

# Town of Palm Beach Water Feasibility Study

TOWN OF PALM BEACH  
PUBLIC WORKS



APRIL 2022

Prepared By:

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## APPENDICES

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## EXECUTIVE SUMMARY

The Town is interested in exploring alternate options for providing potable water to the residents and business owners of the Town upon expiration of the current Retail Water Service and Franchise Agreement with the City of West Palm Beach, which will expire in 2029. Kimley-Horn was retained to perform a conceptual review of potential water supply options for both potable water and irrigation purposes. Water Supply options that were identified and explored include the following:

- Continue with a Retail Agreement with the City of West Palm Beach.
- Negotiate a Wholesale Agreement with the City of West Palm Beach.
- Negotiate a Wholesale Agreement with an alternative public water supplier.
- Develop a Town-owned water supply source.
- Enter into a Public-Private-Partnership with a private utility provider.
- Consider a combination of the above-mentioned water supply options as potential additional alternatives.

An approach was developed to perform the study in three phases.

### **Phase 1: Identification and Overview of Potential Alternative Potable Water Service and Utility Providers (Sections 3 & 4)**

The first phase focused on data collection, establishing the hydraulic baseline to define the Town's existing level of service, and identification of potential water suppliers. A review of the City of West Palm Beach's hydraulic model was performed, and the Town's current level of service (LOS) is provided in **Table 1** below and defined based on the existing model results.

<b>Parameter</b>	<b>Existing System</b>
Maximum Day Demand (MDD) Model Output	6,900 gpm (approx.) 9.93 MGD
Town of Palm Beach Average Pressure	72 psi

The list of potential municipal water suppliers initially evaluated included:

1. City of West Palm Beach
2. Palm Beach County Water Utilities Department
3. City of Riviera Beach
4. City of Lake Worth Beach
5. Town of Manalapan

The current Agreement with the City can be defined as a Retail Service Agreement. In a Retail Service Agreement, the water supplier is responsible for operations, maintenance, and administration functions of the utility, including the distribution systems for which they serve. This means that the water customers in the Town are direct customers of the City of West Palm Beach. For all alternative municipal water supply options we evaluated, except the City of West Palm Beach, the Town would be required to enter into a bulk customer agreement for the Town's residents and business owners to receive potable and irrigation water. If the Town were to execute an alternative agreement to the current Franchise Agreement with the City, the

potable water assets (i.e., the distribution system infrastructure) within the Town would be conveyed to the Town and the Town would own these assets. Under any scenario other than the City of West Palm Beach and City of Lake Worth Beach, decisions would need to be made regarding how the Town would provide operations, maintenance, and administration services needed to operate and maintain the potable water distribution system, including customer service and billing.

In lieu of establishing a Town potable water utility, there are utility provider opportunities that the Town would be able to access when considering Public Private Partnership (P3). A P3 is a feasible solution for public municipalities to access the benefits of the water system operation and maintenance from a private provider with varying amounts of ownership, financing, and risk factors. The P3 model has several types of agreements including:

### **Contract Operations and Maintenance**

### **Design Build Finance Operate (DBFO) Concessions**

### **Private Ownership of Asset**

Phase 1 of the study provided an overview of the various P3 options to consider, if the Town were to move forward with any of the bulk supply alternatives. We met with three private utility companies and found each were most interested in assisting the Town with setting up a utility if they were to decide to enter into a bulk agreement or decide to build their own water supply. There was no private utility nearby that had the ability to provide water similar to the local municipal water suppliers. The conclusion to the first phase included a review meeting with Town staff and a short list of water supply alternatives to evaluate further in the second phase the study.

Considerations for preliminary screening include the complexity and regional impact associated with modifying the potable water allocation to serve the Town. Additionally, alternative water suppliers that do not appear to have the ability to satisfy 100% of the Town's requirements were not further evaluated as these options would pose additional complexities to the process and will create an environment where multiple providers with different service arrangements and rates would need to be established for various geographic areas in Town.

### **Phase 2: Evaluation of Alternatives (Section 5)**

The following alternatives were identified to further evaluate as part of the second phase of the study:

**Alternative 1** - City of West Palm Beach Utilities

**Alternative 2A and 2B** - Town of Palm Beach developed and owned water supply system

**Alternative 3** - Palm Beach County Water Utilities

**Alternative 4** - City of Lake Worth Beach Utilities

Each of the four alternatives were evaluated to meet the Town's existing level of service. Each alternative included an evaluation of system improvements and capital costs that would be required to provide service to the Town. Additionally, each alternative included a qualitative evaluation of water supply security, water supply permitting complexity, construction complexity, operational complexity, system reliability, land acquisition requirements, permitting complexity, and stakeholder considerations. Following the evaluation each of the four alternatives were found to be viable water suppliers and with the improvements identified in the study each can supply potable water while maintaining the current level of service within the Town.

An overview of each of the Alternatives is provided in **Tables 2 and 3**.

Table 2: Alternative Overview						
Alternative	Description	Capital Costs <sup>1</sup> Pipeline Replacements <sup>2</sup>	Capital Costs <sup>1</sup> Interconnects and Town Distribution Improvements	Capital Costs <sup>1</sup> Water Treatment Improvements	Connection Fees	Total
1	City of West Palm Beach	\$47M – \$70M	\$0	\$0	\$0	\$47M – \$70M
2A	Town Owned Supply - Groundwater	\$22M – \$32M	\$101M to \$151M	\$188M – \$281M	\$0	\$311M – \$464M
2B	Town Owned Supply - Seawater	\$22M – \$32M	\$96M to \$144M	\$198M – \$298M	\$0	\$316M – \$474M
3	Palm Beach County	\$22M – \$32M	\$135M - \$202M	\$0	\$209M <sup>3</sup>	\$366M – \$443M
4	City of Lake Worth Beach	\$21M – \$32M	\$111M to \$166M	\$131M – \$197M	\$0 <sup>4</sup>	\$263M – \$395M

1. Class 5 “Order of Magnitude” conceptual opinion of probable costs.
2. Pipeline Improvement per Franchise Agreement and Critical Pipeline Improvements per the Master Plan
3. Connection/Capacity Fees based on the Town’s water use converted to an equivalent residential unit consumption.
4. The capital cost for the treatment improvement was used in lieu of the Lake Worth Beach connection /capacity fees.

Table 3: Alternative Overview									
Alt	Desc	Town Developed Utility Required	Water Supply Security	Water Supply Permitting Complexity	Construction Complexity	Operational Complexity and System Reliability	Land Acquisition	Permitting Complexity	Stakeholder Coordination
1	City of West Palm Beach	Retail – No Bulk - Yes	Moderate	None – Already Permitted	Low	Low / High	Low	Low	Low
2A	Town Owned Supply - Groundwater	Yes	High	High	High	High / High	Moderate	High	Moderate
2B	Town Owned Supply - Seawater	Yes	High	High	High	High / High	Moderate	High	Moderate
3	Palm Beach County	Yes	Moderate - High	Moderate	High	High / Moderate	High	High	High
4	City of Lake Worth Beach	Retail – No Bulk - Yes	Moderate - High	High	High	Low / Moderate	High	High	High

Building upon the Phase 2 findings, the Town requested that a third Phase of the analysis be performed to continue assisting the Town through the decision-making process as they consider the results of the study.

### Phase 3: Further Evaluation of Alternatives (Section 6)

Additional detailed investigations were performed as Phase 3 of this study. The following three select alternatives were further developed to gain a deeper understanding of the project components and the associated impacts if implemented:

- **Evaluation of Desalination Facility at Phipps Park Detailed Site Evaluation (Section 6.1).**
- **Evaluation of Membrane Treatment Facility at Quadrille Site Evaluation (Section 6.2)**
- **Partnership with the City of West Palm Beach to Phase in Membrane Treatment (Section 6.3)**

The purpose of the Phase 3 additional detailed investigations is to support an economic evaluation of select alternatives. The economic evaluation considers costs associated with capital infrastructure improvements including raw water supply, treatment, and distribution system improvements. For some of the alternatives, utility formation costs are also considered, as the Town will be required to establish a water utility for two of the options discussed below. Additional costs to be considered in the economic analysis include operation, maintenance, and administration associated with the raw water, potable treatment, and distribution systems. Additional costs considered in the economic evaluation include costs associated with an asset renewal program, which would provide replacement costs associated with renewal of the existing pipelines and proposed treatment facility assets.

For the alternative where bulk water is purchased from the City, costs associated with the purchase of the water were assumed and included.

<b>Table 4: Summary of Capital Costs and Utility Formation Costs</b>						
	<b>10 MGD Desalination Treatment Facility at Phipps Park</b>		<b>10 MGD Membrane Treatment Facility at Quadrille</b>		<b>47 MGD City of West Palm Beach Upgrade</b>	
	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>
Capital Cost	\$351M	\$526M	\$268M	\$402M	\$547M	\$821M
Utility Formation	\$1M	\$3M	\$1M	\$3M	NA	NA
Subtotal Capital Cost and Utility Formation	\$352M	\$529M	\$269M	\$405M	\$547M	\$821M

<b>Table 5: Summary of Cost to Produce 1,000 Gallons</b>								
	<b>10 MGD Desalination Treatment Facility at Phipps Park</b>		<b>10 MGD Membrane Treatment Facility at Quadrille</b>		<b>47 MGD City of West Palm Beach Phased Upgrade</b>		<b>47 MGD City of West Palm Beach One Program Upgrade</b>	
	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>
Capital Cost	\$5.34	\$8.03	\$4.08	\$6.14	\$2.96	\$4.43	\$2.02	\$3.02
Plant O&M	\$3.78	\$3.78	\$2.32	\$2.32	\$5.73	\$5.73	\$5.73	\$5.73
Distribution O&M	\$0.50	\$0.50	\$0.55	\$0.55				
Pipeline Renewal Program- 75-years	\$2.29	\$2.29	\$2.78	\$2.78	\$2.25	\$2.25	\$2.25	\$2.25
Treatment Plant Renewal Program- 50-years	\$1.60	\$1.60	\$1.03	\$1.03	\$0.93	\$0.93	\$0.93	\$0.93
Bulk Water Purchase	NA	NA	\$3.81	\$3.81	NA	NA	NA	NA
<b>Total \$/ 1,000 gal</b>	<b>\$13.50</b>	<b>\$16.20</b>	<b>\$14.58</b>	<b>\$16.64</b>	<b>\$11.87</b>	<b>\$13.35</b>	<b>\$10.93</b>	<b>\$11.93</b>

The Town’s current franchise agreement expires in 2029, and it is important to understand the timeframes required to implement these three options. An evaluation of a conceptual implementation schedule of the **Section 6** alternatives is provided in **Figure 1** below.

Alternate	Task/Activity	Duration (Months)	Duration (Quarters)	2023				2024				2025				2026				2027				2028				2029				2030				2031			
				1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
General	Preliminary Design and Field Investigations	12	4	■	■	■	■																																
	Consumptive Use and Wellhead Permitting	12	4			■	■	■	■																														
	Deep Injection Well Design and Permitting	12	4					■	■	■	■																												
	Membrane Water Treatment Facility Design and Permitting	15	5					■	■	■	■	■																											
	Water Distribution System Design and Permitting	24	8					■	■	■	■	■	■	■																									
Seawater Supply at Phipps Park	Seawater Wellfield Development	42	14			■	■	■	■	■	■	■	■	■																									
	Seawater RO Water Treatment Facility Construction	36	12					■	■	■	■	■	■	■																									
	Town Water Distribution System Construction	72	24									■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■					
	Deep Injection Well Construction	30	10									■	■	■	■	■	■	■	■	■	■	■																	
WPB Supply Re-Treat at Quadrille	Quadrille Membrane Water Treatment Facility Construction	42	14									■	■	■	■	■	■	■	■	■	■																		
	West Palm Beach Water Distribution System Construction	60	20									■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						
	Deep Injection Well Construction	30	10									■	■	■	■	■	■	■	■	■	■																		
Upgrade WPB WTP Treatment	West Palm WTP Membrane Water Treatment Facility Construction	36	12					■	■	■	■	■	■	■																									
	Deep Injection Well Construction	30	10									■	■	■	■	■	■	■	■	■	■																		

Figure 1: Estimated Completion Durations of Selected Alternatives

Each of the alternatives were developed to meet the Town’s existing level of service for water supply. Each alternative included system improvements and capital costs that would be required to provide water service to residents of the Town. An economic evaluation was completed to further evaluate the alternatives in terms of cost to produce 1,000 gallons of water to allow each alternative to be compared to each other. Additionally, each alternative included an analysis of near-term and long-term impacts to the community. Following the evaluation, each of the three alternatives were found to be viable water supply options that can supply potable water while maintaining the current level of service within the Town. The estimated construction duration for each of the three alternatives indicates the Desalination Water Plant at Phipps Park and the Membrane Treatment Plant at Quadrille could require an extension of the current franchise agreement with the City. Each of the alternatives is technically possible and the relevant regulations allow permits to be issued for their construction. Each of the alternatives offer somewhat different benefits to the Town.

# 1 INTRODUCTION

## 1.1 BACKGROUND

The Town of Palm Beach (Town) receives potable water service from the City of West Palm Beach (City), who currently owns and operates a potable water supply system which supplies water to the City and South Palm Beach. Potable water service is provided to the Town and its residents by the City pursuant to a 30-year Franchise Agreement executed in 1999 (**Appendix A**). The general location map is provided in **Figure 2**. According to this agreement, the City owns and maintains all the water infrastructure facilities throughout the Town. The Town is interested in exploring alternate options for providing potable water to the residents of the Town upon expiration of the current Retail Water Service and Franchise Agreement with the City, which will expire in 2029.

Kimley-Horn was retained to perform a conceptual review of potential water supply options currently being considered by the Town for potable water purposes, which includes both potable water and irrigation use. The Town of Palm Beach desires to receive their potable water supply from a single supplier, as opposed to obtaining multiple water supply agreements. Potential water supply options currently being considered include the following:

1. Continue with a Retail Agreement with the City of West Palm Beach.
2. Negotiate a Wholesale Agreement with the City of West Palm Beach.
3. Negotiate a Wholesale Agreement with an alternative public water supplier.
4. Develop a Town-owned water supply source.
5. Enter into a Public-Private-Partnership with a private utility provider.

## 1.2 APPROACH

This study was performed in three (3) phases as follows:

### **Phase 1: Identification and Overview of Potential Alternative Potable Water Service and Utility Providers (Section 4)**

1. The collection of data necessary to perform analysis.
2. The establishment of the hydraulic baseline for evaluation of the Town's potable water system and potential potable water supply alternatives.
3. The identification of several potential water supply alternatives.
4. The preliminary screening and identification of four (4) potable water supply alternatives to be evaluated in Phase 2.

### **Phase 2: Evaluation of Alternatives (Section 5)**

Upon completion of the first phase, a meeting was held with Town staff to discuss the preliminary identification of potable alternatives and a shortlist of four (4) alternatives was identified to further screen as part of Phase 2 of this study. The Phase 2 effort includes evaluation of technical feasibility of each alternative. Phase 2 comprised of the following efforts:

1. Development of planning scenarios for each alternative and performing a hydraulic analysis to determine required improvements, such as water main upgrades, storage requirements, and re-pumping facilities that would be required for each alternative.

2. Development of Class 5 “Order of Magnitude” opinion of probable costs for the water system modifications required for each alternative.
3. Identification of advantages and disadvantages of each alternative.
4. Presentation of findings to Town staff.

### **Phase 3: Further Evaluation of Alternatives (Section 6)**

Upon completion of the second phase, a meeting was held with Town staff to discuss the evaluation of four (4) alternatives. The City then requested Kimley-Horn to expand the scope of the analysis to further refine one of the previously identified potential water supply options, review the feasibility of two additional water supply options, and perform a cost analysis that provides a comparative basis in terms of cost per 1,000 gallons of water treated.

# Town of Palm Beach Water Supply Assessment

## Study Area Map

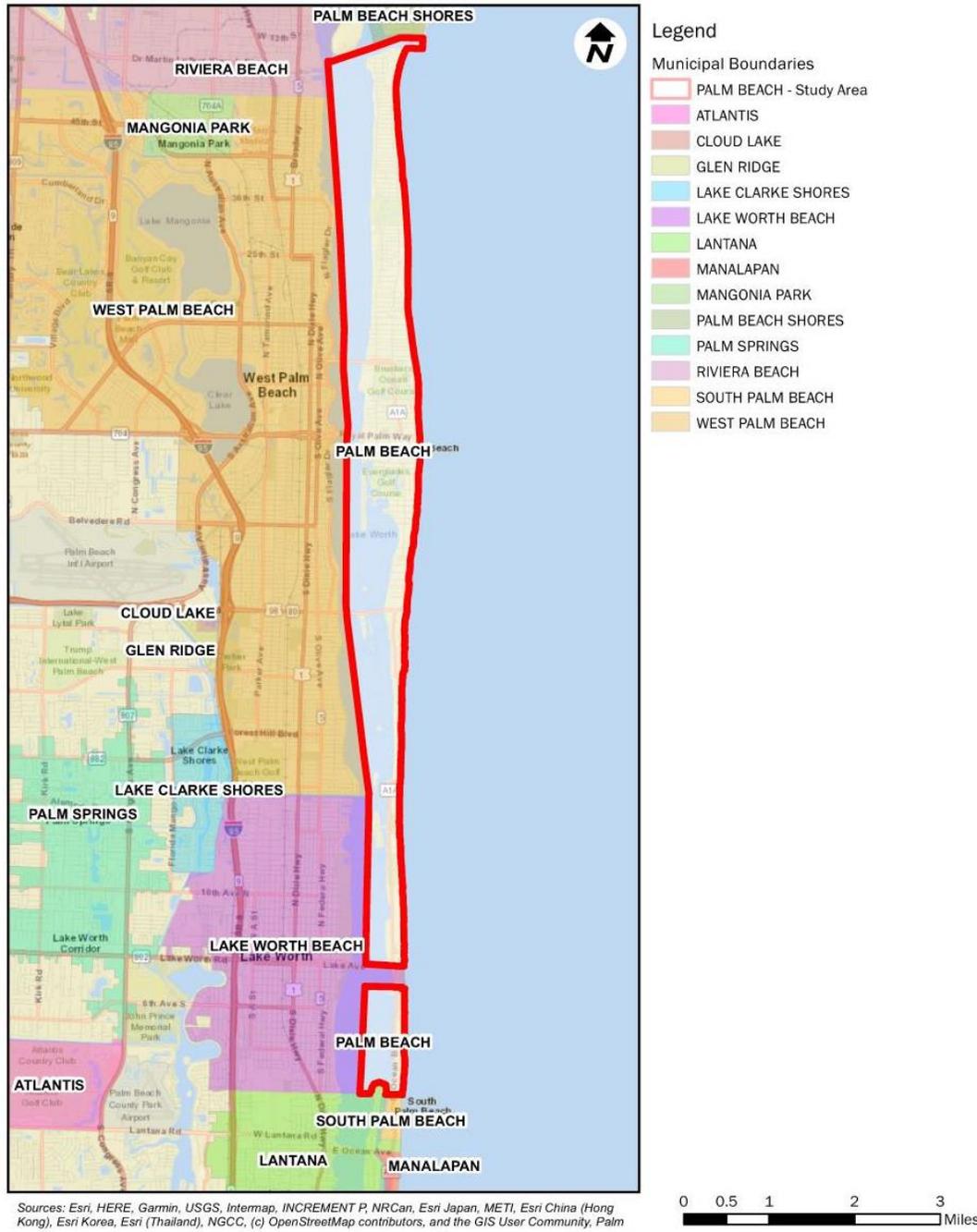


Figure 2: Study Area Location Map

### 1.3 PURPOSE

The purpose of this report is to provide a summary of Phase one and Phase two efforts associated with this study including a summary of each of the alternatives evaluated, advantages, disadvantages, the capital improvements required to implement each alternative and the Class 5 “Order of Magnitude” cost estimate for each alternative.

The objective of this study is to identify feasible alternative water supply options and identify the Class 5 “Order of Magnitude” costs associated with each alternative. This study does not address operational, maintenance, and administration costs for each alternative. Additionally, this study does not determine the impact that each alternative has on the customers, in terms of retail or bulk rates. Should the Town determine to proceed with further investigation of any or all of the alternatives discussed herein, additional analysis and discussions will need to be had with the corresponding water providers to determine the impact that any alternative has on the rate payer and a formal rate study will likely be required.

## 2 AVAILABLE INFORMATION

Historically, the Town has given great consideration to water supply alternatives and options. In the past, numerous reports, studies, data collection efforts, etc. have been undertaken to evaluate the issue of water supply. To the extent possible, this evaluation has incorporated the information available from those past efforts, which has been reviewed and/or updated for current-day conditions. A summary of the information made available by the Town is presented in **Appendix B**. In addition, the following documents were obtained from various sources and reviewed by Kimley-Horn as part of this analysis:

1. West Palm Beach Franchise Agreement
2. South Florida Water Management District (SFWMD) Water Use Permits (WUP) for the following entities:
  - a. City of West Palm Beach
  - b. Palm Beach County Water Utilities Department
  - c. City of Riviera Beach
  - d. City of Lake Worth Beach
  - e. Town of Manalapan
  - f. The Breakers Palm Beach (Golf Course)
  - g. Palm Beach Country Club (Golf Course)
  - h. Palm Beach Par 3 (Golf Course)
  - i. The Everglades Club (Golf Course)
3. 2019 Water Quality Report, City of West Palm Beach
4. Applicable Florida Department of Environmental Protection Permit (FDEP) documentation for neighboring utilities.
5. Applicable FDEP permitting requirements.
6. Applicable Chapters of the Florida Administrative Code and Sections of the Florida Statutes.
7. Applicable/available data related to private utility providers

Additionally, several meetings and correspondence with potential alternative water suppliers were held. Detailed discussions of these meetings are provided in **Section 4** of this Technical Memorandum. Information provided by alternative water suppliers to support this evaluation include the following:

- City of Riviera Beach Water System GIS files
- City of Lake Worth Water System GIS files

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### 3 EVALUATION OF EXISTING SYSTEM

#### 3.1 DESCRIPTION OF EXISTING SYSTEM

The Town has an estimated average population of approximately 8,800 residents; however, seasonal populations can be as high as 25,000 residents (inclusive of permanent residents). The Town spans approximately 8 miles, north to south, and is primarily less than ¼ - mile wide (east to west) with a few areas of exception.

Residents receive water supply through the aforementioned Franchise Agreement with the City. There are approximately 3,411 total water accounts in the City’s system attributed to Town residents (including 290 dedicated irrigation accounts). There are an additional 52 total water accounts attributed to the Town of South Palm Beach (including 3 dedicated irrigation accounts).

According to the 2014, “Inventory of City of West Palm Beach Water Facilities in the Town of Palm Beach” prepared by Erdman Anthony, the City’s water supply infrastructure is comprised of approximately 384,000 linear feet (72 miles) of distribution pipelines of varying diameters and material. Additionally, the Town’s potable water distribution system contains a Booster Pumping Station at Phipps Ocean Park and a 1.0 million-gallon (MG) ground storage tank and repump station located at the corner of Slope Trail and Country Club Road.

The City provides potable water to the Town through five (5) pipeline crossings of the Intracoastal Waterway. The City also serves the community of South Palm Beach which is conveyed through the infrastructure located within in the Town prior to entering the South Palm Beach service area. The City’s water distribution system and the limits of the Town study area is shown on **Figure 3**.

#### 3.2 HISTORICAL WATER DEMAND

Two sources were evaluated to identify the Town’s historical water usage including:

- 2017 – 2019 customer billing data provided by the City
- 2015 City of West Palm Beach Water and Wastewater Master Plan (2015 Master Plan)

These annual average demands are listed in **Table 6** below.

<b>Demand Source</b>	<b>Total Demand (Million Gallons per Day (MGD))</b>	<b>Town of Palm Beach Demand (MGD)</b>	<b>Town of South Palm Beach Demand (MGD)</b>
Billing Data (Average 2017-2019)	7.87	7.53	0.34
2015 Master Plan – 2020 Projection*	8.45	8.13	0.32

\*calculation for 2020 from the projection of 2015 and 2025 demands

Town of Palm Beach  
Water Supply Assessment

Water Distribution Map

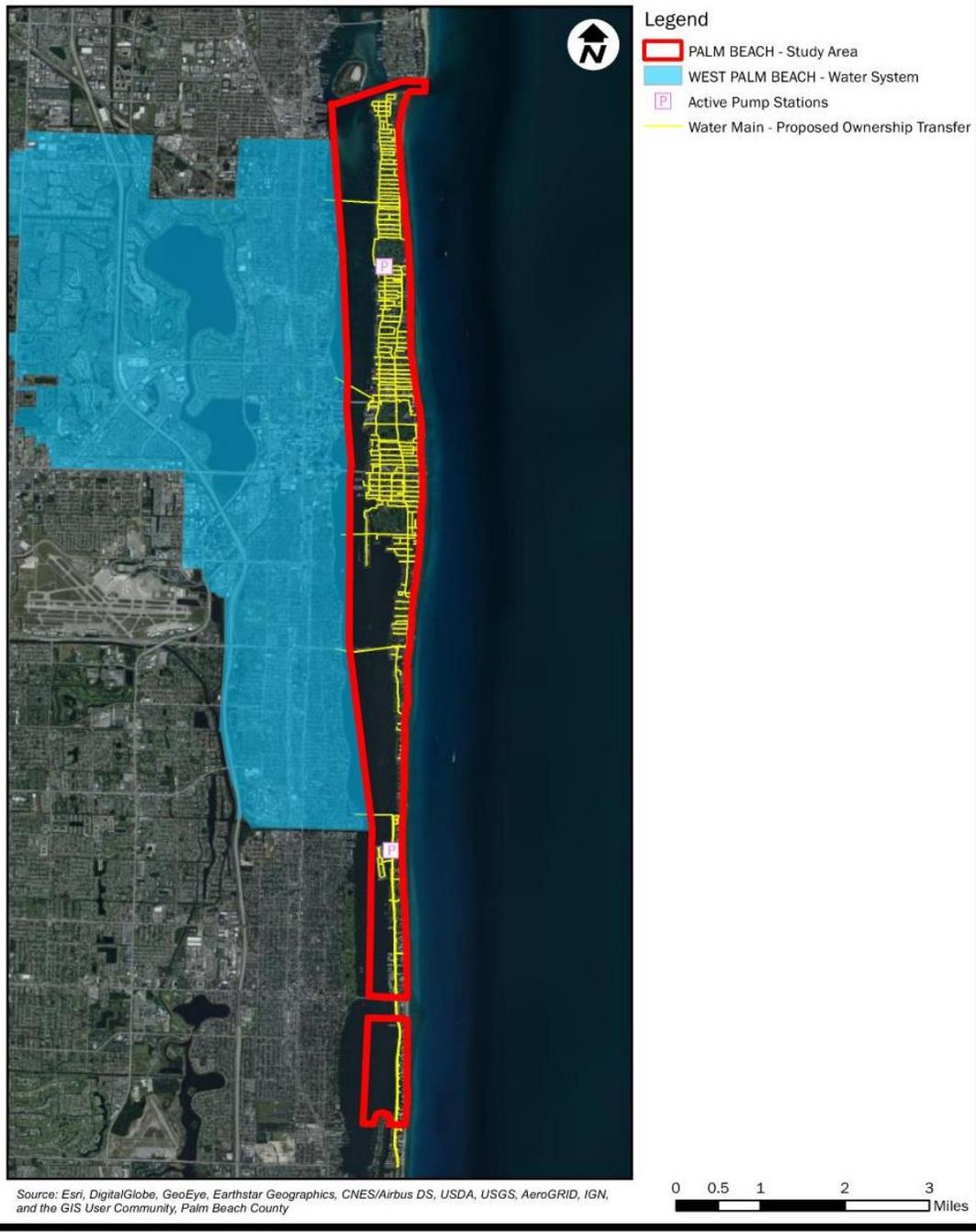


Figure 3: Existing Potable Water System

Historical billing data suggest that the average day demand for the Town for the period 2017 to 2019 is reported to be 7.53 MGD. The 2015 Master Plan projected the 2020 average day demand to be 8.45 MGD. For the purpose of this evaluation, our analysis will assume the existing condition and baseline annual average day demand is 8.45 MGD in accordance with the City’s 2015 Master Plan. This is slightly higher than the billing data suggests; however, if utilized for planning purposes, it provides a conservative approach to evaluating future alternatives.

### 3.3 PER CAPITA WATER USE

A summary of the estimated per capita water use in gallons per capita per day (gpcd) for the customers within the Town was identified within the 2015 Master Plan, as well as the Water Use Permit (WUP 50-00615). A summary of the estimated per capita use is provided below in **Table 7**.

<b>Source Document</b>	<b>Water Service Area</b>	<b>Per Capita Demand (gpcd)</b>
<b>2015 Master Plan Average Day Per Capita Demand Rates</b>	West of the Turnpike	144
	I-95 to Turnpike	182
	East of I-95	176
	<b>Town of Palm Beach</b>	<b>899</b>
	Town of South Palm Beach	252
	Composite for Water Service Area	229
<b>WUP 50-00615-W Average Day Per Capita Demand Rates</b>	City of West Palm Beach and Unincorporated Palm Beach County	185
	Town of South Palm Beach	285
	Town of Palm Beach	997
	City of West Palm Beach Public Utilities Average	272

The per capita water usage for the Town residents is reported in the 2015 Master Plan and is estimated to be 899 gpcd. The per capita water usage, as reported in the City’s Water Use Permit, is 997 gpcd. The Water Use Permit estimate accounts for water use, as well as non-revenue generating activities, such as water loss and hydrant flushing.

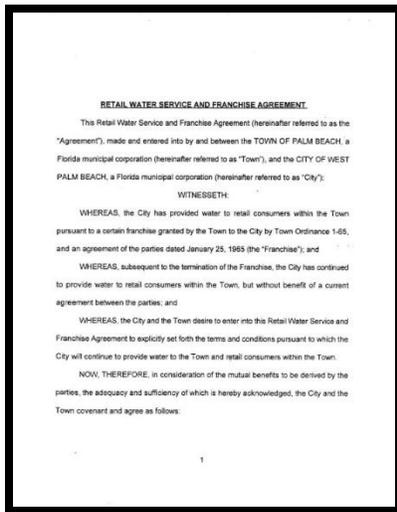
In both cases, the Town’s per capita water usage is significantly higher than the City’s remaining service area. The City’s composite potable water demand (including customers within the town) is 229 gpcd. The Town’s water use has historically been higher due to irrigation needs and property size. Irrigation demands are met with the potable water provided by the City. Irrigation wells within the Town are not feasible.

### 3.4 EXISTING CONDITION OF INFRASTRUCTURE

The following reports were reviewed, as they provide historical documentation of the condition of the City's potable water system, including the Town's system.

- Retail Water Service and Franchise Agreement Between the Town and the City, June 23, 1999
- Inventory of City facilities within the Town by Erdman Anthony, July 25, 2014
- City's Utility Master Plan Water Distribution System Criticality Assessment Technical Memorandum by Brown and Caldwell, May 8, 2014

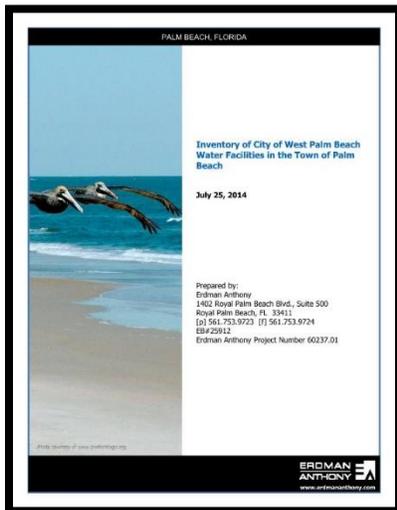
#### 3.4.1 FRANCHISE AGREEMENT



The 1999 Franchise Agreement between the Town and the City listed 84 projects to be completed by the City by 2004. These projects address the needs of the aging infrastructure. The Franchise Agreement states the projects total approximately 102,640 linear feet of pipe and funding for these projects was capped at \$18,000,000 (in 1999).

The Franchise Agreement also requires that the Town provide written notice of the Town's intent to extend the terms of the agreement or any renewal term, at least two years prior to the expiration of the initial term. Therefore, notification to the City regarding the Town's intent to renew, alter, or terminate the agreement is required by October 1, 2027.

#### 3.4.2 INVENTORY OF CITY FACILITIES



In 2014, the Town commissioned a report to provide an inventory of the water facilities within the Town and a priority listing of water projects that should be undertaken. The study, *Inventory of City of West Palm Beach Water Facilities in The Town of Palm Beach* by Erdman Anthony was completed as a draft in July 25, 2014. The report found that the Town has approximately 384,000 linear feet of pipe, which was evaluated based on size, age, and material.

The tables of the report detail the findings as it relates to the progress of the 1999 Franchise Agreement projects and additional projects prioritized based on condition and location to Capital Improvement Program (CIP) roadway projects. See **Appendix C** for select tables from the report.

The report determined the approximate 67% of the Franchise Agreement projects were completed at the time of the study. Of the remaining approximately 37,000 linear feet of pipeline improvements, the report indicated that the City had plans for approximately 15,000 of pipeline improvements to be completed by 2016.

Additional water distribution improvement projects that have been completed within the limits of the Town include the rehabilitation of the two pump stations. The Phipps Booster Pump Station was improved in 2011 and the Palm Beach Repump station was improved in 2015.

### 3.4.3 2015 UTILITY MASTER PLAN



The City completed a Utility Master Plan in 2015. The Utility Master Plan included a criticality assessment for all infrastructure within the City’s potable water system, including the Town. The full assessment is detailed in the City of West Palm Beach Utility Master Plan Water Distribution System Criticality Assessment Technical Memorandum by Brown and Caldwell, January 12, 2015. See **Appendix D** for select figures and tables from the Technical Memorandum. The criticality assessment identified an overall criticality score based on likelihood of failure and consequence of failure to the system’s water system piping. From this scoring, the Master Plan identified six critical pipelines within the Town including four water mains crossing the Intracoastal Waterway to the Town. These critical pipeline segments are identified by GIS water main asset ID and corresponding project areas that are comprised of one or more water main assets are illustrated in **Figure 4**. The specific details of the pipelines, including length of pipe, pipe material, and

likelihood of failure score are listed in **Table 8**.

Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM4	WSP24790	859	195	35,490	16	CAS	1964
WM4	WSP24791	1462	215	32,680	16	CICL	1967
WM5	WSP30096	962	220	24,640	12	CAS	1950
WM7	WSP12603	6	215	21,070	8	AC	1972
WM7	WSP31599	25	215	21,070	8	AC	1972
WM7	WSP32451	3063	190	18,620	8	CICL	1972
WM12	WSP23657	3374	180	20,160	16	DIP	1950

After review of this information, it appears that the analysis performed as part of the 2015 Master Plan should be further validated. For example, one of the pipelines identified as critical and to be considered for replacement includes WM5, a 12-inch diameter water main referenced to be installed in 1950. This water main appears to be the same water main located on Country Club Road. Kimley-Horn designed the replacement of this line and it was constructed in 2004.

Town of Palm Beach  
2015 Master Plan Water Distribution Areas

Water Distribution Map

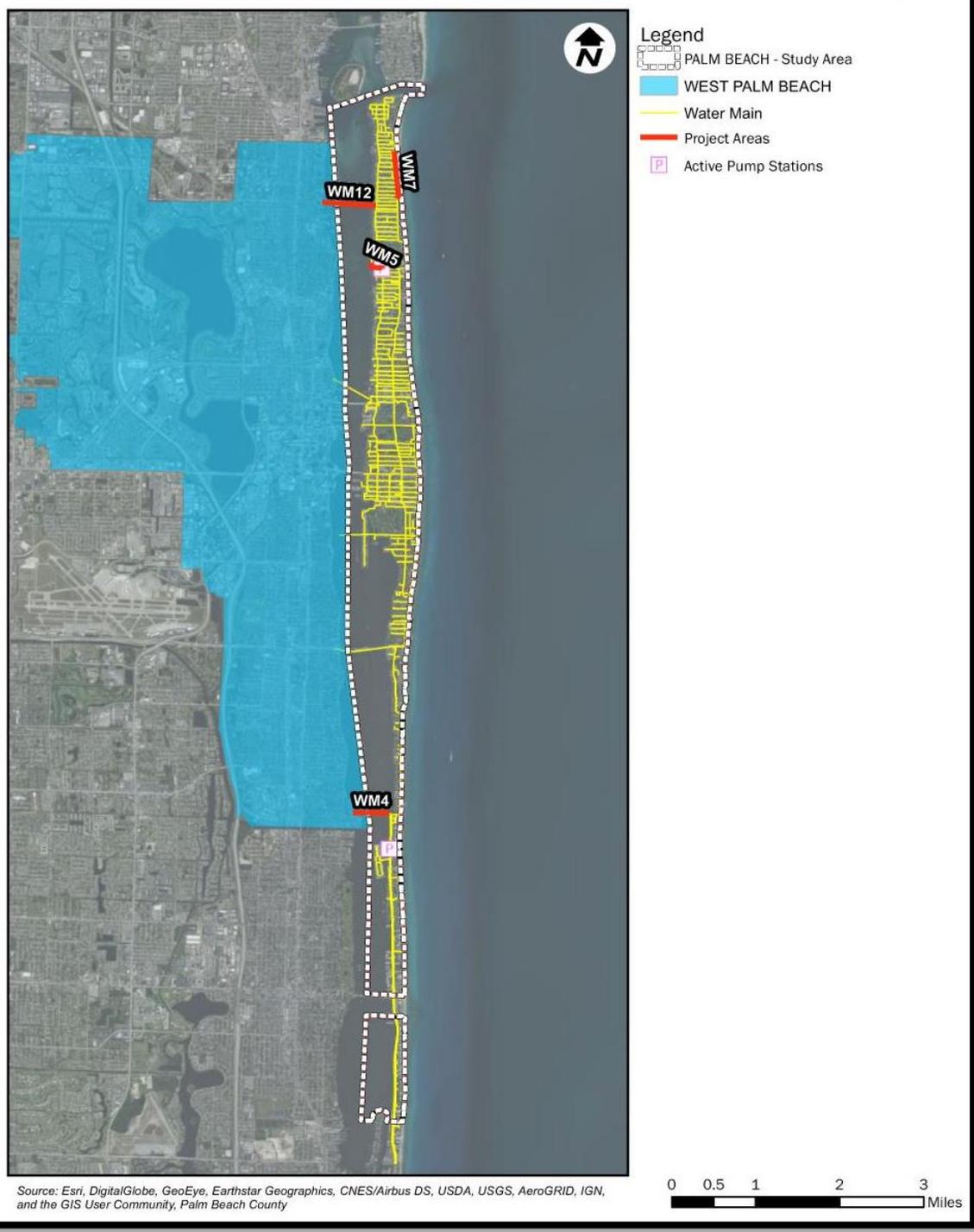


Figure 4: Water Distribution Main - Candidate Project Areas

### 3.4.4 EXISTING INFRASTRUCTURE CONDITION SUMMARY

A review of the available information on the condition of the existing infrastructure suggests that there are still pipelines within the Town that may be in need of repair and/or improvements since the establishment of the 1999 Franchise Agreement. However, the City has invested in improving several of the identified deficiencies since 1999 including rehabilitation of the two pump stations.

In addition to the overall maintenance needs, in the 2015 Master Plan, through a risk-based analysis, the City identified seven critical pipeline segments associated with four specific pipeline replacement projects that have high criticality score based on likelihood of failure and consequence of failure to the system's water system piping.

Each alternative evaluated considers the required rehabilitation/replacement needs for the water distributions system within the Town limits as well as any critical infrastructure identified in the 2015 Master Plan. An updated "Order of Magnitude" opinion of probable cost for the remaining pipeline replacements associated with the Franchise Agreement was developed for each alternative and is presented in **Section 5.2.2** of this report. Additionally, the potential cost related to the necessary pipeline replacement based on pipeline segment useful life and criticality will be evaluated. This cost will be relevant to maintaining a reliable system, regardless of what alternative water supply strategy is evaluated.

### 3.5 EXISTING HYDRAULIC MODEL

The existing potable water system serving the Town is included within the City's overall hydraulic model. The City provided their hydraulic model for use in this evaluation. The City's overall hydraulic model also includes the system serving the Town of South Palm Beach. For the purposes of this analysis the hydraulic model was reviewed from the Town's points of connection to the City's system. A review and summary of the portion of the existing hydraulic model serving the Town is provided herein. The data extracted from the existing system hydraulic model was compared to known operating data to validate that the hydraulic model is representative of the system serving the Town and can be used to evaluate alternative water supplies.

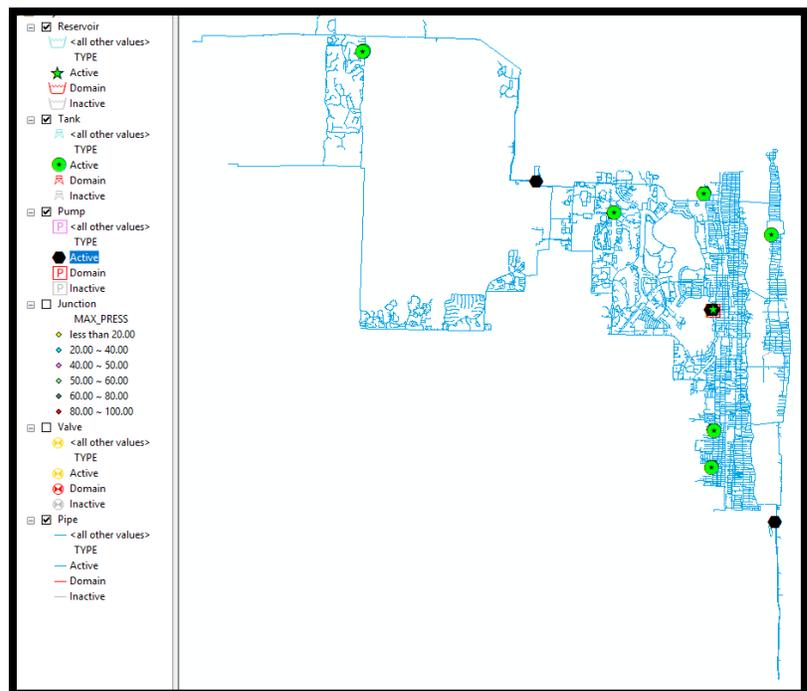


Figure 5: Existing Hydraulic Model

The existing hydraulic model for the Town's system includes:

- Water mains 2-inch diameter and greater;
- Five intracoastal pipeline crossings;
- Palm Beach Repump Station (2 pumps) and 1 MG storage;
- Phipps Ocean Park Booster Pump Station (2 pumps).

A snapshot of the entire existing hydraulic model is shown in **Figure 5** and **Table 9** provides a summary of the pipe inventory within the hydraulic model. The remainder of the hydraulic model discussion will focus on the Town's system for the purposes of this review and will terminate at the point of connection of the five intracoastal crossings on the mainland.

<b>Diameter (inches)</b>	<b>Length (LF)</b>
2	1,518
2.5	10
3	294
4	23,034
6	79,156
8	138,471
10	6,057
12	96,945
16	35,168
20	13,770
24	3,782
<b>Total</b>	<b>398,207</b>

### 3.5.1 MODEL RESULTS

The model results provide a basis to compare existing water use information to determine if the model is reflective of existing conditions and if the model is a viable tool that can be used to evaluate alternative water supply strategies. Once the model is confirmed to be an accurate representation of existing conditions, additional model results can be extracted to determine the operating conditions the Town requires to maintain its existing level of service.

A multi-step process was utilized to validate the model including:

**Demand** - First, the demand for the Town was compared to existing demand data to validate the model to existing conditions.

**Operating Pressure** - The model results for flows and pressures were summarized as a range to determine the range of operating conditions of flow and pressure that the Town requires in a max day scenario.

## Demand

The model demand results were extracted for the Town of Palm Beach and Town of South Palm Beach, this demand collectively represents the water that is delivered from the City through the intracoastal waterway pipeline crossings. The demands, as contained within the hydraulic model, for average day, max day, and peak hour for each of the Towns and the total of the Towns' demand that flows through the crossings are listed in **Table 10**.

<b>Table 10: Hydraulic Model Existing Demand Summary</b>				
<b>Demand Type</b>	<b>Peak Factor</b>	<b>Total Demand (MGD)</b>	<b>Town of Palm Beach Demand (MGD)</b>	<b>Town of South Palm Beach Demand (MGD)</b>
Average Day	-	8.34	8.07	0.27
Max Day	1.19	9.93	9.61	0.32
Peak Hour	1.73	14.43	13.93	0.50

A review of the model information in comparison with the 2015 Master Plan and 2017-2019 billing information is provide below in **Table 11**.

<b>Table 11: Existing Annual Average Day Demand - Summary Comparison</b>			
<b>Demand Source</b>	<b>Total Demand (MGD)</b>	<b>Town of Palm Beach Demand (MGD)</b>	<b>Town of South Palm Beach Demand (MGD)</b>
Hydraulic Model	8.34	8.07	0.27
Billing Data (Average 2017-2019)	7.87	7.53	0.34
2015 Master Plan – 2020 Projection*	8.45	8.13	0.32

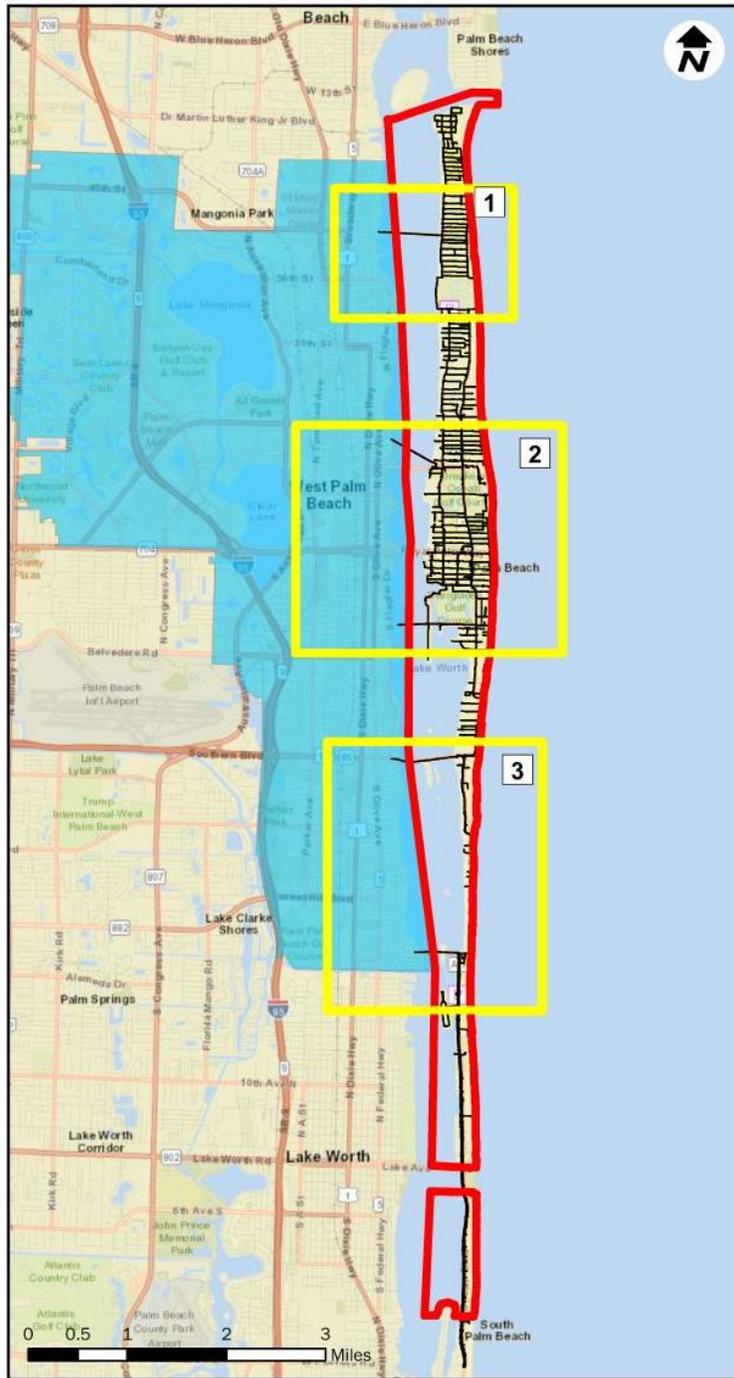
## Operating Condition at Intracoastal Waterway Pipeline Crossings

The existing water source for the Town are the pipeline crossings that transmit water from the City's mainland system to the Town. There are five pipeline crossings varying in pipe size from 16-inch to 24-inch and pipe material, see **Table 12** for a detailed list of crossing location, diameter, and material. **Figure 6** shows the pipeline crossing locations within the existing system.

<b>Table 12: Existing Water Source Summary</b>				
<b>Pipeline Crossing</b>	<b>Road Name</b>	<b>Pipe Diameter</b>	<b>Pipe Material*</b>	<b>Installation Year*</b>
Crossing 1	Getter Park to N. Lake Way and Orange Grove Road	16"	DIP	1967
Crossing 2	1015 N. Flagler Dr. to Bradley Park	24"	HDPE	2011
Crossing 3	Barcelona Rd. to Island Rd. at Everglades Island	20"	CSU	1937
Crossing 4	Southern Blvd. (SR98/CR80) crosses along the Marjorie Merriweather Post Memorial Causeway between the City and TOPB	16"	HDPE/DIP	2017
Crossing 5	7619 S Flagler Drive to S. Ocean Blvd.	16"	CAS/CICL	1967
*Data source is City of West Palm Beach geodatabase				

# Town of Palm Beach Water Supply Assessment

# Water Distribution Water Crossings Map



- Legend**
- PALM BEACH - Study Area
  - WEST PALM BEACH
  - Active Pump Stations
  - Water Main - Proposed Ownership Transfer
- Water Main - Pipe Size**
- < 2"
  - 2 - 4"
  - 6 - 8"
  - 10 - 16"
  - > 20"



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Figure 6: Pipeline Crossings

For the purpose of gathering information about the existing water supply needs of the Town, the crossings are considered to be the boundary condition of the City’s potable water source. The model results, for the flow through and pressure within these crossings at the mainland connection point, was extracted from the model and is presented in **Table 13**.

<b>Table 13: Existing System Max Day Model Results Summary</b>						
<b>Pipeline Crossing</b>	<b>Max Day Flow (gallons per minute (gpm))</b>			<b>Max Day Pressure (psi)</b>		
	<b>Avg.</b>	<b>Min.</b>	<b>Max.</b>	<b>Avg.</b>	<b>Min.</b>	<b>Max.</b>
Crossing 1	1,139	3	2,004	77	59	91
Crossing 2	1,543	1,188	2,061	84	69	95
Crossing 3	2,121	1,595	3,388	81	66	94
Crossing 4	536	2	1,638	77	63	91
Crossing 5	1,558	1,017	2,498	76	62	91
<b>Total Flow (gpm)</b>	<b>6,897</b>		<b>11,589</b>			
<b>System Operating Range (psi)</b>				<b>59-95 psi</b>		

The model results provide a range of demand flows through each crossing and pressure at the point these crossing connect to the City’s mainland system. The maximum flow through each crossing creates velocity ranging from 1.5 feet per second (fps) in Crossing 2 to 4.0 fps in Crossing 5. The minimum pressure provided is 59 psi at Crossing 1 and the maximum pressure provided is 95 psi at Crossing 2.

**Level of Service (LOS)** – For the purposes of evaluating alternative water supply options, the current level of service is defined as the ability to provide the maximum day demand while maintaining the average system pressure across the Town as represented within the existing conditions model. **Table 14** provides a summary of the existing LOS. A hydraulic evaluation of each alternative was performed to determine system improvement needs required to maintain the existing level of service.

<b>Table 14: Existing System LOS</b>	
<b>Parameter</b>	<b>Existing System</b>
Maximum Day Demand (MDD)	6,900 gpm (approx.)
Model Output	9.93 MGD
Town of Palm Beach Average Pressure	72 psi

**Fire Flow** – The hydraulic model of the existing system within the Town also provides confirmation of the system’s ability to meet the MDD and fire flow requirements of 1,000 gpm. Under this scenario, the existing model results indicate that the Town’s distribution system not fall below a residual pressure of 20 psi under the fire flow scenario. For each alternative evaluated as a part of this study, fire flow scenario will be evaluated. For each alternative to be considered feasible, the scenario must meet or exceed the 20 psi residual pressure under a fire flow scenario.

### **Modeling Conclusions and Results**

The basis of evaluation of water supply alternatives is the ability for a potential provider to deliver, at a minimum:

- Average Day Demand of 6,900 gpm (approximately)
- Peak Hour Demand 10,000 gpm (approximately)
- Operating Ranges 59-95 psi at 5 different crossings
- Average system pressure of 72 psi within the TOPB potable water system

Once potential alternative scenarios are identified, the model will be utilized to evaluate each alternative and potential improvements necessary, such as additional storage and booster pumping needs.

For each alternative water supply strategy evaluated, the hydraulic model will be used to determine the extent of infrastructure improvements required. Additional consideration may be required to address the demand distribution between the Town of Palm Beach and the Town of South Palm Beach within the model.

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## 4 OVERVIEW OF POTENTIAL ALTERNATIVE POTABLE WATER SERVICE AND UTILITY PROVIDERS

### 4.1 IDENTIFICATION OF POTABLE WATER SERVICE AND UTILITY PROVIDERS

A significant part of this evaluation depends on the interest and feasibility for private water suppliers and/or public and private utility providers to provide service to the Town. A preliminary evaluation was performed to identify potential municipal utilities, private water suppliers (Golf Courses), and private utility companies to engage as part of this study. The study evaluated three types of partners including:

#### Municipal Utility Water Suppliers –

An evaluation of adjacent municipal water suppliers was performed, and the following suppliers were identified to include in the evaluation:

1. City of West Palm Beach
2. Palm Beach County Water Utilities Department
3. City of Riviera Beach
4. City of Lake Worth Beach
5. Town of Manalapan

Several adjacent municipal water suppliers were initially considered however, they were not evaluated based on the likelihood of having adequate water supply and/or geographic proximity to the Town which would deem these suppliers less feasible. These options included Village of Palm Springs, City of Boynton Beach, Village of Golf, and the Town of Lantana. See **Figure 7** for the location of each of the municipal water supplier service areas.

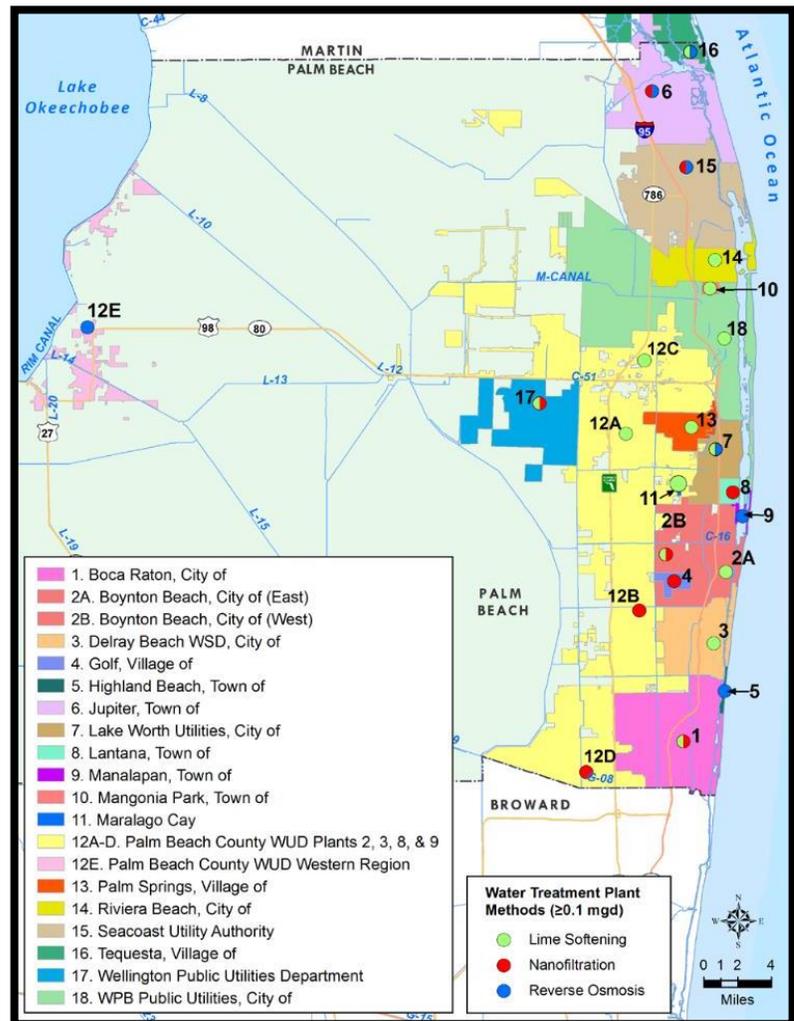


Figure 7: Palm Beach County utility service areas, from 2018 LEC Water Supply Plan Update by SFWMD.

**Golf Course Water Suppliers** – There are four golf courses (The Breakers Golf Course, Palm Beach Country Club, Everglades Golf Course, Palm Beach Par 3) located within the Town’s limits that possess WUP allocations for irrigation water and, in some instances, ancillary purposes. An evaluation was performed to determine if the golf courses should be considered as a feasible alternative potable water supply strategy.

**Private Utility Providers** – Private utility providers offer several opportunities to support both water supply and utility services and responsibilities. There are several types of contractual opportunities to have some or all required services necessary to support a potable water utility. This study investigates public-private partnership opportunities including:

1. Contract Operations and Maintenance
2. Design Build Finance Operate (DBFO) Concessions
3. Private Ownership of Asset

To support this evaluation, the following private utility providers/companies were further investigated as part of the overall alternative water supply strategy: Florida Governmental Utility Authority (FGUA), Veolia, and Corix.

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#### 4.1.1 COORDINATION MEETINGS

To facilitate the initial and preliminary stages of the identification of feasible strategies, as well as to gauge the interest of the potential water supply and utility providers, each of the identified potential potable water service suppliers and utility providers were contacted to discuss the following:

- Interest in being the Town’s potable water system provider
- Overview of Town’s potable water service system and needs
- Overall potable water system (source, treatment, service area, distribution system operating conditions, etc.)
- Overall ability to provide potable water service to Town
- Opportunities and challenges associated with providing the Town with potable water supply
- Framework to further evaluate feasibility of due diligence investigations, if mutually deemed appropriate.

The following sections of this report provide general overview of the municipal water suppliers, golf course suppliers, and private utility providers. This overview includes information available to the public via the SFWMD, FDEP, and utility websites; as well as information obtained from meeting with each of the individual entities.

## 4.2 MUNICIPAL WATER SUPPLIERS

### 4.2.1 CITY OF WEST PALM BEACH PUBLIC UTILITIES

The City of West Palm Beach Public Utilities is located directly west of the Town of Palm Beach and is north of the City of Lake Worth Beach. The water treatment plant is located at 1009 Banyan Blvd, West Palm Beach, FL 33401, as shown in **Figure 8**.

The City's raw water supply is obtained from Clear Lake and SFWMD Canal (L-8) Tieback surface waters, as well as the East Coast Surficial aquifer system (SAS) in the eastern and western wellfields which are only available during specific drought conditions. The City's Water Treatment Plant (WTP) has a capacity of 47 MGD and uses PAC (powder activated carbon), lime softening, carbon and sand filtration, ultraviolet disinfection, and finally chloramine disinfection.

The City operates a water system and distributes finished bulk water to the Solid Waste Authority of Palm Beach County (0.15 MGD) and Palm Beach County Water Utilities (PBCWUD) (0.35 MGD). A summary of the City of West Palm Beach Public Utilities current system water use is presented in **Table 15**.

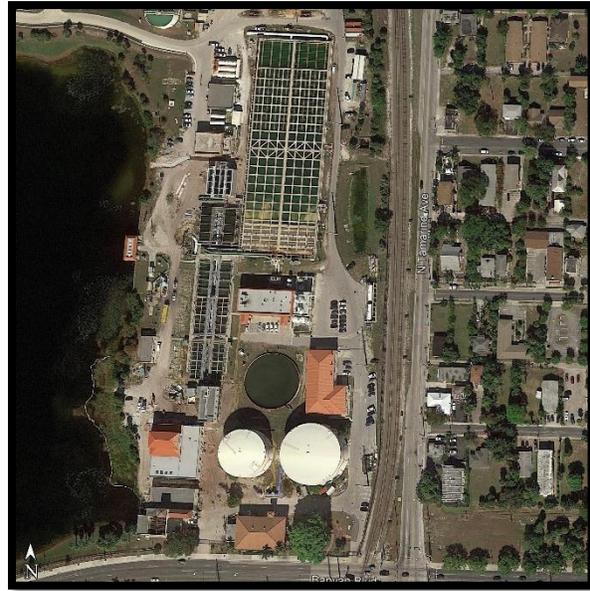


Figure 8: City of West Palm Beach Water Treatment Plant

SFWMD Permit Number		50-00615-W
FDEP PWS ID		4501559
Gross (Raw) Water Annual Allocations (MGD)		41.20
Design Treatment Capacity (MGD)		47.00
Average Annual Potable Water Production (MGD)	2019	29.00
	2020	29.49
Projected Daily Average Annual Finished Water Demand (MGD)	2030	32.66
	2040	35.07
	Supply	<b>12.20</b>
Excess Capacity (MGD)	Treatment	<b>18.00</b>

Sources:

Water Use Permit 50-00615-W

Average Annual potable water production provided by FDEP Monthly Operating Report

Projected Daily Average Annual Demand provided by the SFWMD 2018 Water Supply Plan.

The current Franchise Agreement between the town and the City is structured so the potable water customers are directly served by the City, in what is referred to as a "Retail" Agreement. One alternative to the existing agreement is if the City were to provide bulk water service to the Town. In this case, the Town would then be responsible for utility services including administration, customer service, maintenance, and operations of the distribution system and connected customers in the Town.

A meeting with representatives of the City of West Palm Beach Public Utilities was held on August 28, 2020, to discuss the interest and opportunities associated with providing the Town with potable water services. A summary of the meeting is provided in **Appendix E**. In summary, the City expressed great interest in renewing the current agreement they have in place with the Town that will allow the City to continue their retail service to customers within the Town. At this time the City did not express an interest in providing the Town with potable water service through a bulk agreement. They are more interested in keeping the retail agreement but indicated they would consider a bulk arrangement if that was ultimately desired by the Town.

#### 4.2.2 PALM BEACH COUNTY WATER UTILITIES DEPARTMENT

The Palm Beach County Water Utilities Department (PBCWUD) is located west of the Town of Palm Beach and is responsible for the daily operation of a potable water system that serves customers in unincorporated Palm Beach County and several municipalities. PBCWUD serves two regions, the larger eastern service area and the western region (formerly known as the Glades Utility Authority) which is not connected to the eastern region.

PBCWUD's raw water supply is obtained from a combination of two wellfields, the SAS (eastern region) and Floridan Aquifer System (FAS) (western region) wellfields. Water is treated at two lime softening and two nanofiltration WTPs in the eastern region, and at one Reverse Osmosis WTP in the western region, see locations in **Figure 9**. These WTPs have a combined capacity of 113.28 MGD. Finished water at all four eastern WTPs shown in **Table 16** are disinfected using chloramines where the west region WTP uses free chlorine for disinfection.

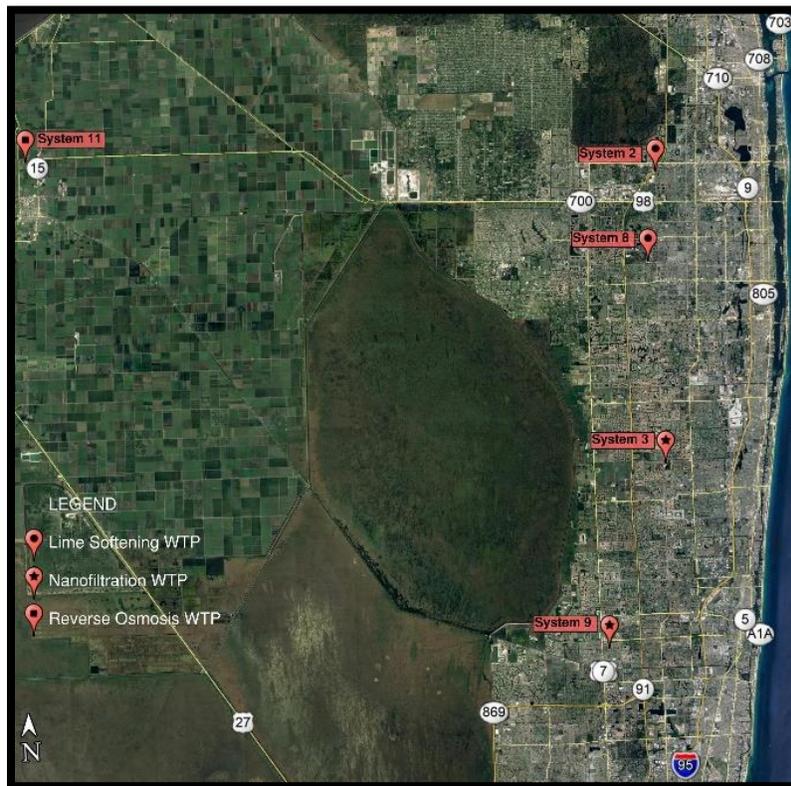


Figure 9: PBCWUD Water Treatment Plants

<b>Table 16: PBCWUD's Water Treatment Plants</b>		
<b>WTP Name/Region</b>	<b>Treatment Process</b>	<b>Design Treatment Capacity (MGD)</b>
System 2/Eastern	Lime Softening	16.40
System 3/Eastern	Nanofiltration	30.00
System 8/Eastern	Lime Softening	30.00
System 9 Membrane/Eastern	Nanofiltration	26.88
System 11/Western	Reverse Osmosis	10.00
		<b>113.28</b>

PBCWUDs operates a water system with distribution interconnections with the Cities of Boca Raton, Boynton Beach, Delray Beach, Atlantis, Lake Worth Beach and West Palm Beach; Seminole Improvement District, Seacoast Utility Authority; and Town of Lake Clark Shores. A summary of PBCWUD's current system water use, is presented in **Table 17**.

<b>Table 17: Palm Beach County Water Utilities Department Water Use Summary</b>			
		<b>Eastern Region</b>	<b>Western Region</b>
<b>SFWMD Permit Number</b>		50-00135-W	50-06857-W
<b>FDEP PWS ID</b>		4504393	4505005
<b>Gross (Raw) Water Annual Allocations (MGD)</b>		86.99	9.43
<b>Design Treatment Capacity (MGD)</b>		103.28	10.00
<b>Average Annual Potable Water Production (MGD)</b>	<b>2019</b>	52.18	5.95
	<b>2020</b>	59.37	5.67
<b>Projected Daily Average Annual Finished Water Demand (MGD)</b>	<b>2030</b>	68.10	6.04
	<b>2040</b>	75.24	6.26
	<b>Supply</b>	<b>34.81</b>	<b>3.48</b>
<b>Excess Capacity (MGD)</b>	<b>Treatment</b>	<b>51.10</b>	<b>4.05</b>

Sources:

Water Use Permit 50-00135-W and 50-06857-W

Average Annual potable water production provided by FDEP Monthly Operating Report.

Projected Daily Average Annual Demand provided by the SFWMD 2018 Water Supply Plan.

A meeting with representatives of the PBCWUD was held on September 10, 2020, to discuss the interest and opportunities associated with providing the Town with potable water services. A meeting summary is provided in **Appendix E**. PBCWUD expressed an interest in providing the Town with water as a bulk customer. PBCWUD has surplus capacity to provide the Town with 10 MGD Annual Average Daily Flow (AADF). This can be achieved with any of the WTPs taken offline for maintenance without influencing the total system's ability to service the Town.

PBCWUD indicated that the preference would be to create water main extensions to serve the Town, each of which would require right-of-way or utility easements from the City of West Palm Beach and City of Lake Worth Beach.

#### 4.2.3 CITY OF RIVIERA BEACH

The City of Riviera Beach (Riviera Beach) is located just north of the Town of Palm Beach. Riviera Beach Utility District's Water Treatment/Distribution Division is responsible for the daily operation of the water supply and the water treatment plant is located at 800 West Blue Heron Boulevard, West Palm Beach, Florida 33404 shown in **Figure 10**.

Riviera Beach's raw water supply is obtained from the East Coast SAS via 27 production wells in the eastern and western wellfields. Riviera Beach's lime softening WTP has a capacity of 17.5 MGD. Raw water is pumped from the wells into tower scrubbers which are equipped with turbine transfer pumps to three up-flow conventional lime softeners, through filters and to the high service pump station.

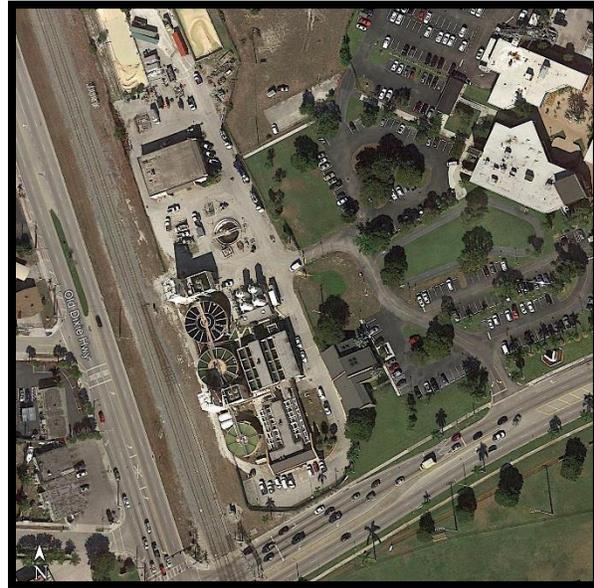


Figure 10: City of Riviera Beach Water Treatment Plant

Riviera Beach's water is disinfected with a gaseous chlorination system and anhydrous ammonia system. Treated water is stored onsite in a one-million-gallon concrete ground storage tank and there are three existing water storage tank and repump stations within the City of Riviera Beach service area.

Riviera Beach has water distribution interconnections with the Town of Mangonia Park, City of West Palm Beach and the Seacoast Utility Authority. To lower per capita use rates and decrease future water demands, the City of Riviera Beach is upgrading water meters and modifying the frequency of system flushing to reduce water loss. A summary of Riviera Beach's current system water use, as of 2018, is presented in **Table 18**.

<b>Table 18: City of Riviera Beach Water Use Summary</b>		
<b>SFWMD Permit Number</b>		50-00460-W
<b>FDEP PWS ID</b>		4501229
<b>Gross (raw) Water Annual allocations (MGD)</b>		9.08
<b>Design Treatment Capacity (MGD)</b>		17.50
<b>Average Annual Potable Water Production (MGD)</b>	<b>2019</b>	7.88
	<b>2020</b>	7.81
<b>Projected Daily Average Annual Finished Water Demand (MGD)</b>	<b>2030</b>	8.87
	<b>2040</b>	9.72
	<b>Supply</b>	1.20
<b>Excess Capacity</b>	<b>Treatment</b>	9.62

Sources:

Water Use Permit 50-00460-W

Average Annual potable water production provided by FDEP Monthly Operating Report.

Projected Daily Average Annual Demand provided by the SFWMD 2018 Water Supply Plan.

The City of Riviera Beach's WUP allocation is 9.08 MGD, and they are currently utilizing 87% of their annual allocations per their WUP. Additional WUP allocations would be required to provide the full 10 MGD AADF that the Town requires. Riviera Beach's treatment plant is currently rated for 17.50 MGD, of which they are utilizing 45% of their treatment capacity.

A meeting with representatives of the City of Riviera Beach Utility District was held on September 15, 2020, to discuss the interest and opportunities associated with providing the Town with potable water services. A meeting summary is provided in **Appendix E**. While Riviera Beach does not currently have the water allocations, they are interested in being one of the potential water suppliers and may be able to provide a portion of the Town's potable water needs. Riviera Beach is currently planning to expand their treatment plant with a mixture of nanofiltration and reverse osmosis production facilities within the next 3-5 years and indicated that the plant could be online by the time the Town's Agreement with the City would expire. Riviera Beach expressed an interest in supplying water to the Town as a bulk or retail agreement. Riviera Beach believes that the system hydraulics to provide water to the Town will be the most challenging aspect of this alternative since their ability to connect to the Town would be limited to the extreme north end of the island.

#### 4.2.4 CITY OF LAKE WORTH BEACH

The City of Lake Worth Beach (LWB) is located southwest of the Town of Palm Beach. The Utility Department's Water Division is responsible for the daily operation of the City's water supply and the water treatment plant is located at 301 College Street Lake Worth, FL 33460 shown in **Figure 11**.

The potable water system consists of two water treatment processes and has a combined capacity of 17.4 MGD. The lime softening treatment capacity is 12.9 MGD and the Reverse Osmosis (RO) treatment capacity is 4.5 MGD. LWB's raw water supply for the lime softening treatment process is obtained from the East Coast Surficial aquifer and Biscayne aquifer system (SAS) pumped out of 12 production wells. The SFWMD permit limits withdrawals from this aquifer during the dry season to 5.1 MGD which seasonally reduces the lime softening treatment capacity from 12.9 MGD to 5.1 MGD. The RO treatment process is supplied brackish raw water from 3 Floridan aquifer system (FAS) wells. The treated water from the two processes is disinfected via chlorination and blended before distribution.

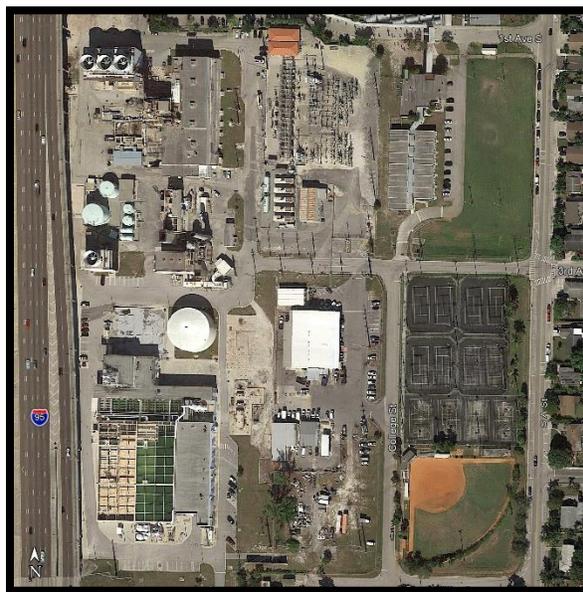


Figure 11: City of Lake Worth Beach WTP

LWB's total water storage volume at the WTP is 2.8 million gallons, and an offsite storage tank adds an additional 1.3 million gallons of storage capacity.

LWB has water distribution interconnections with the Town of Lantana (disconnected), Palm Beach County Water Utilities Department, and the City of West Palm Beach. The interconnections are used to maintain LWB's water supply during emergencies or provide emergency water supply to neighboring utilities. A summary of LWB's current system water use, as of 2018, is presented in **Table 19**.

<b>Table 19: City of Lake Worth Beach Water Use Summary</b>		
<b>SFWMD Permit Number</b>		50-00234-W
<b>FDEP PWS ID</b>		4500773
<b>Gross (Raw) Water Annual Allocations (MGD)</b>		11.25
<b>Design Treatment Capacity (MGD)</b>		17.40
<b>Average Annual Potable Water Production (MGD)</b>	<b>2019</b>	5.29
	<b>2020</b>	5.31
<b>Projected Daily Average Annual Finished Water Demand (MGD)</b>	<b>2030</b>	5.78
	<b>2040</b>	6.12
	<b>Supply</b>	<b>5.96</b>
<b>Excess Capacity (MGD)</b>	<b>Treatment</b>	<b>12.11</b>

Sources:

Water Use Permit 50-00234-W

Average Annual potable water production provided by FDEP Monthly Operating Report.

Projected Daily Average Annual Demand provided by the SFWMD 2018 Water Supply Plan.

A meeting with representatives of the City of Lake Worth Beach Utilities Department was held on September 8, 2020 to discuss the interest and opportunities associated with providing the Town with potable water services. A meeting summary is provided in **Appendix E**.

LWB staff expressed an interest in providing the Town with water as a bulk customer but would be open to discussing an approach to a retail agreement. In 2019, LWB's average daily flow was 5.29 MGD (peak 7.84 MGD), including service to bulk customers which included approximately 1 MGD to Lake Clarke Shores and 0.5 MGD to Lantana, and a small service area near Lake Osborne. LWB also indicated their comprehensive plan envisions their utility to be a regional provider of water. Therefore, expansion of their existing WTP capacity is consistent with their long-term goals. There is sufficient surplus capacity in the LWB's existing WTP permitted capacity to meet the Town's demand of 10 MGD under average day conditions however, LWB would require an expansion to their RO treatment facility and increase in their WUP allocation for the Floridan Aquifer in order to serve the Town.

According to LWB, two connection points, one located at Northwest Park near the C-51 canal and one on Lake Worth Road near Bryant Park, could conceptually be service point locations for the Town. Since the LWB's service area is located entirely on the mainland, two new subaqueous crossings will be required to provide water to the Town.

#### 4.2.5 TOWN OF MANALAPAN

The Town of Manalapan (Manalapan) is located south of the Town of Palm Beach (and south of the Town of South Palm Beach). The Utilities Department is responsible for the daily operation of the City's water supply and the WTP is located at 7000 South Federal Highway, Hypoluxo, FL 33462 shown in **Figure 12**.

Manalapan's RO WTP has a capacity of 2.35 MGD and is supplied raw water from two FAS wells. In addition, Manalapan maintains four East Coast SAS wells. Permeate from the RO WTP is blended with filtered SAS water prior to distribution. The blended water is degasified, aerated, and disinfected with chloramines. A small amount of zinc orthophosphate is added to reduce corrosivity of the finished water. Water facilities also include four hydropneumatic tanks and a 300,00-gallon steel ground storage tank.



Figure 12: Town of Manalapan Water Treatment Plant

Manalapan's water system has distribution interconnections with the Town of Lantana and the City of Boynton Beach. Manalapan's Town limits begin immediately south of the Town of South Palm Beach (East Ocean Ave) and extends south to the Boynton Inlet, lying entirely on the barrier island.

A summary of Manalapan's current system water use, as of 2018, is presented in **Table 20**.

<b>Table 20: Town of Manalapan Water Use Summary</b>		
<b>SFWMD Permit Number</b>		50-00506-W
<b>FDEP PWS ID</b>		4500840
<b>Gross (Raw) Water Annual Allocations (MGD)</b>		1.92
<b>Design Treatment Capacity (MGD)</b>		2.35
<b>Average Annual Potable Water Production (MGD)</b>	<b>2019</b>	1.15
	<b>2020</b>	1.16
<b>Projected Daily Average Annual Finished Water Demand (MGD)</b>	<b>2030</b>	0.91
	<b>2040</b>	0.98
	<b>Supply</b>	<b>0.77</b>
<b>Excess Capacity (MGD)</b>	<b>Treatment</b>	<b>1.20</b>

Sources:

Water Use Permit 50-00506-W

Average Annual potable water production provided by FDEP Monthly Operating Report.

Projected Daily Average Annual Demand provided by the SFWMD 2018 Water Supply Plan.

A meeting with representatives of the Town of Manalapan Utilities Department was held on October 2, 2020, to discuss the interest and opportunities associated with providing the Town with potable water services.

The Town of Manalapan’s Town Manager expressed an interest in providing the Town with some level of service, if feasible. Manalapan has historically provided water to the Town of Hypoluxo through a retail agreement but since has ended their agreement. Manalapan indicated it is not viable to provide all 10 MGD the Town would need and that the preference would be to sell the 0.5 MGD they previously provided to Hypoluxo. Manalapan would be willing to run a few model scenarios on the north end of Manalapan’s distribution system using theoretical demands and a theoretical point of connection to determine the feasibility and system needs. It should be noted that Manalapan would need to provide a connection point through the Town of South Palm Beach to reach the southern Town limits.

#### 4.2.6 MUNICIPAL WATER SUPPLIER SUMMARY

In summary, all municipal water suppliers expressed an interest in providing potable water service to the Town. Of the five municipal water suppliers, currently the City of West Palm Beach and PBCWUD are the only suppliers that have the permitted available water allocations and treatment capacity to provide the full 10 MGD demand to the Town. The City Riviera Beach does have a planned expansion in the future, that could allow the City of Riviera Beach to also provide the full 10 MGD demand to the Town. However, Riviera Beach would need to know relatively soon whether or not the Town would seek to receive service from them so they can design and construct the excess capacity. Additional permit approvals from the SFWMD would be required to increase the City of Riviera Beach’s permitted water allocation in order to meet the needs of the Town. See **Table 21** for a water use summary of each potential municipal water service supplier.

<b>Table 21: Potential Municipal Water Service Supplier Summary</b>								
Supplier Name	SFWMD Permit Number	Permitted Supply Capacity (MGD)	Treatment Design Capacity (MGD)	Average 2019 Potable Water Production (MGD)	Projected Demand (MGD)			Excess Supply Capacity/Excess Treatment Capacity (MGD)
					2020	2030	2040	
City of West Palm Beach	50-00615-W	41.20	47.00	29.00	29.49	32.66	35.07	<b>12.20/18.00*</b>
Palm Beach County Water Utilities Department	50-00135-W	86.99	103.28	52.18	59.37	68.10	75.24	<b>34.81/51.10</b>
	50-06857-W	9.43	10.00	5.95	5.67	6.04	6.26	<b>3.48/4.05</b>
City of Riviera Beach	50-00460-W	9.08	17.50	7.88	7.81	8.87	9.72	<b>1.20/9.62</b>
City of Lake Worth Beach	50-00234-W	11.25	17.40	5.29	5.31	5.78	6.12	<b>5.96/12.11</b>
Town of Manalapan	50-00506-W	1.92	2.35	1.15	1.16	0.91	0.98	<b>0.77/1.20</b>

\*City of West Palm Beach excess capacity considers the Town’s 10 MGD in the calculation.

Sources:

Water Use Permits.

Average 2019 potable water production provided by FDEP Monthly Operating Report.

Projected Daily Average Annual Demand provided by the SFWMD 2018 Water Supply Plan.

With the exception of the City of West Palm Beach and Riviera Beach, all utilities emphasized a desire to provide bulk water service to the Town. The City expressed primary interest in maintaining the current retail agreement structure but would be willing to further discuss a bulk arrangement if that was the will of the Town.

Additional infrastructure improvements would be required to implement any alternative other than renewing the current agreement with the City.

### 4.3 GOLF COURSE WATER SUPPLIERS

There are four golf courses located within the Town's limits that possess WUP allocations for irrigation water and, in some instances, ancillary purposes. See **Figure 13** for the location of each golf course water supplier.

The WUPs for each of the four golf courses were evaluated and they indicate that the rated capacities of the withdrawal facilities at each of the courses exceed the corresponding permitted withdrawal allocations; however, a more detailed review of the capacities indicate that the Town's demands could not be met solely from golf course supplies. For the purpose of this preliminary evaluation, two specific water supply scenarios were reviewed.

**Scenario 1** assumes that all excess capacity (Floridan, surficial and surface water) from all four golf courses could be used for potable purposes.

**Scenario 2** assumes that only the groundwater would be suitable for potable purposes. Scenario 2 is included because the golf course runoff into the pond is likely high in nutrients (fertilizers) and organics which may require cumbersome pretreatment or an entirely separate treatment process (i.e. not RO) for potable use. In both scenarios, it has been assumed that the supplies could provide potable quality water (requires confirmation at a later date). Scenarios 1 and 2 are summarized in **Tables 22 and 23**, respectively.



Figure 13: Palm Beach Golf Course Water Suppliers

Golf Course Name	Potential Surplus Capacity (Rated - Allocated)		Perceived Surplus	
	FAS + SAS + Surface Water Rated Capacity (MGY)	Annual Allocation (MGY)	MGY	Normalized MGD
The Breakers Golf Course	639	151	488	1.34
Palm Beach Country Club	289	116	173	0.47
Everglades Golf Course	1,634	215	1,419	3.89
Palm Beach Par 3	568	33	535	1.47
<b>TOTAL</b>	-	-	2,615	7.16

Golf Course Name	Potential Surplus Capacity (Rated - Allocated)		Perceived Surplus	
	FAS + SAS Rated Capacity (MGY)	Annual Allocation (MGY)	MGY	Normalized MGD
The Breakers Golf Course	245	151	94	0.26
Palm Beach Country Club	289	116	173	0.47
Everglades Golf Course	714	215	499	1.37
Palm Beach Par 3	236	33	203	0.56
<b>TOTAL</b>	-	-	969	2.65

With the Town’s anticipated needs of 10 MGD, both scenarios fail to fully meet the demand. Scenario 1 leaves a shortfall of 2.84 MGD and Scenario 2 leaves a shortfall of 7.35 MGD. It is not likely that the full rated capacity surplus could be made available to the Town due to operational flexibility requirements for golf course operations (and the likelihood that the actual withdrawal potentials are something less than the rated capacities).

As part of this Water Feasibility Study, a meeting was held with representatives of the Breakers Golf Course. A meeting summary is provided in **Appendix E**. The representatives validated that the Breakers Golf Course is operating at the capacity of their annual allocations and any additional water use in excess of these allocations would require significant permitting and the necessary evaluations to determine the impacts of additional withdrawals. All parties agreed that the option of the golf course’s ability to provide potable water supply to the town would be a great challenge, require significant treatment, capacity, permit and operational upgrades as well as additional real estate to implement these upgrades. With the exception of the Par 3 Golf Course, obtaining potable water from the private local golf course suppliers is not likely a feasible alternative. Utilizing the Par 3 Golf Course is discussed in more detail in **Section 5.3**.

## 4.4 PRIVATE UTILITY PROVIDER

For all alternative municipal water supply options except the City of West Palm Beach, the Town will be required to evaluate receiving potable water as a bulk customer. In the retail customer scenario, which is similar to the current Franchise Agreement, the water supplier will be responsible for operations, maintenance, and administration functions of the utility. If the Town were to execute an alternative agreement to the current Franchise Agreement with the City, the potable water assets within the Town would be conveyed to the Town and the Town would own these assets. Under this scenario, decisions would need to be made on how the Town would provide operations, maintenance, and administration services needed to operate and maintain the potable water distribution system.

In lieu of establishing a Town potable water utility, there are utility provider opportunities that the Town would be able to access when considering Public Private partnership (P3). A P3 is a feasible solution for public municipalities to access the benefits of the water system operation and maintenance from a private provider with varying amounts of ownership, financing, and risk factors. The P3 model has several types of agreements including:

1. Contract Operations and Maintenance
2. Design Build Finance Operate (DBFO) Concessions
3. Private Ownership of Asset

For all of these contractual options, consideration would be given to system improvements needed to maintain assets and maintain and/or improve reliability. Additionally, the process of entering these types of agreements requires engineering investigations, evaluation of assets, the development of the financial model to support the perspective contract, public education, and legal support. While these options have varying levels of complexity, as it pertains to developing the contractual arrangement, all of these options can include contractual mechanisms that support the Town's interest if performance from the private utility provider is not in accordance with contract.

This section of the Technical Memorandum introduces these three forms of P3 contractual relationships between utility providers and the Town. Additionally, meetings were held with three private utility providers including Veolia, FGUA, and Corix. Summaries of those discussions and preliminary findings are also presented in this section.

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### 4.4.1 CONTRACT OPERATIONS AND MAINTENANCE

Contract operations and maintenance is a common approach for many utilities to contract with a private utility provider to design, build, and operate utility assets. For the purpose of this study, this can include water supply, treatment, and distribution assets. This partnership shifts responsibility for operation, maintenance, management, and support of the utility to the private partner while the public utility maintains control over the physical infrastructure. In this option, the Town would maintain ownership of water distribution assets, however operations and maintenance of the system would be contracted to a private utility provider. Administration of the utility, such as customer service and billing could also be contracted to the private utility provider, or the Town could maintain responsibility of these functions. Additionally, the financing of operations, administration, maintenance, and improvements is the responsibility of the Town. A schematic of the relationship between the Town and the utility operator for this option is presented in **Figure 14**.

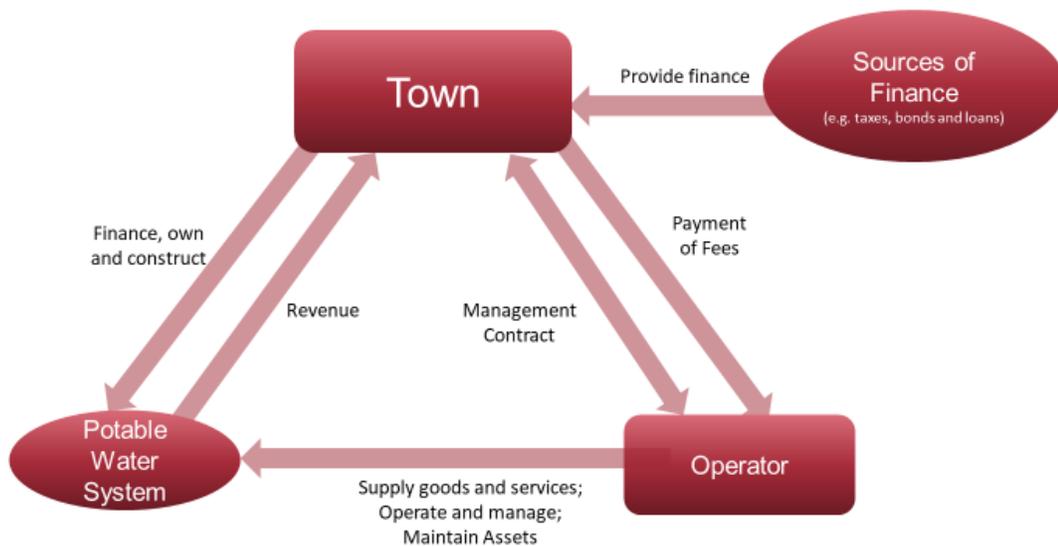


Figure 14: Contract Operations and Maintenance

#### 4.4.2 DESIGN BUILD FINANCE OPERATE (DBFO) CONCESSIONS

This P3 option includes the Town contracting with a private utility provider to design, build, operate and finance the potable water system for a defined period of time, after which, the Town would take over the system. For the duration of the contract, the potable water system is owned by the private utility and costs are recovered by the private utility through water user rates. A schematic of the Relationship between the Town and the private utility provider for this option is presented in **Figure 15**.

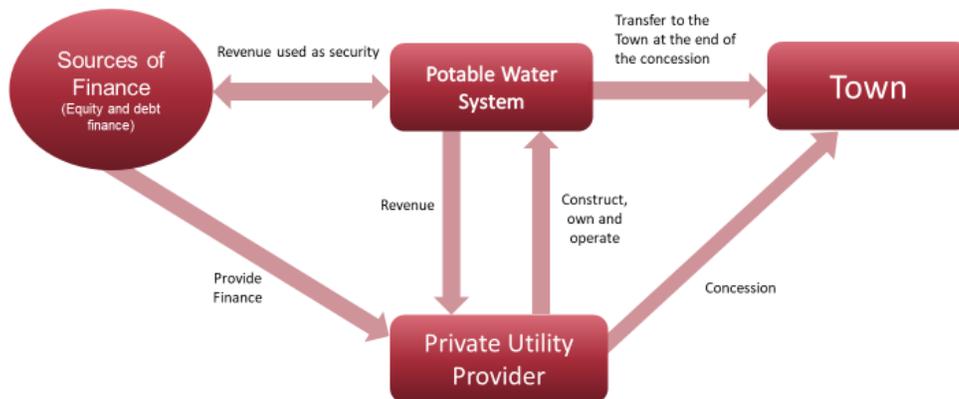


Figure 15: Concession Contract

#### 4.4.3 PRIVATE OWNERSHIP OF ASSET

This P3 option includes the Town conveying all potable water assets to a private utility company for an agreed upon price. Under this scenario the private potable water provider remains responsible for design,

construction, operations of the utility and the Town would relinquish all right of ownership of assets and the private utility provider would be responsible for providing potable water service directly to the customers.

There are several models of how the divestment of a utility asset to a private utility provider, however for the purpose of this initial phase, the discussion of private ownership of the Town's potable water assets will be limited to a high-level discussion. A schematic of the Relationship between the Town and the private utility provider for this option is presented in **Figure 16**.

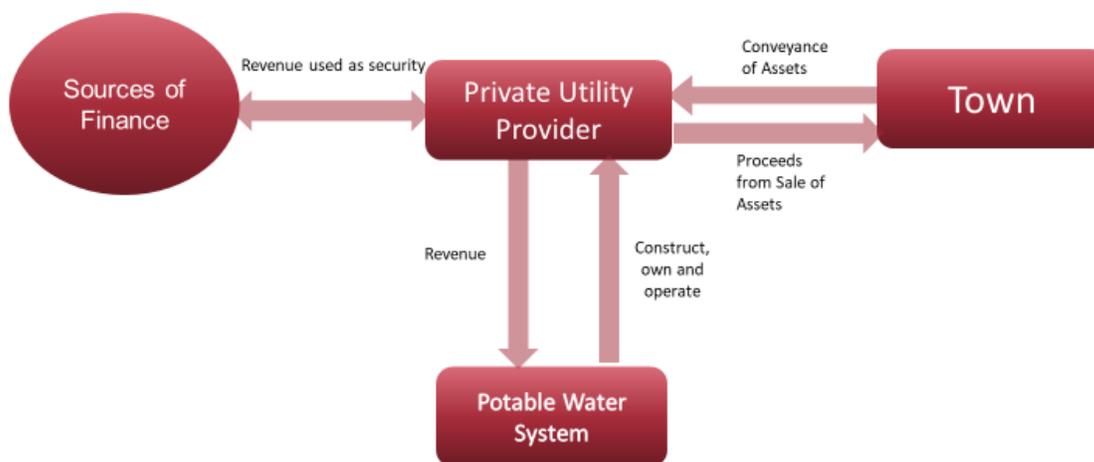


Figure 16: Private Ownership of Asset

#### 4.4.4 INITIAL INVESTIGATION OF PRIVATE UTILITY PROVIDERS

Three introductory meetings were held between the Town and three private utility providers. A brief summary of each meeting is provided below.



Veolia is an environmental company that supplies their customers with solutions for water, waste, and energy utility areas that are traditionally managed by public authorities. Veolia uses P3s to allow public municipalities to access private resources such as labor, expertise, and capital. They have two Florida offices, one Tallahassee and one in Tampa.

A meeting with representatives from Veolia was held on November 13, 2020, to discuss the interest and opportunities associated with providing the Town with potable water services. Veolia was most interested in providing contract operations services to the Town in a scenario where the Town elects to receive water as a bulk customer and takes ownership of the distribution system at the expiration of the Agreement with the City. Under this scenario, the Town would have the option to operate and maintain the water system themselves or to contract with a company such as Veolia to operate and maintain the system. Contracts are typically five (5) years and have five (5) year renewals, with a flat fee for staffing, power, chemicals etc. Veolia did not express a strong interest in being a water provider or constructing new facilities to treat a new water source.

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#### 4.4.5 FGUA



Florida Governmental Utility Authority (FGUA) is a utility authority that provides water, wastewater, and reclaimed water services throughout Florida, serving over approximately 120,000. FGUA owns and operates over 80 water and wastewater utility systems spread across several County's within the State of Florida. customers.

FGUA is considered a special purpose government and is authorized under Section 163.01(7)(g)1, Florida Statutes. A special purpose government is more like an Expressway Authority, rather than a City or County, which would be considered a general-purpose form of government. In 1999, FGUA was established through the execution of interlocal agreements between Brevard, Lee, Polk, and Sarasota Counties to acquire former franchise utilities within Florida. Since the establishment of FGUA, additional interlocal agreements have been executed across Florida and FGUA provides utility services to:

- Lehigh Acres Utility System (Lee County)
- North Fort Myers Utility System (Lee County)
- Pasco Utility System (Pasco County)
- Consolidated Utility System (Pasco County)
- Lindrick Utility System (Pasco County)
- MacDill Air Force Base Utility System (Hillsborough County)
- Pasco Aqua Utility System (Pasco County)
- Lake Aqua Utility System (Lake County)
- Unified Aqua Utility System
- Dunnellon Utility System

FGUA is governed by a Board of Director's which is comprised of representatives from the Counties that are served by the utility. FGUA does not have employees, and contracts all services associated with utilities operations and maintenance including contract management, operations, maintenance, customer services, and billing.

A meeting with representatives from FGUA was held on November 13, 2020, to discuss the interest and opportunities associated with providing the Town with potable water services. FGUA was interested in providing an alternative contract that keeps the water utility supply in a government realm. Through the establishment of an interlocal agreement with the Town, FGUA would own and operate and maintain the Town's potable water system. While the Town would convey all potable water assets, the Town would have the opportunity to have representation on the Board of Directors. As a board member, the Town would have the ability to participate in policy related decisions.

FGUA expressed interest in continuing to discuss the process of further evaluating this option and showed interest in providing potable water services to the Town and its customers.

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#### 4.4.6 CORIX/UTILITES INC.



Corix Group of Companies' US operations and is one of the largest privately-owned water and wastewater utilities in the United States. Corix Group of Companies US includes Utilities, Inc. of Florida (UIF) who has invested approximately \$100 million in infrastructure in the last decade and provides utility service to 10 Florida

Counties. Corix supports water and wastewater utility systems through providing design, build, finance, and operations and maintenance services.

A meeting with representatives from Corix was held on November 16, 2020, to discuss the interest and opportunities associated with providing the Town with potable water services. Corix expressed an interest in providing potable water service to the Town. Corix is willing to support the Town's needs and can provide turnkey operation and distribution services to operate the water distribution system. They are also equipped to provide customer care and utility billing. Another option includes financing the development of water supply, water treatment, and a new distributions system, if needed. In summary, Corix indicated interest in supporting the Town's needs which could include investing in building or buying a neighboring plant, developing a utility, and owning or managing the system.

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#### 4.4.7 PRIVATE UTILITY PROVIDER SUMMARY

All three of the private utility providers expressed an interest in providing potable water utility service to the Town. In any case, a detailed engineering and financial evaluation would be required to establish the contractual relationship. While all the private utility providers indicated some level of preferred participation, it is important that the Town fully evaluate each contracting mechanism independently. Should the town proceed with additional investigations of any of the alternatives discussed in Section 5 of this study, it is recommended that the Town revisit the P3 options and consider identifying goals and objectives associated with evaluating a P3 partnership.

#### 4.5 PHASE 1 SUMMARY AND CONCLUSIONS

During this study, five potential public water suppliers were identified. Additionally, four golf courses were evaluated to determine if water supplied by the local golf courses is a feasible strategy to evaluate. The initial evaluation suggests that the private golf courses are not a feasible water supplier and should not be considered as part of the alternative water supply strategies to investigate.

To further validate the feasibility of alternative water strategies to be investigated in Phase 2 of this study, a qualitative matrix was developed to compare the following criterion for each of the water suppliers:

**Primary Interest in Service Type** – With a retail option, the Town would not be required to develop a potable water utility to maintain and operate. For the bulk scenario, the Town would need to evaluate establishing a water utility, which could be through a private partnership or internal to the Town. For the purpose of this discussion, the bulk alternative has additional complexities and investigations associated with evaluating the feasibility, since a detailed investigation of developing a Town owned water utility versus a private partnership will be required.

**Adequate Water Allocation to Serve the Town** – Understanding the complexity of increasing water allocations, as well as the regional impact, water supply options where the Town's needs can be met within an existing permitted allocation will be less complex to pursue. The time necessary to modify a WUP, which includes detailed evaluation and analysis of the regional impact of increased withdrawals, may delay the Town's ability to secure an alternative potable water supply within the timeframe of the Franchise Agreement.

**Adequate Treatment Capacity to Serve TOPB** - Evaluating alternative water supply options that do not require the permitting, design, and construction of new water treatment capacity will be less costly and less complex to pursue. The time necessary to secure adequate treatment capacity

may delay the Town’s ability to secure an alternative potable water supply within the timeframe of the Franchise Agreement.

An evaluation of each potable water supply option based on this criterion was performed and is presented in **Table 24**.

<b>Table 24: Phase 1 Potable Water Supplier Evaluation Matrix</b>			
<b>Public Water Suppliers</b>	<b>Primary Interest (Bulk Service/Retail Service)</b>	<b>Adequate WUP Allocation to Serve TOPB</b>	<b>Adequate Treatment Capacity to Serve TOPB</b>
<b>City of WPB Public Utilities</b>	Retail	Yes	Yes
<b>PBCWUD</b>	Bulk	Yes	Yes
<b>City of Riviera Beach</b>	Bulk	No	No
<b>City of Lake Worth Beach</b>	Bulk	No	Yes*
<b>Town of Manalapan</b>	Bulk	No	No
<b>The Breakers Golf Course</b>	NA	No	No
<b>Palm Beach Country Club</b>	NA	No	No
<b>Everglades Golf Course</b>	NA	No	No
<b>Palm Beach Par 3</b>	NA	No	No

\* Lake Worth Beach does have adequate permitted treatment capacity however the excess treatment capacity is conventional lime softening and filtration treatment capacity which is adequate for treating raw water from the surficial aquifer. Lake Worth Beach’s water use permit has capped their withdrawal from the surficial aquifer. To serve the Town’s water supply needs Lake Worth Beach will be required to receive additional Floridan Aquifer water allocation and expand their RO treatment capacity.

#### 4.6 PRELIMINARY SCREENING OF WATER SUPPLY ALTERNATIVES TO BE FURTHER EVALUATED IN PHASE 2

Significant effort is required to evaluate the technical feasibility of each potential option which will be required to develop cost opinions for necessary and unique capital improvements needed for each alternative. An initial screening of the list of alternative water suppliers was performed to screen which alternatives to pursue further. Considerations for preliminary screening include the complexity and regional impact associated with modifying the potable water allocation to serve the Town. Additionally, alternative water suppliers that do not appear to have the ability to satisfy 100% of the Town’s demands will not be

further evaluated as these options will pose additional complexities to the process and will create an environment where different service arrangements and rates will be established for various geographic areas in Town.

Based on the preliminary review and screening of the alternative water supply options the following is recommended that the study provide further evaluation of the following four (4) options.

**Alternative 1- City of West Palm Beach Utilities** - It is recommended that the Town proceed with evaluating continuing the current water supply option with the City of West Palm Beach.

**Alternative 2- Town of Palm Beach Developed and Owned Water Supply System** - It is recommended that the feasibility of a Town Owned Water Supply be considered. For this alternative the following two water source options are discussed:

**Alternative 2A** – System Improvements associated with groundwater-based water supply

**Alternative 2B** – System Improvements associated with sea water desalinization

**Alternative 3- Palm Beach County Water Utilities** - Based on the review of the potential alternative water suppliers it is recommended that the Town proceed with evaluating the feasibility of connecting to the PBCWUD system. The PBCWUD system currently has adequate permitted supply and treatment capacity to serve the Town's demands. Additionally, PBCWUD has expressed in interest in providing bulk water supply to the Town. It is recommended that this option be further evaluated to determine the infrastructure necessary to convey water to the Town as well as improvements within the Town that are needed to meet the potable water level of service that the Town currently receives.

**Alternative 4- City of Lake Worth Beach Utilities** - Based on the review of the potential alternative water suppliers it is recommended that the Town proceed with evaluating the feasibility of connecting to the LWB system. The LWB system would have to increase the permitted water supply and expand their current treatment capacity to serve the Town's demands. Due to the proximity of LWB to the Town of Palm Beach they are well positioned to be able to connect to the Town's distribution system. Additionally, LWB has expressed a preferred interest in providing bulk water supply to the Town and would consider investigating a retail agreement. It is recommended that this option be further evaluated to determine the infrastructure necessary to convey water to the Town as well as improvements within the Town that are needed to meet the potable water level of service that the Town currently receives.

**Section 5** of this report provides a detailed discussion on the evaluation of each of these alternatives. With regards to the preliminary review and investigations of the private utilities, it is recommended that the Town identify goals and objectives associated with evaluating a P3 partnership and evaluate P3 opportunities based on these goals. The type of arrangement with a private utility can vary significantly from the scenario where the P3 partner operates a system the Town owns, to a scenario where the P3 partner owns and operates all the utility system assets.

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## 5 EVALUATION OF ALTERNATIVES

The information collected, analyzed, and presented in the previous report sections provided the basis for the preliminary screening and evaluation of the four (4) alternatives identified as potential water supply options available to the Town of Palm Beach including:

**Alternative 1-** City of West Palm Beach Utilities

**Alternative 2-** Town of Palm Beach developed and owned water supply system (this includes Option 2A for ground water supply and 2B sea water desalination)

**Alternative 3-** Palm Beach County Water Utilities

**Alternative 4-** City of Lake Worth Beach Utilities

The purpose of preliminary screening and evaluation of the four (4) alternatives presented herein was performed to gain a conceptual understanding including a magnitude of capital costs associated with the infrastructure improvements required to implement each of the alternatives.

### 5.1 APPROACH

This Section provides a description of each alternative and identifies the specific infrastructure improvements required to meet the Towns' water supply needs. A summary of the Conceptual Order of Magnitude Capital Cost to construct each improvement was also developed and provided for each alternative. Finally, a list of advantages and disadvantages of each alternative is provided. The approach for evaluating each of the four alternatives is as follows:

**Demand Scenario** – For each of the water supply alternatives two planning scenarios were developed to evaluate the required improvements necessary to deliver maximum day demands (MDD) as follows:

**Demand Scenario 1-** Provide 9.61 MGD MDD to the Town only

**Demand Scenario 2** – Provide 9.93 MGD MDD to the Town and the Town of South Palm Beach

Hydraulic evaluations were performed for each alternative as well as each of the two demand scenarios. In all four alternatives, the recommended improvements were substantially the same for Demand Scenario 1 and Demand Scenario 2, with the addition of the Town of South Palm Beach's demand considered negligible (relative to pipe sizing and system pressures). **The discussion presented below is based on the water supplier's ability to provide potable water to both the Town of Palm Beach and the Town of South Palm Beach** (9.93 MGD, Scenario 2), but the evaluation did not include a focus on specific infrastructure improvements within the Town of South Palm Beach distribution network to accommodate the alternate supplier's point of delivery. Detailed discussions with all stakeholders, including the Town of South Palm Beach, would be required to further evaluate the feasibility of options 2 through 4 presented below.

**System Improvements** – A hydraulic analysis was performed for each alternative to evaluate and identify the necessary system improvements to convey water to the Town, as well as the improvements within Town's distribution system that are necessary to maintain the existing level of service and fire flow requirement. The proposed improvements are considered conceptual in nature and were identified to understand the capital improvements necessary to implement each alternative and to form the basis of identifying capital costs associated for each alternative. Pipelines identified for replacement within the existing Franchise Agreement are included as additional improvements for each alternative. Additionally, pipelines identified as critical within the 2015 City of West Palm Beach Master Plan are also included as additional improvements for each alternative.

**Capital Cost** – Conceptual Order of Magnitude Capital Costs associated with each alternative have been developed based on the conceptual project definitions associated with each of the alternatives. The capital cost figures are based engineering judgement considering current project costs and cost trends observed in ongoing projects in Florida.

Since Kimley-horn does not control the cost of labor, materials, equipment, or services furnished by others, methods of determining prices, or competitive bidding or market conditions, any opinions rendered as to costs, including but not limited to opinions as to the costs of construction and materials, shall be made on the basis of its experience and represent its judgment as an experienced and qualified professional, familiar with the industry. Kimley-Horn cannot and does not guarantee that proposals, bids or actual costs will not vary from its opinions of cost.

The opinion of cost prepared is considered to be a Class 5 estimate, in accordance with the AACE Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries. Class 5 estimates are typically applied to conceptual screening of alternatives. Class 5 estimates are generally based on very limited information and as a result have a wide range of accuracy. Class 5 estimates are utilized for business planning purposes and assessment of initial viability. Typical accuracy ranges for Class 5 estimates are -20% to -50% on the low range and +30% to +100% on the high range. As such, the opinions are planning level only and include a 35% contingency factor to account for the limited detail available at this level of evaluation. The purpose of the order of magnitude opinion of probable cost does, however, provide a good basis for evaluating the differences in costs between the alternatives.

The development of Conceptual Order of Magnitude Capital Costs does not address who the responsible parties are, or provide a detailed financial evaluation of alternatives, which would consider operations, maintenance, and administration. A financial analysis will also be required to evaluate the benefits of bulk purchase of water versus a retail agreement. The purpose of the development of the capital costs is to understand the relative costs of the different alternatives to assist the Town in determining if further evaluation and investigation of an alternative to the current agreement with the City is warranted. Additional investigations would consist of further evaluating operation and maintenance costs, administration costs, funding alternatives, detailed permitting, discussions with SFWMD and the impact to the rate payer. These investigations will require considerable time and effort by the alternative water supplier to prepare and should be pursued after the Town has had the opportunity to review and consider the required capital costs to implement the alternative.

**Evaluation of Alternative** – With the exception of the capital costs, the evaluation of each alternative will also provide a qualitative discussion of factors that influence the advantages and disadvantages of each alternative. These factors include the following:

Water Supply Security – Water supply security involves the reliability or security of the water source to be available under varying conditions. These conditions include adverse factors influencing the quality of the water for use as a potable water supply. An additional factor is the susceptibility of the water supply to adverse or extreme weather conditions (hurricanes, drought, power failure, etc.).

Drinking water in Florida traditionally is produced from one of two sources: ground water, such as the Floridan or Surficial Aquifers, and surface water, such as marshes, canals and lakes. Both sources come with their own benefits and challenges when used as a drinking water source.

There are two groundwater sources available in southeast Florida: the Floridan aquifer and the surficial aquifer system (SAS) including Biscayne and Lower Tamiami aquifers. The water from the Floridan

aquifer is brackish with a higher salt concentration that must be removed in the treatment process, usually through a process known as reverse osmosis, which can be a costly method for treatment but is also one of the most effective treatment methods for drinking water. Wells within the SAS and Floridan aquifer are closely monitored for salt content to minimize the saltwater intrusion into the aquifer. The SAS is a source of fresh groundwater, but water use may be limited due to the risk of saltwater intrusion into these aquifers if the aquifer is overstressed in one location. Sea level rise is also a threat to the SAS as it may cause increased saltwater intrusion as sea levels rise.

Surface water used for drinking water sources can be found in marshes, canals, lakes, and water conservation areas or constructed wetlands. These waters tend to have low salt content but can receive stormwater runoff from developed areas and agricultural operations which leads to an increase in chemical compounds, nutrients, and microorganisms, which need to be removed in the treatment process. Surface water sources are also subject to shortages due to seasonal drought which reduces water supply and can increase nutrient and contaminant concentrations in the water body.

Water Supply Permitting Complexity- Except for Alternative 1, the remaining alternatives will have varying degrees of permitting requirements and associated costs to secure the water supply with SFWMD. The overall approach to water supply permitting is provided for each alternative.

Construction Complexity- Construction projects have different degrees of complexity associated with the location of the construction, the type of construction required, the number of locations where work is required, and the length of time required to complete the construction. For each alternative there are several project components identified and each component was evaluated in terms of complexity ranging from moderate to high. For each alternative construction complexity is qualified as follows:

**Moderate** – For the purpose of this evaluation, the construction complexity is considered moderate for the following types of construction activities:

- Linear infrastructure within Town right-of-way
- Linear infrastructure within FDOT right-of-way
- Linear infrastructure within the City of West Palm Beach Right-of-way
- Linear Infrastructure within the City of Lake Worth Beach Right-of-way
- Linear Infrastructure within Palm Beach County Right-of-way
- Development of site and construction of booster pump station

These types of construction activities include open cut and trenchless construction techniques within highly congested corridors with limited right-of-way, and significant impacts can be anticipated to community. The rights-of-way in Town are narrow and densely packed with utilities. Additionally, most areas of Town only have one or two north-south roadways which can create extreme maintenance of traffic (MOT) issues. Many of the corridors where improvements are proposed include hurricane evacuation routes. These activities also include site development and construction of booster pumping stations. For several of these options, the project component will require additional stakeholders as the limits of construction are not within the Town's jurisdictions. Additionally, these types of activities may require more specialized and skilled contractors.

**High** – For the purpose of this evaluation, the construction complexity is considered high for the following types of construction activities

- Intracoastal waterway crossing (ICW)
- Railroad crossing

- Wellfield development
- Concentrate disposal wells
- Development of site and construction of water treatment plant facilities

These types of construction activities have a higher associated risk and require highly specialized contractors with experienced with complex installations of treatment systems, pipelines, and water supply wells. Additionally, the permitting requirements for the specialized crossings (ie. railroad crossing, and intracoastal waterway) add additional permitting requirements.

Operational Complexity - The degree of complexity of an alternative can be influenced by the need to operate facilities in multiple locations or operation of different treatment processes to provide potable water. Additionally, the more complex an alternative is, the more impact the complexity can have on reliable operation. System reliability can also be related to the number of connections serving the Town and the ability to maintain service if one of the connection points were out of service.

Land Acquisition and Permitting - Land acquisition and the associated costs of right-of-way acquisition, will influence both the cost and the timeframe for implementing an alternative. Acquisition of land through easement and/or purchase will be required for the location of pumping and water storage facilities, treatment facilities, and the installation of pipelines. Additionally, permitting activities associated with routes and site development outside of the Town’s jurisdiction adds complexity with the additional jurisdictional with FDOT, the City of Lake Worth Beach, the City of West Palm, and/or Palm Beach County coordination and approval. Permitting requirements can include right-of-way use permits, submerged land lease agreements, US Army Corps, SFWMD, FDOT permits, environmental permits, dewatering permits, and other associated permits. The level of complexity of the permit requirements can impact the feasibility of one alternative over another alternative.

Stakeholder Considerations- The impact of providing water and constructing facilities in any community impacts governments, residents, businesses, and other community associations. In major projects such as this, a significant degree of community outreach, education, and public participation may be involved depending on the impacts of the chosen alternative.

## 5.2 ALTERNATIVE 1 – RENEW CURRENT FRANCHISE AGREEMENT WITH THE CITY OF WEST PALM BEACH

The Town currently receives potable water service from the City of West Palm Beach. As previously discussed, the Town receives potable water through five (5) different pipeline interconnections that cross the ICW, providing a high level of service in terms of flow and pressure to the Town. In addition to the Town’s demand, the City also provides water to South Palm Beach through the distribution system that exists throughout the Town. A summary of the existing level of service currently provided by the City to the Town is provided below in **Table 25**.

Table 25: Alternative 1 City of West Palm Beach System Operating Condition	
Parameter	Existing System
Maximum Day Demand (MDD) <sup>1</sup> Model Output	6,900 gpm (10 MGD) 9.93 MGD
Town of Palm Beach Average Pressure	72 psi
Number of Tie in Locations	Five ICW Crossings 16-inch @ N Lake Way 24-inch @ 1015 N Flagler Dr. 20-inch @ Barcelona Rd. 16-inch @ Southern Blvd. 16-inch @ 7619 S Flagler Dr.

1. MDD rounded to nearest 100 gpm.

### 5.2.1 SYSTEM IMPROVEMENTS

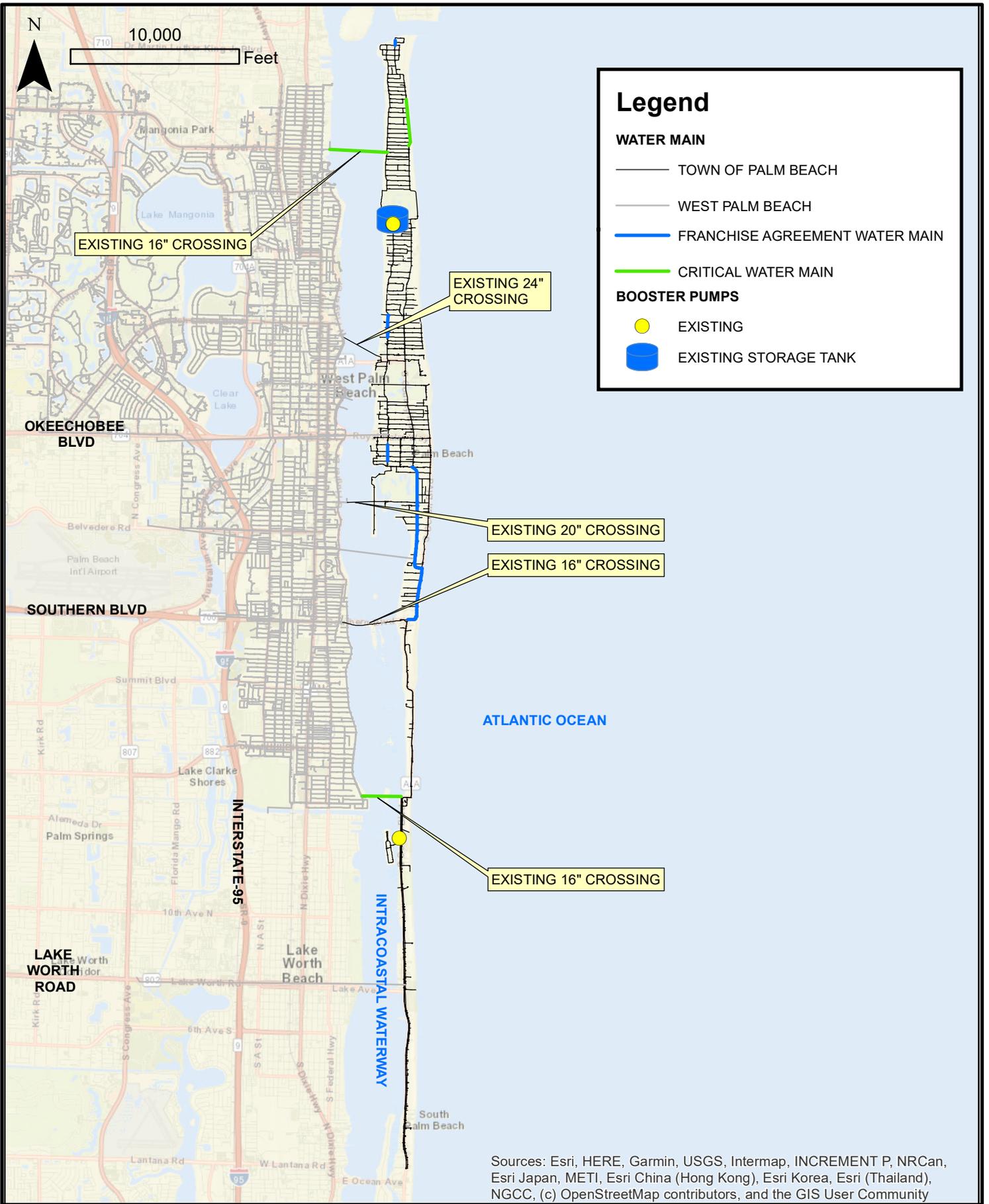
Alternative 1 represents the existing conditions as presented in **Figure 17**. For this alternative there are no required system improvements needed for the City to continue to deliver potable water to the Town. There are, however, several capital improvements that have been identified as part of the existing Franchise Agreement. Additionally, the City of West Palm Beach Master Plan identified critical pipelines within the Town that should be replaced. The following discussion identifies system improvement needs that have been identified as needing to be addressed regardless of the framework (bulk vs. retail) future agreement with the City.

### 5.2.2 PIPELINE REPLACEMENT NEEDS AS IDENTIFIED IN FRANCHISE AGREEMENT

If the Town continues to receive potable water from the City of West Palm Beach, it is important that the Town consider reinvestment strategies that include replacing the pipelines within the Town that were originally identified for replacement and identified within the Agreement for replacement. There is currently 384,484 linear feet of pipeline within the town ranging from 2-inches in diameter to 20-inches in diameter. The franchise agreement identified approximately 110,000 linear feet of pipe (29% of the system) to be replaced by the City as part of the agreement. To date, approximately 81% of the pipelines identified for replacement have been replaced and there is 20,900 linear feet of pipe remaining to be replaced per the franchise agreement.

An inventory of pipelines within the Town is provided in **Table 26**, including an inventory of what has been replaced and what is remaining to be replaced. If the Town continues to receive potable water from the City, it should be expected that the remaining 20,900 linear feet of pipelines are replaced. Proposed replacements will be with equivalent pipe diameters, however all 4-inch and 6-inch water mains within the Town, when replaced, will be replaced with 8-inch diameter water mains.

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Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



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TOWN OF PALM BEACH  
WATER FEASIBILITY STUDY  
ALTERNATIVE 1: WEST PALM BEACH



<b>Table 26: Pipeline Replacement Status – Franchise Agreement</b>			
<b>Diameter (in)</b>	<b>Total Pipe Within Town Length (LF)</b>	<b>Pipelines That Have Been Replaced Per Franchise Agreement Length (LF)</b>	<b>Pipeline Remaining to Be Replaced Per Franchise Agreement Length (LF)</b>
Unknown		5,546	2,835
2	1,518	-	120
2.5	10	-	-
3	294	-	-
4 <sup>1</sup>	23,034	1,475	3,551
6 <sup>2</sup>	79,156	5,625	3,471
8	138,471	41,068	6,893
10	6,057	1,065	960
12	96,945	28,495	3,070
16	35,168	4,370	-
20	3,782	1,314	-
<b>Total</b>	<b>384,484</b>	<b>88,958</b>	<b>20,900</b>

### 5.2.3 CRITICAL PIPELINE IMPROVEMENTS AS IDENTIFIED IN MASTER PLAN

As previously discussed, the 2015 Master Plan prepared by the City identified several critical pipelines to be further evaluated for rehabilitation and/or replacement (See **Figure 4, Section 3**). It is recommended that future agreements with the City address these critical pipelines. These pipelines were identified as part of a criticality assessment and were prioritized for further investigation, rehabilitation, or replacement. For the purpose of this study, it is assumed that rehabilitation and/or replacement will be required for all alternatives. An inventory of critical pipelines to consider replacing in future agreements is provided in **Table 27**.

<b>Table 27: 2015 Critical Pipeline Replacement Per 2015 Master Plan</b>							
<b>Project Area</b>	<b>GIS Water Main Asset ID</b>	<b>Linear Feet (LF)</b>	<b>Likelihood of Failure Score</b>	<b>Total Risk Score</b>	<b>Pipe Diameter (inches)</b>	<b>Pipe Material</b>	<b>Install Date</b>
WM4	WSP24790	859	195	35,490	16	CAS	1964
WM4	WSP24791	1462	215	32,680	16	CICL	1967
WM7	WSP12603	6	215	21,070	8	AC	1972
WM7	WSP31599	25	215	21,070	8	AC	1972
WM7	WSP32451	3063	190	18,620	8	CICL	1972
WM12	WSP23657	3374	180	20,160	16	DIP	1950

## 5.2.4 WATER QUALITY

Water supply vulnerability is always a concern when considering long term planning for drinking water supplies. The issue of water reliability and water quality most recently became of public concern when the City of West Palm Beach issued a Drinking Water Advisory on May 28th, 2021. The issue was the discovery of the drinking water toxin cylindrospermopsin. This toxin is produced by cyanobacteria (formerly known as blue-green algae) and has been appearing in recent years in some surface water systems throughout the Country. Samples of the City's raw water supply and finished water supplying the City of West Palm Beach, Town of Palm Beach and Town of South Palm Beach detected the toxin at levels above the USEPA health advisory level for vulnerable populations of 0.7 PPB (parts per billion).

## 5.2.5 CAPITAL COSTS

The Conceptual Order of Magnitude Opinion of Capital Costs for Alternative 1 are presented below in **Table 28**. As previously mentioned, the opinion of capital cost figures are based on engineering judgement considering current project costs and cost trends observed in ongoing projects in Florida and are conceptual in nature. The opinion of Costs reflect pipeline replacement needs as identified in the Franchise Agreement as well as pipeline replacement costs associated with the critical pipelines identified in the 2015 Master Plan.

<b>Table 28: Alternative 1 Conceptual Order of Magnitude Opinion of Capital Costs</b>		
<b>ITEM</b>	<b>ITEM OF WORK</b>	<b>SUBTOTAL</b>
1	Pipeline Improvements	\$13,250,000
2	Critical Pipeline Improvements Per Masterplan	\$15,660,000
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>		<b>\$28,910,000</b>
Engineering/Administration (20%)		\$5,782,000
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION:</b>		<b>\$34,692,000</b>
Contingency (35%)		\$12,143,000
<b>SUBTOTAL CAPITAL, ENGINEERING ADMINISTRATION, AND CONTINGENCY:</b>		<b>\$46,834,000</b>
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST (0% - + 50%):</b>		<b>\$47,000,000 to \$70,000,000</b>

## 5.2.6 ALTERNATIVE 1 SUMMARY

This Alternative represents a continuation of the current arrangement with the City of West Palm Beach under a retail service arrangement. As an alternative, the agreement could be modified to become a bulk service agreement with the City providing water to the current points of connection to the Town system and the Town taking over the ownership and operation of the water distribution system. The conceptual order of magnitude opinion of capital costs for either option under Alternative 1 are the same.

**Capital Costs-** The total conceptual order of magnitude opinion of capital costs for pipeline replacement remaining to be performed under the current franchise agreement as well as for those recommended in the 2015 Water Master Plan is estimated in the range of \$47M to \$70M.

Connection/Capacity Fees- Capacity fees are charged by sewer utilities to assure that customers that connect to their system pay the customer’s share of distribution and treatment plants required to treat and distribute water. For this option, there are no additional capacity fees or charges.

Water Supply Security- While water supply has been reliable during the current franchise agreement, there has been concerns regarding surface water as a source for the City’s water supply. This source has previously been impacted by drought conditions which caused the City to perform numerous improvements to become more drought resistant. However, the surface water source has recently been impacted by algal blooms that were not removed by the City’s current treatment process. This is a concern that is more prevalent in surface water as opposed to groundwater sources. As indicated in **Section 5.2.4** recent events with the City surface water supply have created a question regarding water supply security. The City is currently evaluating means and methods to address the water quality issue through changes to the current water treatment process. At this time, it is not known the extent of any required changes of the short and long term financial impacts of these changes.

Water Supply Permitting complexity- The City of West Palm Beach currently has a water use permit (WUP) that includes allocation for the Town of Palm Beach. This alternative would require no action from a water supply permitting perspective.

Construction Complexity- This alternative has five (5) major project components and an evaluation of construction complexity was performed based on the defined levels of complexity presented in Section 5.1. The majority of the improvements will be within the Town’s right-of-way, however this alternative includes replacing two of the Town’s intracoastal crossings, which is considered to have high complexity. **Table 29** lists the construction complexity for each project component.

<b>Alternative 1 Project Component #</b>	<b>Project Component</b>	<b>Construction Complexity</b>	<b>Description</b>
1	Pipeline Replacement Needs as Identified in Franchise Agreement	Moderate	Linear infrastructure within Town's right-of way
2	Critical Pipeline Improvements (WM 4)	High	ICW Crossing
3	Critical Pipeline Improvements (WM 7)	High	ICW crossing
4	Critical Pipeline Improvements (WM 12)	Moderate	Linear infrastructure within Town's right-of way

Operational Complexity and System Reliability- The operation complexity is considered low as the Town’s demands have been reliably met in terms of water quantity and pressure. The City currently provides a high level of service to the Town with average Town pressure of 72 psi during maximum day demand. The existing system also includes five (5) interconnections with the City’s system which offers an increase in system reliability at the interconnections., relative to the other alternatives. The reliability of the system, however, has recently been a source of concern due to the surface water source algae issue. Additionally, reliance on 5 ICW crossing has the potential for loss of service in the event of damage or failure of a crossing pipeline. The factor that there are 5 crossings helps to some degree in moderating the reliability risk as it is not likely multiple pipeline failure would not occur simultaneously, allowing service, although perhaps limited, to remain in place.

Land Acquisition and Permitting- Alternative 1 will not require any significant land acquisition other than right-of-way use for the construction of replacement pipelines. Submerged land leases and US Army Corps easements for the ICW channel will be required for pipeline crossing replacements. This issue would be the same for all other Alternatives as well.

Stakeholder Considerations- Because Alternative 1 is identical to the existing conditions, and in the event of changing to a bulk agreement, similar to the existing conditions, there is little concern regarding the development of stakeholder issues. The normal public process the Town uses for negotiation of continuing or new agreements would be followed.

### 5.3 ALTERNATIVE 2 – TOWN OWNED WATER SUPPLY

Alternative 2 involves the Town developing its own water supply. This can be accomplished either using groundwater from the Floridan aquifer or through the desalinization of sea water. In 2009, the Town engaged Kimley-Horn to complete a Feasibility Analysis for developing a reverse osmosis (RO) facility to provide the Town's potable water supply. The report looked at the feasibility of siting an RO facility at two Town-owned properties, along with the raw water supply facilities at each.

System Improvements associated with Alternative 2 will consider the following two alternative Town Own Water Source Options as presented in the 2009 study as follows:

**Alternative 2A** – System Improvements Associated with a groundwater-based water supply.

**Alternative 2B** – System Improvements Associated with a sea water desalinization concept.

With an identified demand of approximately 10 MGD to meet the Town's needs in serving both potable and irrigation demands, there are several factors to consider if the Town is to proceed with developing a Town-owned water source.

Regulatory: the SFWMD requires that applicants for water use permits prioritize the use of the lowest quality water available that is acceptable for the intended use. In this instance, sources of irrigation water would be prioritized as, for example, reclaimed water (nutrient-rich wastewater treatment facility byproduct), stormwater runoff/surface water or irrigation wells, with potable water being the last resort option. For potable water supply, priority sources would be, for example, seawater, the lowest possible aquifer (Floridan), the shallower aquifer (surficial/Biscayne, etc.), or surface water. The priority for potable water sources can shift from location to location based on reliability of the source.

Availability: the SFWMD requires a project to consider the use of reclaimed water for irrigation first. If reclaimed water is available from a nearby utility and the applicant can feasibly connect to the distribution system, it is often required that the applicant do so.

Cost to Produce: Cost to produce includes the labor, materials, chemicals, equipment, electrical power, testing, administration, and debt service associated with the alternative. This element goes beyond the scope of this work assignment and would be included in a more comprehensive analysis that concludes with a rate comparison between the alternatives the Town is interested in perusing after considering the capital cost implications and the advantages and disadvantages of each alternative presented in this report.

In general, the project components necessary include raw water source development and conveyance, water treatment facilities, concentrate disposal facilities, storage and high service pumping facilities. Additionally, improvements will be necessary to the existing distribution system. These specific components are generally, dependent on viable siting of the proposed water source and treatment facilities.

A summary of the site selection process presented in the 2009 feasibility study is provided below, followed by a detailed discussion of the proposed improvements associated with Alternative 2A and 2B.

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### 5.3.1 WATER TREATMENT SITE OPTIONS

The 2009 report looked at the feasibility of siting a water treatment facility at two Town-owned properties, along with the raw water supply facilities at each as follows:

**Phipps Park Site** - This site is located within the Town limits, at Phipps Park (2185 S. Ocean Boulevard), is a 20.59-acre property with an estimated usable area of approximately 14-acres for a WTP. Two source-water options were evaluated for this location including groundwater and sea water.

**Quadrille Boulevard Site** - The mainland site, located on North Quadrille Boulevard, is a 2.81-acre property approximately ½ mile east of the City's WTP.

Quadrille and Phipps Park are the most feasible locations for a town owned water supply as they are currently owned by the Town of Palm Beach. Both the Phipps Park and Quadrille sites were evaluated using the following three elements:

The 2009 study evaluated the water production potential at each site for the two different potential water sources. The following provides the site-specific capacity from each location required to meet the Towns water supply needs:

- Quadrille Site – 3.75 MGD water treatment plant (WTP)
  - Floridan Aquifer – Reverse Osmosis (RO)
  
- Phipps Park Site – 7.5 MGD / 10 MGD WTP
  - 7.5 MGD – Floridan Aquifer, RO
  - 10 MGD – Seawater, RO

It should be noted that considering plants in two locations was due to limitations of available property for Floridan Well sites, space constraints and hydraulic limitations of delivering water from a single location. The Town geography is very long and linear which makes pumping to the extreme ends difficult from a hydraulic perspective. A more distributed water supply source reduces the distance the water must travel which lowers capital costs and reduces water age in the system. Additionally, it is further noted that a seawater facility will create a higher volume of concentrate waste due to the increased salinity over the Floridan Aquifer. A larger capacity seawater treatment plant must be constructed to deliver the same quantity of finished water that a Floridan treatment system would yield. This difference in recovery rates can be seen in the **Table 30** below.

Table 30: Alternative 2A and 2B Water Treatment Recovery Rates						
Alternative	Location	Source Water	Max Influent Flow	Recovery Rate	Max Permeate Flow	Concentrate Flow
2A	Quadrille	Upper Floridan	5 MGD	75%	3.75 MGD	1.25 MGD
2A	Phipps Park	Upper Floridan	10 MGD	75%	7.5 MGD	2.5 MGD
2B	Phipps Park	Saltwater	20 MGD	50%	10 MGD	10 MGD

The Quadrille site was identified to be in the City’s Downtown Master Plan Area and zoned as the Industrial Chic District (ICD-5). This is significant because historically, this district does not allow water treatment plants as a permitted use, but due to a settlement agreement between the Town of Palm Beach and the City of West Palm Beach, a water treatment plant can be located on Town owned property in the City. A conceptual site plan was created based on the requirements for an ICD-5 property, but due to the district not typically allowing water treatment plants, there may be unanticipated issues while trying to gain zoning approval.

The area surrounding the Phipps Park site is being utilized for public services, recreation, and wastewater collection and transmission at the A-39 Lift Station. It was identified that this site is zoned R-B, so when creating the conceptual site plan, the zoning requirements for an R-B property were used. More recently, the Preservation Foundation has developed a Master Plan of improvements to revitalize the Park. These improvements would reconfigure the park significantly which may prevent its use as a water treatment plant facility. However, for the purposes of this study we are continuing to assume it would be available for this purpose.

5.3.2 WATER SUPPLY AND TREATMENT

5.3.2.a Alternative 2A – Floridan Aquifer Water Source

Alternative 2A considers that the Quadrille and Phipps Park sites are available to be used as possible groundwater well sites. These sites would both utilize the Floridan aquifer.

The 2009 study concluded that, based on existing withdrawal capacities of surrounding wells, there is a reasonable expectation for each well drilled (24-inches in diameter) to have a 5.0 MGD capacity at a 75% RO finished water treatment recovery and a 10 MGD finished water maximum day capacity requirement, a minimum of 3 wells plus one back-up well, is required. Based on the 2009 study it was determined that both the Phipps Park site and the Quadrille site would be required to meet the Town’s 10 MGD demand. For all sites, groundwater modelling would need to be performed to determine impacts to the surrounding groundwater table and existing legal users.

Some points of concern regarding these well site locations include the Quadrille site has the potential to impact the City of West Palm Beach Water Treatment Plant and the City’s Aquifer Storage and Recovery Well (ASR) while the Phipps Park site has the potential to impact the City of Lake Worth Beach. These factors would need to be further evaluated through groundwater modeling during an in-depth engineering

evaluation of the design. This level of evaluation would be needed in order to prepare permit applications for the new wells.

Based on site constraints, the Quadrille site can only accommodate one 5 MGD production well. A second back-up well can be installed. Only one of the two wells would operate at a time due to groundwater limitations. The finished water capacity at Quadrille, based on a 75% RO recovery factor is 3.75 MGD.

The Phipps Park site can accommodate two 5 MGD wells. In addition to the two 5.0 MG capacity wells at Phipps Park, the existing irrigation well at the Par 3 Golf Course adjacent to Phipps Park, could be retrofitted to provide 1.65 MGD raw capacity. Accounting for Par 3's allocation, that would leave another 1.22 MGD available. If both 5.0 MGD wells were utilized and the existing Par 3's well was utilized, there would be a total of 8.415 MGD of water produced after treatment. However, to provide a firm capacity at the site, a back-up well equal to the capacity of the largest well (5 MGD) would be required and could be installed at the Par 3 golf course property. Without Par 3 golf course well modification, the Phipps Park site would have a firm finished water capacity of 7.5 MGD.

As the Town has a 10 MGD potable water demand, development of both the Quadrille and the Phipps Park sites are required for a combined capacity of 11.25 MGD finished water without the Par 3 golf course well modification or 12.165 MGD with the Par 3 golf course well. See the **Table 31** below for a summary of the sites and their raw water production capacities.

<b>Site</b>	<b>No. Of Wells<sup>1</sup></b>	<b>Capacity (each) MGD</b>	<b>Capacity Total MGD</b>	<b>Finished Water MGD</b>	<b>RO concentrate MGD</b>
Quadrille	1	5	5	3.75	1.25
Phipps Park <sup>2</sup>	2	5	10	7.5	2.5
Total Combined	3	5	15	11.25	3.34 <sup>3</sup>

1. No. of Wells does not include required back-up well.
2. Does not include Par 3 Well modification and capacity
3. RO total reject set at 25% of 13.33 MGD raw water required to meet 10 MGD finished water maximum day requirement.

### 5.3.2.b Alternative 2A Groundwater Source Water Treatment Process

Reverse Osmosis (RO) was assumed for water treatment as it has proven to be an efficient and compact method of removing dissolved solids from raw water. If the source water is from the Floridan Aquifer, approximately 4,000 part per million (ppm) of total dissolved solids will need to be removed from the water. With this concentration, it is known that a recovery rate of 75% – 80% is achievable. When evaluating, a 75% recovery was assumed to represent the worst-case scenario. This would result in the Town requiring 13.34 MGD raw to meet the city's 10 MGD demand.

The RO concentrate disposal will require disposal capacity of 3.34 MGD. The concentrate disposal option will be through deep well injection. In the past the use of surface water discharge has been used for concentrate disposal either as the primary method of disposal or as an emergency back-up. However, more recently, the feasibility of permitting a new surface discharge for RO concentrate has been reduced and will not be considered in this evaluation of alternatives. If the Town decides to proceed with this alternative,

significant additional engineering, design and permitting will be required for surface discharge of RO concentrate. There will be challenges with permitting a deep injection well, such as providing documentation that the intended concentrate would not leach back into the drinking water supply sources. There are many deep injection wells in Florida that have been permitted and have been running without issue. It has been accepted that the concentrate does not leach into the drinking water supply if the geology of the area provides for confinement. Due to FDEP requirements, redundancy will need to be considered if a deep injection well is chosen to be the primary disposal method of the RO concentrate. Therefore, the use of deep well injection does require that a back-up well be provided and a dual zone monitoring well system must also be installed.

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### 5.3.2.c Alternative 2B – Sea Water Source Treatment Process

As an alternative, the Phipps Park site was also evaluated for an RO water treatment plant with seawater as a supply source, rather than the Floridan Aquifer option. The nature of the barrier island is such that the groundwater at a relatively shallow depth exhibits salinity characteristics approaching that of ocean water. Higher chloride and Total Dissolved Solids (TDS) concentrations require a slightly different membrane within the RO treatment process, and results in a higher volume of byproduct (concentrated saltwater) being generated vs. brackish water RO with the Floridan Aquifer source water. Specifically, it was determined that approximately 20 MGD of source seawater would be required to generate 10 MGD of usable drinking water. To obtain the seawater, the 2009 evaluation stated that a series of 15 to 30 shallow wells could be required to produce the necessary source water (actual number of wells would be highly dependent on pump test data obtained from a future test well, should this option be selected). Well spacing for this number of production wells would likely result in wells being placed well outside of the property boundaries, in a north-south alignment that could extend up to 2.75 miles. Actual well locations and identification of available Town rights-of-way or private properties in which to place the wells were not included in the evaluation. The benefits of using seawater are twofold: there is a nearly limitless supply, and it is currently exempt from Water Use Permitting requirements (i.e., no permit needed). The issue of concentrate discharge, given the extremely high salinity of the byproduct, would effectively be limited to deep well injection.

The lower recovery rate for RO systems with sea water will result in approximately 50% of the raw water going to reject. That reject will have a dissolved solids and a chloride concentration of double that of the incoming sea water. The process will yield 10 MGD of concentrate for disposal using deep injection wells. See **Alternate 2A** Concentrate Disposal section above for additional description.

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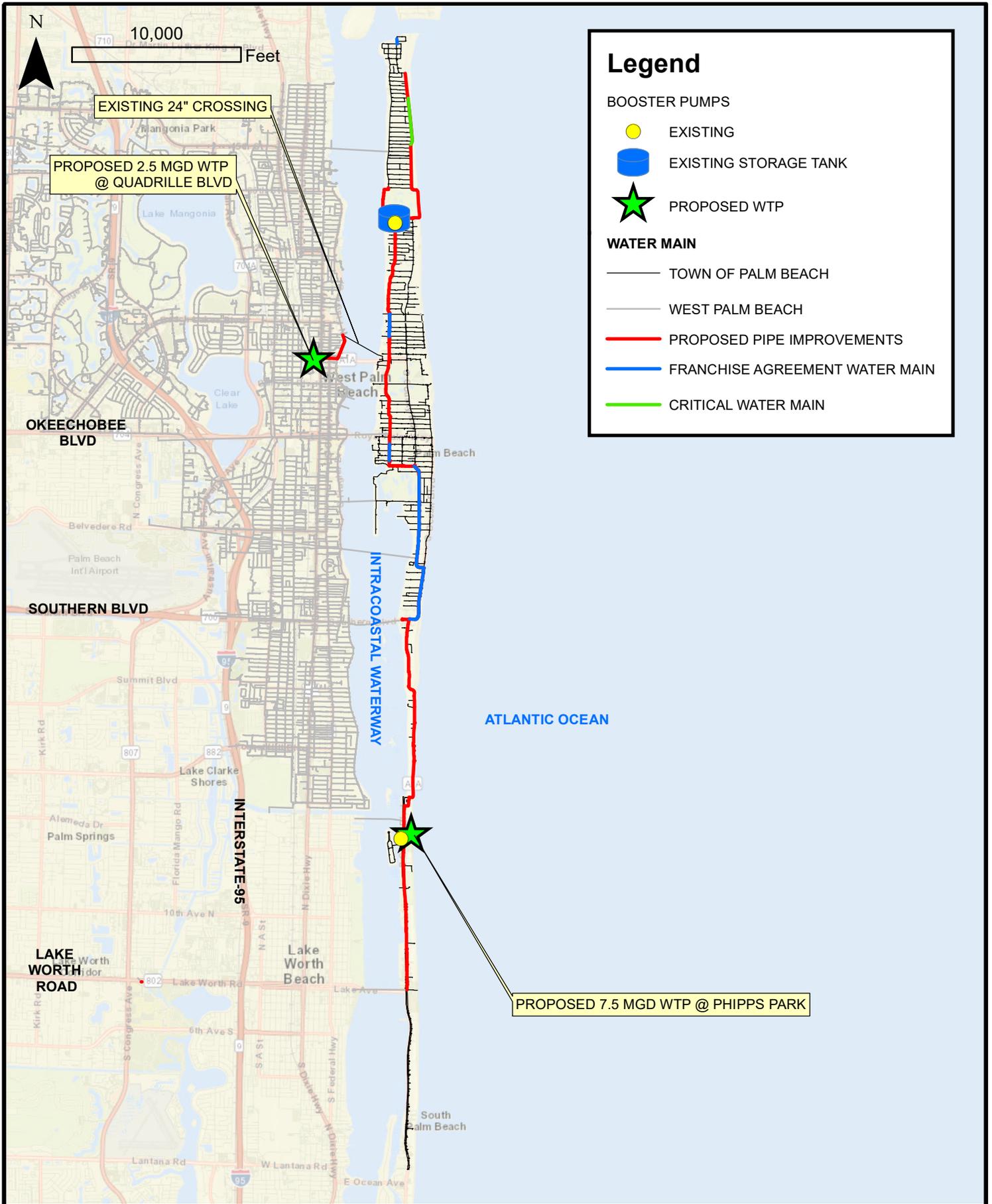
### 5.3.3 WATER DISTRIBUTION SYSTEM IMPROVEMENTS

A hydraulic evaluation of both alternatives was performed to identify the proposed water distribution system improvements necessary for Alternatives 2A and 2B. A conceptual schematic of Alternatives 2A and 2B is provided in **Figures 18** and **19** respectively. These proposed improvements are conceptual in nature and were identified as hydraulically feasible options to provide maximum day demand flows, average system pressure meeting 72 psi, and fire flow requirements, thereby maintaining existing level of service. **Table 32** provides a summary of hydraulic evaluation results for both alternatives.

**Table 32: Alternative 2A and 2B Operating Conditions**

<b>Parameter</b>	<b>Existing</b>	<b>Town Owned Water Supply 2A</b>	<b>Town Owned Water Supply 2B</b>
Maximum Day Demand (MDD) Model Output	6,900 gpm	6,900	6,900
	9.93 MGD	9.93 MGD	9.93 MGD
Town of Palm Beach Average Pressure	72 psi	73.2	73.2

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**TOWN OF PALM BEACH  
WATER FEASIBILITY STUDY  
ALTERNATIVE 2A: TOWN OWNED  
FLORIDAN AQUIFER SOURCE**



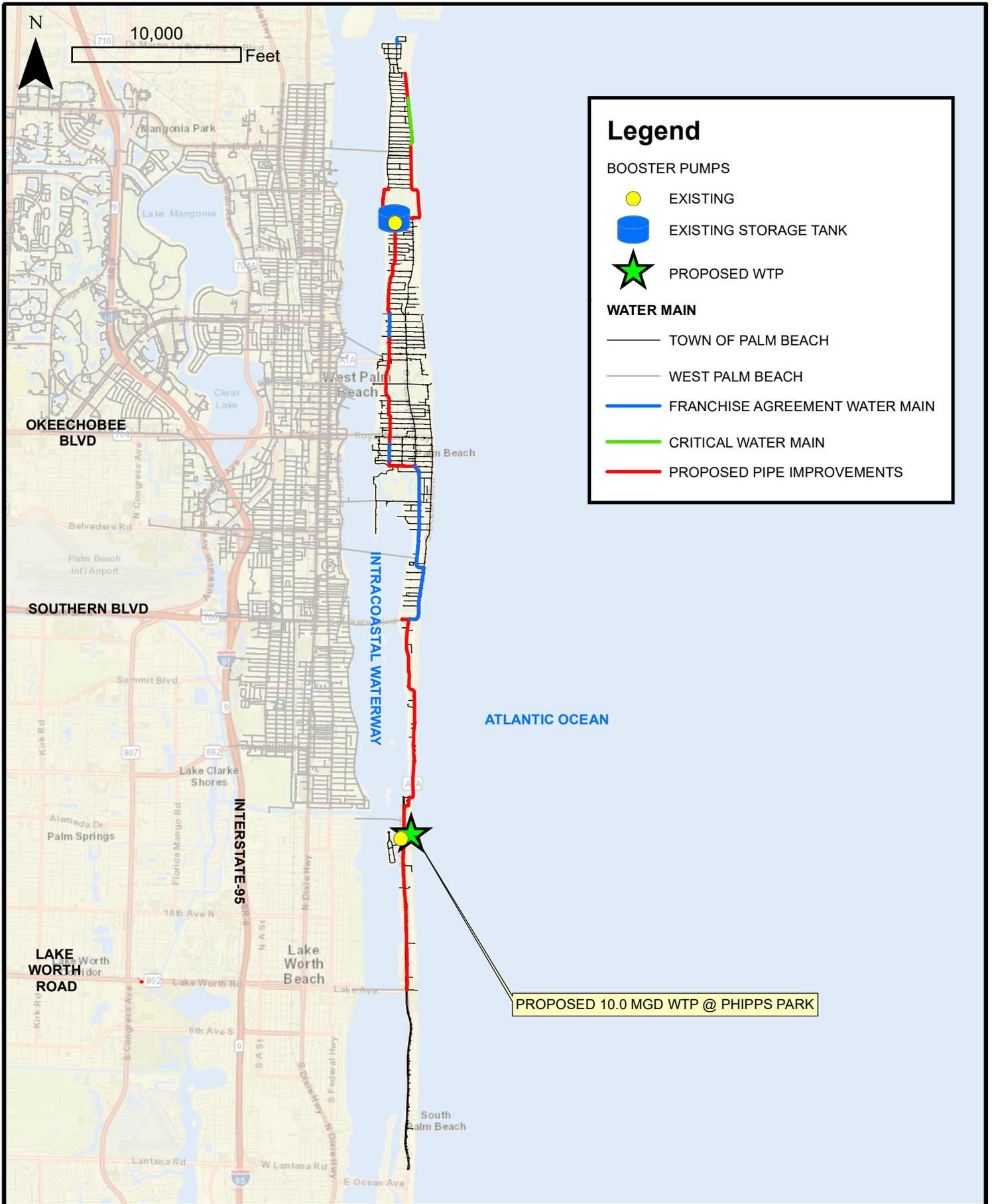
SCALE: AS NOTED

PALM BEACH COUNTY

SEPTEMBER 2021

FIGURE 18

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**TOWN OF PALM BEACH  
WATER FEASIBILITY STUDY  
ALTERNATIVE 2B: TOWN OWNED  
SEAWATER SOURCE**



SCALE: AS NOTED

PALM BEACH COUNTY

SEPTEMBER 2021

FIGURE 19

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### 5.3.3.a Alternative 2A Quadrille Site Interconnection

For option 2A, an interconnection is required with the Quadrille site. The proposed transmission main route from the Quadrille site was conceptually developed for the purpose of developing cost opinions and was established based on the shortest distance between the proposed water plant and the proposed point of connection to the Town's distribution system. A detailed route analysis for pipeline corridors was not performed as part of this effort and would be required to refine this alternative should the Town decide this alternative should be further pursued.

**Alternative 2A Quadrille Site Interconnection:** Connection to the Town's distribution system would be accomplished in this location by constructing a new water main from the proposed Quadrille site along North Quadrille Boulevard, thence North Flagler Drive to connect at the Town's existing 24-inch water main ICW crossing located at 1015 North Flagler Drive located within City of West Palm Beach. The Quadrille Site Interconnection will require 3,200 linear feet of new 24-inch diameter water main to convey water from the interconnect to the Town's potable water distribution system. This proposed route requires constructing the proposed water main within City of West Palm Beach controlled right-of-way.

Both North Quadrille Boulevard and Flagler Drive are located within the City of West Palm Beach right-of-way. This route is a highly developed urban area, with most of the surroundings being commercial and retail land uses. This area is also highly traveled by residents and visitors to the Town. Challenges associated with this route include:

- High traffic volumes
- Congested utility corridor
- FEC and CSX railroad crossings
- High urban corridor
- Complex permitting issues

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### 5.3.3.b Existing Town Distribution System Required Improvements

In general, the current water distribution network within the Town receives flow from five connection points. Changing the source water to either Alternative 2A or 2B will require upsizing of the existing potable water distribution system within the Town. The required improvements are the same for both Alternative 2A and 2B and are listed in **Table 33**.

<b>Table 33: Alternative 2A and 2B System Improvements within the Town Pipeline Improvements</b>	
2A	
Size (in.)	Quantity (LF)
20"	24,007
24"	3,163
30"	23,469
2B	
Size (in.)	Quantity (LF)
20"	16,388
24"	7,618
30"	22,930

### 5.3.3.c Pipeline Replacement Needs as Identified In Franchise Agreement

In addition to the required improvements associated with the Town Owned Water Supply option, the pipelines as previously identified for replacement within the Franchise agreement (**Table 34**) are considered necessary as part of each alternative. Several of the pipelines identified in the Franchise agreement remaining to be replaced are required to be upsized as part of this alternative. As such, the pipeline replacement requirements for Alternatives 2A and 2B includes only 16,920 linear feet of pipeline replacement. An inventory of pipelines requiring replacement as part of this alternative is provided in **Table 34**. Proposed replacements will be with equivalent pipe diameters, however all 4-inch and 6-inch water mains within the Town, when replaced, will be replaced with 8-inch diameter water mains.

<b>Table 34: Alternative 2 Pipeline Replacement Needs - Franchise Agreement</b>	
Size (in.)	Quantity (LF)
8"	15,960
10"	960
Total	16,920

### 5.3.3.d Critical Pipeline Improvements as Identified In the Master Plan

In addition to the required improvements associated with both Alternatives 2A and 2B, the following pipelines have been identified as critical for replacement within the 2015 Master Plan and are considered necessary as part of this alternative: WM 7. See **Table 35** below.

Table 35: Alternative 3 Critical Pipeline Replacement Per 2015 Master Plan							
Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM7	WSP12603	6	215	21,070	8	AC	1972
WM7	WSP31599	25	215	21,070	8	AC	1972
WM7	WSP32451	3063	190	18,620	8	CICL	1972

#### 5.3.4 CAPITAL COSTS

The Conceptual Order of Magnitude Capital Costs for Alternative 2A and 2B are presented below in **Table 36** and **Table 37**, respectively. As previously discussed, these capital cost figures are based on engineering judgement considering current project costs and cost trends observed in ongoing projects in Florida and are conceptual in nature. The costs include the water supply, treatment, and water distribution system upgrades for each alternative. These costs also include the 2015 Master Plan identified pipeline replacements and the remaining franchise agreement pipeline replacements.

<b>Table 36: Alternative 2A Conceptual Order of Magnitude Capital Costs</b>		
<b>ITEM</b>	<b>ITEM OF WORK</b>	<b>SUBTOTAL</b>
1	Phipps Park Water Supply and Treatment System (7.5 MGD)	<b>\$79,030,000</b>
2	Quadrille Water Supply and Treatment System (2.5 MGD)	<b>\$36,784,000</b>
3	Pipeline Improvements	<b>\$62,253,000</b>
4	Franchise Agreement Pipeline Replacements	<b>\$10,248,000</b>
5	Critical Pipeline Improvements Per Masterplan	<b>\$3,100,000</b>
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>		<b>\$191,415,000</b>
Engineering/Administration (20%)		\$38,283,000
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION:</b>		<b>\$229,698,000</b>
Contingency (35%)		\$80,394,300
<b>SUBTOTAL CAPITAL, ENGINEERING, ADMINISTRATION, AND CONTINGENCY:</b>		<b>\$310,093,000</b>
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST (0% - + 50%):</b>		<b>\$310,000,000 to \$465,000,000</b>

<b>Table 37: Alternative 2B Conceptual Order of Magnitude Capital Costs</b>		
<b>ITEM</b>	<b>ITEM OF WORK</b>	<b>SUBTOTAL</b>
1	Phipps Park Water Supply and Treatment System (10.0 MGD)	<b>\$122,435,000</b>
2	Pipeline Improvements	<b>\$59,117,600</b>
3	Franchise Agreement Pipeline Replacements	<b>\$10,248,000</b>
4	Critical Pipeline Improvements Per Masterplan	<b>\$3,100,000</b>
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>		<b>\$194,900,600</b>
Engineering/Administration (20%)		\$38,981,000
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION:</b>		<b>\$233,882,000</b>
Contingency (35%)		\$81,859,000
<b>SUBTOTAL CAPITAL, ENGINEERING, ADMINISTRATION, AND CONTINGENCY:</b>		<b>\$315,741,000</b>
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST (0% - + 50%):</b>		<b>\$316,000,000 to \$474,000,000</b>

### 5.3.5 ALTERNATIVE 2 SUMMARY

Alternative 2 has the Town developing its own water supply system using either the groundwater (Floridan Aquifer) or sea water as the raw source supply and RO treatment to treat the water to potable standards.

Alternate 2A uses two sites, one being the Quadrille site and the other being the Phipps Park site for developing two RO water treatment systems. The Quadrille site can process up to 3.75 MGD of potable water and the Phipps Park site can process up to 7.5 MGD of potable water. Alternate 2B uses the Phipps Park site to for the development of a 10 MGD potable water treatment system. Each Alternative uses deep injection wells for concentrate disposal. The total capital cost includes the costs of all infrastructure to treat the raw water sources to potable standards, provide water distribution system improvements to deliver the treated water at required pressures within the water distribution system, as well as pipeline replacements still remaining under the current franchise agreement and the cost of the one (1) water main replacement as recommended in the 2015 Water Master Plan. The following is a discussion of the relevant evaluation criteria for Alternative 2A and 2B.

Capital Costs- The Conceptual Order of Magnitude Capital Cost for Alternative 2A is estimated to range from \$310M to \$465M. The Conceptual Order of Magnitude Capital Cost for Alternative 2B is estimated to range from \$316M to \$474M. These costs include the new water source, treatment facilities, concentrate disposal facilities, high service pumping, transmission pipelines, storage and pumping facilities, remaining pipelines to be replaced per the franchise agreement, and applicable critical pipeline replacement recommended in the 2015 Water Master Plan.

Connection/Capacity Fees- Capacity fees are charged by sewer utilities to assure that customers that connect to their system pay the customer's share of distribution and treatment plants required to treat and distribute water. For this option, there are no additional capacity fees anticipated as the treatment facility capacity will be constructed as part of this alternative and the Town will need identify the means of securing the funding for the new facilities.

#### Water Supply Security

Alternative 2A - This Alternative utilizes groundwater as the source of raw water. The source is considered very reliable and is generally tolerant of drought conditions. Over the last 10 years we have gained experience from Floridan aquifer that has shown water quality declines over time. The rate of the decline has shown to be directly related to withdrawal rates. The 5 MGD well capacities discussed in this alternative are very high yields. While it is possible to obtain well capacities in excess of 5 MGD these higher yields make the well more vulnerable to rapid water quality degradation. To reduce the rate of raw water degradation a best management practice would be to limit the withdrawal from each well site to 1-1.5 MGD. To accomplish this additional well sites would need to be secured to provide adequate well spacing. Another aspect of the well construction that will need to be addressed is formation water disposal for use during the construction of the wells and needed during future well rehabilitation. Due to the high TDS of the raw water the disposal will be limited to discharging to the ICW. This will likely require an additional pipeline from each wellsite to the ICW.

Alternative 2B - This alternative utilizes sea water as its source but collects the sea water using a series of wells along the coastline drawing water from shallow seawater aquifer. The source is considered very reliable, generally provides stable water quality, and is generally tolerant of drought conditions. A restrictive covenant exists on the Phipps Park property that is related to ground water contamination and restricts the use of the shallow seawater aquifer. Alternative 2B will require that the restrictive covenant be revisited. While this restrictive covenant effects the use of the shallow seawater aquifer it is understood that it does not impact the use of the Floridan aquifer. Well sites will be required to be secured outside of Town owned property at Phipps Park and Par 3 Golf Course will likely be required for this option. Similar to the Alternative 2A formation water disposal

for use during the construction of the wells and needed during future well rehabilitation will need to be addressed. Due to the high TDS of the raw water the disposal will be limited to discharging to the ICW. This will likely require an additional pipeline from each wellsite to the ICW.

#### Water Supply Permitting Complexity

*Alternative 2A* -This alternative would require a new WUP to be applied for and issued to the Town. Permit requirements are outlined in the SFWMD's Applicant's Handbook for Water Use Permit Applications, and applicable regulations. The Town would be required to prepare demand projections to support the requested allocation of 10.05 MGD (a combination of historical usage, population an per capita usage); identification of source water (SAS or Floridan aquifer system); preparation of a reclaimed water feasibility study (to demonstrate that reclaimed water is being utilized for irrigation to the greatest extent possible prior to pursuing withdrawal allocation for irrigation); preparation of a groundwater model to demonstrate impacts to existing legal users and environmental features (wetlands, surface water bodies, etc.) as well as water quality (saltwater intrusion); and impacts, if any, on established minimum flows and levels.

Since the City of West Palm Beach has an existing allocation to include the Town's demand, issuance of a separate permit to the Town may be considered redundant or duplication of allocation. SFWMD may require the City to forfeit that allocation if the need to retain the allocation cannot be properly demonstrated; however, this is not likely to occur simultaneously with the review of a new application. Therefore, the modeling to support the requested 10.05 MGD demand would reflect an additional stress on the existing aquifer conditions, not simply a relocation of the withdrawal point(s).

SFWMD, by rule, has 120 days to review and comment on applications. The typical review time is closer to 90 to 100 days, but 120 days should be considered when developing an overall project schedule. One or more requests for additional information (RAI) should be considered, especially for new permits/new sources, to allow for minor modifications to permitting and supporting documents. RAIs can be minimized through the scheduling of productive pre-application meetings, development of modeling approach memorandum (to outline the detailed process to be used and obtain buy in from the reviewers prior to commencing the modeling effort) and open communications with the permit reviewer(s) during the process. Conservatively, the Town could anticipate the entire permitting process to last approximately 8 to 10 months, including development of the groundwater model and supporting documentation, preapplication meeting, the 120-day review time, and one to two RAIs prior to permit issuance.

*Alternative 2B* - The permitting for *Alternative 2B*, as a sea water source eliminates the need for a SFWMD permit for the withdrawal of the raw water. There would still be the FDEP WTP construction permit process and the deep injection well process for the RO concentrate disposal as well as the various permits for building construction, ROW use, dewatering and other permit activities associated with a significant construction project.

Construction Complexity – *Alternative 2A* has seven (7) major project components and *Alternative 2B* has five (5) major project components. An evaluation of construction complexity was performed based on the defined levels of complexity presented in Section 5.1. Both options include construction of one or more treatment facilities, well construction, and the construction of linear infrastructure improvements within the Town. *Alternative 2A* includes two treatment facilities and the construction of linear infrastructure within the City of West Palm Beach and ICW crossing. **Tables 38 and 39** lists the construction complexity for the project components in each alternative.

<b>Table 38: Alternative 2A Construction Complexity</b>			
<b>Alternative 2A Project Component #</b>	<b>Project Component</b>	<b>Construction Complexity</b>	<b>Description</b>
1	Water Supply Wells	High	Well construction
2	Water Treatment Facility (Phipps Park)	High	Treatment facility
3	Water Treatment Facility (Quadrille Site)	High	Treatment facility
4	Concentrate Disposal	High	Well construction
5	Quadrille WTP Interconnection Pipeline	Moderate	Linear infrastructure within the City of West Palm Beach's right-of way
6	Water Distribution System Upgrades within Town	Moderate	Linear infrastructure within Town's right-of way
7	Critical Pipeline Improvements (WM 7)	Moderate	Linear infrastructure within Town's right-of way

<b>Table 39: Alternative 2B Construction Complexity</b>			
<b>Alternative 2B Project Component #</b>	<b>Project Component</b>	<b>Construction Complexity</b>	<b>Description</b>
1	Water Intake structure	High	Well construction
2	Water Treatment Facility	High	Treatment plant
3	Concentrate Disposal	High	Well construction
4	Water Distribution System Upgrades within the Town	Moderate	Linear infrastructure within Town's right-of way
5	Critical Pipeline Improvements (WM 7)	Moderate	Linear infrastructure within Town's right-of way

Operational Complexity and System Reliability

*Alternative 2A* - The operational complexity for Alternative 2A is considered high. This alternative requires the operation of two separate water treatment plants in different locations. System reliability is considered good as groundwater supply systems are generally reliable. The reliance on ICW crossings does create some vulnerability due to the potential for damage of failure of the crossing pipeline resulting in diminished ability to meet the demands of the water system. Additionally, this alternative would require the Town to establish a utility, whether the utility functions are self-performed or established through a P3, the Town would be responsible for administration, maintenance, and operation of the treatment plant and distribution system.

*Alternative 2B* - Operational complexity for Alternative 2B is considered high, however it is less complex than Alternative 2A. The treatment system is at one site and the operation of a sea water raw water RO system while larger in capacity than a brackish groundwater RO system, is relatively straightforward to operate. The larger size, additional equipment requirements and the increased

number of wells to monitor and maintain will require skill operational labor. Additionally this alternative would require the Town to establish a utility, whether the utility functions are self-performed or established through a P3, the Town would be responsible for administration, maintenance, and operation of the treatment plant and distribution system.

#### Land Acquisition and Permitting

Alternative 2A will require land acquisition for the installation of pipeline infrastructure particularly for the installation of the supply line from the Quadrille site to the Towns water distribution system. Other pipeline improvements within the Town to make required improvements to deliver water from both water treatment plants to appropriate areas of the distribution system. Securing additional wellsites will increase the long-term reliability of this alternative. An investigation of the ownership of adjacent properties is recommended.

Alternative 2B- the treatment plant site can be completed on Town owned property however the raw water wells will require securing ROW along the coastline. An investigation of the ownership of appropriate properties is required to assess ROW requirements.

#### Stakeholder Considerations

Alternative 2A - Due to the location of the Quadrille site within the City of West Palm Beach, the City would be a significant stakeholder. Issues regarding zoning requirements, permitting issues and the potential impacts to the City's water supply wells and the City's ASR reservoir create areas that will require significant coordination and consideration. Additional stakeholders will include the SFWMD, FDEP, the local community impacted by the construction, as well as other business and commercial groups in the area.

Alternative 2B - will have stakeholders that are more localized with the Town as the construction is within the Town and mostly on Town owned land.

### 5.4 ALTERNATIVE 3 – PALM BEACH COUNTY

As previously discussed PBCWUD's raw water supply is obtained from a combination of two wellfields, the SAS (eastern region) and Floridan Aquifer System (FAS) (western region) wellfields. Water is treated at two lime softening and two nanofiltration WTPs in the eastern region, and at one Reverse Osmosis WTP in the western region, see locations in Figure 10. These WTPs have a combined capacity of 113.28 MGD. The County currently has adequate water supply and treatment capacity to provide the Town with potable water needs.

A meeting was held on May 14, 2021 with the Palm Beach County Water Utility Department (PBCWUD) to discuss how they would provide water to the Town if Alternative 3 was pursued. PBCWUD stated that they could meet the Town's maximum daily demand and would be able to provide water at a level of service between 55-65 psi at the connection points to their system. Three potential connection points were identified by PBCWUD as follows:

**PBCWUD Interconnection 1** - Okeechobee Boulevard at Church Street

**PBCWUD Interconnection 2** - Southern Boulevard at Australian Avenue

**PBCWUD Interconnection 3** - Lake Worth Road at Congress Avenue

These tie in locations are within the PBCWUD service area and will require new pipelines to convey water to the Town of Palm Beach. A hydraulic analysis was performed to determine the proposed improvements necessary to convey water from the PBCWUD service area to the Town including the evaluation of pipeline and pump station sizing requirements, as well as any upgrades to the existing infrastructure within the Town's potable water distribution system.

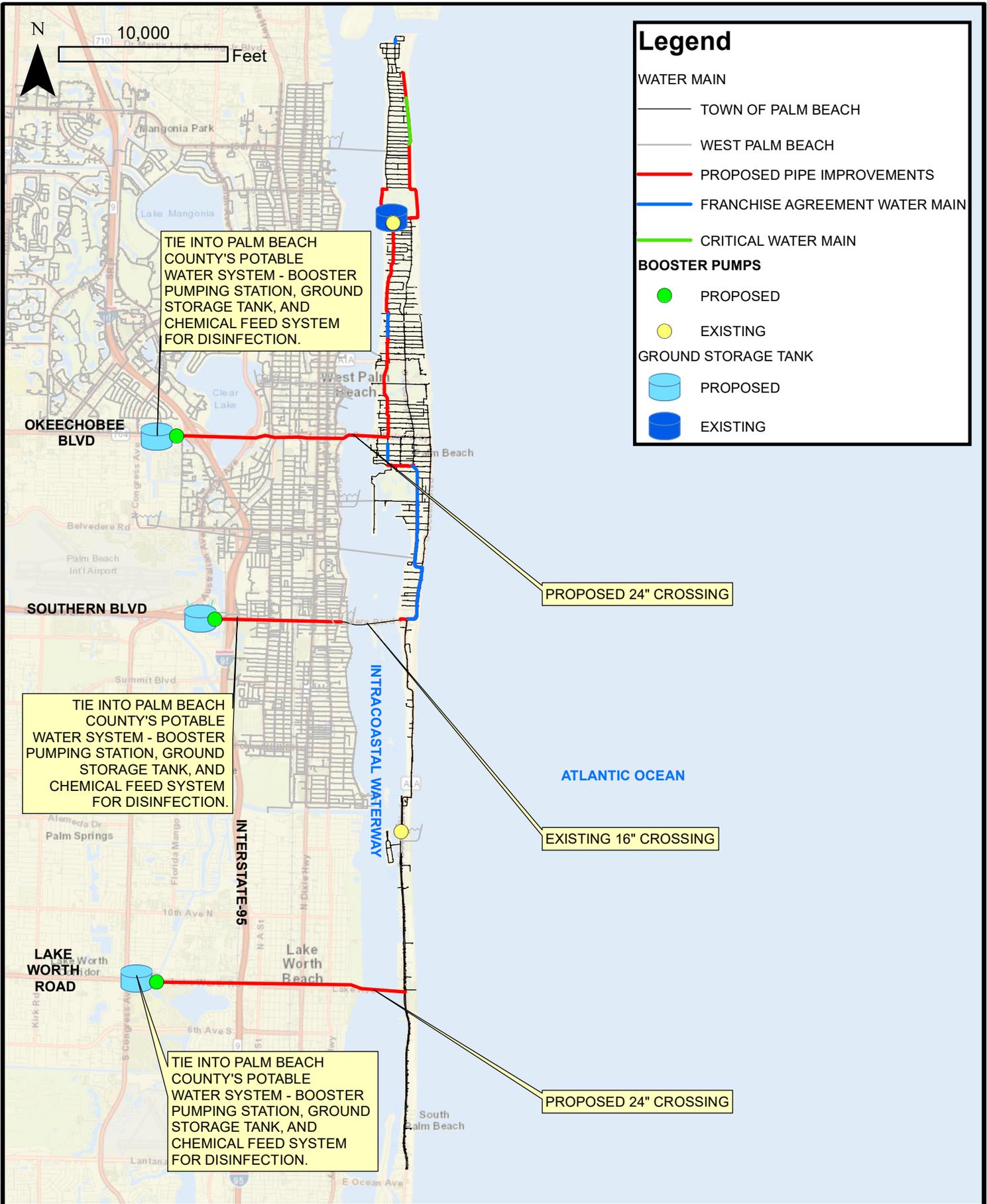
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#### 5.4.1 SYSTEM IMPROVEMENTS

To maintain the existing average system pressure of 72 psi within the Town, during a maximum day demand and fire flow requirements, the conveyance system from PBCWUD will require booster pumping facilities. The County's distribution system was not modeled as part of this evaluation, but based on the reduced number of connections, it is assumed that ground storage tanks will be required to deliver peak hour flows. Additionally, water quality modeling was not a part of this analysis and it is assumed that additional chemical feed systems would also be required to maintain disinfection residuals within the expanded system.

A conceptual schematic of the proposed improvements is provided in **Figure 20**. These proposed improvements are conceptual in nature and were identified as hydraulically feasible options that provide maximum day demand flows, fire flow requirements, and an average system pressure of 72 psi thereby maintaining the existing level of service. **Table 40** provides a summary of the hydraulic evaluation results.

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**TOWN OF PALM BEACH  
 WATER FEASIBILITY STUDY  
 ALTERNATIVE 3 : PALM BEACH COUNTY**



<b>Table 40: Alternative 3 PBCWUD Operating Conditions</b>		
<b>Parameter</b>	<b>Existing</b>	<b>PBCWUD Water Supply</b>
Maximum Day Demand (MDD) Model Output	6,900 gpm	6,900 gpm
	9.93 MGD	9.93 MGD
Town of Palm Beach Average Pressure	72 psi	72.4 psi
Number of Tie in Locations	Five Connection Points 16-inch @ N Lake Way 24-inch @ 1015 N Flagler Dr. 20-inch @ Barcelona Rd. 16-inch @ Southern Blvd. 16-inch @ 7619 S Flagler Dr.	Three Connection Points 24-inch @ Okeechobee Blvd. 16-inch @ Southern Blvd. 24-inch @ Lake Worth Road
Max Tie – in Pressure Requirements to meet min Level of Service	91-95 psi	90 psi

A discussion of the proposed system improvements is provided below. The proposed transmission main routes were conceptually developed for the purpose of developing cost opinions and were established based on the shortest distance between the County’s system and the proposed point of connection to the Town’s distribution system. A detailed route analysis for pipeline corridors was not performed as part of this effort. Additionally, potential locations to meet the real estate needs for the associated storage and pumping facilities were not evaluated. Both route studies and real estate searches would need to be conducted to further refine this alternative should the Town decide this alternative should be further pursued.

**PBCWUD Interconnection 1:** Connection to the PBCWUD distribution system would be accomplished in this location by tying into an existing 16-inch water main located at Okeechobee Boulevard and Church Street. A booster pumping station with a ground storage tank and chemical feed system for disinfection will be required at or near the proposed interconnect. Interconnection 1 will also require 13,700 linear feet of new 24-inch diameter water main to convey water from the interconnect to the Town’s potable water distribution system. This proposed route requires constructing the proposed water main within City of West Palm Beach controlled right-of-way. For this evaluation it is assumed that the new water main will be located along Okeechobee Boulevard, from Church Street to Flagler Drive, then across the ICW to the proposed tie-in location within the Town’s system.

Okeechobee Boulevard is a FDOT maintained road and is a major roadway in Palm Beach County, with four lanes of traffic in each direction at the interconnect location, reducing to two lanes in each direction closer to the tie in location with the Town system on Royal Palm Way. Okeechobee Boulevard along this route is a highly developed urban area, with most of the surroundings being commercial and retail land uses. This area is also highly traveled by residents and visitors to the Town. Challenges associated with this route include:

- High traffic volumes
- Congested utility corridor
- I-95 crossing
- FEC and CSX railroad crossings
- High urban corridor
- ICW crossing
- Complex permitting issues

Property acquisition will be required to accommodate the booster pumping station, ground storage tank (GST), and chemical feed system.

**PBCWUD Interconnection 2:** Connection to the PBCWUD distribution system would be accomplished in this location by tying into an existing 16-inch water main located at Southern Boulevard and Australian Avenue. A booster pumping station with a ground storage tank and chemical feed system for disinfection will be required at or near the proposed interconnect location. Interconnection 2 will also require 8,400 linear feet of new 24-inch diameter water main to convey water from the interconnect the existing Southern Boulevard 16" watermain ICW crossing. This interconnect is assumed to reuse the existing 16-inch watermain ICW crossing that was recently replaced by the City. This proposed route requires constructing the proposed water main within City of West Palm Beach controlled right-of-way. For this evaluation, it is assumed that the new water main will be located along Southern Boulevard, from Australian Avenue to the Southern Boulevard Bridge.

Southern Boulevard is a FDOT maintained road and is a major roadway in Palm Beach County. Challenges for this route include:

- High traffic volumes
- Congested utility corridor
- Roadway route that is a part of the Strategic Intermodal System (SIS)
- I-95 crossing
- FEC and CSX railroad crossings
- Complex permitting issues

Property acquisition will be required to accommodate the booster pumping station, ground storage tank (GST), and chemical feed system.

**PBCWUD Interconnection 3:** Connection to the PBCWUD distribution system would be accomplished in this location by tying into an existing 16-inch water main located at Lake Worth Road and Congress Avenue. A booster pumping station with a ground storage tank and chemical feed system for disinfection will be required at or near the proposed interconnect location. Interconnect 3 will also include 15,700 linear feet of new 24-inch diameter water main to convey water from the interconnect to the Town's potable water distribution system. This proposed route includes a new crossing of the ICW and requires constructing the proposed water main within City of Lake Worth Beach controlled right-of-way.

Lake Worth Road/Lake Ave/Lucerne Ave is an FDOT maintained road and is a major roadway in Palm Beach County. Lake Worth Road is in a developed urban area, with most of the surrounding area having residential, commercial, and retail land uses. Challenges for this route include:

- High traffic volumes
- Congested utility corridor
- Major canal crossing
- I-95 crossing
- FEC and CSX railroad crossings
- ICW Crossing
- Complex permitting issues

Property acquisition will be required to accommodate the booster pumping station, ground storage tank (GST), and chemical feed system.

#### 5.4.2 EXISTING TOWN DISTRIBUTION SYSTEM REQUIRED IMPROVEMENTS

The improvements required to be made to the Town’s existing potable water distribution system in order to successfully receive water from PBCWUD at the same level of service as exists currently can be categorized as follows:

1. Improvements resulting from PBCWUD interconnects
2. Pipeline replacement needs as identified in Franchise Agreement
3. Critical pipeline improvements as identified in the City’s 2015 Master Plan

#### 5.4.3 IMPROVEMENTS RESULTING FROM PBCWUD INTERCONNECTIONS

In general, the current water distribution network within the Town receives flow from five connection points. With the PBCWUD option, the number of connection points is reduced to three connections, which are located more generally towards the southern end of the island. As such, the existing water distribution system will need to be improved to accommodate the distribution of potable water to the northern end of the island. The proposed pipe improvements required within the Town’s potable water distribution system are listed in **Table 41**.

Table 41: Alternative 3 System Improvements within the Town				
Item	Location	Length (Feet)	Existing Diameter	Proposed Diameter
1	N Ocean Blvd road from Country Club Rd to Onondaga Ave	9,000	8"	12"
2	N Lake Way from Country Club Rd to Bahama Ln	2,000	12"	16"
3	Country Club Rd from N Lake Way to N Ocean Blvd	1,000	8"	12"
4	N Lake Way from Country Club Rd to Royal Poinciana Way	8,500	12", 16"	20"
5	S County Rd from Island Dr to Southern Blvd	7,500	12"	16", 20"
6	Worth Ave from Lake Dr to S County Rd	2,500	12"	16"

### 5.4.3.a Pipeline Replacement Needs as Identified in Franchise Agreement

In addition to the required improvements associated with the PBCWUD option, the pipelines as previously identified for replacement within the Franchise agreement are considered necessary as part of each alternative. Several of the pipelines identified in the Franchise agreement remaining to be replaced are required to be upsized as part of this alternative. As such, the pipeline replacement requirements for this Alternative includes only 17,830 linear feet of pipeline replacement. An inventory of pipelines requiring replacement as part of this alternative is provided in **Table 42**. Proposed replacements will be with equivalent pipe diameters, however all 4-inch and 6-inch water mains within the Town, when replaced, will be replaced with 8-inch diameter water mains.

Table 42: Franchise Agreement Pipeline Replacements	
Size (in.)	Quantity (LF)
8"	16,870
10"	960
<b>Total</b>	<b>17,830</b>

### 5.4.3.b Critical Pipeline Improvements as Identified in the Master Plan

In addition to the required improvements associated with the LWB option, the following pipelines have been identified as critical for replacement within the 2015 Master Plan and are considered necessary as part of this alternative: WM 7. See **Table 43** below.

Table 43: Alternative 3 Critical Pipeline Replacement Per 2015 Master Plan							
Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM7	WSP12603	6	215	21,070	8	AC	1972
WM7	WSP31599	25	215	21,070	8	AC	1972
WM7	WSP32451	3063	190	18,620	8	CICL	1972

## 5.4.4 CAPITAL COSTS

The Conceptual Order of Magnitude Capital Costs for Alternative 3 are presented below in **Table 44**. As previously mentioned, these capital cost figures are based engineering judgement considering current project costs and cost trends observed in ongoing projects in Florida and are conceptual in nature. The costs include the new infrastructure to convey water from the three PBCWUD connection points identified in **Table 41**. These costs also include the 2015 Master Plan identified critical pipeline replacements and the remaining franchise agreement pipeline replacements.

Table 44: Alternative 3 Conceptual Order of Magnitude Capital Costs		
ITEM	ITEM OF WORK	SUBTOTAL
1	Interconnection 1 - Okeechobee Blvd	\$18,680,000
2	Interconnection 2 - Southern Blvd	\$12,560,000
3	Interconnection 3 - Lake Worth Road	\$28,130,000
4	Pipeline Improvements	\$23,865,000
5	Franchise Agreement Pipeline Replacements	\$10,794,000
6	Critical Pipeline Improvements Per Masterplan	\$2,480,000
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>		<b>\$96,509,000</b>
Engineering/Administration (20%)		\$19,301,800
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION:</b>		<b>\$115,810,800</b>
Contingency (35%)		\$40,533,800
<b>SUBTOTAL CAPITAL, ENGINEERING, ADMINISTRATION, AND CONTINGENCY:</b>		<b>\$156,342,000</b>
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST (0% - + 50%):</b>		<b>\$156,000,000 to \$235,000,000</b>

5.4.5 ALTERNATIVE 3 SUMMARY AND EVALUATION

Alternative 3 has the Town being supplied water from Palm Beach County Water Utilities. The County has indicated their interest in providing water through a bulk water purchase agreement. The bulk service agreement would have the County providing water to the three points of connection and the Town taking over the operation of the new transmission mains and the existing water distribution system. The total capital cost includes the costs of all infrastructure to provide water from the County to the three points of connection to the Town system as well as for pipeline replacements still remaining under the current franchise agreement and the cost for three (3) water main replacements as recommended in the 2015 Water Master Plan. The following is a discussion of the relevant evaluation criteria for Alternative 3.

**Capital Costs-** The conceptual order of magnitude capital for Alternative 3 is estimated to be in the range of \$156M to \$235M. These costs include pipeline improvements, ICW crossings, high service pumping stations, ground storage tanks, chemical feed systems, franchise agreement pipeline replacements, and pipeline replacements per the 2015 Master Plan.

**Connection/Capacity Fees-** Capacity fees are charged by sewer utilities to assure that customers that connect to their system pay the customer’s share of distribution and treatment plants required to treat and distribute water. Any connection to a water supply system requires that the new user pay a fee for the reserved capacity of the existing capital facilities. In the case of the PBCWUD alternative, the estimated connection fee was calculated based existing published data from PBCWUD and is based on the equivalent residential units. PBCWUD has a systemwide estimated water consumption per residential unit. In the case of the Town of Palm Beach, the per capital consumption is significantly higher than the countywide consumption rate and the Town’s water use was converted to an equivalent residential unit consumption upon which to calculate the estimated connection fee. The connection fee is estimated to be **\$121,000,000** which is in addition to the capital costs associated with this alternative. These connections fees are subject to confirmation with the County and are only shown as an

approximation of the order of magnitude of the cost to connect that is in addition to the other capital costs described herein.

Water Supply Security - The source of water from Palm Beach County is groundwater wells. This source is considered very reliable, generally provides stable water quality, and is generally tolerant of drought conditions. This water supply source is considered highly secure.

Water Supply Permitting complexity - Palm Beach County Water Utilities Department (PBCWUD) operates a combination of water treatment plants with a total capacity of 113.28 MGD, supplied by both SAS and Floridan aquifer system wells. A meeting was held with PBCWUD to discuss available capacity and the ability to serve the Town (10.05 MGD demand), in which PBCWUD indicated that the water system has a combined excess treatment capacity of 55.15 MGD and an excess in wellfield supply/allocation of 38.29 MGD. PBCWUD expressed both an interest in serving the Town (as a bulk customer) and the ability to do so under the current WUP allocation with no requirement to modify the permit or increase allocation. Therefore, permitting requirements for Alternative 3 would be limited to those required to construct the water mains and transmission infrastructure to serve the Town.

Construction Complexity - Alternative 3 has 11 major project components. An evaluation of construction complexity was performed based on the defined levels of complexity presented in Section 5.1. While the type of construction required for Alternative 3 is typical for major water supply projects, the ICW, railroad, major canal, and I-95 crossings represent an increased level of complexity. As for the remaining pipeline infrastructure, there are the typical construction difficulties involved with replacing pipelines in areas with high population density, significant presence of existing utilities, and significant local year-round and seasonal traffic. **Table 45** lists the construction complexity for each project component. The level of complexity associated with this alternative is considered high.

<b>Table 45: Alternative 3 Construction Complexity</b>			
<b>Alternative 3 Project Component No.</b>	<b>Project Component</b>	<b>Construction Complexity</b>	<b>Description</b>
1	PBCWUD Interconnection 1- Booster Pump station	Moderate	Development of site and construction of booster pump station.
2	PBCWUD Interconnection 1 - 24-inch Pipeline	Moderate	Linear infrastructure within Palm Beach County and City of West Palm Beach
3	PBCWUD Interconnection 1 - ICW Crossing	High	ICW crossing
4	PBCWUD Interconnection 2- Booster Pump station	Moderate	Development of site and construction of booster pump station.
5	PBCWUD Interconnection 2 - 24-inch Pipeline	Moderate	Linear infrastructure within Palm Beach County and City of West Palm Beach
6	PBCWUD Interconnection 3- Booster Pump station	Moderate	Development of site and construction of booster pump station.
7	PBCWUD Interconnection 3 - 24-inch Pipeline	Moderate	Linear infrastructure within Palm Beach County and City of West Palm Beach
8	PBCWUD Interconnection 3 - ICW Crossing	High	ICW crossing
9	Water Distribution Upgrades within the Town	Moderate	Linear infrastructure within Town's right-of way
10	Critical Pipeline Improvements (WM 7)	Moderate	Linear infrastructure within Town's right-of way

Operational Complexity and System Reliability - The operation complexity is considerably more complex as this option is for bulk distribution to the Town. For this scenario the Town to create a utility to operate, manage, maintain, and administer water distribution operations. three booster sites. The level of complexity is considered high. This option includes three interconnections and an evaluation of the system with one connection out of service was performed and preliminary hydraulic evaluations determined that the LOS could be met with one of the interconnection out of service.

Land Acquisition and Permitting - Alternative 3 will require significant land acquisition including acquisition of property to site three pumping stations with space for 1-million-gallon storage tanks, right-of-way use and permitting for the construction of replacement pipelines, securing submerged land leases from the State of Florida, easements from the US Army Corps, railroad crossings, local building permits and FDEP permits for the pump stations and storage tanks, and environmental impact reviews. The level of difficulty for this component is considered difficult.

Stakeholder Considerations - The location of the pumping stations and storage tanks will likely involve soliciting input from impacted communities. Additionally, the commitment of water supply capacity from the Town could raise concerns from current customers as to the adequacy of their water source for future community needs. This Alternative is likely to require significant public outreach and participation efforts. The level of effort for this component is considered high.

## 5.5 ALTERNATIVE 4 – CITY OF LAKE WORTH BEACH

As previously discussed, LWB’s potable water system consists of two water treatment processes and has a combined capacity of 17.4 MGD. The lime softening treatment capacity is 12.9 MGD but due to SFWMD Water Use Permit dry season limitations the capacity is seasonally limited to 5.1 MGD. The Reverse Osmosis (RO) treatment capacity is 4.5 MGD. LWB’s raw water supply for the lime softening treatment process is obtained from the East Coast Surficial aquifer and Biscayne aquifer system (SAS) pumped from twelve (12) production wells. The RO treatment process is supplied brackish raw water from three (3) Floridan aquifer system (FAS) wells. The treated water from the two processes is disinfected via chlorination and blended before distribution.

A meeting was held on May 6, 2021, with Lake Worth Beach Utilities (LWB) to discuss how they would provide water to the Town if Alternative 4 was pursued. LWB stated that they could meet the Town’s maximum daily demand and would be able to provide water at a level of service between 50-60 psi at the connection points to their system. Two potential connection points were identified by LWB as follows:

**LWB Interconnection 1** – C-51 canal at Northwest Park

**LWB Interconnection 2** - Lake Worth Road at Bryant Park

The City of Lake Work Beach Commissioned a study (Town of Palm Beach Water Supply Demand Evaluation, Mock-Roos, 2021) to evaluate the City’s ability to deliver 10.0 MGD to the Town of Palm Beach. The study evaluated several options and concluded that the City was capable of delivering 10 MGD to the Town through two proposed interconnects with the LWB Interconnection 1 having a residual pressure of 61 psi and LWB Interconnection 2 having a residual pressure of 64 psi at the point of connection to the Town, east of the ICW. While the study suggests that LWB can meet the demands while maintaining a system pressure above 60 psi, to meet the Town’s existing Level of Service (LOS) of an average system pressure of 72 psi, improvements will be required in addition to what has been identified in the study.

As part of the evaluation of Alternative 4, a hydraulic analysis was performed to determine the proposed improvements necessary to convey water from the LWB service area to the Town including the evaluation of pipeline and pump station sizing requirements, as well as any upgrades to the existing infrastructure within the Town’s potable water distribution system. The analysis generally followed the proposed connection points and infrastructure proposed by the Mock-Roos study, however additional booster pumping facilities will be required to meet the Town’s LOS requirements. A detailed discussion of the proposed improvements necessary is provided in the sections below.

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### 5.5.1 SYSTEM IMPROVEMENTS

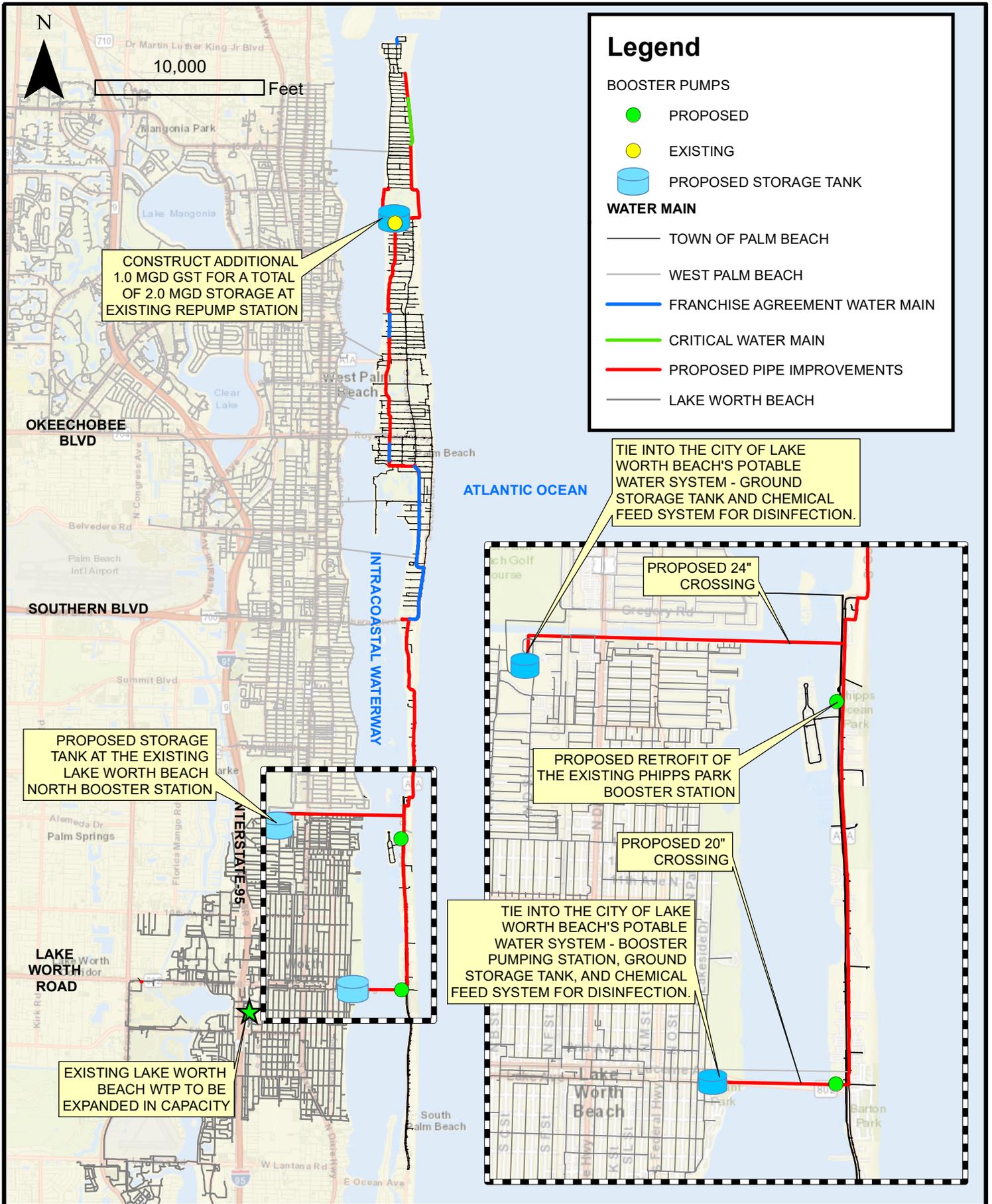
To maintain the existing average system pressure of 72 psi within the Town during a maximum day demand and to meet fire flow requirements, the conveyance system from LWB will require the use of existing LWB infrastructure, new water mains, and booster pumping facilities. The Mock-Roos study did not include additional tank storage required for LWB to provide max day demands, however peak hour and fire flow demands were not modeled as part of their evaluation. Based on the reduced number of connections, it is

assumed that an increase in system storage may be required. Additionally, water quality modeling was not a part of this analysis and it is assumed that additional chemical feed systems would also be required to maintain disinfection residuals within the expanded system.

While LWB has a 17.4 MGD treatment capacity, due to their water use permit their production is seasonally limited to 9.6 MGD. In order to meet the Town's max day demands the Lake Worth Beach Water Treatment Plant will require additional capacity. The Mock-Roos study has described the plant upgrades to include five (5) new Florida Aquifer Wells, new raw water mains to convey raw water from the new wells to the plant, modifications to expand three (3) existing RO trains from 1.7 MGD to 2.5 MGD, constructing three (3) new 2.5 MGD RO trains, expansion of the plant pre-treatment, post-treatment systems, and chemical systems, and one additional concentrate disposal deep injection well.

A conceptual schematic of the proposed improvements is provided in **Figure 21**. These proposed improvements are conceptual in nature and were identified as hydraulically feasible options that provide maximum day demand, fire flow requirements, and an average system pressure of 72 psi thereby maintaining the existing level of service. **Table 46** provides summary of the hydraulic evaluation results.

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**TOWN OF PALM BEACH  
 WATER FEASIBILITY STUDY  
 ALTERNATIVE 4: LAKE WORTH BEACH (LWB)**



<b>Table 46: Alternative 4 LWB System Improvements and Operating Conditions</b>		
<b>Parameter</b>	<b>Existing System</b>	<b>LWB Water Supply</b>
Maximum Day Demand (MDD)	6,900 gpm	6,900 gpm
Model Output	9.93 MGD	9.93 MGD
Town of Palm Beach Average Pressure	72 psi	73.4 psi
Number of Tie in Locations	Five 16-inch @ N Lake Way 24-inch @ 1015 N Flagler Dr. 20-inch @ Barcelona Rd. 16-inch @ Southern Blvd. 16-inch @ 7619 S Flagler Dr.	Two 24-inch @ C-51 Canal 20-inch @ Lake Worth Road
Tie – in Pressure Requirements to meet min LOS	-	93 psi

**LWB Interconnection 1:** Connect to the LWB North Booster Station located at the Northwest Park and extend a new 20-inch watermain. Install approximately 6,200 linear feet of 20-inch water main from the LWB North Booster Station to the C-51 canal and routing east along the C-51 canal to the west side of the ICW. This proposed route includes a new crossing of the FEC railroad and utilizing the C-51 right-of-way. Install a new 24-inch diameter ICW crossing (2,500 linear feet) and connect to the Town’s distribution system east of the ICW. The Phipps Park booster pump station will need to be upsized to accommodate this alternative. Additional storage may be required to meet the Town’s peak demands. It is assumed that any increase in storage can be accommodated at the LWB North Booster Station.

The C-51 canal is a major drainage feature in Palm Beach County providing regional flood protection. The pipeline route along the south side of the C-51 Canal right-of-way would require crossings of North Dixie Highway and North Federal Highway which are both FDOT maintained roads and approximately 1,600 linear feet of the route is located behind residential properties with little access to the right-of-way. Challenges for this route include:

- High traffic volumes
- Congested utility corridor
- FEC railroad crossing
- High urban corridor
- Lack of access to right-of-way
- Highly Complex ICW crossing
- Complex permitting issues

**LWB Interconnection 2:** LWB’s Lake Worth Water Treatment Plant is located at 301 College Street. There is an existing 16-inch concentrate line (8,400 linear feet) which routes east from the Water Treatment Plant

along 6<sup>th</sup> Avenue South to the west side of the ICW at Bryant Park. The LWB Interconnection 2 will utilize the existing 16-inch concentrate line by converting it to a potable water line. From Bryant Park, Interconnection 2 will require the installation of a new 20-inch diameter ICW crossing (3,200 linear feet) and connection to the Town's distribution system east of the ICW. A new booster pump station will be required and is recommended to be located east of the ICW within the Town. Additional storage may be required to meet the Town's peak demands. It is assumed that any increase in storage can be accommodated at the Lake Worth Water Treatment Plant.

Utilizing the existing 16-inch concentrate main will require permitting, pigging, disinfection and bacteriological testing but will eliminate the need for pipeline construction through a high urban corridor in Lake Worth Beach as well as an FEC railroad crossing. Challenges for this route include:

- Conversion of the existing concentrate main to potable use
- Highly Complex ICW crossing
- Complex permitting issues

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## 5.5.2 EXISTING TOWN DISTRIBUTION SYSTEM REQUIRED IMPROVEMENTS

The improvements required to be made to the Town's existing potable water distribution system in order to successfully receive water from LWB at the same level of service as exists currently can be categorized as follows:

1. Improvements resulting from LWB interconnects
2. Storage improvement needs within the Town
3. Pipeline replacement needs as identified in Franchise Agreement
4. Critical pipeline improvements as identified in the City's 2015 Master Plan

---

### 5.5.2.a Improvements resulting from LWB interconnects

In general, the current water distribution network within the Town receives flow from five connection points. With the LWB option, the number of connection points is reduced to two connections, which are located towards the southern end of the island. As such, the existing water distribution system will need to be upgraded to allow the distribution of potable water to the northern end of the island. The proposed pipeline improvements required within the Town's potable water distribution system are listed in **Table 47**.

Table 47: Alternative 4 System Improvements within the Town				
Item	Location	Length (Feet)	Existing Diameter	Proposed Diameter
1	N Ocean Blvd road from Country Club Rd to Onondaga Ave	9,000	8"	16"
2	N Lake Way from Country Club Rd to Bahama Ln	2,000	12"	20"
3	N Lake Way from Royal Poinciana Way to Country Club Rd	6,000	8"	20"
4	N Lake Way from Royal Poinciana Way to Worth Ave	6,800	8"	24"
5	Worth Ave from S County Rd to N Lake Way	1,500	12"	24"
6	S County Rd from S Ocean Blvd to Worth Ave	6,400	12"	24"
7	S Ocean Blvd from S County Rd to Sloan's Curve Dr	15,500	12"	24"
8	S Ocean Blvd from Lake Worth Road to Sloan's Curve Dr	8,000	12"	20"

### 5.5.2.b Storage Improvement Needs within the Town

In addition to the required pipeline improvements associated with the LWB option, an additional one (1) million gallons of storage will need needed within the Town. This ground storage tank (GST) will need to be located near or at the existing Town storage tank south of the Palm Beach Country Club. Property acquisition may be required to accommodate the ground storage tank if the existing tank cannot be upgraded in capacity.

### 5.5.2.c Pipeline Replacement Needs as Identified in Franchise Agreement

In addition to the required improvements associated with the LWB option, the pipelines previously identified for replacement within the Franchise Agreement (**Appendix A**) are considered necessary as part of each alternative. Several of the pipelines identified in the Franchise Agreement remaining to be replaced are required to upsized as part of this alternative. As such, the pipeline replacement requirements for this Alternative include only 16,920 linear feet of pipeline replacement. An inventory of pipelines requiring

replacement as part of this alternative is provided in **Table 48**. Proposed replacements will be with equivalent pipe diameters, however all 4-inch and 6-inch water mains within the Town, when replaced, will be replaced with 8-inch diameter water mains.

**Table 48: Alternative 4 Pipeline Replacement Needs, Franchise Agreement**

Franchise Agreement Pipeline Replacements	
Size (in.)	Quantity (LF)
8"	15,960
10"	960
Total	16,920

#### 5.5.2.d Critical Pipeline Improvements as Identified in the Master plan

In addition to the required improvements associated with the LWB option, the pipelines in **Table 49** have been identified as critical for replacement within the City’s 2015 Master Plan and are considered necessary as part of this alternative. Note that WM4 and WM12 are not included from the original list in Table 5-3 since these ICW crossings will no longer be utilized under this alternative.

Table 49: Alternative 4 2015 Critical Pipeline Replacement Per 2015 Master Plan							
Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM7	WSP12603	6	215	21,070	8	AC	1972
WM7 WM7	WSP31599	25	215	21,070	8	AC	1972

#### 5.5.3 CAPITAL COSTS

The Conceptual Order of Magnitude Capital Costs for Alternative 4 are presented below in **Table 50**. As previously mentioned, these capital cost figures are based engineering judgement considering current project costs and cost trends observed in ongoing projects in Florida and are conceptual in nature. The costs include the new infrastructure to expand the Lake Worth Water Treatment Plant to produce the water and all infrastructure to convey water from the two LWB connection points identified in **Table 47**. These costs also include the 2015 Master Plan identified critical pipeline replacements and the remaining franchise agreement pipeline replacements.

Table 50: Alternative 4 Conceptual Order of Magnitude Capital Costs		
ITEM	ITEM OF WORK	SUBTOTAL
1	Lake Worth WTP Upgrades	\$81,000,000
2	Interconnection 1 - C-51 Canal	\$17,200,000
3	Interconnection 2 - Lake Worth Road	\$11,400,000
4	Town Distribution System Improvements	\$39,800,000
5	Franchise Agreement Pipeline Replacements	\$10,250,000
6	Critical Pipeline Improvements Per Masterplan	\$2,800,000
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>		\$162,450,000
Engineering/Administration (20%)		\$32,490,000
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION:</b>		\$194,940,000
Contingency (35%)		\$68,229,000
<b>SUBTOTAL CAPITAL, ENGINEERING, ADMINISTRATION, AND CONTINGENCY:</b>		<b>\$263,169,000</b>
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST (0% - + 50%):</b>		<b>\$263,000,000 to \$395,000,000</b>

5.5.4 ALTERNATIVE 4 SUMMARY AND EVALUATION

Alternative 4 has the Town being supplied water from Lake Worth Beach either through a retail (franchise) agreement or through a bulk water purchase agreement. The retail agreement would be similar to the current arrangement with the City of West Palm Beach. A bulk service agreement would have Lake Worth Beach providing water at the two points of connection to the Town system and the Town taking over the ownership and operation of the water distribution system. The capital costs for either option under Alternative 4 are the same. The total capital cost includes the costs of all infrastructure to expand the Lake Worth Water Treatment Plant to produce the water and all infrastructure to bring the water from Lake Worth Beach to the two points of connection to the Town system as well as for pipeline replacements still remaining under the current franchise agreement and the cost for two (2) water main replacements as recommended in the 2015 Water Master Plan. The following is a discussion of the relevant evaluation criteria for Alternative 4.

Capital Costs- The capital cost for Alternative 4 could range from \$263 million to \$395 million. These costs include the required treatment plant upgrades, new transmission pipelines, storage and pumping facilities, remaining pipelines to be replaced per the franchise agreement, and applicable critical pipeline replacement recommended in the 2015 Water Master Plan.

Connection/Capacity Fees- Capacity fees are charged by sewer utilities to assure that customers that connect to their system pay the customer's share of distribution and treatment plants required to treat and distribute water. For this option the LWB identified 81,000,000 in capital upgrades to accommodate the Town's demand. This estimate represents the capital cost needed to update capacity to accommodate the Town's demands and represents the estimated capacity fees anticipated as the treatment facility capacity will be constructed as part of this alternative.

Water Supply Security- The source of water for Lake Worth Beach is groundwater wells. This source is considered very reliable, generally provides stable water quality, and is generally tolerant of drought conditions. This water supply source is considered highly secure.

Water Supply Permitting Complexity- The City of Lake Worth Beach operates two WTPs (one lime softening and one reverse osmosis) with a combined treatment capacity of 17.4 MGD however due to their water use permit they currently can only produce 9.6 MGD. In order to meet the Town's max day demands the Lake Worth Water Treatment Plant will require additional capacity. The City is supplied by both SAS and Floridan aquifer system wells. Due to the Water Use Permit (WUP) limitations on the SAS wells the additional capacity would need to come from the Floridan Aquifer. A meeting was held with the City to discuss their water system and it is understood that the City has identified and secured well sites to construct Floridan aquifer system wells sufficient to meet the demand, but the wells have not yet been constructed. The modification of the WUP would require adherence to the Applicant's Handbook described in Alternative 1, including additional groundwater modeling and supporting documentation. The process for this modification could also require an 8-to-10-month timeframe. In addition, permitting would be required to construct the wells and distribution mains, though these permits could be completed concurrently and typically do not require lengthy review times.

Construction Complexity- While the type of construction required for Alternative 4 is typical for major water supply projects, the ICW and railroad crossings, along with the C-51 canal alignment represent an increased level of complexity. The increase in capacity of the Lake Worth Water Plant and the existing ground storage tank south of the Palm Beach Country Club will also be highly complex. As for the remaining pipeline infrastructure, there are typical construction difficulties involved with replacing pipelines in areas with high population density, significant presence of existing utilities, and significant local year-round and seasonal traffic.

**Table 51: Alternative 4 Construction Complexity**

Alternative 4 Project Component #	Project Component	Construction Complexity	Description
1	LWB Interconnection 1 Retrofit of the Existing Phipps Park Booster Station	Moderate	Development of site and upgrades to the existing booster pump station.
2	LWB Interconnection 1 20-inch Pipeline	High	Linear infrastructure and FEC crossing within SFWMD right-of-way
3	LWB Interconnection 1 – 24-inch ICW Crossing	High	ICW crossing
4	LWB Interconnection 2 Existing 16-inch Concentrate Main Conversion	Moderate	Convert existing concentrate main to potable use
5	LWB Interconnection 2 – 24-inch ICW Crossing	High	ICW crossing
6	LWB Interconnection 2 Booster Pump Station	Moderate	Development of site and construction of booster pump station.
7	Water Distribution Upgrades within the Town (including new GST)	High	Linear infrastructure within Town's right-of way
8	Critical Pipeline Improvements (WM 7)	Moderate	Linear infrastructure within Town's right-of way
9	Lake Worth Beach WTP Upgrades	High	Increasing the capacity of the LWB WTP to accommodate the 10 MGD of additional demand from the Town

Operational Complexity and System Reliability- The operational complexity is dependent on whether a retail agreement or a bulk service agreement is negotiated. If a retail agreement is negotiated the operational complexity is anticipated to be similar to Alternative 1. If a bulk service agreement is negotiated, the complexity will be considerably higher for the Town. For a bulk service agreement, the Town would need to create a utility to operate, manage, maintain, and administer water distribution operations. The level of complexity in establishing such a utility is considered high. The distribution system reliability for this option is considered to be the lowest of the four options due to the limitation of the two interconnections and the location of each in the southern end of the Town.

Land Acquisition and Permitting- Alternative 4 will require significant land acquisition including acquisition of property or easements to site a new booster pumping station, ground storage tanks, right of way and easement use for the construction of replacement pipelines, securing submerged land leases from the State of Florida, easements from the US Army Corps, FDOT, FDEP, and local building permits, and environmental impact reviews. This option also includes the re-purposing of the existing 16-inch concentrate line, which adds additional complexity to the permitting of this alternative. The level of difficulty for this component is considered high.

Stakeholder Considerations- The location of the pumping stations and storage tanks will likely involve soliciting input from impacted communities. Additionally, the commitment of water supply capacity from Lake Worth Beach could raise concerns from current customers as to the adequacy of their water source for future community needs. This Alternative is likely to require significant public outreach and participation efforts. The level of effort for this component is considered moderate.

## 5.6 PHASE 2 SUMMARY AND CONCLUSIONS

Each of the four alternatives were evaluated to meet the Town's existing level of service. Each alternative included an evaluation of system improvements and capital costs that would be required to provide service to the Town. Additionally, each alternative included a qualitative evaluation of water supply security, water supply permitting complexity, construction complexity, operational complexity, system reliability, land acquisition requirements, permitting complexity, and stakeholder considerations. Following the evaluation each of the four alternatives were found to be viable water suppliers and with the improvements identified in the study each can supply potable water while maintaining the current level of service within the Town.

An overview of each of the Alternatives is provided in **Tables 52** and **53**.

Table 52: Phase 2 Alternative Overview						
Alternative	Description	Capital Costs <sup>1</sup> Pipeline Replacements <sup>2</sup>	Capital Costs <sup>1</sup> Interconnects and Town Distribution Improvements	Capital Costs <sup>1</sup> Water Treatment Improvements	Connection Fees	Total
1	City of West Palm Beach	\$47M – \$70M	\$0	\$0	\$0	\$47M – \$70M
2A	Town Owned Supply - Groundwater	\$22M – \$32M	\$101M to \$151M	\$188M – \$281M	\$0	\$311M – \$464M
2B	Town Owned Supply - Seawater	\$22M – \$32M	\$96M to \$144M	\$198M – \$298M	\$0	\$316M – \$474M
3	Palm Beach County	\$22M – \$32M	\$135M - \$202M	\$0	\$209M <sup>3</sup>	\$366M – \$443M
4	City of Lake Worth Beach	\$21M – \$32M	\$111M to \$166M	\$131M – \$197M	\$0 <sup>4</sup>	\$263M – \$395M

1. Class 5 “Order of Magnitude” conceptual opinion of probable costs.
2. Pipeline Improvement per Franchise Agreement and Critical Pipeline Improvements per the Master Plan
3. Connection/Capacity Fees based on the Town’s water use converted to an equivalent residential unit consumption.
4. The capital cost for the treatment improvement was used in lieu of the Lake Worth Beach connection /capacity fees.

Table 53: Phase 2 Alternative Overview									
Alt	Desc	Town Developed Utility Required	Water Supply Security	Water Supply Permitting Complexity	Construction Complexity	Operational Complexity and System Reliability	Land Acquisition	Permitting Complexity	Stakeholder Coordination
1	City of West Palm Beach	Retail – No Bulk - Yes	Moderate	None – Already Permitted	Low	Low / High	Low	Low	Low
2A	Town Owned Supply - Groundwater	Yes	High	High	High	High / High	Moderate	High	Moderate
2B	Town Owned Supply - Seawater	Yes	High	High	High	High / High	Moderate	High	Moderate
3	Palm Beach County	Yes	Moderate - High	Moderate	High	High / Moderate	High	High	High
4	City of Lake Worth Beach	Retail – No Bulk - Yes	Moderate - High	High	High	Low / Moderate	High	High	High

At the conclusion of the Phase 2 evaluation of alternatives and during the December 6, 2021 review meeting associated with of Phase 2 findings and conclusions.

For Alternative 1, the Town would continue to receive potable water from the City. This option is the low cost alternative and, has the least complexity associated with construction, operation, land acquisition and permitting. This option, does not however, provide a completely resilient finished water supply, as the City's current treatment facility has not yet been improved to effectively treat emerging contaminants of concern. Based on the review of this Alternative, it is recommended that the Town consider two additional variations of this option including:

- 1) The evaluation of the Town constructing a membrane treatment facility at the Quadrille site which will treat finished water purchased in bulk from the City.
- 2) The evaluation of a modified partnership with the City of West Palm Beach that will support the phased installation of Membrane Treatment at the City's water treatment facility over time.

Both of these options provided an increase in the reliability and treatment capabilities to address emerging contaminants of concern.

Alternative 2 offers two potentially viable options for the Town to own their own water supply. Additionally, these options address the reliability of the water supply and offer water supply and treatment options that offer additional safeguards to the Town's public water supply. Of the two potential water sources, the seawater option (Alternative 2B) offers the Town the least complexity in terms of consumptive use permitting, but it is quite costly.

Alternatives 3 and 4 are considered technically feasible, however these options include capital higher costs and offer significantly more complexity. The anticipated operational and maintenance costs associated with these alternatives, as well as projecting proposed rates, will require further coordination with Palm Beach County and the City of Lake Worth Beach.

Upon review of the Phase 2 findings, the Town requested that a third Phase of the analysis be performed to continue assisting the Town through the decision-making process as they consider the results of the study. Building on the Phase 2 efforts, the Town identified the following additional select alternatives to be further investigated:

**Evaluation of Desalination Facility at Phipps Park Detailed Site Evaluation** - At the conclusion of the Phase 2 effort, the Town requested Kimley-Horn further investigate Alternative 2 – Town Owned Water Supply. Alternative 2 involves the Town developing its own water supply and two alternatives were evaluated including a treatment facility at the Phipps Park site. This included evaluating a brackish ground water supply (**Alternative 2A**) as well as desalination of seawater (Alternative 2B). The purpose of the additional investigation into the Town owned water supply is to provide a more comprehensive understanding of having a Town owned water supply with seawater as the source along with a desalination treatment facility at the Phipps Park site. Additionally, an impact analysis was performed to provide a high-level understanding of how the construction and operation of a water treatment facility at the Phipps Park site will impact the Town in terms of short term and long-term community impacts.

**Evaluation of Membrane Treatment Facility at Quadrille Site Evaluation** - The Phase 2 effort also included an evaluation of a proposed treatment facility at the Quadrille site to treat a Town controlled groundwater supply (**Alternative 2A**). At the conclusion of the 2021 Study, the Town requested that Kimley-Horn modify the analysis to consider a stand-alone 10 MGD Water Treatment Plant at Quadrille site which would provide enhanced treatment to drinking water supplied by the City. For this new alternative, finished water from the existing City's treatment plant under a bulk customer arrangement will be conveyed to the Quadrille site for additional treatment prior to distribution to the Town via the five existing Intracoastal

Crossings. Additionally, an impact analysis was performed to provide a high-level understanding of how the construction and operation of a water treatment facility at the Quadrille site will impact the Town in terms of short term and long-term impacts.

**Partnership with the City of West Palm Beach to Phase in Membrane Treatment** – This new alternative would explore a financial partnership with the City in order to perform a phased replacement program that adds approximately 10 MGD of RO treatment capacity at the existing City Water Treatment Plant every 5 years for a period of 25 years. This addition of membrane treatment capacity would be offset by a commensurate reduction in current treatment system output, thereby not using more water than permitted by the City’s existing CUP. The long-term phasing program would ultimately need to consider a capacity expansion as water demands in the City are projected to current outpace capacity in the future according to the City’s existing master plan. The Town would like to understand total costs of such a program to get an order of magnitude cost opinion of what the Town’s fair share contribution could be.

**Section 6** of this report provides an overview and summary of the Phase 3 efforts which explores the select three alternatives and includes an economic evaluation of each alternative which is inclusive of capital costs, administration, operation and maintenance costs, utility formation costs, and asset replacement costs.

## 6 DETAILED INVESTIGATIONS OF SELECTED ALTERNATIVES

Detailed investigations were performed as a third phase of this study. The following three selected alternatives were further developed to gain a deeper understanding of the project components and the associated impacts if implemented:

- **Evaluation of Desalination Facility at Phipps Park Detailed Site Evaluation (Section 6.1)**
- **Evaluation of Membrane Treatment Facility at Quadrille Site Evaluation (Section 6.2)**
- **Partnership with the City of West Palm Beach to Phase in Membrane Treatment (Section 6.3)**

The purpose of the Phase 3 detailed investigations is to support an economic evaluation of selected alternatives. The economic evaluation considers costs associated with capital infrastructure improvements including raw water supply, treatment, and distribution system improvements. For some of the alternatives, utility formation costs are also considered, as the Town will be required to establish a water utility for two of the options discussed below. Additional costs considered in the economic analysis include operation, maintenance, and administration associated with the raw water, potable treatment, and distribution systems. Additional costs considered in the economic evaluation include an asset renewal program, which would provide funds to replace the existing pipelines and proposed treatment facility assets.

For the alternative where bulk water is purchased from the City, costs associated with the purchase of the water were assumed and included. A summary of the detailed investigations of the selected alternatives is presented below.

### 6.1 EVALUATION OF DESALINATION FACILITY AT PHIPPS PARK SITE

The purpose of the additional investigation into a Desalination Facility at Phipps Park site is to provide a more comprehensive understanding of having a seawater supplied desalination treatment facility at this location. An overall conceptual site plan for the facility at the Phipps Park site was developed and presented in **Figure 22**.

A detailed discussion is provided below, that refines the conceptual design for this option including:

1. Raw water well sizing and siting
2. Treatment facility and site requirements
3. Potable water storage requirements
4. Concentrate management
5. Distribution system upgrades

An impact analysis was performed to provide a high-level understanding of how the construction and operation of a water treatment facility at the Phipps Park site will impact the Town in terms of short term and long-term community impacts.

Additionally, an economic evaluation was performed and considers operation, maintenance, and administration associated with the raw water, potable treatment, and distribution systems. Additional costs considered in the economic evaluation include costs associated with an asset renewal program, which would provide replacement costs associated with renewal of the existing pipelines and proposed treatment facility assets.

---

### 6.1.1 RAW WATER WELL SIZING AND SITING

Preliminary siting of proposed shallow sea water wells was performed based on our local understanding of hydrogeologic conditions. It is assumed that shallow water wells will have the ability to withdraw up to 1,400 GPM of raw water per well. Additionally, it is assumed that a minimum of 500 feet of separation between well sites will be required to mitigate drawdown interference, therefore it is reasonable to assume that each well can produce 2.0 MGD of raw water. Well depths will likely be in the order of approximately 100 feet deep.

A raw water supply of 20 MGD is required to produce 10 MGD of potable water given the anticipated recovery rate of 50% for the desalination treatment process. A total of 11 wells are assumed to be required to meet the 20 MGD raw water supply requirement. This accounts for one well to be out of service at any given time. An additional three (3) wells are proposed to account for variable hydrogeologic conditions and redundancy given the total quantity of well. If the Town were to proceed with this option, a detailed hydrogeologic investigation would be required to identify the actual hydrogeologic conditions and specific well capacities.

The siting of the wells also considered site accessibility for operation and routine maintenance activities, and zoning and setback requirements. Additionally, all wells were sited westward of the Coastal Construction Control Line (CCCL). As shown in **Figures 23 and 24**, five (5) wells will be located at the Phipps Park site, and eight (8) wells will be located at Par 3 golf course. Another wellsite on Ibis Island is possible on Town owned property. Preliminary sizing and routing of a raw water main was performed and is also illustrated in **Figure 22**.

Plotted By: Staller, Casey Sheet Set: WATER FEASIBILITY STUDY Layout: FIG 21 DESALINATION FACILITY AT PHIPPS PARK OVERVIEW April 07, 2022 11:33:24am K:\web\_civil\044063264 - water feasibility study\CADD\plansheets\FIG 1 PHIPPS PARK SITE PLAN.dwg  
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NORTH

GRAPHIC SCALE IN FEET  
0 100 200 400

- PROPERTY BOUNDARY
- SETBACK DISTANCE
- PROP. WELL PIPING
- PROP. INJECTION WELL PIPING
- - - COASTAL CONSTRUCTION LINE
- PROP. WELL

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DATE	APRIL 2022
SCALE	AS SHOWN
DESIGNED BY	JRL
DRAWN BY	CFS
CHECKED BY	JRL

WATER FEASIBILITY STUDY

PREPARED FOR  
TOWN OF PALM BEACH

TOWN OF PALM BEACH FLORIDA

LICENSED PROFESSIONAL
JASON R. LEE
FLORIDA LICENSE NUMBER
67472
DATE: _____

DESALINATION FACILITY AT  
PHIPPS PARK OVERVIEW

SHEET NUMBER
FIG 22

Plotted By: Staller, Casey Sheet Set: WATER FEASIBILITY STUDY Layout: FIG 22 DESALINATION FACILITY AT PHIPPS PARK SITE PLAN April 07, 2022 11:33:12am K:\web\_civil\044063264 - water\_feasibility\_study\CADD\plansheets\FIG 1 PHIPPS PARK SITE PLAN.dwg  
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WATER FEASIBILITY STUDY

PREPARED FOR  
TOWN OF PALM BEACH

TOWN OF PALM BEACH      FLORIDA

LICENSED PROFESSIONAL
JASON R. LEE
FLORIDA LICENSE NUMBER
67472
DATE: _____

DESALINATION FACILITY AT  
PHIPPS PARK SITE PLAN

SHEET NUMBER
FIG 23

Plotted By: Staller, Casey Sheet Set: WATER FEASIBILITY STUDY Layout: FIG 23 PAR 3 SITE PLAN April 07, 2022 11:33:21am K:\wpb\_civil\044063264 - water feasibility stud\CADD\plansheets\FIG 1 PHIPPS PARK SITE PLAN.dwg  
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PAR 3 SITE PLAN

SHEET NUMBER
FIG 24

## 6.1.2 PHIPPS PARK DESALINATION WATER TREATMENT FACILITY

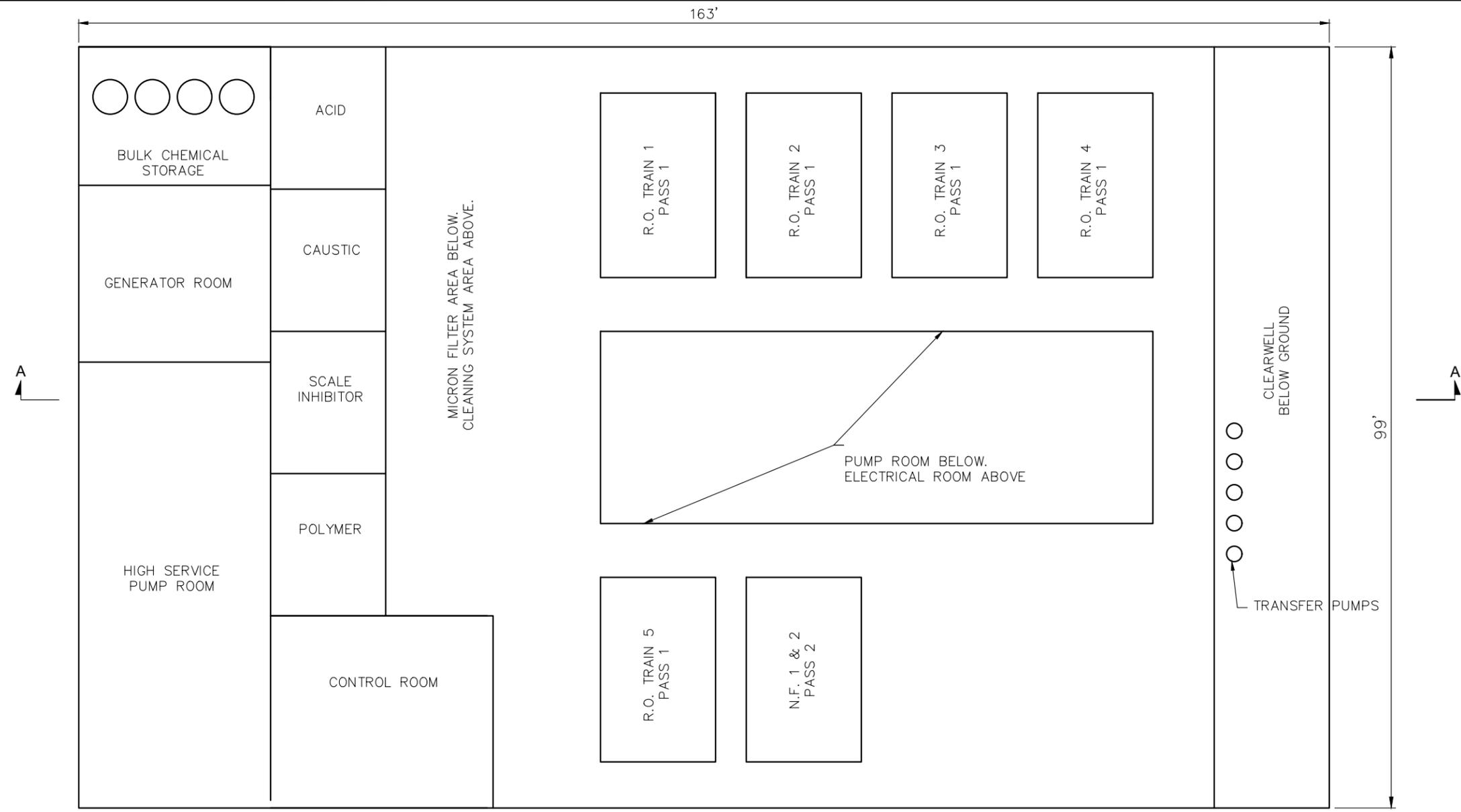
A preliminary facility layout was developed based on the use of membrane technology, specifically reverse osmosis technology. The purpose of the membrane system is to treat the water through the removal of dissolved constituents including hardness, salts, and organics. Water treatment is provided via preliminary filtration (pre-treatment), reverse osmosis (RO) train membranes, post treatment stabilization, and disinfection. The membrane system includes the membrane elements, pressure vessels, and train frames. A summary of the treatment system conceptual basis of design is provided below in **Table 54**.

<b>Table 54: Phipps Park Desalination Water Treatment Facility</b>	
<b>Basis of Design</b>	
Water Production	10 MGD Potable Water Production 20 MGD Raw Water Supply 50% Recovery
Concentrate	10 MGD Concentrate Disposal: Two (2) Deep Injection Wells
Pretreatment	Cartridge Filters Design Filter Loading Rate: 3-5 gpm per 10-inch Cartridge Element Cartridge Filter: 5 micron, 40-inch long Spiral Wound Each train will be equipped with a duplex stainless steel horizontal filter vessel with (176) 40-inch long cartridge filters with a design flow rate of 2,800 gpm. Scale Inhibitor Injection
Membrane System	Pass 1 Five Trains each rated at 2.0 MGD. Train: 48 Pressure Vessels; 6 Element Pressure Vessels, stacked 6 vessels high Train Dimensions: 8' wide, 22' long, and 16' high Feed Water Pump Pressure: 900 psi  Pass 2 One Train rated at 500gpm Train: 18 vessels, 6 element pressure vessels, stacked 6 vessels high Train dimensions: 3' wide, 22' long, and 16' high. Feed water pump pressure: 100 psi
Post Treatment	pH adjustment Stabilization with calcite contact bed. disinfection with free chlorine and corrosion inhibitor

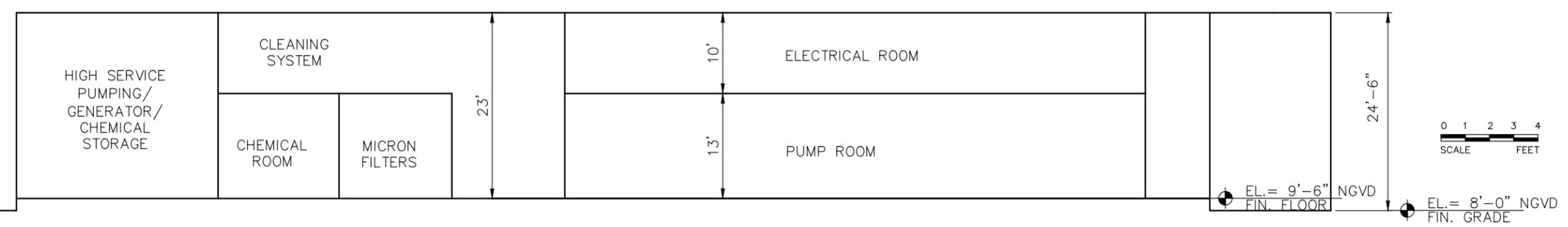
The water treatment facility will be housed within a 16,000 square foot building. A preliminary schematic of the facility layout is provided in **Figure 25**.

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Plotted By: Stiller, Casey  
 Sheet Set: WATER FEASIBILITY STUDY - Layout: FIG 24 PHIPPS PARK DESALINATION WATER TREATMENT BUILDING LAYOUT - April 07, 2022 - 11:33:36am  
 K:\web\_civil\044063264 - water\_feasibility\_study\CADD\plan sheets\FIG 24 PHIPPS PARK DESALINATION WATER TREATMENT BUILDING LAYOUT - April 07, 2022 - 11:33:36am  
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**FLOOR PLAN**  
AS NOTED



**SECTION A - CEILING HEIGHT PROFILE**  
AS NOTED

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**WATER FEASIBILITY STUDY**  
 PREPARED FOR  
**TOWN OF PALM BEACH**  
 TOWN OF PALM BEACH FLORIDA

LICENSED PROFESSIONAL	JASON R. LEE
FLORIDA LICENSE NUMBER	67472
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**PHIPPS PARK DESALINATION  
 WATER TREATMENT BUILDING  
 LAYOUT**

SHEET NUMBER	FIG 25
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The existing Phipps Park site currently includes a tennis center, fire station, historic school building, public beach parking and public beach access. The proposed treatment plant facility was located north of the fire station and tennis courts, and south of the existing parking lot on the existing Phipps Park site. The site is currently zoned R-B for low density residential. However, the Town considers the park as an “essential service” so we do not anticipate that a land use or zoning change would be required. However, the site will be subject to Landmarks Preservation and Town Council Approval along with a potential voter referendum to use the park space for a water treatment plant and for green space impacts. The Town Charter does include an exemption for public utility structures deemed necessary by the Town. A summary of the setback requirements for this zoning designation is provided in **Table 55**.

<b>Table 55: Phipps Park Zoning</b>	
<b>Requirement</b>	<b>R-B – Low Density Residential</b>
Water Plant Use Permitted?	Yes
Front Setback (S. Ocean Blvd)	1 story = 25 ft 2 story = 30 ft
Side Setback	1 story = 12.5 ft 2 story = 15 ft
Rear Setback	1 story = 10 ft 2 story = 15 ft
Height Restriction	1 story = 15 ft 2 story = 25 ft
Max Building Coverage	1 story = 40% 2 story = 30%
Max. C.C.R.	3.50
Parking Ratio	Based on Operator Staff

### 6.1.3 POTABLE WATER STORAGE REQUIREMENTS

The Florida Administrative Code (FAC) section 52-555 stipulates that potable water treatment facilities must have a minimum storage capacity of 25% of the permitted plant capacity, in terms of annual average daily demand. While the FAC would require 2.5 MGD additional storage to meet this requirement, storage capacity in addition to the 2.5 MGD will provide the Town with more efficient delivery of treated water during peak demand times and will likely be required to handle irrigation peak demands. Therefore, in addition to the water treatment facility building, two (2) ~ 2 MG ground storage tanks are proposed to be located at the facility site.

### 6.1.4 CONCENTRATE MANAGEMENT

The byproduct of the desalinization process is a high salinity concentrate that requires disposal, typically via Class I injection wells. Florida Class I injection wells are regulated by FAC 62-528.405-460. There currently are over 180 permitted Class 1 deep injection wells within Florida. Where hydrogeologic conditions are suitable, subsurface injection below the underground source of drinking water (USDW) is considered a viable disposal option for municipal wastewater effluent (including RO concentrate) disposal. **Figure 26** provides a schematic of Class 1 wells relative to the USDW (source: EPA.gov). Hydrogeologic conditions are expected to be present at Phipps Park.

The base of the USDW occurs at an elevation of approximately -1,800 feet NGVD 1929. Below this depth, the total dissolved solids concentrations within the Floridan aquifer exceed 10,000 milligrams per liter (mg/L). The permeable zone within the Lower Floridan Aquifer's Oldsmar Formation is used for the deep disposal of untreated wastewater. Commonly referred to as the Boulder Zone, this massively bedded dolostone is highly transmissive do to its fractured and cavernous permeability. The top of the Boulder Zone occurs at an elevation of approximately -2,800 feet NGVD 1929. Within much of the Palm Beach County, the permeable zone is more than 1,000 feet thick. Separating the Boulder Zone from the base of the USDW is a thick sequence of confining and semi-confining rocks that make up the Glauconite marker unit. This low permeability micritic limestone separates the Boulder Zone from the overlying Lower Avon Park Permeable Zone.

An injection well system typically consists of an injection well and a dual zone monitoring well (DZMW). The lower zone of the DZMW monitors the first permeable zone above the confinement overlying the injection zone. It is intended to be below the base of the underground sources of drinking water (USDW). The upper monitoring zone is a permeable zone above the base of the USDW. A test well would be required to establish the total depth required.

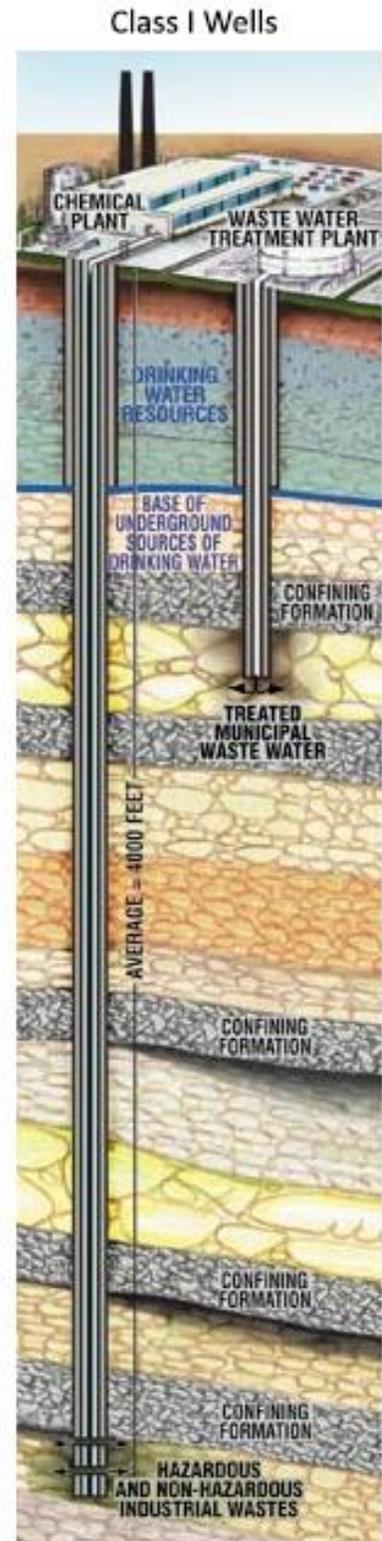


Figure 26: Class 1 Injection Well

A backup means of disposal is required for an injection well system and the construction of two wells allows for one to be out of service. For the Town-owned water supply and desalinization facility located at Phipps Park, concentrate disposal would consist of two deep injection wells, each with an estimated capacity of 10 MGD. This will allow for disposal capacity of 10 MGD with one well out of service.

### 6.1.5 POTABLE WATER DISTRIBUTION SYSTEM UPGRADES

Potable water distribution system upgrades are required to maintain system pressures, to replace aged infrastructure as identified in the current Franchise Agreement, and to replace critical infrastructure as identified in the City’s 2015 Master Plan. A summary of these improvements is provided below:

#### Distribution Improvements to Maintain System Pressure

The potable water distribution system upgrades were presented and discussed in the Phase 1 study based on a hydraulic evaluation of the Town’s system. The proposed distribution system upgrades are required to maintain the Town’s current level of service which includes maintaining an average system pressure of 72 psi. In general, the current water distribution network within the Town receives flow from five existing connection points with the City. Changing the source water and treatment facility to the Phipps Park site will require upsizing of the existing potable water distribution system within the Town and the required new and upsized water main is presented below in **Table 56** and is illustrated in **Figure 27**.

<b>Table 56: Distribution System Improvements to Maintain System Pressure</b>	
Size (in.)	Quantity (LF)
20"	16,388
24"	7,618
30"	22,930

#### Distribution Improvements to Replace Aged Infrastructure

In addition to the required improvements associated with the Town Owned Water Supply option, the pipelines as previously identified for replacement within the Franchise agreement are considered necessary as part of each alternative. Several of the pipelines identified in the Franchise agreement remaining to be replaced are required to be upsized as part of this alternative. As such, the pipeline replacement requirements include only 16,920 linear feet of pipeline replacement. An inventory of pipelines requiring replacement as part of this alternative is provided in **Table 57**. Proposed replacements will be with equivalent pipe diameters, however all 4-inch and 6-inch water mains within the Town, when replaced, will be replaced with 8-inch diameter water mains.

<b>Table 57: Distribution System Improvements to Replace Aged Infrastructure</b>	
Size (in.)	Quantity (LF)
8"	15,960
10"	960
Total	16,920



## Distribution Improvements to Replaced Critical Infrastructure

In addition to pipeline improvements associated with maintaining system pressure and replacing aged infrastructure, the following pipelines have been identified as critical for replacement within the 2015 Master Plan and are considered necessary as part of this alternative: The critical water main requiring to be replaced is identified as WM 7 in the 2015 Master Plan and includes replacing over 3,000 linear feet of 8-inch water main, see **Table 58** below.

<b>Table 58: Distribution System Improvements to Replace Critical Pipelines</b>							
<b>Project Area</b>	<b>GIS Water Main Asset ID</b>	<b>Linear Feet (LF)</b>	<b>Likelihood of Failure Score</b>	<b>Total Risk Score</b>	<b>Pipe Diameter (inches)</b>	<b>Pipe Material</b>	<b>Install Date</b>
WM7	WSP12603	6	215	21,070	8	AC	1972
WM7	WSP31599	25	215	21,070	8	AC	1972
WM7	WSP32451	3063	190	18,620	8	CICL	1972

### 6.1.6 IMPACT ANALYSIS

An evaluation of this alternative in terms of the anticipated near-term and long-term impacts to the community was performed. Near-term impacts are primarily associated with construction activities. Construction projects have different degrees of complexity associated with the location of the construction, the type of construction required, the number of locations where work is required, and the length of time required to complete the construction.

#### Near Term Community Impacts

Due to the complexity of the multi-year construction for the various project components, the near-term impacts to the community that are a result of the various construction activities are considered significant. There are four main project components associated with this alternative including:

- The construction of raw water supply wells and a raw water main on and adjacent to Phipps Park and Par 3 Golf Course
- Construction and commissioning of the water treatment facility at Phipps Park
- Construction of the deep injection wells adjacent to Phipps Park
- Construction of nearly 47,000 linear feet in upgraded water distribution pipeline improvements within the Town.
- Construction of nearly 20,000 linear feet of water distribution pipeline improvements that are required to be replaced due to age or criticality within the Town.

Each of these project components requires specialized contractors to construct. For the construction of the raw water supply wells, raw water main, water treatment facility, and deep injection wells, the impact will be localized to the Phipps Park site, Par 3 Golf Course, Ibis Isle and adjacent properties. The construction will pose an impact to Park activities including the loss of use for portions of the Park and Par 3 due to:

- The need for staging areas for materials and equipment within and adjacent to the park site
- The need for space to construct the improvements
- The need for partial golf course closure during construction of the wells and piping

There will also be an increase in vehicular traffic and noise due to the heavy construction equipment and activities. Noise associated with construction activities will be a concern for adjacent property owners during construction at the Phipps Park and Par 3 sites for many months.

For this option, the construction of approximately 67,000 LF in distribution system improvements poses the most significant impacts to the overall community. The construction of the required distribution improvements, as well as the replacement of aged infrastructure will include construction within Town and FDOT road right of way. These types of construction activities include open cut and trenchless construction techniques within highly congested corridors with limited right-of-way, and significant impacts to the community can be anticipated. This is expected to include complete rolling road closures of South Ocean Blvd., North Ocean Blvd., Cocoanut Row, Bradley Place, and North Lake Way, and Country Club Road due to the sizes of the pipelines being installed. Because most areas of Town only have one or two north-south roadways, these road closures will create extreme maintenance of traffic (MOT) issues. Additionally, many of the corridors where improvements are proposed include hurricane evacuation routes. For this water supply alternative to be constructed, the Town will experience heavy construction and significant impacts within the right-of-way for multiple years.

### Long Term Community Impacts

From a long-term impact perspective, the construction of a water treatment plant at Phipps Park will result in the loss of availability to add future recreational space within the Park. While this option will allow for the public to have beach access, no additional space for future recreational use will be available. Additional impacts to adjacent properties include increased vehicular traffic associated with routine maintenance and deliveries to support plant operations and increased site lighting. Since the facility will be housed within a building, significant noise associated with equipment operation is not anticipated. There will be visual impacts due to the new building and ground storage tanks. We anticipate that screening will be required to shield the industrial style equipment from the public view.

### Economic Evaluation

An economic evaluation was performed as a way of comparing the overall cost implications of each alternative relative to each other. The economic analysis is conceptual in nature and does not constitute a rate study, nor should these figures be misinterpreted as rates that a customer would be required to pay. A rate study performed by a municipal utility financial consultant would be required to identify actual financial strategies and potential customer rates. The purpose of the economic analysis is to provide a basis of comparing relative costs to produce water for each alternative. The analysis evaluates anticipated conceptual expenditures associated with each alternative including:

1. Capital and Utility Start Up Costs
2. Administration, Operations, and Maintenance Costs
3. Asset Replacement Costs

### Capital and Utility Start Up Costs

An updated Conceptual Order of Magnitude Capital Costs for a desalination treatment facility Phipps Park was developed based on conceptual refinements developed as part of Phase 3 of the study and is presented **Table 59**. These capital cost figures are based on engineering judgement considering current project costs and cost trends observed in ongoing projects in Florida and are conceptual in nature. The costs include the water supply, treatment, and water distribution system upgrades for this alternative. These

costs also include the 2015 Master Plan identified pipeline replacements and the remaining franchise agreement pipeline replacements.

Since Kimley-Horn does not control the cost of labor, materials, equipment, or services furnished by others, methods of determining prices, or competitive bidding or market conditions, any opinions rendered as to costs, including but not limited to opinions as to the costs of construction and materials, shall be made on the basis of its experience and represent its judgment as an experienced and qualified professional, familiar with the industry. Kimley-Horn cannot and does not guarantee that proposals, bids or actual costs will not vary from its opinions of cost.

The opinion of cost prepared is considered to be a Class 5 estimate, in accordance with the AACE Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries. Class 5 estimates are typically applied to conceptual screening of alternatives. Class 5 estimates are generally based on very limited information and as a result have a wide range of accuracy. Class 5 estimates are utilized for business planning purposes and assessment of initial viability. Typical accuracy ranges for Class 5 estimates are -20% to -50% on the low range and +30% to +100% on the high range. As such, the opinions are planning level only and include a 35% contingency factor to account for the limited detail available at this level of evaluation. The purpose of the order of magnitude opinion of probable cost does, however, provide a good basis for evaluating the differences in costs between the alternatives.

<b>Table 59: Phipps Park Opinion of Probable Construction Cost</b>		
<b>ITEM</b>	<b>ITEM OF WORK</b>	<b>SUBTOTAL</b>
1	Phipps Park Water Supply and Treatment System (10.0 MGD)	\$140,700,000
2	Raw Water Piping	\$3,600,000
3	Town Pipeline Improvements	\$59,100,000
4	Franchise Agreement Pipeline Replacements	\$10,200,000
5	Critical Pipeline Improvements Per Masterplan	\$3,100,000
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>		<b>\$216,700,000</b>
	Engineering/Administration (20%)	\$43,300,000
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION:</b>		<b>\$260,000,000</b>
	Contingency (35%)	\$91,000,000
<b>SUBTOTAL CAPITAL, ENGINEERING, ADMINISTRATION, AND CONTINGENCY:</b>		<b>\$351,000,000</b>
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST (0% +/- 50%):</b>		<b>\$351,000,000 to \$526,600,000</b>

For this alternative, the Town would be required to form a potable water utility and there are anticipated upfront costs associated with utility formation. For the purpose of this evaluation, an estimated range of \$1M – \$3M was the assumed cost associated with utility formation.

The amortization of the upfront costs associated with this alternative was performed over a 30-year period at a rate of 2.4%. **Table 60** provides a summary of the estimated range of capital and utility start up costs. The table also includes the amortized cost over 30 years and the resulting estimated cost per 1,000 gallons of water produced. For this alternative it is estimated that the annual amortized cost for capital and utility start up is \$5.34 – \$8.03 per 1,000 gallons of water produced.

<b>Table 60: Capital and Utility Startup Cost Summary</b>		
<b>Upfront Investment Cost</b>	<b>Low</b>	<b>High</b>
Capital Costs	\$351,000,000	\$526,600,000
Utility Start Up Costs	\$1,000,000	\$3,000,000
<b>Subtotal Capital and Start Up Costs</b>	<b>\$352,000,000</b>	<b>\$529,600,000</b>
<b>Assumed Municipal Bond Rate</b>	<b>2.4%</b>	<b>2.4%</b>
30-Year Amortized Cost @ 2.4%	\$16,470,000 / year	\$24,780,000 / year
Total Water Produced Annually	3084 MG	3084 MG
<b>Annual Amortized cost for Capital and Utility Start Costs / 1000 gallons treated</b>	<b>\$5.34</b>	<b>\$8.03</b>

Administration, Operation, and Maintenance Cost

Administration, operation, and maintenance (O&M) costs were evaluated for the Town owned water supply and desalination facility at Phipps Park. Costs were estimated based on published information provided within the American Water Works Association (AWWA) Reverse Osmosis and Nanofiltration Manual of Water Supply Practices (M46). Additionally, costs associated with the operation and maintenance of the raw water supply water distribution systems were evaluated based on evaluation of AWWA 2019 Benchmarking Survey (AWWA Survey) and knowledge of similar distribution operation and maintenance costs around Palm Beach County. Using a similar 10 MGD Seawater O&M break down from the M46 reference, a cost per 1,000 gallons produced was calculated. The O&M cost includes:

- Labor
- Chemicals
- Power Required
- Filters
- Membrane Replacements
- Other Materials

Additionally, an estimated administration cost was included based on knowledge of similar administration costs within Palm Beach County.

**Table 61** provides a summary of the estimated O&M costs for the Desalination Facility at Phipps Park alternative. Costs are provided per 1,000. gallons of treated water. For this alternative an additional \$4.28 per 1000 gallons produced will be required to support administration, operations, and maintenance for the potable water system.

<b>Table 61: Summary of Operation and Maintenance Costs</b>	
<b>O&amp;M</b>	<b>\$ / 1,000 gallons</b>
Plant O&M and Administration	\$3.78
Distribution O&M	\$0.50
<b>Total Cost</b>	<b>\$4.28</b>

#### Asset Replacement Costs

Costs were developed to address asset lifecycle replacement needs. A pipeline renewal program cost was estimated to account for the need to replace the entire piping system as pipelines come to the end of their useful lives. On average, a pipeline's lifespan is about 75-years. The total present-day cost of replacing the distribution system, including all the proposed piping of this alternative is \$239M.

A treatment facility renewal program cost was also estimated to account for the asset replacement associated with the treatment facility as parts of the treatment process near the end of their useful lifespan. On average, a treatment facility's lifespan is about 50-years. The total present-day cost of \$140M was used because this was the capital cost of the treatment facility, as previously shown in **Table 59**. A summary of the asset replacement costs is shown in **Table 62**.

<b>Table 62: Summary of Assets Replacement Costs</b>		
<b>Asset Replacement Cost</b>	<b>Pipeline</b>	<b>Treatment</b>
Present Day Replacement Cost	\$239M	\$140M
Lifecycle	75 years	50 years
Inflation Rate	2.5%	2.5%
Amortized Cost	\$7.05M	\$4.29M
Total Annual Water Produced	3084 MG	3084 MG
Annual Amortized Cost for Capital and Utility Start Costs / 1000 gallons treated	<b>\$2.29</b>	<b>\$1.60</b>

#### Summary Desalination Facility at Phipps Park Summary of Estimated Costs

A summary of the total cost to produce 1,000 gallons is presented below in **Table 63**. It is estimated that for the Desalination Facility at Phipps Park alternative, the estimated conceptual cost to produce 1,000 gallons of water is \$13.50 – \$16.20.

<b>Table 63: Summary of Desalination Facility at Phipps Park Cost per 1,000 Gallons</b>		
<b>Costs</b>	<b>Low - \$/ 1,000 gallons</b>	<b>High - \$/ 1,000 gallons</b>
Capital and Utility Formation Cost	\$5.34	\$8.03
Plant O&M and Administration	\$3.78	\$3.78
Distribution O&M	\$0.50	\$0.50
Pipeline Renewal Program	\$2.29	\$2.29
Treatment Plant Renewal Program	\$1.60	\$1.60
<b>Total Annual Cost / 1000 gallons</b>	<b>\$13.50</b>	<b>\$16.20</b>

## 6.2 MEMBRANE TREATMENT FACILITY AT QUADRILLE SITE

The purpose of this investigation is to evaluate the technical feasibility of a new alternative currently being considered as an alternative water supply strategy. This option includes conveying treated potable water from the City's existing water treatment facility to the Town-owned Quadrille site, where the Town will own and maintain an advanced water treatment facility that will provide additional water treatment prior to distribution to the Town. This option will treat the City's potable water to improve water quality and mitigate water supply vulnerability concerns associated with the City's current surface water supply.

The discussion presented below includes conceptual design considerations for this option including the requirements associated with:

1. Conveying water from City's WTP to the Quadrille Site
2. Treatment facility components and siting
3. Potable water storage
4. Concentrate management
5. Distribution system upgrades

An overall conceptual site plan for this alternative is provided in **Figure 28**.

The Quadrille site is in the City's Downtown Master Plan Nora District Area and zoned as the Industrial Chic District (ICD-5). This is significant because historically, this district does not allow water treatment plants as a permitted use, but due to a settlement agreement between the Town of Palm Beach and the City of West Palm Beach, a water treatment plant can be located on Town owned property in the City. A conceptual site plan was created based on the requirements for an ICD-5 property, but due to the district not typically allowing water treatment plants, there may be unanticipated issues while trying to gain zoning approval. If this alternative is to be pursued further, we recommend that a meeting with the City's Planning and Zoning Department be held to discuss process and potential variances required.

Additionally, an economic evaluation was performed and considers operation, maintenance, and administration associated with the raw water, potable treatment, and distribution systems. Additional costs considered in the economic evaluation include costs associated with an asset renewal program, which would provide replacement costs associated with renewal of the existing pipelines and proposed treatment facility assets.

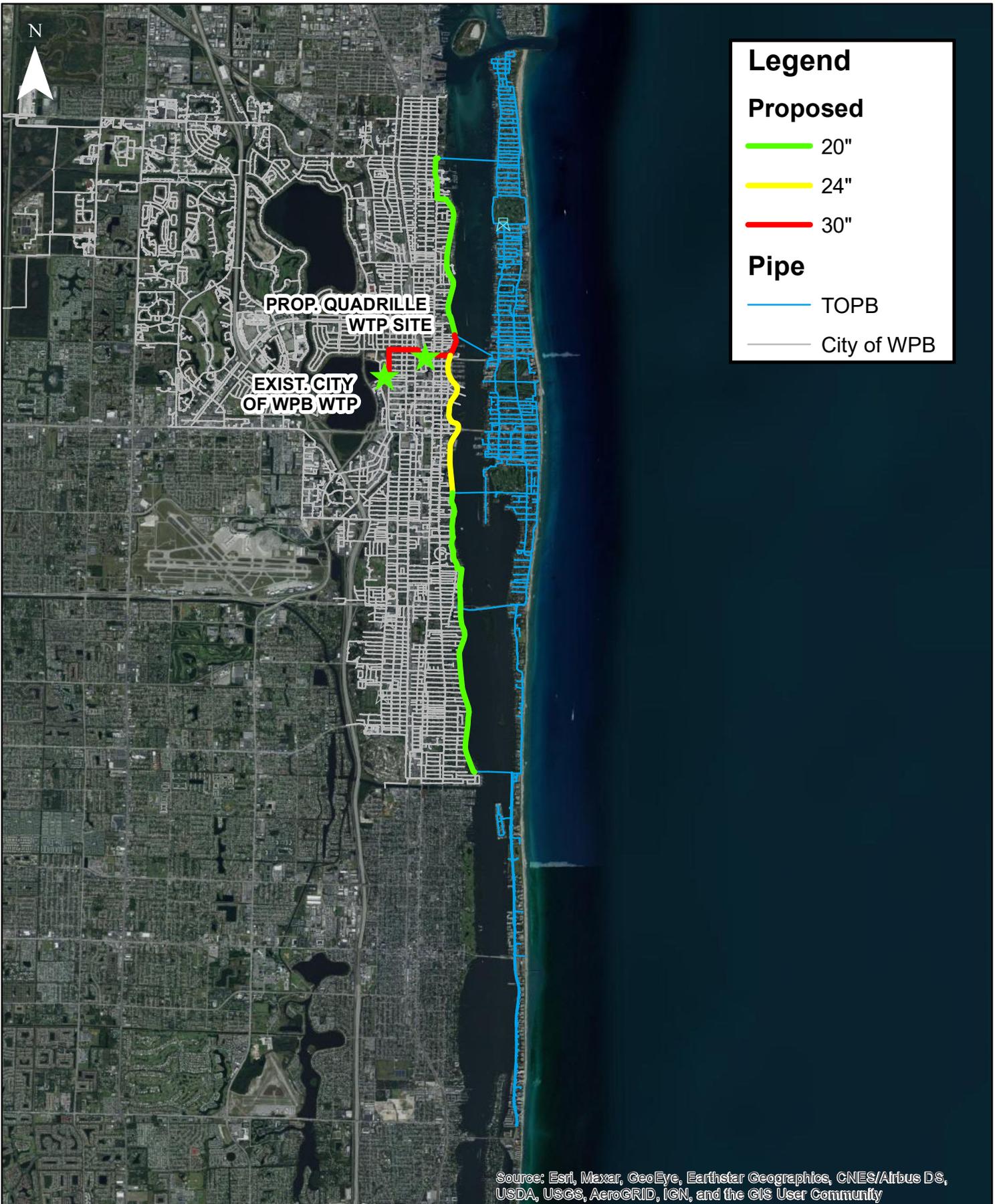
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### 6.2.1 CONVEYING TREATED WATER FROM THE CITY'S WTP TO THE QUADRILLE SITE

For this alternative, 11MGD of treated water will be purchased by the Town from the City under a Bulk Service Agreement. 11MGD accounts for a 90% recovery rate through the Town owned WTP, allowing for the 10MGD demand to be met.

For the purposes of this conceptual exercise, the proposed raw water main alignment follows N Tamarind Ave and 7<sup>th</sup> street to convey the purchased water from the City's WTP and the Town's proposed Quadrille WTP. A detailed route evaluation would be required if this alternative were to be investigated further. The proposed water main is approximately 4,250 linear feet in length and is sized at 30-inches in diameter to carry the 11MGD of flow to the proposed plant site. The proposed water main is further illustrated in **Figure 29**.

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TOWN OF PALM BEACH  
WATER FEASIBILITY STUDY  
OVERALL CONCEPTUAL SITE PLAN



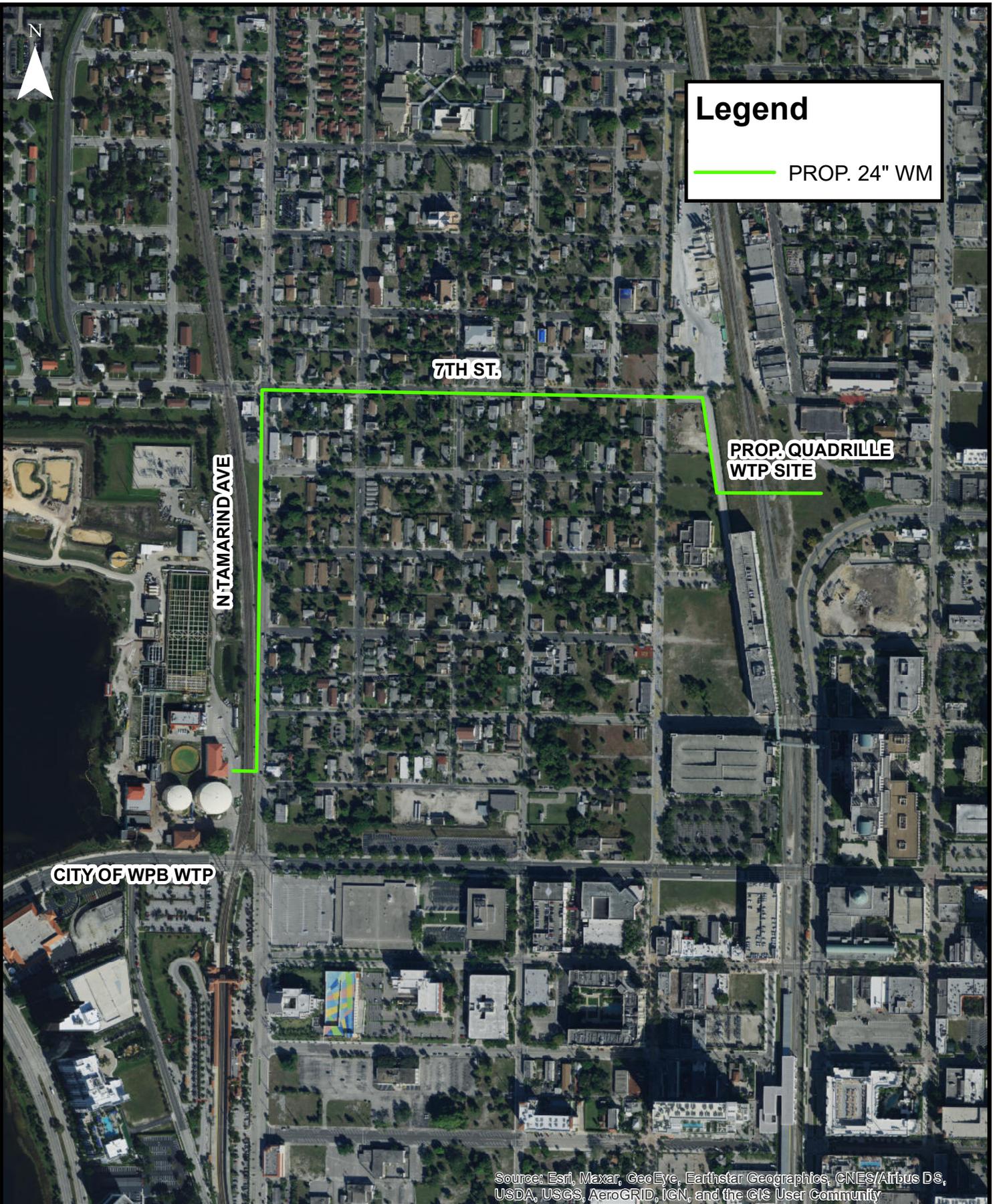
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PALM BEACH COUNTY

APRIL 2022

FIGURE 28

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Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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TOWN OF PALM BEACH  
WATER FEASIBILITY STUDY  
PIPING ROUTE FROM WPB WTP TO  
QUADRILLE SITE



SCALE: N.T.S.

PALM BEACH COUNTY

APRIL 2022

FIGURE 29

## 6.2.2 TREATMENT FACILITY COMPONENTS AND SITING

A preliminary facility layout was developed based on the use of membrane technology, specifically nanofiltration technology. The purpose of the membrane system is to treat the water through the removal of dissolved constituents including hardness, salts, and organics. Water treatment is provided via preliminary filtration (pre-treatment), nanofiltration membranes, post treatment stabilization, and disinfection. The membrane system includes the membrane elements, pressure vessels, and train frames. A summary of the treatment system conceptual basis of design is provided below in **Table 64**.

<b>Table 64: Quadrille Membrane Treatment Facility</b>	
<b>Basis of Design</b>	
Water Production	10 MGD Potable Water Production 11 MGD Purchased Water 90% Recovery
Concentrate	1 MGD Disposal: Two (2) Deep Injection Wells
Pretreatment	Chlorine Removal with Sodium Bisulfite Cartridge Filters Design Filter Loading Rate: 3-5 gpm per 10-inch Cartridge Element Cartridge Filter: 5 micron, 40-inch long Spiral Wound Each train will be equipped with a stainless steel horizontal filter vessel with (176) 40-inch long cartridge filters with a design flow rate of 2,550 gpm. Scale Inhibitor Injection
Membrane System	3 Nanofiltration Trains are required with a flow of 3.4 MGD per Train
Post Treatment	Clearwell required for flow buffer and disinfection with free chlorine pH adjustment and corrosion inhibitor.

The water treatment facility will be housed within a 9,000 square foot building. Preliminary schematics of the site plan and facility layout are provided in **Figures 30 and 31**.

Plotted By: Staller, Casey Sheet: Sct: WATER FEASIBILITY STUDY Layout: FIG 29 MEMBRANE TREATMENT FACILITY AT QUADRILLE SITE PLAN April 07, 2022 11:34:01am K:\web\_civil\044063264 - water\_feasibility\_study\CADD\plansheets\FIG 27 QUADRILLE SITE PLAN FOR 10 MGD NANO WTP.dwg  
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DESIGNED BY	JRL
DRAWN BY	CFS
CHECKED BY	JRL

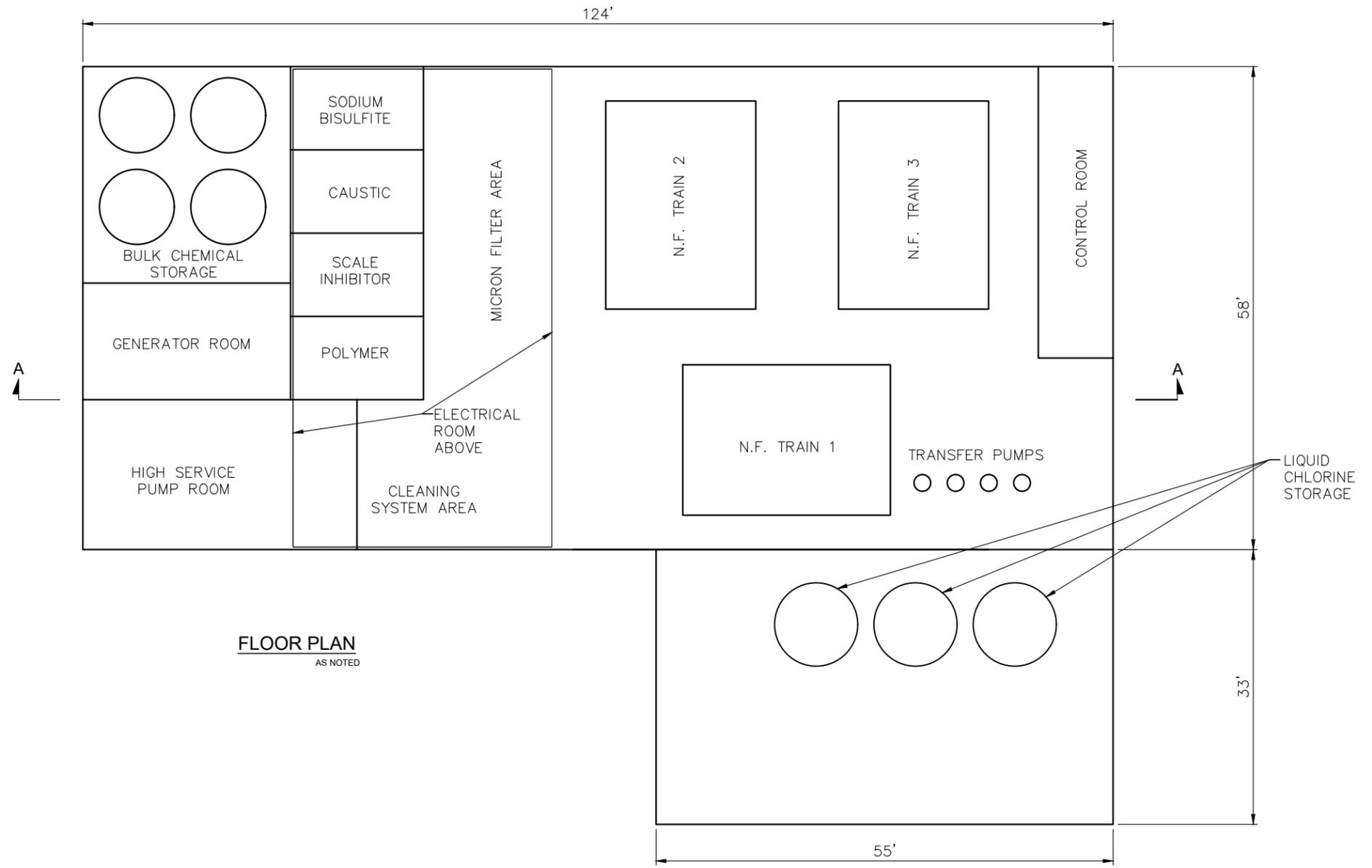
**WATER FEASIBILITY STUDY**  
 PREPARED FOR  
**TOWN OF PALM BEACH**  
 TOWN OF PALM BEACH FLORIDA

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 FLORIDA LICENSE NUMBER  
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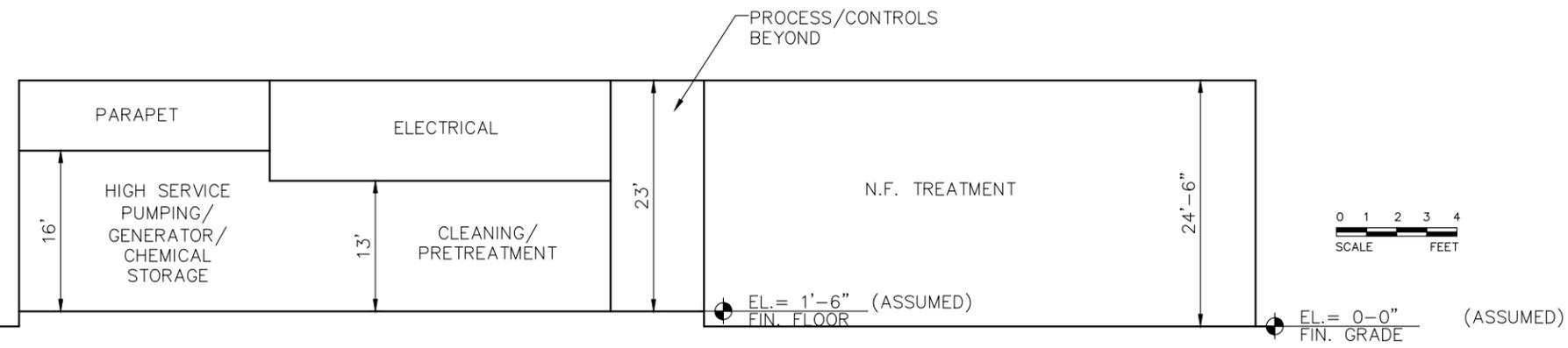
**MEMBRANE TREATMENT FACILITY AT QUADRILLE SITE PLAN**

SHEET NUMBER  
**FIG 30**

Plotted By: Staller, Casey  
 Sheet Set: WATER FEASIBILITY STUDY, Layout: FIG. 30, MEMBRANE TREATMENT FACILITY AT QUADRILLE BUILDING LAYOUT, April 07, 2022, 11:34:13am, K:\wpb\_civil\044063264 - water\_feasibility\_study\CADD\plansheets\FIG. 28 QUADRILLE NANO WATER TREATMENT PLANT BUILDING LAYOUT.dwg  
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**FLOOR PLAN**  
AS NOTED



**SECTION A - CEILING HEIGHT PROFILE**  
AS NOTED

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**WATER FEASIBILITY STUDY**  
 PREPARED FOR  
**TOWN OF PALM BEACH**  
 TOWN OF PALM BEACH FLORIDA

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**MEMBRANE TREATMENT FACILITY AT QUADRILLE BUILDING LAYOUT**

SHEET NUMBER  
**FIG 31**

### 6.2.3 CONCENTRATE MANAGEMENT

Similar to the previous option, a Class I deep injection well will be required for concentrate disposal. A backup means is required for an injection well system and the construction of two wells allows for one to remain out of service. For the Town-owned nanofiltration facility at the Quadrille site, concentrate disposal will consist of two (2) deep injection wells, each with an estimated capacity of 1 MGD. This will allow for disposal capacity of 1 MGD with one well out of service.

### 6.2.4 POTABLE WATER DISTRIBUTION SYSTEM UPGRADES

Potable water distribution system upgrades are required to convey potable water from the Quadrille WTP site to the existing Intracoastal Waterway crossings, maintain system pressures, to replace aged infrastructure as identified in the current Franchise Agreement, and to replace critical infrastructure as identified in the City's 2015 Master Plan. A summary of these improvements is provided below:

#### Proposed Water Mains to Convey Water to Existing Intracoastal Waterway Crossings

As previously discussed, this option will utilize existing Intracoastal Waterway crossings to convey potable water to the Town. New water main infrastructure is required to convey the potable water from the Quadrille site to the existing crossings. For the purposes of this conceptual study, the proposed water main alignment follows Flagler Drive. A detailed route evaluation would be required if this alternative were to be investigated further. The proposed water main includes 13,478 linear feet of pipeline to convey water to the northern two interconnections, including Crossing 1 and Crossing 2. The proposed water main includes 27,500 linear feet of pipeline to convey water to the southern three interconnections, including Crossing 3, Crossing 4, and Crossing 5. The proposed water main is approximately 42,500 linear feet in length and ranges from 20-inches in diameter to 30-inches in diameter. A summary of the proposed pipe size and length is provided below in **Table 65**.

The proposed water main is further illustrated in Figure 28. No additional improvements are required within the distribution system located within the Town. Hydraulic modeling did not suggest additional storage within the town is required; however, the hydraulic evaluations performed to support this study were high level in nature and if the Town proceeds with this option, additional hydraulic investigations will be required to confirm system storage requirements.

<b>Table 65: Proposed Flagler Drive Distribution Piping</b>	
<b>Pipe Diameter</b>	<b>Pipe Length (LF)</b>
20"	22,691
24"	16,944
30"	2,909
Total	42,544

### Distribution Improvements to Maintain System Pressure

This water supply alternative will utilize the existing five (5) Intracoastal Waterway crossings and will continue to maintain current level of service, therefore no additional potable water distribution system upgrades within the Town are required for this alternative to maintain system pressures.

This is one of two water supply alternatives that utilizes the existing Intracoastal Waterway crossings, if the Town proceeds with this alternative, it is recommended that the Town further evaluate the condition of the crossings and consider replacing crossings if the condition warrants. It should be noted that the original pipeline installed at Crossing 3 has an installation date of 1937 and should be evaluated as a priority for continued use and reliability.

### Distribution Improvements to Replaced Aged Infrastructure

Similar to the first option, this option will require the replacement of the pipelines as previously identified for replacement within the Franchise agreement are considered necessary as part of each alternative. Several of the pipelines identified in the Franchise agreement remaining to be replaced are required to upsized as part of this alternative. These pipe replacements are the same for all alternatives discussed herein.

As such, the pipeline replacement requirements include 16,920 linear feet of pipeline replacement. An inventory of pipelines requiring replacement as part of this alternative is provided in **Table 66**. Proposed replacements will be with equivalent pipe diameters, however all 4-inch and 6-inch water mains within the Town, when replaced, will be replaced with 8-inch diameter water mains.

<b>Table 66: Distribution System Improvements to Replace Aged Infrastructure</b>	
Size (in.)	Quantity (LF)
8"	15,960
10"	960
Total	16,920

### Distribution Improvements to Replace Critical Infrastructure

In addition to pipeline improvements associated with maintaining system pressure and replacing aged infrastructure, the following pipelines have been identified as critical for replacement within the 2015 Master Plan and are considered necessary as part of this alternative: Since this option does not include the upsizing or upgrading of any of the existing water distribution system mains within the Town, all pipelines identified in the 2015 Master Plan as critical and listed in **Table 67** are recommended to replace under this option.

Table 67: Water Distribution Main Candidate Project's Details							
Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM4	WSP24790	859	195	35,490	16	CAS	1964
WM4	WSP24791	1462	215	32,680	16	CICL	1967
WM5	WSP30096	962	220	24,640	12	CAS	1950
WM7	WSP12603	6	215	21,070	8	AC	1972
WM7	WSP31599	25	215	21,070	8	AC	1972
WM7	WSP32451	3063	190	18,620	8	CICL	1972
WM12	WSP23657	3374	180	20,160	16	DIP	1950

### 6.2.5 IMPACT ANALYSIS

An evaluation of this alternative in terms of the anticipated near-term and long-term impacts to the community was performed. Near-term impacts are primarily associated with construction activities. Construction projects have different degrees of complexity associated with the location of the construction, the type of construction required, the number of locations where work is required, and the length of time required to complete the construction.

#### Near Term Community Impacts

Due to the complexity of the multi-year construction for the various project components, the near-term impacts to the community that are a result of the various construction activities are considered significant. There are four main project components associated with this alternative including the construction of a raw water main within the City limits, construction and commissioning of the water treatment facility at the Quadrille Site, construction of the deep injection wells at the Quadrille site, and the construction of over 73,300 linear feet in water distribution pipeline within the City limits. Similar to the previous option, each of these project components require specialized contractors. For the construction of the raw water main, water treatment facility, and deep injection wells, the impact will be localized to the Quadrille site and adjacent properties. There are limited staging areas, and traffic will likely be impacted due to the location and ingress and egress into the proposed site. Noise associated with construction activities will also be a concern during construction at the Quadrille site for a couple years.

For this option, the construction of over 73,300 LF in distribution system improvements within the City poses the most impact to the community. The construction of the required distribution improvements, as well as the replacement of aged infrastructure will include construction within City and FDOT right of way. These types of construction activities include open cut and trenchless construction techniques within highly congested corridors with limited right-of-way, and significant impacts can be anticipated to community. The rights-of-way in City are narrow and densely packed with utilities and contain areas of very poor soils. Work within the City's right-of way will be required lane and street closures, impacting resident and business access. There is also the potential that the City may impose right of way permit fees for the construction,

though they have not done so in the past. Therefore, these fees are not included in our opinion of costs. Additionally, many of the corridors where improvements are proposed include hurricane evacuation routes.

### Long Term Community Impacts

From a long-term impact perspective, the construction of a water treatment plant at the Quadrille site includes increased vehicular traffic associated with routine maintenance and deliveries and increased site lighting. Since the facility will be housed within a building, significant noise associated with equipment operation is not anticipated. There will be an increase in site lighting and there will be visual impacts of the new building and ground storage tanks.

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## 6.2.6 ECONOMIC EVALUATION

An economic evaluation was performed as a way of comparing the overall cost implications of each alternative relative to each other. The economic analysis is conceptual in nature and does not constitute a rate study, nor should these figures be misinterpreted as rates that a customer would be required to pay. A rate study performed by a municipal utility financial consultant would be required to identify actual financial strategies and potential customer rates. The purpose of the economic analysis is to provide a basis of comparing relative cost to produce water for each alternative. The analysis evaluates anticipated conceptual expenditures associated with each alternative including:

1. Capital and Utility Start Up Costs
2. Administration, Operations, and Maintenance Costs
3. Asset Replacement Costs

### Capital and Utility Start Up Costs

An updated Conceptual Order of Magnitude Capital Costs for a membrane treatment facility at the Quadrille site was developed based on conceptual refinements developed as part of Phase 3 of the study and is presented **Table 68**. These capital cost figures are based on engineering judgement considering current project costs and cost trends observed in ongoing projects in Florida and are conceptual in nature. The costs include the water supply, treatment, and water distribution system upgrades for this alternative. These costs also include the 2015 Master Plan identified pipeline replacements and the remaining franchise agreement pipeline replacements.

Since Kimley-Horn does not control the cost of labor, materials, equipment, or services furnished by others, methods of determining prices, or competitive bidding or market conditions, any opinions rendered as to costs, including but not limited to opinions as to the costs of construction and materials, shall be made on the basis of its experience and represent its judgment as an experienced and qualified professional, familiar with the industry. Kimley-Horn cannot and does not guarantee that proposals, bids or actual costs will not vary from its opinions of cost.

The opinion of cost prepared is considered to be a Class 5 estimate, in accordance with the AACE Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries. Class 5 estimates are typically applied to conceptual screening of alternatives. Class 5 estimates are generally based on very limited information and as a result have a wide range of accuracy. Class 5 estimates are utilized for business planning purposes and assessment of initial viability. Typical accuracy ranges for Class 5 estimates are -20% to -50% on the low range and +30% to +100% on the high range. As such, the opinions are planning level only and include a 35% contingency factor to account for the limited detail available at this level of evaluation. The purpose of the order of magnitude opinion of probable cost does, however, provide a good basis for evaluating the differences in costs between the alternatives.

<b>Table 68: Quadrille Site Opinion of Probable Construction Costs</b>		
<b>ITEM</b>	<b>ITEM OF WORK</b>	<b>SUBTOTAL</b>
1	Treated Water Conveyance from City's WTP to Quadrille Site (11.0 MGD)	\$7,800,000
2	Quadrille Nano Water Treatment System (10.0 MGD)	\$90,600,000
3	Pipeline Distribution to the TOPB	\$47,700,000
4	Franchise Agreement Pipeline Replacements	\$10,200,000
5	Critical Pipeline Improvements Per Masterplan	\$9,100,000
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>		\$165,400,000
Engineering/Administration (20%)		\$33,100,000
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION:</b>		\$198,500,000
Contingency (35%)		\$69,500,000
<b>SUBTOTAL CAPITAL, ENGINEERING, ADMINISTRATION AND CONTINGENCY:</b>		\$268,000,000
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST:</b>		<b>\$268,000,000 to \$402,000,000</b>

For this alternative, the Town would be required to form a potable water utility and there are anticipated upfront costs associated with utility formation. For the purpose of this evaluation, an estimated range of \$1M-\$3M was the assumed cost associated with utility formation.

The amortization of the upfront costs associated with this alternative was performed over a 30-year period at a rate of 2.4%. **Table 69** provides a summary of the estimated range of capital and utility start up costs. The table also includes the amortized cost over 30 years and the resulting estimated cost per 1000 gallons of water produced. For this alternative it is estimated that the annual amortized cost for capital and utility start up is \$4.08 – \$6.14 per 1,000 gallons of water produced.

<b>Table 69: Capital Utility Startup Cost Summary</b>		
<b>Upfront Investment Cost</b>	<b>Low</b>	<b>High</b>
Capital Costs	\$268,000,000	\$402,000,000
Utility Start Up Costs	\$1,000,000	\$3,000,000
<b>Subtotal Capital and Start Up Costs</b>	\$269,000,000	\$405,000,000
<b>Assumed Municipal Bond Rate</b>	2.4%	2.4%
30-Year Amortized Cost @ 2.4%	\$12,590,000 / year	\$18,950,000 / year
Total Water Produced Annually	3084 MG	3084 MG
<b>Annual Amortized Cost for Capital and Utility Start Costs / 1000 gallons treated</b>	<b>\$4.08</b>	<b>\$6.14</b>

### Administration, Operation, and Maintenance Cost

Administration, operation, and maintenance (O&M) costs were evaluated for the Town owned membrane facility at the Quadrille site. Costs were estimated based on published information provided within the American Water Works Association (AWWA) Reverse Osmosis and Nanofiltration Manual of Water Supply Practices (M46). Additionally, costs associated with the operation and maintenance of the raw water supply water distribution systems were evaluated based on evaluation of AWWA 2019 Benchmarking Survey (AWWA Survey) and knowledge of similar distribution operation and maintenance costs around Palm Beach County. Using a similar 10 MGD Nanofiltration facility O&M break down from the M46 reference, a cost per 1,000 gallons produced was calculated. The O&M cost includes:

- Labor
- Chemicals
- Power Required
- Filters
- Membrane Replacements
- Other Materials

Additionally, an estimated administration cost was included based on knowledge of similar administration costs within Palm Beach County.

**Table 70** provides a summary of the estimated O&M costs for the membrane facility at the Quadrille site alternative. Costs are provided per 1,000. gallons of treated water. For this alternative an additional \$2.87 per 1000 gallons produced will be required to support administration, operations, and maintenance for the potable water system.

<b>Table 70: Summary of Operation and Maintenance Costs</b>	
<b>O&amp;M</b>	<b>\$/ 1,000 gallons</b>
Plant O&M and Administration	\$2.32
Distribution O&M	\$0.55
<b>Total Cost</b>	<b>\$2.87</b>

### Asset Replacement Costs

Costs were developed to address asset lifecycle replacement needs. A pipeline renewal program cost was estimated to account for the need to replace the entire piping system as pipelines come to the end of their useful lives. On average, a pipelines lifespan is about 75-years. The total present-day cost of replacing the distribution system, including all the proposed piping of this alternative is \$290M.

A treatment facility renewal program cost was also estimated to account for the asset replacement associated with the treatment facility as parts of the treatment process near the end of their useful lifespan. On average, a treatment facilities lifespan is about 50-years. The total present-day cost of \$90.6M was used because this was the capital cost of the treatment facility as previously shown in **Table 68**.

<b>Asset Replacement Cost</b>	<b>Pipeline</b>	<b>Treatment</b>
Present day replacement Cost	\$290M	\$90.6M
Lifecycle	75 years	50 years
Inflation rate	2.5%	2.5%
Amortized Annual Cost	\$8.58M	\$3.17M
Total Annual Water Produced	3084 MG	3084 MG
<b>Annual Amortized Cost for Capital and Utility Start Costs / 1000 gallons treated</b>	<b>\$2.78</b>	<b>\$1.03</b>

#### Bulk Water Purchase

For this option, the City will be purchasing bulk water from the City for further treatment at the Quadrille site. A review was performed of a 2015 executed bulk water agreement between the City and the Solid Waste Authority (SWA). Under this agreement the SWA purchases bulk water from the City to support facility operation. Under the agreement, the City provides the SWA with up to 400,000 gpd of potable water. The City and SWA have agreed on a wholesale bulk rate of \$3.81 per 1,000 gallons. The agreement states that the rate may be amended “from time to time”, and the City must provide SWA notice of rate change no less than 30 days prior to change. Additionally, the agreement indicates that SWA has the right to request an increase in bulk water.

The City will likely perform a rate study to develop a bulk rate to provide potable water to the Town. Assuming a bulk rate of \$3.81/1000 gallons. It is anticipated that the Town would pay \$14.6M annually to purchase water from the City.

#### Summary of Membrane Treatment Facility at Quadrille Estimated Costs

A summary of the total cost to produce 1,000 gallons is presented below in **Table 72**. It is estimated that for the Membrane Facility at Quadrille alternative, the estimated conceptual cost to produce 1,000 gallons of water is \$14.58 – \$16.64.

<b>Costs</b>	<b>Low - \$ / 1,000 gallons</b>	<b>High - \$ / 1,000 gallons</b>
Capital and Utility Formation Cost	\$4.08	\$6.14
Plant O&M and Administration	\$2.32	\$2.32
Distribution O&M	\$0.55	\$0.55
Pipeline Renewal Program	\$2.78	\$2.78
Treatment Plant Renewal Program	\$1.03	\$1.03
Bulk Water Agreement	\$3.81	\$3.81
<b>Total Annual Cost / 1000 gallons</b>	<b>\$14.58</b>	<b>\$16.64</b>

## 6.3 UPGRADE CITY OF WPB TREATMENT PLANT

The purpose of the investigation into upgrading of the WPB Treatment Plant is to explore a financial partnership with the City that would include a phased water treatment upgrade and replacement program that will include conversion of the City's 47 MGD facility from the currently treatment processes (PAC, Lime softening, settling, carbon and sand filtration, UV disinfection, and chloramine disinfection) to a reverse osmosis treatment facility. This option explores two different approaches for implementation. The first approach to implementation considered a phased approach to the WTP upgrade and replacement that will add approximately 10 MGD of RO treatment capacity at the existing City Water Treatment Plant every 5 years. The second approach to implementation considered constructing the improvement in a single phase. This addition of additional membrane treatment capacity would be offset by a commensurate reduction in current treatment system output, thereby not using more water than permitted by the City's existing CUP.

The long-term phasing program would ultimately need to consider a capacity expansion as water demands in the City are projected to outpace capacity in the future according to the City's master plan. The Town would like to understand total costs of such a program to get an order of magnitude cost opinion of what the Town's fair share contribution could be.

A detailed discussion is provided below, that introduces the following project components associated with this additional water supply alternative.

1. Water supply
2. Potable Water System Upgrades
3. Impact Analysis
4. Economic Evaluation

An impact analysis was performed to provide a high-level understanding of how the construction and operation of this alternative will impact the Town in terms of short term and long-term community impacts.

Additionally, an economic evaluation was performed and considers operation, maintenance, and administration associated with the raw water, potable treatment, and distribution systems. Additional costs considered in the economic evaluation include costs associated with an asset renewal program, which would provide replacement costs associated with renewal of the existing pipelines and proposed treatment facility assets.

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### 6.3.1 WATER SUPPLY

As presented in Phase 1, The City's raw water supply is obtained from Clear Lake and SFWMD Canal (L-8) Tieback surface waters. The City also has two wellfields where groundwater is withdrawn from the East Coast Surficial aquifer system (SAS), however this supply option is only available during specific drought conditions. The option to partner with WPB in a phased expansion to enhance water treatment processes to provide a higher level of treatment, will rely on continued use of the existing water supplies currently permitted and allocated to the City under SFWMD Consumptive Use Permit (CUC # 50-00615-W).

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### 6.3.2 POTABLE WATER SYSTEM UPGRADES

Potable water distribution system upgrades are required to replace aged infrastructure as identified in the current Franchise Agreement, and to replace critical infrastructure as identified in the City's 2015 Master Plan. A summary of these improvements is provided below:

### Distribution Improvements to Maintain System Pressure

This water supply alternative will utilize the existing five (5) Intracoastal Waterway crossings and will continue to maintain current level of service, therefore not additional potable water distribution system upgrades are required for this alternative to maintain system pressures.

This is one of two water supply alternatives that utilizes the existing Intracoastal Waterway crossings, if the City proceeds with this alternative, it is recommended that the City further evaluate the condition of the crossings and consider replacing crossings if the condition warrants. Of note, the original pipeline installed at Crossing 3 has an installation date of 1937 and should be evaluated as a priority for continued use and reliability.

### Distribution Improvements to Replace Aged Infrastructure

Similar to the first option, this option will require the replacement of the pipelines as previously identified for replacement within the Franchise agreement that are considered necessary as part of each alternative. These pipe replacements are the same for all alternatives discussed herein.

As such, the pipeline replacement requirements include only 16,920 linear feet of pipeline replacement. An inventory of pipelines requiring replacement as part of this alternative is provided in **Table 73**. Proposed replacements will be with equivalent pipe diameters, however all 4-inch and 6-inch water mains within the Town, when replaced, will be replaced with 8-inch diameter water mains.

<b>Table 73: Distribution System Improvements to Replace Aged Infrastructure</b>	
Size (in.)	Quantity (LF)
8"	15,960
10"	960
Total	16,920

### Distribution Improvements to Replace Critical Infrastructure

In addition to pipeline improvements associated with maintaining system pressure and replacing aged infrastructure, the following pipelines have been identified as critical for replacement within the 2015 Master Plan and are considered necessary as part of this alternative. Since this option does not include the upsizing or upgrading of any of the existing water distribution system mains within the Town, all pipelines identified in the 2015 Master Plan as critical and listed in **Table 74** are recommended to be replaced under this option.

**Table 74: Water Distribution Candidate Project's Details**

Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM4	WSP24790	859	195	35,490	16	CAS	1964
WM4	WSP24791	1462	215	32,680	16	CICL	1967
WM5	WSP30096	962	220	24,640	12	CAS	1950
WM7	WSP12603	6	215	21,070	8	AC	1972
WM7	WSP31599	25	215	21,070	8	AC	1972
WM7	WSP32451	3063	190	18,620	8	CICL	1972
WM12	WSP23657	3374	180	20,160	16	DIP	1950

### 6.3.3 IMPACT ANALYSIS

An evaluation of this alternative in terms of the anticipated near-term and long-term impacts to the community was performed. Near-term impacts are primarily associated with construction activities. Construction projects have different degrees of complexity associated with the location of the construction, the type of construction required, the number of locations where work is required, and the length of time required to complete the construction.

#### Near Term Community Impacts

Since this option primarily includes construction of water treatment plant improvements on the City owned water treatment facility site, the construction is anticipated to impact adjacent parcels in terms of traffic and noise associated with construction vehicles and activities.

For this option, the construction of over 26,700 LF in distribution system improvements within the Town poses the most impact to the community, however the extent of the impact will be significantly less since there is not an additional need to upsize and/or upgrade major infrastructure to convey flows within the Town. The construction of the required distribution improvements will include construction within Town and FDOT right of way. These types of construction activities include open cut and trenchless construction techniques within highly congested corridors with limited right-of-way, and significant impacts can be anticipated to community. The rights-of-way in the Town are narrow and densely packed with utilities and contain areas of very poor soils. Work within the Town's right-of way will be required lane and street closures, impacting resident and business access. Additionally, many of the corridors where improvements are proposed include hurricane evacuation routes.

#### Long Term Community Impacts

From a long-term impact perspective, options that continue to rely on water supplied by the City will continually be scrutinized and public concern and stakeholder involvement is anticipated to be higher for this scenario as the water supply and treatment is a regional issue and there are many more stakeholders associated with the City's system, versus a Town owned system.

Additionally, since this option will require a phased approach to converting the existing WTP to membrane technology and the City will be balancing providing enhanced treated water to existing customers as well as future customers within growth areas.

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#### 6.3.4 ECONOMIC EVALUATION

An economic evaluation was performed as a way of comparing the overall cost implications of each alternative relative to each other. The economic analysis is conceptual in nature and does not constitute a rate study, nor should these figures be misinterpreted as rates that a customer would be required to pay. A rate study performed by a municipal utility financial consultant would be required to identify actual financial strategies and potential customer rates. The purpose of the economic analysis is to provide a basis of comparing relative economic impact of each alternative. The analysis evaluates anticipated conceptual expenditures associated with each alternative including:

1. Capital and Utility Start Up Costs
2. Administration, Operations, and Maintenance Costs
3. Asset Replacement Costs

##### Capital and Utility Start Up Costs

An updated Conceptual Order of Magnitude Capital Costs for upgrading the current City of WPB Treatment facility was developed based on conceptual refinements developed as part of Phase 3 of the study and is presented **Table 75**. These capital cost figures are based on engineering judgement considering current project costs and cost trends observed in ongoing projects in Florida and are conceptual in nature. The costs include the water supply, treatment, and water distribution system upgrades for this alternative. These costs also include the 2015 Master Plan identified pipeline replacements and the remaining franchise agreement pipeline replacements.

Since Kimley-Horn does not control the cost of labor, materials, equipment, or services furnished by others, methods of determining prices, or competitive bidding or market conditions, any opinions rendered as to costs, including but not limited to opinions as to the costs of construction and materials, shall be made on the basis of its experience and represent its judgment as an experienced and qualified professional, familiar with the industry. Kimley-Horn cannot and does not guarantee that proposals, bids or actual costs will not vary from its opinions of cost.

The opinion of cost prepared is considered to be a Class 5 estimate, in accordance with the AACE Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries. Class 5 estimates are typically applied to conceptual screening of alternatives. Class 5 estimates are generally based on very limited information and as a result have a wide range of accuracy. Class 5 estimates are utilized for business planning purposes and assessment of initial viability. Typical accuracy ranges for Class 5 estimates are -20% to -50% on the low range and +30% to +100% on the high range. As such, the opinions are planning level only and include a 35% contingency factor to account for the limited detail available at this level of evaluation. The purpose of the order of magnitude opinion of probable cost does, however, provide a good basis for evaluating the differences in costs between the alternatives.

<b>Table 75: Upgrade City Water Treatment Plant</b>		
<b>ITEM</b>	<b>ITEM OF WORK</b>	<b>SUBTOTAL</b>
1	Phased WTP Upgrades to RO Facility	\$278,700,000
2	Deep Injection Wells	\$39,900,000
3	Franchise Agreement Pipeline Replacements	\$10,200,000
4	Critical Pipeline Improvements Per Masterplan	\$9,100,000
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>		<b>\$337,900,000</b>
Engineering/Administration (20%)		\$67,600,000
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION:</b>		<b>\$405,500,000</b>
Contingency (35%)		\$141,900,000
<b>SUBTOTAL CAPITAL, ENGINEERING, ADMINISTRATION AND CONTIGENCY:</b>		<b>\$547,400,000</b>
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST:</b>		<b>\$547,400,000 to \$821,100,000</b>

Implementation of Upgrades to the City's WTP

The implementation of the upgrades to the City's WTP was evaluated based on performing the upgrades in a phased approach and performing the upgrades as one phase.

For the phased approach, the implementation of the upgrades at the City's WTP includes the conversion of 10 MGD of existing treatment capacity to membrane technology every 5 years. The City's existing WTP is rated as a 47 MGD capacity plant. This phased approach would require 25 years to complete the upgrade with the last phase only requiring a 7 MGD upgrade. The estimated cost associated with the treatment system upgrades per 1,000 gallons of water treated during the 25-year phased implementation period was estimated based on the present worth cost for this alternative. **Table 76** provides a summary of the estimated range of capital costs and a range of estimated cost per 1,000 gallons of treated water produced. It is estimated that the cost for capital is \$2.96 - \$4.43 per 1,000 gallons of water produced via the membrane system.

<b>Table 76: Capital and Utility Startup Cost Summary</b>		
<b>Upfront Investment Cost</b>	<b>Low</b>	<b>High</b>
Capital Costs	\$547,400,000	\$821,100,000
Total Membrane Produced Water over 25-year Phased Program	250,025 MG	250,025 MG
<b>Capital Costs / 1000 gallons treated</b>	<b>\$2.96</b>	<b>\$4.43</b>

The cost to treat 1,000 gallons was estimated for the for implementing the improvements as a single phase. For this option, the amortization of the upfront costs phase associated with this alternative was performed over a 30-year period at a rate of 2.4%. **Table 77** provides a summary of the estimated range of capital costs and the amortized cost over 30 years and the resulting estimated cost per 1,000 gallons of water

produced. For this alternative it is estimated that the annual amortized cost for capital and utility start up is \$2.02 – \$3.02 per 1,000 gallons of water produced.

<b>Table 77: Capital Cost Summary</b>		
<b>Upfront Investment Cost</b>	<b>Low</b>	<b>High</b>
Capital Costs	\$547,400,000	\$821,100,000
<b>Assumed Municipal Bond Rate</b>	2.4%	2.4%
30-Year Amortized Cost @ 2.4%	\$25,600,000 / year	\$38,400,000 / year
Total Water Produced Annually	12,707 MG	12,707 MG
<b>Annual Amortized Cost for Capital and Utility Start Costs / 1000 gallons treated</b>	\$2.02	\$3.02

#### Administration, Operation, and Maintenance Cost

O&M costs were evaluated for the Upgraded City of West Palm Beach Membrane facility. Costs were estimated based on the 2021 Water Sales in the Town provided by the City and the average annual water usage in the Town. A total of \$5.73 / 1,000 gallons was calculated.

The breakdown of what this average cost includes is not published and is undetermined. It is assumed that this cost includes only administration, operations and maintenance costs for the plant and distribution system and is used as such for this study.

#### Asset Replacement Costs

Costs were developed to address asset lifecycle replacement needs. A pipeline renewal program cost was estimated to account for the need to replace the entire piping system as pipelines come to the end of their useful lives. On average, a pipelines lifespan is about 75-years. The total present-day cost of replacing the distribution system, including all the proposed piping of this alternative is \$235M.

A treatment facility renewal program cost was also estimated to account for the asset replacement associated with the treatment facility as parts of the treatment process near the end of their useful lifespan. On average, a treatment facilities lifespan is about 50-years. The total present-day cost of \$338M was used because this was the capital cost of the treatment facility as previously shown in **Table 75**. A summary of the asset replacement costs is shown in **Table 78**.

<b>Table 78: Summary of Asset Replacement Costs</b>		
<b>Asset Replacement Cost</b>	<b>Pipeline</b>	<b>Treatment</b>
Present day replacement Cost	\$235M	\$338M
Lifecycle	75 years	50 years
Inflation rate	2.5%	2.5%
Amortized Cost	\$6.94M	\$4.29M
Total Annual Water Produced	3084 MG	12707 MG
<b>Annual amortized cost for Capital and Utility Start Costs / 1000 gallons treated</b>	<b>\$2.25</b>	<b>\$0.93</b>

Summary of Upgrade City of West Palm Beach Estimated Costs

A summary of the total cost to produce 1,000 gallons is presented below in **Table 79**. It is estimated that for the Phased upgrade of the City's WTP alternative, the estimated conceptual cost to produce 1,000 gallons of water is \$11.87 – \$13.35. Table 79 introduces a fourth alternative that assumes upgrading the City treatment system is conducted as a single program. This alternative reduces the program cost by eliminating the assumed inflation for the future plant upgrading and allows all customers to receive water produced by the upgraded treatment process at conclusion of a single construction program.

It is estimated that for a single phase program upgrade of the City's WTP, the estimated conceptual cost to produce 1,000 gallons of water is \$10.93– \$11.93.

<b>Table 79: Summary of City of West Palm Beach WTP Upgrade Cost per 1,000 Gallons</b>				
<b>Costs</b>	<b>Phased Implementation of City Treatment Plant Upgrade</b>		<b>Single Phase Implementation City Treatment Plant Upgrade</b>	
	<b>Low - \$/ 1,000 gallons</b>	<b>High - \$/ 1,000 gallons</b>	<b>Low - \$/ 1,000 gallons</b>	<b>High - \$/ 1,000 gallons</b>
Capital Cost	\$2.96	\$4.43	2.02	\$3.02
Plant O&M and Administration	\$5.73	\$5.73	\$5.73	\$5.73
Distribution O&M				
Pipeline Renewal Program	\$2.25	\$2.25	\$2.25	\$2.25
Treatment Plant Renewal Program	\$0.93	\$0.93	\$0.93	\$0.93
<b>Total Annual Cost / 1000 gallons</b>	<b>\$11.87</b>	<b>\$13.35</b>	<b>\$10.93</b>	<b>\$11.93</b>

## 6.4 EVALUATION OF ALTERNATIVES

The following alternatives were identified to further evaluate as part of the third phase of the study:

- **Evaluation of Desalination Facility at Phipps Park Detailed Site Evaluation (Section 6.1)**
- **Evaluation of Membrane Treatment Facility at Quadrille Site Evaluation (Section 6.2)**
- **Partnership with the City of West Palm Beach to Phase in Membrane Treatment (Section 6.3)**

In the respective sections mentioned above, each of the alternatives were evaluated to provide a deeper understanding of the project components and associated community impacts if implemented. Each of the alternatives presented were found to be feasible. An economic evaluation was performed for each alternative to provide a capital cost, utility formation cost, and a detailed cost per 1,000 gallons of water produced that includes plant and distribution operation and maintenance, a pipeline renewal program, a treatment plant renewal program, and a bulk water purchase when required.

A summary of each of the alternatives is provided in **Table 80** and **Table 81** below.

It is important to note in **Table 80** that a 47 MGD capacity water plant is being constructed instead of the 10 MGD facility in the other two alternates. Additionally, the 47 MGD facility is being constructed partially in the future which makes the present worth value much higher. The capital cost in this alternative is assumed to be the responsibility of all customers of the City water system, including those that will connect in the future.

<b>Table 80: Summary of Capital Costs and Utility Formation Costs</b>						
	<b>10 MGD Desalination Treatment Facility at Phipps Park</b>		<b>10 MGD Membrane Treatment Facility at Quadrille</b>		<b>47 MGD City of West Palm Beach Upgrade</b>	
	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>	<b>Low</b>	<b>High</b>
Capital Cost	\$351M	\$526M	\$268M	\$402M	\$547M	\$821M
Utility Formation	\$1M	\$3M	\$1M	\$3M	NA	NA
Subtotal Capital Cost and Utility Formation	\$352M	\$529M	\$269M	\$405M	\$547M	\$821M

**Table 81** presents an estimation of the total program costs for each alternative expressed as a cost per 1,000 gallons per month of water used by each customer. In the case of the two alternatives that benefit only Town customers, the calculations assume Town customers must pay the entire program cost. The Alternative to upgrade the City water treatment system calculates the cost/1,000 gal for all customers that will benefit from the entire 47 MGD facility.

**Table 81** includes the fourth alternative that assumes upgrading the City treatment system is conducted as a single program. This alternative reduces the program cost by eliminating the assumed inflation for the future plant upgrading and allows all customers to receive water produced by the upgraded treatment process.

The capital cost presented in **Table 81** includes the cost to finance the program over a 30-year bond at 2.4% interest rate.

Table 81: Summary of Cost to Produce 1,000 Gallons								
	10 MGD Desalination Treatment Facility at Phipps Park		10 MGD Membrane Treatment Facility at Quadrille		47 MGD City of West Palm Beach Phased Upgrade		47 MGD City of West Palm Beach One Program Upgrade	
	Low	High	Low	High	Low	High	Low	High
Capital Cost	\$5.34	\$8.03	\$4.08	\$6.14	\$2.96	\$4.43	\$2.02	\$3.02
Plant O&M	\$3.78	\$3.78	\$2.32	\$2.32	\$5.73	\$5.73	\$5.73	\$5.73
Distribution O&M	\$0.50	\$0.50	\$0.55	\$0.55				
Pipeline Renewal Program 75-years	\$2.29	\$2.29	\$2.78	\$2.78	\$2.25	\$2.25	\$2.25	\$2.25
Treatment Plant Renewal Program 50-years	\$1.60	\$1.60	\$1.03	\$1.03	\$0.93	\$0.93	\$0.93	\$0.93
Bulk Water Purchase	NA	NA	\$3.81	\$3.81	NA	NA	NA	NA
Total \$ / 1,000 gal	\$13.50	\$16.20	\$14.58	\$16.64	\$11.87	\$13.35	\$10.93	\$11.93

While the economic evaluation is conceptual in nature and does not reflect the details needed to develop rates, it provides a basis for comparison to evaluate the overall economic impact of each alternative. In summary, the economic evaluation suggests the following:

**10 MGD Desalination Treatment Facility at Phipps Park** – While the capital costs associated with the construction of the desalination plant are higher than those estimated for the construction of the Membrane Treatment Facility at Quadrille, the overall cost to reliably produce 1,000 gallons of potable water is lower than the Quadrille site option. This is primarily due to the fact that the Quadrille site option requires the additional bulk water purchase cost. The overall estimated cost for the Phipps park desalination alternative ranges from \$13.50 – \$16.20/ 1,000 gallons.

**10 MGD Membrane Treatment Facility at Quadrille** - The capital costs associated with this option are the lowest. However, since this alternative includes the bulk water purchase, the overall cost to reliably produce 1,000 gallons of potable water appears to be highest overall cost ranging from \$14.58 – \$16.64/ 1,000 gallons.

**47 MGD City of West Palm Beach Upgrade** – The capital costs associated with this alternative reflect the highest cost to implement. However, since the total project costs will be distributed across the City’s entire services area, including the Town, the overall cost to reliably produce 1,000 gallons of potable water appears to be lowest overall cost ranging from \$10.93 – \$11.93/ 1,000 gallons.

Implementation Schedule- The Town’s current franchise agreement with the City expires in 2029, and it is important to understand the timeframes required to implement these three alternatives. A conceptual

implementation schedule of the **Section 6** alternatives is provided in **Figure 32** below. It demonstrates that the longest duration elements are those involving substantial pipeline improvements, either in the Town or the City.



# Appendix A

## 1999 Franchise Agreement



# TOWN OF PALM BEACH

## MEMORANDUM

TO: Albert P. Dusey, Director of Public Works

FROM: Robert J. Doney, Town Manager *RJD*

SUBJECT: Retail Water Service and Franchise Agreement Between the Town and the City of West Palm Beach

DATE: June 23, 1999

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Attached for your review and reference files is a copy of the subject Agreement, fully executed by both parties.

At the appropriate times and as required, please insure that all provisions of this Agreement are fully complied with by both the City and the Town. Please continue to follow-up with actions, as required.

In addition, as we have discussed, please plan to provide an annual update to the Mayor and Town Council regarding the City's implementation of the \$16.5 million to \$18 million capital improvement program required by the Agreement. Please include in that report a detailed list of the locations and scopes of all projects to be completed during the following construction season.

By copy of this memorandum to Mr. Randolph and Mrs. Pollitt, I am providing one (1) fully executed original Agreement to each and requesting that they assist you with follow-up actions, as needed. By copy of this memorandum and attachment to all other noted Town Staff, I am advising of the successful conclusion of this matter, enclosing same for their review and reference files, and requesting that they also assist you with follow-up actions, as needed.

June 23, 1999  
Page 2

Thank you for your continued attention and actions on this very important subject matter.

RJD:cc

Attachment

cc: Mayor and Town Council  
John C. Randolph, Town Attorney (with original Agreement)  
Mary A. Pollitt, Town Clerk (with original Agreement)  
Vincent K. Elmore, Chief of Fire-Rescue  
Jane Skittone, Finance Director  
Robert L. Moore, Director of Planning, Zoning, and Building  
David F. Jakubiak, Assistant to the Town Manager

**RETAIL WATER SERVICE AND FRANCHISE AGREEMENT**

This Retail Water Service and Franchise Agreement (hereinafter referred to as the "Agreement"), made and entered into by and between the TOWN OF PALM BEACH, a Florida municipal corporation (hereinafter referred to as "Town"), and the CITY OF WEST PALM BEACH, a Florida municipal corporation (hereinafter referred to as "City"):

WITNESSETH:

WHEREAS, the City has provided water to retail consumers within the Town pursuant to a certain franchise granted by the Town to the City by Town Ordinance 1-65, and an agreement of the parties dated January 25, 1965 (the "Franchise"); and

WHEREAS, subsequent to the termination of the Franchise, the City has continued to provide water to retail consumers within the Town, but without benefit of a current agreement between the parties; and

WHEREAS, the City and the Town desire to enter into this Retail Water Service and Franchise Agreement to explicitly set forth the terms and conditions pursuant to which the City will continue to provide water to the Town and retail consumers within the Town.

NOW, THEREFORE, in consideration of the mutual benefits to be derived by the parties, the adequacy and sufficiency of which is hereby acknowledged, the City and the Town covenant and agree as follows:

SECTION I

DEFINITIONS

A. The term "Town Consumers," as utilized herein, shall mean all individual users of water located within the Town, and shall include residential, commercial, multi-family, municipal, and any other users located in the Town who are furnished water by the City pursuant to this Agreement.

B. The term "Bond Documents" means Resolution No. 240-93 adopted by the City Commission of the City on November 29, 1993, as amended and supplemented by Resolution No. 264-93, Resolution No. 332-96 and Resolution No. 184-98 and as further amended and supplemented, from time to time, consistent with the provisions of Section XIII.M. below, and Resolution No. 280-96, adopted by the City Commission of the City on October 7, 1996.

C. "Outstanding Bonds" means the City's (i) Utility System Revenue Refunding Bonds, Series 1993A, (ii) Utility System Revenue Bonds, Series 1993B, (iii) Utility System Revenue Bonds, Series 1996, (iv) Utility System Revenue Refunding Bonds, Series 1998, and (v) Utility Expansion Revenue and Refunding Note, Series 1996, issued pursuant to the Bond Documents.

D. The term "water," as utilized herein, shall mean potable water, produced, treated, stored, transmitted and distributed for purposes of human consumption, irrigation, fire protection, and all other potable and non-potable uses.

E. The term "Water Distribution System," as utilized herein, shall mean all of the City's right, title and interest in the potable water distribution piping, storage, pumping,

metering and other such appurtenances located within the Town necessary for the proper delivery of water for potable and non-potable purposes, including permits which are unique to the potable water distribution elements located in the Town and which do not apply to the City's water distribution facilities and which are transferrable to the Town. The Water Distribution System shall expressly include the five subaqueous crossings located within the Intracoastal Waterway which deliver potable water from the City to the Town including that portion of such crossings located within the corporate limits of the City to the western boundary of the Intracoastal, excluding the western control valves.

F. The term "water pressure," as utilized herein, shall mean the internal pressure expressed in pounds per square inch within the Water Distribution System, up to and including the point at which metering occurs, or, on the consumer's side of any backflow prevention device, all of which are considered to be the point of delivery. The minimum pressure at this point of delivery during peak non-fireflow conditions is to be 40 psi.

## SECTION II

### GRANT OF FRANCHISE

A. The Town hereby grants to the City and the City hereby accepts the exclusive right and privilege to provide water to the Town Consumers for potable and non-potable purposes through the Water Distribution System (the "Franchise"). The territory to which the Franchise is applicable is all geographical territory within the municipal limits of the Town of Palm Beach, Florida, as of the effective date hereof, as such date is hereinafter defined. The Franchise shall include the right to erect, construct, operate, maintain and improve the Water Distribution System in the Town and to lay and maintain any lines,

pipes, mains, service connections, meters, and other appurtenances necessary therefor, in, along, under, and across any public alley, street, road, easement and highway of the Town. Notwithstanding the foregoing exclusive right and privilege granted by the Town, the Town hereby reserves the rights described in Section II.B., II.C. and II.F. below. The Town acknowledges and agrees that the City currently provides water to the Town Consumers for all purposes through the Water Distribution System and shall continue to provide water for all purposes for the term of this Agreement. The City hereby accepts such rights and privileges and the obligations set forth herein that accompany the retail sale of water to the Town Consumers.

B. The Town shall have the right to construct a limited capacity reverse osmosis water treatment facility (the "Town R.O. Facility"), such limited capacity not to exceed 6.0 million gallons per day ("MGD") pursuant to a consumptive use permit issued by South Florida Water Management District ("SFWMD"). The Town R.O. Facility shall be used solely during emergency drought conditions as declared by SFWMD pursuant to Chapter 40E-21, F.A.C., Water Shortage Plan, as such chapter may be amended from time to time ("Emergency Drought Conditions"), and solely for the purpose of distribution to supplement irrigation within the Town which cannot be met by the City during such emergency drought conditions and at such time as is necessary to maintain the facility in a standby, yet active, status. The Town R. O. Facility shall comply with all applicable governmental regulatory requirements, and the City shall have the right to object to any permit application by the Town if the City determines in good faith that the granting of such permit application will impact or compete adversely with the City's consumptive use permit for its water system

operations or any future application by the City for limited aquifer exemptions. The Town shall construct, maintain, and operate the Town R.O. Facility at its sole cost and expense. The City shall have the right to approve the connection of the Town R.O. Facility to the Water Distribution System, which approval shall not be unreasonably withheld. The Town shall bear the responsibility and liability for any reduction in water quality that results from the connection of the Town R.O. Facility to the Water Distribution System. The City shall, at the Town's expense, install all necessary backflow prevention devices at each subaqueous crossing or at such other appropriate locations as agreed to by the parties, to ensure the integrity of the water distribution system located within the City. The City shall pay the Town for the amount of Town R.O. Facility water metered due to Emergency Drought Conditions at a rate which is calculated according to the following formula (the "Town R.O. Facility Rate Formula"):

$$\frac{\text{Town R.O. Facility Water Metered at the Point of Connection with the Water Distribution System}}{\text{Total Water Sold to Town Consumers}} \times \frac{\text{Total Commodity Revenue Billed to Town Consumers}}{\text{Total Commodity Revenue Billed to Town Consumers}} \times .95$$

For purposes of the Town R.O. Facility Rate Formula, commodity revenue is total revenue billed from the application of the City's consumption charges to metered water use by the Town Consumers. The Town R.O. Facility Rate Formula shall be calculated on a monthly basis and the City shall pay the Town for amounts due, if any, by the 20th day of the following month. The Town and the City shall synchronize the reading of the Town R.O. Facility meter with the reading of the City's meters for Town Consumers.

C. The Town shall have the right to permit the owners of any golf course located within the Town boundaries to construct a facility for the production and delivery of water to be used solely within the boundaries of the golf course. No golf course owner shall be permitted to distribute such water beyond the boundaries of such owner's golf course. The Town shall take all appropriate action to strictly enforce this provision. At such time as the City may adopt an ordinance that prohibits on-site facilities for potable water purposes, the Town shall use its best efforts to also adopt an ordinance that contains the same prohibition within the Town, excluding the Town R.O. Facility.- Such ordinance shall remain in effect, and shall be strictly enforced by the Town for the duration of this Agreement so long as the City's ordinance remains in effect. The City will defend the Town in any lawsuit filed during the term of this Agreement which challenges this ordinance for prohibition of on-site facilities.

D. The Town acknowledges that the Water Distribution System is owned by the City, including any portions of the system which may have been or shall be constructed by third parties and dedicated to the City and including any portions of the system which may be constructed, renewed or replaced under the terms of this Agreement. The Town further acknowledges that all facilities located within the City which may directly or indirectly serve the Town are exclusively owned by and are the property of the City (the "City Facilities"). The Town agrees that the Town has no right, title or interest in the City Facilities and may not make any claim now or in the future to the City Facilities. The Town acknowledges that it may not make any claim to the Water Distribution System or future improvements to the

Water Distribution System until the Town acquires the Water Distribution System pursuant to Section IX below.

E. The City agrees to supply the Town Consumers with all of their water needs during the term of this Agreement. The City shall not restrict water supplied to the Town Consumers except as ordered by the SFWMD during Emergency Drought Conditions. The City shall not impose a capacity charge or impact fee at or after transfer of ownership of the Water Distribution System, pursuant to Section IX below.

F. All work conducted by the City within the Town shall be performed by the City in conformance with the "Standards Applicable to the Public Rights-of-Way and Easements Within the Town of Palm Beach," dated May, 1998, a copy of which has been provided to the City and which is incorporated herein by reference. The Town may from time to time amend provisions of the "Standards Applicable to the Public Rights-of-Way and Easements Within the Town of Palm Beach." When any such amendment would only affect the Water Distribution System, the amended "Standards Applicable to the Public Rights-of-Way and Easements Within the Town of Palm Beach" document shall supersede the requirements set forth in this paragraph only upon the prior written consent of the City, which consent shall not be unreasonably withheld. The City agrees that no above ground storage facilities for the Water Distribution System shall be erected in the Town without the prior written approval of the Town.

G. The "Effective Date" of this Agreement shall be October 1, 1999, subject to the following: 1) dismissal of the lawsuits pursuant to Section X of this Agreement; 2) removal of the surcharge by no later than July 1, 1999; and 3) reimbursement to the

Town of \$258,906.12 for the water main relocation relating to the D-14 project within the Town.

H. The Town acknowledges that the City provides retail water service to South Palm Beach through the Water Distribution System. Until the Town acquires ownership of the Water Distribution System, the City shall continue to have the right to provide retail water service to South Palm Beach using the Water Distribution System. If, however, the Town acquires the Water Distribution System in accordance with Section IX, the Town shall have the right to purchase water at a wholesale rate determined in the manner set forth in Section III below in sufficient quantities to supply South Palm Beach, provided the Town obtains the legal right to serve water consumers in South Palm Beach. If the Town chooses not to supply South Palm Beach with potable water service, the City may continue to do so, but will pay to the Town a fee of five percent (5%) of the total retail rate charges to South Palm Beach for the use of the Town's distribution system for the delivery of potable water to South Palm Beach.

### SECTION III

#### TERM

The initial term of this Agreement shall be for a period of thirty (30) years from the Effective Date (the "Initial Term") unless the Initial Term is extended pursuant to Section V.D., below. In addition to the Initial Term, the Town shall have the option to extend the Initial Term from one to four terms of five years each as determined by the Town (the "Renewal Terms"). Each Renewal Term shall be based either on the Town's election to continue to pay retail rates (the "Retail Renewal Term") or the Town's election

to pay rates based on a wholesale formula (the "Wholesale Renewal Term"). No Retail Renewal Term may follow a Wholesale Renewal Term. The Initial Term and all Retail Renewal Terms shall be referred to collectively as the "Retail Term." The Town shall give the City written notice of its intent to extend the Initial Term or any Renewal Term at least two years prior to the expiration of the Initial Term and any subsequent Renewal Term (the "Extension Notice").

The Extension Notice shall include notice of the Town's selection of the Retail Renewal Term or the Wholesale Renewal Term. The Wholesale Renewal Term shall be based on a wholesale rate to be determined by the parties in accordance with the procedure described below. A sample rate calculation using a wholesale formula shall be made by the City on or before the twenty-fifth anniversary of the Effective Date, and such wholesale formula and sample rate calculation shall be provided to the Town within sixty (60) days of such date, it being understood that such sample rate calculation may change based on applying the wholesale formula on the Transfer Date. Upon receipt by the Town of the wholesale formula and sample rate calculation, the parties shall commence good-faith negotiations to facilitate the Town, in its sole discretion, to select a Retail Renewal Term or Wholesale Renewal Term or to allow the Agreement to terminate at the end of the Initial Term.

In the event this Agreement is extended for any Wholesale Renewal Term, the following sections of this Agreement shall be of no further force or effect: Section II, except II.H; Section IV; Section V, except the last sentence of clause D(i) as it applies to said clause D(i) and clause D(ii)2; Section VII; and Section VIII.

## SECTION IV

### RATES

A. Same Rate Structure.

The Town Consumers shall be considered as in-City customers and billed in accordance with the policies and procedures approved by the City in its rate resolutions (the "Consumer Rates").

B. Covenant Not to Surcharge.

Regardless of any law or other regulation which may now or at any time in the future authorize or limit a surcharge, the Town and City by this contractual agreement agree that City hereby covenants not to impose a surcharge or premium of any kind on the Consumer Rates within the Town for the term of this Agreement. The surcharge which is presently being paid by the Town Consumers will be removed on or before July 1, 1999.

C. Town's Participation in City's Rate Making.

The Town acknowledges that the City will be required during the term of this Agreement to conduct rate studies to ensure the appropriateness of the Consumer Rates, fees and charges which may be adopted by the City from time to time. The City shall not adopt any rate change without first providing the Town thirty (30) days 'written notice of its intent to change said rates, together with a copy of the rate study.

D. Town's Acknowledgment of City's Existing Rate Structure and City's Commitment to Maintain Rate Proportionality.

The Town hereby acknowledges the validity, enforceability and applicability of the City's existing rate structure, as set forth in Resolution No. 33-99, adopted by the

City Commission on January 25, 1999, except with respect to the City's surcharge. There shall be no change in the proportional relationship of the commodity charge blocks in the rate schedule which is in effect as of the Effective Date, except as may be required by applicable mandatory laws or regulations of governmental regulatory agencies external to the City, or with the prior written consent of the Town. The City agrees to set rates in accordance with prudent rate making practices, including the recovery of fixed and variable costs. In no instance will the schedule of rates charged to the Town Consumers be higher than the schedule of rates charged to consumers within the City. Any increases or decreases in volumetric commodity portions of the rates shall be applied uniformly to each rate in each block so that each rate in each block maintains the exact same proportionality to each other as established in Resolution No. 33-99.

## SECTION V

### CAPITAL IMPROVEMENTS

#### A. Five Year Plan.

The City and Town have developed a five (5) year capital improvement plan for specific non-recurring improvements to the Water Distribution System (the "Town CIP"). The Town CIP identifies prioritized capital improvements and the scope of such capital improvements to be made in the Town. A copy of the Town CIP is attached hereto as Exhibit "A."

Subject to the funding limits provided in Section V.B. below, the Town CIP shall be substantially completed by the City within five (5) years from the Effective Date. The substantial completion date for the Town CIP may be extended if reasonably

necessary, with the consent of the Town, which consent shall not be unreasonably withheld.

B. Funding the Town CIP.

The parties are aware that the City intends to issue utility system revenue bonds (the "1999 Bonds") which bonds will include the capital costs of \$16,500,000 (net funded to include interest income during the construction period) for the Town CIP. The City agrees that in the event that \$16,500,000 is insufficient funding to complete the Town CIP, the City will, subject to the provisions of the Bond Documents, use its best efforts to issue additional debt of up to \$1,500,000 (net funded) to complete the Town CIP, it being understood by the parties that the City's maximum liability for funding the Town CIP is capped at \$18,000,000 (net funded). The pledge for repayment of the 1999 Bonds, and the \$1,500,000, if required, shall be the City's system-wide rates and charges including those derived from service to the Town Consumers. The bond documents for the 1999 Bonds shall require that a separate and distinct construction subaccount be established for the Town CIP. The City agrees that any increase in its system-wide monthly water user rate shall not, except as provided below, include as a component of such increase the annual debt service cost for the Town CIP up to the \$18,000,000 (net funded) limit; it being understood by the parties, however, that the City is required to set rates in accordance with the rate covenant contained in the Bond Documents and sufficient to make funds available for deposit into the Town R & R Account as required by Section V.E.

C. Procedure For Implementation of Town CIP.

In order to prioritize and coordinate the construction of the Town CIP and to minimize disturbance to the Town Consumers, the Town and the City staff shall meet as often as required to coordinate completion of the Town CIP.

D. Additional Town CIP.

If at any time after fifteen years from the Effective Date of this Agreement the amount in the Town R & R Account referred to in Section V.E. below is reasonably anticipated to be insufficient to pay the cost of Town R & R Projects (as defined in Section V.E. below), then the Town may provide the City with a list of projects which are required and for the funding of which there are insufficient amounts in the Town R & R Account, together with an engineering study that concludes that such R & R projects are necessary and prudent, including cost estimates for such projects (the "Town Engineering Report"). The City shall review the Town Engineering Report and list of projects and, if desired, obtain an independent engineering report (the "City Engineering Report") to verify the findings of the Town Engineering Report. The parties agree to cooperate in good faith towards resolving any discrepancies in the scope of work between the two reports and to select the additional Town R & R projects (the "Agreed Additional Town R & R Projects"). The cost of Agreed Additional Town R & R Projects during the remainder of the term of the Agreement, including any extensions as hereinafter provided, shall be funded as follows.

Until the total cumulative cost of all Agreed Additional Town R & R Projects, including pending Agreed Additional Town R & R Projects, reaches \$2,500,000, adjusted

from the Effective Date in accordance with the Handy-Whitman Index for the South Atlantic Region (the "Handy-Whitman Index"), the following options shall apply:

(i) Unless the Town elects to proceed pursuant to (ii) below, the City will, subject to the provisions of the Bond Documents, use all commercially reasonable efforts to promptly issue or incur additional debt in an amount sufficient to fund the cost of Agreed Additional Town R & R Projects and, subject to receipt of financing, shall complete installation of same. Such indebtedness shall be secured with system-wide revenues. In the event that transfer of ownership of the Water Distribution System from the City to the Town occurs pursuant to Section IX and such indebtedness remains outstanding, the Town shall pay to the City an amount sufficient to, at the election of the Town, discharge or defease such indebtedness on the Transfer Date, and any unspent proceeds of such indebtedness (including debt service reserves allocable to such indebtedness) not necessary for the funding of the Agreed Additional Town R & R Projects shall be applied to the payment of such indebtedness and payment obligation. On and after the Transfer Date and continuing until all bonds and/or other indebtedness issued by the City to finance the Agreed Additional Town R & R Projects have been retired at or prior to maturity (i.e., principal has been paid in full to the holders), the Town shall take no action which will adversely affect the tax-exempt status of such bonds or other indebtedness and shall not fail to take any action which the failure to take will adversely affect the tax-exempt status of such bonds or other indebtedness;

(ii) At the election of the Town, the Town may incur indebtedness in order to finance the cost of any Agreed Additional Town R & R Projects. In the event the Town incurs indebtedness, the City shall, subject to the provisions of the Bond Documents, pay

to the Town from system-wide revenues, amounts sufficient to pay the debt service on such indebtedness as the same becomes due and payable. At such time, if ever, as transfer of the Water Distribution System from the City to the Town occurs, the City's obligation to make payments to the Town pursuant to this subparagraph (ii) shall terminate.

Once the total cumulative cost of all Agreed Additional Town R & R Projects, including pending Agreed Additional Town R & R Projects, exceeds \$2,500,000, as adjusted, then the Town may select one of the following options to fund the cost of Agreed Additional Town R & R Projects exceeding \$2,500,000, as adjusted:

1. The Town may pay for such amounts that exceed \$2,500,000, as adjusted, without any reimbursement from the City from system-wide revenues or the Town R & R Account; or

2. The City may issue additional indebtedness as provided in Section IV.D.(i) above, and the parties shall comply with all provisions of said Section IV.D.(i). In such event, the Initial Term of the Agreement shall be extended in accordance with the following schedule based upon the total cumulative indebtedness for all Agreed Additional Town R & R Projects:

<u>Cumulative Additional Town CIP*</u>	<u>Cumulative Retail Extension</u>
> \$ 2.5 ≤ 5.0M	5 Years
> \$ 5.0 ≤ 7.5M	10 Years
> \$ 7.5 ≤ 10.0M	15 Years

\*All of the foregoing amounts shall be adjusted from the Effective Date in accordance with the Handy-Whitman Index.

All improvements installed as Agreed Additional Town R & R Projects shall be part of the Water Distribution System.

E. Renewal and Replacement.

The City shall perform annual renewal and replacement projects on the Water Distribution System (the "Town R & R Projects"). Commencing on the Effective Date of this Agreement and each month thereafter, the City shall, in connection with the Town R & R Projects, deposit in a separate account (the "Town R & R Account") created within the Renewal, Replacement and Improvement Fund established under the Bond Documents (the "R & R Fund") from revenues collected pursuant to the Bond Documents and available for deposit the following amounts: for the first five years of this Agreement, a sum equal to six (6%) percent of the monthly gross revenues received by the City from the Town Consumers; thereafter, throughout the Retail Term, an amount equal to five (5%) percent of the monthly gross revenues received by the City from the Town Consumers. The monthly amount deposited shall be based on the actual revenues received from Town Consumers for the prior month and shall be deposited by the 20th day of the succeeding month. Interest earned on such deposits shall remain in the Town R & R Account. Town R & R Projects shall be determined annually by mutual agreement of the parties, which agreement shall not be unreasonably withheld by either party. The expenditures for the Town R & R Projects shall be limited to the amounts deposited in the Town R & R Account as described above and the application of said amounts shall be subject to the provisions of the Bond Documents. The Town R & R Account may be used for any Town R & R Project which is permissible under the R & R Fund. It is the intent of this Agreement that

the Town R & R Projects may include, but shall not be limited to, work items such as replacement of an entire street block of pipe and appurtenances, valve, meter, or hydrant replacement programs, subaqueous crossing replacement and repair, storage facility upgrade/rehabilitation, and similar work involving substantive replacement or rehabilitation of significant portions of the Water Distribution System. The City shall provide the Town with a semi-annual accounting of the amounts deposited in the Town R & R Account and available for the Town R & R Projects.

At the Transfer Date, the Town shall have no claim to any undesignated funds remaining in the Town R & R Account, and all such funds shall remain with the City, subject to the following sentence. Funds in the Town R & R Account may be designated for Town R & R Projects prior to the transfer of ownership and such designated funds may be expensed after the transfer. Such designation shall not be unreasonably withheld. If the Town does not commence such projects within one year of the designation, the City shall have no obligation to release moneys from the Town R & R Account for such projects. The Town R & R Account shall be liquidated upon the earlier of the exhaustion of the funds remaining or completion of projects commenced within one year of designation of the remaining funds.

The City shall, subject to the Bond Documents, take all lawful and reasonable steps necessary to attempt to insure that amounts in the Town R & R Account are used only to pay the cost of Town R & R Projects. Notwithstanding the foregoing, the parties understand and agree that (i) the Town R & R Account is being created as a separate account within the R & R Fund solely for accounting purposes and for all other purposes

constitutes a part of the R & R Fund under the Bond Documents, (ii) moneys will be deposited in the Town R & R Account solely from available revenues as part of the required funding of the R & R Fund in accordance with the provisions of the Bond Documents, on a parity with and without priority over all other moneys required to be deposited in the R & R Fund, and (iii) the application of moneys on deposit in the Town R & R Account shall be subject to all of the provisions concerning the R & R Fund under the Bond Documents including, to the extent required, the application of such moneys to all other purposes for which moneys in the R & R Fund may be applied under the Bond Documents.

F. Coordination With Town Projects.

The Town shall annually provide the City with an updated list of the Town's roadway, stormwater and sanitary sewer system capital improvement program for the following five (5) years (the "Town Projects"). The City shall, whenever operationally feasible as determined by the City, coordinate and sequence the Town CIP and the Town R & R Projects with the improvements required by the Town Projects in order to ensure coordinated construction of the City's and the Town's capital improvements. The Town shall construct the Town Projects at the Town's sole cost and expense and may not use any unencumbered R & R Fund balance to pay for any portion of the Town Projects. The City will cooperate with the Town in relocating its facilities where the Water Distribution System conflicts with Town facilities or Town Projects, which cooperation shall not be unreasonably withheld. Conflicts that involve portions of the Water Distribution System with a remaining useful life of less than 25% of its original useful life shall be paid from the

Town R & R Account without the Town's consent. Conflicts that involve portions of the Water Distribution System with a remaining useful life of greater than 25% of its original useful life may be paid from the Town R & R Account with the Town's consent. A mutually agreed-upon list of the average useful life of certain assets of the Water Distribution System is attached as Exhibit "B." If the Town does not consent to payment for relocation of such conflict from the Town R & R Account, the City agrees that it will contribute up to \$30,000 for the cost of such conflict relocation in any one calendar year, such amount to be adjusted annually pursuant to the Handy-Whitman Index (the "City's Contribution"). If the City's Contribution is not sufficient to pay the cost of the conflict relocation and the Town does not consent to payment for such relocation of such conflict from the Town R & R Account, then the Town and the City shall share the costs of such conflict relocation on an equal 50/50 basis from sources other than the Town R & R Account. The Town will make all reasonable attempts, during the design process, to avoid conflicts with the Water Distribution System.

G. Coordination with FDOT Projects.

The City acknowledges that from time to time the Florida Department of Transportation ("FDOT") may undertake roadway projects within the Town (the "FDOT Projects"). The City will cooperate with FDOT in relocating its facilities where the Water Distribution System conflicts with FDOT Projects, which cooperation shall not be unreasonably withheld. Conflicts with FDOT Projects that involve portions of the Water Distribution System with a remaining useful life of less than 25% of its original useful life shall be paid from the Town R & R Account without the Town's consent. Conflicts that

involve portions of the Water Distribution System with a remaining useful life of greater than 25% of its original useful life may be paid from the Town R & R Account with the Town's consent. If the Town does not consent to payment for relocation of such conflict from the Town R & R Account, the City agrees that it will pay for such relocation from sources other than the Town R & R Account. Nothing herein shall preclude the Town from initiating a Town Project within an FDOT right-of-way and, for any such Town Project, the City's payment obligation in the event of a conflict shall be determined according to Section V.F. above.

## SECTION VI

### QUALITY OF SERVICE

A. The operation and maintenance of the facilities described herein shall be in compliance with the quality standards for drinking water as set forth in rules, regulations, and standards now or hereinafter adopted by the United States Environmental Protection Agency (EPA), the Florida Department of Environmental Protection (DEP), the Florida Department of Health and Rehabilitative Services (HRS), the SFWMD, and such other governmental bodies which have jurisdiction over such matters. The water provided by the City within the Town shall conform to the requirements of applicable drinking water standards as set forth by the governmental bodies mentioned above.

B. The water supplied pursuant to this Agreement shall be furnished at or above the minimum water pressure as defined herein. This provision shall not apply in emergency situations. Notwithstanding the minimum pressure requirements set forth

herein, the City shall endeavor to maintain a consistent pressure of at least 50 psi throughout the Town after the completion of the Town CIP.

## SECTION VII

### SUPPLY OF SERVICE.

A. The City shall provide service to any and all Town Consumers on a nondiscriminatory basis. All rules, regulations, and levels of service established by the City's water utility shall apply uniformly to consumers within the City and to the Town Consumers. The application of this "equal treatment" principle shall include, but not be limited to, use of fire hydrants for fire protection, use of fire hydrants for other purposes, placement and maintenance of fire hydrants, and implementation of the City's cross-connection control program.

B. The Town agrees to require developers of buildings hereafter established in the Town, where the extension of water mains are required, to provide any necessary installation of water mains and facilities within such development at the developer's own expense and in accordance with all applicable rules, regulations and ordinances of the City, as same may be amended from time to time; to make adequate provisions for inspection, approval, and acceptance of such facilities by the City and to require that such facilities be dedicated to the City and become a part of the Water Distribution System.

C. The Town agrees to use its best efforts to protect the integrity of the Water Distribution System by complying with the City's ordinances, resolutions and regulations relating to such. For all water connections within the Town, the Town shall agree to recognize and comply with the City's backflow prevention policies and procedures as same

may be amended from time to time, and in the same manner as compliance is required and applied within the City. Any notification by the City to a Town Consumer relating to the requirement of installation of a backflow prevention device shall be provided via certified mail between November 1st and April 30th. Single family dwellings shall comply within six (6) months and commercial properties and multi-family dwellings shall comply within twelve (12) months. A copy of the City's notification to any Town Consumer shall be provided to the Town's Building Official, so that the Town's Planning, Zoning, and Building Department can assist the City and each Town Consumer in identifying an acceptable location which shall not defeat the original purpose of such device, but shall maintain the Town's goal of sight screening wherever practicable, for the placing of the backflow prevention apparatus. The City must be able to supply sufficient water pressure (in accordance with the requirements of this Agreement) on the Town Consumer's side of the backflow prevention device.

D. The Town agrees that all impact fees and connection charges of the City for connection to the Water Distribution System within the Town are the property of the City.

#### SECTION VIII

#### MAINTENANCE

The City shall maintain at the City's sole expense the Water Distribution System in the same manner as it maintains its in-city water distribution system in accordance with the City's Water Distribution Standard Operating Procedures Manual dated May 1999, as may be amended from time to time. If such amendment contemplates reduced maintenance levels of operation as to the Water Distribution System, such amendment shall not apply

to the Town without the Town's prior written consent. Maintenance items shall include, but not be limited to, repair of main leaks, repair of valves, replacement of individual malfunctioning valves, replacement/adjustment of damaged meter boxes, replacement/repair of fire hydrants, and replacement/repair of service laterals and meters unless such replacement, adjustment, or repair is included in the scope of any Town R & R Project, Agreed Additional Town R & R Project or Town CIP Projects. The City shall supply the Town with an annual report of maintenance performed in the Town. Ordinary maintenance shall not be paid for from the Town R & R Account.

## SECTION IX

### OWNERSHIP OF WATER DISTRIBUTION SYSTEM

The City shall transfer the Water Distribution System to the Town and the Town shall thereafter own the Water Distribution System on a date (the "Transfer Date") which shall be the later of:

(i) expiration of the Retail Term,

and

(ii) the earlier of:

a. the date on which none of the Outstanding Bonds are Outstanding (as defined in the Bond Documents) and all payment obligations of the City to the issuers of any bond insurance policies or debt service reserve surety bonds in effect as of April 15, 1999, and securing the Outstanding Bonds have been fully satisfied,

and

b. the date on which the transfer is not prohibited by the Bond Documents.

The City represents that the Outstanding Bonds are scheduled to be paid in full prior to October 1, 2029. The City shall not voluntarily extend the maturity of the Outstanding Bonds. The City shall at the earliest practicable opportunity take all lawful and reasonable steps necessary (including seeking insurer and/or bondholder consent) in order to amend the Bond Documents so as to permit the transfer of the Water Distribution System to the Town as provided above without regard to any limitation or condition precedent related to the Bond Documents; it being understood by the parties that the City cannot require such consent and the City shall have no obligation to pay consideration for such consent or to prosecute litigation to obtain such consent.

Within 30 days after the Transfer Date, the City shall deliver to the Town, at no cost to the Town, a bill of sale for the Water Distribution System. The bill of sale shall include transfer of ownership of the entire Water Distribution System unencumbered and said transfer shall include, but not be limited to, all records, reports, and maintenance parts uniquely associated with the Water Distribution System. If it is determined that the City owns land or has a reversionary interest in land on or under which portions of the Water Distribution System are located in the Town or has easements relating to the Water Distribution System, the City shall quit claim and/or assign its interest in such land or easements. Accompanied by the transfer of the system, the City shall provide easements to the Town for perpetual access to the five subaqueous crossings located within the City of West Palm Beach and the City shall not deny access to same at any time. If the Town

elects the Wholesale Renewal Term, the City shall install, at Town's expense, wholesale water meters on all pipe crossings and shall maintain same at the City's expense throughout the Wholesale Renewal Term.

The Town acknowledges that the transfer of ownership of the Water Distribution System is without any representation or warranty by the City other than the fact that it is free of liens and encumbrances, and that the condition of the Water Distribution System at the time of delivery shall be in its then "as is" condition. If the Town elects the Retail Renewal Term, the City agrees to continue to make monthly deposits into the Town R & R Account as provided in Section V.E. above at the rate of five percent (5%) and shall otherwise comply in all respects with this Agreement.

In the event the Town does not elect the Retail Renewal Term, the City shall immediately permit the Town, at Town's expense, to begin the necessary conversions to the system required to have the system complete and ready for transfer to the Town upon the Transfer Date. Such conversions shall be subject to the issuance of permits by applicable regulatory agencies and shall not impair the integrity of the City's utility system. The parties agree to cooperate in the process of conversion.

#### SECTION X

#### PENDING LITIGATION

Case No. CL97-7726 AJ ( the "Surcharge Lawsuit") and Case No. CL98-10711 AI (the "Valuation Lawsuit") are presently pending in the Fifteenth Judicial Circuit, Palm Beach County, Florida. Within ten days after the execution of this Agreement by both parties, the parties shall submit a stipulated final judgment to the Court in the Surcharge Lawsuit (the

"Stipulated Final Judgment"). The Stipulated Final Judgment shall provide that, without admission of liability by either party, the parties have simultaneously executed a retail water service and franchise agreement that resolves all disputes between the parties, that claims of the parties shall be dismissed with prejudice, and that each party shall bear its own attorney's fees and costs in connection with the Surcharge Lawsuit. The Town shall enter a notice of voluntary dismissal with prejudice in the Valuation Lawsuit. Each party shall bear its own fees and costs incurred in the Valuation Lawsuit. This Agreement shall not become effective, as defined in Section II.G. above, until both lawsuits are dismissed.

## SECTION XI

### DEFAULT

In the event of material breach by a party of its covenants and agreements hereunder, the other party shall provide notice of such breach or default by certified mail within thirty (30) days of the occurrence or knowledge of such breach, and shall allow a reasonable opportunity to correct such default. Each "material breach," for the purposes of this Section, shall be classified as an "administrative matter" (relating to rates or some other matter which can be cured by a decision of an official or group of officials) or as a matter relating to "system design, operation and the physical plant" (such as a pressure problem, a project coordination issue or some other matter which can be cured only by physically altering the Water Distribution System). "A reasonable opportunity," for the purposes of this Section, shall mean not more than three (3) months for breaches relating to administrative matters and not more than twelve (12) months for breaches relating to system design or the physical plant. The remedies for default shall include any and all

remedies afforded through legal and/or equitable relief but shall specifically not include the right to termination.

## SECTION XII

### HOLD HARMLESS CLAUSE

To the extent permitted by law, and subject to the limits, defenses, and immunities provided by Florida Statutes, Section 768.28, the City shall during the terms of this Agreement indemnify and hold harmless the Town, its Council members, agents, and employees from and against any loss sustained by the Town on account of any suit, judgment, execution, claim, or demand whatsoever resulting from negligent acts on the part of the City or its employees under the terms of this Agreement.

To the extent permitted by law, and subject to the limits, defenses, and immunities provided by Florida Statutes, Section 768.28, the Town during the term of this Agreement shall indemnify and hold harmless the City, its Commissioners, agents, and employees, from and against any loss sustained by the City on account of any suit, judgment, execution, claim, or demand whatsoever resulting from negligent acts on the part of the Town or its employees under the terms of this Agreement.

This Section shall not be construed as a waiver of any right or defense that either the Town or the City may have pursuant to Section 768.28, Florida Statutes, as amended from time to time.

SECTION XIII

MISCELLANEOUS PROVISIONS

A. This Agreement shall be executed in four (4) counterparts, each of which shall be considered an original.

B. Whenever one party gives notice to the other party concerning any of the provisions of this Agreement, such notice shall be given by certified mail, return receipt requested. Notice shall be addressed as follows:

TOWN OF PALM BEACH  
c/o Town Manager  
360 South County Road  
Palm Beach, Florida 33480

With a copy to:  
Town Attorney  
360 South County Road  
Palm Beach, Florida 33480

CITY OF WEST PALM BEACH  
c/o Mayor  
200 Second Street  
West Palm Beach, Florida 33401

With a copy to:  
City Attorney  
200 Second Street  
West Palm Beach, Florida 33401

C. This Agreement shall be construed in accordance with the laws of the State of Florida.

D. Each party will, at any time and from time to time after the Effective Date, upon request of the other party, execute, acknowledge, and deliver or will cause to be executed, acknowledged and delivered, all such further acts, assignments, transfers,

powers of attorneys and assurances as may be required in order to implement and perform any of the obligations, covenants, and agreements of the parties herein.

E. It is agreed by and between the parties hereto that all words, terms, and conditions herein contained are to be read in concert, each with the other, and that a provision contained under one section or sub-section herein may be considered to be equally applicable under another in the interpretation of this Agreement.

F. In the event the City is delayed in the performance of any of its obligations under this Agreement as a result of strike, lockouts, wars, unavailability of materials, floods, unusual weather conditions, government regulations and acts, or other causes beyond the City's reasonable control, then the time for the performance of any such obligation so delayed shall be extended for the period of such delay.

G. In the event that any action is filed in relation to this Agreement, the unsuccessful party in the action shall pay to the successful party, in addition to all the sums that either party may be called on to pay, a reasonable sum for the successful party's attorney fees and costs.

H. The invalidity of any portion of this Agreement will not and shall not be deemed to affect the validity of any other provision. In the event that any provision of this Agreement is held to be invalid, the parties agree that the remaining provision shall be deemed to be in full force and effect as if they had been executed by both parties subsequent to the expungement of the invalid provision.

I. This Agreement shall constitute the entire Agreement between the parties and any prior understanding or representation of any kind preceding the date of this

Agreement shall not be binding upon either party except to the extent incorporated in this Agreement.

J. Any modification of this Agreement or additional obligation assumed by either party in connection with the Agreement shall be binding only if evidenced in writing signed by each party or an authorized representative of each party.

K. The rights of each party under this Agreement are personal to that party and may not be assigned or transferred to any other person, firm, corporation, or other entity without the prior, express, and written consent of the other party, which consent shall not be unreasonably withheld.

L. The titles to the paragraphs of this Agreement are solely for the convenience of the parties and shall not be used to explain, modify, simplify, or aid in the interpretation of the provisions of this Agreement.

M. Each party agrees not to take any action (including any amendment of the Bond Documents) which would materially and adversely affect the ability of such party to perform its obligations under this Agreement. Subject to the foregoing limitation, nothing contained herein shall prohibit the City from supplementing and/or amending the Bond Documents: (1) in connection with the issuance of additional bonds, notes, or other

indebtedness under the provisions of the Bond Documents and (2) to permit transfer of the Water Distribution System to the Town.

IN WITNESS WHEREOF, each party to this Agreement has caused it to be executed on this 16<sup>TH</sup> day of JUNE, 1999.

**EFFECTIVE  
DATE  
OCTOBER 1, 1999**

CITY OF WEST PALM BEACH, FLORIDA

By: *[Signature]*  
Mayor

TOWN OF PALM BEACH, FLORIDA

By: *[Signature]*  
Town Council President

Attest:

By: *[Signature]*  
City Clerk

Attest:

By: *[Signature]*  
Town Clerk

Approved as to legal form and content:

By: *[Signature]*  
Attorney for the City of West Palm Beach

Approved as to legal form and content:

By: *[Signature]*  
Attorney for the Town of Palm Beach

April 20, 1999F:\CLAUDIA\TOWN\IDRAFT10.TWN

RECOMMEND APPROVAL:

*[Signature]* 6-16-99  
ALBERT P. DUSEY, DIRECTOR OF PUBLIC WORKS

TOWN OF PALM BEACH  
WATER SYSTEM IMPROVEMENTS

6/99

Proj. No.	Project Type	From	To	Length (feet)	Size (inches)
<b>Hydraulic Improvements</b>					
1	Angler Ave.	N. Lake Way	Ocean Way	750	8
2	Mediterranean Rd.	North Lake Way	N. Ocean Way	700	8
3	North Lake Way	Mediterranean Rd.	Orange Grove Rd	5500	12
4	Royal Palm WM	Lake Trail	S.County Road	2400	10
4a	Royal Palm WM	S.County Road	Ocean Blvd	900	12
5	Royal Poinciana Way	Flagler Bridge	Bradley Place	600	24
<b>Subaqueous Crossings Replacement</b>					
6	Flagler Bridge Crossing			2100	24
7	Barcelona Rd Crossing			1900	20
<b>Repump Stations Renewal</b>					
8	Palm Beach Repump Station				
9	Phipps Ocean Park Booster				
<b>Multiple Work Orders and/or AC Pipe Removal</b>					
10	Monterey Road	North Lake Way	N. Ocean Blvd	1280	8
11	Ocean Way	Indian Road	Mediterranean	880	8
12	Onondaga Ave	N. Lake Way	Ocean Blvd	500	8
13	Orange Grove Road	N. Lake Way	N. Ocean Blvd	1280	8
14	Queen's Lane	N. Lake Way	N. Ocean Blvd	1380	8
15	N. Ocean Blvd	Inlet Drive	Onongaga Ave	1900	8
16	Via Manila	N. Lake Way	N. Ocean Blvd	1340	8
17	S Woods Road	N. Lake Way	N. Ocean Blvd	1170	8
18	Seaspray Ave	Lake Trail	Cocoanut Row	350	8
19	Sunset	N. Lake Trail	N. County Road	1420	8
20	Sunset	N. County Road	Twds Ocean	1130	10
21	Ibis Way	Ibis Island Road	SR A1A	700	8
22	Ocean Blvd	1840 Ocean Blvd	1930 Ocean Blvd	950	12
23	Chilean Ave	Lake Drive	S. County Row	2050	8
24	Everglades Ave	Lake Trail	Ocean Blvd	2230	8
25	Cocoanut Row	Brazilian	Peruvian	980	16
<b>FDOT</b>					
26	S. County Road	Royal Poinciana Way	Royal Palm Way	4500	12
<b>Transmission Pipe</b>					
27	Slope Trail	Country Club Road	Ridgeview Drive	500	12
28	Bradley Place	Atlantic	Seminole Ave	550	12
29	N. Lake Way	Kawama Lane	Wells Road	1220	12
30	S. County Road	Royal Palm Way	Peruvian Ave	1450	12
31	S. County Road	Peruvian Ave	SR A1A	5050	12
32	Island Road	Everglades Island	S. County Road	2660	12
33	Ocean Blvd	S. County Road	Southern Blvd	3450	12

TOWN OF PALM BEACH  
WATER SYSTEM IMPROVEMENTS

6/99

Proj. No.	Project Type	From	To	Length (feet)	Size (inches)
<b>AC Pipe Removal- 4"</b>					
34	Dolphin Road	N. Lake Way	N. Ocean Blvd	980	8
35	Seagate Road	N. Lake Way	N. Ocean Blvd	1000	8
36	Grace Trail	Ocean Blvd	320' West	320	8
<b>Old Pipe Replacement</b>					
37	Jamaica Lane	N. Lake Way	N. Ocean Blvd	1320	8
38	Brazilian Avenue	Hibiscus	S. County Road	750	8
39	Crescent Drive	Emerald Lane	Wells Road	680	8
40	Oleander Avenue	Bradley Place	N. County Road	1000	8
41	Peruvian Avenue	Lake Drive	S. County Road	2350	8
42	Seabreeze Ave	Lake Trail	Cocconut Row	550	8
43	Whitehall Way	Intercoastal	Cocconut Row	900	8
44	Algoma Road	Intercoastal	SR A1A	1070	8
45	Island Drive	Island Road	Intercoastal	1900	8
46	Via Vizcaya	Intercoastal	S. County Road	930	8
<b>AC Pipe Removal and Replacement</b>					
47	Municipal Pier Easement	Brazilian Avenue	Peruvian	1300	8
48	Pendelton Lane	Lake Trail	Cocconut Row	700	8
49	N. Lake Way	Indian Road	Mediterranean	900	8
50	Adam Road	Garden Road	Eden Road	300	8
51	Arabian Road	Lake Court	N. Ocean Way	1150	8
52	Caribbean Road	N. Lake Way	Ocean Way	980	8
53	Colonial Lane	N. Lake Way	N. Ocean Blvd	1270	8
54	Eden Road	N. Lake Way	N. Ocean Blvd	1330	8
55	El Pueblo Way	N. Lake Way	N. Ocean Blvd	1000	8
56	Esplanade Way	N. Lake Way	Ocean Way	720	8
57	Garden Road	N. Lake Way	N. Ocean Blvd	1320	8
58	Indian Road	Lake Court	N. Ocean Way	1150	8
59	La Puerta Way	N. Lake Way	N. Ocean Blvd	1300	8
60	Lake Court	Indian Road	Arabian	250	8
61	Merrain Road	N. Lake Way	N. Ocean Blvd	1000	8
62	Mockingbird Trail	N. Ocean Way	N. Ocean Blvd	300	8
63	N. Ocean Way	Indian	Mediterranean	870	8
64	Nightingale Trail	N. Lake Way	N. Ocean Blvd	1250	8
65	Palmo Way	N. Lake Way	N. Ocean Blvd	1150	8
66	Australian Avenue	Lake Drive	S. County Road	2300	8
67	Coral Lane	N. Lake Way	Crescent Drive	780	8
68	Crest Road (Jogs)	Via Linda	Plantation Road	350	8
69	Dunbar Road	Bradley Place	Ocean Blvd	1920	8
70	Emerald Lane	N. Lake Way	Crescent Drive	1100	8
71	Royal Poinciana Way	Bradley Place	N. County Road	1100	8
72	Sanford Avenue	N. Lake Way	N. County Road	1100	8
73	Seminole Avenue	Bradley Place	Ocean Blvd	2030	8
74	Tangiers Avenue	Intercoastal	N. Lake Way	110	4
75	El Vedado	Pelican Lane	S. County Road	820	8
76	Hammon Avenue	S. County Road	S. Ocean Blvd	770	8
77	Tarpon Way	Island Road	Tarpon Island	500	8

**TOWN OF PALM BEACH  
WATER SYSTEM IMPROVEMENTS**

6/99

Proj. No.	Project Type	From	To	Length (feet)	Size (inches)
78	Via Palma	Intercoastal	SR A1A	930	8
79	Woodbridge Road	Intercoastal	SR A1A	1030	8
80	Ocean Blvd	2320 Ocean Blvd	Par 3 Golf Course	390	8
81	Ocean View Road	Intercoastal	S. Ocean Blvd	450	8
82	Worth Avenue	Lake Drive	Cocoanut Row	920	12
83	Alley Twds Lake Way	Arabian Road	Caribbean Road	280	8

<b>Total Pipe Length [ft]</b>	<b>102,640</b>
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**TABLE 3-1  
TOWN OF PALM BEACH  
REPRODUCTION COST APPROACH  
AVERAGE SERVICE LIVES**

No.	Description	HAI ASL (years)
1	Subaqueous Crossings	60
	<b>Water Pumping and Storage Facilities</b>	
2	Chlorination System	15
3	Buildings	50
4	Hydropneumatic Systems	35
5	Storage Tanks - Concrete	50
6	Pumps	25
7	Sitework	50
8	Yard Piping	75
9	Electrical	15
	<b>Water Transmission and Distribution</b>	
10	AC	50
11	PVC	100
12	DI/CI	75
13	Hydrants	50
	<b>Meters</b>	
14	5/8" x 3/4"	20
15	1"	20
16	2"	20
17	3"	20
18	4"	20
19	6"	20
	<b>Services</b>	
20	5/8" x 3/4"	40
21	1"	40
22	2"	40
23	3"	40
24	4"	40
25	6"	40

# Town of Palm Beach Water System Improvements

## *Hydraulic Improvements:*

Includes the following:

- Water main replacement [increase in size where applicable]
- Replacement of valves; Pavement replacement
- Traffic maintenance
- Service connections where applicable
- Tie-In Costs

## *Subaqueous Crossings Replacement:*

Includes the following:

- Subaqueous water main replacement [increase in size where applicable]
- Replacement of valves

## *Repump Stations Renewal:*

Includes the following:

- Replace pumps
- Replace control valves
- Mechanical and Electrical improvements

## *Multiple Work Orders and/or AC Pipe Removal:*

Includes the following:

- AC pipe removal [where applicable]
- Water main replacement [increase in size where applicable]
- Replacement of valves
- Pavement replacement
- Traffic maintenance
- Service connections where applicable
- Tie-In Costs

## *FDOT:*

Includes the following:

- Water main replacement [increase in size where applicable]
- Replacement of valves
- Pavement replacement
- Traffic maintenance
- Service connections where applicable
- Tie-In Costs

***AC Pipe Removal/ Easement Work:***

Includes the following:

- AC pipe removal
- Water main replacement [increase in size where applicable]
- Replacement of valves
- Pavement Replacement
- Traffic Maintenance
- New service connections where applicable
- Rerouting of service connections from rear to front of property where applicable
- Tie-In Costs

***Transmission Pipe:***

Includes the following:

- AC pipe removal [where applicable]
- Water main replacement [increase in size where applicable]
- Replacement of valves
- Pavement replacement
- Traffic maintenance
- Service connections where applicable
- Tie-In Costs

***AC Pipe Removal and Replacement:***

Includes the following:

- AC pipe removal
- Water main replacement [increase in size where applicable]
- Replacement of valves
- Pavement Replacement
- Traffic Maintenance
- Service connections where applicable
- Tie-In Costs

***Old Pipe Replacement:***

Includes the following:

- Water main replacement [increase in size where applicable]
- Replacement of valves
- Pavement Replacement
- Traffic Maintenance
- Service connections where applicable
- Tie-In Costs

# **Town of Palm Beach Water System Improvements**

## ***Hydraulic Improvements:***

Includes the following:

- Water main replacement [increase in size where applicable]
- Replacement of valves; Pavement replacement
- Traffic maintenance
- Service connections where applicable
- Tie-In Costs

## ***Subaqueous Crossings Replacement:***

Includes the following:

- Subaqueous water main replacement [increase in size where applicable]
- Replacement of valves

## ***Repump Stations Renewal:***

Includes the following:

- Replace pumps
- Replace control valves
- Mechanical and Electrical improvements

## ***Multiple Work Orders and/or AC Pipe Removal:***

Includes the following:

- AC pipe removal [where applicable]
- Water main replacement [increase in size where applicable]
- Replacement of valves
- Pavement replacement
- Traffic maintenance
- Service connections where applicable
- Tie-In Costs

## ***FDOT:***

Includes the following:

- Water main replacement [increase in size where applicable]
- Replacement of valves
- Pavement replacement
- Traffic maintenance
- Service connections where applicable
- Tie-In Costs

### ***AC Pipe Removal/ Easement Work:***

Includes the following:

- AC pipe removal
- Water main replacement [increase in size where applicable]
- Replacement of valves
- Pavement Replacement
- Traffic Maintenance
- New service connections where applicable
- Rerouting of service connections from rear to front of property where applicable
- Tie-In Costs

### ***Transmission Pipe:***

Includes the following:

- AC pipe removal [where applicable]
- Water main replacement [increase in size where applicable]
- Replacement of valves
- Pavement replacement
- Traffic maintenance
- Service connections where applicable
- Tie-In Costs

### ***AC Pipe Removal and Replacement:***

Includes the following:

- AC pipe removal
- Water main replacement [increase in size where applicable]
- Replacement of valves
- Pavement Replacement
- Traffic Maintenance
- Service connections where applicable
- Tie-In Costs

### ***Old Pipe Replacement:***

Includes the following:

- Water main replacement [increase in size where applicable]
- Replacement of valves
- Pavement Replacement
- Traffic Maintenance
- Service connections where applicable
- Tie-In Costs

# Appendix B

## Data Collection Summary

Town of Palm Beach  
Water Feasibility Study  
Data Collection Log

Item No.	Name	Author	Description	File Location	Document Name in File	Document date	Document Type (pdf/excel/word/other)	Date Received
1*	Water Distribution System GIS		Shape Files	Data Collection/WPB Requested Data	Item #1 PB water distribution system shapefiles.zip	5/12/2020	excel	6/10/2020
2*	InfoWATER MODEL2020		Existing InfoWater hydraulic water model of the distribution system serving the Town and South PB	Data Collection /Water Model Files	Item #2 InfoWATERMODEL2020.zip	2/12/2020	mxd	6/10/2020
3*	Phipps Park Booster Pump Station Rehabilitation and Modifications	Mock Roos	Record Drawings for Phipps Booster Pump Station	Data Collection/WPB Requested Data/Item #3 Record Drawings	phipps repump ab.pdf	4/6/2012	PDF	6/10/2020
3*	Town of Palm Beach Watermains Pump Station Rehabilitations	Metcalf and Eddy	Record Drawings for Rehabilitation for PB and Phipps Repump Stations	Data Collection/WPB Requested Data/Item #3 Record Drawings	ToPB WM Pump Station Rehabs.pdf	5/1/2001	PDF	6/10/2020
4*	Hydrant and Water Supply System Inspection Report		Hydrant Flow Inspection Data	Data Collection/WPB Requested Data	Hydrant Flow Data 2017 ((PB)).xlsx	5/8 - 7/9/17	excel	6/10/2020
4*	Operational Data	City of WPB	Hydrant Flushing Inspections	Data Collection/WPB Requested Data	TOPB_HydrantFlushing 2019.pdf	5/1 - 9/16/17	PDF	6/10/2020
4*	Operational Data		2-year, 1-hr interval operational data in excel format for Phipps and Palm Beach Pump Stations	Data Collection /Water Model Files	Palm Beach 1-19-19 to 2-19-19.csv... (48 files with consecutive dates)	Jan 19 - May 20	csv excel	6/10/2020
5*	Fire Hydrant Test	Jacobs	Graphic depicting Recorded Field Pressure and Model Pressure	Data Collection/WPB Requested Data	Fire Hydrant Test from Jacobs.pdf	unknown	PDF	6/10/2020
6*	3-Year Monthly Record		Meter data to determine actual water consumption of Town and South Palm Beach residents	Data Collection/WPB Requested Data/Item #6 3-year monthly record	City-Wide WT for Jan-Dec-2017.xls City-Wide WT for Jan-Dec-2018.xls City-Wide WT for Jan-Dec-2018.xls City-Wide WT for Jan-Dec-2020.xls	2017-2020	excel	6/10/2020
7*	not available							
8*	West Palm Beach Water and Wastewater Plan DRAFT	Brown and Caldwell	Draft report of Master Plan Elements	Data Collection/WPB Requested Data/Item #8 Water Master Plan	Draft West Palm Beach Water & Wastewater Master Plan.docx	8/15/2014	Word	6/10/2020
8*	Appendices to the West Palm Beach Water and Wastewater Plan DRAFT	Brown and Caldwell	Draft Report Appendices attachments	Data Collection/WPB Requested Data/Draft WPB Water & Wastewater MP Appendices	various files	8/1/2015	PDF	6/10/2020
8*	West Palm Beach Water and Wastewater Plan FINAL	Brown and Caldwell	Provides a general overview of Master Plan elements, describes the assumptions and limitations under which this Master Plan was developed, and describes the data sets used to compose this Master Plan.	Data Collection/WPB Requested Data	Final West Palm Beach Water Master Plan2015.pdf	2/13/2015	PDF	6/10/2020
8*	Appendices to the West Palm Beach Water and Wastewater Plan FINAL	Brown and Caldwell	Final Report Appendices Attachments	Data Collection/WPB Requested Data/Final Water & Wastewater Master Plan files	various files	2/1/2015	PDF	6/10/2020
9*	2018 Water Quality Report	City of WPB	City's latest drinking water quality monitoring report	Data Collection/WPB Requested Data/Item #9 Water Quality Report	2018WaterReport_Final.pdf	7/10/1905	PDF	6/10/2020
10*	Town of Palm Beach Work Orders		History of breakage and maintenance work orders	Data Collection /Water Model Files/Item #10 Water Dist	Town of Palm Beach Work orders.xls	1/4/17 - 5/4/20	excel	6/10/2020
11	Fire Flow Analysis	Brown and Caldwell	Evaluation of Water Distribution Hydraulic Model Scenarios Requested by the City of West Palm Beach Water Utilities Department	Data Collection/WPB Requested Files/Final Water & Wastewater Master Plan files	2015.08.19 Fire Flow Verification Memo_B&C.pdf	8/19/2015	PDF	6/10/2020
12	Evaluation of Water Distribution Hydraulic Model Scenarios	Brown and Caldwell	A review of utility franchise agreement between the City and the Town to verify MP analyses were consistent with specified water delivery requirements; review of intracoastal Waterway water main crossing closure scenarios related to the Town	Data Collection/WPB Requested Files/Final Water & Wastewater Master Plan files	Crossings-Analysis Memo 01272015.pdf	1/27/2015	PDF	6/10/2020

13	Future Water Supply Study Executive Summary	James M Montgomery Consulting Engineers	Overall feasibility and economic analysis for the alternatives available for the Town of PB future water supply	Data Collection	Town of PB Future Water Supply Study 1990.pdf	Oct-90	PDF	5/26/2020
14	Water Management Study	CH2M Hill	Provides framework for Water Management Plan	Data Collection	City of WPB Water Management Study 1991.pdf	Nov-91	PDF	5/26/2020
15	Irrigation Water Report	Hutcheon Engineers Kimley-Horn	Study for a separate irrigation water supply system from the City of WPB	Data Collection	Town of PB Irrigation Water Report 1995.pdf	4/5/1995	PDF	5/26/2020
16	Irrigation Water System with Aquifer Storage and Recovery DRAFT	Hutcheon Engineers Kimley-Horn	Study for a separate irrigation water supply system from the City of WPB	Data Collection	Town of PB Irrigation Water System w Aquifer Storage and Recovery DRAFT.pdf	12/20/1995	PDF	5/26/2020
17	Irrigation Water System with Aquifer Storage and Recovery DRAFT	Hutcheon Engineers Kimley-Horn	Study for a separate irrigation water supply system from the City of WPB	Data Collection	Town of PB Irrigation Water System w Aquifer Storage and Recovery.pdf	12/20/1995	PDF	5/26/2020
18	Feasibility Analysis for Reverse Osmosis Facilities for the Town of Palm Beach DRAFT	Kimley-Horn	Study of raw water supply, treatment options by-product disposal options and site limitations for potable water options.	Data Collection	Town of PB Feasibility Analysis for RO Facilities 2009.pdf	10/6/2009	PDF	5/26/2020
19	Feasibility Study for the Acquisition of the West Palm Beach Water Distribution System DRAFT		Research conducted on the feasibility of assuming ownership of the City of WPB water distribution system	Data Collection	Town of PB Feasibility Study for Acquisition of WPB Water Distribution System 2017.pdf	8/3/2017	PDF	5/26/2020

# Appendix C

Select Tables from Inventory of City Facilities within  
the Town by Erdman Anthony, July 25, 2014

Summary of Capital Improvement Projects from Exhibit A in the 1999 Franchise Agreement

Summary of Capital Improvement Projects from Exhibit A in the 1999 Franchise Agreement																	
Basic Information about Link							Exhibit A Information										
Link #	BranchName	From	To	Length (ft)	Water main size (inches)	Material	Useful Life Remaining	Budget Cost To Replace (2014 dollars)	Number on Exhibit A in the 1999 Franchise Agreement	Size on Exhibit A	Length on Exhibit A	Type of Work on Exhibit A	Completed per 2006 Funds Statement?	Completed based on WPB reported year built?	Status from Town notes	On Exhibit A and Not Yet Done?	Year to be done in Town's CIP
<b>TO BE COMPLETED</b>																	
346	Royal Poinciana Plaza	West of Bradley Place	Bradley Place	620	6	AC	(14)	\$262,020	5	24	600	1	Y		done	?	2015
388	Tangier Ave Lake Access	Lake Trail	West End of Tangier Ave	98	0	-	n/a	\$12,604	74	4	110	9	Y		not done	?	
372	South Woods Road	West of Lake Way	Lake Way	197	0	-	(54)	\$25,337	17	8	1170	4			done	Y	
375	South Woods Road	East Woods Road	County Road	310	0	-	(54)	\$39,870	17	8	-	4			done	Y	
241	Ocean Blvd, North	100' south of E Inlet Drive	Indian Road	320	8	AC	(44)	\$159,428	15	8	-	4			no asbuilts	Y	
406	Via Marila	Lake Way	Ocean Blvd	1291	0	-	(44)	\$166,040	16	8	1340	4			design only	Y	2016
417	Whitehall Way	Lake Trail	Cocconut Row	553	8	AC	(34)	\$275,512	43	8	900	8			design only	Y	
169	Island Drive	800' South of Island Road	South End	1100	8	AC	(34)	\$548,035	45	8	-	8			design only	Y	
116	Eden Road	Adam Road	Ocean Blvd	420	4	AC	(34)	\$145,746	54	8	-	9			design only	Y	
117	Eden Road	Adam Road	Ocean Blvd	240	6	AC	(34)	\$101,427	54	8	-	9			design only	Y	
135	Esplanade Way	Lake Way	Ocean Way	500	6	AC	(34)	\$211,307	56	8	720	9			design only	Y	
185	La Puerta Way	Lake Way	Ocean Way	1010	4	DI	(34)	\$299,579	59	8	1300	9			design only	Y	2015
186	La Puerta Way	Ocean Way	Ocean Blvd	430	6	AC	(34)	\$181,724	59	8	-	9			design only	Y	
25	Australian Avenue	Lake Drive	Cocconut Row	650	8	AC	(34)	\$323,839	66	8	-	9			design void	Y	
27	Australian Avenue	Hibiscus Avenue	County Road (A1A)	650	8	DI	(34)	\$280,159	66	8	-	9			design void	Y	
29	Australian Avenue	County Road (A1A)	Ocean Blvd	220	8	AC	(34)	\$109,607	66	8	-	9			design void	Y	
151	Hammon Avenue	County Road (A1A)	Ocean Blvd	746	0	AC	(34)	\$95,946	76	8	770	9			design void	Y	
393	Tarpon Way	Island Road	Tarpon Island Bridge	160	0	AC	(34)	\$20,578	77	8	-	9			done	Y	
409	Via Palma	West End	Ocean Blvd	770	8	AC	(34)	\$383,624	78	8	930	9			no plans	Y	2014
95	County Road, South	600' s/o Royal Poiciana Way	Pendleton Ave	1820	12	AC	(24)	\$1,120,780	26	12	-	5			no info	Y	2015
97	County Road, South	Barton Avenue	Clarke Avenue	450	12	AC	(24)	\$277,116	26	12	-	5			no info	Y	
98	County Road, South	Clarke Avenue	Seaview Avenue	960	10	AC	(24)	\$550,861	26	12	-	5			no info	Y	
369	Slope Trail	Country Club Road	Fairview Road	250	16	AC	(24)	\$183,353	27	12	500	6			done	Y	
3	Adam Road	S/Side of Garden Road	N/Side of Eden Road	300	0	AC	(24)	\$38,584	50	8	300	9			design only	Y	
115	Eden Road	Lake Way	Adam Road	600	6	AC	(24)	\$253,568	54	8	-	9			design only	Y	
144	Garden Road	Lake Way	Adam Road	731	4	AC	(24)	\$253,667	57	8	1320	9			design only	Y	
145	Garden Road	Adam Road	Ocean Blvd	350	4	AC	(24)	\$121,455	57	8	-	9			design only	Y	
83	Coral Lane	Lake Way	Crescent Drive	570	6	AC	(24)	\$240,890	67	8	780	9			design void	Y	
84	Coral Lane	Lake Way	Crescent Drive	120	2	COP	(24)	\$15,434	67	8	-	9			design void	Y	
133	Emerald Lane	Lake Way	Crescent Drive	150	8	DI	(24)	\$64,652	70	8	1100	9			design void	Y	
134	Emerald Lane	Lake Way	Crescent Drive	660	4	AC	(24)	\$229,029	70	8	-	9			design void	Y	
348	Sanford Avenue	Lake Way	County Road	1065	0	AC	(24)	\$136,973	72	8	1100	9			done	Y	
240	Ocean Blvd, North	East Inlet Drive	100' south	100	6	CI	(14)	\$36,381	15	8	1900	4			no asbuilts	Y	
147	Grace Trail	County Road (A1A)	Ocean Blvd	325	4	AC	(14)	\$112,779	36	8	320	7			done	Y	
148	Grace Trail	County Road (A1A)	Ocean Blvd	325	6	AC	(14)	\$137,349	36	8	-	7			done	Y	
114	Eden Road	Lake Way	Adam Road	100	6	AC	(14)	\$42,261	54	8	1330	9			design only	Y	
136	Esplanade Way	Lake Way	Ocean Way	450	6	AC	(14)	\$190,176	56	8	-	9			design only	Y	
146	Garden Road	Adam Road	Ocean Blvd	300	6	AC	(14)	\$126,784	57	8	-	9			design only	Y	
226	Mocking Bird Trail	Ocean Way	Ocean Blvd	281	6	CI	(14)	\$102,232	62	8	300	9			no plans	Y	2016
105	Crest Road	North End of Crest Road	West End of Plantation	380	4	AC	(14)	\$131,865	68	8	350	9			design void	Y	
345	Royal Poinciana Plaza	West of Bradley Place	Bradley Place	400	6	DI	(14)	\$145,525	71	8	1100	9			done	Y	2015
272	Ocean Blvd, South	Old South Ocean	Lake Avenue	8400	12	AC	(14)	\$5,172,832	80	8	390	4			done	Y	2015
386	Sunset Avenue	County Road	Ocean Walk	240	10	AC	(4)	\$137,715	20	10	-	4			done	Y	
94	County Road, South	Royal Poinciana Way	600' south	600	12	AC	(4)	\$369,488	26	12	4500	5			no info	Y	2015
230	Municipal Pier Easement	Brazilian Avenue	Peruvian Avenue	1300	8	AC	(4)	\$647,677	47	8	1300	9			no plans	Y	
24	Austrailian Avenue	Docks	Lake Drive	720	8	AC	(4)	\$358,714	66	8	2300	9			design void	Y	
81	Colonial Lane	Lake Way	Ocean Way	1010	4	PVC	16	\$299,579	53	8	1270	9			done	Y	
26	Australian Avenue	Cocconut Row	Hibiscus Avenue	750	8	PVC	16	\$323,260	66	8	-	9			design void	Y	
28	Australian Avenue	County Road (A1A)	Ocean Blvd	750	8	PVC	16	\$323,260	66	8	-	9			design void	Y	
96	County Road, South	Pendleton Ave	Barton Avenue	200	12	PVC	26	\$106,363	26	12	-	5			no info	Y	2015
129	El Pueblo Way	Lake Way	Ocean Blvd	435	8	PVC	46	\$187,491	55	8	1000	9			done	Y	
307	Pendleton Avenue	Westerly end	Cocconut Row	540	8	PVC	56	\$232,747	48	8	700	9			done	Y	
354	Sea Spray Ave Lake Access	Lake Trail	Sea Spray Cul de Sac	207	0	-	n/a	\$26,623	18	8	350	4			done	Y	2016
82	Colonial Lane	Ocean Way	Ocean Blvd	257	0	-	n/a	\$33,054	53	8	-	9			done	Y	

Summary of Capital Improvement Projects from Exhibit A in the 1999 Franchise Agreement

Basic Information about Link																	Exhibit A Information				
Link #	BranchName	From	To	Length (ft)	Water main size (inches)	Material	Useful Life Remaining	Budget Cost To Replace (2014 dollars)	Number on Exhibit A in the 1999 Franchise Agreement	Size on Exhibit A	Length on Exhibit A	Type of Work on Exhibit A	Completed per 2006 Funds Statement?	Completed based on WPB reported year built?	Status from Town notes	On Exhibit A and Not Yet Done?	Year to be done in Town's CIP				
283	Ocean View Road	West End	Ocean Blvd (A1A)	400	0	-	n/a	\$51,445	81	8	450	9			design void	Y	2014				

**SUBTOTAL TO BE COMPLETED \$16,424,343**

**COMPLETED**

12	Angler Avenue	Lake Way	Ocean Blvd	760	8	PVC	66	\$327,570	1	8	750	1	Y	Y	done		
217	Mediterranean Road	Lake Way	Ocean Blvd	530	8	PVC	66	\$228,437	2	8	700	1	Y	Y	done		
196	Lake Way, North	Indian Road	Mediterranean Road	900	12	PVC	66	\$478,632	3	12	900	1	Y	Y	done		
339	Royal Palm Way	Royal Poinciana Bridge	Cocoanut Row	400	12	PVC	66	\$212,725	4	10	2400	1	Y	Y	done		2015
340	Royal Palm Way	Royal Poinciana Bridge	Cocoanut Row	420	16	PVC	66	\$265,698	4	10	-	1	Y	Y	done		2015
341	Royal Palm Way	Cocoanut Row	Hibiscus Avenue	700	16	PVC	66	\$442,829	4	10	-	1	Y	Y	done		2015
342	Royal Palm Way	Hibiscus Avenue	County Road	750	10	PVC	66	\$373,660	4	10	-	1	Y	Y	done		2015
228	Monterey Road	Lake Way	Ocean Blvd	1350	8	PVC	66	\$581,868	10	8	1280	4	Y	Y	done		2017
295	Onondaga Avenue	Lake Way	Ocean Blvd	500	8	PVC	66	\$215,507	12	8	500	4		Y	done		2017
298	Orange Grove Road	Lake Way	Ocean Blvd	1350	8	PVC	66	\$581,868	13	8	1280	4		Y	done		2017
328	Queens Lane	Lake Way	Ocean Way	1013	6	PVC	66	\$368,543	14	8	1380	4		Y	done		
329	Queens Lane	Ocean Way	Ocean Blvd	347	6	PVC	66	\$126,243	14	8	-	4		Y	done		
242	Ocean Blvd, North	Indian Road	Curve	2100	0	PVC	66	\$270,088	15	8	1900	9		Y	no asbuilts		
373	South Woods Road	Lake Way	East Woods Road	575	8	PVC	66	\$247,833	17	8	-	4		Y	done		2014
374	South Woods Road	East Woods Road	County Road	120	6	PVC	66	\$43,658	17	8	-	4		Y	done		
355	Sea Spray Avenue	West of Cocoanut Row	Cocoanut Row	650	0	PVC	66	\$83,599	18	8	350	9		Y	done		2016
383	Sunset Avenue	West of Bradley Place	Bradley Place	325	6	PVC	66	\$118,239	19	8	1420	4		Y	done		
384	Sunset Avenue	Bradley Place	County Road	970	8	PVC	66	\$418,083	19	8	-	4		Y	done		2016
385	Sunset Avenue	County Road	Ocean Walk	75	10	PVC	66	\$37,366	20	10	1130	4		Y	done		
387	Sunset Avenue	County Road	Ocean Walk	785	12	PVC	66	\$417,473	20	10	-	4		Y	done		
162	Ibis Way	Ibis Isle Road West	Ibis Isle Road East	270	6	PVC	66	\$98,230	21	8	700	4		Y	done		2014
163	Ibis Way	Ibis Isle East	Ocean Blvd (A1A)	570	8	PVC	66	\$245,678	21	8	-	4		Y	done		2014
267	Ocean Blvd, South	250' S/O Via Agape	1150' S/O Via Agape	900	12	PVC	66	\$478,632	22	12	950	4		Y	done		
58	Chilean Avenue	Lake Drive	Cocoanut Row	843	8	PVC	66	\$363,344	23	8	2050	4		Y	done		
59	Chilean Avenue	Cocoanut Row	Hibiscus Avenue	732	8	PVC	66	\$315,502	23	8	-	4		Y	done		
60	Chilean Avenue	Hibiscus Avenue	County Road (A1A)	650	8	PVC	66	\$280,159	23	8	-	4		Y	done		
137	Everglade Avenue	Lake Trail	Bradley Place	400	8	PVC	66	\$172,405	24	8	-	4	Y	Y	done		
138	Everglade Avenue	Bradley Place	County Road	923	8	PVC	66	\$397,825	24	8	-	4	Y	Y	done		
139	Everglade Avenue	County Road	Ocean Blvd	999	8	PVC	66	\$430,582	24	8	2230	4	Y	Y	done		
76	Cocoanut Row	Brazilian Avenue	Australian Avenue	350	8	PVC	66	\$150,855	25	16	980	4		Y	done		2015
77	Cocoanut Row	Australian Avenue	Chilean Avenue	280	8	PVC	66	\$120,684	25	16	-	4		Y	done		2015
78	Cocoanut Row	Chilean Avenue	Peruvian Avenue	280	8	PVC	66	\$120,684	25	16	-	4		Y	done		2015
370	Slope Trail	Country Club Road	Ridgeview Drive	550	8	PVC	66	\$237,057	27	12	500	6		Y	done		
38	Bradley Place	Wells Road	Everglade Avenue	1030	12	PVC	66	\$547,768	28	12	550	9		Y	done		2015
39	Bradley Place	Everglade Avenue	Seminole Avenue	280	12	PVC	66	\$148,908	28	12	550	6	Y	Y	done		2015
204	Lake Way, North	Kawama Lane	Wells Road	1223	8	PVC	66	\$527,129	29	12	1200	6	Y	Y	done		
100	County Road, South	Royal Palm Way	Worth Avenue	1650	12	PVC	66	\$877,492	30	12	1450	9		Y	done		2014
101	County Road, South	Worth Avenue	El Vedado Road	3000	16	PVC	66	\$1,897,840	31	12	1450	6	Y	Y	done		
102	County Road, South	El Vedado Road	Ocean Blvd	3150	12	PVC	66	\$1,675,212	31	12	-	6	Y	Y	done		
171	Island Road	Bridge	County Road (A1A)	750	12	PVC	66	\$398,860	32	12	2660	6		Y	portion remains		
172	Island Road	Bridge	County Road (A1A)	1314	20	PVC	66	\$1,052,006	32	12	-	6		Y	portion remains		2015
256	Ocean Blvd, South	County Road	Southern Blvd.	2800	12	PVC	66	\$1,489,077	33	12	3450	4		Y	done		
107	Dolphin Road	Lake Way	Ocean Blvd	954	8	PVC	66	\$411,187	34	8	980	7		Y	done		
362	Seagate Road	Lake Way	Ocean Blvd	942	8	PVC	66	\$406,015	35	8	1000	7		Y	done		
149	Grace Trail	County Road (A1A)	Ocean Blvd	400	8	PVC	66	\$172,405	36	8	-	7		Y	done		
173	Jamaica Lane	Lake Way	Ocean Blvd	1298	8	PVC	66	\$559,455	37	8	1320	8		Y	done		
44	Brazilian Avenue	Hibiscus Avenue	County Road (A1A)	650	8	PVC	66	\$280,159	38	8	750	8		Y	done		2016
103	Crescent Drive	Emerald Lane	Wells Road	506	8	PVC	66	\$218,093	39	8	680	8		Y	done		
294	Oleander Avenue	Bradley Place	County Road	945	8	PVC	66	\$407,308	40	8	1000	8	Y	Y	done		
309	Peruvian Avenue	Lake Drive	Cocoanut Row	820	8	PVC	66	\$353,431	41	8	2350	8		Y	done		
310	Peruvian Avenue	Cocoanut Row	Hibiscus Avenue	750	8	PVC	66	\$323,260	41	8	-	8		Y	done		2015

Summary of Capital Improvement Projects from Exhibit A in the 1999 Franchise Agreement

Basic Information about Link																	Exhibit A Information						
Link #	BranchName	From	To	Length (ft)	Water main size (inches)	Material	Useful Life Remaining	Budget Cost To Replace (2014 dollars)	Number on Exhibit A in the 1999 Franchise Agreement	Size on Exhibit A	Length on Exhibit A	Type of Work on Exhibit A	Completed per 2006 Funds Statement?	Completed based on WPB reported year built?	Status from Town notes	On Exhibit A and Not Yet Done?	Year to be done in Town's CIP						
311	Peruvian Avenue	Hibiscus Avenue	County Road (A1A)	650	8	PVC	66	\$280,159	41	8	-	8		Y	done		2015						
350	Sea Breeze Avenue	West of Coconut Row	Coconut Row	600	0	PVC	66	\$77,168	42	8	550	8		Y	design only								
5	Algoma Road	West End	Ocean Blvd	980	6	PVC	66	\$356,537	44	8	1070	8		Y	design only								
168	Island Drive	Island Road	800' South of Island Road	800	8	PVC	66	\$344,811	45	8	1900	8		Y	design only								
411	Via Vizcaya	West Loop	County Road (A1A)	1012	8	PVC	66	\$436,185	46	8	930	8		Y	done								
16	Arabian Road	West End of Arabian Road	Lake Way	380	8	PVC	66	\$163,785	51	8	1150	9	Y	Y	done								
17	Arabian Road	Lake Way	Ocean Blvd	450	8	PVC	66	\$193,956	51	8	-	9	Y	Y	done								
18	Arabian Road	Ocean Blvd	Ocean Way	225	8	PVC	66	\$96,978	51	8	-	9	Y	Y	done								
48	Caribbean Road	West of Lake Way	Lake Way	238	8	PVC	66	\$102,581	52	8	980	9	Y	Y	done								
49	Caribbean Road	Lake Way	Ocean Blvd	457	8	PVC	66	\$196,973	52	8	-	9	Y	Y	done								
50	Caribbean Road	Ocean Blvd	Ocean Way	225	8	PVC	66	\$96,978	52	8	-	9	Y	Y	done								
130	El Pueblo Way	Lake Way	Ocean Way	1010	8	PVC	66	\$435,323	55	8	-	9		Y	done								
164	Indian Road	Lake Court	Lake Way	360	8	PVC	66	\$155,165	58	8	1150	9	Y	Y	done								
165	Indian Road	Lake Way	Ocean Blvd	460	8	PVC	66	\$198,266	58	8	-	9	Y	Y	done								
166	Indian Road	Ocean Blvd	Ocean Way	225	8	PVC	66	\$96,978	58	8	-	9	Y	Y	done								
190	Lake Court (North End)	W/End of Indian Road	N/Side of Arabian Road	275	8	PVC	66	\$118,529	60	8	250	9		Y	done								
220	Merrain Road	Lake Way	Ocean Way	800	8	PVC	66	\$344,811	61	8	1000	9		Y	design only								
221	Merrain Road	Ocean Way	Ocean Blvd	200	8	PVC	66	\$86,203	61	8	-	9		Y	design only								
231	Nightingale Trail	Lake Way	Ocean Way	979	8	PVC	66	\$421,962	64	8	1250	9		Y	done		2015						
232	Nightingale Trail	Ocean Way	Ocean Blvd	272	8	PVC	66	\$117,236	64	8	-	9		Y	done		2015						
301	Palmo Way	Lake Way	Ocean Way	900	8	PVC	66	\$387,912	65	8	1150	9	Y	Y	done		2016						
302	Palmo Way	Ocean Way	Ocean Blvd	271	8	PVC	66	\$116,805	65	8	-	9	Y	Y	done		2016						
108	Dunbar Road	Bradley Place	County Road	893	8	PVC	66	\$384,895	69	8	1920	9		Y	done		2016						
109	Dunbar Road	County Road	Ocean Blvd	980	8	PVC	66	\$422,393	69	8	-	9		Y	done		2016						
344	Royal Poinciana Way	Bradley Place	County Road	1030	12	PVC	66	\$547,768	71	8	-	9		Y	done		2015						
365	Seminole Avenue	Bradley Place	County Road	923	8	PVC	66	\$397,825	73	8	2030	9	Y	Y	done								
366	Seminole Avenue	County Road	Ocean Blvd	1038	8	PVC	66	\$447,392	73	8	-	9	Y	Y	done								
389	Tangier Avenue	West of Lake Way	Lake Way	140	4	PVC	66	\$41,526	74	4	-	9	Y	Y	done		2015						
390	Tangier Avenue	West of Lake Way	Lake Way	165	6	PVC	66	\$60,029	74	4	-	9	Y	Y	done		2015						
131	El Vedado Road	West End	County Road (A1A)	1250	8	PVC	66	\$538,767	75	8	820	9		Y	done								
392	Tarpon Way	Island Road	Tarpon Island Bridge	160	6	PVC	66	\$58,210	77	8	500	9		Y	done								
418	Woodbridge Road	West End	Ocean Blvd (A1A)	1500	8	PVC	66	\$646,520	79	8	1030	9		Y	done		2014						
419	Worth Avenue	Lake Drive	Coconut Row	800	6	PVC	66	\$291,051	82	12	920	9		Y	done		2016						
10	Alley W/E of Caribbean	S/Side of Arabian	N/Side of Caribbean	260	8	PVC	66	\$112,063	83	8	280	9		Y	portion remains								
233	North Ocean Way	Indian Road	Mediterranean Road	920	8	PVC	66	\$396,532	11 and 63	8	880	4 and 9		Y	done								
197	Lake Way, North	Mediterranean Road	Orange Grove Road	5480	12	PVC	66	\$2,924,973	3 and 49	12	5500	1	Y	Y	done		2016						
343	Royal Palm Way	County Road (A1A)	Ocean Blvd	940	12	PVC	66	\$499,905	4a	12	900	9		Y	done		2015						
423	Flager Bridge Crossing								6	24	2100	2	Y	Y	joint								
424	Barcelona Road Crossing								7	20	1900	2	Y	Y	design only								
425	Palm Beach Repump Station								8	n/a	n/a	3			done								
426	Phipps Ocean Park Booster								9	n/a	n/a	3	Y	Y	done								
<b>SUBTOTAL COMPLETED</b>								<b>\$33,592,308</b>															

Oldest Facilities

Basic Information about Link				Age Informaiton								2014			
Link #	BranchName	From	To	Length (ft)	Water main size (inches)	Material	Installation date (decade)	Age (years)	Expected Life (years)	Goal Year to Replace	Useful Life Remaining	Budget Cost To Replace (2014 dollars)	On Exhibit A and Not Yet Done?	Year to be done in Town's CIP	
363	Seagrape Circle	West end	Ocean Blvd	170	0	-	1920	94	0	1920	(94)	\$21,864		2014	
34	Barton Avenue	County Road (A1A)	Ocean Blvd	1100	0	-	1930	84	0	1930	(84)	\$141,475		2015	
79	Cocoanut Row	Peruvian Avenue	Worth Avenue	150	0	-	1930	84	0	1930	(84)	\$19,292			
89	County Road, North	Fairview Road	Wells Road	5450	0	-	1930	84	0	1930	(84)	\$700,943		2016	
142	Flagler Drive	Barton Avenue	South of Clarke Avenue	650	0	-	1930	84	0	1930	(84)	\$83,599			
353	Sea Breeze Avenue	County Road (A1A)	Ocean Blvd	620	0	-	1930	84	0	1930	(84)	\$79,740			
391	Tangier Avenue	Lake Way	County Road	1104	0	-	1930	84	0	1930	(84)	\$141,925			
13	Angler Avenue	Lake Way	Ocean Blvd	240	0	-	1940	74	0	1940	(74)	\$30,867			
281	Ocean Terrace	Lake Way	Ocean Blvd	1000	6	-	1940	74	0	1940	(74)	\$363,813		2017	
56	Cherry Lane	West of Lake Way	Lake Way	280	0	-	1950	64	0	1950	(64)	\$36,012			
57	Cherry Lane	Lake Way	County Road	1025	0	-	1950	64	0	1950	(64)	\$131,829		2016	
125	El Dorado Lane	Lake Way	County Road	988	0	-	1950	64	0	1950	(64)	\$127,070			
189	Lake Avenue	County Road	East end	620	0	-	1950	64	0	1950	(64)	\$79,740			
179	Kawama Lane	Lake Way	County Road	1048	0	-	1960	54	0	1960	(54)	\$134,787			
372	South Woods Road	West of Lake Way	Lake Way	197	0	-	1960	54	0	1960	(54)	\$25,337	Y		
375	South Woods Road	East Woods Road	County Road	310	0	-	1960	54	0	1960	(54)	\$39,870	Y		
40	Bradley Place	Seminole Avenue	Sunset Avenue	1070	12	AC	1920	94	50	1970	(44)	\$658,920		2015	
41	Bradley Place	Sunset Avenue	Royal Poinciana Way	230	12	AC	1920	94	50	1970	(44)	\$141,637		2015	
241	Ocean Blvd, North	100' south of E Inlet Drive	Indian Road	320	8	AC	1920	94	50	1970	(44)	\$159,428	Y		
243	Ocean Blvd, North	Curve	Angler Ave	1150	8	AC	1920	94	50	1970	(44)	\$572,945			
244	Ocean Blvd, North	Angler Ave	Betw Queens & Colonial	4050	8	AC	1920	94	50	1970	(44)	\$2,017,764			
247	Ocean Blvd, North	Betw Queens & Colonial	Bahama Lane	2620	8	AC	1920	94	50	1970	(44)	\$1,305,319			
248	Ocean Blvd, North	Bahama Lane	Curve	400	8	AC	1920	94	50	1970	(44)	\$199,285		2014	
249	Ocean Blvd, North	Curve	Country Club Road	1600	8	AC	1920	94	50	1970	(44)	\$797,141		2014	
250	Ocean Blvd, North	Wells Road	Sunrise Ave	1890	8	AC	1920	94	50	1970	(44)	\$941,623			
265	Ocean Blvd, South	Lagomar Road	250' S/O Via Agape	2210	8	AC	1920	94	50	1970	(44)	\$1,101,051			
268	Ocean Blvd, South	1150' S/O Via Agape	Solan's Curve (east)	2030	12	AC	1920	94	50	1970	(44)	\$1,250,101			
381	Sunrise Avenue	Bradley Place	County Road	979	6	AC	1920	94	50	1970	(44)	\$413,738			
382	Sunrise Avenue	County Road	Ocean Blvd	1098	8	AC	1920	94	50	1970	(44)	\$547,038			
401	Via Fontana	West end	Ocean Blvd	180	4	AC	1920	94	50	1970	(44)	\$62,462			
406	Via Marila	Lake Way	Ocean Blvd	1291	0	-	1970	44	0	1970	(44)	\$166,040	Y	2016	
414	Wells Road	Lake Way	County Road	874	12	AC	1920	94	50	1970	(44)	\$538,221		2017	
415	Wells Road	County Road	Ocean Blvd	953	12	AC	1920	94	50	1970	(44)	\$586,870		2017	
7	Alley South of Barton Ave	Cocoanut Row	Flagler Drive Extension	2043	4	AC	1930	84	50	1980	(34)	\$708,948			
8	Alley South of Clarke Ave	Cocoanut Row	Flagler Drive Extension	1968	4	AC	1930	84	50	1980	(34)	\$682,922			
25	Australian Avenue	Lake Drive	Cocoanut Row	650	8	AC	1930	84	50	1980	(34)	\$323,839	Y		
27	Australian Avenue	Hibiscus Avenue	County Road (A1A)	650	8	DI	1930	84	50	1980	(34)	\$280,159	Y		
29	Australian Avenue	County Road (A1A)	Ocean Blvd	220	8	AC	1930	84	50	1980	(34)	\$109,607	Y		
31	Banyan Road	West End	County Road	530	4	AC	1930	84	50	1980	(34)	\$183,917			
32	Banyan Road	County Road	Ocean Blvd	600	8	DI	1930	84	50	1980	(34)	\$258,608			
36	Bermuda Lane	West of County Road	County Road	146	4	AC	1930	84	50	1980	(34)	\$50,664			
64	Clarke Avenue	County Road (A1A)	Ocean Blvd	1030	6	AC	1930	84	50	1980	(34)	\$435,292			
116	Eden Road	Adam Road	Ocean Blvd	420	4	AC	1930	84	50	1980	(34)	\$145,746	Y		
117	Eden Road	Adam Road	Ocean Blvd	240	6	AC	1930	84	50	1980	(34)	\$101,427	Y		
132	El Vedado Road	County Road (A1A)	Ocean Blvd	250	0	AC	1930	84	50	1980	(34)	\$32,153			

**Oldest Facilities**

Basic Information about Link				Age Informaiton								2014			
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135	Esplanade Way	Lake Way	Ocean Way	500	6	AC	1930	84	50	1980	(34)	\$211,307	Y		
151	Hammon Avenue	County Road (A1A)	Ocean Blvd	746	0	AC	1930	84	50	1980	(34)	\$95,946	Y		
167	Island Drive	North End	Island Road	1701	16	AC	1930	84	50	1980	(34)	\$1,247,536			
169	Island Drive	800' South of Island Road	South End	1100	8	AC	1930	84	50	1980	(34)	\$548,035	Y		
185	La Puerta Way	Lake Way	Ocean Way	1010	4	DI	1930	84	50	1980	(34)	\$299,579	Y	2015	
186	La Puerta Way	Ocean Way	Ocean Blvd	430	6	AC	1930	84	50	1980	(34)	\$181,724	Y		
211	Main Street	County Road	East of County Road	200	8	AC	1930	84	50	1980	(34)	\$99,643			
253	Ocean Blvd, South	Peruvian Avenue	Worth Avenue	250	8	AC	1930	84	50	1980	(34)	\$124,553		2015	
261	Ocean Blvd, South	Blossom Way	Ocean View Road	3500	8	AC	1930	84	50	1980	(34)	\$1,743,747			
263	Ocean Blvd, South	Ocean View Road	Lagomar Road	420	12	AC	1930	84	50	1980	(34)	\$258,642			
271	Ocean Blvd, South	Solan's Curve (east)	Ibis Way	2600	12	AC	1930	84	50	1980	(34)	\$1,601,115		2015	
277	Ocean Blvd, South	3000 S Ocean	3500 S Ocean	6750	12	AC	1930	84	50	1980	(34)	\$4,156,740		2014	
312	Peruvian Avenue	County Road (A1A)	Ocean Blvd	990	6	DI	1930	84	50	1980	(34)	\$360,175		2015	
317	Pine Walk/Cocoanut Walk	Cocoanut Row	County Road	1240	8	AC	1930	84	50	1980	(34)	\$617,785			
332	Reef Road	Lake Way	Ocean Blvd	200	6	CI	1930	84	50	1980	(34)	\$72,763			
357	Sea Spray Avenue	County Road (A1A)	Ocean Blvd	956	6	AC	1930	84	50	1980	(34)	\$404,018			
393	Tarpon Way	Island Road	Tarpon Island Bridge	160	0	AC	1930	84	50	1980	(34)	\$20,578	Y		
398	Via Bellaria	West End	Ocean Blvd	960	6	AC	1930	84	50	1980	(34)	\$405,709		2014	
399	Via Del Lago	West End	Ocean Blvd	910	6	AC	1930	84	50	1980	(34)	\$384,578		2014	
409	Via Palma	West End	Ocean Blvd	770	8	AC	1930	84	50	1980	(34)	\$383,624	Y	2014	
417	Whitehall Way	Lake Trail	Cocoanut Row	553	8	AC	1930	84	50	1980	(34)	\$275,512	Y		
3	Adam Road	S/Side of Garden Road	N/Side of Eden Road	300	0	AC	1940	74	50	1990	(24)	\$38,584	Y		
65	Cocoanut Row	Royal Poinciana Way	Whitehall Way	675	16	AC	1940	74	50	1990	(24)	\$495,054			
66	Cocoanut Row	Royal Poinciana Way	Whitehall Way	675	16	c	1940	74	50	1990	(24)	\$427,014			
67	Cocoanut Row	Whitehall Way	Chapel Hill Road	700	16	AC	1940	74	50	1990	(24)	\$513,389			
83	Coral Lane	Lake Way	Crescent Drive	570	6	AC	1940	74	50	1990	(24)	\$240,890	Y		
84	Coral Lane	Lake Way	Crescent Drive	120	2	COP	1940	74	50	1990	(24)	\$15,434	Y		
90	County Road, North	Wells Road	Atlantic Avenue	720	12	AC	1940	74	50	1990	(24)	\$443,386			
95	County Road, South	600' s/o Royal Poiciana Way	Pendleton Ave	1820	12	AC	1940	74	50	1990	(24)	\$1,120,780	Y	2015	
97	County Road, South	Barton Avenue	Clarke Avenue	450	12	AC	1940	74	50	1990	(24)	\$277,116	Y		
98	County Road, South	Clarke Avenue	Seaview Avenue	960	10	AC	1940	74	50	1990	(24)	\$550,861	Y		
115	Eden Road	Lake Way	Adam Road	600	6	AC	1940	74	50	1990	(24)	\$253,568	Y		
133	Emerald Lane	Lake Way	Crescent Drive	150	8	DI	1940	74	50	1990	(24)	\$64,652	Y		
134	Emerald Lane	Lake Way	Crescent Drive	660	4	AC	1940	74	50	1990	(24)	\$229,029	Y		
144	Garden Road	Lake Way	Adam Road	731	4	AC	1940	74	50	1990	(24)	\$253,667	Y		
145	Garden Road	Adam Road	Ocean Blvd	350	4	AC	1940	74	50	1990	(24)	\$121,455	Y		
184	Kings Road	West End	Ocean Blvd (A1A)	570	6	AC	1940	74	50	1990	(24)	\$240,890		2014	
201	Lake Way, North	Ridgeview Drive	La Costa Way	2250	8	AC	1940	74	50	1990	(24)	\$1,120,980			
203	Lake Way, North	Miraflores Drive	Kawama Lane	952	8	AC	1940	74	50	1990	(24)	\$474,130		2015	
258	Ocean Blvd, South	Southern Blvd	Ocean Woods	760	8	DI	1940	74	50	1990	(24)	\$327,570			
259	Ocean Blvd, South	Ocean Woods	Blossom Way	820	12	AC	1940	74	50	1990	(24)	\$504,967			
323	Plantation Road	Crest Road	Lake Way	230	6	AC	1940	74	50	1990	(24)	\$97,201			
324	Plantation Road	Lake Way	Junction with Southland	910	6	AC	1940	74	50	1990	(24)	\$384,578			
325	Polmer Park	West of Lake Way	Lake Way	371	0		1960	54	50	1990	(24)	\$47,716			
348	Sanford Avenue	Lake Way	County Road	1065	0	AC	1940	74	50	1990	(24)	\$136,973	Y		

Oldest Facilities

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369	Slope Trail	Country Club Road	Fairview Road	250	16	AC	1940	74	50	1990	(24)	\$183,353	Y	
377	Southland Road	Junction with Plantation	County Road	150	6	AC	1940	74	50	1990	(24)	\$63,392		2017
19	Atlantic Ave Access	Lake Trail	Bradley Place	150	0	AC	1950	64	50	2000	(14)	\$19,292		
20	Atlantic Avenue	Bradley Place	County Road	560	6	AC	1950	64	50	2000	(14)	\$236,663		
21	Atlantic Avenue	Bradley Place	County Road	366	4	AC	1950	64	50	2000	(14)	\$127,007		
22	Atlantic Avenue	County Road	Ocean Blvd	1017	6	AC	1950	64	50	2000	(14)	\$429,798		
30	Bahama Lane	Lake Way	Ocean Blvd	1349	8	AC	1950	64	50	2000	(14)	\$672,090		
87	Country Club Road	Lake Way	Slope Trail	600	12	AC	1950	64	50	2000	(14)	\$369,488		
105	Crest Road	North End of Crest Road	West End of Plantation	380	4	AC	1950	64	50	2000	(14)	\$131,865	Y	
110	Dunbar Road	Lake Trail	Bradley Place	175	6	DI	1950	64	50	2000	(14)	\$63,667		2016
111	Dunbar Road	Lake Trail	Bradley Place	364	8	DI	1950	64	50	2000	(14)	\$156,889		2016
112	East Inlet Drive	E/Side Ocean Blvd	E/Side Ocean Blvd	613	4	CI	1950	64	50	2000	(14)	\$181,824		2015
113	East Inlet Drive	E/Side Ocean Blvd	E/Side Ocean Blvd	613	6	CI	1950	64	50	2000	(14)	\$223,018		2015
114	Eden Road	Lake Way	Adam Road	100	6	AC	1950	64	50	2000	(14)	\$42,261	Y	
119	El Bravo Way	West End	County Road (A1A)	400	6	AC	1950	64	50	2000	(14)	\$169,045		2014
136	Esplanade Way	Lake Way	Ocean Way	450	6	AC	1950	64	50	2000	(14)	\$190,176	Y	
141	Flagler Drive	Via Bethesda	Barton Avenue	348	6	AC	1950	64	50	2000	(14)	\$146,858		
146	Garden Road	Adam Road	Ocean Blvd	300	6	AC	1950	64	50	2000	(14)	\$126,784	Y	
147	Grace Trail	County Road (A1A)	Ocean Blvd	325	4	AC	1950	64	50	2000	(14)	\$112,779	Y	
148	Grace Trail	County Road (A1A)	Ocean Blvd	325	6	AC	1950	64	50	2000	(14)	\$137,349	Y	
180	Kenlyn Road	Lake Way	Ocean Way	846	6	CI	1950	64	50	2000	(14)	\$307,786		2016
181	Kenlyn Road	Ocean Way	Ocean Blvd	266	6	CI	1950	64	50	2000	(14)	\$96,774		2016
183	Kings Road	West End	Ocean Blvd (A1A)	280	4	CI	1950	64	50	2000	(14)	\$83,052		2014
192	Lake Drive	350' north of Worth Ave	Worth Avenue	350	6	AC	1950	64	50	2000	(14)	\$147,915		2016
198	Lake Way, North	Orange Grove Road	Bahama Lane	2170	12	DI	1950	64	50	2000	(14)	\$1,154,035		2015
199	Lake Way, North	Bahama Lane	Country Club Road	2680	12	DI	1950	64	50	2000	(14)	\$1,425,260		2014
200	Lake Way, North	Country Club Road	Ridgeview Drive	580	12	AC	1950	64	50	2000	(14)	\$357,172		2014
205	Lauria Lane	N. of Debra Lane	N/Side of Onandaga Ave	380	4	CI	1950	64	50	2000	(14)	\$112,713		
207	Leaman Lane	Ocean Blvd	East End	220	4	DI	1950	64	50	2000	(14)	\$65,255		
208	List Road	Lake Way	Ocean Blvd	1176	6	CI	1950	64	50	2000	(14)	\$427,844		2016
209	List Road	Lake Way	Ocean Blvd	120	6	AC	1950	64	50	2000	(14)	\$50,714		2016
210	List Road	Lake Way	Ocean Blvd	1270	0		1970	44	50	2000	(14)	\$163,339		2016
225	Mocking Bird Trail	Lake Way	Ocean Way	943	6	CI	1950	64	50	2000	(14)	\$343,076		2016
226	Mocking Bird Trail	Ocean Way	Ocean Blvd	281	6	CI	1950	64	50	2000	(14)	\$102,232	Y	2016
234	North Ocean Way	Onandaga Ave	Esplanade Way	220	6	AC	1950	64	50	2000	(14)	\$92,975		
240	Ocean Blvd, North	East Inlet Drive	100' south	100	6	CI	1950	64	50	2000	(14)	\$36,381	Y	
269	Ocean Blvd, South	Solan's Curve (east)	Old South Ocean	4600	12	AC	1950	64	50	2000	(14)	\$2,832,741		2015
272	Ocean Blvd, South	Old South Ocean	Lake Avenue	8400	12	AC	1950	64	50	2000	(14)	\$5,172,832	Y	2015
275	Ocean Blvd, South	Lake Worth Road	3000 S Ocean	1200	12	AC	1950	64	50	2000	(14)	\$738,976		2014
287	Ocean Way	Merrain Road	Kenlyn Road	260	4	CI	1950	64	50	2000	(14)	\$77,119		
289	Ocean Way	Palmo Way	Mockingbird Trail	380	4	CI	1950	64	50	2000	(14)	\$112,713		
297	Orange Grove Lake Access	Lake Trail	Lake Way	204	16	DI	1950	64	50	2000	(14)	\$129,053		2017
322	Plantation Road	Crest Road	Lake Way	100	6	DI	1950	64	50	2000	(14)	\$36,381		
333	Reef Road	Lake Way	Ocean Blvd	759	4	AC	1950	64	50	2000	(14)	\$263,383		
334	Regents Park Drive	West End	Ocean Blvd (A1A) (All)	470	6	DI	1950	64	50	2000	(14)	\$170,992		2014

Oldest Facilities

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337	Root Trail	County Road (A1A)	Ocean Blvd	520	4	AC	1950	64	50	2000	(14)	\$180,447		2015	
338	Root Trail	County Road (A1A)	Ocean Blvd	520	6	AC	1950	64	50	2000	(14)	\$219,759		2015	
345	Royal Poinciana Plaza	West of Bradley Place	Bradley Place	400	6	DI	1950	64	50	2000	(14)	\$145,525	Y	2015	
346	Royal Poinciana Plaza	West of Bradley Place	Bradley Place	620	6	AC	1950	64	50	2000	(14)	\$262,020	?	2015	
376	Southland Road	Lake Way	Junction with Plantation	1050	6	AC	1950	64	50	2000	(14)	\$443,744		2017	
402	Via Linda	West of Lake Way	Lake Way	363	4	AC	1950	64	50	2000	(14)	\$125,966			
403	Via Linda	Lake Way	County Road	1105	6	AC	1950	64	50	2000	(14)	\$466,988			
412	Via Vizcaya	County Road (A1A)	Ocean Blvd	458	4	AC	1950	64	50	2000	(14)	\$158,932			
24	Austrailian Avenue	Docks	Lake Drive	720	8	AC	1960	54	50	2010	(4)	\$358,714	Y		
46	Canterbury Lane	County Road	East end	460	6	AC	1960	54	50	2010	(4)	\$194,402			
47	Canterbury Lane	County Road	East end	70	4	AC	1960	54	50	2010	(4)	\$24,291			
51	Casa Bendita	County Road	East of County Road	684	6	AC	1960	54	50	2010	(4)	\$289,068			
55	Chateaux Drive	County Road	East End	450	6	AC	1960	54	50	2010	(4)	\$190,176			
91	County Road, North	Wells Road	Atlantic Avenue	720	10	AC	1960	54	50	2010	(4)	\$413,146			
92	County Road, North	Atlantic Avenue	Sunset Avenue	1250	12	AC	1960	54	50	2010	(4)	\$769,767			
93	County Road, North	Atlantic Avenue	Royal Poinciana Way	1600	10	CI	1960	54	50	2010	(4)	\$797,141			
94	County Road, South	Royal Poinciana Way	600' south	600	12	AC	1960	54	50	2010	(4)	\$369,488	Y	2015	
126	El Mirasol	County Road	East of County Road	410	6	AC	1960	54	50	2010	(4)	\$173,271			
127	El Mirasol	County Road	East of County Road	330	4	AC	1960	54	50	2010	(4)	\$114,514			
202	Lake Way, North	La Costa Way	Miraflores Drive	875	8	AC	1960	54	50	2010	(4)	\$435,937		2015	
222	Middle Road	Gulfstream Road	Via Marina	875	8	CI	1960	54	50	2010	(4)	\$377,137			
223	Middle Road	Via Marina	South of Via Marina	460	6	AC	1960	54	50	2010	(4)	\$194,402			
230	Municipal Pier Easement	Brazilian Avenue	Peruvian Avenue	1300	8	AC	1960	54	50	2010	(4)	\$647,677	Y		
237	North Woods Road	West of Lake Way	Lake Way	366	6	AC	1960	54	50	2010	(4)	\$154,676			
238	North Woods Road	Lake Way	South Woods Road	970	6	AC	1960	54	50	2010	(4)	\$409,935			
257	Ocean Blvd, South	Southern Blvd	Ocean Woods	760	12	DI	1960	54	50	2010	(4)	\$404,178			
266	Ocean Blvd, South	Lagomar Road	250' S/O Via Agape	2210	12	AC	1960	54	50	2010	(4)	\$1,360,947			
285	Ocean Way	Ocean Terrace	Osceola Way	220	4	CI	1960	54	50	2010	(4)	\$65,255			
299	Osceola Way	Lake Way	Ocean Way	100	4	CI	1960	54	50	2010	(4)	\$29,661			
300	Osceola Way	Lake Way	Ocean Way	880	6	CI	1960	54	50	2010	(4)	\$320,156			
347	Sandpiper Drive	Lake Way	Ocean Blvd	1360	6	AC	1960	54	50	2010	(4)	\$574,754			
386	Sunset Avenue	County Road	Ocean Walk	240	10	AC	1960	54	50	2010	(4)	\$137,715	Y		
394	Tradewind Drive	Lake Way	Ocean Blvd	650	8	AC	1960	54	50	2010	(4)	\$323,839			
400	Via Del Mar	West End	County Road	260	6	AC	1960	54	50	2010	(4)	\$109,879		2014	
416	West Indies Drive	Lake Way	County Road	998	6	AC	1960	54	50	2010	(4)	\$421,768			
14	Antigua Lane	West of Cocoanut Row	Cocoanut Row	290	4	DI	1970	44	50	2020	6	\$86,018			
15	Antigua Lane	West of Cocoanut Row	Cocoanut Row	290	6	DI	1970	44	50	2020	6	\$105,506			
68	Cocoanut Row	Chapel Hill Road	Pendleton Ave	320	16	AC	1970	44	50	2020	6	\$234,692			
69	Cocoanut Row	Pendleton Ave	Barton Avenue	370	16	AC	1970	44	50	2020	6	\$271,363			
70	Cocoanut Row	Barton Avenue	Clarke Avenue	430	16	AC	1970	44	50	2020	6	\$315,368			
73	Cocoanut Row	Sea Breeze Avenue	Sea View Avenue	570	16	AC	1970	44	50	2020	6	\$418,046			
177	Jungle Road	Pelican Lane	County Road (A1A)	531	6	AC	1970	44	50	2020	6	\$224,408			
178	Jungle Road	County Road (A1A)	Ocean Blvd	635	6	AC	1970	44	50	2020	6	\$268,359			
212	Main Street	County Road	East of County Road	100	8	AC	1970	44	50	2020	6	\$49,821			
213	Main Street	County Road	East of County Road	275	10	DI	1970	44	50	2020	6	\$137,009			

**Oldest Facilities**

Basic Information about Link				Age Informaiton								2014			
Link #	BranchName	From	To	Length (ft)	Water main size (inches)	Material	Installation date (decade)	Age (years)	Expected Life (years)	Goal Year to Replace	Useful Life Remaining	Budgtet Cost To Replace (2014 dollars)	On Exhibit A and Not Yet Done?	Year to be done in Town's CIP	
245	Ocean Blvd, North	Angler Ave	Betw Queens & Colonial	4050	8	CI	1970	44	50	2020	6	\$1,745,604			
246	Ocean Blvd, North	Betw Queens & Colonial	List Road	750	8	CI	1970	44	50	2020	6	\$323,260			
274	Ocean Blvd, South	Ibis Way	Lake Avenue	9900	12	AC	1970	44	50	2020	6	\$6,096,552		2015	
278	Ocean Blvd, South	3500 S Ocean	Southern limits	2800	12	AC	1970	44	50	2020	6	\$1,724,277		2014	
318	Pine Walk/Cocoanut Walk	County Road	Breakers Row	1170	8	DI	1970	44	50	2020	6	\$504,286			
326	Primavera Avenue	West of Cocoanut Row	Cocoanut Row	170	6	AC	1970	44	50	2020	6	\$71,844			
405	Via Los Incas	County Road	East end	560	6	AC	1970	44	50	2020	6	\$236,663			
26	Australian Avenue	Cocoanut Row	Hibiscus Avenue	750	8	PVC	1930	84	100	2030	16	\$323,260	Y		
28	Australian Avenue	County Road (A1A)	Ocean Blvd	750	8	PVC	1930	84	100	2030	16	\$323,260	Y		
81	Colonial Lane	Lake Way	Ocean Way	1010	4	PVC	1930	84	100	2030	16	\$299,579	Y		
251	Ocean Blvd, South	Barton Avenue	Royal Palm Way	1900	6	PVC	1930	84	100	2030	16	\$691,245		2015	
252	Ocean Blvd, South	Brazilian Avenue	Peruvian Avenue	950	8	PVC	1930	84	100	2030	16	\$409,463		2015	
279	Ocean Blvd, South	3500 S Ocean	Southern limits	2800	8	PVC	1930	84	100	2030	16	\$1,206,837		2014	
96	County Road, South	Pendleton Ave	Barton Avenue	200	12	PVC	1940	74	100	2040	26	\$106,363	Y	2015	
254	Ocean Blvd, South	Worth Avenue	Hammon Avenue	330	8	PVC	1940	74	100	2040	26	\$142,234		2015	
260	Ocean Blvd, South	Ocean Woods	Blossom Way	820	8	PVC	1940	74	100	2040	26	\$353,431			
262	Ocean Blvd, South	Blossom Way	Ocean View Road	3500	8	PVC	1940	74	100	2040	26	\$1,508,547			
264	Ocean Blvd, South	Ocean View Road	Lagomar Road	420	12	PVC	1940	74	100	2040	26	\$223,362			
												<b>\$87,154,466</b>			

# Appendix D

Select Figures and Tables from 2014 Brown  
and Caldwell Technical Memorandum

## 3.2 Candidate Project Areas

Using the likelihood of failure and total risk score results, the water distribution mains were grouped into candidate project areas for purposes of condition assessment, rehabilitation and replacement activities. The project areas include water distribution mains having High to Very High likelihood of failure and risk scores. Although there were many aerial crossings that had high scores, these were excluded from the project areas since they are already being addressed by the City under a separate program. Table 3-4 lists the candidate project areas and the water distribution main segments included within each area. Figure 3-4 illustrates the location of each proposed project area, highlighted in red.

Table 3-4. Water Distribution Main Candidate Project Areas							
Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM1	WSP01774	133	180	20160	20	CAS	1960
WM1	WSP01789	153	165	18,480	24	DIP	1968
WM1	WSP05504	292	180	20,160	20	CAS	1960
WM1	WSP05505	836	277	44,874	20	DIP	1973
WM1	WSP05506	118	155	17,360	20	DIP	1973
WM1	WSP05700	258	155	17,360	24	DIP	1972
WM1	WSP05752	50	180	20,160	24	CAS	1968
WM1	WSP05890	83	180	20,160	24	CAS	1968
WM1	WSP05905	203	180	20,160	24	CAS	1968
WM1	WSP05957	517	165	18,480	24	DIP	1968
WM1	WSP05958	497	165	26,730	24	DIP	1968
WM1	WSP06571	137	180	19,440	8	CAS	1960
WM1	WSP08164	7	180	20,160	24	CAS	1968
WM1	WSP08170	6	180	29,160	24	CAS	1968
WM1	WSP08171	7	180	17,640	10	CAS	1968
WM1	WSP10014	408	180	20,160	24	CAS	1968
WM1	WSP10024	178	180	20,160	24	CAS	1968
WM1	WSP10461	133	155	17,360	24	DIP	1972
WM1	WSP10462	67	155	17,360	24	DIP	1972
WM1	WSP10469	41	180	20,160	24	CAS	1972
WM1	WSP10471	98	155	25,110	20	DIP	1973
WM1	WSP10472	7	155	17,360	20	DIP	1973
WM1	WSP12321	2740	155	17,360	20	DIP	1973
WM1	WSP19521	306	180	29,160	20	CAS	1960
WM1	WSP19524	201	180	20,160	20	CAS	1960
WM1	WSP19525	68	180	29,160	20	CAS	1960
WM1	WSP21729	26	180	20,160	24	CAS	1968

Table 3-4. Water Distribution Main Candidate Project Areas							
Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM1	WSP21730	7	180	20,160	24	CAS	1968
WM1	WSP22547	278	180	29,160	20	CAS	1960
WM1	WSP22552	35	180	20,160	20	CAS	1960
WM1	WSP22553	142	180	20,160	20	CAS	1960
WM1	WSP22554	335	180	29,160	20	CAS	1960
WM1	WSP25682	6	180	20,160	24	CAS	1937
WM1	WSP25683	137	180	20,160	24	CAS	1937
WM1	WSP28007	85	180	20,160	24	CAS	1927
WM1	WSP28008	38	180	20,160	24	CAS	1937
WM1	WSP28009	259	180	20,160	24	CAS	1937
WM1	WSP28010	46	180	20,160	24	CAS	1937
WM1	WSP28011	134	180	20,160	24	CAS	1937
WM1	WSP28012	43	180	20,160	24	CAS	1937
WM1	WSP28013	13	180	20,160	24	CAS	1937
WM1	WSP28014	3	180	20,160	24	CAS	1937
WM1	WSP28015	107	180	20,160	24	CAS	1937
WM1	WSP28016	34	180	20,160	24	CAS	1968
WM1	WSP28017	79	180	20,160	24	CAS	1968
WM1	WSP28022	279	180	20,160	24	CAS	1937
WM1	WSP28444	628	180	20,160	24	CAS	1968
WM1	WSP28445	272	180	20,160	24	CAS	1968
WM1	WSP28446	11	195	21,840	24	CAS	1968
WM1	WSP28699	159	180	20,160	24	CAS	1937
WM1	WSP28742	100	180	20,160	24	CAS	1937
WM1	WSP28743	28	180	20,160	24	CAS	1937
WM2	WSP05118	442	235	38,070	16	CAS	1986
WM2	WSP06993	638	235	47,470	18	CAS	1986
WM3	WSP22743	1644	260	42,120	12	CAS	1972
WM4	WSP24790	859	195	35,490	16	CAS	1964
WM4	WSP24791	1462	215	32,680	16	CICL	1967
WM5	WSP30096	962	220	24,640	12	CAS	1950
WM6	WSP05805	745	220	35,640	16	CAS	1957
WM7	WSP12603	6	215	21,070	8	AC	1972
WM7	WSP31599	25	215	21,070	8	AC	1972
WM7	WSP32451	3063	190	18,620	8	CICL	1972
WM8	WSP07029	110	215	24,080	12	DIP	1967

Table 3-4. Water Distribution Main Candidate Project Areas							
Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM8	WSP11081	272	180	23,040	8	CAS	1969
WM8	WSP18026	987	195	21,840	12	DIP	1965
WM8	WSP21745	415	180	32,040	8	CAS	1969
WM9	WSP02285	79	165	16,170	10	CAS	1977
WM9	WSP05245	49	165	16,170	10	CAS	1977
WM9	WSP05254	123	195	19,110	10	CAS	1977
WM9	WSP14069	2080	235	34,780	10	DIP	1974
WM10	WSP14561	9	180	17,640	10	CAS	1970
WM10	WSP15437	222	180	17,640	10	CAS	1970
WM10	WSP15446	44	180	17,640	10	CAS	1970
WM10	WSP15450	229	180	20,160	12	CAS	1970
WM10	WSP15451	5	180	20,160	12	CAS	1970
WM10	WSP15453	391	180	17,640	10	CAS	1970
WM10	WSP15454	2	180	17,640	10	CAS	1970
WM10	WSP15723	82	180	17,640	10	CAS	1970
WM10	WSP15724	280	180	26,640	10	CAS	1970
WM10	WSP15731	441	180	17,640	10	CAS	1970
WM10	WSP15744	261	180	17,640	10	CAS	1970
WM10	WSP15973	247	180	17,640	10	CAS	1970
WM10	WSP15975	4	180	17,640	10	CAS	1970
WM10	WSP15977	305	180	17,640	10	CAS	1970
WM10	WSP15979	437	180	17,640	10	CAS	1970
WM10	WSP16014	261	180	17,640	10	CAS	1970
WM10	WSP16022	4	180	17,640	10	CAS	1970
WM10	WSP22307	357	210	20,580	10	CAS	1970
WM11	WSP02039	237	180	27,360	14	CAS	1968
WM11	WSP02113	596	180	27,360	14	CAS	1968
WM11	WSP02115	580	260	42,120	16	CAS	1968
WM11	WSP04637	7	180	27,360	14	CAS	1968
WM11	WSP04647	201	180	27,360	14	CAS	1968
WM11	WSP09965	46	180	27,360	14	CAS	1968
WM11	WSP09966	544	180	36,360	14	CAS	1968
WM11	WSP09972	70	180	27,360	14	CAS	1968
WM11	WSP09978	382	180	27,360	14	CAS	1968
WM11	WSP09981	122	180	27,360	14	CAS	1968
WM11	WSP09983	167	180	27,360	14	CAS	1968

Table 3-4. Water Distribution Main Candidate Project Areas							
Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM11	WSP16554	7	180	27,360	14	CAS	1958
WM11	WSP16555	7	180	27,360	14	CAS	1968
WM11	WSP16556	13	180	27,360	14	CAS	1958
WM11	WSP16557	12	180	27,360	14	CAS	1968
WM11	WSP16663	452	400	60,800	32	CICL	1956
WM11	WSP16663	452	400	60,800	32	CICL	1956
WM11	WSP16664	954	180	20,160	16	CAS	1956
WM11	WSP17700	675	215	32,680	14	DIP	1968
WM11	WSP17908	308	180	27,360	14	CAS	1968
WM11	WSP17909	72	180	36,360	14	CAS	1968
WM11	WSP18265	398	180	27,360	14	CAS	1968
WM11	WSP18273	14	180	27,360	14	CAS	1968
WM11	WSP18275	7	180	27,360	14	CAS	1968
WM11	WSP18284	297	180	27,360	14	CAS	1968
WM11	WSP18285	7	180	27,360	14	CAS	1968
WM11	WSP18287	7	180	36,360	14	CAS	1968
WM11	WSP18288	354	180	36,360	14	CAS	1968
WM11	WSP18305	20	180	27,360	14	CAS	1968
WM11	WSP18306	3	180	27,360	14	CAS	1968
WM11	WSP18307	57	180	19,440	8	CAS	1968
WM11	WSP18308	1	180	19,440	8	CAS	1968
WM11	WSP18311	7	180	20,160	16	CAS	1968
WM11	WSP18312	7	180	10,440	8	CAS	1968
WM11	WSP18314	4	180	20,160	16	CAS	1968
WM11	WSP18317	2	180	19,440	8	CAS	1968
WM11	WSP18320	330	180	36,360	14	CAS	1968
WM11	WSP18324	7	180	20,160	16	CAS	1968
WM11	WSP18325	80	180	27,360	14	CAS	1968
WM11	WSP18332	499	180	27,360	14	CAS	1968
WM11	WSP18621	54	180	10,440	8	CAS	1968
WM11	WSP18622	148	180	36,360	14	CAS	1968
WM11	WSP18632	105	180	19,440	8	CAS	1968
WM11	WSP22355	84	180	27,360	14	CAS	1968
WM11	WSP22356	10	180	27,360	14	CAS	1968
WM11	WSP22359	95	180	27,360	14	CAS	1968
WM11	WSP22360	398	180	36,360	14	CAS	1968

Table 3-4. Water Distribution Main Candidate Project Areas

Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM11	WSP22361	564	180	36,360	14	CAS	1968
WM11	WSP22368	497	180	36,360	14	CAS	1968
WM11	WSP22369	119	180	27,360	14	CAS	1968
WM11	WSP25941	57	180	27,360	14	CAS	1958
WM11	WSP25942	502	180	27,360	14	CAS	1958
WM11	WSP27523	367	210	34,020	16	DIP	2005
WM12	WSP23657	3374	180	20,160	16	DIP	1950
WM13	WSP07555	436	180	17,640	10	CAS	1973
WM13	WSP07557	619	180	17,640	10	CAS	1973
WM13	WSP08174	7	180	17,640	10	CAS	1968
WM13	WSP08186	596	180	17,640	10	CAS	1968
WM13	WSP08189	242	180	17,640	10	CAS	1968
WM13	WSP08857	66	180	17,640	10	CAS	1968
WM13	WSP09385	35	180	17,640	10	CAS	1968
WM13	WSP12302	358	180	17,640	10	CAS	1968
WM13	WSP12305	7	180	17,640	10	CAS	1968
WM13	WSP16763	39	180	17,640	10	CAS	1968
WM13	WSP35663	4	180	17,640	10	CAS	1968
WM14	WSP02956	579	180	29,160	12	CAS	1951
WM14	WSP02957	101	180	19,440	8	CAS	1951
WM14	WSP11051	4	180	20,160	12	CAS	1951
WM15	WSP09924	2073	180	20,160	36	DIP	1937
WM15	WSP16363	905	330	45,960	72	CAS	1937
WM16	WSP04958	373	180	29,160	16	CAS	1968
WM16	WSP04961	338	180	29,160	16	CAS	1968
WM16	WSP04965	596	180	20,160	16	CAS	1972
WM16	WSP04993	570	180	20,160	16	CAS	1972
WM16	WSP05234	51	180	20,160	16	CAS	1972
WM16	WSP05241	7	180	20,160	16	CAS	1973
WM16	WSP05270	12	180	20,160	16	CAS	1972
WM16	WSP05278	249	180	20,160	16	CAS	1972
WM16	WSP10466	113	180	29,160	16	CAS	1972
WM16	WSP10473	18	180	20,160	24	CAS	1972
WM16	WSP18776	4	180	20,160	16	CAS	1973
WM16	WSP18777	4	180	20,160	16	CAS	1972
WM16	WSP22370	315	180	20,160	16	CAS	1968

Table 3-4. Water Distribution Main Candidate Project Areas							
Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM16	WSP22371	222	180	20,160	16	CAS	1968
WM16	WSP22372	8	180	20,160	16	CAS	1968
WM17	WSP04709	95	180	20,160	12	CAS	1974
WM17	WSP04714	878	180	20,160	12	CAS	1974
WM17	WSP11874	634	180	20,160	12	CAS	1974
WM17	WSP11875	196	180	20,160	12	CAS	1974
WM17	WSP15683	272	180	29,160	12	CAS	1974
WM18	WSP02411	13	180	20,160	12	CAS	1974
WM18	WSP04716	11	180	20,160	12	CAS	1974
WM18	WSP04717	45	180	20,160	12	CAS	1974
WM18	WSP11090	376	180	20,160	12	CAS	1974
WM18	WSP16209	335	180	17,640	10	CAS	1972
WM18	WSP16214	351	155	15,190	10	DIP	1972
WM18	WSP16527	66	180	20,160	12	CAS	1974
WM18	WSP16528	1072	180	29,160	12	CAS	1974
WM18	WSP17310	160	180	20,160	12	CAS	1974
WM18	WSP17319	229	180	29,160	12	CAS	1974
WM18	WSP17325	256	180	20,160	12	CAS	1974
WM18	WSP17326	481	180	20,160	12	CAS	1974
WM18	WSP17823	407	180	17,640	10	CAS	1972
WM18	WSP17882	525	180	17,640	10	CAS	1972
WM18	WSP17888	253	180	17,640	10	CAS	1972
WM18	WSP18087	598	180	20,160	12	CAS	1974
WM18	WSP18094	282	180	20,160	12	CAS	1974
WM18	WSP18095	182	180	20,160	12	CAS	1974
WM18	WSP18140	64	180	20,160	12	CAS	1974
WM18	WSP22139	151	180	17,640	10	CAS	1972
WM18	WSP22147	3	180	20,160	12	CAS	1972
WM18	WSP22148	375	180	20,160	12	CAS	1974
WM18	WSP34745	100	180	17,640	10	CAS	1972
WM18	WSP37637	3	180	17,640	10	CAS	1972
WM19	WSP05921	61	180	26,640	10	CAS	1971
WM19	WSP06607	257	180	20,160	16	CAS	1967
WM19	WSP06611	91	180	20,160	16	CAS	1967
WM19	WSP13259	10	180	17,640	10	CAS	1967
WM19	WSP13260	182	180	17,640	10	CAS	1971

Table 3-4. Water Distribution Main Candidate Project Areas							
Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM19	WSP14565	242	180	26,640	10	CAS	1971
WM19	WSP15041	384	180	26,640	10	CAS	1971
WM19	WSP15043	354	180	20,160	16	CAS	1967
WM19	WSP15044	7	180	17,640	10	CAS	1970
WM19	WSP15049	10	180	17,640	10	CAS	1971
WM19	WSP15066	195	180	17,640	10	CAS	1971
WM19	WSP15076	243	180	19,440	8	CAS	1971
WM19	WSP15077	303	180	26,640	10	CAS	1971
WM19	WSP15088	395	180	26,640	10	CAS	1971
WM19	WSP15089	500	180	26,640	10	CAS	1971
WM19	WSP15098	6	180	10,440	8	CAS	1971
WM19	WSP15106	5	180	17,640	10	CAS	1971
WM19	WSP15110	512	180	19,440	8	CAS	1971
WM19	WSP15866	14	180	17,640	10	CAS	1971
WM19	WSP15878	174	180	19,440	6	CAS	1971
WM19	WSP15891	176	180	26,640	10	CAS	1971
WM19	WSP15906	518	180	17,640	10	CAS	1971
WM19	WSP15910	3	180	17,640	10	CAS	1971
WM19	WSP15917	655	180	26,640	10	CAS	1971
WM19	WSP15919	12	180	17,640	10	CAS	1971
WM19	WSP15920	10	180	17,640	10	CAS	1959
WM19	WSP15921	64	180	17,640	10	CAS	1971
WM19	WSP15922	401	180	17,640	10	CAS	1970
WM19	WSP15929	6	180	20,160	16	CAS	1971
WM19	WSP15974	495	180	26,640	10	CAS	1971
WM19	WSP16039	1	180	17,640	10	CAS	1971
WM19	WSP16439	365	180	17,640	10	CAS	1971
WM19	WSP16440	55	180	17,640	10	CAS	1971
WM19	WSP22581	315	180	26,640	10	CAS	1971
WM19	WSP22665	147	180	26,640	10	CAS	1971
WM19	WSP22668	15	180	17,640	10	CAS	1971
WM19	WSP22669	535	180	19,440	8	CAS	1971
WM19	WSP22670	24	92	2,392	8	PVC	1971
WM19	WSP22671	190	180	10,440	8	CAS	1971
WM19	WSP23047	112	180	20,160	16	CAS	1967
WM19	WSP23048	4	180	20,160	16	CAS	1967

Table 3-4. Water Distribution Main Candidate Project Areas							
Project Area	GIS Water Main Asset ID	Linear Feet (LF)	Likelihood of Failure Score	Total Risk Score	Pipe Diameter (inches)	Pipe Material	Install Date
WM19	WSP36482	12	180	17,640	10	CAS	1971
WM20	WSP02335	183	180	20,160	12	CAS	1945
WM20	WSP02336	3	180	20,160	12	CAS	1945
WM20	WSP02338	558	185	37,370	12	CICL	1945
WM20	WSP02988	442	180	20,160	12	CAS	1971
WM20	WSP02989	242	180	20,160	12	CAS	1971
WM20	WSP05143	6	180	19,440	8	CAS	1947
WM20	WSP11065	106	180	20,160	12	CAS	1947
WM20	WSP11066	4	180	10,440	6	CAS	1973
WM20	WSP11070	6	195	11,310	8	CAS	1973
WM20	WSP11072	4	195	11,310	8	CAS	1973
WM20	WSP13522	753	180	19,440	8	CAS	1964
WM20	WSP13523	16	180	10,440	8	CAS	1971
WM20	WSP13524	370	180	10,440	8	CAS	1964
WM20	WSP13574	10	120	6,960	8	CAS	1971
WM20	WSP13576	2	180	10,440	8	CAS	1964
WM20	WSP17288	104	275	15,950	8	CAS	1973
WM20	WSP17297	198	180	19,440	8	CAS	1964
WM20	WSP22965	10	180	20,160	12	CAS	1970
WM20	WSP23001	103	180	10,440	8	CAS	1964
WM20	WSP23002	5	180	10,440	8	CAS	1964
WM20	WSP23003	101	180	19,440	8	CAS	1964
WM20	WSP23005	88	180	10,440	8	CAS	1964
WM20	WSP23006	6	180	10,440	8	CAS	1964
WM20	WSP23015	264	180	19,440	6	CAS	1973
WM20	WSP23016	6	107	2,782	8	PVC	1973
WM20	WSP23353	82	180	10,440	8	CAS	1964
WM20	WSP23361	208	180	10,440	8	CAS	1964
WM20	WSP29376	408	310	34,720	24	CAS	1986
WM20	WSP29376	408	310	34,720	24	CAS	1986
WM20	WSP29379	41	155	17,360	12	CAS	1986
WM20	WSP29398	16	155	17,360	16	CAS	1986
WM20	WSP37481	110	180	10,440	8	CAS	1964

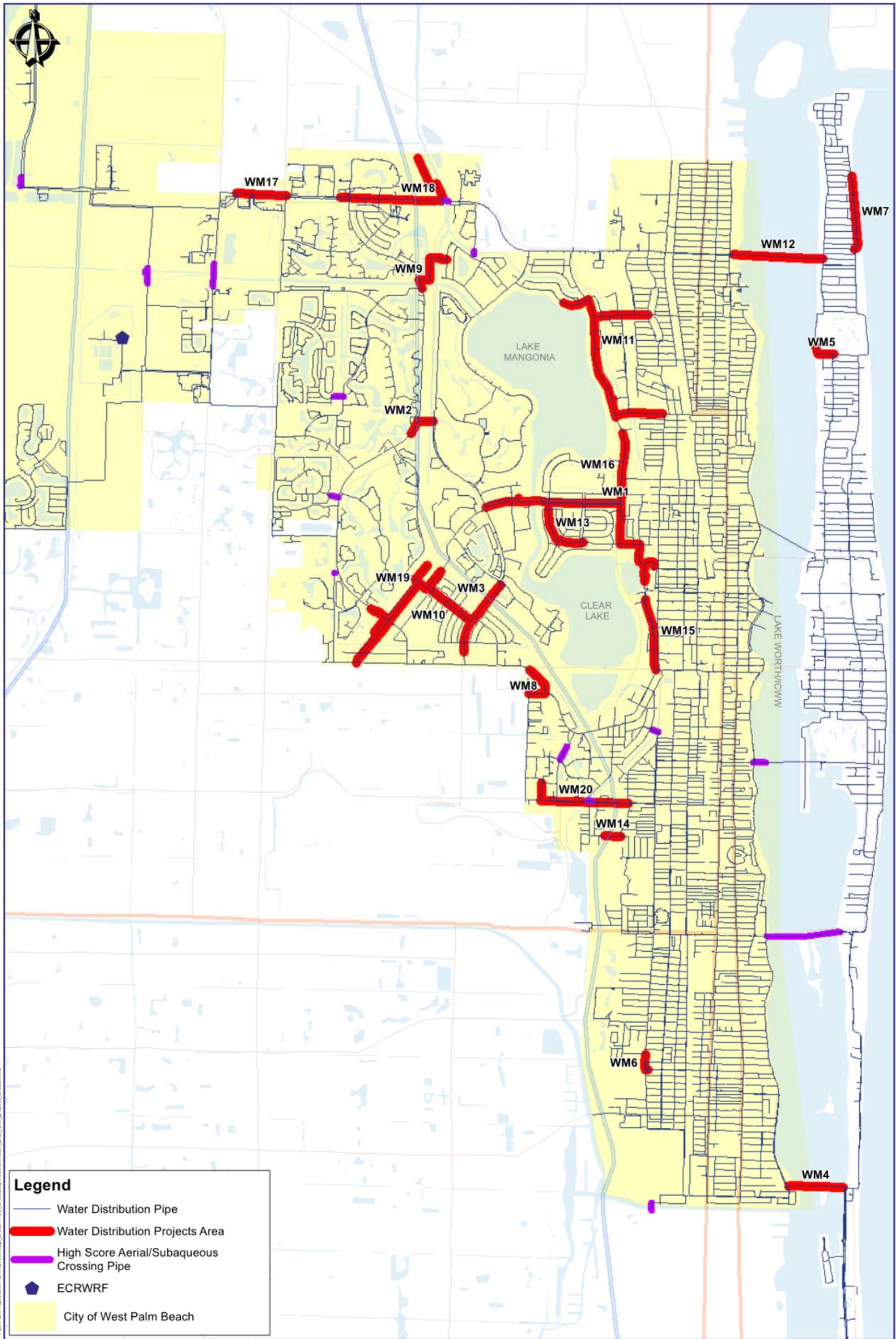


Figure 3-4. Candidate Project Areas – Water Distribution Mains

# Appendix E

## Correspondence and Meetings with Water Suppliers and Providers



# TOWN OF PALM BEACH

Public Works Department

August 11, 2020

Poonam K Kalkat PhD. Public Utilities Engineer  
Director of Public Utilities  
City of West Palm Beach  
401 Clematis Street, 4<sup>th</sup> Floor  
West Palm Beach, FL 33401

Reference: Town of Palm Beach Water Supply Feasibility Study

Dear Dr. Kalkat:

As you are aware, the Town of Palm Beach (the Town) is currently conducting a Water Supply Feasibility Study to examine potential potable water supply options that may be available to provide service to the residents and property owners within the Town. The Town is interested in discussing with the City of West Palm Beach (the City) options for the City's continued provision of potable water service to the Town. A preliminary agenda for this meeting is provided below:

1. Discuss potential option to renew the current agreement to allow the City to continue providing retail service to customers within the Town
2. Discuss potential option to enter into a wholesale agreement with the Town
3. Discuss City's investment/reinvestment strategy for aged infrastructure in the Town
4. Discuss opportunities and challenges associated with any of the above topics

We appreciate the opportunity to meet with the City to discuss these topics. Please note, we have technology available that would allow us to meet virtually over a video call that would allow us to share screen content with no special software required on your part.

Please feel free to call or email me regarding your availability to meet and discuss further.

Sincerely,

Patricia Strayer  
Town of Palm Beach, Town Engineer  
[PStrayer@TownofPalmBeach.com](mailto:PStrayer@TownofPalmBeach.com)

PS/lm

cc: Kirk Blouin, Town Manager  
Jay Boodheshwar, Deputy Town Manager  
Paul Brazil, P.E., Director of Public Works  
Jason Debrincat, P.E., Senior Project Engineer  
Jason Lee, Kimley-Horn & Associates

## Town of Palm Beach Water Feasibility Study Meeting with City of West Palm Beach (08/28/2020)

Attendees: Jason Debrincat (TOPB)  
Poonam Kallat (WPB)  
Laura Le (WPB)  
Donna Levengood (WPB)  
Leighton Walker (WPB)  
Jason Lee (KH)  
David Calle (KH)  
Mohammed Shammut (KH)  
Kevin Schanen (KH)

- Meeting was held virtually and Jason shared the screen so the initial letter provided by the Town to the City was able to be viewed. This letter served as the meeting agenda.
- Jason asked if the option to renew the current agreement to allow the City to continue providing retail service to customers within the Town was a feasible option for KH to consider in the study.
  - Poonam said: Yes, this option is still on the table. The City is still agreeable and would prefer this option.
- Jason brought up the potential option to enter into a wholesale agreement with the Town since this option is currently contemplated in the existing retail agreement.
  - Poonam said this option would need to go to administration of WPB for a decision. Poonam said the City has not discussed this option internally in depth. At this time, the City has no bulk customers and does not have a rate structure built to support this type of arrangement. Donna said that the City would most likely be more interested in keeping the retail agreement, however, the City would be open to discussions on a wholesale agreement if retail agreement renewal is not desired.
- Jason asked if there is currently a plan or a strategy to update/modify the current CIP and/or R&R program for the water infrastructure within the Town. Jason brought up the study done by Eardman Anthony several years ago that developed a database of the age and potential replacement costs for the water infrastructure in the Town.
  - Poonam said their CIP and R&R strategy in the Town is not any different than in the City. Poonam said out of 13 million, about 1 million is for investment into Town. The 1 million is based on user fees as described in the current retail agreement. The City meets with the Town regularly to review the Town's program of improvements, GIS Information, the Master Plans, and O&M Data in order to prioritize the pipeline R&R projects within the Town.
  - Donna says that the Town and City meet once a year to discuss any necessary CIP improvements to the Town's infrastructure. These improvements are coordinated to coincide with phases of the Town's UG program.
- Laura asked if the City could have a copy of the water feasibility study once it is complete.
  - The study is not yet written but Kevin and Jason D. said it should not be a problem to provide the City a copy.

- Laura asked if the City could get a copy of the Eardman Anthony report from the Town.
- Poonam says the City does not have any plans on pursuing a new bond for expansion of the CIP program in the near future. The City is already paying back a bond and is not looking to issue any new debt.
- Donna says the City will refer to the Erdman Anthony document for future improvements. Donna said the Town can bring up any desired improvements on their monthly coordination calls with the Town.
- Poonam asked if the intent of the study is to lay out pros and cons of various water supply options for the Town and ultimately to make a recommendation on how the Town should proceed.
  - Jason said the intent of our study is to provide factual information about water supply options that exist so that the Town's policy makers can make an informed decision regarding how they would like to proceed.
- Poonam asked if the City can see a draft of the study.
  - Jason D. said that the study can be shared with the City as soon as it's available.
- Donna asked if there's a date that is being targeted for the study to be completed.
  - Jason said we are targeting to complete the initial phase of the study later this year. Once KH is able to identify how many viable options exist, a schedule for their analysis and completion of the study can be developed and shared.



# TOWN OF PALM BEACH

Public Works Department

Mr. Jim Stiles  
Department Director  
Palm Beach County Water Utilities Department  
8100 Forest Hill Blvd.  
West Palm Beach, FL 33413

Reference: Town of Palm Beach Water Feasibility Study

Dear Mr. Stiles:

The Town of Palm Beach (the Town) is currently in the process of examining potential options that may be available to provide potable water service to the residents and property owners within the Town. The Town currently receives potable water service from the City of West Palm Beach (the City). The City owns and operates a potable water supply system which also supplies water to the City, the Town, and South Palm Beach. Potable water service is provided to the Town by the City pursuant to a 30-year Franchise Agreement executed in 1999. According to this agreement, the City owns and maintains all the water facilities throughout the Town through the duration of the agreement. The Town receives approximately ten (10) MGD of potable water (maximum day demand) through a series of pipelines that cross the Lake Worth Lagoon.

The Town is interested in exploring options for potable water service upon expiration of the current Retail Water Service and Franchise Agreement with the City, which will expire in 2029.

The Town has retained Kimley-Horn (Consultant) to perform a Water Supply Feasibility Study which will evaluate the feasibility of alternative potable water service providers. We would like to meet with the Palm Beach County Water Utilities Department, together with our Consultant, to facilitate discussions regarding your level of interest in providing potable water service to the Town, along with discussing the feasibility of your facilities to provide such service. A preliminary agenda for this meeting is provided below:

1. Discuss interest in being the Town of Palm Beach's potable water system provider
2. Discuss overview of the Town's potable water service system and needs
3. Discuss overall potable water system (source, treatment, service area, distribution system operating conditions, etc.)
4. Discuss overall ability to provide potable water service to the Town
5. Discuss opportunities and challenges associated with providing the Town with potable water supply

6. Discuss framework to further evaluate feasibility of due diligence investigations, if mutually deemed appropriate

We appreciate the opportunity to meet with the Palm Beach County Water Utilities Department to discuss the Town of Palm Beach's Water Supply Feasibility Study. Please note, we have technology available that would allow us to meet virtually over a video call that would allow us to share screen content with no special software required on your part.

Please feel free to call or email me regarding your availability to meet and discuss further.

Sincerely,



Patricia Strayer  
Town of Palm Beach, Town Engineer  
[PStrayer@TownofPalmBeach.com](mailto:PStrayer@TownofPalmBeach.com)

PS/lm

cc: Kirk Blouin, Town Manager  
Jay Boodheshwar, Deputy Town Manager  
Paul Brazil, P.E., Director of Public Works  
Jason Debrincat, P.E., Senior Project Engineer  
Jason Lee, Kimley-Horn & Associates

## **Town of Palm Beach Water Feasibility Study Meeting with Palm Beach County Water Utilities Department (09/10/2020)**

- Jason Lee says the Town currently has a 10 MGD max day demand. System pressure is sustained about 70 psi. There are 5 crossings serving the Town.
- Jim Stiles said the County is interested in providing potable water service to the Town.
- Jim said that the County would typically do a bulk agreement to provide service.
  - Jim said that he is not aware of any franchise agreements the County has to provide service.
- Ali with the County said the County has 110 MGD capacity with 4 plants and are currently working with 55 MGD max day demand.
  - North plants, Plant 8 and Plant 2 are lime softening/ion exchange
  - Both Plants down south are membrane plants
  - Entire system is interconnected. At any time, any plant can feed entire system.
- Ali said the County has GIS they can share with KHA that shows the service reach of the County's service area. Ali shared a map which showed that there is infrastructure capacity to serve the Town to the east.
- Jim said that the challenge to serve the Town would be to get an easement from WPB or Lake Worth to connect to the Town's system.
- Jim says that there are large water lines sitting by the airport, not in service, that could possibly be used to connect to the Town's system. The pipes used to be used to provide fire flow to the airport PBI, however, the lines are no longer in use due to the airport switching to other methods of fire suppression such as foam.
- Jim said that PBC is ready, willing, and able to work with the Town on providing water service. Jim said that the County has high water quality standards.



# TOWN OF PALM BEACH

Public Works Department

Dr. Jimmie Johnson  
City of Riviera Beach Utility Special District  
600 W. Blue Heron Blvd.  
Riviera Beach, FL 33404

Reference: Town of Palm Beach Water Feasibility Study

Dear Dr. Johnson:

The Town of Palm Beach (the Town) is currently in the process of examining potential options that may be available to provide potable water service to the residents and property owners within the Town. The Town currently receives potable water service from the City of West Palm Beach (the City). The City owns and operates a potable water supply system which also supplies water to the City, the Town, and South Palm Beach. Potable water service is provided to the Town by the City pursuant to a 30-year Franchise Agreement executed in 1999. According to this agreement, the City owns and maintains all the water facilities throughout the Town through the duration of the agreement. The Town receives approximately ten (10) MGD of potable water (maximum day demand) through a series of pipelines that cross the Lake Worth Lagoon.

The Town is interested in exploring options for potable water service upon expiration of the current Retail Water Service and Franchise Agreement with the City, which will expire in 2029.

The Town has retained Kimley-Horn (Consultant) to perform a Water Supply Feasibility Study which will evaluate the feasibility of alternative potable water service providers. We would like to meet with the City of Riviera Beach Utility Special District, together with our Consultant, to facilitate discussions regarding your level of interest in providing potable water service to the Town along with discussing the feasibility of your facilities to provide such service. A preliminary agenda for this meeting is provided below:

1. Discuss interest in being the Town of Palm Beach's potable water system provider
2. Discuss overview of the Town's potable water service system and needs
3. Discuss overall potable water system (source, treatment, service area, distribution system operating conditions, etc.)
4. Discuss overall ability to provide potable water service to the Town
5. Discuss opportunities and challenges associated with providing the Town with potable water supply

6. Discuss framework to further evaluate feasibility of due diligence investigations, if mutually deemed appropriate

We appreciate the opportunity to meet with the City of Riviera Beach Utility Special District to discuss the Town of Palm Beach's Water Supply Feasibility Study. Please note, we have technology available that would allow us to meet virtually over a video call that would allow us to share screen content with no special software required on your part.

Please feel free to call or email me regarding your availability to meet and discuss further.

Sincerely,



Patricia Strayer  
Town of Palm Beach, Town Engineer  
PStrayer@TownofPalmBeach.com

PS/lm

cc: Kirk Blouin, Town Manager  
Jay Boodheshwar, Deputy Town Manager  
Paul Brazil, P.E., Director of Public Works  
Jason Debrincat, P.E., Senior Project Engineer  
Jason Lee, Kimley-Horn & Associates

## Town of Palm Beach Water Feasibility Study Meeting with City of Riviera Beach (09/15/2020)

- Jonathan Evans, City Manager
- Ms. Jacobs, Assistant City Manager
- Jonathan said that the City is interested in supplying water to the Town via a bulk or retail agreement.
- Town is a 10 MGD max day demand. Served by 5 crossings to the island. Town has 2 booster pump stations that are owned by the City. Both rated near 3 MGD. 1 MG ground storage tank on island as well. Pressures around 80 psi. Town average demand is 7 MGD.
- The City treatment facility is permitted to 17 MGD. The allocated water supply is over 10 MGD. Max day production is just over 9 MGD.
- The City is looking to expand their plant with a mix of Nano and RO production.
- The current utility easements in the Town are not exclusive to the City of West Palm.
- Dr. Johnson said that the City does have GIS for service area. In return John Armstrong asked if the Town can provide their GIS to the City.
- Nigel Grace asked what extent the Town has given consideration to making improvements to the transmission system infrastructure to accommodate less crossings to maintain system service level.
- Nigel asked if the Town is giving consideration to have more than one supplier provide service to the Town. Jason said currently not, but that could happen. Currently we are looking at just trying to use one supplier.
- Dr. Johnson asked if elevated storage tanks have been considered. Kevin said that we're so early in the stages of the study that we have not gotten there yet. The Town is not opposed to considering all necessary improvements or engaging multiple suppliers; however, the process is not far enough along to be considering those options.
- Dr. Johnson asked how many pressure planes are in the City. Jason said he believes there is 1 and that they are all hydraulically connected.
- Kevin asked the City if they have a time frame on when they expect the new water facility to come online. Mr. Grace said that the City is looking to do this as soon as they can. 3-5 years from now, they believe it will be online before the supply to the Town would begin.
- Nigel thinks the big challenge will be the transmission hydraulics, not the treatment capacity.
- Patricia said a lot of the Town's water lines are over 50 years old.
- Dr. Johnson asked if the Town is proposing that the City would operate and maintain the Town's infrastructure. Patricia said it would depend on the agreement that is made, whether, it is bulk or franchise.



# TOWN OF PALM BEACH

Public Works Department

Mr. Brian Shields, P.E.  
Water Utilities Director  
City of Lake Worth Beach  
301 College Street  
Lake Worth Beach, FL 33460

Reference: Town of Palm Beach Water Feasibility Study

Dear Mr. Shields:

The Town of Palm Beach (the Town) is currently in the process of examining potential options that may be available to provide potable water service to the residents and property owners within the Town. The Town currently receives potable water service from the City of West Palm Beach (the City). The City owns and operates a potable water supply system which also supplies water to the City, the Town, and South Palm Beach. Potable water service is provided to the Town by the City pursuant to a 30-year Franchise Agreement executed in 1999. According to this agreement, the City owns and maintains all the water facilities throughout the Town through the duration of the agreement. The Town receives approximately ten (10) MGD of potable water (maximum day demand) through a series of pipelines that cross the Lake Worth Lagoon.

The Town is interested in exploring options for potable water service upon expiration of the current Retail Water Service and Franchise Agreement with the City, which will expire in 2029.

The Town has retained Kimley-Horn (Consultant) to perform a Water Supply Feasibility Study which will evaluate the feasibility of alternative potable water service providers. We would like to meet with the City of Lake Worth Beach, together with our Consultant, to facilitate discussions regarding your level of interest in providing potable water service to the Town along with discussing the feasibility of your facilities to provide such service. A preliminary agenda for this meeting is provided below:

1. Discuss interest in being the Town of Palm Beach's potable water system provider
2. Discuss overview of the Town's potable water service system and needs
3. Discuss overall potable water system (source, treatment, service area, distribution system operating conditions, etc.)
4. Discuss overall ability to provide potable water service to the Town
5. Discuss opportunities and challenges associated with providing the Town with potable water supply

6. Discuss framework to further evaluate feasibility of due diligence investigations, if mutually deemed appropriate

We appreciate the opportunity to meet with the City of Lake Worth Beach to discuss the Town of Palm Beach's Water Supply Feasibility Study. Please note that we have technology available that would allow us to meet virtually over a video call that would allow us to share screen content with no special software required on your part.

Please feel free to call or email me regarding your availability to meet and discuss further.

Sincerely,



Patricia Strayer  
Town of Palm Beach, Town Engineer  
[PStrayer@TownofPalmBeach.com](mailto:PStrayer@TownofPalmBeach.com)

PS/lm

cc: Kirk Blouin, Town Manager  
Jay Boodheshwar, Deputy Town Manager  
Paul Brazil, P.E., Director of Public Works  
Jason Debrincat, P.E., Senior Project Engineer  
Jason Lee, Kimley-Horn & Associates

## Town of Palm Beach Water Feasibility Study Meeting with City of Lake Worth Beach (8/28/2020)

- Bryan Shields said that the City of Lake Worth is interested in providing retail water service to the Town of Palm Beach
- Jason asked if the City has GIS files or other data that could be shared with KHA that would show any crossings that the City currently has
  - Bryan said yes, Mock Roos has produced this database/hydraulic modeling and would share it with KHA.
- Bryan said that the City has a blend of lime softening and RO production
  - Lime plant is rated at 17 MGD
  - RO plant is rated at 4.5 MGD. RO is expandable with new trains to 10.5 MGD.
  - 6 MGD is the average production at the city. This includes all of the City's customers.
  - The City has a booster station behind the lake worth ball fields that could be used to serve the Town
- New watermain crossings at C-51 and/or Lake Avenue would likely be needed. Mock Roos has been assigned the task of determining how much flow and pressure could be provided by Lake Worth Beach through one or more new crossings.
- Bryan said that the City is more interested in retail agreement, it would be interested in bulk agreement.
  - City is currently engaged in bulk agreement with Lantana and Lake Clark Shores. Lantana and Lake Clark Shores are both 0.5-1 MGD.
  - Bulk of the City's customers are within the City limits.
  - The City would not be interested in purchasing the lines or meters.
- Jason asked if there are any challenges with serving the Town from a capacity standpoint.
  - Bryan said the challenges would not be so much plant production related, but rather the challenge would be the permitting of the crossings.
- Bryan said he would ask Mock Roos to identify the best points of connection on the hydraulic model.
  - Bryan said to get in contact with Giles Roads for GIS
- Lake Worth is more interested in bulk agreement to serve the Town. Not really interested in a retail agreement, do not want to purchase lines and meters. They would be open to talking about a retail agreement, but they would need to add staff and develop a rate structure, it's not their first preference.
- Bulk rate with capacity and commodity, or all commodity. Likely would need to expand RO plant to provide total needs to the Town.



# TOWN OF PALM BEACH

Public Works Department

Ms. Linda Stumpf  
Town Manager  
Town of Manalapan  
600 S. Ocean Blvd.  
Manalapan, FL 33462

Reference: Town of Palm Beach Water Feasibility Study

Dear Ms. Stumpf:

The Town of Palm Beach (the Town) is currently in the process of examining potential options that may be available to provide potable water service to the residents and property owners within the Town. The Town currently receives potable water service from the City of West Palm Beach (the City). The City owns and operates a potable water supply system which also supplies water to the City, the Town, and South Palm Beach. Potable water service is provided to the Town by the City pursuant to a 30-year Franchise Agreement executed in 1999. According to this agreement, the City owns and maintains all the water facilities throughout the Town through the duration of the agreement. The Town receives approximately ten (10) MGD of potable water (maximum day demand) through a series of pipelines that cross the Lake Worth Lagoon.

The Town is interested in exploring options for potable water service upon expiration of the current Retail Water Service and Franchise Agreement with the City, which will expire in 2029.

The Town has retained Kimley-Horn (Consultant) to perform a Water Supply Feasibility Study which will evaluate the feasibility of alternative potable water service providers. We would like to meet with the Town of Manalapan, together with our Consultant, to facilitate discussions regarding your level of interest in providing potable water service to the Town along with discussing the feasibility of your facilities to provide such service. A preliminary agenda for this meeting is provided below:

1. Discuss interest in being the Town of Palm Beach's potable water system provider
2. Discuss overview of the Town's potable water service system and needs
3. Discuss overall potable water system (source, treatment, service area, distribution system operating conditions, etc.)
4. Discuss overall ability to provide potable water service to the Town

5. Discuss opportunities and challenges associated with providing the Town with potable water supply
6. Discuss framework to further evaluate feasibility of due diligence investigations, if mutually deemed appropriate

We appreciate the opportunity to meet with the Town of Manalapan to discuss the Town of Palm Beach's Water Supply Feasibility Study. Please note that we have technology available that would allow us to meet virtually over a video call that would allow us to share screen content with no special software required on your part.

Please feel free to call or email me regarding your availability to meet and discuss further.

Sincerely,



Patricia Strayer  
Town of Palm Beach, Town Engineer  
[PStrayer@TownofPalmBeach.com](mailto:PStrayer@TownofPalmBeach.com)

PS/lm

cc: Kirk Blouin, Town Manager  
Jay Boodheshwar, Deputy Town Manager  
Paul Brazil, P.E., Director of Public Works  
Jason Debrincat, P.E., Senior Project Engineer  
Jason Lee, Kimley-Horn & Associates

## Town of Palm Beach Water Feasibility Study Meeting with Town of Manalapan (12/04/2020)

- Brent Watson is the superintendent for the water plant for Manalapan
- Linda Stumpf is the Manalapan Town Manager
- Tom Biggs with Mock Roos is the consulting engineer representing Manalapan as the Town Engineer
- Gary Gruber with Mock Roos was also on the call
- Tom said the Town is interested in supplying to TOPB, but they can't do the 10 MGD. The question is how much can Manalapan supply to the Town? Would the TOPB be interested in only having partial supply from Manalapan? How much demand can TOPB take from Manalapan with the hydraulic limitations of TOPB's system?
- Jason said that the 10 MGD demand includes the Town of South Palm Beach's demand.
- Jason Lee asked if there is capability from land use and permit restraints to scale up to a larger capacity.
- Manalapan's water plant is in Hypoluxo. There are land constraints. It would be an effort to expand the plant footprint and the existing wellfield.
- Tom Biggs said he doesn't think it is viable for the Town of Manalapan to sell 10 MGD to TOPB.
- Tom says Town of Manalapan has historically sold water to Hypoluxo. That relationship has ended so the amount that was being supplied to Hypoluxo is available to sell to TOPB.
- Manalapan's water use permit would need to be modified.
- Manalapan has 0.5 MGD available now to sell to the Town.
- Agreement with Hypoluxo was a retail agreement.
- Kevin said the study would benefit from understanding in more detail the Town of Manalapan's distribution system up to South Palm Beach.
- Tom said we could run a few modeling scenarios on the north end of Manalapan's distribution system using theoretical demands and a theoretical point of connection.
- Linda Stumpf said she would talk to Tom Biggs about sharing the GIS file for Manalapan's distribution system with KHA and get back to us.
- Linda said Manalapan will be interested in providing some level of service if it is feasible.

September 1, 2020

Ken Wise  
Director of Facilities Management and Support Services  
The Breaker  
One South County Road  
Palm Beach, FL 33480

Reference: Town of Palm Beach Water Feasibility Study

Dear: Mr. Wise

The Town of Palm Beach (Town) is currently in the process of examining potential options that may be available to provide potable water service to the residents and property owners within the Town. The Town currently receives potable water service from the City of West Palm Beach (City). The City owns and operates a potable water supply system which also supplies water to the City, the Town, and South Palm Beach. Potable water service is provided to the Town by the City pursuant to a 30-year Retail Water Service and Franchise Agreement executed in 1999. The Town is interested in exploring additional options for potable water service upon expiration of the current Agreement with the City, which will expire in 2029.

The Town has retained Kimley-Horn (Consultant) to perform a Water Supply Feasibility Study which will evaluate the feasibility of alternative potable water service providers, including the possibility of partnering with local groups that have existing raw water supplies and treatment facilities, such as local golf course operators with these facilities. We would like to meet with the appropriate representative(s) from The Breakers, together with our Consultant, to have a discussion regarding your level of interest in partnering with the Town to provide drinking water to the community, along with discussing the feasibility of using your water treatment facilities to provide such service.

We appreciate the opportunity to meet with The Breakers to discuss the Town of Palm Beach's Water Supply Feasibility Study. Please note that we have technology available that would allow us to meet virtually over a video call with the capability to share screen content with no special software required on your part. Please feel free to call or email me regarding your availability to meet and discuss further.

Patricia Strayer  
Town of Palm Beach  
Engineering Department  
Title: Town Engineer  
Phone: 561-838-5440  
PStrayer@TownofPalmBeach.com

## **Town of Palm Beach Water Feasibility Study Meeting with The Breakers Golf Course (09/30/2020)**

- Harry Schaefer, assistant facilities director with The Breakers
- Ken Wise with The Breakers
- Town is 10 MGD max day demand
- Mark said that The Breakers is permitted to generate 500,000 gallons a day and the golf course uses about 300,000 gallons a day
- Mark said that of the 3 golf courses on the island, the clubs are operating at permitted capacity. A study would need to be done in conjunction with the SFWMD to understand how much additional capacity could be provided from the aquifer.
- Mark said the physical limits of the property to expand treatment capacity or production wells would be a great challenge.

September 1, 2020

Scott Lesé  
General Manager  
Everglades Club  
356 Worth Avenue  
Palm Beach, FL 33480

Reference: Town of Palm Beach Water Feasibility Study

Dear: Mr. Lesé

The Town of Palm Beach (Town) is currently in the process of examining potential options that may be available to provide potable water service to the residents and property owners within the Town. The Town currently receives potable water service from the City of West Palm Beach (City). The City owns and operates a potable water supply system which also supplies water to the City, the Town, and South Palm Beach. Potable water service is provided to the Town by the City pursuant to a 30-year Retail Water Service and Franchise Agreement executed in 1999. The Town is interested in exploring additional options for potable water service upon expiration of the current Agreement with the City, which will expire in 2029.

The Town has retained Kimley-Horn (Consultant) to perform a Water Supply Feasibility Study which will evaluate the feasibility of alternative potable water service providers, including the possibility of partnering with local groups that have existing raw water supplies and treatment facilities, such as local golf course operators with these facilities. We would like to meet with the appropriate representative(s) from The Everglades Club, together with our Consultant, to have a discussion regarding your level of interest in partnering with the Town to provide drinking water to the community, along with discussing the feasibility of using your water treatment facilities to provide such service.

We appreciate the opportunity to meet with The Everglades Club to discuss the Town of Palm Beach's Water Supply Feasibility Study. Please note that we have technology available that would allow us to meet virtually over a video call with the capability to share screen content with no special software required on your part. Please feel free to call or email me regarding your availability to meet and discuss further.

Patricia Strayer  
Town of Palm Beach  
Engineering Department  
Title: Town Engineer  
Phone: 561-838-5440  
PStrayer@TownofPalmBeach.com



# TOWN OF PALM BEACH

Public Works Department

October 28, 2020

Mr. Terry J. Duffy  
Veolia North America  
14055 Riveredge Drive, Suite 240  
Tampa, FL 33637  
Terry.j.duffy@veolia.com

RE: Town of Palm Beach Water Feasibility Study

Dear Mr. Duffy:

The Town of Palm Beach (the Town) is currently in the process of examining potential options that may be available to provide potable water service to the residents and property owners within the Town. The Town currently receives potable water service from the City of West Palm Beach (the City). The City owns and operates a potable water supply system which supplies water to the City, the Town, and the Town of South Palm Beach. The Town receives approximately 10 MGD of potable water (maximum day demand) through a series of pipelines that cross the Lake Worth Lagoon.

Potable water service is provided to the Town by the City pursuant to a 30-year Retail Water Service and Franchise Agreement executed in 1999. According to this Agreement, the City will own and maintain all the water facilities throughout the Town through the duration of the Agreement, which will expire in 2029. The Town is interested in exploring options for potable water service upon expiration of the Agreement with the City.

The Town has retained Kimley-Horn (Consultant) to perform a Water Supply Feasibility Study which will evaluate the feasibility of alternative potable water service providers. Options include obtaining water service from a municipal supplier other than West Palm Beach, obtaining water service from a private utility, and/or developing a Town-owned water supply source. We would like to meet with representatives of your organization together with our Consultant to have a discussion regarding your level of interest in providing potable water service and/or utility management/operation services for the Town. A preliminary agenda for this meeting is provided below:

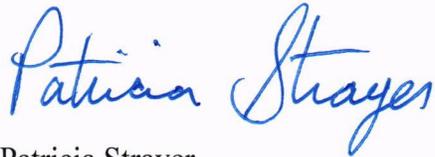
1. Discuss interest in being the Town of Palm Beach's potable water system provider.
2. Discuss overview of Town's potable water service system and needs.
3. Discuss overall potable water system (source, treatment, service area, distribution system operating conditions, etc.).
4. Discuss overall ability to provide potable water service to Town.

5. Discuss overall ability to provide utility management and operation services.
6. Discuss opportunities and challenges associated with providing the Town with potable water supply and/or utility management and operation services.

We appreciate the opportunity to meet with your organization to discuss the Town of Palm Beach's Water Supply Feasibility Study.

Please note, we have technology available that would allow us to meet virtually over a video call that would allow us to share screen content with no special software required on your part. Please feel free to call or email me regarding your availability to meet and to discuss further.

Sincerely,



Patricia Strayer  
Town Engineering  
[PStrayer@townofpalmbeach.com](mailto:PStrayer@townofpalmbeach.com)

PS/lm

## Town of Palm Beach Water Feasibility Study Meeting with Veolia (11/13/2020)

- Terry said in the USA, Veolia has focused their work on the water sector. Terry said the Town has the option to operate the water system themselves or to contract Veolia to operate the system if they choose to retain the water system infrastructure following the expiration of the contract with WPB.
- Terry said Veolia's core model focuses around operations.
- Kevin said that when the agreement with the city of WPB expires the water system assets will automatically turnover to the Town. The Town will not have to buy the assets. Kevin asked if Veolia's model can be revised such that the service fees would be used to rehabilitate the existing system rather than buy the system assets since that will not be needed.
- Veolia can manage above and below ground assets and billing.
- Veolia would be able to provide services to integrate the Town's own water utility into being able to manage and operate the system.
- Patricia said that becoming a water utility would be an entirely new endeavor for the Town. The Town currently only bills for garbage pickup.
- Wholesale would also be a new endeavor for the Town.
- Terry (Veolia) said contracts are typically 5 years with 5 year renewals
- Terry said there is a flat fee for staffing. Power, chemicals,



# TOWN OF PALM BEACH

Public Works Department

October 28, 2020

FGUA

J. Kevin Grace, Assistant Director of Municipal Services

Government Services Group, Inc.

280 Wekiva Springs Road, Suite 2070

Longwood, FL 32779-6026

[kgrace@govmserv.com](mailto:kgrace@govmserv.com)

RE: Town of Palm Beach Water Feasibility Study

Dear Mr. Grace:

The Town of Palm Beach (the Town) is currently in the process of examining potential options that may be available to provide potable water service to the residents and property owners within the Town. The Town currently receives potable water service from the City of West Palm Beach (the City). The City owns and operates a potable water supply system which supplies water to the City, the Town, and the Town of South Palm Beach. The Town receives approximately 10 MGD of potable water (maximum day demand) through a series of pipelines that cross the Lake Worth Lagoon.

Potable water service is provided to the Town by the City pursuant to a 30-year Retail Water Service and Franchise Agreement executed in 1999. According to this Agreement, the City will own and maintain all the water facilities throughout the Town through the duration of the Agreement, which will expire in 2029. The Town is interested in exploring options for potable water service upon expiration of the Agreement with the City.

The Town has retained Kimley-Horn (Consultant) to perform a Water Supply Feasibility Study which will evaluate the feasibility of alternative potable water service providers. Options include obtaining water service from a municipal supplier other than West Palm Beach, obtaining water service from a private utility, and/or developing a Town-owned water supply source. We would like to meet with representatives of your organization together with our Consultant to have a discussion regarding your level of interest in providing potable water service and/or utility management/operation services for the Town. A preliminary agenda for this meeting is provided below:

1. Discuss interest in being the Town of Palm Beach's potable water system provider.
2. Discuss overview of Town's potable water service system and needs.

3. Discuss overall potable water system (source, treatment, service area, distribution system operating conditions, etc.).
4. Discuss overall ability to provide potable water service to Town.
5. Discuss overall ability to provide utility management and operation services.
6. Discuss opportunities and challenges associated with providing the Town with potable water supply and/or utility management and operation services.

We appreciate the opportunity to meet with your organization to discuss the Town of Palm Beach's Water Supply Feasibility Study.

Please note, we have technology available that would allow us to meet virtually over a video call that would allow us to share screen content with no special software required on your part. Please feel free to call or email me regarding your availability to meet and to discuss further.

Sincerely,

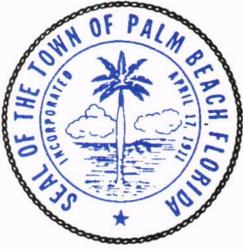


Patricia Strayer  
Town Engineering  
pstrayer@townofpalmbeach.com

PS/lm

## **Town of Palm Beach Water Feasibility Study Meeting with FGUA (11/13/2020)**

- Kevin Grace is assistant director for municipal practices in Orlando
- Gary Dermer President and CEO of US water. US Water is contractor for O&M and billing
- 2029 franchise agreement with WPB will expire.
- Steve Spratt with Government Services Group. Government Services Group has managed the FGUA systems since inception in 1999. Steve Spratt is the FGUA System Manager.
- FGUA would provide an alternative that keeps the water supply in a government realm.



# TOWN OF PALM BEACH

Public Works Department

October 28, 2020

Mr. Patrick Flynn  
Corix  
200 Wetherside Avenue  
Altamonte Springs, FL 32714  
[Patrick.Flynn@uiwater.com](mailto:Patrick.Flynn@uiwater.com)

RE: Town of Palm Beach Water Feasibility Study

Dear Mr. Flynn:

The Town of Palm Beach (the Town) is currently in the process of examining potential options that may be available to provide potable water service to the residents and property owners within the Town. The Town currently receives potable water service from the City of West Palm Beach (the City). The City owns and operates a potable water supply system which supplies water to the City, the Town, and the Town of South Palm Beach. The Town receives approximately 10 MGD of potable water (maximum day demand) through a series of pipelines that cross the Lake Worth Lagoon.

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1. Discuss interest in being the Town of Palm Beach's potable water system provider.
2. Discuss overview of Town's potable water service system and needs.

3. Discuss overall potable water system (source, treatment, service area, distribution system operating conditions, etc.).
4. Discuss overall ability to provide potable water service to Town.
5. Discuss overall ability to provide utility management and operation services.
6. Discuss opportunities and challenges associated with providing the Town with potable water supply and/or utility management and operation services.

We appreciate the opportunity to meet with your organization to discuss the Town of Palm Beach's Water Supply Feasibility Study.

Please note, we have technology available that would allow us to meet virtually over a video call that would allow us to share screen content with no special software required on your part. Please feel free to call or email me regarding your availability to meet and to discuss further.

Sincerely,



Patricia Strayer  
Town Engineering  
[pstrayer@townofpalmbeach.com](mailto:pstrayer@townofpalmbeach.com)

PS/lm

## Town of Palm Beach Water Feasibility Study Meeting with Corix (11/16/2020)

- Patrick Flynn, VP of Operations for Florida
- Gary Rudkin, President
- Chris Snow, Director of External Affairs. Critical in business development efforts
- Nate Carver, Manager, familiar with typical challenges that come up
- TOPB is served by WPB 30 year franchise agreement that expires in 2029
- At end of contract period, if Town does not renew agreement, potable water infrastructure within TOPB is turned over to the Town. There is no purchase price associated with the transfer
- Patrick said that Corix does not have a water source in the vicinity of the Town
- Jason and Kevin said that the Town may develop the water source and have a private utility manage the utility/system.
- Kevin said there are 9000 properties on the island. 15000 permanent residents and 30000 at peak season. Approximately a 10 MGD demand.
- Gary said that Corix would be interesting in building a plant, developing a utility, and managing it. Gary said Corix has the capital to invest in a plant or buy a plant from a neighboring system. They would also be open to owning the Town's system.
- Jason said that as of today the infrastructure in the Town is owned by the City.
- Chris asked what the "opt out date" is to let the City of WPB know the Town's decision moving forward.
- Patricia said there is not a contractual "opt out date"
- Patrick asked if there is a case where the agreement could be terminated before 2029.
- Patricia said yes, the contract could be terminated before 2029.
- Gary asked what the ratio of service in the Town to service on WPB mainland is. Service provided by WPB.
- Jason estimated 10-20% of the City's service is in the Town. Patricia said at least 10%.
- Patrick asked approximately how old the infrastructure is in the Town.
- Jason said the infrastructure is dated, in some areas older than 50 years. There are 5 aerial crossings into the Town from the mainland.
- Kevin said that in the contract it states that the Town must notify the City in writing 2 years in advance of the expiration date their intent to renew the contract.
- Currently the City takes 8% of the billing on the island and transfers it into a repair and replace fund dedicated to being used on the Town's potable system infrastructure. This is approximately \$1 million a year.
- Gary asked if there was any interest from the Town's side on exploring the need for Corix to provide sanitary sewer services to the Town as well.
- Patricia said the Town is only interested in the study for potable water options
- Patrick asked what the average customer's bill is. Chris also asked if this bill could be provided.
- Kevin said there are 3 types of customers on the island:
  - Single family homeowner. 0.1-0.2 acre lot.
  - Large estates on waterfront. Multiple acres. Water bill way higher than the typical single family.
  - Condo properties on south end. Large bills due to irrigation. Irrigation drives a significant demand on the island. No reclaim system in place. No ability to drill a well for groundwater irrigation. All irrigation water is potable water.
- Patrick said it would be more informative to know what the average single family homeowner pays.
- Kevin said typical 0.1-0.2 acre property pays \$200-\$300 a month.
- Patrick asked if there's any push from SFWMD to address irrigation usage.

- Kevin said there was an effort about 10 years ago which resulted in “smart irrigation systems” with moisture sensors in the yards. If you installed “smart irrigation systems” you would not be subject to water restrictions.
- Patrick said that Corix has about 2000 water systems in Florida. Majority of them are ones where Corix provides water source, water treatment, distribution, billing, operations & maintenance etc. A few systems Corix buys from a 3<sup>rd</sup> party and maintains distribution system. A plethora of customer types. Majority are single family customers. Not any industrial customers.
- Corix is in 18 states and 3 provinces of Canada.
- Gary asked when there would be indication from the City on their new rate structure for the renewal.
- Kevin said the study hasn’t gotten that far to answer that question. We are currently fact finding and seeing who can do what. Our goal is to provide policy makers at Town a list of options. After Town hones in on a few options they like, KHA would dive deeper into things like rates, etc.
- Patrick asked if the City differentiates the rates in the Town versus the rest of the service base.
- Kevin said the rates are the same, but the 8% surcharge which goes to the fund for replace aging infrastructure is only applicable to the Town.
- The Town drives the spending of the fund for R&R on the Town’s system.
- Patrick asked what the next step is
- Jason said the entire study is a phased approach. KHA will provide a report that ultimately results in a deeper dive into the feasibility of the options

# Appendix F

## Cost Estimates Tables

Alternative 1 - West Palm Beach: Opinion of Probable Construction Cost

ITEM	ITEM OF WORK	QUANTITY	UNIT	UNIT COST	SUBTOTAL
<b>Pipeline Improvements</b>					
1	8" Water Main	16,870	LF	\$600	\$10,122,000
2	10" Water Main	960	LF	\$700	\$672,000
3	12" Water Main	3,070	LF	\$800	\$2,456,000
	<b>SUBTOTAL:</b>				<b>\$13,250,000</b>
<b>Critical Pipeline Improvements Per Masterplan</b>					
1	Critical Water Main 4 - 16"	2,350	LF	\$2,400	\$5,640,000
2	Critical Water Main 7 - 8"	3,100	LF	\$600	\$1,860,000
3	Critical Water Main 12 - 16"	3,400	LF	\$2,400	\$8,160,000
	<b>SUBTOTAL:</b>				<b>\$15,660,000</b>
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>					<b>\$28,910,000</b>
Engineering/Administration (20%)					\$5,782,000
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION</b>					<b>\$34,692,000</b>
Contingency (35%)					\$12,143,000
<b>SUBTOTAL CAPITAL, ENGINEERING, ADMINISTRATION, AND CONTINGENCY:</b>					<b>\$46,835,000</b>
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST (-20% -/+ 50%)</b>					<b>\$37,468,000 to \$70,253,000</b>

Alternative 2A-Town of Palm Beach Owned Floridan Aquifer Supply Source: Opinion of Probable Construction Cost

ITEM	ITEM OF WORK	QUANTITY	UNIT	UNIT COST	SUBTOTAL
<b>Phipps Park Water Supply and Treatment System (7.5 MGD)</b>					
1	Site/Civil	LS	1.00	\$1,200,000	\$1,200,000
2	24" Floridan Well and Wellhead	EA	4	\$2,940,000	\$11,760,000
3	Raw Water Main	LF	5600	\$1,000	\$5,600,000
4	1.5 MG Storage Tanks	EA	2	\$1,500,000	\$3,000,000
5	Concentrate Discharge Deep Injection Well*	EA	1	\$11,550,000	\$11,550,000
6	Concentrate Emergency Outfall Structure and Piping	LS	1	\$504,000	\$504,000
7	RO Treatment System	GAL	7,500,000	\$4	\$31,500,000
8	RO Treatment Building (Does not include Clearwell)	LS	1	\$4,525,000	\$4,525,000
9	High Service Pumping	LS	1	\$750,000	\$750,000
10	Par 3 Well Retrofit	LS	1	\$79,000	\$79,000
11	Transfer Pumps	LS	1	\$420,000	\$420,000
12	Clearwell	LS	1	\$1,050,000	\$1,050,000
13	Degasifiers and Scrubbers	LS	1	\$1,092,000	\$1,092,000
14	Emergency Generators	LS	1	\$750,000	\$750,000
15	Dual zone monitor well	LS	1	\$5,250,000	\$5,250,000
	<b>SUBTOTAL:</b>				<b>\$79,030,000</b>
<b>Quadrille Water Supply and Treatment System (2.5 MGD)</b>					
1	Site/Civil	LS	1.00	\$900,000	\$900,000
2	24" Floridan Well and Wellhead	EA	2	\$2,520,000	\$5,040,000
3	Raw Water Piping	LF	750	\$900	\$675,000
4	2 X 0.8 MG Storage Tanks	EA	2	\$450,000	\$900,000
5	Concentrate Discharge Deep Injection Well	EA	1	\$6,300,000	\$6,300,000
6	Concentrate Discharge Emergency Surface Water Outfall Piping	LF	1200	\$263	\$315,000
7	Concentrate Emergency Outfall Structure	LS	1	\$420,000	\$420,000
8	RO Treatment System	GAL	3750000	\$3	\$11,813,000
9	RO Treatment Building (Does not include Clearwell)	LS	1	\$3,024,000	\$3,024,000
10	High Service Pumping	LS	1	\$600,000	\$600,000
11	Transfer Pumps	LS	1	\$315,000	\$315,000
12	Clearwell	LS	1	\$1,050,000	\$1,050,000
13	Degasifiers and Scrubbers	LS	1	\$1,092,000	\$1,092,000
14	Emergency Generators	LS	1	\$500,000	\$500,000
15	24" Water Main	LF	3,200	\$1,200	\$3,840,000
	<b>SUBTOTAL:</b>				<b>\$36,784,000.00</b>
<b>Pipeline Improvements</b>					
1	20" Water Main	20,907	LF	\$1,000	\$20,907,000.00
2	24" Water Main	3,163	LF	\$1,200	\$3,795,600.00
3	30" Water Main	23,469	LF	\$1,600	\$37,550,400.00
	<b>SUBTOTAL:</b>				<b>\$62,253,000.00</b>
<b>Franchise Agreement Pipeline Replacements</b>					
1	8" Water Main	15,960	LF	\$600	\$9,576,000
2	10" Water Main	960	LF	\$700	\$672,000
	<b>SUBTOTAL:</b>				<b>\$10,248,000.00</b>
<b>Critical Pipeline Improvements Per Masterplan</b>					
1	Critical Water Main 7 - 20"	3,100	LF	\$1,000	\$3,100,000
	<b>SUBTOTAL:</b>				<b>\$3,100,000</b>
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>					<b>\$191,415,000</b>
Engineering/Administration (20%)					\$38,283,000
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION</b>					<b>\$229,698,000</b>
Contingency (35%)					\$80,394,300
<b>SUBTOTAL CAPITAL, ENGINEERING, ADMINISTRATION, AND CONTINGENCY</b>					<b>\$310,093,000</b>
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST (-20% -/+ 50%)</b>					<b>\$248,074,400 to \$465,139,500</b>

Alternative 2B-Town of Palm Beach Owned Seawater Supply Source: Opinion of Probable Construction Cost

ITEM	ITEM OF WORK	QUANTITY	UNIT	UNIT COST	SUBTOTAL
<b>Phipps Park Water Supply and Treatment System (10.0 MGD)</b>					
1	Site/Civil	LS	1.00	\$1,200,000	\$1,200,000
2	24" Shallow Seawater Well	EA	30	\$200,000	\$6,000,000
3	Raw Water Piping	LF	10000	\$1,000	\$10,000,000
4	2 MG Storage Tanks	EA	2	\$1,750,000	\$3,500,000
5	Concentrate Discharge Deep Injection Well*	EA	2	\$11,550,000	\$23,100,000
6	RO Treatment System	GAL	10,000,000	\$6	\$63,000,000
7	RO Treatment Building (Does not include Clearwell)	SF	14,650	\$500	\$7,325,000
8	High Service Pumping	LS	1	\$735,000	\$735,000
9	Transfer Pumps	LS	1	\$525,000	\$525,000
10	Clearwell	LS	1	\$1,050,000	\$1,050,000
11	Emergency Generators	LS	1	\$750,000	\$750,000
12	Dual zone monitor well	LS	1	\$5,250,000	\$5,250,000
	<b>SUBTOTAL:</b>				<b>\$122,435,000</b>
<b>Pipeline Improvements</b>					
1	20" Water Main	13,288	LF	\$1,000	\$13,288,000.00
2	24" Water Main	7,618	LF	\$1,200	\$9,141,600.00
3	30" Water Main	22,930	LF	\$1,600	\$36,688,000.00
	<b>SUBTOTAL:</b>				<b>\$59,117,600</b>
<b>Franchise Agreement Pipeline Replacements</b>					
1	8" Water Main	15,960	LF	\$600	\$9,576,000
2	10" Water Main	960	LF	\$700	\$672,000
	<b>SUBTOTAL:</b>				<b>\$10,248,000</b>
<b>Critical Pipeline Improvements Per Masterplan</b>					
1	Critical Water Main 7 - 20"	3,100	LF	\$1,000	\$3,100,000
	<b>SUBTOTAL:</b>				<b>\$3,100,000</b>
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>					<b>\$194,900,600</b>
Engineering/Administration (20%)					\$38,981,000
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION</b>					<b>\$233,882,000</b>
Contingency (35%)					\$81,859,000
<b>SUBTOTAL CAPITAL, ENGINEERING, ADMINISTRATION, AND CONTINGENCY:</b>					<b>\$315,741,000</b>
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST (-20% -/+ 50%):</b>					<b>\$252,593,000 to \$473,612,000</b>

Alternative 3 - Palm Beach County Alternative: Opinion of Probable Construction Cost

ITEM	ITEM OF WORK	QUANTITY	UNIT	UNIT COST	SUBTOTAL
<b>Interconnection 1 - Okeechobee Blvd</b>					
1	Booster Pump Station	1	LS	\$1,000,000	\$1,000,000
2	1 MG Ground Storage Tank	1	LS	\$1,000,000	\$1,000,000
3	Chemical feed system and storage tank	1	LS	\$250,000	\$250,000
4	Electrical system	1	LS	\$175,000	\$175,000
5	Instrumentation and Controls	1	LS	\$175,000	\$175,000
6	Backup Power	1	LS	\$750,000	\$750,000
7	Site/Civil	1	LS	\$500,000	\$500,000
8	Security	1	LS	\$150,000	\$150,000
9	Real Estate Acquisition	1	LS	\$1,000,000	\$1,000,000
10	24" Water Main	11,400	LF	\$1,200	\$13,680,000
11	24" Water Main ICW Crossing	2,350	LF	\$3,000	\$7,050,000
	<b>SUBTOTAL:</b>				<b>\$18,680,000</b>
<b>Interconnection 2 - Southern Blvd</b>					
1	Booster Pump Station	1	LS	\$1,000,000	\$1,000,000
2	1 MG Ground Storage Tank	1	LS	\$1,000,000	\$1,000,000
3	Chemical feed system and storage tank	1	LS	\$250,000	\$250,000
4	Electrical system	1	LS	\$175,000	\$175,000
5	Instrumentation and Controls	1	LS	\$175,000	\$175,000
6	Backup Power	1	LS	\$750,000	\$750,000
7	Site/Civil	1	LS	\$500,000	\$500,000
8	Security	1	LS	\$150,000	\$150,000
9	Real Estate Acquisition	1	LS	\$1,000,000	\$1,000,000
10	16" Water Main	8,400	LF	\$900	\$7,560,000
	<b>SUBTOTAL:</b>				<b>\$12,560,000</b>
<b>Interconnection 3 - Lake Worth Road</b>					
1	Booster Pump Station	1	LS	\$1,000,000	\$1,000,000
2	1 MG Ground Storage Tank	1	LS	\$1,000,000	\$1,000,000
3	Chemical feed system and storage tank	1	LS	\$250,000	\$250,000
4	Electrical system	1	LS	\$175,000	\$175,000
5	Instrumentation and Controls	1	LS	\$175,000	\$175,000
6	Backup Power	1	LS	\$750,000	\$750,000
7	Site/Civil	1	LS	\$500,000	\$500,000
8	Security	1	LS	\$150,000	\$150,000
9	Real Estate Acquisition	1	LS	\$1,000,000	\$1,000,000
10	24" Water Main	13,400	LF	\$1,200	\$16,080,000
11	24" Water Main ICW Crossing	2,350	LF	\$3,000	\$7,050,000
	<b>SUBTOTAL:</b>				<b>\$28,130,000</b>
<b>Pipeline Improvements</b>					
1	12" Water Main	6,526	LF	\$800	\$5,222,000
2	16" Water Main	4,755	LF	\$900	\$4,280,000
3	20" Water Main	14,363	LF	\$1,000	\$14,363,000
	<b>SUBTOTAL:</b>				<b>\$23,865,000</b>
<b>Franchise Agreement Pipeline Replacements</b>					
1	8" Water Main	16,870	LF	\$600	\$10,122,000
2	10" Water Main	960	LF	\$700	\$672,000
	<b>SUBTOTAL:</b>				<b>\$10,794,000.00</b>
<b>Critical Pipeline Improvements Per Masterplan</b>					
1	Critical Water Main 7 - 12"	3,100	LF	\$800	\$2,480,000
	<b>SUBTOTAL:</b>				<b>\$2,480,000</b>
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>					<b>\$96,509,000</b>
Engineering/Administration (20%)					\$19,302,000
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION:</b>					<b>\$115,811,000</b>
Contingency (35%)					\$40,534,000
<b>SUBTOTAL CAPITAL, ENGINEERING, ADMINISTRATION, AND CONTINGENCY:</b>					<b>\$156,345,000</b>
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST (-20% -/+ 50%):</b>					<b>\$125,076,000 to \$234,518,000</b>

Alternative 4 - Lake Worth Beach Alternative: Opinion of Probable Construction Cost

ITEM	ITEM OF WORK	QUANTITY	UNIT	UNIT COST	SUBTOTAL
<b>Lake Worth WTP Upgrades</b>					
1	Lake Worth WTP Upgrades	1	LS	\$81,000,000	\$81,000,000
	<b>SUBTOTAL:</b>				<b>\$81,000,000.00</b>
<b>Interconnection 1 - C-51 Canal</b>					
2	1 MG Ground Storage Tank	1	LS	\$1,000,000	\$1,000,000
3	Chemical feed system and storage tank	1	LS	\$250,000	\$250,000
4	Electrical system	1	LS	\$175,000	\$175,000
5	Instrumentation and Controls	1	LS	\$175,000	\$175,000
6	Backup Power	1	LS	\$750,000	\$750,000
7	Site/Civil	1	LS	\$500,000	\$500,000
8	Security	1	LS	\$150,000	\$150,000
9	Real Estate Acquisition	1	LS	\$500,000	\$500,000
10	20" Water Main	6,200	LF	\$1,000	\$6,200,000
11	24" Water Main ICW Crossing	2,500	LF	\$3,000	\$7,500,000
	<b>SUBTOTAL:</b>				<b>\$17,200,000.00</b>
<b>Interconnection 2 - Lake Worth Road</b>					
1	Booster Pump Station	1	LS	\$1,000,000	\$1,000,000
2	1 MG Ground Storage Tank	1	LS	\$1,000,000	\$1,000,000
3	Chemical feed system and storage tank	1	LS	\$250,000	\$250,000
4	Electrical system	1	LS	\$175,000	\$175,000
5	Instrumentation and Controls	1	LS	\$175,000	\$175,000
6	Backup Power	1	LS	\$750,000	\$750,000
7	Site/Civil	1	LS	\$500,000	\$500,000
8	Security	1	LS	\$150,000	\$150,000
9	Real Estate Acquisition	1	LS	\$1,000,000	\$1,000,000
10	20" Water Main ICW Crossing	3,200	LF	\$2,000	\$6,400,000
	<b>SUBTOTAL:</b>				<b>\$11,400,000.00</b>
<b>Town Distribution System Improvements</b>					
1	16" Water Main	6,000	LF	\$900	\$5,400,000.00
2	20" Water Main	15,000	LF	\$1,000	\$15,000,000.00
3	24" Water Main	14,000	LF	\$1,200	\$16,800,000.00
4	Storage Improvements	1	LS	\$1,000,000	\$1,000,000
5	Phipps Park Booster Station Improvements	1	LS	\$600,000	\$600,000
6	Real Estate Acquisition	1	LS	\$1,000,000	\$1,000,000
	<b>SUBTOTAL:</b>				<b>\$39,800,000.00</b>
<b>Franchise Agreement Pipeline Replacements</b>					
1	8" Water Main	15,960	LF	\$600	\$9,576,000
2	10" Water Main	960	LF	\$700	\$672,000
	<b>SUBTOTAL:</b>				<b>\$10,248,000.00</b>
<b>Critical Pipeline Improvements Per Masterplan</b>					
1	Critical Water Main 7 - 16"	3,100	LF	\$900	\$2,790,000
	<b>SUBTOTAL:</b>				<b>\$2,790,000</b>
<b>SUBTOTAL CAPITAL IMPROVEMENTS:</b>					<b>\$162,438,000</b>
Engineering/Administration (20%)					\$32,488,000
<b>SUBTOTAL CAPITAL, ENGINEERING AND ADMINISTRATION</b>					<b>\$194,926,000</b>
Contingency (35%)					\$68,225,000
<b>SUBTOTAL CAPITAL, ENGINEERING, ADMINISTRATION, AND CONTINGENCY:</b>					<b>\$263,151,000</b>
<b>LEVEL 5 ENGINEERS OPINION OF PROBABLE COST (-20% -/+ 50%)</b>					<b>\$210,521,000 to \$394,727,000</b>