CITY OF MARGATE, FLORIDA

ORDINANCE NO. _____

AN ORDINANCE OF THE CITY OF MARGATE, FLORIDA, ADOPTING AMENDMENTS TO THE CITY OF MARGATE, FLORIDA'S COMPREHENSIVE PLAN; AMENDING ELEMENT III, "SANITARY SEWER, SOLID WASTE, DRAINAGE, POTABLE WATER AND NATURAL GROUND WATER, AQUIFER RECHARGE"; AMENDING PART 1, "POTABLE WATER" IN ORDER TO ADOPT THE UPDATED TEN-YEAR WATER SUPPLY FACILITIES WORK PLAN, PURSUANT TO SECTION 163.3177, FLORIDA STATUTES; PROVIDING FOR TRANSMITTAL TO THE FLORIDA DEPARTMENT OF COMMERCE; PROVIDING FOR REPEAL; PROVIDING FOR SEVERABILITY; PROVIDING FOR CODIFICATION; PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, Chapter 163, Part II, Florida Statutes (F.S.), Section 163.3177 requires local governments to prepare and adopt Ten-Year Water Supply Facilities Work Plans into their comprehensive plans after the South Florida Water Management District (SFWMD) approves a regional water supply plan or its update.

WHEREAS, this ordinance provides a required update to the Margate Water Supply Facilities Work Plan following the adoption of SFWMD's 2018 Lower East Coast Water Supply Plan Update.

WHEREAS, the Margate Planning and Zoning Board, which serves as the Local Planning Agency, held a public hearing on March 5, 2024, regarding the amendment, and recommended that the City Commission approve the Amendment.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COMMISSION OF THE CITY OF MARGATE, FLORIDA:

SECTION 1: That Element III, "Sanitary Sewer, Solid Waste, Drainage, Potable Water And Natural Ground Water, Aquifer Recharge," Part 1, "Potable Water," of the City of Margate's Comprehensive Plan is hereby amended to provide

for an update to the City of Margate's Ten-Year Water Supply Facilities Work Plan, as more fully described in Exhibit "A," which is attached hereto, and incorporated herein by reference.

Section 2: That the City Commission directs City Administration to transmit the Comprehensive Plan amendment to the Florida Department of Commerce in accordance with Section 163.3184, Florida Statutes.

SECTION 3: All ordinances or parts of ordinances in conflict herewith are and the same is hereby repealed to the extent of such conflict.

SECTION 4: If any section, sentence, clause, or phrase of this ordinance is held to be invalid or unconstitutional by a court of competent jurisdiction, then said holding shall in no way affect the validity of the remaining portions of this ordinance.

SECTION 5: It is the intention of the City Commission that the provisions of this ordinance shall become and be made a part of the City of Margate Code of Ordinances, and that the sections of this ordinance may be renumbered or relettered and the word "ordinance" may be changed to "section", "article" or such other appropriate word or phrase in order to accomplish such intentions.

SECTION 6: That the effective date of this plan amendment, if the amendment is not timely challenged, shall be 31 days after the state land planning agency notifies the City of Margate that the plan amendment package is complete. If the amendment is timely challenged, this amendment shall become effective on the date the state land planning agency or the Administration Commission enters a final order determining this adopted amendment to be in compliance.

PASSED ON FIRST READING THIS_____day of_____ 2024.

PASSED ON SECOND READING THIS____day of_____ 2024.

ATTEST:

_____ _____

JENNIFER M. JOHNSON
CITY CLERK

TOMMY RUZZANO
MAYOR

RECORD OF VOTE - 1ST READING		RECORD OF VOTE - 2ND READING	
Caggiano	_____	Caggiano	_____
Simone	_____	Simone	_____
Arserio	_____	Arserio	_____
Schwartz	_____	Schwartz	_____
Ruzzano	_____	Ruzzano	_____

ORDINANCE EXHIBIT A:

2024 UPDATE TO MARGATE COMPREHENSIVE PLAN, ELEMENT III, PART 1, INCLUDING THE WATER SUPPLY FACILITIES WORK PLAN

City of Margate – Comprehensive Plan Amendment

Element III

Sanitary Sewer, Solid Waste, Drainage, Potable Water & Natural Groundwater Aquifer Recharge

Part 1 – Potable Water

October 2020

Hazen and Sawyer

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1. Service Area

The City of Margate provides water services to approximately 62,300 people located within the City limits of the City of Margate and the southern portion of the City of Coconut Creek. The service area encompasses 10.7 square miles and the land use is predominantly residential. The City owns and maintains the entire water supply, treatment, and distribution system, and is the sole entity responsible for planning, financing, constructing, and operating the facilities that supply water within its service area.

In 1957, a private utility company, the Margate Utilities Corp. was established and the City's first water treatment plant and distribution system was built. In June 1968, the company was sold to the Margate Utility Authority (MUA), a not-for-profit corporation. In 1977, the City assumed the operation of the utility and MUA's debt. The City's Department of Environmental and Engineering Services (DEES) currently owns and operates the potable water supply and wastewater treatment facilities serving the entire geographical area within the City's corporate limits and a portion of the City of Coconut Creek. The detailed service area boundary map is provided in **Figure III-1**. The City and its water service area are primarily residential with a mix of apartments, condominiums, single-family homes, shopping centers, schools, and health care facilities.

2. Population and Water Consumption

Population projections and the average historic five-year water demand per person per day were used to forecast water demand within the City's water service area. The historic and forecasted populations and water demands are provided in Section 4 of the 2020 update to the City of Margate Water Supply Facilities Work Plan (Work Plan) provided in **Attachment – A**.

3. Existing Facilities

The raw water source for the City's water system is the Biscayne Aquifer, a porous underground formation that underlies most of Miami-Dade, Broward, and Palm Beach Counties. The Biscayne Aquifer has been designated as a "sole source" of drinking water supply for Southeastern Florida by the United States Environmental Protection Agency.

In addition to direct rainwater recharge, the aquifer receives stored fresh water from Lake Okeechobee and the interior Conservation Areas through a system of canals owned and operated by the South Florida Water Management District (SFWMD). These canals are hydrologically linked to the shallow aquifer. Except for the relatively high calcium hardness and occasionally high iron content, the Biscayne Aquifer water is suitable for most domestic, commercial, and industrial uses.

The City's water system includes a 13.5-million gallon per day (mgd) water treatment plant (WTP) fed with raw water from 12 Biscayne Aquifer wells; a water distribution system with 213.4 miles of distribution mains; a remote 2 million gallon (MG) water storage tank facility, and four interconnects with neighboring municipalities. The distribution system includes 17,004 service connections to residential, commercial, and local government customers.

This 2020 update reflects new language and replaces entire text from the 2015 update of the Potable Water Element. Therefore, the text in this update is not underscored. This update also incorporates the updated Water Supply Facilities Work Plan, required by the Florida Legislature.

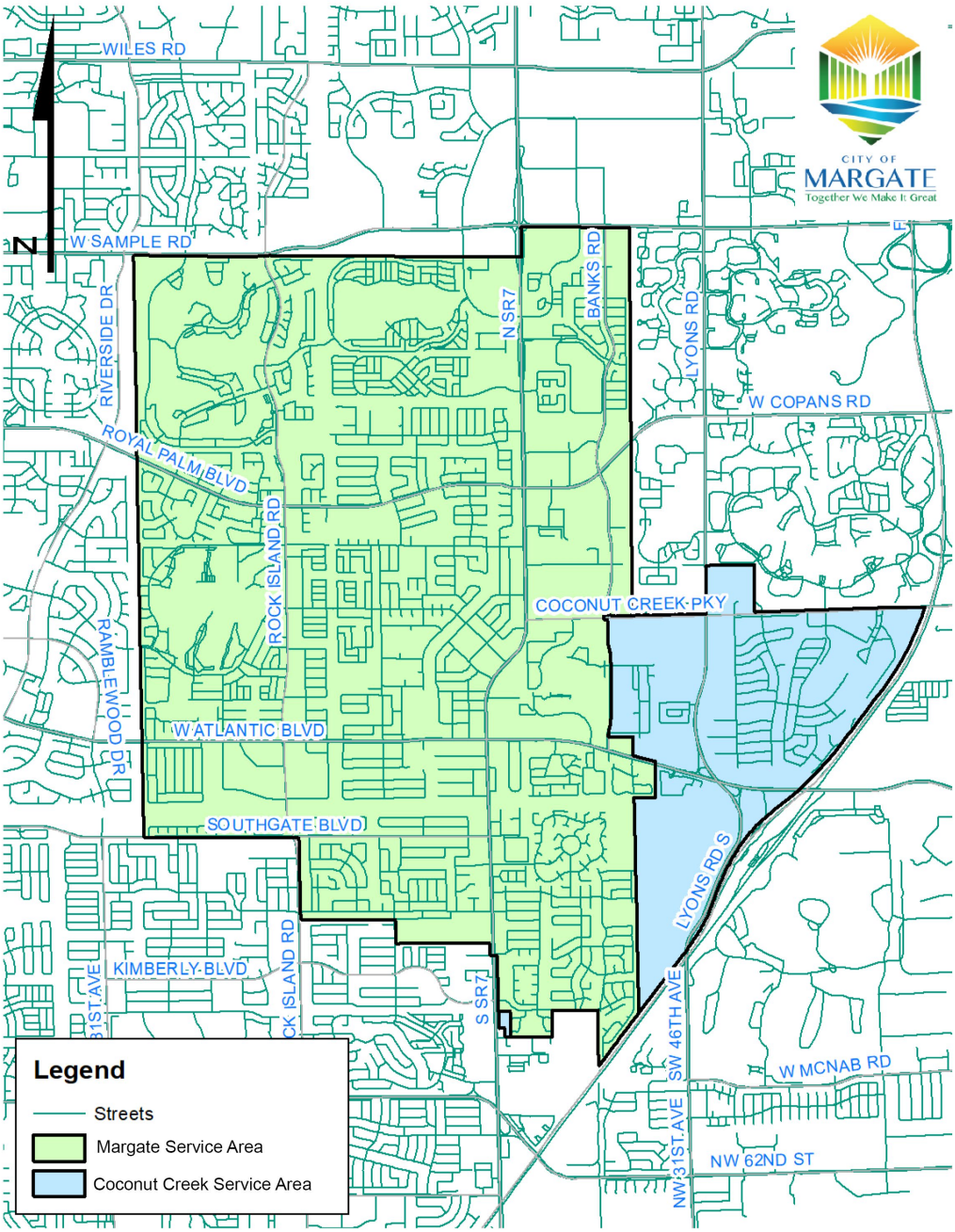

Figure III-1: City of Margate's Water Service Area Boundaries

This 2020 update reflects new language and replaces entire text from the 2015 update of the Potable Water Element. Therefore, the text in this update is not underscored. This update also incorporates the updated Water Supply Facilities Work Plan, required by the Florida Legislature.

4. Water Supply

The raw water quantities permitted to be pumped from the City's wellfield are governed by the SFWMD. Currently, the City may withdraw up to an annual average daily quantity of 8.53 mgd from the Biscayne aquifer through its 12 withdrawal wells. This quantity represents the City's "base condition water use". Under the SFWMD's Regional Water Availability (RWA) Rule adopted on February 16, 2007, raw water withdrawals from the Biscayne Aquifer are limited to the permittee's "base condition water use" which is defined as the basis for establishing permitted water quantities. For a water utility, the "base condition water use" is the maximum quantity of water withdrawn by the applicant from the permitted source during any consecutive twelve-month period during the five years preceding April 1, 2006.

After the year 2040, the City's forecasted raw water demand will be greater than its "base condition water use". Withdrawals from the Biscayne aquifer above the established base condition water use are only authorized if the Permittee has received the required offset water to prevent an increase in volume or change in timing of surface and groundwater withdrawn from the Lower East Coast Everglades Waterbodies over the base condition water use.

On December 4, 2019, the City signed a capacity allocation agreement for 2.00 mgd of storage capacity in the C-51 Reservoir that will allow the City to withdraw an additional estimated 2.00 mgd from its wellfield once the reservoir becomes operational. In its recent water use permit modification application, which was approved by the SFWMD on September 2, 2020, the City requested that 1.57 mgd of this 2.00 mgd be used as offset water to supply future water demands through 2065. This offset will allow the City to withdraw an annual average daily quantity of 10.10 mgd and an annual average daily maximum month quantity of 11.09 mgd. The reservoir is expected to become fully operational by September 2022 at which time the City will be able to withdraw all of its allocated 10.10 mgd.

5. Adequacy of Water Supply through 2040

During the period 2020 to 2040, the forecast of average daily raw water withdrawals from the City's Biscayne Aquifer wellfield is below the City's base condition water use. Once the C-51 Reservoir becomes operational, permitted water withdrawals from the Biscayne aquifer will increase to 10.10 mgd providing sufficient water supply through 2040 and beyond. During the period 2020 to 2040, there is enough water treatment capacity available to supply the forecasted water demand.

6. Water Supply Capital Improvements

The City's capital improvement projects include the purchase of water storage from the C-51 Reservoir in an amount that will provide 2.00 mgd of water supply on an annual average daily basis. This water supply will be used as offset water to support additional permitted withdrawals from the Biscayne aquifer to supply the future water demands of the City's water service area through the year 2065. Other than capacity from the C-51 Reservoir, all capital improvement items included in the City's five-year capital improvement plan are intended to replace and rehabilitate the existing water infrastructure as components reach the end of their useful lives.

This 2020 update reflects new language and replaces entire text from the 2015 update of the Potable Water Element. Therefore, the text in this update is not underscored. This update also incorporates the updated Water Supply Facilities Work Plan, required by the Florida Legislature.

7. Performance Assessment

The following measures are established to assess the performance of the water system:

1. Meet or exceed all existing federal, State, and local water quality standards.
2. Every five years after the year 2020, prepare an annual utility report to evaluate the operational and fiscal status of the water system.
3. Evaluate treatment and water use permit capacity annually and implement appropriate measures to address deficiencies, if any.

8. Goals, Objectives, and Policies

All goals, objectives, and policies related to Part 1 – Potable Water are provided in Section 7.0 of the Work Plan provided as **Attachment – A**.

This 2020 update reflects new language and replaces entire text from the 2015 update of the Potable Water Element. Therefore, the text in this update is not underscored. This update also incorporates the updated Water Supply Facilities Work Plan, required by the Florida Legislature.

Attachment A

City of Margate Water Supply Facilities Work Plan Update - 2020

This 2020 update reflects new language and replaces entire text from the 2015 update of the Potable Water Element. Therefore, the text in this update is not underscored. This update also incorporates the updated Water Supply Facilities Work Plan, required by the Florida Legislature.

CITY OF
MARGATE
Together We Make It Great

Water Supply Facilities Work Plan Update

April 24, 2020

Hazen and Sawyer
4000 Hollywood Boulevard, 750N
Hollywood, FL 33021 • 954.987.0066

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Section 1.0 – History and Statutory Overview

The City of Margate (City) in northern Broward County is approximately ten miles inland from the Atlantic Coast. The City is bordered on the north and east by the City of Coconut Creek, on the north and west by the City of Coral Springs and on the south by the City of North Lauderdale. The City is 9.17 square miles in size with no opportunity for annexation of additional lands. The City was chartered as a town government in 1955 and incorporated as a City in 1961.

In 1957, a private utility company, the Margate Utilities Corp. was established and the City's first water treatment plant and distribution system was built. In June 1968, the company was sold to the Margate Utility Authority (MUA), a not-for-profit corporation. In 1977, the City assumed the operation of the utility and MUA's debt. The City's Department of Environmental and Engineering Services (DEES) currently owns and operates the potable water supply and wastewater treatment facilities serving the entire geographical area within the City's corporate limits and a portion of the City of Coconut Creek. The location of the City and its service area within Broward County is provided in **Figure 1.1**. The detailed service area boundary map is provided in **Figure 1.2**. The City and its water service area are primarily residential with a mix of apartments, condominiums, single-family homes, shopping centers, schools, and health care facilities.

The City's water utility draws its potable water from the Biscayne Aquifer, the primary water supply source in Broward and Miami-Dade counties and southeastern Palm Beach County. Water withdrawal from the Biscayne Aquifer is governed by the South Florida Water Management District (SFWMD) through the issuance of Consumptive Use Permits (CUPs).

Chapter 163, Part II, Florida Statutes (F.S.), requires local governments to prepare and adopt 10-Year Water Supply Facilities Work Plans into their comprehensive plans within 18 months after the SFWMD approves a regional water supply plan or its update. The 2018 Lower East Coast Water Supply Plan Update (2018 LECWSP Update) was adopted by the SFWMD's Governing Board on November 8, 2018. Therefore, local governments within the Lower East Coast Region are required to amend their comprehensive plans and include an updated 10-year Water Supply Facilities Work Plan and related planning elements by May 8, 2020.

The State of Florida requires that the 10-Year Water Supply Facilities Work Plan Update address the development of traditional and alternative water supplies and management strategies, including conservation and reuse. The data and analyses, including population projections and water demand, must span at least a 10-year planning period and be consistent with the 2018 LECWSP Update. The data presented herein are for the planning period through the year 2040.

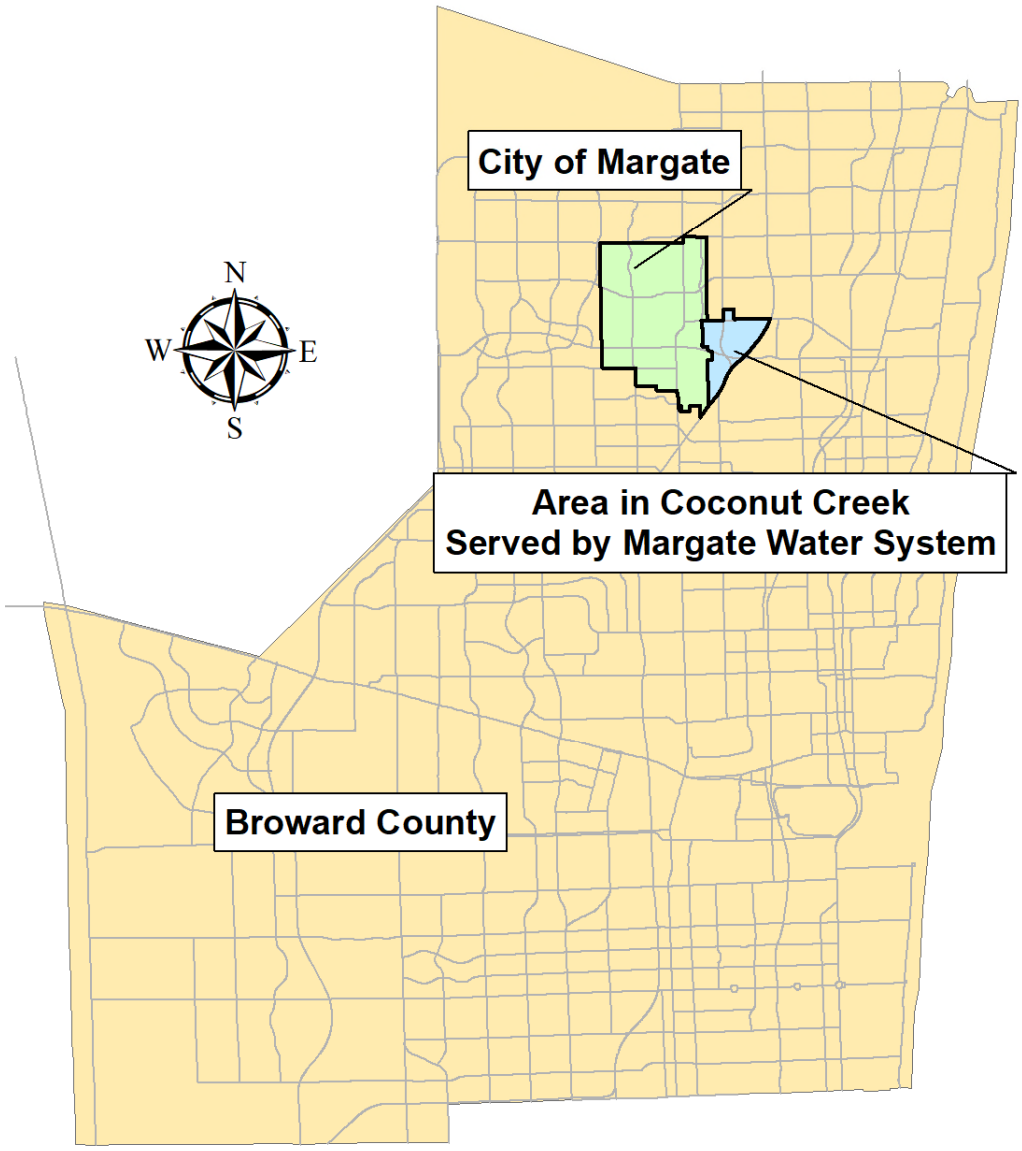


Figure 1.1 Location of City of Margate's Water Service Area

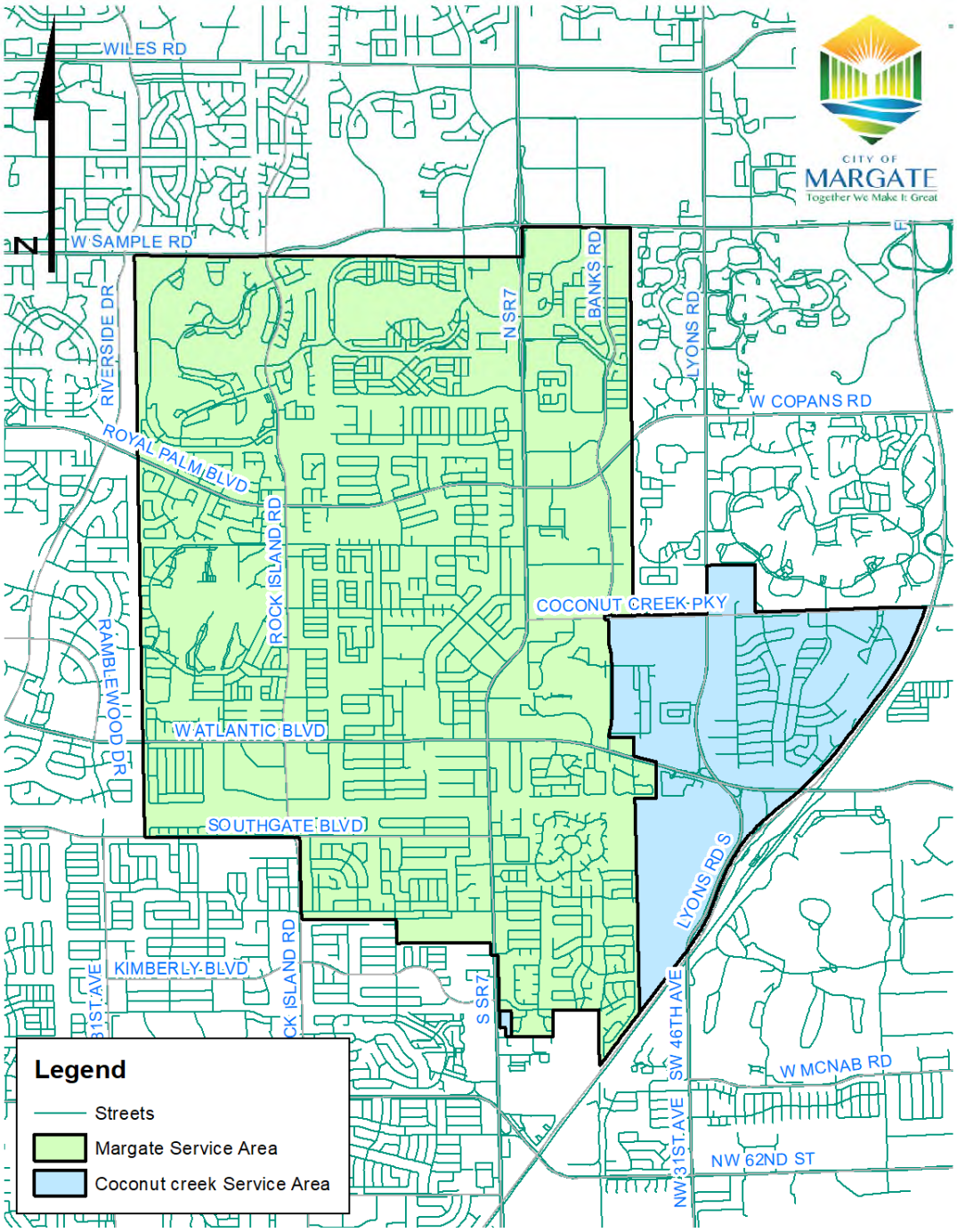


Figure 1.2 City of Margate's Water Service Area Boundaries

Section 2.0 – Work Plan Objectives

The City withdraws potable water from the Biscayne Aquifer in conformance with its consumptive use permit (CUP) number 06-00121-W issued by SFWMD. The City's 20-year CUP was issued on April 13, 2005 and expires on April 13, 2025. This work plan provides a detailed plan to serve water demands in its service area for the required 10-year planning period and through 2040.

This Water Supply Facilities Work Plan 2020 Update includes the following items.

- Assessment of the City's current water supply sources and treatment capacities (Section 3.0)
- Identification of water conservation and reuse practices and regulations within the City's service area. (Section 3.0)
- Five-year population and water demand projections through the year 2040 within the City's jurisdiction and in the portion of the City of Coconut Creek served by the City (Section 4.0).
- Recognition of the regional water supply planning issues that have the potential to impact the City. (Section 5.0)
- Identification of the City's water supply capital improvement projects including alternative water supply. (Section 6.0)
- Identification of Goals, Objectives, and Policies (GOP's) required to implement the Work Plan and water supply concurrency requirements. (Section 7.0)

Section 3.0 – Water Supply System

3.1 System Overview

3.1.1 Service Area

The City provides water and wastewater services to approximately 62,254 people located within the City limits of the City of Margate and the southern portion of the City of Coconut Creek. The service area encompasses 10.7 square miles and the land use is predominantly residential. The City owns and maintains the entire water supply, treatment, and distribution system, and is the sole entity responsible for the planning, financing, construction and operation of the facilities that will supply water within its service area.

The City's water system includes a 13.5-million gallon per day (mgd) water treatment plant (WTP) fed with raw water from 12 Biscayne Aquifer wells; a water distribution system with 213.4 miles of distribution mains; a remote 2 million gallon (MG) water storage tank facility, and four interconnects with neighboring municipalities. The distribution system includes 17,004 service connections to residential, commercial and local government customers.

3.1.2 Large Users of Utility Potable Water

The City's billing records were evaluated to identify water customers with the highest consumption over the past three years. The top 100 consumers include schools, multifamily communities and a regional hospital. The top 10 users of potable water from the City's system are listed in **Table 3.1**.

Table 3.1 City of Margate Water Service Area Top 10 Potable Water Customers by Water Use

Customer Name	Average Gallons Per Day from CY 2017 to 2019
School Board of Broward County (Schools)	97,146
Coral Cay Plantation - Mobile Home Community (MHC)	88,628
Northwest Regional Hospital	80,167
Cross Creek Apartments	71,058
City Of Margate	48,530
Townhomes Of Oriole Association	35,024
Banyan Bay Apartment Homes	32,425
Holiday Springs Condominiums	29,941
Palm Lakes Association Condominiums	27,220
Margate Village Condominiums	24,912

3.1.3 Large Users with Individual Consumptive Use Permits (CUPs)

Large users with individual consumptive use permits were identified using the SFWMD water use permit portal and searching by Section/Township/Range. The overwhelming majority of the CUPs identified within the service area are for landscape irrigation purposes. These include CUPs issued to golf courses, parks, condominiums, schools, churches and commercial facilities. The number of CUPs and the acreage associated with these permits by water use type are provided in **Table 3.2**. There are about 72 CUPs serving about 623 acres within the City of Margate's water service area. Landscape irrigation is the dominant water use.

Table 3.2 - Number of SFWMD Consumptive Use Permits and Acres Permitted in the City of Margate Water Service Area

Water Use Type	Number of CUPs	Acres Served
Landscape	67	484
Golf Course	2	125
Industrial	3	14
Total	72	623

3.1.4 Private Wells and Septic Systems

The City is not aware of private wells for potable water located within its service area or other uses exempt from permitting (40E-2.051, Florida Administrative Code) such as fire-fighting. The only unsewered area within the City's water service area is in the City of Coconut Creek and is comprised of 24 single-family lots each about one-acre in size and totaling 26 acres.

3.2 Description of the City's Water Supply System

3.2.1 Raw Water Sources

The City is permitted by the SFWMD to extract water from the Biscayne Aquifer using a total of twelve raw water supply wells. Raw water extracted from the Biscayne Aquifer is metered at the City's water treatment plant. The location of the raw water wells is mapped in **Figure 3.1**.

3.2.2 Treatment Facilities

Raw water mains from each well combine into a 30-inch raw water header main, which then splits to feed two parallel treatment trains. Separate venturi meters record the flow entering each of the two parallel trains. Each train consists of cascade aerators to oxidize iron and manganese (for subsequent precipitation and removal by the filters) and remove hydrogen sulfide and carbon dioxide; a lime softening unit to reduce hardness; and a 4-bay filter unit consisting of four 2.5 mgd bays with granular media. Chloramination is used for disinfection. Treated water is collected in a clearwell and subsequently transferred to the ground storage tanks. The softening units are upflow solids contact clarifiers, with integral mixing and quiescent zones, rated at 13.5 mgd each. A process flow schematic of the WTP is provided in **Figure 3.2**. An overview of the overall WTP site plan is provided in **Figure 3.3**.

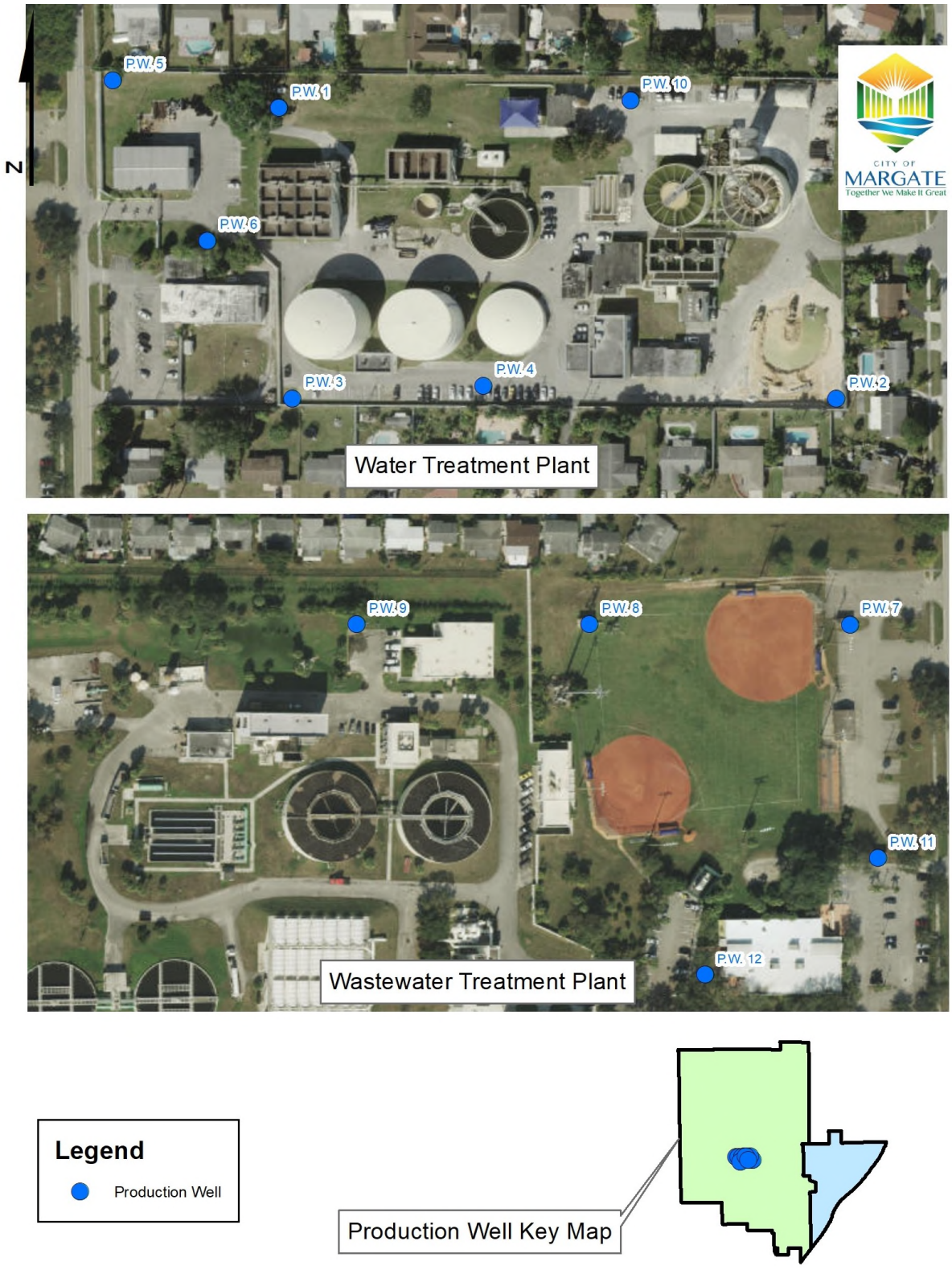


Figure 3.1 Raw Water Well Locations

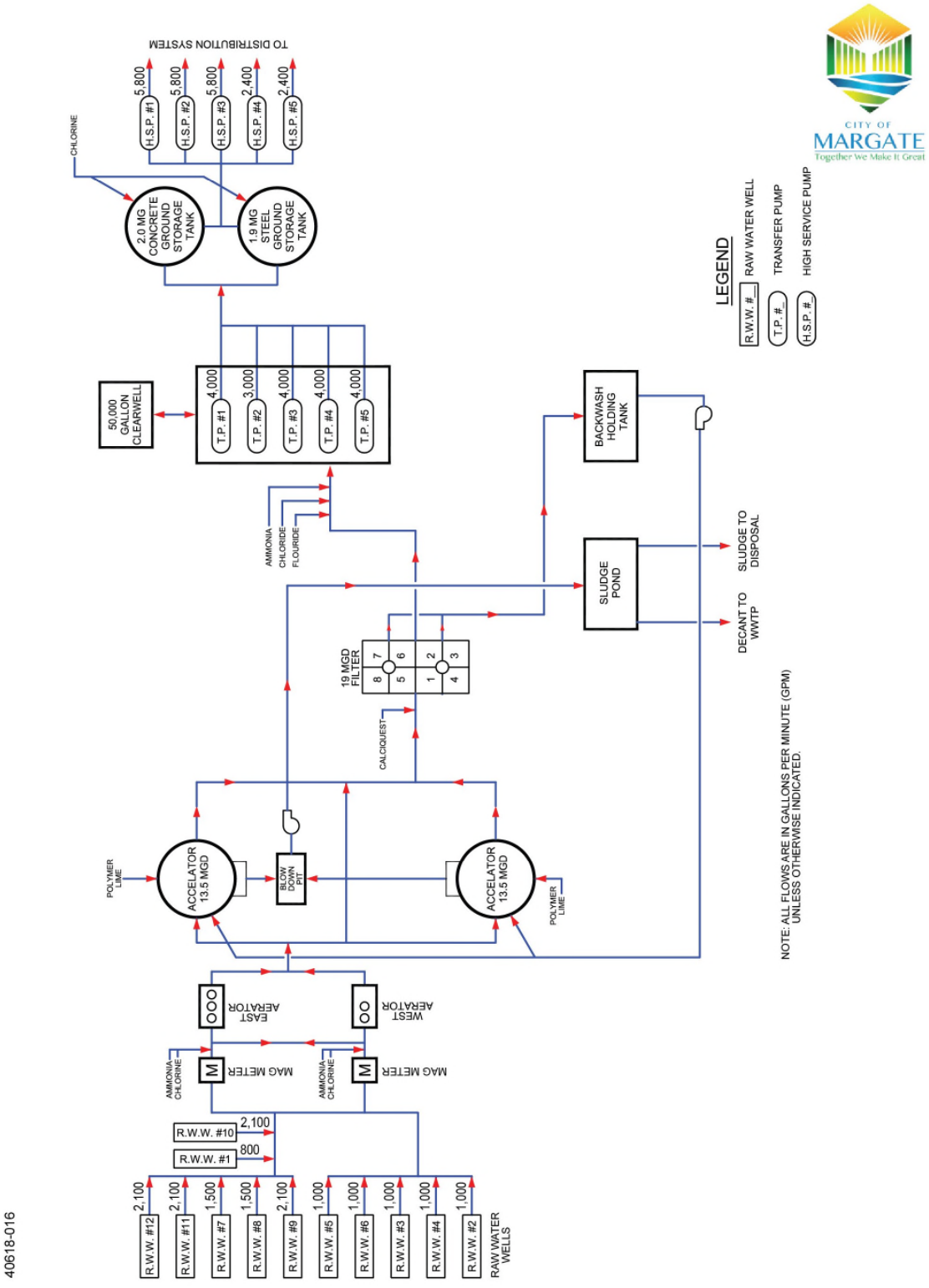


Figure 3.2 – City's Water Treatment Plant Process Flow Diagram

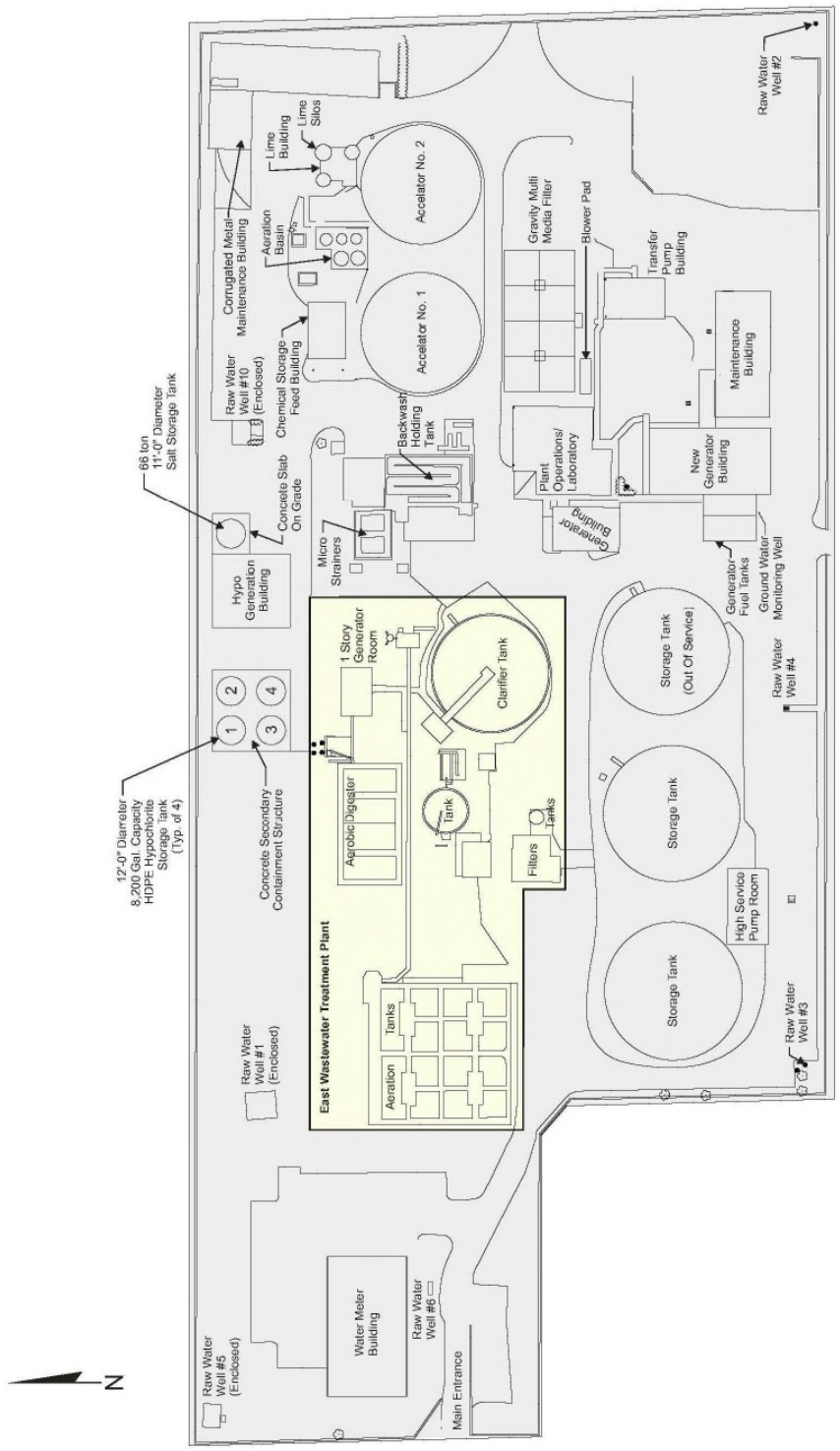


Figure 3.3 - Water Treatment Plant Existing Site Plan

3.2.3 Storage Facilities

From the clearwells water is transferred to two aboveground storage tanks located at the WTP: a 1.9 MG steel tank and a 2.0 MG concrete tank. A remote 2.0 MG tank, located at Coral Gate Park, approximately 1.5 miles from the plant in the northeast portion of the City's service area, is connected to the distribution mains and is filled or emptied using a valve located within the remote facility. This valve is controlled from the treatment plant via the Supervisory Control and Data Acquisition (SCADA) system.

3.2.4 Distribution System

High service pumps at the treatment plant are equipped with variable frequency drives to maintain an average pressure of 64 pounds per square inch (psi). The City's distribution system consists of 213.4 miles of distribution mains and 17,004 service connections. The service area includes the entire City of Margate and that portion of the City of Coconut Creek located south of Coconut Creek Parkway. An overview of the distribution system is provided in **Figure 3.4**.

3.2.5 Interconnects

The City's distribution system has four interconnects with neighboring community water systems for use during emergency situations. There is a 4-inch interconnect along the southern boundary with the City of North Lauderdale, a 12-inch interconnect at the northern boundary with the City of Coral Springs, an 8-inch interconnect along the western boundary with the Coral Springs Improvement District, and a 10-inch interconnect along the eastern boundary with the City of Pompano Beach. All interconnects are straight piped and are isolated by valves located on either side of the service area boundaries. The interconnect locations are also shown in **Figure 3.4**.

3.3 Water Utility Consumptive Use Permit

The City's current CUP was renewed by the SFWMD in April 2005 (Permit No. 06-00121-W). This permit allows the City to withdraw a specified quantity of water from the Biscayne Aquifer until the permit expires in April 2025. The permit stipulates an annual allocation of 9.3 mgd and a maximum month allocation of 10.46 mgd through April 13, 2010. After April 13, 2010, the annual and maximum month allocations are reduced to 8.51 mgd and 9.31 mgd, respectively.

3.4 City's Water Conservation Program

The City continues to implement the conservation programs summarized below.

Broward Water Partnership Conservation Program - To save water, money and the environment, the City of Margate is a partner with the County and 14 other cities providing free, high-efficiency water faucet aerators and showerheads to qualifying residential customers. The City also offers residents a $100 rebate to replace old, high-flow toilets that use more than 1.6 gallons per flush with new, WaterSense® certified high-efficiency models.

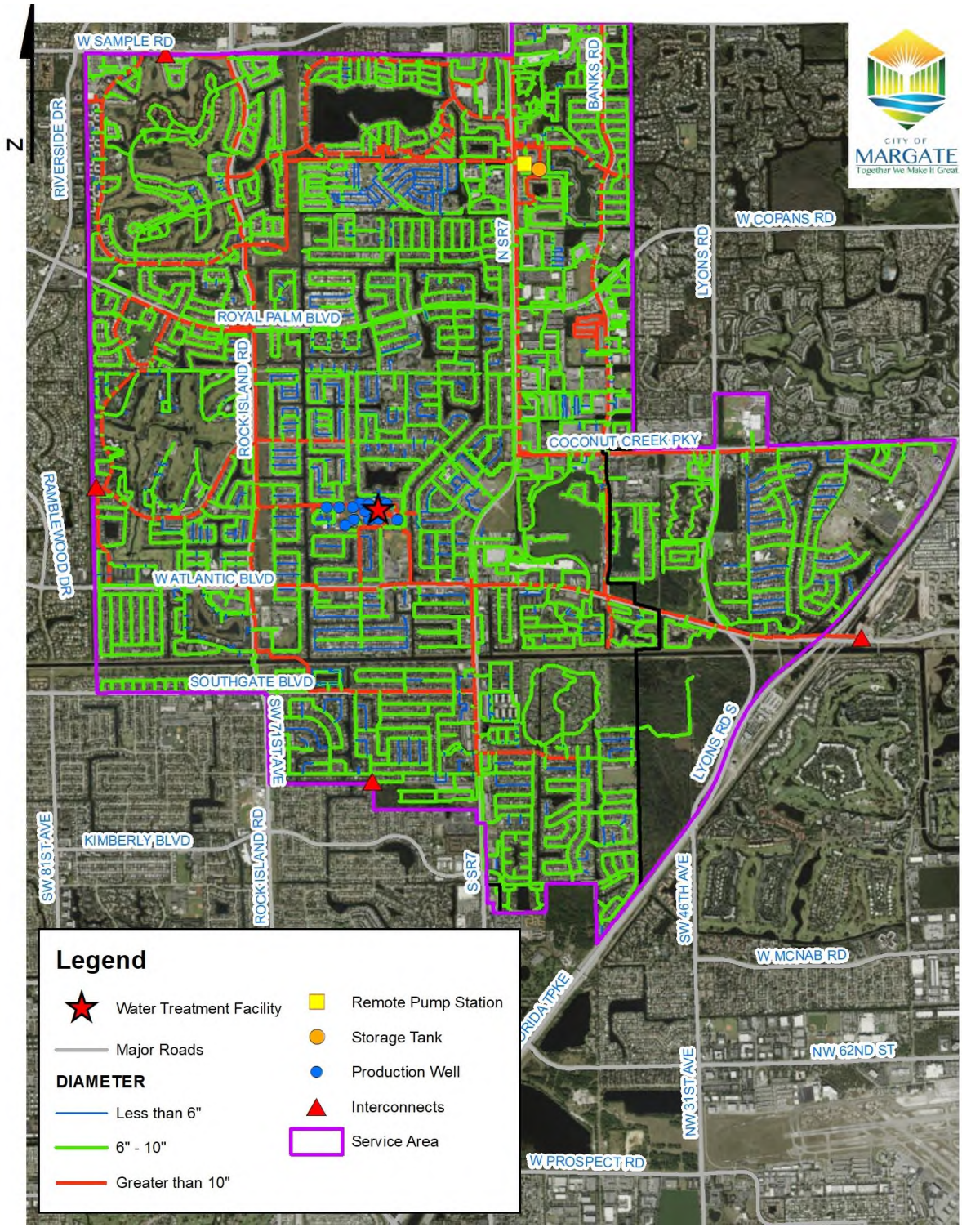


Figure 3.4 - City of Margate's Water Distribution System

NatureScape Irrigation Service - The City of Margate has partnered with Broward County for their NatureScape Irrigation Service (NIS). The goal of the NIS is to reduce urban water consumption and improve the quality of surface waters through efficient irrigation and environmentally-friendly landscape practices. The NIS program targets large properties such as government facilities, parks, schools, and multi-family complexes where conservation efforts can produce the greatest water savings. Over the past 4 years, the City has audited 19 properties with a combined annual water savings of 3,666,336 gallons. In 2019, Broward County introduced a pilot program to the NIS for residential irrigation rebates. With a successful pilot, a full residential irrigation rebate program will be introduced as an option on the next NIS renewal in 2020.

Lawn and ornamental irrigation limits - Landscape irrigation is addressed in Chapter 39, Article VI, Section 39-56 (and Section 23-12(F)) of the City Code of Ordinances which prohibits irrigation outside the hours of 5:00 PM to 9:00 AM and specifies that SFWMD irrigation limits take precedence when more restrictive.

Use of xeriscape principles - Section 39-57 of the City Code adopts by reference Chapter 373.185, Florida Statutes regarding xeriscape planning requirements. Compliance is administered through the City's Development Review Committee.

Requirements of rain-sensor over-rides for new lawn sprinkler systems - Section 39-58 of the City Code requires the installation of a rain-sensor override on all new automatic lawn sprinkler systems. Compliance is administered through the City's Building Department.

Requirement of ultra-low volume plumbing - Section 4613(C) of the Florida Building Code was adopted by reference and is included in Section 39-60 of the City Code.

Leak detection programs - The City actively responds to reported leaks and continuously upgrades the distribution system to reduce the magnitude of unaccounted for water losses between the WTP and the end user. In addition, the City accounts for WTP usage and water losses during main breaks, fire hydrant flushing, and firefighting activities.

Water conservation public education programs - Margate promotes water conservation awareness through its website, www.margatefl.com, and the City's publications. Publications containing water conservation information such as the Margate Messenger (City Newsletter) and the City's annual water quality report are distributed to customers and other interested parties.

Water conservation rate structures - Margate employs an increasing block rate structure where higher rates are charged for greater water use as summarized in the table below.

Monthly Consumption (gallons)	Monthly Charge per 1,000 Gallons ($) Inside Margate
0 to 6,000	$3.72
6,001 to 15,000	$4.65
15,000 to 25,000	$5.59
Above 25,000	$6.51

Impact of the City's Water Conservation Programs on Water Use – The City's water conservation programs appear to have increased customer water use efficiency. As demonstrated in Section 4.0, water use per person has fallen each year over the past five years, from 110.3 gallons per person per day (gpcd) in 2015 to 87.9 gpcd in 2019. This reflects a reduction in total water use as the total population served increased each year. Over the past two years (2018 to 2019), total water use fell by 0.86 percent while the total number of customer accounts increased by 0.98 percent. Water use by single-family customers fell by 0.89 percent while the total number of single-family customers increased by 1.20 percent.

3.5 City's Reuse Program

The City does not currently treat wastewater for reuse. A reuse feasibility study was completed in 2005 and concluded that implementing a reclaimed water program was not feasible because the identified end users were obtaining water at a much lower cost. In 2008, a water reuse program was again considered to obtain water offsets that could be added to the City's CUP to augment the City's water supply. Afterward, the 2009 economic downturn and the City's water conservation programs reduced water use to the point that the offsets were not needed. The reuse project was put on hold and has since been evaluated periodically.

Section 4.0 – Water Demand Forecast and Supply Adequacy

The City's water utility service area includes the entire City of Margate and that portion of the City of Coconut Creek located south of Coconut Creek Parkway. The population, raw water pumpage, and treated water production of the Margate service area as presented in this section reflect this geographic area.

Population projections and the average historic five-year water demand per person per day were used to forecast water demand within the City's water service area. The historic and forecasted populations are from the Broward County Planning and Development Management Division, PFAM 2017, published 6/17/2018. The data are by Traffic Analysis Zone (TAZ) and include the City of Margate and the area of Coconut Creek served by the City. A map of the TAZs in the City's water service area is provided in **Figure 4.1**.

Population estimates for the City's service area organized by TAZ are provided in **Table 4.1**. For TAZs split between more than one municipality, the Broward County Planning and Development Division divided the population within that TAZ between each municipality pursuant to the Broward County Land Use Plan.

Table 4.1 - Historic and Forecasted Population by TAZ in the City of Margate's Water Service Area: Years 2015-2040 (5-Year Increments)

TAZ	2010	2015	2020	2025	2030	2035	2040
83	2,453	2,790	3,129	3,258	3,420	3,536	3,623
84	138	159	177	278	359	416	473
85	1,485	1,655	1,754	1,955	2,149	2,276	2,385
86	1,957	2,370	2,773	2,940	3,097	3,215	3,317
87	6,406	7,211	7,974	8,096	8,310	8,521	8,675
88	5,706	5,733	5,632	5,528	5,445	5,624	5,738
89	4,315	4,285	4,207	4,395	4,563	4,715	4,836
90	2,813	2,823	2,774	2,948	3,098	3,262	3,402
91	1,035	1,219	1,436	1,635	1,778	1,887	1,982
92	1,944	1,925	1,892	2,101	2,249	2,370	2,471
93	1,108	1,096	1,079	1,313	1,465	1,585	1,688
94	694	692	682	911	1,062	1,183	1,288
95	772	770	755	981	1,129	1,239	1,336
96	415	427	426	490	488	486	484
97	5,241	5,313	5,243	5,149	5,072	5,052	5,014
98	2,316	2,381	2,353	2,393	2,369	2,362	2,343
99	905	895	874	865	859	879	889
100	192	196	211	459	613	737	850
101	2,117	2,135	2,098	2,060	2,029	2,163	2,256
148	0	0	0	0	0	0	0
149	2,268	2,439	2,505	2,693	2,863	2,986	3,094
150	2	2	2	2	2	2	2

Table 4.1 - Historic and Forecasted Population by TAZ in the City of Margate's Water Service Area: Years 2015-2040 (5-Year Increments)

TAZ	2010	2015	2020	2025	2030	2035	2040
151	5,195	5,479	5,436	5,601	5,971	6,187	6,351
152	696	682	669	911	1,067	1,186	1,299
153	393	394	390	385	386	386	385
154	664	647	638	630	625	621	617
155	1,094	1,078	1,060	1,045	1,034	1,053	1,061
156	2,236	2,203	2,160	2,398	2,563	2,691	2,799
157	644	710	762	1,122	1,192	1,242	1,287
195	3,107	3,092	3,051	3,010	3,039	3,019	2,999
880	0	0	0	0	0	0	0
Total	**58,312**	**60,800**	**62,142**	**65,552**	**68,296**	**70,880**	**72,945**
Growth from previous year		**2,488**	**1,342**	**3,410**	**2,744**	**2,585**	**2,065**

(a) The populations reported in this table represent only the portion of the TAZ within the City's Water Service Area. The data include the City of Margate jurisdiction and the area of Coconut Creek served by the City. The Coconut Creek TAZs are 85, 149, 195 and 880. Source: Broward County Planning and Development Management Division.

The City's service area population and treated water production from 2015 to 2019 is provided in **Table 4.2**. The amount of treated water supplied to customers in the City of Margate and the amount supplied to customers in Coconut Creek are not known. Billing records indicate that 90 percent of the City of Margate's treated water supply is sold to customers within the City of Margate and 10 percent is sold to customers in Coconut Creek.

Table 4.2 - City of Margate's Historic Water Service Area Population and Total, Per Capita, and Maximum Monthly Treated Water Production (Calendar Year 2015 to 2019)

Year	Service Area Population	Treated Water Production				
		Annual Average (mgd)	Daily Per Capita (gallons)	Maximum Month (MG)	Average Month (MG)	Maximum to Average Month Ratio
(1)	(2)	(3)	(4) = [(3) x 10^6] / (2)	(5)	(6)	(7) = (5) / (6)
2015	60,800	6.70	110.3	221.34	203.90	1.09
2016	61,066	6.47	105.9	230.65	196.68	1.17
2017	61,334	5.95	97.0	193.52	180.93	1.07
2018	61,602	5.57	90.4	189.89	169.42	1.12
2019	61,872	5.44	87.9	182.69	165.45	1.10
5-year Average			**98.3**			**1.11**
3-year Average			**91.8**			**1.10**

Sources: 2015 and 2020 populations were taken from Broward County population forecasts by TAZ adjusted for the percent of Margate's service area within each TAZ. Yearly populations from 2016 through 2019 were interpolated between the two years. Treated water production is from the City of Margate's Monthly Operating Reports.

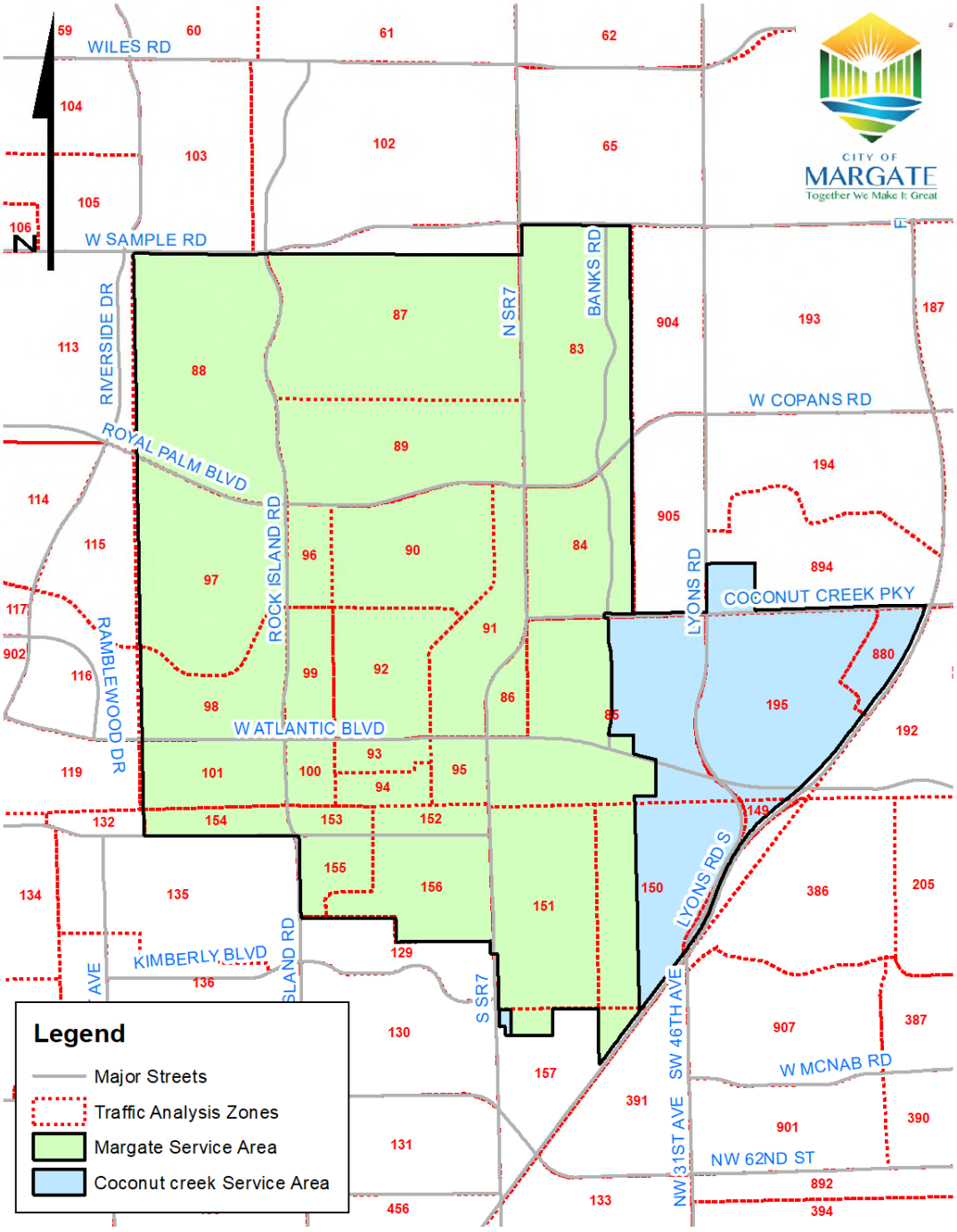


Figure 4.1 – TAZs Within the City of Margate Water Service Area

The service area population, the annual average treated water production and the average daily per capita water use are provided in columns (2), (3) and (4) of the table. The annual service area population values were interpolated between the 2015 and 2020 values provided in **Table 4.1**. In 2015, the City's water utility provided water service to 60,800 people. By 2019, the population served had grown to 61,872. In 2015, the annual average daily treated water production was 6.70 mgd which fell to 5.44 mgd by 2019. This trend reflects a significant reduction in water use per person per day, from 110 gallons in 2015 to only 88 gallons in 2019.

The average per capita water use over the five year period is 98.3 gallons per day which was used to prepare the forecast of treated water demand through 2040. Use of the five-year period is consistent with the method used by the SFWMD in determining annual average daily permitted water quantities for public water supply permittees and applicants. (SFWMD Applicant's Handbook for Water Use Permit Applications, page WUAH – 48)

The maximum month treated water production and the average monthly treated water production over the past five years in million gallons are provided in columns (5) and (6) of the table. Both the maximum month and average month treated quantities fell over the five-year period. The ratio of maximum to average month production is provided in column (7) and averages 1.10 over the past three years. This ratio was used to forecast the maximum month water production consistent with the method used by the SFWMD in determining the maximum month permitted water quantities for public water supply permittees and applicants.

Calculation of the forecasted treated water demand that must be met by the City's water production is provided in **Table 4.3**. Annual average monthly treated water demand was forecast as the product of service area population (column (2)) and daily per capita water use of 98.3 gallons (column (3)) converted to monthly demand (column (4)). This value is further converted to annual average daily demand in column (5). Annual average daily demand is forecast to be 6.11 mgd in 2020 and increases to as high as 7.17 mgd by 2040.

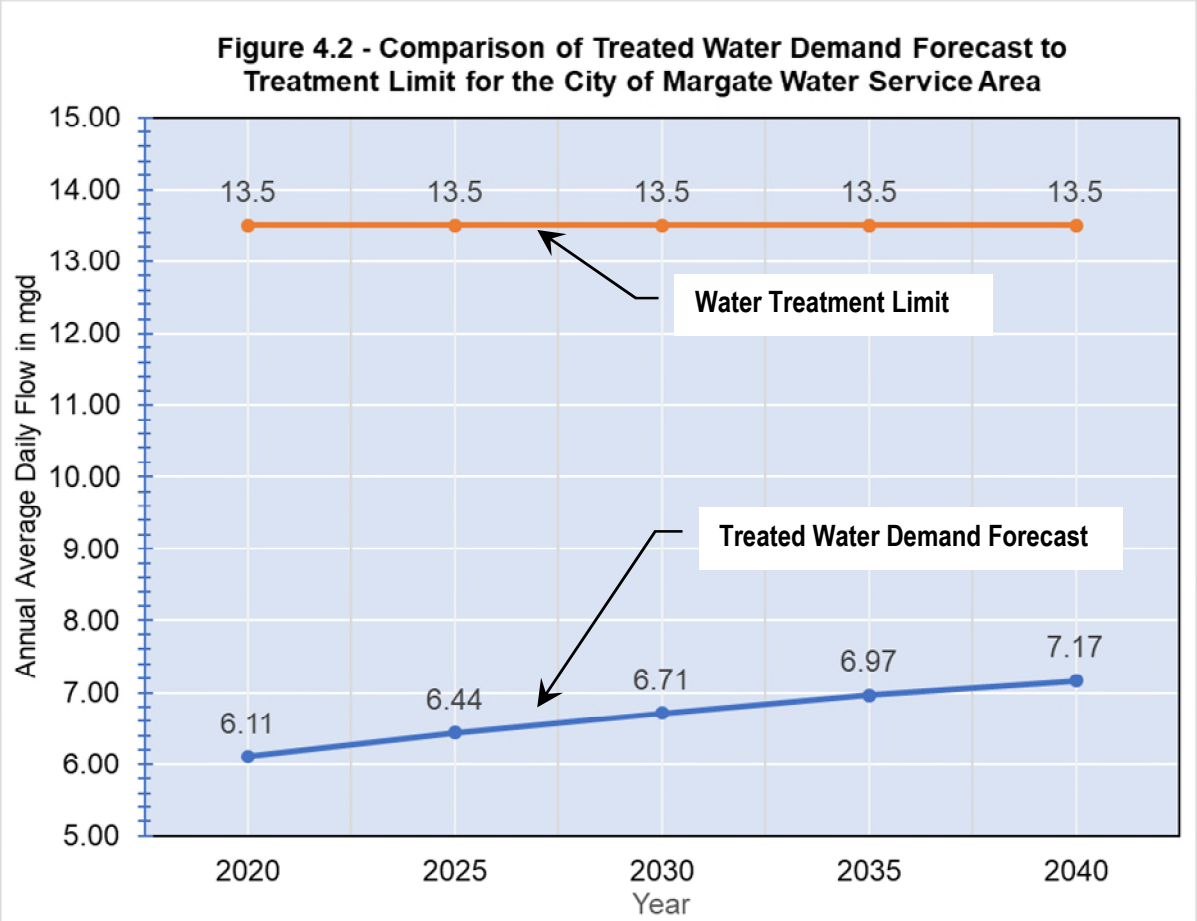
Maximum month demand in million gallons (column (6)) was calculated as the product of average monthly demand (column (4)) and the maximum to average ratio of 1.10 as was calculated in **Table 4.2**. This forecast was converted to average daily mgd in column (7). Maximum month average daily demand is forecast to be 6.71 mgd in 2020 and increases to as high as 7.87 mgd by 2040. Given that the City's water treatment plant capacity is 13.5 mgd, there is enough treatment capacity available through 2040.

Table 4.3 - City of Margate Forecasted Water Service Area Population and Treated Water Demand, Five-year increments from 2020 to 2040

Year	Service Area Population	Treated Water Demand				
		Daily Per Capita (gallons)	Average Month (MG)	Annual Average Daily (mgd)	Maximum Month (MG)	Maximum Month Average Daily (mgd)
(1)	(2)	(3)	(4) = {[(2) x (3) x 365] / 12} / 10^6	(5) = [(2) x (3)] / 10^6	(6) = (4) x 1.10	(7) = (6) x (365/12)
2020	62,142	98.3	185.79	6.11	204.03	6.71
2025	65,552	98.3	195.98	6.44	215.23	7.08
2030	68,296	98.3	204.18	6.71	224.23	7.37
2035	70,880	98.3	211.91	6.97	232.72	7.65
2040	72,945	98.3	218.08	7.17	239.50	7.87

The comparison of forecasted treated water demand to the available water treatment capacity is provided in **Figure 4.2**. During the period 2020 to 2040, there is enough treatment capacity available to supply the forecasted demand.

Figure 4.2 - Comparison of Treated Water Demand Forecast to Treatment Limit for the City of Margate Water Service Area



Treated water demand was converted to raw water withdrawal demand using the average percent treatment loss over the past five years. The calculation of average percent treatment loss is provided in **Table 4.4**. Annual average daily raw water pumpage is provided in column (2) and average daily treated water production is provided in column (3). The percent treatment loss is calculated from these two values in column (4). Treatment loss was 11.9 percent in 2015 and increased to 19.0 percent in 2019. The average over the past five years is 14.7 percent which was used to convert treated water demand to the needed raw water withdrawals. The City is currently replacing several water meters and performing recalibrations to determine if the increase in treatment loss is associated with the measurement of the losses and not an actual increase in losses.

Table 4.4 - City of Margate's Historic Raw Water Pumpage, Treated Water Production and Percent Treatment Loss

Year	Raw Water Pumpage, Average Daily mgd	Treated Water Production, Average Daily mgd	Percent Treatment Loss (Raw - Treated)/(Raw)
(1)	(2)	(3)	(4) = [(2) - (3)] / (2)
2015	7.61	6.70	11.9%
2016	7.32	6.47	11.7%
2017	6.82	5.95	12.8%
2018	6.83	5.57	18.4%
2019	6.70	5.44	18.8%
Average Percent Treatment Loss			**14.7%**

The calculations of annual average daily and maximum month raw water pumpage needed to meet forecasted treated water demand are provided in **Table 4.5**. The annual average daily raw water withdrawal is provided in column (3) and is the ratio of the annual average treated water demand and one minus the proportional treatment loss (0.147). The result is an annual average raw water withdrawal requirement of 7.16 mgd in 2020 that increases annually to 8.41 mgd in 2040.

Maximum month raw water pumpage is provided in column (5) and is similarly calculated as the ratio of the maximum month treated water demand and one minus the proportional treatment loss (0.147). The result is a maximum month raw water pumping requirement of 242 million gallons in 2020 that increases annually to 284 million gallons in 2040.

Table 4.5 - City of Margate Forecasted Raw Water Pumpage, Annual Average Daily and Maximum Month, Five Year Increments from 2020 to 2040

Year	Treated Water Demand, Average Daily mgd	Raw Water Pumpage, Average Daily mgd	Treated Water Demand, Maximum Month MG	Raw Water Pumpage, Maximum Month MG
(1)	(2)	(3) = (2) / (1-0.147)	(4)	(5) = (4) / (1-0.147)
2020	6.11	7.16	204.03	239.28
2025	6.44	7.56	215.23	252.41
2030	6.71	7.87	224.23	262.97
2035	6.97	8.17	232.72	272.92
2040	7.17	8.41	239.50	280.87

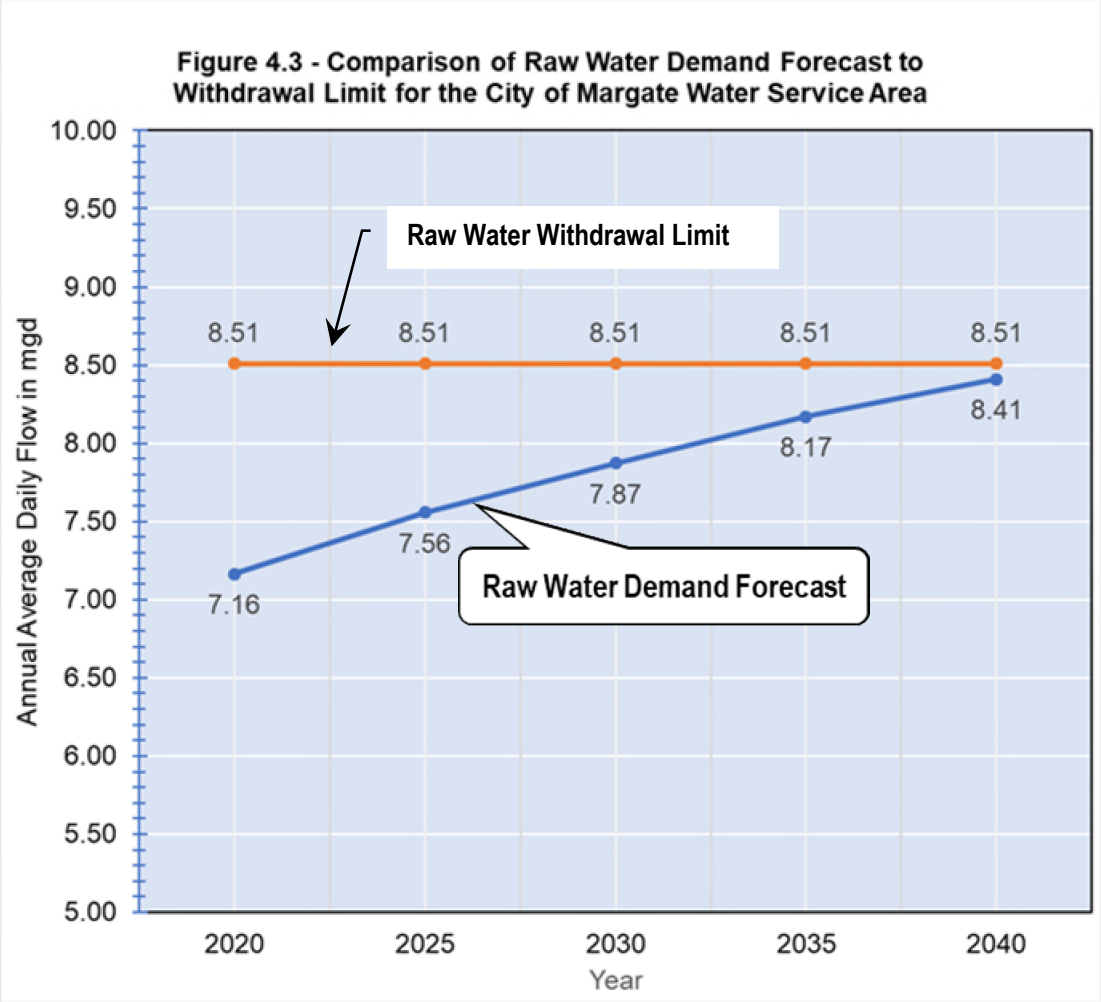
The raw water quantities permitted to be pumped from the City's wellfield by the South Florida Water Management District are provided in **Table 4.6**. The relevant time period is "After April 13, 2010". The City is permitted to withdraw up to 3,106 million gallons of water from the Biscayne Aquifer each year. This is an annual average daily quantity of 8.51 mgd.

Table 4.6 - City of Margate's Permitted Raw Water Quantities from the Biscayne Aquifer

Time Period	Annual (MG)	Average Daily (mgd)	Maximum Month (MG)	Maximum Month Average Daily (mgd)
(1)	(2)	(3) = (2) / 365	(4)	(5) = (4) / [365/12]
Through April 13, 2010	3,396	9.30	313.9	10.32
After April 13, 2010	3,106	**8.51**	279.2	**9.18**

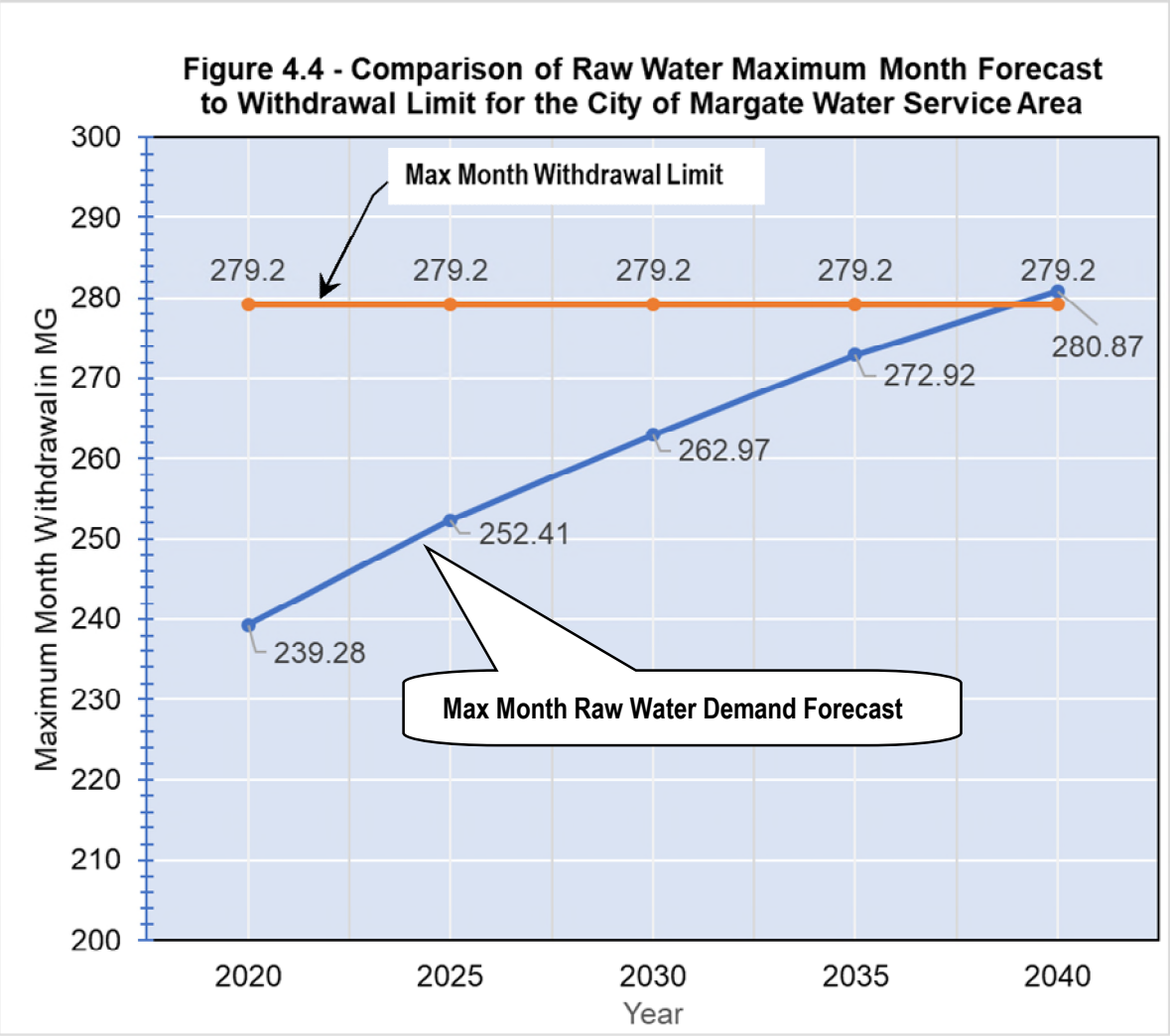
Source: SFWMD Water Use Permit Number 06-00121-W

Comparison of the forecasted annual average daily raw water withdrawal to the permitted quantity is provided in **Figure 4.3**. During the period 2020 to 2040, the forecast of average daily raw water withdrawals from the City's Biscayne Aquifer wellfield is below the City's



permitted quantity. However, by 2025 the difference is less than one mgd and by 2040 raw water demand is only 0.10 mgd below the permitted quantity.

Comparison of the maximum month raw water withdrawal to the maximum month permitted quantity finds that the permitted quantity is exceeded after 2035 as demonstrated in **Figure 4.4**. Therefore, given this conclusion and the conclusion that the difference between the permitted and actual withdrawal is forecasted to be less than one mgd by 2025, it would be prudent to begin development of an alternative water supply. The City recently signed a capacity allocation agreement for 2 mgd of storage capacity in the C-51 Reservoir that will allow the City to withdraw an additional estimated 2 mgd from its wellfield. The City is currently updating its Biscayne Aquifer CUP to be consistent with the new water supply.



Section 5.0 – Regional Issues

The City is aware of and studies the regional issues that impact or have the potential to impact water supply, water demand, and utility infrastructure. The City works with other local governments and utilities within the region to address these issues. This section summarizes the regional issues being followed by the City including:

- Regional Climate Action Plan;
- Climate Change;
- Sea Level Rise;
- Saltwater Intrusion;
- Extreme Weather Events;
- Infrastructure Development;
- C-51 Reservoir;
- Lake Okeechobee Surface Water Allocation Limitations;
- Lowering Lake Okeechobee Level;
- Infrastructure Planned to Attenuate Damaging Peak Flow Events from Lake Okeechobee; and,
- Use of brackish groundwater from the Floridan Aquifer.

Each is discussed in turn. Much of the information provided in this section was taken from the Broward County Water Supply Facilities Work Plan, 2020, DRAFT.

5.1 Regional Climate Action Plan

Southeast Florida's unique geographic characteristics make it one of the most vulnerable regions to be impacted by climate change and sea level rise. These characteristics include low land elevations, flat topography, a porous geology, and dense coastal development. In combination, climate change and sea level rise are expected to present significant challenges relating to water resource planning, management and infrastructure for communities throughout the region, which includes Palm Beach, Broward, Miami-Dade and Monroe counties. These communities have agreed to partner in regionally-coordinated climate mitigation and adaptation strategies as part of the Southeast Florida Regional Climate Change Compact (Compact) and have jointly developed and adopted a Regional Climate Action Plan (RCAP) including 21 recommendations that address "Water Supply, Management, and Infrastructure".

The water supply-related recommendations from the Regional Climate Action Plan 2.0 are summarized in Table 5.1.[1] These recommendations are intended to advance water management strategies and infrastructure improvements needed to mitigate the adverse impacts of climate change and sea level rise. They are incorporated throughout this Water Supply Facilities Work Plan Update and related comprehensive planning element updates.

[1] http://southeastfloridaclimatecompact.org/regional-climate-action-plan/

Table 5.1 - Water Supply Recommendations of the 2019 Regional Climate Change Action Plan

Item	Recommendations
WS-1	Foster innovation, development, and exchange of ideas for managing water.
WS-2	Ensure consistency in water resource scenarios used for planning.
WS-3	Plan for future water supply conditions.
WS-4	Coordinate saltwater intrusion mapping across Southeast Florida.
WS-5	Maintain regional inventories of water and wastewater infrastructure.
WS-6	Develop a spatial database of resilience projects for water infrastructure.
WS-7	Modernize infrastructure development standards in the region.
WS-8	Address the resilience of the regional flood control system.
WS-9	Update the regional stormwater rule.
WS-10	Integrate combined surface and groundwater impacts into the evaluation of at-risk infrastructure and the prioritization of adaptation improvements.
WS-11	Encourage green infrastructure and alternative strategies.
WS-12	Integrate hydrologic and hydraulic models.
WS-13	Practice integrated water management and planning.
WS-14	Advance comprehensive improvements to regional and local stormwater management practices.
WS-15	Foster scientific research for improved water resource management.
WS-16	Expand partnerships and resources to further innovation in water resource management.
WS-17	Advance capital projects to achieve resilience in water infrastructure.
WS-18	Coordinate innovation and regional funding.
WS-19	Recognize adaptable infrastructure.
WS-20	Support the Comprehensive Everglades Restoration Plan (CERP).
WS-21	Expand regional surface water storage.

5.2 Climate Change

Investigations and evaluations conducted at the national, regional, and local levels have reinforced the need to plan for the predicted impacts of more frequent and severe drought and increases in tidal and storm-related flooding. To protect the City's water supply infrastructure, ongoing planning efforts should be flexible to adapt to these climate changes.

The City of Margate, together with its municipal and regional partners, understands that local governments and water utilities must integrate water supply and climate change

considerations through coordinated planning efforts. The City works to provide relevant updates to the 10-year Water Supply Facilities Work Plan and to enhance the Goals, Objectives and Policies (GOPs) of its comprehensive plan.

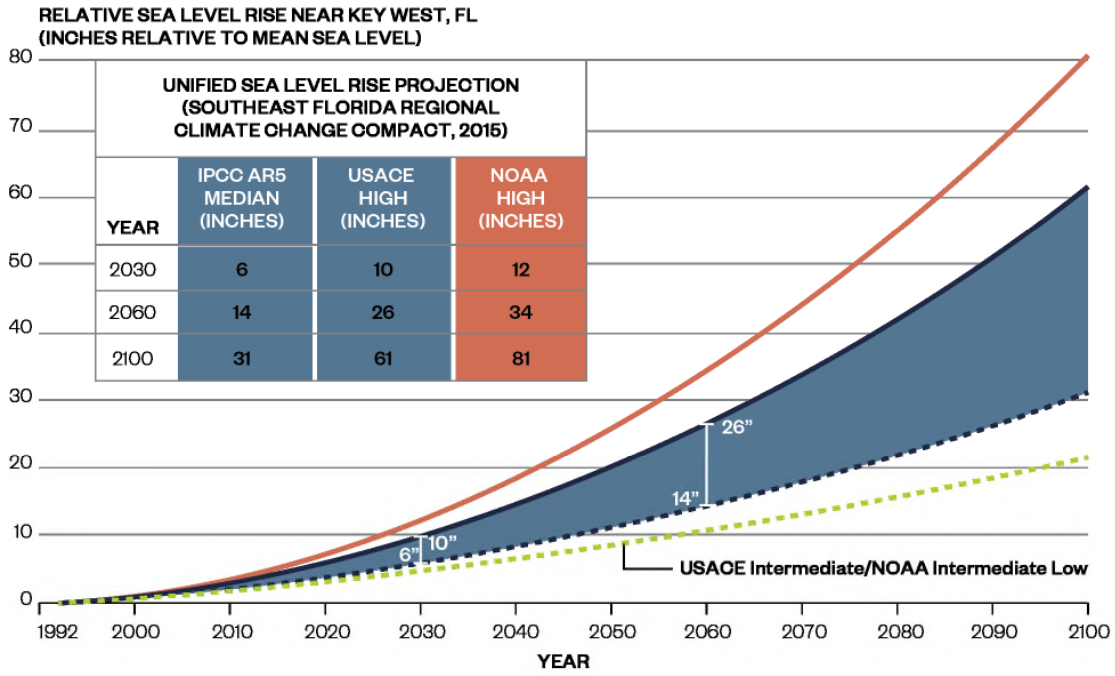
The City is a leader in developing planning tools and identifying achievable and cost-effective goals that meet the needs of its community. In 2013, the City signed a resolution endorsing the Mayor's Climate Action Pledge in support of the Southeast Florida Regional Climate Change Compact and the Regional Climate Action Plan.

The City is a participant in the Southeast Florida Regional Climate Change Compact. The Compact outlines an ongoing collaborative effort among the Compact participants to foster sustainability and climate resilience on a regional scale. The Compact participants include local communities, regulatory agencies, and the counties of Broward, Miami-Dade, Monroe and Palm Beach.

5.3 Sea Level Rise

The City of Margate and its raw water wells are located well inland from the Atlantic Ocean and, at this time, no impacts are expected from sea level rise. However, development of cost-effective sea level rise adaptation strategies to ensure the sustainability of the water supply in Broward County is critical to the wellbeing of all county residents, including those in Margate. A unified projection by the Southeast Florida Regional Climate Change Compact developed in 2015, is illustrated in Figure 5-1. It shows a 6- to 10-inch increase in sea level in the near term, and a 14- to 26-inch rise by mid-century.

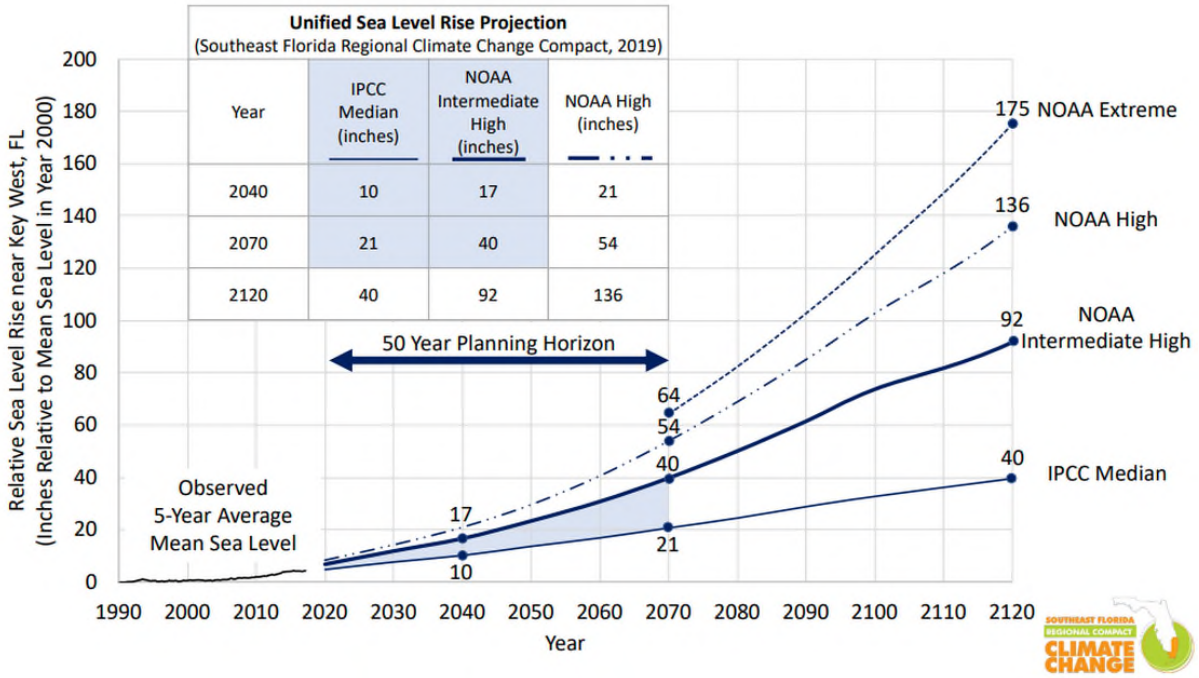
Figure 5-1 – Sea Level Rise Projection (2015)



The sea level rise projection was recently updated by the Compact (in December 2019) that

increases the projected magnitude of sea level rise. The revised projection is provided in Figure 5-2. This update is now being used as the basis for planning throughout the region.

Figure 5-2 – Sea Level Rise Projection (2019)



to be assessed for its vulnerability and, if necessary, protected. This includes basic services, such as provision of drinking water, sewage treatment, electricity and waste disposal.

5.4 Saltwater Intrusion

The Biscayne Aquifer is the City's primary water supply. It is a shallow, surficial, highly transmissive aquifer. Coastal saltwater intrusion of the aquifer has occurred in eastern parts of Broward County. The extent of saltwater intrusion is measured by the depth and location of the 250 mg/L chloride concentration toe. The mapping of this saltwater intrusion front is supported by local governments throughout the region, the United States Geologic Survey (USGS), and the SFWMD. The SFWMD's 250 mg/L Isochlor Line in Broward County is illustrated in Figure 5-3 along with the location of the City's raw water wells. At the toe of the saltwater front, chloride concentrations exceed drinking water standards of 250 mg/L and thus restrict and/or require abandonment of wellheads located east of the saltwater intrusion line. It has been concluded that movement of the saltwater front is primarily caused by the historic lowering of the water table in western Broward County for the construction of regional drainage canals. While the City's Biscayne Aquifer wellfields are located sufficiently west of the 250 mg/L Isochlor, the City monitors its movement and the potential impact on the City's water supply.

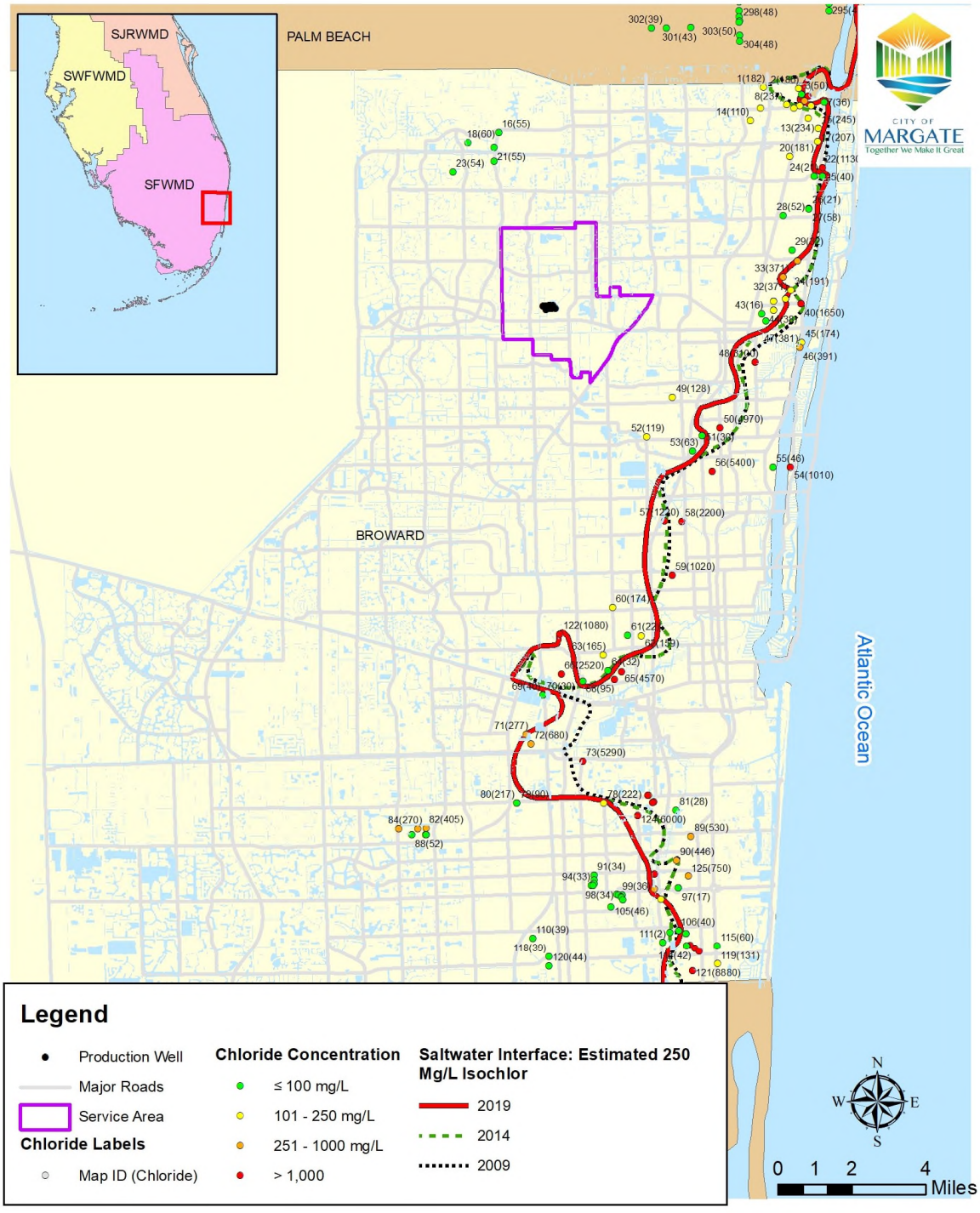


Figure 5-3 – 250 mg/L Isochlor Line in Broward County and Location of City's Raw Water Production Wells (SFWMD)

5.5 Extreme Weather Events

An increase in frequency and severity of extreme weather events may be an impact of climate change. Comprehensive planning should consider impacts and risks associated with drought, water shortages and reduced groundwater tables, all of which can hasten saltwater intrusion and exacerbate water supply deficits. Conversely, more intense rainfall will cause flooding, increased runoff, impacts to the natural systems and provide more recharge potential for wellfields. Integrated water resource management strategies will help to mitigate for these impacts, particularly those projects that can serve to provide additional long-term storage of stormwater runoff and redistribution of excess rainfall during dry periods and drought. Regional surface water reservoirs and below ground aquifer storage and recovery systems (ASR) are potentially viable alternative water supply projects and climate adaptation strategies.

5.6 Infrastructure Development

To ensure the long-term sustainability of key facilities in the face of climate change, sea level rise and extreme weather events, it becomes critical to diversify water supply sources, improve treatment technologies, and develop adaptive stormwater and wastewater infrastructure design criteria. Strategic infrastructure planning should incorporate these opportunities and work within the GOPs of the Comprehensive Planning process and 10-year Water Supply Facilities Work Plans to provide for long-term sustainability and a balanced approach to future development.

Increases in groundwater elevations, as a direct and indirect response to sea level, will challenge the function of drainage systems and is expected to exacerbate future flooding for even mild storm events. Future conditions will be more severe with extreme rainfall events increasing damage to low-lying utility infrastructure and contributing to prolonged surface water flooding. Planning for the combined influences of storm events, high tides and sea level rise on drainage system functions and other public infrastructure is a critical need as is the assessment of viable water supplies and impacts to the natural systems from prolonged droughts.

Options that provide for a diversification of water projects and protection of resources will be fundamental and may include changing treatment technologies; developing regional water storage such as the C-51 Reservoir; improving (or relocating) infrastructure in low lying areas; and enhancing operational flexibility. The City's planning effort regarding water supply infrastructure includes use of water capacity from the C-51 Reservoir as an alternative water supply source.

The Regional Water Availability (RWA) Rule was adopted by the SFWMD on February 16, 2007. The RWA limits raw water withdrawals from the Biscayne Aquifer to the maximum quantity withdrawn during any consecutive five years preceding April 2006. Cities needing additional water supplies are required to seek sources that are not dependent upon the Everglades for recharge. These alternative water supply solutions include recycling water, using reclaimed water to recharge the Biscayne Aquifer, or drawing water from the deeper Floridan Aquifer. As of April 13, 2010, the RWA Rule limits the City's Biscayne Aquifer

withdrawal from its wells to 8.51 mgd on an annual average day basis and 9.18 mgd on a maximum month basis.

5.7 C-51 Reservoir

The City of Margate recently signed a capacity allocation agreement for 2 mgd of storage capacity in the C-51 Reservoir that will allow the City to withdraw an additional estimated 2 mgd from its wellfield. The City is currently updating its Biscayne Aquifer CUP to be consistent with the new water supply. The C-51 Reservoir project is a public-private partnership to construct 60,000 acre-feet of storage for use as an alternative water supply source in southeast Florida. The reservoir will divert water away from the Lake Worth Lagoon and improve the management of freshwater flows which was formally identified as a priority restoration strategy in the 1992 US Army Corps of Engineers Restudy of the C & SF Flood Control Project.

Over the past decade, the SFWMD, Lake Worth Drainage District, Palm Beach Aggregates, local governments, water managers, and water utilities in Broward and Palm Beach counties jointly investigated the feasibility of a regional reservoir to capture and store excess surface water runoff discharged to Lake Worth Lagoon, primarily during wet weather conditions, and release the water into the C-51 Canal during dry periods to meet water demands.

The site of the C-51 Reservoir is adjacent to the SFWMD's existing L-8 Flow Equalization Basin in Palm Beach County and is expected to share the same impermeable geologic formation that provides for significant inground storage capacity. The C-51 Reservoir is included in the 2018 LECWSP Update as an alternative water supply to meet forecasted increases in regional water demand in 2040. Beyond water supply, the reservoir captures excess stormwater flows and enhances stormwater management including the reduction of harmful discharges and associated nutrient loads to the Lake Worth Lagoon and mitigation of saltwater intrusion by maintaining higher canal stages and recharging coastal wellfields.

Hydrologic modeling indicates that the C-51 Reservoir can capture enough basin runoff to reduce excess stormwater flows from the western C-51 Basin to the Lake Worth Lagoon by about 40 percent with an associated reduction in nutrient loads. The SFWMD would operate the reservoir and could redistribute the stored water through the existing canal network to provide Biscayne Aquifer recharge that can be used to increase SFWMD permitted water quantities of water utilities in southeast Florida. In addition, the stored water could be used to help sustain regional water resources. The C-51 Reservoir is modeled to support approximately 150 mgd in stormwater reuse for beneficial purposes while achieving critical water quality improvements in the Lake Worth Lagoon.

The proposed project is expected to provide the following benefits.

- Reduce harmful water quality and quantity discharges to the Lake Worth Lagoon via the S-155 structure.

- Improve water quality in the Everglades Protected Area from additional storage and, in conjunction with the L-8 Flow Equalization Basin, optimize flows to the Stormwater Treatment Areas (STAs).

- Aid the SFWMD in meeting the objectives of the Loxahatchee River Watershed Restoration Project.

- Improve the quality of water delivered to the STAs by blending water from the C-51 Reservoir with water from the L-8 Flow Equalization Basin.

- Mitigate stormwater impacts and flooding in western and central Palm Beach County.

- Mitigate saltwater intrusion and protect wellfields in coastal communities.

- Serve as a regional alternative water supply source.

- Support water resource protection and potential adaptation strategies to mitigate the effects of sea level rise and drought.

From a financial standpoint, the C-51 Reservoir is expected to provide the following benefits.

- Achieve “Economies-of-Scale” as a regional water resource development project providing diverse benefits to the region.

- Capitalize on the current construction and engineering work at the existing L-8 Flow Equalization Basin, including use of the L-8 Flow Equalization Basin’s intake structure and pumping facilities.

- Capitalize on the SFWMD’s operations of the L-8 Flow Equalization Basin resulting in operational coordination and reduced costs.

- Provide a cost-competitive solution relative to end-of-pipe water quality treatment, environmental degradation and associated economic losses, flood impacts, and other types of alternative water supplies and treatment technologies.

- Capitalize on current mining activities that create large pits in southeast Florida.

- Relies largely upon existing conveyance infrastructure.

- Reduces longer-term need for new water infrastructure and energy-intensive treatment technologies.

In 2017, the Florida Legislature approved the project as a priority water supply project under enabling legislation Senate Bill 10 and the SFWMD designated the C-51 Reservoir Phase 1 as a pilot alternative water supply development project, pursuant to Section 373.037, F.S.

Water utilities have executed agreements with the property owner to purchase storage capacity. To date, agreements have been executed for 13 mgd of storage capacity out of Phase 1's available 35 mgd: Broward County (6 mgd); Sunrise (5 mgd); and Hallandale Beach and Dania Beach (1 mgd each). The utilities have received or are processing modifications to their water use permits to reflect this AWS source as a means for meeting future demands. Senate Bill 92 (2019) clarified language and intent of the project and allowed the SFWMD to negotiate for any portion of the project not already committed to partners for water supply.

The mining operation for Phase 1 is complete and designed to store an estimated 14,000 acre-feet of surface water and provide 35 mgd of canal/surficial aquifer recharge near water utility wellfields. The FDEP has issued a diversion and impoundment consumptive use permit and an environmental resource permit for construction and operation of Phase 1. Phase 2 of the project could provide an additional 46,000 acre-feet of storage, most likely for natural systems. The FDEP has issued a conceptual environmental resource permit for Phase 2.

Additionally, water routed south to the Hillsboro Canal could be redistributed to recharge local canals and drainage districts in Broward County, pursuant to an operations and maintenance agreement between the SFWMD and Palm Beach Aggregates and implemented through an operating plan with the SFWMD (under development) or other local water control districts.

A commitment for Phase 1 construction financing has been extended to May 31, 2020. It is hoped that construction can commence in September and be completed by September 2022. Phase 2 would expand the project area to include 46,000 acre-feet of storage and potentially another 115 mgd which is envisioned for environmental purposes.

5.8 Lake Okeechobee Surface Water Allocation Limitations

Surface water allocations from Lake Okeechobee and the Water Conservation Areas are limited in accordance with the Lake Okeechobee Service Area Restricted Allocation Area (RAA) criteria. In 2008, the SFWMD adopted RAA criteria for the Lake Okeechobee Service Area as part of the Minimum Flow and Minimum Water Level (MFL) recovery strategy for Lake Okeechobee. The criteria limit allocations from Lake Okeechobee and integrated conveyance systems hydraulically connected to the lake to base condition water uses that occurred from April 1, 2001 to January 1, 2008. After adoption of the RAA, all irrigation users in the Lake Okeechobee Service Area were required to renew their water use permits.

In 2007, the SFWMD adopted the LEC Regional Water Availability criteria to prohibit increases in surface water and groundwater withdrawn from the North Palm Beach County/Loxahatchee River Watershed Waterbodies and Lower East Coast Everglades Waterbodies above base condition water uses permitted as of April 1, 2006. This also includes canals that are connected to and receive water from these water bodies. New direct surface water withdrawals are prohibited from the Everglades and Loxahatchee River watersheds and from the integrated conveyance systems. These criteria are components of

the MFL recovery strategies for the Everglades and the Northwest Fork of the Loxahatchee River.

While the City is not directly impacted by the Lake Okeechobee surface water allocation limitations, the City is directly impacted by the LEC Regional Water Availability criteria as it applies to the Lower East Coast Everglades Waterbodies. These criteria impact the amount of permitted water quantities available to the City from the Biscayne Aquifer.

5.9 Lowering Lake Okeechobee Level

In January 2019, Florida's Governor announced his promotion of a plan to lower the minimum level of the Lake Okeechobee Regulation Schedule to 10.5 feet. The current Lake Okeechobee Regulation Schedule (LORS) ranges from a minimum level of 12.5 feet to a maximum of 15.5 feet.

While lowering Lake levels could provide environmental benefits to the Lake and the coastal estuaries, dropping the minimum level to 10.5 feet would reduce the amount of water stored in Lake Okeechobee, potentially reducing the amount of water available to recharge the Biscayne Aquifer. Should this happen, the risk of water shortages in the LEC, including the City of Margate, would increase. The City continues to monitor this issue and, when appropriate, will develop a policy to address any potential impacts to its water utility.

5.10 Infrastructure Planned to Attenuate Damaging Peak Flow Events from Lake Okeechobee

Construction of additional storage systems (e.g., reservoirs, aquifer storage and recovery systems) to capture wet season flow volumes may be needed to increase water availability during dry conditions and attenuate damaging peak flow events from Lake Okeechobee. The C-51 Reservoir project located in southwestern Palm Beach County is one such project.

The infrastructure planned to attenuate damaging peak flows to surface water bodies and coastal ecosystems located near the City are those underway in Broward County by the SFWMD and the US Army Corps of Engineers under the Comprehensive Everglades Restoration Project (CERP).

The Broward County Water Preserve Areas project is part of the CERP and was designed to perform three primary functions:

1. Reduce seepage loss from WCA-3A/3B to developed areas (i.e., the C-11 and C-9 basins);

2. Capture, store, and distribute surface water runoff from the western C-11 Basin; and,

3. Restore wetlands, recharge groundwater, improve hydroperiods in WCA-3A/3B, and maintain flood protection.

The following major infrastructure features will be constructed as part of the project.

- C-11 Impoundment – A 1,168-acre impoundment to capture and store runoff from the C-11 Basin, reduce pumping of surface water into the WCAs, and provide releases for other regional uses.

- WCA-3A/3B Seepage Management Area – A 4,353-acre seepage management area that would establish a buffer to reduce seepage from WCA-3A/3B, connect the C-11 and C-9 impoundments via conveyance canal, and maintain flood protection.

- C-9 Impoundment – A 1,641-acre impoundment to capture and store surface runoff from the C-9 Basin, store C-11 Impoundment overflow, manage seepage, and provide releases for regional benefit.

These infrastructure features will provide various functions such as reducing seepage from WCA-3A, reducing phosphorus loading to WCA-3A, capturing stormwater otherwise lost to tide, and providing conveyance features for urban and natural system water deliveries. The preserve areas will benefit federally listed threatened and endangered species and many wading birds. This project provides water supplies identified in the Everglades MFL recovery strategy. The project received congressional authorization in 2014. Design efforts are under way for the C-11 Impoundment, and construction began in October 2017 on a portion of the mitigation area. Construction of the C-11 Impoundment is expected to be completed in 2027. The WCA-3A/3B Seepage Management Area is anticipated to begin construction in 2027. Construction of the C-9 Impoundment is expected to begin in 2030. The City continues to monitor the status of environment restoration projects in the LEC.

5.11 Use of brackish groundwater from the Floridan Aquifer

The use of brackish water from the Floridan Aquifer for potable use after treatment is considered an alternative water supply. At this time, the City of Margate has no plans to develop this resource.

Section 6.0 – Water Supply Capital Improvements

While there is no immediate need for an alternative water supply, the City has signed an agreement to obtain 2.0 mgd of water capacity from the C-51 Reservoir to address increases in future water demand. This cost and the FY 2020 approved five-year capital improvement plan are provided in Table 6.1. Other than capacity from the C-51 Reservoir, all capital improvement items are intended to replace and rehabilitate the existing water infrastructure as components reach the end of their useful lives.

Table 6.1: City of Margate Five-Year Capital Improvement Program for Water Service

Item	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Total Five-Year
Water Line Replacement	$2,450,000	$950,000	$950,000	$950,000	$950,000	$6,250,000
Computer Equipment	$0	$30,000	$0	$0	$0	$30,000
Water & Wastewater Equipment	$459,500	$551,500	$406,500	$489,000	$324,000	$2,230,500
Install Water Meters/ Service Connections	$750,000	$750,000	$150,000	$150,000	$150,000	$1,950,000
Electronic Meter Reading	$600,000	$300,000	$100,000	$100,000	$100,000	$1,200,000
Rehabilitate Raw Water Wells	$60,000	$90,000	$30,000	$60,000	$30,000	$270,000
Replace all (16) mag meters	$60,000	$0	$0	$0	$0	$60,000
Upgrade Telemetry system	$0	$50,000	$50,000	$50,000	$50,000	$200,000
Rehabilitate Generator Systems	$120,000	$60,000	$0	$0	$0	$180,000
4-Log Implementation	$0	$0	$250,000	$3,000,000	$0	$3,250,000
Water Main / Force Main Control Improvements	$200,000	$200,000	$200,000	$225,000	$225,000	$1,050,000
Rehabilitate DEES Administration Building	$550,000	$40,000	$0	$77,500	$365,000	$1,032,500
Aerial Utility Crossings	$250,000	$0	$0	$0	$0	$250,000
Emergency Interconnect	$0	$200,000	$0	$0	$0	$200,000
Repair Water Treatment Plant Accelators	$450,000	$0	$0	$0	$0	$450,000
Rehabilitate Backwash Holding Tank	$200,000	$0	$0	$0	$0	$200,000
Rehabilitate Water Treatment Plant Filters	$400,000	$0	$0	$0	$0	$400,000
SCADA System Upgrades	$650,000	$500,000	$0	$0	$0	$1,150,000

Table 6.1: City of Margate Five-Year Capital Improvement Program for Water Service

Item	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Total Five-Year
Security System Upgrades	$0	$100,000	$0	$0	$0	$100,000
Rehabilitate High Service Pump Building	$0	$50,000	$0	$0	$0	$50,000
Asphalt Resurfacing - WTP	$0	$0	$0	$0	$200,000	$200,000
Lime Sludge Handling Process	$0	$0	$250,000	$3,000,000	$3,000,000	$6,250,000
Water Treatment Plant Infrastructure Improvements	$0	$0	$250,000	$2,000,000	$2,000,000	$4,250,000
Total - Budgeted	**$7,199,500**	**$3,871,500**	**$2,636,500**	**$10,101,500**	**$7,394,000**	**$31,203,000**
C-51 Reservoir Capacity Cost-Share - 2 mgd	$0	$0	$9,200,000	$0	$0	$9,200,000
Total	**$7,199,500**	**$3,871,500**	**$11,836,500**	**$10,101,500**	**$7,394,000**	**$40,403,000**

Source: Total - Budgeted Items from "City of Margate FY 2020 Adopted Budget and Five-Year Capital Improvement Program". Some items include the costs associated with both water and wastewater service. C-51 Reservoir Capacity Cost Share is from "Agreement for Capacity Allocation of the Phase 1 of the C-51 Reservoir, City of Margate".

Section 7.0 – Goals, Objectives and Policies

The proposed changes to the Goals, Objectives and Policies of the City's Comprehensive Plan are indicated by the yellow highlighted text.

Goal Statement

~~Establish procedures to identify water supply resources to address allocation deficiencies, if any, during the current 10-year planning period and beyond.~~

Regularly assess the sufficiency of the City's water supply to water customers in the City and in its water service area and identify water supply sources to address deficiencies.

Objective 1.1:

~~Update Population Projections and Demand patterns to quantify water supply needs.~~

Annually update population and water demand projections to quantify water supply needs.

Policy 1.1.1.:

Track and update population projections annually, as published by Broward County Planning Services Division. Compare projections with the figures published in the South Florida Water Management District's 2018 Lower East Coast Water Supply Plan Update and the City's 2020 Water Supply Facilities Work Plan Update.

Policy 1.1.2:

Track and update water demand projections annually based on actual demand figures as recorded in the monthly operating reports. Compare projections with the figures published in the South Florida Water Management District's 2018 Lower East Coast Water Supply Plan Update and the City's 2020 Water Supply Facilities Work Plan Update.

Policy 1.1.3:

Based on changes identified in Policy #1.1.1 and 1.1.2, modify the scope and size of future AWS projects or other water resources projects which may be required to address long term water supply needs.

Objective *1.2:*

On an annual basis, track regional water resources projects and/or changes in treatment technologies, which may impact the selection of ~~water resources~~ AWS projects~~, including the previously proposed reuse system,~~ to address future water supply ~~needs during the current planning period and beyond~~.

Policy 1.2.1:

As needed, proactively participate in regional pilot or bench scale studies which have a potential to mitigate or minimize the future demands and/or costs associated with implementation of AWS projects.

Policy 1.2.2:

Develop inter-local agreements to facilitate participation in programs stated in Policy # 1.2.1.

Objective 1.3:

As needed, identify revenue sources to fund additional AWS projects, if required, to address water supply needs of the current planning period and beyond.

Policy 1.3.1:

By 2023, develop a comprehensive water and wastewater master plan to identify system needs over a long-term planning period (i.e. beyond the current 10-year planning period).

Policy 1.3.2:

As needed, perform a comprehensive rate study to identify revenue sources to implement the recommendations of the master plan identified in Policy # 1.3.1.

Policy 1.3.3:

As needed, revise the rate structure or identify additional funding sources to fund the projects identified in the master plan to meet the water supply needs beyond the current 10-year planning period.

Policy 1.3.4:

Adopt an ordinance, if required, which incorporates the revised rate structure to fund projects to meet the water supply needs beyond the current 10-year planning period.

Section 8.0 – References

1. 2018 Lower East Coast Water Supply Plan Update, SFWMD, November 8, 2018
2. Applicant's Handbook for Water Use Permit Applications, SFWMD, Effective September 7, 2015
3. Broward County Water Supply Facilities Work Plan, April 2020
4. City of Margate Water Supply Facilities Update, 2015
5. Water Supply Facilities Work Plan Updates – SFWMD Technical Assistance Guide, January 2019