



City of Oakland Park

Water Supply Facilities Work Plan

DRAFT REPORT
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MWH Project 10506069



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1.0 GENERAL

The State of Florida has passed legislation over the past few years with the purpose of strengthening the linkage between growth and water availability based on specific demands identified in the water supply planning process. Section 373.709 and Section 163.3177(6) (c)3 of Florida Statutes (F.S.) requires that the “Water Supply Work Plan” be updated within 18 months after a water management district’s governing board approves an updated regional water supply plan to reflect whatever changes in the regional plan affect their local water supply and work plan. The City’s last Water Supply Facilities Work Plan was prepared and adopted in 2008. The South Florida Water Management District (SFWMD) performed an update to the Lower East Coast Regional Water Supply Plan in September 2013. This Water Supply Facilities Work Plan (Work Plan) has been prepared for the City of Oakland Park (City), located within Broward County (County). It has been prepared in response to the requirements for local governments to revise their Comprehensive Plan within 18 months after the Regional Water Supply Plan is adopted.

1.1 BACKGROUND

The Florida Legislature enacted bills in 2002, 2004, 2005 and 2011 sessions to help 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. This strengthened coordination and started requiring local governments to prepare a Water Supply Facilities Work Plan (Work Plan), if the local government was located within an area that had a Regional Water Supply Plan. These local governments are required to submit a Work Plan to ensure linkage between the Regional Water Supply Plan and their individual comprehensive plans. Each Work Plan should address infrastructure and conservation requirements, needed capital improvements, and inter-governmental and water supplier coordination. The City of Oakland Park is a “Receiver” and not a “Supplier” of potable water to other water purveyors.

Appendix A, herein; Relevant Portion of Cited Florida Statute Provisions, provides a summary of regulatory requirements that impact local governments and their water supply planning efforts. As a result of their required regional



water supply planning efforts, the South Florida Water Management District (SFWMD) evaluated the adequacy of existing water supplies to meet existing and future water demands and determined that traditional water supply resources from the Biscayne Aquifer will not be adequate to meet future demands. The 2013 Lower East Coast Water Supply Plan Update indicates most future water supply needs will need to be met by the implementation of alternative water supply sources. All local governments located within the Lower East Coast regional area are now required to develop a Work Plan to ensure linkage between the regional water supply plan and their individual comprehensive plans by March 2015.

1.2 SERVICES PROVIDED BY OAKLAND PARK

The City of Oakland Park supplies retail treated water services to approximately 29,000 residents in the City. The City does not operate and maintain any water supply wells or treatment facilities. However, the City is able to provide such service to all its residents by purchasing wholesale potable water from the City of Fort Lauderdale and having portions of its incorporated area provided retail service by Broward County and Fort Lauderdale.

In addition to the roughly 29,000 citizens provided retail service by the City, another 13,000 citizens receive retail service directly via the City of Fort Lauderdale and Broward County. The City of Oakland Park no longer provides either bulk or retail sales outside of its City Limits. In addition to providing normal potable water service to customers within the City Limits, it is the City's intent to provide adequate fire flow to both residential and non-residential customers. The location of Oakland Park is shown in **Figure 1-1**.

The City currently does not provide reuse water service to its customers.

1.3 RELEVANT REGIONAL ISSUES

This section is a brief description or narrative discussing the overarching regional issues impacting water supply planning at the local level. The regional issues identified for 2030 in the Lower East Coast Water Supply Plan and outlined in Broward County's Water Supply Facilities Work Plan (WSFWP) are briefly described below:

1. Increased withdrawals from both the Surficial Aquifer System and surface water from Lake Okeechobee are limited.



2. Use of reuse water continues to be an important alternative source in the region and helps to meet requirements of the 2008 Leah G. Schad Ocean Outfall Program.
3. Integration of climate impacts, sea level rise, and water resources planning.
4. Conservation continues to be relied upon to reduce per capita use and a means to potentially delay or perhaps avoid adding capacity.

1.3.1 Surficial Aquifer System and Limited Water Availability

The Surficial Aquifer System (SAS), known as the Biscayne Aquifer, in the southeastern Florida peninsula is the primary source of freshwater to residents of Broward County, Miami-Dade County, and southeastern Palm Beach County. Withdrawals from the SAS are managed by the SFWMD through the issuance of Consumptive Use Permits (CUP). 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 (including harm to the environment, saltwater intrusion, wetlands, and movement of pollution). To prevent wasteful uses, consumptive use permits require water conservation such as the use of reuse water (treated wastewater/ reuse water). All water supply utilities applying for an individual permit are required to develop and implement a water conservation plan.

Water can be used for public supply (drinking water), agricultural and nursery plant irrigation, golf course irrigation, commercial use, dewatering/mining activities and power. Water uses not covered by these consumptive use permits include domestic uses, home irrigation and water used for firefighting. These uses must include compliance with the Minimum Flow and Levels (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 following are considered as AWS 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 reuse after one or more public water supply, municipal, industrial, commercial, or agricultural uses; the downstream augmentation of water bodies with reuse water; stormwater; and any other water supply source that is designated as nontraditional for a water supply region in the applicable water supply plan. 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. Since this program, funding has 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.

1.3.2 2008 Ocean Outfall Program and Reuse Water Options

In 2008, the Florida Legislature enacted an ocean outfall legislation which required the elimination of the use of six ocean outfalls in southeastern Florida as the primary means for disposal of treated domestic wastewater, influencing the Broward County North Regional Wastewater Treatment Plant (BCNR WWTP). The objectives of this statute were to reduce nutrient loadings to the environment and to achieve the new use of water for water supply needs.

This statute requires BCNR WWTP to reuse at least 60 percent of the historic outfall flows by 2025 and follow the below outfall program:

- 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.

Important considerations when developing reuse water projects are rising sea levels, and increasing salt concentrations in coastal wastewater collection systems that could impact cost-effective reuse 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 sanitary sewer collection systems, redesigning or relocating collection systems, and building additional water quality treatment capacity such as membrane filtration.

1.4 PURPOSE

The purpose of this Work Plan is to present an implementation plan that will guide the City's efforts to develop and maintain sustainable sources of water for its overall service area in coordination with the LEC Plan. A description of the City's existing and proposed transmission and distribution facilities to satisfy projected water demands is included. The City of Oakland Park does not have raw water or treatment facilities; thus, treated water for the citizens of Oakland Park comes from the City of Fort Lauderdale and Broward County (Suppliers). Part of the City's purpose is to assure that the "Suppliers" have adequate plans to enable Oakland Park to progress and grow without water supply and treatment issues. As required, it is anticipated that this Work Plan will be updated every five years or within 18 months of a revision to the LEC Plan.

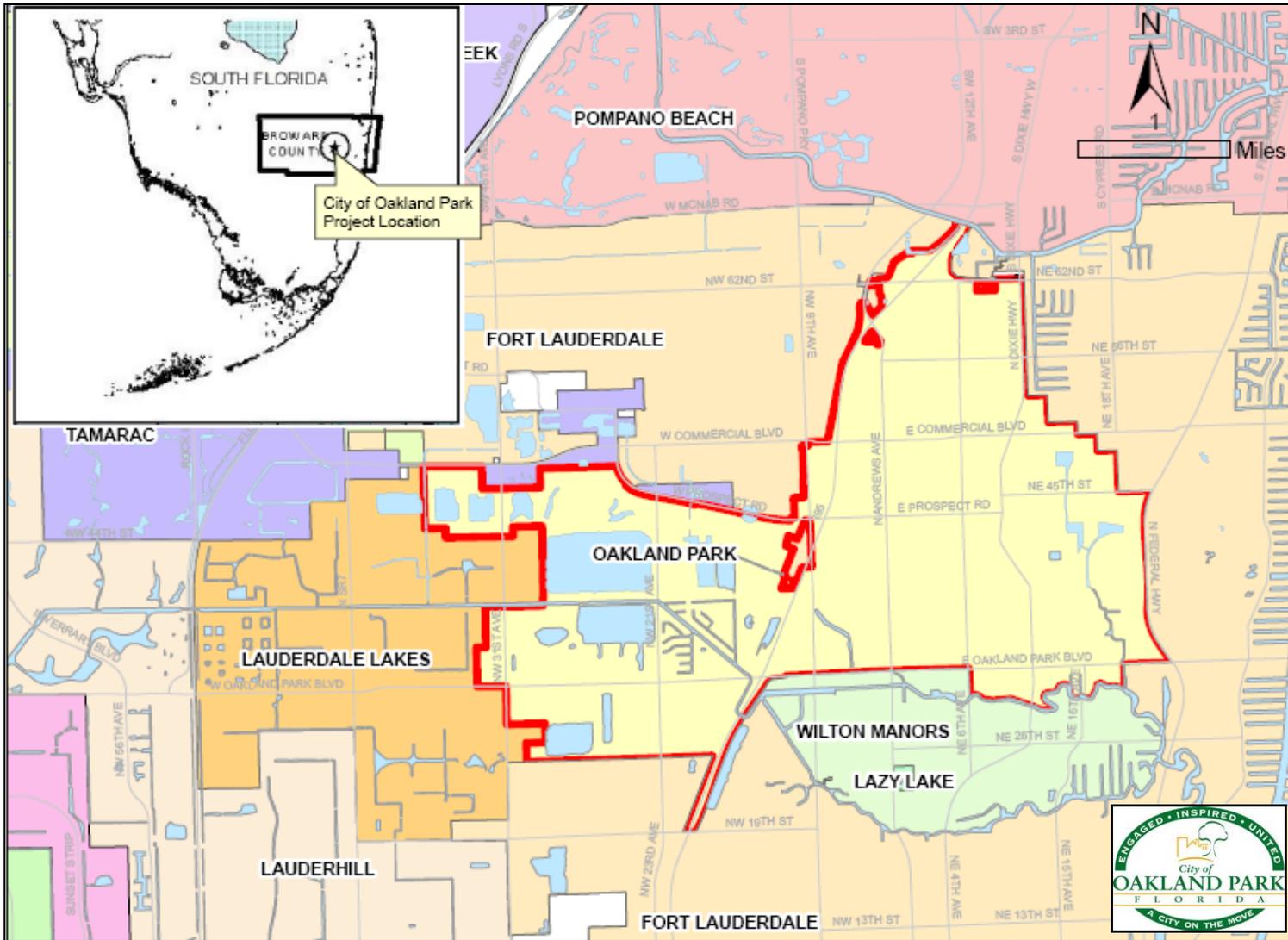


Figure 1-1 City of Oakland Park Location Map



2.0 WATER SERVICE AREA

The City of Oakland Park (City) was established approximately 85 years ago with the abolishment of the Town of Floranada, reestablishing the water service area boundaries to approximately the west side of U.S. 1 west to N.W. 31st Avenue and the north fork of Middle River north to what is now Prospect Road. The City currently provides potable water service to approximately 29,000 people in the City's retail water service area. Another 13,000 people within the City Limits receive retail water service from Broward County and the City of Fort Lauderdale. The City Limits covers approximately 5,128 acres. See **Figure 2-1** for City Limits and Retail Services provided by the City, the City of Fort Lauderdale, and Broward County.

2.1 LOCATION DESCRIPTION

The City has been in a transition period since 2000 with annexation and service area changes primarily taking place between 2005 and 2007. Pressures within the County to gradually incorporate all the unincorporated areas have lead the City to annex several adjacent areas. Some of the annexed areas had previous water service from the City, while other areas had water service from Broward County. There have also been "neighborhood improvement projects" completed within some annexed areas. Part of the neighborhood improvement areas in the area north of Prospect Rd, East of Interstate 95, and south of Commercial Blvd had previously been provided service by Oakland Park as retail customers. This area is now within the City of Oakland Park City Limits, but is now being provided potable water service from Broward County. The current City potable water service area is comprised roughly of the area bounded by Commercial Blvd and Prospect Rd to the north, North Federal Highway to the east, Oakland Park Blvd and NW 26 St to the south, and NW 31st Avenue to the west.

2.2 WATER SERVICE PROVIDERS

The City is supplied with potable water from the City of Fort Lauderdale and Broward County Water and Wastewater Services (BCWWS). Within the City Limits the retail service is subdivided into three areas by retail service providers: the City retail service area, the City of Fort Lauderdale retail service area, and Broward County retail service area. The City retail service area receives potable water via wholesale purchases of treated water from the City of Fort Lauderdale. **Figure 2-1** shows the City of Oakland Park City Limits and its retail service providers.



2.2.1 SERVICE AGREEMENTS

The City has an agreement with the City of Fort Lauderdale for them to provide wholesale (bulk) potable water service to the residents within the City retail service area. The service agreement between the City and City of Fort Lauderdale was signed in 1994 and extends until 2023.

The City does not normally have involvement in the planning, construction, and operation of the water supply and water treatment facilities maintained, operated, and owned by the City of Fort Lauderdale. The City could be financially involved in the installation of additional water lines or water meters if required to convey water from the City of Fort Lauderdale. Currently, and as projected, there does not appear to be a need for any such additional wholesale service connections from the Fort Lauderdale to the Oakland Park System. The City has sole responsibility over the transmission and distribution system within the City's retail service area.

Broward County Water & Wastewater Services (BCWWS) provides retail potable water service to some of the areas within the City. Currently, the City does not have an agreement with BCWWS as the City does not buy wholesale (bulk) water from BCWWS.

While not normally being involved in the water resource and treatment planning, the City has been actively coordinating and cooperating with both Broward County and the City of Fort Lauderdale in the major annexation, service area, and neighborhood improvement projects that have taken place over the past years. The annexations added about 40 percent to the City's population. Since both parties have retail services within the City of Oakland Park City Limits and the City of Fort Lauderdale provides wholesale (bulk) water service to the City, the Water Supply Facilities Work Plans for each of these public water "Suppliers" has been included herein in the appendices.

Neither the City of Fort Lauderdale nor Broward County reserve specific plant capacity for the City, but both plan to meet the water demands of their retail service areas, as well as the wholesale water needs by the City of Fort Lauderdale for the City of Oakland Park.

2.3 PRIVATE SUPPLIERS

There are no known sources of potable water being served within the City Limits other than the primary providers mentioned above.



There are two non-potable water service providers within the City: Oak Tree Country Club Golf Course and the City's Wimberly Field Park. The golf course is located at 2400 Prospect Rd. It is currently not in service but has potential to reactivate and has had a withdrawal permit from SFWMD. The City's athletic complex at Wimberly Park is located at the corner of NE 3rd Ave and NE 38 St and up to NE 41 St. The park water use is considerably less than 100,000 gpd and therefore is not required to obtain a withdrawal permit. **Figure 2-1** shows the location of the non-potable water service providers as points within the water service area. There are no other potable water purveyors than the City, Broward County, and City of Fort Lauderdale.

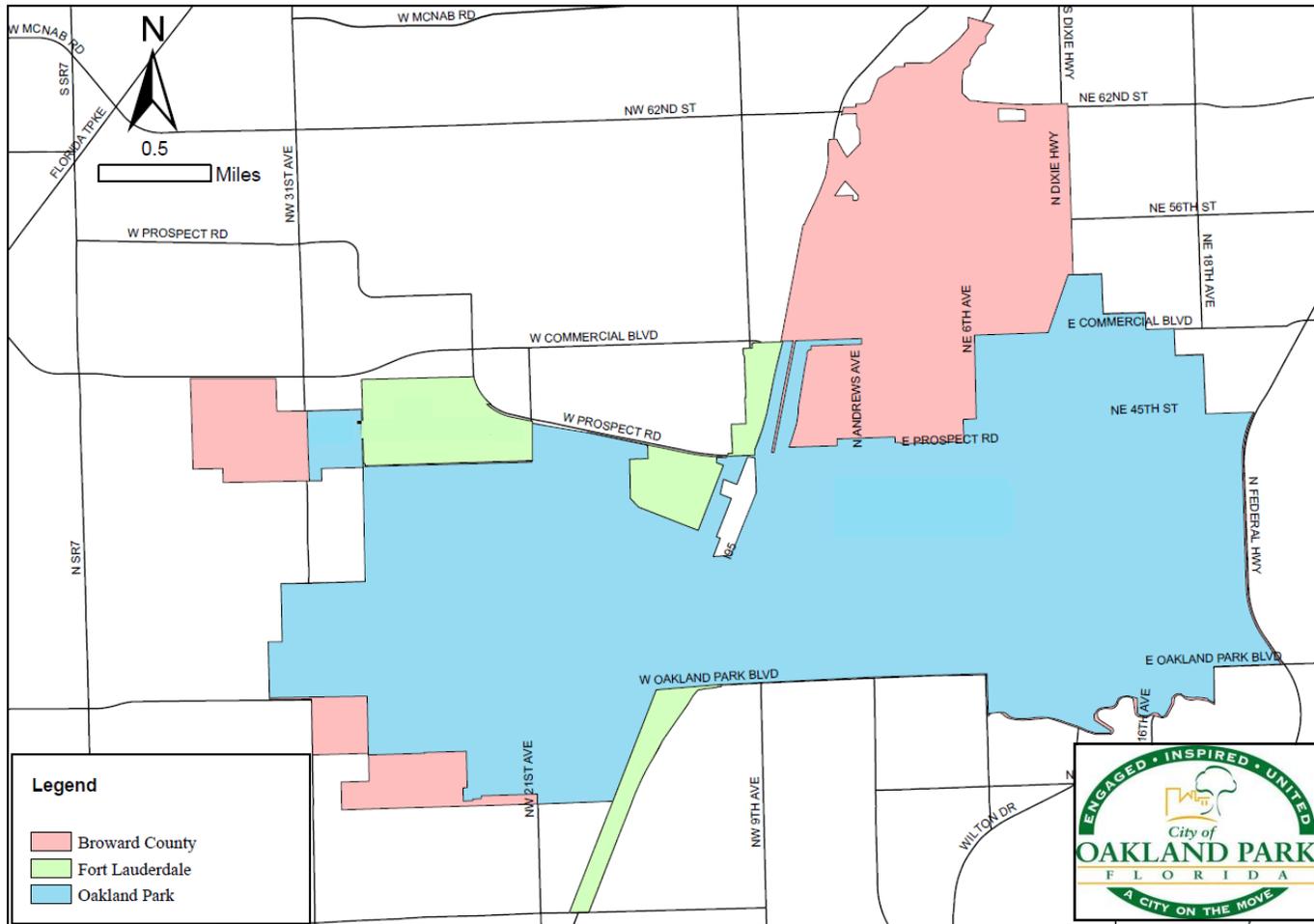


Figure 2-1 City of Oakland Park City Limits and Retail Service Providers



3.0 EXISTING FACILITIES

The City of Oakland Park (City) does not own or operate any water supply, treatment, or storage facilities. This section summarizes the existing water supply and treatment facilities owned, operated, and maintained by the City of Fort Lauderdale and by Broward County. These facilities include wellfields, treatment plants, storage tanks and transmission and distribution systems. This report section also addresses the City's transmission and distribution system.

It should be noted that the City has neither wastewater treatment facilities nor access currently to any wastewater effluent treated for reuse. Wastewater collected within the City is transmitted to the City of Fort Lauderdale and Broward County for treatment and disposal.

Additional information on the Broward County and the City of Fort Lauderdale facilities can be found in their WSFWP in the Appendices.

3.1 WATER SUPPLY FACILITIES

The City of Fort Lauderdale maintains two active wellfields: the Dixie Wellfield and the Prospect Wellfield, which withdraw water supply from the Surficial Aquifer System (SAS). Both wellfields are permitted by the SFWMD under Water Use Permit (WUP) No. 06-00123-W, allowing a combined annual average daily withdrawal of 52.55 million gallons per day (MGD), and a combined equivalent average day based on a maximum month withdrawal of 59.90 MGD.

The Dixie wellfield is located west of the Peele-Dixie Water Treatment Plant (WTP) on N State Road 7, north of SW 24th street and south of Broward Blvd. The wellfield is comprised of eight wells and they are located within the Fort Lauderdale Country Club golf course. The total installed capacity of all wells is approximately 20 MGD. The wellfield withdrawal permit limits the maximum withdrawal to 15 MGD on an equivalent average day for maximum month.

The Prospect wellfield is located near the intersection of Florida Turnpike and NW 62nd St surrounding Prospect Lake and has an installed capacity of 87 MGD. The wellfield withdrawal permit limits the maximum withdrawal to 43.43 MGD on an annual average day basis and 49.5 MGD on an equivalent average day for maximum month.

The WUP No. 06-00123-W also allows withdrawal from the Floridan Aquifer with an Annual Allocation of 3,153 million gallons (MG) and Maximum Month



Allocation of 300.6 MG. The City of Fort Lauderdale is currently evaluating the future use and constructability of Floridan Aquifer wells to increase its supply capacity. See **Appendix B** for details regarding Fort Lauderdale Facilities.

Broward County Water & Wastewater Services (BCWWS) owns and operates two regional wellfields: the District 1 Wellfield and the District 2 wellfield. BCWWS supplies raw water from the SAS to a variety of raw water large users. The Broward County retail service area within the City of Oakland Park City Limits receives water supply from the Broward County District 1 wellfield, which has a total design capacity of 23.5 MGD, with a total firm capacity of 19.6 MGD. The current SFWMD Consumptive Use Permit (CUP) No 06-00146-W for the District 1 wellfield allows the Maximum Month and Average Annual Daily withdrawal of 280 million gallons per month (MGM) and 9.2 MGD, respectively. Two District 1 Alternative Water Supply (AWS) upper Floridan aquifer wells are under construction. The wells will provide raw brackish water for membrane treatment by 2020. The current SFWMD CUP allows for a Maximum Month and Average Annual Daily withdrawal of 181 MGM and 4.7 MGD, respectively, from the upper Floridan aquifer.

3.2 WATER TREATMENT FACILITIES

The City of Fort Lauderdale owns two water treatment plants: the Fiveash WTP and the Peele-Dixie WTP.

The Fiveash WTP is the City of Fort Lauderdale's largest WTP. It is located at Powerline Road and NW 38th Street and withdraws source water from the Prospect Wellfield. The service area for this plant includes the jurisdictions of the City of Fort Lauderdale, City of Wilton Manors, Town of Lauderdale-by-the-Sea, Port Everglades, and portions of City of Tamarac, City of Davie, and Broward County. The plant was originally constructed in 1950 and has undergone several expansions allowing a permitted capacity of 70 MGD. However, plant staff indicated the plant capacity maybe limited to 60 MGD. The plant provides conventional lime softening treatment, followed by filtration and disinfection.

The Peele-Dixie WTP is located at S.R. 7/U.S. 441 and SW 16th Street and withdraws source water from the Dixie Wellfield. The plant used to be a lime softening facility, now retired and was replaced by a nanofiltration treatment plant in 2007. The plant has a maximum installed treated water treatment capacity of 12 MGD. The City of Fort Lauderdale has had planned to expand the facility with a 6 MGD Floridan Aquifer (alternative source) Reverse Osmosis



(RO) treatment plant that would increase the total installed potable water production capacity at the Peele-Dixie WTP site to 18 MGD. However, the RO system hasn't been constructed since the recent Fort Lauderdale WSWFP indicates that their WUP has sufficient allocation from SAS to meet future water demand.

The portion of the City provided retail service by Broward County receives water supply from Broward County's District 1 WTP located in the City of Lauderdale Lakes. The service area for this plant includes portions of the cities of Fort Lauderdale, Lauderdale Lakes, Lauderhill, North Lauderdale, Oakland Park, Plantation, Pompano Beach, and Tamarac, as well as certain unincorporated areas in central Broward County. The plant was originally constructed in 1960 and has undergone several expansions to achieve a current design capacity of 16.0 MGD and a firm capacity of 15.3 MGD. The plant is a lime softening treatment facility that uses up-flow clarifiers and multimedia filtration systems.

3.3 FINISHED WATER STORAGE

The City of Oakland Park does not have any storage tanks or high service booster pump stations within the City's transmission and distribution system.

The City of Fort Lauderdale has two on-site storage and high service pumping facilities and two offsite storage and high service pumping facilities. The two on-site storage and high service pumping facilities are located at the Fiveash and the Peele-Dixie Water Treatment Plants, with storage capacities of 21.8 million gallons (MG) and 10.3 MG, respectively. The two offsite facilities are the Poinciana Park Water Tank and Pump Station and the Northwest Second Avenue Water Tank and Pump Station. The Poinciana Park facility was upgraded in 2006 with a new 2.0 MG pre-stressed concrete tank, a new pumping facility, and standby power on-site. The Northwest Second Avenue Water Tank is an elevated 1 MG steel tank located between NW 6th Street and NW 7th Street and was refurbished in 2012 with a new pump, electrical supply, and automated control system. The total storage capacity for City of Fort Lauderdale is 25.1 MG.

The Broward County District 1 WTP has two on-site water storage facilities at the plant site and four remote tanks within the distribution system. The total District 1 storage capacity is 7.1 MG. All but one of the storage facilities are ground storage tanks, meaning pumps are required to feed the distribution system.



3.4 WATER TRANSMISSION AND DISTRIBUTION SYSTEM

The City maintains over 83 miles of water mains in sizes ranging from 4 to 12 inches in diameter. There are many miles of smaller water mains, typically 2 inch. The transmission and distribution system has been modeled in 1992 and again in 2005. With the number and location of the bulk meters from the City of Fort Lauderdale, there has not been shown to be any system-wide problems under normal operating conditions. See **Figure 3-1** for a map of the Oakland Park Transmission and Distribution System. There has been an issue relative to the need for additional fire hydrants to provide more uniform and better fire hydrant coverage with looped water lines, but pressure in the system is excellent under peak hour flow conditions.

The City purchases treated water from the City of Fort Lauderdale through master meters at twelve separate interconnect locations throughout the distribution system. Nine of these interconnects are currently open and active. See **Figure 3-2** for a location map showing the transmission and distribution system along with the Fort Lauderdale interconnection locations. See **Table 3-1** below for exact interconnection locations.



**Table 3-1
Oakland Park (OKP) Master Meter Connections
With Fort Lauderdale (FTL)**

OKP Meter #	FTL ID #	FTL Account #	Meter Size	Location of Master Meters
1	7200284	370-3800-7002	6"	1001 East Oakland Park Blvd
2	635595	370-40003007	6"	2054 East Oakland Park Blvd
3	70685360	370-4500-2004	6"	1601 NE 45 Street
4	700961700	370-5000-2006	8"	4500 NW 31 Avenue
5	70632140	370-5250-3001	8"	3500 NW 31 Avenue
6	4210594000	370-6200-7001	6"	1690 West Prospect Road
7	10722622	370-6300-5004	6"	1600 NW 41 Street
8	6906501	370-6500-0003	6"	499 West Prospect Road
9	802680100	370-7000-0006	6"	2 NE 38 Street
10	72230820	370-7800-3002	8"	2604 NW 21 Avenue
11	72359770	370-8000-9005	6"	2610 NW 26 Avenue
12	49504078	370-3700-9009	8"	1300 NE 38 Street

The City has many interconnections with the City of Fort Lauderdale and two interconnections with Broward County. The Interconnections with Broward County are located near the addresses below:

- N.W. 29th Street, near N.W. 30th Avenue off Oakland Park Boulevard
- South of Oakland Park Blvd. between N.W. 29th Avenue and N.W. 31st Avenue

Since additional annexations and neighborhood improvement projects have been implemented, there may be an opportunity for other such interconnections between the City and the County. Additional discussions are taking place between Broward County and the City for possible emergency interconnections.

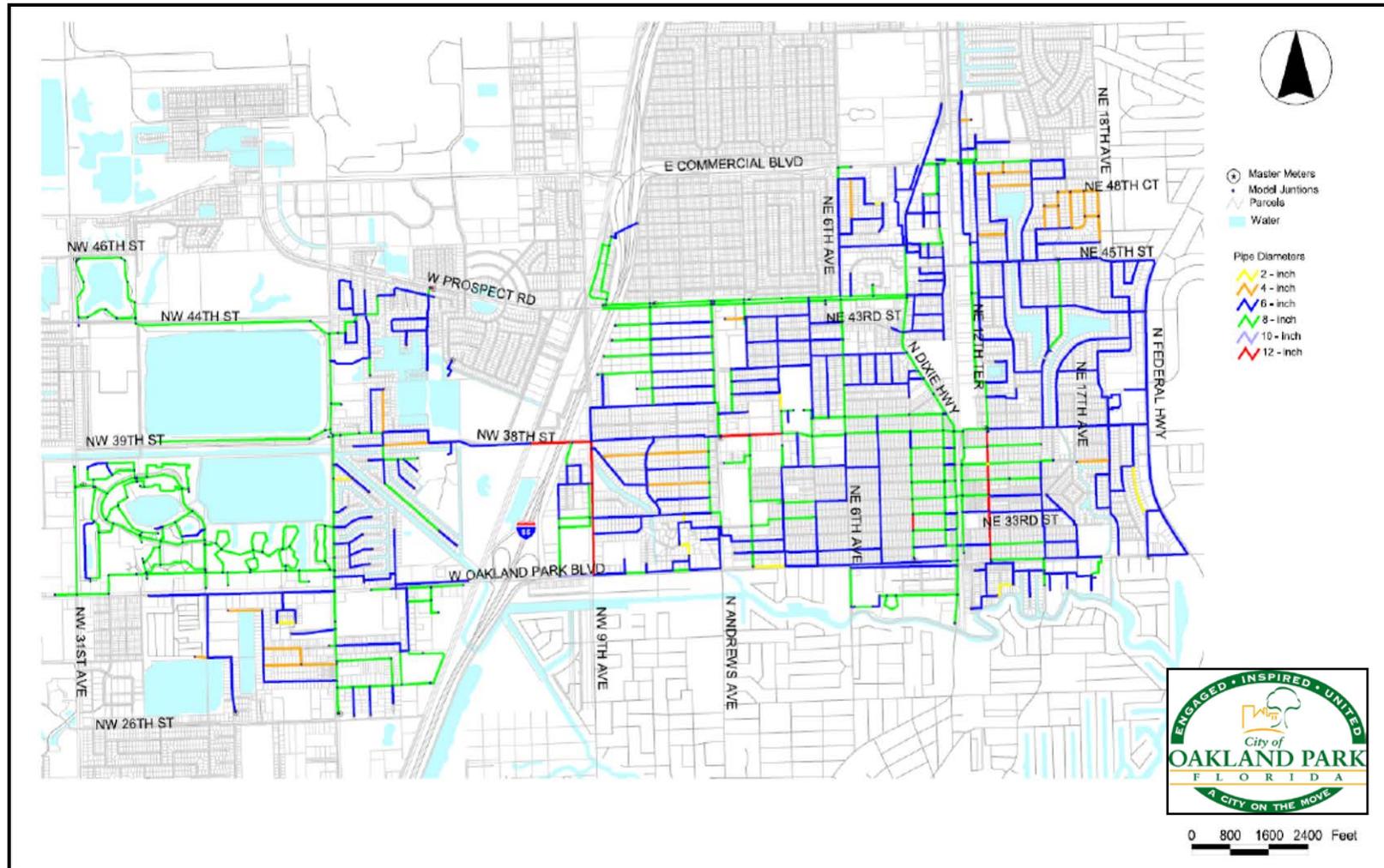


Figure 3-1 Oakland Park Transmission and Distribution System Map

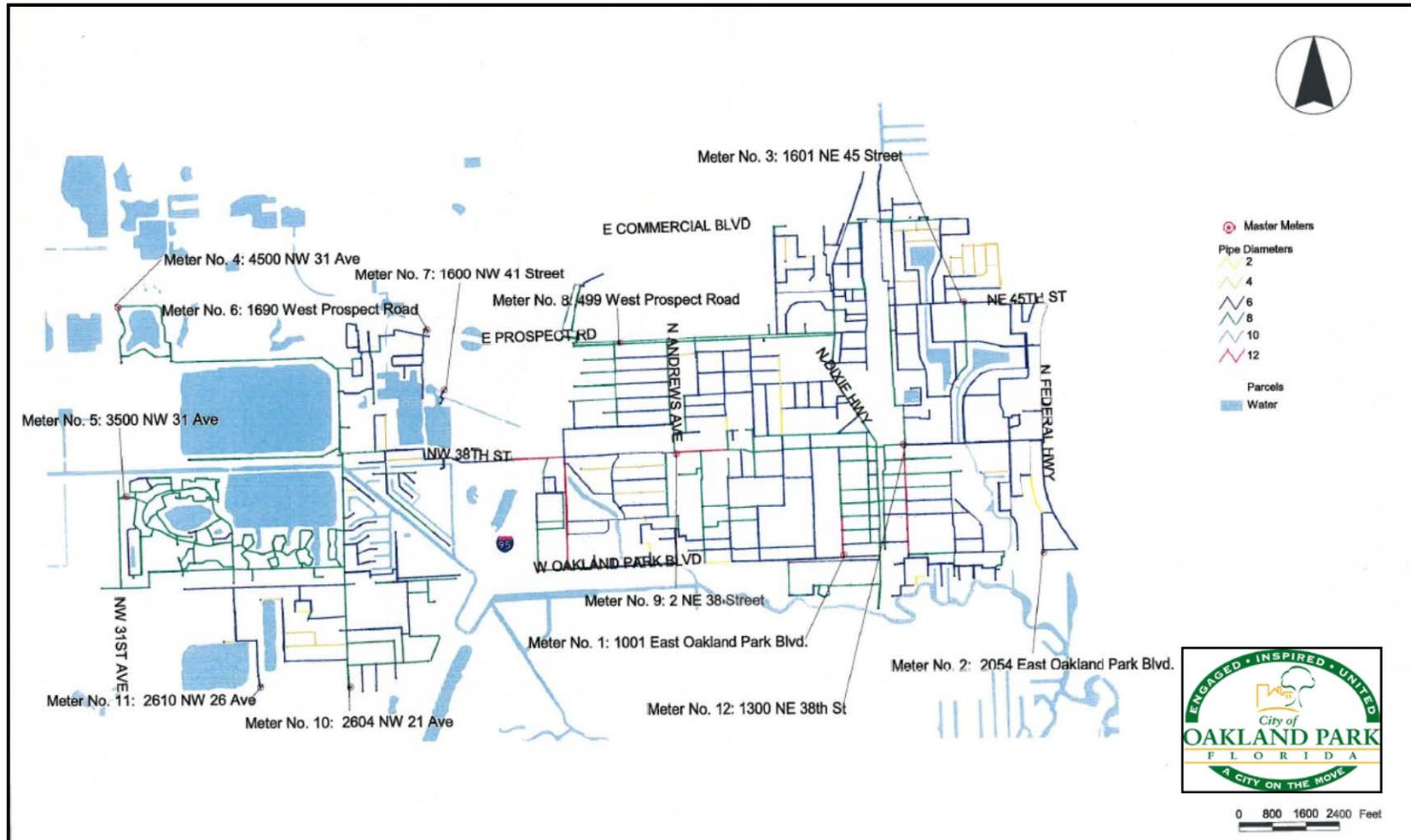


Figure 3-2 Transmission and Distribution System Including Fort Lauderdale Interconnection Locations



To verify the ability of the transmission and distribution system to adequately address fire flow events, a number of hydrant flow tests were performed. **Table 3-2** below indicates the results of said flow tests at the locations indicated:

**Table 3-2
Fire Hydrant Flow Test Results**

Test Location	Hydrant Static (psi)	Residual (psi)	Pitot (psi)	Hydrant Flow (gpm)
1302 NE 32 Street	81	60	73	1430
316 NW 40 th Court	84	60	62	1320
3901 N. Federal Highway	85	60	58	1280
850 E. Commercial Boulevard	80	45	40	1060
1522NE 34 th Court	83	65	60	1300
111 Lake Emerald Drive	80	74	57	1025
3970 NW 21 st Avenue	75	55	52	1200
1701 W. Oakland Park Boulevard	85	59	50	1190
2301 W. Oakland Park Boulevard	75	67	55	1250
NW 29 th Street & NW 19 th Avenue	80	54	49	1180
3501 NW 10 th Terrace	81	60	72	1425

Static and residual pressures were excellent as were the flows. The computer model was modeled in 2005 using peak hour flows and a Fort Lauderdale pressure at the interconnections of 70 psi. The actual fire flow test revealed that pressures in the system were normally 5 to 15 psi higher than the assumed 70 psi. **Figure 3-3** indicates that during peak hour flow conditions, pressure loss in the City's transmission and distribution system was only 5 to 6 psi.

The City has completed an analysis of the ability of this distribution system to continue to provide adequate service to City residents. The analysis found that the existing distribution system is adequate to handle average daily, maximum daily, and peak hourly demands.

The City of Fort Lauderdale conveys water to the City through the 12 interconnects located within its water distribution system consisting of over 750 miles of 2 to 54-inch diameter water mains.



The transmission and distribution system for BCWWS District 1 contains approximately 246 miles of pipe. Broward County implemented a \$320 million major water system rebuilding effort in District 1. The county maintains interconnection with the Cities of Fort Lauderdale, Tamarac, Plantation, and Lauderhill for emergency purposes.

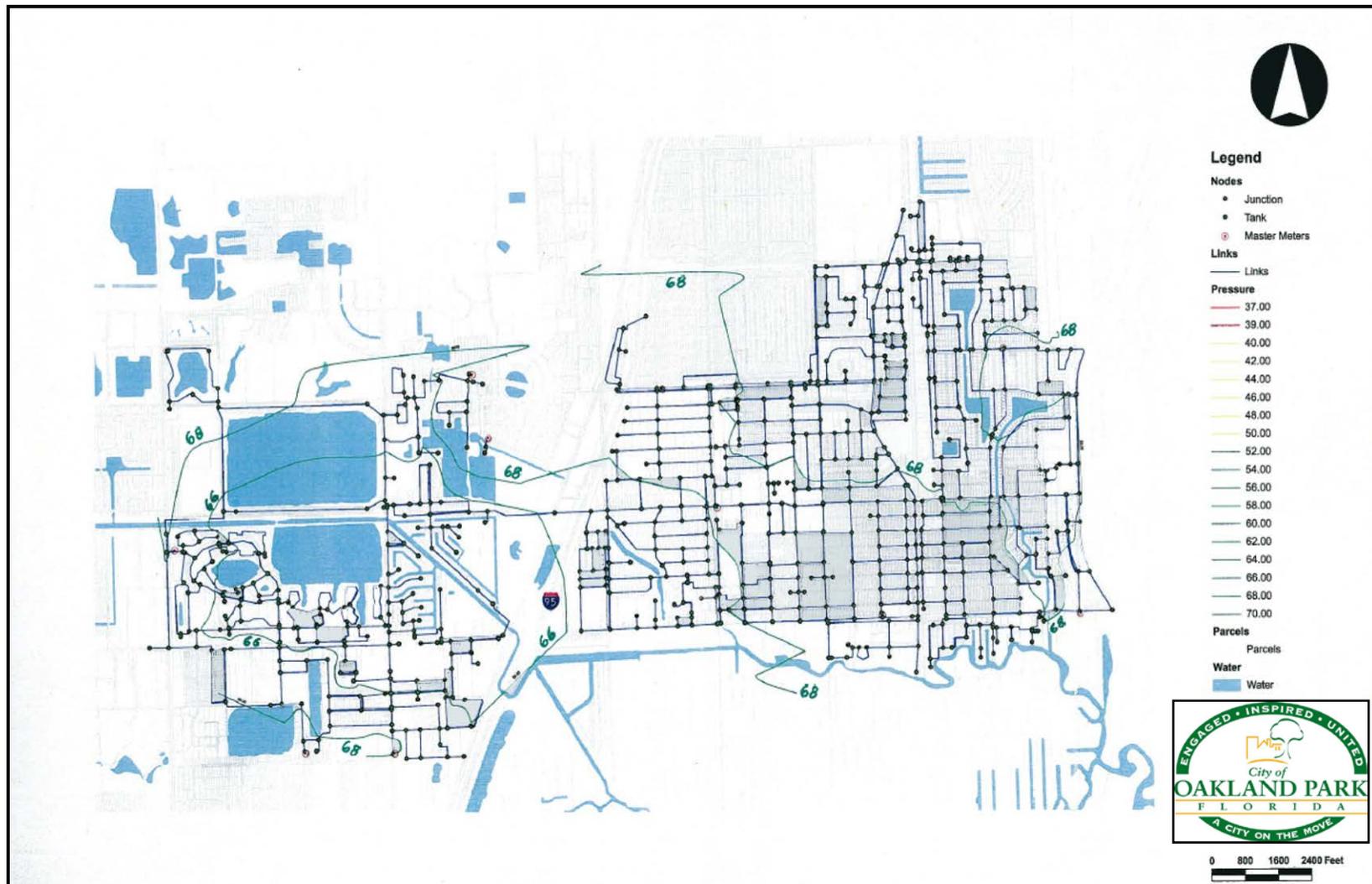


Figure 3-3 Peak Hour Flow Conditions; Pressure Contours



4.0 HISTORIC POPULATION DATA

In the last decade, the City population grew from approximately 40,500 to nearly 42,000 people according to statistics published by the University of Florida, Bureau of Economic and Business Research (BEBR). The population growth rate is near 3.7 percent for the past 10 years, or an average growth rate of about 0.36 percent per year.

Currently, the City uses population projections provided by Broward County, which are based on Traffic Analysis Zones (TAZs). In 2005, the City had annexation in North Andrews Gardens, Twin Lakes South, Mira Lago and Montage by the Lake/Sartori Plat Area adding approximately 11,000 people for a total population of approximately 42,000 people. Due to the annexations and transfer of service areas between 2005 and 2007, it has been difficult to ascertain population base and water demand differentiation between retail and wholesale areas for the past few years. The City has worked closely with the City of Fort Lauderdale and Broward County to develop their population projections using the Traffic Analysis Zone (TAZ) population data. **Table 4-1** presents the estimated historical population within the current City Limits.

Table 4-1
Estimated Historical Population: Within Current City Limits

Retail Service Provider Area	Year						
	2007	2008	2009	2010	2011	2012	2013
City of Oakland Park	29,224	28,904	28,584	28,265	28,396	28,528	28,659
City of Fort Lauderdale	1,920	1,787	1,653	1,520	1,524	1,528	1,532
Broward County	9,869	10,402	10,936	11,470	11,466	11,462	11,457
TOTAL	41,012	41,093	41,174	41,255	41,386	41,517	41,649

4.1 POPULATION PROJECTIONS

The City's Service Area population projections were carried out using the TAZ population projections from Broward County Planning TAZ projections. Linear Interpolation was conducted to project intermediate year populations that were not included in the TAZ projections. **Table 4-2** shows the future population projections for the entire City.



Where in this report the retail service area shown as “City of Oakland Park” is the area where consumers receive direct service from the City, which purchases wholesale potable water from the City of Fort Lauderdale. However, since the City of Fort Lauderdale supplies both wholesale and retail service within the City’s City Limits, The City of Fort Lauderdale WSFWP population forecast for “Oakland Park” is a combination of both “City of Oakland Park” and “City of Fort Lauderdale” retail service population in this report. For example; **Appendix B, Table 4** of the City of Fort Lauderdale’s WSFWP shows the 2015 Oakland Park population of 30,706, which is a close match to the sum of population from “City of Oakland Park” and “City of Fort Lauderdale” retail service areas in this report at 30,496.

**Table 4-2
Future Population Projections**

Retail Service Provider Area	Year				
	2015	2018	2020	2025	2030
City of Oakland Park	28,923	29,593	30,041	30,327	31,530
City of Fort Lauderdale	1,540	1,539	1,539	1,518	1,557
Broward County	11,449	11,499	11,533	11,508	11,936
TOTAL	41,912	42,632	43,112	43,354	45,022

The total population from **Table 4-2** will be served in three ways. Those provided retail service with the City as their Service Provider will be receiving potable water that the City purchases through the metered interconnections with the City of Fort Lauderdale. Those receiving retail potable water service from the City of Fort Lauderdale as their Service Provider will be receiving water directly from the Fort Lauderdale transmission and distribution system. Those receiving retail potable water service from Broward County as their Service Provider will be receiving their potable water directly from the Broward County’s transmission and distribution system. The water demand projections based on these population projections are presented in the next section.



5.0 DEMAND PROJECTIONS

The future treated water needs for the City are compiled in this Section. The population projections presented in the previous section were utilized to ascertain potable water needs for the future. Actual historical population estimates and real treated water supply numbers are used herein to establish per capita needs.

5.1 HISTORICAL WATER USE

The City's future water service areas are anticipated to remain as they are currently configured in **Figure 2-1**. No major unincorporated areas remain in the surrounding areas that could materially increase the City Limits. Only a few small unincorporated parcels remain near the City. A compilation of the total annual water purchased from the City of Fort Lauderdale for recent 10 years for resale in the City Service Provider Area has been conducted and is presented in **Table 5-1**.

Table 5-1
Summary of Oakland Park Wholesale Water
Purchased From Fort Lauderdale (FTL)

Year	From FTL (gal)
2004	1,666,557,000
2005	1,665,213,000
2006	1,604,964,000
2007	1,293,602,000
2008	1,225,894,000
2009	1,376,590,000
2010	1,300,638,000
2011	1,200,474,000
2012	1,127,683,000
2013	1,195,054,000

Historically, Broward County has sent its retail customers, now in the City of Oakland Park City Limits, about 1.30 to 1.36 MGD on an average day basis. The City of Fort Lauderdale was not able to provide the historic water demand data for their retail service area within the City of Oakland Park City Limits.



5.2 PER CAPITA USAGE

The historic per capita usage will be a major factor in projecting future treated water needs. **Table 5-2** below indicates the historic per capita demands for the City Retail Service Area based on treated water purchased from the City of Fort Lauderdale:

Table 5-2
Per Capita Usage in
Oakland Park Retail Service Area (RSA)

Year	2008	2009	2010	2011	2012	2013
Oakland Park RSA Population	28,904	28,584	28,265	28,396	28,528	28,659
Wholesale Water Purchased from Fort Lauderdale in Thousand Gallons	1,225,894	1,376,590	1,300,638	1,200,474	1,127,683	1,195,054
Per Capita Usage (gpcd)	116	132	126	116	108	114

The average per capita usage over the recent 6 years is 118.8 gpcd within the City Retail Service Area. Both the Broward County and Fort Lauderdale data for their small retail service area provider section are not broken into area level for the City, but the services provided within the City Limits are similar to that of City's retail service area.

With the average historic usage hovering slightly below 119 gpcd, this indicates a significantly lowered average than the last reported 152 gpcd in the 2009 WSFWP. The lowered per capita usage may be attributable to a downturn in the economy, slowdown in population growth, greater amount of rainfall and the City's conservation efforts.

The estimated monthly system losses within the City's transmission and distribution system for the past three years have ranged in-between 7.4% to 14.1%. With an overall water loss of 10%, the system loss is above the City's long term goal of staying below the 10% loss factor, thus steps will be taken to reduce system loss. See **Table 5-3** below for system loss data:



Table 5-3
Potable Water Loss
Oakland Park Service Provider Area

Water Purchased (Thousand Gallons)			Water Sold (Thousand Gallons)		Water Loss
	Monthly	12 Mon Avg*	Monthly	12 Mon Avg*	%
Oct 2010	111,413		83,531		
Nov 2010	102,648		90,481		
Dec 2010	106,930		95,395		
Jan 2011	91,001		93,131		
Feb 2011	78,400		87,788		
Mar 2011	119,015		89,135		
Apr 2011	104,062		97,076		
May 2011	111,157		91,587		
Jun 2011	95,070		92,357		
Jul 2011	92,113		96,543		
Aug 2011	91,298		85,167		
Sep 2011	97,367	100,040	87,486	90,806	9.2%
Oct 2011	83,380	97,703	79,223	90,447	7.4%
Nov 2011	98,520	97,359	77,526	89,368	8.2%
Dec 2011	92,862	96,187	84,423	88,454	8.0%
Jan 2012	97,820	96,755	92,525	88,403	8.6%
Feb 2012	98,966	98,469	84,444	88,124	10.5%
Mar 2012	98,536	96,763	86,337	87,891	9.2%
Apr 2012	92,329	95,785	95,214	87,736	8.4%
May 2012	97,011	94,606	72,024	86,106	9.0%
Jun 2012	86,806	93,917	82,910	85,319	9.2%
Jul 2012	93,988	94,074	82,491	84,148	10.6%
Aug 2012	102,792	95,031	81,051	83,805	11.8%
Sep 2012	84,673	93,974	84,921	83,591	11.0%



Water Purchased (Thousand Gallons)			Water Sold (Thousand Gallons)		Water Loss
Oct 2012	89,268	94,464	80,654	83,710	11.4%
Nov 2012	102,991	94,837	76,253	83,604	11.8%
Dec 2012	95,085	95,022	87,593	83,868	11.7%
Jan 2013	106,712	95,763	86,018	83,326	13.0%
Feb 2013	97,684	95,656	97,993	84,455	11.7%
Mar 2013	102,544	95,990	86,810	84,494	12.0%
Apr 2013	106,699	97,188	83,549	83,522	14.1%
May 2013	105,658	97,908	82,018	84,355	13.8%
Jun 2013	87,326	97,952	127,073	88,035	10.1%
Jul 2013	97,167	98,217	80,839	87,898	10.5%
Aug 2013	100,673	98,040	84,244	88,164	10.1%
Sep 2013	103,247	99,588	89,887	88,578	11.1%

*Because water purchased billings and water sold billings are not on the same time frame, a 12 month running average was used to give more meaningful results.

Water conservation corrective actions are outlined in **Section 6**. Such corrective actions should help reduce the system loss and maintain the per capita needs within the City Limits to the 119 gpcd level during normal rainfall years.

5.3 WATER DEMAND PROJECTIONS

In a cooperative effort with Broward County and the City of Fort Lauderdale, the per capita need for the City's City Limits has been projected to a threshold of 119 gpcd. Broward County District 1 uses 118 gpcd for demand projections and requested their per capita demand to be adopted by the City portion within the District 1 retail service area. The City of Fort Lauderdale uses a varying per capita demand from 179 gpcd in 2015 to 170 gpcd by 2028 for demand projections. See **Table 5-4** below for the City's treated water demand projections.



Table 5-4
City of Oakland Park Treated Water
Average Annual Day Demand (AADD) Projections City Wide

Demand Projections AADD in MGD					
	2015	2018	2020	2025	2030
City of Oakland Park*	3.44	3.52	3.57	3.61	3.75
City of Fort Lauderdale*	0.18	0.18	0.18	0.18	0.19
Broward County**	1.35	1.36	1.36	1.36	1.41
Total	4.98	5.06	5.12	5.15	5.35

* Demand projections were calculated by multiplying population projections in **Table 4-2** by 119 gpcd.

** Demand projections were calculated by multiplying population projections in **Table 4-2** by 118 gpcd.

5.4 CUSTOMER TYPES

Within the City Service Area there are 5 categories of service in the billing system: Commercial, Government, Hotel, Multi-family Residential, and Residential. The split of the demand per billing type is shown in **Table 5-5** below:

Table 5-5
Billing Service Types

Customer Type	Percentage of Total Flow
Commercial	30.75%
Government	6.75%
Hotel	0.95%
Multi-family	35.00%
Residential	26.00%
Total	99.45%



5.5 SEASONAL DEMAND

The City's water system has a very low seasonal demand peak. The City, while adjacent to the City of Fort Lauderdale, is not a tourist destination. The marginal (0.8 percent above annual average) extra seasonal demand does not indicate a seasonal demand peak. **Table 5-6** provides the average monthly percentages of water sold to the City's customers within the City Retail Service Area.

**Table 5-6
City of Oakland Park Water Consumption**

Month	Water Billed in Thousands of Gallons						Monthly Average	% of Annual Average
	2008	2009	2010	2011	2012	2013		
Jan	95,784	102,538	95,353	93,131	92,525	86,018	94,225	8.7%
Feb	89,500	95,633	94,306	87,788	84,444	97,993	91,611	8.5%
Mar	86,982	103,957	91,835	89,135	86,337	86,810	90,843	8.4%
Apr	85,708	97,414	87,392	97,076	95,214	83,549	91,059	8.4%
May	92,900	95,705	86,954	91,587	72,024	82,018	86,865	8.0%
Jun	97,012	97,774	92,312	92,357	82,910	127,073	98,240	9.1%
Jul	95,795	88,496	90,561	96,543	82,491	80,839	89,121	8.3%
Aug	90,295	89,861	94,579	85,167	81,051	84,244	87,533	8.1%
Sep	101,516	90,854	88,053	87,486	84,921	89,887	90,453	8.4%
Oct	90,715	85,228	83,531	79,223	80,654	82,216	83,595	7.7%
Nov	83,876	91,598	90,481	77,526	76,253	81,491	83,538	7.7%
Dec	99,700	100,101	95,395	84,423	87,593	87,532	92,457	8.6%
Total	1,109,783	1,139,159	1,090,752	1,061,442	1,006,417	1,069,670	1,079,537	100.0%

In Broward County, the rainfall season is from late May to Late October. The peak seasonal water demand in Southeast Florida is normally in March, April, and May. However, as indicated in **Table 5-6**, the City does not have a significant peak seasonal demand. The normal dry season's peak three months (March, April and May) does not show much increase in demand compared to an annual monthly average of 8.3%. A small increase is noted from December to June. These very minor demand comes primarily from lack of rainfall during the



winter and spring months when water demand for irrigation and commercial activities increases.

The three hotel motel establishments within the City Service Area do have a separate billing category and constitute a minor percentage of the City's total sales in recent years, as shown in **Table 5-7** below:

Table 5-7
City of Oakland Park Hotel/Motel Water Consumption

Year	Percent of Total Water Consumed
2008	0.19%
2009	0.20%
2010	0.21%
2011	0.57%
2012	0.87%
2013	0.93%

Additionally, the City's agreement with the City of Fort Lauderdale does not include a seasonal or peak factor limitation on the water provided. This is a further indication of the lack of a seasonal demand within the City. The City is able to meet its maximum water demands through the current treated water supplies.



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6.0 WATER SUPPLY FACILITIES WORK PLAN

The treated water needs and population projections for the City presented in previous sections were utilized to ascertain potable water needs for the future. The agreement between the City and the City of Fort Lauderdale does not allocate plant capacity. However, Fort Lauderdale agrees to meet water demands from the City. **Appendix D**, herein; indicates the Agreement between the City and City of Fort Lauderdale. The City of Fort Lauderdale has determined through their Water Supply Facilities Work Plan (WSFWP) that new facilities will not be required to meet future demands of both their retail and wholesale customers. The Fort Lauderdale draft WSFWP is included as **Appendix B**.

Since there is no wholesale service from Broward County, therefore no agreement exists with Broward County. However, since Broward County provides retail service to a portion of the City, the Broward County WSFWP is included as **Appendix C**.

6.1 INFRASTRUCTURE ELEMENT

The essential infrastructure elements required for developmental approval and for subsequent certificate of occupancy are required per the City's Land Development Code. Sign off on adequacy of water supply and treatment is coordinated with Suppliers, Broward County and the City of Fort Lauderdale. On-site retention of storm water and impervious limitations are coordinated with Broward County Environmental Protection Division and for large projects with SFWMD. Some key Goals, Objectives, and Policies (G.O.P.'s) and proposed amendments to these are included in Section 6.8; whereas, the complete G.O.P.'s are included in Volume I of the City's 2007 Comprehensive Plan. Proposed amendments to the Comprehensive Plan affect the following elements: Future Land Use, Infrastructure, Conservation, Coastal Management, Capital Improvements and Intergovernmental Coordination.

Discussion is included, herein, regarding both Traditional Water Supply Facilities as well as Alternative Water Supply Projects being proposed by the Suppliers, Broward County and the City of Fort Lauderdale.

The City's ongoing conservation program will continue and be enhanced further as included in this report section. While "Reuse" is included, herein, there are no substantive plans for implementation of reuse projects within the 10 Year WSFWP schedule.



6.2 TRADITIONAL WATER SUPPLY PROJECTS

The City does not have any raw water supply facilities and relies on its wholesale supplier of treated water, the City of Fort Lauderdale.

City of Fort Lauderdale

The City of Fort Lauderdale has improved the reliability and expanded the capacity of the Fiveash WTP lime softening process to a firm maximum day treatment capacity of 60 MGD in subsequent years. There are no ongoing traditional water supply projects. For details on the Fort Lauderdale WSFWP, see **Appendix B**.

Broward County

According to the Broward County WSFWP, there are no traditional water supply projects associated with the District 1 SAS wellfield. The District 1 wellfield supplies raw water to District 1 WTP from which the treated water is distributed to their retail service area within the City. The District 1 SAS has excess capacity to meet the current and future needs of their District 1 Service Area, which includes their retail Service Area in the City. However, with their withdrawal permit limited to 9.2 MGD, alternative Floridan Aquifer source projects are currently under construction. For details on the Broward County WSFWP, see **Appendix C**.

6.3 ALTERNATIVE WATER SUPPLY PROJECTS

City of Fort Lauderdale

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 of Fort Lauderdale 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.

Broward County

Broward County Water and Wastewater Service (BCWWS) is currently exploring construction of a membrane treatment plant for the treatment of brackish water from the upper Floridan aquifer alternative water supply source. The treatment plant is planned to be located at the existing District 1 treatment site. The first phase of the treatment plant is planned to produce a minimum 4.5 MGD of finished water (maximum day basis), and will be designed so that it is expandable to a minimum of 5.5 MGD. According to demand projections, the initial Floridan treatment plant combined with the Lime softening treatment plant should meet demands after 2040.

The alternative water supply project will include enough Floridan well capacity to supply the treatment plant. Using a 1 day to average day factor and 25% in plant process use of raw water, Floridan wells with an average annual day withdrawal of 4.1 MGD will be required for the first phase of the treatment plant. The plant expansion would require an additional 0.9 MGD of average annual day withdrawal. The initial phase of the Floridan wellfield will be designed for its eventual expansion. The wellfield should have enough physical capacity to insure delivery of raw water with the largest well out of service.

Based on the water use projection, 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 Andrew Gardens) to District 1. Alternatively, the AWS provided by the Floridan Aquifer will be needed by 2020.

6.4 CONSERVATION PROGRAMS

The City's 1998 Comprehensive Plan included the objective to reduce its per capita water consumption rates by at least 5 percent through 2001. The City will continue to have water conservation practices through the long-range planning horizon and will coordinate with City of Fort Lauderdale and Broward County on the incorporation of other water conservation techniques.

As previously mentioned, the City has projected its treated water supply needs at 119 gpcd. Several conservation measures will be utilized to keep the per capita demands close to the projected level. These measures include: Purchase and Distribution of Water Conservation Kits, Water Meter Replacement Program, continued monitoring of



losses and benefits of conservation practices implemented, and compliance with regulatory requirements for watering limits.

The purchase and distribution of Water Conservation Kits is being applied for via a SFWMD Water Savings Incentive Program (SIP) grant program. Previous study concludes that Water Conservation Kits will save between 8,760 and 26,280 gallons per year per kit. For each 1,000 kits successfully installed, a saving between 9 to 26 MG per year of treated water can be realized. The City has given out 113 water conservation kits in the past five years.

The City has typically provided for a Water Meter Replacement Program in their annual budgets. While such is done routinely, the City cannot make future year budget commitments as each budget must be done annually. There are no bonds, loans, or other long term Capital Improvement Funds outstanding or committed for this program.

All water conservation programs and incentives, current and future, implemented by the City will support the goals and objectives of the Lower East Coast Water Supply Plan implemented by the South Florida Water Management District. The City's water conservation program will also conform to anticipated amendments to Florida Statute 62-40.412 – Water Resource Implementation Rule: Water Conservation.

The City will continue to monitor the benefits of the above programs from the system operations and maintenance budget. Also, lawn watering restrictions and conservation mandates from regulatory agencies will be adhered to by the City.

City of Fort Lauderdale

The City of Fort Lauderdale has actively pursued a conservation strategy that enforces water restriction during drought. The ongoing conservation initiatives implemented by the City of Fort Lauderdale are listed below:

- Broward Water Partnerships
- ConservationPay\$ Program
- NatureScape Irrigation Services
- Water Matters Day
- Conservation Rate Structure
- Water Shortage Restriction
- Florida-Friendly Landscaping



- Irrigation System Design Code
- Landscape Irrigation Restrictions
- Water for Heating or Process Water
- Water Used for Cooling Including Condensate
- Commercial Power Washing
- Water for Decorative Features
- Lakes and Ponds
- Leak Detection
- Meter Replacement Program
- Plumbing Code Changes
- Water Conservation Education Program
- Sustainability Action Plan 2011 Update
- 2035 Fast Forward Vision Plan
- 2018 Press Play Strategic Plan
- Identify and Local Financial Responsibilities

Broward County

Broward County has implemented a conservation program that includes the following initiatives:

- Water Use Restriction/Initiatives
- Use of Florida-Friendly Landscape Principles
- Water Conservation Based Rate Structure
- Rain Sensor Overrides for New Lawn Sprinkler System
- Public Information Program

6.5 REUSE PROGRAM

The City has no wastewater treatment facilities within its city limits or access to treated wastewater effluent for reuse. Should either Broward County or The City of Fort Lauderdale make treated effluent available for reuse, Oakland Park would consider taking benefit of such service.



City of Fort Lauderdale

The City of Fort Lauderdale has previously conducted studies that have demonstrated the practical, logistical, and economic infeasibility of instituting most options to reuse reclaimed water. 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.

Broward County

Broward County 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. 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).

6.6 CAPITAL IMPROVEMENTS ELEMENT

The City does not have any Capital Improvement Plans (C.I.P.) related to water supply and treatment. The treated water supply needs for the entire City indicated in **Table 6-1** will be provided by the City of Fort Lauderdale (retail and wholesale) and Broward County (retail). Even though the City does not have any immediate need, some expenditure will be made to benefit the transmission and distribution system. As indicated previously, the City continues to place emphasis on replacement of old meters, plus conservation measures to reduce system demand. The City's Five Year Capital Improvements for traditional water supply, treatment, and storage and distribution system are presented in **Table 6-2**.

As required by the state law, the City is including the AWS plans of both its suppliers in its Capital Improvements Element. See **Table 6-3** for details of Broward County alternative water supply project.



Table 6-1
Current and Projected Treated Water Supply Needs

Year	2015	2018	2020	2025	2030
Population	41,912	42,632	43,112	43,354	45,022
Per Capita Needs (gpcd)	119	119	119	119	119
Potable Water Demands (MGD) (daily average annual)	4.98	5.06	5.12	5.15	5.35
Volume from SAS* (MGD)	—	—	—	—	—
Volume from Floridan* (MGD)	—	—	—	—	—
Combination of SAS & Floridan Volume* (MGD)	4.98	5.06	5.12	5.15	5.35
Volume from Other	0	0	0	0	0
Volume from Reclaimed	0	0	0	0	0
Additional Potable Water Needed	0	0	0	0	0

*The division of treated water source has not been determined. This will depend upon Suppliers operation



Table 6-2
City of Oakland Park Water Supply Capital Improvement Plan Program

Project Number	Project Name	Expenditure					Five-Year Total
		FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	FY 2018-19	
	Water Supply Projects						
Funding Source							
	General CIP Fund	514,555					514,555
	General Fund Transfer	455,962	295,000				750,962
	Water/Sewer Bonds	8,297,000					8,297,000
	Water/Sewer Fund Bal	1,911,054	3,966,000	15,000	15,000	332,500	6,239,554
	Water/Sewer Operation	375,946					375,946
	Grant Revenue	5,657,486			1,000,000	1,850,000	8,507,486
	Total Revenues	17,212,003	4,261,000	15,000	1,015,000	2,182,500	24,685,503
Appropriations							
	Water & Sewer System	10,584,000	3,966,000	15,000	15,000	332,500	14,912,500
	Total Appropriations	10,584,000	3,966,000	15,000	15,000	332,500	14,912,500

Source: City of Oakland Park Capital Budget FY2014-2015



**Table 6-3
Broward County Alternative Water Supply Capital Improvement Plan Program**

Project Number	Project Name	Expenditure					Five-Year
		FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	Total
Alternative Water Supply Projects							
	Water Treatment Plant 1A Treatment Expansion						
	Design	1,273,990	3,300,000				4,573,990
	Construction		33,803,000				33,803,000
	Subtotal	1,273,990	37,103,000	-	-	-	38,376,990
	Water Treatment Plant 2A Treatment Expansion						
	Design			700,000		2,160,000	2,860,000
	Construction					1,800,000	1,800,000
	Subtotal	-	-	700,000	-	3,960,000	4,660,000
	Total Alternative Water Supply Projects	1,273,990	37,103,000	700,000	-	3,960,000	43,036,990
Funding Source		Water and Wastewater Capital					
	Total Revenues	74,726,900	141,834,030	39,525,530	47,314,300	67,021,580	370,422,340
		Appropriations					
Retail Water & Wastewater							
	Total Alternative Water Supply Projects	1,273,990	37,103,000	700,000	-	3,960,000	43,036,990
	Other Projects	37,595,770	18,250,060	17,039,900	8,192,110	114,451,230	195,529,070
	Subtotal	38,869,760	55,353,060	17,739,900	8,192,110	118,411,230	238,566,060
Regional Treatment Projects							
	All Projects	30,193,200	85,868,450	10,999,000	34,994,170	48,087,740	210,142,560
	Subtotal	30,193,200	85,868,450	10,999,000	34,994,170	48,087,740	210,142,560
Regional Transmission							
	All Projects	5,663,940	612,520	10,786,630	4,128,020	522,610	21,713,720
	Subtotal	5,663,940	612,520	10,786,630	4,128,020	522,610	21,713,720
	Total Appropriations	74,726,900	141,834,030	39,525,530	47,314,300	167,021,580	470,422,340

Source: Adapted from Broward County Enterprise Capital Budget FY 2014



6.7 INTERGOVERNMENTAL COORDINATION ELEMENT

The City, in preparation of this document, coordinated with a number of governmental agencies so that the findings and conclusions were the result of information exchange and an understanding of the implications associated with this plan. Specifically the City's Planning and Utilities staff met with The City of Fort Lauderdale and Broward County. Through these meetings, the City conveyed its water service areas, population projections, its water demand projections and the need for continued communication as future growth occurs. As part of its EAR-based amendments, the City included policies to continue future coordination with its water suppliers in the Intergovernmental Coordination Element (Policy 8.3.5). Several additional policies are proposed in Section 6.8 to reflect other items in the WSFWP.

The City shall coordinate with its water suppliers through existing agreements, the Broward County Water Resources Task Force, and at an annual meeting (prior to adoption of each fiscal year budget), to collaborate on water supply planning issues such as: population projections; the development of efficient, cost-effective, and technically feasible water supply sources that will supplement future demands; without causing adverse impacts to water quality; wetlands and aquatic systems. Consideration and coordination efforts for each major water project shall be noted in the Work Plan.

The City does not have a dedicated page or Section in the Lower East Coast Plan as adopted in September, 2013. Both Fort Lauderdale and Broward County, District 1, which provide service within the City's City Limits, do have Utility Summaries within said L.E.C. Plan. The plans of Broward County, District 1, and Fort Lauderdale call for future supplies from the alternative source, Floridan Aquifer, using reverse osmosis for treatment.

The City has been coordinating and cooperating with both Suppliers for many years as exemplified by the following actions:

- January, 1994 Agreement with Fort Lauderdale as well as recent amendment dated January, 2007 to revise service area boundaries based on annexation and service area changes with Broward County.
- New interconnection location #12 with Fort Lauderdale to have improved flow into the central east area of the City Service Area where new water main improvements were implemented.



- Coordination and cooperation with Broward County with regards to annexation, neighborhood improvement program (includes water main improvements), and service area boundary shifts within the City Limits.
- Utilization of the Broward County Mobile Irrigation Lab to reduce irrigation losses.
- Procedures adopted by the City for notification to City Residents of both voluntary and mandatory water restrictions in conjunction with SFWMD.

The City, even though not a Supplier, will continue to coordinate and cooperate with the Suppliers, regulatory agencies, and planning departments to help in demand management, reduction in system losses, conservation practices, and utilization of alternative raw water sources. Previous implementation of Land Development Regulations by the City assures that adequate water supply and treatment facilities will be in place to serve existing and proposed new developments prior to issuance of a building permit or certificate of occupancy.

6.8 GOALS, OBJECTIVES, AND POLICIES AND PROPOSED AMENDMENTS TO INCORPORATE THE WSFWP

6.8.1 Existing Goals Objectives and Policies

The following are the existing goals, objectives and policies supporting the goal of the city related to potable water supply.

Future Land Use Element

Goal 1 Protect and enhance the single-family residential, multiple-family residential, nonresidential and natural resource areas of Oakland Park.

Objective 1.1 The City shall continue to enforce the Land Development Code in order to assure that all new development connects to public sewer and water, addresses traffic problems, and respects its soil and terrain characteristics.

Policy 1.1.1 As new development and redevelopment occurs, require a tie-in to public sanitary sewer and potable water systems, wherever feasible.

Policy 1.1.5 The City shall continue to provide a Concurrency Management System (CMS) as incorporated within the land development code. The CMS provides procedures and criteria to assess future development approval requests relative to impacts to the adopted level of service standards. The procedures establish mechanisms such that development impacts can be



phased concurrently with the level of service standards for roadways, recreation and open space and infrastructure facilities (i.e., sanitary sewer, drainage, solid waste, potable water and natural aquifer recharge). Development applications that are not consistent with the adopted level of service standards or cannot be phased concurrently with available facilities will be denied.

The Concurrency Management System includes the following guidelines.

- The City shall not grant a development permit for a proposed development unless the City has determined that public facilities are adequate to serve the needs of the proposed development or unless the developer agrees in writing that no certificate of occupancy shall be issued for the proposed development until public facilities meet the LOS Standards as specified in the Land Development Code. Transportation facilities must be in place or under construction within three years of building permit, or functional equivalent, approval.
- A preliminary concurrency determination shall be made at the earliest stage of development permit review process. Final concurrency should be determined at site plan or final plat stage.
- The prescribed service needs must be met upon completion of construction and prior to issuance of a certificate of occupancy.
- The burden of indicating compliance is upon the developer. Sufficient and verifiable information showing compliance is required for approval.
- The City shall be responsible for monitoring development activity to ensure the development is consistent with the City Comprehensive Plan. Monitoring shall include monthly reports of all new or amended land development regulations including changes in zoning districts, building permits, demolition permits, certificates of occupancy and an annual summary of land use acreage.
- Compliance will be finally calculated and capacity reserved at the time of final action of an approved site plan or an enforceable developer's agreement. Applications for development permits shall be chronologically logged upon approval to determine rights to available capacity.



- A building permit application must be submitted within 18 months of site plan approval to preserve the concurrency reservation.

Infrastructure Element

Goal 4 To ensure that basic urban services of potable water, sanitary sewer and solid waste disposal, and land drainage capabilities are available and adequate to meet the needs of all City residents and businesses.

Objective 4.1 The City shall continue to provide local infrastructure services in accord with the following Level of Service Standards:

- a) Average and peak flow per capita rates for sanitary sewer.
- b) Pickup frequency/per capita generation rate for solid waste.
- c) Storm drainage design criteria, and
- d) Minimum design flow and fire pressure and per capita consumption rate for potable water.

Policy 4.1.1 Adopt the local level of service standards for infrastructure services as follows:

- For sanitary sewer - 150 gallons per day per resident
- For potable water - 119 gallons per day per resident
- For fire flow - as required by the Fire Marshall
- For solid waste - 8 pounds per capita per day with bi-weekly pickup
- For drainage (Roadway Crown) - 10 year 3 day storm
- For drainage (Finished Floor) - floor elevation above 100 years 3 day storm. Finished floor shall be no lower than the highest of:
 1. One (1) foot above the FEMA Flood Insurance Rate Base Flood Elevation; or
 2. The 100-year flood elevation as determined by the Broward County 100-year Flood Criteria Map; or



3. Twelve (12) inches above the adjacent road crown for residential development and six (6) inches above the adjacent road crown for nonresidential development.

- Policy 4.1.4 Maintain the level of service standards through perpetuation of the existing or future inter-local retail service agreements with Fort Lauderdale, Broward County and, where appropriate, private service providers.
- Policy 4.1.5 Review and, if appropriate, consider the adoption of revised level of service standards based on planning efforts of outside service providers to the City.
- Objective 4.2 The City shall continue to implement land development regulations to assure that new development or redevelopment occurs concurrently with the adopted level of service standards.
- Policy 4.2.1 Approval of all City development and redevelopment plans shall be conditioned on service availability at the adopted standards concurrently with development.
- Objective 4.8 Through the Year 2012, correct existing water distribution system deficiencies, extend water service to non-serviced areas as appropriate and support centralized regional wellfield and water conservation efforts.
- Policy 4.8.1 Include in the annual modification of the Capital Improvement Program funding for correcting existing water distribution system deficiencies.
- Policy 4.8.2 Through implementation of the Land Development Regulations the City shall continue to require extension of water services to new developments.
- Policy 4.8.3 Support centralized regional wellfield efforts through the adoption of resolutions.
- Policy 4.8.4 Retain a procedure, in conjunction with water suppliers and the South Florida Water Management District, to notify City residents of voluntary and mandatory water conservation practices during drought periods.



- Objective 4.10 Prior to Plat approval, ensure that the public facilities and services necessary to meet the level of service standards established within the City of Oakland Park Comprehensive Plan will be available concurrent with the impacts of the development, consistent with Chapter 163.3202(g) Florida Statutes and the concurrency management policies included within Goal 1 of the Oakland Park Comprehensive Plan.
- Objective 4.11 Coordinate with Broward County, the City of Fort Lauderdale, and the South Florida Water Management District (SFWMD) to address the City's water supply and wastewater treatment needs for 2030.
- Policy 4.11.1 The City shall coordinate with Broward County and the City of Fort Lauderdale to ensure potable water and wastewater service is provided to all areas of the City.
- Policy 4.11.2 Within 18 months after adoption of the Lower East Coast Water Supply Plan by the SFWMD, the City shall amend the Comprehensive Plan to:
- Include a water supply facilities work plan.
 - Identify and incorporate the alternate water supply project(s) selected by the City's water suppliers, Broward County and the City of Fort Lauderdale; and
 - Identify traditional and alternate water supply projects and programs necessary to meet current and future water use demands.

Coastal Management

- Goal 5 To develop and maintain the coastal area of the City in a manner which protects human life, limits public expenditures in areas subject to destruction by natural disasters and perpetuates existing upland uses while best preserving local shoreline and tidewater resources.
- Objective 5.6 Provide for urban services consistent with the level of service standards of each Comprehensive Plan Element.
- Policy 5.6.1 Maintain existing inter-local agreements for provision of potable water and wastewater collection with the City of Fort Lauderdale and Broward County.



Conservation

- Goal 6 The development and maintenance of a high quality natural environment based on the preservation, improvement and wise use of local existing natural resources.
- Objective 6.4 Promote water conservation by advocating reduced consumption and encouraging development and redevelopment to include Xeriscape and other water conservation techniques in its design.
- Policy 6.4.1 The City shall continue to utilize standardized procedures to notify City residents of voluntary and mandatory (when requested by the South Florida Water Management District) water conservation practices during drought periods.
- Policy 6.4.2 The City shall distribute information on water conservation techniques through water service bills and at City-owned civic locations such as City Hall and the Public Works Department.
- Policy 6.4.3 The City shall continue to participate in the National “Xeriscape” Council and continue to plant drought tolerant species, where feasible.
- Policy 6.4.4 The City shall continue to encourage green building in the Federal Highway Mixed Use Business and Entertainment Overlay District, and shall consider including similar incentives for green building in other redeveloping areas of the City.

Intergovernmental Coordination

- Goal 8 To maintain a cooperative and effective local environment of communication and participation with other governments and government agencies in the overall best interest of City residents and businesses.
- Objective 8.3 The City shall continue to review local level of service (LOS) standards for sanitary sewer, potable water and solid waste for consistency with those of outside providers of City infrastructure services such as Fort Lauderdale and Broward County and amend the City's adopted LOS standards as necessary to ensure consistency and facilitate execution and renewal of inter-local agreements and service contracts, as deemed appropriate by the City Commission.



- Policy 8.3.1 When negotiating or renewing inter-local service agreements with Fort Lauderdale and/or Broward County, the City shall provide for contractual recognition of adopted local level of service standards.
- Policy 8.3.2 The City shall review the level of service standards subsequently adopted by other government service providers (Fort Lauderdale and Broward County) to the City through continued monitoring of the actions of the Broward County Planning Council and Board of County Commissioners with respect to the amendment of adjacent jurisdictional Comprehensive Plans. To identify consistency with local level of service standards, the City will annually contact all service providers to obtain current information, and evaluate if future modifications to either the service agreements or level of service standards should be included in subsequent Comprehensive Plan amendments.
- Policy 8.3.5 The City shall coordinate with the SFWMD and the City's potable water providers, Broward County and the City of Fort Lauderdale, in implementing the regional water supply plan as it applies to the City of Oakland Park, including identified traditional and alternate water supply projects.

Capital Improvements

- Goal 9 To ensure the orderly and efficient provision of all public services and facilities necessary to serve existing and future local population needs.
- Objective 9.2 The City shall continue to implement a Concurrency Management System that ensures development or redevelopment proposals are approved consistent with the programmed provision of additional services at the adopted level of service standards and meets existing and future facility needs.
- Policy 9.2.1 The City shall continue to review development proposals cognizant of the City's adopted level of service standards, existing levels of service and where appropriate, the timeframe for implementation of additional facility improvements.
- Policy 9.2.2 The approval of proposed development or redevelopment projects shall be conditioned on the basis of project related service needs being concurrently available at the adopted level of service standards



specified in Policy 9.2.4. Transportation facilities needed to serve development or redevelopment projects shall be in place or under construction within three (3) years after the building permit, or functional equivalent, is approved.

Policy 9.2.3 Subject to Policy 9.2.2., the City shall allow for phasing of development related infrastructure improvements concurrently with project impacts on public facilities.

Policy 9.2.4 The Level of Service (LOS) standards for capital facilities shall be:

- For sanitary sewer - 150 gallons per day per resident
- For potable water - 119 gallons per day per resident
- For fire flow - as required by the Fire Marshall
- For solid waste - 8.0 pounds per capita per day with bi-weekly pickup
- For drainage (Roadway Crown) - 10 year, 3 day storm
- For drainage (Finished Floor) - Floor elevation above 100 year, 3 day storm; finished floor shall be no lower than the highest of:
 1. One (1) foot above the FEMA Flood Insurance Rate Base Flood Elevation; or
 2. The 100-year flood elevation as determined by the Broward County 100-year Flood Criteria Map; or
 3. Twelve (12) inches above the adjacent road crown for residential development and six (6) inches above the adjacent road crown for nonresidential development.

For parks and recreation facilities – three (3) acres per 1,000 residents, with two (2) acres per 1,000 population provided by neighborhood parks or mini-parks and one (1) acre per 1,000 population provided by community parks; and

- For transportation facilities:
 - I-95 (a SIS corridor) - LOS E.



- Cypress Creek Road from I-95 to Andrews Avenue and Andrews Avenue from Cypress Creek Road to the Tri-Rail station entrance (a SIS connector) - LOS D.
- As part of the Broward County Central District using transit oriented concurrency – coordinate with the county to achieve headways of 30 minutes or less on 80% of routes (non-contract BCT routes), establish at least one neighborhood transit center, and establish at least two additional community bus routes, increase bus shelters by 30%, and maintain the peak hour two-way maximum service volumes on arterial roads as listed below:
 - Two-lane arterials 2,555
 - Four-lane arterials 5,442
 - Six-lane arterials 8,190
 - Eight-lane arterials 10,605; and
 - For Local Roadways - LOS C ADT, PSDT and PKHR

Policy 9.2.5 By 2015, the City shall review and modify as necessary the land development regulations to be consistent with the level of service standards and the requirements of Florida Statutes regarding the timing of development and the provision of facilities and infrastructure.

Objective 9.4 Provide a capital program that can be adequately accommodated by projected revenues or other available financial resources.

Policy 9.4.4 Within 18 months of adoption of the Lower East Coast Water Supply Plan, the City shall amend the comprehensive plan to include supply projects and work plan schedules and funding as identified by Broward County and the City of Fort Lauderdale.

6.8.2 Proposed Amendments to Incorporate the WSFWP

The following are the proposed amendments to Volume I of the City’s comprehensive plan that are necessary to incorporate the WSFWP. For brevity, only those sections proposed for amendment are included. Amendments to the Supporting Data and



Analysis and Map Volume are also proposed to incorporate the WSFWP but are not included in this section since they are not formally adopted by the City. The supporting data and revised map will be included as part of the comprehensive plan amendment package transmitted to the reviewing agencies.

INTRODUCTION

General

The Local Government Comprehensive Planning Act of 1975 (LGCPA) requires each governmental jurisdiction to prepare and adopt a comprehensive plan. Significant revisions to the LGCPA in 1985 and 1986 (known as the Growth Management Act) have added additional requirements for a more detailed and systematic approach to local planning. In 2005, revisions to the Growth Management Act established a “pay-as-you-grow” plan through Senate Bills 360, 444 and 362 to ensure the roads; schools and water are available to meet the needs of communities. In addition to the State Acts, the State of Florida Department of Community Affairs issued minimum criteria for plan compliance in Rule 9J-5 of the Florida Administrative Code.

The Comprehensive Plan for the City of Oakland Park has been prepared relative to the State Growth Management Act and Rule 9J-5. It is designed to provide a guide for the future physical, economic, and social development of the City of Oakland Park.

In 2008, the City adopted a Water Supply Facilities Work Plan (Exhibit 1) and in accordance with state law, portions of this Work Plan have been incorporated into the Comprehensive Plan. Affected sections include the Future Land Use, Infrastructure, Conservation, Coastal Management, Capital Improvements and Intergovernmental Coordination Elements. To be consistent with the Water Supply Facilities Work Plan, information for the years 2013 and 2018 was included as appropriate.

Future Land Use

Policy 1.1.9 Adequate water supplies and potable water facilities shall be in place and available to serve new development or redevelopment that increases density or intensity no later than the issuance by the City of a certificate of occupancy or its functional equivalent. Prior to approval of a building permit or its functional equivalent that allows an increase in density or intensity, the City shall consult with the applicable water supplier 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 or its functional equivalent. The



Land Development Regulations shall be updated to reflect this change by 2009.

Policy 1.7.5 Proposed amendments to the Future Land Use Map shall provide data and analysis demonstrating that adequate water supply and associated public facilities will be available to meet projected growth demands.

Infrastructure

Policy 4.1.1 Adopt the local level of service standards for infrastructure services as follows:

- For sanitary sewer - 150 gallons per day per resident
- For potable water - 119 gallons per day per resident
- For fire flow - as required by the Fire Marshall
- For solid waste - 8 pounds per capita per day with bi-weekly pickup
- For drainage (Roadway Crown) - 10 year 3 day storm
- For drainage (Finished Floor) - floor elevation above 100 year 3 day storm. Finished floor shall be no lower than the highest of:
 1. One (1) foot above the FEMA Flood Insurance Rate Base Flood Elevation; or
 2. The 100-year flood elevation as determined by the Broward County 100-year Flood Criteria Map; or
 3. Twelve (12) inches above the adjacent road crown for residential development and six (6) inches above the adjacent road crown for nonresidential development.

Policy 4.1.4 Maintain the level of service standards through perpetuation of the existing or future inter-local retail service agreements with Fort Lauderdale and Broward County



- Policy 4.1.7 By 2017, establish an implementation program to increase the number of fire hydrants and improve fire flow as identified in the water distribution system analysis undertaken in 2005.
- Policy 4.1.8 By 2015 the City will evaluate the feasibility of establishing a potable water level of service standard for non-residential users.
- Objective 4.8 Through the Year 2018, correct existing water distribution system deficiencies and extend water service to non-serviced areas as appropriate.
- Policy 4.8.3 Retain a procedure, in conjunction with water suppliers and the South Florida Water Management District, to notify City residents of voluntary and mandatory water conservation practices during drought periods.
- Objective 4.11 Coordinate with Broward County and the City of Fort Lauderdale to address the City's water supply and wastewater treatment needs for 2030.
- Objective 4.12 The City shall coordinate land use planning with the management of water source and supply plans through the Comprehensive Plan, coordination with the City's water providers, and the South Florida Water Management District's Lower East Coast Water Supply Plan.
- Policy 4.12.1 The City shall maintain a Water Supply Facilities Work Plan (Work Plan) for at least a ten (10) year planning period addressing water supply facilities necessary to serve existing and future development within the City and support other local and regional water supply plans. The Work Plan shall be incorporated wholly into the Infrastructure Element of the Comprehensive Plan. Other elements of the Comprehensive Plan shall be amended as necessary to support and be consistent with the Work Plan.
- Policy 4.12.2 Capital projects scheduled in the first five years of the ten year Work Plan shall be included in the Capital Improvements Element which is to be financially feasible. This schedule shall be updated annually as necessary to maintain consistency with the capital projects listed in the Work Plan and within 18 months following updates to the Lower East Coast Water Supply Plan, the City of Fort Lauderdale Water Supply Plan, or the Broward County Water Supply Plan.



- Policy 4.12.3 The City shall coordinate the Water Supply Facilities Work Plan with the adopted Future Land Use Map and the socio-economic data projections of the Comprehensive Plan. This coordination will occur in two ways:
- Long range water supply planning to meet future service demand shall be based upon Broward County's socio-economic data projections for the City. The City shall update its socio-economic data every seven years with the Evaluation and Appraisal Report or more frequently as needed. Coordination with the City of Fort Lauderdale and Broward County regarding their service areas will be completed as part of these updates.
 - Prior to issuing a building permit that increases density or intensity, the City shall continue to require a concurrency review finding that the calculated water service demand can be met by available and uncommitted facility capacity and water supply.
- Policy 4.12.4 The City shall coordinate with and be consistent with the South Florida Water Management District's most current Lower East Coast (LEC) Water Supply Plan when proposing or amending the ten-year Water Supply Facilities Work Plan (Work Plan). At a minimum, this coordination shall take place within 18 months following an update to the LEC, generally done every five (5) years, and be documented in the text of the Work Plan.
- Policy 4.12.5 The City shall coordinate with its water suppliers through existing agreements, the Broward County Water Resources Task Force, and at an annual meeting (prior to adoption of each fiscal year budget), to collaborate on water supply planning issues; such as population projections, water conservation practices, the development of efficient, cost-effective, and technically feasible water supply sources that will supplement future demands, without causing adverse impacts to water quality, wetlands and aquatic systems. Consideration and coordination efforts for each major water project shall be noted in the Work Plan.
- Policy 4.12.6 The City shall seek to maximize the use of existing potable water facilities, when financially and technically feasible, through the implementation of conservation techniques as described in the Work Plan, including but not limited to reducing per capita water



consumption rates through education, incentive programs (promoting utilization of water conservation kits, pre-rinse valves, and leak detection kits), the replacement of outdated water meters, and water conservation techniques (xeriscaping).

- Policy 4.12.7 By 2020 the City shall continue to implement a water conservation type rate structure for the City's retail service area.
- Policy 4.12.8 By 2020 the City shall continue to reduce losses in the water system to ten percent or less.
- Policy 4.12.9 The City will apply for a Water Savings Incentive Program (SIP) grant from the South Florida Water Management District to assist with the purchase and distribution of pre-rinse valves and water conservation kits.

Coastal Management

- Policy 5.6.2 Adequately fund continued local maintenance and operation needs with respect to storm drainage, roadway surfacing and parks and recreation.
- Policy 5.6.3 Support and, where applicable, participate in water supply projects identified by the City of Fort Lauderdale, Broward County and the South Florida Water Management District to ensure adequate potable water for future development.

Conservation

- Policy 6.4.6 The City shall implement the water conservation techniques identified in the Water Supply Facilities Work Plan including but not limited to reducing per capita water consumption rates through education, incentive programs (promoting utilization of water conservation kits, pre-rinse valves, leak detection kits, and the replacement of outdated water meters), and water conservation techniques (xeriscaping).
- Policy 6.4.7 The City will apply for a Water Savings Incentive Program (SIP) grant from the South Florida Water Management District to assist with the purchase and distribution of pre-rinse valves and water conservation kits.



Intergovernmental Coordination

- Policy 8.3.6 The City will work with Broward County on establishing emergency water main interconnections within their franchise area.
- Policy 8.3.7 As a means to achieve the adopted level of service for potable water, the City will coordinate with Broward County, the City of Fort Lauderdale, and the South Florida Water Management District on improving water conservation practices. Specific coordination mechanisms include the City's participation in the National Xeriscape Council, involvement on the Broward County Water Resources Task Force, participation in the Water Management District's Water Savings Incentive Program, and through its website, printed materials available at City Hall, and information included with the City's water Bills. Water conservation best practices will also be discussed during the annual meeting with the City's water suppliers.
- Policy 8.3.8 To assist commercial and residential landowners with water conservation, the City will apply for a Water Savings Incentive Program (SIP) grant from the South Florida Water Management District to assist in the purchase and distribution of pre-rinse valves and water conservation kits.

Capital Improvements

- Policy 9.2.4 Adopt the local level of service standards for infrastructure services as follows:
- For sanitary sewer - 150 gallons per day per resident
 - For potable water - 119 gallons per day per resident
 - For fire flow - as required by the Fire Marshall
 - For solid waste - 8 pounds per capita per day with bi-weekly pickup
 - For drainage (Roadway Crown) - 10 year 3 day storm
 - For drainage (Finished Floor) - floor elevation above 100 year 3 day storm. Finished floor shall be no lower than the highest of:



1. One (1) foot above the FEMA Flood Insurance Rate Base Flood Elevation; or
2. The 100-year flood elevation as determined by the Broward County 100-year Flood Criteria Map; or
3. Twelve (12) inches above the adjacent road crown for residential development and six (6) inches above the adjacent road crown for nonresidential development.

Policy 9.2.6 By 2015, the City shall modify the Concurrency Management System to require written approval from water suppliers regarding available capacity to support new development as described in Policy 1.1.9 of the Future Land Use Element.

Policy 9.4.4 Capital projects scheduled in the first five years of the ten year Work Plan shall be included in the Capital Improvements Element which is to be financially feasible. This schedule shall be updated annually as necessary to maintain consistency with the capital projects listed in the Work Plan and within 18 months following updates to the Lower East Coast Water Supply Plan, the City of Fort Lauderdale Water Supply Plan, or the Broward County Water Supply Plan

Policy 9.4.5 The following list identifies improvements the City would like to undertake. They are not specified in the City's Five-Year Capital Improvement Program. (Costs, where identified, reflect FY 2015 amounts and are subject to change.

Project	Costs (\$)
Wastewater Collection System Refining Project	1,000,000
East Zone South of NE 38 th Street	3,037,600
Central Zone South of NE/NW 38 St (Park Lane)	8,469,000
Central Zone North	1,744,000
NE 5 Ave Drainage Improvements	170,000
Park Lane Phase V	1,669,000
NW 10 Ave NW 38 St to Prospect Road	2,670,500
NE 34 Court from NE 12 Ter to NE 16 Ave Roadway Improvement	1,425,000
Lloyd Estates Drainage Expanded Scope	4,845,000
Dixie Highway West Landscape Improvements	230,000
Oakland Park Blvd West Landscaping	275,000



Project	Costs (\$)
NW 38 th St CSX Crossing Quiet Zone	495,000
Park Lane East Underground Service Lines	200,000
Andrews Avenue Roadway Improvement	2,672,500
Prospect Road & Andrew Avenue Parking Lot	1,100,000
Downtown Parking	-
Oakland Station Crosswalk	30,000
Lakeside Rock Island Entryway Features	76,000
Royal Palm Natural Area	49,500
Royal Palm Park Lighting	164,000

The table below contains the City's Capital Improvements Program. The City of Oakland Park is almost fully developed. No specific infrastructure improvements to achieve level of service standards are identified in the City's comprehensive plan. There are two improvements identified in **Table 12** related to water supply. Both of these are projects being undertaken by the City's water suppliers, the City of Fort Lauderdale and Broward County, and are included as a separate table to comply with state law. Projects included in the capital improvements program are designed to ensure operational capacity and efficiency to maintain level of service standards.



Appendices



Appendix A

2. CITED FLORIDA STATUTE PROVISIONS (RELEVANT PORTIONS ONLY)

163.3167(9): Each local government shall address in its comprehensive plan, as enumerated in this chapter, the water supply sources necessary to meet and achieve the existing and projected water use demand for the established planning period, considering the applicable plan developed pursuant to s. 373.709.

163.3177(3)(a): The comprehensive plan shall contain a capital improvements element designed to consider the need for and the location of public facilities in order to encourage the efficient use of such facilities and set forth:

1. A component that outlines principles for construction, extension, or increase in capacity of public facilities, as well as a component that outlines principles for correcting existing public facility deficiencies, which are necessary to implement the comprehensive plan. The components shall cover at least a 5-year period.
2. Estimated public facility costs, including a delineation of when facilities will be needed, the general location of the facilities, and projected revenue sources to fund the facilities.
3. Standards to ensure the availability of public facilities and the adequacy of those facilities including acceptable levels of service.
4. A schedule of capital improvements which includes any publicly funded project of federal, state or local government, and which may include privately funded projects for which the local government has no fiscal responsibility. Projects necessary to ensure that any adopted level-of-service standards are achieved and maintained for the 5-year period must be identified as either funded or unfunded and given a level of priority for funding.

163.3177(4)(a): Coordination of the local comprehensive plan with the comprehensive plans of adjacent municipalities, the county, adjacent counties, or the region; with the appropriate water management district's regional water supply plans approved pursuant to s. 373.709; and with adopted rules pertaining to designated areas of critical state concern shall be a major objective of the local comprehensive planning process. To that end, in the preparation of a comprehensive plan or element thereof, and in the comprehensive plan or element as adopted, the governing body shall include a specific policy statement indicating the relationship of the proposed development of the area to the comprehensive plans of adjacent municipalities, the county, adjacent counties, or the region, as the case may require and as such adopted plans or plans in preparation may exist.

163.3177(5)(a): Each local government comprehensive plan must include at least two planning periods, one covering at least the first 5-year period occurring after the plan's adoption and one covering at least a 10-year period. Additional planning periods for specific components, elements, land use amendments, or projects shall be permissible and accepted as part of the planning process.

163.3177(6)(a): A future land use plan element designating proposed future general distribution, location, and extent of the uses of land for residential uses, commercial uses, industry, agriculture, recreation, conservation, education public facilities, and other categories of the public and private uses of land. The approximate acreage and the general range of density or intensity of use shall be provided for the gross land area included in each existing land use category. The element shall establish the long-term end toward which land use programs and activities are ultimately directed.

163.3177(6)(a)2.: The future land use plan and plan amendments shall be based upon surveys, studies, and data regarding the area, as applicable including:

- a. The amount of land required to accommodate anticipated growth.
- b. The projected permanent and seasonal population of the area.
- c. The character of undeveloped land.
- d. The availability of water supplies, public facilities, and services.
- e. The need for redevelopment, including the renewal of blighted areas and the elimination of nonconforming uses which are inconsistent with the character of the community.

163.3177(6)(c): A general sanitary sewer, solid waste, drainage, potable water, and natural groundwater aquifer recharge element correlated to principles and guidelines for future land use, indicating ways to provide for future potable water, drainage, sanitary sewer, solid waste, and aquifer recharge protection requirements for the area. The element may be a detailed engineering plan including a topographic map depicting areas of prime groundwater recharge.

1. Each local government shall address in the data and analyses required by this section those facilities that provide service within the local government's jurisdiction. Local governments that provide facilities to serve areas within other local government jurisdictions shall also address those facilities in the data and analyses required by this section, using data from the comprehensive plan for those areas for the purpose of projecting facility needs as required in this subsection. For shared facilities, each local government shall indicate the proportional capacity of the systems allocated to serve its jurisdiction.
2. The element shall describe the problems and needs and the general facilities that will be required for solution of the problems and needs including correcting existing facility deficiencies. The element shall address coordinating the extension of, or increase in the capacity of,

facilities to meet future needs while maximizing the use of existing facilities and discouraging urban sprawl; conserving potable water resources; and protecting the functions of natural groundwater recharge areas and natural drainage features.

3. Within 18 months after the governing board approves an updated regional water supply plan, the element must incorporate the alternative water supply project or projects selected by the local government from those identified in the regional water supply plan pursuant to s. 373.709(2)(a) or proposed by the local government under s. 373.709(8)(b). If a local government is located within two water management districts, the local government shall adopt its comprehensive plan amendment within 18 months after the later updated regional water supply plan. The element must identify such alternative water supply projects and traditional water supply projects and conservation and reuse necessary to meet the water needs identified in s. 373.709(2)(a) within the local government's jurisdiction and include a work plan, covering at least a 10-year planning period, for building public, private, and regional water supply facilities, including development of alternative water supplies, which are identified in the element as necessary to serve existing and new development. The work plan shall be updated, at a minimum, every five years within 18 months after the governing board of a water management district approves an updated regional water supply plan. Local governments, public and private utilities, regional water supply authorities, special districts, and water management districts are encouraged to cooperatively plan for the development of multijurisdictional water supply facilities that are sufficient to meet projected demands for established planning periods, including the development of alternative water sources to supplement traditional sources of groundwater and surface water supplies.

163.3177(6)(d): A conservation element for the conservation, use, and protection of natural resources in the area, including air, water, water recharge areas, wetlands, water wells, estuarine marshes, soils, beaches, shores, flood plains, rivers, bays, lakes, harbors, forests, fisheries and wildlife, marine habitat, minerals, and other natural and environmental resources, including factors that affect energy conservation.

1. The following natural resources, where present within the local government's boundaries, shall be identified and analyzed and existing recreational or conservation uses, known pollution problems, including hazardous wastes, and the potential for conservation, recreation, use, or protection shall also be identified:
 - a. Rivers, bays, lakes, wetlands including estuarine marshes, groundwaters, and springs, including information on quality of the resource available.
 - b. Floodplains.

2. The element must contain principles, guidelines, and standards for conservation that provide long-term goals and which:
 - b. Conserves, appropriately uses, and protects the quality and quantity of current and projected water sources and waters that flow into estuarine waters or oceanic waters and protect from activities and land uses known to affect adversely the quality and quantity of identified water sources, including natural groundwater recharge areas, wellhead protection areas, and surface waters used as a source of public water supply.
 - c. Provides for the emergency conservation of water sources in accordance with the plans of the regional water management district.
3. Current and projected needs and sources for at least a 10-year period based on the demands for industrial, agricultural, and potable water use and the quality and quantity of water available to meet these demands shall be analyzed. The analysis shall consider the existing levels of water conservation, use, and protection and applicable policies of the regional water management district and further must consider the appropriate regional water supply plan approved pursuant to s. 373.709, or, in the absence of an approved regional water supply plan, the district water management plan approved pursuant to s. 373.036(2). This information shall be submitted to the appropriate agencies...

163.3177(6)(h)1.: An intergovernmental coordination element showing relationships and stating principles and guidelines to be used in coordinating the adopted comprehensive plan with the plans of school boards, regional water supply authorities, and other units of local government providing services but not having regulatory authority over the use of land, with the comprehensive plans of adjacent municipalities, the county, adjacent counties, or the region, with the state comprehensive plan and with the applicable regional water supply plan approved pursuant to s. 373.709, as the case may require and as such adopted plans or plans in preparation may exist...

- a. The intergovernmental coordination element must provide procedures for identifying and implementing joint planning areas, especially for the purpose of annexation, municipal incorporation, and joint infrastructure service areas.

163.3177(6)(h)3.b.: Ensure coordination in establishing level of service standards for public facilities with any state, regional, or local entity having operational and maintenance responsibility for such facilities.

163.3180: Concurrency.—

163.3180(1)(a): Sanitary sewer, solid waste, drainage, and potable water are the only public facilities and services subject to the concurrency requirement on a statewide basis...

163.3180(1)(b): The local government comprehensive plan must demonstrate, for required or optional concurrency requirements, that the levels of service adopted can be reasonably met. Infrastructure needed to ensure that adopted level-of-service standards are achieved and maintained for the 5-year period of the capital improvement schedule must be identified pursuant to the requirements of s. 163.3177(3). The comprehensive plan must include principles, guidelines, standards, and strategies for the establishment of a concurrency management system.

163.3180(2): Consistent with public health and safety, 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 local government shall consult with the applicable water supplier to determine whether adequate water supplies to serve the new development will be available no later than the anticipated date of issuance by the local government of a certificate of occupancy or its functional equivalent...

163.3180(3): Governmental entities that are not responsible for providing, financing, operating, or regulating public facilities needed to serve development may not establish binding level-of-service standards on governmental entities that do bear those responsibilities.

163.3191: Evaluation and appraisal of comprehensive plan.—

163.3191(1): At least once every 7 years, each local government shall evaluate its comprehensive plan to determine if plan amendments are necessary to reflect changes in state requirements in this part since the last update of the comprehensive plan, and notify the state land planning agency as to its determination.

163.3191(2): If the local government determines amendments to its comprehensive plan are necessary to reflect changes in state requirements, the local government shall prepare and transmit within 1 year such plan amendment or amendments for review pursuant to s. 163.3184.

163.3191(3): Local governments are encouraged to comprehensively evaluate and, as necessary, update comprehensive plans to reflect changes in local conditions.



Appendix B

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

November 19, 2014

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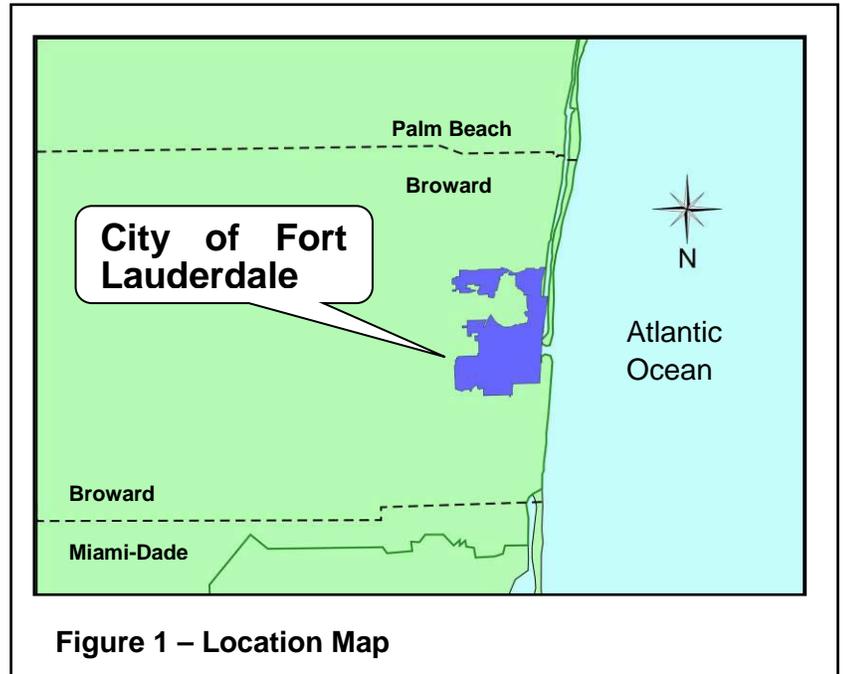
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1.0 INTRODUCTION

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.



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:

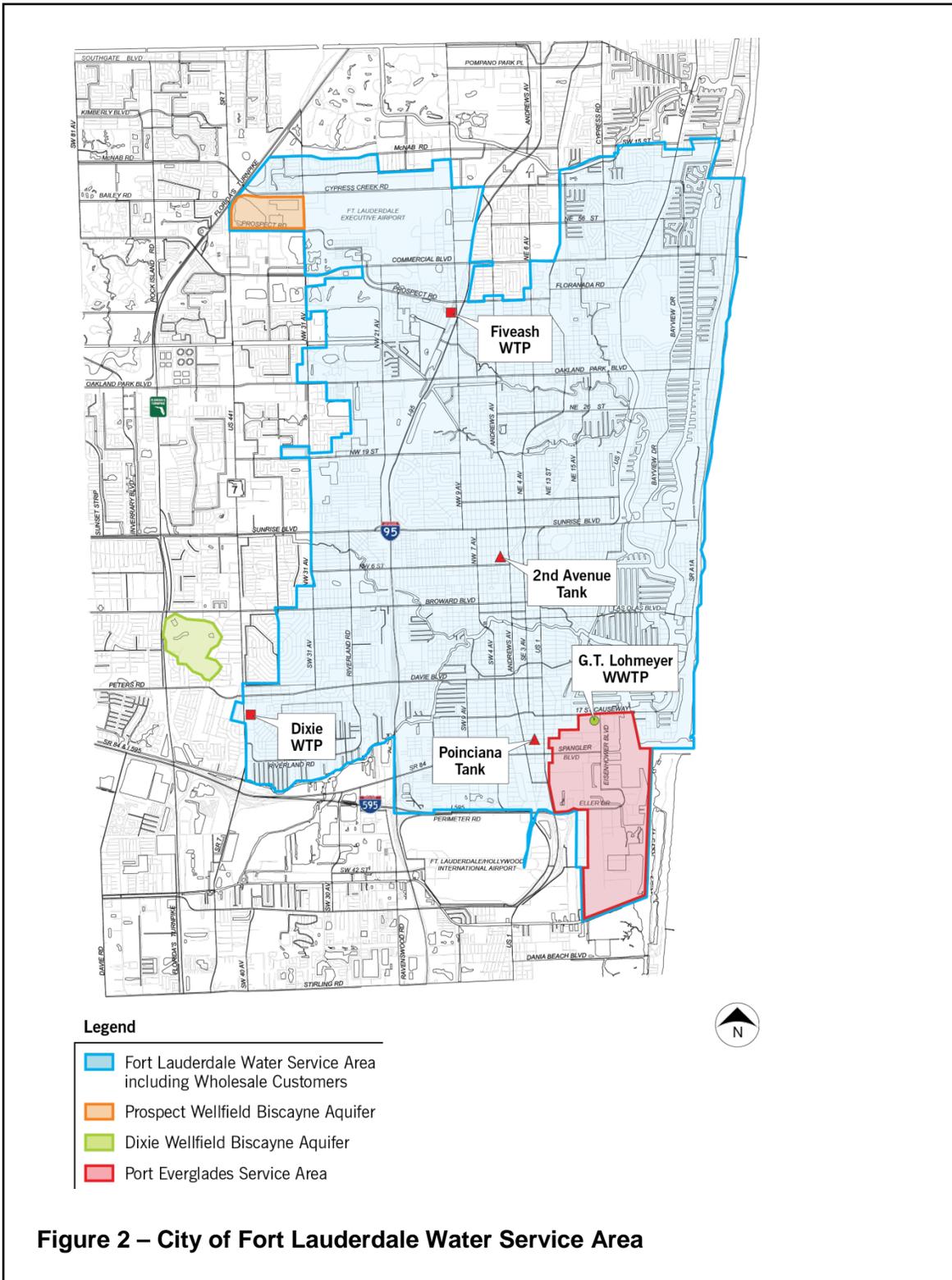
- An overview of the City of Fort Lauderdale’s water service area; and
- A description of regional water supply planning issues that impact the City of Fort Lauderdale, including the following:
 - Climate Change
 - Regional Water Availability Rule
 - Participation in the C-51 Reservoir Project
 - Leah 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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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:

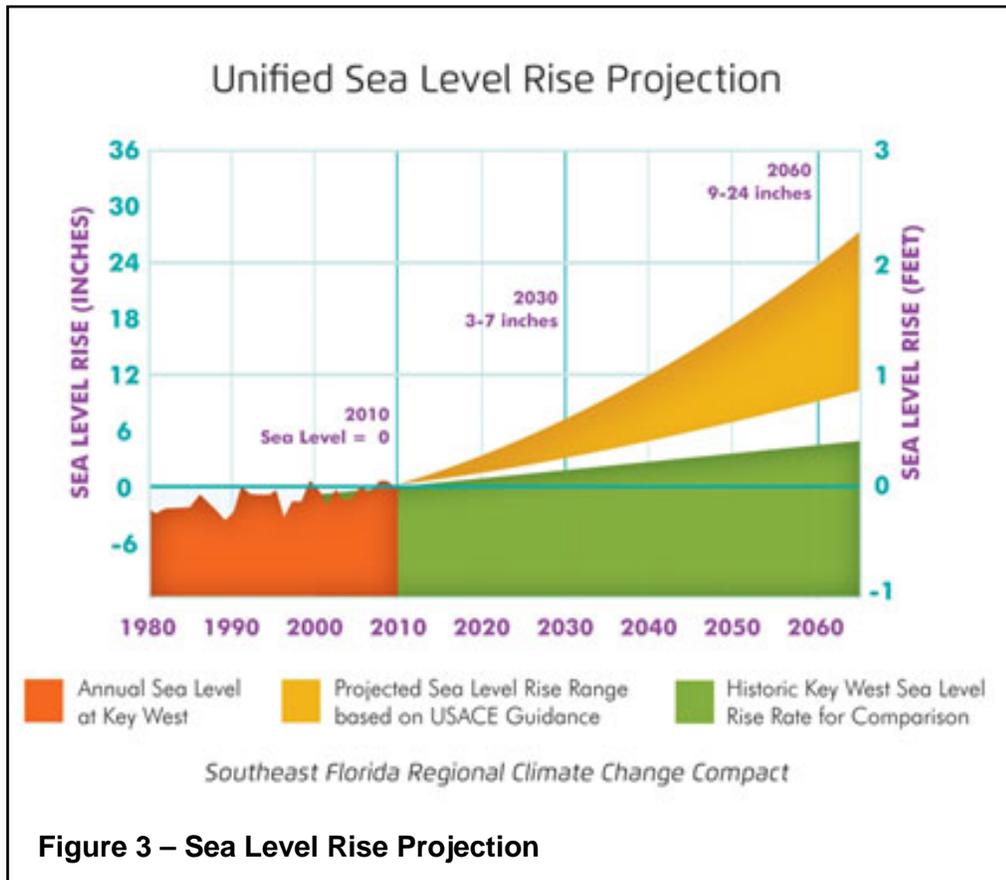
1. sea level rise;
2. saltwater intrusion;
3. extreme weather; and
4. infrastructure development,

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.



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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**.

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.

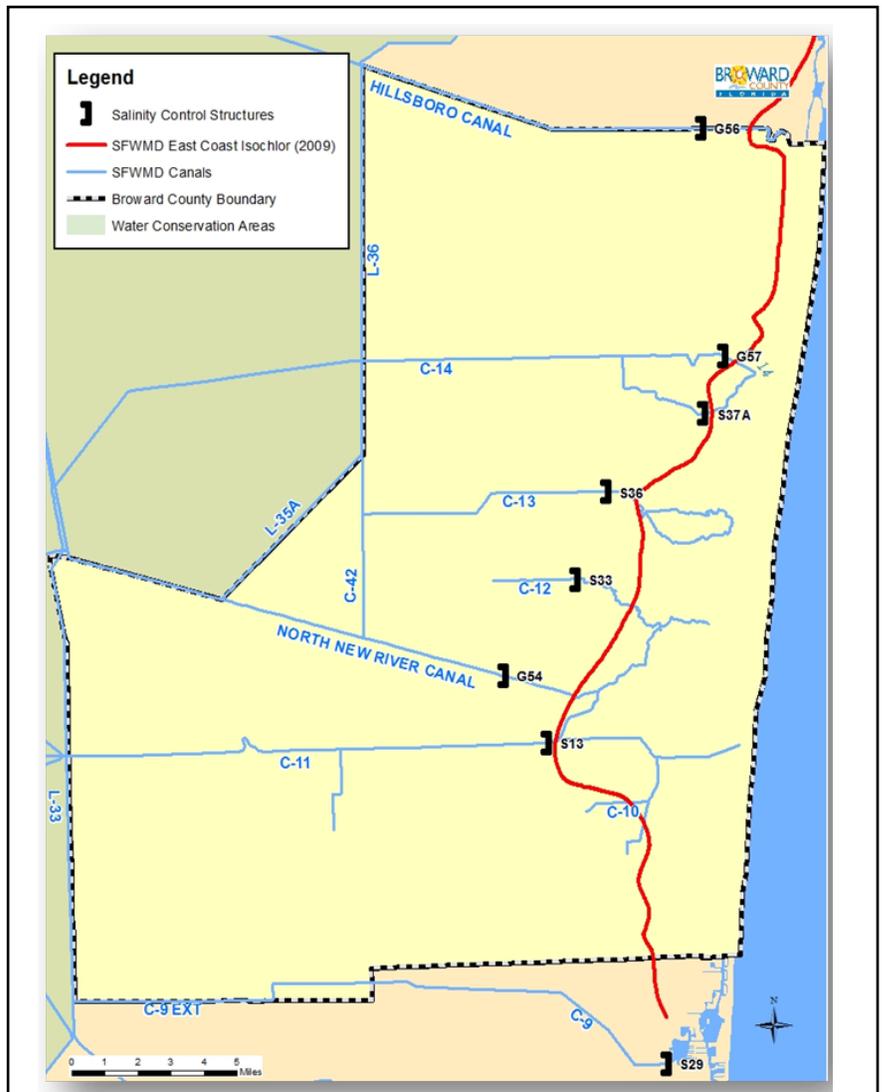


Figure 4 - Saltwater Intrusion Line, 2013

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 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. Ongoing reduction of inflow and infiltration may result in changes in water quality over time that enhance 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	<p>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:</p> <ul style="list-style-type: none"> • 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	<p>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:</p> <ul style="list-style-type: none"> • 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	<p>Develop agency capabilities to provide rapid deployment of resources in immediate response to intense precipitation and storm events through use of Next RAD technology.</p>
WS-14	<p>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.</p>
WS-15	<p>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.</p>
WS-16	<p>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.</p>

**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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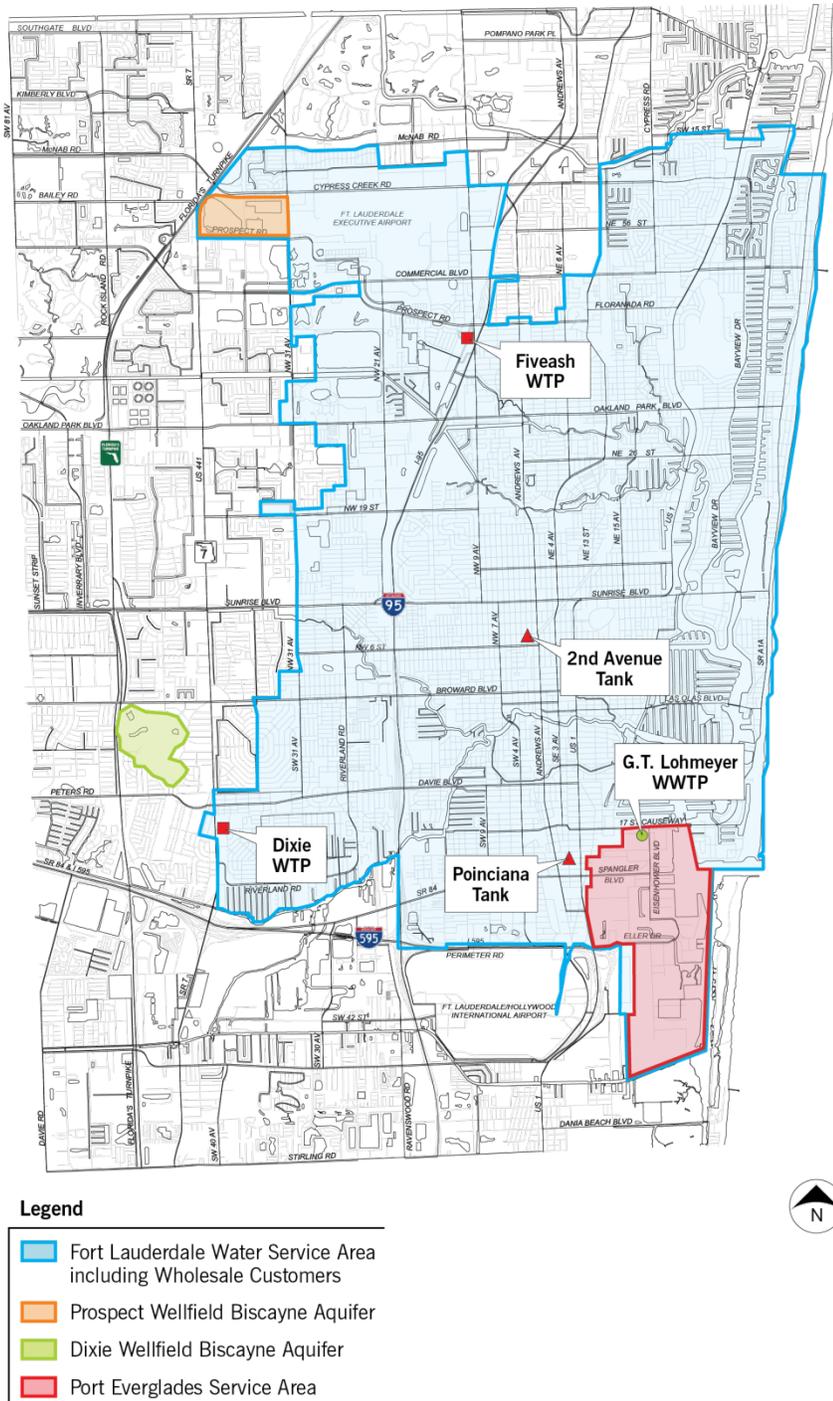


Figure 5 – City of Fort Lauderdale Water Service Area

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	Policy 1.2.2 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 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 are 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 area 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.

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	176	170	46.3	44.7	56.76
2035	267,196	176	170	47.0	45.4	57.65

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 finished water per capita demands for the years 2028 through the 2035 is assumed to remain constant at 170 gallons per person per day.

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.

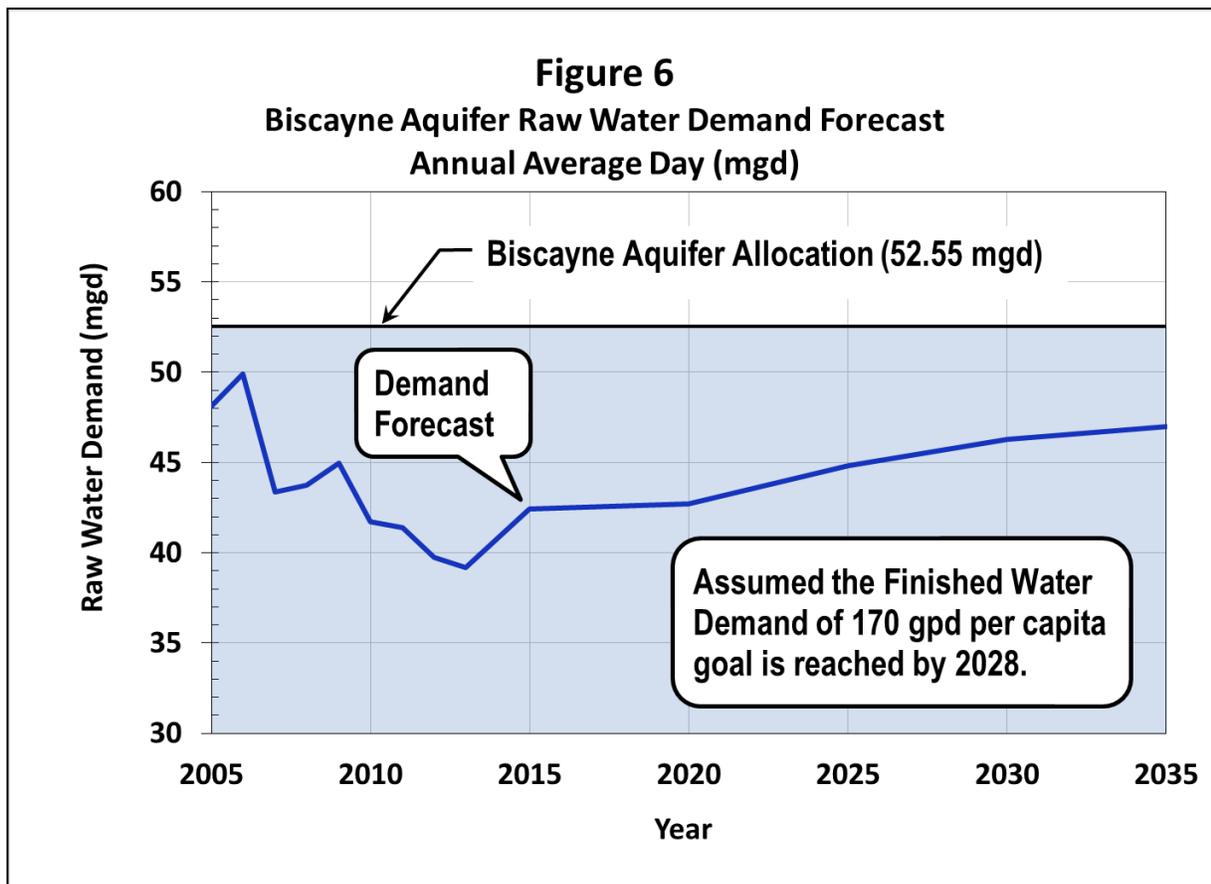
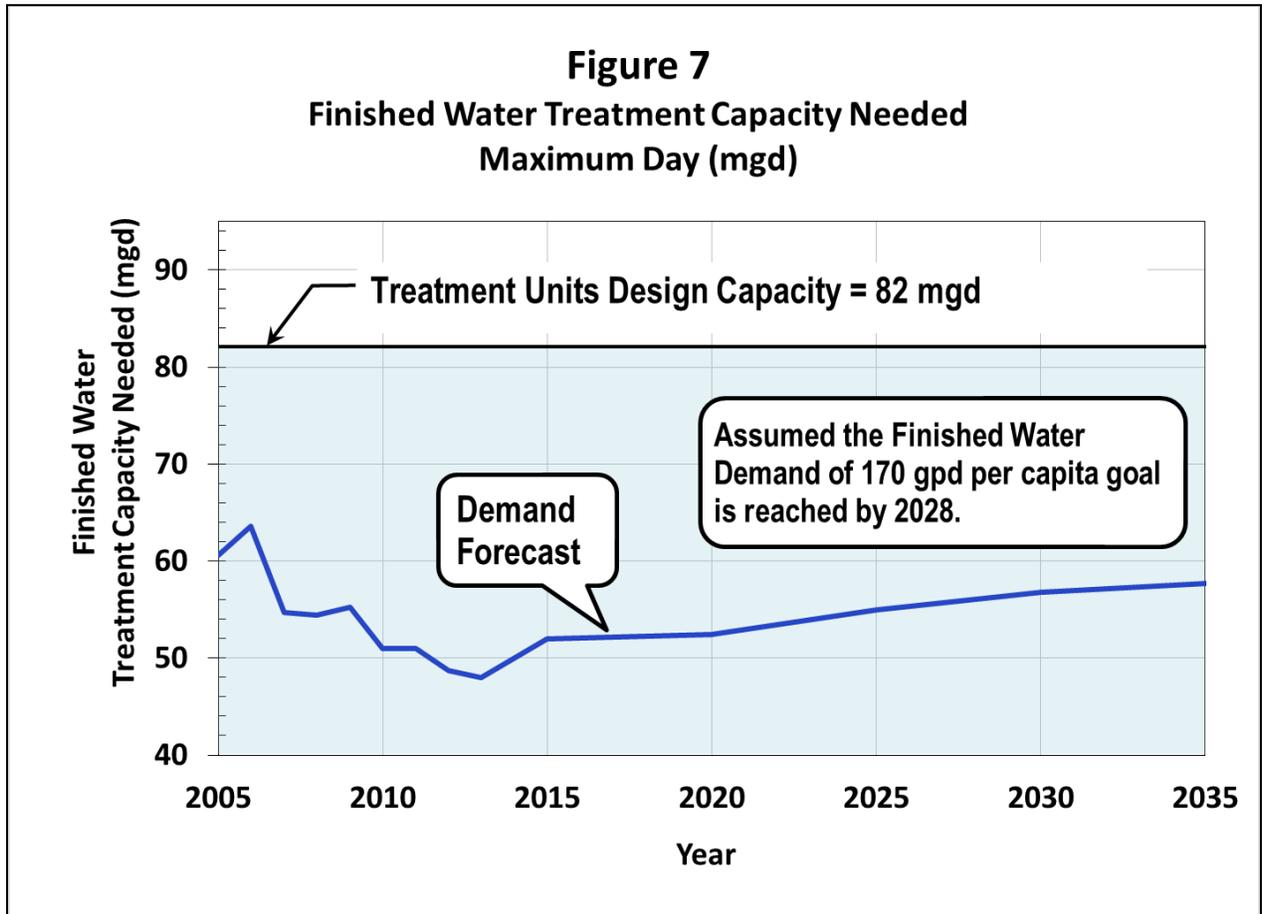


Figure 6 illustrates that the annual average day raw water demand does not exceed the annual average day Biscayne Aquifer allocation through the year 2035.



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.

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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**.

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 were 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 Served
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.

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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 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 States 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, III 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, III 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.

**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.

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Table 12 (continued)
Water Conservation Action Status

Action	Status
Action 1.1.4 - Consider innovative projects including water reuse and harvesting rainwater.	<p>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.</p> <p>Participating in other water reuse and rainwater harvesting projects are evaluated as the opportunities are identified.</p>

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 initiatives to be completed over the next 5 years to make progress at reaching the goals. Key initiatives 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 a 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 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.

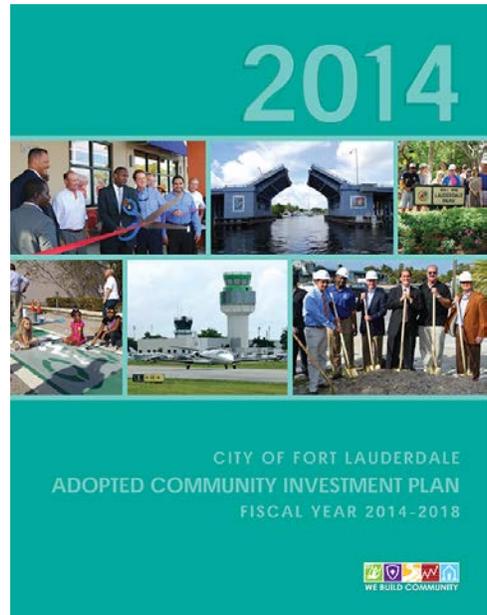
4.2 Capital Improvements Element/Schedule

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 Intrcl	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	-
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	-

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
P10851 Lake Ridge Small Water Main Improvements	Fund 454	\$500,000	-
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
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 Improvmt - Phase 2	Fund 482	\$1,000,000	-

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
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	-
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 or 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.



Appendix C

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

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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

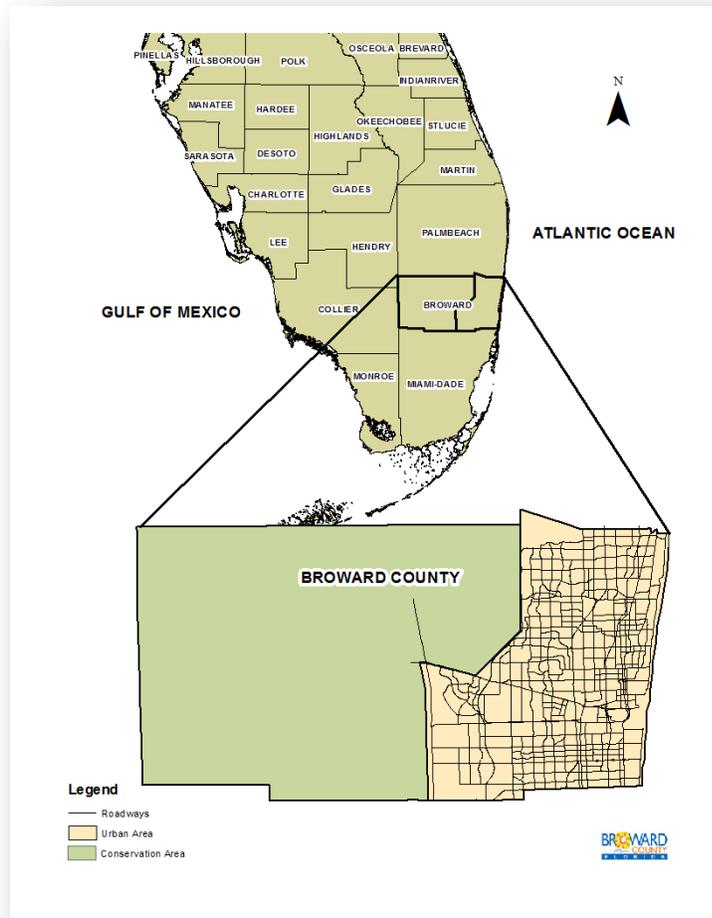


Figure 1.0: Broward County

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.

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 LECSWP 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 [Section 163.3177 (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) [Section 163.3177 (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 [Section 163.3180 (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 [Section 163.3191 (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.

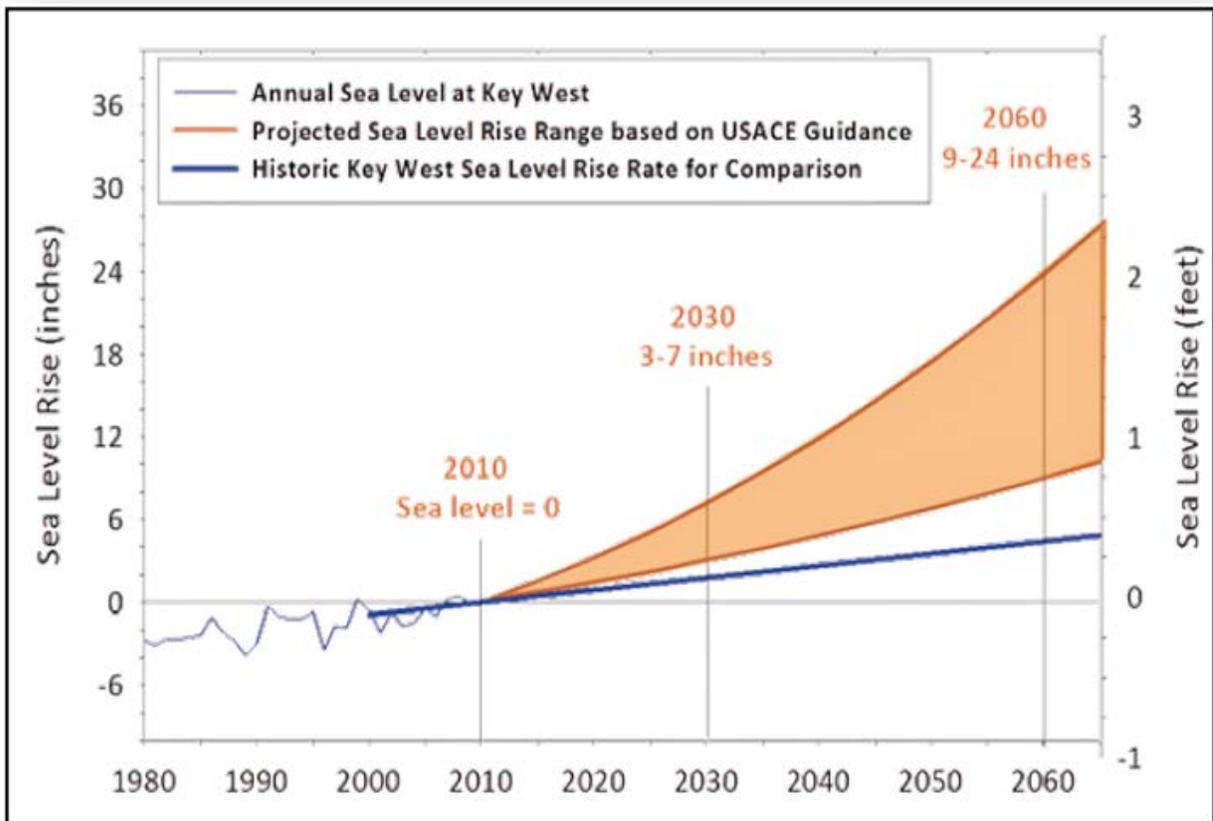


Figure 2.0: Florida Regional Climate Change Compact Adopted Sea Level Rise Projection

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.

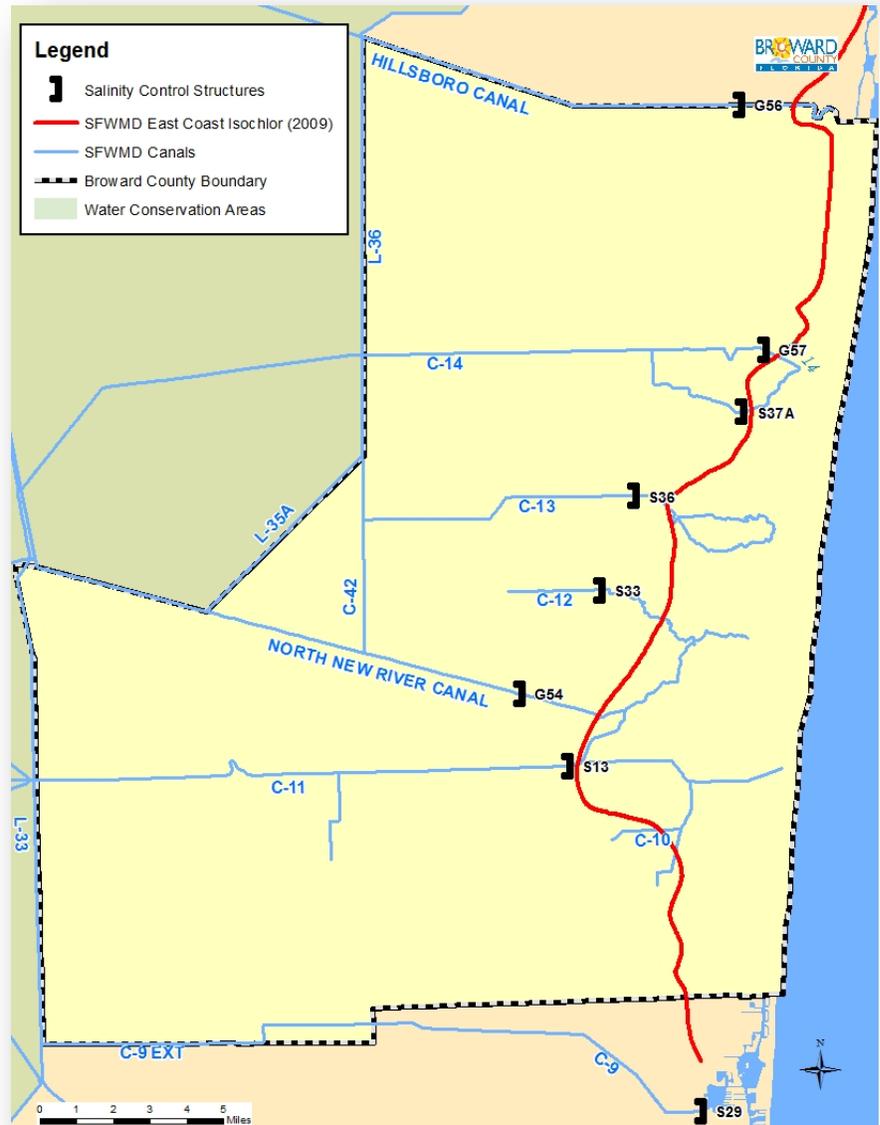


Figure 2.1: Saltwater Intrusion Line, Broward County, 2013

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 sanitary 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.

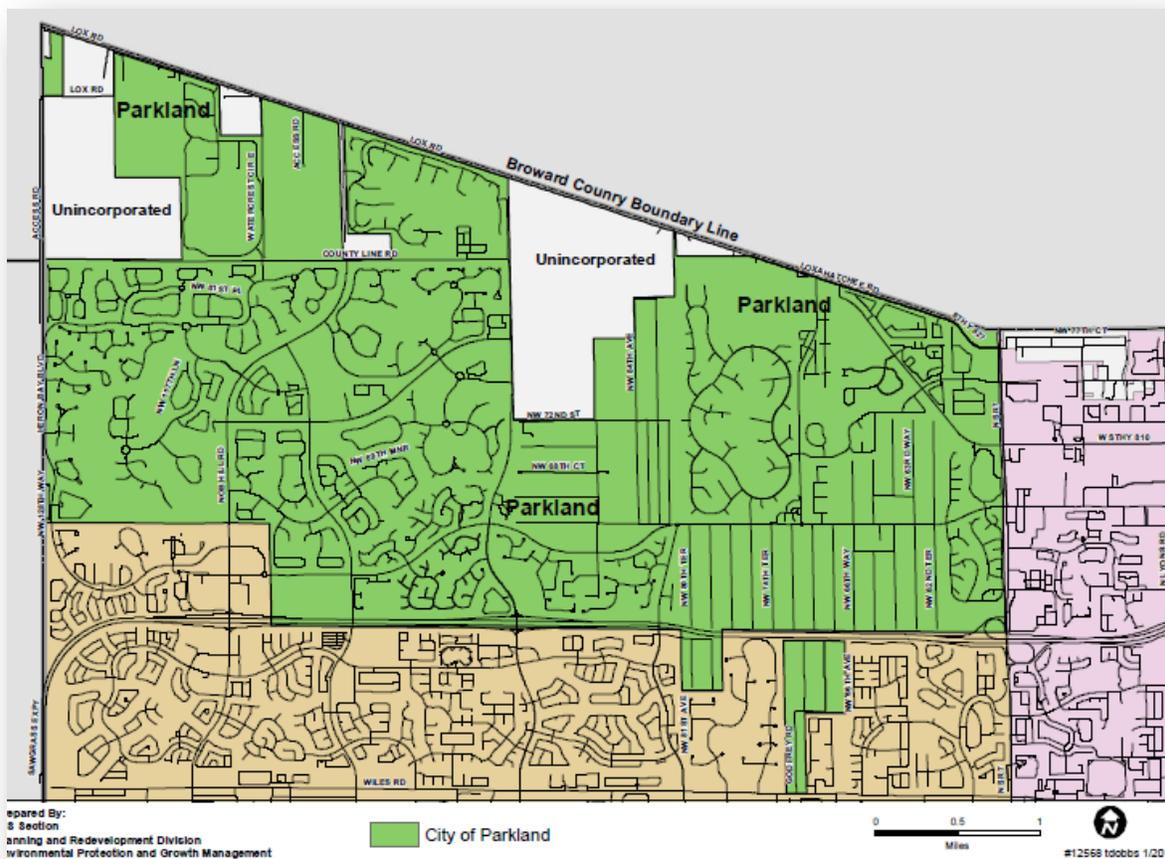


Figure 3.0: City of Parkland Wedge Area, 2014

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.

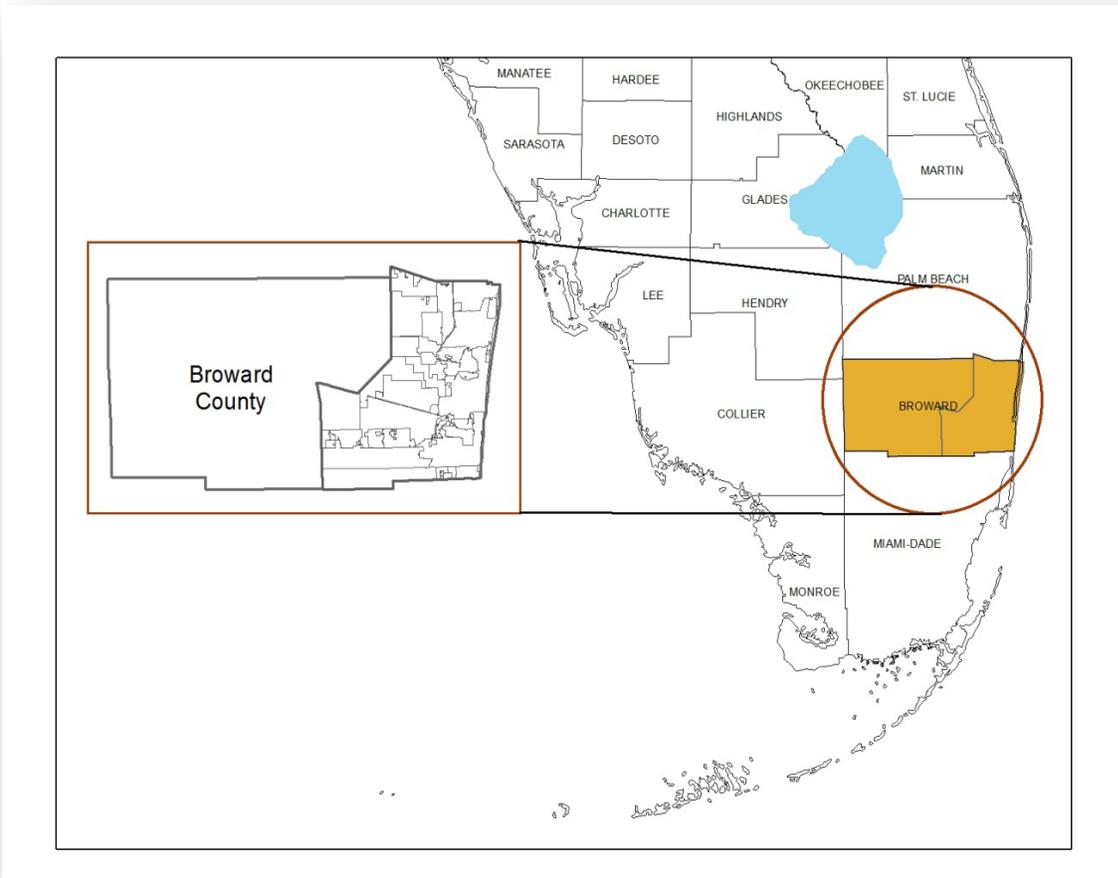


Figure 2.1: Location of Broward County

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

<p>WS-1</p>	<p>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).</p>
<p>WS-2</p>	<p>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.</p>
<p>WS-3</p>	<p>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.</p>
<p>WS-4</p>	<p>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.</p>
<p>WS-5</p>	<p>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.</p>
<p>WS-6</p>	<p>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.</p>
<p>WS-7</p>	<p>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.</p>

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	<p>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:</p> <p>Improved down-scaling of global climate models for representation of precipitation at the regional/local scales,</p> <p>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</p> <p>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.</p>
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	<p>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:</p> <p>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,</p> <p>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</p> <p>Establish a venue for a periodic exchange of ideas between resource managers, policy makers, and researchers.</p>

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.
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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,

parcs, 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:

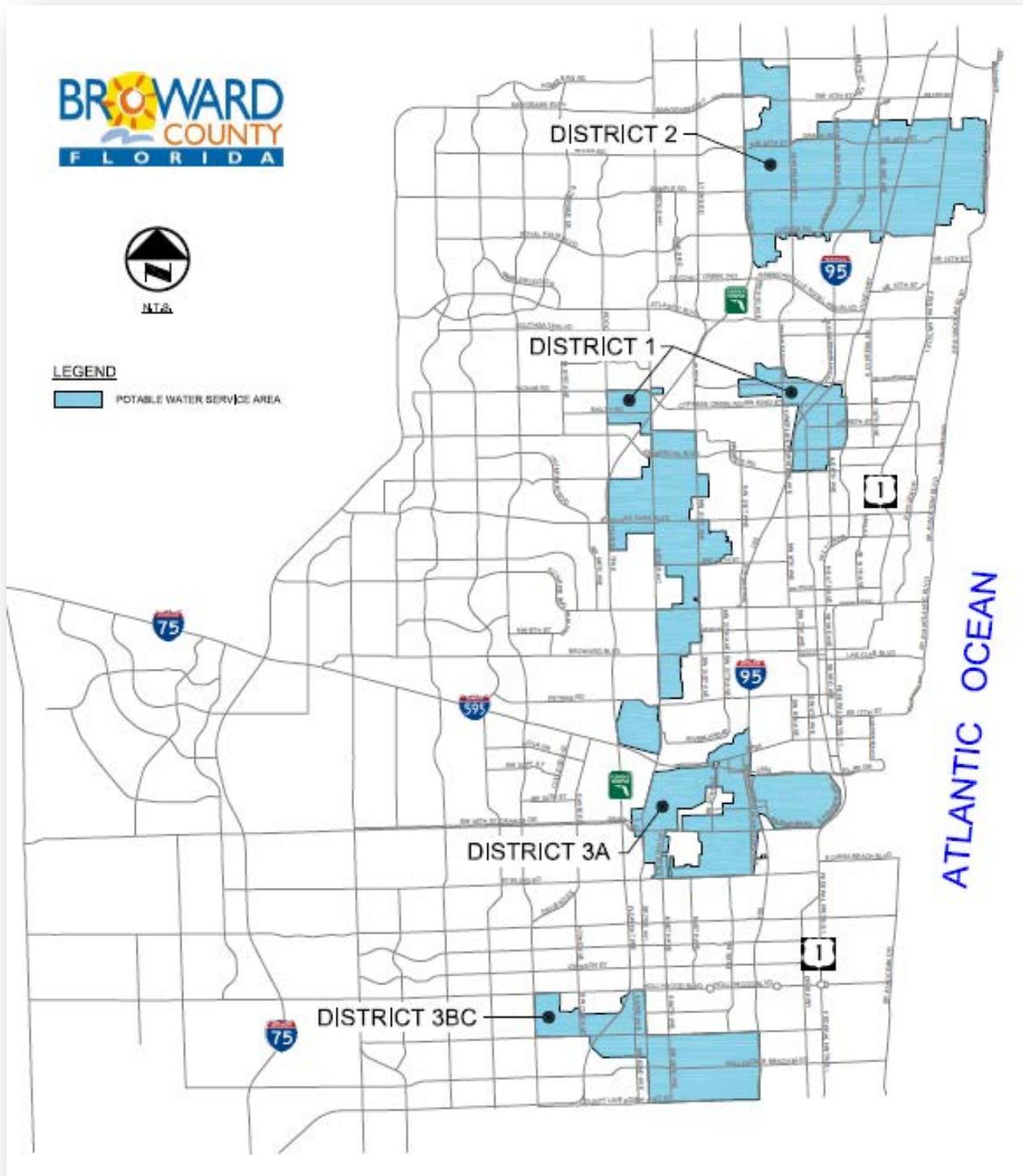


Figure 4-1: BCWWS Retail Water Service Areas, 2014

- 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.

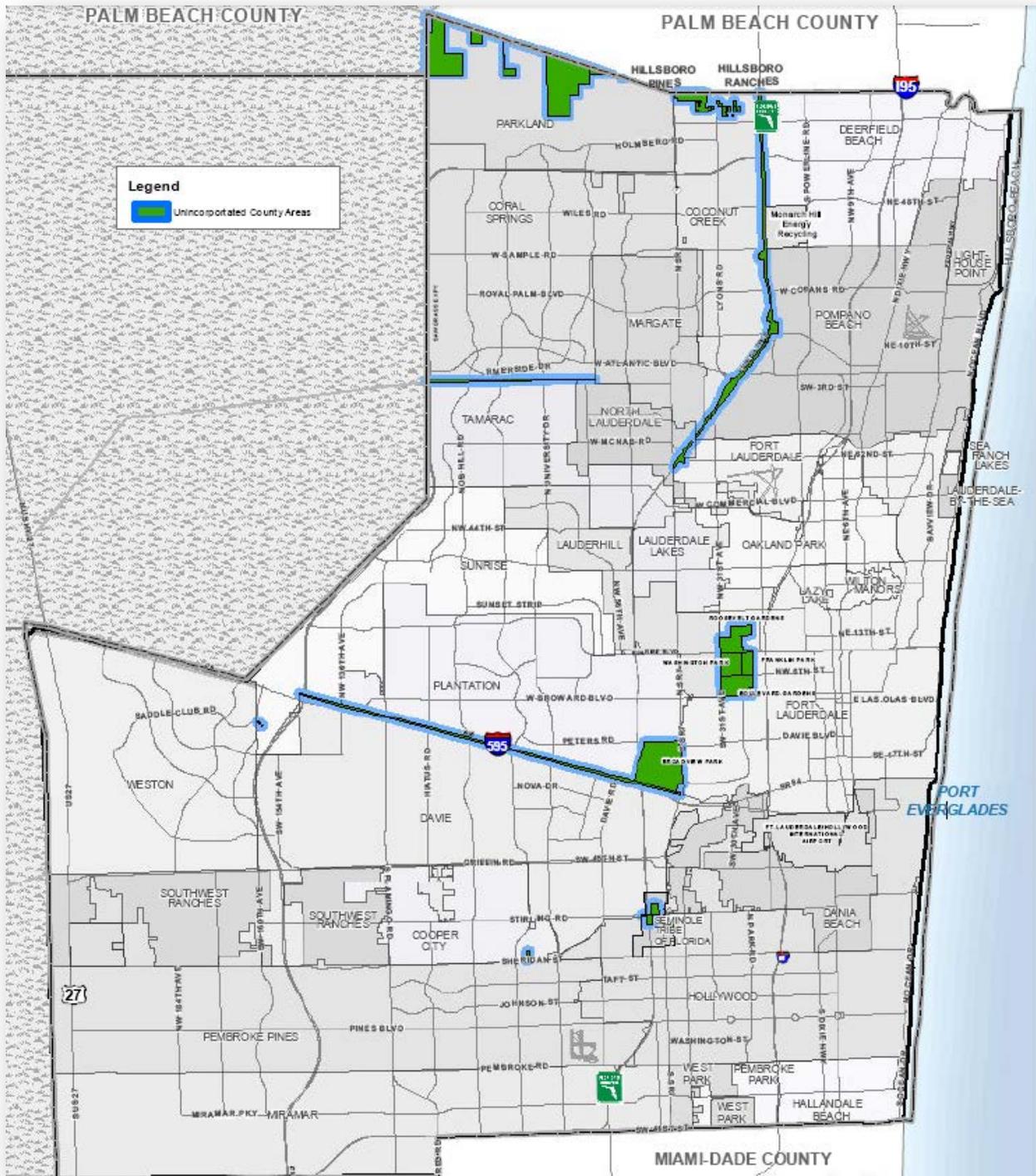


Figure 4.2: Broward County Unincorporated Areas, 2013

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 to 2040

Utility Service Area	PROJECTED POPULATION ¹						
	2010	2015	2020	2025	2030	2035	2040
District 1	<u>75,091</u> <u>1</u>	<u>75,091</u> <u>6</u>	<u>76,428</u> <u>889</u>	<u>78,125</u> <u>950</u>	<u>82,155</u> <u>3</u>	<u>83,715</u> <u>116</u>	<u>85,029</u> <u>826</u>
District 2 & Coconut Creek	<u>109,181</u>	<u>110,173</u> <u>496</u>	<u>115,747</u> <u>272</u>	<u>119,575</u> <u>159</u>	<u>123,402</u> <u>209</u>	<u>124,854</u> <u>431</u>	<u>125,506</u> <u>22</u>
District 2 Coconut Creek	<u>56,687</u> <u>7</u>	<u>54,933</u> <u>256</u>	<u>55,274</u> <u>799</u>	<u>55,604</u> <u>185</u>	<u>56,868</u> <u>675</u>	<u>57,148</u> <u>725</u>	<u>57,159</u> <u>575</u>
District 3A		<u>16,384</u> <u>8</u>	<u>16,960</u> <u>014</u>	<u>17,451</u> <u>42</u>	<u>17,962</u> <u>23</u>	<u>18,013</u> <u>17, 928</u>	<u>18,019</u> <u>17, 827</u>
District 3BC		<u>32,902</u> <u>85, 2</u>	<u>33,660</u> <u>70, 6</u>	<u>34,075</u> <u>3, 8, 25</u>	<u>35,594</u> <u>76, 3, 3</u>	<u>36,309</u> <u>28, 5</u>	<u>36,878</u> <u>64, 0</u>

1. Based on 2013 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.

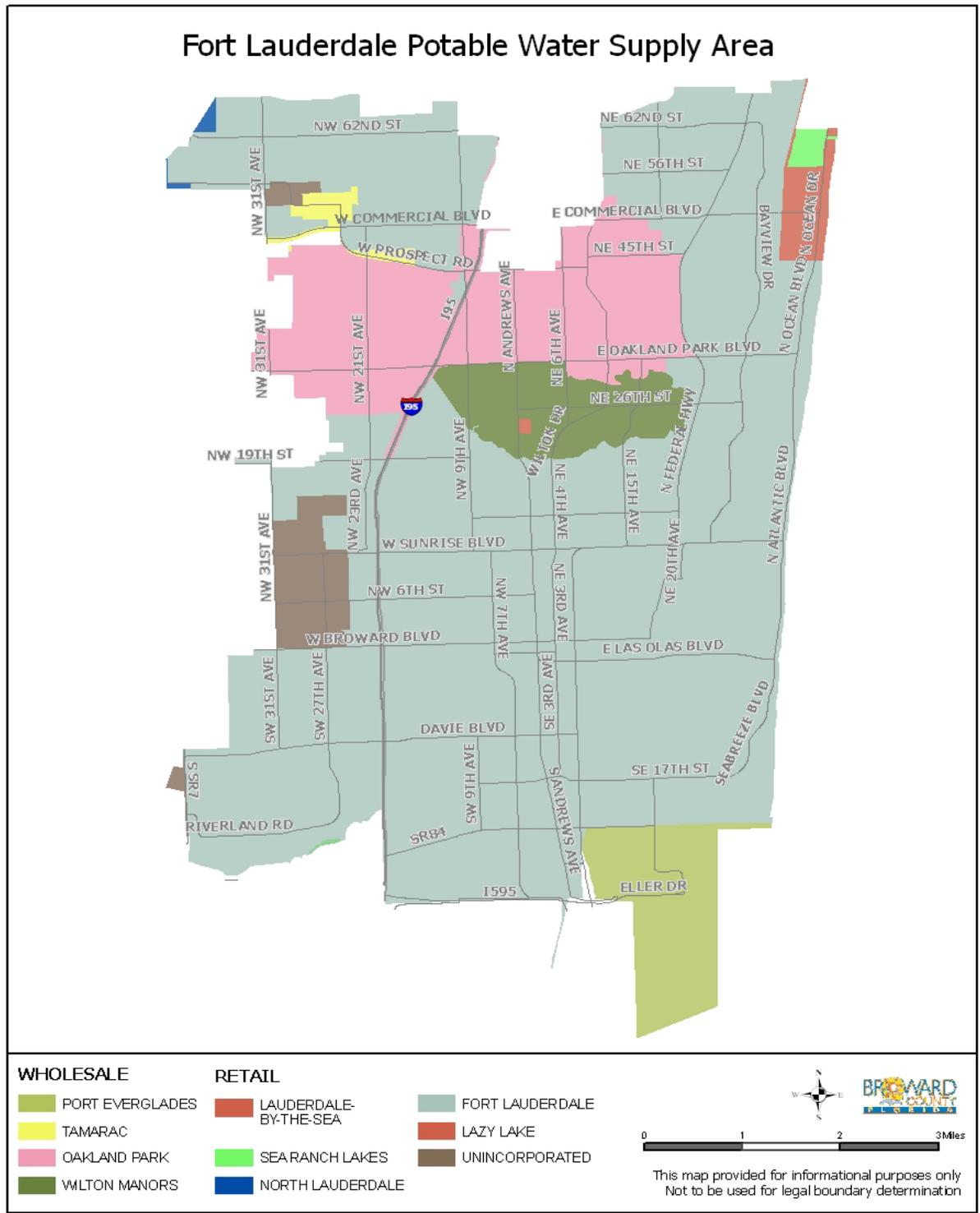


Figure 4.3: City of Fort Lauderdale Service Area

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 (BEER), "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.

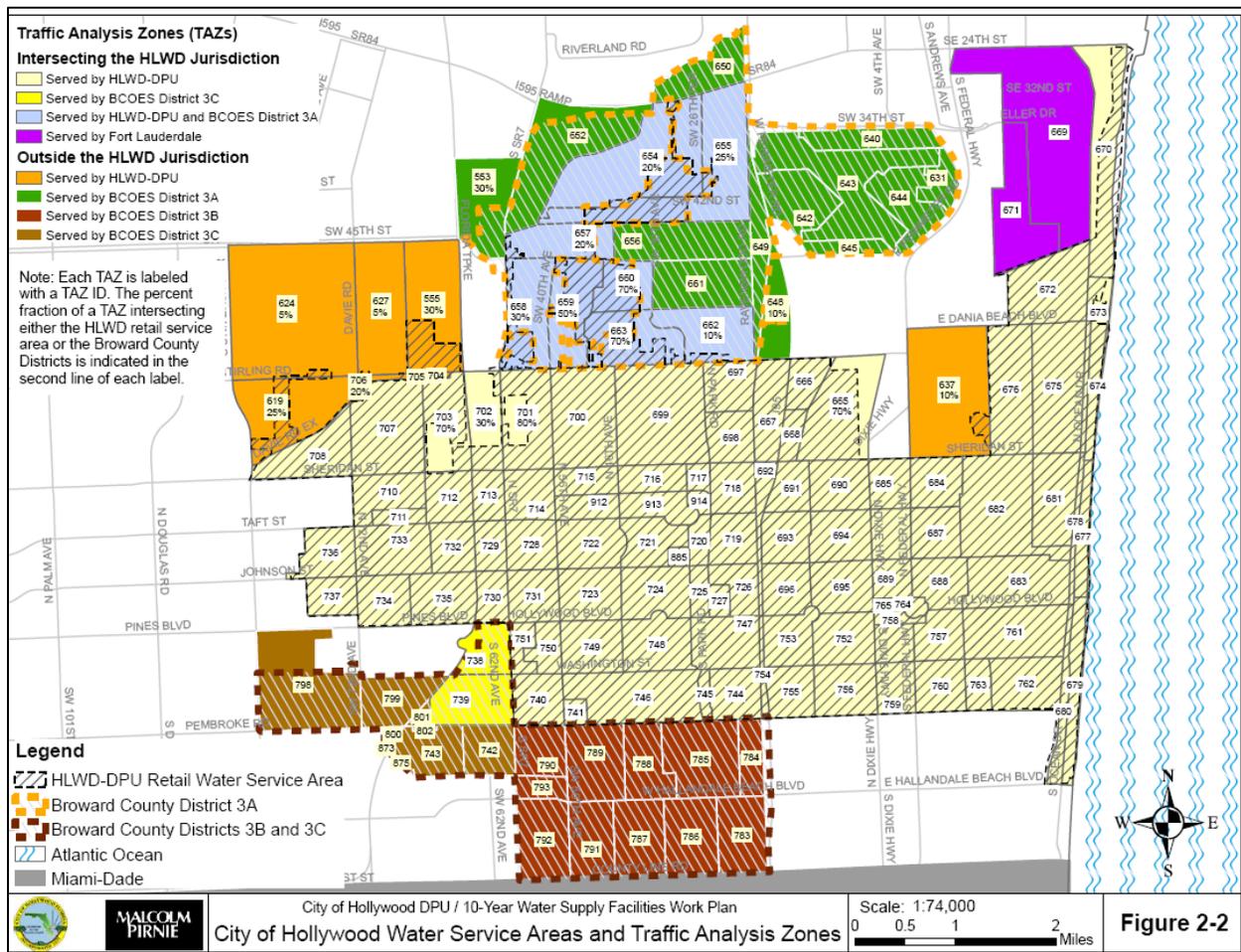


Figure 4.5: City of Hollywood Served Areas in District 3A,3B, 3C from 2008 WSP.

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 11.43 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 = 1185 GPCD		Level of Service = 120 GPCD				Avg Day Allocation = 9.2 MGD
		Max/ Avg Day Ratio = 1.3		Max/ Avg Day Ratio = 1.09			Treatment Surplus/ (Deficit) ¹ (MGD)	Avg Day Surplus/ (Deficit) ² (MGD)
		Average Day (MGD)	Maximum Day (MGD)	Average Day (MGD)	Maximum Day (MGD)	Average Month (MGM)		
2015	75,004,546	8.69	11.329	9.07	9.988	274.95.74	4.05.42	0.213
2020	76,428,889	9.08.73	11.535	9.211	10.09.93	279.86.99	3.85.37	0.09
2025	78,125,950	9.28.96	11.865	9.435	10.20	286.04.52	3.5.10	(0.2)(0.15)
2030	82,455,923	9.754	12.40	9.95	10.85	300.82.67	2.94.45	(0.75)
2035	83,715,116	9.967	12.658	10.4009	11.00	306.57.02	2.74.30	(0.9)(0.89)
2040	85,029,826	10.09.75	12.868	10.218	11.210	341.309.61	2.54.20	(1.0)(0.98)

Notes:

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

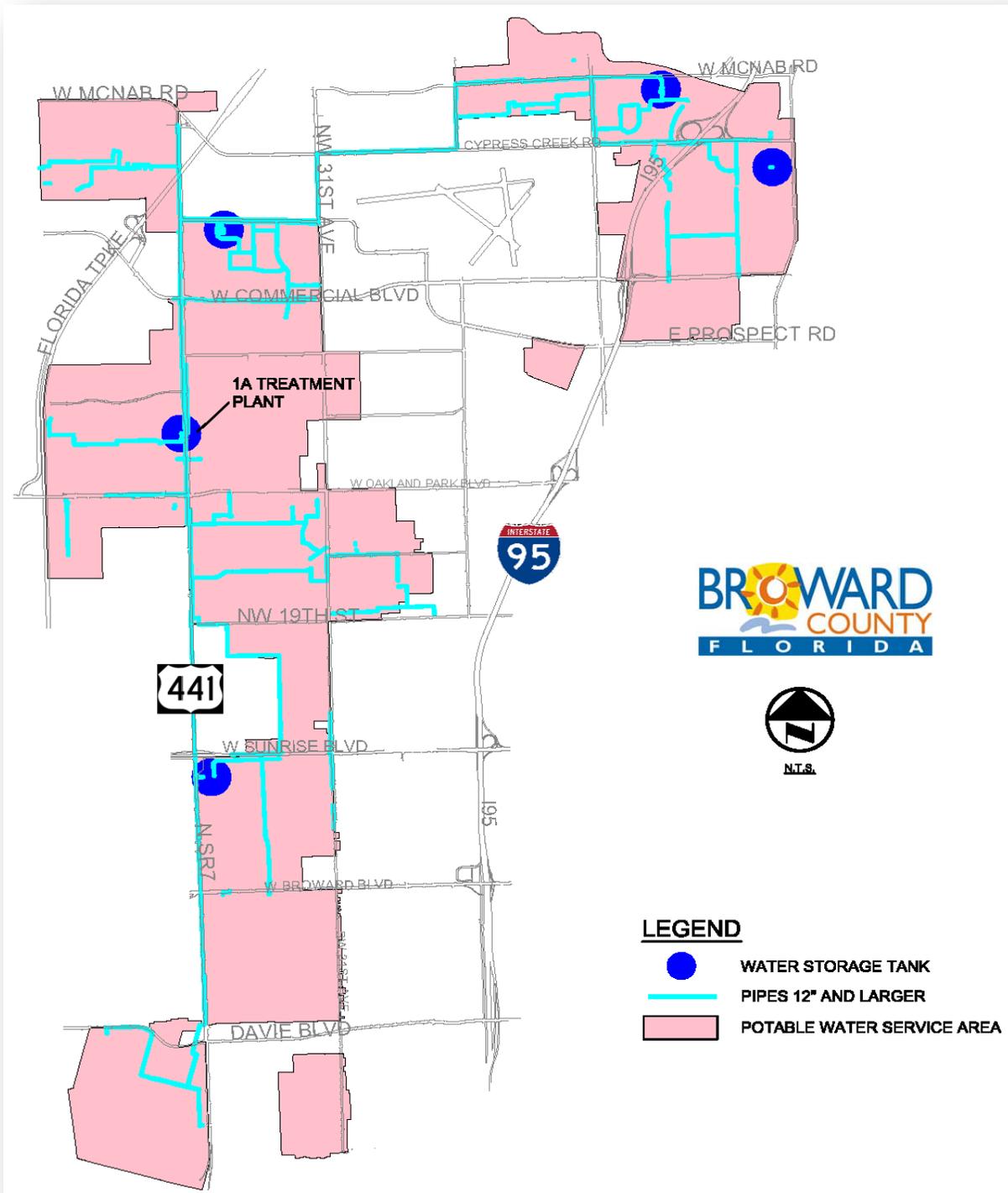


Figure 4.6: District 1 Service Area

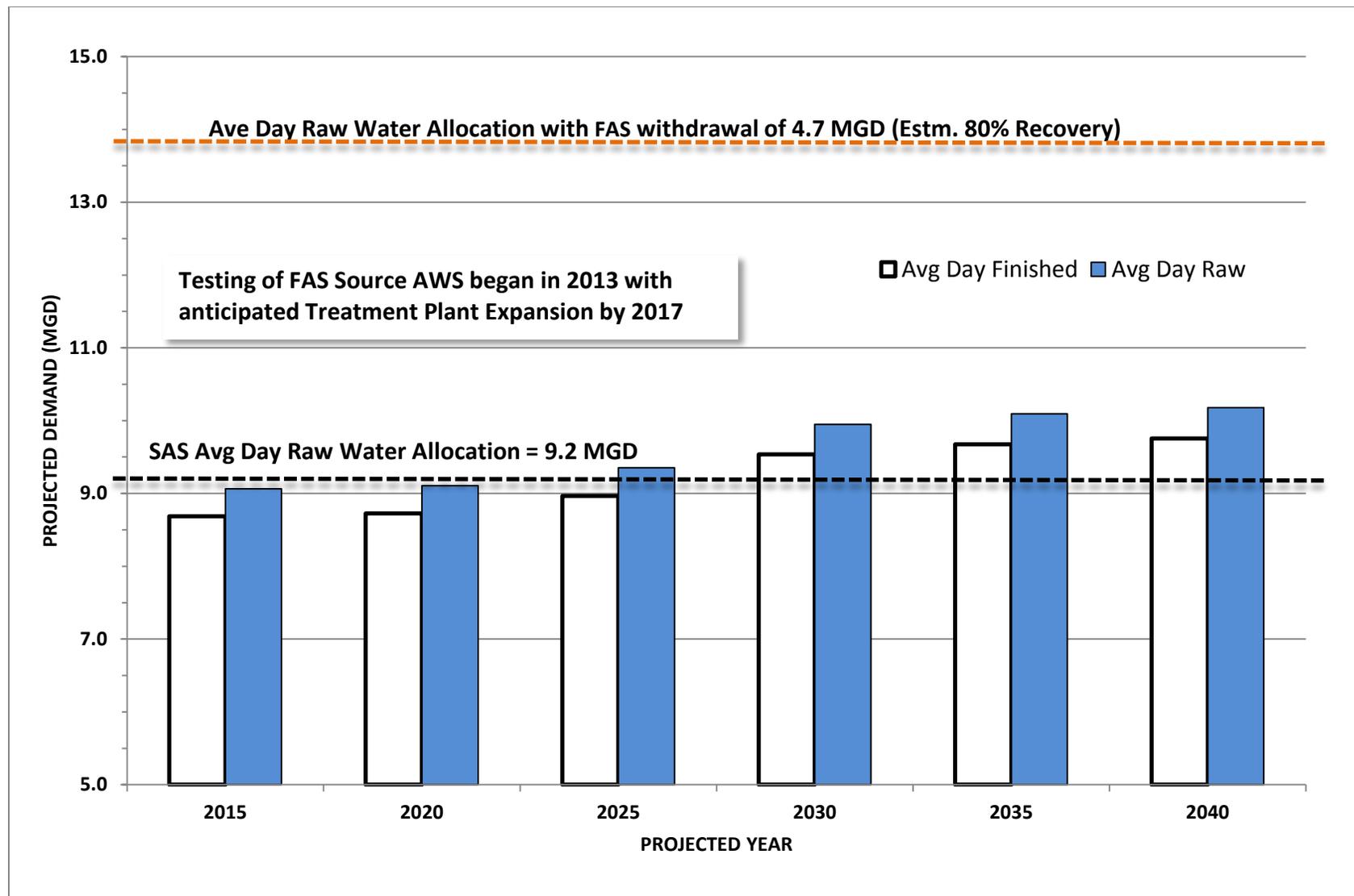


Figure 4.7: District 1 Finished and Raw Water Projected Demands vs. Allocations

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.



N.T.S.

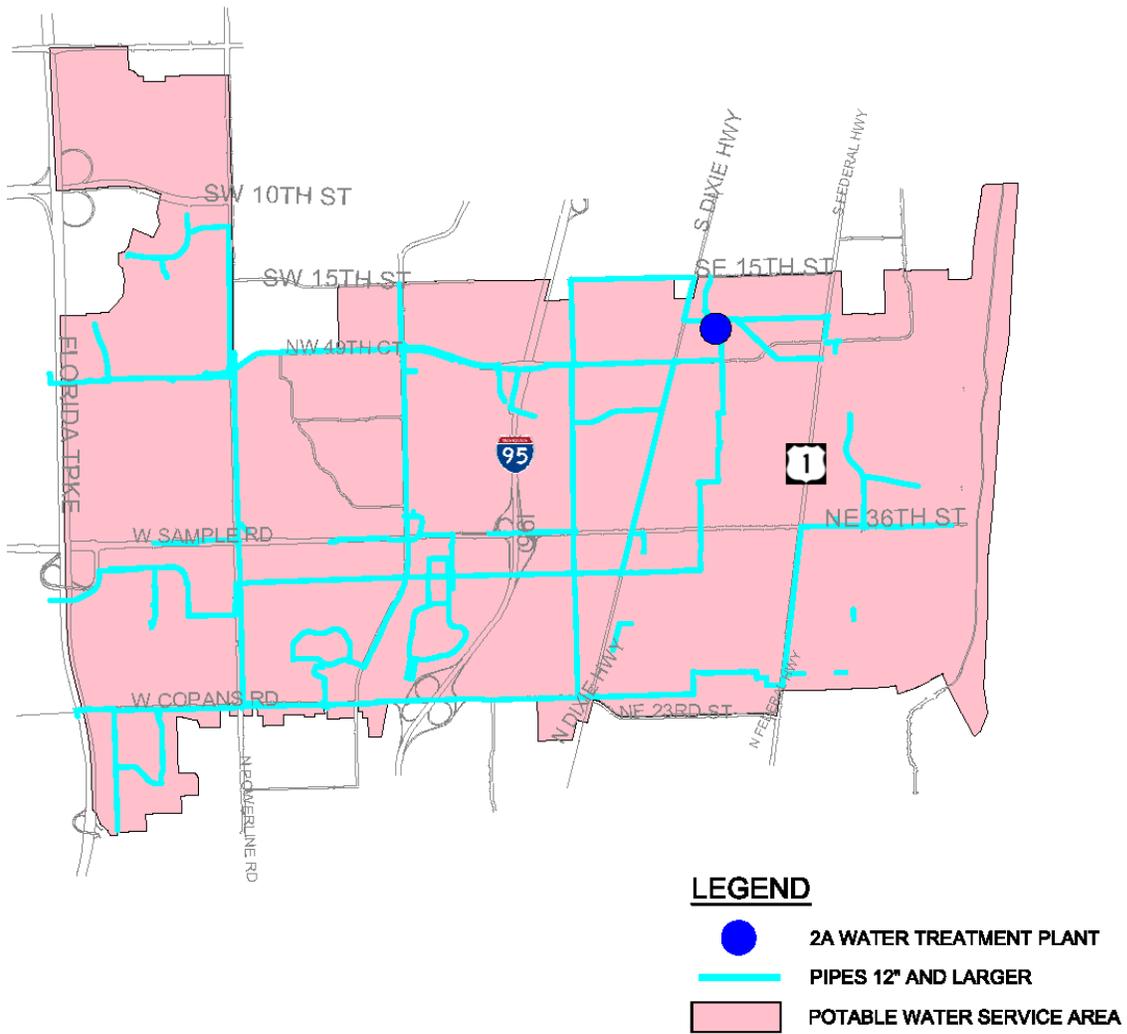


Figure 4.8: District 2 Service Area

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			Treatment Surplus/ (Deficit) ¹ (MGD)	Avg Day Surplus/ (Deficit) ₂ (MGD)
		Average Day (MGD)	Maximum Day (MGD)	Average Day (MGD)	Maximum Day (MGD)	Average Month (MGM)		
2015	110,173 111,496	13.4 27	16.8 17.25	13.7 83	17.2 15.21	415.5 420.53	135.09	3.8 67
2020	115,747 116,272	13.8 4	17.6 99	14.4 2	18.4 15.86	436.6 438.54	12.7 4 44	3.4 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	465.4 465.43	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 42
2040	125,506 125,506	14.9 4	19.4 42	15.6 56	19.9 17.12	473.4 473.37	11.2 13.18	1.9 4

Notes:

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

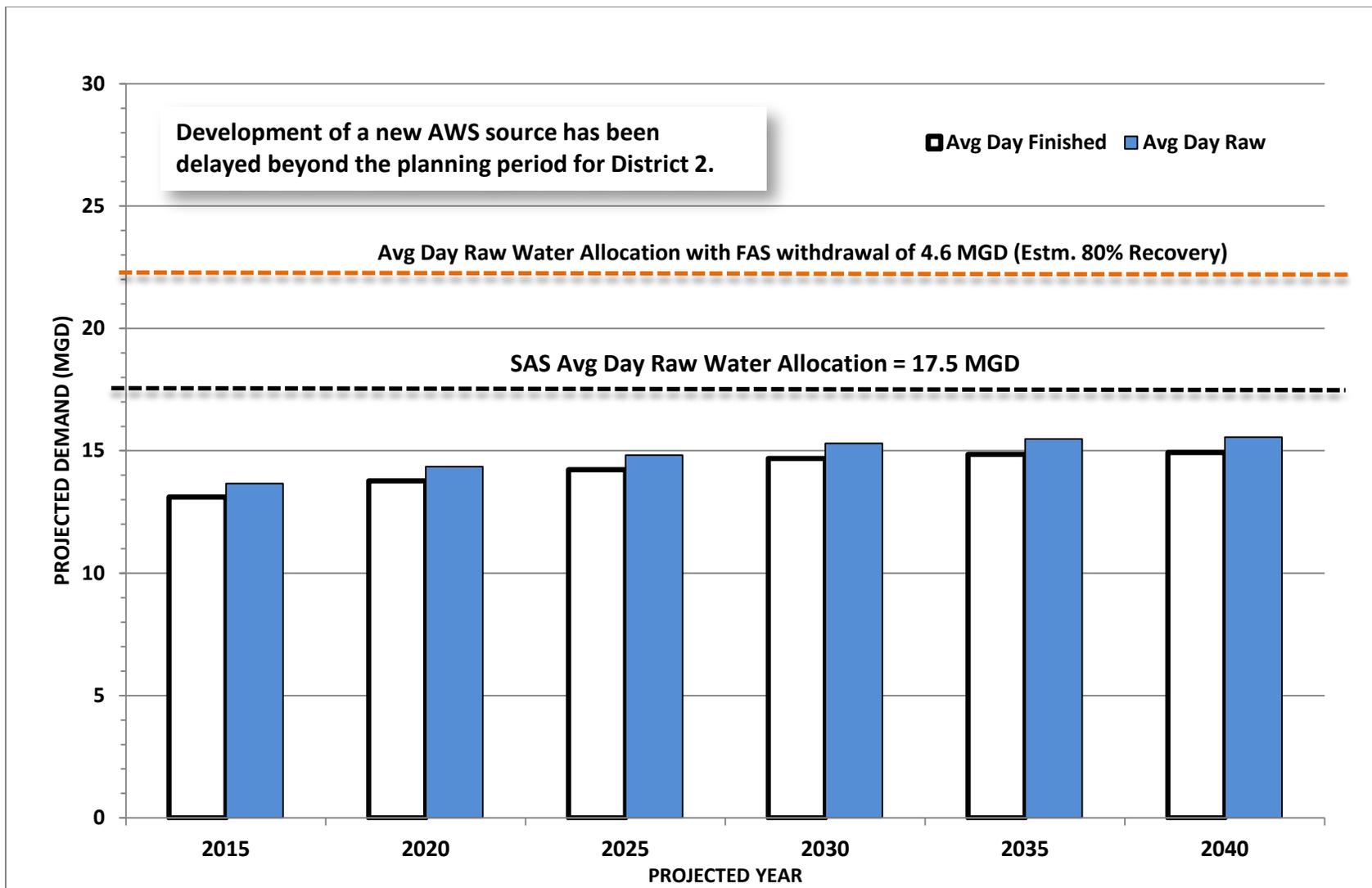


Figure 4.9: District 2 Finished and Raw Water Projected Demands vs. Allocations

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.

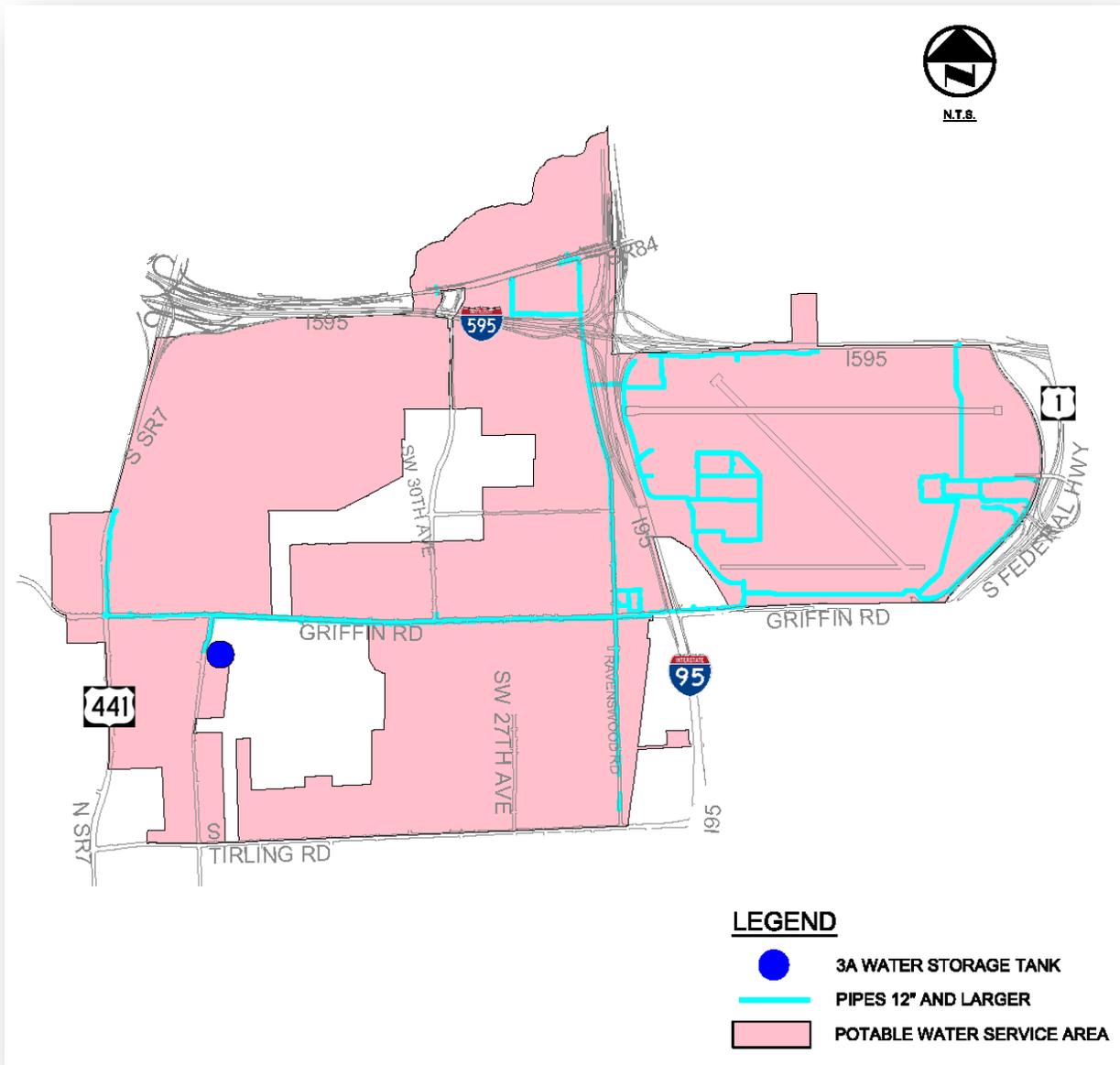


Figure 4.10: District 3A Service Area

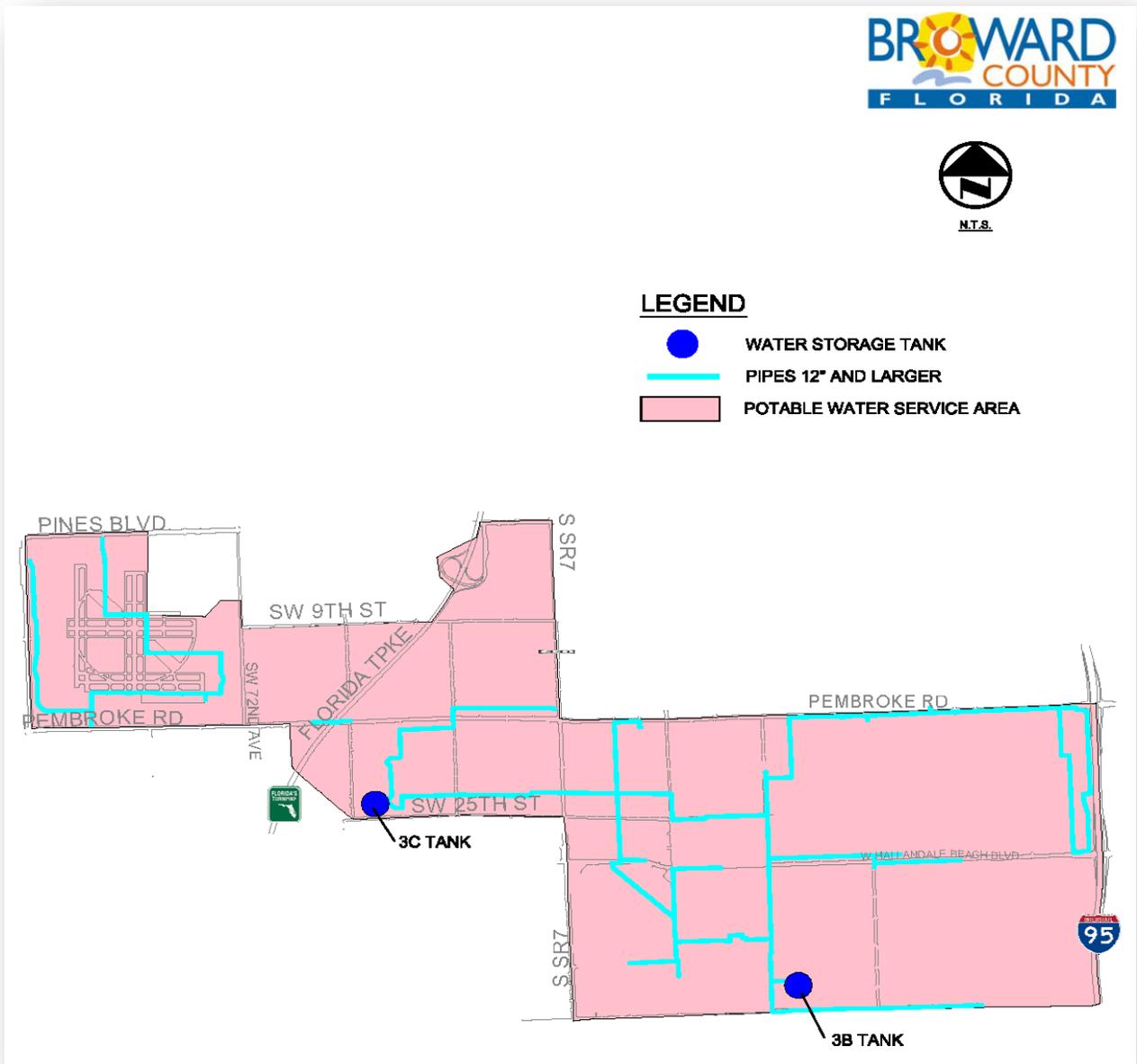


Figure 4.11: District 3BC Service Area

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

Planning Year	Dist. 3A Pop. ¹ (UAZ Estm)	3A Finished Water		Dist. 3B Pop. ¹ (UAZ Estm)	3BC Finished Water		Total Dist. 3 Pop. ¹ (UAZ Estm)	3A & 3BC Finished Water	
		Level of Service 197 GPCD ¹			Level of Service 103 GPCD ¹			Average Day (MGD)	Maximum Day (MGD)
		Max/ Avg Day Ratio 1.4 ²			Max/ Avg Day Ratio 1.5 ²				
Average Day (MGD)	Maximum Day (MGD)	Average Day (MGD)	Maximum Day (MGD)	Average Day (MGD)	Maximum Day (MGD)	Average Day (MGD)	Maximum Day (MGD)		
2015	16,384 <u>16,384</u> 298 <u>298</u>	<u>3.21</u>	<u>4.40</u>	32,902 <u>32,902</u> 852 <u>852</u>	<u>3.438</u>	<u>4.94</u>	49,286 <u>49,286</u> 150 <u>150</u>	<u>6.659</u>	<u>9.434</u>
2020	16,960 <u>16,960</u> 17,014 <u>17,014</u>	<u>3.35</u>	<u>4.659</u>	33,660 <u>33,660</u> 706 <u>706</u>	<u>3.547</u>	<u>5.407</u>	50,620 <u>50,620</u> 720 <u>720</u>	<u>6.82</u>	<u>9.666</u>
2025	17,451 <u>17,451</u> 442 <u>442</u>	<u>3.44</u>	<u>4.71</u>	34,075 <u>34,075</u> 3825 <u>3825</u>	<u>3.548</u>	<u>5.409</u>	51,526 <u>51,526</u> 267 <u>267</u>	<u>6.92</u>	<u>9.879</u>
2030	17,758 <u>17,758</u> 963 <u>963</u>	<u>3.54</u>	<u>4.85</u>	35,594 <u>35,594</u> 763 <u>763</u>	<u>3.768</u>	<u>5.438</u>	53,556 <u>53,556</u> 725 <u>725</u>	<u>7.22</u>	<u>10.23</u>
2035	17,962 <u>17,962</u> 228 <u>228</u>	<u>3.53</u>	<u>4.984</u>	36,309 <u>36,309</u> 285 <u>285</u>	<u>3.74</u>	<u>5.546</u>	54,322 <u>54,322</u> 213 <u>213</u>	<u>7.327</u>	<u>10.30</u>
2040	18,013 <u>18,013</u> 17,827 <u>17,827</u>	<u>3.651</u>	<u>4.981</u>	36,878 <u>36,878</u> 640 <u>640</u>	<u>3.877</u>	<u>5.551</u>	54,897 <u>54,897</u> 464 <u>464</u>	<u>7.329</u>	<u>10.432</u>

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 reuse 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 NRWTP. (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

CAPITAL IMPROVEMENTS ELEMENT

**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	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	0	400,000	PWE Obj. 4.2		
Sanitary Systems Improvements	B	1,326,348	550,000	1,3	0	0	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	0	11,187,000			
Service Area Infrastructure Improvements 314 pipe replacement	A,B	135,521	3,057,500	1,3	0	0	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	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	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	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	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	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	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	0	38,376,990	PWE Obj. 4.2		
Water Treatment Plant 2A Treatment Expansion	C	0	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	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	0	71,000,000	SSE Obj. 5.1		
NRWWTP** Disposal System - Reclaimed Water	C	0	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	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	0	0	339,870	SSE Obj. 5.1		
NRWWTP** Emergency Power System	A	0	0	0	0	0	3,700,000	1,3	0	0	3,700,000			
NRWWTP** Energy Project Measurement and Verification	A	0	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 Treatment 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 eCounty'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 2048~~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 4.2.24. 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 4.2.46. 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 4.2.57. ~~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-pPlan 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 4.2.57. ~~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-pPlan 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 4.2.810. 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 eCounty'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 4.2.1012. 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 4.4.38. 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, ~~County-wide~~ landscape irrigation restrictions.

Policy 4.4.49. ~~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 4.4.611. 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 4.4.712. 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 4.4.813. 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 4.4.1016. 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 4.4.1217. 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 provide the ~~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 sSurficial aAquifer sSystem (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 sSurficial aAquifer sSystem (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 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 13.35. 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: ~~14132~~ gallons per capita per day for District 1; ~~and 15240~~ gallons per day for District 2A; ~~255~~ gallons per capita per day for District 3A; and ~~417~~ gallons per day for District 3B.

Policy 13.35.1. 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 13.35.34. 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 13.35.45. 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 13.35.56. 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 13.35.67. 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 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 13.35.78. 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 13.35.810- 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 13.35.911. 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 landscape irrigation, aquifer recharge, and environmental enhancement where technically, environmentally, and economically feasible.

Policy 13.35.1012. 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 13.35.1413. 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 13.35.1414. 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 Floridan 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 13.35.1415. 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 13.35.1416. 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 13.35.1417. 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 13.35.1418. 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 13.35.1719. 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 15.3.27. 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, rail, 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
FDH	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 A

Broward County Population Projections by Water and Wastewater Service District

Broward County Water and Wastewater Services (BCWWS) provides finished water to multiple municipalities within three service areas known as District 1, District 2, and District 3.

- **District 1** service area contains: all of Lauderdale Lakes and portions of the cities of Fort Lauderdale, Lauderdale Hill, 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.

The Broward County Planning and Redevelopment Division (BC PRD) is responsible for providing updated population forecasts throughout the County. The 2014 Broward County Traffic Analysis Zones (TAZs) and Municipal Forecasts Update is a demographic forecast model that was utilized to proportion the populations of each municipality served by BCWWS. See link at [Broward County Demographics Analysis](#).

A visual review of GIS map overlays showing BCWWS district service areas, municipal and TAZ boundaries were used to adjust the percentage of any partial TAZs included in each district by municipality. This resulted in an estimated total population within the BCWWS served area by municipality out to the year 2040 that approximates the BCWWS service area in the total populations within 2 percent of the BCWWS Master Plan numbers (2014) which are those included in the 2014 Broward County Water Supply Facility Work Plan.

See the District populations in the following three (3) service area tables, below.

DISTRICT 1 SERVICE AREA

Municipalities Served	2010	2015	2020	2025	2030	2035	2040
Fort Lauderdale	7,022	7,099	7,457	7,950	8,047	8,017	8,012
Lauderdale Lakes	31,346	31,944	32,133	31,924	34,030	34,583	34,728
Lauderhill	8,421	8,319	8,276	8,167	10,192	10,796	11,463
North Lauderdale	6,454	6,482	6,407	7,718	8,035	8,193	8,263
Oakland Park	12,102	12,079	12,166	12,139	12,581	12,645	12,674
Plantation	597	602	601	616	630	625	622
Pompano Beach	453	468	508	523	569	577	594
Tamarac	2,100	2,172	2,208	2,306	2,356	2,483	2,590
Unincorporated	6,921	6,923	6,918	7,640	7,804	7,783	7,727

DISTRICT 2 SERVICE AREA

Municipalities Served	2010	2015	2020	2025	2030	2035	2040
Coconut Creek	53,494	55,240	60,473	63,974	66,534	67,706	68,347
Deerfield Beach	22,515	22,890	22,806	22,687	23,259	23,207	23,070
Lighthouse Point	10,229	10,392	10,284	10,171	10,345	10,360	10,340
Pompano Beach	22,942	22,952	22,690	23,305	24,026	24,100	24,085
County Regional Facility	0	0	0	0	77	99	128

DISTRICT 3A & 3B SERVICE AREA

Municipalities Served	2010	2015	2020	2025	2030	2035	2040
Dania Beach	14,780	15,339	16,119	16,648	17,153	17,208	17,197
Davie	310	325	324	321	320	318	316
Fort Lauderdale	526	548	538	533	643	678	707
Fort Lauderdale-Hollywood International Airport	0	0	0	0	0	0	0
Hollywood	4,518	4,615	4,877	4,990	5,104	5,104	5,074
Miramar	5,258	5,161	5,089	5,012	5,865	6,118	6,417
Pembroke Park	6,028	6,231	6,345	6,245	6,795	6,955	7,031
Pembroke Pines	2,799	2,751	2,709	2,669	2,659	2,723	2,789
West Park	14,082	14,309	15,061	15,163	15,595	15,635	15,578



Appendix D

FILE

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PUBLIC WORKS DEPT.

**FIRST AMENDMENT
TO
AGREEMENT BETWEEN THE CITY OF FORT LAUDERDALE AND THE CITY
OF OAKLAND PARK**

This First Amendment serves to amend and modify that certain Agreement dated January 5, 1994 ("Agreement") and entered into between the **City of Fort Lauderdale, a municipal corporation** ("Fort Lauderdale") and **City of Oakland Park, a municipal corporation** ("Oakland Park").

WHEREAS, the Agreement dated on January 5, 1994 between Fort Lauderdale and Oakland Park addressed the service of potable water by Fort Lauderdale to Oakland Park for a term of thirty (30) years;

WHEREAS, a portion of the service area identified in the Agreement was the unincorporated residential neighborhood of North Andrews Gardens;

WHEREAS, Broward County has committed to upgrade the water distribution system in North Andrews Gardens as part of a Neighborhood Improvement Project which included sewer lines and other improvements; and

WHEREAS, as a condition of the annexation agreement, the City of Oakland Park will no longer provide potable water to North Andrews Gardens, but Broward County, upon completion of water service improvements and certification from the Florida State Department of Health, will be responsible for the delivery of potable water into that area;

WHEREAS, the resultant effect of the annexation and the transfer of water service from Oakland Park to Broward County is that the service area governed by the Agreement dated January 5, 1994 has been reduced;

WHEREAS, this Amendment is necessary to accurately reflect the service area subject to the terms and provisions of the Agreement;

WHEREAS, Fort Lauderdale and Oakland Park desire to amend certain terms and provisions of the Agreement to accurately reflect the service area.

NOW THEREFORE, in consideration of the foregoing premises, mutual covenants and conditions herein contained, the parties hereto agree as follows:

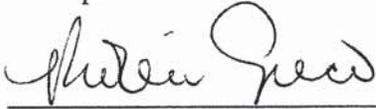
1. Section 2 of the Agreement dated January 5, 1994 is hereby amended to modify the service area as previously reflected on Exhibit "A". Specifically, a new exhibit, attached hereto and made a part hereof, identified as "A-1" is substituted for Exhibit "A"
2. All of the terms and provisions of the Agreement, not otherwise amended or modified hereby, are ratified and confirmed and shall remain in full force and effect.

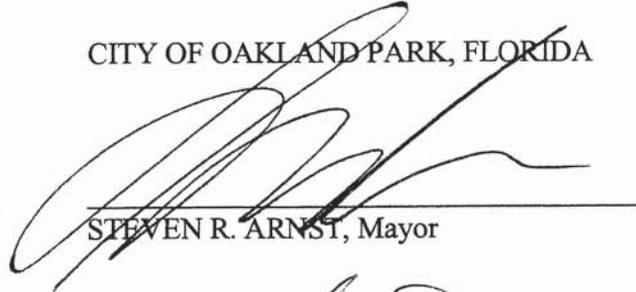
3. In the event of any conflict between the terms and provision of the Agreement and this First Amendment, the terms and provisions of this First Amendment shall control and prevail.

IN WITNESS OF THE FOREGOING, the parties have set their hands and seals the day and year first written above.

Signed, sealed and witnessed
in the presence of:

CITY OF OAKLAND PARK, FLORIDA





STEVEN R. ARNST, Mayor

Robin GRECO

Print Name





JOHN STUNSON, City Manager

Sandra E. Williams

Print Name

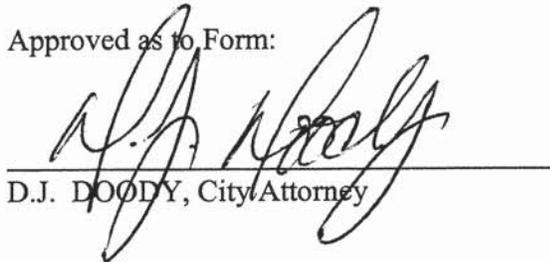
(SEAL)

Attest:



NANCY BALL RICHTER, City Clerk

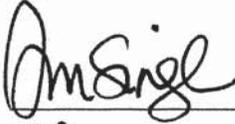
Approved as to Form:



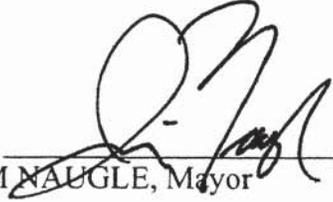
D.J. DOODY, City Attorney

WITNESSES:

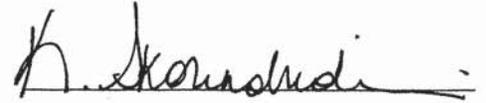
CITY OF FORT LAUDERDALE,
a municipal corporation.



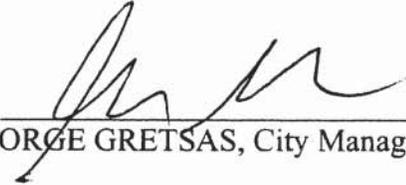
Maxine-A. SINGH
Print Name

By 

JIM NAUGLE, Mayor



Katerina Skouridakis
Print Name

By 

GEORGE GRETSAS, City Manager

(SEAL)

ATTEST:



JONDA K. JOSEPH, City Clerk

Approved as to form:



VICTORIA F. MINARD
Assistant City Attorney

CITY OF OAKLAND PARK

BOUNDARY DESCRIPTION FOR WATER SERVICE AREA

The areas to be serviced by the Consumer are situated in Broward County, Florida, and are described as follows: Begin at the intersection of the west right-of-way line of U.S. Highway #1 (Federal Highway) and the north right-of-way line of Oakland Park Blvd. (N.E.31st Street); thence go westerly along said north right-of-way line to the east line of Section 23, T49S, R42E; thence southerly along said east line and along the east line of Section 26, T49S, R42E to the center line of North Fork Middle River; thence meander westerly along said center line to the east right-of-way line of N.E.6th Avenue; thence northerly along said line to the northerly extension intersection with the north line section 26, T49S, R42E; thence westerly along the north section lines of Sections 26, 27, 28, T49S, R42E; to the intersection with the west right-of-way line of the Department of Transportation's CSX Railroad; thence southwestwardly along said line to the intersection with the south line of the N.W. 1/4 of Section 28, T49S, R42E, thence westerly along said south line to the intersection with the west line of section 28, T49S, R42E; thence north along said line to the intersection with the easterly projection of the south lot line of Lot 1, Block A, Ziladen Properties Misc. Tax-Appraiser's Map P.B. 2/Pg. 20, of the Public Records of Broward County, Florida; thence westerly to the N.E. corner of Lot 6, Block E, Ziladen Properties Map, P.B. 2/Pg. 20, of the Public Records of Broward County, Florida; thence south to N.E. corner of Lot 3, Block E, Ziladen Map; thence westerly to the N.W. corner of Lot 1, Block E, Ziladen Map, thence southerly to the intersection of the easterly extension of the north line of Lot 5, Block 4, Lake Tahoe Estates P.B. 57/Pg. 37, of the Public Records of Broward County, Florida; thence westerly along the extension of the north property line of Lot 5 to the N.E. corner of Lot

"Exhibit "A-1"

5; thence continue westerly along said line to the N.E. corner of Lot 1, Block 4 of said plat; thence southerly along the east property line to the north right-of-way of N.W. 26th Street; thence westerly to the west right-of-way line of N.W. 26th Avenue; thence continue west along the north right-of-way line of N.W. 26th Street to the intersection with the southerly extension of the west plat line, Lake Tahoe Estates; thence north along the southerly extension of the west plat line of Lake Tahoe Estates to the S.W. corner of Lot 1, Block 5, Lake Tahoe Estates; thence north along the west plat line of said plat to the N.W. corner of Lot 13, Block 1 of said plat; thence westerly along the extension of the south plat line of Carpenter's Plat, P.B. 85/Pg. 17, of the Public Records of Broward County, Florida, to the S.E. corner of Lot 20, Block 1, Orange Grove Manors P.B.50/Pg.30, of the Public Records of Broward County, Florida; thence northerly along the east plat line of said plat or east right-of-way line of N.W. 29th Avenue to the intersection of the projection of said line with the north right-of-way line of West Oakland Park Blvd.; thence westerly along said right-of-way to the S.W. corner of Strok Plat 2, P.B. 147/Pg. 22, of the Public Records of Broward County, Florida; thence northerly along west plat line to the N.W. corner of said plat thence easterly along said plat line to the intersection with the west plat line of Oakland Grove Commerce Park P. B.142/Pg. 23, of the Public Records of Broward County, Florida; thence northerly along said west plat line to the N.W. corner of Forest Commercial Center P.B. 142/Pg. 24, of the Public Records of Broward County, Florida; thence easterly along the north plat line to the intersection of west section line of Section 20, T49S, R42E; thence continue easterly along the south right-of-way line of Mid River Canal approximately 1315 feet; thence northerly across the C-13 canal right-of-way to the west right-of-way line of N.W. 29th Avenue; thence northerly along said line to the intersection with the south right-of-

way line of N.W. 44th Street; thence westerly along said line to the N.E. corner of Lake Pointe Plaza P.B. 128/Pg. 37, of the Public Records of Broward County, Florida; thence southerly along the east plat line to the S.E. corner of said plat; thence westerly to the S.W. corner of said plat; thence northerly along the west plat line and it's extension to the S.W. corner of M & S Properties plat P.B. 98/Pg. 29, of the Public Records of Broward County, Florida; thence northerly along said plat line to the N.W. corner of said plat; thence easterly along the north line of said plat to the N.E. corner of said plat; thence southerly along the east plat line to a point on the south section line of section 17, T49S, R42E, which is 1337 feet east of the S.W. corner of same section; thence easterly along the south line of section 17, T49S, R42E to the S.E. corner of the Section 17, T49S, R42E; thence northerly along the east line of said section to the extension of the south right-of-way line of Prospect Road; thence southeasterly along said right-of-way line to the east line of the S.W. 1/4 of section 16, T49S, R42E; thence southerly along said east line to the north line of section 21, T49S, R42E; thence westerly along said north line to the east line of the west 1/2 of the east 1/2 of the northeast 1/4 of the northwest 1/4 of Section 21, T49S, R42E,(being the same as the N.E. corner of Lot 34, Block 1, Tamarac Hills); thence southerly along said east line to the center line of the North Fork Middle River; thence meander southeasterly along said center line to the west right-of-way line of N. W.10 Avenue; thence northeasterly along said line to the S.E. corner of Twin Lakes Homes Parcel A, P.B. 47/Pg. 15, of the Public Records of Broward County, Florida; thence westerly along the south property line to the S.W. corner of said plat; thence northerly along said plat to the N.W. corner of said plat; thence easterly to the N.E. corner of said plat; thence northeasterly along the extension of the east property line of said plat to the intersection of the north section line of Section 21, T49S, R42E; thence

"Exhibit "A-1"

easterly to the N.E. corner of Section 21, T49S, R42E; thence northerly along the west section line of Section 15, T49S, R42E, to the intersection with the CSX Railroad east right-of-way Line; thence continue northerly along said right-of-way line to the northwest corner of Milbrand Industrial Park P.B. 54/Pg. 39, of the Public Records of Broward County, Florida; thence easterly and southerly along the plat line of said plat to the north right-of way line of Prospect Road; thence east along said line to the east right-of-way line of the I-95 expressway; thence north and easterly along said right-of-way line to the easterly right-of-way line of I-95 on Commercial Boulevard, thence southerly along said right-of-way line to the south right-of-way line of Commercial Boulevard, thence westerly along the south right-of-way line of Commercial Boulevard contiguous with the I-95 right-of-way line to the east right-of-way line of I-95, thence southerly, thence westerly, thence southwesterly along the I-95 right-of-way line to a point 110 feet south of the south right-of way line of N.W. 45 Street; thence easterly to the to the west right-of-way line of N.W. 3 Avenue; thence northerly along the west right-of-way line of N.W. 3 Avenue to the north right-of-way line of N.W. 45 Street; thence easterly along the north right-of-way line of N.W. 45 Street to the east right-of way line of N.E. 1 Terrace; thence southerly along the east right of way line of N.E. 1 Terrace to the northwest corner of Lot 11, Block 8, of said North Andrews Gardens Second Addition; thence easterly along the north line of said Lot 11, Block 8, to the northeast corner of said Lot 11, Block 8; thence south and west to the northwest corner of Lot 46, Block 9, North Andrews Gardens Second Addition; thence east along a line parallel with and 100 feet north of the north right-of-way line of N.E. 44 Street to the west right-of-way line of N.E. 5 Avenue; thence south along the west right-of-way line of N.E. 5 Avenue to a point 75 feet north of the north right-of way line of N.E. 44 Street; thence east parallel with and 75 feet north of the

north right-of-way line of N.E. 44 Street to the west line of the Seminole Warehouse Plat Addition, Plat Book 39, Page 32, Broward County Records; thence northerly along the west line of said Seminole Warehouse Plat Addition and Seminole Warehouse Plat, Plat Book 38, Page 8, of the Broward County Records, to the north line of Seminole Warehouse Plat Addition, Plat Book 39, Page 32 of the Broward County Records; thence easterly along the north line of the of Seminole Warehouse Plat Addition, Plat Book 39, Page 32 of the Broward County Records for 305.80 feet to the west right-of-way line of N.E. 6 Avenue; thence northerly to the north line of the S.E. ¼ of Section 15, T49S, R42E; thence continue easterly along the north line of the S.W. ¼ of Section 14, T49S, R42E to the centerline of Dixie Highway; thence northeasterly along said centerline to the intersection of the north line of the south 1/2 of the N.W. ¼ of section 14, T49S, R42E; thence easterly along said north line to the northwest corner of the south ½ of the N.E. 1/4 of Section 14, T49S, R42E, thence continue easterly along said line to the west plat line Parcel "D", Coral Ridge Isles P.B. 45/Pg. 47, of the Public Records of Broward County, Florida; thence southerly along said plat line of Parcel "D" to the north right-of-way line of N. E. 50th Court; thence easterly along said line to the intersection with the northerly extension of the east plat line of Commercial Blvd. Plaza, P.B. 88/Pg.12 of the Public Records of Broward County, Florida; thence southerly along the east plat line extension to its intersection with the south quarter section line of the N.E. 1/4 of Section 14, T49S, R42E; thence easterly along said quarter section line to the northerly projection of the center line of N.E. 17th Avenue; thence continue southerly along said projected center line to the projected north right-of-way line of N.E. 48 Court; thence continue easterly along said line to the east line of Section 14, T49S, R42E; thence southerly along said line to the extension of the north right-of-way line of N.E. 45th Street; thence

"Exhibit "A-1"

easterly along said line to the west right-of-way line of U.S. Highway One (Federal Highway); thence southerly along said line to the north right-of-way line of Oakland Park Blvd. being the point of beginning.

LESS: Commencing at the intersection of the west right-of-way line of N.W. 9th Avenue and the south right-of-way line of N.W. 44th Street; thence southerly along said west line to the intersection with the west right-of-way line of I-95; thence southwesterly along said line to a point approximately 275 feet north of the north right-of-way line of N.W. 38 street; thence westerly to the east right-of-way line of the CSX railroad; thence northeasterly along said line to its intersection with the extension of a line 44 feet north and parallel to the south lot line of Lot 27A, Twin Lakes Section 2, P.B. 30/Pg. 1, of the Public Records of Broward County, Florida; thence westerly along said line to the east right-of-way line of N.W. 10th Avenue; thence northerly 200 feet to a point; thence easterly along a line parallel to the north lot line of Lot 27 of said plat to the east right-of-way line of the CSX Railroad; thence north along said right-of-way to the south right-of-way line of N.W. 44th street; thence east along said line to the west right of-way line of N.W. 9th Avenue being the point of beginning. Said property being the City of Ft. Lauderdale's Fiveash Water Plant Complex.

AGREEMENT

THIS AGREEMENT, made and entered into this 5th day
of January, 1993⁴ by and between:

CITY OF FORT LAUDERDALE, a municipal
corporation of the State of Florida,
herein called the "Seller",

and

CITY OF OAKLAND PARK, a municipal
corporation of the State of Florida,
herein called the "Consumer".

Pursuant to Resolution No. 93-214, adopted at its meeting
of December 21, 1993, the City Commission of the City of Fort
Lauderdale authorized the proper officials of Seller to enter into
this Agreement.

Pursuant to Resolution No. 93-154, adopted at its meeting
of December 1, 1993, the City Council of the City of Oakland Park
authorized the proper officials of Consumer to enter into this
Agreement.

Seller and Consumer entered into a 30-year agreement in
1963 for the provision of potable water from Seller to Consumer.

The Agreement was amended in 1965 and in 1988 to modify
the service area.

The parties hereto desire to continue the relationship
experienced for those 30 years.

The Seller in its proprietary capacity owns and operates a
municipal public water supply and is in a position to continue to
provide service to the Consumer.

The Consumer in its proprietary capacity owns and operates
a water distribution system, and Consumer desires to continue to
purchase water from Seller to service Consumer's customers upon
terms mutually agreeable.

In consideration of the mutual promises, covenants and
agreements, and other good and valuable consideration, the receipt
and adequacy of which are hereby acknowledged, the parties agree as
follows:

1. Beginning October 30, 1993, and continuing for a period of
thirty (30) years thereafter, the Seller agrees to sell to the
Consumer and the Consumer agrees to buy from the Seller potable
water for resale to the citizens and customers of the Consumer,
under the terms and conditions set forth herein. The Utilities
Directors of Consumer and Seller, or their designees, shall confer

6. The Seller shall not be required during periods of water shortage resulting from an emergency condition declared by any governmental entity with jurisdiction or resulting from an inadequacy of mains or other facilities, to do more than deliver water to Consumer's master meters in such quantities as are available for allocation by the Seller among all its consumers. In the event it should become necessary for the Seller to adopt regulations for conservation of water in case of emergency, the Consumer agrees that it will adopt and enforce similar regulations for conservation of water during such time of emergency.

7. There shall be one (1) or more master meters located at points mutually agreeable, through which all water supplied to customers of Consumer shall be supplied, and all water furnished by Seller shall be metered through such meters. Such meters shall be supplied and installed by the Seller at the expense of the Consumer as provided in Chapter 28 of the Code of Ordinances of the City of Fort Lauderdale. After installation, the Seller shall, at its own expense, maintain the meters. Title to the meters shall remain in the Seller. All master meters shall be tested annually by and at the expense of the Seller. All master meters shall be adjusted to the registration accuracy as specified in the American Water Works Association Standard for Cold Water Meters. The date and time of the test shall be coordinated with Consumer to allow Consumer to witness the test whenever possible. In addition to the annual test, the Consumer may at any time request that Seller conduct an additional test or that Seller arrange for such test by an independent qualified testing company. The request shall be made in writing and the date and time of the test shall be coordinated with Consumer to allow Consumer to witness the test whenever possible. If such test shows that the master meter has been over-registering by more than two percent (2%), there will be no charge for such test and the previous bill rendered based on the last reading of that master meter shall be adjusted accordingly. If such test shows that the master meter has not been over-registering by more than two percent (2%), the cost of such test shall be charged to Consumer. If such test shows that the master meter has been under-registering by more than two percent (2%), the previous bill rendered based on the last reading of that master meter shall be adjusted accordingly.

8. The Consumer shall be bound by the provisions of Chapter 28 of the Code of Ordinances of the City of Fort Lauderdale, now existing or as amended from time to time, insofar as same are applicable, as well as all applicable ordinances of the City of Fort Lauderdale now existing or hereafter adopted pertaining to water service and water regulations.

9. The water rates to be charged by the Seller to the Consumer shall be the rate provided to be charged to municipalities, political subdivisions and privately-owned utilities under the provisions of Section 28-143 of the Code of Ordinances of the City of Fort Lauderdale. It is the intention of the parties that the Seller shall not discriminate against the Consumer, vis-a-vis, the

consumers within the limits of the City of Fort Lauderdale. Any rate increases to Consumer during the life of this Agreement shall be based on increases in the cost of providing water to Consumer and others similarly situated.

10. The Seller shall render monthly or bimonthly statements for water furnished and the Consumer shall pay promptly all statements furnished. Should the Consumer fail or refuse to pay the amount of such statement within thirty (30) days after same has been submitted, the Seller shall have the right to enforce the provisions of Chapter 28 of the Code of Ordinances of the City of Fort Lauderdale providing for discontinuance of service until past due indebtedness is paid and any other legal remedies available to Seller.

11. Consumer and Seller shall cooperate in obtaining from or providing to the appropriate regulatory agencies such permits or other data as may be required for the performance of this Agreement. Consumer shall furnish to Seller plans and specifications of the existing water distribution system of Consumer and from time to time furnish copies of plans and specifications of any additions to or extension of Consumer's water distribution system.

12. To the extent provided by law, Consumer and Seller agree to indemnify and hold harmless each other from all costs, losses and expenses, including, but not limited to, damages to persons or property, judgments and attorneys' fees, arising out of and in connection with this Agreement.

13. The Seller shall have the right to install feeder mains, and necessary booster pumps and storage facilities in the existing City limits of Consumer and in any future incorporated areas. The Seller shall have the right to repair and replace such aforementioned mains, pumps and storage facilities, with the understanding that the Seller shall replace, repair or otherwise return the paving and right-of-way to its original condition when these installations and repairs are made. All such work shall comply with all applicable regulations of Consumer. All operational and maintenance expenses of such installations shall be the responsibility of the Seller.

14. This Agreement supersedes the previous agreements between the parties of August 16, 1955, March 7, 1961 and October 29, 1963, as amended. This Agreement may not be amended, except by the mutual consent of the parties in writing executed with the same dignity as this Agreement.

15. This Agreement shall not become effective until a Resolution has been adopted by the governing bodies of Seller and Consumer approving this Agreement and authorizing its execution.

16. This Agreement shall be governed by the laws of the State of Florida. The parties waive the privilege of venue and agree that all litigation between them in the state courts shall take place in Broward County, Florida, and that all litigation between them in the federal courts shall take place in the United States District Court for the Southern District of Florida.

IN WITNESS OF THE FOREGOING, the parties have set their hands and seals the day and year first written above.

SELLER

WITNESSES:

CITY OF FORT LAUDERDALE

Ratsay H. Adams

By [Signature]
Mayor

Lorich O'Leary

By [Signature]
City Manager

(CORPORATE SEAL)

ATTEST:

[Signature]
City Clerk

Approved as to form:

[Signature]
City Attorney

CONSUMER

WITNESSES:

Sharon A. Montefurto

Denise Barnett

(CORPORATE SEAL)

CITY OF OAKLAND PARK

By Raymond J. [Signature]
Mayor

By Woodward M. [Signature]
City Manager

ATTEST:

Carol [Signature]
City Clerk

Approved as to form:

Ronald J. [Signature]
City Attorney

DF:lgeuser:OP
11/23/93

CITY OF OAKLAND PARK
BOUNDARY DESCRIPTION FOR WATER SERVICE AREA

The areas to be serviced by the Consumer are situated in Broward County, Florida, and are described as follows: Begin at the intersection of the west right-of-way line of U.S. Highway #1 (Federal Highway) and the north right-of-way line of Oakland Park Blvd. (N.E. 31st Street); thence go westerly along said north right-of-way line to the east line of Section 23, T49S, R42E; thence southerly along said east line and along the east line of Section 26, T49S, R42E to the center line of North Fork Middle River; thence meander westerly along said center line to the east right-of-way line of N.E. 6th Avenue; thence northerly along said line to the northerly extension intersection with the north line Section 26, T49S, R42E; thence westerly along the north section lines of Sections 26, 27, 28, T49S, R42E; to the intersection with the west right-of-way line of the Department of Transportation's CSX Railroad; thence southwestery along said line to the intersection with the south line of the N.W. 1/4 of Section 28, T49S, R42E, thence westerly along said south line to the intersection with the west line of Section 28, T49S, R42E; thence north along said line to the intersection with the easterly projection of the south lot line of Lot 1, Block A, Ziladen Properties Misc. Tax Appraiser's Map P.B. 2/Pg. 20, of the Public Records of Broward County, Florida; thence westerly to the N.E.

corner of Lot 6, Block E, Ziladen Properties Map, P.B. 2/Pg. 20, of the Public Records of Broward County, Florida; thence south to N.E. corner of Lot 3, Block E, Ziladen Map; thence westerly to the N.W. corner of Lot 1, Block E, Ziladen Map, thence southerly to the intersection of the easterly extension of the north line of Lot 5, Block 4, Lake Tahoe Estates P.B. 57/Pg. 37, of the Public Records of Broward County, Florida; thence westerly along the extension of the north property line of Lot 5 to the N.E. corner of Lot 5; thence continue westerly along said line to the N.E. corner of Lot 1, Block 4 of said plat; thence southerly along the east property line to the north right-of-way of N.W. 26th Street; thence westerly to the west right-of-way line of N.W. 26th Avenue; thence continue west along the north right-of-way line of N.W. 26th Street to the intersection with the southerly extension of the west plat line, Lake Tahoe Estates; thence north along the southerly extension of the west plat line of Lake Tahoe Estates to the S.W. corner of Lot 1, Block 5, Lake Tahoe Estates; thence north along the west plat line of said plat to the N.W. corner of Lot 13, Block 1 of said plat; thence westerly along the extension of the south plat line of Carpenter's Plat, P.B. 85/Pg. 17, of the Public Records of Broward County, Florida, to the S.E. corner of Lot 20, Block 1, Orange Grove Manors P.B. 50/Pg. 30, of the Public Records of Broward County, Florida; thence northerly along east plat line of said plat or east right-of-way line of N.W. 29th Avenue to the intersection of the projection of said line with the north right-of-way line of West Oakland Park Blvd.; thence westerly along said right-of-way to

the S.W. corner of Strok Plat 2, P.B. 147/Pg. 22, of the Public Records of Broward County, Florida; thence northerly along west plat line to the N.W. corner of said plat; thence easterly along plat line to the intersection with the west plat line of Oakland Grove Commerce Park P.B. 142/Pg. 23, of the Public Records of Broward County, Florida; thence northerly along west plat line to the N.W. corner of Forest Commercial Center P.B. 142/Pg. 24, of the Public Records of Broward County, Florida; thence easterly along north plat line to the intersection of west section line of Section 20, T49S, R42E; thence continue easterly along south right-of-way line of Mid River Canal approximately 1315 feet; thence northerly across the C-13 canal right-of-way to the west right-of-way line of N.W. 29th Avenue; thence northerly along said line to the intersection with the south right-of-way line of N.W. 44th Street; thence westerly along said line to the N.E. corner of Lake Pointe Plaza P.B. 128/Pg. 37, of the Public Records of Broward County, Florida; thence southerly along east plat line to the S.E. corner of said plat; thence westerly to the S.W. corner of said plat; thence northerly along west plat line and it's extension to the S.W. corner of M & S Properties plat P.B. 98/Pg. 29, of the Public Records of Broward County, Florida; thence northerly along said plat line to the N.W. corner of said plat; thence easterly along plat line to the N.E. corner of said plat; thence southerly along plat line to a point on the south section line of Section 17, T49S, R42E, which is 1337 feet east of the S.W. corner of same section; thence easterly along south line of Section 17, T49S, R42E to the

S.E. corner of the Section 17, T49S, R42E; thence northerly along section line to the extension of the south right-of-way line of Prospect Road; thence southeasterly along said right-of-way line to the east line of the S.W. 1/4 of Section 16, T49S, R42E; thence southerly along said east line to the north line of Section 21, T49S, R42E; thence westerly along said north line to the east line of the west 1/2 of the east 1/2 of the northeast 1/4 of the northwest 1/4 of Section 21, T49S, R42E, (being the same as the N.E. corner of Lot 34, Block 1, Tamarac Hills); thence southerly along said east line to the center line of the North Fork Middle River; thence meander southeasterly along said center line to the west right-of-way line of N.W. 10 Avenue; thence northeasterly along said line to the S.E. corner of Twin Lakes Homes Parcel A, P.B. 47/Pg. 15, of the Public Records of Broward County, Florida; thence westerly along the south property line to the S.W. corner of said plat; thence northerly along said plat to the N.W. corner of said plat; thence easterly to the N.E. corner of said plat; thence northeasterly along the extension of the east property line of said plat to the intersection of the north section line of Section 21, T49S, R42E; thence easterly to the N.E. corner of Section 21, T49S, R42E; thence northerly along west section line of Section 15, T49S, R42E, to the intersection with the CSX Railroad east right-of-way line; thence continue northerly along said right-of-way line to the northwest corner of Milbrand Industrial Park P.B. 54/Pg. 39, of the Public Records of Broward County, Florida; thence easterly and southerly along the plat line of said plat to the north right-of-

way line of Prospect Road; thence east along said line to the east right-of-way line of the I-95 expressway; thence north and easterly along said right-of-way to the N.E. 1/4 corner of the S.W. 1/4 of Section 15, T49S, R42E; thence easterly along the north line of the S.E. 1/4 of Section 15, T49S, R42E to the N.W. 1/4 of the S.W. 1/4 of Section 14, T49S, R42E; thence continue easterly along the north line of the S.W. 1/4 of Section 14, T49S, R42E to the centerline of Dixie Highway; thence northeasterly along said centerline to the intersection of the north line of the south 1/2 of the N.W. 1/4 of Section 14, T49S, R42E; thence easterly along said north line to the northwest corner of the south 1/2 of the N.E. 1/4 of Section 14, T49S, R42E, thence continue easterly along said line to the west plat line Parcel "D", Coral Ridge Isles P.B. 45/Pg. 47, of the Public Records of Broward County, Florida; thence southerly along said plat line of Parcel "D" to the north right-of-way line of N.E. 50th Court; thence easterly along said line to the intersection with the northerly extension of the east plat line of Commercial Blvd. Plaza, P.B. 88/Pg. 12, of the Public Records of Broward County, Florida; thence southerly along the east plat line extension to its intersection with the south quarter section line of the N.E. 1/4 of Section 14, T49S, R42E; thence easterly along said quarter section line to the northerly projection of the center line of N.E. 17th Avenue; thence continue southerly along said projected center line to the projected north right-of-way line of N.E. 48 Court; thence continue easterly along said line to the east line of Section 14, T49S, R42E; thence southerly along said line to

the extension of the north right-of-way line of N.E. 45th Street; thence easterly along said line to the west right-of-way line of U.S. Highway One (Federal Highway); thence southerly along said line to the north right-of-way line of Oakland Park Blvd. being the point of beginning.

LESS: Commencing at the intersection of the west right-of-way line of N.W. 9th Avenue and the south right-of-way line of N.W. 44th Street; thence southerly along said west line to the intersection with the west right-of-way line of I-95; thence southwesterly along said line to a point approximately 275 feet north of the north right-of-way line of N.W. 38 Street; thence westerly to the east right-of-way line of the CSX railroad; thence northeasterly along said line to it's intersection with the extension of a line 44 feet north and parallel to the south lot line of Lot 27A, Twin Lakes Section 2, P.B. 30/Pg. 1, of the Public Records of Broward County, Florida; thence westerly along said line to the east right-of-way line of N.W. 10th Avenue; thence northerly 200 feet to a point; thence easterly along a line parallel to the north lot line of Lot 27 of said plat to the east right-of-way line of the CSX Railroad; thence north along said right-of-way to the south right-of-way line of N.W. 44th Street; thence east along said line to the west right-of-way line of N.W. 9th Avenue being the point of beginning. Said property being the City of Ft. Lauderdale's Fiveash Water Plant Complex.