Marco Island Ten Year Water Supply Work Plan

April 26, 2024

City of Marco Island

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Contents

1. Introduction

1.1.1 Statutory History

The Florida Legislature enacted bills during the 2002, 2004, 2005, 2011, 2012, 2015, 2016, 2018, and ~~2016~~2019 sessions to address the state's water supply needs. These bills, particularly Senate Bills 360 and 444 enacted during the 2005 legislative session, strengthened the statutory links between the regional water supply plans (RWSPs) prepared by water management districts and the Comprehensive Plans prepared by local governments through changes to Chapters 163 and 373, Florida Statutes (F.S.). These changes improved coordination between local land use planning and regional water supply planning.

1.1.2 Regional Water Supply Plans

The South Florida Water Management District (SFWMD) develops and updates RWSPs to assess current and future water needs while sustaining Central and South Florida's water resources. Section 373.709, F.S., provides the framework for an RWSP's scope, analysis, implementation, and process. The RWSP plans are required to be based on a 20-year planning period and updated every 5 years. The RWSP must include specific water resource and water supply development projects. There are five RWSP regions within the SFWMD: Upper East Coast, Lower East Coast, Lower West Coast, Lower Kissimmee Basin, and Upper Kissimmee Basin/Central Florida Water Initiative (~~CFWI) (~~Figure 1.1).

1.1.3 Comprehensive Plans

The Florida Legislature established a water supply planning process for local governments through the Community Planning Act [Chapter 163, F.S.] and Water Resources Act [Chapter 373, F.S.]. A local government's Comprehensive Plan provides guidelines for development of the community and includes the projects, programs and timeframes to implement the plan elements. Under Section 163.3177(6)(c)3., F.S., local governments are required to update their Comprehensive Plans within 18 months after the District's Governing Board approves the applicable RWSP. Work Plan Updates are comprehensive plan amendments, as required by Section 163.3184, F.S. Every seven years, local governments are required to complete an Evaluation and Appraisal Review ~~(EAR)~~ of their comprehensive plan to address new statutory requirements and local government conditions.

1.1.4 Water Supply Facilities Work Plans

Within 18 months following approval of a RWSP, local governments must develop and adopt a Comprehensive Plan amendment consistent with the plan amendment process in Section 163.3184, F.S. The amendment must include updates to the local government's Water Supply Facilities Work Plan (Work Plan), as outlined in Section 163.3177(6)(c)3., F.S., and be consistent with the water resource and water supply development projects listed in the RWSP. The Work Plan must also cover at least a 10-year planning period and identify alternative and traditional water supply development as well as conservation and reuse projects needed to meet the community's projected future demands.

1.1.5 Marco Island Water Supply Facilities Work Plan

The City of Marco Island (City) adopted ~~their~~this Work Plan on ~~March 17, 2014 within 18 months~~XXX, 2024 after the SFWMD adopted the ~~2012~~2022 Lower West Coast Water ~~(LWC)~~ Supply Plan (LWCSP) Update on ~~November 15, 2012.~~December 16, 2022. This document is an update to the ~~original 2014~~2022 Work Plan and references

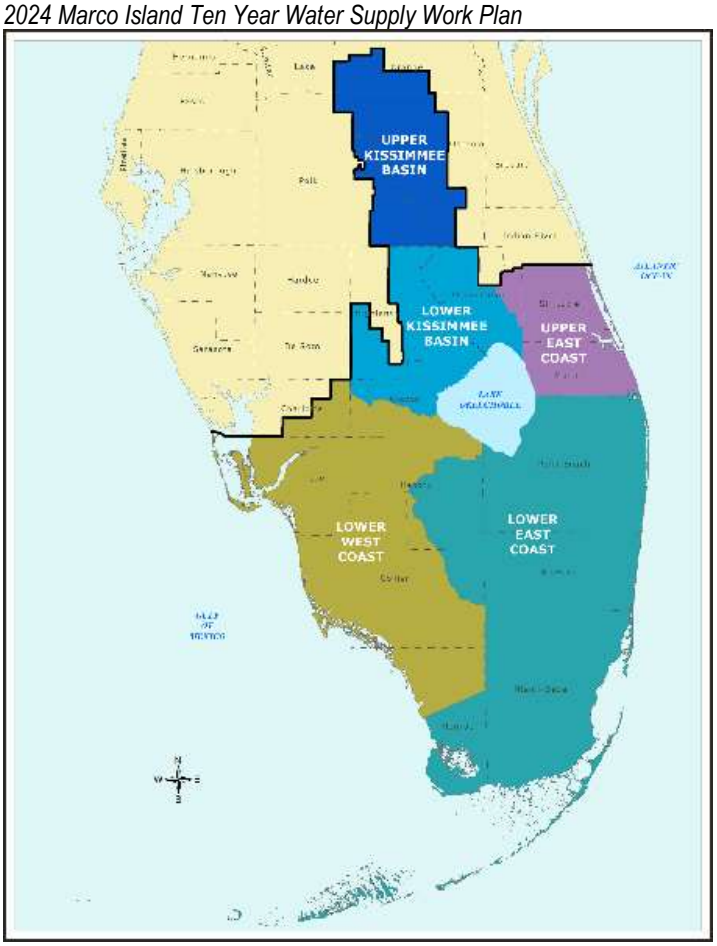
the issues identified in the SFWMD's ~~2017 LWC Supply Plan~~2022 LWCSP update. According to state guidelines, the Work Plan and the comprehensive plan amendment must address the development of traditional and alternative water supplies, bulk sales agreements and conservation and reuse programs that are necessary to serve existing and new development for at least a 10-year planning period.

This document was first presented to the City of Marco Island Planning Board on February ~~4, 2022~~2, 2024. First reading in front of the City Council was held on February ~~22, 2022~~20, 2024. The Department of Economic Opportunity (DEO) issued its Objections, Recommendations and Comments Report ~~on the underlying Comprehensive Plan changes and this Work Plan's data and analysis.~~. Changes recommended by DEO were incorporated into this revised version and are subject to City Council adoption on ~~April 18, 2022~~XX, 2024.

1.1.6 Incorporation of the Work Plan into the Marco Island Comprehensive Plan

The current 2040 Marco Island Comprehensive Plan amended by the Marco Island City Council on ~~April 18, 2022~~XX, 2024 adopts the current standalone Work Plan document by reference within Policy 1.1.1 of the Potable Water Goal of the Infrastructure Element.

FIGURE 1.1
SFWMD Regional Water Supply Planning Regions
2024 Marco Island Ten Year Water Supply Work Plan



Source: SFWMD Website, 2021

2. Background Information

2.1 Overview

The City was incorporated in August 1997 making it the third municipality established in Collier County. The original boundaries of the City encompassed an area of approximately twenty-four (24) square miles bounded by the Marco River. The City consists of one large island approximately four by six miles which includes another smaller island along the southern area called Caxambas Island (with 38 buildable lots of single-family homes). In 2004 the City annexed the small island in the southeast area called Key Marco (a.k.a. Horr's Island) which has community of 130 building lots for single family homes. The City is surrounded by the Gulf of Mexico. The narrow body of water (approximately 0.5 miles wide) on the north side of the island that separates the City from the mainland (i.e., unincorporated Collier County) is called the Marco River.

The City is substantially built-out with regard to condominiums, businesses and institutions. There are approximately 1,400 vacant building lots for single family homes and 400 condominiums. The current population is approximately 17,700 permanent residents and a peak population in February and March of approximately ~~39~~41,500 permanent and part-time residents, and workers. The principal growth in population will occur from the building of single-family homes. At build-out the permanent population is estimated to reach approximately ~~19~~18,500 with a peak population estimated to reach approximately ~~44,400.~~45,300. However, in 2023 the water demand data indicates that the permanent population is growing faster than projections indicating that the seasonal population is staying on the Island more than previous years.

The *2020 City of Marco Island Comprehensive Plan Update Assessment Report* shows that the City lands include 6,883 total acres split by residential, commercial, conservation, and community facilities as shown in Table 2.1. The City does not anticipate increases in land area in the near future. In the meantime, the residential and non-residential growth rate is anticipated to be moderate for the next 5 to 10 years and through build-out in 2040, as the city's remaining vacant single family residential lots develop as planned.

TABLE 2.1
Marco Island Land Use
2024 Marco Island Ten Year Water Supply Work Plan

Total Land Area by Future Land Use		
Future Land Use Category	**Total Acreage**	**% of Total Land Area**
Low Density Residential	2,381	35%
Medium Density Residential	35	0.5%
High Density Residential	385	5%
Resort/Residential	97	1%
Community Facility	280	4%
Planned Unit Development	1,245	18%
Village Commercial	35	0.5%
Community Commercial	80	1%
Town Center/Mixed Use	120	2%
Heavy Commercial	36	0.5%
Preservation/Conservation – Private	68	1%
Preservation/Conservation - Public	2,121	31%
TOTAL	**6,883 Acres**	**100%**

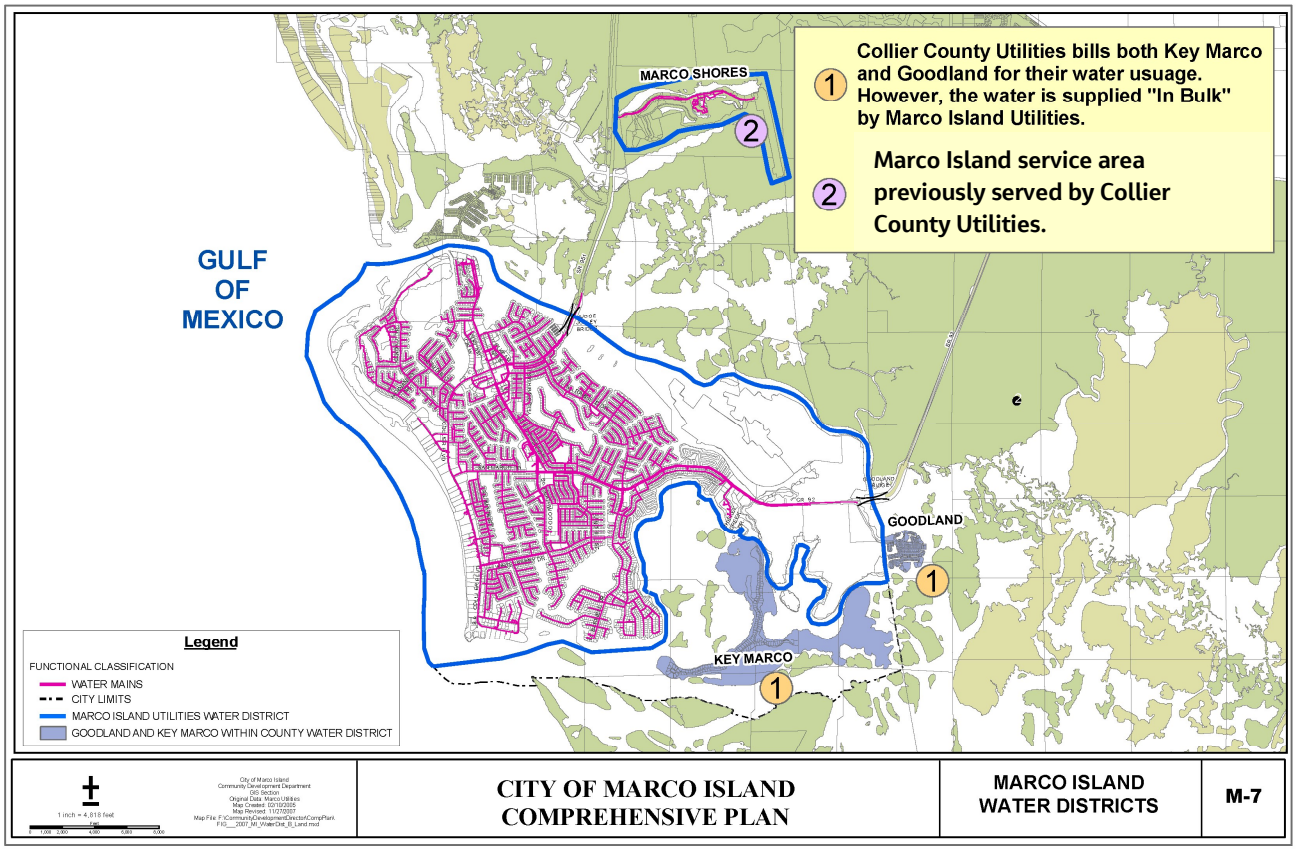
Source: City of Marco Island Comprehensive Plan Update Assessment Report, September 29, 2020

2.2 Potable Water Service Area

The City of Marco Island's potable water service area includes all of the incorporated City of Marco Island, except Goodland and Key Marco. The City has an interlocal agreement with Collier County (County) for bulk sale of potable water. The County distributes water through direct sale customers in Goodland and Key Marco.

The City previously had an interlocal supply agreement with Collier County to supply bulk potable water to Marco Shores located two miles north of Marco Island. Beginning in January 2020, the City reincorporated the Marco Shores distribution system back into its service area and discontinued the interlocal agreement to supply this area by Collier County. Figure 2.1 shows the service areas inside and outside the City, and the excluded areas.

FIGURE 2.1
Marco Island Drinking Water Service
2024 Marco Island Ten Year Water Supply Work Plan



Source: City of Marco Island 2009 Comprehensive Plan

2.3 Areas Served by Domestic Self-Supply

The City provides potable water service to all locations within the Marco Island and Collier bulk sales service area. There are no areas served by domestic self-supply. The only other water use within the Marco Island service area are small non-potable irrigation wells from the surficial aquifer system (SAS) on Key Marco and Marco Island

Marriott Chiller Mid-Hawthorn Aquifer (MHA) Well (Water Use Permit 11-03014-W), located along the western side of the island.

2.4 Marco Island Raw Water Sources and Water Use Permit

The SFWMD granted the City a water use permit (WUP) to use the following three raw water sources:

- Surface water from Marco Lakes, which receives its water from Henderson creek.
- Aquifer storage and recovery (ASR) in the Upper Floridan Aquifer (UFA), which uses stored surface water from Marco Lakes.
- Brackish groundwater from the Mid-Hawthorn Aquifer (MHA) wellfield on Marco Island.

The WUP #11-00080-W, issued in 2017, authorizes an annual allocation of 4,801.86 million gallons (MG) and maximum monthly allocation of 954.93 MG for all sources of water. The allocation breakdown is listed in Table 2.2. The City's surface water withdrawal source and ASR system at Marco Lakes is located approximately nine miles north of Marco Island northeast of the US Route 41 and County Road 951 (Collier Blvd) intersection as shown in Figure 2.2. The surface water is pumped from Marco Lakes source water facility (SWF) to the City's North Water Treatment Plant (NWTP) for lime softening treatment or to ASR wells for later extraction during peak demands. The City also withdraws groundwater from an MHA wellfield located on the island which supplies the source water to the reverse osmosis (RO) treatment process at the South Water Treatment Plant (SWTP). The WUP expires on February 20, 2037~~ and is not expected to change during the 5 and 10-year planning periods of this work plan.~~

The WUP lists an annual withdrawal limit of 1320.28 MG (3.62 mgd on average) from the MHA, and a maximum month allocation of 163.93 MG (5.46 mgd on average). Therefore, the SWTP is able to produce an annual average of 2.72 mgd, or a maximum month average of 4.10 mgd, assuming 75 percent recovery. Given the increasing demand trends and the higher off-season demands, the current MHA allocation is not adequate to meet the City's demands. The required withdrawal from the MHA increased from 3.1 mgd in 2021 to 5.0 mgd in 2023. The City is currently negotiating an increase in the MHA allocation to meet these growing demands during the 5 and 10-year planning periods of this work plan.

TABLE 2.2
Raw Water Source and Allocation
2024 Marco Island Ten Year Water Supply Work Plan

Source	Annual Allocation (MG)	Maximum Monthly Allocation (MG)
Marco Lakes (for Service Area)	1,966.37	244.16
Marco Lakes (for ASR)	1,515.21	546.84
Mid-Hawthorn Aquifer	1,320.28	163.93
Total	4,801.86	954.93

Source: Marco Island WUP 11-00080-W, SFWMD, 2017

FIGURE 2.2
Marco Lakes Source Water Facility Location
2024 Marco Island Ten Year Water Supply Work Plan

Source: Marco Island 2013 Ten Year Water Supply Work Plan

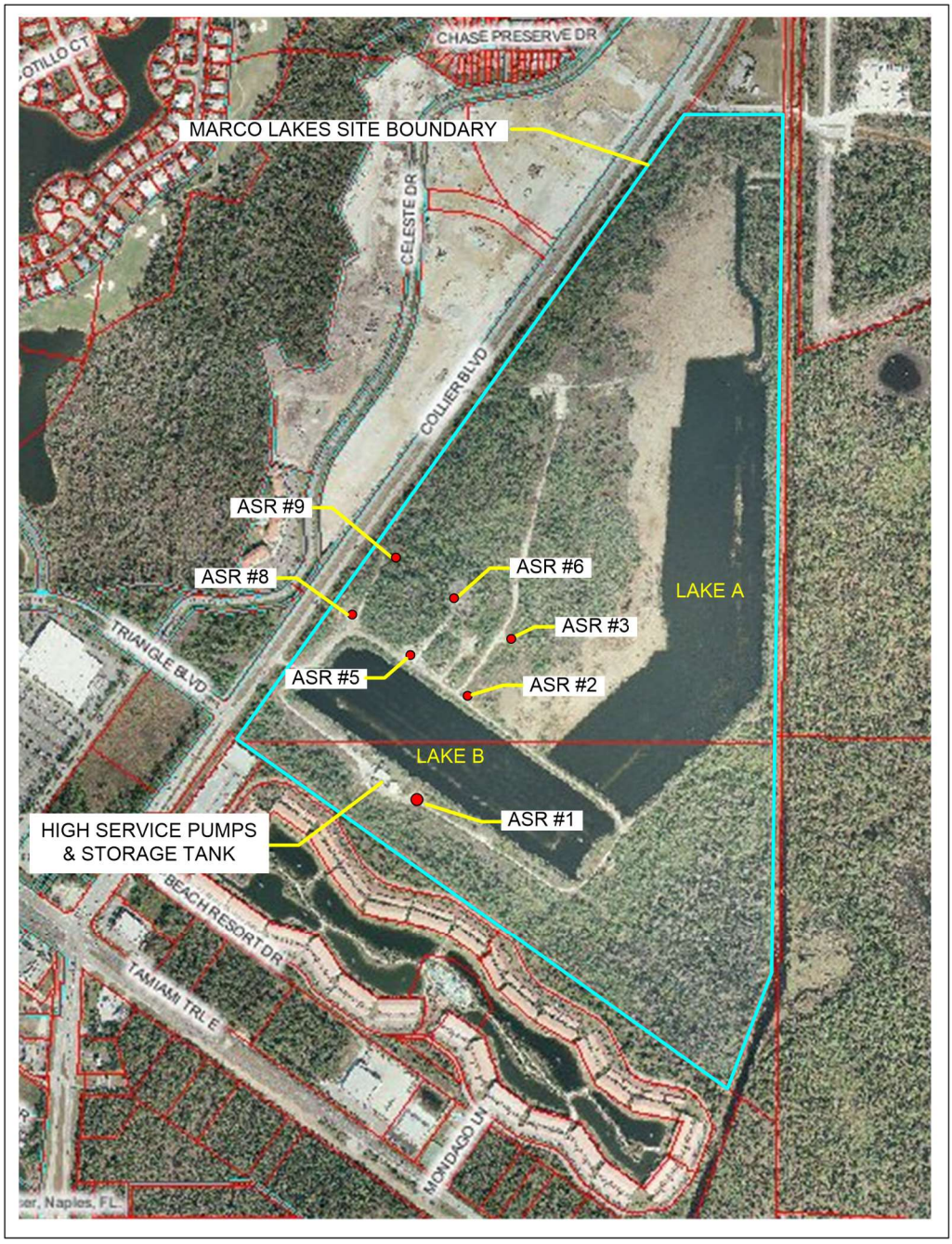
2.4.1 NWTP Raw Water Supply

The existing Marco Lakes source water facility shown in Figure 2.3 includes the following major components:

- Two man-made Lakes (Marco Lakes A & B). Lake A can receive diverted flows from Henderson Creek Canal when the canal level is above 3.5 feet NGVD. The flow is controlled by a sluice gate.
- One 0.5 MG ground storage tank (GST) for on-site storage of raw or recovered ASR water.
- Two raw water intake pumps (SWP-1 and SWP-2), each with a rated capacity of 2,300 gpm, and pump raw water from the lakes to GST.
- Two raw water intake pumps (SWP-3 and SWP-4), each with a rated capacity 5,000 gpm. These pumps can transfer raw water from the lakes to the GST or inject water into the ASR system.
- An ASR system, including seven ASR wells, each with an injection/recovery capacity of 1,100 gpm (1.58 mgd) per well, and 7,700 gpm (11.10 mgd) total. Each well can recover and pump water from the UFA to the GST. The City is permitted to install two additional ASR wells if necessary, in the future. These wells are currently not planned for construction within the 5 or 10-year planning period.
- Five high service raw water pumps that transfer water from the Marco Lakes GST to NWTP. Two pumps have a rated capacity 5,200 gpm, two pumps have a rated capacity of 4,000 gpm, and one pump has rated

capacity of 4,300 gpm. The firm capacity is 17,500 gpm (25.20 mgd). However, the maximum flow in the raw water transmission main to the NWTP is approximately 7,000 gpm (10.08 mgd). The limit is due to the maximum velocity and pressure drop in the transmission main.

FIGURE 2.3
Marco Lakes Source Water Facility Site
2024 Marco Island Ten Year Water Supply Work Plan



Source: Marco Island Water Treatment Facilities 2011 Capacity Analysis Report

The WUP has an annual withdrawal limit of 1,966.37 million gallon per year (MGY) from Marco Lakes, or 5.39 mgd annual average withdrawal limit. During the wet season, June 1st to November 30th, the maximum monthly allocation of the Marco Lakes water limits the amount of water available for treatment to 244.16 MG, which is an average of 7.88 mgd for a 31-day month. The ASR withdrawals are typically made in the dry season between December 1st and May 31st to meet additional demand. There is an allocated 1,515.21 MGY for withdrawal from the ASR. This is equivalent to an average withdrawal of 8.33 mgd from the ASR during that 182-day period, in addition to water available from Marco Lakes.

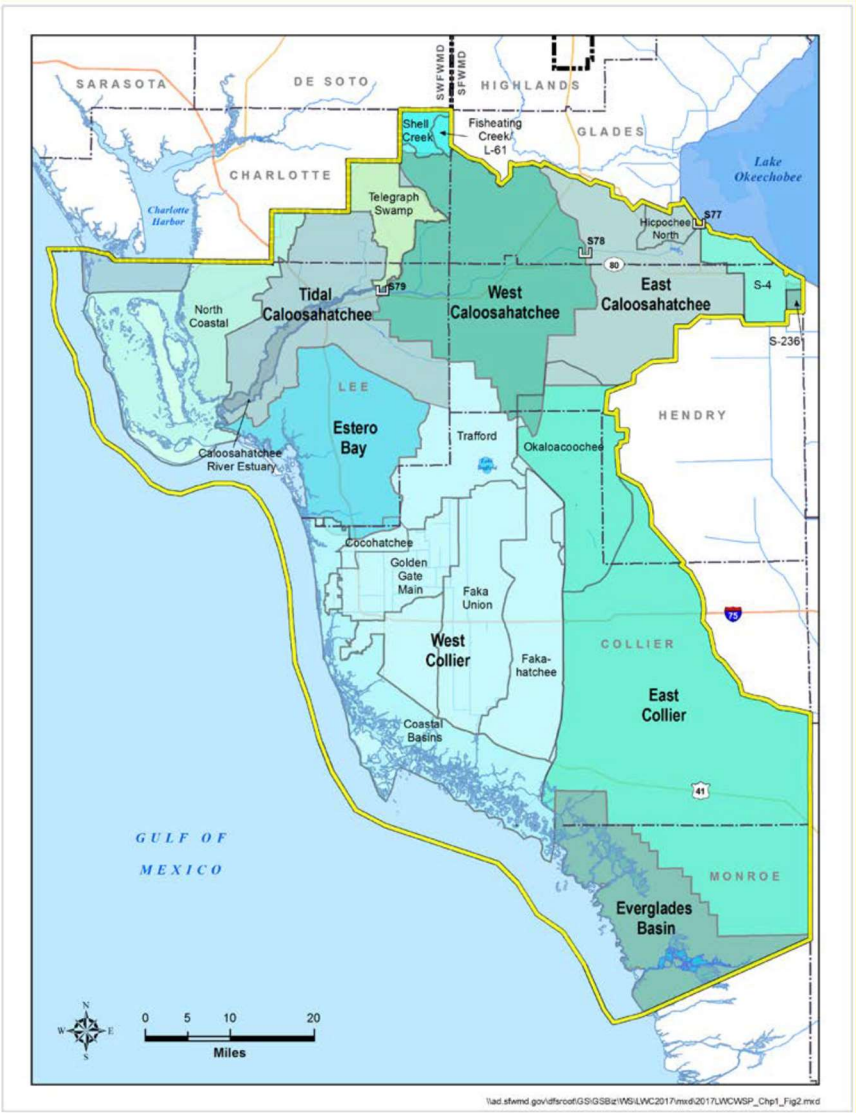
The ASR wells are used to provide year-round water supply by storing large quantities of Marco Lakes water during the wet season, when lake water is plentiful, and for later recovery during the dry season when lake water is limited. Injection into the ASR can occur when the following three conditions are met:

- The date is June 1st to November 30th (183 days)
- The stage level of Henderson Creek Canal exceeds 3.5 feet NGVD
- The stage level of Marco Lakes exceeds 2 feet NGVD.

The raw lake water is stored in a deep but unused aquifer, which minimizes the flow of the fresh water away from the well. The ambient water in the storage aquifer is higher-density brackish water. There is a significant stratification of the fresh and brackish water, and the injected raw water creates a "bubble" of fresh water within the brackish aquifer. This stratification can minimize mixing two sources of water and keep a similar lake water quality for future recovery. Typically, only about 70 – 80 percent of the bubble of water is recovered before exceeding the drinking water standards for total dissolved solids ~~(TDS)~~ and chloride level. ASR water generally has less than 150 mg/L chloride concentration and does not exceed 250 mg/L to meet the operational requirements of NWTP.

The Marco Lakes are dedicated to the City's water supply and are fed by the Henderson Creek canal system, which is part of the West Collier Basin, as shown in Figure 2.4. The Henderson Creek canal system drainage basin is fed by the drainage area east of Collier Blvd. north of US Route 41 and primarily south of Interstate 75 as shown in Figure 2.5. A proposed connection to the northern section of the Golden Gate canal system may increase the drainage area north to Immokalee Road to increase dry season flows to the Rookery Bay.

FIGURE 2.4
Lower West Coast Planning Area drainage basins
2024 Marco Island Ten Year Water Supply Work Plan



Source: SWFWMD 2017 ~~LWC Supply Plan~~LWCSP Update

The principal source of water for Henderson Creek is stormwater runoff which is an alternative raw water supply. A half mile past the Lakes, Henderson Creek flows over a weir at Route 41 into a saltwater stream that flows into the Gulf of Mexico. The City's ASR system captures and stores excess stormwater runoff during the rainy season and supplements the City's water supply during the dry season to provide a drought resistant solution in accordance with the ~~LWC Supply Plan~~LWCSP guidance.

FIGURE 2.5
Current and Proposed Henderson Creek Watershed
2024 Marco Island Ten Year Water Supply Work Plan

Source: Marco Island Water Treatment Facilities 2011 Capacity Analysis Report

2.4.2 SWTP Raw Water Supply

Raw water for the RO system at the SWTP is supplied by the MHA brackish wellfield located on Marco Island, as shown on Figure 2.6. There are a total of 21 wells of which 15 are currently in operation. The City has abandoned and plugged four brackish wells (RO-2, RO-3, RO-6, and RO-9) due to increasing salinity. Two of the wells (RO-5

and RO-8) are disconnected from the system and are maintained as standby wells. Table 2.3 shows the rated capacity of each of the operating brackish wells.

FIGURE 2.6
Marco Island Mid-Hawthorn Aquifer Brackish Wellfield and WTP Locations
2024 Marco Island Ten Year Water Supply Work Plan

Source: Marco Island Water Treatment Facilities 2011 Capacity Analysis Report

The SWTP treatment capacity is 6.0 mgd, and the RO treatment process operates at 75 percent recovery, which requires 8.0 mgd of raw water to meet treatment capacity. The total capacity of the wells with the largest well out of service is 8.60 mgd, as shown in Table 2.3, which is greater than the required 8.0 mgd. The City will only need

to drill new wells to replace existing wells that experience salinity increases that make them unsuitable to feed the SWTP.

TABLE 2.3
South Water Treatment Plant Mid-Hawthorn Wellfield Summary
2024 Marco Island Ten Year Water Supply Work Plan

Name of Well	Design Capacity of Well Pump (mgd)
RO well 1	0.69
RO well 2	Not in use – filled in
RO well 3	Not in use - filled in
RO well 4	0.65
RO well 5	Out of Service
RO well 6	Not in use - filled in
RO well 7	0.70
RO well 8	Out of Service
RO well 9	Not in use - filled in
RO well 10	0.60
RO well 11	0.79
RO well 12	0.76
RO well 13	0.79
RO well 14	0.61
RO well 15	0.43
RO well 16	0.69
RO well 17	0.63
RO well 18	0.51
RO well 19	0.63
RO well 20	0.63
RO well 21	0.69
Wellfield Firm Capacity (largest well out of service)	8.60

Source: Marco Island Water Treatment Facilities 2021 Capacity Analysis Report

2.5 Water Supply Provided by City of Marco Island

The City operates two water treatment plants on Marco Island that are permitted with the Florida Department of Environmental Protection (FDEP) under Public Water Supply (PWS) ID Number 5110183. The NWTP treats raw water from the Marco Lakes SWF using lime softening and microfiltration. The SWTP desalts brackish groundwater from the MHA using RO. The permitted operating capacity of the NWTP is 6.67 million gallons per day (mgd) and the permitted capacity of the SWTP is 6.0 mgd, for a total WTP production capacity of 12.67 mgd. The two WTPs supply water to the Marco Island service area.

2.5.1 Marco Island North Water Treatment Plant

The Marco Island NWTP is located at Elkcam Circle and Windward Drive on the north end of Marco Island as shown in Figure 2.6. Marco Lakes, located nine miles north of Marco Island, provides raw surface water to the NWTP. The permitted capacity of the NWTP is 6.67 mgd and is typically operated near this capacity year-round with the SWTP used for peaking. Approximately 3.67 mgd of the NWTP finished water is distributed by local high service pumps to the north side of Marco Island. The remaining 3.0 mgd of finished water is transferred to the SWTP for blending with RO permeate and distribution to the south end of the island by the SWTP high service pumps.

The NWTP is a conventional lime softening and filtration facility that uses a lime softening reactor/clarifier followed by a membrane filtration. Lime and alum are added to the reactor/clarifier to remove TOC, color, hardness and alkalinity from the water. The membrane filters remove residual turbidity from the lime softening process, as well as provide a critical removal barrier for pathogens. Primary and residual disinfection is accomplished by adding chloramines to the filter influent. The filtered water is transferred to the SWTP and to the existing storage tanks for additional disinfection contact time, storage and eventual distribution. The permitted capacity of the treatment system is 6.67 mgd. All treatment components are sized to continuously produce this peak flow in accordance with FDEP rules. The permitted capacity is limited by the capacity of the Lime Reactor at 6.67 mgd. The new Pall Membrane Filtration System (PMFS) currently can filter up to 10 mgd.

The finished water is sent to the single 4.0 MG GST at the NWTP or transferred to the SWTP GSTs. Finished water from the NWTP 4.0 MG GST is sent to distribution using the onsite high service pump station (HSPS). The HSPS consists of three (3) pumps, each with a rated capacity of 3,300 gpm, with room for a future fourth pump. The NWTP HSPS firm capacity is 6,600 gpm (9.50 mgd), with a total capacity of 9,900 gpm (14.26 mgd).

The City is ~~beginning the design of upgrades to~~planning to upgrade the NWTP treatment process to incorporate biologically active filtration (BAF) pretreatment and to add low-pressure reverse osmosis (LPRO). The BAF process, to be located at the SWF before transferring the surface water to the NWTP, will remove naturally occurring nutrients, taste and odors compounds, and organics within the source water that reduce PMFS efficiency and negatively impact finished water quality. The LPRO process will replace the existing aging lime softening process to improve reliability, reduce operating cost and improve finished water quality.

2.5.2 Marco Island South Water Treatment Plant

The SWTP is located near the center of the southern portion of Marco Island off Lily Court and is the source of water supply for the south end of the island. The SWTP has a permitted production capacity of 6.0 mgd and receives an additional 3.0 mgd of finished water from the NWTP for blending and distribution at the SWTP. Raw

water is provided to the facility by 15 brackish wells located in the central and eastern portion of the island as shown in Figure 2.6.

The SWTP is a brackish RO facility that desalts brackish feed water. The facility utilizes sand separation, cartridge filtration and scale inhibitor chemical addition as pretreatment to a two-stage RO desalting process. The RO permeate is degasified for sulfide removal and then residually disinfected by chloramines before transferring to the finished water storage tanks for blending, storage and eventual distribution. All treatment components are adequately sized to treat the rated 6.0-mgd WTP capacity in accordance with FDEP rules. The RO system went operational in 1991 and many of the system components are upgraded annually.

The SWTP has two 2.0 MG storage tanks, one 3.0 MG storage tank, and one 1.0 MG storage tank, for a total of 8 MG storage capacity. The SWTP has two High Service Pump Stations (HSPS): an east HSPS and a west HSPS. The two pump stations have a total of eight high service pumps with a firm capacity of 13,300 gpm (19.15 mgd) and a total capacity of 16,400 gpm (23.62 mgd). The east HSPS has four pumps, each rated at 3,3000 gpm. The west HSPS has four pumps, three of the pumps are rated at 1,000 gpm each, and the fourth pump is rated at 400 gpm.

The City is currently upgrading the west HSPS. The existing pump station will be demolished and replaced with a station with two pumps, each with a rated capacity of 3,300 gpm, with room for a third pump. With the new west HSPS, the SWTP will have a total of seven high service pumps with a firm capacity of 16,500 gpm (23.76 mgd) and a total capacity of 19,800 gpm (28.51 mgd).

2.6 Relevant Regional Issues

~~SFWMD's 2017 LWC Supply Plan update identified the following overarching issues:~~

~~Increased~~The 2022 LWCSP update concludes that future water needs of the region can be met through the planning horizon with appropriate management, conservation, and implementation of projects identified in Chapter 9 of the LWCSP. Meeting future water needs through 2045 depends on the following:

1. Construction of potable water supply development projects by two PWS utilities (Ave Maria and Florida Governmental Utility Authority – Lehigh Acres);

2. Implementation of the Comprehensive Everglades Restoration Plan C-43 West Basin Storage Reservoir, Picayune Strand Restoration Project, and other ecosystem restoration projects;

3. Coordination between the SFWMD and appropriate local governments to identify long-term sustainable water supply solutions in DSS demand areas that are currently or projected to experience aquifer stress; and

4. Completion of repairs to the Herbert Hoover Dike by the USACE and implementation of the new Lake Okeechobee System Operating Manual.

SFWMD's 2022 LWCSP update identified the following issues that are specific to the City's public water system::

1. Climate change and sea level rise are issues of concern, especially in coastal regions.

2. The SFWMD's recommendations for water supply planning in the LWC Planning Area include continued coordination with AG stakeholders, PWS utilities, and other water users; protection of natural resources; diversification of water sources; and continued monitoring of water levels and water quality in surface water and groundwater.

3. Water availability in most surface water systems is limited due to restricted allocation area criteria or other protective measures. Additional water storage features could enhance water availability.

4. Public service utilities are encouraged to create additional storage capacity for surface water, where appropriate and feasible. ASR systems can store water during periods of low demand and high-water levels (i.e., during the wet season) for subsequent recovery during dry periods, which could reduce withdrawals from the ~~surficial aquifer~~SAS and ~~intermediate aquifer systems are limited~~IAS wells.

5. Use of reclaimed water for urban irrigation is encouraged to reduce demands on the potable water system and freshwater resources.

6. Development of the SAS and IAS has been maximized in many areas due to the potential harm to water resources and related natural systems, saltwater intrusion, and impacts to ~~the~~ existing legal users.

7. Water users are encouraged to reduce reliance on the SAS and IAS by diversifying water sources and developing AWS sources to meet future water demands.

8. Local water users installing FAS wells are encouraged to collaborate with the SFWMD to gather and share hydrogeologic data. Additional data will increase knowledge of aquifer properties and could support updates to future groundwater modeling efforts of the FAS.

9. The SFWMD will continue to support AWS development and promote water conservation to increase the security and diversity of water sources, as withdrawing less water from aquifers helps prevent saltwater intrusion.

10. PWS utilities should plan for climate change and sea level rise by reducing withdrawals from the SAS and by using the IAS and FAS, employing water conservation measures to reduce overall water demands, and expanding reuse programs to reduce potable and self-supplied SAS withdrawals for irrigation

~~1.~~11. Water conservation is an important component of integrated water resource ~~and existing legal uses, as defined in the permitting criteria.~~management and may reduce, defer, or eliminate the need to expand water supply infrastructure. Local governments should adopt a year-round irrigation ordinance that fully comports with the SFWMD's Mandatory Year-Round Landscape Irrigation Conservation Measures Rule (Chapter 40E-24, Florida Administrative Code).

~~2. Surface water allocations from Lake Okeechobee and hydraulically connected surface waters are limited in accordance with the Lake Okeechobee Service Area Restricted Allocation Area (RAA) criteria.~~

~~3. Peak freshwater discharges during the wet season affect the health of the Caloosahatchee Estuary.~~

~~4. Surface water availability and current storage capacity are insufficient to meet water demands and environmental needs for the C-43 Canal and Caloosahatchee River and Estuary during dry conditions.~~

The City has implemented ASR storage to maximize the use of wet weather surface water and has enacted conservation measures to meet support the issues identified within the 2022 LWCSP. The City's water sources are not connected to nor impact the overarching issues identified in the ~~2017 LWC Supply Plan~~2022 LWCSP update and therefore do not affect the City's water supply planning. The City relies on two alternative drinking water supply sources and maximizes the use of reclaimed water to reduce potable water demand. All three water sources are in accordance with ~~LWC Supply Plan~~LWCSP guidance to diversify water supply using alternative sources.

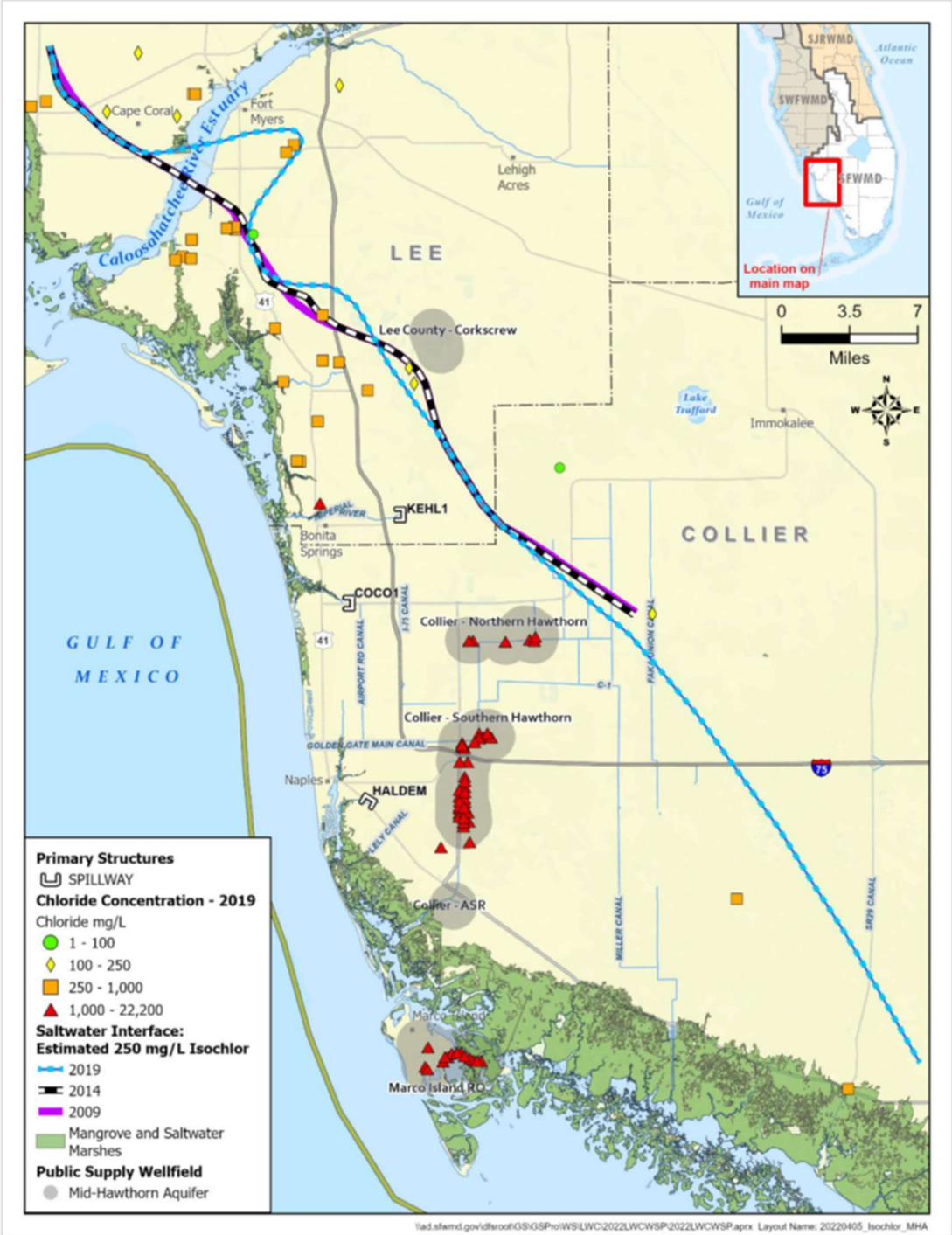
Even with the proposed expanded drainage area, the City's surface water source avoids contributing to the following SFWMD Lower West Coast regional issues:

- Does not withdraw from a surficial aquifer system.
- Does not hydraulically link to Lake Okeechobee, therefore does not contribute to its demand.
- Does not hydraulically link to the Caloosahatchee River or Estuary (Caloosahatchee), therefore does not discharge into the Caloosahatchee or demand water from the Caloosahatchee.

While located within the intermediate aquifer system (IAS), the MHA wellfield on Marco Island is located within a brackish zone that is considered an alternative water supply source and is located approximately 30 miles south of the saltwater interface in northern Collier County as shown in Figure 2.7.

The City of Marco Island's SWTP follows SFWMD Maximum Developable Limits (MDL) to not withdraw water from the Mid-Hawthorn aquifer wells to less than 20 feet above the top of the uppermost geologic strata of the aquifer. The land surface elevation on Marco Island is approximately 5 feet NGVD. The top of the MHA occurs at approximately -320 feet NGVD on Marco Island. The MDL for the aquifer in this area occurs around -300 feet NGVD. Nearby well construction reports that the MHA potentiometric surface remains above land surface in this area is believed to be approximately 305 feet above the MDL.

FIGURE 2.7
Southwest Florida Mid-Hawthorn Aquifer Saltwater Interface
2024 Marco Island Ten Year Water Supply Work Plan



Source: ~~2017~~Figure D-4 of the 2022 Lower West Coast Water Supply Plan Update

3. Data and Analysis

3.1 Population Information

The City's existing and future population figures are derived from the data provided by the City's Community Development Department and the University of Florida Shimberg Center. Table 3.1 shows the past and projected population of the Marco Island service area including Marco Island, Marco Shores, Key Marco and Goodland. The City's permanent population grew from16,413 in 2010 to 17,594 in 2020. During the 5 and 10-year planning periods, the City's permanent population is estimated to increase to18,362 in 2026 and 18,859 in 2031. This minor population growth is reflective of the fact that the City is substantially built-out, with future development potential and population growth limited by the amount of remaining vacant and developable land.

TABLE 3.1
Marco Island and Collier County Bulk Sales Service Areas Population Estimates
2024 Marco Island Ten Year Water Supply Work Plan

Year	Total Marco Island Service Area Permanent Population	Collier County Service Area Served by Marco Island Permanent Population (Key Marco/Goodland)	City of Marco Island Permanent Population	Total Peak Season Population [c]
Previous Estimates				
1990[a]	9,773			
2000[a]	14,879			
2010	16,413			
2020	17,594	796	16,798	41,248
2023	17,727	870	16,857	41,561
Future Projection [b]				
~~2021~~	~~17,727~~	~~870~~	~~16,857~~	~~41,561~~
~~2026~~2025	18,362	901	17,461	42,784
2028	18,667	916	17,751	43,493
~~2031~~2030	18,859	925	17,933	43,941
2033	19,040	934	18,106	44,364
2040	19,532	959	18,574	45,260

[a] The 1990 and 2000 populations are based on values previously reported in the 2013 Ten Year Plan report
[b] Projected by City's Community Development Department and Shimberg Center for Housing Studies, based on 2000, 2010 and 2020 U.S. Census data and population projections by the Bureau of Economic and Business Research, University of Florida
[c] Peak population calculated using equivalent population per ERC. Population per ERC is estimated to be 2.13 capita per dwelling unit per US 2020 census quick facts.

3.2 Land Use and Equivalent Residential Connection

The City's drinking water service area contains a mixture of land use categories, including single family homes, multi-family homes, hotels, commercial (including recreational and institutional facilities), restaurants, government/municipal facilities, and bulk sale of water.

Table 3.2 shows the summarized land use, equivalent residential connection (ERC), and estimated effective population equivalent during peak season in the Marco Island Service Area. The population, single family and multifamily unit data in Table 3.2 is updated based on land use data from the 2020 Marco Island Comprehensive Plan Update.

The Marco Island Service area land use is estimated to be near build-out. The City's single-family homes, multi-family homes, and commercial area are presently more than at ~~84.3%, 96.5~~86.0%, 98.4%, and ~~88.5~~90.3% of the 2040 build-out capacity, respectively. The Key Marco and Goodland area is estimated to be ~~83~~84.7% of the 2040 build-out capacity. There are currently no plans for future development of hotels, restaurants, or government/municipal builds, which are anticipated to be at 100 percent of build-out. Land use total is estimated to be ~~91.2~~92.8% of build-out.

~~An equivalent residential connection, or ERC, has a water demand equivalent to one residential single-family home. Single Family and Collier County units are weighted at 1.0 ERC/unit in this study. Multi-family, condo, and timeshare units are weighted at 0.8 ERC/unit. Hotel and Government/Municipal ERC equivalents were estimated by dividing known water use by a gpd/ERC ratio equivalent to that of one residential ERC. Commercial units were given an ERC weighting from the City's ERC factor tables. The annual ERC is the number of units connected to the service system at the end of the year.~~

TABLE 3.2
Marco Island Service Area – Land Use, Estimated Peak Season Population, and ERC
2024 Marco Island Ten Year Water Supply Work Plan

Land Use	Land Use (~~2021~~2023)	Build-out Land Use (2040)	ERC Factor (ERC/ Land Use Unit)[a]	ERC (~~2021~~2023)	Build-out ERC (2040)	Peak Season Population (2021)[a]	Build-out Population (2040)[a]
Bulk Collier Sales (Key Marco & Goodland)	~~498~~508	600	1.0	~~498~~508	600	1,061	1,278
Single Family	7,~~457~~607	8,841	1.0	7,~~457~~607	8,841	15,883	18,831
Multi-Family; Condominium; Timeshare	~~10,999~~11,220	11,401	0.8	8,~~799~~976	9,121	18,742	19,427
Hotel Rooms	1,163	1,163	0.6	663	663	1,412	1,412
Commercial	2,~~556~~607	2,889	0.2	~~580~~592	656	1,236	1,397
Restaurants[b]	120	120	9.1	1,092	1,092	2,326	2,326
Government/Municipal	136	136	2.0	276	276	588	588
Total	**~~22,929~~23,361**	**25,150**	**-**	**19,~~365~~713**	**21,249**	**41,248**	**45,260**

a. The population is the estimation of effective population equivalent during peak season that results in maximum day demand, used for information only. The average equivalent population factor per ERC is estimated to be 2.13 capita per dwelling unit per US 2020 census quick facts.
b. Restaurants are estimated to have an average 100 seats per unit

Source: Marco Island Water Treatment Facilities ~~2021~~2023 Capacity Analysis ~~Report~~ Update

An equivalent residential connection, or ERC, has a water demand equivalent to one residential single-family home. Single Family and Collier County units are weighted at 1.0 ERC/unit in this study. Multi-family, condo, and timeshare units are weighted at 0.8 ERC/unit. Hotel and Government/Municipal ERC equivalents were estimated by dividing known water use by a gpd/ERC ratio equivalent to that of one residential ERC. Commercial units were given an ERC weighting from the City's ERC factor tables. The annual ERC is the number of units connected to the service system at the end of the year.

3.3 Peak Population and Potable Water Demand Projections

The historical water demand data from 2011 to 2023~~2020~~, shown in Table 3.3 is based upon water usage data provided by the City. The water demand data allows for the calculation of annual average day demand (ADD), maximum day demand (MDD), and the average day demand of the highest water use month, or maximum month. The MDD and ADD can be used to calculate a peaking factor ratio to predict future water usage, and the maximum month average daily demand (MMADD) and ADD can be used to predict the ratio for the peak water use month.

~~Historical data shows that the ADD is increasing, from 6.73 mgd in 2011 to 8.14 mgd in 2020. In the dataset shown in Table 3.3, the highest ADD (8.24 mgd) and highest average water usage per connection (433 gpd/ERC) are from 2018. However, these are lower than the historically highest ADD (8.26 mgd in 2004 and 2006) and the historically highest average water usage per connection observed (489 gpd/ERC in 2000). This is primarily due to the City connecting condominiums to the reclaimed water distribution system for irrigation in 2008, which reduced potable water usage. While potable water usage has increased due to land development, the use of reclaimed water for irrigation for large users continues to help offset the demand per ERC.~~

TABLE 3.3
Marco Island Service Area - Historical Water Demand Data
2024 Marco Island Ten Year Water Supply Work Plan

Year	ERC at Year End[a]	Average Usage per ERC (GPD/ERC)	Annual Day Demand (ADD) (MGD)	Maximum Day Demand (MDD) (MGD)	Ratio (MDD/ADD)	Maximum Monthly Average Day Demand (MMADD) (MGD)	Ratio (MMADD/ADD)
2011[b]	18,371	366	6.73	10.41	1.55	8.49	1.26
2012	18,464	356	6.57	9.92	1.51	8.14	1.24
2013	18,557	368	6.83	10.52	1.54	8.38	1.23
2014	18,650	388	7.24	10.10	1.40	8.45	1.17
2015	18,742	394	7.39	10.91	1.48	8.79	1.19
2016	18,835	406	7.65	10.89	1.42	9.27	1.21

2017	18,928	409	7.75	11.05	1.43	9.63	1.24
2018	19,021	433	8.24	11.28	1.37	9.33	1.13
2019	19,114	428	8.17	11.82	1.45	9.59	1.17
~~2020[c]~~2020	19,365	420	8.14	11.17	1.37	9.81	1.21
2021	19,495	439	8.57	11.63	1.36	10.41	1.22
2022	19,625	465	9.12	11.84	1.30	10.72	1.18
2023[b]	19,754	506	9.99	12.19	1.22	10.80	1.08
~~2018~~-2020-2023 Three Year Average		**~~427~~470**			**1.~~40~~29**		**1.~~17~~16**

a. ERC: equivalent residential connection. ERC for ~~2012~~2011 through 2019 are estimated assuming a linear increase~~.~~ from the 2011 Capacity Analysis Report to the 2020 Capacity Analysis Report updated values. ERC for 2021-2023 are `

~~b. From Marco Island Water Treatment Facilities 2011 Capacity Analysis Report.~~

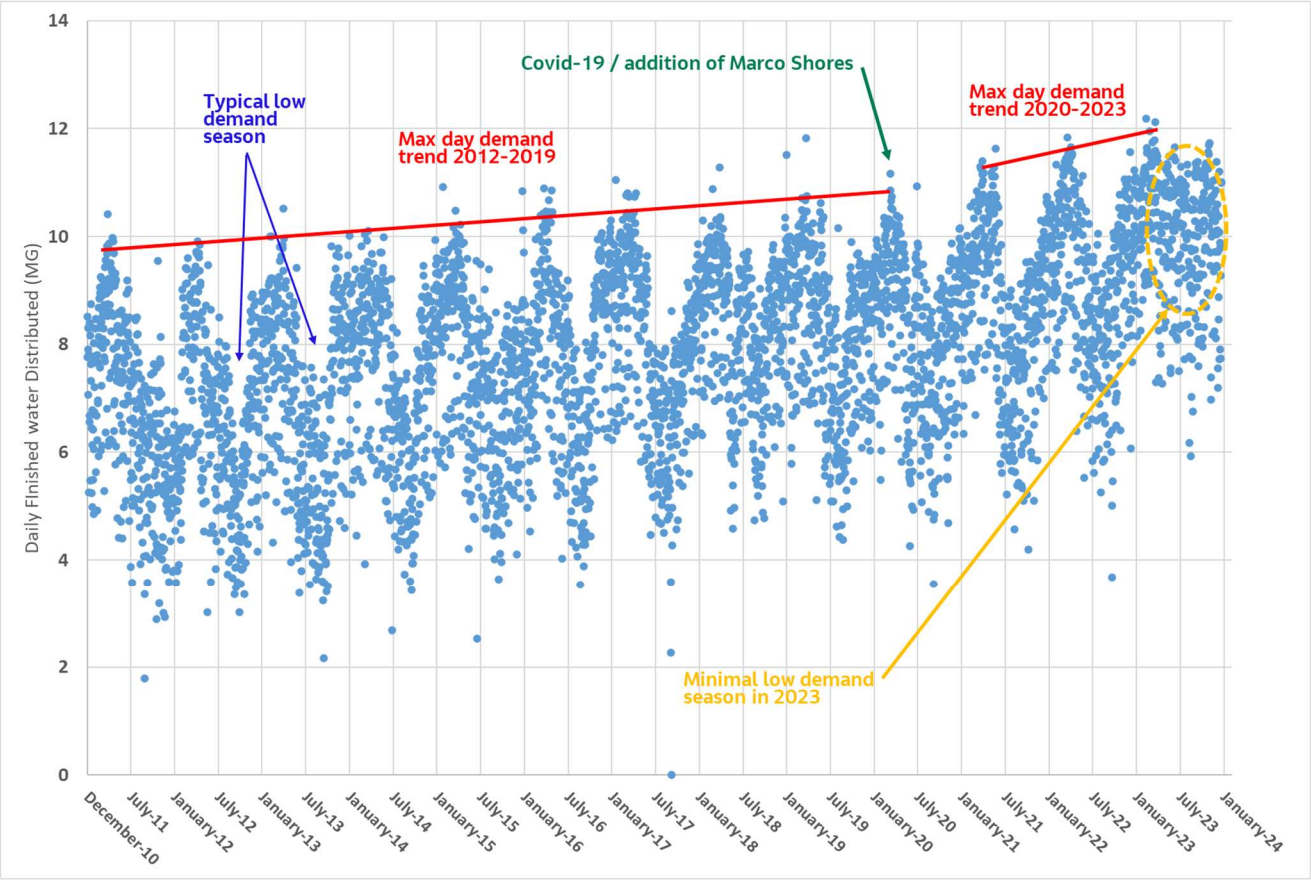
~~c.~~b. Estimated using the updated land use data from the Marco Island Comprehensive Plan Assessment Report.

Source: Marco Island Water Treatment Facilities ~~2021~~2023 Capacity Analysis ~~Report~~ Update

Historical data shows that the ADD is increasing, from 7.24 mgd in 2014 to 9.99 mgd in 2023. In the dataset shown in Table 3.3, shows the ADD and average usage declined in 2020 and 2021 due to the likely impacts of Covid-19. However, the ADD and average usage have since increased to higher than previous trends. These demands have increased beyond the historically highest ADD (8.26 mgd in 2004 and 2006) and the historically highest average water usage per connection observed (489 gpd/ERC in 2000). The drop was primarily due to the City connecting condominiums to the reclaimed water distribution system for irrigation in 2008, which reduced potable water usage. Potable water usage has increased due to land development beyond the beneficial impact of the reclaimed water for irrigation for large users that helped to offset the demand per ERC. Starting in 2020, the City of Marco Island supplied water to Marco Shores. The ADD in 2020 and beyond includes the additional water demand. Marco Shores added an estimated 675 ERCs to the existing system.

Figure 3.1 shows the daily combined NWTP and SWTP finished water volume sent to the distribution system between 2011 and 2023. The data shows a relatively steady increase in average and maximum daily demand from 2011 to 2019. Demand remained steady due to a combination of adding the Marco Shores distribution area combined decreased seasonal population due to Covid-19. However demands have been increasing at a higher rates since 2020 including a minimal reduction of distributed water during the low-demand season in 2023, which may indicate a higher permanent (year-round) population.

FIGURE 3.1
Marco Island Service Area - Daily Finished Water Demand between 2011-2023
2024 Marco Island Ten Year Water Supply Work Plan



Source: Marco Island Water Treatment Facilities 2023 Capacity Analysis Update

Table 3.3 presents the projected water demands through build-out in 2040. Future ADD were calculated based on the projected future ERC counts, water usage, and maximum day water demands. The demand projections use the ~~2018-2020~~2021-2023 average use per ERC, MDD/ADD ratio, and MMADD/ADD ratio.

~~Starting~~ These projections will need to be re-evaluated in ~~2020,~~2024 to assess whether the ~~City of Marco Island supplied water to Marco Shores. The future projected ADD in 2020 and beyond includes the additional water demand based on the actual 2020 demand data and the average of Collier County Bulk Sales daily water demands in 2018-2019. This is an estimated instantaneous addition of 675 ERC to the existing system~~2023 minimal off-season trend continues. The projected water demands during the 5-year and 10-year planning timeframe of this work plan are highlighted in Table 3.4.

TABLE 3.4
Marco Island Service Area Projected Future Water Demand Data
2024 Marco Island Ten Year Water Supply Work Plan

Year	ERC at Year End[a]	Annual Day Demand (~~ADD~~AADD)[b] (MGD)	Maximum Day Demand (MDD)[c] (MGD)	Maximum Monthly Average Day Demand (MMADD)[d] (MGD)
~~2021~~	~~19,488~~	~~8.32~~	~~11.61~~	~~9.74~~
~~2022~~	~~19,610~~	~~8.38~~	~~11.69~~	~~9.80~~
~~2023~~	~~19,733~~	~~8.43~~	~~11.76~~	~~9.86~~
2024	19,~~856~~884	~~8.48~~9.34	~~11.83~~12.07	~~9.92~~10.82
2025	~~19,978~~20,014	~~8.53~~9.41	~~11.91~~12.15	~~9.98~~10.89
2026	20,~~**076**~~112	9.45~~8.57~~	~~**11.96**~~12.21	10.~~**03**~~94
2027	20,~~174~~211	~~8.62~~9.50	12.~~02~~27	10.~~08~~99
2028	20,~~272~~309	~~8.66~~9.54	12.~~08~~33	~~10.13~~11.05
2029	20,~~370~~408	~~8.70~~9.59	12.~~14~~39	11.10~~.18~~
2030	20,~~467~~506	~~8.74~~9.64	12.~~20~~45	~~10.23~~11.15
2031	20,~~**569**~~594	~~**8.79**~~9.68	12.~~**26**~~51	~~**10.28**~~11.20
2032	20,~~671~~683	~~8.83~~9.72	12.~~32~~56	~~10.33~~11.25
2033	20,~~774~~771	~~8.87~~9.76	12.~~38~~61	~~10.38~~11.30
2034	20,~~876~~859	~~8.92~~9.80	12.~~44~~67	~~10.43~~11.35
2035	20,~~978~~947	~~8.96~~9.84	12.~~50~~72	~~10.48~~11.39
2036	21,~~032~~008	~~8.98~~9.87	12.~~53~~76	~~10.51~~11.43
2037	21,~~086~~068	9.~~01~~90	12.~~57~~79	~~10.54~~11.46
2038	21,~~140~~128	9.~~03~~93	12.~~60~~83	~~10.57~~11.49
2039	21,~~194~~188	9.~~05~~96	12.~~63~~87	~~10.59~~11.52
2040	21,249	9.~~08~~99	12.~~66~~90	~~10.62~~11.56

a. ERC: equivalent residential connection. ERC for ~~2021~~2024 through 2040 calculated proportional to estimated population rate increase.
b. ADD is calculated using an average usage per ERC of ~~427~~470 GPD/ERC, the average usage of ~~2018 – 2020~~2021 - 2023.
c. MDD is calculated using the average MDD/ADD ratio of 1.40, the average MDD/ADD ratio of ~~2018 – 2020~~2021 - 2023.
d. MMADD is calculated using the average MMADD/ADD ratio of 1.~~17~~16, the average MMADD/ADD ratio of ~~2018 – 2020~~2021 - 2023.

Source: Marco Island Water Treatment Facilities ~~2021~~2023 Capacity Analysis Report Update

3.4 Potable Water Level of Service Standard

The current level of service (LOS) is 200 gallons per day (gpd) per person ~~per~~within the ~~updated~~2021 City Comprehensive Plan. but will need to be increased due to higher low-season demands. The peak population on the island is expected to increase from ~~40,052~~41,248 in ~~2021~~2020 to ~~43,981~~45,260 at build-out (see Table 3.1). When the population is at a peak during the months of February, March and April the rainfall is at a

minimum and there is additional demand for irrigation water. In the past three years since Covid and the addition of the Marco Shores service area, the peak demand day for water consumption has increased at a higher rate and was ~~11.82~~12.19 mgd that occurred in ~~March 2019.~~February 2023. The MDD flow to customers is expected to increase to about ~~11.96~~12.33 mgd after 5 years in ~~2026~~2028, 12.~~26~~61 mgd after 10 years in ~~2031~~2033, and to 12.~~66~~90 mgd at build-out as shown in Table 3.4. The ADD within the 10-year planning period of this Work plan is projected to increase to ~~8.79~~9.76 mgd for an estimated ~~43,941~~44,364 City service area peak population or an average usage of ~~200~~220 gpd.

The combined capacity of the City's water treatment plants is 12.67 mgd, which ~~meets~~ does not meet the projected needs of the 2040 maximum day demand ~~as well as the demands~~and represents 97% and 99.5% of maximum day demand within the 5-year ~~and 10~~planning and10-year planning timeframes of this work plan. ~~With~~Given the limited water supplies ~~sufficient~~that are insufficient to meet future build-out demand, along with the limited existing treatment capacity, there is ~~no~~a need to revise the LOS for residential and non-residential customers up to the projected 220 gpd requirement.

3.5 Treatment and Distribution Losses

3.5.1 Treatment Losses at NWTP

The NWTP raw water losses results from three sources: 1) approximately 3,000 gallons per day in the limestone cake (i.e., 50 % weight solids) sent offsite for disposal; 2) approximately 5,000 to 10,000 gpd from evaporation; and approximately 5,000 gpd from the blow down of chemical cleaning the Pall Membrane Filtration System that is sent to the wastewater plant.

3.5.2 Treatment Losses at SWTP

The SWTP operates at 72 to 75 percent recovery efficiency depending on the salinity of the raw water and age of the membranes. Up to 280,000 gpd is lost for every 1.0 million gpd produced.

3.6 Summary of Raw Water Supply to Meet Demand

The water use permit allows for up to 408.09 MG of surface and brackish water to be withdrawn for water treatment service using during the maximum demand month, or a total of 13.16 MGD daily average during a 31-day month. The withdrawal of ASR water for the service area does not have a maximum monthly average listed in the WUP but is limited by the ASR wellfield pumping capacity (9.51 mgd firm / 11.1 mgd total).

Water treatment is not 100 percent efficient in producing finished water. The WUP #11-00080-W conservatively lists the NWTP as 94 percent efficient in treating the Marco Lakes and ASR recovered water, and the SWTP as 70 percent efficient in treating the Mid-Hawthorn Aquifer water. In addition, the WUP #11-00080-W assumes that only 72 percent of the Marco Lakes water allocated for injection is recoverable for potable water treatment. There is also a 100 MG per year allocation of Marco Lakes water for use of irrigation and blending into reuse water. Table 3.5 lists the water assumed to be available for potable water treatment, and the estimated finished water product based on the treatment efficiency.

~~During the months when the ASR is not available for withdrawal, the annual average daily finished water is estimated to be 8.42 mgd, and the maximum month is estimated to be 11.11 mgd of finished water. However,~~ The months when the ASR is not available are the wet months from June 1 to November 30, where the need for

irrigation is lower and is not during the peak seasonal population period. During the months when the ASR is not available for withdrawal, the average daily finished water demand was 7.64 mgd compared to 8.17 mgd for the whole year in 2019. The MMADD was 8.44 mgd between June to November compared to 9.59 mgd for the entire year in 2019. These off-season demands have increased significantly to 9.82 mgd ADD and 10.21 mgd MMADD in 2023, possibly due to more year-round permanent residents.

During the months when the ASR is available, which is for 182 days, the annual average daily finished water available is estimated to be 14.06 mgd, greater than what the NWTP and SWTP can produce, and the maximum month is up to 20.04 mgd, as the ASR withdrawal does not have a maximum month withdrawal limit.

The WUP lists an annual withdrawal limit of 1320.28 MG (3.62 mgd on average) from the MHA, and a maximum month allocation of 163.93 MG (5.~~46~~29 mgd on average). Therefore, the SWTP is able to produce an annual average of 2.~~72~~71 mgd, or a maximum month average of ~~4.10~~3.97 mgd, assuming 75 percent recovery. Given the increasing demand trends and the higher off-season demands, the current MHA allocation is not adequate to meet the City's demands. The required withdrawal from the MHA increased from 3.1 mgd in 2021 to 5.0 mgd in 2023. The City is currently negotiating an increase in the MHA allocation to meet these growing demands.

There is a 100 MGY Marco Lakes withdrawal allocated to supplement the reclaimed water system and irrigation water to golf courses on Marco Island, with a maximum of 1.0 mgd flow during the dry season. Therefore, the remaining 1866.37 MGY of the Marco Lakes water is used as raw water supply to NWTP, leaving a 5.11 mgd annual average withdrawal limit for treatment. Of the approximately 10 mgd transfer capacity of the Marco Lakes transmission main, there is a 9 mgd remaining hydraulic capacity available to the NWTP for treatment for peak day treatment. Overall, the NWTP's raw water supply system has sufficient capacity to supply the permitted 6.67 mgd to the plant.

The existing raw water transfer pumps, raw water high pressure transmission main pumps, and ASR well pumps are also adequate to supply the 6.67 mgd of feedwater needed for the NWTP and up to the 9 mgd hydraulic capacity of the raw water transmission main to the NWTP.

3.7 Interlocal Agreements

3.7.1 Interlocal Agreement to Sell Water

The City has an Interlocal Agreement to provide potable water to Collier County that they distribute to their customers in Goodland and Key Marco. ~~For example,~~ During the period of January 1, ~~2012~~2023 to December 31, ~~2012~~2023 a total of ~~40,655,500~~132,400,000 gallons (362,740 gpd) of water was sold to Collier County. Goodland has only a limited number of available lots for new homes and Key Marco has ~~110~~117 vacant lots for new homes. Using an estimate for the number of additional ERCs for the additional homes and multiplying it by ~~440~~470 gpd per ERC value for Marco Island, the average daily flow at build out is estimated at ~~271~~418,000 gallons. Assuming the ratio of maximum daily flow to average daily flow of 1.~~44~~29 for Marco Island is applicable to Goodland and Key Marco, the maximum daily flow at build out would be ~~391~~540,000 gpd. The Interlocal Agreement has a maximum monthly limit (i.e., no daily limit) of 30,000,000 gallons of potable water. The potable water projections in Table 3.4 account for the increase in demand and show that the existing water facilities can meet these added demands.

3.7.2 Interlocal Agreement to Buy Water / Interconnection

The City had an interlocal agreement between 2007 and 2019 with Collier County to sell potable water to its customers within Marco Shores. This agreement has ended and the City began supplying water to the Marco Shores customers in January 2020. The City is not dependent on another entity to serve any of its customers as of January ~~2020~~2024. No additional intergovernmental activities are needed to ensure water services are planned for, adequately available, and provided to the water customers of the City.

The City of Marco Island maintains an interconnect with Collier County Public Utility Department that is capable of providing finished water to the Marco Island distribution system in the event of an emergency.

Table 3.5

Raw Water for Treatment and Finished Water Availability Analysis

2022 Marco Island Ten Year Water Supply Work Plan

Source	Annual Allocation (MG)	Maximum Monthly Allocation (MG)	Average Daily Allocation (MGD)	Maximum Month Average Daily Allocation (MGD)[a]	Water Treatment Plant Overall Efficiency (%)[b]	Annual Finished Water (MG)	Maximum Month Finished Water (MG)	Annual Average Daily Finished Water (MGD)	Maximum Month Average Daily Finished Water (MGD)
June 1 to November 30									
Marco Lakes (For Service Area)	1,866.37[c]	244.16	5.11	7.88	94.0%	1,754.39	229.51	4.81	7.40
ASR Withdrawal	-	-	-	-	-	-	-	-	-
Mid-Hawthorn Aquifer	1,320.28	163.93	3.62	5.29	70.0%	~~1,320.28~~924.20	114.75	~~3.62~~2.53	3.70
Total	3,186.65	408.09	8.73	13.16	-	3,074.67	344.26	8.42	11.11
Dec 1 to May 31									
Marco Lakes (For Service Area)	1,866.37	244.16	5.11	7.88	94.0%	1,754.39	229.51	4.81	7.40
ASR Withdrawal	1,090.95[d]	294.8[e]	5.99[f]	9.51[e]	94.0%	1,025.49	-	5.63	8.94
Mid-Hawthorn Aquifer	1,320.28	163.93	3.62	5.29	70.0%	1,320.28	114.75	3.62	3.70
Total	4,277.60	408.09	8.73	13.16	-	4,100.16	344.26	14.06	20.04[g]

a Maximum month allocation based on a 31-day month

b Water treatment plant efficiencies is based upon SFWMD values

c Marco Lakes for service area has 100 MG annual allocation for irrigation and reuse supplementation

d ASR withdrawal recovery assumes 72% of injected annual allocation is recoverable, per WUP 11-00080-W, SFWMD, 2017

e There is no maximum monthly withdrawal limit to the ASR – assumed 31 days at 9.51 mgd firm capacity of ASR recovery system

f ASR annual allocation is only available for 182 days

g Max month finished water assumes sum of max month from Marco Lakes for service area, MHA and firm capacity of ASR recovery wells

3.8 Conservation

The City currently implements a standard water conservation plan (WCP) (Appendix A) in accordance with the SFWMD Applicants Handbook for Water Use Permit Applications (09/07/2015) (AH). The City's WCP includes all of the SFWMD required elements for WCPs such as ordinances on irrigation, Florida-friendly landscaping, plumbing fixtures, rain sensors; water conservation rate structure, leak detection program; water conservation education programs; and reuse of reclaimed water. The City has actively promoted the WCP elements described within the sections below.

3.8.1 Consumer Education

Presently, the City actively promotes water conservation by educating the public through the dissemination of Water Conservation booklets, placement of conservation-related articles and reports in local news media, and by posting water conservation information on its website. Additionally, Marco Island conducts an open-house where residents are encouraged to visit the WTP for a tour of the facilities with utility staff available for questions.

In addition to these long-term education practices, the City is in the process of hiring a field representative whose duties will include to educate high volume users about conservation and more efficient irrigation.

Furthermore, our recent contract award by the City Council for the study and implementation of an upgrade to advanced meter infrastructure (AMI) represents a significant step forward in conservation and educating consumers. AMI utilizes state-of-the-art fixed-based technology, including collection devices and communication systems, to gather, measure, and analyze water usage data comprehensively. This advancement not only will allow the City to better understand water usage real-time to support conservation measures and enforcement, but it will also provide customers with online access through a dedicated portal for real-time monitoring and management of water usage. This will also facilitate the identification of water leaks on the customer's side of the meter. By providing a better understanding of water usage and minimizing water waste to prevent inflated water bills, AMI aligns seamlessly with our commitment to sustainable water management practices.

The City will continue to implement the current educational and public service elements of the water conservation plan. In the future, the City will continue to pursue and combine new educational methods of communication to inform the public about the benefits of water conservation.

3.8.2 Mandatory Year-Round Landscape Irrigation Conservation Measures

As a part of the City's outdoor water-use conservation program, on May 17, 2010 the City adopted Ordinance 10-05 along with Resolution 10-20 to reduce and/or prevent wasteful, uneconomical, impractical, or unreasonable uses of water resources for lawn and landscape irrigation. ***The Marco Island City Council adopted City Ordinance 20-02 on August 17, 2020 to amend their existing landscape irrigation regulations to restrict the number of days and hours of irrigation activities to meet the requirements of Chapter 40E-24, Florida Administrative Code (F.A.C.).*** Ordinance 20-02 (Appendix A) remains in effect and continues to provide the following policies and rules to water irrigation of landscaping within the City:

a. Permitted hours of irrigation are 12 a.m. to 8 a.m.

b. Permitted days of irrigation for even number address residences Tuesday, Thursday and Sunday.

c. Permitted days of irrigation for even number address residences Monday, Wednesday and Saturday.

3.8.3 Block Rates for Potable Water for Single Family Homes

At the end of 2005 the City initiated setting Block Rates for water used at single-family homes (Residential~~).~~) and were most recently updated on May 1, 2020 within the City's Utility Rate Schedule (Appendix A). If the potable water usage exceeds the Block 1 Volume (i.e., the allowable volume of water at the lowest dollars/1000 gallons), then cost of water increases to the next Block. The Block rates increase as each block volume is exceeded. ~~The block rates were updated on May 1, 2020 within the City's Utility Rate Schedule (Appendix A).~~

The City's approach to block rates is distinct and purposeful. Rather than employing a one-size-fits-all approach. The City tailors block rates to enable customers to adequately irrigate their properties based on lot size and the recommended water requirements for effective irrigation in their respective areas. This Block Rate billing structure has caused homeowners to carefully monitor their irrigation systems so that they do not exceed the block with the lowest rates.

3.8.4 Block Rates for Potable Water for Multifamily Homes

In March 2007 the City initiated block rates for multifamily units (i.e., includes condominiums~~). The block rates~~) and were most recently updated on May 1, 2020. Each multifamily unit has separate meters for indoor use and irrigation use. The block rates for irrigation are initially set by the size of the irrigation meter but can be modified by information provided on the amount of irrigation area of the site~~.~~ reflecting the principles applied to residential customers. For example, if a facility has a 2-inch irrigation meter, then the lowest block rate is from 0-160,000 gallons per month of water for irrigation. However, the facility can provide information on the area of irrigation showing that a larger amount of water per month is needed to properly irrigate the area in which case that site would be assigned a larger quantity of water for the lower block rate. ~~The block rates were most recently updated on May 1, 2020.~~By incorporating factors such as meter size, usage, and in some cases, lot/property size, our aim is to deter excessive irrigation beyond what is essential for vegetation survival. Since its implementation this program has reduced the amount of potable water for irrigation on the order of 10%.

3.8.5 Exceptional High Uses

In 2007, the City set up a computer system that identifies any users that have a monthly increase in water usage of 60% greater than the historical usage for that month. The City takes the initiative to contact those users to identify the cause of the increase and work with the users to reduce the usage.

3.8.6 Water Loss Reduction

One of the five major elements of a water conservation plan can be the implementation of a Water Loss Reduction Program (WLRP). However, in accordance with Subsection 2.3.2.F.2 of the SFWMD AH, due to the fact that unaccounted-for distribution system losses in the City currently do not exceed 10% as calculated, no WLRP needs to be implemented at this time. In the future, implementation of this measure will be considered if and/or when it becomes appropriate. The City currently submits an annual report addressing un-accounted for distribution losses for the system.

3.8.7 Indoor Water Conservation Program

The City has developed language that promotes indoor water-conservation. The new language was incorporated into the water conservation webpage and recommends "low-flow" technologies during the building or retro-fitting of commercial and/or residential plumbing facilities. The City also provides tips on its website on how to conserve a limited water supply indoors, and at the same time protect valuable resources and save money. One of most important of these tips is early indoor leak detection.

3.8.8 Reclaimed Water for Irrigation

The City has maximized its use of the available reclaimed water as described in Section 3.9 below.

3.8.9 Regional and County-wide Issues

Collier County has a waiting list of customers for reuse water. To help meet the demand for reuse water the County is constructing an Aquifer Storage and Recovery Well field to store reuse water, mainly during the rainy season when the production of reuse water exceeds demand, and to recover the reuse water for distribution during periods of high demand for reuse.

Another program that may be developed is a Regional Irrigation Distribution System (RIDS) that would include both Collier and Lee Counties so that areas that have extra reuse can be connected to areas with a need for reuse.

The City has the potential to expand its raw water aquifer storage system to store up to 18 mgd of raw water during the rainy season. This would allow the City to sell the extra raw water directly to Collier County or into the RIDS system providing that the raw water is considered to be reuse water with minimal treatment such as chlorination.

3.8.10 Conservation Analysis

The City has promoted the elements described within the sections above and has been successful in maintaining reduced per capita usage rates since implementation of these components between 2005 and 2010. The conservation efforts initiated at the end of 2005 in single family homes reduced the MDD by an estimated 5 percent. Additional conservation measures initiated in March 2007 further reduced demand an estimated 1%. While these measures had an impact on the MDD, they had a minimal impact on the AADD. The estimated AADD for irrigation in 2008 was 1.16 mgd, or about 15% of the total annual water demand. Of this irrigation demand, approximately 67% occurs during dry months when block rates are most likely to limit irrigation use. The impact of the conservation measures on AADD are about 0.6%, or about 0.05 MGD. While this results in saving approximately 17MG of water each year, this is small relative to the overall water usage. The exceptional high use reviews that started in 2007 help eliminate increases in demand due to problems with irrigation systems.

The City uses 100% alternative water supplies and maximizes available reclaimed water for reuse in accordance with the LWCSP. The City's WCP meets the policies and guidelines of the SFWMD, LWCSP and Collier County. Given that the conservation measures have maintained reduced per capita usage, the City maximizes reuse, and uses 100% alternative water supplies that do not impact the regional issues, no additional conservation measures are planned within the upcoming 10-year planning period.

3.9 Reuse

The City has made a commitment to developing and building out the reclaimed/reuse irrigation capacities of the City's service area. The Marco Island Reclaimed Water Production Facility (RWPF) has a designed and permitted capacity of 4.92 MGD. Reclaimed water produced at this facility is primarily land applied on public access reuse irrigation sites. When reuse demand is less than the effluent flow, or reuse criteria are not met, the treated effluent is disposed of using the deep injection well system.

Since 2008, the City has expanded the annual reclaimed water produced at the RWPF ~~by approximately 343 MGY and reclaimed water sold by about 249 MGY.~~ Annual average production for the period between 2015 and 2023 was about 806 MGY, up from 673 MGY between 2008 ~~and~~to 2014 ~~indicates that~~. In 2023, the ~~system~~City produced ~~about 673 MGY~~ 824.7 MG of reclaimed water and utilized ~~about 87~~more than 93% of the produced reclaimed water. Only three of the City's reclaimed water users have agreements where volumes of reclaimed water are incorporated into the agreements. The agreement with Hideaway Beach Association is to provide them an annual average volume of 181,000 gallons per day (GPD). The Hammock Bay Association has an agreement that requires them to accept a minimum of 250,000 GPD and up to 500,000 GPD if it is available. The Island Country Club has in its agreement that they can take whatever volume they need up to the volume produced. This agreement has been in place since 1986.

The reclaimed water distribution system has not changed since 2008 when the City expanded the sewer system to include an additional 4,400 single family homes and 1,335 buildable vacant lots, providing the City with an estimated additional 10 million gallons per month (MGM) of reclaimed water. There are two distribution lines that leave the RWPF. The pipeline going north is 16-inch diameter with a capacity of 4.5 MGD that provides reclaimed water to customers north of the RWPF including the two largest users: the Island Country Club and Hammock Bay Country Club with an average daily flow of 250,000 to 300,000 GPD. The second pipeline is 20-inches in diameter with a capacity of 7 MGD and provides reclaimed water to customers south and west of the RWPF with an average daily flow of 1.0 to 1.5 MGD. There are no uncommitted supplies for Marco Island and additional expansion projects are being considered. All of the reclaimed water cannot be sold because during times of low demand the excess reclaimed water has to be disposed in the deep injection wells. ~~For example, in 2013, more rainfall occurred than recent years which caused a reduction in the demand for reclaimed water.~~

Marco Island has an extremely high population swing, from about ~~12,000 to 15~~18,000 in the summer months to about ~~38,000 to 40~~42,000 in the winter months. For example, during the low population months of May and June, there is high demand for reclaimed water but very low inflows of wastewater. In order to meet the demand for reclaimed water in these months, the RWPF takes raw water from the SWF site and puts it into the Chlorine Contact Chamber to produce the additional reclaimed water needed. For ~~2013~~2023, a total ~~47.8 million gallons~~122.5 MG of raw water was used ~~for this purpose at~~to supplement reclaimed water produced by the RWPF. The need to produce the additional reclaimed water from raw water demonstrates that there is no uncommitted supply of reclaimed water.

4. Capital Improvements

4.1 Capital Improvements Element

The City does not require capital improvements projects to achieve or maintain the current level of service that is adequate for the 10-year planning timeframe of this document as well as ultimate buildout of the utility in 2040. There are no anticipated large developments or expansion of the current Marco Island service area. Existing

drinking water source facilities, potable water treatment and reuse facilities are adequately sized for buildout and no expansion projects are planned within the 10-year planning timeframe of this document. Table 4.1 shows fully self-funded projects by the City related to the existing water source and treatment facilities.

4.1.1 Water Supply Projects

The water supply projects within the City's 5-year capital improvement plan (CIP) are standard ongoing maintenance and do not represent development of new sources or added capacity. The City allocated funding to continue ASR and MHA well maintenance within the renewal, replacement and improvement (RR&I) budget. The City allocated money for a replacement MHA well if needed within the capital improvements budget. Other capital improvements projects are maintenance and improvement projects including SWF pump house replacement, upsizing the SWTP raw water main between the farthest productive MHA wells to improve hydraulics, and SWF lakes maintenance. Continued similar maintenance and water quality improvement projects are anticipated for the 6 to10 year CIP cycle.

4.1.2 Treatment Projects

The City allocated funds within the RR&I and capital improvements budget for finished water quality improvement, reliability improvements, and maintenance projects. These projects do not represent expansion of existing treatment facilities that are adequate to maintain the current level of service through system buildout in 2040. Major projects include adding BAF pretreatment at the Marco Lakes SWF to reduce NWTP membrane fouling, to increase reliability and reduce operating cost, converting the NWTP process from lime softening to LPRO to improve finished water quality and reduce operating cost, and SWF pump house replacement to replace aging pumps. Continued similar maintenance and water quality improvement projects are anticipated for the 6 to10 year CIP cycle.

TABLE 4.1
Marco Island ~~2022~~2024 Capital Improvement Program 5-Year Capital Improvements Schedule Source Water Projects
2024 Marco Island Ten Year Water Supply Work Plan

RENEWAL REPLACEMENT & IMPROVEMENT (RR&I)	**FUNDING SOURCE**	**FY ~~22~~ 2024**	**FY ~~23~~ 2025**	**FY ~~24~~ 2026**	**FY ~~25~~ 2027**	**FY ~~26~~2028**	**TOTAL**
Meter Replacement	City RR&I Fund	$~~400~~800,000	$~~400~~800,000	$~~400~~800,000	$~~400~~800,000	$~~400~~800,000	**$~~2~~4,000,000**
RO Membrane Replacement	City RR&I Fund	$~~50~~75,000	$~~50~~75,000	$~~50~~75,000	$~~50~~75,000	$~~50~~75,000	**$~~250~~375,000**
Pump Improvements / Replacement Program	City Capital Reserve	$150,000	$150,000	$150,000	$150,000	$150,000	**$750,000**
Renewal & Replacement Water	City RR&I Fund	$450,000	$450,000	$450,000	$450,000	$~~450~~500,000	**$2,250,000**
Chemical Storage Tank Replacement Program	City Capital Reserve	$25,000	$25,000	$25,000	$25,000	$25,000	**$125,000**
NWTP Membrane Replacement	City RR&I Fund	$~~120~~100,000	$~~120~~100,000	$~~60~~100,000	$~~60~~100,000	$~~60~~100,000	**$~~420~~500,000**
Well Maintenance Program	City Capital Reserve	$300,000	$300,000	$300,000	$300,000	$300,000	**$1,500,000**
TOTAL RR&I		**$~~300~~1.900,000**	**$~~300~~1.900,000**	**$~~300~~1.900,000**	**$~~300~~1.900,000**	**$~~300~~1,950,000**	**$~~1,500~~9,550,000**

CAPITAL IMPROVEMENT PROJECTS	FUNDING SOURCE	FY 18-~~22~~ 24	FY ~~23~~ 2025	FY ~~24~~ 2026	FY ~~25~~ 2027	FY ~~26~~2028	TOTAL
Biologically Active Filters Pretreatment Upgrades	City Funded in FY22	$~~2,751,000~~5,444,368					**$2,751,000**
NWTP Conversion from Lime to LPRO Treatment	City Funded in FY18	$5,222,000					**$5,222,000**
~~Upsize Raw Water Piping from MHA wells 17 to 19~~	~~City Funded in FY22~~	~~$460,000~~	-	-	-	-	~~**$460,000**~~
SWF Lake Intake Screen~~SWTP RO Building Improvements~~	City Funded in ~~FY23~~FY25		$500,000				**$500,000**
~~Source Water Facility Lake Intake Debris Catchment~~SWTP Odor Control Replacement	City Funded in ~~FY23~~FY25		$~~170~~1,400,000				**$~~170~~1,400,000**
SWTP RO Building Improvements~~Sand Separator Replacement~~	City Funded in ~~FY23~~FY25		$~~400~~500,000				**$~~400~~500,000**
Source Water ~~Facility~~ Pumphouse Replacement	City Funded in ~~FY24~~FY25		$500,000	$~~500~~2,100,000	~~$2,200,000~~		**$2,~~700~~600,000**
~~SWTP Odor Control~~Sand Separator Replacement	City Funded in ~~FY24~~FY26			$~~700~~400,000	~~$700,000~~		**$~~1,~~400,000**
~~SWTP~~RO Well Replacement~~ of Old High Service Pump House~~	City Funded in ~~FY25~~FY26			$800,000	~~$300,000~~	~~$800,000~~	**$~~1,100~~800,000**
~~South Water Treatment Plant MHA Well Replacement~~	~~City Funded in FY25~~	-	-	-	~~$400,000~~	-	~~**$400,000**~~
~~SWF Lake Interconnect Improvements~~	~~City Funded in FY25~~	-	-	-	~~$150,000~~	-	~~**$150,000**~~
TOTAL CAPITAL IMPROVEMENTS		**$~~8,433,000~~10,666,368**	**$~~570~~2,900,000**	**$~~500~~3,300,000**	**$~~2,750,000~~0**	**$~~800,000~~0**	**$~~15,253~~14,173,000**

Source: Marco Island ~~2022~~2024 Capital Improvement Program

4.1.3 Reuse Projects

Reuse projects are not included within the 5-year CIP budget or 10-year planning timeframe. The City currently has built-out its sanitary sewer system on the island to maximize reuse. The current 13% unused reclaimed water is only available during the wet season. There is no unaccounted-for reclaimed water during the dry season that can be used for irrigation within the current reclaimed water system.

4.1.4 Conservation Projects

The City has incorporated ongoing drinking water meter replacement within the RR&I budget over the next 5 years. Meter replacement helps maintain accurate billing and prevents underbilling. Accurate billing promotes reduced water consumption when combined with the City's block rate billing structure. Other conservation projects are not included within the 5-year CIP budget or 10-year planning timeframe. The City has made changes to water rate structures, has implemented watering ordinances consistent with the FAC, and has incorporated demand reviews to encourage conservation that do not require capital improvements.

5. Goals, Objectives and Policies

The 2040 City of Marco Island Comprehensive Plan adopted October 4, 2021 includes several goals, objectives, and policies (GOPs) that apply to the source water and treatment facilities covered by this 10-year plan. GOPs related to the City's water supply needs are included within the Potable Water sub-element of the Infrastructure Element, the Intergovernmental Coordination Element, Future Land Use Element, and the Capital Improvements Element of the City's Comprehensive Plan as necessary to incorporate and provide reference to this Work Plan. These GOPs, listed below, are consistent with the elements of this 10-year plan as discussed within this section.

5.1 Infrastructure Element for Potable Water

The City's Comprehensive Plan includes the goals below for potable water supply. The City ~~is meeting~~needs to reassess these goals because the current source and treatment are not adequate to maintain the City's LOS through the 10 years of this plan and through buildout in 2040. The City is committed to implement capital improvement and RR&I projects to improve finished water quality, improve treatment efficiency, rehabilitate and maintain existing infrastructure, and improve overall reliability and operability. The upcoming biological filtration and LPRO improvements are examples of this commitment while maximizing the use of existing infrastructure per the GOPs below. The City continues to maintain a conservation plan and maximizes reuse to make efficient use of its existing water sources.

INFRASTRUCTURE ELEMENT GOAL 1 FOR POTABLE WATER: ***Assure a sufficient, dependable, and high-quality potable water supply to meet the needs of Marco Island on a timely basis, at a reasonable cost, and, at a minimum, complies with all federal and state requirements to protect the health and safety of the public.***

The City's Comprehensive Plan listed the following objectives with associated policies to meet this **Potable Water Infrastructure Element Goal 1**:

1. **OBJECTIVE 1.1:** The City shall locate and develop potable water supply sources to meet the future needs of the City, and as necessary to meet or exceed the minimum LOS Standards established by this Plan. The development and utilization of new potable water supply sources shall be based upon the information, guidelines and procedures identified within the City's Work Plan, the City's Utility Master Plan, and the LWC Supply Plan prepared by the SFWMD.

    a. **POLICY 1.1.1:** The City has developed and adopted a Ten-Year Water Supply Facilities Work Plan, (dated April ~~18, 2022~~XX, 2024) and authored by the City of Marco Island Utilities, in accordance with the Water Supply Guidelines of the South Florida Water Management District's Lower West Coast Water Supply Plan. The policies and recommendations are hereby incorporated by reference.

    b. **POLICY 1.1.2:** The City of Marco Island will require that public potable water facilities and services meet or exceed adopted LOS standards. The Work Plan should evaluate the existing and projected potable water LOS standard(s) based on the following:

        i. An identification of the existing standard(s) by service area and/or facility.

        ii. A comparison of the existing standard to current use and ensured consistency with LOS standard.

iii. The need for revising standards for residential uses and additional standards for nonresidential uses.

c. **POLICY 1.1.3/1.1.3.1:** The City shall continue to provide potable water facilities and services sufficient to accommodate and maintain projected growth and development through build-out. The City will apply concurrency with LOS standards when determining the issuance of building permits to ensure service is adequate and available.

2. **OBJECTIVE 1.2:** The City shall maximize the use of existing facilities and coordinate future expansion plans consistent with projected needs to accommodate development at the densities prescribed in the Future Land Use Plan Element, and consistent with the Capital Improvements Plan and the Work Plan.

   a. **POLICY 1.2.1:** Require that the Utilities produce an engineering report for all LOS-based potable water system expansion projects prior to the issuance of a Development Order, showing that the projects are consistent with this Objective.

   b. **POLICY 1.2.2/1.2.2.1:** Maximize the use of existing facilities prior to the expansion of potable water systems that are not in response to needs based on LOS standards. The City shall require new construction or redevelopment to connect to City Utilities.

   c. **POLICY 1.2.3:** The City will thoroughly review all potable water system expansion project proposals, which are not in response to need based LOS standards, to ensure that the project is designed to be consistent with development densities prescribed in the Future Land Use Map Plan, and to curtail the potential encouragement of urban sprawl due to over-sizing of facilities.

   d. **POLICY 1.2.4:** Should Collier County, as the supplier responsible for potable water services approach 80% of capacity in their adopted LOS standard during the five-year planning period, such entity is required to notify the City in writing or respond to the City's request for notification of status, as to how and when the water supplier will take action to increase capacity to ensure continued compliance with the adopted LOS.

3. **OBJECTIVE 1.3:** The City will investigate, support and encourage efforts to reduce the use of potable water for household and non-household consumptive uses, such as golf course irrigation or lawn watering.

   a. **POLICY 1.3.1:** The City will continue to implement a conservation program and maintain quarterly monitoring reports to track water usage. The water conservation program includes block rates for single and multi-family homes and a program to track and mitigate exceptionally high-water users.

   b. **POLICY 1.3.2:** The City will regularly review and revise, as necessary, the landscape ordinance to incorporate best practices and encourage the use of native and drought tolerant plants permitted in conjunction with new development.

   c. **POLICY 1.3.3:** The City will regularly review and revise, if necessary, the amount of pervious surface area required for new development.

   d. **POLICY 1.3.4:** The City may continue the installation of reclaimed water facilities to plan for cost-effective services to consumers.

e. **POLICY 1.3.5:** The City may allow for the continued expansion of storage and distribution facilities for reclaimed water to commercial and residential properties in an effort to reduce the use of potable water for irrigation purposes.

f. **POLICY 1.3.6:** The City will continue irrigation restrictions consistent with the City's Code of Ordinances. The City will consider modification of restrictions as appropriate and necessary to coordinate with the South Florida Water Management District's water conservation initiatives and requirements that are consistent with the City's interests.

4. **OBJECTIVE 1.4:** The City will ensure thoughtful, thorough, pre- and post-storm planning to ensure minimal disruption in service to customers.

    a. **POLICY 1.4.1:** To plan for essential information concerning plans in the event of a storm event, the City will offer essential information in order to maintain and update the City's Comprehensive Emergency Management Plan.

    b. **POLICY 1.4.2:** The City will seek full recovery of service within two (2) weeks of any category 3 hurricane for 80% of their customers on Marco Island.

5. **OBJECTIVE 1.5:** The City will implement and update its Work Plan every five years consistent with water supply sources identified within and in coordination with the SFWMD's LWC Supply Plan.

    a. **POLICY 1.5.1:** The City shall participate in the planning process with SFWMD with the objective to assist in the development of a regional water supply plan that will reasonably assure adequate quantity and quality of potable water resources needed to meet future demands without creating water use conflicts or unacceptable impacts to natural resources.

5.2 Intergovernmental Coordination Element

The City's comprehensive plan includes the following GOPs for intergovernmental coordination related to water supply with their associated objectives and policies. The City is meeting these GOPs through continued coordination with the County to maintain adequate LOS to the County's consumers within the City's distribution system. The City is also currently coordinating with the County to incorporate land development protections for the City's SWF including both upstream surface water within Henderson Creek, and underground impacts to the City's ASR wells. The city is regularly updating its Comprehensive Plan and this 10-year plan to comply with the GOPs of the ~~LWC supply plan~~LWCSP, FAC, and SFWMD CUP requirements. These GOPs continue to be appropriate for maintaining and protecting the City's potable water LOS.

EXISTING INTERGOVERNMENTAL COORDINATION ELEMENT GOAL 1: ***Coordinated and cooperative long-range planning plan for the delivery of excellent services to the residents of Marco Island through intergovernmental coordination amongst all agencies, which includes making decisions affecting growth management and planning, transportation, essential services, natural resources, emergency management, and education.***

The City's Comprehensive Plan listed the following objectives with associated policies to meet this **Intergovernmental Coordination Element Goal 1**:

1. **OBJECTIVE 1.1:** The City shall maintain effective and efficient communication and working relationships with Collier County, the City of Naples and other special districts, agencies and units of governments identified to be active in the City.

    a. **POLICY 1.1.4:** Marco Island will coordinate with partner agencies to develop procedures and protocol for the exchange of information and data in order to leverage available resources and foster a collaborative approach to addressing regional issues.

    b. **POLICY 1.1.5:** For Collier County or any other public facility providing water, sewer, or transportation, within Marco Island and for which the City does not have responsibility, the City will participate in establishing LOS with the entity that has operational and maintenance responsibility for that facility and adopt such standard(s) into the Comprehensive Plan and appropriate City plans and documents.

    c. **POLICY 1.1.6:** The City shall regularly review the Comprehensive Plan to determine if memorandums of understanding or other interlocal agreements are needed with adjacent jurisdictions or other agencies.

    d. **POLICY 1.1.7:** Where appropriate, the City Council will execute memorandums of understanding or other interlocal agreements with adjacent jurisdictions or other agencies in order to ensure coordination and formalize responsibilities.

    e. **POLICY 1.1.8:** The City will monitor updates to Florida Statutes on an annual basis relating to intergovernmental coordination to ensure the intergovernmental planning process maintains internal consistency and conforms with state and regional goals and objectives.

INTERGOVERNMENTAL COORDINATION ELEMENT GOAL 2: ***Coordinate the plans and policies of the City and adjacent local governments to plan for the delivery of adequate and appropriate public facilities, infrastructure, and natural resource protection.***

The City's Comprehensive Plan listed the following objectives with associated policies to meet this **Intergovernmental Coordination Element Goal 2**:

1. **OBJECTIVE 2.5:** The City shall ensure the coordination of the Comprehensive Plan with the ~~LWCSP~~LWC Supply Plan, approved pursuant to Sec. 373.0361 FS

    a. **POLICY 2.5.1:** Participate in the water supply planning process in conjunction with the SFWMD and other pertinent entities with the objective to assist in the development of a regional water supply plan that will reasonably ensure adequate quantity and quality of potable water resources needed to meet future needs.

    b. **POLICY 2.5.2:** The City will maintain a water supply facilities work plan by updating the adopted Ten Year Water Supply Facilities Work Plan within 18 months of an update to the regional Water Supply Plan.

c. **POLICY 2.5.3:** The City will participate in water supply development-related activities, such as coordinating. meetings, educational programs, or other collaborative policy development activities as may be facilitated by the SFWMD that affect the City.

2. **OBJECTIVE 2.7:** Protect natural resource systems both internal to the City and those that cross governmental boundaries through a coordinated approach with partner agencies.

    a. **POLICY 2.7.1:** The City shall participate with adjacent governmental and non-governmental natural resource protection agencies, including local, state and federal environmental agencies, in regularly conducted natural resource protection staff intergovernmental coordination meetings.

    b. **POLICY 2.7.2:** To plan for increased protection of natural resource systems which cross government boundaries, the City shall continue to participate with other governments to prepare and implement water management plans, including the Water Management District Surface Water Improvement and Management (SWIM) plans, FDEP Aquatic Preserve Management Plans, water supply plans, and other water resource management plans.

    c. **POLICY 2.7.3:** The City shall re-evaluate its policies for protecting and enhancing natural resources upon a review of natural resource management plans that are newly adopted or revised by other partner agencies for consistency and to facilitate implementation

    d. **POLICY 2.7.4:** The City shall continue to pursue efforts to coordinate with Collier County, the South Florida Water Management District, and other participating agencies to implement a plan for surface water management in the Rookery Bay Watershed.

3. **OBJECTIVE 2.8:** The City shall maintain coordination with other units of local government and other entities providing utility services to its residents.

    a. **POLICY 2.8.1:** The City shall coordinate with Collier County Utilities to ensure provision of acceptable levels of potable water service.

    b. **POLICY 2.8.2:** The City shall evaluate current mechanisms used for intergovernmental coordination and determine the need to increase intergovernmental coordination activities regarding the delivery of potable water services between Collier County Utilities and Marco Island Utilities.

    c. **POLICY 2.8.3:** City will evaluate the need for Interlocal Agreements and amendments to existing agreements with adjacent local governments, as necessary, to formalize processes and procedures for the coordinated delivery of services.

5.3 Capital Improvements Element

The City's comprehensive plan included one goal within its Capital Improvements Element related to water supply with their associated objectives and policies. Section 4 shows that the City is meeting the GOPs within this section of the City's comprehensive plan by maintaining facilities and improving reliability to maintain the current LOS through the next 10 years and through buildout in 2040.

CAPITAL IMPROVEMENTS ELEMENT GOAL 1: ***The City will plan for and maintain public facilities and services to serve the needs of both existing and future populations through a financially sound and efficient Capital Improvements Program.***

The City's Comprehensive Plan listed the following objectives with associated policies to meet this **Capital Improvements Element Goal 1**:

1. **OBJECTIVE 1.1:** Pursuant to adopted LOS as described in the Concurrency Management System (CMS), the City will fund and implement those capital projects necessary to ensure that facilities and services provided by the City of Marco Island will be in place to accommodate projected growth and development in five-year increments.

    a. **POLICY 1.1.1:** The Five-Year Capital Improvements Schedule (CIS) of the Capital Improvements Plan is the primary implementation mechanism for the LOS standards adopted in the Comprehensive Plan. Chapter 163, F.S. requires the CIS to be annually updated and adopted as simple non-text amendment by ordinance of the City Council or as a text amendment to the Comprehensive Plan that must follow the procedures of Chapter 163.3184, F.S.

    b. **POLICY 1.1.2:** City Council will prioritize capital improvement projects on an annual basis to ensure that all CMS deficiencies, if any, are prioritized, properly funded and resolved in advance of actual need.

    c. **POLICY 1.1.3:** In conjunction with the Annual LOS Report, the City will establish maintenance guidelines and criteria to ensure that existing systems continue to function at or above adopted LOS standards.

    d. **POLICY 1.1.4:** The City shall renew, expand, or replace such facilities on a planned and prudent basis to ensure that all systems continue to function at or above adopted LOS standards, or where proportionate fair share payments are committed in accordance with the Florida Statutes.

    e. **POLICY 1.1.5:** The City shall annually prepare and adopt by ordinance a Capital Improvements Program showing all public facility development projects to be undertaken during the ensuing five-year period. The City shall also annually review this Capital Improvements Element.

2. **OBJECTIVE 1.2:** Establish, monitor, and maintain the following LOS standards to outline the basis for facility planning and design, setting impact fees, and for the operation of the Concurrency Management System (CMS).

    a. **POLICY 1.2.1:** The adopted LOS standard for potable water will be ~~200~~220 gallons per capita per day including the seasonal population.

3. **OBJECTIVE 1.3:** To ensure that public facilities are provided in conformance with the City's adopted LOS standards, the City shall adopt, maintain, and enforce a Concurrency Management System (CMS).

    a. **POLICY 1.3.1:** The City shall enforce its LOS standards for potable water, sanitary sewer, solid waste, and drainage facilities under the concurrency requirements of Florida law upon development orders or building permits which may cause the LOS to fall below the City's adopted minimum LOS for that facility by issuance of certificate of occupancy. Consistent with

Section 163.3180(2), F.S., prior to approval of a building permit or its functional equivalent, the local government shall consult with the applicable water supplier to determine whether adequate water supplies to serve the new development will be available no later than the anticipated date of issuance by the local government of a certificate of occupancy or its functional equivalent.

5.4 Future Land Use Element

The remaining 1,400 (estimated) vacant lots for single family homes and 400 condominium units represent the vast majority of the future demand for potable water. The existing facilities address the expected potable water demand for build-out of the City at the level of service specified within the City's comprehensive plan. Therefore, there will not be a need to further expand the water supply and treatment facilities within the 10-year timeframe of this work plan and through buildout of the Island in 2040.

5.5 Conserve Potable Water Resources

5.5.1 Reducing Salinity Increase within the MHA Wellfield

Over the past 10 years, the City has expanded the membrane filtration system at the NWTP to allow more reliable and consistent operation near the facility's 6.7 mgd rated capacity. The use of the more readily renewable surface water source has reduced the annual average production of the SWTP to less than 2 mgd. The reduced pumping of the MHA wellfield that serves the SWTP has stopped the previously observed salinity increase within the wells.

5.5.2 Maximizing Reuse

The City has implemented infrastructure over the past 15 years to maximize the use of reuse water to offset potable water for irrigation. The sanitary sewer system within the City's service area is built-out, producing up to 4.92 mgd of reclaimed water for irrigation that was previously supplied by potable water. Expansion of the reclaimed water distribution system in 2009 saved more than 0.5 mgd of average annual daily potable water demand. The City currently makes use of 87% of the available reclaimed water for irrigation, with the remaining amount injected into the City's deep injection disposal well during the rainy season when demand for reclaimed water is low. The City has no unaccounted-for reclaimed water during moderate and peak irrigation periods.

5.5.3 Increasing Capture of Renewable Rainwater for Treatment

The City has installed infrastructure to increase the capture of rainwater each year during the rainy season for storage in the ASR wells. The added ASR capacity has allowed the expansion of the NWTP membrane filtration system to reliably treat consistently more than 6 mgd of the renewable surface water and reduce the need for pumping from the MHA wells on the island.

5.5.4 Conservation Programs

The City has implemented conservation programs consistent with the ~~LWC Supply Plan~~LWCSP and SFWMD guidance. Conservation measures include implementing irrigation restrictions in accordance with the requirements of Chapter 40E-24, Florida Administrative Code (F.A.C.)., instituting block rates that increase unit cost for water at higher usage rates, requiring the use of low-flow technologies in new construction or renovated

commercial or residential construction, exceptional high use monitoring, and maximizing reclaimed water for irrigation.

5.6 Coordination with the ~~LWC~~Lower West Coast Supply Plan

The City is currently using alternative water sources for both the NWTP surface water supply and the SWTP MHA brackish water supply. The use of ASR to help maintain the MFL of Henderson Creek and reduced pumping of the MHA to prevent additional saltwater intrusion into the aquifer are both consistent with the goals of the ~~LWC Supply Plan~~LWCSP.

6. References

1. Marco Island Water Treatment Facilities 2011 Capacity Analysis Report, January 5, 2012
2. Marco Island Water Treatment Facilities 2021 Capacity Analysis Report Update, June 4, 2021
3. 2040 Comprehensive Plan, City of Marco Island, Adopted October 4, 2021
4. 2017 SFWMD Lower West Coast Water Supply Plan Update, December 2017
5. SFWMD Website
6. City of Marco Island Comprehensive Plan Update Assessment Report, September 29, 2020
7. SFWMD Applicants Handbook for Water Use Permit Applications, September 7, 2015

7. Definition of Acronyms

AWWA	American Water Works Association
AADD	Annual Average Daily Demand
ADD	Average Daily Demand
AG	Agricultural
ASR	Aquifer Storage & Recovery
BAF	Biologically Active Filtration
CMS	Concurrency Management System
CUP	Consumptive Use Permit
DEO	Department of Economic Opportunity
ERC	Equivalent Residential Connection
FDEP	Florida Department of Environmental Protection
F.S.	Florida Statutes
GPD	Gallons per Day
GPM	Gallons per Minute
GST	Ground Storage Tank
HSPS	High Service Pump Station
IAS	Intermediate Aquifer System
LOS	Level of Service
LPRO	Low Pressure Reverse Osmosis
LWC	Lower West Coast
LWCSP	Lower West Coast Supply Plan
MDL	Maximum Developable Limits
MG	Million Gallons

MGY	Million Gallon per Year
MDD	Maximum Daily Demand
MMADD	Maximum Monthly Average Day Demand
MGD	Million Gallons per Day
MFH	Multifamily Home
MHA	Mid-Hawthorn Aquifer
NGVD	National Geodetic Vertical Datum
NWTP	North Water Treatment Plant
PMFS	Pall Membrane Filtration System
PPM	Parts Per Million
PWS	Public Water Supply
RIDS	Regional Irrigation Distribution System
RO	Reverse Osmosis
RWSP	Reclaimed Water Production Facility
RWSP	Regional Water Supply Plan
SAS	Surficial Aquifer System
SFH	Single Family Home
SFWMD	South Florida Water Management District
SWF	Source Water Facility (Marco Lakes facility)
SWTP	South Water Treatment Plant
TOC	Total Organic Carbon
UFA	Upper Floridan Aquifer
WTP	Water Treatment Plant
WUP	Water Use Permit

Appendix A. Additonal Information

1. Marco Island Conservation Plan
2. Marco Island Ordinance 20-02 – Update to Conservation Landscape Irrigation Regulations
3. Marco Island Resolution 10-20 – Resolution Establishing Restrictions on the Days and Hours of Landscape Irrigation
4. Marco Island Utility Rate Schedule