MIRAMAR
BEAUTY AND PROGRESS
EST 1955

CITY OF MIRAMAR

An Equal Opportunity Employer

"We're at the Center of Everything"

Community & Economic Development

2200 Civic Center Place
Miramar, Florida 33025

Phone (954) 602-3264
FAX (954) 602-3448

May 27, 2020

D. Ray Eubanks, Plan Processing Administrator
Florida Department of Economic Opportunity
Division of Community Planning/Plan Review and Processing
107 East Madison Street – MSC 160
Caldwell Building
Tallahassee, Florida 32399-4120

Subject: *City of Miramar Proposed Comprehensive Plan Amendments to update the Water Supply Facilities Work Plan and various related goals, objectives and policies (Expedited State Review Process)*

Dear Mr. Eubanks,

Pursuant to Section 163.3184(3), Florida Statutes ("F.S."), the City of Miramar is transmitting three (3) copies of certain *proposed* Water Supply Workplan Amendments to its adopted Comprehensive Plan, along with the 10-Year Water Supply Workplan update and the Ordinance authorizing transmittal of same. These three (3) copies consist of one paper copy and two electronic copies in Portable Document Format (PDF) on a CD ROM. Electronic copies of these Amendments have also been provided in PDF format to the appropriate review agencies (as listed below).

The *proposed* Amendments were triggered by the November 2018 Update of the Lower East Coast Regional Water Supply Plan ("LECRWSP") by the Governing Board of the South Florida Water Management District ("SFWMD"). In compliance with Section 163.3177, F.S., the City prepared an update to its 2015 10-Year Work Plan and is amending its Comprehensive Plan to reflect such update, which identifies and incorporates traditional and alternative projects and the water reuse programs necessary to meet the water needs for all existing and future reasonable-beneficial uses in the City for the next 10 years.

Pursuant to state statutes and the City Land Development Code, the City's Local Planning Agency reviewed the *proposed* Amendments at a duly noticed public hearing on May 12, 2020 and forwarded a recommendation for adoption to the City Commission. On May 20, 2020, the City Commission held a duly advertised public hearing on the *proposed* Amendment and unanimously voted to authorize their transmittal to DEO and other state review agencies, through the passage on first reading of the accompanying ordinance (See unsigned copy, enclosed). The *proposed* Amendments are subject to the Expedited State Review Process, pursuant to Section 163.3184(3), F.S.

Should you have any questions regarding the transmittal package, please feel free to contact Nixon Lebrun, AICP, Senior Planner, City of Miramar Community and Economic Development Department, 2200 Civic Center Place, Miramar, FL, 33025, or by phone at (954) 602-3281 or email: Nlebrun@miramarfl.gov.

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CITY OF MIRAMAR

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Sincerely,

Eric Silva, AICP
Community Development Department Director

c: Vernon E. Hargray, City Manager
Kelvin L. Baker, Sr., Assistant City Manager
Hector A. Vazquez, AICP, Strategic Development Officer
Pam E. Booker, Esq. City Attorney
Burnadette Norris-Weeks, Esq. City Attorney
Deborah Stevens, Community Development Department Assistant Director
Nixon Lebrun, AICP, Senior Planner
Barbara Blake Boy, Executive Director, Broward County Planning Council
Isabel Cosio Carballo, Executive Director, South Florida Regional Planning Council
Terry Manning, AICP, Policy and Planning Analyst, South Florida Water Management District, Lower East Coast Region
Jason Andreotta, Director, State of Florida Department of Environmental Protection, Southeast Division
Steve Braun, Director of Transportation Development, State of Florida Department of Transportation, District 4
Deena Woodward, Historic Preservation Planner Florida Department of State

Attachments: City of Miramar *Proposed* Comprehensive Plan Amendments
Ordinance Authorizing Transmittal of the *Proposed* (First Reading)
10-Year Water Supply Workplan update

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Community & Economic Development

2200 Civic Center Place
Miramar, Florida 33025

Phone (954) 602-3264
FAX (954) 602-34488

EXHIBIT "A"

CITY OF MIRAMAR, FLORIDA

Proposed Water Supply Facilities Work Plan
Comprehensive Plan Amendments

March 31, 2020

I. Future Land Use Plan
Natural, Cultural and Historical Resource Protection

Policy 6.13 The City has established ~~2.0~~ 5.0 MGD of reclaimed water as an integral part of their wastewater management and alternative water management program. The City has established ~~2.0~~ 5.0 MGD of reclaimed water for reuse. In 2022, the City shall expand the reclaimed water an additional ~~2.0~~ 2.5 MGD.

Objective 6F

~~*Provide coordination of growth management policies and water resource management. Miramar will coordinate and cooperate with the SFWMD and other local, regional, state and federal agencies in the implementation of effective linkage between growth management and water planning in the City.*~~ Coordinate water supply planning and land use planning activities of the City to ensure the water needs of the City residents and all existing and future reasonable/beneficial uses are met.

Policy 6F.2 ~~Adopted by reference the City of Miramar 2015 10-Year Water Supply Facilities Work Plan adopted May 20, 2015.~~ Continue to implement water supply projects described in the 10-Year Water Supply Facilities Work Plan as amended.

Policy 6F 3 Work with Broward County and other municipalities to update the Broward County Population Forecasting Model. Wholesale user agreement shall meet the demand projected by the Broward County Population Forecasting Model. Monitoring of population projections for retail customers outside the City limits will be accomplished through the Broward County Population forecasting Model and annual confirmation of those projections with each City.

IV(a). Potable Water/Aquifer Recharge Sub-Element

Policy 1.1 ~~The City adopts by reference and incorporates herein, the City of Miramar 2015 10-Year Water Supply Facilities Work Plan Update adopted May 20, 2015. All references throughout this Comprehensive Plan to the City's 10-Year Water Supply Facilities Work Plan, shall be interpreted to mean this 2015 10-Year Water Supply Facilities Work Plan, shall be interpreted to mean this 2015 10-Year Water Supply Facilities Work Plan Update.~~ The City of Miramar hereby adopts by reference the 2020 Water Supply Facilities Work Plan (Work Plan) for

a planning period of not less than 10 years. The Work Plan addresses issues that pertain to water supply facilities and requirements needed to serve current and future development within the City of Miramar water service area. The City of Miramar shall review and update the Work Plan at least every 5 years, within 18 months after the Governing Board of the SFWMD approves an update to the LECWSRP. Any changes affecting the Work Plan shall be included in the annual Capital Improvements Plan update to ensure consistency between the Potable Water sub-element and the Capital Improvements element.

Policy 1.2 The City shall continue coordinating with Broward County on water service that is provided to a portion of the City, and as such, ~~The City~~ hereby adopts by reference and incorporate herein, the ~~2014~~ 2020 Broward County 10-Year Water Supply Facilities Work Plan, as reviewed and updated at least every 5 years, within 18 months after the SFWMD approves an update to the LECWSRP.

IV(b). Sanitary Sewer Sub-Element

Policy 1.4 The City shall expand in the near future the current permitted capacity of its Wastewater Reclamation Facility (WWRF) from 5.0 MGD to 7.5 MGD for public access irrigation and for alternative water supply requirements, especially to provide service to the areas west of I-75. ~~Maintain the current 4.0 MGD reclaimed water capacity at the City's Wastewater Reclamation Facility for public access irrigation and implement system expansions as necessary for alternative water supply requirements.~~

VIII. Capital Improvements Element

Policy 1.11 Consistent with public health and safety, and in compliance with Section 163-3180, F.S., adequate water supplies and potable water facilities meeting the adopted LOS, shall be in place and available to serve new development no later than the issuance of the certificate of occupancy.

Policy 1.12 Implement the water supply projects described in the 10-Year Water Supply Facilities Plan. These improvements shall be incorporated into the Capital Improvements Plan on an annual basis.

Words in ~~struck-through~~ type are deletions from existing text. Words in underscored type are additions.

Temp. Ord. No. 1746
3/31/20
5/13/20

CITY OF MIRAMAR
MIRAMAR, FLORIDA

ORDINANCE NO. _____

AN ORDINANCE OF THE CITY COMMISSION OF THE CITY OF MIRAMAR, FLORIDA; CONSIDERING AN EXPEDITED STATE REVIEW COMPREHENSIVE PLAN AMENDMENT TO PART 1: GOALS, OBJECTIVES AND POLICIES OF THE CITY OF MIRAMAR ADOPTED COMPREHENSIVE PLAN, PURSUANT TO SECTIONS 163.3167, 163.3174, 163.3177 AND 163.3184, FLORIDA STATUTES (2019), AND SECTION 303 OF THE CITY OF MIRAMAR ADOPTED LAND DEVELOPMENT CODE; SPECIFICALLY BY AMENDING: (1) POLICIES 6F.1 AND 6F.2 OF THE FUTURE LAND USE ELEMENT TO REPEAL THE ADOPTION BY REFERENCE OF THE CITY'S 10-YEAR WATER SUPPLY FACILITIES WORK PLAN AND ENSURE COORDINATION WITH OTHER MUNICIPALITIES IN THE UPDATE OF THE BROWARD COUNTY POPULATION FORECASTING MODEL; (2) POLICIES 1.1 AND 1.2 OF THE POTABLE WATER/AQUIFER RECHARGE SUB-ELEMENT TO UPDATE THE CITY'S AND BROWARD COUNTY'S 10-YEAR WATER SUPPLY FACILITIES WORK PLANS AS CURRENTLY ADOPTED BY REFERENCE THEREIN, IN FURTHERANCE OF THE NOVEMBER 2018 UPDATE OF THE LOWER EAST COAST REGIONAL WATER SUPPLY PLAN BY THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT; POLICY 1.4 OF THE SANITARY SEWER SUB-ELEMENT TO REFLECT THE INCREASED CAPACITY OF THE CITY'S WASTEWATER RECLAMATION FACILITY; AND (4) POLICIES 1.11 AND 1.12 OF THE CAPITAL IMPROVEMENTS ELEMENT TO TIE THE ISSUANCE OF CERTIFICATE OF OCCUPANCY FOR NEW DEVELOPMENT TO THE AVAILABILITY OF ADEQUATE WATER FACILITIES AND TO INCORPORATE THE WATER SUPPLY PROJECTS IDENTIFIED IN THE WORK PLAN INTO THE CAPITAL IMPROVEMENTS PLAN ON AN ANNUAL BASIS; PROVIDING DEFINITIONS; MAKING FINDINGS; PROVIDING FOR ADOPTION; PROVIDING FOR TRANSMITTAL; PROVIDING FOR SEVERABILITY; PROVIDING FOR INTERPRETATION; PROVIDING FOR CORRECTION OF SCRIVENER'S ERRORS; AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, in 1972, the State of Florida Legislature ("Legislature") took its first step towards an intergovernmental system of planning by adopting the Environmental Land and Water Management Act, which established, among other things, a program to designate Areas of Critical State concern and to provide increased regulation and regional and state oversight for Developments of Regional Impact ("DRIs") affecting multiple jurisdictions; and

WHEREAS, the 1975 Legislature passed the Local Government Comprehensive Planning Act, which required local governments to adopt comprehensive plans by July 1, 1979, and to manage development according to the adopted plans; and

WHEREAS, in response to continued rapid growth and the challenges of state and local governments to adequately address development impacts, the 1985 Legislature adopted the Growth Management Act as Part II of Chapter 163 of the Florida Statutes ("F.S."), known officially as "The Local Government Comprehensive Planning and Land Development Regulation Act," which remedied various deficiencies in the 1975 Local Government Comprehensive Planning Act by giving more state oversight and control to the State Land Planning Agency in the continuous and ongoing planning process; and

WHEREAS, the Growth Management Act required all Florida's local governments to adopt by 1992 local comprehensive plans to guide future growth and development, to prepare Evaluation and Appraisal Reports ("EARs") every seven years, and subsequently update their comprehensive plans based on the recommendations of the EARs; and

WHEREAS, in conformity with, and in furtherance of, the Growth Management Act, the City of Miramar (the "City") adopted its first Comprehensive Plan in 1989 and prepared two EARs in 1995 and in 2005, which resulted in adopted EAR-based Comprehensive Plan Amendments in 2000 and 2010, respectively; and

WHEREAS, the 2005 Legislature revised the Growth Management Act, along with Chapter 373, F.S., to improve the coordination of water supply planning and land use planning between local governments and the five water management districts in the State of Florida (the "State"); and

WHEREAS, in furtherance of the water supply planning process created thereby, all five water management districts are required to periodically evaluate whether adequate sources of water exist to supply all existing and future reasonable-beneficial uses and, in the event that existing sources of water supply were determined to not be adequate, to prepare regional water supply plans, ("RWSP"), which identified how water supply needs could be met for a 20-year planning period and are to be updated every five years; and

WHEREAS, all five water management districts in the State determined that they would have insufficient supplies of water from traditional sources (typically groundwater), and have since adopted RWSPs that address water supply needs for existing and expected reasonable-beneficial uses for the next 20 years; and

WHEREAS, the 2011 Legislature enacted House Bill ("HB") 7207, which not only redesignated the Growth Management Act as the Community Planning Act in Part II of

Chapter 163 (ss. 163.3161- 163.3248), F.S., but also featured substantial amendments to the former legislation; the thrust of which was to utilize and strengthen the existing role, processes and powers of local government in the establishment and implementation of comprehensive planning programs to guide and manage future development consistent with the proper role of local government, and to focus the state role in managing growth to protecting the functions of important state resources and facilities; and

WHEREAS, the Community Planning Act requires local comprehensive plans to include the policy foundation for local planning and land use decisions on future land use, transportation, housing, intergovernmental coordination, public facilities, recreation, open space, conservation, coastal management (where applicable) and capital improvements, as further outlined in Sections 163.3177, F.S.; and

WHEREAS, like its predecessor, the Community Planning Act continues to provide for the coordination of water supply planning and comprehensive plan land use planning, and, in Section 163.3167(9), F. S., explicitly mandates that all local governments address in their comprehensive plans the water supply sources necessary to meet and achieve the existing and projected water use demand for the established planning period, consistent with the applicable RWSP developed pursuant to Section 373.709, F.S.; and

WHEREAS, the Community Planning Act also requires that local comprehensive plans be coordinated with the appropriate water management district's RWSP developed pursuant to Section 373.709, F.S., and that all local comprehensive plan amendments be

based on the availability of adequate water supplies and associated public facilities to meet projected growth demands, pursuant to Section 163.3177(4)(a), F.S., and Section 163.3177(6)(a), F.S., respectively; and

WHEREAS, Section 163.3177(6)(c), F.S., provides that local governments subject to a RWSP amend their local comprehensive plans to adopt a 10-year water supply work plan ("work plan") for building public, private, and regional water supply facilities, including development of alternative water supplies, which are necessary to serve existing and new development; said work plan to be updated within 18 months after the governing board of a water management district updates its RSWP; and

WHEREAS, pursuant to Section 163.3177(6)(c), F.S., local governments subject to a RWSP shall, in adopting work plan comprehensive plan amendments, revise the sanitary sewer, solid waste, drainage, potable water, and natural groundwater aquifer recharge element, i.e., the infrastructure element thereof to: (1) identify and incorporate the alternative water supply project(s) selected from the applicable RWSP, or proposed pursuant to Section 373.709(8)(b), F.S.; (2) identify the traditional and alternative water supply projects and the conservation and reuse programs necessary to meet water needs identified in the applicable RWSP, F.S.; and (3) update their 10-year work plan for building the water supply facilities necessary to serve existing and new development; and

WHEREAS, pursuant to Section 163.3177(6)(d), F.S., local governments subject to a RWSP may, in adopting work plan comprehensive plan amendments and to the

extent necessary to maintain internal consistency in their comprehensive plans, revise the conservation element to assess projected water needs and sources for at least a 10-year planning period, in light of the applicable water use permit(s) and RWSP developed pursuant to Section 373.709, F.S.; and

WHEREAS, Section 163.3177(6)(h)(1), F.S., states that local governments subject to a RWSP may, in adopting work plan comprehensive plan amendments and to the extent necessary to keep internal consistency in their comprehensive plans, revise the intergovernmental coordination element to ensure consistency between their comprehensive plans and the applicable RWSP developed pursuant to Section 373.709, F.S.; and

WHEREAS, pursuant to Section 163.3177(3)(a)4., F.S., local governments subject to a RWSP shall, in adopting work plan comprehensive plan amendments, revise their Five-Year Schedule of Capital Improvements to include water supply, reuse, and conservation projects and programs to be implemented during the 5-year period; and

WHEREAS, the South Florida Water Management District ("SFWMD") is the state agency responsible for water supply planning in the Lower East Coast ("LEC") Planning Area, which includes all of Broward County and the City; and

WHEREAS, the SFWMD's Governing Board approved in 1998 the interim LEC Regional Water Supply Plan ("LECRWSP") and in 2000 the final LECRWSP, which was updated in 2006 and 2013; and

WHEREAS, in compliance with the Growth Management Act as amended in 2005 and in response to the 2006 Update to the LECRWSP, the City adopted its first 10-Year Water Facilities Work Plan in 2007, which was later updated in March 2015, in response to the 2013 Update of the LECRWSP; and

WHEREAS, on November 8, 2018, the SFWMD's Governing Board approved another Update to the LECRWSP, the purpose of which is to establish a framework for future actions by the SFWMD to meet the water supply and natural resource protection requirements of Chapter 373, F.S.; and

WHEREAS, in compliance with the 18-month deadline from the approval of the LECRWSP Update as set forth in Section 163.3177, F.S., the City coordinated with the SFWMD to prepare an update to its 10-Year Water Supply Facilities Work Plan, which identifies and incorporates traditional and alternative projects and the water reuse programs necessary to meet the water needs for all existing and future reasonable-beneficial uses for the next 10 years within the City; and

WHEREAS, as further provided by Section 163.3177, F.S., the City is seeking to amend Part 1: Goals, Objectives and Policies ("GOPs") of its adopted Comprehensive Plan (the "Amendment"), specifically by amending: (1) Policies 6F.1 and 6F.2 of the Future Land Use Element ("FLUE") to repeal the adoption by reference of the City's 10-Year Water Supply Facilities Work Plan ("Work Plan") and ensure coordination with other municipalities in the update of the Broward County Population Forecasting Model; (2)

Policies 1.1 and 1.2 of the Potable Water/Aquifer Recharge Sub-Element to update both the City's and Broward County's 10-Year Work Plans as adopted by reference therein, in furtherance of the November 2018 Update of the LECRWSP by the Governing Board of the SFWMD; Policy 1.4 of the Sanitary Sewer Sub-Element to reflect the increased capacity of the City's Wastewater Reclamation Facility ("WWRF"); and (4) Policies 1.11 and 1.12 of the Capital Improvements Element to tie the issuance of certificate of occupancy for new development to the availability of adequate water facilities and to incorporate the water supply projects identified in the City's Work Plan into the City's Capital Improvements Plan ("CIP") on an annual basis, in order to maintain internal consistency in the Comprehensive Plan, pursuant to Section 163.3177(2), F.S.; and

WHEREAS, general amendments to local comprehensive plans, including those related to water supply work plans or updates thereof, must follow the expedited state review process pursuant to Section 163.3184 (2) and (3), F.S.; and

WHEREAS, pursuant to Section 163.3184(3). F.S., local governments must hold an initial public hearing on all proposed amendments to their comprehensive plan and subsequently transmit said amendments with all supporting data and analyses to the State Department of Economic Opportunity ("DEO"), the designated State Land Planning Agency, and all other reviewing agencies listed under Section 163.3184(1)(c), F.S.; and

WHEREAS, Section 163.3184(3), F.S., requires all reviewing agencies to transmit their comments, if any, to the local governments within 30 days from the date of receiving

the proposed amendments; said comments to be within the scope prescribed therein; and

WHEREAS, pursuant to Section 163.3184(3), F.S., local governments must hold a second public hearing within 180 days after receipt of timely agency comments to adopt the amendments, as may be revised to address any such comment(s), and subsequently transmit the adopted amendments to DEO for a determination of completeness; and

WHEREAS, Section 163.3184(11), F.S., provides that local governments shall adopt amendments to their comprehensive plans by ordinance and by affirmative vote of not less than the majority the members of the governing body present at the hearing, with the first and second public hearings being held at least seven and five days, respectively, after the advertisement is published; and

WHEREAS, pursuant to Section 163.3184(3), F.S., adopted amendments to local comprehensive plans are not to become effective until 31 days after DEO notified the local governments of their completeness, or, if timely challenged, until the Administration Commission or DEO enters a final order determining the adopted amendments to be in compliance; and

WHEREAS, the City Community Development Department reviewed the proposed Work Plan Amendment to the City Comprehensive Plan and concluded in its Staff Report that the Amendment, if adopted, would preserve the internal consistency of the City Comprehensive Plan, and would satisfy all applicable requirements of the Community Planning Act and the City LDC; and

WHEREAS, the City Manager concurred with findings of fact from the Staff Report and recommended adoption of the Amendment; and

WHEREAS, Section 107 of the City LDC designates and establishes the Planning and Zoning Board as the Local Planning Agency ("LPA") vested with all the powers and duties related to the preparation of the City Comprehensive Plan and amendment thereof, as further specified in Section 163.3174(4)(a), F.S.; and

WHEREAS, Sub-section 303.6 of the City LDC provides that the Planning and Zoning Board, sitting as the LPA, shall hold at least one duly noticed public hearing to review any proposed amendment to the City Comprehensive Plan, and upon giving due consideration of all matters, forward a recommendation to the City Commission; and

WHEREAS, the Planning and Zoning Board, sitting as the LPA, held a duly noticed public hearing on May 12, 2020 to review and discuss the Amendment, at which hearing public testimony was taken, and the Staff Report considered; and

WHEREAS, after due consideration of all matters, the Planning and Zoning Board, sitting as the LPA, concluded that the Amendment, if adopted, would preserve the internal consistency of the City Comprehensive Plan, and comply with the Community Planning Act and the City LDC, and therefore recommended adoption by the City Commission; and

WHEREAS, at an initial hearing held on May 20, 2020 pursuant to the notice requirements of Section 163.3184(11), F.S., the City Commission reviewed the proposed

Amendment and authorized its transmittal, along with appropriate supporting data and analyses, to DEO and the state reviewing agencies for review under the expedited state review process, as per Sections 163.3184(2) and (3), F.S.; and

WHEREAS, the City transmitted the proposed Amendment to DEO and the state reviewing agencies and received no timely comments; and

WHEREAS, pursuant to Section 163.3184(3)(c), F.S., the City Commission held a second public hearing on _____, 2020, pursuant to the notice requirements of Section 163.3184(11), F.S., and, after due consideration of all matters, found the Amendment to preserve the internal consistency of the City Comprehensive Plan, and to comply with all applicable criteria of the Community Planning Act and the City LDC; and

WHEREAS, the City Commission also found that the Amendment would foster and preserve public health, safety, comfort and welfare, and to aid in the harmonious, orderly, and progressive development of the City, and further authorized its transmittal to DEO for a determination of Ordinance completeness, in accordance with state law, unless timely challenged, in which case until the Administrative Commission or DEO issues a final order determining that the Amendment is in compliance.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COMMISSION OF THE CITY OF MIRAMAR, FLORIDA AS FOLLOWS:

Section 1: **Recitals; Definitions:**

(a) Recitals. That the foregoing "**WHEREAS**" clauses are ratified and confirmed as being true and correct and are made a specific part of this Ordinance.

(b) Definitions. As used herein, unless the context or City Code of Ordinances requires to the contrary, the following terms will be defined as set forth below:

(1) "City" means the City of Miramar, a Florida Municipal Corporation.

(2) "DEO" means the State of Florida Department of Economic Opportunity, also designated as the State Land Planning Agency.

(3) "Development" is defined as set forth in Section 163.3164, Florida Statutes.

(4) "F.S." means Florida Statutes.

(5) "FLUE" means the Future Land Use Element of the Comprehensive Plan.

(6) "GOPs" means Goals, Objectives and Policies of the Comprehensive Plan of the City of Miramar.

(7) "LDC" means the Land Development Code of Ordinances of the City of Miramar.

(8) “LEC” means the Lower East Coast, which is one of five planning areas in the South Florida Water Management District, covering 6,500 square miles and covering all of Broward, Miami-Dade and Palm Beach counties, most of Monroe County and parts of Collier and Hendrick counties.

(9) “LECRWSP” means the Lower East Coast Regional Water Supply Plan, developed pursuant to Section 339.175(7), F.S.

(10) “Legislature” means the State of Florida Legislature.

(11) “SFWMD” means the South Florida Water Management District, the regional governmental agency that manages the water resources in the southern half of the state, covering 16 counties from Orlando to the Florida Keys.

Section 2: **Findings:** The City Commission of the City of Miramar, Florida, hereby finds the adopted Amendment to preserve the internal consistency of the City Comprehensive Plan, and to comply with all applicable provisions of the Community Planning Act and the City Land Development Code.

Section 3: **Adoption:** The City Commission of the City of Miramar, Florida, hereby passes and adopts the proposed Amendment to the texts of the City of Miramar Comprehensive Plan, attached hereto as composite Exhibit “A” involving: (1) Policies 6F.1 and 6F.2 of the Future Land Use Element to repeal the adoption by reference of the City’s 10-Year Water Supply Facilities Work Plan and ensure coordination with other municipalities in the update of the Broward County Population Forecasting Model; (2)

Policies 1.1 and 1.2 of the Potable Water/Aquifer Recharge Sub-Element to update both the City's and Broward County's 10-Year Water Supply Facilities Work Plans as adopted by reference therein, in furtherance of the November 2018 Update of the Lower East Coast Regional Water Supply Plan by the Governing Board of the South Florida Water Management District; Policy 1.4 of the Sanitary Sewer Sub-Element to reflect the increased capacity of the City's Wastewater Reclamation Facility; and (4) Policies 1.11 and 1.12 of the Capital Improvements Element to tie the issuance of certificate of occupancy for new development to the availability of adequate water facilities and to incorporate the water supply projects identified in the City's Work Plan into the City's Capital Improvements Plan on an annual basis, in order to maintain internal consistency in the Comprehensive Plan. No other provisions are amended, added or deleted from the Comprehensive Plan, except those that are depicted.

Section 4: **Transmittal:** The City Commission of the City of Miramar, Florida, hereby authorizes the City Manager to transmit the appropriate number of copies of this Ordinance and the City's Comprehensive Plan, as amended herein, to the State of Florida Department of Economic Opportunity, the designated State Land Planning Agency, and to any other reviewing agency having jurisdiction with regard to the approval of same in accordance with, and pursuant to, the Community Planning Act, as codified in Part II of Chapter 163, F.S., and to keep available copies of the amended City Comprehensive Plan for public review and examination at the City Community Development Department.

Section 5: **Severability:** If any word, clause, phrase, sentence, paragraph or section of this Ordinance is held to be unconstitutional or invalid by any court of competent jurisdiction, such unconstitutional or invalid part or application shall be considered as eliminated and shall not affect the validity of the remaining portions or applications which shall remain in full force and effect.

Section 6: **Interpretation.** In interpreting the provisions of Exhibit "A" appended to this Ordinance, the following rules and symbols shall apply:

(a) Additions are shown in underlined text and deletions in ~~stricken through~~ text; and

(b) Changes between first and second reading are shown in highlighted text.

Section 7: **Scrivener's Errors:** The City Attorney is hereby authorized to correct scrivener's errors in this Ordinance by filing a corrected copy with the City Clerk.

Section 8: Effective Date: The effective date of Section 3 of this Ordinance shall be 31 days after the Department of Economic Opportunity, the State Land Planning Agency, notifies the City that the adopted amendment is complete, unless timely challenged by an affected person, in which case, until such time the State Land Planning Agency or the Administration Commission enters a final order determining the adopted Amendment to be "In Compliance." Sections 1, 2, 4, 5, 6, 7, and 8 of this Ordinance shall become effective upon adoption.

Temp. Ord. No. 1746
10/17/19
5/13/20

PASSED FIRST READING: _____

PASSED AND ADOPTED ON SECOND READING: _____

_____
Mayor, Wayne M. Messam

_____
Vice Mayor, Maxwell B. Chambers

ATTEST:

_____
City Clerk, Denise A. Gibbs

I HEREBY CERTIFY that I have approved
this ORDINANCE as to form:

_____
City Attorney,
Austin Pamies Norris Weeks Powell, PLLC

Requested by Administration	**Voted**
Commissioner Winston F. Barnes	_____
Vice Mayor Maxwell B. Chambers	_____
Commissioner Yvette Colbourne	_____
Commissioner Alexandra P. Davis	_____
Mayor Wayne M. Messam	_____

ATTACHMENT 1

APPENDIX A

2020 WATER SUPPLY FACILITIES WORK PLAN

CITY OF MIRAMAR, FLORIDA

CITY OF MIRAMAR, FLORIDA
13900 PEMBROKE ROAD | MIRAMAR FL 33027

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1. INTRODUCTION

This City of Miramar (City) Water Supply Facilities Work Plan (2020 Work Plan) addresses traditional and alternative water supply (AWS) source development and management strategies to meet existing and projected water use demand. This work plan primarily focuses on City of Miramar's water and sewer service areas. The City's water service areas comprise about 96% of the city's population whereas its sewer service area is 100% of its population. The remaining portion is served by Broward County Water and Wastewater Services for water services only.

Florida Law [Florida Statutes Section 163.3177(6)(c)3] requires local governments to adopt water supply facilities work plans into their comprehensive plans within eighteen months after the South Florida Water Management District (SFWMD) approves a regional water supply plan update. The SFWMD approved the 2018 Lower East Coast Water Supply Plan Update (LESWSP, SFWMD, 2018) on November 8, 2018, with final administrative order on January 11, 2019. The 2020 Work Plan is City of Miramar's required update based on that plan's adoption.

Like most Southeast Florida water utilities, the City's primary public water supply source water is the Surficial Aquifer System (SAS) located from ground surface to approximately 240 feet underground. The City's groundwater withdrawal wells range between 75 to 130 feet below ground. The City's primary SAS feature is the Biscayne Aquifer and it provides the vast majority of BCWWS and BMSD populations' water supply needs. However, the Biscayne Aquifer is considered a finite water resource by the SFWMD. This means that, of the available alternative water supply sources, none can reasonably provide for current area water demands should the Biscayne Aquifer become contaminated. In 2007, the SFWMD mandated through a Regional Water Availability Rule that alternative water supply (AWS) will be used to serve future population growth (SFWMD, 2007). For example, the brackish Upper Floridan Aquifer (approximately to 1000 – 1700 feet underground) can be withdrawn and treated with more complex processes than used for the Biscayne Aquifer water. Other AWS options include, but are not limited to, water conservation, water reuse, and surface water storage development. The 2020 Work Plan outlines future projects to serve future populations as well as projects that maintain and optimize the City's current systems.

The City's reuse expansion is the City's primary AWS initiative, in addition to the Floridan Aquifer. The City is currently increasing its water reuse production capacity to seven and half (7.5) million gallons per day from the current five (5) million gallons per day.

Additional regional drivers for the City's water supply include regional climate impacts such as sea level rise, saltwater intrusion, and extreme weather events. Sea level rise threatens future South Florida water conveyance that could negatively impact aquifer recharge and flood control management practices. Due in large part to a porous aquifer, future sea level rise also will increase saltwater intrusion's negative effect on public water supplies. Saltwater intrusion from the coastal ocean will likely move further inward and pose contamination risk for freshwater aquifers. Future extreme weather events may include longer dry weather patterns that could decrease public water supply levels and also increase saltwater intrusion's landward extent.

The City of Miramar, together with its municipal and regional partners, supports and facilitates water supply and climate change planning integration and implementation including, but not limited to integrated resource management, resiliency in water utility practices.

A major regional plan to restore Florida's Everglades – the Comprehensive Everglades Resto-ration Plan (CERP) – will also change future water resource conditions. CERP will construct additional water storage systems to capture wet season flow volumes and provide critical natural system water needs as well as maintain public water supply. CERP features within Broward County and in other SFWMD regions should collectively benefit local water supply sustainability throughout South Florida.

This work plan is prepared with the following objectives:

- To meet existing and projected needs for at least a 10-year period.
- To identify the capital improvements that will be needed to develop, treat, and deliver those supplies.
- To identify conservation measures and reuse supplies that can be used to offset de-mand for new water.

Water conservation and reuse expansion remains a critical AWS strategy in the 2020 Work Plan. This report outlines the water treatment plant (WTP) upgrades and water conservation projects required to meets its growing population and sustain economic growth to the year 2030 and beyond.

1.1 BACKGROUND

The City of Miramar is located along the southern border of Broward County as shown in Figure 1-1. It is bordered on the north by the City of Pembroke Pines and by the City of Hollywood, on the east by the City of West Park, on the south by the City of Miami Gardens and Miami-Dade County, and on the west by the Everglades. Figure 1-2 shows the corporate limits of the City of Miramar.

The City was established in 1955, and the City's growth up until the early 1990's was largely confined to the eastern portion of the City (historically defined as the area between Palm Avenue and US 441). At that time, the City's utility service generally consisted of the East Water Treatment Plant (East WTP), and a master pump station that sent wastewater to the City of Hollywood's Southern Regional Wastewater Treatment Plant (SRWWTP).

Over the past twenty-five (25) years, the City of Miramar underwent extraordinary growth and development as previously vacant lands in its western service area were developed. This development required extensive expansion of water and wastewater infrastructure as the City has more than doubled in population. To provide necessary water service, the City planned, designed, financed, and constructed the West Water Treatment Plant (West WTP) to serve future development. The West WTP has been expanded in three (3) phases, from the original capacity of 4.5 MGD, to the current capacity of 11.75 MGD. In addition, the East WTP is being renovated and converted to a state-of-art Nanofiltration water treatment plant with a new permitted treatment capacity of 6.0 MGD. Currently, the East and West WTPs service about 96 percent of City's population. The remaining portion is served by Broward County Water and Wastewater Services (BCWWS).

As the City continues to grow through development and redevelopment, assessments of the growth and impacts are continuously monitored. This document identifies water supply sources, availability of water plant capacity, facilities planning, and environmental impacts in order to serve existing and new development within the City's Service Area.

1.2 STATUTORY REQUIREMENTS

In 2002, the Florida Departments of Community Affairs (DCA) and Environmental Protection (DEP) and the state's water management districts examined the agencies' statutory and regulatory authorities, as well as their processes for providing technical assistance to local governments, to determine whether water supply planning and local government comprehensive planning could be better integrated.

It has been determined that traditional water supply sources used in the South Florida area will not be sufficient to meet the demands of the growing population and the needs of the environment, agriculture and industry over the next twenty (20) years. As potential

limitations on the continued use of traditional water supplies became increasingly apparent in recent years, the Florida Legislature enacted bills in 2002, 2004, 2005, and 2011 to more effectively address the state water supply needs by improving the coordination between local land use planning and water supply planning.

In 2005, the Florida Legislature significantly changed Chapter 163, Part II, and 373, F.S., to improve the coordination of water supply planning and land use planning. Senate Bills 360 and 444 strengthened the statutory linkage between the regional water supply plans and local government comprehensive plans, plan amendments, and evaluation and appraisal reports (EARs). The Bills encouraged local governments located in the areas subject to regional water supply plans to cooperate with the water management districts in development of alternative water supplies. The legislation also re-emphasized the need for local governments to implement water conservation and reuse programs.

Each local government located in a regional water supply planning area must now prepare a Water Supply Facilities Work Plan for a minimum 10-year period, describing the public, private, and regional water supply facilities and alternative water supply projects, reuse, and conservation that will be developed to address future water needs.

Furthermore, these bills that were enacted in 2002, 2004, 2005, 2011, 2012, 2015 and 2016 by the Florida Legislature address the state's water supply needs and established the basis for improving coordination between local land use and water supply planning.

1.3 WATER SUPPLY PLANNING REQUIREMENTS

With regard to water supply, the legislation requires the local government to ensure that adequate water supplies and facilities are available to serve new development no later than the date on which the local government anticipates issuing a certificate of occupancy, and consult with the applicable water supplier prior to approving a building permit, to determine whether adequate water suppliers will be available to serve the development by the anticipated issuance date of the certificate of occupancy. This "water supply concurrency" is now required for all new development proposals.

Specifically, the water supply plan needs to address the following elements:

a. The Infrastructure Element identifies alternative and traditional water supply projects, and conservation and reuse programs necessary to meet the projected water demands identified within the local government's jurisdiction; incorporates the alternative water supply projects the local government has elected from the regional 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.

b. The Capital Improvements Element addresses the need for and preliminary planning of public facilities, including those identified in the 10-Year Water Facilities Work Plan. The five-year schedule of capital improvements must describe projects listed

in the 10-year work plan that are to be implemented in the first five years of the plan, including both publicly and privately funded water supply projects, that are necessary to ensure that adopted level of service standards are achieved and maintained.

c. The Conservation Element includes an assessment of current and projected water needs and sources for a minimum 10-year period, considering the appropriate regional water supply plan and consumptive use permit.

1.4 REGIONAL WATER SOURCES AND PLANNING

The Biscayne Aquifer is one of the most productive aquifers in the world and is currently the primary source of freshwater to residents of Broward County, Miami-Dade County, and south-eastern Palm Beach County. In 1979, it was designated a sole source aquifer by the U.S. Environmental Protection Agency (EPA), under the Safe Drinking Water Act (1974). The South Florida Water Management District (SFWMD) is the state agency responsible for water supply planning in the Lower East Coast Planning (LEC) Area, which includes all of Broward County and the City of Miramar. Withdrawals from the Biscayne Aquifer are managed by the SFWMD through the issuance of Consumptive Use Permits (CUPs). In order to protect the Biscayne Aquifer from saltwater intrusion, ensure adequate groundwater levels for maintenance of natural systems, and prevent excessive groundwater seepage or surface water flows from the regional (Everglades) system the Governing Board of the SFWMD adopted the "Regional System Water Availability Rule" requiring that new water demands be met through alternative water sources.

In recognizing the new requirements for water supply planning and financing, the City of Miramar has taken initiatives on meeting growth requirements by integrating alternative water supplies in its Comprehensive Plan. In 2007, the City's Department of Utilities prepared the 10-Year Water Facilities Work Plan, which incorporated proposed alternative water supplies, such as the use of the Floridan Aquifer for increased potable water supply, and the expansion of the reclaimed water treatment and distribution system.

In addition, SFWMD worked with local water supply utilities and developed an update to the Lower East Coast Regional Water Supply Plan (LECRWSP) in 2018. The LEC Update identifies base line conditions of Biscayne Aquifer allocation and alternative water supply sources that local utilities are required to implement in order to ensure adequate water supply for present and future water capacity demands.

1.5 10-YEAR SUPPLY PLAN DEVELOPMENT AND OBJECTIVES

In response to the 2018 LECRWSP update, regional governments are required to update their Water Supply Facilities Work Plan (the Work Plan) through an amendment to their Comprehensive Plan within 18 months of the LECRWSP adoption. The City's 2020 update to the 10-Year Water Supply Facilities Work Plan was prepared under the guidelines of

Water Supply Facilities Work Plan Updates – SFWMD Technical Assistance Guide, January 2019. Various references were also used in generating this report including the Broward County Water Supply Facilities Work Plan, Draft Report (September 18, 2019), the Broward County and Municipal Population and Allocation Model (PFAM), 2017, and the 2018 Lower East Coast Water Supply Plan Update.

To address the three (3) required elements above, the Work Plan identifies the future water supply needs and develops a strategy for meeting projected water demands. The Work Plan also includes a detailed analysis of existing water facilities and identifies the base line condition with Biscayne Aquifer allocation under the "Water Availability Rule" and in combination with alternative water supplies to meet future water demands. The Work Plan also includes a 5-year Capital Improvement Projects schedule which includes preliminary construction cost estimates needed to maintain level of service and for expansion and alternative water supply facilities. The Work Plan also addresses the area that is served by Broward County through the Large-User Wholesale Agreement with the City of Hollywood.

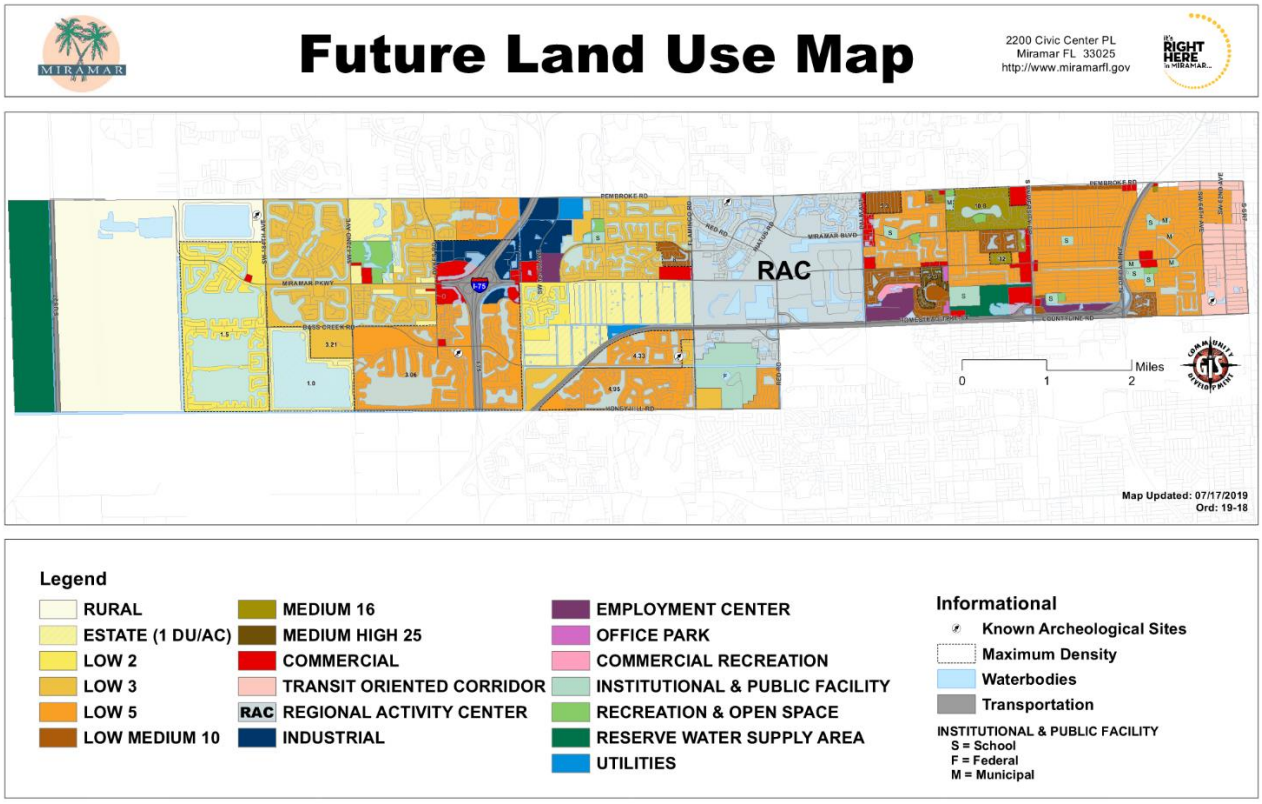
During the preparation of the Work Plan, the City of Miramar coordinated with SFWMD regarding demand projections, the use of appropriate water sources to meet projected demands and the use of water conservation and reuse strategies through permitting efforts and coordinated with the Department of Community Development to incorporate the latest water supply requirements into the Comprehensive Plan and the Future Land Use Plan. The Work Plan is intended to strengthen the coordination between Community Development land use planning responsibilities, Utilities water supply facilities planning activities and the water resource development responsibilities of the water management districts. Figure 1-1 shows the City's future land use plan.

1.6 GOALS, OBJECTIVES, AND POLICIES

The Work Plan, as amended, is adopted by reference in the City's Comprehensive Plan. In furtherance of the coordination between water supply planning and comprehensive land use planning set forth in Section 163.3167 and 163.3177, F.S., the numerous Goals, Objectives and Policies ("GOPs") of the City's Comprehensive Plan, were reviewed for consistency with the City's 2020 Work Plan and updated as necessary. These GOPs, which are specifically found in the Future Land Use Element, the Potable Water/Aquifer Recharge Sub-Element, the Sanitary Sewer Sub-Element, the Intergovernmental Coordination Element and the Capital Improvements Element reflect the City's commitment to water supply planning and water resource protection to meet and

achieve for existing and expected reasonable-beneficial uses for the next 10 years, considering the requirements of the 2018 LECRWSP Update.

Figure 1—1 FUTURE LAND USE MAP



2. WATER SUPPLY INFRASTRUCTURE

2.1 SERVICE AREAS

2.1.1 CITY OF MIRAMAR SERVICE AREA

The City of Miramar is located along the southern border of Broward County as shown in Figure 2-1. It is bordered on the north by the City of Pembroke Pines and by the City of Hollywood, on the east by the City of West Park, on the south by the City of Miami Gardens and Miami-Dade County, and on the west by the Everglades. Figure 2-2 shows the corporate limits of the City of Miramar and shows its major utility facilities.

The City was established in 1955, and the City's growth up until the early 1990's largely was con-fined to the eastern portion of the City (historically defined as the area between Palm Avenue and US 441). The City's utility service generally consisted of the East Water Treatment Plant (East WTP), and a master pump station to send wastewater to the City of Hollywood.

Over the past twenty-five (25) years, the City of Miramar underwent extraordinary growth and development of previously vacant lands in its western service area. This development required extensive expansion of water and wastewater infrastructures as the City has more than doubled in population. To provide necessary water service, the City planned, designed, financed, and constructed the West Water Treatment Plant (West WTP) to serve future development. The West WTP has been expand-ed in three (3) phases, from the original capacity of 4.5 MGD, to the current capacity of 11.75 MGD. In addition, the East WTP is being renovated and converted to a state of the art Nanofiltration water treatment plant and its new permitted treatment capacity is 6.0 MGD. Currently, the East and West WTPs service almost all customers within the City limits, except for a small portion of area in the northeast side of the City of Miramar. This area is currently being served by Broward County Water and Wastewater Services (BCWWS).

As the City continues to grow through development and redevelopment, assessments of the growth and impacts continue to be performed. This document identifies water supply sources, availability of water plant capacity, facilities planning, and environmental impacts in order to serve existing and new development within the City's Service Area.

As shown on Figure 2-2, the area in white inside the City of Miramar service area (between Miramar Pkwy and SW 48th Ct, S Flamingo Rd and SW 148th Ave) is known as the Country Club. The County Club area is served by domestic self-supply systems. Currently, the City is planning to include the County Club area in phases starting Year 2025. Therefore, the Country Club area water demand projection is only considered starting Year 2025.

Figure 2—1 LOCATION MAP

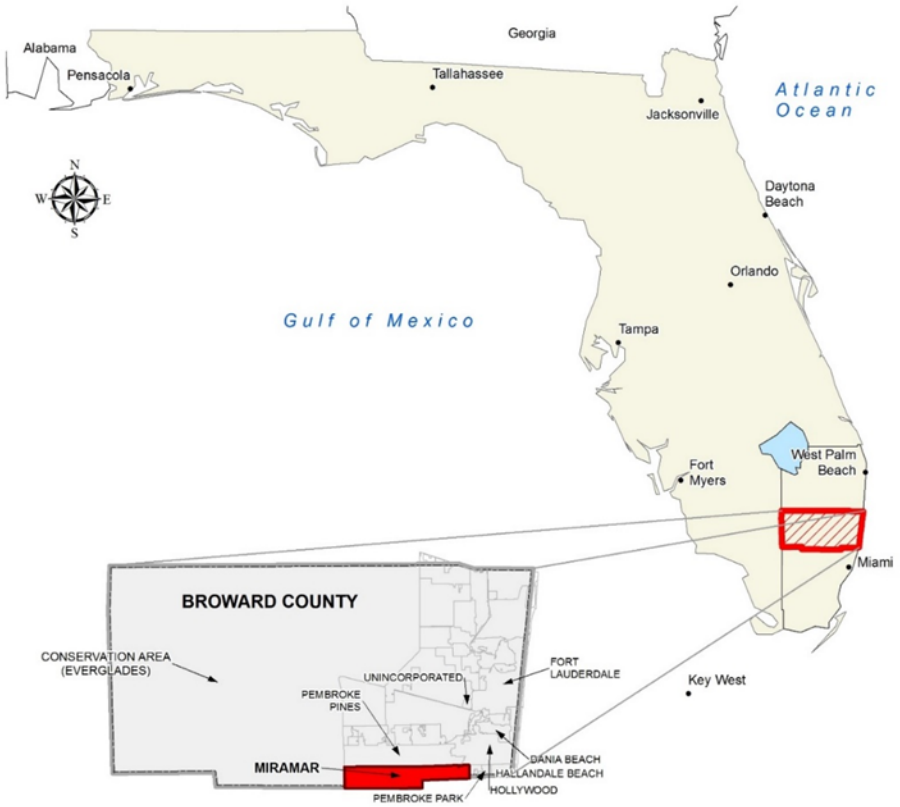
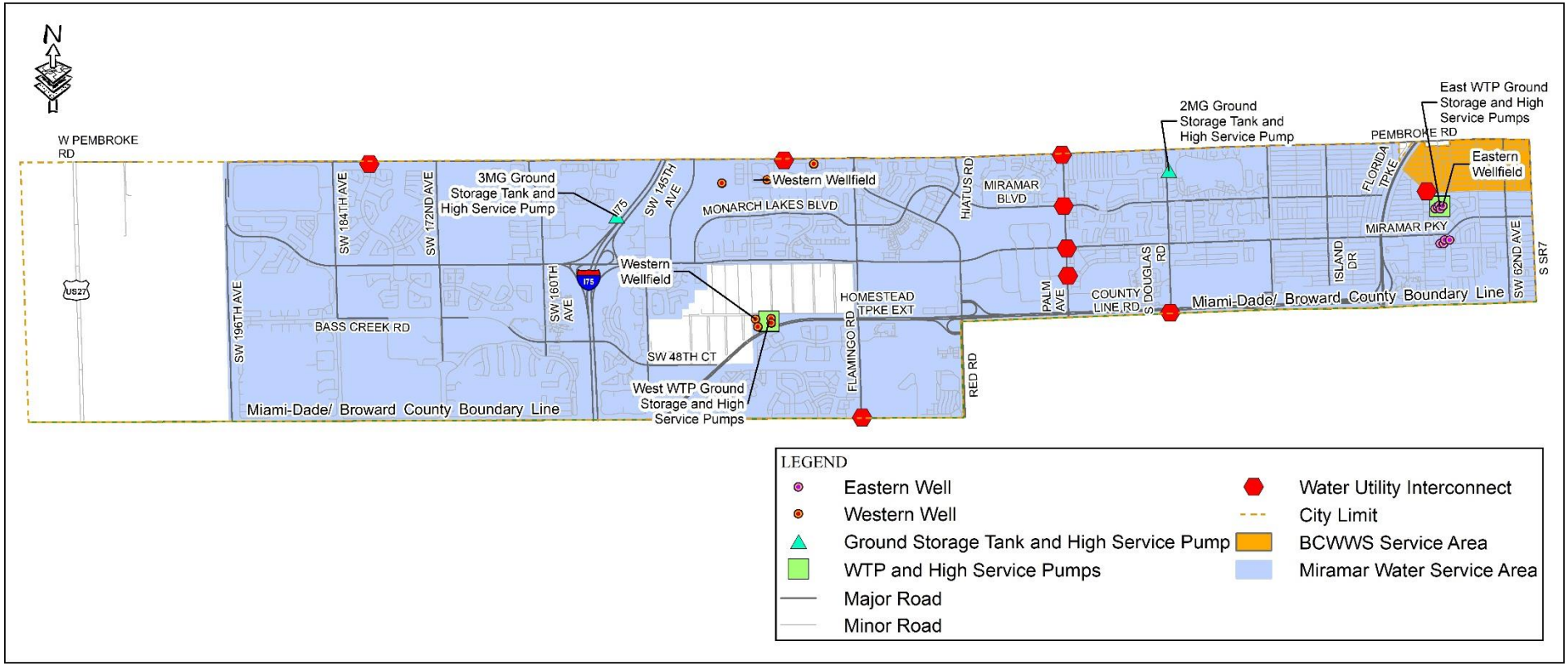


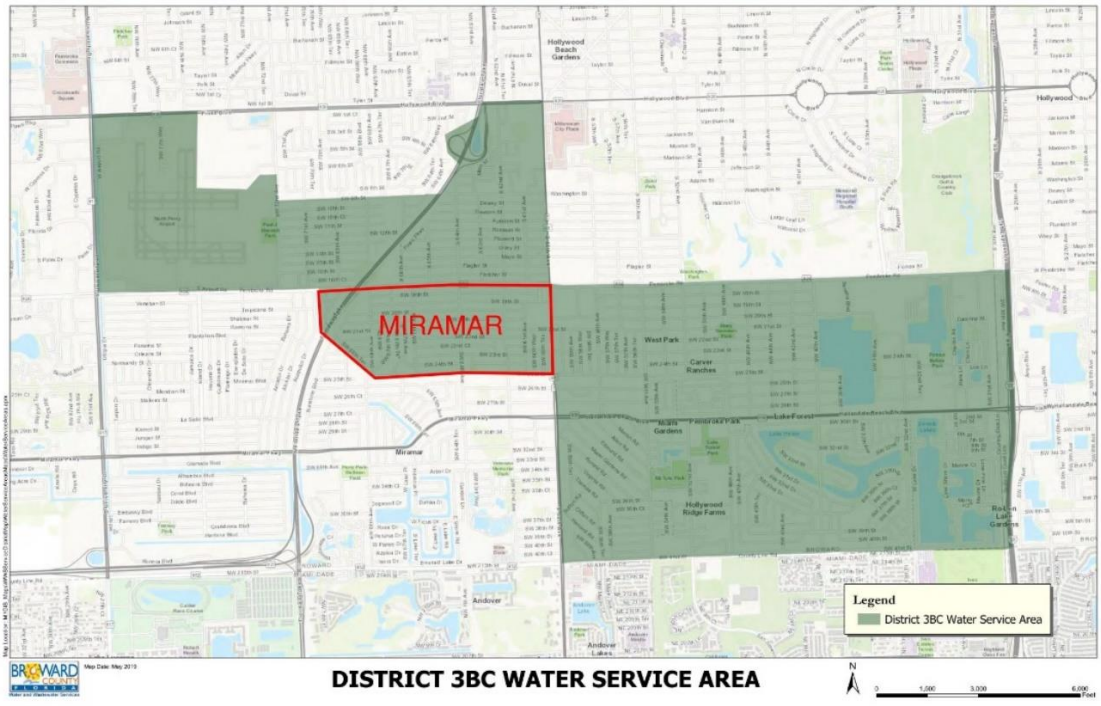
Figure 2—2 CITY'S CORPORATE LIMITS AND MAJOR FACILITIES



2.1.2 BROWARD COUNTY SERVICE AREA(BCWWS DISTRICT 3A AND 3BC)

This section of the report was extracted from the Broward County Water Supply Facilities Workplan, April 2020. District 3 service area is divided into two geographically separate subdistricts, Figure 2-3. The County purchases bulk treated water primarily from the City of Hollywood interconnect and distributes the treated water through the County's distribution system. District 3 has a combined service area of approximately 14.3 square miles and contains 223 miles of transmission and distribution mains. Subdistrict 3A has interconnects with the City of Hollywood, for is primary water supply, and with the City of Fort Lauderdale and the City of Dania Beach, to provide for emergency water supply. Subdistrict 3BC has interconnects with the City of Hollywood for its primary water supply, and the Cities of Pembroke Pines and Miramar to provide for emergency water supply.

Figure 2—3 BCWWS SERVICE AREA IN MIRAMAR



A small portion within the corporate limits of the City is served by Broward County. The County's Service Area, about 0.30 square mile, is denoted as "Retail District 3BC" and includes a relatively small section of the City bounded by the Florida Turnpike to the west, US 441 to the east, Pembroke Road to the north, and SW 25th Street to the south.

Table 2-1 shows the service population projection per municipality is some of the areas currently served by Broward County.

Table 2-1 POPULATION PROJECTION BY MUNICIPALITY

Municipality	2015	2020	2025	2030	2035	2040	2045
District 3BC Total	52,584	54,394	56,972	60,221	62,325	63,734	65,235
Dania Beach	15,307	15,888	16,808	17,379	17,680	17,824	17,950
Davie	60	60	325	538	710	874	1,033
Fort Lauderdale	721	713	705	906	1,044	1,161	1,271
Hollywood	4,698	4,922	5,266	5,603	5,840	6,036	6,250
Miramar	**6,615**	**6,623**	**7,359**	**8,291**	**8,858**	**9,310**	**9,832**
Pembroke Pines	4,040	4,384	4,334	4,294	4,417	4,477	4,520
Pembroke Park	6,940	6,922	6,792	7,127	7,292	7,355	7,412
West Park	14,203	14,882	15,383	16,083	16,484	16,697	16,967

Note: This data was extracted from the Table WS 10 of the Broward County Facilities Work Plan, April 2020

The City has been closely coordinating with Broward County on water service that is provided to a portion of the City by meetings and sharing 10-year water supply facility work plans. In fact, we the City of Miramar, has partnered with Broward County in upgrading its water distribution system in a project called Historic Miramar Infrastructure Improvements Project (HMII-3). This project is still on-going and should be completed by mid-2020.

The City will be coordinating with Broward County Water and Wastewater Services on a continuing basis to better serve the areas under the County's service area.

2.2 WATER RESOURCES AND ALLOCATIONS

2.2.1 ACTIVE CONSUMPTIVE USE PERMIT

The City is currently operating under the SFWMD Water Use Permit No. 06-00054-W, which was issued on October 3, 2017 and will expire on March 14, 2036. The annual allocation is 6,887.55 million gallons (18.87 MGD). The total monthly allocation is 607.43 MG, provided the City demonstrates through documentation of reclaimed water end user meter readings that a minimum citywide average of 4.0 MGD of reclaimed water is being provided for irrigation. Currently the City is expanding its water reuse capacity from 5 MGD to 7.5 MGD.

2.3 WATER SUPPLY FACILITIES

2.3.1 SYSTEM DESCRIPTION

The City of Miramar owns, operates and maintains a public water system serving most of the City. The major components of the water system are water supply well fields, water treatment facilities, storage and re-pump facilities, transmission/distribution system, interconnections with other utilities, and customer service connections. Potable water is supplied primarily by two water treatment plants (WTPs) owned and operated by the City, namely: the East Water Treatment Plant and the West Water Treatment Plant.

These two plants are operated independently but are interconnected via the water transmission/distribution system. The East WTP is located along S.W. 26th Terrace, north of Miramar Parkway (2600 SW 66th Terrace, Miramar, FL 33023). The West WTP is located approximately one (1) mile west of Flamingo Road, north of the Florida Turnpike (4100 Flamingo Rd, Miramar, FL 33027).

2.3.2 WATER SUPPLY SOURCES AND WELL FIELDS

The City currently has eight primary Biscayne aquifer production wells and two Floridan aquifer system wells and proposes one additional Floridan aquifer system production well. The wells are divided between two wellfields. The Eastern Wellfield located in the eastern portion of the City's service area consists of four Biscayne aquifer production wells. The Western Wellfield, located in the central portion of the City's service area consists of four existing Biscayne aquifer production wells, two existing Floridan aquifer system production wells, and one proposed Floridan aquifer system production well. Two additional Biscayne aquifer wells have been constructed in the Western Wellfields (Huntington) but are currently capped with no pump or transmission lines installed.

2.3.2.1 FLORIDAN AQUIFER SOURCE

In response to the Water Availability Rule, and the restrictions on Biscayne aquifer withdrawals, the City developed and installed a 2.5 MGD reverse osmosis treatment system utilizing water from the Floridan aquifer, which was placed into full operation in 2012. The Floridan aquifer is considered as an alternative water supply to the Biscayne aquifer and desalting technologies are needed to treat the water to potable quality.

With the upgrade of the East Water Treatment Plant from lime softening to nanofiltration treatment technology, all existing well fields in the east have been plugged and abandoned. Four new wells E1-N through E4-N have been constructed in 2018 and now supply the new nanofiltration process.

Table 2-2 EAST WATER TREATMENT PLANT NEW GROUNDWATER WELLS

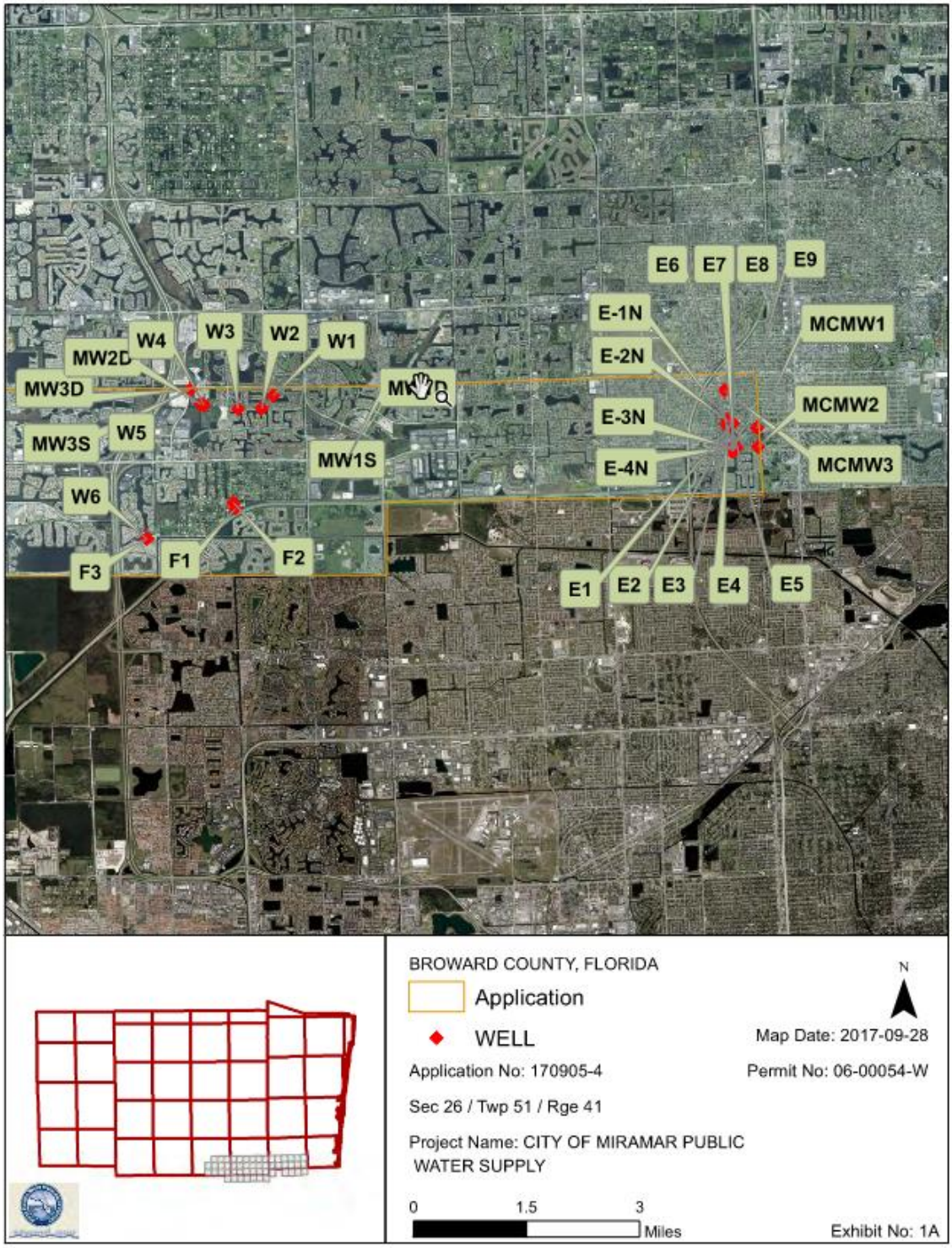
New Ground Water Wells – EWTP				
Well name	E1-N	E2-N	E3-N	E4-N
FLUWID				
Year well drilled	2018	2018	2018	2018
Depth well drilled (feet)	150	150	150	150
Aquifer Name	Biscayne	Biscayne	Biscayne	Biscayne
Depth of Casing (feet)	100	100	100	100
Diameter of casing (inches)	20.7	20.7	20.7	20.7
Pump Type				
Horsepower				
Rated Capacity (GPM@psi)	1,736	1,736	1,736	1,736
Observed Yield(GPM@psi)				
Consumptive Use Permit Rating	All New Wells - combined capacity is 6,944 GPM Permitted Allocation Not to Exceed- 1,825 MG per year or 162.73 MG/month or 5 MGD.			

Table 2-3 EXISTING GROUND WATER WELLS SUMMARY

Groundwater Wells - WWTP									
Well name	W1	W2	W3	W4	W5	W6	F-1	F-2	F-3
FLUWID	AAH0039	AAH0038	AAH0037	AAh0040	AAN6758		AAN6758	AAN6757	
Year well drilled	1995	1995	1995	1992	2003	2003	2010	2010	2010
Depth well drilled (feet)	110	115	112	70	115	115	1,350	1,350	1,350
Aquifer Name	Biscayne	Biscayne	Biscayne	Biscayne	Biscayne	Biscayne	Floridan	Floridan	Floridan
Depth of Casing (feet)	90	88	93	48	75	75	950	950	950
Diameter of casing (inches)	20	20	20	18	24	24	18	18	18
Pump Type	V. Turbine	V. Turbine	V. Turbine	V. Turbine	Submersible	Submersible	Submersible		
Horsepower	120	120	120	120	200	200	200	200	
Rated Capacity (GPM@psi)	2,800	2,800	2,800	2,800	-	-	1,400	1,400	1,400
Observed Yield(GPM@psi)									
Consumptive Use Permit Rating	Permitted Allocation Not to Exceed - 10.15 MGD annual or 330.34 MG/month						Not to Exceed 1,149.75 MG/year or 95.81 MG/month		

Groundwater Wells – EWTP (All of these wells were recently retired and are now out of service)									
Well name	E1	E2	E3	E4	E5	E6	E7	E8	E9
FLUWID	AAH0028	AAH0033	AAH0030	AAH0031	AAH0029	AAH0033	AAH0034	AAH0035	AAH0036
Year well drilled	1955	1955	1955	1955	1955	1963	1963	1963	1963
Depth well drilled (feet)	110	110	110	110	120	110	110	110	110
Aquifer Name	Biscayne	Biscayne	Biscayne	Biscayne	Biscayne	Biscayne	Biscayne	Biscayne	Biscayne
Depth of Casing (feet)	100	100	100	100	110	100	100	100	100
Diameter of casing (inches)	8	6	8	8	10	12	12	8	8
Pump Type	Turbine	Turbine	Turbine	Turbine	Turbine	Turbine	Turbine	Turbine	Turbine
Horsepower	10	10	10	10	10	10			
Rated Capacity (GPM@psi)	550	400	550	500	500	1100	1100	800	450
Observed Yield(GPM@psi)	540	320	370	500	515	940			
Consumptive Use Permit Rating	All Wells are Now Plugged and Abandoned with combined capacity								

Figure 2—3 GROUNDWATER WELL LOCATIONS



Source: SFWMD, Note that Wellfields E1 thru E9 are now retired and out of service.

2.4 WATER TREATMENT PLANTS

2.4.1 EAST WATER TREATMENT PLANT

The East WTP (EWTP) was constructed in the 1950s and has undergone many modifications and expansions. The facility was originally constructed as a conventional lime softening treatment plant that utilizes up-flow, solids contact precipitators, followed by gravity dual media filters, disinfection, fluoridation, and treated water storage and pumping facilities. Over the past two years, this facility was modernized with the construction of a low-pressure membrane technology (nanofiltration) as a replacement of the lime softening process. Since May 27, 2019, the membrane process at the EWTP is now in full operation with 6 MGD capacity. The process is configured to permit controlled bypass and blending of raw water with permeate to enhance treated water stability and efficiency of source water utilization. The old lime softening facility (5.7 MGD capacity) has now been decommissioned and demolished.

2.4.2 WEST WATER TREATMENT PLANT

The West WTP was constructed in 1996 with an initial capacity of 4.5 MGD of Nanofiltration (NF) treatment. In 2003, the plant was expanded by 3.0 MGD, to a total of 7.5 MGD. In 2007, construction of plant modifications increased the total plant capacity to 9.25 MGD. The most recent expansion, bringing on-line new Floridan wells, and reverse osmosis (RO) membrane treatment, was operational in 2012 and expanded the total plant capacity to 11.75 MGD. The plant utilizes both a low-pressure membrane softening process (nanofiltration) and a medium pressure brackish water reverse osmosis process and blends the two (2) permeate streams together before distribution. Unlike the East WTP, this facility is not equipped for raw water bypass/blending.

2.5 WATER TREATMENT PROCESSES

2.5.1 NANOFILTRATION PROCESS

(This applies to both East and West Water Treatment Plants)

The nanofiltration process incorporates raw water from the Biscayne wellfield. Scale inhibitor is added to prevent membrane fouling; and the conditioned feed water is then pre-filtered through a bank of cartridge filters to remove silt and other small particulates from the water.

Filtered water is then pressurized by vertical turbine pumps to the feed pressure required by the membrane assemblies. The membrane pressure vessels are arranged in a two-stage array, which means that the concentrate from the first stage becomes the feedwater to the second stage. This two-stage configuration is needed to improve

finished water recovery and reduce treatment loss. The permeate water is then sent to degasifiers from which it is discharged to a clear well where sodium hypochlorite is added for disinfection, caustic soda is added for pH adjustment, and fluoride is added for dental health. Water is then transmitted to ground storage prior to the distribution system.

Concentrate from the membrane process is discharged to injection wells for disposal at a depth of approximately 3,500 ft.

2.5.2 REVERSE OSMOSIS PROCESS

(This applies to the West Water Treatment Plant Only)

The reverse osmosis system is similar to the nanofiltration system but incorporates a different design due to the higher concentrations of dissolved solids present in the Floridan aquifer. A scale inhibitor and sulfuric acid are added to adjust pH and prevent membrane fouling. The conditioned feed water is then pre-filtered through a separate bank of two (2) micro cartridge filters to remove silt and other particulates from the water. Filtered water is then pressurized by a vertical turbine pump to the feed pressure required by the membrane assemblies (typically, 150-180 psi). The reverse osmosis (RO) system requires a higher feed pressure and brackish water membrane elements to remove salinity and other contaminants needed to meet regulatory standards. The RO system is also arranged in a two-stage array with energy recovery, to improve finished water recovery and reduce treatment loss. The purified water that permeates the membranes is directed to a degasifier tower to remove dissolved gases, such as hydrogen sulfide, before blending with the nanofiltration permeate in the clear well.

Concentrate stream generated from the membrane treatment process is disposed of via two (2) on-site injection wells that are approximately 3,500 feet deep. The typical recovery of both membrane systems is approximately 80%, which means that 80% of the raw water is purified, and 20% of the raw water is concentrated and disposed.

2.6 STORAGE AND PUMPING FACILITIES

The City has approximately of 10 million gallons (MG) in potable water storage capacity in the system. Upon project completion at East WTP (a new 2 MG tank will replace the existing tank) the City will have a combined capacity of 11.25 MG. The West WTP has 4.25 MG ground storage tank capacity. Each WTP also has high service pumping facilities appropriately sized to meet peak demands. Offsite storage is provided by a 2 MG storage and repumping facility (SRF) located along Douglas Road, and a 3 MG storage and repumping facility located on the west side of I-75. Each off-site storage facility consists of a concrete ground storage tank and high service pumping facilities. To achieve additional redundancy, the City is also planning additional storage capacity at the East WTP when the lime softening facilities are demolished. Table 2-3 presents the summary of the City's existing storage and pumping facilities.

Table 2-4 SUMMARY OF STORAGE AND PUMPING FACILITIES

Facility	Storage (MG)	Pumping Capacity (MGD)	Firm Pumping Capacity (MGD)
East WTP	1.5	11.5	8.6
Douglas Road SRF	2.0	10.8	7.2
West WTP	4.25	27.8	22.0
I-75 SRF	3.0	10.8	7.2
Total Capacities	10.75	60.9	45.0

2.7 TRANSMISSION AND DISTRIBUTION SYSTEM

The potable water distribution system within the City, including remote storage and high ser-vice pump stations is interconnected in a looped configuration. This provides reliable service to residents throughout the service area. The water distribution system is designed to deliver adequate flow and pressure to customers. The existing transmission and distribution system consist of approximately 442 miles of pipe ranging in size from 2 to 24 inches in diameter and predominantly constructed of polyvinyl chloride (PVC) and ductile iron (DI). The transmission and distribution system are in relatively good condition; however, water main improvements are underway via the East Redevelopment Transmission and Distribution Main Improvement Program to replace undersized and/or aging water mains located in eastern Miramar with larger diameter mains. Fire hydrants are also added throughout the area.

The City has several other programs to provide preventive maintenance for the water transmission and distribution system. The water valve replacement program provides routine maintenance and exercising of valves in the transmission and distribution system to ensure proper functioning. The meter exchange program has replaced the old manual read customer meters with new automatic read meters that drastically improve meter reading operations. The galvanized iron and polybutylene pipe replacement program systematically replaces piping in the water system that is approaching the end of its useful life.

2.7.1 CUSTOMER CONNECTIONS

The City's water system provided potable water services to 34,043 customer accounts in 2019. About 97.45% are residential and 2.55% is non-residential.

2.7.2 INTERCONNECTS WITH ADJACENT UTILITY AGENCIES

The City maintains a total of five (5) interconnections: three (3) with Pembroke Pines, one (1) with BCWWS, and one (1) with Miami-Dade Water and Sewer Department (MDWASD). The three (3) interconnects with the City of Pembroke Pines are along Pembroke Road; at Palm Avenue, at 136th Avenue, and at SW 178th Avenue. The BCWWS connection is located at 25th Street and 68th Avenue, to provide emergency service to the eastern service area from Broward County's District 3B storage and booster pump facility. MDWASD interconnect that was constructed in 2008 is located at the corner of Flamingo Road and Honey Hill Road.

Table 2-5 WATER SUPPLY INTERCONNECTIONS

Interconnect with	Location Description	Size	Capacity (MGD) (see note)	Metered
City of Pembroke Pines	Pembroke Road and Palm Avenue	12"	2.50	No
	Pembroke Road and SW 133rd Avenue	12"		No
	Pembroke Road and SW 178th Avenue	12"		No
Broward County	SW 68th Avenue and SW 25th Street	8"	1.50	Yes
Miami Dade WASD	Flamingo Road/Honey Hill Road	6"	1.00	Yes

Note: The capacities are estimated based on pipe diameter.

2.8 WATER CONSERVATION

The City has implemented a number of water conservation elements including limitation of irrigation hours, use of xeriscape principles, requirement of ultra-low volume plumbing in new construction, a water conservation-based rate structure, a leak detection program, rain-sensor overrides for new lawn sprinkler systems, and public education programs. Detailed information on each of these elements is provided below.

2.8.1 LIMITATION OF IRRIGATION HOURS

The City's Code of Ordinances (Section 21-48) sets forth requirements for restriction or curtailment of water usage at such times that an "emergency situation" is declared by the South Florida Water Management District and affects the City. Under these conditions, irrigation is limited to the hours of 4:00 AM to 6:00 AM and specific days of the week based upon a property's address.

City's Code of Ordinances (Section 21-272) states that "the potable water system on the premises supplies water for only ordinary domestic type uses … and does not supply water to any irrigation piping system…" Thus, irrigation supply is limited to non-potable sources.

2.8.2 RECLAIMED WATER PROGRAM

City's Code of Ordinances (Section 21-294 – 21-296) states that where reclaimed water is available, its use is required for irrigation purposes. Where there exists available reclaimed water service, an existing individual irrigation system shall be connected to the reclaimed water system within twelve (12) months of availability. Any existing master irrigation system(s) shall be connected to the available reclaimed water service within ninety (90) days of availability.

2.8.3 USE OF FLORIDA FRIENDLY LANDSCAPE PRINCIPLES

The City adopted Ordinance No. 93-4 in response to this requirement and falls under the jurisdiction of Broward County Code of Ordinances Sections 39-77, 39-80(i) and 39-85(b). Florida Friendly Landscape principles encourage using low-maintenance plants and environmentally sustainable practices.

2.8.4 REQUIREMENT OF ULTRA-LOW VOLUME PLUMBING IN NEW CONSTRUCTION

The City has adopted the South Florida Building Code (SFBC), which contains plumbing flow restriction requirements. Section 6 of the Broward County Code prohibits a City within its jurisdiction from enacting standards different from the SFBC.

2.8.5 WATER CONSERVATION BASED RATE STRUCTURE

The City has a volumetric (conservation-based) rate structure, which includes tier rate structure with higher use, as a means of water savings. The specific rate tiers by usage type, with three (3) rate levels: The current rates, which were adopted and approved for 2019 are as follows:

Table 2-6 CITY OF MIRAMAR RESIDENTIAL WATER RATES

	Cost
Monthly Base Charge	$14.16
Usage Charge per 1,000 Gallons:	
0 – 5,000 Gallons	$2.81
5,001 – 15,000 Gallons	$3.44
Over 15,000 Gallons	$4.32

Unaccounted-for-water summaries are submitted to the District annually. The most recent re-port showed that unaccounted is a little shy of 10%. The estimates of average loss (due to leaks, hydrant flushing, storage maintenance and other losses, also called non-revenue water) in public supply systems in the United States range from 12 to 16%.

2.8.6 RAIN SENSOR OVERRIDES FOR NEW LAWN SPRINKLER SYSTEMS

The City has adopted the SFBC, which requires the installation of rain sensors on new irrigation systems. Additionally, the City abides by all of the Broward County Zoning Code regulations, which include Section 39-78 regarding rain sensors on automatic lawn sprinkler systems.

2.8.7 WATER CONSERVATION PUBLIC EDUCATION PROGRAMS

The City has partnered with Broward County to provide a comprehensive public education pro-gram to inform residences and businesses on the importance of water conservation. The City includes water conservation literature in the monthly water bills, and pamphlets on water conservation are available at Utility Billing where customers pay their bills. In addition, City employees provide information at schools and public events and provide conservation kits, which include water saving devices.

2.9 WATER SUPPLY INFRASTRUCTURE IN SUMMARY

The City operates a well maintained and appropriately sized water system, which has the capacity to serve current and future demands. The City maintains a high level of service and reliability through treatment process redundancy, storage and pumping facilities, interconnects, and an extensive distribution system. In addition, many programs are in effect to con-serve water, to preserve water resources and to maximize treatment and production efficiency.

The permitted water supply allocation and treatment facilities are being reviewed to account for future growth and to maintain compliance with current and future regulations. Ongoing permit renewal activities will seek to expand use of alternative water supplies and use offsets to account for future increases in Biscayne Aquifer withdrawals. The City plans to continue to diversify the array of alternative water supplies, such as reclaimed water and the Floridan aquifer as previously mentioned in Chapter 2. It is anticipated that the majority of the additional potable water demands over the next twenty (20) years will be due to buildout development of planned communities, and future redevelopment of historic areas.

3. WATER DEMAND PROJECTIONS

3.1 HISTORICAL WATER DEMAND

The City's historical water demand data for its two water treatment plants was obtained from the City's Monthly Operating Reports (MORs). Table 3.1 presents the historical annual finished water usage of the City's system since 2002. The West WTP has a capacity of 9.25 MGD for nanofiltration and 2.5 MGD for the reverse osmosis. In the past couple of years, the City embarked on the conversion of the existing East Water Treatment Facility from lime softening to nanofiltration with a treatment capacity of 6 MGD. Currently, the City has a total water treatment capacity of 17.75 MGD.

The South Florida Water Management District (SFWMD) requires that the per-capita demand rate be used for the purposes of water demand projections and should be the most representative of the anticipated demands. This per capita demand rate can be generally estimated as the average over the past five years. However, in 2011 the per-capita demand rate started to trend upward and was not indicative of the historical usage rates. This may likely due to water loss coupled with a marked increase in commercial/industrial development.

3.2 LEVEL OF SERVICE AND CITY STANDARDS

Since the development of the western service area, the City has adopted a level of service standard of 325 gallons per day (gpd) per Equivalent Residential Connection (ERC). This level of service continues to be representative of the current residential usage, of which the persons per household continues to remain steady at approximately 3.3, based on City and US Census statistics. Table 3-2 presents the current City level of standards (LOS) and expressed in Equivalent Residential Connections (ERCs).

3.3 POPULATION AND WATER DEMAND PROJECTIONS

Needs assessments were developed based on current utility operations and the existing customer base, compared to population projections through 2045. The population modeling was performed by Broward County Planning and Development Management Division (BCPDMD) using the Broward County Traffic Analysis Zones (TAZ) and municipal forecasts updated in 2017 to develop the projected populations based on the University of Florida's BEBR (Bureau of Economic and Business Research) Bulletin 175, "Detailed Population Projections by Age, Sex, Race, and Hispanic Origin, for Florida and Its Counties, 2020-2045, With Estimates for 2015" to Broward County's 2017 Traffic analysis Zones (TAZ) and municipalities. The demographic forecast model update is detailed in, "Broward County and Municipal Population Forecast and Allocation Model (PFAM), 2017 (BCPDMD, 2017) based on the original PFAM developed in 2012 and updated in 2014.

Table 3-1 HISTORICAL WATER DEMAND

Year	Service Population	Average Daily Production (ADP) (MGD)	Maximum Daily Production (MDP) (MGD)	Max-Day Peaking Factor	Treatment Design Capacity (MGD)	Percent Treatment Plant Utilization	Average Per Capita Demand (gpcd)
2009	113,842	10.13	11.17	1.10	15.25	73%	89
2010	114,484	10.48	12.44	1.19	15.25	82%	92
2011	115,763	11.68	12.46	1.07	15.25	82%	101
2012	117,055	12.39	13.27	1.07	15.25	87%	106
2013	118,361	13.48	14.46	1.07	17.45	83%	114
2014	119,525	13.76	14.67	1.07	17.45	84%	115
2015	120,981	13.1	14.45	1.10	17.45	83%	108
2016	122,115	13.22	14.68	1.11	17.45	84%	108
2017	123,258	13.48	14.98	1.11	17.45	86%	109
2018	124,412	13.35	15.01	1.12	17.75	85%	107
2019	125,576	13.13	14.67	1.12	17.75	83%	105

Table 3-2 LEVEL OF SERVICE (325 GPD PER ERC)

Type of Use	Unit of Measure	ERCs per Unit
Single Residential Unit	Each	1.00
Apartments	Each	0.500
Duplexes, Townhouses and Mobile Homes	Each	0.700
Gas station (fueling only)	Fuel Pump	0.500
Vehicular Repair	Per Bay	0.500
Laundry	Per Machine	1.510
Restaurant/Cafeteria	Per Seat	0.113
Restaurant (24 hour)	Per Seat	0.189
Restaurant (Fast Food)	Per Seat	0.057
Bar, Cocktail lounge	Per Seat	0.057
Place of Worship	Per Seat	0.011
Private School	Per Student	0.040
Dentist/Doctor Office	Per Doctor/Dentist	0.943

Results from the previous exercise and results were compared with the 2018 LEC Update and the City decided to use the data from that study with minor modification due the inclusion of Country Club Ranches which is currently unserved by the City. The City does

not currently serve this area and residents are dependent on private wells. Table 3-3 summarizes projected populations from year 2020 through 2045.

Table 3-3 City of Miramar Service Population Projection (2020-2040)

Planning Year	2018 LEC Water Supply Population Projection	Additional Service Area - Country Club Ranches	City Service Area Population
2020	128,105		128,105
2025	134,007	1,500	135,507
2030	138,662	2,000	140,352
2035	142,425		142,425
2040	145,576		145,756
2045	No Data		148,766

3.3.1 DEVELOPMENT PROJECTION

The results of the Broward County Population Projections were also compared to City planning information for consistency. It is expected that the City will experience still experience moderate growth due to infill development and densification. However, for long-term planning (beyond 2040) redevelopment and intensification of land use will likely occur such as the Transit-Oriented Corridor. Therefore, all existing undeveloped and underdeveloped land are tabulated and summarized by land use type (residential and commercial/industrial). The land use map and tabulations, and ERC and occupancy estimations are presented in the Appendix and summarized in Table 3-4. The list of project summarized in Table 3-4 is shown as Appendix A.

Table 3-4 SUMMARY OF POTENTIAL DEVELOPMENT

Type of Development	Estimated Water Demand	Units
Non-Residential Development	650,855	thousand gallons/day
Residential Development	881,185	thousand gallons/day
Total	1,532,040	MGD
Equivalent ERC	4,714	units

3.3.2 PER CAPITA ESTIMATION

Based on recent projection by the City's Planning Division much of the development will occur in the central part of the City, known as the Miramar Regional Activity Center. In the proposed land use change, majority of the demand will come from residential

development, about 2,300 residential units and office buildings. This should occur within the next 5 to 15 years. The Regional Activity Center alone is expected to generate a net demand of about 0.60 MGD from its current land use.

Another area of development and a subject of land use amendment is the area known as MITAC (Miramar Innovation and Technology Center) which is another multi-use development with a projected additional demand of about 0.22 MGD.

In order to plan for future development, which will likely include a mix of residential and commercial development, a per-capita usage rate of 110 gallon per day is used. This per capita rate incorporates the most recent water usage and current demand patterns, expected water loss recovery, and the anticipated increases in population and commercial development.

3.3.3 AVERAGE AND MAXIMUM DAY DEMAND PROJECTIONS

The average daily production (ADP) and maximum daily production (MDP) values have been tabulated and averaged based upon MOR summaries in Table 3-1. An examination of the 5-year record indicates maximum day to average day ratio of 1.12. The max-day peaking factor is applied to peak the water demand in order to plan for treatment system capacity expansions. Table 3-5 shows the projected average and maximum daily finished water demands. Table 3-6 shows actual and projected finished water demands.

The groundwater allocations (Biscayne and Floridan Aquifer System) is limited by source and by wellfield under the City's current permit which expires on March 14, 2036. Table 3-7 shows actual and projected raw water demands and Table 3-8 shows City of Miramar water allocation by source.

Table 3-5 ACTUAL AND PROJECTED FINISHED WATER DEMANDS

Planning Year	Population Estimate	Finished Water Demands		
		Annual (MG)	Average Day (MGD)	Per Capita Use
Actual Water Use				
2010	114,484	3,825.92	10.48	92
2011	115,763	4,264.27	11.68	101
2012	117,055	4,521.60	12.39	106
2013	118,361	4,921.02	13.48	114
2014	119,525	5,020.80	13.76	115
2015	120,981	4,780.45	13.10	108
2016	122,115	4,825.43	13.22	108
2017	123,258	4,921.34	13.48	109
2018	124,412	4,871.90	13.35	107
2019	125,576	4,790.76	13.13	105
Projected Water Use				
2020	128,105	5,143.42	14.09	110
2025	135,507	5,440.61	14.91	110
2030	140,662	5,647.58	15.47	110
2035	142,425	5,718.36	15.67	110
2040	145,576	5,844.88	16.01	110
2045	148,766	5,972.95	16.36	110

Table 3-6 Projected Raw Water Demand

Planning Year	Finished Water Annual Demand (MG)	Raw Water Demands			
		Raw: Finished Ratio	Annual (MG)	Average Day (MGD)	Maximum Month (MGM)
2020	5,143.42	1.2	6,192.47	16.97	516.04
2025	5,440.61	1.2	6,623.27	18.15	551.94
2030	5,647.58	1.2	6,762.16	18.53	563.51
2035	5,718.36	1.2	6,876.07	18.84	573.01
2040	5,844.88	1.2	6,956.50	19.06	579.71
2045	5,972.95	1.2	7,039.87	19.29	586.66

Table 3-7 City of Miramar Allocation by Source (expires 3/14/2036)

Wellfield	Allocation		
	Annual, MG	Monthly, MG	Daily, MGD
Biscayne	5,529.75	493.07	15.15
Floridan	1,149.75	95.81	3.15
Total	6,679.50	588.88	18.3

Note: the total allocation shows 18.3 MGD which incorporates the reuse off credit.

Based on current permit, the City's allocation of 6,679.50 million gallons will expire in 2036. A comparison of Table 3.7 and Table 3.6 will indicate a deficiency by 2030. This is shown graphically in Figure 3-1. It cannot be overemphasized that the limiting factor to meeting future finished water requirement to year 2030 and beyond is not only the treatment capacity of the two treatment plants but also raw water allocations. It is therefore prudent to consider requesting an increase in the allocation by this year 2020 and start expansion studies of the current plant operations at the West Water Treatment Plant of reverse osmosis. Additional water allocation may be in order from Biscayne aquifer through offset credit with the City's reclaimed water program. Most likely, an additional water allocation can be applied for Floridan aquifer withdrawal.

3.4 RECLAIMED WATER FACILITY UPDATE

The City has implemented a reclaimed water treatment program at its Wastewater Reclamation Facility (WWRF). Currently, the City's Wastewater Reclamation Facility (WWRF) has a permitted reuse capacity of 5.0 million gallons per day (MGD) and distribution pipeline that serves reuse customers east of I-75. The WWRF has a permitted wastewater treatment capacity of 12.7 MGD.

In 2019, a project was started to construct 2.5 MGD of additional reclaimed water treatment capacity with additional filter tank and a reuse tank. This will bring the total capacity of the WWRF reclaimed water facility to 7.5 MGD. This project is scheduled to be completed in September 2020.

3.5 FACILITY CAPACITY ANALYSIS

The existing permitted treatment capacities of the East and West WTP total to 17.75 MGD, with the East WTP capacity of 6.0 MGD and the West WTP capacity of 11.75 MGD, respectively.

Under a do-nothing scenario and based on the projections shown previously, the existing water plants can accommodate growth beyond 2030. However, current regulations stipulate that treatment capacity of water plants should be planned to have a 25% buffer

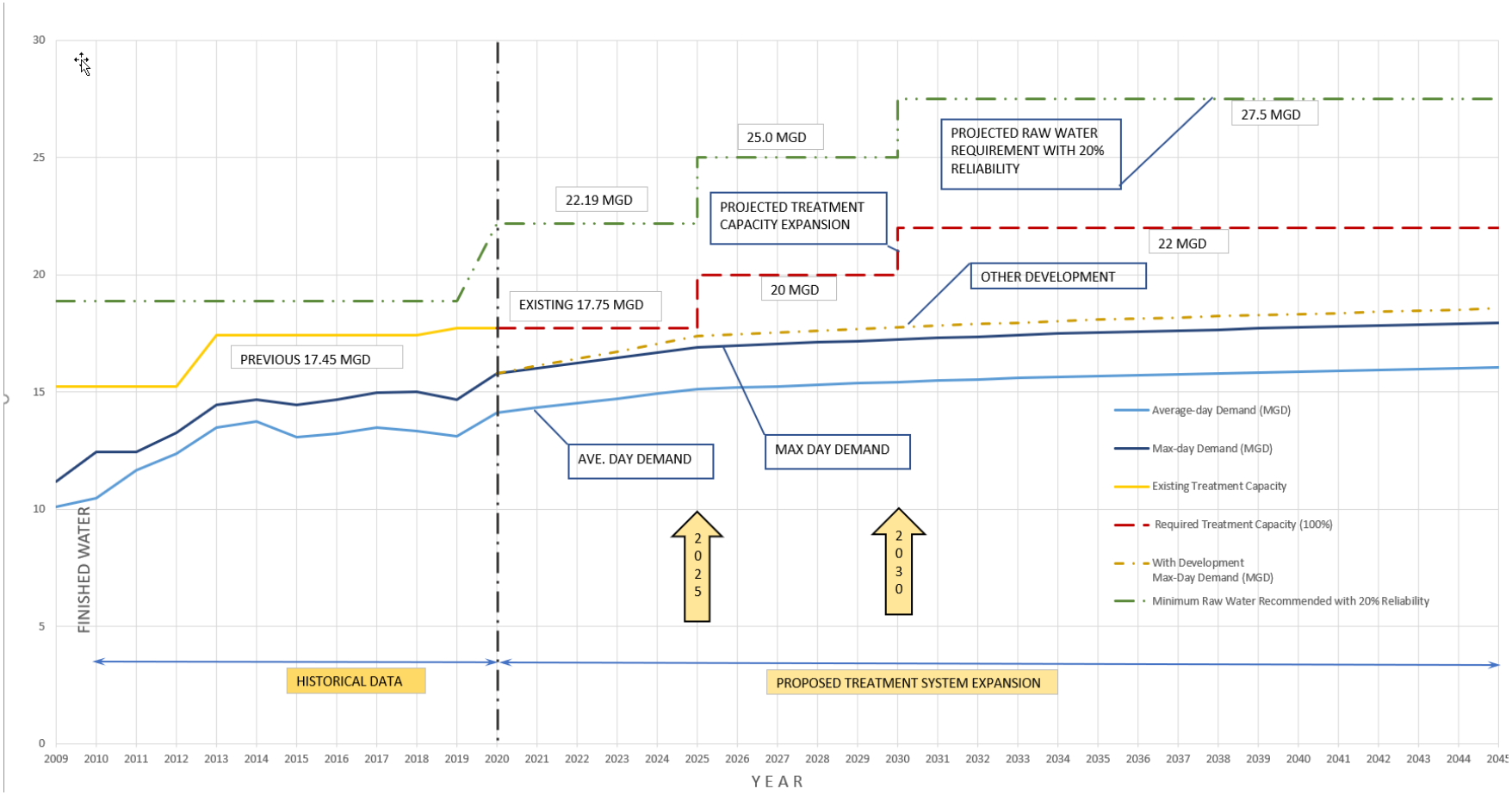
in the system. The existing plants clearly do not have this and in need of immediate expansion.

Figure 3-1 shows a graphical representation of raw and finished water projection over the planning horizon. It also gives an indication when these investments would need to be implemented. It should be noted that the target dates are when the treatment facility would have been in operations. Hence when planning expansion, a reasonable allowance is given for planning, budgeting and construction periods.

3.5.1 IMPACTS OF DEMAND PROJECTIONS ON GROUNDWATER ALLOCATIONS

As shown in Figure 3-1, the City's water treatment facilities possess the capacity and flexibility to meet the future planning horizon. The current allocation and treatment capacity can support growth up to year 2030 under current growth scenario. Alternative water supply or offset is needed to be explored at this stage to guarantee a sustainable growth for the City. As shown, in Figure 3-1, the water allocation would need to be increased and properly sized to maximize use of the treatment capacity potential of the existing water plants.

Figure 3—1 FINISHED AND RAW WATER PROJECTIONS



4. CAPITAL IMPROVEMENTS PROGRAM

4.1 BACKGROUND

Until the early 1990s, the City of Miramar primarily consisted of residential and commercial development east of Palm Avenue (formerly generally known as the Eastern Service Area). With significant interest voiced by western property owners for the development of land located-ed between Palm Avenue and the City's western development boundary, the City has since observed substantial growth within this previously near-vacant corridor. Much of the infra-structure required for such growth has been constructed and was paid for by special assessments to the developers.

With a water treatment capacity at 17.75 MGD, there is enough treatment capacity to meet the buildout demands of the system over the next 20 years as shown in Chapter 3. However, improvements to the facilities are needed in order to improve treatment efficiency and operation-al reliability. In addition, expansion of the reuse system is also in the City's best interest in order to promote alternative water supplies, reuse, and replenishment of the Biscayne aquifer. The City has heavily invested in upgrading water services in the eastern portion of the City (known as historic Miramar).

4.2 STRATEGIC FUNDING ANALYSIS AND FINANCIAL FEASIBILITY

In the past, the City of Miramar implemented special assessment programs to finance a water facility to serve the western development areas west of Palm Avenue and constructed the West WTP and the WWRF. With the City nearing buildout, these assessment programs are no longer the primary funding source.

In order to fund current and future water system improvements, the City has decided to fund projects primarily from user rates, impact fees, and the State of Florida's Revolving Fund Program which are generally low interest bearing. With these additional investments, the City is able to meet it current and future financial obligations with minimal impact on water rates as compared to its neighboring jurisdictions in Broward County.

4.3 WATER SYSTEM CAPITAL IMPROVEMENTS

The City maintains a Capital Improvement Program (CIP) and provides funding required in addressing capacity expansion, renewal and replacement, and general upgrades. The City has implemented large capital projects as follows:

1) Water Meter Repair and Replacement – an ongoing project that is intended to be pursued on a continuing basis as part of the City water loss program.
2) East Water Treatment Plant Process Enhancement – scheduled to be completed in 2020
3) Eastern Miramar Fire Hydrant & Line Improvements –completed in 2019

4) Reuse Water Treatment Expansion – scheduled to be completed in 2020
5) Reuse Water Distribution System Expansion – an ongoing initiative
6) Country Club Ranches Water Main Project – design in progress and will be implemented in small phases. Construction to commence in 2021.

4.3.1 WATER METER REPAIR AND REPLACEMENT

This is an ongoing project that started in 2014 and is aimed at maintaining accuracy in readings and billing. This project involves the replacement and refurbishment of radio-read meters to promote water accountability and operational efficiency. The purchase of meters and meter parts will be an on-going effort to phase out old and broken meters and replacing radio transmitters on an as-needed basis. The intent is to implement automated meter reading city wide.

4.3.2 EAST WATER TREATMENT PLANT PROCESS ENHANCEMENT

This program is to modify the treatment process of the plant that would allow the plant to improve treatment reliability, contaminant removal efficiency, and meet future water quality requirements. This requires the full conversion from lime softening to nanofiltration. The utilization of the membrane treatment at the East Water Facility will allow the City to standardize its operation with common processes already employed at the West Water Treatment Facility. The project is anticipated to be complete by the end of 2019.

4.3.3 EASTERN MIRAMAR FIRE HYDRANT AND LINES IMPROVEMENT PROJECT

This project was implemented to upgrade aged and under-sized water mains and install new fire hydrants in Historic Miramar to increase capacity and to improve fire-fighting capability through in the installation of over 160 fire hydrants. The project is bounded by Pembroke Road to the north, Tarpon Drive and Utopia Drive to the west, Embassy Boulevard and SW 36th Street to the south and SW 68th Avenue to the east.

4.3.4 REUSE WATER TREATMENT EXPANSION

The aim is to expand current capacity from 5.0 MGD to 7.5 MGD. This project is currently on-going and scheduled to be completed in 2020. With this project, the City will meet the goals and objectives as defined in the City's Comprehensive Plan by reducing dependency on a traditional water source (Biscayne aquifer) and fresh surface water with provision of up to 2.5 MGD reclaimed water to users who are currently using or plan to use groundwater or surface water for irrigation.

4.3.5 REUSE WATER PIPELINE EXPANSION

This project incorporates additional system infrastructure west of I-75 within the City's reclaimed water service area and includes a crossing under the I-75 corridor. Currently the City supplies reuse water from Palm Avenue to communities east of I-75.

4.3.6 COUNTRY CLUB RANCHES

This area covering about 700 acres has rural character and water is independently withdrawn from the aquifer by residents. This project aims to provide potable water main distribution system to this area on a phased basis. Currently, Phase 1 is in design and should be ready for bid and construction by 2021. The entire neighborhood is divided into multiples phases and planned to be implemented and completed within a 10-year period or so.

4.4 ASSET MANAGEMENT STRATEGY

Aging water infrastructure can bring with it risks that can include potential equipment or system failure and regulatory compliance issues. When it comes time to improving aging water infrastructure, new construction is always an option. However, it is often the most expensive option. As a part of its asset management program, the City consider the three R's – repair, rehabilitate, or replace (R&R) based on five different factors:

- Life-Cycle Cost
- Criticality
- Future Growth
- Level of Service Improvements
- Energy Efficiency

As utilities age, increasing funds are often required to be allocated to R&R in order to address the aspects of age and obsolescence of assets. Many utilities typically target R&R funding in the range of 5 to 10 percent of annual operating revenue (in this case, water system revenue). The City typically adopts these guidelines in their annual budgeting.

4.5 CAPITAL IMPROVEMENTS INVESTMENTS PLAN

The City has prepared financially and technically for the previously mentioned water system capital improvement projects. For the future period, FY 2020-2024, the water system and wastewater related project costs are estimated at $20.22 million.

The current Capital Program includes requisite improvements and budgeting to address ongoing renewal and replacement needs of the existing systems, as well as provide for treatment capacity expansion to meet projected water de-mands for the future.

In addition to the above, capital improvement plans, the City would need to pursue expansion of the current West WTP to add capacity by another 2.25 MGD by 2025 and another 2 MGD expansion by 2030 with the corresponding expansion of its raw water source. The current CIP Program would need to be updated to accommodate these projects. This will be proposed in the coming budget cycle of FY 2021-2022.

Table 4-1 CAPITAL IMPROVEMENTS PLAN

Project Title	FY20	FY21	FY22	FY23	FY24
Meter Repair & Replacement	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000
Water Service Line /Main,Repair/Replacement	$ 250,000	$ 250,000	$ 250,000	$ 250,000	$ 250,000
West WTP Membrane Skid	$ -	$ 300,000	$ 1,200,000	$ 1,200,000	$ -
SCADA Security Improvement	$ 230,582	$ 230,582	$ 230,586	$ -	
Reclaimed Water System Expansion/Piping - I-75 Crossing & T&D Improvements	$ -	$ 500,000	$ 800,000	$ 800,000	$ -
West WTP Lab & Office Space	$ 1,000,000				$ -
Country Club Ranches Watermain Improvements Phase I	$ 1,000,000		$ 1,000,000	$ 1,000,000	$ -
Supply Wells Development and Raw Water Transmission Main		$ 1,000,000	$ 5,000,000	$ 5,000,000	

4.6 GOALS, OBJECTIVES AND POLICIES

The City of Miramar will manage its water resources and related infrastructure using collaborative, equitable, and cost-effective integrated approach that optimizes its potable water supplies, wastewater treatment and reclamation facility, existing infrastructure to meet the needs of the its residents, visitors, and businesses. To this end, the City has adopted the following objectives and policies:

- Promote water conservation programs and initiatives in conjunction with Broward County.
- Increase sustainability of water supply through protection and enhancement of wellfields and treatment facilities.
- Increase reclaimed water production up to a minimum of 80% of wastewater capacity over the 10-year planning window to promote regional goals of aquifer recharge. In addition, pursue the potential to become a regional supplier of reclaimed water.
- Investigate other alternative water supplies, including groundwater recharge, canal recharge, concentrate recovery, and wetlands restoration.
- Coordinate and collaborate with state, regional and local agencies to promote integrated water resources management strategies.
- Implement and regulate infrastructure based on planned availability of resources to meet the City's development vision.

- Develop an integrated water and sewer masterplan for short-, medium- and long-term capital improvements program that are cost-effective, equitable and sustainable.
- Implement a robust and aggressive water loss program especially in the neighborhood service lines where most of the leaks are coming from.
- Evaluate and proactively review Capital Improvements Project on an annual basis to ensure that it addresses present infrastructure deficiencies and future needs.
- In coordination with Broward County, the City aims to plan and implement adaptation strategies for short and long-term climate change event and impact.
- Review and evaluate the City's level of service standards (for potable water and sanitary sewer facilities) to meet and sustain the City's development plans and objectives.

4.7 SUMMARY

It is expected that the City will continue to grow at a sustained moderate population rate within the next 10 years. The challenge at this time is to increase its raw water allocation and increase its water treatment capacity to accommodate future development growth and provide a buffer and redundancy to the drinking water system and further elevate the City's level of service. In the meantime, the City needs to focus on maintaining and hardening its existing infrastructure assets including water loss control in the distribution system. The City will also continue to collaborate with regulatory agencies and its regional partners to ensure that the City is making necessary plans to comply with future requirements while providing the City's residents, visitors, and businesses with quality service.

5. REGULATORY COMPLIANCE

5.1 GENERAL

Current water and wastewater infrastructure meet all known requirements of various agencies having jurisdictions, such as the:

- Florida Department of Environmental Protection
- Broward County Environmental Protection and Growth Management Department
- United States Army Corps of Engineers
- United States Environmental Protection Agency
- Broward County Health Department
- South Broward Drainage District
- South Florida Water Management District
- City of Miramar Building Department
- City of Miramar Engineering Department
- Construction right-of-way requirements from the Florida Department of Transportation and other Broward County agencies

5.2 WATER SYSTEM

Drinking water supply is subject to both federal and state regulations that are intended to protect public health and ensure aesthetic quality. The Florida Department of Environmental Protection (FDEP) has the primary role of regulating public water systems in Florida. Authority derives from Chapter 403, Part IV, Florida Statutes, and by delegation of the federal program from the U.S. Environmental Protection Agency. The department has promulgated a number of rules in the Florida Administrative Code.

The City's finished water is compliant with present federal and state primary standards. The City continually monitors levels of different drinking water contaminants as required by the Primary Drinking Water Standards. Table 5.1 presents a summary of the 2018 water quality data with the list of contaminants detected in the City's drinking water. The water quality data was obtained from the City's 2018 Water Quality Report.

5.3 REUSE REGULATIONS

The City has implemented a reuse water treatment program at its Wastewater Reclamation Facility (WWRF). The current capacity if 5.0 MGD and work are underway for its expansion to 7.5 MGD, which is anticipated to be completed by September 2020.

Reclaimed water is primarily used for irrigation purposes only. Over the last decade, the City has expanded its reuse water to residential communities and commercial areas between Palm Avenue and I-75. With the completion of the expansion project, reuse water will be available to areas west of I-75 upon project completion. This expansion offsets the additional withdrawals from the City's Biscayne wellfields over the base withdrawal base conditions and satisfied the City's permit conditions with the South Florida Water Management District.

TABLE 5-1
City of Miramar Water Quality Data

Contaminant	Units	Violation of MCL	MCLG	MCL	Level Detected	Range of Results
Microbiological Contaminants (Primary)						
Total Coliform Bacteria	positive	No	5%	5%	N/A	
Radioactive Contaminants (Primary)						
Alpha Emitters (2018)	pCi/L	No	0	15	1.5	0.4 – 1.5
Combined Radium (2018)	pCi/L	No	0	5	0.8	0.2 - 0.8
Lead and Copper						
Copper per tap (2018)[1]	ppm	No	0	AL 1.3	0.714	ND-0.714
Lead per tap (2018)[1]	ppm	No	0	AL 0.015	0.044	ND-0.044
Inorganic Contaminants						
Fluoride	ppm	No	4	4	0.796	0.582-0.796
Barium	ppm	No	2	2.0	0.004	ND-0.0044
Sodium	ppm	No	N/A	160	28.2	18.8-28.2
Nitrate	Ppm	No	10	10	0.192	ND-0.192
Disinfectant/Disinfection By-Product (D/DBP) Parameters						
Chlorine/Chloramine	ppm	No	4	4	3.5	1.3-4.00
Total Trihalomethanes	ppb	No	0	80	45.6	9.92-42.9
Haloacetic Acids (HAAs)	ppb	No	0	60	31.4	0.91-29.2

6. REGIONAL ISSUES

6.1 2018 LOWER EAST COAST WATER SUPPLY PLAN UPDATE

In November 2018, the District's Governing Board approved the 2018 Lower East Coast Water Supply Plan Update (2018 LEC Plan Update). The LEC Planning Area encompasses about 6,500 square miles and it includes all of Broward, Miami-Dade and Palm Beach counties, most of Monroe County, and portions of Hendry and Collier counties. The plan contains an assessment of projected water demands and potential water sources to meet these de-mands through 2040.

The LEC Planning Area has one of the fastest growing populations in the country. The region is home to 6 million people and supports a large seasonal population, tourism and golf, and substantial agricultural industry. The population is expected to grow to 7.5 million by 2040. Hence, future water demands will largely be influenced by population growth.

To meet the future needs through 2040, the LEC Planning Area depends on the following:

- Construction of potable water supply development project by Public Water Supply (PWS) utilities;
- Implementation of the Comprehensive Everglades Restoration Plan (CERP) and other project identified in the Minimum Flows and Minimum Water Level (MFL) prevention and recovery strategies, and;
- Completion of repairs to the Herbert Hoover Dike by United State Army Corp of Engineers (USACE) and subsequent implementation of a new Lake Okeechobee Regulation Schedule

Successful implementation of the 2018 LEC Plan Update requires close collaboration with agricultural interests, local governments, utilities, and other stakeholders. Coordination efforts should ensure that water resources in the LEC Planning area continue to be prudently man-aged and available to meet demands while also protecting the environment.

6.2 BROWARD COUNTY CLIMATE ACTION PLAN

The Broward County Climate Action Plan Water Supply Actions are intended to maintain adequate water supply through conservation and adaptation, development of decision support tools necessary to build community resilience and increase the resilience of natural systems through integrated water resource management.

The 11 actions that are proposed include:

- Continue local water conservation programs
- Include climate change in updates of Lower East Coast Plan
- Investigate regionalization of water supply
- Monitor and protect wellfields
- Develop alternative water supply strategies
- Model the sustainable use of the aquifer
- Evaluate impacts of flooding of contaminated sites
- Evaluate reuse water interaction with and impacts to the natural systems
- Implement reuse strategies
- Evaluate reuse considering sea level rise
- Increase percentage of pervious areas

6.3 REGIONAL WATER SYSTEM

Current water supply source options in the LEC Planning Area include surface water, groundwater (fresh and brackish), reclaimed water, and seawater.

6.3.1 GROUNDWATER/AQUIFERS

The predominant potable water source to support population growth is the Surficial Aquifer System (SAS) in the southeastern Florida peninsula. The Biscayne Aquifer, which is part of the SAS, is one of the most productive aquifers in the world. Hydrologic analyses indicate that roughly two-thirds of the water in the aquifer underlying urban Broward County is the result of rainfall infiltration, the remaining one-third is from lateral seepage from the Everglades. Groundwater inflows from the Everglades to the coast form a significant portion of recharge to the SAS. These recharge characteristics, influenced by the region's unique geology, create water supply advantages as well as vulnerabilities for the entire region.

The Floridan Aquifer System is part of a large network of zones that stretch throughout Florida and into other states. Traditionally, the FAS is subdivided into two major, regionally continuous producing zones, the brackish Upper Floridan aquifer (UFA) and more saline Lower Floridan aquifer (LFA), separated by a middle confining unit.

The UFA can be further divided into two regional sub-units, the upper producing zone at the top of the FAS and the Avon Park Permeable Zone (APPZ) in the upper portion of the Avon Park Formation. The FAS receives most of its recharge from outside of the LEC Planning Area in central and northern Florida. Several FAS zones under artesian pressure in South Florida. Throughout the LEC Planning Area, water from all portions of the UFA is non-potable due to salinity, requiring desalination or blending to meet potable standards.

Primarily, the City of Miramar's water supply comes from the Biscayne (SAS) aquifer, while the recently constructed Floridan wells draw from the APPZ. The water quality of the

Biscayne wells is moderately hard and highly colored, relatively low chloride concentrations, and salinity less than the potable standard of 500 mg/L. The water quality of the Floridan wells is hard and odorous, with higher sodium and chloride concentrations, and salinity generally be-tween 1,500 mg/L and 2,500 mg/L.

6.3.2 SURFICIAL SOURCES

Major surface water bodies in the LEC Planning Area include Lake Okeechobee and hydraulically connected surface water bodies, the Loxahatchee River and Estuary, Lake Worth La-goon, and the Everglades. South of Lake Okeechobee, the Southern Everglades is divided into surface water management basins. In terms of water management, the SFWMD groups the LEC Planning Area into three hydrologically related areas:

- Lake Okeechobee Basin/Lake Okeechobee Service Area (encompassing portions of Martin, Okeechobee, Palm Beach, Hendry, Glades, and Lee counties) including the Everglades Agricultural Area (EAA)
- Water Conservation Areas (WCAs), and Everglades National Park; and
- Lower East Coast Canals and Service Areas.

The City of Miramar is located inside Conservation Area 3. There are no major surface water bodies inside or near the City limits. However, these major surface water bodies provide and indirect impact to the City's water supply through the canal system, which is a major direct source of recharge to the surficial aquifers. More about the regional canal system is detailed below.

6.3.3 CANALS

A regional system of canals provides a means to move water from one location to another. Water in the Lower East Planning Coastal Area is generally transported from north to south and west to east, from Lake Okeechobee through water control structures to the EAA canals and into the WCAs. Located south of Lake Okeechobee and north of the Everglades, Storm-water Treatment Areas (STAs) reduce excess phosphorus from stormwater runoff through the natural filtering of native vegetation before water enters protected wetlands. Water moves from the WCAs via structures and canals to Everglades National Park and the urbanized coastal basins. Water from WCA-1 also moves through the G-94 culverts, the Hillsboro Canal, and the C-51 Canal to the Lake Worth Drainage District. When canal elevations are greater than surrounding groundwater, water in coastal canals provides recharge to the Biscayne aquifer, enhancing groundwater supplies and helping replenish water in lakes, rivers, and wet-lands. Surface water inflows to the LEC Planning Area come through the Central and South-ern Florida Flood Control Project (C&SF) canals. Outflows of surface water in the LEC Planning Area are largely directed through water control structures, many of which were construct-ed as part of the C&SF Project. Flows and stages in Lake Okeechobee and most of the region's canals are operated consistent with regulation schedules for multiple purposes. The amount of stored water is of critical importance to both the natural ecosystems and the

developed areas in the LEC Planning Area. Management of surface water storage capacity involves balancing two conflicting conditions: 1) drought conditions may occur during periods of deficient rainfall, and 2) flooding may occur due to excessive rainfall, especially during the wet season.

Overall, the canals are primarily used for flood control; however, secondary uses include drainage of land for development, discharge of excess water to and from the WCAs, prevention of saltwater intrusion, and recharge of wellfields. The result is a highly managed, intricate system of canals and retention ponds with control structures and pumps that maintain the balance between flood prevention and over drainage.

The major canal with the greatest impact to the City of Miramar and its water supplies is the C-9 (Snake Creek) canal. The C-9 Canal drains a relatively large basin with an area of ap-proximately 98 square miles. The majority of this basin lies within southern Broward County (59 mi2) and the remainder lies in northern Miami-Dade County (39 square miles). In addition, the C-9 Basin is split into a western sub-basin (53 square miles), and an eastern (45 square miles) sub-basin, of which the entire City of Miramar is located within these East and West boundaries. The total length of the C-9 Canal (approximately 20 miles) is almost evenly divided between the two counties.

The flow in the C-9 Canal is normally to the east with a final discharge into the estuarine Dum-foundling Bay via SFWMD control structure S-29 (Miami-Dade County). Several seepage control canals and structures determine the volume and rate of flow in the waterway. The L-33 Canal is oriented in a north-south direction and makes a connection at the westernmost end of the C-9 Canal (west of US 27). The S-30 is immediately to the east of the confluence of the L-33 and C-9 canals and either allows water to move east or stores it west of the structure. The S-32 is located below the Broward County line and along with S-30 and S-9XS (see C-11 Basin, Section III.J.1) determine the L-33 Canal's stage which, in turn, controls the rate of seepage from WCA 3B (Cooper and Lane 1987).

A small north-south oriented canal, the North Fork of the C-9 Canal (also Flamingo Canal), exists on the west side of Flamingo Road and runs parallel along the roadway until making an open connection to the C-9 Canal (Cooper and Lane 1987). Flow is normally to the south and water originates in portions of the C-11 Basin in Pembroke Pines. Some water may be divert-ed to the C-8 Canal (Miami-Dade County) by way of a secondary canal along NW 67th Avenue. Beyond the Flamingo Canal, six north-south oriented secondary canals also exist in the western sub-basin.

The SFWMD controls the operations of the main canal and structures. Within Broward County, the South Broward Drainage District is the main local management body (see Section 1, Figure 1.4). Miami-Dade County does not have a system of dependent and independent districts.

During the 1970s and 1980s, the C-9 West Basin was much less populated than other areas of the county. Rapid expansion into this area occurred throughout the 1990's and

2000's, as the Cities of Miramar and Pembroke Pines expanded west. The open land and agricultural lands were redeveloped into residential areas. The urban and residential development in this area improved the flooding hazards caused by low elevation and poor soil drainage but introduced substantial increases in water demands for irrigation and potable water use.

6.4 ISSUES AND CONCERNS

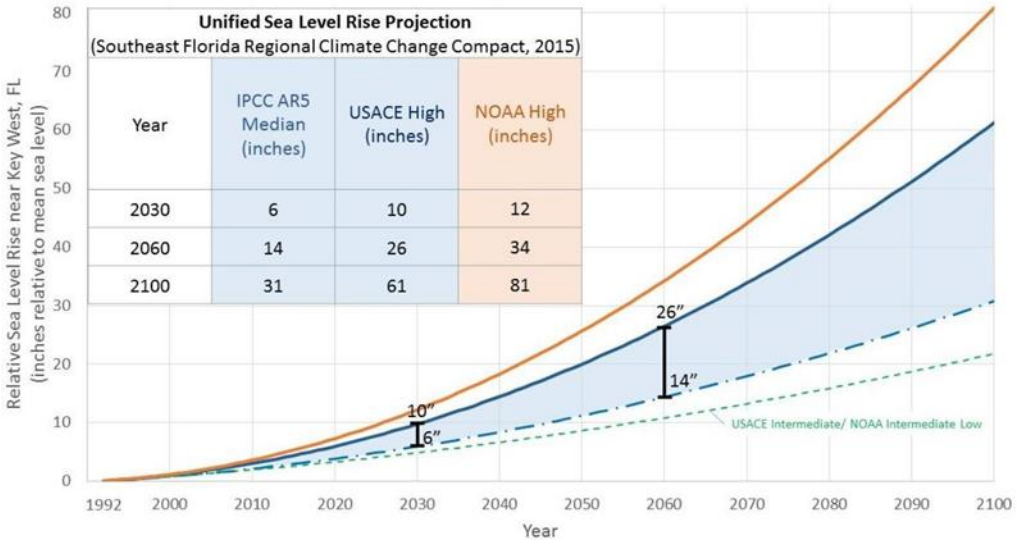
Southeast Florida is widely considered one of the most vulnerable regions to the impacts of climate change and sea level rise as a result of several unique geographic characteristic which include low land elevations, flat topography, a porous geology, and dense coastal development. In combination, climate change and sea level rise are expected to present significant challenges relating to water resource planning, management and infrastructure for communities throughout the region, which includes Palm Beach, Broward, Miami-Dade and Mon-roe Counties.

The City of Miramar understand that water resource resilience requires the integration of water supply and climate change considerations. The key factors affecting communities in South Florida includes: sea level rise, saltwater intrusion, extreme weather conditions, and infrastructure investments.

6.4.1 SEA LEVEL RISE

Sea level rise has significant implications for water management and water supply planning in southeast Florida, the rate of which is accelerating. During the previous century, the global rate of sea level rise averaged approximately 0.063 inch (1.6 mm) per year. The rate of rise increased to an average of 0.067 inch (1.7 mm) per year during the second half of the last century, followed by a more significant increase to 0.130 inch (3.3 mm)per year measured during the last decade. This trend of rising sea level is reinforced by local tide data which documents an increase in regional sea level of about 9 inches during the last 100 years. While there continues to be uncertainty about the overall extent of sea level rise that might be realized in the coming century, the Fourth National Climate Assessment (NCA, USGCRP, 2018) report presents a probable range of 1 to 6 feet by 2100. In Southeast Florida, partner counties in the Southeast Florida Regional Climate Change Compact, inclusive of Broward, Palm Beach, Miami-Dade, and Monroe counties, have collectively agreed to use modified guidance developed by the U.S. Army Corps of Engineers (USACE) and a planning scenario of 9 to 24 inches additional sea level rise by 2060, consistent with projections presented in the 2014 NCA, Figure 6-1 below. This unified sea level rise projection has been formally adopted by Palm Beach, Broward, Miami-Dade and Monroe Counties and is now being used to inform planning processes and project design throughout the region. As the impacts of historic sea level rise are already being realized and acceleration of the rate of rise is expected to com-pound local impacts and vulnerabilities, it is prudent that planning processes begin to formally reflect consideration of sea level rise as a future condition with recognized implications for near-term and longer- term planning decisions.

Figure 6—1 UNIFIED SEA LEVEL RISE PROJECTION



Source: Broward County Water Supply Facilities Workplan, Draft, 2019

6.4.2 SALT WATER INTRUSION

As the impacts of historic sea level rise are already being realized and acceleration of the rate of rise is expected to compound local impacts and vulnerabilities, it is prudent that planning process begin to be formally reflect consideration of sea level rise as a future condition with recognized implications for near-term and longer-term planning decisions.

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

These realities necessitate consideration of plans and investments that may be needed to compensate for loss of existing water supplies through relocation of wellfields and the development of alternative water supplies while also seeking opportunities to expand regional water storage opportunities. These investments and considerations are

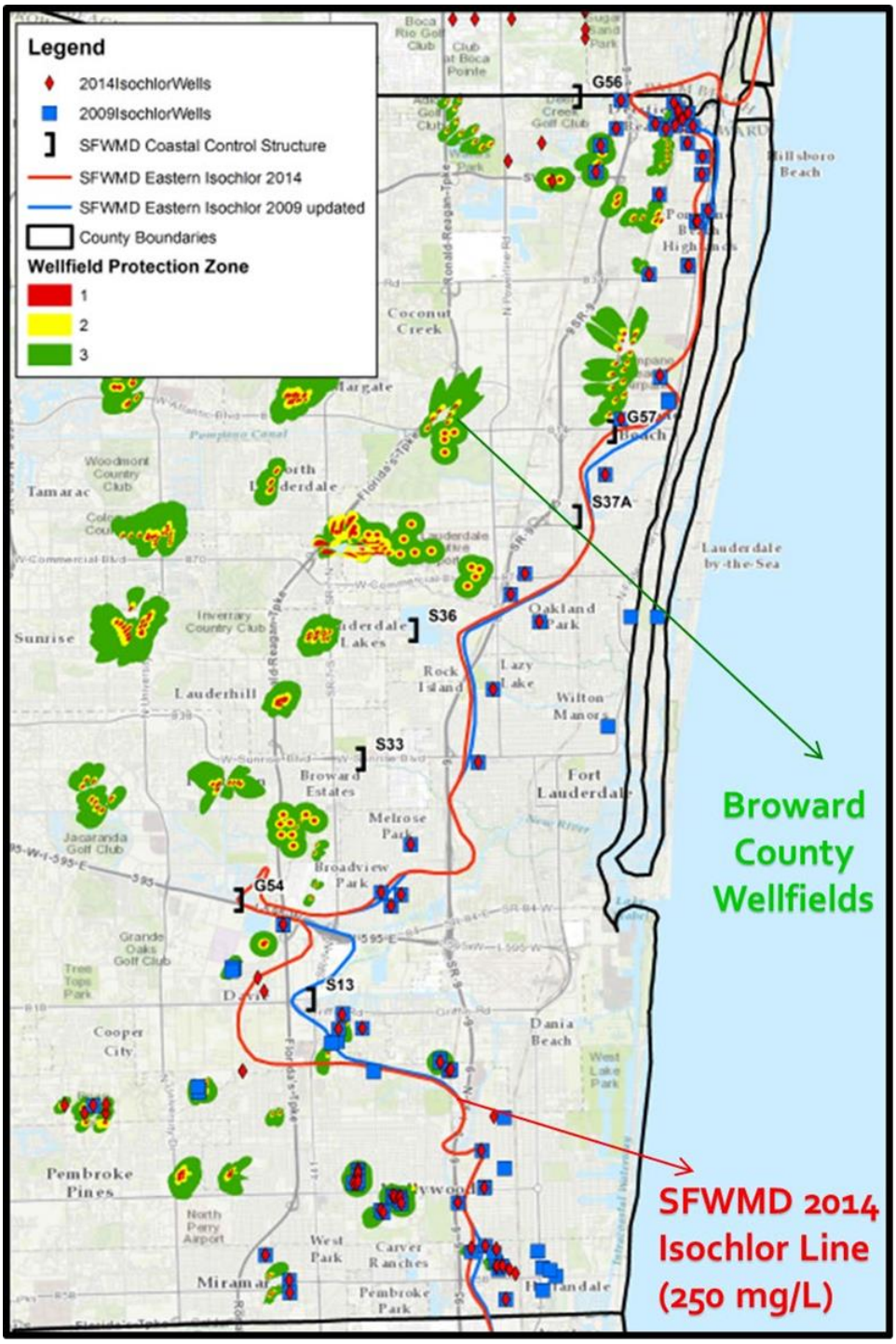
in addition to concurrency planning for population growth and water demands that are typical requirements for water supply planning requirements.

The impacts from climate change, including increased frequency and severity of droughts, and increased sea level rise will constrain existing wellfields and challenge water resource planning, management and infrastructure protection for all communities in the LEC region. This is especially true in Broward County where sea level rise is documented to have substantially accelerated the rate of saltwater intrusion of the coastal aquifer and where as much as 40% of the coastal wellfield capacity is considered vulnerable to saltwater contamination. Therefore, it is imperative that local governments, including Broward County, begin to formalize the integration of water supply and climate change considerations as part of their coordinated, long-term planning efforts.

Hydrologic modeling has revealed that sea level rise, when combined with coastal wellfield pumping, has accelerated the movement of the front, doubling the rate at which the front has progressed during the last several decades at certain locations. It is expected that sea level rise will constitute an increasingly significant influence on the rate of saltwater migration during the decades to come and that critical wellfield capacity will be lost with an additional 2-foot increase in sea level, the extent of which will vary along the coast. Conditions will be further influenced by temporal hydrologic conditions and responses in water management operations. It is therefore prudent for water utilities throughout the region (both inland and coastal) to con-sider adaptation plans that might include wellfield relocation or expansion of western wellfields as part of planned efforts to meet shared regional water demands. Continuation of groundwater monitoring and modeling efforts will be critical to predicting the movement of the front un-der sea level rise scenarios anticipated over the next several decades and adaptation efforts should continue to be refined in accordance with predicted and realized trends. Regional and local data will be important in informing decision-making.

The mapping of the current saltwater intrusion front is elaborated based on the end of dry season data available at 93 monitoring stations supported by local governments throughout the region, the USGS, and the SFWMD. The current Saltwater Intrusion Line for Broward County, Figure 6.6-2 was last updated in 2014.

Figure 6—2 BROWARD COUNTY SALTWATER INTRUSION LINE



Source: Broward County Water Supply Facilities Workplan, Draft, 2019

6.4.3 EXTREME WEATHER EVENTS AND WATER SUPPLIES

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

6.4.4 INFRASTRUCTURE DEVELOPMENT

With increasing climate disruptions, there is a need to diversify water supply sources, improve treatment technologies and to support the development of adaptive stormwater and wastewater infrastructure design criteria to ensure long-term sustainability of key facilities. Conversely, alternative water treatment technologies generally have a high energy demand and carbon footprint that can exacerbate climate change impacts. Strategic infrastructure planning should incorporate these constraints and work within with the goals, objectives, and policies of Broward County's and the City's 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 deviations, as both direct and indirect response to sea level, will challenge the function of drainage systems and is expected to exacerbate flooding, for even mild storm events. Conditions will be more severe with extreme rainfall events increasing damage to low-lying utility infrastructure and contribution to prolonged surface water flooding. Planning for the combined influences of storm events, high tides and sea level rise on drainage system functions and other public infrastructure is a critical need as is the assessment of viable water supplies and impacts to the natural systems from prolonged droughts.

6.5 REGIONAL ISSUES IMPACTING THE CITY OF MIRAMAR

6.5.1 SOURCE WATER MONITORING

As mentioned previously, the City currently utilizes the Biscayne and Floridan aquifers as a water source for municipal water supply. The City itself has a total of eight (8) surficial monitoring wells for the East and West plants that are sampled monthly for water level, chlorides, conductivity, total dissolve solids (TDS), and temperature. It is important for the City of Miramar to monitor the surficial aquifer water levels and salt water intrusion at City's own monitoring wells, and to keep abreast of significant changes to neighboring utilities water supplies in order to be prepared for any necessary actions to protect and preserve the City's water supply.

As the Sentinel Network model is updated, the City will need to evaluate the effects upon the water system and take appropriate action to safeguard the water supply reliability. These observations may lead the South Florida Water Management District (SFWMD or District) to re-quest weekly monitoring from more stations—including utility production wells—to determine the extent of the saltwater intrusion and its impact on the aquifer and potable water quality from the affected utility.

6.5.2 RECLAIMED EXPANSION

Beneficial use of reclaimed water as an alternative water supply has been encouraged by the SFWMD. In 2008, the Florida Legislature enacted an ocean outfall statute (Subsection 403.086(9), F.S.) requiring the elimination of the use of six ocean outfalls in southeastern Florida as the primary means for disposal of treated domestic wastewater. In addition, the affected wastewater utilities have to reuse at least 60 percent of the outfall flows by 2025. The objectives of this statute were to reduce nutrient loadings to the environment and to achieve the more efficient use of water for water supply needs. Although the City of Miramar does not have an ocean outfall, reclaimed water does provide a more efficient use in recharging the surficial aquifer than deep well disposal.

The City's goal is to continue to provide larger volumes of reclaimed water to current permitted irrigation users that utilize surficial aquifer sources. Depending on how and where reclaimed water is supplied, and the results of groundwater modeling scenarios, the City will likely be eligible for partial or full credits for supplying reclaimed water that will allow the retirement of water use permits as an alternative water supply.

6.5.3 WELLFIELDS PROTECTION

Wellfields, especially from Biscayne aquifer, are a major water supply source hence the need to protect those investments. Saltwater intrusion is an irreversible process; once it enters well it would almost be impossible to reverse. It is also very expensive to relocate wellfields including associated infrastructure such as pipelines, treatment

plants, and processes. Other sources of water such as the Floridan aquifer or concentrate recovery are very expensive to develop and operate.

The City also recognizes that the West WTP is in low lying area, that may be prone to flooding and/or increases in salinity if sea level rise from climate change causes a water level elevation of the surrounding canals. A projected sea level rise of approximately 9-24 inches by 2060 as adopted by the regional authorities, may have serious consequences on plant operation. The West wells and treatment facility would be expected to have a service life of approximately 50 years, which would correspond to a time period somewhere between 2040 and 2060. As part of future planning, the City may need to investigate new areas for a wellfield and treatment facility.

7. REFERENCES

- 2015 City of Miramar 10-Year Water Supply Facilities Work Plan
- 2018 Lower East Coast Water Supply Plan (https://www.sfwmd.gov/our-work/water-supply/lower-east-coast)
- 2020 Broward County Water Supply Facilities Work Plan, April 2020
- Water Supply Facilities Work Plan Updates SFWMD Technical Assistance Guide, January 2019
- Water Supply Facilities Work Plans (https://www.sfwmd.gov/doing-business-with-us/work-plans)
- 2017 Broward County and Municipal Population Forecast and Allocation Model (FPAM)