City of
DEERFIELD
BEACH

COMPREHENSIVE PLAN

UTILITIES ELEMENT:

SANITARY SEWER, SOLID WASTE, STORMWATER MANAGEMENT, POTABLE WATER AND NATURAL GROUNDWATER AQUIFER RECHARGE

VOLUME 5.0

DEPARTMENT OF PLANNING AND DEVELOPMENT SERVICES

UTILITIES ELEMENT
OF THE
DEERFIELD BEACH COMPREHENSIVE PLAN
August 18, 2015

Prepared by the
City of Deerfield Beach
and
CH2MHill

In compliance with the Local Government Comprehensive Planning and Land Development Regulation Act and Florida State Statue Chapter 163

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5.0 UTILITY ELEMENT

EXECUTIVE SUMMARY

The following section is an executive summary of the Utilities Element of the City of Deerfield Beach Comprehensive Plan. The element includes sub-elements for sanitary sewer, solid waste, stormwater management, potable water, natural groundwater aquifer recharge, and includes a 10-Year Water Supply Facilities Work Plan (Work Plan), to strengthen the link between land use and water supply planning. The sub-elements have been prepared by Hazen and Sawyer, P.C. with assistance from staff. The Plan has been prepared in response to the Local Government Comprehensive Planning and Land Development Regulation Act.

SANITARY SEWER

Level of Service

Goals, objectives and policies have been formulated to assure residents that adequate sanitary sewer services are provided in the City. The level of service (LOS) to be adopted for the City's service area is 126 gallons average annual daily flow per capita of permanent population. Non-residential flows are included in this factor.

Operations

The City owns and operates the wastewater collection and transmission facilities and contracts with Broward County for treatment of wastewater. Sanitary sewer services are provided to most areas of the City. Those areas not served by the City system are served by Broward County at the same wastewater treatment facility. Only 11 septic tanks remain in the City limits.

Treatment

The 2004 average day wastewater flow was 6.97 mgd. The flows are expected to reach 8.6 mgd by 2025. The City has 7.0 mgd reserve capacity at the County's regional facility, with an additional 2.0 mgd reserved through May 2007. To meet projected needs, the City will have to secure an additional 2.0 mgd of permanent reserve capacity by 2010. At a minimum, the City will require a total permanent reserve capacity of 8.0 mgd by 2010 and 9.0 mgd by 2020.

Transmission

The transmission system currently does not experience any major problems other than routine maintenance. There is approximately 10,000 to 14,000 linear feet (LF) of sewer pipe that is scheduled for lining. In addition, there are 19 sewer manholes identified for rehabilitation to assist in reducing the amount of infiltration into the sewer system. Six lift stations are scheduled for rehabilitation and/or replacement.

Implementation

A summary of capital improvements necessary for the implementation of the plan includes:

- Lift Station No. 12 – This station has antiquated pumps and motors, control panel, piping check valves and plug valves. The wet well is also leaking.

- Lift Station No. 13 – This station has antiquated pumps and motors, control panel, piping check valves and plug valves. The wet well is also leaking.

- Lift Station No. 25 – This station has antiquated pumps and motors, control panel, piping check valves and plug valves. The wet well is also leaking. In addition, the wetwell needs to be increased in size to handle additional capacity that will be diverted from lift station No. 54.

- Lift Station No. 54 – The wetwell is located in the middle of a roadway which poses a safety concern. The wetwell will be converted to a manhole and flow will be diverted to Lift Station No. 25.

- Lift Station No. 61 – This station has antiquated pumps and motors, control panel, piping check valves and plug valves. This station also needs to be converted from a can station to a submersible station.

- Lift Station No. 64 – This station has antiquated pumps and motors, control panel, piping check valves and plug valves. This station will also be converted into a submersible station.

- 10,000 – 15,000 LF of sewer lines to be TV inspected and subsequently lined.

- Rehabilitation of 19 sewer manholes.

SOLID WASTE

Level of Service

Goals, objectives and policies have been formulated that assure adequate solid waste disposal capacity will be provided to the City by Broward County, under the existing interlocal agreement for resource recovery. This agreement guarantees disposal capacity of the total volume of solid waste tipped by the City, regardless of what that volume is and regardless of the volume of waste generated per capita. The adopted LOS for the City's solid waste service is 5.4 lbs per capita per day for collection, and 7.0 lbs per capita per day for disposal.

Operations
The City is responsible for regular garbage collection, bulk trash and yard trimming collection, recyclables collection and education and referral programs. The City does not own or operate any solid waste disposal facilities. The City serves the entire City, including those areas annexed from unincorporated Broward County.

Implementation

A summary of capital improvements necessary for the implementation of the plan includes:

- Purchasing new commercial containers and /or dumpsters.

- Purchasing new equipment including three boom trucks, one side loader, five front-loaders, two curb sorters/trough loaders, four compactors and one garbage truck.

STORMWATER MANAGEMENT

Level of Service
Stormwater quantity, quality, and flood protection are all important factors in stormwater management. Stormwater management in the City is primarily the responsibility of the South Florida Water Management District (SFWMD), the Broward County Environmental Protection Department (EPD), and the City Department of Public Works. Stormwater management level of service is based on the amount of drainage a development can manage for a given storm for a given period of time. The level of service that is adopted in the City is dictated by SFWMD, EPD, the City Code and the Florida Building Code.

Implementation

The City's stormwater management department needs additional funding and resources to remain in compliance with certain codes – particularly for Broward County. The City will evaluate the feasibility of implementing a stormwater utility within its service area to help fund needed improvements throughout the City. At a minimum, a stormwater master plan should be completed by 2010.

Drainage problems that cause potential loss of health or property are the priority problems that the City will address. A list of capital projects that are the responsibility of the City has been prepared and included in the plan. Projects that are not the responsibility of the City, will be addressed by the responsible entity, however, the City must ensure that the projects are carried out and the City's level of service is maintained. The public works department will maintain its street cleaning program to help meet the City's levels of service for stormwater discharge quality.

In addition, a summary of capital improvements necessary for the implementation of the plan includes:

- The 8th Avenue flood control project
- Acquire land for flood control/green space areas
- Miscellaneous drainage maintenance projects

POTABLE WATER

Level of Service

Goals, objectives and policies have been formulated to assure residents that adequate potable water services are provided in the City. The level of service to be adopted for the City's service area is 175 gallons per person per day for average annual residential service, 224 gallons per person per capita day (gpcd) on an average day basis, and 265 gallons per person per day for maximum daily flow for system-wide service, including non-residential demands. Water pressures will be maintained at a minimum of 20 psi during fire fighting activities and a minimum of 40 psi under normal operating conditions.

Water treatment capacity for customers who are within the city limits but served by the Broward County system is set by the county, according to the Broward County Comprehensive Plan. The County's potable water level of service is based on maximum day demand. Maximum day demand is defined by existing customers average daily flow added to prior committed flow plus potential average daily flow, multiplied by a maximum day factor.

Operations

The city owns and operates the potable water supply, treatment and distribution systems. Potable water services are provided to most areas of the City. Those areas not served by the City are served by Broward County.

Treatment

Finished average day and maximum monthly water demands for the City are anticipated to approach 10.35 MGD and 388 million gallons per month respectively by the 2030 planning horizon. To meet these demands, the City has recently completed a comprehensive construction program, incorporating many of the initiatives recommended by the South Florida Water Management District (SFWMD) published in its 2013 update of the Lower East Coast Water Supply Plan (LECWSP).

One important measure taken by the City has involved reducing withdrawals from the East Wellfield to control saltwater intrusion in the Biscayne Aquifer. Withdrawals were reduced by abandoning eight production wells at the East Wellfield, and transferring the withdrawals to the West Wellfield with installation of two high capacity (2,800 gallons per minute) production wells in the Biscayne Aquifer. The City also diversified its raw water supplies by installing two

production wells in the Floridan Aquifer System at the West Wellfield between 2008 and 2010. In addition to modifying its raw water supplies, the City has emphasized water conservation practices throughout its service area with measureable results. Per capita usage declined nearly 21 percent from 223 to 177 gallons per day (gpd) between 2000 and 2010.

In 2012, the City de-commissioned the East WTP and closed the Lime Softening treatment facility in the plant, while adding a 3.0-mgd Reverse Osmosis (RO) treatment process to the West WTP. These measures increased the treatment capacity of the West WTP to 21.0 mgd. Treatment processes at the West WTP now comprise of lime softening, reverse osmosis, and nanofiltration. The finished water produced from each process is blended in the ratio of 36 percent from lime softening, 14 percent from RO, and 50 percent from nanofiltration, prior to delivery into the City's distribution system. The City will be constructing a 4.0-million gallon (MG) ground storage tank, and a pump station at the location of the former East WTP to store and transfer raw water to the West WTP.

Water Supply

In the late 1980's and early 1990's, the City's east wellfield experienced salt water intrusion which has led to reduced permitted withdrawals. The groundwater withdrawal rate in the east well field is limited to 355.4 million gallons per month (3,184 million gallons per year) to sustain production safely in the long run. To make up for the lost capacity and to meet future demands, the City is currently underway with the design of two Floridan Aquifer Wells (one existing 1.0 mgd Floridan Aquifer production well will be equipped, and one new Floridan Aquifer production well, yielding a total of 5.0 mgd, will be constructed). The City is also in the process of constructing two new Biscayne Aquifer wells. The construction of these wells does not allow the City to withdraw more than the permitted capacity, but will provide reliability in the western wellfield in case one of the four existing wells is out of service. These additional wellfield improvements are anticipated to be complete by 2010.

Distribution

A hydraulic computer modeling effort undertaken in the late 1990's indicated that there are no significant hydraulic deficiencies in the City's distribution system. The model took into account the planned conversion of the East Water Treatment Plant to a remote storage and repumping facility, and sized proposed pumps and storage adequately to meet all required fire flow and pressure conditions throughout the City. In addition, the City is in the process of replacing existing 2-inch diameter water mains with larger 6-inch diameter mains. This is an on-going project throughout the City and should be completed by 2020.

Implementation

A summary of the capital improvements necessary for the implementation of the potable water plan includes:

- Wellfield Improvements – two Biscayne Aquifer wells, two Floridan Aquifer wells and new transmission mains.

- Conversion of the East WTP to a remote storage and booster station.
- Construct the deep injection well for membrane concentrate disposal.
- Replace the existing membrane elements.
- Upgrade 2-inch diameter lines and miscellaneous system repairs.
- Construct Reverse Osmosis membrane facility.

NATURAL GROUNDWATER AQUIFER RECHARGE

Background

The Biscayne Aquifer is the City's main source of potable water. The City is planning to begin using the Floridan Aquifer water as a raw water source. Therefore, the quantity and quality of the groundwater must be carefully protected.

Quantity

The quantity of water in the Biscayne Aquifer must be protected on a regional basis. The SFWMD is responsible for coordinating this effort. SFWMD locates and regulates the prime recharge areas that lie west of the City limits. The City participates in protecting groundwater quantity by maintaining recharge functions within the City limits. All green spaces, such as undeveloped acreage, conservation area, parks, golf courses, and lawns serve as potential recharge sites. Redevelopment east of I-95 will also be evaluated for recharge opportunities.

Quality

The quality of the groundwater near the City's well fields is of crucial importance to the City. Protecting groundwater quality is currently the responsibility of the County through the Well Field Protection Ordinance. However, since the issue is of more importance to the City than to the County, the City should take a stronger role making sure the ordinance is fully enforced. This can be accomplished via the establishment of recharge areas and green space within the protection zone.

Implementation

The plan to protect the function of the natural groundwater aquifer will involve implementing the stormwater management plan to promote recharge rather than run off; reserving green space in the City to protect groundwater quantity; and implementing the City's program to regulate and monitor the quality of groundwater near the City's well fields. This program identifies the areas that are in strategic positions to the wells and either rezoning them or restricting the handling of hazardous substances in their development.

5.1 INTRODUCTION

SANITARY SEWER, SOLID WASTE, STORMWATER MANAGEMENT, POTABLE WATER, AND NATURAL GROUNDWATER AQUIFER RECHARGE

The City of Deerfield Beach has prepared a Comprehensive Plan in response to the Local Government Comprehensive Planning and Land Development Regulation Act (Chapter 163.311(6)c, Florida Statutes (FS) and to provide for more effective management of growth, redevelopment and the provision of municipal services. The purpose of the Act and the intent of the Deerfield Beach Comprehensive Plan (Plan) are to use and strengthen the role of local governments in establishing, implementing, and financing programs to control future development for the well being of the public.

Additional requirements to strengthen the link between land use and water supply planning were made by the 2005 state legislature, including the requirement for identification of any traditional and alternative water supply projects (AWS), as well as conservation and reuse programs necessary to meet projected water demands. Also included were the requirements that local governments: revise their Plans within 18 months after the approval of a regional water supply plan or its update; 2) prepare a minimum 10-Year Work Plan for building water supply facilities to serve existing and new development within their jurisdiction; and 3) adopt the Work Plan into the comprehensive plan. The Utilities Element's goals, objectives and policies have modified to support and adopt the Work Plan as attached per Appendix A: 10-Year Water Supply Facilities Work Plan.

The Utilities Element which includes Sanitary Sewer, Solid Waste, Stormwater Management, Potable Water and Natural Groundwater Aquifer Recharge sub-elements, is one of nine elements in the City's Comprehensive Plan. The purpose of this element is to present the City's plans for meeting the current and future demands for utility services in Deerfield Beach. The element defines the goals, objectives, and policies for utilities, discusses the consistency of the element, and describes the data, analysis, and strategies to implement necessary changes for each utility in the element.

The Utilities Element has been prepared jointly by the City of Deerfield Beach and Hazen and Sawyer, P.C. The materials presented in this element have been prepared to satisfy all applicable portions of Chapter 9J-5.011 of the Florida Administrative Code (FAC) relating to data and analysis requirements of local government's utility systems.

5.2 GOALS, OBJECTIVES AND POLICIES

This section presents the goals, objectives, and policies of the Utilities Element. Separate goals, objectives and policies, including levels of service for the Sanitary Sewer, Solid Waste, Stormwater Management, Potable Water, and Natural Groundwater Aquifer Recharge Sub-elements are included. Chapter 9J-5.003, F.A.C. defines goals, objectives, policies and levels of service in the following way:

> GOAL: the long-term end toward which programs or activities are ultimately directed.
>
> OBJECTIVE: a specific, measurable, intermediate end that is achievable and marks progress toward a goal.
>
> POLICY: the way in which programs and activities are conducted to achieve an identified goal.
>
> LEVEL OF SERVICE: an indicator of the extent or degree of service provided by, or proposed to be provided by a facility based on and related to the operational characteristics of the facility. Level of service shall indicate the capacity per unit of demand for each public facility.

Pursuant to Chapter 163, FS, the goals, objectives, policies and levels of service, as part of the comprehensive plan, will be adopted by the City. As such they will become a commitment made by the City to provide services of a defined quantity or quality. The City plans to provide utility services that meet or exceed the level of service adopted in this element. These plans will involve correcting existing deficiencies, as well as expanding services as necessary to meet the demands of growth. In the event that the level of service provided by the City falls short of the defined and adopted level of service, action will have to be taken by the City to correct the deficiency.

To be certain that the City is following the adopted plan, Chapter 163, FS requires that the progress be monitored and evaluated at least every seven years. The Act also requires annual monitoring of the levels of service provided and corresponding updates of the Capital Improvements Element.

The goals, objectives, policies and required level of service for the five utilities follow in this section. The rationale and accompanying discussion behind the level of service, as well as explanations and clarification of ideas and definitions of special terms, follow this section in the respective support documents for each utility.

5.2.1 SANITARY SEWER

GOAL UT 1.0: The City of Deerfield Beach will secure adequate capacity for treatment and disposal of wastewater, install and maintain adequate wastewater collection and transmission facilities, take steps to minimize per capita wastewater flows, maintain sufficient and equitable financing to provide these services, eliminate septic tanks that may cause pollution within the City's direct service area, and coordinate with Broward County to achieve this goal in those parts of the City served by Broward County.

Objective UT 1.1: Adequate Treatment and Disposal Capacity. The City of Deerfield Beach will seek to secure reserve capacity at the Broward County North Regional Wastewater Treatment Plant that is adequate to meet or exceed the City's level of service standard. The expected reserve capacity needs will be 8.6 mgd by 2025. The demand is based on the level of service standard and is subject to change if the City's rate of population growth is inconsistent with the forecasts.

Policy UT 1.1.1: The level of service standard for wastewater treatment and disposal capacity for customers served by the City system will be 126 gallons average annual daily flow, per capita of permanent population. This standard is equal to the level of service the City provided in 2004.

The level of service standard for wastewater treatment and disposal capacity for customers living in the City limits, but served by the Broward County utility system are set by the County per their Comprehensive Plan.

Policy UT 1.1.2: The City will renegotiate the existing agreement with Broward County to secure adequate wastewater treatment and disposal capacity.

Objective UT 1.2: Adequate and Efficient Collection and Transmission Facilities. The City of Deerfield Beach will provide collection and transmission services for residential and non-residential customers adequate to meet projected flows.

Policy UT 1.2.1: New transmission facilities will be sized to meet year 2025 conditions, including expected redevelopment.

Policy UT 1.2.2: Development and redevelopment that is consistent with other goals, objectives and policies of the City will be encouraged in areas presently served adequately by existing sanitary sewer facilities.

Policy UT 1.2.3: The annual maintenance program will identify needs for renewal, replacement, and betterment. Capital improvements considered necessary to maintain the system in good working condition will be included in the capital improvement element updates and made as necessary.

Policy UT 1.2.4: A master plan for facility expansion and improvement will be updated and implemented by the year 2010.

Objective UT 1.3: Minimize Wastewater Flows. The City of Deerfield Beach will keep wastewater flows resulting from infiltration and inflow within EPA guidelines of acceptable levels.

> **Policy UT 1.3.1:** Estimates of infiltration and inflow will be made every 5 years to determine rates and locations. Where feasible, within the course of normal utility maintenance, system improvements will be made to reduce these levels.

Objective UT 1.4: Financing of System Improvements and Operations. The City of Deerfield Beach will fund sanitary sewer system capital improvements, replacement and rehabilitation, and operation and maintenance costs such that these costs are borne by customers on the basis of cost-of-service.

> **Policy UT 1.4.1:** The sanitary sewer system will be operated as an enterprise, such that all costs will be borne by customers. The rate schedule for sanitary sewer services will be based on public utility cost-of-service principles.
>
> **Policy UT 1.4.2:** Costs for providing service to new customers will be borne to the maximum extent possible by these new customers through a connection charge.
>
> **Policy UT 1.4.3:** The City will fund renewal, replacement, and betterment of the system to maintain the system in good working condition.

Objective UT 1.5: Elimination of Septic Tanks. All pollution-causing septic tank systems will be eliminated within the City limits by the year 2010.

> **Policy UT 1.5.1:** City and County sewer service will continue to be provided to all areas within the City.
>
> **Policy UT 1.5.2:** New septic tanks will not be permitted in the City after June 1, 1989.
>
> **Policy UT 1.5.3:** Existing businesses and residences that are on septic systems must connect to the sanitary sewer system within 180 days of notice that sanitary sewer services have become available provided the sewer is within 100 feet of the property line.

Objective UT 1.6: A capital improvement program to eliminate existing deficiencies will be implemented according to the schedule presented in the CIE.

Policy UT 1.6.1: Priorities for replacement, correcting existing deficiencies, and providing for future needs will be made according to need and urgency. The need and urgency shall be determined by the Department of Engineering and Utilities through a master planning process. The priorities shall be reflected in the CIE such that the most needed and urgent improvements shall be implemented first. Issues related to public health shall receive first priority, issues related to providing the standard level of service shall receive second priority, and all other issues shall be implemented as needed to keep the system operationally efficient.

5.2.2 SOLID WASTE

GOAL UT. 2.0: The City of Deerfield Beach will maintain secured capacity for disposal of its solid waste, maintain adequate and efficient collection services, minimize the amount of solid waste to be disposed and maintain sufficient and equitable financing measures to provide collection and disposal services that satisfy the demands of the system's customers.

Objective UT 2.1: Adequate Collection Services. The City of Deerfield Beach will provide sufficient collection services to meet the projected needs of residential and non-residential customers.

Policy UT 2.1.1: Current services for curbside and container collections, will be maintained and collection capacity shall remain flexible enough to expand on an annual basis as growth and waste generation increases, but shall not drop below the adopted level of service standard of 5.4 pounds per capita per day for collection equipment and facilities.

Policy UT 2.1.2: The current services and level of service standard for curbside and container collection will be provided concurrent with future development, redevelopment, and annexation.

Policy UT 2.1.3: An on-going preventative maintenance program will be initiated to ensure proper, timely repair, and maintenance of equipment.

Objective UT 2.2: Adequate Disposal Capacity. The City of Deerfield Beach will continue to secure disposal capacity at regional disposal facilities that is adequate to serve its projected needs.

Policy UT 2.2.1: The City will honor and maintain the existing Interlocal Agreement with Broward County which effectively secures adequate capacity for its projected needs at existing and planned regional disposal facilities. The agreement secures capacity to handle all of the City's solid waste disposal needs and therefore provides the City with the capacity to meet its hereby adopted level of service standard for solid waste disposal facilities of 7.0 pounds per capita per day through the year 2025.

Policy UT 2.2.2: Upon request, the City will provide appropriate county officials with local waste disposal information necessary for planning regional disposal facilities.

Policy UT 2.2.3: The City will continue to provide input for regional solid waste facility planning through continued membership and participation with the County's Resource Recovery Board.

Objective UT 2.3: The City shall continue to recycle 30% of its solid waste stream by increasing its recycling program.

Policy UT 2.3.1: The City will continue to provide residential and commercial recyclable collection services and public education on methods, procedures, and benefits of recycling as part of its residential waste management program.

Policy UT 2.3.2: The City will continue to participate with Broward County in the use of a resource reduction and recovery system, for non-diverted solid waste.

Policy UT 2.3.3: The City will coordinate and participate in programs designed to collect and dispose of small volume hazardous wastes.

Policy UT 2.3.4: The City will coordinate and participate in programs to find alternative methods for disposing of materials no longer acceptable at landfills in accordance with Florida Statutes, Section 403.

Objective UT 2.4: Protect the functions of the City's groundwater aquifer recharge areas and other natural resources from improper disposal of solid waste.

Policy UT 2.4.1: The City shall continue to maintain Chapter 27 "Pollution Control," Article VI, "Solid Waste," Broward County Code of Ordinances, as it relates to the licensing and compliance of solid waste facilities.

Policy UT 2.4.2: Solid Waste management facilities shall be designed, constructed, operated, and maintained so as not to exceed established water quality standards.

Objective UT 2.5: Financing of System Improvements and Operations. The City of Deerfield Beach will fund solid waste collection and disposal capital improvements, replacement and rehabilitation, and operation and maintenance costs such that these costs are borne by system customers on the basis of the cost-of-service.

Policy UT 2.5.1: The City will continue to conduct and implement cost-of-service rate and fee analyses as the basis for recovering costs incurred for solid waste management operations.

Policy UT 2.5.2: The City accounts for solid waste expenditures on a cost-of-service basis, to meet reporting requirements, under Florida Statutes Section 403.

Policy UT 2.5.3: The City operates the solid waste system as an enterprise, such that all costs are borne by customers and the rate schedule is based on public utility cost-of-service principles.

5.2.3 STORMWATER MANAGEMENT

GOAL UT 3.0: The City of Deerfield Beach will continue to secure, maintain, and finance an integrated stormwater management system which reduces the damage and impact from flooding, promotes the recharge of the Surficial Aquifer System (SAS), improves and protects water quality in surface and ground waters, including the functions of urban wetlands, and meets the requirements of designated land uses.

Objective UT 3.1: Adequate Facilities. Stormwater drainage facilities sufficient to keep damage to public and private property within the defined level of service will be constructed and maintained throughout the City.

Policy UT 3.1.1: The level of service for drainage in the City of Deerfield Beach will be consistent with Chapter 62-25, F.A.C. and the regulations of the South Florida Water Management District, Broward County and the Florida Building Code. This policy may be amended after the capacity of the drainage facilities is determined in the City's recommended stormwater master plan.

All developments must meet the requirements of the Florida Building Code. All developments of 10 acres or more must meet South Florida Water Management District and Broward County requirements for drainage to receive permits necessary for development approval. These regulations include:

a. Drainage discharge quantity shall be determined from a three day 25 year design storm. Peak runoff shall not exceed 35 cubic feet per second per square mile. In no case shall off-site discharge exceed the inflow limit of SFWMD primary receiving canal or the local conveyance system, whichever is less.

b. Flooding in new structures will be minimized by requiring the lowest floor elevation of the building to be no lower that the elevation for the respective area depicted on the 100-Year Flood Elevation Map or the FEMA Base Flood Elevation, whichever is higher.

c. Street flooding will be minimized by requiring that new or reconstructed residential streets (with 50-ft. or less wide rights-of way) to have crown elevations no lower than the elevation for the respective area depicted on the ten year "Flood Criteria Map". Rights of way greater than 50 feet wide shall have an ultimate edge of pavement no lower than the elevation for the respected area depicted on the 10 year "Flood Criteria Map".

d. Water quality shall be considered preserved when ½-inch of stormwater runoff is retained on-site.

Policy UT 3.1.2: New stormwater drainage facilities will be constructed by the appropriate governmental entity to minimize existing drainage deficiencies.

Policy UT 3.1.3: All future land use, zoning, and development decisions will incorporate considerations for the provision of adequate stormwater drainage facilities. The development review process will include drainage quantity and quality considerations.

Policy UT 3.1.4: Development and redevelopment activities will be encouraged in areas already served with adequate stormwater drainage facilities to encourage compact urban growth patterns.

Policy UT 3.1.5: The City's annual maintenance and evaluation program will be continued to identify needs for replacement and improvement to the City's stormwater drainage system and identify needed expansions to the City's existing system.

Policy UT 3.1.6: Drainage problems that cause property damage, first floor structure flooding or traffic hazards will be classified as priority projects and will be corrected by the appropriate governmental entity to the level of service standard.

Policy UT 3.1.7: Drainage problems that do not cause property damage or public hazards will be classified as nuisance flooding and will not be considered priority projects for corrective action by the City.

Policy UT 3.1.8: A regular program of street cleaning will be maintained by the City on major streets.

Policy UT 3.1.9: Miscellaneous facilities such as open ditches will be cleaned on an as-needed basis. Cleaning will be done by or coordinated through the City's Environmental Services Department.

Policy UT 3.1.10: The City will inform the State or County of problems with drainage facilities within the City that are owned by these entities. The City will cooperate with these entities as they repair and maintain their facilities within the City limits.

Policy UT 3.1.11: Priorities for replacement, correcting existing deficiencies, and providing for future needs will be made according to need. The need shall be determined by the Department of Environmental Services through the stormwater master planning process.

Objective UT 3.2: Stormwater management facilities shall be designed, constructed and operated in a manner that protects, conserves, and enhances potable water resources, including the abatement of saltwater intrusion.

Policy UT 3.2.1: The City shall work with the South Florida Water Management District (SFWMD) to implement applicable portions of the 2013 LECWSP Update intended to reduce losses of excess stormwater to tide, recharge the surficial aquifer system (SAS) and provide additional storage to surface waters.

Objective UT 3.3: Protect Receiving Waters. The City of Deerfield Beach will protect receiving bodies of water from contamination resulting from direct discharges of stormwater runoff. The City will continue to participate in the area wide National Pollutant Discharge Elimination System (NPDES) program to control and maintain adequate surface water quality.

Policy UT 3.3.1: The development review process will include an evaluation of the water quality of drainage discharge.

Policy UT 3.3.2: Appropriate stormwater management facilities will include, but not be limited to, those which emphasize the reduction of the peak runoff rate, runoff volume, and water pollution (particularly sediment).

Policy UT 3.3.3: Stormwater runoff will be minimized by promoting site plans that maximize infiltration by percolation into lakes, ponds, grassy swales, medians, golf courses, landscape areas, nurseries, parks, lawns, etc.

Policy UT 3.3.4: Exfiltration drains will be used to alleviate small drainage problems in currently developed areas whenever possible.

Policy UT 3.3.5: All new site plans must have approval (or letter of exemption) from the appropriate State, County and/or City agencies.

Policy UT 3.3.6: All new development will have approved detailed construction plans which include drainage facilities and identify all areas of recharge.

Policy UT 3.3.7: Redesigned and proposed inlets, catch-basins, and drainage control structures shall include sediment settling basins which can be cleaned of deposits. Sediments will be disposed of at appropriate sites.

Policy UT 3.3.8: Retention and/or detention in new developments will conform to the water quality requirements of Chapter 62-3, FAC, as amended.

Objective UT 3.4.: Financing of System Improvements and Operations. Since drainage benefits all areas of the watershed which are served by a particular facility, the City of Deerfield Beach will allocate stormwater drainage system capital improvements, replacement and rehabilitation, and operation and maintenance costs such that costs are borne as equitably as possible by all residents of the City.

Policy UT 3.4.1: The City shall coordinate its improvement plans with those of the State and County.

Policy UT 3.4.2: Developers will pay a fair share of the total cost of design and construction of drainage necessitated by a new development.

Policy UT 3.4.3: Drainage problems will be corrected in the most cost effective manner.

Policy UT 3.4.4: The City shall evaluate the feasibility of establishing a stormwater utility to assist in financing the capital improvements projects required for stormwater management.

Objective UT 3.5: The concurrency management stormwater drainage regulations contained in the City's land development code will provide for protection of natural resources stormwater management systems compatible with the City's drainage sub-element.

Policy UT 3.5.1: The City Planning Department will prepare amendments to the stormwater drainage provisions of the land development code to ensure that new developments are required to meet concurrency management requirements of Rule 62-25, Florida Administrative Code, as necessary.

5.2.4 POTABLE WATER

GOAL UT 4.0: The City of Deerfield Beach will secure and maintain adequate potable water treatment and distribution facilities for its current and future utility service area residents and businesses, including large users, take steps to minimize per capita increases in demands, maintain sufficient and equitable financing to provide these services and provide adequate fire flows.

Objective UT 4.1: Adequate Water Supply and Treatment Capacity. The City of Deerfield Beach will continue to secure raw water supplies and treatment capacity sufficient to meet or exceed its short and long term potable water supply needs, by providing an adequate potable water system which meets all applicable federal, state and local water quality standards, and does not compromise the sustainability of the regional's water resources, or ability to supply water in the future.

Policy UT 4.1.1: The City will strive to ensure the adequacy of water supply facilities and infrastructure to effectively capture, store, treat and distribute potable water under variable climate conditions, including changes in rainfall patterns, sea level rise projections and flooding with potential water quality and quantity impacts.

Policy UT 4.1.2: The City will participate in intergovernmental coordination of sub-regional water supply projects and the development of alternative water supply projects incorporating sea level rise projections.

Policy UT 4.1.3: To increase the coordination between land use and water supply planning, as required by Chapter 163 Florida Statutes, the City hereby adopts by reference the 10-Tear Water Supply Facilities Work Plan, on August 18, 2015 and as included as Appendix A of the Utilities Element.

Policy UT 4.1.4: Prior to approval of a building permit, the City shall consult with the appropriate water supplier to determine whether adequate water supplies to serve the new development will be available, no later than the anticipated date of issuance of a certificate of occupancy.

Policy UT 4.1.5: The level of service (LOS) standard for water supply and treatment capacity for customers served by the City system will be 175 gallons per person per day for average annual residential service, and 224 gallons per person per capita day (gpcd) on an average day basis, and 265 gpcd for maximum daily flow for system-wide service, including non-residential demands.

The LOS standard for BCWWS potable water facilities shall be the Florida Department of Environmental Protection Permitted Capacity of the facility. The permitted capacity of the District 2 water treatment plant is 30.0 mgd. Permitted capacity is defined in terms of maximum day demand. The LOS for source of supply is maximum monthly demand plus in-plant uses. District 2 current source of supply (Biscayne aquifer) is permitted at 25.6 mgd, maximum day finished water until March 1, 2013 and 22.4 mgd thereafter.

Policy UT 4.1.6: In order to protect and conserve the Surficial Aquifer System, and limit demands on the regional water management system, the City shall investigate the development of alternate water sources (AWS) to supplement and broaden future water supply sources. These potential sources could include the increased use of reclaimed water when available, conservation, development of the Floridan Aquifer, improved operations to increase stormwater reuse and aquifer recharge, and other management strategies, which may be reflected in the 2013 LECWSP Update, or per future updates.

Policy UT 4.1.7: The City will continue to construct AWS projects which are sufficient to meet its 2030 LOS potable water needs.

Policy UT 4.1.8: The City will meet or exceed the potable water quality requirements of Federal and State regulations as they become effective.

Since Federal and State water quality regulations are subject to change, and these changes cannot be anticipated in advance of their adoption, the costs associated with meeting these regulations cannot be accurately estimated in advance. The Capital Improvements Element of the City will include estimates of the costs of meeting expected regulations, but these estimates are subject to change as water quality regulations are passed. The City will reconsider anticipated regulations each year as the Capital Improvements Element is updated.

Objective UT 4.2: Utilize existing potable water facilities to the extent permitted and encourage compact urban growth patterns.

Policy UT 4.2.1: The City shall continue to utilize the development review process of the Land Development Code to require applicants for development permits within the City's service area, to enter into an agreement to "tie-in" to existing facilities or construct improvements to the City's potable water system necessitated by the proposed development, when adequate facilities, (based on the adopted LOS standards) are not available and no fiscally feasible plan to construct or expand said facilities is proposed.

Policy UT 4.2.2: The City shall recommend the denial of future land use map amendments that could result in increased densities or intensities if:

a. Plans do not demonstrate that adequate water supplies and associated public facilities will be available to meet projected growth demands.

b. There is not a reasonable expectation that a consumptive use permit (CUP) for will be issued by the SFWMD for the proposed source.

c. Plans to extend and/or develop potable water resources and facilities do not include a financially feasible capital improvement program.

Policy UT 4.2.3: When evaluating alternatives to new potable water facility construction, or retrofitting existing infrastructure, the City shall assess, identify, and evaluate the costs and benefits of adaption alternatives when implementing policies for the increased efficiency and capacity of existing facilities while balancing operational, economic and environmental effects, as part of long-term water supply planning.

Objective UT 4.3: Adequate and Efficient Distribution Facilities. The City of Deerfield Beach will provide distribution services to its potable water customers which are adequate to meet flow levels as projected in the City's Work Plan.

The level of service standard for water distribution pressure will be a minimum of 20 psi during fire flow conditions and 40 psi during normal operating conditions.

Policy UT 4.3.1: Development and redevelopment that is consistent with other goals, objectives and policies of the City will be encouraged in areas adequately served by existing water transmission.

Policy UT 4.3.2: An annual maintenance program will identify system needs for renewal, replacement, and betterment. Capital improvements considered necessary to maintain the system in good working condition will be made on a timely basis.

Policy UT 4.3.3: New distribution facilities will be sized to meet the Work Plan's 2030 conditions, including expected redevelopment.

Policy UT 4.3.4: Facility expansion and improvements, as identified in the Work Plan will be updated and implemented per the annually adopted; CIE's Five-Year Schedule of Capital Improvements.

Objective UT 4.4: Conserve potable water by optimizing the utilization of water through effective water management practices.

Policy UT 4.4.1: The City shall follow Chapter 36, "Water Resources and Management," Article II, "Water Emergencies." Section 36-55, "Restrictions on landscape irrigation," Broward County Code of Ordinances, which imposes year-round, county-wide landscape irrigation restrictions.

Policy UT 4.4.2: The City shall continue to enforce Section 98-80 (e) xeriscaping requirement, which addresses landscaping and incorporates the SFWMD's xeriscape guidelines.

Policy UT 4.4.3: The City's Building Division shall enforce Chapter 46, "Plumbing," Section 46-14.13, Table 46 R2 The South Florida Building Code, Broward Edition, which contains standards for ultra-low volume plumbing fixtures to be used in all new construction.

Policy UT 4.4.4: The City shall implement a leak detection program to reduce the amount of unaccounted-for water loss within its system.

Policy UT 4.4.5: The City shall implement a year-round public information and education program promoting water conservation.

Policy UT 4.4.6: The City shall study and develop a program to further promote conservation of water resources in concert with its C.U.P. and the 2013 LECWSP Update requirements.

Objective UT 4.5: Financing of System Improvements and Operations. The City of Deerfield Beach will fund potable water system capital improvements, replacement and rehabilitation, and operation and maintenance costs such that costs are borne by customers on the basis of the cost-of-service.

Policy UT 4.5.1: The potable water system will be operated as an enterprise, such that all costs will be borne by customers. The rate schedule for water services will be based on public utility cost-of-service principles and include incentives for water conservation.

Policy UT 4.5.2: Costs for the extension of service to new customers will be borne to the maximum extent possible by those new customers through a connection charge, or impact fee, system.

Policy UT 4.5.3: The City will fund renewal, replacement, and betterment of the system to maintain the system in good working condition.

Objective UT 4.6: Fire Protection. The City of Deerfield Beach will provide an adequate water supply, transmission system with hydrants, and system pressures to fight fires in the City.

Policy UT 4.6.1: The water storage capacity of the City will be sized to adequately meet peak hour fire flows as defined by the City by the Insurance~~s~~ Services Office.

Policy UT 4.6.2: The transmission lines will be sized to adequately deliver adequate fire flows in all areas served by the City.

Policy UT 4.6.3: Fire hydrants will be spaced throughout the City in accordance with the Land Development Code, Chapter 98, Article II.

Objective UT 4.7: A program to eliminate existing deficiencies will be implemented according to the schedule presented in the annually adopted, CIE Five Year Schedule of Capital Improvements.

Policy UT 4.7.1: Priorities for replacement, correcting existing deficiencies, and providing for future needs will be made according to need. The need shall be determined by the Department of Public Works and Environmental Services in accordance with the Work Plan's capital improvement table. The priorities shall be reflected in the annual adopted, CIE Five-Year Schedule of Capital Improvements, such that the improvements needed first, shall be implemented first, in order to maintain adopted level of service standards.

5.2.5 NATURAL GROUNDWATER AQUIFER RECHARGE

GOAL UT 5.0: The City of Deerfield Beach will identify and protect natural groundwater aquifer recharge areas to maintain the Biscayne aquifer's function as the City's main source of raw water.

Objective UT 5.1: Identify Recharge Areas. By 2008 the City of Deerfield Beach will identify and map the natural groundwater aquifer recharge areas that have the greatest impact on the City's well fields.

Policy UT 5.1.1: Areas identified and mapped as having the greatest impact on existing or proposed well fields will be classified as "priority recharge parcels" for zoning and permitting considerations.

Objective UT 5.2: Protect Recharge Priority Parcels. Areas classified as priority recharge parcels will be protected from potential groundwater depletion or contamination potential through zoning, land use planning, and the development review process.

Policy UT 5.2.1: Depending on its characteristics, undeveloped properties classified as priority recharge parcels will be either rezoned as conservation areas rezoned as low impact residential areas, or allowed to develop as zoned with development restriction on the handling of hazardous substances.

Policy UT 5.2.2: All developed properties within the 10-day travel time contour of any of the City's existing or future water production wells will be classified as priority recharge parcels. Commercial developments on priority recharge parcels that handle or create hazardous substances will be required to provide certain management information to the City.

Policy UT 5.2.3: The City will promptly notify the Broward County Environmental Protection Department and the Environmental Quality Control Board of any known violations of the County Well Field Protection Ordinance or of any potential hazards in the cones of influence of the City's well fields.

Policy UT 5.2.4: Deerfield Beach will cooperate with other appropriate local governments to protect areas with the greatest recharge potentials that extend beyond the City limits.

Objective UT 5.3: Maintain and protect ground water recharge of the Surficial Aquifer System (SAS) so as to maintain all of the functions of the Biscayne Aquifer, including potable water supply, and the abatement of saltwater intrusion.

Policy UT 5.3.1: The City shall encourage the use of BMPs in accordance with its regulations and those of the South Florida Water Management District (SFWMD).

Policy UT 5.3.2: The City shall continue to participate in regulations governing stormwater management in conjunction with the Wellfield Protection Regulations.

The city will continue to implement regulations that prohibit direct stormwater discharges to surface and ground water within Zone 1 and Zone 2 of wellfield zones of influence as designated on the Wellfield Protection maps.

Policy UT 5.3.3: The City shall maintain an integrated geographic information system inventory of public water supply, wellfield and monitoring data to facilitate local and regional planning efforts to monitor the movement of the saltwater front and to.

Policy UT 5.3.4: The City shall work cooperatively with the SFWMD and independent drainage districts to implement plans for additional surface water storage such as water preserve areas, the Lower East Coast Regional Water Supply Plan and any other plans and operating procedures to increase recharge water to the Biscayne Aquifer.

Policy UT 5.3.5: In order to protect and conserve the Biscayne Aquifer, the City shall investigate utilization of alternate potable water resources to supplement and broaden the City's future water supply sources. These potential sources include the Floridan Aquifer, Aquifer Storage and Recovery (ASR), desalination, capture and storage of excess storm water and other technologies addressed in the Lower East Coast Regional Water Supply Plan of the SFWMD.

Policy UT 5.3.6: Protect the water storage and water quality enhancement functions of wetlands, floodplains, and aquifer recharge areas through acquisition, enforcement of rules, and the application of land and water management practices.

Policy UT 5.3.7: The City shall protect aquifers from depletion through water conservation and preservation of the functions of high recharge areas including but not limited to the water conservation areas and water preserve areas.

Objective UT 5.4: Potable water facilities shall be designed, constructed, maintained and operated in such a manner as to protect the functions of natural groundwater recharge areas and natural drainage features without inducing the inland movement or upwelling of saline water into Underground Sources of drinking Water (USDW) as defined in Chapter 62-528, FAC and SFWMD Basis of Review For Water Use as referenced in Chapter 40E-2 FAC.

Policy UT 5.4.1: The design for the construction, operation and maintenance, of new or expanded potable water facilities shall consider the short-term and long-term impacts to natural groundwater recharge areas, wetlands, surface and groundwater levels, and exacerbation of saltwater intrusion considering sea level rise. Adverse impacts of construction, operation, and maintenance shall be avoided or at least minimized.

City of
DEERFIELD
BEACH

APPENDIX A

10-YEAR WATER SUPPLY FACILITIES WORK PLAN

Adopted August 18, 2015

Prepared by:

CH2MHILL®

550 West Cypress Creek Road,
Fort Lauderdale, Florida 33309

PLANNING AND DEVELOPMENT SERVICES
ENVIRONMENTAL SERVICES

10-Year Water Supply Facilities Work Plan

Prepared for

City of Deerfield Beach, Florida

March 2015

CH2MHILL®

550 West Cypress Creek Road,
Fort Lauderdale, Florida 33309

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Acronyms and Abbreviations

ASR	aquifer storage and recovery
AWS	alternative water supply
BCPFM	Broward County Forecasting Model
BCWSFP	Broward County Water Supply Facilities Workplan
BCWWS	Broward County Water and Wastewater Services
BEBR	Bureau of Economic and Business Research
CIE	Capital Improvement Element
CPRD	(Broward) County Planning and Redevelopment Division
CUP	Consumptive Use Permit
DIW	deep injection well
DOI	Delineation of improvements
EPA	Environmental Protection Agency
EPD	Environmental Protection and Growth Management Department (Broward County)
FBC	Florida Building Code
fbg	feet below grade
FS	Florida Statutes
GOP	goals, objectives, and policies
gpd	gallon(s) per day
gpm	gallon(s) per minute
IWRP	Integrated Water Resource Plan
LECWSP	Lower East Coast Water Supply Plan
LOS	level of service
MG	million gallon(s)
mg/L	milligram(s) per liter
mgd	million gallon(s) per day
mi^2	square mile(s)
NR WWTP	North Regional Wastewater Treatment Plant
NRW	North Regional Wellfield
RO	reverse osmosis
SFWMD	South Florida Water Management District
TAZ	Traffic Analysis Zones
WSFWP	Water Supply Facilities Work Plan
WTP	water treatment plant
WUP	Water Use Permit

Executive Summary

The South Florida Water Management District (SFWMD) reissued the City's Water Use Permit in 2009, increasing its permitted raw water allocation to 14.15 mgd from the Biscayne and Floridan Aquifers. The permit was issued for a 20-year period that expires in 2029. Individual aquifer allocations equal 10.15 and 4.0 mgd for the Biscayne and Floridan Aquifers, respectively. The City also augments their water supplies by purchasing an average of 0.59 mgd from Broward County's regional system. To meet maximum day demands the City can purchase up to 0.89 mgd from the County. With the diversification of raw water supplies, modifications to the West Water Treatment Plant (WTP), and the re-issuance of the Water Use Permit (WUP), the City appears well situated to meet water demands through the 2030 planning horizon.

Finished average day and maximum monthly water demands for the City of Deerfield Beach's (City) Water Service Area are anticipated to approach 10.35 million gallons per day (mgd) and 388 million gallons per month (MGM), respectively, by the 2030 planning horizon. To meet these demands, the City has recently completed a comprehensive construction program, incorporating many of the initiatives recommended by the South Florida Water Management District (SFWMD) published in its 2013 update of the Lower East Coast Water Supply Plan (LECWSP).

One important measure taken by the City has involved reducing withdrawals from the East Wellfield to control saltwater intrusion in the Biscayne Aquifer. Withdrawals were reduced by abandoning eight production wells at the East Wellfield, and transferring the withdrawals to the West Wellfield with installation of two high capacity (2,800 gallons per minute) production wells in the Biscayne Aquifer. The City also diversified its raw water supplies by installing two production wells in the Floridan Aquifer System at the West Wellfield between 2008 and 2010. In addition to modifying its raw water supplies, the City has emphasized water conservation practices throughout its service area with measureable results. Per capita usage declined nearly 21 percent from 223 to 177 gallons per day (gpd) between 2000 and 2010.

In 2012, the City de-commissioned the East WTP and closed the Lime Softening treatment facility in the plant, while adding a 3.0-mgd Reverse Osmosis (RO) treatment process to the West WTP. These measures increased the treatment capacity of the West WTP to 21.0 mgd. Treatment processes at the West WTP now comprise of lime softening, reverse osmosis, and nanofiltration. The finished water produced from each process is blended in the ratio of 36 percent from lime softening, 14 percent from RO, and 50 percent from nanofiltration, prior to delivery into the City's distribution system. The City will be constructing a 4.0-million gallon (MG) ground storage tank, and a pump station at the location of the former East WTP to store and transfer raw water to the West WTP.

Portions of the City were built under un-incorporated Broward County requirements, and are served, and will continue to be served, by the Broward County Water and Wastewater Services (BCWWS). These areas lie in BCWWS District 2. BCWWS and Broward County Environmental Protection and Growth Management Department (EPD) are currently updating their 10-Year Water Supply Facilities Work Plan. This plan identifies future water supply requirements, and assesses the county's ability to meet system wide potable water needs. Per the County's 2014 draft update of the plan, average day water demands in District 2 are expected to increase by approximately 11 percent, from 13.27 mgd in 2015 to 14.78 mgd in 2030. In addition to the continued use of traditional sources, conservation efforts, and the County's reclaimed water facility, the construction of new wells in the Floridan Aquifer and treatment facilities will be needed to meet the 2030 raw water demands. The County started installing the Floridan Aquifer wells in mid-2014.

Broward County has developed a County-wide Integrated Water Resource Plan (IWRP), which the City assists in implementing. The IWRP was designed to provide comprehensive and efficient water management of local water resources through water resource assessments, water resources management strategies, policy integration and conservation outreach and education. While the improved management of localized water resources could allow greater flexibility and capacity in optimizing potable water withdrawals from

the Biscayne Aquifer, and may reduce overall demand, executing the IRWP will still not satisfy County-wide water demands. Therefore, the development and integration of alternative water supply (AWS) resources, with potable water from the Biscayne Aquifer under the IRWP will comprise necessary components of both the City's and County's water planning efforts.

SECTION 1

Introduction

The City of Deerfield Beach (the "City") is located in northeast Broward County (see Figure 1-1), on the southeast coast of Florida. The City is bounded by the Atlantic Ocean on the east, Florida's Turnpike on the west, Sample Road on the south, and the Palm Beach County line on the north (see Figure 1-2). The City contains approximately 16.27 square miles and is home to 77,300 residents.

Planners consider the City as nearly built-out (Deerfield Beach, 2009), with only 3 percent of its land area remaining undeveloped. The City supports a mixture of residential, commercial, industrial, and community facility types of uses. Convenient access to both the Florida's Turnpike and Interstate 95 make the City attractive to many companies. Major employers include the Publix distribution facility, Sun Sentinel offices, and JM Family offices.

As part of its efforts to address population growth, complex environmental issues, and changes to the Florida Statutes (FS), such as the Chapter 163 Intergovernmental Programs and 373 Water Resources, the City is developing this comprehensive 10-Year Water Supply Facilities Work Plan (WSFWP) that conforms to Broward County's draft 2014 10-Year Water Supply Facilities Workplan (BCWSFP), and the South Florida Water Management District (SFWMD) Lower East Coast Water Supply Plan (LECWSP) 2013 update (SFWMD, 2013).

1.1 Statutory Regulations

In response to the finding that traditional water supply sources will not be sufficient to meet the demands of a growing population, development, and the environment, the Florida Legislature enacted bills in 2002, 2004, 2005, 2011, and 2013. Senate Bills 360 and 444 significantly changed Chapters 163 (Intergovernmental Programs) and 373 (Water Resources), FS. Their statutory requirements improved the coordination of water supply and land use planning by linking regional water supply plans prepared by the water management districts with comprehensive plans prepared by local governments. The legislation also re-emphasized the need for local governments to implement water conservation and reuse programs.

The legislation requires local government agencies to ensure that adequate water supplies and facilities are available to serve new development no later than the date on which the agency anticipates issuing a certificate of occupancy, and to consult with the applicable water suppliers regarding water availability prior to approving a building permit. Accordingly, local government agencies must comply with these regulations for all new developments.

To ensure that the future land use planning is based on the availability of adequate water supplies, public facilities, and services, all proposed Future Land Use map amendments submitted to the Department of Economic Opportunity shall provide data and analysis demonstrating that adequate public facilities will be available to serve the proposed Future Land Use Map modification.

1.1.1 Objectives for Water Supply Plans

Specially, water supply plans need to address the following requirements:

1. The water supply plan shall identify alternative and traditional water supply projects, along with conservation and reuse programs necessary to meet the projected water demands identified within the local government's jurisdiction. The plan must identify and incorporate alternative water supply projects that the local government has selected from the regional water supply plan (for example, Broward County's water supply plan) or its own proposed alternative water supply plan, and include a minimum 10-year work plan for building public water supply facilities necessary to serve existing and new development.

FIGURE 1-1

Location Map for City of Deerfield Beach

Source: Broward County Water Supply Plan Draft (Broward County, 2014)

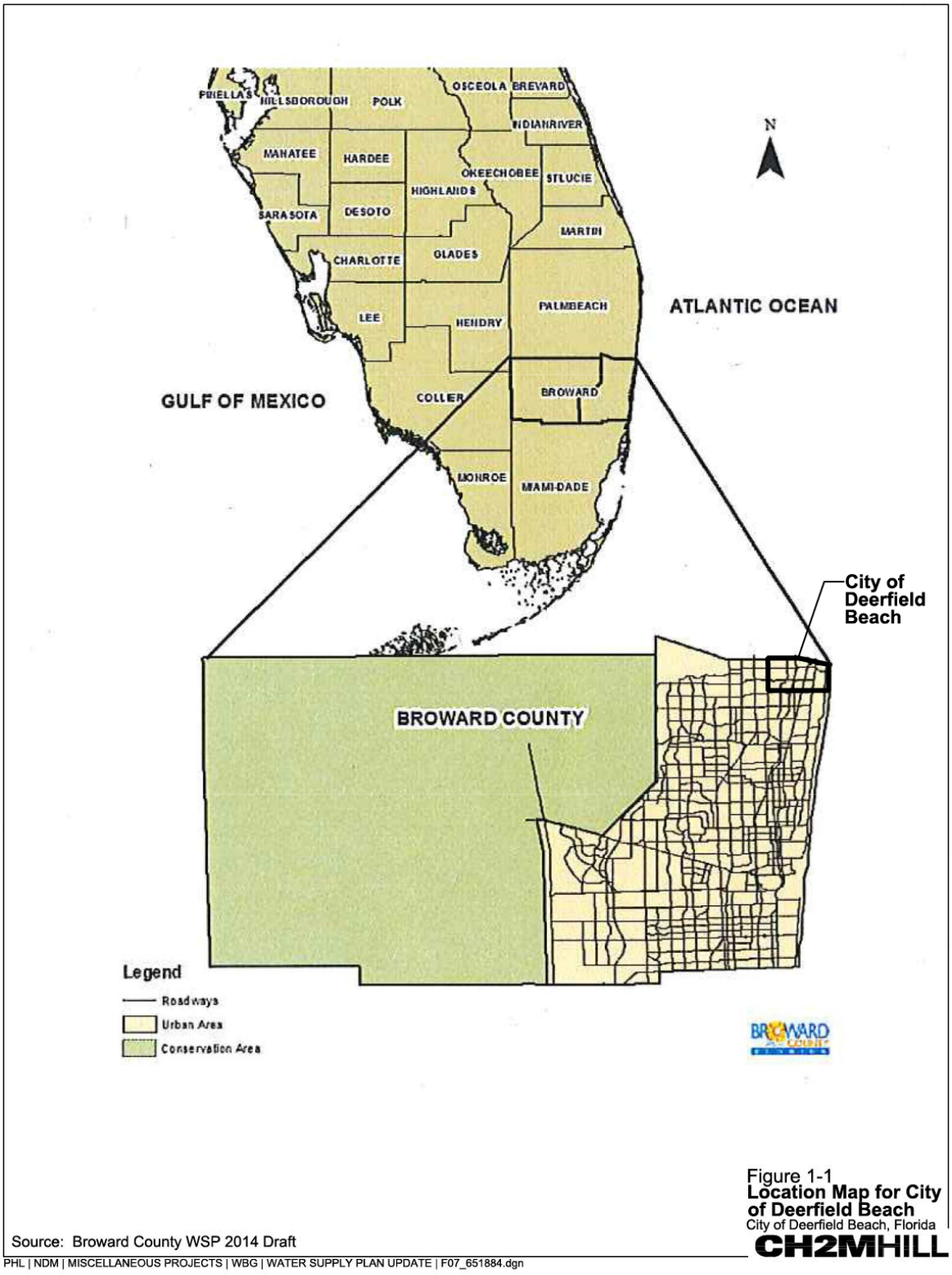
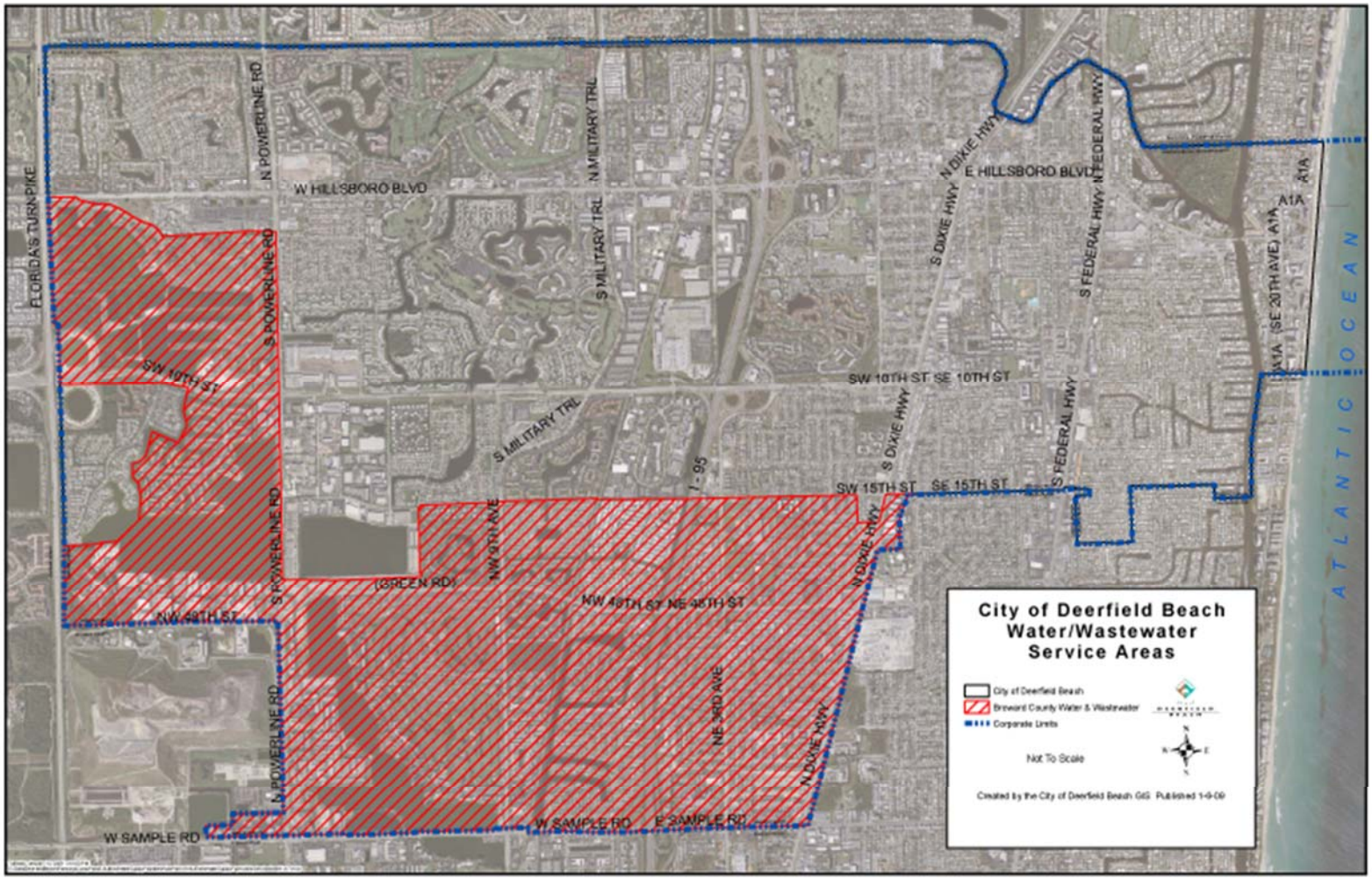


FIGURE 1-2

City and Broward County Water/Wastewater Service Areas

Source: Deerfield Beach Water Supply Plan (Deerfield Beach, 2009)



2. The WSFWP addresses the water supply sources necessary to meet and achieve the existing and projected water use demand for the established planning period, considering the 2013 LECWSP Update (Section 163.3167(9), FS).
3. Coordination of the appropriate aspects of the City's Comprehensive Planning Elements with the 2013 LECWSP Update (Section 163.3177(4) (a), FS).
4. Demonstrating that the data and analysis adequately address water supplies and associated public facilities necessary to meet projected growth demands (Section 163.3177 (6) (a), FS).
5. The Capital Improvement Element shall address the needs and location of public facilities, including those identified in the WSFWP. The 5-year schedule of capital improvements shall describe Work Plan projects that are to be implemented in the first 5 years of the Work Plan, ensuring that adopted level of service (LOS) standards are achieved and maintained.
6. Revision of the 5-Year Schedule of Capital Improvements to include water supply, reuse, and conservation projects and programs to be implemented during the 5-year period (Section 163.3177(3)(a)4, FS).
7. The Conservation Element shall include an assessment of current and projected water needs and sources for a minimum 10-year planning period, considering the appropriate regional water supply plan and Water Use Permit (WUP).
8. The Intergovernmental Element shall be revised as necessary to ensure coordination of the comprehensive plan with applicable regional water supply plans.
9. Future Land Use Element shall add policies that ensure the coordination with future land uses changes with the availability of potable water supply and facilities.
10. Recommendations from the Broward County 2013 Evaluation and Appraisal Report in identifying alternative water supply projects, traditional water supply projects, and conservation and reuse programs needed to meet local water use demands (Section 163.3191(3), FS).

SECTION 2

Relevant Regional Water Issues and Planning

The Biscayne Aquifer currently represents the primary source of potable for residents of Broward, Miami-Dade, and southeastern Palm Beach counties. SFWMD, a state-funded agency, manages water supply planning in the LEC planning area, including all of Broward County and the City. Withdrawals from the Biscayne Aquifer are regulated by SFWMD through the issuance of Water Use Permits (WUPs) and Consumptive Use Permits (CUPs). SFWMD issues CUPs to counties and WUPs to municipalities such as the City of Deerfield Beach.

SFWMD first developed its own water supply planning document (the LECWSP) in 2000, to protect the Biscayne Aquifer from saltwater intrusion, ensure adequate groundwater levels for maintenance of natural systems, and prevent excessive groundwater seepage into and surface water flows out of the regional (Everglades) system.

In February 2007, the Governing Board of the SFWMD adopted the "Regional System Water Availability Rule", which requires that new water demands be met through alternative water sources.

The LECWSP was also updated in February 2007 and identified baseline conditions for managing allocations from the Biscayne Aquifer, and alternative water supply sources that local utilities are required to implement to meet future water capacity demands. The City and Broward County's permitted Biscayne Aquifer allocations and future projected water supply needs are included in the LECWSP. SFWMD updated the LECWSP again in 2013 (SFWMD, 2013). Per state statutes, the City is required to update their WSFWP within 18 months of SFWMD's adoption.

2.1 Regional Issues

Regional issues affecting the City and Broward County include:

1. Integrating climate impacts and water resources planning;
2. Biscayne Aquifer System's limited water availability; and
3. Saltwater intruding the Biscayne Aquifer system.

2.2 Climate Impacts

Investigations conducted at the national, regional, and local levels have prompted the need to plan for the effects of future climate change and rising sea levels (see Figure 2-1), including more frequent and severe drought, increased tidal and storm-related flooding, and the loss of coastal wellfield capacity from saltwater contamination (see Figure 2-2). In the absence of planning, these factors will present liabilities for coastal and inland communities with implications for urban water supplies, water and wastewater infrastructure, and both regional and local drainage/flood control systems.

Both the City and Broward County understand the importance of local governments and water utilities integrating water supply and climate change considerations as part of coordinated planning efforts, while updating their WSFWPs. This approach extends to enhancing the goals, objectives, and policies (GOPs) of its comprehensive plan.

Key considerations for the City regarding the influence of climate change include sea level rise, saltwater intrusion, extreme weather, and infrastructure investments involved with diversifying water supply sources, and adapting stormwater and wastewater systems.

FIGURE 2-1

Projected Sea Level Rise

Source: Broward County Water Facilities Work Plan (Broward County, 2014)

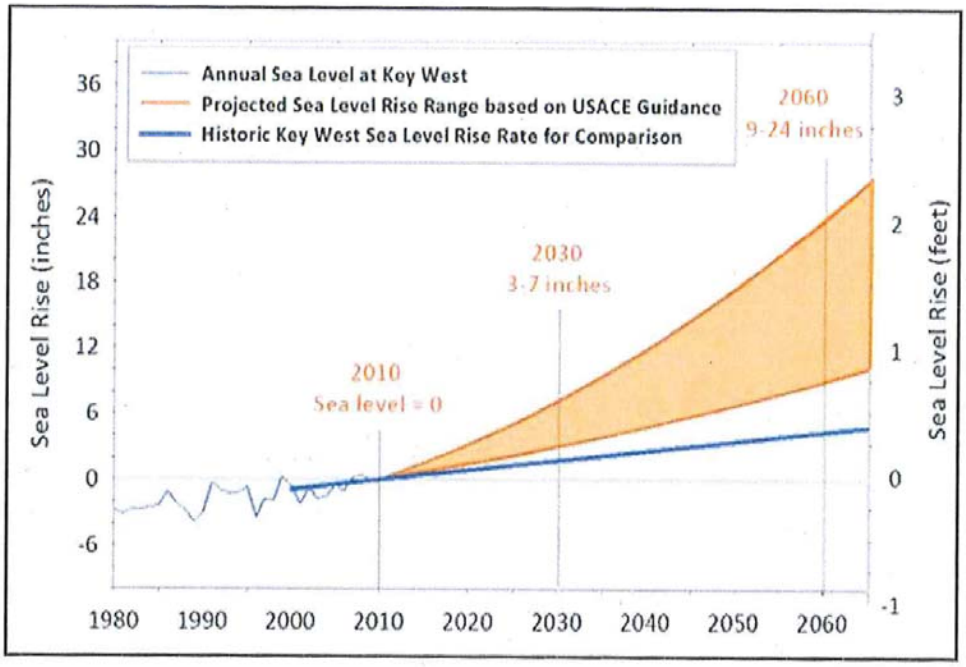


Figure 2-1
Projected Sea Level Rise by Florida Regional Climate Change Compact
City of Deerfield Beach, Florida

Source: Broward County WSP Draft 2014

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FIGURE 2-2

Inland Extent of Saltwater Incursion in Biscayne Aquifer

Source: Broward County Water Facilities Work Plan (Broward County, 2014)

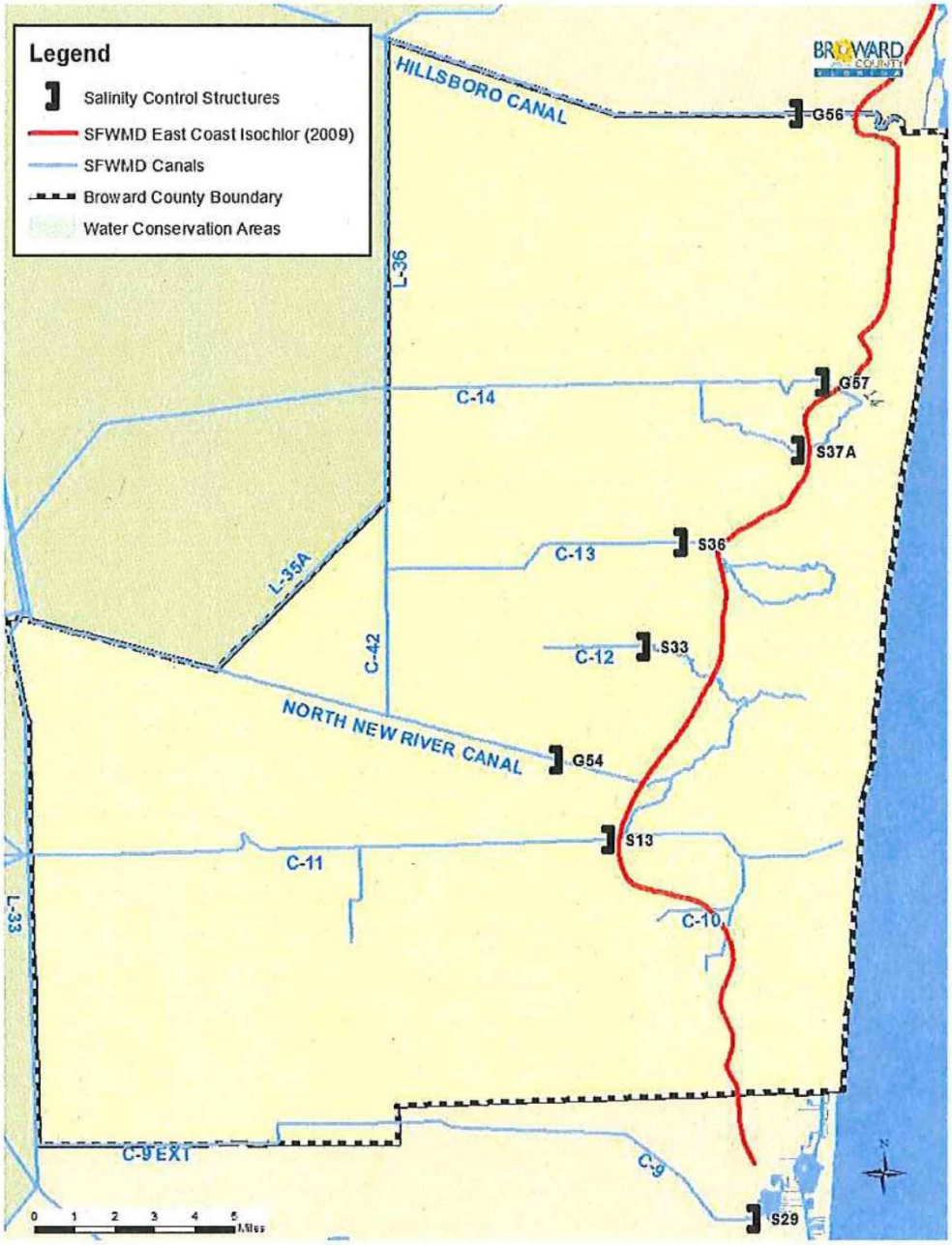

Figure 2-2
Inland Extent of Saltwater Incursion in Biscayne Aquifer
City of Deerfield Beach, Florida

Source: Broward County WSP Draft 2014

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2.2.1 Sea Level Rise

Sea level rise produces varied challenges regarding the sustainability of water resources, water management, and water/wastewater facilities and infrastructure. These challenges include saltwater contamination of coastal wellfields, brackish or saline groundwater infiltrating wastewater collection systems and impairing normal operations and maintenance, and the need to consider the use of reclaimed water as an alternative water supply. Water management systems are also compromised by rising groundwater levels that reduce soil storage and discharge capacity, increased potential for both inland and coastal flooding, and less opportunity for long-term storage of stormwater for beneficial reuse.

These realities necessitate considering plans and investments needed to compensate for loss of existing water supplies through relocation of wellfields and the development of alternative water supplies while also seeking opportunities to expand regional water storage opportunities. These investments and considerations complicate planning for population growth and water demands, which are more typical requirements for water supply planning.

2.2.2 Saltwater Intrusion

Along coastal southeast Florida, and several miles inland, groundwater supplies and potable wells are vulnerable to saltwater contamination. The Biscayne Aquifer serves as the region's primary water supply, and consists of a shallow, surficial aquifer characterized by limestone karst geology, displaying highly porous and transmissive characteristics. Because of this geology, individual supply wells installed in the Biscayne Aquifer can supply water at rates of several thousand gallons per minute (gpm).

The City maintains a network of monitoring wells and measures water levels monthly in partial fulfillment of WUP 06-00082-W. Continuing groundwater monitoring and modeling efforts will prove critical to predicting sea level rise scenarios anticipated over the next several decades. As a result of the concern regarding saltwater intrusion, in 2014 the City abandoned eight production wells from its East Wellfield.

2.2.3 Extreme Weather Events

As extreme events increase in frequency and severity, water supply planning should consider the risks associated with drought, water shortages, and reduced groundwater tables, all of which can hasten saltwater intrusion. Conversely, more intense rainfall will cause flooding, increased runoff, damage to the natural systems, while providing less recharge to aquifers providing potable water supplies. To help mitigate these problems, integrated water resource management strategies can address additional long-term storage of stormwater runoff and redistribution of excess rainfall during dry periods and drought. Regional surface water reservoirs and belowground aquifer storage and recovery (ASR) systems offer viable alternative water supply projects and climate adaptation strategies.

2.2.4 Infrastructure Development

With increasing risks of water system disruptions caused by climate change, the City must continue to diversify water supply sources, improve treatment technologies, and support the development of adaptive stormwater and wastewater infrastructure design criteria to ensure long-term sustainability. Conversely, alternative water treatment technologies generally display high-energy demands and a carbon footprint that can exacerbate climate change impacts. Strategic infrastructure planning should incorporate these constraints and work within with the GOPs of the Comprehensive Planning process and Water Supply Facilities Work Plans to provide for long-term sustainability and a balanced approach to future development.

Increases in groundwater elevations, directly or indirectly associated with sea level rise, will challenge the function of drainage systems and are expected to exacerbate flooding, even for mild storm events. Conditions could prove 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 systems and other public infrastructure remains critical as is the assessment of viable water supplies and impacts to the natural systems from prolonged droughts.

SECTION 3

Existing Water Supply Facilities

3.1 Water Service Areas

As illustrated in Figure 1-1, the City contains two water service areas. The City's Water Service Area encompasses approximately 10.86 square miles (mi^2) and serves an estimated population of 53,315 persons, based on the 2010 census. The City does not provide water to properties outside City limits. The Broward County Water and Wastewater Services (BCWWS) District 2 area within City limits encompasses approximately 5.41 mi^2, and serves an estimated 2010 population of 21,724. Section 4.1 of this report provides a detailed analysis of population and water demand projections for both service areas. At this time, the City and BCWWS do not have plans to expand their water service areas.

The City and BCWWS are responsible for the planning, financing, construction, maintenance, and operation of the water supply facilities within their respective water service areas. The City's WSFWP has incorporated portions of the draft 2014 BCWSP that addresses or affects the areas of the City that BCWWS serves. The draft 2014 BCWSP identifies water supply facilities that will meet the 2030 water demands for the entire Broward County water system.

3.2 Water Supplies

Potable water is currently supplied to City residents by the City's and BCWWS District 2 wellfields (see Figure 3-1) and water treatment plants (WTPs; see Figure 3-2). The City obtains raw water from the surficial Biscayne Aquifer and the confined Floridan Aquifer.

Under a large user raw water agreement with BCWWS, the County is obligated to provide the City with a minimum of 0.59 million gallons per day (mgd) annual average daily flow and a maximum of 0.89 mgd of raw water from the County's North Regional Wellfield (NRW). Therefore, the County's NRW system also provides raw water to the City. BCWWS District 2's current raw water source for potable water is the Biscayne Aquifer, although the County started installing production wells in the Floridan Aquifer in mid-2014.

3.2.1 City Wellfields and Capacities

Historically, the Biscayne Aquifer system has supplied the majority of the City's water. The East Wellfield was constructed first, and for many years served as the City's only raw water supply.

Expansion of the East Wellfield was prohibited because of saltwater intrusion concerns, and withdrawals from the wellfield were limited. In the 1970s, the City began construction of a new wellfield known as the West Wellfield. This wellfield was again expanded, until SFWMD restricted allocations from the Biscayne Aquifer. Currently, the City has moved forward with development of alternative water supply (AWS) that includes the use of the upper Floridan Aquifer System to supplement the raw water supply from the Biscayne Aquifer. The City installed production wells in the Floridan Aquifer in 2008 and 2010 with a total pumping capacity of 5.9 mgd. However, the City's WUP limits its allocation to 4.0 mgd from the Floridan Aquifer. The wells installed in the Floridan Aquifer produce brackish water quality that is treated using the RO membrane process.

The East and West Wellfields both withdraw water from the Biscayne Aquifer. Wells are typically constructed to depths less than 200 feet (see Table 3-1). Groundwater originating from the Biscayne Aquifer represents the most economical raw water source from a collection and treatment viewpoint. Water quality is good, but contains organics and iron that are addressed during treatment.

Production wells installed in the upper Floridan Aquifer are more than 1,000 feet deeper than wells in the Biscayne Aquifer. The City's two wells penetrating the Floridan Aquifer extend up to 1,200 feet and 1,340 feet below grade (fbg). Groundwater from the upper portion of the Floridan Aquifer has total dissolved solids (TDS) concentrations of 500 to 30,000 milligrams per liter (mg/L) (Hem, 1985) with chloride concentrations around 1,800 mg/L.

FIGURE 3-1

City Wellfield Location Map

Source: Deerfield Beach 10-year Water Supply Facilities Work Plan (Deerfield Beach, 2009)

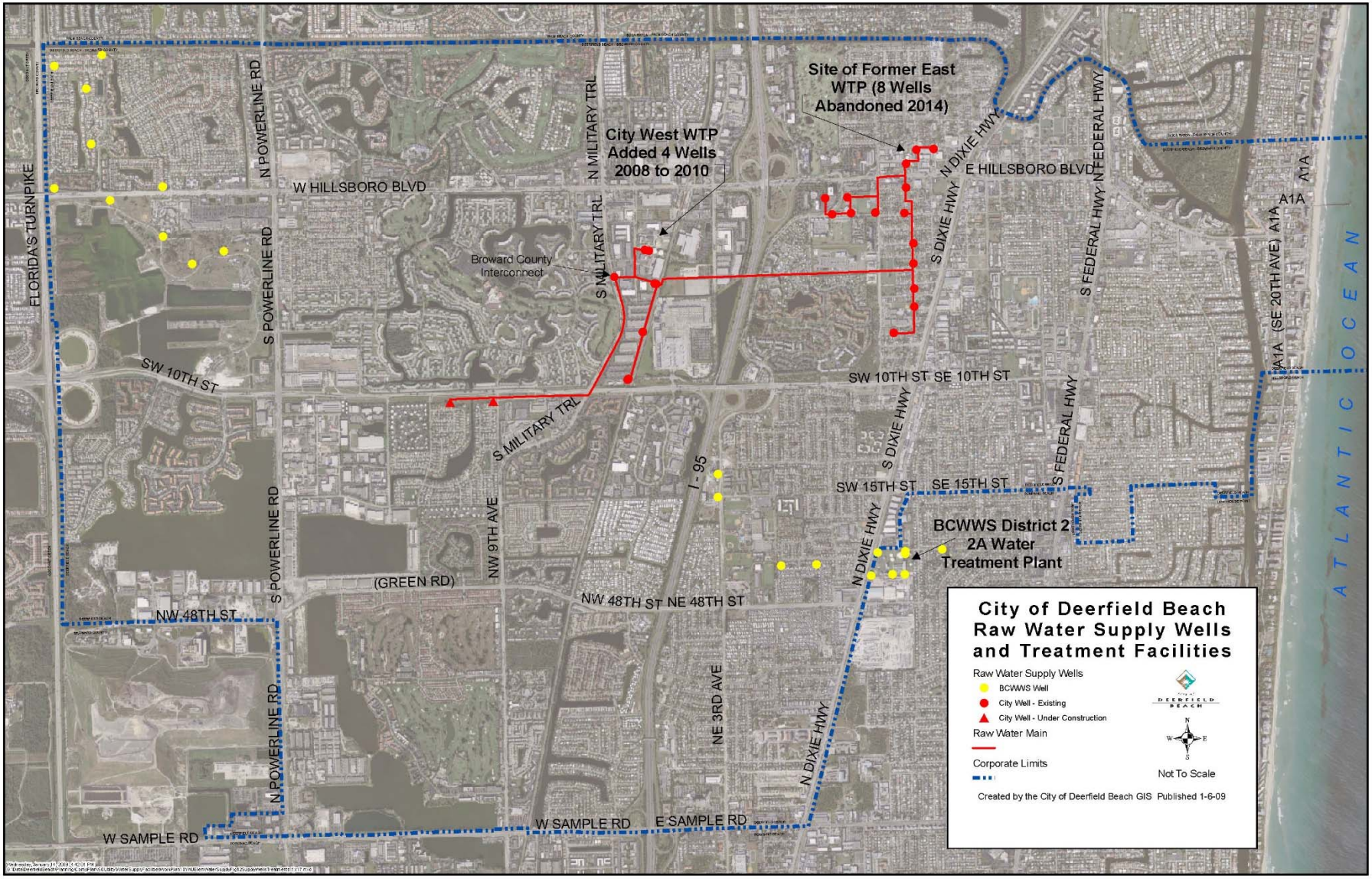

FIGURE 3-2

Location Map of City and Broward County Water Treatment Plants

Source: Deerfield Beach 10-year Water Supply Facilities Work Plan (Deerfield Beach, 2009)

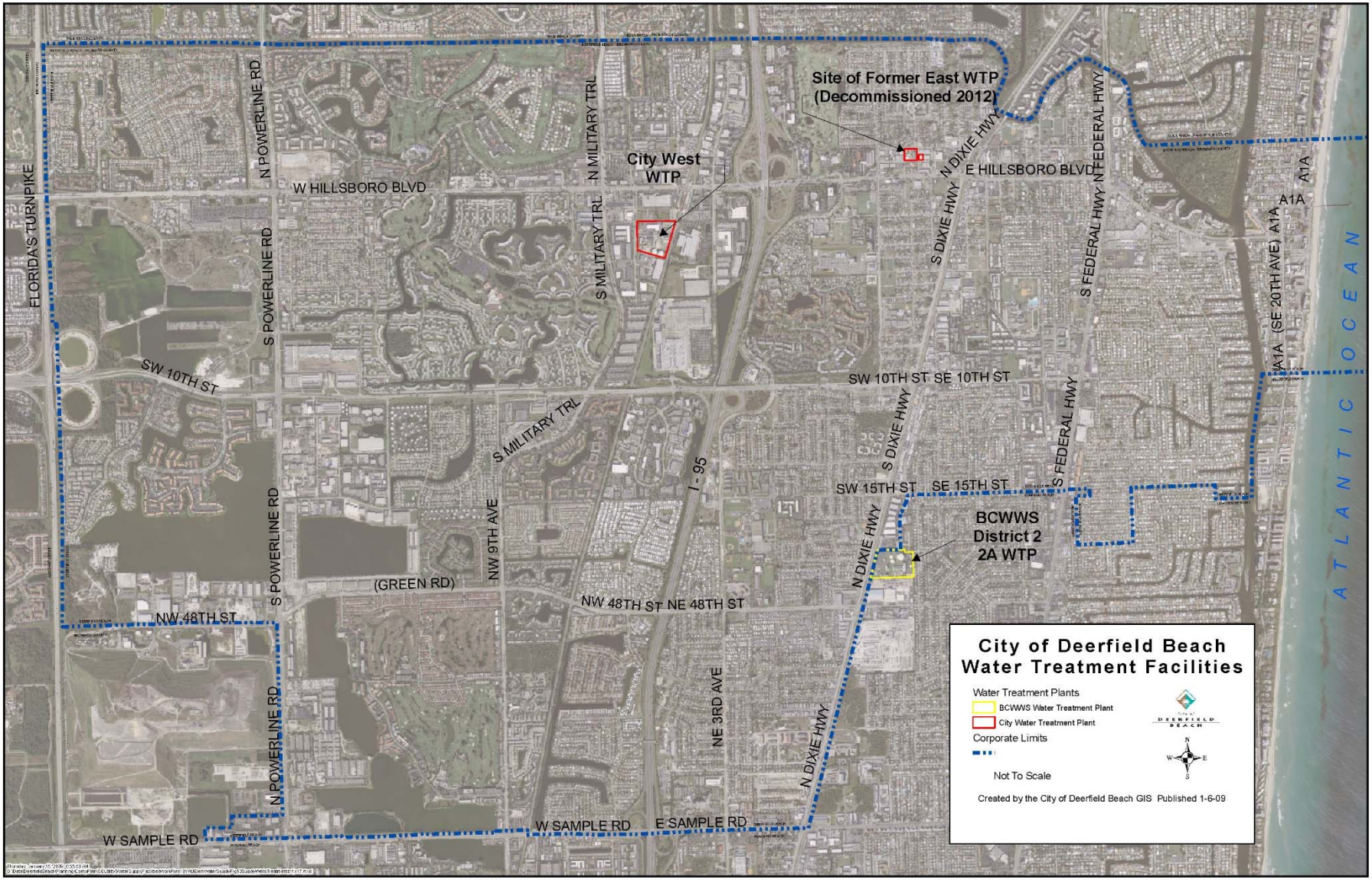

TABLE 3-1
Active Production Wells

Well Name	Age	Depth (feet)	Aquifer	Diameter (inches)	Capacity	Pump Type
9	1958	96	Biscayne	12	700 gpm	Vertical Turbine
11	1965	96	Biscayne	14	700 gpm	Submersible
12	1965	83	Biscayne	14	700 gpm	Submersible
13	1965	96	Biscayne	14	700 gpm	Submersible
14	1965	96	Biscayne	14	700 gpm	Submersible
15	1965	96	Biscayne	14	700 gpm	Submersible
16	1965	96	Biscayne	14	700 gpm	Submersible
17	1978	155	Biscayne	14	2800 gpm	Submersible
18	1978	155	Biscayne	14	2800 gpm	Submersible
19	1979	100	Biscayne	20	2800 gpm	Vertical Turbine
21	2000	138	Biscayne	14	2800 gpm	Submersible
22	2010	177	Biscayne	14	2800 gpm	Submersible
23	2010	190	Biscayne	14	2800 gpm	Submersible
FA-1	2008	1200	Floridan	14	1300 gpm	Submersible
FA-2	2010	1340	Floridan	24	2800 gpm	Submersible

3.2.1.1. East Wellfield

The East Wellfield once consisted of 16 production wells, referred to as PW-1 through PW-16. Production well PW-1 was plugged and abandoned several years ago. PW-2 through PW-8, and PW-10 were abandoned in 2014 after the decommissioning of the East WTP. The seven remaining wells extend into the Biscayne Aquifer to depths ranging from 83 feet to 96 feet. At present, the City's WUP imposes a maximum monthly limit of 102 million gallons (MG) (that is, 3.4 mgd during a 30-day month), and an annual limit of 1,224 MG (that is, 3.35 mgd) for withdrawals from the East Wellfield. Water quality from the Biscayne Aquifer at the East Wellfield typically displays lower iron and total organic carbon concentrations than water from the West Wellfield.

3.2.1.2. West Wellfield

The City's West Wellfield originally consisted of four production wells (PW-17, PW-18, PW-19, and PW-20). PW-17 and PW-18 were replaced with PW-17R and PW-18R in 1999. PW-20 was rehabilitated in 2000 with PW-21. Two new wells (PW-22 and PW-23) were installed in the Biscayne Aquifer in 2010. PW-22 and PW-23 each contain 14-inch-diameter casing and have a pumping capacity of 2,800 gpm. Wells installed in the Biscayne Aquifer at the West Wellfield run slightly deeper than in the East Wellfield, with total depths of 190 fbg. The City now operates two wells, FA-1 and FA-2, installed in the Floridan Aquifer within the West Wellfield with a total capacity of 5.9 mgd. However, the City is limited to an allocation of 4.0 mgd from the Floridan Aquifer. Wells FA-1 and FA-2 extend 1,200 fbg and 1,340 fbg, respectively.

3.2.1.3. BCWWS District 2 Wellfields and Capacities

The existing BCWWS District 2 water supply system consists of the Northern Regional Wellfield (NRW), and the 2A wellfield. Both wellfields supply raw water to the 2A WTP. The NRW is comprised of ten wells, each with a capacity of 2 mgd, providing a total design capacity for the wellfield of 20 mgd, and a firm capacity of

18 mgd (with the largest well unit out of service). According to the draft BCWSP updated in 2014, the District 2 wellfields have a total pumping capacity of 54.7 mgd. However, their permitted withdrawal limits per SFWMD are much lower.

3.3 Water Treatment Facilities

The customers in the City water service area are served by the West WTP and its associated pumping and storage facilities, while those in the BCWWS service area are served by BCWWS District 2 WTP-2A.

3.3.1 City Water Treatment Facilities

Prior to 2012, the City owned and operated two water treatment plants, the East WTP and West WTP. The East WTP, which used lime softening as the only method of treatment and was supplied primarily by production wells in the East Wellfield, was decommissioned in 2012. The City now owns and operates only the West WTP, which uses three different processes for water treatment: RO, nanofiltration, and lime softening (Deerfield Beach, 2009).

The lime softening facility at the West WTP was completed in 1984 and has a capacity of 6 mgd. A filter re-rate study completed in 1996 led to the Health Department's approval to increase the lime softening plant's treatment capacity to 7.5 mgd.

In 2004, the facilities at the West WTP were expanded to include a 10.5-mgd nanofiltration membrane plant. The nanofiltration facility increased the total treatment capacity of the West WTP from 7.5 mgd to 18 mgd.

In 2012, a 3-mgd RO treatment facility was completed and placed into service at the West WTP, increasing the total capacity of the West WTP to 21 mgd.

The RO membrane plant treats raw water from the Floridan Aquifer. Unlike the lime softening plants that produce finished water at rates nearly equal to the raw water supplies, RO plants produce at 75-percent efficiency. The lower efficiency requires greater volumes of raw water to produce the same volume of finished water. Additionally, RO produces a concentrate by-product, which requires proper disposal by the City.

To maintain the West WTP in optimal operating condition, the City has performed the following upgrades and repairs since 2009:

- Environmental Protection Agency (EPA) compliant emissions equipment for emergency generators installed (2014).
- Upgraded cleaning system for the membrane plants (2013).
- High-service pumps 4, 6, 9, 10, and 11 were upgraded to improve energy efficiency (2012).
- Degasifier tops fitted with rain caps (2014).
- SCADA upgrades (2011).
- Installed variable frequency drive at PW-18 (2014).
- Installed security and surveying camera system for improved security (2014).
- Three 8-inch-diameter valves and one check valve were installed at the 1-MG elevated tank. The altitude valve was rebuilt (2014).
- High-service pump #13 motor was rewound and rebuilt (2013).
- Plant skid #7 – rebuilt motor and replaced the drive (2014).
- Redesigned the sulfuric acid feed system to reduce mechanical stress on piping (2010).
- Improved chemical feed system and automation of skid startup (2013)

- Reduced amount of concentrate rejected from the nanofiltration plant by using it as feed for the RO plant (2014)
- Improved the sand strainer to prevent water hammer (2012)
- Improved the pneumatic air system with redundant capabilities to provide seamless operation (2010).

Replacement of the membrane elements of the Nanofiltration facility is scheduled for 2015.

3.3.1.1. BCWWS Water Treatment Facilities

As stated in the 2008 BCWSP, WTP-2A is a lime softening facility located at 1390 N.E. 51st Street in Pompano Beach. It was built in 1972, and has a treatment capacity of 40 mgd. The treatment process includes upflow clarifiers and multimedia filtration.

3.4 Finished Water Storage Facilities

The City maintains a total of 9.3 MG of storage available to meet daily demands. Storage is available at each WTP, and within the distribution system (see Table 3-2). The site of the former East WTP has storage facilities with a capacity of 2.0 MG, while facilities at the West WTP can store 6.0 MG. An additional 1.30 MG of storage is also provided by two elevated storage facilities located within the distribution network. The elevated storage tanks provide additional storage capacity while maintaining system pressures. The City plans to construct an additional 4-MG storage tank at the site of the former East WTP in 2016.

BCWWS District 2 storage facilities consist of four in-plant tanks that have a total capacity of 7.5 MG.

3.5 Water Distribution Facilities

This City is served by two distributions systems that are supplied by their respective WTP facilities.

3.5.1 City Water Distribution System

The City's 232-mile-long distribution system consists of pipelines ranging in size from 4 inches to 42 inches in diameter. The distribution system is pressurized by high-service pumps located at the East WTP and the West WTP. Hydraulic modeling of the distribution system completed in the late 1990s indicated that the existing distribution system is adequate for current and near-term future demands.

Since 2009, the City has implemented a number of upgrades to its distribution system:

- Installed 6-inch-diameter main on N.E. 1st Street between N.E. 20th Terrace and SR A1A
- Upgraded main from 2 to 6 inches in diameter on S.E. 4th Street between S.E. 12th Avenue and S.E. 17th Avenue
- Replaced and relocated mains as part of Streetscape Improvement Project – Hillsboro Blvd., between Federal Highway and S.E. 15th Avenue
- Replaced and relocated transcite pipe with ductile iron as part of Cove Shopping Center parking lot improvement project
- Installed ten new fire hydrants

3.5.2 BCWWS Water Distribution System

As described by Broward County's Draft 2014 WSFWP, BCWWS District 2 distributes water to their customers through a high-pressure piping system comprised of approximately 240 miles of pipe. District 2's distribution system capacity was designed using the latest water distribution system hydraulic modeling techniques. Currently the District is implementing system rebuilding to correct identified deficiencies.

3.6 Emergency Water Supply Interconnections

Emergency supplies are provided via interconnects with adjacent utilities. The City interconnects with the following utility distribution systems:

- Broward County (two 6-inch-diameter and one 8-inch-diameter interconnects for a total capacity of 3.2 mgd)
- Town of Hillsboro Beach (one 6-inch-diameter interconnect providing capacity of 1 mgd)
- City of Boca Raton (one 6-inch-diameter and one 12-inch-diameter interconnect for a total capacity of 3.0 mgd)

If necessary, the City could provide water to its neighbors through these interconnections.

BCWWS District 2 maintains interconnections with the water systems of the Cities of Pompano Beach Deerfield Beach, the Town of Hillsboro Beach, and Palm Beach County.

These interconnections are used for emergency purposes to maintain adequate water supply in the event of disruptions to the BCWWS supply.

3.7 Reuse Water Treatment, Storage and Transmission Facilities

The City currently pumps all wastewater to Broward County's North Regional Wastewater Treatment Plant (NR WWTP) for treatment in the City of Pompano Beach. Because of the distance between the NR WWTP and the City's WTPs, there is no reuse water connection back to the City. The City has no reuse water capabilities at this time.

BCWWS District 2 has a reuse water facility located at 2402 North Powerline Road in the City of Pompano Beach. This facility is associated with the NR WWTP, and has a capacity of 10 mgd. The reuse water is used for non-potable water applications, such as cooling towers and irrigation. This facility currently serves the BCWWS Administration Complex, NR WWTP, Waste Management Resource Recovery Facility, Septage Receiving Facility, and the Pompano Beach Commercial Park. The current facility demand on the facility is 4.3 mgd. The County has committed the remaining capacity of 5.7 mgd to NRWWTP, and the Pompano Beach Commercial Park.

SECTION 4

Population and Water Demand Projections

Population statistics contained in the City's I0-Year Water Supply Facilities Work Plan are based on the historical and projected population for the years 2010 through 2030. Broward County developed county-wide population statistics using their Broward County Forecasting Model (BCPFM), creating a standard data set for application by cities and towns in the County for their water supply planning activities. The County anchored population projections to the 2010 census statistics.

Unlike periods preceding earlier I0-Year Water Supply Facilities Work Plans, no new areas of Broward County were incorporated by the City. Population statistics contained in the 2008 BCWSFP were updated based on the 2010 census.

4.1 Population Projections

4.1.1 City Water Service Area Population Projections

Current and projected population statistics used for the City's and County's analysis were generated by the County's Planning and Redevelopment Division (CPRD). CPRD provides population data and demographic information for all local water utilities and in support of the County's own needs, based on the University of Florida Bureau of Economic and Business Research (BEBR). A notable recent change for Broward County involves the County's 2014 Traffic Analysis Zones (TAZ) and Municipal Forecasts Update Model. This model coordinates and updates all the TAZs and population forecasts across Broward County.

The City adopted new population statistics based on the 2010 Census and the County's projections. The change in County's approach to treating population statistics since publishing the last BCWSFP (2008) combined with the economic downturn from 2007–2012 resulted in significantly lower projections for the years 2015 through 2030, compared with the 2008 BCWSFP.

Table 4-1 displays the City's water service area population in comparison to the City's total population. The difference between the two population sets equals the number of persons in the City who are served by BCWWS. The City's Water Service Area population is expected to grow by more than 5,000, exceeding 58,690 persons in 2030. By comparison, the City's population served by BCWWS displays a more stable projection, increasing by less than 1,000 between 2010 and 2030.

TABLE 4-1
City Water Service Area Population and City Population

Year	City's Water Service Area Population	Total City Population	BCWWS Area Population
2010	53,654	75,039	21,385
2015	55,462	77,263	21,801
2020	56,493	78,232	21,739
2025	56,923	78,567	21,644
2030	58,690	80,856	22,166

4.2 City Water Supply Capacity and Projected Demands

4.2.1 Water Supply System

Raw water withdrawals are permitted by the SFWMD under WUP No. 06-00082-W, which was re-issued on May 14, 2009, and expires on March 14, 2029. Limiting conditions of the permit included a maximum allowable monthly withdrawal of 525 MG. The City's annual allocation cannot exceed 5,165 MG from a combination of the Biscayne Aquifer at 4,347 MG, and the Upper Floridan Aquifer at 1,460 MG. The re-issued permit increased the annual allocation by 637 MG over the permit that expired in 2009. The increase in allocation from the Upper Floridan Aquifer allowed the City to reduce its capacity from the Biscayne Aquifer at their East Wellfield by abandoning PW-2 through PW-10 (see Table 4-2). As a condition of the new permit, the City can only withdraw 102 MG per month from the remaining wells (PW-9, PW-11 through PW-16).

A summary of the WUP is presented below:

Source Classification - Groundwater

- Biscayne Aquifer
- Floridan Aquifer System

Annual Allocation

- 5,165,000,000 gallons (14.15 mgd); 3,705,000,000 gallons (10.15 mgd) from the Biscayne Aquifer; 1,460,000 gallons (4.00 mgd) from the Upper Floridan Aquifer

Maximum Month Allocation

- 525 MG per month
- 102 MG per month at the East Wellfield

Since the City's last 10-year Water Facilities Supply Plan was submitted in 2009, in addition to abandoning abandoned PW-2 through PW-10, the City decommissioned the East WTP. In reconfiguring the East WTP site, the City is planning the construction of a 4-MG ground storage tank and pump station, which should be completed by 2018.

Two production wells were installed in the Upper Floridan Aquifer in 2008 and 2010, and are capable of pumping a total of 4,100 gpm. Additionally, the City installed two new production wells in the Biscayne Aquifer in 2010, each capable of pumping 2,800 gpm. All of the new wells were installed in the City's West Wellfield.

A critical aspect of the raw water supply system involves the efficiency of the treatment processes in producing finished water. Historically, a Lime Softening treatment process utilized by the City exhibited good efficiency incurring minimal losses. RO and Nanofiltration processes operate at efficiencies ranging from 75 to 85 percent, respectively, so they require more raw water to produce an equal volume of treated water. For example, only slightly more than 10 MG of raw groundwater are required to produce 10 MG of finished water using the lime softening process. Assuming a 75 percent efficiency for treatment using RO, 13.33 MG of raw water is required to produce 10 MG of finished water. To account for the losses attributed to these new treatment processes, the City obtained higher annual and monthly allocation limits when their permit was re-issued in 2009.

TABLE 4-2
Production Wells Abandoned in 2014

Well No.	Year Installed	Depth (fbg)	Aquifer	Diameter (inches)	Pumping Capacity (gpm)	Pump Type
2	Unknown	100	Biscayne	12	700	Vertical Turbine
3	1958	110	Biscayne	12	700	Vertical Turbine
4	1958	112	Biscayne	12	700	Submersible
5	1958	100	Biscayne	12	700	Vertical Turbine
6	1958	87	Biscayne	12	700	Submersible
7	1958	100	Biscayne	12	700	Vertical Turbine
8	1958	100	Biscayne	12	700	Vertical Turbine
10	1965	96	Biscayne	14	700	Vertical Turbine

Notes:
fbg=feet below grade

4.2.1.1. Raw Water Capacity

The City operates 13 wells installed in the Biscayne Aquifer at their East (7) and West Wellfields (6), with a total pumping capacity of 31.24 mgd (see Table 4-3). Two production wells installed in the Upper Floridan Aquifer at the West Wellfield could provide an additional 4,100 gpm (5.8 mgd). In total, the City's wells could produce 36.8 mgd, with a firm capacity of 35.0 mgd when well FA-1 is inactive.

Based on these production capacities, the City's raw water pumping system possesses the capacity required to satisfactorily meet current and projected demands.

The City decommissioned the lime-softening treatment plant at the East WTP in 2012 but has maintained piping for conveying raw water from the East WTP to the West WTP for treatment. In addition to wells at the East and West Wellfields, the City entered into a large user agreement with Broward County that supplements the City's raw water supply by 0.59 mgd (on an average daily basis), and 0.89 mgd on a maximum day basis. The County's Regional System withdraws water from the Biscayne and Upper Floridan Aquifers.

4.2.1.2. Treatment Capacity

The City's total treatment capacity resides at its West WTP. The current treatment capacity of 21.0 mgd consists of the following:

- Lime Softening 7.5 mgd
- Nanofiltration 10.5 mgd
- Reverse Osmosis 3.0 mgd

Although decommissioning the East WTP reduced the City's treatment capacity by more than 13 mgd, the remaining capacity still exceeds the City's maximum day demands by almost 10 mgd.

4.2.1.3. Disposal Capacity

Disposal of concentrate from either the Nanofiltration facility and/or the RO facility requires a concentrate disposal well, or other suitable methods. The City completed construction of its deep injection well (DIW) in 2007. The well is permitted to accept up to 4.0 mgd of concentrate for disposal.

TABLE 4-3
Active Wells

Well No.	Year Installed	Depth (fbg[1])	Aquifer	Diameter (inches)	Pumping Capacity (gpm)	Pump Type
9	1958	96	Biscayne	12	700	Vertical Turbine
11	1965	96	Biscayne	14	700	Submersible
12	1965	83	Biscayne	14	700	Submersible
13	1965	96	Biscayne	14	700	Submersible
14	1965	96	Biscayne	14	700	Submersible
15	1965	96	Biscayne	14	700	Submersible
16	1965	96	Biscayne	14	700	Submersible
17	1978	155	Biscayne	14	2800	Submersible
18	1978	155	Biscayne	20	2800	Submersible
19	1979	100	Biscayne	14	2800	Vertical turbine
21	2000	138	Biscayne	14	2800	Submersible
22	2010	177	Biscayne	14	2800	Submersible
23	2010	190	Biscayne	14	2800	Submersible
FA-1	2008	1,200	Upper Floridan	14	1300	Submersible
FA-2	2010	1,340	Upper Floridan	24	2800	Submersible

4.3 Raw Water Demands

With the City's Water Service Area population remaining relatively stable to the 2030 planning horizon, future raw water demands will depend on factors unrelated to growth. These factors include the type and efficiency of treatment processes employed to housing unit density. The City appears well situated to address future demands with the system modifications implemented over the last several years. Using wells installed in the Floridan Aquifer System to supplement their capacity in Biscayne Aquifer while transferring the raw water capacity to the West Wellfield will enable the City to adequately meet future demands without creating saltwater intrusion issues in the Biscayne Aquifer.

4.3.1 Historical City Water Use

The historical potable water use by the City from 2009 through 2013 was evaluated as a basis for forecasting future potable water demands for the City's water service area (see Table 4-4). In addition to withdrawals from the City's East and West Wellfields, the City's raw water supply was supplemented by the Broward County's regional system. On average, 0.59 mgd was provided by the County's system from 2009 through 2013.

TABLE 4-4
Historical Demands for City of Deerfield Beach 2009 to 2013

Year	Annual Demand (MG)	Average Day (mgd)	Maximum Day (mgd)
2009	3,535	9.68	13.56
2010	3,445	9.44	13.21
2011	3,662	10.03	12.19
2012	3,314	9.05	13.14
2013	3,358	9.20	12.97

Potable water demands fluctuated from 2009 through 2013, with average day demands ranging from a maximum of 10.03 mgd in 2011 to 9.05 mgd in 2012. The maximum month demands ranged from 276 to 353 MG per month for 2011 and 2012, respectively, during the same period. Thus, recent water demands have not shown an increasing trend. Moreover, water demands from 2009 to 2013 were nearly 1.0 mgd lower than the 5 years extending from 2001 to 2005 (see Table 4-5).

TABLE 4-5
Historical Demands City Service Area 2001–2005

Year	Average Day Demand (mgd)
2001	9.86
2002	10.93
2003	10.71
2004	10.88
2005	10.92

Examining daily demands from 2011 through 2013, and calculating an average for every day of the year allows identifying the annual period of elevated demands. The average day demand for the 3-year period equaled 9.06 mgd. Demands exceeding the average day started around November 1 and extended to May 1 of the following year (see Figure 4-1).

4.3.2 Projected City Water Demands

The average per capita water demand for the population in the City's Water Service Area was estimated at 177 gallons per day (gpd) based on 2010 census data. The per capita use value was combined with projected population statistics provided by Broward County in forecasting future water demands (see Table 4-6). Given the estimated population increase, water demands should increase from 9.44 (actual) in 2010 to 10.35 in 2030. Projected monthly demands will increase from 354 to 388 MG per month during the same period. Both the projected daily and monthly demands stay well below the 14.15 mgd and 525 MG per month limits (raw water), respectively, allocated to the City under the current WUP.

FIGURE 4-1
Average Daily Demands 2011–2013

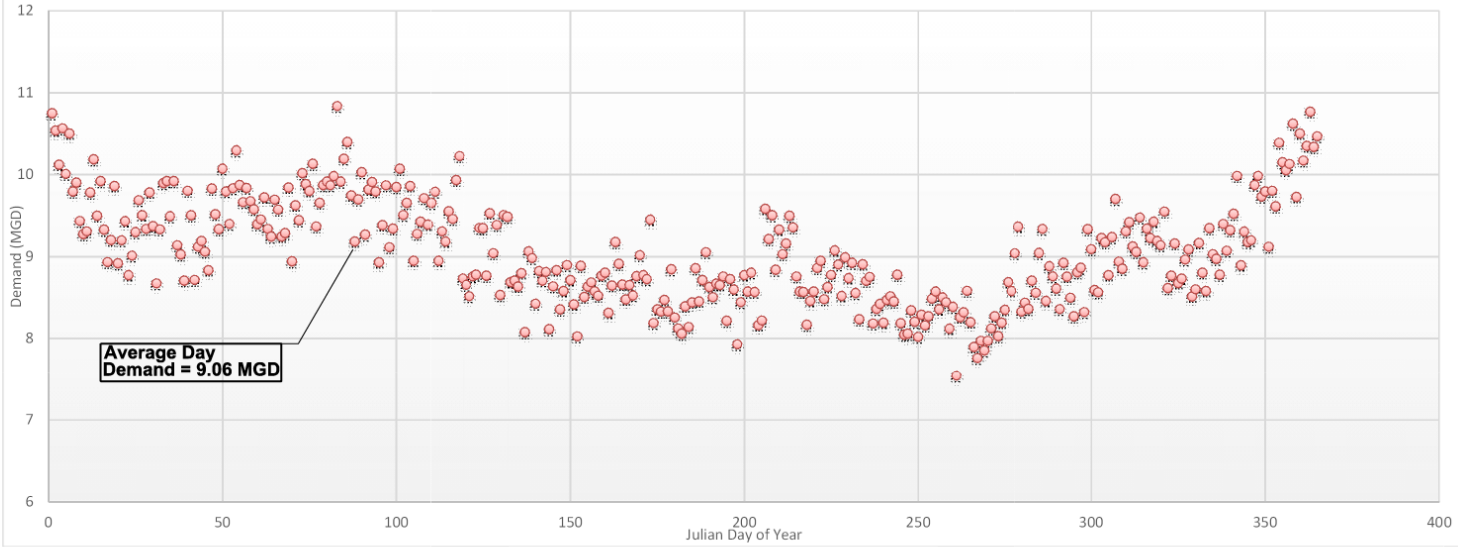

Figure 4-1
Average Daily Demands 2011 through 2013
City of Deerfield Beach, Florida
CH2MHILL

PHL | NDM | MISCELLANEOUS PROJECTS | WBG | WATER SUPPLY PLAN UPDATE | F06_651884.dgn

TABLE 4-6
Projected Water Demands for the City from 2015 to 2030

Year	City's Water Service Area Population	Projected Average Day Water Demands (mgd)	Projected Maximum Month Demand (MGM)
2010[a]	53,315	9.44[b]	353.97[b]
2015	56,090	9.93	372.40
2020	56,551	10.01	375.46
2025	58,886	10.42	390.96
2030	58,491	10.35	388.34

Notes:
Per capita use 177 gpd
[a]Based on 2010 census
[b]Actual demands

4.4 BCWWS District 2 Existing and Future Water Demands

Although demands will remain stable in portions of the City served by BCWWS District 2, the County expects increasing water demands between 2010 and 2030 in other portions of the district. Average day demands are expected to increase from 13.27 to 14.78 mgd between 2010 and 2030, respectively (see Table 4-7). During the same period, maximum day demands will increase from 16.98 to 19.22 mgd. The District 2 WTP-2A holds the permitted and physical capacity to meet finished water demands to the planning horizon. Conversely, BCWWS will need to install wells in the Upper Floridan Aquifer and use a portion of its allocation for the aquifer (4.6 mgd) to meet average day demands by 2020.

TABLE 4-7
BCWWS District 2 Population and Finished Water Demand Projections 2010–2030

Year	BCWWS District 2 (persons)	Finished Water[1] Demand Potential Avg. Day (mgd)	Finished Water Demand Potential Max Day (mgd)	Overall Per Capita Demand (gpd)
2010	109,750	13.06	16.98	119.0
2015	111,496	13.27	17.25	119.0
2020	116,272	13.84	17.99	119.0
2025	120,159	14.30	18.59	119.0
2030	124,209	14.78	19.22	119.0

Notes:
[1]Permitted treatment capacity = 30.3 mgd

4.5 Water Use Permits

4.5.1 City Water Permit

Raw water withdrawals are permitted by the SFWMD under WUP No. 06-00082-W. SFWMD re-issued WUP No. 06-0082-W in May 2009 for a 20-year period.

The WUP limits withdrawals on an annual and monthly basis from the Biscayne and Upper Floridan Aquifers as presented below:

Source Classification - Groundwater

- Biscayne Aquifer
- Floridan Aquifer System

Total Annual Allocation

- 5,165 million gallons (14.15 mgd)

Total Maximum Month Allocation

- 525 million gallons (17.5 mgd during a 30-day month)

Total Biscayne Aquifer Annual Allocation

- 3,705 million gallons (10.15 mgd)

Total Floridan Aquifer Annual Allocation

- 1,460 million gallons (4.0 mgd)

Total Biscayne Aquifer Maximum Month Allocation from the East Wellfield

- 102 million gallons (3.4 mgd during a 30-day month)

4.5.2 Special Conditions

Most of the constraints in the 2009 WUP involve "standard" conditions included in all public water supply permits, such as the permit duration, allocation, and specific source limitations discussed above.

The WUP also contained limiting conditions of interest as presented below:

- Condition No. 17 – Flow meters should be calibrated every 5 years.
- Condition No. 18 – Report monthly withdrawals from each facility quarterly.
- Condition No. 21 – Submit monthly unaccounted for losses on an annual basis.
- Condition No. 24 – Implement the Water Conservation Plan.
- Condition No. 25 – Continuation of the water level monitoring program collecting measurements monthly at selected monitoring wells.
- Condition No. 26 – Continuation of the saline intrusion monitoring program determining quarterly chloride levels at selected monitoring wells.
- Condition No. 31 – Submit a wellfield compliance report every 10 years.

4.5.3 BCWWS District 2 Source of Supply

BCWWS District 2 (Figure 1-1) is supplied by the North Regional and BCWWS District 2 Wellfields, which draw water from the Biscayne Aquifer. Raw water is treated at the District 2 WTP-2A before distributing to retail customers including residents of the City of Deerfield Beach and the City of Coconut Creek.

District 2 WTP-2A (Permit No. 06-58-00010) was expanded to a maximum capacity of 40 mgd in 1994, while maintaining a permitted capacity of 30 mgd. The plant uses up-flow clarifiers and multimedia filtration to provide lime softening of the raw water. BCWWS projects a maximum day demand of 17 mgd in 2015, or 57 and 42 percent of the permitted and maximum plant capacities, respectively.

The District 2 wellfield contains seven wells with a design capacity totaling 27.1 mgd surrounding the District 2 WTP-2A. The firm capacity of the wellfield totals 21.3 mgd with the largest well removed from service. Pursuant to the SFWMD Consumptive Use Permit (CUP) No. 6-01634-W covering the combined North Regional and District 2 wellfields, issued in March 2008 allocated 585.2 MG per month and 17.5 mgd for the maximum monthly and average annual daily withdrawals, respectively. The District 2 CUP also contains an Upper

Floridan Aquifer allocation of 152.8 MG per month on a maximum month and 4.6 mgd on an average daily basis. Although not presently in service, BCWWS started installing production wells in the Upper Floridan Aquifer in mid-2014. No alternative water supplies are required to meet water demands in the near future.

The County participated in the development of funding strategies and a governance structure for the C-51 Reservoir as a source of water supply. The C-51 Reservoir is located north of Broward County in Palm Beach County, and should yield long-term regional benefits to the entire Lower East Coast Planning Region by reducing withdrawals from the Biscayne Aquifer. The recently completed study estimated that constructing the reservoir will cost $160 million. No construction activities are presently planned for the next several years.

4.6 Water Conservation

Several factors drive the need for water conservation in the City's service area:

- Demands for residential, commercial, and industrial water use are expected to grow over time. Conservation can optimize the use of water supplies.
- Reducing peak daily and seasonal water use allows deferring future WTP and distribution system expansion costs.
- Water conservation measures are required and regulated under 40E-24 of the Florida Administrative Code.

The City has implemented a number of water conservation elements including restrictions on permitted water usage, use of xeriscape principles, requirements for ultra-low volume plumbing in new construction, a water conservation-based rate structure, a meter replacement program, rain sensor over-rides for new lawn sprinkler systems, and public educational programs. Detailed information on each of these elements is provided below.

All customers are subject to the City's water conservation measures including the water rate schedule, outdoor water use restrictions, and financial incentives to install water-saving toilets, or other conservation devices. If water service gets extended to unincorporated areas previously not served by the City, new customers will adhere to the City's conservation program. The City will provide water conservation public education to new customers and make available information, services, and incentives designed to help customers use water wisely. The City has coordinated its conservation program with the County's program.

4.6.1 Restrictions on Permitted Water Use

The City's Code of Ordinances (Section 70-164) requires restrictions or curtailment of water usage at such times when an "emergency situation" is declared by SFWMD or when the City Commission determines that a reduction in water consumption is necessary in alleviating a local water shortage within the City's water system. Water restrictions may include reducing hours allowed for irrigation, washing of vehicles, washing of outdoor surfaces, operation of ornamental fountains, operation of air conditioning without a recirculation system, limiting the filling and use of swimming pools, preventing the leaking of water through defective plumbing, restricting hotels and restaurants to the minimum amount of water necessary to conduct operations, and other restrictions as necessary.

4.6.2 Use of Florida-Friendly Landscaping Principles

The City's Land Development Code [Section 98-80 (e) and Broward County's Zoning Code (Section 3980(i)], recommends the use of Florida-friendly landscaping principles and provides the minimum percent of required pervious area, as set forth in the City's Land Development Regulations. SFWMD's *Waterwise South Florida Landscapes* provides the watering needs of popular South Florida plant material so that the choice of plant material is consistent with Florida-friendly fundamentals. Copies of the *Waterwise* publication is used as an educational resource and is made free of charge to citizens at the Planning Department.

Fundamentals of Florida-friendly landscape design include the following elements: planning and designing of the project, limiting turf areas, efficient irrigation, soil improvements, use of mulches, use of low-water-demand plants, and appropriately maintaining the landscaped area.

The City is working with the County in developing a model landscape/water efficiency ordinance. Under the Broward County Code of Ordinances Section 39-79, the County now requires installation of controllers for rain shut-off devices combined with soil moisture sensors as part of any landscape plan for new construction.

4.6.3 Requiring Ultra-Low Volume Plumbing in New Construction

The City has adopted the Florida Building Code (FBC), which contains plumbing flow restriction requirements. Section 6 of the Broward County Code prohibits a City within its jurisdiction from enacting standards differing from the FBC. The City's Building and Inspection Services Division enforces the FBC by requiring that all new buildings, parks, etc. install water conservation control devices per the Florida Plumbing Code, as a condition for granting certificates of occupancy.

4.6.4 Water Conservation-Based Rate Structure

The City manages a conservation-based water rate structure, which includes progressively increasing rates for increased use, as a means of reducing demand (see Table 4-8).

TABLE 4-8
City of Deerfield Beach Water Rates

Category	Monthly Base Charge ($)	Usage (gallons)	Meter Size (inches)	Usage (gallons)	Rate ($ per 1,000 gallons)
Single and Multi-Family Residence	15	0 to 6000	NA	NA	2.65
		6001 to 12,000	NA	NA	3.67
		Above 12,000	NA	NA	4.03
General Service Accounts	15 to 1,350.14		0.75	0 to 120,000	3.67
			0.75	above 120,000	4.03
			1	0 to 30,000	3.67
			1	above 30,000	4.03
			1.5	0 to 60,000	3.67
			1.5	above 60,000	4.03
			2	0 to 96,000	3.67
			2	above 96,000	4.03
			3	0 to 192,000	3.67
			3	above 192,000	4.03
			4	0 to 300,000	3.67
			4	above 300,000	4.03
			6	0 to 600,000	3.67
			6	above 600,000	4.03
			8	0 to 960,000	3.67
			8	above 960,000	4.03

4.6.5 Meter Replacement Program

The City operates leak detection and meter replacement programs. The programs entail conducting monthly analysis of unaccounted for water loss, and striving to keep leaks and other losses to less than 10 percent. The City submits unaccounted for water summaries to the District annually. The average annual estimated unaccounted water loss for 2009 to 2013 was 6.8 percent.

4.6.6 Rain Sensor Overrides for New Lawn Sprinkler Systems

In addition to ultra-low volume plumbing in new buildings, the FBC requires that municipalities require the installation of rain sensors on new irrigation systems. Moreover, the City abides by the County's landscape Code requirements, including Section 39-78 covering rain sensors on automatic lawn sprinkler systems.

4.6.7 Water Conservation Public Education Programs

The City attaches water conservation and restriction literature to monthly water bills, and provides pamphlets covering water conservation issues at the locations where customers pay their bills. The City provides free public xeriscaping workshops in support of the City's "ECO-Neighbor Green Team program". This program identifies indigenous trees and plant species that consume minimal water and the types of paving materials that reduce run-off, control pollution, and recharge groundwater. In addition, City employees provide information at schools and public events. Also, City personnel provided valuable input to SFWMD during development of the draft 2008 Conservation Program Plan.

4.6.8 Progress to Date

Conservation measures implemented by the City between 2000 and 2010 appear to have successfully reduced per capita usage (see Table 4-9). During the period, per capita use fell from 223 gpd in 2000 to 177 gpd in 2010, a nearly 20-percent savings in water. The period of interest included the years spanning a strong downturn in the global economy (2007 to 2012), inhibiting water use. However, per capita use fell at approximately the same rate for the years preceding the recession (2000 to 2005).

During the same period, BCWWS recorded a decline in per capita use from 146 to 119 gpd, a savings of nearly 20 percent. The City should continue to update its conservation program with new techniques, conservation devices, and education, while allocating capital funding to these projects. The City should consider developing per capita water usage goals for the planning horizon of 2030.

TABLE 4-9
Per Capita Usage from 2000 to 2010

Year	City Served Population	Average Day Water Demand (mgd)	Per Capita Usage (gpd)
2000	53,484	11.94	223
2005	55,825	11.19	200
2010	53,315	9.44	177

SECTION 5

Water Supply Facilities Work Plan

This section identifies the water supply projects that are planned to meet the City's water service area demands through 2030. The section also discusses proposed projects BCWWS plans on executing to meet water demands in District 2, which serves areas within the City limits

5.1 City Assessment of Water Supply Facilities Work Plan

Since issuing the last WSFP in 2009, the City has completed an ambitious program to improve its capability in meeting water demands while upgrading its ability to treat raw water. The projects involved adding new sources of supply and treatment capacity at the West Wellfield. Moreover, the City has also closed older treatment facilities and abandoned production wells in the eastern portion of the service area to guard against saltwater intrusion in the Biscayne Aquifer.

The City recently implemented the following measures to upgrade its capacity in meeting water demands:

- Installed two new production wells in the Upper Floridan Aquifer (FA-1 and FA-2) with a total pumping capacity of 4,100 gpm (5.9 mgd)
- Installed two new production wells in the Biscayne Aquifer with a pumping capacity totaling 5,600 gpm (8.06 mgd).
- Installed an RO facility at the West WTP, increasing the existing WTP's treatment capacity by 3 mgd.
- Abandoned eight production wells installed in the Biscayne Aquifer at the East Wellfield
- Decommissioned the East WTP
- Consolidated treatment operations at the West WTP, comprising lime softening, nanofiltration, and RO treatment processes
- Dispose of concentrate from the City's membrane plants in a DIW

The SFWMD re-issued WUP 06-00082-W to the City for a 20-year permit period, increasing the City's annual and monthly allocation to 5,165 MG per year and 525 MG per month, respectively. The new allocation covers the average and maximum day demands projected through 2030. In addition to its source of supply, the City plans to continue purchasing 0.59 mgd from BCWWS.

With completion of the program, the City has fulfilled many of the activities set forth in the 2009 10-year WSFWP. The plan provided a program to meet future demands with a high level of certainty. The increase in allocation issued by SFWMD in WUP No. 06-00082-W complimented the steps taken by the City to meet demands in 2030. Thus, the City now possesses sufficient water supply capacity, treatment capacity, and allocation to meet water demands through 2030.

5.2 Work Plan Capital Projects

5.2.1 Financial Feasibility - City

The Capital Improvement Element (CIE), adopted December 2, 2013, demonstrated that the City projects listed in Table 5-1 are considered financially feasible, and that the City has the funding resources in place to construct them. Because the City is approaching its built-out limits, improvements to the WTPs and to the water supply system are scheduled to be completed within the next 5 years. The projects listed in Table 5-1 focus on improving operations at the WTP along with storing and conveying water, rather than developing new sources of supply. The City also plans on installing an automatic meter reading system to better record demands across its system. These projects facilitate the City's assessment as outlined in Section 5.1.

TABLE 5-1
Capital Improvement Element Costs for Water Supply and Treatment Projects

Project Description	Year	Capital Cost	Annual Average Raw or Finished Water Quantity (MG)
Rehabilitation of the 1-mgd Elevated Storage Tank	FY 2016	$350,000	1.0
Phase II - Conversion to Pump Station/4-mgd Storage Tank	FY 2017 & 2018	$4,000,000	4.0
Automatic Meter Reading	FY 2017	$1,500,000	NA
Replacement of Nanofiltration Elements	FY 2015	$1,500,000	6.2
Replacement of Launders in the Accelator Clarifier	FY 2015	$275,000	NA
Installation of New RO Sand Filter	FY 2015	$400,000	3.0
Replacement of High-Service, Well and Concentrate Pumps	FY 2015	$215,000	NA
Replacement of East Plant Generator	FY 2015	$300,000	NA

Note:
NA=not applicable

5.2.2 Financial Feasibility- BCWWS

The County's 2014 BCWSFP comprises the listing of public and regional supply projects and programs over the next 10-year period (at a minimum) that may prove necessary to serve BCWWS's service area and large users. BCWWS has developed plans for developing traditional and alternative water supply sources, along with conservation and reuse initiatives to support water resource and supply projections. The BCWSFP describes water supply development projects identified in the 2013 LECWSP as approved by the District Governing Board in September 2013. SFWMD acknowledged the receipt of these projects in December 2013.

The water supply, treatment and reuse projects are described in the following subsections.

5.2.2.1. District 1A Treatment Plan Expansion (RO WTP, Floridan Aquifer Wells, and a Disposal Well)

The project completion date for the District 1A WTP expansion was updated from Fiscal Year 2017 to 2019 in the 2014 BCWSFP because of the reduced water demand forecasts for 2010 and 2011. The overall cost of the project increased to an estimated $48,200,000, consistent with the recent trend in increasing construction costs. Currently, the County is installing two Floridan Aquifer test wells at the District 1 WTP with the results of testing anticipated for early 2015. The project will provide BCWWS with an additional 1.5 mgd in RO treatment capacity by 2020.

5.2.2.2. District 2A Reclaimed Water Highlands, Pompano Beach

The Reclaimed Water Distribution Project to supply Pompano Beach Highlands (District 2) area with reclaimed water is nearing completion. The County will complete installation of the distribution lines in early 2015. The County is presently negotiating the purchase of 0.3 mgd of reclaimed water from the City of Pompano Beach.

5.2.2.3. Broward County Water Partnership

The Conservation Pays Partnership represents a successful County-wide program that has operated since 2011. The program has provided approximately 4,500 high-efficiency toilets and $450,000 in toilet rebates, saving an estimated 0.442 mgd since 2011. BCWWS participates in the program as a media partner. BCWWS also promotes a toilet rebate program for their own customers. The program accounts for an additional 2,250 high-efficiency toilets and $230,000 in billing credit rebates since 2010. The County estimates that the ongoing

High Efficiency Toilet Replacement and Conservation Devices Credit Program will continue unchanged through the next 5-year planning period.

5.2.2.4. Capital Improvements Element/Schedule

This section concerns projects planned for BCWWS District 2 in the 2014 BCWSP Work Plan. The public and regional projects and programs to achieve and maintain the adopted level of service standards are identified in Broward County's Five Year Schedule of Capital Improvements (see Table 5-2). The schedule describes the costs of capital improvements, the funding source, and responsible entity.

TABLE 5-2

BCWWS Water Projects Involving District 2 in Current CIE/CIA Schedule

Appropriations	DOI[1]	Prior Year Approved but Not Completed ($)	FY 2013/2014 Expenditure ($)	Funding Source[2]	FY 2014/2015 Expenditure ($)	Funding Source[2]	FY 2015/2016 Expenditure ($)	Funding Source[2]	FY 2016/2017 Expenditure ($)	Funding Source[2]	FY 2017/2018 Expenditure ($)	Funding Source[2]	Total FYs 2014 through 2018 ($)
Potable storage tank repairs	B	$-	$-		$150,000.00	1,3	$2,050,000.00	1,3	$-		$-	1,3	$2,200,000.00
Rehabilitate process equipment	A	$-	$40,000.00	1,3	$400,000.00	1,3	$400,000.00	1,3	$400,000.00	1,3	$400,000.00		$1,640,000.00
Repair District 2 Storage tank	A	$-	$-		$30,000.00	1,3	$330,000.00	1,3	$-		$-		$360,000.00
Infrastructure improvements 314 pipe replacement	A,B	$135,521.00	$3,057,500.00	1,3	$-		$-		$-		$-		$3,057,500.00
Infrastructure improvements 316 pipe replacement	A,B	$384,019.00	$7,033,330.00	1,3	$164,810.00	1,3	$-		$-		$-		$7,198,140.00
Infrastructure improvements 318 pipe replacement	A,B	$348,914.00	$3,427,390.00	1,3	$173,470.00	1,3	$-		$-		$-		$3,600,860.00
Short line extensions	A,B,C	$-	$500,000.00	1,2,3	$500,000.00	1,2,3	$500,000.00	1,2,3	$500,000.00	1,2,3	$500,000.00	1,2,3	$2,500,000.00
Storage tank replacement WTP 1A	B	$1,238,313.00	$200,000.00	1,3	$-		$-		$-		$-		$200,000.00
Water Conservation Plan	C	$-	$108,070.00	1,3	$100,000.00	1,3	$-		$-		$-		$208,070.00
Treatment billing meters	A,D,C	$-	$880,333.00	1,3	$1,755,700.00	1,3	$807,000.00	1,3	$2,144,070.00	1,3	$2,080,740.00	1,3	$7,667,843.00
Water Treatment Plant 2A Treatment Expansion	C	$-	$-		$-		$700,000.00	1,2,3	$-		$3,960.000.00	1,2,3	4,660,000.00

Notes:

[1]DOI – Delineation of improvements – A) reduce inefficiencies; B) For replacement; C) Meet future demands.

[2]Funding sources for 5-year capital projects: 1) Capital recovery charges; 2) Bond proceeds; 3) Fund balance.

SECTION 6

Goals Objective, and Policies Supporting Water Supply Planning

The City's adopted Comprehensive Plan was reviewed to identify the GOPs that integrate the 2015 Work Plan into the Comprehensive Plan. Elements of the Comprehensive Plan are being revised in support of the Work Plan. The revised GOPs listed below are consistent with strategies in the Work Plan, which address the selection of water sources, improvement of facilities, conservation, and reuse in concert with the regional water plan. The text of the Data and Analysis Sections of the Utility Element will also be updated to be consistent with the assessment of the current and projected water supply needs and sources, considering the requirements of the LECWSP 2013 Update (SFWMD, 2013).

The proposed amendments to the Comprehensive Plan, in support of the Work Plan and the requirements of Chapter 163 and 373, FS, include modifications to the GOPs of the Utilities Element.

Note: Words underlined are additions. ~~Words struck through are deletions.~~

PROPOSED CHANGES TO THE UTILITIES ELEMENT GOPS

5.2.3 STORMWATER MANAGEMENT (SUB-ELEMENT)

GOAL UT 3.0: The City of Deerfield Beach will continue to secure, maintain, and finance ~~adequate~~ an integrated stormwater ~~drainage~~ management system which reduces the damage and impact from flooding, ~~facilities to provide protection from flooding~~, promotes the recharge of the ~~Biscayne~~ Surficial Aquifer System (SAS), improves and protects water quality in surface and ground waters, including the functions of urban wetlands, and ~~to~~ meets the requirements of designated land uses.

Objective UT 3.1: Adequate Facilities. Stormwater drainage facilities sufficient to keep damage to public and private property within the defined level of service will be constructed and maintained throughout the City.

Policy UT 3.1.1: The level of service for drainage in the City of Deerfield Beach will be consistent with Chapter 62-25, F.A.C. and the regulations of the South Florida Water Management District, Broward County and the Florida Building Code. This policy may be amended after the capacity of the drainage facilities is determined in the City's recommended stormwater master plan.

All developments must meet the requirements of the Florida Building Code. All developments of 10 acres or more must meet South Florida Water Management District and Broward County requirements for drainage to receive permits necessary for development approval. These regulations include:

a. Drainage discharge quantity shall be determined from a three day 25 year design storm. Peak runoff shall not exceed 35 cubic feet per second per square mile. In no case shall off-site discharge exceed the inflow limit of SFWMD primary receiving canal or the local conveyance system, whichever is less.

b. Flooding in new structures will be minimized by requiring the lowest floor elevation of the building to be no lower than the elevation for the respective

area depicted on the ~~that first floor elevations be set at, or above, the level of the~~ 100-Year Flood Elevation Map or the FEMA Base Flood Elevation, whichever is higher. ~~as shown on the most recent Flood Insurance Rate Map~~.

c. Street flooding will be minimized by requiring that new or reconstructed residential streets (with 50-ft. or less wide rights-of way) to have crown elevations no lower than the elevation for the respective area depicted on the ten year "Flood Criteria Map". ~~street elevations be set at, or above the 10-year Flood Elevation shown on the most recent Flood Insurance Rate Map~~. Rights of way greater than 50 feet wide shall have an ultimate edge of pavement no lower than the elevation for the respected area depicted on the 10 year "Flood Criteria Map".

d. Water quality shall be considered preserved when ½-inch of stormwater runoff is retained on-site.

Policy UT 3.1.2: New stormwater drainage facilities will be constructed by the appropriate governmental entity to minimize existing drainage deficiencies.

Policy UT 3.1.3: All future land use, zoning, and development decisions will incorporate considerations for the provision of adequate stormwater drainage facilities. The development review process will include drainage quantity and quality considerations.

Policy UT 3.1.4: Development and redevelopment activities will be encouraged in areas already served with adequate stormwater drainage facilities to encourage compact urban growth patterns.

Policy UT 3.1.5: The City's annual maintenance and evaluation program will be continued to identify needs for replacement and improvement to the City's stormwater drainage system and identify needed expansions to the City's existing system. Areas with adequate capacity will be determined in the stormwater master plan.

Policy UT 3.1.6: Drainage problems that cause property damage, first floor structure flooding or traffic hazards will be classified as priority projects and will be corrected by the appropriate governmental entity to the level of service standard.

Policy UT 3.1.7: Drainage problems that do not cause property damage or public hazards will be classified as nuisance flooding and will not be considered priority projects for corrective action by the City.

Policy UT 3.1.8: A regular program of street cleaning will be maintained by the City on major streets.

Policy UT 3.1.9: Miscellaneous facilities such as open ditches will be cleaned on an as-needed basis. Cleaning will be done by or coordinated through the City's ~~Public Works and~~ Environmental Services Department.

Policy UT 3.1.10: The City will inform the State or County of problems with drainage facilities within the City that are owned by these entities. The City will cooperate with these entities as they repair and maintain their facilities within the City limits.

Policy UT 3.1.11: Priorities for replacement, correcting existing deficiencies, and providing for future needs will be made according to need. The need shall be determined by the Department of ~~Public Works and~~ Environmental Services through the stormwater master planning process.

Objective UT 3.2: Stormwater management facilities shall be designed, constructed and operated in a manner that protects, conserves, and enhances potable water resources, including the abatement of saltwater intrusion.

Policy UT 3.2.1: The City shall work with the South Florida Water Management District (SFWMD) to implement applicable portions of the 2013 LECWSP ~~2005-2006~~ Update intended to reduce losses of excess stormwater to tide, recharge the surficial aquifer system (SAS) and provide additional storage to surface waters.

Text omitted for brevity:

5.2.4 POTABLE WATER (SUB-ELEMENT)

GOAL UT 4.0: The City of Deerfield Beach will secure and maintain adequate potable water treatment and distribution facilities for its current and future utility service area residents and businesses, including large users, take steps to minimize per capita increases in demands, maintain sufficient and equitable financing to provide these services and provide adequate fire flows.

Objective UT 4.1: Adequate Water Supply and Treatment Capacity. The City of Deerfield Beach will continue to secure raw water supplies and treatment capacity sufficient to meet or exceed its ~~the City's~~ short and long term potable water supply needs, by providing an adequate ~~supply of water~~ potable water system which meets all applicable federal, state and local water quality standards, and does not compromise the sustainability of the regional's water resources, or ability to supply water in the future.

Policy UT 4.1.1: The City will strive to ensure the adequacy of water supply facilities and infrastructure to effectively capture, store, treat and distribute potable water under variable climate conditions, including changes in rainfall patterns, sea level rise projections and flooding with potential water quality and quantity impacts.

Policy UT 4.1.2: The City will participate in intergovernmental coordination of sub-regional water supply projects and the development of alternative water supply projects incorporating sea level rise projections.

Policy UT 4.1.3 ~~1~~: The City shall adopt the 10-Year Water Supply Facilities Work Plan, (Work Plan) to increase the coordination between land use and water supply planning, as required by Chapter 163 Florida Statutes, and attached per Appendix A.

Policy UT 4.1.4 ~~2~~: Prior to approval of a building permit, the City shall consult with the appropriate water supplier to determine whether adequate water supplies to serve

the new development will be available, no later than the anticipated date of issuance of a certificate of occupancy.

Policy UT 4.1.5 ~~3~~: The level of service (LOS) standard for water supply and treatment capacity for customers served by the City system will be 175 gallons per person per day for average annual residential service, and 224 gallons per person per capita day (gpcd) on an average day basis, and 265 gpcd for maximum daily flow for system-wide service, including non-residential demands.

The LOS standard for BCWWS potable water facilities shall be the Florida Department of Environmental Protection Permitted Capacity of the facility. The permitted capacity of the District 2 water treatment plant is 30.0 mgd. Permitted capacity is defined in terms of maximum day demand. The LOS for source of supply is maximum ~~day~~ monthly demand plus in-plant uses. District 2 current source of supply (Biscayne aquifer) is permitted at 25.6 mgd, maximum day finished water until March 1, 2013 and 22.4 mgd thereafter.

Policy UT 4.1.6 4: In order to protect and conserve the ~~Biscayne~~ Surficial Aquifer System, and limit demands on the regional water management system, the City shall ~~continue to~~ investigate the development ~~utilization~~ of alternate water sources (AWS) to supplement and broaden future water supply sources. ~~as described in the Work Plan~~. These potential sources could include the increased use of reclaimed water when available, ~~improved methods of~~ conservation, development of the Floridan Aquifer, improved operations to increase stormwater reuse and aquifer recharge, and other management strategies, which may be reflected in the 2013 LECWSP ~~2005-2006~~ Update, or per future updates.

Policy UT 4.1.7 ~~5~~: ~~By the year 2013,~~ The City will ~~have~~ continue to construct AWS projects which are sufficient to meet its 2030~~25~~ LOS potable water needs.

Policy UT 4.1.8 ~~6~~: The City will meet or exceed the potable water quality requirements of Federal and State regulations as they become effective.

Since Federal and State water quality regulations are subject to change, and these changes cannot be anticipated in advance of their adoption, the costs associated with meeting these regulations cannot be accurately estimated in advance. The Capital Improvements Element of the City will include estimates of the costs of meeting expected regulations, but these estimates are subject to change as water quality regulations are passed. The City will reconsider anticipated regulations each year as the Capital Improvements Element is updated.

Objective UT 4.2: Utilize existing potable water facilities to the extent permitted and encourage compact urban growth patterns.

Policy UT 4.2.1: The City shall continue to utilize the development review process of the Land Development Code to require applicants for development permits within the City's service area, to enter into an agreement to "tie-in" to existing facilities or construct improvements to the City's potable water system necessitated by the proposed development, when adequate facilities, (based on the adopted LOS standards)

are not available and no fiscally feasible plan to construct or expand said facilities is proposed.

Policy UT 4.2.2: The City shall recommend the denial of future land use map amendments that could result in increased ~~where~~ densities or intensities ~~are increased~~ if:

1. Plans do not demonstrate that adequate water supplies and associated public facilities will be available to meet ~~the~~ projected growth demands.

2. There is not a reasonable expectation that a consumptive use permit (CUP) for ~~the proposed water source~~ will be issued by the SFWMD for the proposed source.

3. Plans to extend and/or develop potable water resources and facilities do not include a financially feasible capital improvement program.

Policy UT 4.2.3: ~~As an~~ When evaluating alternatives to new potable water facility construction, or retrofitting existing infrastructure, the City shall assess, identify, and evaluate the costs and benefits of adaption alternatives when implementing ~~opportunities~~ policies for the ~~to~~ increased ~~the~~ efficiency and ~~optimization~~ capacity of existing facilities while ~~promoting water conservation initiatives~~ balancing operational, economic and environmental effects, as part of long-term water supply planning.

Text omitted for brevity:

Policy UT 4.3.3: New distribution facilities will be sized to meet the Work Plan's 2030 ~~25~~ conditions, including expected redevelopment.

Text omitted for brevity:

Policy UT 4.4.6: The City shall study and develop a program to further promote conservation of water resources ~~by 2009~~, in concert with its C.U.P. and the 2013 LECWSP ~~2005-2006~~ Update requirements.

Text omitted for brevity:

5.2.5 NATURAL GROUNDWATER AQUIFER RECHARGE (SUB-ELEMENT)

GOAL UT 5.0: The City of Deerfield Beach will identify and protect natural groundwater aquifer recharge areas to maintain the Biscayne aquifer's function as the City's main source of raw water.~~freshwater.~~

Text omitted for brevity:

Objective UT 5.3: Maintain and protect ground water recharge of the ~~s~~ Surficial ~~a~~ Aquifer ~~s~~ System (SAS) so as to maintain all of the functions of the Biscayne Aquifer, including potable water supply, and the abatement ~~reduction~~ of saltwater intrusion.

Policy UT 5.3.1: The City shall encourage the use of BMPs in accordance with its regulations and those of the South Florida Water Management District (SFWMD).

Policy UT 5.3.2: The City shall continue to participate in regulations governing stormwater management in conjunction with the Wellfield Protection Regulations.

The city will continue to implement regulations that prohibit direct stormwater discharges to surface and ground water within Zone 1 and Zone 2 of wellfield zones of influence as designated on the Wellfield Protection maps.

Policy UT 5.3.3: The City shall maintain ~~develop~~ an integrated geographic information system inventory of public water supply, wellfields and monitoring data to facilitate local and regional planning efforts to monitor the movement of the saltwater front and to.

Text omitted for brevity:

Objective UT 5.4: Potable water facilities shall be designed, constructed, maintained and operated in such a manner as to protect the functions of natural groundwater recharge areas and natural drainage features ~~and not exacerbate saltwater intrusion~~ without inducing the inland movement or upwelling of saline water into Underground Sources of drinking Water (USDW) as defined in Chapter 62-528, FAC and SFWMD Basis of Review For Water Use as referenced in Chapter 40E-2 FAC.

Policy UT 5.4.1: The design for the construction, operation and maintenance, of new or expanded potable water facilities shall consider the short-term and long-term impacts to natural groundwater recharge areas, wetlands, surface and groundwater levels, and exacerbation of saltwater intrusion considering sea level rise. ~~The design shall also consider whether or not the construction, operation and maintenance will significantly harm the aquifer system~~. Adverse impacts of construction, operation, and maintenance shall be avoided or at least minimized.

SECTION 7

Works Cited

Broward County. 2014. *Broward County Water Facilities Work Plan (Draft)*. Broward County Environmental Protection and Growth Management Department. Fort Lauderdale, FL. 2014.

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Hem, J.D. 1985. *Study and Interpretation of the Chemical Characteristics of Natural Water*. United States Geological Survey Water Supply Paper No. 2254. Reston, VA. 1985.

Rosen, Morris (Ed). 1990. *XERISCAPE PLANT GUIDE II [SOUTH FLORIDA WATER MANAGEMENT DISTRICT]*. South Florida Water Management District, West Palm Beach FL. 48 pp.

South Florida Water Management District. 2013. *Lower East Coast Water Supply Plan Update 2013.* West Palm Beach Florida. October 10, 2013.