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

Updated: February 26, 2015

Table of Contents

1.0 INTRODUCTION 4
1.1 Statutory History 5
1.2 Statutory Requirements 5
2.0 BACKGROUND INFORMATION 7
2.1 Service Area 7
2.2 Climate Change 11
2.2.1 Sea Level Rise 12
2.2.2 Saltwater Intrusion 12
2.2.3 Extreme Weather Events 14
2.2.4 Infrastructure Development 14
2.3 Regional Water Availability Rule 14
2.4 C-51 Reservoir Project 15
2.5 Leah G. Schad Ocean Outfall Program 15
2.6 Regional Climate Action Plan 17
3.0 DATA AND ANALYSIS 21
3.1 Population Information 21
3.2 Maps of Current and Future Served Areas 22
3.3 Potable Water Level of Service Standard 27
3.4 Population and Potable Water Demand Projections 30
3.5 Water Supply from Local Governments 38
3.5.1 Water Use Permit 38
3.5.2 Raw Water Allocation 39
3.5.3 Fiveash Water Treatment Plant 40
3.5.4 Peele-Dixie Water Treatment Plant 40

3.5.5 Prospect Wellfield 40
3.5.6 Dixie Wellfield 41
3.5.7 Saline Intrusion Monitoring (SALT) Program 41
3.5.8 Distribution System Water Storage Facilities 41
3.5.9 Raw Water Aquifer Storage and Recovery 42
3.5.10 Finished Water Distribution System 42
3.5.11 Interlocal Agreements and Bulk Sales 42
3.5.12 Distribution System Interconnects 42
3.5.13 Treatment Losses 43
3.5.14 Distribution System Losses 44
3.5.15 Outstanding Compliance Issues 45
3.5.16 Required Upgrades or Expansions 45
3.5.17 George T. Lohmeyer (GTL) Wastewater Treatment Plant (WWTP) 45
3.5.18 Deep Well Injection Wells 46
3.6 Water Supply Provided by Others 46
3.7 Conservation 47
3.7.1 Broward Water Partnerships 47
3.7.2 ConservationPay$ Program 47
3.7.3 NatureScape Irrigation Services 47
3.7.4 Water Matters Day 48
3.7.5 Conservation Rate Structure 48
3.7.6 Water Shortage Restrictions 49
3.7.7 Florida-Friendly Landscaping and Green Infrastructure 49
3.7.8 Irrigation System Design Code 49
3.7.9 Landscape Irrigation Restrictions 49
3.7.10 Water for Heating or Process Water 49
3.7.11 Water Used for Cooling Including Condensate 50
3.7.12 Commercial Power Washing 50

3.7.13 Water for Decorative Features 50
3.7.14 Lakes and Ponds 50
3.7.15 Leak Detection 50
3.7.16 Meter Replacement Program 50
3.7.17 Plumbing Code Changes 51
3.7.18 Water Conservation Education Program 51
3.7.19 Sustainability Action Plan 2011 Update 51
3.7.20 2035 Fast Forward Vision Plan 52
3.7.21 2018 Press Play Strategic Plan 53
3.7.22 Identify any Local Financial Responsibilities 53
3.8 Reuse 53
3.8.1 Local Government Specific Actions, Programs, Regulations, or Opportunities 53
3.8.2 Identify any Local Financial Responsibilities 55
3.9 Sector Plans 55
4.0 CAPITAL IMPROVEMENTS 56
4.1 Work Plan Projects 56
4.1.1 Water Supply / Treatment Projects Needed from 2015 to 2025 56
4.1.2 Water Supply / Treatment Projects Needed from 2025 to 2035 56
4.1.3 Transmission System Projects Needed from 2015 to 2025 57
4.1.4 Projects Needed to Supply Water Outside of the City's Water Service Area 57
4.2 Capital Improvements Element/Schedule 57
5.0 GOALS, OBJECTIVES AND POLICIES 67

- Remainder of this Page is Intentionally Blank -

1.0 INTRODUCTION

The City of Fort Lauderdale is located on the southeastern coast of Florida within Broward County. **Figure 1** illustrates a location map of the City. This 2014 City of Fort Lauderdale 10-Year Water Supply Facilities Work Plan identifies water supply sources, availability and facilities needed to serve existing and new development within the local government's jurisdiction. Chapter 163, Part II, (F.S.), requires local governments to prepare and adopt 10-Year Water Supply Facilities Work Plans into their comprehensive plans within 18 months after the South Florida Water Management District (District) approves a regional water supply plan or its update. The 2013 Lower East Coast Water Supply Plan Update (2013 LECWSP Update) was adopted by the District's Governing Board on September 12, 2013. Therefore, local governments within the Lower East Coast Region are required to amend their comprehensive plans and include an updated 10-year Water Supply Facilities Work Plan and related planning elements by March 12, 2015.

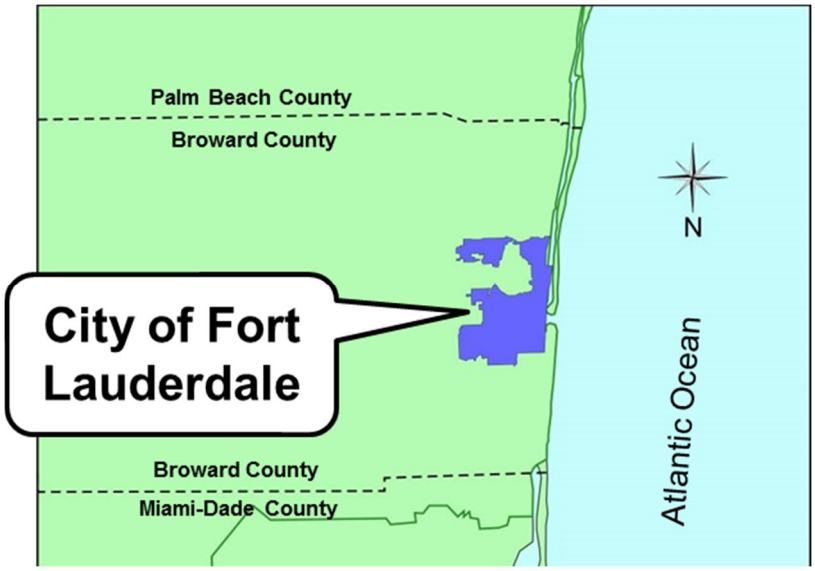


Figure 1 – Location Map

The State of Florida requires that the 10-year Water Supply Facilities Work Plan - 2014 Update address the development of traditional and alternative water supplies and management strategies, including conservation and reuse. The data and analyses, including population projections, water demands and service areas must cover at least a 10-year planning period and be consistent to the LECWSP and the updated comprehensive plan amendment.

The City of Fort Lauderdale's 10-year Water Supply Facilities Work Plan - 2014 Update is divided into five sections:

1.0 – Introduction

2.0 – Background Information

3.0 – Data and Analysis

4.0 – Capital Improvements

5.0 – Goals, Objectives, and Policies

1.1 Statutory History

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

1.2 Statutory Requirements

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

1. Coordinate appropriate aspects of its comprehensive plan with the 2013 LECWSP [163.3177(4) (a), F.S.].

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

3. Ensure that adequate water supplies and potable water facilities are available to serve new development no later than the issuance by the local government of a certificate of occupancy or its functional equivalent and consult with the applicable water supplier to determine whether adequate water supplies will be available to serve the development by the anticipated issuance date of the certificate of occupancy [s.163.3180 (2), F.S.].

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

a. Identify and incorporate the alternative water supply project(s) selected by the local government from projects identified in the 2013 LECWSP, or alternative project(s) proposed by the local government under s. 373.709(8)(b), F.S. [s. 163.3177(6)(c), F.S.];

b. Identify the traditional and alternative water supply projects and the conservation and reuse programs necessary to meet water needs identified in the 2013 LECWSP [s. 163.3177(6)(c)3, F.S.]; and

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

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

6. To the extent necessary to maintain internal consistency after making changes described in Paragraph 1 through 5 above, revise the Conservation Element to assess projected water needs and sources for at least a 10-year planning period, considering the 2013 LECWSP, as well as applicable consumptive use permit(s) [s.163.3177 (6) (d), F.S.]. The plan must address the water supply sources necessary to meet and achieve the existing and projected water use demand for the established planning period, considering the applicable regional water supply plan [s.163.3167(9), F.S.].

7. To the extent necessary to maintain internal consistency after making changes described in Paragraphs 1 through 5 above, revise the Intergovernmental Coordination Element to ensure coordination of the comprehensive plan with the 2013 LECWSP [s.163.3177 (6) (h) 1., F.S.].

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

2.0 BACKGROUND INFORMATION

This section includes the following:

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

2.1 Service Area

The City of Fort Lauderdale is the single largest purveyor of potable water in Broward County. This includes retail customers residing in the Roosevelt Gardens, Franklin Park, Washington Park, and Boulevard Gardens communities of unincorporated Broward County. These communities are expected to become incorporated by the end of the planning period. The utility's service area encompasses a total area of 43 square miles, approximately one-tenth the total area of urban Broward County. Other retail customers include residential, commercial, and industrial properties within the City of Fort Lauderdale, Lazy Lake, and a portion of Lauderdale-by-the-Sea. The utility also maintains wholesale agreements for potable water supply with the Cities of Oakland Park, Wilton Manors, Tamarac (east of 34th Avenue), Town of Davie and Port Everglades. **Figure 2** depicts the water service area (inclusive of all retail and wholesale customers).

Figure 2 also depicts the location of key City assets including the following: 1) Dixie Wellfield; 2) Prospect Wellfield; 3) Peele-Dixie Water Treatment Plant; 4) Fiveash Water Treatment Plant; 5) 2nd Avenue Water

Tank and Pump Station; 6) Poinciana Park Water Tank and Pump Station; and 7) George T. Lohmeyer Wastewater Treatment Plant.

Figure 3 depicts the separate jurisdictions served by the City.

- Remainder of this Page is Intentionally Blank -

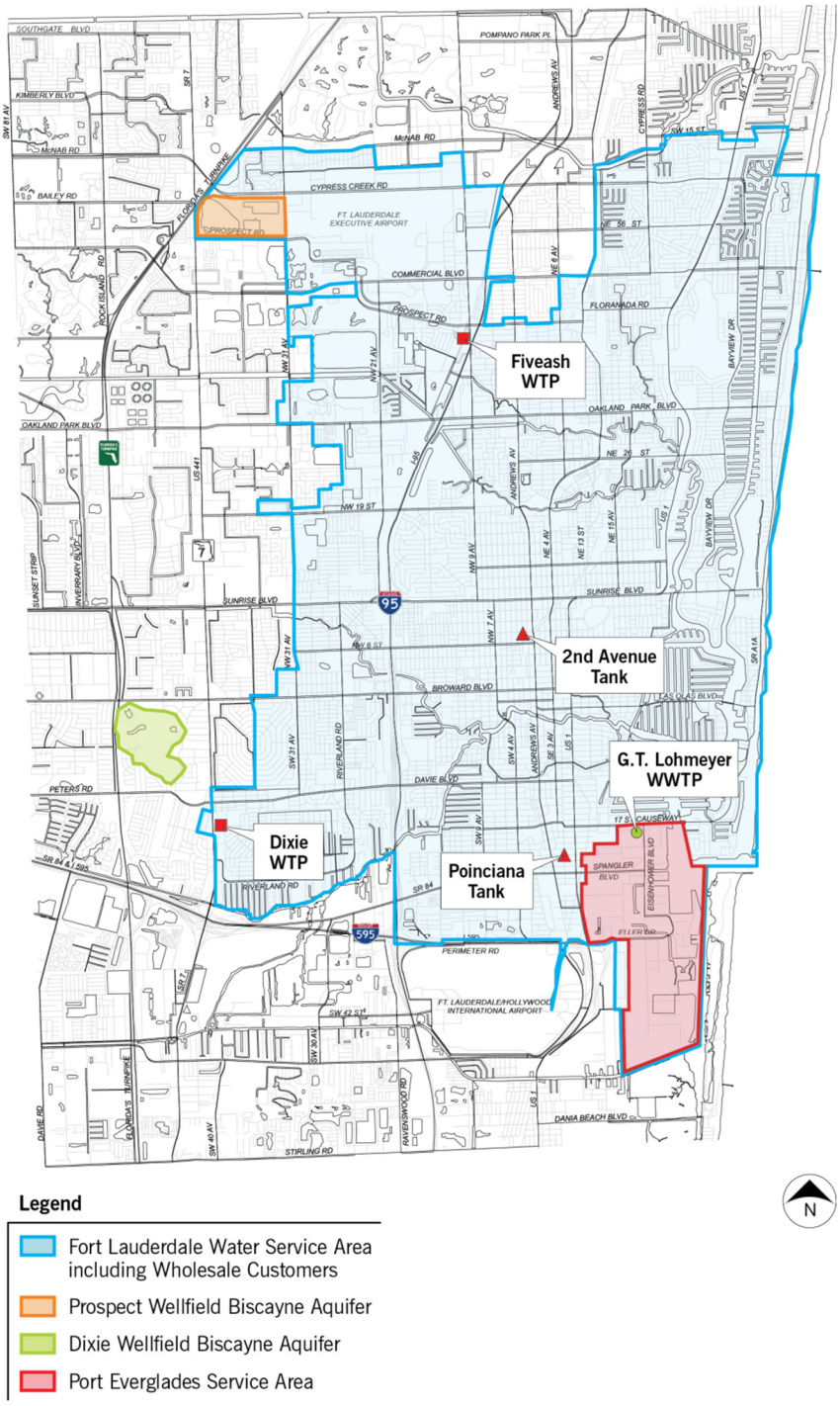


Figure 2 – City of Fort Lauderdale Water Service Area

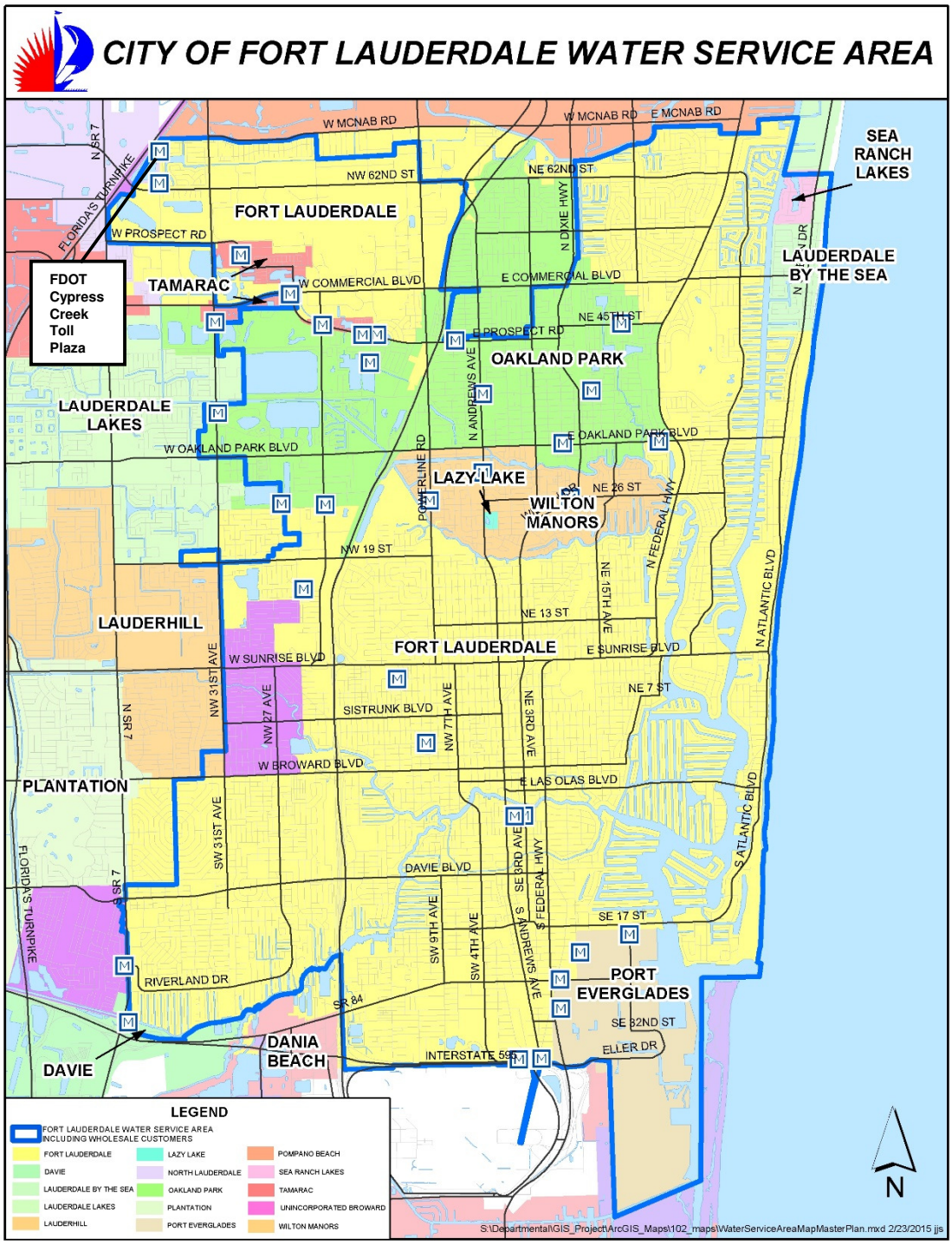


Figure 3 – Jurisdictions Served within the City of Fort Lauderdale Water Service Area

2.2 Climate Change

Investigations and evaluations conducted at the national, regional, and local levels have reinforced the need to plan for the predicted impacts of more frequent and severe drought, increases in tidal and storm-related flooding, and ensuring that future planning efforts are flexible to adapt to changes to ensure a sustainable water supply infrastructure.

The City of Fort Lauderdale, together with its municipal and regional partners, understands that it is imperative that local governments and water utilities begin to formalize the integration of water supply and climate change considerations as part of coordinated planning efforts and work to provide relevant updates to the 10-year Water Supply Facilities Work Plan and enhance Goals, Objectives and Policies (GOPs) of its comprehensive plan.

The City is a leader in developing planning tools and identifying achievable and cost effective goals that meet the needs of its community. The City has recently participated in the development of regional planning documents related to integrating water supply and climate change considerations including the Regional Climate Action Plan (2012). The City has adopted its own strategies to address climate change and resilience that are administered citywide. The following documents outline the City's goals, policies, and specific strategies:

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

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

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

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

2.2.1 Sea Level Rise

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

Development of cost-effective sea level rise adaptation strategies to ensure the sustainability of the City's water supply is critical to all ongoing planning efforts. A unified projection by the Southeast Florida Regional Climate Change Compact indicates 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.

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**.

- Remainder of this Page is Intentionally Blank -

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.

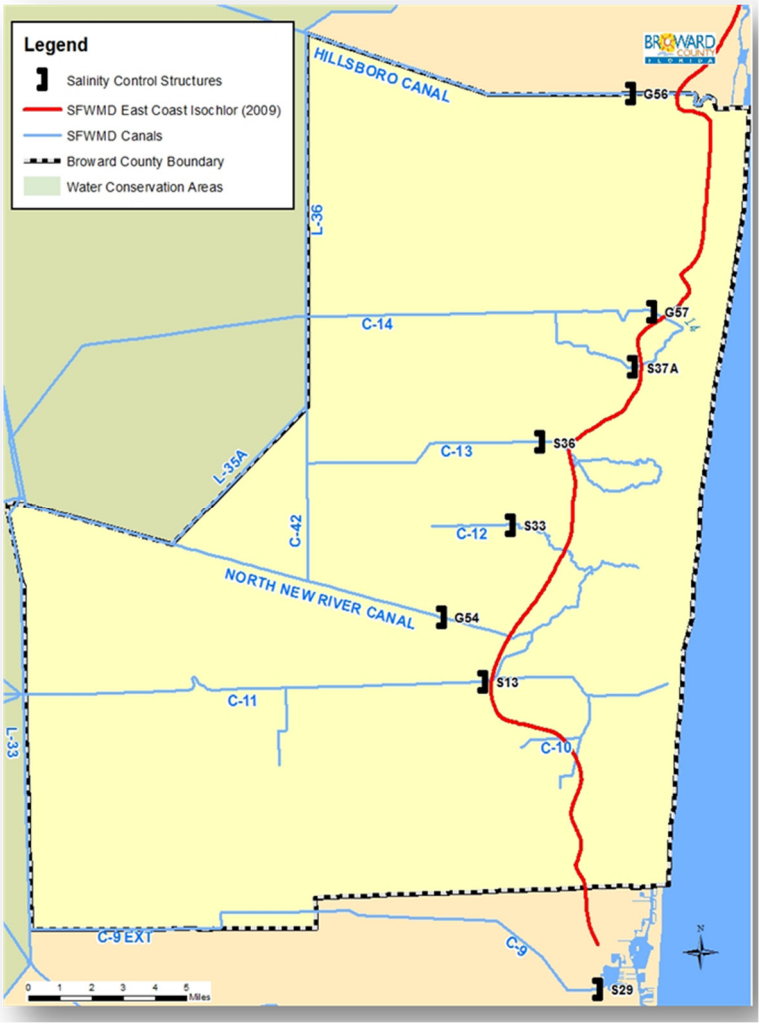


Figure 4 - Saltwater Intrusion Line, 2013

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

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

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

2.2.3 Extreme Weather Events

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

2.2.4 Infrastructure Development

With increasing climate disruptions there is a need to diversify water supply sources, improve treatment technologies and to support the development of adaptive stormwater and wastewater infrastructure design criteria to ensure long-term sustainability of key facilities. Conversely, alternative water treatment technologies generally have a high energy demand and carbon footprint that can exacerbate climate change impacts. Strategic infrastructure planning should incorporate these constraints and work within the Goals, Objectives, and Policies of the Comprehensive Planning process and 10-year Water Supply Facilities Work Plans to provide for long-term sustainability and a balanced approach to future development.

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

Options that provide for a diversification of water projects and protection of resources will be fundamental and may include: regional water storage such as the C-51 Reservoir; conservation; the improvement (or relocation) of infrastructure in low lying area to mitigate flooding; and enhancing operational flexibility.

2.3 Regional Water Availability Rule

The Regional Water Availability (RWA) rule was passed by the SFWMD on February 16, 2007. The RWA limits usage of the Biscayne Aquifer to the maximum quantity during any consecutive five years preceding April 2006. City's needing additional water supplies are required to seek sources that are not dependent upon the

Everglades for recharge. These alternative water supply solutions include recycling water, using reclaimed water to recharge the Biscayne Aquifer, or drawing water from the deeper Floridan Aquifer (which requires high energy consumption treatment methods). The RWA and the approval of the City's Water Use permit limited the City's Biscayne Aquifer withdrawal to 52.55 millions of gallons per day (mgd) on an annual average day basis. Demands in excess of this amount would be met via conservation and alternative water supplies.

2.4 C-51 Reservoir Project

The capture of excess stormwater is considered an alternative water supply project as defined in Section 373.707, F.S. One such project, the proposed C-51 reservoir, was evaluated in 2009 by a group of seven utilities located in Broward and Palm Beach Counties (including the City of Fort Lauderdale). The location of this proposed reservoir is adjacent to the SFWMD's existing L-8 Reservoir in Palm Beach County and is expected to share the same impermeable geologic formation that facilitates storage. This project if constructed would capture excess stormwater that is currently discharged to the Lake Worth Lagoon. The captured stormwater would be utilized to augment traditional water supplies and be treated via traditional treatment methods.

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

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

2.5 Leah G. Schad Ocean Outfall Program

In 2008, the Florida Legislature enacted an ocean outfall statute (Subsection 403.086(9), F.S.), Leah Schad Memorial Ocean Outfall Program. This requires the elimination of the use of six ocean outfalls in

southeastern Florida as the primary means for disposal of treated domestic wastewater, two of which are located in Broward County. The affected wastewater utilities have to reuse at least 60 percent of the historic outfall flows by 2025. The objectives of this statute were to reduce nutrient loadings to the environment and to achieve the more efficient use of water for water supply needs.

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

Requirements of the outfall program include the following:

- Discharge through ocean outfalls must meet either advanced wastewater treatment and management by December 31, 2018, or an equivalent reduction in outfall nutrient loading.
- A functioning reuse system that reuses a minimum of 60 percent facility's baseline flow on an annual basis installed no later than December 31, 2025 (baseline flow is defined as the historical outfall flow between 2003 and 2007).
- Timely submission of certain progress and planning summary documents.
- Inclusion of projects that promote the elimination of wastewater ocean outfalls in SFMWD's regional water supply plans.
- State or SFWMD funding assistance must give first consideration to water supply development projects that replace existing sources or implement reuse projects to eliminate ocean outfalls.

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

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

1. If wastewater generation forecasting indicates the future need for expanding deep injection well (DIW) capacity at the City's George T. Lohmeyer (GTL) Wastewater Water Treatment Plant (WWTP), the capital cost and social impact would likely be high due to the limited land availability and

required high level disinfection (HLD) under the 2005 Underground Injection Control (UIC) rule change.

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

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

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

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

- Remainder of this Page is Intentionally Blank -

Table 1
Water Supply Recommendations
2012 Regional Climate Change Action Plan

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

Table 1
Water Supply Recommendations
2012 Regional Climate Change Action Plan

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

Table 1
Water Supply Recommendations
2012 Regional Climate Change Action Plan

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

Table 1
Water Supply Recommendations
2012 Regional Climate Change Action Plan

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

These recommendations are intended to meet the goals of advancing water management strategies and infrastructure improvements needed to mitigate for adverse impacts of climate change and sea level rise on water supplies, water and wastewater infrastructure, and water management systems and have been incorporated throughout this 10-year Water Supply Facilities Work Plan - 2014 Update and related comprehensive planning element updates.

3.0 DATA AND ANALYSIS

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

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

3.1 Population Information

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

The water demand forecast was developed based on current utility operations and the existing customer base, compared to population projections through 2035. The population modeling was performed by Broward County Planning and Redevelopment Division (BCPRD) using the Broward County Traffic Analysis

Zones and Municipal Forecasts Update, 2014 to develop the projected populations based on the University of Florida's Bureau of Economic and Business Research (BEBR), "Detailed Population Projections by Age, Sex, Race, and Hispanic Origin, for Florida and Its Counties, 2015-2040, With Estimates for 2012 All Races". The population forecast was then disaggregated into Broward County's 2010 Traffic Analysis Zones (TAZ) by municipalities.

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

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

3.2 Maps of Current and Future Served Areas

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

- Entirety of the City of Lauderdale-by-the Sea
- Entirety of the Village of Sea Ranch Lakes
- Small areas of Unincorporated Broward County (i.e., Roosevelt Gardens, Franklin Park, Washington Park, and Boulevard Gardens communities)
- Small area of the Town of Davie
- Small area of the City of Lauderdale Lakes
- Small area of the City of Lauderhill
- Entirety of the Village of Lazy Lake
- Small area of the City of North Lauderdale

- Entirety of the City of Oakland Park
- Portions of the City of Tamarac
- Entirety of the City of Wilton Manors
- Port Everglades

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

- Broward County Water and Wastewater Services
- City of Oakland Park
- City of Tamarac
- City of Wilton Manors
- Port Everglades
- Florida Department of Transportation (FDOT) Cypress Creek Toll Plaza
- 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.

Figure 6 depicts the separate jurisdictions served by the City.

- Remainder of this Page is Intentionally Blank -

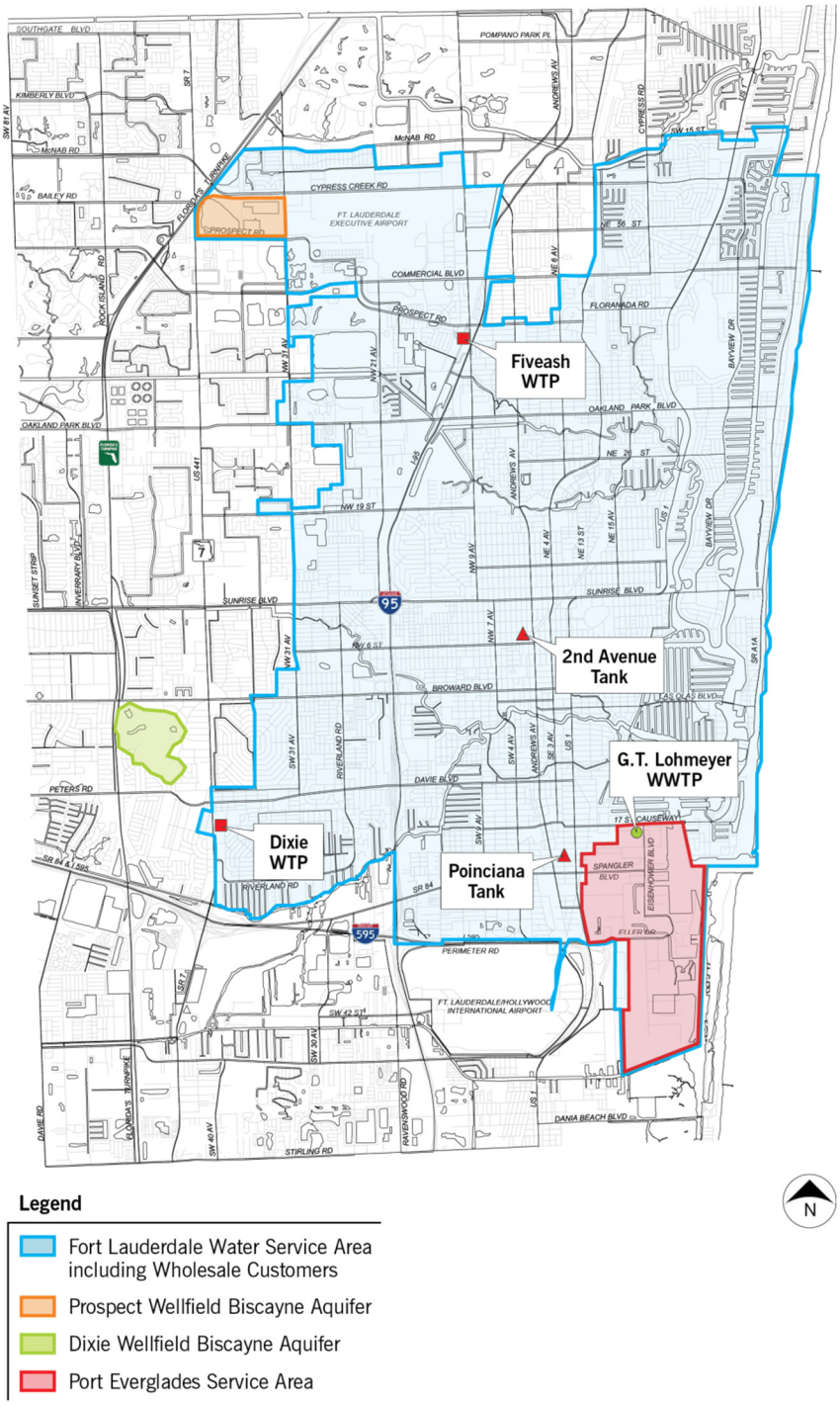


Figure 5 – City of Fort Lauderdale Water Service Area

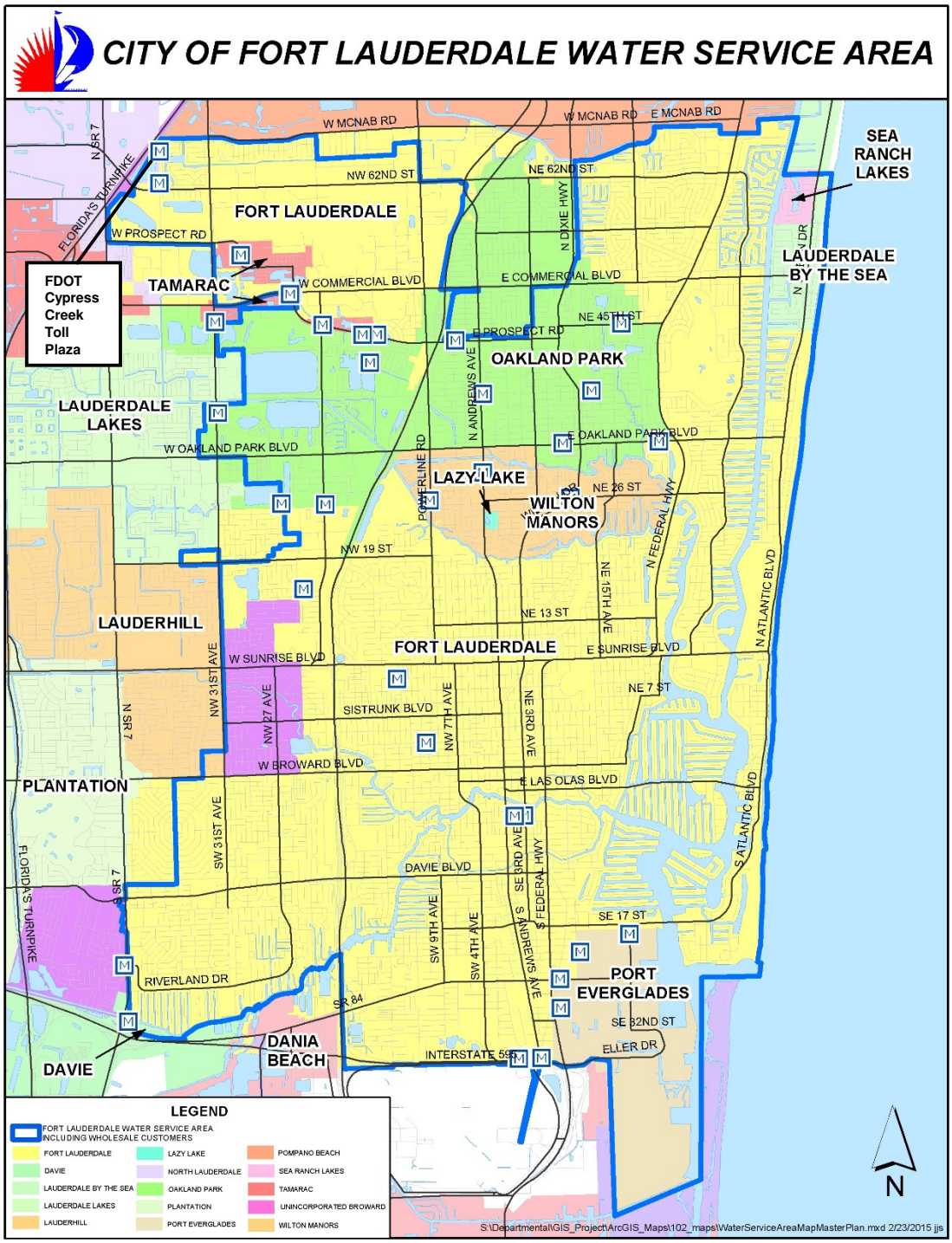


Figure 6 – Jurisdictions Served within the City of Fort Lauderdale Water Service Area

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**.

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

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

Component	Level Of Service Standard / Goal
Raw Water Supply	Maximum Day Demand with 20 percent of wells out of service for maintenance
Treatment Capacity	Maximum Day with all units in service
Minimum system pressure during peak hour demand with largest pump out of service during non-fire flow conditions	Maintain a minimum of 45 psi in the distribution system
Minimum system pressure during peak hour demand with largest pump out of service during fire flow conditions	Maintain a minimum of 20 psi in the distribution system
Finished Water Pumped Per Capita – 2008 Comprehensive Plan Volume 1, Infrastructure Element	Policies 1.2.2 and 2.3.1 of the Comprehensive Plan Volume 1, Infrastructure Element indicates that the level of service for finished water pumped shall be 197 gallons per capita per day
Finished Water Pumped Per Capita – City Goal	It is the City's goal to reduce the finished water pumped level of service to 170 gallons per capita per day through conservation by the year 2028

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

Component	Level Of Service Standard / Goal
Finished Water Storage	Comply with FAC 62-555.320(19): minimum requirement of 25 percent of maximum day demand plus maximum fire flow volume with all tanks in service. Maximum fire flow storage based upon a 5,000 gallons per minute (gpm) fire over a four hour period.
Maximum Distribution System Water Loss	10 Percent of Finished Water Pumped

- Remainder of this Page is Intentionally Blank -

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 are population forecast.

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

3.4 Population and Potable Water Demand Projections

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

- Remainder of this Page is Intentionally Blank -

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
BCOES (Irrigation at FL Int. Airport)	--	0	0	0	0	0	0
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
Port Everglades	--	0	0	0	0	0	0
FDOT Cypress Creek Toll Plaza	--	0	0	0	0	0	0
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 overall 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 on 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.

- Remainder of this Page is Intentionally Blank -

Table 5
City of Fort Lauderdale Water Service Area
Overall 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	181	42.4	41.4	52.50
2020	235,489	181	177	42.7	41.7	52.90
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.

- Remainder of this Page is Intentionally Blank -

Table 6 presents the Biscayne Aquifer raw water demands on an AADF basis broken down by municipal jurisdictions within the City of Fort Lauderdale's water service area.

Table 6
City of Fort Lauderdale Water Service Area
Biscayne Aquifer Raw Water Demand AADF (mgd) by Jurisdiction

Location with Fort Lauderdale Water Service Area	2015	2020	2025	2030	2035
Fort Lauderdale	31.1124	31.3240	32.8677	33.9525	34.4771
Lauderdale-by-the Sea	0.5403	0.5452	0.5775	0.5989	0.6090
Sea Ranch Lakes	0.1015	0.1024	0.1081	0.1120	0.1138
Unincorporated Broward County	1.8965	1.9045	1.9617	2.0016	2.0209
BCOES (Irrigation at FL Int. Airport)	0.0105	0.0105	0.0105	0.0105	0.0105
Davie	0.1704	0.1710	0.1753	0.1783	0.1798
Lauderdale Lakes	0.0563	0.0568	0.0599	0.0620	0.0630
Lauderhill	0.4348	0.4383	0.4614	0.4775	0.4852
Lazy Lake	0.0038	0.0038	0.0040	0.0042	0.0042
North Lauderdale	0.0518	0.0522	0.0609	0.0679	0.0716
Oakland Park	4.3645	4.4030	4.6662	4.8493	4.9372
Tamarac	0.2287	0.2313	0.2487	0.2607	0.2663
Wilton Manors	1.9329	1.9471	2.0425	2.1078	2.1388
Port Everglades	1.4984	1.5284	1.5589	1.5901	1.6219
Florida DOT Cypress Creek Toll Plaza	0.0007	0.0007	0.0007	0.0007	0.0007
Total	**42.4**	**42.7**	**44.8**	**46.3**	**47.0**

- Remainder of this Page is Intentionally Blank -

Table 7 presents the finished water demands on an AADF basis broken down by municipal jurisdictions within the City of Fort Lauderdale's water service area.

Table 7
City of Fort Lauderdale Water Service Area
AADF Finished Water Demand (mgd) by Jurisdiction

Location with Fort Lauderdale Water Service Area	2015	2020	2025	2030	2035
Fort Lauderdale	30.3520	30.5633	31.7578	32.8061	33.3129
Lauderdale-by-the Sea	0.5271	0.5320	0.5570	0.5777	0.5875
Sea Ranch Lakes	0.0990	0.0999	0.1044	0.1081	0.1098
Unincorporated Broward County	1.8501	1.8582	1.9024	1.9410	1.9596
BCOES (Irrigation at FL Int. Airport)	0.0102	0.0102	0.0102	0.0102	0.0102
Davie	0.1662	0.1669	0.1702	0.1730	0.1745
Lauderdale Lakes	0.0549	0.0554	0.0578	0.0598	0.0608
Lauderhill	0.4241	0.4276	0.4456	0.4610	0.4685
Lazy Lake	0.0037	0.0037	0.0039	0.0040	0.0041
North Lauderdale	0.0505	0.0510	0.0576	0.0645	0.0680
Oakland Park	4.2578	4.2963	4.5000	4.6768	4.7617
Tamarac	0.2231	0.2257	0.2392	0.2507	0.2562
Wilton Manors	1.8856	1.8998	1.9737	2.0367	2.0667
Port Everglades	1.4618	1.4910	1.5208	1.5512	1.5823
Florida DOT Cypress Creek Toll Plaza	0.0006	0.0006	0.0006	0.0006	0.0006
Total	**41.4**	**41.7**	**43.3**	**44.7**	**45.4**

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 7 illustrates the raw water demand forecast on an annual average day basis graphically. As can be seen, the annual average day raw water demand does not exceed the annual average day Biscayne Aquifer allocation through the year 2035.

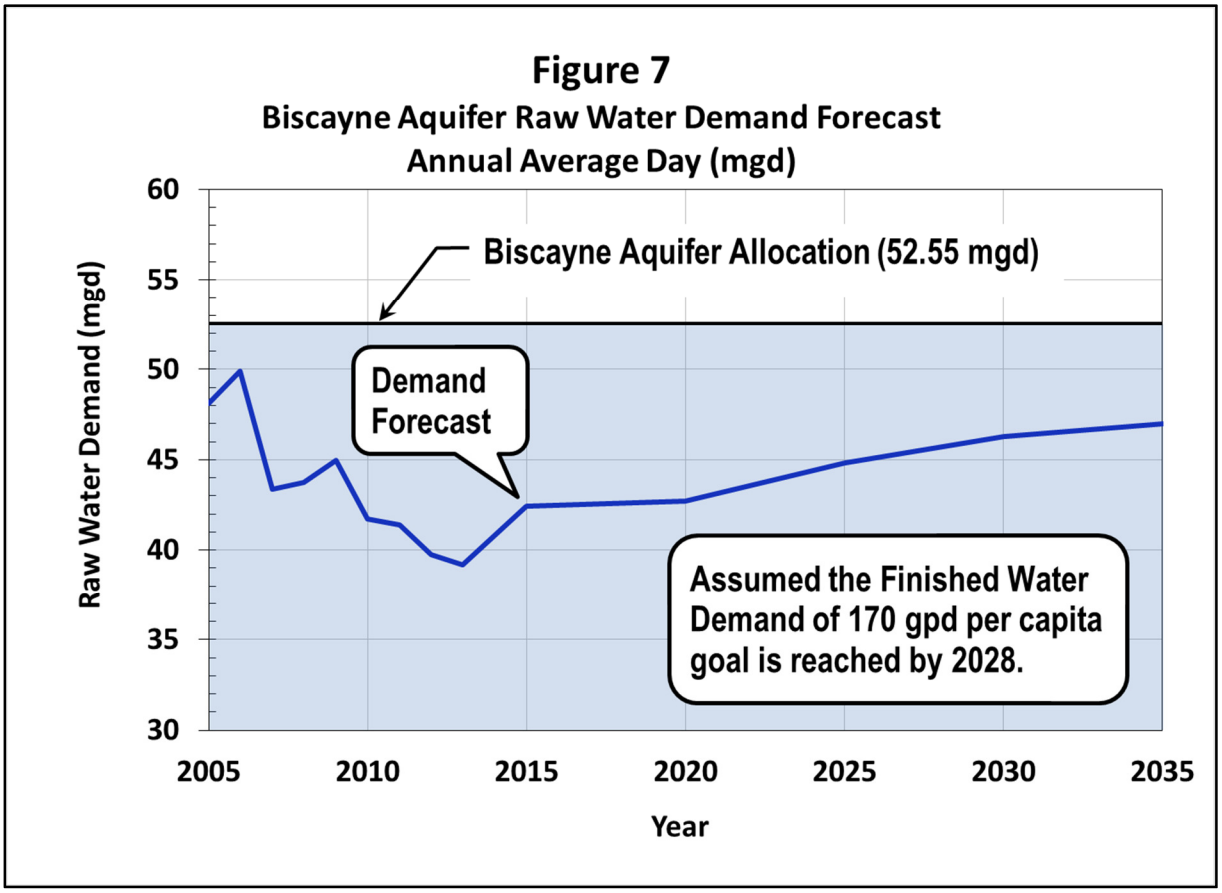
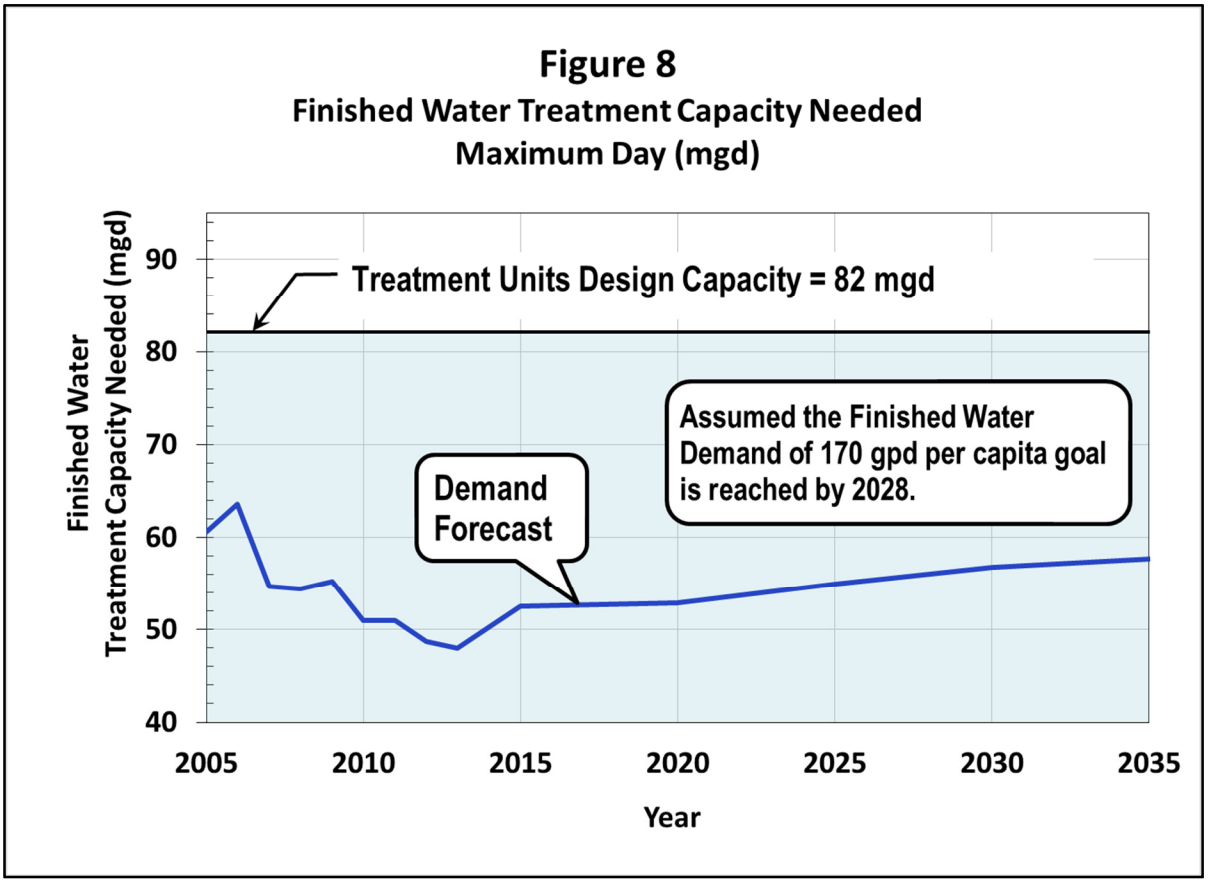


Figure 8 illustrates the finished water demand forecast on a maximum day basis graphically.

- Remainder of this Page is Intentionally Blank -



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 8** 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.

- Remainder of this Page is Intentionally Blank -

3.5 Water Supply from Local Governments

This section briefly describes the water supply, treatment, storage and distribution infrastructure that is owned and operated by the City of Fort Lauderdale. Additionally, the City of Fort Lauderdale's wastewater facilities are briefly described as they relate to water supply planning.

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

3.5.1 Water Use Permit

The City of Fort Lauderdale obtains all of its raw water supply from the surficial Biscayne Aquifer system via two active wellfields. These wellfields, which are commonly known as the Dixie Wellfield and the Prospect Wellfield, operate independently of each other, the former serving the Peele-Dixie WTP and the latter serving the Fiveash WTP. Both wellfields are permitted by the South Florida Water Management District under Consumptive Use Permit No. 06-00123-W. The permit was issued September 11, 2008 with an expiration date of September 11, 2028.

3.5.2 Raw Water Allocation

The WUP allows withdrawal from the Biscayne Aquifer within the limitations presented in **Table 8**.

Table 8
Biscayne Aquifer Withdrawal Limits from WUP 06-00123-W

Category	Limitation		
	Million Gallons per Year	Million Gallons per Month	Million Gallons per Day
Biscayne Aquifer Annual Withdrawal	19,181	--	52.55
Biscayne Aquifer Maximum Month 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

WUP Limiting Condition No. 4 indicates that the City's ground water sources are the Biscayne Aquifer and the Floridan Aquifer System. Additionally, WUP Limiting Condition No. 5 indicates an annual allocation of no more than 22,334 million gallons with a Biscayne Aquifer limitation of 19,181 million gallons per year. A reasonable interpretation of these limiting conditions is that the difference between the annual allocation and the Biscayne Aquifer Annual Withdrawal limitation would be supplied by the Floridan Aquifer, as follows:

Floridan Aquifer Allocation Limit = Annual Allocation Limit - Biscayne Aquifer Annual Withdrawal Limit

Where:

- Annual Allocation Limit = 22,334 million gallons per year
- Biscayne Aquifer Annual Withdrawal Limit = 19,181 million gallons per year

Floridan Aquifer Allocation Limit = 22,334 - 19,181 million gallons per year

Floridan Aquifer Allocation Limit = 3,153 million gallons per year

In 2007, the City completed the construction of two Floridan Aquifer test wells at the Dixie Wellfield site under SFWMD Water Well Construction Permit #SF030907A issued March 30, 2007. These wells are currently idle and not equipped with pumping facilities. Based upon the permit conditions these wells are approved for testing purposes only. Withdrawals for public water supply from these wells is not currently permitted. The City would apply for a WUP modification prior to utilizing these existing wells for public water supply.

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 2035. However, the City will continue assessing the need for alternative water supplies, such as the Floridan Aquifer. If the City determines that implementation of Floridan Aquifer supply and treatment is required to meet demand, the City would plan these improvements in cooperation with the SFWMD.

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.

- Remainder of this Page is Intentionally Blank -

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

3.5.6 Dixie Wellfield

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

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

3.5.7 Saline Intrusion Monitoring (SALT) Program

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

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

3.5.8 Distribution System Water Storage Facilities

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

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

3.5.9 Raw Water Aquifer Storage and Recovery

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

3.5.10 Finished Water Distribution System

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

3.5.11 Interlocal Agreements and Bulk Sales

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

- Broward County Water and Wastewater Services
- City of Oakland Park
- City of Tamarac
- City of Wilton Manors
- Port Everglades
- Florida Department of Transportation (FDOT) Cypress Creek Toll Plaza
- Town of Davie

3.5.12 Distribution System Interconnects

The City of Fort Lauderdale maintains nine distribution system interconnects with other utilities. **Table 9** identifies the location and size of the each interconnect. The isolation valves on all interconnects are closed.

Table 9
City of Fort Lauderdale Water Distribution System Interconnects

No.	Location	Size	Meter	Valve Position	Routine Check	Area Serviced
1	NW 24 Ave / 19 St	6"	No	Closed	monthly	Broward County
2	NW 9 Ave / 62 St	10"	No	Closed	monthly	Broward County
3	Peters Rd / SR 7	8"	No	Closed	monthly	Plantation
4	SW 35 Ave / W Broward Blvd	10"	No	Closed	monthly	Broward County
5	SW 34 St / 9 Ave	8"	No	Closed	monthly	Broward County
6	SW 34 St / 2 Ave	6"	005014099	Closed	monthly	Broward County
7	NE 68 St / 20 Terr	6"	No	Closed	monthly	Pompano
8	SW 20 St / SR 7 (Broadview) 2001 S. St. Rd. 7	6"	004237763	Closed	monthly	Broward County
9	5450 N Ocean Dr	10"	No	Closed	monthly	Pompano

3.5.13 Treatment Losses

Treatment losses, for the purpose of this report, is defined as the difference between raw water pumped and finished water pumped. The terminology “treatment loss” may be misleading since the water is not actually “lost”. Rather the “lost” water is repurposed for ground water recharge or other beneficial use. Hence, “treatment efficiency” may be a more accurate term. However, since the 10-year water supply plan template issued by the SFWMD used the terminology “treatment loss”, this report uses the same terminology as the SFWMD template.

Treatment losses vary with the efficiency of the treatment technology utilized. The treatment loss for the Fiveash WTP, which uses lime softening technology, is roughly one to three percent of the raw water pumped. The treatment loss for the Peele-Dixie WTP, which uses nanofiltration softening technology, is roughly 15 percent of the raw water pumped. The historical overall treatment loss in the system is summarized in **Table 10**.

Table 10
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 11**. The percent distribution system loss is based on a percent of finished water pumped. The distribution system losses have averaged 6.3 percent over the timeframe from 2005 through 2013.

Table 11
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

Table 11
Historical Distribution System Loss

Water Use Category	Annual Average Day Flow (mgd)								
	2005	2006	2007	2008	2009	2010	2011	2012	2013
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 or in the distribution system are currently available. Hence, the actual loss is believed to be less than that indicated in **Table 11**. The City is planning to implement improvements to incorporate meters to measure water consumption at the WTPs.

3.5.15 Outstanding Compliance Issues

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

3.5.16 Required Upgrades or Expansions

The City of Fort Lauderdale is planning an upgrade project at the Fiveash WTP titled "Reliability Upgrades and Disinfection System Replacement". This project includes replacement of the chlorine gas system with sodium hypochlorite along with a series of improvements intended to enhance the reliability and automation of the Fiveash WTP. No expansion of the City of Fort Lauderdale's water system is planned at this time.

3.5.17 George T. Lohmeyer (GTL) Wastewater Treatment Plant (WWTP)

The GTL WWTP is located on a 9.6-acre site near Southeast 17th Street and Eisenhower Boulevard. The plant provides secondary treatment followed by deep-well injection via five injection wells located approximately one-quarter mile south of the site. The plant is owned and operated by the City of Fort Lauderdale and is used to treat wastewater generated in a region encompassing the following areas:

- City of Fort Lauderdale
- City of Wilton Manors
- City of Oakland Park
- Port Everglades

- A portion of the City of Tamarac
- A portion of unincorporated Broward County
- A portion of the Town of Davie

The facility has been expanded several times over the years. It was converted from a small trickling filter plant to a 22 million gallon per day facility in 1978, with effluent disposal via an outfall to the Intracoastal Waterway. In 1984, four deep injection wells were constructed for effluent disposal and the plant was converted and expanded to a permitted capacity of 38 million gallon per day. New clarifiers and biosolids dewatering facilities were added to the existing treatment train. In 1994, the Florida Department of Environmental Protection issued a permit with a capacity of 43 million gallon per day, on a maximum three-month average daily flow (M3MADF) basis. In 2001, Florida Department of Environmental Protection issued a permit modification that increased the design capacity of the plant to 54.0 MGD, pending approval of the increase in disposal capacity of the underground injection well system. The City then re-rated the plant to 56.6 million gallon per day on a M3MADF basis.

The existing facility does not currently include reclaimed water treatment facilities. However, on average the plant uses about 4 MGD of its own secondary effluent as in-plant re-use instead of potable water.

3.5.18 Deep Well Injection Wells

The GTL WWTP effluent pump station discharges to five deep injection wells via 3,500 feet of 54-inch-diameter force main. The wells are permitted to operate at up to 10 feet per second (fps) flow velocity on a sustained basis and 12 fps during emergencies. These velocities yield total injection well capacities of 93.25 and 112 MGD, respectively. The existing deep injection wells do not require high level disinfection (HLD) under the United Stated Environmental Protection Agency Underground Injection Control (UIC) Program. If a new injection well is required it would require HLD under the UIC program. HLD is not required for the existing injection wells under current regulations.

3.6 Water Supply Provided by Others

This City of Fort Lauderdale does not currently receive water supplied by others. This section is not applicable to the City of Fort Lauderdale.

- Remainder of this Page is Intentionally Blank -

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 12 presents the historical water savings from completed contract years under the NatureScape program.

Table 12
Historical NatureScape Program Water Savings

Contract Year	Water Saved (gal)
2010 - 2011	11,599,796
2011 - 2012	24,378,385
2012 - 2013	7,431,746
2013 - 2014	27,152,112
Total (2010 to 2014)	**70,562,039**

3.7.4 Water Matters Day

The City of Fort Lauderdale is a sponsor of Broward County's Water Matters Day program. Water Matters Day is a one day water conservation event where participants learn about our local and regional water resources, how water is managed and how utilities are planning for future water needs. Participants receive tips and information on water conservation, rebates and incentives for upgrading to water-conserving devices and learn how to create "Florida friendly" and drought tolerant landscapes. The goal of the program is to promote long-term water demand reductions.

3.7.5 Conservation Rate Structure

A conservation rate ordinance was originally enacted by the City in 1996. The City continues to have a conservation rate structure (progressively higher rates for as water usage increases) that went into effect in 2010 to encourage a water conservation ethic.

3.7.6 Water Shortage Restrictions

Section 28-1A of the Code of Ordinances (in effect since 2009) requires that in the event the South Florida Water Management District declares a drought and mandates water restrictions in one of the four established drought phases (Phase I, II, II or IV), the City of Fort Lauderdale implements a surcharge on water usage. The amount of the surcharge is based on the level of water restrictions (Phase I, II, II or IV) and the number of gallons used. The surcharge is applied to water, wastewater and sprinkler meter accounts.

3.7.7 Florida-Friendly Landscaping and Green Infrastructure

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.

In addition, the City adopted an update to the City's Downtown Master Plan on February 4, 2014 to include transit oriented development (TOD) guidelines. The adopted TOD guidelines aim to create pedestrian-friendly, vibrant station areas to support the continued growth of the Downtown as a live, work, and play environment. They also included green building, green site design and green infrastructure guidelines that would apply to new residential development in the Downtown Regional Activity Center (RAC). The TOD guidelines recommend that new residential projects should comply with the County's Comprehensive Plan – Climate Change Element, and recommend that projects incorporate green infrastructure and green landscaping into site design, such as the use of porous pavement, bioswales, raingardens, green roofs, drip irrigation, drought tolerant and native landscaping, and Florida-Friendly Landscaping.

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 gallons per capita per day (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 13 provides a summary of the current status of implementing the actions described in the Sustainability Action Plan 2011 Update.

Table 13
Water Conservation Action Status

Action	Status
Action 1.1.1 - Expedited, Continuing Escalation of High-User Potable Water Fees in Single-Family Zoning.	The City of Fort Lauderdale continues to have a conservation rate structure (progressively higher rates for as water usage increases) that went into effect in 2010 to encourage a water conservation ethic.
Action 1.1.2 - Implement and enforce landscape ordinance requiring low volume / avoidance watering.	Per Section 28-1A of the Code of Ordinances (in effect since 2009), it is the City's policy to encourage use of Florida-friendly drought resistant plants and trees within the City.
Action 1.1.3 - Directly engage all large water users in long-range water resource planning and conservation.	The City of Fort Lauderdale is conducting ongoing discussions with its wholesale customers relative to opportunities to reduce water consumption.
Action 1.1.4 - Consider innovative projects including water reuse and harvesting rainwater.	The City of Fort Lauderdale is part of a partnership with Broward County to explore the feasibility of regional wastewater reuse opportunities. Additionally, the City is collaborating with other utilities in exploring the feasibility of harvesting rainwater via the proposed C-51 Reservoir project. Participating in other water reuse and rainwater harvesting projects are evaluated as the opportunities are identified.

3.7.20 2035 Fast Forward Vision Plan

The City has developed a planning document titled Fast Forward Fort Lauderdale that envisions the City through the year 2035. The document is also known as the Fast Forward Fort Lauderdale Vision for 2035. The Fast Forward Plan is a compilation of ideas/goals that are used to guide the City's decision making. A key aspect of the 2035 Vision Plan is ensuring that the City enhance water conservation efforts to ensure a sustainable water supply.

3.7.21 2018 Press Play Strategic Plan

The Press Play 2018 Strategic Plan, was approved by the City Commission in September 2013. This document complements the Fast Forward Fort Lauderdale Vision for 2035. Fast Forward establishes the overarching goals of the City, while Press Play establishes specific initiates to be completed over the next 5 years to make progress at reaching the goals. Key initiates related to water supply included in the 2018 Strategic Plan are as follows:

- Work with partners to identify and implement wastewater reuse opportunities
- Participate in regional long-term water supply strategies such as the C-51 reservoir project
- Monitor salt water intrusion and implement best practices, reuse, and other practices to minimize movement of the saltwater front
- Update the City's Water and Sewer Master Plan; integrate the plan with infrastructure improvement that include modern and efficient energy standards
- Develop a Water Capacity Model and approval process for future development

3.7.22 Identify any Local Financial Responsibilities

The City of Fort Lauderdale participates in a water conservation incentive program through an interlocal agreement (ILA) with Broward County marketed under the program name "Conservation Pay$". The City of Fort Lauderdale became partners with Broward County in the program on June 21, 2011. The ILA expires in fiscal year 2015/2016. The City of Fort Lauderdale has a financial responsibility to continue funding this program through fiscal year 2015/2016.

3.8 Reuse

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

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

This section describes the City of Fort Lauderdale's ongoing assessment of reuse opportunities within the City's service area.

The City of Fort Lauderdale's GTL WWTP is a regional facility used to treat wastewater in a region encompassing the following:

- City of Fort Lauderdale
- City of Wilton Manors
- City of Oakland Park
- Port Everglades
- A portion of the City of Tamarac
- A portion of unincorporated Broward County
- A portion of the Town of Davie

The facility does not currently treat effluent to reclaimed water standards for public irrigation or other off-site uses. However, on average the plant uses about 4 MGD of its own secondary effluent as in-plant re-use instead of potable water.

Additionally, the City is participating in the County-wide Integrated Water Resources Plan Grants for feasibility studies related to potential beneficial reuse. These have included a 2008 feasibility study for selected reclaimed water projects within the City for a 50% cost share for $125,000. A second feasibility study in 2009 was for the reclaimed water in the area of the Convention Center Broward County provided a 50% cost share for $5,000.

The City of Fort Lauderdale prepared a report assessing reclaimed water opportunities in November 2008 titled "Feasibility Study for the Implementation of Selected Reclaimed Water Projects with the City of Fort Lauderdale". Key conclusions of the report were:

- The GTL WWTP is located far from any significant users of reclaimed water, such as golf courses. Therefore, the construction of an irrigation-quality reclaimed water production facility at or near the plant to provide further treatment of effluent to public reuse standards is not feasible. There is little available space on the plant site or plant vicinity to construct the required treatment facilities. In addition, due to high levels of infiltration into gravity sewer piping located near coastal areas and waterways, the chloride concentration in the treated effluent is high (approximately 600 mg/L), resulting in unaffordable levels of treatment to reuse standards at the GTL WWTP site. Therefore,

the only practical alternatives for implementing reuse systems are off-site and near potential beneficial uses of reclaimed water;

- Two options studied (reclaimed water facilities at the E-Repump Station and the Former Composting Facility) are technically feasible but are not be economically viable.

The City of Fort Lauderdale will prepare a Comprehensive Utility Strategic Master Plan for water and wastewater in 2015 that will evaluate reclaimed water opportunities that identify WUP consumptive use credits. A critical component of this analysis would factor in the cost avoidance of implementing HLD at the GTL WWTP.

The City of Fort Lauderdale continues to assess water reuse opportunities that can be used to help other municipalities and collaborate with Broward County to identify and assess cost effective alternative water supply opportunities. Indirect potable reuse systems are under consideration because of the dual benefits of providing more disposal capacity and augmenting local water supplies.

The recently approved amendment to the Ocean Outfall Legislation (i.e., amendment to FS 403.086, effective date of July 1, 2013), allows facilities that discharged through an ocean outfall during the baseline period (2003 through 2007) to contract with other utilities to install functioning reuse system capacity on the utilities' behalf. This amendment provides the City of Fort Lauderdale with an opportunity to collaborate with local outfall owners (with the possibility of negotiating cost sharing) in the development potential reuse projects. The opportunities for collaborative project development (and cost sharing) with nearby ocean outfall owners (i.e., Broward County and City of Hollywood) will be assessed in the development of the City of Fort Lauderdale's Comprehensive Utility Strategic Master Plan for water and wastewater planned for completion in 2015.

3.8.2 Identify any Local Financial Responsibilities

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

3.9 Sector Plans

This section is not applicable to the City of Fort Lauderdale.

4.0 CAPITAL IMPROVEMENTS

This section provides a brief description of the City of Fort Lauderdale Capital Improvements Program (it is noted that the terminology "Community Investment Plan" is utilized by the City of Fort Lauderdale) for Water Supply.

4.1 Work Plan Projects

This section identifies projects required to augment and/or diversify water supply to meet demand in the City of Fort Lauderdale's water service area.

4.1.1 Water Supply / Treatment Projects Needed from 2015 to 2025

Based upon the raw water demand forecast, development of traditional water supply, alternative water supply, and reuse projects are not required to meet the demand within the City of Fort Lauderdale's water service area over the period from 2015 to 2025. Hence, the City plans on the following actions relative to water supply planning over the next 10-years:

1. The City of Fort Lauderdale will continue to implement its ongoing conservation programs as outlined in Section 3.7 of the 10-year Water Supply Facilities Work Plan – 2014 Update.

2. The City of Fort Lauderdale will continue to participate in the C-51 reservoir regional stormwater capture project in collaboration with the Broward County Water Resources Task Force Technical Team.

3. The City of Fort Lauderdale will develop a Comprehensive Utility Strategic Master Plan for the water and wastewater systems by the end of 2015. This document will take a holistic view of water supply, treatment, storage, distribution, and conservation along with wastewater collection, transmission, treatment, disposal, and reuse to identify improvement needs through the year 2035 to ensure sustainable, reliable and adaptable water and wastewater infrastructure.

4.1.2 Water Supply / Treatment Projects Needed from 2025 to 2035

Based upon the raw water demand forecast, development of traditional water supply, alternative water supply, and reuse projects are not required to meet the demand within the City of Fort Lauderdale's water service area over the period from 2025 to 2035. However, the City will continue assessing the "Dixie Floridan Water Supply/Treatment Facility" that was included in the 2005-2006 LEC Water Supply Plan and Table F-2 of the 2013 Lower East Coast Water Supply Plan Update.

Per Table F-2 of the 2013 Lower East Coast Water Supply Plan Update, the City of Fort Lauderdale anticipates implementing six million gallons per day of reverse osmosis treatment at the Peele-Dixie WTP by the year 2030. This project would require eight million gallons per day of raw water from the Floridan Aquifer system.

The City of Fort Lauderdale will develop a Comprehensive Utility Strategic Master Plan by the end of 2015. The City will assess the necessity (and the recommended timeframe) for implementing the "Dixie Floridan Water Supply/Treatment Facility" project or an alternative to this project that is more beneficial to the community (e.g., conservation or reuse). The City will consider the need for additional treatment capacity to allow for extended duration maintenance of the Fiveash WTP lime softening treatment units and enhancing infrastructure sustainability.

4.1.3 Transmission System Projects Needed from 2015 to 2025

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

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

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

4.2 Capital Improvements Element/Schedule

Table 14 presents the Five-Year (Fiscal Year 2015 – 2019) 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.

The projects presented herein are based upon the City of Fort Lauderdale's Community Investment Plan for Fiscal Year 2015 – 2019. 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.

- Remainder of this Page is Intentionally Blank -

Table 14
City of Fort Lauderdale Water System
5-year (FY 2015-2019) Community Investment Plan

Project Number and Title	2015	2016	2017	2018	2019	Total	Unfunded
P11484 Dixie Wellfield Raw Water Main Rplcmnt	$1,023,529	-	-	-	-	-	-
P11877 Flcc Remediation Action Plan	$467,419	-	-	-	-	-	-
P11586 C12 & 13 Interconnect - Brw Cty Intrlcl	$360,000	-	-	-	-	-	-
P11770 Se 17 St Large Water Main Replacement	$331,138	-	-	-	-	-	-
P11855 Prospect Wellfield Improvement R&R	$249,970	-	-	-	-	-	-
P11859 Annual Water Service Replacement	$249,889	-	-	-	-	-	-
P11685 Water Monitoring System (Scada)	$195,369	-	-	-	-	-	-
P11939 Prospect Wellfield Pump/ Motor Assembly	$185,000	-	-	-	-	-	-
P11405 Nw 2nd Ave Tank & Pump Station Rehab	$173,238	-	-	-	-	-	-
P11866 Dixie Wellfield	$99,951	-	-	-	-	-	-
P11720 Imperial Point Large Water Mn - Phase 2	$27,686	-	-	-	-	-	-

Table 14
City of Fort Lauderdale Water System
5-year (FY 2015-2019) Community Investment Plan

Project Number and Title	2015	2016	2017	2018	2019	Total	Unfunded
P11589 Fiveash Disinfection/ Reliability Upgrades	$4,039,752	$9,000,000	$9,000,000	$3,000,000	-	$25,039,752	-
P11246 Water Treatment Plant Repairs	$285,050	$300,000	-	-	-	$585,050	-
P11887 Nw Second Avenue Tank Restoration	$715,434	-	-	-	-	$715,434	-
P11471 Shady Banks Small Water Main Improvements	$520,208	-	-	-	-	$520,208	-
P11622 Sw 20th Ct, Sw 22 Terr, Sw 24 Ave Small Water Main	$154,346	-	-	-	-	$154,346	-
P11901 Victoria Park B- South Sm Watermains Improv	$687,549	-	-	$1,500,000	$2,440,000	$4,627,549	-
P11571 Oakland Park Beach Area Water Main	$490,479	-	-	$1,105,000	$800,000	$2,395,479	-
P12099 Comprehensive Eval & Improvements At Fiveash	-	$450,000	$3,100,000	$1,870,000	$1,000,000	$6,420,000	-
P10850 Victoria Park A - North Small Water Main Impr	$1,590,000	$1,170,000	-	-	-	$2,760,000	-
P10853 Flagler Heights - Sm Watermain Improvements	$10,000	-	-	-	-	$10,000	-

Table 14
City of Fort Lauderdale Water System
5-year (FY 2015-2019) Community Investment Plan

Project Number and Title	2015	2016	2017	2018	2019	Total	Unfunded
P11932 Aeration Basin Rehab At Fiveash Wtp	$54,093	-	-	-	-	$54,093	-
P12100 Peele-Dixie Wtp Injection Well Mit	$120,000	-	-	-	-	$120,000	-
P11719 Sunrise Blvd Middle Rvr Bridge Wm Relocate Design	$150,000	-	-	-	-	$150,000	-
P12101 Nw 2nd Avenue Pump Station Appearance Modificat	$160,000	-	-	-	-	$160,000	-
P11080 Port Condo Large Water Main Improvements	$450,000	-	-	-	-	$450,000	-
P12038 Filter Rehabilitation At Fiveash	$600,000	-	-	-	-	$600,000	-
P11858 Comprehensive Utilities Strategic Master Plan	$900,000	-	-	-	-	$900,000	-
P10851 Lake Ridge - Small Watermain Improvements	$1,140,000	-	-	-	-	$1,140,000	-
P12111 Small Water Main Resurfacing	$1,180,000	-	-	-	-	$1,180,000	-
P11856 Peele Dixie Wtp Renewal & Replacement	$350,000	$1,500,000	-	-	-	$1,850,000	-

Table 14
City of Fort Lauderdale Water System
5-year (FY 2015-2019) Community Investment Plan

Project Number and Title	2015	2016	2017	2018	2019	Total	Unfunded
P10814 Central New River Water Main River Crossings	-	$1,120,000	-	$120,000	$1,300,000	$2,540,000	-
FY 20150169 Croissant Park Small Water Mains	-	-	-	-	-	-	$2,500,000
FY 20150170 The Landings Off Bayview Drive Small Water Main Re	-	-	-	-	-	-	$1,870,000
FY 20150172 Tanbark Lane Small Water Main Replacement	-	-	-	-	-	-	$50,000
FY 20150176 Sw 29 Street Small Watermains	-	-	-	-	-	-	$50,000
FY 20150177 2535 North Federal Highway Small Watermains	-	-	-	-	-	-	$50,000
FY 20150178 Sw 1 Street (Sw 28 Ave Thru Sw 29 Ave) Small Water	-	-	-	-	-	-	$50,000
FY 20150180 Lake Estates Small Water Mains	-	-	-	-	-	-	$50,000
FY 20150181 Lauderhill Small Water Mains	-	-	-	-	-	-	$50,000
FY 20150182 Poinsettia Drive Small Water Main Improvements	-	-	-	-	-	-	$50,000

Table 14
City of Fort Lauderdale Water System
5-year (FY 2015-2019) Community Investment Plan

Project Number and Title	2015	2016	2017	2018	2019	Total	Unfunded
FY 20150183 Coral Shores Small Water Main Improvements	-	-	-	-	-	-	$50,000
FY 20150184 Coral Ridge Country Club Small Water Main Improvem	-	-	-	-	-	-	$50,000
FY 20150185 Sea Ranch Lakes Small Water Mains	-	-	-	-	-	-	$50,000
FY 20150186 Bermuda Riviera Small Water Main Improvements	-	-	-	-	-	-	$50,000
FY 20150187 Lauderdale By The Sea Small Water Main Improvement	-	-	-	-	-	-	$50,000
FY 20150188 Coral Ridge Small Water Main Improvements	-	-	-	-	-	-	$50,000
FY 20150189 Lake Aire Palm View Small Water Mains	-	-	-	-	-	-	$50,000
FY 20150190 Bay Colony Small Water Main Improvements	-	-	-	-	-	-	$50,000
FY 20150191 Laudergate Isles Small Water Main Improvements	-	-	-	-	-	-	$50,000
FY 20150219 Advanced Metering Infrastructure Implementation	-	-	-	-	-	-	$22,900,000

Table 14
City of Fort Lauderdale Water System
5-year (FY 2015-2019) Community Investment Plan

Project Number and Title	2015	2016	2017	2018	2019	Total	Unfunded
FY 20150227 Comprehensive Evaluation & Improvements At Peele D	-	-	-	-	-	-	$3,470,000
FY 20150228 Analysis Of Chemical Addition Systems At Peele Dix	-	-	-	-	-	-	$90,000
P11465 17th Street Causeway - Large Water Main Replacement	-	-	-	-	-	-	$7,300,000
P11594 Fiveash Water Treatment Plant - Chemical System	-	-	-	-	-	-	$4,000,000
P10508 Fiveash Water Plant Phase 2 Improvements	$49,983	-	-	-	-	-	-
P11932 Aeration Basin Rehab At Fiveash Wtp	$135,749	-	-	-	-	-	-
P11080 Port Condo Small Water Main Improvements	$186,998	-	-	-	-	-	-
P11622 Sw 20 Ct, Sw 22 Ter, Sw 24 Av Sml Wtr Mn	$235,148	-	-	-	-	-	-
P11828 Filters 10, 11, 12, & 13 Rehab-Fiveash	$394,546	-	-	-	-	-	-
P10851 Lake Ridge Small Water Main Improvements	$412,330	-	-	-	-	-	-

Table 14
City of Fort Lauderdale Water System
5-year (FY 2015-2019) Community Investment Plan

Project Number and Title	2015	2016	2017	2018	2019	Total	Unfunded
P11720 Imperial Point Large Water Mn - Phase 2	$190,759	-	-	-	-	-	-
P11685 Water Monitoring System (SCADA)	$468,456	-	-	-	-	-	-
P10853 Flagler Heights Small Water Main Improv	$264,321	-	-	-	-	-	-
P10850 Victoria Park A North-Small Watermains	$506,359	-	-	-	-	-	-
P11719 Sunrise Bvd Middle Rvr Bdge Wm Reloc/Des	$677,157	-	-	-	-	-	-
P11887 Nw Second Ave Tank Restoration	$745,712	-	-	-	-	-	-
P11858 Comprehensive Util Strategic Master Plan	$991,958	-	-	-	-	-	-
P10940 Sewer Area 19 Annexed Riverland W&S Mns	$151,768	-	-	-	-	-	-
P11589 Fiveash Wtp Disinfection Improvements	$4,940,181	-	-	-	-	-	-
P12050 30" Wm Replacemnt On Brow Blvd Brdg FDOT	$200,000	-	-	-	-	-	-

Table 14
City of Fort Lauderdale Water System
5-year (FY 2015-2019) Community Investment Plan

Project Number and Title	2015	2016	2017	2018	2019	Total	Unfunded
Total	**$27,511,525**	**$13,540,000**	**$12,100,000**	**$7,595,000**	**$5,540,000**	**$52,371,911**	**$42,930,000**

5.0 GOALS, OBJECTIVES AND POLICIES

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

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

The following comprehensive plan goals, objectives, and policies (GOPs) have been reviewed for consistency with the 10-year Water Supply Facilities Work Plan - 2014 Update. New GOPs to be adopted and existing GOPS to be revised are identified below.

The following GOPs have been adopted in the original Water Supply Facilities Work Plan (adopted by Ordinance C-09-01 in January 2009) and have been reviewed to see if updates are revisions are needed:

1. Coordination of land uses and future land use changes with the availability of water supplies and water supply facilities;
2. Revision of potable water level of service standards for residential and non-residential users;
3. Provision for the protection of water quality in the traditional and new alternative water supply sources;
4. Revision of priorities for the replacement of facilities, correction of existing water supply and facility deficiencies, and provision for future water supply and facility needs;
5. Provision for conserving potable water resources, including the implementation of reuse programs and potable water conservation strategies and techniques;
6. Provisions for improved or additional coordination between a water supply provider and the recipient local government concerning the sharing and updating of information to meet ongoing water supply needs;

7. Coordination between local governments and the water supply provider in the implementation of alternative water supply projects, establishment of level of service standards and resource allocations, changes in service areas, and potential for annexation;
8. Coordination of land uses with available and projected fiscal resources and a financially feasible schedule of capital improvements for water supply and facility projects;
9. Additional revenue sources to fund water supply and facility projects;
10. Coordination with the respective regional water supply plan;
11. Update the Water Supply Facilities Work Plan within 18 months following the approval of a regional water supply plan; and
12. Concurrency requiring water supplies at the building permit stage.