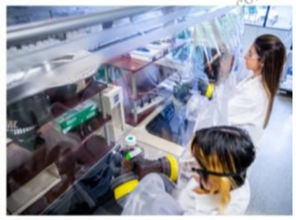
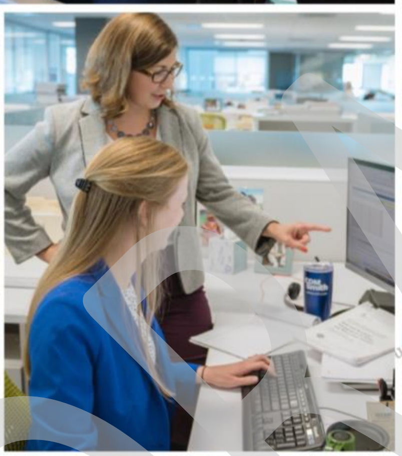
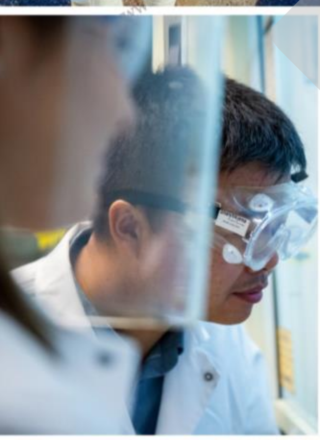
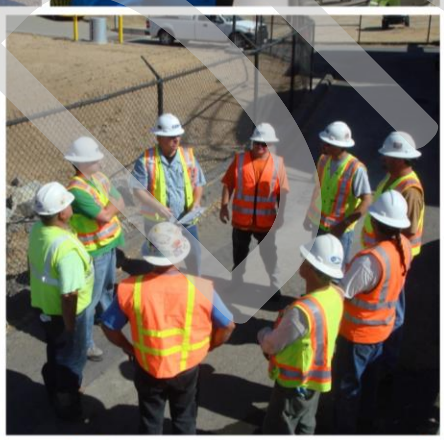




DRAFT REPORT

MAY 2024



City of Delray Beach Water Treatment Plant Facilities Plan

Prepared for:

City of Delray Beach

CONTRACT NO.: 291242



CDM Smith

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Acronyms and Abbreviations

AACE	Association for the Advancement of Cost Engineering
AADD	Average Annual Day Demand
ADF	Average Daily Flow
AIX	Anion Exchange
BAT	Best Available Technology
CIP	Clean in Place
CY	Cubic Yard
DIW	Deep Injection Well
DBP	Disinfection Byproduct
dp	Pressure Drop
EBCT	Empty Bed Contact Time
FAS	Floridan Aquifer System
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
GAC	Granular Activated Carbon
gfd	Gallons per day per Square Foot of Membrane Area
HP	Horsepower
LS	Lime Softening
MCL	Maximum Contaminant Level
MDD	Maximum Day Demand
mg/L	Milligrams per Liter
MG	Million Gallons
MGD	Million Gallons per Day
MMD	Maximum Month Demand
MOR	Monthly Operating Report
NF	Nanofiltration
NPDWR	National Primary Drinking Water Regulation
O&M	Operation and Maintenance

OPCC	Opinion of Probable Construction Cost
PAC	Powdered Activated Carbon
PFAS	Per and Polyfluoroalkyl Substances
POE	Point of Entry
ppt	Parts per Trillion
PWS	Public Water Supply
RO	Reverse Osmosis
SAS	Surficial Aquifer System
SFWMD	South Florida Water Management District
SLR	Surface Loading Rate
SRF	State Revolving Fund
TDH	Total Dynamic Head
USEPA	United States Environmental Protection Agency
VFD	Variable Frequency Drive
WTP	Water Treatment Plant
WUP	Water Use Permit

1.0 Executive Summary

This Facilities Plan was prepared by CDM Smith Inc. (CDM Smith) in accordance with the requirements for State Revolving Fund (SRF) grant funding of drinking water systems. The area considered in preparing this plan is the City of Delray Beach Water Treatment Plant.

1.1 Scope of Study

This report is organized into the following sections:

1) **Executive Summary:** Provides information related to the scope of study, project background, project need and project location.
2) **Environmental Effects:** Provides a description of the environmental and socio-economic conditions of the planning area and potential project impacts.
3) **Development of Alternatives:** Provides a description of existing facilities and establishes design needs for the planning period and identify and evaluate various water system alternatives to satisfy the planning year needs.
4) **Preferred Alternative:** Recommends the most cost effective, environmentally sound facilities to meet the planning needs, identifies any adverse environmental impacts and proposed mitigating measures, and describes in detail the recommended facilities and their cost.
5) **Public Participation and Regulatory Review:** Summarizes the public hearing for this project and identifies the relevant regulatory agencies that would need to review this project.
6) **Financial Feasibility:** Summarizes the financial impact of this project and presents a business plan on how this project will be financed.
7) **Implementation Schedule:** Presents a schedule of implementation of the recommended facilities.
8) **Adopting Resolution:** Specific Authorization to implement the planning recommendations.
9) **Appendices:** Appendices include:
    A. The Drinking Water Facility Plan Review Checklist
    B. A Copy of the Certified Public Advertisement
    C. Minutes from the Public Hearing
    D. The Business Plan
    E. The Adopting Resolution

1.2 Project Background

The City of Delray Beach (City) owns and operates a 26 million gallons per day (MGD) capacity conventional lime softening water treatment plant (WTP). The facility is subject to State and Federal drinking water quality regulations.

The WTP was originally constructed in 1972 and later expanded in 1992. As part of the "Water Supply and Treatment Feasibility Study Update" prepared by Kimley Horn and issued in January 2022 (herein after referred to as the 2022 Study Update), a condition assessment of the existing WTP was performed. This assessment identified that some of the existing infrastructure had reached the end of its useful life, with the age of the major components summarized in **Table 1.1**.

Table 1.1 Existing Treatment Plant Component Ages

Component	#	Year Installed	Age in Years (as of 2024)
Aeration Towers	2	1972 (North) 1982 (South)	52 42
Lime Solid Contact Clarifiers	4	1972 (Units 1 + 2) 1978 (Unit 3) 1989 (Unit 4)	52 46 35
Concrete Filter Bays	8	1972 (Filters 1 – 6) 1984 (Filters 7 – 8)	52 40
Filter Underdrains and Media	8	1992 (last replaced)	32
Clearwells	2	1972 (East) 1982 (West)	52 42
Sludge Thickeners	2	1992 (both)	32
Vacuum Filters	2	1992 (both)	32
Emergency Sludge Pond	1	1972	52
Backwash Recovery Basin	1	1972	52
Lime Storage Silos	2	1982	42
Lime Paste Slakers	3	1992	32
Lime Slurry Pumps	4	1992	32
Polymer Storage and Feed	2 (Tanks) 6 (Pumps)	Pre-2004	32 – 52 (est)
Ferric Chloride Storage and Feed	1 (Tank) 3 (Pumps)	2002	22
Polyphosphate Storage and Feed	1 (Tank) 3 (Pumps)	1982	42
Ammonia Gas Storage and Feed	1 (Tank) 2 (Pumps)	1984	40
CO_2 Storage and Feed	1 (Tank) 2 (Pumps)	Unknown	42 (est)

The City treats raw water from the East Coast Surficial Aquifer System (SAS) using a conventional lime softening and filtration treatment process. The City's water supply is comprised of five wellfields that include a total of 30 production wells within the SAS and one Floridan Aquifer System (FAS) well. The existing production wells are currently operational with the exception of SAS well 15 and the single FAS well.

1.3 Project Need

On April 10, 2024, the United States Environmental Protection Agency (USEPA) released the final National Primary Drinking Water Regulation (NPDWR) for per- and polyfluoroalkyl substances (PFAS), which is a category of manufactured chemicals that have been used in industry and consumer products since the 1940s, and are commonly found in the environment, including typical raw drinking water supply sources (ground water and surface waters). The PFAS NPDWR includes enforceable maximum contaminant levels (MCLs) for PFOA, PFOS, PFHxS, PFNA, and HFPO-DA as individual contaminants, and mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS using an enforceable level Hazard Index. The USEPA has issued a compliance date for the proposed PFAS NPDR of 2029.[1] The MCLs proposed by the USEPA are as follows:

- PFOA: < 4.0 parts per trillion (ppt)
- PFOS: < 4.0 ppt
- PFHxS: < 10 ppt
- PFNA: < 10 ppt
- HFPO-DA: < 10 ppt
- PFNA, PFHxS, PFBS, HFPO-DA: < 1.0 Hazard Index.

The City's water sampling program has identified the presence of certain PFAS constituents in the raw water that supplies the water treatment plant (**Figure 1.1**), as well as in the lime softened treated finished water in levels that exceed the currently proposed PFAS MCLs (**Table 1.2**). Based on this data, the existing water treatment plant will require upgrades to meet the proposed PFAS MCLs.

Table 1.2 Point of Entry (POE) to the Distribution System PFAS Testing Results

Date	PFOA (ppt)	PFOS (ppt)	Total (ppt)
December 13, 2022	11.0	28.0	39.0
June 13, 2022	14.0	38.0	52.0
March 10, 2022	14.0	40.0	54.0
December 7, 2022	11.0	35.0	46.0
September 2, 2021	10.0	27.0	37.0
June 9, 2021	13.0	32.0	45.0
March 11, 2021	10.0	21.0	31.0
March 11, 2021	13.0	28.0	41.0
December 4, 2020	13.0	26.0	39.0
October 29, 2020	0.0	0.4	0.4
August 11, 2020	16.0	33.0	49.0
Overall Average POE:	**11.4**	**28.0**	**39.4**

Note: Point-of Entry PFAS Data from the Request for Inclusion on the Drinking Water Priority List submitted to the Florida Department of Environmental Protection by the City date May 19, 2023.
ppt = parts per trillion

[1] Per- and Polyfluoroalkyl Substances (PFAS), Final PFAS National Primary Drinking Water Regulation, April 10, 2024, United States environmental Protection Agency, Office of Water [Per- and Polyfluoroalkyl Substances (PFAS) | US EPA].

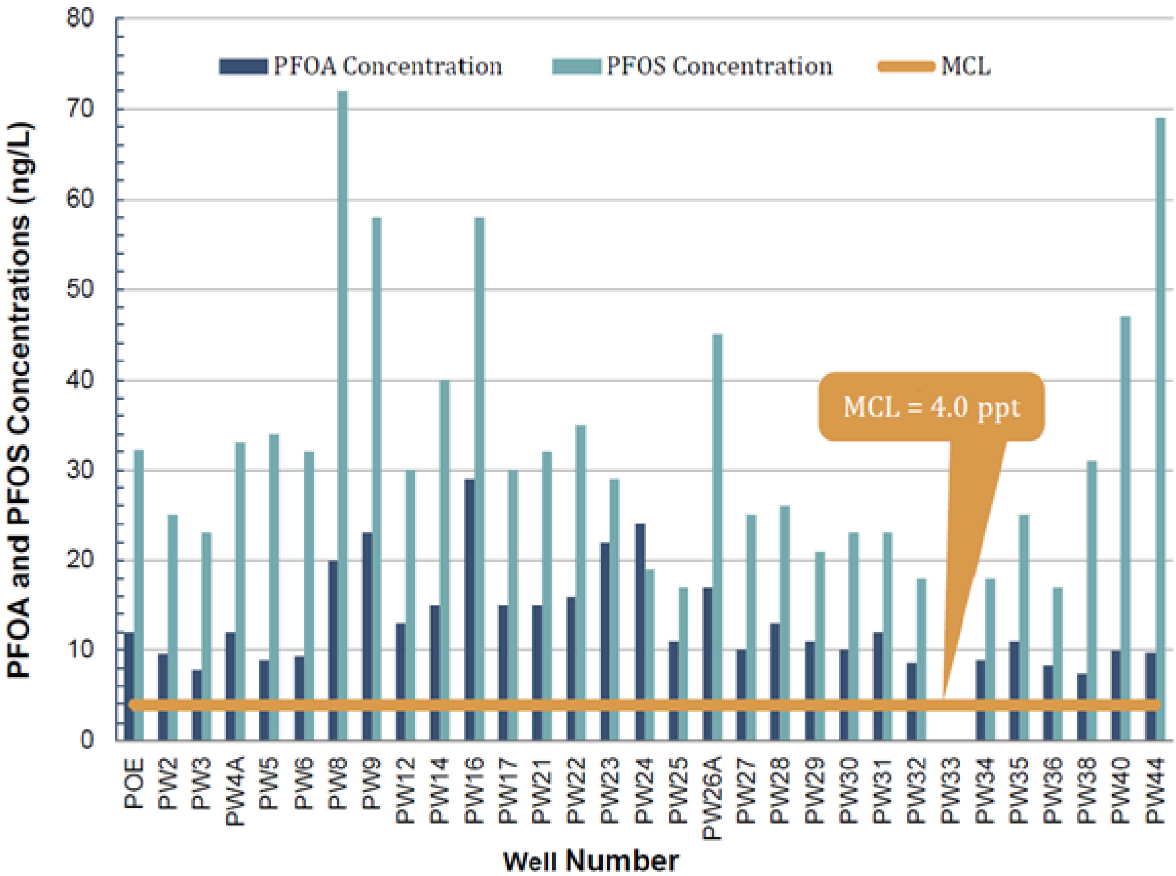

Figure 1.1 PFOA and PFOS Concentrations per Well as of 2021[2]

The combined impacts of the plant having several primary components at the end of its service life (Table 1.1) as well as the plant's inability to treat for PFAS demonstrates the need for a new water treatment plant. This new treatment plant will need to remove PFAS in order to meet the new regulations.

The USEPA has identified three treatment technologies as the best available technologies (BATs) for the removal of all regulated PFAS: membranes (nanofiltration, (NF), or reverse osmosis, (RO)), granular activated carbon (GAC), and anion exchange (AIX). While the three technologies have different pre- and post-treatment requirements, process requirements, design criteria, operating requirements, and capital and operating costs, in principle these processes are all capable of removing PFAS to non-detectable levels at the feedwater PFAS levels observed at Delray Beach. However, the PFAS-removal performance of GAC and AIX can be inhibited by site-specific factors such as the presence of high levels of total organic carbon (TOC) in South Florida surficial aquifer groundwater. Another significant difference between the technologies is that membranes are a broad-spectrum removal technology that

[2] Well PFAS data visualization modified from Hazen and Sawyer (May 2023). *City of Delray Beach Proposed Membrane Water Treatment Plant Concept Validation.* City of Delray Beach. Figure 5-2.

will perform the function of the existing lime softening process (allowing the decommissioning of the lime softening components associated with the treatment capacity replaced with membranes), whereas GAC and AIX are more contaminant-specific technologies that would constitute an additional treatment step in the existing lime softening process, requiring that the existing lime softening process be maintained and operated in the future.

The 2022 Study Update recommended the initial construction of a 14.0 MGD NF process addition to the lime softening facility, with the NF permeate to be blended with the lime softened water to meet the proposed PFAS MCLs at the time. It is important to note that the 2022 Study Update was completed prior to issuance of the MCLs by the USEPA in April 2024, and the analysis that concluded that the required PFAS treatment could be achieved through blending of the NF permeate with lime softened water was based on the following finished water PFAS goal:

- PFAS (PFOA + PFOS): 10 ppt to 20 ppt (maximum)[3]

Because the actual MCLs released in April 2024 are substantially lower than the goals used in the 2022 Study Update, the concept for the water treatment plant upgrades to achieve compliance with the proposed PFAS regulations must be modified. The purpose of this plan is to evaluate the treatment technology alternatives available to the City for achieving compliance with the final PFAS NPDWR at the City's WTP.

It should also be noted that the design "buildout" treatment plant capacity (maximum day basis) mandated for this project is 25 MGD installed, or 22 MGD including one redundant membrane unit, which differs slightly from the current rated capacity of 26 MGD for the existing lime softening plant. The rationale for the process design capacity change is discussed further later in this plan.

A 2022 Study Update recommended the initial construction of a 14.0 MGD NF facility in parallel with blending with the existing lime softened water. Although the recommendation was for a 14.0 MGD NF facility, the subsequent sections of this report will further illustrate the alternatives to be considered.

1.4 Project Location

The City's Utility Service Area is shown on **Figure 1.2**, which is serviced by the WTP located at 200 SW 6th Street Delray Beach, FL 33444. The City's service area includes the municipal limits of Delray Beach, portions of unincorporated Palm Beach County to the west. The total service area encompasses approximately 18 square miles. The City also provides water to the town of Gulf Stream through a wholesale interlocal agreement. Note that the town of Gulf Stream maintains their own distribution system, so they are not considered part of the service area.

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[3] Table 6-2, Kimley-Horn (2022). *Water Supply and Treatment Feasibility Study Update.*

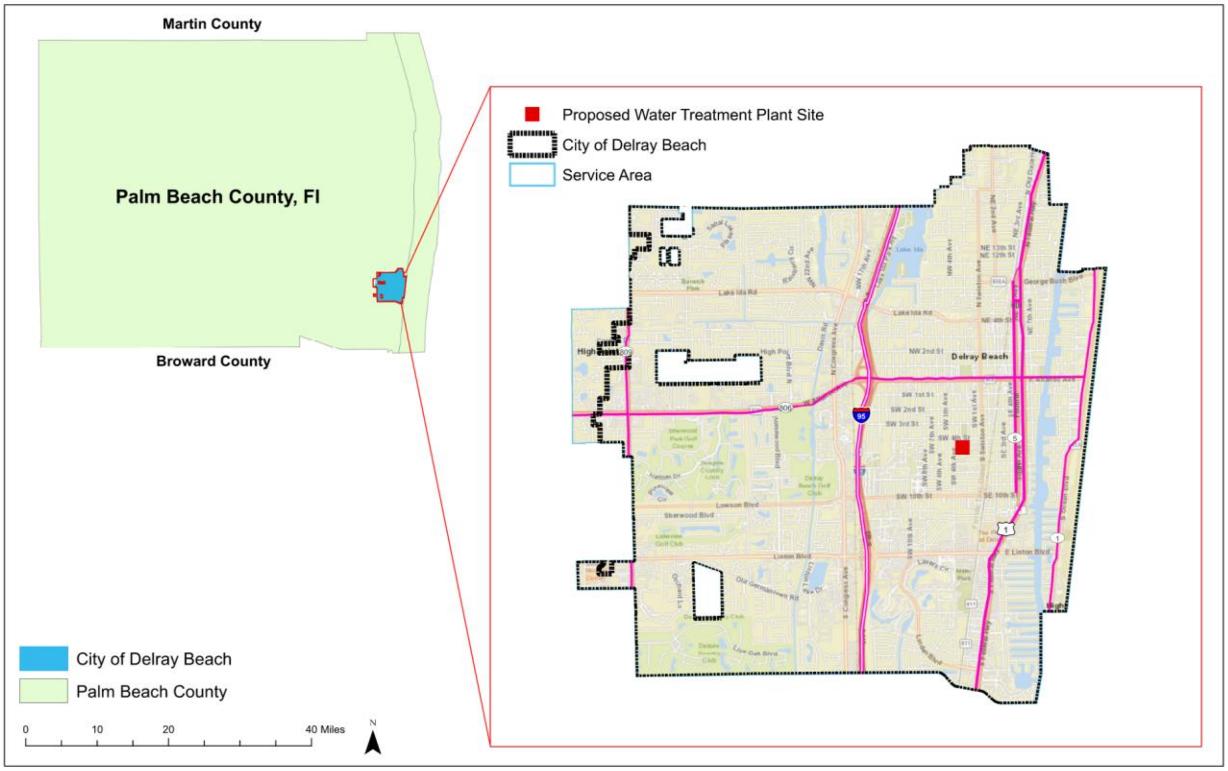

Figure 1.2 City of Delray Beach Utility Service Area. Image from City of Delray Beach.

The City has emergency interconnect agreements with three neighboring municipalities: the City of Boynton Beach, Palm Beach County Utilities, and the City of Boca Raton. Additionally, the City has an agreement with the Town of Gulf Stream, whereby the City continuously provides the Town with up to 0.80 MGD (million gallons per day) for water service. Some additional geographic information is listed below:

- Latitude :26.45211461045345, Longitude: -80.0756323913689
- The City's Public Water Supply System (PWS) number is 4500-351

2.0 Environmental Effects

2.1 Environmental Benefits

The proposed project involves converting the City's existing lime softening plant to a nanofiltration (NF) plant. There are numerous environmental benefits that come from conducting this transition, which are summarized below.

2.1.1 Decreased Sludge Production

The City's existing WTP currently uses a precipitative lime softening process to remove hardness from the raw water, which ends up producing large amounts of spent lime solids. These solids are currently disposed of using a settling basin with two (2) sludge thickening basins that concentrate the particulate matter, which is then sent to two (2) vacuum filter presses that reduce the amount of water present in the particulate matter and reduce the particulate matter to a cake for disposal offsite. These spent lime solids could potentially be considered as hazardous waste in the future depending on the concentration of PFAS substances that are within the spent lime sludge[4].

In contrast, NF does not produce any sludge since it primarily removes contaminants through membrane filtration rather than chemical precipitation. Removed contaminants from NF are kept in solution in the NF concentrate, which is disposed of through deep well injection. Therefore, transitioning to NF removes a solid waste stream that could potentially become hazardous waste in the future, which produces a net positive environmental impact.

2.1.2 Reduced Lime Usage

NF also uses less lime per unit volume of water treated than lime softening, which reduces the environmental impact from mining and transporting the large volumes of lime needed to operate a precipitative softening process. In addition, lime production is a extremely carbon intensive process, both from the release of CO_2 during production and in the fuel required to heat the limestone in the conversion process.

2.1.3 Enhanced Removal of Contaminants

Lime softening primarily relies on precipitation and physical filtration downstream of the softening process to remove contaminants. Precipitation and physical filtration are effective at removing suspended solids and residual precipitated hardness salts but are not effective at removing anionic and organic constituents such as PFAS. NF membranes are capable of effectively removing a wide range of contaminants, including bacteria, viruses, organic compounds, PFAS, and dissolved solids from water. By improving the overall quality of treated water, NF can help safeguard human health, as well as ecosystems and aquatic habitats that receive water treated by the plant either directly (irrigation), or indirectly (pass through the urban water system and discharged through a wastewater treatment plant).

[4] Moody, C., & Murray, C. (2023). Water Systems Could Face Costly PFAS Waste Rules. *Journal - American Water Works Association*, *115*(9), 6–7. https://doi.org/10.1002/awwa.2174

2.2 Environmental Effects

The proposed project is located on the existing Delray Beach WTP parcel, which lies in a heavily urbanized area. Presented below is a summary of the anticipated environmental effects of this project.

2.2.1 Description of Planning Area

The planning area encompasses the southwest portion of the parcel containing the existing Delray Beach WTP, which is parcel 12-43-46-20-01-009-0010, as well as parcels 12-43-46-20-06-000-0091, 12-43-46-20-06-000-0092, and 12-43-46-20-07-000-0080 (**Figure 2.1**). These parcels are bounded by SW 4th St to the north, SW 4th Ave to the west, S Swinton Ave to the east, and SW 7th St to the south.

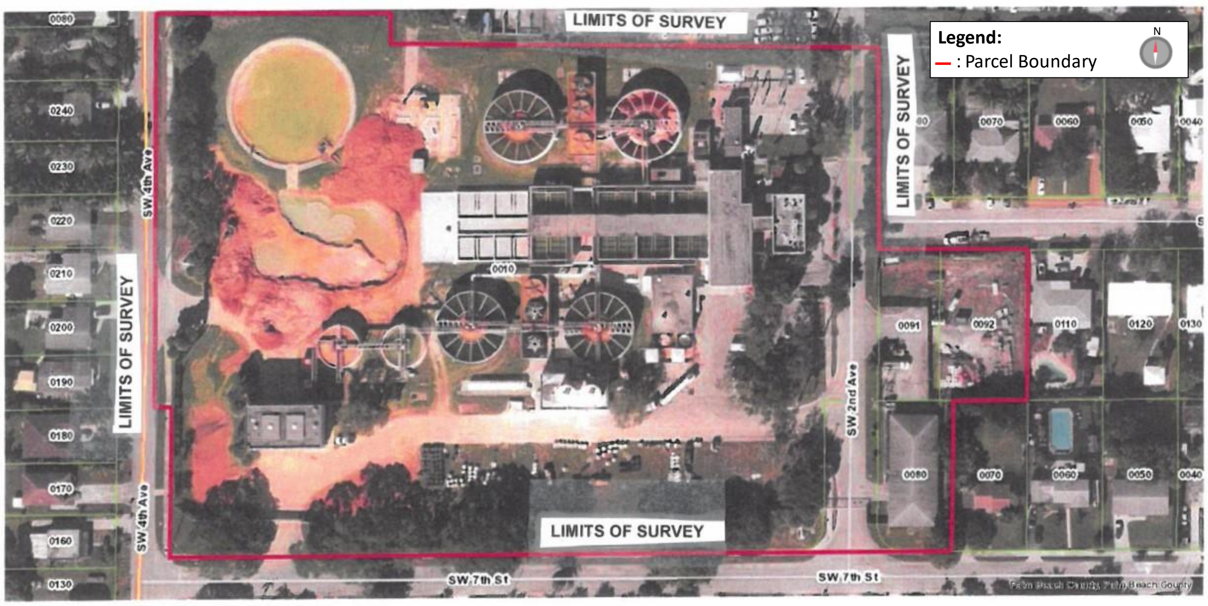

Figure 2.1 City of Delray Beach WTP Parcel Boundary

2.2.2 Flora and Fauna

The dominant types of natural vegetation on the property are live oak, cabbage palm, and strangler fig. There are no rare, endangered or threatened species of vegetation in the planning area. Based on the Florida Department of Transportation (FDOT) Florida Land Use, Cover and Forms Classification system, the parcel is considered a Class 833 - water supply plant, due to the water supply plant on the property.

Most of the area is now used for residential and commercial development. Animal life in the developed areas is limited. Wild turkeys, squirrels, rabbits, foxes, and raccoons can be found in the planning area and its environs. Amphibians and reptiles include various species of toads, tree frogs, sirens, salamanders, iguanas, turtles, geckos, lizards, and snakes. A wide variety of water and land birds are present in the area. There are no rare, endangered or threatened species of animals within the project area. The nearest critical habitat to the project site is the Atlantic coast of Florida, which is located 1 mile away from the eastern edge of the project site and is critical habitat for the Loggerhead Sea Turtle according to the US Fish & Wildlife Service.

2.2.3 Surface Water Hydrology

The nearest surface water body is the Intracoastal Waterway, which is 0.6 miles away from the eastern edge of the parcel.

2.2.4 Prime Agricultural Lands

There are no prime agricultural lands on the parcel.

2.2.5 Wetlands

There are no wetlands on the parcel. According to the National Wetlands Inventory, the nearest wetland is the Intracoastal Waterway, which is considered a E1UBL (E - estuarine, 1 - subtidal, UB - unconsolidated bottom, L - subtidal) wetland and is located 0.6 miles away from the eastern edge of the project site.

2.2.6 Undisturbed Areas

The project site is already a disturbed area since there have been historic human activities on the project site that have altered the site's soils, vegetation, and drainage patterns from what would occur under natural conditions. The nearest large undisturbed area is the Loxahatchee National Wildlife Refuge, which is located 9 miles from the western edge of the project site.

2.2.7 Soils and Site History

According to the USDA Web Soil Survey, the primary soils on the project site are Quartzipsamments and the St. Lucie-Paola-Urban land complex, which are shown on Figure 2.2. Quartzipsamments cover the central portion of the project site and are a low-sloped well-drained non-hydric soil composed of fine sand that typically rises on marine terraces that originate from sandy marine deposits. The St. Lucie-Paola-Urban land complex covers the edges of the site and is a low-sloped excessively drained non-hydric sand that forms on ridges and knolls on marine terraces that originates from eolian or sandy marine deposits. Quartzipsamments are typically found in areas that were historically sandy pine flatwoods and hammocks, while the St. Lucie-Paola-Urban land complex is typically found in areas that were historically sandy scrub on ridges, knolls, and dunes of xeric uplands.

Figure 2.2 City of Delray Beach WTP Site Soils

2.3 Human Health Impacts

2.3.1 Reduced Health Risks

The proposed project is essential to minimizing human health risks from exposure to PFAS. PFAS are a group of manufactured chemicals that have been used since the 1940's. There are thousands of different PFAS compounds. A common characteristic across many PFAS compounds is that they are difficult to break down, which causes them to accumulate in people, animals, and the environment over time. The known risks from PFAS exposure include liver and kidney damage, hormone disruption, reproductive system damage and higher risks of cancer. Children are especially at risk with increased threats to healthy development related to PFAS exposure[5].

2.3.2 Enhanced Water Quality Protections

The proposed NF system will provide enhanced protection against future threats to water quality, including disinfection byproducts (DBPs) and salts that result from saltwater intrusion. DBPs can pose

[5] *Our Current Understanding of the Human Health and Environmental Risks of PFAS | US EPA*. (2023). https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas

additional cancer risks as well as nervous system disruptions when one is exposed to large concentrations and are formed when disinfectants interact with natural organic material in water. When inadequately treated, water with high salt content can increase hypertension and blood pressure, which can lead to cardiovascular issues.

2.3.3 Improved Community Equity

The project site is located within Palm Beach County tract 12099006802, which is identified as a disadvantaged census tract for climate change, health, and legacy pollution according to the screening criteria identified in the Justice40 initiative.

The existing lime softening process requires trucks to constantly transport chemicals and sludge into and out of the plant. This creates noise and disruption, a nuisance to families. The proposed system would positively affect the community, reducing nuisances as NF does not require lime delivery and does not produce sludge to be transported outside of the plant. Additionally, emissions related to the trucks would be lessened, ensuring cleaner air for the families surrounding the plant. Overall, the proposed improvements to the project site will improve the current situation relative to impacts from climate change, health, and legacy pollution in a historically underinvested area.

2.4 Previous Investigations

The environmental effects of the proposed project were investigated by checking applicable data on the National Wetlands inventory, the FDOT Land use database, the US Fish & Wildlife Service threatened and endangered species map, the USDA web soil survey, and the Justice40 Climate and Economic Justice Screening Tool. In addition, the project team has visited the project site to verify the conditions documented in the indicated public databases.

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3.0 Development of Alternatives

3.1 Treatment Process Overview and Upgrade Alternatives

3.1.1 Existing Treatment Process

3.1.1.1 Description

Figure 3.1 presents the site plan for the existing water treatment plant. **Figure 3.2** presents a process flow diagram of the existing treatment process. The existing WTP utilizes conventional lime softening with aeration upstream of the lime softening units, followed by granular media gravity filtration, and chemical disinfection. Raw water enters the site through four primary raw water mains: 20-inch and 24-inch mains from the western wellfield (20-Series, Golf Course, and Morikami), and 30-inch and 16-inch mains from the eastern wellfields. In general, the treatment process through the gravity filters, upstream of the common clearwells is divided into two trains (north and south), with each train being a near mirror image of the other. The four mains are tied together in a common manifold network on the plant site which allows both the north and south treatment units to be fed from either wellfield.

Raw water from the wellfields first flows into cascade-type aerators (three for each process train) which are elevated such that the raw water then flows by gravity into the lime softening solids-contact reactor-clarifiers (two for each process train). Slaked lime, coagulant (ferric chloride), and polymer are injected into the raw water in the mixing zone of each reactor-clarifier to raise the pH to precipitate dissolved hardness (as calcium carbonate, $CaCO_3$) and enhance settling within the clarifiers. Carbon dioxide is injected into the lime softened water immediately downstream of the lime softening units to reduce the pH to quench the $CaCO_3$ precipitation reaction and prevent cementing of the downstream granular filter media.

Softened water from the reactor-clarifiers is routed to the granular multi-media (sand and anthracite) gravity filters (four per process train) for the removal of suspended particulates, and turbidity. The filtered water then flows by gravity into two clearwells (east and west) located beneath the filters. Chlorine is added in the effluent of the clarifiers for disinfection. Other chemical post-treatment occurs in the clearwells, which includes injection of a phosphate-based corrosion inhibitor (to inhibit corrosion of water distribution piping and building plumbing and aid in compliance with the Lead and Copper Rule), and injection of hydrofluosilicic acid (fluoride). Following free chlorine primary disinfection, ammonia is injected to form a combined chloramine residual, and the finished water is pumped to storage with the transfer pumps. From the storage tanks, the finished water is pumped to distribution with the high service pumping system.

Sludge from the lime softening reactor-clarifiers is blown down to the gravity sludge thickeners (two). Thickened lime sludge is further dewatered with a vacuum filter system prior to being hauled off site for disposal. Filter backwash water is routed to a washwater recovery basin, where the solids are settled out and sent to the gravity sludge thickeners, and the supernatant returned to the feedwater to the lime softening units for recycle. Supernatant from the thickeners is routed to the washwater recovery basin as well.

3.1.1.2 Water Demands

Table 3.1 and **Table 3.2** summarizes the raw and treated water flows reported on the Monthly Operating Reports (MORs) for the 12-month period from December 2022 through November 2023 as well as relevant water demand statistics. The 2023 finished water annual average day demand (AADD) was 14.9 MGD, and the maximum day demand (MDD) was 17.3 MGD.

Table 3.1 Summary of Plant Flow Statistics December 2022 through November 2023

Month	Raw Water (MG)	Treated Water (MG)	Treatment Efficiency	Daily Finished Water Demands		
				Min (MGD)	Max (MGD)	Avg (MGD)
Dec-22	458.11	455.37	99.4%	13.13	16.85	14.69
Jan-23	473.75	470.71	99.4%	13.41	16.47	15.18
Feb-23	427.40	424.89	99.4%	13.75	16.16	15.17
Mar-23	497.00	493.88	99.4%	14.20	16.88	15.93
Apr-23	462.48	460.02	99.5%	13.70	16.77	15.33
May-23	490.41	486.98	99.3%	13.91	17.28	15.71
Jun-23	436.43	432.67	99.1%	13.04	16.03	14.42
Jul-23	435.31	434.47	99.8%	11.88	16.15	14.02
Aug-23	441.91	438.97	99.3%	11.82	15.54	14.16
Sep-23	433.79	430.53	99.2%	12.24	16.88	14.35
Oct-23	467.37	461.93	98.8%	11.66	16.92	14.90
Nov-23	455.67	452.20	99.2%	12.01	17.16	15.07
Min	427.40	424.89	98.8%	11.66	15.54	14.02
Max	497.00	493.88	99.8%	14.20	17.28	15.93
Avg	456.64	453.55	99.3%	12.90	16.59	14.91

Table 3.2 Summary of Flow Statistics

Statistic	Raw Water	Finished Water
Annual Average Day Demand (AADD)	15.02 MGD	14.91 MGD
Maximum Month Demand (MMD)	497.00 MG	493.88 MG
Maximum Day Demand (MDD)	17.39 MGD	17.28 MGD
MDD/AADD Peaking Factor	1.16	1.16
MMD/AADD Peaking Factor	1.07	1.07

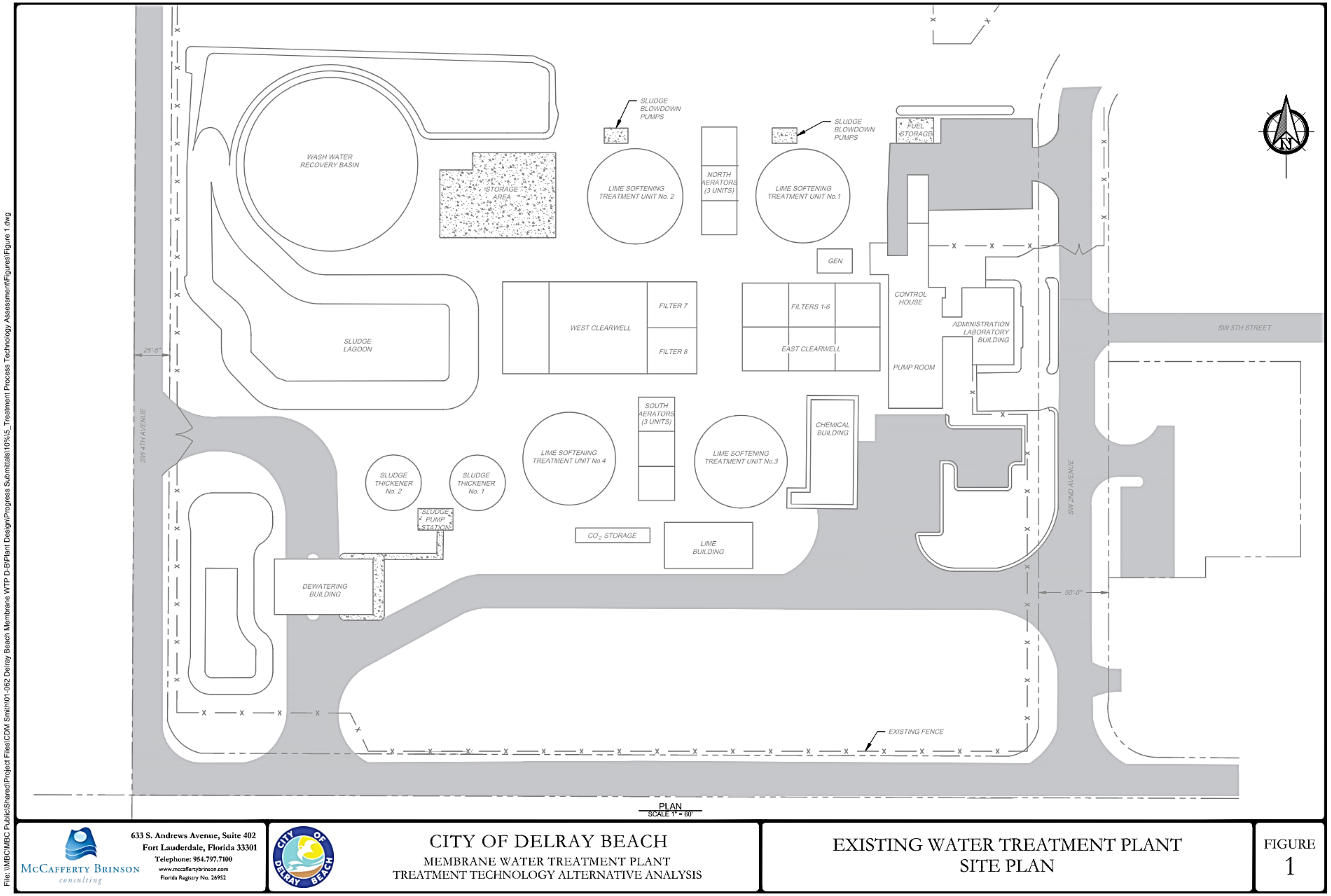

Figure 3.1 Existing Water Treatment Plant Site Plan

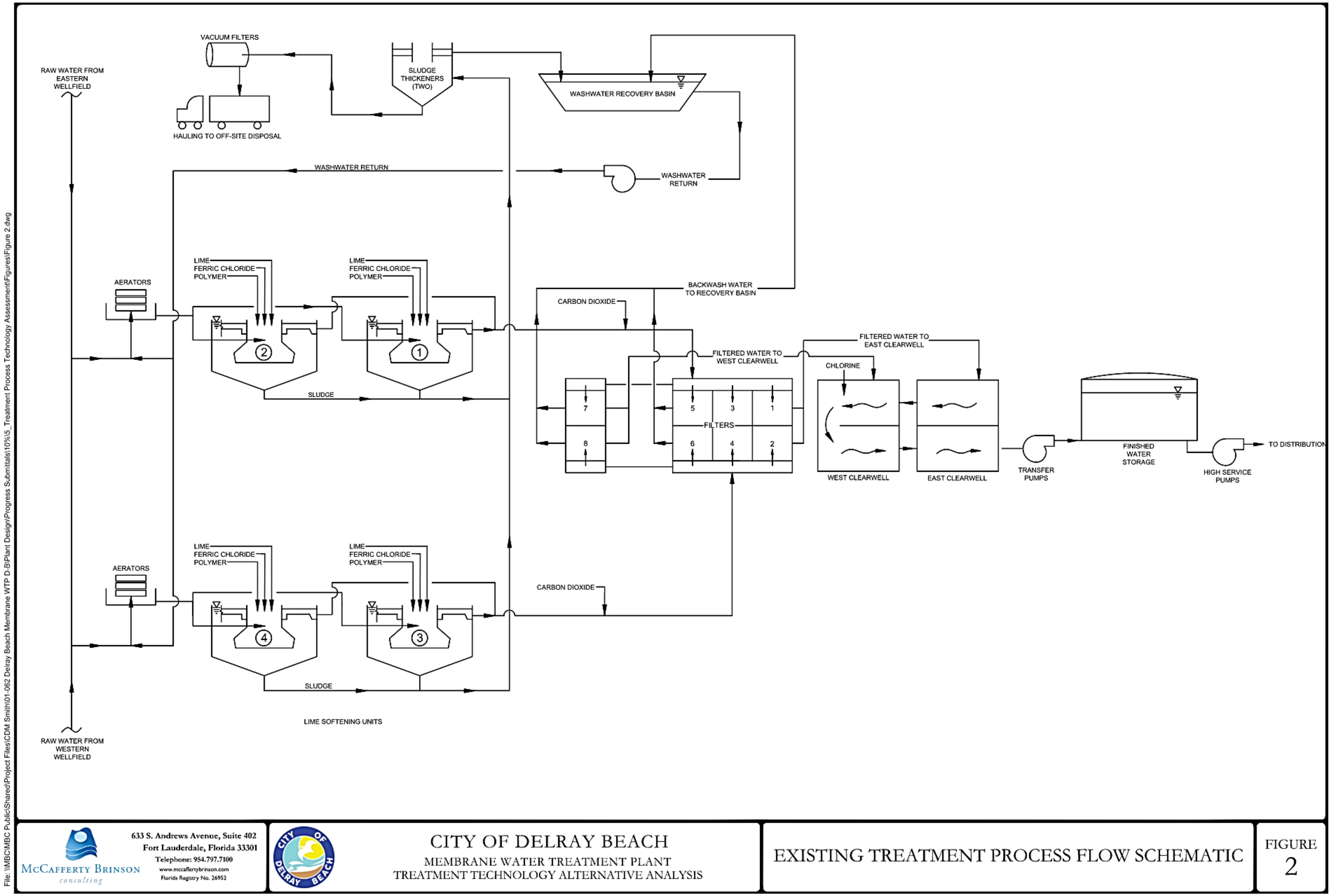

Figure 3.2 Existing Water Treatment Plant Process Flow Schematic

Table 3.3 shows the finished water demand projections that were provided as part of the basis of development of the project concept[6]:

Table 3.3 Projected Water Demands

Year	Average Day Demand (MGD)	Maximum Day Demand (MGD)
2030	16.05	21.67
2040	17.05	23.02
2050	17.83	24.06
2060	18.55	25.04

3.1.1.3 Treatment Chemical Usage and Sludge Generation

Table 3.4 summarizes the treatment chemical dosage rates, lime sludge production, and sludge disposal data for the 12-month period from December 2022 through November 2023.

Table 3.4 Summary of Lime Softening Chemical Dosage Rates 12/2022 through 11/2023

Month	Lime (mg/L)	Ferric Chloride (mg/L)	Chlorine (mg/L)	Fluoride (mg/L)	Phosphate (mg/L)	Carbon Dioxide (mg/L)	Polymer (mg/L)	Ammonia (mg/L)
Dec-22	137	10	10.4	0.45	2.1	34	0.13	1.38
Jan-23	99	9	11.2	0.48	1.6	31	0.13	0.67
Feb-23	92	8	9.6	0.48	2.0	28	0.13	1.28
Mar-23	105	8	9.7	0.44	2.2	33	0.12	1.29
Apr-23	127	8	10.7	0.48	2.2	36	0.13	1.43
May-23	129	7	10.3	0.51	2.5	30	0.12	1.38
Jun-23	129	7	10.6	0.51	2.6	37	0.14	1.42
Jul-23	131	10	12.4	0.56	3.1	40	0.14	0.78
Aug-23	129	8	9.6	0.49	3.0	38	0.14	1.27
Sep-23	129	8	8.4	0.45	3.2	32	0.14	1.12
Oct-23	144	8	8.5	0.46	2.4	26	0.13	1.13
Nov-23	164	9	8.1	0.66	2.8	22	0.13	1.08
Min	92	7	8.1	0.44	1.6	22	0.12	0.67
Max	164	10	12.4	0.66	3.2	40	0.14	1.43
Avg	126	8	10.0	0.50	2.5	32	0.13	1.19

- Dry sludge hauled: 21,956 cubic yards (CY), dry sludge disposal cost: $17.50/CY
- Wet sludge hauled: 11,375 CY, wet sludge disposal cost: $24.90/CY
- Total finished water produced: 5,443.636 million gallons (MG).

[6] Table 4-3, *Proposed Membrane Water Treatment Plant Concept Validation* (May 2023, Hazen and Sawyer).

This data is utilized in the estimates of operating costs for alternative evaluation in section 3.3.

3.1.1.4 PFAS-Treatment Performance

In general, conventional lime softening (without specialized treatment upgrades) does not provide significant removal of PFAS constituents, and this is true of the existing treatment process at Delray Beach. **Figure 3.3** summarizes the available historical PFAS data in the City's raw water supply, and **Table 3.5** summarizes the available historical PFAS data in the treated lime softened finished water. Because the raw water samples are of individual wells and not the composite feedwater to the plant, and the raw and point-of-entry (POE) samples were not collected at the same time, the data in Figure 3.3 and Table 3.5 are not specifically comparable to directly indicate the removal efficiency of the lime softening process. However, it is evident from a general comparison of the average raw water PFAS levels to the average treated water POE PFAS levels that the lime softening process does not provide significant removal of PFAS. This is consistent with observations of similar lime softening treatment processes at other South Florida utilities.

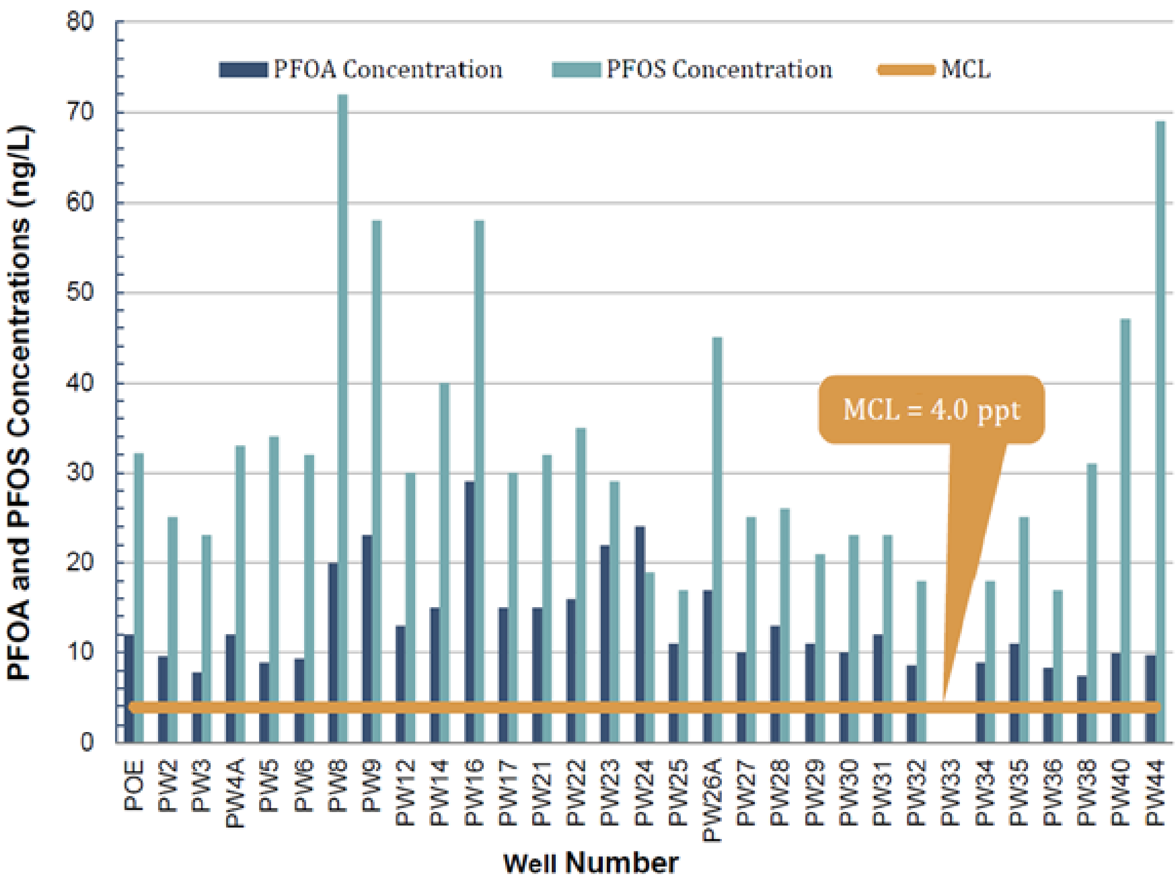

Figure 3.3 PFOA and PFOS Concentrations per Well as of 2021[2]

Table 3.5 Point of Entry (POE) to the Distribution System PFAS Testing Results

Date	PFOA (ppt)	PFOS (ppt)	Total (ppt)
December 13, 2022	11.0	28.0	39.0
June 13, 2022	14.0	38.0	52.0
March 10, 2022	14.0	40.0	54.0
December 7, 2022	11.0	35.0	46.0
September 2, 2021	10.0	27.0	37.0
June 9, 2021	13.0	32.0	45.0
March 11, 2021	10.0	21.0	31.0
March 11, 2021	13.0	28.0	41.0
December 4, 2020	13.0	26.0	39.0
October 29, 2020	0.0	0.4	0.4
August 11, 2020	16.0	33.0	49.0
Overall Average POE:	**11.4**	**28.0**	**39.4**

Note: Point-of Entry PFAS Data from the Request for Inclusion on the Drinking Water Priority List submitted to the Florida Department of Environmental Protection by the City date May 19, 2023.ppt = parts per trillion

It is also important to note that PFAS levels vary substantially from well to well, meaning that well selection on any given day could cause substantial variations in the raw water PFAS concentrations. For both PFOA and PFOS, concentrations vary nearly 4-fold, from the minimum well (PFOA 7.4 ppt, PFOS 17 ppt) to the maximum well (PFOA 29 ppt, PFOS 72 ppt). This translated to a nearly 2-fold variation in POE values varying from 10 ppt to 16 ppt for PFOA and 21 ppt to 40 ppt for PFOS, excluding near-zero outliers.

3.2 Raw Water Supply Considerations

The basis of the buildout capacity for the membrane process (25 MGD installed, or 22 MGD with one redundant membrane unit) was to maximize the existing Surficial Aquifer raw water supply allocations in the City's existing Water Use Permit (WUP) with the South Florida Water Management District (SFWMD) (Permit No. 50-00177-W, expiration date December 20, 2030). The current raw water supply allocations are as follows:

- Annual allocation shall not exceed 6,972 MG (19.10 MGD)
- Maximum monthly allocation shall not exceed 654 MG

The current allocations are projected to be sufficient to support the above plant design capacity (maximum day demand basis). The 22 MGD total treatment capacity (with redundant membrane unit) is projected to meet the City's MDD through approximately the year 2030.[7]

[7] Section 7.4, *Proposed Membrane Water Treatment Plant Concept Validation* (May 2023, Hazen and Sawyer).

3.3 PFAS Treatment Technology Alternatives

The following are the primary considerations when evaluating technical alternatives to upgrade the Delray Beach WTP to meet future PFAS MCLs:

- The total design capacity for the WTP upgrades in this study is 25 MGD (on a MDD basis).
- The 2022 Study Update included a planning-level evaluation (prior to USEPA issuance of the proposed PFAS MCLs in March 2023) of available options for upgrading the existing water treatment plant for PFAS compliance and recommended an initial phase consisting of implementation of a 14 MGD NF process to be blended with the lime softened water, with a subsequent (ultimate) phase consisting of the complete replacement of the existing lime softening treatment process with an NF process expansion. The 2022 Study Update did not include a cost-based evaluation of available treatment technologies. However, Kimley-Horn's findings and recommendations were generally consistent with those of other recent PFAS-compliance alternative evaluations at similar South Florida lime softening facilities.
- While GAC is recognized by the USEPA as one of the BATs for PFAS removal, the high TOC levels in the Surficial Aquifer raw water have proven to render GAC alternatives generally cost-prohibitive for this application. Recent pilot testing conducted at Pompano Beach showed PFOS breakthrough in less than two weeks operation, presumably due to TOC loading and/or fouling of the media by iron and/or calcium carbonate precipitate. Due to high likelihood of TOC loading resulting in excessive GAC media replacement frequencies, coupled with uncertainty regarding disposal of spent GAC, GAC alternatives were eliminated from consideration.
- As a point of comparison to confirm the Kimley-Horn recommendation for the full replacement of the lime softening process with a 25 MGD NF process, a full PFAS-treatment upgrade of the existing lime softening process with a different treatment technology should be considered. An alternative to the 25 MGD NF process replacement would be the addition of a 25 MGD AIX step to the existing lime softening process. It is recommended that this alternative be evaluated.
- Considering the relatively high initial capital cost of a complete replacement of the lime softening process, a potentially lower capital cost option for achieving PFAS compliance in the interim until the full replacement of the lime softening process was to be considered. Based on jar testing conducted by CDM Smith in August 2023; the addition of a powdered activated carbon (PAC) feed system to the existing lime softening process may be the lowest capital cost approach to upgrading the lime softening process. It is recommended that this alternative be evaluated on both a capital and operation and maintenance (O&M) cost basis.

Based on the above considerations, the **three treatment technology alternatives** evaluated herein for the City's project are as follows:

1. **Alternative 1: Upgrade the two existing lime softening process trains with a 25 MGD AIX process step.** The AIX process could be installed upstream of the lime softening process or downstream of the gravity filters, prior to disinfection. The AIX must treat the entire lime softened flow prior to disinfection and distribution. In addition, a full facility upgrade is

necessary for aging infrastructure to be replaced and newly installed for reliable operation in the future.

2. **Alternative 2: Construct a 14 MGD NF membrane treatment plant and upgrade one of the two existing lime softening process trains with an 11 MGD PAC feed system.** The PAC could be injected into the lime softening flow stream in the existing lime softening units to adsorb the PFAS constituents during the residence time in those units, and the spent PAC would be removed with the settled lime sludge and with the downstream filtration step.

3. **Alternative 3: Construct a 25 MGD NF membrane treatment plant and decommission the existing lime softening process equipment (everything up to and including the gravity filters).** The membrane permeate could be routed to the existing clearwells for disinfection and chemical post-treatment, and the existing transfer pumping, storage, and high service pumping systems would be retained and remain in service.

The following sections present the development and evaluation of the three alternatives listed above. In general, the basis for development of the conceptual designs discussed herein is to provide compliance with the PFAS MCLs utilizing each considered treatment technology in the most cost-effective configuration feasible given the current levels of PFAS constituents in the raw water and the existing treatment plant configuration, without compromising compliance with any other water quality regulations or City finished water quality goals. With respect to PFAS constituents, the recommended treated water quality goals are set to less than 80% of the Federal MCLs:

- PFOA: < 3.2 ppt
- PFOS: < 3.2 ppt
- PFHxS: < 8 ppt
- PFNA: < 8 ppt
- HFPO-DA: < 8 ppt
- PFNA, PFHxS, PFBS, HFPO-DA: < 0.8 Hazard Index.

Class 5 cost estimates, as defined by the Association for the Advancement of Cost Engineering (AACE) cost estimate classification system, are presented for each alternative. This is a “study-level or concept screening” estimate with expected accuracy range of +50% or -30%. Class 5 estimates were developed without detailed engineering data (e.g., drawings and technical specifications) using construction estimates based on similar projects completed within the last ten years in the South Florida public utility construction market or using factored or parametric models and pricing cost curves where such information was not available.

The following general assumptions are included in the development of the project estimates for each alternative as a percentage of the base construction cost:

- Bonds, insurance, construction permits - 5%.
- General conditions (include the contractor’s mobilization, demobilization, construction trailer(s), temporary facilities) – 10%

- Contractor Overhead and Profit – 10%
- Construction Contingency for unforeseen potential increases in construction cost – 30%
- Design-phase engineering services (traditional level of surveying, geotechnical engineering, preliminary and final design engineering services, and bidding services) – 9%
- Construction-phase engineering services (contract administration, limited representative project representative (RPR) services, shop drawing reviews)– 6%
- Owner administration and legal for project administration and permitting – 5%
- Escalation to midpoint of construction year 2026 – 5% per year.

Operating costs (primarily power and chemicals) are estimated based on recent unit costs provided by the City and/or obtained from other similar South Florida drinking water utilities ($/kW-hour for power and $/pound for chemicals) and estimated usage based on annual average day demand (AADD) flows as indicated in the respective cost tables. For the purpose of estimating variable (demand-based) operating costs such as treatment chemicals and power, we have assumed a total AADD of 16.0 MGD. Annual maintenance costs for each alternative are estimated at 2% of the capital construction cost.

3.3.1 Alternative 1: 25 MGD AIX-Upgraded Lime Softening Process

3.3.1.1 Conceptual Design

The AIX process removes PFAS by exchanging ionic groups on the virgin resin with the individual PFAS constituents, which are captured on the resin during this exchange. Under Alternative 1, the entire existing lime softening process flow stream would receive an additional treatment step for PFAS-removal through an AIX system. The AIX system would consist of multiple cylindrical steel pressure vessels containing the AIX resin. Because there is a pressure loss through the resin beds, the system will require a set of feed pumps.

Conceptually, the AIX process could be located either upstream of the lime softening process or downstream of the gravity filters. Since the AIX resin also removes dissolved organic carbon compounds, high levels of organics in the AIX feedwater will reduce the resin life and increase the required resin replacement frequency and associated costs. Installation of the AIX system downstream of the filters would result in lower organic loading rates. However, any location downstream of the lime softening process presents a potential risk of cementing of the resin bed from the calcium carbonate precipitation reaction which may continue downstream of the lime softening units. Severe fouling of the AIX resin from calcium carbonate scale has been observed in recent pilot testing at other South Florida utilities.

Locating the AIX system upstream of the lime softening process would eliminate the risk of cementing of the resin beds and remove PFAS from the lime sludge which avoids future complications for lime sludge disposal. However, this would result in higher organic loading of the AIX media. Because there is also a risk of fouling of the media beds by oxidized iron, the AIX system should be located upstream of the aerators. If the City were to proceed with further design development of an AIX treatment system, it is strongly recommended that pilot testing be conducted to identify the best location in the process for the AIX treatment step. However, for the purpose of this cost comparison, it is not necessary to definitively determine the location of the AIX system in the treatment process flow scheme. Due to the configuration of the raw water piping on site, two separate 12.5 MGD AIX systems will be required, one for each of the two parallel lime softening trains.[8]

As noted above, the relatively high levels of dissolved organics that are typical of the South Florida Surficial Aquifer raw water have the potential to prematurely load the AIX resin that is intended to remove PFAS constituents, resulting in the need for frequent resin replacement and high operating costs. Delray Beach's groundwater has a color of approximately 35 color units, which may correspond to a TOC of about 8 mg/L, based on TOC/color relationships at other South Florida groundwater treatment plants. For this reason, AIX system manufacturers have typically recommended a organics-removal pretreatment AIX system using a resin that may be regenerated, followed by the PFAS-removal step, which utilizes a resin that cannot be regenerated and must be properly disposed of. This substantially extends the life of the PFAS-removal resin. The conceptual design for Alternative 1 includes a pretreatment step consisting of seven AIX vessels for the removal of organics, followed by the PFAS removal step consisting of seven vessel pairs.

Figure 3.4 presents a treatment process flow schematic of the plant showing the addition of the AIX systems upstream of the aerators (one 12.5 MGD system for each existing lime softening process train). In this conceptual design, AIX would be the first step in the treatment process, and the treated water would then flow to the aerators and through the remainder of the existing lime softening process. Under this alternative, it would be necessary to undertake a comprehensive rehabilitation of the entire existing lime softening treatment process to provide a minimum 20-year service life (comparable to a new facility).

3.3.1.2 Design Criteria

Error! Reference source not found. summarizes the major design criteria and major process equipment for the AIX system. The primary design parameter is the empty bed contact time (EBCT). The proposed EBCT for this application is approximately 3 minutes. This results in two parallel AIX systems, each consisting of twenty-one 12-foot diameter by 15-foot tall vertical steel AIX vessels.

Table 3.6 Summary of AIX Process Design Parameters and Major Equipment

Design Parameter	Value
Total design flow:	25.0 MGD = 17,361 gpm
Design flow per train (North and South lime softening trains):	12.5 MGD = 8,681 gpm
Target Empty Bed Contact Time (EBCT) per vessel:	2 to 3 minutes
Number of pretreatment vessels per train:	7 each
Number of primary vessel pairs per train:	7 each
Total number of vessels per train:	21 each
Vessel diameter:	12 feet

[8] Some manufacturers have expressed concern that the backwash water may contain elevated levels of PFAS which may require additional treatment. If the City elected to pursue an AIX treatment system similar to that considered herein, this concern should be evaluated thoroughly during final design through pilot testing.

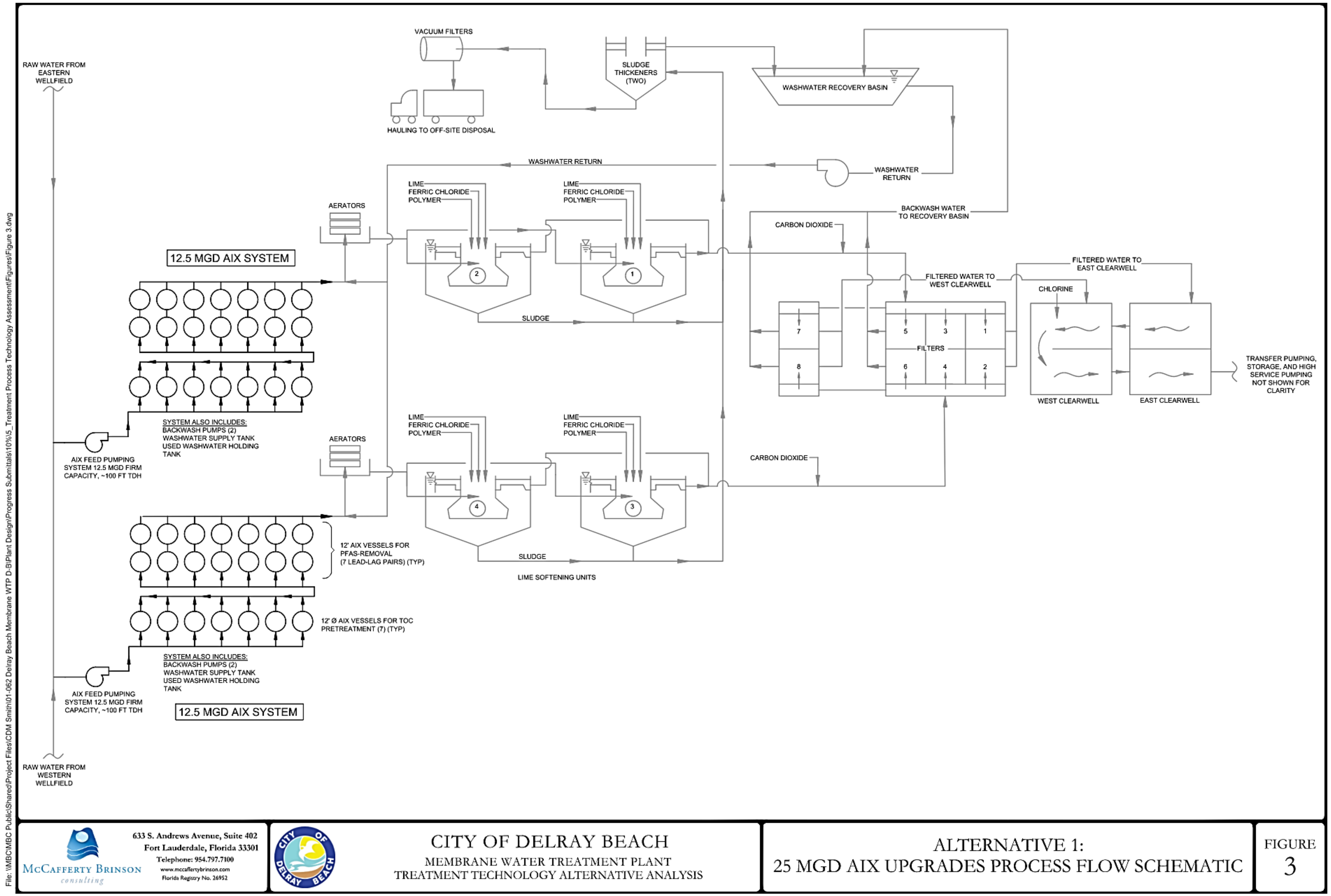

Figure 3.4 Alternative 1: 25 MGD AIX Upgrades Process Flow Schematic

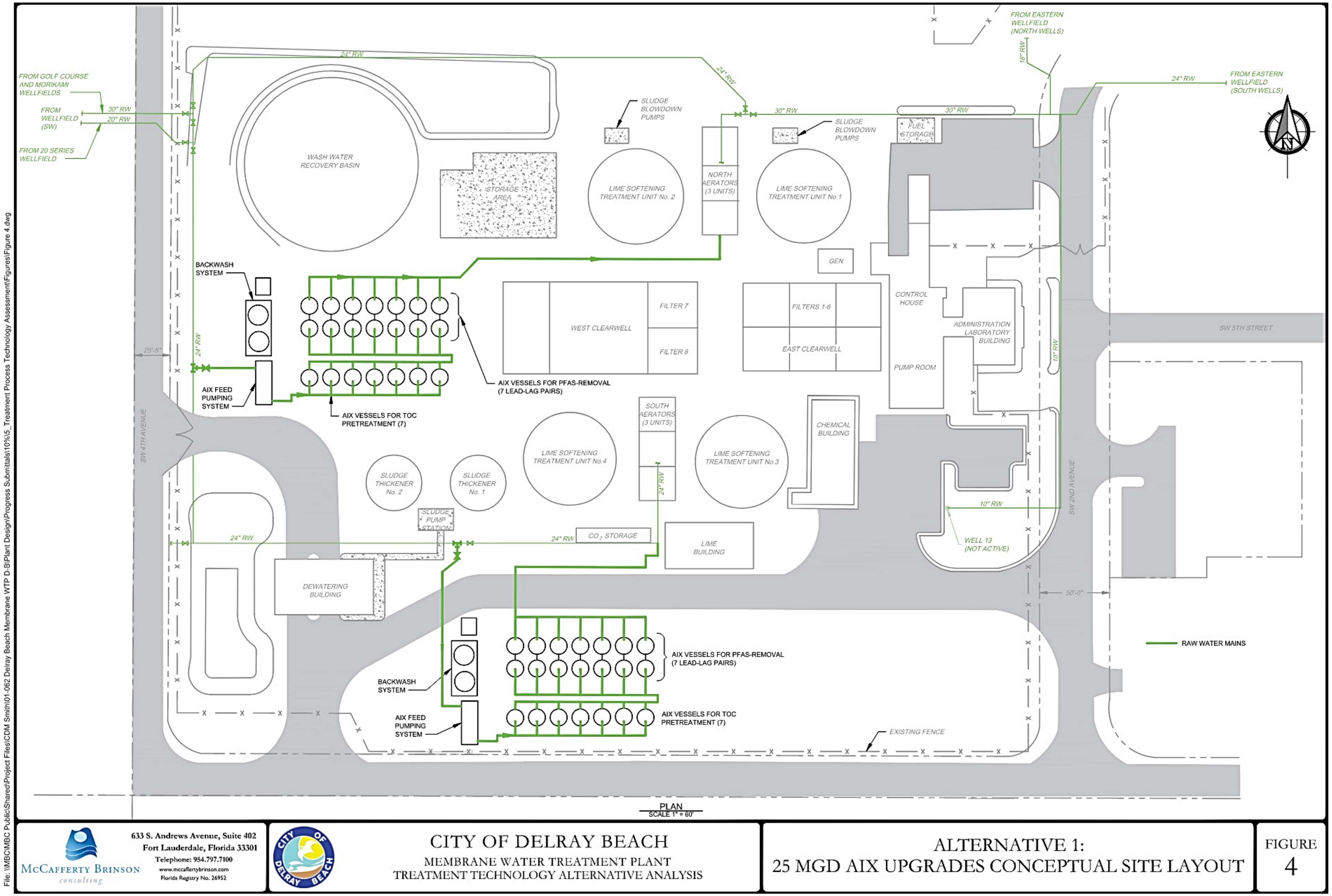

Figure 3.5 Alternative 1: 25 MGD AIX Conceptual Site Layout

3.3.1.3 Implementation and Operating Requirements

Figure 3.5 depicts a conceptual site layout for the AIX upgrades. In general, the system would be integrated into the existing treatment process by connecting the existing raw water mains that currently feed the aerator systems to the suction of the AIX feed pumping system that would boost water pressure to flow through the AIX vessels and then up to the elevation of the existing cascade aerators. AIX resin for PFAS applications cannot be regenerated and must be disposed of when it is exhausted. Resin-replacement costs typically make up the majority of the ongoing operating cost for PFAS-removal AIX systems.

3.3.1.4 Preliminary Opinions of Cost

Table 3.7 presents our preliminary opinion of project cost for the addition of a 25 MGD AIX system to the City's existing lime softening treatment process. It should be noted that, because the NF components of Alternative 2 (14 MGD NF) and Alternative 3 (25 MGD NF) will be new facilities with an expected service life of at least 20 years, an equitable cost comparison of the alternatives that include AIX or PAC upgrades to the existing lime softening treatment process must include costs for rehabilitation of the existing lime softening process equipment such that the lime softening process will also have a 20-year service life. This is reflected in Table 3.7.

Table 3.8 summarizes our preliminary opinion of operating cost for the AIX treatment system. Similar to the project capital costs discussed above, an equitable cost comparison of the AIX-upgraded lime softening process to the NF process (which performs the function of the lime softening process in addition to removing PFAS) must include the operating costs of the retained lime softening process components. Note that no costs are included for the treatment and pumping components downstream of the gravity filters (e.g., chemical post-treatment, transfer pumping, storage, and high service pumping) because those components are the same for all alternatives and therefore do not affect the cost comparison. Also, operating costs do not include labor as this alternative would not require a net change of operations or maintenance staffing levels.

Table 3.7 Alternative 1: 25 MGD AIX Upgrades Preliminary Opinion of Project Costs

Cost Item	Total
Ion Exchange System	$57,136,000
Construction Contingency (30%)	$17,141,000
OPCC Ion Exchange System	**$74,277,000**
25 MGD Lime Softening Upgrade	$84,423,000
Construction Contingency (30%)	$25,327,000
OPCC Lime Softening Upgrade	**$109,750,000**
Subtotal Alternative 1 OPCC	**$184,027,000**
Engineering and Design (9%)	$16,563,000
Engineering Services During Construction (6%)	$11,042,000
Legal/Administration (5%)	$7,428,000
Alternative 1 OPPC	$219,060,000
Class 5 OPPC (Escalated to 2026-midpoint construction)	***$240,966,000***
Class 5, -30%	$168,676,000
Class 5, +50%	$361,449,000

Table 3.8 Alternative 1: 25 MGD AIX Upgrades Preliminary Opinion of Probable Operating Costs

Operating Parameter / Cost Component	Unit		Value	
Average Daily Flow (ADF)				
Plant ADF	MGD			16.00
AIX/LS process ADF	MGD			16.00
Power Costs	**Rated Power**		**% of Time Operating**	**Annual kW-hr**
	HP	**kW**		
AIX feed system (11,111 gpm, 55 psi)[1]	490	366.0	100%	3,202,374
Lime slurry pumps (4 x 7.5 HP)	30	22.4	100%	195,970
Lime softening unit drive (4 x 30 HP)	120	89.5	100%	783,880
Sludge blow-down pumps (4 x 7.5 HP)	30	22.4	100%	195,970
Filter backwash pump (1 x 250 HP)	250	186.4	30%	489,925
Gravity sludge thickener drive (2 x 6.5 HP)	13	9.7	100%	84,920
Thickened sludge pumps (2 x 7.5 HP)	15	11.2	100%	97,985
Sludge vacuum filter drive (2 x 2 HP)	4	3.0	100%	26,129
Washwater return pump (1 x 60 HP)	60	44.7	10%	39,194
Total Annual kilowatt-hours	**kWh**			**5,116,347**
Total Annual Power Cost[2]	$			579,700

Operating Parameter / Cost Component	Unit	Value
Consumable Costs[2]		
AIX Media Replacement Cost	$	5,544,000
Lime Softening Process Chemical and Sludge Disposal Costs	-	
Lime	$	618,375
Ferric Chloride	$	250,334
Polymer	$	42,197
Carbon Dioxide	$	43,318
Lime Sludge Disposal	$	716,067
Total Annual Consumable Costs	$	7,214,300
Total Annual Maintenance Costs[3]	$	6,973,000
Total Annual O&M Costs	**$**	**14,767,000**

Notes:

1. Power Consumption calculated assuming a pump efficiency of 80% and a motor efficiency of 91%.
2. Unit costs and average dosing/production rates:

Power:	$0.1133	per kilowatt-hour		
Lime (quicklime):	$446.95	per ton, dosage =	126.3	mg/L
Ferric chloride:	$3.20	per gallon, dosage =	8.4	mg/L
Polymer:	$6.58	per pound, dosage =	0.13	mg/L
Carbon dioxide:	$0.23	per pound, usage =	32.3	pounds/MG
Lime sludge disposal:	$122.61	per MG finished water		
TOC AIX resin replacement[5]:	$450.00	per cubic foot resin, average resin life:	12	months
PFAS AIX resin replacement[5]:	$450.00	per cubic foot resin, average resin life:	24	months

3. Annual maintenance and repair costs are estimated at 2% of their initial capital construction cost for the AIX system and 5% of the rehabilitation cost for the lime softening process equipment.
4. This cost analysis does not include treatment or pumping components located downstream of the gravity filters (e.g. post-treatment chemicals, transfer pumping, etc.) because those components are common to all alternatives and do not affect the cost comparison.
5. AIX media replacement cost and frequency based on previous experience at similar facilities.

3.3.2 Alternative 2: 14 MGD NF Process and 11 MGD PAC-Upgraded Lime Softening Process

3.3.2.1 Conceptual Design

Alternative 2 consists of construction of a 14 MGD NF membrane system and the addition of a PAC feed system for the existing north lime softening train (11 MGD). The PAC system will provide removal of PFAS constituents by adsorption to the PAC particles, and ultimate removal from the process in the lime sludge residual stream. The products from the two process streams will be blended in the existing clearwells.

The conceptual design of the NF system includes a raw water booster pump station, sand strainers and 5-micron cartridge filters, as well as sulfuric acid and antiscalant chemical pretreatment to control membrane fouling and carbonate scaling, upstream of the NF membrane units. The NF system would also include a membrane cleaning system and an automatic permeate flush system to manage long-term fouling of the membranes. The permeate from the NF system would be routed to three 12-foot diameter forced draft-type degasifiers, and the degasified permeate would flow by gravity to the existing clearwell system to be blended with the PAC-treated lime softened water. Concentrate disposal will be in a deep injection well (DIW).

The PAC system would consist of a PAC storage vessel (silo), a slurry make-up system, and a PAC slurry feed system to feed the PAC slurry to the mixing zones of the lime softening units.

Figure 3.6 presents a treatment process flow schematic of the plant showing the addition of the NF and PAC systems to the existing treatment process. In this conceptual design, the south lime softening treatment train would be decommissioned and demolished, while the washwater recycle and sludge handling and disposal systems would be rehabilitated and retained to support the rehabilitated north lime softening treatment train.

3.3.2.2 Design Criteria

Error! Reference source not found. summarizes the major design parameters and major equipment for the NF system. The NF system would include five two-stage NF units, each with a permeate capacity of 2.80 MGD operating at a recovery rate of 85%.

Table 3.9 Summary of 14 MGD NF Process Design Parameters and Major Equipment

Design Parameter	Value
Overall treatment process	
Total plant permeate capacity	14.0 MGD = 9,722 gpm
Design annual average day demand (AADD)	12.1 MGD = 8,402 gpm
Process recovery rate	85%
Raw water booster pump station	
Number of pumps	3
Capacity per pump	8.2 MGD = 5,719 gpm
Sand strainer system	
Number of units	2
Flow per unit (maximum)	16.5 MGD = 11,438 gpm
Cartridge filter system	
Number of units	4
Flow per unit (maximum)	5.5 MGD = 3,813 gpm
NF Units	
Number of units	5
Permeate capacity per unit	2.80 MGD = 1,944 gpm
Feed flow per unit	3.29 MGD = 2,288 gpm
Concentrate flow per unit	0.49 MGD = 343 gpm
Membrane feed pumps	
Number	5
Capacity per pump	3.29 MGD = 2,288 gpm
Degasifiers	
Number	3
Capacity per unit	4.7 MGD = 3,241 gpm
Diameter	12 feet

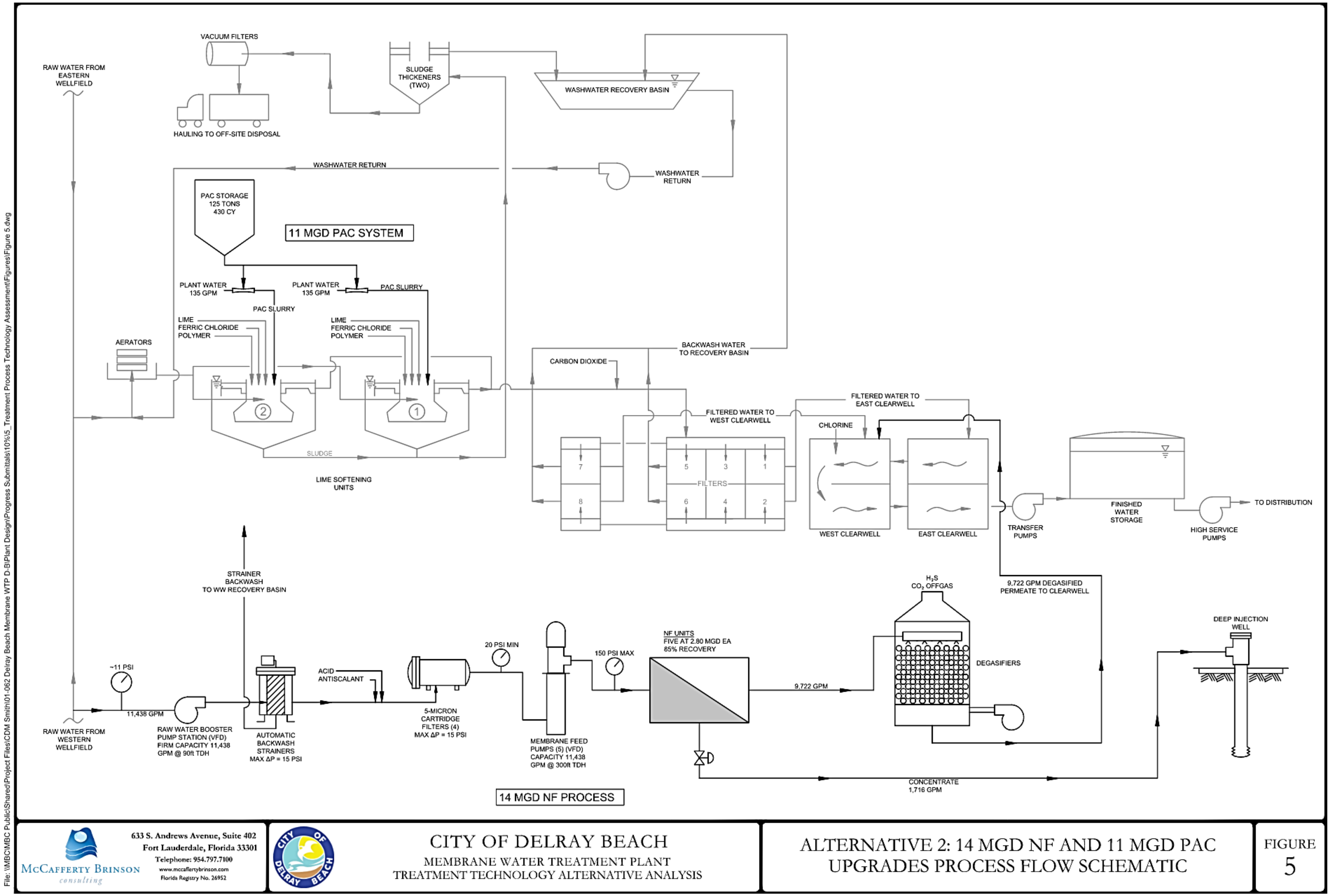

Figure 3.6 Alternative 2: 14 MGD NF and 11 MGD PAC Upgrades Process Flow Schematic

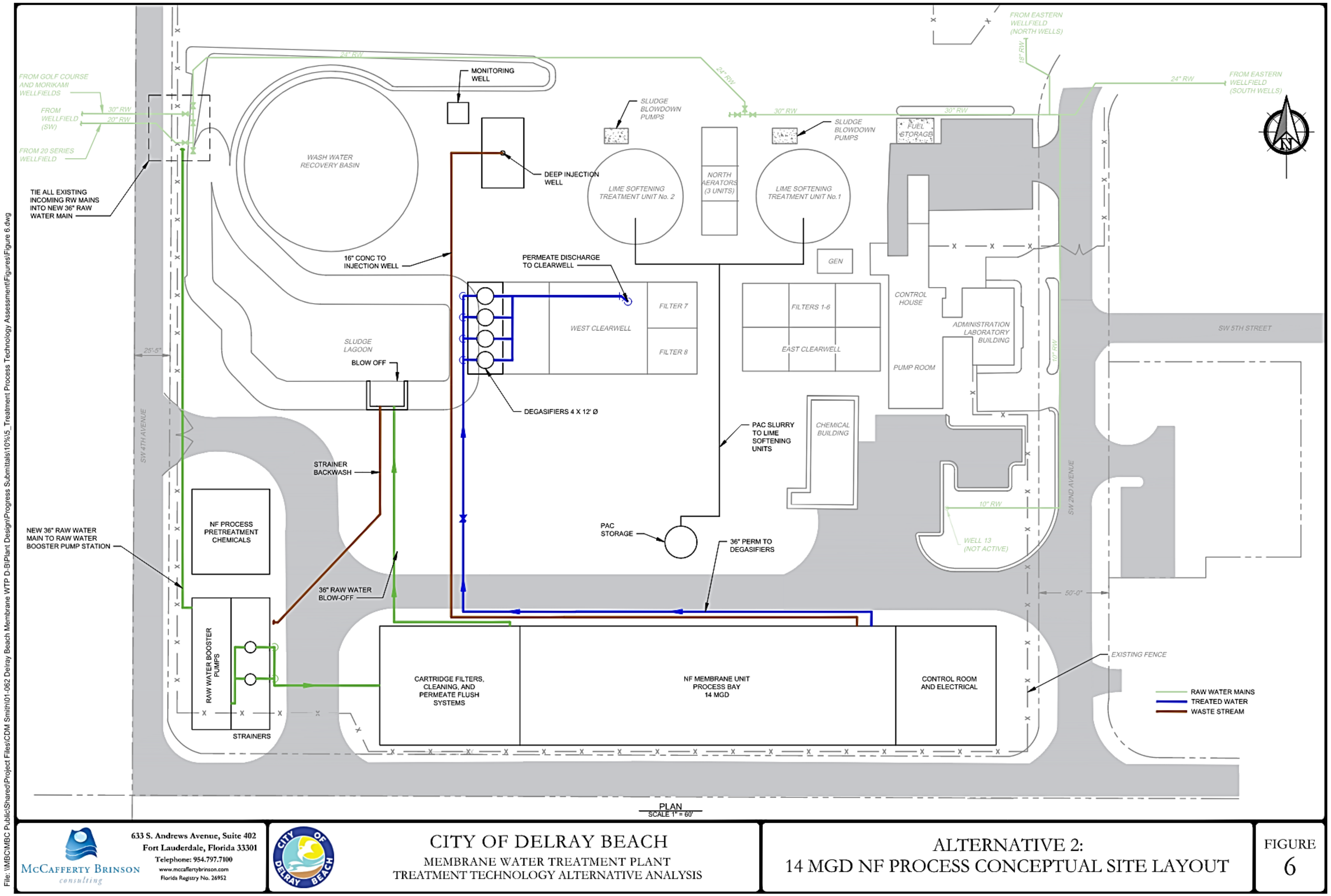

Figure 3.7 Alternative 2: 14 MGD NF Process Conceptual Site Layout

Table 3.10 summarizes the major design parameters and equipment for the PAC system. For the conceptual design of the PAC system, based on previous jar testing conducted by CDM Smith, a PAC dosing rate of 100 ppm is assumed.

Table 3.10 Summary of 11 MGD PAC Upgrades Process Design Parameters and Major Equipment

Design Parameter	Value
Process design flow (maximum day basis):	11.0 MGD = 7,639 gpm
Design annual average day demand (AADD)	9.5 MGD = 6,585 gpm
Process design flow per lime softening unit	5.5 MGD = 3,819 gpm
Design PAC dosing rate	100 ppm

3.3.2.3 Implementation and Operating Requirements

Figure 3.7 depicts a conceptual site plan for the NF and PAC upgrades. The NF system would be integrated into the existing treatment process by connecting to the existing raw water mains from the western wellfields. The NF process raw water booster pump station would boost the NF process feed pressure to a minimum of approximately 40 to 50 psi to overcome the fouled-condition pressure losses through the downstream sand strainers and cartridge filters and maintain a positive pressure on the suction side of the membrane feed pumps. The sand strainer will be automatic backwash-type with the backwash water routed to the existing washwater recovery basin. The cartridge filter system will utilize 40-inch string-wound or melt-blown polypropylene filter elements which will require periodic replacement (every four to six months). The NF process will have a clean-in-place (CIP) system to allow the operators to chemically clean the membrane elements periodically (typically every 4 to 6 months, with increasing frequency as the membranes age). It is also recommended to include a permeate flush system to automatically flush the NF units with clean permeate each time a unit is shut down. The membrane elements will need to be replaced periodically (typically every 8 to 10 years depending on the fouling characteristics of the raw water).

As noted above, PAC will be fed to the lime softening process with a slurry feed system. It appears that the most convenient location for the PAC feed will be directly into the mixing zone of each lime softening reactor-clarifier (total of two).

3.3.2.4 Preliminary Opinions of Cost

Table 3.11 presents our preliminary opinion of project cost for construction of a 14 MGD NF process and the addition of an 11 MGD PAC system to the north train of the City's existing lime softening treatment process. Similar to Alternative 1, the project cost includes costs for rehabilitation of the retained existing (north) lime softening process train, as well as the washwater recycle and sludge handling and disposal systems such that the lime softening process will also have a 20-year service life.

Table 3.11 Alternative 2: 14 MGD NF and 11 MGD PAC Upgrades Preliminary Opinion of Project Costs

Cost Item	Total
Powdered Activated Carbon (PAC) System	$1,905,000
Construction Contingency (30%)	$572,000
OPCC PAC System	**$2,477,000**
11 MGD Lime Softening Upgrade	$41,321,000
Construction Contingency (30%)	$12,397,000
OPCC Lime Softening Upgrade	**$53,718,000**
14 MGD Nanofiltration (NF) Facility	$93,678,000
Construction Contingency (30%)	$28,104,000
OPCC 14 MGD NF	**$121,782,000**
Deep Injection Well	$18,000,000
Construction Contingency (10%)	$1,800,000
OPCC Deep Well Injection	**$19,800,000**
Subtotal Alternative 2 OPCC	**$197,777,000**
Engineering and Design (9%)	$17,009,000
Engineering Services During Construction (6%)	$11,274,000
Legal/Administration (5%)	$9,098,000
Alternative 2 OPPC	$235,158,000
Class 5 OPPC (Escalated to 2026-midpoint construction)	***$258,674,000***
Class 5, -30%	$181,072,000
Class 5, +50%	$388,011,000

Table 3.12, Table 3.13, and **Table 3.14** summarize our preliminary opinion of operating cost for the NF and PAC treatment systems. Similar to Alternative 1, the operating costs for the retained portion of the lime softening process components are included. No costs are included for treatment or pumping components downstream of the gravity filters because those components are the same for all alternatives and therefore do not affect the cost comparison. It is assumed that the addition of the second treatment process train (NF) will require the addition of three operators. Because the lime sludge will contain PFAS-laden spent PAC, sludge disposal costs are estimated at $720/ton (incineration).

Table 3.12 Alternative 2: 14 MGD NF Upgrades Preliminary Opinion of Probable Operating Costs

Operating Parameter / Cost Component	Unit		Value	
Average Daily Flow (ADF)				
Plant ADF	MGD			16.00
NF process permeate ADF	MGD			8.00
Raw feed water flow	MGD			9.41
Concentrate flow	MGD			1.41
Power Costs	**Rated Power**		**% of Time Operating**	**Annual kWh**
	HP	**kW**		
Raw water booster and membrane feed pumps (6,536 gpm, 100 psi)[1]	524	391.0	100%	3,425,214
Degasifier blowers (2 x 25 HP)[1]	50	37	100%	326,772
Total Annual kilowatt-hours	**kWh**			**3,751,986**
Total Annual Power Cost[4]	$			425,100
Consumable Costs				
Cartridge replacement[2]	$			34,300
Membrane element replacement[3]	$			352,000
Sulfuric acid[4]	$			491,369
Antiscalant[4]	$			87,670
Caustic[4]	$			854,783
Cleaning chemicals[4]	$			22,000
Total Annual Consumable Costs	$			1,842,200
Total Annual Maintenance Costs[5]	$			2,436,000
Total Annual Labor Costs[6]	$			216,000
Total Annual O&M Costs	**$**			**4,920,000**

Notes:

1. Power Consumption calculated assuming a pump efficiency of 80% and a motor efficiency of 91%
2. Cartridge filter element replacement: [(# elements) x ($/element) / 0.333 years) = $34,300
3. Membrane element replacement: [(2,835 elements) x ($993/element) / 8 years] = $352,000
4. Unit costs and average dosing/production rates:

Power:	$0.1133	per kilowatt-hour		
Sulfuric acid:	$290	per ton (93% concentration)	110.00	mg/L
Antiscalant:	$1.53	per pound, dosage =	2.00	mg/L
Caustic:	$1.95	per pound, dosage =	2.00	mg/L
Membrane cleaning materials:	$2,200	per membrane unit cleaning (assume 5 units, 6-month frequency).		

5. Annual maintenance and repair costs are estimated at 2% of the initial capital construction cost.
6. It is assumed that the second treatment process (NF) will require three additional operators at an average annual cost of: $71,999
7. This cost analysis does not include treatment or pumping components located downstream of the degasifiers (e.g. post-treatment chemicals, transfer pumping, etc.) because those components are common to all alternatives and do not affect the cost comparison.

Table 3.13 Alternative 2: 11 MGD PAC-Upgraded Lime Softening Process Preliminary Opinion of Probable Operating Costs

Operating Parameter / Cost Component	Unit		Value	
Average Daily Flow (ADF)				
Plant ADF	MGD			16.00
PAC/LS Process ADF	MGD			8.00
Power Costs	**Rated Power**		**% of Time Operating**	**Annual kW-hr**
	HP	**kW**		
PAC feed system (269 gpm, 140 psi)[1]	30	23.0	100%	197,352
Lime slurry pumps (2 x 7.5 HP)	15	11.2	100%	97,985
Lime softening unit drive (2 x 30 HP)	60	44.7	100%	391,940
Sludge blow-down pumps (2 x 7.5 HP)	11	11.2	100%	97,985
Filter backwash pump (1 x 250 HP)	250	186.4	15%	244,962
Gravity sludge thickener drive (2 x 6.5 HP)	13	9.7	100%	84,920
Thickened sludge pumps (2 x 7.5 HP)	15	11.2	100%	97,985
Sludge vacuum filter drive (2 x 2 HP)	4	3.0	100%	26,129
Washwater return pump (1 x 60 HP)	60	44.7	10%	39,194
Total Annual kilowatt-hours	**kWh**			**1,278,453**
Total Annual Power Cost[2]	$			144,900
Consumable Costs[2]				
PAC consumption cost	$			3,677,273
Lime Softening Process Chemical and Sludge Disposal Costs	-			
Lime	$			309,187
Ferric chloride	$			125,167
Polymer	$			21,098
Carbon dioxide	$			21,659
Lime Sludge disposal	$			11,817,274
Total Annual Consumable Costs	$			15,971,700
Total Annual Maintenance Costs[3]	$			2,735,000
Total Annual O&M Costs	**$**			**18,852,000**

Notes:

1. Power Consumption calculated assuming a pump efficiency of 80% and a motor efficiency of 91%
2. Unit costs and average dosing/production rates:

Power:	$0.1133	per kilowatt-hour		
Lime (quicklime):	$446.95	per ton, dosage =	126.3	mg/L
Ferric chloride:	$3.20	per gallon, dosage =	8.4	mg/L
Polymer:	$6.58	per pound, dosage =	0.13	mg/L
Carbon dioxide:	$0.23	per pound, usage =	32.3	pounds/MG
Lime sludge disposal:	$720.00	per cubic yard (incineration)		
PAC unit cost and dosing rate:	$1.51	per pound, dosage =	100	mg/L

3. Annual maintenance and repair costs are estimated at 2% of their initial capital construction cost for the PAC system and 5% of the rehabilitation cost for the lime softening process equipment.
4. This cost analysis does not include treatment or pumping components located downstream of the gravity filters (e.g. post-treatment chemicals, transfer pumping, etc.) because those components are common to all alternatives and do not affect the cost comparison.

Table 3.14 Alternative 2: Summary of Combined Processes

Cost Component	Value
14 MGD NF process	$4,920,000
11 MGD PAC-upgraded lime softening process	$18,852,000
Total Alternative 2 Operating Cost:	**$23,772,000**

3.3.3 Alternative 3: 25 MGD NF Process and Decommissioning of Lime Softening Process

3.3.3.1 Conceptual Design

Alternative 3 consists of construction of a 25 MGD NF membrane process to completely replace the existing lime softening process.

The conceptual design of the 25 MGD NF process includes the same components as described above for Alternative 2, except the number of units and process capacities will be adjusted for the 25 MGD total plant capacity rating. Because the NF permeate will have substantially lower dissolved hardness, it may be necessary to incorporate a re-mineralization system to maintain a stable, non-corrosive finished water quality. The proposed conceptual design of the 25 MGD NF plant for this evaluation includes a calcite contactor system downstream of the NF process and upstream of the degasifiers. Permeate from the degasifiers will flow by gravity into the existing clearwells.

Figure 3.8 presents a treatment process flow schematic of the plant showing the new 25 MGD NF process integrated into the existing process flow scheme. In this conceptual design, all existing lime softening process equipment up to and including the filters will be demolished, as well as the existing washwater recycling and sludge handling and disposal systems.

3.3.3.2 Design Criteria

Table 3.15 summarizes the major design parameters and process equipment for the 25 MGD NF system. If the City elected to construct the full 25 MGD NF process in a single phase, the recommended NF system design may differ somewhat from the approach of constructing the plant in two phases. The conceptual design proposed herein would include eight two-stage NF units, each with a permeate capacity of 3.13 MGD operating at a recovery rate of 85%.

3.3.3.3 Implementation and Operating Requirements

Figure 3.9 depicts a conceptual site layout for the 25 MGD NF facility. The NF system would be integrated into the existing treatment process in essentially the same manner as described above for the NF system in Alternative 2, and in general the operating requirements will be the same except at a larger scale. One significant difference in process operating requirements between Alternatives 2 and 3 is that, because the product of the treatment process under Alternative 3 is pure NF permeate which is substantially lower in dissolved minerals than lime softened water, it may be necessary to include a remineralization treatment step to maintain stable, non-corrosive finished water quality. For the purpose of this analysis, we have assumed a 25-MGD calcite contactor system.

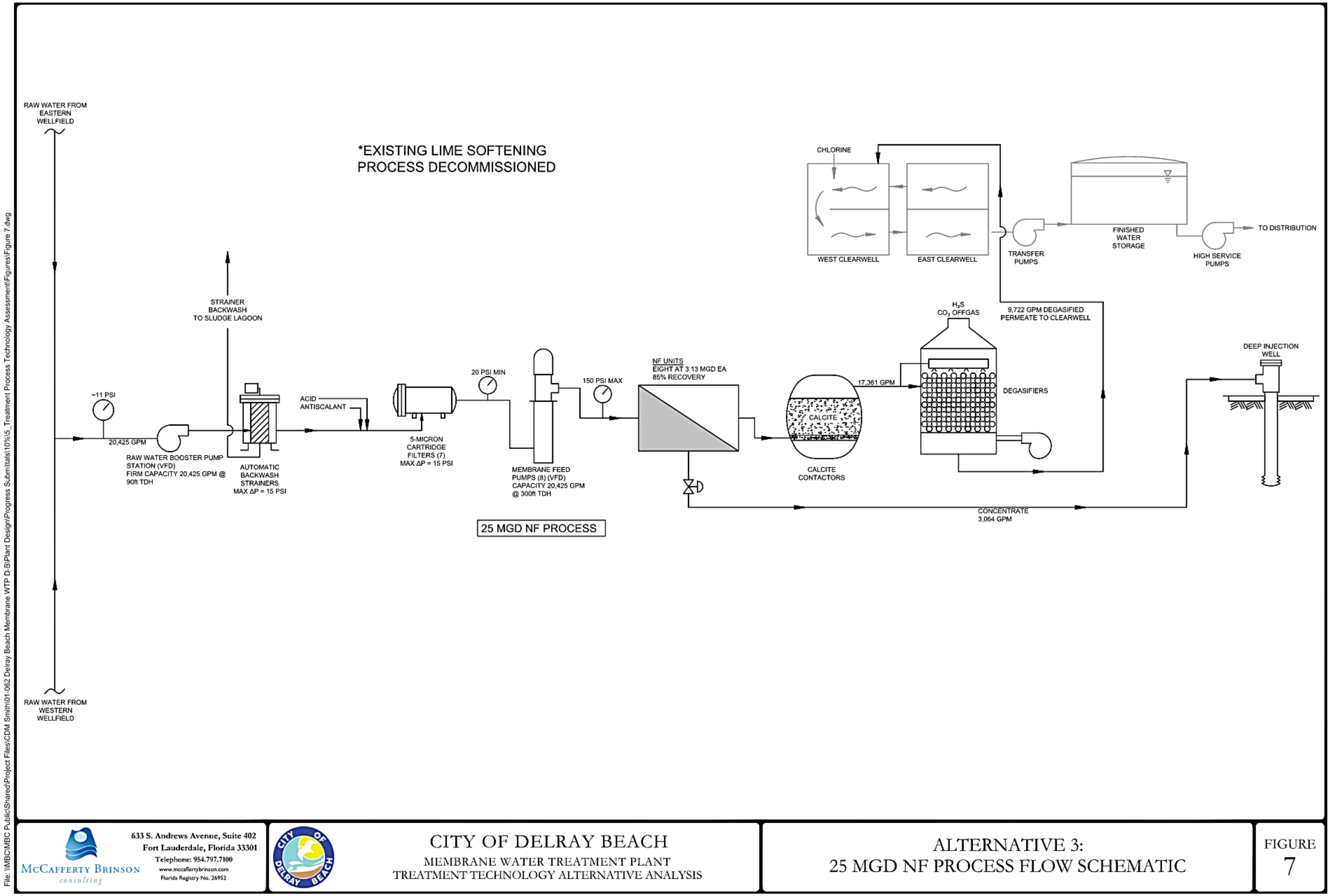

Figure 3.8 Alternative 3: 25 MGD NF Process Flow Schematic

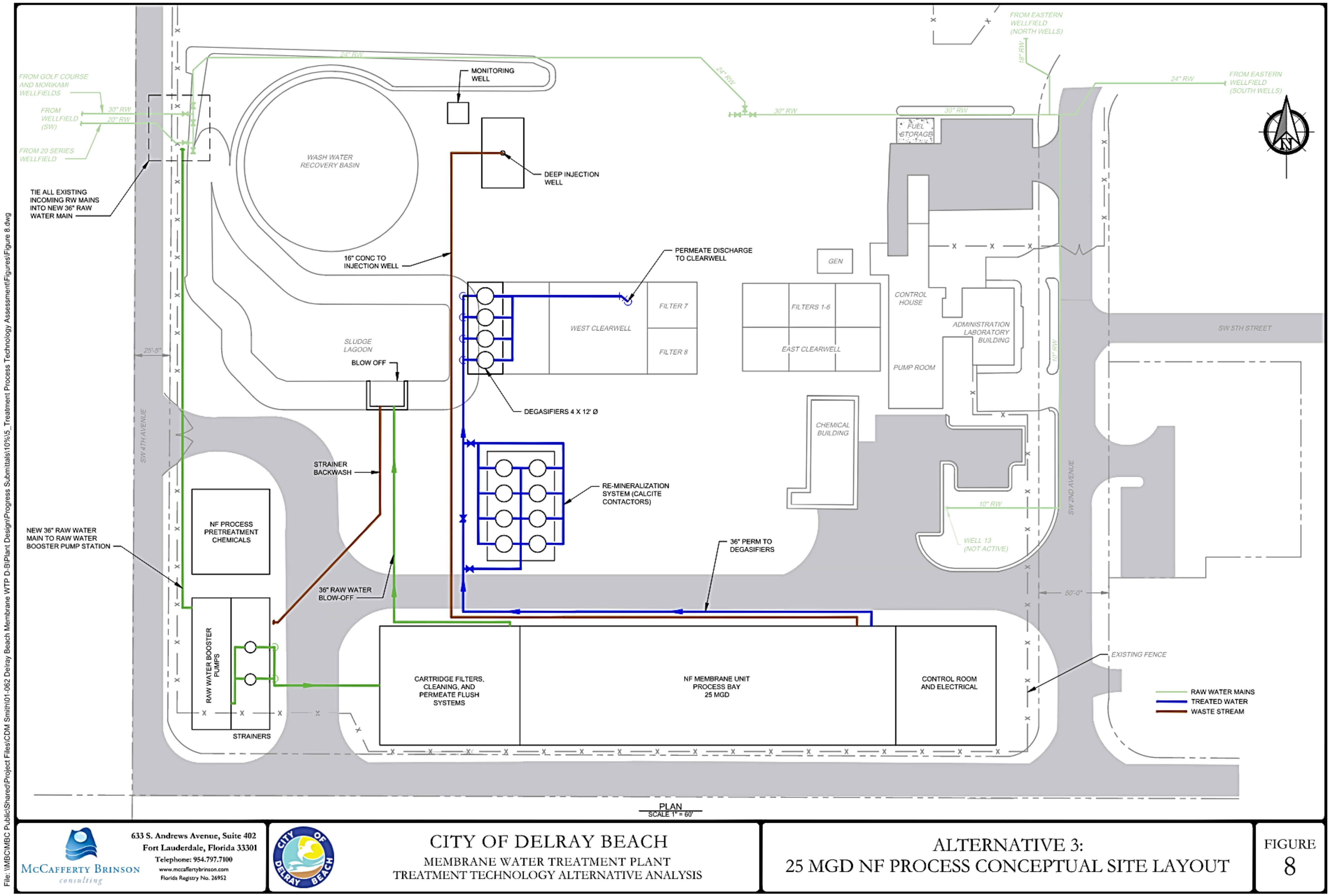

Figure 3.9 Alternative 3: 25 MGD NF Process Conceptual Site Layout

Table 3.15 Summary of 25 MGD NF Process Design Parameters and Major Equipment

Design Parameter	Value
Overall treatment process	
Total plant permeate capacity (MDD basis)	25.0 MGD = 17,361 gpm
Design annual average day demand (AADD)	21.6 MGD = 15,000 gpm
Process recovery rate	85%
Raw water booster pump station	
Number of pumps	5
Capacity per pump	7.4 MGD = 5,106 gpm
Sand strainer system	
Number of units	3
Flow per unit (maximum)	14.7 MGD = 10,212 gpm
Cartridge filter system	
Number of units	7
Flow per unit (maximum)	4.9 MGD = 3,404 gpm
NF Units	
Number of units	8
Permeate capacity per unit	3.13 MGD = 2,170 gpm
Feed flow per unit	3.68 MGD = 2,553 gpm
Concentrate flow per unit	0.55 MGD = 383 gpm
Membrane feed pumps	
Number	8
Capacity per pump	3.68 MGD = 2,553 gpm
Head rating	300 ft TDH
Calcite Contactors	
Number of vessels	8
Dimension of vessels	12 ft dia x 36 ft long horizontal
Number	4
Capacity per unit	6.3 MGD = 4,340 gpm

3.3.3.4 Preliminary Opinions of Cost

Table 3.16 presents our preliminary opinion of project cost for construction of a 25 MGD NF process and demolition of the existing lime softening process.

Table 3.16 Alternative 3: 25 MGD NF Process Preliminary Opinion of Project Costs

Cost Item	Total
25 MGD Nanofiltration (NF) Facility	$145,149,000
Construction Contingency (30%)	$43,545,000
OPCC 25 MGD NF	**$188,694,000**
Deep Injection Well	$18,000,000
Construction Contingency (10%)	$1,800,000
OPCC Deep Well Injection	**$19,800,000**
Subtotal Alternative 3 OPCC	**$208,494,000**
Engineering and Design (9%)	$18,765,000
Engineering Services During Construction (6%)	$12,510,000
Legal/Administration (5%)	$10,425,000
Alternative 3 OPPC	$250,194,000
Class 5 OPCC (Escalated to 2026-midpoint construction)	***$275,214,000***
Class 5, -30%	$192,650,000
Class 5, +50%	$412,821,000

Table 3.17 summarizes our preliminary opinion of operating cost for the 25 MGD NF process. As with the other alternatives, no costs are included for treatment or pumping components downstream of the gravity filters, and operating costs do not include any additional labor.

Table 3.17 Alternative 3: 25 MGD NF Upgrades Preliminary Opinion of Probable Operating Costs

Operating Parameter / Cost Component	Unit		Value	
Average Daily Flow (ADF)				
Plant ADF	MGD			16.00
NF process permeate ADF	MGD			16.00
Raw feed water flow	MGD			18.82
Concentrate flow	MGD			2.82
Power Costs	**Rated Power**		**% of Time Operating**	**Annual kWh**
	HP	**kW**		
Raw water booster and membrane feed pumps (13,072 gpm, 100 psi)[1]	1048	782	100%	6,850,428
Degasifier blowers (4 x 25 HP)[1]	100	75	100%	653,544
Total Annual kilowatt-hours	**kWh**			**7,503,972**
Total Annual Power Cost[4]	$			850,200
Consumable Costs				
Cartridge replacement[2]	$			48,000
Membrane element replacement[3]	$			626,000
Sulfuric acid[4]	$			982,738
Antiscalant[4]	$			175,340
Caustic[4]	$			1,709,567
Calcite[4]	$			428,125
Cleaning chemicals[4]	$			35,200
Total Annual Consumable Costs	$			4,005,000
Total Annual Maintenance Costs[5]	$			3,774,000
Total Annual O&M Costs	**$**			**8,630,000**

Notes:

1. Power Consumption calculated assuming a pump efficiency of 80% and a motor efficiency of 91%
2. Cartridge filter element replacement: [(# elements) x ($/element) / 0.333 years) = $48,000
3. Membrane element replacement: [(5,040 elements) x ($993/element) / 8 years] = $626,000
4. Unit costs and average dosing/production rates:

Power:	$0.1133	per kilowatt-hour (kWh)		
Sulfuric acid:	$290	per ton (93% concentration)	110.00	mg/L
Antiscalant:	$1.53	per pound, dosage =	2.00	mg/L
Caustic:	$1.95	per pound, dosage =	9.00	mg/L
Calcite:	$343	per ton, usage =	1,250	tons per year
Membrane cleaning materials:	$2,200	per membrane unit cleaning (assume 8 units, 6-month frequency).		

5. Annual maintenance and repair costs are estimated at 2% of the initial capital construction cost.
6. This cost analysis does not include treatment or pumping components located downstream of the degasifiers (e.g. post-treatment chemicals, transfer pumping, etc.) because those components are common to all alternatives and do not affect the cost comparison.

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4.0 Preferred Alternative

4.1 Evaluation of Alternatives

Table 4.1 presents a 20-year net present worth comparison of the three alternatives. As reflected in Table 4.1, Alternative 3, which involves constructing a 25 MGD NF process and decommissioning the existing lime softening process, is the lowest net-present worth alternative. The 20-year net present worth cost of Alternative 3 is approximately 10% lower than the next lowest cost option (Alternative 1, 25 MGD AIX upgrades to the existing lime softening process), and approximately 31% lower than Alternative 2, 14 MGD NF process and 11 MGD PAC upgrades to the existing lime softening treatment process.

There are several objective and subjective advantages of Alternative 3 that should be considered by the City:

- In addition to PFAS constituents, NF membranes also remove hardness and dissolved organics (e.g., disinfection by-product precursors), effectively replacing all of the existing aging lime softening and granular filtration equipment, whereas the other considered treatment technologies are additional steps to the lime softening process and rely on the lime softening process (the aging lime softening equipment) to remove dissolved hardness and suspended particulate contaminants.
- NF is a broad-spectrum treatment technology (rather than targeted to a specific contaminant) that is more likely to be capable of removing other emerging contaminants (such as pharmaceuticals and microplastics) that may be regulated in the future.
- The NF technology offers the flexibility in the future of selecting and utilizing “tighter” (higher-rejecting) membranes using the same process equipment to target other more difficult-to-remove contaminants.
- The future cost of rehabilitating and continuing to maintain the existing aging lime softening process equipment, while considered in the O&M cost analysis, is increasingly uncertain as time passes. Additional unforeseen costs are likely to increase significantly in the future as the structures and equipment continue to age and deteriorate.
- The costs for disposal of spent AIX resin and PFAS-containing lime sludge are likely to increase and become increasingly uncertain as more utilities install AIX systems for PFAS removal, and regulation of PFAS-containing residual waste streams becomes more restrictive.

Table 4.1 20-Year Net Present Worth Comparison of Alternatives

Year	Alternative 1		Alternative 2		Alternative 3	
	Cost	Present Worth	Cost	Present Worth	Cost	Present Worth
0	$240,966,000	$240,966,000	$258,674,000	$258,674,000	$275,214,000	$275,214,000
1	$14,767,000	$14,063,810	$23,772,000	$22,640,000	$8,630,000	$8,219,048
2	$14,767,000	$13,394,104	$23,772,000	$21,561,905	$8,630,000	$7,827,664
3	$14,767,000	$12,756,290	$23,772,000	$20,535,147	$8,630,000	$7,454,918
4	$14,767,000	$12,148,847	$23,772,000	$19,557,283	$8,630,000	$7,099,922
5	$14,767,000	$11,570,331	$23,772,000	$18,625,984	$8,630,000	$6,761,831
6	$14,767,000	$11,019,363	$23,772,000	$17,739,032	$8,630,000	$6,439,839
7	$14,767,000	$10,494,631	$23,772,000	$16,894,317	$8,630,000	$6,133,180
8	$14,767,000	$9,994,887	$23,772,000	$16,089,825	$8,630,000	$5,841,124
9	$14,767,000	$9,518,940	$23,772,000	$15,323,643	$8,630,000	$5,562,975
10	$14,767,000	$9,065,657	$23,772,000	$14,593,946	$8,630,000	$5,298,071
11	$14,767,000	$8,633,959	$23,772,000	$13,898,996	$8,630,000	$5,045,782
12	$14,767,000	$8,222,818	$23,772,000	$13,237,139	$8,630,000	$4,805,507
13	$14,767,000	$7,831,255	$23,772,000	$12,606,799	$8,630,000	$4,576,673
14	$14,767,000	$7,458,338	$23,772,000	$12,006,475	$8,630,000	$4,358,736
15	$14,767,000	$7,103,179	$23,772,000	$11,434,738	$8,630,000	$4,151,178
16	$14,767,000	$6,764,933	$23,772,000	$10,890,227	$8,630,000	$3,953,502
17	$14,767,000	$6,442,793	$23,772,000	$10,371,645	$8,630,000	$3,765,240
18	$14,767,000	$6,135,994	$23,772,000	$9,877,757	$8,630,000	$3,585,943
19	$14,767,000	$5,843,803	$23,772,000	$9,407,388	$8,630,000	$3,415,184
20	$14,767,000	$5,565,527	$23,772,000	$8,959,417	$8,630,000	$3,252,556
Total Net Present Worth:		**$424,995,000**		**$554,926,000**		**$382,763,000**

Notes:

1. Assumes an interest rate of 5%

4.2 Preferred Alternative

Based on the cost comparison in Table 4.1, as well as the subjective considerations discussed above, Alternative 3 (25 MGD NF process and full decommissioning of the existing lime softening process) is recommended to meet project objectives. This alternative would be conducted in two phases to meet schedule requirements. The first phase would involve constructing the deep well injection system, and the second phase would involve constructing the 25 MGD NF WTP.

5.0 Public Participation and Regulatory Review

5.1 Public Hearing/Dedicated Revenue Hearing

A public hearing/dedicated revenue hearing will be held at the City of Delray Beach (City) after advertising in the area newspapers. The public hearing is currently scheduled for June 4th, 2024. Interested parties will be individually notified of the hearing. Records of the public notice and the hearing will be made available in the City's Public Utility office.

- The certified advertisement copy is provided in **Appendix B**.
- Minutes from the public hearing will be provided after the meeting in **Appendix C**.

5.2 Regulatory Agency Review

The City's water system currently withdraws raw water from the Surficial Aquifer under the WUP No 50-00177-W.

As part of the review process for this plan and to qualify for an SRF loan, various governmental agencies must approve the manner in which the City will implement the plan. Agencies that will have the opportunity to review and comment on the plan include:

- The Florida Department of Environmental Protection
- The South Florida Regional Planning Council
- The South Florida Water Management District

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6.0 Financial Feasibility

6.1 Financial Planning – Water System

6.1.1 Proposed Project Costs

The scope of this financing plan includes the planned water improvements for a total program cost of approximately $275M (in mid-point construction dollars with 30% contingency) (**Table 6.1**).

Table 6.1 Project Construction Costs

Project Description	Construction Costs	Contingency	Program Costs	Funding Source
Design Services	$18,765,000	$-	$18,765,000	State Revolving Fund (SRF)
Injection Well	$18,000,000	$1,800,00	$19,800,000	State Revolving Fund (SRF)
Technical Services	$12,510,000	$-	$12,510,000	State Revolving Fund (SRF)
Legal & Administration	$10,425,000	$-	$10,425,000	
New Water Treatment Plant	$145,149,000	$43,545,000	$188,694,000	SRF, Revenue Bond & WIFIA
Totals	**$204,849,000**	**$45,345,000**	**$250,194,000**	
Updated to mid-point Construction			**$275,214,000**	

6.1.2 Financing Plan Model

The Financing Plan was determined using a spreadsheet model. The model projected customer user fees for the financing scenario. Debt service was added to show financing projects with either SRF funding or revenue bonds.

6.1.2.1 Assumptions

Financial

Financial assumptions include the following:

- Debt terms (SRF) – 20 years; 1.41% interest rate – water; 2% issuance cost.
- Debt terms (Revenue Bonds) – 20 years; 3.48% interest rate; 2% issuance cost.
- Debt terms (WIFIA) – 30 years; 1.48% interest, 2% issuance cost.
- Customer base – assumed increases in residential customer growth and rates per 2022 Rate Study.

Table 6.2 presents a financial plan to fund the water system treatment plant improvements with a combination of Revenue Bonds, SRF loans and potential WIFIA loan and or grants.

Table 6.2 Potential Financing Plan

Description	EC Principal Forgiveness	SRF	Revenue Bond	WIFIA	Total
Injection Well	$19,800,000	$-	$-	$-	$19,800,000
Construction Costs	$-	$75,477,600	$37,738,800	$75,477,600	$188,694,000
Design Services	$18,765,000	$-	$-	$-	$18,765,000
Legal & Administration	$-	$-	$10,425,000	$-	$10,425,000
Technical Services	$-	$12,510,000	$-	$-	$12,510,000
Subtotal	**$38,565,000**	**$87,987,600**	**$48,163,800**	**$75,477,600**	**$250,194,000**
Updated to mid-point of Construction	$42,421,500	$96,786,360	$52,980,180	$83,025,360	$275,213,400
Total Program Costs	$42,421,500	$96,786,360	$52,980,180	$83,025,360	$275,213,400
Finance Costs – SRF and Revenue Bonds (2%)[1]	$-	$1,935,700	$1,059,600	$1,660,500	$4,655,800
Subtotal	**$42,421,500**	**$98,722,060**	**$54,039,780**	**$84,685,860**	**$279,869,200**
Capitalized Interest[2]	$-	$1,392,000	$-	$1,253,400	$2,645,400
Principal Loan/Bond	$-	$100,114,060	$54,039,780	$85,939,260	$282,514,600
Annual Debt Service[3]	$-	$5,762,200	$3,773,000	$3,568,000	$13,103,200

Notes:

1. Finance costs equal 2 percent of above subtotal.
2. Capitalized interest equal to one-half of 24-month construction period 1.41 (SRF) or 3.48 (percent interest).
3. Annual Debt Service for SRF based on 20 years at 1.41% interest, Revenue Bond based on 20 years at 3.48% interest and WIFIA based on 30 years at 1.48% interest.

Table 6.3 presents the impact of the SRF loans, revenue bonds, and WIFIA on the customer base, in terms of the cost per equivalent residential connection (ERC) per year.

Table 6.3 Annual Cost of Selected Plan's Impact on Residential Customers

Description	With Multiple Funds
Annual Debt Service[1]	$13,103,200
Residential Percent[2]	81.0%
Residential Share of Debt Service	$10,613,592
Residential Customer Connections	21,428
Annual Cost per customer connection	$495.31

Notes:

1. Taken from Table 6.2.
2. The residential percent was calculated based on the rate in Table 10 from the 2022 Rate study, which is equal to (1 – (non-residential revenue/rate study total)).

Table 6.4 presents a financial analysis of the water and wastewater systems and the overall impact of the improvements and identifies total water and wastewater system costs and the resulting net revenue through 2028. With the rate increases projected in the 2022 Rate Study and estimated customer increases, the existing water and wastewater rates will provide for the existing and projected debt service coverage through 2028.

Table 6.4 Summary of Water and Wastewater System Revenue and Expenses

Description	Actual		Budget	Projected			
	2022	2023	2024	2025	2026	2027	2028
Operating Revenues:							
Water Sales	$16,719,612	$19,168,570	$26,272,687	$29,155,856	$32,502,397	$36,608,759	$41,248,948
Sewer & Reclaimed Fees	$19,260,829	$19,923,137	$21,477,628	$21,820,065	$22,169,350	$22,510,498	$22,857,083
Other Fees	$2,278	$1,695	$-	$-	$-	$-	$-
Total Operating Revenues	$35,982,719	$39,093,402	$47,750,315	$50,975,921	$54,671,748	$59,119,257	$64,106,031
Operating Expenses:							
Salary & Benefits	$10,357,298	$10,082,714	$12,562,369	$12,939,240	$13,327,417	$13,727,240	$14,139,057
Contractual, Material, Supplies	$20,698,224	$19,366,282	$32,271,653	$24,845,303	$25,590,662	$26,358,382	$27,149,133
Incremental Operating Expenses	$-	$-	$-	$-	$-	$8,630,000	$8,630,000
Total Operating Expenses per ACFR	**$31,055,522**	**$29,448,996**	**$44,834,022**	**$37,784,543**	**$38,918,079**	**$48,715,621**	**$49,918,190**
Net Operating Revenues	**$4,927,197**	**$9,644,406**	**$2,916,293**	**$13,191,378**	**$15,753,669**	**$10,403,636**	**$14,187,841**
Investment Income	$30,147	$25,531	$124,469	$124,469	$124,469	$124,469	$124,469
Total Net Revenues	**$4,957,344**	**$9,669,937**	**$3,040,762**	**$13,315,847**	**$15,878,138**	**$10,528,105**	**$14,312,310**
Revenue Bond Debt Service Requirements:							
Existing Revenue Bonds	$-	$-	$-	$-	$-	$-	$-
New Revenue Bonds – Water	$-	$-	$-	$-	$3,773,000	$3,773,000	$3,773,000
Total Annual Senior Debt Service	**$-**	**$-**	**$-**	**$-**	**$3,773,000**	**$3,773,000**	**$3,773,000**
Revenue Bond D/S Coverage % (Req 1.10)	N/A	N/A	N/A	N/A	$4	$3	$4
Net Revenues After Sr. D/S	$4,957,344	$9,669,937	$3,040,762	$13,315,847	$12,105,138	$6,755,105	$10,539,310

Description	Actual		Budget	Projected			
	2022	2023	2024	2025	2026	2027	2028
SRF Loan Debt Service Requirements.:							
SRF Water	$-	$-	$-	$-	$-	$-	$5,762,200
WIFIA	$-	$-	$-	$-	$-	$-	$3,568,000
Total Annual SRF & WIFIA Loan Debt Service	**$-**	**$-**	**$-**	**$-**	**$-**	**$-**	**$9,330,200**
SRF Loan D/S Coverage % (Req 1.15)							
Net Revenues After SRF Loan D/S	$4,957,344	$9,669,937	$3,040,762	$13,315,847	$12,105,138	$6,755,105	$1,209,110
Non-Operating Expenditures:							
Share of Regional WWTP JV (Loss)	$(446,769)	$-	$-	$-	$-	$-	$-
Gain (Loss) on Disposal of Equipment	$(118,059)	$-	$-	$-	$-	$-	$-
Investment Expense	$(18,847)	$-	$-	$-	$-	$-	$-
Non-Operating Expenditures:	**$(583,675)**	**$-**	**$-**	**$-**	**$-**	**$-**	**$-**
Capital Contributions & Transfers:							
Capital Contributions	$1,372,568	$735,595	$-	$-	$-	$-	$-
Transfers In	$123,068	$112,070	$134,344	$134,344	$134,344	$134,344	$134,344
Transfers Out	$(3,209,413)	$(3,995,230)	$(4,251,169)	$(4,378,704)	$(4,510,065)	$(4,645,367)	$(4,784,728)
Total Capital Contributions & Transfers	**$(1,713,777)**	**$(3,147,565)**	**$(4,116,825)**	**$(4,244,360)**	**$(4,375,721)**	**$(4,511,023)**	**$(4,650,384)**
Annual Surplus/(Deficit)	**$2,659,892**	**$6,522,372**	**$(1,076,063)**	**$9,071,487**	**$7,729,417**	**$2,244,082**	**$(3,441,274)**

6.2 Implementation

The City has the sole responsibility and authority to implement the recommended facilities.

6.3 Business Plan

The business plan is provided in **Appendix D**.

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7.0 Implementation Schedule

The schedule for implementing the recommended facilities is shown in **Table 7.1**.

Table 7.1 Annual Cost of Selected Plan's Impact on Residential Customers

	Design & Injection Well	WTP Construction
Request for Inclusion & Business Plan Completed	June 28, 2024	February 17, 2025
Facilities Plan Completed	May 21, 2024	May 21, 2024
Public Hearing - County Commission	June 4, 2024	June 4, 2024
DEP Review, Planning Document Approved	June 15, 2024	June 15, 2024
Design Submittal	February 17, 2025	May 13, 2025
GMP Date	February 17, 2025	May 13, 2025
Construction Start	July 1, 2025	July 1, 2025
Substantial Completion	November 1, 2027	November 1, 2027

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8.0 Adopting Resolution

The Specific Authorization to implement the planning recommendations is presented in **Appendix E.** Currently, a draft resolution is presented. The final version will be presented once it is available.

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Appendix A Drinking Water Facility Plan Review Checklist

Drinking Water Facility Plan Review Checklist

The basis for this checklist is Section 62-552.700 F.A.C. of the DW Rule. The questions below are used to verify that the planning requirements of the rule have been met. Complete the questions by checking the appropriate response and providing the requested information.

SECTION I - GENERAL

1) Project Sponsor: DW 5020D - City of Delray Beach

   Is this a review of an amended facilities plan? Yes ☐ No ☑ Date of original FP: 5/8/24

2) List below the title, date and author of all major reports, sources of information, documents, and correspondence that comprise the complete planning document. These documents may be referenced by section or page number on the Source/Comment line in subsequent questions.

   - City of Delray Beach Water Treatment Plant Facilities Plan - May 2023 prepared by CDM Smith
   - Per- and Polyfluoroalkyl Substances (PFAS), Final PFAS National Primary Drinking Water Regulation, April 10, 2024, United States environmental Protection Agency, Office of Water [Per- and Polyfluoroalkyl Substances (PFAS) | US EPA]
   - Water Supply and Treatment Feasibility Study Update - January 2022 prepared by Kimley-Horn

3) Is there sufficient illustrative/descriptive detail of the project to identify project location and existing and proposed service areas (with map of service area/city/county boundaries)? Yes ☑ No ☐

   Source/Comment:

   Section 1.4 Project Location: Figure 1.2 City of Delray Beach Utility Service Area. Image from City of Delray Beach.

4) Is a description of the existing water system and its performance provided? Yes ☑ No ☐

   Source/Comment:

   Section 3.1.1 Existing Treatment Process

5) Briefly describe the major components of the proposed project.

   Alternative 3: 25 MGD NF process and full decommissioning of the existing lime softening process
   Section 3.3.3 provides a description of this alternative, including major design parameters and process equipment for the 25 MGD NF facility. If the City elected to construct the full 25 MGD NF process in a single phase, the recommended NF system design may differ somewhat from the approach of constructing the plant in two phases. The conceptual design includes eight two-stage NF units, each with a permeate capacity of 3.13 MGD operating at a recovery rate of 85%.

6) Provide justification/need for project, list environmental and economic impacts, and give benefits of the project.

   The City's water sampling program has identified the presence of certain PFAS constituents in the City's raw water supply to the existing lime softening water treatment plant (Figure 1.1), as well as in the lime softened treated finished water in levels that exceed the PFAS MCLs (Table 1.2). Based on this data, the existing water treatment plant will require upgrades to remove and comply with the newly issued PFAS MCLs.

   The benefits to the construction of the new NF facility include:

7) Are there any problems with the existing water system regarding water quality, public health, system pressure, capacity, or other problems? Yes ☐ No ☑ (review recent DW sanitary survey)

   Source/Comment:

   The City's water sampling program has identified the presence of certain PFAS constituents in the City's raw water supply to the existing lime softening water treatment plant (Figure 1.1), as well as in the lime softened treated finished water in levels that exceed the PFAS MCLs. The lime softening treatment currently used for treatment of the existing raw water supply does not provide the removal of PFAS contaminants; thus requiring plant upgrades.

8) Is a projection of population and water demand (minimum 20-years) and present and historic water usage given? Yes ☑ No ☐
Source/Comment:

Table 3.1 Summary of Plant Flow Statistics December 2022 through November 2023
Table 3.3 Projected Water Demands

9) Is there a description of the O&M program and the managerial & technical capacity of the existing water system? Yes ☑ No ☐ (also view the business plan for a managerial/technical summary)
Source/Comment:

Maintenance and operating costs for the 25 mgd NF facility are presented in Section 3.3.3

10) List any interest rate adjustments [per 62-552.300(6)(c), F.A.C.] that the project sponsor may qualify.
Source/Comment:

Emerging Contaminates project - 100% principal forgiveness.

SECTION II - COST COMPARISON AND SELECTED ALTERNATIVE

1) Do the planning documents discuss the factors affecting the decision-making process that led to the "selected alternative" with a comprehensive rationale for the selection? Yes ☑ No ☐
Source/Comment:

4.1 Evaluation of Alternatives

2) Is a cost comparison of at least three alternatives documented? Yes ☑ No ☐
Source/Comment:

Refer to Tables 3.7, 3.11 and 3.16 for capital costs associated with the three alternatives

3) Is a project cost breakdown given for each alternative with a total cost that reflects the project data used in the cost comparison? Yes ☑ No ☐
Source/Comment:

Refer to Tables 3.7, 3.11 and 3.16 for capital costs associated with the three alternatives

4) Does the planning document include a description of the selected/recommended alternative and associated appurtenances, the estimated capital costs, the estimated operation/maintenance costs, and the repair/replacement costs (if applicable)? Yes ☑ No ☐
Source/Comment:

Refer to Section 4.0

5) If this project involves more than one phase, are detailed capital costs and total project costs presented for each phase? Yes ☑ No ☐ N/A ☐
Source/Comment:

The project presented is future build-out for year 2060. The project has multiple phases, and two of the phases include construction of an injection well and design services for a facility to meet 2040 projections. Detailed capital cost for these phases will be provided in the

SECTION III - ENVIRONMENTAL REVIEW

An environmental review is required for each project to be funded. This review includes the preparation and publication of an Environmental Information Document (EID) by FDEP staff.

1) Check below the type of EID issued for this project and provide the publication date.

FFONSI ☐ FCEN ☑ FEIS/FROD ☐ FRAN ☐ Publication Date: __________

2) If a FCEN was issued, check the below categorical exclusion criterion that applies. N/A ☐

☑ Rehabilitation of existing facilities or replacement of structures, wells, water mains, or equipment.

☑ Facilities that will not result in more than a 50% increase of existing public water system capacity and there is no acquisition of land other than easements and rights-of-way where streets have been established, underground utilities installed, building sites excavated, or where such lands have otherwise been disturbed from their natural condition.

☑ Facilities for the disinfection of public water supplies.

☑ Back-up supply wells where, after disinfection, existing water quality meets drinking water standards and there is no acquisition of land.

☐ Facilities that will result solely in the provision of adequate public water system pressure.

3) Does the planning document include a list from the U.S. Fish &Wildlife Service of threatened, endangered, proposed, and candidate species and their designated critical habitats that may be present in the project area? Yes ☑ No ☐ N/A ☐
Source/Comment:
2.2.2 Flora and Fauna

4) Does the project require U.S. Fish & Wildlife review; and, if so, have comments been issued?
Yes ☐ No ☑ N/A ☐
Source/Comment:

5) Will the proposed project have any significant adverse effects upon flora/fauna, threatened/endangered plant/animal species, surface water bodies, groundwater, prime agricultural lands, wetlands, undisturbed natural areas, archaeological/historical sites, floodplains, or air quality? Yes ☐ No ☑
Source/Comment:
Refer to Section 2.2

6) Will the proposed project have any significant adverse human health/environmental impact on minority/low-income communities? Yes ☐ No ☑
Source/Comment:
2.3 Human Health Impacts

7) List any significant adverse environmental impacts and what project components will mitigate such impacts? N/A ☑
Source/Comment:

8) Has the project received a State Clearinghouse review/approval? Yes ☐ No ☑
Source/Comment: https://floridadep.gov/oip/oip/content/clearinghouse

9) If the project involves source water protection/capacity development, has approval by the FDEP Source/Drinking Water Program been obtained? Yes ☑ No ☐ N/A ☐
Source/Comment:
PWS 4500351

SECTION IV - PUBLIC PARTICIPATION

1) Was a public meeting held to explain details of the project and its financial impact to affected parties; and was the public able to participate in evaluating project alternatives? Yes ☑ No ☐
   Source/Comment:
   Refer to Appendix A and B

2) Date of Public Meeting: __________

3) Have copies of the public notice and public meeting minutes been provided? Yes ☑ No ☐
   Source/Comment:
   Refer to Appendix B

SECTION V - FINANCIAL FEASIBILITY

1) Did the project sponsor provide a completed financial business plan (including technical/managerial sections) signed by the chief financial officer or the authorized representative? Yes ☐ No ☑
   Source/Comment:
   Full Business Plan not needed - only the T/M portion.

2) Do the planning documents include a proposed system of charges/rates/fees and other collections that generate revenues to be dedicated to loan repayment (e.g. user charge rates)? Yes ☐ No ☑
   Source/Comment:
   N/A

3) Does the financial information demonstrate the project sponsor's ability to repay the loan including a 1.15 coverage factor and sufficient collateral if other than a government agency? Yes ☐ No ☑
   Source/Comment:
   N/A

SECTION VI - SCHEDULE

1) Do the planning documents include a schedule to implement the proposed project? Yes ☑ No ☐
   Source/Comment:
   7.0 Implementation Schedule

2) If the planning period exceeds 5 years, has project phasing been considered; and if so, has an implementation schedule been presented for each phase of the planning period? Yes ☐ No ☐
   Source/Comment: N/A ☑
   Notice to proceed (start of preliminary design/design phase): 3/27/2024
   Construction Substantially Complete: 11/1/2027 - 3.6 years

SECTION VII - PROJECT AUTHORIZATION

1) Do the planning documents include an adopted resolution or other action establishing a commitment to implement the planning recommendations, and was the public meeting held before the resolution was adopted? Yes ☑ No ☐ Date of resolution/action: ___________
   Source/Comment:
   Refer to Section 8 and Appendix D

SECTION VIII - IMPLEMENTATION

1) Is there anything about the proposed project that appears questionable from an engineering, environmental or financial perspective; and therefore, requires resolution? Yes ☐ No ☑
Source/Comment:

2) List any proposed service agreements or local contracts (e.g. county, city, private entity) necessary to implement the selected alternative. Describe the status of each agreement/contract. N/A ☑
Source/Comment:

3) List any DEP permits (other than a construction permit) needed to implement the selected plan.
N/A ☑
Source/Comment:

4) Does the project require approval by the Public Service Commission for a rate increase or expansion of the service area? Yes ☐ No ☑ N/A ☐
Source/Comment:

SECTION IX - PLANNING DOCUMENT COMPLETION

1) Is the planning document signed and sealed by a professional engineer? Yes ☐ No ☐
2) Has the FEID been mailed to the appropriate parties? Yes ☐ No ☐
3) Have the following action/approval/acceptance dates been entered into the SRF database?

State Clearinghouse:	Yes ☐	No ☐	
Financial Business Plan:	Yes ☐	No ☐	
Public Meeting Date:	Yes ☐	No ☐	
Adopted Resolution/Action Date:	Yes ☐	No ☐	
EID Publication Date:	Yes ☐	No ☐	
Facilities Plan Acceptance Date:	Yes ☐	No ☐	
FDEP District Office:	Yes ☐	No ☐	
FDEP Source/Drinking Water Program:	Yes ☐	No ☐	N/A ☐
U. S. Fish & Wildlife:	Yes ☐	No ☐	N/A ☐
USDA Natural Resources Conservation:	Yes ☐	No ☐	N/A ☐
Corps of Engineers:	Yes ☐	No ☐	N/A ☐

4) Is the planning document approval letter included with this checklist? Yes ☐ No ☐

ACCEPTANCE:

Project Manager: ____________________________ ____________________
Effective Date

Program Administrator: ____________________________

Appendix B Certified Advertisement Copy

Order ID: 7635591

* Agency Commission not included

GROSS PRICE * : $167.79

PACKAGE NAME: SSC_Notice of Public Meeting

Order ID: 7635591

* Agency Commission not included

GROSS PRICE * : **$167.79**

PACKAGE NAME: SSC_Notice of Public Meeting

Product(s): Sun Sentinel, Affidavit, Floridapublicnotices.com, Classified.ss.com_Legal

AdSize(s): 1 Column

Run Date(s): Thursday, May 16, 2024

Zone: Full Run

Color Spec. B/W

Preview

CITY OF DELRAY BEACH, FLORIDA
NOTICE OF PUBLIC HEARING

The City Commission of the CITY OF DELRAY BEACH hereby gives notice of its intent to discuss the proposed City of Delray Beach Water Facilities Plan for the construction of a new Water Treatment Plant Project. This hearing will include a discussion of the Water Facilities Plan and the financial impact on system users. The hearing is intended to give individuals the opportunity to be heard on the economic and social effects of the location, design, and environmental impact of the improvements. A portion of the funding for this project is anticipated to come from the State Revolving Fund (SRF) loan program. Financial impacts on utility users will be presented at the hearing.

This item will be heard at the June 4, 2024, Regular Commission meeting scheduled to begin at 6:00 p.m. at the City Commission Chambers, 100 NW 1st Street, Delray Beach, Florida 33444.

The City of Delray Beach proposes to construct a new water treatment plant. The purpose of the public hearing is to present the proposed plan with an estimated cost of $275,214,000 and to provide the public with an opportunity to review, discuss, and provide input. The project may be eligible for funding from the State of Florida through State Revolving Fund ("SRF") low-interest loans from the Florida Department of Environmental Protection, the proceeds of which will be loaned to the City of Delray Beach to fund the costs.

A copy of the Facility Plan is available for review at the Swinton Operations Center at 434 S. Swinton Avenue, Delray Beach, Florida 33444 between the hours of 7:30 a.m. and 3:30 p.m. Monday through Friday for the period of May 21, 2024, through June 4, 2024

Order ID: 7635591

* Agency Commission not included

GROSS PRICE * : $167.79

PACKAGE NAME: SSC_Notice of Public Meeting

through June 4, 2024.

This hearing is open to the public and all interested parties are invited to attend and express their views. Written statements may be submitted prior to or at the time of the hearing.

Please be advised that if a person decides to appeal any decision made by the City Commission with respect to any matter considered at this hearing, such person may need to ensure that a verbatim record includes the testimony and evidence upon which the appeal is to be based. The City does not provide nor prepare such record pursuant to F.S. 286.0105.

CITY OF DELRAY BEACH
Katerri Johnson, CMC
City Clerk
5/16/2024 7635591

Appendix C Public Hearing Minutes

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Appendix D Business Plan

DRINKING WATER STATE REVOLVING FUND BUSINESS PLAN

Sponsor Name:	City of Delray Beach		System Population:		
DWSRF Project #:			PWS ID#:		
Contact Person and Title:			Telephone:		
Mailing Address:		City:		State:	Zip:
Contact for Finance Plan (if different):			Telephone:		
Mailing Address:		City:		State:	Zip:
e-mail:			Fax:		

Source Type:
- ☒ Ground Water
- ☐ Purchase Water
- ☐ Surface Water
- ☐ Surface/Ground Combined

The Drinking Water State Revolving Fund Program (DWSRF), authorized by the 1996 amendments to the Safe Drinking Water Act, provides financial assistance to public water systems (PWS). To obtain this assistance, project sponsors must demonstrate Capacity Development or demonstrate how the assistance will ensure these requirements are met. The term Capacity Development takes into consideration three vital areas of a public water system: Technical, Managerial, and Financial capabilities.

FINANCIAL

A financial capability demonstration (and certification) is required well before the evaluation of the actual loan or grant application. This demonstration is necessary to ensure that the system has the financial capability to repay the loan, if applicable, and to adequately operate and maintain the system. Financial capability also includes funding future capital improvements that may be required. Please see Rule 62-552.700(4) in Chapter 62-552, F.A.C. for further details.

It is expected that the revenues to be dedicated to repaying a loan will be generated either from water and sewer utility operations or from water utility operations alone. If the source of revenues will not be from such enterprises, this set of worksheets alone will not satisfy the Department's needs. (Please contact the Department for further guidance if dedicated revenues will be generated externally to such utilities.)

The following worksheets have been developed to identify the minimum information needed. The completed worksheets should be used in disclosing DWSRF project financing to the public during the required dedicated revenue hearing. The worksheets can serve to identify the impacts of the SRF project on residential users and how the project fits into the project sponsor's overall capital improvement program for the water and sewer utility (or water utility, as appropriate). Supplemental capital financing documentation may be submitted with these worksheets and may be presented at the required dedicated revenue hearing.

The revenues being dedicated to repayment of the DWSRF loan are:	Net Revenues
What is the frequency of water system billing?	Monthly
How often are system rates reviewed for adequacy?	
When was the last time rates were reviewed?	2022
What resources and guidance does the water system use for setting water user rates, fees or charges?	
What is your water system bond rating?	
Is a rate increase necessary as a result of this project?	
What is the Median Household Income (MHI) for the entire system?	

Which, if any, of the following activities must be undertaken to implement the DWSRF project?

	Yes	No
Acquire privately held land?	☐	☒
Acquire land held by another public water system entity?	☐	☒
Enter into inter-local or inter-project sponsoring agency's agreements?	☐	☒
Does the system have an annual budget with a separate reserve account for equipment replacement and/or capital improvement?	☐	☐
Does the system have a capital improvement plan? How many years does it cover? 5	☒	☐
Does the system have a governing board of directors?	☒	☐
Does the water system employ the services of a professional engineer?	☒	☐
Are there procedures for billing and collection?	☒	☐

Does the system have audited financial statements?	Yes ☒	No ☐	
Are there standard purchasing procedures that provide controls over expenditures?	Yes ☒	No ☐	
What year will construction be completed and repayments begin (for the first project)?	2028		
What is the estimated cost of your SRF project?	$275M		

Note: Pages 2 – 11 of this business plan are **Not Applicable**

Please attach a copy of the user charge ordinance.

Table 1

WATER RATE REVENUE SUMMARY

		LAST YR.	YEAR 1 (Current Year)	YEAR 2	YEAR 3		SRF Project
1.	Number of Residential Customers						
2.	Number of New Residential Service Connections						
3.	Annual Residential Water Sales (Gallons)						
4.	Avg Daily Residential Usage (Gal/day) (Line 3 divided by line 1 divided by 365)						
5.	Annual Residential Water Sales ($)						
6.	Average Annual Residential Bill (line 5 divided by line 1)						
7.	Annual Residential Bill Amount Uncollected						
8.	Total Residential Rates Collected (Line 5 minus line 7)						
9.	Impact and Connection Fees per Residential Service						
10.	Total Residential Impact and Connection Fees (Line 2 times line 9)						
11.	Number of Commercial Customers						
12.	Number of New Commercial Service Connections						
13.	Annual Commercial Water Sales (Gallons)						
14.	Annual Commercial Water Sales ($)						
15.	Annual Commercial Bill Amount Uncollected						
16.	Total Commercial/Industrial Bills Collected (Line 14 minus line 15)						
17.	Impact and Connection Fees for Commercial Service						
18.	Total Commercial Impact and Connection Fees (Line 12 times line 17)						
19.	Bulk Water Sales						
20.	Total Projected Water Revenue (Line 8+10+16+18+19)						

* Large meters should be checked annually for accuracy.

Instructions for Completing Table 1

Identify the source of the above information and explain methods used to develop the projections (*Attachment #* _____). Include an explanation of any revenue and expense growth or other adjustments; for example, any rate increases, service growth, inflation adjustments, expense adjustments reflecting the cost of operating additional facilities, or other considerations. In completing this table assume through year 3 that no SRF project is constructed. In the " SRF Project" column enter the numbers that reflect the first year in which the SRF loan will begin repayments. When completing the numbers in this column assume that the SRF project will be financed using 100% loan funding.

Line 1 Include the actual number of customers for last year and year 1 (current year). The numbers in years 2 and 3 should reflect an estimated number of residential customers, adjusted for growth. In the SRF column include the expected number of customers based on constructing your SRF project.

Line 2 This line is a subset of line 1. It should reflect the number of new customers for that year.

Line 3 This line is your total volume (gallons) of water used by your residential customers. Use actual gallons sold for Last Year and do an estimate for the current year based on total to-date. To determine Year 2 and 3 water sales, first calculate the average daily residential usage in gallons per day on line 4. The estimated water sales for Year 2 and 3 can now be determined by multiplying line 4 by line 1.

Line 4 This is the average daily residential usage (gallons per day) by a single residential customer. To get this number divide line 3 by line 1. Use Last Year and Current Year to project usage for Year 2 and 3. Usage should be fairly constant.

Line 5 This is your total residential water sales in dollars. Year 2 and 3 water sales should reflect any increases in rates (i.e. due to inflation). In the SRF column list what the sales would need to be if the SRF project was a 100% loan (to meet all expenses).

Line 6 To obtain the average annual residential bill, divide line 5 by line 1.

Line 7 This is the amount of the uncollected residential bills outstanding for the year.

Line 8 Line 5 minus line 7.

Line 9 This line is the impact and connection fee for new residential service.

Line 10 Multiply line 2 by line 9.

Line 11 Include the actual number of customers for last year and year 1 (current year). The numbers in years 2 and 3 should reflect an estimated number of commercial customers, adjusted for growth. In the SRF column include the expected number of customers based on constructing your SRF project.

Line 12 This line is a subset of line 11. It should reflect the number of new customers that will be charged an impact or connection fee.

Line 13 This line is your total volume (gallons) of water used by your commercial accounts.

Line 14 This is your total commercial water sales in dollars. Year 2 and 3 water sales should reflect any increases in rates (i.e. due to inflation). In the SRF column list what the sales would need to be if the SRF project was a 100% loan (to meet all expenses).

Line 15 This is the amount of the uncollected residential bills outstanding for the year.

Line 16 Total revenue collected for commercial accounts (line 14 minus line 15).

Line 17 This line is the impact and connection fee for new commercial/industrial accounts.

Line 18 Multiply line 12 by line 17.

Line 19 Total revenue for bulk water sales to consecutive systems.

Line 20 Total of line 8+10+16+18+19.

TABLE 2

INCOME, EXPENSES, AND CASH FLOW STATEMENT

Income, Expense, and Cash Flow Statement		Last Yr.	Year 1	Year 2	Year 3		SRF Project
	OPERATING REVENUES						
1	Water Rates						
2	Fire Protection						
3	Fees and Services						
4	Interest Income						
5a	Other –						
5b	Other –						
6	**Total (Lines 1 - 5)**						
	NON-OPERATING REVENUES						
7	Interest Income						
8	Interfund Transfer						
9	Proceeds from the Sale of Assets						
10	Leases and Extraction Fees						
11	Construction Grants						
12	Proceeds from Borrowing						
13	Equity Contribution						
14	Other -						
15	**Total (Lines 7 - 14)**						
	OPERATING EXPENSES						
	OPERATION AND MAINTENANCE						
16	Salaries (Operators)						
17	Benefits						
18	Utilities						
19	Chemicals & Treatment						
20	Monitoring						
21	Materials, Supplies & Parts						
22	Transportation						
23	Purchased Water Costs						
24	Outside Services –						
25	Other –						
26	**Total (Lines 16 – 25)**						

	ADMINISTRATIVE						
27	Salaries and Benefits						
28	Building Overhead						
29	Office Supplies & Postage						
30	Insurance						
31	Customer Billing & Collection						
32	Accounting and Legal						
33	A/E & Professional Services						
34	Other -						
35	**TOTAL (Lines27 – 34)**						
36	**Net Operating Income (Line 6 minus 26 minus 35)**						
	NON-OPERATING EXPENSES						
37	Debt-Repayment – Principal and Interest						
38	Capital Improvements Acquisition of Plant Equipment						
39	Interfund Transfers						
40	To General Fund						
41	To Replacement Fund						
42	To Emergency Fund						
43	Depreciation Expenses (If money is set aside)						
44	Other -						
45	**TOTAL (Lines 37 + 44)**						
46	**Net Non-Operating Income (Line 15 minus Line 45)**						
47	**Net Income Before Taxes (Lines 36 + 46)**						
	TAXES (N/A for publicly owned systems)						
48	Income Taxes						
49	Other Taxes						
50	**TOTAL (Lines 48 + 49)**						
51	**Net Income After Taxes (Line 47 minus 50)**						

Instructions for Completing Table 2

Identify the source of the above information and explain methods used to develop the projections (*Attachment #* _____). Include an explanation of any revenue and expense growth or other adjustments; for example, any rate increases, service growth, inflation adjustments, expense adjustments reflecting the cost of operating additional facilities, or other considerations.

<u>REVENUES</u>-	Revenues include all sources of income to the system. They are separated on this form as: "Operating", lines 1-6 and "Non-Operating", lines 7-15. When using the subcategory "other" under any item, please write a descriptive term.
<u>EXPENSES</u>-	Expenses include all those activities or purchases which incur cost for the system. Expenses can be estimated in various ways. One method bases the projections on historical expense. This can be accomplished by using historical costs and escalating them from known and projected changes. An example of a known change would be an increase in labor costs for the budget period due to known or anticipated salary increases. An example of a projected increase or escalation in costs would be a 5% annual inflation rate. Materials and Supplies expense, for instance, would be expected to increase with the projected inflation rate. Expenses are separated on this form in the same fashion as Revenues with further subtopics to more clearly define expenses. When using the subcategory "other" under any item please write a descriptive term and cross out the word "other". Expenses are separated on this form as "Operating", lines 16-26, "Administrative", lines 27-35, "Non-Operating", lines 37-45, and "Taxes" lines 48-50.
Lines 1	This line includes all money received for supplying water service. Information should come from completed Attachment 1.
Line 2	If a separate fee is charged for fire protection include on this line.
Line 3	Include all miscellaneous fees and charges generated by providing water service other than for the actual water service (for example, connection fees, bad check fees, reconnect fees, meter testing fees, etc.).
Line 4	Interest earned from cash on hand or on fees financed by the utility.
Line 5	If used, please describe.

Non-operating revenues are funds generated outside the water system and used by the water system to cover expenses.

Lines 7-15	Items should be clear, modify topics if needed.
Lines 16-17	Salaries and Benefits (Operators), include all compensation to employees of your system when the work is related to the system's O&M. This account should not include compensation of officers, directors, or general and administrative staff. Volunteer labor cannot be applied.
Line 18	Utilities, includes the cost of all electric power, gas, telephone, water (at least account for what is being used at the plant), and any other system-related expenses incurred in producing and delivering water.

Line 19	Chemicals and treatment is intended to cover the cost of all chemicals used in the treatment of your water.

Line 20	Monitoring, includes all water monitoring costs incurred by the system. This should include both in-house monitoring and analysis costs as well as outside laboratory costs.

Line 21	Materials, supplies, and parts means all materials and supplies used in the O&M of the water system and in providing and delivering the water to the customer. Include any repairs or parts needed in producing and delivering water. This would include grease, oil, and minor repairs to equipment. This should not include materials for administrative purposes such as postage, copying or copy machine supplies, billing forms, or letterhead.

Line 22	Transportation is intended to include all expenses related to trucks, automobiles, construction equipment, and other vehicle expense used in producing and delivering water to the customer.

Line 23	Include the cost of purchasing water. Use only if a consecutive system.

Administration expenses are considered overhead but not those directly related to O&M of the daily production and delivery of water to the customer. This category includes billing and administrative costs incurred by the system. For example, all meter reading costs, secretarial costs, postage, publications, reference materials, uncollectible debts insurance accounting services, and all other overhead items belong in this subsection.

Lines 27	Salaries and Benefits include all compensation to employees of your system in which the work is related to the administration of the system, such as officers, directors, secretarial, and meter reading salaries and benefits. This account should not include compensation of operators. If an employee performs both operation and meter reading a percentage of their salary should appear under the appropriate topic. For example, if an operator reads meters 25% of the time, ¾ of their salary should be shown on line 16 and ¼ of their salary on line 27.

Line 28	Overhead associated with the building itself such as, mortgage payment, insurance, taxes, maintenance, etc.

Line 29	Office supplies and postage includes all materials and supplies in administration of the water system. This includes office supplies, postage, copier charges, and paper.

Line 30	Insurance (Vehicles, Liability, Workers' Compensation) includes all insurance costs associated with the coverage for the vehicles, general liability, workers' compensation insurance, and other insurance costs related to the operation and administration of the system.

Line 31	Customer billing and collection should include all expenses specific to this function such as, special billing forms or software.

Lines 32	Accounting and legal expenses includes all salaries and wages with legal and accounting functions for the system even if they are outside services.

Line 33	A/E and professional services means all engineering and other professional services expenses associated with water system planning and design requirements.

Line 34 Other means expenses such as employee training and water certification requirements (classes, registration fees, travel, etc.), public relations campaigns and public notifications, etc. Also include any recurring expenses that did not fit into any of the above line items.

Non-operating expenses are ones that are necessary and paid by the water system, but are not part of daily O&M or Administration of the system. Debt Repayment and Capital Improvements are typical items that may appear on this type of analysis.

Lines 37-42 Expenses that are involved in operating or administering the water system that were not considered in the totals appearing on lines 26 and 35 should be shown in these items, modify if necessary.

Line 38 Capital improvements include facility and non-facility costs related to: 1) Meeting growth requirements or improving your system's infrastructure to provide better service and reliability to existing customers, 2) replacing or renovating existing facilities, or 3) to ensure compliance with drinking water regulations.

Line 39-42 Identify any transfer of funds used to offsets other non-water system related capital expenditures. These lines represent some possible categories, modify if needed.

Line 43 Depreciation expense only applies to systems which are currently depreciating investments made in the past (recovery of previously invested funds). Include amounts on this line only if money is actually set aside.

Line 44 Include any recurring non-operating expenses that did not fit into any of the above line items.

Taxes can be incurred in a variety of ways such as a state utility tax, business and occupation tax, property tax or federal income tax. Each of these taxes can be accounted for separately within the operating budget, modify if necessary.

Lines 48-49 Include any incurred taxes.

Table 3

SCHEDULE OF PRIOR, PARITY, AND PROJECTED LIENS

List annual debt service beginning two years before the anticipated loan agreement date and continuing at least fifteen fiscal years. Include all existing and projected liens on the system. Use additional pages as necessary.

Identify Each Obligation	**Coverage**		**Insured?**
#1 ________________________			
#2 ________________________			
#3 ________________________			
#4 ________________________			
#5			

~~**Annual Debt Service (Principal Plus Interest)**~~

Fiscal Year	#1	#2	#3	#4	#5	Total Debt Service	Total Debt Service Incl. Coverage
2000							
2001							
2002							
2003							
2004							
2005							
2006							
2007							
2008							
2009							
2010							
2011							
2012							
2013							
2014							
2015							
2016							
2017							
2018							
2019							
2020							
2021							
2022							

SCHEDULE OF PRIOR, PARITY, OR PROJECTED REVENUES AND DEBT COVERAGE FOR RATE-BASED SYSTEM PLEDGED REVENUE

(Provide information beginning with the two fiscal years preceding the anticipated date of the first SRF loan repayment.)

		FY ____	FY ____	FY ____	FY ____	FY ____
(a)	Net Operating Revenues. (Table 2 line 36)	____	____	____	____	____
(b)	Debt Service (including required coverage) pledged to all prior, parity, or projected projects (last column of Table 3).	____	____	____	____	____
(c)	Net Revenue (= a – b)	____	____	____	____	____

(d) Attach audited annual financial report(s), or pages thereof, and any other documentation necessary to support the above information. Include any notes or comments from the audit reports regarding compliance with covenants of debt obligations having a prior or parity lien on the revenues pledged for repayment of the SRF loan. (*Attachment #* _____)

(e) Attach worksheets reconciling this page with the appropriate financial statements (for example, backing out depreciation and interest payments from operating expenses). (*Attachment #* _____)

(f) If the net revenues were not sufficient to satisfy the debt service and coverage requirement, please explain what corrective action was taken. (Attachment #_____)

(k) Identify the source of the above information and explain methods used to develop the projections (Attachment # _____). Include an explanation of any revenue and expense growth or other adjustments; for example, any rate increases, service growth, inflation adjustments, expense adjustments reflecting the cost of operating additional facilities, or other considerations.

LIST OF ATTACHMENTS (use additional sheets if necessary)

Attachment	Number

TECHNICAL: Accurate answers to the following questions will help identify the technical strengths as well as areas that may need improving within your system. If a question or section does not apply to your system, please write N/A for not applicable. For questions that ask you to rate your system from 1 to 5, answer 1 for worst case scenario and answer 5 for the best case scenario.

- System has current and accurate data showing average and peak gpd used — Yes ☒ No ☐
- System's capacity exceeds peak demand by more than 20% (Percentage - %) — Yes ☐ No ☒
- System can meet peak demand without pumping at peak capacity for extended periods. — Yes ☒ No ☐
- System has an emergency plan in place to meet system demand during a shortage (natural disaster or largest pump/well out, etc.) — Yes ☒ No ☐
- System has accurate records indicating types and percentage of customers use: — Yes ☒ No ☐
Residential 96.47% Commercial 0.02% Industrial 0.00% Dedicated Irrigation Meter 3.51%
- System has comprehensive water loss program that compares amount of water produced (plant meter) with total delivered through metered and unmetered service connections (system's unaccounted for water is 15.24% in 2023%) — Yes ☒ No ☐

Purchase Water Systems **NA** ☒

System has a written agreement with the supplier that:

- ensures adequate supply of water during shortage conditions, — Yes ☐ No ☐
- does not require the purchase of a minimum amount of water (water is supplied through a meter), — Yes ☐ No ☐
- assures supplying water system will remain in compliance with the appropriate State or federal regulations, and — Yes ☐ No ☐
- assures purchasing system will be notified of any water quality issues. — Yes ☐ No ☐

Surface Water Systems and Systems Using Ground Water Under the Influence of Surface Water **NA** ☒

- System has redundancy for all critical treatment components — 1 2 3 4 5
- System monitors raw, settled, and individual filtered water turbidity — 1 2 3 4 5
- System consistently (95% of the time) has a filtered water turbidity of _____%, which is within the current standard of .3 NTU — 1 2 3 4 5
- System has the capability to add coagulant before the filter and disinfect at various points in the treatment process — 1 2 3 4 5
- System is evaluating (or has evaluated) changes necessary to meet the Enhanced Surface Water Treatment Rule — 1 2 3 4 5
  Some needed changes are: ______________________________
  ____
- System is evaluating (or has evaluated) changes needed to meet requirements in the Disinfection By Products Rule — 1 2 3 4 5
  Some planned modifications are: ______________________________

Ground Water System NA ☐

- A minimum of two sources of groundwater are provided — Yes ☒ No ☐
- Source water protection area provides a minimum 500 foot radius around each drinking water well — Yes ☒ No ☐
- Groundwater source capacity equals or exceeds the design maximum day demand and equals or exceeds the design average day demand with the largest producing well out of service — Yes ☒ No ☐
- System monitors raw water quality to determine appropriate treatment — 1 2 3 4 (5)
- System's well(s) have; air/vacuum relief valve, check valve, blow-off, by-pass, meter, working sanitary seal, construction/maintenance records and are properly vented — 1 2 3 4 (5)
- System routinely monitors drawdown — 1 2 3 4 (5)

Disinfection

- System has adequate contact time of >80 minutes following disinfection and before the first user in the distribution system — Yes ☒ No ☐
- Disinfection equipment is regularly inspected and maintained — Yes ☒ No ☐
- A chlorine residual is maintained throughout the distribution system — 1 2 3 4 (5)

Distribution System

- System has accurate information, including age, for pipe materials that currently make up the distribution system — 1 2 3 (4) 5
- Water mains providing fire protection are a minimum of 6-inches in diameter — Yes ☒ No ☐
- System is free of severe "water hammer" problems — 1 2 3 4 (5)
- System tracks ranges of operating pressure, especially during peak demand — 1 2 3 4 (5)
- System maintains a minimum operating pressure of 20 psi — Yes ☒ No ☐
- Normal operating pressure is kept between 40 and 100 psi — 1 2 3 4 (5)
- System has a routine leak detection program that uses (type of equipment) monitoring demands[JB1][JB2], repairs identified leaks quickly, and keeps water loss in the distribution system below 15.24%. Average number of leak repairs per year is 3 — 1 2 (3) 4 5
- System has a cross connection control program in place that addresses: evaluation of each service connection, installation of specified backflow preventer, training, record keeping, annual testing, and education — 1 2 3 4 (5)
- System is working to eliminate dead ends in the mains — 1 2 3 (4) 5

- System has a flushing program that operates 2 times a year 1 2 3 4 5

- System has a map showing the bacteriological, lead and copper, and TTHM (if applicable) sampling points 1 2 3 4 5

- System has accurate "as-built" maps of the distribution system posted that show: location of sources (or intakes), size of mains, dead end mains, valves, curb stops on service lines, and proximity of mains to other utilities (gas, electric, etc.) 1 2 3 4 5

- System has a routine valve exercise program 1 2 3 4 5

- All customers are metered and all meters are routinely calibrated 1 2 3 4 5

- Customer complaints are relatively infrequent 1 2 3 4 5
  List number of complaints in the past year: 128.

Pumping

- System has a pump maintenance program that includes annual inspection, scheduling of repair, and routine maintenance that is conducted by a qualified contractor 1 2 3 4 5

- System has standby or emergency power equipment that is routinely tested under load and can provide 100% of the average daily demand for 5 days 1 2 3 4 5

Storage

- System is able to meet peak demand without the high service pumps running at peak capacity for extended period 1 2 3 4 5

- System has adequate reserve capacity for fire protection. 1 2 3 4 5
  Total storage capacity of the system is 8,500,000 gals

- System's 5 storage tanks receive routine inspection (every 3-5 years) to determine and schedule any needed maintenance 1 2 3 4 5

- All storage tanks are equipped with an altitude valve to prevent overflowing and are sized appropriately to ensure adequate turnover and no loss of water quality 1 2 3 4 5

- Storage tanks are covered and the surrounding areas are fenced 1 2 3 4 5

- Storage tanks have a drain valve and an entry hatch to allow access for cleaning and painting of the interior of the tank 1 2 3 4 5

MANAGERIAL: Answering the next set of question will help the system clearly define responsible parties, staffing needs, operational needs, policies, and internal standard that guide system performance. For questions that ask you to rate your system from 1 to 5, answer 1 for worst case scenario and answer 5 for the best case scenario.

- System has a current organizational chart and accompanying position descriptions that clearly define responsibilities of staff members — 1 2 3 4 (5)
- The plant is a category 1A plant operating 24 hours per day.

List names, class, and license numbers for all operators fulfilling staffing requirements:[JB3][JB4][JB5]

William Blake, [DWA], 0013407; Christopher Bartley, [DWA], 0022315; Greg Colden, [DWA], 0022082;
Tracy Bean, [DWC], 0014373; Daniel Rolon, [DWC], 0020436; Brian Robertson, [DWC], 0025245;
Amirbahador Zandi, [DWB], 0028713; Odvylles Ostane, [DWC], 0029075;
Zane Bucknell, [DWC], 0029652;

- System is satisfied with service provided by contract operator(s) — (NA) 1 2 3 4 5
- The operator's authority and responsibilities are clearly defined — 1 2 3 4 (5)

Policies and Plans: Please indicate with a check mark the items for which the water system has written policies or plans.

☐ standard specifications
☒ bacteriological sampling plan
☒ cross connection control plan
☐ general rules
☒ disaster response plan
☒ connection policies
☒ emergency operation plan
☒ record management plan
☐ disconnection policy
☒ personnel policy
☐ main extension policies
☒ Lead & Copper sample plan
☒ TTHM
☐ public education & outreach
☐ Safety/Risk Management Policy

- Based on the answers above the system has: clear organizational structure, defined staffing requirements, and appropriate rules/policies — 1 2 3 4 (5)

Operations and Maintenance: The items that follow are elements that may be contained in a thorough Operations and Maintenance (O&M) manual. A complete O&M manual is useful as a quick reference for anything from trouble shooting to emergency procedures. Please indicate with a check mark those items contained in the system's O&M manual.

Introduction and Overview

☒ System name
☒ design flow capacity
☐ available training
☒ System ID#
☒ type of treatment
☐ publications available
☒ location
☒ water source
☐ Statement of the purpose of the manual and relay to the operator how to best obtain pertinent information
☒ organizational chart (note which activities require qualified and licensed/certified personnel)

General System Description

☒ a flow schematic (source to distribution)
☒ pumping capabilities (source, chemicals, and high service)
☒ storage (raw, finished water, and chemicals)
☒ system map showing location of all wells, intake structures, pumping stations, storage tanks, and the defined service area

System Operation and Control

☒ identification of major system components including a description of the normal operation of each component

- ☒ possible alternative operation modes and circumstances under which they would be used
- ☒ schematic diagrams of each treatment process
- ☒ preventative maintenance program (include inspections performed when the facility is off-line)
- ☒ common operating problems with methods of bypassing while being repaired
- ☒ importance of and how to use laboratory tests for process control
- ☒ routine system operation for each major system component this should include startup and shutdown procedures, safety procedures, and meter reading
- ☒ evaluation of overall system performance

Laboratory Testing

- ☒ identification of samples and tests needed for compliance as well as for process control.
- ☒ sampling locations, time, and methods
- ☒ how to interpret laboratory results and the use of these results to improve the process
- ☒ what should be in laboratory supply and chemicals inventory
- ☒ list of laboratory references;
- ☒ instructions for filling out worksheets for a sample (include completed example)
- ☒ for tests to be performed by outside laboratories, the name of the laboratory, contact person, telephone number, and method of requesting sample pick-up or schedule for sample pick-up

Records and Reports Section

- ☒ a general explanation of the purpose and importance of accurate records and reports
- ☒ a log of complaints and responses
- ☒ daily logs, maintenance records, laboratory records, monthly reports, monitoring reports, sanitary surveys, annual reports, operating cost reports, and accident reports.
- ☒ historical records (permits, standards, pumping capacity, consumption, and drawdown)
- ☒ list of equipment warranties and provisions
- ☒ specific area for filing records
- ☒ procedures for reporting to appropriate agencies (specify how long records should be kept)

Maintenance

- ☒ general information including purpose and value of scheduled and preventative maintenance
- ☒ preventative maintenance schedule and sample worksheets with instructions
- ☒ specifications for fuels, lubricants, filters, etc. for equipment
- ☒ troubleshooting charts or guides which reference pages in manufacturers' O&M manual or system's O&M manual as appropriate
- ☒ a record of data plate information on each piece of equipment maintained, this should include manufacturers' maintenance schedule for routine adjustments
- ☒ a work order system for maintenance of equipment with sample forms to accurately track O&M costs for each piece of equipment
- ☒ brief operation instructions for each piece of equipment with reference to the manufacturers' technical specifications for major system components
- ☐ a mechanism for storage and check out of specialized equipment used infrequently
- ☒ list of outside contract maintenance tasks
- ☒ contact person and phone numbers for equipment manufacturers, major suppliers, and all utilities serving the system
- ☒ list of special tools used and how to replace
- ☒ stocks of spare parts, supplies, chemicals and other items vital to system operation
- ☒ a system of requisitions and/or work orders used to distribute parts, supplies, chemicals, etc. for reorder purposes

Emergency Response Program

- ☒ pre-response activity such as; personnel assignments, emergency equipment inventory, filling a storage tank before a storm hits, copies of all emergency numbers. Laminated copy of phone numbers to keep readily accessible should include water system personnel responsible for making decisions in specific situations; including name, job title, home and work phone number (pager/cell phone number if available), police, fire departments, and for chemical spills or exposure CHEMTECH 800-424-9300.

☒ safety procedures for all personnel involved in the response
☒ a contingency plan to ensure proper treatment of water even in adverse conditions which may include agreements with nearby water systems for equipment or personnel
☒ procedures for putting standby and emergency sources into active service
☒ procedures for notifying customers, the local health jurisdiction, and EPA of water quality problems
☒ systematic procedure for returning to normal operation

Appendix

The appendix can contain documents and other information that cannot be easily incorporated into the body of the manual. Large documents such as copies of plans and specifications may be stored separately from the main manual. The following list has examples of items that might be included in appendices. Please check all that apply to your O&M Manual.

☒ Detailed design criteria	☐ User Charge System	☐ Approved shop drawings
☒ Schematics	☐ Piping color codes	☐ Valve indices or schedule
☐ As-built drawings	☐ Drinking water rules/Ordinance	☐ Manufacturers' manuals

- Based on the answers above please rate the system's current O&M Manual. 1 2 (3) 4 5

The last set of questions is designed to help you evaluate the systems' source(s). Please read the item then circle the number from 1 (needs improving) to 5 (top notch) that you feel best describes your systems' current status relative to that item or check boxes as appropriate.

- System has an active Source Water Assessment Program 1 2 3 (4) 5

For Ground Water Systems:

- System has accurate historical information (like well driller's log and construction records) for each well 1 (2) 3 4 5
- Well(s) have the "zone of contribution" identified on a map 1 2 (3) 4 5
- No storage of potential contaminants in close proximity of well(s) 1 2 3 4 (5)
- Well(s) are housed and fenced and have an appropriate concrete pad 1 2 3 4 (5)
- Well casing(s) extend at least 12" above floor or ground 1 2 3 4 (5)
  Name of aquifer is known: ☒ Yes ☐ No
  Aquifer is: Surficial Biscayne ☐ Confined ☒ Unconfined

For Surface Water Systems: Not Applicable

- Commercial, industrial, or agricultural operations up stream are identified 1 2 3 4 5
- System has provided a contact to these facilities in case of an accidental release 1 2 3 4 5
- System performs up stream monitoring 1 2 3 4 5
- System has a raw water reservoir of _____ gallons that acts as a buffer 1 2 3 4 5

Overall:

- System has adequate knowledge and program activity to protect and ensure an adequate supply of drinking water 10 years into the future 1 2 3 4 (5)

CERTIFICATION: I, the undersigned authorized representative of the applicant, hereby certify that all information contained in this form and attachments is true, correct, and complete to the best of my knowledge and belief. I also certify that I have been duly authorized to file the business plan and to provide these assurances.

Signature Of Authorized Representative ________________________________

Name (Please Print) ________________________________

Title ________________________________

Address ________________________________

City ____________________ State ________ Zip ____________

Phone ____________________ Fax ____________________

Appendix E Adopting Resolution

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RESOLUTION NO. 121-24

A RESOLUTION OF THE CITY COMMISSION OF THE CITY OF DELRAY BEACH, FLORIDA, ADOPTING A WATER FACILITY PLAN FOR THE CONSTRUCTION OF A NEW WATER TREATMENT PLANT, RELATING TO THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION, STATE REVOLVING FUND; AUTHORIZING THE CITY MANAGER TO TAKE ANY AND ALL ACTIONS NECESSARY TO EFFECTUATE THE INTENT OF THIS RESOLUTION; PROVIDING AN EFFECTIVE DATE; AND FOR OTHER PURPOSES.

WHEREAS, Florida Statutes provide for loans to local government agencies to finance the construction of water facilities; and the Florida Administrative Code requires the formal authorization by the City Commission to formally adopt a facility plan outlining necessary water facility improvements to comply with State of Florida funding requirements; and

WHEREAS, formal adoption of the proposed Facility Plan is required for the City of Delray Beach to participate in the State Revolving Loan Fund Program; and

WHEREAS, the City Commission of the City of Delray Beach, Florida agrees with the findings and summary of necessary improvements as outlined in the Facility Plan for the purpose of water treatment plant facility improvements.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF DELRAY BEACH, FLORIDA, AS FOLLOWS:

Section 1. The foregoing recitals are hereby affirmed and ratified.

Section 2. The City of Delray Beach is authorized to approve and hereby adopts the Facility Plan, attached hereto and incorporated herein as Exhibit "A".

Section 3. The City Manager is hereby designated as the authorized representative to provide the assurances and commitments required by the Facility Plan. The City Manager is authorized to represent the City in carrying out the responsibilities under the Facility Plan and to delegate responsibility to appropriate City Staff to carry out technical, financial, and administrative activities associated with the Facility Plan. The City Manager is authorized to take any and all actions necessary to effectuate the intent of this Resolution.

Section 4. This Resolution shall become effective immediately upon adoption.

PASSED AND ADOPTED in regular session on the ____ day of ______________, 2024.

ATTEST:

______________________________	______________________________
Katerri Johnson, City Clerk	Thomas F. Carney, Jr., Mayor

Approved as to form and legal sufficiency:

____

Lynn Gelin, City Attorney

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