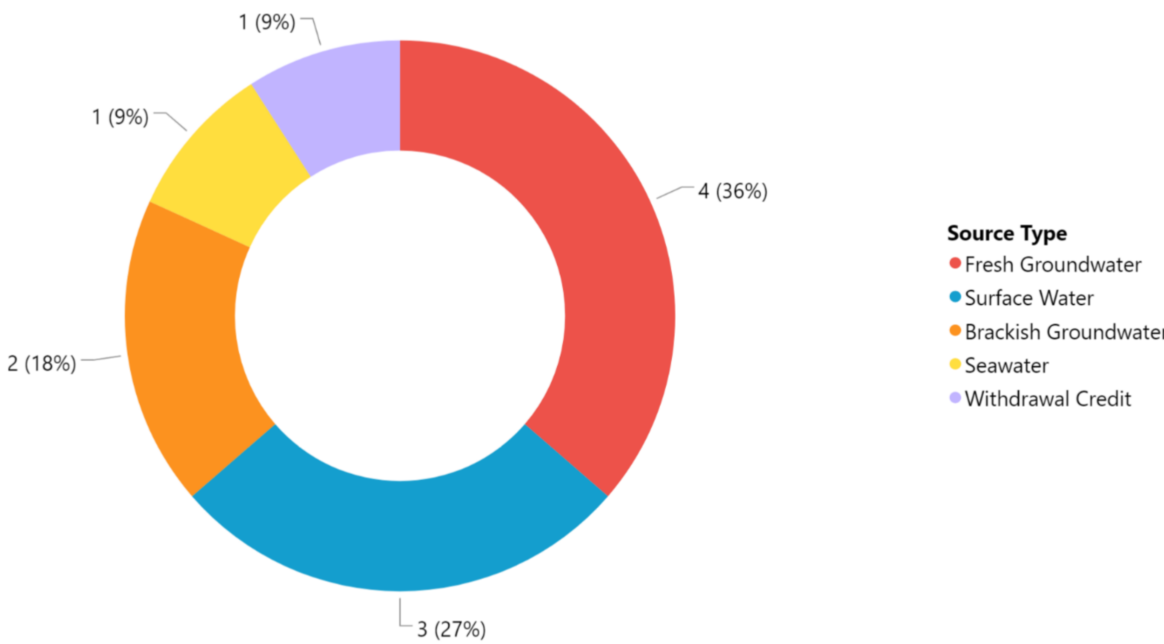


Figure 3 Water Source Options Summary (by Count)

During the upcoming Short-List Evaluation, additional assessments will be performed to further develop and evaluate the remaining concepts. The next steps in the Short-List Evaluation will include the following tasks:

- Define the short-list screening framework and criteria
- Gather additional input from stakeholders including:
  - Tampa Bay Water Member Governments
  - Southwest Florida Water Management District (SWFWMD)
  - Mosaic Company
- Perform further evaluation on the 11 concepts remaining from the fine screening process including the following assessments:
  - Hydrogeological evaluations
  - Facility footprint evaluations
  - Water quality investigations
  - Water treatment assumptions review

- Design and construction schedule and timeline review
- Sea level rise review

- Define the proposed scope of work for the additional evaluations that would be completed as part of the subsequent Feasibility Program phase for short-listed water supply concepts, including:
    - Additional detailed modeling, including hydraulic, hydrologic and water quality modeling
    - Pilot testing
    - Test wells
    - Property/site investigations
    - Pipeline routing Study

5.1 Developmental Alternatives

The fine screening process for this 2023 Long Term Master Water Plan resulted in no direct potable reuse (DPR) or indirect potable reuse (IPR) concepts making it through this screening phase for consideration as part of the short-list of water supply options that will be recommended for the upcoming Feasibility Study phase of the current water supply planning cycle. However, Tampa Bay Water acknowledges the benefits of continuing to further evaluate potable reuse concepts since the viability of this source water as a future option for the region can quickly change as technologies advance, new processes are developed, regulations are enacted, and public reception evolves over time. As questions and concerns regarding these items are answered or resolved in the future, the cost estimates and available water supply capacity for these options have the potential to increase or decrease significantly.

Based on this, Tampa Bay Water is proposing to include direct and indirect potable reuse project concepts as “developmental alternatives” for continued evaluations during the next phase of the master water planning process. Tampa Bay Water uses the term “developmental alternatives” to describe water supply concepts that have potential for being considered a future water supply option for the region, but currently require more long-term study or additional establishment of technologies and operating history before they can be recommended for implementation.

The developmental alternatives will be evaluated separately from the water supply project concepts that will be short-listed for inclusion in the Feasibility Study phase of the current master water planning cycle; however, continued investigations and refinements to the developmental alternatives would proceed concurrently with the feasibility studies for the short-listed concepts. The original 1998 Tampa Bay Water LTMWP included developmental alternatives, with the most notable being seawater desalination and brackish groundwater desalination, both of which were ultimately developed in the Tampa Bay region over the following decade.

As part of the current 2023 Long Term Master Water Plan update, Tampa Bay Water will identify specific water supply concepts as developmental alternatives for continued assessments. The selection of the developmental alternatives will consider previous potable reuse concepts, such as the Tampa Bay Regional Reclaimed & Downstream Augmentation Project, as well as other recently developed concepts involving reclaimed water and potentially other source water types that did not make it through the current screening process for water supply concepts.

By adding project concepts that involve reclaimed water to the current master water planning process as developmental alternatives, Tampa Bay Water can continue studying these options to potentially meet future potable water demands. Tampa Bay Water will continue to explore treatment technologies and implementation strategies, which may include conducting pilot plant studies to further understand and confirm treatment requirements and water quality. This also allows time for new rules to be promulgated, which can minimize current uncertainties surrounding options involving direct and indirect potable reuse. The additional time for evaluating the developmental alternatives can also provide greater assurances that treatment goals can be met and other questions and concerns from stakeholders and the public can be answered or resolved before considering these concepts for the future water supply selection process.

Appendix A. Fine Screening Concept Summary Sheets

Concept 1: Gulf Coast Desalination

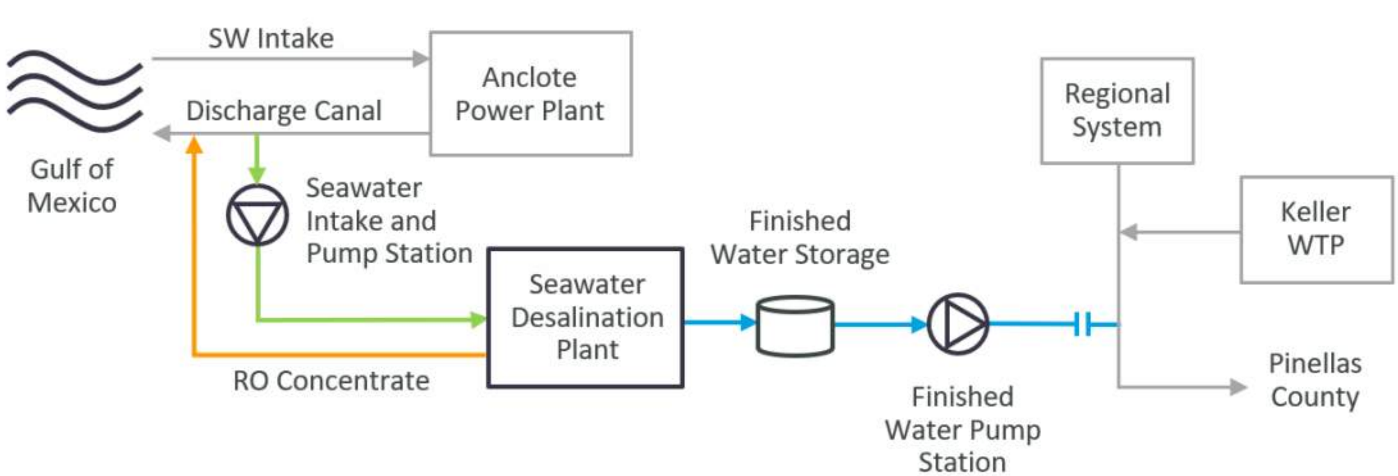
Project Description

The Gulf Coast Desalination concept consists of constructing a new seawater desalination facility that would produce a finished water annual average yield of 25 mgd for use in Tampa Bay Water's regional system. The facility could be a stand-alone facility or co-located with the existing Anclote Power Plant, which is located in southwestern Pasco County and owned and operated by Duke Energy. Finished water would tie into the existing Regional Transmission System at the northern end of the Keller Transmission Main.

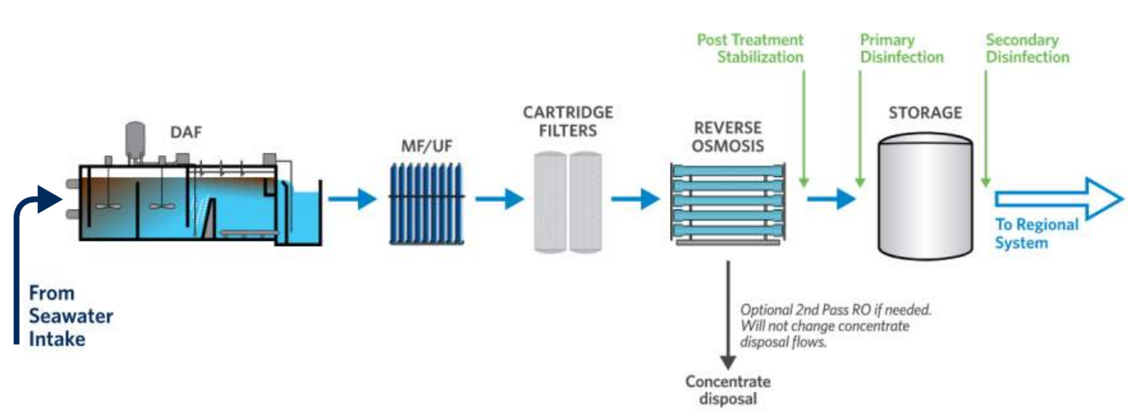
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	128.9
Finished Water – Rated Capacity	56.3
Finished Water – Average Annual Yield	25.0

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Seawater desalination facility including solids removal and processing, an alkalinity adjustment facility, and filtration systems.
- Seawater intake and seawater pump station.
- Concentrate disposal pipeline to existing canal.
- Finished water storage tank.
- Pump station and 12-mile 48-inch diameter transmission pipeline for finished water to the regional system.

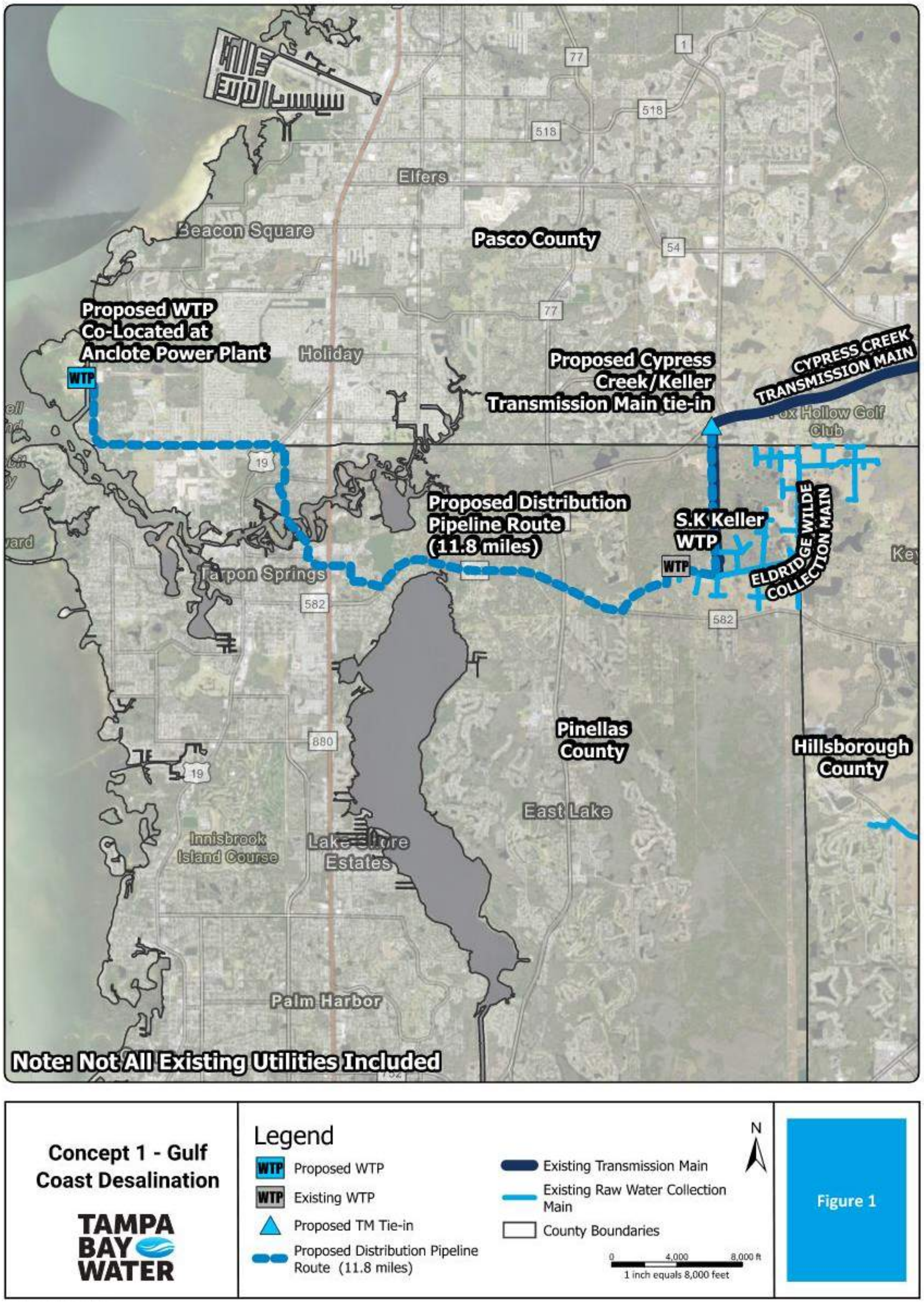
Anticipated Regulatory Requirements

- National Pollutant Discharge Elimination System (NPDES) Industrial Wastewater Discharge Permit Modification.
- Anclote NPDES permit modification.
- Florida Department of Environmental Protection (FDEP) Facility Operational Permit modification
- FDEP Public Drinking Water Facility Construction Permit
- Environmental Resource Permit (ERP)

Key Feasibility Aspects and Stakeholder Considerations

- The existing source of pre-filtered cooling water from the Anclote power plant can be used as intake water and as a source of water for dilution of a discharge concentrate stream.
- Use of the intake and discharge canals of the power plant would substantially reduce the potential for environmental problems generally associated with intake and discharge structures.
- A designated Outstanding Florida Water and an aquatic preserve exist near the power plant.
- Provides a drought-proof supply source.
- Information on the seasonality and operation of the Anclote Power Plant must be further evaluated.
- Some risk is associated with co-locating with a third party and sharing infrastructure.

CONCEPT FIGURE



TAMPA BAY WATER

Environmental Sustainability

- Assumes co-location with the existing Anclote Power Plant.
- This concept has potential salinity impacts on Outstanding Florida Waters, though brine discharge will more than likely need to be treated to standards that follow any discharges within the Pinellas County Aquatic Preserve which will help mitigate potential impacts.
- Desalination plant is anticipated to have high energy consumption.

Regulatory / Ease of Permitting

- Assumes co-location with the existing Anclote Power Plant.
- Would require a modification of the existing NPDES permit for the Anclote Power Plant as well as a new NPDES permit for the allowable intake and concentrate discharge.

Public Reception

- Based on previous outreach, stakeholders have voiced concern regarding impacts to boating, fishing, and swimming as well as to the Anclote Park.
- There is also concern over the impacts to marine life, seagrasses, migration of Stauffer contamination to the area, power use, utility cost, and whether the desalination plant will be able to be a stand-alone facility without complete reliance on the power plant.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$479,010,000
Pipeline Capital Cost	$74,900,000
Pump Station Capital Cost	$96,380,000
Total Costs[1]	
Subtotal of Construction Costs	$650,290,000
Contingency	$195,090,000
Contractor Overhead & Profit	$130,060,000
Subtotal of Construction, Contingency, and OH&P	$975,430,000
Engineering, Legal, and Administrative	$243,860,000
Total Project Capital Cost	$1,227,490,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$8.75
Annual O&M Cost, $/1000 gal	$2.31
Total Project Cost, $/1000 gal	$11.06

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Project Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- The distribution pipeline length is approximately 12 miles long, which is expected to have a moderate impact on water age and water quality at the Member Government's tap with respect to disinfectant residual and DBP formation.
- The concept's annual average yield of 25 mgd ties into the Regional Keller Transmission Main which significantly improves hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that maintenance personnel will be required to travel a large distance starting from the Cypress Creek Pump Station Operational Hub to the proposed desalination facility which will require significant coordination.
- Desalination has high O&M complexity, and Tampa Bay Water has experience with this type of treatment.
- This concept has a high potential for future expansion.

Cost Risk Factors

- Potential supply chain issues with membrane filtration equipment.
- Long lead time on large plant equipment (including pumps and transformers).
- High anticipated ability to meet future regulatory changes due to proposed treatment type.
- Constructability risks associated with a long pipeline and colocation with the power plant.

Yield Reliability

- High long term yield reliability and limited seasonal impacts with seawater source.
- The source and location are anticipated to have limited resilience but moderate ability to recover from natural disasters, climate change and sea level rise.

Yield Reliability Cont.

- The concept partially relies on the Anclote Power Plant for supply of cooling water, though third party reliance for source water is not anticipated.

Regional System Reliability Impacts

- The concept is located in Pasco County therefore supporting the growing demand.
- The location also increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, and through its regional connection downstream of the regional high service pump station.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
- A new agreement is necessary between Tampa Bay Water and Progress Energy.

References

- Hazen & Sawyer, *Long Term Master Water Plan*, Final Report, Prepared for Tampa Bay Water, December 2018.
- Hazen & Sawyer, *Long Term Master Water Plan*, Report Appendices, Prepared for Tampa Bay Water, December 2018, p. 232-258.
- Tampa Bay Water, *Gulf Coast Desalination Feasibility Study*, April 2001.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, August 2001.
- PB Water, *Tampa Bay Water Gulf Coast Desalination Final Feasibility Study Report*, Prepared for Tampa Bay Water, July 24, 2001

Concept 2: Pasco Brackish Wellfield

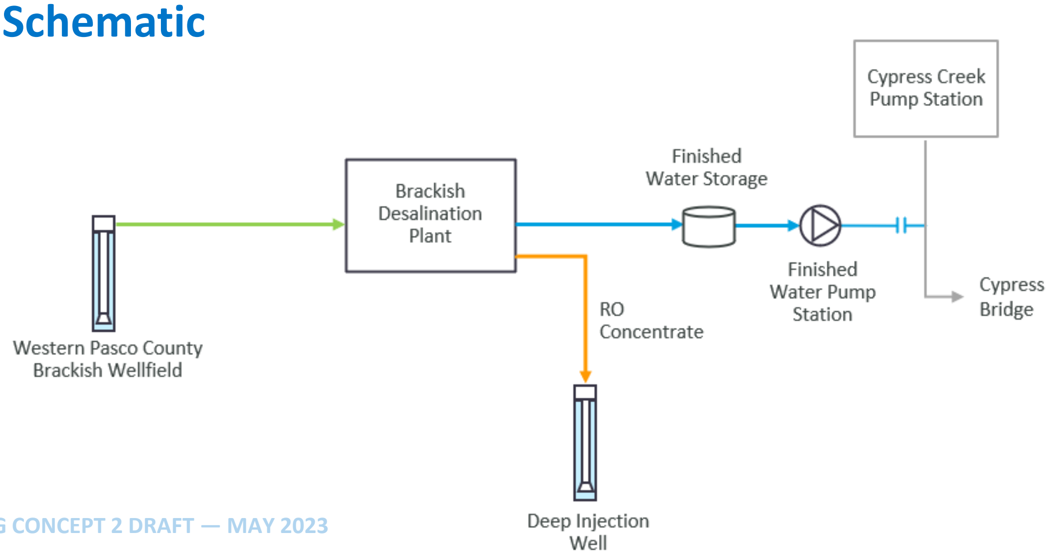
Project Description

The Pasco Brackish Wellfield consists of constructing a new wellfield and groundwater treatment plant in western Pasco County that would produce an estimated finished water annual average yield of 4.3 mgd. The brackish water from either the lower portion of the Upper Floridan Aquifer or the Lower Floridan Aquifer would be treated at a new, small footprint RO facility and the concept includes a deep injection well for concentrate discharge disposal. The most probable brackish water supply locations are in western Pasco County. Finished water would tie into the Regional System at the Cypress Creek/Keller Transmission Main.

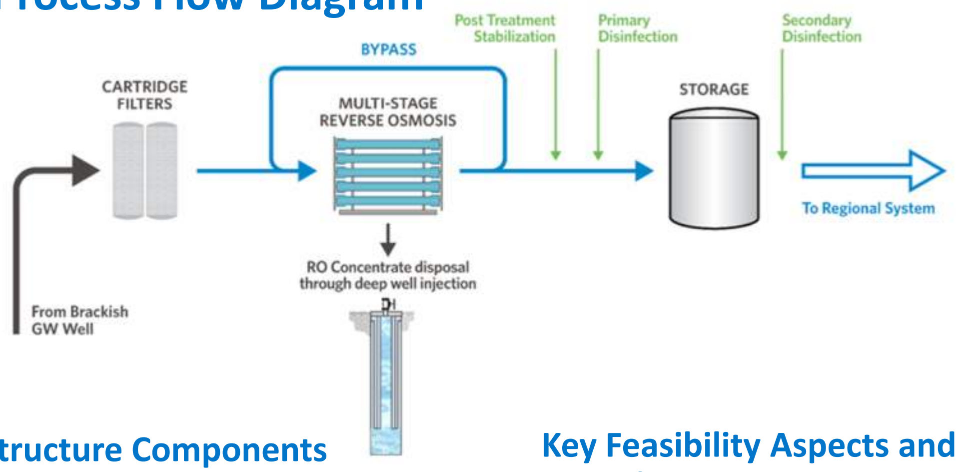
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	11.3
Finished Water – Rated Capacity	9.7
Finished Water – Average Annual Yield	4.3

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Production wellfield and approximately 1-mile 24-inch diameter raw water supply pipeline.
- Brackish desalination facility including reverse osmosis treatment trains.
- Finished water storage tank.
- Finished water pump station and 5-mile 20-inch diameter transmission main to regional system.
- Deep injection well for concentrate disposal located at the new desalination treatment plant.

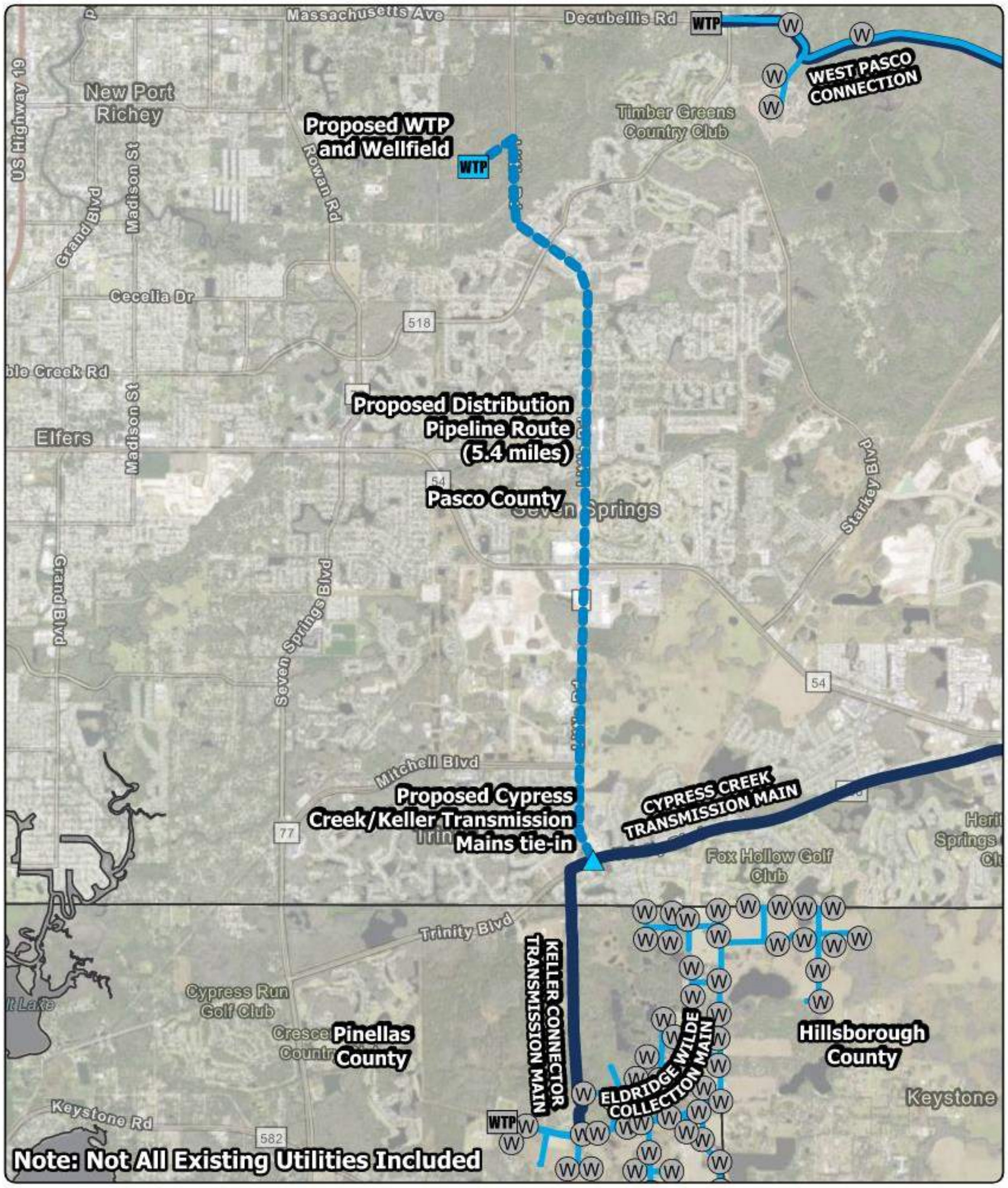
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permits.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit.
- FDEP Class V Well Construction and Operation permits for each new well.
- Underground Injection Control (UIC) Permit for concentrate disposal.

Key Feasibility Aspects and Stakeholder Considerations

- Potential wellfield and plant site constraints due to limited land availability in the area.
- Potential for fouling of brackish wells will need to be further evaluated in a feasibility study, and hydraulic modelling and testing will need to be conducted. It is anticipated that more wells with lower production volume will be required.
- The presence of chlorides and sulfides within the source water will need to be tested and addressed through additional treatment at the new desalination facility.

CONCEPT FIGURE



Concept 2 - Pasco Brackish Wellfield

TAMPA BAY WATER

Legend

- WTP Proposed WTP & Wellfield
- Proposed TM Tie-in
- W Existing Well
- WTP Existing WTP
- Proposed Distribution Pipeline Route (5.4 miles)
- Existing Transmission Main
- Existing Raw Water Collection Main
- County Boundaries

N

0 2,500 5,000 ft

1 inch equals 5,000 feet

Figure 2

Environmental Sustainability

- There are potential drawdown impacts to the Lower Floridian Aquifer.
- Brackish desalination plant is anticipated to have a moderate to high energy consumption.

Regulatory / Ease of Permitting

- The concept would require a WUP for the withdrawal, a UIC for concentrate disposal, and an ERP for the new treatment plant.

Public Reception

- Predicted stakeholder concerns will most likely be related to the drawdown impacts to other users, migration of shallow contamination, and saltwater intrusion.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$31,690,000
Pipeline Capital Cost	$15,340,000
Pump Station Capital Cost	$6,160,000
Wellfield Capital Cost	$32,160,000
Total Costs[1]	
Subtotal of Construction Costs	$85,360,000
Contingency	$25,610,000
Contractor Overhead & Profit	$17,070,000
Subtotal of Construction, Contingency, and OH&P	$128,040,000
Engineering, Legal, and Administrative	$32,010,000
Total Project Capital Cost	$162,270,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$6.69
Annual O&M Cost, $/1000 gal	$1.75
Total Project Cost, $/1000 gal	$8.44

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. Brackish water sources include the Lower Floridan Aquifer.
4. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- The distribution pipeline length is approximately 5 miles long. Due to the length of the pipeline a moderate to low water age impact is to be expected.
- The concept's annual average yield of 5 mgd ties into the Regional Keller Transmission Main TM which slightly improves hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that maintenance personnel will be required to travel a medium distance starting from the Cypress Creek Pump Station Operational Hub to the project concept. Tampa Bay Water is moderately familiar with brackish water reverse osmosis through the existing desalination plant.
- Brackish desalination has moderate O&M complexity, and Tampa Bay Water has experience with this type of treatment. Tampa Bay Water is familiar with the operation of groundwater wells.
- This concept has some supply expansion potential, but additional studies would need to be performed to confirm.

Cost Risk Factors

- Less supply chain concerns and potential for delays due to smaller RO plant size with no microfiltration (MF) / Ultrafiltration (UF) membrane filtration.
- The proposed treatment is anticipated to meet future water quality, although there is a potential for bypass flow to need treatment in the future.
- Some constructability risks associated with pipeline, new plant and new concentrate well.

Yield Reliability

- Moderately high long term yield reliability and limited seasonal impacts from brackish groundwater, although depletion from increased pumping is possible.
- The supply is expected to have moderate resilience and recovery from natural disasters, climate change and sea level rise.
- This concept is not reliant on a third party for supply.

Regional System Reliability Impacts

- The concept is located in Pasco County therefore supporting the growing demand.
- The location also increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, and through its regional connection downstream of the regional high service pump station.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

References

- West Coast Regional Water Supply Authority, "The Master Water Plan: A 20-Year Water Supply Development Plan", *Resource Development Plan*, December 20, 1996.
- Black & Veatch, *Long Term Water Supply Plan*, Final Report, Prepared for Tampa Bay Water, December 2008.
- Black & Veatch, *Long Term Water Supply Plan*, Report Appendices, Prepared for Tampa Bay Water, December 2008, p. *18-29*.

Concept 3a: St. Petersburg Desalination Plant

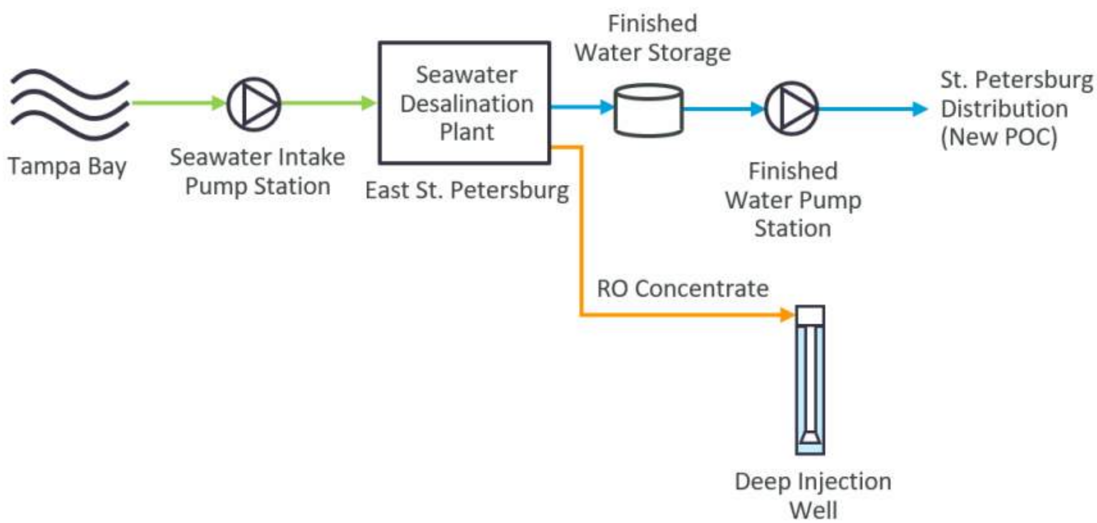
Project Description

Concept 3a involves the construction of a new seawater desalination plant in eastern St. Petersburg that would produce a finished water annual average yield of up to 30 mgd. The new plant would tie into a new point of connection with the existing St. Petersburg distribution system, which would reduce St. Petersburg's demand from the Tampa Bay Water regional system.

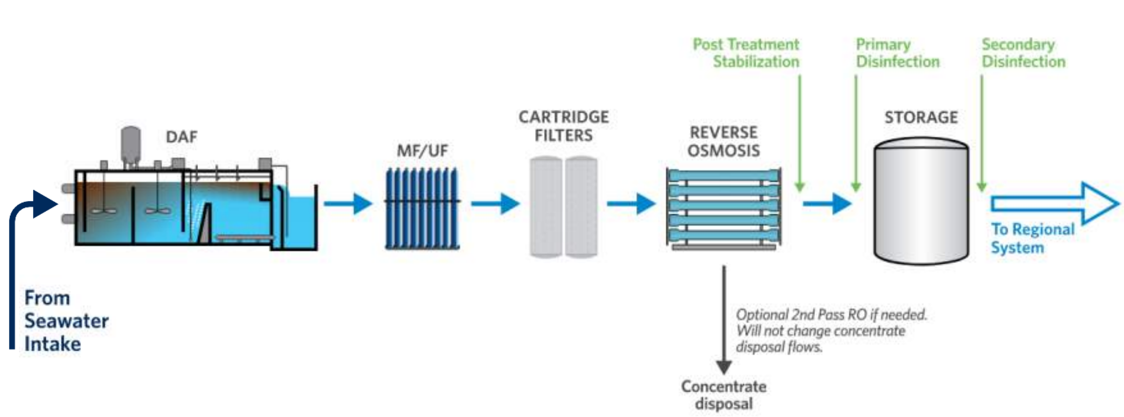
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	125.5
Finished Water – Rated Capacity	67.5
Finished Water – Average Annual Yield	30.0

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Seawater desalination facility including solids removal and processing, an alkalinity adjustment facility, and filtration systems.
- Seawater intake, seawater pump station and 4 miles of 72-inch pipeline.
- Deep well injection.
- Finished water storage tank.
- Finished water pump station and 1 mile of 54-inch diameter pipeline to the regional system.

Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit modification
- FDEP Public Drinking Water Facility Construction Permit
- Environmental Resource Permit (ERP)
- Underground Injection Control (UIC) Permit for concentrate disposal.

Key Feasibility Aspects and Stakeholder Considerations

- Provides a drought-proof water supply source.
- Provides a significant reduction in water age and improved water quality in the St. Petersburg area.
- Since the facility will likely be located on the coast, there is the potential for additional mitigation due to sea level rise.

CONCEPT FIGURE

Environmental Sustainability

- Assumes the new facility is located in East St. Petersburg.
- There is the potential for new impingement/entrainment and salinity impacts.
- Desalination plant is anticipated to have high energy consumption.

Regulatory / Ease of Permitting

- Assumes new facility with no co-location with an existing power plant once-through cooling system.
- New impingement/entrainment and salinity impacts to a sensitive area of Tampa Bay.
- A new NPDES permit for the allowable intake and concentrate discharge will be required.

Public Reception

- The main stakeholder concerns for this concept are in relation to the intake and discharge and the ways in which those structures will affect Tampa Bay, boating, sailing, fishing, swimming, traffic related to construction, power use, utility cost, and impacts to the surrounding communities including students and the Coast Guard outposts.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$644,600,000
Pipeline Capital Cost	$44,150,000
Pump Station Capital Cost	$100,480,000
Total Costs[1]	
Subtotal of Construction Costs	$789,240,000
Contingency	$236,770,000
Contractor Overhead & Profit	$157,850,000
Subtotal of Construction, Contingency, and OH&P	$1,183,860,000
Engineering, Legal, and Administrative	$295,960,000
Total Project Capital Cost	$1,489,660,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$8.85
Annual O&M Cost, $/1000 gal	$2.31
Total Project Cost, $/1000 gal	$11.16

Notes:

1. Costs include 30% for contingency, 20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- The distribution pipeline length is 1 mile long. Due to the length of the pipeline a low water age impact is to be expected.
- The concept's annual average yield of 30 mgd supplies a new St. Petersburg Point of Connection which significantly improves hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that maintenance personnel will be required to travel a large distance starting from the Cypress Creek Pump Station Operational Hub to the project concept Desalination has high O&M complexity, and Tampa Bay Water has experience with this type of treatment
- This concept has some location constraints which would limit expansion potential.

Cost Risk Factors

- Potential supply chain issues with membrane filtration equipment.
- Long lead time on large plant equipment (including pumps and transformers).
- High anticipated ability to meet future regulatory changes due to treatment type.
- Constructability risks associated with deep injection well and the supply pipeline in.

Yield Reliability

- High long term yield reliability and limited seasonal impacts with seawater source.
- The supply is expected to have low to moderate resilience and recovery from natural disasters, sea level rise and climate change, though there are vulnerabilities due to the coastal bay location of the proposed facility.
- This concept is not reliant on a third party for supply.

Regional System Reliability Impacts

- The concept is not located near a high demand area therefore not supporting the growing demand.
- The location increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

References

- West Coast Regional Water Supply Authority, "The Master Water Plan: A 20-Year Water Supply Development Plan", *Resource Development Plan*, December 20, 1996.
- Black & Veatch, *Long Term Water Supply Plan*, Final Report, Prepared for Tampa Bay Water, December 2008.
- Black & Veatch, *Long Term Water Supply Plan*, Report Appendices, Prepared for Tampa Bay Water, December 2008, p. 31-49.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, August 2001.

Concept 3b: St. Petersburg Brackish Plant

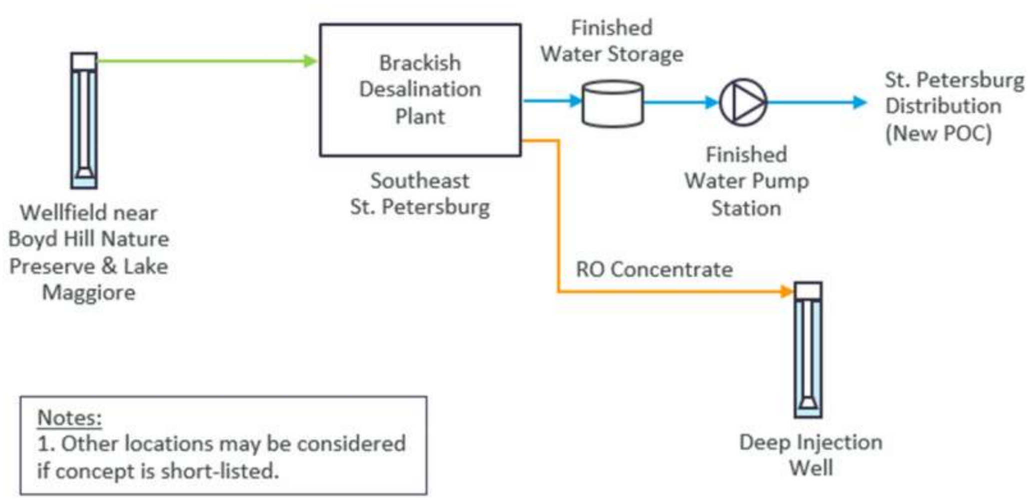
Project Description

Concept 3b consists of constructing a new RO facility to treat brackish groundwater from the lower portion of the Upper Floridan Aquifer in eastern St. Petersburg that would produce a finished water annual average yield of 4.3 mgd. For this planning effort, the new brackish water supply wells are assumed to be located northwest of Lake Maggiore. The potable water supply generated from this concept would be delivered to a new POC with the existing St. Petersburg water distribution system.

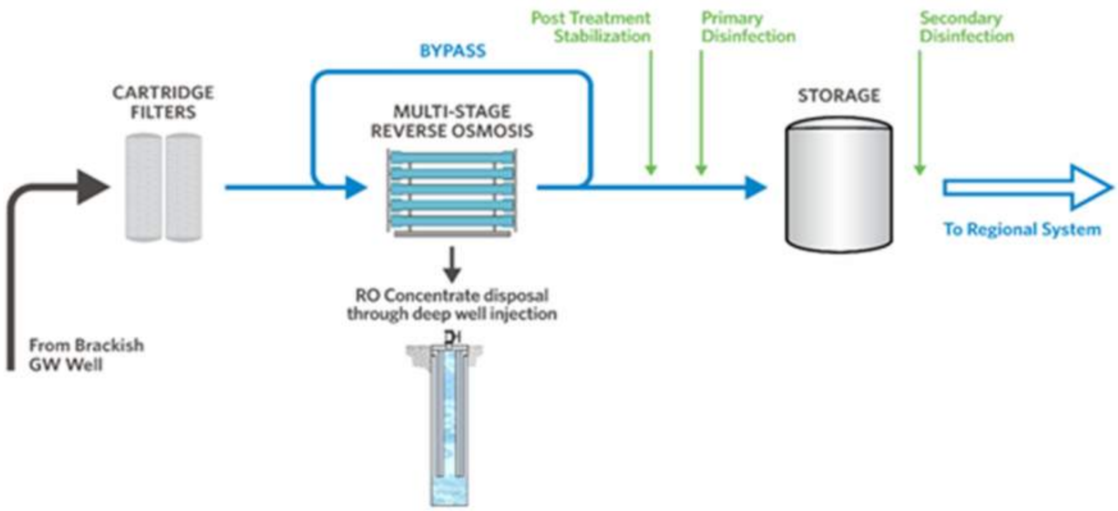
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	11.3
Finished Water – Rated Capacity	9.7
Finished Water – Average Annual Yield	4.3

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Water supply wellfield and 2-mile 24-inch diameter pipeline.
- Brackish desalination facility including reverse osmosis treatment trains.
- Concentrate disposal injection well.
- Holding and blending tanks.
- Finished water pump station and 2-mile 20-inch diameter transmission pipeline.
- Deep injection well for concentrate disposal located at the new desalination treatment plant.

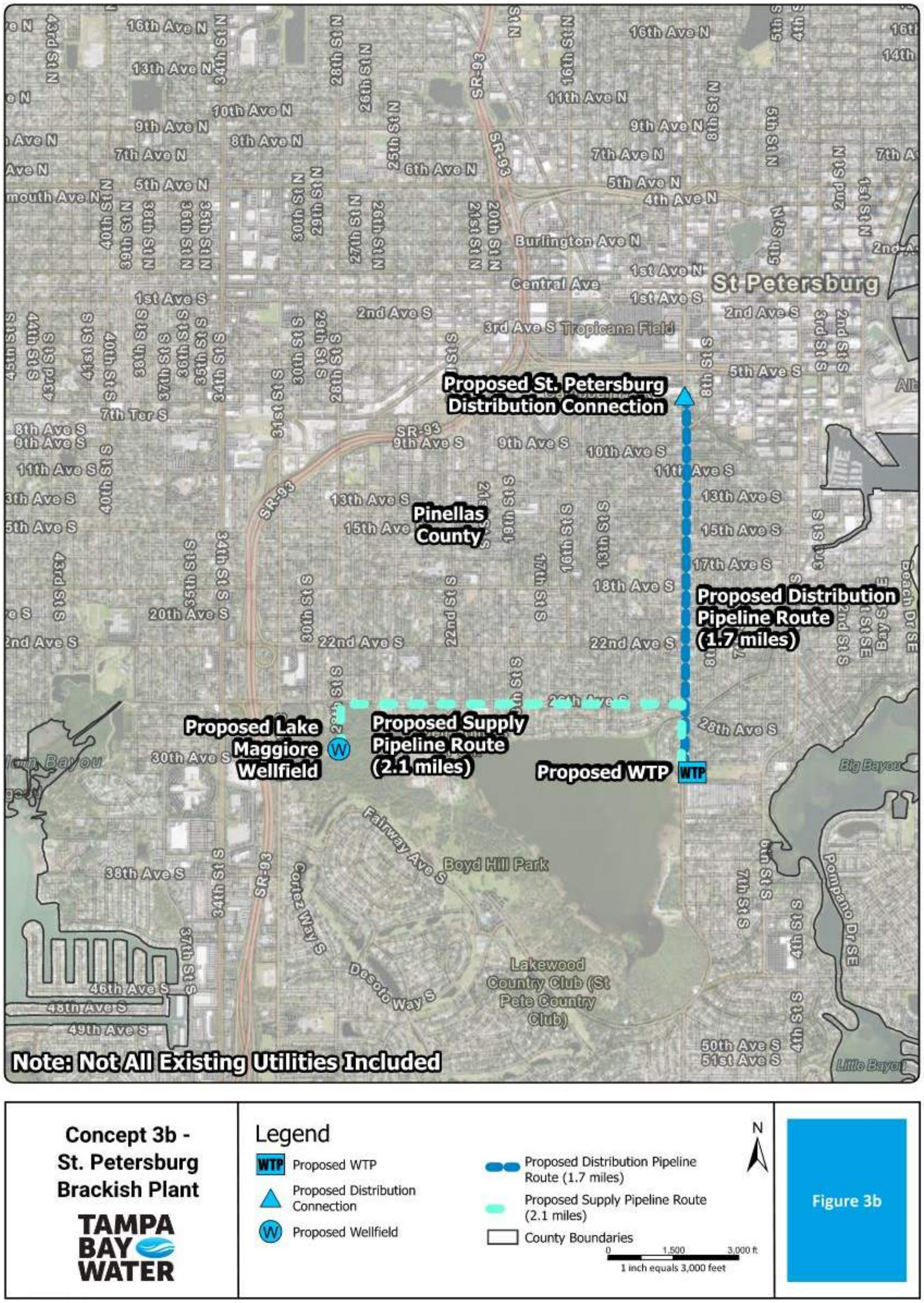
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit modification.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- FDEP Class V Well Construction and Operation permits for each new well.
- Underground Injection Control (UIC) Permit for concentrate disposal.

Key Feasibility Aspects and Stakeholder Considerations

- Limited availability of land for wells and pipeline routing. A more detailed review of property available would need to be performed in a feasibility study.
- Potential for fouling of brackish wells will need to be further evaluated in feasibility, and hydraulic modelling and testing will need to be conducted. It is anticipated that more wells with lower production volume will be required
- Since the facility will likely be located on the coast, future mitigation due to sea level rise may be required.

CONCEPT FIGURE



Environmental Sustainability

- A multi-stage reverse osmosis brackish treatment will create concentrate discharge challenges.
- The brackish desalination plant is anticipated to have moderate to high energy consumption.

Regulatory / Ease of Permitting

- The concept would require a WUP for the withdrawal, a UIC for concentrate disposal, and an ERP for the new treatment plant.

Public Reception

- Within this concept, stakeholders will likely be concerned about impacts to Lake Maggiore, upwelling from injection wells, and the pipeline construction in the area.
- However, this concept has fewer potential impacts to boating, fishing, and the bay, in general.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$31,900,000
Pipeline Capital Cost	$10,930,000
Pump Station Capital Cost	$6,140,000
Wellfield Capital Cost	$19,220,000
Total Costs[1]	
Subtotal of Construction Costs	$68,200,000
Contingency	$20,460,000
Contractor Overhead & Profit	$13,640,000
Subtotal of Construction, Contingency, and OH&P	$102,300,000
Engineering, Legal, and Administrative	$25,570,000
Total Project Capital Cost	$130,090,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$5.38
Annual O&M Cost, $/1000 gal	$1.88
Total Project Cost, $/1000 gal	$7.26

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- The distribution pipeline length is approximately 2 miles long. Due to the length of the pipeline a low water age impact is to be expected.
- The concept's annual average yield of 5 mgd supplies the St. Petersburg Point of Connection which slightly improves hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that maintenance personnel will be required to travel a large distance starting from the Cypress Creek Pump Station Operational Hub to the project concept. Brackish desalination has moderate O&M complexity, and Tampa Bay Water has experience with this type of treatment. Tampa Bay Water is familiar with the operation of groundwater wells.
- This concept has some location constraints which would limit expansion potential.

Cost Risk Factors

- Less supply chain concerns and potential for delays due to smaller RO plant size with no microfiltration (MF) / Ultrafiltration (UF) membrane filtration.
- The proposed treatment is anticipated to meet regulatory changes, although there is a potential for bypass flow to need treatment in the future.
- Some constructability risks associated with pipeline, new plant and new concentrate well.

Yield Reliability

- Low long term yield reliability due to fouling in similar brackish wells.
- The supply is anticipated to have low to moderate resilience and recovery from natural disasters, sea level rise and climate change.
- The concept relies on the City of St. Petersburg to repair existing deep injection wells for successful implementation.

Regional System Reliability Impacts

- The concept is not located near a high demand area therefore not supporting the growing demand.
- The location increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

References

- West Coast Regional Water Supply Authority, "The Master Water Plan: A 20-Year Water Supply Development Plan", *Resource Development Plan*, December 20, 1996.
- Black & Veatch, *Long Term Water Supply Plan*, Final Report, Prepared for Tampa Bay Water, December 2008.
- Black & Veatch, *Long Term Water Supply Plan*, Report Appendices, Prepared for Tampa Bay Water, December 2008, p. 31-49.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, August 2001.

Concept 4: Existing Desalination Plant Expansion

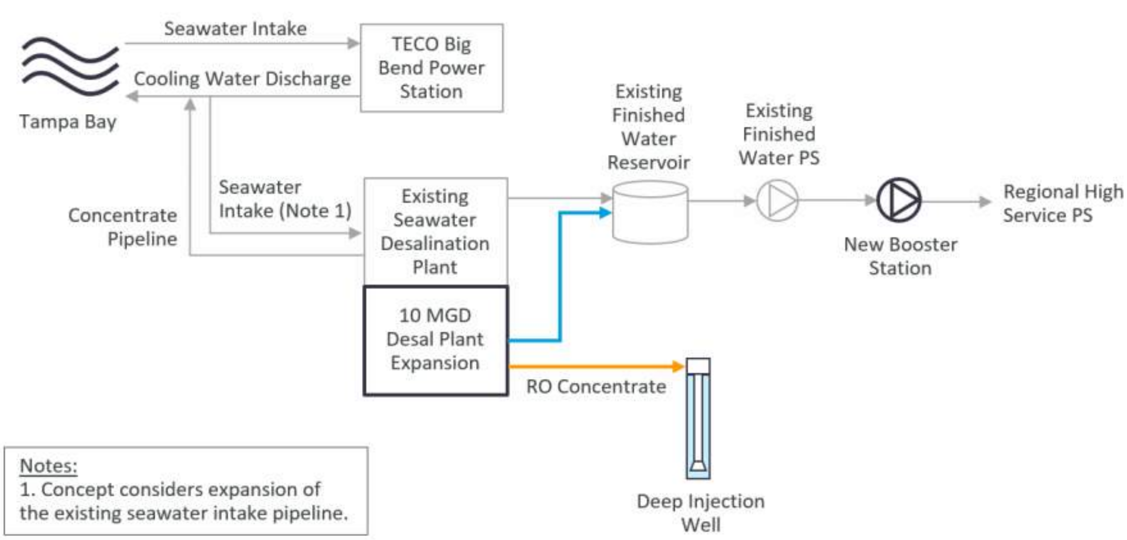
Project Description

This concept would increase the finished water annual average yield of the existing Tampa Bay Water Seawater Desalination Plant by 10.4 mgd. The existing desalination plant is located adjacent to the TECO Big Bend Power Plant in Apollo Beach and ties into the Tampa Bay Water regional system at the Regional Facilities Site. The desalination plant expansion would include upgrades and expansion of the pretreatment processes, RO treatment trains, post-treatment processes, residuals and concentrate handling systems, and finished water pumping systems. A feasibility study of this concept was completed in March 2022.

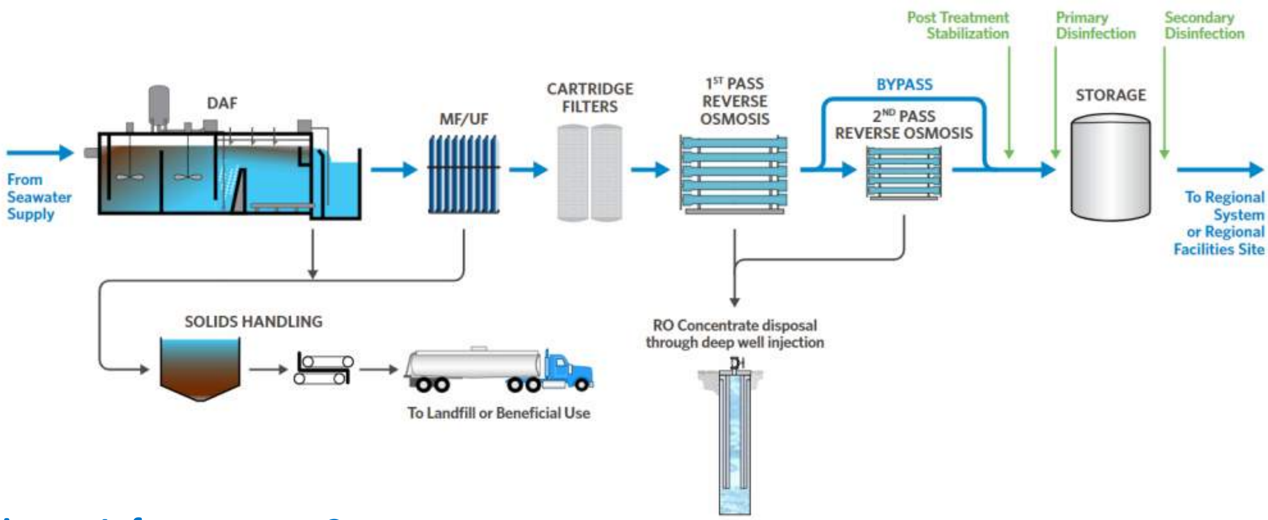
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	18.6
Finished Water – Rated Capacity	10.0
Finished Water – Average Annual Yield	10.4

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Seawater intake pumps and pipeline.
- Expansion/modifications to the existing pretreatment facility.
- Expansion/modifications to the existing chemical facility.
- Additional 1st and 2nd pass reverse osmosis trains.
- Pump station for transmission of finished water to the regional system.
- Deep injection well for concentrate disposal.

Anticipated Regulatory Requirements

- National Pollutant Discharge Elimination System (NPDES) Industrial Wastewater Discharge Permit Modification.
- Florida Department of Environmental Protection (FDEP) Facility Operational Permit modification
- FDEP Public Drinking Water Facility Construction Permit
- Environmental Resource Permit (ERP)
- Underground Injection Control (UIC) Permit for concentrate disposal.

Key Feasibility Aspects and Stakeholder Considerations

- The use of existing intake and discharge structures will lessen environmental impacts and expedite the permitting process.
- The desalination plant has significant constraints on space availability.
- Concept has a high annual average yield relative to design capacity because it includes additional reliability and redundancy improvements that alleviate operational bottlenecks at the existing desalination plant.
- Increasing the amount of waste concentrate from the facility would require additional investigation.

Environmental Sustainability

- Due to the relatively low recovery of seawater RO systems, the process results in a large concentrate stream requiring disposal.
- Desalination plant is anticipated to have high energy consumption.

Regulatory / Ease of Permitting

- There is potential for higher intake salinity within this concept. Therefore, modeling and monitoring will be required.
- A new permit will be required for the concentrate discharge injection well.

Public Reception

- This concept is favorable to stakeholders as Tampa Bay Water has a record of sustainable operations at the desalination plant.
- However, studies will need to be conducted to ensure that a modification to the existing NPDES permit will not harm marine life in the area.

Yield Reliability

- Moderately high long term yield reliability with seawater source, although impacts from TECO's operation is considered.
- The supply is expected to have limited resilience, but high ability to recover from natural disasters, sea level rise and climate change. Although, storm surge could keep the plant offline for an extended period.
- The concept continues to have some reliance on the co-located power plant.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	Note 1
Pipeline Capital Cost	Note 1
Pump Station Capital Cost	Note 1
Wellfield Capital Cost	Note 1
Total Costs[1]	
Subtotal of Construction Costs	$229,770,000
Contingency	$68,930,000
Contractor Overhead & Profit	$45,950,000
Subtotal of Construction, Contingency, and OH&P	$344,660,000
Engineering, Legal, and Administrative	$86,160,000
Total Project Capital Cost	$430,820,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$7.38
Annual O&M Cost, $/1000 gal	$3.80
Total Project Cost, $/1000 gal	$11.18

Notes:

1. The construction subtotal prepared in the March 2022 Tampa Bay Water Desalination Plant Expansion Feasibility Study was escalated using ENR CCI to October 2022 dollars. Indirect costs (contingency, contractor overhead and profit, ELA) were applied to the escalated construction subtotal to arrive at a total project capital cost estimate.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- Water age will improve in the desalination plant transmission main if production is increased from the plant even though the desalination supply is trimmed at the Regional Facility site.
- The Desalination Plant Expansion includes an additional 10 mgd capacity on the North Central Hillsborough Intertie and the Morris Bridge Transmission Main which moderately reduces hydraulic capacity constraints on these two transmission mains.
- There is no increased travel distance for maintenance to reach an Operation Hub as existing out-sourced O&M staff maintains the existing facility.
- Desalination has high O&M complexity, and Tampa Bay Water has experience with this type of treatment.
- This concept has space constraints that restrict supply increases beyond this expansion.

Cost Risk Factors

- Potential supply chain issues with membrane filtration equipment.
- Long lead time on large plant equipment (including pumps and transformers), but this expansion is a smaller capacity than a new plant.
- High anticipated ability to meet future regulatory changes due to proposed treatment type.
- Constructability risks due to upsized seawater pipeline, challenges with construction on existing site, maintenance of plant operation challenges.

Regional System Reliability Impacts

- The concept serves the regional high service pump station with a connection to the South Hillsborough Pipeline therefore supporting the growing demand.
- The location does not provide relief to areas downstream of a single point of failure, but is upstream of the regional high service pump station which provides increased reliability to the region.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

References

- Black & Veatch, *Long Term Water Supply Plan*, Final Report, Prepared for Tampa Bay Water, December 2008.
- Black & Veatch, *Long Term Water Supply Plan*, Report Appendices, Prepared for Tampa Bay Water, December 2008, p. 50-55.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, August 2001.
- Black & Veatch and Hazen, *Tampa Bay Seawater Desalination Plant Expansion Feasibility Study*, Final Report, Prepared for Tampa Bay Water and Southwest Florida Water Management District, March 16, 2022.

Concept 5a: Existing Desalination Plant Expansion with Reuse Water

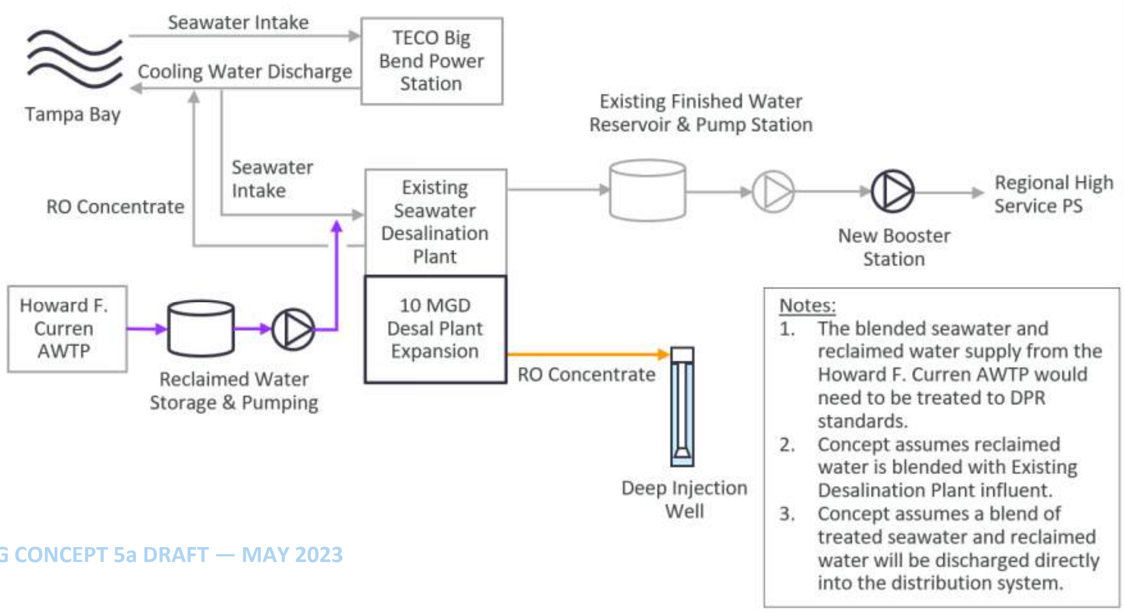
Project Description

Concept 5a considers expansion of the existing Tampa Bay Seawater Desalination Plant by blending the seawater supply with reclaimed water. Augmenting the desalination plant influent flow with reclaimed water from the City of Tampa or Hillsborough County would require a facility expansion and treatment process modifications to provide an additional finished water annual average yield of 9.9 mgd. The concept would require expansion and modifications to the pretreatment system, reverse osmosis treatment trains, chemical systems, and finished water pumping and transmission system. Additionally, this concept includes provisions for UV/AOP to meet contaminant and pathogen reduction requirements typically required for DPR systems.

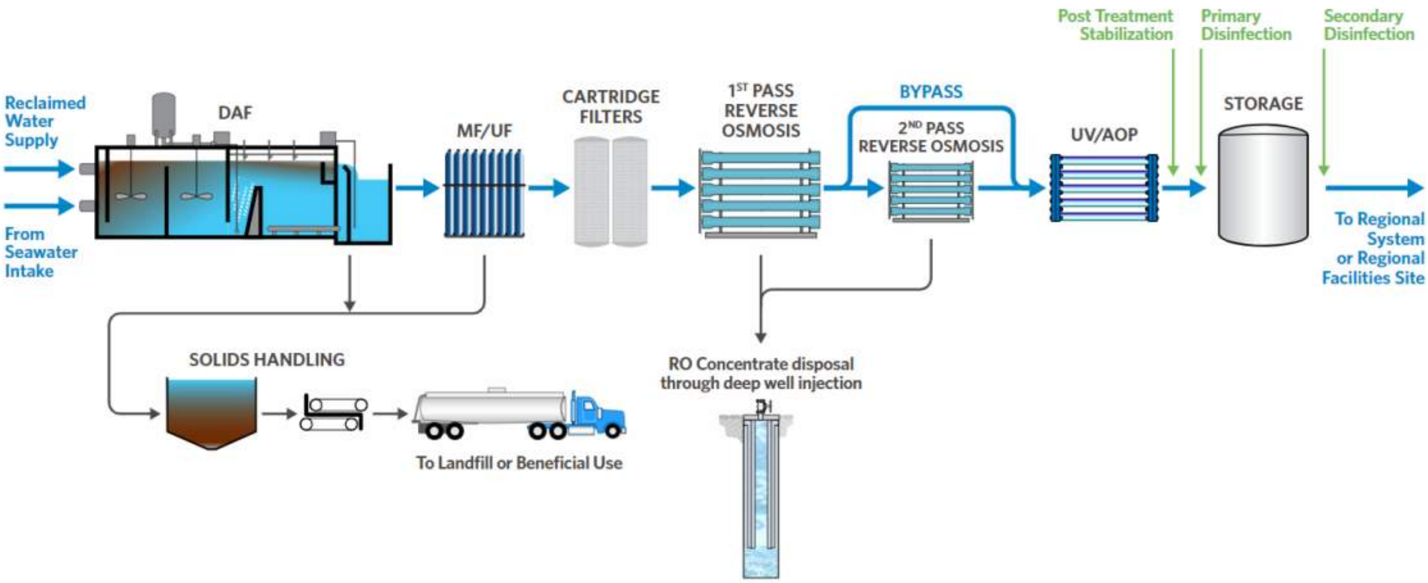
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	28.0
Finished Water – Rated Capacity	16.7
Finished Water – Average Annual Yield	9.9

Project Schematic



Simplified Process Flow Diagrams



Primary Infrastructure Components

- A new reclaimed water 15-mile 36-inch diameter transmission main from H.F. Curren AWTP or Hillsborough County reclaimed water system to the existing desalination plant.
- Reclaimed water storage tank.
- Booster station for transmission of reclaimed water to the desalination plant intake.
- Expansion/modifications to the existing pretreatment and chemical facilities.
- Additional reverse osmosis trains.
- Booster pump station for transmission of finished water in the regional system.
- Deep injection well for concentrate disposal.

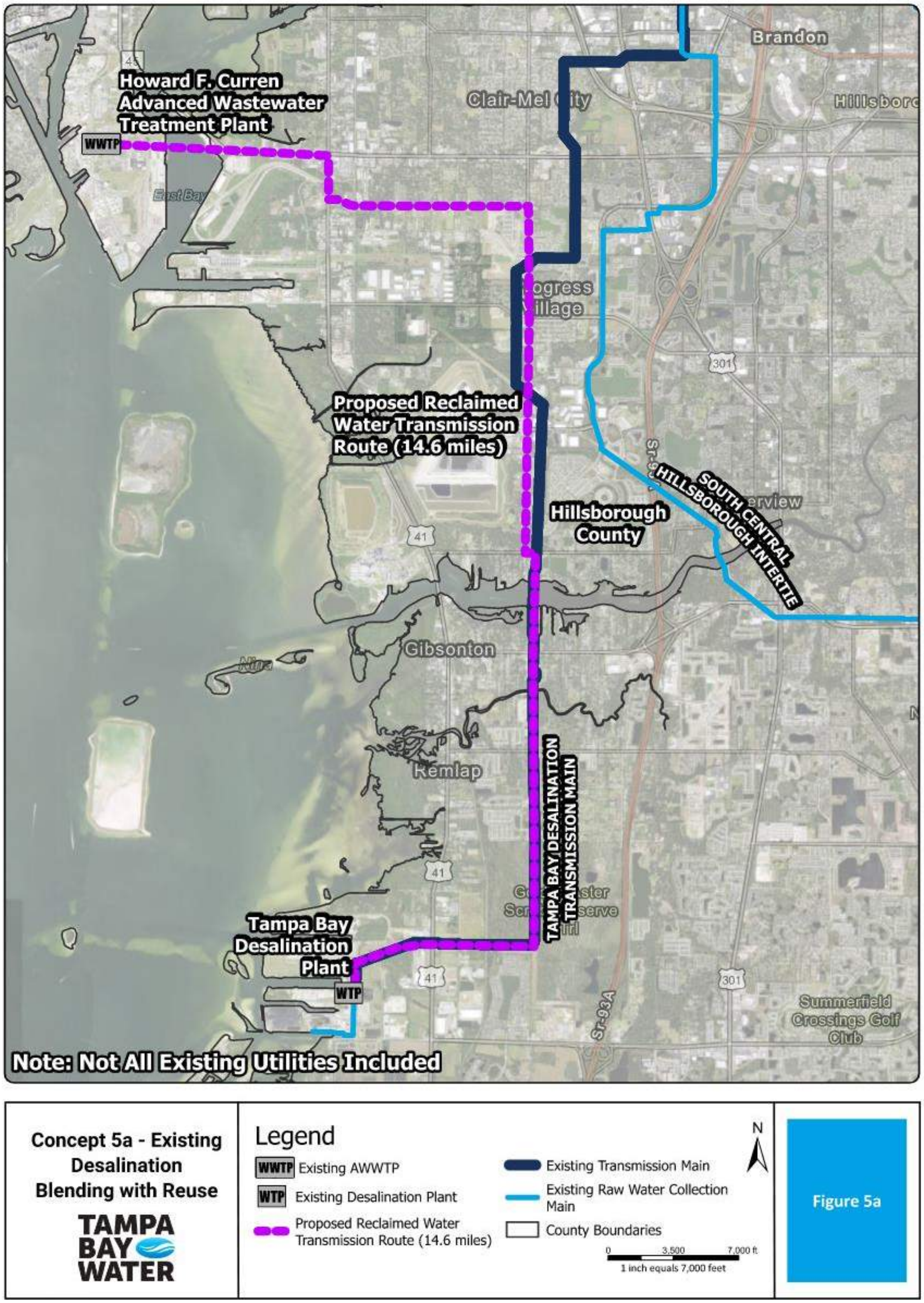
Anticipated Regulatory Requirements

- National Pollutant Discharge Elimination System (NPDES) Industrial Wastewater Discharge Permit Modification.
- Florida Department of Environmental Protection (FDEP) Facility Operational Permit modification.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- Underground Injection Control (UIC) Permit for concentrate disposal.
- NPDES Stormwater Permit
- Requirements for DPR are not yet defined but are being addressed in draft regulations.

Key Feasibility Aspects and Stakeholder Considerations

- An agreement between Tampa Bay Water and reclaimed water supplier would be needed for the reclaimed water supply. A preliminary cost is included for the purchase of reclaimed water but would need to be finalized.
- Concept will require permit modifications and significant public involvement.
- Desalination plant may require different RO membranes due to change in influent water quality from the reclaimed water blending.
- The desalination plant has significant constraints on space availability.
- Reclaimed water supply would reduce plant reliance on the intakes at TECO which would reduce Tampa Bay Water’s risk of lost production when TECO units are offline.
- Concept has a high annual average yield relative to design capacity because it includes additional reliability and redundancy improvements that alleviate operational bottlenecks at the existing desalination plant.
- FDEP is proposing a new Chapter in the DPR draft regulations.

CONCEPT FIGURE



Environmental Sustainability

- Blending with reuse water will most likely require replacement of the existing reverse osmosis membranes.
- Moderate to high energy consumption, since the reuse will lower the salinity.

Regulatory / Ease of Permitting

- The concept would have no additional surface water impacts.
- However, the concept would be permitted as a DPR implementation and would require a modification to the existing NPDES.
- FDEP is proposing a new Chapter in the DPR draft regulations.

Public Reception

- This concept will likely require pilot testing as stakeholders will be interested in any new or different constituents within the concentrate discharge that will potentially affect Tampa Bay as well as what constituents are in the reclaimed supply and how they are being removed.
- For DPR implementations, continuous outreach, long-term pilot testing, and cumulative impact analyses will need to be conducted to provide confidence that the water supply will be safe for consumption.
- Stakeholder concerns include impacts to Tampa Bay, PFAS, PPCP, and other constituents.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$197,560,000
Pipeline Capital Cost	$69,450,000
Pump Station Capital Cost	$23,250,000
Wellfield Capital Cost	$4,800,000
Total Costs[1]	
Subtotal of Construction Costs	$317,050,000
Contingency	$95,110,000
Contractor Overhead & Profit	$63,410,000
Subtotal of Construction, Contingency, and OH&P	$475,570,000
Engineering, Legal, and Administrative	$118,890,000
Total Project Capital Cost	$594,460,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$10.66
Annual O&M Cost, $/1000 gal	$2.80
Total Project Cost, $/1000 gal	$13.46

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- Water age will improve in the desalination plant transmission main if production is increased from the plant even though the desalination supply is trimmed at the Regional Facility site.
- This concept includes an additional 10 mgd capacity on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main which moderately reduces hydraulic capacity constraints on both transmission mains.
- There is no increased travel distance for maintenance to reach an Operation Hub as existing out-sourced O&M staff maintains the existing facility.
- Advanced water treatment of reclaimed water has high O&M complexity, but Tampa Bay Water has familiarity with some of the treatment processes.
- This concept has space constraints that restrict supply increases beyond this expansion.

Cost Risk Factors

- Potential supply chain issues with membrane filtration equipment.
- Long lead time on large plant equipment (including pumps and transformers and pumps for reclaimed water), but this expansion is a smaller capacity than a new plant.
- High anticipated ability to meet future regulatory changes due to proposed treatment type, but some uncertainty related to upcoming DPR regulations.
- Constructability risks due to long pipeline, challenges with construction on existing site, maintenance of plant operation challenges, and uncertainty related to upcoming DPR regulations.

Yield Reliability

- Relatively high long term yield reliability from reclaimed water source.
- The source and location are anticipated to have limited resilience but high ability to recover from natural disasters, climate change and sea level rise. Although, storm surge could keep the plant offline for an extended period.
- The concept continues to have some reliance on the co-located power plant.

Regional System Reliability Impacts

- The concept serves the regional high service pump station with a connection to the South Hillsborough Pipeline therefore supporting the growing demand.
- The location does not provide relief to areas downstream of a single point of failure, but is upstream of the regional high service pump station which provides increased reliability to the region.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
- A new agreement with member government providing the reclaimed source will be required.

References

- Black & Veatch and Hazen, *Tampa Bay Seawater Desalination Plant Expansion Feasibility Study*, Final Report, Prepared for Tampa Bay Water and Southwest Florida Water Management District, March 16, 2022.
- Black & Veatch, "Concept 6 - Desal Plant Expansion with Reclaimed Water Supply"*, WA-006 Concept Summary Sheets*, Draft, Prepared for Tampa Bay Water, August 26, 2022.

TAMPA BAY WATER

Concept 5b: Existing Desalination Plant Expansion with Brackish Water

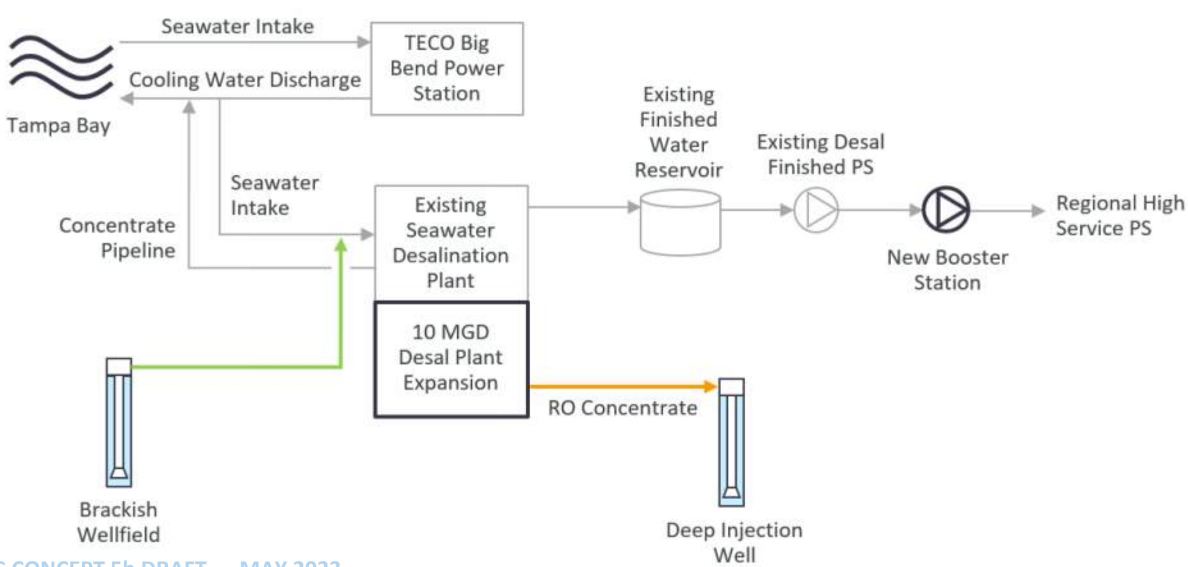
Project Description

Concept 5b considers expansion of the existing Tampa Bay Seawater Desalination Plant by blending pretreated seawater with brackish groundwater from the lower portion of the Upper Floridan Aquifer to augment the existing Tampa Bay Seawater Desalination Plant. Augmenting the desalination plant's influent flow with brackish groundwater, obtained via new groundwater production wells in southern Hillsborough County, would require a facility expansion to produce an additional finished water annual average yield of 5 mgd. The concept would require expansion and modifications to the RO treatment systems, chemical systems, and finished water pumping and transmission systems.

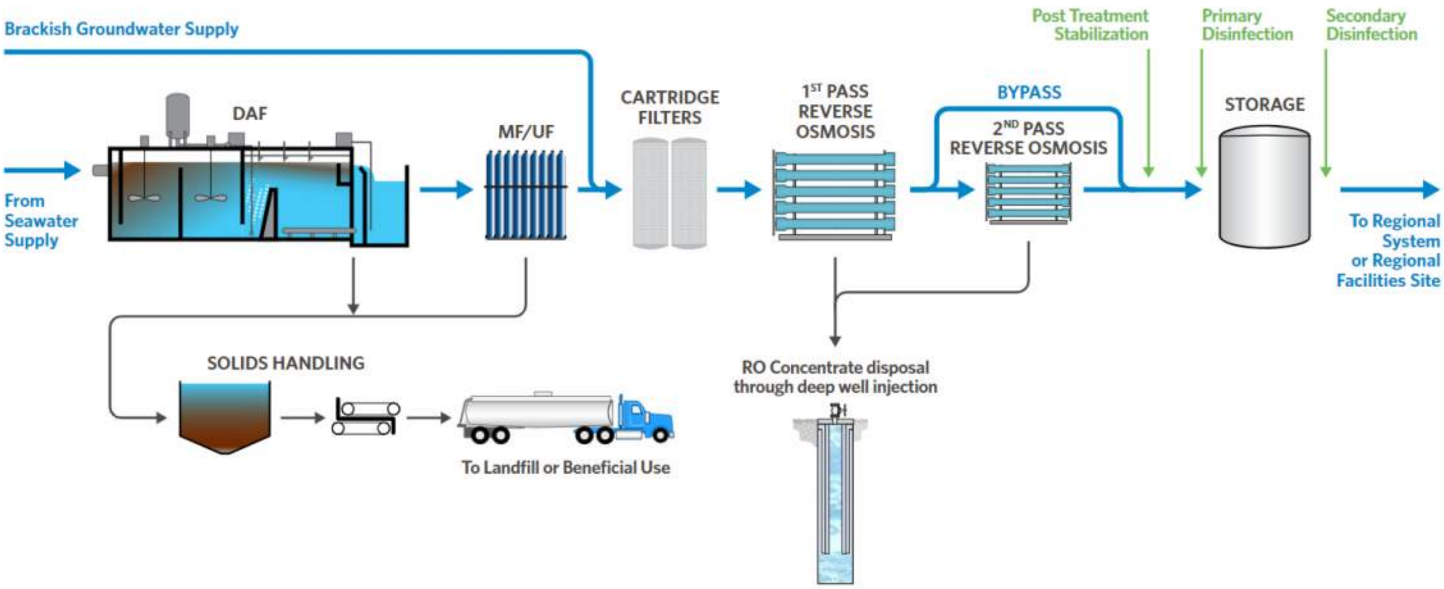
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	18.0
Finished Water – Rated Capacity	11.3
Finished Water – Average Annual Yield	5.0

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Groundwater wells and 3-mile 24-inch pipeline to the existing desalination plant.
- Expansion/modifications to the existing pretreatment and chemical facilities.
- Additional reverse osmosis trains.
- Booster pump station for transmission of finished water in the regional system.
- Deep injection well for concentrate disposal.

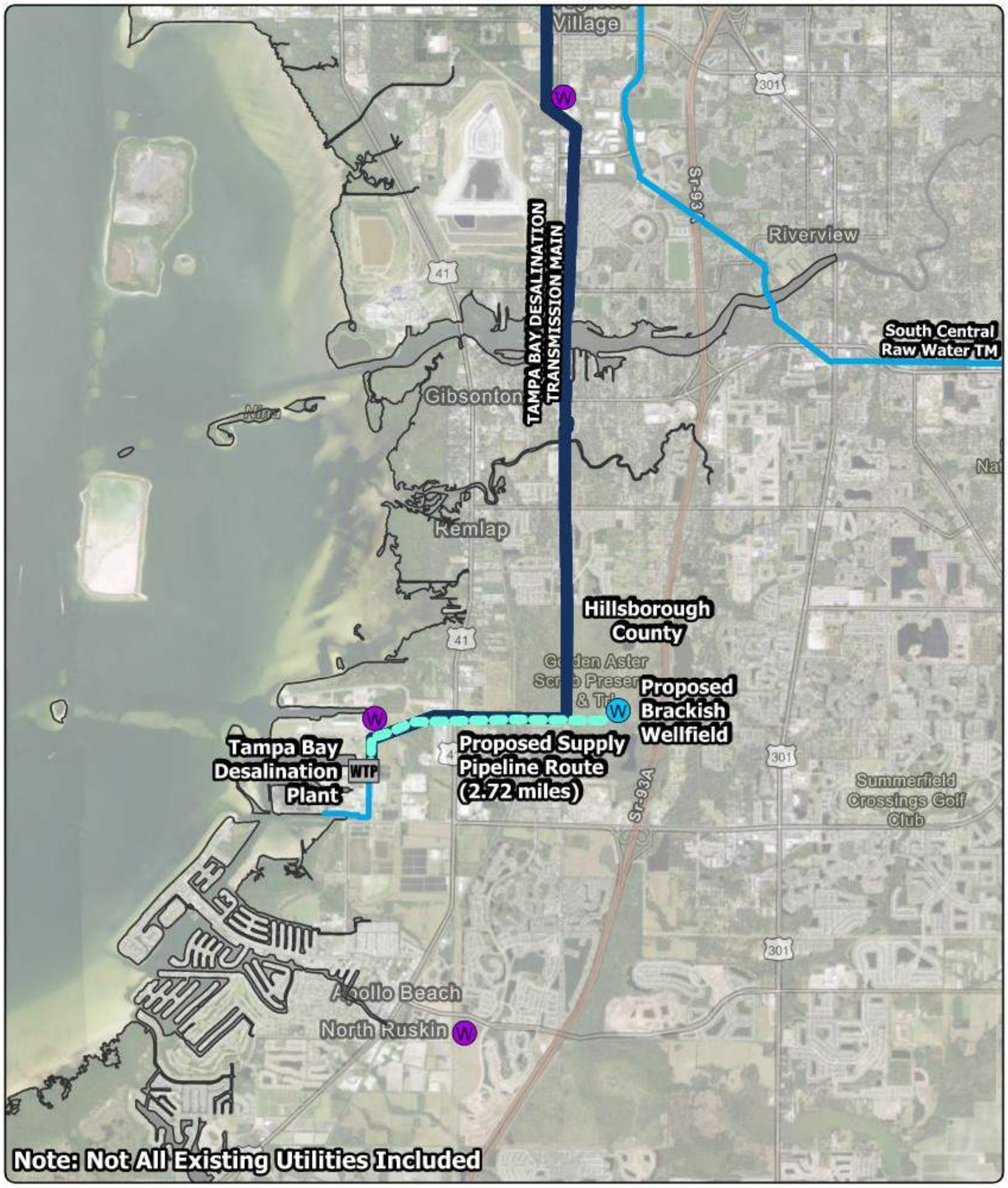
Anticipated Regulatory Requirements

- NPDES Industrial Wastewater Discharge Permit Modification.
- FDEP Facility Operational Permit modification.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- Underground Injection Control (UIC) Permit for concentrate disposal.
- NPDES Stormwater Permit
- Southwest Florida Water Management District (SWFWMD) Water Use Permit

Key Feasibility Aspects and Stakeholder Considerations

- Desalination plant may require different RO membranes due to change in influent water quality from the brackish water blending.
- The desalination plant has significant constraints on space availability.
- Brackish water supply would reduce plant reliance on the intakes at TECO which would reduce Tampa Bay Water’s risk of lost production when TECO units are offline.
- Investigation into the specific locations and production volumes of the wells, as well as any potential interaction with existing South Hillsborough Aquifer Recharge Program (SHARP) wells would need to be performed in a feasibility study.
- Concept has a high annual average yield relative to design capacity because it includes additional reliability and redundancy improvements that alleviate operational bottlenecks at the existing desalination plant.

CONCEPT FIGURE



Concept 5b - Existing Desalination Blending with Brackish

TAMPA BAY WATER

Legend

- WTP Existing Desalination Plant
- Proposed Brackish Wellfield
- Proposed Supply Pipeline Route (2.72 miles)
- Existing SHARP Well
- Existing Transmission Main
- Existing Raw Water Collection Main
- County Boundaries

N

0 3,500 7,000 ft
1 inch equals 7,000 feet

Figure 5b

Environmental Sustainability

- Blending with brackish water could potentially lower intake salinity.
- Desalination plant is anticipated to have high energy consumption.

Regulatory / Ease of Permitting

- The concept would have no additional surface water impacts and may require modification of the existing NPDES, and a new UIC for concentrate disposal.

Public Reception

- Stakeholders will be interested in any new or different constituents within the concentrate discharge that will potentially affect Tampa Bay.
- As brackish water is non-native, there will also be concerns associated with the supply withdrawal and inland saltwater intrusion.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$58,730,000
Pipeline Capital Cost	$8,830,000
Pump Station Capital Cost	$20,820,000
Wellfield Capital Cost	$17,280,000
Total Costs[1]	
Subtotal of Construction Costs	$105,660,000
Contingency	$31,700,000
Contractor Overhead & Profit	$21,130,000
Subtotal of Construction, Contingency, and OH&P	$158,490,000
Engineering, Legal, and Administrative	$39,620,000
Total Project Capital Cost	$198,110,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$7.06
Annual O&M Cost, $/1000 gal	$2.26
Total Project Cost, $/1000 gal	$9.32

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

TAMPA BAY WATER

System Integration and Expansion Potential

- Water age will improve in the desalination plant transmission main if production is increased from the plant even though the desalination supply is trimmed at the Regional Facility site.
- This concept includes an additional 5 mgd capacity on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main which slightly reduces hydraulic capacity constraints on both the transmission mains.
- It is expected that maintenance personnel will be required to travel a small distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept.
- Desalination has high O&M complexity, and Tampa Bay Water has experience with this type of treatment. Tampa Bay Water is familiar with the operation of groundwater wells.
- Tampa Bay Water is familiar with the operation of groundwater wells.
- This concept has space constraints that restrict supply increases beyond this expansion.

Cost Risk Factors

- Less supply chain concerns since there is no expansion of microfiltration (MF) / Ultrafiltration (UF) and solids handling.
- High anticipated ability to meet future regulatory changes due to proposed treatment type.
- Constructability risks due to challenges with construction on existing site, maintenance of plant operation challenges.

Yield Reliability

- Low long term yield reliability due to fouling in similar brackish wells.
- Deep injection wells are shallow and subject to upwelling, thus mixing with brackish groundwater.
- Limited seasonal impacts from brackish groundwater.
- The source and location are anticipated to have limited resilience but high ability to recover from natural disasters, climate change and sea level rise. Although, storm surge could keep the plant offline for an extended period.
- The concept continues to have some reliance on the co-located power plant.

Regional System Reliability Impacts

- The concept serves the regional high service pump station with a connection to the South Hillsborough Pipeline therefore supporting the growing demand.
- The location does not provide relief to areas downstream of a single point of failure, but is upstream of the regional high service pump station which provides increased reliability to the region.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
- Some potential for new or revised agreements due to colocation.

References

- Black & Veatch and Hazen, *Tampa Bay Seawater Desalination Plant Expansion Feasibility Study*, Final Report, Prepared for Tampa Bay Water and Southwest Florida Water Management District, March 16, 2022.
- Black & Veatch, "Concept 6 - Desal Plant Expansion with Reclaimed Water Supply"*, WA-006 Concept Summary Sheets*, Draft, Prepared for Tampa Bay Water, August 26, 2022.

Concept 6: North Pinellas Surface Water Plant

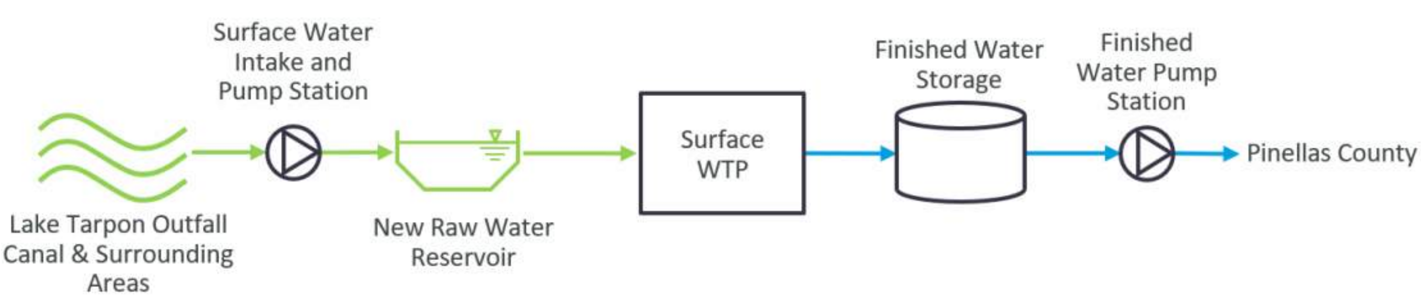
Project Description

Concept 6 consists of harvesting excess surface water from the Lake Tarpon outfall canal along with other potential sources including Chesnut Park, Canal Park, East Lake, Channel "A", and Brushy Creek. The surface water supply would be sent to a new off-stream reservoir for seasonal storage and treatment at a new SWTP in North Pinellas County with similar treatment processes as the existing Regional SWTP. The new SWTP would include provisions for TOC removal and is currently estimated to produce a finished water annual average yield of 8.5 mgd. The finished water would tie into the existing Tampa Bay Water regional system near the northern end of the Keller Transmission Main.

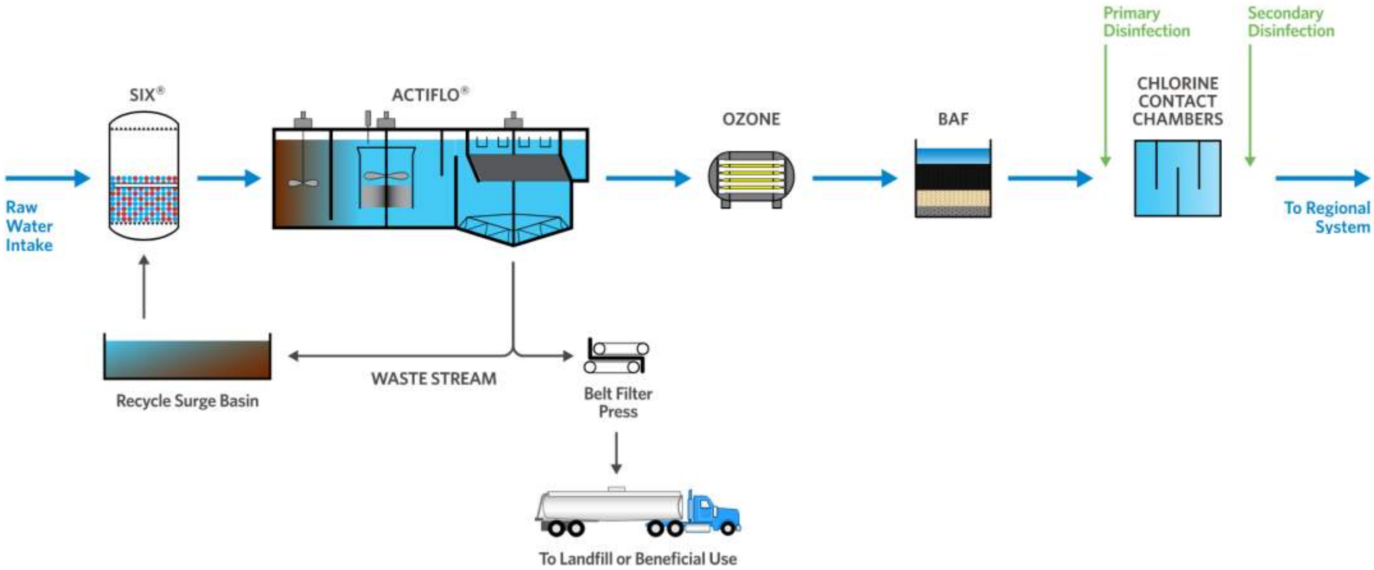
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	27.0
Finished Water – Rated Capacity	25.4
Finished Water – Annual Average Yield	8.5

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Surface water intake and pump station.
- 9-mile 36-inch diameter raw water pipeline to reservoir.
- Surface water treatment facility.
- New raw water reservoir.
- Finished water storage tank.
- Pump station and 0.1-mile transmission main for finished water to Pinellas County.

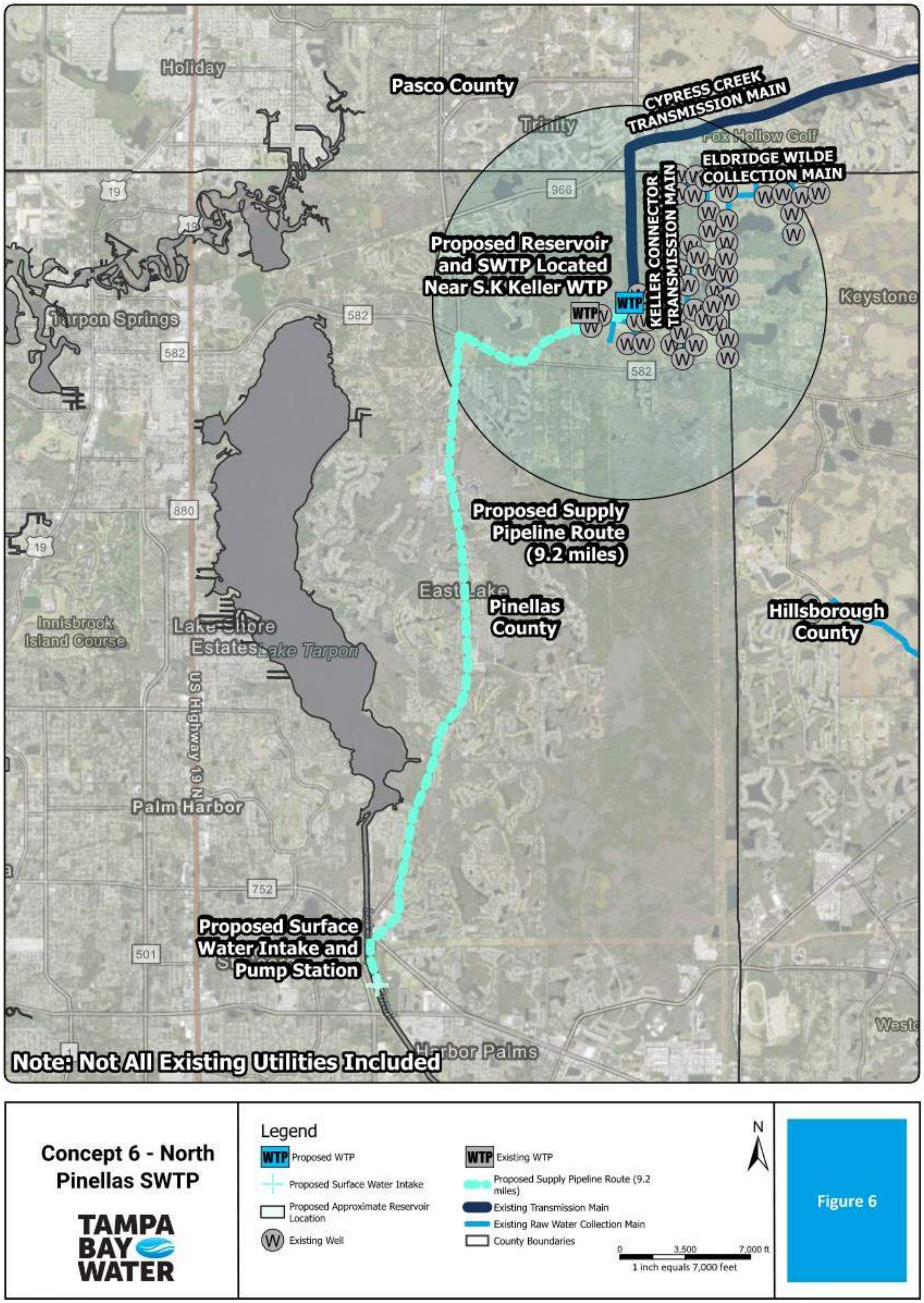
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit.
- Clean Water Act Section 404 permit.

Key Feasibility Aspects and Stakeholder Considerations

- To confirm the consistency of the available yield, additional studies regarding the lake level and watershed modeling need to be performed in a feasibility study.
- There is a potential for lake improvements to be required to meet an increased yield.
- A reduction in freshwater from the outfall canal has the potential to improve the health of bay seagrass.
- A more detailed evaluation into the specific locations of the treatment plant and reservoir would need to be performed in future studies.
- There is a potential for Pinellas County to pursue additional withdrawals from Lake Tarpon in the future, so uses will need to be coordinated in future studies.

CONCEPT FIGURE



TAMPA BAY WATER

Environmental Sustainability

- Harvesting excess surface water discharged to Old Tampa Bay could have potential ecological benefits.
- Monitoring and control of water levels in Lake Tarpon may be required.
- A new SWTP is anticipated to have low to moderate energy consumption.

Regulatory / Ease of Permitting

- The concept has potential net environmental benefits to Old Tampa Bay but will require a new WUP for the surface water withdrawal.
- Potential concerns about adverse lake level impacts to Lake Tarpon.

Public Reception

- This concept will require significant and sustained outreach if construction will be located in any county park.
- Stakeholders are more likely to accept an intake on the Lake Tarpon outfall than the lake itself; will likely express concern regarding impacts to lake levels.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$90,800,000
Pipeline Capital Cost	$34,540,000
Pump Station Capital Cost	$27,280,000
Total Costs[1]	
Subtotal of Construction Costs	$284,620,000
Contingency	$85,390,000
Contractor Overhead & Profit	$56,920,000
Subtotal of Construction, Contingency, and OH&P	$426,940,000
Engineering, Legal, and Administrative	$106,730,000
Total Project Capital Cost	$540,620,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$11.37
Annual O&M Cost, $/1000 gal	$0.86
Total Project Cost, $/1000 gal	$12.23

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- There will be no water age impact on this concept since there is no new distribution pipeline.
- This concept includes 9 mgd less required capacity on the North Central Hillsborough Intertie and the Morris Bridge Transmission Main which slightly improves hydraulic capacity constraints on both transmission mains.
- It is expected that maintenance personnel will be required to travel frequently from the Cypress Creek Pump Station Operational Hub to the project concept. An in-sourced or out-sourced dedicated O&M staff would be required.
- Surface water treatment has moderate treatment and O&M complexity, and Tampa Bay Water has familiarity with this type of treatment. There will be additional O&M requirements associated with the new reservoir.
- Based on the addition of a reservoir and the potential changes to lake level operations, this concept has some supply expansion potential.

Cost Risk Factors

- Low to moderate potential for supply chain delays, some unique treatment considerations that may impact project.
- Modifications to proposed treatment may be necessary to meet future regulatory changes.
- Low constructability score for new reservoir.

Yield Reliability

- Low long term yield reliability due to inconsistent flow from Lake Tarpon.
- Seasonal impacts on capacity and quality are mitigated by the presence of a reservoir.
- The supply is expected to have low to moderate resilience and recovery from natural disasters, sea level rise and climate change.
- This concept is not reliant on a third party for supply.

Regional System Reliability Impacts

- The concept is not located near a high demand area therefore not supporting the growing demand.
- The location increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

References

- PBS&J, Douglas E. Robison and Thomas Farkas, *Evaluation of Storage and Beneficial Reuse Alternatives for Lake Tarpon Discharge Water,* Prepared for Pinellas County Utilities, September 2001.
- Jones Edmunds & Associates, Inc., *North Pinellas County Aquifer Storage and Recovery and Managed Aquifer Recharge Feasibility Study,* Prepared for Pinellas County Utilities, July 2019.
- MWH, *Surface & Recharge Projects Configuration Cost Analysis,* Prepared for Tampa Bay Water, May 2011.
- Southwest Florida Water Management District, *Regional Water Supply Plan,* Board Approved, August 2001.
- Southwest Florida Water Management District, *Regional Water Supply Plan,* Board Approved, December 1, 2006.

Concept 7: New SWTP via Lake Thonotosassa

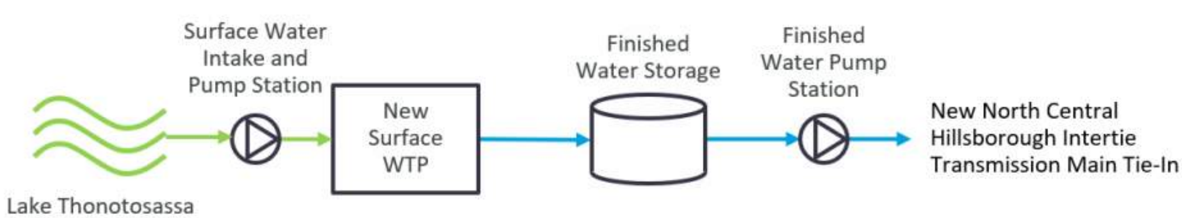
Project Description

Concept 7 would involve a new SWTP constructed in Hillsborough County near Lake Thonotosassa and is expected to produce a finished water annual average yield of 2 mgd. The new SWTP would include similar treatment processes as the existing Regional SWTP with additional provisions to manage TOC removal and a pump station and pipeline to convey finished water supply to the existing Tampa Bay Water regional system at the North-Central Hillsborough Intertie.

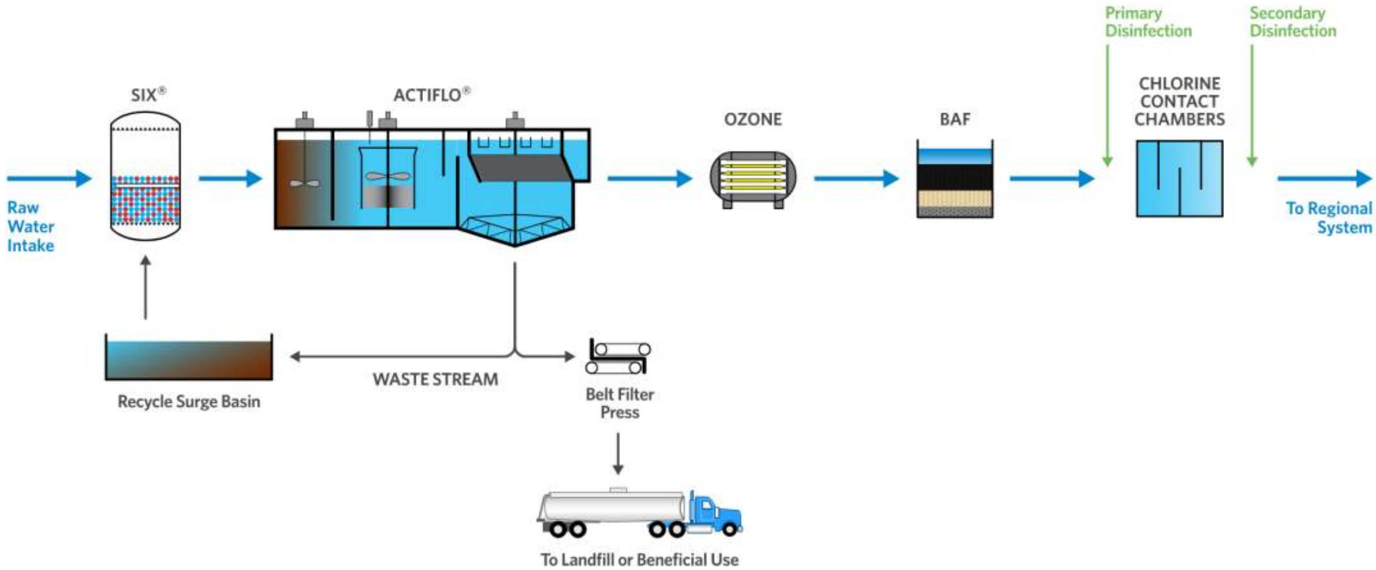
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	6.0
Finished Water – Rated Capacity	5.7
Finished Water – Average Annual Yield	2.0

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Raw water pump station and 16-inch diameter transmission from Lake Thonotosassa to the new surface water treatment plant.
- Surface water treatment facility.
- Finished water storage tank.
- Pump station and 4.0-mile 16-inch diameter transmission pipeline for finished water from the SWTP to the North-Central Hillsborough Intertie.

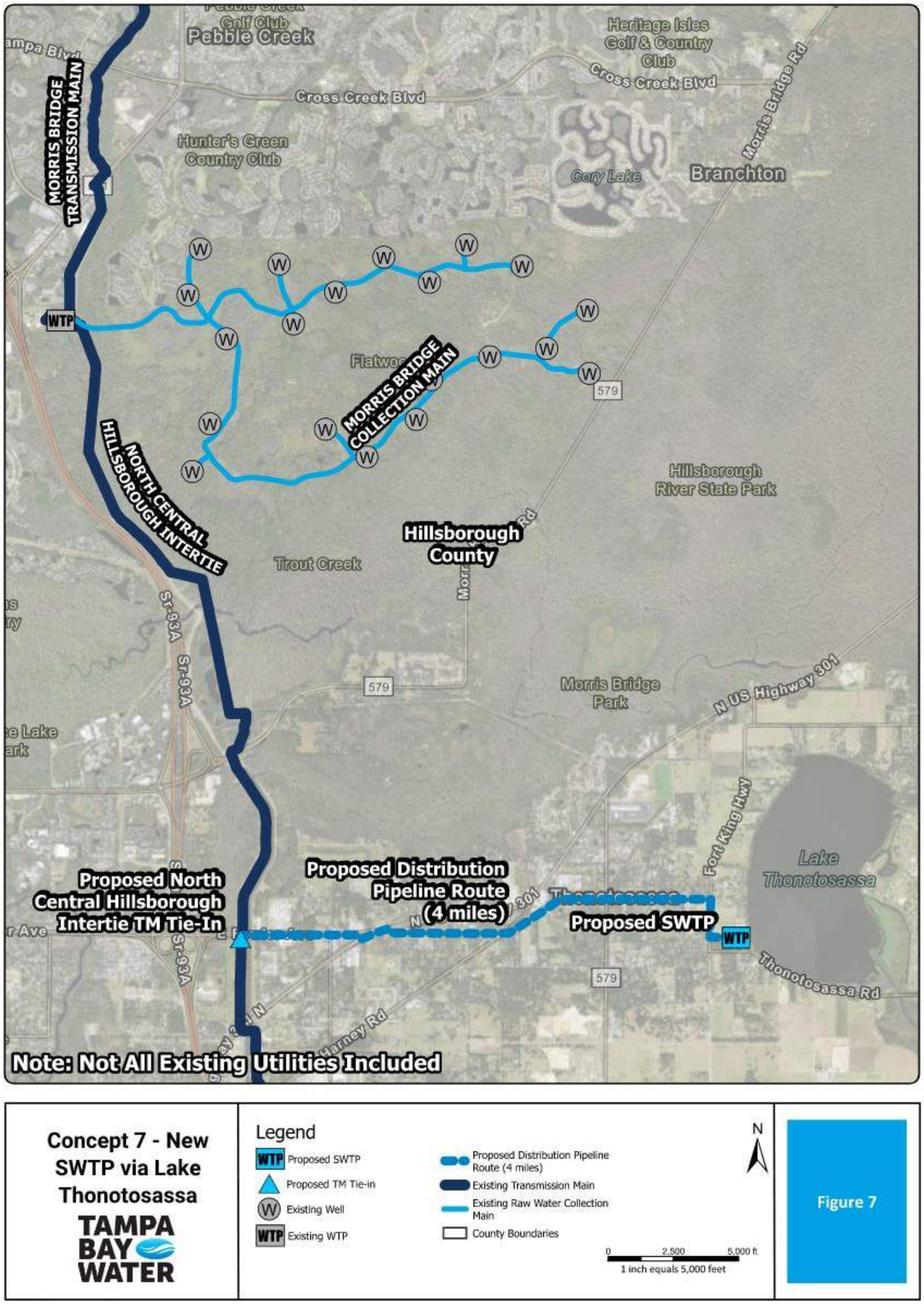
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit.

Key Feasibility Aspects and Stakeholder Considerations

- Yield may be subject to seasonal constraints. More detailed analysis and evaluation would need to be performed to determine and achieve a more consistent yield.
- Withdrawals from the lake may impact the Hillsborough River flow level at the Morris Bridge flow gauge, making this concept infeasible.
- Since the lake is tributary to the Hillsborough River, impacts to existing Tampa Bay Water and City of Tampa withdrawals would need to be evaluated in a future feasibility study.
- A more detailed evaluation into the specific locations of the treatment plant would need to be performed in future studies.

CONCEPT FIGURE



Environmental Sustainability

- Potential flow reductions could impact the upper Hillsborough River minimum flow level requirements.
- A new SWTP is anticipated to have low to moderate energy consumption.

Regulatory / Ease of Permitting

- The concept would require a WUP for the new withdrawal and may be inconsistent with the existing MFL.

Public Reception

- Residents will likely express concern regarding potential impacts to the lake levels, recreation, and potential downstream impacts to Hillsborough River.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$24,570,000
Pipeline Capital Cost	$8,680,000
Pump Station Capital Cost	$7,380,000
Total Costs[1]	
Subtotal of Construction Costs	$40,630,000
Contingency	$12,190,000
Contractor Overhead & Profit	$8,130,000
Subtotal of Construction, Contingency, and OH&P	$60,950,000
Engineering, Legal, and Administrative	$15,240,000
Total Project Capital Cost	$77,220,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$6.88
Annual O&M Cost, $/1000 gal	$0.70
Total Project Cost, $/1000 gal	$7.58

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- The distribution pipeline length is approximately 4 miles long. Due to the length of the pipeline a moderate to low water age impact is to be expected.
- This concept includes an additional 2 mgd capacity on the North Central Hillsborough Intertie and the Morris Bridge Transmission Main which negligibly reduces hydraulic capacity constraints on both transmission mains.
- It is expected that maintenance personnel will be required to travel a medium distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept. An in-sourced or out-sourced dedicated O&M staff would be required.
- Surface water treatment has moderate treatment and O&M complexity, and Tampa Bay Water has familiarity with this type of treatment.
- Based on a desktop review of Lake Thonotosassa's water availability, this concept has limited supply expansion potential.

Cost Risk Factors

- Low to moderate potential for supply chain delays, some unique treatment considerations that may impact project.
- Modifications to proposed treatment may be necessary to meet future regulatory changes.
- Low constructability score for risk of a reservoir requirement.

Yield Reliability

- Low long term yield reliability due to low and inconsistent flow from Lake Thonotosassa and historical surrounding well data.
- Significant impacts to capacity are anticipated due to seasonal variations.
- The supply is expected to have limited resilience and recovery from natural disasters, sea level rise and climate change.
- This concept is not reliant on a third party for supply.

Regional System Reliability Impacts

- Although water from the supply travels north through the North-Central Hillsborough Intertie, the supply origin is not directly adjacent to Pasco County or South Hillsborough County growth areas.
- The location does not provide relief to areas downstream of a single point of failure but is downstream of the regional high service pump station which provides increased reliability to the region.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

References

- West Coast Regional Water Supply Authority, "The Master Water Plan: A 20-Year Water Supply Development Plan", *Resource Development Plan*, December 20, 1996.
- Black & Veatch, *Long Term Water Supply Planning*, Comprehensive Project List Screening, Prepared for Tampa Bay Water, December 2001.
- MWH, *Surface & Recharge Projects Configuration Cost Analysis*, Prepared for Tampa Bay Water, May 2011.

Concept 8: New SWTP at the Regional Reservoir via Increased Alafia Withdrawal

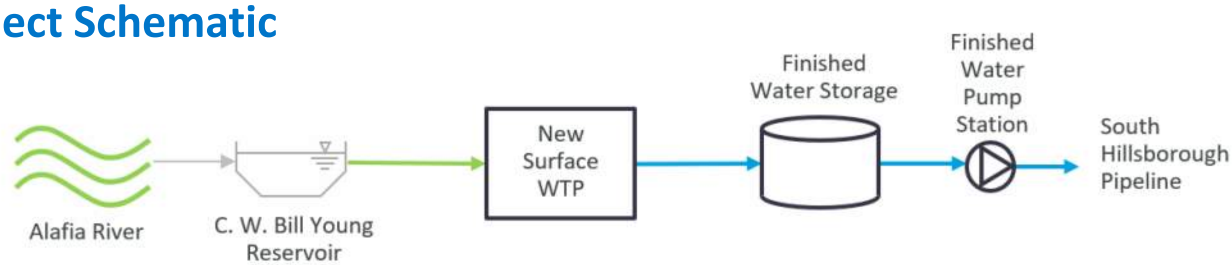
Project Description

Concept 8 involves constructing a new SWTP near the existing Regional Reservoir in Hillsborough County to treat additional surface water supply provided by increased Alafia River withdrawals. Modifications to the existing water use permit would be required to increase the allowable withdrawals from the river. This concept would rely on the existing Enhanced Surface Water System for raw surface water supply, transmission, and seasonal storage. The concept would also involve the construction of a new finished water pump station and transmission pipeline to deliver the treated supply to the regional transmission system. The new SWTP would include similar treatment processes as that of the existing Regional SWTP with additional provisions to enhance TOC removal.

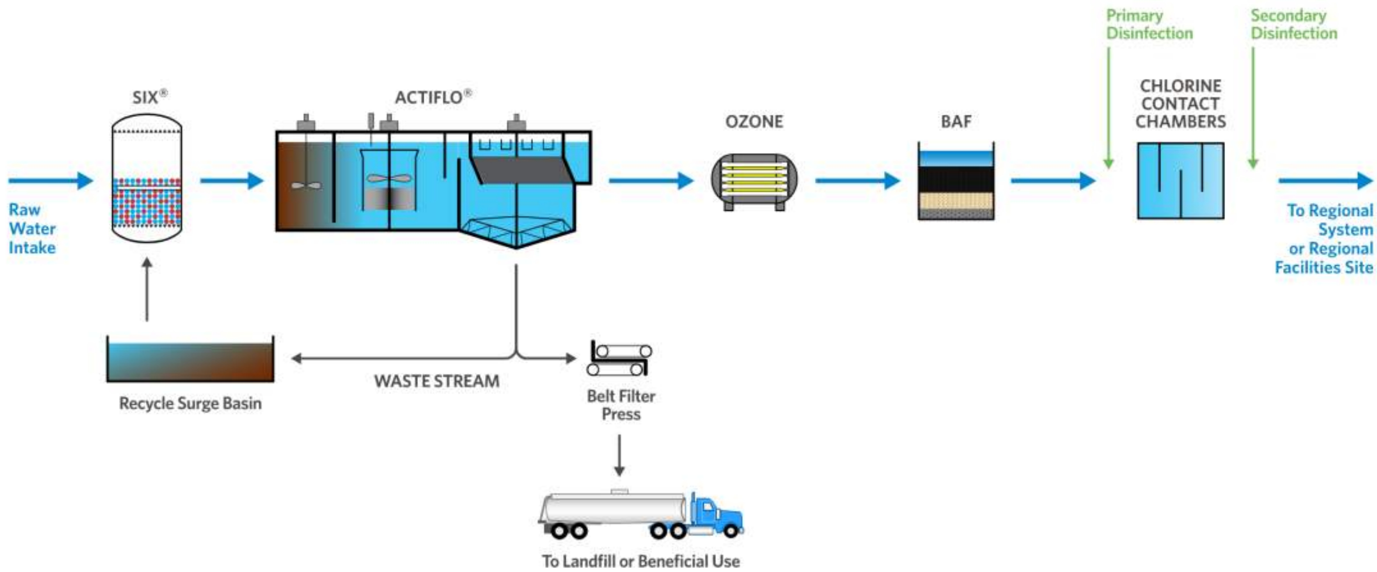
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	19.2
Finished Water – Rated Capacity	18.1
Finished Water – Average Annual Yield	6.4

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Surface water treatment plant.
- Finished water storage tank.
- Pump station and 5-mile 30-inch diameter transmission pipeline for finished water to the South Hillsborough Pipeline.

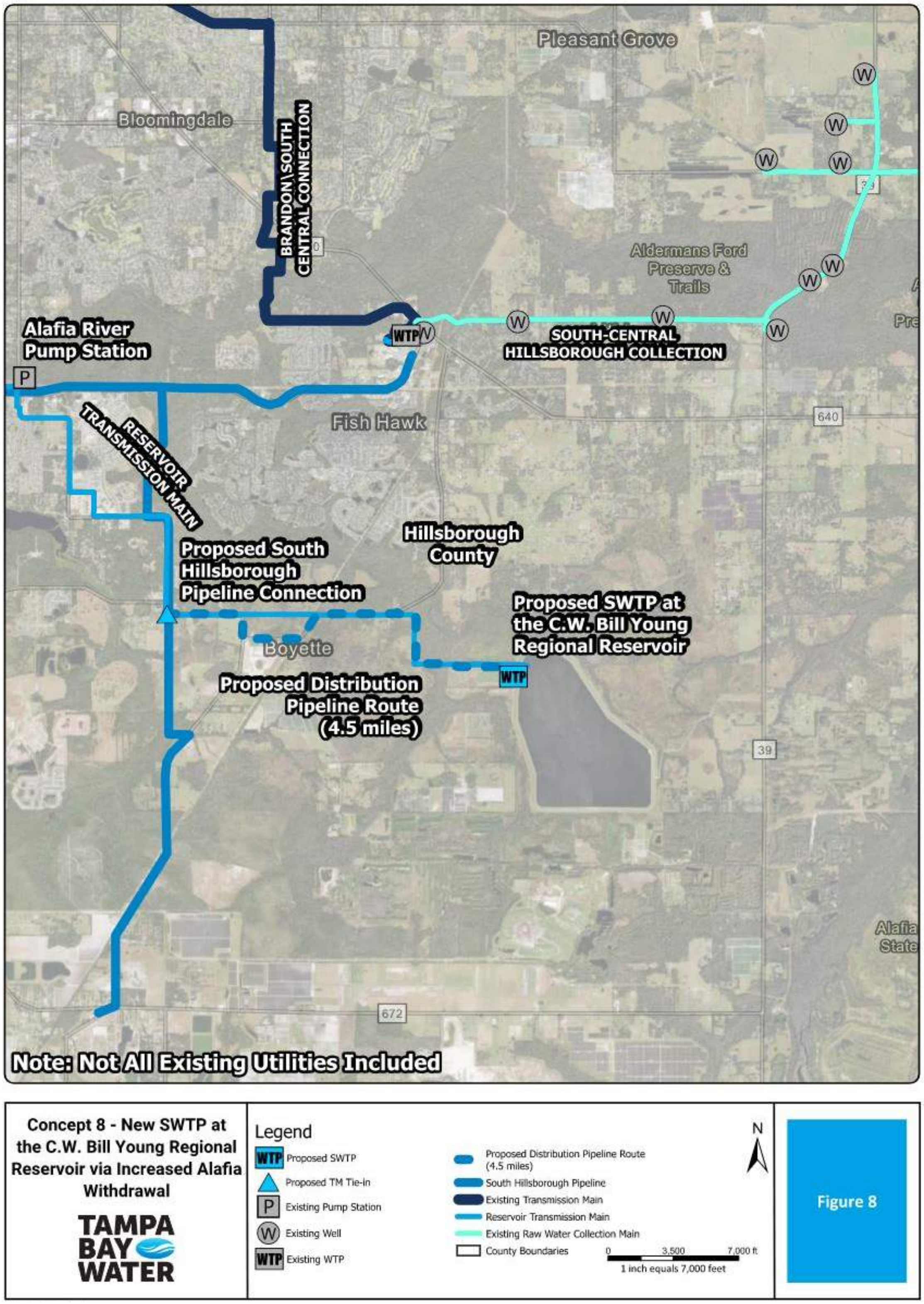
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit modification.

Key Feasibility Aspects and Stakeholder Considerations

- Potential fluoride and TOC levels in the source water would need to be addressed and may require additional treatment upon further investigation of water quality. Fluoride levels may decrease over time due to decreased mining activities.
- Additional evaluations should be performed to better understand this potential source including:
  - Obtain new MFL information
  - Evaluate the North Prong and South Prong Basin MFL, since these sources contribute a majority of the Alafia River flow
  - Assess withdrawal when the updated version of the IHM is completed.

CONCEPT FIGURE



Environmental Sustainability

- The current minimum flow level determination for the lower Alafia River allows for increased withdrawals over the existing water use permit.
- A new SWTP is anticipated to have low to moderate energy consumption.

Regulatory / Ease of Permitting

- The existing MFL allows for increased withdrawals, but this concept would require a modification to the existing WUP with new modeling and increased monitoring.

Public Reception

- This concept will likely be well received by the public; however, outreach efforts will need to be conducted to ensure that increased withdrawals from the Alafia River will not impact the river, Tampa Bay, or the surrounding estuarine environment.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$67,440,000
Pipeline Capital Cost	$18,300,000
Pump Station Capital Cost	$9,410,000
Total Costs[1]	
Subtotal of Construction Costs	$95,150,000
Contingency	$28,540,000
Contractor Overhead & Profit	$19,030,000
Subtotal of Construction, Contingency, and OH&P	$142,720,000
Engineering, Legal, and Administrative	$35,680,000
Total Project Capital Cost	$181,720,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$5.06
Annual O&M Cost, $/1000 gal	$0.68
Total Project Cost, $/1000 gal	$5.74

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- The distribution pipeline length is approximately 5 miles long. Due to the length of the pipeline a moderate to low water age impact is to be expected.
- This concept includes 6 mgd less required capacity on the Brandon South-Central Connection Transmission Main which slightly improves hydraulic capacity constraints on this transmission main.
- It is expected that maintenance personnel will be required to travel a close distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept. An in-sourced or out-sourced dedicated O&M staff would be required.
- Surface water treatment has moderate treatment and O&M complexity, and Tampa Bay Water has familiarity with this type of treatment.
- Based on the size of the reservoir and the Alafia withdrawals, this concept has limited supply expansion potential.

Cost Risk Factors

- Low to moderate potential for supply chain delays, some unique treatment considerations that may impact project.
- Modifications to proposed treatment may be necessary to meet future regulatory changes.
- Constructability risks associated with fluoride treatment and water management uncertainty.

Yield Reliability

- Low long term yield reliability for surface water sources.
- Moderate impacts of quantity and quality from seasonal variations, including fluoride concerns.
- Moderate resilience and recovery from natural disasters, sea level rise and climate change, and natural disasters.
- This concept is not reliant on a third party for supply.

Regional System Reliability Impacts

- The concept is connected to the South Hillsborough Pipeline therefore supporting the growing demand.
- The location increases reliability by providing relief to a point of connection downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection rather than the regional system though reverse flow could potentially be possible through the regional high service pump station if pressures were great enough.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

References

- Black & Veatch, *Long Term Water Supply Plan*, Final Report, Prepared for Tampa Bay Water, December 2008.
- Black & Veatch, *Long Term Water Supply Plan*, Report Appendices, Prepared for Tampa Bay Water, December 2008, p. 118-135.
- Black & Veatch, "RE: TBW Long Term WSP - Alafia River Fluoride Issue - ESWS Tie in Point for delivery to Tippin WTP", April 25, 2011, Office Communication (January 19, 2023).
- MWH*, Surface & Recharge Projects Configuration Cost Analysis*, Prepared for Tampa Bay Water, May 2011.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, December 1, 2006.
- Black & Veatch, *TOC Removal Conceptual Plans and Costs*, Draft Technical Memorandum, Prepared for Tampa Bay Water, September 29, 2017.
- Tampa Bay Water, *Alafia River Pump Station and Water Use Permit (WUP)*, Standard Operating Procedure, June 1, 2015.

TAMPA BAY WATER

Concept 9: New SWTP and Reservoir via New Supplies

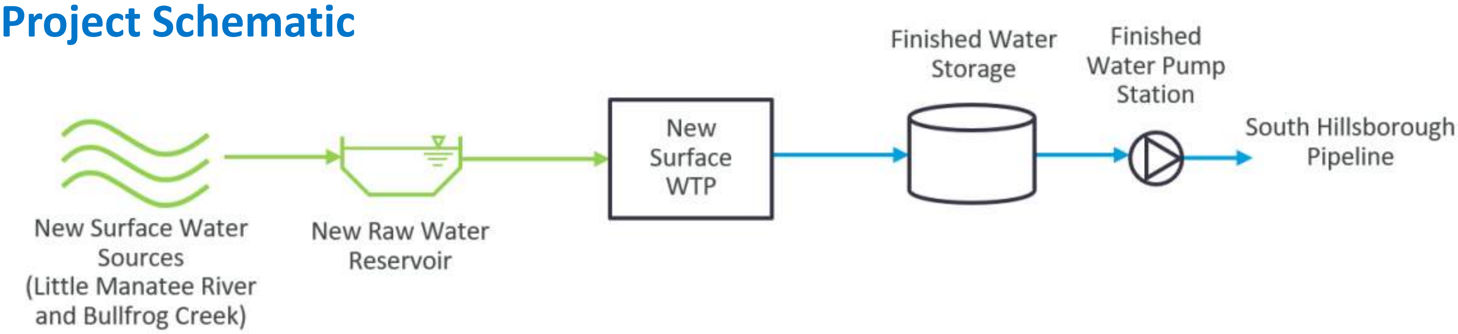
Project Description

Concept 9 involves the development of new surface water supplies from sources in southern Hillsborough County including the Little Manatee River and Bullfrog Creek. This concept requires the construction of a new surface water seasonal storage reservoir in conjunction with a new SWTP to provide a finished water annual average yield of 11.4 mgd. The new SWTP would be located in southern Hillsborough County and would connect into the regional transmission system at the southern end of the proposed new South Hillsborough Pipeline. The new SWTP would include similar treatment processes as the existing Regional SWTP with additional provisions to enhance TOC removal.

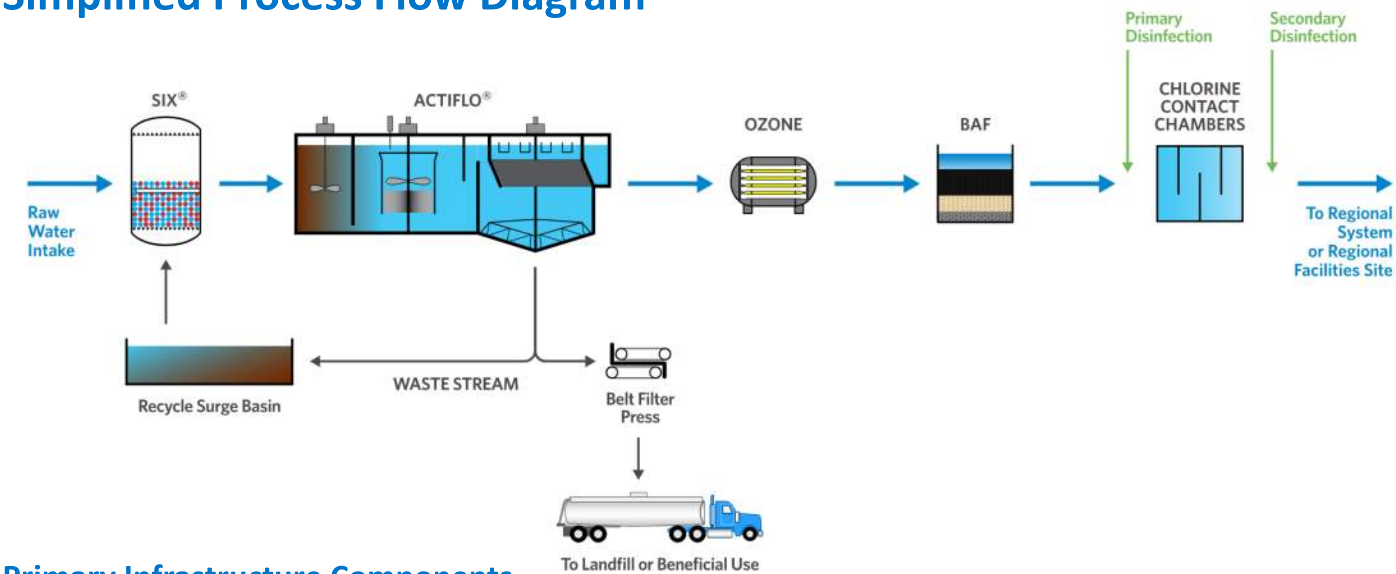
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	34.2
Finished Water – Rated Capacity	32.2
Finished Water – Average Annual Yield	11.4

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Intake pump stations and transmission piping from Bullfrog Creek (18-inch diameter) and Little Manatee River (36-inch diameter) sources to proposed reservoir. It is assumed that some existing Enhanced Surface Water (raw water) pipeline will be used for transmission.
- 2.1 BG raw water reservoir.
- Surface water treatment plant.
- Storage tank for finished water.
- Finished water pump station and 4-miles of 30-inch diameter transmission pipeline to South Hillsborough Pipeline.

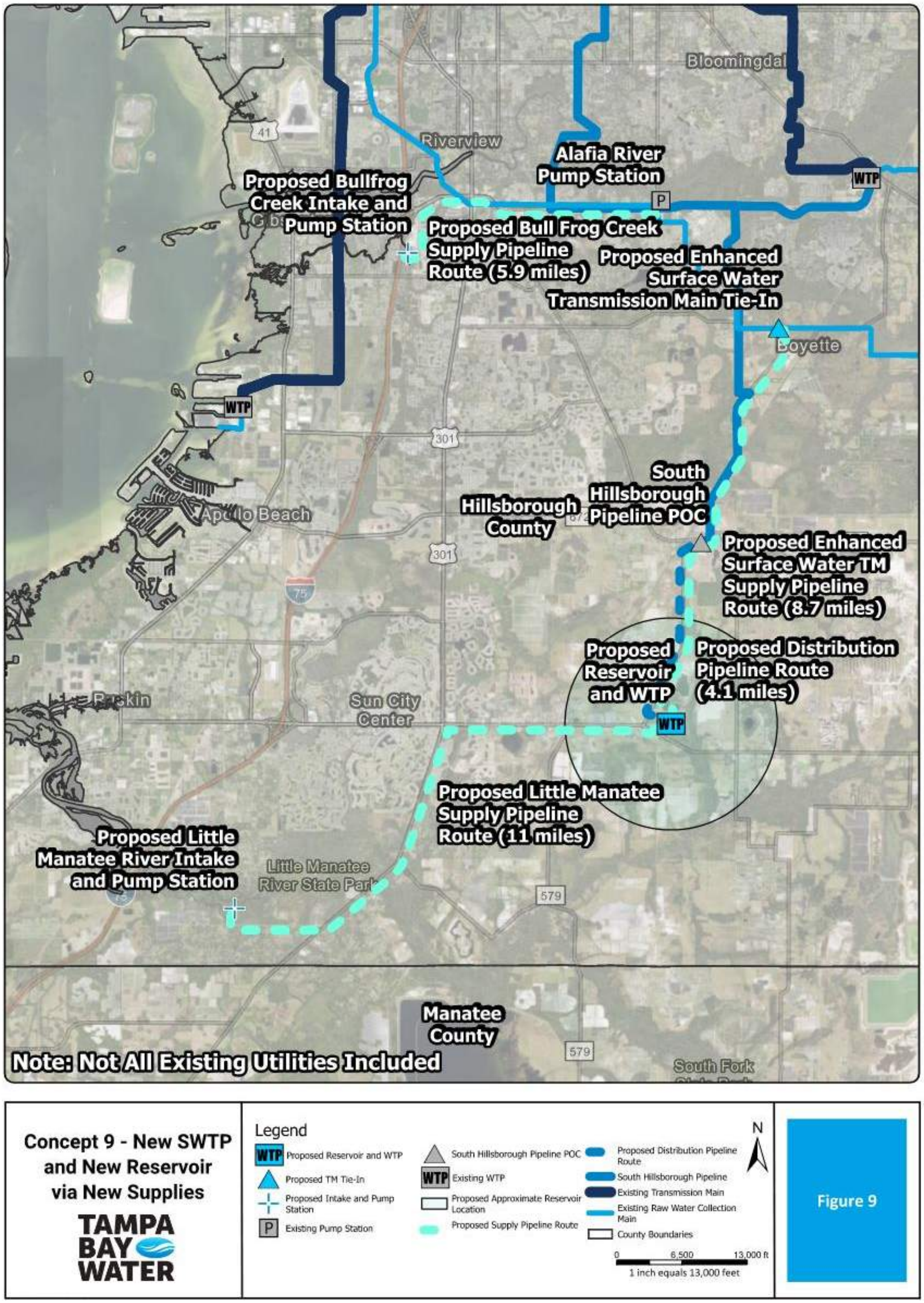
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permits.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit.
- Clean Water Act Section 404 permit.

Key Feasibility Aspects and Stakeholder Considerations

- Main supply sources considered for this option include Little Manatee River and Bullfrog Creek, which have estimated annual average yields of 9.0 mgd and 2.4 mgd respectively. In a more detailed study, Morris Bridge Sink and Shelly Lake can also be evaluated as contributing sources.
- Use of the Enhanced Surface Water Pipeline may not be feasible. Alternative direct routes from Little Manatee River to the reservoir will be considered.
- Reservoir size may be adjusted based on flow estimates determined in more detailed studies.
- Florida Power and Light has an existing withdrawal on the Little Manatee River.
- Little Manatee River Minimum Flow Level (MFL) is currently being reassessed.
- A more detailed evaluation into the specific locations of the treatment plant and reservoir would need to be performed in future studies.

CONCEPT FIGURE



Environmental Sustainability

- Assumes new surface water withdrawals from the Little Manatee River and/or Bullfrog Creek.
- Likely new salinity and ecological impacts in the affected surface water bodies.
- A new SWTP is anticipated to have low to moderate energy consumption.

Regulatory / Ease of Permitting

- Assumes new withdrawals from the Little Manatee River and/or Bullfrog Creek.
- This concept would require new WUPs for the surface water withdrawals, with extensive modeling.
- New withdrawal from the Little Manatee may be inconsistent with the existing MFL.
- ERP and 404 permits required for new reservoir.

Public Reception

- This concept will require communication to the public to convey that this project will support the region's continued growth, not just the southward growth of the County.
- Environmental concerns from new withdrawals will also need to be addressed.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$111,730,000
Pipeline Capital Cost	$130,920,000
Pump Station Capital Cost	$44,870,000
Reservoir Capital Cost	$46,200,000
Total Costs[1]	
Subtotal of Construction Costs	$333,710,000
Contingency	$100,110,000
Contractor Overhead & Profit	$66,740,000
Subtotal of Construction, Contingency, and OH&P	$500,570,000
Engineering, Legal, and Administrative	$125,140,000
Total Project Capital Cost	$656,260,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$10.26
Annual O&M Cost, $/1000 gal	$0.91
Total Project Cost, $/1000 gal	$11.17

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- The distribution pipeline length is approximately 4 miles long. Due to the length of the pipeline a moderate to low water age impact is to be expected.
- This concept includes 9 mgd less required capacity on the Brandon Urban Dispersed Transmission Main which moderately improves hydraulic capacity constraints on the Brandon Urban Dispersed Transmission Main.
- It is expected that maintenance personnel will be required to travel a moderate distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept. An in-sourced or out-sourced dedicated O&M staff would be required.
- Surface water treatment has moderate treatment and O&M complexity, and Tampa Bay Water has familiarity with this type of treatment. There will be additional O&M requirements associated with the new reservoir.
- This concept has some supply expansion potential, it could potentially connect with other supplies.

Cost Risk Factors

- Low to moderate potential for supply chain delays, some unique treatment considerations that may impact project.
- Modifications to proposed treatment may be necessary to meet future regulatory changes.
- Constructability risks associated with long pipelines from multiple sources and new reservoir.

Yield Reliability

- Moderate long term yield reliability for surface water sources, including Bullfrog Creek and Little Manatee River.
- Seasonal impacts on capacity and quality are mitigated by the presence of a reservoir.
- Moderate resilience and recovery from natural disasters, sea level rise and climate change, and natural disasters.
- This concept is not reliant on a third party for supply.

Regional System Reliability Impacts

- The concept is connected to the South Hillsborough Pipeline therefore supporting the growing demand.
- The location increases reliability by providing relief to a point of connection downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection rather than the regional system though reverse flow could potentially be possible through the regional high service pump station if pressures were great enough.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

References

- Hazen & Sawyer, *Long Term Master Water Plan*, Final Report, Prepared for Tampa Bay Water, December 2018.
- MWH, *Surface & Recharge Projects Configuration Cost Analysis*, Prepared for Tampa Bay Water, May 2011.

Concept 10: Eastern Pasco Wellfield

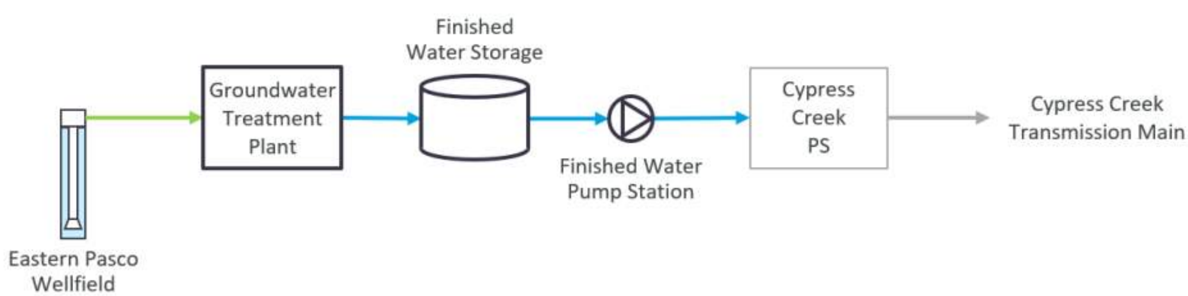
Project Description

The Eastern Pasco Wellfield concept would involve the construction of a new wellfield in eastern Pasco County outside of the existing Consolidated Water Use Permit. Fresh groundwater supply would be treated at a new groundwater treatment plant using ozone and GAC filters to produce a finished water annual average yield of 10 mgd. The finished water would be connected into the regional transmission system in the vicinity of the Cypress Creek Pump Station and/or to a new point of connection with Pasco County northeast of the Cypress Creek Pump Station.

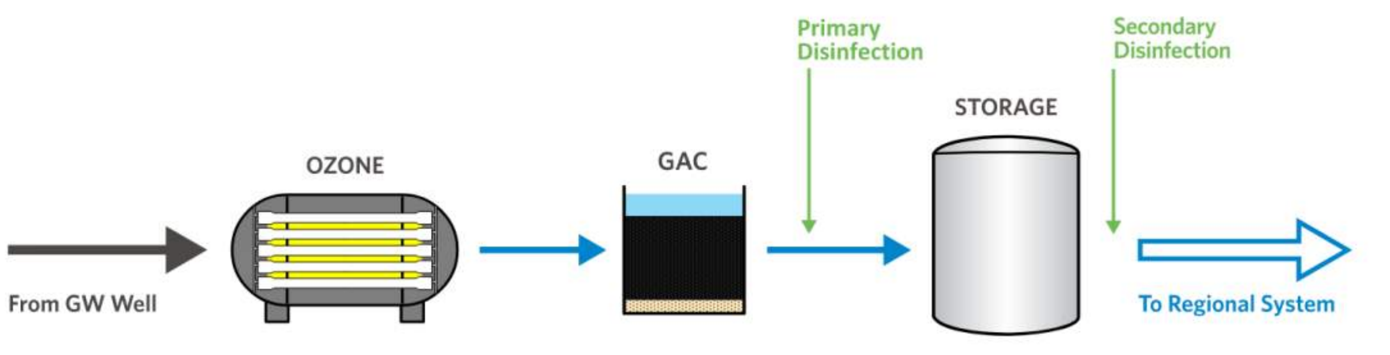
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	22.5
Finished Water – Rated Capacity	22.1
Finished Water – Average Annual Yield	10.0

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Wellfield and 8-mile, 36-inch diameter pipeline to treatment plant.
- Groundwater treatment plant with ozone and GAC treatment.
- Finished water storage tank.
- 30-inch pipeline to existing Cypress Creek Pump Station.

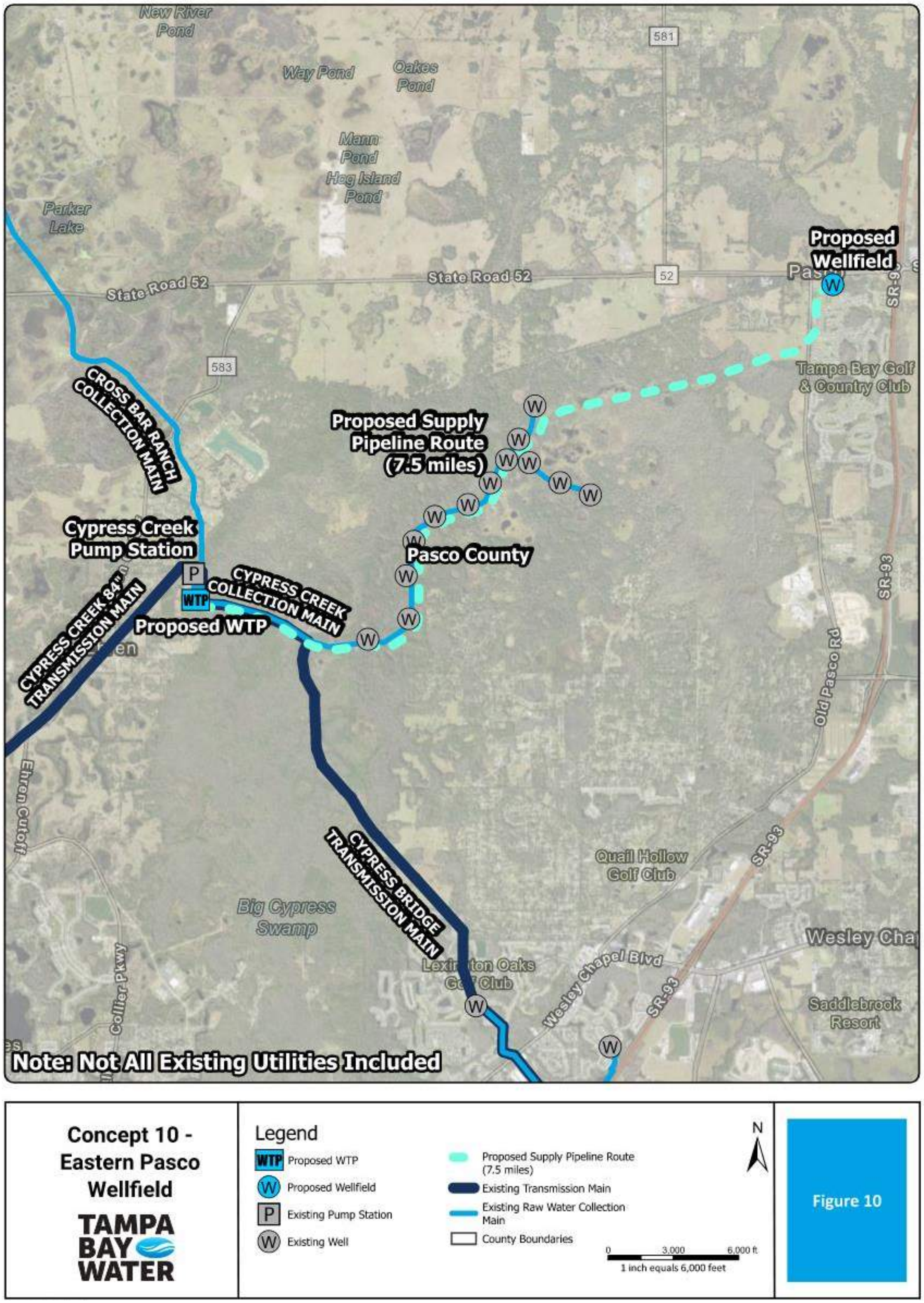
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permits.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit.
- FDEP Class V Well Construction and Operation permits for each new well.

Key Feasibility Aspects and Stakeholder Considerations

- Additional hydrological evaluations would need to be performed in a feasibility study. The degree of connectivity of the Upper Floridan Aquifer would need to be established to ensure that surrounding water sources would not be impacted due to groundwater withdrawals.
- Successfully obtaining additional water use permitting success would be dependent on the ability to demonstrate that existing recovery goals for aquifer levels and surface water levels would not be impeded by such a withdrawal.
- This concept provides water to a growing region of the Tampa Bay Water Service Area.

CONCEPT FIGURE



Environmental Sustainability

- There are potential lake and wetland drawdown impacts, though no impacts have been identified from the operation of existing Tampa Bay Water wellfields.
- The concept must ensure there are no impacts to the Upper Hillsborough River MFL.
- The wellfield and groundwater treatment plant are anticipated to have low energy consumption.

Regulatory / Ease of Permitting

- The concept would require a new WUP and extensive modeling.
- It should be noted that there is potential for mitigation to be required.

Public Reception

- Stakeholder concerns will likely include impacts from drawdown, impacts to nearby wells and surface features, and any potential mitigation that will be required.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$36,250,000
Pipeline Capital Cost	$35,840,000
Pump Station Capital Cost	$11,480,000
Wellfield Capital Cost	$32,930,000
Total Costs[1]	
Subtotal of Construction Costs	$116,500,000
Contingency	$34,950,000
Contractor Overhead & Profit	$23,300,000
Subtotal of Construction, Contingency, and OH&P	$174,750,000
Engineering, Legal, and Administrative	$43,690,000
Total Project Capital Cost	$220,430,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$3.93
Annual O&M Cost, $/1000 gal	$0.86
Total Project Cost, $/1000 gal	$4.79

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- There will be no water age impact on this concept since there is no new distribution pipeline.
- This concept includes an additional 10 mgd capacity that ties into the Cypress Creek Transmission Main which moderately improves hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that maintenance personnel will be required to travel a close distance starting from the Cypress Creek Pump Station Operational Hub to the project concept.
- Tampa Bay Water is familiar with groundwater treatment, O&M and production well processes.
- This concept has some supply expansion potential, but additional studies would need to be performed to confirm.

Cost Risk Factors

- Less supply chain concerns and potential for delays .
- The proposed treatment is anticipated to meet regulatory changes.
- Some constructability risks associated with moderate pipeline length, new groundwater sources and well production risks.

Yield Reliability

- Moderately high long term yield reliability for fresh groundwater supply.
- Limited seasonal impacts to supply quality and capacity.
- Supply and inland location are moderately resilient to natural disasters, sea level rise and climate change, but recovery from events that negatively impact yield is anticipated to be slow.
- This concept is not reliant on a third party for supply.

Regional System Reliability Impacts

- The concept is located in Pasco County therefore supporting the growing demand.
- The location does not provide relief to areas downstream of a single point of failure but is downstream of the regional high service pump station which provides increased reliability to the region.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

References

- West Coast Regional Water Supply Authority, "The Master Water Plan: A 20-Year Water Supply Development Plan", *Resource Development Plan*, December 20, 1996.
- Black & Veatch, *Long Term Water Supply Planning*, Comprehensive Project List Screening, Prepared for Tampa Bay Water, December 2001.
- Black & Veatch, *Long Term Water Supply Plan*, Final Report, Prepared for Tampa Bay Water, December 2008.
- Black & Veatch, *Long Term Water Supply Plan*, Report Appendices, Prepared for Tampa Bay Water, December 2008, p. *79-84*.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, August 2001.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, December 1, 2006.

Concept 11: Interconnect with Polk Regional Water Cooperative

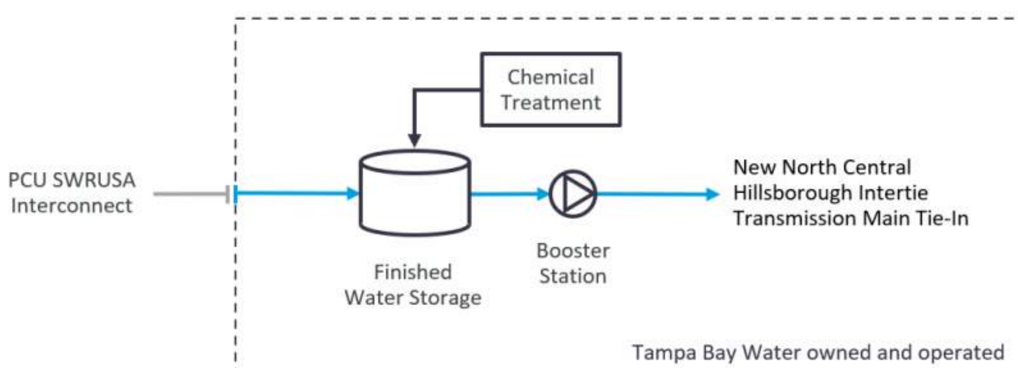
Project Description

Concept 11 would allow for additional supply that may be available from PRWC to be sent to the Tampa Bay Water regional transmission system. This concept would require the construction of a new transmission main from the PRWC planned water system (near the City of Lakeland) to the east side of Tampa Bay Water's existing regional transmission system (along the North-Central Hillsborough Intertie). It is assumed that the interconnect would provide 5 mgd of annual average supply to the Tampa Bay Water system. Feasibility of this concept would be dependent upon the long-term availability of supply capacity and a commitment from PRWC to supply water to the Tampa Bay Water regional system.

Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	N/A
Finished Water – Rated Capacity	7.5
Finished Water – Average Annual Yield	5

Project Schematic



TAMPA BAY WATER

Primary Infrastructure Components

- 33-mile, 18-inch diameter transmission piping from PRWC to a new storage tank.
- Finished water storage tank.
- Chemical trim system at the point of connection.
- Pump station for transmission of finished water to North Central Hillsborough Transmission Main.

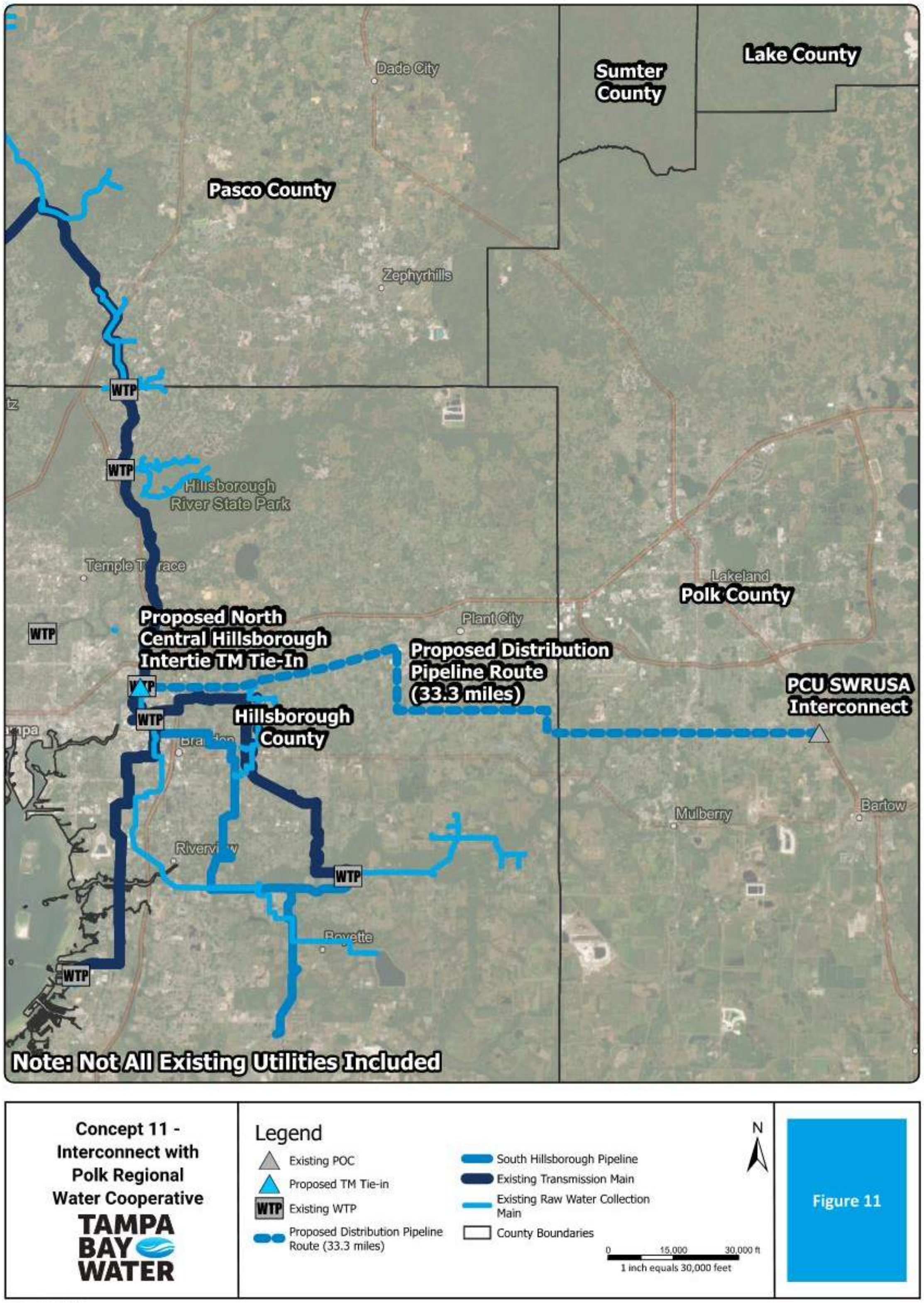
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.

Key Feasibility Aspects and Stakeholder Considerations

- Agreements and additional coordination between Tampa Bay Water and PRWC are needed.
- An interconnect with another regional water supply will increase supply reliability in emergency scenarios.
- A distribution water quality compatibility assessment at the point of connection would be required.
- A potential to send water to PRWC would have to be addressed in the agreement between Tampa Bay Water and PRWC.

CONCEPT FIGURE



TAMPA BAY WATER

Environmental Sustainability

- This concept has potential dredge and fill impacts to wetlands and stream crossings from new pipelines.
- Inter-basin transfers are discouraged by state water policy.
- This concept is anticipated to have low to moderate energy consumption, with most energy related to pumping.

Regulatory / Ease of Permitting

- This concept includes inter-basin water transfers which are discouraged by state water policy.
- A new pipeline would require ERP and 404 permits.

Public Reception

- This concept could be complicated by cost, agreements between parties, or stakeholder perception of the water authority distributing water outside of its designated service area.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$2,090,000
Pipeline Capital Cost	$79,590,000
Pump Station Capital Cost	$4,750,000
Total Costs[1]	
Subtotal of Construction Costs	$86,430,000
Contingency	$25,930,000
Contractor Overhead & Profit	$17,290,000
Subtotal of Construction, Contingency, and OH&P	$129,640,000
Engineering, Legal, and Administrative	$32,410,000
Total Project Capital Cost	$162,150,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$5.78
Annual O&M Cost, $/1000 gal	$3.53
Total Project Cost, $/1000 gal	$9.31

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- The distribution pipeline length is approximately 33 miles long. Due to the length of the pipeline, a significant water age impact is to be expected.
- This concept includes an additional 5 mgd capacity that ties into the Regional Transmission Main which slightly reduce the hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that maintenance personnel will be required to travel a far distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept.
- This concept has minimal O&M and treatment requirements, and Tampa Bay water is familiar with operating interconnects.
- This concept has limited supply expansion potential since it is supplied by a third party.

Cost Risk Factors

- Low potential for schedule delays due to supply chain issues.
- Proposed treatment process modifications would likely be required at PRWC to meet potential future regulations.
- Constructability risk associated with long pipeline.

Yield Reliability

- Lower long term yield reliability due to uncertainty related to the Polk Regional Water Cooperative (PRWC) sources and system reliability.
- Moderately high impacts to capacity based on seasonal variations are anticipated, due to less supply being available for sale from the PRWC.
- Moderate resilience and limited recovery from natural disasters, sea level rise and climate change are anticipated, with the majority of supply expected to come from fresh groundwater.
- This concept is reliant on a third party for supply.

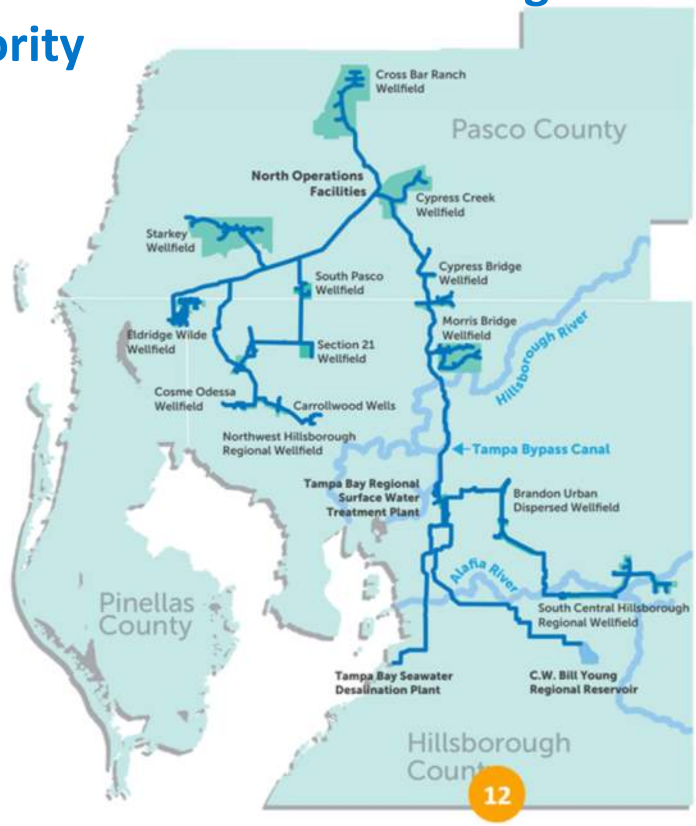
Regional System Reliability Impacts

- Although water from the supply travels north through the North-Central Hillsborough Intertie, the supply origin is not directly adjacent to Pasco County or South Hillsborough County growth areas.
- The location does not provide relief to areas downstream of a single point of failure, though the contractual agreement in addition to the concept being located downstream of the regional high service pump station will provide increased reliability to the region and during emergency events.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
- Amendments to governance documents will be necessary.
- New governance documents, agreements, and contracts will be required between Tampa Bay Water and the entity providing the finished water.

Concept 12: Interconnect with Peace River Manasota Regional Water Supply Authority



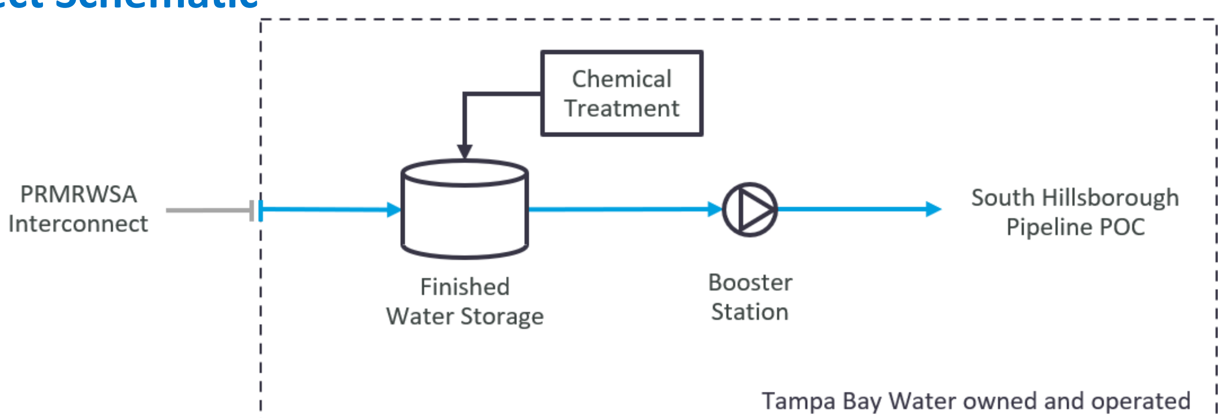
Project Description

Concept 12 would allow for additional supply from PRMRWSA to be sent north to supplement the Tampa Bay Water regional system. This concept would require the construction of a new transmission main from the PRMRWSA system (in Manatee County) to Tampa Bay Water's regional transmission system in southern Hillsborough County. It is assumed that the interconnect would provide 6 mgd of annual average supply to the Tampa Bay Water system. Feasibility of this concept would be dependent upon the long-term availability of supply capacity and a commitment from the PRMRWSA to supply water to the Tampa Bay Water regional system.

Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	N/A
Finished Water – Rated Capacity	9.0
Finished Water – Average Annual Yield	6.0

Project Schematic



Primary Infrastructure Components

- 38-mile, 20-inch diameter transmission piping from PRMRWSA to a new storage tank.
- Finished water storage tank.
- Chemical trim system at interconnect.
- Booster pump station to the South Hillsborough Pipeline POC.

Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.

Key Feasibility Aspects and Stakeholder Considerations

- Agreements and additional coordination between Tampa Bay Water and PRMRWSA are needed.
- An interconnect with another regional water supply will increase supply reliability in emergency scenarios.
- A distribution water quality compatibility assessment at the point of connection would be required.
- A potential to send water to PRMRWSA would have to be addressed in the agreement between Tampa Bay Water and PRMRWSA.

CONCEPT FIGURE

Environmental Sustainability

- This concept has potential dredge and fill impacts to wetlands and stream crossings from new pipelines.
- Inter-basin transfers are discouraged by state water policy.
- This concept is anticipated to have low to moderate energy consumption, with most energy related to pumping.

Regulatory / Ease of Permitting

- This concept includes inter-basin water transfers which are discouraged by state water policy.
- A new pipeline would require ERP and 404 permits.

Public Reception

- This concept could be complicated by cost, agreements between parties, or stakeholder perception of the water authority distributing water outside of its designated service area.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$3,540,000
Pipeline Capital Cost	$100,360,000
Pump Station Capital Cost	$5,700,000
Total Costs[1]	
Subtotal of Construction Costs	$109,600,000
Contingency	$32,880,000
Contractor Overhead & Profit	$21,920,000
Subtotal of Construction, Contingency, and OH&P	$164,390,000
Engineering, Legal, and Administrative	$41,100,000
Total Project Capital Cost	$205,600,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$6.11
Annual O&M Cost, $/1000 gal	$3.75
Total Project Cost, $/1000 gal	$9.86

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- The distribution pipeline length is approximately 38 miles long. Due to the length of the pipeline, a significant water age impact is to be expected.
- This concept includes 6 mgd less required capacity on the Brandon Urban Dispersed Transmission Main which slightly improves hydraulic capacity constraints on the Brandon Urban Dispersed Transmission Main.
- It is expected that maintenance personnel will be required to travel a far distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept.
- This concept has minimal O&M and treatment requirements, and Tampa Bay water is familiar with operating interconnects.
- This concept has limited supply expansion potential since it is supplied by a third party.

Cost Risk Factors

- Low potential for schedule delays due to supply chain issues.
- Proposed treatment process modifications would likely be required at PRMRWSA to meet potential future regulations.
- Constructability risk associated with long pipeline.

Yield Reliability

- Lower long term yield reliability due to uncertainty related to the Peace River Manasota Regional Water Supply Authority (PRMRWSA) sources and system reliability.
- Moderate impacts to capacity based on seasonal variations are anticipated, due to less supply being available for sale from the PRMRWSA.
- The PRMRWSA supply is sourced from the Peace River and ASR systems which are likely to be moderately impacted by climate change, sea level rise and natural disasters.
- This concept is reliant on a third party for supply.

Regional System Reliability Impacts

- The concept is located in South Hillsborough County therefore supporting the growing demand.
- The location increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, with the contractual agreement also increasing reliability to the region especially for emergency events.
- The concept is connected to a single point of connection to serve one Member Government rather than the regional system.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
- Amendments to governance documents will be necessary.
- New governance documents, agreements, and contracts will be required between Tampa Bay Water and the entity providing the finished water.

References

- West Coast Regional Water Supply Authority, "The Master Water Plan: A 20-Year Water Supply Development Plan", *Resource Development Plan*, December 20, 1996.
- Black & Veatch, *Long Term Water Supply Planning*, Comprehensive Project List Screening, Prepared for Tampa Bay Water, December 2001.
- Southwest Florida Water Management District, *Consolidated Annual Report*, Board Approved, March 1, 2022.

Concept 13a: Transfer Existing Groundwater Permits – Pasco County

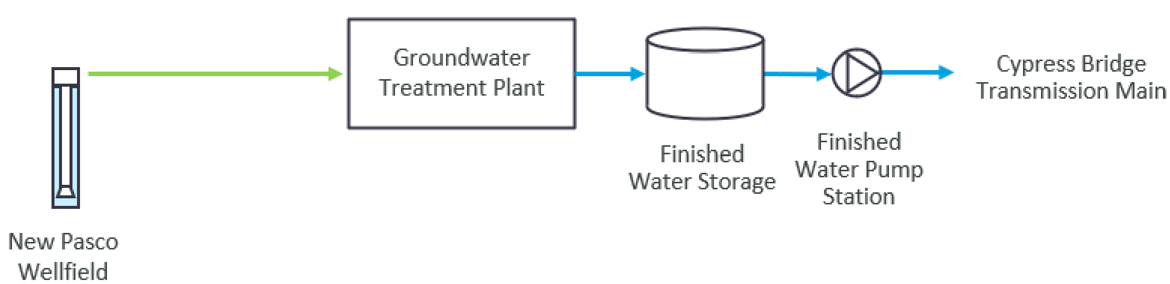
Project Description

Concept 13a involves transferring groundwater permits from large fresh groundwater users in Pasco County to Tampa Bay Water through the identification of existing water use permit holders (such as industrial and agricultural businesses and property owners) that may no longer need an existing water use permit. Large user credits would be purchased and transferred to Tampa Bay Water to allow for the withdrawal of groundwater from existing or new wells in the area. The groundwater supply that is made available would be treated at new groundwater treatment facilities including ozone and GAC filter treatment processes. The finished water supply would be delivered into the existing Regional Transmission system at the Cypress Creek Pump Station.

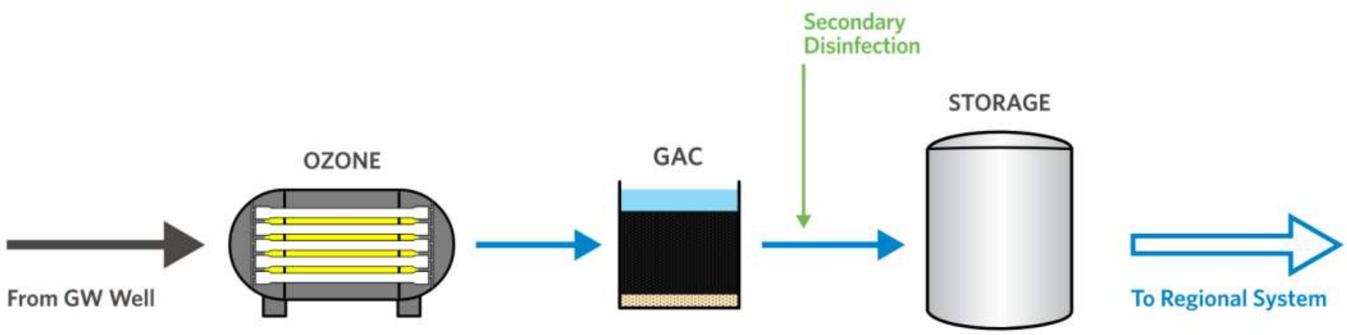
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	7.9
Finished Water – Rated Capacity	7.7
Finished Water – Average Annual Yield	3.5

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Construction of new production wells.
- Groundwater transmission piping to proposed groundwater facility.
- Centralized groundwater treatment facility with ozone and GAC treatment.
- Storage tank for finished water.
- Pump station and finished water 19-mile, 18-inch diameter transmission to the regional system point of connection

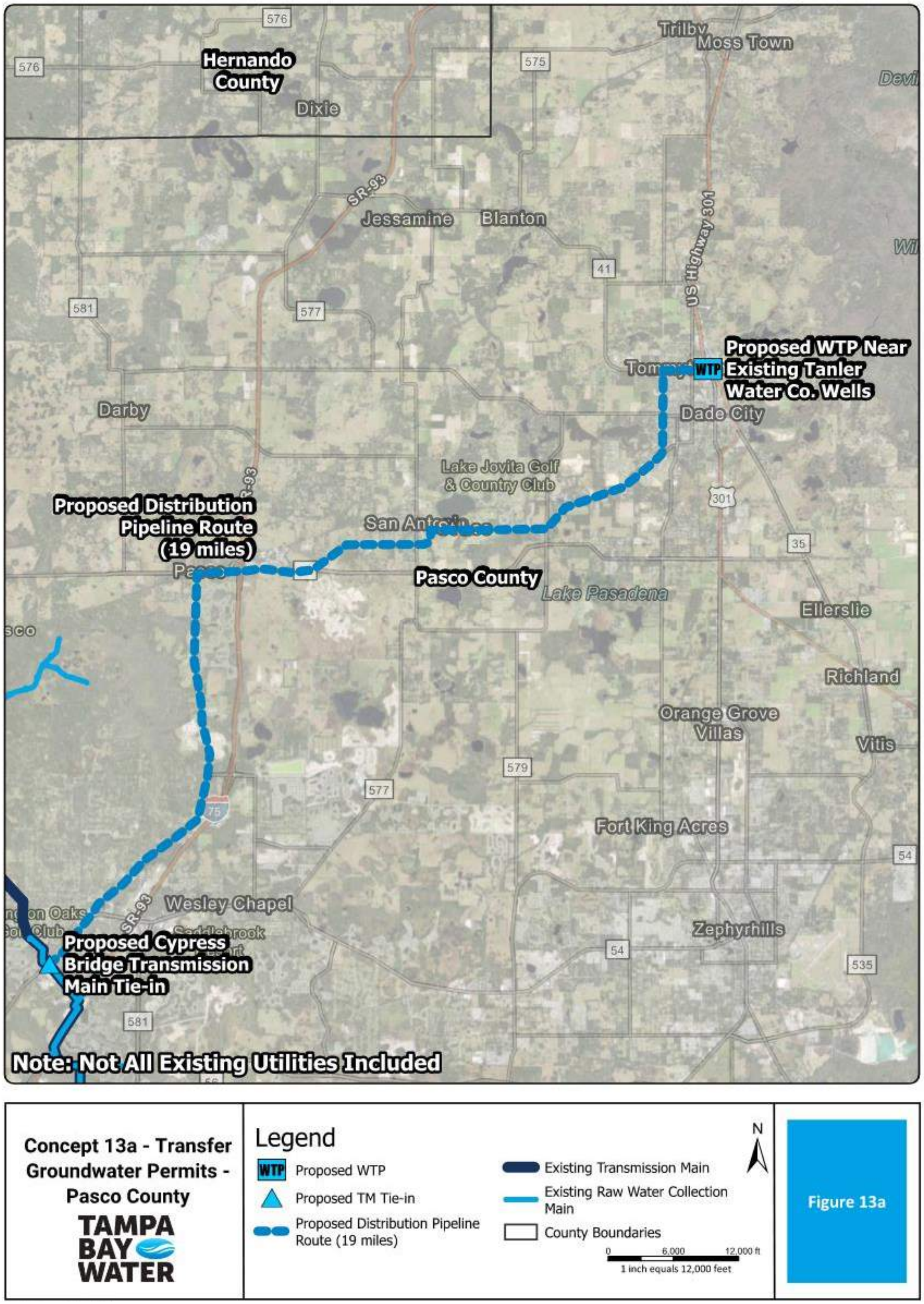
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit modification; existing water use permits held by large users will be obtained by Tampa Bay Water.
- FDEP Class V Well Construction and Operation permits for each new well.

Key Feasibility Aspects and Stakeholder Considerations

- Significant investigations are required to identify interested large private, industrial, and/or agricultural users.
- There is potential for Tampa Bay Water to have multiple agreements with multiple large groundwater users.
- This concept provides water to a growing region of the Tampa Bay Water Service Area.
- It is assumed new production wells will be required and will be located near the existing wells.

CONCEPT FIGURE



Environmental Sustainability

- Minimal new environmental impacts.
- The concept must ensure there are no impacts to the Upper Hillsborough River MFL.
- This concept is anticipated to have low energy consumption.

Regulatory / Ease of Permitting

- The concept would require a modification of existing WUPs that will be acquired to transfer ownership and may require other modifications to permit conditions.

Public Reception

- This concept is familiar to stakeholders as Tampa Bay Water operates existing groundwater facilities, though concerns may arise in how the new facility will affect surrounding wells in the area.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$14,590,000
Pipeline Capital Cost	$45,590,000
Pump Station Capital Cost	$4,890,000
Wellfield Capital Cost	$11,460,000
Total Costs[1]	
Subtotal of Construction Costs	$76,530,000
Contingency	$22,960,000
Contractor Overhead & Profit	$15,310,000
Subtotal of Construction, Contingency, and OH&P	$114,790,000
Engineering, Legal, and Administrative	$28,700,000
Total Project Capital Cost	$144,180,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$7.34
Annual O&M Cost, $/1000 gal	$0.76
Total Project Cost, $/1000 gal	$8.11

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- The distribution pipeline length is approximately 19 miles long. Due to the length of the pipeline, a moderate to significant water age impact is to be expected.
- This concept includes an additional 3.5 mgd capacity that ties into the Regional Transmission Main near Cypress Creek Transmission Main which slightly improves the hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that maintenance personnel will be required to travel a far distance starting from the Cypress Creek Pump Station Operational Hub to the project concept.
- Tampa Bay Water is familiar with groundwater treatment, O&M, and production well processes.
- This concept has some supply potential based on the availability of well permits.

Cost Risk Factors

- Low potential for schedule delays.
- Proposed treatment process modifications would likely be sufficient to meet potential future regulations.
- Constructability risk regarding groundwater quality of existing permit holders and long pipeline.

Yield Reliability

- Long term yield reliability is moderately high as fresh groundwater supply is viewed as reliable and will be permitted for a set withdrawal volume.
- Limited impact to capacity or quality based on seasonal variations is anticipated.
- The supply and inland location are anticipated to have moderately high resilience, but limited recovery from natural disasters, sea level rise and climate change is expected.
- There is some reliance on third parties for the transfer of permits.

Regional System Reliability Impacts

- The concept is located in Pasco County therefore supporting the growing demand.
- The location does not provide relief to areas downstream of a single point of failure but is downstream of the regional high service pump station which provides increased reliability to the region.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

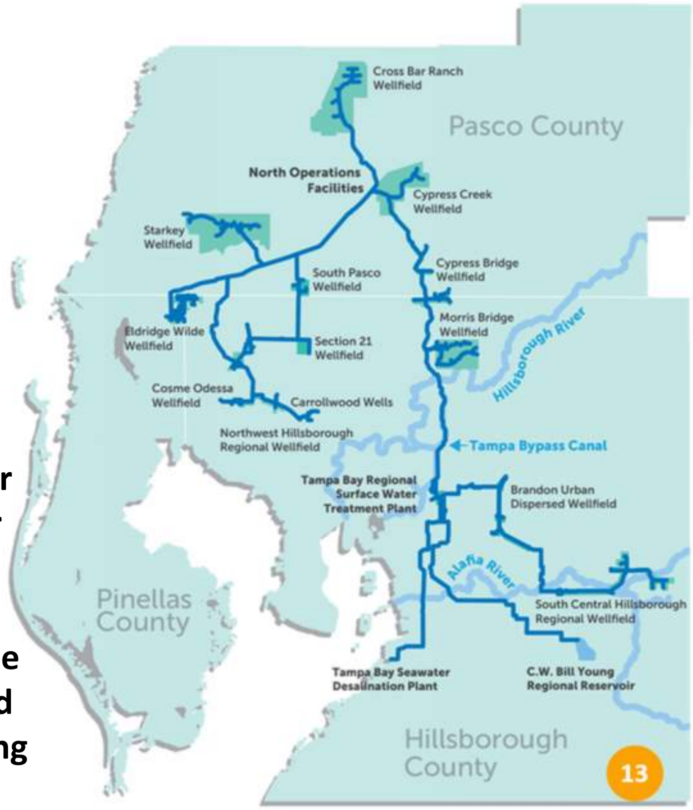
References

- Black & Veatch, *Long Term Water Supply Planning*, Comprehensive Project List Screening, Prepared for Tampa Bay Water, December 2001.
- MWH, *Surface & Recharge Projects Configuration Cost Analysis*, Prepared for Tampa Bay Water, May 2011.
- Juturna Consulting and Applied Sciences, *Analysis of Alternatives to Reduce Non-Beneficial Treated Wastewater Discharge, Improve Supply Reliability, and Improve Minimum Flows in the Lower Hillsborough River*, Prepared for City of Tampa, June 7, 2021.

Concept 13b: Transfer Existing Groundwater Permits – Hillsborough County

Project Description

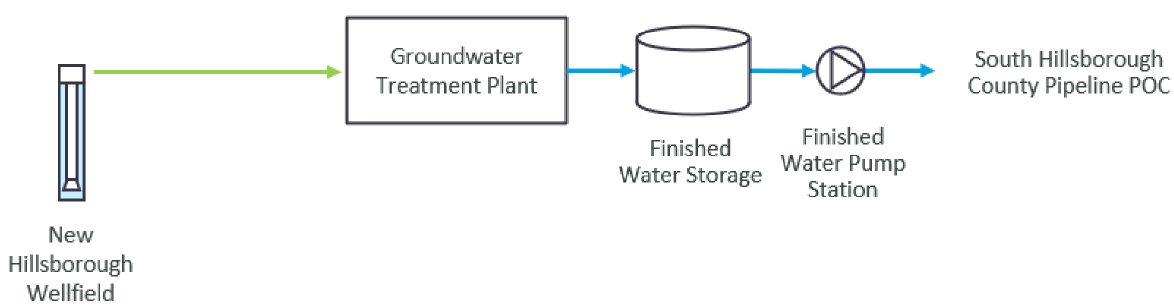
Concept 13b involves transferring groundwater permits from large fresh groundwater users in south Hillsborough County to Tampa Bay Water through the identification of existing water use permit holders (such as industrial and agricultural businesses and property owners) that may no longer need an existing water use permit. Large user credits would be purchased and transferred to Tampa Bay Water to allow for the withdrawal of groundwater from existing or new wells in the area. The groundwater supply that is made available would be treated at new groundwater treatment facilities including ozone and GAC filter treatment processes. The finished water supply would be delivered into the existing Regional Transmission system at the southern end of the proposed new South Hillsborough Pipeline.



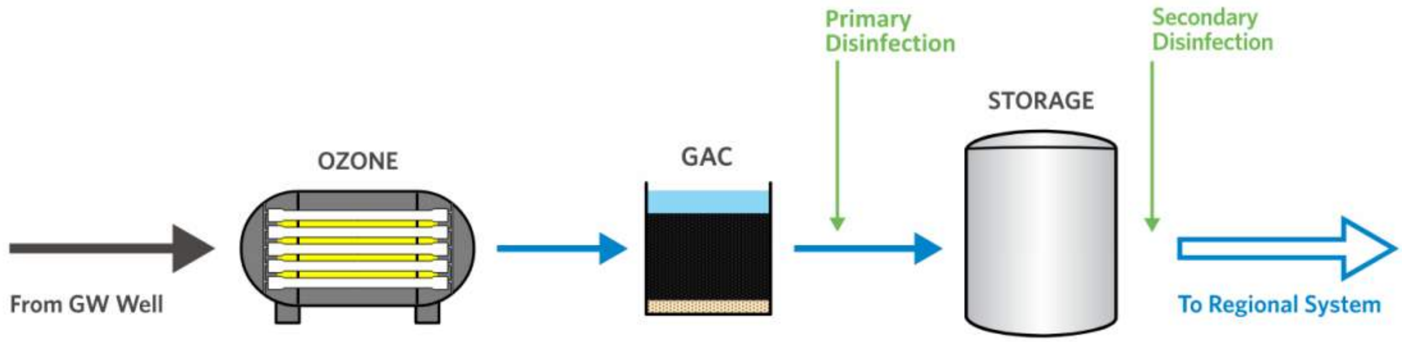
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw water supply	33.8
Design capacity (finished)	22.5
Annual average yield (finished)	15.0

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Construction of new production wells.
- Groundwater 29-mile 42-inch transmission pipeline to a groundwater treatment facility.
- Centralized groundwater treatment facility with ozone and GAC treatment.
- Storage tank for finished water.
- Pump station and 2-mile 36-inch finished water pipeline to the regional system POC.

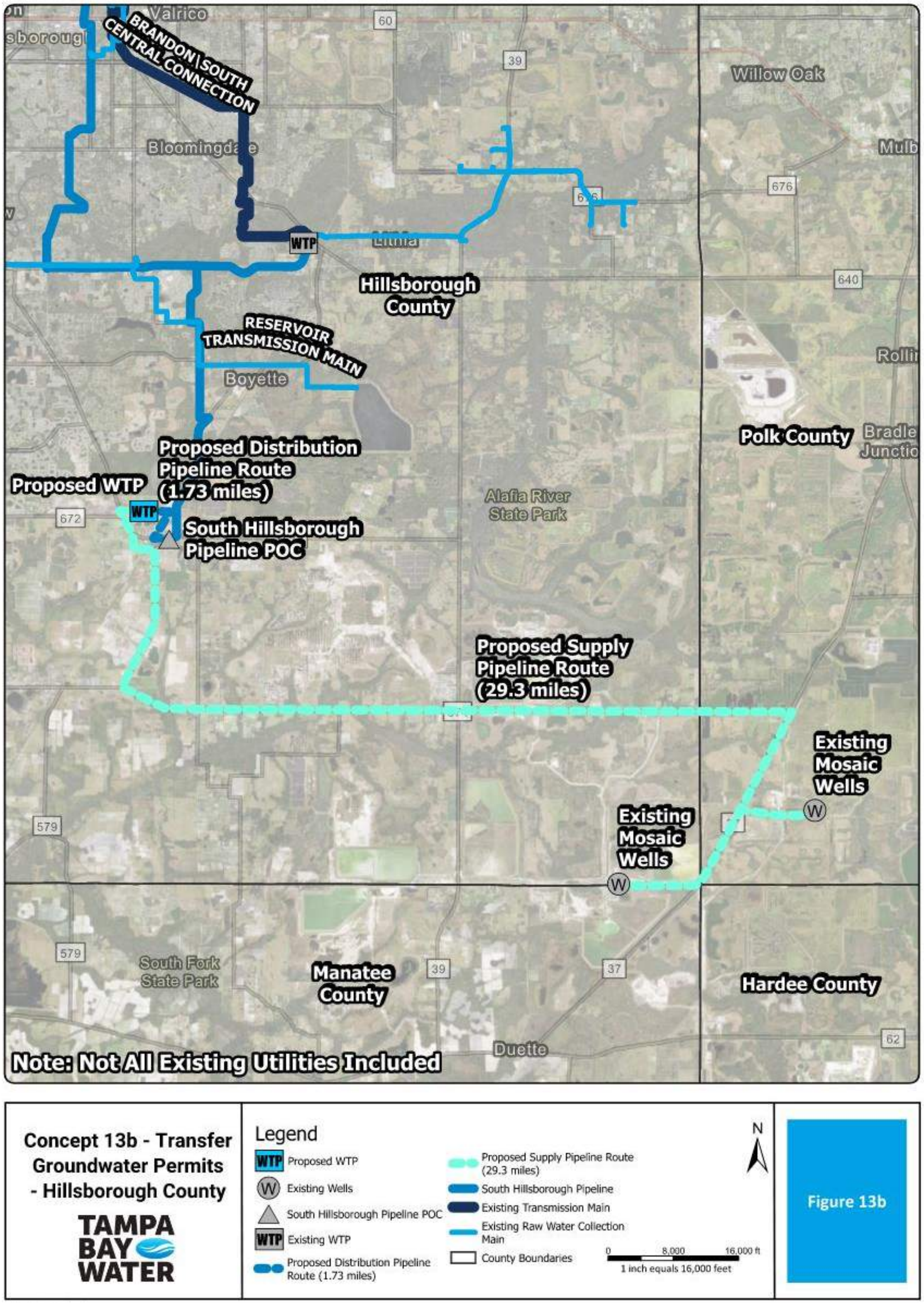
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit modification; existing water use permits held by large users will be obtained by Tampa Bay Water.
- FDEP Class V Well Construction and Operation permits for each new well.

Key Feasibility Aspects and Stakeholder Considerations

- Significant investigations are required to identify interested large private, industrial, and/or agricultural users. It is anticipated that outreach will start with the Mosaic Company, a phosphate mining company, with operations in Hillsborough County.
- There is potential for Tampa Bay Water to have multiple agreements with multiple large groundwater users.
- Additional potential agricultural groundwater users are identified on Page 6 and can be further evaluated in a feasibility study.
- It is assumed new production wells will be required and will be located near the existing wells.

CONCEPT FIGURE



Environmental Sustainability

- Minimal new environmental impacts.
- This concept is anticipated to have low energy consumption.

Regulatory / Ease of Permitting

- The concept would require a modification of existing WUPs that will be acquired to transfer ownership and may require other modifications to permit conditions.

Public Reception

- This concept is familiar to stakeholders as Tampa Bay Water operates existing groundwater facilities, though concerns may arise in how the new facility will affect surrounding wells in the area.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$51,570,000
Pipeline Capital Cost	$170,930,000
Pump Station Capital Cost	$11,710,000
Wellfield Capital Cost	$25,580,000
Total Costs[1]	
Subtotal of Construction Costs	$259,790,000
Contingency	$77,940,000
Contractor Overhead & Profit	$51,960,000
Subtotal of Construction, Contingency, and OH&P	$389,690,000
Engineering, Legal, and Administrative	$97,420,000
Total Project Capital Cost	$490,080,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$5.82
Annual O&M Cost, $/1000 gal	$0.80
Total Project Cost, $/1000 gal	$6.63

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- The distribution pipeline length is approximately 2 miles long. Due to the length of the pipeline a low water age impact is to be expected.
- This concept includes 15 mgd less required capacity on the Brandon Urban Dispersed Transmission Main which moderately improves hydraulic capacity constraints on the Brandon Urban Dispersed Transmission Main.
- It is expected that maintenance personnel will be required to travel a far distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept.
- Tampa Bay Water is familiar with groundwater treatment, O&M and production well processes.
- This concept has some supply expansion potential based on the availability of well permits.

Cost Risk Factors

- Low potential for schedule delays.
- Proposed treatment process modifications would likely be sufficient to meet potential future regulations.
- Constructability risk regarding groundwater quality of existing permit holders and long pipeline.

Yield Reliability

- Long term yield reliability is moderately high as fresh groundwater supply is viewed as reliable and will be permitted for a set withdrawal volume.
- Limited impact to capacity or quality based on seasonal variations is anticipated.
- The supply and inland location are anticipated to have moderately high resilience, but limited recovery from natural disasters and climate change is expected.
- There is some reliance on third parties for the transfer of permits.

Regional System Reliability Impacts

- The concept is located in South Hillsborough County therefore supporting the growing demand.
- The location increases reliability by providing relief to a point of connection downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

References

- Black & Veatch, *Long Term Water Supply Planning*, Comprehensive Project List Screening, Prepared for Tampa Bay Water, December 2001.
- MWH, *Surface & Recharge Projects Configuration Cost Analysis*, Prepared for Tampa Bay Water, May 2011.
- Juturna Consulting and Applied Sciences, *Analysis of Alternatives to Reduce Non-Beneficial Treated Wastewater Discharge, Improve Supply Reliability, and Improve Minimum Flows in the Lower Hillsborough River*, Prepared for City of Tampa, June 7, 2021.

ADDITIONAL HILLSBOROUGH COUNTY AGRICULTURAL WUPs FOR FUTURE CONSIDERATION

WUP PERMIT	COMPANY	AGRICULTURAL USE TYPE	AVERAGE PERMITTED QUANTITY (MGD)
9585	Ocean Breeze Farm	Sod	0.58
12361	Artesian Farms-Dimare Ruskin	Melons, Tomatoes	0.60
2714	Balm Farms	Sod	1.90
9489	Holmberg Farms, Inc.	Citrus, Nursery	1.06
655	Deseret Repetto Farm	Tomatoes, Sod, Small Vegetables	0.69
12523	IFAS Research Center (Balm)	Research	0.60
1124	Artesian Farms Inc/Dickman Investments	Nursery	0.78
6203	Davis Farms	Citrus, Peppers, Tomatoes	0.84
6892	Chu Farms, Inc.	Tomatoes, Citrus, Mix Crops	0.53
		Total:	7.58

Concept 14a: Increase Consolidated Water Use Permit

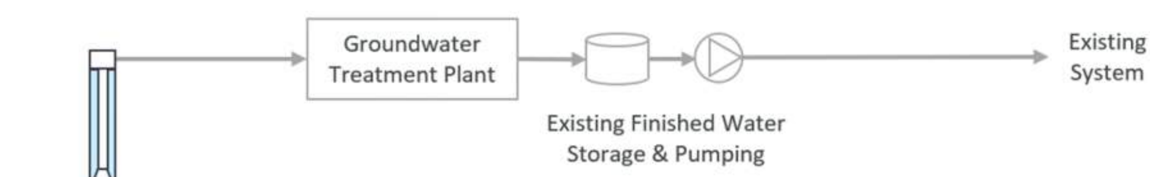
Project Description

Concept 14a involves increasing the permitted withdrawal quantity associated with Tampa Bay Water's existing CWUP based on providing evidence that a higher permitted withdrawal rate could be achieved without negatively impacting the environmental recovery that occurred due to the CWUP withdrawal rate reduction from 158 mgd to 90 mgd. This concept would primarily rely on the existing wellfields and groundwater treatment facilities for supply and treatment; however, additional groundwater treatment system improvements may be included if determined necessary to maximize the rotational capacity of the 10 wellfields that are part of the CWUP.

Approximate Potable Water Yield

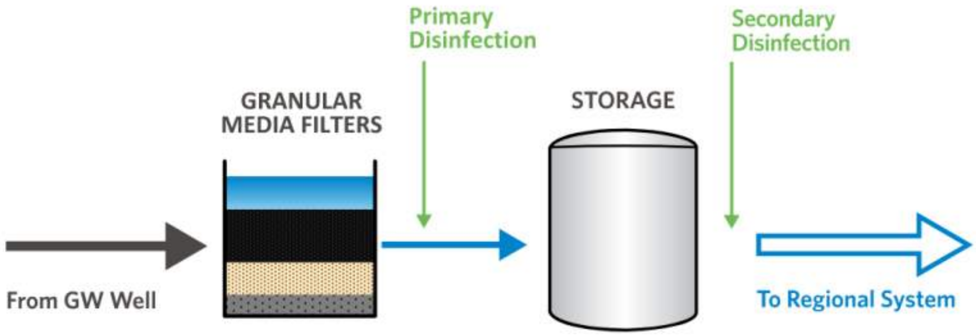
Parameter	Flow (mgd)
Raw Water – Rated Capacity	23
Finished Water – Rated Capacity	22
Finished Water – Average Annual Yield	10

Project Schematic



Notes:
1. Size and provisions for new infrastructure is dependent on modifications to the Consolidated WUP.

Simplified Process Flow Diagram



Primary Infrastructure Components

- No additional infrastructure, assumed existing wellfield can support proposed increased capacity.

Anticipated Regulatory Requirements

- Southwest Florida Water Management District (SWFWMD) Water Use Permit modification.

Key Feasibility Aspects and Stakeholder Considerations

- Since there is no mitigation, extensive hydraulic modeling must be conducted with the withdrawal of groundwater.
- The Carrollwood Wells and Eagles wells, which are Tampa Bay Water wells no longer in operation, would be included in this WUP increase.
- Wellfields to be considered for increased withdrawal include:
  - Starkey Wellfield
  - Cross Bar Wellfield
  - Eldridge-Wilde Wellfield

Environmental Sustainability

- Potential impacts to the environment, though no impacts have been identified from the operation of existing Tampa Bay Water wellfields.
- The concept must ensure there are no impacts to the Upper Hillsborough River MFL.
- Tampa Bay Water's Recovery Assessment Plan, which examined environmental health and recovery around the Authority's wellfield facilities, is approved for the existing yield only.
- This concept is anticipated to have low energy consumption.

Regulatory / Ease of Permitting

- This concept would require extensive modeling and reasonable assurance and may require modifications to Tampa Bay Water's Recovery Assessment Plan.

Public Reception

- Stakeholders will be interested in any potential environmental impacts from increasing the withdrawals of the existing permitted sources, though nearby residents experiencing flooding may support the concept.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$0
Pipeline Capital Cost	$0
Pump Station Capital Cost	$0
Total Costs[1]	
Subtotal of Construction Costs	$0
Contingency	$0
Contractor Overhead & Profit	$0
Subtotal of Construction, Contingency, and OH&P	$0
Engineering, Legal, and Administrative	$0
Total Project Capital Cost	$0
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$0.00
Annual O&M Cost, $/1000 gal	$0.50
Total Project Cost, $/1000 gal	$0.50

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- Utilizing existing infrastructure, this concept includes an increase of 10 mgd to the Tampa Bay Water CWUP.
- Pulling an additional 10 mgd of groundwater in Hillsborough County will moderately improve capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that no additional travel will be required for maintenance personnel as increased withdrawals will be at existing wellfields.
- This concept has minimal O&M and treatment requirements.
- This concept has limited supply expansion potential.

Cost Risk Factors

- No potential for schedule delays due to supply chain issues as no new infrastructure is required.
- Since this concept relies on treatment of existing groundwater supplies through existing groundwater treatment facilities, treatment modifications would likely be required to meet future regulatory changes.
- No constructability risk as no new infrastructure is required.

Yield Reliability

- Long term yield reliability is moderately high as fresh groundwater supply is viewed as reliable and will be permitted for a set withdrawal volume.
- Limited impact to capacity or quality based on seasonal variations is anticipated.
- The supply and inland location are anticipated to have moderately high resilience, but limited recovery from natural disasters and climate change is expected.
- This concept has no reliance on third parties.

Regional System Reliability Impacts

- An increased consolidated WUP throughout the system supports the growing demand in the region.
- The location increases reliability by providing relief to areas upstream and downstream of points of failure, as identified in the 2035 System Analysis Update, therefore increasing supply throughout the regional system.

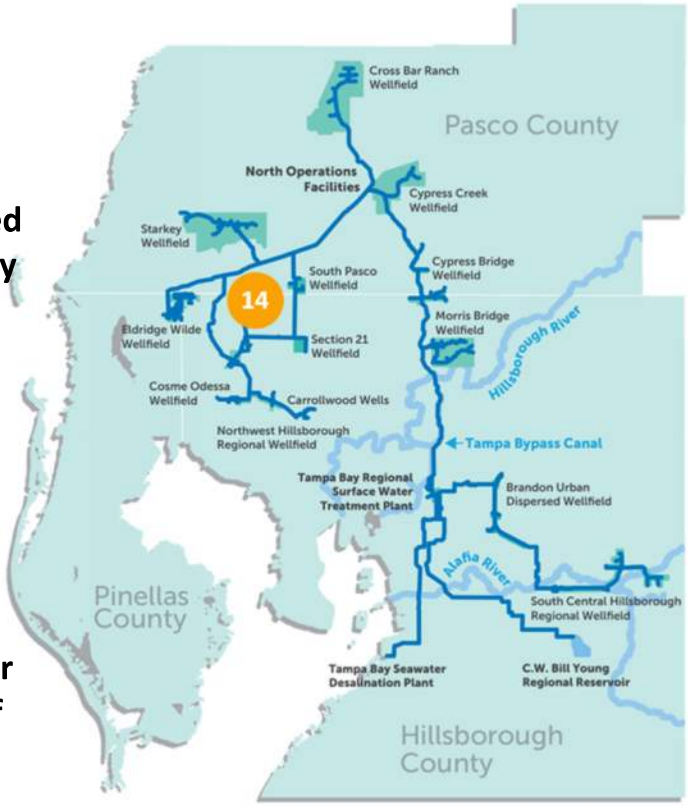
Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

Concept 14b: Increased Consolidated Water Use Permit via a Pinellas County Reclaimed Water Aquifer Recharge Wellfield

Project Description

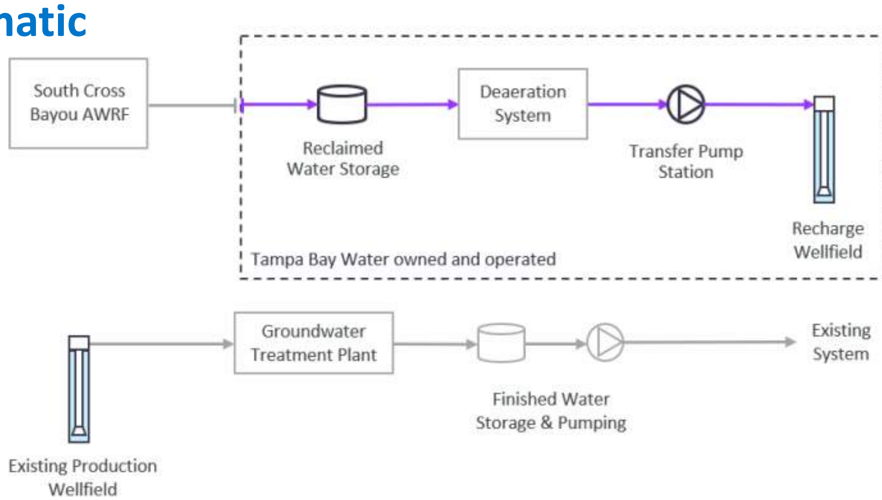
Concept 14b includes modifications to the existing CWUP to allow for increased fresh groundwater withdrawals based on credits achieved through aquifer recharge with reclaimed water. The recharged water would form a salinity barrier with the intention of protecting the freshwater aquifer to allow for additional groundwater withdrawals from the wellfields located further inland. The reclaimed water supply would be supplied from Pinellas County. The aquifer recharge system would include the construction of a new reclaimed water recharge wellfield in northern Pinellas County. It is assumed that adding the reclaimed water aquifer recharge system could allow for up to 6.3 mgd of additional annual average water supply yield.



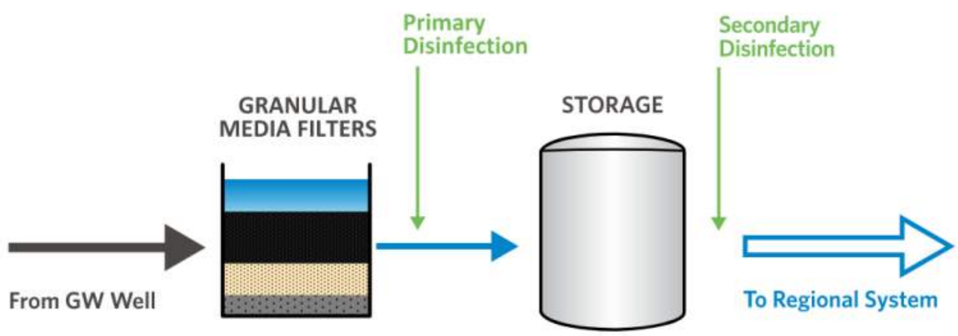
Approximate Potable Water Yield

Parameter	Flow (mgd)
Reclaimed Water – Rated Capacity	18.0
Finished Water – Rated Capacity	14.1
Finished Water – Average Annual Yield	6.3

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- 24-mile, 30-inch diameter reclaimed water pipeline from Pinellas County's South Cross Bayou WRF to the new recharge wellfield.
- Pump station for reclaimed water transmission to the recharge wellfield.
- Reclaimed water storage tank.
- Deaeration system.
- Aquifer recharge wells.

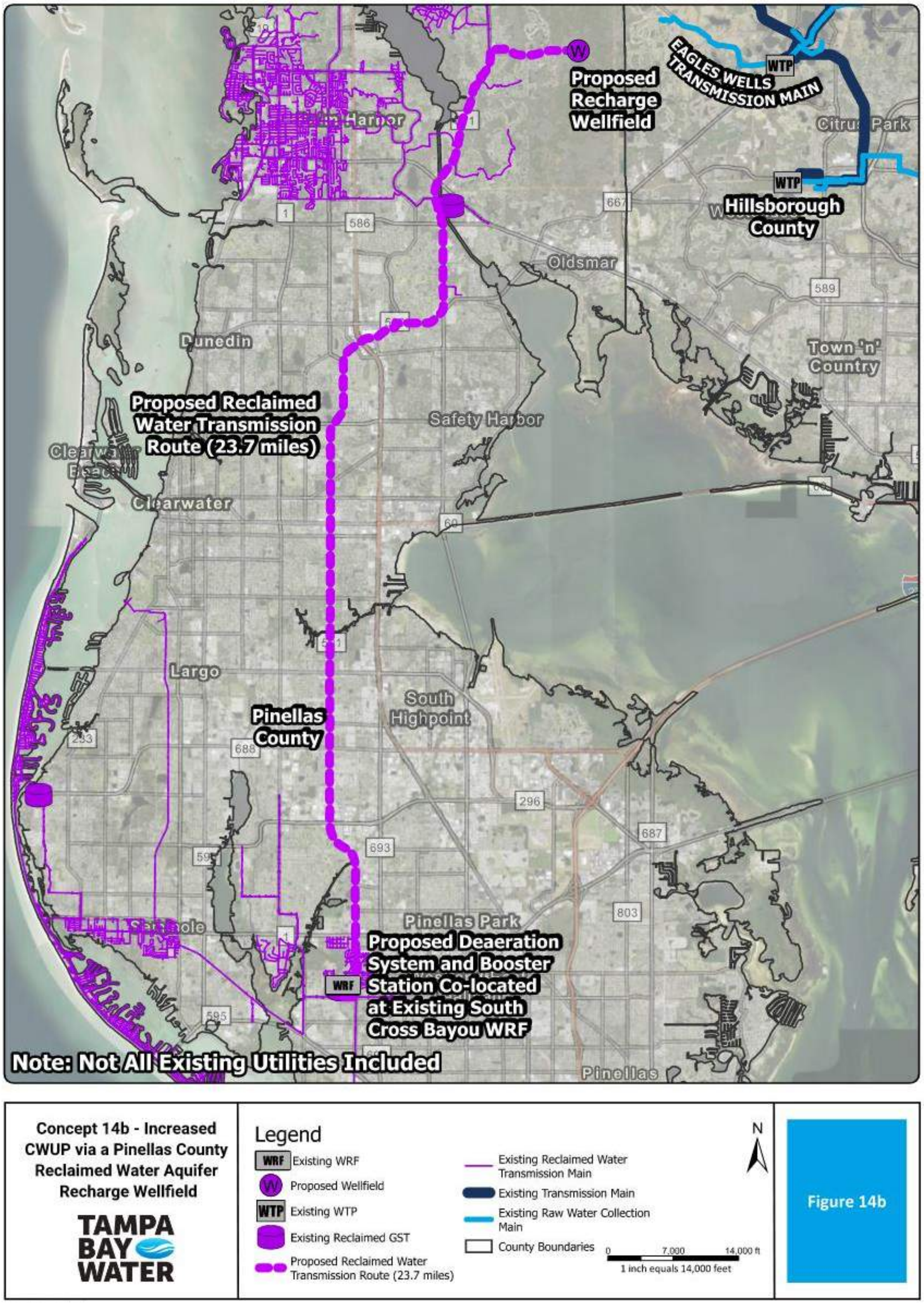
Anticipated Regulatory Requirements

- Environmental Resource Permit (ERP).
- NPDES Stormwater Permits.
- FDEP Class V Well Construction and Operation permits for each new recharge well.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit Modification.

Key Feasibility Aspects and Stakeholder Considerations

- Agreements between Tampa Bay Water and Pinellas County would be needed for the reclaimed water supply. A preliminary cost is included for the purchase of reclaimed water but would need to be finalized.
- SWFWMD would determine if groundwater withdrawal credits will be granted for the aquifer recharge system and groundwater modeling that indicates a net benefit to the aquifer.
- It is assumed that the reclaimed water injected into the recharge wells will not migrate to the withdrawal wells.

CONCEPT FIGURE



Environmental Sustainability

- Aquifer recharge with reclaimed water could improve impacts to lakes and wetlands if modeling showed it would be necessary.
- The concept must ensure there are no impacts to the Upper Hillsborough River MFL.
- This concept is anticipated to have low to moderate energy consumption, with most energy consumption related to wellfield injection.

Regulatory / Ease of Permitting

- This concept would require extensive modeling and reasonable assurance and may require modifications to Tampa Bay Water's Recovery Assessment Plan.

Public Reception

- Stakeholder concerns are regarding the County's injection of reclaimed water into the aquifer and potential drawdown impacts to surrounding wells and surface water features.
- However, since the reclaimed water is not being ingested, this withdrawal credit concept will likely be more favorable than other configurations.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$76,960,000
Pipeline Capital Cost	$94,320,000
Pump Station Capital Cost	$9,370,000
Wellfield Capital Cost	$22,320,000
Total Costs[1]	
Subtotal of Construction Costs	$202,970,000
Contingency	$60,890,000
Contractor Overhead & Profit	$40,590,000
Subtotal of Construction, Contingency, and OH&P	$304,460,000
Engineering, Legal, and Administrative	$76,110,000
Total Project Capital Cost	$382,190,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$10.64
Annual O&M Cost, $/1000 gal	$2.14
Total Project Cost, $/1000 gal	$12.78

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- There will be no water age impact on this concept since there is no new finished water distribution pipeline.
- This concept includes an increase of 6.3 mgd to the existing CWUP. Pulling additional groundwater in Hillsborough County will improve capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that maintenance personnel will be required to travel a far distance starting from the Cypress Creek Pump Station Operational Hub to the project concept.
- TBW is very familiar with existing groundwater treatment systems, although there is less familiarity with deaeration and recharge wells. This concept will have moderate O&M requirements.
- This concept has some supply expansion potential based on reclaimed water availability.

Cost Risk Factors

- Low potential for schedule delays due to supply chain issues.
- Since this concept relies on treatment of existing groundwater supplies through existing groundwater treatment facilities, treatment modifications would likely be required to meet future regulatory changes.
- Constructability risk associated with long pipeline.

Yield Reliability

- Moderate long term yield reliability due to dependence on reclaimed water source and withdrawal pumping.
- The supply is anticipated to have moderate seasonal impacts capacity and quality that will be mitigated by reclaimed water injections.
- Low to moderate resilience and recovery from natural disasters and climate change is anticipated, with the inland location of the concept and injections providing additional resiliency and recovery.
- This concept has some reliance on third parties.

Regional System Reliability Impacts

- An increased consolidated WUP throughout the system supports the growing demand in the region.
- The location increases reliability by providing relief to areas upstream and downstream of points of failure, as identified in the 2035 System Analysis Update, therefore increasing supply throughout the regional system.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. Amendments to governance documents will be necessary.
- Utilization of reclaimed water to recharge the Surficial Aquifer will require new governance, agreement, or contract documents for recharge credits.
- A new contract with the reclaimed water provider is anticipated to be required.

References

- MWH, *Surface & Recharge Projects Configuration Cost Analysis*, Prepared for Tampa Bay Water, May 2011.

Concept 14c: Increased Consolidated Water Use Permit via a Reclaimed Water Aquifer Recharge with Natural Systems

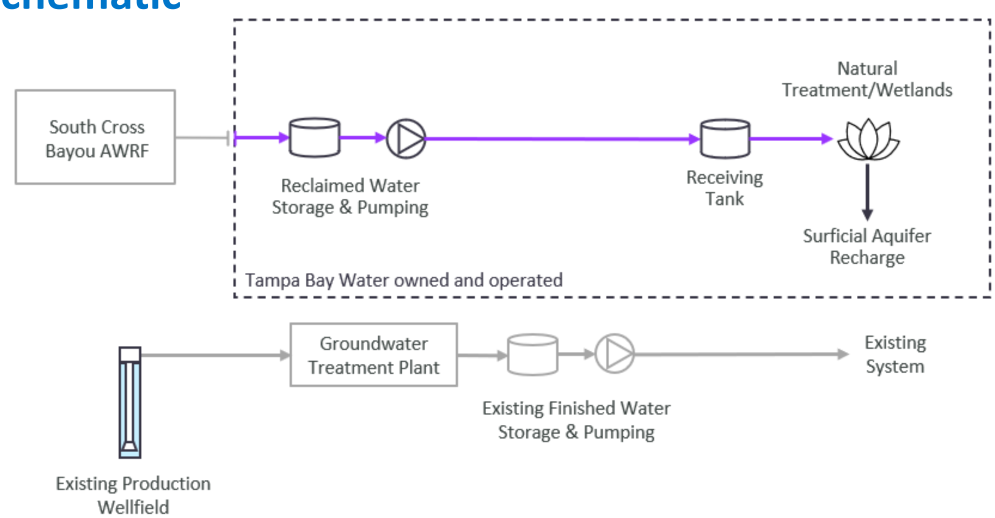
Project Description

Concept 14c involves the use of reclaimed water, from Hillsborough or Pinellas County, to supplement natural groundwater recharge from percolation from surficial systems (such as wetlands, rapid infiltration basins or percolation ponds) down to the water table. Supplementation would be intended to mitigate the potential impacts of additional groundwater withdrawals from the CWUP on natural systems, such as wetlands. The concept would include the construction of a reclaimed water surficial recharge system in northwest Hillsborough County or northern Pinellas County.

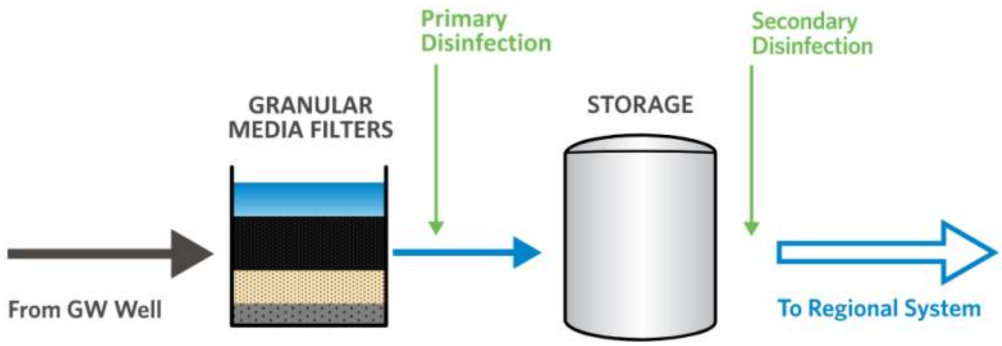
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	2.0
Finished Water – Rated Capacity	3.0
Finished Water – Average Annual Yield	0.2

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- 35-mile, 30-inch diameter reclaimed water pipeline from Pinellas County's South Cross Bayou WRF to the wellfield.
- Pump station for reclaimed water transmission to the recharge locations.
- Reclaimed water storage tank.
- Deaeration system.
- Implementation of recharge wetlands, rapid infiltration basins, or percolation ponds.

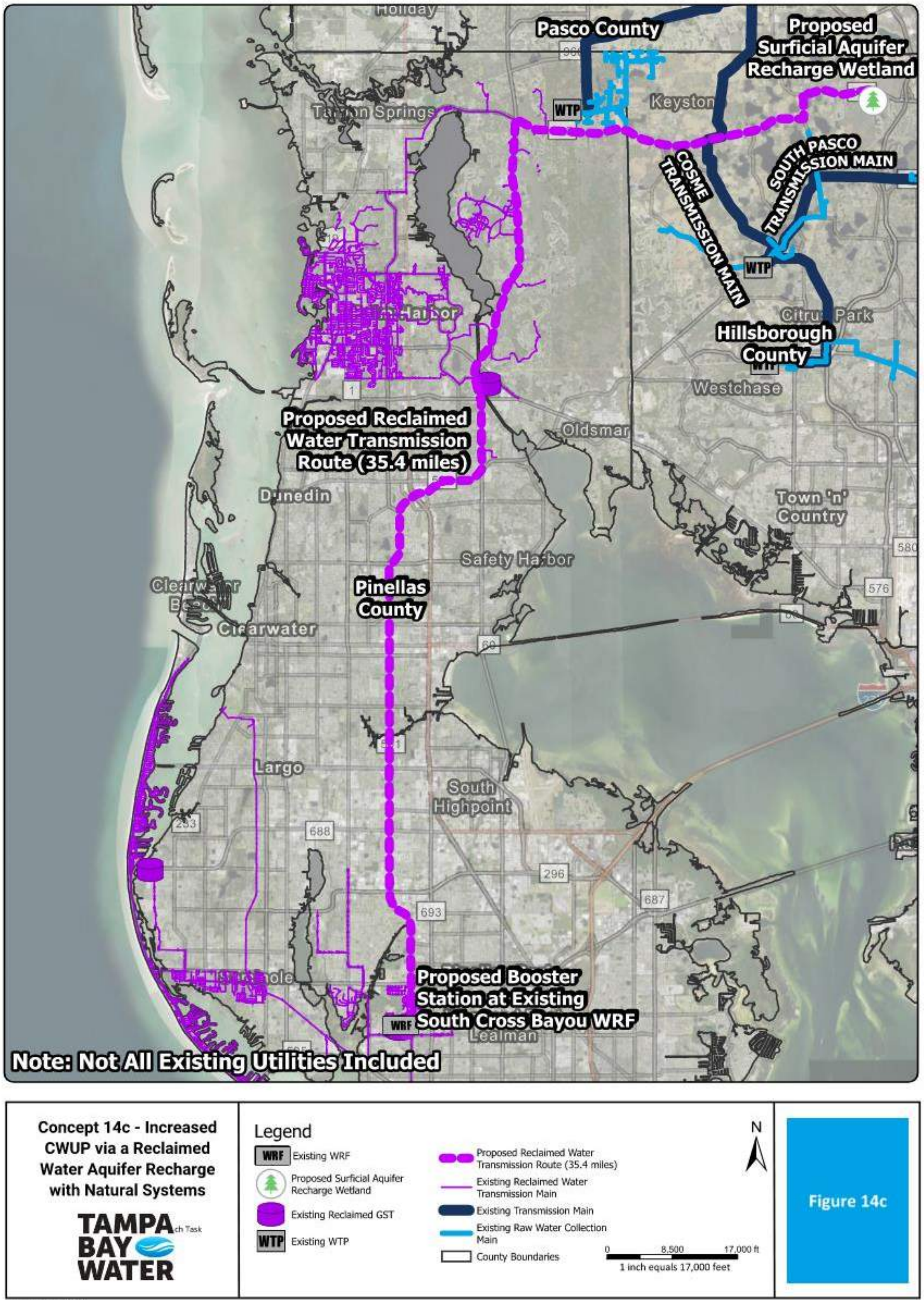
Anticipated Regulatory Requirements

- Environmental Resource Permit (ERP).
- NPDES Stormwater Permits.
- FDEP Class V Well Construction and Operation permits for each new recharge well.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit Modification.

Key Feasibility Aspects and Stakeholder Considerations

- Agreements between Tampa Bay Water and the reclaimed water supplier would be needed. A preliminary cost is included for the purchase of reclaimed water but would need to be finalized.
- SWFWMD would determine if groundwater withdrawal credits will be granted for the natural systems reuse recharge system and groundwater modeling that indicates a net benefit to the aquifer.
- It is assumed that the reclaimed water will not migrate to the withdrawal wells.

CONCEPT FIGURE



TAMPA BAY WATER

Environmental Sustainability

- Natural recharge with reclaimed water could minimize impacts to lakes and wetlands if modeling showed it to be necessary.
- The concept must ensure there are no impacts to the Upper Hillsborough River MFL.
- This concept is anticipated to have low to moderate energy consumption, with most energy consumption related to natural system supplementation.

Regulatory / Ease of Permitting

- This concept would require extensive modeling and reasonable assurance and may require modifications to Tampa Bay Water's Recovery Assessment Plan.

Public Reception

- Stakeholder concerns are regarding the County's addition of reclaimed water into the wetland and potential drawdown impacts to surrounding wells and surface water features.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$17,930,000
Pipeline Capital Cost	$140,110,000
Pump Station Capital Cost	$9,370,000
Total Costs[1]	
Subtotal of Construction Costs	$167,410,000
Contingency	$50,220,000
Contractor Overhead & Profit	$33,480,000
Subtotal of Construction, Contingency, and OH&P	$251,110,000
Engineering, Legal, and Administrative	$62,780,000
Total Project Capital Cost	$344,870,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$20.49
Annual O&M Cost, $/1000 gal	$2.96
Total Project Cost, $/1000 gal	$23.45

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- There will be no water age impact on this concept since there is no new finished water distribution pipeline.
- This concept includes an increase of 0.2 mgd to the existing CWUP. Pulling additional groundwater in northern Pinellas and Pasco Counties will slightly improve capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that maintenance personnel will be required to travel a far distance starting from the Cypress Creek Pump Station Operational Hub to the project concept.
- TBW is very familiar with existing groundwater treatment systems, although there is less familiarity with deaeration and recharge wells. This concept will have moderate O&M requirements.
- This concept has some supply expansion potential based on reclaimed water availability.

Cost Risk Factors

- Low potential for schedule delays due to supply chain issues.
- Since this concept relies on treatment of existing groundwater supplies through existing groundwater treatment facilities, treatment modifications would likely be required to meet future regulatory changes.
- Constructability risk associated with long pipeline, constructed wetland and permeability considerations.

Yield Reliability

- Moderate long term yield reliability due to dependence on reclaimed water source and withdrawal pumping.
- The supply is anticipated to have seasonal impacts on capacity and quality.
- The supply and location are expected to have limited resilience and recovery from natural disasters and climate change as natural groundwater and wetlands recharge can take several years, though the inland location of the concept provides some resiliency benefit.
- This concept has some reliance on third parties.

Regional System Reliability Impacts

- An increased consolidated WUP throughout the system supports the growing demand in the region.
- The location increases reliability by providing relief to areas upstream and downstream of points of failure, as identified in the 2035 System Analysis Update, therefore increasing supply throughout the regional system.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
- A new contract with the reclaimed water provider is anticipated to be required.

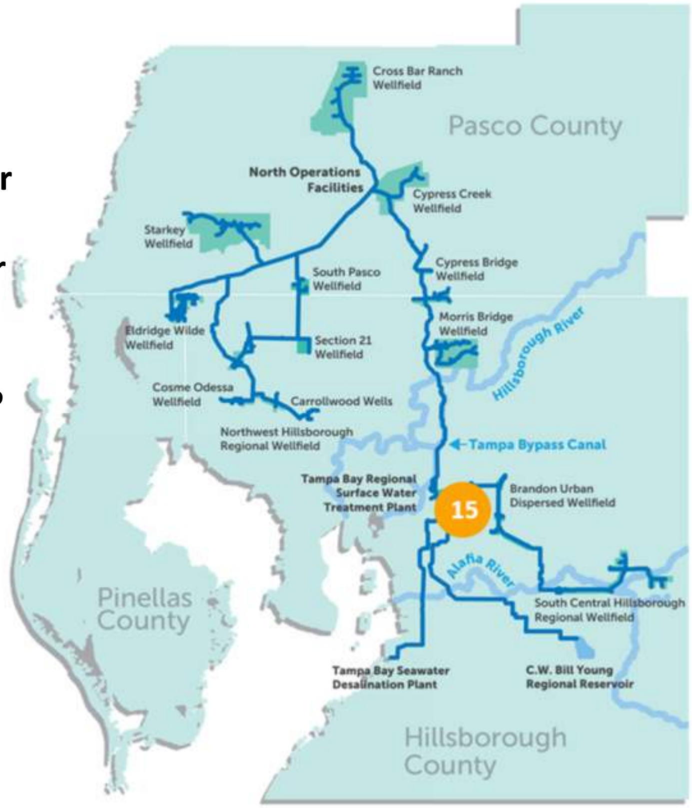
References

- West Coast Regional Water Supply Authority, "The Master Water Plan: A 20-Year Water Supply Development Plan", *Resource Development Plan*, December 20, 1996.
- Black & Veatch, *Long Term Water Supply Planning*, Comprehensive Project List Screening, Prepared for Tampa Bay Water, December 2001.
- MWH, *Surface & Recharge Projects Configuration Cost Analysis*, Prepared for Tampa Bay Water, May 2011.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, August 2001.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, December 1, 2006.

Concept 15a: Direct Potable Reuse – Hillsborough County

Project Description

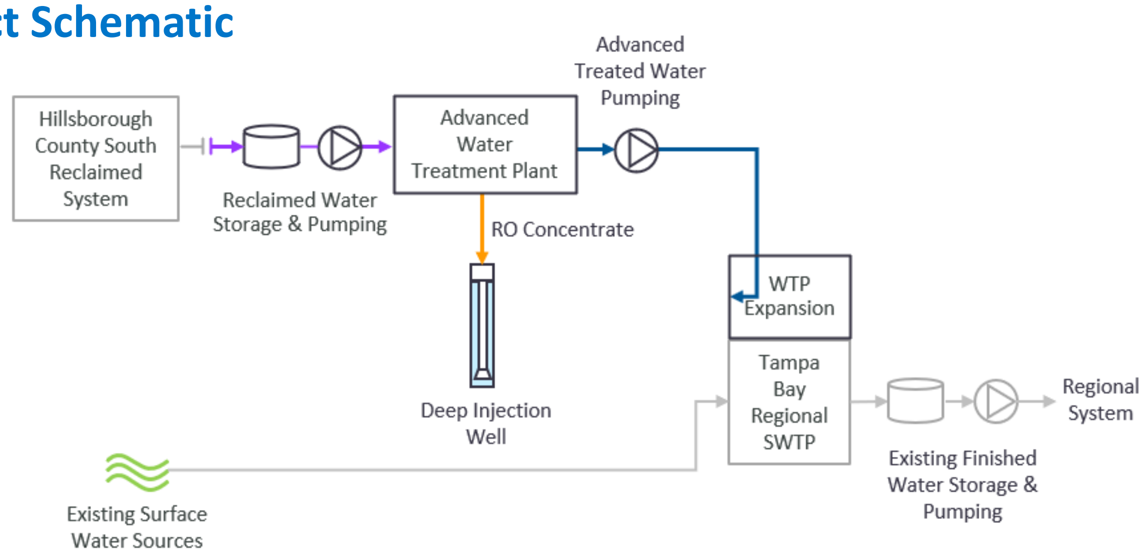
Concept 15a is DPR concept in Hillsborough County that supplements the existing Tampa Bay Water Regional SWTP with reclaimed water supply that is treated to drinking water standards. The reclaimed water supply used for this concept is assumed to be from the Hillsborough County southern reclaimed water system or Falkenburg Road AWTP. A new AWTP would be constructed to treat 15 mgd of reclaimed water supply to drinking water standards using MF/UF, RO, UV/AOP, and GAC filter treatment processes. The treated water would be pumped to the Regional SWTP for additional treatment and provide a finished water annual average yield of 10.5 mgd.



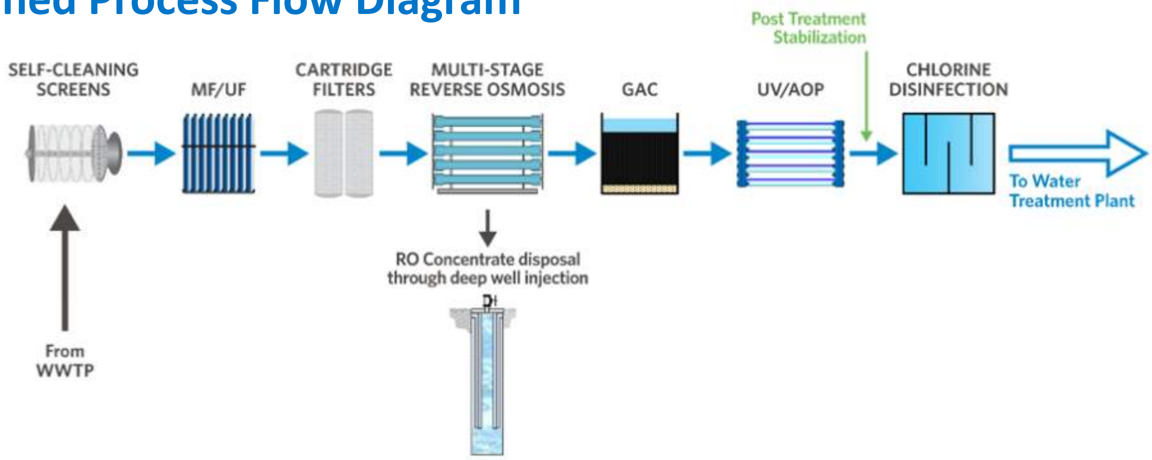
Approximate Potable Water Yield

Parameter	Flow (mgd)
Reclaimed Water – Rated Capacity	33.8
Finished Water – Rated Capacity	25.1
Finished Water – Average Annual Yield	10.5

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Reclaimed water storage tank.
- Reclaimed water pump station and 1-mile 42-inch diameter transmission pipeline from Hillsborough County southern reclaimed water system to the new advanced treated water facility.
- Advanced treated water treatment facility.
- Pump station for advanced treated water transmission to the Regional SWTP.
- Treatment expansion of the Regional SWTP.
- Deep injection well for concentrate disposal.

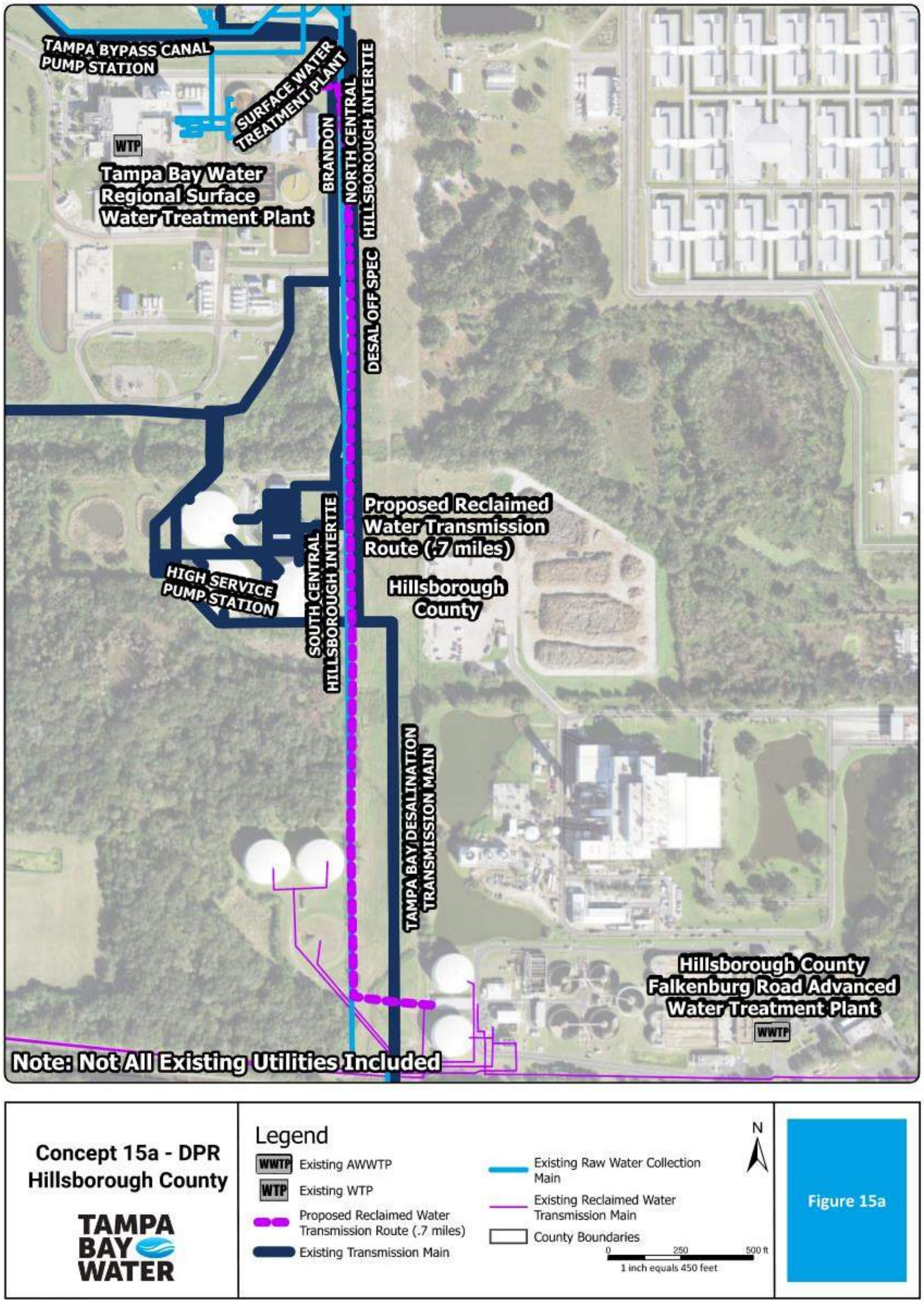
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- Underground Injection Control (UIC) Permit for concentrate disposal.
- NPDES Stormwater Permit.
- Requirements for DPR are not yet defined but are being addressed in draft regulations.

Key Feasibility Aspects and Stakeholder Considerations

- Agreements between Tampa Bay Water and Hillsborough County are needed for the reclaimed water supply. A preliminary cost is included for the purchase of reclaimed water but would need to be finalized.
- Significant public involvement is required including engagement of environmental groups.
- The concept would reduce wastewater effluent to Tampa Bay while improving supply reliability to the region.
- It is assumed the Regional SWTP will need expansion to treat reclaimed water supply.
- FDEP is proposing a new Chapter in the DPR draft regulations.

CONCEPT FIGURE



Environmental Sustainability

- Minimal new environmental impacts.
- This concept is anticipated to have a moderate energy consumption.

Regulatory / Ease of Permitting

- The regulatory requirements for DPR implementations are under development, however, it can be assumed that a high-level treatment will be needed.

Public Reception

- For DPR implementations, continuous outreach, long-term pilot testing, and cumulative impact analyses will need to be conducted to provide confidence that the water supply will be safe for consumption.
- Stakeholder concerns include impacts to Tampa Bay, PFAS, PPCP, and other constituents.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$233,040,000
Pipeline Capital Cost	$3,960,000
Pump Station Capital Cost	$30,650,000
Wellfield Capital Cost	$4,800,000
Total Costs[1]	
Subtotal of Construction Costs	$272,450,000
Contingency	$81,730,000
Contractor Overhead & Profit	$54,490,000
Subtotal of Construction, Contingency, and OH&P	$408,670,000
Engineering, Legal, and Administrative	$102,170,000
Total Project Capital Cost	$518,630,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$6.16
Annual O&M Cost, $/1000 gal	$3.49
Total Project Cost, $/1000 gal	$9.65

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. Total project costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- There will be no water age impact on this concept since there is no new distribution pipeline.
- This concept includes an additional 10.5 mgd capacity from the Tampa Bay Regional Surface Water Treatment Plant which will moderately reduce hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that maintenance personnel will be required to travel a close distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept.
- Advanced water treatment of reclaimed water has high O&M complexity and will require some sort of nanofiltration and reverse osmosis. The DPR treatment process will require a dedicated O&M staff. Tampa Bay Water has minimal familiarity with these O&M requirements.
- This concept has good supply expansion potential based on the anticipated volume of reclaimed water available from Hillsborough County, however treatment capacity at the existing SWTP would need to be confirmed in a future study.

Cost Risk Factors

- Potential for schedule delays due to supply chain issues with membrane filtration equipment.
- Long lead time on moderately-sized plant equipment (pumps, treatment systems, transformers).
- High anticipated ability to meet future regulatory changes due to proposed treatment type.
- Constructability risks associated with SWTP expansion and development of DPR regulatory requirements.

Yield Reliability

- Moderate long term yield reliability, with 20 mgd of water anticipated to be available from Hillsborough County.
- Moderate impacts to capacity are anticipated based on seasonal variations.
- High resilience and recovery from natural disasters, sea level rise and climate change is anticipated due to inland location and reclaimed water supply type.
- This concept is reliant on a third party.

Regional System Reliability Impacts

- The concept serves the regional high service pump station with a connection to the South Hillsborough Pipeline therefore supporting the growing demand.
- The location does not provide relief to areas downstream of a single point of failure but is upstream of the regional high service pump station which provides increased reliability to the region.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
- A new contract with the reclaimed water provider is anticipated to be required.

References

- Black & Veatch, *Long Term Water Supply Planning*, Comprehensive Project List Screening, Prepared for Tampa Bay Water, December 2001.
- Juturna Consulting and Applied Sciences, *Analysis of Alternatives to Reduce Non-Beneficial Treated Wastewater Discharge, Improve Supply Reliability, and Improve Minimum Flows in the Lower Hillsborough River*, Prepared for City of Tampa, June 7, 2021.

Concept 15b: Direct Potable Reuse – Pinellas County

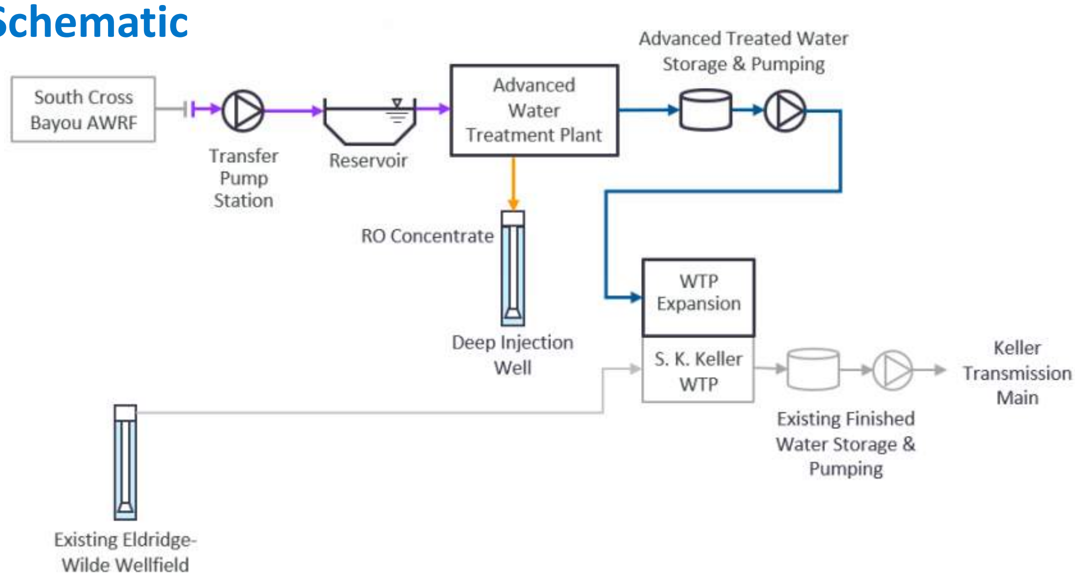
Project Description

Concept 15b is a DPR concept in Pinellas County that would supplement the S.K. Keller WTP with reclaimed water supply that is treated to drinking water standards. The reclaimed water supply used for this concept is assumed to be from the Pinellas County reclaimed water system or South Cross Bayou AWRF. A new reservoir would be constructed for seasonal storage of the reclaimed water supply and a new AWTP would be added to treat 8 mgd of reclaimed water supply to drinking water standards using MF/UF, RO, UV/AOP, and GAC filter treatment processes. The treated water would be pumped to the S.K. Keller WTP for additional treatment.

Approximate Potable Water Yield

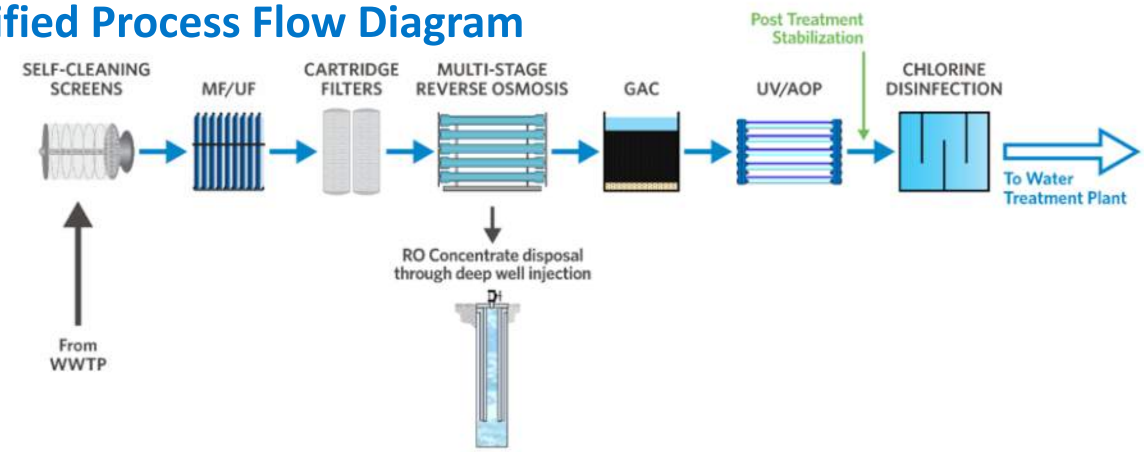
Parameter	Flow (mgd)
Reclaimed Water – Rated Capacity	18.0
Finished Water – Rated Capacity	13.4
Finished Water – Average Annual Yield	5.8

Project Schematic



TAMPA BAY WATER

Simplified Process Flow Diagram



Primary Infrastructure Components

- Reclaimed water pump station and 27-mile, 30-inch diameter pipeline from South Cross Bayou WRF to proposed reservoir.
- Reclaimed water reservoir.
- Advanced treated water facility to treat supply from South Cross Bayou WRF.
- New advanced treated water storage tank.
- Pump station for advanced treated water transmission to the Keller WTP.
- Deep injection well for concentrate disposal.
- Treatment expansion of the Keller WTP.

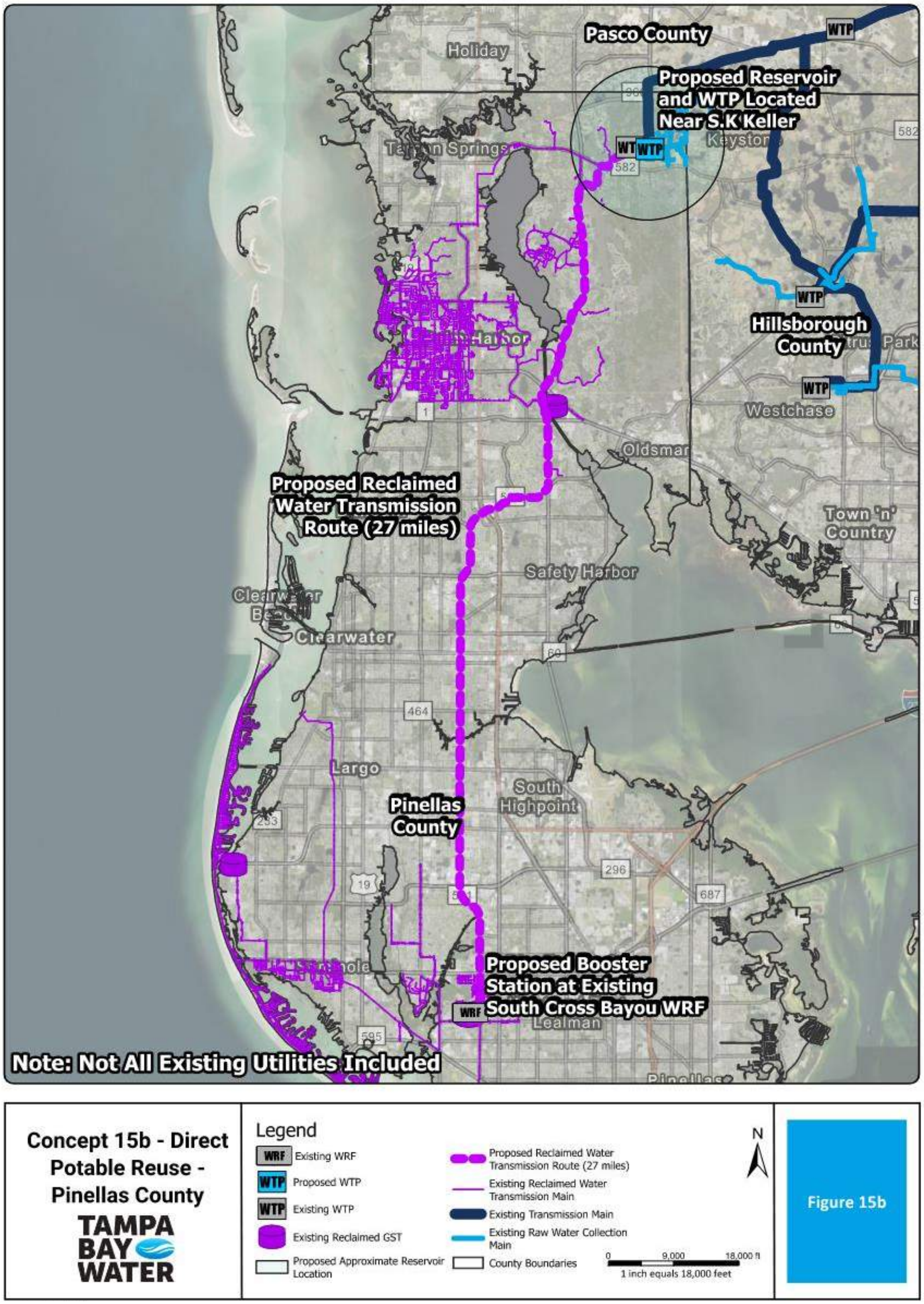
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- Underground Injection Control (UIC) Permit for concentrate disposal.
- NPDES Stormwater Permit.
- Requirements for DPR are not yet defined but are being addressed in draft regulations.
- Clean Water Act Section 404 permit.

Key Feasibility Aspects and Stakeholder Considerations

- Agreements between Tampa Bay Water and Pinellas County are needed for the reclaimed water supply. A preliminary cost is included for the purchase of reclaimed water but would need to be finalized.
- Significant public involvement is required including engagement of environmental groups.
- It is assumed that Keller WTP will need expansion to treat reclaimed water supply.
- The construction of a reservoir allows for the potential to store additional utilities' reclaimed water, and increases resiliency related to drought concerns.
- FDEP is proposing a new Chapter in the DPR draft regulations.

CONCEPT FIGURE



Environmental Sustainability

- Minimal new environmental impacts.
- This concept is anticipated to have a moderate energy consumption.

Regulatory / Ease of Permitting

- The regulatory requirements for DPR implementations are under development, however, it can be assumed that a high-level treatment will be needed.

Public Reception

- For DPR implementations, continuous outreach, long-term pilot testing, and cumulative impact analyses will need to be conducted to provide confidence that the water supply will be safe for consumption.
- Stakeholder concerns include impacts to Tampa Bay, PFAS, PPCP, and other constituents.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$99,980,000
Pipeline Capital Cost	$107,320,000
Pump Station Capital Cost	$17,860,000
Wellfield Capital Cost	$7,200,000
Reservoir Capital Cost	$11,000,000
Total Costs[1]	
Subtotal of Construction Costs	$243,360,000
Contingency	$73,010,000
Contractor Overhead & Profit	$48,670,000
Subtotal of Construction, Contingency, and OH&P	$365,040,000
Engineering, Legal, and Administrative	$91,260,000
Total Project Capital Cost	$469,810,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$4.65
Annual O&M Cost, $/1000 gal	$3.08
Total Project Cost, $/1000 gal	$7.73

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. Total project costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- There will be no water age impact on this concept since there is no new distribution pipeline.
- This concept includes an additional 5.8 mgd capacity into the Keller Transmission Main which will slightly reduce hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that maintenance personnel will be required to travel a far distance starting from the Cypress Creek Pump Station Operational Hub to the project concept.
- Advanced water treatment of reclaimed water has high O&M complexity and will require some sort of nanofiltration and reverse osmosis. The DPR treatment process will require a dedicated O&M staff. Tampa Bay Water has minimal familiarity with these O&M requirements.
- This concept has good supply expansion potential based on the anticipated volume of reclaimed water available from Pinellas County, however treatment capacity at the existing S.K Keller WTP would need to be confirmed in a future study.

Cost Risk Factors

- Potential for schedule delays due to supply chain issues with membrane filtration equipment.
- Long lead time on moderately-sized plant equipment (pumps, treatment systems, transformers).
- High anticipated ability to meet future regulatory changes due to proposed treatment type.
- Constructability risks associated with long pipeline length, WTP expansion and development of DPR regulatory requirements.

Yield Reliability

- Moderate long term yield reliability, with approximately 8 mgd of water anticipated to be available from Pinellas County.
- Moderate impacts to capacity are anticipated based on seasonal variations.
- Limited resilience but moderately high recovery from natural disasters, sea level rise and climate change is anticipated due to coastal location, reclaimed water supply type and presence of a reclaimed water reservoir.
- This concept is reliant on a third party.

Regional System Reliability Impacts

- Although the supply origin is not directly adjacent to Pasco County, connection to the Keller transmission main may increase available pressures to Pasco County's points of connection by reducing flow in the North-Central Hillsborough Intertie. Also, by connecting to Keller transmission main, flow can potentially travel to Pasco County's points of connection in case of emergency.
- The location increases reliability by providing relief to areas upstream and downstream of points of failure, as identified in the 2035 System Analysis Update, and is upstream of the regional high service pump station which provides increased reliability to the region.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
- A new contract with the reclaimed water provider is anticipated to be required.

Concept 15c: Direct Potable Reuse – City of Tampa

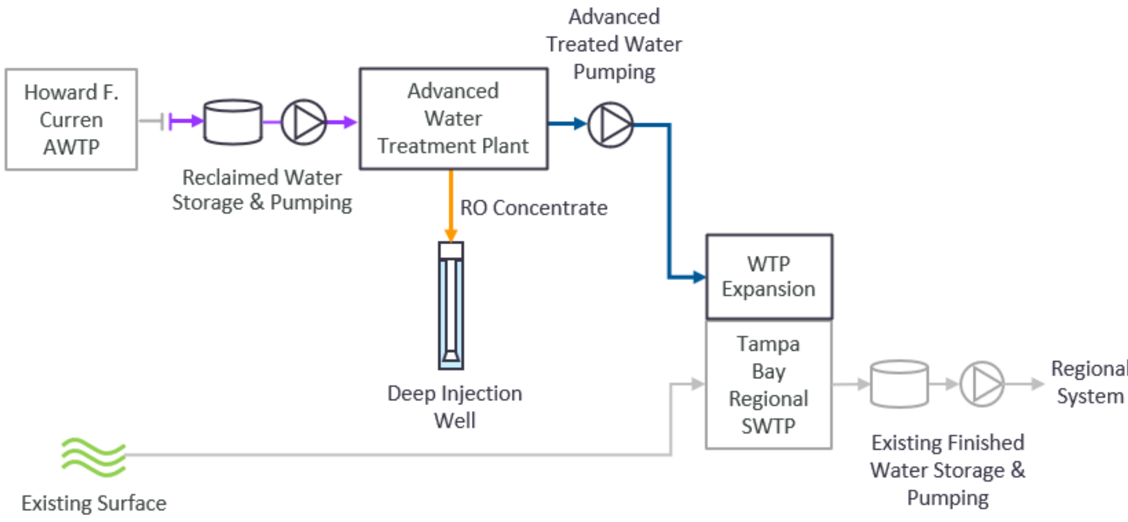
Project Description

Concept 15c is a DPR concept in Hillsborough County that supplements the existing Tampa Bay Regional SWTP with reclaimed water supply that is treated to drinking water standards. The reclaimed water supply used for this concept is assumed to be from the H.F. Curren AWTP. A new advanced water treatment facility would be constructed to treat 20 mgd of reclaimed water supply to drinking water standards using MF/UF, RO, UV/AOP, and GAC filter treatment processes. The treated water would be pumped to the Regional SWTP for additional treatment and provide a finished water annual average yield of 14 mgd.

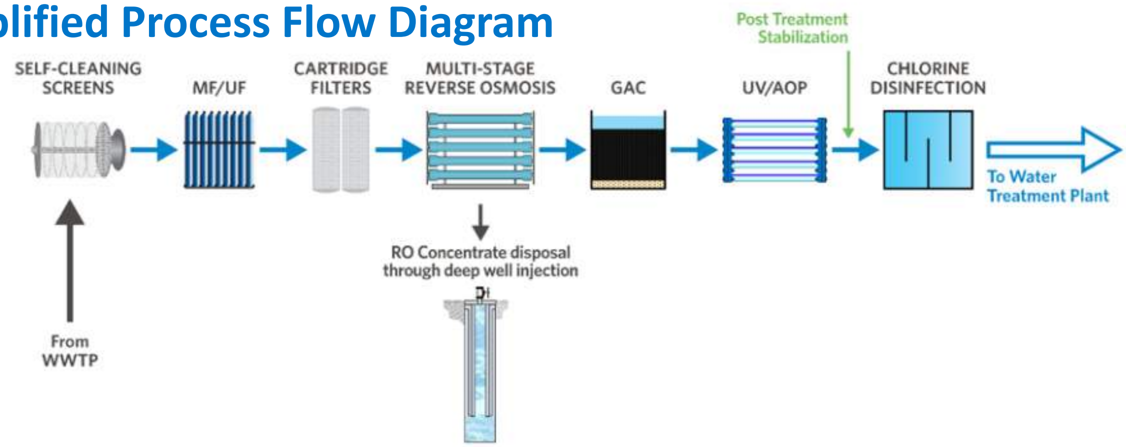
Approximate Potable Water Yield

Parameter	Flow (mgd)
Reclaimed Water – Rated Capacity	45.0
Finished Water – Rated Capacity	33.5
Finished Water – Average Annual Yield	14.0

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Reclaimed water storage tank.
- Reclaimed water pump station and 9-mile 48-in pipeline from Howard F. Curren AWTP to proposed Advanced Treated Water Facility.
- Advanced treated water facility.
- Pump station and pipeline for advanced treated water transmission to the Regional SWTP.
- Treatment expansion of the Regional SWTP.
- Deep injection well for concentrate disposal.

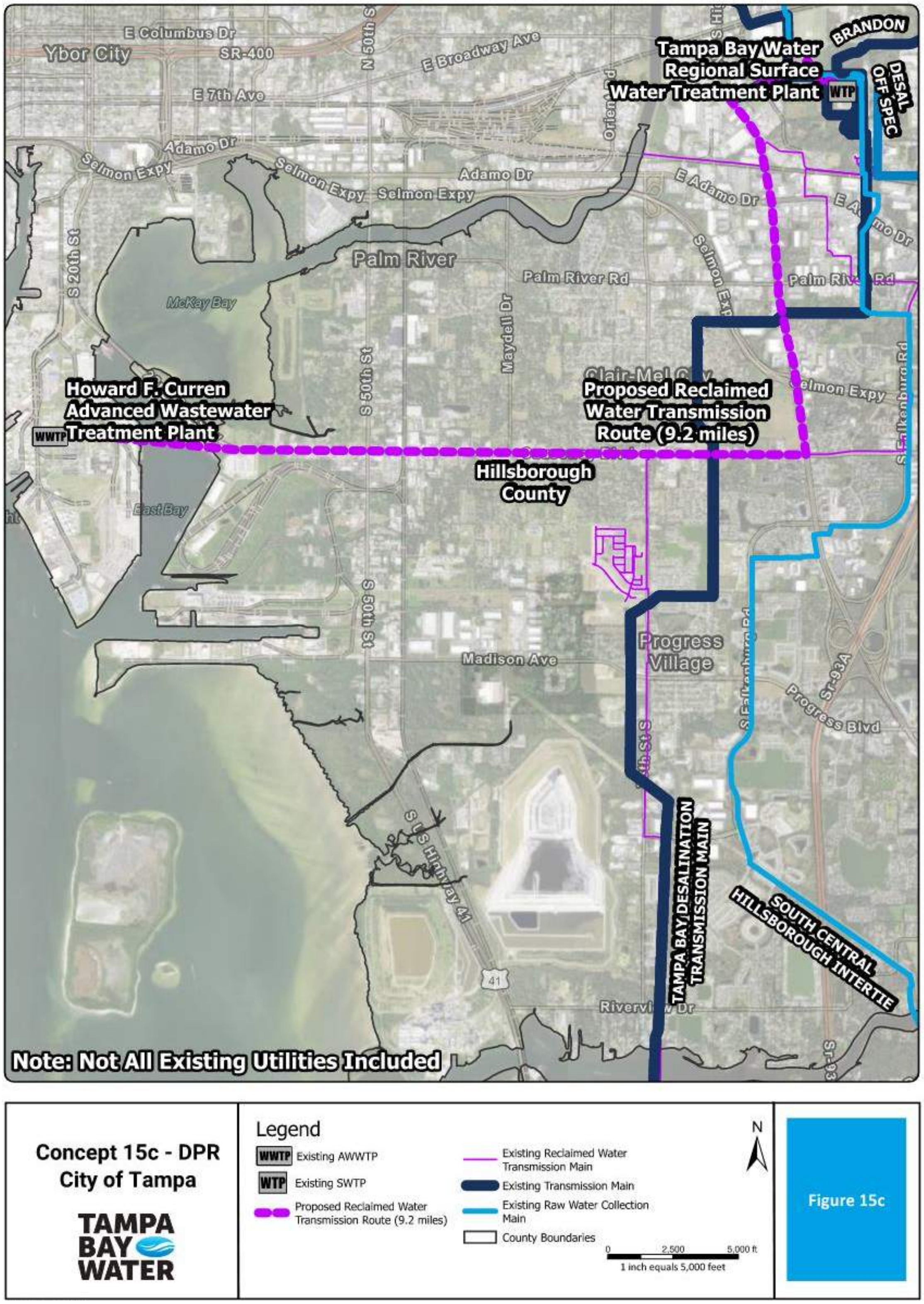
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- Underground Injection Control (UIC) Permit for concentrate disposal.
- NPDES Stormwater Permit.
- Requirements for DPR are not yet defined but are being addressed in draft regulations.

Key Feasibility Aspects and Stakeholder Considerations

- Agreements between Tampa Bay Water and the City of Tampa are needed for the reclaimed water supply. A preliminary cost is included for the purchase of reclaimed water but would need to be finalized.
- Significant public involvement is required including engagement of environmental groups.
- The concept would reduce wastewater effluent to Tampa Bay while improving supply reliability to the region.
- There is the potential for additional flow available from H.F. Curren AWTP, up to 50 mgd.
- It is assumed the Regional SWTP will need expansion to treat reclaimed water supply.
- FDEP is proposing a new Chapter in the DPR draft regulations.

CONCEPT FIGURE



Environmental Sustainability

- Minimal new environmental impacts.
- This concept is anticipated to have a moderate energy consumption.

Regulatory / Ease of Permitting

- The regulatory requirements for DPR implementations are under development, however, it can be assumed that a high-level treatment will be needed.

Public Reception

- For DPR implementations, continuous outreach, long-term pilot testing, and cumulative impact analyses will need to be conducted to provide confidence that the water supply will be safe for consumption.
- Stakeholder concerns include impacts to Tampa Bay, PFAS, PPCP, and other constituents.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$326,400,000
Pipeline Capital Cost	$58,350,000
Pump Station Capital Cost	$40,870,000
Wellfield Capital Cost	$4,800,000
Total Costs[1]	
Subtotal of Construction Costs	$430,420,000
Contingency	$129,130,000
Contractor Overhead & Profit	$86,080,000
Subtotal of Construction, Contingency, and OH&P	$645,630,000
Engineering, Legal, and Administrative	$161,410,000
Total Project Capital Cost	$817,420,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$3.24
Annual O&M Cost, $/1000 gal	$3.38
Total Project Cost, $/1000 gal	$6.62

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. Total project costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- There will be no water age impact on this concept since there is no new distribution pipeline.
- This concept includes an additional 14 mgd capacity from the Tampa Bay Regional Surface Water Treatment Plant which will moderately to significantly reduce hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main.
- It is expected that maintenance personnel will be required to travel a close distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept.
- Advanced water treatment of reclaimed water has high O&M complexity and will require some sort of nanofiltration and reverse osmosis. The DPR treatment process will require a dedicated O&M staff. Tampa Bay Water has minimal familiarity with these O&M requirements.
- This concept has good supply expansion potential based on the anticipated volume of reclaimed water available from the City of Tampa, however treatment capacity at the existing SWTP would need to be confirmed in a future study.

Cost Risk Factors

- Potential for schedule delays due to supply chain issues with membrane filtration equipment.
- Long lead time on moderately-sized plant equipment (pumps, treatment systems, transformers).
- High anticipated ability to meet future regulatory changes due to proposed treatment type.
- Constructability risks associated with moderate pipeline length, SWTP expansion and development of DPR regulatory requirements.

Yield Reliability

- High long term yield reliability, with 20-50 mgd of water anticipated to be available from the City of Tampa.
- Due to large available supply, limited impacts to capacity based on seasonal variations are anticipated.
- Limited resilience but moderately high recovery from natural disasters, sea level rise and climate change is anticipated due to coastal location and reclaimed water supply type.
- This concept is reliant on a third party.

Regional System Reliability Impacts

- The concept serves the regional high service pump station with a connection to the South Hillsborough Pipeline therefore supporting the growing demand.
- The location does not provide relief to areas downstream of a single point of failure but is upstream of the regional high service pump station which provides increased reliability to the region.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
- A new contract with the reclaimed water provider is anticipated to be required.

References

- Juturna Consulting and Applied Sciences, *Analysis of Alternatives to Reduce Non-Beneficial Treated Wastewater Discharge, Improve Supply Reliability, and Improve Minimum Flows in the Lower Hillsborough River*, Prepared for City of Tampa, June 7, 2021.

Concept 16a: South Hillsborough Wellfield

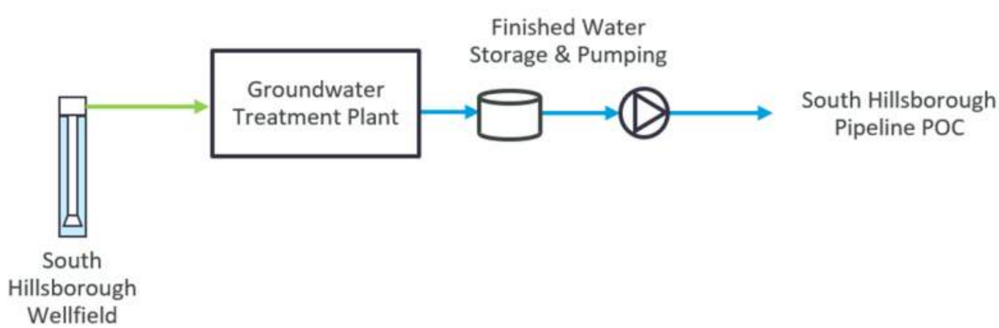
Project Description

Concept 16a involves obtaining a Water Use Permit for a new wellfield in southern Hillsborough County based on requesting relief from the SWUCA and MIA withdrawal restrictions by SWFWMD. The supply would be treated at a new groundwater treatment plant with ozone and GAC filter treatment processes and would produce an estimated annual average yield of 6 mgd. The finished water supply would be delivered from the groundwater treatment plant into the Tampa Bay Water Regional System at the southern end of the proposed new South Hillsborough Pipeline. It is understood that the feasibility of this concept would be dependent upon SWFWMD making a determination that measured recovery in the SWUCA and MIA have been achieved.

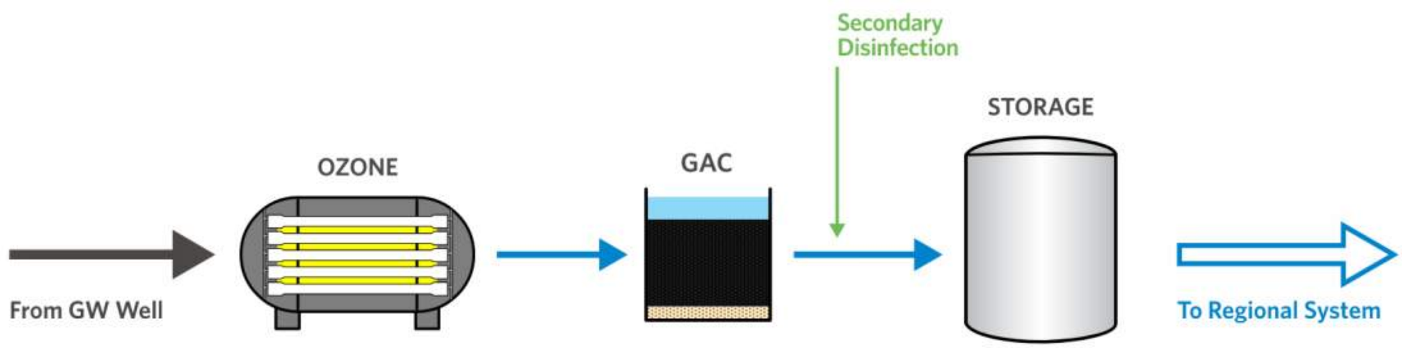
Approximate Potable Water Yield

Parameter	Flow (mgd)
Raw Water – Rated Capacity	14.0
Finished Water – Rated Capacity	13.7
Finished Water – Average Annual Yield	6

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- New production wellfield.
- A new storage tank for groundwater.
- Construction of a new groundwater treatment facility with ozone and GAC treatment.
- Pump station and 2-mile 24-inch diameter finished water pipeline to the South Hillsborough Pipeline.

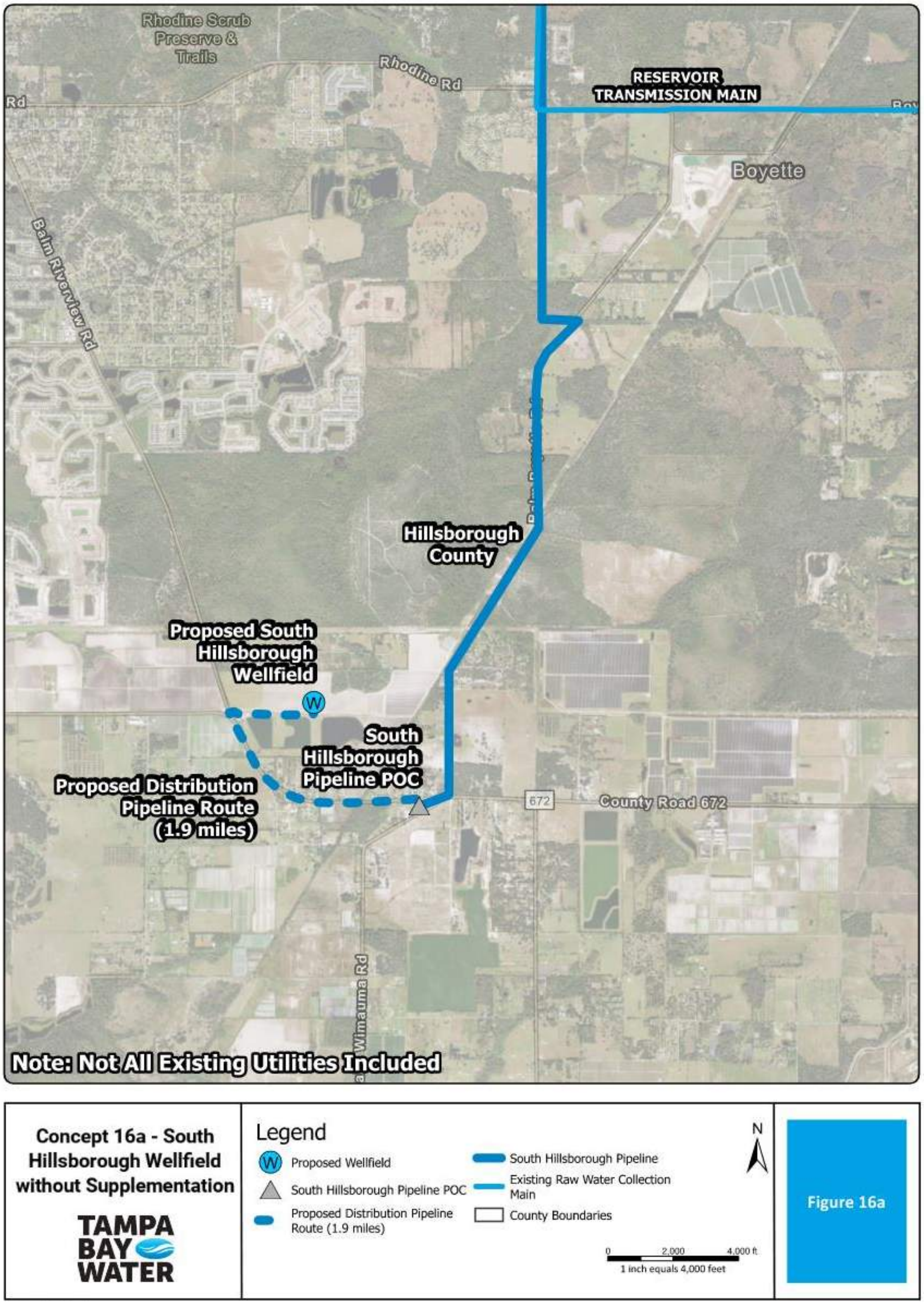
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit Modification.
- FDEP Class V Well Construction and Operation permits for each new well.

Key Feasibility Aspects and Stakeholder Considerations

- Extensive hydraulic modeling must be conducted with the withdrawal of groundwater.
- Investigation into the specific locations and production volumes of the wells would need to be performed in a feasibility study. Data gathered from the south Hillsborough aquifer recharge feasibility study, completed in December 2021 will be incorporated where applicable.

CONCEPT FIGURE



Environmental Sustainability

- Potential impacts to the environment.
- The wellfield and groundwater treatment plant are anticipated to have low energy consumption.

Regulatory / Ease of Permitting

- A new wellfield in the SWUCA and MIA would require extensive modeling, a new WUP, and reasonable assurance.

Public Reception

- Tampa Bay Water has a record of sustainable operations of groundwater supply withdrawals.
- Depending on the size of the proposed wells and pilot testing data, this concept may be more acceptable to the public.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$23,940,000
Pipeline Capital Cost	$6,710,000
Pump Station Capital Cost	$8,660,000
Wellfield Capital Cost	$8,680,000
Total Costs[1]	
Subtotal of Construction Costs	$47,990,000
Contingency	$14,400,000
Contractor Overhead & Profit	$9,600,000
Subtotal of Construction, Contingency, and OH&P	$71,980,000
Engineering, Legal, and Administrative	$18,000,000
Total Project Capital Cost	$91,210,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$2.62
Annual O&M Cost, $/1000 gal	$0.79
Total Project Cost, $/1000 gal	$3.41

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- There will be no water age impact on this concept since there is a small distribution pipeline.
- This concept includes a 4-6 mgd tie-in to the South Hillsborough Point of Connection which may improve hydraulic capacity constraints and reduce reliance on the Brandon Urban Dispersed Transmission Main.
- It is expected that maintenance personnel will be required to travel a close distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept.
- Tampa Bay Water is familiar with groundwater treatment, O&M and production well processes.
- This concept has unknown expansion potential due to changing land uses.

Cost Risk Factors

- Less supply chain concerns and potential for delays.
- The proposed treatment is anticipated to meet regulatory changes.
- Some constructability risks associated with new well production risks.

Yield Reliability

- Moderate long term yield reliability for this fresh groundwater supply.
- Moderately high seasonal impacts to reclaimed water supply.
- Supply and inland location are anticipated to have moderate resilience but low recovery from natural disasters, sea level rise and climate change.
- This concept is not reliant on a third party.

Regional System Reliability Impacts

- The concept is located in South Hillsborough County therefore supporting the growing demand.
- The location increases reliability by providing relief to a point of connection downstream and upstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.

References

- Hillsborough County, "RE: TBW/WRD Bi-Weekly Project Status Update", October 11, 2022, Member Government Communication (October 11, 2022).
- WSP, Hazen, *South Hillsborough Wellfield via SHARP Credits Feasibility Study*, Draft, Prepared for Tampa Bay Water, December 23, 2021.

Concept 16b: South Hillsborough Wellfield via Aquifer Recharge

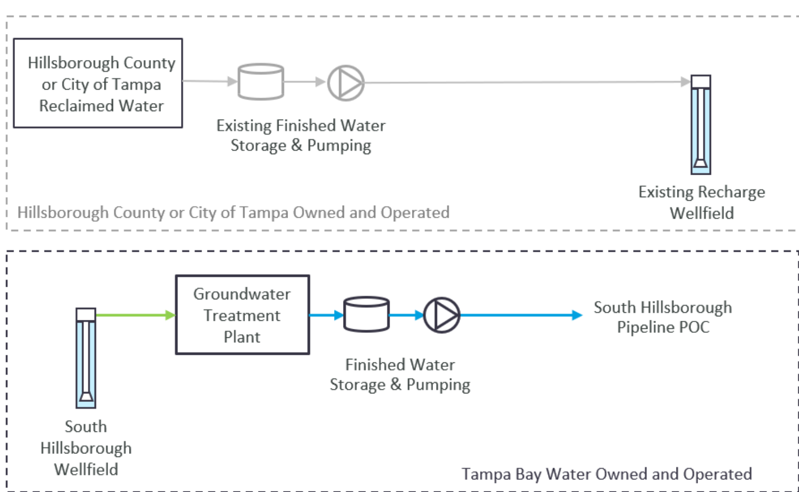
Project Description

Concept 16b involves obtaining a Water Use Permit for a new wellfield in southern Hillsborough County based on providing evidence of a net-benefit to the aquifer associated with constructing and operating a reclaimed water aquifer recharge system to form a salinity barrier. The aquifer recharge system would be used to generate credits to withdraw a certain quantity of fresh groundwater from a new production wellfield located further inland of the aquifer recharge wells. The supply would be treated at a new groundwater treatment plant with ozone and GAC filter treatment processes. The finished water supply would be delivered into the Tampa Bay Water Regional System at the southern end of the proposed new South Hillsborough Pipeline.

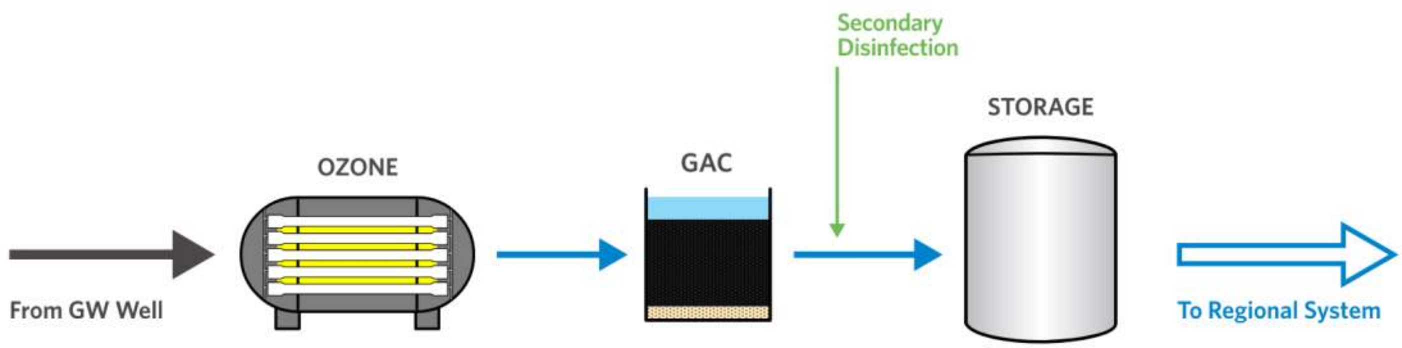
Approximate Potable Water Yield

Parameter	Flow (mgd)
Reclaimed Water – Rated Capacity	22.5
Finished Water – Rated Capacity	9.1
Finished Water – Average Annual Yield	6

Project Schematic



Simplified Process Flow Diagram



Primary Infrastructure Components

- Construction of a new production wellfield in southern Hillsborough County.
- Construction of recharge wells for the salinity barrier.
- Construction of a new groundwater treatment facility with ozone and GAC treatment.
- Finished water storage tank.
- Finished water pump station and 2-mile 20-inch diameter pipeline from the production wellfield to the South Hillsborough Pipeline.

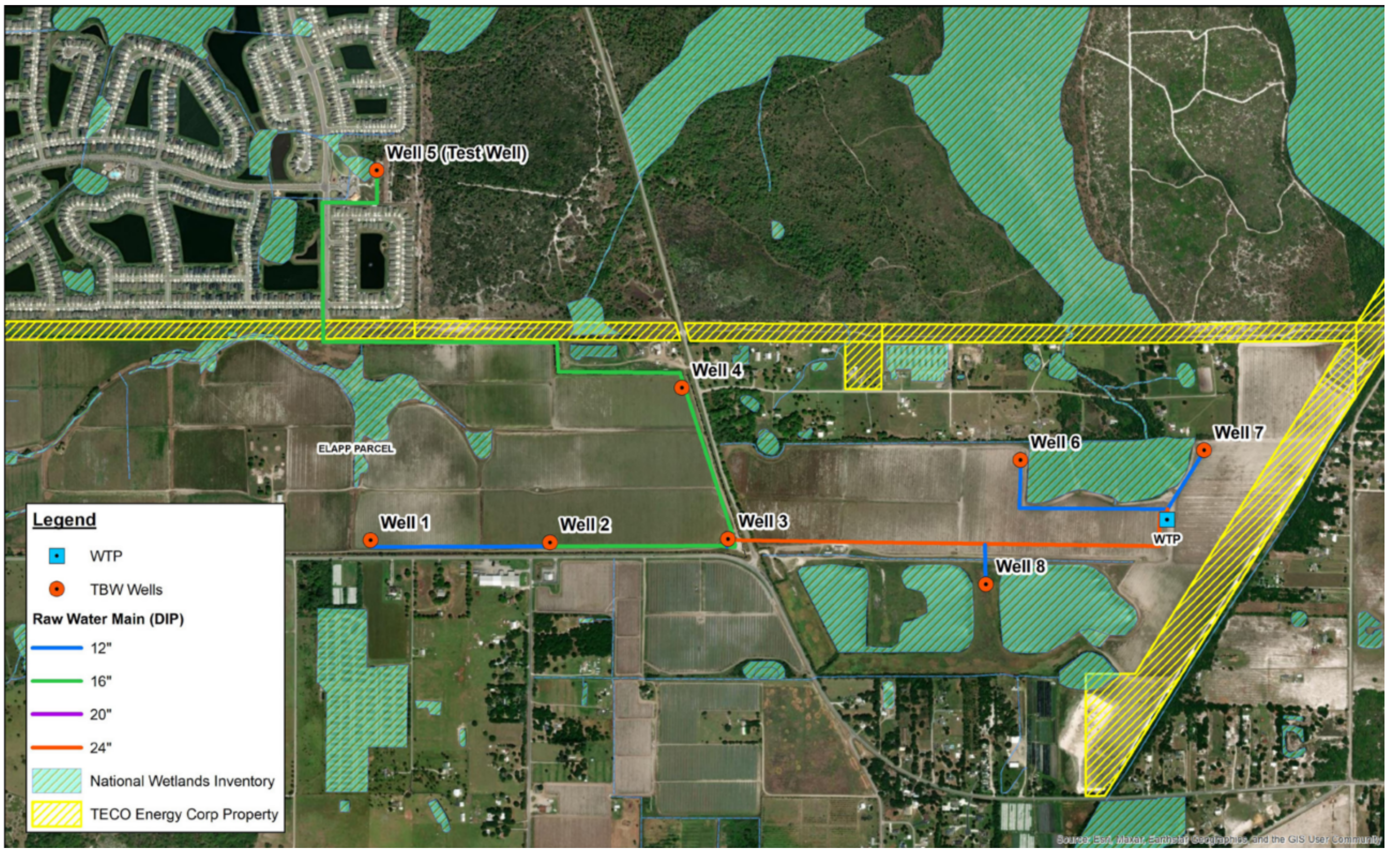
Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit Modification.
- FDEP Class V Well Construction and Operation permits.

Key Feasibility Aspects and Stakeholder Considerations

- An agreement between Tampa Bay Water and Hillsborough County or City of Tampa, or other utility would be needed for the reclaimed water supply. A preliminary cost is included for the purchase of credits but would need to be finalized.
- SWFWMD would determine if groundwater withdrawal credits will be granted for the aquifer recharge system and groundwater modeling that indicates a net benefit to the aquifer.
- A feasibility study was previously completed for this concept. WSP's "South Hillsborough Wellfield via SHARP Credits Feasibility Study" was finalized in 2022 and the map shown for this concept is from that study.

CONCEPT FIGURE



Environmental Sustainability

- Positive environmental impact due to salinity barrier.
- Assumes low to moderate energy consumption for new groundwater plant.

Regulatory / Ease of Permitting

- A new wellfield in the SWUCA and MIA would require extensive modeling and reasonable assurance, although a salinity barrier may reduce or eliminate potential mitigation requirements.
- This concept has undergone preliminary modeling and agency review.

Public Reception

- Stakeholder concerns are regarding the injection of reclaimed water into the brackish aquifer and potential drawdown impacts to surrounding wells and surface water features.
- However, since the reclaimed water is not migrating to drinking water supply wells, this withdrawal credit concept will likely be more favorable than other concepts.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$38,040,000
Pipeline Capital Cost	$5,590,000
Pump Station Capital Cost	$5,730,000
Wellfield Capital Cost	$8,050,000
Total Costs[1]	
Subtotal of Construction Costs	$57,400,000
Contingency	$17,220,000
Contractor Overhead & Profit	$11,480,000
Subtotal of Construction, Contingency, and OH&P	$86,100,000
Engineering, Legal, and Administrative	$21,530,000
Total Project Capital Cost	$110,430,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$1.97
Annual O&M Cost, $/1000 gal	$3.43
Total Project Cost, $/1000 gal	$5.40

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- There will be no water age impact on this concept since there is a small distribution pipeline.
- This concept includes a 4-6 mgd tie-in to the South Hillsborough Point of Connection which may improve hydraulic capacity constraints and reduce reliance on the Brandon Urban Dispersed Transmission Main.
- It is expected that maintenance personnel will be required to travel a far distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept.
- Tampa Bay Water is familiar with groundwater treatment, O&M and production well processes.
- This concept has good supply expansion potential based on reclaimed water availability.

Cost Risk Factors

- Low potential for schedule delays due to supply chain issues.
- The proposed treatment is anticipated to meet regulatory changes although there is some uncertainty regarding arsenic mobilization.
- Some constructability risks associated with new well production risks, however since this project has already been evaluated, a higher score was given.

Yield Reliability

- Moderately high long term yield reliability for water supply.
- Moderate seasonal impacts to supply quality and capacity are anticipated.
- Inland location of supply wells and treatment are anticipated to have moderately high resilience and recovery from natural disasters, sea level rise and climate change.
- This concept has some reliance on a third party.
- Yield could be limited to prevent inland migration of reclaimed water.

Regional System Reliability Impacts

- The concept is located in South Hillsborough County therefore supporting the growing demand.
- The location increases reliability by providing relief to a point of connection downstream and upstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
- There is no existing governance documentation that focuses on indirect potable reuse.
- New governance, agreements, or contracts will be required.

References

- WSP, Hazen, *South Hillsborough Wellfield via SHARP Credits Feasibility Study*, Draft, Prepared for Tampa Bay Water, December 23, 2021.
- Hillsborough County, "RE: TBW/WRD Bi-Weekly Project Status Update", October 11, 2022, Member Government Communication (October 11, 2022).
- Black & Veatch, "Concept 1 - South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge", *WA-006 Concept Summary Sheets*, Draft, Prepared for Tampa Bay Water, August 26, 2022.
- Black & Veatch, *2022 New Water Supply Configuration Alternatives Selection Process*, Draft, Prepared for Tampa Bay Water, January 11, 2023.

Concept 16c: South Hillsborough Wellfield via IPR

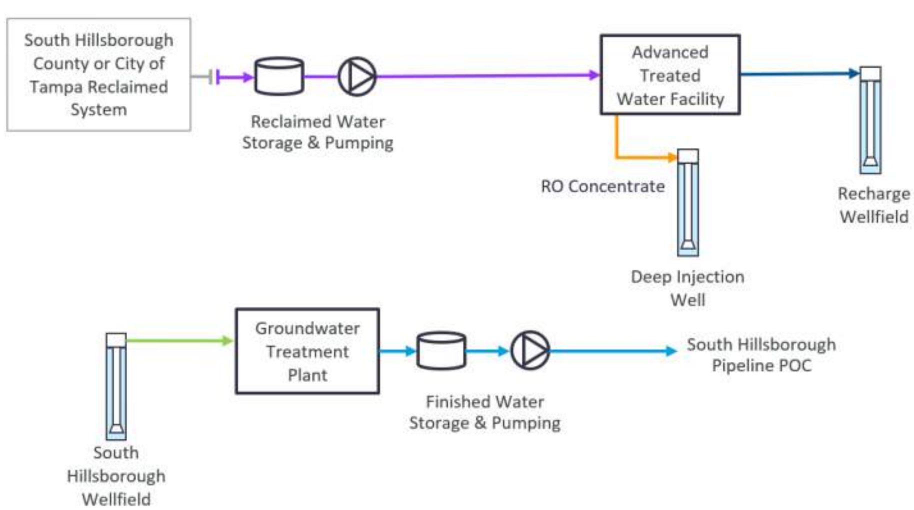
Project Description

Concept 16c involves reclaimed water supply being treated to drinking water standards at an AWTP prior to aquifer recharge, along with locating the aquifer recharge wells in close proximity to the new wellfield so that the aquifer recharge supply is eventually withdrawn from the production wells. The water withdrawn from the new production wellfield would be sent to a new groundwater treatment facility for additional treatment before delivery into the Tampa Bay Water Regional System at the southern end of the proposed new South Hillsborough Pipeline. The reclaimed water supply for would be from the City of Tampa H.F. Curren AWTP or the Hillsborough County reclaimed water system.

Approximate Potable Water Yield

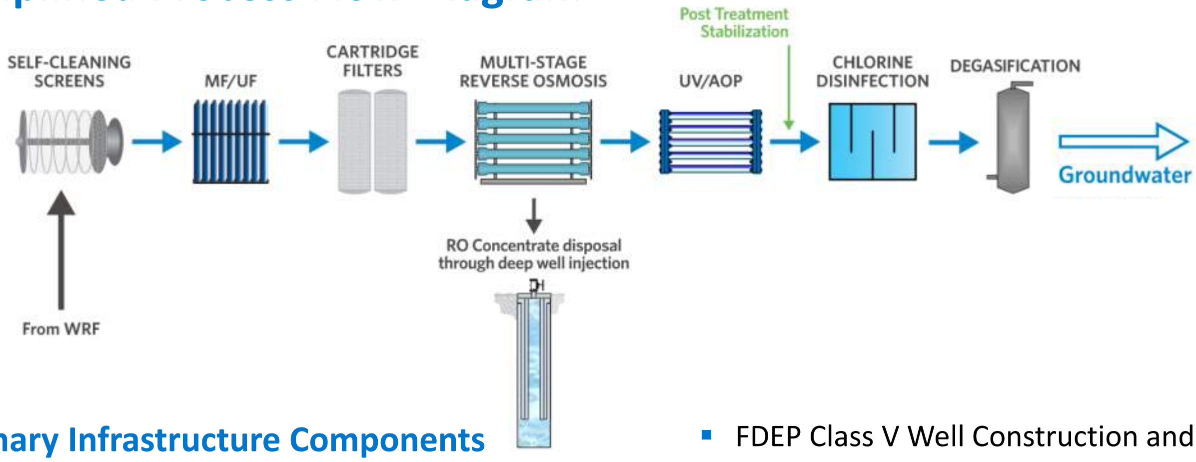
Parameter	Flow (mgd)
Reclaimed Water – Rated Capacity	33.8
Finished Water – Rated Capacity	20.9
Finished Water – Average Annual Yield	9.3

Project Schematic



TAMPA BAY WATER

Simplified Process Flow Diagram



Primary Infrastructure Components

- Reclaimed water storage tank, pump station and 6-mile 42-inch diameter pipeline to advanced water treatment facility and recharge wellfield.
- Advanced water treatment facility.
- Recharge wellfield.
- Production wellfield.
- Groundwater treatment facility with ozone and GAC treatment.
- Finished water storage tank, pump station and 2-mile, 30-inch pipeline to South Hillsborough Pipeline.
- Deep injection well for concentrate disposal.

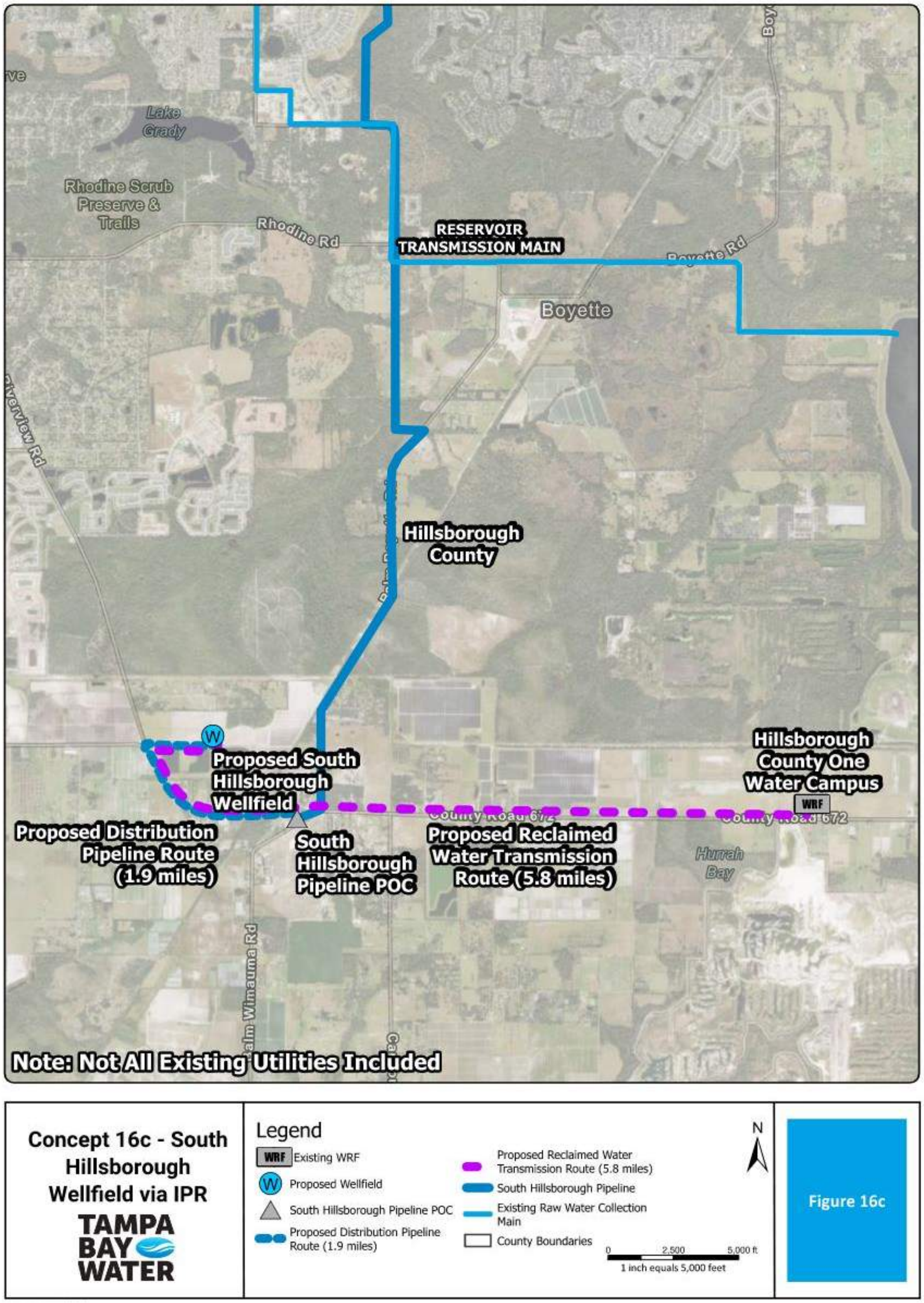
- ### Anticipated Regulatory Requirements

- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit Modification.
- Existing IPR regulations are being revised, resulting in regulatory uncertainty.
- FDEP Class V Well Construction and Operation permits.
- Underground Injection Control (UIC) Permit for concentrate disposal.

Key Feasibility Aspects and Stakeholder Considerations

- An agreement between Tampa Bay Water and Hillsborough County or City of Tampa would be needed for the reclaimed water supply. A preliminary cost is included for the purchase of water but would need to be finalized.
- Removal of dissolved oxygen to prevent arsenic mobilization may be required upon further hydrogeologic investigation. It is likely that pyrite is present in the lime rock and treatment will be needed.

CONCEPT FIGURE



Environmental Sustainability

- Potential new lake and wetland drawdown impacts could be mitigated by indirect potable reuse projects.
- Assumes low to moderate energy consumption for new groundwater plant.

Regulatory / Ease of Permitting

- A new wellfield in the SWUCA and MIA would require extensive modeling and reasonable assurance, as well as possible mitigation.
- Existing IPR regulations are being revised, resulting in regulatory uncertainty.

Public Reception

- This concept will require lengthy and continuous public outreach and pilot testing to meet all drinking water requirements.
- Stakeholder concerns will likely focus on PFAS, pharmaceuticals, and other constituents and how they could affect the aquifer, nearby wells, and finished water quality.

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown	
Facilities Capital Cost	$282,420,000
Pipeline Capital Cost	$40,620,000
Pump Station Capital Cost	$28,240,000
Wellfield Capital Cost	$48,430,000
Total Costs[1]	
Subtotal of Construction Costs	$399,710,000
Contingency	$119,910,000
Contractor Overhead & Profit	$79,940,000
Subtotal of Construction, Contingency, and OH&P	$599,560,000
Engineering, Legal, and Administrative	$149,890,000
Total Project Capital Cost	$757,650,000
$/1,000 gallons cost, based on annual production yield [2]	
Total Capital Cost, $/1000 gal	$9.00
Annual O&M Cost, $/1000 gal	$4.01
Total Project Cost, $/1000 gal	$13.02

Notes:

1. Costs include 30% for contingency,20% for contractor overhead & profit, and 25% for engineering, legal and administrative costs.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30 year term and a 5% interest rate.
3. All costs are representative of October 2022 dollars.

System Integration and Expansion Potential

- There will be no water age impact on this concept since there is a small distribution pipeline.
- This concept includes a 9 mgd tie-in to the South Hillsborough Point of Connection which may improve hydraulic capacity constraints and reduce reliance on the Brandon Urban Dispersed Transmission Main.
- It is expected that maintenance personnel will be required to travel a close distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept.
- Advanced water treatment of reclaimed water for the purpose of IPR has high O&M complexity, and Tampa Bay Water has minimal familiarity with these O&M requirements. A dedicated O&M staff is required. Tampa Bay Water is familiar with the operation of production wells.
- This concept has somewhat good supply expansion potential based on reclaimed water availability.

Cost Risk Factors

- Potential for supply chain issues due to membrane filtration and long lead time anticipated due to moderately-sized plant equipment (including pumps and treatment systems).
- The proposed treatment is anticipated to meet regulatory changes although there is some uncertainty regarding arsenic mobilization.
- Some constructability risks associated with new well production risks and moderate pipeline length.

Yield Reliability

- Moderately high long term yield reliability for reclaimed water supply.
- Moderate seasonal impacts to supply quality and capacity are anticipated.
- Supply and inland location are anticipated to have high resilience and recovery from natural disasters, sea level rise and climate change.
- This concept has some reliance on a third party.

Regional System Reliability Impacts

- The concept is located in South Hillsborough County therefore supporting the growing demand.
- The location increases reliability by providing relief to a point of connection downstream and upstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.

Contractual Requirements / Risks

- The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
- There is no existing governance documentation that focuses on indirect potable reuse.
- Indirect potable reuse will require a new governance, agreement, or contract documents.

References

- WSP, Hazen, *South Hillsborough Wellfield via SHARP Credits Feasibility Study*, Draft, Prepared for Tampa Bay Water, December 23, 2021.
- Hillsborough County, "RE: TBW/WRD Bi-Weekly Project Status Update", October 11, 2022, Member Government Communication (October 11, 2022).
- Black & Veatch, "Concept 1 - South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge", *WA-006 Concept Summary Sheets*, Draft, Prepared for Tampa Bay Water, August 26, 2022.

Appendix B. Fine Screening Criteria - Detailed Scoring

The nine sub-criteria are described in more detail in the following section, along with the reasoning for the specific scores.

Environmental Stewardship – Environmental Sustainability

Table B-1 Fine Screening Scoring - Environmental Sustainability

Concept ID	Concept Name	Protection of Downstream Water Quantity or Quality	Protection of Natural Habitats and/or Listed Species	Energy Consumption	Average Score	Comments
1	Gulf Coast Desalination	3	3	1	2.33	• Assumes co-location with the existing Anclote Power Plant. • This concept has potential salinity impacts on Outstanding Florida Waters, though brine discharge will more than likely need to be treated to standards that follow any discharges within the Pinellas County Aquatic Preserve which will help mitigate potential impacts. • Desalination plant is anticipated to have high energy consumption.
2	Pasco Brackish Wellfield	4	4	2	3.33	• There are potential drawdown impacts to the Lower Floridian Aquifer. • Brackish desalination plant is anticipated to have a moderate to high energy consumption.
3a	St. Petersburg Desalination Plant	2	2	1	1.67	• Assumes the new facility is not co-located with an existing power plant. • There is the potential for new impingement/entrainment and salinity impacts. • Desalination plant is anticipated to have high energy consumption.
3b	St. Petersburg Brackish Plant	3	4	2	3.00	• A multi-stage reverse osmosis brackish treatment will create concentrate discharge challenges. • The brackish desalination plant is anticipated to have moderate to high energy consumption.
4	Existing Desalination Plant Expansion	4	3	1	2.67	• Due to the relatively low recovery of seawater RO systems, the process results in a large concentrate stream requiring disposal. • Desalination plant is anticipated to have high energy consumption.
5a	Existing Desalination Plant Expansion with Reuse	4	4	2	3.33	• Blending with reuse water will most likely require replacement of the existing reverse osmosis membranes. • Moderate to high energy consumption since the reuse will lower the salinity.
5b	Existing Desalination Plant Expansion with Brackish	4	4	1	3.00	• Blending with brackish water could potentially lower intake salinity. • Desalination plant is anticipated to have high energy consumption.
6	North Pinellas SWTP	5	4	4	4.33	• Harvesting excess surface water discharged to Old Tampa Bay could have potential ecological benefits. • Monitoring and control of water levels in Lake Tarpon may be required. • A new SWTP is anticipated to have low to moderate energy consumption.
7	New SWTP via Lake Thonotosassa	1	1	4	2.00	• Potential flow reductions could impact the upper Hillsborough River minimum flow level requirements. • A new SWTP is anticipated to have low to moderate energy consumption.
8	New SWTP at the Regional Reservoir via Increased Alafia Withdrawals	3	3	4	3.33	• The current minimum flow level determination for the lower Alafia River allows for increased withdrawals over the existing water use permit. • A new SWTP is anticipated to have low to moderate energy consumption.
9	New SWTP and Reservoir via New Supplies	3	2	4	3.00	• Assumes new surface water withdrawals from the Little Manatee River and/or Bullfrog Creek. • Likely new salinity and ecological impacts in the affected surface water bodies. • A new SWTP is anticipated to have low to moderate energy consumption.
10	Eastern Pasco Wellfield	3	3	5	3.67	• There are potential lake and wetland drawdown impacts, though no impacts have been identified from the operation of existing Tampa Bay Water wellfields. • The concept must ensure there are no impacts to the Upper Hillsborough River MFL. • The wellfield and groundwater treatment plant are anticipated to have low energy consumption.
11	Interconnect with Polk Regional Water Cooperative	3	3	4	3.33	• This concept has potential dredge and fill impacts to wetlands and stream crossings from new pipelines. • Inter-basin transfers are discouraged by state water policy. • This concept is anticipated to have low to moderate energy consumption, with most energy related to pumping.

Concept ID	Concept Name	Protection of Downstream Water Quantity or Quality	Protection of Natural Habitats and/or Listed Species	Energy Consumption	Average Score	Comments
12	Interconnect with Peace River Manasota Water Supply Authority	3	3	4	3.33	• This concept has potential dredge and fill impacts to wetlands and stream crossings from new pipelines. • Inter-basin transfers are discouraged by state water policy. • This concept is anticipated to have low to moderate energy consumption, with most energy related to pumping.
13a	Transfer Existing Groundwater Permits – Pasco County	5	5	5	5.00	• There are no new environmental impacts. • The concept must ensure there are no impacts to the Upper Hillsborough River MFL. • This concept is anticipated to have low energy consumption.
13b	Transfer Existing Groundwater Permits – Hillsborough County	5	5	5	5.00	• There are no new environmental impacts. • This concept is anticipated to have low energy consumption.
14a	Increase CWUP	3	3	5	3.67	• Potential impacts to the environment, though no impacts have been identified from the operation of existing Tampa Bay Water wellfields. • The concept must ensure there are no impacts to the Upper Hillsborough River MFL.Tampa Bay Water's Recovery Assessment Plan, which examined environmental health and recovery around the Authority's wellfield facilities, is approved for the existing yield only. • This concept is anticipated to have low energy consumption.
14b	Increase CWUP via a Pinellas County Reclaimed Water Aquifer Recharge Wellfield	4	4	4	4.00	• Aquifer recharge with reclaimed water could improve impacts to lakes and wetlands if modeling showed it to be necessary. • The concept must ensure there are no impacts to the Upper Hillsborough River MFL. • This concept is anticipated to have low to moderate energy consumption, with most energy consumption related to wellfield injection.
14c	Increase CWUP via a Reclaimed Water Aquifer Recharge with Natural Systems	3	3	4	3.33	• Natural recharge with reclaimed water could minimize impacts to lakes and wetlands if modeling showed it to be necessary. • The concept must ensure there are no impacts to the Upper Hillsborough River MFL. • This concept is anticipated to have low to moderate energy consumption, with most energy consumption related to natural system supplementation.
15a	DPR – Hillsborough County	5	5	3	4.33	• There are no new environmental impacts. • This concept is anticipated to have a moderate energy consumption.
15b	DPR – Pinellas County	5	5	3	4.33	• There are no new environmental impacts. • This concept is anticipated to have a moderate energy consumption.
15c	DPR – City of Tampa	5	5	3	4.33	• There are no new environmental impacts. • This concept is anticipated to have a moderate energy consumption.
16a	South Hillsborough Wellfield	1	1	5	2.33	• Potential impacts to the environment. • The wellfield and groundwater treatment plant are anticipated to have low energy consumption.
16b	South Hillsborough Wellfield via Aquifer Recharge	4	4	4	4.00	• Positive environmental impact due to salinity barrier. • Assumes low to moderate energy consumption for new groundwater plant.
16c	South Hillsborough Wellfield via IPR	4	4	4	4.00	• Potential new lake and wetland drawdown impacts could be mitigated by indirect potable reuse projects. • Assumes low to moderate energy consumption for new groundwater plant.

Environmental Stewardship – Regulatory/Ease of Permitting

Table B-2 Fine Screening Scoring - Regulatory/Ease of Permitting

Concept ID	Concept Name	Consistency with Existing Policies, Rules, and Regulations	Involvement of Permitting Requirements and Supporting Documentation	Mitigation Requirements	Average Score	Comments
1	Gulf Coast Desalination	4	3	4	3.67	• Assumes co-location with existing Anclote Power Plant. • Would require a modification of the existing National Pollutant Discharge Elimination System (NPDES) permit for the Anclote Power Plant as well as a new NPDES permit for the allowable intake and concentrate discharge.
2	Pasco Brackish Wellfield	4	4	3	3.67	• The concept would require a WUP for the withdrawal, an underground injection control (UIC) for concentrate disposal, and an Environmental Resource Permit (ERP) for the new treatment plant.
3a	St. Petersburg Desalination Plant	4	2	1	2.33	• Assumes new facility with no co-location with an existing power plant once-through cooling system. • New impingement/entrainment and salinity impacts to a sensitive area of Tampa Bay. • A new NPDES permit for the allowable intake and concentrate discharge will be required.
3b	St. Petersburg Brackish Plant	4	4	4	4.00	• The concept would require a WUP for the withdrawal, a UIC for concentrate disposal, and an ERP for the new treatment plant.
4	Existing Desalination Plant Expansion	4	3	4	3.67	• There is potential for higher intake salinity within this concept. Therefore, modeling and monitoring will be required. • A new permit will be required for the concentrate discharge injection well.
5a	Existing Desalination Plant Expansion with Reuse	2	2	5	3.00	• The concept would have no additional surface water impacts. • However, the concept would be permitted as a DPR implementation and would require a modification to the existing NPDES. • FDEP is proposing a new Chapter in the DPR draft regulations.
5b	Existing Desalination Plant Expansion with Brackish	4	3	3	3.33	• The concept would have no additional surface water impacts and may require modification of the existing NPDES, and a new UIC for concentrate disposal.
6	North Pinellas SWTP	4	3	5	4.00	• The concept has potential net environmental benefits to Old Tampa Bay but will require a new WUP for the surface water withdrawal. • Potential concerns about adverse lake level impacts to Lake Tarpon.
7	New SWTP via Lake Thonotosassa	4	3	3	3.33	• The concept would require a WUP for the new withdrawal and may be inconsistent with the existing Minimum Flows and Level (MFL).
8	New SWTP at the Regional Reservoir via Increased Alafia Withdrawals	4	3	3	3.33	• The existing MFL allows for increased withdrawals, but this concept would require a modification to the existing WUP with new modeling and increased monitoring.
9	New SWTP and Reservoir via New Supplies	3	2	4	3.00	• Assumes new withdrawals from the Little Manatee River and/or Bullfrog Creek. • This concept would require new WUPs for the surface water withdrawals, with extensive modeling. • New withdrawal from the Little Manatee may be inconsistent with the existing MFL. • ERP and 404 permits required for new reservoir.
10	Eastern Pasco Wellfield	4	3	3	3.33	• The concept would require a new WUP and extensive modeling. • It should be noted that there is potential for mitigation to be required.
11	Interconnect with Polk Regional Water Cooperative	2	2	2	2.00	• This concept includes inter-basin water transfers which are discouraged by state water policy. • A new pipeline would require ERP and 404 permits.
12	Interconnect with Peace River Manasota Water Supply Authority	2	2	2	2.00	• This concept includes inter-basin water transfers which are discouraged by state water policy. • A new pipeline would require ERP and 404 permits.
13a	Transfer Existing Groundwater Permits – Pasco County	4	5	5	4.67	• The concept would require a modification of existing WUPs that will be acquired to transfer ownership and may require other modifications to permit conditions.

Concept ID	Concept Name	Consistency with Existing Policies, Rules, and Regulations	Involvement of Permitting Requirements and Supporting Documentation	Mitigation Requirements	Average Score	Comments
13b	Transfer Existing Groundwater Permits – Hillsborough County	4	5	5	4.67	• The concept would require a modification of existing WUPs that will be acquired to transfer ownership and may require other modifications to permit conditions.
14a	Increase CWUP	3	2	2	2.33	• This concept would require extensive modeling and reasonable assurance and may require modifications to Tampa Bay Water's Recovery Assessment Plan.
14b	Increase CWUP via a Pinellas County Reclaimed Water Aquifer Recharge Wellfield	3	2	4	3.00	• This concept would require extensive modeling and reasonable assurance and may require modifications to Tampa Bay Water's Recovery Assessment Plan.
14c	Increase CWUP via a Reclaimed Water Aquifer Recharge with Natural Systems	3	2	4	3.00	• This concept would require extensive modeling and reasonable assurance and may require modifications to Tampa Bay Water's Recovery Assessment Plan.
15a	DPR – Hillsborough County	2	2	4	2.67	• The regulatory requirements for DPR implementations are under development, however, it can be assumed that a high-level treatment will be needed.
15b	DPR – Pinellas County	2	2	4	2.67	• The regulatory requirements for DPR implementations are under development, however, it can be assumed that a high-level treatment will be needed.
15c	DPR – City of Tampa	2	2	4	2.67	• The regulatory requirements for DPR implementations are under development, however, it can be assumed that a high-level treatment will be needed.
16a	South Hillsborough Wellfield	1	1	1	1.00	• A new wellfield in the SWUCA and MIA would require extensive modeling and reasonable assurance.
16b	South Hillsborough Wellfield via Aquifer Recharge	4	4	4	4.00	• A new wellfield in the SWUCA and MIA would require extensive modeling and reasonable assurance, although a salinity barrier may reduce or eliminate potential mitigation requirements. • This concept has undergone preliminary modeling and agency review.
16c	South Hillsborough Wellfield via IPR	4	3	4	3.67	• A new wellfield in the SWUCA and MIA would require extensive modeling and reasonable assurance, as well as possible mitigation. • Existing IPR regulations are being revised, resulting in regulatory uncertainty.

Environmental Stewardship – Public Reception

Table B-3 Fine Screening Scoring - Public Reception

Concept ID	Concept Name	Anticipated Reception of Concept	Type and Duration of Public Outreach Required	Average Score	Comments
1	Gulf Coast Desalination	3	3	3.00	• Based on previous outreach, stakeholders have voiced concern regarding impacts to boating, fishing, and swimming as well as to the Anclote Park. • There is also concern over the impacts to marine life, seagrasses, migration of Stauffer contamination to the area, power use, utility cost, and whether the desalination plant will be able to be a stand-alone facility without complete reliance on the power plant.
2	Pasco Brackish Wellfield	3	3	3.00	• Predicted stakeholder concerns will most likely be related to the drawdown impacts to other users, migration of shallow contamination, and saltwater intrusion.
3a	St. Petersburg Desalination Plant	2	2	2.00	• The main stakeholder concerns for this concept are in relation to the intake and discharge and the ways in which those structures will affect Tampa Bay, boating, sailing, fishing, swimming, traffic related to construction, power use, utility cost, and impacts to the surrounding communities including students and the Coast Guard outposts.
3b	St. Petersburg Brackish Plant	2	2	2.00	• Within this concept, stakeholders will likely be concerned about impacts to Lake Maggiore, upwelling from injection wells, and the pipeline construction in the area. • However, this concept has fewer potential impacts to boating, fishing, and the bay, in general.
4	Existing Desalination Plant Expansion	5	3	4.00	• This concept is favorable to stakeholders as Tampa Bay Water has a record of sustainable operations at the desalination plant. • However, studies will need to be conducted to ensure that a modification to the existing NPDES permit will not harm marine life in the area.
5a	Existing Desalination Expansion with Reuse	3	2	2.50	• This concept will likely require pilot testing as stakeholders will be interested in any new or different constituents within the concentrate discharge that will potentially affect Tampa Bay as well as what constituents are in the reclaimed supply and how they are being removed. • For DPR implementations, continuous outreach, long-term pilot testing, and cumulative impact analyses will need to be conducted to provide confidence that the water supply will be safe for consumption. • Stakeholder concerns include impacts to Tampa Bay, PFAS, PPCP, and other constituents.
5b	Existing Desalination Expansion with Brackish	4	3	3.50	• Stakeholders will be interested in any new or different constituents within the concentrate discharge that will potentially affect Tampa Bay. • As brackish water is non-native, there will also be concerns associated with the supply withdrawal and inland saltwater intrusion.
6	North Pinellas SWTP	2	2	2.00	• This concept will require significant and sustained outreach if construction will be located in any county park. • Stakeholders are more likely to accept an intake on the Lake Tarpon outfall than the lake itself; will likely express concern regarding impacts to lake levels.
7	New SWTP via Lake Thonotosassa	2	2	2.00	• Residents will likely express concern regarding potential impacts to the lake levels, recreation, and potential downstream impacts to Hillsborough River.
8	New SWTP at the Regional Reservoir via Increased Alafia Withdrawals	4	4	4.00	• This concept will likely be well received by the public; however, outreach efforts will need to be conducted to ensure that increased withdrawals from the Alafia River will not impact the river, Tampa Bay, or the surrounding estuarine environment.
9	New SWTP and Reservoir via New Supplies	3	3	3.00	• This concept will require communication to the public to convey that this project will support the region's continued growth, not just the southward growth of the County. • Environmental concerns from new withdrawals will also need to be addressed.
10	Eastern Pasco Wellfield	3	3	3.00	• Stakeholder concerns will likely include impacts from drawdown, impacts to nearby wells and surface features, and any potential mitigation that will be required.
11	Interconnect with Polk Regional Water Cooperative	4	4	4.00	• This concept could be complicated by cost, agreements between parties, or stakeholder perception of the water authority distributing water outside of its designated service area.
12	Interconnect with Peace River Manasota Water Supply Authority	4	4	4.00	• This concept could be complicated by cost, agreements between parties, or stakeholder perception of the water authority distributing water outside of its designated service area.
13a	Transfer Existing Groundwater Permits – Pasco County	4	4	4.00	• This concept is familiar to stakeholders as Tampa Bay Water operates existing groundwater facilities, though concerns may arise in how the new facility will affect surrounding wells in the area.

Concept ID	Concept Name	Anticipated Reception of Concept	Type and Duration of Public Outreach Required	Average Score	Comments
13b	Transfer Existing Groundwater Permits – Hillsborough County	4	4	4.00	• This concept is familiar to stakeholders as Tampa Bay Water operates existing groundwater facilities, though concerns may arise in how the new facility will affect surrounding wells in the area.
14a	Increase CWUP	3	3	3.00	• Stakeholders will be interested in any potential environmental impacts from increasing the withdrawals of the existing permitted sources, though nearby residents experiencing flooding may support the concept.
14b	Increase CWUP via a Pinellas County Reclaimed Water Aquifer Recharge Wellfield	3	3	3.00	• Stakeholder concerns are regarding the County's injection of reclaimed water into the aquifer and potential drawdown impacts to surrounding wells and surface water features. • However, since the reclaimed water is not being ingested, this withdrawal credit concept will likely be more favorable than other configurations.
14c	Increase CWUP via a Reclaimed Water Aquifer Recharge with Natural Systems	3	3	3.00	• Stakeholder concerns are regarding the County's addition of reclaimed water into the wetland and potential drawdown impacts to surrounding wells and surface water features.
15a	DPR – Hillsborough County	1	1	1.00	• For DPR implementations, continuous outreach, long-term pilot testing, and cumulative impact analyses will need to be conducted to provide confidence that the water supply will be safe for consumption. • Stakeholder concerns include impacts to Tampa Bay, PFAS, pharmaceuticals, and other constituents.
15b	DPR – Pinellas County	1	1	1.00	• For DPR implementations, continuous outreach, long-term pilot testing, and cumulative impact analyses will need to be conducted to provide confidence that the water supply will be safe for consumption. • Stakeholder concerns include impacts to Tampa Bay, PFAS, pharmaceuticals, and other constituents.
15c	DPR – City of Tampa	1	1	1.00	• For DPR implementations, continuous outreach, long-term pilot testing, and cumulative impact analyses will need to be conducted to provide confidence that the water supply will be safe for consumption. • Stakeholder concerns include impacts to Tampa Bay, PFAS, pharmaceuticals, and other constituents.
16a	South Hillsborough Wellfield	2	2	2.00	• Tampa Bay Water has a record of sustainable operations of groundwater supply withdrawals. • Depending on the size of the proposed wells and pilot testing data, this concept may be more acceptable to the public.
16b	South Hillsborough Wellfield via Aquifer Recharge	3	3	3.00	• Stakeholder concerns are regarding the injection of reclaimed water into the brackish aquifer and potential drawdown impacts to surrounding wells and surface water features. • However, since the reclaimed water is not migrating to drinking water supply wells, this withdrawal credit concept will likely be more favorable than other concepts.
16c	South Hillsborough Wellfield via IPR	2	2	2.00	• This concept will require lengthy and continuous public outreach and pilot testing to meet all drinking water requirements. • Stakeholder concerns will likely focus on PFAS, pharmaceuticals, and other constituents and how they could affect the aquifer, nearby wells, and finished water quality.

Project Cost – Life Cycle Cost

Table B-4 Fine Screening Scoring - Life Cycle Cost

Concept ID	Concept Name	Score	$/1,000 Gallons
1	Gulf Coast Desalination	2	$ 11.06
2	Pasco Brackish Wellfield	3	$ 8.44
3a	St. Petersburg Desalination Plant	2	$ 11.16
3b	St. Petersburg Brackish Plant	3	$ 7.26
4	Existing Desalination Plant Expansion	2	$ 11.18
5a	Existing Desalination Plant Expansion with Reuse	2	$ 13.46
5b	Existing Desalination Plant Expansion with Brackish	3	$ 9.32
6	North Pinellas SWTP	2	$ 12.23
7	New SWTP via Lake Thonotosassa	3	$ 7.58
8	New SWTP at the Regional Reservoir via Increased Alafia Withdrawals	4	$ 5.74
9	New SWTP and Reservoir via New Supplies	2	$ 11.17
10	Eastern Pasco Wellfield	4	$ 4.79
11	Interconnect with Polk Regional Water Cooperative	3	$ 9.31
12	Interconnect with Peace River Manasota Water Supply Authority	3	$ 9.86
13a	Transfer Existing Groundwater Permits – Pasco County	3	$ 8.11
13b	Transfer Existing Groundwater Permits – Hillsborough County	3	$ 6.63
14a	Increased CWUP	5	$ 0.50
14b	Increase CWUP via a Pinellas County Reclaimed Water Aquifer Recharge Wellfield	2	$ 12.78
14c	Increase CWUP via a Reclaimed Water Aquifer Recharge with Natural Systems	1	$ 23.45
15a	DPR – Hillsborough County	3	$ 9.65
15b	DPR – Pinellas County	3	$ 7.73
15c	DPR – City of Tampa	3	$ 6.62
16a	South Hillsborough Wellfield	4	$ 3.41
16b	South Hillsborough Wellfield via Aquifer Recharge	4	$ 5.40
16c	South Hillsborough Wellfield via IPR	2	$ 13.02

Project Cost – System Integration and Expansion Potential

Table B-5 Fine Screening Scoring - System Integration and Expansion Potential

Concept ID	Concept Name	Water Age/ Water Quality Impact (13%)	Hydraulic Impact (13%)	Distance to Operational Hub (13%)	Familiarity with Treatment/ Maintenance (13%)	Difficulty of Operation (24%)	Ability to be Implemented in Phases or Expanded (24%)	Weighted Average Score	Comments
1	Gulf Coast Desalination	2	5	1	3	1	5	2.87	• The distribution pipeline length is approximately 12 miles long, which is expected to have a moderate impact on water age and water quality at the Member Government's tap with respect to disinfectant residual and DBP formation. • The concept's annual average yield of 25 mgd ties into the Regional Keller Transmission Main which significantly improves hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that maintenance personnel will be required to travel a large distance starting from the Cypress Creek Pump Station Operational Hub to the proposed desalination facility which will require significant coordination. • Desalination has high O&M complexity, and Tampa Bay Water has experience with this type of treatment. • This concept has a high potential for future expansion.
2	Pasco Brackish Wellfield	3.5	3	3	3	4	3	3.31	• The distribution pipeline length is approximately 5 miles long. Due to the length of the pipeline a moderate to low water age impact is to be expected. • The concept's annual average yield of 5 mgd ties into the Regional Keller Transmission Main TM which slightly improves hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that maintenance personnel will be required to travel a medium distance starting from the Cypress Creek Pump Station Operational Hub to the project concept. • Tampa Bay Water is moderately familiar with brackish water reverse osmosis through the existing desalination plant. • Brackish desalination has moderate O&M complexity, and Tampa Bay Water has experience with this type of treatment. Tampa Bay Water is familiar with the operation of groundwater wells. • This concept has some supply expansion potential, but additional studies would need to be performed to confirm.
3a	St. Petersburg Desalination Plant	4	5	1	3	1	2	2.41	• The distribution pipeline length is approximately 1 mile long. Due to the length of the pipeline a low water age impact is to be expected. • The concept's annual average yield of 30 mgd supplies a new St. Petersburg Point of Connection which significantly improves hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that maintenance personnel will be required to travel a large distance starting from the Cypress Creek Pump Station Operational Hub to the project concept. • Desalination has high O&M complexity, and Tampa Bay Water has experience with this type of treatment. • This concept has some location constraints which would limit expansion potential.

Concept ID	Concept Name	Water Age/ Water Quality Impact (13%)	Hydraulic Impact (13%)	Distance to Operational Hub (13%)	Familiarity with Treatment/ Maintenance (13%)	Difficulty of Operation (24%)	Ability to be Implemented in Phases or Expanded (24%)	Weighted Average Score	Comments
3b	St. Petersburg Brackish Plant	4	3	1	3	4	2	2.87	• The distribution pipeline length is approximately 2 miles long. Due to the length of the pipeline a low water age impact is to be expected. • The concept's annual average yield of 5 mgd supplies the St. Petersburg Point of Connection which significantly improves hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that maintenance personnel will be required to travel a large distance starting from the Cypress Creek Pump Station Operational Hub to the project concept. • Brackish desalination has moderate O&M complexity, and Tampa Bay Water has experience with this type of treatment. Tampa Bay Water is familiar with the operation of groundwater wells. • This concept has some location constraints which would limit expansion potential.
4	Existing Desalination Plant Expansion	5	3	5	3	1	1	2.56	• Water age will improve in the desalination plant transmission main if production is increased from the plant even though the desalination supply is trimmed at the Regional Facility site. • The Desalination Plant Expansion includes an additional 10 mgd capacity on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main which moderately reduces hydraulic capacity constraints on these two transmission mains. • There is no increased travel distance for maintenance to reach an Operation Hub as existing out-sourced O&M staff maintains the existing facility. • Desalination has high O&M complexity, and Tampa Bay Water has experience with this type of treatment. • This concept has space constraints that restrict supply increases beyond this expansion.
5a	Existing Desalination Plant Expansion with Reuse	5	3	5	2	1	1	2.43	• Water age will improve in the desalination plant transmission main if production is increased from the plant even though the desalination supply is trimmed at the Regional Facility site. • This concept includes an additional 10 mgd capacity on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main which moderately reduces hydraulic capacity constraints on both transmission mains. • There is no increased travel distance for maintenance to reach an Operation Hub as existing out-sourced O&M staff maintains the existing facility. • Advanced water treatment of reclaimed water has high O&M complexity, but Tampa Bay Water has familiarity with some of the treatment processes. • This concept has space constraints that restrict supply increases beyond this expansion.
5b	Existing Desalination Plant Expansion with Brackish	5	2.5	4	3	1	1	2.37	• Water age will improve in the desalination plant transmission main if production is increased from the plant even though the desalination supply is trimmed at the Regional Facility site. • This concept includes an additional 5 mgd capacity on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main which moderately to significantly reduces hydraulic capacity constraints on both the transmission mains. • It is expected that maintenance personnel will be required to travel a small distance starting from the Regional SWTP Operational Hub to the project concept. • Desalination has high O&M complexity, and Tampa Bay Water has experience with this type of treatment. Tampa Bay Water is familiar with the operation of groundwater wells. • Tampa Bay Water is familiar with the operation of groundwater wells. • This concept has space constraints that restrict supply increases beyond this expansion.

Concept ID	Concept Name	Water Age/ Water Quality Impact (13%)	Hydraulic Impact (13%)	Distance to Operational Hub (13%)	Familiarity with Treatment/ Maintenance (13%)	Difficulty of Operation (24%)	Ability to be Implemented in Phases or Expanded (24%)	Weighted Average Score	Comments
6	North Pinellas SWTP	5	3	1	3	3	3	3.00	• There will be no water age impact on this concept since there is no new distribution pipeline. • This concept includes 5 mgd less required capacity on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main which slightly improves hydraulic capacity constraints on both the transmission mains. • It is expected that maintenance personnel will be required to travel frequently from the Cypress Creek Pump Station Operational Hub to the project concept. An in-sourced or out-sourced dedicated O&M staff would be required. • Surface water treatment has moderate treatment and O&M complexity, and Tampa Bay Water has familiarity with this type of treatment. There will be additional O&M requirements associated with the new reservoir. • Based on the addition of a reservoir and the potential changes to lake level operations, this concept has some supply expansion potential.
7	New SWTP via Lake Thonotosassa	3.5	3	3	3	3	1	2.59	• The distribution pipeline length is approximately 4 miles long. Due to the length of the pipeline a moderate to low water age impact is to be expected. • This concept includes an additional 2 mgd capacity on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main which negligibly reduces hydraulic capacity constraints on both transmission mains. • It is expected that maintenance personnel will be required to travel a medium distance starting from the SWTP Operational Hub to the project concept. An in-sourced or out-sourced dedicated O&M staff would be required. • Surface water treatment has moderate treatment and O&M complexity, and Tampa Bay Water has familiarity with this type of treatment. • Based on a desktop review of Lake Thonotosassa's water availability, this concept has limited supply expansion potential.
8	New SWTP at the Regional Reservoir via Increased Alafia Withdrawals	3.5	3	4	3	3	2	2.96	• The distribution pipeline length is approximately 5 miles long. Due to the length of the pipeline a moderate to low water age impact is to be expected. • This concept includes 6 mgd less required capacity on the Brandon South-Central Connection Transmission Main which slightly improves hydraulic capacity constraints on this transmission main. • It is expected that maintenance personnel will be required to travel a close distance starting from the Regional SWTP Operational Hub to the project concept. An in-sourced or out-sourced dedicated O&M staff would be required. • Surface water treatment has moderate treatment and O&M complexity, and Tampa Bay Water has familiarity with this type of treatment. • Based on the size of the reservoir and the Alafia withdrawals, this concept has limited supply expansion potential.

Concept ID	Concept Name	Water Age/ Water Quality Impact (13%)	Hydraulic Impact (13%)	Distance to Operational Hub (13%)	Familiarity with Treatment/ Maintenance (13%)	Difficulty of Operation (24%)	Ability to be Implemented in Phases or Expanded (24%)	Weighted Average Score	Comments
9	New SWTP and Reservoir via New Supplies	4	3.5	1	3	3	3	2.94	• The distribution pipeline length is approximately 4 miles long. Due to the length of the pipeline a moderate to low water age impact is to be expected. • This concept includes 9 mgd less required capacity on the Brandon Urban Dispersed Transmission Main which moderately improves hydraulic capacity constraints on the Brandon Urban Dispersed Transmission Main. • It is expected that maintenance personnel will be required to travel a medium distance starting from the Regional SWTP Operational Hub to the project concept. An in-sourced or out-sourced dedicated O&M staff would be required. • Surface water treatment has moderate treatment and O&M complexity, and Tampa Bay Water has familiarity with this type of treatment. There will be additional O&M requirements associated with the new reservoir. • This concept has some supply expansion potential, it could potentially connect with other supplies.
10	Eastern Pasco Wellfield	5	3.5	5	5	5	3	4.33	• There will be no water age impact on this concept since there is no new distribution pipeline. • This concept includes an additional 10 mgd capacity that ties into the Cypress Creek Transmission Main which moderately improves hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that maintenance personnel will be required to travel a close distance starting from the Cypress Creek Pump Station Operational Hub to the project concept. • Tampa Bay Water is familiar with groundwater treatment, O&M, and production well processes. • This concept has some supply expansion potential, but additional studies would need to be performed to confirm.
11	Interconnect with Polk Regional Water Cooperative	1	2	1	5	5	1	2.61	• The distribution pipeline length is approximately 33 miles long. Due to the length of the pipeline, a significant water age impact is to be expected. • This concept includes an additional 5 mgd capacity that ties into the Regional Transmission Main which slightly reduces the hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that maintenance personnel will be required to travel a far distance starting from the Regional SWTP Operational Hub to the project concept. • This concept has minimal O&M and treatment requirements, and Tampa Bay water is familiar with operating interconnects. • This concept has limited supply expansion potential since it is supplied by a third party.
12	Interconnect with Peace River Manasota Water Supply Authority	1	3	1	5	5	1	2.74	• The distribution pipeline length is approximately 38 miles long. Due to the length of the pipeline, a significant water age impact is to be expected. • This concept includes 6 mgd less required capacity on the Brandon Urban Dispersed Transmission Main which slightly improves hydraulic capacity constraints on the Brandon Urban Dispersed Transmission Main. • It is expected that maintenance personnel will be required to travel a far distance starting from the SWTP Operational Hub to the project concept. • This concept has minimal O&M and treatment requirements, and Tampa Bay water is familiar with operating interconnects. • This concept has limited supply expansion potential since it is supplied by a third party.

Concept ID	Concept Name	Water Age/ Water Quality Impact (13%)	Hydraulic Impact (13%)	Distance to Operational Hub (13%)	Familiarity with Treatment/ Maintenance (13%)	Difficulty of Operation (24%)	Ability to be Implemented in Phases or Expanded (24%)	Weighted Average Score	Comments
13a	Transfer Existing Groundwater Permits – Pasco County	2	3	3	5	5	2	3.37	• The distribution pipeline length is approximately 19 miles long. Due to the length of the pipeline, a moderate to significant water age impact is to be expected. • This concept includes an additional 3.5 mgd capacity that ties into the Regional Transmission Main near Cypress Creek Transmission Main which slightly improves the hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that maintenance personnel will be required to travel a far distance starting from the Cypress Creek Pump Station Operational Hub to the project concept. • Tampa Bay Water is familiar with groundwater treatment, O&M, and production well processes. • This concept has some supply potential based on the availability of well permits.
13b	Transfer Existing Groundwater Permits – Hillsborough County	4	4	1	5	5	3	3.74	• The distribution pipeline length is approximately 2 miles long. Due to the length of the pipeline a low water age impact is to be expected. • This concept includes 15 mgd less required capacity on the Brandon Urban Dispersed Transmission Main which moderately improves hydraulic capacity constraints on the Brandon Urban Dispersed Transmission Main. • It is expected that maintenance personnel will be required to travel a far distance starting from the SWTP Operational Hub to the project concept. • Tampa Bay Water is familiar with groundwater treatment, O&M, and production well processes. • This concept has some supply expansion potential based on the availability of well permits.
14a	Increase CWUP	5	3	5	5	5	1	3.78	• Utilizing existing infrastructure, this concept includes an increase of 10 mgd to the Tampa Bay Water CWUP. • Pulling an additional 10 mgd of groundwater in Hillsborough County will moderately improve capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that no additional travel will be required for maintenance personnel as increased withdrawals will be at existing wellfields. • This concept has minimal O&M and treatment requirements. • This concept has limited supply expansion potential.
14b	Increase CWUP via a Pinellas County Reclaimed Water Aquifer Recharge Wellfield	5	3	2	3	3	3	3.13	• There will be no water age impact on this concept since there is no new finished water distribution pipeline. • This concept includes an increase of 6.3 mgd to the existing CWUP. Pulling additional groundwater in Hillsborough County will improve capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that maintenance personnel will be required to travel a far distance starting from the Cypress Creek Pump Station Operational Hub to the project concept. • Tampa Bay Water is very familiar with existing groundwater treatment systems, although there is less familiarity with deaeration and recharge wells. This concept will have moderate O&M requirements. • This concept has some supply expansion potential based on reclaimed water availability.

Concept ID	Concept Name	Water Age/ Water Quality Impact (13%)	Hydraulic Impact (13%)	Distance to Operational Hub (13%)	Familiarity with Treatment/ Maintenance (13%)	Difficulty of Operation (24%)	Ability to be Implemented in Phases or Expanded (24%)	Weighted Average Score	Comments
14c	Increase CWUP via a Reclaimed Water Aquifer Recharge with Natural Systems	5	3	2	3	3	3	3.13	• There will be no water age impact on this concept since there is no new finished water distribution pipeline. • This concept includes an increase of 0.2 mgd to the existing CWUP. Pulling additional groundwater in northern Pinellas and Pasco Counties will slightly improve capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that maintenance personnel will be required to travel a far distance starting from the Cypress Creek Pump Station Operational Hub to the project concept. • Tampa Bay Water is very familiar with existing groundwater treatment systems, although there is less familiarity with deaeration and recharge wells. This concept will have moderate O&M requirements. • This concept has some supply expansion potential based on reclaimed water availability.
15a	DPR – Hillsborough County	5	2	5	1	2	4	3.13	• There will be no water age impact on this concept since there is no new distribution pipeline. • This concept includes an additional 10.5 mgd capacity from the Tampa Bay Regional Surface Water Treatment Plant which will moderately reduce hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that maintenance personnel will be required to travel a close distance starting from the Regional SWTP Operational Hub to the project concept. • Advanced treatment of reclaimed water has high O&M complexity and will require some sort of nanofiltration and reverse osmosis. The DPR treatment process will require a dedicated O&M staff. Tampa Bay Water has minimal familiarity with these O&M requirements. • This concept has good supply expansion potential based on the anticipated volume of reclaimed water available from Hillsborough County, however treatment capacity at the existing SWTP would need to be confirmed in a future study.
15b	DPR – Pinellas County	5	3	1	1	2	4	2.74	• There will be no water age impact on this concept since there is no new distribution pipeline. • This concept includes an additional 5.8 mgd capacity into the Keller Transmission Main which will slightly reduce hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that maintenance personnel will be required to travel a far distance starting from the Cypress Creek Pump Station Operational Hub to the project concept. • Advanced treatment of reclaimed water has high O&M complexity and will require some sort of nanofiltration and reverse osmosis. The DPR treatment process will require a dedicated O&M staff. Tampa Bay Water has minimal familiarity with these O&M requirements. • This concept has good supply expansion potential based on the anticipated volume of reclaimed water available from Pinellas County, however treatment capacity at the existing S.K. Keller WTP would need to be confirmed in a future study.

Concept ID	Concept Name	Water Age/ Water Quality Impact (13%)	Hydraulic Impact (13%)	Distance to Operational Hub (13%)	Familiarity with Treatment/ Maintenance (13%)	Difficulty of Operation (24%)	Ability to be Implemented in Phases or Expanded (24%)	Weighted Average Score	Comments
15c	DPR – City of Tampa	5	1.5	5	1	2	5	3.31	• There will be no water age impact on this concept since there is no new distribution pipeline. • This concept includes an additional 14 mgd capacity from the Tampa Bay Regional Surface Water Treatment Plant which will moderately to significantly reduce hydraulic capacity constraints on the North-Central Hillsborough Intertie and the Morris Bridge Transmission Main. • It is expected that maintenance personnel will be required to travel a close distance starting from the Regional SWTP Operational Hub to the project concept. • Advanced treatment of reclaimed water has high O&M complexity and will require some sort of nanofiltration and reverse osmosis. The DPR treatment process will require a dedicated O&M staff. Tampa Bay Water has minimal familiarity with these O&M requirements. • This concept has good supply expansion potential based on the anticipated volume of reclaimed water available from the City of Tampa, however treatment capacity at the existing SWTP would need to be confirmed in a future study.
16a	South Hillsborough Wellfield	4	3	4	5	5	1	3.52	• There will be no water age impact on this concept since there is a small distribution pipeline. • This concept includes a 4-6 mgd tie-in to the South Hillsborough Point of Connection which may improve hydraulic capacity constraints and reduce reliance on the Brandon Urban Dispersed Transmission Main. • It is expected that maintenance personnel will be required to travel a close distance starting from the Regional SWTP Operational Hub to the project concept. • Tampa Bay Water is familiar with groundwater treatment, O&M, and production well processes. • This concept has unknown expansion potential due to changing land uses.
16b	South Hillsborough Wellfield via Aquifer Recharge	4	3	4	5	4	4	4.00	• There will be no water age impact on this concept since there is a small distribution pipeline. • This concept includes a 4-6 mgd tie-in to the South Hillsborough Point of Connection which may improve hydraulic capacity constraints and reduce reliance on the Brandon Urban Dispersed Transmission Main. • It is expected that maintenance personnel will be required to travel a far distance starting from the Regional SWTP Operational Hub to the project concept. • Tampa Bay Water is familiar with groundwater treatment, O&M, and production well processes. • This concept has good supply expansion potential based on reclaimed water availability.
16c	South Hillsborough Wellfield via IPR	4	3	4	1	2	4	3.00	• There will be no water age impact on this concept since there is a small distribution pipeline. • This concept includes a 9 mgd tie-in to the South Hillsborough Point of Connection which may improve hydraulic capacity constraints and reduce reliance on the Brandon Urban Dispersed Transmission Main. • It is expected that maintenance personnel will be required to travel a close distance starting from the Regional Surface Water Treatment Plant Operational Hub to the project concept. • Advanced water treatment of reclaimed water for the purpose of IPR has high O&M complexity, and Tampa Bay Water has minimal familiarity with these O&M requirements. A dedicated O&M staff is required. Tampa Bay Water is familiar with the operation of production wells. • This concept has somewhat good supply expansion potential based on reclaimed water availability.

Project Cost – Cost Risk Factors

Table B-6 Fine Screening Scoring - Cost Risk Factors

Concept ID	Concept Name	Potential for Schedule Delays due to Supply Chain Issues (Equipment or Chemicals)	Ability to Meet Future Regulatory Changes that Mandate More Stringent Water Quality Requirements (e.g., PFAS)	Constructability Risk	Average Score	Comments
1	Gulf Coast Desalination	1	5	1	2.33	• Potential supply chain issues with membrane filtration equipment. • Long lead time on large plant equipment (including pumps and transformers). • High anticipated ability to meet future regulatory changes due to proposed treatment type. • Constructability risks associated with a long pipeline and colocation with the power plant.
2	Pasco Brackish Wellfield	4	4	3	3.67	• Less supply chain concerns and potential for delays due to smaller RO plant size with no microfiltration (MF) / Ultrafiltration (UF) membrane filtration. • The proposed treatment is anticipated to meet future water quality, although there is a potential for bypass flow to need treatment in the future. • Some constructability risks associated with pipeline, new plant, and new concentrate well.
3a	St. Petersburg Desalination Plant	1	5	2	2.67	• Potential supply chain issues with membrane filtration equipment. • Long lead time on large plant equipment (including pumps and transformers). • High anticipated ability to meet future regulatory changes due to treatment type. • Constructability risks associated with deep injection well and the supply pipeline in.
3b	St. Petersburg Brackish Plant	4	4	3	3.67	• Less supply chain concerns and potential for delays due to smaller RO plant size with no microfiltration (MF) / Ultrafiltration (UF) membrane filtration. • The proposed treatment is anticipated to meet regulatory changes, although there is a potential for bypass flow to need treatment in the future. • Some constructability risks associated with pipeline, new plant, and new concentrate well.
4	Existing Desalination Plant Expansion	3	5	2	3.33	• Potential supply chain issues with membrane filtration equipment. • Long lead time on large plant equipment (including pumps and transformers), but this expansion is a smaller capacity than a new plant. • Anticipated ability to meet future regulatory changes due to proposed treatment type. • Constructability risks due to upsized seawater pipeline, challenges with construction on existing site, maintenance of plant operation challenges.
5a	Existing Desalination Plant Expansion with Reuse	2	4	1	2.33	• Potential supply chain issues with membrane filtration equipment. • Long lead time on large plant equipment (including pumps and transformers and pumps for reclaimed water), but this expansion is a smaller capacity than a new plant. • Anticipated ability to meet future regulatory changes due to proposed treatment type, but some uncertainty related to upcoming DPR regulations. • Constructability risks due to long pipeline, challenges with construction on existing site, maintenance of plant operation challenges, and uncertainty related to upcoming DPR regulations.
5b	Existing Desalination Plant Expansion with Brackish	3	5	2	3.33	• Less supply chain concerns since there is no expansion of pretreatment microfiltration (MF) /Ultrafiltration (UF) treatment and solids handling. • Anticipated ability to meet future regulatory changes due to proposed treatment type. • Constructability risks due to challenges with construction on existing site, maintenance of plant operation challenges.
6	North Pinellas SWTP	4	3	2	3.00	• Low to moderate potential for supply chain delays, some unique treatment considerations that may impact project. • Modifications to proposed treatment may be necessary to meet future regulatory changes. • Low constructability score for new reservoir.
7	New SWTP via Lake Thonotosassa	4	2	2	2.67	• Low to moderate potential for supply chain delays, some unique treatment considerations that may impact project. • Modifications to proposed treatment may be necessary to meet future regulatory changes. • Low constructability score for risk of a reservoir requirement.
8	New SWTP at the Regional Reservoir via Increased Alafia Withdrawals	4	2	3	3.00	• Low to moderate potential for supply chain delays, some unique treatment considerations that may impact project. • Modifications to proposed treatment may be necessary to meet future regulatory changes. • Constructability risks associated with fluoride treatment and water management uncertainty.

Concept ID	Concept Name	Potential for Schedule Delays due to Supply Chain Issues (Equipment or Chemicals)	Ability to Meet Future Regulatory Changes that Mandate More Stringent Water Quality Requirements (e.g., PFAS)	Constructability Risk	Average Score	Comments
9	New SWTP and Reservoir via New Supplies	4	3	1	2.67	• Low to moderate potential for supply chain delays, some unique treatment considerations that may impact project. • Modifications to proposed treatment may be necessary to meet future regulatory changes. • Constructability risks associated with long pipelines from multiple sources and new reservoir.
10	Eastern Pasco Wellfield	5	5	3	4.33	• Less supply chain concerns and potential for delays. • The proposed treatment is anticipated to meet regulatory changes. • Some constructability risks associated with moderate pipeline length, new groundwater sources and well production risks.
11	Interconnect with Polk Regional Water Cooperative	5	3	2	3.33	• Low potential for schedule delays due to supply chain issues. • Proposed treatment process modifications would likely be required at PRWC to meet potential future regulations. • Constructability risk associated with long pipeline.
12	Interconnect with Peace River Manasota Water Supply Authority	5	3	2	3.33	• Low potential for schedule delays due to supply chain issues. • Proposed treatment process modifications would likely be required at PRMRWSA to meet potential future regulations. • Constructability risk associated with long pipeline.
13a	Transfer Existing Groundwater Permits – Pasco County	5	4	4	4.33	• Low potential for schedule delays. • Proposed treatment process modifications would likely be sufficient to meet potential future regulations. • Constructability risk regarding groundwater quality of existing permit holders and long pipeline.
13b	Transfer Existing Groundwater Permits – Hillsborough County	5	4	2	3.67	• Low potential for schedule delays. • Proposed treatment process modifications would likely be sufficient to meet potential future regulations. • Constructability risk regarding groundwater quality of existing permit holders and long pipeline.
14a	Increase CWUP	5	3	5	4.33	• No potential for schedule delays due to supply chain issues as no new infrastructure is required. • Ability to meet future regulatory changes varies based on existing WTP processes. • No constructability risk as no new infrastructure is required.
14b	Increase CWUP via a Pinellas County Reclaimed Water Aquifer Recharge Wellfield	4	3	2	3.00	• Low potential for schedule delays due to supply chain issues. • Ability to meet future regulatory changes varies based on existing WTP processes. • Constructability risk associated with long pipeline.
14c	Increase CWUP via a Reclaimed Water Aquifer Recharge with Natural Systems	5	3	1	3.00	• Low potential for schedule delays due to supply chain issues. • Ability to meet future regulatory changes varies based on existing WTP processes. • Constructability risk associated with long pipeline, constructed wetland and permeability considerations.
15a	DPR – Hillsborough County	2	5	2	3.00	• Potential for schedule delays due to supply chain issues with membrane filtration equipment. • Long lead time on moderately sized plant equipment (pumps, treatment systems, transformers). • Anticipated ability to meet future regulatory changes due to proposed treatment type. • Constructability risks associated with SWTP expansion and development of DPR regulatory requirements.
15b	DPR – Pinellas County	2	5	1	2.67	• Potential for schedule delays due to supply chain issues with membrane filtration equipment. • Long lead time on moderately sized plant equipment (pumps, treatment systems, transformers). • Anticipated ability to meet future regulatory changes due to proposed treatment type. • Constructability risks associated with long pipeline length, WTP expansion and development of DPR regulatory requirements.
15c	DPR – City of Tampa	2	5	1	2.67	• Potential for schedule delays due to supply chain issues with membrane filtration equipment. • Long lead time on moderately sized plant equipment (pumps, treatment systems, transformers). • High anticipated ability to meet future regulatory changes due to proposed treatment type. • Constructability risks associated with moderate pipeline length, sufficient SWTP expansion and development of DPR regulatory requirements.

Concept ID	Concept Name	Potential for Schedule Delays due to Supply Chain Issues (Equipment or Chemicals)	Ability to Meet Future Regulatory Changes that Mandate More Stringent Water Quality Requirements (e.g., PFAS)	Constructability Risk	Average Score	Comments
16a	South Hillsborough Wellfield	5	5	4	4.67	• Less supply chain concerns and potential for delays. • The proposed treatment is anticipated to meet regulatory changes. • Some constructability risks associated with new well production risks.
16b	South Hillsborough Wellfield via Aquifer Recharge	4	3	4	3.67	• Low potential for schedule delays due to supply chain issues. • The proposed treatment is anticipated to meet regulatory changes although there is some uncertainty regarding arsenic mobilization. • Some constructability risks associated with new well production risks, however since this project has already been evaluated, a higher score was given.
16c	South Hillsborough Wellfield via IPR	2	4	3	3.00	• Potential for supply chain issues due to membrane filtration and long lead time anticipated due to moderately sized plant equipment (including pumps and treatment systems). • The proposed treatment is anticipated to meet regulatory changes although there is some uncertainty regarding arsenic mobilization. • Some constructability risks associated with new well production risks and moderate pipeline length.

Reliability – Yield Reliability

Table B-7 Fine Screening Scoring - Yield Reliability

Concept ID	Concept Name	Long-Term Yield Reliability	Impacts to Capacity and Quality by Seasonal Variation	Resilience to Natural Disasters, Sea Level Rise, and Climate Change	Recovery from Events or Conditions that Negatively Impact Yield	Reliance on Third Parties to Ensure Supply Availability	Average Score	Comments
1	Gulf Coast Desalination	5	5	1	4	3	3.60	• High long term yield reliability and limited seasonal impacts with seawater source. • The source and location are anticipated to have limited resilience but moderate ability to recover from natural disasters, climate change and sea level rise. • The concept partially relies on the Anclote Power Plant for supply of cooling water, though third-party reliance for source water is not anticipated.
2	Pasco Brackish Wellfield	4	5	3	3	5	4.00	• Moderately high long term yield reliability and limited seasonal impacts from brackish groundwater, although depletion from increased pumping is possible. • The supply is expected to have moderate resilience and recovery from natural disasters, climate change and sea level rise. • This concept is not reliant on a third party for supply.
3a	St. Petersburg Desalination Plant	5	5	2	5	5	4.40	• High long term yield reliability and limited seasonal impacts with seawater source. • The supply is expected to have low to moderate resilience and recovery from natural disasters, sea level rise and climate change, though there are vulnerabilities due to the coastal bay location of the proposed facility. • This concept is not reliant on a third party for supply.
3b	St. Petersburg Brackish Plant	1	5	2	3	2	2.60	• Low long term yield reliability due to fouling in similar brackish wells. • The supply is anticipated to have low to moderate resilience and recovery from natural disasters, sea level rise and climate change. • The concept relies on the City of St. Petersburg to repair existing deep injection wells for successful implementation.
4	Existing Desalination Plant Expansion	4	5	1	4	4	3.60	• Moderately high long term yield reliability with seawater source, although impacts from TECO's operations is considered. • The supply is expected to have limited resilience, but high ability to recover from natural disasters, sea level rise and climate change. Although, storm surge could keep the plant offline for an extended period. • The concept continues to have some reliance on the co-located power plant.
5a	Existing Desalination Plant Expansion with Reuse	4	3	1	4	4	3.20	• Relatively high long term yield reliability from reclaimed water source. • The source and location are anticipated to have limited resilience but high ability to recover from natural disasters, climate change and sea level rise. Although, storm surge could keep the plant offline for an extended period. • The concept continues to have some reliance on the co-located power plant.
5b	Existing Desalination Plant Expansion with Brackish	1	5	1	4	4	3.00	• Low long term yield reliability due to fouling in similar brackish wells. • Deep injection wells are shallow and subject to upwelling, thus mixing with brackish groundwater. • Limited seasonal impacts from brackish groundwater. • The source and location are anticipated to have limited resilience but high ability to recover from natural disasters, climate change and sea level rise. Although, storm surge could keep the plant offline for an extended period. • The concept continues to have some reliance on the co-located power plant.
6	North Pinellas SWTP	2	3	2	3	5	3.00	• Low long term yield reliability due to inconsistent flow from Lake Tarpon. • Seasonal impacts on capacity and quality are mitigated by the presence of a reservoir. • The supply is expected to have low to moderate resilience and recovery from natural disasters, sea level rise and climate change. • This concept is not reliant on a third party for supply.

Concept ID	Concept Name	Long-Term Yield Reliability	Impacts to Capacity and Quality by Seasonal Variation	Resilience to Natural Disasters, Sea Level Rise, and Climate Change	Recovery from Events or Conditions that Negatively Impact Yield	Reliance on Third Parties to Ensure Supply Availability	Average Score	Comments
7	New SWTP via Lake Thonotosassa	1	1	2	2	5	2.20	• Low long term yield reliability due to low and inconsistent flow from Lake Thonotosassa and historical surrounding well data. • Significant impacts to capacity are anticipated due to seasonal variations. • The supply is expected to have limited resilience and recovery from natural disasters, sea level rise and climate change. • This concept is not reliant on a third party for supply.
8	New SWTP at the Regional Reservoir via Increased Alafia Withdrawals	2	3	3	4	5	3.40	• Low long term yield reliability for surface water sources. • Moderate impacts of quantity and quality from seasonal variations, including fluoride concerns. • Moderate resilience and recovery from natural disasters, sea level rise and climate change, and natural disasters. • This concept is not reliant on a third party for supply.
9	New SWTP and Reservoir via New Supplies	3	3	4	3	5	3.60	• Moderate long term yield reliability for surface water sources, including Bullfrog Creek and Little Manatee River. • Seasonal impacts on capacity and quality are mitigated by the presence of a reservoir. • Moderate resilience and recovery from natural disasters, sea level rise and climate change, and natural disasters. • This concept is not reliant on a third party for supply.
10	Eastern Pasco Wellfield	4	5	4	1	5	3.80	• Moderately high long term yield reliability for fresh groundwater supply. • Limited seasonal impacts to supply quality and capacity. • Supply and inland location are moderately resilient to natural disasters, sea level rise and climate change, but recovery from events that negatively impact yield is anticipated to be slow. • This concept is not reliant on a third party for supply.
11	Interconnect with Polk Regional Water Cooperative	2	2	3	1	1	1.80	• Lower long term yield reliability due to uncertainty related to the Polk Regional Water Cooperative (PRWC) sources and system reliability. • Moderately high impacts to capacity based on seasonal variations are anticipated, due to less supply being available for sale from the PRWC. • Moderate resilience and limited recovery from natural disasters, sea level rise and climate change are anticipated, with the majority of supply expected to come from fresh groundwater. • This concept is reliant on a third party for supply.
12	Interconnect with Peace River Manasota Water Supply Authority	2	3	3	3	1	2.40	• Lower long term yield reliability due to uncertainty related to the Peace River Manasota Regional Water Supply Authority (PRMRWSA) sources and system reliability. • Moderate impacts to capacity based on seasonal variations are anticipated, due to less supply being available for sale from the PRMRWSA. • The PRMRWSA supply is sourced from the Peace River and aquifer storage and recovery (ASR) systems which are likely to be moderately impacted by climate change, sea level rise and natural disasters. • This concept is reliant on a third party for supply.
13a	Transfer Existing Groundwater Permits – Pasco County	4	5	4	1	3	3.40	• Long term yield reliability is moderately high as fresh groundwater supply is viewed as reliable and will be permitted for a set withdrawal volume. • Limited impact to capacity or quality based on seasonal variations is anticipated. • The supply and inland location are anticipated to have moderately high resilience, but limited recovery from natural disasters, sea level rise and climate change is expected. • There is some reliance on third parties for the transfer of permits.
13b	Transfer Existing Groundwater Permits – Hillsborough County	4	5	4	1	3	3.40	• Long term yield reliability is moderately high as fresh groundwater supply is viewed as reliable and will be permitted for a set withdrawal volume. • Limited impact to capacity or quality based on seasonal variations is anticipated. • The supply and inland location are anticipated to have moderately high resilience, but limited recovery from natural disasters and climate change is expected. • There is some reliance on third parties for the transfer of permits.

Concept ID	Concept Name	Long-Term Yield Reliability	Impacts to Capacity and Quality by Seasonal Variation	Resilience to Natural Disasters, Sea Level Rise, and Climate Change	Recovery from Events or Conditions that Negatively Impact Yield	Reliance on Third Parties to Ensure Supply Availability	Average Score	Comments
14a	Increase CWUP	5	5	4	1	5	4.00	• Long term yield reliability is moderately high as fresh groundwater supply is viewed as reliable and will be permitted for a set withdrawal volume. • Limited impact to capacity or quality based on seasonal variations is anticipated. • The supply and inland location are anticipated to have moderately high resilience, but limited recovery from natural disasters and climate change is expected. • This concept has no reliance on third parties.
14b	Increase CWUP via a Pinellas County Reclaimed Water Aquifer Recharge Wellfield	3	3	2	3	3	2.80	• Moderate long term yield reliability due to dependence on reclaimed water source and withdrawal pumping. • The supply is anticipated to have moderate seasonal impacts capacity and quality that will be mitigated by reclaimed water injections. • Low to moderate resilience and recovery from natural disasters and climate change is anticipated, with the inland location of the concept and injections providing additional resiliency and recovery. • This concept has some reliance on third parties.
14c	Increase CWUP via a Reclaimed Water Aquifer Recharge with Natural Systems	3	2	2	1	3	2.20	• Moderate long term yield reliability due to dependence on reclaimed water source and withdrawal pumping. • The supply is anticipated to have seasonal impacts on capacity and quality. • The supply and location are expected to have limited resilience and recovery from natural disasters and climate change as natural groundwater and wetlands recharge can take several years, though the inland location of the concept provides some resiliency benefit. • This concept has some reliance on third parties.
15a	DPR – Hillsborough County	3	3	4	4	1	3.00	• Moderate long term yield reliability, with 20 mgd of water anticipated to be available from Hillsborough County. • Moderate impacts to capacity are anticipated based on seasonal variations. • High resilience and recovery from natural disasters, sea level rise and climate change are anticipated due to inland location and reclaimed water supply type. • This concept is reliant on a third party.
15b	DPR – Pinellas County	3	3	2	4	1	2.60	• Moderate long term yield reliability, with approximately 8 mgd of water anticipated to be available from Pinellas County. • Moderate impacts to capacity are anticipated based on seasonal variations. • Limited resilience but moderately high recovery from natural disasters, sea level rise and climate change are anticipated due to coastal location, reclaimed water supply type and presence of a reclaimed water reservoir. • This concept is reliant on a third party.
15c	DPR – City of Tampa	5	4	2	4	1	3.20	• High long term yield reliability, with 20-50 mgd of water anticipated to be available from the City of Tampa. • Due to large available supply, limited impacts to capacity based on seasonal variations are anticipated. • Limited resilience but moderately high recovery from natural disasters, sea level rise and climate change are anticipated due to coastal location and reclaimed water supply type. • This concept is reliant on a third party.
16a	South Hillsborough Wellfield	3	2	3	1	5	2.80	• Moderate long term yield reliability for this fresh groundwater supply. • Moderately high seasonal impacts to reclaimed water supply. • Supply and inland location are anticipated to have moderate resilience but low recovery from natural disasters, sea level rise and climate change. • This concept is not reliant on a third party.

Concept ID	Concept Name	Long-Term Yield Reliability	Impacts to Capacity and Quality by Seasonal Variation	Resilience to Natural Disasters, Sea Level Rise, and Climate Change	Recovery from Events or Conditions that Negatively Impact Yield	Reliance on Third Parties to Ensure Supply Availability	Average Score	Comments
16b	South Hillsborough Wellfield via Aquifer Recharge	4	3	4	4	3	3.60	• Moderately high long term yield reliability for fresh groundwater supply. • Moderate seasonal impacts to supply quality and capacity are anticipated. • Inland location of supply wells and treatment are anticipated to have moderately high resilience and recovery from natural disasters, sea level rise and climate change. • This concept has some reliance on a third party. • Yield could be limited to prevent inland migration of reclaimed water.
16c	South Hillsborough Wellfield via IPR	4	3	5	4	3	3.80	• Moderately high long term yield reliability for reclaimed water supply. • Moderate seasonal impacts to supply quality and capacity are anticipated. • Supply and inland location are anticipated to have high resilience and recovery from natural disasters, sea level rise and climate change. • This concept has some reliance on a third party.

Reliability – Regional System Reliability Impacts

Table B-8 Fine Screening Scoring - Regional System Reliability Impacts

Concept ID	Concept Name	Consistency of Supply to Growing Demands	Ability of Concept to Provide Service/Relief During Emergency Events	Degree of Impact to Reliability (Regional v. Isolated)	Average Score	Comments
1	Gulf Coast Desalination	3	5	4	4.00	• The concept is located in Pasco County therefore supporting the growing demand. • The location also increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, and through its regional connection downstream of the regional high service pump station.
2	Pasco Brackish Wellfield	3	5	4	4.00	• The concept is located in Pasco County therefore supporting the growing demand. • The location also increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, and through its regional connection downstream of the regional high service pump station.
3a	St. Petersburg Desalination Plant	1	5	1	2.33	• The concept is not located near a high demand area therefore not supporting the growing demand. • The location increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.
3b	St. Petersburg Brackish Plant	1	5	1	2.33	• The concept is not located near a high demand area therefore not supporting the growing demand. • The location increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.
4	Existing Desalination Plant Expansion	4	2	5	3.67	• The concept serves the regional high service pump station with a connection to the South Hillsborough Pipeline therefore supporting the growing demand. • The location does not provide relief to areas downstream of a single point of failure but is upstream of the regional high service pump station which provides increased reliability to the region.
5a	Existing Desalination Plant Expansion with Reuse	4	2	5	3.67	• The concept serves the regional high service pump station with a connection to the South Hillsborough Pipeline therefore supporting the growing demand. • The location does not provide relief to areas downstream of a single point of failure but is upstream of the regional high service pump station which provides increased reliability to the region.
5b	Existing Desalination Plant Expansion with Brackish	4	2	5	3.67	• The concept serves the regional high service pump station with a connection to the South Hillsborough Pipeline therefore supporting the growing demand. • The location does not provide relief to areas downstream of a single point of failure but is upstream of the regional high service pump station which provides increased reliability to the region.
6	North Pinellas SWTP	1	5	1	2.33	• The concept is not located near a high demand area therefore not supporting the growing demand. • The location increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.
7	New SWTP via Lake Thonotosassa	2	2	4	2.67	• Although water from the supply travels north through the North-Central Hillsborough Intertie, the supply origin is not directly adjacent to Pasco County or South Hillsborough County growth areas. • The location does not provide relief to areas downstream of a single point of failure but is downstream of the regional high service pump station which provides increased reliability to the region.
8	New SWTP at the Regional Reservoir via Increased Alafia Withdrawals	5	3	1	3.00	• The concept is connected to the South Hillsborough Pipeline therefore supporting the growing demand. • The location increases reliability by providing relief to a point of connection downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection rather than the regional system though reverse flow could potentially be possible through the regional high service pump station if pressures were great enough.
9	New SWTP and Reservoir via New Supplies	5	3	1	3.00	• The concept is connected to the South Hillsborough Pipeline therefore supporting the growing demand. • The location increases reliability by providing relief to a point of connection downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection rather than the regional system though reverse flow could potentially be possible through the regional high service pump station if pressures were great enough.
10	Eastern Pasco Wellfield	5	2	4	3.67	• The concept is located in Pasco County therefore supporting the growing demand. • The location does not provide relief to areas downstream of a single point of failure but is downstream of the regional high service pump station which provides increased reliability to the region.

Concept ID	Concept Name	Consistency of Supply to Growing Demands	Ability of Concept to Provide Service/Relief During Emergency Events	Degree of Impact to Reliability (Regional v. Isolated)	Average Score	Comments
11	Interconnect with Polk Regional Water Cooperative	1.5	3	4	2.83	• Although water from the supply travels north through the North-Central Hillsborough Intertie, the supply origin is not directly adjacent to Pasco County or South Hillsborough County growth areas. • The location does not provide relief to areas downstream of a single point of failure, though the contractual agreement in addition to the concept being located downstream of the regional high service pump station will provide increased reliability to the region and during emergency events.
12	Interconnect with Peace River Manasota Water Supply Authority	5	3	1	3.00	• The concept is located in South Hillsborough County therefore supporting the growing demand. • The location increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, with the contractual agreement also increasing reliability to the region especially for emergency events. • The concept is connected to a single point of connection to serve one Member Government rather than the regional system.
13a	Transfer Existing Groundwater Permits – Pasco County	4	2	4	3.33	• The concept is located in Pasco County therefore supporting the growing demand. • The location does not provide relief to areas downstream of a single point of failure but is downstream of the regional high service pump station which provides increased reliability to the region.
13b	Transfer Existing Groundwater Permits – Hillsborough County	5	3	1	3.00	• The concept is located in South Hillsborough County therefore supporting the growing demand. • The location increases reliability by providing relief to a point of connection downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.
14a	Increase CWUP	4	4	5	4.33	• An increased CWUP throughout the system supports the growing demand in the region. • The location increases reliability by providing relief to areas upstream and downstream of points of failure, as identified in the 2035 System Analysis Update, therefore increasing supply throughout the regional system.
14b	Increase CWUP via a Pinellas County Reclaimed Water Aquifer Recharge Wellfield	4	4	5	4.33	• An increased CWUP throughout the system supports the growing demand in the region. • The location increases reliability by providing relief to areas upstream and downstream of points of failure, as identified in the 2035 System Analysis Update, therefore increasing supply throughout the regional system.
14c	Increase CWUP via a Reclaimed Water Aquifer Recharge with Natural Systems	4	4	5	4.33	• An increased CWUP throughout the system supports the growing demand in the region. • The location increases reliability by providing relief to areas upstream and downstream of points of failure, as identified in the 2035 System Analysis Update, therefore increasing supply throughout the regional system.
15a	DPR – Hillsborough County	4	2	5	3.67	• The concept serves the regional high service pump station with a connection to the South Hillsborough Pipeline therefore supporting the growing demand. • The location does not provide relief to areas downstream of a single point of failure but is upstream of the regional high service pump station which provides increased reliability to the region.
15b	DPR – Pinellas County	4	4	5	4.33	• Although the supply origin is not directly adjacent to Pasco County, connection to the Keller transmission main may increase available pressures to Pasco County's points of connection by reducing flow in the North-Central Hillsborough Intertie. Also, by connecting to Keller transmission main, flow can potentially travel to Pasco County's points of connection in case of emergency. • The location increases reliability by providing relief to areas upstream and downstream of points of failure, as identified in the 2035 System Analysis Update, and is upstream of the regional high service pump station which provides increased reliability to the region.
15c	DPR – City of Tampa	4	2	5	3.67	• The concept serves the regional high service pump station with a connection to the South Hillsborough Pipeline therefore supporting the growing demand. • The location does not provide relief to areas downstream of a single point of failure but is upstream of the regional high service pump station which provides increased reliability to the region.
16a	South Hillsborough Wellfield	5	3	1	3.00	• The concept is located in South Hillsborough County therefore supporting the growing demand. • The location increases reliability by providing relief to a point of connection downstream and upstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.
16b	South Hillsborough Wellfield via Aquifer Recharge	5	3	1	3.00	• The concept is located in South Hillsborough County therefore supporting the growing demand. • The location increases reliability by providing relief to a point of connection downstream and upstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.
16c	South Hillsborough Wellfield via IPR	5	3	1	3.00	• The concept is located in South Hillsborough County therefore supporting the growing demand. • The location increases reliability by providing relief to a point of connection downstream and upstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.

Reliability – Contractual Requirements and Risks

Table B-9 Fine Screening Scoring - Contractual Requirements

Concept ID	Concept Name	Aligns with the Terms of the Interlocal Agreement and Master Water Supply Contract	Requires Amendments to Governance Documents	Requires New Governance Documents/ Agreements or New Contracts	Average Score	Comments
1	Gulf Coast Desalination	5	5	2	4.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. • A new agreement is necessary between Tampa Bay Water and Progress Energy.
2	Pasco Brackish Wellfield	5	5	5	5.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
3a	St. Petersburg Desalination Plant	5	5	2	4.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
3b	St. Petersburg Brackish Plant	5	5	2	4.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
4	Existing Desalination Plant Expansion	5	5	4	4.67	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
5a	Existing Desalination Plant Expansion with Reuse	5	1	2	2.67	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. • A new agreement with member government providing the reclaimed source will be required.
5b	Existing Desalination Plant Expansion with Brackish	5	5	4	4.67	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. • Some potential for new or revised agreements due to colocation.
6	North Pinellas SWTP	5	5	5	5.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
7	New SWTP via Lake Thonotosassa	5	5	5	5.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
8	New SWTP at the Regional Reservoir via Increased Alafia Withdrawals	5	5	5	5.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
9	New SWTP and Reservoir via New Supplies	5	5	5	5.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
10	Eastern Pasco Wellfield	5	5	5	5.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
11	Interconnect with Polk Regional Water Cooperative	5	1	2	2.67	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. • Amendments to governance documents will be necessary. • New governance documents, agreements, and contracts will be required between Tampa Bay Water and the entity providing the finished water.
12	Interconnect with Peace River Manasota Water Supply Authority	5	1	2	2.67	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. • Amendments to governance documents will be necessary. • New governance documents, agreements, and contracts will be required between Tampa Bay Water and the entity providing the finished water.
13a	Transfer Existing Groundwater Permits – Pasco County	3	3	3	3.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
13b	Transfer Existing Groundwater Permits – Hillsborough County	3	3	3	3.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
14a	Increase CWUP	5	5	5	5.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
14b	Increase CWUP via a Pinellas County Reclaimed Water Aquifer Recharge Wellfield	5	1	2	2.67	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. • Utilization of reclaimed water to recharge the Surficial Aquifer will require new governance, agreement, or contract documents for recharge credits. • A new contract with the reclaimed water provider is anticipated to be required.
14c	Increase CWUP via a Reclaimed Water Aquifer Recharge with Natural Systems	5	1	2	2.67	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. • A new contract with the reclaimed water provider is anticipated to be required.

Concept ID	Concept Name	Aligns with the Terms of the Interlocal Agreement and Master Water Supply Contract	Requires Amendments to Governance Documents	Requires New Governance Documents/ Agreements or New Contracts	Average Score	Comments
15a	DPR – Hillsborough County	5	1	2	2.67	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. • A new contract with the reclaimed water provider is anticipated to be required.
15b	DPR – Pinellas County	5	1	2	2.67	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. • A new contract with the reclaimed water provider is anticipated to be required.
15c	DPR – City of Tampa	5	1	2	2.67	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. • A new contract with the reclaimed water provider is anticipated to be required.
16a	South Hillsborough Wellfield	5	5	5	5.00	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract.
16b	South Hillsborough Wellfield via Aquifer Recharge	5	1	2	2.67	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. • There is no existing governance documentation that focuses on indirect potable reuse. • New governance, agreements, or contracts will be required.
16c	South Hillsborough Wellfield via IPR	5	1	2	2.67	• The concept aligns with the terms of the Interlocal Agreement and Master Water Supply Contract. • There is no existing governance documentation that focuses on indirect potable reuse. • Indirect potable reuse will require a new governance, agreement, or contract document.

Appendix C. Basis of Total Project Cost Estimates

Conceptual total project cost estimates were developed for each of the concepts identified in **Appendix A**. The conceptual total project cost is based on a 30-year planning period and is inclusive of the estimated capital cost, annual operations and maintenance (O&M) cost, and financing costs for all components of the water supply concept. Conceptual capital cost estimates were developed based on the anticipated design capacity of each concept, annualized over the planning period based on the average annual yield or operating capacity of the system. Conceptual O&M cost estimates are based on the average annual yield for each concept. Conceptual life cycle costs consider financing costs at an interest rate of 5% over a 30-year loan period. The total project costs are planning level cost estimates developed specifically for use in the fine screening evaluation. Costs are representative of October 2022 dollars. During the Short-List Evaluation, more refined conceptual cost estimates will be developed based on concept-specific considerations. The following sections outline the scope of facilities for cost estimates and the basis of estimate for conceptual capital and O&M costs.

C.1 Scope of Facilities

Conceptual capital cost estimates were developed based on the infrastructure components and treatment systems identified in the Summary Sheets in **Appendix A**. Conceptual capital cost estimates are inclusive of the following major facilities:

- Raw water supply (wellfields, surface water intakes, and reservoirs, as applicable)
- Raw water transmission systems (pump stations and pipelines)
- Treatment facilities
- Concentrate disposal (discharge canal, deep well injection)
- Solids handling facilities, as required
- Chemical storage and feed systems
- Finished water storage and pumping
- Transmission pipelines to nearest point of connection
- Administration building and general facilities

C.2 Basis of Capital Cost Estimates

C.2.1 Facilities

C.2.1.1 Well Development

For concepts that include wells, the cost of the well was estimated along with pump and housing costs. To estimate the required number of production and deep injection wells, the assumptions in **Table C-1** were made. The cost per well shown in this table does not include additional costs for well drilling or for monitoring wells. The number of wells required are estimates and will be further refined through each screening phase of the Long Term Master Water Plan.

Table C-1 Assumptions for Well Capacity and Cost

Well Type	Capacity (mgd)	Estimated Cost ($M per well)
Production Well – Surficial Aquifer	1.0	0.2
Injection Well	1.0	1.2
RO Concentrate Deep Injection Well - Inland	1.5	2.4
RO Concentrate Deep Injection Well - Coastal	5.0	2.4

C.2.1.2 Equipment Systems

A summary of the equipment costs is provided in **Table C-2**. Costs presented in this table have been adjusted to a 20 mgd equivalent capacity using a power factor. Equipment costs associated with specific options vary based on water supply availability and design capacity of associated treatment systems.

Table C-2 Unit Costs for Equipment Systems

Equipment System	Unit Cost ($/gpd)
Dissolved air flotation	0.11
Microsand ballasted clarification (Actiflo)	0.25
Media filtration (includes filter ancillary systems)	0.30
Granular Activated Carbon (GAC) adsorbers (includes backwash system)	0.24
Membrane filtration system	0.48
Intermediate storage and pumping systems	0.10
Brackish Water Reverse Osmosis (BWRO) system	0.97
Surface Water Reverse Osmosis (SWRO) system	1.94
Fluidized bed ion exchange system	0.62
Ozone	0.34
Ultraviolet (UV)/ Advanced Oxidation Process (AOP) system	0.44
Finished water storage	0.24
Liquid chemical storage and feed systems (per chemical)	0.01
Concentrate disposal	3.34
Solids handling	0.36
Seawater Intake	0.15
Canal Concentrate Discharge	0.09
Intake Screens	0.06
Chlorine Contact Chamber	0.08
Vacuum Degasifier	0.78
Seawater Concentrate Deep Injection Well (DIW)	2.49
Constructed Wetland	1.58

C.2.1.3 Concrete Basins

Volumes for concrete basins were estimated based on the detention times for specific treatment processes, as identified in **Table C-3**. Basin costs assume $1.50 per gallon of basin volume.

Table C-3 Assumptions for Treatment Facility Detention Time

Basin Type	Detention Time (min)
Ozone contact basins	10
Fluidized bed ion exchange basins	60
Microsand ballasted clarification basins	60
Dissolved air flotation basins	40
Filter basins	15
Intake screens chamber	10

C.2.1.4 Buildings

A summary of the building footprints and building costs are provided in **Table C-4** and **Table C-5,** respectively.

Table C-4 Assumptions for Treatment Process Building Footprints

Building Type	Footprint (ft^2/mgd)
Ozone	500
GAC adsorbers (includes backwash system)	750
Media filtration (includes filter ancillary systems)	500
Membrane filtration system	900
BWRO system	1500
SWRO system	2500
UV/AOP system	200
Liquid chemical storage and feed systems (per chemical)	20
Administrative buildings	40

Table C-5 Assumptions for Building Costs

Location Type	Assumption
Facility building cost	$275/square foot
Office building cost	$650/square foot

C.2.1.5 General Cost Factors

Cost estimates for treatment facilities were developed based on historical equipment costs, leveraging a combination of budgetary and firm pricing information from recent projects. Historical costs were escalated to October 2022 dollars using the Engineering News Record (ENR) Construction Cost Index (CCI). Unit costs for equipment systems, buildings, and basins were adjusted using a power factor to account for economy of scale. The following considerations were made to account for economy of scale.

$$Factored\ Cost\ =\ Cost\ (\$) * (Q_2/Q_1)^x$$

where: x = power factor (0.6 for basins, 0.8 for buildings, 0.9 for equipment)
Q_1 = capacity of reference system
Q_2 = capacity of proposed system

C.2.1.6 Overall Facility Footprints, Siting, and Land Acquisition

Most of the concepts require land acquisition to accommodate the development of a new water supply (intakes, transmission systems, treatment facilities, etc.). Land acquisition costs were revised during Fine Screening to differentiate between infrastructure planning in urban and rural areas. Additionally, the cost of land in urban areas was updated based on cost information provided by Tampa Bay Water's Real Estate group. A summary of unit costs for land acquisition is provided in **Table C-6**. Facility siting and cost of land acquisition will be refined as part of the future feasibility program for the short-listed concepts.

Table C-6 Assumptions for Cost of Land Acquisition

Location Type	Unit Cost ($/acre)
Urban areas (treatment)	300,000
Rural areas (wetlands and reservoirs)	110,000

Overall facility footprints were developed for each concept based on source type reference projects involving similar treatment systems. The conceptual facility footprints are inclusive of treatment systems identified in **Appendix A** as well as general site facilities (administrative building, laboratory, maintenance/workshop, electrical rooms, etc.). Assumptions for overall facility footprints developed in the Coarse Screening were maintained for Fine Screening and are provided in **Table C-7**. Conceptual facility layouts will be prepared during the shortlist screening evaluation.

Wherever possible, facility locations were selected based on sites identified in previous studies. In cases where concepts required identification of new sites for treatment facilities, efforts were made to avoid high density urban areas and areas identified for redevelopment. Pipeline routes largely followed main roads and, if available, relied on routes identified in previous studies. Pipeline alignments typically avoid parallel stretches along major highways.

Table C-7 Assumptions for Facility Footprints

Source Type	Footprint (acres/mgd)
Seawater	0.49
Surface water	0.61
Fresh groundwater	0.30
Brackish groundwater	0.76
Indirect & direct potable reuse	1.03
Constructed wetlands (based on infiltration rate of 0.65 gpd/ft2)	35.2

C.2.2 Transmission Systems

C.2.2.1 Pipelines

Pipeline routes were created using ArcGIS Pro for concepts requiring new raw water supply and/or finished water transmission pipelines. Pipeline routes established a basis for pipeline distances to be used for conceptual cost estimating. Details on specific pipeline routes for each concept are provided in the concept maps shown in **Appendix A**. For all concept pipelines, pipe sizing was determined based on supply or finished water rated capacity flowrate. Pipe diameter was calculated based on a maximum velocity of 7 ft/s. Pipeline construction costs assume an average cost of $25 per inch-diameter per linear foot. Land acquisition costs are inclusive of construction costs at the fine screening level. Pipeline construction costs are presented in **Table C-8** based on pipe diameter.

Table C-8 Unit Prices for Piping

Pipe Diameter (inches)	Maximum Flow (mgd)	Construction Cost ($/ft)	Unit Price ($/gpd/mile)
10	2.5	$250	$1.01
16	6.3	$400	$0.63
18	8.1	$450	$0.55
20	9.9	$500	$0.50
24	14.3	$600	$0.42
30	22.2	$750	$0.33
36	32	$900	$0.28
42	43.5	$1,050	$0.24
48	56.9	$1,200	$0.21
54	72	$1,350	$0.19
72	127.9	$1,800	$0.14
78	150.2	$1,950	$0.14

C.2.2.2 Pump Station Costs

Pump station facilities for raw water supply and finished water distribution were estimated based on reference costs using the Tampa Bay Water Capital Cost Estimating Tool. Costs are inclusive of the pumping equipment and pump housing. Pump station costs were estimated based on capacity range as shown in **Table C-9**.

Table C-9 Assumptions for Pump Station Capacity and Unit Costs

Pump Station Cost Category	Unit Cost ($/MGD)
Capacity < 15 mgd	633,000
Capacity > 15 mgd	521,000

C.2.3 General Considerations

A summary of factors applied for estimating direct and indirect costs is provided in **Table C-10.**

Table C-10 Summary of Direct and Indirect Cost Factors

Cost Factor	Value
Direct Cost Factors	
Equipment installation	25% of equipment cost
Mechanical	8% of facilities subtotal
Electrical and Instrumentation & Controls (I&C)	8-10% of facilities subtotal
Sitework	5-6% of facilities subtotal
Yard Piping	3% of facilities subtotal
Indirect Cost Factors	
Contingency	30% of construction subtotal
Contractor overhead and profit (OH&P)	20% of construction subtotal
Engineering, legal, and administrative (ELA)	25% of construction subtotal

C.3 Basis of O&M Cost Estimates

O&M costs were developed based on the source type and level of treatment required. Wherever possible, information from previous studies or from existing Tampa Bay Water systems was used to supplement annual O&M costs. O&M costs include the cost of bulk reclaimed water, withdrawal credits, and wholesale potable water supply as required. A summary of general O&M costs is provided in **Table C-11**.

Table C-11 Assumptions for O&M Costs

Source Water Type	O&M Cost ($/1,000 gal)
Bulk & Wholesale Water Supply Costs[1]	
Potable water supply from Polk County	3.30
Potable water supply from Peace River Manasota Regional Water Supply Authority	3.52
Reclaimed water from Hillsborough County	0.75
Reclaimed water from Pinellas County	0.50
Reclaimed water from City of Tampa	0.75
Withdrawal credits from Pinellas County	1.00
Withdrawal credits from Hillsborough County	1.50
Treatment Costs	
Seawater Desalination (SWRO)	2.25
Surface water	0.63
Fresh groundwater	0.50
Brackish groundwater	1.00
Indirect potable reuse	1.50
Direct potable reuse	1.50
Storage reservoir	0.17

1. Water supply, reclaimed water and withdrawal credit costs are estimates for the purpose of this fine screening evaluation and are subject to change.

The annual O&M costs are calculated based on the annual average yield or the anticipated annual average flow rate being treated through the system. A ratio of annual average yield to design capacity was established for each source type as shown in **Table C-12**.

Table C-12 Ratio of Annual Average Yield to Design Capacity by Source Water Type

Source Water Type	Ratio of Annual Average Yield to Design Capacity
Seawater	44%
Surface water	49%
Fresh groundwater	65%
Brackish groundwater	60%
Indirect potable reuse	32%
Direct potable reuse	53%

Pipeline and pump station O&M costs were estimated taking into consideration the cost of pipeline maintenance, utility labor, and power consumed by pumping. A summary of the annual O&M costs applied to pipelines and pump stations are provided below in **Table C-13**.

Table C-13 Pipeline, Pump Station, and Wellfield O&M Costs

O&M Type	Estimated Annual Cost	Unit
Pipeline maintenance	$2,300	per mile
Pump Station Labor	$600	per mgd
Pump Station Power (50 psi)	$16,500	per mgd
Pump Station Power (100 psi)	$33,100	per mgd
Wellfield Labor	$4,800	per well
Deep Wellfield Power	$151,200	per mgd
Shallow Wellfield Power	$82,700	per mgd

C.4 Concept Specific Cost Details

C.4.1 Concept 1 – Gulf Coast Desalination

Concept 1 considers seawater desalination with water supplied from the Gulf of Mexico. This concept was previously evaluated in the 2018 Long-Term Water Master Plan (LTWMP) as a 20 mgd treatment facility and is currently considered for 25 mgd of potable water supply. Concept 1 utilizes the existing Anclote Power Plant discharge canal as a seawater intake for the desalination plant. The desalination plant treatment process is based on the process flow diagram shown in **Appendix A**. Since this concept considers seawater from the Gulf of Mexico, raw water total dissolved solids (TDS) is assumed to be around 35,000 milligram per liter (mg/L). For this reason, a recovery of 50% is considered for the SWRO process. Additionally, in order to meet finished water quality goals, it is anticipated that approximately 40% of the SWRO permeate will need to be treated through the second pass RO system. This concept considers concentrate disposal into the Gulf of Mexico via the Anclote Power Plant discharge canal. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-14**.

A conceptual distribution pipeline route was created in ArcGIS Pro to develop pipeline lengths between the desalination plant and the existing Cypress Creek/Keller transmission main. An assumed pipeline length for raw water supply was also developed between the Anclote Power Plant discharge canal and the proposed desalination plant. Routes are shown on the concept map in **Appendix A**.

Table C-14 Concept 1 - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	56.3	25
BWRO System	33.8	15
SWRO System	60	27
MF/UF System	126	56
Dissolved Air Floatation (DAF) System	129	57
Raw water supply	129	57.3
Concentrate Disposal	64	28.3
Solids Handling	8.9	4.0

C.4.2 Concept 2 – Pasco Brackish Wellfield

Concept 2 considers brackish groundwater supplied from the lower portion of the Upper Floridan Aquifer utilizing a new wellfield to be constructed in Pasco County. A survey of neighboring utilities with brackish groundwater supplies estimates the concentration of TDS in the raw water supply could range from 1,000 mg/L to 10,000 mg/L. An average raw water TDS of 3,625 mg/L and finished water target TDS of 500 mg/L were used to establish design criteria for the BWRO system. The brackish groundwater treatment process is based on the process flow diagram shown in **Appendix A**. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-15**.

A 5-mile-long conceptual pipeline route was created from the proposed wellfield and WTP location to the existing Cypress Creek/Keller transmission main. Route is shown on the concept map in **Appendix A**.

Table C-15 Concept 2 - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	9.7	4.3
BWRO Bypass (10%)	1.1	0.5
BWRO System	8.6	3.8
Concentrate Disposal	1.5	0.7
Raw Water Supply	11.2	5.0

C.4.3 Concept 3a – St. Petersburg Desalination Plant

Concept 3a considers seawater desalination with raw water supplied from Tampa Bay. The seawater desalination plant will draw raw seawater directly from the bay and is independent of power plant operations. As such, Concept 3a includes costs for a seawater intake pipeline, intake structure/screens. The seawater intake is located approximately 4 miles offshore. The desalination plant treatment process is based on the process flow diagram shown in **Appendix A**. Since this concept considers seawater from Tampa Bay, raw water total dissolved solids (TDS) is assumed to be around 26,500 mg/L with RO recovery comparable to the existing desalination plant. This concept considers concentrate disposal via deep injection well to be consistent with the preferred approach for concentrate discharge identified in the Desalination Plant Expansion Feasibility Study (2022). A 1-mile-long finished water pipeline is assumed from the proposed Desalination WTP to the St. Peterburg distribution system. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-16**.

Table C-16 Concept 3a - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	67.5	30.0
BWRO System	23.6	10.5
SWRO System	70.1	31.2
MF/UF System	123	54.7
DAF System	126	55.8
Raw water supply	126	55.8
Concentrate Disposal	49.3	21.9
Solids Handling	8.7	3.9

C.4.4 Concept 3b – St. Petersburg Brackish Plant

Concept 3b considers brackish groundwater supplied from the lower portion of the Upper Floridan Aquifer via wellfields located adjacent to Lake Maggiore. The TDS concentration in the raw water supply is estimated to be 4,000 mg/L to 5,000 mg/L. Design criteria for the BWRO system is based on an average raw water TDS concentration of 4,500 mg/L and finished water target TDS concentration of 500 mg/L. The brackish groundwater treatment process is based on the process flow diagram shown in **Appendix A**. As with other brackish treatment alternatives, concentrate will be disposed of via deep injection wells located at the WTP site. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-17**.

Conceptual routes for a 2-mile-long pipeline from the proposed Maggiore wellfield to the proposed WTP and a 2-mile-long a finished water pipeline from the WTP to the St. Petersburg distribution system were developed in ArcGIS Pro. Routes are shown on the concept map in **Appendix A**.

Table C-17 Concept 3b - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	9.7	4.3
BWRO Bypass (8%)	0.9	0.4
BWRO System	8.8	3.9
Concentrate Disposal	1.6	0.7
Raw Water Supply	11.3	5.0

C.4.5 Concept 4 – Existing Desalination Plant Expansion

Concept 4 considers an expansion of Tampa Bay Water's existing seawater desalination plant by 10 mgd, based on evaluations from the Desalination Plant Expansion Feasibility Study (2022). Capital costs for Concept 4 are based on the construction subtotal identified in Table 6-13 of the Desalination Plant Expansion Feasibility Study, reproduced below in **Table C-18**.

The construction subtotal was escalated using ENR CCI to October 2022 dollars. Indirect costs (contingency, contractor overhead and profit, ELA) were applied to the escalated construction subtotal to arrive at a capital cost estimate comparable to other concepts evaluated in Fine Screening. Project financing costs were applied to the life cycle cost estimate, in dollars per 1,000 gallons, to arrive at a representative total project cost with financing.

O&M costs are based on the estimated annual O&M for plant expansion from the same report and are applied over the annual average yield of 10.4 mgd. While Concept 4 considers a 10 mgd desalination plant expansion, the annual average yield for this concept is 10.4 mgd since it includes measures to recover existing plant capacity, optimize existing treatment facilities, and eliminate restrictions related to concentrate disposal, in addition to the plant expansion.

Table C-18 Concept 4 Desal Plant Expansion Costs

Facility	Construction Cost ($)
Raw Water Supply (66 inch pipe alternative)	$6,336,000
Pretreatment Expansion (DAF-MF)	$70,841,000
RO Expansion (RO-1TC per train)	$42,792,000
Post-treatment (convert to liquid lime)	$3,805,000
Residuals and Solids Handling (35 mgd lamella clarifier and new belt filter press)	$11,265,000
Concentrate Discharge (20 mgd deep injection well system)	$50,400,000
Finished Water Transmission (booster station)	$26,134,000
Subtotal of Construction (before contingency, contractor overhead and profit, and ELA)	**$211,600,000**

C.4.6 Concept 5a – Existing Desalination Plant Expansion with Reuse

Concept 5a would include a 10 mgd expansion of Tampa Bay Water's existing seawater desalination plant, augmenting seawater supply with reclaimed water as influent to the desalination plant. Capital costs for Concept 5a are based on the construction subtotal identified in **Table C-18**, excluding the cost to expand the raw water supply and expand the DAF system. The desal plant expansion construction subtotal was escalated to October 2022 dollars with indirect costs included. Unlike other seawater desalination alternatives, this concept includes UV/AOP treatment of the desalinated water to achieve anticipated DPR treatment requirements. As such, the cost of UV/AOP is added to the cost of the desalination plant expansion.

This concept would include a pump station and 15 miles of pipeline to deliver reclaimed water supply from the City of Tampa or Hillsborough County to the existing desalination plant. A conceptual route is shown on the concept map in **Appendix A**.

O&M costs for this concept are slightly lower than other seawater desalination alternatives, accounting for reduced energy consumption in the SWRO process resulting from lower raw water TDS from blending seawater with reclaimed water. The O&M costs provide adjustments for UV/AOP and include the cost of bulk reclaimed water supply from the City of Tampa. The cost of Concept 5a is assumed to be similar between the alternatives of using bulk reclaimed water supply from the City of Tampa or Hillsborough County.

C.4.7 Concept 5b – Existing Desalination Plant Expansion with Brackish

Concept 5b would include a 10 mgd expansion of Tampa Bay Water's existing seawater desalination plant, augmenting seawater supply with brackish groundwater. This concept would include brackish groundwater blended with pretreated seawater (e.g., brackish groundwater is introduced upstream of the cartridge filters). The brackish groundwater supply is assumed to have a raw water TDS of 4,500 mg/L. Incorporation brackish groundwater results in a blended raw water TDS of approximately 20,600 mg/L. As such, a higher SWRO recovery of 65% was assumed for facility sizing. Additionally, O&M costs were adjusted to account for reduced energy consumption by the SWRO process resulting from lower RO feed TDS. Annual O&M estimates are also much lower than other seawater desalination options, since the brackish water supply does not require the same level of pretreatment prior to RO. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-19**.

A conceptual route for a 3-mile-long pipeline from the proposed wellfield to the proposed WTP is shown on the concept map in **Appendix A**.

Table C-19 Concept 5b - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	7.5	5.0
BWRO System	2.6	1.75
BWRO Bypass	4.9	3.25
SWRO System	7.8	5.2

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Raw water supply	12.0	8.0
Concentrate Disposal	4.5	3.0

C.4.8 Concept 6 – North Pinellas Surface Water Treatment Plant and New Reservoir

Concept 6 considers surface water treatment of excess water harvested during wet season months from sources such as Lake Tarpon. The excess water will be stored in a 2-billion-gallon (BG) reservoir to augment supply during dry-season months or drought conditions. Similar concepts have previously been evaluated and are documented in several reports such as the 2019 North Pinellas County Aquifer Storage and Recovery and Managed Aquifer Recharge Feasibility Study and the 2002 Evaluation of Storage and Beneficial Reuse Alternatives for Surface Waters Discharged from Lake Tarpon, Florida. These reports estimated approximately 9 to 10 mgd of surface water supply would be available on an annual average basis. The surface water treatment process is based on the process flow diagram shown in **Appendix A**. The suspend ion exchange (SIX), Actiflo, and biologically active filtration (BAF) treatment processes are each considered to have a 98% recovery. This concept includes solids handling facilities for treatment of liquid residuals and waste disposal. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-20.**

A conceptual route for a 9-mile-long pipeline from the proposed Lake Tarpon Surface Water Intake to the proposed reservoir and WTP is shown on the concept map in **Appendix A**.

Table C-20 Concept 6 - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	25.4	8.5
SIX System	27.0	9.0
Actiflo System	26.4	8.8
Ozone System	25.9	8.6
BAF System	25.9	8.6
Solids Handling	1.6	0.5

C.4.9 Concept 7 – New Surface Water Treatment Plant via Lake Thonotosassa

Concept 7 would include treatment of surface water available via Lake Thonotosassa. This concept was last evaluated in the 2001 LTWMP; however, an expected raw water yield was not quantified at that time. Based on historical data for inflow and outflow at Lake Thonotosassa, an average annual yield of 2 mgd was considered. The surface water treatment process is based on the process flow diagram shown in **Appendix A**. The SIX, Actiflo, and BAF treatment processes are each considered to have a 98% recovery. This concept includes solids handling facilities for treatment of liquid residuals and waste disposal. Unlike other surface water concepts, Concept 7 does not utilize a reservoir for raw water storage. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-21**.

A conceptual route for a 4.0-mile-long pipeline from the proposed Lake Thonotosassa SWTP to the North-Central Hillsborough Intertie Tie-In is shown on the concept map in **Appendix A**.

Table C-21 Concept 7 - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	5.7	2.0
SIX System	6.0	2.1
Actiflo System	5.9	2.1
Ozone System	5.8	2.0
BAF System	5.8	2.0
Solids Handling	0.4	0.1

C.4.10 Concept 8 – New Surface Water Treatment Plant at the Regional Reservoir via Increased Alafia River Withdrawal

Concept 8 considers an additional SWTP supplied via the C.W. Bill Young Regional Reservoir. Unlike other surface water supply options, Concept 8 considers utilization of an existing reservoir, which would be supplemented by the Alafia River. Increased withdrawals from the Alafia River were previously evaluated in the 2013 LTMWP and 2018 LTMWP. The assumed annual average raw water increased withdrawal is approximately 6.4 mgd. The surface water treatment process is based on the process flow diagram shown in **Appendix A**. The SIX, Actiflo, and BAF treatment processes are each considered to have a 98% recovery.

The proposed treatment process and conceptual cost estimates assume the fluoride concentration of water supplied from the reservoir is below Tampa Bay Water's fluoride treatment goal of 0.8 mg/L. Further analysis of the expected raw water fluoride concentration and the potential need for fluoride treatment will be evaluated during the Short-List Evaluation, as additional modeling is required to assess the impact to the resulting fluoride concentration in the C.W. Bill Young Reservoir. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-22**.

O&M costs for this concept are slightly lower than other surface water treatment options because it assumes there are no additional O&M expenses associated with delivering raw water supply from the Alafia River to the existing C.W. Bill Young Reservoir.

A conceptual route for a 5-mile-long pipeline from the proposed SWTP and South Hillsborough County Pipeline Connection is shown on the concept map in **Appendix A**.

Table C-22 Concept 8 - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	18.4	6.4
SIX System	19.2	6.4
Actiflo System	18.8	6.4
Ozone System	18.4	6.4
BAF System	18.4	6.4
Raw Water Withdrawal to C.W. Bill Young Regional Reservoir	19.2	6.4
Solids Handling	18.1	0.3

C.4.11 Concept 9 – New Surface Water Treatment Plant and Reservoir via New Supplies

Concept 9 considers a new surface water treatment plant supplied by a new reservoir. The new reservoir would be supplied via withdrawals from Little Manatee River and Bullfrog Creek. The estimated withdrawal amount from Little Manatee River is 9.0 mgd and Bullfrog Creek is 2.4 mgd. The combined raw water sources amount to an annual average raw water supply of 11.4 mgd. Wet season flows will be captured and diverted to a new reservoir for use during dry seasons or drought conditions. The surface water treatment process is based on the process flow diagram shown in **Appendix A**. The SIX, Actiflo, and BAF treatment processes are each considered to have a 98% recovery. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-23**.

Conceptual routes for a 6-mile-long and 9-mile-long raw water pipeline from the Bull Frog Creek Intake via the enhanced surface water transmission to the proposed reservoir and WTP, an 11-mile-long raw water pipeline from Little Manatee River Intake to the proposed reservoir and WTP, and a 4 miles of proposed finished water pipeline were developed and are shown on the concept map in **Appendix A**.

Table C-23 Concept 9 - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	32.2	11.4
SIX System	34.2	11.4
Actiflo System	33.5	11.4
Ozone System	32.9	11.4
BAF System	32.9	11.4
Solids Handling	32.2	11.4

C.4.12 Concept 10 – Eastern Pasco Wellfield

Concept 10 considers a wellfield and groundwater treatment plant located in Eastern Pasco County. The wellfield would source fresh groundwater from the Upper Floridan Aquifer and supply raw water at annual average of 10 mgd to the groundwater treatment plant. The proposed groundwater treatment plant would be co-located with the Cypress Creek Pump Station. The groundwater treatment process will include ozone disinfection and GAC adsorption as shown in the concept summary sheet, which can be found in **Appendix A.** Further evaluation of the expected groundwater quality and the required level of treatment will be assessed during the Short-List Evaluation. The GAC treatment process is considered to have a 98% recovery for this concept. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-24**.

A conceptual route for an 8-mile-long pipeline from the proposed wellfield to the proposed WTP at Cypress Creek Pump Station is shown on the concept map in **Appendix A**.

Table C-24 Concept 10 - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	22.1	10.0
Ozone System	22.5	10.2
GAC System	22.5	10.2

C.4.13 Concept 11 – Interconnect with Polk Regional Water Cooperative

Concept 11 deviates from other concepts evaluated during fine screening as it does not involve a new raw water source and treatment facility. Cost assumptions for Concept 11 include the wholesale purchase of treated water from Polk Regional Water Cooperative, storage via an elevated storage tank, and chemical storage and feed systems to ensure compatibility of water quality in the distribution system. The wholesale water rate is based on the water use charge of $3.30 per thousand gallons. An elevated storage tank would be located in eastern Hillsborough County for equalization purposes. Facilities for chemical storage and feed would be located at the elevated storage tank. Chemical systems include sodium hypochlorite, liquid ammonium sulfate, and sodium hydroxide for the purpose of maintaining disinfectant residual and corrosion control. O&M costs for chemical use were estimated based on the average annual flow.

A conceptual route for a 33-mile-long pipeline from the proposed Polk County Utilities interconnect to the North- Central Hillsborough Intertie is shown on the concept map in **Appendix A**.

C.4.14 Concept 12 – Interconnect with Peace River Manasota Regional Water Supply Authority

Concept 12 considers the wholesale purchase of treated water from Peace River Manasota Regional Water Supply Authority with a base rate charge of $3.30 per 1,000 gallons for an allocation of 6 mgd and a charge of $6.60 per 1,000 gallons when water use exceeds 6 mgd. Like Concept 11, this alternative does not involve development of a new raw water source and treatment facility. Instead, it considers an elevated storage tank and chemical systems to ensure compatibility of water quality in the distribution system. The elevated storage tank would be located in southern Hillsborough County for equalization purposes. Facilities for chemical storage and feed would be located at the elevated storage tank. Chemical systems include sodium hypochlorite, liquid ammonium sulfate, and sodium hydroxide for the purpose of maintaining disinfectant residual and corrosion control. O&M costs for chemical use were estimated based on the average annual flow.

A conceptual route for a 38-mile-long pipeline from the proposed PCU interconnect to the North-Central Hillsborough Intertie is shown on the concept map in **Appendix A**.

C.4.15 Concept 13a – Transfer Existing Groundwater Permits – Pasco County

Concept 13a considers the transfer of groundwater permits from large users to Tampa Bay Water. Large users that no longer require any water source would be prioritized, otherwise the large user would transfer the existing groundwater permit to Tampa Bay Water. This concept assumes a permitted withdrawal of 3.5 mgd is available to transfer via the Tanler Water Company wells located in Pasco County, and supplementation with reclaimed water will not be required. This concept assumes a new wellfield will be located near the existing permitted wells and the raw water will be treated at a new groundwater treatment facility. The groundwater treatment process includes ozone disinfection and GAC adsorption as shown in the concept summary sheet, which can be found in **Appendix A.** Further evaluation of the expected groundwater quality and the required level of treatment will be assessed during the Short-List Evaluation. The GAC treatment process is considered to have a 98% recovery for this concept. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-25**.

A conceptual route for a 19-mile-long finished water pipeline from the proposed WTP to the Cypress Bridge Transmission Main is shown on the concept map in **Appendix A**.

Table C-25 Concept 13a - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	7.7	3.5
Ozone System	7.9	3.6
GAC System	7.9	3.6

C.4.16 Concept 13b – Transfer Existing Groundwater Permits – Hillsborough County

Concept 13b considers the transfer of groundwater permits from large users to Tampa Bay Water. This concept is focused on large users in Hillsborough County. The Mosaic Company, a fertilizer company with significant phosphate mining operations throughout Florida, has indicated that mining activities in Hillsborough County will be completed by 2030. This concept considers that 15.5 mgd of permitted groundwater withdrawals will no longer be needed by Mosaic, which could be Tampa Bay Water for water supply purposes. As they will no longer require water, supplementation with reclaimed water will not be required. This concept assumes a new wellfield will be located near the existing permitted wells and the raw water will be treated at a new groundwater treatment facility. The groundwater treatment process will include ozone disinfection and GAC adsorption as shown in the concept summary sheet, which can be found in **Appendix A.** Further evaluation of the expected groundwater quality and the required level of treatment will be assessed during the Short-List Evaluation. The GAC treatment process is considered to have a 98% recovery for this concept. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-26**.

Conceptual routes for a 29-mile-long raw water pipeline from the existing mosaic groundwater wells to a proposed WTP and a 2-mile-long finished water pipeline from the proposed WTP to South Hillsborough Pipeline and are shown on the concept map in **Appendix A**.

Table C-26 Concept 13b - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	33.1	15.0
Ozone System	33.8	15.3
GAC System	33.8	15.3

C.4.17 Concept 14a – Increased Consolidated Water Use Permit

Concept 14a considers modifications to Tampa Bay Water's existing Water Use Permit, increasing the allowable withdrawals. It is assumed that the increase in withdrawals will be handled by the existing groundwater treatment facilities and does not consider additional infrastructure. Given the proposed Per – and Polyfluoroalkyl Substances (PFAS) regulations, additional water quality sampling would be required to determine whether infrastructure is needed to provide PFAS treatment (GAC, ion exchange, reverse osmosis).

O&M costs have been included for this concept to account for the increased operation of the existing wellfields and additional chemical costs at the groundwater treatment facilities.

C.4.18 Concept 14b – Increase Consolidated Water Use Permit via Pinellas County Reclaimed Water Aquifer Recharge Wellfield

Concept 14b considers modifications to Tampa Bay Water's existing WUP, increasing the allowable withdrawals. This concept assumes that the increase in allowable withdrawal will require aquifer recharge. Aquifer recharge will consist of injection of reclaimed water via Pinellas County. Reclaimed water will be supplied via the South Cross Bayou AWRF and will not require additional treatment. The reclaimed water will be deoxygenated to minimize arsenic leaching, and then distributed to a new injection wellfield located in central Hillsborough County. It is assumed 8 mgd of reclaimed water is available for aquifer recharge via Pinellas County and 6.4 mgd of finished water supply will be made available as a result.

Annual O&M costs for this concept are inclusive of the groundwater treatment facility and the cost of withdrawal credits from Pinellas County.

A conceptual route for a 24-mile-long reclaimed water pipeline from the South Cross Bayou AWRF to the proposed recharge wellfield is shown on the concept map in **Appendix A**.

C.4.19 Concept 14c – Increase Consolidated Water Use Permit via Reclaimed Water Aquifer Recharge with Natural Systems

Concept 14c considers modifications to Tampa Bay Water's existing WUP, increasing the allowable withdrawals. This concept assumes the increase in allowable withdrawal will require supplementation of the surficial aquifer via natural recharge. The surficial aquifer will be recharged utilizing wetlands, and similar to Concept 14b, 8 mgd of reclaimed water will be supplied via Pinellas County. It is assumed groundwater withdrawals would be 25% of the reclaimed water supplied to the wetlands, resulting in a finished water supply of approximately 2 mgd.

Annual O&M costs for this concept are inclusive of the groundwater treatment facility, bulk purchase of reclaimed water from Pinellas County, and wetland maintenance.

A conceptual route for a 35-mile-long reclaimed water pipeline from the South Cross Bayou AWRF to the proposed surficial aquifer recharge wetland is shown on the concept map in **Appendix A**.

C.4.20 Concept 15a – Direct Potable Reuse Hillsborough County

Concept 15a considers supplementing the Tampa Bay Water Regional SWTP with reclaimed water. Approximately 15 MGD of reclaimed water is supplied via Hillsborough County and sent to an advanced water treatment facility prior to treatment at the Tampa Bay Water Regional SWTP. The advanced water treatment facility processes are shown in **Appendix A.** The reclaimed water is first sent through an MF/UF system where 95% recovery is expected. After the MF/UF system, the water will be treated via reverse osmosis and GAC processes. The recovery for these processes expected to be 80% and 98%, respectively. The reverse osmosis process will result in a concentrate waste stream which will be disposed via deep well injection. The overall advanced water treatment facility recovery is approximately 74%. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-27**.

Annual O&M costs for this concept are inclusive of the advanced water treatment facility, bulk purchase of reclaimed water from Hillsborough County, and the increase in O&M at the Tampa Bay Water Regional SWTP as a result of additional flow.

A conceptual route for a 1-mile-long reclaimed water pipeline from the Hillsborough County Falkenburg Road Advanced Wastewater Treatment Plant to the Regional Surface Water Treatment Plant is shown on the concept map in **Appendix A**.

Table C-27 Concept 15a - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	23.6	7.9
Tampa Bay Regional SWTP Expansion	23.6	7.9
UV/AOP System	25.1	10.5
GAC System	25.7	10.7
BWRO System	25.7	10.7
MF/UF System	33.8	14.1
Reclaimed water supply	33.8	14.1
Concentrate Disposal	6.4	2.7

C.4.21 Concept 15b – Direct Potable Reuse Pinellas County

Concept 15b considers supplementing the S.K. Keller WTP with reclaimed water. Reclaimed water supplied via Pinellas County is stored in a reservoir and subsequently supplied to an advanced water treatment facility, before transmission to the S.K. Keller WTP for final treatment. Consistent with Concepts 14b and 14c, 8 mgd of reclaimed water will be supplied via Pinellas County. A 500-million-gallon reservoir will store the reclaimed water for water supply augmentation during dry-season and drought conditions. The reclaimed water is then sent through an MF/UF system where 95% recovery is expected. After the MF/UF system, the water will be treated via reverse osmosis and GAC processes. The recovery for these processes expected to be 80% and 98%, respectively. The reverse osmosis process will result in a concentrate waste stream which will be disposed via deep well injection. The overall advanced water treatment facility recovery is approximately 74%. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-28**.

Annual O&M costs for this concept are inclusive of the advanced water treatment facility, bulk purchase of reclaimed water from Pinellas County, and the increase in O&M at the S.K. Keller WTP as a result of additional flow.

A conceptual route for a 27-mile-long reclaimed water pipeline from the South Cross Bayou AWRF to the proposed reservoir and WTP located near the S.K. Keller WTP is shown on the concept map in **Appendix A**.

Table C-28 Concept 15b - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	13.4	5.8
UV/AOP System	13.4	5.8
GAC System	13.7	6.0
BWRO System	13.7	6.0
MF/UF System	18.0	7.8
Reclaimed water supply	18.0	7.8
Concentrate Disposal	3.4	1.5

C.4.22 Concept 15c – Direct Potable Reuse City of Tampa

Concept 15c considers supplementing the Tampa Bay Water Regional SWTP with reclaimed water. Reclaimed water is supplied via the City of Tampa to an advanced water treatment facility before transmission to the Tampa Bay Water Regional SWTP for final treatment. It is assumed 20 mgd of reclaimed water will be supplied via the City of Tampa. The reclaimed water is then sent through an MF/UF system where 95% recovery is expected. Following the MF/UF system the water will be treated via reverse osmosis and GAC processes. The recovery for these processes is 80% and 98%, respectively. The reverse osmosis process will result in a concentrate waste stream which will be disposed via deep well injection. The overall advanced water treatment facility recovery is approximately 74%. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-29**.

Annual O&M costs for this concept are inclusive of the advanced water treatment facility, bulk purchase of reclaimed water from the City of Tampa, and the increase in O&M at the Tampa Bay Water Regional SWTP as a result of additional flow.

A conceptual route for a 9-mile-long reclaimed water pipeline from the Howard Curren Advanced Wastewater Treatment Plant to the Regional SWTP is shown on the concept map in **Appendix A**.

Table C-29 Concept 15c - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	31.5	10.5
Tampa Bay Regional SWTP Expansion	33.5	11.2
UV/AOP System	33.5	11.2
GAC System	34.2	11.4
BWRO System	34.2	11.4
MF/UF System	45.0	15.0
Reclaimed water supply	45.0	15.0
Concentrate Disposal	8.6	2.9

C.4.23 Concept 16a – South Hillsborough Wellfield

Concept 16a considers a wellfield located in southern Hillsborough County. The wellfield will supply approximately 6.2 mgd of groundwater to a groundwater treatment facility. The concept does not include supplementation of the surficial aquifer and is estimated assuming that additional withdrawals are available via relief from the Southern Water Use Caution Area based on measured recovery in the area. The groundwater treatment process will include ozone disinfection and GAC adsorption as shown in the concept summary sheet, which can be found in **Appendix A.** Further evaluation of the expected groundwater quality and the required level of treatment will be assessed during the Short-List Evaluation. The GAC treatment process is considered to have a 98% recovery for this concept. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-30**.

A conceptual route for a 2-mile-long finished water pipeline from the proposed South Hillsborough Wellfield and GWTP to the South Hillsborough Pipeline is shown on the concept map in **Appendix A**.

Table C-30 Concept 16a - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Finished Water Supply	13.7	6.1
GAC System	14.0	6.2
Ozone System	14.0	6.2

C.4.24 Concept 16b – South Hillsborough Wellfield via Aquifer Recharge

Concept 16b considers a wellfield located in southern Hillsborough County. The wellfield will supply approximately 6.2 mgd of groundwater to a groundwater treatment facility. This concept assumes supplementation of the surficial aquifer will be required. Supplementation will be in the form of aquifer recharge with reclaimed water from Hillsborough County used to create a salinity barrier in the area. The groundwater treatment process will include ozone disinfection and GAC adsorption as shown in the concept summary sheet, which can be found in **Appendix A.** Further evaluation of the expected groundwater quality and the required level of treatment will be assessed during the Short-List Evaluation. The GAC treatment process is considered to have a 98% recovery for this concept. Prior to injection, it is assumed that a deaeration system is required to minimize arsenic leaching in the aquifer. The overall withdrawal-to-injection ratio is 62%. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-31**.

Annual O&M costs for this concept are inclusive of the groundwater treatment facility and the cost of purchasing withdrawal credits from Hillsborough County.

A conceptual route for a 2-mile-long finished water pipeline from the proposed South Hillsborough Wellfield and GWTP to the South Hillsborough Pipeline is shown on the concept map in **Appendix A**.

Table C-31 Concept 16b - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Groundwater Treatment		
Finished Water Supply	9.0	6.1
GAC System	9.2	6.2
Ozone System	9.2	6.2
Groundwater Supply	9.2	6.2
Aquifer Recharge		
Deaeration System	22.5	10.0
Reclaimed Water Supply	22.5	10.0

C.4.25 Concept 16c – South Hillsborough Wellfield via Indirect Potable Reuse

Concept 16c considers an advanced water treatment facility for reclaimed water supplied from the City of Tampa or Hillsborough County and a wellfield located in southern Hillsborough County to supply a groundwater treatment facility. The reclaimed water is then sent through an MF/UF system where 95% recovery is expected. Following the MF/UF system the water will be treated via reverse osmosis and GAC processes. The recovery for these processes is 80% and 98%, respectively. The reverse osmosis process will result in a concentrate waste stream which will be disposed via deep well injection. The overall advanced water treatment facility recovery is approximately 74%. The groundwater treatment process will include ozone disinfection and GAC adsorption as shown in the concept summary sheet, which can be found in **Appendix A.** The GAC treatment process is considered to have a 98% recovery for this concept. The overall withdrawal-to-injection ratio is 62%. A summary of treatment system design capacities and estimated annual average operating capacities is provided in **Table C-32**.

Annual O&M costs for this concept are inclusive of the advanced water treatment facility, bulk purchase of reclaimed water from Pinellas County, and the groundwater treatment facility.

Conceptual routes for a 6-mile-long reclaimed water pipeline from the Hillsborough County One Water Campus to the proposed recharge wellfield and a 2-mile-long finished water pipeline from the proposed South Hillsborough Wellfield and GWTP to the South Hillsborough Pipeline is shown on the concept map in **Appendix A**.

Table C-32 Concept 16c - Treatment System Design Criteria

Treatment Process	Design Capacity (mgd)	Annual Average Yield (mgd)
Groundwater Treatment		
Finished Water Supply	20.5	9.1
GAC System	33.5	9.3
Ozone System	33.5	9.3
Advanced Water Treatment Facility		
Recharged Water Supply	25.7	11.4
Deaeration System	25.7	11.4
UV/AOP System	25.7	11.4
BWRO System	25.7	11.4
MF/UF System	33.8	15.0
Reclaimed Water Supply	33.8	33.8
Concentrate Disposal	6.4	2.85

Appendix I. Feasibility Project Summary Sheets

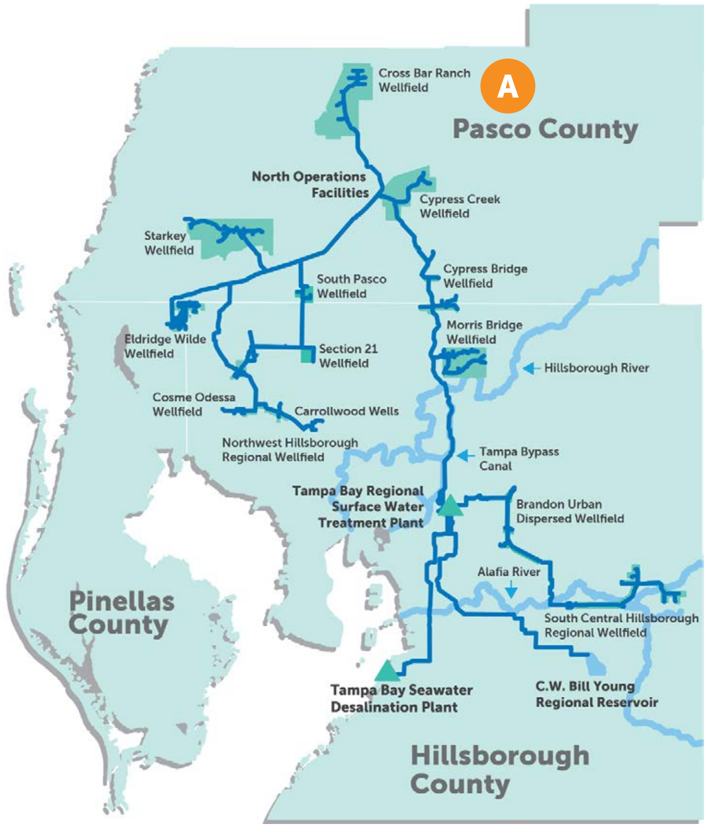
Project A: Eastern Pasco Wellfield

Project Description

The Eastern Pasco Wellfield project would withdraw and treat brackish and/or fresh groundwater from a new wellfield and treatment plant in Pasco County. The brackish wells would withdraw supply from the middle portion of the Lower Floridan Aquifer (LFA) (approximately 1,500 feet below surface) and the fresh groundwater wells would withdraw supply from the upper portion of the LFA (approximately 700 feet below surface). The brackish supply would require reverse osmosis (RO) treatment and the fresh groundwater supply is assumed to require ozone treatment. The estimated finished water annual average yield of 9 million gallons per day (mgd) (range = 3 to 17 mgd) would connect into the existing regional system at the Cypress Bridge Transmission Main.

Approximate Potable Supply Water Yield (fresh groundwater) = 4.0 mgd

Approximate Potable Supply Water Yield (brackish groundwater) = 5.0 mgd



Primary Infrastructure Components

- Fresh groundwater wellfield with four wells and a 3.5-mile, 16-inch diameter pipeline to treatment plant.
- 6 mgd groundwater/ozone treatment plant.
- Brackish groundwater wellfield with 6 wells and a 2-mile, 24-inch diameter pipeline to treatment plant.
- 11 mgd groundwater treatment plant with RO.
- Finished water storage tank.
- Finished water pump station and 13-mile, 30-inch diameter pipeline to Cypress Bridge Transmission Main.

Anticipated Regulatory Requirements

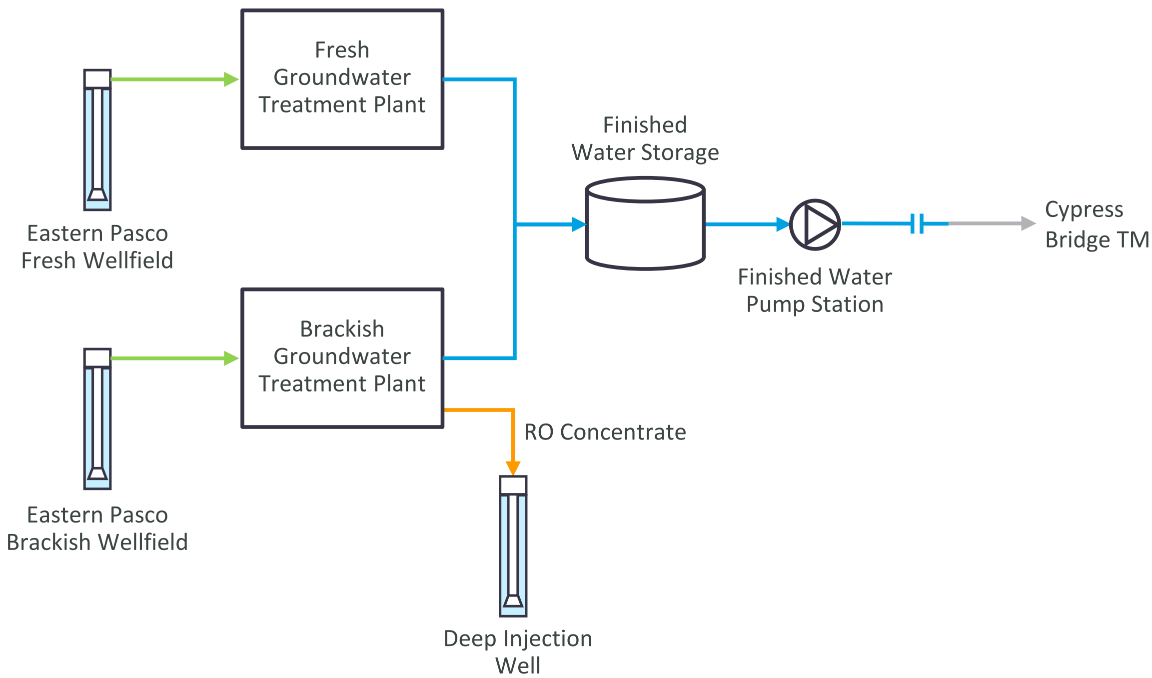
- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater permits.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit.
- FDEP Class V Well Construction and Operation permits for each new well.
- Underground Injection Control (UIC) Permit for concentrate disposal.

Key Feasibility Aspects

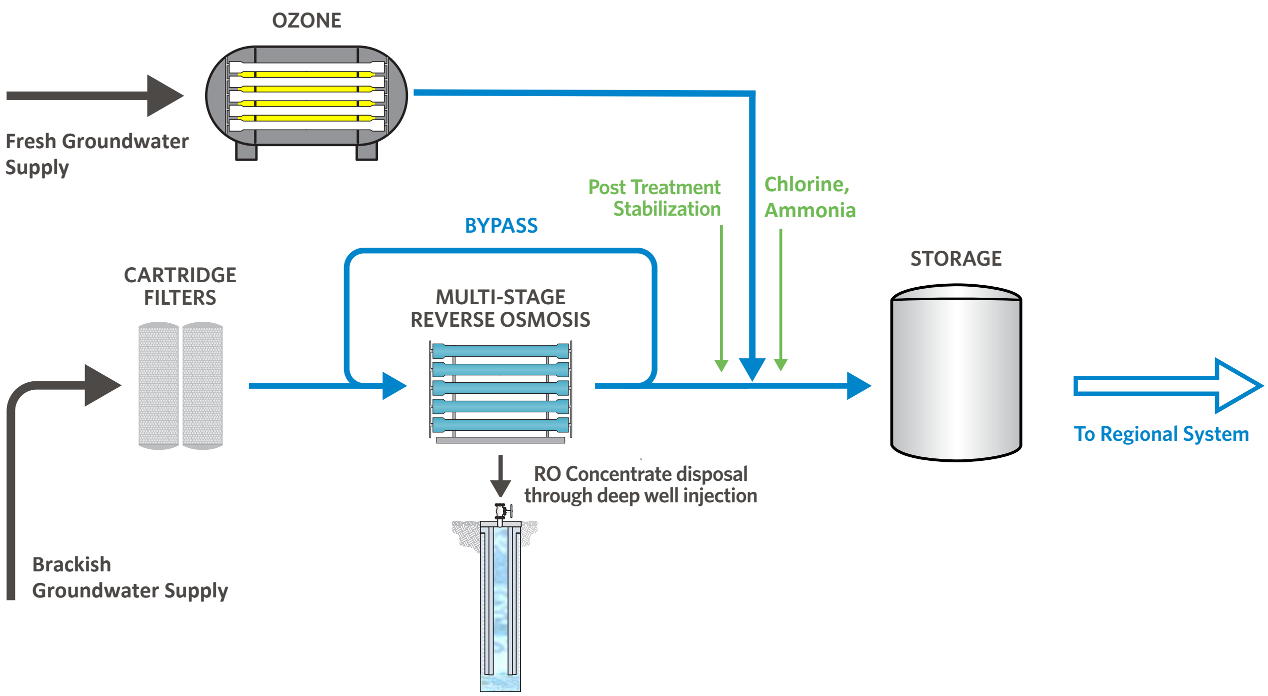
- Potential for a co-located fresh and brackish wellfield will need to be further evaluated in a feasibility study.
- Additional hydrological evaluations will need to be performed in a feasibility study to confirm yield and water quality.
- Estimated production capacity for wells: 1 to 1.5 mgd for fresh water and 1.5 to 2 mgd for brackish wells.
- Successfully obtaining water use permits will require demonstrating that existing environmental recovery of aquifer and surface waters will be maintained with additional withdrawals.
- The location of this project is consistent with an area where water demands in the region are growing.
- This project may have potential for SWFWMD co-funding.

Project A: Eastern Pasco Wellfield

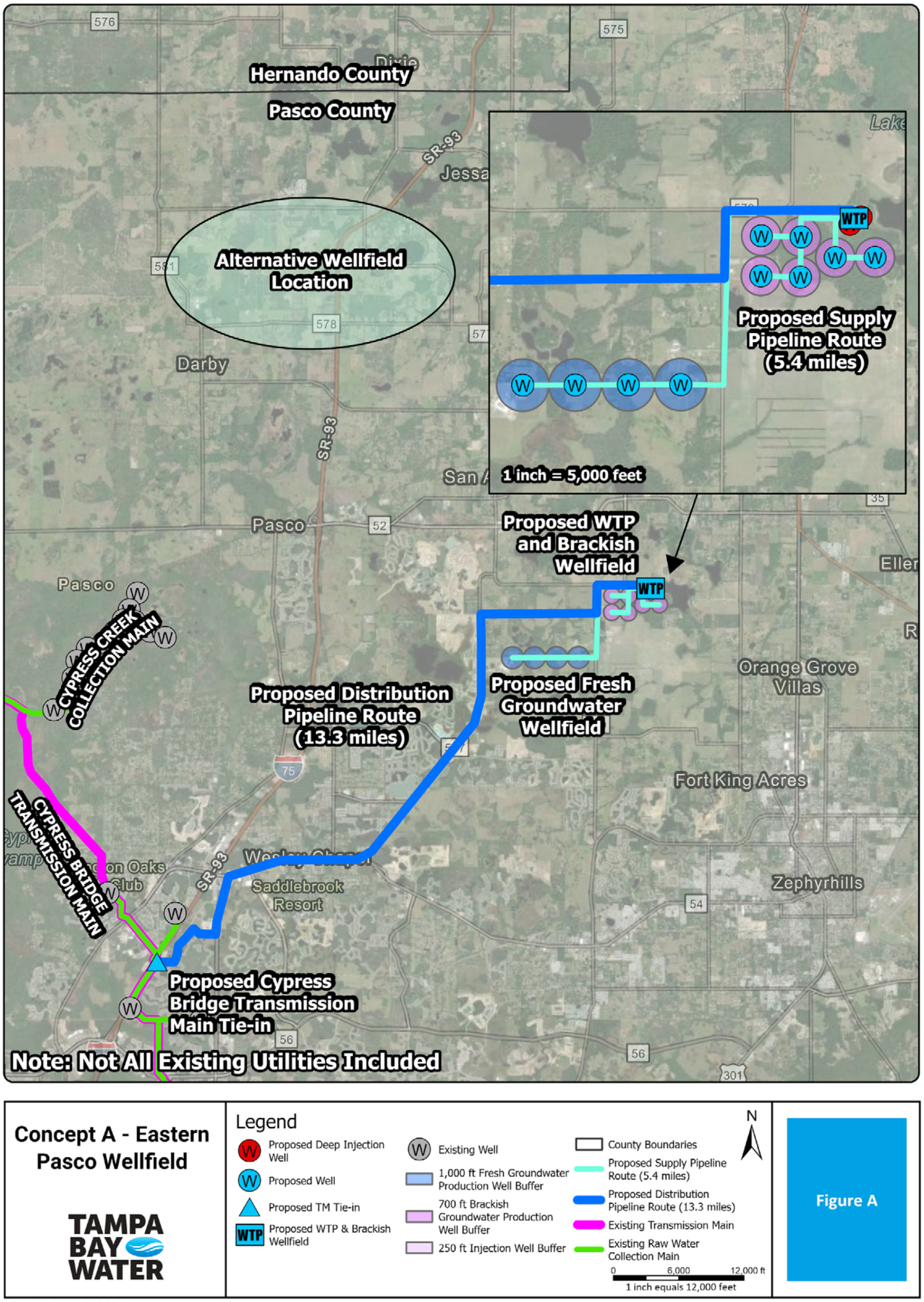
Project Schematic



Treatment Process Flow Diagram



Project A: Eastern Pasco Wellfield



September 12, 2023

Project A: Eastern Pasco Wellfield

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown[1]	
Facilities Capital Cost	$29,810,000.00
Wellfield Capital Cost	$14,000,000.00
Pipeline Capital Cost	$72,400,000.00
Pump Station Capital Cost	$8,740,000.00
Total Cost	
Infrastructure Capital Cost	$124,940,000.00
Contingency	$37,480,000.00
Contractor Overhead, Profit, and General Conditions	$32,480,000.00
Escalation to Mid-Point of Construction	$71,830,000.00
Subtotal of Construction Cost (with escalation)	**$266,730,000.00**
Engineering, Legal, and Administrative	$66,680,000.00
Land Acquisition	$5,700,000.00
Owner's Allowance Budget	$33,910,000.00
Total Project Cost (with owner's allowance)[2]	**$373,020,000.00**
$/1,000 gallons cost, based on annual production yield	
Total Capital Cost per 1,000 Gallons	$7.56
Annual Operation and Maintenance Cost per 1,000 Gallons	$0.77
Total Life Cycle Project Cost per 1,000 Gallons[3,4]	$8.33

Notes

1. All costs are estimated and representative of October 2022 dollars.
2. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%, escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.
4. Costs are representative of a combined fresh and brackish co-located wellfield. A fresh groundwater wellfield only would have a total life cycle project cost per 1,000 of $8.25. A brackish groundwater wellfield only would have a total lifecycle project cost per 1,000 gallons of $11.01

References

- West Coast Regional Water Supply Authority, "The Master Water Plan: A 20-Year Water Supply Development Plan," *Resource Development Plan*, December 20, 1996.
- Black & Veatch, *Long Term Water Supply Planning*, Comprehensive Project List Screening, Prepared for Tampa Bay Water, December 2001.
- Black & Veatch, *Long Term Water Supply Plan*, Final Report, Prepared for Tampa Bay Water, December 2008.
- Black & Veatch, *Long Term Water Supply Plan*, Report Appendices, Prepared for Tampa Bay Water, December 2008, p. 18-29.
- Black & Veatch, *Long Term Water Supply Plan*, Report Appendices, Prepared for Tampa Bay Water, December 2008, p. 79-84.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, August 2001.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, December 1, 2006.

TAMPA BAY WATER

Project B: Consolidated Water Use Permit Increase

Project Description

This project proposes increasing the permitted withdrawal quantity associated with Tampa Bay Water's existing Consolidated Water Use Permit (CWUP). The utility would be required to provide evidence that a higher permitted withdrawal rate could be achieved while maintaining the environmental recovery that occurred due to the withdrawal reduction from 158 million gallons per day (mgd) to 90 mgd annual average. The fresh groundwater would be withdrawn from existing wellfields and treated at existing groundwater treatment facilities. The current estimated increase in finished water annual average yield for this project is 10 mgd (range = 5 to 20 mgd) and could be implemented in phases.

Approximate Potable Water Supply Yield = 10.0 mgd

Primary Infrastructure Components

- None. This project concept leverages existing wellfields, treatment, storage and pumping facilities and pipelines.
- Improvements to existing groundwater treatment systems may be constructed if deemed necessary to maximize rotational capacity of the ten existing wellfields that are part of the CWUP.

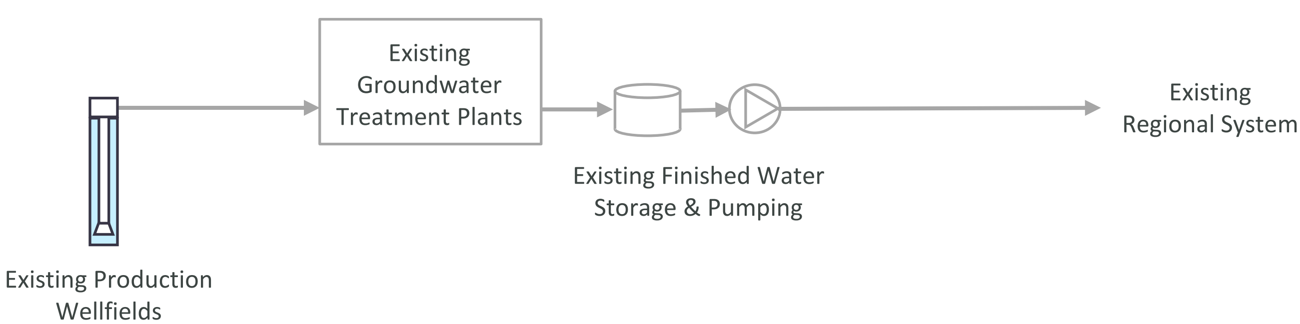
Anticipated Regulatory Requirements

- Southwest Florida Water Management District Water Use Permit modification.

Key Feasibility Aspects

- Hydrological modeling and evaluations would be required to assess the proposed additional withdrawals of groundwater from the wellfields operated under the existing CWUP to ensure environmental recovery is maintained.

Project Schematic



Project B: Consolidated Water Use Permit Increase

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown[1]	
Facilities Capital Cost	$0.00
Wellfield Capital Cost	$0.00
Pipeline Capital Cost	$0.00
Pump Station Capital Cost	$0.00
Total Cost	
Infrastructure Capital Cost	$0.00
Contingency	$0.00
Contractor Overhead, Profit, and General Conditions	$0.00
Escalation to Mid-Point of Construction	$0.00
Subtotal of Construction Cost (with escalation)	**$0.00**
Engineering, Legal, and Administrative	$0.00
Land Acquisition	$0.00
Owner's Allowance Budget	$0.00
Total Project Cost (with owner's allowance)[2]	**$0.00**
$/1,000 gallons cost, based on annual production yield	
Total Capital Cost per 1,000 Gallons	$0.00
Annual Operation and Maintenance Cost per 1,000 Gallons	$0.50
Total Life Cycle Project Cost per 1,000 Gallons[3]	$0.50

Notes

1. All costs are estimated and representative of October 2022 dollars.
2. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%, escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.

Project C: North Pinellas Surface Water Plant & Reservoir

Project Description

This project proposes harvesting excess surface water from the Lake Tarpon outfall canal along with other potential surface water sources including Chesnut Park, Canal Park, East Lake, Channel "A," and Brushy Creek. The surface water supply would be sent to a new 800-million-gallon reservoir for seasonal storage and treatment at a new Surface Water Treatment Plant (SWTP) in north Pinellas County with similar treatment processes as the existing Regional SWTP. The new SWTP is currently estimated to produce a finished water annual average yield of 4.5 million gallons per day (mgd) (range = 3 to 9.5 mgd). The finished water supply would be delivered into the existing regional system near the northern end of the Keller Transmission Main.

Approximate Potable Water Supply Yield = 4.5 mgd

Primary Infrastructure Components

- Surface water intake and 9 mgd pump station.
- 9-mile, 20-inch diameter raw water pipeline to reservoir.
- 800-million-gallon raw water storage reservoir.
- 8.5 mgd surface water treatment facility, including biologically active filtration and ozone treatment.
- Finished water storage tank.
- Pump station and 500-feet, 20-inch diameter transmission main for finished water to Pinellas County.
- Finished water pump station.

Anticipated Regulatory Requirements

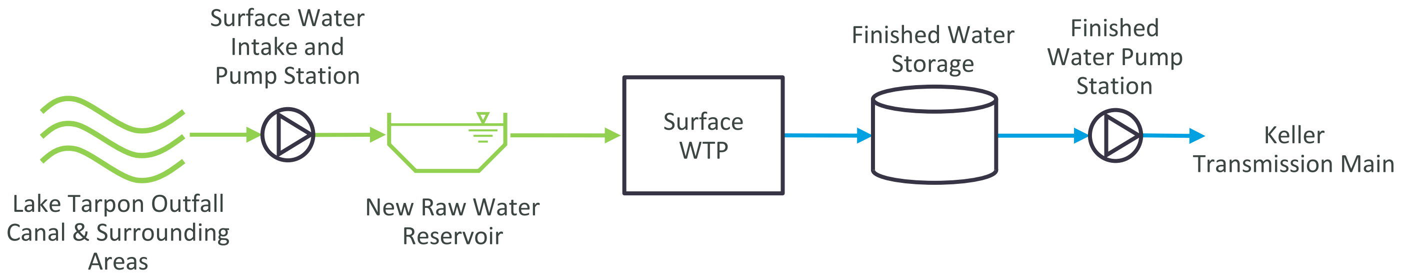
- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit.
- Clean Water Act Section 404 permit.

Key Feasibility Aspects

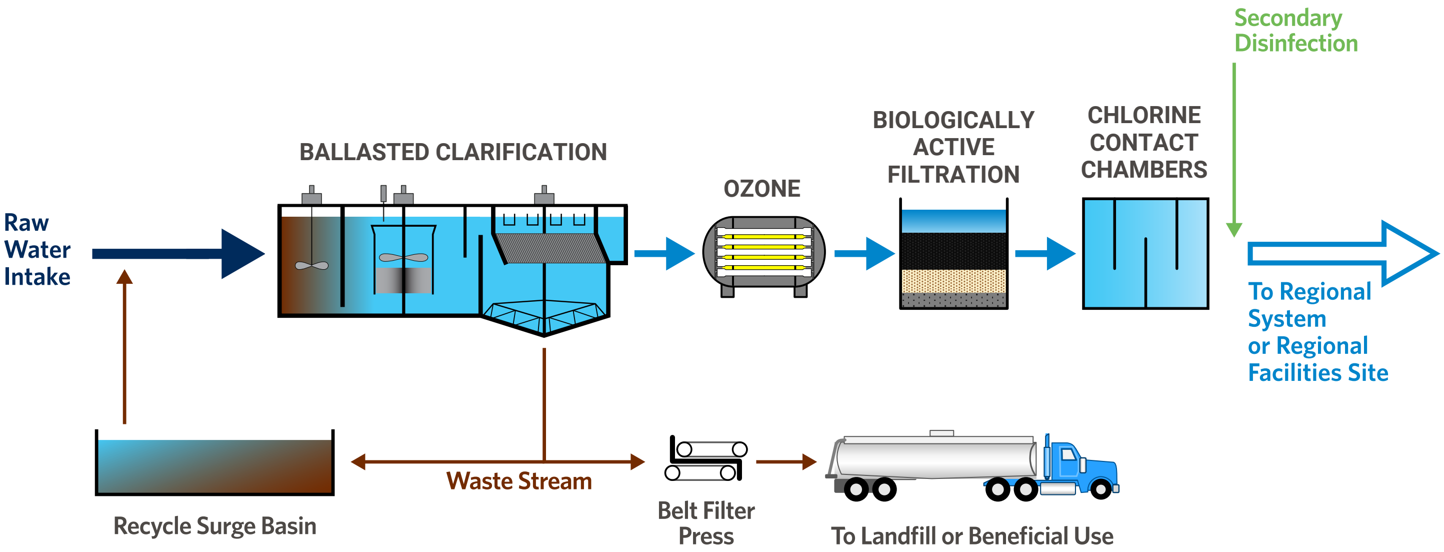
- To confirm the consistency of the available yield, additional studies need to be performed in a feasibility study.
- There is a potential for lake improvements to be required to meet an increased yield.
- A reduction in freshwater discharged to upper Tampa Bay from the Lake Tarpon outfall canal could benefit the health of the seagrasses in the bay.
- A more detailed evaluation to identify the specific locations of the treatment plant and reservoir would need to be performed in future studies.
- There is a potential for Pinellas County to pursue additional withdrawals from the Lake Tarpon outfall canal in the future, so uses will need to be coordinated in future studies.
- This project represents an alternative water supply concept and has the potential for SWFWMD co-funding.

Project C: North Pinellas Surface Water Plant & Reservoir

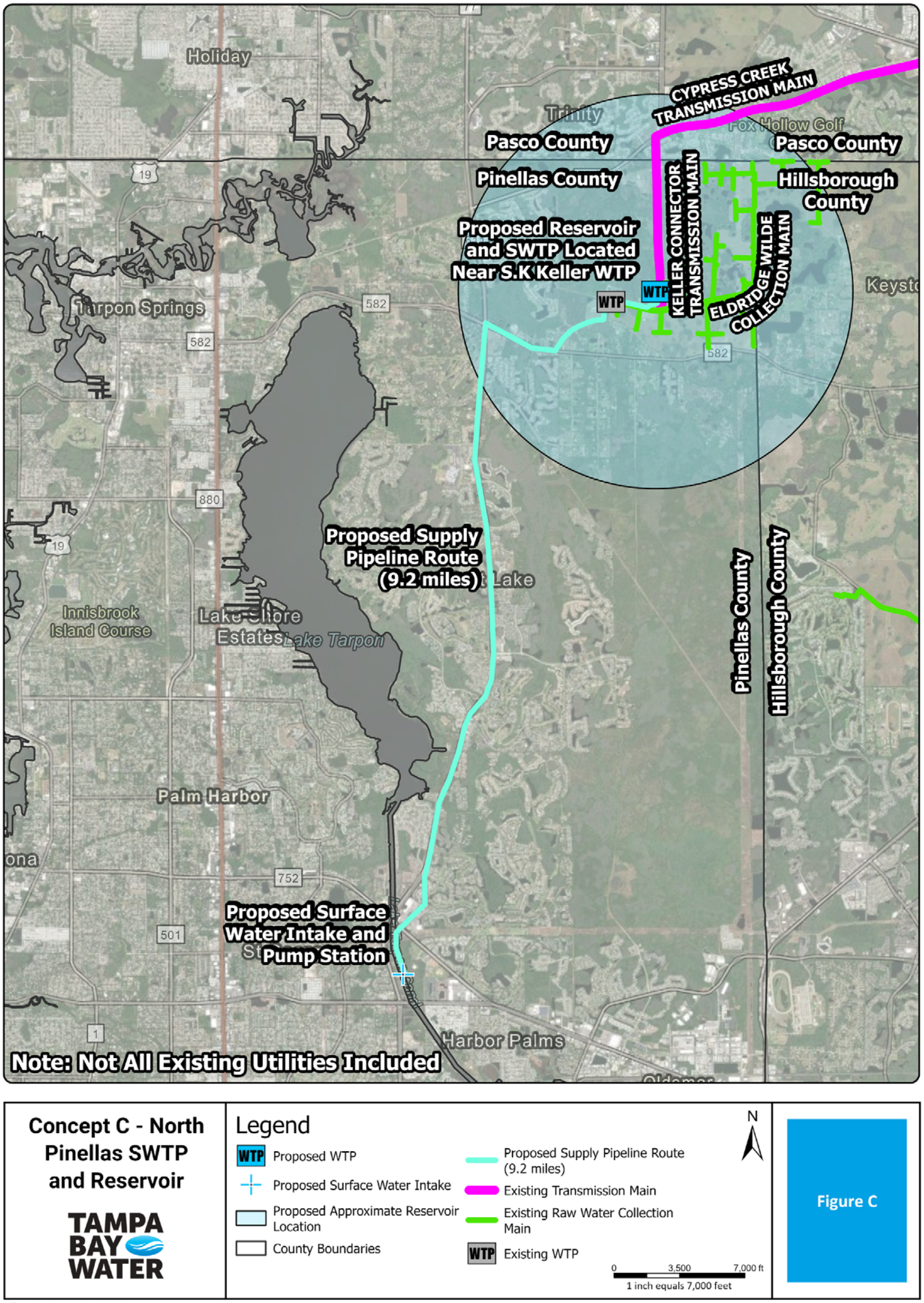
Project Schematic



Treatment Process Flow Diagram



Project C: North Pinellas Surface Water Plant & Reservoir



September 18, 2023

Project C: North Pinellas Surface Water Plant & Reservoir

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown[1]	
Facilities Capital Cost	$40,240,000.00
Reservoir Capital Cost	$16,000,000.00
Pipeline Capital Cost	$26,460,000.00
Pump Station Capital Cost	$13,410,000.00
Total Cost	
Infrastructure Capital Cost	$80,100,000.00
Contingency	$24,030,000.00
Contractor Overhead, Profit, and General Conditions	$20,830,000.00
Escalation to Mid-Point of Construction	$46,050,000.00
Subtotal of Construction, Contingency, and OH&P	**$171,010,000.00**
Engineering, Legal, and Administrative	$42,750,000.00
Land Acquisition	$12,500,000.00
Owner's Allowance Budget	$22,630,000.00
Total Project Cost (with owner's allowance)[2]	**$248,890,000.00**
$/1,000 gallons cost, based on annual production yield	
Total Capital Cost per 1,000 Gallons	$10.04
Annual Operation and Maintenance Cost per 1,000 Gallons	$0.88
Total Life Cycle Project Cost per 1,000 Gallons[3]	$10.92

Notes

1. All costs are estimated and representative of October 2022 dollars.
2. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%, escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.

References

- PBS&J, Douglas E. Robison and Thomas Farkas, *Evaluation of Storage and Beneficial Reuse Alternatives for Lake Tarpon Discharge Water*, Prepared for Pinellas County Utilities, September 2001.
- Jones Edmunds & Associates, Inc., *North Pinellas County Aquifer Storage and Recovery and Managed Aquifer Recharge Feasibility Study*, Prepared for Pinellas County Utilities, July 2019.
- MWH, *Surface & Recharge Projects Configuration Cost Analysis*, Prepared for Tampa Bay Water, May 2011.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, August 2001.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, December 1, 2006.

Project D: Desalination Plant Expansion

Project Description

This project considers expansion of the existing Tampa Bay Seawater Desalination Plant with either additional seawater or brackish groundwater. An expansion with seawater would consist of upgrades to the existing infrastructure to add an additional 10 to 12 million gallons per day (mgd) of finished water annual average yield. An expansion with brackish water would consist of constructing a new wellfield to withdraw supply that would be blended with the pretreated seawater and treated through the existing infrastructure to produce an estimated finished water annual average yield of 11.5 mgd. Since a feasibility study for the desalination plant expansion with seawater was completed in 2021, the remaining information presented focuses on an expansion with brackish groundwater supply.

Approximate Potable Water Supply Yield (seawater expansion) = 10.0 mgd

Approximate Potable Water Supply Yield (brackish groundwater) = 11.5 mgd

*The rated capacity of the desal plant expansion is 11.5 mgd, while the rated capacity of the brackish groundwater supply is 25 mgd. Brackish groundwater wells operated at max capacity can be used to offset seawater supply.

Primary Infrastructure Components

- Brackish groundwater wellfield with 24 wells and an 11-mile, 36-inch pipeline to the existing desalination plant.
- Expansion/modifications to the existing pretreatment, residuals handling, and chemical facilities.
- Additional reverse osmosis (RO) treatment trains.
- Booster pump station for transmission of finished water into the regional system.
- Deep injection well for concentrate disposal.

Anticipated Regulatory Requirements

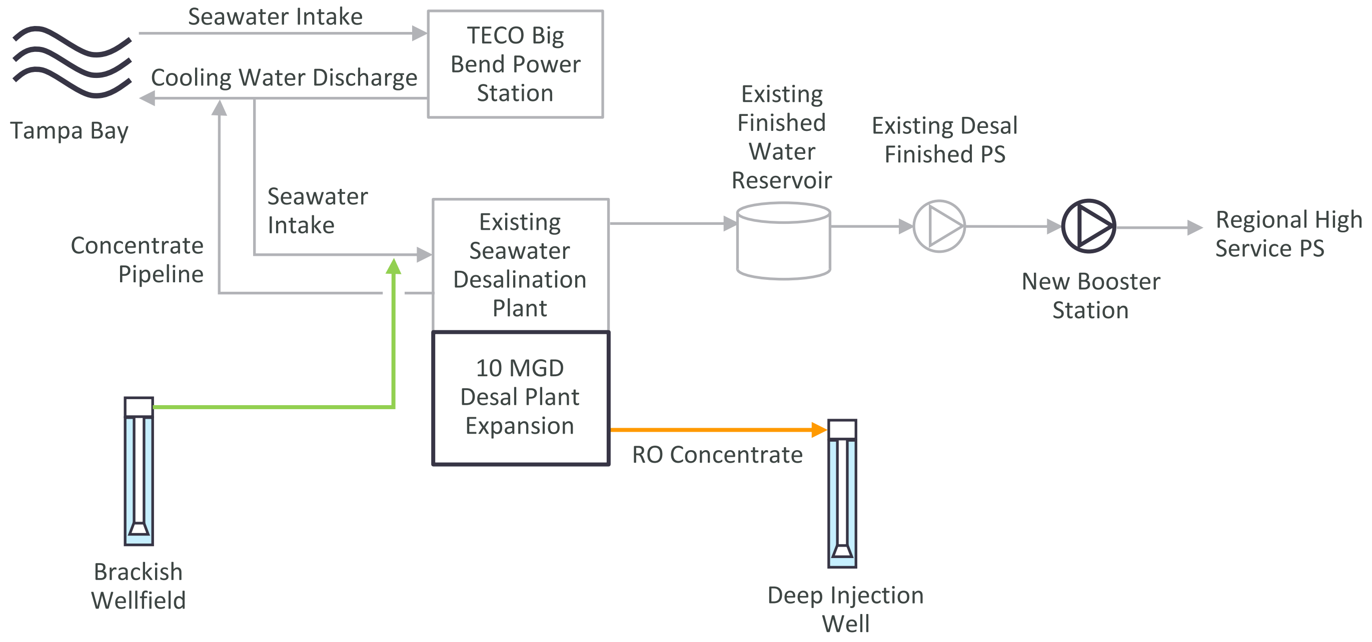
- NPDES Industrial Wastewater Discharge Permit Modification.
- FDEP Facility Operational Permit modification.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- Underground Injection Control (UIC) Permit for concentrate disposal.
- NPDES Stormwater Permit
- Southwest Florida Water Management District (SWFWMD) Water Use Permit

Key Feasibility Aspects

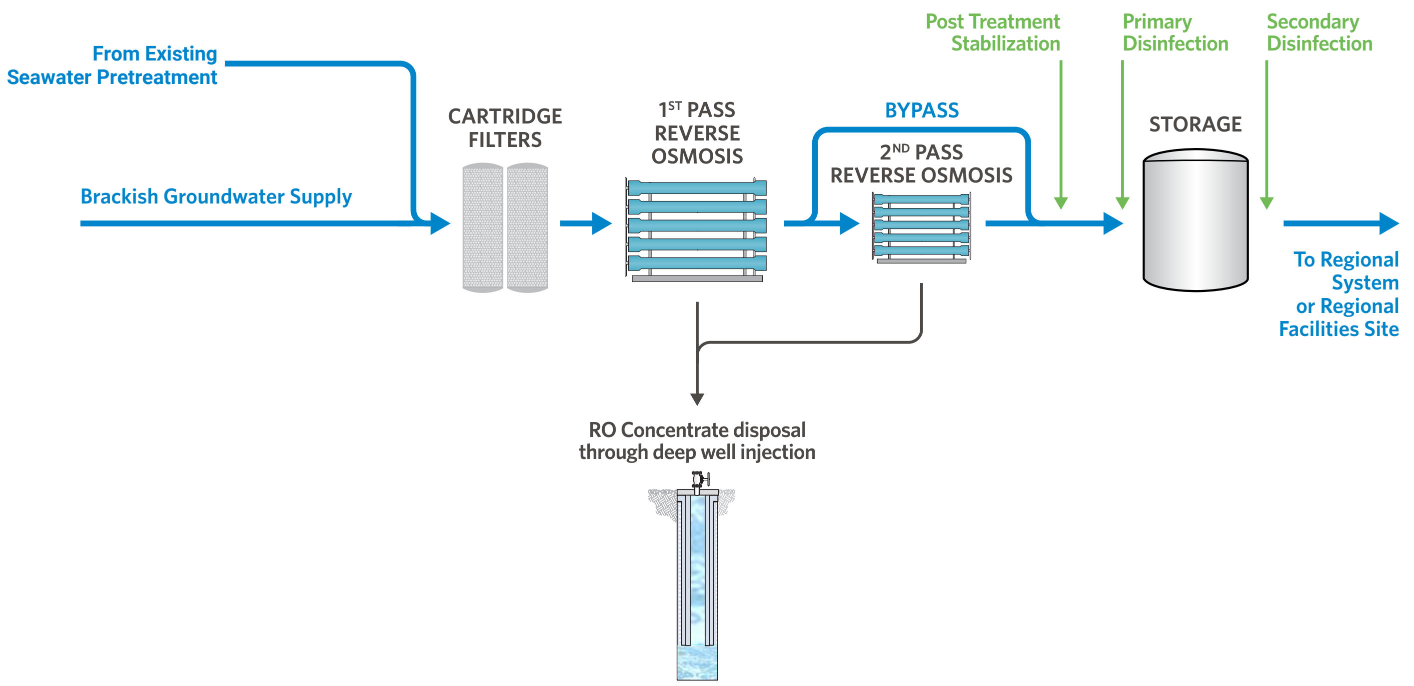
- Desalination plant may require different RO membranes due to change in influent water quality from brackish water blending.
- The desalination plant has limited space availability for expansion.
- Brackish water supply may provide operational flexibility and reduce reliance on TECO cooling water tunnel operations for raw water supply.
- Investigation into specific well locations, withdrawal aquifers and production volumes, as well as potential interaction with the existing South Hillsborough Aquifer Recharge Program (SHARP) wells would need to be performed via a feasibility study.
- Project has a high annual average yield relative to design capacity because it includes additional reliability and redundancy improvements to alleviate operational bottlenecks at the existing desalination plant.
- This project is considered an alternative water supply source, which would be eligible for SWFWMD co-funding.

Project D: Desalination Plant Expansion

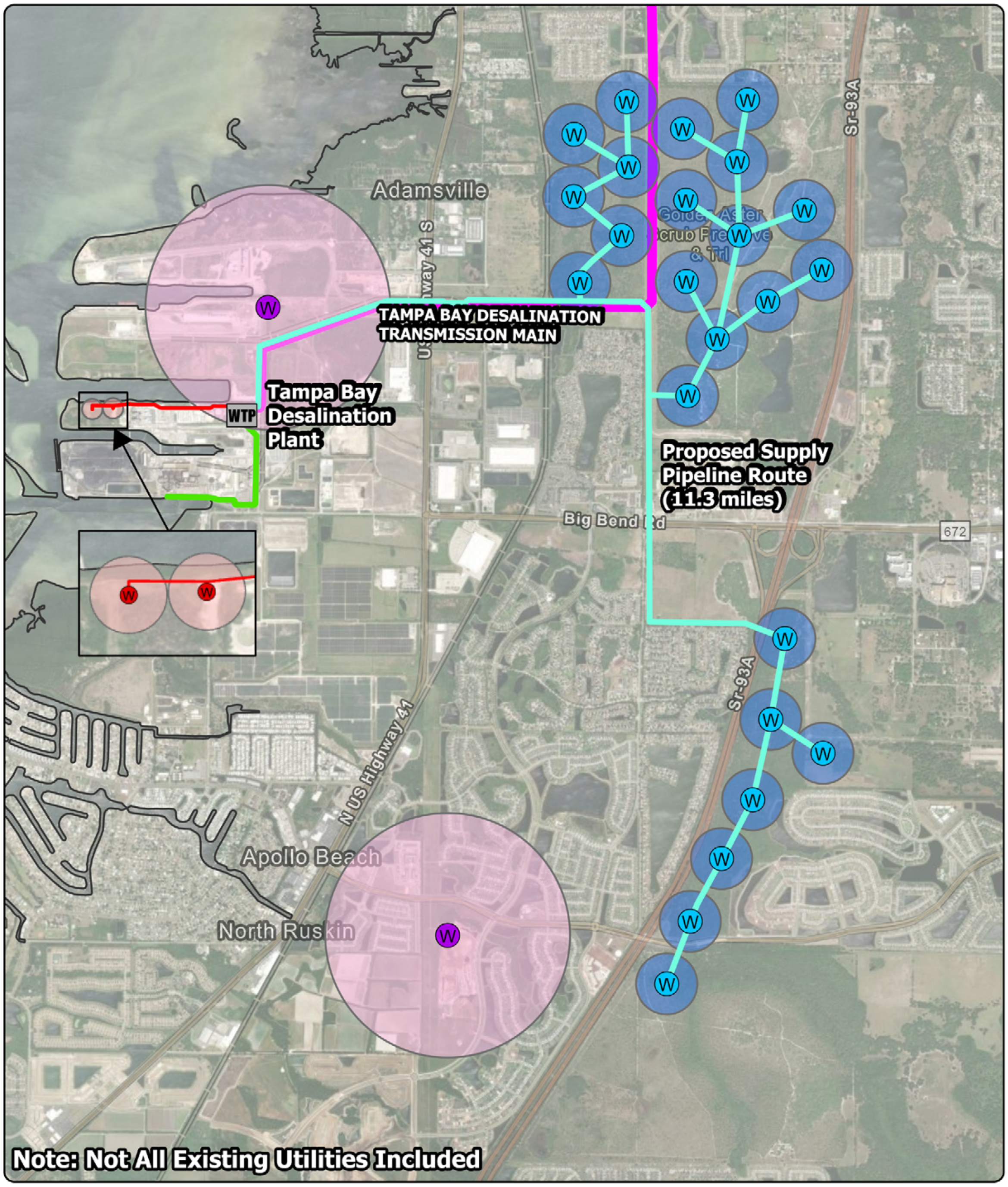
Project Schematic



Treatment Process Flow Diagram



Project D: Desalination Plant Expansion



Project D - Desalination Plant Expansion with Brackish

TAMPA BAY WATER

Legend

- Proposed Deep Injection Well
- Proposed Brackish Wellfield
- Existing Desalination Plant
- Existing SHARP Well
- 250 ft Injection Well Buffer
- 750 ft Production Well Buffer
- 3,000 ft SHARP Well Buffer
- County Boundaries
- Proposed Supply Pipeline Route (11.3 miles)
- Proposed Injection Pipeline Route (0.8 miles)
- Existing Transmission Main
- Existing Raw Water Collection Main

N

0 1,750 3,500 ft

1 inch equals 3,500 feet

Figure D

September 12, 2023

Project D: Desalination Plant Expansion

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown[1]	
Facilities Capital Cost	$74,734,000.00
Pipeline Capital Cost	$60,460,000.00
Pump Station Capital Cost	$28,380,000.00
Wellfield Capital Cost	$33,600,000.00
Total Cost	
Infrastructure Capital Cost	$197,160,000.00
Contingency	$59,150,000.00
Contractor Overhead, Profit, and General Conditions	$51,260,000.00
Escalation to Mid-Point of Construction	$113,360,000.00
Subtotal of Construction, Contingency, and OH&P	**$420,930,000.00**
Engineering, Legal, and Administrative	$105,230,000.00
Land Acquisition	$3,740,000.00
Owner's Allowance Budget	$52,990,000.00
Total Project Cost (with owner's allowance)[2]	**$582,890,000.00**
$/1,000 gallons cost, based on annual production yield	
Total Capital Cost per 1,000 Gallons	$9.20
Annual Operation and Maintenance Cost per 1,000 Gallons	$2.79
Total Life Cycle Project Cost per 1,000 Gallons[3,4]	$11.99

Notes

1. All costs are estimated and representative of October 2022 dollars.
2. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%, escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.
4. An expansion with brackish groundwater would have a total life cycle project cost per 1,000 gallons of $11.99. Whereas, an expansion of the Seawater Plant would have a total life cycle project cost per 1,000 gallons of $13.17

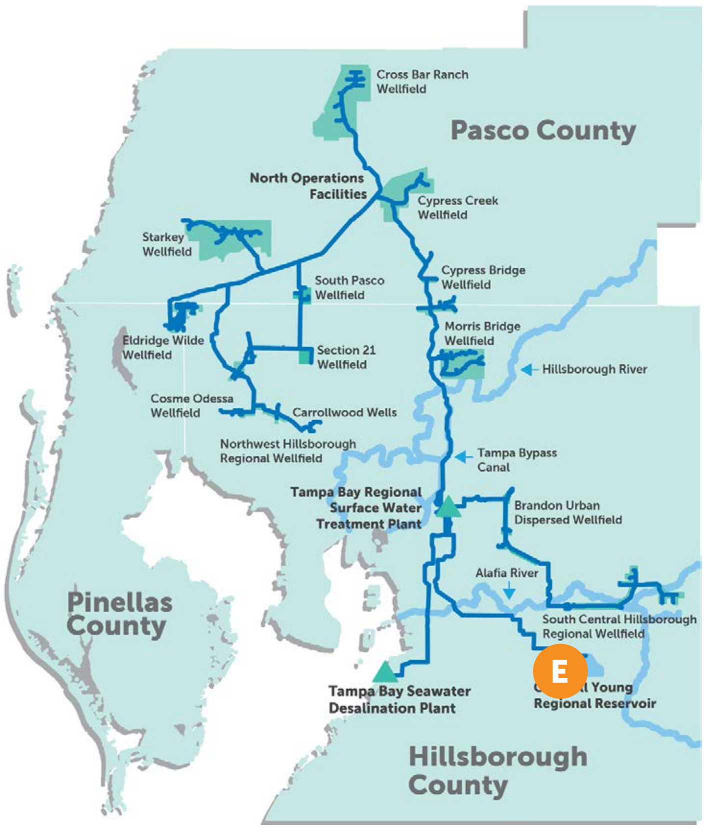
References

- Black & Veatch and Hazen, *Tampa Bay Seawater Desalination Plant Expansion Feasibility Study*, Final Report, Prepared for Tampa Bay Water and Southwest Florida Water Management District, March 16, 2022.
- Black & Veatch, "Concept 6 - Desal Plant Expansion with Reclaimed Water Supply," *WA-006 Concept Summary Sheets,* Draft, Prepared for Tampa Bay Water, August 26, 2022.

Project E: Surface Water Treatment Plant at the Regional Reservoir

Project Description

This project proposes constructing a new Surface Water Treatment Plant (SWTP) near the existing regional reservoir in Hillsborough County to treat additional supply provided by increased Alafia River withdrawals. Modifications to the existing water use permit would be required to increase the allowable withdrawals from the river. This concept would leverage the existing Enhanced Surface Water System infrastructure for raw surface water intakes, transmission, and seasonal storage. In addition to the new SWTP with similar treatment processes to the existing Regional SWTP, this project would require the construction of a finished water pump station and pipeline to deliver the treated supply to the regional transmission system. The new SWTP is currently estimated to produce a finished water annual average yield of 6 million gallons a day (mgd) (range = 2.5 to 8.5 mgd).



Approximate Potable Water Supply Yield = 6.0 mgd

Primary Infrastructure Components

- Upgraded pumps at existing Alafia River intake pump station, with an additional 9 mgd capacity.
- 8.5 mgd surface water treatment plant, including BAF and ozone treatment.
- Finished water storage tank.
- Pump station and 4.5-mile, 20-inch diameter transmission pipeline for finished water to the South Hillsborough Pipeline.

Anticipated Regulatory Requirements

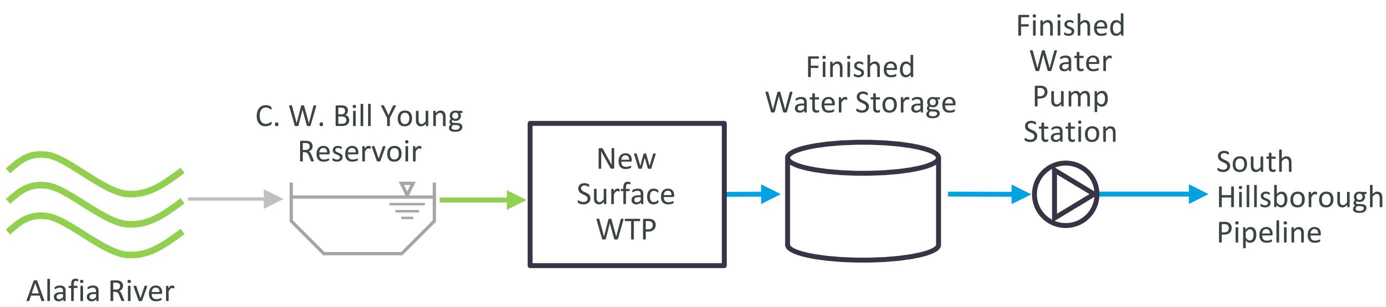
- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit modification.

Key Feasibility Aspects

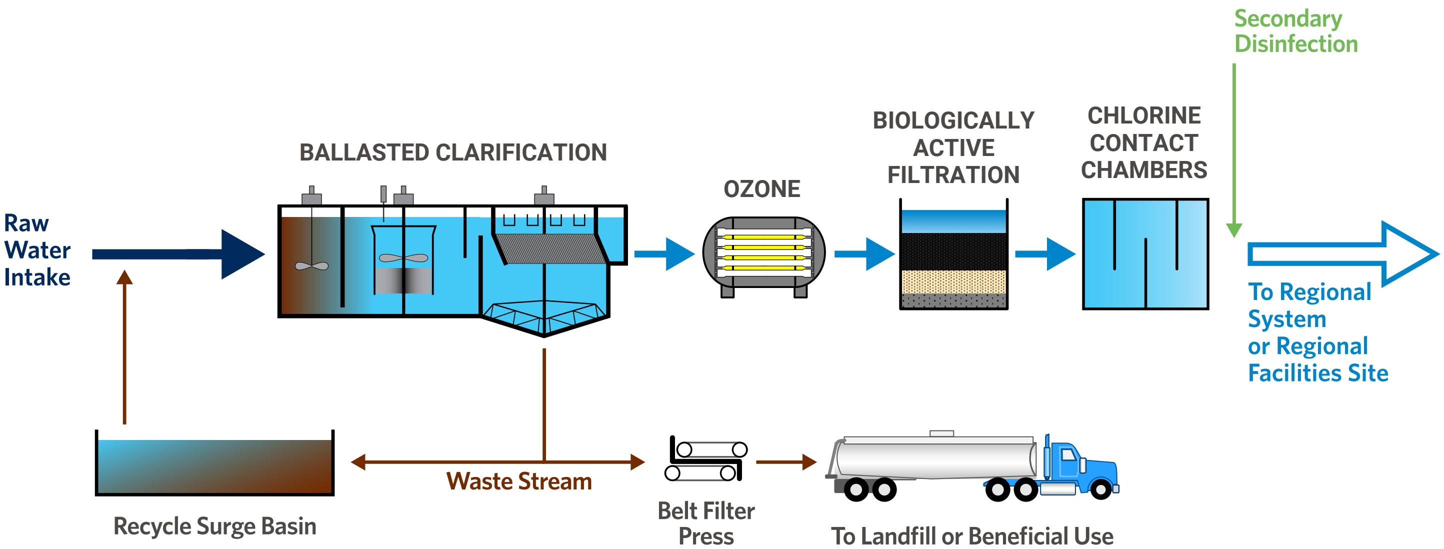
- Additional evaluations should be performed to better understand this potential source including:
    - Evaluate the North Prong and South Prong Basin MFL, since these sources contribute a majority of the Alafia River flow.
    - Assess withdrawal when the updated version of the Integrated Hydraulic Model is completed.
- Additional evaluations should be performed to better assess the water quality in the Alafia River, Tampa Bay Bypass Canal and regional reservoir, to ensure the appropriate level of treatment is being recommended. For this project, fluoride treatment was preliminarily evaluated but not included.
- This project is considered an alternative water supply source project, which may be eligible for SWFWMD co-funding.

Project E: Surface Water Treatment Plant at the Regional Reservoir

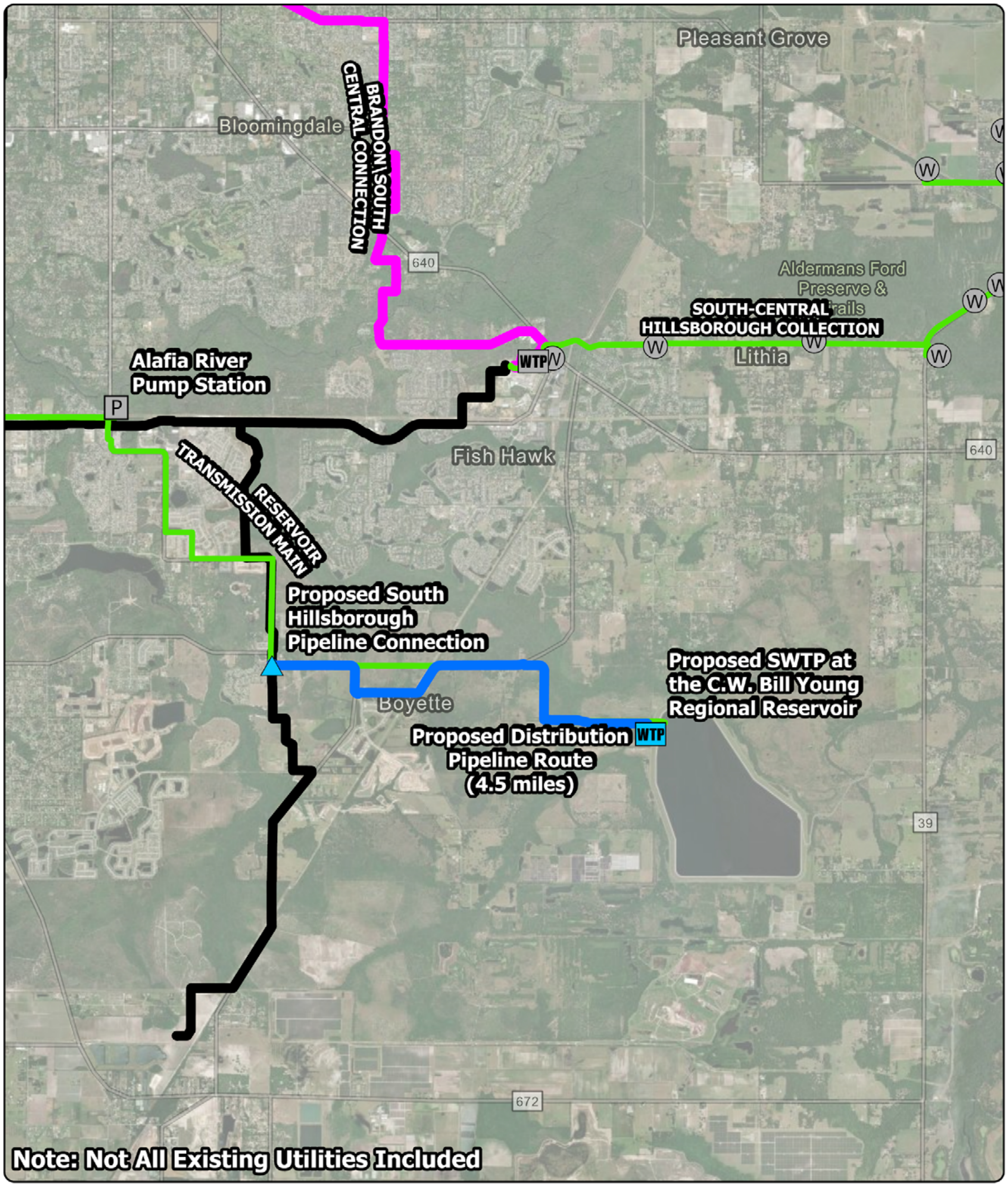
Project Schematic



Treatment Process Flow Diagram



Project E: Surface Water Treatment Plant at the Regional Reservoir



Concept E - New SWTP at the C.W. Bill Young Regional Reservoir via Increased Alafia Withdrawal

TAMPA BAY WATER

Legend

- WTP Proposed SWTP
- Proposed TM Tie-in
- P Existing Pump Station
- W Existing Well
- WTP Existing WTP
- Proposed Distribution Pipeline Route (4.5 miles)
- Existing Transmission Main
- Existing Raw Water Collection Main
- South Hillsborough Pipeline

N

0 3,500 7,000 ft
1 inch equals 7,000 feet

Figure E

September 12, 2023

Project E: Surface Water Treatment Plant at the Regional Reservoir

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown[1]	
Facilities Capital Cost	$23,620,000.00
Pipeline Capital Cost	$12,200,000.00
Pump Station Capital Cost	$7,480,000.00
Total Cost	
Infrastructure Capital Cost	$43,290,000.00
Contingency	$12,990,000.00
Contractor Overhead, Profit, and General Conditions	$11,260,000.00
Escalation to Mid-Point of Construction	$24,890,000.00
Subtotal of Construction, Contingency, and OH&P	**$92,430,000.00**
Engineering, Legal, and Administrative	$23,110,000.00
Land Acquisition	$1,700,000.00
Owner's Allowance Budget	$11,720,000.00
Total Project Cost (with owner's allowance)[2]	**$128,960,000.00**
$/1,000 gallons cost, based on annual production yield	
Total Capital Cost per 1,000 Gallons	$3.74
Annual Operation and Maintenance Cost per 1,000 Gallons	$0.73
Total Life Cycle Project Cost per 1,000 Gallons[3,4]	$4.47

Notes

1. All costs are estimated and representative of October 2022 dollars.
2. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%, escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.
4. If fluoride treatment is to be included in this project, it is assumed that 28% of the plant influent would need to be treated by reverse osmosis. This would increase the Total Project Cost per 1,000 gallons by approximately 36%.

References

- Black & Veatch, *Long Term Water Supply Plan*, Final Report, Prepared for Tampa Bay Water, December 2008.
- Black & Veatch, *Long Term Water Supply Plan*, Report Appendices, Prepared for Tampa Bay Water, December 2008, p. 118-135.
- Black & Veatch, "RE: TBW Long Term WSP - Alafia River Fluoride Issue - ESWS Tie in Point for delivery to Tippin WTP," April 25, 2011, Office Communication (January 19, 2023).
- MWH, *Surface & Recharge Projects Configuration Cost Analysis*, Prepared for Tampa Bay Water, May 2011.
- Southwest Florida Water Management District, *Regional Water Supply Plan*, Board Approved, December 1, 2006.
- Black & Veatch, *TOC Removal Conceptual Plans and Costs*, Draft Technical Memorandum, Prepared for Tampa Bay Water, September 29, 2017.
- Tampa Bay Water, *Alafia River Pump Station and Water Use Permit (WUP)*, Standard Operating Procedure, June 1, 2015.

Project F: South Hillsborough Surface Water Treatment Plant & Reservoir

Project Description

This project would develop new surface water supply sources in southern Hillsborough County including the Little Manatee River and Bullfrog Creek. This project includes the construction of a new 700-million-gallon reservoir in conjunction with a new Surface Water Treatment Plant (SWTP) to provide an estimated finished water annual average yield of 4 million gallons per day (mgd) (range = 1 to 16.5 mgd). The new SWTP would be located in southern Hillsborough County and would connect into the regional transmission system at the southern end of the new South Hillsborough Pipeline. The new SWTP would include similar treatment processes as the existing Regional SWTP.

Approximate Potable Water Supply Yield = 4.0 mgd

Primary Infrastructure Components

- Intake pump stations and transmission piping from Bullfrog Creek (7-mile, 10-inch diameter) and Little Manatee River (3-mile, 16-inch and 4-mile, 18-inch diameter) sources to proposed reservoir, with a total pumping capacity of 8 mgd.
- 700-million-gallon raw water reservoir.
- 7.5 mgd surface water treatment plant.
- Storage tank for finished water.
- Finished water pump station and 6 miles of 18-inch diameter transmission pipeline to South Hillsborough Pipeline.

Anticipated Regulatory Requirements

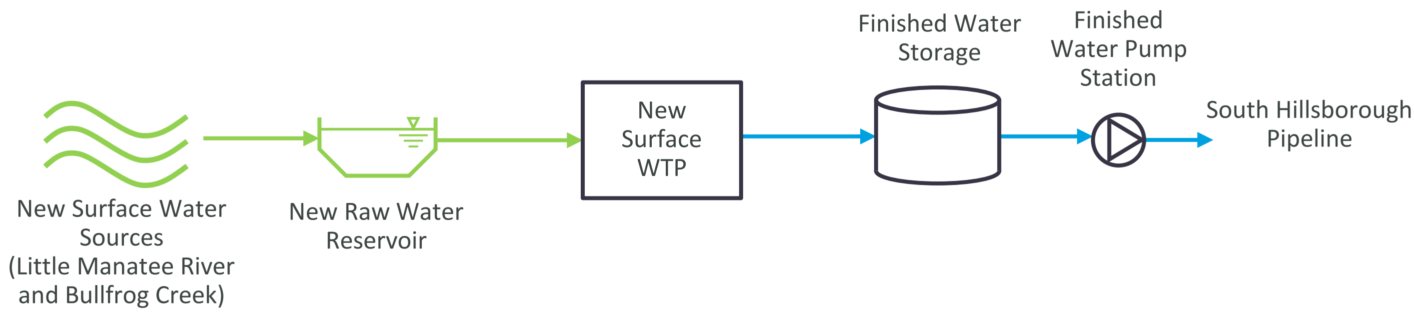
- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater permits.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit.
- Clean Water Act Section 404 permit.

Key Feasibility Aspects

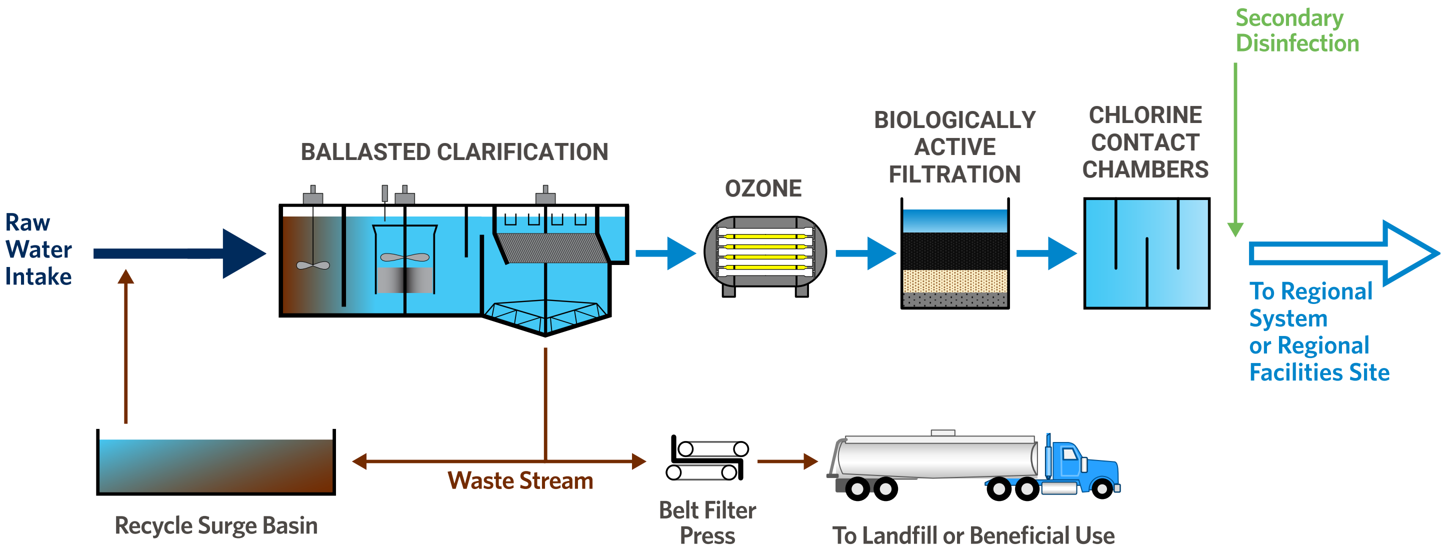
- Main supply sources considered for this option include Little Manatee River and Bullfrog Creek, which have estimated annual average yields of 3.0 mgd and 1.0 mgd respectively. In a more detailed study, Morris Bridge Sink and Shelly Lake can also be evaluated as contributing sources.
- Reservoir size may be adjusted based on flow estimates determined in more detailed studies.
- Florida Power and Light has an existing withdrawal on the Little Manatee River.
- Little Manatee River Minimum Flow Level (MFL) is currently being reassessed.
- A more detailed evaluation into the specific locations of the treatment plant and reservoir would need to be performed in future studies.
- This project involves the use of an alternative water supply source and may be eligible for SWFWMD co-funding.

Project F: South Hillsborough Surface Water Treatment Plant & Reservoir

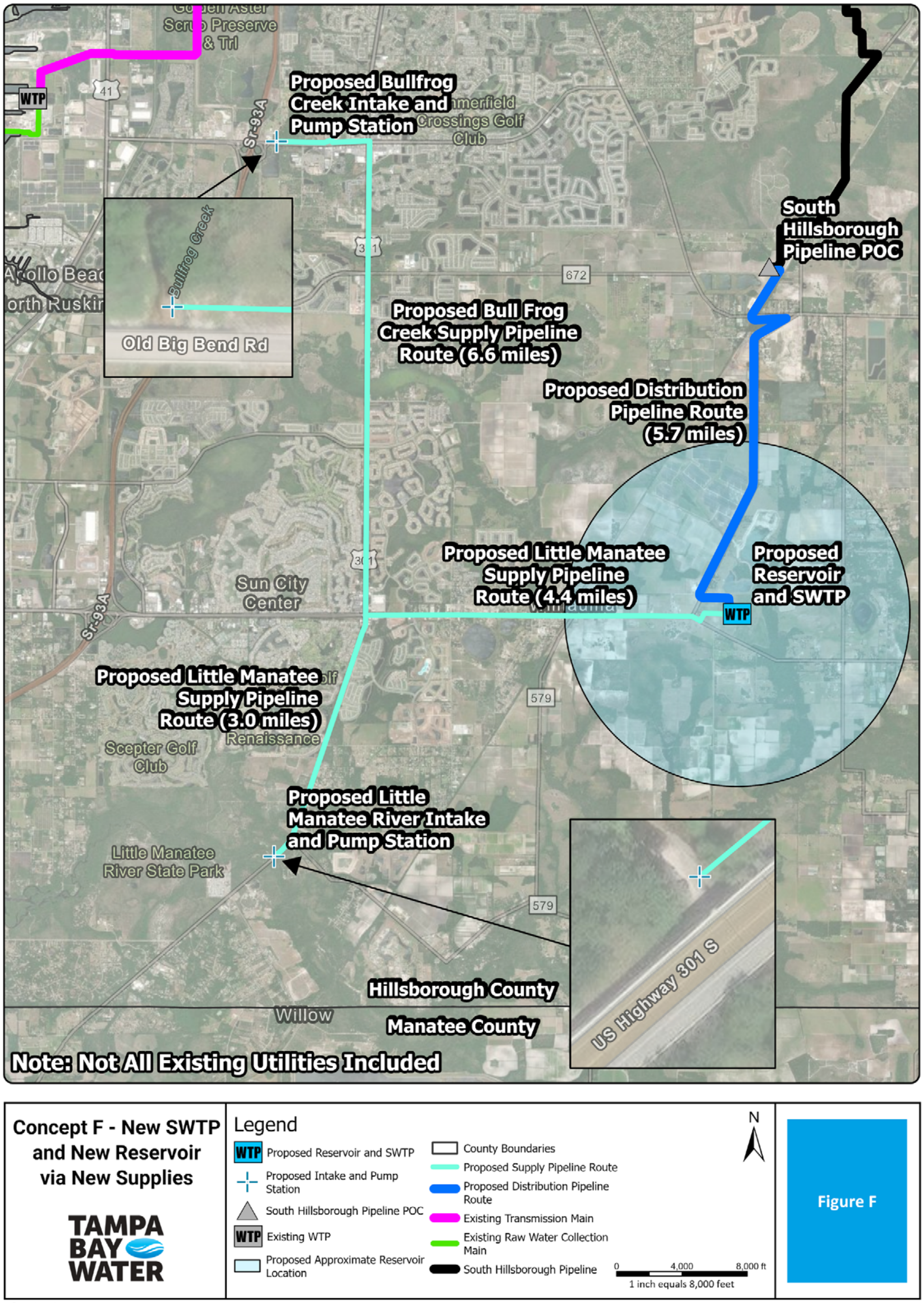
Project Schematic



Treatment Process Flow Diagram



Project F: South Hillsborough Surface Water Treatment Plant & Reservoir



September 12, 2023

Project F: South Hillsborough Surface Water Treatment Plant & Reservoir

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown[1]	
Facilities Capital Cost	$21,440,000.00
Reservoir Capital Cost	$14,000,000.00
Pipeline Capital Cost	$33,940,000.00
Pump Station Capital Cost	$11,460,000.00
Total Cost	
Infrastructure Capital Cost	$80,820,000.00
Contingency	$24,250,000.00
Contractor Overhead, Profit, and General Conditions	$21,010,000.00
Escalation to Mid-Point of Construction	$46,470,000.00
Subtotal of Construction, Contingency, and OH&P	**$172,550,000.00**
Engineering, Legal, and Administrative	$43,140,000.00
Land Acquisition	$13,880,000.00
Owner's Allowance Budget	$22,960,000.00
Total Project Cost (with owner's allowance)[2]	**$252,530,000.00**
$/1,000 gallons cost, based on annual production yield	
Total Capital Cost per 1,000 Gallons	$11.71
Annual Operation and Maintenance Cost per 1,000 Gallons	$0.90
Total Life Cycle Project Cost per 1,000 Gallons[3]	$12.61

Notes

1. All costs are estimated and representative of October 2022 dollars.
2. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%, escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.

References

- Hazen & Sawyer, *Long Term Master Water Plan*, Final Report, Prepared for Tampa Bay Water, December 2018.
- MWH, *Surface & Recharge Projects Configuration Cost Analysis*, Prepared for Tampa Bay Water, May 2011.

Project G: South Hillsborough Wellfield via Aquifer Recharge

Project Description

This project proposes obtaining a water use permit for a new fresh groundwater wellfield in southern Hillsborough County based on evidence of a net-benefit to the aquifer from Hillsborough County's concurrent operation of a reclaimed water aquifer recharge system to the west of the production wellfield. The aquifer recharge system would be used to generate credits to withdraw a certain quantity of fresh groundwater from a new production wellfield located further inland of the aquifer recharge wells. The supply would be treated at a new groundwater treatment plant that would include an ozone treatment process. The finished water supply would be delivered to the southern end of the new South Hillsborough Pipeline.

Approximate Potable Water Supply Yield = 6.0 mgd

Primary Infrastructure Components

- Fresh groundwater production wellfield with eight production wells in southern Hillsborough County and a 4-mile long collection main, with diameters ranging from 16 to 24-inch.
- 9 mgd groundwater treatment facility with ozone treatment.
- Finished water storage tank.
- Finished water pump station and 500-feet 20-inch diameter pipeline from the groundwater treatment facility to the south end of the South Hillsborough Pipeline.

Anticipated Regulatory Requirements

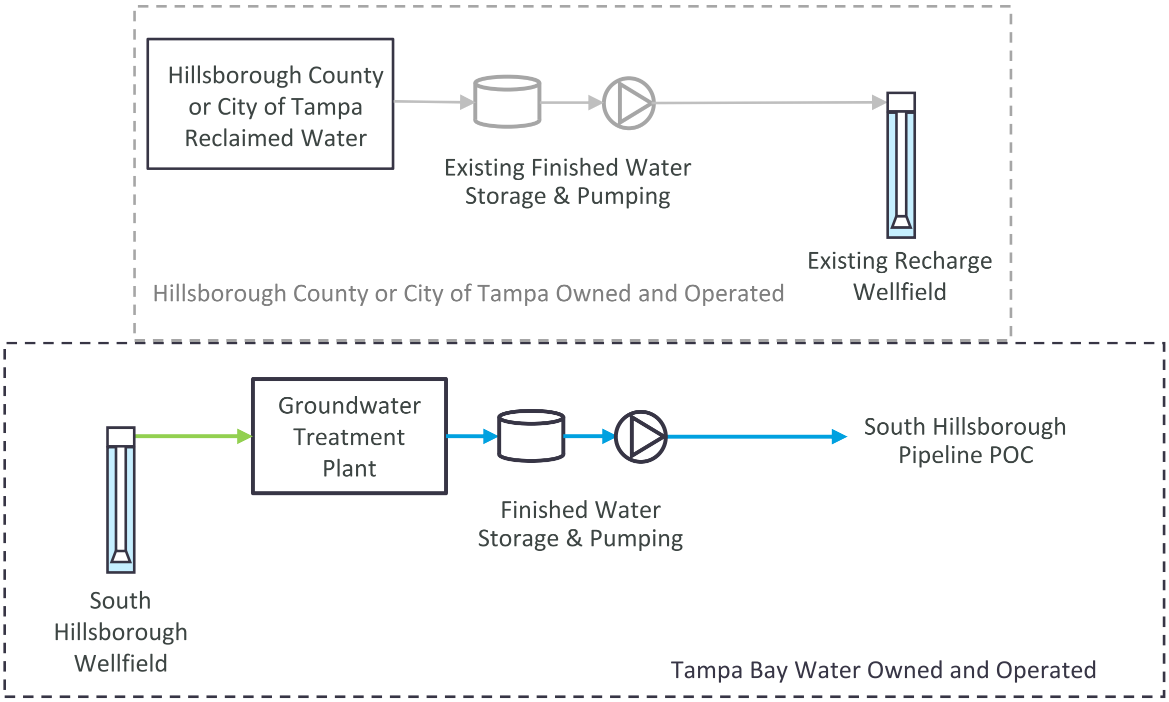
- Florida Department of Environmental Protection (FDEP) Facility Operational Permit.
- FDEP Public Drinking Water Facility Construction Permit.
- Environmental Resource Permit (ERP).
- NPDES Stormwater Permit.
- Southwest Florida Water Management District (SWFWMD) Water Use Permit.
- FDEP Class V Well Construction and Operation permits.

Key Feasibility Aspects

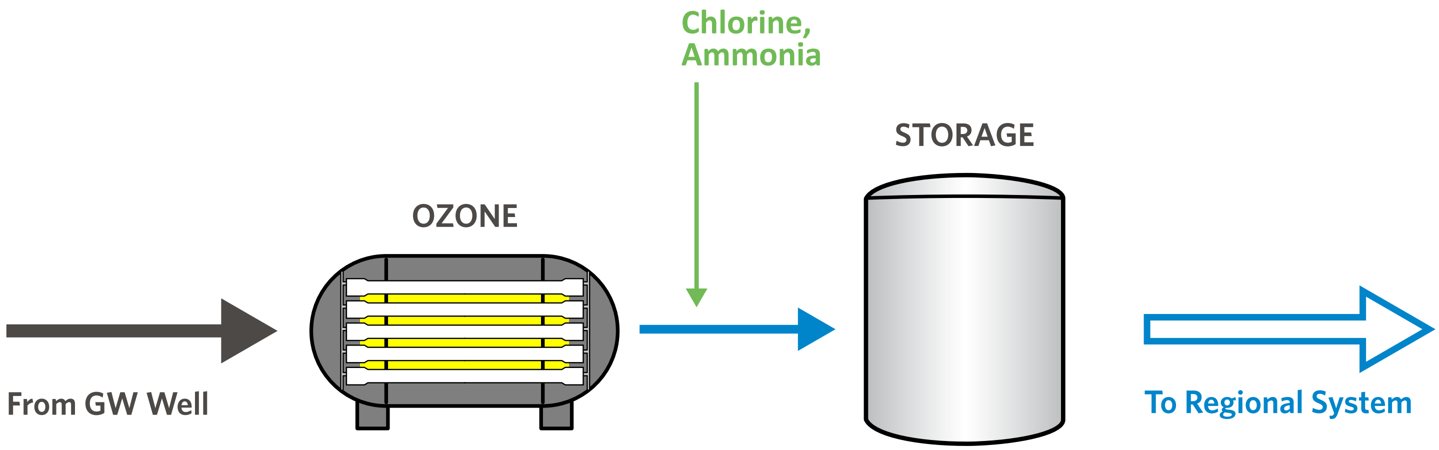
- An agreement between Tampa Bay Water and Hillsborough County, City of Tampa, or other reclaimed water supplier would be needed for the reclaimed water aquifer recharge component of this project.
- Costs related to the reclaimed water aquifer recharge system that is proposed to be used to obtain the fresh groundwater withdrawal permit is not included in the project cost estimate.
- A feasibility study was previously completed for this project. WSP's "South Hillsborough Wellfield via SHARP Credits Feasibility Study" was finalized in 2022 and the map shown for this project is from that study.

Project G: South Hillsborough Wellfield via Aquifer Recharge

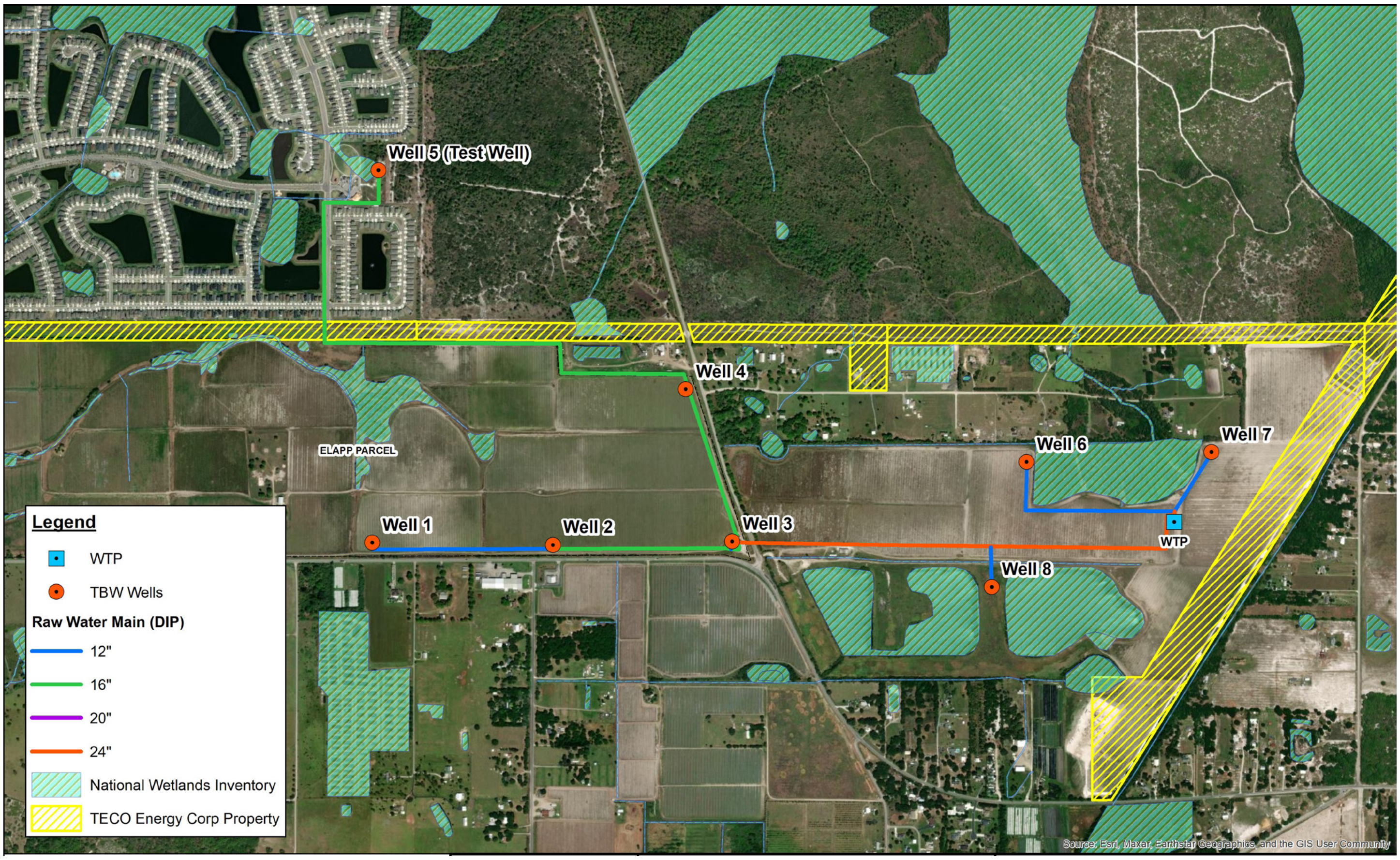
Project Schematic



Treatment Process Flow Diagram



Project G: South Hillsborough Wellfield via Aquifer Recharge



Project G: South Hillsborough Wellfield via Aquifer Recharge

Life Cycle Cost

INFRASTRUCTURE	EST. COST
Capital Cost Breakdown[1]	
Facilities Capital Cost	$11,340,000.00
Wellfield Capital Cost	$11,200,000.00
Pipeline Capital Cost	$3,440,000.00
Pump Station Capital Cost	$5,770,000.00
Total Cost	
Infrastructure Capital Cost	$37,730,000.00
Contingency	$11,320,000.00
Contractor Overhead, Profit, and General Conditions	$9,810,000.00
Escalation to Mid-Point of Construction	$21,690,000.00
Subtotal of Construction, Contingency, and OH&P	**$80,550,000.00**
Engineering, Legal, and Administrative	$20,140,000.00
Land Acquisition	$2,350,000.00
Owner's Allowance Budget	$10,300,000.00
Total Project Cost (with owner's allowance)[2]	**$113,340,000.00**
$/1,000 gallons cost, based on annual production yield[3]	
Total Capital Cost per 1,000 Gallons	$3.26
Annual Operation and Maintenance Cost per 1,000 Gallons	$0.57
Total Life Cycle Project Cost per 1,000 Gallons[4]	$3.83

Notes

1. All costs are estimated and representative of October 2022 dollars.
2. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%, escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Costs of reclaimed water credits are not included.
4. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.

References

- WSP, Hazen, *South Hillsborough Wellfield via SHARP Credits Feasibility Study*, Draft, Prepared for Tampa Bay Water, December 23, 2021.
- Hillsborough County, "RE: TBW/WRD Bi-Weekly Project Status Update," October 11, 2022, Member Government Communication (October 11, 2022).
- Black & Veatch, "Concept 1 - South Hillsborough Wellfield via Reclaimed Water Aquifer Recharge," *WA-006 Concept Summary Sheets*, Draft, Prepared for Tampa Bay Water, August 26, 2022.
- Black & Veatch, *2022 New Water Supply Configuration Alternatives Selection Process*, Draft, Prepared for Tampa Bay Water, January 11, 2023.

Appendix J. Short-List Criteria – Detailed Scoring

Appendix J. Short-List Criteria - Detailed Scoring

The eight short-list sub-criteria are described in more detail in the following section, along with the reasoning for the specific scores.

Environmental Stewardship – Environmental Sustainability

Table J-1 Short-List Scoring - Environmental Sustainability

Concept ID	Concept Name	Protection of Downstream Water Quantity or Quality	Protection of Natural Habitats and/or Listed Species	Energy Consumption	Average Score	Comments
4	Existing Desalination Plant Expansion	4	3	1	**2.67**	• Due to the relatively low recovery of seawater RO systems, the process results in a large concentrate stream requiring disposal. • Desalination plant is anticipated to have high energy consumption.
5b	Existing Desalination Plant Blending with Brackish	4	4	1	**3.00**	• Blending with brackish water could potentially lower intake salinity. • Desalination plant is anticipated to have high energy consumption.
6	North Pinellas SWTP	5	4	4	**4.33**	• Harvesting excess surface water discharged to Old Tampa Bay could have potential ecological benefits. • Monitoring and control of water levels in Lake Tarpon may be required. • A new SWTP is anticipated to have low to moderate energy consumption.
8	SWTP at the Regional Reservoir via Increased Alafia Withdrawals	3	3	4	**3.33**	• The current minimum flow level determination for the lower Alafia River allows for increased withdrawals over the existing water use permit. • A new SWTP is anticipated to have low to moderate energy consumption.
9	South Hillsborough SWTP and Reservoir	3	2	4	**3.00**	• Assumes new surface water withdrawals from the Little Manatee River and/or Bullfrog Creek. • Likely new salinity and ecological impacts in the affected surface water bodies. • A new SWTP is anticipated to have low to moderate energy consumption.
10	Eastern Pasco Wellfield	3	3	4	**3.33**	• There are potential lake and wetland drawdown impacts. • The wellfield and groundwater treatment plant are anticipated to have low energy consumption.
14a	Increase CWUP	3	3	5	**3.67**	• Potential impacts to the environment. • The Recovery Plan is approved for the existing yield only. • This concept is anticipated to have low energy consumption.
16b	South Hillsborough Wellfield via Aquifer Recharge	4	4	4	**4.00**	• Positive environmental impact due to salinity barrier. • Assumes low to moderate energy consumption for new groundwater plant.

Environmental Stewardship – Regulatory/Ease of Permitting

Table J-2 Short-List Scoring - Regulatory/Ease of Permitting

Concept ID	Concept Name	Involvement of Permitting Requirements and Supporting Documentation	Mitigation Requirements	Average Score	Comments
4	Existing Desalination Plant Expansion	3	4	3.50	• There is potential for higher intake salinity within this concept. Therefore, modeling and monitoring will be required.
5b	Existing Desalination Plant Blending with Brackish	3	3	3.00	• The concept would have no additional surface water impacts and may require modification of the existing NPDES, and a new UIC for concentrate disposal.
6	North Pinellas SWTP	3	5	4.00	• The concept has potential net environmental benefits to Old Tampa Bay but will require a new WUP for the surface water withdrawal. • Potential concerns about adverse lake level impacts to Lake Tarpon.
8	SWTP at the Regional Reservoir via Increased Alafia Withdrawals	3	3	3.00	• The existing MFL allows for increased withdrawals, but this concept would require a modification to the existing WUP with new modeling and increased monitoring.
9	South Hillsborough SWTP and Reservoir	2	4	3.00	• Assumes new withdrawals from the Little Manatee River and/or Bullfrog Creek. • This concept would require new WUPs for the surface water withdrawals, with extensive modeling. • New withdrawal from the Little Manatee may be inconsistent with the existing MFL. The MFL for Little Manatee River is expected to be published within the year. • ERP and 404 permits required for new reservoir.
10	Eastern Pasco Wellfield	2	2	2.00	• The concept would require a new WUP and extensive modeling. • It should be noted that there is potential for mitigation to be required.
14a	Increase CWUP	2	2	2.00	• This concept would require extensive modeling and reasonable assurance and may require modifications to the existing Recovery Plan.
16b	South Hillsborough Wellfield via Aquifer Recharge	4	4	4.00	• A new wellfield in the SWUCA and MIA would require extensive modeling and reasonable assurance, although a salinity barrier may reduce or eliminate potential mitigation requirements. • This concept has undergone preliminary modeling and agency review.

Environmental Stewardship – Public Reception

Table J-3 Short-List Scoring - Public Reception

Concept ID	Concept Name	Anticipated Reception of Concept	Type and Duration of Public Outreach Required	Average Score	Comments
4	Existing Desalination Plant Expansion	5	3	4.00	• This concept is favorable to stakeholders as Tampa Bay Water has a record of sustainable operations at the desalination plant. • However, studies will need to be conducted to ensure that a modification to the existing NPDES permit will not harm marine life in the area.
5b	Existing Desalination Blending with Brackish	4	3	3.50	• Stakeholders will be interested in any new or different constituents within the concentrate discharge that will potentially affect Tampa Bay. • As brackish water is non-native, there will also be concerns associated with the supply withdrawal and inland saltwater intrusion.
6	North Pinellas SWTP	2	2	2.00	• This concept will require significant and sustained outreach if construction will be located in any county park. • Stakeholders are more likely to accept an intake on the Lake Tarpon outfall than the lake itself; will likely express concern regarding impacts to lake levels.
8	SWTP at the Regional Reservoir via Increased Alafia Withdrawals	4	4	4.00	• This concept will likely be well received by the public; however, outreach efforts will need to be conducted to ensure that increased withdrawals from the Alafia River will not impact the river, Tampa Bay, or the surrounding estuarine environment.
9	South Hillsborough SWTP and Reservoir	3	3	3.00	• This concept will require communication to the public to convey that this project will support the region's continued growth, not just the southward growth of the County. • Environmental concerns from new withdrawals will also need to be addressed.
10	Eastern Pasco Wellfield	3	3	3.00	• Stakeholder concerns will likely include impacts from drawdown, impacts to nearby wells and surface features, and any potential mitigation that will be required.
14a	Increase CWUP	3	3	3.00	• Stakeholders will be interested in any potential environmental impacts from increasing the withdrawals of the existing permitted sources, though nearby residents experiencing flooding may support the concept.
16b	South Hillsborough Wellfield via Aquifer Recharge	3	3	3.00	• Stakeholder concerns are regarding the injection of reclaimed water into the brackish aquifer and potential drawdown impacts to surrounding wells and surface water features. • However, since the reclaimed water is not migrating to drinking water supply wells, this withdrawal credit concept will likely be more favorable than other concepts.

Project Cost – Life Cycle Cost

Table J-4 Short-List Scoring - Life Cycle Cost

Concept ID	Concept Name	Score	$/1,000 Gallons
4	Existing Desalination Plant Expansion	1	$ 13.17
5b	Existing Desalination Plant Blending with Brackish	2	$ 11.99
6	North Pinellas SWTP	2	$ 10.92
8	SWTP at the Regional Reservoir via Increased Alafia Withdrawals	4	$ 4.47
9	South Hillsborough SWTP and Reservoir	1	$ 12.61
10	Eastern Pasco Wellfield	3	$ 8.25
14a	Increased CWUP	5	$ 0.50
16b	South Hillsborough Wellfield via Aquifer Recharge	4	$ 3.83

Project Cost – Expansion Potential

Table J-5 Short-List Scoring - Expansion Potential

Concept ID	Concept Name	Ability to be Implemented in Phases or Expanded	Average Score	Comments
4	Existing Desalination Plant Expansion	1	**1.00**	• This concept has space constraints that restrict supply increases beyond this expansion.
5b	Existing Desalination Plant Blending with Brackish	1	**1.00**	• This concept has space constraints that restrict supply increases beyond this expansion.
6	North Pinellas SWTP	3	**3.00**	• Based on the addition of a reservoir and the potential changes to lake level operations, this concept has some supply expansion potential.
8	SWTP at the Regional Reservoir via Increased Alafia Withdrawals	2	**2.00**	• Based on the size of the reservoir and the Alafia withdrawals, this concept has limited supply expansion potential.
9	South Hillsborough SWTP and Reservoir	4	**4.00**	• This concept has good expansion potential based on the proposed reservoir and treatment plant. Concept could potentially connect with other supplies.
10	Eastern Pasco Wellfield	3	**3.00**	• This concept has some supply expansion potential, but additional studies would need to be performed to confirm.
14a	Increase CWUP	3	**3.00**	• This concept has limited supply expansion potential.
16b	South Hillsborough Wellfield via Aquifer Recharge	4	**4.00**	• This concept has good supply expansion potential based on reclaimed water availability.

Project Cost – Cost Risk Factors and Implementation Schedule

Table J-6 Short-List Scoring - Cost Risk Factors and Implementation Schedule

Concept ID	Concept Name	Potential for Schedule Delays due to Supply Chain Issues (Equipment or Chemicals)	Ability to Meet Future Regulatory Changes that Mandate More Stringent Water Quality Requirements (e.g., PFAS)	Constructability Risk	Implementation Schedule	Average Score	Comments
4	Existing Desalination Plant Expansion	3	5	2	3	**3.25**	• Potential supply chain issues with membrane filtration equipment. • Long lead time on large plant equipment (including pumps and transformers), but this expansion is a smaller capacity than a new plant. • Anticipated ability to meet future regulatory changes due to proposed treatment type. • Constructability risks due to upsized seawater pipeline, challenges with construction on existing site, maintenance of plant operation challenges. • Implementation schedule can meet new water supply deadline.
5b	Existing Desalination Plant Blending with Brackish	3	5	2	1	**2.75**	• Less supply chain concerns since there is no expansion of pretreatment microfiltration (MF) /Ultrafiltration (UF) treatment and solids handling. • Anticipated ability to meet future regulatory changes due to proposed treatment type. • Constructability risks due to challenges with construction on existing site, maintenance of plant operation challenges. • Implementation schedule is challenging to meet new water supply deadline.
6	North Pinellas SWTP	4	3	2	1	**2.50**	• Low to moderate potential for supply chain delays, some unique treatment considerations that may impact project. • Modifications to proposed treatment may be necessary to meet future regulatory changes. • Low constructability score for new reservoir. • Implementation schedule is challenging to meet new water supply deadline.
8	SWTP at the Regional Reservoir via Increased Alafia Withdrawals	4	2	3	1	**2.50**	• Low to moderate potential for supply chain delays, some unique treatment considerations that may impact project. • Modifications to proposed treatment may be necessary to meet future regulatory changes. • Constructability risks associated with fluoride treatment and water management uncertainty. • Implementation schedule is challenging to meet new water supply deadline.
9	South Hillsborough SWTP and Reservoir	4	3	1	1	**2.25**	• Low to moderate potential for supply chain delays, some unique treatment considerations that may impact project. • Modifications to proposed treatment may be necessary to meet future regulatory changes. • Constructability risks associated with long pipelines from multiple sources and new reservoir. • Implementation schedule is challenging to meet new water supply deadline.
10	Eastern Pasco Wellfield	4	3	2	1	**2.50**	• Low supply chain concerns and potential for delays. • Modifications to proposed treatment may be necessary to meet future regulatory changes. • Constructability risks associated with long pipeline length, new groundwater sources and well production risks. • Implementation schedule is challenging to meet new water supply deadline.

Concept ID	Concept Name	Potential for Schedule Delays due to Supply Chain Issues (Equipment or Chemicals)	Ability to Meet Future Regulatory Changes that Mandate More Stringent Water Quality Requirements (e.g., PFAS)	Constructability Risk	Implementation Schedule	Average Score	Comments
14a	Increase CWUP	5	3	5	5	**4.50**	• No potential for schedule delays due to supply chain issues as no new infrastructure is required. • Ability to meet future regulatory changes varies based on existing WTP processes. • No constructability risk as no new infrastructure is required. • Implementation schedule is short and can easily meet the new water supply deadline.
16b	South Hillsborough Wellfield via Aquifer Recharge	4	3	4	3	**3.50**	• Low potential for schedule delays due to supply chain issues. • The proposed treatment is anticipated to meet regulatory changes although there is some uncertainty regarding arsenic mobilization. • Some constructability risks associated with new well production risks, however since this project has already been evaluated, a higher score was given. • Implementation schedule can meet new water supply deadline.

Reliability – Yield Reliability

Table J-7 Short-List Scoring - Yield Reliability

Concept ID	Concept Name	Long-Term Yield Reliability	Impacts to Capacity and Quality by Seasonal Variation	Resilience to Natural Disasters, Sea Level Rise, and Climate Change	Recovery from Events or Conditions that Negatively Impact Yield	Reliance on Third Parties to Ensure Supply Availability	Average Score	Comments
4	Existing Desalination Plant Expansion	4	5	1	4	4	**3.60**	• Moderately high long term yield reliability with seawater source, although impacts from TECO's operations is considered. • The supply is expected to have limited resilience, but high ability to recover from natural disasters, sea level rise and climate change. Although, storm surge could keep the plant offline for an extended period. • The concept continues to have some reliance on the co-located power plant.
5b	Existing Desalination Plant Blending with Brackish	1	5	1	4	4	**3.00**	• Low long term yield reliability due to fouling in similar brackish wells. • Deep injection wells are shallow and subject to upwelling, thus mixing with brackish groundwater. • Limited seasonal impacts from brackish groundwater. • The source and location are anticipated to have limited resilience but high ability to recover from natural disasters, climate change and sea level rise. Although, storm surge could keep the plant offline for an extended period. • The concept continues to have some reliance on the co-located power plant.
6	North Pinellas SWTP	2	3	2	3	5	**3.00**	• Low long term yield reliability due to inconsistent flow from Lake Tarpon. • Seasonal impacts on capacity and quality are mitigated by the presence of a reservoir. • The supply is expected to have low to moderate resilience and recovery from natural disasters, sea level rise and climate change. • This concept is not reliant on a third party for supply.
8	SWTP at the Regional Reservoir via Increased Alafia Withdrawals	2	3	3	4	5	**3.40**	• Low long term yield reliability for surface water sources. • Moderate impacts of quantity and quality from seasonal variations, including fluoride concerns. • Moderate resilience and recovery from natural disasters, sea level rise and climate change, and natural disasters. • This concept is not reliant on a third party for supply.
9	South Hillsborough SWTP and Reservoir	2	3	4	3	5	**3.40**	• Limited information regarding long term yield reliability for surface water sources, including Bullfrog Creek and Little Manatee River. No MFL is established for Bullfrog Creek. An MFL is in development for Little Manatee River. • Seasonal impacts on capacity and quality are mitigated by the presence of a reservoir. • Moderate resilience and recovery from natural disasters, sea level rise and climate change, and natural disasters. • This concept is not reliant on a third party for supply.

Concept ID	Concept Name	Long-Term Yield Reliability	Impacts to Capacity and Quality by Seasonal Variation	Resilience to Natural Disasters, Sea Level Rise, and Climate Change	Recovery from Events or Conditions that Negatively Impact Yield	Reliance on Third Parties to Ensure Supply Availability	Average Score	Comments
10	Eastern Pasco Wellfield	4	5	4	2	5	**4.00**	• Moderately high long term yield reliability for fresh groundwater supply. • Limited seasonal impacts to supply quality and capacity. • Supply and inland location are moderately resilient to natural disasters, sea level rise and climate change, but recovery from events that negatively impact yield is anticipated to be slow. • This concept is not reliant on a third party for supply.
14a	Increase CWUP	5	5	4	1	5	**4.00**	• Long term yield reliability is moderately high as fresh groundwater supply is viewed as reliable and will be permitted for a set withdrawal volume. • Limited impact to capacity or quality based on seasonal variations is anticipated. • The supply and inland location are anticipated to have moderately high resilience, but limited recovery from natural disasters and climate change is expected. • This concept has no reliance on third parties.
16b	South Hillsborough Wellfield via Aquifer Recharge	4	3	4	4	3	**3.60**	• Moderately high long-term yield reliability for fresh groundwater supply. • Moderate seasonal impacts to supply quality and capacity are anticipated. • Inland location of supply wells and treatment are anticipated to have moderately high resilience and recovery from natural disasters, sea level rise and climate change. • This concept has some reliance on a third party. • Yield could be limited to prevent inland migration of reclaimed water.

Reliability – Regional System Reliability Impacts

Table J-8 Short-List Scoring - Regional System Reliability Impacts

Concept ID	Concept Name	Consistency of Supply to Growing Demands	Ability of Concept to Provide Service/Relief During Emergency Events	Degree of Impact to Reliability (Regional v. Isolated)	Average Score	Comments
4	Existing Desalination Plant Expansion	4	2	5	**3.67**	• The concept serves the regional high service pump station with a connection to the South Hillsborough Pipeline therefore supporting the growing demand. • The location does not provide relief to areas downstream of a single point of failure but is upstream of the regional high service pump station which provides increased reliability to the region.
5b	Existing Desalination Plant Blending with Brackish	4	2	5	**3.67**	• The concept serves the regional high service pump station with a connection to the South Hillsborough Pipeline therefore supporting the growing demand. • The location does not provide relief to areas downstream of a single point of failure but is upstream of the regional high service pump station which provides increased reliability to the region.
6	North Pinellas SWTP	1	5	1	**2.33**	• The concept is not located near a high demand area therefore not supporting the growing demand. • The location increases reliability by providing relief to areas downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection to serve one Member Government rather than the regional system.
8	SWTP at the Regional Reservoir via Increased Alafia Withdrawals	5	3	3	**3.67**	• The concept is connected to the South Hillsborough Pipeline therefore supporting the growing demand. • The location increases reliability by providing relief to a point of connection downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection rather than the regional system though reverse flow could potentially be possible through the regional high service pump station if pressures were great enough.
9	South Hillsborough SWTP and Reservoir	5	3	3	**3.67**	• The concept is connected to the South Hillsborough Pipeline therefore supporting the growing demand. • The location increases reliability by providing relief to a point of connection downstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection rather than the regional system though reverse flow could potentially be possible through the regional high service pump station if pressures were great enough.
10	Eastern Pasco Wellfield	5	2	4	**3.67**	• The concept is located in Pasco County therefore supporting the growing demand. • The location does not provide relief to areas downstream of a single point of failure but is downstream of the regional high service pump station which provides increased reliability to the region.
14a	Increase CWUP	4	4	5	**4.33**	• An increased CWUP throughout the system supports the growing demand in the region. • The location increases reliability by providing relief to areas upstream and downstream of points of failure, as identified in the 2035 System Analysis Update, therefore increasing supply throughout the regional system.
16b	South Hillsborough Wellfield via Aquifer Recharge	5	3	3	**3.67**	• The concept is located in South Hillsborough County therefore supporting the growing demand. • The location increases reliability by providing relief to a point of connection downstream and upstream of a single point of failure, as identified in the 2035 System Analysis Update, however, is connected to a single point of connection rather than the regional system though reverse flow could potentially be possible through the regional high service pump station if pressures were great enough.

Appendix K. Public Engagement

TAMPA BAY WATER

2021 Public Opinion Survey

TABLE OF CONTENTS

INTRODUCTION

INTRODUCTION

The objective of this research study is to explore public attitudes regarding the following issues:

- Water Needs
- Tampa Bay Water
- Water Sources
- Reclaimed Water
- Conservation Programs
- Water Quality
- Water Cost
- Information Sources

A statistically valid internet survey of 1,200 randomly selected households in the Tampa Bay Water service area was conducted from August 20, 2021, to September 3, 2021.

The margin of error for responses from the three-county service area is 2.8 percentage points, and it is 4.9 percentage points for results from each county. Questions for the study emanated from past studies for Tampa Bay Water and from Tampa Bay Water management.

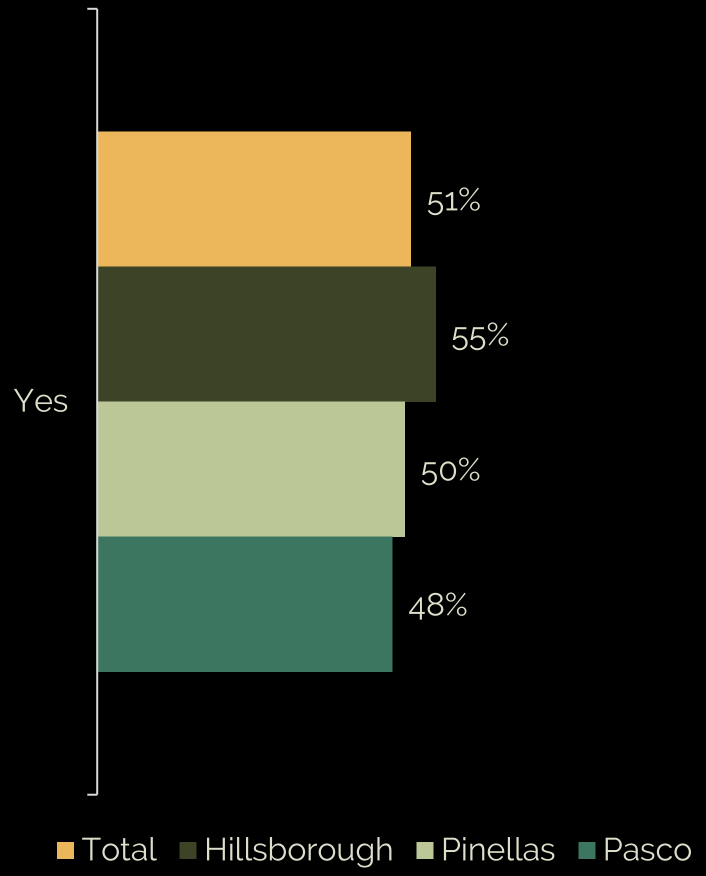
This report presents results from the 2015, 2018, and 2021 study aggregated for the entire service area and broken down by county. Comparisons to results from 2015 + 2018 are shown when appropriate.

KEY FINDINGS - HIGHLIGHTS

Water Needs

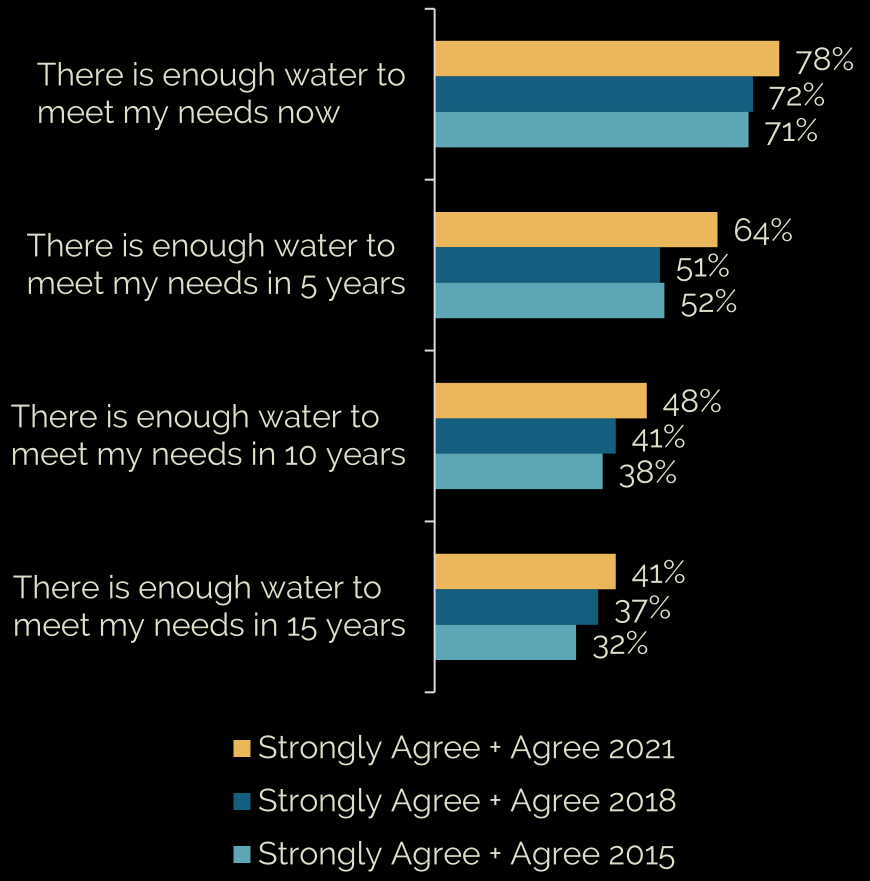
WATER NEEDS

- **Over half of residents (51%)** served by Tampa Bay Water believe that public officials are adequately meeting the drinking water needs for the region



WATER NEEDS

- Nearly **4 in 5 residents (78%)** believe there is enough water to meet their needs today. Only about **1 in 10 residents (12%)** disagree
- Over **3 in 5 residents (64%)** believe there will be enough water to meet their needs in 5 years, while only about **1 in 7 residents (15%)** disagree
- **Nearly half of residents (48%)** believe there will be enough water to meet their needs in 10 years, while about **1 in 4 (23%)** disagrees
- **2 in 5 residents (41%)** thinks there will be enough water to meet their needs in 15 years, while **26%** disagree



KEY FINDINGS - HIGHLIGHTS

Tampa Bay Water

TAMPA BAY WATER

- Aided recall of Tampa Bay Water is **modest (23%)** and has stayed steady since 2018
- Of those aware of Tampa Bay Water:
  - **82% agree** that Tampa Bay Water is effectively supplying water to the region, an increase from 2018
  - **3 in 4 residents** agree that Tampa Bay Water is concerned about the environment
  - **77%** agree Tampa Bay Water is concerned about finding new sources of water to meet their needs
  - Over **7 in 10 (72%)** agree that Tampa Bay Water helps governments cooperate on water problems
  - Nearly **7 in 10 residents (69%)** agree that the agency is effectively developing water conservation programs that can lower water use

TAMPA BAY WATER

- Of those aware of Tampa Bay Water:
  - Over **3 in 5 residents (63%)** agree that the agency listens to the community and accepts ideas that may benefit the region
  - Over **3 in 4 residents (77%)** believe that Tampa Bay Water helps protect the region's water resources
  - **3 in 5 residents (61%)** think Tampa Bay Water develops new water sources in an environmentally sound manner
  - Nearly **7 in 10 residents (68%)** believe that Tampa Bay Water is concerned about climate change impacting water supplies, a significant increase from 2018
  - Nearly **4 in 5 residents (78%)** rate Tampa Bay Water as being good, very good, or excellent at planning, developing, producing, and delivering high quality water supply to the area

KEY FINDINGS - HIGHLIGHTS

Water Sources

WATER SOURCES

- **The Floridan Aquifer** is the most frequently named source of water
- **Springs (33%), reservoirs (29%), and surface water (27%)** are also mentioned frequently as sources of water
- **84%** believe there should be more comprehensive rules and regulations to protect the region's water resources
- **3 in 5 residents (59%)** believe more stringent source water protection regulations and investment in more advanced treatment technology should be used, in tandem
- **55%** who believe advanced treatment technology should be used would be willing to pay up to $5-$10 more per month

Source of Drinking Water	2015	2018	2021
Floridan Aquifer	46%	53%	43%
Springs	41%	36%	33%
Reservoirs	39%	36%	29%
Surface water	32%	24%	27%
Seawater	18%	15%	15%
Brackish water	8%	11%	8%

WATER SOURCES

- **Fertilizer (53%), development & growth (48%), and industry (43%)** are most cited as threats to the region's water resources

- Over **3 in 5 residents (64%)** say they care what the source of new water supplies is if the quality of water remains the same or better

Greatest Threat to Region's Water	2015	2018	2021
Fertilizer	51%	51%	53%
Development & growth	48%	52%	48%
Industry	44%	43%	43%
Lawn run-off	42%	47%	40%
Mining and mining spills	31%	33%	37%
Animal waste	29%	27%	27%
Agriculture	28%	27%	24%
Regulation	17%	13%	14%

WATER SOURCES

- Residents are more willing to drink tap water that comes from groundwater from the **Floridan Aquifer (81%)** or from **river water (66%)**

- Over **1 in 3 residents (36%)** will drink tap water from reclaimed water

Willing to Drink Tap Water by Source

Source of Drinking Water	2018	2021
Groundwater from Floridan Aquifer	69%	81%
River water	56%	66%
Seawater	53%	56%
Reclaimed water	30%	36%

KEY FINDINGS - HIGHLIGHTS

Reclaimed Water

RECLAIMED WATER

- **Over 2 in 5 residents (41%)** are willing to drink reclaimed water that has been cleaned to drinking water standards, then put back in groundwater, reservoirs, or rivers, then withdrawn and treated again to drinking water standards before being sent to homes and businesses. About **1 in 3 residents (32%)** are not willing to drink this water
- **1 in 3 residents (34%)** are willing to drink reclaimed water that has been cleaned to drinking water standards and blended with other drinking water before being sent to homes and businesses, while nearly **2 in 5 residents (38%)** are not willing to drink water treated in this manner
- **Nearly 2 in 5 residents (37%)** are willing to drink reclaimed water that has been put back to groundwater, reservoirs, or rivers then withdrawn and treated again before being sent to homes and businesses, while **35%** are not willing to do so
- **1 in 3 residents (34%)** are willing to drink reclaimed water that has been put in a salty or non-drinking water zone of the aquifer to increase groundwater levels, resulting in a credit that can be used to withdraw groundwater several miles away at a different location, then be treated to drinking water standards, and sent to homes and businesses, while **31%** are not willing to do so

Treatment Process	2015	2018	2021
Clean it to drinking water standards, then put it back in groundwater, reservoirs or rivers, then withdraw it and treat it again to drinking water standards before sending it to homes and businesses	43%	39%	41%
Clean it to drinking water standards, blend it with other drinking water, then send it to homes and businesses	NA	33%	34%
Put it into groundwater, reservoirs or rivers then withdraw it and treat it to drinking water standards, then send it to homes and businesses	36%	36%	37%
Put it in a salty or non-drinking water zone of the aquifer to increase groundwater levels. This would result in a credit that can be used to withdraw groundwater several miles away at a different location, treat it to drinking water standards, then send to homes and businesses	NA	34%	34%

RECLAIMED WATER

- Residents' biggest concern about cleaned and treated reclaimed water is that it **may contain contaminants (81%)**

- The next biggest concern about cleaned and treated reclaimed water is that it **may taste bad (79%)**

Reclaimed Water Statement	2015	2018	2021
Cleaned and treated reclaimed water may include contaminants	79%	81%	81%
Cleaned and treated reclaimed water may taste bad	71%	77%	79%
Cleaned and treated reclaimed water may fail to meet drinking water safety standards	74%	78%	76%
Cleaned and treated reclaimed water may contain pharmaceutical byproducts	80%	78%	76%
Using cleaned and treated reclaimed water may cost more	79%	73%	74%
The concept of cleaned and treated reclaimed water just makes me uncomfortable	67%	70%	72%
Reclaimed water may harm the aquifer	NA	NA	62%

RECLAIMED WATER

- **Over 3 in 5 residents (65%)** are completely willing to accept reclaimed water for gardening and landscaping, while nearly as many **(61%)** are completely willing to use reclaimed water for irrigation

- Under **1 in 5 residents (18%)** is completely comfortable drinking reclaimed water

Uses of Reclaimed Water	Completely Acceptable	Somewhat + Completely Acceptable
Gardening & Landscaping	65%	91%
Irrigation	61%	91%
Industrial use	54%	86%
Household use	35%	69%
Drinking water	18%	45%

KEY FINDINGS - HIGHLIGHTS

Conservation Programs

CONSERVATION PROGRAMS

- The percentage of residents in the Tampa Bay Water service area who are "very willing" or "somewhat willing" to participate in various conservation programs ranges from **61% to 77%**

- **74%** are very willing or somewhat willing to use reclaimed water for sprinkling/lawn watering

- The percentage of residents who are very willing or somewhat willing to participate in conservation programs that offer cash incentives ranges from a low of **61% for putting in shallow irrigation wells to replace tap water for irrigation to 74% for replacing toilets with low-flow or water efficient toilets**

Conservation Program	Very Willing	Very + Somewhat Willing
Reclaimed water for sprinkling/lawn watering	45%	77%
Cash or financial incentives for replacing toilets with low-flow or water efficient toilets	41%	74%
Cash or financial incentives for installing irrigation control devices, such as rain or soil moisture sensors	34%	69%
Landscape/Florida-friendly landscaping evaluations	32%	69%
Technical assistance for improving the efficiency of your existing irrigation system or practices	28%	68%
Landscape education and design courses	29%	62%
Cash or financial incentives for putting in shallow irrigation wells to replace tap water for irrigation	27%	61%

KEY FINDINGS - HIGHLIGHTS

Water Quality

WATER QUALITY

- **Over half of residents (53%)** drink household tap water, down 3% points from 2018
  - Pinellas County residents are slightly more likely to drink household tap water (56%)
  - 54% of Hillsborough County residents drink household tap water
  - 48% of Pasco County residents drink household tap water
- **Taste** and **preference for bottled water** are the two most frequently offered reasons for not drinking tap water

Reasons for Not Drinking Tap Water	2015	2018	2021
Don't like the taste	52%	46%	59%
Bottles water tastes better	39%	33%	57%
Bottled water is better quality	32%	36%	49%
Don't like the smell	25%	20%	29%
It's unsafe or of poor quality	27%	26%	28%
Particles in it	23%	17%	22%
Bottles water is more convenient	15%	15%	19%
It's milky looking	6%	7%	6%

WATER QUALITY

- **Over 3 in 5 residents (61%)** think bottled water is safer than tap water, an **increase of 8% points from 2018**

- The **taste of tap water is rated a low 2.9** on a 5-point scale, while **appearance (3.5), odor (3.3), safety (3.2), cost (3.2), and purity (3.1)** of tap water are rated higher than taste

Water Characteristics	2015	2018	2021
Appearance	3.8[1]	3.7	3.5
Odor	3.6	3.5	3.3
Safety	3.5	3.5	3.2
Cost	3.3	3.3	3.2
Purity	3.3	3.3	3.1
Taste	3.1	3.2	2.9

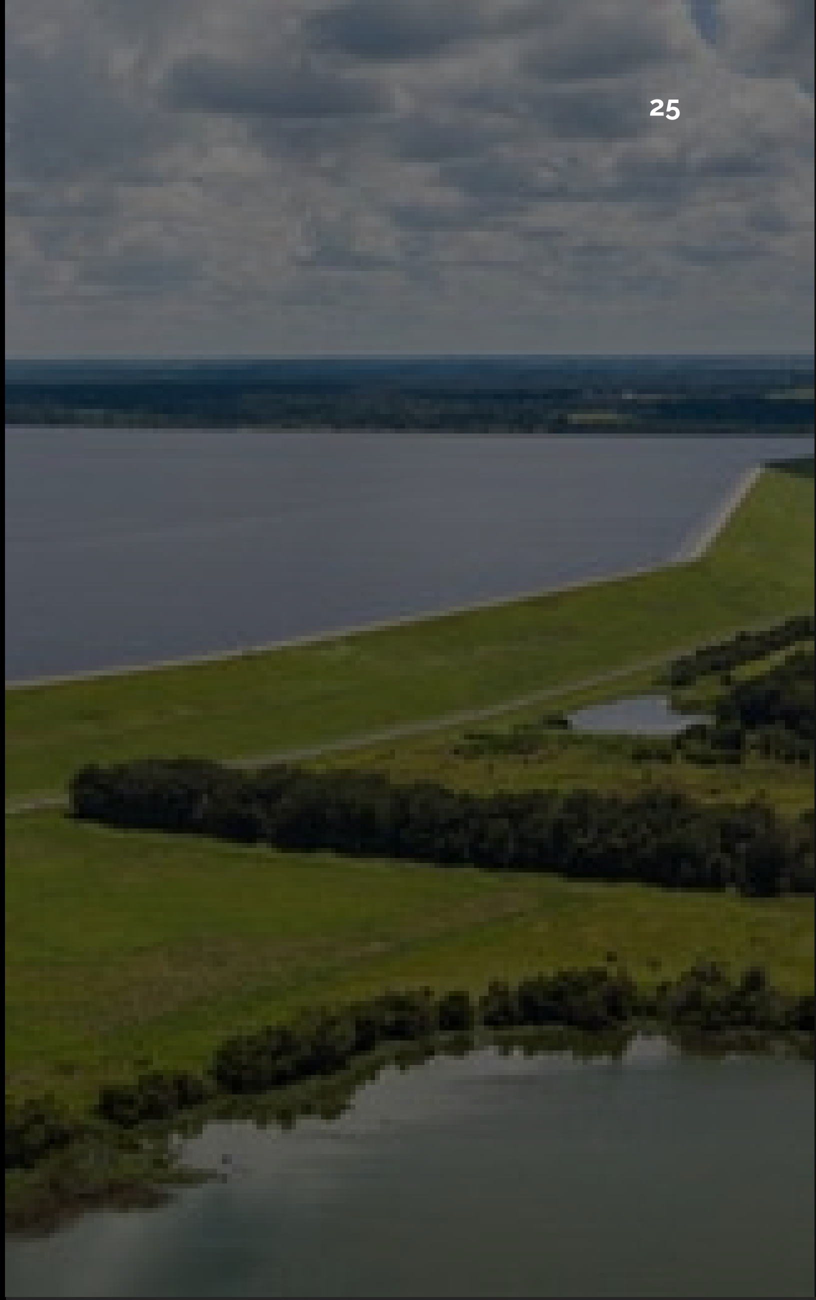
KEY FINDINGS - HIGHLIGHTS

Water Cost

WATER COST

- **Nearly 2 in 5 residents (38%)** say that amount of their water bill affects the way they use water

- **Over half of residents (55%)** believe the cost of tap water is about right; **33%** of residents say the cost of tap water is too high



KEY FINDINGS - HIGHLIGHTS

Information Sources

INFORMATION SOURCES

- **Southwest Florida Water Management District** is the most trusted medium for reporting on water issues
- **Followed closely by residents' utility company** in second and **Tampa Bay Water** in third
- **Direct mail, email, and television** are the three media from which residents prefer to receive information about water issues

KEY FINDINGS - HIGHLIGHTS

Demographics

DEMOGRAPHICS

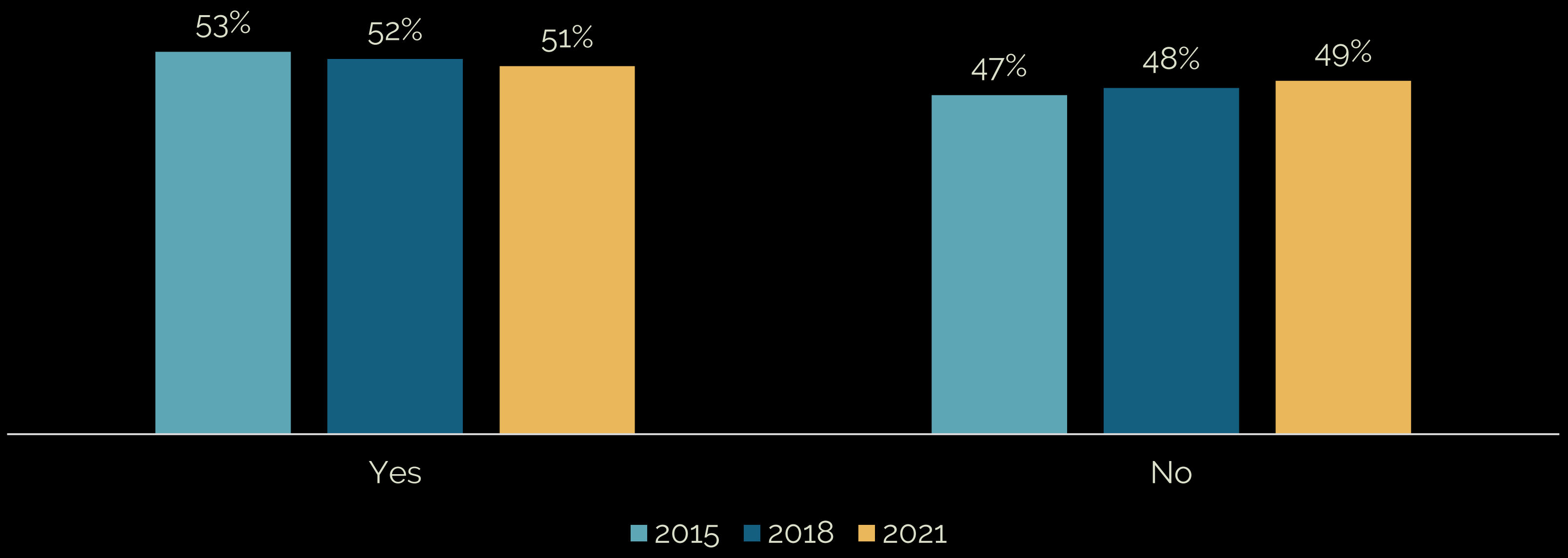
- The typical resident who participated in this study was consistent with the demographics profile of the region, they were:
  - **53** years of age
  - **Registered to vote** in the county (88%)
  - **Owns** their own home (66%)
  - Income of **$54,700**
  - **Female** (63%)

DETAILED FINDINGS

Water Needs

WATER NEEDS BY YEAR

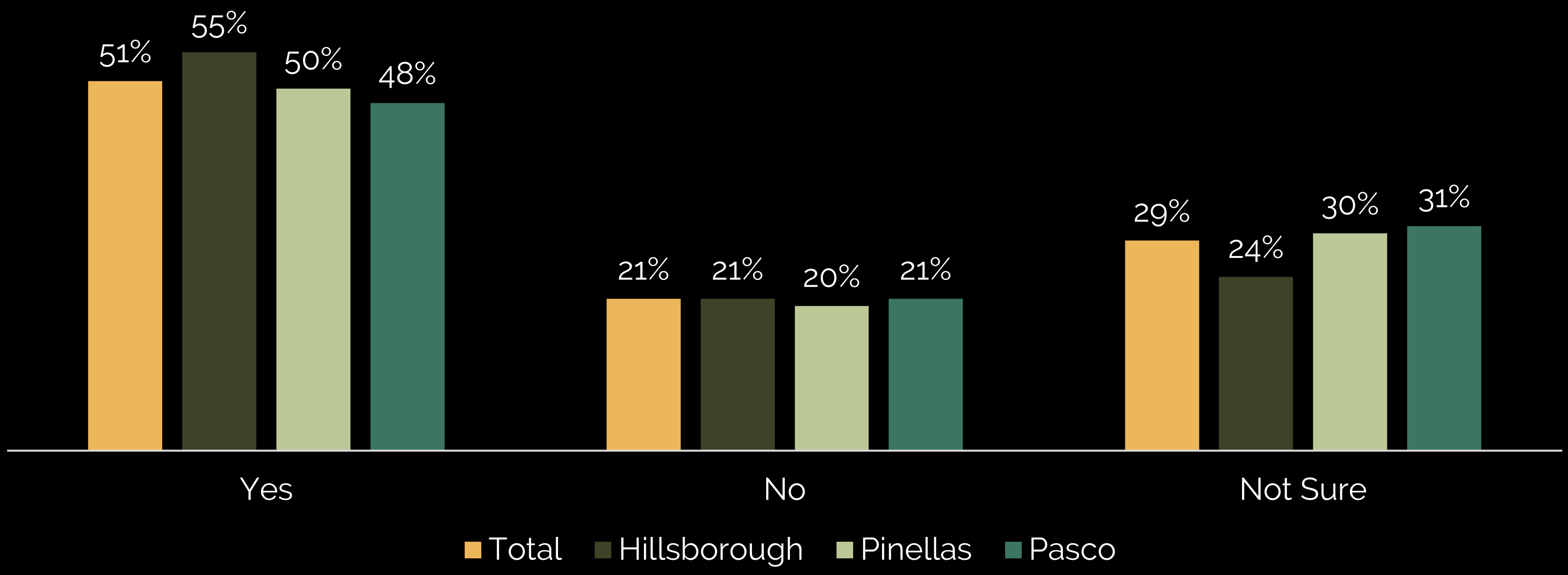
Do you think public officials are adequately meeting the drinking water needs for your region?



- There has been virtually **no change** in the past three years in residents' views on the performance of public officials in meeting drinking water needs for the region

WATER NEEDS BY COUNTY

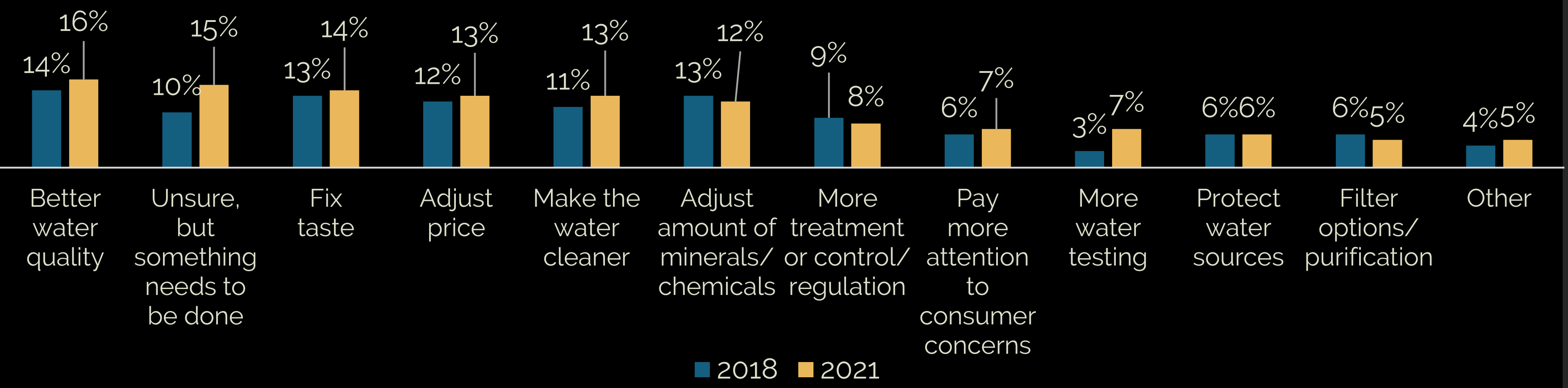
Do you think public officials are adequately meeting the drinking water needs for your region?



- **Over half** of residents think public officials are **adequately meeting** the drinking water needs of their region
- As in 2015 & 2018, **Hillsborough County residents** are more likely to hold this opinion (55%)

WATER NEEDS BY YEAR

What should public officials be doing differently to meet water needs?[1]



- Of the Tampa Bay residents who do not feel public officials are adequately meeting the drinking water needs for their region, most suggest **better water quality or mention they are unsure but know something needs to be done**

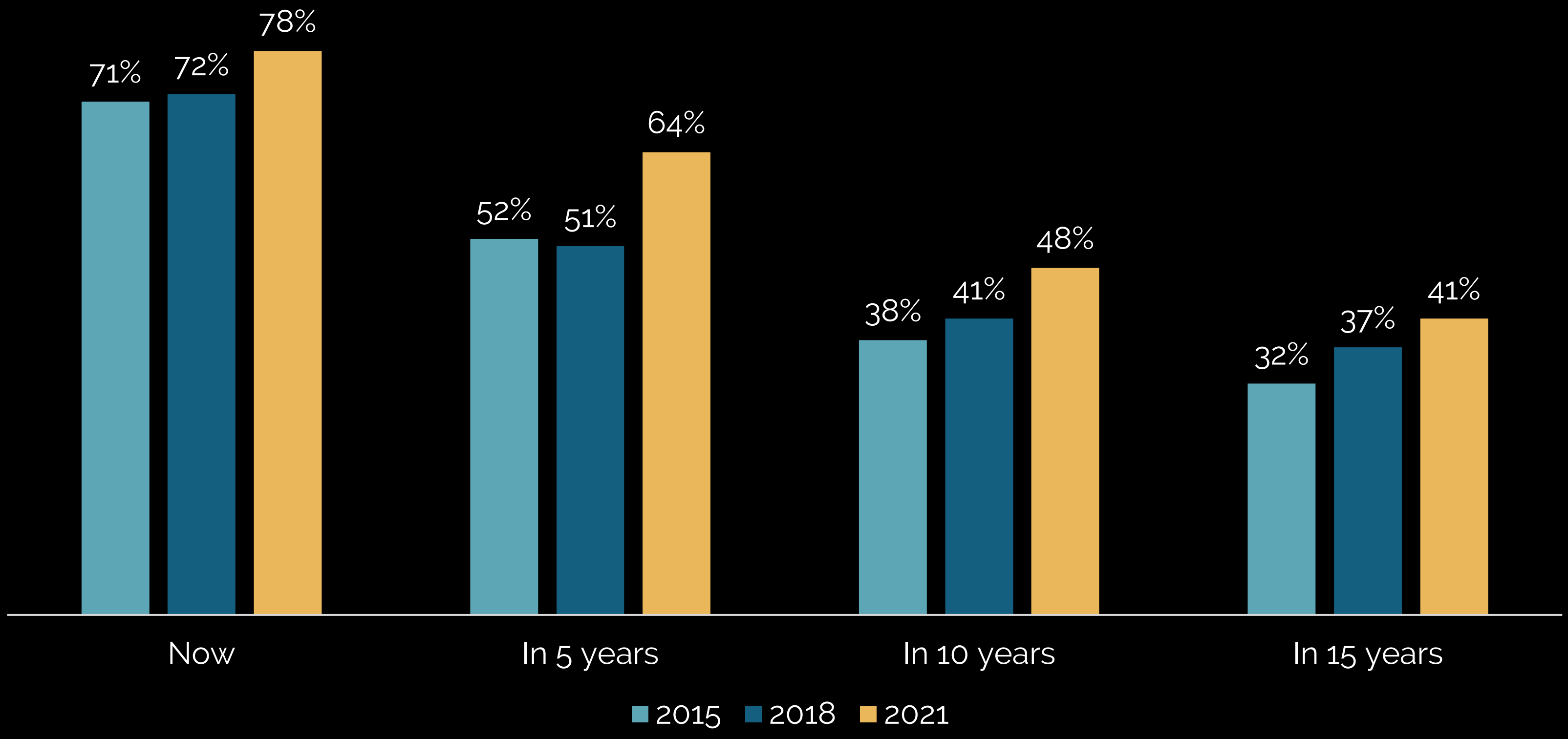
[1] Asked only to residents who answered "no" or "Not sure" to previous question. Coded open-ended responses.

TAMPA BAY WATER Supplying Water To The Region

downs & st. germain RESEARCH

BELIEVE THERE IS/WILL BE ENOUGH WATER[1]

All areas



- **Nearly 4 in 5** residents believe that there will be enough water to meet Tampa Bay region's water needs **presently**
- **Over 3 in 5** residents believe that there will be enough water to meet Tampa Bay region's water needs in the **next 5 years**
- **Nearly half of** residents believe that there will be enough water to meet Tampa Bay region's water needs in the **next 10 years**
- **About 2 in 5** residents believe that there will be enough water to meet Tampa Bay region's water needs in the **next 15 years**
- **Considerably more residents believe** there is/will be enough water to **meet needs up to 15 years in the future** than in previous years

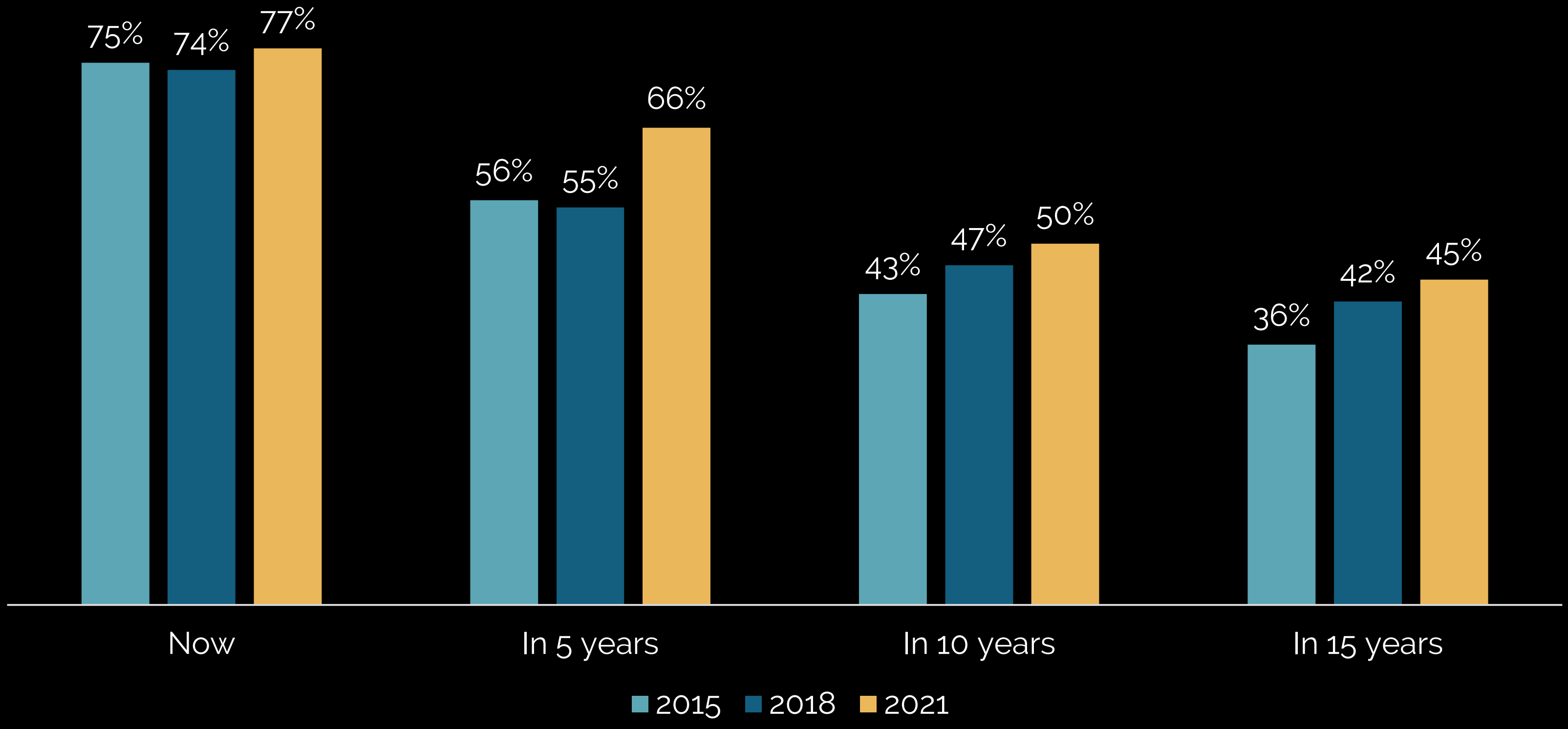
TAMPA BAY WATER
Supplying Water To The Region

[1] There will be enough water to meet the Tampa Bay Region's water needs in....
Top two boxes: Strongly Agree + Agree

downs & st. germain RESEARCH

BELIEVE THERE IS/WILL BE ENOUGH WATER[1]

Hillsborough

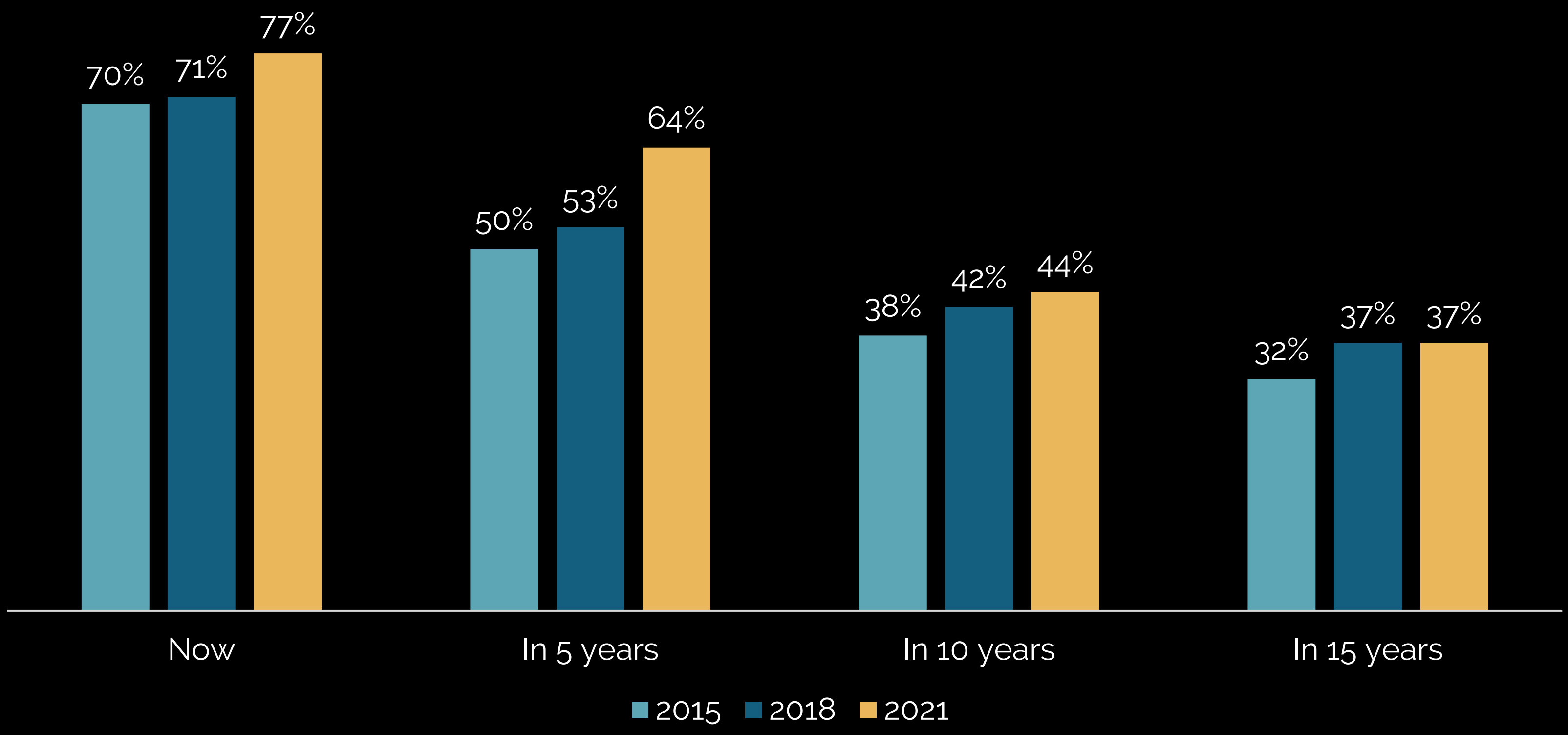


- **Over 3 in 4 Hillsborough County** residents believe that there will be enough water to meet Tampa Bay region's water needs now
- **Nearly 7 in 10 Hillsborough County** residents believe that there will be enough water to meet Tampa Bay region's water needs in the next 5 years
- **Half** hold this opinion 10 years or more in the future

[1] There will be enough water to meet the Tampa Bay Region's water needs in….
Top two boxes: Strongly Agree + Agree

BELIEVE THERE IS/WILL BE ENOUGH WATER[1]

Pinellas

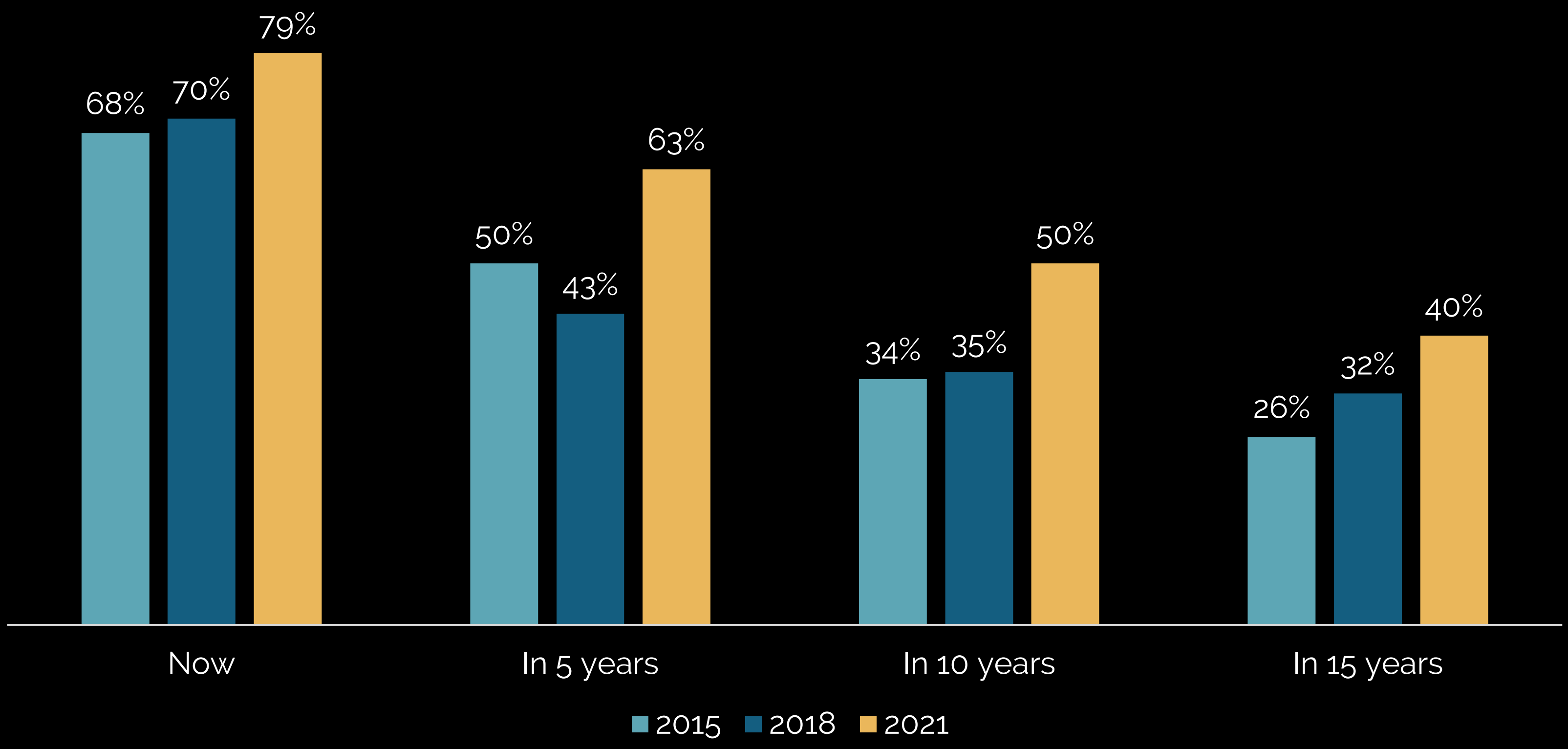


- **Over 3 in 4 Pinellas County** residents believe that there will be enough water to meet Tampa Bay region's water needs now
- **Over 3 in 5 Pinellas County** residents believe that there will be enough water to meet Tampa Bay region's water needs in the next 5 years
- **Fewer than half** hold this opinion 10 years or more in the future

[1] There will be enough water to meet the Tampa Bay Region's water needs in....
Top two boxes: Strongly Agree + Agree

BELIEVE THERE IS/WILL BE ENOUGH WATER[1]

Pasco



- **Pasco County residents are the most optimistic** as they are most likely to believe there will be enough water to meet the Tampa Bay region's needs, now and in the future
- **Pasco County residents presented** the highest percentage point increase from previous years to believe there will be enough water to meet the Tampa Bay region's needs, now and in the future

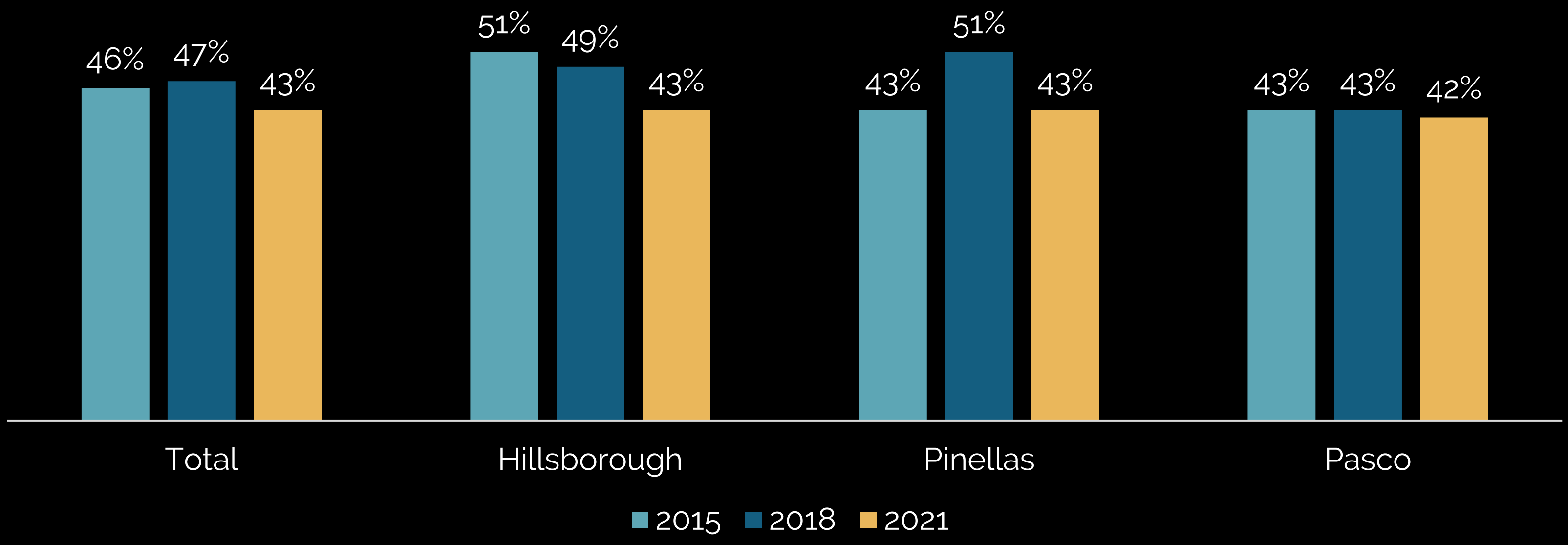
TAMPA BAY WATER
Supplying Water To The Region

[1] There will be enough water to meet the Tampa Bay Region's water needs in….
Top two boxes: Strongly Agree + Agree

downs & st. germain
RESEARCH

WATER SUPPLY AND THE ENVIRONMENT BY YEAR

In our area, drinking water is harvested and supplied without harming the environment[1]

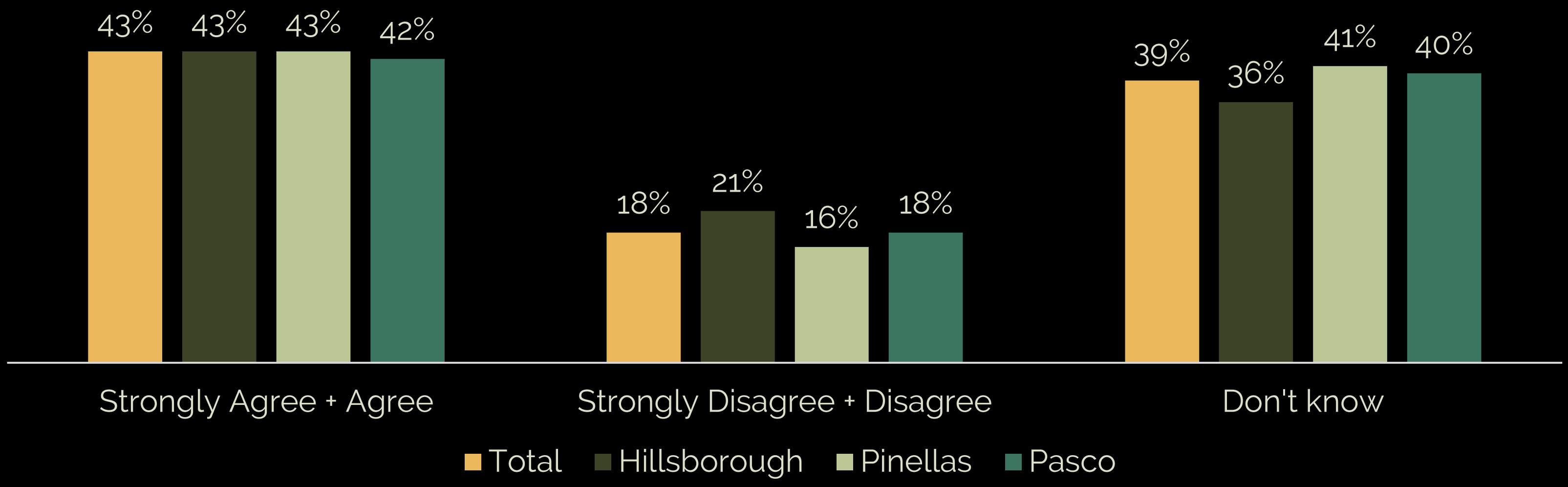


- **Over 2 in 5 residents (43%)** agree drinking water is harvested and supplied without harming the environment in their area, **this figure is 4% points lower than in 2018**
- Compared to other counties, **Pinellas County residents were less likely to agree** with this statement than in previous years

[1] Top two boxes: Strongly Agree + Agree

WATER SUPPLY AND THE ENVIRONMENT BY COUNTY

In our area, drinking water is harvested and supplied without harming the environment[1]



- **About 2 in 5** residents across the tri-county areas agree drinking water is harvested and supplied without harming the environment

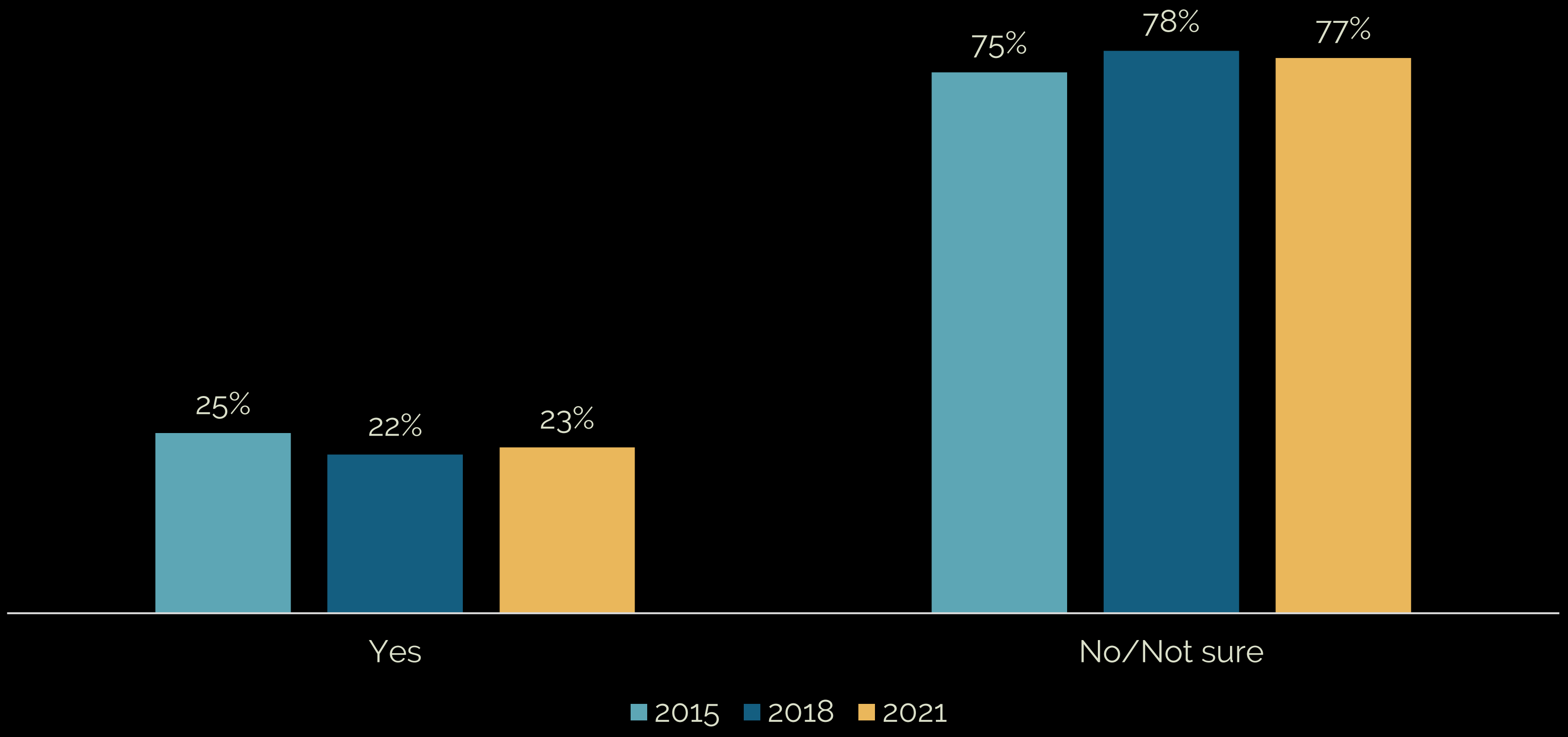
[1] Top two boxes: Strongly Agree + Agree

DETAILED FINDINGS

Tampa Bay Water

AWARENESS BY YEAR

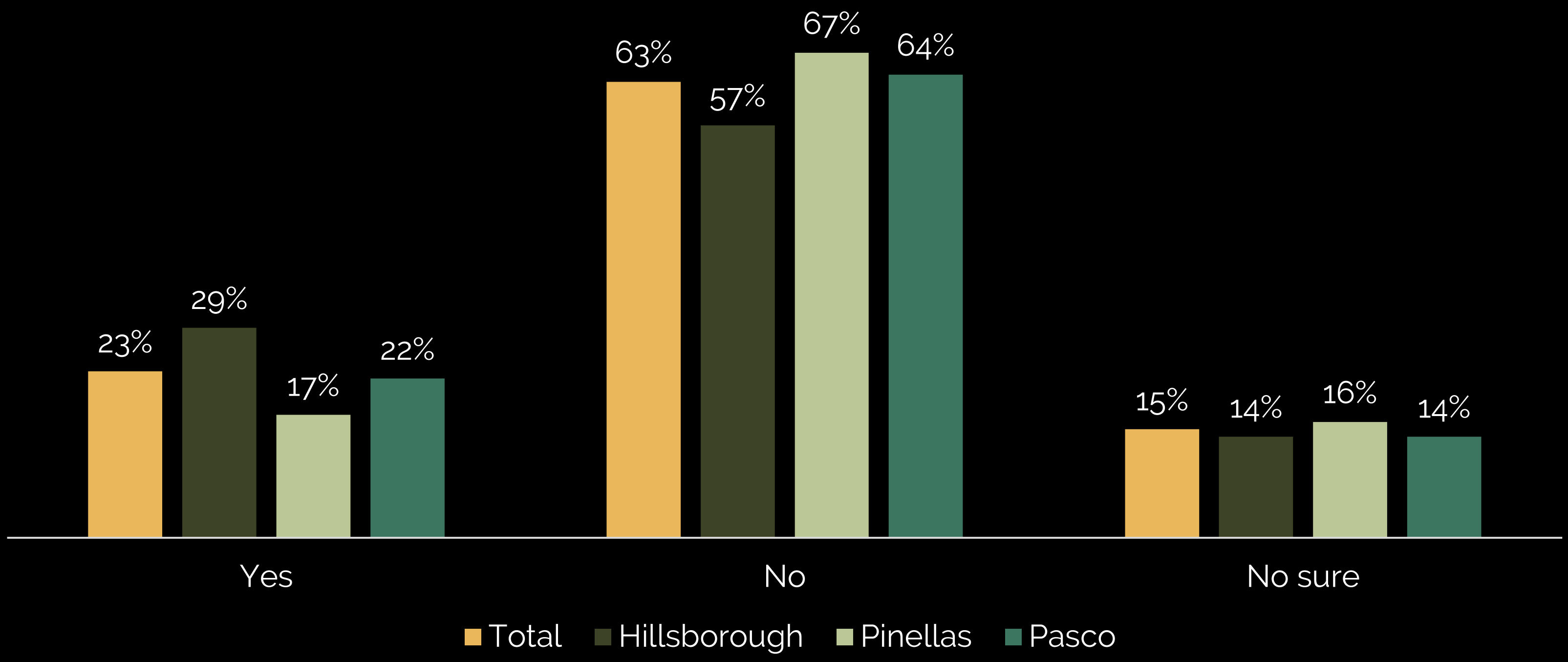
Have you heard of Tampa Bay Water, the region's wholesale drinking water provider?



- Awareness of Tampa Bay Water is 1% point higher than in 2018 (22%)

AWARENESS BY COUNTY

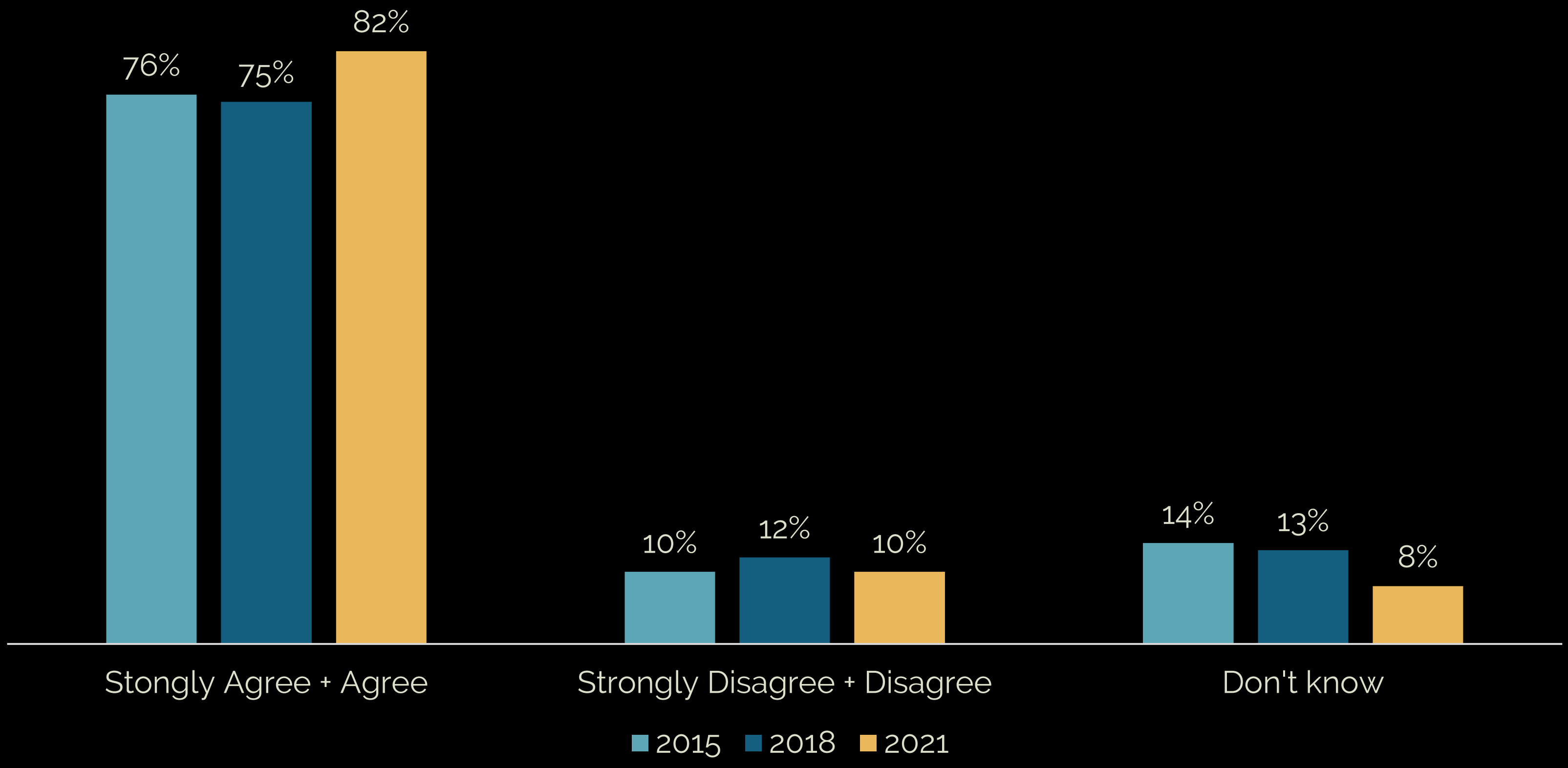
Have you heard of Tampa Bay Water, the region's wholesale drinking water provider?



- **Fewer than 1 in 4** residents have heard of Tampa Bay Water
- Of all the counties, **Hillsborough** residents, are most likely to have heard of Tampa Bay Water **(29%)**

EFFECTIVELY SUPPLYING WATER BY YEAR

Tampa Bay Water is effectively supplying water to the region[1]

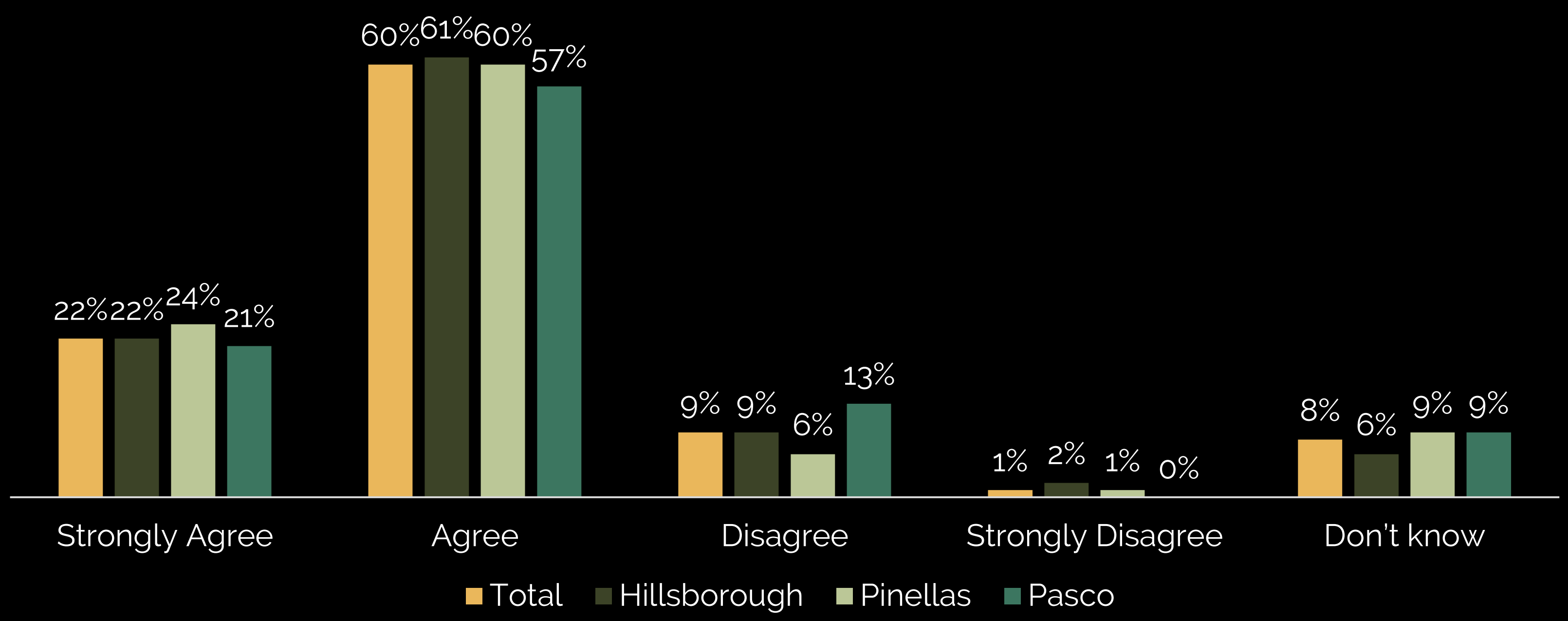


- **Over 4 in 5 residents (82%)** who have heard of Tampa Bay Water agree that it is effective in supplying water to the region, **this figure is 7% points higher than in 2018**

[1] Only asked to those who have heard of Tampa Bay Water.
Top two boxes: Strongly Agree + Agree

EFFECTIVELY SUPPLYING WATER BY COUNTY

Tampa Bay Water is effectively supplying water to the region[1]

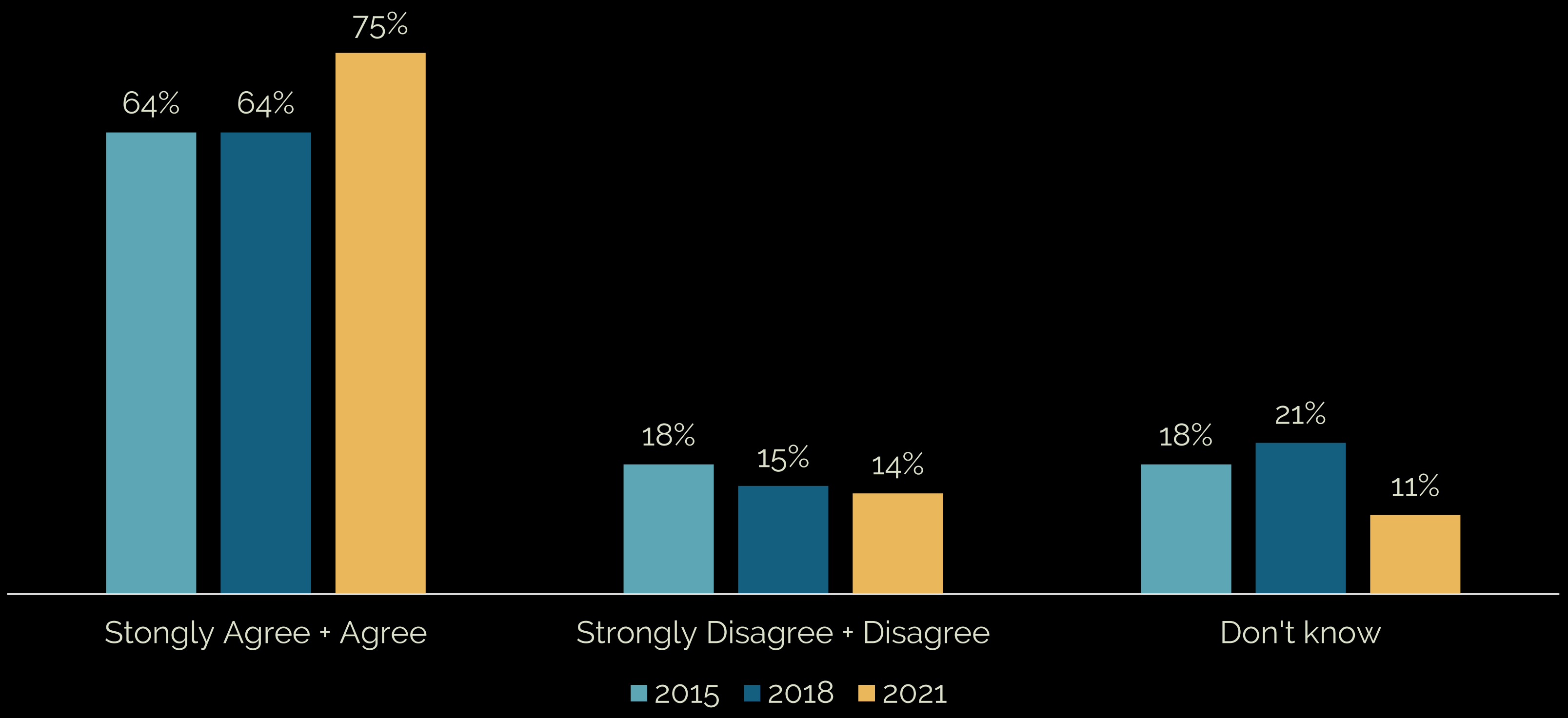


- Of residents who have heard of Tampa Bay Water, over **4 in 5 agree it is effectively supplying water to the region**
- Of all counties, **Pasco County residents are more likely to disagree (13%)** it is effectively supplying water to the region

[1] Only asked to those who have heard of Tampa Bay Water.

ENVIRONMENT CONCERN BY YEAR

Tampa Bay Water is concerned about the environment[1]

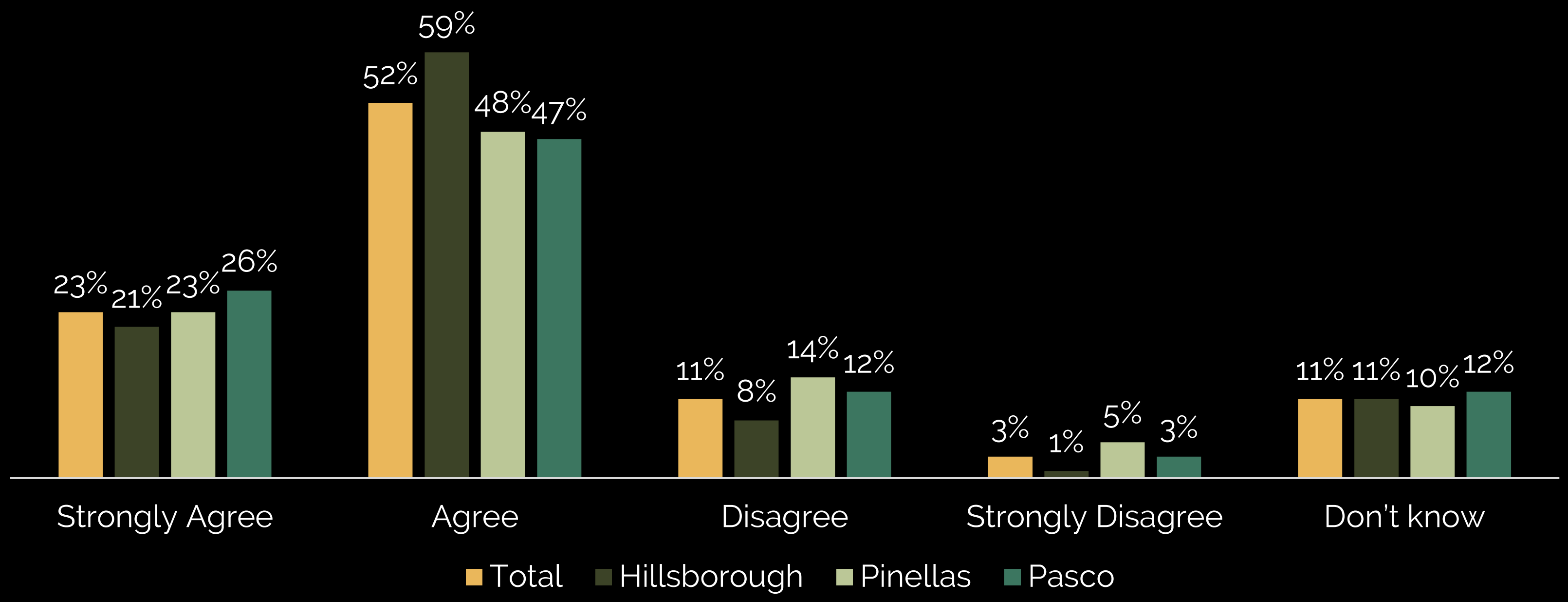


- **3 in 4 residents (75%)** who have heard of Tampa Bay Water agree that Tampa Bay Water is concerned about the environment, **this is an 11% points increase from 2018**

[1] Only asked to those who have heard of Tampa Bay Water.
Top two boxes: Strongly Agree + Agree

ENVIRONMENT CONCERN BY COUNTY

Tampa Bay Water is concerned about the environment[1]

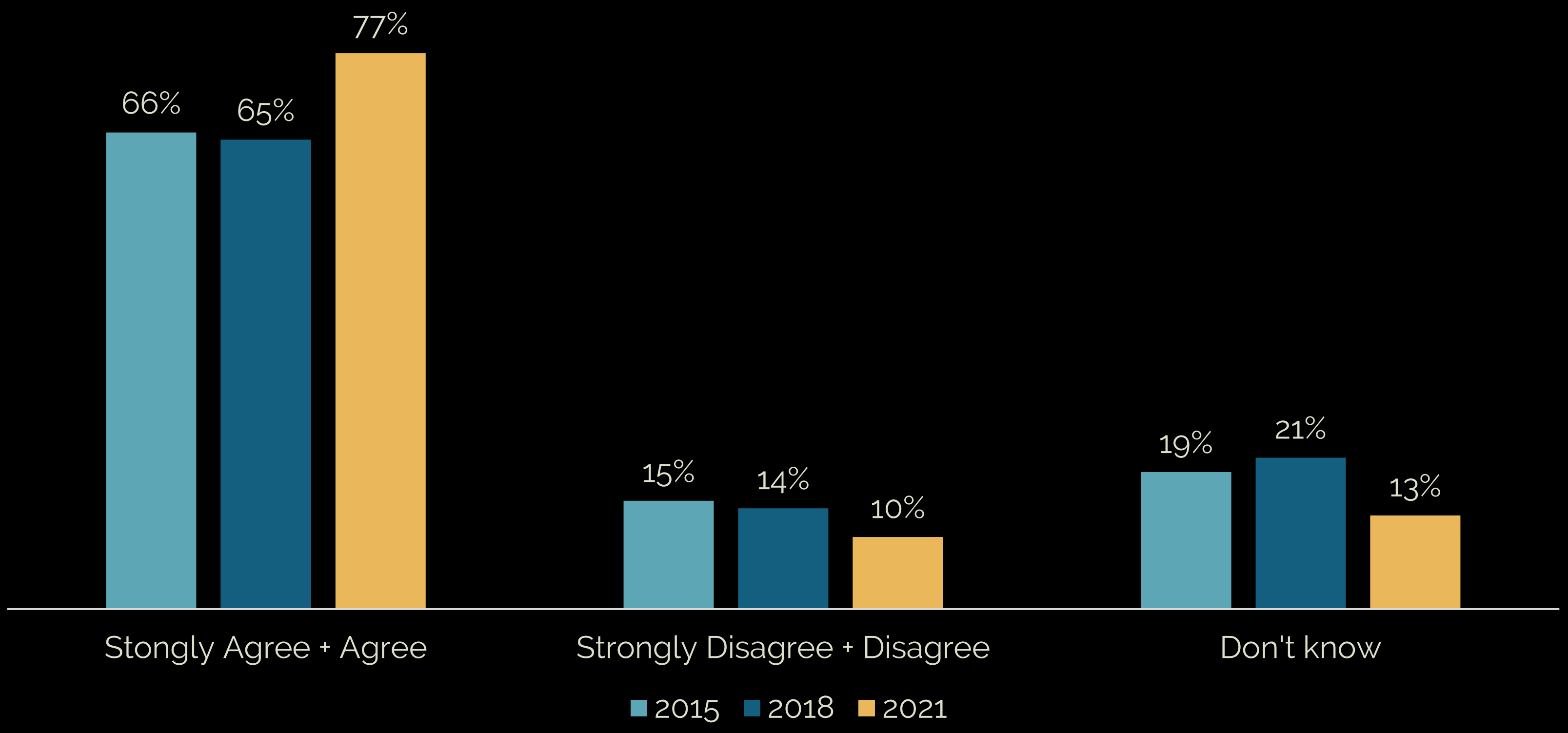


- Of residents who have heard of Tampa Bay Water, **3 in 4 agree it is concerned about the environment**
- **Hillsborough County residents (80%) are more likely to agree** that Tampa Bay Water is concerned about the environment

[1] Only asked to those who have heard of Tampa Bay Water.

NEW WATER SOURCES BY YEAR

Tampa Bay Water is concerned about finding new sources of drinking water to meet our needs[1]

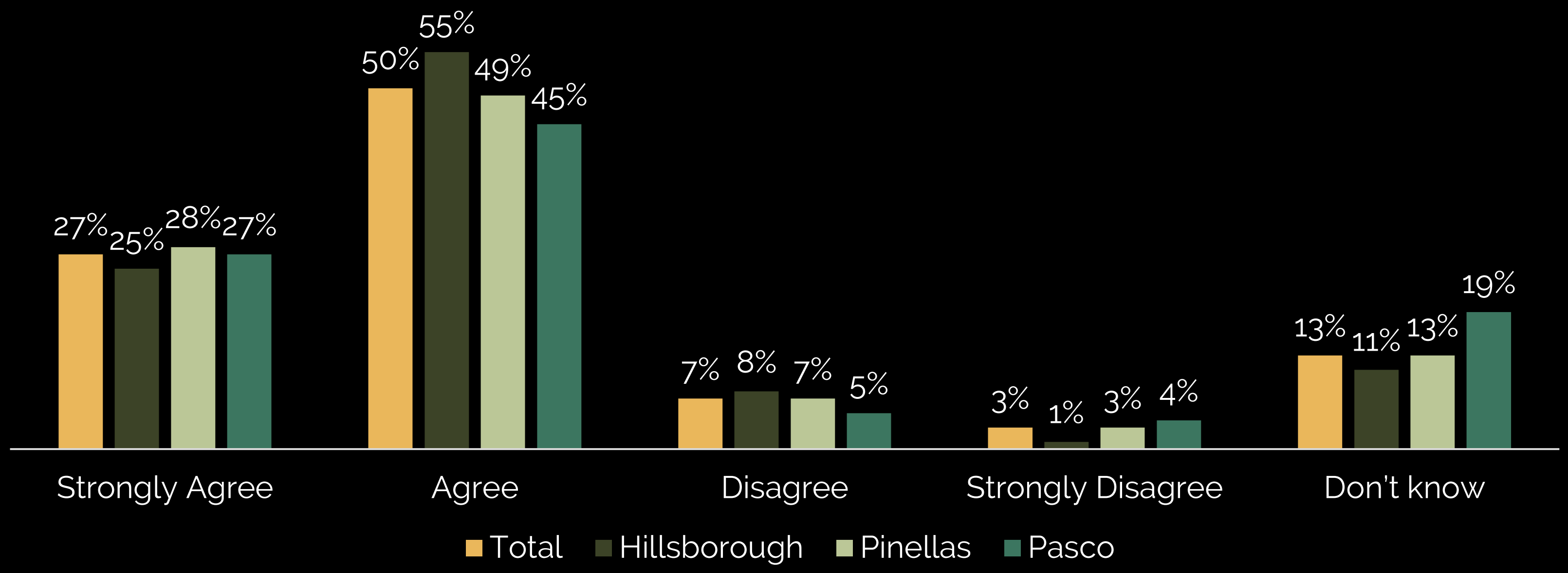


- **Over 3 in 4 residents (77%)** who have heard of it believe Tampa Bay Water is concerned about finding new sources of drinking water to meet the region's needs, **an increase of 12% points from 2018**

[1] Only asked to those who have heard of Tampa Bay Water.
Top two boxes: Strongly Agree + Agree

NEW WATER SOURCES BY COUNTY

Tampa Bay Water is concerned about finding new sources of drinking water to meet our needs[1]



- Of residents who have heard of Tampa Bay Water, over **3 in 4 agree it is concerned about finding new sources of drinking water**
- **Hillsborough County residents (80%) are more likely to agree, while Pasco County residents (72%) are less likely to agree** that Tampa Bay Water is concerned about finding new sources of drinking water

[1] Only asked to those who have heard of Tampa Bay Water.

TAMPA BAY WATER Supplying Water To The Region

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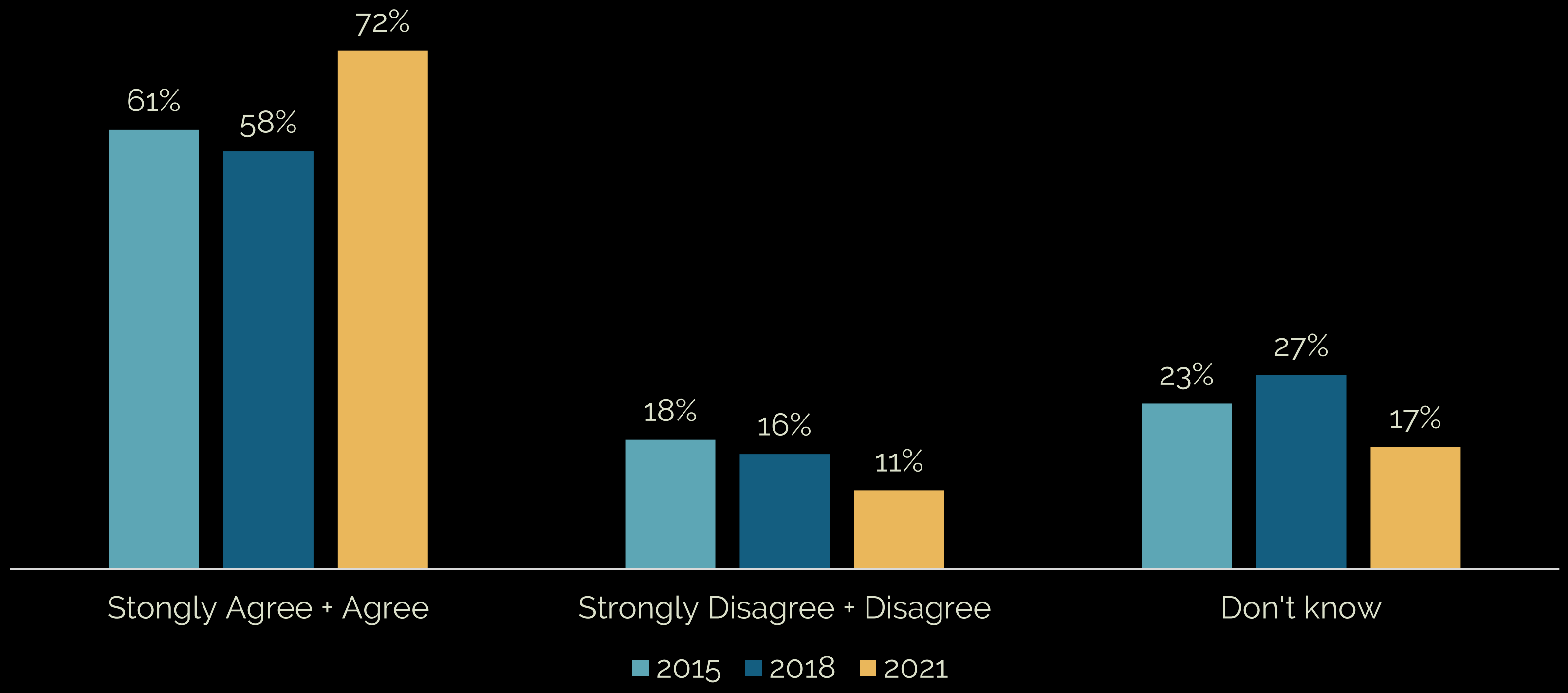
SOLVING DRINKING WATER CHALLENGES BY YEAR

Tampa Bay Water helps local governments cooperate on solving drinking water challenges[1]

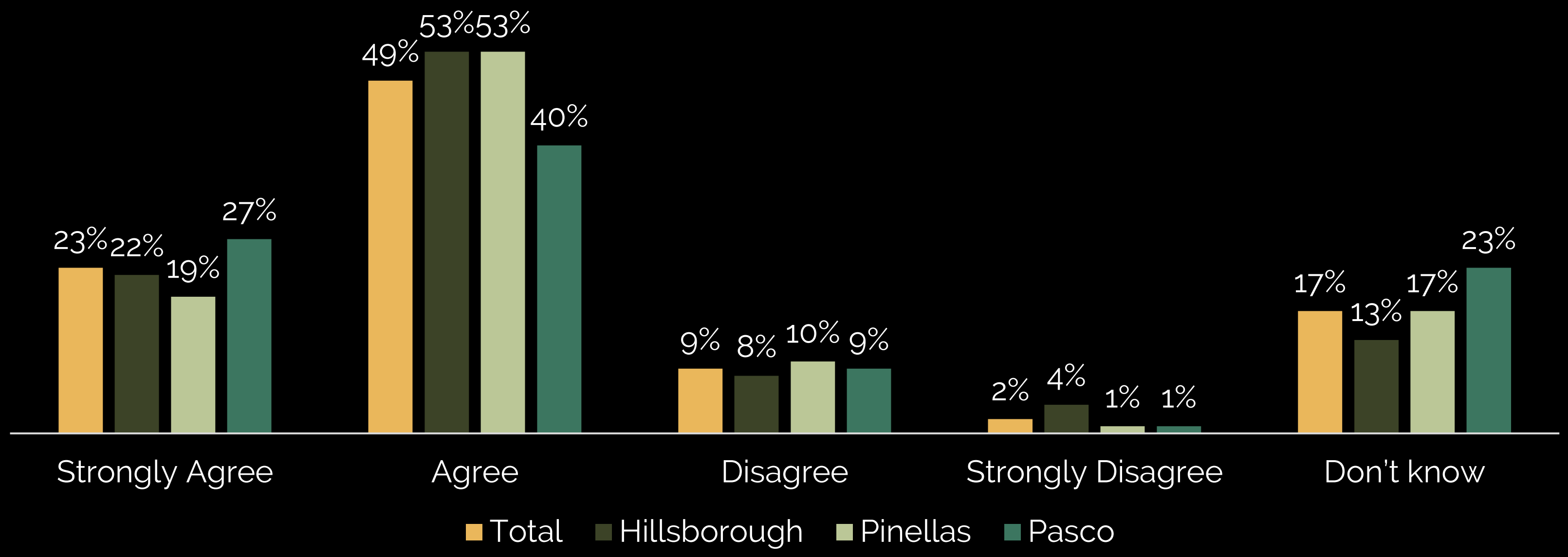


- **Just over 7 in 10 residents (72%)** of Tampa Bay Water's service area who have heard of the organization believe it helps local governments cooperate on drinking water problems
- **In 2018, 58% of residents believed this statement**

[1] Only asked to those who have heard of Tampa Bay Water.
Top two boxes: Strongly Agree + Agree

SOLVING DRINKING WATER CHALLENGES BY COUNTY

Tampa Bay Water helps local governments cooperate on solving drinking water challenges[1]



- Of residents who have heard of Tampa Bay Water, more than **7 in 10 agree it helps local governments cooperate on solving drinking water challenges**
- **Hillsborough County residents (75%) are most likely to believe** that Tampa Bay Water helps local governments cooperate in solving drinking water problems, while **only 67% of Pasco County residents feel this way**

TAMPA BAY WATER
Supplying Water To The Region

[1] Only asked to those who have heard of Tampa Bay Water.

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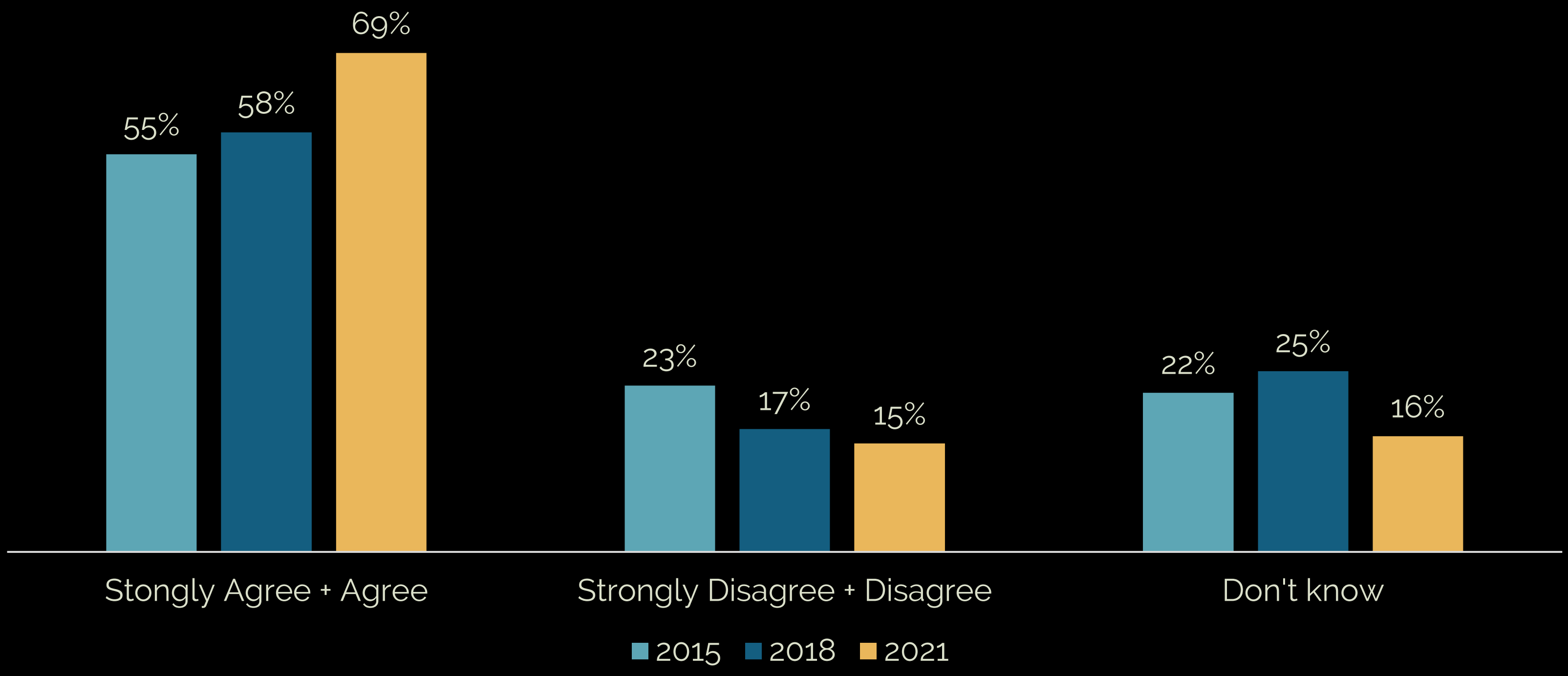
WATER CONSERVATION PROGRAMS BY YEAR

Tampa Bay Water is effectively developing water conservation programs that can lower your water use[1]

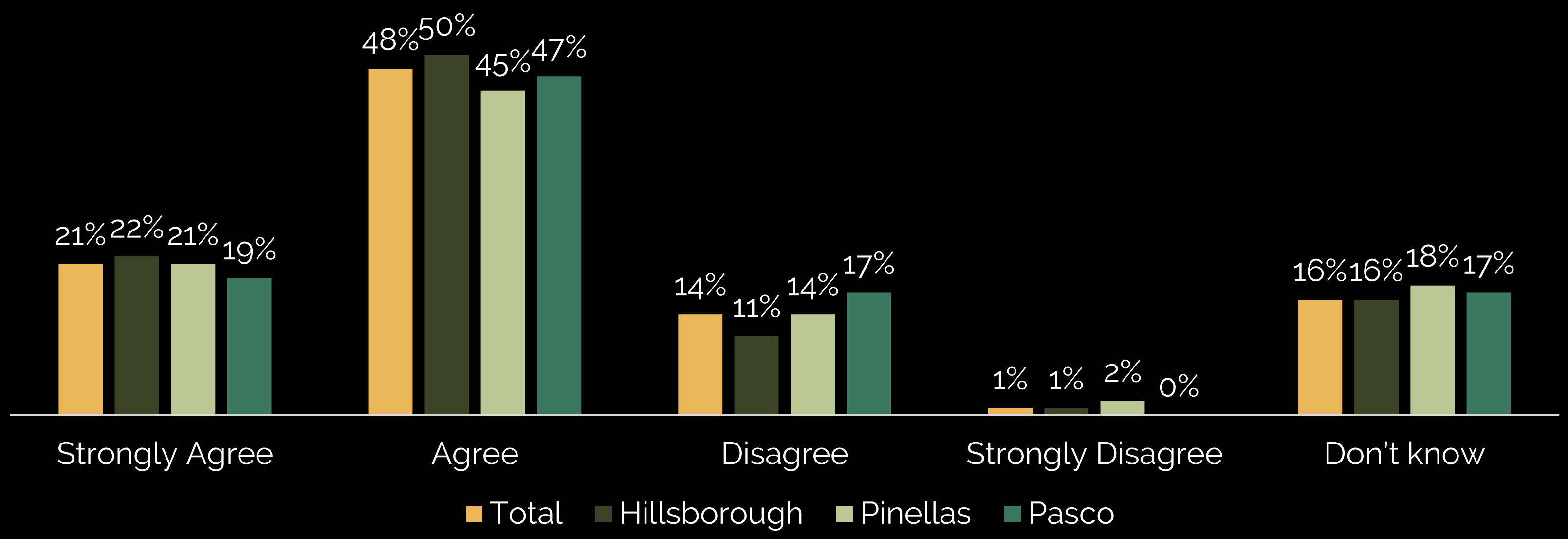


- **About 7 in 10 residents (69%)** who are familiar with Tampa Bay Water agree that it effectively develops water conservation programs that can lower water use, **this finding is up 11% points since 2018**

[1] Only asked to those who have heard of Tampa Bay Water.
Top two boxes: Strongly Agree + Agree

WATER CONSERVATION PROGRAMS BY COUNTY

Tampa Bay Water is effectively developing water conservation programs that can lower your water use[1]

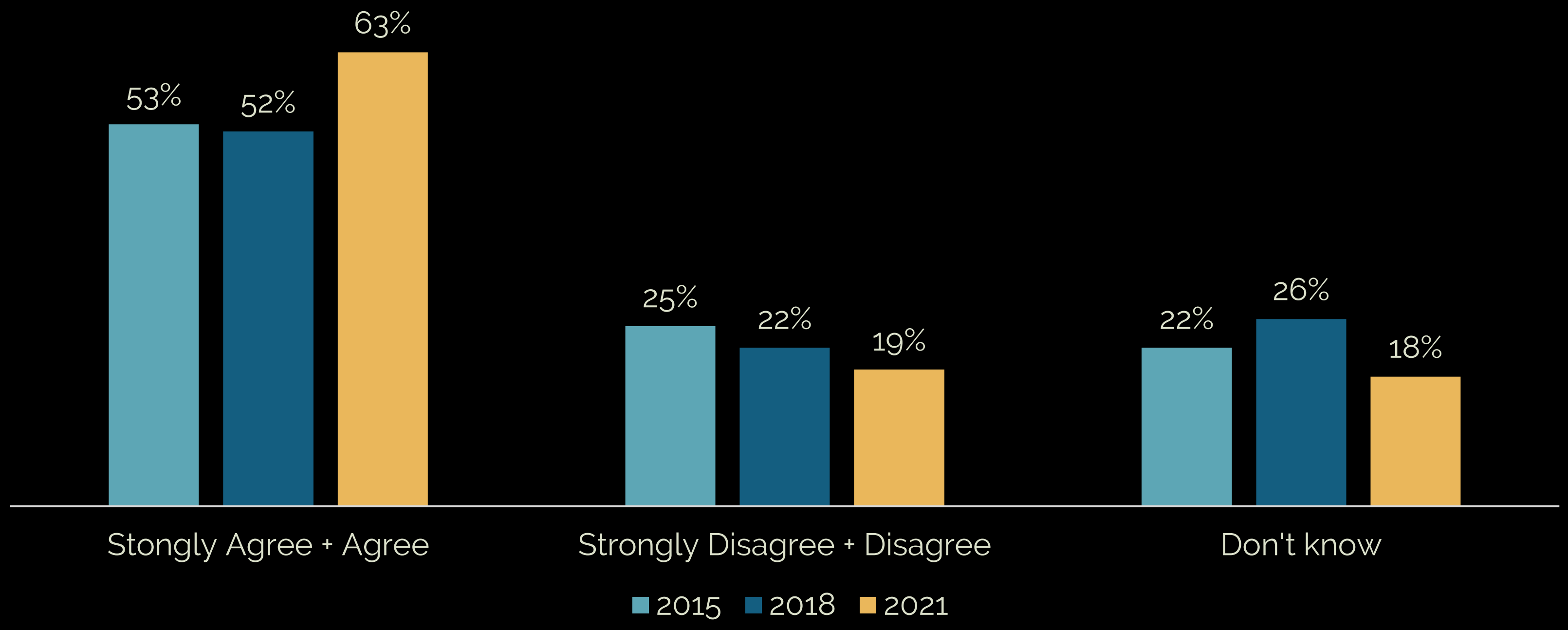


- Of residents who have heard of Tampa Bay Water, about **7 in 10 agree it is effectively developing water conservation programs**
- **Residents in Hillsborough (72%) are more likely to agree,** while residents in **Pinellas and Pasco County (66%) are less likely to agree** that Tampa Bay Water is effective in developing water conservation programs that lower water usage

[1] Only asked to those who have heard of Tampa Bay Water.

LISTENING TO THE COMMUNITY BY YEAR

Tampa Bay Water listens to the community and accepts ideas that may benefit the region[1]

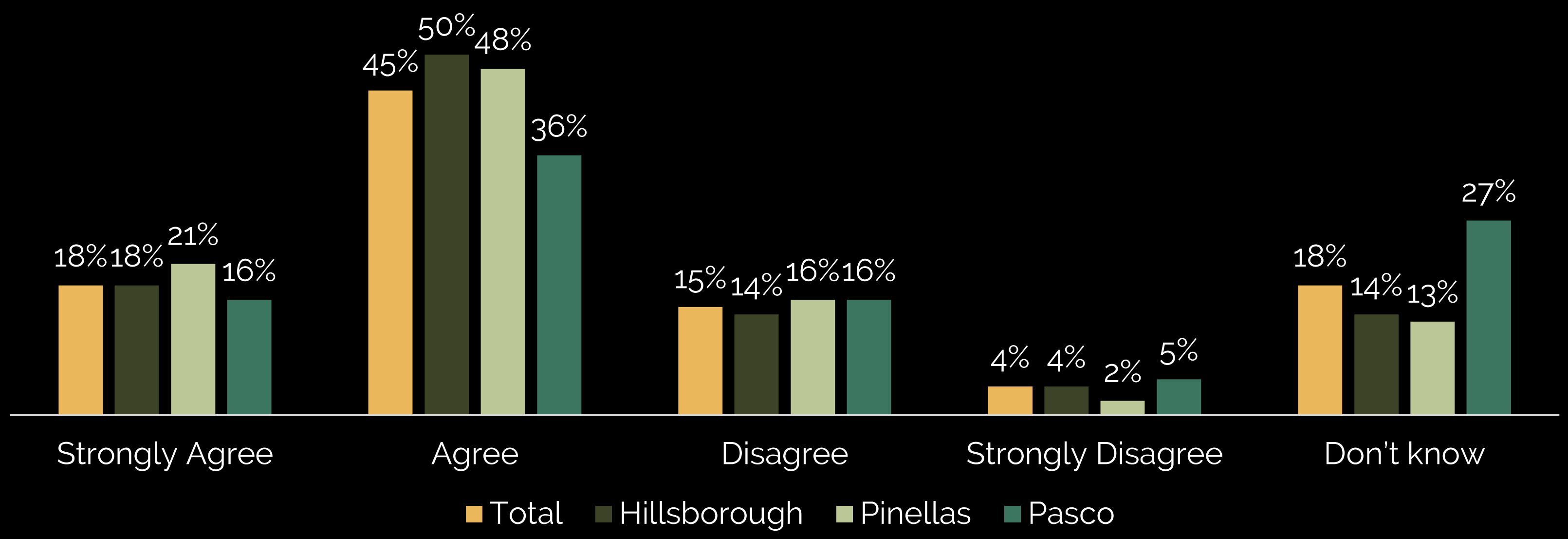


- **Over 3 in 5 residents (63%)** who are familiar with Tampa Bay Water believe that it listens to the community and accepts ideas that may benefit the region, **this was 52% in 2018**

[1] Only asked to those who have heard of Tampa Bay Water.
Top two boxes: Strongly Agree + Agree

LISTENING TO THE COMMUNITY BY COUNTY

Tampa Bay Water listens to the community and accepts ideas that may benefit the region[1]

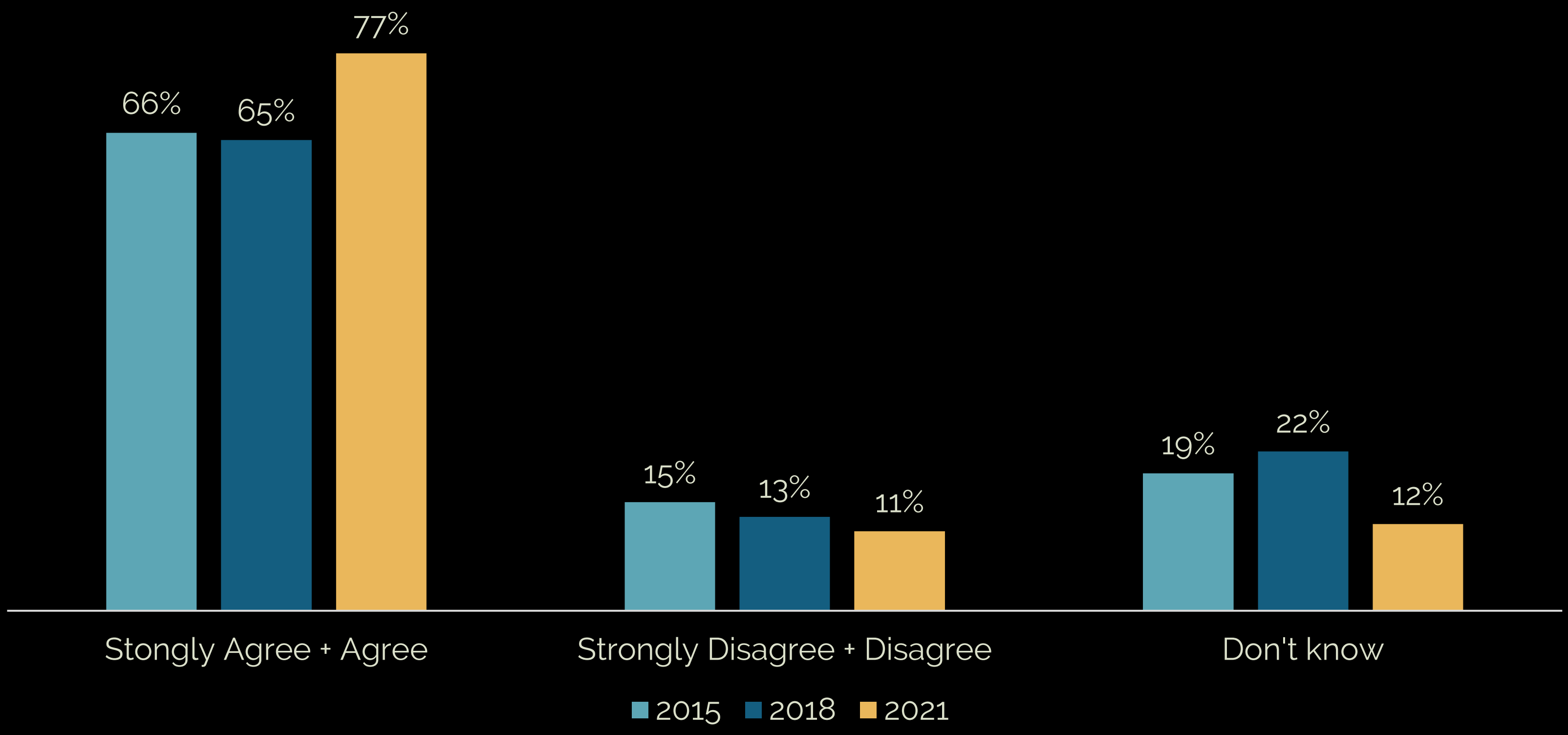


- Of residents who have heard of Tampa Bay Water, over **3 in 5 agree it listens to the community and accepts ideas**
- **Pinellas County residents (69%)** are more likely to believe that Tampa Bay Water listens to the community, while **only 52% of Pasco County residents believe this**

[1] Only asked to those who have heard of Tampa Bay Water.

PROTECT WATER RESOURCES BY YEAR

Tampa Bay Water helps protect the region's water resources[1]

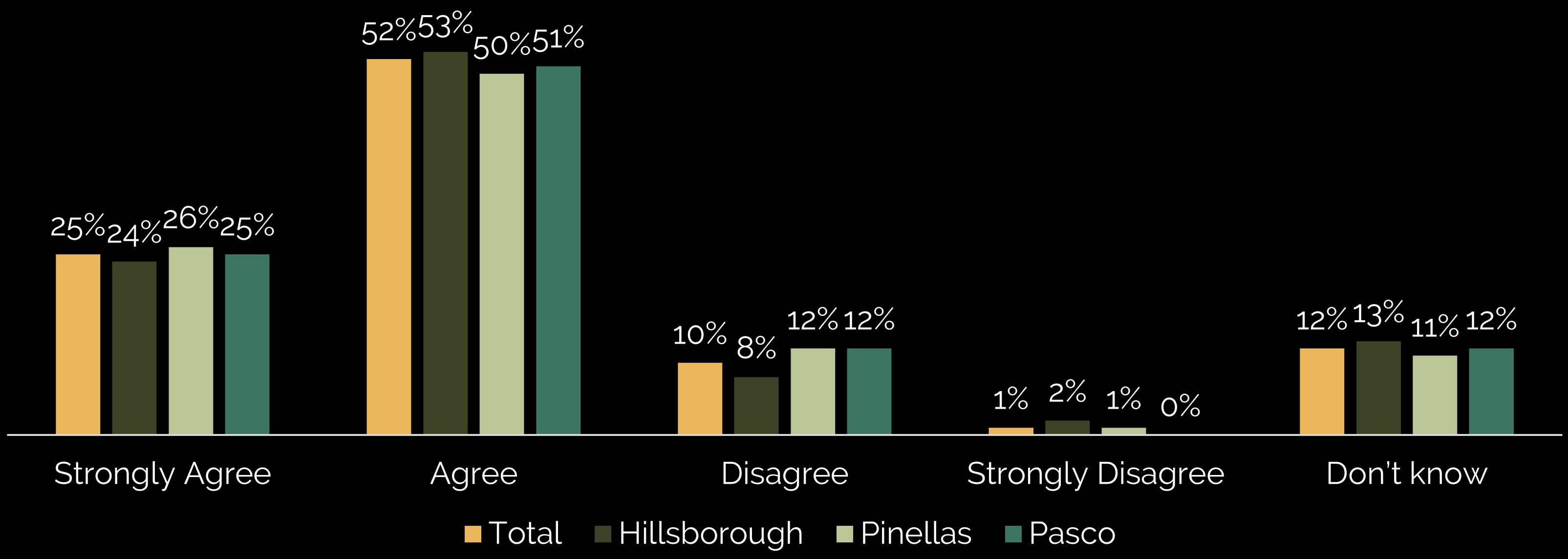


- Of residents who are aware of Tampa Bay Water, **over 3 in 4 (77%) agree** that it helps protect the region's water resources, **this is up 12% points since 2018**

[1] Only asked to those who have heard of Tampa Bay Water.
Top two boxes: Strongly Agree + Agree

PROTECT WATER RESOURCES BY COUNTY

Tampa Bay Water helps protect the region's water resources[1]

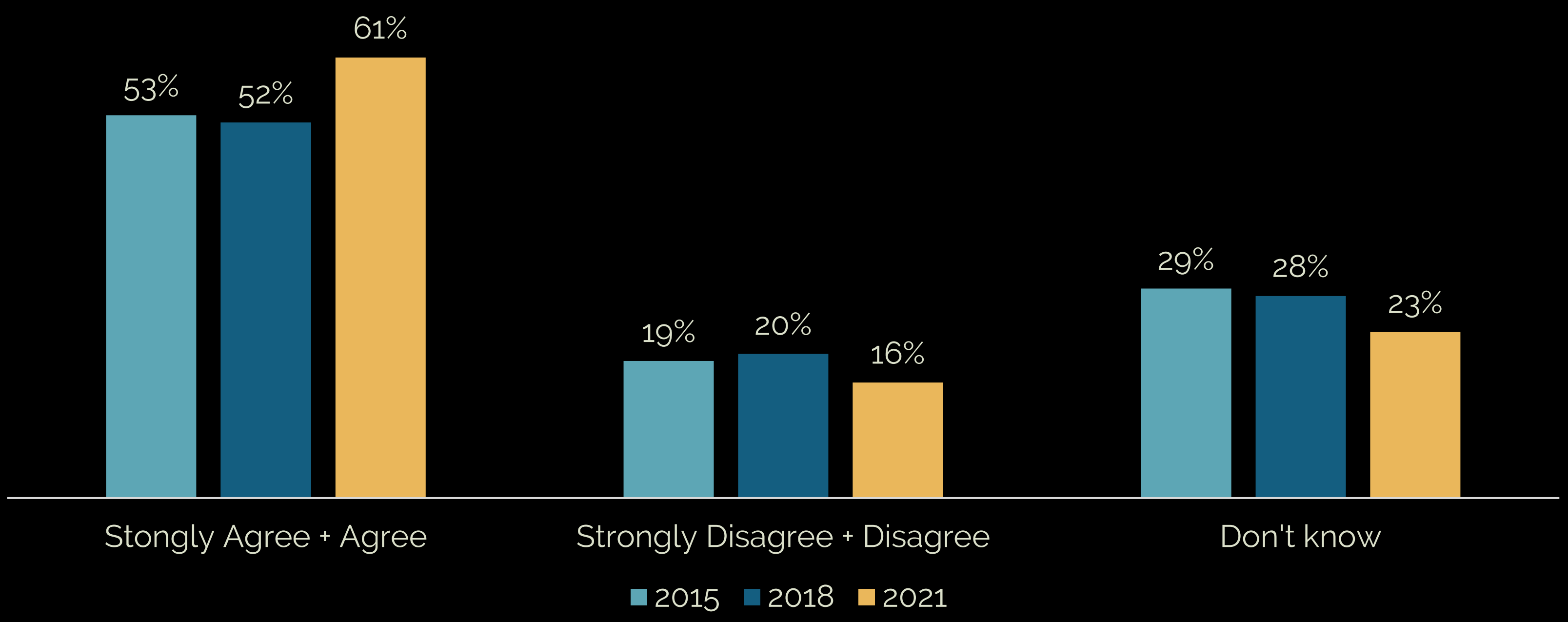


- Of residents who have heard of Tampa Bay Water, over **3 in 4 agree it helps protect the region's water resources**
- Of all counties, **Pinellas County residents are more likely to disagree (13%)** it helps protect the region's water resources

[1] Only asked to those who have heard of Tampa Bay Water.

NEW WATER SOURCES BY YEAR

Tampa Bay Water has developed new water sources in an environmentally sound manner[1]

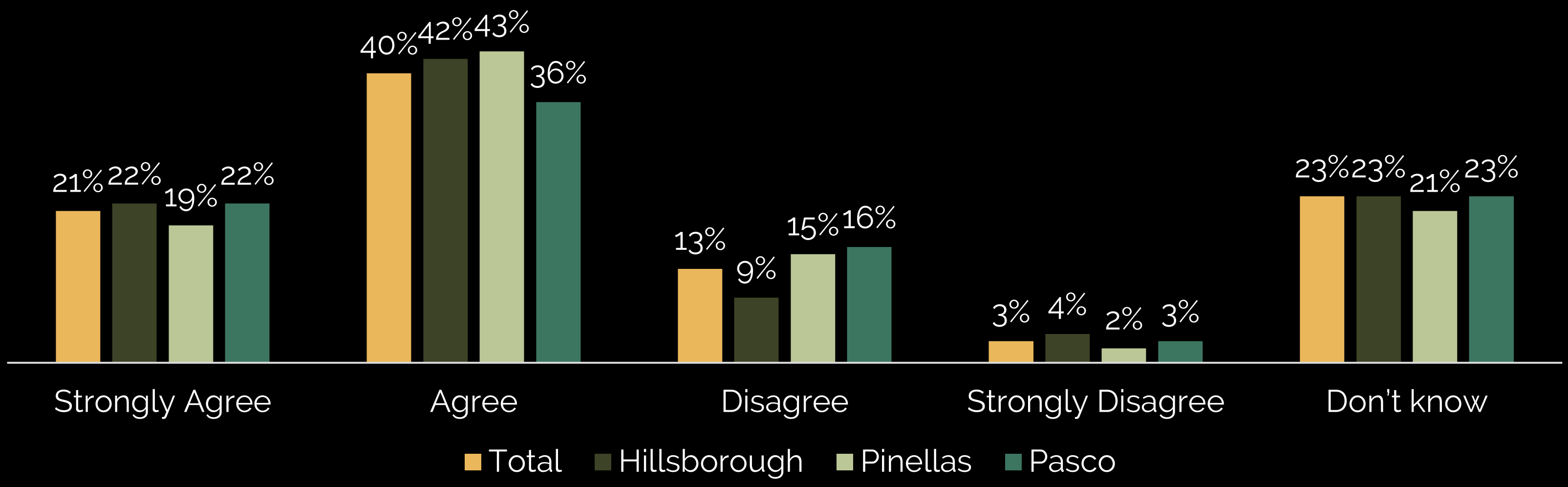


- **Just over 3 in 5 residents (61%)** who are aware of Tampa Bay Water think that it has developed new water sources in an environmentally friendly fashion, **this compares to 52% in 2018**

[1] Only asked to those who have heard of Tampa Bay Water.
Top two boxes: Strongly Agree + Agree

NEW WATER SOURCES BY COUNTY

Tampa Bay Water has developed new water sources in an environmentally sound manner[1]



- Of residents who have heard of Tampa Bay Water, over **3 in 5 agree it has developed new water sources in an environmentally sound manner**
- **Hillsborough County residents (64%)** are more likely to agree, while **Pasco County residents (58%)** are less likely to agree

TAMPA BAY WATER Supplying Water To The Region

[1] Only asked to those who have heard of Tampa Bay Water.

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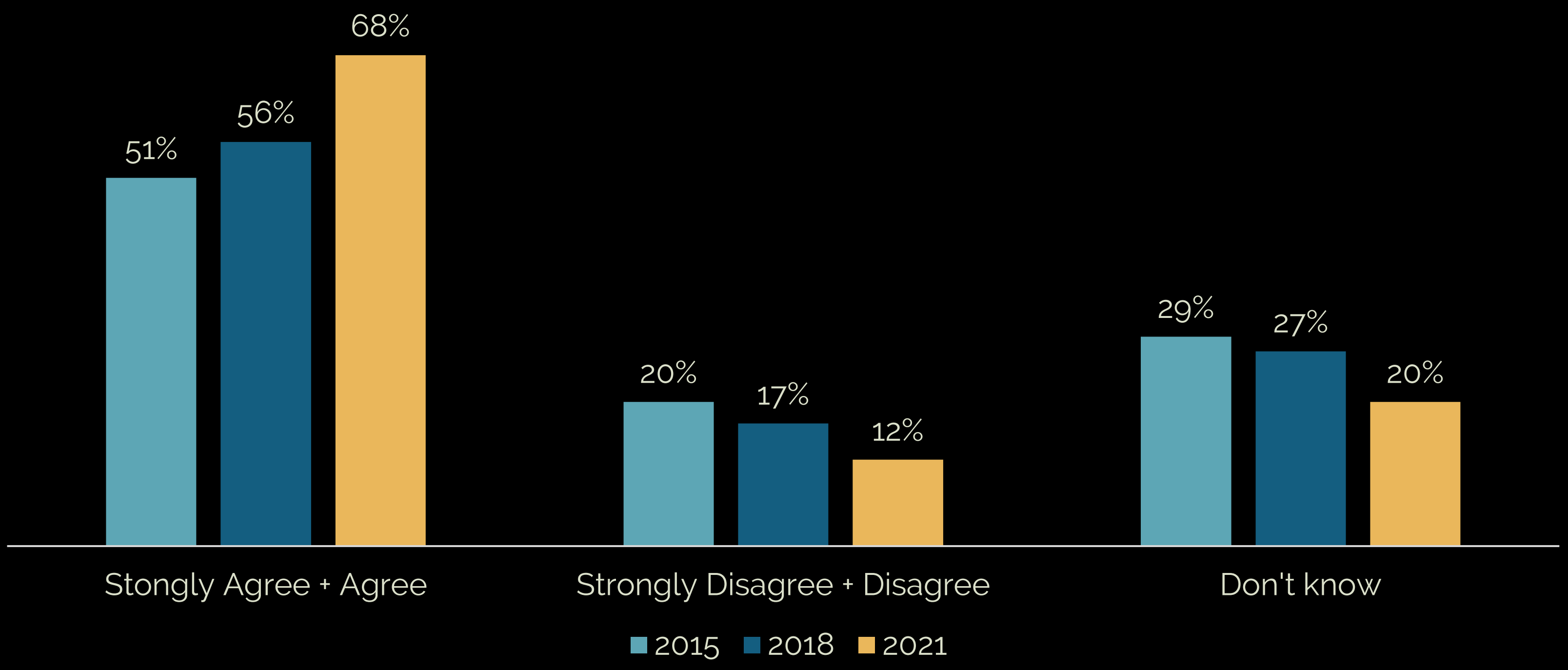
CLIMATE CHANGE BY YEAR

Tampa Bay Water is concerned about climate change impacting water supplies[1]



- Of residents who are aware of Tampa Bay Water, **68% agree** that it is concerned about climate change impacting water supplies
- **In 2018, only 56% of residents agreed**

TAMPA BAY WATER Supplying Water To The Region

[1] Only asked to those who have heard of Tampa Bay Water.
Top two boxes: Strongly Agree + Agree

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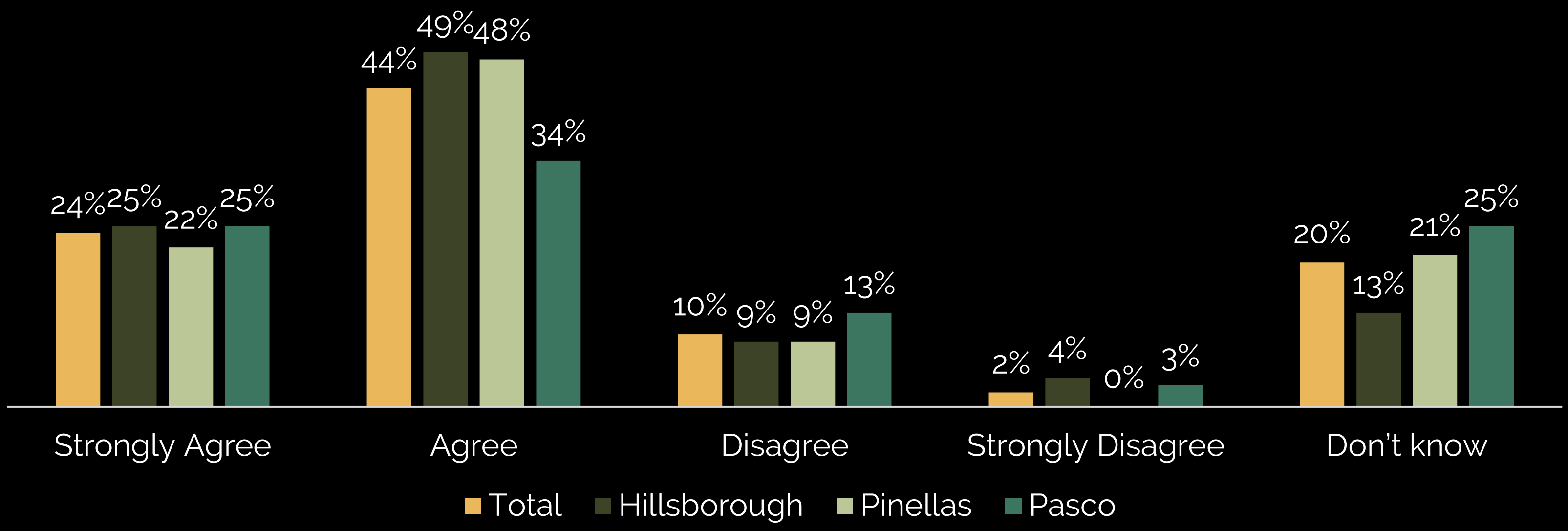
CLIMATE CHANGE BY COUNTY

Tampa Bay Water is concerned about climate change impacting water supplies[1]

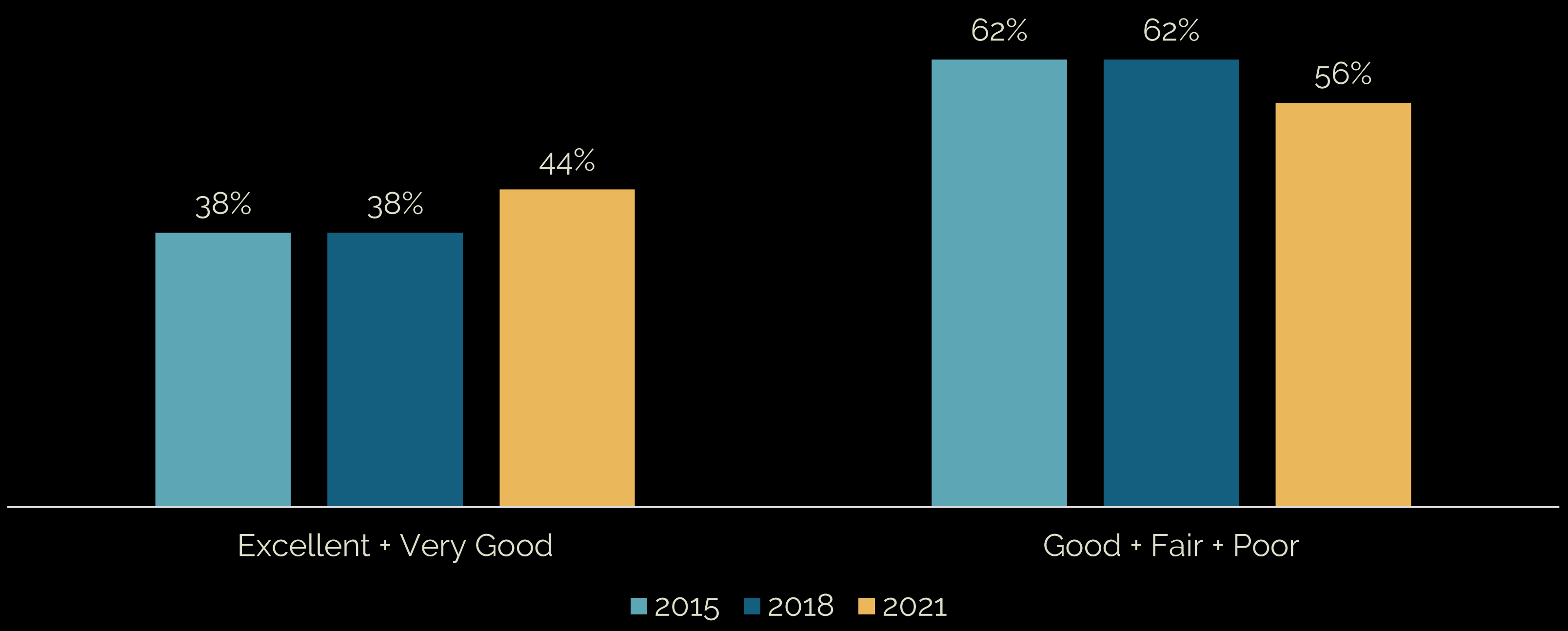


- Of residents who have heard of Tampa Bay Water, nearly **7 in 10 agree it is concerned about climate change impacting water supplies**
- **Hillsborough County residents (74%) are most likely to agree,** while **Pasco County residents (59%) are least likely to agree** that Tampa Bay Water is concerned about climate change's impact on water supplies

[1] Only asked to those who have heard of Tampa Bay Water.

RATE TAMPA BAY WATER BY YEAR

How would you rate Tampa Bay Water on how well it is planning, developing, producing and delivering high quality water supply to your area?

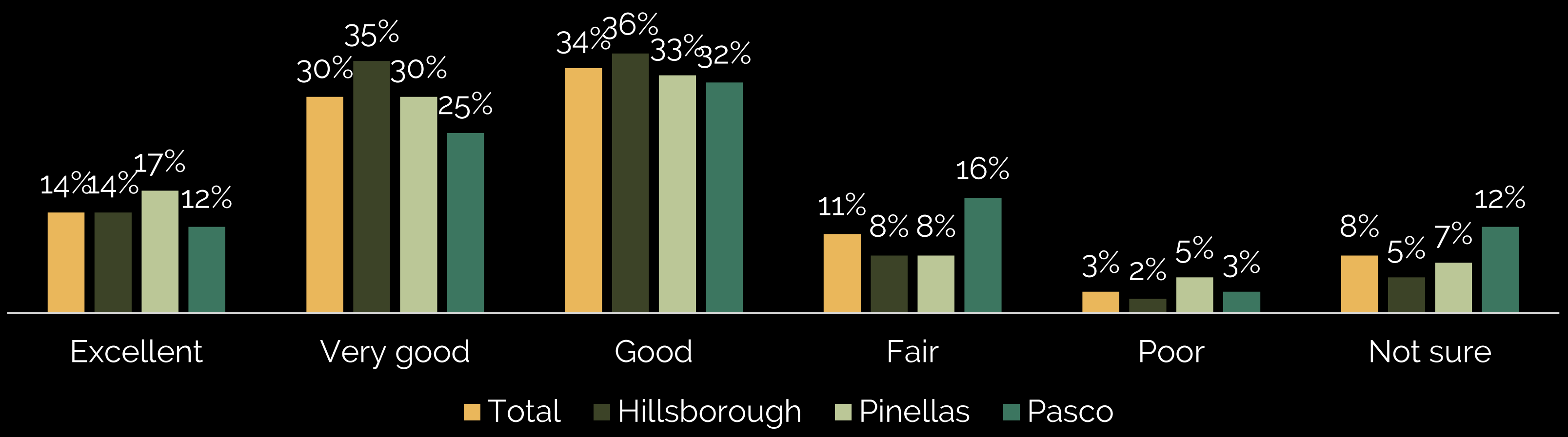


- **Over 2 in 5 residents (44%)** who are familiar with Tampa Bay Water rate it "Excellent" or "Very Good" in planning, developing, producing, or delivering high quality water supplies to their area, **this figure is an increase of 6% point from 2018**
- **Nearly 4 in 5 residents (78%)** give Tampa Bay Water an "Excellent," "Very Good," or "Good" rating on this dimension

[1] Only asked to those who have heard of Tampa Bay Water.
Top two boxes: Excellent + Very Good

RATE TAMPA BAY WATER BY COUNTY

How would you rate Tampa Bay Water on how well it is planning, developing, producing and delivering high quality water supply to your area?



- Of residents who have heard of Tampa Bay Water, nearly **4 in 5 would give Tampa Bay Water a rating of excellent, very good, or good** for how well it is planning, developing, producing and delivering high quality water supply to the area
- **Pasco County residents (69%) are less likely** to give Tampa Bay a "Good" or better rating on planning, developing, producing, and delivering high quality water supplies to their area
- **85% of Hillsborough County residents** give Tampa Bay Water a "Good" or better rating

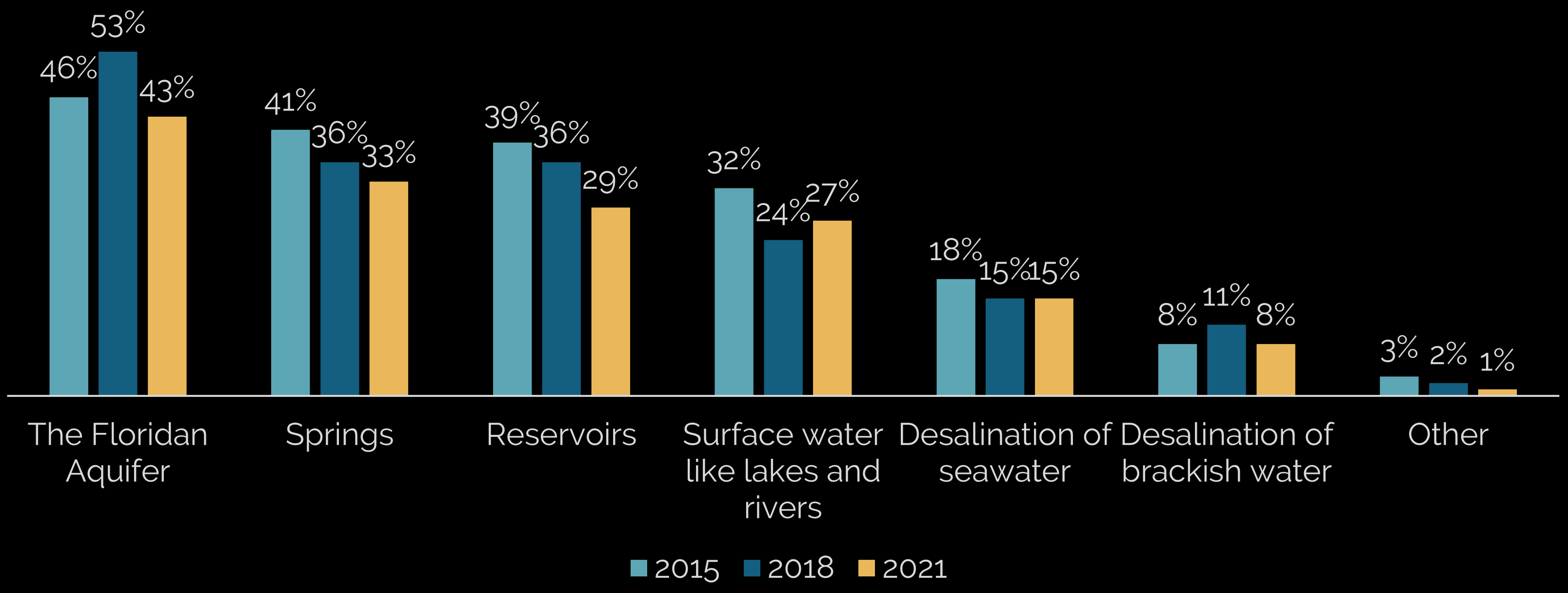
[1] Only asked to those who have heard of Tampa Bay Water.

DETAILED FINDINGS

Water Sources

DRINKING WATER SOURCES BY YEAR

Which of the following drinking water sources are currently being used to supply drinking water to the Tampa Bay region?[1]

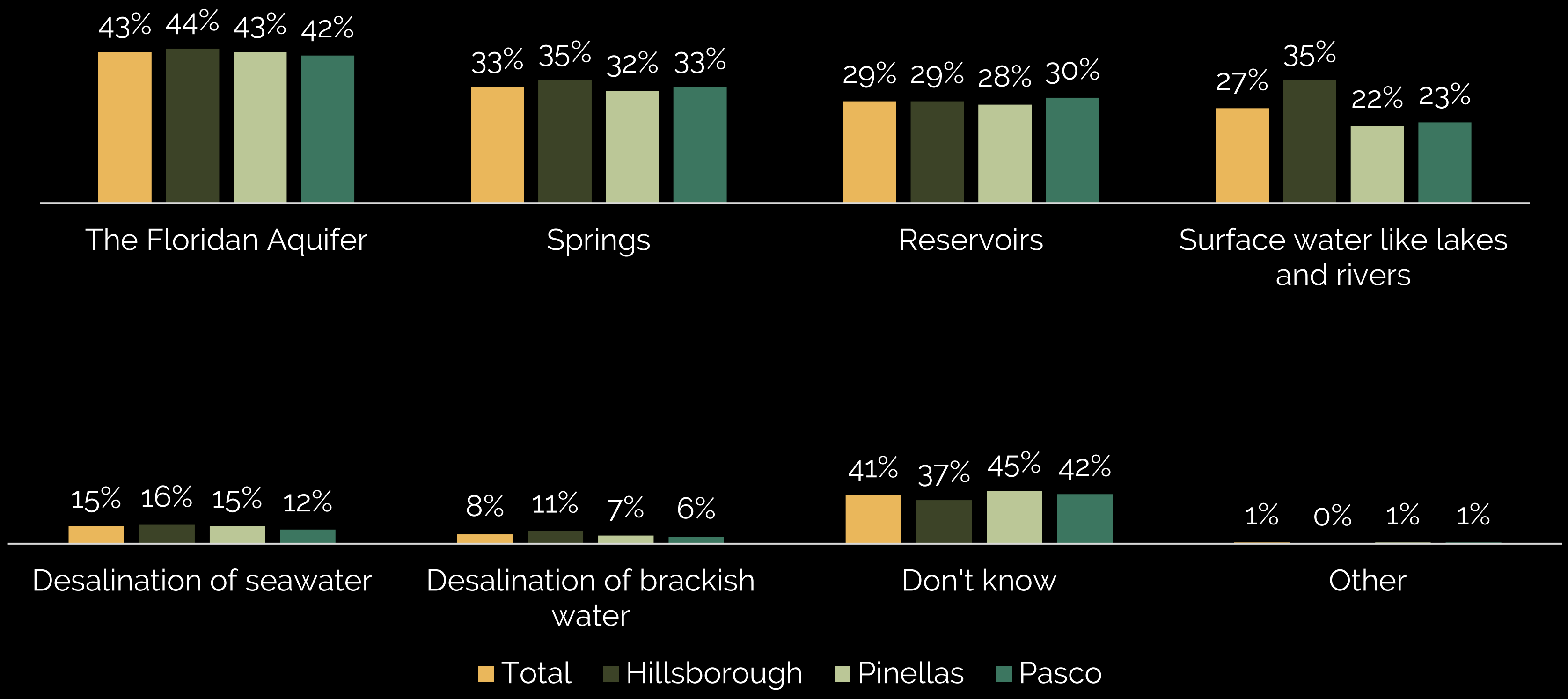


- **A plurality of residents (43%) believe their drinking water comes from the Floridan Aquifer;** a 10% points decrease from 2018
- **About 3 in 10 residents** believes the source of their drinking water is either **springs (33%, -3% points from 2018) or reservoirs (29%, -7% points from 2018)**
- **Overall responses decreased across all options**, indicating residents may be less familiar with drinking water sources than in previous years

[1] Multiple responses accepted.

DRINKING WATER SOURCES BY COUNTY

Which of the following drinking water sources are currently being used to supply drinking water to the Tampa Bay region?[1]

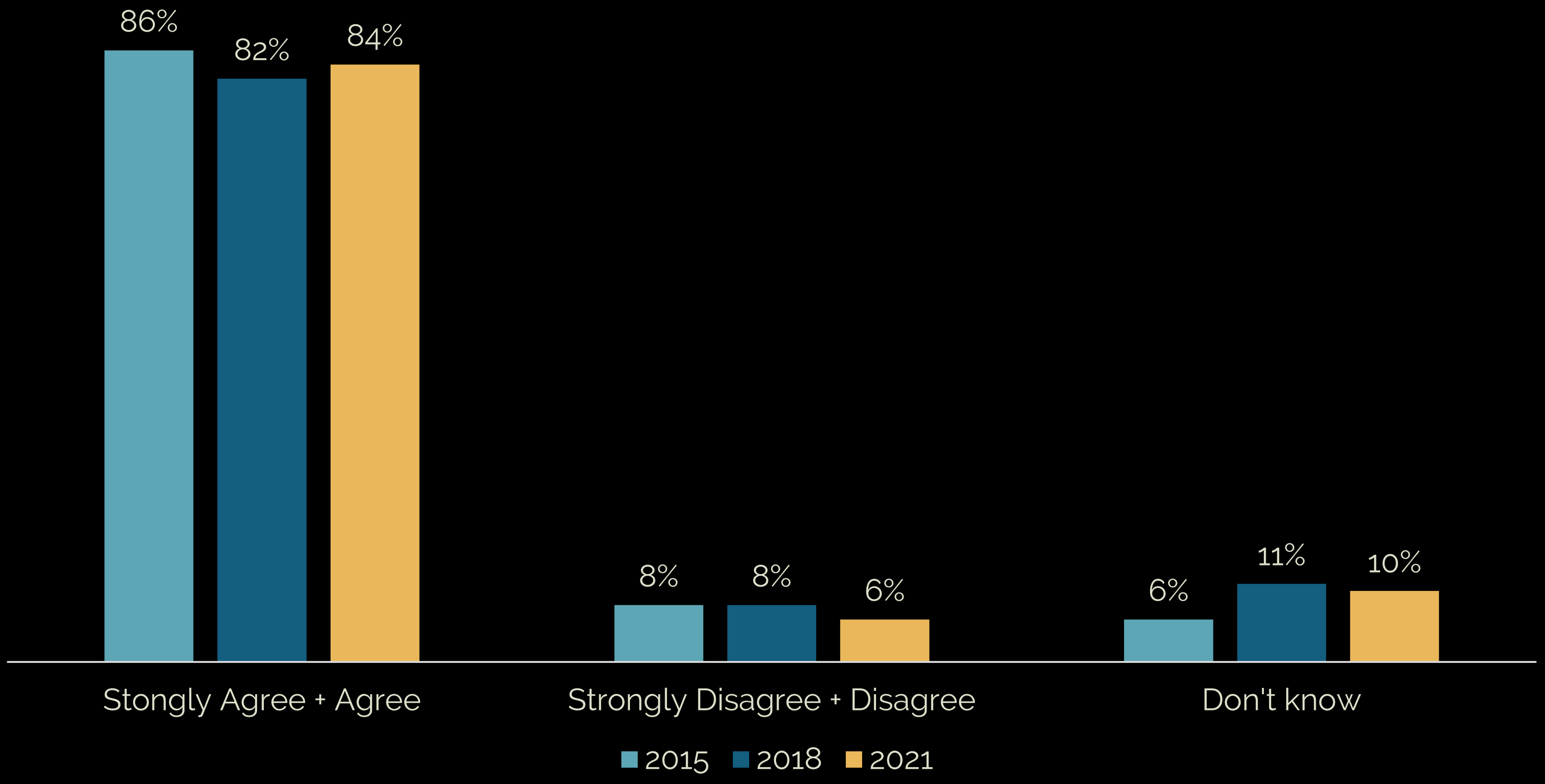


- **Hillsborough residents (35%)** are slightly more likely to name surface water like lakes and rivers as a source of tap water
- **Just 15% of residents** believe their drinking water comes from desalination of seawater with **16% of Hillsborough County residents believing this assertion**

[1] Multiple responses accepted.

RULES AND REGULATIONS BY YEAR

There should be more comprehensive rules and regulations to protect the region's water resources[1]

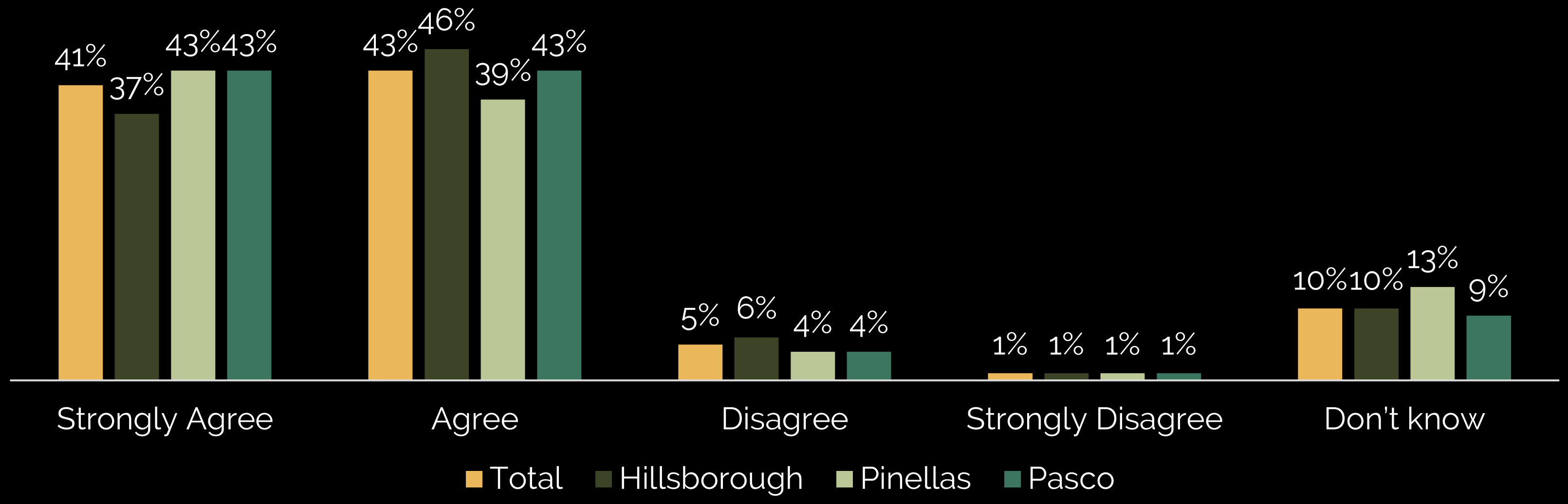


- **Over 4 in 5 residents (84%)** in the Tampa Bay Water service area think there should be more comprehensive rules and regulations to protect the region's water resources, **this result compares with 82% who felt this way in 2018**

[1] Top two boxes: Strongly Agree + Agree

RULES AND REGULATIONS BY COUNTY

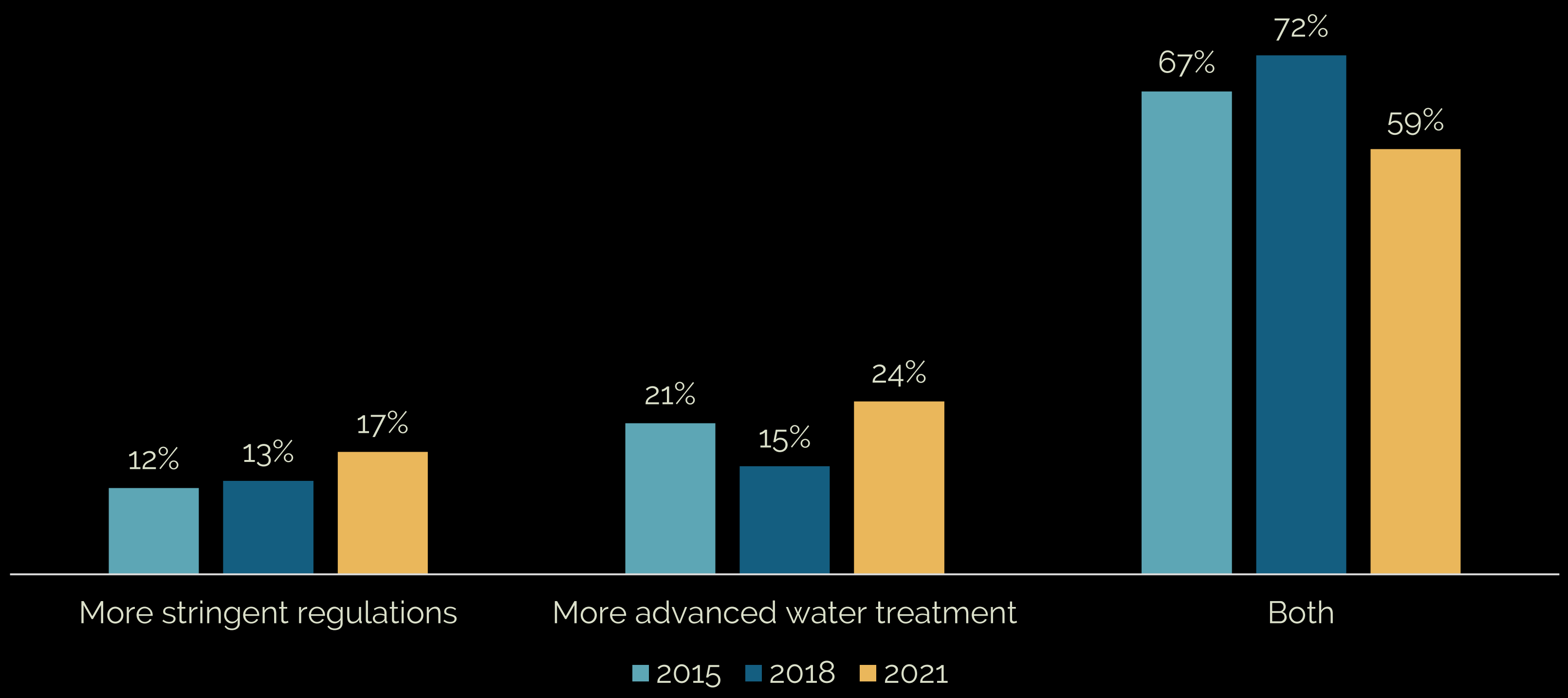
There should be more comprehensive rules and regulations to protect the region's water resources



- **A majority of residents agree** there should be more comprehensive rules and regulation to protect the region's water resources **(84%)**
- Comparatively **more Pasco County residents (86%) believe this**, while **only 82% of Pinellas County residents** share this opinion

REGULATIONS VS TECHNOLOGY BY YEAR

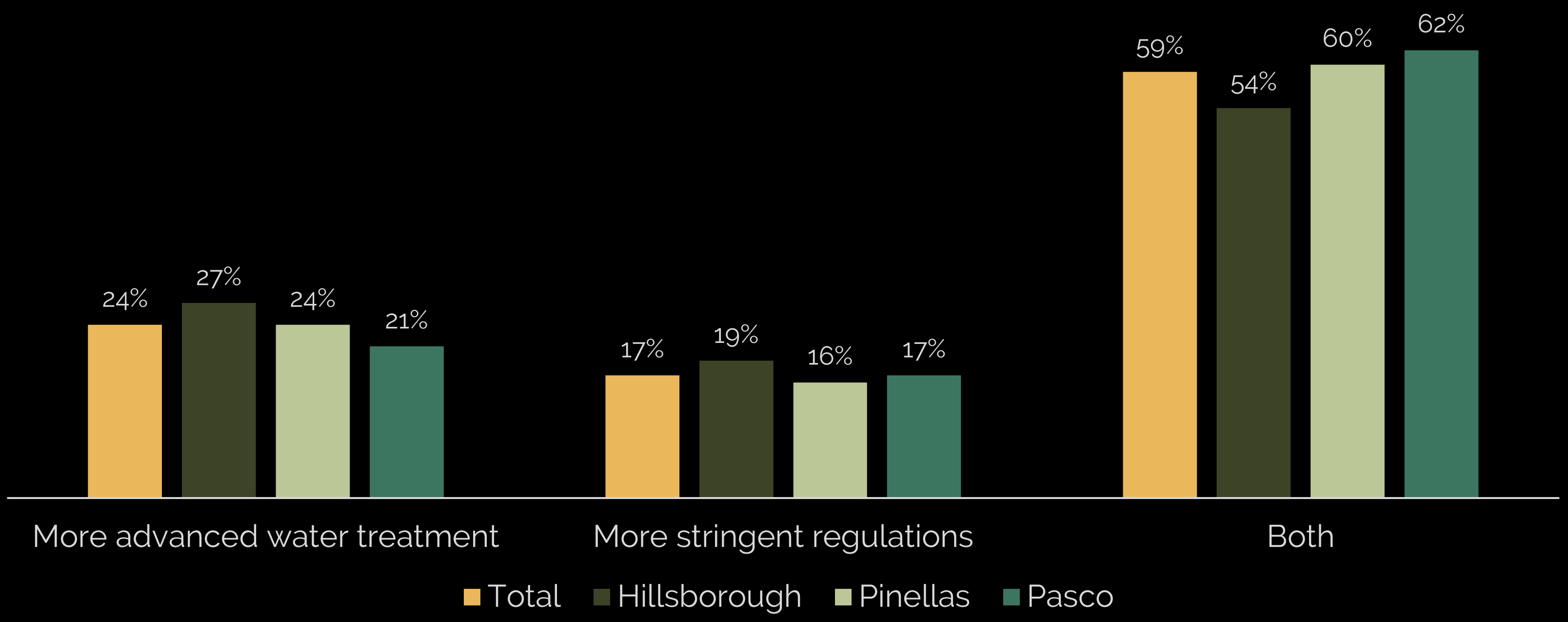
Does it make more sense to protect drinking water quality through more stringent source water protection regulations or to invest in more advanced water treatment technology or both?



- **Comparatively fewer residents in 2021 (59%) than in 2018 (72%)** think it makes more sense to combine more stringent source water protection regulations with more investment in advanced treatment technology to protect drinking water quality than to take only one of these measures

REGULATIONS VS TECHNOLOGY BY COUNTY

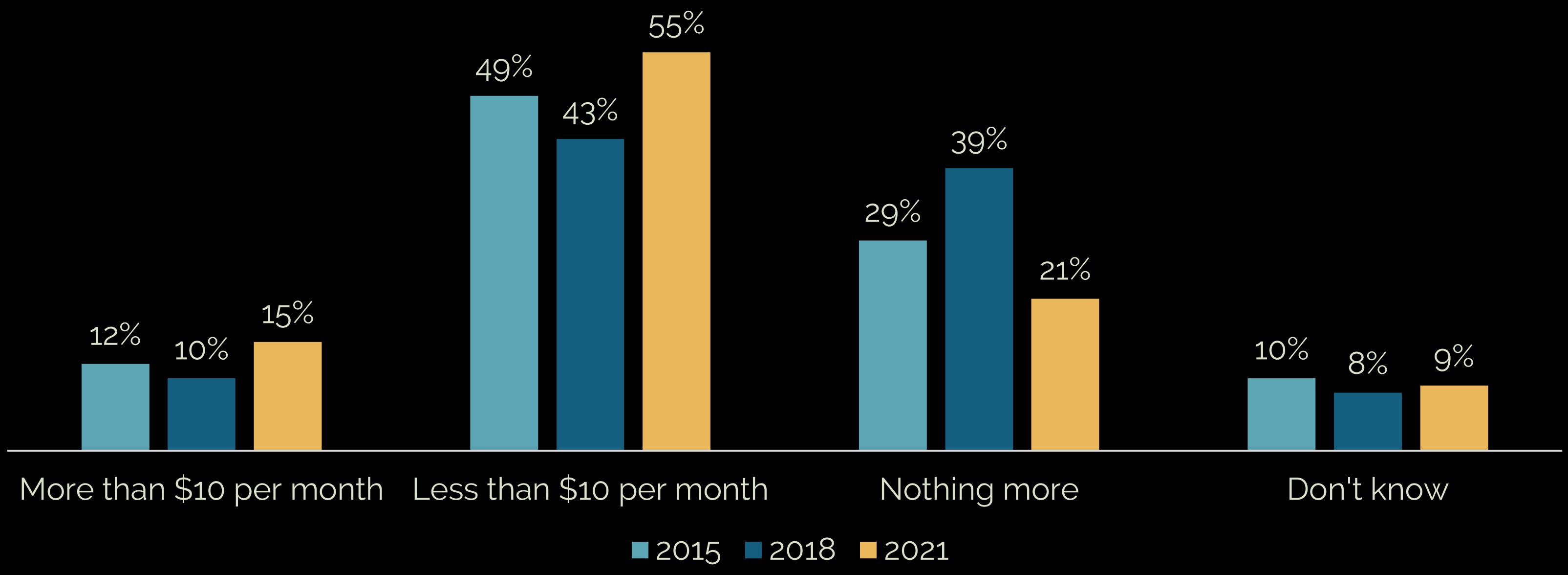
Does it make more sense to protect drinking water quality through more stringent source water protection regulations or to invest in more advanced water treatment technology or both?



- **More residents (59%)** believe that **both measures** should be used in tandem to protect drinking water
- **24% of residents** think **only more advanced water treatment** is the best approach, while **17% of residents** think **only more stringent regulations** is the best approach to ensure drinking water quality
- **Comparatively more Pasco County residents (62%)** believe that both measures should be used in tandem to protect drinking water

WATER BILL BY YEAR

How much more would you be willing to pay each month on your water bill for water utilities to use more advanced water treatment technology?[1]

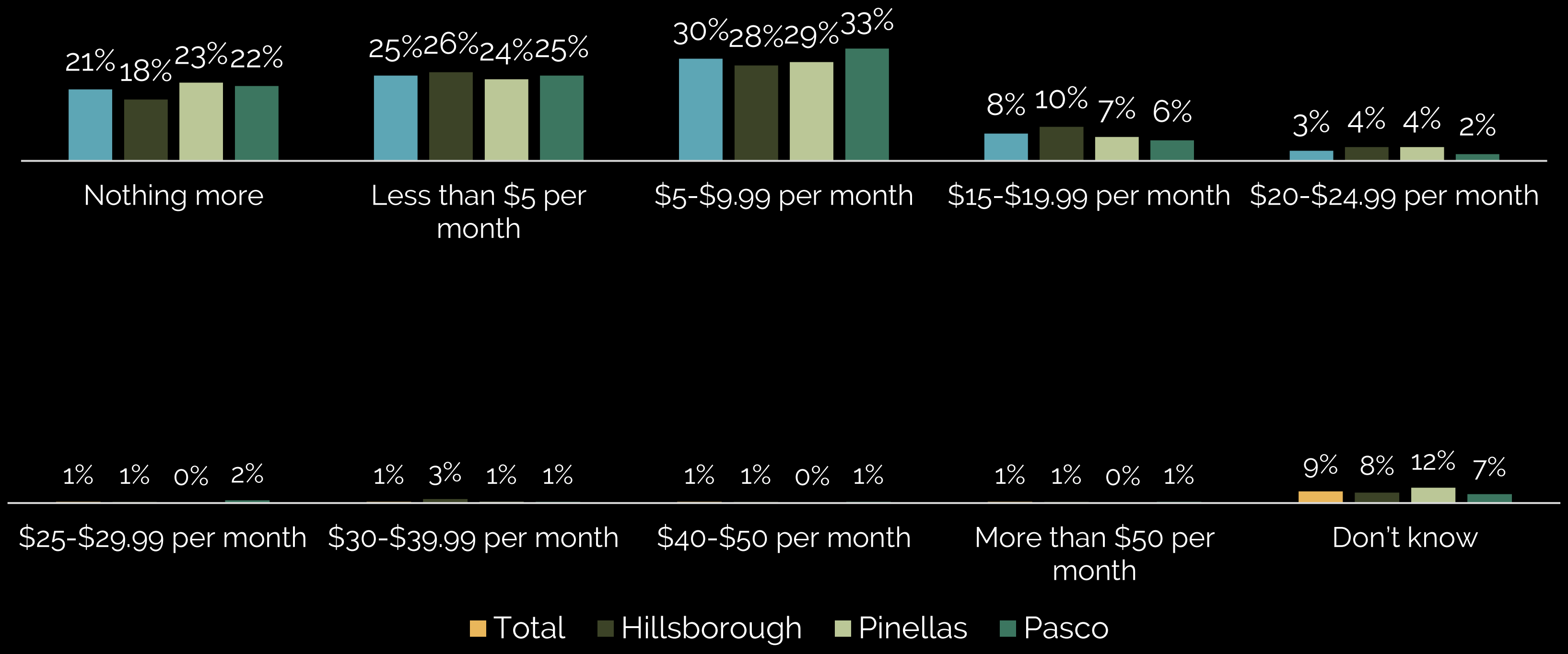


- The average amount residents are willing to pay for more advanced treatment technologies is **$7 per month, up $2 from 2018**
- **Fewer residents are not willing to pay anything more** to their utilities on their monthly bills to affect change, **a decrease of 18% points from 2018**

[1] Only asked to those who selected "More advanced water treatment" or " Both" in previous question.

WATER BILL BY COUNTY

How much more would you be willing to pay each month on your water bill for water utilities to use more advanced water treatment technology?[1]



- Among residents who support investment in more advanced treatment of water, **1 in 5 (21%) are not willing to pay anything more** to their utilities on their monthly bills to affect change
- The average amount residents are willing to pay for more advanced treatment technologies is **$7 per month**

[1] Only asked to those who selected "More advanced water treatment" or " Both" in previous question.

GREATEST THREAT BY YEAR

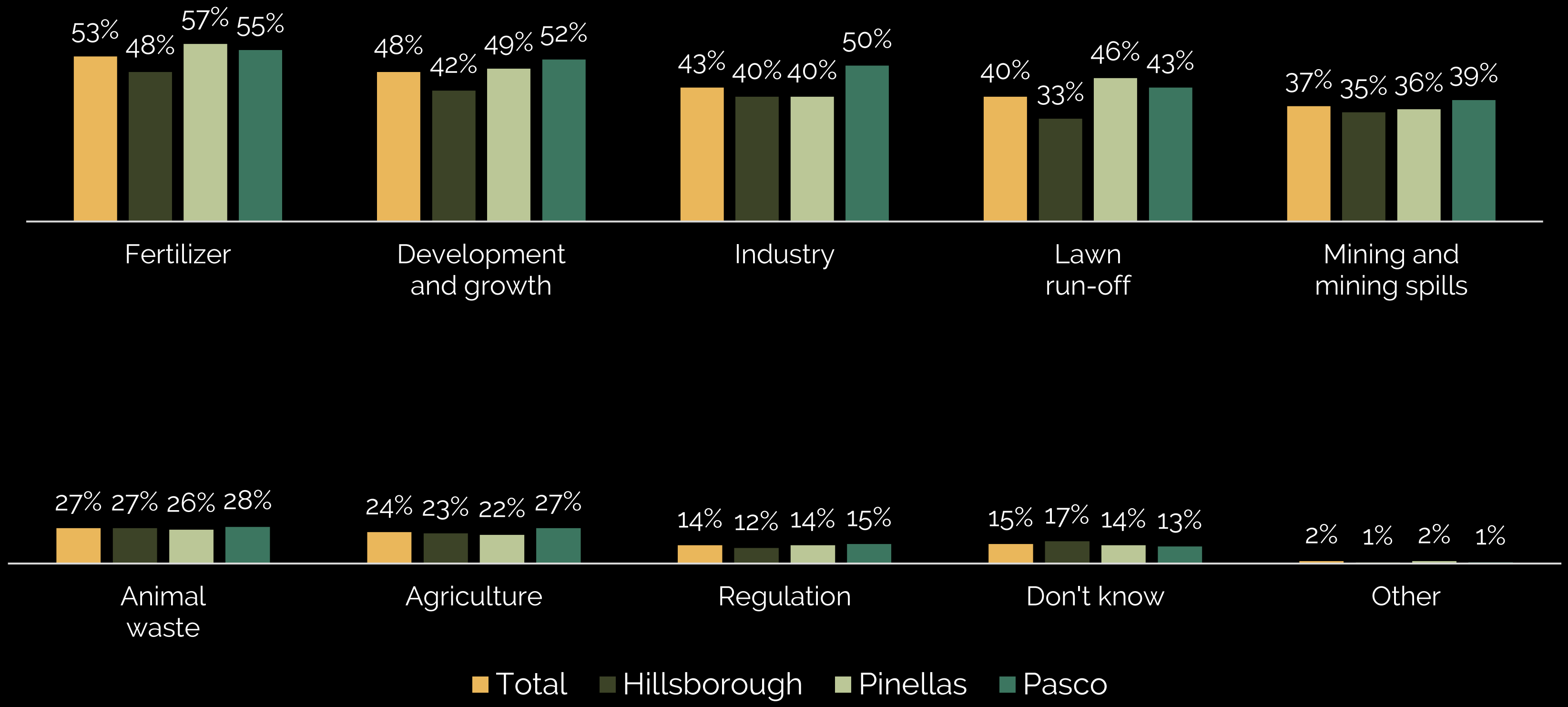
Which of the following is the greatest threat to our region's water resources?[1]

- **Fertilizer is the greatest threat** to the region's water resources according to residents of Tampa Bay Water's service area was **up 2% points from 2018**
- **Development and growth decreased 4% points from 2018**

[1] Multiple responses accepted.

GREATEST THREAT BY COUNTY

Which of the following is the greatest threat to our region's water resources?[1]

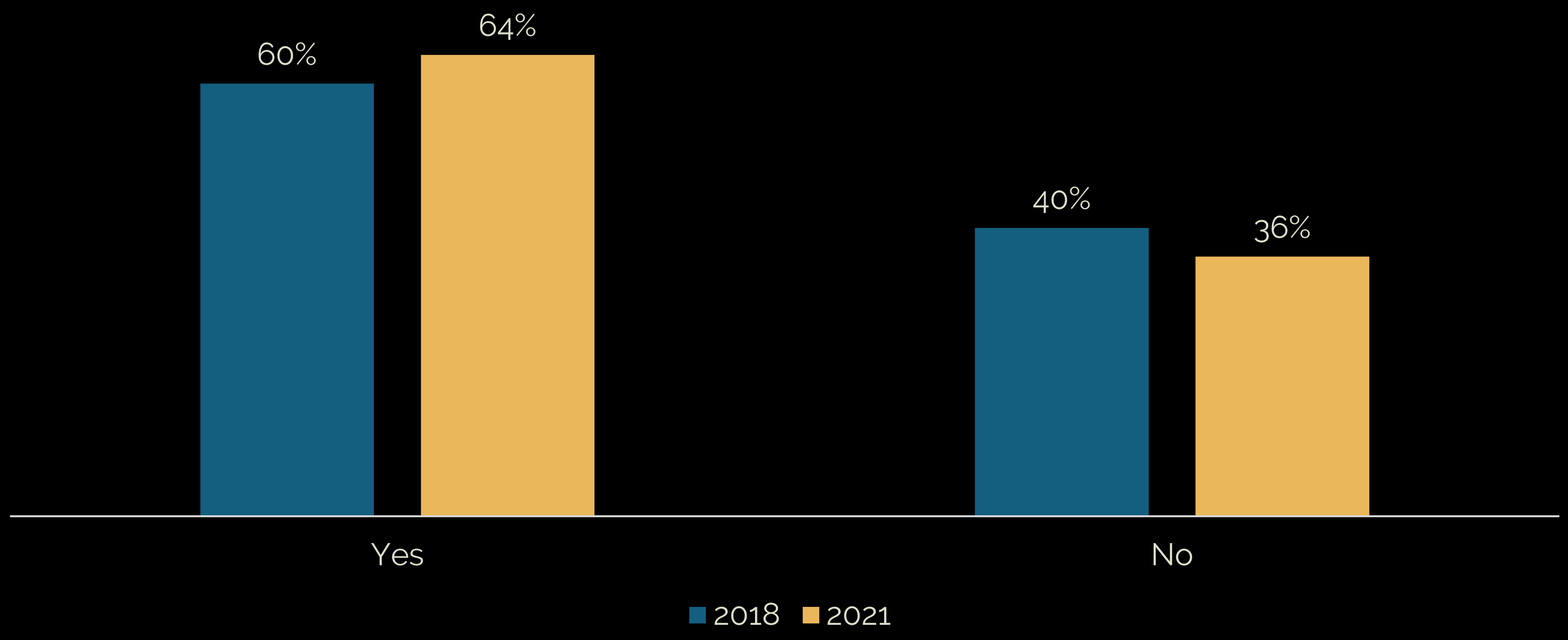


- **Fertilizer is the greatest threat** to the region's water resources according to residents of Tampa Bay Water's service area as **53% name it as a major concern**
- **Development and growth was second as nearly half of residents (48%)** select it as one of the greatest threats to water resources

[1] Multiple responses accepted.

CARE ABOUT WATER SOURCE BY YEAR

If new water supplies are added and your tap water remains the same quality or better, do you care what the source of that water would be?[1]

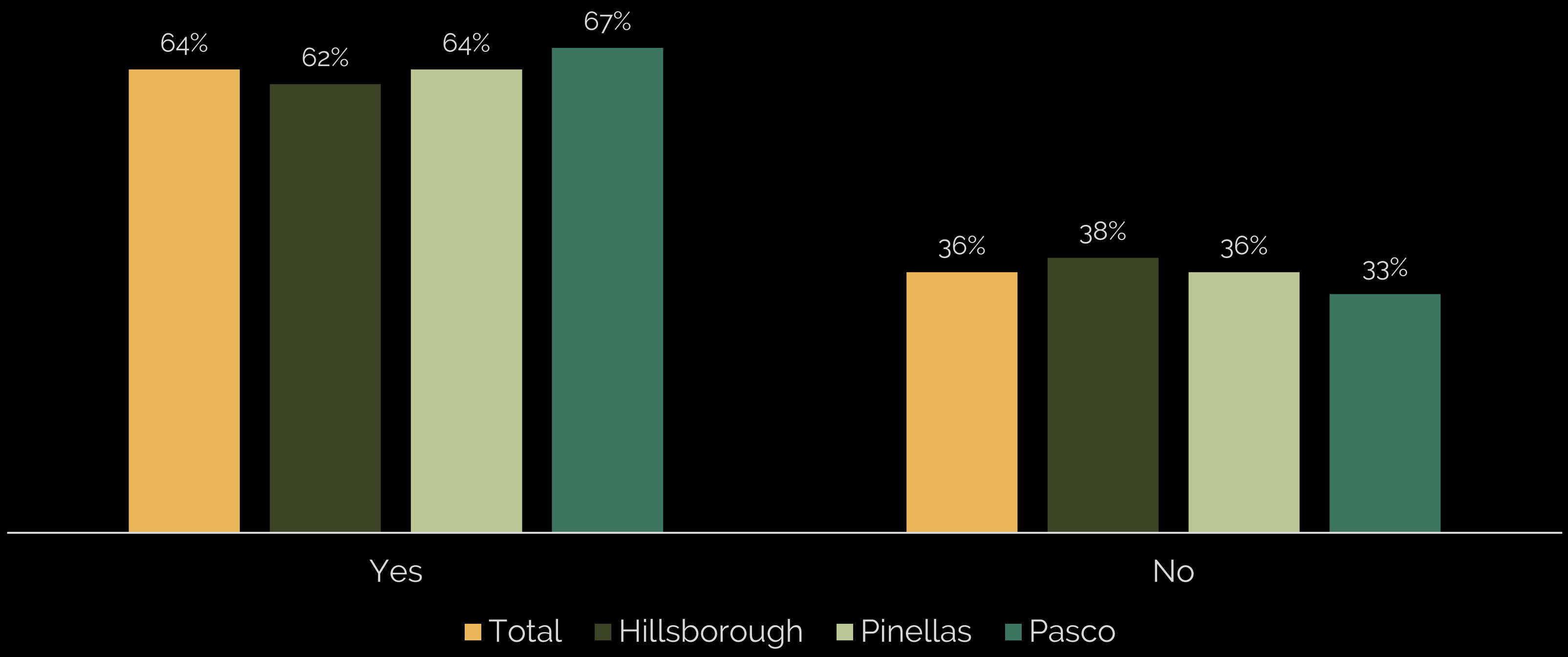


- More residents care what the sources of a new water supply would be from 2018, **up 4% points**

[1] Question not asked in 2015.

CARE ABOUT WATER SOURCE BY COUNTY

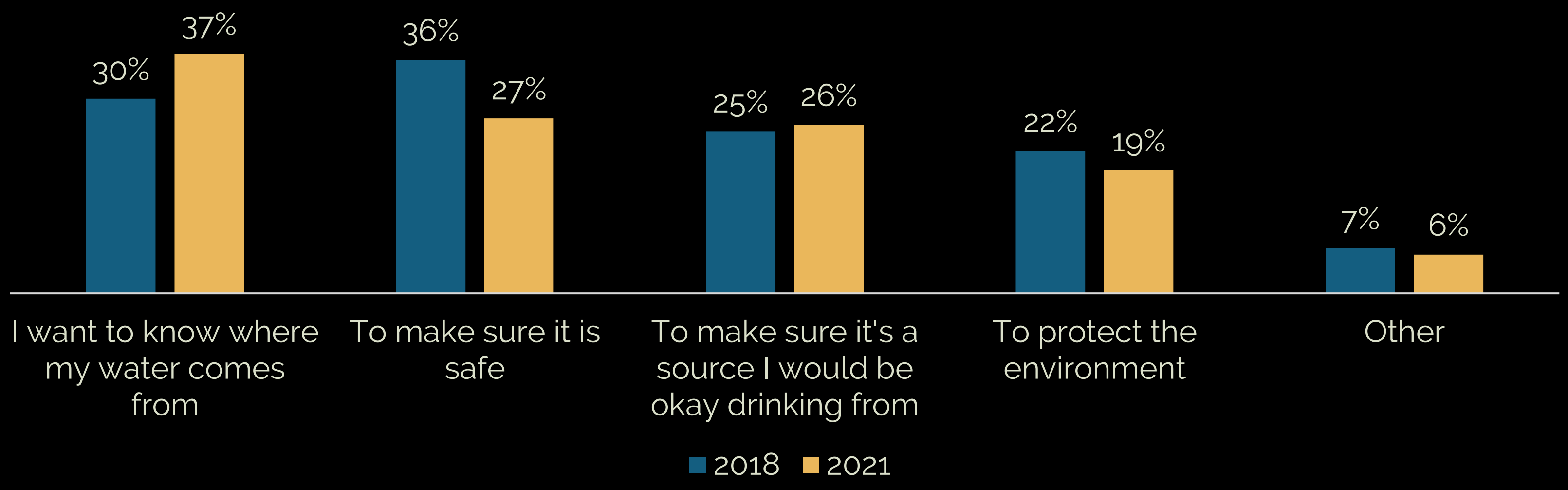
If new water supplies are added and your tap water remains the same quality or better, do you care what the source of that water would be?



- **Over 3 in 5 (64%)** residents say **they care** what the source of new water supplies is
- **Pasco County** residents are most likely to hold this belief

CARE ABOUT WATER SOURCE BY YEAR

If yes, why is the source important to you?[1]

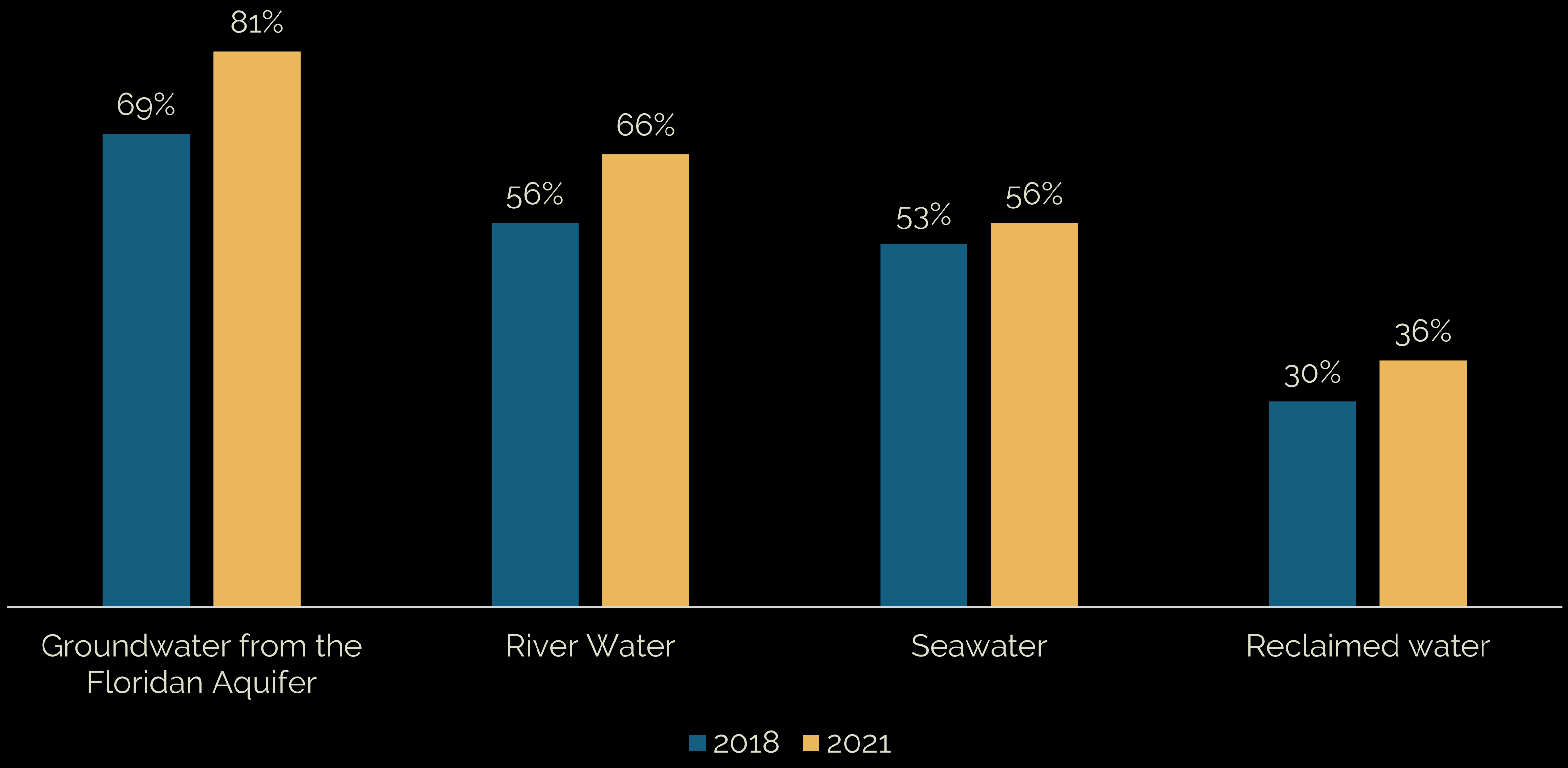


- Of those who said they care about a new source of water, **nearly 2 in 5** residents say they **want to know where their water comes from**

[1] Only asked to those who said they care about the source of water.
Question not asked in 2015.
Coded open-ended responses.

DRINKING WATER SOURCES BY YEAR

Would you drink tap water that came from:[1]



- **Only 36% of residents** who live in the Tampa Bay Water service area will drink reclaimed water, **this is a 6% points increase from 2018**

TAMPA BAY WATER Supplying Water To The Region

[1] Question not asked in 2015.

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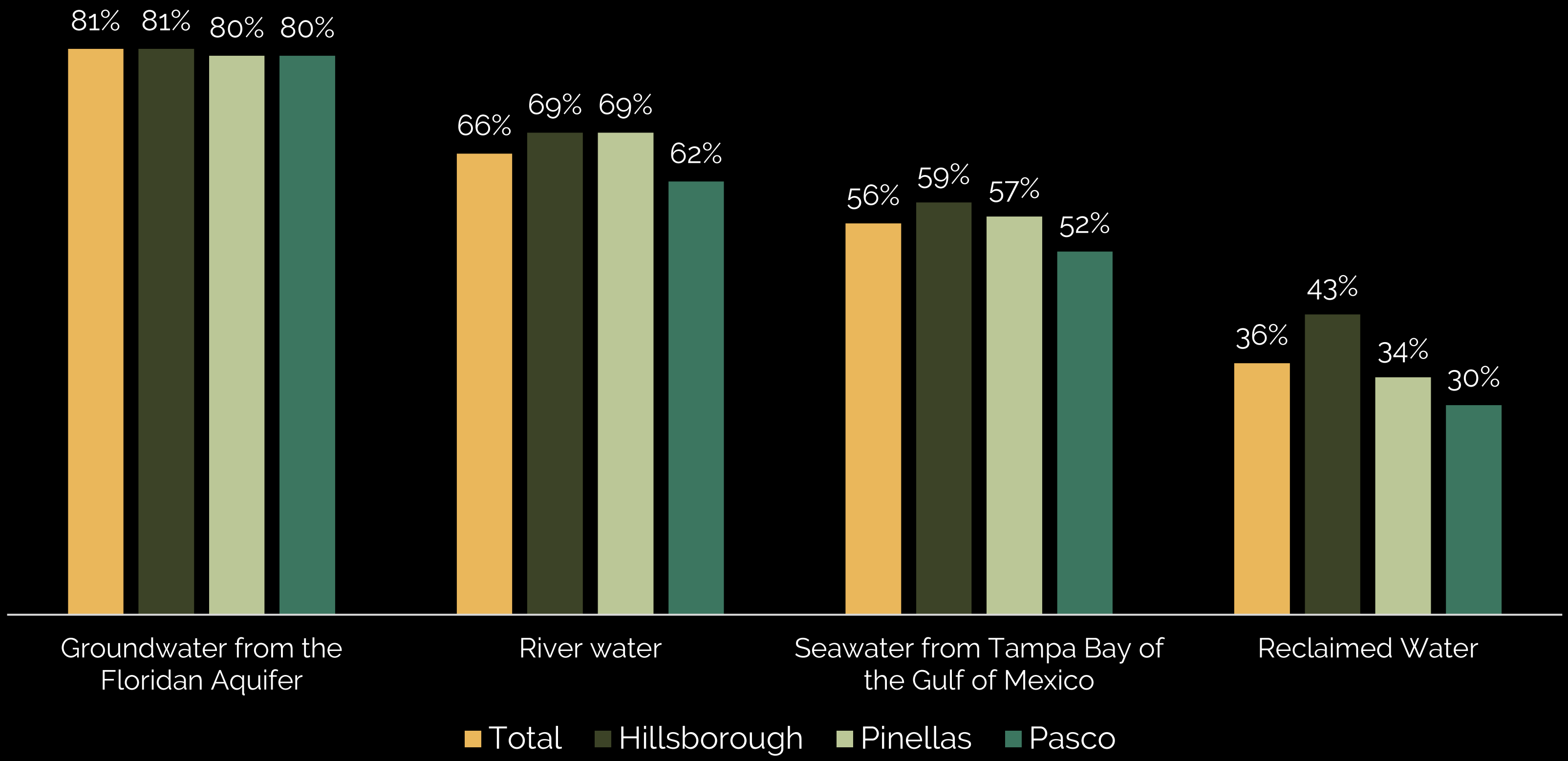
DRINKING WATER SOURCES BY COUNTY

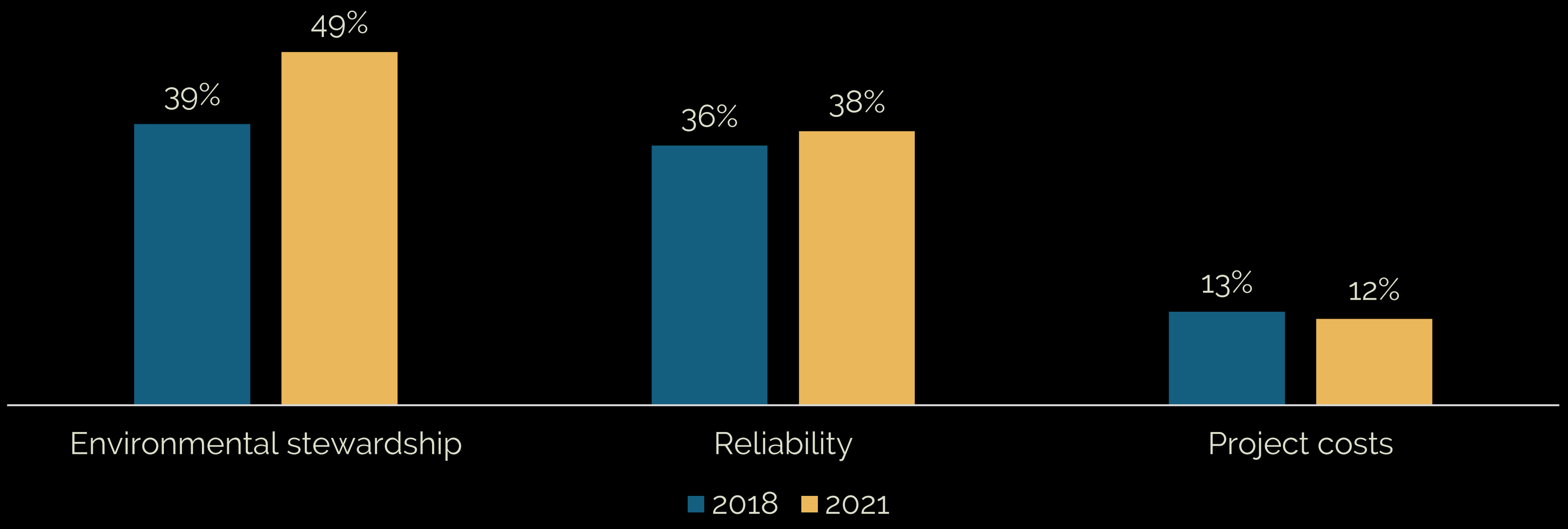
Would you drink tap water that came from:



- **4 of 5 residents (81%)** claim they will drink **groundwater from the Floridan Aquifer**, while **2 in 3 will drink water from river water (66%) and over half from seawater (56%)**
- **Hillsborough County residents (43%) are more likely** to drink reclaimed water, while **Pasco County residents (30%) are less likely**

ACCEPTING A NEW WATER SUPPLY BY YEAR

Which of the following 3 is **most** important to you in deciding whether to accept a new water supply?

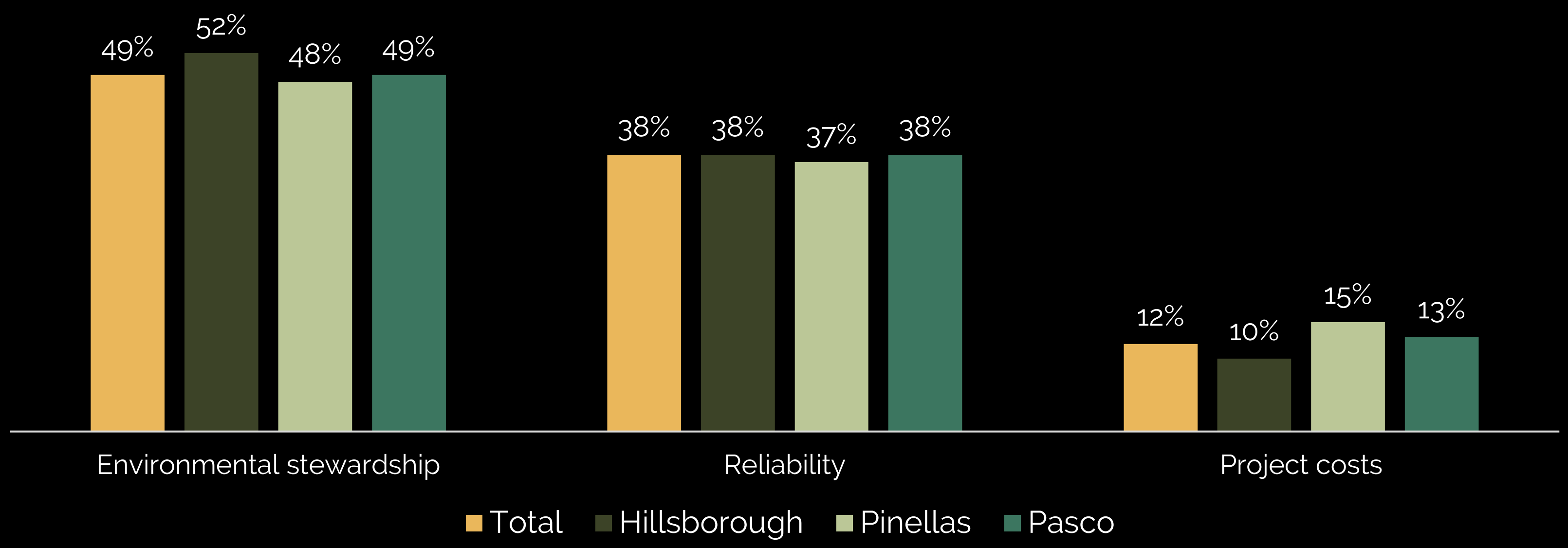


- **About half of residents (49%)** of Tampa Bay Water's service area believe **environmental stewardship** is the **most important** consideration when deciding whether to accept a new water supply, **up 10% points from 2018**

[1]Question not asked in 2015.

ACCEPTING A NEW WATER SUPPLY BY COUNTY

Which of the following 3 is **most** important to you in deciding whether to accept a new water supply?



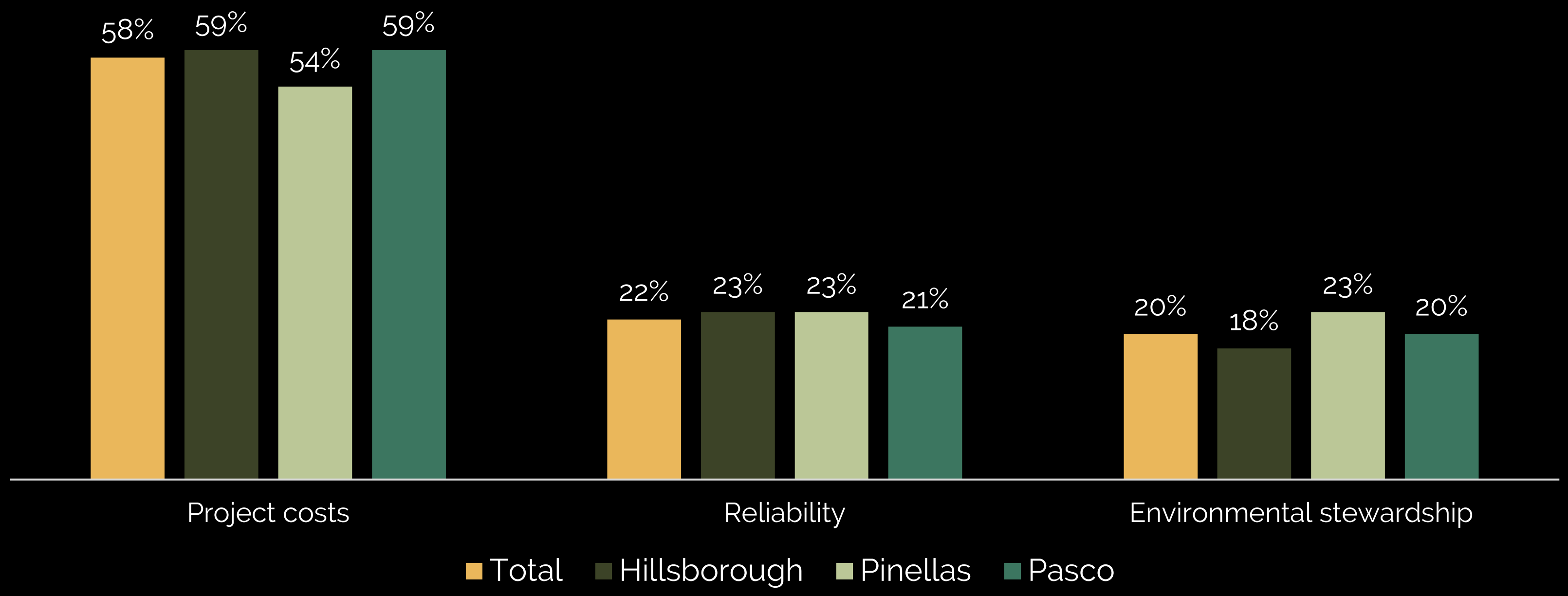
- **About half of residents (49%)** of Tampa Bay Water's service area believe **environmental stewardship** is the **most important** consideration when deciding whether to accept a new water supply

- Environmental stewardship is **most important to residents of Hillsborough County**

- Second in importance when deciding to accept a new water supply is **reliability – 38%** of residents of the Tampa Bay Water service area selected this factor as **most important**

ACCEPTING A NEW WATER SUPPLY BY COUNTY

Which of the following 3 is **least** important to you in deciding whether to accept a new water supply?



- Least important in deciding whether to accept a new water supply is **project costs**
- **Nearly 3 in 5 residents** selected this option as **least important** when deciding whether to accept a new water supply option

TAMPA BAY WATER
Supplying Water To The Region

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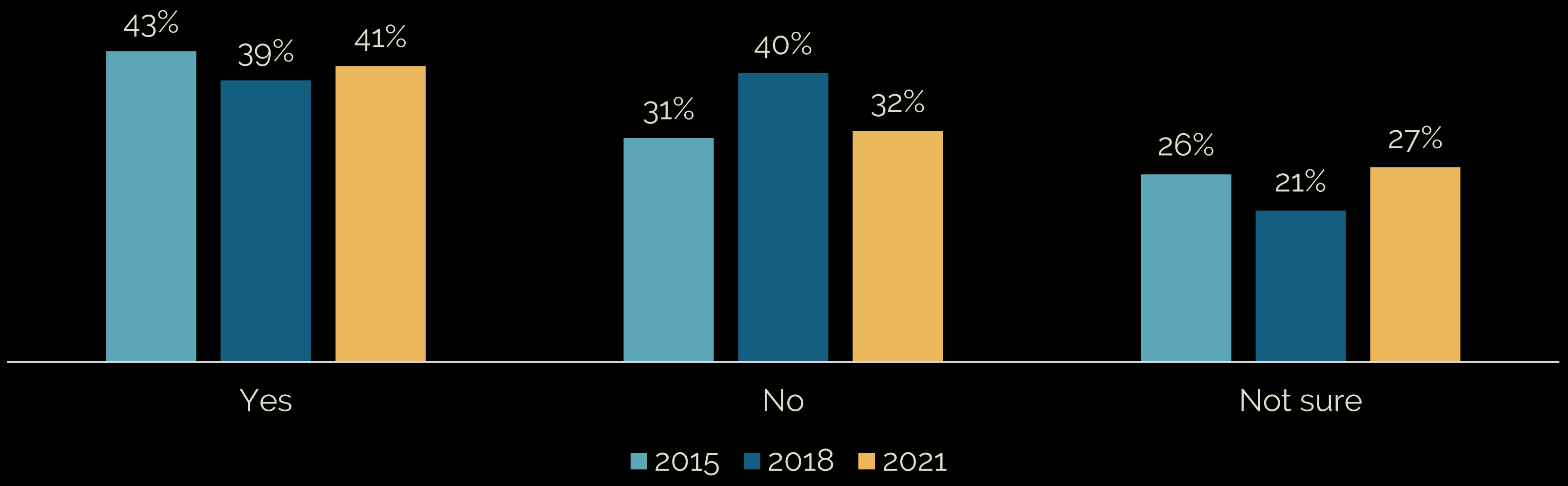
DETAILED FINDINGS

Reclaimed Water

DRINKING WATER BY YEAR

One way to reuse reclaimed water is to clean it to drinking water standards, then put it back in groundwater, reservoirs or rivers, then withdraw it and treat it again to drinking water standards before sending it to homes and businesses.

If water were treated in this manner, would you be willing to drink it?

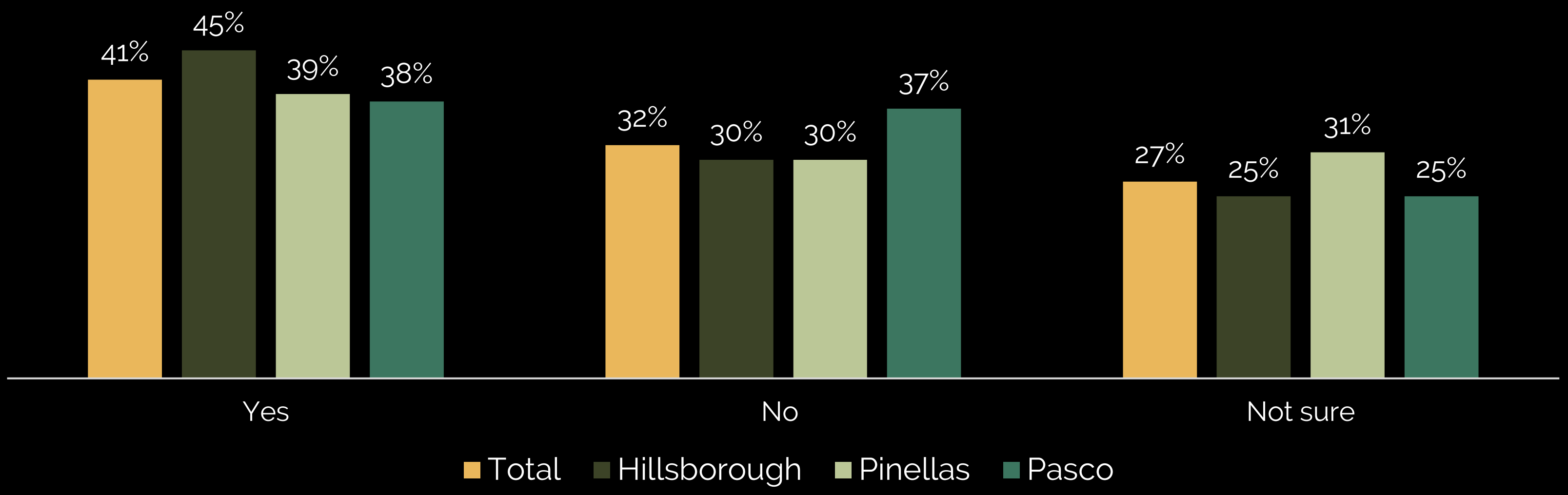


- **About 2 in 5 residents** of the Tampa Bay Water service area **will drink reclaimed water** using this method, up **2% points from 2018**

DRINKING WATER BY COUNTY

One way to reuse reclaimed water is to clean it to drinking water standards, then put it back in groundwater, reservoirs or rivers, then withdraw it and treat it again to drinking water standards before sending it to homes and businesses.

If water were treated in this manner, would you be willing to drink it?



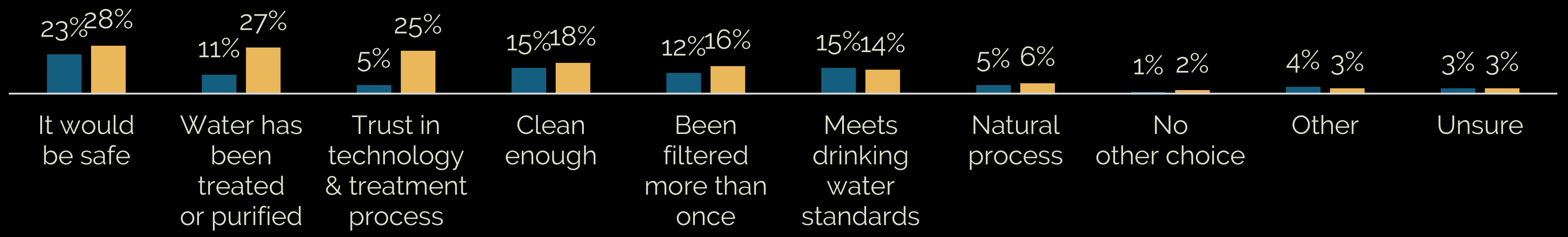
- **About 2 in 5 residents** of the Tampa Bay Water service area **will drink reclaimed water** using this method
- **About 1 in 3 residents (32%) are not willing to drink this water**
- **Hillsborough County residents are more likely to drink reclaimed water using this method**

DRINKING WATER BY YEAR

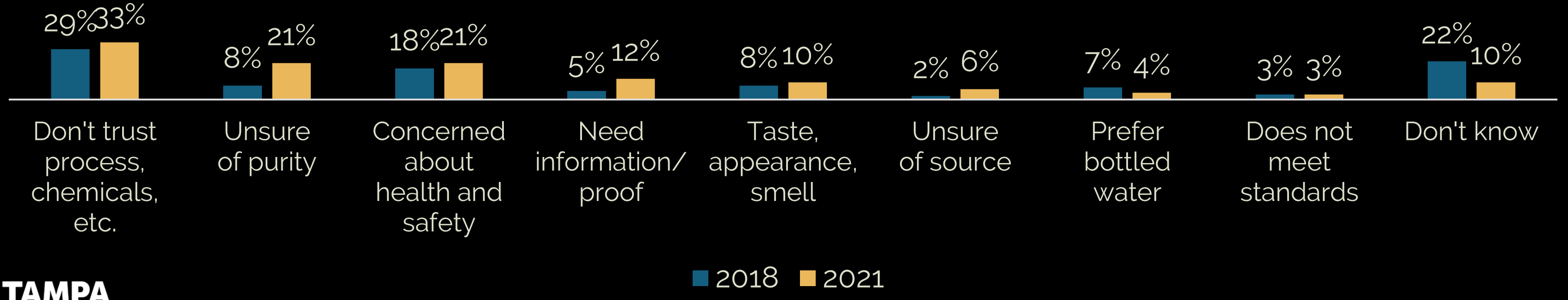
One way to reuse reclaimed water is to clean it to drinking water standards, then put it back in groundwater, reservoirs or rivers, then withdraw it and treat it again to drinking water standards before sending it to homes and businesses

If water were treated in this manner, would you be willing to drink it?[1]

Why Would You Be Willing?



Why Would You Be Unwilling?



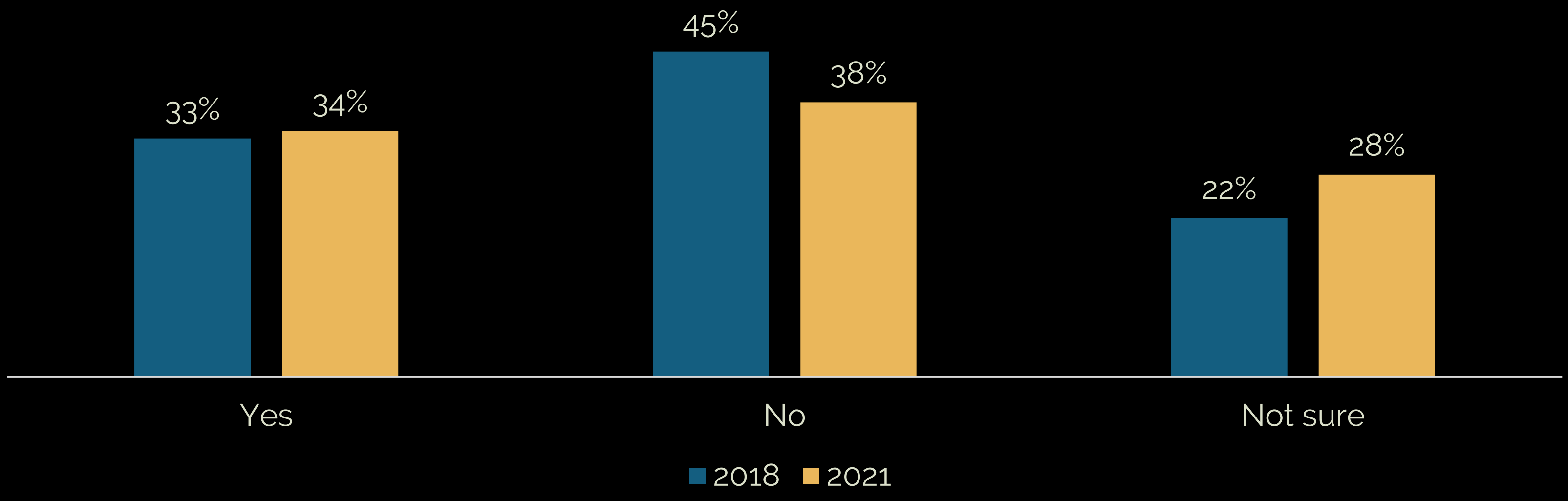
- Residents who are willing to drink reclaimed water treated in this manner mention the water **would be safe**
- Residents who are not willing to drink reclaimed water treated in this manner mention their **lack of trust in the process, chemicals, etc.**

[1] Why would you be willing/unwilling to drink it? Coded open-ended responses.

DRINKING WATER BY YEAR

One way to reuse reclaimed water is to clean it to drinking water standards, blend it with other drinking water, then send it to homes and businesses.

If water were treated in this manner, would you be willing to drink it?[1]



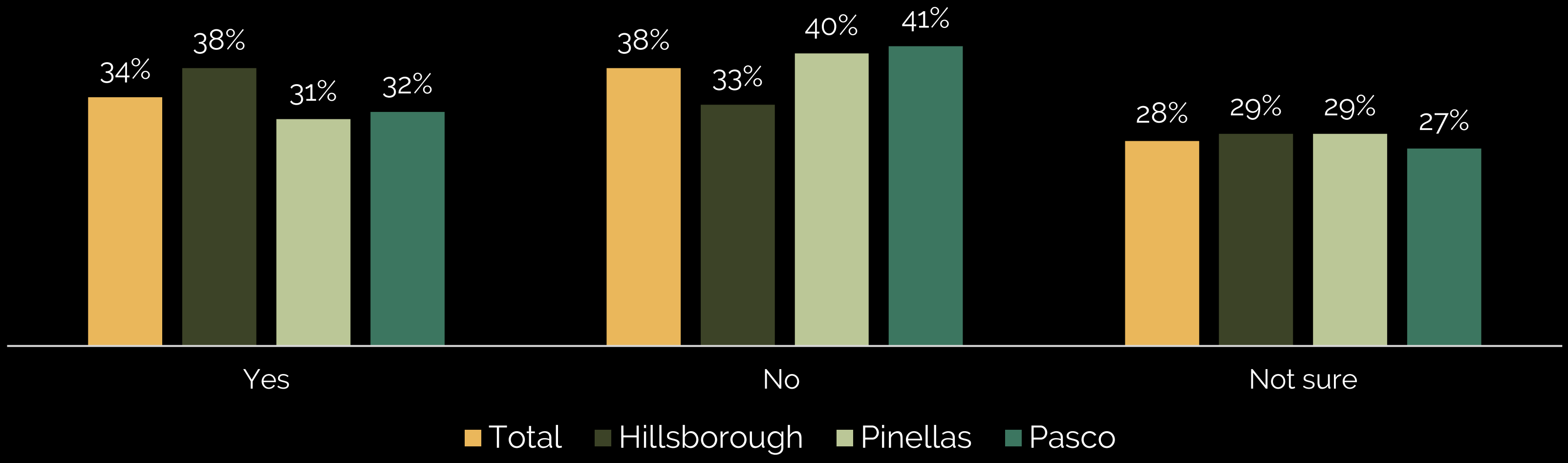
- **About 1 in 3 residents** of the Tampa Bay Water service area **will drink reclaimed water** using this method, **up 1% point from 2018**

[1]Question not asked in 2015.

DRINKING WATER BY COUNTY

One way to reuse reclaimed water is to clean it to drinking water standards, blend it with other drinking water, then send it to homes and businesses.

If water were treated in this manner, would you be willing to drink it?



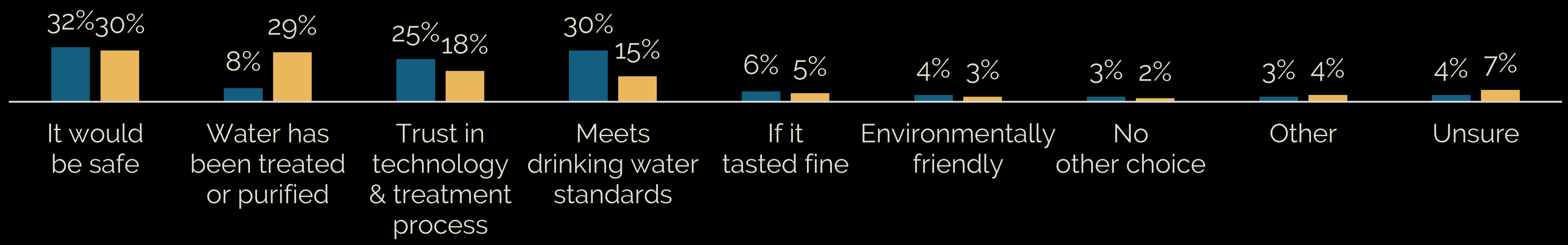
- **About 1 in 3 residents** of the Tampa Bay Water service area **will drink reclaimed water** using this method
- Yet nearly **2 in 5 residents (38%) are not willing** to drink water treated in this manner
- **Hillsborough County residents are more likely to drink reclaimed water using this method**

DRINKING WATER BY YEAR

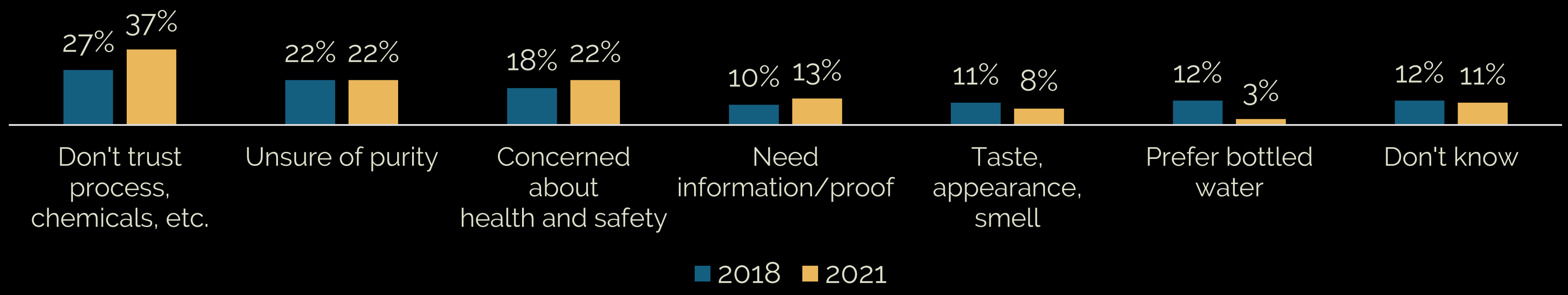
One way to reuse reclaimed water is to clean it to drinking water standards, blend it with other drinking water, then send it to homes and businesses.

If water were treated in this manner, would you be willing to drink it?[1]

Why Would You Be Willing?



Why Would You Be Unwilling?



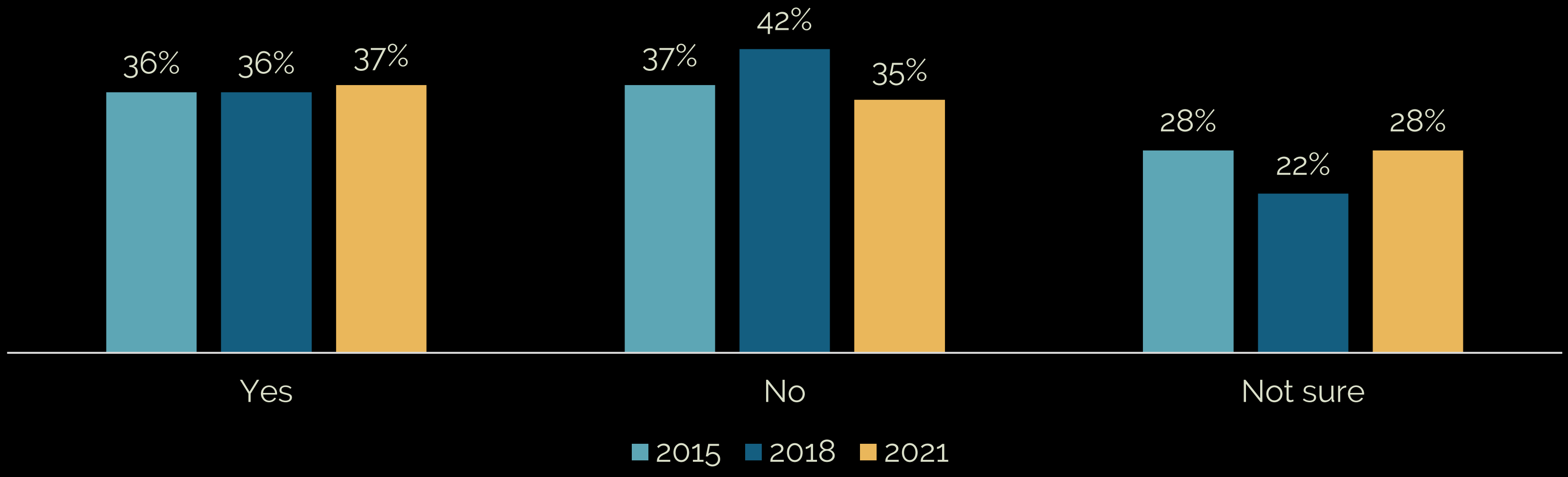
- Residents who are willing to drink reclaimed water treated in this manner mention the water **would be safe**
- Residents who are not willing to drink reclaimed water treated in this manner mention their **lack of trust in the process, chemicals, etc.**

[1] Why would you be willing/unwilling to drink it? Coded open-ended responses.

DRINKING WATER BY YEAR

One way to use reclaimed water is to put it into groundwater, reservoirs or rivers then withdraw it and treat it to drinking water standards, then send it to homes and businesses.

If water were treated in this manner, would you be willing to drink it?

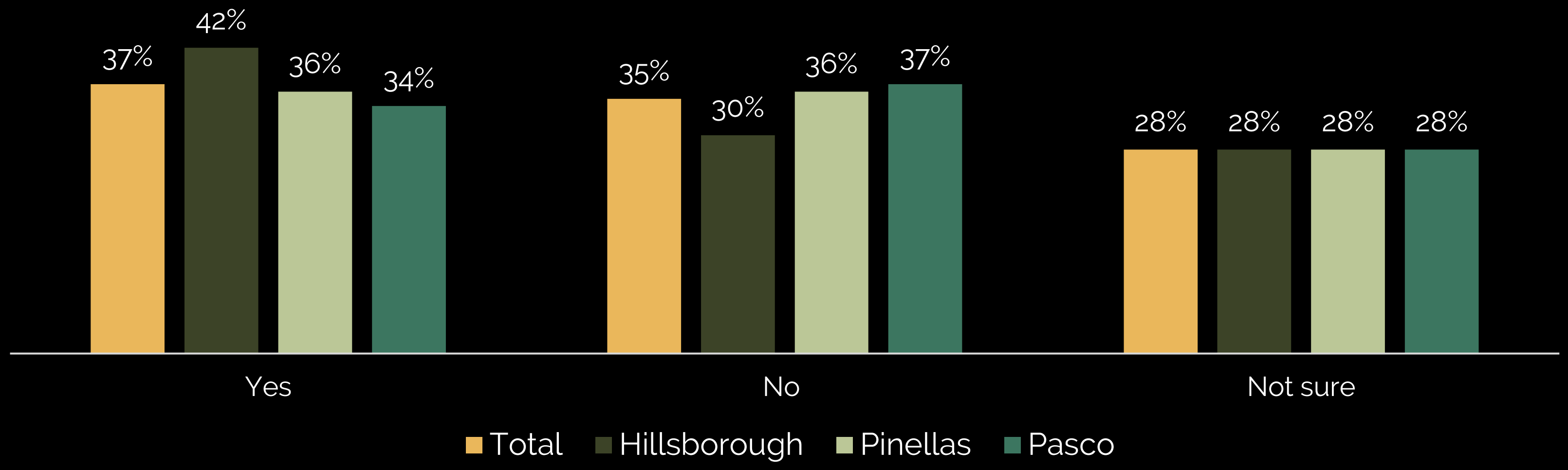


- **Nearly 2 in 5 residents** of the Tampa Bay Water service area **will drink reclaimed water** using this method, **up 1% point from 2018**

DRINKING WATER BY COUNTY

One way to use reclaimed water is to put it into groundwater, reservoirs or rivers then withdraw it and treat it to drinking water standards, then send it to homes and businesses.

If water were treated in this manner, would you be willing to drink it?



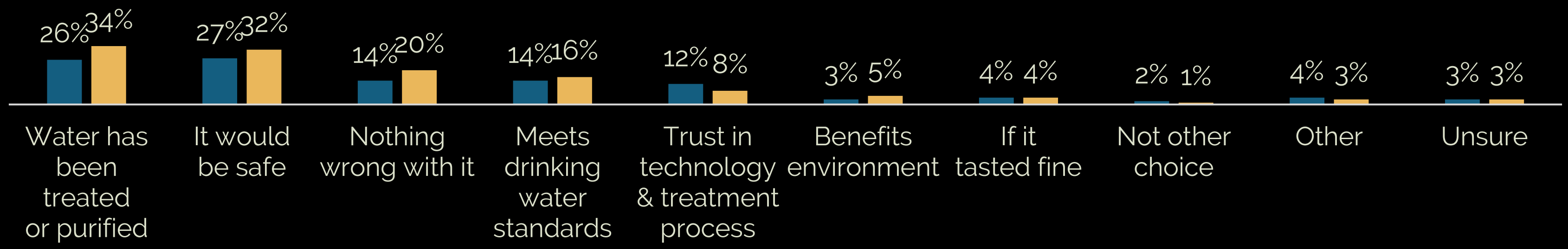
- **Nearly 2 in 5 residents** of the Tampa Bay Water service area **will drink reclaimed water** using this method
- **35% are not willing to do so**
- **Hillsborough County residents are more likely to drink reclaimed water using this method**

DRINKING WATER BY YEAR

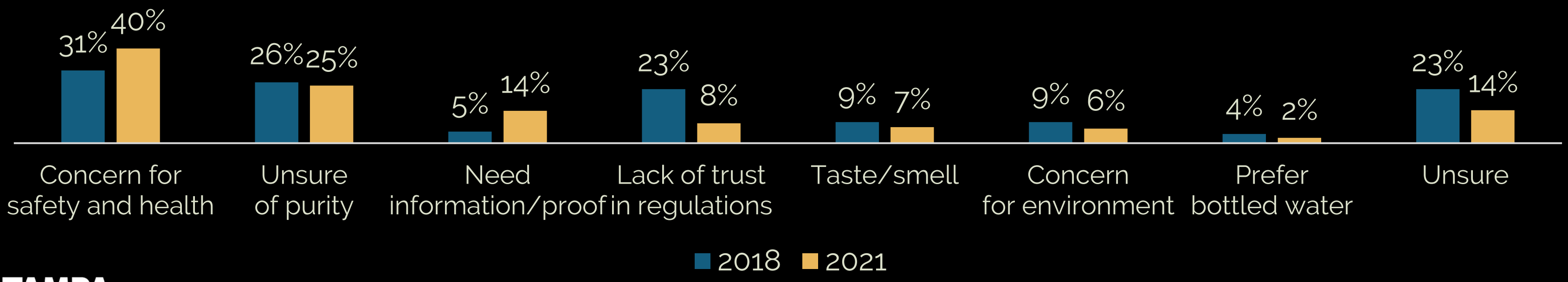
One way to use reclaimed water is to put it into groundwater, reservoirs or rivers then withdraw it and treat it to drinking water standards, then send it to homes and businesses.

If water were treated in this manner, would you be willing to drink it?[1]

Why Would You Be Willing?



Why Would You Be Unwilling?



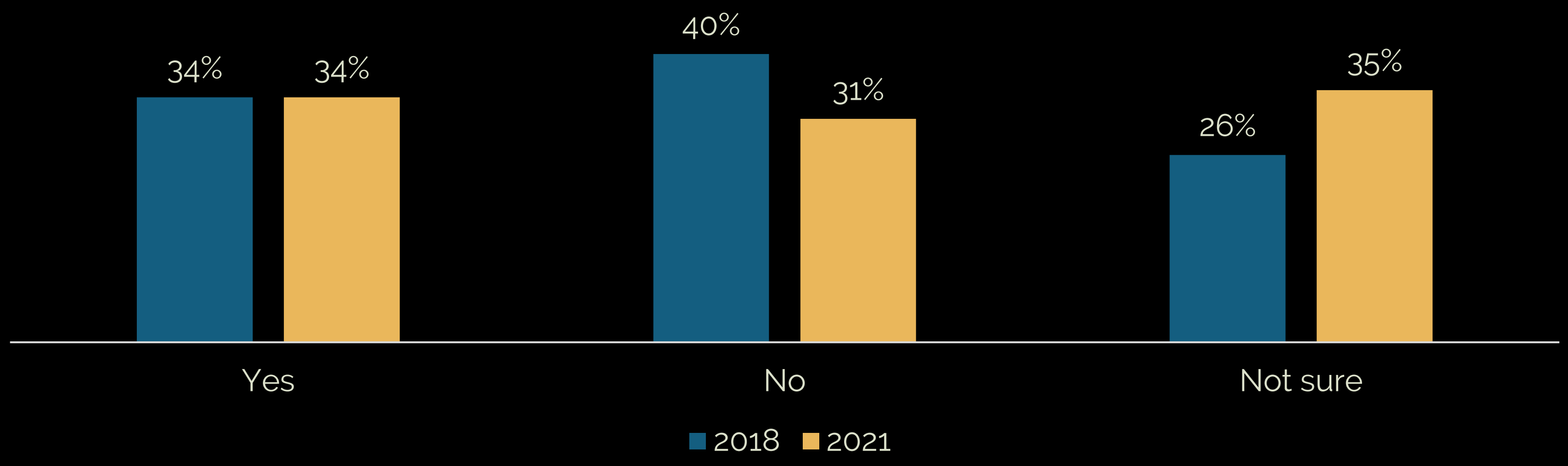
- Residents who are willing to drink reclaimed water treated in this manner mention the water had been **treated and purified and it would be safe**
- Residents who are not willing to drink reclaimed water treated in this manner mention their **concern for their safety and health**

[1] Why would you be willing/unwilling to drink it? Coded open-ended responses.

DRINKING WATER BY YEAR

One way to use reclaimed water is to put it in a salty or non-drinking water zone of the aquifer to increase groundwater levels. This would result in a credit that can be used to withdraw groundwater several miles away at a different location, treat it to drinking water standards, then send to homes and businesses.

If water were treated in this manner, would you be willing to drink it?[1]



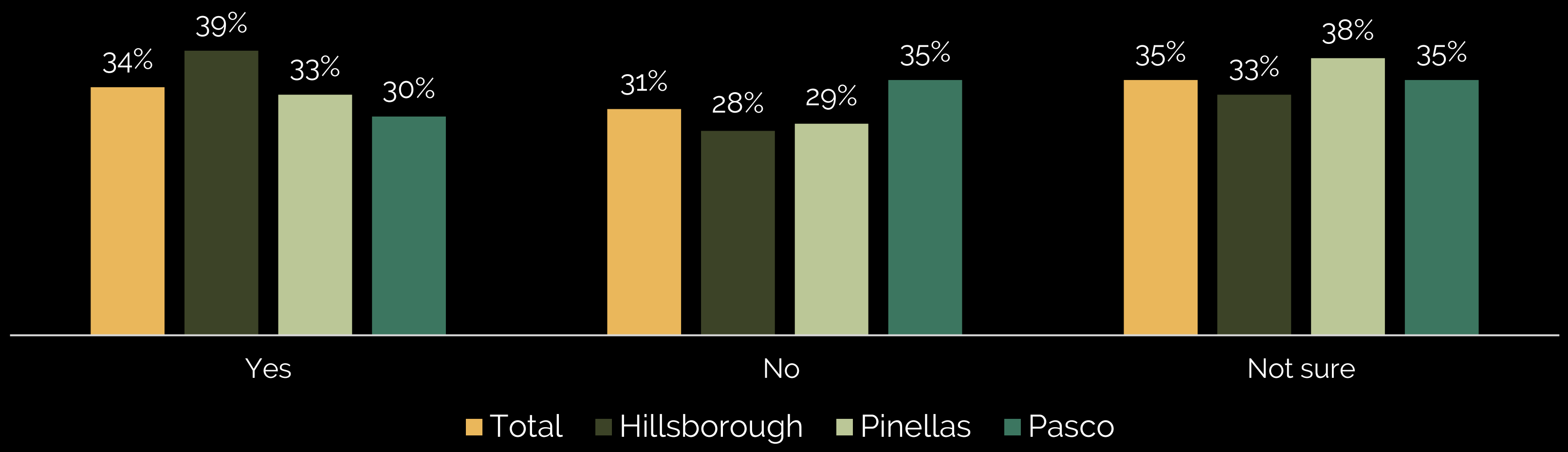
- **1 in 3 residents** of the Tampa Bay Water service area **will drink groundwater** treated using this method, **exactly the same as 2018**

[1] Question not asked in 2015.

DRINKING WATER BY COUNTY

One way to use reclaimed water is to put it in a salty or non-drinking water zone of the aquifer to increase groundwater levels. This would result in a credit that can be used to withdraw groundwater several miles away at a different location, treat it to drinking water standards, then send to homes and businesses.

If water were treated in this manner, would you be willing to drink it?



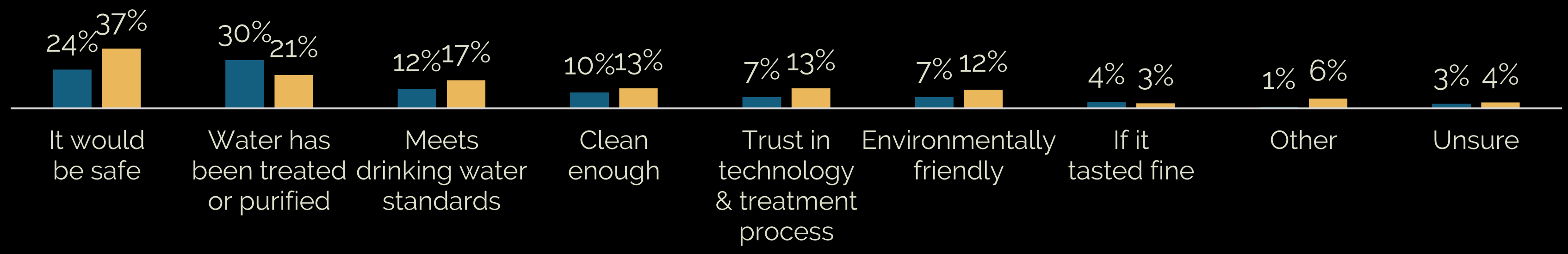
- **About 1 in 3 residents** of the Tampa Bay Water service area **will drink groundwater** treated using this method
- **Hillsborough County residents are more likely to drink groundwater treated using this method**

DRINKING WATER BY YEAR

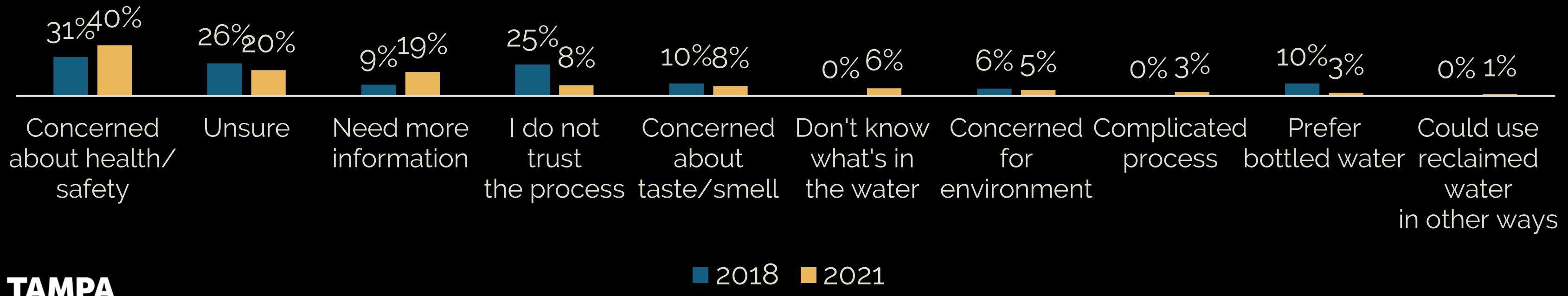
One way to use reclaimed water is to put it in a salty or non-drinking water zone of the aquifer to increase groundwater levels. This would result in a credit that can be used to withdraw groundwater several miles away at a different location, treat it to drinking water standards, then send to homes and businesses

If water were treated in this manner, would you be willing to drink it?[1]

Why Would You Be Willing?



Why Would You Be Unwilling?

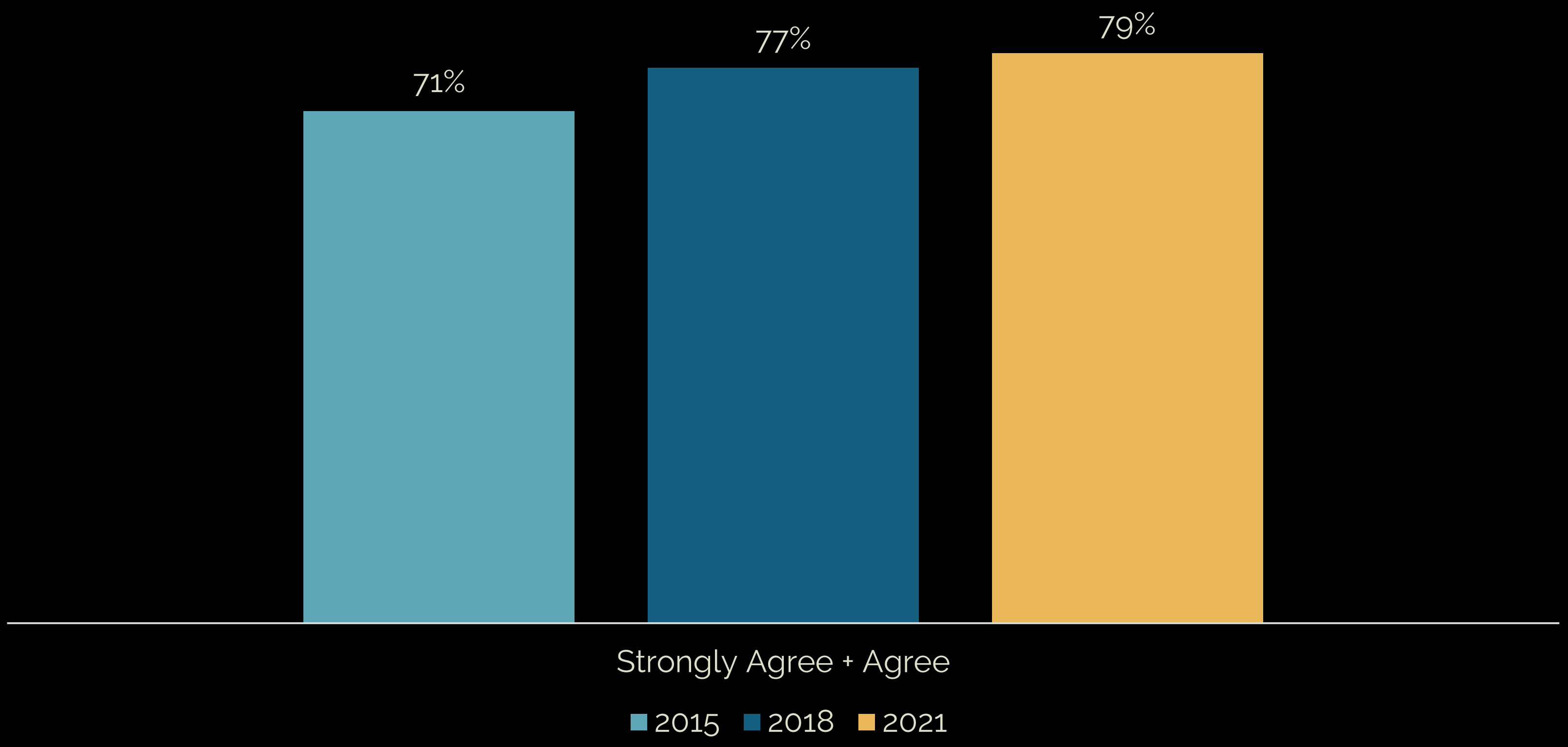


[1] Why would you be willing/unwilling to drink it? Coded open-ended responses.

- Residents who are willing to drink groundwater treated in this manner mention the water **would be safe**
- Residents who are not willing to drink groundwater treated in this manner mention their **concern for their safety and health**

PUBLIC OPINION BY YEAR

"Cleaned and treated reclaimed water may taste bad"[1]

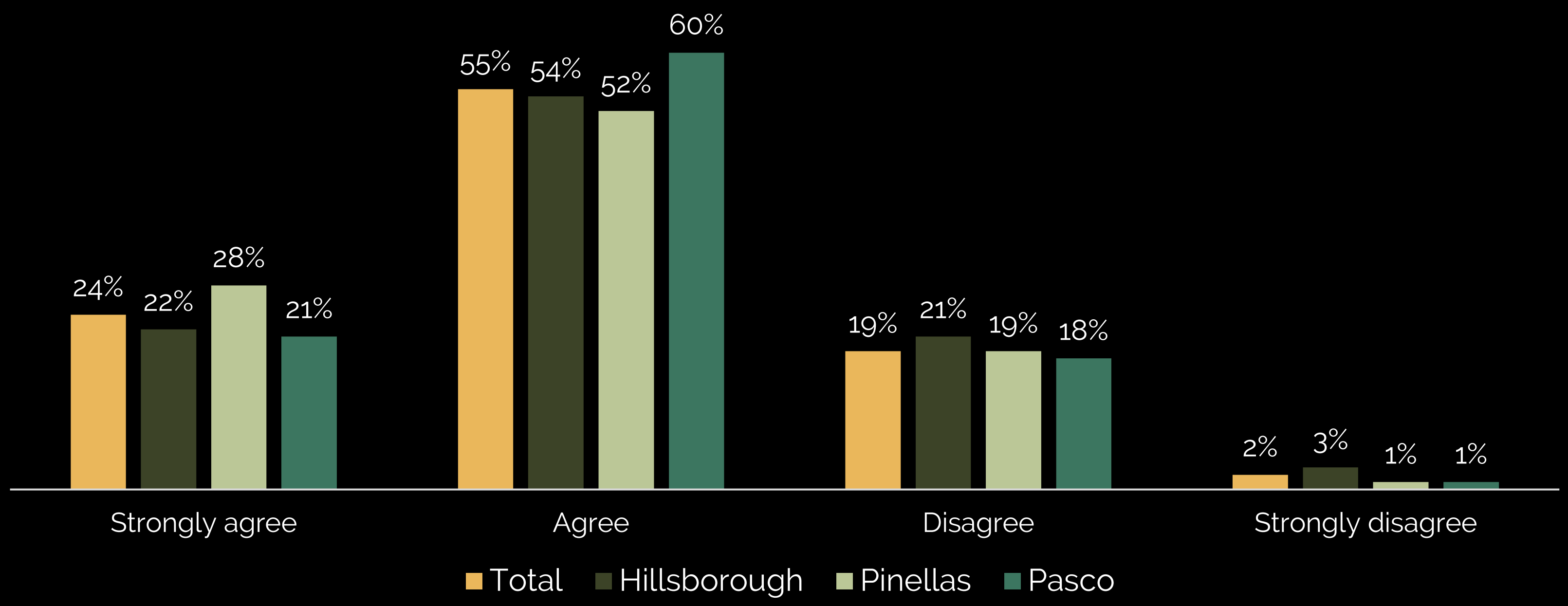


- **Nearly 4 in 5 residents (79%)** agree, "cleaned and treated reclaimed water may taste bad," **an increase of 2% points from 2018**

[1] Top two boxes: Strongly Agree + Agree

PUBLIC OPINION BY COUNTY

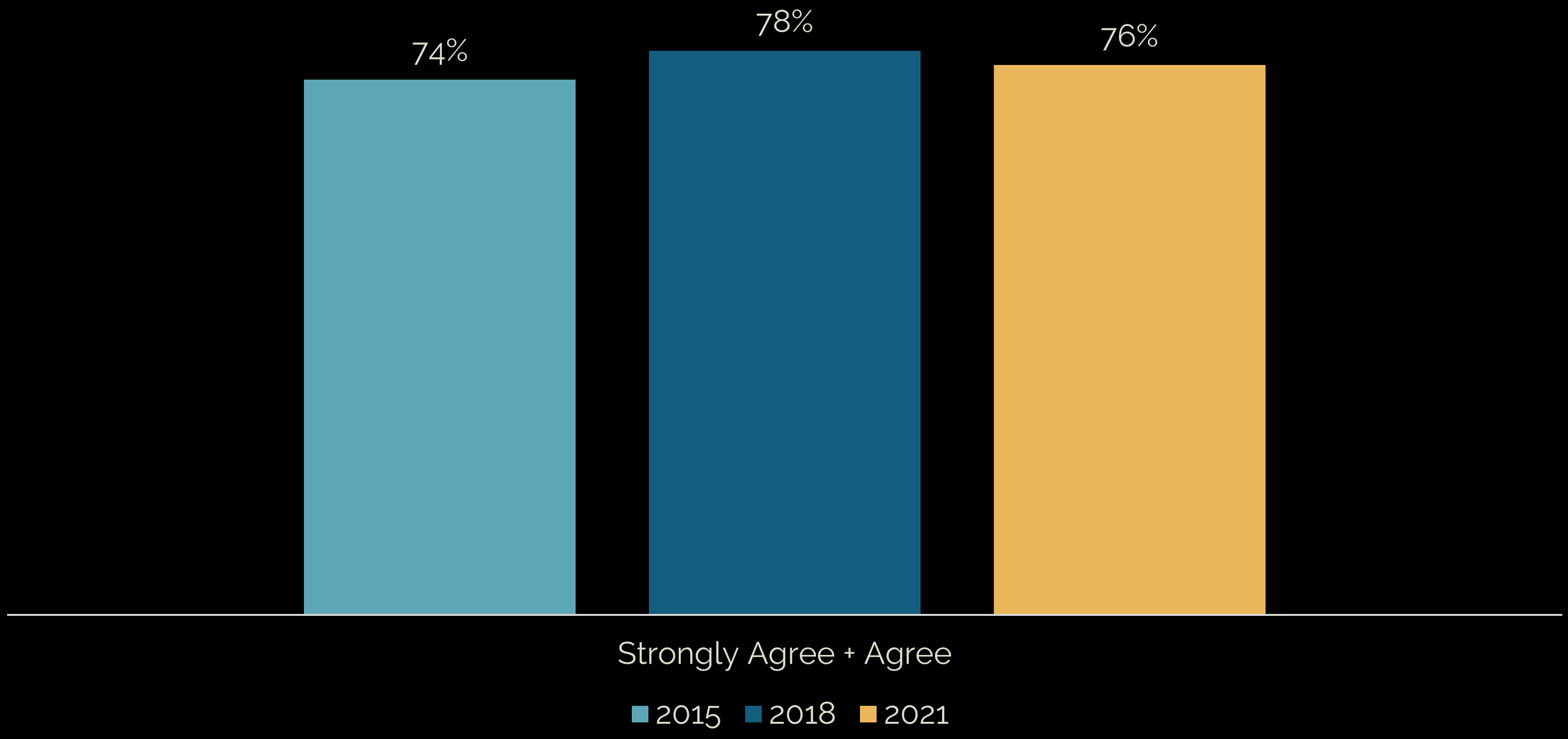
"Cleaned and treated reclaimed water may taste bad"



- **Nearly 4 in 5 residents (79%)** agree, "cleaned and treated reclaimed water may taste bad"
- **Pasco County residents are more likely to agree** with this statement (81%)
- **Hillsborough County residents are least likely to agree** with this statement (76%)

PUBLIC OPINION BY YEAR

"Cleaned and treated reclaimed water may fail to meet drinking water safety standards"[1]

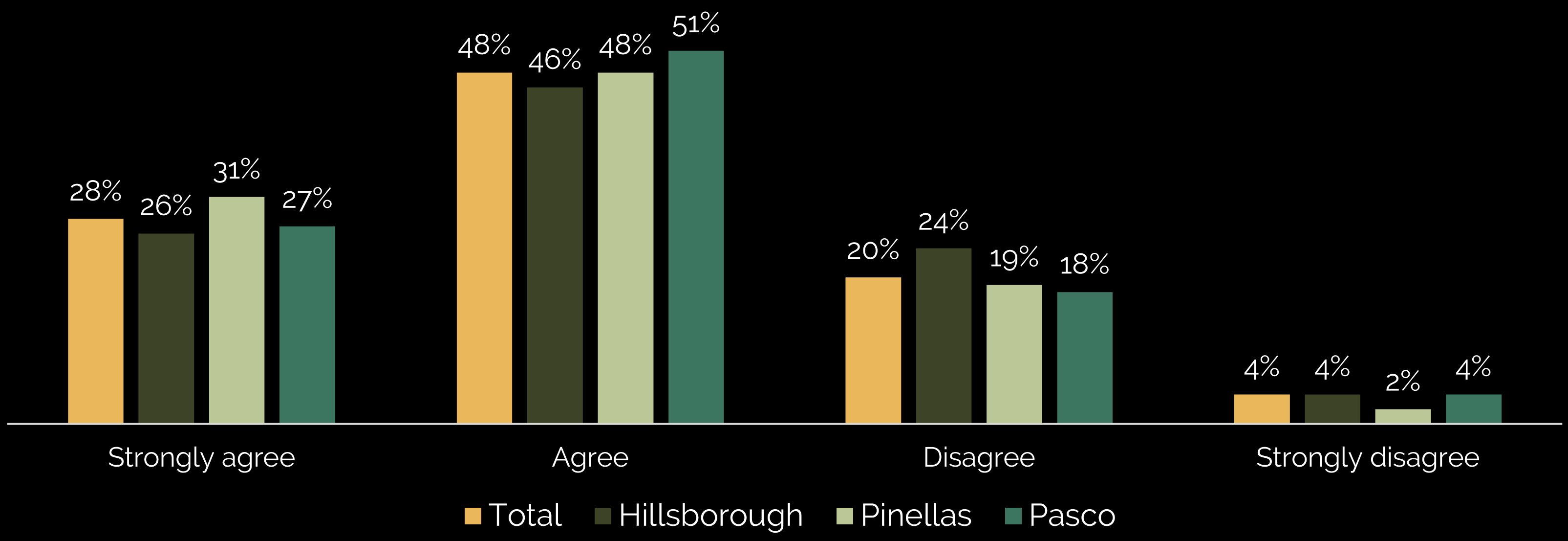


- **Meeting drinking water safety standards is slightly less of a concern in 2021 as 2% points fewer** residents think reclaimed water may not meet these standards

[1] Top two boxes: Strongly Agree + Agree

PUBLIC OPINION BY COUNTY

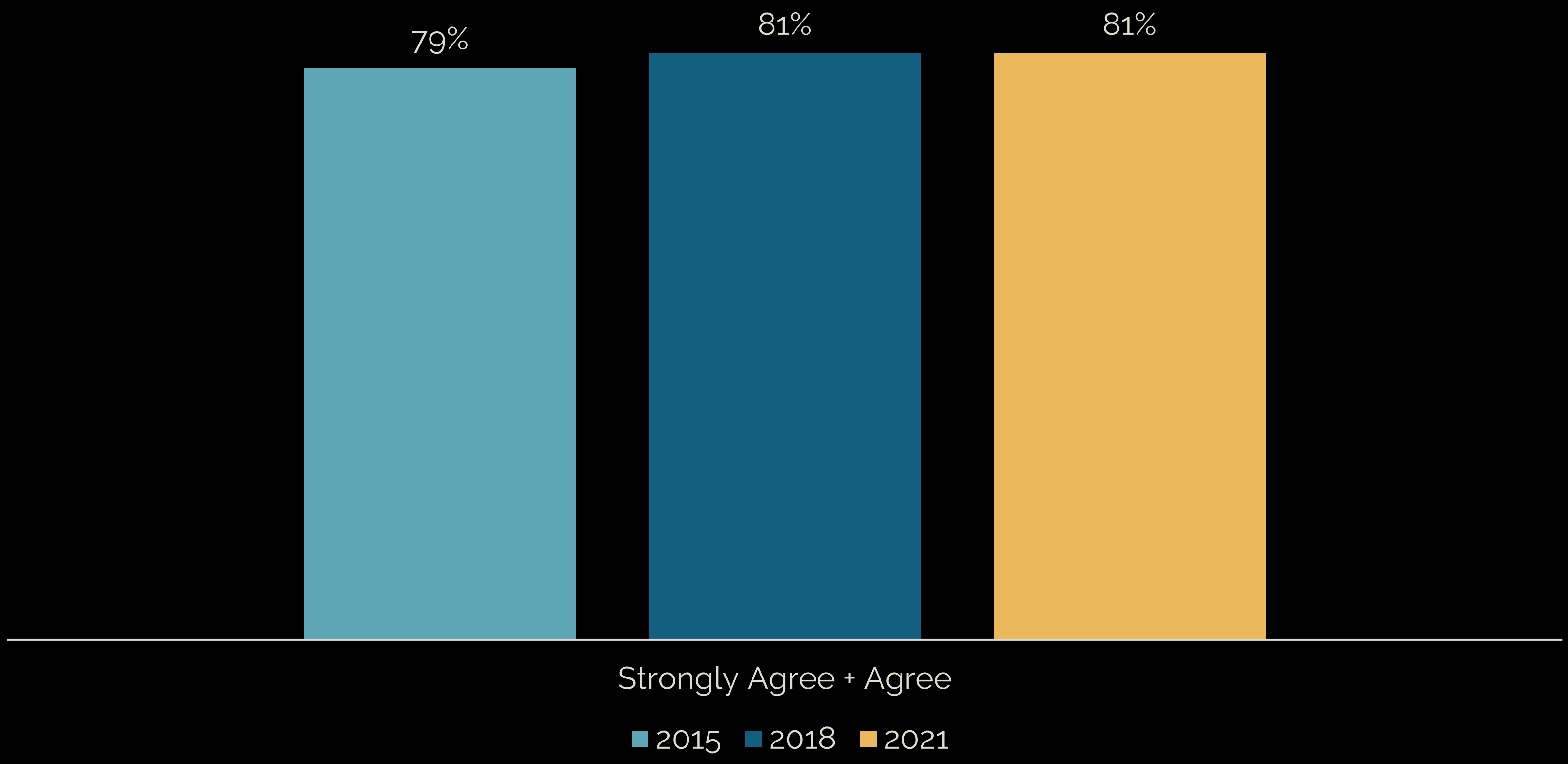
"Cleaned and treated reclaimed water may fail to meet drinking water safety standards"



- **Over 3 in 4 residents** agree, "cleaned and treated reclaimed water may fail to meet drinking water safety standards"
- **Pinellas County residents are more likely to agree** with this statement (79%)
- **Hillsborough County resident are least likely to agree** with this statement (72%)

PUBLIC OPINION BY YEAR

"Cleaned and treated reclaimed water may include contaminants"[1]

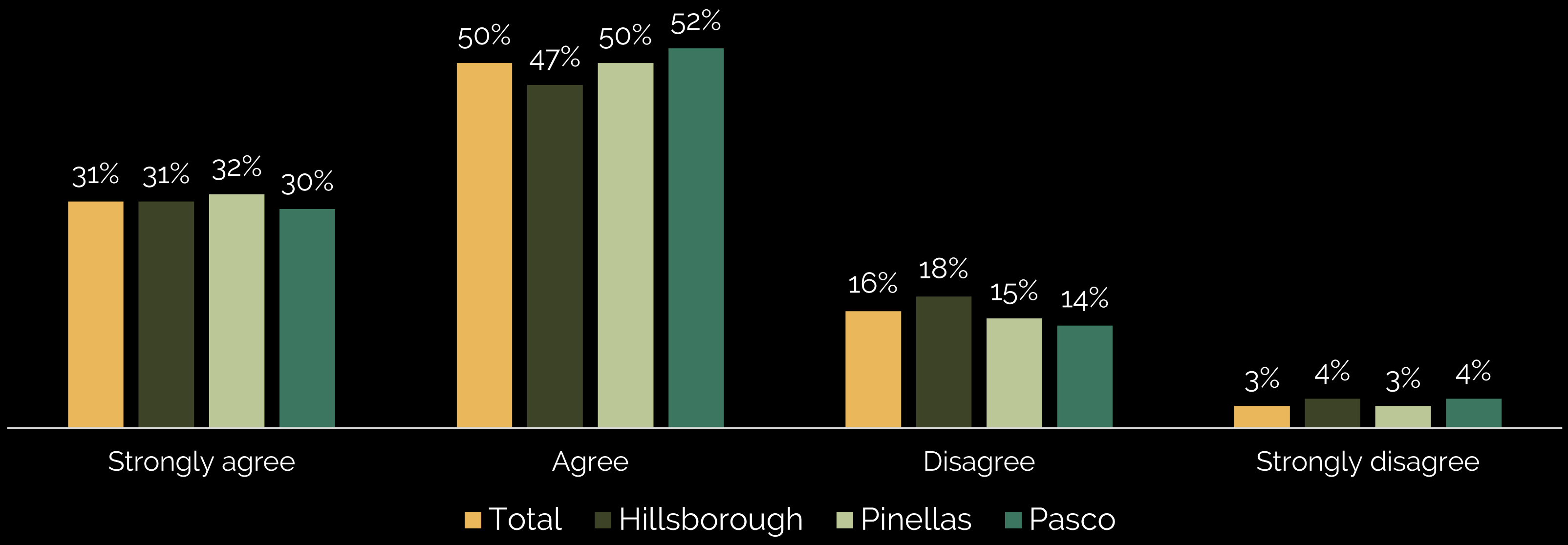


- **Over 4 in 5 residents** agree, "cleaned and treated reclaimed water may include contaminants," **the same as 2018**

[1] Top two boxes: Strongly Agree + Agree

PUBLIC OPINION BY COUNTY

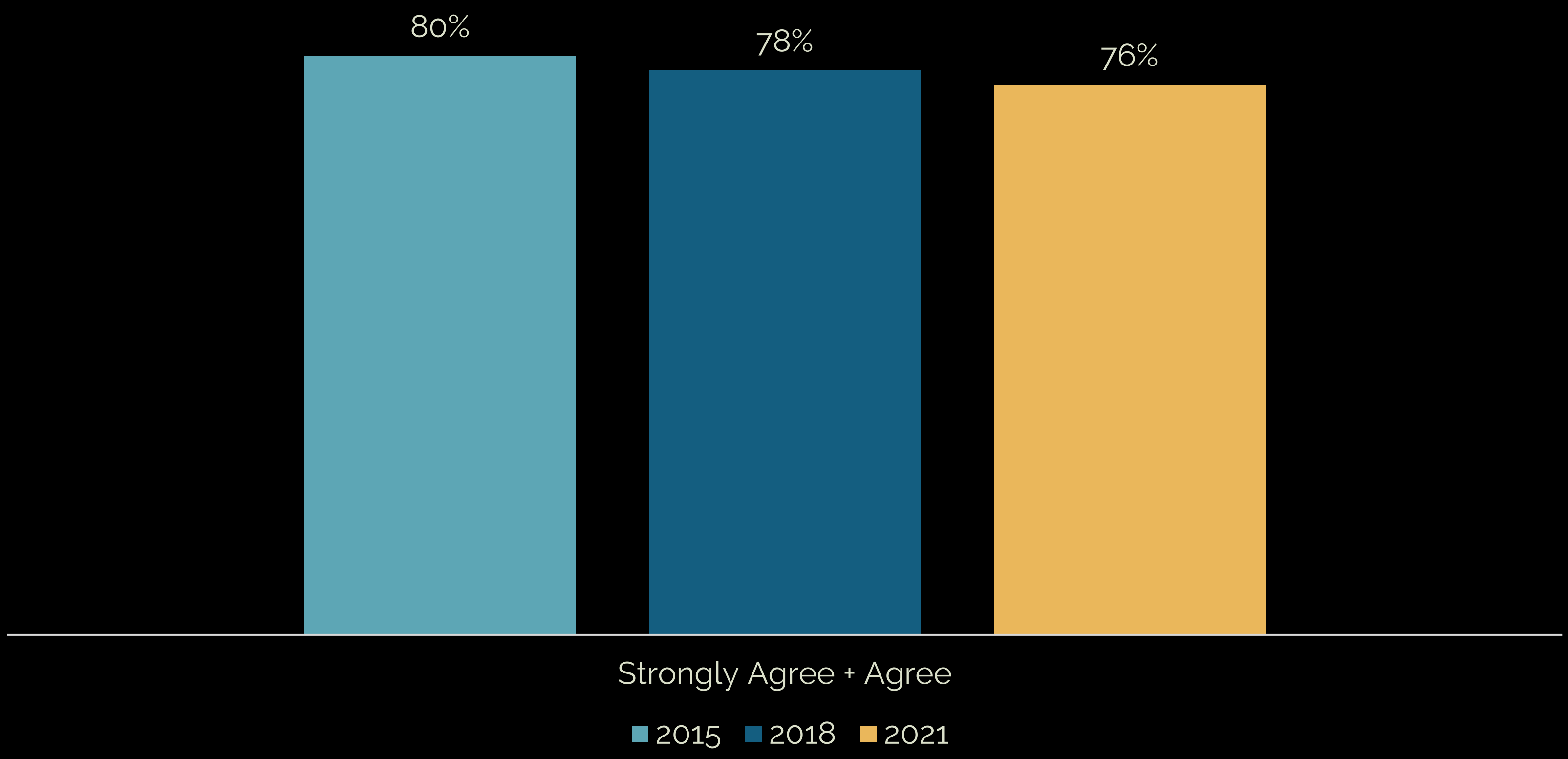
"Cleaned and treated reclaimed water may include contaminants"



- **Over 4 in 5 residents** agree, "cleaned and treated reclaimed water may include contaminants"
- **Hillsborough County residents are least likely to agree** with this statement (78%)

PUBLIC OPINION BY YEAR

"Cleaned and treated reclaimed water may contain pharmaceutical byproducts"[1]

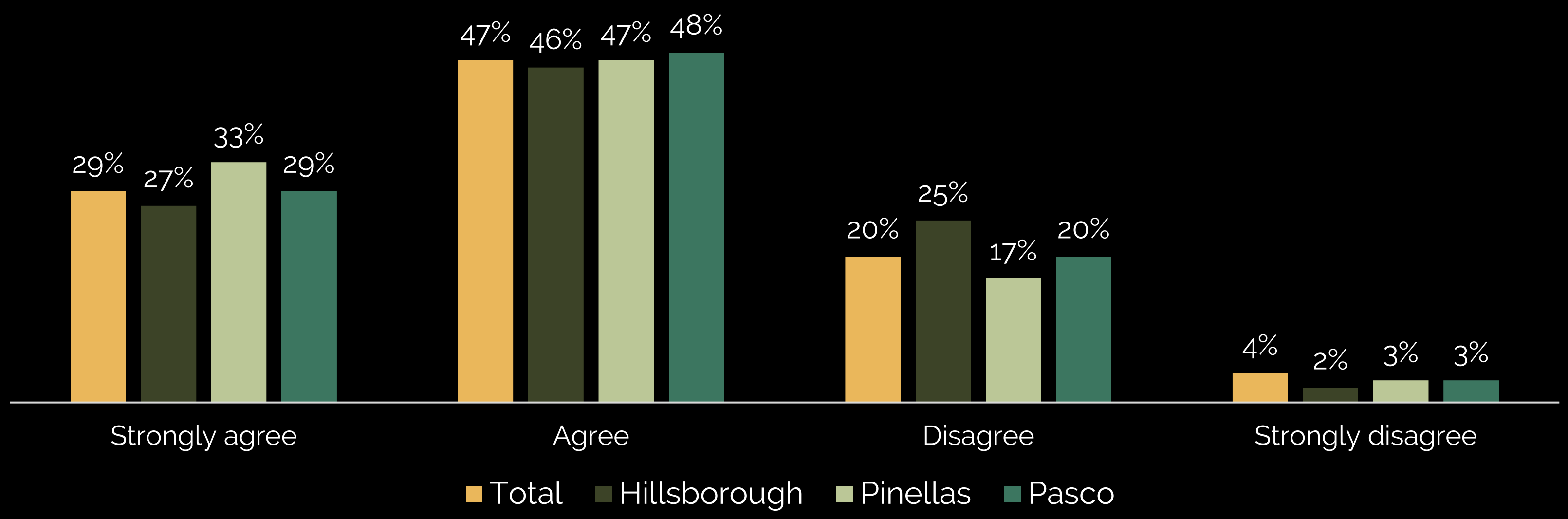


- Concern about reclaimed water containing pharmaceutical byproducts **decreased 2% points**

[1] Top two boxes: Strongly Agree + Agree

PUBLIC OPINION BY COUNTY

"Cleaned and treated reclaimed water may contain pharmaceutical byproducts"



- **Over 3 in 4 residents** agree, "cleaned and treated reclaimed water may contain pharmaceutical byproducts"
- **Pinellas County residents are more likely to agree** with this statement (80%)
- **Hillsborough County resident are least likely to agree** with this statement (73%)

TAMPA BAY WATER
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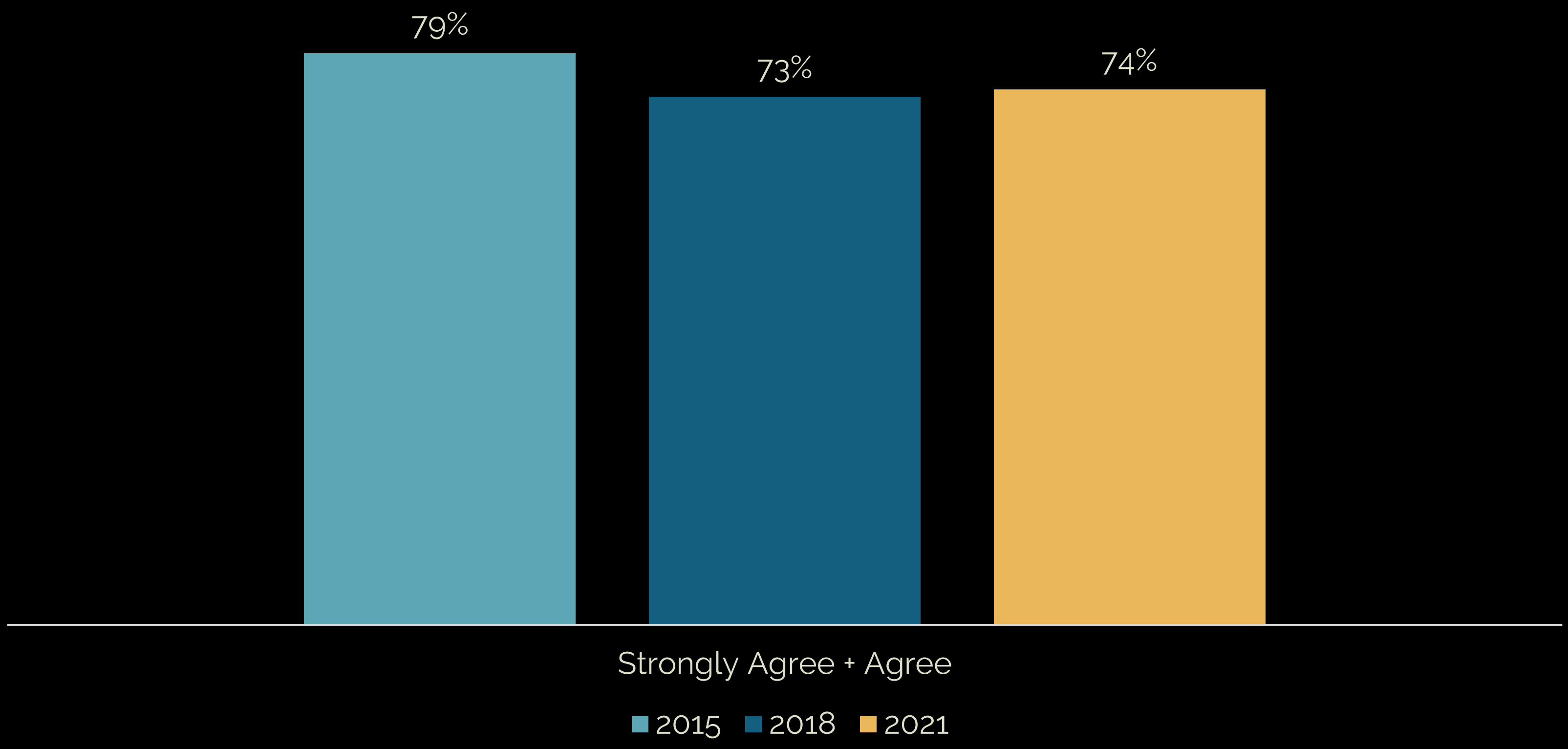
PUBLIC OPINION BY YEAR

"Using cleaned and treated reclaimed water may cost more"[1]

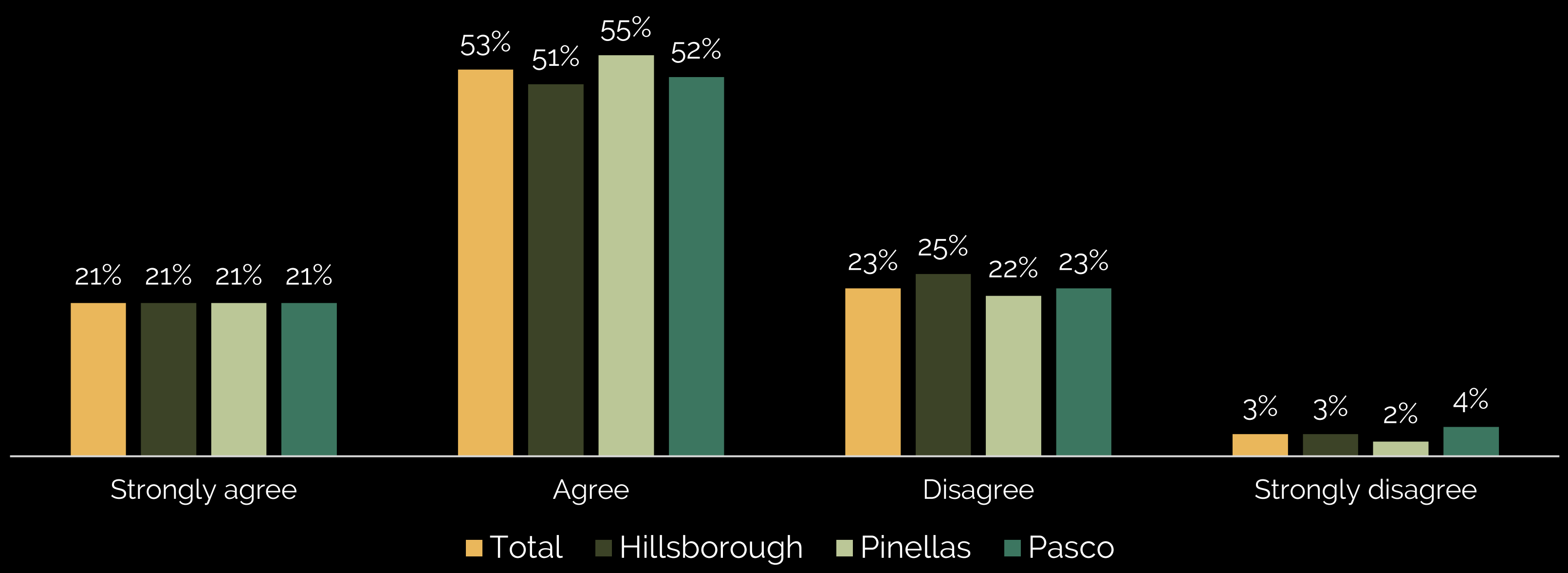


- Belief that using cleaned and treated reclaimed water may cost more **increased by 1% point from 2018**

[1] Top two boxes: Strongly Agree + Agree

PUBLIC OPINION BY COUNTY

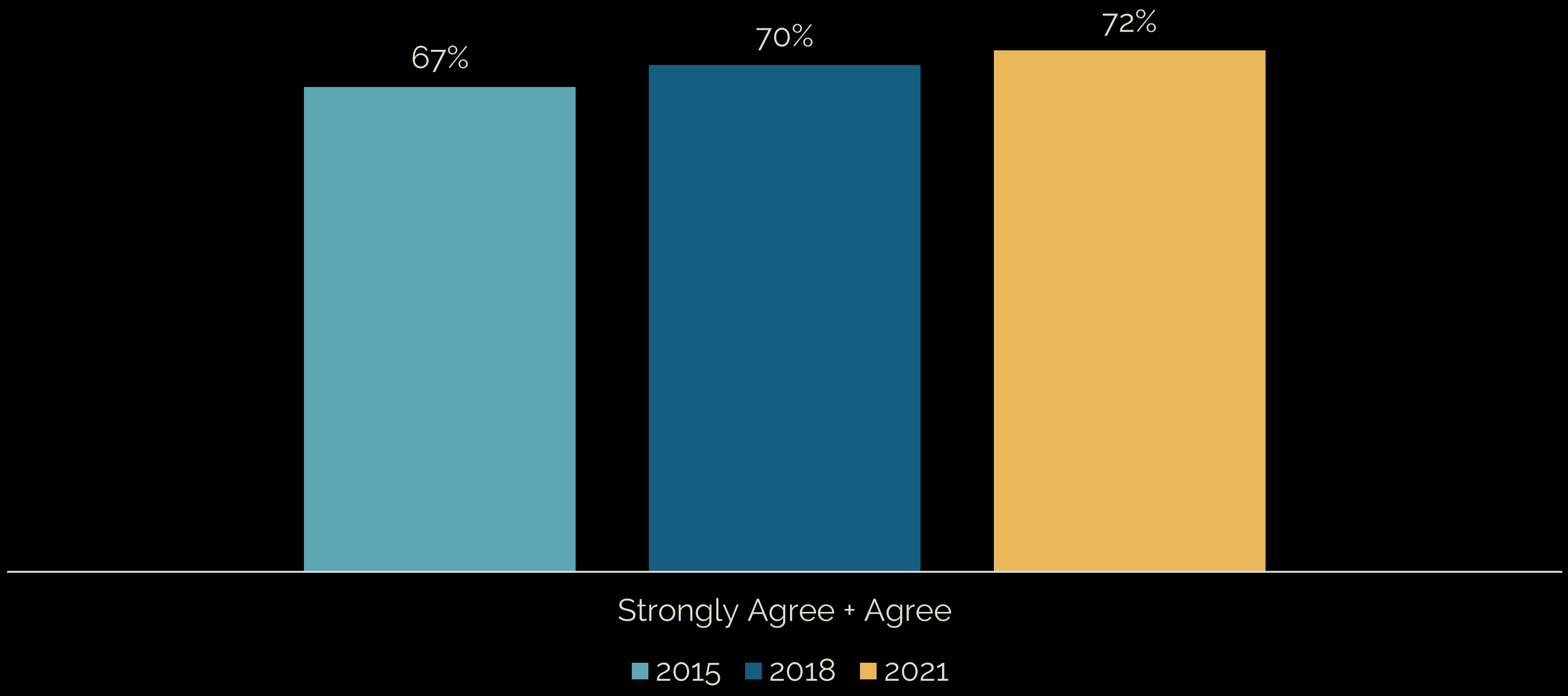
"Using cleaned and treated reclaimed water may cost more"



- **About 3 in 4 residents** agree, "using cleaned and treated reclaimed water may cost more"
- **Pinellas County residents are more likely to agree** with this statement (76%)

PUBLIC OPINION BY YEAR

"The concept of cleaned and treated reclaimed water just makes me uncomfortable"[1]

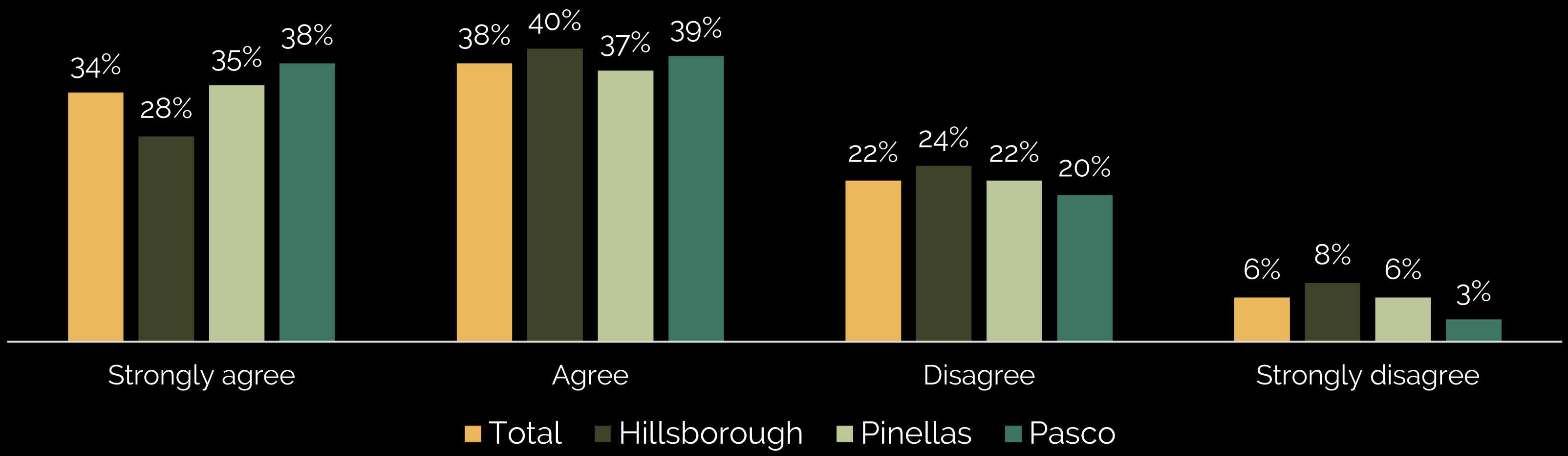


- More people were uncomfortable with the concept of cleaned and treat reclaimed water, an **increase of 2% points**

[1] Top two boxes: Strongly Agree + Agree

PUBLIC OPINION BY COUNTY

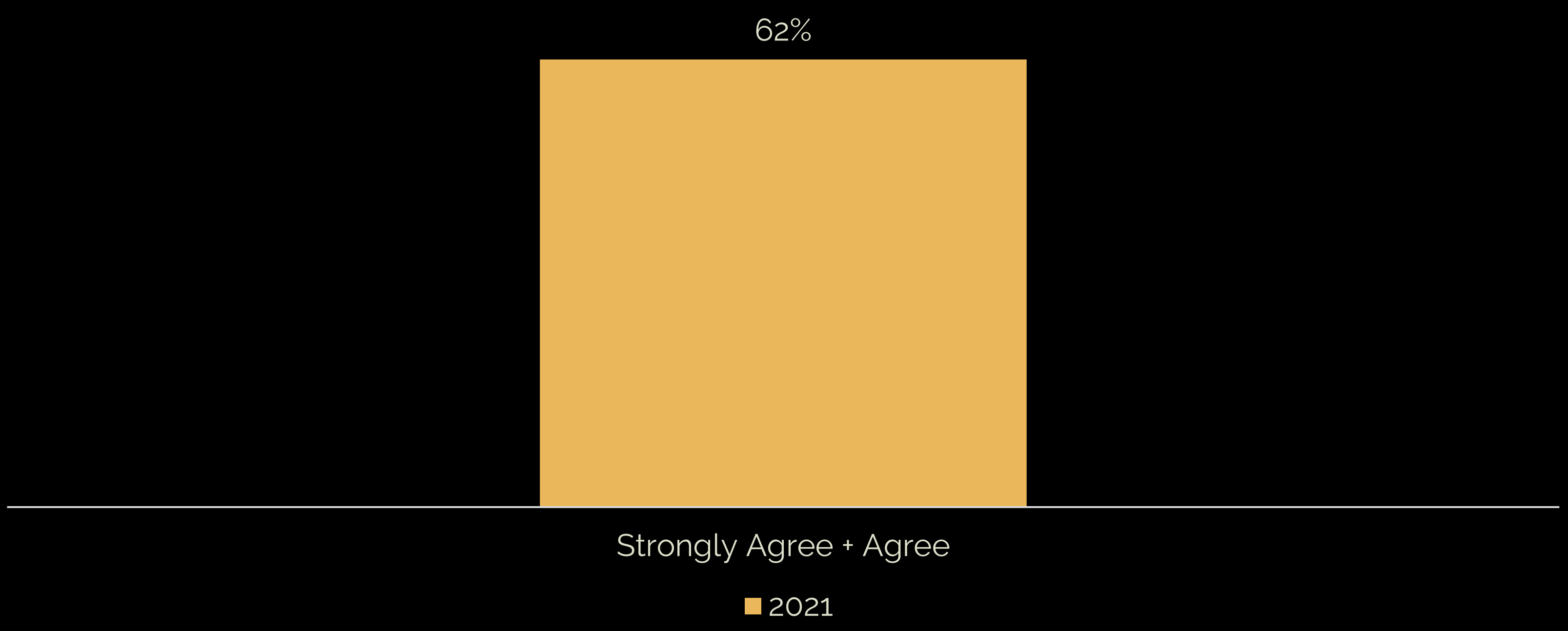
"The concept of cleaned and treated reclaimed water just makes me uncomfortable"



- **Over 7 in 10 residents** agree, "the concept of cleaned and treated reclaimed water just makes me uncomfortable"
- Residents are more likely to **strongly agree**, "the concept of cleaned and treated reclaimed water just makes me uncomfortable" over other public opinion statements
- **Hillsborough County residents are least likely to agree** with this statement (68%)

PUBLIC OPINION BY YEAR

"Reclaimed water may harm the aquifer"[1]

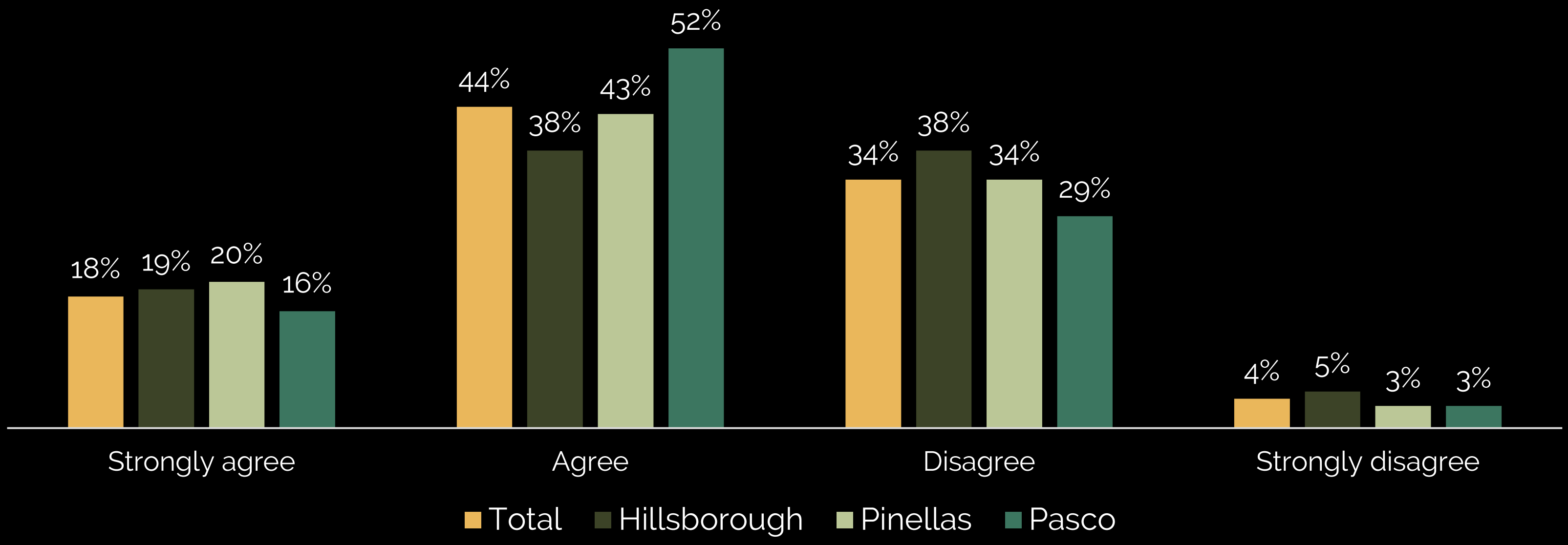


- **Over 3 in 5 residents (62%)** agree, "reclaimed water may harm the aquifer"

[1] Question not asked in 2015 or 2018.
Top two boxes: Strongly Agree + Agree

PUBLIC OPINION BY COUNTY

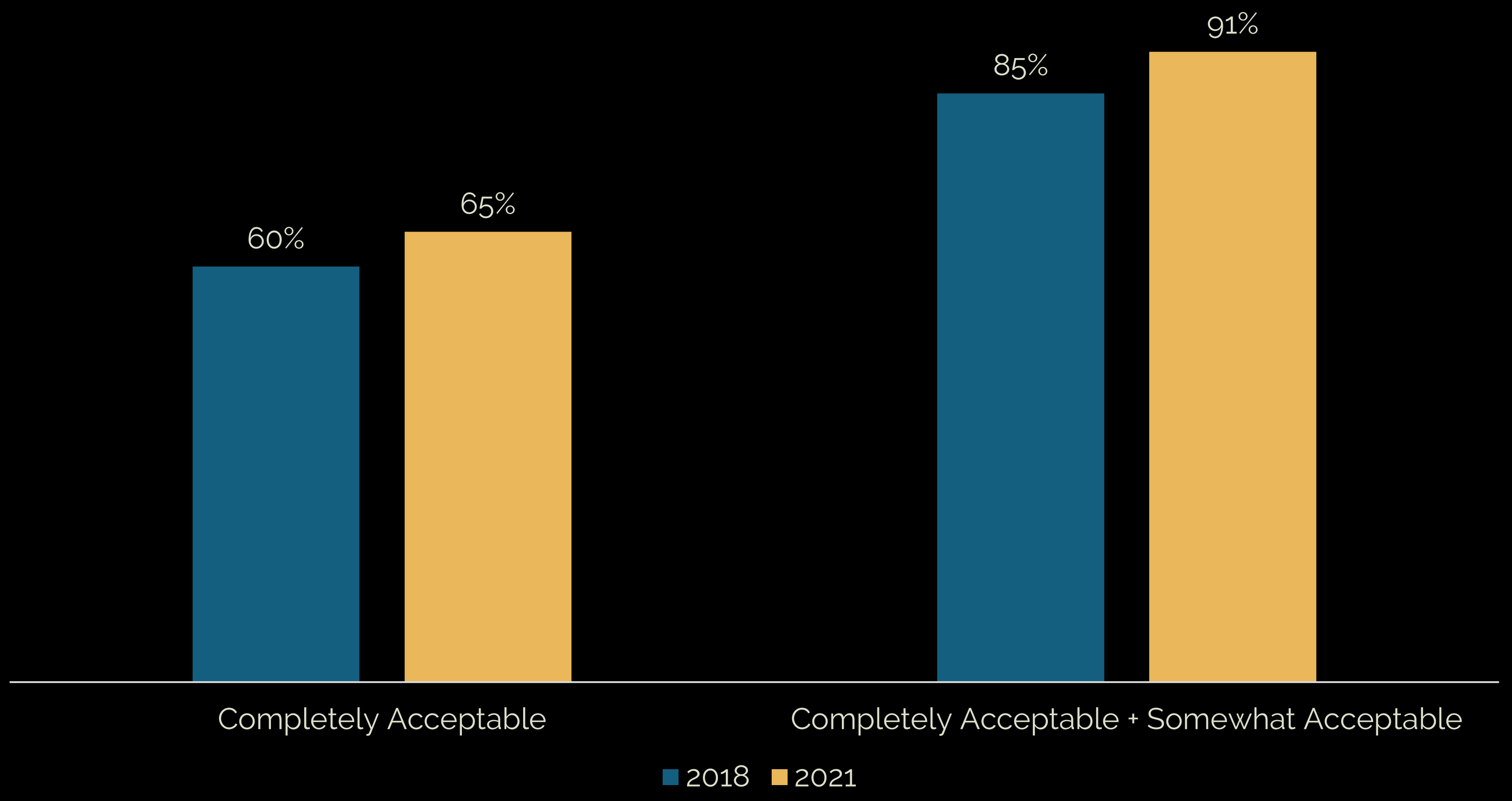
"Reclaimed water may harm the aquifer"[1]



- **Over 3 in 5 residents** agree, "reclaimed water may harm the aquifer"
- **Pasco County residents are more likely to agree** with this statement (68%)
- **Hillsborough County resident are least likely to agree** with this statement (57%)

ACCEPTABLE USES FOR RECLAIMED WATER BY YEAR

Gardening and landscaping[1]



- More residents find it completely acceptable to use reclaimed water for gardening and landscaping, **up 5% points from 2018**

[1] Question not asked in 2015.

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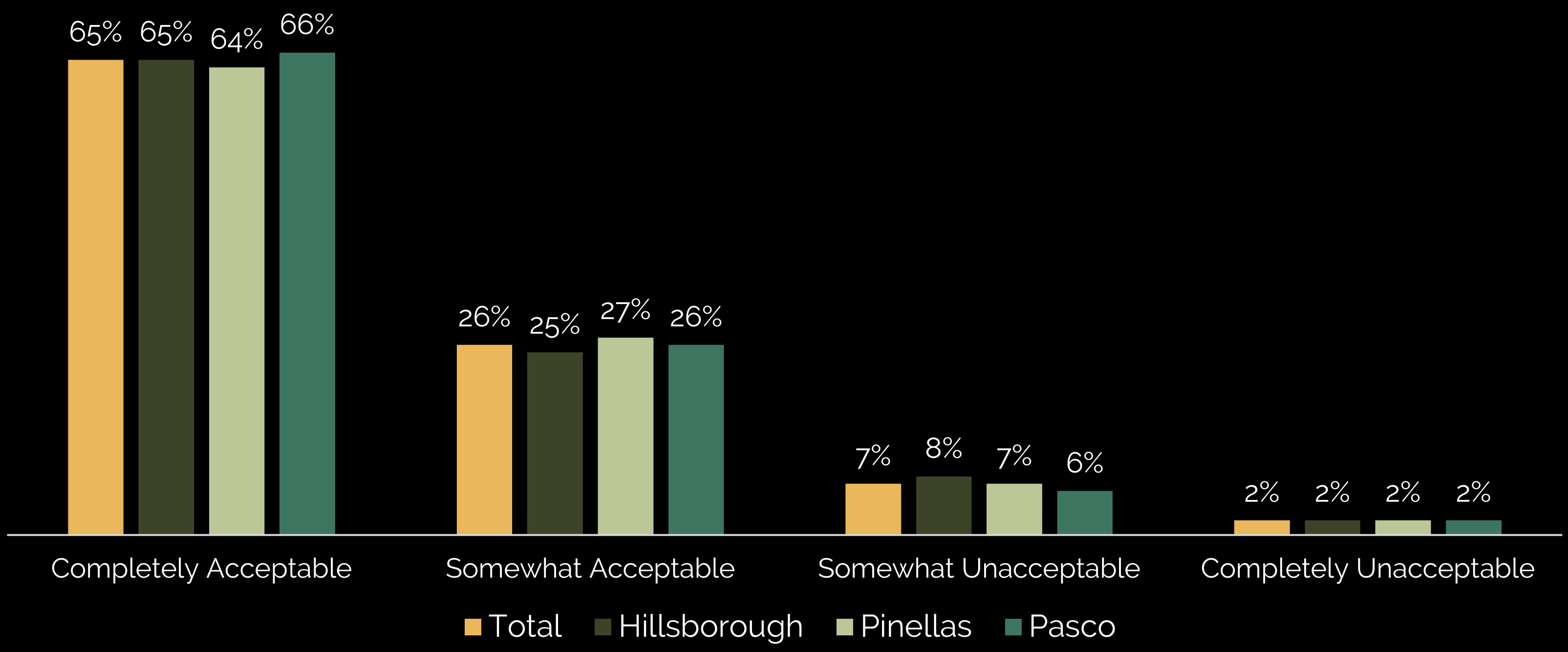
ACCEPTABLE USES FOR RECLAIMED WATER BY COUNTY

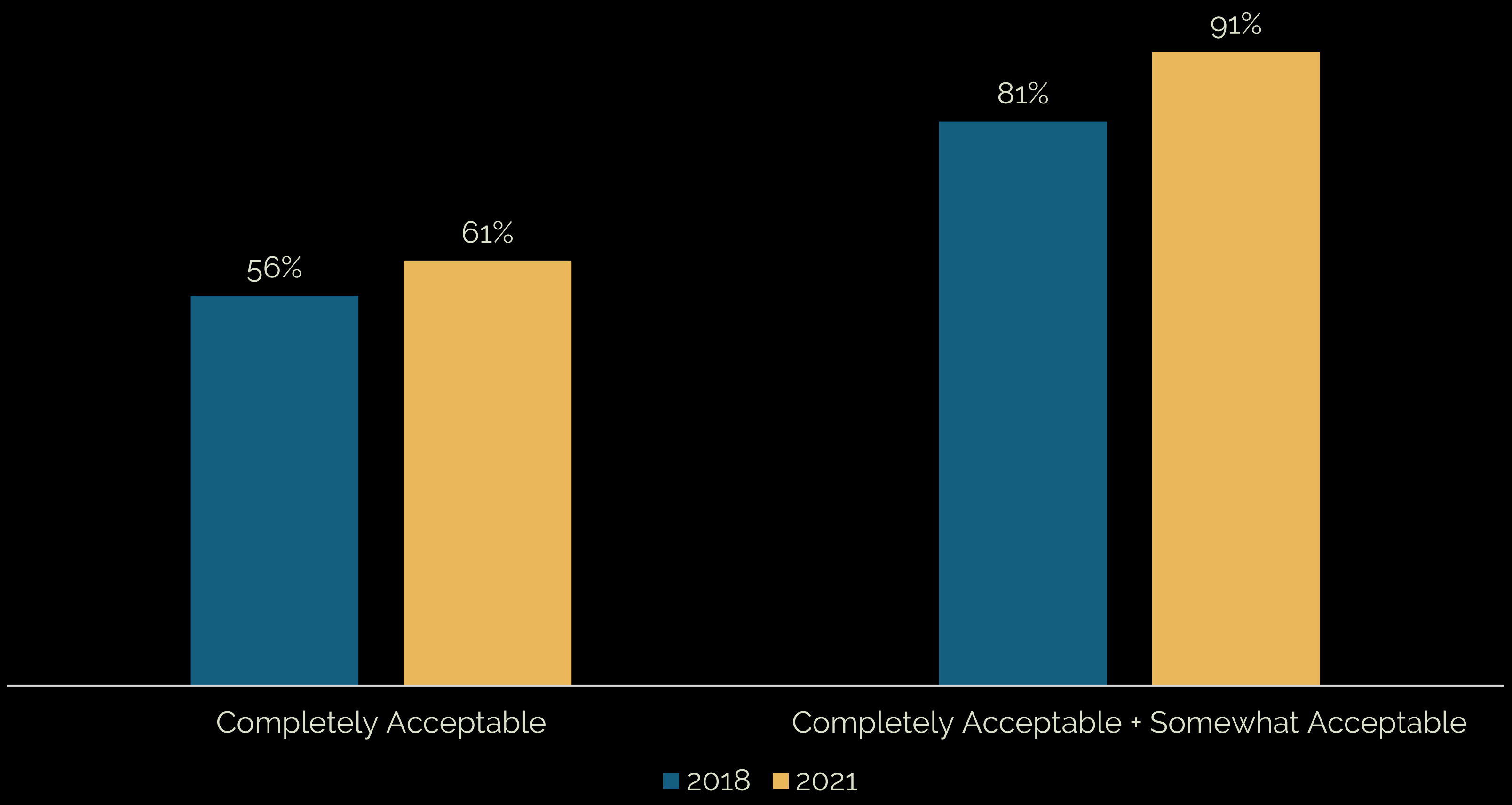
Gardening and landscaping



- **Over 3 in 5 residents** of Tampa Bay Water's service area will completely accept reclaimed water in a **gardening and landscaping** context

ACCEPTABLE USES FOR RECLAIMED WATER BY YEAR

Irrigation[1]

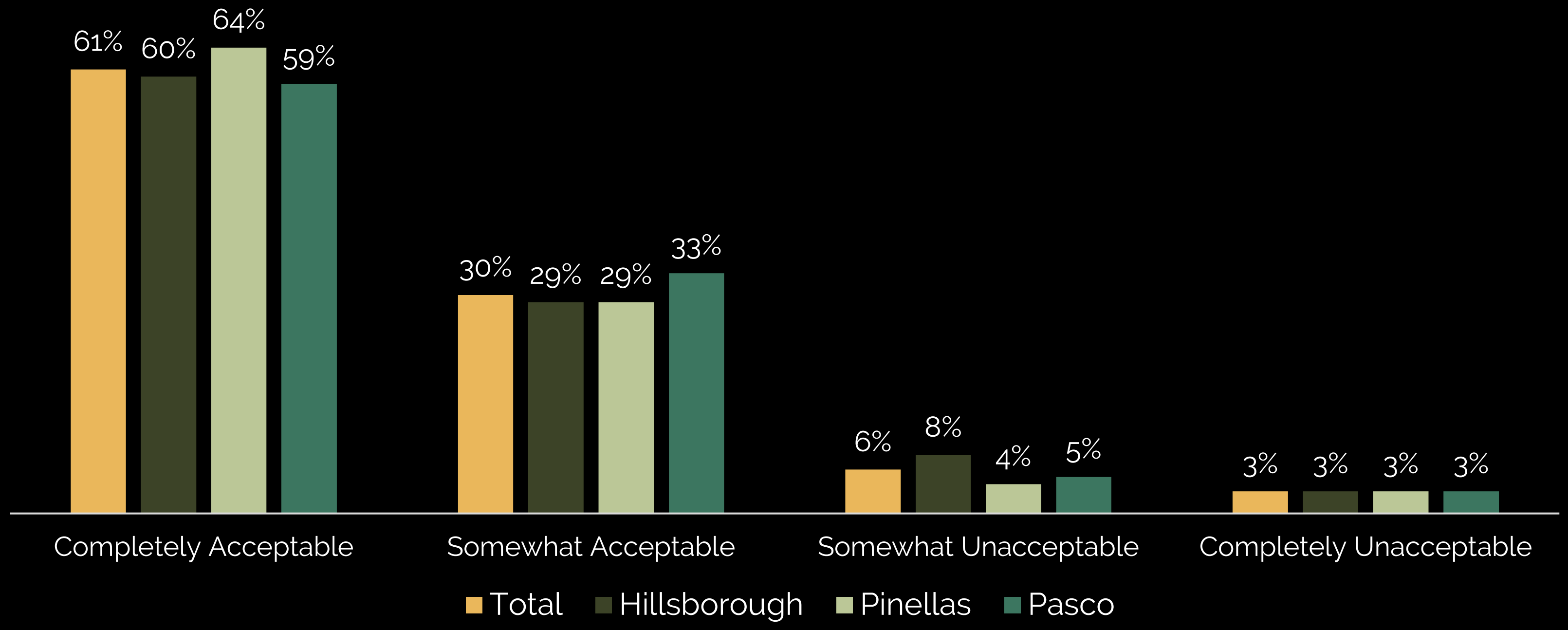


- More residents find it completely acceptable to use reclaimed water for irrigation, **up 5% points from 2018**

[1] Question not asked in 2015.

ACCEPTABLE USES FOR RECLAIMED WATER BY COUNTY

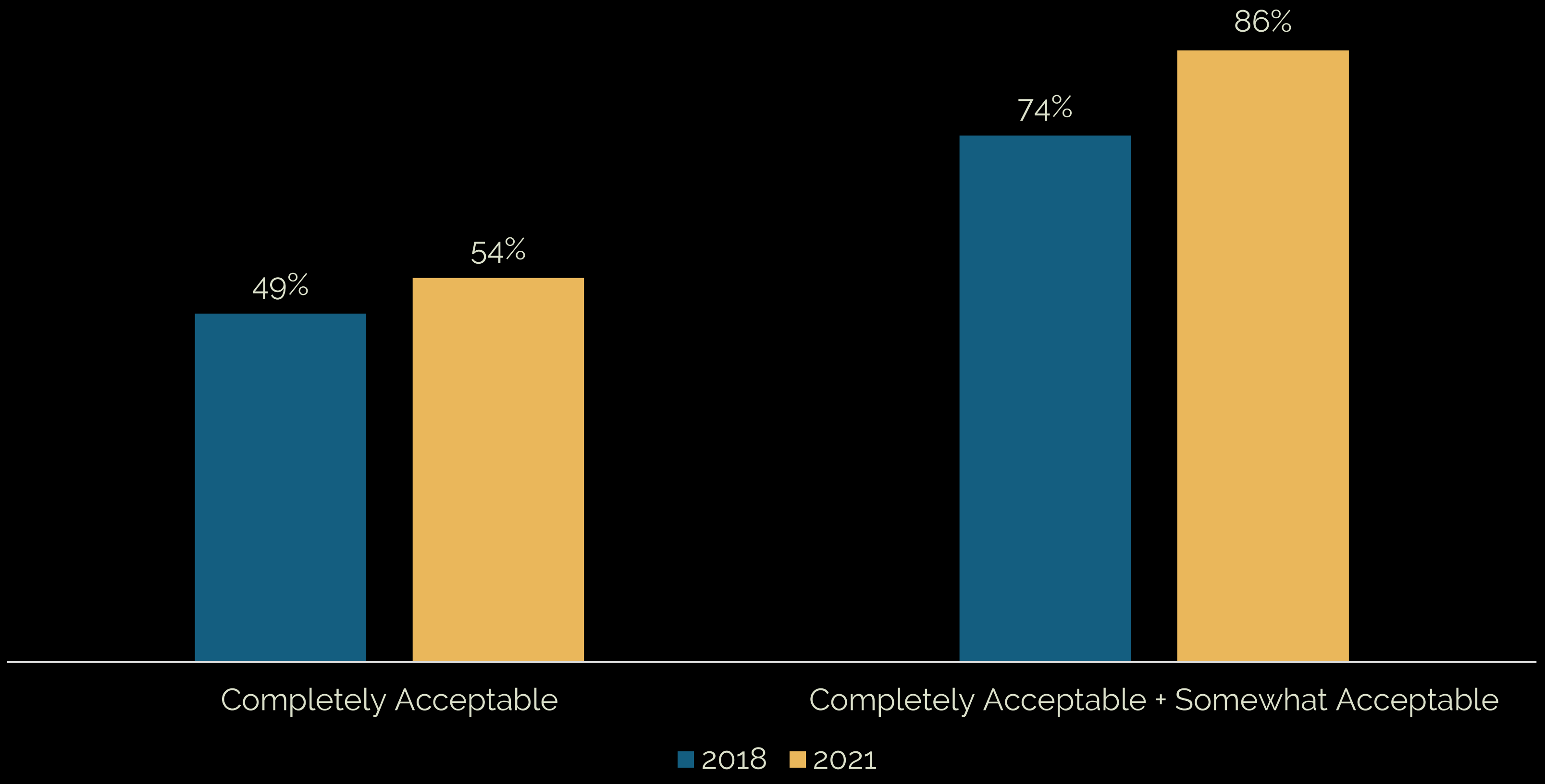
Irrigation



- **3 in 5 residents** of Tampa Bay Water's service area will completely accept reclaimed water in an **irrigation** context
- Residents of **Pinellas County (64%) were more likely** to find irrigation a completely acceptable use for **reclaimed water**

ACCEPTABLE USES FOR RECLAIMED WATER BY YEAR

Industrial use[1]

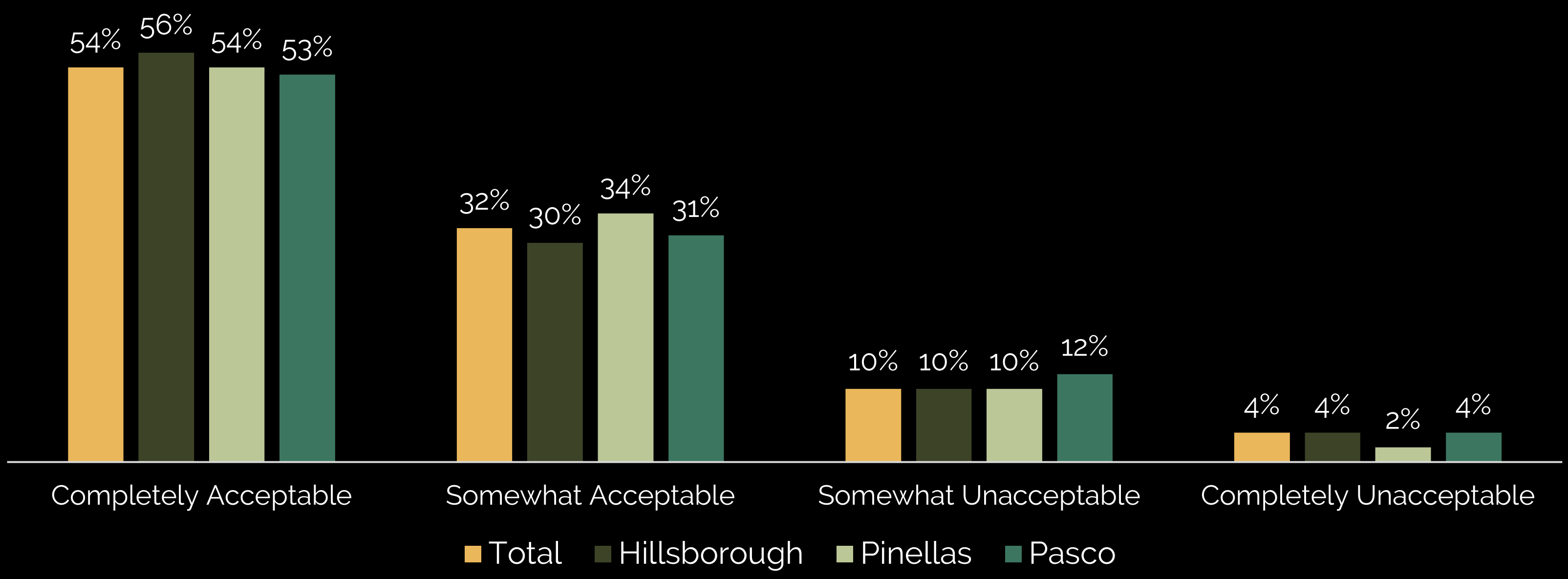


- More residents find it completely acceptable to use reclaimed water for industrial use, **up 5% points from 2018**

[1] Question not asked in 2015.

ACCEPTABLE USES FOR RECLAIMED WATER BY COUNTY

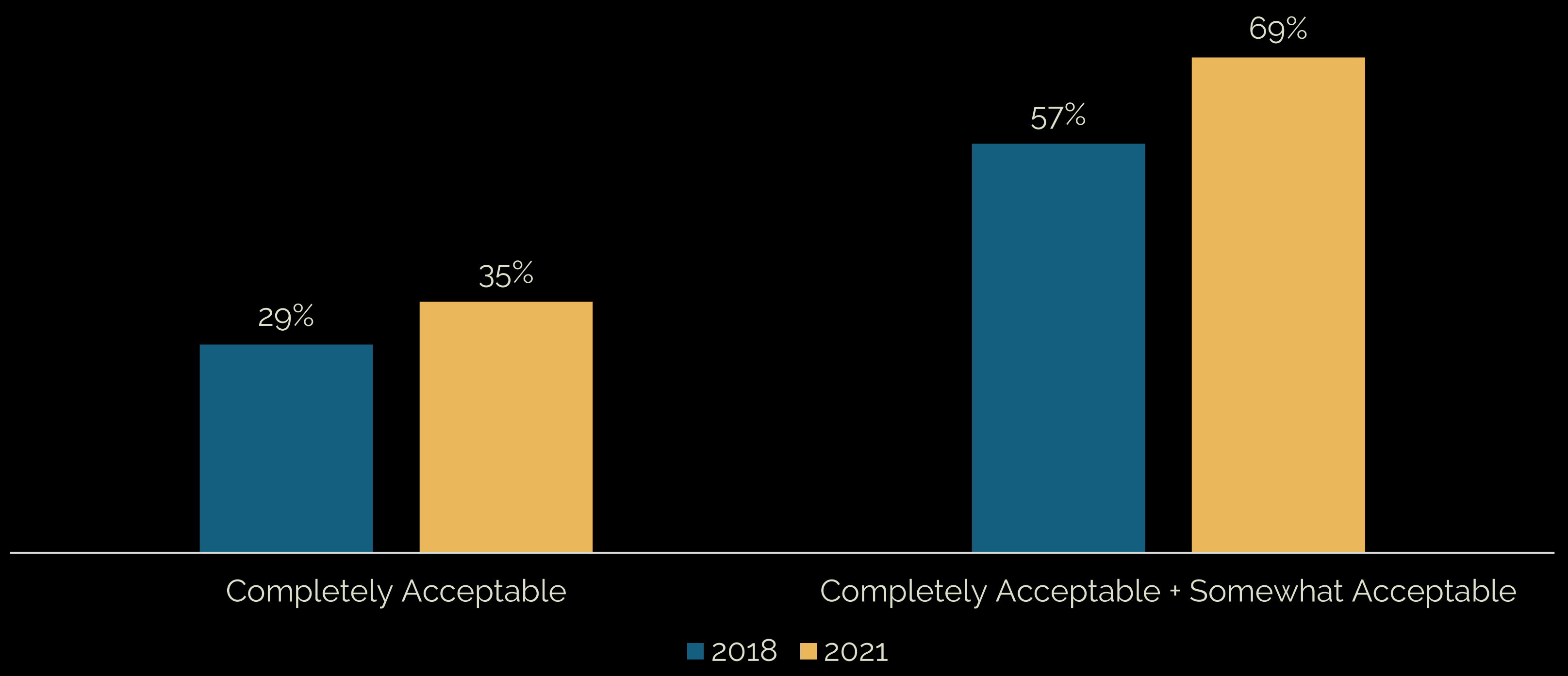
Industrial use



- **Over half of residents** of Tampa Bay Water's service area will completely accept reclaimed water in an **industrial use** context
- Residents of **Hillsborough County (56%) were more likely** to find irrigation a completely acceptable use for **industrial use**

ACCEPTABLE USES FOR RECLAIMED WATER BY YEAR

Household use, such as laundry, showers and dishwashers[1]

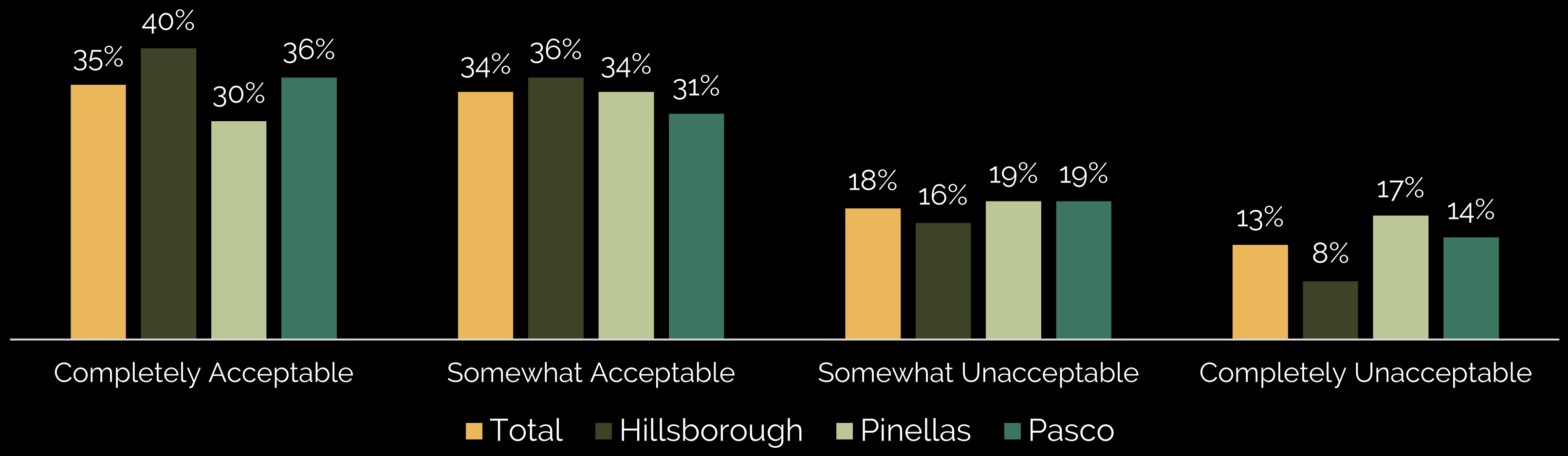


- More residents find it completely acceptable to use reclaimed water for household use, **up 6% points from 2018**

[1] Question not asked in 2015.

ACCEPTABLE USES FOR RECLAIMED WATER BY COUNTY

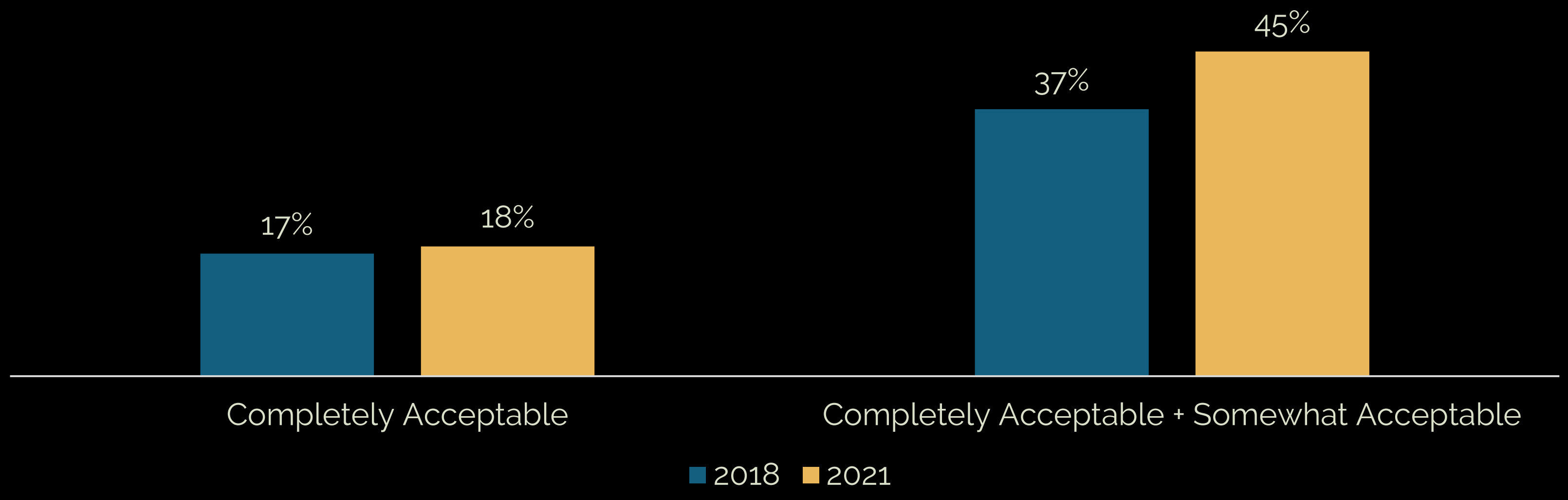
Household use, such as laundry, showers and dishwashers



- **Over 1 in 3 residents** of Tampa Bay Water's service area will completely accept reclaimed water in a **household use** context
- Residents of **Hillsborough County (40%) were more likely** to find irrigation a completely acceptable use for **household use**

ACCEPTABLE USES FOR RECLAIMED WATER BY YEAR

Drinking water[1]

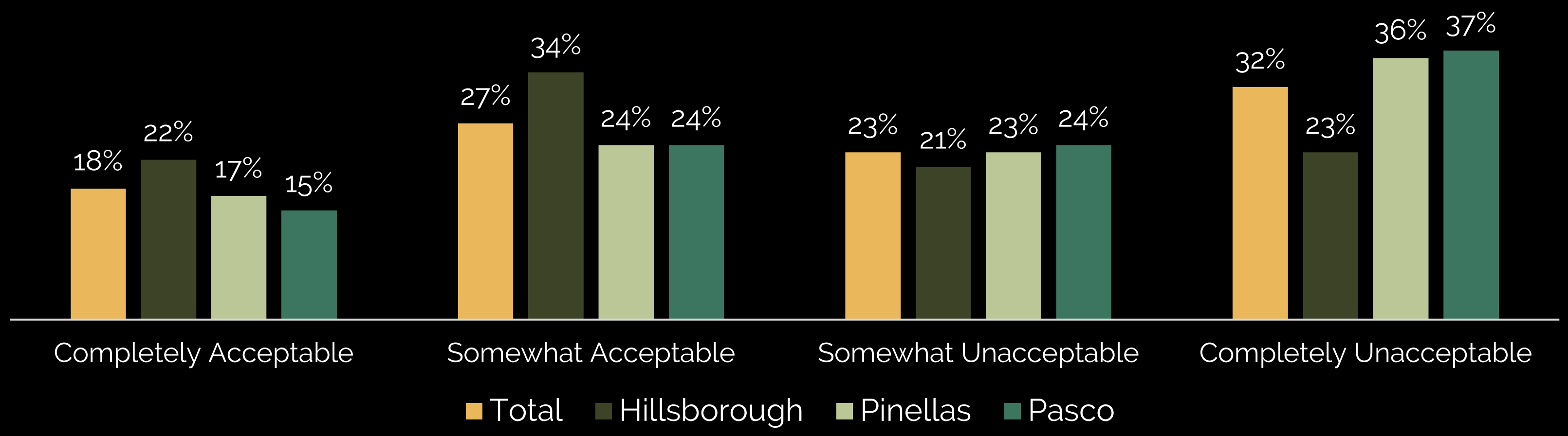


- More residents find it at least somewhat acceptable to use reclaimed water for drinking, **up 8% points from 2018**

[1] Question not asked in 2015.

ACCEPTABLE USES FOR RECLAIMED WATER BY COUNTY

Drinking water



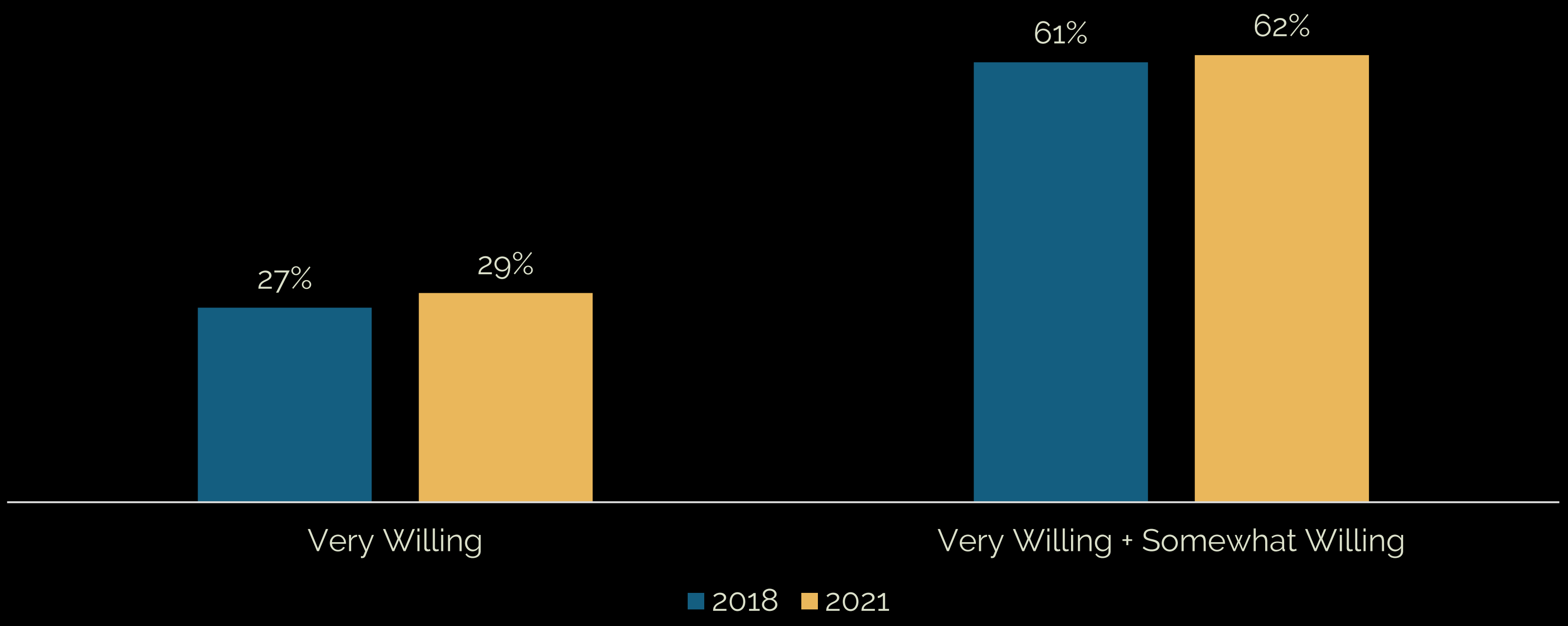
- **Fewer than 1 in 5 residents** of Tampa Bay Water's service area will completely accept reclaimed water for **drinking**
- Hillsborough County residents are **more likely** to completely or somewhat **accept reclaimed water for drinking water**

DETAILED FINDINGS

Conservation Programs

CONSERVATION PARTICIPATION BY YEAR

Landscape education and design courses[1]

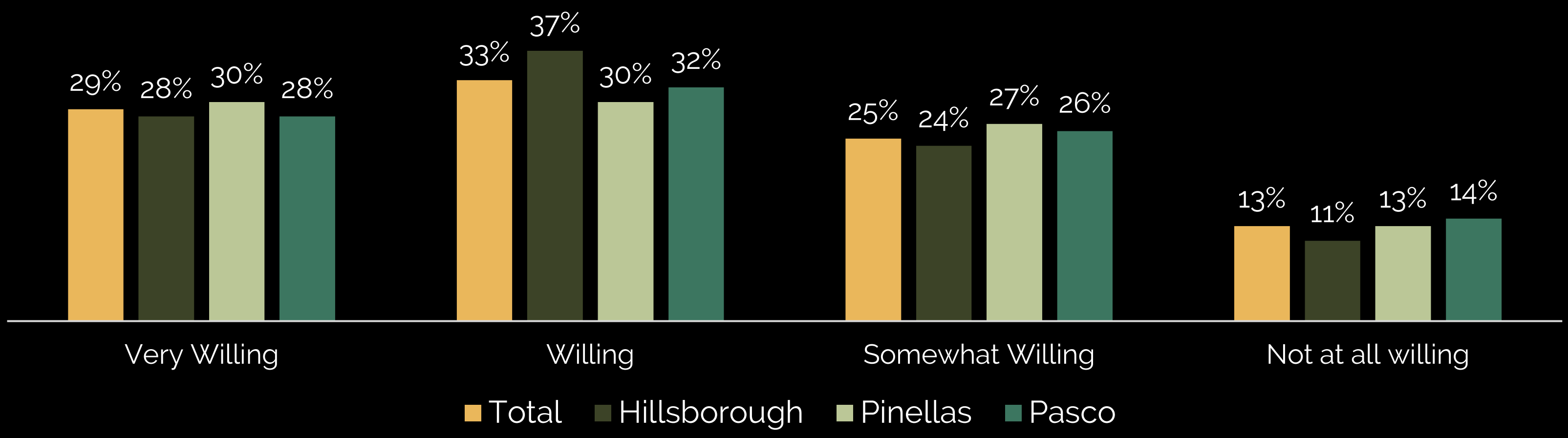


- Willingness to participate in landscape education and design courses **was up slightly from 2018**

[1] Question not asked in 2015.

CONSERVATION PARTICIPATION BY COUNTY

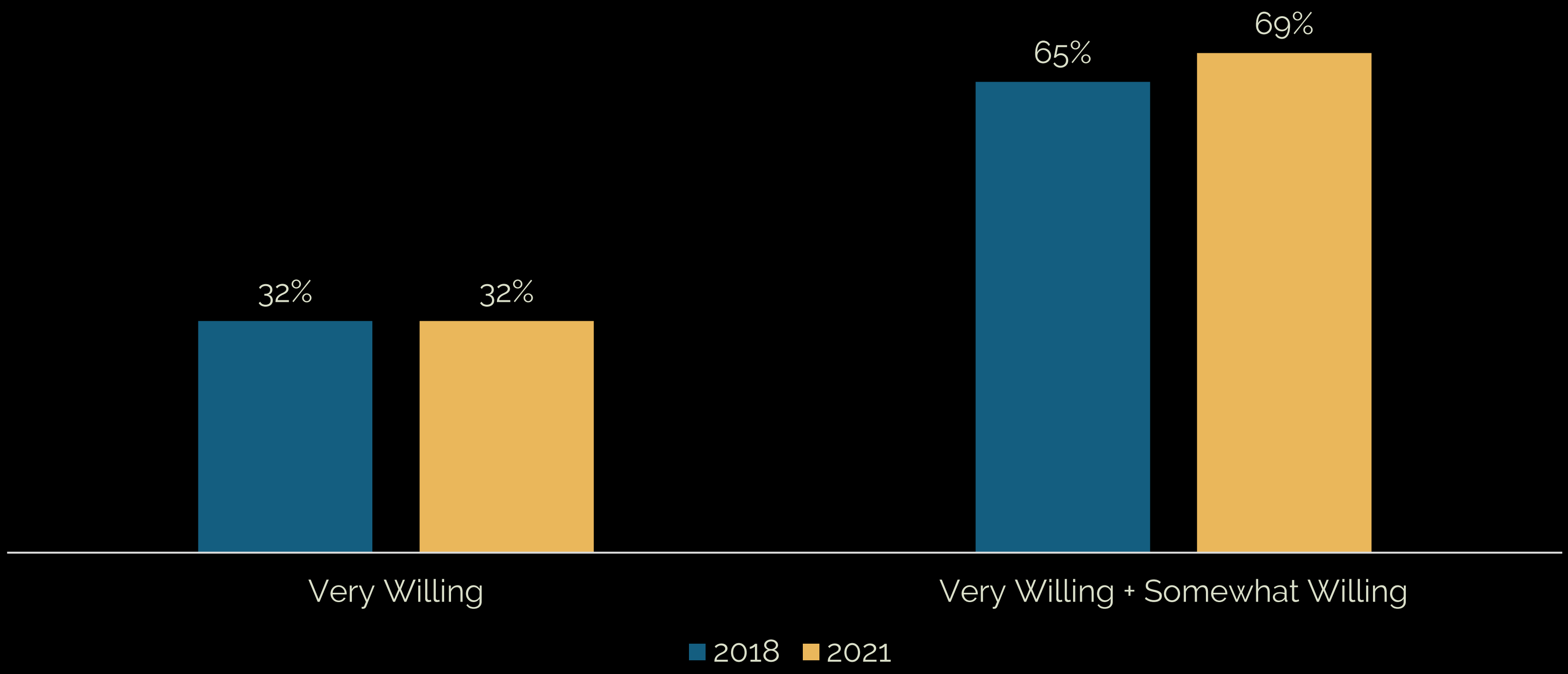
Landscape education and design courses



- **Nearly 9 in 10 residents** are at least somewhat willing to participate in a **landscape education and design course** conservation program
- Hillsborough County residents are **slightly more willing** to participate (65%)

CONSERVATION PARTICIPATION BY YEAR

Landscape/Florida-friendly landscaping evaluations[1]

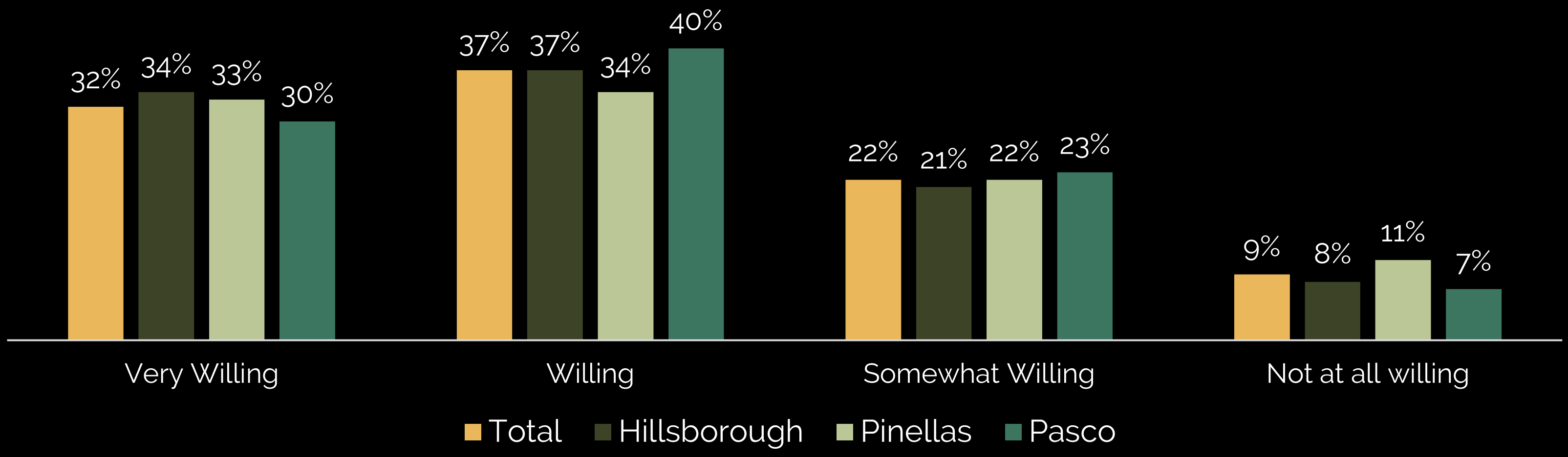


- Willingness to participate in landscape/Florida-friendly landscaping evaluations **stayed steady from 2018**

[1] Question not asked in 2015.

CONSERVATION PARTICIPATION BY COUNTY

Landscape/Florida-friendly landscaping evaluations



- **9 in 10 residents** are at least somewhat willing to participate in a **landscape/Florida-friendly landscaping evaluation** conservation program
- **Residents of Pasco County are most likely to be at least somewhat willing** to participate in a landscape/Florida-friendly landscaping evaluations program (93%)

TAMPA BAY WATER Supplying Water To The Region

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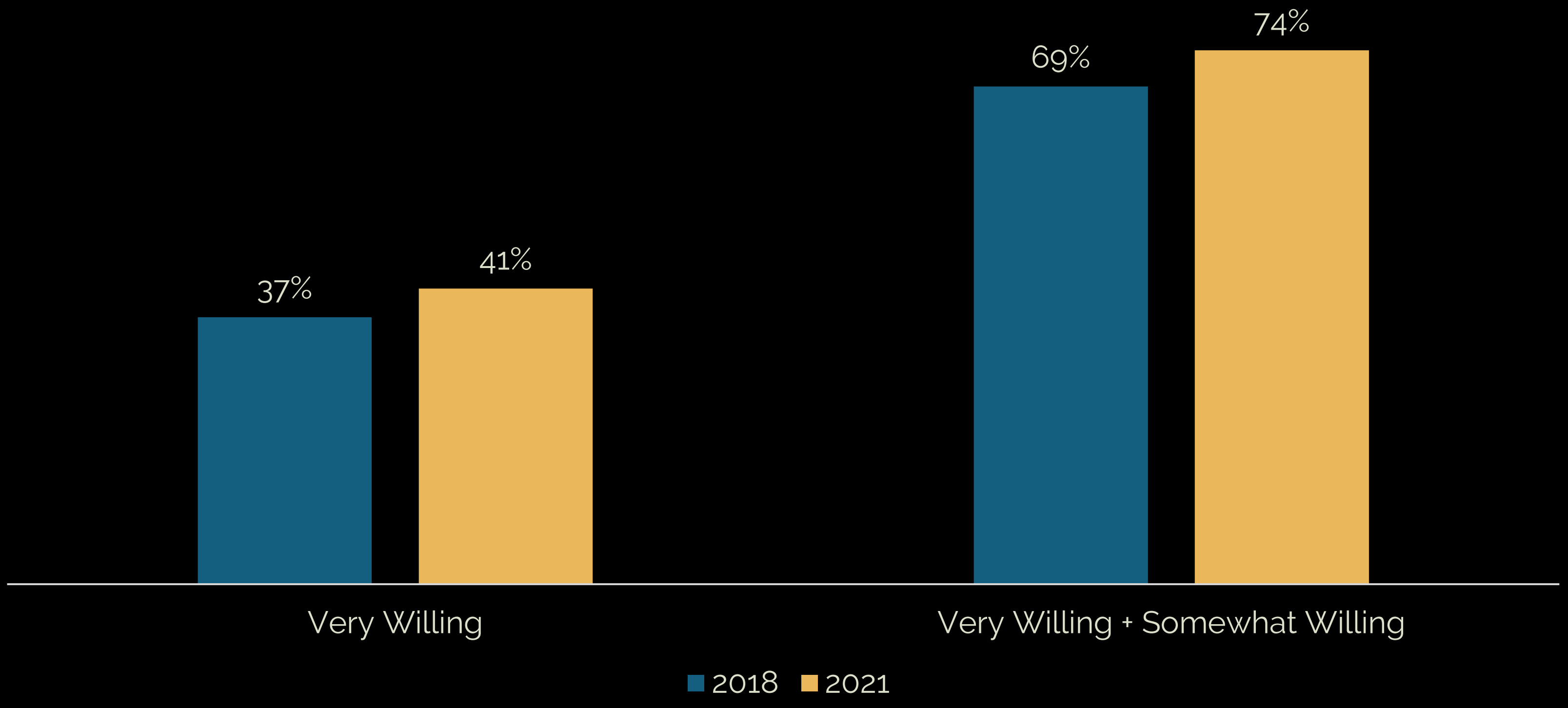
CONSERVATION PARTICIPATION BY YEAR

Cash or financial incentives for replacing toilets with low-flow or water efficient toilets[1]

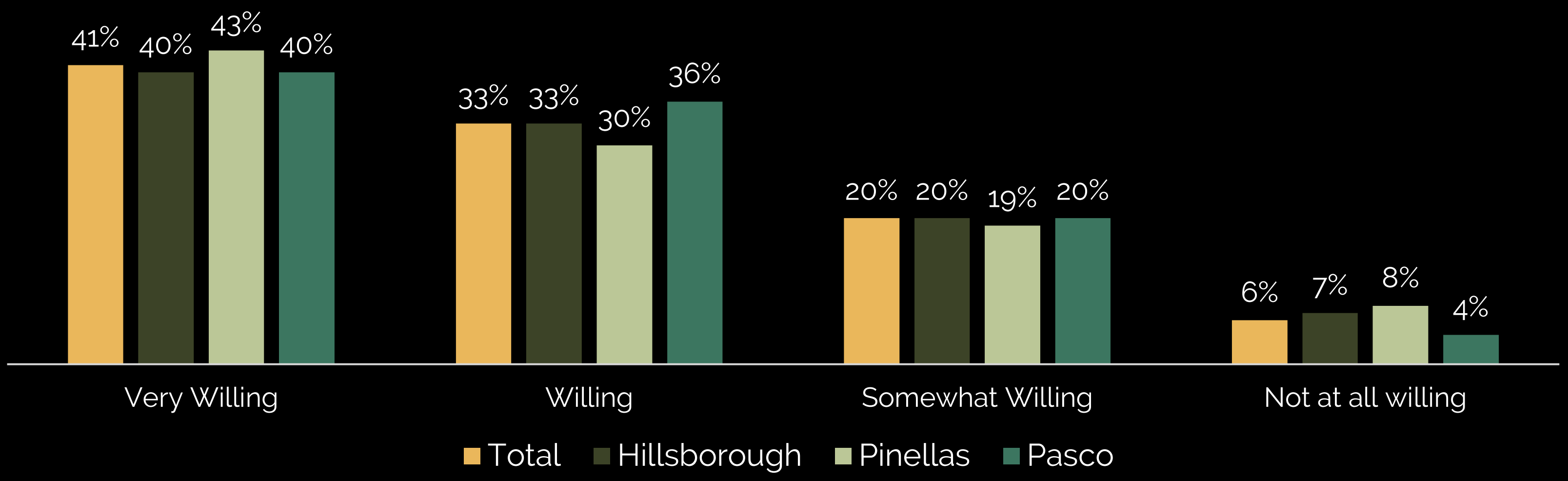


- Willingness to participate in cash/financial incentives for replacing toilets **increased from 2018 by 5% points**

[1] Question not asked in 2015.

CONSERVATION PARTICIPATION BY COUNTY

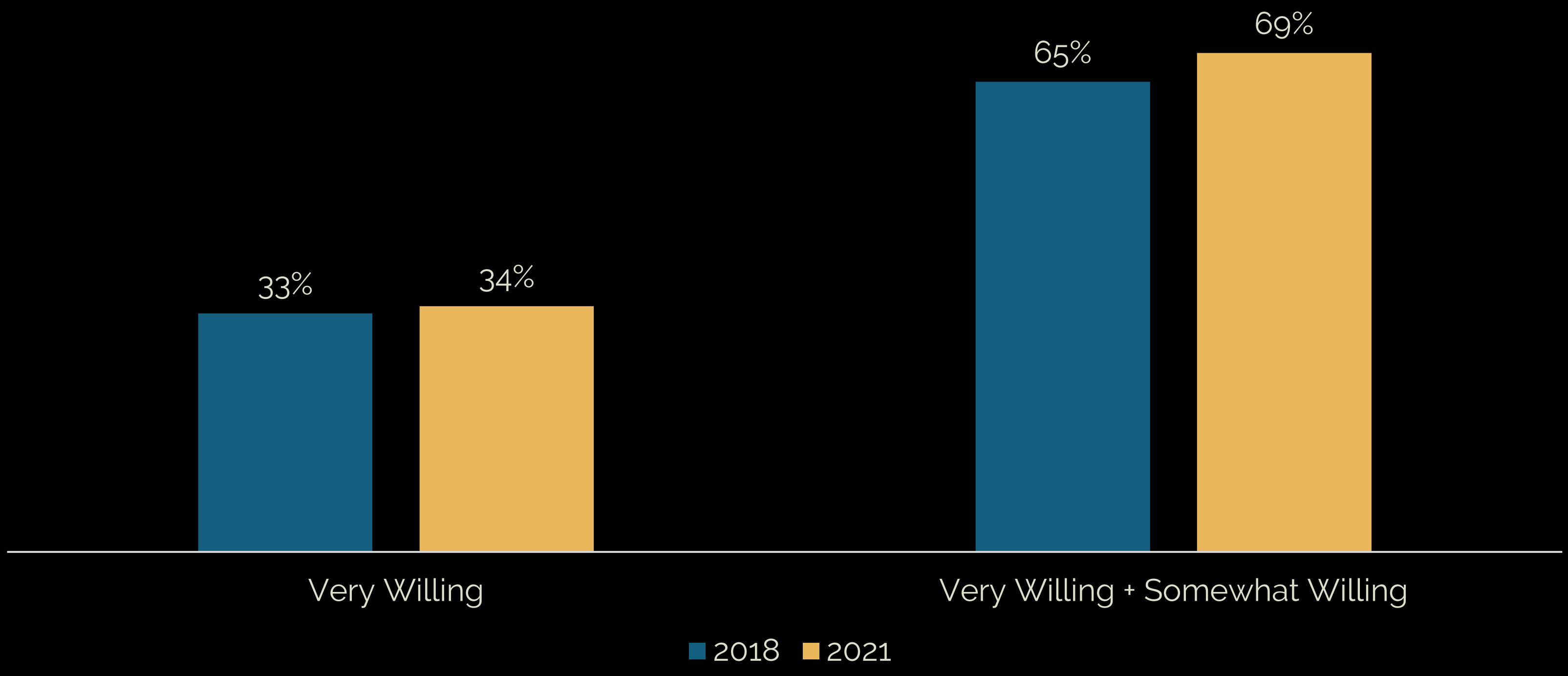
Cash or financial incentives for replacing toilets with low-flow or water efficient toilets



- **Over 9 in 10 residents** are at least somewhat willing to participate in a **cash or financial incentive for replacing toilets with low-flow or water efficient toilet** conservation program
- **Residents of Pasco County are most likely to be at least somewhat willing** to participate in a cash/financial incentive to replace toilets (96%)

CONSERVATION PARTICIPATION BY YEAR

Cash or financial incentives for installing irrigation control devices, such as rain or soil moisture sensors[1]

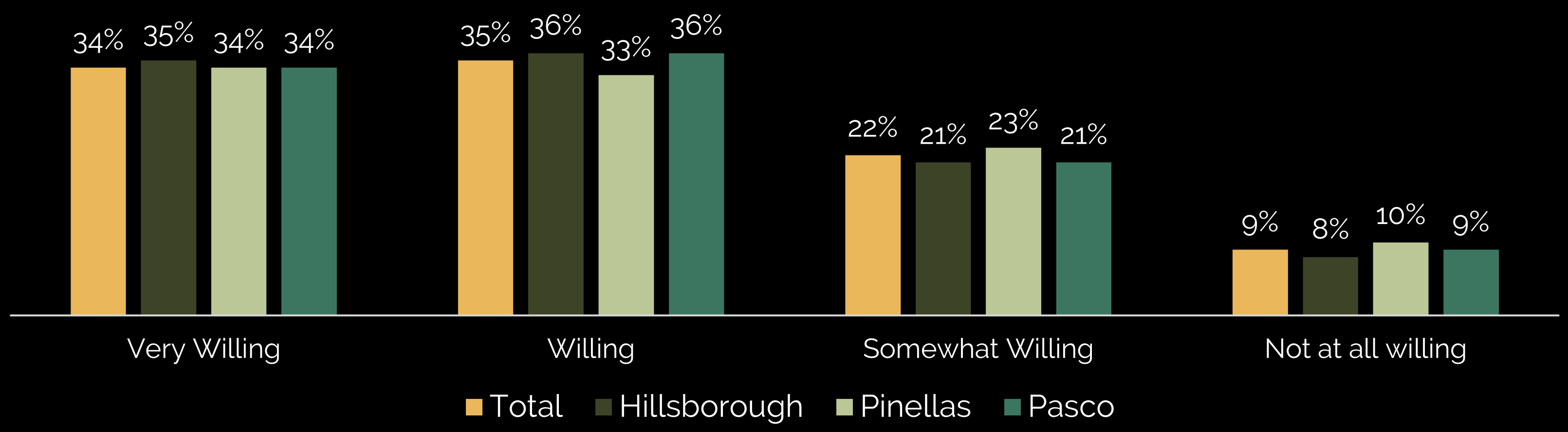


- Willingness to participate in cash/financial incentives to install irrigation control devices **was up 4% points from 2018**

[1] Question not asked in 2015.

CONSERVATION PARTICIPATION BY COUNTY

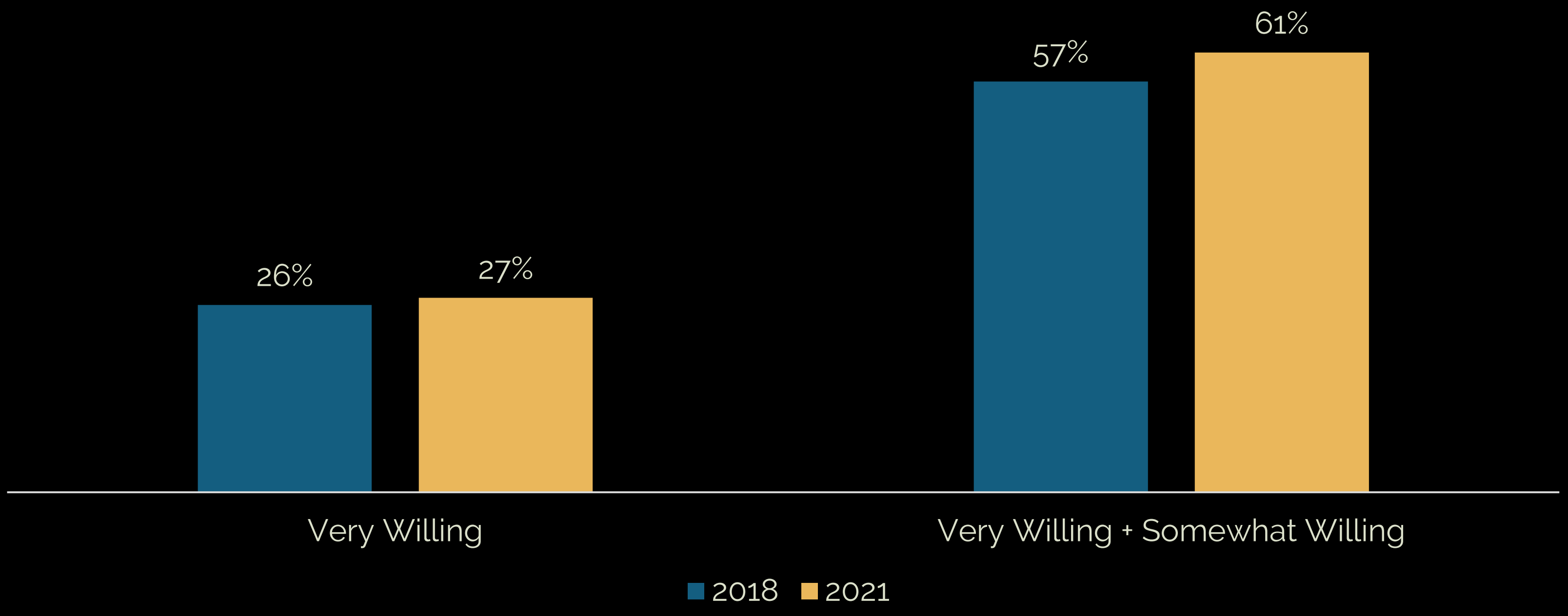
Cash or financial incentives for installing irrigation control devices, such as rain or soil moisture sensors



- **9 in 10 residents** are at least somewhat willing to participate in a **cash or financial incentive for installing irrigation control devices, such as rain or soil moisture sensor** conservation program
- **Residents of Hillsborough County are slightly more likely to be at least somewhat willing** to participate in a cash/financial incentive to install irrigation control devices (92%)

CONSERVATION PARTICIPATION BY YEAR

Cash or financial incentives for putting in shallow irrigation wells to replace tap water for irrigation[1]

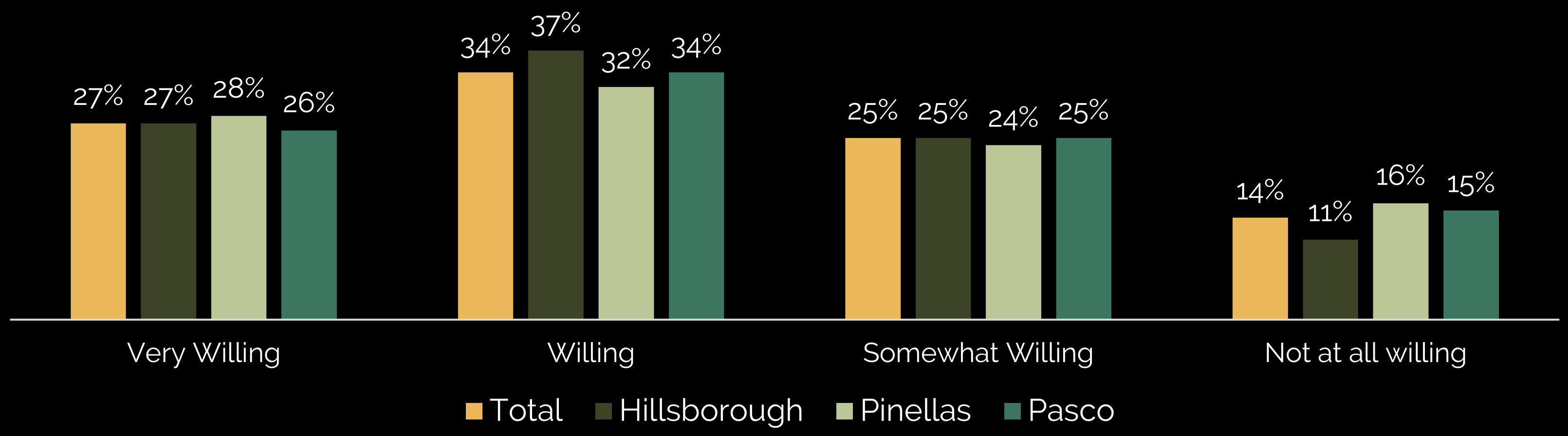


- Willingness to participate in cash/financial incentives to replace shallow irrigation wells to replace tap water for irrigations **was up 4% points from 2018**

[1] Question not asked in 2015.

CONSERVATION PARTICIPATION BY COUNTY

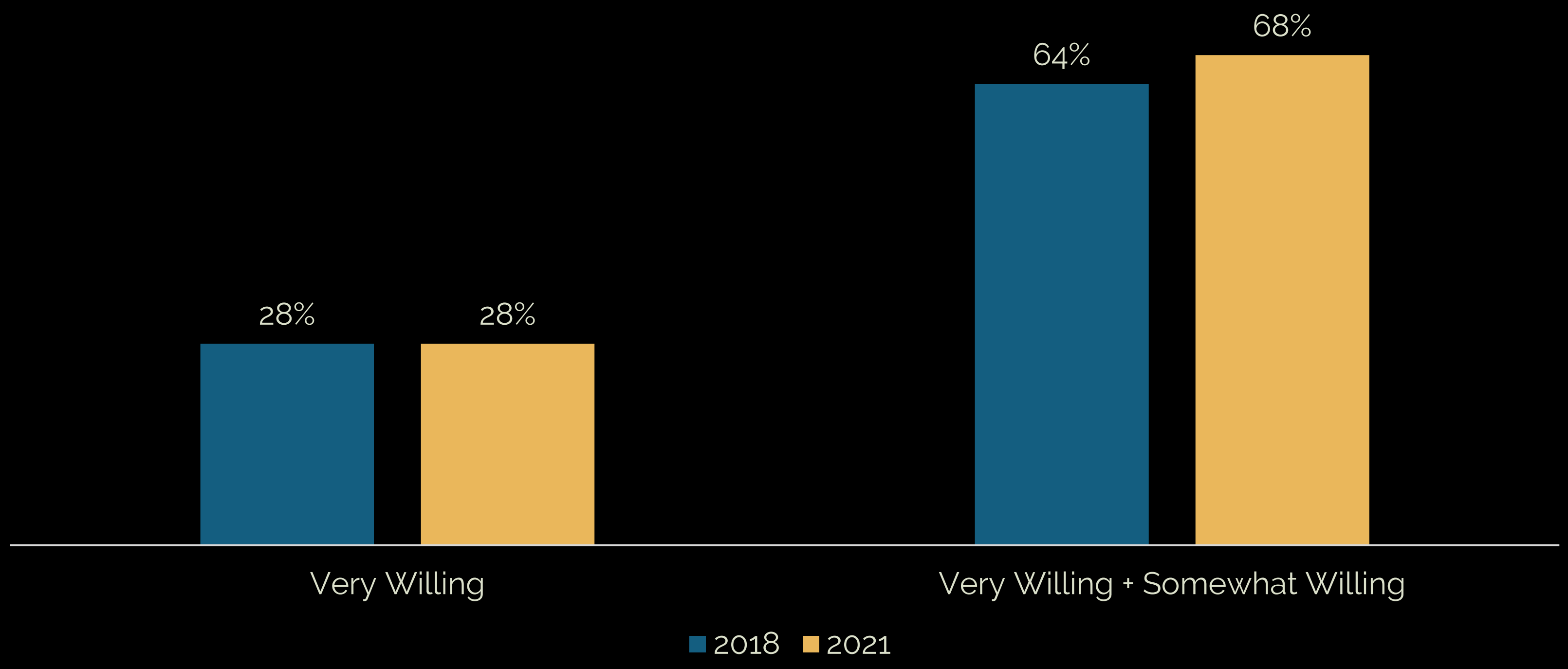
Cash or financial incentives for putting in shallow irrigation wells to replace tap water for irrigation



- **Nearly 9 in 10 residents** are at least somewhat willing to participate in a **cash or financial incentive for putting in shallow irrigation wells to replace tap water for irrigation** conservation program
- **Residents of Hillsborough County are slightly more likely to be at least somewhat willing** to participate in a cash/financial incentive to put in shallow irrigation wells (89%)

CONSERVATION PARTICIPATION BY YEAR

Technical assistance for improving the efficiency of your existing irrigation system or practices[1]

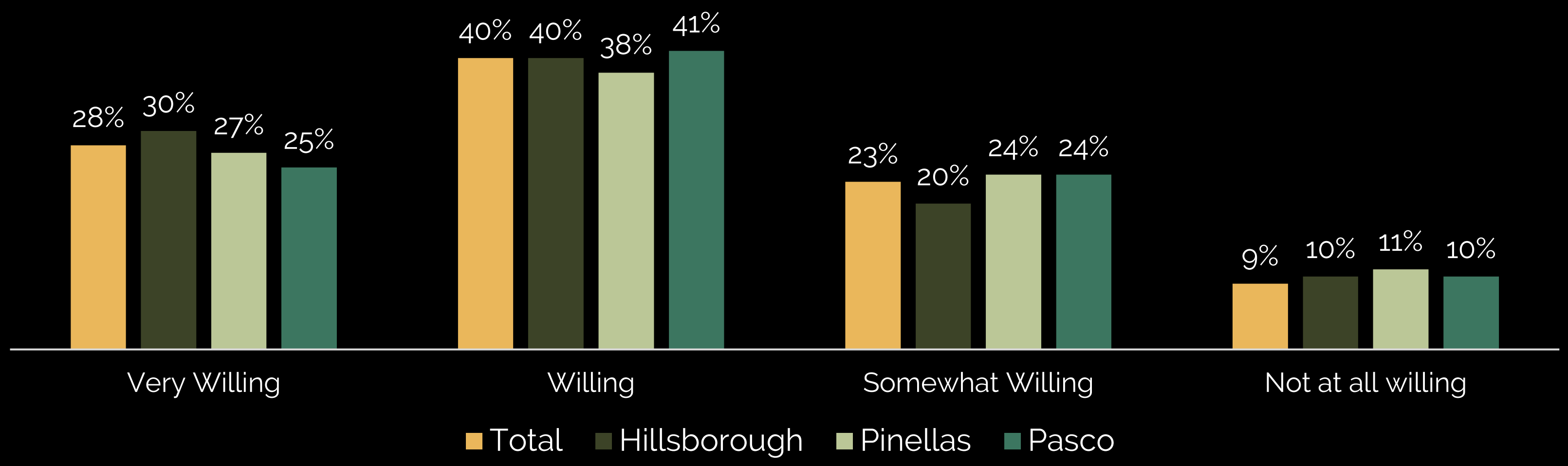


- Willingness to participate in technical assistance for improving the efficiency of existing irrigation **was up 4% points from 2018**

[1] Question not asked in 2015.

CONSERVATION PARTICIPATION BY COUNTY

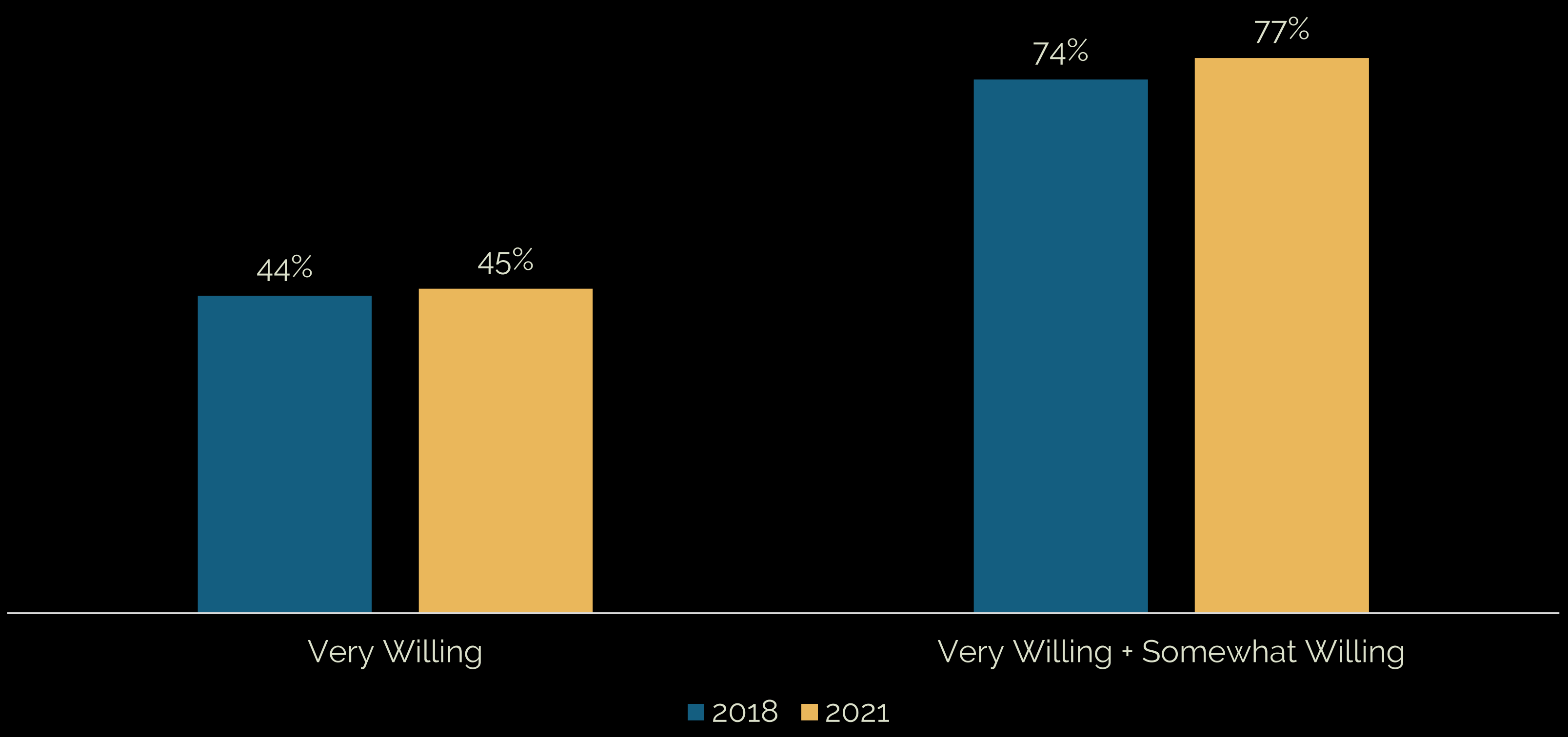
Technical assistance for improving the efficiency of your existing irrigation system or practices



- **9 in 10 residents** are at least somewhat willing to participate in a **technical assistance for improving the efficiency of the existing irrigation system** conservation program

CONSERVATION PARTICIPATION BY YEAR

Reclaimed water for sprinkling/lawn watering[1]

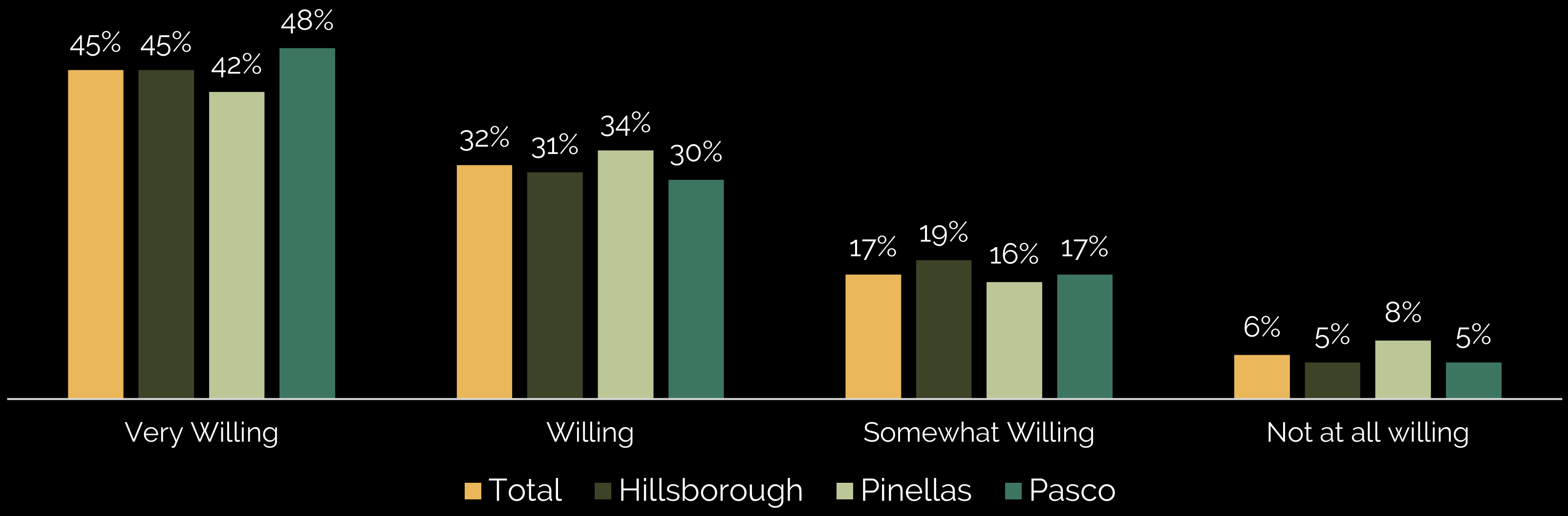


- The conservation program that gained the most traction with residents of Tampa Bay Water's service area is using reclaimed water for sprinkling/lawn watering as **45% are very willing and 77% are at least somewhat willing to try this form of conservation**
- This was a slight increase from 2018

[1] Question not asked in 2015.

CONSERVATION PARTICIPATION BY COUNTY

Reclaimed water for sprinkling/lawn watering



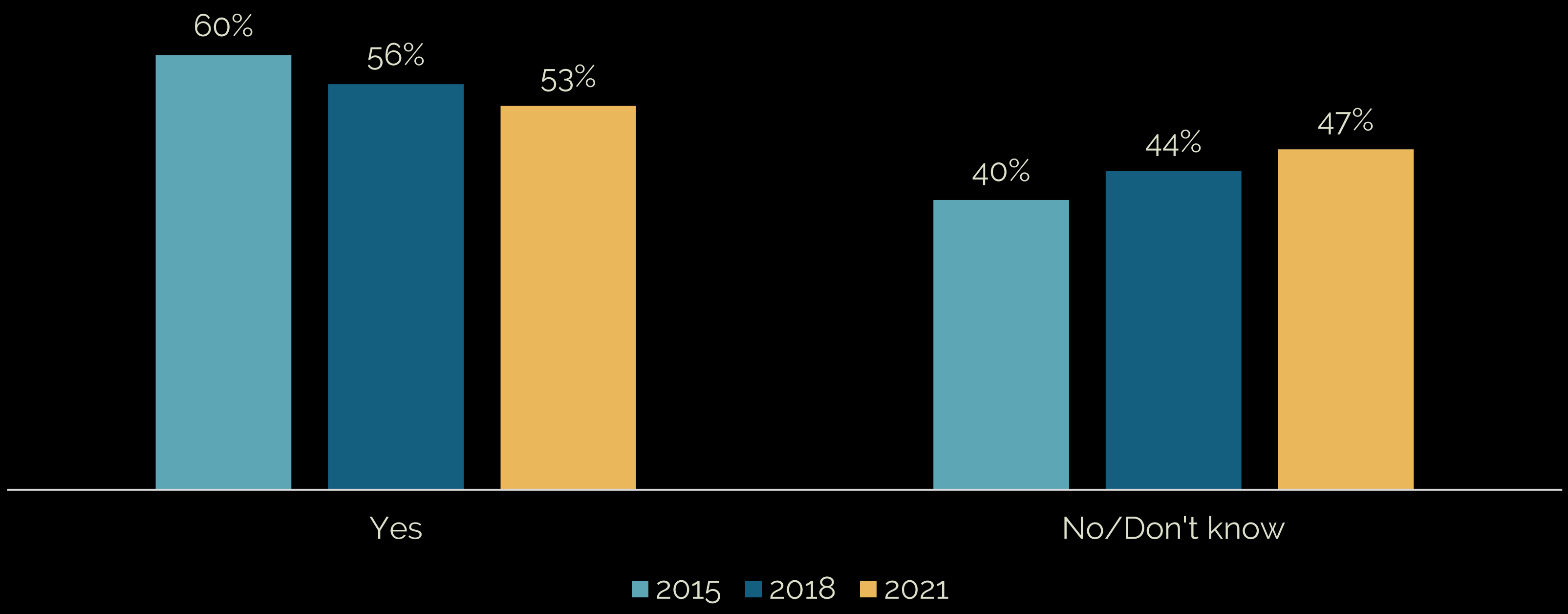
- **Over 9 in 10 residents** are at least somewhat willing to participate in a **reclaimed water for sprinkling/lawn watering** conservation program

DETAILED FINDINGS

Water Quality

DRINK TAP WATER BY YEAR

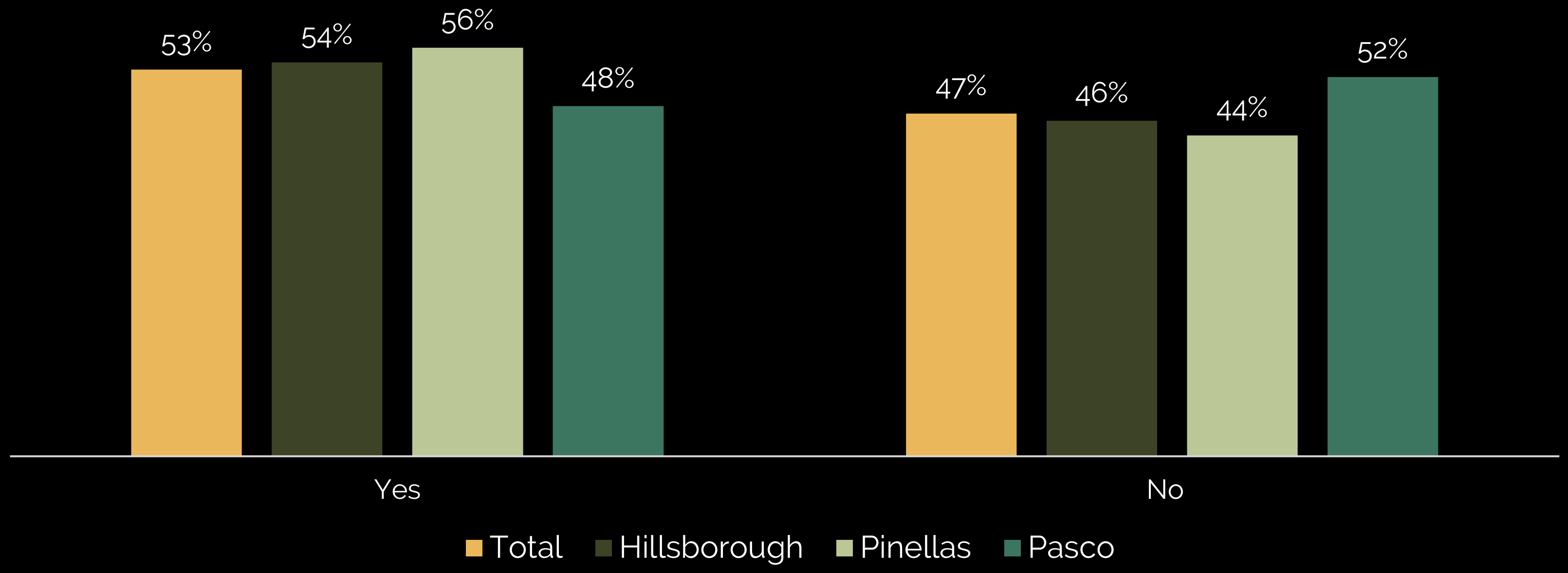
Do you drink household tap water?



- The percentage of residents who say they drink tap water **is down from 56% in 2018 to 53% in 2021**
- This percentage is the lowest recorded figure in a decade

DRINK TAP WATER BY COUNTY

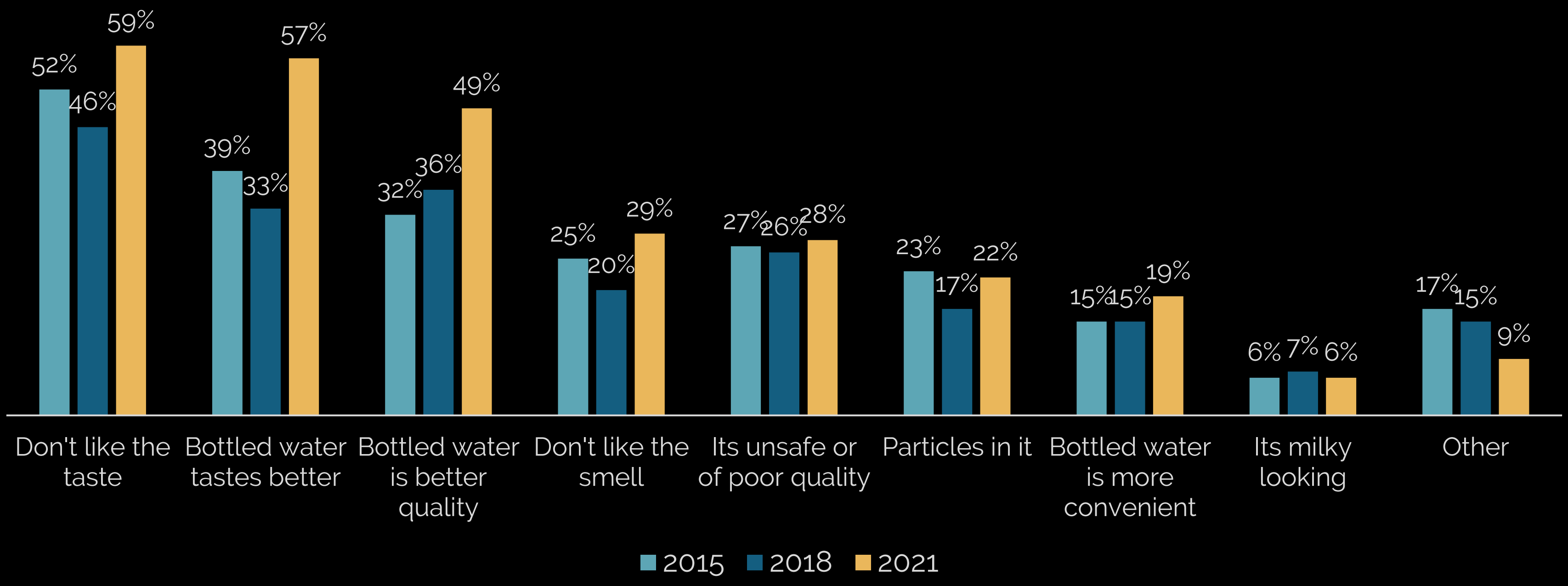
Do you drink household tap water?



- **Over half of residents (53%)** drink household tap water
- **Pinellas County residents are slightly more likely** to drink household tap water (56%)

DRINK TAP WATER BY YEAR

Why don't you drink your tap water?[1]

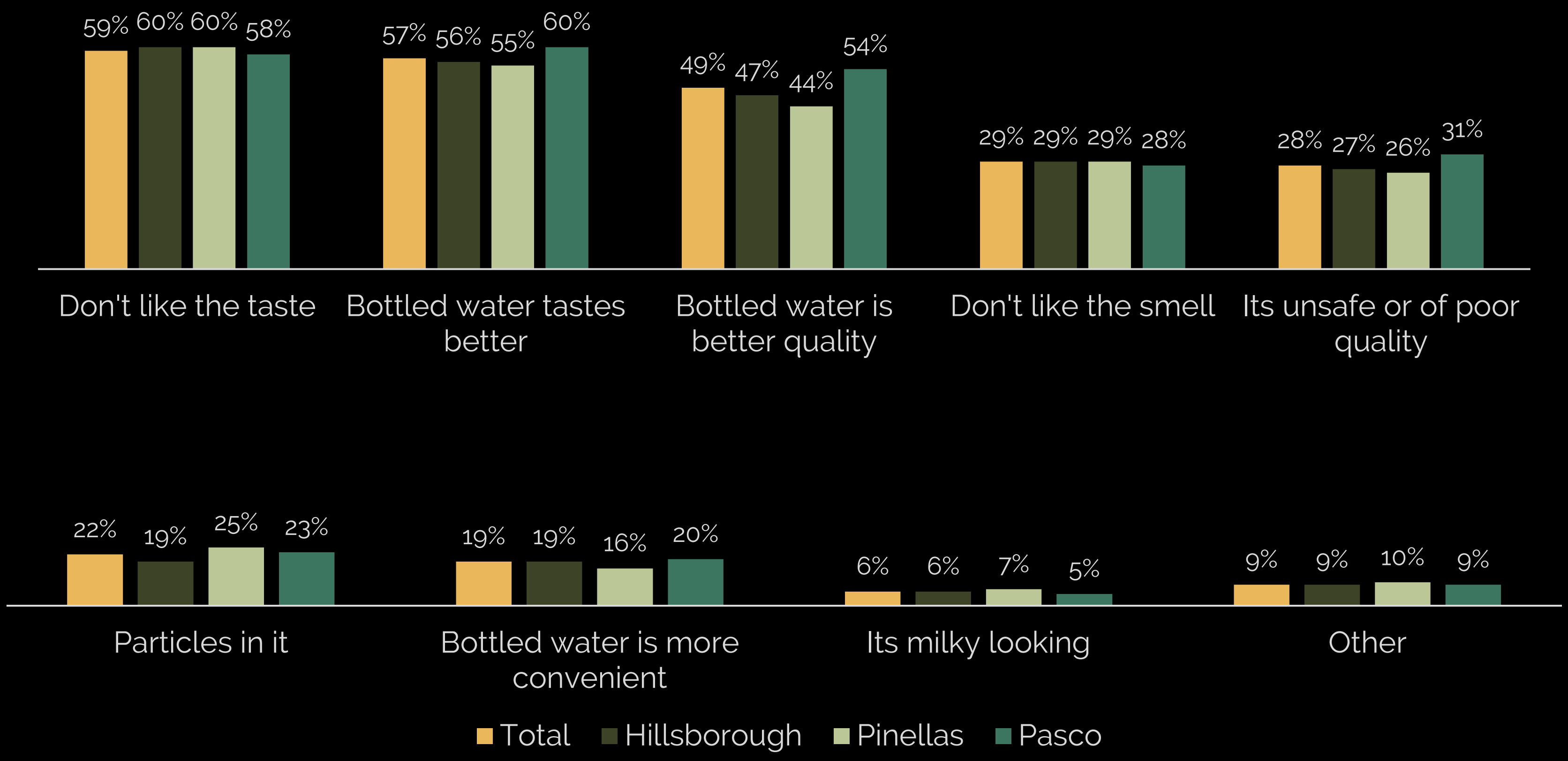


- **Taste** is the number one reason why people do not drink tap water, the percentage listing **this reason is up 13% points since 2018**

[1] Multiple responses accepted.
Only asked to those who do not drink household tap water.

DRINK TAP WATER BY COUNTY

Why don't you drink your tap water?[1]

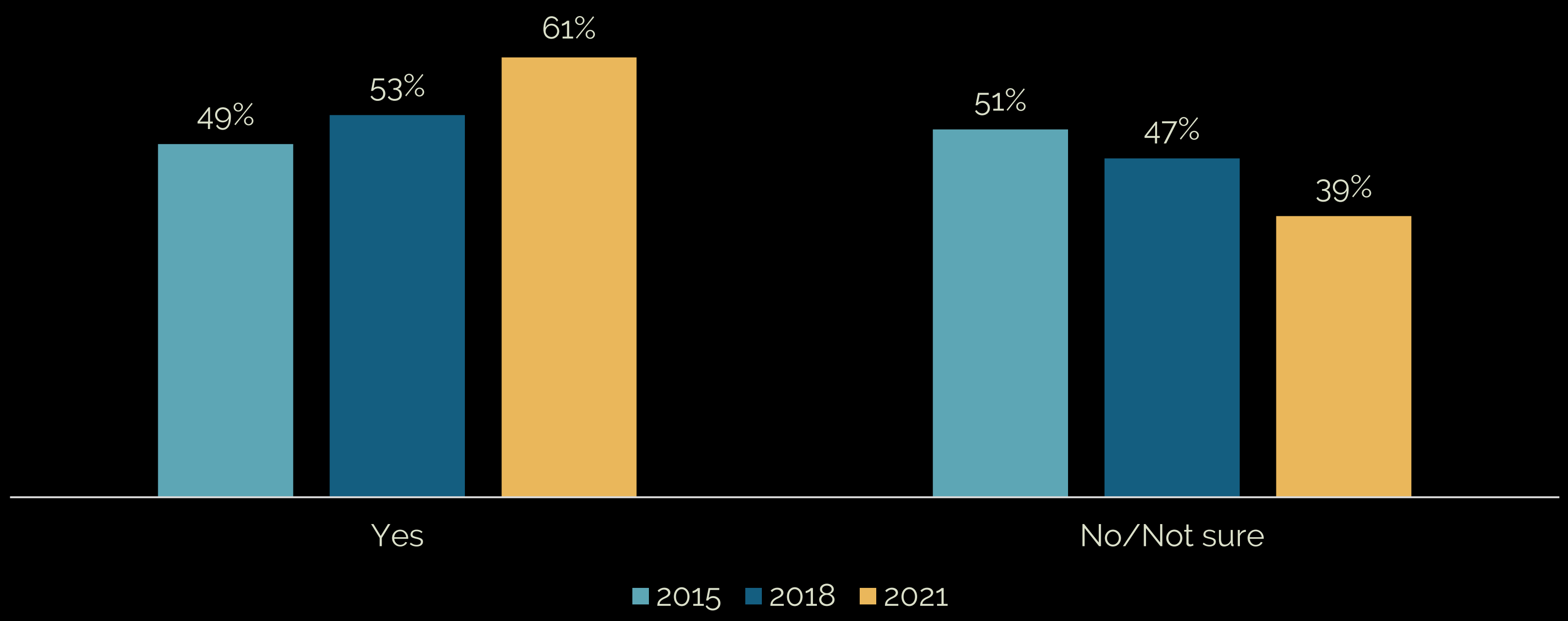


- **Taste (59%)** is the number one reason why people do not drink tap water
- When factoring in the **taste of bottled water**, significantly more residents in 2021 selected this reason for not drinking tap water (57%)

[1] Multiple responses accepted.
Only asked to those who do not drink household tap water.

TAP WATER SAFETY BY YEAR

Believe bottled water is safer than tap water



- **Just over 3 in 5 residents (61%)** think bottled water is safer than tap water, **up from 53% who believed this in 2018**

TAMPA BAY WATER
Supplying Water To The Region

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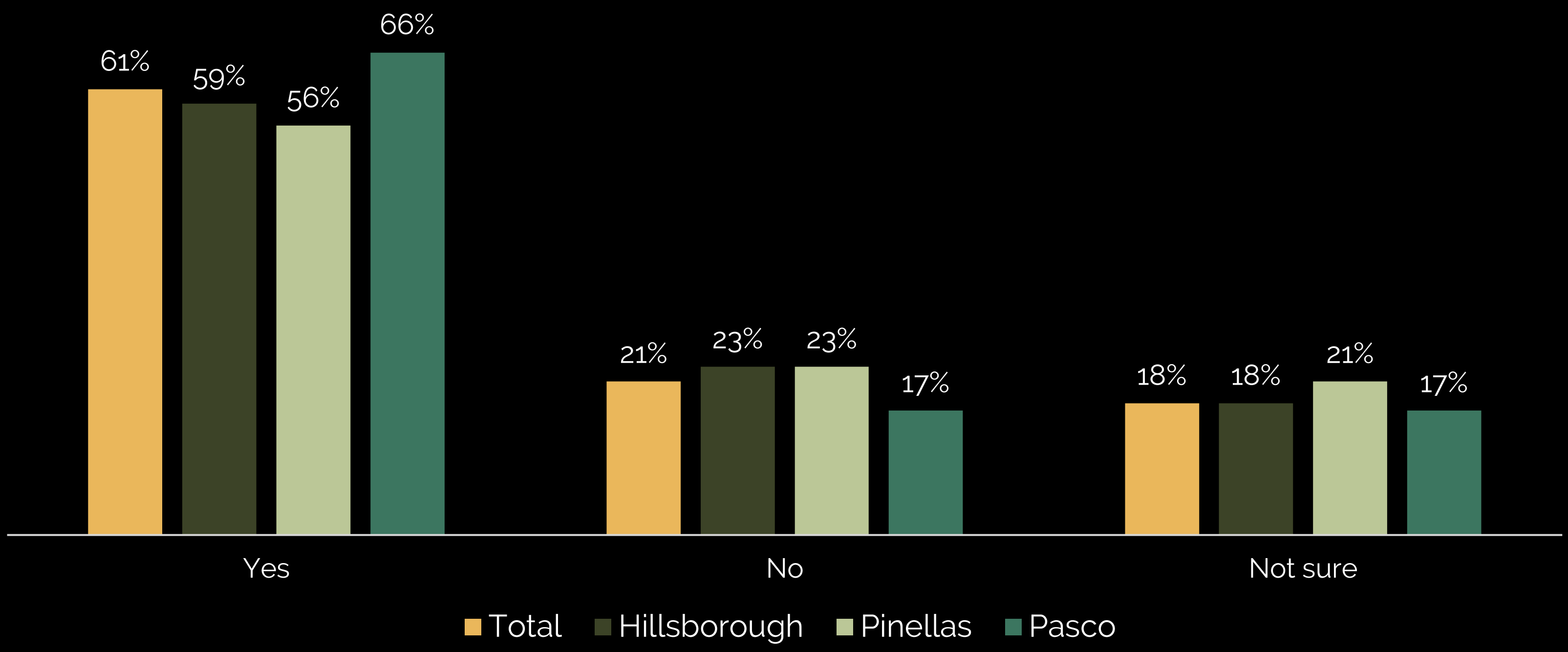
TAP WATER SAFETY BY COUNTY

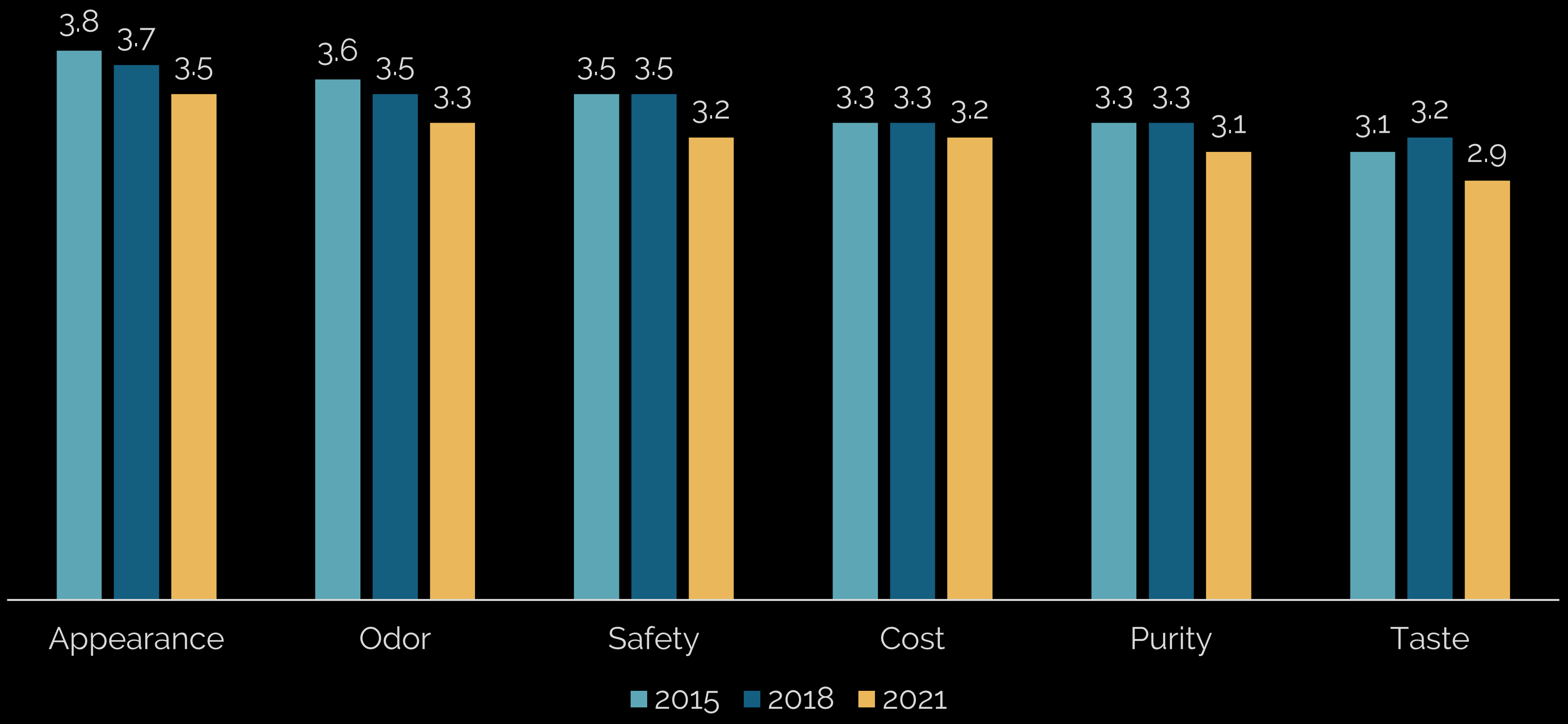
Believe bottled water is safer than tap water



- **3 in 5 residents (61%)** believe bottled water if safer than tap water
- **Pasco County residents (66%) are more likely** to think bottled water is safer, while **Pinellas County residents (56%) are least likely**

TAP WATER SATISFACTION BY YEAR

Tap water satisfaction[1]

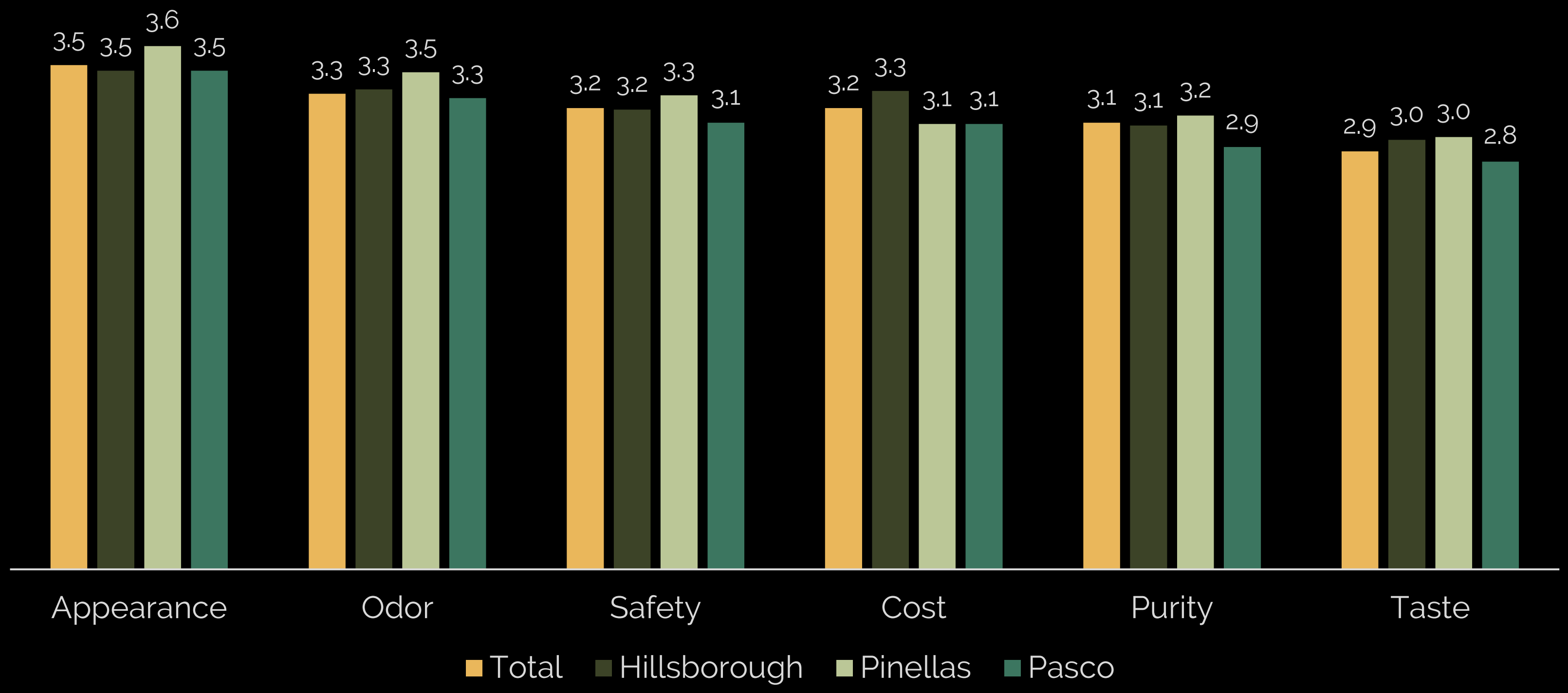


- The graph shows residents' average ratings for tap water (on a 5-point scale) on six characteristics
- Scores went down across all attributes from 2018

[1] On a scale of 1 to 5, with 5 being Very Satisfied and 1 being Very Unsatisfied.

TAP WATER SATISFACTION BY COUNTY

Tap water satisfaction[1]



- The taste of tap water is rated a **low 2.9** on a 5-point scale, while **appearance (3.5), odor (3.3), safety (3.2), cost (3.2), and purity (3.1)** of tap water are rated higher than taste
- **Pinellas County residents gave the highest rating** across all categories except for cost

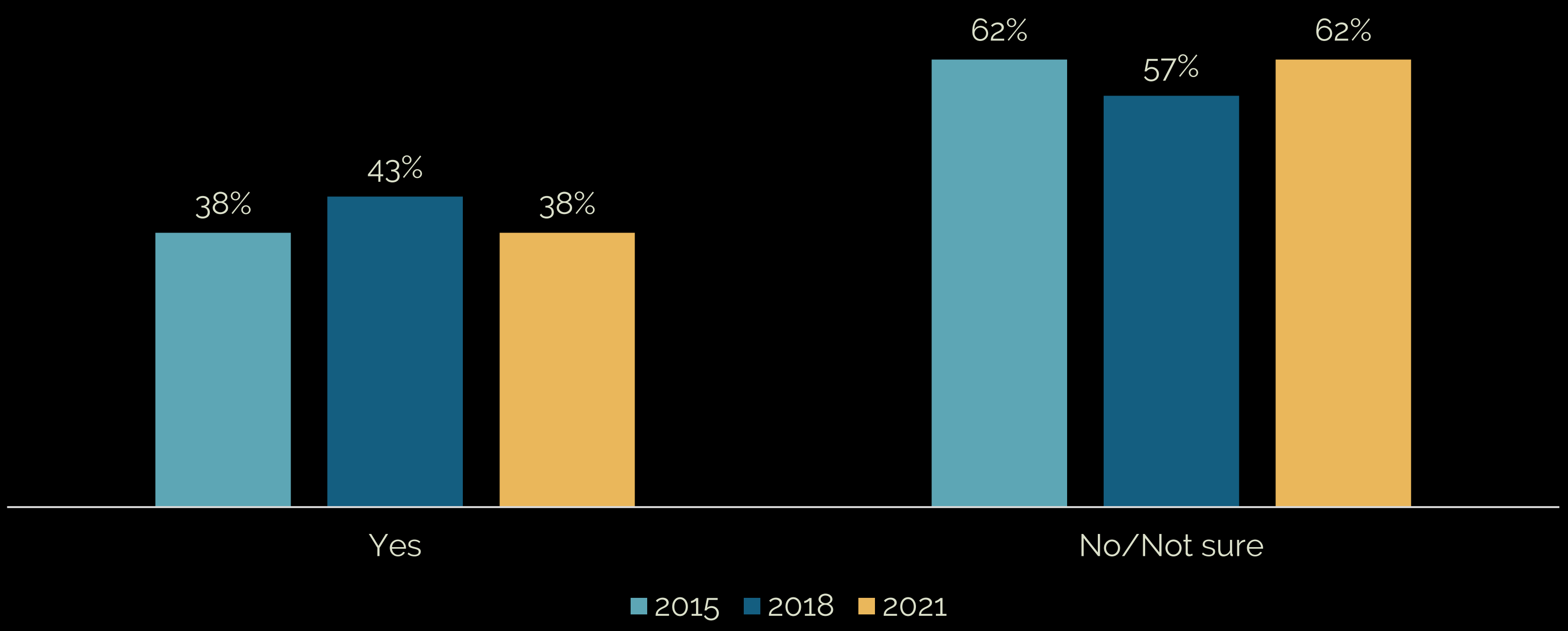
[1] On a scale of 1 to 5, with 5 being Very Satisfied and 1 being Very Unsatisfied.

DETAILED FINDINGS

Water Cost

WATER COST BY YEAR

Does the amount of your water bill affect the way you use tap water?



- Fewer residents feel the cost of their water bill affects they way they use tap water, **down 5% points from 2018**

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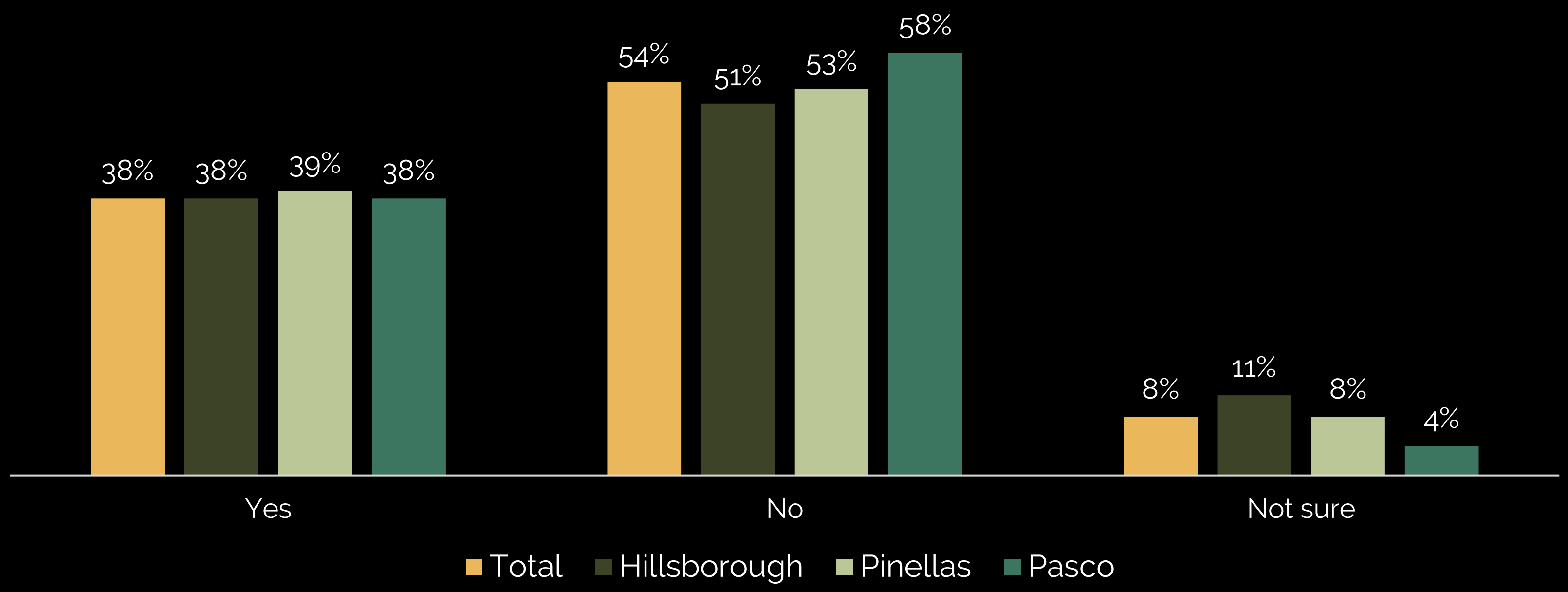
WATER COST BY COUNTY

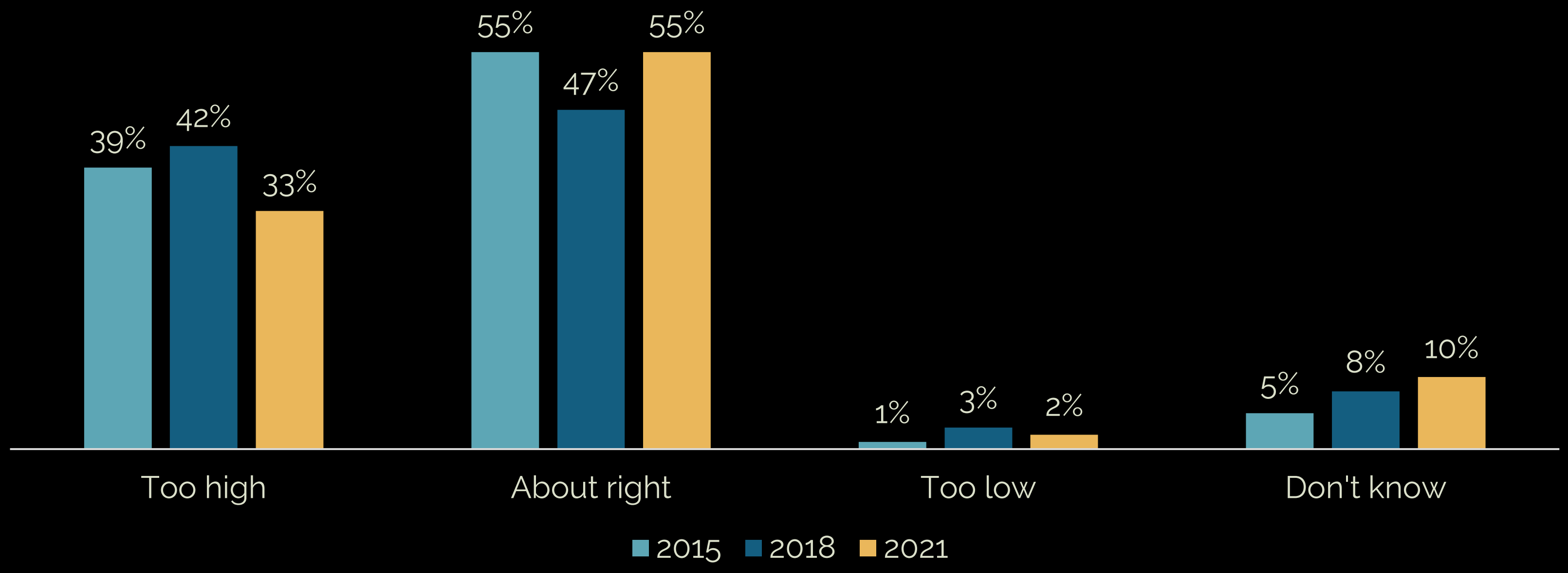
Does the amount of your water bill affect the way you use tap water?



- **Just under 2 out of 5 residents (38%)** maintain that their water bill affects the way they use tap water

WATER COST BY YEAR

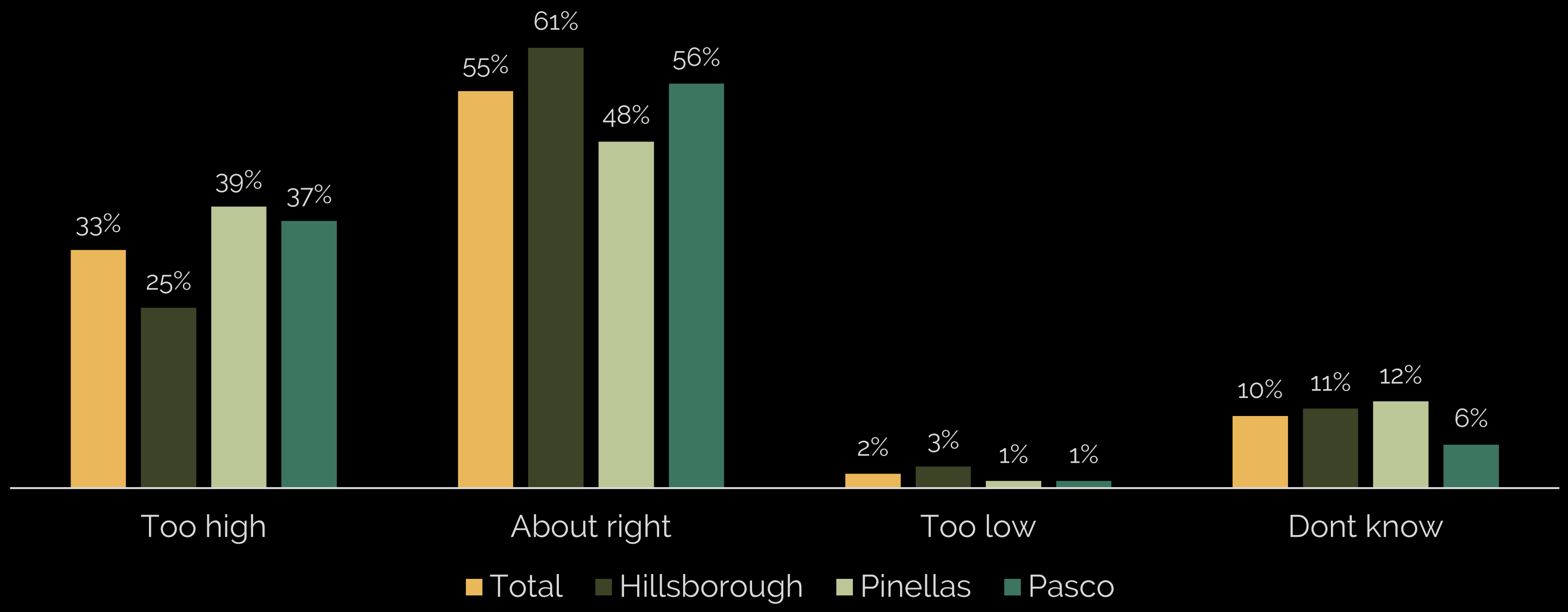
Given what you pay and what you receive, would you say the cost of your tap water is too high, about right, or lower than you expect?



- Fewer **residents (33%)** of Tampa Bay Water's service area feel tap water prices are too high, this feeling is **down 9% points since 2018**

WATER COST BY COUNTY

Given what you pay and what you receive, would you say the cost of your tap water is too high, about right, or lower than you expect?



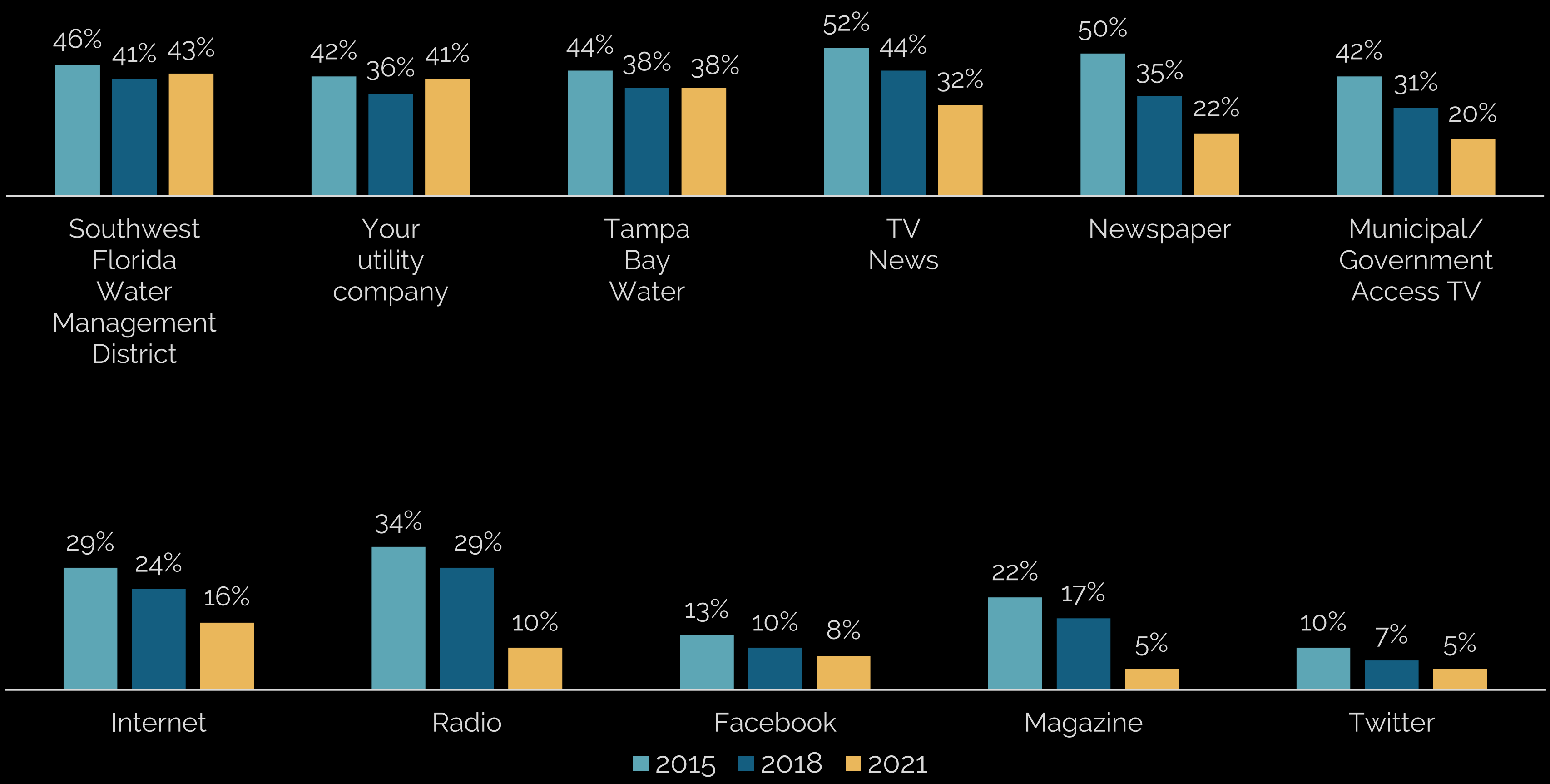
- Based on what they pay, **1 out of 3 residents (33%)** of Tampa Bay Water's service area feel tap water prices are too high
- **Pinellas County residents (39%) are more likely** to think the price of tap water is too high
- **Hillsborough County residents (25%) are least likely to feel this way**

DETAILED FINDINGS

Information Sources

TRUSTWORTHY SOURCES BY YEAR

Which of the following sources do you feel are trustworthy when reporting on water issues?[1]

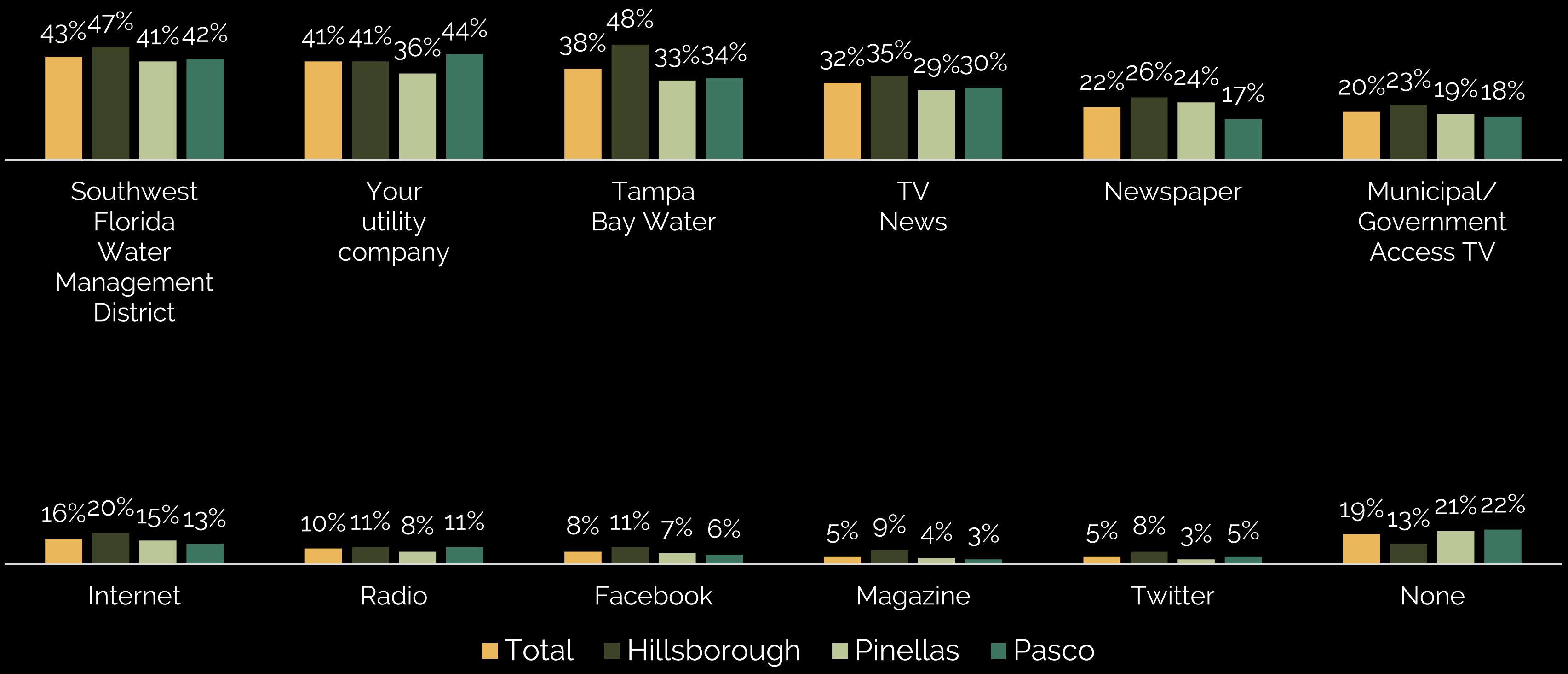


- **Television, which was the most trusted source in 2018, fell to the fourth spot**
- **Trust in sources of information dropped across the board**, with the exceptions of Southwest Florida Management District, residents' utility company, and Tampa Bay Water

[1] Multiple responses accepted.

TRUSTWORTHY SOURCES BY COUNTY

Which of the following sources do you feel are trustworthy when reporting on water issues?[1]

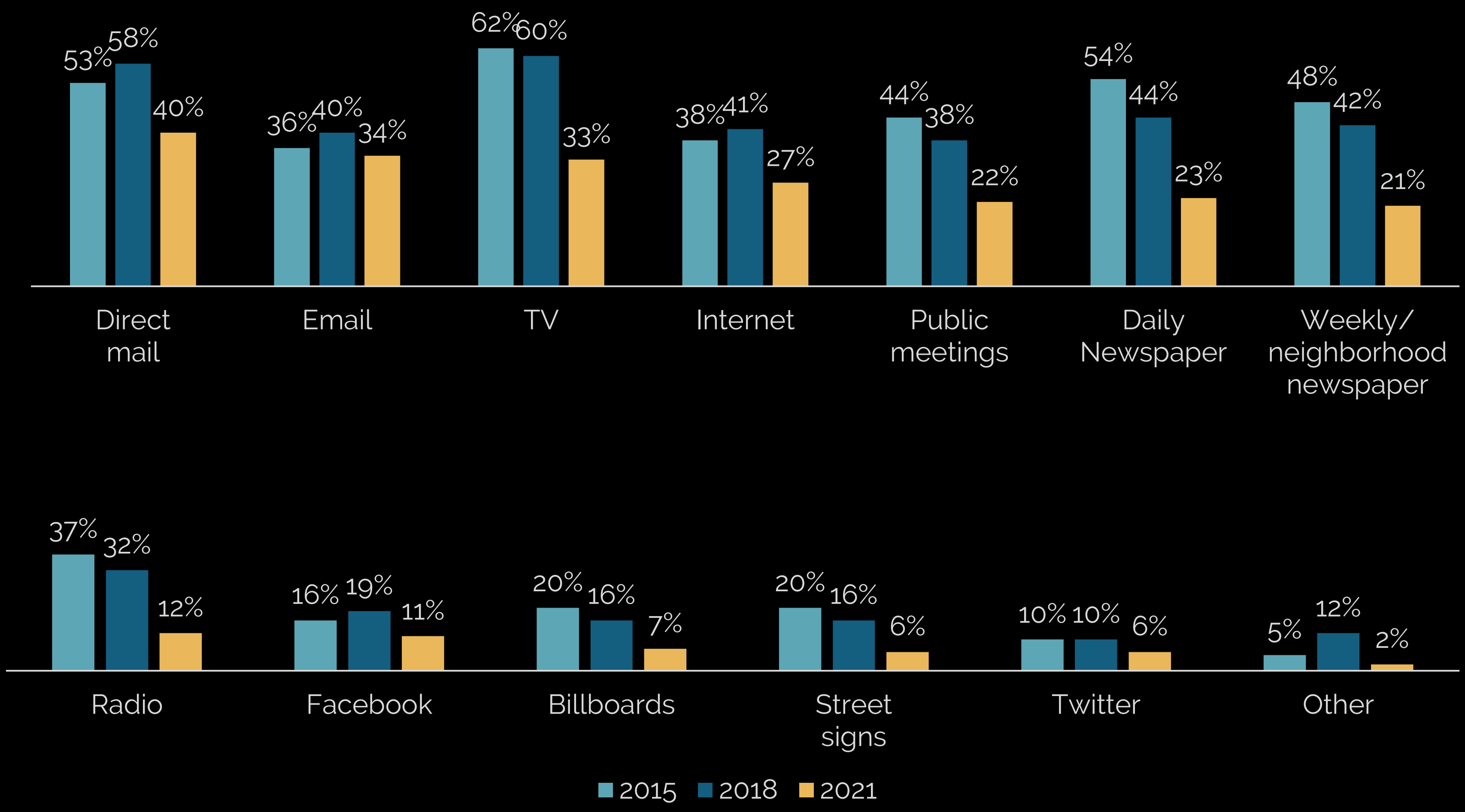


- **Southwest Florida Water Management District (43%)** is the most trusted source for reporting on water issues
- **Residents' utility company (41%)** is second and **Tampa Bay Water (38%) third**
- Social media sources fared poorly as only **8% listed Facebook and 5% listed Twitter** as trusted sources for water issues

[1] Multiple responses accepted.

INFORMATION PREFERENCE BY YEAR

How do you prefer to receive information about water resource issues and projects?[1]

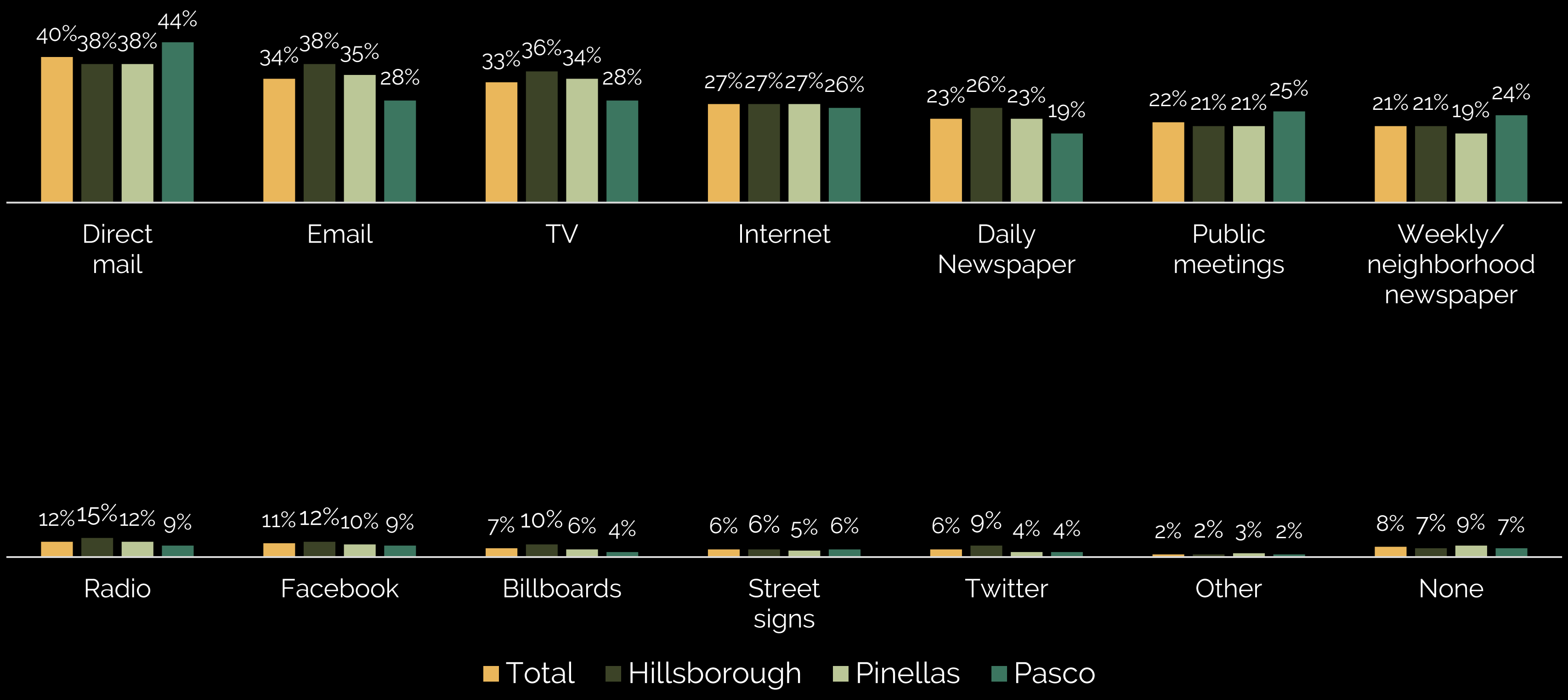


- There were decreases across all information sources from previous years, suggesting residents may not be interested in receiving any information whatsoever or have no preference to the medium in which this information is received

[1] Multiple responses accepted.

INFORMATION PREFERENCE BY COUNTY

How do you prefer to receive information about water resource issues and projects?[1]

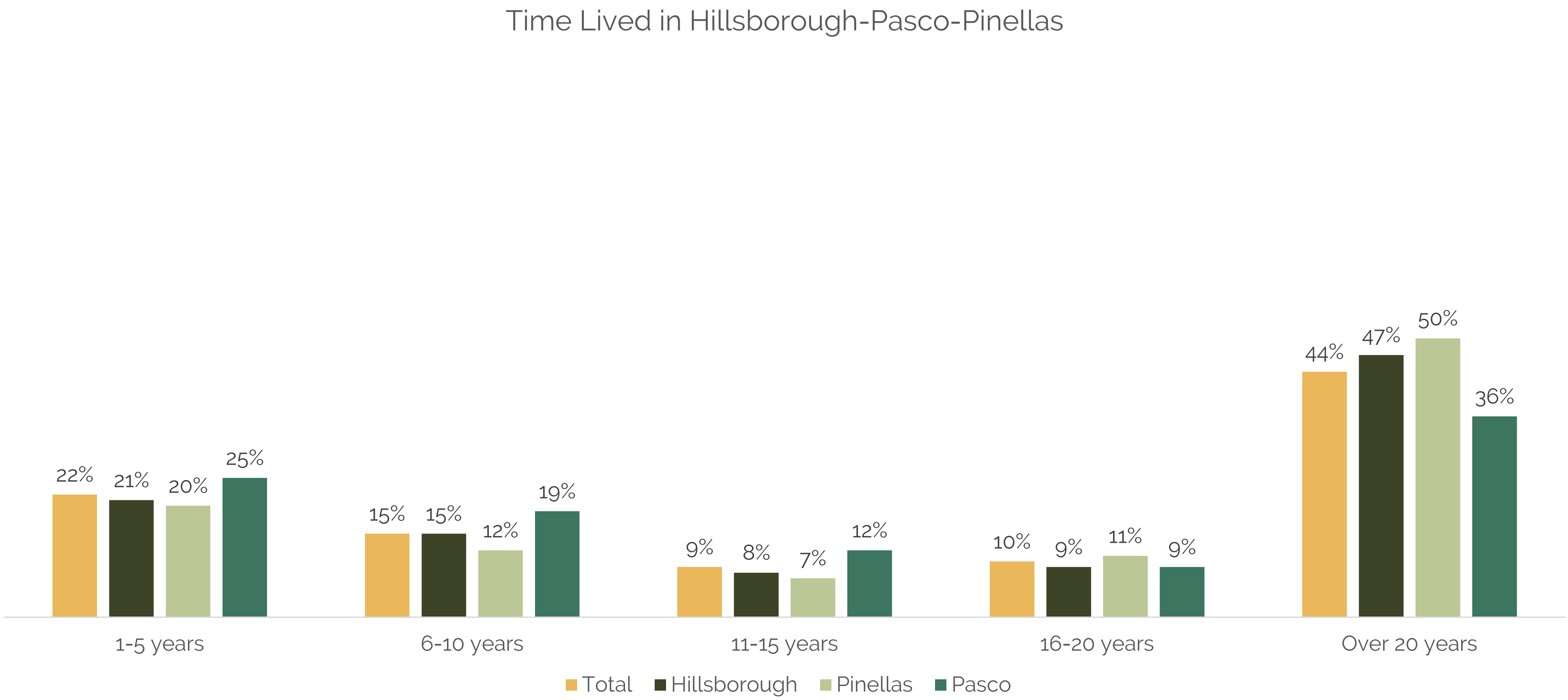


- **Direct mail (40%), email (34%), and television (33%)** are the three media from which residents prefer to receive information about water issues

[1] Multiple responses accepted.

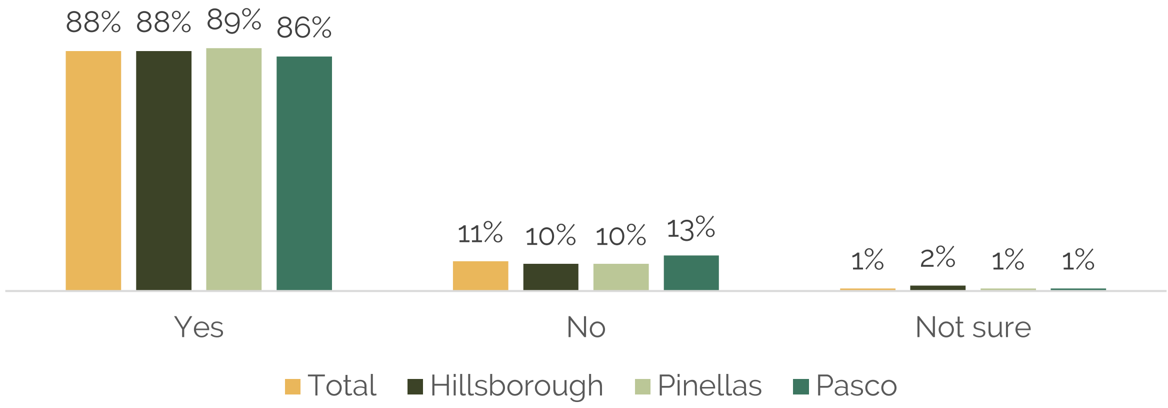
DETAILED FINDINGS

Demographics

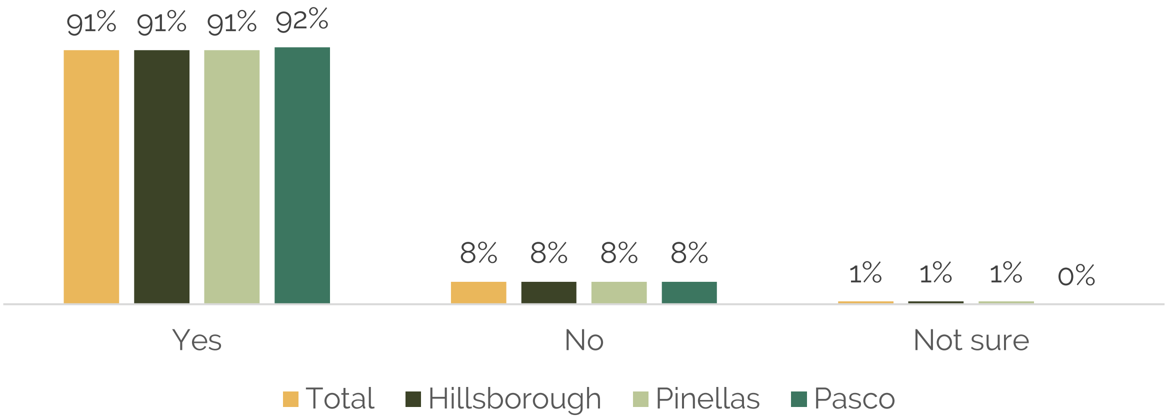

Time Lived in Hillsborough-Pasco-Pinellas
22%
21%
20%
25%
15%
15%
12%
19%
9%
8%
7%
12%
10%
9%
11%
9%
44%
47%
50%
36%
1-5 years
6-10 years
11-15 years
16-20 years
Over 20 years
Total
Hillsborough
Pinellas
Pasco

VOTING + HOME OWNERSHIP

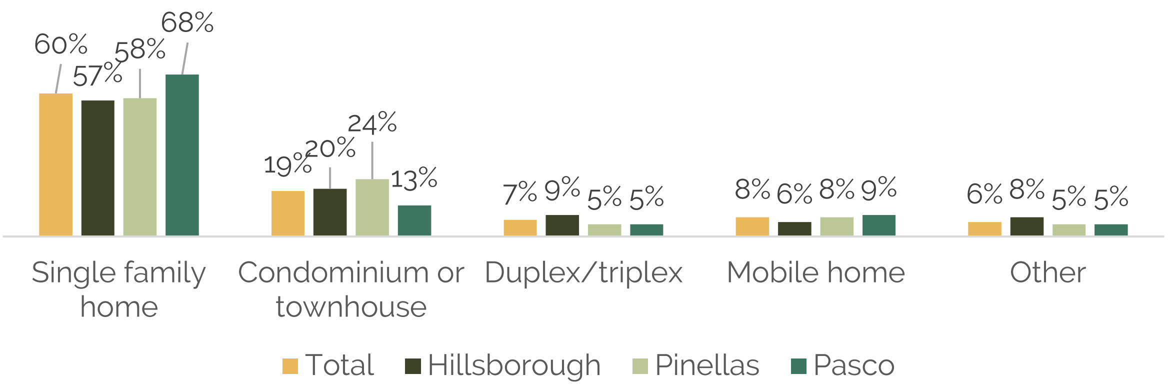
Registered to Vote in County



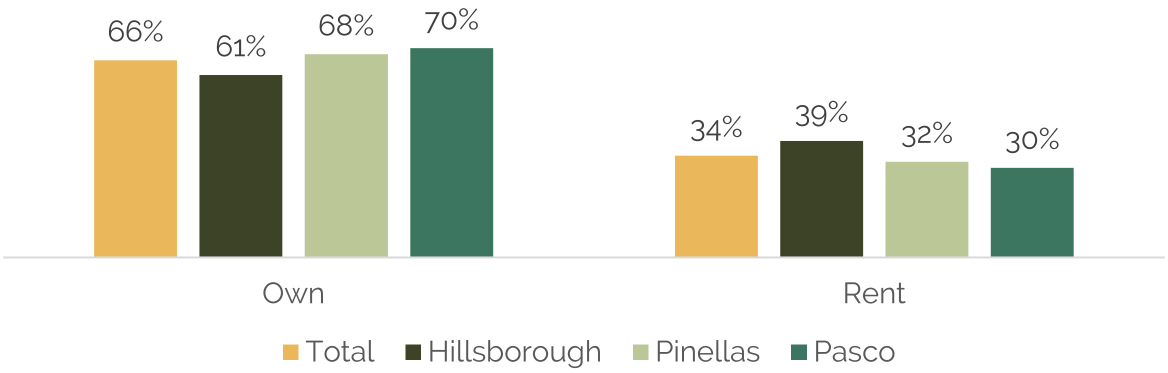
Have Voted in Past 2 Years



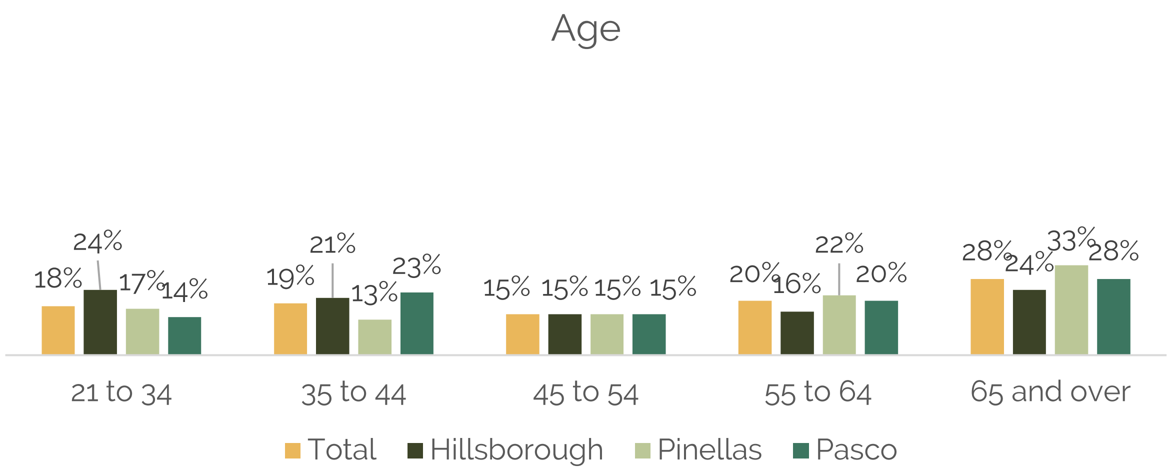
Home Type

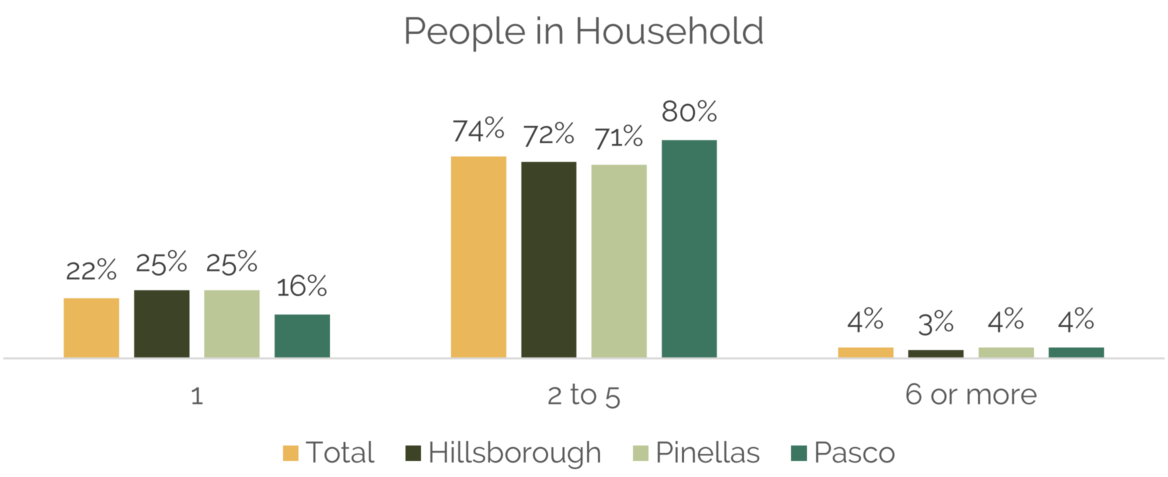


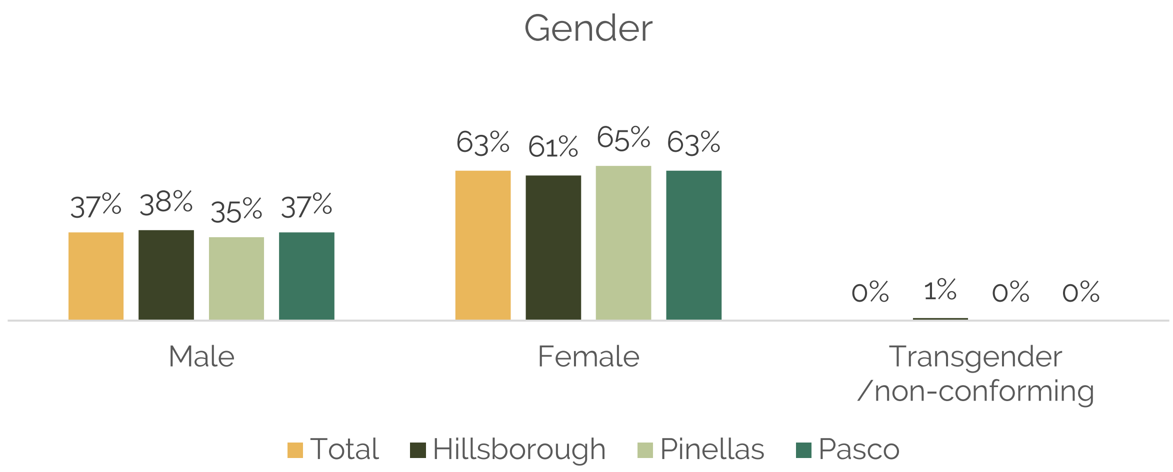
Home Ownership

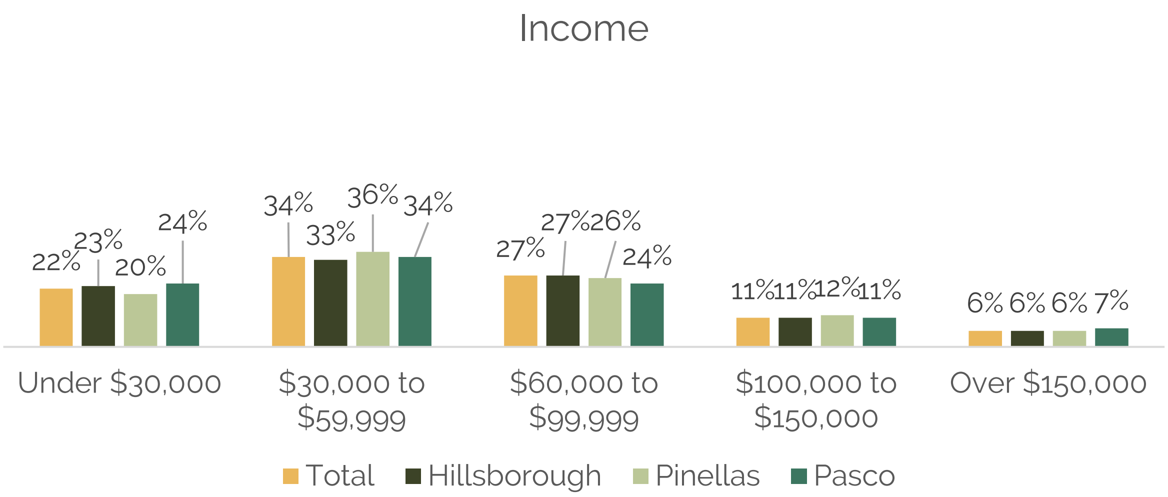


DEMOGRAPHICS









TAMPA BAY WATER

2021 Public Opinion Survey

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RESEARCH

Dialogue
public relations for water / construction / conservation

To: Amanda Schwerman, Black & Veatch
Bobby Burchett, Black & Veatch

From: Michelle Robinson, Dialogue Public Relations

Date: Jan. 4, 2023

Subject: Taproot Potable Water Reuse Survey Crosstab Report

Dialogue Public Relations has reviewed the above-referenced cross-tabulation report of data collected by Taproot on behalf of the Southwest Florida Water Management District in March of 2020. Following is a summary of Dialogue's impressions:

- The data collected and presented for Hillsborough, Pinellas and Pasco counties cannot be considered representative of the respective county populations, or the tri-county as a whole, due to the small sample sizes (the original survey sought to collect data at the water management district level, not at the county level). The total number of respondents for the tri-county region was 260 (Hillsborough, 125; Pasco, 60; Pinellas, 75). In contrast, Tampa Bay Water's periodic public opinion survey collects 400 responses per County to achieve a 2.8 percentage point margin of error for the region and 4.9 percentage point margin of error per County at the 95 percent confidence level (only Tampa Bay Water member government or consecutive system customers are surveyed).
- Respondents of the Taproot survey do not appear to reflect the population of each county. For example, 79 percent of respondents in Hillsborough report being a college graduate or having done post-graduate work, but the 2020 U.S. census indicates 35.5 percent of Hillsborough residents have a bachelor's degree or higher. Likewise, 87 percent of Pinellas respondents report having children under 18 at home, but census data indicates less than 20 percent of Pinellas residents are under 18.
- Of the respondents in the tri-county region, it is impossible to determine which are supplied drinking water by Tampa Bay Water's members due to the question-and-answer structure. Respondents were asked to select the sources of their drinking water, but possible answers included supply sources, such as reservoirs, desalinated seawater and springs, with possible providers, such as wells or drinking water from my utility. Respondents could "pick all that apply." Therefore, we don't know if the respondents are served by a utility, the kind of utility (private or municipal) or from a domestic well.
- Given the way the question and responses are worded regarding type of water a respondent drinks at home, the data does not clearly indicate whether a respondent drinks tap water from a utility or tap water from a well. Respondents could select "Tap water that is filtered in your home at your well" but could also select "Tap water that is filtered in your home through a pitcher or container" or "Unfiltered water straight from the tap/faucet," all of which could be supplied from a domestic well.

- The survey appears to have asked opinions on tap water from all respondents, even those on domestic wells.

In conclusion, based on the above examples and the lack of a statistically valid sample, the results of this cross-tabulation report cannot be seen as representative of the views of residents in Hillsborough, Pasco and Pinellas counties, either in total or individually.

Tampa Bay Water's 2021 public opinion survey provides the latest statistically valid views among member government customers, both at the regional and county level.

TECHNICAL AD HOC COMMITTEE MEETING
Meeting Minutes

Project Name:			Project No:	File Number:
2023 Long Term Master Water Plan Update			09016	
Subject:				
Technical Ad Hoc Committee Meeting #1				
Location:			**Date:**	**Time:**
Black & Veatch Office: 3405 W. Dr Martin Luther King Jr Blvd, Tampa, FL 33607			1/11/23	1:30 PM
Recorded By:				
Michelle Robinson, Dialogue Public Relations				

Participants:	Title:	Organization:	Attendance
Dr. Katherine Alfredo	Assistant Professor	USF Civil and Environmental Engineering Department	X
Dr. Michael Annable	Professor and Department Head	UF Department of Environmental Engineering Sciences	Virtual
Dr. Wendy Graham	Swisher Eminent Scholar and Director	UF Water Institute	Virtual
Dr. Jody Harwood	Professor and Chair	USF Department of Integrative Biology	X
Dr. Donna Petersen	Senior Associate Vice President and Health Dean	USF College of Public Health Professor	X
Dr. Mark Rains	Chief Science Officer for the State of Florida	USF School of Geosciences	X
Dr. Joan Rose	Homer Nowlin Endowed Chair in Water Research	Co-Director, Center for Water Sciences and Center for Advancing Microbial Risk Assessment, Michigan State University	Virtual
Bob Vincent	Environmental Administrator	Florida Department of Health	Virtual
Dr. Becky Zarger	Associate Professor	USF Department of Anthropology	X
Warren Hogg	Chief Science Officer	Tampa Bay Water	X
Danielle Keirsey	Planning Project Manager	Tampa Bay Water	X
Maribel Medina	Planning and Projects Manager	Tampa Bay Water	Virtual
Brandon Moore	Public Communications Manager	Tampa Bay Water	X
Meghan Christopher	Public Affairs Coordinator	Tampa Bay Water	Virtual
Adrienne Arceri	Project Manager II	Tampa Bay Water	Virtual
Kira Krall	Project Manager II	Tampa Bay Water	Virtual

TAMPA BAY WATER Supplying Water To The Region	**TECHNICAL AD HOC COMMITTEE MEETING** **Meeting Minutes**

Bobby Burchett	Program Manager	Black & Veatch	Virtual
Amanda Schwerman	Planning Manager	Black & Veatch	X
Jo Ann Jackson	Water Supply Specialist	Black & Veatch	X
Deanna Hamilton	CIP Project Manager	Black & Veatch	Virtual
Michelle Tudor	Engineering Manager	Black & Veatch	Virtual
Distribution:			

Action Items:				
No.	**Item**	**Assigned To**	**Due Date**	**Status**

Minutes:

Introductions, Purpose of the Ad Hoc Committee, Overview of Tampa Bay Water

Warren Hogg opened the meeting by thanking attendees for their time and participation. After attendees, staff and consultants introduced themselves, Warren provided a brief overview of Tampa Bay Water, its mandate and water supply system.

2023 Long-term Master Water Plan

Danielle Keirsey provided an overview of Tampa Bay Water's long-term planning process, which is required by its governing contracts. She discussed the purpose of the Long-term Master Water Plan, the screening criteria and the schedule for the 2023 update. She said this long-term plan is aiming to provide an additional 10 million gallons per day (mgd) in the 2033 timeframe.

Source Options Discussion

Amanda Schwerman then presented slides on the different water sources that are being investigated in the current Long-term Master Water Plan and presented the results of the coarse screening evaluation. She presented the potential project options by source. Group discussion, questions and answers, and comments followed each presentation of project concepts and proposed treatment trains by source.

a. <u>Desalination & Brackish Water Supplies</u>

- Power consumption with these sources should be considered; using more power to produce water seems like a short-term solution.

- What is the disposal method for inland brackish desalination? (Answer: deep well injection) How deep are the injection wells, and what are the rules for brackish brine disposal with deep well injection?
- With seawater desalination, does red tide impact intake/discharge? (Answer: Dissolved air flotation (DAF) does treat red tide and organic materials.
- Need to consider sea level rise and how it affects future projects.
- Does DAF remove toxins (algal?)? Is there a threshold trigger for toxins where DAF is shut down?
- Are these projects "and" or "or"? (Answer: could be both; Tampa Bay Water needs 10 mgd, they could look at projects that can be easily phased.)
- There is less variability in water quality with brackish groundwater, but is TOC a concern for brackish groundwater treatment?
- With both concepts, how to address residuals and power consumption are concerns.
- Are there consumptive use permits for seawater and brackish groundwater withdrawal? (Answer: Not at this time for seawater; yes for brackish groundwater.)
- Are there public concerns with desal and brackish treatment? (Answer: a discussion ensued about Tampa Bay Water's efforts to work closely with stakeholders to address concerns of stakeholders at the existing desalination facility as well as concerns voiced during outreach for a proposed Gulf Coast facility.)

b. <u>Surface Water Supplies</u>

- Have we estimated the cost for all the different options? (Answer: engineering estimates will be refined and presented in the shortlist of options.)
- For aquifer recharge, how many years of reduced rainfall can occur before you begin pulling native water?
- Can you bake-in operations protocols scheduling that keeps you in the aquifer storage and recovery (ASR) bubble? Can you establish a baseline so you don't "blow the bubble."
- With ASR, arsenic mobilization/oxygenation is a concern. Is there a pretreatment or treatment process we're considering that's specific to that?
- ASR still has arsenic addition by limestone, but it's easy to remove.
- Aquifer storage has more needs for monitoring/guidelines for capacity – what do you monitor for and what are the indicators?

- How would any of these new sources change the average water age in the distribution system? Nitrification? Chlorination? What is the current average water age?
- Impacts of climate change on surface water availability? Water quality? Previous analysis showed less availability from Alafia and Hillsborough. How is climate change factored in the surface water availability?
- How much performance data is available for rapid filtration basins?
- Plan for freshwater cyanotoxins monitoring and regulatory maximum contaminant levels (MCLs) within this 10-year window. Lab work, carbon and reverse osmosis (RO) treatment.
- West Palm Beach cyanotoxins were mobilized in the sediments on the intake side.

c. Fresh Groundwater & Other Water Supplies

- What percent of supply comes from groundwater currently? As population grows, will that percentage decrease over time? (Answer: currently around 60% and the supply mix percentages will likely change over time.)
- Groundwater is easiest to treat if we can get it, considering District limitations.
- Peace River Manasota Water Supply Authority surface water availability may be limited given sea level rise.
- Peace River Manasota Water Supply Authority is expanding pipeline network into Manatee County so connection may be feasible, but they may want water from Tampa Bay Water as well.
- Should granular activated carbon (GAC) be biological?
- A few large utilities with shallow wells in Florida urban areas have PFAS contamination; Florida Department of Health has data it can share.
- Where is the PFAS data coming from? (Answer: A discussion ensued regarding PFAS rule making.)
- Are other water utilities experiencing the same pressure in terms of water needs? How big is the region going to get socio-politically for there to be partnerships with other utilities?
- What is the storage shown on the groundwater treatment diagrams? (Answer: ground storage tanks used operationally for treatment and high demand periods.)
- Any well sites at risk for contamination from septic systems? (Answer: Tampa Bay Water's wells are generally cased 100 plus feet deep in aquifers that don't interact with septic systems.)

- Is the East Pasco Wellfield concept in a protected area, or will it require new property purchases?
- Do you try to stay away from sinkhole areas with groundwater wells? Flooding can affect sinkhole formation, which can affect water quality.

d. Indirect & Direct Potable Reuse

- Conversation on these sources started with discussions on the following questions:
  - How much do we know about direct potable reuse throughout the country? (Answer: Jo Ann Jackson, Black & Veatch's OneWater expert, provided an overview of direct potable reuse (DPR) projects in the United States.)
  - Would this be a pilot scale or larger scale with direct? (Answer: Yes, a pilot project is contemplated as there are no rules yet in Florida.)
  - How about California? Any projects? (Answer: the group discussed indirect potable reuse (IPR) projects in California.)
  - Singapore's NEWater reuse project? (A discussion ensued about how Singapore's NEWater went from a potable project to primarily an industrial water project with some augmentation of its reservoir.)
  - Senate Bill 64, to what extent are we coordinating with members to help address it? How much water do members have to sell? How much of the projected demand could this source address? (The group discussed which members have available reclaimed water and their quantities, as well as Tampa Bay Water's 10 mgd for its next increment of water.)
- How much is DNA being considered? A lot makes it through the wastewater treatment process. Concern is antibiotic resistant bacteria and genes. Possible horizontal gene exchange. Potential for human health issue.
- Public will want to know what's in the water that we aren't testing for.
- Agrees with concerns, but the reclaimed water constituents remain whether or not the water is consumed.
- Public opinion needs to be part of the data collected for this source. Singapore had five years of study with a focus on water quality and transparency with the public. They posted data on a public dashboard that was an important tool with the community.
  - Need to continue monitoring and sharing results even if the result is no detect or zero.

- Accessibility shouldn't be limited to online as some stakeholders may never access that information. Trusted influential sources are important to helping reach these stakeholders.

- California had a working group of advocates to support is potable reuse project. Medical professionals, universities and other trusted sources helped garner support.
- This may be a good time/moment for IPR given droughts and water shortages in other parts of the county.
- For indirect and withdrawal, what happens during times of stress? The 10 percent offset isn't addressing the environment so what are the permitting considerations for protecting levels?
- Public opinion data should be collected and analyzed over time by demographics, region, neighborhood, homeowners and renters. Sometimes it is hard to collect data on renters.
- Storytelling is important – not just showing a bunch of facts and figures but telling the story in a relatable way. Something that resonates. Brewery using reuse to make beer.
- Most people aren't separating the supply options like we do. It's not about one solution but communicating how they all fit together now and in the future.
- Data collection, testing, analyzing communication over time long-term for all source options is important; modify in response to what we learn.
    - Need holistic perception of the public for all sources.

d. <u>Comments Related to All Sources</u>

- Will any of these water sources or new treatment plants create geographic/demographic disparities among customers?
- You have 11 water treatment plants, are they all connected or do they serve specific areas? How do these new facilities fit into the system?
- Potable reuse, and all the sources, need to stay part of the Long-term Master Water Plan due to uncertainty in the future.
- Taste and odor should not be brushed off as "aesthetics." Taste and odor are just as important to consumers as water quality and should be an up-front consideration.

Other Comments:

Next Meeting

- Friday, March 24, 9:30 a.m. at Black & Veatch

TECHNICAL AD HOC COMMITTEE MEETING
Meeting Minutes

Project Name:	Project No:	File Number:
2023 Long-term Master Water Plan Update	09016	
Subject:		
Technical Ad Hoc Committee Meeting #2		
Location:	**Date:**	**Time:**
Black & Veatch Office: 1715 N Westshore Blvd, Suite 725, Tampa, FL 33607 and Teams	5/11/23	1:00 PM
Recorded By:		
Michelle Robinson, Dialogue Public Relations		

Participants:	Title:	Organization:	Attendance
Dr. Katherine Alfredo	Assistant Professor	USF Civil and Environmental Engineering Department	X
Dr. Michael Annable	Professor and Department Head	UF Department of Environmental Engineering Sciences	Virtual
Dr. Wendy Graham	Swisher Eminent Scholar and Director	UF Water Institute	Virtual
Dr. Jody Harwood	Professor and Chair	USF Department of Integrative Biology	Virtual
Dr. Donna Peterson	Senior Associate Vice President and Health Dean	USF College of Public Health Professor	
Dr. Mark Rains	Chief Science Officer for the State of Florida	USF School of Geosciences	Virtual
Dr. Joan Rose	Homer Nowlin Endowed Chair in Water Research	Co-Director, Center for Water Sciences and Center for Advancing Microbial Risk Assessment, Michigan State University	Virtual
Bob Vincent	Environmental Administrator	Florida Department of Health	Virtual
Dr. Becky Zarger	Associate Professor	USF Department of Anthropology	X
Warren Hogg	Chief Science Officer	Tampa Bay Water	X
Danielle Keirsey	Project Manager III	Tampa Bay Water	X
Maribel Medina	Planning and Projects Director	Tampa Bay Water	Virtual
Brandon Moore	Public Communications Manager	Tampa Bay Water	X
Bobby Burchett	Program Manager	Black & Veatch	X
Amanda Schwerman	Planning Manager	Black & Veatch	X
Jo Ann Jackson	Water Supply Specialist	Black & Veatch	Virtual

TAMPA BAY WATER Supplying Water To The Region	TECHNICAL AD HOC COMMITTEE MEETING **Meeting Minutes**		

Deanna Hamilton	CIP Project Manager	Black & Veatch	Virtual
Michelle Robinson	Public Engagement Consultant/Facilitator	Dialogue Public Relations LLC	X
Distribution:			

Action Items:				
No.	**Item**	**Assigned To**	**Due Date**	**Status**
1	Send final Universe of Options & Coarse Screening tech memos to committee	M. Robinson	6/16/23	
2	Send final Fine Screening tech memo when available	M. Robinson	7/3/23	
3	Write summary of ad hoc committees' purpose for committee review	M. Robinson	5/19/23	
4	Send meeting invitation for tech ad-hoc committee meeting #3; 9/13/23 at 1 p.m.	M. Robinson	5/12/23	Placeholder sent; Teams invite to follow

Minutes:

Introductions, Purpose of the Ad Hoc Committee, Overview of Tampa Bay Water

Warren Hogg opened the meeting by thanking attendees for their time and participation. After attendees, staff and consultants introduced themselves, Warren provided a brief overview of Tampa Bay Water, its mandate and water supply system. He reminded participants that the purpose of the ad hoc committee is to help Tampa Bay Water understand the concerns of technical leaders in the water industry. He said Tampa Bay Water wants to understand their concerns for the various source options, including questions to be answered and data to be gathered during future feasibility studies.

2023 Long-term Master Water Plan

Danielle Keirsey provided an overview of Tampa Bay Water's long-term planning process, which is required by its governing contracts. She discussed the purpose of the Long-term Master Water Plan, the screening criteria and the schedule for the 2023 update. She said this long-term plan is aiming to provide an additional 10-20 million gallons per day (mgd) in the 2033 timeframe, and the utility is looking at several options to meet that need. Danielle then described the evaluation process to narrow the universe of options down to 11 options through coarse and fine screening and said the project team is now working on paring down those 11 options to around 5 options through the short-list evaluation process.

Stakeholder Input to Date

Michelle Robinson provided an overview of stakeholder input received since the January technical ad hoc committee meeting. She said input received through the environmental ad hoc committee meeting and five focus groups showed that known water supply sources are generally more acceptable to the public, including groundwater, river water and desalinated seawater, though concerns were voiced for each source type, ranging from environmental concerns to cost. Reclaimed water as a source received strong negative reactions, with residents skeptical that the water could be cleaned enough to remove all known and unknown contaminants. She shared some of the common themes that Tampa Bay Water can use going forward, including the need for transparency and data for all sources, that residents want to know the standards and whether they are the same for all sources, and independent third-party confirmation or participation would help bolster trust.

Source Options Discussion

Amanda Schwerman then presented slides on the projects that made it through the fine screening process. She presented the 11 potential project options by source: three desalination and brackish water projects; three surface water projects; and five groundwater projects, one of which is made possible by generating groundwater withdrawal credits through aquifer recharge with reclaimed water, such as Hillsborough County's SHARP (South Hillsborough Aquifer Recharge Project). She noted that this was the only concept involving reclaimed water that scored high enough to continue to the next step of evaluation. She indicated that indirect and direct potable reuse concepts scored well in Environmental Sustainability, System Integration & Expansion Potential, Yield Reliability and Regional System Reliability Impacts, but scored poorly in Regulatory and Permitting (since there are currently no direct potable reuse regulations in the State of Florida), Public Reception, Life Cycle Costs, and Cost Risk Factors.

After the presentation, the group asked questions and provided comments, which are categorized and captured below:

a. <u>Comments and Questions Related to All Sources</u>

- Can you summarize/explain the screening process? And are there reports Tampa Bay Water can share with the ad hoc committee? (Answer: Tampa Bay Water used board-approved equally weighted criteria, with additional weighted sub-criteria, to evaluate each concept. Tampa Bay Water's consultant, Black & Veatch, has prepared technical memoranda for each phase of the screening process. The first tech memo, "The Universe of Options Technical Memorandum," summarizes all the potential concepts under consideration as well as the preliminary assumptions for treatment and infrastructure requirements. The second memo, "Coarse Screening Technical Memorandum" summarizes the coarse screening process and criteria used to evaluate the concepts included in the Universe of Options to reduce the number of options/concepts to approximately 50. Both of these memos are completed and will be made available to the committee. The draft Fine Screening Technical Memo is currently under review by Tampa Bay Water Staff and should be available to the Committee this June.)

- Who does the rating/ranking of project concepts using the evaluation criteria? (Answer: Tampa Bay Water's consultant, Black and Veatch, and their sub-consultant, ESA, evaluate and rank the projects. They have several experts on staff who participate. The results are shared with Tampa Bay Water staff and member governments for feedback and adjusted if needed.)
- What timeframe does this plan cover? (Answer: The Long-term Master Water Plan is updated every five years and covers a 20-year planning horizon. The current plan looks at demands into 2050, with the next increment of new water needed by 2033.)
- What projects were removed since the coarse screening? (Answer: More information can be found in the technical memos, but some of the major projects that did not make it through the fine screening include the Gulf Coast Seawater Desalination Project, the seawater and brackish desalination projects in St. Petersburg, the Lake Thonotosassa surface water project, and several direct/indirect potable reuse projects, including recharge projects in northern Pinellas and Pasco counties.)
- You have these 11 projects remaining after fine screening; so what happens to the other six projects that don't make it through the short-list screening? (Answer: Some of these projects have the potential to be selected for continued evaluation as "developmental alternatives" or they will be put back into the Universe of Options database for reconsideration as part of the next (2028) Long-term Master Water Plan update.)
- What caused things to be screened out? Did we recognize any patterns during the screening process? Any categories that were lower for some projects? (Answer: It was different for each concept, but for potable reuse concepts we saw themes such as the unknowns associated with permitting and regulations. For the Lake Thonotosassa concept, we made initial assumptions regarding the concept and after further evaluation we refined the requirements, which increased the project cost estimate and reduced the supply reliability, resulting in a lower score. The projects that remain on the list generally have higher scores for yield reliability, cost, and environmental sustainability.)
- U.S. EPA recently issued guidance on PFOS and PFOA. Will PFAS be considered as you evaluate these projects? (Answer: Yes, for existing supply sources and treatment plants Tampa Bay Water and the members are all sampling under UCMR5. The City of Tampa completed its first quarter of sampling this January. Tampa Bay Water and the other member governments will begin sampling this summer and will make data available for the first quarterly sampling event by September. Tampa Bay Water is collecting water quality data on the upstream side of the water delivery points to its member governments, and the member governments are sampling on the downstream side. For the future water supply concepts that are currently being evaluated, the team included "cost risk factors" as one of the sub-criteria for scoring each concept. One "cost risk factor" considered was whether the supply source and assumed treatment process has a risk of needing additional treatment processes in the future if more stringent PFAS regulations are enacted.)

- PFAS are going to be very important. Continue incorporating PFAS in your evaluations and planning, both short-term and long-term.
- Does the plan consider ecological impacts on surface waters and the aquifer? (Answer: Yes, and feasibility studies would go into more detail to evaluate potential impacts.)
- In the future, utilities have to figure out how we better communicate with the public. They don't know about their water system; they don't read the consumer confidence reports. We need to invest in apps or dashboards to display data and share information about projects in an easy-to-understand way. How do we get people to read or look for this information?
- With red tide studies, we are finding people seem more ready to receive that information and search it out than they were years ago.
- How do we present the water quality data in a better way?
- Building trust in the infrastructure delivering water to homes, such as pipes, and in governments supplying the water is important.
- Overall, water providers need to improve communications about water, perhaps similar to a weather report. Need to improve communications so that water is top-of-mind and consumers start to seek information on a regular basis. Perhaps a dashboard or trend data. Look at work done for SARS data collection in wastewater. Non-detects are okay to show. Consider sharing where we stand compared to the nation? High/low in comparison to other utilities.
- Did you consider risk factors for sea level rise or temperature/climate change? (Answer: Yes, these risk factors were considered in the fine screening, which contributed to one of the reclaimed water projects and some of the seawater and brackish desalination projects falling off the list.)
- The City of Tampa is going to increase their request for water from Tampa Bay Water. Is that going to change over time? Have you accounted for that? (Answer: Yes. The City of Tampa has a permit allowing them to take up to 82 mgd from the Hillsborough River when available. That is in our interlocal agreement among the members. We plan for an annual average of 6 mgd additional currently, and additional water demand in the City above its 82 mgd permit limit will be provided by Tampa Bay Water.)
- What do you do when there are droughts, when all of these sources are going to be limited? Do you take drought into consideration in the planning process. (Answer: Right now, Tampa Bay Water mitigates the impacts of drought with the 15.5-billion-gallon C.W. Bill Young Regional Reservoir. We store water here during wet times, and during dry times, it can feed the surface water treatment plant with up to 80 mgd. There are projects in the current long-term plan that also include reservoir storage. Long-term reliability is one of the evaluation criteria.)

- Which bins had the highest environmental scores? (Answer: Reuse projects generally scored well on the environmental side.)
- How did surface water and groundwater compare on the environmental scores? (Answer: This varied by location and what impacts were projected to occur; there wasn't a real trend as the scores varied by project.)
- Do you coordinate with other large wastewater treatment utilities to figure out what they are doing with their water and how it might affect your project concepts in the future? (Answer: Yes, Tampa Bay Water and Black and Veatch met with each member government when the Long-term Master Water Plan project was kicked off to get an understanding of what their current and long-term plans are for their reclaimed water supply, including estimated quantities. We have continued to coordinate and update them throughout the process to get feedback and updated information.)
- Do you build into your analysis the competition for water from others in the region that are growing, like Dade City or Plant City? (Answer: Yes, in the regulatory and permitting criteria. For example, for the Eastern Pasco Wellfield concept, the Water Management District informed us that Dade City and Zephyrhills are looking for water in those areas as well.)
- Is the District part of this process? (Answer: Yes, to a degree. We have been meeting with them throughout the process to get their feedback on the project concepts, and for their feedback on permitting challenges we may have, as well as what types of modeling they are going to want to see to support the applications. However, the District won't give an opinion on a project until a water use permit application is submitted.)
- Will the District co-fund any of these projects? (Answer: That depends on the timing of the funding request as most of the available co-funding dollars are currently allocated. It would also depend on the source type and whether the project would qualify for funding.)
- Are we looking at water supply sources and where they are geographically in relation to where the actual demands are for growing areas? (Answer: Yes, this is included in the system integration and cost categories.)
- How will you report and share our input and advice? It is important for the committee to know how we report our involvement, and we will want to confirm we are all comfortable with it. It will also affect the credibility of the projects and the ad-hoc technical process. We want to review and provide input on what this language looks like. Describe the committee, and make sure it's clear that we aren't necessarily agreeing on all the same things, but more just individual feedback. It's not a consensus workshop, so we will need to be careful of how we convey the information we are reporting. (Answer: Agreed. The purpose of the ad hoc committees is to provide input that will be used in the feasibility process: what questions need to be answered about the various concepts? What types of information and data should Tampa Bay Water seek and study? Minutes from the ad hoc committee meetings will be included in

the Long-term Master Water Plan report appendices. Tampa Bay Water and Dialogue will prepare language for the committee's review.)

b. Desalination & Brackish Water Supplies

- Cost in terms of dollars and power/carbon are continued concerns for these concepts.
- What criteria caused the Anclote Desalination Plant to fall off the list? (Answer: The Anclote Desal Facility fell off mainly due to cost, vulnerability to storm surge, water quality concerns, getting it to customers in the system, and environmental concerns regarding withdrawing seawater.)
- Is waste disposal a concern for seawater and brackish desalination projects? (Answer: Yes, the concentrate disposal method can vary. For the seawater desalination concepts, it was assumed that the concentrate would be diluted and returned back into the body of water from which it was withdrawn. The St. Petersburg brackish groundwater option assumed deep well injection for concentrate disposal.)

c. Surface Water Supplies

- Ecological and environmental impacts should be considered. (Discussion: Warren Hogg explained how the water use permits issued by the Southwest Florida Water Management District for Tampa Bay Water's surface water sources work. He explained that they are flow-based withdrawal schedules that protect the low and high flow regimes of the river systems. For example, for the Alafia River, the District set a suite of flows (high, medium and low), and we tie our withdrawals to that. Below a certain level, we take nothing in order to protect the estuarine environment downstream.)
- Were surface water and changes in precipitation patterns taken into consideration? (Answer: Yes, the criteria take into consideration climate change and precipitation patterns in the yield reliability, but further analysis would need to be conducted during the feasibility study phase to do an in-depth analysis. Tampa Bay Water looks at hydrological dry condition it its long-term planning.)
- Does your evaluation consider climate change and its impacts on water quality? (Answer: Yes, and we see this now on the Alafia River with respect to fluoride. These impacts are considered in the cost of treatment for the various supply options.)
- Recent research conducted on a reservoir showed better water quality than the native river/surface water source as some parasites and other contaminants settled into the sediment.
- Surface water sources could be risker due to impacts of drought on availability, recreation and water quality.

d. Fresh Groundwater & Other Water Supplies

- Are you taking into consideration environmental/ecological impacts associated with pumping and surface water withdrawals? (Answer: Yes. And if these concepts make it to the feasibility phase, modeling will be conducted to determine potential yield as well as to understand the projected water level drawdowns and any streamflow impacts at different production levels.)
- Does increasing the Consolidated Water Use Permit consist of increasing withdrawals from 90 million gallons per day (mgd) to some rolling annual average? What would that increase be? (Answer: Right now we are still refining that number and it could range from 1 mgd to 10 mgd, but it's a very low-cost option compared to the other projects, so even a small amount of additional permitted capacity would be worth the effort.)
- If it's permitted, and the groundwater pumping results in negative impacts, then what? (Answer: Tampa Bay Water addresses this by monitoring water levels, and rotating pumping and resources to avoid or reduce impacts. However, if there are unanticipated impacts, Tampa Bay Water would be required to mitigate impacts and potentially reduce withdrawals. But we have a long track record of managing groundwater withdrawals in a way that is environmentally sound and that would remain the goal if the permitted capacity for groundwater withdrawals was increased.)
- Impacts to the environment should be considered.
- The current recovery at the wellfields – was the reduction to 90 mgd responsible for that recovery and did the Water Management District agree that the environment has recovered? (Answer: Yes, the reduction in wellfield pumping to an annual average of 90 mgd was responsible for the environmental recovery at the wellfields. We renewed our permit in January 2022 and the District determined the area had recovered; we reestablished a new baseline for future comparisons with the permit renewal.)
- How vulnerable is the aquifer? How does it replenish? And are any of these wellfields in areas where we need to be concerned with saltwater intrusion? (Answer: The Floridan Aquifer is resilient and replenishes by rainfall and stormwater runoff that seeps as far north as the Green Swamp, which is known as the "heart of the Floridan Aquifer." Water in the aquifer flows toward both coasts. There are two wellfields in Tampa Bay Water's system that have been vulnerable to saltwater intrusion in the past, but pumping reductions and operational strategies have stalled the movement of saltwater inland in these areas. The new wellfields currently under consideration would be sited in areas that are not vulnerable to saltwater intrusion.)

e. Developmental Alternatives/Reclaimed Water

- If we educated the public to frame reclaimed water coming out of their tap, by informing them that the amount of reclaimed water that may be delivered to their home is a small percentage, that it will be blended with other sources, dilution, etc., they may be more accepting of the concept? Has this been explored by the Agency? (Answer: This round of focus groups sought to understand the acceptability by water customers of each source under consideration. Downs & St. Germaine Research constructed the questions to be neutral to determine if each source was treated to local, state and federal drinking water standards, whether it would be acceptable to customers. The focus group moderator also asked what information or data participants would need to feel comfortable that each source type is safe to drink and probed attitudes and options throughout the discussion.)

- It may be helpful for the group to review and provide input on the questions that were used in the public focus groups. (Answer: The last quantitative survey was conducted by DSG Research. Tampa Bay Water is not planning another survey until 2024.)
- Would demonstrating that by using reclaimed water, cost to the customer won't go up, or would be at a discount versus other sources? Have we considered this messaging? (Answer: Tampa Bay Water has not considered that messaging. Without permitting rules in place, the estimated cost of reuse projects is projected to be high and would likely cause rates to go up, unless there was significant grant funding to offset the cost. But additionally, that message and the water delivery would have to be explored to ensure that it doesn't create a social justice concern among residents.)
- When will developmental alternatives be evaluated? Now or in the future? If the agency waits, it will be too late, so it is better to start now. And public outreach should not stop with the developmental alternatives. (Answer: Work on the developmental alternatives continues, including public engagement. These concepts require additional work and additional time for things like pilot testing, regulation promulgation and public outreach. Work will continue, and one or more of the developmental alternatives could potentially be moved into the short-list of concepts that Tampa Bay Water will select from for the next water supply expansion program.)

Other Comments:

Next Meeting

- Sept. 13, 2023, 1-3 p.m. via Teams

TAMPA BAY WATER Supplying Water To The Region	**TECHNICAL AD HOC COMMITTEE MEETING** **Meeting Minutes**

Name:		Project No:	File Number:
2023 Long-term Master Water Plan Update		09016	
Subject:			
Technical Ad Hoc Committee Meeting #3			
Location:		**Date:**	**Time:**
Microsoft Teams		9/13/23	1:00 PM
Recorded By:			
Michelle Robinson, Dialogue Public Relations			

Participants:	Title:	Organization:	Attendance
Dr. Katherine Alfredo	Assistant Professor	USF Civil and Environmental Engineering Department	X
Dr. Michael Annable	Professor and Department Head	UF Department of Environmental Engineering Sciences	X
Dr. Wendy Graham	Swisher Eminent Scholar and Director	UF Water Institute **Had to respectfully resign from the committee due to a new national assignment*	
Dr. Jody Harwood	Professor and Chair	USF Department of Integrative Biology	X
Dr. Donna Peterson	Senior Associate Vice President and Health Dean	USF College of Public Health Professor	
Dr. Mark Rains	Chief Science Officer for the State of Florida	USF School of Geosciences	X
Dr. Joan Rose	Homer Nowlin Endowed Chair in Water Research	Co-Director, Center for Water Sciences and Center for Advancing Microbial Risk Assessment, Michigan State University	X
Bob Vincent	Environmental Administrator	Florida Department of Health	
Dr. Becky Zarger	Associate Professor	USF Department of Anthropology	
Warren Hogg	Chief Science Officer	Tampa Bay Water	X
Danielle Keirsey	Project Manager III	Tampa Bay Water	X
Maribel Medina	Planning and Projects Director	Tampa Bay Water	X
Brandon Moore	Public Communications Manager	Tampa Bay Water	X
Meghan Christopher	Communications Coordinator	Tampa Bay Water	
Bobby Burchett	Program Manager	Black & Veatch	X

TAMPA BAY WATER Supplying Water To The Region	**TECHNICAL AD HOC COMMITTEE MEETING** **Meeting Minutes**

Amanda Schwerman	Planning Manager	Black & Veatch	X
Deanna Hamilton	CIP Project Manager	Black & Veatch	
Michelle Tudor	Engineering Manager	Black & Veatch	
Distribution:			

Action Items:				
No.	**Item**	**Assigned To**	**Due Date**	**Status**
1	Review of meeting #3 minutes	M. Robinson	9/29/23	

Minutes:

Introductions, Purpose of the Ad Hoc Committee, Overview of Tampa Bay Water

After introductions, Warren Hogg opened the meeting announcing that Wendy Graham respectfully resigned from the ad hoc committee due to a new position with the National Science Foundation. She will be the Division Director in the Geosciences Directorate called RISE (Research, Synergies, Innovation and Education). Mr. Hogg then thanked the ad hoc members for their time and participation, expressing gratitude on behalf of Tampa Bay Water for the attendees sharing their time and expertise to help shape feasibility studies for the shortlist and developmental alternatives projects. Mr. Hogg provided an overview of the agenda, then turned the presentation over to Ms. Keirsey.

2023 Long-term Master Water Plan

Danielle Keirsey provided an overview of Tampa Bay Water's water supply expansion process, which typically takes 10 years to complete. The process starts with the Long-term Master Water Plan, which provides a short list of projects recommended for further study. Approved projects go through a feasibility program, which results in feasible projects being recommended to the board for water supply selection. Projects that are selected then go into design and construction to become the region's next water supply facilities. Ms. Keirsey then showed a graphic that depicted Tampa Bay Water's projected water supply needs. The surface water treatment plant expansion, approved through the last Long-term Master Water Plan process, is expected to add 10 million gallons per day to the region's water supply in 2028. In 2033, Tampa Bay Water is projecting it will need another 10-20 million gallons per day, with a total of 25 million gallons per day needed by 2043. Ms. Keirsey then reviewed the shortlist evaluation criteria, then turned the presentation over to Amanda Schwerman.

Shortlist Concepts & Developmental Alternatives

Amanda Schwerman presented slides on the water supply projects remaining after the shortlist screening evaluation. Seven projects were shown, which represent geographic and source diversity. She then presented slides on each project concept, discussing the project's source water, treatment process, estimated yield and additional pipeline needs.

She said if the shortlist is approved by the board, the next step for the seven projects is to enter into the feasibility study phase, where a more detailed technical and economic analysis will be completed. Feasibility studies will provide more certainty regarding yield, water quality and costs, and determine if there are any roadblocks that may remove the project from consideration.

Ms. Schwerman then presented slides on developmental alternatives. She said Tampa Bay Water will be studying developmental alternatives alongside the seven feasibility studies. The current developmental alternatives are all evaluating the potential for potable reuse, including direct potable reuse at locations such as the desalination plant, regional surface water plant and other locations, or indirect potable reuse through groundwater wellfields or surface water reservoirs.

The developmental alternatives would start with the member government facilities that have available excess reclaimed water, including Hillsborough County, Pinellas County and the City of Tampa. She said the first step would include conducting source-water assessments for each reclaimed water source and then building on the information from this to evaluate potential concepts more thoroughly.

After the presentation, the group asked questions and provided comments, as noted below:

- What is the difference between the shortlist projects and developmental alternatives? (Answer: The developmental alternatives are projects that either have something holding them back, such as a lack of regulatory requirements, or require a longer study period. For example, potable reuse guidelines have not been implemented, and more public outreach is needed. The shortlist projects are those for which feasibility studies could be completed in time to meet the next water supply selection timeframe.)
- Does it seem more likely that the developmental alternatives will be considered in the next Long-term Master Water Plan update, or is there a pathway whereby they could make it into the current water supply selection process? (Answer: If the roadblocks to implementation are removed in time to meet the region's water supply needs, a developmental alternative could be considered in this water supply selection process; if not, they will be included in the next Long-term Master Water Plan update.)

Michelle Robinson then asked if there was any input on the reclaimed water source-water assessments or pilot studies. She asked Ms. Schwerman to elaborate on those assessments. Ms. Schwerman said they are looking at each reclaimed water facility and at industrial contributors to determine what constituents are coming out of the plant, what needs to be removed to meet drinking water standards, and what the public wants to see removed, such as viruses.

- Are you studying the impacts of withdrawals on the surface water projects? For example, wouldn't you want to study the impacts of withdrawals on the surface water bodies, like Bull Frog Creek? (Answer: Each feasibility study for the shortlist projects will include environmental assessments. The feasibility studies cover a variety of studies, tailored by source, including hydrologic, hydraulic and hydrogeologic modeling; environmental assessments, pilot testing, water quality and more.)

A discussion ensued regarding the Southwest Florida Water Management District's efforts to establish minimum flows and levels (MFL) for Bullfrog Creek and efforts to update the MFL for the Little Manatee River. Mr. Hogg said the District is currently collecting data for Bullfrog Creek and actively updating the MFL for the Little Manatee River

- For the projects that involve brackish groundwater, are you modeling and monitoring salinity? (Answer: Yes. For any brackish well location, especially east Pasco County where we don't have a lot of data, any feasibility study would likely involve a drilling and testing program. That program would collect site-specific data to be used in modeling, so that we have not only hydrologic data, but also water quality data for the site. We would also perform modeling to make sure we aren't proposing to over-extract and cause water quality degradation or impacts to anyone using the local resource.)

For the developmental alternatives, Ms. Robinson said there are three potential sources: the City of Tampa, Hillsborough County and Pinellas County. Ms. Schwerman explained that Tampa has one reclaimed facility, but Pinellas and Hillsborough have multiple, so the source water assessments would be conducted for each facility as the effluent may differ.

Ms. Schwerman then described how the source water assessments could affect potential pilot studies. She said if the source water among the facilities is very similar, and they have a representative sample, they could reduce the number of pilot studies. But if there is a facility with a significant difference, that is usually due to some kind of infiltration and inflow contamination or industrial contributors so those might be separate pilots. That was done in another city to help determine the ultimate treatment technologies.

Ms. Schwerman also mentioned the Plant City pilot effort, which has an interesting industrial component to it. While the regulations call for only six months of piloting, Plant City is going a full year at the request of the Florida Department of Environmental Protection due to the industrial contributors. They found that the same technology that would be used for normal residential application would be fine for the industrial component. They also did significant outreach within the city leadership and public.

Mr. Hogg then wrapped up by covering next steps, including a telephone town hall meeting on Sept. 14, a board presentation on Oct. 16, and recommendations to the board on Nov. 13. He said the board meetings are streamed live, and virtual public comment is welcomed. He asked that the ad hoc committee speedily review the meeting minutes when received to ensure they are included in the Long-term Master Water Plan update.

Ms. Robinson advised the group that their input is appreciated at any time, and they can contact anyone in the meeting with additional input.

- What is the total need versus what can be supplied by this shortlist? Have you built in additional capacity or buffer? It looks like the projects on the shortlist add up to about 50 million gallons per day, but are you only pursuing a fraction of that? (Answer: Yes. The Long-term Master Water Plan looks at a 20-year planning horizon, so it goes through 2043, and an additional 25 million gallons per day will be needed by that point. The recommendation is not to build all 25 million gallons per day by 2033, but rather 10-20 million gallons per day, which provides a buffer and closely aligns supply with demand, and the water rate isn't overburdened. Tampa Bay Water does anticipate more than one project will be needed to meet the region's water needs. The feasible projects will be ranked, and the top projects will be recommended for implementation. Anything that is not selected goes back into the Long-term Master Water Plan for future consideration; anything that is not feasible falls off the list.)
- What does the next 6-12 months look like for what you are trying to accomplish? During that time, will you be doing public hearings and public education on the program? (Answer: Once the board approves the shortlist, it begins the feasibility program, which will take about two years. The feasibility program includes developing scopes and fees and soliciting consultants for each project concept. Tampa Bay Water expects to wrap up the feasibility program in late 2026. Each individual project will have a dedicated public information and involvement component. At the project level, public outreach is a grassroots effort, working closely with communities and stakeholders. There will also be a larger, overall effort on the program.)

The meeting concluded at approximately 1:40.

ENVIRONMENTAL AD HOC COMMITTEE MEETING
Meeting Minutes

Project Name:	Project No:	File Number:
2023 Long Term Master Water Plan Update	09016	
Subject:		
Environmental Ad Hoc Committee Meeting #1		
Location:	**Date:**	**Time:**
Tampa Bay Water Office: 2575 Enterprise Road, Clearwater, FL 33763	1/31/23	4:00 PM
Recorded By:		
Michelle Robinson, Dialogue Public Relations		

Participants:	Title:	Organization:	Attendance
Caryle Cammissa	Hillsborough County League of Women Voters	Hillsborough County League of Women Voters	Virtual
Phil Compton	Friends of the Sierra Club	Friends of the River	X
Marti Folwell	North Pinellas League of Women Voters	North Pinellas League of Women Voters	X
Don Fraser	West Pasco Audubon	West Pasco Audubon	X
Garry Gibbons	Tampa Bay Sierra Club	Tampa Bay Sierra Club	Virtual
Alana Ginelli	Keystone Civic Association	Keystone Civic Association	X
John Ovink	Friends of the River	Friends of the River	Virtual
Angelique Riling	Blue-Green Connections	Blue-Green Connections	X
Ed Sherwood	Tampa Bay Estuary Program	Tampa Bay Estuary Program	X
Nancy Stevens	Tampa Bay Sierra Club	Tampa Bay Sierra Club	X
Alana Todd	Agency on Bay Management	Agency on Bay Management (Tampa Bay Regional Planning Council)	X
Warren Hogg	Chief Science Officer	Tampa Bay Water	X
Danielle Keirsey	Planning Project Manager	Tampa Bay Water	X
Maribel Medina	Planning and Projects Manager	Tampa Bay Water	X
Brandon Moore	Public Communications Manager	Tampa Bay Water	X
Michelle Stom	Chief of Staff/Chief Strategy Officer	Tampa Bay Water	X
Meghan Christopher	Public Affairs Coordinator	Tampa Bay Water	X

TAMPA BAY WATER Supplying Water To The Region	**ENVIRONMENTAL AD HOC COMMITTEE MEETING** **Meeting Minutes**

Bobby Burchett	Program Manager	Black & Veatch	Virtual
Amanda Schwerman	Planning Manager	Black & Veatch	X
Jo Ann Jackson	Water Supply Specialist	Black & Veatch	Virtual
Deanna Hamilton	CIP Project Manager	Black & Veatch	Virtual
Michelle Tudor	Engineering Manager	Black & Veatch	Virtual
Distribution:			

Action Items:

No.	Item	Assigned To	Due Date	Status

Minutes:

Introductions, Purpose of the Ad Hoc Committee, Overview of Tampa Bay Water

Warren Hogg opened the meeting by thanking attendees for their time and participation. After attendees, staff and consultants introduced themselves, Warren provided a brief overview of Tampa Bay Water, its mandate and water supply system. He explained that Tampa Bay Water is the region's water supply wholesaler, providing drinking water to Hillsborough, Pasco and Pinellas counties and the cities of New Port Richey, St. Petersburg and Tampa. He said Tampa Bay Water has no authority to control growth or require that the members conserve water; the utility's sole mission is to supply drinking water to meet the members' needs now and in the future. Warren also discussed the purpose of the ad hoc committee: to document stakeholders' questions and concerns regarding the different sources, and what data should be collected during the feasibility stage to help allay those concerns.

2023 Long-term Master Water Plan

Danielle Keirsey provided an overview of Tampa Bay Water's long-term planning process, which is required by its governing contracts. She said the purpose of the Long-term Master Water Plan is to ensure the region has enough water to meet demands in the future. It's a thorough planning process that looks at a number of factors, like population growth, to determine what to build and when. She discussed the screening criteria and the schedule for the 2023 update. She said this long-term plan is aiming to provide an additional 10 million gallons per day (mgd) in the 2033 timeframe.

Source Options Discussion
Amanda Schwerman then presented slides on the different water sources that are being investigated in the current Long-term Master Water Plan and the results of the coarse screening evaluation. She presented the potential project options by source and discussed the potential treatment processes for the different sources. Group discussion, questions and answers, and comments followed each presentation of project concepts and proposed treatment trains by source. Questions, comments and data needs are noted below by source. (There is also a category at the end for questions, comments and data needs related to all potential projects.)

a. Desalination & Brackish Water Supplies

- Are there any environmental impacts to salty discharge? (Answer: The existing desalination plant's concentrate is blended back into the power plant's cooling water supply, then the blended water goes to the discharge canal. By the time the water exits the discharge canal, there is no measurable difference in salinity. The plant's operations have been monitored for 20 years.)
- Will discharge options be contemplated for all project concepts? (Answer: yes)
- For deep well injection, into what aquifer will the concentrate be injected? How deep? And it is isolated from other aquifers?
- What is the expected yield from these proposed concepts?
- For seawater desalination, what is the vulnerability to red tide? Will that affect reliability?
- For brackish desalination, does the withdrawal and injection impact other brackish water users/permit holders even for the future users? Other users need to be considered.
- For desal in St. Pete, how will building a large facility impact the communities around Albert Whitted Airport?
- How far off the coast would the intake be for Gulf Coast Desalination?
- What the current capacity of the desal plant? What's the range for budgeted vs. capacity? (Answer: The plant's capacity is 25 million gallons per day. It is currently operating between 17 and 20 million gallons per day.)
- Need to consider projects' susceptibility to climate change, sea level rise and saltwater intrusion.

b. Surface Water Supplies

- On concept 8, is the plan to increase both Hillsborough River and Alafia withdrawals or just one or the other? (Answer: Tampa Bay Water's current expansion of its surface water treatment plant is within the utility's existing permitted withdrawals. Concept 8 would be seek to increase permitted withdrawals from the Alafia River.)

- Would like to see withdrawal schedules for what is currently being withdrawn versus what is being proposed.
- Does ASR/MAR compete with existing domestic wells? (Answer: The Southwest Florida Water Management District's permitting process would not permit a project that would impact existing legal users and would likely require Tampa Bay Water to mitigate any well it impacts despite modeling projection. The goal is to not impact other users.)
- How deep into the aquifer are the storage and buffer zones for ASR/MAR?
- What is the seasonality of collecting the water for ASR/MAR? Is there a way to capture more in extreme weather events?
- On the north Pinellas option, is there an additional reservoir as an option? Why is ASR/MAR the only storage option? Why not use straight surface water throughout the year? Is there not enough surface water?
- Need to take a balanced approach in consideration of the estuarine environment as we propose diverting freshwater from the estuary.
- Do regulations protect water quality in the wells? Do you monitor for quality in local wells? (Answer: Regulations protect both the quantity and quality of existing wells including unpermitted residential wells).
- Need to consider changing rainfall patterns and how that impacts replenishment of sources.
- How will changing rainfall patterns affect river flow? Reservoir in Colorado reaching dead pool…could that happen to our reservoir? (Answer: Tampa Bay Water's reservoir is an off-stream reservoir, so no rivers are dammed by this facility. Tampa Bay Water skims water from river systems during higher flow times according to its permitted withdrawal schedules and pumps that water into the reservoir. It then withdraws water from the reservoir when it's needed.)
- What are the current flow rates of the rivers? What are the projections based on climate change?
- Regarding treatment, desal shows reverse osmosis but surface water shows ion exchange. Why is it different? (Answer: The treatment methods are proposed based on the anticipated constituents that need to be removed.)

c. Fresh Groundwater & Other Water Supplies

- Will a new wellfield include new connection infrastructure? (Answer: Yes, any new supply that's outside the existing system would need to connect to Tampa Bay Water's system.)
- For option 13, is it too early to estimate capacity? It could be a lot. (Answer: Yes, it's too early at this time as Tampa Bay Water has not yet reached out to those large potable users.)

- How would you convert large potable users to alternative sources? (A discussion ensued about Tampa Bay Water's thought to approach large users who have their own groundwater permits to see if they are scaling down operations or to see if they might consider using reclaimed water.)
- Need a balanced approach. Any new wellfield should take into consideration protection of surface water features like wetlands and should be part of Tampa Bay Water's rotational scheme to avoid impacts.
- Polk and Peace River have their own demand challenges. How would a connection with either water supplier work?
- Does our groundwater flow from Georgia? (Answer: In northern Florida it does, but in our area, it actually flows from mid-state near Ocala.)
- Does your process look at cross-watershed movement? Does it consider large movements of water from one watershed to another? (Answer: Yes, Tampa Bay Water and the Southwest Florida Water Management District look at water regionally and by basin. Additionally, Tampa Bay Water was formed to take a regional approach to water, to make sure fast-growing and slower-growing areas have equal access to water.)
- Will additional groundwater withdrawals hurt the environment? What are the long-term rates of recharge? And the future impacts of saltwater intrusion, sea level rise? What are the depth of the proposed wells?
- Could we put money into increasing permeability of areas to increase the rate of recharge? For example, replacing asphalt with permeable surfaces.

d. Indirect & Direct Potable Reuse

- With the reuse graphic, what is meant by discharge/mitigation? (A discussion followed in which the project team explained that mitigation should be changed to supplementation.)
- With some of the treatment processes, so much is being removed but humans need minerals, and that should be considered for healthy water. Also need to consider where those minerals that must be added back are sourced.
- Is this treated water going to impact the environment if it's put back in the aquifer or the environment?
- If RO is removing all the contaminants from the reuse water and that is injected into the aquifer, is it going to affect the environment? Will it come back up?
- Once something is put into the aquifer, there's no going back if there is a mistake. Glad to hear about the proposed monitoring, but may need safeguards beforehand versus monitoring after.

- Could injecting the discharge water create sinkholes? (Answer: Fracturing of the aquifer, not the formation of sinkholes, can occur when whatever is injected is done so under pressure, which is not proposed for this project.)
- Bottom line, we need to know if this is safe to drink.
- Need data on what contaminants are in wastewater, not just human waste, but also industrial waste. Need to understand and search for what's in it now and whether the treatment process will address it.
- Consider a possible positive outcome of reuse could be better source control of contaminants.
- For indirect potable, need to make sure the polished reuse water is compatible with the natural buffer.
- RO treatment should be part of any reclaimed option, but need to address what we're doing with the concentrate from RO.
- Is cost an issue and will it be discussed? RO is great but expensive.
- For deep well injection, are there any studies on the capacity of storage in the aquifer? What is the volume of concentrate long-term and do we have room for it?
- For deep well injection, need to know more about the capacity of deep aquifer. Also what about the effects on other permit holders and the environment cumulative effects and sinkholes.
- How do we make sure everyone has access to non-potable reclaimed water for lawn watering to reduce demand? (Answer: Tampa Bay Water has no authority over reclaimed water as it is the member government's product, but residents can reach out to their local government.)

d. <u>Comments Related to All Sources</u>

- To what extent will Tampa Bay Water need to acquire land for these facilities? Are you going to screen areas for known environmental features first or the other way around? (Answer: Land acquisition varies by concept, but if land is needed, it will be screened for compatibility with a municipalities comprehensive plans and will be screened for environmental considerations.)
- Will there be only one project selected or will it be a combination of projects? (Answer: It could be one project but likely would be a combination of projects.)
- Regarding the chart with demand projections, how much do you need over the permitted maximum capacity? And what is the current breakdown by source? (Answer: The demand projection chart also includes the City of Tampa's demand. Tampa Bay Water's current

source percentage is 65 percent groundwater, 30 percent surface water and 5 percent desalinated seawater.)

- Make sure we look at the population growth, including seasonal variations.
- Who has the authority to approve these projects? (Answer: Tampa Bay Water's board of directors has the ultimate responsibility to select projects. The board comprises elected officials from the governments that Tampa Bay Water serves. There are usually multiple approval points. The board first considers projects for further analysis through feasibility studies. Those studies provide the board with detailed information to compare the projects as part of the next approval point — selecting the next project or configuration of projects for development. Any project that is selected also has to go through a permitting process.)
- For each source, what constituents are in the source water? And will the proposed treatment clean/address those constituents?
- Need to include power use/carbon footprint in environmental impacts for each project.
- How do you address residents who may not want these projects in their backyards? (A discussion followed about Tampa Bay Water's long track record of working with the community to address project-specific concerns and ensure projects reflect community values.)
- One source you have not mentioned is conservation. Do you have a public relations budget for conservation? Think this is a benefit to prioritize conservation. (Answer: Tampa Bay Water does have a regional program that it promotes with its members, but we do not have authority to require participation.)
- Agriculture wastes a lot of water. Anything we can do to curb ag water use? (A discussion ensued about the Southwest Florida Water Management District's role in permitting.)
- Are there other entities like Tampa Bay Water? (A discussion ensued about water utilities and regional water authorities.)
- What environmental aspects are considered in your selection criteria?
- What are the impacts on the lands, wetlands and wildlife?
- PFAS (forever chemicals) and pharmaceutical/personal care products are currently not regulated and represent wildcards for various sources and proposed treatment. How do you factor in these wildcards? (Answer: The treatment trains proposed for the projects shown are modular. If a rule is passed for a particular constituent and the current/proposed treatment process does treat for the constituent, Tampa Bay Wate would seek to add a module to address new water quality rules.)
- Also, may need to educate residents on PFAS.

- It's reassuring to know there are so many people with good motives discussing this to find out what's best for our future.
- Many people feel tap water is not safe to drink now and either filter their water or buy bottled water. Need to communicate better that the water is safe and clean now.
- Create a task force of communicators to make sure people know water is safe so they don't buy plastic bottles.
- Is there anything we can do to fight development?
- Understanding what experts in public health, etc. are in favor of would be reassuring.

Other Comments:

- Marti shared information about a Feb. 15 meeting: Everyone Needs and Deserves Clean Water

Next Meeting

- The next meeting for environmental ad hoc committee will from 4-6 p.m. on Tuesday, March 28 at Tampa Bay Water.

ENVIRONMENTAL AD HOC COMMITTEE MEETING
Meeting Minutes

Project Name:			Project No:	File Number:
2023 Long-term Master Water Plan Update			09016	
Subject:				
Environmental Ad Hoc Committee Meeting #2				
Location:			**Date:**	**Time:**
Tampa Bay Water Office: 2575 Enterprise Road, Clearwater, FL 33763			5/16/23	4:00 PM
Recorded By:				
Michelle Robinson, Dialogue Public Relations				

Participants:	Title:	Organization:	Attendance
Caryle Cammissa		Hillsborough County League of Women Voters	X
Phil Compton		Friends of the River	
Marti Folwell		North Pinellas League of Women Voters	
Don Fraser		West Pasco Audubon	X
Garry Gibbons		Tampa Bay Sierra Club	X
Yvonne Stoker		Keystone Civic Association	X
John Ovink		Friends of the River	Virtual
Angelique Riling		Blue-Green Connections	
Ed Sherwood	Executive Director	Tampa Bay Estuary Program	
Nancy Stevens		Tampa Bay Sierra Club	X
Alana Todd	Environmental Planner	Agency on Bay Management (Tampa Bay Regional Planning Council)	X
Warren Hogg	Chief Science Officer	Tampa Bay Water	X
Danielle Keirsey	Project Manager	Tampa Bay Water	X
Brandon Moore	Public Communications Manager	Tampa Bay Water	X
Meghan Christopher	Communications Coordinator	Tampa Bay Water	X
Bobby Burchett	Program Manager	Black & Veatch	Virtual
Amanda Schwerman	Planning Manager	Black & Veatch	X
Jo Ann Jackson	Water Supply Specialist	Black & Veatch	
Deanna Hamilton	CIP Project Manager	Black & Veatch	Virtual

Michelle Robinson	Public Engagement Consultant/Facilitator	Dialogue Public Relations	X

Distribution:

Action Items:

No.	Item	Assigned To	Due Date	Status
1	Send schedule request for next meeting	M Robinson	5/17/23	Done
2	Send reminder regarding August board meeting	M Robinson	8/14/23	

Minutes:

Introductions, Purpose of the Ad Hoc Committee, Overview of Tampa Bay Water

Warren Hogg opened the meeting by thanking attendees for their time and participation. After attendees, staff and consultants introduced themselves, Warren provided a brief overview of Tampa Bay Water, its mandate and water supply system. He reminded participants that the purpose of the ad hoc committee is to help Tampa Bay Water understand the concerns of environmental stakeholders in the local community. He said Tampa Bay Water wants to understand their concerns for the various source options, including questions to be answered and data to be gathered during future feasibility studies.

2023 Long-term Master Water Plan

Danielle Keirsey provided an overview of Tampa Bay Water's long-term planning process, which is required by its governing contracts. She discussed the purpose of the Long-term Master Water Plan, the screening criteria and the schedule for the 2023 update. She said this long-term plan is aiming to provide an additional 10-20 million gallons per day (mgd) in the 2033 timeframe, and the utility is looking at several options to meet that need. Danielle then described the evaluation process to narrow the universe of options down to 11 options through coarse and fine screening and said the project team is now working on paring down those 11 options to around five options through the short-list evaluation process.

Stakeholder Input to Date

Michelle Robinson provided an overview of stakeholder input received since the last environmental ad hoc committee meeting. She said input received through the ad hoc committees and five focus groups showed that known water supply sources are generally more acceptable to the public, including groundwater, river water and desalinated seawater, though concerns were voiced for each source type, ranging from environmental concerns to cost. Reclaimed water as a source received strong negative reactions, with residents skeptical that the water could be cleaned enough to remove all known and unknown contaminants. She shared some of the common themes that Tampa Bay Water can use going forward, including the need for transparency and data for all sources, that residents want to know the standards and whether they are the same for all sources, and independent third-party confirmation or participation would help bolster trust.

Source Options Discussion

Amanda Schwerman then presented slides on the projects that made it through the fine screening process. She presented the 11 potential project options by source: three desalination and brackish water projects; three surface water projects; and four groundwater projects, one of which is made possible by generating groundwater withdrawal credits through aquifer recharge with reclaimed water, such as Hillsborough County's SHARP (South Hillsborough Aquifer Recharge Project) program. She noted that only one reclaimed water concept scored high enough to continue to the next step of evaluation. She said the potable reuse concepts scored well in Environmental Sustainability, System Integration & Expansion Potential, Yield Reliability and Regional System Reliability Impacts, but scored poorly in Regulatory and Permitting (there are currently no direct potable reuse regulations in the State of Florida), Public Reception, Life Cycle Costs, and Cost Risk Factors. She explained that even though potable reuse projects did not make it through fine screening, Tampa Bay Water is continuing to explore concepts using reclaimed water through the developmental alternatives category of the Long-term Master Water Plan.

After the presentation, the group asked questions and provided comments, which are categorized and captured below:

a. Comments and Questions Related to All Sources

- Are you looking for one stand-alone project or a combination of projects? (Answer: Tampa Bay Water expects to need a combination of projects to meet the 10-20 million-gallon-per-day need in the 2033 timeframe.)
- Are there other capital improvement projects that will affect the Keystone/Odessa area? (Answer: It is possible since the pipeline routes to connect the different project concepts are unknown at this time. Potential pipeline routes will be evaluated during feasibility studies for the selected projects.)
- Will there be public input on each of these projects? (Answer: Yes. Each project selected for feasibility studies will have a dedicated public information and involvement component. Tampa Bay Water has a strong commitment to public engagement and will work with the community during feasibility, design and construction.)
- Does Tampa Bay Water have eminent domain powers? (Answer: Yes. Tampa Bay Water first tries to acquire property or easements through voluntary negotiations. The utility does utilize its eminent domain authority when necessary.)

b. Desalination & Brackish Water Supplies

- Where is the location of the brackish wellfield? When will you refine the location for the brackish wellfield? (Answer: The site is not yet known but will be more to the west for brackish water availability. If this project concept is approved by Tampa Bay Water's board of directors for feasibility studies, then potential locations would be determined during that stage.)

- What size is the brackish wellfield, both in terms of quantity and land area? (Answer: The quantity is anticipated to be in the 5 to 10 mgd range and would be withdrawn via a linear wellfield, where we have several small-capacity wells dispersed through an area and on small tracts of land, approximately one acre each. Tampa Bay Water does not envision that this would be a large acreage wellfield, like the Cross Bar Ranch Wellfield.)
- How far into the future do you foresee using these wells? (Answer: Tampa Bay Water strives to build water supplies that are sustainable and can last indefinitely into the future. Many of the region's wellfields have operated for decades. For example, the Cosme-Odessa Wellfield began operating in the late 1920s/early 1930s, and though it withdrew too much water in the past, it has continued to operate for close to 100 years and now produces water in a sustainable manner.)
- How will you dispose of the brine left over from brackish desalination? (Answer: The current concept is to dispose of the concentrate through deep well injection, but more study will be done in the feasibility stage to determine the best disposal method.)
- For the desalination expansion with brackish water, where are those wells located? (Answer: They would be along the west coast in southern Hillsborough County.)
- The location of the existing desalination plant is problematic, so concepts 4 and 5 are a concern. This area is known as the "chemical coast" which raises concerns for the cost to clean the water.

c. Surface Water Supplies

- For your reservoir projects, do you have any projects that would minimize water loss to evapotranspiration? (Answer: Tampa Bay Water has looked at some options, like floating solar panels, but the reservoir's changing level posed challenges. There is also a lot of wildlife around the reservoir, including alligators, which also pose challenges. Tampa Bay Water will continue to explore options to reduce water loss.)
- Reports that were done in the 1990s indicated a declining flow trend in the Hillsborough River, Tampa Bypass Canal and Alafia River. Have those reports been updated? (Answer: Tampa Bay Water has not seen updated reports, but the utility is studying climate change and its effects on our surface water supplies.)
- There is a lot of concern for unregulated contaminants and emerging contaminants. Are these considered in your project evaluation? (Answer: Yes, Tampa Bay Water is tracking water quality regulations and proposed changes, and our project evaluation considers what treatment processes may be required in the future.)

- It's important to track changes in land use and how it could affect water quality. For example, how agricultural lands changing to housing or industry will affect water quality in streams and rivers.

d. Fresh Groundwater & Other Water Supplies

- Could you explain how increasing the Consolidated Water Use Permit would work? What would that increase be? (Answer: Right now, we are still refining that number, it could be anywhere from 1 mgd to 10 mgd. The quantity that Tampa Bay Water would request would depend on the outcome of comprehensive analysis and computer modeling, which would have to show no adverse impacts to the environment.)
- If you increase the quantity, do you need to increase your monitoring? (Answer: Tampa Bay Water and the Water Management District have numerous monitoring sites across the region, including all area lakes, so there would be no need to expand the monitoring. And we have a lot of long-term data against which we can compare new data.)
- It sounds like the increase will be minimal, but you don't want to backslide with environmental recovery.
- What is the threshold where environmental impacts occur on the Consolidated Water Use Permit? (Answer: The number isn't known. The wellfields at one time were permitted to produce 192 mgd annual average, with actual production around 160 mgd. The Partnership Agreement with the Water Management District resulted in a negotiated quantity of 90 mgd annual average from the 11 northern wellfields. Our monitoring program shows that quantity is sustainable but given localized flooding in some communities around the wellfields, we may be able to withdraw more without harming the environment.)
- What checks and balances are in place to protect the environment? Who makes the determination that impacts have occurred? (Answer: If the Water Management District issues a permit for an increase, they will require that we continue our monitoring program. Tampa Bay Water and District staff members have been working cooperatively for decades on the current environmental recovery assessment. We would continue to jointly review data to come to a determination.)
- Is the permit revokable? (Answer: Yes, all water use permits are revokable.)
- Are the wellfield recharge projects using reclaimed water off the table? (Answer: Yes. They did not make it through fine screening.)
- The new wellfield using SHARP credits — is the reclaimed water injected into a different aquifer? What lessons can be learned from other projects that can be applied to this project? Does the reclaimed water migrate? (Answer: Hillsborough County injects reclaimed water into a salty zone of the aquifer near the coast. The South Hillsborough Wellfield project would withdraw water from the Floridan Aquifer about 5 miles inland. The reclaimed water will not

enter an aquifer from which fresh water is withdrawn. It would move under the Bay, under Pinellas County and make its way underneath the Gulf of Mexico. The Floridan Aquifer in southern Hillsborough County is unique in the Tampa Bay area because it is separated from the shallow aquifer by a thick confining layer of clay, so there are no comparable projects from which we can take lessons due to the geology of the area.)

- How will sea level rise affect these projects? Will increasing the Consolidate Water Use Permit cause saltwater to migrate inland? (Answer: Sea level rise risk factors were considered in the fine screening, which contributed to one of the reclaimed projects and some of the seawater and brackish desalination projects to fall off the list. For groundwater, Tampa Bay Water and the District monitor seasonally and annually for saltwater intrusion. There are two schools of thought relating to how sea level rise will affect groundwater. Some say saltwater will migrate inland while other say it will reach equilibrium and not change at all, but monitoring wells will show any salinity increases. All of this would be part of the feasibility studies; Tampa Bay Water cannot pump water from aquifers that result in saltwater in the aquifers moving further inland.)
- Are you concerned about groundwater quality? Any water quality trends that are a concern? (Answer: Tampa Bay Water's water quality monitoring shows all of our water supplies, including groundwater, continue to meet all local, state and federal drinking water standards. At the request of some of our member governments, we have been evaluating further removal of total organic carbon, which may make treatment in the members' retail distribution systems more consistent. Additionally, the USEPA recently passed the fifth Unregulated Contaminant Monitoring Rule (UCMR 5), which requires sampling for unregulated compounds by our members governments; Tampa Bay Water is voluntarily sampling the water we send to the members to provide additional data. For the future water supply concepts that are currently being evaluated, the team included "cost risk factors" as one of the sub-criteria for scoring each concept. One "cost risk factor" considered was whether the supply source and assumed treatment process has a risk of needing additional treatment processes in the future.)
- Are there any mitigation plans for springs? (Answer: No. We do monitor some springs, but our groundwater pumping does not affect springs.)
- In southern Hillsborough County, are you proposing a large-scale wellfield? (Answer: No, it is likely a smaller-scale wellfield spread out among dispersed wells.)

e. <u>Developmental Alternatives/Reclaimed Water</u>

- Why didn't any reclaimed projects make it through fine screening? (Answer: While the reclaimed water projects scored well in environmental sustainability and other factors, they did not score well in regulatory & permitting, as there are currently no permitting guidelines in place in the state. They also did not score well with lifecycle costs, cost risk factors or public reception.)

- How are developmental alternatives funded? How do they get into the Master Water Plan? (Answer: These projects will be funded to undergo feasibility studies, including continued public engagement efforts. These concepts require additional work and additional time for things like pilot testing, regulation promulgation and public outreach. Work will continue, and the concepts could be moved into the Master Water Plan at several points throughout the process.)
- How will developmental alternatives be reported? (Answer: Tampa Bay Water will report to the board on all Master Water Plan projects, including developmental alternatives, at key points throughout the evaluation process.)
- Are you considering a project to help Tampa with minimum flows on the Hillsborough River? (Answer: Tampa Bay Water will be working with the City on concepts related to their available reclaimed water supply.)
- Is the Tampa project coming back? (Answer: Tampa Bay Water's developmental alternatives are not PURE. We are looking at three different reclaimed water sources: City of Tampa, Pinellas County and Hillsborough County. We will be studying the best potable supply projects using reclaimed water from any of those sources.)
- There seems to be a disconnect between Senate Bill 64 and the time it takes to study and implement potable reuse projects.
- What happens if there is not enough supply to meet demands, would you be forced to accept rejected sources? Would you force conservation? (Answer: Tampa Bay Water is contractually required to update its long-term planning process every five years. That ensures that supply keeps pace with increasing demand. Tampa Bay Water cannot force residents to conserve. However, we do have a water shortage mitigation plan in place that has a series of progressive measures we can take that coincide with restrictions the Water Management District can implement to encourage conservation of the resource. We also partner with our member governments on the Water Wise Regional Rebate Program, which offers rebates to residents, commercial property owners and others who take proactive steps to reduce water use.
- Water could get so expensive; we will have to conserve.

Other Comments:

Next Meeting

- The next meeting for environmental ad hoc committee will be 3-5 p.m. on Thursday, Sept. 28, 2023, via Teams or Zoom. Those who cannot attend can watch Tampa Bay Water's August board meeting to see the short list presentation. The board meeting is at 9:30 a.m. on Aug. 21, 2023. Anyone can watch on demand by going to www.tampabaywater.org. Michelle Robinson will send out a reminder email in August.

ENVIRONMENTAL AD HOC COMMITTEE MEETING
Meeting Minutes

Project Name:	Project No:	File Number:
2023 Long-term Master Water Plan Update	09016	
Subject:		
Environmental Ad Hoc Committee Meeting #3		
Location:	**Date:**	**Time:**
Virtual – Microsoft Teams	9/28/23	3:00 PM
Recorded By:		
Michelle Robinson, Dialogue Public Relations		

Participants:	Title:	Organization:	Attendance
Caryle Cammissa		Hillsborough County League of Women Voters	
Phil Compton		Friends of the River	X
Marti Folwell		North Pinellas League of Women Voters	
Don Fraser		West Pasco Audubon	
Garry Gibbons		Tampa Bay Sierra Club	X
Yvonne Stoker		Keystone Civic Association	X
John Ovink		Friends of the River	X
Angelique Riling		Blue-Green Connections	
Ed Sherwood	Executive Director	Tampa Bay Estuary Program	X
Nancy Stevens		Tampa Bay Sierra Club	X
Alana Todd	Environmental Planner	Agency on Bay Management (Tampa Bay Regional Planning Council)	
Warren Hogg	Chief Science Officer	Tampa Bay Water	X
Danielle Keirsey	Project Manager	Tampa Bay Water	X
Brandon Moore	Public Communications Manager	Tampa Bay Water	
Meghan Christopher	Communications Coordinator	Tampa Bay Water	X
Bobby Burchett	Program Manager	Black & Veatch	
Amanda Schwerman	Planning Manager	Black & Veatch	X
Jo Ann Jackson	Water Supply Specialist	Black & Veatch	
Deanna Hamilton	CIP Project Manager	Black & Veatch	

Michelle Robinson	Public Engagement Consultant/Facilitator	Dialogue Public Relations	X

Distribution:

Action Items:

No.	Item	Assigned To	Due Date	Status

Minutes:

Introductions, Purpose of the Ad Hoc Committee, Overview of Tampa Bay Water

Meeting attendees were introduced and greeted one another as they entered the virtual meeting. Mr. Hogg began the presentation by expressing gratitude on behalf of Tampa Bay Water for the attendees sharing their time and input to help shape feasibility studies for the shortlist and developmental alternatives projects. Mr. Hogg provided an overview of the agenda, then turned the presentation over to Ms. Keirsey.

2023 Long-term Master Water Plan

Danielle Keirsey provided an overview of Tampa Bay Water's water supply expansion process, which typically takes 10 years to complete. The process starts with the Long-term Master Water Plan, which provides a shortlist of projects recommended for further study. Approved projects go through a feasibility program, which results in feasible projects being recommended to the board for water supply selection. Projects that are selected then go into design and construction to become the region's next water supply facilities. Ms. Keirsey then showed a graphic that depicted Tampa Bay Water's projected water supply needs. The surface water treatment plant expansion, approved through the last Long-term Master Water Plan process, is expected to add 10 million gallons per day to the region's water supply in 2028. In 2033, Tampa Bay Water is projecting it will need another 10-20 million gallons per day, with a total of 25 million gallons per day needed by 2043. Ms. Keirsey reviewed the shortlist evaluation criteria, then turned the presentation over to Amanda Schwerman.

Shortlist Concepts & Developmental Alternatives

Amanda Schwerman presented slides on the water supply projects remaining after the shortlist screening evaluation. Seven projects were shown, which represent geographic and source diversity. She then presented slides on each project concept, discussing the project's source water, treatment process, estimated yield and additional pipeline needs.

She said if the shortlist is approved by the board, the next step for the seven projects is to enter into the feasibility study phase, where a more detailed technical and economic analysis will be completed. Feasibility studies will provide more certainty regarding yield, water quality and costs, and determine if there are any roadblocks that may remove the project from consideration.

Ms. Schwerman then presented slides on developmental alternatives. She said Tampa Bay Water will be studying developmental alternatives alongside the seven feasibility studies. The current developmental alternatives are all evaluating the potential for potable reuse, including direct potable reuse at locations such as the desalination plant, regional surface water plant and other locations, or indirect potable reuse through groundwater wellfields or surface water reservoirs.

The developmental alternatives would start with the member government facilities that have available excess reclaimed water, including Hillsborough County, Pinellas County and the City of Tampa. She said the first step would include conducting source-water assessments for each reclaimed water source and then building on this information to evaluate potential concepts more thoroughly.

After the presentation, the group asked questions and provided comments, as noted below:

- In your feasibility study slide, it mentions predictive modeling, but what about trend analyses? Where does that fit, and will you be looking at water quality and water quantity trends? Some residents in the Keystone area feel like there seems to be a declining trend in water quality, which also seems to be indicated by the Lake James monitoring well, though this data isn't fully studied. (Answer: Tampa Bay Water looks at trends as well as predictive modeling. For systems where data exists, we would look at the analysis of all the system data. For example, for surface water sources in southern Hillsborough County, where data exists and the Southwest Florida Water Management District is setting minimum flows and levels (MFLs), we will look at trends and will follow the guidance of the District when it sets minimum flows and levels. For groundwater, we'll also look at all available data to make sure that any withdrawal we would have for those projects creates no negative trend in any parameters. Additionally, Tampa Bay Water performs significant environmental monitoring on the Consolidated Water Use Permit wellfields, which were originally permitted at 192 million gallons per day (mgd), though the maximum they produced on an annual basis was 160 mgd . Production was cut back to 90 mgd, so there might be some additional water available, but we'd first need to make sure we are maintaining the recovery we achieved by analyzing the environmental data and water quality data, and predictive modeling. We have talked to Pasco County about the possibility of an incremental increase, so we can closely monitor the environment to ensure there are no impacts, then perhaps pursue another incremental expansion if there are no adverse impacts. We left most of the monitoring in place, so we continue to monitor hundreds of wetlands and aquifer monitoring wells. We're also required to monitor long-term water quality in all production wells.)
- With the original Master Water Plan and its surface water sources, there was a need for a hydrobiological monitoring program. I would hope that hydrobiological monitoring would be considered in the feasibility and the cost of any new proposed surface water expansions, particularly in pristine rivers like the Little Manatee River, and we would encourage that to happen. Withdrawals from the Little Manatee River and Bullfrog Creek would have broader concern from the standpoint of the Estuary Programs in terms of salinity distributions, fish and wildlife use and more. (Answer: The previous program was quite robust and demonstrated

to stakeholders that the monitoring parameters weren't being affected. Over time, it was proven that there was not a linkage between withdrawals and the parameters being monitored, so many of those monitoring requirements fell away. Tampa Bay Water would offer the District and the community some similar type of program for those riverine withdrawals under consideration. It may not be the full program, but something appropriate that would be developed with robust conversation among the District, Tampa Bay Water and stakeholders.)

- Does Tampa Bay Water consider sharing the pain when they site projects? Do you consider donor areas versus non-donor areas? There are still long-time residents who resent that water in Keystone goes to St. Pete and Pinellas County. (Answer: With each Long-term Master Water Plan, Tampa Bay Water looks not only at different source types but also geographic diversity, including where new water is needed and other selection criteria. There are some water supply projects in Pinellas County, including two that started as Tampa Bay Water concepts: Oldsmar brackish water wellfield and Clearwater brackish water wellfield. Tarpon Springs, Dunedin and Belleair also have their own brackish wells; though some are experiencing deteriorating water quality. For example, Belleair will soon abandon its brackish wells and purchase water from Pinellas County. Tampa Bay Water does consider those pre-existing legal uses when considering potential future projects, so we don't negatively impact them, thus the recommendation for surface water in Pinellas County.)
- Has Tampa Bay Water considered having those smaller systems join Tampa Bay Water to further consolidate the regional system? (Answer: Tampa Bay Water staff has not heard this suggestion before. Any change in Tampa Bay Water member government composition would require a change to the interlocal agreement and would require a broader intergovernmental discussion and negotiation. However, it is possible for cities like Zephyrhills to purchase water from a Tampa Bay Water member government, like Pasco County.)
- For sites like the Eastern Pasco Wellfield, in your assessment of the project and future capacity, how do you factor the rapid development and loss of pervious surface which replenishes the wellfield? It's a dynamic situation; demand is growing, but at the same time supply could be shrinking for the same reason. (Answer: The Eastern Pasco Wellfield has not yet been sited. One factor for development in that area is the Green Swamp; you can't develop into that area under existing regulations, which provides a protective buffer. Growth and impervious surface change is expected outside the Green Swamp. Tampa Bay Water is studying growth and infiltration change through its integrated hydrologic model around the existing wellfields and there is a cause-and-effect relationship between growth and infiltration in those areas. When we model, we will need to look at current condition and future conditions.)
- When you evaluate developmental alternatives, what contaminants will you be looking at and how detailed? Will you study contaminants of emerging concern and others that aren't regulated? At a minimum, DEP's list of unregulated contaminants (contaminants of emerging concern) they are monitoring should be included as well as PFAS, but there are others like pharmaceuticals that are a concern and should be studied. (Answer: The plan is still being

formulated, but the team will look at the list from the EPA and test for representative parameters. Tampa Bay Water is looking at membrane treatment, which removes a lot of contaminants. We do want to know what's in the source water and whether the proposed treatment will remove it, which is part of the pilot testing. Some of the reclaimed facilities under consideration to supply reclaimed water have only residential services, but some do have industrial contributors, so Tampa Bay Water would need to study those carefully. Depending on what's contributing to the reclaimed source, it could affect the pilot study length. Residential reuse water study only is six months, but those with industrial contributors would require a longer pilot study.)

- How are commercial water users permitted and balanced with public supply? For example, there are breweries, distilleries and bottled water companies that export water from the area. (Answer: If the water is used through one of our member governments, then that demand is factored into our long-term projections. If the user has their own water use permit, that is solely under the purview of the Water Management District to issue the permit for a fixed period of time and renew if the applicant re-applies.)

In closing, Michelle Robinson said that Tampa Bay Water will continue outreach during the feasibility studies and during the next Long-term Master Water Plan update. She encouraged the participants to reach out to Tampa Bay Water in the future if they have any questions or suggestions on the project or the process. Mr. Hogg went over the next steps and advised the group that they are welcome to provide comments directly to the board in October or November, in person or virtually, if they choose.

The group thanked Tampa Bay Water for multiple opportunities to learn about the project and engage with Tampa Bay Water.

The meeting concluded at 3:55 p.m.

ECONOMIC AD HOC COMMITTEE MEETING
Meeting Minutes

Project Name:	Project No:	File Number:
2023 Long-term Master Water Plan Update	09016	
Subject:		
Economic Ad Hoc Committee Meeting #1		
Location:	**Date:**	**Time:**
Zoom Virtual Meeting	3/29/23	8:30 a.m.
Recorded By:		
Michelle Robinson, Dialogue Public Relations		

Participants:	Title:	Organization:	Attendance
Bill Cronin	President/CEO	Pasco Economic Development Council	X
Dr. Cynthia Johnson	Director	Pinellas County Economic Development Council	X
Matt Letteleir	President/CEO	Brandon Chamber of Commerce	X
Amy Martinez-Monfort	Director	CEO Council of Tampa Bay	X
Amanda Payne	President/CEO	Amplify Clearwater	X
Craig Richard	President/CEO	Tampa Bay Economic Development Council	X
Bob Rohrlack	President/CEO	Greater Tampa Chamber of Commerce	X
Tammy See	Board Chair	Greater Riverview Chamber of Commerce	X
Bemetra Simmons	President/CEO	Tampa Bay Partnership	X
Sean Sullivan	Executive Director	Tampa Bay Regional Planning Council	X
Chuck Carden	General Manager	Tampa Bay Water	X
Michelle Stom, APR	Chief of Staff/Chief Strategy Officer	Tampa Bay Water	X
Warren Hogg	Chief Science Officer	Tampa Bay Water	X
Danielle Keirsey	Planning Project Manager	Tampa Bay Water	X
Maribel Medina	Planning and Projects Director	Tampa Bay Water	X
Meghan Christopher	Communications Coordinator	Tampa Bay Water	X
Amanda Schwerman	Planning Manager	Black & Veatch	X

TAMPA BAY WATER Supplying Water To The Region	**ECONOMIC AD HOC COMMITTEE MEETING** **Meeting Minutes**

Distribution:

Action Items:				
No.	**Item**	**Assigned To**	**Due Date**	**Status**

Minutes:

Introductions, Purpose of the Ad Hoc Committee, Overview of Tampa Bay Water

Chuck Carden opened the meeting by thanking attendees for their time and participation. Chuck introduced staff members attending the meeting, then asked participants to introduce themselves. After introductions, Chuck provided a brief overview of Tampa Bay Water, its mandate and water supply system. He explained that Tampa Bay Water is the region's water supply wholesaler, providing drinking water to Hillsborough, Pasco and Pinellas counties and the cities of New Port Richey, St. Petersburg and Tampa. He said Tampa Bay Water has no authority to control growth or require that the members conserve water; the utility's sole mission is to supply drinking water to meet the members' needs now and in the future. He discussed the the importance of adequate and reliable drinking water to the region's economy and the role that economic development leaders played in past Master Water Plan efforts. He said the purpose of the ad hoc committee is to document stakeholders' questions and concerns regarding the different sources, and what data should be collected during the feasibility stage to help allay those concerns.

2023 Long-term Master Water Plan

Maribel Medina provided an overview of Tampa Bay Water's long-term planning process, which is required by its governing contracts. She said the purpose of the Long-term Master Water Plan is to ensure the region has enough water to meet demands in the future. It's a thorough planning process that looks at a number of factors, like population growth, to determine what to build and when. She discussed the screening criteria and the schedule for the 2023 update. She said this long-term plan is aiming to provide an additional 10 million gallons per day (mgd) in the 2033 timeframe.

Source Options Discussion

Amanda Schwerman then presented slides on the different water sources that are being investigated in the current Long-term Master Water Plan and the results of the coarse screening evaluation. She presented the potential project options by source. Questions, comments and data needs are noted below by source.

a. Desalination & Brackish Water Supplies

- Is brackish desalination for agricultural use? (Answer: No. The projects shown in the slides would be for drinking water purposes. Tampa Bay Water is considered project locations in areas of growth in the Tampa Bay region.)
- Do the project numbers shown on the map indicate project priority? (Answer: No, they are indicators only. The projects were numbered from north to south, but there is no priority in the project list at this time.)
- Regarding the cost of desalination, is there a lot of pushback on desalination even though we need it so much? (Answer: Tampa Bay Water is considering the cost per thousand gallons of all potential source options. Some residents do understand that the more treatment that a supply requires, the more it may cost. However, the advantage of Tampa Bay Water's regional system is that those costs are shared regionally among the six local governments and their 2.5 million plus end users, so the impact to the unitary rate is mitigated.)
- Have you communicated directly with industries to identify with their growth is happening and where the supplies should be located? How do you determine where the growth will occur? (Answer: As part of the Long-term Master Plan Plan process, Tampa Bay Water's project team works with its local governments and their planning departments to forecast demand into the future. Demand forecasts include different sectors, such as single and multi-family housing, manufacturing/industry, and more. We also work with the local governments to understand where they expect to see growth in the long-term.)
- Pinellas County is being very intential with its future growth, so it makes sense to ensure there is infrastructure in those areas to support that growth. For example, the area indicating a project in St. Petersburg is an area targeted for future growth.
- Are there any environmental impacts to associated with desalination? (Answer: Before the Tampa Bay Seawater Desalination Plant in Apollo Beach was built, Tampa Bay Water worked closely with the regulatory and environmental community to understand and address environmental concerns. The power plant is co-located with the Big Bend Power Plant. The desalination plant uses a small amount of the power plant's cooling water for its intake. Then concentrated seawater leftover from the process is blended back into the power plant's cooling water supply, then the blended water goes to the discharge canal. By the time the water exits the discharge canal, there is no measurable difference in salinity. The plant's operations have been monitored for 20 years.)
- Are you coordinating with local entities to make sure that the water tables are not changed in sites where future industries, businesses or homes will be built? (Answer: As Tampa Bay Water goes forward, we are not looking to make wholesale pumping changes, so water levels at the surface should not change. Any new groundwater project will include extensive

groundwater modeling in the feasibility stage to make sure that new projects do not impact the environment. Zoning and land use are included in the feasibility studies as well.)

b. Surface Water Supplies

- How long will it take to build these options? (Answer: The options currently being considered are to meet projected demands in 2033. It takes about 10 years to investigate, permit and build a new water supply. Anything that would take longer than 10 years will be considered in a future Long-term Master Water Plan.)

c. Fresh Groundwater & Other Water Supplies

- How are the local governments involved? (Answer: Tampa Bay Water's member government utility directors are an important part of the planning process. Tampa Bay Water staff and consultants meet regularly with the member governments to obtain input on the planning process, solicit ideas for future projects, and discuss outcomes from the screening process. We welcome a collaborative process with our members and their various stakeholders.)
- Is the horizon for planning and construction 10 years? (Answer: The horizon is 10 years for planning and construction, but the population projections have a 20-year horizon.)
- Have there been cost analyses done for the various options? (Answer: Generally, fresh groundwater is the lowest cost source as it generally requires less treatment than other options. However, other factors are considered in the cost, such as the length of a pipeline to connect the source to the regional system and pumping costs. All projects will be evaluated for cost per thousand gallons; cost is a consideration for the Board of Directors when it selects new projects.)

d. Indirect & Direct Potable Reuse

- At the Tampa City Council candidate forum, a comment was made that the City needs to pursue a reuse project because its withdrawals from the Hillsborough River are limited at 82 million gallons per day. Can you elaborate? (Answer: The City of Tampa is unique among Tampa Bay Water's members in that it can self-supply up to 82 million gallons per day from the Hillsborough River. Demands above 82 mgd are met by Tampa Bay Water, which annually plans to deliver 6 mgd to the City of Tampa and considers the City's growth in its long-term demand forecasts.)

d. Questions/Comments Related to All Sources

- Will you send out the presentation to the ad hoc committee members? (Answer: Yes.)
- Is Tampa Bay Water available to give a presentation to the Tampa Bay Regional Planning Council or other groups? (Answer: Yes. Michelle Stom will be sending out the presentation slides to the group; she can assist in scheduling staff to present to any groups that are interested.)

- Anything that you can send out that would help us with the learning curve on these different sources would be helpful.

Other Comments:

Next Meeting

- Tampa Bay Water will reach out to the group to poll for potential meeting dates in the August timeframe, after the short-list of alternatives has been presented to the Board of Directors.

ECONOMIC AD HOC COMMITTEE MEETING
Meeting Minutes

Project Name:	Project No:	File Number:
2023 Long-term Master Water Plan Update	09016	
Subject:		
Economic Ad Hoc Committee Meeting #2		
Location:	**Date:**	**Time:**
Zoom Virtual Meeting	9/19/23	9:00 a.m.
Recorded By:		
Michelle Robinson, Dialogue Public Relations		

Participants:	Title:	Organization:	Attendance
Bill Cronin	President/CEO	Pasco Economic Development Council	
Dr. Cynthia Johnson	Director	Pinellas County Economic Development Council	X
Matt Letteleir	President/CEO	Brandon Chamber of Commerce	
Amy Martinez-Monfort	Director	CEO Council of Tampa Bay	X
Kenneth Parker	Executive Director	Florida Strawberry Growers Association	X
Amanda Payne	President/CEO	Amplify Clearwater	X
Craig Richard	President/CEO	Tampa Bay Economic Development Council	
Bob Rohrlack	President/CEO	Tampa Bay Chamber	
Tammy See	Board Chair	Greater Riverview Chamber of Commerce	
Bemetra Simmons	President/CEO	Tampa Bay Partnership	
Sean Sullivan	Executive Director	Tampa Bay Regional Planning Council	X
Chuck Carden	General Manager	Tampa Bay Water	X
Michelle Stom, APR	Chief of Staff/Chief Strategy Officer	Tampa Bay Water	X
Warren Hogg	Chief Science Officer	Tampa Bay Water	X
Danielle Keirsey	Planning Project Manager	Tampa Bay Water	X
Amanda Schwerman	Planning Manager	Black & Veatch	X

Action Items:

No.	Item	Assigned To	Due Date	Status

Minutes:

Introductions, Purpose of the Ad Hoc Committee, Overview of Tampa Bay Water
Chuck Carden opened the meeting by thanking attendees for their time and participation. Mr. Carden provided a brief overview of the meeting agenda, Tampa Bay Water, its mandate and water supply system. He discussed the importance of adequate and reliable drinking water to the region's economy and said Tampa Bay Water continues balancing the region's need for drinking water with that of the environment. He said the region continues to grow and will need at least 10 million gallons per day of additional water by 2033 and a total of 25 million gallons per day by 2043. As Tampa Bay Water looks at new projects, input from this and the other ad hoc committees, as well as other public outreach efforts, help shape our future work. He then turned the presentation over to Amanda Schwerman.

Water Supply Expansion Process
Amanda Schwerman provided an overview of Tampa Bay Water's long-term planning process, which includes four steps and takes about 10 years to complete. This process starts with the Long-term Master Water Plan, which is a comprehensive analysis of demand, growth and system reliability and includes reviewing more than 100 potential water supply options. This plan is updated every five years. The options in the plan are analyzed and screened to a recommended shortlist.

Shortlist options will enter the Feasibility Program, where they will undergo a more rigorous review and assessment to determine costs and feasibility. The feasibility stage takes approximately two years to complete.

Feasible projects enter the third step, Water Supply Selection. The projects are ranked and presented to Tampa Bay Water's board of directors in configurations that can meet the supply milestones and timing. (Projects that are not feasible fall out of the plan.)

Tampa Bay Water's board of directors votes on a feasible project or a configuration of multiple projects to move into design and construction to be the region's next water supply facilities. Projects that are not selected go back into the Long-term Master Water Plan for future consideration.

Source Options Discussion
Next Ms. Schwerman presented slides on the water supply projects remaining after the shortlist screening evaluation. Seven projects were shown, which represent geographic and source diversity. She then presented slides on each project concept, discussing the project's source water, treatment process, estimated yield and additional pipeline needs.

She said if the shortlist is approved by the board, the next step for the seven projects is to enter into the feasibility study phase, where a more detailed technical and economic analysis will be completed. Feasibility studies will provide more certainty regarding yield, water quality and costs, and determine if there are any roadblocks that may remove the project from consideration.

Ms. Schwerman then presented slides on developmental alternatives. She said Tampa Bay Water will be studying developmental alternatives alongside the seven feasibility studies. The current developmental alternatives are all evaluating the potential for potable reuse, including direct potable reuse at locations such as the desalination plant, regional surface water plant and other locations, or indirect potable reuse through groundwater wellfields or surface water reservoirs.

The developmental alternatives would start with the member government facilities that have available excess reclaimed water, including Hillsborough County, Pinellas County and the City of Tampa. She said the first step would include conducting source-water assessments for each reclaimed water source and then building on the information from this to evaluate potential concepts more thoroughly.

After the presentation, the group asked questions as noted below:

- For each of the projects you discussed, will you be doing studies to determine if they will impact agricultural interests, like strawberry growers and cattle farmers? Strawberries are the most valuable agricultural crop in Florida, so it's important to know the impact on water quality and water quantity. Because of food safety concerns, strawberry growers rely on groundwater. (Answer: Every project under consideration must go through analyses of environmental impacts to determine whether it could impact another user, including agriculture and domestic wells. The regulatory process with the Southwest Florida Water Management District (District) requires that any new use cannot impact other users. In looking at the proposed projects, the majority of the groundwater projects are in Pasco County, and they will be highly scrutinized by Tampa Bay Water and the District. Tampa Bay Water has worked closely with the District to achieve environmental recovery in the area of our Consolidated Wellfields, and we intend to maintain those results. In southern Hillsborough County, we have the South Hillsborough Wellfield project, which is based on aquifer recharge by Hillsborough County to create an increase in water pressure inland. As we go into permitting for this project, we have to evaluate whether any proposed drawdown would impact domestic or agricultural wells and would modify our proposed withdrawals based on the results.)
- Could you provide more detail on the water supply selection process for the committee members, so we can describe it after this meeting? (Answer: Yes. These minutes include a narrative describing the process on page 2 under the Water Supply Selection Process heading.)

The Tampa Bay Regional Planning Council requested a presentation at one of its future meetings. Tampa Bay Water will reach out to coordinate. Michelle Robinson advised the group that their input is appreciated at any time, and they can contact anyone in the meeting with additional input. Mr. Carden thanked the participants again for their time and input. The meeting concluded at 9:30 a.m.

downs & st. germain RESEARCH

TAMPA BAY WATER

LONG-TERM MASTER WATER PLAN FOCUS GROUPS

Table Of Contents

Contents List

Research Goals

The goals of this research project were to:

- Get people's perceptions of various sources of tap water
- Assess reasons for these perceptions
- Explore what content might assure people that tap water from various sources is safe to drink
- Determine who is most trusted to convey the concept that tap water from various sources is safe to drink

downs & st. germain RESEARCH

TAMPA BAY WATER

Key Takeaways

01

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TAMPA BAY WATER

Most focus group participants are skeptical of tap water quality. They express interest for information on water quality that they have not sought on their own, nor have they read this information when given to them in utility bill flyers or water utility annual reports.

Beyond that, they do not understand the science of water treatment. Asking them to understand the science in water treatment is like asking them to understand the science involved in shooting a rocket to the moon. They believe it is possible when they see it happen.

People will believe that tap water is pure, good tasting, and drinkable when they see and taste it themselves. So, give people a chance to test tap water from various sources. It is not possible to give everyone a taste test, but it is possible to have highly publicized taste tests. Then promote the results. In other words, communicate the results of water treatment, not the science, regardless of the water source.

In fact, there have been recent taste competitions using beer brewed with reclaimed water resulting in panels being unable to detect which beers were made with recycled water. Furthermore, these beer batches were sold out in a matter of days!

Key Takeaways

02 Lack of Trust

Participants display a marked lack of trust in external sources when it comes to gauging the safety of drinking water. Rather, they prefer to rely on their own senses - taste, smell, and sight - to assess its quality and potential risks.

03 Transparency

The primary concern for participants is determining the standards of cleanliness that should be expected for different sources of water. Many participants express confusion about what level of cleanliness was acceptable and desired. Overall, participants are unsure about what standards are currently in place, whether the standards were the same for all sources and express a desire for greater clarity.

Key Takeaways

04 Pipe Quality Concerns

Participants are more worried about the quality of water after it passes through old pipes and reaches their homes, rather than its cleanliness at the source. They feel that the state of the distribution pipes plays a critical role in determining the safety and quality of the water.

05 Reclaimed Water

The majority of participants exhibit a strong negative reaction to the idea of drinking reclaimed water, expressing skepticism that it can ever be made clean enough for consumption. However, a minority of participants suggest that an education campaign can help shift perceptions about the safety of reclaimed water, even though they personally would not drink it.

Key Takeaways

06 Water Sources

Participants view water from the Floridan Aquifer and from lakes and rivers as the safest sources for drinking water. The deep underground location of the aquifer and natural filtration process help to alleviate concerns about potential contaminants.

Participants are more accepting of moving water, whether it is from rivers or lakes, but they perceive lakes as more stagnant. There is also a preference for knowing the specific rivers and lakes the water is sourced from.

Desalinated water is also generally viewed as acceptable, with some preferring this source as the desalting process yields a cleaner drinking water supply. However, some participants express hesitation about desalinated water due to concerns about human contaminants, oil spills and red tide.

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TAMPA BAY WATER

Water Sources

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TAMPA BAY WATER

Surface Water

First Thoughts/Feelings

Overall, the responses to surface water from lakes and rivers that has been cleaned to drinking water standards are mixed.

Some people feel okay with it as long as it meets the standards, while others have concerns about the initial source of the water, the potential for pollutants and runoffs, and the effectiveness of the cleaning process.

Standards and transparency in the process are emphasized as important factors in determining whether or not it is safe to drink.

The idea of sustainability and using a natural source of water is also appreciated by some.

Surface Water

Safety Rating

People rate the safety of drinking water from lakes and rivers based on various factors, including the cleaning process, source of water, removal of contaminants, treatment method, runoff from outside sources, standards for drinking water, use of pesticides and fertilizers, and the location of the river or lake.

Some people trust the cleaning process and standards for drinking water, while others are skeptical about the effectiveness of cleaning and disinfecting contaminants.

The source of water, location, and outside runoff are also significant factors that people consider when rating the safety of drinking water from lakes and rivers.

Surface Water

Convincing Information

Participants suggest that to convince someone about the safety of drinking water from surface water like lakes and rivers, they would need information such as the process used for cleaning and treatment, the chemicals used and their effects, additional filtration measures, storage and delivery methods, testing for harsh chemicals, transparency and monitoring, consistent water reports and surveys, and approval from health authorities.

They may also want to know the source of the water, the standards set for cleaning and treatment, and the type of testing done to ensure safety.

Many participants suggested tasting the water or providing information in plain English with translated chemical names.

Selected Quotes

Surface Water

> I trust it a little more because of movement of the water.

> I think it would be somewhat safer however there needs to be consistency in testing as people swim, boat, and fish in these water bodies.

> Not sure it meets my standards. Definitely need to see the cleaning process.

Selected Quotes

Surface Water

"You don't know about the machine and the water is not clean regardless of the situation because of the bacteria that could be growing. Runoffs and stuff."

"But it doesn't matter. It's in the pipes coming from everyone's houses. It's also not the best considering the pipe systems. So, it doesn't really matter where the source of water comes from when it comes out of a tap. That's part of the sort of contaminated right back at the end. Tampa is known for a lot of pipes busting. I run into that all the time."

"I put down that it was very safe because we don't get any notices and the water that comes from my tap is very clear. Where water sits awhile if you don't turn the water on enough, it may leave some rust or residue coming out of it, but we let it run, it clears up, you know? Our water out of the tap is the water we use for cooking. I don't see people sick from that. It might be from other things, but I've never heard it being from water."

Floridan Aquifer

First Thoughts/Feelings

Familiarity and knowledge about the Floridan Aquifer varied across groups.

Some people feel that the deeper source of water is more pure and sustainable, while others are concerned about the depletion of the Aquifer and the quality of the water.

There are also questions about the standards for cleaning the water, the chemical breakdown of the water, and whether the water is safe to drink.

Overall, there seems to be a mix of positive and negative reactions to the idea of drinking water from the Floridan Aquifer.

Floridan Aquifer

Safety Rating

Overall, people seem to rate the safety of drinking water from the Floridan Aquifer as reasonably safe, although some have concerns about taste or visible sediments.

Many trust the natural filtration process of the deep sourcing and double filtration system, but some are unsure of the standards or regulations in place.

There are also questions about the process of cleaning and who is responsible for ensuring its safety.

Despite these concerns, many view the groundwater from the Floridan Aquifer as a healthier alternative to water from lakes and rivers.

Floridan Aquifer

Convincing Information

To convince someone about the safety of drinking water from the Floridan Aquifer once it has been cleaned to drinking water standards, they would need information such as the process involved in filtration, breakdown of chemicals and comparison with prior years, comparison with other states, visual information, data on what's taken out and added, contents such as iron and chemicals, who is drinking it and statistics, understanding the standards and the process, regulation, guarantee of consistent source of water, regular news reports, consistent testing, and evaluation of test results by multiple companies.

Selected Quotes

Floridan Aquifer

This is the “original” water that indigenous people drank, but because of modern contaminants, it is no longer automatically safe.

It goes through a natural filtering process.

Underground water is from nature and that is good.

Selected Quotes

Floridan Aquifer

"

I've heard about it so I wrote that I feel good about the source. I wrote that I would prefer to see some numbers. I also wrote that it's not reliable during drought seasons. Because an aquifer does eventually dry out whereas with a drought water isn't reliable for it.

"

Because there's that natural filtration that happened also and it's also being filtered, I guess, from the water source. So there's two sources of filtration instead of one. Especially with lakes and rivers, I'm getting a natural one and then the company filtration so.

"

I think that there could be more trust in the process. If you know the process and, you know, you was assured that, you know, was assured the process is going to be the same over the whole city not just certain areas. You know if it was a standard process.

Reclaimed Water

First Thoughts/Feelings

People have strong feelings (mostly negative) about reclaimed water that has been cleaned to drinking water standards.

Few are open to the idea if they know more about the standards and the process, while most are skeptical and find the idea unappealing or disgusting.

Some are concerned about the chemicals used in processing, while others wonder if it smells or if contaminants are still present.

Overall, the standards and the process seem to be the most important factors for people's acceptance of the reclaimed water.

Reclaimed Water

Safety Rating

There are strong concerns about the safety and quality of drinking reclaimed water.

They question the standards for cleaning and processing, worry about the chemicals and pollutants in the water, and are skeptical of the reliability of the systems used to clean it.

Few are open to drinking reclaimed water if it is cleaned to high standards, while others remain firmly opposed to the idea.

Many also express a need for more information about the standards and processes used to clean the water before they can feel comfortable consuming it.

Reclaimed Water

Convincing Information

To convince people about the safety of drinking reclaimed water that has been cleaned to drinking water standards, they would require a complete breakdown of the process and chemicals used, information about checks and balances in place, labeling and presentation of the product, a website with live statistics of cleanliness, a 10-year study from a reputable institution, a detailed tour of facilities, information about mineral levels and where it falls within the standard, visual evidence, education on the process and comparison with other sources, and data showing the difference between reclaimed and quality water.

However, the consensus seems to be that individuals may not be convinced at all.

Selected Quotes

Reclaimed Water

”

There is no way to clean it as well as you could clean water from the Aquifer.

”

Yuck! Smelly, unclean, impure, and unsafe no matter what they say.

”

Just the fact that an organization says it is cleaned to drinking water standards is not enough for me.

Selected Quotes

Reclaimed Water

"I think we're already drinking it, to be honest with you. Yup. I think we are already drinking it and they're filtering and cleaning it, and it comes back to us. Maybe the other things that don't make it clean, like old pipes or whatever, but other than that I think we are drinking it."

"I wrote no-way-Jose. Not my preferred choice. Not very trusting on reliability or some contaminants being left behind. So, this is not my favorite option. I'm not sure if it's the case, but like you all have already said, we are already probably drinking it. I put that I would like a better option."

"It's already a thing, at least what we go through at least. I think it's nasty, polluted, and unclean still and I actually hate more of that situation. It's that high on my list. And unfortunately, we bathe in it. But there's really nothing else we can bathe in other than the ocean. Now the ocean is even toxic to us. At this point, we're at a dead end. You're going to have to accept whatever water you're getting."

Desalinated Water

First Thoughts/Feelings

The responses varied, with some participants considering desalinated water from the Gulf, Bay, or brackish sources to be a more abundant and perhaps more natural and sustainable option.

Others are unsure about the taste and processing of the water or have concerns about oil spills or red tide events. A few mentioned concerns for cost.

Some are worried about potential sodium content of the water or are skeptical about the cleaning process.

However, a few participants consider desalinated water as a safe option, though not necessarily their first choice. Some participants say if tastes salty they prefer other sources of water.

Desalinated Water

Safety Rating

Overall, people's ratings of the safety of drinking desalinated water are largely dependent on factors such as personal experience, trust in the process and standards, transparency, sustainability, and source of the water.

Many believe that desalinated water is safer because it goes through a more thorough process to remove salt, but others are concerned about the original source of the water and potential pollutants like bacteria, toxins, and chemicals.

Red tide and run-off are also concerns for some people. Ultimately, consumers require more information to determine whether desalinated water is the safest possible option.

Desalinated Water

Convincing Information

Similar to other water sources, people may be convinced about the safety of drinking desalinated water if they are provided information about the steps of the process, the quantities and types of chemicals used for cleaning, safety protocols, and cost comparison with other methods of cleaning.

People also want to receive regular updates on the cleanliness of the water and the results of testing.

Additionally, some individuals prefer visual aids and would like to see the cleaning process in action.

Selected Quotes

Desalinated Water

Desalination is not enough for me to consider drinking it. It would be all right to use it for other purposes, but not for drinking.

With red tide and everything else that is in the ocean, no way am I drinking it.

I'm fine with that (desalinated water) as long as we have standards to make the water OK, and as long as what is being done is communicated to us.

Selected Quotes

Desalinated Water

"I just want to know what the standards are. When you say drinking water standards, is the standard between 5 and 10 or is it 10? I want to know it's the standard it's supposed to be. I know people say if it's 5-10, then It'll at least do 5, but I don't have to go to 10. So, if I know what the standards are and those standards are being met."

"I wrote that I was okay with it as long as the current water situation is looked upon and made sure it's safe enough for us, for us to be consuming. You see what it does to the wildlife and other animals. I wouldn't want that to happen to us, that we drink it and all of sudden we're dying from drinking water that we thought was safe. So, the process would have to be extreme and make sure it's all clean."

"I grew up in Tampa, I've always been told between the Bay, the Gulf, and the brackish water, that is not good. I don't drink it. And I'll drink pretty much anything. I am not drinking that water. I'll drink it from the ground, or the lakes, the sink before that. And I love the beach, I love the Gulf."

Trusted Sources

Safety

Participants have little trust in any sources to provide them with accurate information on water safety.

Many individuals trust their own eyes, noses and taste buds when assessing water quality. Others prefer independent research to determine the safety of the water. However, there are also those who do not trust any source unless they see proof.

Some suggested trusted sources are U.S. government agencies (FDA, NIH, CDC), independent third-party sources with no affiliation or interest, university professors, non-profit water organizations, chemists, and activists who can provide proof.

Pay for Enhanced Drinking Water Quality

Extra Cost

About half of participants claim they will pay no more for enhanced drinking water quality. They believe they should already be receiving the highest quality drinking water.

Other participants maintain they will pay up to $75 more a month for the highest quality drinking water.

It should be noted that in past quantitative research for Tampa Bay Water, about half of participants are willing to pay between $5 and $10 more per month for higher quality tap water.

Methodology

Focus groups were conducted with five target groups on March 22 and 23, 2023:

- Pinellas County residents (including St. Petersburg)
- Pasco County residents (including New Port Richey)
- Hillsborough County residents (including Tampa)
- Hispanic/Latino residents from all member governments
- African American residents from all member governments

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TAMPA BAY WATER

Downs & St. Germain Research
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850-906-3111 | www.dsg-research.com

Date & Time: 11:30 a.m. Wednesday, June 21, 2023

Host Organization: Tampa Bay Association of Environmental Professionals

Point of Contact (Name, Phone, Email): Noemi Castillo; tpaep@faep-fl.org; Noemi.Castillo@hdrinc.com

Location: BRIO at International Plaza

Presentation Used (Male or Female Voiceover): LTMWP Fine Screening Presentation

Presenter: Warren Hogg; Danielle Kiersey

Additional Staff/Consultants in Attendance: Michelle Robinson, Dialoge Public Relations

Audience Size: approximately 64

Equipment Used Tampa Bay Water laptop; screen, projector, podium and mic provided

Audience Sentiment/Opinions Expressed

Is there a possibility of running out of supply, given the growth? Any progress in processes to bring down the cost of desalination? Is there capacity to expand the existing desalination plant? Is there an internal hierarchy of preference on the projects? How much more water can you get from the Alafia River? Is another reservoir in the universe of options? What are the sources of reclaimed water that you are considering – run-off or advanced wastewater treatment plants? Many communities in Pasco County that were build when the wellfields were pumped at a higher rate now experience periodic flooding – do you have similar complaints from residents in Pasco and other areas? What are some of the more interesting consulting services that Tampa Bay Water may need for the short-listed projects? How do the developmental alternatives fit into the project selection process? Will you be able to handle any water quality testing needs in your lab or will you outsource? Will you engage the legislature at any point to keep water affordable? Does Tampa Bay Water follow Sunshine laws? Are you a state agency? How will you notice/advertise for upcoming work/services that you need? Do these projects include distribution system connections? What are you doing regarding PFAS for existing and new sources?

Follow-up Required

Michelle Robinson's email was provided for any questions/input at a later time. She will monitor the email and update this meeting summary, if needed.

Date & Time: 6:30 p.m., Monday, Aug. 14, 2023

Host Organization: Balm Civic Association

Point of Contact (Name, Phone, Email): Buddy Harwell, budharwell@gmail.com

Location: Balm Civic Center, 14747 Balm Wimauma Road, Wimauma, FL 33598

Presentation Used (Male or Female Voiceover): South Hillsborough Wellfield – Phase 1 and Master Water Plan Update

Presenter: Warren Hogg; Danielle Keirsey

Additional Staff/Consultants in Attendance: Maribel Medina, Tampa Bay Water; Michelle Robinson, Dialogue Public Relations

Audience Size: approximately 15 (plus two Hillsborough County staff members)

Equipment Used Tampa Bay Water laptop; screen, projector,

Audience Sentiment/Opinions Expressed
Is the aquifer recharge monitored to ensure there is no backflow of reclaimed water into the drinking water aquifer? How is it the reclaimed water doesn't flow inland but saltwater can intrude inland? As a matter of science, if water quality is monitored inland, and nothing worsens, then technically the recharge is OK. If monitoring of Tampa Bay Water activity shows a problem, then will you mitigate or change operations? Is Tampa Bay Water's monitoring data public? When you report monitoring data, do you also analyze it and report findings? When will the well go into service? Where will the pipe run between the well and the County's property? Will you bore under Balm Riverview Road? Will you go over or under the County's 42-inch pipeline? Where does the water come from that runs through the County's 42-inch pipeline down Balm Riverview Road? My spring-fed pond went down 3 feet during the aquifer test and hasn't come back up. Need to make sure Tampa Bay Water's permit includes mitigation requirements for domestic wells, including mitigating water quality. There needs to be some discussion/methodology about obtaining baseline water quality samples from nearby domestic wells. There is an illegal, unlined landfill in the vicinity of 672 and 301; Tampa Bay Water needs to investigate as this landfill has been the source of arsenic pollution. Does the water produced in South County go to Pinellas County? Why do you need a well if you are building a pipeline? Can the public tap into the new pipeline?

Follow-up Required
Michelle Robinson to send PDF of slides to Al Brunner and Buddy Harwell. Warren Hogg to investigate unlined landfill; Warren Hogg to provide information on local labs that can assist with baseline water quality sampling.

Date & Time: August 22, 2023, at 7:00 p.m.

Host Organization: Bloomingdale Neighborhood Association

Point of Contact (Name, Phone, Email): Donna Jankowitz, 813-681-2051, bl.neigbor1@gmail.com

Location: 1906 Bloomingdale Ave., Valrico

Presentation Used: Handouts for South Hillsborough Pipeline and Long-term Master Water Plan

Presenter: Justin Fox (Tampa Bay Water) and Danielle Keirsey (Tampa Bay Water)

Additional Staff/Consultants in Attendance: Meghan Christopher (Tampa Bay Water)

Audience Size: 10 attendees including board members

Equipment Used: Handouts only, no AV

Audience Sentiment/Opinions Expressed:
South Hillsborough Pipeline –
Will they start building the pipeline from both ends and meet in the middle? Why was the blue route chosen and not the orange route that did not touch anything? It seems like the people voted for the orange route, why did the County choose this one? Is there a possibility for the chosen pipeline to branch out from what is depicted on the map? Is this pipeline using river water? Since the water is pumped from the Tampa Bay Regional Surface Water Treatment Plant to the County's treatment plant, does that mean the water has more contaminants in it after it leaves the first treatment plant? Where does runoff water go?

Long-term Master Water Plan –
How do you interface with developers that are building so much and making the demand for water increase? Do you have any control over the growth in the area that is increasing the demand for water? Where does funding for the projects in the Long-term Master Water Plan come from? Does Tampa Bay Water participate in educational programs to help homeowners conserve water? Is there anything that homeowners can do to conserve water? Does Tampa Bay Water speak to schools and the younger generation about conservation? What is the average water use per person in the area? Are all of the bugs worked out at the Tampa Bay Seawater Desalination Plant? What happens to gray water from showers?

Follow-up Required:
The Bloomingdale Neighborhood Association is interested in including information about the rebate program and the Telephone Town Hall meeting in the Bloomingdale Gazette. Meghan Christopher will contact Jane Owen, editor of the Bloomingdale Gazette, with more information.

Date & Time: 7:00 a.m., Thursday, Aug. 24, 2023

Host Organization: Dade City Sunrise Rotary Club

Point of Contact (Name, Phone, Email): Rick Leanillo, rleanil60@verizon.net

Location: First Presbyterian Church, 37412 Church Ave., Dade City, FL 33525

Presentation Used: Long-term Master Water Plan Short-List (short version)

Presenter: Danielle Keirsey

Additional Staff/Consultants in Attendance: Michelle Robinson, Dialogue Public Relations

Audience Size: 12

Equipment Used Tampa Bay Water laptop; screen, projector

Audience Sentiment/Opinions Expressed
Your water comes from multiple sources…is reclaimed water a source that you are using now? With global warming, our waters are getting warmer and there have been recent incidence of amoebas and other things in the water. Does your treatment handle that in the finished water? What about in the raw water? Is groundwater limited in all Pasco County areas, like Zephyrhills?

Follow-up Required
A member of the Rotary Club asked whether Tampa Bay Water staff might be able to speak to her school at the Great American Teach In. Michelle Robinson provided the contact information to Meghan Christopher of Tampa Bay Water, who is following up.

Date & Time: 3:00 p.m., Tuesday, Sept. 12, 2023

Host Organization: Amplify Clearwater

Point of Contact: Kristina Park, chief operating officer, 727-461-0011, kristina@amplifycleaewater.com

Location: Clearwater Sailing Center, 1001 Gulf Blvd., #2702, Clearwater, FL 33767

Presentation Used: Long-term Master Water Plan Short List – short version

Presenter: Danielle Keirsey

Additional Staff/Consultants in Attendance: Michelle Robinson, Dialogue Public Relations

Audience Size: approximately 21

Equipment Used Tampa Bay Water laptop; screen, projector

Audience Sentiment/Opinions Expressed
We take water for granted, but with more and more people moving in, more apartments being built, and national news concerning water level of Lake Mead, are we concerned about whether we'll be in a similar situation? Will we have enough water? The desalination plant uses similar technology to large vessels to produce high-quality drinking water from seawater. Does it make sense to have more desalination plants? Are we considering a second desalination plant? It would make sense with sea level rise to expand desalination.

Follow-up Required
Oliver Kugler with Visit St. Pete Clearwater offered to distribute Water Wise information to its members/partners to help promote commercial conservation. Michelle Robinson to ask Amelia Brown and/or Brandon Moore to send information to Mr. Kugler.

Date & Time: September 20, 2023, at 8:00 a.m.

Host Organization: Central Pinellas Chamber

Point of Contact (Name, Phone, Email): Tom Morrissette, 727-584-2321, tom@centralchamber.com

Location: 801 West Bay Center, Suite 602, Largo, FL 33770

Presentation Used: Short-list LTMWP presentation

Presenter: Maribel Medina (Tampa Bay Water)

Additional Staff/Consultants in Attendance: Brandon Moore (Tampa Bay Water)

Audience Size: 20 attendees.

Equipment Used: Thumb drive.

Audience Sentiment/Opinions Expressed:
Does the plan consider droughts (2 year)? Does the plan consider PFAS? Where is the north Pinellas project located? Is desal working? Is the City of Largo reclaimed/recharged the same as groundwater via aquifer recharge? What about Weeki Wachee water? Who are your board members? What type of agency is Tampa Bay Water? Can you seek additional funding for projects? Did you get the U.S. recovery act? Up to 40 mgd – Will you meet demand with 2-3 projects? What project have been through feasibility studies?

Follow-up Required: N/A

Date & Time: September 27, 2023, at 9:00 a.m.

Host Organization: Barrier Island Government Council

Point of Contact (Name, Phone, Email): MaryBeth Henderson, 727-492-6495, MBHenderson@redshoresfl.com

Location: Island Way Grill, 20 Island Way, Clearwater, FL 33767

Presentation Used: Long-term Master Water Plan short-list presentation

Presenter: Danielle Keirsey (Tampa Bay Water)

Additional Staff/Consultants in Attendance: Michelle Robinson (Dialogue Public Relations)

Audience Size: 33

Equipment Used: Thumb drive

Audience Sentiment/Opinions Expressed:

Danielle's presentation was preceded by an IFAS Florida-Friendly Landscape presentation. Some of the questions asked during that presentation also pertain to Tampa Bay Water efforts: What is your position on artificial turf as lawns? What is your position on water wasted due to flushing of local systems? Is there a way to use the water that is discharged due to flushing? If there is an excess of reclaimed water, how will cities and counties use it? How does Senate Bill 64 affect Tampa Bay Water and its members? Are there comprehensive conservation resources that discuss easy and simple ways to save water, like turning off the faucet while one lathers up in the shower?

Follow-up Required:

A representative of Big C will contact Michelle Robinson to find resources with the Tampa Bay Estuary Program or Agency on Bay Management regarding turf grass. A gentleman in the audience will contact Michelle Robinson to obtain Amelia Brown's email address.

Date & Time: September 27, 2023, at 12:00 p.m.

Host Organization: Rotary Club of Wesley Chapel

Point of Contact (Name, Phone, Email): Jodie Sullivan, 813-927-2730, rotaryjodie@gmail.com

Location: 26133 Lexington Oaks Blvd Wesley Chapel, FL 33544

Presentation Used: Long-term Master Water Plan (short version)

Presenter: Danielle Keirsey (Tampa Bay Water)

Additional Staff/Consultants in Attendance: Brandon Moore (Tampa Bay Water)

Audience Size: 50 attendees

Equipment Used: Thumb drive.

Audience Sentiment/Opinions Expressed:
Why do we allow Nestle and such to take water? Tell us about desal. Who makes up the board of Tampa Bay Water? Various water quality questions were asked. Why is fluoride added to the water? Are in home water filters needed for tap water? Have you heard about the devices that pull water from air and are there rebates for them?

Follow-up Required:

Date & Time: September 28, 2023 at 12:00 p.m.

Host Organization: Greater Pasco County Chamber of Commerce

Point of Contact (Name, Phone, Email): Tim McClain, 727-842-7651, tim@greaterpasco.com

Location: Zoom

Presentation Used: Long-term Master Water Plan Short-list Presentation

Presenter: Maribel Medina (Tampa Bay Water)

Additional Staff/Consultants in Attendance: Brandon Moore (Tampa Bay Water)

Audience Size: 3 attendees

Equipment Used: Zoom

Audience Sentiment/Opinions Expressed:
How is Tampa Bay growing so much? Is desal working?

Follow-up Required:
Brandon Moore to send information about Tampa Bay Water Wise, a PDF of the presentation and copy for the Pasco Chamber's newsletter to Tim McClain.

Date & Time: October 3, 2023, at 12:00 p.m.

Host Organization: Brandon Chamber of Commerce

Point of Contact (Name, Phone, Email): Matt Lettelleir, 813-689-1221, president@brandonchamber.com

Location: Zoom

Presentation Used: Long-term Master Water Plan short-list presentation with S. Hillsborough Solutions

Presenter: Warren Hogg and Justin Fox (Tampa Bay Water)

Additional Staff/Consultants in Attendance: Michelle Robinson (Dialogue Public Relations)

Audience Size: 2 – the meeting was recorded for the larger chamber membership

Equipment Used: Personal computers

Audience Sentiment/Opinions Expressed:

Why is there such a variation in projected growth between Pinellas County, St. Petersburg and New Port Richey versus Pasco County, Hillsborough County and Tampa? Are those cities and counties not growing as much because they are built out? Is option G the "toilet to tap" project we've heard about? Can you describe project G in more detail? The presentation mentioned possibly linking the existing C.W. Bill Young Regional Reservoir with a potential new reservoir – how far away would the new reservoir be? And how would they be connected?

Follow-up Required:

Dialogue Public Relations sent an email to Mr. Lettelleir letting him know how chamber members can send their input and questions to the project team.

Meeting Minutes

Long-term Master Water Plan Telephone Town Hall

Sept. 14, 2023
6:30 p.m.
Zoom Virtual Meeting

Attendees:	Michelle Stom, Tampa Bay Water Warren Hogg, Tampa Bay Water Danielle Keirsey, Tampa Bay Water Amanda Schwerman, Black &Veatch Brandon Moore, Tampa Bay Water Meghan Christopher, Tampa Bay Water Michelle Robinson, Dialogue Public Relations Robin Bizjack, Dialogue Public Relations Tampa Bay area residents: an average of approximately 1,500 residents stayed on the call for 10 minutes; approximately 150 residents stayed on the call for the duration of the meeting.
Notification:	Emails to 42 area HOAs/CDDs and Chambers of Commerce Sept. 8 & 11, 2023 Future Water web page updated Aug. 14, 2023 News release posted to Tampa Bay Water website Aug. 31, 2023 Facebook posts on Sept. 2 & 14, 2023 Twitter posts on Sept. 2, 13, & 14, 2023 LinkedIn posts on Sept. 14, 2023 Facebook and Instagram ads on Sept. 2, 2023 More than 17,000 outbound calls to residents in Tampa Bay Water's service area the evening of the meeting

1. Purpose of the Meeting

The telephone town hall provided residents with an overview of Tampa Bay Water, an update on the agency's 2023 Long-term Master Water Plan update and the shortlist projects that will be recommended to the board in November 2023 for feasibility studies to potentially meet the region's long-term drinking water supply needs in the 2033 timeframe.

2. Meeting Summary

Michelle Stom welcomed attendees to the meeting and introduced speakers. She then gave a brief overview of Tampa Bay Water and how it has successfully supplied wholesale drinking water to its member governments for the last 25 years through a diverse, interconnected system. She touched on the population growth in the region and the need for more water as well as the agency's conservation efforts to offset the need and cost for new supplies. She then handed the meeting over to Danielle Keirsey.

Ms. Keirsey provided an overview of Tampa Bay Water's water supply expansion process, which typically takes 10 years to complete. The process starts with the Long-term Master Water Plan, which provides a short list of projects recommended for further study. Approved projects go through a feasibility program, which results in feasible projects being recommended to the board for water supply selection. Projects that are selected then go into design and construction to become the region's next water supply facilities.

Ms. Keirsey then shared the seven shortlisted project concepts and detailed the project concepts by water source: groundwater, river water and seawater, stopping between each water source to answer questions.

Three groundwater concepts were presented: an Eastern Pasco Wellfield (groundwater or brackish water), increasing the Consolidated Water Use Permit, and a new South Hillsborough Wellfield via Aquifer Recharge.

Three surface water concepts were presented: a North Pinellas Surface Water Treatment Plant & Reservoir, a Surface Water Treatment Facility near the existing C.W. Bill Young Regional Reservoir, and a new South Hillsborough Surface Water Treatment Plant & Reservoir.

Desalination concepts included expanding the existing Tampa Bay Seawater Desalination Plant using either brackish groundwater or seawater.

The moderator then presented a poll question: Do you have any preferences among the proposed water sources? Answer options were fresh groundwater, brackish groundwater, surface water, or seawater.

Ms. Keirsey explained the next steps for the shortlisted options, stating that feasibility studies provide more certainty regarding yield, water quality and costs, and determine if there are any roadblocks that may remove the project from consideration.

She then discussed the developmental alternatives that will be evaluated alongside the seven feasibility studies. These potential potable reuse projects propose to use reclaimed water in either a direct or indirect way. Developmental alternatives require longer feasibility studies, additional investigation or need time for regulations to be implemented. The developmental alternatives program will run concurrent with the feasibility program and will give Tampa Bay Water time to work with the member governments to define the availability of reclaimed water, assess the reclaimed water for water quality and other parameters, understand the permitting and regulatory framework, conduct pilot studies, and talk to the public extensively.

When or if developmental alternatives become clearly defined and are considered feasible options, they can become part of the water supply selection process. Ms. Keirsey then took questions regarding developmental alternatives.

The moderator presented a second poll question: Would you drink reclaimed water that has been treated to drinking water standards? Answer options were yes; yes, but only if there were no other options; unsure, need more information; and no.

After the second poll, the moderator said the meeting time was nearly up and handed the meeting over to Michelle Stom.

Ms. Stom thanked everyone for attending, asking questions and providing feedback. She said the shortlist would be presented to the board for approval at the Nov. 13, 2023, meeting. The meeting is open to the public and can be accessed via TampaBayWater.org. Anyone wanting to speak must sign up in advance at TampaBayWater.org/Board-Meetings.

The meeting concluded at 7:08 p.m.

3. Questions and Input Received

Groundwater Questions:

Does this have anything to do with the World Economic Forum? Does Tampa Bay Water have any connections to this group or their recommendations?
Mr. Hogg responded that no, Tampa Bay Water and its long-term planning have nothing to do with the Economic Forum, nor does Tampa Bay Water have any connections to the group.

How will Tampa Bay Water ensure increasing the Consolidated Well Use Permit or a new wellfield won't hurt the environment?
Mr. Hogg responded that Tampa Bay Water has invested heavily in building alternative supplies to help the environment recover. We won't recommend any projects that threaten the environmental recovery we have achieved; however, there may be additional water available, and we'll perform studies and groundwater modeling to ensure there is no impact.

Is there any scenario where both the Consolidated Well Use Permit increase and new Eastern Pasco Wellfield would be implemented?
Mr. Hogg responded that yes, there could be a scenario where some water comes from each of those sources distribute withdrawals over a larger geographic arar and protect the environment.

Surface Water Questions:

How much will this increase my water bill?
Ms. Stom said that Tampa Bay Water performs a rate analysis in feasibility studies to see what potential effects will be on water bills. Currently, we don't know the impact to the uniform water rate.

Will a new South Hillsborough reservoir serve the region or just Hillsborough County?
Ms. Keirsey responded that the reservoir would be connected to the regional system to supply the region, not just Hillsborough.

Pinellas is very populated; where will you put a reservoir?
Ms. Schwerman responded that the exact location would be determined as part of feasibility study, but that there is some space in northeast Pinellas County that may be a good location.

Who's going to pay for all this, and will developers be taxed to help with the cost?
Mr. Hogg said that Tampa Bay Water is a non-profit wholesale water supplier serving six member governments. Each member government pays the same uniform rate and sets their own rates for water they distribute to their end users. Tampa Bay Water receives grant funding from the Southwest Florida Water Management District, in addition to state and federal funding, to bring costs down. Tampa Bay Water only supplies water; we cannot control growth and have no taxing authority. We simply meet the demands of our six member governments every day.

Will these projects affect personal wells?
Mr. Hogg said all our projects are evaluated for environmental and residential and agricultural well impact. The Southwest Florida Water Management District will not issue a permit if a project impacts existing legal domestic or agricultural wells. Tampa Bay Water has a domestic well mitigation policy that requires we investigate any water-level related complaint in the vicinity of our wellfields and mitigate if we caused the problem.

How do you ensure river withdrawals won't hurt the river or estuary?
Mr. Hogg responded that we follow the minimum river flow rates set by the District, so our withdrawals have no impact on the rivers.

Surface water availability depends on the weather; what do you do in times of drought?
Mr. Hogg said Tampa Bay Water is uniquely situated because we have three different water sources so we can shift production to sources that have more supply without taking too much from any one source.

The City of Tampa shows a pass-through charge. What is the wholesale rate?
Ms. Stom said the current uniform water rate is $2.59 per 1,000 gallons, which is a little less than a penny per gallon. The City of Tampa mostly self-supplies and purchases water from us only when they need it. Right now, they are purchasing water from us, and that's why you're seeing the passthrough charge on your bill.

<u>**Desalination Questions:**</u>

Is the desalination plant working?
Ms. Stom responded that the plant has been taken offline as usual during the summer. The plant is co-located with TECO, which has been making modifications to the power plant, so the desalination plant was taken offline a little earlier this year. We anticipate coming back online in November.

Why are you not considering more desalination plants, given sea level rise?
Ms. Keirsey said that desalination is very expensive because of high energy costs, so no new desalination plants are being considered at this time; however, we are considering expanding the existing desalination plant.

Have TECO's changes at the Big Bend Power Plant affected desalination operations?
Ms. Stom said that, yes, there has been some effect on the desalination plant. Tampa Bay Water depends on TECO to feed our plant, and their modification has reduced the amount of water we can use and produce.

Has the desalination plant affected salinity in the bay?
Mr. Hogg said there is no change in the salinity in the bay based on the desalination plant's use. The plant has been in production for 20 years, and we've studied the ecology in Tampa Bay, observing plants and wildlife, and there has been no change in the environment or water quality.

Developmental Alternatives Questions:

What is the difference between direct and indirect reuse?
Ms. Schwerman said the major difference is an environmental buffer. Indirect reuse sends reclaimed water into the environment first, for instance, into surface waters, where it may later be skimmed for treatment. In direct potable reuse, reclaimed water is refined to drinking water standards and goes directly into the drinking water distribution system.

Why are you considering reclaimed as a potential source?
Ms. Schwerman responded that reclaimed water is a drought-proof supply. Member governments have plenty of it, and it can be treated to drinking water standards. The main reason is reclaimed water's availability compared to traditional sources.

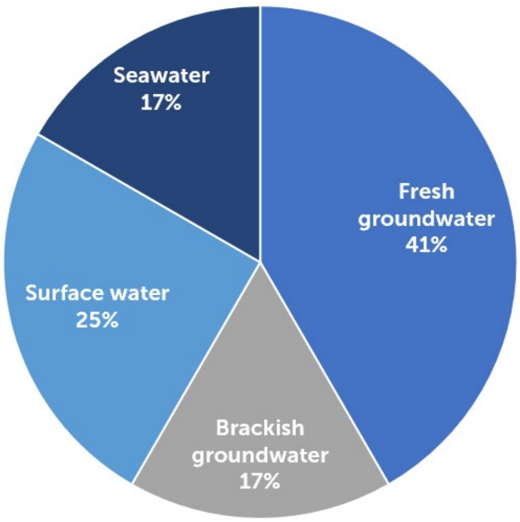
Coastal wells could supply a better source than seawater; why don't you do more of those?
Mr. Hogg said we are considering desalination plant expansion using brackish water from the lower Floridan aquifer and inland in eastern Pasco County. Both of those concepts would use brackish wells. Dunedin and Tarpon Springs have their own brackish wells, so we don't want to place brackish wells in areas that could affect existing users.

How successful is Tampa's direct and indirect water use? Do they reuse the Hooker's Point water or discharge their reclaimed water?
Mr. Hogg said Tampa uses some reclaimed water for outdoor irrigation. Their Howard F. Curren Plant delivers reclaimed water to homes and businesses to use on landscapes. Tampa is considering what to do with its remaining reclaimed water rather than discharging it to the bay, and they have asked us to see how the region could beneficially use their reclaimed water. We are evaluating reclaimed water use in our developmental alternative program.

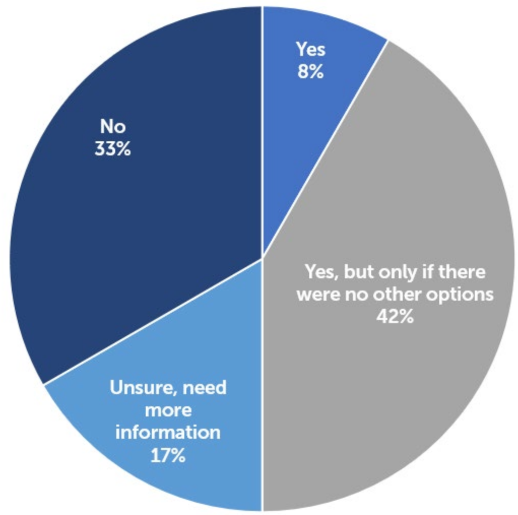
4. Poll Results

Twelve attendees responded to each of the two poll questions.

Do you have any preferences among the proposed water sources?



Would you drink reclaimed water that has been treated to drinking water standards?



5. Signage, Social Media and Ads

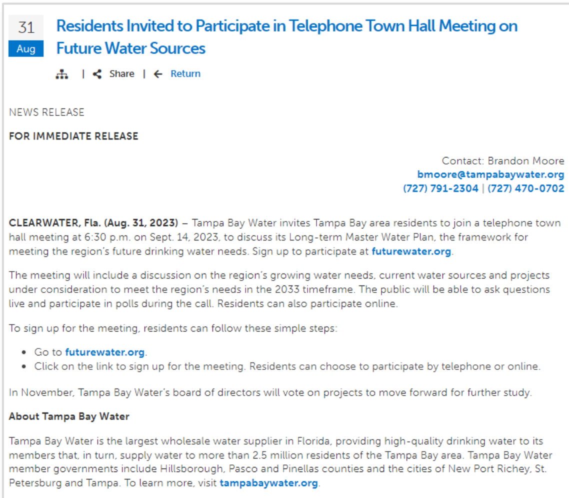
To help promote the meeting, Tampa Bay Water notified the general public by sending a news release to local media and posting the release to the utility's website Aug. 31, 2023. Additionally, information on the meeting and how to attend was listed on the utility's Future Water website (futurewater.org).

Tampa Bay Water also used social media to reach the general public. The utility posted organically to Facebook (3,800 followers), LinkedIn (3,847 followers) and Twitter (1,960 followers). These posts directed readers to the utility's Future Water webpage for more information and a link to register for the meeting. Tampa Bay Water ran digital ads on Facebook and Instagram from Sept. 2 to Sept. 14 to promote the virtual meeting. The ads received 318,352 impressions and 2,242 clicks.

Additionally, Tampa Bay Water enlisted the help of area chambers of commerce and homeowners' associations to promote the meeting.

For people who could not attend the meeting, the meeting slides and summary are being posted to the Future Water webpage.

News release posted Aug 31, 2023:



31 Aug

Residents Invited to Participate in Telephone Town Hall Meeting on Future Water Sources

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NEWS RELEASE

FOR IMMEDIATE RELEASE

Contact: Brandon Moore
bmoore@tampabaywater.org
(727) 791-2304 | (727) 470-0702

CLEARWATER, Fla. (Aug. 31, 2023) – Tampa Bay Water invites Tampa Bay area residents to join a telephone town hall meeting at 6:30 p.m. on Sept. 14, 2023, to discuss its Long-term Master Water Plan, the framework for meeting the region's future drinking water needs. Sign up to participate at **futurewater.org**.

The meeting will include a discussion on the region's growing water needs, current water sources and projects under consideration to meet the region's needs in the 2033 timeframe. The public will be able to ask questions live and participate in polls during the call. Residents can also participate online.

To sign up for the meeting, residents can follow these simple steps:

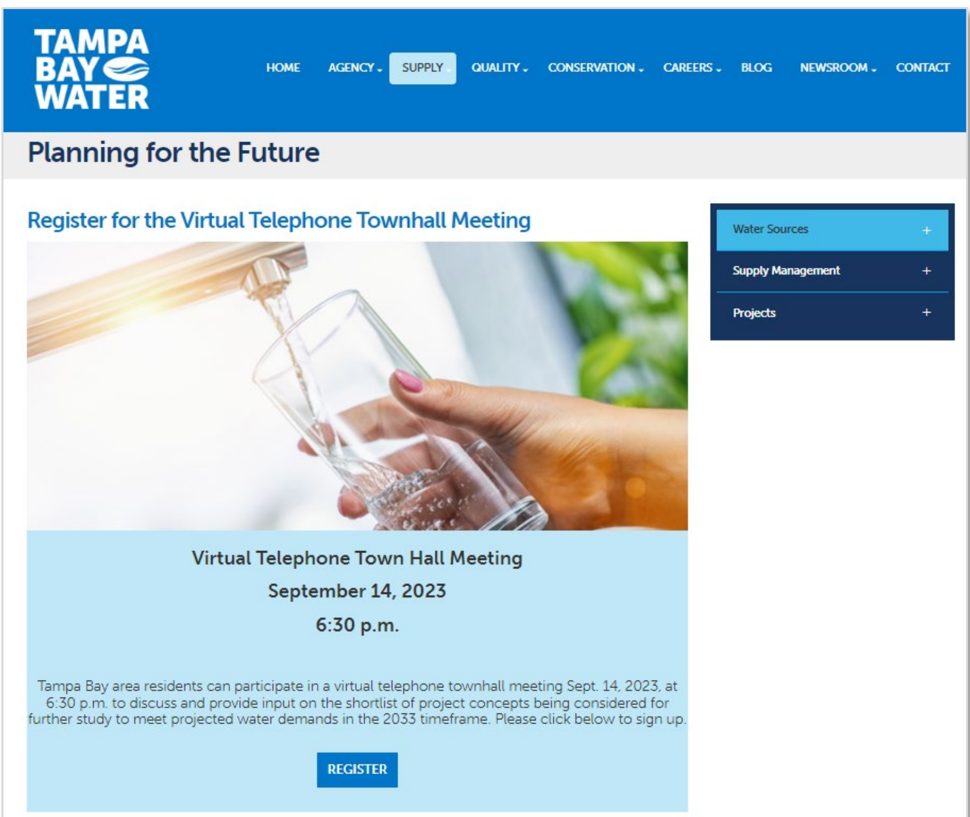
- Go to **futurewater.org**.
- Click on the link to sign up for the meeting. Residents can choose to participate by telephone or online.

In November, Tampa Bay Water's board of directors will vote on projects to move forward for further study.

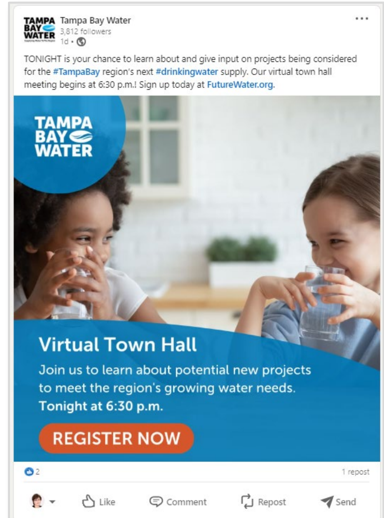
About Tampa Bay Water

Tampa Bay Water is the largest wholesale water supplier in Florida, providing high-quality drinking water to its members that, in turn, supply water to more than 2.5 million residents of the Tampa Bay area. Tampa Bay Water member governments include Hillsborough, Pasco and Pinellas counties and the cities of New Port Richey, St. Petersburg and Tampa. To learn more, visit **tampabaywater.org**.

Updated Future Water web page and meeting notification posted August 14, 2023:



LinkedIn posts Sept. 8, 13, 14, 2023:



Twitter organic posts Sept. 2, 13 and 14, 2023:

Facebook organic posts Sept. 2 and 14, 2023:

Facebook and Instagram Targeted Ads Sept. 2 - 14:


Instagram
Tampa Bay Water
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TAMPA
BAY
WATER
Virtual Town Hall
Join us to learn about potential new projects
to meet the region's growing water needs.
Thursday, Sept. 14, 2023 at 6:30 p.m.
REGISTER NOW
Sign up
We're holding a virtual town hall meeting on Thursday,
September 14, at 6:30 p.m. to discuss future wa... more


Tampa Bay Water
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TAMPA
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WATER
Virtual Town Hall
Join us to learn about potential new
projects to meet the region's growing
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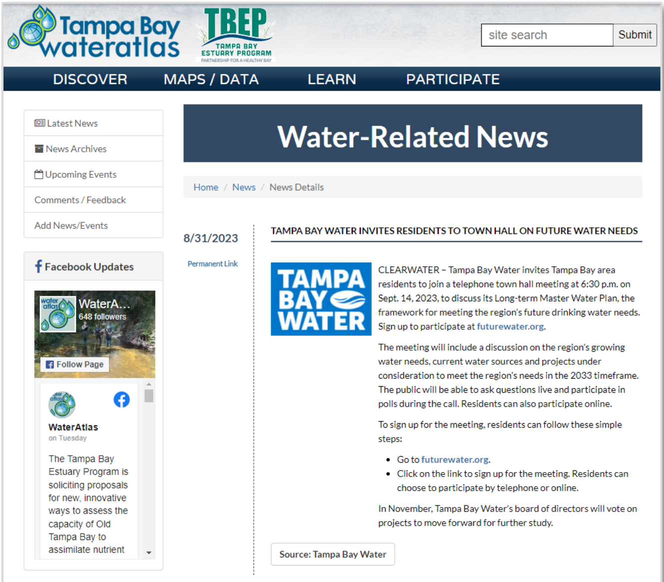
News coverage:

Tampa Bay Water Atlas online post Aug. 31, 2023:



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The Tampa Bay Estuary Program is soliciting proposals for new, innovative ways to assess the capacity of Old Tampa Bay to assimilate nutrient

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TAMPA BAY WATER INVITES RESIDENTS TO TOWN HALL ON FUTURE WATER NEEDS

TAMPA BAY WATER

CLEARWATER – Tampa Bay Water invites Tampa Bay area residents to join a telephone town hall meeting at 6:30 p.m. on Sept. 14, 2023, to discuss its Long-term Master Water Plan, the framework for meeting the region's future drinking water needs. Sign up to participate at futurewater.org.

The meeting will include a discussion on the region's growing water needs, current water sources and projects under consideration to meet the region's needs in the 2033 timeframe. The public will be able to ask questions live and participate in polls during the call. Residents can also participate online.

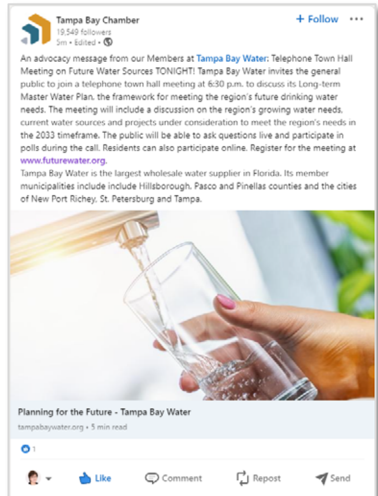
To sign up for the meeting, residents can follow these simple steps:

- Go to futurewater.org.
- Click on the link to sign up for the meeting. Residents can choose to participate by telephone or online.

In November, Tampa Bay Water's board of directors will vote on projects to move forward for further study.

Source: Tampa Bay Water

Tampa Bay Chamber LinkedIn post Sept. 14, 2023:



Tampa Bay Chamber
19,549 followers
5m • Edited •

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An advocacy message from our Members at Tampa Bay Water: Telephone Town Hall Meeting on Future Water Sources TONIGHT! Tampa Bay Water invites the general public to join a telephone town hall meeting at 6:30 p.m. to discuss its Long-term Master Water Plan, the framework for meeting the region's future drinking water needs. The meeting will include a discussion on the region's growing water needs, current water sources and projects under consideration to meet the region's needs in the 2033 timeframe. The public will be able to ask questions live and participate in polls during the call. Residents can also participate online. Register for the meeting at www.futurewater.org.

Tampa Bay Water is the largest wholesale water supplier in Florida. Its member municipalities include include Hillsborough, Pasco and Pinellas counties and the cities of New Port Richey, St. Petersburg and Tampa.

Planning for the Future - Tampa Bay Water
tampabaywater.org • 5 min read

1

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Central Pinellas Chamber email to members Sept. 12, 2023:

Central Pinellas CHAMBER OF COMMERCE

Good afternoon!

I hope you can join us for the first meeting of our **Business Development & Advocacy Committee (B-DAC) next Wednesday, Sept. 20 at 8 a.m. in the Chamber Conference Room.** (801 West Bay Drive, Suite 602, Largo FL 33770). For those who missed us last month, it was agreed to merge our former Economic Development Committee and Government Advocacy Panel into a single entity as most of the information covered at the two monthly meetings was similar.

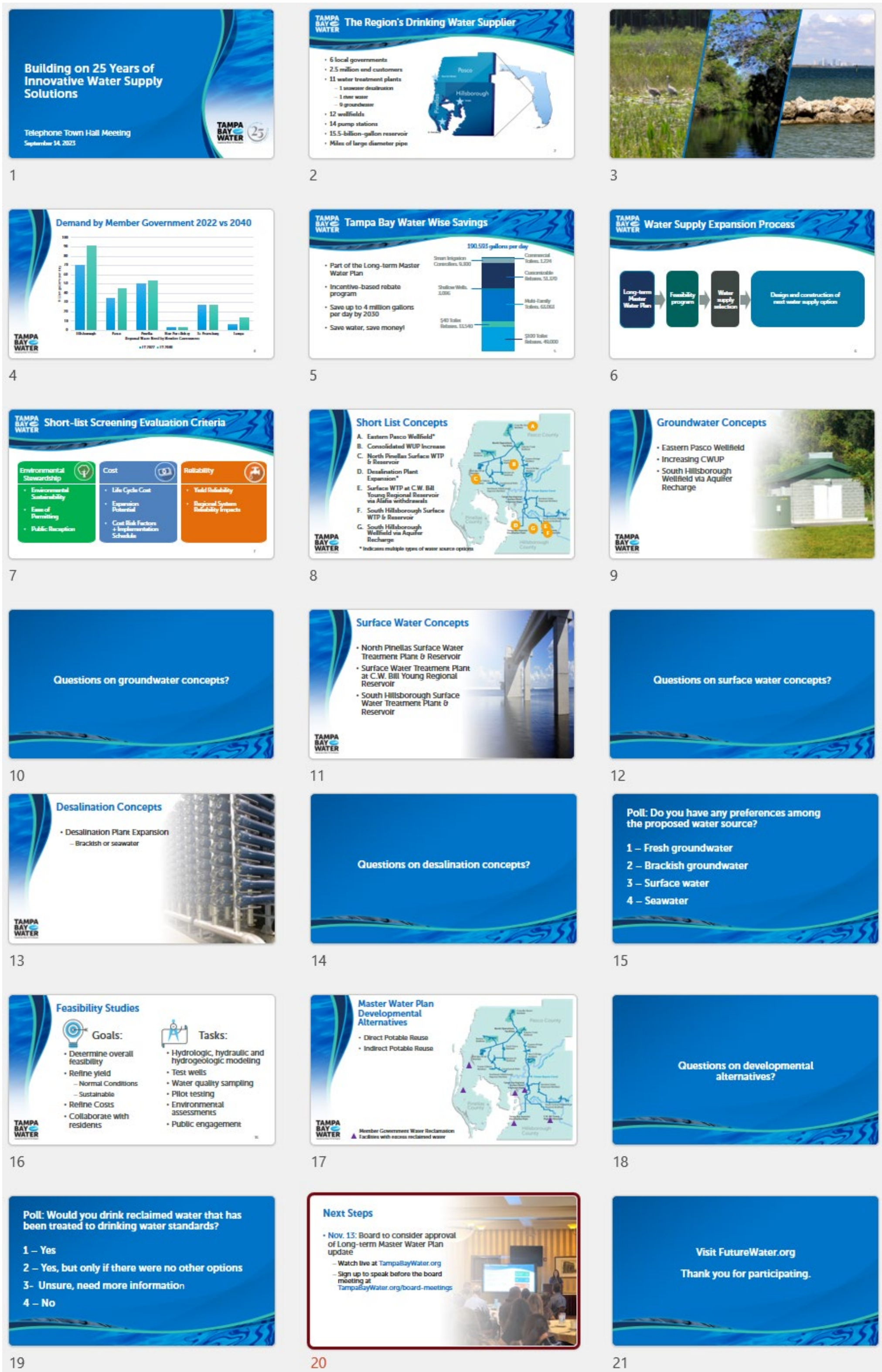
TAMPA BAY WATER

Featured this month is a presentation by Tampa Bay Water entitled "**Building on 25 Years of Innovative Water Supply Solutions.**" It's an overview of the utility's latest Long-term Master Water Plan to supply 10-20 million gallons per day of additional supply to the region by 2033. See the agenda I've attached for more information.

To accommodate this presentation and our committee reports, the meeting is extended to 9:15 a.m. Please let me know if you will be attending.

To join virtually, here's the registration info:
CP Business Development & Advocacy Mtg - Wednesday, Sept. 20, 8:00 – 9:15 am
(Please note that the meeting will exceed the allotted hour and the call cut-off)
Google Meet joining info: Video call link: https://meet.google.com/jmf-uwsz-ups

6. Presentation



Appendix L. Short-List Detailed Cost Estimates

Appendix L. Short-List Detailed Cost Estimates

L.1 Eastern Pasco County Wellfield

Cost estimates are included below for each of the following three scenarios: combined brackish and fresh groundwater wellfields, a brackish groundwater only wellfield, and a fresh groundwater only wellfield.

Table L-1 Cost Estimate – Eastern Pasco Brackish and Fresh Groundwater Wellfields

Conceptual Opinion of Probable Capital Cost Estimate				
Item	Unit of Measure	Quantity	Unit Price	Cost
Wellfield & Raw Water Transmission				
Production Well Construction	each	10	$200,000	$2,000,000
Production Well Pumps & Wellhouse	each	10	$1,200,000	$12,000,000
24" Raw Water Pipeline - Open Cut (Rural)	LF	10354	$600	$6,213,000
16" Raw Water Pipeline - Open Cut (Rural)	LF	18121	$400	$7,249,000
Subtotal Wellfield & Raw Water Transmission				**$27,461,000**
Treatment Facility[1]				
BWRO Equipment	mgd	5.0	$1,390,661	$6,894,000
BWRO Building	mgd	5.0	$595,395	$2,952,000
Ozone Equipment	mgd	6.0	$477,527	$2,866,000
Ozone Basin	mgd	6.0	$47,892	$288,000
Ozone Building	mgd	6.0	$220,419	$1,323,000
Chlorine Contact Chamber	mgd	16.8	$107,708	$1,809,000
Chemical Equipment	mgd	16.8	$115,377	$1,938,000
Chemical Building	mgd	16.8	$150,584	$2,529,000
Concentrate Discharge Construction (Deep Injection Well)	each	1	$945,000	$945,000
Concentrate Discharge Pumps & Wellhouse	each	1	$2,646,000	$2,646,000
Finished Water Storage	mgd	16.8	$307,738	$5,167,000
Administrative Building	mgd	16.8	$26,926	$453,000
Subtotal Treatment Facility				**$29,804,000**
Finished Water Transmission				
Finished Water Pump Station	mgd	16.8	$520,545	$8,740,000

30" Finished Water Pipeline - Open Cut (Rural)	LF	30514	$750	$22,886,000
30" Finished Water Pipeline - Open Cut (Urban)	LF	38823	$886	$34,412,000
30" Finished Water Pipeline - Trenchless	LF	745	$2,196	$1,637,000
Subtotal Finished Water Transmission				**$67,673,000**
Subtotal Construction Cost (before Contingency, Contractor Fees, and Escalation Costs)				**$ 124,937,000**
Contingency			30%	$37,481,000
Contractor General Conditions, Overhead & Profit			20%	$32,484,000
Escalation to Mid-Point of Construction	years	8	4%	$71,835,000
Total Construction Cost				**$ 266,736,000**
Engineering, Legal, and Administrative			25%	$66,684,000
Rural Land & Easement Acquisition	acres	30.1	$110,000	$3,309,000
Urban Land & Easement Acquisition	acres	7.9	$300,000	$2,385,000
Subtotal of Project Cost				**$ 339,113,000**
Owner's Allowance Budget			10%	$33,912,000
Total Project Cost (with Owner's Allowance Budget)[2]				**$ 373,025,000**

Annual Operation and Maintenance Costs				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Wellfield				
Wellfield O&M	each	10	$5,000	$50,000
Energy Consumption	kWh	4,560,000	$0.10	$456,000
Treatment Facility				
Energy Consumption	kWh	3,330,000	$0.10	$333,000
Chemicals	mgd	8.8	$41,727	$367,000
Process Consumables	mgd	8.8	$19,897	$175,000
Labor	mgd	8.8	$37,520	$330,000
Maintenance & Administrative	mgd	8.8	$46,616	$410,000
Pump Station & Pipeline				
Pipeline O&M	LF	98,556	$0.44	$44,000
Pump Station O&M	mgd	8.8	$566	$5,000

Energy consumption	kWh	2,910,000	$0.10	$291,000
Total Annual Operation and Maintenance Cost				**$2,461,000**
Summary				
Total Project Capital Cost				**$ 373,025,000**
Total Capital Cost per 1,000 Gallons				**$ 7.56**
Annual Operation and Maintenance Cost				**$ 2,461,000**
Annual Operation and Maintenance Cost per 1,000 Gallons				**$ 0.77**
Total Life Cycle Project Cost per 1,000 Gallons[3]				**$ 8.33**

1. Costs of treatment facility components vary and are based on water supply availability and design capacity of the associated treatment systems. The flow identified in the quantity column represents the value used to calculate the treatment component.
2. All costs are estimated and representative of October 2022 dollars. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%; escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.

Table L-2 Cost Estimate – Eastern Pasco Brackish Groundwater Wellfield Only

Conceptual Opinion of Probable Capital Cost Estimate				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Wellfield & Raw Water Transmission				
Production Well Construction	each	6	$200,000	$1,200,000
Production Well Pumps & Wellhouse	each	6	$1,200,000	$7,200,000
24" Raw Water Pipeline - Open Cut (Rural)	LF	10851	$600	$6,520,000
Subtotal Wellfield & Raw Water Transmission				**$14,920,000**
Treatment Facility[1]				
BWRO Equipment	mgd	5.0	$1,390,661	$6,900,000
BWRO Building	mgd	5.0	$595,395	$2,960,000
Chlorine Contact Chamber	mgd	10.8	$112,578	$1,220,000
Chemical Equipment	mgd	10.8	$160,826	$1,740,000
Chemical Building	mgd	10.8	$78,405	$850,000

Concentrate Discharge Construction (Deep Injection Well)	each	1	$945,000	$945,000
Concentrate Discharge Pumps & Wellhouse	each	1	$2,646,000	$2,646,000
Finished Water Storage	mgd	10.8	$321,652	$3,480,000
Administrative Building	mgd	10.8	$29,416	$320,000
Subtotal Treatment Facility				**$21,061,000**
Finished Water Transmission				
Finished Water Pump Station	mgd	10.8	$633,363	$6,840,000
24" Finished Water Pipeline - Open Cut (Rural)	LF	30514	$600	$18,310,000
24" Finished Water Pipeline - Open Cut (Urban)	LF	38823	$709	$27,530,000
24" Finished Water Pipeline - Trenchless	LF	745	$1,757	$1,310,000
Subtotal Finished Water Transmission				**$53,990,000**
Subtotal Construction Cost (before Contingency, Contractor Fees, and Escalation Costs)				**$ 89,971,000**
Contingency			30%	$27,000,000
Contractor General Conditions, Overhead & Profit			20%	$23,400,000
Escalation to Mid-Point of Construction	years	8	4%	$51,740,000
Total Construction Cost				**$ 192,111,000**
Engineering, Legal, and Administrative			25%	$48,030,000
Rural Land & Easement Acquisition	acres	20.5	$110,000	$2,260,000
Urban Land & Easement Acquisition	acres	7.9	$300,000	$2,390,000
Subtotal of Project Cost				**$ 244,791,000**
Owner's Allowance Budget			10%	$24,480,000
Total Project Cost (with Owner's Allowance Budget)[2]				**$ 269,271,000**

Annual Operation and Maintenance Costs

Item	Unit of Measure	Quantity	Unit Price	Cost
Wellfield				
Wellfield O&M	each	6	$5,000	$30,000
Energy Consumption	kWh	2,570,000	$0.10	$257,000
Treatment Facility				
Energy Consumption	kWh	2,450,000	$0.10	$245,000

Chemicals	mgd	5.2	$55,700	$289,000
Process Consumables	mgd	5.2	$33,758	$175,000
Labor	mgd	5.2	$46,200	$240,000
Maintenance & Administrative	mgd	5.2	$60,000	$312,000
Pump Station & Pipeline				
Pipeline O&M	LF	80,932	$0.44	$40,000
Pump Station O&M	mgd	4.8	$566	$10,000
Energy consumption	kWh	1,590,000	$0.10	$159,000
Total Annual Operation and Maintenance Cost				**$1,756,000**
Summary				
Total Project Capital Cost				**$ 269,271,000**
Total Capital Cost per 1,000 Gallons				**$ 10.01**
Annual Operation and Maintenance Cost				**$ 1,756,000**
Annual Operation and Maintenance Cost per 1,000 Gallons				**$ 1.00**
Total Life Cycle Project Cost per 1,000 Gallons[3]				**$ 11.01**

1. Costs of treatment facility components vary and are based on water supply availability and design capacity of the associated treatment systems. The flow identified in the quantity column represents the value used to calculate the treatment component.

2. All costs are estimated and representative of October 2022 dollars. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%; escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.

Table L-3 Cost Estimate – Eastern Pasco Fresh Groundwater Wellfield Only

Conceptual Opinion of Probable Capital Cost Estimate				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Wellfield & Raw Water Transmission				
Production Well Construction	each	4	$200,000	$800,000
Production Well Pumps & Wellhouse	each	4	$1,200,000	$4,800,000

16" Raw Water Pipeline – Open Cut (Rural)	LF	18121	$400	$7,249,000
Subtotal Wellfield & Raw Water Transmission				**$12,849,000**
Treatment Facility[1]				
Ozone Equipment	mgd	6.0	$477,527	$2,866,000
Ozone Basin	mgd	6.0	$47,892	$288,000
Ozone Building	mgd	6.0	$220,419	$1,323,000
Chlorine Contact Chamber	mgd	6.0	$119,382	$717,000
Chemical Equipment	mgd	6.0	$51,164	$307,000
Chemical Building	mgd	6.0	$52,901	$318,000
Finished Water Storage	mgd	6.0	$341,091	$2,047,000
Subtotal Treatment Facility				**$7,863,000**
Finished Water Transmission				
Finished Water Pump Station	mgd	6.0	$633,363	$3,801,000
16" Finished Water Pipeline – Open Cut (Rural)	LF	30514	$400	$12,206,000
16" Finished Water Pipeline – Open Cut (Urban)	LF	38823	$473	$18,353,000
16" Finished Water Pipeline – Trenchless (Urban)	LF	745	$1,171	$873,000
Subtotal Finished Water Transmission				**$35,231,000**
Subtotal Construction Cost (before Contingency, Contractor Fees, and Escalation Costs)				**$ 55,942,000**
Contingency			30%	$16,783,000
Contractor General Conditions, Overhead & Profit			20%	$14,545,000
Escalation to Mid-Point of Construction	years	8	4%	$32,165,000
Total Construction Cost				**$ 119,434,000**
Engineering, Legal, and Administrative			25%	$29,859,000
Rural Land & Easement Acquisition	acres	12.8	$110,000	$1,405,000
Urban Land & Easement Acquisition	acres	12.5	$300,000	$3,756,000
Subtotal of Project Cost				**$ 154,453,000**
Owner's Allowance Budget			10%	$15,446,000
Total Project Cost (with Owner's Allowance Budget)[2]				**$ 169,898,000**

Annual Operation and Maintenance Costs				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Wellfield				
Wellfield O&M	each	9	$5,000	$45,000
Energy Consumption	kWh	1,980,000	$0.10	$198,000
Treatment Facility				
Energy Consumption	kWh	880,000	$0.10	$88,000
Chemicals	mgd	4.0	$20,000	$80,000
Labor	mgd	4.0	$41,250	$165,000
Maintenance & Administrative	mgd	4.0	$60,000	$240,000
Pump Station & Pipeline				
Pipeline O&M	LF	88,202	$0.44	$40,000
Pump Station O&M	mgd	6.0	$566	$4,000
Energy consumption	kWh	1,320,000	$0.10	$132,000
Total Annual Operation and Maintenance Cost				**$ 991,000**

Summary	
Total Project Capital Cost	**$ 169,898,000**
Total Capital Cost per 1,000 Gallons	**$ 7.57**
Annual Operation and Maintenance Cost	**$ 991,000**
Annual Operation and Maintenance Cost per 1,000 Gallons	**$ 0.68**
Total Life Cycle Project Cost per 1,000 Gallons[3]	**$ 8.25**

1. Costs of treatment facility components vary and are based on water supply availability and design capacity of the associated treatment systems. The flow identified in the quantity column represents the value used to calculate the treatment component.
2. All costs are estimated and representative of October 2022 dollars. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%; escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.

L.2 Consolidated Water Use Permit Increase

Table L-4 Cost Estimate – CWUP Increase

Annual Operation and Maintenance Costs				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Wellfield				
Wellfield O&M	each	28	$5,000	$140,000
Energy Consumption	kWh	4,960,000	$0.10	$496,000
Treatment Facility				
Energy Consumption	kWh	892,000	$0.10	$90,000
Chemicals	mgd	10	$28,000	$280,000
Labor	mgd	10	$16,500	$165,000
Maintenance & Administrative	mgd	10	$32,000	$320,000
Pump Station & Pipeline				
Pipeline O&M	LF	10,410	$0.44	$5,000
Pump Station O&M	mgd	20.0	$566	$12,000
Energy consumption	kWh	3,310,000	$0.10	$331,000
Total Annual Operation and Maintenance Cost				**$1,838,000**
Summary				
Total Project Capital Cost				**$ -**
Total Capital Cost per 1,000 Gallons				**$ -**
Annual Operation and Maintenance Cost				**$ 1,838,000**
Annual Operation and Maintenance Cost per 1,000 Gallons				**$ 0.50**
Total Life Cycle Project Cost per 1,000 Gallons[2]				**$ 0.50**

1. Costs of treatment facility components vary and are based on water supply availability and design capacity of the associated treatment systems. The flow identified in the quantity column represents the value used to calculate the treatment component.
2. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.

L .3 North Pinellas Surface Water Treatment Plant & Reservoir

Table L-5 Cost Estimate – North Pinellas SWTP & Reservoir

Conceptual Opinion of Probable Capital Cost Estimate				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Pump Station & Raw Water Transmission				
Intake Pump Station	mgd	15	$520,545	$7,809,000
20" Raw Water Pipeline - Open Cut (Rural)	LF	46604	$500	$23,302,000
20" Raw Water Pipeline - Trenchless (Urban)	LF	1883	$1,464	$2,758,000
Subtotal Pump Station & Raw Water Transmission				**$33,868,000**
Treatment Facility[1]				
Ballasted Clarification Equipment	mgd	9.20	$326,818	$3,007,000
Ballasted Clarification Basin	mgd	9.20	$82,690	$761,000
Ozone Equipment	mgd	9.02	$458,471	$4,134,000
Ozone Basin	mgd	9.02	$60,807	$549,000
Ozone Building	mgd	9.02	$203,178	$1,832,000
BAF Equipment	mgd	9.02	$409,349	$3,691,000
BAF Basin	mgd	9.02	$47,489	$429,000
BAF Building	mgd	9.02	$203,178	$1,832,000
Chemical Equipment	mgd	8.84	$164,071	$1,450,000
Chemical Building	mgd	8.84	$81,600	$721,000
Solids Handling Facility	mgd	8.84	$492,212	$4,350,000
Finished Water Storage	MG	0.88	$1,374,416	$1,215,000
Administrative Building	mgd	8.84	$30,615	$271,000
Reservoir	MG	800	$20,000	$16,000,000
Subtotal Treatment Facility				**$40,237,000**
Finished Water Transmission				
Finished Water Pump Station	mgd	8.8	$633,363	$5,597,000
20" Finished Water Pipeline - Open Cut (Rural)	LF	800	$500	$400,000
Subtotal Finished Water Transmission				**$5,997,000**

Subtotal Construction Cost (before Contingency, Contractor Fees, and Escalation Costs)				**$ 80,100,000**
Contingency			30%	$24,030,000
Contractor General Conditions, Overhead & Profit			20%	$20,826,000
Escalation to Mid-Point of Construction	years	8	4%	$46,055,000
Total Construction Cost				**$ 171,011,000**
Engineering, Legal, and Administrative			25%	$42,753,000
Rural Land & Easement Acquisition	acres	97.9	$110,000	$10,765,000
Urban Land & Easement Acquisition	acres	5.8	$300,000	$1,735,000
Subtotal of Project Cost				**$ 226,262,000**
Owner's Allowance Budget			10%	$22,627,000
Total Project Cost (with Owner's Allowance Budget)[2]				**$ 248,888,000**
Annual Operation and Maintenance Costs				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Intake Pump Station				
Pump Station O&M	mgd	4.6	$566	$3,000
Energy Consumption	kWh	2,280,000	$0.10	$228,000
Treatment Facility				
Surface water treatment	mgd	4.4	$0.63	$1,016,000
Pump Station & Pipeline				
Pipeline O&M	LF	49,287	$0.44	$22,000
Pump Station O&M	mgd	4.4	$566	$3,000
Energy consumption	kWh	1,460,000	$0.10	$146,000
Total Annual Operation and Maintenance Cost				**$1,417,000**
Summary				
Total Project Capital Cost				**$ 248,888,000**
Total Capital Cost per 1,000 Gallons				**$ 10.04**
Annual Operation and Maintenance Cost				**$ 1,417,000**
Annual Operation and Maintenance Cost per 1,000 Gallons				**$ 0.88**
Total Life Cycle Project Cost per 1,000 Gallons[3]				**$ 10.92**

1. Costs of treatment facility components vary and are based on water supply availability and design capacity of the associated treatment systems. The flow identified in the quantity column represents the value used to calculate the treatment component.
2. All costs are estimated and representative of October 2022 dollars. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%; escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.

L.4 Desalination Plant Expansion

Table L-6 Cost Estimate – Desalination Plant Expansion with Seawater Supply

Conceptual Opinion of Probable Capital Cost Estimate				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Raw Water Transmission				
Raw water supply (66" pipe)	LF	4,000	$1,720	$6,880,000
Treatment Facility[1]				
Pretreatment (DAF-MF)	mgd	70	$1,098,929	$76,925,000
RO Expansion (RO-1TC per train)	each	10	$4,646,700	$46,467,000
Post-Treatment (Convert to Liquid Lime)	each	1	$4,132,000	$4,132,000
Solids Handling (35 mgd Lamella + New Belt Filter Press)	mgd	35	$349,486	$12,232,000
Concentrate Discharge (20 mgd Deep Injection Well)	mgd	20	$2,736,400	$54,728,000
Subtotal Treatment Facility				**$194,484,000**
Finished Water Transmission				
Finished Water Transmission	mgd	40	$709,450	$28,378,000
Subtotal Construction Cost (before Contingency, Contractor Fees, and Escalation Costs)				**$229,742,000**
Contingency			30%	$68,923,000
Contractor General Conditions, Overhead & Profit			20%	$59,733,000
Escalation to Mid-Point of Construction	years	6	4%	$95,090,000
Total Construction Cost				**$453,488,000**
Engineering, Legal, and Administrative			25%	$113,372,000

Subtotal of Project Cost				**$566,859,000**
Owner's Allowance Budget			10%	$56,686,000
Total Project Cost (with Owner's Allowance Budget)[2]				**$623,545,000**
Annual Operation and Maintenance Costs				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Treatment Facility Costs				
Energy Consumption	kWh	89,218,500	$0.10	$8,922,000
Chemicals	mgd	12.1	$507,298	$6,139,000
Labor	mgd	12.1	$41,219	$499,000
Maintenance & Administrative	mgd	12.1	$168,837	$2,043,000
Total Annual Operation and Maintenance Cost				**$17,602,000**
Summary				
Total Project Capital Cost				**$ 623,545,000**
Total Capital Cost per 1,000 Gallons				**$ 9.18**
Annual Operation and Maintenance Cost				**$ 17,602,000**
Annual Operation and Maintenance Cost per 1,000 Gallons				**$ 3.99**
Total Life Cycle Project Cost per 1,000 Gallons[3]				**$ 13.17**

1. Costs of treatment facility components vary and are based on water supply availability and design capacity of the associated treatment systems. The flow identified in the quantity column represents the value used to calculate the treatment component.
2. All costs are estimated and representative of October 2022 dollars. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%; escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.

Table L-7 Cost Estimate – Desalination Plant Expansion with Brackish Supply

Conceptual Opinion of Probable Capital Cost Estimate				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Wellfield & Raw Water Transmission				
Production Well Construction	each	24	$200,000	$4,800,000
Production Well Pumps & Wellhouse	each	24	$1,200,000	$28,800,000
36" Raw Water Pipeline - Open Cut (Rural)	LF	36844	$900	$33,160,000
36" Raw Water Pipeline - Open Cut (Urban)	LF	21021	$1,064	$22,359,000
36" Raw Water Pipeline - Trenchless (Urban)	LF	1872	$2,636	$4,935,000
Subtotal Wellfield & Raw Water Transmission				**$94,054,000**
Treatment Facility[1]				
RO Expansion (RO-1TC per train)	each	10	$4,646,700	$46,467,000
Post-Treatment (Convert to Liquid Lime)	each	1	$4,132,000	$4,132,000
Concentrate Discharge (20 mgd Deep Injection Well)	mgd	20	$1,206,750	$24,135,000
Subtotal Treatment Facility				**$74,734,000**
Finished Water Transmission				
Finished Water Pump Station	mgd	40.0	$709,450	$28,378,000
Subtotal Construction Cost (before Contingency, Contractor Fees, and Escalation Costs)				**$ 197,164,000**
Contingency			30%	$59,150,000
Contractor General Conditions, Overhead & Profit			20%	$51,263,000
Escalation to Mid-Point of Construction	years	8	4%	$113,363,000
Total Construction Cost				**$ 420,938,000**
Engineering, Legal, and Administrative			25%	$105,235,000
Rural Land & Easement Acquisition	acres	21.4	$110,000	$2,355,000
Urban Land & Easement Acquisition	acres	4.6	$300,000	$1,380,000
Subtotal of Project Cost				**$ 529,906,000**
Owner's Allowance Budget			10%	$52,991,000
Total Project Cost (with Owner's Allowance Budget)[2]				**$ 582,896,000**
Annual Operation and Maintenance Costs				

Item	Unit of Measure	Quantity	Unit Price	Cost
Wellfield				
Wellfield O&M	each	24	$5,000	$120,000
Energy Consumption	kWh	8,930,000	$0.10	$893,000
Treatment Facility				
Energy Consumption	kWh	80,721,500	$0.10	$8,073,000
Chemicals	mgd	11.3	$409,991	$4,629,000
Labor	mgd	11.3	$33,657	$380,000
Maintenance & Administrative	mgd	11.3	$139,232	$1,572,000
Pump Station & Pipeline				
Pipeline O&M	LF	59,736	$0.44	$27,000
Pump Station O&M	mgd	11.3	$566	$7,000
Energy consumption	kWh	3,730,000	$0.10	$373,000
Total Annual Operation and Maintenance Cost				**$16,073,000**

Summary	
Total Project Capital Cost	**$ 582,896,000**
Total Capital Cost per 1,000 Gallons	**$ 9.20**
Annual Operation and Maintenance Cost	**$ 16,073,000**
Annual Operation and Maintenance Cost per 1,000 Gallons	**$ 2.79**
Total Life Cycle Project Cost per 1,000 Gallons[3]	**$ 11.99**

1. Costs of treatment facility components vary and are based on water supply availability and design capacity of the associated treatment systems. The flow identified in the quantity column represents the value used to calculate the treatment component.
2. All costs are estimated and representative of October 2022 dollars. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%; escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.

L .5 Surface Water Treatment Plant at Regional Reservoir via Alafia Withdrawals

Table L-8 Cost Estimate – SWTP at Regional Reservoir via Alafia Withdrawals

Conceptual Opinion of Probable Capital Cost Estimate				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Pump Station & Raw Water Transmission				
20" Raw Water Pipeline - Open Cut (Rural)	LF	500	$500	$250,000
New Pumps at Existing Pump Station	EA	4	$500,000	$2,000,000
Subtotal Pump Station & Raw Water Transmission				**$2,250,000**
Treatment Facility[1]				
Ballasted Clarification Equipment	mgd	9.00	$327,537	$2,948,000
Ballasted Clarification Basin	mgd	9.00	$83,590	$753,000
Ozone Equipment	mgd	8.82	$459,479	$4,053,000
Ozone Basin	mgd	8.82	$39,656	$350,000
Ozone Building	mgd	8.82	$204,073	$1,800,000
BAF Equipment	mgd	8.82	$410,249	$3,619,000
BAF Basin	mgd	8.82	$49,559	$438,000
BAF Building	mgd	8.82	$204,073	$1,800,000
Chemical Equipment	mgd	8.64	$164,432	$1,422,000
Chemical Building	mgd	8.64	$81,960	$709,000
Solids Handling Facility	mgd	8.64	$493,295	$4,264,000
Finished water storage	MG	0.86	$1,386,388	$1,199,000
Administrative building	mgd	8.64	$30,750	$266,000
Subtotal Treatment Facility				**$23,616,000**
Finished Water Transmission				
Finished Water Pump Station	mgd	8.6	$633,363	$5,475,000
20" Finished Water Pipeline - Open Cut (Rural)	LF	23898	$500	$11,949,000
Subtotal Finished Water Transmission				**$17,424,000**
Subtotal Construction Cost (before Contingency, Contractor Fees, and Escalation Costs)				**$ 43,289,000**

Contingency			30%	$12,987,000
Contractor General Conditions, Overhead & Profit			20%	$11,256,000
Escalation to Mid-Point of Construction	years	8	4%	$24,890,000
Total Construction Cost				**$ 92,421,000**
Engineering, Legal, and Administrative			25%	$23,106,000
Rural Land & Easement Acquisition	acres	1.0	$110,000	$110,000
Urban Land & Easement Acquisition	acres	5.3	$300,000	$1,586,000
Subtotal of Project Cost				**$ 117,222,000**
Owner's Allowance Budget			10%	$11,723,000
Total Project Cost (with Owner's Allowance Budget)[2]				**$ 128,944,000**
Annual Operation and Maintenance Costs				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Treatment Facility				
Surface water treatment	mgd	6	$0.63	$1,414,000
Pump Station & Pipeline				
Pipeline O&M	LF	24,398	$0.44	$11,000
Pump Station O&M	mgd	8.6	$566	$5,000
Energy consumption	kWh	2,030,000	$0.10	$203,000
Total Annual Operation and Maintenance Cost				**$1,633,000**
Summary				
Total Project Capital Cost				**$ 128,944,000**
Total Capital Cost per 1,000 Gallons				**$ 3.74**
Annual Operation and Maintenance Cost				**$ 1,633,000**
Annual Operation and Maintenance Cost per 1,000 Gallons				**$ 0.73**
Total Life Cycle Project Cost per 1,000 Gallons[3,4]				**$ 4.47**

1. Costs of treatment facility components vary and are based on water supply availability and design capacity of the associated treatment systems. The flow identified in the quantity column represents the value used to calculate the treatment component.
2. All costs are estimated and representative of October 2022 dollars. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%; escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.

3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.
4. If fluoride treatment is to be included in this project, it is assumed that 28% of the plant influent would need to be treated by reverse osmosis. This would increase the Total Cost $/1,000 gallons by approximately 36%.

L.6 South Hillsborough Surface Water Treatment Plant & Reservoir

Table L-9 Cost Estimate – South Hillsborough Surface Water Treatment Plant & Reservoir

Conceptual Opinion of Probable Capital Cost Estimate				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Pump Station & Raw Water Transmission				
Intake Pump Station (Bullfrog Creek)	mgd	3	$633,363	$1,901,000
Intake Pump Station (Little Manatee)	mgd	9	$520,545	$4,685,000
10" Raw Water Pipeline - Open Cut (Rural)	LF	5265	$250	$1,317,000
10" Raw Water Pipeline - Open Cut (Urban)	LF	28232	$295	$8,342,000
10" Raw Water Pipeline - Trenchless (Urban)	LF	400	$732	$293,000
16" Raw Water Pipeline - Open Cut (Rural)	LF	8129	$250	$2,033,000
16" Raw Water Pipeline - Open Cut (Urban)	LF	7771	$295	$2,297,000
16" Raw Water Pipeline - Trenchless (Urban)	LF	200	$732	$147,000
18" Raw Water Pipeline - Open Cut (Rural)	LF	10827	$250	$2,707,000
18" Raw Water Pipeline - Open Cut (Urban)	LF	10004	$295	$2,956,000
18" Raw Water Pipeline - Trenchless (Urban)	LF	500	$732	$367,000
Subtotal Pump Station & Raw Water Transmission				**$27,039,000**
Treatment Facility[1]				
Ballasted Clarification Equipment	mgd	8.00	$331,418	$2,652,000
Ballasted Clarification Basin	mgd	8.00	$88,680	$710,000
Ozone Equipment	mgd	7.84	$464,923	$3,645,000
Ozone Basin	mgd	7.84	$47,168	$370,000
Ozone Building	mgd	7.84	$208,937	$1,639,000
BAF Equipment	mgd	7.84	$415,110	$3,255,000
BAF Basin	mgd	7.84	$52,397	$411,000

BAF Building	mgd	7.84	$208,937	$1,639,000
Chemical Equipment	mgd	7.68	$166,380	$1,279,000
Chemical Building	mgd	7.68	$83,913	$645,000
Solids Handling Facility	mgd	7.68	$499,139	$3,835,000
Finished water storage	MG	0.77	$1,453,564	$1,117,000
Administrative building	mgd	7.68	$31,483	$242,000
Reservoir	MG	700	$20,000	$14,000,000
Subtotal Treatment Facility				**$35,434,000**
Finished Water Transmission				
Finished Water Pump Station	mgd	7.7	$633,363	$4,867,000
18" Finished Water Pipeline - Open Cut (Rural)	LF	29954	$450	$13,480,000
Subtotal Finished Water Transmission				**$18,346,000**
Subtotal Construction Cost (before Contingency, Contractor Fees, and Escalation Costs)				**$ 80,818,000**
Contingency			30%	$24,246,000
Contractor General Conditions, Overhead & Profit			20%	$21,013,000
Escalation to Mid-Point of Construction	years	8	4%	$46,468,000
Total Construction Cost				**$ 172,544,000**
Engineering, Legal, and Administrative			25%	$43,136,000
Rural Land & Easement Acquisition	acres	87.5	$110,000	$9,631,000
Urban Land & Easement Acquisition	acres	14.2	$300,000	$4,248,000
Subtotal of Project Cost				**$ 229,558,000**
Owner's Allowance Budget			10%	$22,956,000
Total Project Cost (with Owner's Allowance Budget)[2]				**$ 252,514,000**
Annual Operation and Maintenance Costs				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Intake Pump Stations				
Pump Station O&M	mgd	4.0	$566	$3,000
Energy Consumption	kWh	1,980,000	$0.10	$198,000
Treatment Facility				

Surface water treatment	mgd	3.8	$0.63	$884,000
Pump Station & Pipeline				
Pipeline O&M	LF	101,282	$0.44	$45,000
Pump Station O&M	mgd	3.8	$566	$3,000
Energy consumption	kWh	1,270,000	$0.10	$127,000
Total Annual Operation and Maintenance Cost				**$1,258,000**

Summary	
Total Project Capital Cost	**$ 252,514,000**
Total Capital Cost per 1,000 Gallons	**$ 11.71**
Annual Operation and Maintenance Cost	**$ 1,258,000**
Annual Operation and Maintenance Cost per 1,000 Gallons	**$ 0.90**
Total Life Cycle Project Cost per 1,000 Gallons[3]	**$ 12.61**

1. Costs of treatment facility components vary and are based on water supply availability and design capacity of the associated treatment systems. The flow identified in the quantity column represents the value used to calculate the treatment component.
2. All costs are estimated and representative of October 2022 dollars. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%; escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.

L.7 South Hillsborough Wellfield via Aquifer Recharge

Table L-10 Cost Estimate – South Hillsborough Wellfield via Aquifer Recharge

Conceptual Opinion of Probable Capital Cost Estimate				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Wellfield & Raw Water Transmission				
Production Well Construction	each	8	$200,000	$1,600,000
Production Well Pumps & Wellhouse	each	8	$1,200,000	$9,600,000
12" Raw Water Pipeline - Open Cut (Rural)	LF	5303	$300	$1,591,000
16" Raw Water Pipeline - Open Cut (Rural)	LF	11022	$400	$4,409,000
24" Raw Water Pipeline - Open Cut (Rural)	LF	5349	$600	$3,210,000
Subtotal Wellfield & Raw Water Transmission				**$20,410,000**
Treatment Facility[1]				
Ozone Equipment	mgd	9.1	$458,046	$4,169,000
Ozone Basin	mgd	9.1	$39,080	$356,000
Ozone Building	mgd	9.1	$202,801	$1,846,000
Chlorine Contact Chamber	mgd	9.1	$114,511	$1,043,000
Chemical Equipment	mgd	9.1	$49,076	$447,000
Chemical Building	mgd	9.1	$24,336	$222,000
Finished Water Storage	mgd	9.1	$327,175	$2,978,000
Administrative Building	mgd	9.1	$30,435	$277,000
Subtotal Treatment Facility				**$11,334,000**
Finished Water Transmission				
Finished Water Pump Station	mgd	9.1	$633,363	$5,764,000
20" Finished Water Pipeline - Open Cut (Rural)	LF	444	$500	$222,000
Subtotal Finished Water Transmission				**$5,986,000**
Subtotal Construction Cost (before Contingency, Contractor Fees, and Escalation Costs)				**$ 37,729,000**
Contingency			30%	$11,319,000
Contractor General Conditions, Overhead & Profit			20%	$9,810,000
Escalation to Mid-Point of Construction	years	8	4%	$21,693,000

Total Construction Cost				**$ 80,549,000**
Engineering, Legal, and Administrative			*25%*	$20,138,000
Rural Land & Easement Acquisition	acres	6.2	$110,000	$679,000
Urban Land & Easement Acquisition	acres	5.6	$300,000	$1,670,000
Subtotal of Project Cost				**$ 103,034,000**
Owner's Allowance Budget			10%	$10,304,000
Total Project Cost (with Owner's Allowance Budget)[2]				**$ 113,337,000**
Annual Operation and Maintenance Costs				
Item	**Unit of Measure**	**Quantity**	**Unit Price**	**Cost**
Wellfield				
Wellfield O&M	each	8	$5,000	$40,000
Energy Consumption	kWh	3,080,000	$0.10	$308,000
Treatment Facility				
Energy Consumption	kWh	495,000	$0.10	$57,000
Chemicals	mgd	6.2	$28,226	$175,000
Labor	mgd	6.2	$53,226	$330,000
Maintenance & Administrative	mgd	6.2	$25,000	$155,000
Pump Station & Pipeline				
Pipeline O&M	LF	22,118	$0.44	$10,000
Pump Station O&M	mgd	9.1	$566	$6,000
Energy consumption	kWh	2,050,000	$0.10	$205,000
Total Annual Operation and Maintenance Cost				**$1,285,000**
Summary				
Total Project Capital Cost				**$ 113,337,000**
Total Capital Cost per 1,000 Gallons				**$ 3.26**
Annual Operation and Maintenance Cost				**$ 1,285,000**
Annual Operation and Maintenance Cost per 1,000 Gallons				**$ 0.57**
Total Life Cycle Project Cost per 1,000 Gallons[3,4]				**$ 3.83**

1. Costs of treatment facility components vary and are based on water supply availability and design capacity of the associated treatment systems. The flow identified in the quantity column represents the value used to calculate the treatment component.

2. All costs are estimated and representative of October 2022 dollars. The calculation of Total Project Costs includes the following assumptions: contingency = 30%; contractor general conditions, overhead & profit = 20%; escalation to mid-point of construction = 4% per year; engineering, legal, and administrative costs = 25%; and owner's allowance budget = 10%.
3. Costs of reclaimed water credits are not included.
4. Total Cost $/1,000 gallons incorporates both capital and O&M costs, with capital costs annualized based on a 30-year term and a 5% interest rate.