Exhibit B

WATER SUPPLY PLAN

POTABLE WATER SUB-ELEMENT

PREPARED BY

THE UTILITIES DEPARTMENT AND

BROWN AND CALDWELL

CITY OF HOLLYWOOD

HOLLYWOOD, FLORIDA

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1. Introduction

This section presents the statutory overview and the project objective, including a brief description of the content in this report.

1.1. Statutory Overview

To address the increasing water demands of a growing population, the portions of the Florida Statutes (F.S.) that cover local government comprehensive planning (Chapter 163, Part II, F.S.) and regional water supply planning (Chapter 373, F.S.) require that planned growth be coordinated with available water supply and treatment capacity. This legislation required local governments to prepare Water Supply Facilities Work Plans that demonstrate that sufficient capacity is either available or will be provided over a minimum 10-year planning horizon. For utilities where traditional water sources (in the case of Hollywood, Biscayne Aquifer groundwater) are not sufficient to meet demand, alternative water supplies must be provided. Alternative water supply projects must be reflected both in the municipality's comprehensive plan and CIP, as well as the regional water supply plan.

Water Supply Facilities Work Plans must be amended within 18 months of adoption of an updated water supply plan prepared by the governing Water Management District. The City of Hollywood falls under South Florida Water Management District's (SFWMD) Lower East Coast Water Supply Plan ("LEC Plan"). The most recent update of this plan was adopted on September 12, 2013. Prior to this, the City had prepared a Water Facilities Plan Update Amendment (WFPUA) based on the previous LEC plan update. Now, the City must prepare a new WFPUA that takes into account the most recent LEC plan update. These WFPUAs are comprehensive plan updates, as required by Subsection 163.3177(6)(c)3., F.S. This update will be the 2014 10-Year WFPUA. It should be noted that since the adoption of the previous WFPUA, the SFWMD has developed a revised set of guidelines that should be reflected in the 2014 WFPUA. Therefore, the 2014 WFPUA focuses on updating the following:

- Planning timeframes
- Population estimates and projections
- Projections of future water demand
- Identification of viable water sources and development efforts
- Conservation efforts

- Coordination with applicable Regional Water Supply Plan

As a comprehensive plan amendment, the WFPUA must be reviewed and adopted by the Florida Department of Economic Opportunity (DEO) pursuant to Chapter 163, Florida Statutes. This can be done under the expedited review process defined under 163.3184, Florida Statutes.

1.2. Objective

Brown and Caldwell has been contracted by the City of Hollywood Department of Public Utilities (HLWD-DPU) to prepare this 2014 WFPUA. The main objective of the 2014 WFPUA is to ensure that potable water service is available to concurrently support development through the 10-year planning horizon.

1.3. Project Overview

This 2014 WFPUA provides the characterization of water utilities that serve the City of Hollywood jurisdiction and presents the development of traditional and alternative water supplies, bulk sale agreements, and conservation and reuse programs that are necessary to serve existing and new development for a specific planning period while complying with regulatory requirements. Note that the term "water supply facilities" includes raw water supply infrastructure, treatment facilities, distribution system, and associated storage. Although this report is referred to as being over a 10-year period, the water demand forecasts and projects identified cover up to the year 2030, which is consistent with SFMWD's LEC Plan.

This 2014 WFPUA builds upon the City's previous WFPUA, the SFWMD's LEC Plan, the 10-Year Broward County Water Supply Facilities Work Plan (dated November 2014), the 10-Year City of Fort Lauderdale Water Supply Facilities Work Plan, and data provided by the City on recent developments regarding its reuse system and water conservation.

Generally, this 2014 WFPUA includes the following:

- Population and water supply projections up to the year 2030 within the City of Hollywood's jurisdiction and HLWD-DPU's service area; these will be aggregate population projections with the service area as a whole that are consistent with the approach used in the most recent SFWMD LEC Plan; water demand projections will be based on aggregate demands over the service area, which includes an implicit assumption that customer makeup will not change significantly over the planning horizon;

- Assessment of current water supply sources and facilities for each water utility serving the City's jurisdiction and their adequacy for projected demands;

- Identification of alternative water supply projects for implementation including cost and schedule for each water utility;

- Identification of water conservation and reuse practices and regulations within the City's service area;

- Identification of capital improvement projects including demonstration of financial feasibility for the first five years of the plan for HLWD-DPU;

- Demonstration that the City of Hollywood has coordinated with other service providers supplying within the City's jurisdiction (i.e. BCWWS and the City of Fort Lauderdale) to ensure that short- and long-term water supply needs will be met; and

- Identification of goals, objectives, and policies required to implement the Work Plan and water supply concurrency requirements.

It should be noted that because the Seminole Tribe of Florida reservation maintains its own water supply system, it is required to prepare its own WFPUA. Detailed demand projections for its service area will therefore not be included in Hollywood's 2014 WFPUA.

This report is organized into the following seven sections:

Section 1 – *Introduction* – presents the statutory overview and the project objective, including a brief description of the content in this report.

Section 2 – *Water Service Areas* – introduces the geographic service areas for potable and reuse water service providers of the City of Hollywood jurisdiction. This section also presents the population projections by water service area.

Section 3 – *Water Suppliers* – characterizes the water suppliers including consumptive use permit information, raw water sources, existing treatment facilities, storage facilities, distribution and interconnects, and conservation and reuse practices in place.

Section 4 – *Water Demand Characterization* – characterizes HLWD-DPU's retail water customers and describes the existing HLWD wholesale agreement with Broward County. Based on HLWD-DPU's historical finished water production, this section also determines the average per-capita daily demand, as well as maximum-day and maximum-month peaking factors. Fire flow requirements were taken from the City's Water Master Plan. This section ends with a brief review of Port Everglades' water demand characterization, water demand forecast, and water supplier adequacy.

Section 5 – *Water Demand Forecast and Water Supply Adequacy* – evaluates the water supply facilities adequacy relative to the water demand forecast and shows that the

existing water supply facilities and conservation and reuse practices meet projected demands. Based on the projections developed herein, it appears that the City's existing water supply and treatment capacity is adequate to satisfy demand through the planning horizon of 2030.

Section 6 – *Water Supply Capital Improvements* – identifies the capital improvements required to build all public water supply facilities to serve the existing and new development within the City of Hollywood jurisdiction. No capital improvements were required to meet water supply needs over the planning horizon. The City continues to invest in repairing and replacing distribution system infrastructure to maintain and enhance its overall level of service.

Section 7 – *Water Supply Goals, Objectives, and Policies* – includes a statement of current Goals, Objectives, Policies (GOPs) and identifies any new or revised GOPs needed to implement the work plan.

2. Water Service Areas

This section introduces the geographic service areas for potable and reuse water service providers of the City of Hollywood jurisdiction. This section also presents the population projections by water service area.

2.1. Potable Water Service Areas

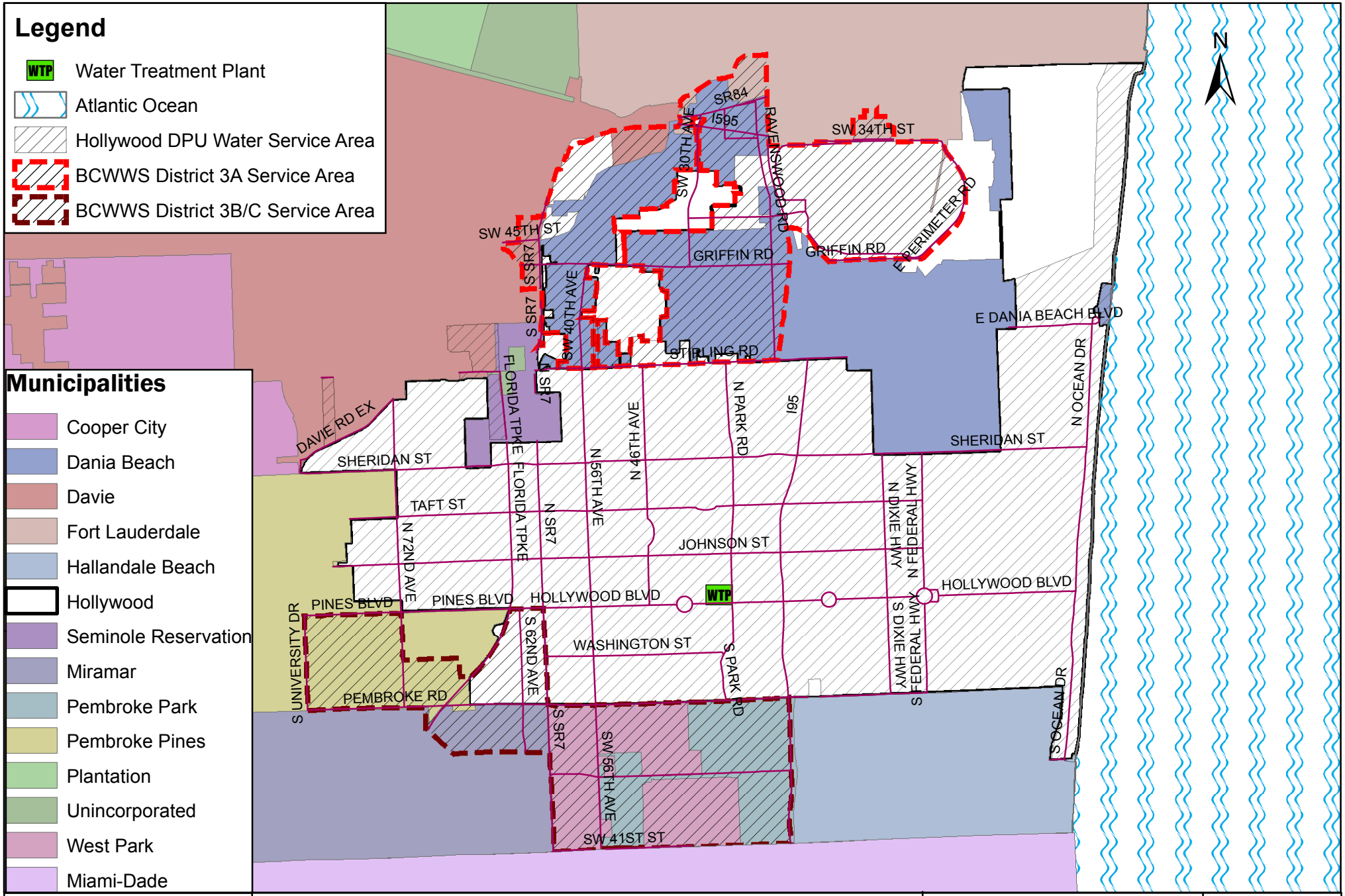
The City of Hollywood, located in southeast Florida, covers approximately 29 square miles bound by the Atlantic Ocean to the east and surrounded by seven cities, one town, a Seminole Tribe of Florida reservation, and unincorporated areas. Figure 2-1 illustrates the City of Hollywood jurisdiction and its neighboring municipalities. Except for Port Everglades, the City of Hollywood jurisdiction is supplied with finished water produced at the City of Hollywood Water Treatment Plant. Port Everglades is supplied by the City of Fort Lauderdale Public Works Department.

2.1.1. City of Hollywood Potable Water System Service Area

The City of Hollywood Water Treatment Plant (City's WTP) is operated by the City of Hollywood Department of Public Utilities (HLWD-DPU). The City's WTP supplies both a retail service area, extending over most of the City of Hollywood jurisdiction, and a wholesale service area, covering Broward County Water and Wastewater Services (BCWWS) Districts 3A, 3B, and 3C. In this report, these service areas are referred to as HLWD-DPU water retail area and HLWD-DPU water wholesale area. In 2013, the City's WTP produced approximately 21.0 million gallons per day (mgd) of potable water, of which 14.7 mgd were served to nearly 40,000 connections in the retail area and the remaining 6.3 mgd were sold to the wholesale service area. All three BCWWS districts are served under an interlocal resale water agreement by which Broward County purchases potable water from HLWD-DPU for resale to its customers.

Beyond the City of Hollywood jurisdiction, the HLWD-DPU water retail area serves approximately 300 acres in the Town of Davie, 50 acres in the City of Dania Beach, and 100 acres in the Seminole Tribe of Florida reservation. These areas are billed as retail customers. It should be noted that the Hard Rock Hotel and Casino is served by the Town of Davie.

In addition to the retail and wholesale services, HLWD-DPU has an emergency connection with the City of Dania Beach, which withdraws water from the HLWD-DPU system to maintain its system pressure. In 2013, the City supplied only a nominal amount (less than 1,000 gallons per day) on a regular basis to Dania Beach.



City of Hollywood 10-Year Water Supply Facilities Work Plan - 2014 Update

City of Hollywood Jurisdiction and Water Service Areas

Figure 2-1

2.1.2. Broward County Water Districts 3A and 3B/3C

BCWWS District 3A covers approximately eight square miles containing portions of the Cities of Dania Beach and Fort Lauderdale, Town of Davie, Fort Lauderdale-Hollywood International Airport, and unincorporated Broward County. BCWWS District 3A has two wholesale interconnects with HLWD-DPU. Districts 3B and 3C are interconnected and are connected to HLWD-DPU via two wholesale interconnects each. Like District 3A, they are also supplied solely by HLWD-DPU. BCWWS District 3B covers approximately four square miles containing the Cities of West Park and Pembroke Park. BCWWS District 3C covers approximately two square miles containing portions of the Cities of Hollywood, Miramar, and Pembroke Pines.

All three BCWWS districts fall mainly outside the City of Hollywood jurisdiction except for the 400 acre southwest corner of the City of Hollywood located south of Hollywood Boulevard and west of State Road 7, which is served by BCWWS District 3C – See Figure 2-1. Small areas in the City of Hollywood jurisdiction are served by BCWWS District 3A.

2.1.3. Port Everglades

Port Everglades purchases potable water from the City of Fort Lauderdale through five metered connections at the following locations:

- 10-inch meter at Southeast 17th Street
- 12-inch meter at Southeast 20th Street
- 8-inch meter at Southeast 24th Street
- 16-inch meter at Southeast Eller Drive / Old South Federal Highway
- 10-inch meter at 900 Southeast 26th Street

Port Everglades distributes this potable water to various commercial and industrial users within its boundaries, such as passenger cruise ships, cargo container ships, and commercial space.

In summary, three water utilities supply the City of Hollywood jurisdiction: (1) HLWD-DPU, (2) BCWWS, and (3) the City of Fort Lauderdale Public Works Department. The first two utilities are supplied by the same water treatment plant (City's WTP) and deliver potable water to the entire jurisdiction except for Port Everglades, which is supplied by the City of Fort Lauderdale Public Works Department. Table 2-1 tabulates the number of square miles covered by each potable water service area in and out of the City of Hollywood jurisdiction. There are no anticipated changes in the size or coverage of these potable water service areas.

Table 2-1.
Potable Water Service Areas

Water Service Area	*In the City of Hollywood Jurisdiction*	*Out of the City of Hollywood Jurisdiction and Served by the City's WTP*	Total by Water Service Area Served by the City's WTP
HLWD-DPU	26.7 sq. miles	0.6 sq. miles	27.3 sq. miles
BCWWS District 3A		7.7 sq. miles	7.7 sq. miles
BCWWS District 3B		3.8 sq. miles	3.8 sq. miles
BCWWS District 3C	0.6 sq. miles	1.8 sq. miles	2.5 sq. miles
Fort Lauderdale	2 sq. miles		
Total relative to the jurisdiction	29.3 sq. miles	14 sq. miles	41.3 sq. miles

Source: GIS estimates

2.2. Population Projections

The City of Hollywood is approaching full development, with less than one percent of vacant developable land parcels remaining, which are mainly infill lots scattered throughout the jurisdiction. Overall, Broward County is expected to reach build-out in the near future. In other words, redevelopment (instead of vacant land) will accommodate the projected population.

In the City's 2012 Update to the 2007 Water Master Plan, countywide 2010 Census data was used as a basis for estimating the City's water service area. The 2010 block level Census data was analyzed using a weighted methodology to estimate the population of census blocks that were totally or partially within the City's service area. A summary of the 2010 estimated population is provided in Table 2-2.

Table 2-2:
City's 2010 Water Service Area Population Estimated Based on the 2010 Census

Service Area	**2010 Estimated Population**
City's Retail Water Service Area	138,585
Broward County District 3A Large User Service Area	15,431
Broward County District 3B/3C Large User Service Area	33,062
Total City Water Service Area	**187,078**

*Table 5.1 of the 2012 Update to the 2007 Water Master Plan

The basis of the population projections for the City's water service area were estimated for 2015-2030 based on population projections published by the Bureau of Economic and Business Research (BEBR) in June 2013 in the "Detailed Projections by Age, Sex, Race, and Hispanic Origin for Florida and Its Counties 2015-2040, With Estimates for 2013".

The Broward County Planning and Redevelopment Division (BCPRD) further refined these projections for each municipality using TAZ-level population projection data and aerial photography data to allocate population to the various municipalities and unincorporated areas within the County. The most recent versions of these projections, which are summarized in the "Traffic Analysis Zones and Municipal Forecasts Update, 2014" published by BCPRD, were used as the basis for estimating the City's retail populations for this report. The population projections for the Broward County 3A and 3B/C service areas were calculated by Broward County based on a Utility Analysis Zone (UAZ) level analysis of BEBR population data. A detailed description of their methodology can be found in the Broward County Water facilities Work Plan located in Appendix A of this report. Table 2-3 presents the water service area population projections for the City's retail, wholesale, and overall service areas.

Table 2-3:
City's Water Service Area Estimated Population 2010-2030

Service Area	2010	2015	2020	2025	2030
City's Retail Water Service Area	138,585	144,554	149,573	150,720	155,105
Broward County District 3A Service Area	15,431	16,384	16,960	17,451	17,962
Broward County District 3B/3C Service Area	33,062	32,902	33,660	34,075	35,594
City's Water Service Area	**187,078**	**193,840**	**200,193**	**202,246**	**208,661**

2.3. Reuse Water Service Areas

HLWD-DPU has implemented a reuse system by making use of secondary treated effluent from its own wastewater service area, Cooper City and the Town of Davie. Up to 4 mgd of high-salinity reuse water is available for internal use at the City's South Regional Wastewater Treatment Plant for non-potable process water and plant washdown. In addition to this, HLWD-DPU delivers up to 4 mgd of blended low-salinity reuse water for irrigation with chloride levels within the salt tolerance of local turf grasses and ornamentals.

The existing reuse distribution system serves primarily golf courses, public medians, private developments, and parks that have a relatively large irrigation demand. These customers, classified as contract customers, are the most cost effective to serve. Table 2-4 lists these contract customers. Figure 2-2 illustrates the coverage of the existing reuse water service area.

Table 2-4.
Existing Reuse System Customers

Current Users Under Contract	Committed (mgd)	Actual (mgd) 2013-2014
Diplomat Country Club	0.446	0.267
Emerald Hills Country Club	0.671	0.908
ECO Grande Golf Course	0.109	0.043
Orangebrook Country Club	0.888	0.526
Hollywood Country Club	0.213	0.065
Hillcrest Country Club	0.582	0.675
Total	**2.909**	**2.484**
Other Current Users		
Park Road Medians	0.025	0.010
Dowdy Field	0.014	0.012
Memorial Hospital	0.026	0.001
City Nursery	0.005	0.001
Rotary Park	0.023	0.015
David Park	0.002	0.004
Lincoln Park/School	0.028	0.020
West Lake Village	0.040	0.003
McKinley Street	0.001	0.001
Park Road & Lincoln	0.003	0.001
HWD Blvd/U.S. 1 Median	0.001	0.001
Total	**0.168**	**0.069**

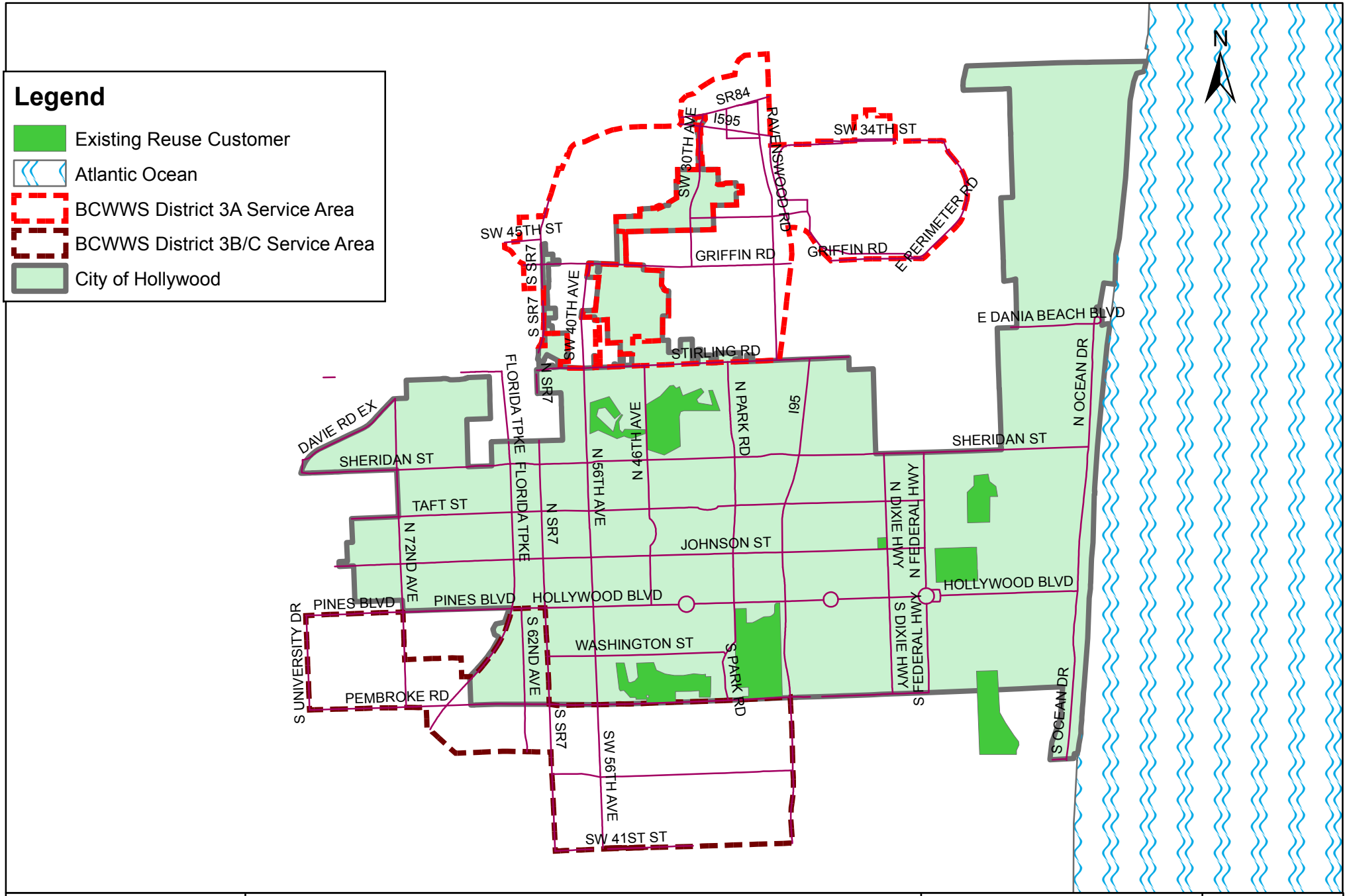
Source: 2007 Reuse System Master Plan and COH-Department of Public Utilities

Expansion of the existing system could incorporate additional contract customers as well as residential and commercial customers and likely be done in phases. Table 2-5 identifies potential additional reuse customers (future committed and future non-committed) and their associated demands. Expansion will be subject to the availability of suitable-quality water. Other potential reuse customers are identified in the Reuse Master Plan that may serve as alternatives to the ones identified in the table below or as additional future customers, if future studies indicate that further expansion is feasible.

Table 2-5.
Expanded Reuse System Customers

Future Committed	**mgd**
Sheridan Station	0.060
T. Y. Park	0.272
Hallandale (Joe Scavo Park)	0.250
Total	**0.582**
Future Non-Committed	
Boggs Field	0.041
West of 441	0.250
Other Medians	0.002
Total	**0.293**

Source: 2007 Reuse Master Plan and COH-Department of Public Utilities



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City of Hollywood Reuse Water Service Area

0 0.5 1 2 Miles

Figure 2-2

3. Water Suppliers

This section characterizes the water suppliers including consumptive use permit information, raw water sources, existing treatment facilities, storage facilities, distribution and interconnects, and conservation and reuse practices in place.

As indicated in Section 2, the City of Hollywood is served, for the most part, by the City's own potable water system. The water suppliers of the City's jurisdiction include:

1. City of Hollywood Potable Water System: Serves most of the City's jurisdiction as illustrated in Figure 2-1.
2. City of Hollywood Reclaimed Water System: Currently, serves seven contract customers in the City for irrigation.
3. Broward County Water System: Purchases finished water from the City of Hollywood WTP and resells it to a small portion of the City's jurisdiction that is mostly served by Broward County Service Area 3B.
4. City of Fort Lauderdale Water System: Serves Port Everglades.

3.1. City of Hollywood Potable Water System

The HLWD-DPU operates its potable water system, which consists of a raw water supply system, a water treatment plant, and a distribution system. They are described as follows.

3.1.1. Raw Water Supply

The City's WTP treats water from the City's own Biscayne Aquifer and Floridan Aquifer wellfields, as well as bulk-purchased raw Biscayne Aquifer water from Broward County's South Regional Wellfield (SRW) located at Brian Piccolo Park. The Biscayne Aquifer is a raw water supply of high quality, while the Floridan Aquifer, a much deeper source of water, is brackish and requires reverse osmosis treatment. Table 3-1 lists the City's Biscayne Aquifer and Floridan Aquifer withdrawal wells. Figure 3-1 maps these wellfield locations.

3.1.1.1. Biscayne Aquifer

Groundwater from the Biscayne Aquifer is fresh and accessed via the Hollywood Biscayne wellfield and Broward County's SRW. The Hollywood Biscayne wellfield includes two wellfields: the Southern and Western (aka Chaminade) wellfields. Biscayne wells 20 and 21 (BW-20 and BW-21), referred to as the North wellfield, were abandoned in 2009. The Southern and Western wellfields have a total of 14 shallow wells with total depths ranging from 75 to 155 feet. The total raw water pumping capacity of the Biscayne wells is currently 30,000 gpm (or 43.0 mgd). The total production capacity

available from the Biscayne wells significantly exceeds the amount of water that can be withdrawn under the City's water use permit, which limits maximum-month withdrawals to 34.9 mgd.

The SRW provides raw water to the City under a raw water large user agreement that has a four year period of time with an automatic renewal for another four years. Up to 5.9 MGD is provided to the City under this agreement. The SRW includes 10 wells, of which eight have a capacity of 4.0 mgd and two have a capacity of 2.0 mgd. The SRW has a total design capacity of approximately 36 mgd and a firm capacity of about 32 mgd with the largest well out of service. This wellfield is in Brian Piccolo Park which is located on the northeast corner of Palm Avenue and Sheridan Street.

3.1.1.2. Floridan Aquifer

Raw water from the Floridan Aquifer, which is a brackish water supply, is accessed via Hollywood's Floridan wellfield. The Floridan wellfield has eight existing withdrawal wells that extend about 926 to 1,300 feet below ground. The last expansions to the Floridan Aquifer wellfield, which included wells FW-6, FW-7, FW-10, and FW-13, occurred between 2008 and 2010. The total raw water pumping capacity of the active Floridan wells is 8,500 gpm (or 12.2 mgd).

It should be noted that for planning purposes the rated capacities of the oldest Floridan wells (F2, F3, and F5) were assumed to be 800 gpm each – which is the lowest operational pumping rate indicated by HLWD-DPU's records, in order to conservatively account for the reduction in efficiency that these wells have experienced over time.

3.1.1.3. Water Supply Allocation

According to the City's WUP No. 06-00038-W, issued on April 10, 2008, the maximum annual average raw water withdrawal allowed from the Biscayne Aquifer is 11,205 MG (or 30.7 mgd) and from the Floridan Aquifer is 3,168 MG (8.7 mgd). The water use permit also defines allowable maximum-month withdrawals: The maximum month withdrawal from the Biscayne Aquifer is limited to 1,062.20 MG, and the maximum month withdrawal from the Floridan Aquifer is limited to 259.00 MG. The existing allocation was established under the requirements of the Water Availability Rule, which limited the maximum-day and maximum-month withdrawals to a base condition that was established based on raw water usage from 2002-2006, and required alternative water supplies to be used to meet any additional demands. In the case of Hollywood, the alternative water supply used is the Floridan Aquifer.

In subsequent sections of this report, the City's water production records will be used to establish annual average and projected maximum-month demands, which will be compared to the respective allocations to determine the overall adequacy of the water supply over the planning horizon.

Table 3-1.
Biscayne Aquifer and Floridan Aquifer Withdrawal Wells

Groundwater Source	Well ID	No. of Wells	Casing Diameter (inches)	Depth of Well (ft.)	Pumping Capacity (gpm)	Pumping Capacity (mgd)	Casing Depth (ft.)
	Existing Biscayne Wells						
Southern Wellfield		**8**			**17,400**	**25.0**	
Biscayne	BW-28	1	10	75	2,400	3.5	60
Biscayne	BW-29	1	10	75	2,400	3.5	60
Biscayne	BW-30	1	24	95	2,100	3.0	60
Biscayne	BW-31	1	24	80	2,100	3.0	60
Biscayne	BW-32	1	24	80	2,100	3.0	55
Biscayne	BW-33	1	24	90	2,100	3.0	69
Biscayne	BW-34	1	24	86	2,100	3.0	70
Biscayne	BW-35	1	24	77	2,100	3.0	60
Western Wellfield		**6**			**12,600**	**18.0**	
Biscayne	BW-36	1	32	112	2,100	3.0	90
Biscayne	BW-37	1	32	144	2,100	3.0	125
Biscayne	BW-38	1	32	150	2,100	3.0	128
Biscayne	BW-39	1	32	155	2,100	3.0	135
Biscayne	BW-40	1	32	145	2,100	3.0	125
Biscayne	BW-41	1	32	150	2,100	3.0	139
Total Biscayne Wellfield		**14**			**30,000**	**43.0**	
	Existing Floridan Wells						
Floridan	FW-F2	1	12	1,100	800	1.2	926
Floridan	FW-F3	1	12	1,100	800	1.2	950
Floridan	FW-F4	1	12	1,100	800	1.2	960
Floridan	FW-F5	1	12	926	800	1.2	920
Floridan	FW-F6	1	16	1,300	1,250	1.8	950
Floridan	FW-F7	1	16	1,300	1,250	1.8	950
Floridan	FW-F10	1	17	1,200	1,400	2.0	1,000
Floridan	FW-F13	1	17	1,200	1,400	2.0	1,000
Total Floridan Existing		**8**			**8,500**	**12.2**	
	Proposed Future Floridan Wells (Beyond 2030)						
Floridan	FW-F8, F9,F11, F12, F14 through F24	15	TBD		15,000	21.6	TBD
Total Floridan Proposed		**15**			**15,000**	**21.6**	

Source: Well ID and capacities table from the City of Hollywood Water and Sewer Revenue Bonds, Series 2014 document provided on November 17, 2014.

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Biscayne and Floridan Aquifer Wells (Existing and Future)

0 0.25 0.5 Miles

Figure 3-1

The City has been proactive in establishing and expanding its Floridan Aquifer supply and treatment capacity as its alternative water supply source. This serves two purposes: to meet projected water demands and to provide increased water supply reliability by including a more drought-resistant source in its overall water supply mix. As part of its overall water supply planning process, the City had received allocation in both its 2000 and 2008 WUPs for new Floridan wells, rated at approximately 1,000 gallons per minute (gpm) each, in addition to the four existing Floridan wells. Between 2008 and 2012, the City constructed four of the planned new wells (F-6, F-7, F-10, and F-13). Because of the supply, transmission, and treatment facility infrastructure already in place, these wells can be installed on a "just in time" basis if needed to meet increasing water demands in the future. At this time, it does not appear that these new wells will be needed within the current planning horizon. Figure 3-1 illustrates the locations of existing and proposed future Floridan wells.

3.1.2. Treatment Processes

The City's WTP has been in continuous operation for almost 85 years and consists of the following treatment processes:

- Lime Softening (LS)
- Membrane Softening (MS)
- Reverse Osmosis (RO)

Raw water from the Hollywood Biscayne wellfield is treated by both the LS and MS treatment systems. In addition, some Biscayne raw water is blended with the softened water from the LS and MS systems to help balance water quality and efficiently use the available Biscayne allocation. Although raw water piping from all Biscayne wellfields is interconnected at the plant, the MS units reportedly treat a higher percentage of SRW water, which tends to be more highly colored (MS is more effective at reducing color). Raw water from the Floridan Aquifer is treated by the RO treatment system exclusively.

Table 3-2 summarizes the existing firm and nominal water treatment capacities of each treatment system. As shown in Table 3-2, the existing total firm and nominal water treatment capacities of the City's water treatment facilities are 40.5 mgd and 46 mgd, respectively. The average treatment losses of the LS, MS, and RO treatments are 2, 13, and 20 percent, respectively. Treatment losses for the LS facility were estimated based on data from 2003-2013 water plant Monthly Operating Reports (MORs). Treatment losses for the MS and RO facilities are based on design and operational criteria.

Table 3-2.
Water Treatment Processes and Capacities

Treatment System	Units in Service Assumed For Firm Capacity	Existing Firm and Nominal Finished Water Treatment Capacities (mgd)	Treatment Losses
Lime Softening (LS)	Nine units in service out of twelve total	Firm: 22.5 mgd Nominal: 24 mgd	2 percent
Membrane Softening (MS)	Six trains in service out of seven total	Firm: 12 mgd Nominal: 14 mgd	13 percent
Reverse Osmosis (RO)	Three trains in service out of four total	Firm: 6 mgd Nominal: 8 mgd	20 percent
Total (all three systems)	All described above	Firm: 40.5 mgd Nominal: 46 mgd	N/A

Source: 2007 Water Master Plan

3.1.2.1. Lime Softening System

The primary water treatment for the LS system is achieved by a process known as fluidized bed crystallization. The City's LS system consists of 12 fluidized bed crystallization units (Spiractors) followed by 18 dual media filters. Each Spiractor has a conservatively-estimated capacity of approximately 2.5 mgd, producing a total capacity of 30 mgd and a firm capacity of 22.5 mgd with three Spiractors offline. Lime is stored in silos and is constantly fed to the Spiractors at an approximate rate of 200 mg/L. There are a total of six lime silos at the WTP (four 50 ton and two 100 ton). The 18 multimedia filters following the Spiractors have a maximum surface loading rate of 2.0 gpm/sq. ft., but the plant prefers to conservatively operate its six larger filters at 1.5 gpm/sq. ft. Using these loading rates, the LS system has a total capacity of 24 mgd and a firm capacity of 22.5 mgd, with the maximum production capacity being limited by the filters. Since the current loading rates are relatively conservative, up-rating the filters may be feasible in the future, if the City has an opportunity to expand its Biscayne supply. The capacities of the Spiractors and membrane systems (described below) together are adequate to be able to fully utilize the City's Biscayne Aquifer allocation.

3.1.2.2. Membrane Softening System

The City's MS system consists of seven operational treatment trains and three available slots for future installation of additional MS trains. Raw water from the Biscayne Aquifer is treated with sulfuric acid and a proprietary antiscalant to protect the membranes from scaling, and is filtered through 5 µm cartridge filters prior to entering the membrane to protect against particulate fouling or damage. Each MS skid has a production capacity of 2.0 mgd, and there are seven skids currently in operation. Therefore, the MS system is able to produce a total of 14 mgd and with one skid out of service; the system has a firm capacity of 12 mgd.

Each train consists of a feed pump and 54 pressure vessels arranged into a three-stage 32:16:6 configuration. Each pressure vessel holds seven membrane elements. Each

membrane softening train is designed to operate at 87 percent recovery, which means that approximately 2.3 mgd of feed water is required to produce 2.0 mgd of permeate. Since future capacity expansion is expected to use water from the Floridan Aquifer, the MS system will likely remain at its current capacity in the long term.

3.1.2.3. Reverse Osmosis System

The City's RO system consists of four RO skids and four available slots to facilitate the installation of additional RO trains. Raw water from the Floridan Aquifer is treated with sulfuric acid and a proprietary antiscalant to protect the membranes from scaling, and is filtered through 5 µm cartridge filters prior to entering the membrane to protect against particulate fouling or damage. The four RO skids that are currently in place have finished water production capacities of 2.0 mgd each operating at 80 percent recovery. At this recovery rate, 2.5 mgd of raw water is needed to produce 2.0 mgd of finished water. Therefore the total finished water capacity of the RO system is 8.0 mgd and the firm capacity is 6.0 mgd with one train out of service.

3.1.2.4. Disinfection System

The City currently uses chloramines to provide primary disinfection and a secondary residual for the distribution system. Free chlorine generated by an on-site generation system is added to the water, and a brief sodium hypochlorite contact time is provided prior to the addition of ammonia to form chloramines.

This system consists of two electrolytic cells, each with a capacity of 1,500 lb./day. Adequate chlorination capacity exists when both chlorinators are online and the average dose is being applied. Currently, 0.8 percent hypochlorite solution is generated by the cells and is stored in a total of nine (seven 10,000 gallons and two 7,000 gallons) fiberglass storage tanks.

The City's ammonia system consists of two 1,000 gallons ammonia gas storage tanks and four rotameters (three 100 lb./day units and one 250 lb./day unit). To maintain a residual of 4.0 mg/L chloramines, 0.85 mg/L ammonia must be added to maintain a ratio of chlorine to ammonia within a recommended range of 4.5:1 to 5.0:1, with a target of 4.7:1. At this dosage, the ammoniators have the capability to treat 77.6 mgd with all four units in service, and 42.3 mgd with the largest (250 lb./day) rotameter offline.

3.1.2.5. Degasifier System

The City's degasifier system reduces CO_2 levels in MS treated water and CO_2 and H_2S levels in RO treated water via air stripping. Sulfuric acid is added to lower pH of Floridan water to aid in H2S removal prior to countercurrent air stripping through a packed tower, but the MS-treated Biscayne water does not require additional pretreatment prior to stripping. The WTP has four forced draft, packed tower degasifiers. Each degasifier unit includes an 18,000 cfm fan, a 13.5 feet diameter by 24 feet overall height tower, and 12

feet of packing. Two degasifiers are designed to remove carbon dioxide from the MS permeate with discharge of the tower exhaust to the atmosphere. One degasifier is designed to remove hydrogen sulfide (H_2S) from the RO permeate with discharge of the tower exhaust to an odor control scrubber. The fourth degasifier is a standby unit for both systems, which can discharge exhaust gas either to the atmosphere or to the odor control scrubber. The degasification system is adequate to treat the MS and RO flows that the plant currently produces. The recent upgrades to the odor scrubber system allow the plant to run all four of its RO skids without generating nuisance odors.

3.1.3. Post-Treatment

Degasified permeate from both MS and RO systems drains to a 250,000 gallon blend tank where it mixes with lime softened water. The secondary treatment in the blend tank includes addition of sodium hypochlorite, and caustic soda, and fluoride. Water from the blend tank is pumped into the onsite ground storage tanks.

3.1.4. Storage

The City has 18 million gallons of total finished water storage capacity; 2 MG in two separate 1 MG elevated storage tanks in the distribution system, 11 MG of ground storage on-site at the WTP, and 5 MG of ground storage located at a new (installed 2014) West Hollywood Storage and Pumping Facility located near Sheridan St. and 68th Avenue. The tankage present at each location is detailed below.

At the plant, a total of five ground storage tanks are available. Water from the blend tank flows into parallel lines that feed two 3.5 MG tanks. Water from these two tanks is discharged into a manifold that feeds three parallel 1.0 MG storage tanks. These three storage tanks then combine into another manifold that feeds a 1 MG high service pumping clearwell. Inclusive of the clearwell, the combined finished water storage inventory (on-site) is 11 MG. The breakdown of the 11 MG on-site finished water storage capacity is indicated below:

- Clearwell: 1 MG
- Tank # 2: 1 MG
- Tank # 3: 1 MG
- Tank # 4: 1 MG
- Tank # 5: 3.5 MG
- Tank # 6: 3.5 MG

The on-site finished water storage tanks provide operational storage required to equalize diurnal demands and provide for emergency storage (fire flows). According to the most recent Water Master Plan, they hold approximately six hours flow when all treatment systems are operating at designed capacity. The water levels in the tanks are typically

maintained between low (50 percent) and high (85 percent) operating limits to accommodate short-term system changes in the system demand. The tanks are all interconnected and are maintained at the same level.

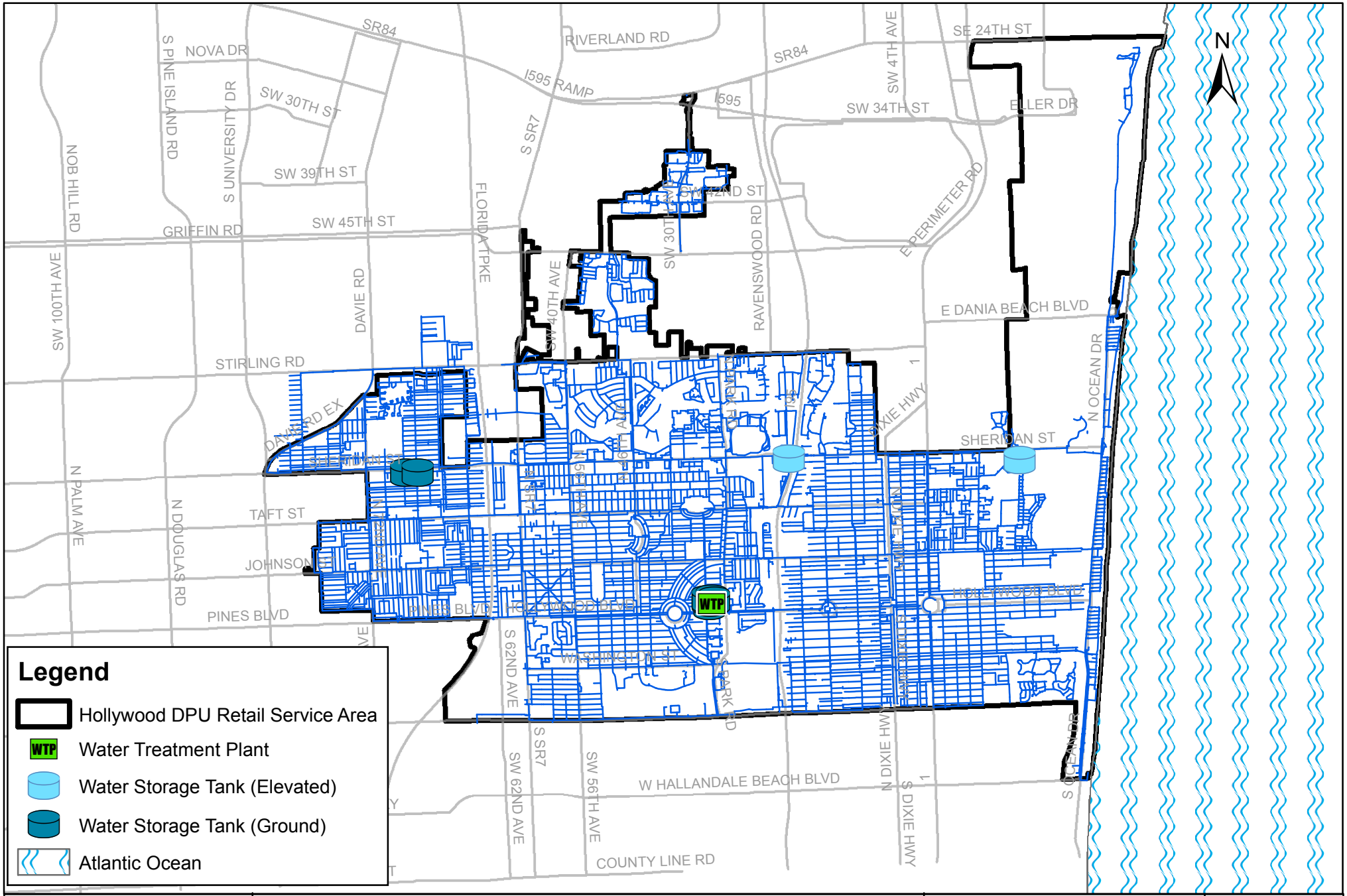
3.1.5. High Service Pumps

The City's WTP has two High Service Pump (HSP) stations that pump finished water from on-site storage tanks at the WTP to the City's distribution system.

1. The main HSP station, referred to as the high service pump room, houses six split-case horizontal centrifugal pumps and their respective motor control centers. The six pumps that are aligned in parallel draw water from clear wells and pump into a common 42-inch discharge header.
2. The secondary HSP station, referred to as the aeration building pump station, is primarily used to complement the required constant operation of the main pumping station. The facility houses four split-case horizontal pumps with their respective motor control centers. The pumps and motors located in this facility are paired up and are arranged in series. These pumps draw water from a 1.0 MG storage tank and pump into a common 20-inch discharge header.

3.1.6. Distribution System

The City's WTP has three discharge mains, a 24-inch water main (South header), a 30-inch water main (West header), and a 20-inch water main (bypass header) that supply water into the distribution system transmission lines. The City's service area water distribution system (Figure 3-2) consists of over 700 miles of pipe with diameters ranging from 2-inch to 36-inch, two elevated 1.0 MG storage tanks, two 2.5 MG ground storage tanks located at a common storage and pumping facility, approximately 40,000 connections, over 2,500 fire hydrants, and over 7,500 valves. The vast majority of these facilities are over 35 years old. There are currently 30 miles of transmission mains of 16 to 30-inches in diameter, approximately 480 miles of distribution mains of 6 to 14-inches in diameter, and approximately 200 miles of distribution pipe of 4-inches and less in diameter. The distribution system piping is constructed of different materials such as cast iron (CI), galvanized iron (GI), polyvinyl chloride (PVC), ductile iron (DI), and asbestos cement (AC).


N
SR84
NOVA DR
RIVERLAND RD
I595 RAMP
I595
SW 4TH AVE
SE 24TH ST
SW 34TH ST
ELLER DR
S PINE ISLAND RD
S UNIVERSITY DR
SW 30TH ST
SW 39TH ST
NOB HILL RD
S SR7
FLORIDA TPKE
SW 42ND ST
SW 30TH AVE
RAVENSWOOD RD
E PERIMETER RD
GRIFFIN RD
SW 45TH ST
SW 100TH AVE
DAVIE RD
SW 40TH AVE
E DANIA BEACH BLVD
STIRLING RD
DANIA RD EX
SW 56TH AVE
DIXIE HWY
N OCEAN DR
SHERIDAN ST
N PALM AVE
N DOUGLAS RD
TAFT ST
JOHNSON ST
PINES BLVD
HOLLYWOOD BLVD
WTP
WASHINGTON ST
S 62ND AVE
S SR7
SW 56TH AVE
N DIXIE HWY
S DIXIE HWY
W HALLANDALE BEACH BLVD
COUNTY LINE RD
Legend
Hollywood DPU Retail Service Area
WTP
Water Treatment Plant
Water Storage Tank (Elevated)
Water Storage Tank (Ground)
Atlantic Ocean
Brown AND Caldwell
City of Hollywood 10-Year Water Supply Facilities Work Plan - 2014 Update
City of Hollywood Retail Service Area Distribution System
0 0.5 1 2
Miles
Figure 3-2

3.2. City of Hollywood Reclaimed Water System

Reclaimed water is a critical component in effectively managing water resources. Effective management employs diverse water resources to strike an appropriate balance among resource conservation, development cost, and sustainability. Reclaimed water, when of suitable quality, may be used for many purposes including, but not limited to:

- Irrigation of golf courses, parks, medians, residential lots, schools, and other green space.
- Cooling water and process water
- Decorative lakes, ponds, and fountains
- Car washing, toilet flushing, and dust control
- Agricultural irrigation and irrigation at nurseries
- Wetlands creation, restoration, and enhancement
- Recharging groundwater

Use of reclaimed water for the above purposes reduces the reliance on potable water for these uses. Within the state of Florida, over 600 MG of reclaimed water are used on a daily basis; over 200 mgd of this is from the 16 counties covered by the SFWMD.

The City's DPU is committed to managing its water supplies and, as such, has an existing reuse (or reclaimed) water system. This reuse water system is at the City-owned Southern Regional Wastewater Treatment Plant (SRWWTP). The SRWWTP collects, treats, and discharges approximately 42 mgd of secondary-treated wastewater into the Atlantic Ocean and to the Boulder Zone via deep injection wells. Since chloride and TDS levels prevent the City from reusing SRWWTP effluent without desalination (RO) treatment, the City has implemented its existing reuse system by importing lower-salinity effluent from the Town of Davie and City of Cooper City, which pump their effluent (approximately 3.7 mgd on an annual average basis) to the SRWWTP

The City's existing reuse water system has a rated capacity of 8.0 mgd, 4.0 of which is used to provide irrigation-quality reuse and the other 4.0 mgd of which is used for non-potable in-plant uses such as foam control, washdown water, and process make-up water. The irrigation reuse portion of the facility has an annual average daily flow of 2.6 mgd, according to recent operating report data provided by the City. Flows from this facility are used primarily for irrigation of a few contract customers, previously listed in Table 2-3. The existing reuse system consists of dedicated reuse mains ranging from 4-inches to 24-inches in diameter, sized to serve the identified contract customers. Secondary

effluent is filtered and treated to the FDEP's High Level Disinfection (HLD) standards as required to facilitate public access reuse.

3.2.1. Ocean Outfall Legislation

In 2008, the State Legislature promulgated Ocean Outfall Legislation (OOL) which requires all utilities in the State of Florida to eliminate discharges from their ocean outfalls by 2025, except for during peak flow events. The rule also requires that utilities provide technically, economically, and environmentally feasible reuse of 60 percent of a base condition annual average flow by December 31, 2025. The legislation also requires this facility to reduce the mass loading of nitrogen and phosphorus from the outfall by 2018. The City has elected to comply with this requirement by shifting outfall flows to its deep injection well system, thereby reducing the mass loading of nitrogen and phosphorus being discharged through the outfall.

The OOL provides that alternative water supply capacity allocated to meet its water supply needs prior to July 2011 may not displace and "strand" that alternative water supply capacity. The City of Hollywood has been investing in its Floridan Aquifer supply and treatment structure since the mid-1990s, and has developed and installed 8 mgd of treatment capacity and the corresponding firm water supply capacity. Consequently, it is not anticipated that reuse may be feasibly utilized to meet anticipated water demand growth through the planning horizon, as that will be fully supplied by its existing Biscayne and Floridan supply and treatment infrastructure. Also, as described above, the salinity of the City's wastewater effluent precludes direct reuse without extensive treatment (RO) beyond what is typical for providing irrigation-quality reuse water.

3.3. City of Hollywood Water Conservation Program

Since 2008, the City's per capita demands have decreased substantially (from a historic 140 gpcd to 114 gpcd). This corresponds to a variety of conservation efforts that include plumbing fixture replacement programs, public education, year-round irrigation restrictions, replacement of aging (leaky) water mains, and other measures. The impact of the City's efforts appear to be durable, as evidenced from a lack of demand rebound with the recent economic recovery and provides equivalent impact to reclaimed water. Its success further diminishes opportunities for reuse integration due to the resulting reduced and intermittent irrigation demand. Florida Statute 373.250(1) recognizes the importance of conservation and gives it equal consideration with reuse in defining what's in the public's best interest. Conservation programs are effective in producing equivalent impact as reuse at a fraction of its cost.

The City's Water Conservation Plan was developed with the goal of maximizing the City's water use efficiency and reducing overall potable water demand. The water conservation plan includes recommendations on water conservation measures and the best management practices (BMPs) that the City has elected to implement to reduce its

per-capita potable water consumption over time and "free up" available water resources to support future growth. Some BMPs that have been implemented include:

1. Expansion of Reuse Projects
2. Water-Efficient Landscape and Irrigation Evaluations
3. Ultra Low Flush (ULF) Toilet Rebates
4. Retrofit Kit Giveaways
5. Water Use Evaluations
6. Restaurant Rinse Valve Replacement

Between 2003 and 2013, the City observed an approximately 10 percent decrease in its 5-year rolling average per capita demand from 128 gpcd to 114 gpcd. This corresponds to an approximately 3 mgd reduction in its use of Biscayne Aquifer water. This could be due to a variety of factors, which include the City's conservation program, water use restrictions, changes in behavior resulting from drought periods and economic conditions during that period, or other factors.

It should be noted that the City is a committed member of the Broward Water Partnership Conservation Program that has a goal of saving 30 mgd county-wide. This program was launched in 2011 and uses monthly promotional materials, public service announcements, and other media to promote consistent water conservation messaging. The City also previously adopted the year-round irrigation restrictions of watering twice per week.

3.4. Broward County Water System

Broward County Districts 3A and 3B/3C are supplied by the City of Hollywood WTP. These systems serve their own retail customers, as well as retail customers in a small portion of the City of Hollywood (less than one square mile) Hence, the raw water sources and treatment plant supplying the three Broward County districts in reference have been already described in this section. This subsection describes the water distribution systems of these service areas.

The transmission and distribution system for District 3A contains approximately 90 miles of pipe of 12-inch and larger and one 2.0 MG finished water storage tank. District 3A also has water interconnects with the City of Fort Lauderdale and the City of Dania Beach, which can be used for emergency purposes to maintain adequate water supply.

The transmission and distribution system for Districts 3B and 3C contains approximately 118 miles of pipe of 12-inch in diameter and larger and two storage tanks with a total storage volume of approximately 3.0 MG. Districts 3B and 3C are interconnected and have emergency interconnects with the City of Hollywood and the City of Miramar to maintain adequate water supply. Figures 4-10 and 4-11, provided in the 2014 Broward

County 10-year Water Supply Facilities Work Plan, shows Broward County Districts 3A, 3B, and 3C's distribution systems.

3.5. City of Fort Lauderdale Water System

According to its 10-Year Water Supply Facilities Work Plan, the City of Fort Lauderdale provides potable water services, among other utility services, to a service area population of approximately 228,500 residents and seven wholesale customers in the City of Fort Lauderdale and surrounding areas in central Broward County.

Port Everglades is one of seven City of Fort Lauderdale's wholesale water customers. Fort Lauderdale's 2014 Water Supply Facilities Work Plan accounts for the demand of Port Everglades as part of its overall aggregate demand projections.

The City of Fort Lauderdale treats raw water from the Prospect wellfield at the Fiveash Water Treatment Plant and from the Dixie wellfield at the Peele-Dixie Water Treatment Plant to supply its retail and wholesale service areas. The Peele-Dixie system supplies Port Everglades.

Both the Prospect and Dixie wellfields are permitted by the SFWMD under Consumptive Use Permit (CUP) No. 06-00123-W. Both wellfields withdraw raw water from the Biscayne Aquifer. The Dixie wellfield is comprised of eight 2.5 mgd rated wells and has an installed capacity of approximately 20 mgd. The existing CUP limits the maximum-day withdrawal of this wellfield to 15 mgd.

The existing Peele-Dixie Water Treatment Plant is a nanofiltration treatment plant on the same site as the retired lime softening facilities. The nanofiltration treatment plant was placed into service in 2008. The nanofiltration treatment plant has a maximum installed finished water treatment capacity of 12 mgd with all units in service.

The Peele-Dixie water service area, which includes Port Everglades, has a remote storage tank (with its associated pump station) known as the Poinciana Park Water Tank, which consists of a 2.0 MG pre-stressed concrete ground storage tank and pumping station with backup power diesel engine generator.

The City of Fort Lauderdale's water distribution system consists of over 770 miles of 2 to 54-inch diameter water mains that convey the finished water from the treatment facilities to the individual customers. In general, the larger diameter transmission mains radiate from the treatment facilities and decrease in size as they extend throughout the service area. The major transmission mains travel east from the water treatment plants to the populated portions of the service area and the two systems are interconnected along major north-south avenues.

4. Water Demand Characterization

This section characterizes HLWD-DPU's wholesale agreement with Broward County and develops average and maximum per-capita daily demand and maximum-day and maximum-month peaking factors based on historical demand data. This section ends with a brief review of Port Everglades' water demand characterization, water demand forecast, and water supplier adequacy.

The City's WTP serves the residents of the City of Hollywood as well as Broward County Districts 3A, 3B, and 3C. The City's WTP also serves small portions of the Town of Davie, the City of Dania Beach, and the Seminole Tribe of Florida reservation, which are all billed as retail customers. Broward County is billed as a wholesale customer. In 2013, the annual average daily finished water production of the City's WTP was approximately 21 mgd, of which approximately 6.2 mgd was sold to Broward County. The following subsection characterizes the retail customer water consumption and the subsection after describes the existing wholesale agreement.

4.1. Finished Water Wholesale Agreement

Broward County purchases finished water from the City for resale to Districts 3A, 3B, and 3C customers. In 1991, Broward County entered into an interlocal resale water agreement with the City under which the City provided potable water to Districts 3B and 3C. In 1996, that agreement was amended to include District 3A. However, service to District 3A actually started in January 2002. The most recent amendment to the potable water sale agreement was made in 2004. The agreement does not have an expiration date and will continue in perpetuity unless there is mutual agreement for termination.

According to the agreement, Broward County will annually review and project its future needs for potable water demand in terms of annual average daily flow and annual maximum daily flow. In turn, the City would use these annual projections as reasonable estimates for planning, expansion, construction, modification, or alteration of City's facilities. Therefore, the water demand forecast introduced in Section 5 uses the most recent projections for Districts 3A, 3B, and 3C indicated in the 2014 Broward County 10-Year Water Supply Facilities Work Plan (dated November 2014).

4.2. Water Demand Characterization

4.2.1. Finished Water Maximum Day Demands, Maximum Month Demands, and Peaking Factors

Table 4-1 presents the past ten year historical annual maximum-day, annual maximum-month, and annual average finished water production of the City's treatment facility (from 2003 through 2013). This information was obtained from the drinking water plant's Monthly Operating Reports (MORs) that are required to be submitted monthly to the Florida Department of Environmental Protection. The annual maximum-day productions (MDPs) and annual maximum-month productions (MMPs) are highlighted in Table 4-1. Maximum-day finished water productions are given for each month of the year. The daily production records for each month were averaged to give an average daily finished water production for each month. The maximum month finished water production for each year was defined as the month with the highest average daily flow. Maximum month demands are expressed on an mgd basis assuming that a typical month has 30.4 days. Generally, the average daily production for the past five years, from 2009 through 2013, at the City's WTP was approximately 21.4 mgd.

Maximum-day finished water peaking factors were calculated as the ratio of the highest maximum-day for a given year to its average daily production. The maximum-month finished water peaking factors were calculated by dividing the highest average monthly production for a given year by that year's annual average daily production. Based on these calculations, the maximum-day peaking factor that will be carried forward for the demand projections is 1.27. The maximum-month peaking factor that will be carried forward for raw water supply need projections is determined in the following section.

Table 4-1.
Historical Finished Water Production

DATE	Data	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Jan	ADP	24.0	25.9	24.5	25.0	23.8	21.8	23.1	21.3	20.6	21.4	20.9
	MDP	26.2	27.5	26.5	29.1	24.8	23.9	25.5	26.5	22.2	23.3	22.4
Feb	ADP	24.0	25.5	25.2	24.9	24.0	22.2	23.8	20.9	22.0	21.2	21.1
	MDP	25.6	28.2	28.0	27.1	26.1	23.8	25.7	22.6	23.7	22.6	22.8
Mar	ADP	23.8	26.6*	24.6	26.0	25.6	22.5	23.7	21.1	22.5	21.7	21.2
	MDP	25.9	29.1*	26.2	27.9	28.0	24.9	25.6	23.0	25.1	22.8	23.1
Apr	ADP	24.1	26.4	25.3	26.7	23.9	21.9	23.9	20.7	22.7	21.0	20.9
	MDP	26.9	29.4	26.8	28.5	25.9	24.2	26.6	25.3	24.5	23.2	23.2
May	ADP	23.2	27.9	25.4	25.9	22.3	23.8	22.7	20.7	22.9	20.5	21.0
	MDP	25.8	31.6	27.9	28.3	24.1	26.5	26.1	22.2	25.3	22.5	22.3
Jun	ADP	21.9	27.7	23.4	24.4	21.8	22.4	21.3	20.5	23.0	20.6	20.6
	MDP	23.2	31.7	25.2	26.7	23.9	24.4	23.7	23.8	25.2	23.1	21.6
Jul	ADP	23.2	26.1†	24.5	23.4	22.2	21.8	22.1	20.6	21.9	21.0	20.2
	MDP	25.8	32.8†	26.8	25.0	24.1	24.5	24.7	22.2	23.8	23.2	21.4
Aug	ADP	23.1	24.3†	25.1	23.7	22.8	21.6	23.1	20.5	21.1	20.6	21.4
	MDP	25.5	25.7†	27.7	25.4	24.7	24.6	25.0	22.0	23.1	22.6	23.9
Sep	ADP	22.9	23.8	23.9	23.2	23.1	21.6	21.7	20.1	20.3	20.8	21.0
	MDP	25.2	26.0	25.9	25.3	25.9	23.6	23.4	21.8	21.7	24.8	22.2
Oct	ADP	24.8	24.2†	23.6	24.7	22.2	21.7	23.0	21.2	20.9	21.1	22.2
	MDP	27.1	25.9†	25.7	26.4	25.5	23.7	24.7	23.6	24.6	22.7	24.7
Nov	ADP	25.0	25.4	24.6	23.4	21.9	22.0	22.1	21.3	21.0	21.0	20.5
	MDP	27.2	27.4	27.7	25.8	23.7	23.2	25.8	22.6	22.7	23.0	22.6
Dec	ADP	25.6	25.4	24.2	23.4	22.0	22.3	20.7	21.2	20.9	20.5	20.9
	MDP	28.1	27.0	28.5	25.5	24.1	24.6	23.2	22.9	23.3	21.8	22.0
Overall	ADP	23.8	25.8	24.5	24.6	23.0	22.1	22.6	20.8	21.7	21.0	21.0
	Max. Day Peaking Factor	1.18	1.27	1.16	1.18	1.22	1.20	1.18	1.27	1.17	1.19	1.18
	MMP	25.6	27.9	25.4	26.7	25.6	23.8	23.9	21.3	23.0	21.7	22.2
	Max Month Peaking Factor	1.07	1.08	1.04	1.09	1.11	1.08	1.06	1.02	1.06	1.03	1.06

*This month contained a maximum-day data point of 36 mgd; however, because this data point does not appear to be reasonable based on the raw water production and finished water production on the consecutive days surrounding that data point, was about 7 mgd higher than any day during the 10-year period, and did not correspond to any known weather event, major main beak, or fire that could have caused such a large demand.

†Data for these specific two months from most recent Water Master Plan.

4.2.2. Maximum-Month Raw Water Production and Peaking Factors for Supply Allocation

The water use permit establishes maximum-month raw water withdrawals that cap the amount of raw water that can be used in any given month. To determine this, monthly raw water withdrawals were summed over the time period from 2003-2013. Based on these, the average monthly withdrawal was calculated for each year. Then, the maximum month raw water use during each year was divided by the average monthly raw water use to calculate the maximum-month peaking factor for that year. The monthly raw water usage and peaking factor calculations are shown in Table 4-2.

4.2.3. Fire Flow

According to the Insurance Services Office, Inc. (ISO), the fire flow duration is two hours for fire flows up to 1,500 gpm for residential and low rise buildings and three hours for fire flows of 3,000 gpm and 3,500 gpm for commercial and high rise buildings. According to the most recent Water Master Plan, the minimum needed fire flow storage for the City's commercial properties criterion can be approximated to 1.0 MG. Hence, 1.0 MG fire flow storage is added to the needed equalization storage projections to estimate the total storage needs. Similarly, 1.0 mgd fire flow is added to the maximum-day forecast.

4.2.4. Average Per-Capita Daily Demand

The per-capita daily water demand is a guideline used to measure the reasonable population-related water use associated with residential, business, institutional, miscellaneous metered and unaccounted uses. According to the guidelines given by the SFWMD, the average per capita daily use rate can be calculated for the last five years of record by dividing the average daily water use by the permanent population served by the utility for the same period of time. The per-capita daily demand is expressed in gallons per capita per day.

In addition to calculating the per-capita usage rate based on the SFWMD methodology, the single-year maximum per-capita demand for the 10-year period between 2003 and 2013 was also determined. Projections will be done for both the five-year average and 10-year maximum per-capita demand in order to provide a range of demand estimates that accounts for current trends in water use, while recognizing that the effects of recent economic conditions, drought restrictions, and other factors may have contributed to a reduction in per-capita demand that may not represent true long-term trends. Projecting demand at both low and high levels allows the City a margin of safety to provide an adequate water supply over the planning horizon.

Table 4-2.
Historical Raw Water Withdrawals

DATE		Years 2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Jan	Floridan Raw Water (MG)	21	0	0	68	49	67	0	8	84	0	70
	Biscayne Raw Water (MG)	828	898	878	852	842	742	834	750	663	772	693
	Total Raw Water (MG)	849	898	878	919	891	809	834	759	747	772	763
Feb	Floridan Raw Water (MG)	0	0	0	35	56	52	0	59	74	73	41
	Biscayne Raw Water (MG)	797	831	833	794	745	696	753	629	617	651	630
	Total Raw Water (MG)	797	831	833	829	801	748	753	687	691	724	672
Mar	Floridan Raw Water (MG)	0	0	0	82	78	74	0	42	85	77	91
	Biscayne Raw Water (MG)	868	902	900	900	831	734	846	710	688	709	696
	Total Raw Water (MG)	868	902	900	982	909	808	846	752	773	786	787
Apr	Floridan Raw Water (MG)	4	0	0	77	73	75	0	17	78	50	63
	Biscayne Raw Water (MG)	861	861	889	898	775	692	823	683	688	678	650
	Total Raw Water (MG)	864	861	889	975	848	767	823	700	766	728	713
May	Floridan Raw Water (MG)	7	0	0	81	82	80	29	17	77	54	74
	Biscayne Raw Water (MG)	845	940	928	894	750	799	773	702	715	663	663
	Total Raw Water (MG)	850	940	928	975	832	878	802	720	793	718	736
Jun	Floridan Raw Water (MG)	34	0	0	18	68	35	6	79	38	71	75
	Biscayne Raw Water (MG)	752	901	843	857	674	750	731	637	720	628	620
	Total Raw Water (MG)	786	901	843	875	742	784	737	716	758	699	695
Jul	Floridan Raw Water (MG)	75	0	0	0	65	71	17	47	42	55	69
	Biscayne Raw Water (MG)	840	873	903	849	715	721	750	682	728	682	638
	Total Raw Water (MG)	908	873	903	849	780	793	767	729	770	737	707
Aug	Floridan Raw Water (MG)	73	0	0	0	75	81	49	79	83	65	73
	Biscayne Raw Water (MG)	776	815	953	873	727	700	740	663	678	676	654
	Total Raw Water (MG)	849	815	953	873	802	781	789	742	762	736	727
Sep	Floridan Raw Water (MG)	42	0	47	0	77	47	50	57	32	67	78
	Biscayne Raw Water (MG)	778	782	827	829	724	702	682	631	662	642	607
	Total Raw Water (MG)	820	782	874	829	802	748	732	688	694	710	684
Oct	Floridan Raw Water (MG)	53	0	52	30	75	78	45	75	46	74	71
	Biscayne Raw Water (MG)	864	845	825	896	725	713	763	692	644	668	662
	Total Raw Water (MG)	916	845	877	926	800	791	808	768	691	742	733
Nov	Floridan Raw Water (MG)	62	1	55	42	18	80	0	79	0	72	78
	Biscayne Raw Water (MG)	788	861	828	816	741	720	756	665	706	673	629
	Total Raw Water (MG)	847	862	883	858	759	800	756	744	706	745	707
Dec	Floridan Raw Water (MG)	55	0	57	67	43	7	4	84	0	72	71
	Biscayne Raw Water (MG)	856	888	832	817	759	790	736	676	755	686	675
	Total Raw Water (MG)	909	888	887	884	802	797	740	760	755	757	746
	Average Monthly Withdrawal (MGM)	855	867	887	898	814	792	782	730	742	738	723
	Max Monthly Withdrawal (MGM)	916	940	953	982	909	878	846	768	793	786	787
	Average Monthly Withdrawal, Daily Flow Basis (MGD)	28.1	28.5	29.2	29.5	26.8	26.1	25.7	24.0	24.4	24.3	23.8
	Max Monthly Withdrawal, Daily Flow Basis (MGD)	30.1	30.9	31.3	32.3	29.9	28.9	27.8	25.2	26.1	25.8	25.9
	Max Month Peaking Factor	1.07	1.08	1.07	1.09	1.12	1.11	1.08	1.05	1.07	1.06	1.09

The City's service area per capita was calculated based on annual average finished water production rates summarized in Table 4-1 and historical and projected population data for the corresponding years. Historical population data for 2004-2006 was taken from the most recent Water Master Plan. 2007-2009 was derived via a straight line interpolation between the 2006 population data and the 2010 census data presented in Section 2, Table 2-2. Historical population levels and equivalent per-capita demands are shown in Table 4-3, along with the associated finished water use and per-capita demand.

Table 4-3.
Historical Per-Capita Demands

Year	Population	Finished Water	Per Capita Flow
		mgd	gpcd
2004	186,648	26.1	140
2005	188,287	24.5	130
2006	190,595	24.6	129
2007	189,716	23.0	121
2008	188,837	22.1	117
2009	187,958	22.6	120
2010	187,078	20.8	111
2011	188,108	21.7	115
2012	189,138	21.0	111
2013	190,168	21.0	110
5-year average		**22.7**	**114**
10-year max		**26.1**	**140**

The City's composite (retail plus wholesale customers) 2009-2013 average per-capita daily demand was estimated to be 114 gpcd. This per-capita demand will be used to prepare the low-range projected finished water and water supply demands in the next section. The 10-year maximum per-capita demand was calculated to be 140 gpcd; this value will be used to prepare the high range demand projections in the next section. Using both the high range and the low range will allow the City to estimate its baseline capacity needs, while giving it the flexibility to be prepared for rebounds in per-capita demand.

4.2.5. Non-Revenue Water (NRW)

The assessment of non-revenue water (NRW) is important to reduce lost revenue and for water conservation. A study done by others reviewed the City's existing water loss accounting methodology, water metering procedures, and historical water distribution system losses and indicated that the inaccuracy of finished water metering or unregistered

losses at the WTP could be the most significant factor contributing to the previous NRW loss computational imprecision. Using the best available data, that study developed a preliminary estimate of the City's distribution system NRW loss of 8 percent between 2002 and 2005. The study recommended the use of the IWA/AWWA consensus methodology for future water loss assessments particularly for the development of a water loss audit and any required water loss reduction plan.

Since that time, the City has utilized its own methodology to determine NRW, which evaluates the finished water total minus (the City's total consumption, Broward County/City of Dania Sales minus Alandco, and the monthly water loss). The most recent one year period from October 2013 to September 2014 averaged a 7.2 percent loss, which is below the 10 percent threshold.

4.3. Port Everglades Water Demand

Due to its varying land uses, Port Everglades' water demand characteristics differ from typical residential/commercial patterns. Generally, the 2008 City of Fort Lauderdale 10-Year Water Supply Facilities Work Plan characterizes the Port Everglades water demand as follows:

- Base 2010 water consumption: 1.31 mgd
- Maximum-day peaking factor: 1.5
- Distribution system losses: 8.1%
- Expected annual water consumption growth: 5% - as approved by Port Everglades and its consultant Craven Thompson.

This characterization was not included in Fort Lauderdale's 2014 Water Supply Facilities Work Plan, so demand was projected based on the available information from the previous version of the plan. Based on these water demand parameters, Table 4-4 tabulates Port Everglades water demand forecast – with and without distribution losses.

Table 4-4.
Port Everglades Water Demand Forecast

Water Demand (mgd)	***2010***	***2015***	***2020***	***2025***	***2030***
Annual average daily flow - without distribution losses	1.68	2.14	2.73	3.49	3.66
Annual average daily flow – including distribution losses (8.1%)	1.83	2.33	2.97	3.80	3.96
Maximum-day flow – including distribution losses (8.1%)	2.74	3.49	4.46	5.70	5.94

The adequacy of the City of Fort Lauderdale water system to supply Port Everglades is implicitly ensured in the City of Fort Lauderdale 10-Year Water Supply Facility Work Plan, where the appropriate capital expansions are identified to meet the overall City of Fort Lauderdale service area water demand. As the water supply adequacy for Port Everglades have been addressed in this section, the following sections will focus on the City of Hollywood WTP service area, including retail and wholesale.

5. Water Demand Forecast and Water Supply Adequacy

This section evaluates the water supply facilities adequacy relative to the water demand forecast and demonstrates that the existing water supply facilities and conservation and reuse practices will meet projected demands.

The projected annual average daily, maximum-month, and maximum-day finished water demands of the City's service area over the planning horizon were estimated based on the population projections for the City's retail service area and the wholesale customer projected demands that were discussed in previous sections. Projected water demands were compared against the existing capacities of the City's Public Water System in order to assess requirements for new or expanded facilities.

5.1. Projected Finished Water Demands

Projected water demands were estimated based on a per-capita coefficient approach for the City's retail service area. Projections were done at low (114 gpcd) and high (140 gpcd) projected per-capita demands that were previously developed in Section 4. Average day projected demands for the Broward County 3A and 3B/C systems that were provided in the county's 2014 Water Supply Facilities Work Plan were used in the overall demand population for the City's service area. The 3A and 3B/C demands fall within the range that would be expected based on the low and high per-capita demands established for the overall service area. The average daily retail per-capita demand rates were assumed to be constant over the planning horizon.

The average daily water demand projections for the City's service area were estimated as the product of the retail population projections and the average daily retail per capita demand. The projections of Broward County's projections for Districts 3A, 3B, and 3C were added to the City's retail water demand projections to obtain the overall water demand forecast. The most recent projections for Districts 3A, 3B, and 3C were obtained from the 2014 Broward County 10-Year Water Supply Facilities Work Plan. The total finished water demand projections were estimated from through the planning horizon as follows:

$$WD_n = [Pop_n \times PC] + BC_n$$

Where,

- WD_n: Finished water demand in year n
- Pop_n: City's service area population in year n
- PC: Average per-capita water demand
- BC_n: Projected water demand from Broward County in year n

The estimated average day finished water demand projections are presented in Table 5-1a (based on low per-capita demand forecast) and 5-1b (based on high per-capita demand forecast). These projections are lower than the water use permit approved in April 2008 due to recent updates of the Broward County demographic projections reflecting corrections related to economic growth and housing market expectations.

Table 5-1a.
Forecasted Average Day Finished Water Demand Projections, 114 gpcd Retail Per-Capita

(1)	*(2)*	*(3)=(2)*Per capita/1M*	*(4)**	*(5)=(4)+(3)*
Year	**City's Retail Service Area Population Projections**	**Average-Day Finished Water Demand Projections for Retail Customers (mgd)**	**Average-Day Finished Water Demand Projections for Broward County 3A and 3B/3C (mgd)**	**Total Average-Day Finished Water Demand Projections (mgd)**
2015	144,554	16.5	6.6	23.1
2020	149,573	17.1	6.8	23.9
2025	150,720	17.2	6.9	24.1
2030	155,105	17.7	7.2	24.9

Source: *2014 Broward County 10-Year Water Supply Facilities Work Plan.

Table 5-1b.
Forecasted Average Day Finished Water Demand Projections, 140 gpcd Retail Per-Capita

(1)	*(2)*	*(3)=(2)*Per capita/1M*	*(4)**	*(5)=(4)+(3)*
Year	**City's Retail Service Area Population Projections**	**Average-Day Finished Water Demand Projections for Retail Customers (mgd)**	**Average-Day Finished Water Demand Projections for Broward County 3A and 3B/3C (mgd)**	**Total Average-Day Finished Water Demand Projections (mgd)**
2015	144,554	20.2	6.6	26.8
2020	149,573	20.9	6.8	27.7
2025	150,720	21.1	6.9	28.0
2030	155,105	21.7	7.2	28.9

Source: *2014 Broward County 10-Year Water Supply Facilities Work Plan.

5.1.1. Projected Maximum-Day Finished Water Demands

A maximum-day peaking factor of 1.27 was used to estimate the maximum-day water demand of the City's service area. The average day demands for the water service area shown in Tables 5-1a and 5-1b were summed and peaked with the overall system peaking factor of 1.27 to estimate the expected maximum-day demands. The storage and pumping facilities at the Broward County 3A, 3B, and 3C facilities will compensate for the difference between the City of Hollywood's peaking factor and the County's system-specific peaking factors. A 1.0 mgd fire flow was added to this total to come up with the total maximum-day demand used for planning purposes. The total average-day and maximum-day finished water demand projections of the City's system thus estimated are presented in Table 5-2.

Table 5-2.
Forecasted Average-Day and Maximum-Day Demands

(1)	(2)	(3)	(4) = [(2) * 1.27] + 1.0	(5) = [(3) * 1.27] + 1.0
Year	**Finished-Water Forecasted Demand (mgd)**			
	Average-Day, Low Retail Per-Capita	**Average-Day, High Retail Per-Capita**	**Maximum- Day, Low Retail per--Capita (inc'l 1.0 mgd fire flow)**	**Maximum- Day, High Retail Per-Capita (inc'l 1.0 mgd fire flow)**
2015	23.1	26.8	30.3	35.0
2020	23.9	27.7	31.4	36.2
2025	24.1	28.0	31.6	36.6
2030	24.9	28.9	32.6	37.7

5.2. Raw Water Supply Adequacy Projections

The adequacy of raw water supplies were projected based on the maximum-month peaking factor developed in Section 4, installed firm well capacities, average-day and maximum-month projected water usage, and treatment losses of the major water plant processes (LS, MS, and RO). Water supply peaking factors and demands were calculated separately from finished water because the demand patterns differ (finished water storage tanks are used to absorb peaks and valleys in finished water demands). Raw water usage was projected under both the low and high annual average daily finished water needs shown in Table 5-2.

As is typical of current operating practice, the City's Biscayne Aquifer allocation is used to meet the majority of finished water demand. The City has proactively committed to using the Floridan Aquifer as its primary alternative water supply and has expended a significant amount of capital to enhance and expand its Floridan Aquifer raw water production and treatment capacity from 4.0 MGD to 8.0 MGD, and has completely replaced its two oldest treatment units to provide more cost-effective and energy-efficient

treatment. Floridan water is used to meet demand beyond what can be satisfied via the Biscayne allocation.

The following assumptions were used to guide the development of the raw water capacity projections:

1. Raw water projections were done for both annual average daily flow and maximum-month flow conditions, since both annual average and maximum-month withdrawals are limited by the City's Water Use Permit. Maximum-day and maximum-month permitted capacities, as well as firm wellfield capacities, are shown for the Biscayne and Floridan Aquifer supplies in Table 5-3.

2. The plant runs 12 MGD (6 x 2 mgd skids) of NF continuously, consistent with historical water plant operational practices. The MOR data supports this, with the 10-year average daily NF production averaging 11.4 mgd.

3. Demand is satisfied in the following manner: MS is used to meet the first 12 mgd of finished water demand, LS is used to meet demand above the MS production up to the permitted maximum Biscayne withdrawal, and RO is used to satisfy any remaining demand.

4. Treatment losses for the NF membranes are 13%, and are 20% for the RO membranes, consistent with design data and operational practices. Treatment losses for the LS facility average 2% based on MOR data.

Table 5-3.
Water Supply Permitted Withdrawals and Firm Wellfield Production Capacities

Source	Finished-Water Forecasted Demand (mgd)			
	Permitted AADF (mgd)	Permitted MMF* (mgd)	Total Capacity (mgd)	Firm Capacity (mgd)
Biscayne Aquifer (Total)	30.7	34.9	43.2	39.7
Floridan Aquifer (Total)	8.7	8.5	12.2	10.2
*Assumes 30.4 days in an average month				

Table 5-3 shows that there is adequate firm wellfield capacity for both the Floridan and Biscayne Aquifer supplies. Therefore, projections were done using the permitted capacity for each source as the maximum amount that can be used to provide water supply. The projected water supply needs are shown in Table 5-4 for the low demand projections, and in Table 5-5 for the high demand projections. Figures 5-1 and 5-2 show the projected water supply needs graphically.

Table 5-4.
Water Supply Capacity Usage, Low Per-Capita Demand

		2015	2020	2025	2030
Finished Water AADF Required (MGD)	MS	12.0	12.0	12.0	12.0
	LS	11.1	11.9	12.1	12.9
	RO	0.0	0.0	0.0	0.0
	Total	**23.1**	**23.9**	**24.1**	**24.9**
Corresponding Raw Water AADF Required (mgd)	MS	13.8	13.8	13.8	13.8
	LS	11.3	12.1	12.3	13.1
	RO	0.0	0.0	0.0	0.0
	Total Biscayne	**25.1**	**25.9**	**26.1**	**26.9**
	Total Floridan	**0.0**	**0.0**	**0.0**	**0.0**
	Total Raw Water	**25.1**	**25.9**	**26.1**	**26.8**
Finished Water MMF Required (MGD)	MS	12.0	12.0	12.0	12.0
	LS	13.8	14.7	15.0	15.9
	RO	0.0	0.0	0.0	0.0
	Total	**25.8**	**26.7**	**27.0**	**27.9**
Corresponding Raw Water MMF Required (mgd)	MS	13.8	13.8	13.8	13.8
	LS	14.1	15.0	15.3	16.2
	RO	0.0	0.0	0.0	0.0
	Total Biscayne	**27.9**	**28.8**	**29.1**	**30.0**
	Total Floridan	**0.0**	**0.0**	**0.0**	**0.0**
	Total Raw Water	**27.9**	**28.8**	**29.1**	**30.0**

Note: Assumes 13% treatment losses for MS, 2% losses for LS, and 20% losses for RO.

Table 5-5.
Water Supply Capacity Usage, High Per-Capita Demand

		2015	2020	2025	2030
Finished Water AADF Required (MGD)	MS	12.0	12.0	12.0	12.0
	LS	14.8	15.7	16.0	16.6
	RO	0.0	0.0	0.0	0.3
	Total	**26.8**	**27.7**	**28.0**	**28.9**
Corresponding Raw Water AADF Required (mgd)	MS	13.8	13.8	13.8	13.8
	LS	15.1	16.1	16.3	16.9
	RO	0.0	0.0	0.0	0.4
	Total Biscayne	**28.9**	**29.9**	**30.1**	**30.7**
	Total Floridan	**0.0**	**0.0**	**0.0**	**0.4**
	Total Raw Water	**28.9**	**29.9**	**30.1**	**31.1**
Finished Water MMF Required (MGD)	MS	12.0	12.0	12.0	12.0
	LS	18.1	19.1	19.4	20.4
	RO	0.0	0.0	0.0	0.0
	Total	**30.1**	**31.1**	**31.4**	**32.4**
Corresponding Raw Water MMF Required (mgd)	MS	13.8	13.8	13.8	13.8
	LS	18.4	19.5	19.8	20.8
	RO	0.0	0.0	0.0	0.0
	Total Biscayne	**32.2**	**33.3**	**33.6**	**34.6**
	Total Floridan	0.0	0.0	0.0	0.0
	Total Raw Water	**32.2**	**33.3**	**33.6**	**34.6**

Note: Assumes 13% treatment losses for MS, 2% losses for LS, and 20% losses for RO.

Figure 5-1
Water Supply Capacity Usage, Annual Average Basis

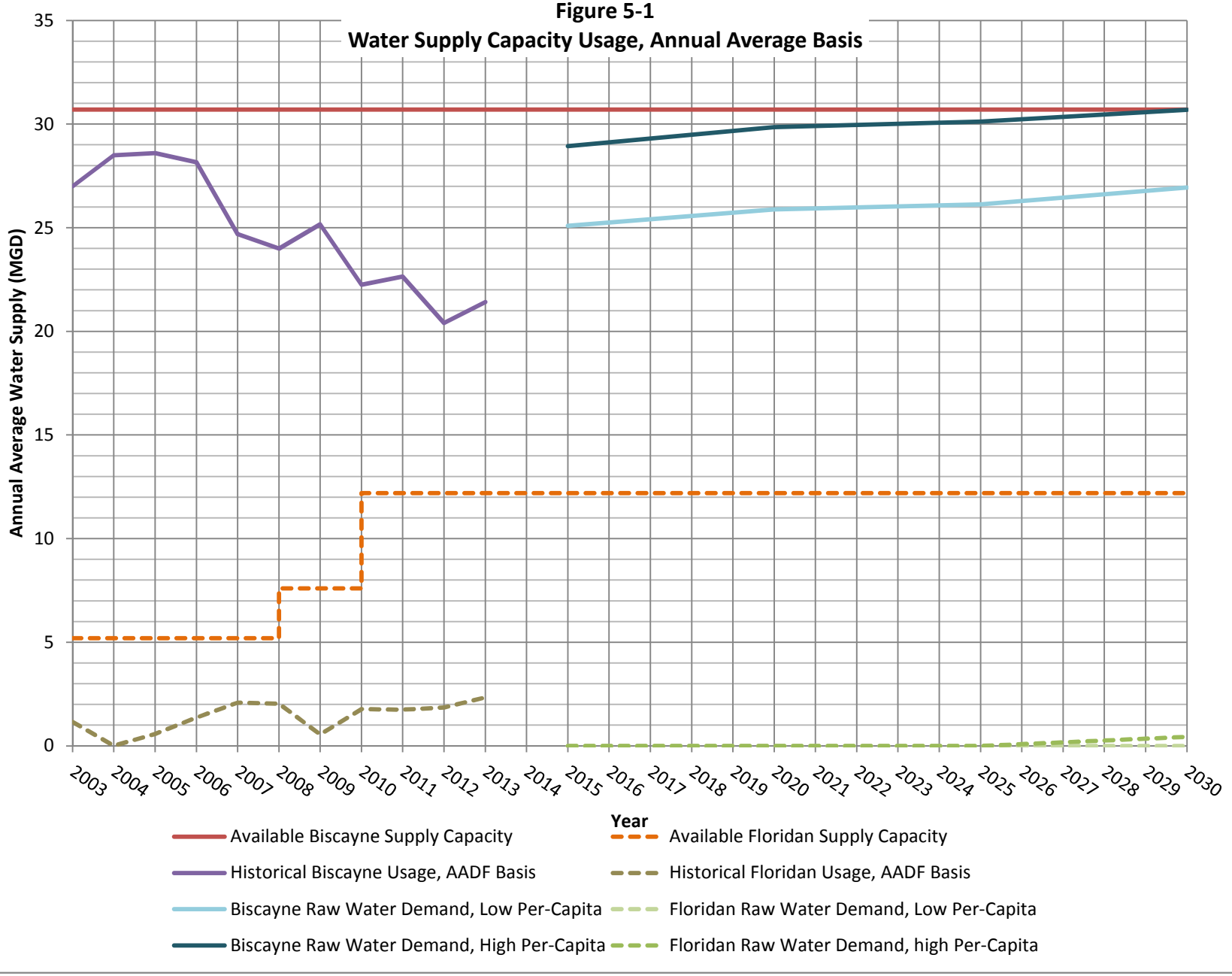
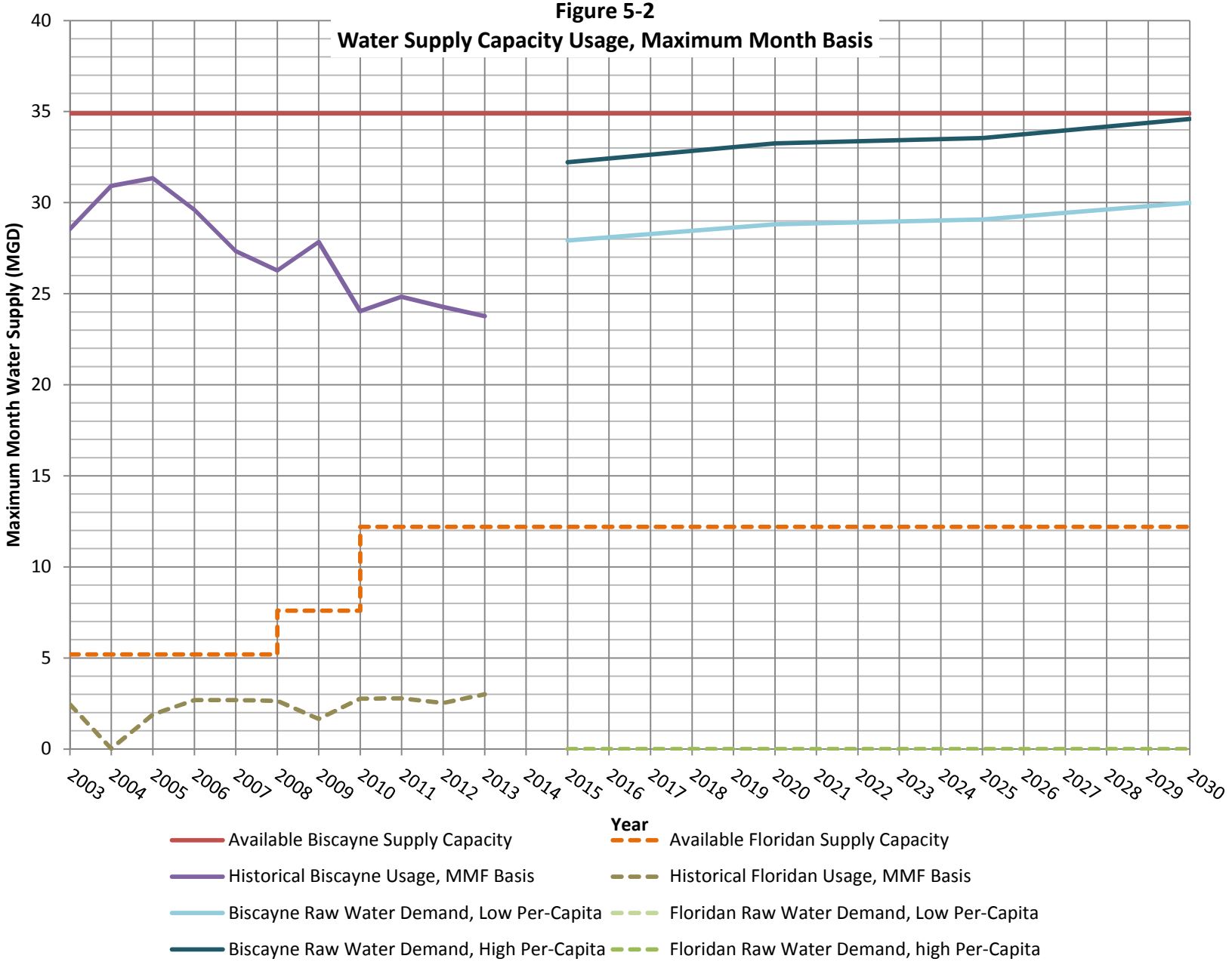


Figure 5-2
Water Supply Capacity Usage, Maximum Month Basis



5.2.1. Water Supply Capacity Summary

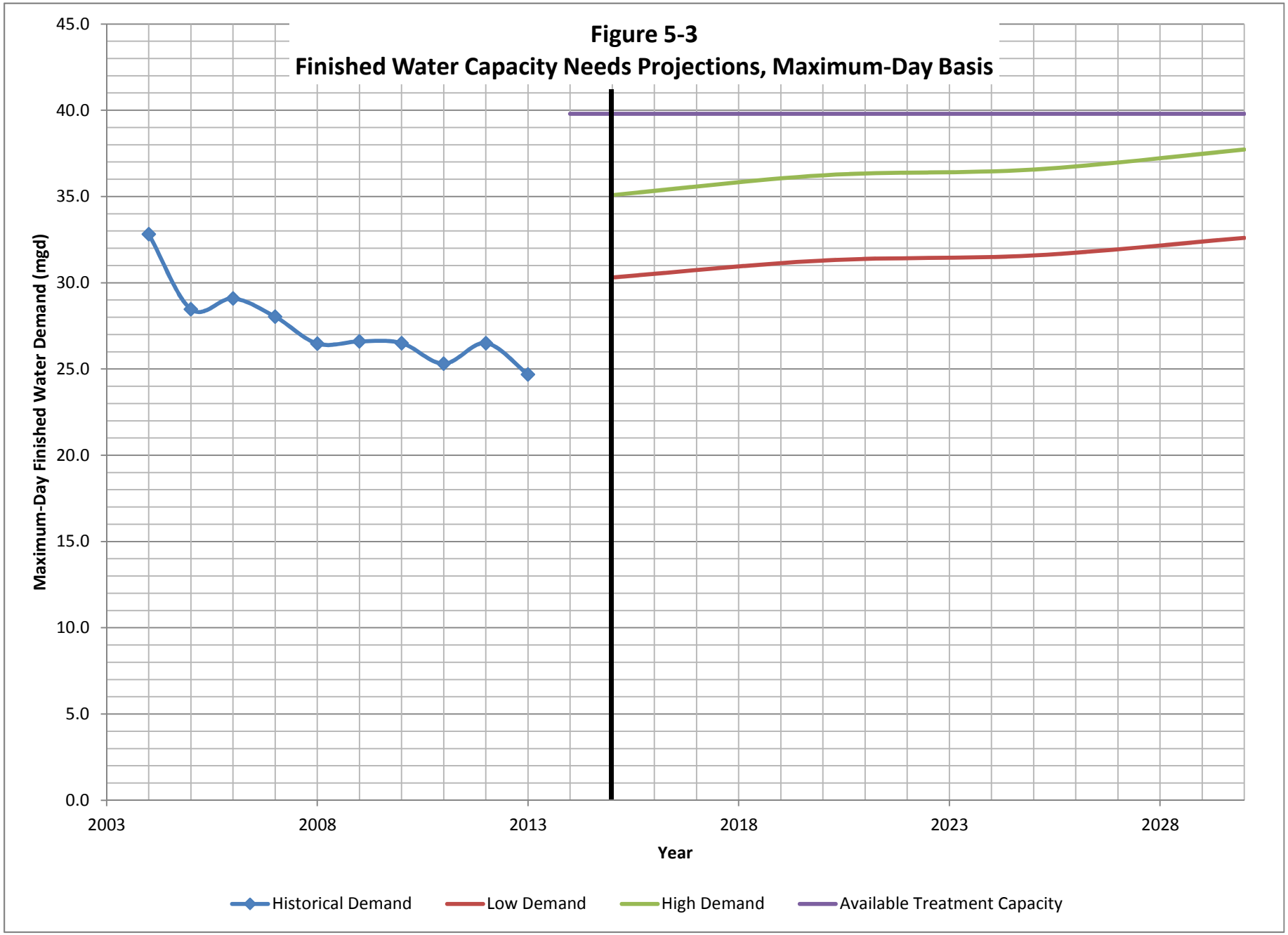
Figures 5-1 and 5-2 show that the Biscayne allocation alone will be sufficient to supply demands until approximately 2026, after which both the Floridan and Biscayne supplies will be needed. The Floridan will continue to be the City's primary Alternative Water Supply, since it has been proactively invested in developing that supply over the last approximately 20 years.

The historical Floridan usage reflects the City's current practice of continuously running one or more RO skids to provide a diverse water supply and maintain the units in good operating condition. While the Floridan Aquifer supply will be needed to meet demands projected over the planning horizon, the total production will remain relatively low (requirement of about 2 MGD), which limits the opportunity to use Floridan Aquifer recharge as a potential future water supply.

5.3. Water Treatment Capacity Evaluation

To ensure maximum-day water delivery while one unit of each treatment process is out of service, adequate firm treatment capacity must be available to meet the projected finished water demands. To establish this, the treatment capacities described in Section 3.1.2 were compared to the maximum-day finished water demands shown in Table 5-2. This comparison is presented in Figure 5-3, along with historical finished water production for the entire HLWD-DPU service area. This figure shows that the City has adequate water treatment capacity to support projected demands through the planning horizon.

Figure 5-3
Finished Water Capacity Needs Projections, Maximum-Day Basis



5.4. Projected Peak-Hour Demands and Storage Needs

According to the Florida Administrative Code (FAC) 62-555, finished water storage needs comprise storage required for operational equalization to meet peak-hour water demand and storage to meet fire-flow requirements. Based on ISO requirements, the fire-flow storage needed for the City's system was estimated to be approximately 1 MG in order to supply 3,500 gpm sustained for 3 hours (Water Master Plan). The equalization storage was estimated using the following two methodologies provided by the FDEP:

- FDEP Criterion 1: Multiplying the projected maximum-day water demand by 25 percent.
- FDEP Criterion 2: Demonstrating sufficient storage available to sustain peak-hour flows beyond treatment plant capacity for 4 hours.

Table 5-6 shows the storage needs estimated under each FDEP Criterion. To estimate the operational storage using FDEP Criterion 1, the City's retail maximum-day demand was multiplied by 25 percent. Because Broward County Districts 3A and 3BC provide their own finished water storage, their maximum-day demands were not included in the previous estimate.

To estimate the operational storage using FDEP Criterion 2, the total peak-hour demand was estimated. Three peaking factors were initially considered for the City's retail service area:

- 2.5, representing a typical peaking factor established by AWWA;
- 2.28, established in the City's most recent Water Master Plan through a detailed hydraulic model analysis of diurnal demand variations and demand peaks; and
- 1.72, representing the highest observed peak flow observed in the four year period between 2010 and 2013. This second peaking factor was obtained by dividing the peak flow observed in 2010, 35.822 mgd, by that year's annual average flow, 20.8 mgd.

The factor of 2.28 was carried forward for the Criterion 2 analysis for the City's retail service area. Compared to the generic 2.5 factor developed by AWWA, the 2.28 factor reflects system-specific information and demand patterns. The 1.72 calculated from actual operating data may not have captured the type of unusual high-demand scenarios evaluated in the model (e.g. a fire flow event occurring concurrently with peak demand), and was therefore considered to be less appropriate than the 2.28 factor. Since Broward County 3A and 3BC have their own storage tanks and pumping systems, a peak hour peaking factor of 1.0 was used for their demands. Both projected peak-hour water demands and storage needs are tabulated in Table 5-6.

Table 5-6.
Peak-Hour Demand and Finished Water Storage Needs

Year	Peak-Hour Demand (mgd)[1]		Planned Treatment Plant Capacity (TPC, mgd)	Storage Needs[2] MG			
	Low Per Capita	High Per-Capita		Criterion 1[3], Low Per-Capita	Criterion 1[3], High Per-Capita	Criterion 2[4], High Per-Capita	Criterion 2[4], High Per-Capita
2015	44.2	52.7	40.5	5.2	6.4	0.6	2.0
2020	45.7	54.5	40.5	5.4	6.6	0.9	2.3
2025	46.1	55.0	40.5	5.5	6.7	0.9	2.4
2030	47.5	56.7	40.5	5.6	6.9	1.2	2.7

Source: (1) Peak-hour flow rate = 2.28 x retail annual average demand + 1.0 x wholesale maximum-day demand

(2) Storage Needs = Fire flow storage (1 MG) + Equalization Storage (ES)

(3) FDEP Criterion 1: ES equal to 25 percent of the retail maximum-day demand (excludes 3A and 3B/C)

(4) FDEP Criterion 2: ES = (PHD - TPC) x 4 hours

5.4.1. Finished Water Storage Capacity Evaluation

To determine finished water storage capacity expansions, the projected storage needs are compared with the existing useful storage capacity. Currently, the City has 18 MG of total nominal storage capacity, 2 MG in elevated storage tanks in the distribution system, 5 MG in ground storage tanks in the distribution system, and the remaining 11 MG of ground storage on-site at the WTP. Since the City is complying with the Ground Water Rule by conducting triggered coliform monitoring, reservation of storage for disinfection is not required; however, a certain minimum level of water is maintained in the tanks at all times to provide adequate head for the high service pumps and maintain an adequate reserve to handle emergency conditions. A minimum capacity of 10% of each ground storage tank was reserved for this purpose. With a total systemwide storage volume of 18 MG, the useful storage volume is therefore 16.2 MG.

Figure 5-3 illustrates the finished water storage need projections along with the existing useful storage capacities. Comparing the projected storage needs estimated using FDEP Criterion 1 against the total useful range of storage volume in the system indicates that adequate storage is available through the planning horizon – as illustrated in Figure 5-3. Similarly, conservatively comparing the projected storage needs estimated using FDEP Criterion 2 against the remote finished water storage (7 MG total, 6.3 MG assuming that 10% of ground storage is reserved) indicates that adequate storage is available. Therefore, storage capacity expansion will not be required over the planning horizon.

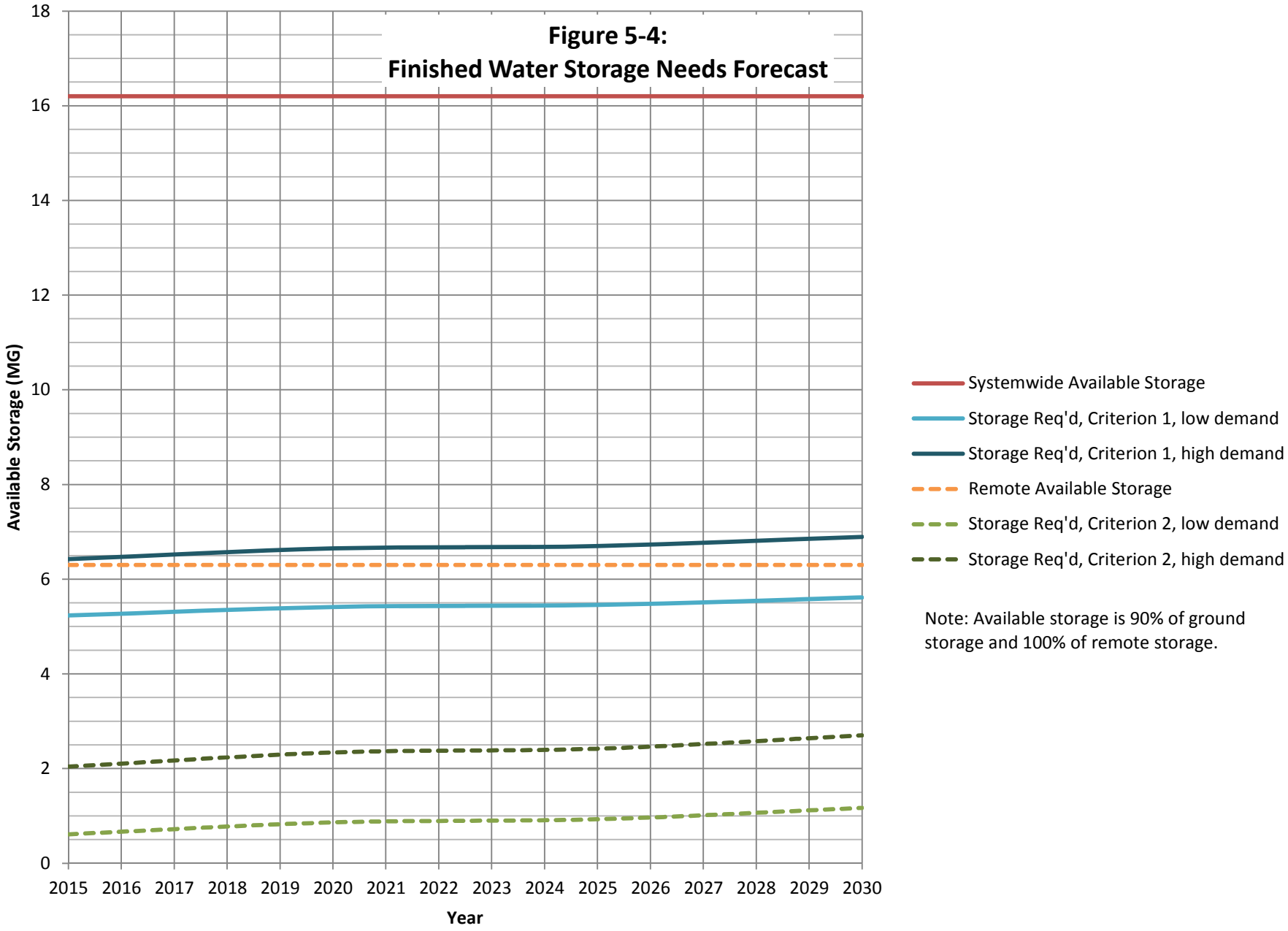


Figure 5-4:
Finished Water Storage Needs Forecast
Available Storage (MG)
0
2
4
6
8
10
12
14
16
18
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
Year
Systemwide Available Storage
Storage Req'd, Criterion 1, low demand
Storage Req'd, Criterion 1, high demand
Remote Available Storage
Storage Req'd, Criterion 2, low demand
Storage Req'd, Criterion 2, high demand
Note: Available storage is 90% of ground storage and 100% of remote storage.

6. Water Supply Capital Improvements

This section identifies the capital improvements required to build all public water supply facilities to serve the existing and new development within the City of Hollywood jurisdiction. The five-year schedule of Capital Improvements for HLWD-DPU is supported by an overview of financial feasibility.

The City's overall FY 2015 – 2019 Capital Improvement Program (CIP) identifies capital improvement projects for the City's DPU that are related to repair and replacement work needed to proactively maintain the level of service for the City's water distribution system. Since the City already has sufficient existing water supply and treatment infrastructure in place, no capital expenditures are required to meet the City's water supply needs over the planning horizon.

6.1. Financial Feasibility

The City of Hollywood has historically supplemented its revenues from impact fees with the following three main funding sources: alternative water supply grants, low-interest state revolving funds (SRFs), and bond proceeds (debt financing). The City anticipates continuing the use of these revenue and funding sources over the next five years as they will be sufficient for the implementation of the Capital Improvement Projects for repair, replacement, and upgrades of existing infrastructure, with no funding being needed for water supply or treatment expansion. The overall financial sufficiency of the City's CIP is demonstrated in the analysis included in the Comprehensive Plan / Capital Improvement Element. Table 6-1 presents the public utilities funding priorities for upgrade, repair and replacement projects over the next five years. It should be noted that water supply rates can be increased by City Commission action, without third party concurrence, to support the issuance of revenue bonds for any projects not funded by other means. However, as of the date of this water supply plan, no rate increases are projected within the CIP's planning horizon.

Table 6-1.
Public Utilities Funding over the Next Five Years

Project Name	Description	Funding Source
Reuse System Infrastructure Expansion	Extension of the reuse distribution system via the installation of pipelines	RRI – Water and Sewer
Water Conservation Phase II	Implementation of water conservation measures included in the limiting conditions of the City's 2008 water use permit	RRI – Water and Sewer
Water Conservation Phase III	Implementation of water conservation measures included in the limiting conditions of the City's 2008 water use permit	RRI – Water and Sewer
Water Distribution Upgrades at the North End of A1A	To improve the volume and pressure of the distribution system via an elevated storage tank or a parallel 15,000 ft., 12-inch pipe along A1A from north dead end down to Dania Beach	RRI – Water and Sewer
Water Main Replacement Program (Level 2)	Replacement of pipelines that have reached their useful lives	RRI – Water and Sewer
Water Main Replacement Program (Level 2)	Replacement of pipelines that have reached their useful lives	RRI – Water and Sewer
Water Main Replacement Program (Level 2)	Replacement of pipelines that have reached their useful lives	RRI – Water and Sewer
Water Main Replacement Program (Level 3)	Replacement of pipelines that have reached their useful lives	RRI – Water and Sewer
Water Main Replacement Program (Level 3)	Replacement of pipelines that have reached their useful lives	RRI – Water and Sewer

Source: City of Hollywood FY 2014 CIP

7. Goals, Objectives, and Policies

This section includes an assessment of current Goals, Objectives, Policies (GOPs) and identifies any new or revised GOPs needed to implement the work plan. For ease of identification, edits are provided in track changes.

7.1 Land Use Element

Goal: Promote a distribution of land uses that will enhance and improve the residential, business, resort, and natural communities while allowing land owners to maximize the use of their property.

Objective 7.0: Achieve consistency with the Broward County Land Use Plan by adopting the following goals, objectives, and policies into the City's Land Use Element, by reference, from other elements of the City's Comprehensive Plan. See Exhibit A at the end of the Land Use Element.

- Policy 7.14: Continue to provide enough potable water for a year-round water supply including the increased utilization of the Floridan Aquifer in addition to the Biscayne Aquifer, thus discouraging an increase in saltwater intrusion.
- Policy 7.15: Coordinate with the SFWMD on any measures they take to decrease the possibility of further salt-water intrusion through their canals.
- Policy 7.16: Cooperate with the SFWMD in enforcing their emergency water conservation measures during droughts.
- Policy 7.20: Continue to address the protection of the functions of natural groundwater recharge areas and natural drainage features.
- Policy 7.21: The City will adopt the minimum design criteria for water management as its level of service per the Drainage sub element of the Utilities element.
- Policy 7.22: The City will continue to adhere to its ongoing annual maintenance program for drainage systems, and will establish priorities for correcting existing deficiencies through its drainage complaint system. Priorities for future facility needs will be based on the City's adopted level of service standards and will be enforced through its concurrency management system.
- Policy 7.23: The City will protect the functions of the natural drainage features by regulating land use to ensure that uses permitted are compatible with adjacent drainage features.
- Policy 7.24: To ensure through coordination with the South Florida Water Management District (SFWMD), the Broward County Water ~~Resources~~ Management Division (W~~R~~MD), and the Broward County Environmental Protection and Growth Management Department ~~Environmental Quality Control Board (EQCB~~EPGMD)

~~(now known as the Office of Natural Resource Protection)~~ in the development review process ~~to ensure~~ that new development is required to provide adequate drainage measures to service itself and to neutralize any deficiencies which would be created by such new development.

- Policy 7.25: Maintain the existing land development regulations requiring new development to provide adequate drainage measures to service itself and to neutralize any deficiencies created by proposed projects.
- Policy 7.26: To continue to address the protection of natural groundwater recharge areas and natural drainage features.
- Policy 7.27: The City will prohibit the use of land ~~uses,~~ which conflicts with the functions of the natural drainage and natural groundwater aquifer recharge areas, and will not permit development in ~~those areas shown as~~ conservation areas.

7.2 Conservation Element

Goal: To maintain, and if possible, encourage better natural environmental quality.

Objective 1.0: Continue to provide enough potable water for a year-round water supply including the increased utilization of the Floridan Aquifer in addition to the Biscayne Aquifer thus discouraging an increase in saltwater intrusion.

- Policy 1.1: Coordinate with the SFWMD on any measures they take to decrease the possibility of further saltwater intrusion through their canals.
- Policy 1.2: Cooperate with the SFWMD in enforcing their emergency water conservation measures during droughts.
- Policy 1.3: Require City parks to use reclaimed water instead of potable water for irrigation. Maintain City golf courses using reclaimed water instead of potable water <u>for irrigation</u>.
- Policy 1.4: Investigate whether or not industrial, office, and commercial uses can also use reclaimed water for watering landscaping.
- Policy 1.5: Investigate whether or not some industries and business<u>es</u> can reuse water in their service or manufacturing processes.
- Policy 1.6: Encourage the use of native instead of exotic plants in landscaping.
- Policy 1.7: The City shall participate in the development of the Regional Water Supply Plan in conjunction with the SFWMD and shall adopt the plan into the Utilities Element of this Plan as required by Florida Statute.

Effectiveness Measures:

(a) Number of meetings with the South Florida Water Management District.
(b) Ground water monitoring for saltwater showing no further intrusion.
(c) Increase in number of water reuse systems.

(d) Decrease in percent of water being used for non-potable uses.

(e) Adoption of Regional Water Supply Plan in the Utilities Element.

Objective 2.0: Continue to encourage the public to participate in the City's Water Conservation Program.

- Policy 2.1: The City shall encourage public participation in the water conservation measures and best management practices presented in the ~~recently completed~~ Water Conservation Plan ~~in~~ dated January 2008. These are provided in the tables below.

Water Conservation Measures

Conserve Florida Water Conservation Measure
Source-Water Metering
Service-Connection Metering
Fixed-Interval Meter Maintenance Program
System Audit
Leak Detection and Repair
Landscape/Irrigation Ordinance
Conservation Rate Structures
Customer Leak Notification
Informative Billing
Water Bill Inserts
Retrofit Kit Giveaway
Public Information/Education
Workshops
Advisory Committee(s)
Reuse Feasibility Study
Customer Surveys
Water Waste Prohibition

Water Conservation Best Management Practices

BMP
Reuse Projects
Water-Efficient Landscape and Irrigation Evaluations
Ultra Low Flush (ULF) Toilet Rebates
Retrofit Kit Giveaways
Water Use Evaluations
Restaurant Rinse Valve Replacement

Objective 3.0: Maintain and if possible, increase the level of ground and surface water quality.

- Policy 3.1: Review ordinances and procedures to ensure that the restrictions dictated by Broward County wellfield protection ordinance are being met and enforced.
- ~~Policy 3.2: Investigate the possibility of adopting a City water protection ordinance that would require uses that generate hazardous waste to locate at an established minimum distance from all surface water by June 2009.~~
- Policy 3.9: Determine the greatest impact on water supply (ground and surface waters) whether point or non-point source pollution, and work to eliminate cause(s). (CWMP Policy CW. 130)

Objective 17: Promote public awareness of natural resources, wildlife habitats, conservation measures, and environmental hazards.

- Policy 17.1: Maintain an information counter in the lobby near the City Commission Chambers.
- Policy 17.2: Obtain information on conservation issues such as water conservation, endangered species and West Lake and distribute the information from the Water Department Counter, the Zoning Counter, and the Information Counter.

7.3 Utilities Element

7.3.1 Drainage Sub Element

Goal: To optimize the utilization of water resources through provision of stormwater management for the City of Hollywood, which reduces damage and inconvenience from flooding, promotes recharge to the Biscayne Aquifer, minimizes degradation of water quality in surface and ground waters, and protects the functions of wetlands in urban areas.

Objective 3.0: Stormwater management facilities shall be designed, constructed and operated in such a manner that conserves potable water resources.

- Policy 3.1: The City shall coordinate with the South Florida Water Management District (SFWMD) to implement applicable portions of the Lower East Coast Regional Water Supply Plan intended to reduce losses of excess stormwater to tide, recharge the surficial aquifer and Water Preserve Areas, or provide additional storage of surface waters.
- Policy 3.3: The City shall address stormwater issues on a watershed (basin) basis as a means of providing cost-effective water quality and water quantity solutions to specific watershed problems.
- Policy 3.4: The City shall develop a basin-wide water management protocol that optimizes flood protection, water quality, stormwater storage, wetlands sustainability, and ground water recharge functions. By assessing the existing surface water management system, wellfield characteristics, groundwater levels, flows, and canal stages, a model will be developed to better utilize the water resource.

- Policy 3.5: The City shall work with Independent Drainage Districts and the SFWMD, and shall investigate application of the basin-wide protocols throughout the City where appropriate.

Objective 4.0: Maintain and protect ground water recharge of the surficial aquifer system so as to maintain all of the functions of the Biscyane Aquifer, including the reduction of saltwater intrusion.

- Policy 4.1: The City shall encourage the use of BMPs in accordance with its regulations and those of the South Florida Water Management District.
- Policy 4.2: The City shall develop an integrated geographic information system inventory of public water supply wellfields to facilitate local and regional planning efforts.
- Policy 4.3: The City of Hollywood in cooperation with the United States Geological Survey (USGS) and SFWMD shall install additional monitoring wells and rehabilitate existing wells to continue monitoring the extent of salt water intrusion into the Biscayne Aquifer.
- Policy 4.4: The City shall work cooperatively with Broward County, the SFWMD, and the independent drainage districts to implement plans for additional surface water storage such as water preserve areas, the Lower East Coast Regional Water Supply Plan and any other plans and operating procedures to increase recharge water to the Biscayne Aquifer.
- Policy 4.5: In order to protect and conserve the Biscayne Aquifer, the City shall continue to utilize the Floridan Aquifer and investigate utilization of other alternate potable water resources to supplement and broaden the future water supplies as addressed in the Lower East Coast Regional Water Supply Plan of the SFWMD.
- Policy 4.6: To utilize, preserve, restore, and enhance natural water bodies and functions by encouraging non-structural and structural erosion control devices and discourage the channelization, installation of seawalls or other alteration of natural rivers, streams and lakes.
- Policy 4.7: Protect the water storage and water quality enhancement functions of wetlands, floodplains, and aquifer recharge areas through acquisition, enforcement of rules, and the application of land and water management practices, which provide for compatible uses.

Policy 4.8: The City will coordinate with Broward County and the SFWMD to protect aquifers from depletion through water conservation and preservation of the functions of high recharge areas including, but not limited to, the water conservation areas and water preserve areas.

7.3.2 Potable Water Sub Element

Goal: Provide residents of the City of Hollywood, and large users a cost-effective and equitable potable water supply system, which provides an adequate supply of water meeting all applicable federal, state and local water quality standards and does not

compromise the sustainability of the county's water resources to supply water in the future.

Objective 1.0: The City of Hollywood shall identify and, where feasible, correct existing potable water facilities deficiencies as necessary.

- Policy 1.1: In the absence of legal constraints on the use of revenues, the City of Hollywood should maintain funding for system improvements identified in the Capital Improvements Element to alleviate potable water deficiencies.
- Policy 1.2: The City of Hollywood shall develop and maintain an inventory of all its potable water facility serving residents, customers, and large users.
- Policy 1.3: Maintain public facilities and areas utilizing preventive measures to avoid deterioration of the public infrastructure. (CWMP Policy CW.31)

Objective 2.0: Potable water facilities shall be provided to meet the City's short-term and long-term future needs.

- Policy 2.1: The level of service (LOS) standard for potable water facilities shall be the Florida Department of Environmental Protection (FDEP) Permitted Capacity of the facility. The LOS standard for water treatment plants shall be measured by maximum daily flow.
- Policy 2.2: The City of Hollywood shall use the information contained to access adequacy of service and concurrency for potential retail customers. For a bulk purchaser of potable water, the City will use the flow information contained in the FDEP permit application to access adequacy of service and concurrency.

Potable Water Demand Rates

Facility Type	Water Use in Gallons per Day
Residential	
Per capita per day (ann. avg. gpcd)	~~122~~ 114 [(a)]
Per single family unit	350 [(b)]
Retail per square foot	0.1 [(b)]
Office space per square foot	0.2 [(b)]
Other non-residential per capita	20 [(b)]

Source: (a) ~~2007 City of Hollywood Water Master Plan~~ Developed in 2014 Water Supply Facilities Work Plan Update
(b) Broward County Health Department, Florida Department of Health.
Note: In the case where the facility type is not listed, then the most suitable one is to be used.

- Policy 2.3: The City shall continue to utilize the development review process of the Broward County Land Development Code to require applicants for development permits to utilize existing potable water facilities if lines are "available" as defined by Chapters 62-550, 62-555, and 62-560, Florida Administrative Code (FAC).
- Policy 2.4: Planning for additional capacity and/or a reduction in per capita demand shall be included in the 10-Year Water Supply Facilities Work Plan as required in Chapter 163 of Florida Statutes to increase the coordination of local land use and future water supply planning.
- Policy 2.5: An assessment of the impacts of the construction and operation of water treatment plants and support services on adjacent natural resources shall be prepared during site review when considering the siting of new water treatment plants and the expansion of, or increase in capacity of, water treatment plants.
- Policy 2.6: Within twelve (12) months after the adoption of the Retail Service Water and Wastewater Master Plan Update, the City of Hollywood shall re-examine the feasibility of amending the potable water facilities LOS standard. The LOS standards that may be considered include treatment plant peak demand capacity, water storage capacity, and water pressure for distribution facilities.
- Policy 2.7: In order to protect and conserve the Biscayne Aquifer, the City of Hollywood shall continue to utilize the Floridan Aquifer and investigate the utilization of alternate water sources to supplement and broaden the City's future water supply sources as described in the 10-Year Water Supply Facilities Work Plan. These potential sources could include the increased use of reclaimed ~~waste~~water, improved methods of conservation, Aquifer Storage and Recovery (ASR), improved operations to increase stormwater reuse and aquifer recharge by improvements to the secondary canal infrastructure, and other technologies, which may be addressed in the Lower East Coast Regional Water Supply Plan of the South Florida Water Management District (SFWMD).
- Policy 2.8: The City shall encourage maximizing the use of existing potable water facilities and reducing redundant facilities.
- Policy 2.9: The City shall promote the implementation of an integrated geographic information system in order to make available standardized land use and potable water supply facilities information for local and regional planning.
- Policy 2.10: The City shall ensure adequate water supplies are available to serve the new development no later than the anticipated date of issuance of a certificate of occupancy or its functional equivalent.
- Policy 2.11: Prior to approval of a building permit, the City shall consult with the appropriate water supplier(s) to determine whether adequate water supplies to serve the new development will be available no later than the anticipated date of issuance of a certificate of occupancy.

Objective 3.0: Maximize the use of existing potable water facilities and encourage compact urban growth patterns.

- Policy 3.1: The City of Hollywood shall continue to coordinate the provision of potable water through agreements with the municipalities serviced by the City of Hollywood.
- Policy 3.2: The City of Hollywood shall recommend the denial of future land use map amendments where densities or intensities are increased if:

1. Potable water facilities are not available and a consumptive use permit for the FDEP Permitted Capacity from the SFWMD has not been issued; and
2. Plans to extend potable water facilities so that they become available are not included within a financially feasible capital improvements program and/or there is not a reasonable expectation that the consumptive use permit will be issued.

- Policy 3.3: As an alternative to new potable water facility construction, the City of Hollywood shall identify opportunities to increase the efficiency and optimize the use of existing facilities.
- Policy 3.4: The City of Hollywood shall encourage the use of coordinated regulatory and programmatic approaches and financial incentives to promote compact, efficient urban growth patterns.

Objective 4.0: Conserve and protect potable water resources with primary focus on the Biscayne Aquifer by optimizing the utilization of water resources through effective water management practices.

- Policy 4.1: The City of Hollywood shall develop a basin-wide water management protocol that optimizes flood protection, water quality, stormwater storage, wetlands sustainability, and groundwater recharge functions while protecting groundwater from saltwater intrusion. By assessing the existing surface water management system, wellfield characteristics, groundwater levels, saltwater intrusion limits, flows and canal stages a model will be developed to better utilize the water resource.
- Policy 4.2: The City of Hollywood shall continue to coordinate with the independent Drainage Districts and the SFWMD to investigate application of the basin-wide protocols throughout the county where appropriate.
- Policy 4.3: The City of Hollywood will cooperate with Broward County to develop a plan to maintain the Centralized Wellfield System to protect and maximize the raw water supply while protecting the Biscayne Aquifer from further saltwater intrusion.
- Policy 4.4: The City of Hollywood and Broward County shall continue to maintain Chapter 36, "Water Resources and Management," Article II, "Water Emergencies," Section 35-55, "Restrictions on Landscape Irrigation," Broward County Code of Ordinances, which imposes year-round, county-wide landscape irrigation restrictions.
- Policy 4.5: The City shall enforce the landscape regulations, which include zoning, functional landscaping, and xeriscaping ordinances. The City will also address the SFWMD's xeriscaping guidelines.

  The Broward County Board of Rules and Appeals has approved the standards for ultra-low plumbing fixtures at 80 psi~~, effective September 1, 1992 in Broward County.~~

Table
Plumbing Standards
Fixture Flow Rate

Fixture	Flow Rate
Toilet	1.6 gal/flush
Shower Heads	2.5 gal/minute
Faucets	2.0 gal/minute

- Policy 4.6: The City shall continue to implement its conservation-oriented rate structure within its utility systems.
- Policy 4.7: The City shall continue to implement a leak detection program to reduce the amount of non-revenue water ~~unaccounted-for water loss~~ within its utility systems.
- Policy 4.8: The City of Hollywood shall continue to implement a year-round public information and education program promoting water conservation.
- Policy 4.9: The City of Hollywood will gather a comprehensive water use profile for service area customers including demographic data, customer class, land use, rate profiles, usage patterns and seasonal variations to increase the effectiveness of conservation efforts by focusing methods on those elements with the greatest water saving potential. Using the data generated, the City of Hollywood will expand and/or implement those programs that promote conservation of water resources. In addition, the City shall expand and continue to implement programs that promote conservation of water resources through efforts such as plumbing retrofit, toilet rebates, water use audits, installation of rain sensors, promotion of xeriscape and landscape Best Management Practices (BMPs), and education as applicable.
- Policy 4.10: The City shall reduce the potential groundwater pollution sources by continuing to implement the Water and Sewer Connection Ordinances.
- Policy 4.11: The City shall continue~~Continue~~ to eliminate causes of pollution to water supply (CWMP Policy CW.130)
- Policy 4.12: The City of Hollywood shall continue to protect the groundwater supply from potential sources of contamination pursuant "Water and Sewers" along with Water and Septic Tank Ordinance.
- Policy 4.13: The City of Hollywood shall protect groundwater quality by continuing to implement Wellfield Protection Ordinance, which regulates the storage, handling, usage, disposal, or production of hazardous materials and solid waste within designated zones of influence as identified in the Code.

Objective 5.0: Potable water facilities shall be designed, constructed, maintained and operated in such a manner as to protect the functions of natural groundwater recharge areas and natural drainage features and not exacerbate saltwater intrusion.

Policy 5.1: The design for the construction, operation, and maintenance, of new or expanded potable water facilities shall consider the short-term and long-term impacts to natural groundwater recharge areas, wetlands, surface and groundwater levels, and exacerbation of saltwater intrusion. The design shall also consider whether or not the construction, operation, and maintenance will significantly harm the aquifer system. Adverse impacts of construction, operation, and maintenance shall be avoided or at least minimized.

Objective 6: Provide the customers and large users of the City of Hollywood cost effective, equitable and adequate potable water system meeting all applicable federal, state and local standards.

- Policy 6.1: The City of Hollywood shall endeavor to provide service to residents, customers, as well as those municipalities having agreements with the City of Hollywood, when service is not anticipated to be provided by others.
- Policy 6.2: The City of Hollywood shall continue to coordinate the provision of potable water services through agreements with municipalities and other service providers in Broward County.
- Policy 6.3: In order to protect and conserve the Biscayne Aquifer, the City of Hollywood shall continue to utilize the Floridan Aquifer and investigate utilization of other alternate potable water supply sources to supplement and broaden future water supply sources. These other potential sources could include ASR, desalination, capture and storage of excess storm water currently lost to tide and other technologies, which may be addressed in the SFWMD's Lower East Coast Regional Water Supply Plan.
- Policy 6.4: Consistent with bonding requirements, the City of Hollywood will take no action by which the rights and benefits of its customers might be impaired or diminished.

Objective 7: With the treatment capacity serviceable by the Reclaimed Water System, expand the reclaimed water system to replace current systems using potable water for irrigation in the public right-of-way and other public facilities. Investigate possible expansion of treatment capacity of the reclaimed water system.

- Policy 7.1: Design large private projects to include reclaimed water. (CWMP Policy CW.34).
- Policy 7.2: Investigate the feasibility of installing reclaimed water for the irrigation system on US 441/SR7 project. (CWMP Policy 1.19)

7.4 Capital Improvements Element

Goal: To undertake actions necessary to adequately provide needed public facilities to all residents within the jurisdiction of the City of Hollywood in a manner which protects investments in existing facilities, and promotes orderly compact urban growth.

Objective 1: Create a 5-year schedule of Capital Improvements, which will be coordinated with land use decisions, and which will ensure that the adopted level of service standards will be maintained through the correction of deficiencies and the provision of capital facilities to meet the needs of future growth.

- Policy 1.6: Proposed capital improvement projects shall be evaluated and ranked in order of priority according to the following guidelines:

    (a) Whether the project is needed to protect public health and safety, to fulfill the City's legal commitment to provide facilities and services, or to preserve or achieve full use of existing facilities.

    (b) Whether the project increases efficiency of use of existing facilities, prevents or reduces future improvement cost, provides service to developed areas lacking full service, or promotes infill development.

    (c) The City Manager shall coordinate the evaluating and ranking in order of priority projections proposed for inclusion in the Schedule of Improvements based on demand anticipated for future growth, facility life expectancy, elimination of blight, correction of deficiencies in service.

    (d) Whether the project implements the policies of the Comprehensive Plan.

- Policy 1.7: The Schedule of Capital Improvements shall be updated on an annual basis.

Objective 4: The City will manage its fiscal resources to ensure the provision of needed capital improvements for previously issued development orders and for future development and redevelopment.

- Policy 4.1: Prior to the issuance of Certificates of Occupancy, the City shall require the provision of all needed public facilities.
- Policy 4.2: In providing capital improvements, the City shall limit the maximum ratio of outstanding general obligation indebtedness to no greater than 15% of the property tax base.
- Policy 4.3: The City shall continue to adopt a capital improvements program and annual capital budget as part of its budgeting process.
- Policy 4.4: Efforts shall be made to secure grants or private funds whenever available to finance the provision of capital improvements.

Objective 5: The City will implement a Concurrence Management System so that decisions regarding the issuance of development orders and permits will be based upon coordination of the development requirements included in this plan, the land development

regulations, and the availability of necessary public facilities to support such development at the time needed.

- Policy 5.1: Water Service

  The level of service (LOS) standard for potable water facilities shall be the Florida Department of Environmental Protection Permitted Capacity of the facility. The LOS standard for water treatment plants shall be measured by maximum daily flow.

  The City of Hollywood shall use the information contained to access adequacy of service and concurrency for potential retail customers. For a bulk purchaser of potable water, the City will use the flow information contained in the FDEP permit application to access adequacy of rates and concurrency.

Potable Water Demand Rates

Facility Type	Water Use in Gallons per Day
Residential	
Per capita per day (ann. avg. gpcd)	~~122~~ 114[(a)]
Per single family unit	350 [(b)]
Retail per square foot	0.1 [(b)]
Office space per square foot	0.2 [(b)]
Other non-residential per capita	20 [(b)]

Source: (a) ~~2007 City of Hollywood Water Master Plan~~ Developed in 2014 Water Supply Facilities Work Plan Update
(b) Broward County Health Department, Florida Department of Health.
Note: In the case where the facility type is not listed, then the most suitable one is to be used.

- Policy 5.2: The City shall require that, at the time a development permit is issued, adequate facility capacity is available or will be available when needed to serve the development.

  The City shall follow the timing requirements to ensure that adequate public facilities are available to meet level of service standards with the impact of development.

  (a) Sanitary sewer, solid waste, drainage, adequate water supplies, and potable water facilities shall be in place and available to serve new development no later than the issuance by the local government of a certificate of occupancy or its functional equivalent. Prior to approval of a building permit or its functional

equivalent, the City shall determine whether adequate water supplies to serve the new development will be available no later than the anticipated date of issuance by the City of a certificate of occupancy or its functional equivalent.

- Policy 5.3: Proposed plan amendments and requests for new development or redevelopment shall be evaluated according to the following guidelines to whether the proposed action would:

  (a) Be consistent with the Sanitary Sewer, Solid Waste, Drainage, Potable Water, and Natural Groundwater Recharge Element; and Coastal Management Element and not contribute to a condition of public hazard.

  (b) Be consistent with the Transportation Element; Sanitary Sewer, Solid Waste, Drainage, Potable Water, and Natural Groundwater Recharge Element; and Recreation and Open Space Element and not exacerbate any existing condition of public facility capacity deficits.

  (c) Generate public facility demands that may be accommodated by planned capacity increases.

  (d) Conform with future land uses as shown on the future land use map of the Future Land Use Element; and service areas as described in the Sanitary Sewer, Solid Waste, Drainage, Potable Water, and Natural Groundwater Recharge Element.

  (e) Accommodate public facility demands based upon LOS standards by provision of facilities by the developer or by the City consistent with this element.

  (f) Be consistent with state agencies' and water management districts' facilities plans.

7.5 Intergovernmental Coordination Element

Goal: To enhance existing intergovernmental coordination mechanisms, and to create new opportunities for cooperation among state, regional, and local government entities in the provision of services and the management of future development.

Objective 3: To coordinate level of service standards with state, regional, and local government entities having responsibility for the operation and maintenance of those facilities.

- Policy 3.10: The City will coordinate its Capital Improvements Schedule with the schedules of adjacent municipalities and other providers of public facilities within or adjacent to the City in order to establish a potential coordination of efforts relating to the maintenance and extension of existing and location of new public facilities subject to concurrency.
- Policy 3.11: The City will annually review the five-year Capital Improvements Plan for consistency with the Comprehensive Plan to address potential impacts or conflicts.

- Policy 3.12: The City will pursue joint funding opportunities with the SFWMD, FPEP, Broward County, FDOT, and surrounding municipalities to insure utilization of joint processes and collaborative planning efforts, when feasible to complete capital improvements.
- Policy 3.18 The City shall coordinate with the South Florida Water Management District and the Lower East Coast Water Supply Plan on alternate water supply planning.
- Policy 3.20 The City in cooperation with the appropriate federal, state, county, and other local governmental agencies, shall encourage the appropriate coordinated level of service facilities and services.
    - Monitoring and Evaluation: The City shall annually review the level of service (LOS) standards utilized by public agencies in their planning activities to ensure consistency.
- Policy 3.21 The City shall ensure and identify the consistency of local level of service standards by annually contacting all local governments in which water service is provided to obtain current information, including populations, level of services, service areas, and water supply facilities, and evaluate if future modification to either the service agreement or level of service standards should be included in subsequent Comprehensive Plan Amendments.
- Policy 3.22 The City shall negotiate or renew interlocal agreements with local governments in which water is supplied, ensuring, contractual agreement of the adopted level of service standards, service area, populations and time periods for services provided.
- Policy 3.23 The City shall review the level of service standards adopted or amended by all adjacent local governments that receive water from the City.

Objective 4:

Public Agency Coordination: The City shall coordinate the Comprehensive Plan and its implementation with the State, the South Florida Regional Planning Council, Broward County and adjacent cities, as well as the Broward County School District, the South Florida Water Management District, and the special districts, through the duration of this plan.

Monitoring and Evaluation: The City shall maintain a record of City staff attendance and participation in appropriate intergovernmental and/or multi-jurisdictional coordination efforts (i.e. meetings, workshops, committees, agreements, etc). This objective shall also be made measurable by its implementing policies.

- Policy 4.1 The City shall provide immediate and ongoing coordination with the SFWMD to ensure that the City's plans, requirements, and related actions contained in the 10-Year Water Supply Facilities Work Plan are consistent with the Lower East Coast Water Supply Plan.

- Policy 4.2 The City shall provide the SFWMD with annual reports on the status of the development of all alternative water supply projects in accordance with limiting condition #30 of Water Use Permit 06-00038-W and the provisions of Section 373.0361(7)(b) F.S. The annual report shall include work completed to date, expenditures, capacities, and any changes in timelines. Where appropriate and feasible, the annual reports shall include ongoing collaborative approaches with other local governments for long term alternative water supply source use and water treatment technology.
- Policy 4.3 The City shall submit Water Use Compliance reports to the SFWMD for review and approval by the District Staff every five years from April 10, 2008 (date of permit issuance) in accordance with Limiting condition #23 of Water Use Permit 06-00038-W.
- Policy 4.4 The City shall submit unaccounted-for water loss reports to the SFWMD every year from April 10, 2008 (date of permit issuance) in accordance with Limiting condition #20 of Water Use Permit 06-00038-W.
- Policy 4.5 The City shall notify the SFWMD within 30 days of any change in service area boundary in accordance with Limiting condition #19 of Water Use Permit 06-00038-W.
- Policy 4.6 The City will hold annual meetings with local governments in the City's Water Service Area and the SFWMD to discuss forecasted populations, service area expansions, review land use changes that increase water supply demand, and review the implementation of all alternative water supplies.
- Policy 4.7 The City shall continue to provide utility services to governments with which the City has executed agreements and will continue to exchange information with surrounding local governments regarding relative items that affect the standing for such service agreements.
- Policy 4.8: The City shall participate in the development of the Lower East Coast Water Supply Plan Update. The City shall adopt a 10-year water supply facility work plan into their comprehensive plan within 18 months after the South Florida Water Management District approves the Lower East Coast Water Supply Plan Update in accordance with Chapter 163.3177(6)(c), F.S.

Appendix A: Broward County 2014 Water Supply Facilities Work Plan Update

BROWARD COUNTY
WATER SUPPLY FACILITIES
WORK PLAN

November 24, 2014

BOARD OF COUNTY COMMISSIONERS

Environmental Protection and Growth Management Department

Broward County Water & Wastewater Services

Table of Contents 1

Executive Summary

The Broward County government has always been an active participant in the Lower East Coast (LEC) water supply planning process and embraces the opportunity to proactively plan for improved water resource management. The County recognizes that increasing water demands of a growing population base will require further development of conservation programs, alternative water sources and proactive planning policies that incorporate climate impacts if we are to ensure sustainable water supplies and a climate resilient community.

As the second most populated county within the State of Florida, Broward County, with a population that is projected to increase almost fifteen (15%) percent between 2012 and 2040.

The predominant potable water source to support this population growth is the Surficial Aquifer System (SAS) in the southeastern Florida peninsula. The Biscayne Aquifer, which is part of the SAS, is one of the most productive aquifers in the world. Hydrologic analyses indicate that roughly two-thirds of the water in the aquifer underlying urban Broward County is the result of rainfall infiltration, the remaining one-third is from lateral seepage from the Everglades. These recharge characteristics, influenced by the region's unique geology, create water supply advantages as well as vulnerabilities for the entire region. The impacts from climate change, including increased frequency, severity of droughts, and increased sea level rise will constrain existing wellfields and challenge water resource planning, management and infrastructure protection for all communities in the LEC region. This is especially true in Broward County, where sea level rise is documented to have substantially accelerated the rate of saltwater intrusion of the coastal aquifer and where as much as 40% of the coastal wellfield's capacity is considered vulnerable to saltwater contamination. Therefore, it is imperative that local governments, including Broward County, begin to formalize the integration of water supply and climate change considerations as part of their coordinated, long-term planning efforts. This includes updating the Water Supply Facilities Work Plans and enhancing the Goals, Objectives and Policies (GOPs) of related comprehensive plan elements to ensure sustainable growth for the future. The updating of the GOPs are a critical planning tool since the goals provide the broad vision of the community's path forward while the objectives include the measurable steps and policies outline specific activities or programs needed to meet the goals.

The Broward County's Environmental Protection and Growth Management Department (EPGMD) and the Broward County Water and Wastewater Services (BCWWS) have partnered to update the required data and analysis necessary to meet the water concurrency requirements in Chapter 163, Florida Statute (F.S.). Included in this effort is an analysis of water demand projections, supplies within the utility's service areas, and an update to the related comprehensive planning elements focused on climate change considerations needed to improve the resilience of our communities.

The County's Planning and Redevelopment Division provides population data and demographic information for all local water utilities and in support of the County's own assessment, based on the University of Florida Bureau of Economic and Business Research (BEBR). A notable recent change for Broward is the use of the BEBR data in the County's 2014 Traffic Analysis Zones (TAZ) and Municipal Forecasts Update Model. This model has been used to coordinate and update for all the TAZs and population forecasts across the County. The model forecasts the county-wide populations growing from 1,748,066 (2010) to 1,982,466 (2040) which positions Broward County between Miami-Dade and Palm Beach County as the three most populous counties in the State.[1]

Concurrent with this growth, Broward County's water utility finished water demands are projected to increase by 6 million gallons per day (MGD) from approximately 42 MGD to 48 MGD by 2040. While the county-wide demands are associated with this growth, they will be assessed through each community's own required water supply plans. The preliminary assessment from the 2013 LEC Regional Water Supply Plan Update forecasts an increase in the finished water demand of approximately 40 MGD, over the same period (2010 baseline data).

While the analyses in this Work Plan demonstrate that the County's Water and Wastewater Services facilities provide adequate infrastructure capacity and water supply allocations to meet water demands through 2040, there are also important long-term strategies in place to meet the County's urban and natural system water resource needs. The County's Environmental Planning and Community Resilience Division (EPCRD) has developed and proactively implements, a county-wide Integrated Water Resources Plan (IWRP) that provides long-term strategies to meet the County's urban and natural system water resource needs. Broward's IWRP coordinates water resource management and supports alternative water supply and water resource development projects through collaborations and advancement of diverse policy and projects. This is in support of sustainable and effective water resource management that extends across regional boundaries.

1.0 INTRODUCTION

Broward County is located on the southeastern coast of Florida and is surrounded by the Atlantic Ocean to the east, Miami-Dade County to the south, Collier County to the west and Palm Beach County to the north (**Figure 1.0**). This Broward County Water Supply Facilities Work Plan, 2014 (2014 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 Work Plans into their comprehensive plans within 18 months after the South Florida Water Management District (District) approves a regional water supply plan or its update. The 2013 Lower East Coast (LEC) Water Supply Plan (LECWSP) was adopted by the District's Governing Board on September 12, 2013. Therefore, local governments within the LEC Region are required to amend their comprehensive plans and include an updated Water Supply Facilities Work Plan and related planning elements by March 12, 2015.

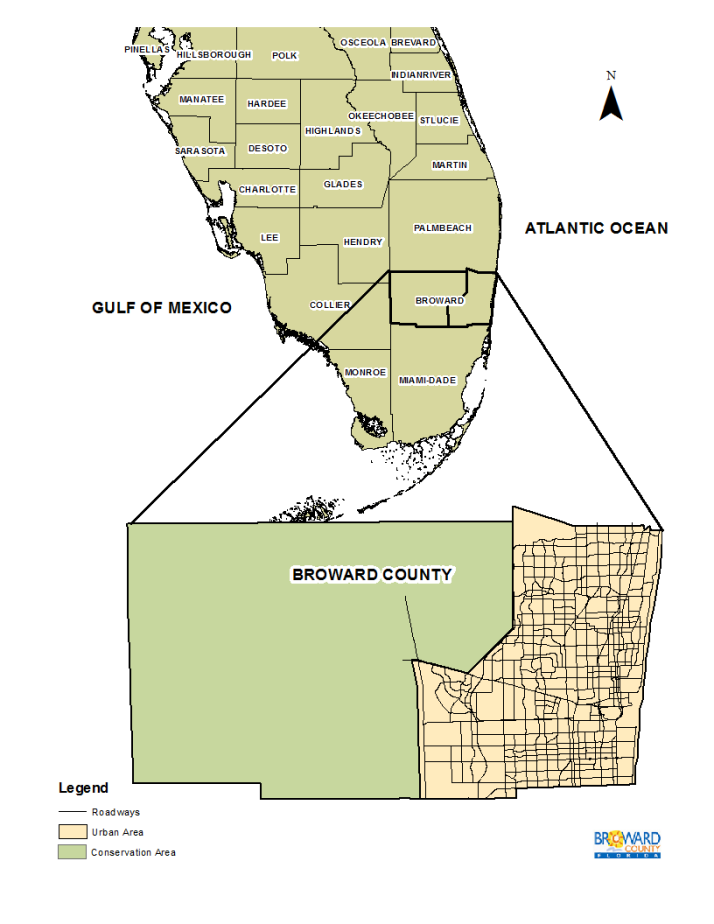


Figure 1.0: Broward County

These state guidelines require that the Water Supply Facility Work Plan 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 to the LECWSP Update and the updated comprehensive plan amendments.

The Broward County 2014 Work Plan is divided into seven sections:

Section 1 – Introduction
Section 2 – Regional Issues
Section 3 – Broward County
Section 4 – Data and Analysis
Section 5 – Special Recommendations and Actions
Section 6 – Capital Improvements
Section 7 – Goals, Objectives, and Policies

1.1 STATUTORY HISTORY

The Florida Legislature enacted bills in the 2002, 2004, 2005, and 2011 sessions to address the state's water supply needs. These bills, in particular 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

Broward County has considered the following statutory provisions in updates to this 2014 Work Plan.

1. The County Work Plan addresses the water supply sources necessary to meet and achieve the existing and projected water use demand for the established planning period, considering the 2013 LECWSP Update [Section 163.3167(9), F.S.].
2. Coordination of the appropriate aspects of the County's Comprehensive Planning Elements with the 2013 LECWSP Update [Section 163.3177(4) (a), F.S.].
3. Assurance that future land use planning and proposed Future Land Use Map amendments are based upon availability of adequate water supplies, public facilities and services [Section163.3177 (6) (a), F.S.].
4. Demonstration that the data and analysis adequately address water supplies and associated public facilities necessary to meet projected growth demands [Section 163.3177 (6) (a), F.S.].
5. Revision of 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 [Section 163.3177(3)(a)4, F.S.].

6. Revision of the related comprehensive planning elements within 18 months after the water management district's update of the 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 2013 LECWSP, or alternative project(s) proposed by the local government under Section 373.709(8)(b), F.S. [Section 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 2013 LECWSP Update [Section 163.3177(6)(c)3, F.S.]; and
    c. update the 2014 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 [Section 163.3177(6)(c)3, F.S.].
7. Maintenance of internal consistency and revision of the Conservation Element to assess projected water needs and sources for at least a 10-year planning period, considering the 2103 LEC WSP as well as applicable consumptive use permit(s) [Section163.3177 (6) (d), F.S.].
8. Assurance 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 through consultation with the applicable water supplier [Section163.3180 (2), FS].
9. Recommendations from the Broward County 2013 Evaluation and Appraisal Report in the identification of alternative water supply projects, traditional water supply projects, and conservation and reuse programs needed to meet local water use demands [Section163.3191 (3), F.S.].

2.0 REGIONAL ISSUES

The regional issues impacting Broward County include:

1. Integrating climate impacts and water resources planning;
2. Everglades protection and Minimum Flows and Levels (MFLs);
3. Surficial Aquifer System and limited water availability; and
4. 2008 Ocean Outfall Program and reclaimed water options.

2.1 CLIMATE IMPACTS

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, increases in tidal and storm-related flooding, and the loss of coastal wellfield capacity due to saltwater contamination. In the absence of proactive planning, these impacts will present liabilities for coastal and inland communities with implications for urban water supplies, water and wastewater infrastructure, and both regional and local drainage/flood control systems.

Broward County, together with its municipal and regional partners, understands that it is imperative that local governments and water utilities begin to formalize the integration of water supply and climate change considerations as part of coordinated planning efforts and work to provide relevant updates the Water Supply Facilities Work Plan and enhance Goals, Objectives and Policies (GOPs) of its comprehensive plan.

Key considerations for communities within the Southeast Florida planning areas include: 1) sea level rise, 2) saltwater intrusion, 3) extreme weather, and 4) infrastructure investments to support diversification and sustainability of water supply sources, and adaptive stormwater and wastewater systems.

2.1.1 Sea Level Rise

Sea level rise has significant implications for water management and water supply planning in southeast Florida, the rate of which is accelerating. During the previous century, the global rate of sea level rise averaged approximately 1.6 mm per year. The rate of rise increased to an average of 1.7 mm per year during the second half of the last century, followed by a more significant increase to 3.3 mm per year measured during the last decade. This trend of rising sea level is reinforced by local tide data which documents an increase in regional sea level of about 9 inches during the last 100 years. While there continues to be uncertainty about the overall extent of sea level rise that might be realized in the coming century, the Third National Climate Assessment (NCA) report presents a probable range of 1 to 4 feet by 2100. In southeast Florida, partner counties in the Southeast Florida Regional Climate Change Compact, inclusive

of Broward, Palm Beach, Miami-Dade and Monroe Counties, have collectively agreed to use modified guidance developed by the U.S. Army Corps of Engineers and a planning scenario of 9 to 24 inches additional sea level rise by 2060, consistent with projections presented in the 2014 NCA (**Figure 2.0**). This unified sea level rise projection has been formally adopted by Palm Beach, Broward, Miami-Dade and Monroe Counties and is now being used to inform planning processes and project design throughout the region. As the impacts of historic sea level rise are already being realized and acceleration of the rate of rise is expected to compound local impacts and vulnerabilities, it is prudent that planning processes begin to formally reflect consideration of sea level rise as a future condition with recognized implications for near-term and longer-term planning decisions.

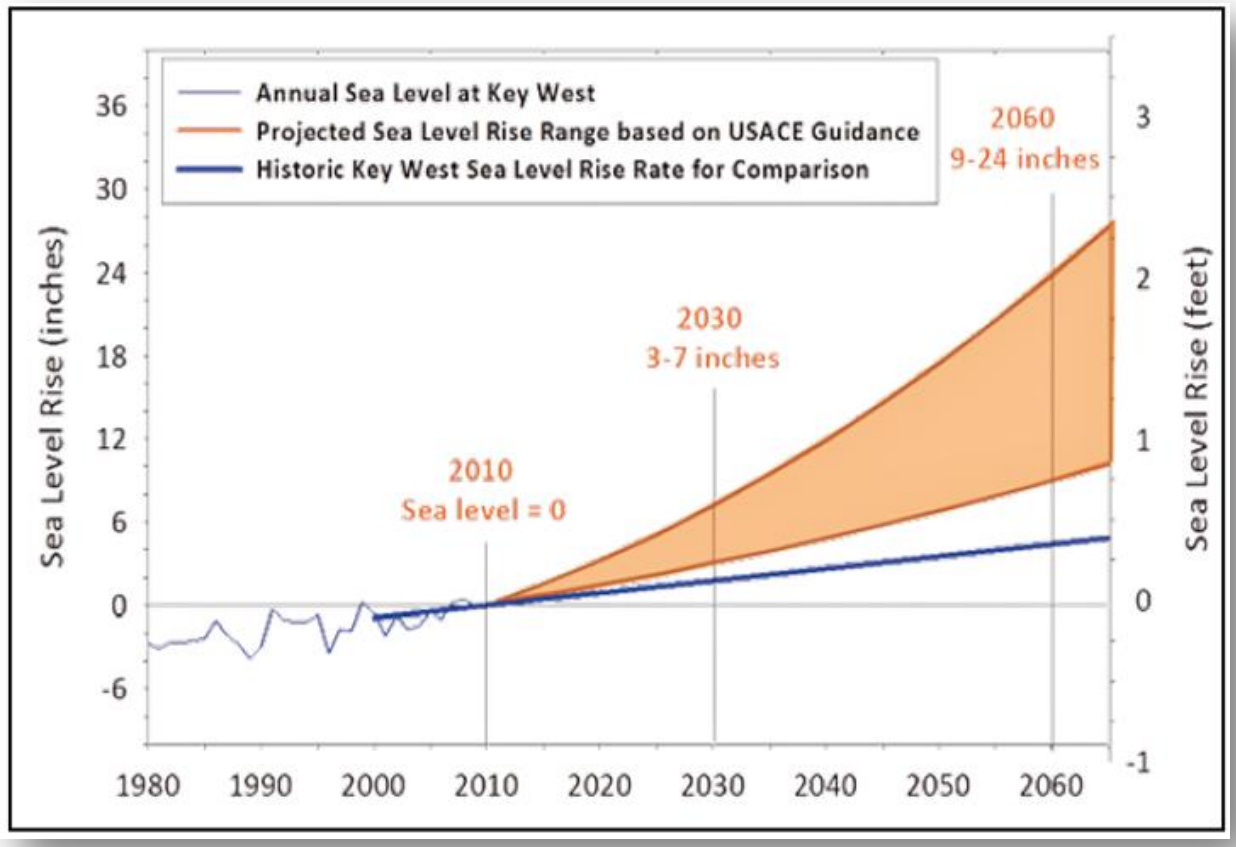


Figure 2.0: Florida Regional Climate Change Compact Adopted Sea Level Rise Projection

Sea level rise produces varied challenges with the respect to water resources sustainability, water management, and water/wastewater facilities and infrastructure. Impacts include salt water contamination of coastal wellfields, infiltration of groundwater with chloride levels into wastewater collection systems, impairing normal operations and maintenance as well as opportunities for beneficial use of reclaimed water as an alternative water supply. Water management systems are also at risk with systems constrained by rising groundwater and tail water elevations which reduce soil storage

and discharge capacity, with increased potential for both inland and coastal flooding and less opportunity for long-term storage of stormwater for beneficial reuse.

These realities necessitate consideration of plans and investments that may be needed to compensate for loss of existing water supplies through relocation of wellfields and the development of alternative water supplies while also seeking opportunities to expand regional water storage opportunities. These investments and considerations are in addition to concurrency planning for population growth and water demands that are typical requirements for water supply planning.

2.1.2 Saltwater Intrusion

Along the coast of southeast Florida, and several miles inland, groundwater supplies and potable wells are vulnerable to saltwater contamination. The Biscayne Aquifer which serves as the region's primary water supply is a shallow, surficial aquifer characterized by limestone karst geology which is highly porous, and transmissive. As a result, coastal saltwater intrusion of the aquifer has begun to restrict coastal water supplies and necessitated the development of western wellfields, changes in wellfield in water management operations, and investments in reclaimed water projects to enhance aquifer recharge. 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.

While impacts and planning efforts have historically focused on the most at risk utilities and wellfields, the accelerated rate of sea level rise and advancements in modeling and planning tools provide support and justification for a more holistic review of anticipated trends and necessary responses on both a local and regional scale.

As early as the 2000 Lower East Coast Water Supply Plan, these impacted water supply entities were classified as:

- Utilities at Risk- Utilities with wellfields near the saltwater interface that do not have an inland wellfield, have not developed adequate alternative sources of water, and have limited ability to meet user needs through interconnects with other utilities; and

- Utilities of Concern - Utilities having wellfields near the saltwater interface, the ability to shift pumpages to an inland wellfield, or an alternative source that is not impacted by the drought.

Technical assessments have further identified changes in land use, drainage of the Everglades, wellfield operations, and sea level rise as contributing factors to the historical movement and current location of the saltwater front within the productive layer of the aquifer.

Hydrologic modeling has revealed that sea level rise when combined with coastal wellfield pumping has accelerated the movement of the front, doubling the rate at which the front has progressed during the last several decades at certain locations. It is expected that sea level rise will constitute an increasingly significant influence on the

rate of saltwater migration during the decades to come and that critical wellfield capacity will be lost with an additional 2 foot increase in sea level, the extent of which will vary along the coast. Conditions will be further influenced by temporal hydrologic conditions and responses in water management operations. It is therefore prudent for water utilities throughout the region (both inland and coastal) to consider adaptation plans that might include wellfield relocation or expansion of western wellfields as part of planned efforts to meet shared regional water demands. Continuation of groundwater monitoring and modeling efforts will be critical to predicting the movement of the front under sea level rise scenarios anticipated over the next several decades and adaptation efforts should continue to be refined in accordance with predicted and realized trends.

Regional and local data will be important in informing decision-making. The mapping of the saltwater intrusion front is supported by local governments throughout the region, the United States Geologic Survey (USGS), and the South Florida Water Management District (SFWMD). The current Saltwater Intrusion Line for Broward County (**Figure 2.1**) is anticipated to be updated in August, 2014.

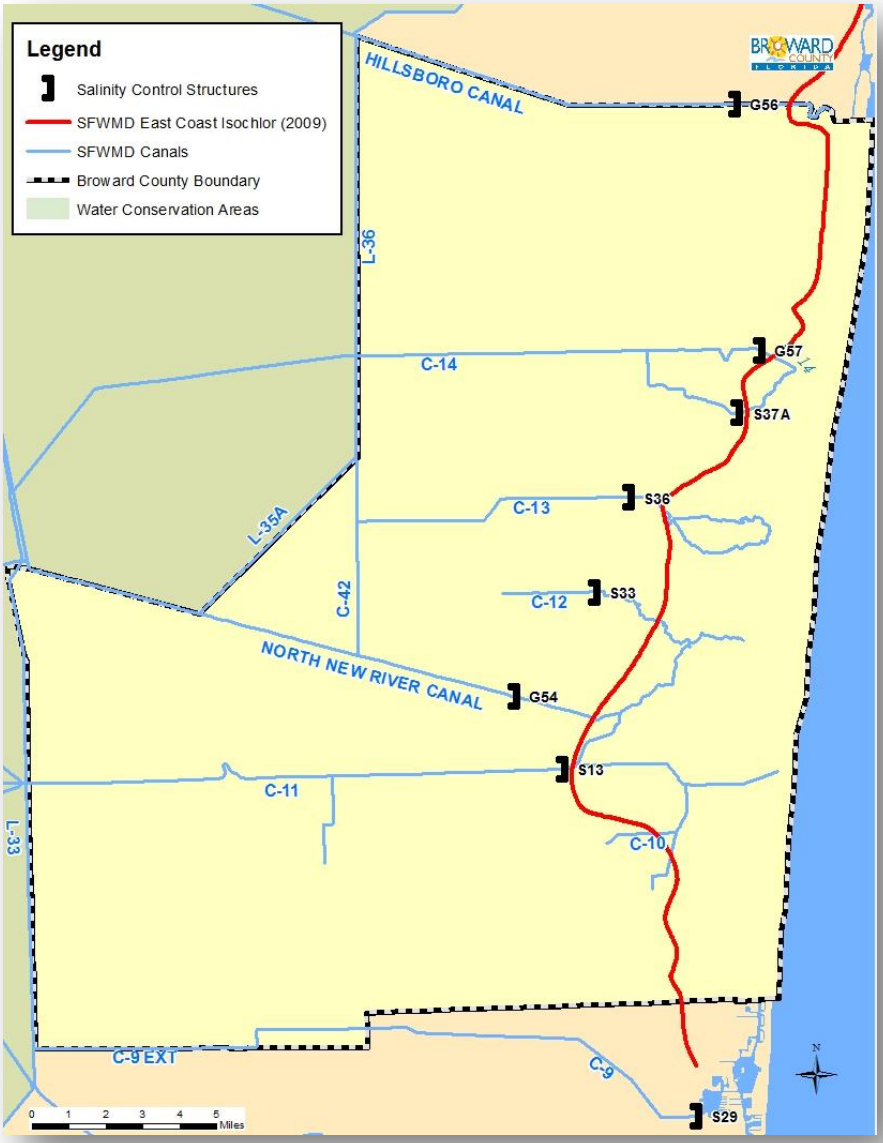


Figure 2.1: Saltwater Intrusion Line, Broward County, 2013

2.1.3 Extreme Weather Events

As extreme events increase in frequency and severity, 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 impacts. Conversely, more intense rainfall will cause flooding, increased runoff, impacts to the natural systems and provide less 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.

2.1.4 Infrastructure Development

With increasing climate disruptions there is a need to diversify water supply sources, improve treatment technologies and to support the development of adaptive stormwater and wastewater infrastructure design criteria to ensure long-term sustainability of key facilities. Conversely, alternative water treatment technologies generally have a high energy demand and carbon footprint that can exacerbate climate change impacts. Strategic infrastructure planning should incorporate these constraints and work within with the Goals, Objectives, and Policies of the Comprehensive Planning process and 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 flooding, for even mild storm events. 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: regional water storage such as the C-51 Reservoir; ASR; the development and use of highly treated wastewater (reverse osmosis) for recharge as hydrodynamic barriers; the relocation and/or regionalization of wellfields and treatment facilities away from low-lying areas; and enhancing operational flexibility.

2.2 EVERGLADES & LAKE OKEECHOBEE MINIMUM FLOWS AND LEVELS (MFLS)

The Minimum Flows and Levels outlined in the Florida State Statutes are defined as the “limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area” (Section 373.042(1), F.S.). They serve to protect the SAS from

saltwater intrusion, ensure adequate groundwater levels for maintenance of natural systems, and prevent excessive groundwater seepage or surface water flows from the regional (Everglades) system.

As part of the establishment of MFLs, the regional water management district must determine whether the existing flow or level in the water body is below or projected to fall below the MFL criteria within the next 20 years. If so, then the District must develop a recovery or prevention strategy and when appropriate, include development of additional water supplies, water conservation, and other efficiency measures consistent with the provisions in Sections 373.0421 and 373.709, F.S. and provide the information and timelines for these strategies within the regional water supply plans. The 2005-6 Lower East Coast Water Supply Plan Update (2005-6 LECWSP) had included the Everglades MFL and identified key water resource development projects in the Comprehensive Everglades Restoration Plan (CERP) as the recovery and prevention strategies to meet the Everglades MFL criteria.

After the approval of the 2005-6 LECWSP, continued concern over the safety of Lake Okeechobee's dike and ecological impacts warranted that the United States Army Corps of Engineers (USACE) set a new regulation schedule for lake water releases. The Lake had historically provided water supplies directly to a few rural utilities, irrigation water for the Everglades agricultural area and backup water source for urban users in the coastal basins during droughts and dry times as 'pass through' water to the Water Conservation Areas (WCAs). With the new 2008 Lake Okeechobee Regulation Schedule (2008 LORS) and lower stage levels, an average loss of approximately 430,000 acre-feet of storage that not only diminished the level of certainty for existing legal users, but also violated the Lake's MFL.[2] This mandated that a prevention and recovery strategy be implemented with water resources strategies identified to meet the MFL criteria, as was done for the Everglades MFL. Therefore, in August 2008 the 2005-6 LECWSP, Appendix H was amended to include a recovery strategy for the Lake Okeechobee MFL, and as with the Everglades MFL, the Lake MFL recovery strategy relies upon key CERP projects to be completed in addition to the completion of the Herbert Hoover Dike repairs.

Given the significant delays in both the CERP project implementation and Herbert Hoover Dike repairs, it cannot be expected the region's water supply will be returned to its previous level of certainty in the near term. In fact, in 2007 additional restrictions on the LEC's consumptive use water allocations were implemented as Restricted Allocation Areas to protect the Everglades and Lake Okeechobee MFLs. See below.

2.3 SURFICIAL AQUIFER SYSTEM AND LIMITED WATER AVAILABILITY

The Surficial Aquifer System (SAS) in the southeastern Florida peninsula, of which the Biscayne Aquifer is a part, is one of the most productive aquifers in the world and is currently the primary source of freshwater to residents of Broward County, Miami-Dade County, and southeastern Palm Beach County. In 1979, it was designated a sole source aquifer by U.S. Environmental Protection Agency (EPA), under the Safe Drinking Water Act (1974). The SFWMD is the state agency responsible for water supply planning in the LEC Planning Area, which includes all of Broward County.

Withdrawals from the SAS are managed by the SFWMD through the issuance of Consumptive Use Permits (CUPs). In order to secure and maintain a CUP, applicants, consisting of water utilities, developers, agricultural operations, and water control districts must meet the permitting criteria of: 1) being a reasonable and beneficial use of the resource; 2) demonstration of no adverse impact to other existing legal uses of water; and 3) assurance that the use of the requested quantity of water is necessary for economic and efficient use and is both reasonable and consistent with the public interest.

These uses must include compliance with the MFLs established for surface water and groundwater sources, Chapter 373, (F.S.). In the implementation of prevention strategy for the Everglades and Lake Okeechobee MFLs, the Governing Board of the District adopted Restricted Allocation Areas in 2007 and 2008. For the LEC planning region, this mandated that new water demands requiring recharge from the Everglades system be met through the development of alternative water supply (AWS). The numerous (115) AWS projects that were recommended as part of the 2005-2006 LECWSP Update were driven largely by these Restricted Allocation Areas and the concurrent consumptive use restriction for future water supply withdrawals from the surficial aquifer to historic levels (prior to April 1, 2006).

Opportunities for assistance for these AWS projects occurred in 2005 with the passage of Senate Bill 444 creating a funding and incentives program to encourage the development of alternative water projects as defined in Section 373.019, F.S.. The projects were defined as from the following sources: salt water; brackish water; surface water captured during wet-weather flows; sources made available through the addition of new storage capacity for surface or groundwater; water that has been reclaimed after one or more public water supply, municipal, industrial, commercial, or agricultural uses; the downstream augmentation of water bodies with reclaimed water; stormwater; and any other water supply source that is designated as nontraditional for a water supply region in the applicable water supply plan.

This program funding has since been severely limited within the Lower East Coast region and has directly impacted the ability of local water supply entities to advance the development of AWS projects through their own individual efforts.

2.4 OCEAN OUTFALL PROGRAM AND RECLAIMED WATER OPTIONS

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

The facilities within Broward County are the Broward County North Regional Wastewater Treatment Plant (WWTP) and the Hollywood Southern Regional Wastewater Treatment Plant (WWTP). Additionally, Cooper City and the Town of Davie are permitted to discharge effluent through the outfall operated by the City of Hollywood at the Southern Regional Water Reclamation Facility. Therefore, these two local governments also have obligations to meet the outfall requirements.

Requirements of the outfall program include the following:

- Discharge through ocean outfalls must meet either advanced wastewater treatment and management by December 31, 2018, or an equivalent reduction in outfall nutrient loading.
- A functioning reuse system that reuses a minimum of 60 percent of the facility's actual flow on an annual basis installed no later than December 31, 2025.
- Timely submission of certain progress and planning summary documents.
- Inclusion of projects that promote the elimination of wastewater ocean outfalls in SFMWD's regional water supply plans.
- State or SFWMD funding assistance must give first consideration to water supply development projects that replace existing sources or implement reuse projects to eliminate ocean outfalls.

The percentage of reuse required for the Broward County facilities is 22 MGD for the North Regional WWTP and 22 MGD for the Hollywood facility.

Broward County is planning to meet the 60 percent reuse requirement by expanding its public access irrigation in northern Broward and southern Palm Beach counties, including expanding reuse systems in the cities of Pompano Beach and Coconut Creek.

Hollywood is planning to inject the upper Floridan aquifer with reclaimed water to meet the 60 percent reuse requirement.

Reuse has been the focus throughout the State and in the beginning of 2009, a reclaimed water policy workgroup met to discuss how state regulatory policy could

better optimize the reuse of reclaimed water. The workgroup consisted of representatives from the Florida Department of Environmental Protection, Florida's five water management districts, Florida Water Environment Association Utility Council, Florida League of Cities, Florida Association of Counties, individual local government utilities, and environmental consulting firms. In 2012, the State of Florida's Reclaimed Water Policy Workgroup issued their Final Report.[3] Many of the recommendations had already been implemented and captured in the recent statewide effort to ensure consistency in consumptive use permitting (CUP/Con). This process has resulted in changes to the Applicant's Handbook and rules codified in the summer of 2014.

Important considerations when developing these reuse projects are rising sea levels, and increasing salt concentrations in coastal wastewater collection systems that could impact cost-effective reclaimed water opportunities. Related infrastructure impacts from sea level rise include accelerated physical degradation of the built environment, increased Operations and Maintenance (O&M) and engineering design costs to support long-term public water and wastewater capital projects. In addition, significant and strategic monitoring and financial programming will be needed to support adaptation strategies. These options might include lining or armoring the sanity sewer collection systems, redesigning or relocating collection systems, and building additional water quality treatment capacity such as membrane filtration.

Finally, the support of regional water conservation efforts is a proven strategy for extending the timeline to develop these expensive alternative water supply technologies and should be a prominent objective with dedicated efforts to support water resource protections under the threat of sea level rise and climate change. The County-wide initiatives addressing each of these concerns and consideration are presented the following sections.

3.0 BROWARD COUNTY

This section identifies the future water supply needs of those areas serviced by either BCWWS, or other water suppliers to ensure that water supply allocations and projects will be sufficient to meet projected demands. The role of the Environmental Protection and Growth Management Department (EPGMD) and BCWWS are to identify the future water supply needs and available supplies of the BCWWS service area (See **Section 4.2**) as well as for those served within the incorporated areas of the County. Currently very little of the unincorporated areas of Broward County are provided water service by BCWWS (see **Figure 4.2**). However, a significant County boundary change took place in 2009 with approval of House Bill 1315 that approved the transfer from Palm Beach County to Broward County of a 1,949-acre wedge-shaped property located between County Line Road and Loxahatchee Road. Currently the area of unincorporated land is 12.4 sq. miles with a population of less than 16,000, which includes the recently annexed 'Wedge' south of the Hillsboro Canal (**Figure 3.0**). The future services in the area are expected to be provided through a combination of the North Springs Improvement District (NSID) and/or Parkland Utilities, Inc. Of the County's remaining unincorporated areas, the City of Fort Lauderdale is the primary municipal provider of potable water. Water supply coordination with the City of Fort Lauderdale is detailed in this 2014 Work Plan.

In coordination with the Fort Lauderdale's Planning and Zoning Department and water utilities, the EPGMD has identified current and future water supply needs and water supplies as detailed below.

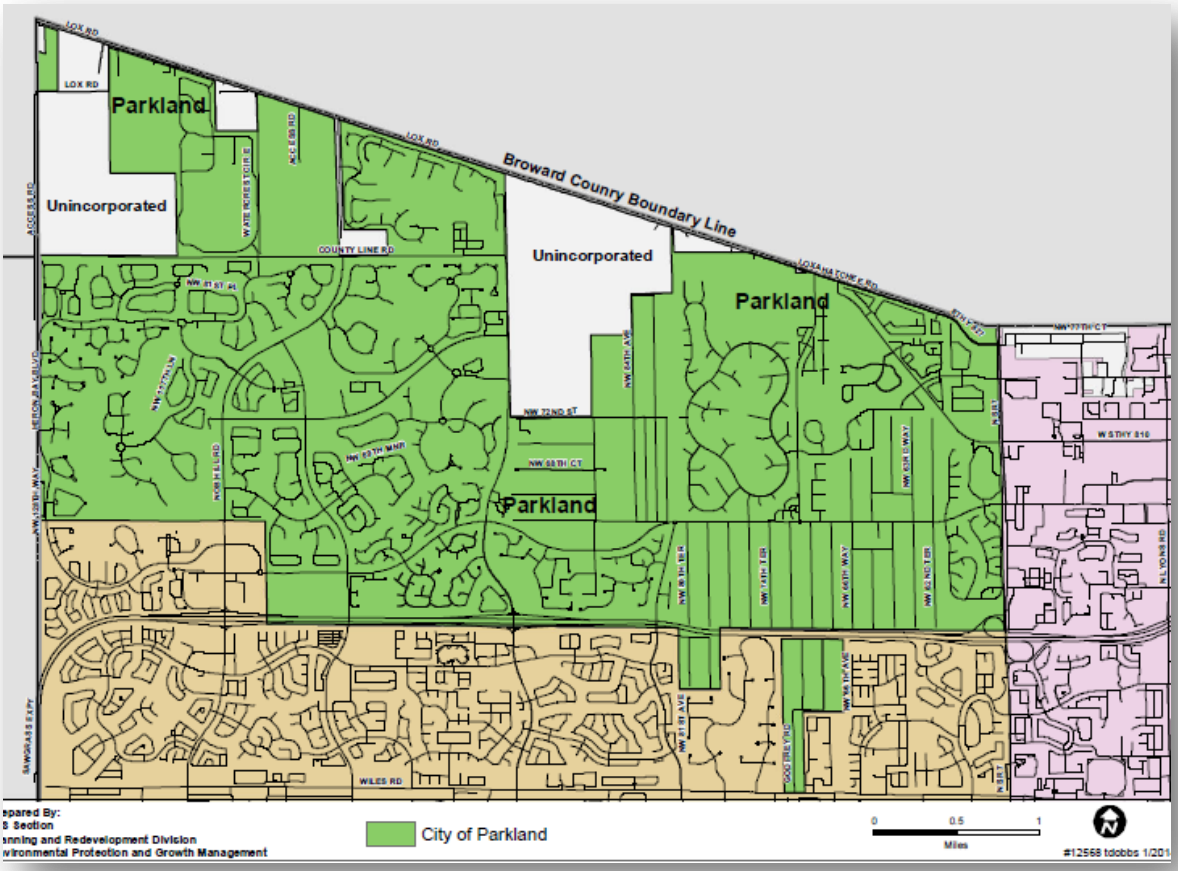


Figure 3.0: City of Parkland Wedge Area, 2014

3.1 BROWARD COUNTY SETTINGS

Broward County (County) is located along the lower east coast of Florida, between Miami-Dade County to the south, Palm Beach County to the north, and Collier and Hendry Counties to the West (**Figure 3.1**). The County was formed from parts of Palm Beach and Dade counties in 1915. At that time, the population was 4,763 (Florida State Census). In 2010, the Census estimated the population of the County to be 1,748,066, making it the second most populated county in the state after Miami-Dade (2010 Census Data). The recent University of Florida's Bureau of Economic and Business Research [4] (BEBR, 2014) estimates the County's population at 1,784,715.

In land size, the County contains more than 1,225 square miles, however, only the eastern third of the County (approximately 422 square miles) is urbanized. The remaining two-thirds of the County is composed of wetlands that constitute a large part of the Everglades Water Conservation Areas. This portion of the County is actively undergoing the planning and construction related to restoration of the Everglades, the largest natural system restoration effort in the world. With a population of nearly 1.8

million living on approximately 422 square miles of relatively low-lying developable urban land, the population density of Broward County was approximately 4,200 people per square mile.

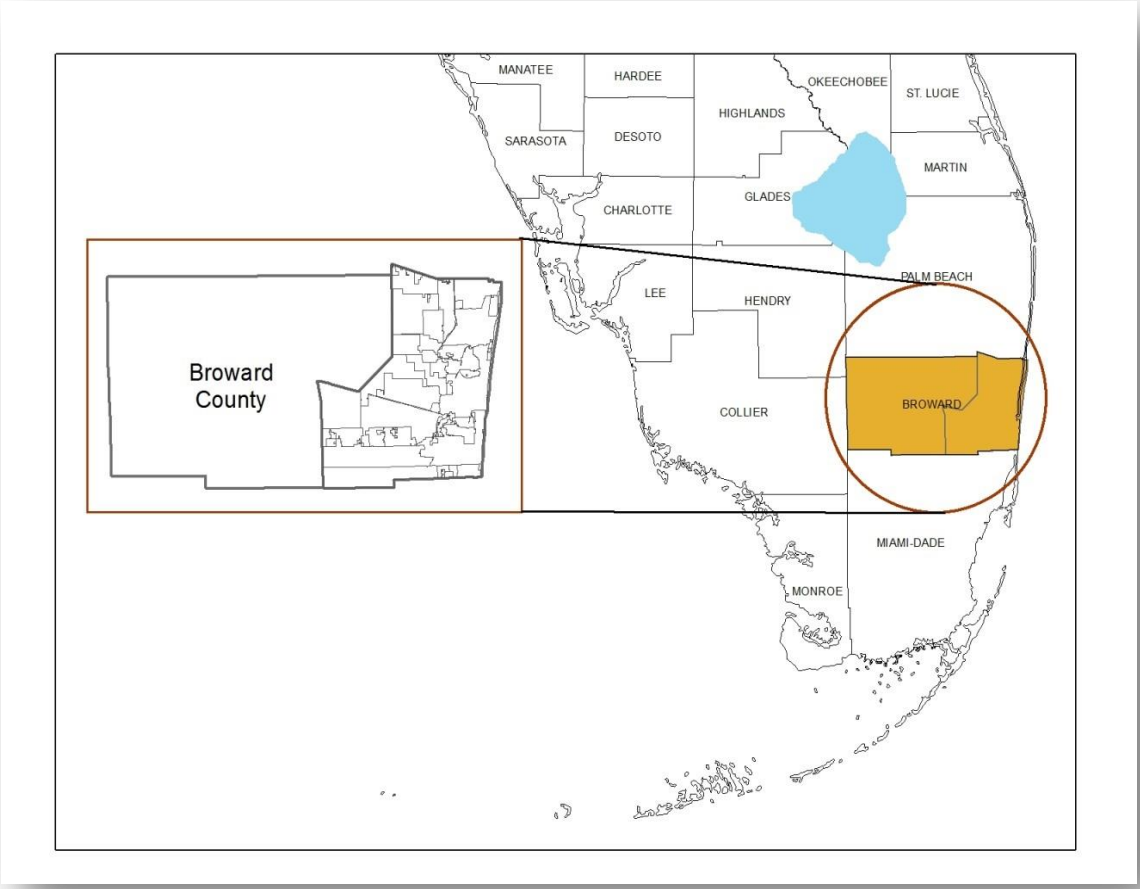


Figure 2.1: Location of Broward County

Balancing the vital restoration of the Everglades restoration efforts and supporting our growing communities in light of the impacts of climate change will present the County with significant water resource planning challenges. However, Broward has long recognized the concept that water is a shared regional resource and that effective and efficient resource management requires County-wide and regional coordination.

3.1.1 Regional Climate Action Plan

Southeast Florida is widely considered one of the most vulnerable regions with respect to the impacts of 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 110 recommendations in seven primary focal areas, with 18 specific to the focal area of "Water Supply, Management, and Infrastructure" (**Table 1.1**).[5]

These 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 2014 Work Plan and related comprehensive planning element updates.

Table 1.1: Water Supply Recommendations from Regional Climate Change Action Plan, 2012

WS-1	Develop local and, where appropriate, regional inventories of existing potable water supply delivery and collection systems, vulnerable wellfields, wastewater collection and/or treatment infrastructure, septic tanks/drainfields, and stormwater drainage and treatment facilities; assess the potential impact from climate change of each component; and develop different climate change scenarios and adaptation strategies for high-risk utilities and/or infrastructure which may require replacement, reinforcement, or relocation to ensure the long-term viability of the system (e.g., modified site, depth, elevation, materials, or connection requirements).
WS-2	Develop a regional saltwater intrusion baseline and utilize saltwater intrusion models to identify wellfields and underground infrastructure at risk of contamination/ infiltration by saltwater with increases in sea level.
WS-3	Utilize existing and refined inundation maps and stormwater management models to identify areas and infrastructure at increased risk of flooding and tidal inundation with increases in sea level, to be used as a basis for identifying and prioritizing adaptation needs and strategies.
WS-4	Evaluate the impacts of rising sea and groundwater levels on soil storage, infiltration rates and inflow to stormwater and wastewater collection and conveyance systems; consider longer-term influences on water quality; and develop strategies for implementing reclaimed water and stormwater reuse projects that account for current and future conditions.
WS-5	Develop and apply appropriate hydrologic and hydraulic models to further evaluate the efficacy of existing water management systems and flood control/ drainage infrastructure under variable climate conditions. Quantify the capacity and interconnectivity of the surface water control network and develop feasible adaptation strategies.
WS-6	Coordinate with the South Florida Water Management District, Drainage/Water Control Districts, and utilities/public works officials to identify flood control and stormwater management infrastructure already operating below the design capacity. Further examine water control structures to ensure that they can provide for inland or upstream migration of riparian species as freshwater habitats become more saline.
WS-7	Develop Integrated Water Management Plans that present a joint assessment and planning strategy involving local water utilities, wastewater service providers, water managers, and partners to the Southeast Florida Regional Climate Change Compact, for coordinated consideration of stormwater use and disposal, traditional and alternative water supplies, wastewater disposal and reuse, and water conservation measures for use by local leadership to guide planning decisions as well as amendments to applicable codes and regulations.

Table 1.1- Water Supply Recommendations from Regional Climate Change Action Plan, 2012 (cont.)

WS-8	Develop and test water management and drainage system adaptation improvements needed to maintain existing levels of service relating to drainage, flood control, and water supply, and use cost-benefit analyses to prioritize potential improvements.
WS-9	Incorporate and prioritize preferred climate adaptation improvement projects in capital improvement plans and pursue funding.
WS-10	Encourage, foster, and support investigative work and scientific research that improves the understanding of local and regional climate change impacts specific to Southeast Florida, including: Improved down-scaling of global climate models for representation of precipitation at the regional/local scales, Identification and targeting of gaps in monitoring to improve quantification of the hydrologic system and its response to climate change, such as evapotranspiration, groundwater levels, and precipitation, and local sea level, and Development of risk-based decision support tools and processes for application in analysis of infrastructure design, water resource management, natural systems management, and hazard mitigation alternatives. Tools should provide for consideration of potential economic costs of comparative planning scenarios, management decisions, and infrastructure investments and the evaluation of potential tradeoffs.
WS-11	Undertake efforts to fill identified data gaps through local program efforts, agency collaborations, and advocacy for additional state/federal resources, as needed.
WS-12	Foster the development and exchange of new information, methods and technical capabilities to address key questions of concern related to climate variability and sea level rise to support management decisions: Assess impacts of observed and predicted climate variability and sea level rise on the frequency, duration, and intensity of flooding as a result of extreme tidal excursions, storm surge, and 100-year storm events, and where impacts are likely to be greatest, Examine the effects of climate change on water availability and groundwater vulnerability due to sea level rise, and predicted changes in precipitation and evapotranspiration patterns and rates,and Establish a venue for a periodic exchange of ideas between resource managers, policy makers, and researchers.
WS-13	Develop agency capabilities to provide rapid deployment of resources in immediate response to intense precipitation and storm events through use of Next RAD technology.

Table 1.1- Water Supply Recommendations from Regional Climate Change Action Plan, 2012 (cont.)

WS-14	Cultivate partnerships with federal and state agencies and professional associations with expertise in integrated water resource planning (such as the U.S. Army Corps of Engineers Institute for Water Resources, the United States Geological Survey, and Water Foundations) as sources of important research, reports, and information regarding climate change, and efforts being undertaken in other communities.
WS-15	Monitor changes in rainfall patterns, temperature means and extremes and sea level rise through coordination with NOAA and other key organizations/partners to better predict future wet-season and dry-season rainfall. Monitor emerging science in order to assess the adequacy of regional climate models. Choose an annual conference or other venue at which such trends can be reviewed at regular intervals.
WS-16	Manage water storage in the region's publicly-owned uplands and wetlands and in other land uses compatible with water storage, including wetland restoration, certain agricultural operations and certain renewable energy production facilities. This will further serve to protect high quality drinking water supply, increase aquifer recharge, and as a means for managing saltwater intrusion.
WS-17	Support complete implementation and funding for the Comprehensive Everglades Restoration Plan (CERP) and its updated versions as fundamental to Everglades restoration, to include increased freshwater flows to the Everglades system, thereby improving water quality, maximizing regional freshwater storage and aquifer recharge, and providing potential to abate saltwater intrusion, which will become increasingly important under variable climate conditions and in the face of sea level rise.
WS-18	Combine existing and develop new land acquisition priorities in a regional setting to protect high quality drinking water supply.

3.1.2 Broward County-wide Integrated Water Resource Plan

In 1997, Broward County initiated the County-wide Integrated Water Resource Plan (IWRP) to improve the coordination and efficiency of local water management. The principle of the IWRP is that water should be viewed as a regional resource, independent of municipal and utility service area boundaries.

Broward's IWRP has four main goals:

- To make the most of local water resources, so that Broward's long-term water supply needs are met;
- To coordinate a diverse water management community, ensuring the efficient and effective management of Broward's water resources;
- To match up local water sources and users to ensure that water supplies are available when and where they're needed;
- To diversify water supplies so that the needs of urban and natural systems are met under wet and dry conditions.

Successful implementation of the plan requires coordination amongst a diversity of stakeholders including: water managers, utility directors and drainage districts and state and local government entities. The water management community in Broward County consists of 27 water providers, 23 special districts and 15 wastewater providers across 31 municipalities (see **Table 1.2**)

Table 1.2: Broward County Municipalities, Utilities and Districts

Municipalities	Water Providers	Special Districts	Wastewater Providers
City of Coconut Creek	Broward County -District 1	Bonaventure Development District	Broward County North Regional
Cooper City	Broward County -2A/North Regional	Broward County Water Control District #2	Cooper City
City of Coral Springs	Broward County -South Regional	Broward County Water Control District #3	Coral Springs Improvement District
City of Dania Beach	Cooper City	Broward County Water Control District #4	Town of Davie
Town of Davie	Coral Springs	Central Broward Water Control District	Ferncrest
City of Deerfield Beach	Coral Springs Improvement District	Cocomar Water Control District	Fort Lauderdale - G.T. Lohmeyer
City of Fort Lauderdale	Dania Beach	Coral Bay Community Development District	Hollywood
City of Hallandale Beach	Davie	Coral Springs Improvement District	Margate
Town of Hillsboro Beach	Deerfield Beach	Cypress Cove Community Development District	City of Miramar
City of Hollywood	Tindall Hammock Irrigation and Soil Conservation	Indian Trace Development District	City of Pembroke Pines
Lauderdale Lakes	Fort Lauderdale	Lauderdale Isles Water Management District	Plantation Regional
Lauderdale-by-the-Sea	Hillsboro Beach	North Lauderdale Water Control District	Pompano Beach
City of Lauderhill	Hallandale	North Springs Improvement District	Sunrise No. 1 (Springtree)
Lazy Lake Village	Hollywood	Oakridge Community Development District	Sunrise No. 3 (Sawgrass)
Lighthouse Point	Lauderhill	Old Plantation Water Control District	Sunrise Southwest
City of Margate	Margate	Pine Tree Water Control District	
City of Miramar	Miramar	Plantation Acres Improvement District	
City of North Lauderdale	North Lauderdale	South Broward Drainage District	
Oakland Park	North Springs Improvement District	Sunshine Water Control District	

Municipalities	Water Providers	Special Districts	Wastewater Providers
Parkland	Parkland Utilities, Inc.	Tindall Hammock Irrigation and Soil Conservation District	
Pembroke Park	Pembroke Pines	Turtle Run Community Development District	
City of Pembroke Pines	Plantation	Twin Lakes Water Control District	
City of Plantation	Pompano Beach	West Lake Community Development District	
City of Pompano Beach	Royal Utility		
Sea Ranch Lakes	Sunrise		
Southwest Ranches	Seminole Tribe of Florida		
City of Sunrise	Tamarac		
City of Tamarac			
Town of Weston			
City of West Park			
Wilton Manors			

The work of the Water Resources Assessment Program within Broward County provides vital information and guidance that support the programs in the Broward County IWRP and the development of alternative water supplies such as secondary canal integration, the use of the Floridan Aquifer, harvesting of excess stormwater (C-51 reservoir), application of reuse water for recharge. The technical assessment of these projects and planning for future mitigation strategies against climate change are investigated through several robust hydrologic models, developed over many years and with significant municipal partner support.

3.1.2.1 Secondary Canal Interconnections and Wetlands Rehydration

The Broward County Secondary Canal Improvement Project, as part of the Comprehensive Everglades Restoration Plan (CERP), is a water management project to optimize the integration and operation of the County's secondary canal system and support Everglades restoration by reducing the County's reliance on water from the regional system.

Authorized and to be funded by the U.S. Congress, State of Florida, and local government, the goals of the Broward County Secondary Canal Improvement Project are to capture as much annual rainfall as possible for storage and recharge of the Biscayne Aquifer, to maintain water levels in wetlands, and to stabilize saltwater intrusion. Additionally, through more efficient management of the local water resources, urban demand on the regional system is expected to be reduced, as well as seepage losses from the Water Conservation Areas (WCAs), as the project has the potential to raise groundwater levels on the east side of the levee.

Wetlands rehydration construction projects are pursued under the IWRP through secondary canal integration that can deliver surface water recharge via the secondary canal network. These projects not only serve to restore hydroperiods, groundwater levels, and natural system function, but approximately 80% of water delivered for wetland rehydration also serves to recharge the Biscayne Aquifer, with water supply benefits. These projects are pursued in coordination with the Water Management Division and Parks and Recreation.

3.1.2.2 Everglades Restoration/ Water Preserve Areas

The Water Preserve Areas (WPA) are a series of marshes, reservoirs, and groundwater recharge areas along the eastern side of the Water Conservation Areas in Broward, Palm Beach, and Miami-Dade Counties. In Broward County, the WPA extends along the western urban limits, adjacent to Levees 37 and 68A. The projects within the WPA are intended to serve multiple uses such as increasing the spatial extent of wetlands, reducing seepage losses from the Water Conservation Areas, improving water supply and quality, and establishing a buffer between the Everglades and developed areas. The County’s urban benefits include: the storage of stormwater runoff, groundwater recharge; management of saltwater intrusion; and increased urban water supplies.

The conceptual plan for the WPA was first contained in the Comprehensive Everglades Restoration Plan and after decades of coordination and process, the WPA was included in the 2014 Water Resources Restoration and Development Act (WRRDA) authorizing the project.

3.1.2.3 Technical Water Resources Assessment

Hydrologic Models

The numerical hydrologic models developed within the IWRP program provide for informed decisions and sustainable investments essential for comprehensive and integrated water resource management strategies throughout Broward County and the LEC planning region.

In 2006, Broward County's Environmental Planning and Community Resilience Division (EPCRD) contracted with the USGS to develop a numerical model to evaluate to various influencing factors on the saltwater movement within the Biscayne Aquifer in the northern third of the County. This tool was proven to be effective in representing historic and future conditions and was demonstrated to have utility as a planning tool for future water resources projects and development of resilience strategies. This modeling effort was subsequently expanded to the central and southern portions of the County to simulate historic saltwater intrusion and to test the extent to which wellfield pumpage, surface water management and sea level rise contribute to and influence the movement of saltwater and how the aquifer can be expected to respond to future climate conditions. The tool will also investigate the implications on the viability of water supplies and be used to identify and test possible adaptive strategies.

The County is also enhancing this investment with concurrent development of a Climate Vulnerability/Inundation model focused on coupled hydrologic impacts of saltwater intrusion, surface water/groundwater elevations, and stormwater inundation. This model (developed in cooperation with USGS) builds upon the County's Variable Density Model to assess the influence of changing climatic conditions on urban water resources and infrastructure. The current effort integrates bias-corrected, dynamically-downscaled data from Global Circulation Models into the updated surface/groundwater model that will be used for predictions county-wide. Refinements such as surface-water routing and variable density components offer more detailed conceptualization of the surface-water/groundwater interactions that can be then used to assess the predictive scenarios and comparison of alternative water resource strategies.

3.1.2.4 Alternative Water Supplies, Conservation and Reuse

Floridan Aquifer

As an alternative water supply, the expanded use of the Floridan Aquifer is currently being investigated with respect to its long-term viability as a water supply resource through additional modeling and studies. Broward County has, in cooperation with the

USGS, recently completed Phase 1 Feasibility Study of the Upper Floridan Aquifer. The study has compiled all available well information and commissioned a new well (G-2984) to be drilled, cored, and logged. Through the use of borehole and core sample data (84 wells at 33 sites), the hydrogeologic framework of the Floridan Aquifer system in Eastern Broward County was delineated. This effort helped to construct unique cross-sections and maps representing the stratigraphic and hydrogeologic units of the Floridan Aquifer in urban Broward County. An additional component of the project was to complete seismic profiling along approximately 14 miles of the Hillsboro Canal, which resulted in seismic reflection data that were then correlated to the borehole geophysical data.[6]

The results offer better definition of the stratigraphic and hydrogeologic characteristics of the aquifer which will improve upon the selection of new well locations or for water storage options, such as ASR. Phase 2 of this Feasibility Study is currently underway to further refine the hydrogeologic framework and regional extent of information that was earlier developed.

C-51 Reservoir

The capture of excess stormwater is considered an alternative water supply project as defined in Section 373.707, F.S. One such project, the C-51 reservoir, was first conceptualized in the 1992 Everglades Restoration Plan (Restudy). 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 provides for significant inground ground storage capacity with limited seepage losses or additional construction requirements. The initial intended purpose was to capture excess stormwater discharged to the Lake Worth Lagoon via the C-51 Canal. Currently, the benefits of this proposed project extend to: regional water supply, flood control, aquifer recharge, saltwater abatement, water quality improvements, and reduced stormwater discharges across a wide geographic area.

In 2009, a group of seven (7) Palm Beach and Broward Counties utilities and water drainage districts undertook a collaborative effort to evaluate the feasibility of the C-51 Reservoir project. Initial efforts resulted in a significant amount of data analysis that included revised water supply demands and preliminary conveyance analysis. While some cost estimations were completed, these were under the scenario that the 75,000 acre-ft capacity would be fully developed.

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 is currently meeting to evaluate project costs, advance regulatory coordination with the SFWMD, and explore future governance structures.

Hillsboro Aquifer Storage & Recovery (ASR)

Aquifer Storage and Recovery (ASR) is a recognized alternative water supply technology and can serve as an effective component of an integrated water management system. This project was originally designed, constructed and briefly tested as a pilot component of CERP. The system has been inactive since June 2012 when the SFWMD's pilot project ended.

BCWWS and the SFWMD have proposed cooperatively evaluating the feasibility of the SFWMD's Hillsboro ASR well to support urban water supply demands. The project concept relies upon the capture of water from the regional system during wet periods, when it would otherwise be discharged to tide, and temporarily storing it within the upper Florida Aquifer for later withdrawal, treatment and distribution. Currently, the availability of additional water from the Regional System for the Northern Broward County Recharge System (NBCRS) is restricted by regulations intended to limit urban reliance upon the Everglades System and deliveries from the WCA-1 (which includes

the Loxahatchee National Wildlife Refuge) for additional recharge of surface and groundwater.

During prolonged dry periods, water recovered from the ASR system can be conveyed eastward to pump stations located along the south bank of the Hillsboro Canal. From there, water can be delivered into the NBCRS, which then serves to provide surface water redistribution and aquifer recharge benefits to several wellfields and utilities within the network.

If successful, this project will provide additional recharge water to the Hillsboro Canal during the dry season and avoid competing uses with WCA-1. Capturing surface water that would otherwise be discharged to tide not only reduces competition, it increases the effectiveness and efficiency of water management operations as part of an integrated water management strategy.

Water Use Efficiency/ Conservation

The County has implemented diverse water conservation initiatives to protect the quantity and quality of Broward's existing and future water resources to help meet our current and projected demands. Consistent with this objective, the County has implemented a broad set of water conservation programs under the "Water Matters" campaign designed to produce long-term demand reductions along with improvements in water quality. These programs, targeted at various user groups, include: NatureScape Broward, Know the Flow, Water Matters Day, ConservationPays, NatureScape Irrigation Services, and NatureScape Broward School Board Agreement. Further support for water conservation is found in a number of conservation-oriented measures, including changes to the Building Codes for Cooling Towers and high efficiency plumbing devices, year-round irrigation measures, model irrigation codes, Go Green Sustainability Programs, and other water conservation policies and regulations.

Initiatives

- **ConservationPays Program**. This effort was launched in 2011 in collaboration with 18 partners to provide a coordinated regional campaign focused on water conservation and the distribution of rebates and other incentives. Rebate dollars are used for the replacement of older, wasteful toilets in addition to 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 as part of the Commission's Strategic Objectives. The program goal is to reach a sustained minimum 10% reduction in water use county-wide over 20 years. This was estimated to be 30 million gallons/day (MGD).
- **NatureScape Irrigation Services**: Launched in 2005, the NatureScape Irrigation Services (NIS) was implemented by the NRPMD with cost-share provided by Broward County Water and Wastewater Services (BCWWS) and 18 local water utilities. The program targets large water users including government facilities,

parks, schools, and homeowner associations where the greatest potential exists for significant water savings. To date, water savings exceed 1 billion gallons with over 2,000 irrigation system evaluations. Best Management Practices (BMPs) that encourage the 'right plant in the right place' and smart irrigation help to promote water conservation messaging that adds to long-term water savings.

- **NatureScape Program**: Launched in 2003, the NatureScape Broward program promotes water conservation, water quality protection, and the creation of wildlife habitat through Florida-friendly landscape practices that encourage the prudent use of water resources, and the planting of native, non-invasive, and other drought-tolerant plants in Broward County. Broward County was the first County in the U.S. to be certified under the Community Wildlife Habitat program. In addition, there are 9 certified and 8 registered County municipalities and over 3,400 landscapes are certified to date.

Broward County Reuse Master Plan

Broward County has focused on the advancement of beneficial reuse and in coordination with its regional partners, recently produced the Broward County-wide Reuse Master Plan. This effort included the active participation of local municipalities, water managers, water and wastewater utilities, local planning agencies, Florida Department of Transportation, and other state and regional agencies. This plan sets the foundation for the long-term implementation strategy to further regional reclaimed water development through several innovative and dynamic planning tools. The Broward County-wide Reuse Master Plan and Implementation Strategy support a cost-effective, regional approach for the development of beneficial reuse throughout the County's water and wastewater providers.

The objective is to advance cost-effective development of reclaimed water initiatives through coordinated planning and implementation. The Plan is designed to:

1. Provide coordination and support between Broward County, state agencies, water and wastewater treatment providers, and municipalities to deliver, update and maintain a comprehensive database of existing and planned reclaimed water infrastructure.

2. Coordinate the installation of reclaimed water lines for recommended projects with public works projects such as transportation improvements, stormwater and other wastewater improvement projects that may be necessitated through local, state and federal permitting requirements.

To support this strategy, Broward County IWRP grant funds provide preferential funding consideration for those projects that are contained within and are consistent with the Reuse Master Plan. Permitting incentives include the potential reuse credit that the South Florida Water Management District could allow as an offset to increase traditional water sources withdrawals in a Consumptive Use Permit.

Additional financial incentives may be available through State funding as indicated in Section 373.1961(3)(f)(6), F.S. that provides encouragement for projects in which the construction and delivery to end users of reuse water is a major component. This statute requires governing boards to give such projects significant weight when selecting AWS projects for funding under Section 403.89: Water Protection and Sustainability Trust Fund (FDEP).

4.0 DATA AND ANALYSIS

The following section provides information in support the requirements of Section 163.3177(1)(f), F.S. as outlined:

- All mandatory and optional elements of the comprehensive plan and plan amendments must be based upon relevant and appropriate data and an analysis by the local government that may include, but not be limited to, surveys, studies, community goals and vision, and other data available at the time of adoption of the comprehensive plan or plan amendment. (Section 163.3177(1)(f), F.S.).

- Data must be taken from professionally accepted sources, (Section 163.3177(1)(f)2., F.S.) and reacted to in an appropriate way, to the extent necessary indicated by the data available on that particular subject at the time of adoption of the plan or plan amendment at issue. (Section 163.3177(1)(f), F.S.).

The planning horizon for the 2014 Work Plan spans 20 years, covering 2015 to 2035.

4.1 COUNTY- WIDE POPULATION ANALYSIS

This 2014 Work Plan identifies and analyzes the future water supply needs for the unincorporated areas of Broward County and those areas serviced by the BCWWS and address any projected deficits. The role of the EPGMD is to identify the future water supply needs of unincorporated areas of Broward County and to present regional strategies supporting county-wide water supply needs and water resource management. The role of BCWWS is to identify the future water supply needs of their service areas, which include both unincorporated areas and incorporated areas, and to determine strategies to meet any unmet demands.

Several of the unincorporated areas (see **Figure 4.2**) of Broward County are provided water service by BCWWS; hence these areas were included in the BCWWS analysis. For the remaining unincorporated neighborhoods, the City of Fort Lauderdale is the largest of the water utility providers while the City of Sunrise is only providing for 6 residential units. EPGMD has coordinated with the Fort Lauderdale Planning and Zoning Department and the water utility in identifying the current and future water supply needs within their water utility's service area. Fort Lauderdale provided data required for the needs assessment and confirmed the accuracy of the analysis.

Needs assessments were developed based on current utility operations and the existing customer base, compared to population projections through 2040. The population modeling was performed by Broward County Planning and Redevelopment Division (BCPRD) using the Broward County Traffic Analysis Zones and Municipal Forecasts Update, 2014 to develop the projected populations based on the University of Florida's Bureau of Economic and Business Research (BEBR), "Detailed Population Projections

by Age, Sex, Race, and Hispanic Origin, for Florida and Its Counties, 2015-2040, With Estimates for 2012 All Races" to Broward County's 2010 Traffic Analysis Zones (TAZ) and municipalities. This is an update from the demographic forecast model developed in 2012.

It should be noted that…"Since the County's population is expected to continue to grow and change, the future distribution of population and housing by municipality and TAZ is likely to be varied. Input from the local planning and service-delivery entities guided the distribution process. Underlying the distribution process are land development characteristics and the Broward County Land Use Plan."

This 2014 Work Plan includes analysis of existing water facilities, current and projected water demands versus water availability (based on current and projected consumptive use permitting), and the presentation of water supply plans for the Fort Lauderdale water utility and BCWWS. Future water demands prepared for this analysis are compared to projected demands presented in the 2013 Lower East Coast Water Supply Plan Update, with discussion of any deviations.

The Broward County Planning and Redevelopment Division (BCPRD) is responsible for providing updated population forecasts throughout the County. The Broward County Traffic Analysis Zones and Municipal Forecasts Update, 2014 is a demographic forecast model that was utilized.

Updated population projections are summarized in 5-year increments to 2040 (**Table 4.1**). This update resulted from the BEBR Report No. 68.

Table 4.2: Broward County Population Projections based on BEBR Estimates

Year	Population Estimates
2012	1,771,099
2015	1,797,981
2020	1,850,809
2025	1,901,480
2030	1,948,726
2035	1,992,208
2040	2,033,471

These BEBR forecasts were assigned to 953 TAZ within 31 municipalities utilizing a household-based model. BEBR's forecasts by population age are converted to county-wide household forecasts using a weighted average of the years 2000 and 2010 Census householders by age group data. The converted countywide household

forecasts were then assigned to TAZ based on the interaction between: (1) The change in the county-wide household size distribution through forecast periods; (2) The established TAZ level distribution of households; and (3) The capacity of each the TAZ to absorb additional housing units. Since the County's population is expected to continue to grow and change, the future distribution of population and housing by municipality and TAZ is likely to be varied. Input from the local planning and service-delivery entities guided the distribution process. Underlying the distribution process are land development characteristics and the Broward County Land Use Plan.

4.2 CURRENT AND FUTURE SERVED AREAS

4.2.1 BCWWS

Broward County Water and Wastewater Services is one of 28 utilities that provide potable water service within the urbanized area of the County. The utility was created on January 31, 1962 with the County's purchase of a small, investor-owned water and wastewater utility. Between 1962 and 1975 the County acquired a number of investor-owned systems. Under the County Code of Ordinances, the Broward County Board of County Commissioners exercises exclusive jurisdiction, control and supervision of the utility system. BCWWS is the County organizational unit directly responsible for the utility.

The utility supplies potable water to retail customers in several sections of the County and to one significant bulk water user. Over the past ten years, the utility has grown from 51,044 customers to its present retail base of 56,503 customers, representing an estimated population of 179,000. The City of Coconut Creek, the bulk water user, has approximately 54,000 customers. Including the City of Coconut Creek, the utility serves about 13 percent of the County's total population. For the year 2012, treated water sold to retail customers equaled about 22.9 million gallons per day (MGD) on an annual average basis. Metered water sales to Coconut Creek equaled an additional 4.5 MGD. Notably, finished water production (treated water at point of delivery) has decreased in recent years. This may be attributable to a downturn in the economy, slowdown in population growth and the County's water conservation efforts, including year-round irrigation conservation measures. Water conservation remains a critical initiative and became increasingly important following a series of significant droughts years coupled with limitations to the County's traditional water source.

BCWWS operates three service districts known as District 1, District 2, and District 3. These service districts are shown on **Figure 4.1** below, and cover about 43 square miles. The three service districts are operated as independent entities, but are managed as a single entity:

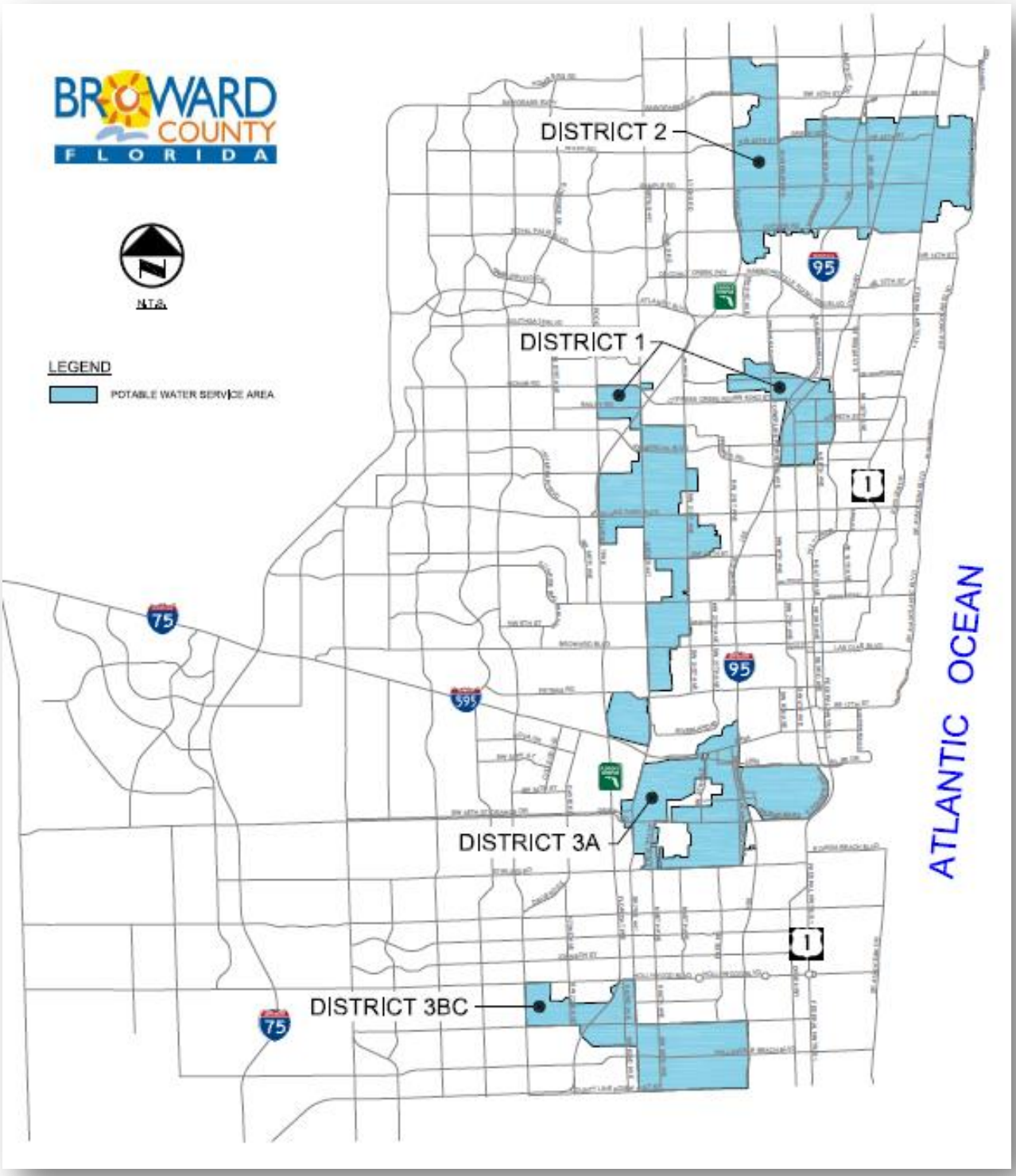


Figure 4-1: BCWWS Retail Water Service Areas, 2014

- District 1 service area contains all of Lauderdale Lakes and portions of the cities of Fort Lauderdale, Lauderhill, North Lauderdale, Oakland Park, Plantation, Pompano Beach, and Tamarac,

- District 2 service area contains portions of the cities of Deerfield Beach, Lighthouse Point and Pompano Beach; and provides water to portions of the City of Coconut Creek as described below, and

- District 3 service area contains portions of the cities of Dania Beach, Davie, Fort Lauderdale, Miramar, West Park, Pembroke Park, Pembroke Pines and Hollywood; and provides water to the Fort Lauderdale-Hollywood International Airport.

All three service districts also include some small unincorporated areas as highlighted on **Figure 4.2.**

BCWWS supplies water primarily to retail customers, but also provides water to the City of Coconut Creek under a resale agreement. Presently, there is no practical or economic incentive for the City to pursue development of its own treatment facilities. Without prior approval from the County, the City is prohibited from buying or otherwise providing water within its service area from any source other than the County.

To plan and coordinate water supply utility activities within its service areas, BCWWS uses utility analysis zones (UAZ). The UAZ defines the boundaries of the utility's service areas within each TAZ. BCWWS service areas encompass, which are then divided into ~~130 UAZ. There are~~ four (4) Retail customer categories in each of the UAZ: "single family residential", "multi-family residential", "commercial" and "other". BCWWS used GIS map overlays to determine the percent area of each TAZ and UAZ and populations that fell within the four BCWWS districts (District 1, District 2, District 3A and District 3BC) and by municipality to develop a total population within the BCWWS service area by municipality. Populations served within each municipality are detailed in Appendix A to this water supply plan.

Finished water usage for each of the four customer categories listed above was determined for each UAZ using BCWWS billing records. System uses and losses were calculated on a District by District basis and allocated to each UAZ to determine a total potable water demand per UAZ within the respective District's service area. The percentage of a TAZ in each UAZ was also determined. Adjustments were made to account for UAZ where BCWWS does not provide potable water service (i.e., those UAZ or portions of UAZ where BCWWS provides services for sewer only and not water) and for UAZ that contained a portion of a TAZ that did not include single or multi-family residential land use.

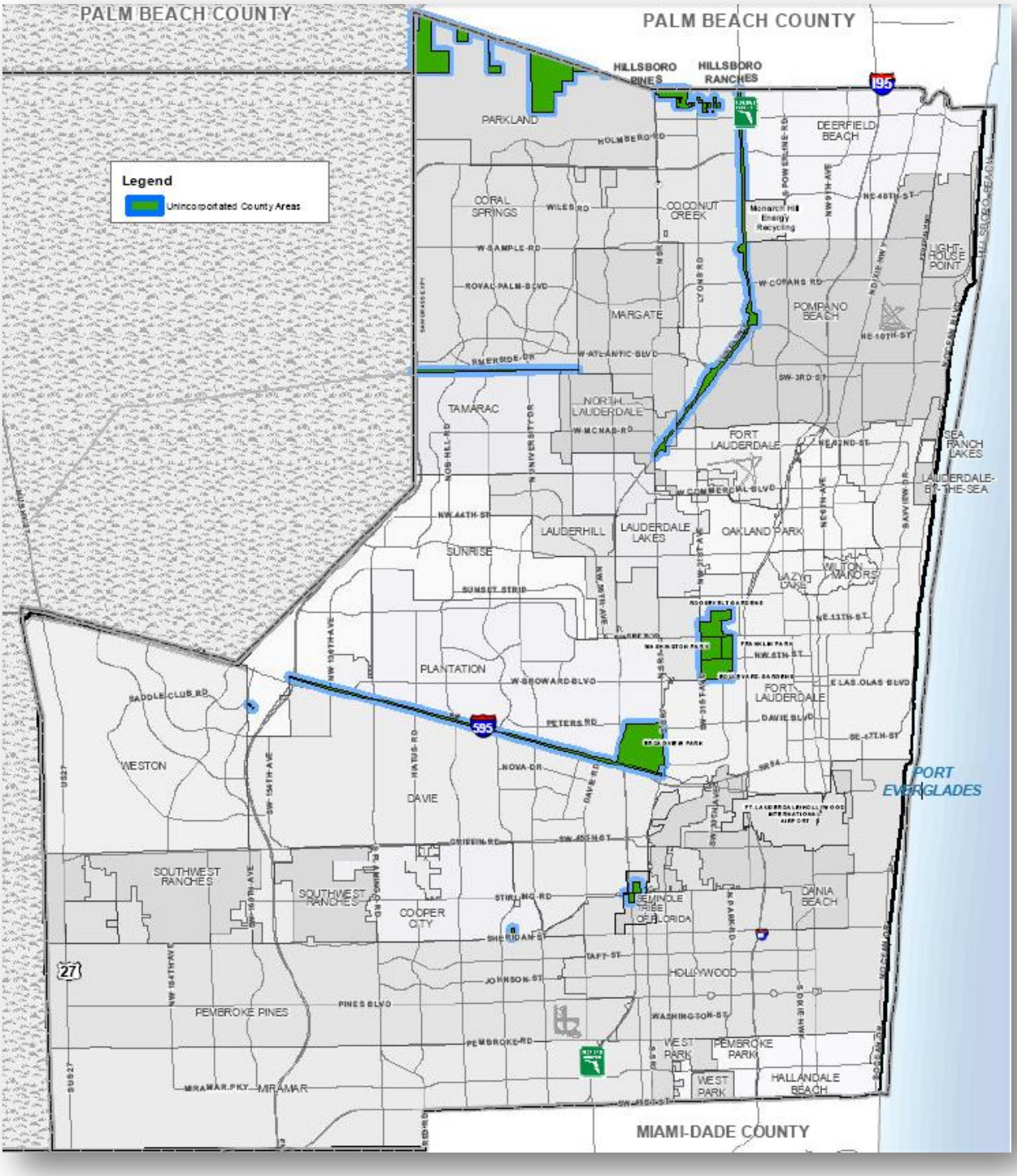


Figure 4.2: Broward County Unincorporated Areas, 2013

BCWWS projections utilized the year 2010 as a base year. The 2040 demands for "single family residential" and "multi-family residential" were estimated by multiplying the year 2010 demands by the change in population from 2010 to 2040 for each UAZ. The year 2040 demands for "commercial" and "other" required a slightly different approach. Because it was not reasonable to assume that a person works or even shops in the same UAZ in which they live, the overall change in population of the County was multiplied by year 2010 "commercial" and "other" demands for each UAZ.

Residential housing demand was calculated by dividing the service area into sub areas, then doing a traditional per capita forecast for each sub area. Therefore, when population growth rates in relatively lower per capita usage sub areas exceeded population growth rates in relatively higher per capita usage sub areas, lower overall residential per capita demands occurred. The projected BCWWS populations are shown in **Table 4-2**.

Table 4.2: Broward County WWS Population Projections 2015~~0~~ to 2040

Utility Service Area		PROJECTED POPULATION [1]					
	2010	2015	2020	2025	2030	2035	2040
District 1	75,091	75,~~091~~54~~6~~	~~76,428~~75,889	~~78,125~~77,950	82,~~155~~92~~3~~	~~83,715~~84,116	~~85,029~~84,826
District 2 & Coconut Creek	109,181	11~~0,173~~1,496	11~~5,747~~6,272	11~~9,575~~2,159	12~~3,402~~4,209	12~~4,854~~5,431	125,~~506~~922
District 2	56,687	~~54,933~~56,256	~~55,274~~55,799	~~55,601~~56,185	~~56,868~~57,675	~~57,148~~57,725	~~57,159~~57,575
Coconut Creek	53,494	55,240	60,473	63,974	66,534	67,706	68,347
District 3A		16,~~384~~298	~~16,960~~17,014	17,4~~51~~42	17,962~~3~~	~~18,013~~17,928	~~18,019~~17,827
District 3BC		32,~~902~~852	33,~~660~~706	34,~~075~~3,825	35,~~594~~763	36,~~309~~285	36,~~878~~640

1. Based on 201~~3~~4 BC PRD TAZ estimate translation to UAZ populations

4.2.2 City of Fort Lauderdale

The municipal utility owned and operated by the City of Fort Lauderdale is the single largest purveyor of potable water in Broward County in terms of total water delivery, providing service to approximately 250,000 customers in 2013. This includes approximately 6,000 retail customers residing in the Roosevelt Gardens, Franklin Park, Washington Park, and Boulevard Gardens communities of unincorporated Broward

County. These communities are expected to become incorporated by the end of the planning period. The utility's service area, shown in **Figure 4-3**, encompasses a total area of 43 square miles, approximately one-tenth the total area of urban Broward County. Other retail customers include residential, commercial, and industrial properties within the City of Fort Lauderdale, Lazy Lake, and a portion of Lauderdale-by-the-Sea (**Table 4.3**). The utility also maintains wholesale agreements for potable water supply with the Cities of Oakland Park, Wilton Manors, Tamarac (east of 34th Avenue), and the Town of Davie and the Port Everglades (**Table 4.4**). Emergency potable water interconnections are maintained with the Cities of Dania Beach, Pompano Beach, and Plantation, and BCWWS service area.

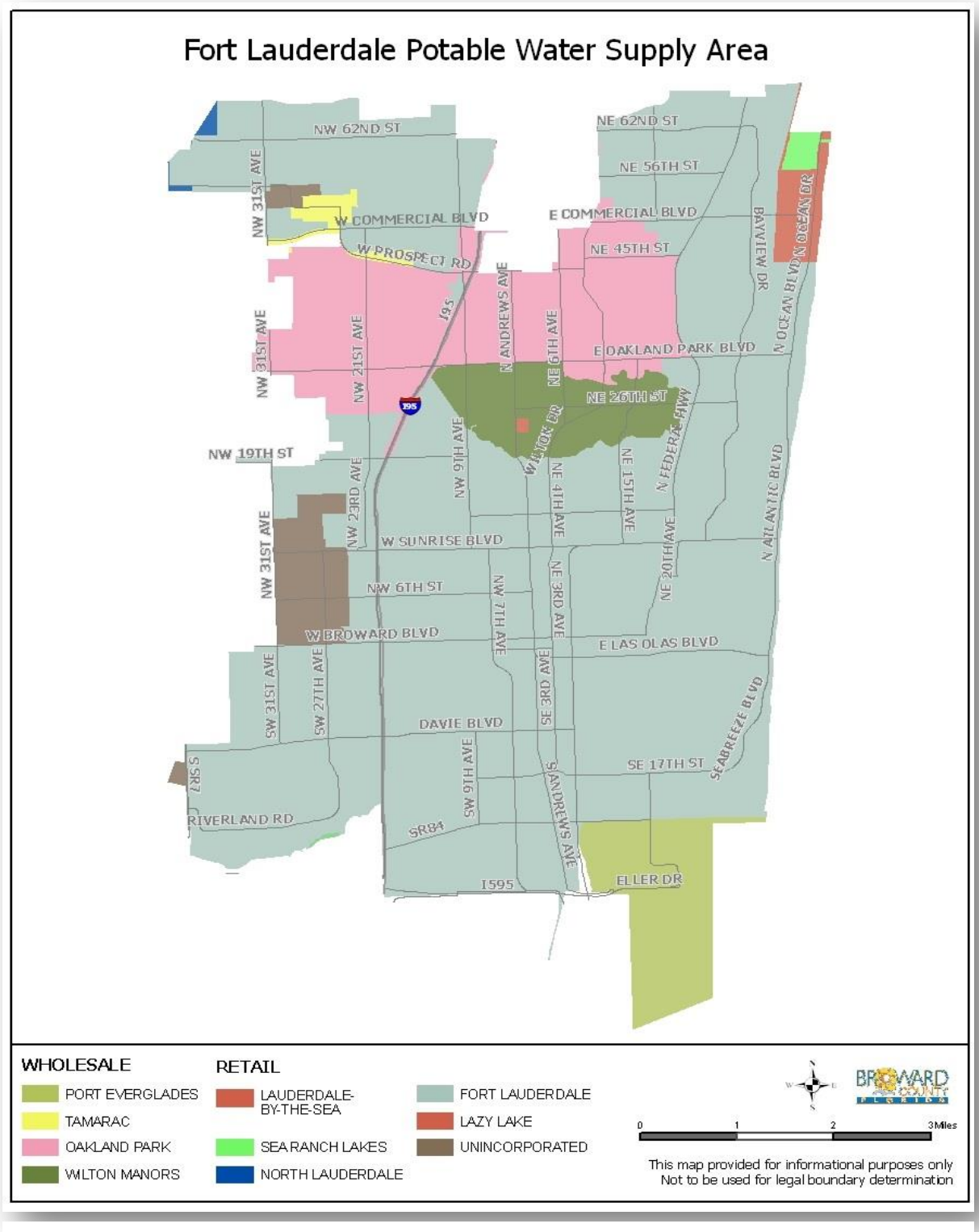


Figure 4.3: City of Fort Lauderdale Service Area

Table 4.3: City of Fort Lauderdale Population Projections 2010-2035

Place	2005[1]	2010[2]	2015[2]	2020[2]	2025[2]	2030[2]	2035[2]
Fort Lauderdale	-	162,715	169,094	174,316	189,166	198,394	201,880
Lauderdale-by-the-Sea	-	3,463	3,841	4,009	3,960	3,922	3,894
Sea Ranch Lakes	-	663	703	720	709	704	697
Unincorporated Broward County		6,745	6,265	6,652	7,005	7,297	7,414
Total	**187,003**	**173,586**	**179,903**	**185,697**	**200,840**	**210,317**	**213,885**

Notes:

1. Source: 2009 City of Fort Lauderdale Water Supply Plan.

2. Source: the 2010 population estimate and 2015 to 2030 population projections are based on the 2014 Traffic Analysis Zones and Municipal Forecasts Update prepared by the Broward County Planning and Redevelopment Division. The update assigns the forecasted estimates from the University of Florida's Bureau of Economic and Business Research (BEBR), "Detailed Population Projections by Age, Sex, Race, and Hispanic Origin, for Florida and Its Counties, 2015-2040, With Estimates for 2012 All Races" to Broward County's 2010 Traffic Analysis Zones (TAZ) and municipalities.

* City of Fort Lauderdale Department of Sustainable Development, Urban Design & Planning Division, 12-Jun-14

Table 4.4: City of Fort Lauderdale Population Projections 2010-2035

Place	2005[1]	2010[2]	2015[2]	2020[2]	2025[2]	2030[2]	2035[2]
Davie[3]	2,400	525	528	530	527	534	585
Lauderdale Lakes	-	374	381	383	378	386	386
Lauderhill	-	2,923	2,890	2,881	2,840	2,927	2,969
Lazy Lake[4]	-	25	26	26	26	26	26
North Lauderdale	-	345	349	352	1,060	1,291	1,403
Oakland Park	26,492	26,321	27,122	28,097	28,682	29,818	30,176
Oakland Forest Subdivision (within Oakland Park)[5]	3,371	3,530	3,584	3,621	3,575	3,659	3,649
Tamarac[6]	7,069	1,497	2,152	2,162	2,137	2,179	2,188
Wilton Manors	12,390	11,374	11,611	11,740	11,693	11,931	11,929
Total	**51,722**	**46,914**	**48,643**	**49,792**	**50,918**	**52,751**	**53,311**

Notes:

1. Source: 2009 City of Fort Lauderdale Water Supply Plan.
2. Source: the 2010 population estimate and 2015 to 2030 population projections are based on the 2014 Traffic Analysis Zones and Municipal Forecasts Update prepared by the Broward County Planning and Redevelopment Division. The update assigns the forecasted estimates from the University of Florida's Bureau of Economic and Business Research (BEBR), "Detailed Population Projections by Age, Sex, Race, and Hispanic Origin, for Florida and Its Counties, 2015-2040, With Estimates for 2012 All Races" to Broward County's 2010 Traffic Analysis Zones (TAZ) and municipalities.
3. Area includes a portion of the Hacienda Village neighborhood, which comprises TAZ 651
4. The Village of Lazy Lake is built-out
5. Oakland Forest is a subdivision of the City of Oakland Park and comprises all of TAZ 414. Potable water from the City of Fort Lauderdale is supplied through a master meter. Water demand by the residents in this subdivision was forecast separately from the water demand of the City of Oakland Park.

The population of Fort Lauderdale and the other municipalities in the water service area was forecasted by using the Broward County Population Forecasting Model (BCPFM). The BCPFM employs a cohort-survival methodology to project population. For purpose of the City's analysis the BCPFM was used as the basis of the forecast.

4.2.3 City of Hollywood

The City of Hollywood's service area is detailed in its current Consumptive Use Permit (06-00038-W) and reported in the 2013 LEC WSP Update which includes population projection of 210,320 out to the year 2030. The average finished water per capita use rate is 123 gallons per day and a maximum monthly to average monthly pumping ratio of 1.09:1. Through the bulk sales agreements with BCWWS, treated water is provided to portions of the City of Dania Beach and Broward County 3A/3B/3C service areas (**Figure 4.4**) with a population of 76,074 persons by 2028 (**Table 4.5**) at an average per capita use rate of 173 gallons per day and a maximum monthly to average monthly pumping ratio of 1.13:1.

Table 4.5: City of Hollywood Population Projections for the 3A/3B/3C Served area

Place	2005	2010[1]	2015[1]	2020[1]	2025[1]	2028[1]
Service Areas 3A/3B/3C		**50,000**	**56,707**	**64,634**	**72,561**	**76,074**
Notes: 1. Source: 2008 City of Hollywood CUP.						

Withdrawals are from the Biscayne aquifer via 16 existing withdrawal facilities and from the Floridan aquifer system (FAS) via six existing withdrawal facilities, as well as untreated water from the Biscayne aquifer that is provided by Broward County's South Regional Brian Piccolo Park wellfield. The majority of the City of Hollywood's water supply comes from the SAS. The city operates three distinct WTPs, utilizing lime softening, membrane, and RO treatment technologies. It is anticipated that the FAS will provide about 25 percent of future demands.

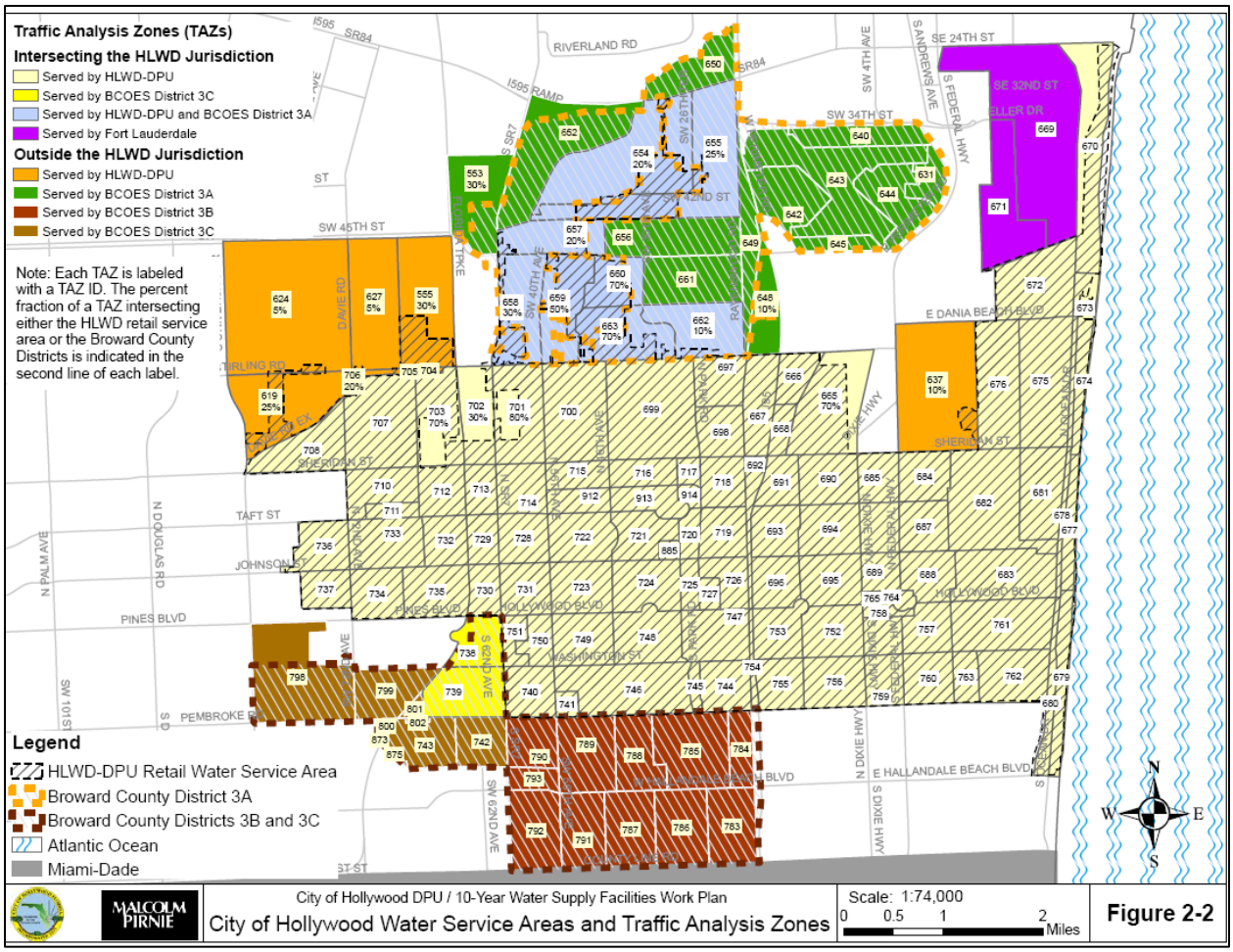


Figure 4.5: City of Hollywood Served Areas in District 3A,3B, 3C from 2008 WSP.

4.3 POTABLE WATER LEVEL OF SERVICE STANDARD

4.3.1 BCWWS

BCWWS has the responsibility to determine if it can adequately serve existing and potential customers. To that end, BCWWS has set potable water level of service standards as shown by **Table 4.5**.

BCWWS Land Development Standards contain the methodology currently used to determine if the level of service standard can be met. BCWWS changes the methodology administratively from time to time as new information becomes available. The following is the current available information.

Table 4.5: BCWWS Retail Potable Water Level of Service Standards

Facility	Level Of Service Standard
Raw Water Supply	Maximum Day Plus In-Plant Uses
Treatment Plant	Maximum Day
Finished Water Storage	40% of Maximum Day demand to cover operational (10%) and emergency (30%) storage; plus fire protection storage of 630,000 gallons (3,500 GPM for 3 hours)
Transmission/ Distribution System	The most stringent of: Peak Hour at 45 psi residual pressure, or Maximum Day Plus Fire Flow at 25 psi residual pressure.

4.3.2 City of Fort Lauderdale

The City of Fort Lauderdale has the responsibility to determine if it can adequately serve existing and potential customers.

To that end, Fort Lauderdale has adopted their level of service for finished water at 197 gallons per capita per day (gpcd). In 2013, the average demand throughout their service area was 36.90 MGD. The finished water per capita demand averaged 179 gallons per person per day from 2009 to 2013. The finished water per capita rates are based upon overall water consumption within the City's water service area including: 1) residential; 2) commercial; 3) industrial; 4) wholesale customers such as Wilton Manors, etc.; and 5) Port Everglades.

4.3.3 City of Hollywood

The City of Hollywood has the responsibility to determine if it can adequately serve the existing and potential customers within their service areas, including that population within the unincorporated areas of Broward County. To that end, Hollywood has adopted a level of service of 173 gallons per day finished water per person. In 2013, the average demand throughout their service area was 19.53 MGD.

4.4 WATER SUPPLY PROVIDED BY LOCAL GOVERNMENTS

4.4.1 BCWWS

4.4.1.1 District 1:

District 1 is supplied by the BCWWS District 1 Wellfield which draws raw water from the Surficial Aquifer System (SAS). Raw water is treated at the District 1 Water Treatment Plant (WTP) prior to distribution to retail customers. The facility's operating permit number is 06-58-00009. The plant was expanded again in 1994 to a capacity of 16.0 MGD (firm capacity 15.3 MGD) and uses up-flow clarifiers and multimedia filtration to provide lime softening of the raw water supply. Per BCWWS' 2012 Annual Report, the plant is in very good condition and all equipment was operating in a satisfactory manner. The projected year 2015 maximum day is 11.~~4~~3 MGD, or 71% of plant capacity. **Figure 4.6** shows the location of the District 1 WTP, storage tanks and finished water distribution pipe 12-inches and larger within the District 1 service area.

The wellfield is located in the area surrounding the WTP and is comprised of nine wells, all of which are currently in service. The total design capacity of the wellfield is approximately 23.5 MGD. The total firm capacity of the wellfield is approximately 19.6 MGD, with the largest well out of service. Pursuant to the SFWMD Consumptive Use Permit (CUP), No. 06-00146-W issued in April 2008 for a 20 -year permit duration, the maximum month and average annual daily withdrawals allowed from the District 1 SAS wellfield are 280 MG per Month (MGM) and 9.2 MGD, respectively. Two alternative water supply upper Floridan aquifer wells are under construction to provide raw brackish water for membrane treatment by 2020. The current SFWMD CUP allows for a maximum month withdrawal from the upper Floridan aquifer of 181 MGM with an associated average daily withdrawal of 4.7 MGD. Based on the water use projection presented in **Table 4.6** and shown graphically in **Figure 4.7**, District 1 will need the pending transfer of SAS allocation from Plantation (0.5 MGD for Broadview Park) and Fort Lauderdale (0.3 MGD for North Andrews Gardens) to District 1. Alternatively, the AWS provided by the Floridan Aquifer will be needed by 2020.

Table 4.6: District 1 Finished and Raw Water Projected Demands

Planning Year	Population (UAZ Estm)	Finished Water		Raw Water Source - SAS			Treatment Capacity = 15.3 MGD	SAS Raw Water
		Level of Service = 11~~8~~5 GPCD		Level of Service = 120 GPCD				Avg Day Allocation = 9.2 MGD
		Max/ Avg Day Ratio = 1.3		Max/ Avg Day Ratio = 1.09				
		Average Day (MGD)	Maximum Day (MGD)	Average Day (MGD)	Maximum Day (MGD)	Average Month (MGM)	Treatment Surplus/ (Deficit) [1] (MGD)	Avg Day Surplus/ (Deficit) [2] (MGD)
2015	75,~~091~~546	8.69	11.~~3~~29	9.07	9.~~9~~88	27~~4.9~~5.74	~~4.0~~5.42	0.~~2~~13
2020	~~76,428~~75,889	~~9.0~~8.73	11.~~5~~35	9.~~2~~11	~~10.0~~9.93	27~~9.8~~6.99	~~3.8~~5.37	0.~~0~~9
2025	~~78,125~~77,950	~~9.2~~ 8.96	11.~~8~~65	9.~~4~~35	10.20	28~~6.0~~4.52	~~3.~~5.10	~~(0.2)~~(0.15)
2030	82,~~155~~923	9.~~7~~54	12.40	9.~~9~~5	10.8~~5~~	30~~0.8~~2.67	~~2.9~~ 4.45	(0.75)
2035	~~83,715~~84,116	9.~~9~~67	12.~~6~~58	10.~~10~~09	11.00	30~~6.5~~7.02	~~2.7~~4.30	~~(0.9)~~ (0.89)
2040	~~85,029~~84,826	~~10.0~~9.75	12.~~8~~68	10.~~2~~18	11.~~2~~10	3~~1~~1.~~3~~09.61	~~2.5~~4.20	~~(1.0)~~(0.98)

Notes:

1. Treatment Capacity minus Maximum Day ~~Raw~~ Finished Water
2. Raw Water Average Day Allocation minus Average Day Demand

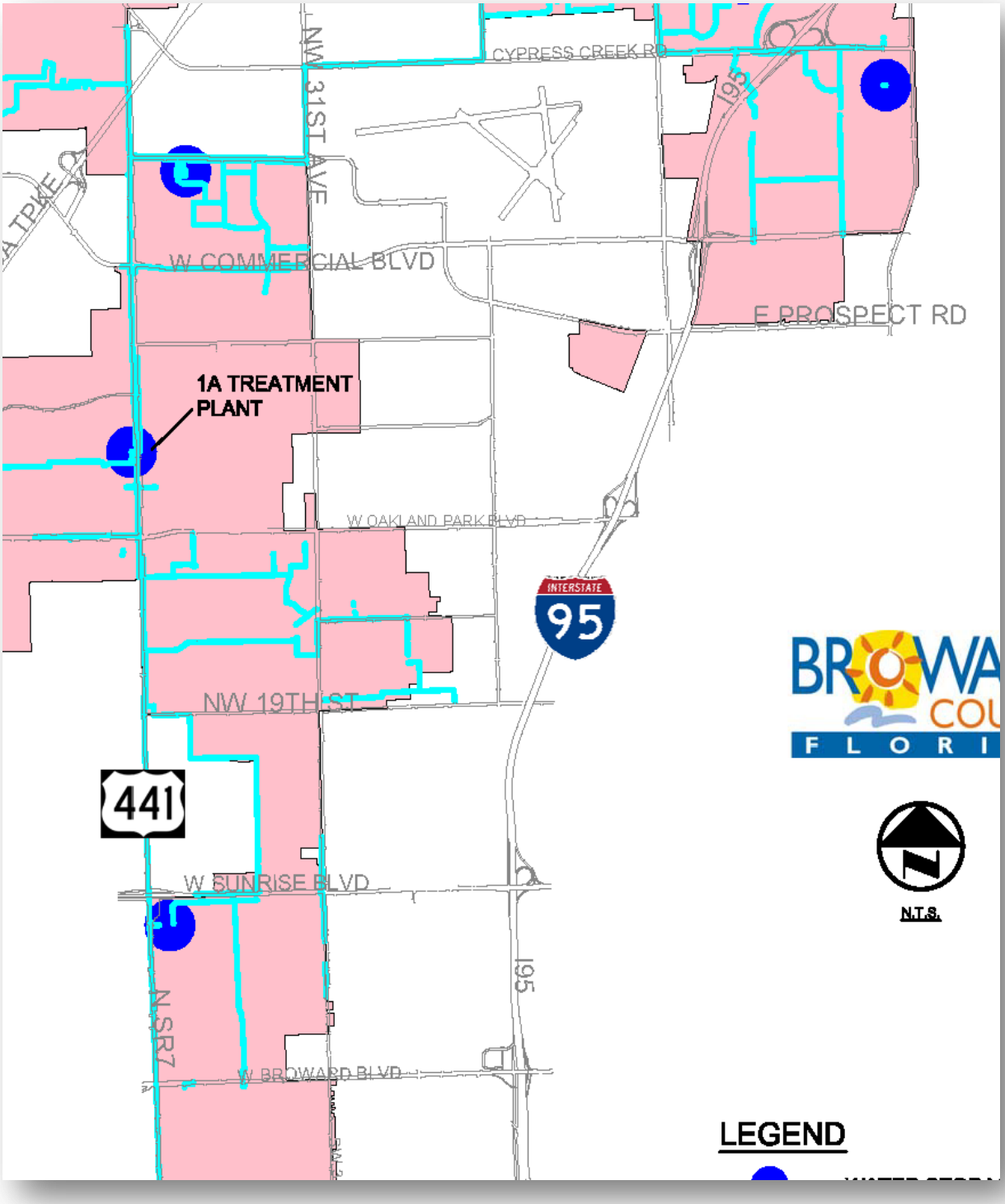


Figure 4.6: District 1 Service Area

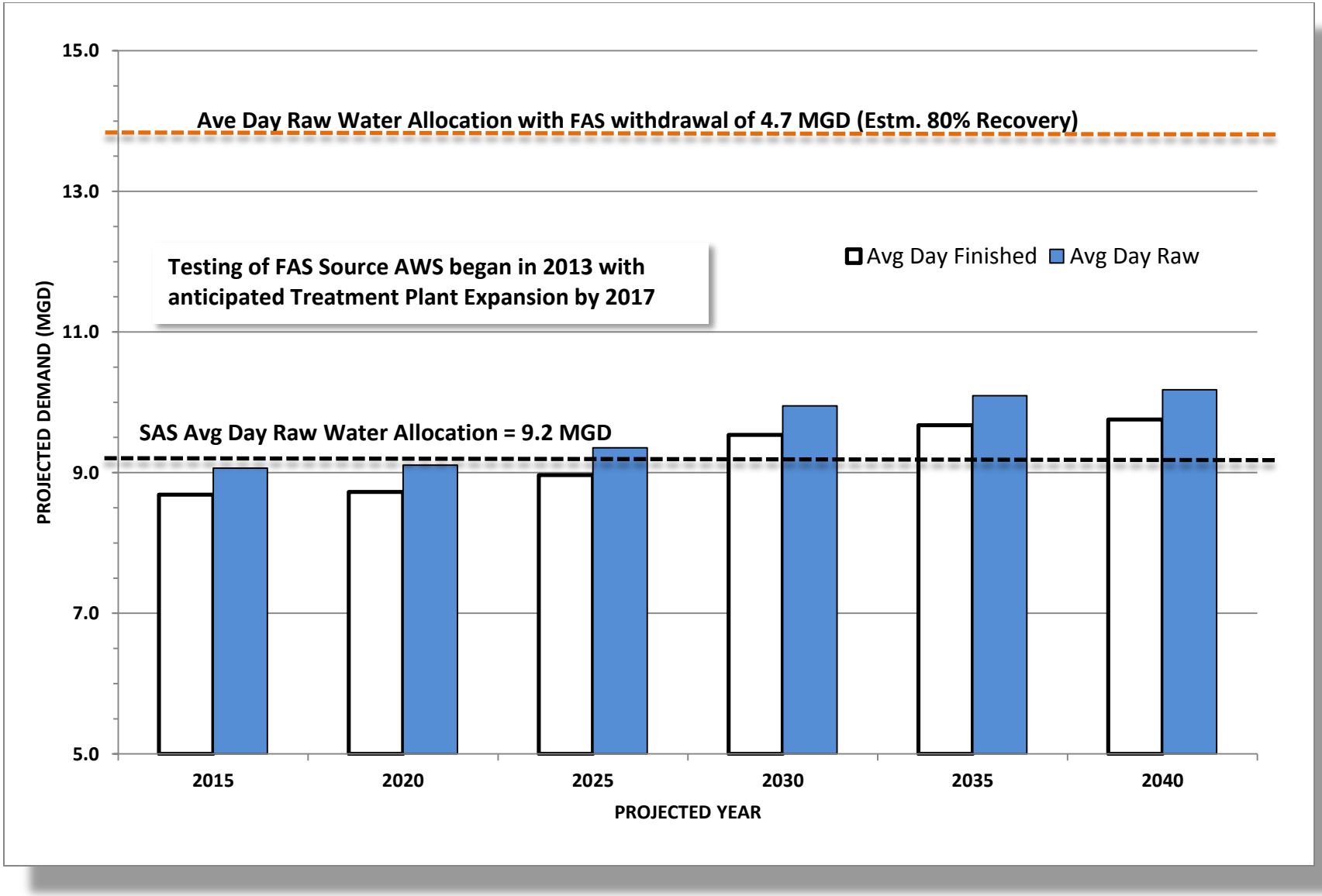


Figure 4.7: District 1 Finished and Raw Water Projected Demands vs. Allocations

4.4.1.2 District 2:

District 2, shown in **Figure 4.8**, is supplied by the BCWWS District 2 and the North Regional Wellfields, which draw raw water from the SAS. Raw water is treated at the District 2 WTP prior to distribution to retail customers and the City of Coconut Creek. The WTP facility's operating permit number is 06-58-00010. The plant was expanded to a physical capacity of 40.0 MGD in 1994 and the plant's permitted capacity is 30.0 MGD. The plant uses up-flow clarifiers and multimedia filtration to provide lime softening of the raw water supply. Per BCWWS' 2012 Annual Report, the plant is in good condition and all equipment was operating in a satisfactory manner. The projected year 2015 maximum day is 17.0 MGD or 57% of permitted plant capacity and 61% of physical plant capacity.

The District 2 wellfield contains seven wells with a total design capacity of approximately 27.1 MGD that are located surrounding the District 2 WTP. The total firm capacity of the wellfield is approximately 21.3 MGD, with the largest well out of service. Wells 1, 2, 3 and 5 have been plugged and abandoned. Pursuant to the SFWMD CUP No. 06-01634-W for the combined District 2 and North Regional Wellfields, issued in March 2008 for a 20-year permit duration, the maximum monthly and average annual daily withdrawals allowed from the SAS are 585.2 MGD and 17.5 MGD, respectively. The District 2 CUP also allots for a Floridan aquifer allocation of 152.8 MGM on a maximum month and 4.6 MGD on an average daily basis. According to the projected water use summarized in **Table 4.7** and shown graphically in **Figure 4.9**, no alternative water supply (AWS) projects will be needed in the near future. Development of a Floridan aquifer raw water wells have been located supply and construction of a RO WTP or constructed at District 2 are included in the County's Capital Improvement Program for authorization when projected demands indicate a need for additional water supplies.

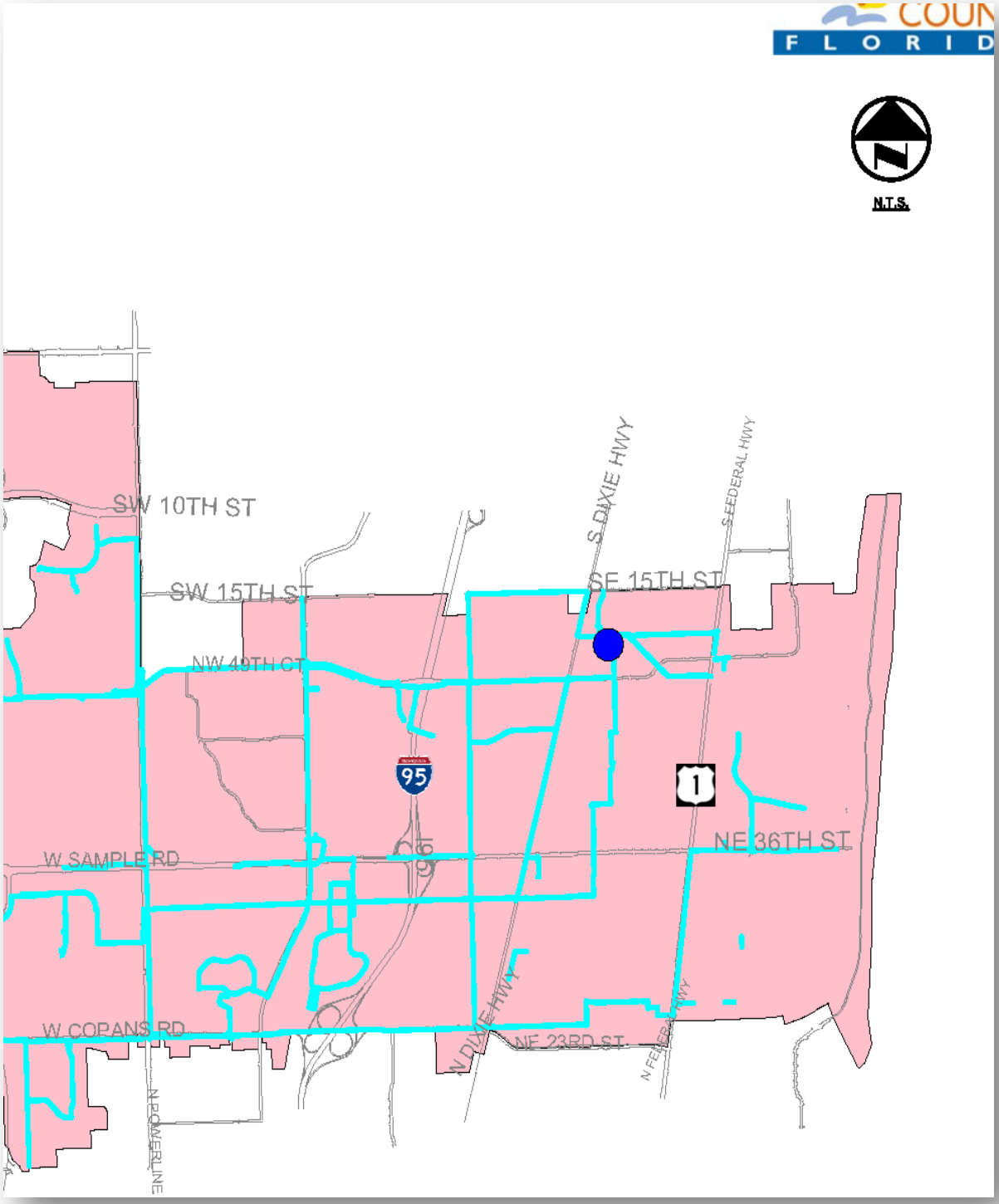


Figure 4.8: District 2 Service Area

Table 4.7: District 2/ Coconut Creek Finished and Raw Water Projected Demands

Planning Year	Pop. (UAZ Estm)	Finished Water		Raw Water Source - SAS			Treatment Capacity = 30.3 MGD	SAS Raw Water
		Level of Service = 119 GPCD		Level of Service = 124 GPCD				Avg Day Allocation = 17.5 MGD
		Max/ Avg Day Ratio = 1.3		Max/ Avg Day Ratio = 1.1				
		Average Day (MGD)	Maximum Day (MGD)	Average Day (MGD)	Maximum Day (MGD)	Average Month (MGM)	Treatment Surplus/ (Deficit) [1] (MGD)	Avg Day Surplus/ (Deficit) [2] (MGD)
2015	~~110,173~~111,496	13.~~1~~27	~~16.8~~17.25	13.~~7~~83	~~17.2~~15.21	~~415.5~~420.53	1~~3~~5.09	3.~~8~~67
2020	~~115,747~~116,272	13.84	17.~~6~~99	14.42	~~18.4~~15.86	~~436.6~~438.54	1~~2.7~~4.44	3.~~1~~08
2025	~~119,575~~120,159	14.~~2~~,30	18.~~2~~59	14.~~8~~90	~~19.0~~16.39	~~451.0~~453.20	~~12.1~~13.91	2.~~7~~60
2030	~~123,402~~123,409	14.~~7~~68	~~18.8~~19.09	15.~~3~~30	~~19.6~~ 16.83	~~465.~~4465.43	~~11.5~~ 13.47	2.~~2~~20
2035	~~124,854~~124,854	14.~~9~~86	19.~~0~~31	15.~~5~~48	~~19.8~~ 17.03	~~470.9~~470.91	~~11.3~~ 13.27	2.0~~1~~2
2040	~~125,506~~125,506	14.94	19.~~1~~42	15.~~6~~56	~~19.9~~ 17.12	~~473.4~~473.37	~~11.2~~ 13.18	1.94

Notes:

1. Treatment Capacity minus Maximum Day ~~Raw~~ Finished Water
2. Raw Water Average Day Allocation minus Average Day Demand

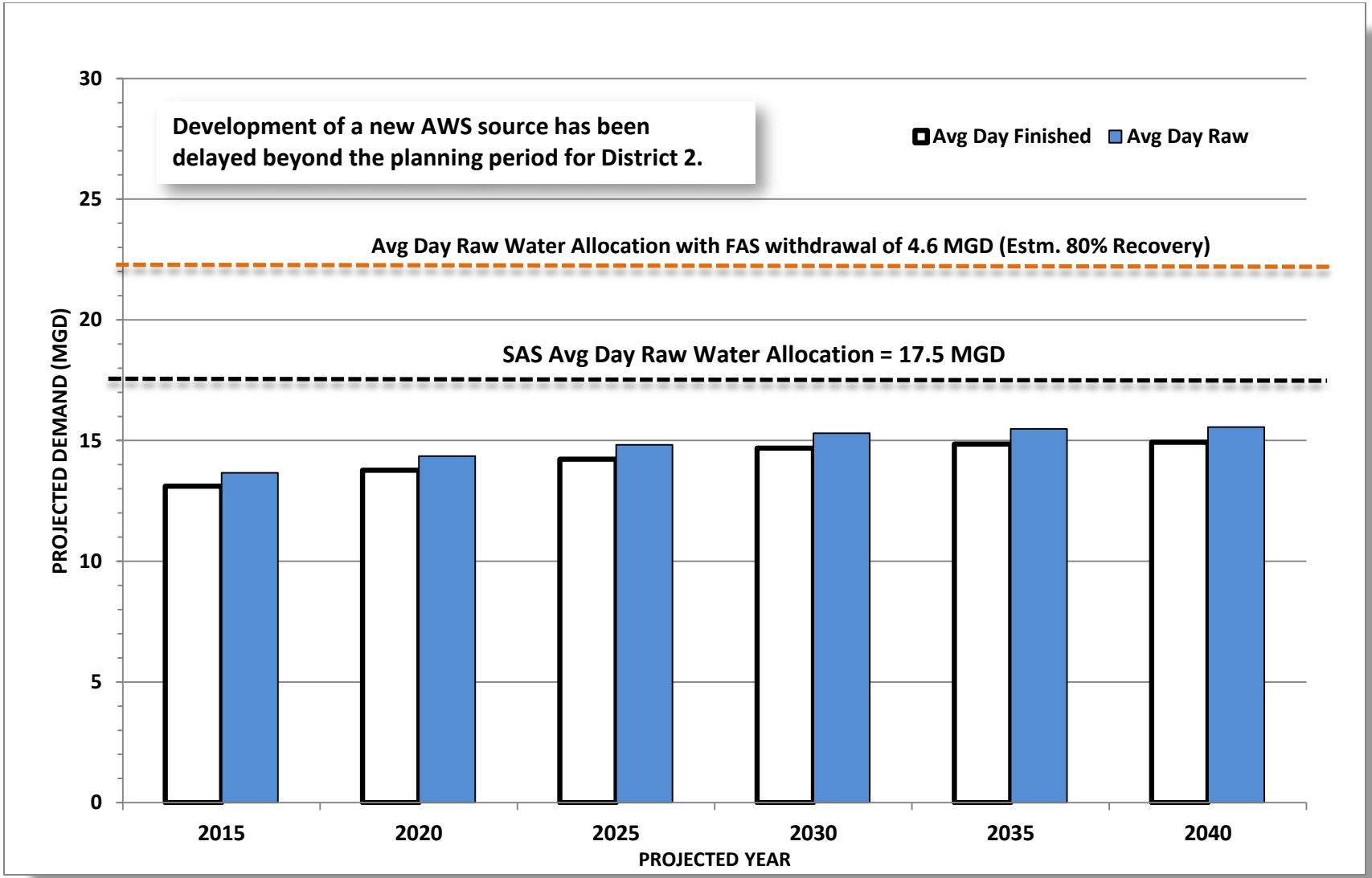


Figure 4.9: District 2 Finished and Raw Water Projected Demands vs. Allocations

4.4.1.3 District 3A and 3BC:

District 3 service area is divided into two geographical areas; District 3A and District 3BC, **Figure 4-10** and **Figure 4-11**, respectively. District 3 does not have water treatment facilities. The service areas are provided finished water through the County has entered into an agreement with the City of Hollywood whereby the City provides treated water to this district the County's distribution system. The City is responsible for ensuring adequate raw water supply and treatment facilities in their current Water Supply Plan Update to serve District 3. The City's existing CUP (Permit No. 06-00038-W) was issued by SFWMD on April 9, 2008 and expires April 9, 2028. The permit contains sufficient allocation to meet demands through the year 2028. BCWWS coordinated closely with the City during its CUP renewal process to ensure that future demands for District 3 were adequately addressed. Updated projected demands through the year 2040 for Districts 3A and 3BC are summarized in **Table 4-8** below. Maximum day is ~~9.46~~10.32 MGD for District 3.

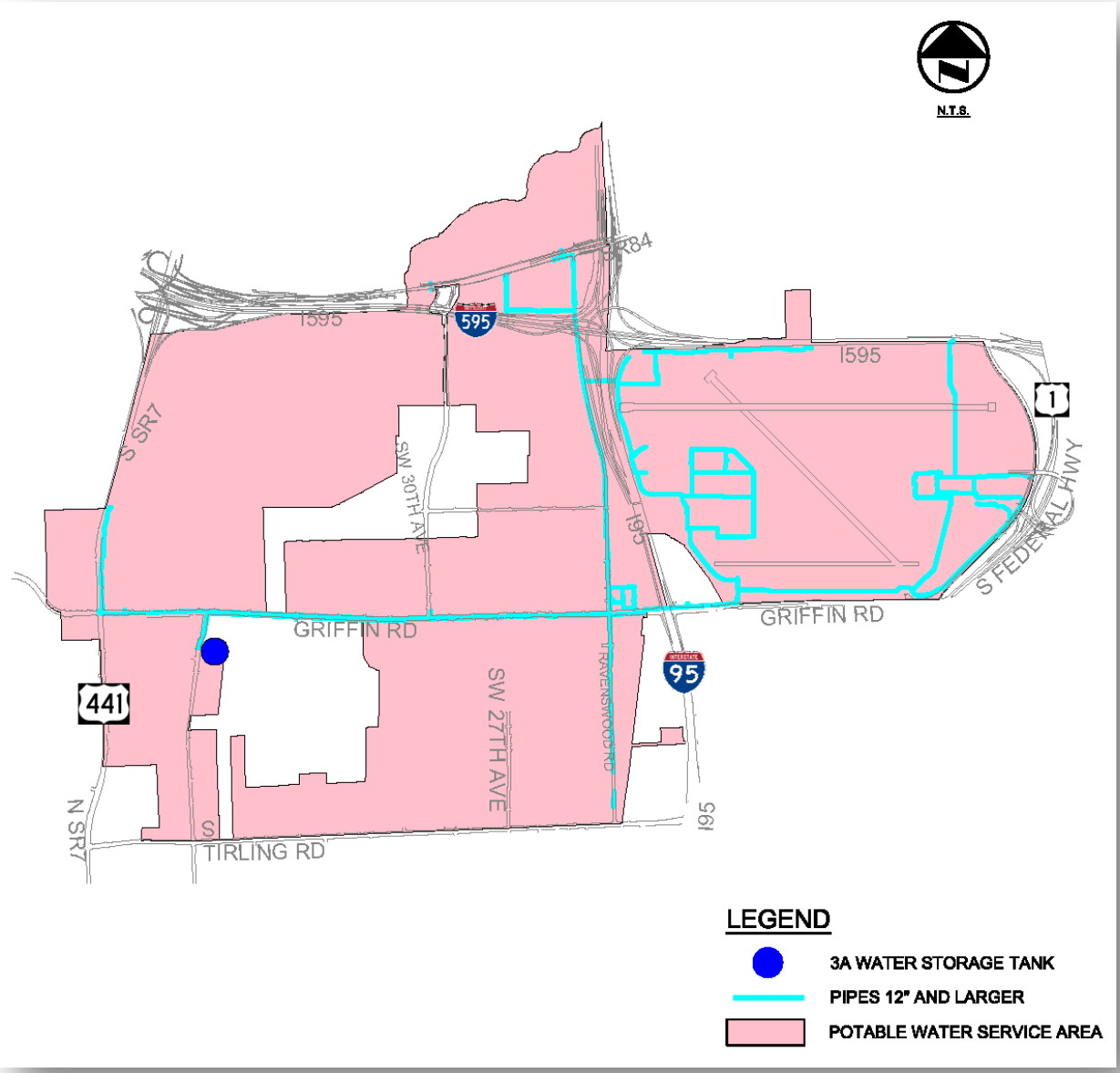


Figure 4.10: District 3A Service Area

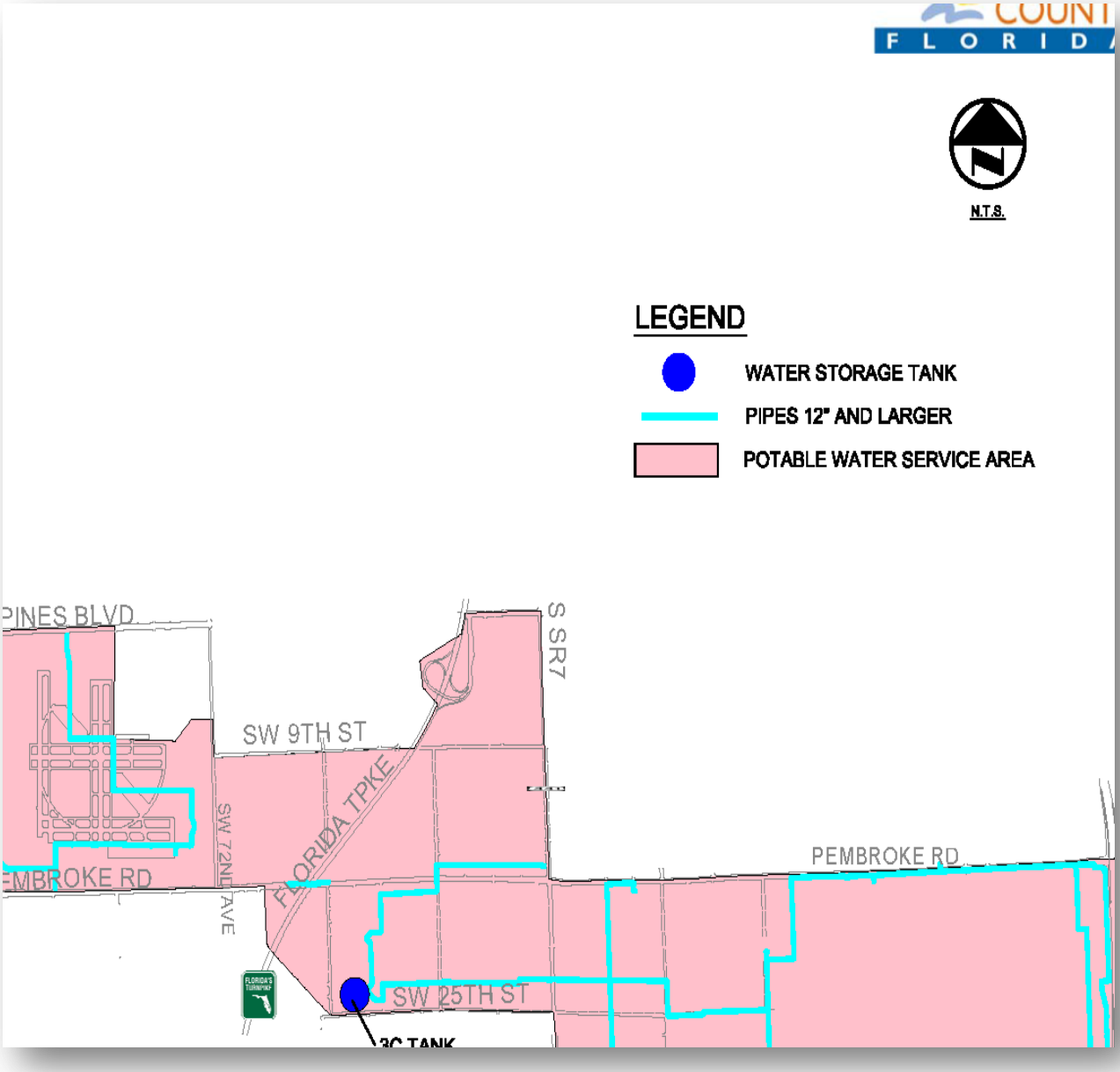


Figure 4.11: District 3BC Service Area

Table 4.8: District 3A and 3BC Finished Water Projected Demands

Planning Year	Dist. 3A Pop. [1] (UAZ Estm)	3A Finished Water Level of Service 197 GPCD [1] Max/ Avg Day Ratio 1.4 [2] Average Day (MGD)	3A Finished Water Level of Service 197 GPCD [1] Max/ Avg Day Ratio 1.4 [2] Maximum Day (MGD)	Dist. 3B Pop. [1] (UAZ Estm)	3BC Finished Water Level of Service 103 GPCD [1] Max/ Avg Day Ratio 1.5 [2] Average Day (MGD)	3BC Finished Water Level of Service 103 GPCD [1] Max/ Avg Day Ratio 1.5 [2] Maximum Day (MGD)	Total Dist. 3 Pop. [1] (UAZ Estm)	3A & 3BC Finished Water Average Day (MGD)	3A & 3BC Finished Water Maximum Day (MGD)
2015	16,~~384~~298	3.21	4.40	32,~~902~~852	3.~~4~~38	~~4.9~~4	49,~~286~~150	6.~~6~~59	9.~~4~~34
2020	~~16,960~~17,014	3.35	4.~~6~~59	33,~~660~~706	3.~~5~~47	5.~~1~~07	50,~~620~~720	6.82	9.~~6~~66
2025	17,4~~51~~42	3.44	4.71	3~~4~~,~~075~~ 3825	3.~~5~~48	5.~~1~~09	51,~~526~~267	6.92	9.~~8~~79
2030	17,~~758~~963	3.54	4.85	35,~~594~~763	3.~~7~~68	5.~~4~~38	53,~~556~~725	7.22	10.23
2035	17,9~~62~~28	3.53	4.~~9~~84	36,~~309~~285	3.74	5.~~5~~46	54,~~322~~213	7.~~3~~27	10.30
2040	~~18,013~~17,827	3.~~6~~51	4.~~9~~81	36,~~878~~640	3.~~8~~77	5.~~5~~51	54,~~897~~464	7.~~3~~29	10.~~4~~32

Notes:

1. Population Estimates and Level of Service based on BCWWS Aug. 2013 Update
2. Maximum to Average Day Ratio is based on BCWWS Comprehensive Plan Public Water Supply Element Update 2014

4.4.1.4 South System Regional Wellfield:

BCWWS operates the South Regional Wellfield (SRW) located in Brian Piccolo Park to supply SAS raw water to the Cities of Dania Beach, Hollywood, and Hallandale Beach and Florida Power and Light (FPL) from eight wells under large user agreements. The SFWMD CUP for the SRW is currently being. At this time, the total demand for the SRW is not anticipated to increase above 15.24 MGD, however an increase in the allocation may be requested to provide emergency flexibility should the coastal wellfields be impacted by saline water intrusion. Table 4-9 summarizes the SRW raw water demands through 2040.

Table 4.9: South System Regional Wellfield Raw Water Large User Average Day Projections

Year	Dania Beach Avg Day (MGD)	Hallandale Beach Avg Day (MGD)	Hollywood Avg Day (MGD)	FPL Avg Day (MGD)	SRW Avg Day (MGD)
2015	1.13	6.27	5.99	1.85	15.24
2020	1.13	6.27	5.99	1.85	15.24
2025	1.13	6.27	5.99	1.85	15.24
2030	1.13	6.27	5.99	1.85	15.24
2035	1.13	6.27	5.99	1.85	15.24
2040	1.13	6.27	5.99	1.85	15.24

Notes:

1. Projected based on the BCWWS 2008 Water Supply Plan Update.

4.4.2 City of Fort Lauderdale

The City of Fort Lauderdale water utility has sufficient Biscayne wellfield capacity and treatment capacity to meet the projected water supply demand in 2035, based on current water sources and treatment technology.

In 1926, the 6 MGD capacity Peele-Dixie lime softening WTP was opened in western Fort Lauderdale. Over the years, the plant has been expanded and modernized, increasing its capacity to 20 MGD (Table 2). In 2008 the WTP was converted from a lime-softening to a state-of-the-art membrane facility with a treatment capacity of 12 MGD at 85% treatment efficiency. Built in 1954, the Fiveash lime softening WTP was designed to treat 8 MGD. Through a series of expansions, the plant has been able to keep pace with the rapid growth experienced in Fort Lauderdale and today has a designed capacity of 70 MGD (Table 2). The Fiveash WTP is supplied raw groundwater for treatment from the Prospect wellfield.

Raw water for the City of Fort Lauderdale is supplied by the Peele-Dixie and Prospect wellfields, which draw from the SAS. The raw water is treated at two water treatment facilities, the Peele-Dixie nanofiltration plant and the Fiveash lime softening plant. There are a total of 37 active wells between the two well fields and 16 wells in operation at a given time. The Peele-Dixie and Prospect Wellfields have a combined pumping capacity of approximately 111 MGD. Wholesale customers receive finished water from the Fiveash WTP.

The City of Fort Lauderdale's CUP (Permit No. 06-00123-W) issued on September 11, 2008 for 20 years allows the City to pump a combined annual average daily allocation for the two wellfields of 52.55 MGD, and a monthly maximum daily allocation of 59.9 MGD. In 2013, the combined pumpage from the Peele-Dixie and Prospect Wellfields averaged 36.8 MGD (15.75 MGD below the permitted allocation). Although the Peele-Dixie and Fiveash WTPs have a combined design capacity of 82.0 MGD, hydraulic constraints at the Fiveash WTP limit its operating capacity to between 55.0 and 60.0 MGD. (**Table 4.10**)

The City of Fort Lauderdale maintains a total of 10 water system interconnections with BCWWS District 1 (3), the Cities of Plantation (1), Dania Beach (1), Tamarac (3), and Pompano Beach (1) and Town of Davie (1).

Table 4.10: Ft. Lauderdale Biscayne and Floridan Aquifer Withdrawal Limits (CUP06-00123-W)

Category	Limitations		
	Million Gallons per Year	**Million Gallons per Month**	**Million Gallons per Day**
Annual Biscayne Aquifer Withdrawal	19,181	--	52.55
Maximum Month Biscayne Aquifer Withdrawal	1,857	--	59.90
Dixie Wellfield Biscayne Withdrawal	5,475	465.0	15.00
Prospect Wellfield Biscayne Withdrawal	15,853	1,534.5	43.43

Annual Floridan Aquifer Withdrawal	**Annual Allocation**	**Maximum Month Allocation**
	3,153	300.6

Fort Lauderdale has adopted their finished water level of service for potable water at 197 gallons per capita per day (gpcd). In 2013, the average demand throughout their service area was 174 gpcd (**Table 4.11**).

Table 4.11: Fort Lauderdale Water Demand Forecast

Year	Population	Overall Raw Water Per Capita (gpcd)	Finished Water Per Capita (gpcd)	AADF Biscayne Aquifer Raw Water Demand (mgd)	AADF Finished Water Demand (mgd)	Max Day Finished Water Demand (mgd)
2005	238,725	202	200	48.1	47.8	60.61
2010	220,500	189	182	41.7	40.2	51.02
2015	228,546	186	179	42.4	41.0	52.01
2020	235,489	186	179	43.7	42.2	53.59
2025	251,758	186	179	46.7	45.1	57.30
2030	263,068	186	179	48.8	47.2	59.87
2035	267,196	186	179	49.6	47.9	60.81

4.5 CONSERVATION

4.5.1 Broward County

Broward County has implemented a number of water conservation elements as described in the following sections.

4.5.1.1 Water Use Restriction/Initiatives

As required in 40E-24 Florida Administrative Code, Broward County has enacted its own irrigation ordinance under Chapter 36, "Water Resources and Management," Article II, "Water Emergencies," Section 36-55:, "Restrictions on landscape irrigation, Year-round landscape irrigation measures" of the Broward County Code of Ordinances. This imposes year-round, county-wide landscape 2 day/week irrigation restrictions.

The County's service areas has been under either the SFWMD's mandatory Phase I and/or Phase II water restrictions or under the County's year-round ordinance since 2005. The overall per capita consumption continues to drop annually in response to a

combination of conservation messaging, financial incentives (High Efficiency Toilet rebates) and ordinance.

BCWWS has developed and implemented a successful strategy to systematically identify and eliminate, where possible, causes of water lost due to inaccurate flow metering and/or leaky pipes. This comprehensive program includes regular inspection, calibration and repair/replacement of meters where necessary, and the replacement of aging sewer and water infrastructure through the County's Neighborhood Improvement Projects. These programs have significantly improved through the County's Neighborhood Improvement Program, which is 93% complete. This has replaced over 26% of the BCWWS' underground infrastructure, thereby reducing leaks and per capita consumption.

As an essential part of the Broward initiatives is the implementation of high efficiency plumbing requirements supported by the Broward County Board of County Commissioners, the Broward League of Cities and the Broward Water Resources Task Force. On March 15, 2012, the Broward County Board of Rules and Appeals adopted changes to Chapter 6, Section 604.4, of the Florida Building Code which contains standards for ultra-low volume plumbing fixtures to be used in all new construction and Chapter 9, Section 908.5, which requires a minimum of 8 cycles of concentration for cooling towers and requirements of reuse concentrate for cooling tower make-up water for air handling systems with a 4-ton BTU capacity air handling system or greater as a condition for the receipt of Certificate of Occupancy.

4.5.1.2 Use of Florida-Friendly Landscape Principles

Pursuant to Section 373.228, Florida Statutes, the Broward County Board of County Commissioners approved a new water efficient landscape code on February 14, 2012. Chapter 39, "Zoning," Article VIII, "Functional landscaping and Xeriscaping for Protection of Water Quality and Quantity," of the Broward County Code of Ordinances, reflects the NatureScape Broward program principles that promote water and energy conservation while creating a climate resilient landscape. This is in effect for the unincorporated areas of Broward County and individual municipalities are adopting as a model landscape code. This program has developed nine principles for sustainable landscapes:

1. Right plant, right place
2. Water efficiently
3. Fertilize appropriately
4. Mulch
5. Attract wildlife
6. Manage yard pests responsibly
7. Recycle yard waste
8. Reduce stormwater runoff
9. Protect the waterfront.

4.5.1.3 Water Conservation Based Rate Structure

Rate structures that encourage water conservation reward consumers that have low rates of water consumption with the lowest per gallon charge and penalize those showing higher rates of water consumption with a higher per gallon charge. BCWWS has adopted a tiered rate structure to incentivize water conservation (Resolution 2012-579). More information on the rate structure may be found at the web address below:

http://www.broward.org/WaterServices/RatesAndFees/Pages/SingleFamily.aspx

4.5.1.4 Rain Sensor Overrides for New Lawn Sprinkler System

Broward County's "Functional Landscaping and Xeriscaping for Protection of Water Quality and Quantity," Ordinance is codified in the Broward County Code of Ordinances Section 39-79. Subsection 39-79(b)(11) includes the requirement for the location and specification of controllers of rain shut-off devices and soil moisture sensors as part of the landscape plan.

4.5.1.5 Public Information Program

Broward County has a targeted outreach program for Broward County employees that consist of education workshops and training on the need for water conservation, the principles of NatureScape, and assistance in the design of a NatureScape landscape. Participants are encouraged to apply for NatureScape certification following conversion

of their traditional landscape to a NatureScape design. Other Broward County programs discussed earlier include: Water Matters Day, Know the Flow, NatureScape Irrigation Services, and NatureScape Broward School Board Agreement.

Broward County WWS has developed a public education program that includes the development and distribution of brochures, educational materials for elementary and high school students, and presentations to homeowner and condominium associations regarding water supply, treatment and conservation. The utility also supports the Water Matters Program by purchasing and distributing rain gauges on Broward County's Water Matters Day.

4.5.2 City of Fort Lauderdale

The City of Fort Lauderdale has an active water conservation program as detailed in the City's CUP, ordinances and in their 2014 Water Supply Plan Update.

In the 2008 Consumptive Use Permit Renewal, the City used an aggressive approach to control their water demand by developing a conservation program through several initiatives. The first is the City's current efforts at retrofitting and upgrading significant portions of its water delivery systems, including leak detection. The City anticipates that the percentage of unaccounted for water loss will be reduced as this process is implemented. The second is the passage of an ordinance that the City estimated would meet a 10 percent reduction in the projected demands, compared to historical demands. The final initiative is the continued implementation of existing programs such as; limitation of irrigation hours, ultra low-volume plumbing in new developments, xeriscaping principles, conservation based rate structure, rain sensor requirements and the City's water conservation education program. The City expects to achieve certain quantifiable goals in the implementation of this program and the City will provide data to the South Florida Water Management District on the progress of this demand management program. The City estimates this effort will result in an estimated per capita use rate of approximately 170 gallons per day which was used for calculating the future demands for the service area.

The City also participates in the Broward County-wide ConservationPays Program in collaboration with 18 partners to provide a coordinated regional campaign focused on water conservation and the distribution of rebates and other incentives. A consistent marketing and media campaign advances water conservation efforts to reach a sustained minimum 10% reduction in water use county-wide over 20 years. This was estimated to be 30 million gallons/day (MGD).

As partners in the NatureScape Irrigation Services (NIS) with 18 local water utilities, the City annual selects a number of large water users including government facilities, parks, schools, and homeowner associations where the greatest potential exists for significant water savings. Tailored irrigation evaluations are performed by the NIS team of certified experts to capture measured water savings. Best Management Practices (BMPs) that

encourage the 'right plant in the right place' and smart irrigation are included in each report to help to promote water conservation messaging that adds to long-term water savings.

Fort Lauderdale has recently (2014) become a registered County municipality in the Community Wildlife Habitat program through NatureScape Broward. This program promotes water conservation, water quality protection, and the creation of wildlife habitat through Florida-friendly landscape practices that encourage the prudent use of water resources, and the planting of native, non-invasive, and other drought-tolerant plants.

4.6 REUSE

Section 373.250(1), F.S. provides "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."

This section highlights the present levels of reuse within each water supply entities' service area.

4.6.1 BCWWS

BCWWS operates the Broward County North Regional Wastewater Treatment Plant (WWTP) located in the City of Pompano Beach. The facility has an FDEP-permitted capacity of 95.00 MGD. It provides wastewater services for northern Broward County. In 2010, the annual average daily wastewater flow at the facility was 71.00 MGD. Approximately 4.40 MGD of the treated wastewater is reused at the facility or at adjacent facilities for irrigation, process, or cooling water.

In 2010, most of the treated wastewater was disposed of via deep injection wells (38.0 MGD) and ocean outfall (28.0 MGD). Of the water sent to the ocean outfall, an average 1.35 MGD was captured by the City of Pompano Beach in 2010 for further treatment and reuse. Overall, water reuse at the facility was approximately 6 percent of the wastewater treated at the facility.

The primary users include: Broward County Septage Receiving Facility, Broward County North Regional WWTP, Pompano Beach Park of Commerce and Wheelabrator Environmental Services.

Based on historic flows to the ocean outfall, the facility is required to reuse 21.45 MGD of treated wastewater by 2025 to comply with the 2008 Ocean Outfall statute (Section 403.086(9), F.S.). The BCWWS is promoting collaborative regional water supply strategies to meet the required 60 percent water reuse by 2025. BCWWS has

developed a regional reuse master plan and is working towards amended County ordinance(s) for the establishment of mandatory reuse zones.

BCWWS continues to investigate means to increase its reclaimed water usage, both as a method to meet future water needs and the requirements of the 2008 Ocean Outfall Program requirements. BCWWS is partnering with Palm Beach County Water Utilities Department to send reclaimed water into southern Palm Beach County for irrigation (see **Section 5** and **Section 6**) Some irrigation customers will be included in northern Broward County as the reclaimed water is sent northward. BCWWS is also in the process of extending reclaimed water to the Pompano Highlands neighborhood for irrigation. The City of Coconut Creek, which is within the North Regional WWTP's service area, installed infrastructure to accept reclaimed water from the facility, primarily for irrigation. The first phase of the City of Coconut Creek reclaimed water system is planned to be operational in 2014. The City of Pompano Beach, which takes treated wastewater from the County's ocean outfall pipeline, is expected to continue expanding its reclaimed system. Potential end users include: City of Coconut Creek, Pompano Highlands, Potential larger users (e.g., golf courses, parks, and schools).

4.6.2 Fort Lauderdale

The information captured below is from the recent 2013 LECWSP UPDATE Appendix C that details information related to each potable water provider as well as wastewater providers (District, 2013).

The City of Fort Lauderdale's George T. Lohmeyer Wastewater Treatment Facility is a central regional facility used to treat wastewater in a region encompassing Port Everglades, the cities of Fort Lauderdale, Wilton Manors and Oakland Park, and parts of the City of Tamarac, Town of Davie, and unincorporated Broward County. The facility has an FDEP-permitted capacity of 55.70 MGD and a 2010 annual average daily flow of 37.60 MGD. Treated effluent from the facility is disposed through five deep injection wells.

While the facility does not currently provide reclaimed water for reuse, the City is participating in the County-wide Integrated Water Resources Plan Grants for feasibility studies related to potential beneficial reuse. These have included a 2008 feasibility study for selected reclaimed water projects within the City for a 50% cost share for $125,000. A second feasibility study in 2009 was for the reclaimed water in the area of the Convention Center Broward County provided a 50% cost share for $5,000. The City of Fort Lauderdale continues to consider water reuse and options that can be used to help develop alternative water supplies. Indirect potable reuse systems are under consideration because of the dual benefits of providing more disposal capacity and augmenting local water supplies.

4.6.2 Hollywood

The city operates a regional WWTP that is subject to the requirements of the 2008 Ocean Outfall statute. Additionally, the city has proposed a reuse program to recharge the FAS as its primary project to meet the resuse requirements of the Ocean Outfall statute for the South Regional WWTP. More than 23 MGD of reclaimed water projects are expected to be developed by 2025. This city is a contributing member of the Broward Water Partnership conservation program, which has the goal of saving a total of 30 MGD countywide. Current projections indicate that the RO expansion project may not be needed during the twenty-year planning horizon.

5.0 Special Recommendations and Actions

5.1 BCWWS

Broward County WWS, as a Water Supply Entity, is responsible for the implementation of the water supply development projects identified in the 2013 Lower East Coast Water Supply Plan (LEC WSP) Update as approved by the District Governing Board September 2013. The County projects listed in Chapter 6 and Appendix F of the 2013 LEC WSP Update are listed below.

Broward County Ocean Outfall Requirements/Reuse Projects

BCWWS, in compliance with the requirements of the ocean outfall legislation, has submitted an Outfall Rule Detailed Plan in June 2013. This plan documents the County's intent to produce an additional 21.45 mgd of reclaimed water. Of the 21.45 mgd reclaimed water production, 19.7 mgd will be produced at NRWWTP. (The remaining reclaimed water will be produced through the Pompano Beach filter facility.) Approximately 4.2 mgd of the reclaimed water demand is scheduled for large reclaimed water users within Broward County, and approx. 11 mgd is scheduled for delivery to Palm Beach County through an interlocal commitment. The estimated capital cost for the total treatment and conveyance to Palm Beach County is anticipated to be $112 million ($47M for Palm Beach side and $65M for Broward), with an ~$100 M for the large users within Broward County. A portion of that cost is anticipated to be shared with Palm Beach County.

Aquifer Storage and Recovery (ASR). The Hillsboro Aquifer Storage and Recovery (ASR) project will evaluate the feasibility of capturing excess water that would be otherwise be discharged to tide and store it for later recovery during the dry season. ASR is a recognized alternative water supply technology and improves the efficiency of the water management system. This project was originally designed, constructed and briefly tested as a pilot component of the Comprehensive Everglades Restoration Program (CERP) but has been inactive since June 2012 when the pilot project ended. Broward County Water and Wastewater Services (BCWWS) and the South Florida Water Management District (SFWMD) are collaborating on operational testing of the system for the continued evaluation for water resource management, and enhancing the Broward County water supply. Approximately $200,000 will be required for a one-year period of cycle testing. The SFWMD will provide project management responsibilities to coordinate continued system operation, maintenance and regulatory compliance activities.

C-51 Reservoir Project. The County is participating in the development of funding strategies and a governance structure for the C-51 Reservoir. The County believes that the C-51 Reservoir will yield long-term regional benefits to the entire Lower East Coast Planning Region. The project has complex benefits including: protection of existing water supplies and water quality, saltwater intrusion mitigation, and diversification of

water sources and resource sustainability. The above-ground storage capacity in this unique geological formation will be especially beneficial for stormwater and flood control protection against extreme storm events relating to climate change. A recent study estimates Phase 1 costs of $160 million with construction commencing in the next few years.

Broward County-wide: Saltwater Intrusion Models for Central and Southern Broward County and Climate/ Inundation Model. Climate change and sea level rise pose significant threats to regional water supplies. Local impacts are accelerated by increased wellfield pumpage, rising sea level and aging urban drainage infrastructure leaving municipalities and water utilities grappling with how to balance the planning needs with the financial challenges.

In 2006 the Broward County's Natural Resources Planning and Management Division contracted with the USGS to develop a numerical model tracking the movement of saltwater intrusion. The model used the USGS's SEAWAT variable modeling code to track density-dependent flow and transport of chlorides as saltwater migration. The scope of the modeling was expanded to be able to assess, through sensitivity analysis, the determinate factors from various anthropogenic stresses and natural stresses on the movement of the saltwater front. These models also provide useful tools for future water management and resource planning.

The **Central and Southern Broward County Saltwater Intrusion Models** are expected to provide better understanding of the interaction between saline water migration and groundwater flow dynamics. The ultimate goal is to determine planning level costs for assessing long-term, cost-effective prevention and mitigation strategies. The central and southern saltwater intrusion models will complete the coverage of the entire county (earlier model focused on the North County) and are scheduled to be finished by March, 2015. Cost-share partners are Fort Lauderdale, Hollywood, Hallandale and Dania.

Building upon on-going saltwater intrusion modeling, the **Climate/ Inundation Model** will assess the influence of changing climatic conditions on the urban water resources and infrastructure. This effort is funded through a 4-year agreement with the USGS and integrates bias-corrected, dynamically-downscaled data from Global Circulation Models into the updated surface/groundwater model. The model will be used for assessing county-wide hydrologic conditions and testing of select adaptation strategies based on future climate conditions, including sea level rise, and changes in precipitation and evaporation.

Upper Floridan Geotechnical Study. Broward County, with the USGS is exploring the development of the Upper Floridan Aquifer as an alternative water supply. The project expands upon work completed in Phase 1 and includes geotechnical work and seismic analysis of upper Floridan Aquifer in south-central Broward to provide a more robust picture of the aquifer. Phase II includes cost-share support in collection and analysis of seismic data the collection of seismic survey lines along several primary canals in

Broward County. The seismic data and synthetics logs, together with new borehole hydrogeological, geologic and geophysical data acquired from wells in the study area are currently being analyzed. Cost-share partners are BCWWS and Sunrise. The completion date is December 31, 2015.

Broward County Water Partnership. An ongoing High Efficiency Toilet Replacement and water conservation incentives Program that strives to reach 30 MGD of savings by 2030. Broward Water and Wastewater Services are media partners in the County-wide Water Conservation Incentives Program, launched in 2011. This program has provided approximately 4,500 high efficiency toilets with an estimated water savings of 450 thousand gallons per day. The program utilizes monthly promotional material, PSAs, radio adds, etc. to promote a consistent water conservation messaging throughout the partner service areas. This covers almost 80% of Broward County. The program is supported through the District's Water Sip dollars, which in 2014 was $50,000.

Additionally, **Broward County Water & Wastewater Services High Efficiency Toilet Rebate Program** has been in existence since 2010 and has offered over $250,000 in billing credits for replacing 2,500 water wasting toilets. This effort is supported by $30,750 of matching funds from South Florida Water Management District. Promotion of this program throughout the BC WWS' service area will continue through this next five-year planning period unchanged.

5.2 FORT LAUDERDALE

The City is also participating in the C-51 Finance and Governance Work Group and their Utility Director has been appointed as a member.

The City is a cost-share partner in the Central and Southern Broward County Saltwater Intrusion Models.

6.0 BCWWS CAPITAL IMPROVEMENTS

This section provides a brief description of the BCWWS Capital Improvements Program and Policies for Water Supply.

6.1 WORK PLAN PROJECTS

The 2014 Work Plan includes the listing of public, and regional water supply projects and programs over the next 10 year period (at a minimum) that may be necessary to serve the BCWWS service area and Large Users. The following sections include additional information related to the development of traditional and alternative water supply sources, and conservation and reuse initiatives that are being advanced to support water resource and water supply protections.

This information follows the information that was given as an acknowledged receipt of the South Florida Water Management District's (District's) December 2013 notification by certified mail that Broward County, as a Water Supply Entity, is responsible for the implementation of the water supply development projects identified in the 2013 Lower East Coast Water Supply Plan Update (LEC WSP) as approved by the District Governing Board September 2013.

The County projects listed in Chapter 6 and Appendix F of the 2013 LEC WSP Update are listed below.

- **District 1A Treatment Plant Expansion** (RO, WTP, Floridan Wells, and a Disposal Well). In the submitted CUP/AWS update for District 1, the District 1A Treatment Plant Expansion project completion date was modified from 2017 to 2019 as a result of the reduced water demand forecasts in 2010 and 2011. The overall cost of the project has increased to an estimated $48.2 million as a result of recent increases in construction costs. Currently, the County is completing the construction of two Floridan Test wells at the District 1 treatment plant and anticipated results from testing to be available late 2014.

  Estimated Completion Date in 2017 at a cost of approximately $41.1 million for an additional 1.5 million gallons per day (MGD) of reverse osmosis (RO) treatment capacity by 2020.

- **District 2A Reclaimed Water Highlands Pompano Beach.** The Reclaimed Water Distribution Project to supply the Pompano Beach Highlands area with reclaimed water in the District 2 service area is nearing overall completion. The distribution lines associated with reclaimed water are expected to be complete by the third quarter of 2014 and the County is actively negotiating the purchase of up to 0.3 MGD of reclaimed water from the City of Pompano Beach.

  Estimated Completion Date in 2013 at a cost of approximately $6.5 million for 0.3 MGD of Distribution

- **Broward County Water Partnership.** The ConservationPays Partnership is a successful County-wide program that has been in operation since 2011. The program has provided approximately 4,500 high efficiency toilets and $450,000 in toilet rebates with an estimated water savings of approximately 442 thousand gallons per day since 2011. The BCWWS participates in this program as a media partner. The County's BCWWS also promote a toilet rebate program for their own customers. This program accounts for an additional 2,250 high efficiency toilets and $230,000 in billing credit rebates since 2010. The promotion of the conservation messaging throughout the County of the ConservationPays program as will the BCWWS rebate program will continue through this next five-year planning period unchanged.

  An ongoing High Efficiency Toilet Replacement and Conservation Devices/ Credit Program that anticipates 30 MGD of savings by 2030.

6.2 CAPITAL IMPROVEMENTS ELEMENT/SCHEDULE

The 2014 Work Plan identifies and addresses the public, and regional water supply facilities needed within the BCWWS jurisdiction. The public and regional projects and programs necessary during the next five years to achieve and maintain adopted level of service standards, are shown as identified projects and programs in Broward County's Five-Year Schedule of Capital Improvements. These projects address the costs of capital improvements, the funding source, responsible entity, and correlate to the populations to be served and construction timeline.

Table 6.1: Water and Wastewater Projects in Current CIE/CIA TABLE 14-F

Table 14-F
Water and Wastewater Capital Projects Fiscal Year (FY) 2013/2014 – FY 2017/2018

APPROPRIATIONS	DOI	Other Prior Year Approved Projects Not Completed	FY 13/14		FY 14/15		FY 15/16		FY 16/17		FY 17/18		TOTAL 2013/14-2017/18	CONSISTENCY
Potable Water Storage Tank Repairs	B	0	0		150,000	1,3	2,050,000	1,3	0		0		2,200,000	
Rehabilitate Process Equipment	A	0	300,000	1,3	300,000	1,3	300,000	1,3	300,000	1,3	300,000	1,3	1,500,000	PWE Obj. 4.1
Repair District 2 Water Storage Tank	A	0	0		50,000	1,3	350,000	1,3	0		0		400,000	PWE Obj. 4.2
Sanitary Systems Improvements	B	1,326,348	550,000	1,3	0		0		0		0		550,000	SSE Obj. 5.1
Service Area Infrastructure Improvements 310 pipe replacement	A,B	197,405	10,130,000	1,3	1,057,000	1,3	0		0		0		11,187,000	
Service Area Infrastructure Improvements 314 pipe replacement	A,B	135,521	3,057,500	1,3	0		0		0		0		3,057,500	
Service Area Infrastructure Improvements 316 pipe replacement	A,B	384,019	7,055,350	1,3	164,810	1,3	0		0		0		7,220,160	
Service Area Infrastructure Improvements 318 pipe replacement	A,B	348,914	3,927,390	1,3	173,470	1,3	0		0		0		4,100,860	
Short Line Extensions	A,B,C	0	500,000	1,2,3	500,000	1,2,3	500,000	1,2,3	500,000	1,2,3	500,000	1,2,3	2,500,000	PWE Obj. 4.1 SSE Obj. 4.1
Steel Storage Tank Replacement at Water Treatment Plant 1A	B	1,238,313	200,000	1,3	0		0		0		0		200,000	
Treasure Cove Sanitary Sewer Extension	A,B	0	165,000	1,2,3	3,366,000	1,2,3	0		0		0		3,531,000	PWE Obj. 4.1 PWE Obj. 4.2 SSE Obj. 5.1 SSE Obj. 5.2
Water Conservation Plan	C	0	108,070	1,3	100,000	1,3	0		0		0		208,070	PWE Obj. 4.3
Water Treatment Plant 1A Treatment Expansion	C	0	1,273,990	1,2,3	37,103,000	1,2,3	0		0		0		38,376,990	PWE Obj. 4.2
Water Treatment Plant 2A Treatment Expansion	C	0	0		0		700,000	1,2,3	0		3,960,000	1,2,3	4,660,000	PWE Obj. 4.2
Capital Project Support - Treatment	A,B,C	0	880,330	1,3	1,755,700	1,3	807,000	1,3	2,144,870	1,3	2,080,740	1,3	7,668,640	
Billing Meters	B	0	150,000	1,3	465,750	1,3	0		5,352,300	1,3	0		5,968,050	
NRWWTP** Capacity Improvement	C	26,592,774	22,500,000	1,2,3	48,500,000	1,2,3	0		0		0		71,000,000	SSE Obj. 5.1
NRWWTP** Disposal System - Reclaimed Water	C	0	0		1,500,000	1,3	0		0		6,000,000	1,3	7,500,000	SSE Obj. 5.1 SSE Obj. 5.2
NRWWTP** Disposal System Transmission System	C	7,500,000	0		2,000,000	1,3	1,500,000	1,3	5,000,000	1,3	4,500,000	1,3	13,000,000	SSE Obj. 5.1 SSE Obj. 5.2
NRWWTP** Effluent Disposal Treatment Enhancements	A,C	18,158,211	339,870	1,3	0		0		0		0		339,870	SSE Obj. 5.1
NRWWTP** Emergency Power System	A	0	0		0		0		3,700,000	1,3	0		3,700,000	
NRWWTP** Energy Project Measurement and Verification	A	0	0		67,000	1,3	67,000	1,3	67,000	1,3	67,000	1,3	268,000	
NRWWTP** Facilities Improvements	A,B	7,380,000	1,420,000	1,3	20,330,000	1,3	300,000	1,3	16,030,000	1,3	33,640,000	1,3	71,720,000	SSE Obj. 5.1

*All Revenues are from committed sources
**North Regional Wastewater Treament Plant
Water and Wastewater revenue sources for the five year capital program include user fees (1); capital recovery charges (2); bond proceeds (3); and fund balance (4).
DOI: Delineation of Improvements: A. Reduce existing deficiencies, B. For replacement, C. Meet Future demand

7.0 GOALS, OBJECTIVES AND POLICIES

The following comprehensive plan goals, objectives, and policies (GOPs) have been reviewed for consistency with the 2014 Work Plan. New GOPs to be adopted and existing GOPS to be revised are identified below.

The following GOPs have been adopted in the original Work Plan and have been reviewed to see if updates are revisions are needed:

a. Coordination of land uses and future land use changes with the availability of water supplies and water supply facilities;

b. Review and revision of potable water level of service standards for residential and non-residential users;

c. Provision for the protection of water quality in the traditional and new alternative water supply sources;

d. Revision of priorities for the replacement of facilities, correction of existing water supply and facility deficiencies, and provision for future water supply and facility needs;

e. Provision for conserving potable water resources, including the implementation of reuse programs and potable water conservation strategies and techniques;

f. Provisions for improved or additional coordination between a water supply provider and the recipient local government concerning the sharing and updating of information to meet ongoing water supply needs;

g. Coordination between local governments and the water supply provider in the implementation of alternative water supply projects, establishment of level of service standards and resource allocations, changes in service areas, and potential for annexation;

h. Coordination of land uses with available and projected fiscal resources and a schedule of capital improvements for water supply and facility projects;

i. Additional revenue sources to fund water supply and facility projects;

j. Coordination with the respective regional water supply plan;

k. Update the Work Plan within 18 months following the approval of a regional water supply plan; and

l. Concurrency requiring water supplies at the building permit stage.

7.1 GOALS, OBJECTIVES, AND POLICIES SUPPORTING WATER SUPPLY PLANNING

There are numerous Goals, Objectives, and Policies (GOPs) found within Broward County's Comprehensive Plan which support the County's Water Supply Facilities Work Plan and the requirements of Chapters 163 and 373, (F.S.). These can be found within the elements of the County's Comprehensive Plan:

- Potable Water
- Sanitary Sewer
- Drainage and Natural Aquifer Groundwater Recharge
- Conservation
- Coastal Management
- Intergovernmental Coordination
- Capital Improvements

The selection of those GOPs included here reflects the County's commitment to water supply planning and water resource protections and is inclusive of any recommended changes that will be included in this current transmittal package:

Future Unincorporated Area Land Use

Objective 2.5. Conserve and protect natural resources, and historic resources.

Policy 2.5.1. Broward County shall protect groundwater quality by continuing to implement the wellfield protection provisions of the Broward County Code of Ordinances.

Policy 2.5.2. The Broward County Public Health Department of the Florida Department of Health shall continue to protect the groundwater supply from potential sources of contamination in accordance with the water and septic tank provisions of the Broward County Code of Ordinances.

Policy 2.5.3. Broward County shall reduce potential groundwater pollution sources by continuing to implement the wastewater collection and transmission provisions of the Broward County Code of Ordinances.

Policy 2.9.6. Consistent with Potable Water Element Policy 4.2.6, Drainage and Natural Groundwater Aquifer Recharge Element Policy 7.2.7., Sanitary Sewer Element Policy 5.2.6., and Solid Waste Element Policy 6.2.2., the impact of infrastructure improvements on adjacent natural resources shall be considered when making land use decisions. ***NOTE: this policy will be updated along with the broader comprehensive plan changes scheduled to occur in 2015***.

Policy 2.10.21. The PRD shall recommend the designation of land use categories on the FUALUEMS in accordance with the availability of public

facilities and services needed to support development concurrent with the impacts of development and consistent with the adopted level of service standards in the Broward County Comprehensive Plan elements including: Transportation, Mass Transit, Sanitary Sewer, Solid Waste, Potable Water, Drainage and Natural Groundwater Aquifer Recharge, Recreation and Open Space, and Public School Facilities.

Potable Water

Goal 4.0. Provide current and future residents of the ~~Unincorporated Area, customers~~ County's utility service areas, and large users of the Broward County ~~utility districts'~~ regional raw water system a cost-effective and equitable potable or raw water supply system which provides an adequate supply of water meeting all applicable federal, state and local water quality standards and does not compromise the sustainability of the ~~c~~County's water resources or ability to supply water in the future.

Objective 4.1. Broward County Water and Wastewater Services (WWS) shall provide current and future residents of the County's utility service areas, customers and large users of Broward County WWS a cost effective, equitable and adequate potable water system meeting all applicable federal, state, and local standards and shall identify and, where feasible, correct existing potable water facilities' deficiencies by 20~~18~~24.

Policy 4.2.1. Broward County WWS and the Environmental Planning and Community Resilience Division will strive to ensure the adequacy of water supply facilities and infrastructure to effectively capture, store, treat, and distribute potable water under variable climate conditions, including changes in rainfall patterns, sea level rise projections of 9 to 24 inches from 2010 to 2060, and flooding, with potential water quality and quantity impacts.

Policy 4.2.2~~4~~4. Broward County WWS shall ~~access~~ assess the adequacy of service and concurrency for potential Broward County retail customers. For Coconut Creek, a bulk purchaser of potable water, Broward County WWS will use the flow information contained in the Health Department permit application to ~~access~~ assess the adequacy of service and concurrency.

Policy 4.2.4~~6~~6. Prior to approval of a building permit, Broward County shall consult with the appropriate water supplier(s) to determine whether adequate water supplies to serve the new development will be available no later than the anticipated date of issuance of a certificate of occupancy.

Policy 4.2.5~~7~~7. ~~Planning for additional capacity and/or a reduction in per capita demand shall be included in the~~ Broward County ~~will~~ hereby adopts a 10-Year Water Supply Facilities Work ~~p~~Plan as required in Chapter 163 of Florida Statutes (F.S.), by reference to ~~increase the coordination of local land use and~~

~~future water supply planning.~~ incorporate any alternative water supply projects including conservation and reuse that may be identified in the regional water supply plan as necessary to serve existing and new development.

Policy 4.2.~~5~~7. ~~Planning for additional capacity and/or a reduction in per capita demand shall be included in the~~ Broward County ~~will~~ hereby adopts a 10-Year Water Supply Facilities Work~~-p~~Plan as required in Chapter 163 of Florida Statutes (F.S.), by reference to ~~increase the coordination of local land use and future water supply planning.~~ incorporate any alternative water supply projects including conservation and reuse that may be identified in the regional water supply plan as necessary to serve existing and new development.

Policy 4.2.~~8~~10. In order to protect and conserve the ~~Biscayne~~ Surficial Aquifer System, and limit demands on the regional water management system, the Broward County Environmental Protection and Growth Management Department (EPGMD) shall ~~continue to~~ investigate the development ~~utilization~~ of alternate water sources to supplement and broaden the ~~c~~County's future water supply sources ~~as described in the 10-Year Water Supply Facilities Workplan. These potential sources could include~~ through the increased use of reclaimed wastewater, ~~improved methods of~~ conservation, development of the Floridan Aquifer~~,~~ Aquifer Storage and Recovery (ASR), improved operations to increase stormwater reuse and aquifer recharge, and by improvements to the secondary canal infrastructure, and other technologies and management strategies ~~which may be reflected addressed in~~ consistent with the goals of the 2013 ~~in~~ Lower East Coast Water Supply Plan ~~2005-2006~~ Update. ~~of the South Florida Water Management District (SFWMD).~~

Policy 4.2.~~10~~12. Broward County shall encourage maximizing the use of existing potable water facilities and reducing redundant facilities, considering necessary adaptation of climate change impacts, especially sea level rise projections of 9 to 24 inches from 2010 to 2060, ~~is incorporated~~ consistent with current water policy, including the SFWMD Regional System Water Availability Rule adopted February 15, 2007 ~~by the SFWMD.~~

Policy 4.2.15. Broward County shall work to protect existing wellfields, surface or subsurface storage facilities, control structures, water and wastewater treatment plants and transmission infrastructure from increased coastal flooding, sea level rise, saltwater intrusion, and other potential future climate change impacts, and plan for infrastructure replacement and relocation as needed to maintain the County's potable water LOS as outlined in the County's Climate Change Element.

Objective 4.3. Utilize existing potable water facilities to the extent permitted and encourage compact urban growth patterns.

Policy 4.3.6. Broward County shall identify water infrastructure at risk from sea level rise projections of 9 to 24 inches (timeframe of 2010 to 2060) and other climate change related impacts by 2015, and update this assessment every 5 years.

Objective 4.4. Conserve, ~~and~~ protect, and efficiently manage available potable water resources with a primary focus on the Biscayne Aquifer by optimizing the utilization of water resources through effective water management practices and development of alternative water supplies with appropriate consideration of climate change impacts.

Policy 4.4.6. Broward County shall develop a County ordinance requiring the connection of existing and new irrigation systems to available reclaimed water lines for use in irrigating landscapes and pursue the establishment of mandatory reuse zones, fully considering the availability of flows, the proximity of irrigation systems to reclaimed water lines, and the costs and effectiveness of such connections.

Policy 4.4.~~3~~8. Broward County shall continue to maintain Chapter 36, "Water Resources and Management," Article II, "Water Emergencies," Section 36-55, ~~"Restrictions on landscape irrigation,"~~ "Year-round landscape irrigation variances," Broward County Code of Ordinances, which imposes year-round, ~~c~~County-wide landscape irrigation restrictions.

Policy 4.4.4~~9~~9. ~~The~~ Broward County Environmental Licensing and Building Permitting Division ~~Permitting, Licensing, and Consumer Division (PLCPD)~~ shall continue to enforce Chapter 39, "Zoning," Article VIII, "~~Functional landscaping and Xeriscaping~~ Landscaping for Protection of Water Quality and Quantity," Broward County Code of Ordinances, which reflects the NatureScape Broward program principles that promote drought tolerant and native plants, landscape best management practices and the preservation of habitat as part of sustainable urban landscapes.

Policy 4.4.6~~1~~11. Broward County WWS shall continue to implement its conservation-oriented utility service rate structure and other conservation measures required by Broward County ordinance. ~~within its WWS utility systems.~~

Policy 4.4.~~7~~12. Broward County WWS shall continue to implement a leak detection program to reduce the amount of unaccounted-for water loss within ~~its~~ the Broward County utility systems.

Policy 4.4.~~8~~13. Broward County's Environmental Planning and Community Resilience Division shall continue to develop and implement County-wide water conservation programs and initiatives including: The County-wide Water Conservation and Incentives Program, the Water Matters education and

outreach program, NatureScape Broward, and the NatureScape Irrigation Service (NIS).

Policy 4.4.~~10~~16. The Broward County Health Department, Florida Department of Health shall reduce potential groundwater pollution sources and protect groundwater supplies by continuing to implement Chapter 34, "Water and Sewers," Article II, "Water and Sewer Connection Ordinance," and Article II 1/2, "Water, Sanitary Sewer and Septic Tank Ordinance," Broward County Code of Ordinances.

Policy 4.4.~~12~~17. Broward County shall protect groundwater quality by continuing to implement the Broward County Code of Ordinances, Chapter 27, Article XIII Wellfield Protection Ordinance~~, Broward County Code of Ordinances~~, which regulates the storage, handling, usage, disposal or production of hazardous materials and solid waste within designated zones of influence as identified in the Code.

Objective 4.5. Potable water facilities shall be designed, constructed, maintained and operated in such a manner as to protect the functions of natural groundwater recharge areas and natural drainage features ~~and not exacerbate saltwater intrusion.~~without inducing the inland movement or upwelling of saline water into Underground Sources of Drinking Water (USDW) as defined in Chapter 62-528, FAC, and SFWMD Basis of Review for Water Use as referenced in Chapter 40E-2, FAC.

Policy 4.5.1. The design for the construction, operation and maintenance, of new or expanded potable water facilities shall consider the short-term and long-term impacts to natural groundwater recharge areas, wetlands, surface and groundwater levels, and exacerbation of saltwater intrusion considering sea level rise. ~~The design shall also consider whether or not the construction, operation and maintenance will significantly harm the aquifer system or result in any additional demand upon the regional system.~~ Adverse impacts of construction, operation, and maintenance shall be avoided or at least minimized.

Sanitary Sewer

Goal 5.0. The Broward County Environmental Protection and Growth Management Department (EPGMD) and Broward County Water and Wastewater Services (WWS) shall identify the needs of and ~~P~~provide the ~~U~~unincorporated areas, large users, and Broward County utility district customers, cost effective, equitable and adequate sanitary sewer facilities meeting applicable federal, state, and local design standards and effluent water quality standards.

Objective 5.3. Broward County WWS shall promote the resiliency of existing and planned sanitary sewer infrastructure or retrofits from the impacts of climate

change, while improving energy efficiency and reducing related carbon emissions as outlined in the Climate Change Element.

Objective 5.45. Sanitary sewer facilities shall be designed, constructed, maintained, and operated in a manner that conserves and protects potable water resources by optimizing the use of reclaimed wastewater, where feasible, thus offsetting demands on the ~~Biscayne~~ Surficial Aquifer System (SAS).

Policy 5.45.1. Broward County shall encourage the use of reclaimed water as an integral part of its wastewater management program, and evaluate the costs and benefits of adaptation alternatives for increased efficiency, and optimization capacity of existing facilities where economically, environmentally, and technically feasible.

Policy 5.45.3. Broward County shall continue public education, coordination and program support for the expansion of beneficial reuse of reclaimed water, while encouraging regional ~~the~~ reuse ~~of water of an appropriate quality level for the purpose intended~~ projects.

Policy 5.5.4. Broward County shall coordinate with local municipalities, water and wastewater utilities by 2015, to develop policies and plans that set short-, intermediate-, and long-range goals and establish adaptive management implementation strategies for water and wastewater resources under their jurisdiction to address the potential impacts of climate change, and its operational, economic, and environmental effects.

Policy 5.5.5. Broward County shall maintain and update the County-wide Reuse Master Plan and pursue the implementation of reclaimed water strategies that reduce demands on the Biscayne Aquifer.

Drainage and Natural Aquifer Groundwater Recharge

Goal 7.0. To optimize the utilization of water resources through ~~provision of~~ integrated stormwater management ~~for Broward County~~ which reduces the damage and ~~inconvenience~~ impact from sea level rise and flooding, promotes recharge to the ~~Biscayne~~ Surficial Aquifer System (SAS), improves and protects water quality in surface and ground waters, and protects the functions of urban wetlands~~.in urban~~ areas.

Objective 7.2. Stormwater management facilities shall be provided to meet the County's short-term and long-term future surface water management needs.

Policy 7.2.2. Broward County shall continue to improve analysis and mapping capabilities for identifying areas of the County vulnerable to sea level rise, tidal flooding, and other impacts of climate change, and improve available

information needed to make informed decisions regarding adaptation strategies, including infrastructure improvements, modifications, and management strategies.

Policy 7.2.13. Broward County shall implement the County-wide Integrated Water Resources Plan to optimize flood protection, water quality treatment and protection, stormwater storage, wetlands sustainability, and groundwater recharge functions in support of climate resilience and the long-term water resource needs of the Broward community.

Objective 7.3. Broward County, in conjunction with its municipalities and partner agencies, shall strive to adapt the built environment to the impacts of climate change through planning and development practices that reduce impervious area run-off and improve upon the capture, treatment and use of rainwater for aquifer recharge, and as an alternative water supply. ~~Continue to maximize the use of stormwater management system facilities so as to encourage compact urban growth patterns.~~

Policy 7.4.1. Broward County shall work with the South Florida Water Management District (SFWMD) and ~~the~~ independent drainage districts to implement applicable portions of the 2013 Lower East Coast Water Supply Plan ~~2005-2006~~ Update intended to reduce losses of excess stormwater to tide, recharge the ~~s~~Surficial ~~a~~Aquifer ~~s~~System (SAS) and provide additional storage of surface waters in the context of sea level rise, in order to improve the ability of these systems to adapt to climate change.

Policy 7.4.2. Broward County shall address stormwater management issues on a watershed (basin) basis as a means of providing cost effective water quality and water quantity solutions to specific watershed problems supported by continued investments in the development and application of regional hydrologic models to help predict and track the impacts of sea level rise and climate disruptions on groundwater levels, saltwater intrusion, and drainage infrastructure.

Objective 7.5. Maintain and enhance ground-water recharge to the ~~s~~Surficial ~~a~~Aquifer ~~s~~System (SAS) so as to maintain all of the functions of the Biscayne Aquifer, including potable water supply, the abatement of saltwater intrusion, and reduce seepage from the Water Conservation Areas, while ensuring the necessary water quality protections.

Policy 7.5.6. Broward County in cooperation with the United States Geological Survey (USGS) and SFWMD shall support the maintenance and expansion of the regional groundwater monitoring network to assess the movement of the saltwater front and ensure adequate data for modeling the predictive progression of the front in response to sea level rise, variable climate and water management operations. ~~install additional monitoring wells and rehabilitate~~

~~existing wells to continue monitoring groundwater levels and the extent of saltwater intrusion into the Biscayne Aquifer.~~

Policy 7.5.8. Broward County shall work cooperatively with the SFWMD, municipalities, and independent and dependent drainage districts to develop and implement plans for additional surface water storage ~~so as~~ to improve the volume of regional water available for the purpose of maintaining canal levels and recharge to the ~~Biscayne Aquifer~~ SAS.

Policy 7.5.9. In order to protect and conserve the ~~Biscayne Aquifer~~SAS, Broward County shall pursue the ~~investigate utilization~~ use of alternative ~~potable~~ water supplies ~~resources~~ (AWS) to supplement and broaden the ~~c~~County's future water supply sources. These potential AWS ~~sources~~ include the Floridan Aquifer, Aquifer Storage and Recovery (ASR), desalination, capture and storage of excess storm water, surface water storage, reclaimed water, and other technologies ~~addressed in~~ consistent with the goals of the 2013 ~~the~~ Lower East Coast Water Supply Plan ~~2005-2006~~ Update ~~of the SFWMD~~.

Policy 7.5.13. Broward County shall protect aquifers from depletion through water conservation and preservation of the functions of high recharge areas including but not limited to the water conservation areas and water preserve areas.

Conservation

Goal 13.0. Conserve, and protect the beneficial use of the natural resources of Broward County so as to provide and maintain a level of environmental quality that ensures the public health, safety, and sustainable environmental communities including factors that affect energy conservation.

Objective 13.3. To protect the groundwater and surface water resources throughout Broward County through effective water management strategies ensuring sustainable water supplies for urban and natural systems water needs.

Policy 13.3.1. Broward County shall continue to lead collaborative intergovernmental practices to advance strategies, programs, and other sustainable initiatives throughout the County and region, that protect the quantity and quality of groundwater and surface water resources.

Policy 13.3.2. Broward County shall continue to implement the County-wide Water Resources Plan to coordinate the water management activities of local drainage districts, utilities and municipalities to optimize the beneficial use of regional water resources and for the improved efficiency of water conservation and protection efforts.

Policy 13.3.3. Broward County shall continue source-water (wellfield) monitoring and protection programs and proactively address potential impacts on the coastal aquifer from increased chlorides due to flooding of coastal and tidally influenced bodies of water that may occur with more intense storms, rising sea levels, increased drought and other impacts of climate change.

Objective 13.~~3~~5. Broward County shall maintain ~~or reduce~~ the average daily per capita water demand as reflected in the South Florida Water Management District's consumptive use permits. The consumptive use permits provide for the following per capita water demand: 1~~41~~32 gallons per capita per day for District 1~~;~~, and ~~15~~240 gallons per day for District 2A~~; 255 gallons per capita per day for District 3A; and 117 gallons per day for District 3BC~~.

Policy 13.~~3~~5.1. Broward County shall ~~encourage the reuse of reclaimed water as an integral part of its wastewater management program, where economically, environmentally, and technically feasible~~ support and promote collaborative regional water supply strategies, water resource development, conservation and reuse projects that provide economies of scale and regional benefits, with special emphasis on those areas that currently contribute to the volume of wastewater being discharged through open ocean outfalls, and with the goal of achieving 60% reuse of water discharged via outfalls by the year 2025, as required by State legislation.

Policy 13.~~3~~5.~~3~~4. Broward County shall work to protect existing wellfields ~~and continue to plan and develop new well fields~~, ~~and~~ water supplies, and plan for infrastructure replacement and wellfield relocation as needed in accordance with state rules, ~~and~~ water policy, and in consideration of potential increased coastal flooding, sea level rise, saltwater intrusion, and other potential future climate change impacts.

Policy 13.~~3~~5.~~4~~5. Broward County shall continue to implement the Water Conservation Plans within the WWS service area as required in their consumptive use permits from the South Florida Water Management District ~~as well as other utility~~ which includes five (5) required ~~specific water~~ conservation ~~efforts~~ elements; a water conservation public education program, an outdoor water use reduction program, the selection of a rate structure designed to promote the efficient use of water, a water loss reduction program, if water losses > 10%, and an indoor water conservation program. ~~which include water use audits, education and support for the NatureScape Irrigation Service operations within the WWS service area~~.

Policy 13.~~3~~5.~~5~~6. Broward County shall continue to develop and implement programming for County-wide water conservation and initiatives, in partnership with local municipalities and water and wastewater entities, including, the Water Conservation Incentives Program, Water Matters education and outreach programs, the NatureScape Broward, and ~~the~~ NatureScape Irrigation Services

(NIS) to promote water and energy conservation while creating a climate resilient landscape.

Policy 13.~~3~~5.~~6~~7. Broward County shall maintain and seek regional compliance with year-round water conservation measures consistent with Chapter 36, "Water Resources and Management," Article II, "Water Emergencies," Section 36-55, “Year-round landscape irrigation measures;” variances of the Broward County Code of Ordinances, which imposes year round, County-wide landscape irrigation restrictions ~~specific landscape irrigation measures urging the public to conserve water resources prior to~~ independent of declaration of an emergency water shortage by the South Florida Water Management District (SFWMD) and shall implement all water use restrictions applicable to Broward County in accordance with Chapter 40E-21, Florida Administrative Code (FAC).

Policy 13.~~3~~5.~~7~~8. Broward County shall continue to enforce Chapter 39, "Zoning," Article VIII, "Functional landscaping and Xeriscaping for Protection of Water Quality and Quantity," of the Broward County Code of Ordinances, which reflects the NatureScape Broward program principles that promote the use of native and drought tolerant plants, landscaping best management practices and the preservation of native habitats in support of sustainable urban landscapes and the conservation of resources.

Policy 13.5.9 The Broward County Environmental Licensing and Building Permitting Division shall enforce Florida Building Code Chapter 6, Section 604.4, which contains standards for ultra low volume plumbing fixtures to be used in all new construction and Chapter 9, Section 908.5, which contains water supply efficiencies for new or replaced cooling towers.

Policy 13.~~3~~5.~~8~~10. Broward County will continue to require a minimum 8 cycles of concentration for cooling towers and the reuse of concentrate from air handlers with a 4-ton BTU capacity or greater as cooling tower make-up water ~~installation of water conservation flow devices~~ as required by the Florida ~~Energy or~~ Building Code as a condition for the receipt of Certificates of Occupancy.

Policy 13.~~3~~5.~~9~~11. Broward County shall pursue the use of reclaimed water as an integral part of regional water development strategies, inclusive of projects outlined in the Broward County-wide Reuse Master Plan ~~for~~ with ~~potential~~ applications that include~~in~~ landscape irrigation, aquifer recharge, and environmental enhancement where technically, environmentally, and economically feasible.

Policy 13.~~3~~5.~~10~~12. Broward County, in cooperation with the United States Geological Survey (USGS) and the SFWMD, shall continue source-water (wellfield) monitoring and protection programs to mitigate water supply loss due to saltwater intrusion. Specifically, Broward County will work regionally to assess the current and future effects of sea level rise on chloride concentrations in the

surficial aquifer and to identify adaptation strategies. ~~to monitor the extent of salt water intrusion into the Biscayne Aquifer.~~

Policy 13.~~3~~5.~~11~~13. Broward County shall work with the SFWMD, municipalities, independent drainage districts, and neighboring counties to plan and develop additional surface water storage including the C-51 Reservoir in Palm Beach County and the water preserve areas in western Broward County.

Policy 13.~~3~~5.~~12~~14. In order to protect and conserve the Biscayne Aquifer, ~~and~~ support Everglades restoration, and protect against future climate change impacts, Broward County shall pursue projects that enhance aquifer recharge and investigate utilization of alternative water resources to supplement and broaden the County's future water supply sources. These potential sources include the Floridian Aquifer, Aquifer Storage and Recovery (ASR), desalination, capture and storage of excess storm water, appropriately treated reclaimed water, and other technologies addressed in the 2013 Lower East Coast Water Supply Plan ~~2005-2006~~ Update of the SFWMD.

Policy 13.~~3~~5.~~13~~15. Broward County shall ensure conservation initiatives consider sea level projections of 9 to 24 inches additional rise from 2010 to 2060, as adopted by the southeast Florida Regional Climate Change Compact. ~~explore additional opportunities to conserve water by targeting industries and areas characterized by high rates of water consumption and develop industry specific water conservation strategies.~~

Policy 13.~~3~~5.~~14~~16. Broward County will support on-going and enhanced development of regional hydrologic models, the integration of down-scaled climate data and continuous data collection to help predict and track the impacts of sea level rise on groundwater levels, saltwater intrusion, and drainage infrastructure to support local planning and projects. ~~work expeditiously to apply the County-wide hydrologic model in support of water resource planning and management~~.

Policy 13.~~3~~5.~~15~~17. Broward County will ~~work~~ collaborate with local governments, water managers, ~~including municipalities and~~ drainage/water control districts and state and regional agencies to apply the County-wide integrated Water Resources Plan principles focused on water resources assessments, coordinated water management strategies, policy coordination, and outreach and education.

Policy 13.~~3~~5.~~16~~18. Broward County shall continue to support ~~pursue a~~ geotechnical analysis of the upper Floridan Aquifer with the USGS, local municipalities and the SFWMD to identify layers of permeability and enhanced hydraulic conductivity to help guide regional Aquifer Storage and Recovery projects and development of the Floridan Aquifer as an alternative water supply.

Policy 13.~~3~~5.~~17~~19. Broward County shall work with water managers to create, develop and implement a suite of planning tools ~~to review water supply planning efforts and consider opportunities for coordination in~~ for development of alternative water resources, including ~~development, such as~~ desalination, ~~the development of~~ Floridan wells, Aquifer Storage and Recovery and reuse to provide for sustainable water supplies and climate resiliency.

Coastal Management

Objective 10.1. Protect and conserve remaining wetlands, living marine resources, coastal barriers, and wildlife habitat, as applicable in the coastal area.

Policy 10.1.1. The County shall limit the specific and cumulative impacts of development or redevelopment upon wetlands, water quality, water quantity, wildlife habitat, living marine resources and the beach dune system through the review of developments by Broward County.

Policy 10.2.6. Broward County shall by 2017, work with its local municipalities to designate Adaptation Action Areas, per Florida State Law, using the Priority Planning Areas for Sea Level Rise Map as a basis for identifying areas especially vulnerable to sea level rise, in order to develop policies for adaptation and enhance the funding potential of infrastructure adaptation projects.

Intergovernmental Coordination

Goal 15.0. Provide accessible, effective, and frequent intergovernmental coordination opportunities to identify and implement compatible goals, objectives, and policies regarding development activities and service provision in Broward County.

Objective 15.1. The Broward County Board of County Commissioners, or its designee, shall coordinate the Broward County Comprehensive Plan with the plans of the School Board of Broward County, with the comprehensive plans of adjacent municipalities and adjacent counties and with other units of local government providing services to the Unincorporated Area but not having regulatory authority over the use of land through such mechanisms as interlocal agreements, dispute resolution processes, intergovernmental review of comprehensive plans, plan amendments, and special district plans, ~~interlocal agreements,~~ and joint planning areas, work groups and meetings.

Policy 15.1.2. Broward County shall further address intergovernmental coordination through:

1. Making demographic and socio-economic information and services available for county, school board and municipal planning activities.

Objective 15.2. Utilize coordinating mechanisms to ensure that the potential development impacts allowed by the Broward County Comprehensive Plan upon

development in adjacent local governments, the School Board of Broward County, the Region, and the State are addressed.

Policy 15.2.3. Broward County shall coordinate its comprehensive plan, plan amendments, and development activities with the South Florida Water Management District.

Policy 15.2.4. Broward County shall work with ~~a task force composed of~~ municipal, regional, state, and affected industry representatives to cooperatively update the Local Hazard Mitigation Strategy and develop model codes and policies to encourage post-hazard redevelopment in areas with less vulnerability to storm surge, inundation, flooding, sea level rise and other impacts of climate change, and incentivize locally appropriate mitigation and adaptation strategies.

Objective 15.3. Ensure the coordinated establishment of level of service standards for public facilities with agencies and/or municipalities having operational and maintenance responsibilities for such facilities and ensure that adaptation to climate change impacts, especially sea level rise, is incorporated into the planning, siting, construction, replacement and maintenance of public infrastructure in a manner that is cost-effective and that maximizes the use of the infrastructure throughout its expected life span.

Policy 15.3.1. Broward County, in conjunction with its municipalities, independent districts and partner agencies, shall work to ensure that adaptation to climate change impacts, especially sea level rise, is incorporated into public infrastructure and is an integral component of all planning processes as stipulated in the Climate Change Element.

Policy 15.3.2. Broward County shall work with its local municipalities to designate Adaptation Action Areas, per Florida State Law, using the Priority Planning Areas for Sea Level Rise Map of 9 to 24 inches from 2010 to 2060 and encourage local municipalities to develop policies to improve resilience to coastal and inland flooding, salt water intrusion, and other related impacts of climate change and sea level rise in their Comprehensive Plans, Sustainability Action Plans, Vision Plans, Stormwater Master Plans, Adaptation Action Areas Plans, Climate Change Plans and other city-wide plans.

Policy 15.3.~~2~~7. Broward County's Natural Resources Planning and Management Division will coordinate with municipalities supplying water to unincorporated areas and those municipalities which receive water from Broward County Water and Wastewater Services ~~D~~. This coordination will include sharing and updating information regarding the ~~10 Year~~ Broward County Water Supply Facilities Work Plan to meet ongoing water supply needs and the implementation of alternate water supplies in consideration of climate change impacts as detailed in the Climate Change Element.

Capital Improvements

Goal 14.0. The County will strive to provide sufficient and efficient infrastructure within its service areas to meet the standards set forth within the comprehensive plan elements, by preserving, modifying and replacing existing infrastructure and providing new infrastructure when required due to growth~~,~~ and development and climate impacts.

Objective 14.1. The Capital Improvements Element will be reviewed and updated annually to reflect the County budget process to ensure that it includes the resources and improvements required to meet present infrastructure deficiencies and future infrastructure needs as discussed in other Elements of this Comprehensive Plan. These deficiencies and needs are addressed in the Schedule of Capital Improvements on Tables 14-A through 14-Q.

Policy 14.1.2. Continue implementation of approved master plans as outlined within the Transportation, Potable Water, Sanitary Sewer, Solid Waste, Deepwater Port and other Comprehensive Plan Elements.

Policy 14.1.5. Capital Improvements needs in order to maintain LOS which are the financial responsibility of Broward County, the Broward Metropolitan Planning Organization (BMPO) and the Broward County School Board, as described in other elements, shall be included within the capital program. These needs will be served concurrently with the impact of new development or the needs to satisfy an existing deficiency or previously approved development.

Objective 14.2. The County shall limit public expenditures within coastal high hazard areas to the maintenance of existing infrastructure.

Policy 14.2.1. Broward County, in conjunction with its municipalities and partner agencies, shall work to ensure that adaptation to climate change impacts, especially sea level rise, is incorporated into the planning, siting, construction, replacement and maintenance of public infrastructure in a manner that is cost-effective and that maximizes the use of the infrastructure throughout its expected life span.

Policy 14.2.2. Broward County, in conjunction with its municipalities and partner agencies, shall make the practice of adapting the built environment to the impacts of climate change an integral component of all planning and capital improvement processes.

Policy 14.2.3. Broward County shall by 2017, work with its local municipalities to designate Adaptation Action Areas, per Florida State Law, using the Priority Planning Areas for Sea Level Rise Map as a basis for identifying areas especially vulnerable to sea level rise, in order to develop policies for adaptation and enhance the funding potential of infrastructure adaptation projects.

Objective 14.4. Construction of all improvements and facilities included within other plan elements shall be monitored through the land development review process, which shall ensure that the County is not required to construct improvements beyond its financial capacity.

Policy 14.4.1. Land development regulations shall be revised and adopted pursuant to Florida Statutes, Chapter 163 to ensure that all the objectives within the Comprehensive Plan are accomplished.

Objective 14.5. Land use decisions shall be made based on the planned availability of resources to provide sufficient improvements to maintain adopted levels of service.

Policy 14.5.1. Recommendations on proposed land use changes shall be based on an analysis of infrastructure planned to support the area.

Objective 14.6. Development orders will be issued based on the availability of infrastructure required to maintain the adopted levels of service discussed in other elements of this Comprehensive Plan.

Policy 14.6.5. Development shall be deferred in those areas without sufficient public facilities to meet the adopted level of service if the above funding alternatives are not approved by the electorate and if other general revenues are not available.

Policy 14.6.6. The County shall provide the infrastructure necessary to maintain the adopted levels of service standards as identified in the respective elements of the Broward County Comprehensive Plan.

Climate Change

Policy 19.3.4. Broward County shall identify public investments and infrastructure at risk from sea level rise and other climate change related impacts by 2015, and update this assessment every 5 years. Specifically, the County shall analyze vulnerability to facilities and services, including but not limited to: buildings; water and wastewater treatment plants, transmission lines and pumping stations; stormwater systems; roads, ra**i**l, bridges, and all transportation and transit infrastructure; power generation facilities and power transmission infrastructure; critical airport and seaport infrastructure; hospitals; city halls, police and fire stations.

Policy 19.3.5. Broward County shall evaluate the costs and benefits of adaptation alternatives in the location and design of new infrastructure as well as the fortification or retrofitting of existing infrastructure.

Policy 19.3.9. Broward County, in conjunction with its municipalities and partner agencies, shall work to ensure that adaptation to climate change impacts, especially sea level rise, is incorporated into the planning, siting, construction, replacement and maintenance of public infrastructure in a manner that is cost-effective and that maximizes the use of the infrastructure throughout its expected life span.

Policy 19.5.1. Broward County shall, by 2015, ensure that water and wastewater service planning and policy development considers methods for reducing utilities' "carbon footprint", including the best management practices recommended in American Waterworks Association Florida Vision 2030, which have been recognized by utilities as appropriate utility responses to climate change. Also, additional means of reducing demand for traditional energy sources at water and wastewater treatment facilities, such as through the production of energy through cogeneration systems, should be explored.

Policy 19.5.2. Broward County shall continue to develop, implement and coordinate regional water conservation initiatives, in partnership with local municipalities, water and wastewater utilities, as part of long-term water supply planning, and seek the continued support of the South Florida Water Management District and other agencies.

Policy 19.5.3. Broward County shall coordinate with local municipalities, water and wastewater utilities by 2015, to develop policies and plans that set short-, intermediate-, and long-range goals and establish adaptive management implementation strategies for water and wastewater resources under their jurisdiction to address the potential impacts of climate change, and its operational, economic, and environmental effects.

Policy 19.5.4. Broward County shall coordinate with local municipalities, water providers and water managers to ensure the adequacy of water supply facilities and infrastructure to effectively capture, store, treat, and distribute potable water under variable climate conditions, including changes in rainfall patterns, sea level rise, and flooding, with potential water quality and quantity impacts.

Policy 19.5.5. Broward County shall coordinate with the South Florida Water Management District, local utilities and neighboring counties to develop regional water demand projection scenarios that account for potential changes in (1) population and rates of water consumption; (2) municipal, industrial, and agricultural demands as temperatures increase and drought (seasonal or intra-annual) persists; and (3) water demand for energy generation due to possible changes in fuel sources over a 100-year planning horizon.

Policy 19.5.6. Broward County shall collaborate with local, regional, state and

federal partner agencies on developing the scientific and technical knowledge needed to understand the potential impacts of climate change on the region's water resources, evaluate various adaptation technologies available, and, by 2015, create an adaptive response plan. Advanced hydrological modeling and engineering evaluations by the South Florida Water Management District, U.S. Geological Survey, and U.S. Army Corps of Engineers will be especially critical to this effort.

Policy 19.5.7. Broward County shall support recurring and continued development of local integrated models and continuous data collection, to help predict and track the impacts of sea level rise on groundwater levels, saltwater intrusion, and drainage infrastructure through enhanced development and application of local hydrologic models and the use of down-scaled climate models.

Policy 19.5.10. Broward County shall continue source-water (well field) monitoring and protection programs to mitigate water supply loss due to saltwater intrusion. Specifically, Broward County should address potential impacts on the coastal aquifer from water quality changes and flooding of coastal and tidally influenced bodies of water that may occur due to more intense storms, higher surface water temperatures, and rising sea levels.

Policy 19.5.12. Broward County shall pursue the establishment of mandatory reuse zones in order to require the use of reclaimed water for irrigation, when source water is available, with the goal of reducing demands on the Biscayne Aquifer.

Policy 19.5.13. Broward County shall study whether to build, modify or relocate water, wastewater and stormwater transmission infrastructure to allow for strategic retreat from areas at risk to sea level rise.

LIST OF ACRONYMS

ADF	Average Daily Flow
ASR	Aquifer Storage & Recovery
AWS	Alternative Water Supplies
BCPFM	Broward County Population Forecasting Model
BCWWS	Broward County Water and Wastewater Services
BCPRD	Broward County Planning and Redevelopment Division
BEBR	Bureau of Economic and Business Research
BMP	Best Management Practices
BMPO	Broward Metropolitan Planning Organization
CERP	Comprehensive Everglades Restoration Plan
CUP	Consumptive Use Permit
EPGMD	Environmental Protection and Growth Management Department
EPCRD	Environmental Planning and Community Resilience Division
FAS	Floridan Aquifer System
FDEP	Florida Department of Environmental Protection
FDOH	Florida Department of Health
FPL	Florida Power and Light Corporation
FS	Florida Statutes
GOPs	Goals, Objectives, and Policies
GPD	Gallons Per Day
GPCD	Gallons Per Capita Per Day
GPM	Gallons Per Minute
IWRMMP	Integrated Water Resources Master Management Plan
IWRP	Integrated Water Resources Plan
LEC	Lower East Coast
LECRWSP	Lower East Coast Regional Water Supply Plan
LORS	Lake Okeechobee Regulation Schedule
MDF	Maximum Daily Flow
MFLs	Minimum Flow and Levels
MG	Millions of Gallons
MGD	Millions of Gallons Per Day
MGM	Millions of Gallons Per Month
MIL	Mobil Irrigation Lab
NBCRS	Northern Broward County Recharge System
NIS	NatureScape Irrigation Service
NRW	North Regional Wellfield
NRWWTP	North Regional Waste Water Treatment Plant
NSID	North Springs Improvement District
RO	Reverse Osmosis
RWSP	Regional Water Supply Plan
SAS	Surficial Aquifer System
SFWMD	South Florida Water Management District
SRW	South Regional Wellfield
TAZ	Traffic Analysis Zone

UAZ	Utility Analysis Zone
USGS	United States Geological Society
USDW	Underground Sources of Drinking Water
WPAs	Water Preserve Areas
WRRDA	Water Resources Reform and Development Act
WTP	Water Treatment Plant
WWTP	Waste Water Treatment Plant

REFERENCES

[1] Broward County Traffic Analysis Zones and Municipal Forecasts Update, 2014

[2] 2013 Lower East Coast Water Supply Plan Update, September 2013.

[3] Final Report of the Reclaimed Water Work Group, 2012

[4] Bureau of Economic and Business Research, Volume 47, Bulletin 168, April 2014.

[5] Southeast Florida Regional Climate Change Compact Counties: Regional Climate Action Plan, October 2012.

Appendix B: Fort Lauderdale 2014 Water Supply Facilities Work Plan Update

City of Fort Lauderdale

10-Year Water Supply Facilities Work Plan

Prepared by:

City of Fort Lauderdale Public Works and Department of Sustainable Development

in association with

HAZEN AND SAWYER
Environmental Engineers & Scientists

October 6, 2014

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1.0 INTRODUCTION

The City of Fort Lauderdale is located on the southeastern coast of Florida within Broward County. **Figure 1** illustrates a location map of the City. This 2014 City of Fort Lauderdale 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 (District) approves a regional water supply plan or its update. The 2013 Lower East Coast Water Supply Plan Update (2013 LECWSP Update) was adopted by the District's Governing Board on September 12, 2013. 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 March 12, 2015.

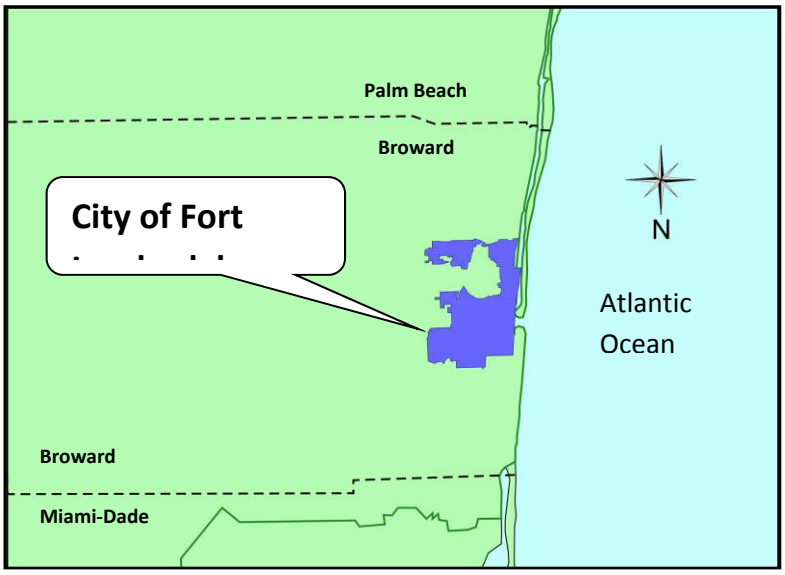

Figure 1 – Location Map

The State of Florida requires that the 10-year Water Supply Facilities Work Plan - 2014 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 to the LECWSP and the updated comprehensive plan amendment.

The City of Fort Lauderdale's 10-year Water Supply Facilities Work Plan - 2014 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 in the 2002, 2004, 2005, and 2011 sessions to address the state's water supply needs. These bills, in particular 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 Fort Lauderdale 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 2013 LECWSP [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 2013 LECWSP, 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 2013 LECWSP [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, 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 2013 LECWSP, 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 applicable regional water supply plan [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 2013 LECWSP [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:

- An overview of the City of Fort Lauderdale's water service area; and
- A description of regional water supply planning issues that impact the City of Fort Lauderdale, including the following:
    - Climate Change
    - Regional Water Availability Rule
    - Participation in the C-51 Reservoir Project
    - Leah G. Schad Ocean Outfall Program
    - Regional Climate Action Plan

2.1 Service Area

The City of Fort Lauderdale is the single largest purveyor of potable water in Broward County. This includes retail customers residing in the Roosevelt Gardens, Franklin Park, Washington Park, and Boulevard Gardens communities of unincorporated Broward County. These communities are expected to become incorporated by the end of the planning period. The utility's service area encompasses a total area of 43 square miles, approximately one-tenth the total area of urban Broward County. Other retail customers include residential, commercial, and industrial properties within the City of Fort Lauderdale, Lazy Lake, and a portion of Lauderdale-by-the-Sea. The utility also maintains wholesale agreements for potable water supply with the

Cities of Oakland Park, Wilton Manors, Tamarac (east of 34th Avenue), Town of Davie and Port Everglades. **Figure 2** depicts the water service area (inclusive of all retail and wholesale customers).

Figure 2 also depicts the location of key City assets including the following: 1) Dixie Wellfield; 2) Prospect Wellfield; 3) Peele-Dixie Water Treatment Plant; 4) Fiveash Water Treatment Plant; 5) 2nd Avenue Water Tank and Pump Station; 6) Poinciana Park Water Tank and Pump Station; and 7) George T. Lohmeyer Wastewater Treatment Plant.

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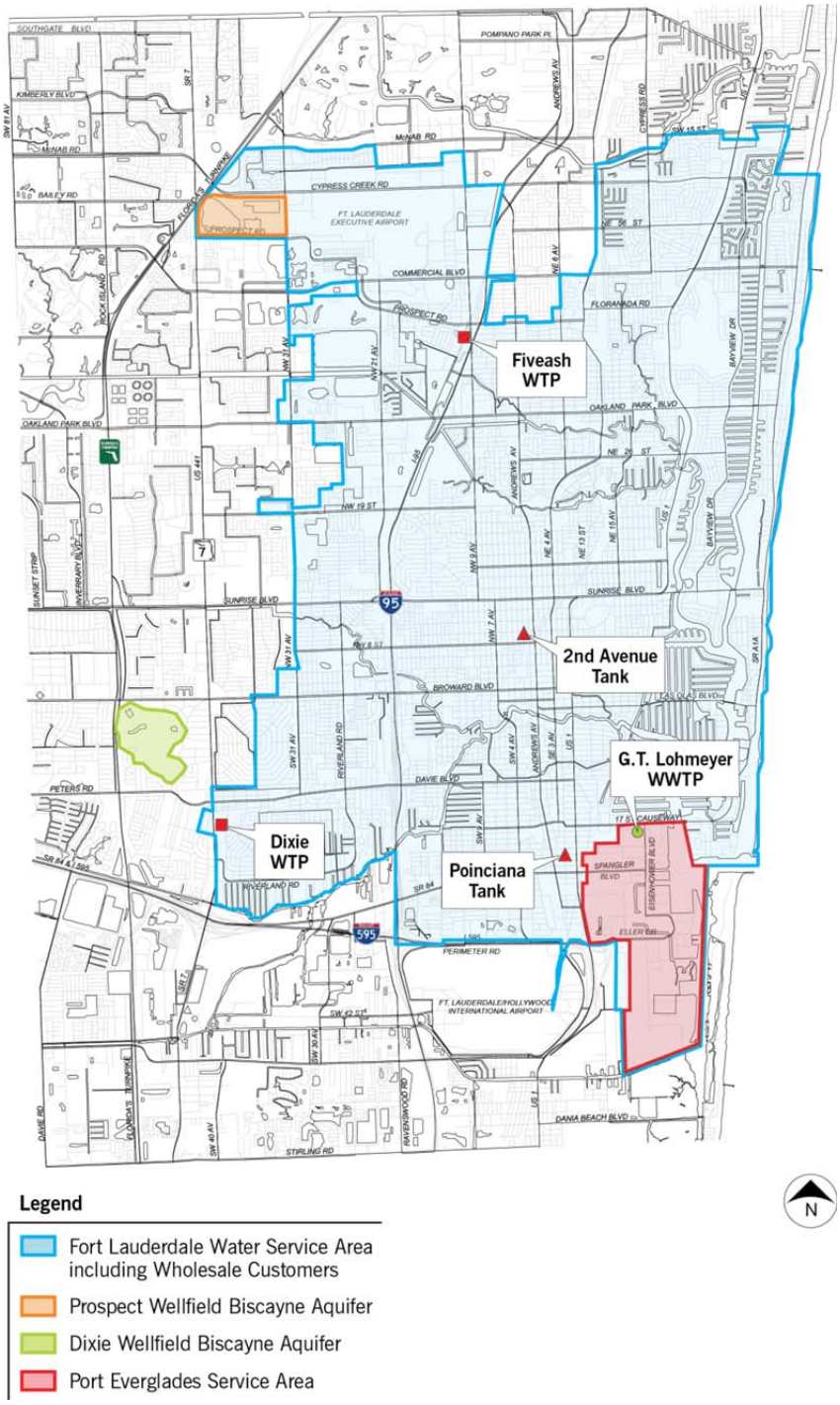

Figure 2 – City of Fort Lauderdale Water Service Area

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, increases in tidal and storm-related flooding, and ensuring that future planning efforts are flexible to adapt to changes to ensure a sustainable water supply infrastructure.

The City of Fort Lauderdale, together with its municipal and regional partners, understands that it is imperative that local governments and water utilities begin to formalize the integration of water supply and climate change considerations as part of coordinated planning efforts and work to provide relevant updates to the 10-year Water Supply Facilities Work Plan and enhance 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. The City has recently participated in the development of regional planning documents related to integrating water supply and climate change considerations including the Regional Climate Action Plan (2012). The City has adopted its own strategies to address climate change and resilience that are administered citywide. The following documents outline the City's goals, policies, and specific strategies:

- 2011 Sustainability Action Plan
- Fast Forward Fort Lauderdale, Vision for 2035 (2013)
- Press Play Fort Lauderdale, 2018 Strategic Plan (2013)

The above documents establish the City's policies and goals moving forward.

Key considerations for the City of Fort Lauderdale relative to climate change include:

1. sea level rise;
2. saltwater intrusion;
3. extreme weather; and

4. infrastructure development,

2.2.1 Sea Level Rise

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

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 3**. It shows a three to seven inch increase in sea level in our region in the near term, and up to a 24-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. The City is currently developing a Comprehensive Utility Strategic Master Plan (CUSMP) for water and wastewater. This report will identify sea level rise adaptation strategies that ensure the sustainability of the City's water infrastructure into the future.

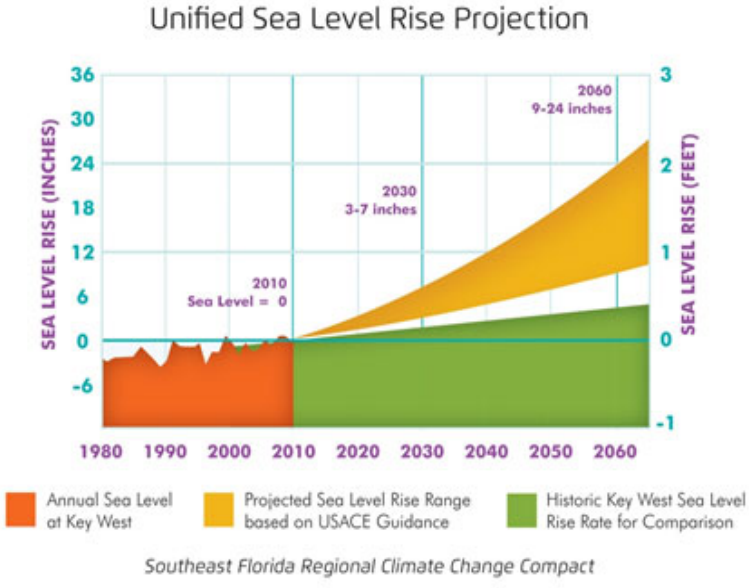

Figure 3 – Sea Level Rise Projection

2.2.2 Saltwater Intrusion

The Biscayne Aquifer which serves as the City's primary water supply is a shallow, surficial aquifer characterized by limestone karst geology which is highly porous, and transmissive. Coastal saltwater intrusion of the aquifer has occurred in eastern parts of Broward County. The mapping of the saltwater intrusion front (i.e., the depth and location of the 250 mg/L chloride concentration toe) is supported by local governments throughout the region, the United States Geologic Survey (USGS), and the South Florida Water Management District (SFWMD). The current Saltwater Intrusion Line for Broward County is illustrated in **Figure 4**.

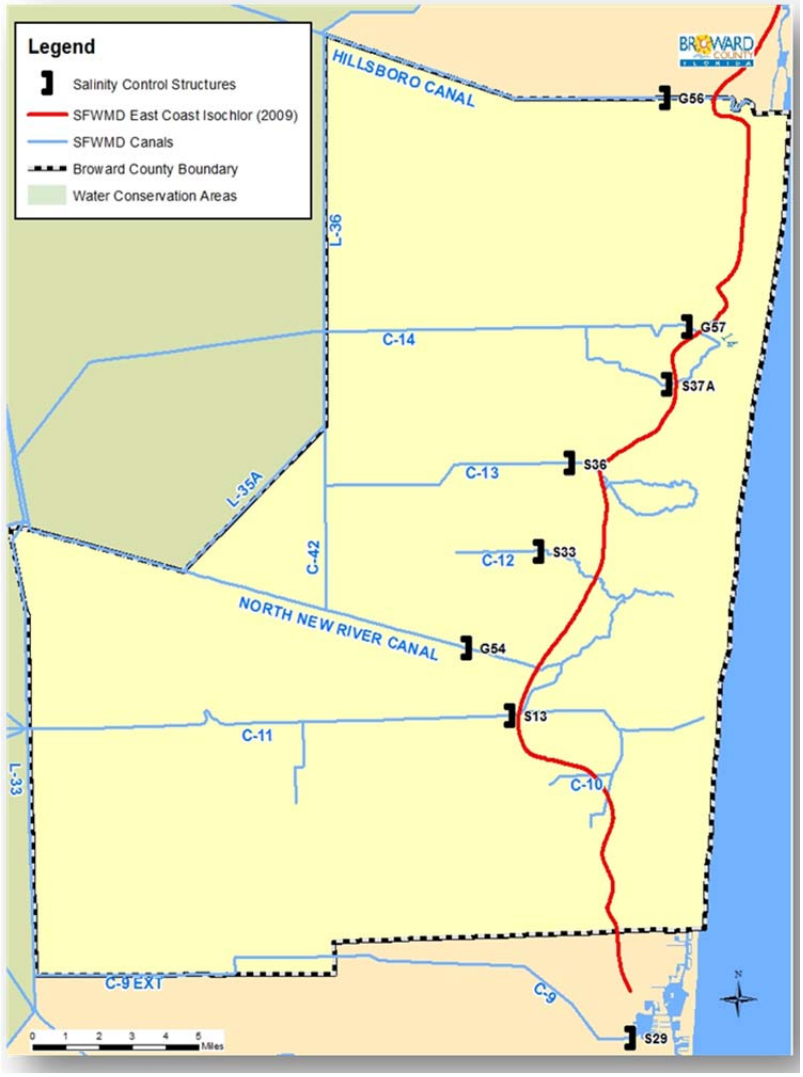

Figure 4 - Saltwater Intrusion Line, 2013

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 City has been proactively managing saltwater intrusion risk through a combination of managing wellfield pumpage, relocation of wells towards the west, abandonment of eastern wells, and the collection of data from 10 saltwater monitoring wells constructed in 2002.

In 2012, the City retained a licensed well contractor to replace three saltwater monitoring wells (i.e., SWMW-5, SWMW-8 and SWMW-10A were replaced). Saltwater monitoring wells SWMW-1 and SWMW-2 were rehabilitated in late 2013.

There is no evidence of saltwater intrusion into the City's existing Dixie and Prospect Wellfields. The City will continue its current saltwater intrusion data collection efforts and support the regional efforts of Broward County to manage the risk of movement of the front under sea level rise scenarios anticipated over the next several decades.

The City is participating in the development of a Saltwater Intrusion Modeling project with Broward County and the USGS. It is anticipated the project will be completed in 2015.

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.

2.2.4 Infrastructure Development

With increasing climate disruptions there is a need to diversify water supply sources, improve treatment technologies and to support the development of adaptive stormwater and wastewater infrastructure design criteria to ensure long-term sustainability of key facilities. Conversely, alternative water treatment technologies generally have a high energy demand and carbon footprint that can exacerbate climate change impacts. Strategic infrastructure planning should incorporate these constraints 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: 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.

2.3 Regional Water Availability Rule

The Regional Water Availability (RWA) rule was passed by the SFWMD on February 16, 2007. The RWA limits usage of the Biscayne Aquifer to the maximum quantity during any consecutive five years preceding April 2006. City's 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 (which requires high energy consumption treatment methods). The RWA and the approval of the City's Water Use permit limited the City's Biscayne Aquifer withdrawal to 52.55 million gallons per day (mgd) on an annual average day basis. Demands in excess of this amount would be met via conservation and alternative water supplies.

2.4 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 (including the City of Fort Lauderdale). 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 if constructed would capture excess stormwater that is currently discharged to the Lake Worth Lagoon. The captured stormwater would be utilized to augment traditional water supplies and be treated via traditional treatment methods.

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 is currently meeting to evaluate project costs, advance regulatory coordination with the SFWMD, and explore future governance structures.

The City of Fort Lauderdale continues to participate in this innovative regional stormwater capture project partnered with the Broward County Water Resources Task Force Technical Team.

2.5 Leah G. Schad Ocean Outfall Program

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

The facilities within Broward County are the Broward County North Regional Wastewater Treatment Plant (WWTP) and the Hollywood Southern Regional Wastewater Treatment Plant (WWTP). Additionally, Cooper City and the Town of Davie are permitted to discharge effluent through the outfall operated by the City of Hollywood at the Southern Regional Water Reclamation Facility. Therefore, these two local governments also have obligations to meet the outfall requirements.

Requirements of the outfall program include the following:

- Discharge through ocean outfalls must meet either advanced wastewater treatment and management by December 31, 2018, or an equivalent reduction in outfall nutrient loading.

- A functioning reuse system that reuses a minimum of 60 percent facility's baseline flow on an annual basis installed no later than December 31, 2025 (baseline flow is defined as the historical outfall flow between 2003 and 2007).
- Timely submission of certain progress and planning summary documents.
- Inclusion of projects that promote the elimination of wastewater ocean outfalls in SFMWD's regional water supply plans.
- State or SFWMD funding assistance must give first consideration to water supply development projects that replace existing sources or implement reuse projects to eliminate ocean outfalls.

An amendment to FS 403.086 (effective date of July 1, 2013), allows facilities that discharged through an ocean outfall during the baseline period (2003 through 2007) to contract with other utilities to install functioning reuse system capacity on the utilities' behalf. This amendment provides the City of Fort Lauderdale with an opportunity to collaborate with local outfall owners (with the possibility of negotiating cost sharing) in the development potential reuse projects.

Critical factors that affect the City of Fort Lauderdale's assessment of the efficacy of reuse collaboration under the Outfall rule are as follows:

1. If wastewater generation forecasting indicates the future need for expanding deep injection well (DIW) capacity at the City's George T. Lohmeyer (GTL) Wastewater Water Treatment Plant (WWTP), the capital cost and social impact would likely be high due to the limited land availability and required high level disinfection (HLD) under the 2005 Underground Injection Control (UIC) rule change.

2. When evaluating alternative water supply projects, such as reuse versus Floridan Aquifer, the benefits of delaying (or avoiding) the costs associated with DIW capacity expansion at GTL would be considered.

3. Reuse opportunities that may allow an increase in the City's Water Use Permit Biscayne Aquifer allocation may be preferred over reuse opportunities that likely would not result in an allocation increase.

4. Rising sea levels due to climate change resulting in increasing salt concentrations in coastal wastewater collection systems would impact the effectiveness of reclaimed water opportunities; salinity increases would be factored into future reuse opportunity assessment(s).

5. It is also noted that the City has an ongoing inflow and infiltration reduction program. On-going reduction of inflow and infiltration may result in changes in water quality over time that enhances the efficacy of reuse collaboration.

2.6 Regional Climate Action Plan

Southeast Florida is widely considered one of the most vulnerable regions with respect to the impacts of 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 110 recommendations in seven primary focal areas, with 18 specific to the focal area of “Water Supply, Management, and Infrastructure”. **Table 1** presents these water supply related recommendations from the Regional Climate Action Plan.

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Table 1
Water Supply Recommendations
2012 Regional Climate Change Action Plan

Item	Recommendations
WS-1	Develop local and, where appropriate, regional inventories of existing potable water supply delivery and collection systems, vulnerable wellfields, wastewater collection and/or treatment infrastructure, septic tanks/drainfields, and stormwater drainage and treatment facilities; assess the potential impact from climate change of each component; and develop different climate change scenarios and adaptation strategies for high-risk utilities and/or infrastructure which may require replacement, reinforcement, or relocation to ensure the long-term viability of the system (e.g., modified site, depth, elevation, materials, or connection requirements).
WS-2	Develop a regional saltwater intrusion baseline and utilize saltwater intrusion models to identify wellfields and underground infrastructure at risk of contamination/ infiltration by saltwater with increases in sea level.
WS-3	Utilize existing and refined inundation maps and stormwater management models to identify areas and infrastructure at increased risk of flooding and tidal inundation with increases in sea level, to be used as a basis for identifying and prioritizing adaptation needs and strategies.
WS-4	Evaluate the impacts of rising sea and groundwater levels on soil storage, infiltration rates and inflow to stormwater and wastewater collection and conveyance systems; consider longer-term influences on water quality; and develop strategies for implementing reclaimed water and stormwater reuse projects that account for current and future conditions.
WS-5	Develop and apply appropriate hydrologic and hydraulic models to further evaluate the efficacy of existing water management systems and flood control/ drainage infrastructure under variable climate conditions. Quantify the capacity and interconnectivity of the surface water control network and develop feasible adaptation strategies.
WS-6	Coordinate with the South Florida Water Management District, Drainage/Water Control Districts, and utilities/public works officials to identify flood control and stormwater management infrastructure already operating below the design capacity. Further examine water control structures to ensure that they can provide for inland or upstream migration of riparian species as freshwater habitats become more saline.

Table 1
Water Supply Recommendations
2012 Regional Climate Change Action Plan

Item	Recommendations
WS-7	Develop Integrated Water Management Plans that present a joint assessment and planning strategy involving local water utilities, wastewater service providers, water managers, and partners to the Southeast Florida Regional Climate Change Compact, for coordinated consideration of stormwater use and disposal, traditional and alternative water supplies, wastewater disposal and reuse, and water conservation measures for use by local leadership to guide planning decisions as well as amendments to applicable codes and regulations.
WS-8	Develop and test water management and drainage system adaptation improvements needed to maintain existing levels of service relating to drainage, flood control, and water supply, and use cost-benefit analyses to prioritize potential improvements.
WS-9	Incorporate and prioritize preferred climate adaptation improvement projects in capital improvement plans and pursue funding.
WS-10	Encourage, foster, and support investigative work and scientific research that improves the understanding of local and regional climate change impacts specific to Southeast Florida, including: • Improved down-scaling of global climate models for representation of precipitation at the regional/local scales, • Identification and targeting of gaps in monitoring to improve quantification of the hydrologic system and its response to climate change, such as evapotranspiration, groundwater levels, and precipitation, and local sea level, and • Development of risk-based decision support tools and processes for application in analysis of infrastructure design, water resource management, natural systems management, and hazard mitigation alternatives. Tools should provide for consideration of potential economic costs of comparative planning scenarios, management decisions, and infrastructure investments and the evaluation of potential tradeoffs.
WS-11	Undertake efforts to fill identified data gaps through local program efforts, agency collaborations, and advocacy for additional state/federal resources, as needed.

Table 1
Water Supply Recommendations
2012 Regional Climate Change Action Plan

Item	Recommendations
WS-12	Foster the development and exchange of new information, methods and technical capabilities to address key questions of concern related to climate variability and sea level rise to support management decisions: • Assess impacts of observed and predicted climate variability and sea level rise on the frequency, duration, and intensity of flooding as a result of extreme tidal excursions, storm surge, and 100-year storm events, and where impacts are likely to be greatest, • Examine the effects of climate change on water availability and groundwater vulnerability due to sea level rise, and predicted changes in precipitation and evapotranspiration patterns and rates, and • Establish a venue for a periodic exchange of ideas between resource managers, policy makers, and researchers.
WS-13	Develop agency capabilities to provide rapid deployment of resources in immediate response to intense precipitation and storm events through use of Next RAD technology.
WS-14	Cultivate partnerships with federal and state agencies and professional associations with expertise in integrated water resource planning (such as the U.S. Army Corps of Engineers Institute for Water Resources, the United States Geological Survey, and Water Foundations) as sources of important research, reports, and information regarding climate change, and efforts being undertaken in other communities.
WS-15	Monitor changes in rainfall patterns, temperature means and extremes and sea level rise through coordination with NOAA and other key organizations/partners to better predict future wet-season and dry-season rainfall. Monitor emerging science in order to assess the adequacy of regional climate models. Choose an annual conference or other venue at which such trends can be reviewed at regular intervals.
WS-16	Manage water storage in the region's publicly-owned uplands and wetlands and in other land uses compatible with water storage, including wetland restoration, certain agricultural operations and certain renewable energy production facilities. This will further serve to protect high quality drinking water supply, increase aquifer recharge, and as a means for managing saltwater intrusion.

Table 1
Water Supply Recommendations
2012 Regional Climate Change Action Plan

Item	Recommendations
WS-17	Support complete implementation and funding for the Comprehensive Everglades Restoration Plan (CERP) and its updated versions as fundamental to Everglades restoration, to include increased freshwater flows to the Everglades system, thereby improving water quality, maximizing regional freshwater storage and aquifer recharge, and providing potential to abate saltwater intrusion, which will become increasingly important under variable climate conditions and in the face of sea level rise.
WS-18	Combine existing and develop new land acquisition priorities in a regional setting to protect high quality drinking water supply.

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 - 2014 Update and related comprehensive planning element updates.

3.0 DATA AND ANALYSIS

This section provides information related to the population forecast and water demand forecast within the City of Fort Lauderdale's water service area.

The planning horizon for the Water Supply Facilities Work Plan - 2014 Update spans 20 years, covering 2015 to 2035.

3.1 Population Information

This 10-year Water Supply Facilities Work Plan - 2014 Update estimates the future water supply needs for the City of Fort Lauderdale's water service area.

The water demand forecast was developed based on current utility operations and the existing customer base, compared to population projections through 2035. The population modeling was performed by Broward County Planning and Redevelopment Division (BCPRD) using the Broward County Traffic Analysis Zones and Municipal Forecasts Update, 2014 to develop the projected populations based on the University of Florida's Bureau of Economic and Business Research (BEBR), "Detailed Population Projections by Age, Sex, Race, and Hispanic Origin, for Florida and Its Counties, 2015-2040, With Estimates for 2012 All Races". The population forecast was then disaggregated into Broward County's 2010 Traffic Analysis Zones (TAZ) by municipalities.

These BEBR forecasts were assigned by the BCPRD to 953 TAZ within 31 municipalities utilizing a household-based model. BEBR's forecasts by population age are converted to county-wide household forecasts using a weighted average of the years 2000 and 2010 Census households by age group data. The converted countywide household forecasts were then assigned to TAZ based on the interaction between the following: 1) The change in the county-wide household size distribution through forecast periods; 2) The established TAZ level distribution of households; and 3) The capacity of each the TAZ to absorb additional housing units. Since Broward County's population is expected to continue to grow and change, the future distribution of population and housing by municipality and TAZ is likely to be varied. Input from the local planning and service-delivery entities guided the distribution process. Underlying the distribution process are land development characteristics and the Broward County Land Use Plan.

The City of Fort Lauderdale Urban Design and Planning Division staff utilized the above described data to develop a forecast of the City's water service area population based upon TAZ within the water service area.

3.2 Maps of Current and Future Served Areas

The City of Fort Lauderdale provides water to City customers within its water service area as well as the following jurisdictions:

- Entirety of the City of Lauderdale-by-the Sea
- Entirety of the Village of Sea Ranch Lakes

- Small areas of Unincorporated Broward County (i.e., Roosevelt Gardens, Franklin Park, Washington Park, and Boulevard Gardens communities)
- Small area of the Town of Davie
- Small area of the City of Lauderdale Lakes
- Small area of the City of Lauderhill
- Entirety of the Village of Lazy Lake
- Small area of the City of North Lauderdale
- Entirety of the City of Oakland Park
- Portions of the City of Tamarac
- Entirety of the City of Wilton Manors
- Port Everglades

The City measures water consumption to the following jurisdictions via master meters:

- Broward County Water and Wastewater Services
- City of Oakland Park
- City of Tamarac
- City of Wilton Manors
- Port Everglades
- State of Florida Department of Transportation
- Town of Davie

Certain jurisdictions are fed through master meter accounts of an upstream consecutive user, as follows:

- Lauderdale Lakes is fed through an Oakland Park Master Meter;
- Lazy Lake is a village contained entirely within the borders of the City of Wilton Manors and is fed through a Wilton Manors master meter;

The balance of the City's customers are supplied with water through individual retail customer water meters (multifamily, single family, commercial and irrigation accounts), including the following:

- City of Fort Lauderdale
- City of Lauderdale-by-the Sea
- Village of Sea Ranch Lakes
- Unincorporated Broward County
- City of Lauderhill

Figure 5 depicts the water service area (inclusive of all retail and wholesale customers).

The City of Fort Lauderdale is the single largest purveyor of potable water in Broward County in terms of total water delivery, providing service to approximately 220,500 customers in 2010. This includes approximately 6,000 retail customers residing in the Roosevelt Gardens, Franklin Park, Washington Park, and Boulevard Gardens communities of unincorporated Broward County. These communities are expected to become incorporated by the end of the planning period.

The City of Fort Lauderdale's water service area, shown in **Figure 5**, encompasses a total area of 43 square miles, approximately one-tenth the total area of urban Broward County. The City's land use is unique within Broward County and is composed of residential, commercial, and industrial uses along with a significant beach community of high-rise hotels and condos with seasonal populations. Additionally, the City of Fort Lauderdale serves Port Everglades through five water meters. The Port's water demand can vary significantly on a day to day basis with the high demand period occurring when ships are in port and are being filled with water.

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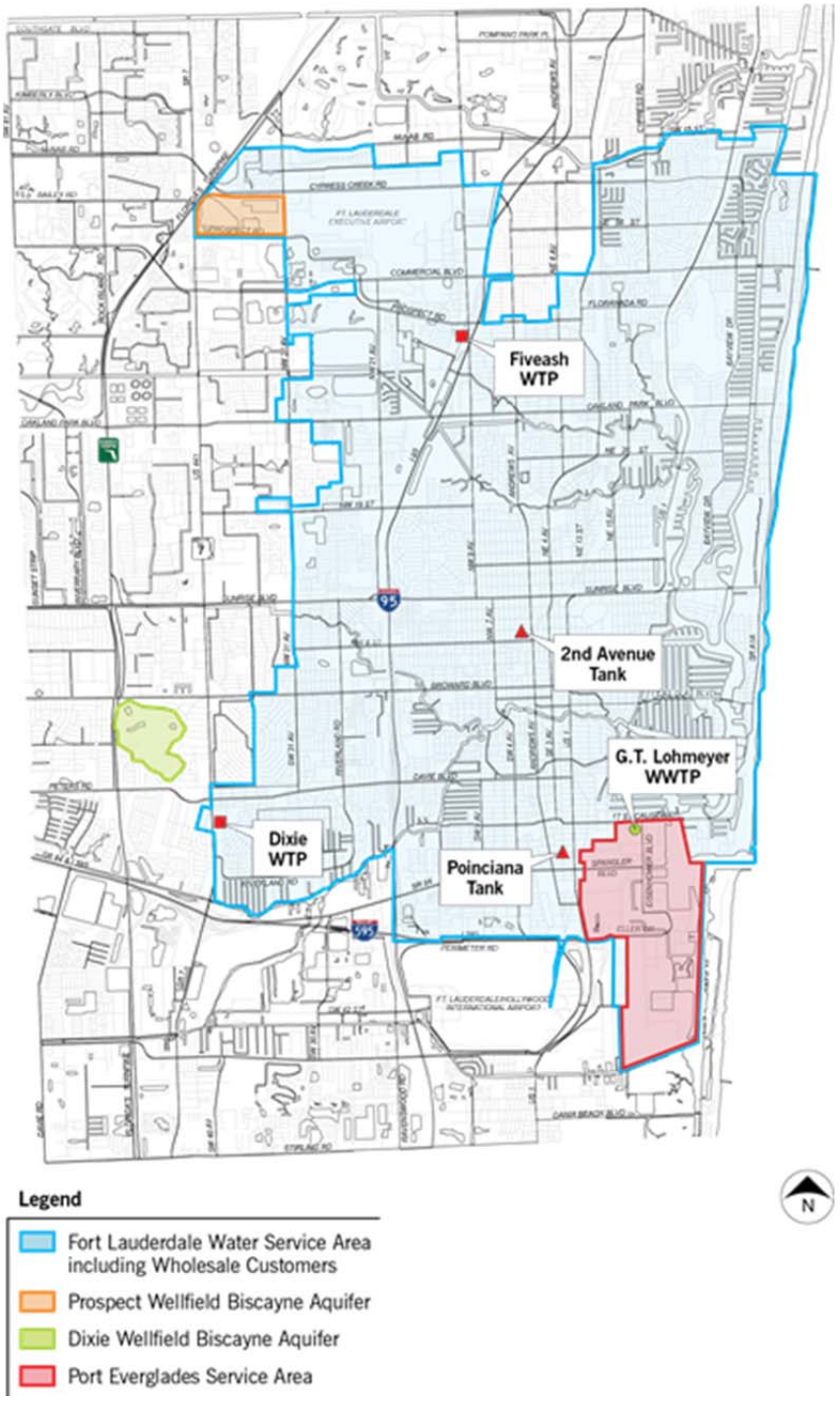

Figure 5 – City of Fort Lauderdale Water Service Area

3.3 Potable Water Level of Service Standard

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

Table 2
City of Fort Lauderdale
Water System Level of Service Standards

Component	Level Of Service Standard / Goal
Raw Water Supply	Maximum Day Demand with 20 percent of wells out of service for maintenance
Treatment Capacity	Maximum Day with all units in service
Minimum system pressure during peak hour demand with largest pump out of service during non-fire flow conditions	Maintain a minimum of 45 psi in the distribution system
Minimum system pressure during peak hour demand with largest pump out of service during fire flow conditions	Maintain a minimum of 20 psi in the distribution system
Finished Water Pumped Per Capita – 2008 Comprehensive Plan Volume 1, Infrastructure Element	Policies 1.2.2 and 2.3.1 of the Comprehensive Plan Volume 1, Infrastructure Element indicates that the level of service for finished water pumped shall be 197 gallons per capita per day
Finished Water Pumped Per Capita – City Goal	It is the City's goal to reduce the finished water pumped level of service to 170 gallons per capita per day through conservation by the year 2028
Finished Water Storage	Comply with FAC 62-555.320(19): minimum requirement of 25 percent of maximum day demand plus maximum fire flow volume with all tanks in service. Maximum fire flow storage based upon a 5,000 gallons per minute (gpm) fire over a four hour period.

Maximum Distribution System Water Loss	10 Percent of Finished Water Pumped

Table 3 presents historical Annual Average Daily Flow (AADF) pumping data from the City's WTPs and wellfields along with the estimated populations from 2009 to 2013. The historical per capita water demand during this time frame is also presented.

Table 3
City of Fort Lauderdale Water Service Area
Historical AADF Finished and Raw Water Pumping Data

Year	Water Service Area Population[A]	AADF Finished Water Pumped		AADF Raw Water Pumped	
		Pumping Rate (mgd)[B]	Per Capita (Gallons per person per day)	Pumping Rate (mgd)[B]	Per Capita (Gallons per person per day)
2009	224,145	43.5	194	45.0	201
2010	220,500	40.2	182	41.7	189
2011	222,109	40.2	181	41.4	186
2012	223,718	38.4	171	39.7	178
2013	225,328	37.8	168	39.2	174
2009 to 2013 Average:		**41.4**	**179**	**40.0**	**186**

Notes:

Note A: Water service area population forecast prepared by the City of Fort Lauderdale Urban Design & Planning Division.

Note B: Data provided by City of Fort Lauderdale Public Works Department in "wtrhist2.xls" spreadsheet.

The above data represent the overall water consumption rate within the City's water service area including: 1) residential; 2) commercial; 3) industrial; 4) wholesale customers such as Wilton Manors, etc.; and 5) Port Everglades. These data indicate the following:

- 2009 to 2013 average raw water per capita demand: 186 gallons per person per day

- 2009 to 2013 average finished water per capita demand: 179 gallons per person per day

The above 5-year per capita averages for raw water and finished water demand are used to assess future forecasts based upon the water service are population forecast.

The City has established a finished water per capita goal of 170 gallons per person per day by the year 2028.

3.4 Population and Potable Water Demand Projections

Table 4 presents the population forecast for the City of Fort Lauderdale's water service area from 2015 through the year 2035. Historical population estimates for the years 2005 and 2010 are also included.

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Table 4

Population Forecast [A, B]

City of Fort Lauderdale Water Service Area

Location	2005	2010	2015	2020	2025	2030	2035
Fort Lauderdale	--	162,715	169,094	174,316	189,166	198,394	201,880
Lauderdale-by-the Sea	--	3,463	3,841	4,009	3,960	3,922	3,894
Sea Ranch Lakes	--	663	703	720	709	704	697
Unincorporated Broward County	--	6,745	6,265	6,652	7,005	7,297	7,414
Davie	--	525	528	530	527	534	585
Lauderdale Lakes	--	374	381	383	378	386	386
Lauderhill	--	2,923	2,890	2,881	2,840	2,927	2,969
Lazy Lake	--	25	26	26	26	26	26
North Lauderdale	--	345	349	352	1,060	1,291	1,403
Oakland Park	--	29,851	30,706	31,718	32,257	33,477	33,825
Tamarac	--	1,497	2,152	2,162	2,137	2,179	2,188
Wilton Manors	--	11,374	11,611	11,740	11,693	11,931	11,929
Total	**238,725**	**220,500**	**228,546**	**235,489**	**251,758**	**263,068**	**267,196**

Notes:

Note A: The 2005 population estimate is based upon data in the 2009 City of Fort Lauderdale Water Supply Plan.

Note B: The 2010 population estimate and 2015 to 2035 population projections are based on the 2014 Traffic Analysis Zones and Municipal Forecasts Update prepared by the Broward County Planning and Redevelopment Division. The update assigns the forecasted estimates from the University of Florida's Bureau of Economic and Business Research (BEBR), "Detailed Population Projections by Age, Sex, Race, and Hispanic Origin, for Florida and Its Counties, 2015-2040, With Estimates for 2012 All Races" to Broward County's 2010 Traffic Analysis Zones (TAZ) and municipalities.

Table 5 presents the water demand forecast for the City of Fort Lauderdale's water service area from 2015 through the year 2035. Historical water demand estimates for the years 2005 and 2010 are also included. Forecasts are presented for the Biscayne Aquifer raw water and finished water demands an AADF basis. Additionally, the maximum day water demand is provided based upon the historical maximum day to annual average day ratio of 1.27 (based upon water pumping data from 2007 to 2013). The data in the table below assumes that the City achieves its finished water per capita goal of 170 gallons per person per day by the year 2028.

Table 5
City of Fort Lauderdale Water Service Area
Water Demand Forecast

Year	Population	Overall Raw Water Per Capita (gpcd)[A,B]	Overall Finished Water Per Capita (gpcd)[A,B]	Biscayne Aquifer Raw Water Demand AADF (mgd)	AADF Finished Water Demand (mgd)	Max Day Finished Water Demand (mgd)
2005	238,725	202	200	48.1	47.8	60.61
2006	235,080	212	213	49.9	50.1	63.59
2007	231,435	187	186	43.4	43.1	54.71
2008	227,790	192	188	43.7	42.9	54.42
2009	224,145	201	194	45.0	43.5	55.26
2010	220,500	189	182	41.7	40.2	51.02
2011	222,109	186	181	41.4	40.2	50.98
2012	223,718	178	171	39.7	38.4	48.68
2013	225,328	174	168	39.2	37.8	47.96
2015	228,546	186	179	42.4	41.0	52.01
2020	235,489	181	175	42.7	41.3	52.40

2025	251,758	178	172	44.8	43.3	54.96
2030	263,068	175	169	45.9	44.4	56.32
2035	267,196	171	165	45.7	44.2	56.07

Notes:

Note A: Year 2015 raw and finished water per capita are based on an average of the per capita from the years 2009 through 2013.

Note B: The finished water demand in the year 2028 is assumed to be 170 gallons per person per day based upon the City's goal and Water Use Permit. The per capita demands for the years 2020 through the 2035 are based upon linear interpolation.

For perspective, the Water Use Permit limits the raw water demand withdrawal to 52.55 mgd on an annual average day basis. The maximum day finished water demand is presented in the above table since it is critical for assess the timing for expanding treatment capacity to meet future demand.

Figure 6 illustrates the raw water demand forecast on an annual average day basis graphically. **Figure 7** illustrates the finished water demand forecast on a maximum day basis graphically.

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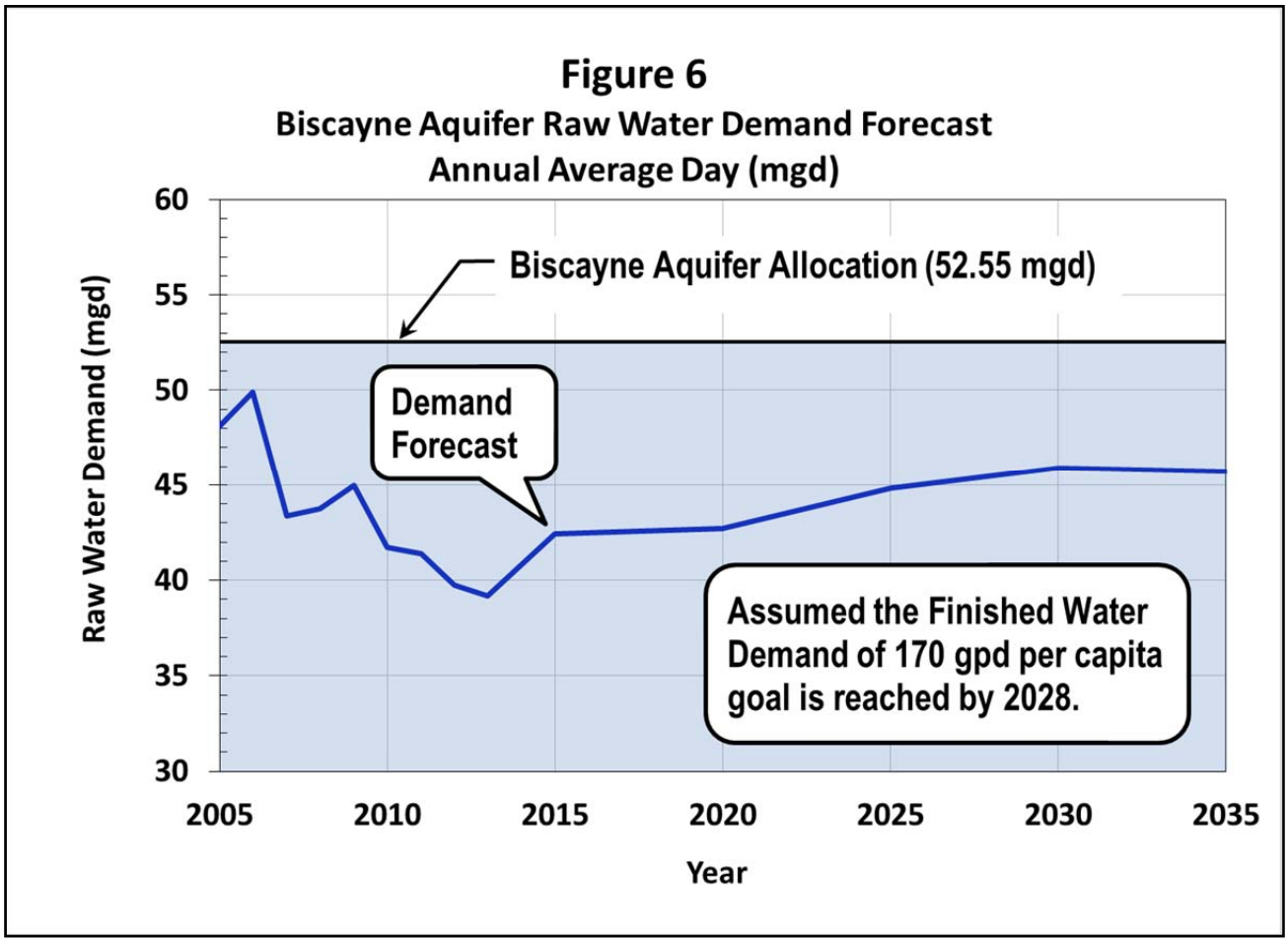
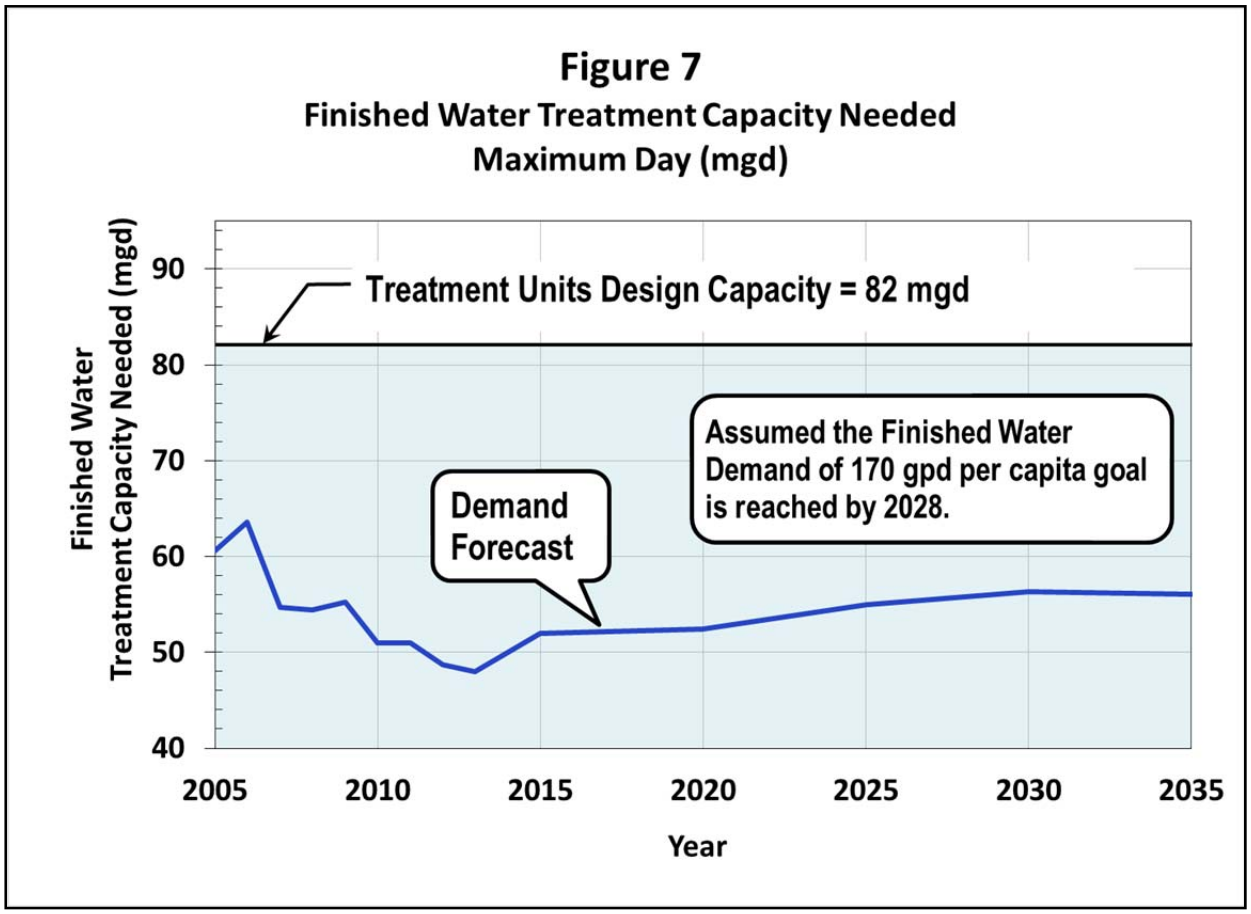


Figure 6 illustrates that the annual average day raw water demand does not exceed the annual average day Biscayne Aquifer allocation through the year 2035.



Assessing the available treatment capacity versus the maximum day finished water demand is critical for determining the timing for planning treatment capacity expansion to meet future demand.

Figure 7 illustrates that the City's design treatment capacity of 82 million gallons per day (12 million gallon per day treatment capacity at the Peele-Dixie WTP plus 72 million gallons per day for the Fiveash WTP) is sufficient through the year 2035 to meet the maximum day demand with all treatment units in service.

The Fiveash WTP design capacity is permitted at 70 million gallons per day. Plant staff indicated the plant capacity may be limited to 60 million gallons per day. If this Fiveash WTP limitation exists, the overall treatment capacity (Fiveash plus Peele-Dixie) would be 72 million gallons per day.

3.5 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 Fort Lauderdale. Additionally, the City of Fort Lauderdale's wastewater facilities are briefly described as they relate to water supply planning.

- Water Use Permit (WUP) Information and Number
- Raw Water Allocation Information
- Existing Water Facilities
    - Fiveash Water Treatment Plant (WTP);
    - Peele-Dixie WTP;
    - Prospect Wellfield;
    - Dixie Wellfield;
    - Saline Intrusion Monitoring (SALT) Program;
    - Distribution System Water Storage Facilities;
    - Raw Water Aquifer Storage and Recovery (ASR); and
    - Finished Water Distribution System.
- Interlocal Agreements and Bulk Sales
- Distribution System Interconnects
- Treatment Losses
- Distribution System Losses
- Outstanding Compliance Issues
- Required Upgrades or Expansion
- Wastewater Facilities

3.5.1 Water Use Permit

The City of Fort Lauderdale obtains all of its raw water supply from the surficial Biscayne Aquifer system via two active wellfields. These wellfields, which are commonly known as the Dixie Wellfield and the Prospect Wellfield, operate independently of each other, the former serving the Peele-Dixie WTP and the latter serving the Fiveash WTP. Both wellfields are permitted by the South Florida Water Management District

under Consumptive Use Permit No. 06-00123-W. The permit was issued September 11, 2008 with an expiration date of September 11, 2028.

3.5.2 Raw Water Allocation

The WUP allows withdrawal from the Biscayne Aquifer within the limitations presented in **Table 6**.

Table 6

Biscayne Aquifer Withdrawal Limits from WUP 06-00123-W

Category	Limitation		
	Million Gallons per Year	Million Gallons per Month	Million Gallons per Day
Annual Biscayne Aquifer Withdrawal	19,181	--	52.55
Maximum Month Biscayne Aquifer Withdrawal	1,857	--	59.90
Dixie Wellfield Biscayne Withdrawal	5,475	465.0	15.00
Prospect Wellfield Biscayne Withdrawal	15,853	1,534.5	43.43

The permit also allows withdrawal from the Floridan Aquifer within the limitations presented in **Table 7**.

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Table 7

Floridan Aquifer Withdrawal Limits (million gallons)

Category	Floridan Aquifer
Annual Allocation	3,153
Maximum Month Allocation	300.6

3.5.3 Fiveash Water Treatment Plant

The Fiveash WTP design capacity is permitted at 70 million gallons per day. Plant staff indicated the plant capacity may be limited to 60 million gallons per day. If this Fiveash WTP limitation exists, the overall treatment capacity (Fiveash plus Peele-Dixie) would be 72 million gallons per day. The plant uses conventional lime softening, followed by filtration. Polymer is added for turbidity removal and a polymer blend is added to assist in color removal. Disinfection is achieved by chloramination. The plant produces safe, reliable potable water which complies with current regulations.

3.5.4 Peele-Dixie Water Treatment Plant

The existing Peele-Dixie WTP is a nanofiltration treatment plant on the same site as the retired lime softening facilities. The nanofiltration treatment plant was placed into service the second quarter of 2008. The nanofiltration treatment plant has a maximum installed finished water treatment capacity of 12 million gallons per day with all units in service. The facility was designed to be expanded by the addition of three Reverse Osmosis (RO) trains that would utilize the Floridan Aquifer. If the RO system is constructed, the total installed potable water production capacity at the Peele Dixie WTP site to 18 million gallons per day.

3.5.5 Prospect Wellfield

Raw water to the Fiveash WTP used to be supplied from groundwater wells that surround Prospect Lake plus wells that surround the Fort Lauderdale Executive Airport. The wells at the executive airport are not in use. As a result, all of the raw water supplied to the Fiveash WTP is pumped from wells around Prospect Lake. This site is known as the Prospect Wellfield.

The Prospect Wellfield has 29 active production wells (Well Numbers 25 through 28, 30 through 49 and 50 through 54) that were constructed from 1969 through 2006. Production well No. 35 is only utilized on a standby basis. The wells have pumping capacities of approximately 2,100 gallons per minute (gpm) each, which equates to a total wellfield capacity of approximately 87 million gallons per day.

3.5.6 Dixie Wellfield

Raw water to the Peele-Dixie WTP is supplied from groundwater from the Dixie Wellfield. The Dixie Wellfield includes eight wells. The wells and pumping equipment where constructed in 2008. Each well has an approximate capacity of 2.5 million gallons per day. The wells are located within the Fort Lauderdale County Club golf course. The total capacity of all wells is approximately 20 million gallons per day. The wellfield withdrawal permit limits the maximum withdrawal to 15 million gallons per day on a maximum day basis.

In 2007, the City completed the construction of two Floridan Aquifer test wells at the Dixie Wellfield site. The purpose of these wells was to collect water quality and drawdown data for the planning the addition of reverse osmosis treatment at the Peele-Dixie WTP.

3.5.7 Saline Intrusion Monitoring (SALT) Program

The City of Fort Lauderdale operates a SALT program. The goal of the SALT program is to locate and monitor the saltwater interface in and around the City's wellfields. The purpose of the program is to provide an early warning monitoring system to assist wellfield managers in tracking the location and to manage withdrawals to limit the inland movement of the salt front. The City currently has 10 saltwater monitor wells.

It is also noted that the City is participating in the development of a Saltwater Intrusion Modeling project with Broward County and the USGS. It is anticipated the project will be completed in 2015.

3.5.8 Distribution System Water Storage Facilities

The City has two distribution system storage sites. These sites are known as the Poinciana Park Water Tank and Pump Station and the Northwest Second Avenue Water Tank and Pump Station. In 2006, the existing tank and pump station at the Poinciana Park Water Tank and Pump Station site were replaced with a 2.0 million gallon pre-stressed concrete ground storage tank and pumping station with backup power diesel engine generator. The Poinciana Park pump station also includes remote monitoring and control at the Fiveash WTP.

The existing elevated steel water tank at the Northwest Second Avenue site is 1.0 million gallons. The pump station was refurbished in 2012 with a new pump, electrical supply and automated controls system that included remote monitoring and control at the Fiveash WTP.

3.5.9 Raw Water Aquifer Storage and Recovery

The City's existing Aquifer Storage and Recovery (ASR) well is located at the Fiveash WTP. The ASR well was constructed in 1998. Performance testing to date has shown less than anticipated water recovery rates. The ASR well currently has a "no flow" permit.

3.5.10 Finished Water Distribution System

The City of Fort Lauderdale's water distribution system consists of over 770 miles of 2 to 54-inch diameter water mains that convey the finished water from the treatment facilities to the individual customers. In general, the larger diameter transmission mains radiate from the treatment facilities and decrease in size as they extend throughout the service area. The major transmission mains travel east from the WTPs to the populated portions of the service area and the two systems are interconnected along major north-south avenues.

3.5.11 Interlocal Agreements and Bulk Sales

The City of Fort Lauderdale sells water in bulk to the jurisdictions listed below. The water sold is measured via master meters.

- Broward County Water and Wastewater Services
- City of Oakland Park
- City of Tamarac
- City of Wilton Manors
- Port Everglades
- State of Florida Department of Transportation
- Town of Davie

3.5.12 Distribution System Interconnects

The City of Fort Lauderdale maintains nine distribution system interconnects with other utilities. **Table 8** identifies the location and size of the each interconnect. The isolation valves on all interconnects are closed.

Table 8

City of Fort Lauderdale Water Distribution System Interconnects

No.	Location	Size	Meter	Valve Position	Routine Check	Area Serviced
1	NW 24 Ave / 19 St	6"	No	Closed	monthly	Broward County
2	NW 9 Ave / 62 St	10"	No	Closed	monthly	Broward County
3	Peters Rd / SR 7	8"	No	Closed	monthly	Plantation
4	SW 35 Ave / W Broward Blvd	10"	No	Closed	monthly	Broward County
5	SW 34 St / 9 Ave	8"	No	Closed	monthly	Broward County
6	SW 34 St / 2 Ave	6"	005014099	Closed	monthly	Broward County
7	NE 68 St / 20 Terr	6"	No	Closed	monthly	Pompano
8	SW 20 St / SR 7 (Broadview) 2001 S. St. Rd. 7	6"	004237763	Closed	monthly	Broward County
9	5450 N Ocean Dr	10"	No	Closed	monthly	Pompano

3.5.13 Treatment Losses

Treatment losses, for the purpose of this report, is defined as the difference between raw water pumped and finished water pumped. The terminology “treatment loss” may be misleading since the water is not actually “lost”. Rather the “lost” water is repurposed for ground water recharge or other beneficial use. Hence, “treatment efficiency” may be a more accurate term. However, since the 10-year water supply plan

template issued by the SFWMD used the terminology “treatment loss”, this report uses the same terminology as the SFWMD template.

Treatment losses vary with the efficiency of the treatment technology utilized. The treatment loss for the Fiveash WTP, which uses lime softening technology, is roughly one to three percent of the raw water pumped. The treatment loss for the Peele-Dixie WTP, which uses nanofiltration softening technology, is roughly 15 percent of the raw water pumped. The historical overall treatment loss in the system is summarized in **Table 9**.

Table 9

Historical Overall Treatment Loss

Water Use Category	Annual Average Day Flow (mgd)								
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Raw Water (Biscayne Wellfields)	48.14	49.89	43.35	43.74	44.97	41.71	41.39	39.75	39.18
Finished Water Pumped from WTPs	47.76	50.10	43.11	42.88	43.54	40.20	40.17	38.36	37.78
Treatment Loss	0.38	-0.21	0.25	0.87	1.42	1.51	1.22	1.39	1.40
Loss as % of Raw Water Pumped	0.8%	-0.4%	0.6%	2.0%	3.2%	3.6%	3.0%	3.5%	3.6%

3.5.14 Distribution System Losses

Distribution system losses are presented in **Table 10**. The percent distribution system loss is based on a percent of finished water pumped. The distribution system losses have averaged 6.3 percent over the timeframe from 2005 through 2013.

Table 10

Historical Distribution System Loss

Water Use Category	Annual Average Day Flow (mgd)								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
Raw Water (Biscayne Wellfields)	48.14	49.89	43.35	43.74	44.97	41.71	41.39	39.75	39.18
Finished Water Pumped from WTPs	47.76	50.10	43.11	42.88	43.54	40.20	40.17	38.36	37.78
Billed Authorized Consumption	45.18	47.85	37.81	39.78	41.86	39.08	34.71	32.33	33.17
Unmetered Authorized Consumption (1.25% estimated for flushing)	0.60	0.63	0.54	0.54	0.54	0.50	0.50	0.48	0.47
Total Authorized Consumption	46.18	48.85	38.81	40.78	42.86	40.08	35.71	33.33	34.17
Distribution System Loss	1.57	1.25	4.30	2.09	0.69	0.12	4.46	5.03	3.62
% Distribution System Loss	3.3%	2.5%	10.0%	4.9%	1.6%	0.3%	11.1%	13.1%	9.6%

The above data do not include authorized unmetered water consumption at the WTPs and the distribution system. Staff believe this consumption is significant. However, no data on unmetered water consumption neither within the WTPs nor in the distribution system are currently available. Hence, the actual loss is believed to be less than that indicated in **Table 10**. The City is planning to implement improvements to incorporate meters to measure water consumption at the WTPs.

3.5.15 Outstanding Compliance Issues

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

3.5.16 Required Upgrades or Expansions

The City of Fort Lauderdale is planning an upgrade project at the Fiveash WTP titled “Reliability Upgrades and Disinfection System Replacement”. This project includes replacement of the chlorine gas system with sodium hypochlorite along with a series of improvements intended to enhance the reliability and automation of the Fiveash WTP.

No expansion of the City of Fort Lauderdale’s water system is planned at this time.

3.5.17 George T. Lohmeyer (GTL) Wastewater Treatment Plant (WWTP)

The GTL WWTP is located on a 9.6-acre site near Southeast 17th Street and Eisenhower Boulevard. The plant provides secondary treatment followed by deep-well injection via five injection wells located approximately one-quarter mile south of the site. The plant is owned and operated by the City of Fort Lauderdale and is used to treat wastewater generated in a region encompassing the following areas:

- City of Fort Lauderdale
- City of Wilton Manors
- City of Oakland Park
- Port Everglades
- A portion of the City of Tamarac
- A portion of unincorporated Broward County
- A portion of the Town of Davie

The facility has been expanded several times over the years. It was converted from a small trickling filter plant to a 22 million gallon per day facility in 1978, with effluent disposal via an outfall to the Intracoastal Waterway. In 1984, four deep injection wells were constructed for effluent disposal and the plant was converted and expanded to a permitted capacity of 38 million gallon per day. New clarifiers and biosolids dewatering facilities were added to the existing treatment train. In 1994, the Florida Department of Environmental Protection issued a permit with a capacity of 43 million gallon per day, on a maximum three-month average daily flow (M3MADF) basis. In 2001, Florida Department of Environmental Protection issued a permit modification that increased the design capacity of the plant to 54.0 MGD, pending approval of the increase in disposal capacity of the underground injection well system. The City then re-rated the plant to 56.6 million gallon per day on a M3MADF basis.

The existing facility does not currently include reclaimed water treatment facilities. However, on average the plant uses about 4 MGD of its own secondary effluent as in-plant re-use instead of potable water.

3.5.18 Deep Well Injection Wells

The GTL WWTP effluent pump station discharges to five deep injection wells via 3,500 feet of 54-inch-diameter force main. The wells are permitted to operate at up to 10 feet per second (fps) flow velocity on a sustained basis and 12 fps during emergencies. These velocities yield total injection well capacities of 93.25 and 112 MGD, respectively. The existing deep injection wells do not require high level disinfection (HLD) under the United Stated Environmental Protection Agency Underground Injection Control (UIC) Program. If a new injection well is required it would require HLD under the UIC program. HLD is not required for the existing injection wells under current regulations.

3.6 Water Supply Provided by Others

This City of Fort Lauderdale does not currently receive water supplied by others. This section is not applicable to the City of Fort Lauderdale.

3.7 Conservation

The City of Fort Lauderdale has been promoting water conservation from more than 25 years. Conservation is a proven strategy for delaying implementation of expensive alternative water supply technologies. The City has established a goal of reducing finished water demand to 170 gallons per person per day by the year 2028. The following subsections summarize the City of Fort Lauderdale's ongoing conservation initiatives.

City Goal: Reduce finished water demand to 170 gallons per person per day (gpcd) by 2028

3.7.1 Broward Water Partnerships

The City of Fort Lauderdale is a member of the Broward Water Partnership, which is a government service consisting of 19 municipalities and water utilities that collaborate on water conservation implementation.

3.7.2 ConservationPay$ Program

The City of Fort Lauderdale participates in a water conservation incentive program through an interlocal agreement (ILA) with Broward County marketed under the program name “Conservation Pay$”. The City of Fort Lauderdale became partners with Broward County in the program on June 21, 2011.

The program provides rebates, and free water-conserving devices to qualifying water customers, and it has a focused outreach and education component. Rebate dollars are used for the replacement of older, wasteful toilets in addition to 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% reduction in water use county-wide over 20 years.

Through June 2014, the City of Fort Lauderdale has issued rebates for 548 high efficiency toilets that use 1.28 gallons per flush. The City’s Sustainability Division estimates that the conservation program currently saves approximately 23,450 gallons per day.

3.7.3 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.

Table 11 presents the historical water savings from completed contract years under the NatureScape program.

Table 11

Historical NatureScape Program Water Savings

Contract Year	Water Saved (gal)
2010 - 2011	11,599,796
2011 - 2012	24,378,385
2012 - 2013	7,431,746
2013 - 2014	27,152,112
Total (2010 to 2014)	**70,562,039**

3.7.4 Water Matters Day

The City of Fort Lauderdale is a sponsor of Broward County's Water Matters Day program. Water Matters Day is a one day water conservation event where participants learn about our local and regional water resources, how water is managed and how utilities are planning for future water needs. Participants receive tips and information on water conservation, rebates and incentives for upgrading to water-conserving devices and learn how to create "Florida friendly" and drought tolerant landscapes. The goal of the program is to promote long-term water demand reductions.

3.7.5 Conservation Rate Structure

A conservation rate ordinance was originally enacted by the City in 1996. The City continues to have a conservation rate structure (progressively higher rates for as water usage increases) that went into effect in 2010 to encourage a water conservation ethic.

3.7.6 Water Shortage Restrictions

Section 28-1A of the Code of Ordinances (in effect since 2009) requires that in the event the South Florida Water Management District declares a drought and mandates water restrictions in one of the four established drought phases (Phase I, II, II or IV), the City of Fort Lauderdale implements a surcharge on water

usage. The amount of the surcharge is based on the level of water restrictions (Phase I, II, II or IV) and the number of gallons used. The surcharge is applied to water, wastewater and sprinkler meter accounts.

3.7.7 Florida-Friendly Landscaping

Per Section 28-1A of the Code of Ordinances (in effect since 2009), it is the City's policy to encourage use of Florida-friendly drought resistant plants and trees within the City. Following Florida-friendly landscaping principles, conservation of 40 to 60 percent of the water that traditional landscapes require may be feasible. The City is currently developing a change to the Code of Ordinances to require Florida-friendly landscaping for new development and re-development.

3.7.8 Irrigation System Design Code

Per Section 28-1A of the Code of Ordinances (in effect since 2009), all new irrigation systems permitted after 2009 require rain sensors to automatically shutdown if rain is detected.

3.7.9 Landscape Irrigation Restrictions

The City of Fort Lauderdale has implemented progressive landscape irrigation restrictions that meet the requirements of the SFWMD. These restrictions apply to all individuals who use City of Fort Lauderdale water, as well as water from private wells, lakes, canals, or other sources.

3.7.10 Water for Heating or Process Water

Per Section 28-1A of the Code of Ordinances (in effect since 2009), a water conservation device conforming to such specifications as may be required by the City, shall be installed on heating, processing or other industrial or commercial uses of water whenever the City determines in its discretion that recycling of the water without treatment is practical. A water conservation device is any equipment, process or procedure whereby all water used for heating or processing is either consumed in the intended use, or is recycled for the same purpose until it is unusable.

3.7.11 Water Used for Cooling Including Condensate

Per 28-1B of the City's Code of Ordinances (in effect since 2009), all new construction and replacements of cooling equipment whose function is evaporative or refrigerated cooling uses and air conditioning facilities that deliver water or condensate to a drain or other discharge facility are prohibited. This includes any equipment, process or procedure which relies upon the temperature of the water supply for cooling purposes.

3.7.12 Commercial Power Washing

Per 28-1B of the City's Code of Ordinances (in effect since 2009), commercial enterprises for which cleaning with water is an essential element of their business shall use only high efficiency equipment that uses 1.6 gallons per minute or less and is certified by the manufacturer.

3.7.13 Water for Decorative Features

Per 28-1B of the City's Code of Ordinances (in effect since 2009), decorative water features or similar water operating devices using potable or recycled water shall recirculate water within the device. Each device connected to the water system must have an approved back-flow prevention assembly.

3.7.14 Lakes and Ponds

Per 28-1B of the City's Code of Ordinances (in effect since 2009), potable water shall not be used to fill or maintain water levels in lakes and ponds.

3.7.15 Leak Detection

The City initiated a leak detection program in 1990 which was completed in 1992. The entire main distribution system was surveyed and the City continues to perform visual checks by field personnel.

3.7.16 Meter Replacement Program

The City has implemented an improved compound meter testing program and changes out all water meters 10 years old or older.

3.7.17 Plumbing Code Changes

An essential part of the City of Fort Lauderdale's conservation program is the implementation of high efficiency plumbing requirements. On March 15, 2012, the Broward County Board of Rules and Appeals adopted changes to Chapter 6, Section 604.4, of the Florida Building Code which contains standards for ultra-low volume plumbing fixtures (e.g., 1.28 gallon per flush toilets, 1.5 gallon per minute shower heads and sink faucets, 0.5 gallon per flush urinals, 6.5 gallons per cycle residential dishwashers, etc.) to be used in all new construction. Additionally, Chapter 9, Section 908.5, of the Florida Building Code requires a minimum of 8 cycles of concentration for cooling towers and requirements to reuse concentrate for cooling tower make-up water for air handling systems with a 4-ton British Thermal Unit (BTU) capacity air handling system or greater as a condition for the receipt of Certificate of Occupancy.

3.7.18 Water Conservation Education Program

The City publishes a variety of brochures and literature, promoting water conservation that are available to members of the public upon request. The City also maintains an active public information campaign on water conservation and restrictions on irrigation using Environmental Inspectors, Code Enforcement Officers, and Police Officers. In addition, the City maintains a website (http://www.fortlauderdale.gov) that includes water conservation information.

3.7.19 Sustainability Action Plan 2011 Update

The City's Sustainability Action Plan 2011 Update identified the following actions to reach the 170 gpcd goal (the action numbers identified in the Sustainability Action Plan 2011 Update are shown for consistency):

- Action 1.1.1 - Expedited, Continuing Escalation of High-User Potable Water Fees in Single-Family Zoning.
- Action 1.1.2 - Implement and enforce landscape ordinance requiring low volume / avoidance watering.
- Action 1.1.3 - Directly engage all large water users in long-range water resource planning and conservation.
- Action 1.1.4 - Consider innovative projects including water reuse and harvesting rainwater.

Table 12 provides a summary of the current status of implementing the actions described in the Sustainability Action Plan 2011 Update.

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Table 12

Water Conservation Action Status

Action	Status
Action 1.1.1 - Expedited, Continuing Escalation of High-User Potable Water Fees in Single-Family Zoning.	The City of Fort Lauderdale continues to have a conservation rate structure (progressively higher rates for as water usage increases) that went into effect in 2010 to encourage a water conservation ethic.
Action 1.1.2 - Implement and enforce landscape ordinance requiring low volume / avoidance watering.	Per Section 28-1A of the Code of Ordinances (in effect since 2009), it is the City's policy to encourage use of Florida-friendly drought resistant plants and trees within the City.
Action 1.1.3 - Directly engage all large water users in long-range water resource planning and conservation.	The City of Fort Lauderdale is conducting ongoing discussions with its wholesale customers relative to opportunities to reduce water consumption.
Action 1.1.4 - Consider innovative projects including water reuse and harvesting rainwater.	The City of Fort Lauderdale is part of a partnership with Broward County to explore the feasibility of regional wastewater reuse opportunities. Additionally, the City is collaborating with other utilities in exploring the feasibility of harvesting rainwater via the proposed C-51 Reservoir project. Participating in other water reuse and rainwater harvesting projects are evaluated as the opportunities are identified.

3.7.20 2035 Fast Forward Vision Plan

The City has developed a planning document titled Fast Forward Fort Lauderdale that envisions the City through the year 2035. The document is also known as the Fast Forward Fort Lauderdale Vision for 2035.

The Fast Forward Plan is a compilation of ideas/goals that are used to guide the City's decision making. A key aspect of the 2035 Vision Plan is ensuring that the City enhance water conservation efforts to ensure a sustainable water supply.

3.7.21 2018 Press Play Strategic Plan

The Press Play 2018 Strategic Plan, was approved by the City Commission in September 2013. This document complements the Fast Forward Fort Lauderdale Vision for 2035. Fast Forward establishes the overarching goals of the City, while Press Play establishes specific initiates to be completed over the next 5 years to make progress at reaching the goals. Key initiates related to water supply included in the 2018 Strategic Plan are as follows:

- Work with partners to identify and implement wastewater reuse opportunities
- Participate in regional long-term water supply strategies such as the C-51 reservoir project
- Monitor salt water intrusion and implement best practices, reuse, and other practices to minimize movement of the saltwater front
- Update the City's Water and Sewer Master Plan; integrate the plan with infrastructure improvement that include modern and efficient energy standards
- Develop a Water Capacity Model and approval process for future development

3.7.22 Identify any Local Financial Responsibilities

The City of Fort Lauderdale participates in a water conservation incentive program through an interlocal agreement (ILA) with Broward County marketed under the program name "Conservation Pay$". The City of Fort Lauderdale became partners with Broward County in the program on June 21, 2011. The ILA expires in fiscal year 2015/2016. The City of Fort Lauderdale has financial responsibilities to continue funding this program through fiscal year 2015/2016.

3.8 Reuse

Florida law supports reuse efforts. Florida's utilities, local governments, and water management districts have led the nation in the quantity of reclaimed water reused and public acceptance of reuse programs. Section 373.250(1) F.S. provides "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."

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

This section describes the City of Fort Lauderdale's ongoing assessment of reuse opportunities within the City's service area.

The City of Fort Lauderdale's GTL WWTP is a regional facility used to treat wastewater in a region encompassing the following:

- City of Fort Lauderdale
- City of Wilton Manors
- City of Oakland Park
- Port Everglades
- A portion of the City of Tamarac
- A portion of unincorporated Broward County
- A portion of the Town of Davie

The facility does not currently treat effluent to reclaimed water standards for public irrigation or other off-site uses. However, on average the plant uses about 4 MGD of its own secondary effluent as in-plant re-use instead of potable water.

Additionally, the City is participating in the County-wide Integrated Water Resources Plan Grants for feasibility studies related to potential beneficial reuse. These have included a 2008 feasibility study for selected reclaimed water projects within the City for a 50% cost share for $125,000. A second feasibility study in 2009 was for the reclaimed water in the area of the Convention Center Broward County provided a 50% cost share for $5,000.

The City of Fort Lauderdale prepared a report assessing reclaimed water opportunities in November 2008 titled “Feasibility Study for the Implementation of Selected Reclaimed Water Projects with the City of Fort Lauderdale”. Key conclusions of the report were:

- The GTL WWTP is located far from any significant users of reclaimed water, such as golf courses. Therefore, the construction of an irrigation-quality reclaimed water production facility at or near the plant to provide further treatment of effluent to public reuse standards is not feasible. There is little available space on the plant site or plant vicinity to construct the required treatment facilities. In addition, due to high levels of infiltration into gravity sewer piping located near coastal areas and waterways, the chloride concentration in the treated effluent is high (approximately 600 mg/L), resulting in unaffordable levels of treatment to reuse standards at the GTL WWTP site. Therefore, the only practical alternatives for implementing reuse systems are off-site and near potential beneficial uses of reclaimed water;

- Two options studied (reclaimed water facilities at the E-Repump Station and the Former Composting Facility) are technically feasible but are not be economically viable.

The City of Fort Lauderdale will prepare a Comprehensive Utility Strategic Master Plan for water and wastewater in 2015 that will evaluate reclaimed water opportunities that identify WUP consumptive use credits. A critical component of this analysis would factor in the cost avoidance of implementing HLD at the GTL WWTP.

The City of Fort Lauderdale continues to assess water reuse opportunities that can be used to help other municipalities and collaborate with Broward County to identify and assess cost effective alternative water supply opportunities. Indirect potable reuse systems are under consideration because of the dual benefits of providing more disposal capacity and augmenting local water supplies.

The recently approved amendment to the Ocean Outfall Legislation (i.e., amendment to FS 403.086, effective date of July 1, 2013), allows facilities that discharged through an ocean outfall during the baseline period (2003 through 2007) to contract with other utilities to install functioning reuse system capacity on the utilities' behalf. This amendment provides the City of Fort Lauderdale with an opportunity to collaborate with local outfall owners (with the possibility of negotiating cost sharing) in the development potential reuse projects. The opportunities for collaborative project development (and cost sharing) with nearby ocean outfall owners (i.e., Broward County and City of Hollywood) will be assessed in the development of the City of Fort Lauderdale's Comprehensive Utility Strategic Master Plan for water and wastewater planned for completion in 2015.

3.8.2 Identify any Local Financial Responsibilities

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

3.9 Sector Plans

This section is not applicable to the City of Fort Lauderdale.

4.0 CAPITAL IMPROVEMENTS

This section provides a brief description of the City of Fort Lauderdale Capital Improvements Program (it is noted that the terminology "Community Investment Plan" is utilized by the City of Fort Lauderdale) for Water Supply.

4.1 Work Plan Projects

This section identifies projects required to augment and/or diversify water supply to meet demand in the City of Fort Lauderdale's water service area.

4.1.1 Water Supply / Treatment Projects Needed from 2015 to 2025

Based upon the raw water demand forecast, development of traditional water supply, alternative water supply, and reuse projects are not required to meet the demand within the City of Fort Lauderdale's water service area over the period from 2015 to 2025. Hence, the City plans on the following actions relative to water supply planning over the next 10-years:

1. The City of Fort Lauderdale will continue to implement its ongoing conservation programs as outlined in Section 3.7 of the 10-year Water Supply Facilities Work Plan – 2014 Update.

2. The City of Fort Lauderdale will continue to participate in the C-51 reservoir regional stormwater capture project in collaboration with the Broward County Water Resources Task Force Technical Team.

3. The City of Fort Lauderdale will develop a Comprehensive Utility Strategic Master Plan for the water and wastewater systems by the end of 2015. This document will take a holistic view of water supply, treatment, storage, distribution, and conservation along with wastewater collection, transmission, treatment, disposal, and reuse to identify improvement needs through the year 2035 to ensure sustainable, reliable and adaptable water and wastewater infrastructure.

4.1.2 Water Supply / Treatment Projects Needed from 2025 to 2035

Based upon the raw water demand forecast, development of traditional water supply, alternative water supply, and reuse projects are not required to meet the demand within the City of Fort Lauderdale's water service area over the period from 2025 to 2035. However, the City will continue assessing the "Dixie Floridan Water Supply/Treatment Facility" that was included in the 2005-2006 LEC Water Supply Plan and Table F-2 of the 2013 Lower East Coast Water Supply Plan Update.

Per Table F-2 of the 2013 Lower East Coast Water Supply Plan Update, the City of Fort Lauderdale anticipates implementing six million gallons per day of reverse osmosis treatment at the Peele-Dixie WTP by the year 2030. This project would require eight million gallons per day of raw water from the Floridan Aquifer system.

The City of Fort Lauderdale will develop a Comprehensive Utility Strategic Master Plan by the end of 2015. The City will assess the necessity (and the recommended timeframe) for implementing the "Dixie Floridan Water Supply/Treatment Facility" project or an alternative to this project that is more beneficial to the community (e.g., conservation or reuse). The City will consider the need for additional treatment capacity to allow for extended duration maintenance of the Fiveash WTP lime softening treatment units and enhancing infrastructure sustainability.

4.1.3 Transmission System Projects Needed from 2015 to 2025

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

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

The City of Fort Lauderdale 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 Fort Lauderdale.

4.2 Capital Improvements Element/Schedule

Table 13 presents the Five-Year (Fiscal Year 2014 – 2018) Schedule of Capital Improvements for traditional water supply, treatment, storage, and distribution system infrastructure. Additionally, alternative water supply projects that have been identified to start within the next five years of are included. Furthermore, projects related to planning for water supply needs that will start within the next five years (such as the Comprehensive Utility Strategic Master Plan for the water and wastewater systems) are included.

Costs include engineering services along with construction costs. Additionally, the Five-Year Schedule of Capital Improvements includes costs for development of engineering studies where appropriate.

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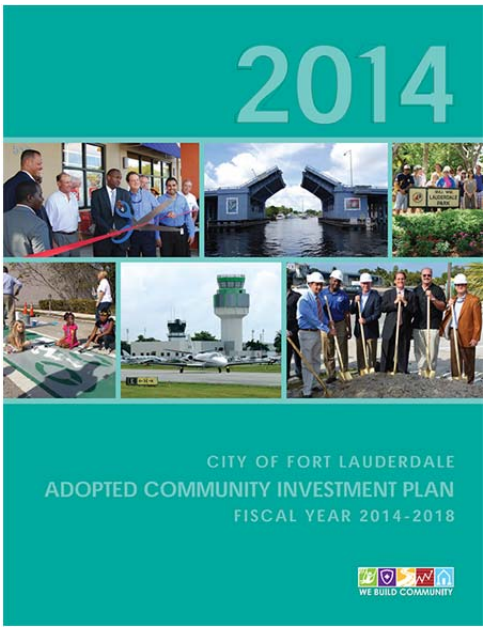

The projects presented herein are based upon the City of Fort Lauderdale's Community Investment Plan for Fiscal Year 2014 – 2018. The projects are intended to be implemented over the next five years to maintain the City's existing level of service standards. The Community Investment Plan projects do not expand or diversify water supply capacity over the next five years. However, the Community Investment Plan does identify preparing a Comprehensive Utility Strategic Master Plan for the water and wastewater systems that will assess long-term water supply needs and recommend capital improvement projects (including: traditional sources; alternative sources such as reuse and the Floridan Aquifer; demand management; and possible expansion of conservation programs) to meet future water demand. It is anticipated that the Comprehensive Utility Strategic Master Plan for the water and wastewater systems would be completed near the end of 2015. The findings of this study would be incorporated, where appropriate, into future Community Investment Plans.

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Table 13

City of Fort Lauderdale Water System

5-year (FY 2014-2018) Community Investment Plan

Project Number and Title	Funding Source	FY 2014-2018 CIP Total	Unfunded Needs
P11866 Dixie Wellfield	Fund 454	$99,951	-
P11685 Water Monitoring System (Scada)	Fund 454	$195,369	-
P11855 Prospect Wellfield Improvement R&R	Fund 454	$249,970	-
P11586 C12 & 13 Interconnect - Brw Cty Intrlcl	Fund 454	$360,000	-
P11857 Annual Utilities Restoration 2012-13	Fund 454	$876,771	-
P11484 Dixie Wellfield Raw Water Main Rplcmnt	Fund 454	$1,031,373	-
P11856 Peele Dixie R&R	Fund 454	$2,500,000	-
P11589 Fiveash Wtp Disinfection Improvements	Fund 454	$27,000,000	-
P11719 Sunrise Bvd Middle Rvr Bdge Wm Reloc/Des	Fund 454	$300,000	-
P11720 Imperial Point Large Water Mn - Phase 2	Fund 454	$633,201	-
P11405 Nw 2nd Ave Tank & Pump Station Rehab	Fund 454	$225,846	-
P11571 Oakland Park Beach Area Water Main	Fund 454	$2,363,668	-

Table 13

City of Fort Lauderdale Water System

5-year (FY 2014-2018) Community Investment Plan

Project Number and Title	Funding Source	FY 2014-2018 CIP Total	Unfunded Needs
P11622 Sw 20 Ct, Sw 22 Ter, Sw 24 Av Sml Wtr Mn	Fund 454	$873,915	-
P11471 Shady Banks Small Wm Improvmnt - Phase 2	Fund 454	$375,516	-
P11828 Filters 10, 11, 12, & 13 Rehab-Fiveash	Fund 454	$166,000	-
P11246 Water Treatment Plant Repair/Replacement	Fund 454	$799,710	-
P11859 Annual Water Service Replacement 2012-13	Fund 454	$999,889	-
P11887 Nw Second Ave Tank Restoration	Fund 454	$2,000,000	-
P11770 Se 17 St Large Water Main Replacement	Fund 454	$349,931	-
P11901 Victoria Park B - South Small Water Mains Impr	Fund 454	$4,640,000	-
P10850 Victoria Park A North-Small Watermains	Fund 454	$2,134,554	-
P10814 Central New River W/Main River Crossing	Fund 454	$500,000	-
P10851 Lake Ridge Small Water Main Improvements	Fund 454	$500,000	-

Table 13

City of Fort Lauderdale Water System

5-year (FY 2014-2018) Community Investment Plan

Project Number and Title	Funding Source	FY 2014-2018 CIP Total	Unfunded Needs
P11080 Port Condo Small Water Main Improvements	Fund 454	$149,240	-
P11591 Prospect Wellfield Sludge Removal	Fund 454	$2,000,000	-
P11594 Fiveash Water Treatment Plant - Chemical System	Fund 454	$5,000,000	-
P11467 Ne 16 Avenue Large Water Main Improvements	Fund 454	$3,300,000	-
Fy20130218 Fiveash WTP Diesel High Service Pump Replacement	Fund 454	$2,663,552	-
Fy20100203 Fiveash Water Treatment Plant Filter Rehab	Fund 454	$2,500,000	-
P11461 Sw 31st Ave - Large Water Main Improvement	Fund 454	$1,663,552	-
Fy20100218 Peele Dixie Alternative Water Supply Construction	Fund 454	$2,222,500	-
P11466 Broward Blvd - Large Water Main Improvements	Fund 454	$1,714,000	$4,986,000
P11465 17th Street Causeway- Large Water Main Replacement	Fund 454	$1,700,000	$5,600,000
P11459 Poinciana Park (North) - Large Water Main	Fund 454	-	$2,400,000

Table 13

City of Fort Lauderdale Water System

5-year (FY 2014-2018) Community Investment Plan

Project Number and Title	Funding Source	FY 2014-2018 CIP Total	Unfunded Needs
P11463 Seabreeze Boulevard - Large Water Main Replacement	Fund 454	-	$4,400,000
P10814 Central New River W/Main River Crossing	Fund 482	$117,150	-
P10848 South Middle River N. Small Water Mains	Fund 482	$296,851	-
P10850 Victoria Park A North-Small Watermains	Fund 482	$711,518	-
P10851 Lake Ridge Small Water Main Improvements	Fund 482	$480,000	-
P10852 South Middle River S. Water Mains	Fund 482	$34,312	-
P10853 Flagler Heights Small Water Main Improv	Fund 482	$945,159	-
P11080 Port Condo Small Water Main Improvements	Fund 482	$199,722	-
P11471 Shady Banks Small Wm Improvmnt - Phase 2	Fund 482	$1,000,000	-
P11589 Fiveash Wtp Disinfection Improvements	Fund 482	$4,988,575	-
P11622 Sw 20 Ct, Sw 22 Ter, SW 24 Av Sml Wtr Mn	Fund 482	$49,661	-

Table 13

City of Fort Lauderdale Water System

5-year (FY 2014-2018) Community Investment Plan

Project Number and Title	Funding Source	FY 2014-2018 CIP Total	Unfunded Needs
P11685 Water Monitoring System (SCADA)	Fund 482	$500,000	-
P11828 Filters 10, 11, 12, & 13 Rehab-Fiveash	Fund 482	$400,000	-
P11932 Aeration Basin At Fiveash Rehab	Fund 482	$200,000	-
P11719 Sunrise Bvd Middle Rvr Bdge Wm Reloc/Des	Fund 482	$700,000	-
P11720 Imperial Point Large Water Mn - Phase 2	Fund 482	$1,599,602	-
P11858 Water & Sewer Master Plan Update	Fund 482	$1,000,000	-
P11887 NW Second Ave Tank Restoration	Fund 482	$750,000	-
TOTAL		**$86,061,058**	**$17,386,000**

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5.0 GOALS, OBJECTIVES AND POLICIES

The City of Fort Lauderdale 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 Fort Lauderdale, State of Florida, Regional, and Broward County plans. The Comprehensive Plan focuses on those issues facing the City of Fort Lauderdale over a twenty-year time horizon. The Comprehensive Plan establishes long-term direction of goals as well as short-term objectives and policies to guide implementation efforts

The following comprehensive plan goals, objectives, and policies (GOPs) have been reviewed for consistency with the 10-year Water Supply Facilities Work Plan - 2014 Update. New GOPs to be adopted and existing GOPS to be revised are identified below.

The following GOPs have been adopted in the original Water Supply Facilities Work Plan (adopted by Ordinance C-09-01 in January 2009) and have been reviewed to see if updates are revisions are needed:

1. Coordination of land uses and future land use changes with the availability of water supplies and water supply facilities;
2. Revision of potable water level of service standards for residential and non-residential users;
3. Provision for the protection of water quality in the traditional and new alternative water supply sources;
4. Revision of priorities for the replacement of facilities, correction of existing water supply and facility deficiencies, and provision for future water supply and facility needs;
5. Provision for conserving potable water resources, including the implementation of reuse programs and potable water conservation strategies and techniques;

6. Provisions for improved or additional coordination between a water supply provider and the recipient local government concerning the sharing and updating of information to meet ongoing water supply needs;
7. Coordination between local governments and the water supply provider in the implementation of alternative water supply projects, establishment of level of service standards and resource allocations, changes in service areas, and potential for annexation;
8. Coordination of land uses with available and projected fiscal resources and a financially feasible schedule of capital improvements for water supply and facility projects;
9. Additional revenue sources to fund water supply and facility projects;
10. Coordination with the respective regional water supply plan;
11. Update the Water Supply Facilities Work Plan within 18 months following the approval of a regional water supply plan; and
12. Concurrency requiring water supplies at the building permit stage.

ATTACHMENT B

Updates to the Potable Water Sub-element