City of Hallandale Beach
10-Year Water Supply Facilities Work Plan

Prepared by:

City of Hallandale Beach

Public Works and Development Services Department

in association with

December ~~13~~ 11, ~~2019~~ 2020

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1.0 INTRODUCTION

The City of Hallandale Beach (City) is located on the southeastern coast of Florida within Broward County. **Figure 1** illustrates a location map of the City. This 2019 City of Hallandale Beach 10-Year Water Supply Facilities Work Plan identifies water supply sources, availability and facilities needed to serve existing and new development within the local government's jurisdiction. Chapter 163, Part II, (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 South Florida Water Management District (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 District's Governing Board on November 9, 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 9, 2020.

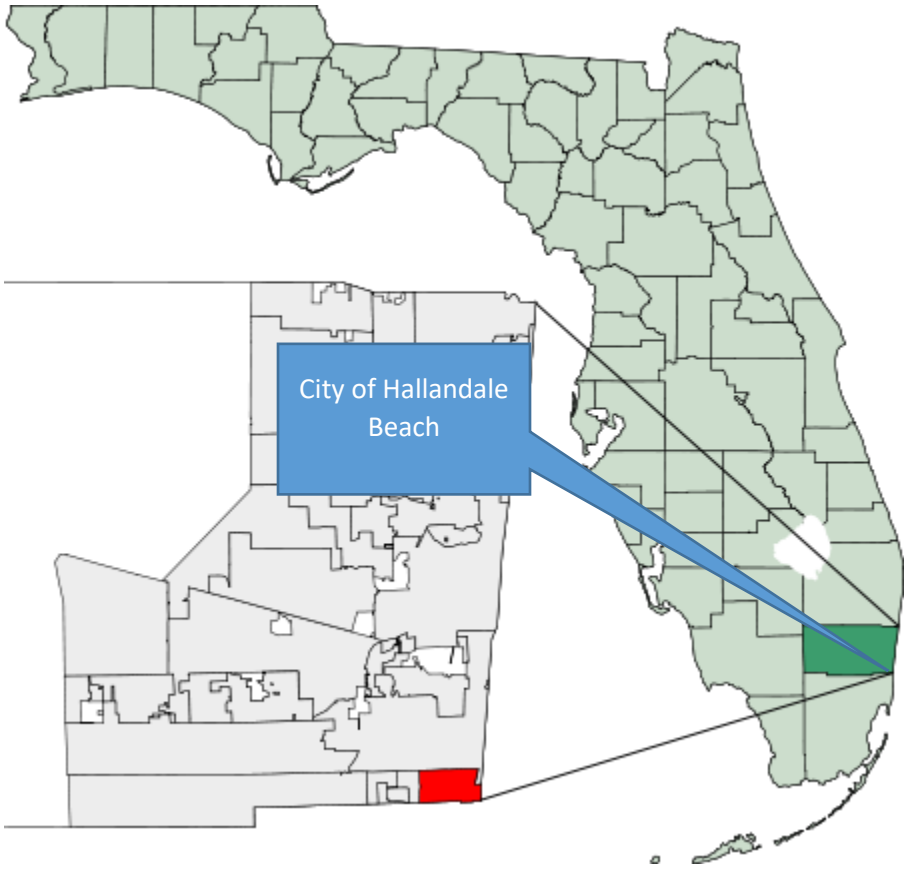


Figure 1 – City of Hallandale Beach Location Map

Source: City of Hallandale Beach 2019

The State of Florida requires that the 10-year Water Supply Facilities Work Plan - 2019 Update address the development of traditional and alternative water supplies and management strategies, including conservation and reuse. The data and analyses, including population projections, water demands and service areas must cover at least a 10-year planning period and be consistent with the 2018 LECWSP Update.

The City of Hallandale Beach 10-year Water Supply Facilities Work Plan - 2019 Update is divided into five sections:

1.0 – Introduction

2.0 – Background Information

3.0 – Data and Analysis

4.0 – Capital Improvements

5.0 – Goals, Objectives, and Policies

1.1 Statutory History

The Florida Legislature enacted bills during the 2002, 2004, 2005, 2011, 2012, 2015, and 2016 sessions to address the state's water supply needs. These bills, including Senate Bills 360 and 444 (2005 legislative session), significantly changed Chapters 163 and 373, F.S., by strengthening the statutory links between the regional water supply plans prepared by the water management districts and the comprehensive plans prepared by local governments. In addition, these bills established the basis for improving coordination between local land use and water supply planning.

1.2 Statutory Requirements

The City of Hallandale Beach has considered the following statutory provisions in updates to this 10-year Water Supply Facilities Work Plan.

1. Coordinate appropriate aspects of its comprehensive plan with the 2018 LECWSP Update [163.3177(4)(a), F.S.].

2. Ensure the future land use plan is based upon availability of adequate water supplies and public facilities and services [s.163.3177 (6) (a), F.S.]. Data and analysis demonstrating that adequate water supplies and associated public facilities will be available to meet projected growth demands must accompany all proposed Future Land Use Map amendments submitted for review.

3. Ensure that adequate water supplies and potable water facilities are available to serve new development no later than the issuance by the local government of a certificate of occupancy or its functional equivalent and consult with the applicable water supplier to determine whether adequate

water supplies will be available to serve the development by the anticipated issuance date of the certificate of occupancy [s.163.3180 (2), F.S.].

4. Revision of the related comprehensive planning elements within 18 months after the water management district approves an updated regional water supply plan, to:

    a. Identify and incorporate the alternative water supply project(s) selected by the local government from projects identified in the 2018 LECWSP Update, or alternative project(s) proposed by the local government under s. 373.709(8)(b), F.S. [s. 163.3177(6)(c), F.S.];

    b. Identify the traditional and alternative water supply projects and the conservation and reuse programs necessary to meet water needs identified in the 2018 LECWSP Update [s. 163.3177(6)(c)3, F.S.]; and

    c. Update the 10-year Water Supply Facilities Work Plan for at least a 10-year planning period for constructing the public, private, and regional water supply facilities identified in the element as necessary to serve existing and new development [s. 163.3177(6)(c)3. and (5), F.S.].

5. Revise the Five-Year Schedule of Capital Improvements to include water supply, reuse, and conservation projects and programs to be implemented during the five-year period [s. 163.3177(3)(a)4, F.S.].

6. To the extent necessary to maintain internal consistency after making changes described in Paragraph 1 through 5 above, revise the Conservation Element to assess projected water needs and sources for at least a 10-year planning period, considering the 2018 LECWSP Update, as well as applicable consumptive use permit(s) [s.163.3177 (6) (d), F.S.]. The plan must address the water supply sources necessary to meet and achieve the existing and projected water use demand for the established planning period, considering the 2018 LECWSP Update [s.163.3167(9), F.S.].

7. To the extent necessary to maintain internal consistency after making changes described in Paragraphs 1 through 5 above, revise the Intergovernmental Coordination Element to ensure coordination of the comprehensive plan with the 2018 LECWSP Update [s.163.3177 (6) (h) 1., F.S.].

8. While an Evaluation and Appraisal Report is not required, local governments are encouraged to comprehensively evaluate, and as necessary, update comprehensive plans to reflect changes in local conditions. The evaluation could address the extent to which the local government has implemented the need to update their 10-year Water Supply Facilities Work Plan, including the development of alternative water supplies, and determine whether the identified alternative water supply projects, traditional water supply projects, and conservation and reuse programs are meeting local water use demands [s.163.3191 (3), F.S.].

2.0 BACKGROUND INFORMATION

This section includes the following:

I. An overview of the City of Hallandale Beach water service area; and,

II. A description of regional water supply planning issues that impact the City of Hallandale Beach, including the following:

   a) Climate Change;

   b) Regional Water Availability Rule;

   c) Participation in the C-51 Reservoir Project;

   d) Leah G. Schad Ocean Outfall Program;

   e) Regional Climate Action Plan;

   f) Lake Okeechobee surface water allocation limitations;

   g) Lowering Lake Okeechobee level;

   h) Infrastructure planned to attenuate damaging peak flow events from Lake Okeechobee; and

   i) Use of brackish groundwater from the Floridan Aquifer.

2.1 Service Area

The City of Hallandale Beach was founded in 1927 and is one of the oldest communities in Broward County. The City is characterized by its many medium and high-rise residential structures, primarily along the beach area and by two pari-mutuel facilities called Gulfstream Park and Mardi Gras Gaming Center. The City is a full-service community offering police service, fire/rescue protection, public works, water and sewer utilities, community development, code enforcement, and parks and recreation services.

The City is currently over 95 percent built-out, as is the case with most municipalities in Broward County. Development in the City is primarily high-density residential and commercial buildings on the City's east side, while the west side of the City has remained relatively low density residential and commercial. There has been a development trend in the western portion of the City including infill development of vacant single-family, multi-family and commercial lots and the redevelopment of underutilized properties. It is noted that continued redevelopment is expected within the Regional Activity Center (RAC), where the City anticipates that the majority of future population and residential units will be established. Water demand growth over the next 20 years will be guided by future land use designations for residential development, including some commercial areas, as illustrated in **Figure 2**.

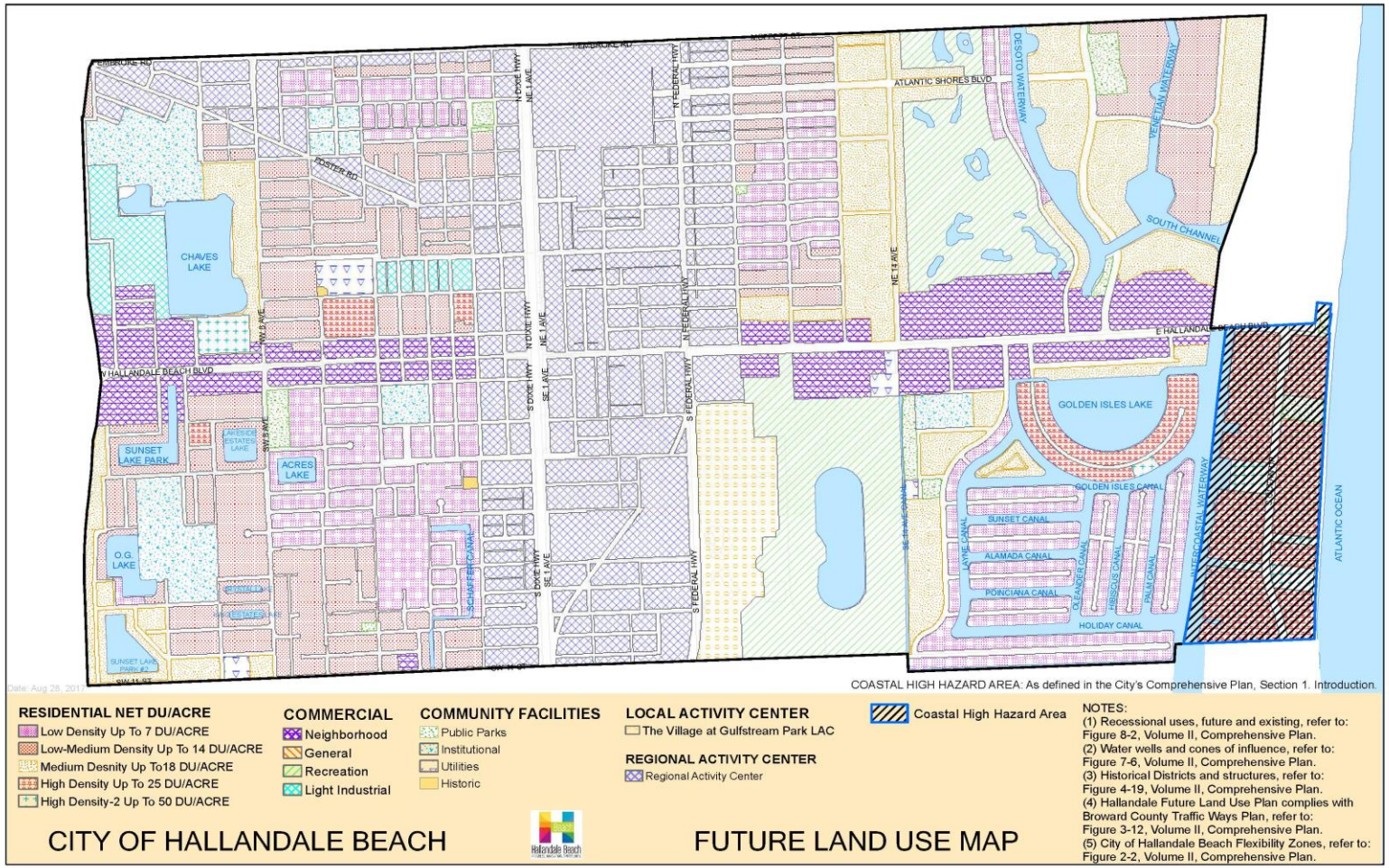


Figure 2 - City of Hallandale Beach Future Land Use Map

Source: City of Hallandale Beach Planning and Zoning Department 2019

The City provides potable water to all areas within the City Limits (approximately 2,800 acres) except the Diplomat Golf Course, which is irrigated with reuse water from the City of Hollywood. Currently, the City has no plans to provide raw or finished water to any other municipality or area outside of its jurisdiction. It is noted that there are no areas of the City served by private domestic self-supply systems or potable water wells. **Figure 3** depicts the water service area (inclusive of all retail and wholesale customers).

Figure 3 also depicts the location of key City assets including the following: 1) City of Hallandale Beach water supply wells (including future Production Well 9); 2) City of Hallandale Beach Water Treatment Plant (WTP); 3) Elevated Water Storage Tanks; and 4) Two City of North Miami Beach interconnects.

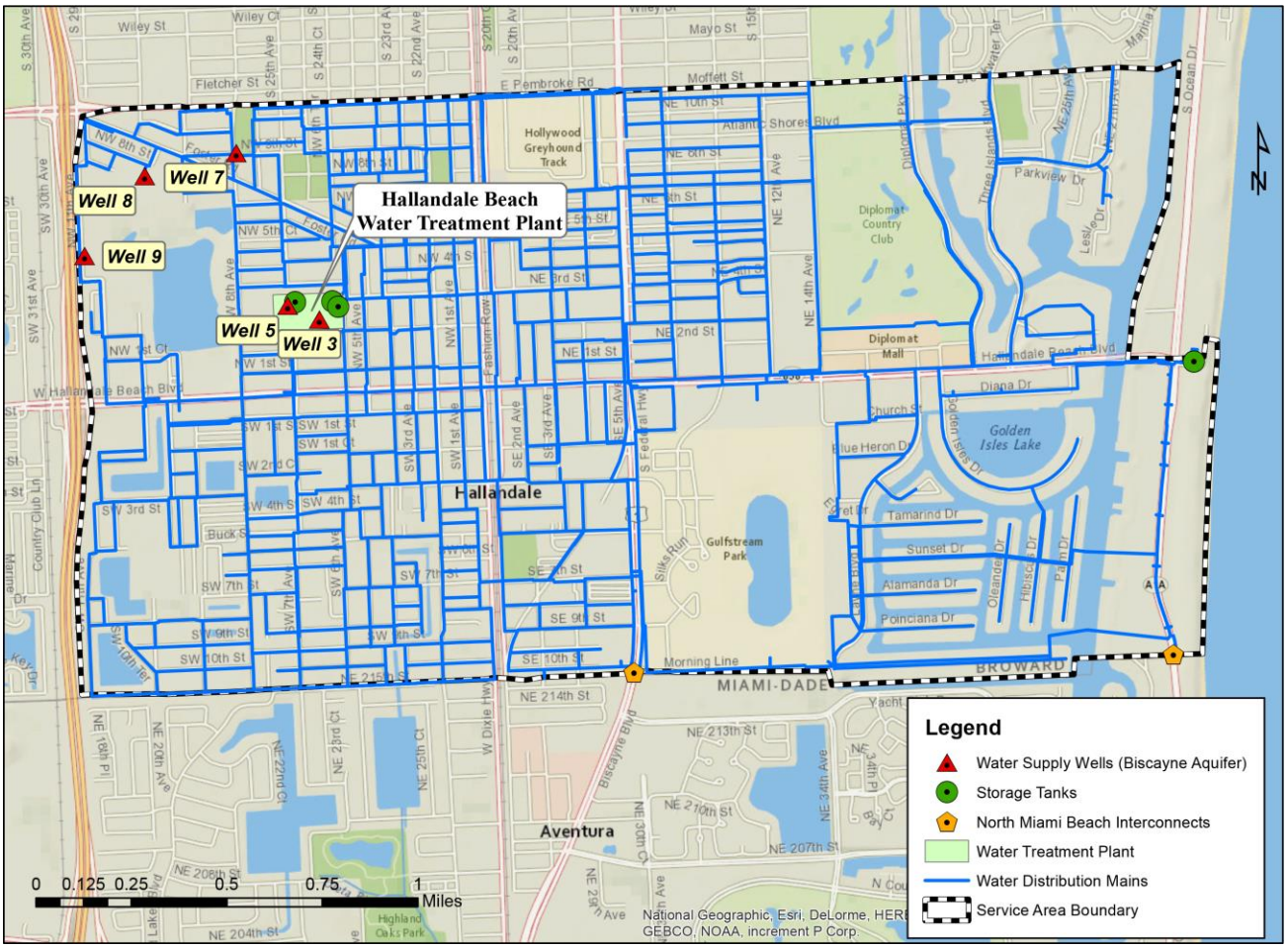


Figure 3 - **City of Hallandale Beach Water Service Area**

Source: City of Hallandale Beach 2019

2.2 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 Hallandale Beach, 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 recently submitted a grant for a Vulnerability Assessment and Adaptation Plan which includes a review of projected changes in precipitation and groundwater impacts.

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. This year the City adopted Intergovernmental Panel on Climate Change's (IPCC) 1.5 degree Celsius goals for climate change mitigation. The City has committed to conduct a Greenhouse Gas (GHG) emission inventory next year and to create a plan to achieve the IPCC goals (Resolution 2019-021).

Key considerations for the City of Hallandale Beach relative to climate change include:

1. Sea level rise;
2. Saltwater intrusion;
3. Extreme weather, especially extreme heat conditions impacting elderly and low-income residents; and
4. Infrastructure development,

2.2.1 Sea Level Rise

The City of Hallandale Beach 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.

Development of cost-effective sea level rise adaptation strategies to ensure the sustainability of the City's water supply is critical to all ongoing planning efforts. A unified projection by the Southeast Florida Regional Climate Change Compact is illustrated in **Figure 4**. It shows a 6- to 10-inch increase in sea level in our region in the near term, and a 14 to 26-inch rise by mid-century. This sea level rise projection is now being used as the basis for planning throughout the region.

In terms of infrastructure, every aspect that is underground or touches the ground will need 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.

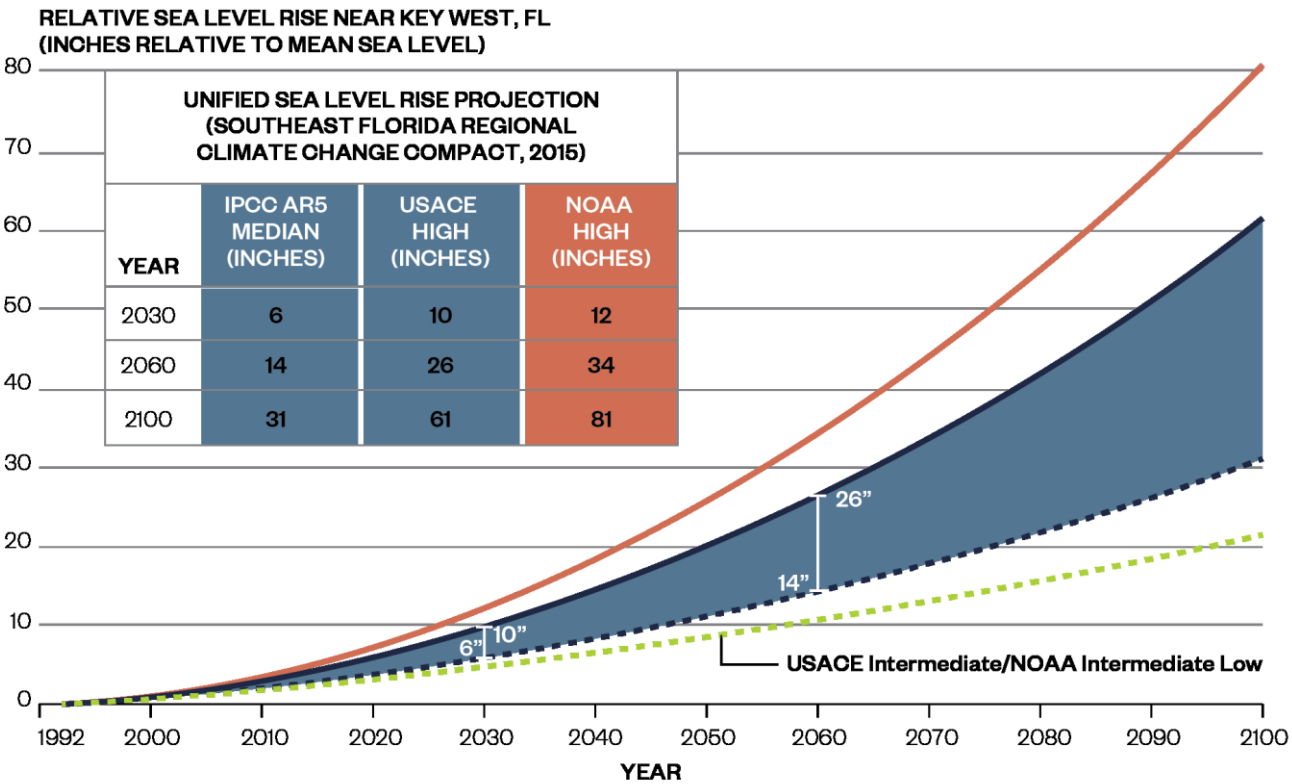


Figure 4 – Sea Level Rise Projection

Source: Unified Sea Level Rise Projection Southeast Florida, October 2015https://southeastfloridaclimatecompact.org/wp-content/uploads/2015/10/2015-Compact-Unified-Sea-Level-Rise-Projection.pdf

2.2.2 Saltwater Intrusion

The Biscayne Aquifer serves as 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 current 250 mg/L isochlor in the vicinity of the City is illustrated in **Figure 5.**

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. The impact of saltwater intrusion on some of the City's Biscayne Aquifer drinking water production wells has been well-

documented by the District and USGS. It has been concluded that movement of the saline water front in the vicinity of the City is primarily caused by the historic lowering of the water table in western Broward County for the construction of regional drainage canals. If saltwater intrusion impacts the City's wells over the next ten years, the water will need to be treated using membranes, instead of lime softening. The result will be an increase in water treatment loss and an increase in the raw water per capita demand.

The City monitors chloride concentrations monthly and submits the data to the SFWMD at the following USGS owned monitor wells.

- G-1435
- G-2294
- G-2409
- G-2410
- G-2477
- G-2478
- G-2965

In 2016 the City constructed three saltwater monitor wells (SWMW) with 4-inch diameter slotted casing to a depth of approximately 250 feet below land surface. The City collects conductivity data monthly. **Figure 6** illustrates the location of the City-owned monitor wells, USGS-owned wells and the City's water supply wells. Based on the conductivity data collected, the 250 mg/L chloride concentration is estimated to be 160 feet below land surface near the City's saltwater monitor well SWMW-2.

The City is currently designing a new production well, PW-9, to be constructed west of Chaves Lake. Once PW-9 is constructed, pumping from City-owned well PW-7 will be discontinued and PW-8 pumping will be limited to 700 gpm. This shift of raw water pumpage to the west is anticipated (per modelling results) to reduce the rate of advancement of the saltwater interface. It is estimated that PW-9 will begin operation in 2020/2021.

2.2.3 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.

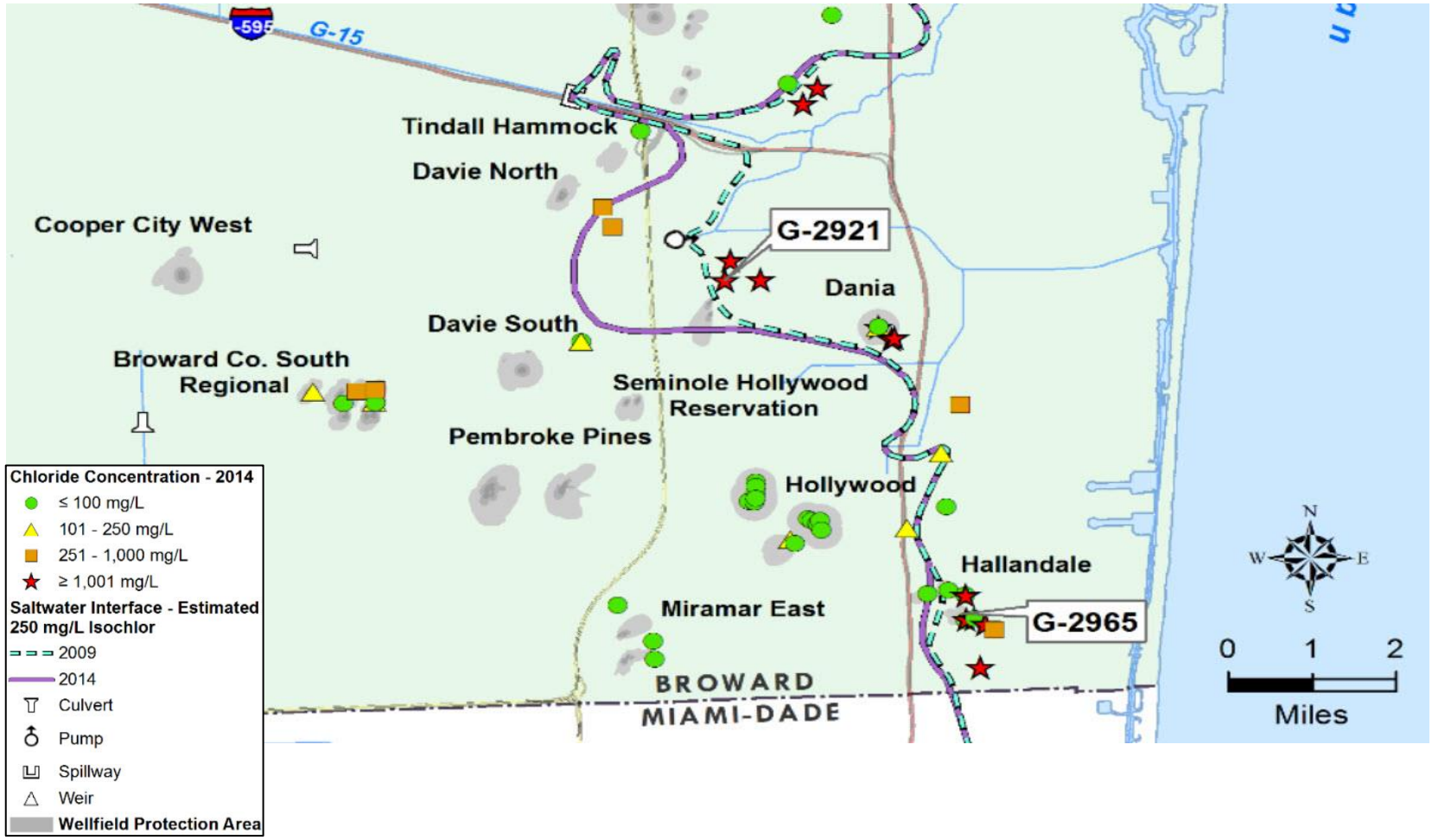


Figure 5 – 250 mg/L Isochlor Map in South Broward County

Source: South Florida Water Management District. (2018b). 2018 Lower East Coast Water Supply Plan Update – Appendices.

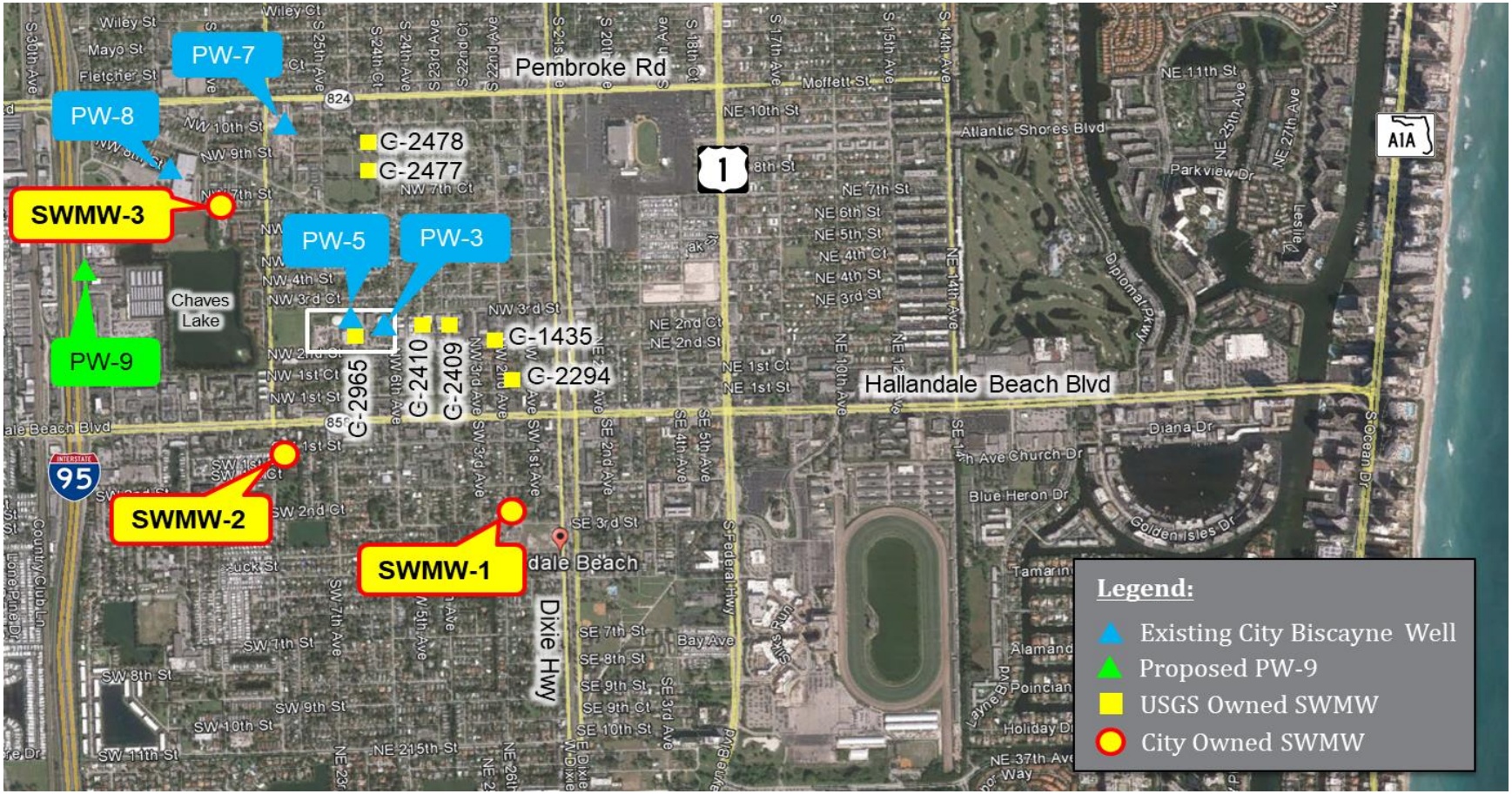


Figure 6 – Location of Chloride Monitor Wells and City-Owned Biscayne Aquifer Wells

Source: City of Hallandale Beach 2019

2.2.4 Infrastructure Development

With increasing climate disruptions, diversification of water supply sources, improvement of treatment technologies, and development of adaptive stormwater and wastewater infrastructure design criteria become critical to ensure the long-term sustainability of key facilities. Strategic infrastructure planning should incorporate these opportunities and work within the Goals, Objectives, and Policies 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 both 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: addition of reverse osmosis skids to existing membrane facility, regional water storage such as the C-51 Reservoir; conservation; the improvement (or relocation) of infrastructure in low lying area to mitigate flooding; and enhancing operational flexibility. The City's planning effort regarding water supply infrastructure includes the consideration of the Regional Water Availability Rule, the C-51 Reservoir Project, the Ocean Outfall Program and the Regional Climate Change Action Plan.

Regional Water Availability (RWA) Rule -The RWA Rule was passed by the SFWMD on February 16, 2007. The RWA Rule limits Public Water Supply Utilities ~~withdrawals from the Biscayne Aquifer~~ to the maximum quantity withdrawn during any consecutive 12-month period during the five years preceding April 2006. ~~Cities~~ Utilities needing additional water supplies are required to seek sources that will not induce additional seepage from the Everglades or connected sources. These alternative water supply solutions include recycling water, using reclaimed water to recharge the Biscayne Aquifer, or drawing water from the deeper Floridan Aquifer (which requires high energy consumption treatment methods).

The RWA Rule limited the City's Biscayne Aquifer withdrawal to 4.03 million gallons per day (mgd) on an annual average day basis. To minimize potential impacts from saltwater intrusion, the City's Water Use permit limited the raw water withdrawal from the City's wellfield to 3.50 mgd (annual average day basis) for several years. The recently issued ~~SFWMD~~ District ~~w~~Water ~~u~~Use ~~p~~Permit, increased the City's Biscayne Aquifer withdrawal back up to 4.03 mgd when ~~w~~Well ~~No.~~ 9 is in production. This well is currently still proposed, and the authorized limit is 3.5 mgd.

The RWA Rule further limited the water that the City receives from Broward County's South Regional Wellfield (SRW) located in the western part of the County at Brian Piccolo Park. From 2019 to 2022, up to 3.5 mgd of raw water can be transmitted to the Hallandale Beach Water Treatment Plant via a 24-inch water main. After 2022, the allocation is 3.26 mgd from the SRW. Once the C-51 Reservoir provides the 1 mgd of offset water, the City will be able to purchase an additional 1 mgd from the County via the SRW. The City of Hallandale Beach is currently permitted for adequate raw water withdrawals from their combined sources (City wells and

Broward County Regional Water Supply wells) through the year 2030. The 1 mgd allocation from C-51, which is detailed in the Broward County SRW permit, is permitted through 2065.

C-51 Reservoir Project - The capture of excess stormwater is considered an alternative water supply project as defined in Section 373.707, F.S. One such project, the proposed C-51 reservoir, was evaluated in 2009 by a group of seven utilities located in Broward and Palm Beach counties. The location of this proposed reservoir is adjacent to the SFWMD's existing L-8 Reservoir in Palm Beach County and is expected to share the same impermeable geologic formation that facilitates storage. This project is designed to capture excess stormwater that is currently discharged to the Lake Worth Lagoon. The captured stormwater would be used to recharge the Biscayne Aquifer.; Phase 1 of C-51 does not allow for treatment of reservoir water for potable demands. Treatment of this water for potable use will remain the responsibility of local water utilities.

In December 2012, a Joint Palm Beach and Broward Counties Water Resources Task Force meeting led to the adoption of resolutions advancing a C-51 Governance and Finance Working Group that would oversee a full, independent cost accounting and exploration of potential governance structures for future operations of the reservoir. That group evaluated project costs, advanced regulatory coordination with the SFWMD, and explored future governance structures.

The City of Hallandale Beach continues to participate in this innovative regional stormwater capture project partnered with the Broward County Water Resources Task Force Technical Team. The City has committed to purchasing 1 mgd of water from the C-51 reservoir which is currently under construction. ~~and~~ The C-51 reservoir is expected to be fully operational ~~in late 2021~~ by December 2022, based on the latest correspondence received by the City of Hallandale from Palm Beach Aggregates. The water supply will provide a recharge "offset" that will allow the City to purchase an additional 1 mgd of raw water from Broward County's SRW.

Leah G. Schad Ocean Outfall Program - In 2008, the Florida Legislature enacted an ocean outfall statute (Subsection 403.086(9), F.S.) called the Leah Schad Memorial Ocean Outfall Program. This statute requires the decommissioning of six ocean outfalls in southeastern Florida, including two in Broward County, which are the primary means for disposal of treated domestic wastewater. The affected wastewater utilities are required to reuse at least 60 percent of the historic outfall flows by 2025. The objectives of this statute are to reduce nutrient loadings to the environment and to achieve a more efficient use of water for water supply needs. The

City, as a large user of the City of Hollywood Southern Regional Wastewater Treatment Plant (SRWWTP), will likely be required to participate in and/or cost-share future reclaimed water projects that comply with this Ocean Outfall Program. Currently, there are no specific participation or cost-sharing arrangements.

Regional Climate Action Plan - Southeast Florida is one of the most vulnerable regions to be impacted by climate change and sea level rise. This is largely the result of several unique geographic characteristics which 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".

Table 1 summarizes the water supply-related recommendations from the Regional Climate Action Plan 2.0.[1] These recommendations are intended to meet the goals of advancing water management strategies and infrastructure improvements needed to mitigate for adverse impacts of climate change and sea level rise on water supplies, water and wastewater infrastructure, and water management systems and have been incorporated throughout this 10-year Water Supply Facilities Work Plan - 2019 Update and related comprehensive planning element updates.

Table 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.

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

Table 1 - Water Supply Recommendations of the 2019 Regional Climate Change Action Plan

Item	Recommendations
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.

2.2.5 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. As a result, the City's 2023 Biscayne Aquifer withdrawal allocation will be limited to 8.29 mgd on an annual average day basis. <u>This limit includes the RWA base condition for water allocation from the Biscayne Aquifer for Hallandale Beach of 1,473 MGY (4.03 mgd) and the base condition of Broward County, from whom the City purchases bulk water.</u>

2.2.6 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 Hallandale Beach, 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.

2.2.7 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 and was described in Section 2.2.4.

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 CERP Broward County Water Preserve Areas project 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.
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.

2.2.8 Use of brackish groundwater from the Floridan Aquifer

Brackish water from the Floridan Aquifer is a potential future alternative water source which is expected to be investigated in FY 2020 as part of the City's conceptual planning for future water supply. The City recognizes that development and use of this potential water supply will require careful planning and wellfield management to prevent undesirable changes in water quality.

3.0 DATA AND ANALYSIS

The planning horizon for the Water Supply Facilities Work Plan - 2019 Update spans 10 years, from 2020 to 2030. The City has identified several options for expanding and/or replacing water supply beyond 10 years and is currently assessing redevelopment efforts within the City to refine water demand projections after 2030. This section provides information related to the population and water demand forecasts within the City of Hallandale Beach's water service area and the sufficiency of water supply through 2030.

3.1 Population Information

This 2019 Update provides estimates of the future water supply needs for the City of Hallandale Beach's water service area based on the service area population forecast provided in the 2018 LECWSP Update, Table B-1. This forecast was developed by the SFWMD in consultation with the City and is based on the county population forecast provided by the University of Florida Bureau of Economic and Business Research (BEBR) and the population forecasts by traffic analysis zone (TAZ) provided by the Broward County Planning and Development Management Division. The City will periodically update the population forecast based on potential or intended redevelopment within the City. The intended redevelopment is expected within the Regional Activity Center (RAC), where the City anticipates that the majority of future population and residential units will be established.

3.2 Current and Future Served Areas

The City of Hallandale Beach provides water service to over 40,000 City residents through 6,748 multi-family, single-family, commercial, and irrigation accounts within the City's jurisdiction. Other than the sand dunes along its beach, the City's entire 4.55 square mile area has been developed but there is significant redevelopment potential in the City, primarily within the RAC. The City is primarily residential, with small concentrations of light industry, stores, and office buildings and is anticipating redevelopment since the

adoption of the RAC regulations. Currently, the City has no plans to provide raw or finished water to any other municipality or area outside of its jurisdiction. It is noted that there are no areas of the City served by private domestic self-supply systems or potable water wells.

3.3 Potable Water Level of Service Standard

The City of Hallandale Beach has set level of service standards for its water system as summarized in **Table 2.**

Table 2 - City of Hallandale Beach Water System Level of Service Standards

Component	Level Of Service Standard / Goal
System Pressure - Water shall be delivered to users at a pressure:	No less than 35 pounds per square inch (psi) and no greater than 100 psi.
Potable Water Facilities - The level of service standard for potable water facilities shall be:	~~178~~ 148 gallons per capita per day (~~max~~ annual average day).
Minimum multi-story residential/commercial fire flow	3,500 gpm
Minimum business district fire flow	2,000 gpm
Minimum fire flow for multi-family residential	1,500 gpm
Minimum fire flow for general residential	500 gpm
Minimum distribution system pressure during peak hour demand periods	20 psi
Minimum distribution system pressure during fire flow occurrences	20 psi
Maximum desired flow velocity in pipe	8 feet/second

3.4 Historic Raw and Finished Water Production

Table 3 presents historical annual average daily flow (AADF) of raw water pumped and treated water produced from the City's wellfields and WTP, respectively, along with the estimated service area population from 2014 to 2018. The raw water pumped and treated water produced represent the demand for water within the City's water service area. The historical per capita water demand during this time frame is also presented.

Table 3 - City of Hallandale Beach Water Service Area Historic Raw Water Pumping and Finished Water Production[A]

Year	Water Service Area Population[B]	Finished Water Production				Raw Water Pumped	
		AADF (mgd)	Gallons per person per day	Maximum Day	Max Day Factor	AADF (mgd)[C]	Gallons per person per day
(1)	(2)	(3)	(4) = (3) x 10^6 / (2)	(5)	(6) = (5) / (3)	(7)	(8) = (7) x 10^6 / (2)
2014	38,552	5.50	143	6.89	1.25	6.11	159
2015	38,964	5.79	149	6.63	1.15	6.44	165
2016	39,375	5.95	151	6.84	1.15	6.67	169
2017	39,787	5.99	151	7.34	1.23	6.63	167
2018	40,198	5.96	148	6.96	1.17	6.55	163
2014 to 2018 Average:		**5.84**	**148**	**6.93**	**1.19**	**6.48**	**165**

Notes:

Note A: Based on City of Hallandale Beach Monthly Operating Reports.

Note B: Based on the City's service area population in 2016 and 2020 as reported in the 2018 LECWSP Update, Appendix B, Table B-1, page B-8.

Note C: Includes Hallandale wellfield pumpage and raw water purchased from Broward County. The water source is the Biscayne Aquifer.

Source: Hazen and Sawyer Water Demand Forecast Spreadsheet - 2019-07-26.xlsx

The above data represent the overall water consumption within the City's water service area including: 1) residential; 2) commercial; and 3) industrial. These data provide the following information.

- Average raw water per capita demand from 2014 to 2018 was 165 gallons per person (capita) per day (gpcd).
- Average finished water per capita demand from 2014 to 2018 was 148 gpcd.
- The 2014 to 2018 average maximum day factor is 1.19.

The 5-year per capita averages for raw water and finished water were used to assess future water use forecasts based upon the forecasted water service area population. Over the past five years, the proportion of water treated using lime softening and the proportion treated using membrane softening was about 50 percent and 50 percent, respectively. For the next 10 years these proportions are expected to remain relatively similar. Therefore, the 165 gpcd raw water demand and the 148 gpcd finished water demand were used in the water demand forecasts from 2020 to 2030.

3.5 Population and Potable Water Demand Projections

Table 4 presents the population in 2018 and the population forecast for the City of Hallandale Beach's water service area through 2030. For planning purposes, it is noted that the City anticipates that the majority of future population is assumed to be distributed within the RAC area.

Table 4 - Population Forecast Hallandale Beach Water Service Area[A]

Year	Population
2018	40,198
2020	41,021
2025	42,862
2030	44,304

Note A: Source of service area population projections is the 2018 LECWSP Update, Appendix B, Table B-1, page B-8.

Table 5 presents the water demand forecast for the City of Hallandale Beach's water service area from 2018 through 2030. Forecasts are presented for the Biscayne Aquifer raw water and finished water demands an AADF basis. Additionally, the maximum day finished water demand forecast is provided based upon the historical maximum day to annual average day ratio of 1.19. The maximum day finished water demand is presented to assess the adequacy of the existing treatment plant capacity. The data in the table below assumes that the City maintains a finished water per capita of 148 gallons per person per day through the year 2030.

Table 5 - City of Hallandale Beach Water Service Area Water Demand Forecast

Year	Population	Raw Water Per Capita (gpcd)[A]	Finished Water Per Capita (gpcd)[A]	Biscayne Aquifer Raw Water Demand AADF (mgd)	AADF Finished Water Demand (mgd)[B]	Max Day Finished Water Demand (mgd)[C]
(1)	(2)	(3)	(4)	(5) = (2) x (3) / 10^6	(6) = (2) x (4) / 10^6	(7) = (6) x 1.19
2018	40,198	163	148	6.55	5.96	6.96
2020	41,021	165	148	6.77	6.07	7.22
2025	42,862	165	148	7.07	6.34	7.55
2030	44,304	165	148	7.31	6.56	7.80

Notes:

Note A: Year 2018 raw and finished water per capita are actual values. Year 2020 through 2030 per capita is the five-year average value (2014 to 2018).

Note B: Data reflect 85% treatment efficiency for membrane treatment and 95% treatment efficiency for lime softening.

Note C: For the years 2020 through 2030, the five-year average (2014 to 2018) Max Day Factor of 1.19 was used.

Source: Hazen and Sawyer Water Demand Forecast Spreadsheet - 2019-07-26.xlsx

The City's raw water withdrawal allocation from the Biscayne Aquifer by source is provided in **Table 6**. The City's current total Biscayne Aquifer allocation is 7 mgd, with 3.50 mgd from the City's wellfield and 3.50 mgd from Broward County's SRW. Beginning in 2021, the City's Biscayne Aquifer allocation from City wells will increase from 3.50 mgd to 4.03 mgd once the proposed new City well, PW-9, located west of the City's existing wellfield, begins operation.

The 3.50 mgd from the SRW was approved by the SFWMD during a five-year temporary allocation period from 2017 to 2022 to allow time for the City to develop an alternative water supply. That alternative became the purchase of 1.0 mgd of raw water from the C-51 Reservoir anticipated to begin operation in ~~October 2021~~ December 2022 based on the latest information received by the City of Hallandale Beach from Palm Beach Aggregates. Beginning in the year 2023 or commencement of C-51 operations, the City's Biscayne Aquifer base allocation from the SRW will fall from 3.50 mgd to 3.26 mgd and the offset allocation from the SRW will be 1.0 mgd. Thus, by 2023, the total Biscayne Aquifer allocation will be 8.29 mgd.

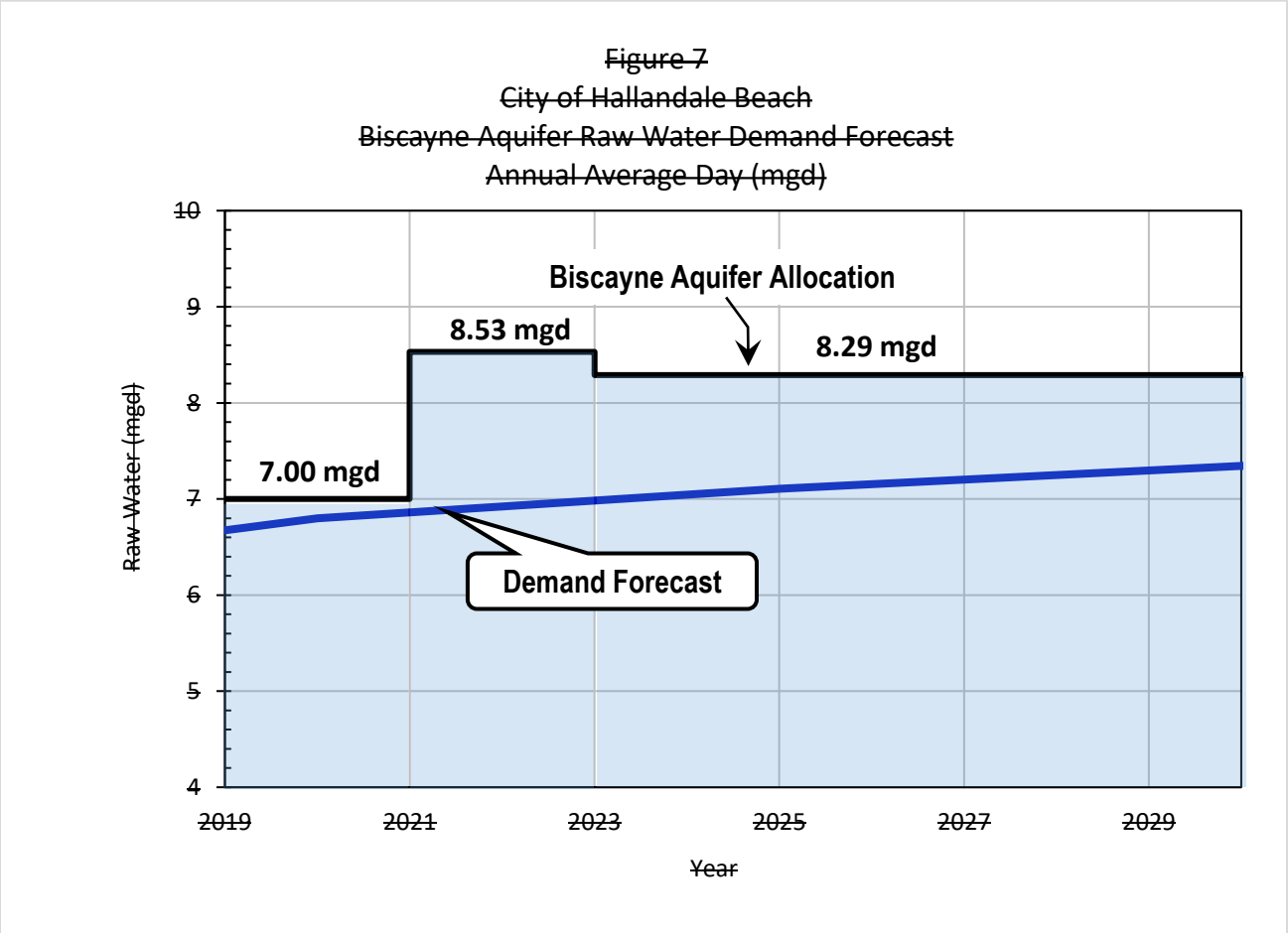
Table 6 - City of Hallandale Beach Raw Water Withdrawal Allocation By Source, AADF in mgd

Year	Broward County South Regional Wellfield		City's Wellfield	Total
	Base	Offsets from C-51 Reservoir		
2019	3.50	0.00	3.50	7.00
2020	3.50	0.00	3.50	7.00
2021	3.50	~~1.00~~ 0.00	4.03	~~8~~ 7.53
2022	3.50	~~1.00~~ 0.00	4.03	~~8~~ 7.53
2023	3.26	1.00	4.03	8.29
2024	3.26	1.00	4.03	8.29
2025	3.26	1.00	4.03	8.29
2026	3.26	1.00	4.03	8.29
2027	3.26	1.00	4.03	8.29

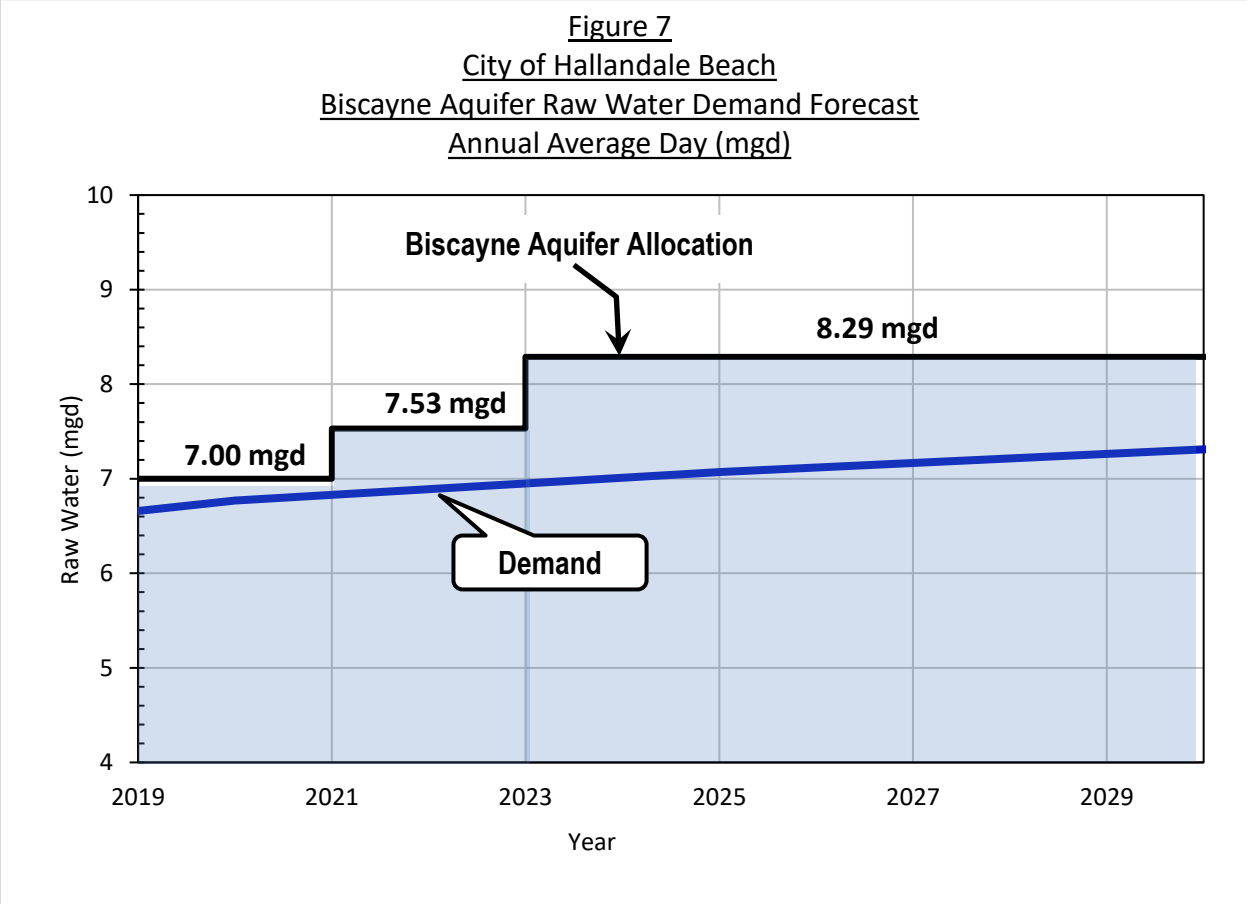
2028	3.26	1.00	4.03	8.29
2029	3.26	1.00	4.03	8.29
2030	3.26	1.00	4.03	8.29

Source: City of Hallandale Beach SFWMD Water Use Permit No. 06-00138-W.

Figure 7 graphically illustrates the raw water demand forecast on an annual average day basis and demonstrates that the annual average day raw water demand does not exceed the annual average day Biscayne Aquifer allocation through the year 2030.



Source: Hazen and Sawyer Water Demand Forecast Spreadsheet - 2019 07 26.xlsx



*Source: Hazen and Sawyer Water Demand Forecast Spreadsheet - 2020-**12**-10.**xlsx***

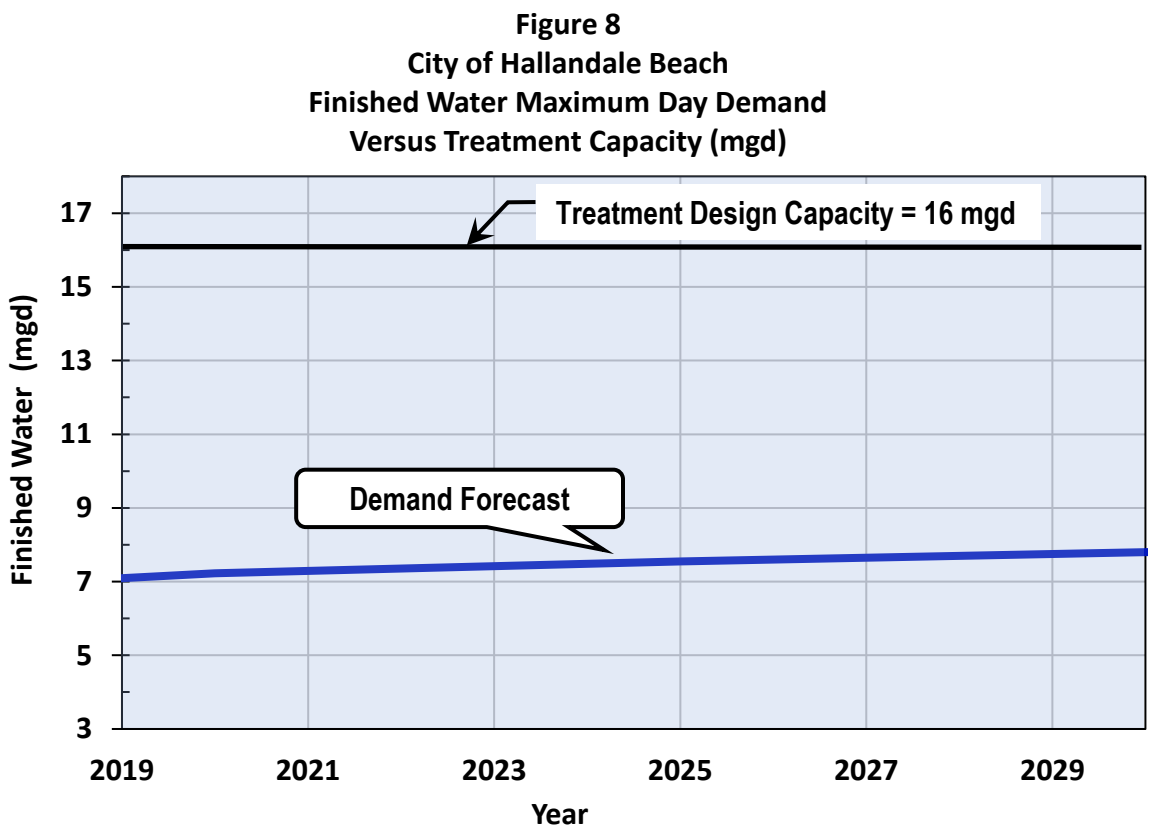


Figure 8 graphically illustrates the finished water demand forecast on a maximum day basis. Assessing the available water treatment capacity versus the maximum day finished water demand is critical for determining the need and timing of treatment capacity expansion.

Source: Hazen and Sawyer Water Demand Forecast Spreadsheet - 2019-07-26.xlsx

Figure 8 illustrates that the City's finished water treatment capacity of 16 million gallons per day with all treatment units in service is sufficient to meet the maximum day demand through the year 2030. The City is currently designing a low-pressure membrane skid to diversify treatment technology to treat up to 2 mgd of finished water from brackish (TDS up to 5,000 mg/L w/ 75% recovery) supply. Additionally, the City is initiating replacement of high service pumps with the firm capacity of 16 mgd, as previously identified in the 2007 Water and Wastewater Model Report.

3.6 Water Supply from Local Governments

This section briefly describes the water supply, treatment, storage and distribution infrastructure that is owned and operated by the City of Hallandale Beach. Additionally, the City's wastewater treatment agreement is also briefly discussed.

3.6.1 Summary of Permitted Raw Water Withdrawals and Type of Treatment

The City of Hallandale Beach obtains its raw water supply from the Biscayne Aquifer. The City's water use permit from the SFWMD provides for an allocation of 3.50 mgd AADF from its wellfield which is treated using lime softening. The City's WUP (No. 06-00138-W) was issued on January 23, 2019 with an expiration date of January 23, 2039. The remaining water demand is supplied by raw water purchased from Broward County from the County's South Regional Wellfield (WUP No.06-01474-W). This raw water is transmitted to the City's WTP and treated using membrane softening. The City maintains an existing large user agreement with Broward County and may purchase up to 3.5 mgd AADF of raw water from the County until 2023 when it will fall to 3.26 mgd. Once the C-51 Reservoir becomes operational in September 2022, the City will be able to obtain a total of 4.26 mgd from Broward County. This water is treated using membrane softening.

3.6.2 Hallandale Beach Wellfield

The City's potable water demand is partially met with groundwater from production wells at the City's wellfield, which has a permitted allocation of 3.5 mgd in both AADF and maximum daily flow until the construction of PW-9. It is noted that the City's current WUP does not limit annual withdrawals based on MGD. The annual allocation expressed in GPD or MGD is for informational purposed only. This withdrawal rate minimizes the potential for saline water intrusion and upconing. To further limit saline water intrusion, the City uses only wells 7 and 8, the two westernmost wells. Well 3 (eastern wellfield) is a standby well and is only used during an emergency (due to high chlorides).is. Wells 7 and 8 have pumping capacities of approximately 2,100 gallons each. Well 3 has a pumping capacity of approximately 1,500 gpm, and Well 5 has a pumping capacity of approximately 1,000 gpm. Upon addition of the new production well, PW-9, approximately 0.5 miles west of the City's WTP, on the west side of Chaves Lake, the City will be permitted to withdraw up to 4.03 mgd from the City wells (PW9 and PW8).

3.6.3 Broward County South Regional Wellfield

Water requirements greater than the City supply are met with bulk water purchased from Broward County via the County's South Regional Wellfield (SRW). The SRW provides raw water to the City of Dania Beach, the City of Hallandale Beach, the City of Hollywood, and the Florida Power and Light Corporation under large raw water user agreements. From 2019 to 2022, up to 3.5 mgd of raw water can be transmitted to the Hallandale Beach WTP through a 24-inch water main.

After 2022, the allocation is 3.26 mgd from the SRW. Once the C-51 Reservoir provides the 1 mgd of offset water, the City will be able to convey an additional 1 mgd from the County via the SRW. The SRW consists of ten wells located in the south-central portion of the County. Eight 4 mgd wells and two 2 mgd wells are

currently in operation, providing a total design capacity of approximately 36 mgd, and a firm capacity of 32 mgd with the largest unit out of service. The firm capacity exceeds the County's permitted capacity for the SRW.

3.6.4 Hallandale Beach Water Treatment Plant

The Hallandale Beach Water Treatment Plant includes a lime softening facility and a nanofiltration membrane softening facility. The original plant was built as a lime softening facility with a finished water capacity of 3 mgd in 1951 and was expanded to a 10 mgd facility in 1968. Raw water from the City's wells is treated at the lime softening facility, which has a current ~~treatment~~ finished water capacity of 10 mgd. Raw water from the Broward County SRW is treated at the membrane softening facility, which was constructed in 2008. The membrane facility has ~~the capacity to treat~~ 6 mgd of ~~raw~~ finished water capacity, with the ability to add up to an additional 9 mgd of ~~treatment~~ finished water capacity. Cumulative raw water loss at the membrane softening facility is approximately 15 percent. The treated water from both facilities is mixed prior to distribution. The finished water is stored in two 1-million gallon and one 2-million-gallon ground level storage tanks prior to distribution.

3.6.5 Saltwater Intrusion Modeling Project

The City was a cost-share partner in the development of a Saltwater Intrusion Modeling project with Broward County and the USGS. The study results provided a better understating of the causes of saltwater intrusion in the southern part of Broward County and guidelines for the future development of monitoring strategies and saltwater intrusion models for other coastal wellfields in Broward County. The project report was completed in 2016.

The City added four small salinity monitoring wells as required by the South Florida Water Management District in the City's Water Use Permit application. These new monitoring wells are part of the City's ongoing saline intrusion monitoring (SALT) program implemented to provide an early warning monitoring system for the possible movement of the saltwater front. The City routinely monitors these wells and SGS wells.

3.6.6 Wellfield Revitalization Project

The City recognizes that saltwater intrusion into its water supply is an ongoing threat. As a precaution to safeguard against future potential intrusion of saltwater into the City's wellfield, the City completed the design of one reverse osmosis (RO) skid within the existing membrane treatment facility that may be capable of treating saline raw water. The RO skid has been designed with the flexibility to either provide redundancy to the existing skids that treat raw water from Broward County or to potentially treat salty water from the City's existing wells. The City has budgeted for the construction of this RO skid if/when saltwater intrusion impacts the use of the City's existing treatment technology. Additional pretreatment testing and permitting will be required to determine if/how to blend the salty water with Biscayne supply for treatment through RO skid.

3.6.7 Distribution System Water Storage Facilities

The City has one elevated storage tank with a capacity of 500,000 gallons. The storage tank is located on the beach, at the intersection of Hallandale Beach and SR A1A.

3.6.8 Raw Water Aquifer Storage and Recovery (ASR)

Although there are no current plans to pursue this technology, the City intends to continue its research on the feasibility and benefits of ASR.

3.6.9 Finished Water Distribution System

The City of Hallandale Beach water distribution system consists of approximately 70 miles of 2 to 20-inch diameter water mains that convey the finished water from the treatment plant to the individual customers. In general, the larger diameter transmission mains radiate from the treatment plant and decrease in size as they extend throughout the service area. The City monitors the reliability of these mains to transmit high quality water and has a water main improvement program in place to maintain system reliability and water quality.

3.6.10 Interlocal Agreements and Bulk Sales

In addition to the agreement with Broward County for the emergency provision of up to 10.5 mgd of raw water, the City of Hallandale also has an emergency/bulk agreement with the City of North Miami Beach for the provision of up to 2 mgd of finished water supplied via two emergency interconnects.

3.6.11 Distribution System Interconnects

The City of Hallandale Beach maintains two distribution system emergency interconnects with the City of North Miami Beach, one is located on Biscayne Boulevard, and the other is located on SR A1A. The isolation valves on all interconnects are closed.

3.6.12 Treatment Loss

Treatment loss, for the purpose of this report, is defined as the difference between raw water pumped and finished water pumped. Treatment losses vary with the type of treatment technology. The treatment loss for lime softening technology is roughly three to five percent of the raw water pumped. The treatment loss for the membrane softening technology, is roughly 15 percent of the raw water pumped. As a blend of lime softened and membrane treated water, the City's overall treatment loss is consistently around 10 percent as demonstrated in **Table 7**. Historical data presented in **Table 7** is not impacted by the C-51 reservoir.

Table 7 - Historical Overall Treatment Loss – Percent of Raw Water Lost After Treatment

Row	Water Use Category	2014	2015	2016	2017	2018
(1)	Raw Water Withdrawal, mgd	6.11	6.44	6.67	6.63	6.55
(2)	Finished Water Produced, mgd	5.50	5.79	5.95	5.99	5.96
(3) = (1) – (2)	Treatment Loss, mgd	0.62	0.65	0.72	0.64	0.59
(4) = (3) / (1)	Loss as % of Raw Water	10.1%	10.1%	10.8%	9.6%	8.9%

Source: Hazen and Sawyer Water Demand Forecast Spreadsheet - 2019-07-26.xlsx

3.5.13 Outstanding Compliance Issues

There are no outstanding compliance issues related to the City of Hallandale Beach's water facilities.

3.6.14 Required Upgrades or Expansions

Certain upgrades are ongoing at the WTP to ensure the continued reliability of the water supply infrastructure. The ongoing upgrades are summarized below:

High Service Pump Replacement: This project includes the replacement of all high service pumps with four new high service pumps equipped with variable speed drives. Construction began in 2019 and is expected to be completed in 2020.

Transfer Pump Replacement: This project includes the replacement of all transfer pumps with three new pumps equipped with variable speed drives. Construction of this project is expected to begin in 2020 and become operational in 2021/2022.

Production Well PW-9: This project includes the construction of one new Biscayne Aquifer water supply well within the City limits. Construction of this project is expected to be completed in 2020/2021.

RO Skid No. 1: The design for this project was completed in 2016. The City would begin permitting and constructing this project if warranted by increasing salinity of its Biscayne Aquifer water supply or a desire for additional redundancy.

Treatment Plant Reliability Improvements: In 2017 the City completed a report titled "WTP Renewal and Replacement". The report identifies equipment nearing the end of their useful lives and recommends a series of prioritized improvements to renew assets in a timely manner to maintain sustainable operations. The City continues to review its priorities and budget capital improvements to maintain this infrastructure.

3.6.15 City of Hollywood Southern Regional Wastewater Treatment Plant (WWTP)

The Southern Regional WWTP is located on a 32-acre site in the central section of Hollywood, with a service area of 139,802 acres. Currently, the City of Hallandale Beach is one of eight municipalities that sends its wastewater to this WWTP. These large user municipalities are listed as follows.

- Pembroke Pines
- Broward County
- Miramar
- Pembroke Park
- Hallandale Beach
- Dania Beach
- Town of Davie
- Cooper City

The City of Hollywood's WWTP has been in operation since the 1940s and has been upgraded and expanded over the years. The current wastewater treatment plant is a Category II, Class A activated sludge plant that has the capacity to treat and dispose of 48.75 mgd (with a possible re-rate to 50 mgd) of industrial, commercial and domestic sewage in an environmentally acceptable manner. Existing treatment units include mechanically cleaned bar screens, grit tanks, influent pumps, oxygenation tanks, clarifiers, chlorination, effluent pumps, an ocean outfall, an effluent reuse system, return and waste sludge systems, and post lime sludge stabilization facilities. The wastewater effluent is disposed via an ocean outfall and deep injection wells. After 2025, use of the ocean outfall is anticipated to be limited to wet weather conditions only.

The City of Hollywood also has a 4 mgd reclaimed water system for effluent reuse serving primarily golf courses, schools, private developments, parks, and other entities that have a relatively large irrigation demand. Such reuse water flow offsets an otherwise potable water use. The existing reuse system serves these contract customers because they are the most cost effective to serve.

3.7 Water Supply Provided by Others

The City of Hallandale Beach supplies finished water exclusively to its residents. The City receives raw water supplied by Broward County's South Regional Wellfield. Additionally, the City maintains an emergency interconnect with the City of North Miami Beach for the supply of bulk finished water during emergency conditions.

3.8 Conservation

Conservation is a proven strategy for delaying implementation of expensive alternative water supply sources and technologies. The City will be able to provide the necessary water to meet future demands simply by continuing its current water conservation measures.

The City of Hallandale Beach has a formal water conservation program that has been submitted as part of the City's Consumptive Water Use Permit Application (WUP) with the SFWMD. A typical water conservation program is composed of five elements: develop/maintain an accurate database of water consumption to reduce municipal water waste; a retro-fit program; the modification of relevant City Codes (plumbing, irrigation, landscaping); the promotion of Florida Friendly landscaping; and public information and education programs. The following subsections summarize the City of Hallandale Beach's ongoing conservation initiatives.

3.8.1 Broward Water Partnership and Conservation Pays Program

The City of Hallandale Beach is a member of the Broward Water Partnership, which is a government service comprised of 19 municipalities and water utilities that collaborate on water conservation implementation. This partnership has the goal of saving a total of 30 mgd countywide.

As part of this partnership, the City of Hallandale Beach participates in a water conservation incentive program through an interlocal agreement (ILA) with Broward County marketed under the program name "Conservation Pays". The program provides rebates and free water-conserving devices to qualifying water customers and includes a focused outreach and education component. Rebate dollars are used for the replacement of older toilets with high efficiency toilets and the distribution of other water efficient fixtures and devices such as aerators and commercial pre-rinse spray valves. A consistent marketing and media campaign advances water conservation efforts. The program goal is to reach a sustained minimum 10 percent reduction in water use County-wide over 20 years. In Fiscal Year 2018 (October 1, 2018 – September 30, 2018) the City of Hallandale Beach issued rebates for 65 high efficiency toilets that use 1.28 gallons per flush.

3.8.2 NatureScape Irrigation Services

Broward County's NatureScape Irrigation Service (NIS) is a water conservation program offered in partnership with 18 local water utilities. 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 residential complexes, where water conservation efforts can produce the greatest water savings.

The City has endorsed and proactively promoted Broward County's NatureScape Irrigation Program, implementing environmentally-sound landscaping practices to reduce water use for irrigation. City locations in the NatureScape program include:

- City Hall
- Hallandale Beach Cemetery (South)

- Hallandale Beach Cemetery (North)
- Cultural Center
- OB Johnson Park
- Bluesten Park
- Cultural Community Center
- Foster Park

Over the past 8 years, the City has achieved an actual water savings of 49,033,589 gallons through the NatureScape Irrigation Audit program. The City is currently registered with Broward County as a NatureScape City through the National Wildlife Federation and will soon become a certified Community Wildlife Habitat.

3.8.3 Conservation Rate Structure

The City of Hallandale Beach maintains a utility (water / sewer) rate structure supporting economic incentives for water conservation (progressively higher rates as water usage increases).

3.8.4 Rain Sensor Device Ordinance

The City adopted a Rain Sensor Device Ordinance, whereby the City requires any person applying for an irrigation system permit to install, operate and maintain rain sensor devices or to provide for automatic switching mechanisms that will stop the irrigation system with the occurrence of adequate rainfall.

3.8.5 Permanent Irrigation Ordinance

City Ordinance, Chapter 30 – Utilities, Article III, Division 4 – Conservation (Sec. 30-131 to Sec. 30-135), provides for enforcement of the SFWMD's Phase I guidelines, which restricts the watering of landscaping to two days a week. The City's Ordinance was updated in December 2020 to adopt the rules of the SFWMD in accordance with Rule 40E-24.201 F.A.C. including variance and enforcement procedures.

3.8.6 Leak Detection Program

The City's Public Works Department maintains a Water Utility Leak Detection Program, whereby all water meters are replaced on a 5-year schedule and the large meters are checked and calibrated for accuracy annually.

In addition, Public Works also maintains a Water Distribution System Leakage Program, whereby the monthly reports for the water piping distribution system are examined to compare the water pumped versus the water billed and identify any excessive unaccounted volumes. Historically, the City's water distribution system has unaccounted water losses averaging less than 4 percent, considerably less than the 10 percent the SFWMD allows for coastal communities.

3.8.7 Ultra-Low Volume Plumbing Fixture Ordinance

The City adopted an Ultra-Low-Volume Plumbing Fixture Ordinance — City Ordinance Chapter 8, Article 1, Section 8-1, recognizing the Florida Building Code as the enforceable Building Code for the City and codifying the Building Code requirements for ultra—low-volume plumbing fixtures on all new construction.

3.8.8 Water Conservation Education Program

The City has maintained a continuous water conservation informational program for its residents, whereby the City periodically issues water conservation messages through newsletters, such as Hallandale Happenings, the annual Water Quality Report, and other means available to convey the need and importance of water conservation.

3.8.9 Reclaimed Water

Effluent from the City of Hallandale Beach is transmitted to the City of Hollywood's Southern Regional Wastewater Treatment Plant where a portion of the wastewater is processed into reclaimed water and used by the City of Hollywood to irrigate golf courses, parks, median strips and other areas.

3.9 Reuse

Florida law supports water reuse efforts. Florida's utilities, local governments, and water management districts lead the nation in the quantity of reclaimed water reused and in public acceptance of reuse programs. Section 373.250(1) F.S. states that "the encouragement and promotion of water conservation and reuse of reclaimed water, as defined by the department, are state objectives and considered to be in the public interest." In addition, Section 403.064(1), F.S., states "reuse is a critical component of meeting the state's existing and future water supply needs while sustaining natural systems".

Effluent reuse can be of substantial benefit to the City, the most important reasons being the replacement of groundwater and potable water use for irrigation and for recharge of the surficial aquifer system. Carefully designed applications of reclaimed water to critical areas of the surficial aquifer could protect freshwater sources. The City has an agreement with the City of Hollywood to send its wastewater to Hollywood's WWTP where reclaimed water is produced. Therefore, the only methods by which the City can increase the region's reclaimed water use is by extending reclaimed water piping from Hollywood to Hallandale Beach or by cost-sharing reuse programs in other areas of the County.

3.9.1 Local Government Specific Actions, Programs, Regulations, or Opportunities

Historically, the wastewater collected throughout City of Hallandale Beach has been transmitted to the City of Hollywood for treatment and disposal. Thus, the wastewater needed to produce reclaimed water is out of the City's control. However, reuse is a stated goal of the State Comprehensive Plan, so the City desires to meeting reuse goals by providing irrigation water to certain public access sites from its nanofiltration concentrate stream. The City has piloted a program to use the concentrate from the membrane softening system in the

water treatment plant to produce reclaimed water. The City desires to use this resource to develop a Public Access Reuse System. The City has proposed a concentrate reuse system with over 0.5 mgd supplied to City parks and schools but has determined that it may be cost-prohibitive.

The City is also coordinating with the City of Hollywood to use a portion of its reuse water for irrigation purposes in the Three Islands area, including Joseph Scavo Park and the area medians under Phase 1 of this reuse program. Phase 2, currently under design, would extend reuse water pipes from Joseph Scavo Park to Hallandale Beach Boulevard, irrigating medians on the way.

3.9.2 Identify any Local Financial Responsibilities

The City of Hallandale Beach does not have any financial responsibilities relative to reuse. Hence, this section is not applicable to the City of Hallandale Beach.

3.9.3. Sustainability Action Plan

In 2018 the City Commission adopted the City's Sustainability Action Plan. This Plan includes short- and long-term goals to increase the conservation of potable water. The City has established a year 2022 goal of reducing potable water consumption in City operations by 20 percent. In the long-term, by 2040, that goal increases to 40 percent for both City operations and residential/commercial sectors. To achieve these goals, the Sustainability Action Plan includes specific projects such as increasing the efficiency of irrigation and indoor water-using fixtures within the City's control and expanding the use of reclaimed water.

4.0 CAPITAL IMPROVEMENTS

This section provides a brief description of the City of Hallandale Beach Capital Improvements Program for Water Supply.

4.1 Water Supply / Treatment Projects Needed from 2020 to 2030

The allocated raw water withdrawals anticipated from 2020 to 2030 are enough to supply the City's forecasted water demand. The City is cognizant of the need to plan for the potential of saltwater intrusion into the City's coastal wellfield and recognizes that in the future all water supplied by the City may need to be treated using membrane softening. The raw water sources could potentially be the existing wellfield (as a brackish wellfield), a new Floridan aquifer wellfield, and/or additional water from the County's South Regional Wellfield permitted using offset water from the C-51 Reservoir. Hence, the City anticipates the following actions relative to water supply planning over the next 10-years.

1. Develop a conceptual plan that identifies future water sources to meet increasing demand and to treat or replace water from the City's wellfield as it is impacted by saltwater intrusion.

2. Continue to implement the City's ongoing conservation programs as outlined in this 10-year Water Supply Facilities Work Plan – 2019 Update.

3. Continue to participate in the C-51 reservoir regional stormwater capture project in collaboration with the Broward County Water Resources Task Force Technical Team.

4. Continue to evaluate and implement improvements to water, wastewater, reuse and stormwater infrastructure to ensure sustainable, reliable, and adaptable water and wastewater services.

5. Continue to develop infrastructure to reduce the risk of saltwater intrusion at the City's existing wellfield.

6. Complete the construction of Biscayne Aquifer Production Well No. 9 to shift raw water withdrawals westward.

7. Install one or two reverse osmosis skid (s) at the WTP when needed.

4.1.1 Transmission System Projects Needed from 2020 to 2030

No transmission system projects related to water supply are required over the next 10-year period.

4.1.2 Projects Needed to Supply Water Outside of the City's Water Service Area

The City of Hallandale Beach has no plans to supply water outside of its existing water service area over the next 10 years. Hence, this section is not applicable to the City of Hallandale Beach.

4.2 Capital Improvements Element/Schedule

The schedule of capital improvements (FY 2020 to 2024) for traditional water supply, treatment, storage, and distribution system infrastructure is provided in Table 8. Costs include engineering services, construction costs, and research where appropriate. The projects are intended to be implemented over the next five years to maintain the City's level of service standards.

Table 8 - Capital Improvement Projects, City of Hallandale Beach, Florida

Name	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Total
Conceptual Planning for Future Water Supply	$200,000	$0	$0	$0	$0	$200,000
Production Well PW-9	$1,500,000	$0	$0	$0	$0	$1,500,000
Raw Water Pipeline from PW-9 to PW- 8	$400,000	$0	$0	$0	$0	$400,000
Nano Filtration Membrane Replacement	$677,000	$0	$0	$0	$0	$677,000
Degasifier Packing Media Replacement	$125,000	$0	$0	$0	$0	$125,000
Membrane Skid No.3	$0	$0	$0	$0	$5,006,000	$5,006,000
Membrane Plant and Generator Building A/C Units	$56,000	$0	$0	$0	$0	$56,000
WTP Security Risk	$266,000	$0	$0	$0	$0	$266,000
Alternative Water Supply - Phase 1 - C51 Reservoir	$0	$4,600,000	$0	$0	$0	$4,600,000
Water Main Insertion Valves	$100,000	$100,000	$100,000	$100,000	$0	$400,000
Water Distribution Upgrades	$500,000	$500,000	$500,000	$500,000	$500,000	$2,500,000
High Service Pumps and Transfers Pumps Improvements	$3,000,000	$0	$0	$0	$0	$3,000,000
Foster Road Water Main	$1,500,000	$0	$0	$0	$0	$1,500,000
WTP Rehabilitation of Lime Plant Softening Units	$90,000	$90,000	$0	$0	$0	$180,000
Total	**$8,414,000**	**$5,290,000**	**$600,000**	**$600,000**	**$5,506,000**	**$20,410,000**

Source: City of Hallandale Beach 2019

5.0 GOALS, OBJECTIVES AND POLICIES

The City of Hallandale Beach Comprehensive Plan addresses the needs and aspirations of the community. This has tremendous implications regarding the importance of community input in the development and implementation of the Comprehensive Plan.

The Comprehensive Plan also plays a significant role within Florida's growth management system. The Comprehensive Plan is required to be consistent with the State Comprehensive Plan (Chapter 187, Florida Statutes), and to be consistent with the Regional and County Comprehensive Plans. In short, the Comprehensive Plan provides a critical link between the City of Hallandale Beach, the State of Florida, the south Florida region, and Broward County. The Comprehensive Plan focuses on issues facing the City over a twenty-year time horizon. The Comprehensive Plan establishes the long-term goals and the short-term objectives and policies to guide implementation efforts.

The following comprehensive plan goals, objectives, and policies (GOPs) related to water supply planning have been reviewed for consistency with the 10-year Water Supply Facilities Work Plan - 2019 Update. The recommended revisions to the existing GOPs are identified below.

INFRASTRUCTURE ELEMENT (GOPs related to Water Supply Planning)

Policy 1.1.1: The following level of service standards are hereby adopted, and shall be used as the basis for determining the availability of facility capacity and the demand generated by a development:

Facility	Level of Service Standard
Sanitary Sewer	Average Sewage Generation Rate; 190 gallons per capita per day
Solid Waste Rate:	Average Solid Waste Generation; 4.75 pounds per capita per day
Stormwater Management - New Development:	Design Storm for onsite retention: 5 year frequency: 1 hour duration; 3.3 total inches standards.
Existing Development	To Meet Florida Building Code drainage standards

Potable Water - ~~175~~ ~~176~~ 148 gallons per capita per day of finished water (Annual Average Day)

Objective 2.1: Existing deficiencies will be corrected by undertaking the following projects by the year ~~2010~~ 2024:

a. Installation of a relief force main in the southeast section.

b. Installation of two (2) subaqueous water mains in the southeast section of the City

c. Implementation of commingled recycling system for residential and multifamily customers.

d. New production well PW-9 and raw water pipeline from PW-9 to PW-8.

e. Installation of RO Membrane Skid No. 3 at the existing membrane facility.

f. Implementation of Phase 1 of the C-51 Reservoir.

g. Installation of new water main along Foster Road.

Objective 2.2: Project demands through the year ~~2012~~ 2025 will be met by undertaking the following projects:

a. Sanitary Sewer Projects

1. Provide rehabilitation for two collection system lift stations per year.

2. Locate and eliminate major sources of I/I in sewer system to prevent increase over present unmetered sewer flow to Hollywood Regional Treatment Plant (R.T.P.)

3. Replace existing 16" Intracoastal force main crossing with new 24" force main.

4. Collaborate with other large users for use of existing wastewater treatment plant capacity.

5. Implement first phase of wastewater reuse program.

b. Solid Waste Projects

1. Enhance and expand City's recycling program through curbside service and commingled recycling.

2. Increase automation and versatility of sanitation fleet.

c. Stormwater Management Projects

1. Meet monitoring and removal of contaminants from surface water discharges to National Pollutant Discharge Elimination System (NPDES) Stormwater Permit requirements.

2. Evaluate major storm (hurricane) related drainage problems to ascertain needs to mitigate flood damages.

3. Perform dredging in drainage canals.

4. Implement major drainage improvement projects in the northeast section of the City.

d. Potable Water Projects

1. Install major water distribution mains in Golden Isles area and across the Intracoastal Waterway to improve pressure, increase capacity and improve looping.

2. Pursue new treated water interconnections with neighboring utilities, especially City of Hollywood.

3. Continue to upgrade distribution system by improved looping, adding fire hydrants, and upgrading water main sizes where appropriate.

4. Coordinate with the City of North Miami Beach for future purchase of potable water as may be required.

5. Continue to participate in the C-51 reservoir regional stormwater capture project in collaboration with the Broward County Water Resources Task Force Technical Team.

6. Complete the construction of Biscayne Aquifer Production Well No. 9 to shift raw water withdrawals westward.

7. Install membrane skid No. 3 at the existing membrane facility.

8. Begin implementation of other projects as required in City's 10-Year Water Supply Facilities Plan.

Objective 2.3: Project demands for the period ~~2012~~ 2020 through ~~2020~~ 2030 will be met by undertaking the following projects:

a. Sanitary Sewer Projects

1. Ongoing maintenance rehabilitation of sewer lines to reduce I/I.

2. Replacement of aging infrastructure as required.

b. Solid Waste Projects

1. Establishment of disposal agreement(s) for City garbage.
2. Continued implementation of enhanced recycling, including curbside service and commingled recycling

c. Stormwater Management Projects

1. Ongoing installation of drainage facilities to comply with adopted policies.
2. Implementation of major drainage improvement projects as required

d. Potable Water Projects

1. Establish interconnect(s) with neighboring jurisdictions.
2. Implementation of distribution improvements to accommodate growth.
3. Implementation of projects to meet future water supply needs, including possible utilization of reverse osmosis technology.
4. Replacement of aging infrastructure as required.
5. Develop a conceptual plan that identifies future water sources to meet increasing demand and to treat or replace water from the City's wellfield as it is impacted by saltwater intrusion.
6. Continue to implement the City's ongoing conservation programs as outlined in this 10-year Water Supply Facilities Work Plan – 2019 Update.
7. Continue to participate in the C-51 reservoir regional stormwater capture project in collaboration with the Broward County Water Resources Task Force Technical Team.
8. Continue to evaluate and implement improvements to water, wastewater, reuse and stormwater infrastructure to ensure sustainable, reliable, and adaptable water and wastewater services.
9. Continue to develop infrastructure to reduce the risk of saltwater intrusion at the City's existing wellfield.
10. Complete the construction of Biscayne Aquifer Production Well No. 9 to shift raw water withdrawals westward.

Policy 4.1.1: City shall ~~adopt~~ update the 10-Year Water Supply Facilities Work Plan prepared by the City in association with Hansen and Sawyer P.C. dated December 11, 2020 and adopted on _____,2021, to increase the coordination between land use and water supply planning within 18 months of the ~~adoption~~ approval of the 2018 Lower East Coast ~~regional~~ Water Supply Plan, as required by Chapter 163, Florida Statutes. (See Exhibit 5-1)

Policy 4.2.1: The City will continue to maintain ~~secure any needed~~ water main interconnections with neighboring utilities to provide emergency service.

Policy 4.3.6: The City will continue to work in conjunction with the South Florida Water Management District to coordinate the monitoring of the saltwater front along the Southeast Broward County coast.

CONSERVATION ELEMENT (GOPs related to Water Supply Planning)

POLICY 1.1.3: The City shall continue ~~and~~ to expand water conservation practices to maintain a low per capita consumption of potable water by implementing the capital improvement projects identified in the 10-year Water Supply Facilities Plan including:

- Adopting water restriction ordinances;
- Implementing and enforcing environmentally sound landscaping practices to reduce irrigation demand;
- Expanding the City's water utility leak detection program and the water distribution system leakage programs; and
- Encouraging the expansion of the City's water reuse system.

CAPITAL IMPROVEMENTS ELEMENT (GOPs related to Water Supply Planning)

OBJECTIVE 1.1: The City shall continue to provide safe quality potable water for residential, commercial and industrial uses within the City at a level of service standard of ~~175~~ 148 gallons per capita per day and promote water conservation.

POLICY 1.2.5: The assessment of needed capital improvements shall be based on the Level of Service standards adopted in the Transportation, Sanitary Sewer, Solid Waste, Stormwater Management, Potable Water, and Natural Groundwater Aquifer Recharge, and Recreation and Open Space Elements of the Comprehensive Plan. These Level of Service standards include:

Transportation	FIHS – As per FDOT Guidelines (2002 Manual)
	Arterial Roadways – Broward County adopted Level of Service for Southeast Benefit District of Transportation Concurrency Management Area (TCMA). However, for the City's traffic impact analysis use LOS "E" for all arterial roadways.

	City Collector / Local Roads - Level of Service "D" for all City collector and local streets.
Sanitary Sewer	Collection and treatment capacity of 190 gallons per capita per day.
Stormwater Management	New Development: Design storm- five year frequency; one hour duration; 3.3 total inches. Existing Development: To meet Florida Building Code drainage standards.
Solid Waste	Ability to collect and dispose of 5.65 pounds of solid waste per person per day, which includes nonresidential waste.
Potable Water	~~Maximum~~ Average day water consumption rate: ~~175~~ ~~176~~ 148 gallons per capita per day.
Recreation/Open Space	Park Area Ratio 3.25 acres of park and open space per 1,000 permanent residents. The inventory of publicly dedicated water bodies used to calculate this ratio shall include 28.44 acres of the Golden Isles Waterway.

The City intends to adopt the Work Plan updates into its Comprehensive Plan using Option 1.