CITY OF MARCO ISLAND

RESOLUTION 08-39

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MARCO ISLAND, FLORIDA APPROVING AND ADOPTING A TEN YEAR WATER SUPPLY FACILITIES WORK PLAN (THE "PLAN"); AUTHORIZING STAFF TO UPDATE THE PLAN EACH YEAR AS PART OF THE BUDGET PROCESS; AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, in 2005 the Florida Legislature amended Sections 163.3180 and 163.3177, Florida Statutes, to require the preparation and completion of a Ten Year Water Supply Facilities Work Plan, as a means to foster greater coordination between water supply and land use planning; and

WHEREAS, the City's Public Works Department has prepared a Ten Year Water Supply Facilities Work Plan following consultation and coordination with staff of the South Florida Water Management District and City staff; and

WHEREAS, the City of Marco Island Ten Year Water Supply Facilities Work Plan contains proposed goals and objectives in accordance with state law and also serves as the supporting documentation and analysis for several proposed amendments to the City of Marco Island Comprehensive Plan; and

WHEREAS, the Marco Island Planning Board has reviewed the proposed Ten Year Water Supply Facilities Work Plan at a public hearing and has recommended that the City Council approve the Plan; and

WHEREAS, the City Council of the City of Marco Island, Florida, hereby finds adoption of the Plan will be in compliance with state law and in the best interest of the public health, safety and welfare of the citizens.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF MARCO ISLAND, FLORIDA, AS FOLLOWS:

SECTION 1. Recitals.

The foregoing "Whereas" clauses are hereby ratified and confirmed as being true, correct and incorporated into this Resolution.

SECTION 2. Adoption.

The City of Marco Island Ten Year Water Supply Facilities Work Plan, attached as Exhibit "A" to this Resolution, is hereby adopted and staff is

authorized to update the Plan annually in accordance with the adopted annual budget without the need for further approval of amendments to the Plan from City Council.

SECTION 3. Effective Date. This Resolution shall take effect immediately upon adoption.

The foregoing Resolution was adopted this 6th day of October, 2008.

Attest:

CITY OF MARCO ISLAND, FLORIDA

By: _____
Laura M. Litzan, City Clerk

By: _____
William D. Trotter, Chairman

(SEAL)

Reviewed for legal sufficiency:

By: _____
Alan L. Gabriel, City Attorney

EXHIBIT A

City of Marco Island

Ten Year Water Supply Facilities Work Plan

Public Works Department

July 17. 2008

1.0 INTRODUCTION

The purpose of the City of Marco Island (the City) Water Supply Facilities Work Plan (hereinafter the Work Plan) is to identify and plan for the water supply sources and facilities needed to serve existing and new development within the local government's jurisdiction. Chapter 163, Part II, F.S., requires local governments to prepare and adopt Work Plans into their comprehensive plans within 18 months after the water management district approves a regional water supply plan or its update.

Residents of the City of Marco Island obtain their water directly from Marco Island Utilities which is responsible for ensuring that enough capacity is available for existing and future customers.

The City's Water Supply Facilities Work Plan (hereinafter the Work Plan) will reference the initiatives identified in the South Florida Water Management District's Lower West Coast Water Supply Plan. 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.

The City's Work Plan is divided into five sections:

Section 1 – Introduction
Section 2 – Background Information
Section 3 – Data and Analysis
Section 4 – Work Plan Projects/Capital Improvement Element/Schedule
Section 5 – Goals, Objectives, Policies

1.1 Statutory History

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

1.2 Statutory Requirements

The following highlights the statutory requirements:

1. Coordinate appropriate aspects of its comprehensive plan with the appropriate water management district's regional water supply plan, [163.3177(4)(a), F.S.]

2. Ensure that its future land use plan is based upon availability of adequate water supplies and public facilities and services, [s.163.3177(6)(a), F.S., effective July 1, 2005.] Data and analysis demonstrating that adequate water supplies and associated public facilities will be available to meet projected growth demands must accompany all proposed Future Land Use Map amendments submitted to the Department for review. The submitted package must also include an amendment to the Capital Improvements Element, if necessary, to demonstrate that adequate public facilities will be available to serve the proposed Future Land Use Map modification.

3. Ensure that adequate water supplies and facilities area available to serve new development no later than the date on which the local government anticipates issuing a certificate of occupancy and consult with the applicable water supplier prior to approving building permit, to determine whether adequate water supplies will be available to serve the development by the anticipated issuance date of the certificate of occupancy. [s.163.3180(2)(a), F.S., effective July 1, 2005.] This "water supply concurrency" is now in effect, and local governments should be complying with the requirement for all new development proposals. In addition, local governments should update their comprehensive plans and land development regulations as soon as possible to address these statutory requirements. The latest point at which the comprehensive plan must be revised to reflect the concurrency requirements is at the time the local government adopts plan amendments to implement the recommendations of the Evaluation and Appraisal Report (EAR).

4. For local government subject to a regional water supply plan, revise the General Sanitary Sewer, Solid Waste, Drainage, Potable Water, and Natural Groundwater Aquifer Recharge Element (the "Infrastructure Element"), within 18 months after the water management district approves an updated regional water supply plan, to:

    a. Identify and incorporate the alternative water supply project(s) selected by the local government from projects identified in the updated regional water supply plan, or the alternative project proposed by the local government under s. 373.0361(7), F.S. [s. 163.3177(6)(c), F.S.];

    b. Identify the traditional and alternative water supply projects, bulk sales agreements, and the conservation and reuse programs necessary to meet current and future water use demands within the local government's jurisdiction [s. 163.3177(6)(c), F.S.]; and

    c. Include a water supply facilities work plan for at least a 10-year planning period for constructing the public, private, and regional water supply facilities identified in the element as necessary to serve existing and new development. [s. 163.3177(6)(c), F.S.] Amendments to incorporate the water supply facilities work plan into the comprehensive plan are exempt from the twice-a-year amendment limitation. [s. 163.3177(6)(c), F.S.]

5. Revise the Five-Year Schedule of Capital Improvements to include any water supply, reuse, and conservation projects and programs to be implemented during the five-year period.

6. To the extent necessary to maintain internal consistency after making changes described in Paragraph 1 through 5 above, revise the Conservation Element to assess projected water needs and sources for at least a 10-year planning period, considering the appropriate regional water supply plan, the applicable District Water Management Plan, as well as applicable consumptive use permit(s). [s.163.3177(6)(d), F.S.]

   If the established planning period of a comprehensive plan is greater than ten years, the plan must address the water supply sources necessary to meet and achieve the existing and projected water use demand for established planning period, considering the appropriate regional water supply plan. [s.163.3167(13), F.S.]

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

8. Address in the EAR, the extent to which the local government has implemented the 10-year water supply facilities work plan, including the development of alternative water supplies, and determine whether the identified alternative water supply projects, traditional water supply projects, bulk sales agreements, and conservation and reuse programs are meeting local water use demands. [s.163.3191(2)(1), F.S.]

2.0 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 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 building 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 gate 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 2,000 vacant building lots for single family homes. The current population is approximately 15,000 permanent residents and a peak population (i.e., residents, non-residents and workers) in February and March of approximately 40,000 permanent and part-time residents, and workers (see Exhibit 2). The principal growth in population will occur from the building of single family homes. At build out the peak population that occurs in February and March is estimated to reach 46,000.

In 2008, an evaluation of existing gross acreage by land uses revealed that 3,451 acres or 47.4% of the total gross acreage in the city is dedicated to residential use. The remaining gross acreages are allocated to non-residential such as commercial and office (3.3%); government (0.1%); institutional (1.0%); utilities (0.3%); recreation/conservation (47.6%). The City does not anticipate substantial 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 10 to 20 years, as the city's remaining vacant single family residential lots (2,097) develop as planned.

2.2 Relevant Regional Issues

As the state agency responsible for water supply in the Lower West Coast planning area, the South Florida Water Management District (SFWMD) plays a pivotal role in resource protection, through criteria used for Consumptive Use Permitting.

The City relies on two raw water sources, both of which are just upstream from the Gulf of Mexico (i.e., no down gradient users). One raw water source is surface water from Marco Lakes (Lakes) located 8 miles north of Marco Island. The principal source of water for the Lakes is Henderson Creek which travels south along the east boarder of the Lakes is the principal source of water for the Lakes. A half mile past the Lakes, Henderson Creek flows over a weir at Route 41 into a salt water stream that flows into the Gulf of Mexico. The Lakes is the source of water for the North Water Treatment Plant (NWTP) on Marco Island The second raw water source is from wells on Marco Island that recover brine (i.e. water with salt levels of 5,000 to 18,000 pounds of dissolved salt per million pounds of water [ppm]) from the mid Hawthorne formation for treatment in the City's Reverse Osmosis Plant (a.k.a the South Water Treatment Plant [SWTP]).

Proper management of withdrawals of raw water at locations upstream from the sources of raw water for the City is needed to insure that the allocation of raw water for the City is available to meet future needs. In particular, development located along Henderson Creek upstream from Marco Lakes must not allow contaminants to degrade the quality of the water.

3.0 DATA AND ANALYSIS

3.1 Population Information

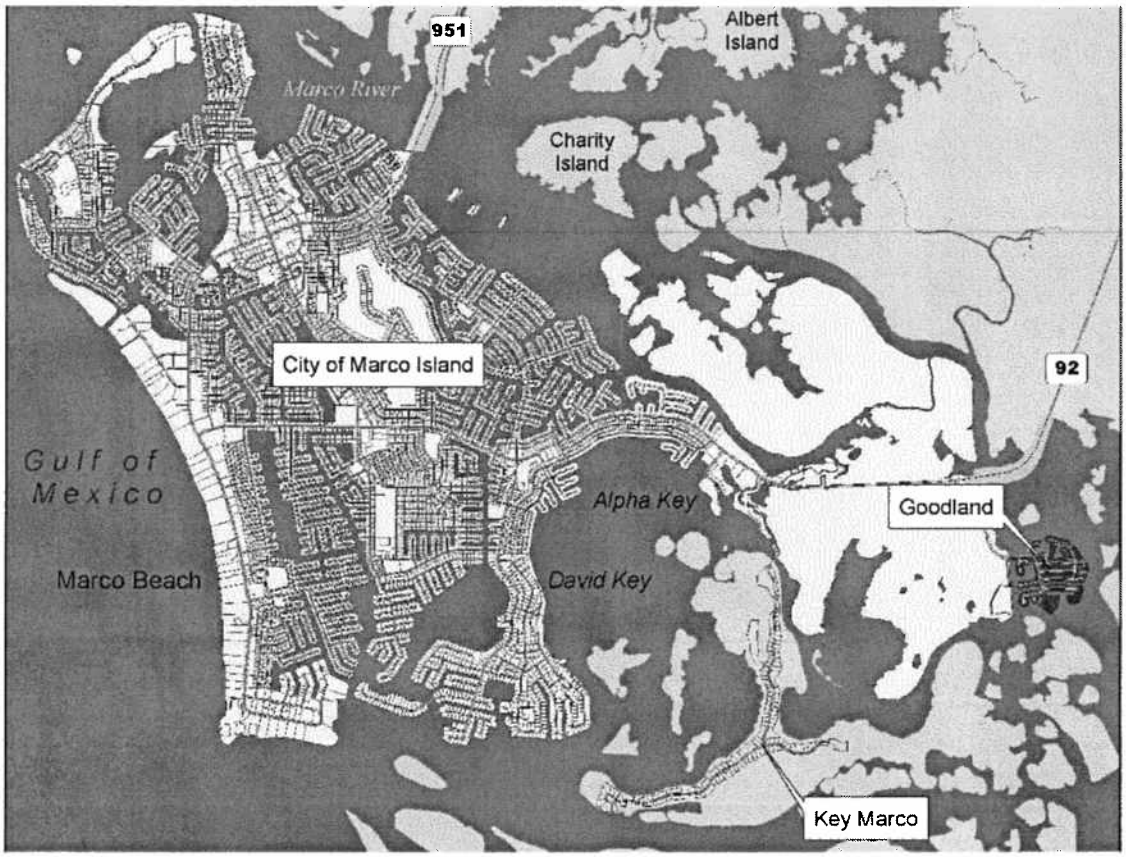
The City's existing and future population figures are derived from the City's Community Development Department and the University of Florida Shimberg Center. Between 1990 and 2000, the City's permanent population grew from 9,773 to 14,879, an increase of fifty-two percent. By 2010, the City's population is anticipated to increase to 16,315; 2015 to 17,338; and 2025 to 19,187 (represents an increase of twenty-eight percent over the 2000 population). This relatively 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 limited amount of remaining vacant and developable land.

3.2 Maps of Current and Future Areas Served

The MIU water service area includes all of the incorporated City of Marco Island except Key Marco. Marco Island has an inter-local Agreement with Collier County for bulk sale of potable water. The County distributes the water through direct sale customers in Goodland and Key Marco. Exhibit 1 shows the Marco Island drinking water service area.

EXHIBIT 1
MIU Drinking Water Service Area

Source: Marco Island Utilities 2007 Capacity Analysis Report



The Marco Island drinking water service area contains a mix of single family users, multi-family homes, planned unit developments (PUD), commercial users, institutions, recreational connections, hotels and government facilities.

The City's service area also includes Marco Shores which is located two miles north of Marco Island. The City has an inter-local Agreement with Collier County to purchase all the potable water to service Marco Shores.

3.3 Potable Water Level of Service Standard

The level-of-service is 200 gallons per day per person. The peak population on the island is expected to increase from 39,825 to 45,998 at build out (see Exhibit 2). 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. The current maximum water production is 12.7 mgd. Peak day demand in 2007 was 12.49 million gallons per day (mgd) and is expected to increase to about 13.5 million at build out.

With the planned increase of 1.67 mgd (possibly to 2 mgd) of capacity at the NWTP the total plant capacity will increase to 14.4 to 14.7 mgd which is sufficient to meet future peak demand. In addition a new 4 million gallons potable water storage tank at the NWTP is due to be online by the end of 2008. This will bring the total potable water storage capacity to 10.5 million gallons which will provide additional storage for a peak demand day.

With supplies of water sufficient to meet future demand and existing and planned expansion of treatment capacity there is no need to revise the level-of-service for residential and non-residential customers.

3.4 Population and Potable Water Demand Projections

Exhibit 3 shows the current and projected service connections in the Marco Island drinking water service area by connection type.

EXHIBIT 2
Marco Island Drinking Water Service Area Land Use and Peak Season Population
From Marco Island Utilities 2007 Capacity Analysis Report

Land Use	2006 Units	2006 Population[1]	Build Out Units	Build Out Population[1]
Single Family	6,671	12,506	8,839	16,722
Multi-Family	10,297	18,232	10,713	19,283
Commercial	2,636	4,634	2,636	5,535
Institutional	21	37	21	42
Recreational	113	113	113	113
Hotel / Timeshare	2,033	4,299	2,033	4,299
Government	2	4	2	4
Total	21,773	39,825	24,357	45,998

[1]Population during peak season that results in maximum day demand

EXHIBIT 3

2008-2017 Marco Island Projected Water Service Area Demands

From Marco Island Water Treatment Facilities 2008 Capacity Analysis Report

Year	Avg. Day Water Demand	Max Day Water Demand
2008	8.28	12.01
2009	8.35	12.10
2010	8.48	12.30
2011	8.62	12.50
2012	8.76	12.70
2013	8.89	12.89
2014	9.03	13.09
2015	9.16	13.29
2016	9.28	13.46
2017	9.33	13.53

3.5 Water Supply Provided by City of Marco Island

The City of Marco Island Utilities Department (MIU) maintains and operates two water treatment plants on Marco Island that are permitted with the Florida Department of Environmental Protection (FDEP) under PWS ID. Number: 5110183. The two plants are the North Water Treatment Plant (NWTP) that lime softens and filters raw water from Marco Lakes surface water supply and the South Water Treatment Plant (SWTP) that desalts brackish groundwater using reverse osmosis (RO). The permitted production capacity of the NWTP is 6.67 mgd and the permitted capacity of the SWTP is 6.0 mgd, for a total system production capacity of 12.67 mgd. The sources of raw water for both of these plants are described in the next two sections and then descriptions of the plants are presented.

Our surface water supply is more reliable than the brackish well water supply. Over the next five years, additional surface water treatment capacity will be added to meet future demand and supplement the reduction of brackish well water use.

3.5.1 Raw Water Sources and Consumptive Use Permit (CUP)

The water use permit (WUP) #11-00080-W for Marco Island lists three raw water sources: fresh surface water from Marco Lakes; recovered water from aquifer storage and recovery (ASR) wells located next to Marco Lakes; brackish groundwater from the Mid-Hawthorn Aquifer well field on Marco Island. Marco Lakes receives it water from Henderson Creek. The permit expires on February 8, 2016.

The WUP annual allocation from all three sources (Marco Lakes, ASR well field, Mid-Hawthorn well field) is 4,535 MG, or an average of 12.42 mgd. The maximum month withdrawal limit for direct use from Marco Lakes and the brackish well field is 381 MG, or an average of 12.7 mgd (30-day month). ASR well recovered water can be used to supplement these maximum month withdrawals as needed, but is specifically limited on an annual basis to 1,600 MG.

The raw water for the NWTP is supplied from Marco Lakes and the ASR wells, while the SWTP uses the raw brackish water from the Mid-Hawthorn well field.

3.5.2 NWTP Raw Water Supply

The Marco Lakes raw water facility is located 8-9 miles north of the NWTP and includes the following major components:

- Two Lakes (A & B)
- A connection to Henderson Creek that is controlled by a sluice gate that can be opened to allow additional creek water into the lakes from June 1 to November 30 if Henderson Creek is above +3.5 NGVD. This additional water is used exclusively for ASR storage. The ASR well storage water is not separately limited by annual or monthly allocations.
- One 500,000-gallon ground storage tank (GST) for on-site storage of raw or recovered ASR water
- An ASR system, including seven (7) ASR wells, each with an injection capacity of 1.5 mgd per well (10.5 mgd total), and each with a dedicated pump capable of recovering and sending 1.5 mgd per well (10.5 mgd total) to the GST.
- Two 5,000 gpm (14.4 mgd total) vertical turbine raw water transfer pumps that can transfer raw water from the lake to the GST.
- Two 3,100 gpm (8.93 mgd total) vertical turbine raw water transfer pumps that can transfer raw water from the lakes to the GST or to the ASR system. MIU intends to replace these pumps with larger pumps to meet the full injection capacity of the ASR system. Pump replacement is planned for 2009.
- Five high pressure centrifugal raw water pumps with a total capacity of 23,900 gpm that can transfer raw water from the GST to the NWTP. The total firm capacity of the pumps is 19,375 gpm (27.9 mgd). However, the maximum velocity and pressure drop in the transmission main limits the maximum raw water flow to the NWTP to about 10.5 mgd.

The WUP has a specific annual withdrawal limit of 1,935 MG (5.3 mgd annual average) from Marco Lakes for direct transfer to the NWTP. In addition, there is a specific annual withdrawal limit of 1,600 MG from the ASR wells. ASR withdrawals are typically made in the dry season between December 1 and May 31. This is equivalent to an average withdrawal of 8.79 mgd during that 182 day period.

The ASR wells are used to provide a year-round water supply by storing large quantities of Marco Lakes water during the wet season, when water is plentiful, for later recovery during the dry season when water is limited. The two-3,100 gpm raw water pumps discharge into a

header that runs through the ASR well field. The wells are designed to take in up to 1.5 mgd each (up to 10.5 mgd total). Due to the size of the pumps, the maximum injection rate is currently about 8.9 mgd. MIU is permitted to inject water into the ASR wells from June 1 to November 30 (183 days) if and when the elevation of Henderson Creek is above +3.5 ft NGVD. At 10.5 mgd, the maximum storage capacity of the ASR wells during each wet season (183 days from June 1 to November 30) is about 1,920 MG.

The 20.2 mgd of raw water transfer pumps, 27.9 mgd of raw water high service pumps, 10.5 mgd ASR well capacity, and 9.0 mgd average annual water use permit are more than adequate to supply the 6.67 mgd of feed water needed for the existing NWTP. Discussed below are expansion plans for the NWTP that will include the need for up to 1.67 mgd of additional feed water. The Marco Lakes system will also be able to supply the required 8.3 mgd of water for the expanded facility without additional expansion.

3.5.3 SWTP Raw Water Supply

The raw brackish water for the RO system at the SWTP is supplied by a Mid-Hawthorn aquifer brackish well field with 17 operating wells. RO Wells 1 and 4 are located at the SWTP; RO Wells 5, 7, 8 and 10 are north of the plant; and RO Wells 11 through 21 are east of the site. RO Wells 3, 6 and 9 have been permanently closed because of high salinity and RO Well 2 is out of service because of high turbidity and sever damage and is expected to be permanently closed in the near future. Exhibit 6 shows the rated capacity of each of the operating brackish wells. The total capacity of the operating wells with the largest well out of service is 9.871 mgd, which is more than the 8.0 mgd needed to feed the SWTP and produce 6.0 mgd, its permitted capacity, at 75% recovery of raw water as RO permeate.

The existing water use permit allows MIU to withdraw up to 1,460 MG annually (4.0 mgd annual average) from the mid-Hawthorn aquifer system. This results in 1,095 MG (3.0 mgd annual average) of finished water at an RO recovery of 75%. The highest monthly withdrawals occur during the dry winter season when the SWTP operates near its maximum permitted capacity.

The 9.871 mgd firm capacity of the existing brackish well field is more than sufficient to meet the feed water needs of the SWTP running at capacity, and the well field will not require capacity expansion in the near future. MIU will only need to drill new wells to replace existing wells that experience salinity increases that make them unsuitable to feed the RO WTP.

The existing water use permit allows MIU to withdraw up to 1,460 MG annually (4.0 mgd annual average) from the mid-Hawthorne aquifer system. The SWTP operates an RO system at 75 percent recovery which results in 1,095 MG (3.0 mgd annual average) of the water becoming fresh finished water while the rest is discharged to a deep injection disposal well. Most of the permitted brackish water withdrawal occurs during the dry season when the SWTP treats the maximum permitted capacity of 6.0 mgd to meet maximum day demands.

EXHIBIT 6
SWTP Brackish Well field Summary
Source: Marco Island Utilities 2008 Capacity Analysis Report

Name/Location of Well	Source Aquifer	Receiving WTP	Design Capacity of Well Pump (MGD)
RO well 1	Mid-Hawthorn	MIU RO Plant (SWTP)	0.691
RO well 2	Mid-Hawthorn	MIU RO Plant (SWTP)	0
RO well 3	Mid-Hawthorn	MIU RO Plant (SWTP)	0
RO well 4	Mid-Hawthorn	MIU RO Plant (SWTP)	0.216
RO well 5	Mid-Hawthorn	MIU RO Plant (SWTP)	0.446
RO well 6	Mid-Hawthorn	MIU RO Plant (SWTP)	0
RO well 7	Mid-Hawthorn	MIU RO Plant (SWTP)	0.698
RO well 8	Mid-Hawthorn	MIU RO Plant (SWTP)	0.648
RO well 9	Mid-Hawthorn	MIU RO Plant (SWTP)	0
RO well 10	Mid-Hawthorn	MIU RO Plant (SWTP)	0.605
RO well 11	Mid-Hawthorn	MIU RO Plant (SWTP)	0.792
RO well 12	Mid-Hawthorn	MIU RO Plant (SWTP)	0.756
RO well 13	Mid-Hawthorn	MIU RO Plant (SWTP)	0.792
RO well 14	Mid-Hawthorn	MIU RO Plant (SWTP)	0.612
RO well 15	Mid-Hawthorn	MIU RO Plant (SWTP)	0.432
RO well 16	Mid-Hawthorn	MIU RO Plant (SWTP)	0.691
RO well 17	Mid-Hawthorn	MIU RO Plant (SWTP)	0.634
RO well 18	Mid-Hawthorn	MIU RO Plant (SWTP)	0.691
RO well 19	Mid-Hawthorn	MIU RO Plant (SWTP)	0.634
RO well 20	Mid-Hawthorn	MIU RO Plant (SWTP)	0.634
RO well 21	Mid-Hawthorn	MIU RO Plant (SWTP)	0.691
Total Capacity	Mid-Hawthorn	MIU RO Plant (SWTP)	**10.663**

The 9.871 mgd firm capacity of the existing brackish wellfield is sufficient to meet the feedwater needs of the SWTP and will not require capacity expansion in the near future. MIU will only drill new wells as needed to replace existing wells that experience salinity increase to the point they are no longer useful. The WUP allows for withdrawal of 4.0 mgd annual average of raw water that can produce 3.0 mgd of finished water. This allocation of

raw water is sufficient to meet the operation of the SWTP which is used primarily in the dry season to meet peak demands.

3.5.4 Summary of Raw Water Supply to Meet Demand

The water use permit allows a total of up to 381 MG of surface and brackish water to be withdrawn in the maximum demand month, or 12.3 mgd average during a 31-day month. In 2007, the maximum demand month was April, when an average of 9.72 mgd was used in the Marco Island service area. The projected maximum monthly average demand at build out is 11.4 mgd. Assuming 8.0 mgd of brackish water is withdrawn during this month, yielding 6 mgd of finished water at the SWTP, then 4.3 mgd of Marco Lakes water and 1.1 mgd of ASR withdrawals would be needed to completely meet this demand, which is within the design capabilities of those source water facilities.

The Marco Island maximum day demand in 2007 was 12.49 mgd and the maximum day demand at build out is projected to be 13.5 mgd. There is no limit on maximum day well withdrawals. In order to produce 13.5 mgd, the maximum day withdrawal would need to be about 15.5 mgd, which would be met with 8.0 mgd from the brackish wells (which will produce 6 mgd of potable water) and 7.5 mgd from a combination of Marco Lakes water and ASR water, which is also within the design capabilities of the existing source water facilities. Due to the degradation of the brackish water wells, and additional 2-4 mgd of surface water treatment will be added.

3.5.5 Treatment, Storage and Pumping Facilities

Marco Island North Water Treatment Plant

The Marco Island North Water Treatment Plant (NWTP) is located at Elkcam Circle and Windward Drive on the north end of Marco Island as shown in Exhibit 6. Marco Lakes, located nine miles north of Marco Island, provides raw surface water to the NWTP. The permitted capacity of the NWTP is 6.7 mgd and is typically operated near this capacity year-round with the SWTP used for peaking. Approximately 3.8 mgd of the NWTP finished water is distributed by local high service pumps to the north side of Marco Island. The remaining 2.9 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.

NWTP Treatment Process

The NWTP is a conventional lime softening and filtration facility that uses a lime softening reactor/clarifier followed by a combination of rapid sand filtration and membrane filtration. Lime and alum are added to the reactor/clarifier to remove TOC, color, hardness and alkalinity from the water. The sand filters and membrane filters both 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.

NWTP Finished Water Storage Requirements

The NWTP has three 0.5 MG finished water storage tanks (1.5 MG total capacity). The NWTP needs finished water storage for the following purposes:

- To attenuate diurnal peaks (~700,000 to ~1,000,000 gallons)
- Fire flow storage (840,000 gallons)
- Disinfection contact time for Giardia (260,000 to 560,000 gallons) and viruses (additional 340,000 to 600,000 gallons)

The City of Marco Island is currently adding a 4,000,000-gallon storage tank and a 9,900 gpm pump station (expandable to 13,300 gpm) to the NWTP to increase total finished water storage capacity up to 5.5 MG to meet upcoming increasing diurnal and disinfection requirements. A total finished water storage capacity of 2,160,000 gallons (3,000,000 gallons with fire flow) will be needed to meet 2016 finished water demands using the current NWTP treatment process at the anticipated future WTP production of 8.33 mgd (see planning for expansion section). The expanded finished water storage facilities will be more than adequate to meet build-out storage demands. The sections below describe in more detail the finished water storage requirements.

The total storage volume required to meet the four-hour fire flow demand is 840,000 gallons when using the conservative AWWA rates. This fire flow storage requirement can be met using a combination of storage at the NWTP and SWTP.

The NWTP has six existing high service pumps with a total firm pumping capacity of 8,600 gpm with the largest pump out of service. The existing high service pumps meet the current peak hourly flow requirement.

The anticipated peak hourly demand will increase as finished water flow increases and as the NWTP is expanded. A maximum firm high service pumping capacity of 9,900 gpm will be needed to meet 2016 projected peak hourly demands at the NWTP. The City of Marco Island is currently adding three 3,300 gpm high service pumps with room for a fourth 3,300-gpm pump at the NWTP. These new pumps plus the existing high service pumps, which will function as backup, will ensure that the NWTP can meet current and future peak hourly finished water demand through build-out.

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 2.9 mgd of finished water from the NWTP for blending and distribution at the SWTP. Raw water is provided to the facility by 18 brackish wells located in the central and eastern portion of the island as shown in Exhibit 4.

SWTP Treatment Process

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 transfer 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 being upgraded annually.

SWTP Finished Water Storage Requirements

Finished water is stored in two 2.0 MG tanks and one 1.0 MG storage tank (5.0 MG total capacity). MIU needs finished water storage at the SWTP for the following purposes:

- To attenuate diurnal peaks (~1,300,000 to ~2,500,000 gallons), and
- Fire flow storage (840,000 gallons)

A total finished water storage capacity of 2,500,000 gallons (3,340,000 gallons with fire flow) will be needed to meet 2016 finished water demands using the current SWTP treatment process. The existing 5 MG of finished water storage at the SWTP is more than adequate to meet diurnal and fire flow storage needs through build-out but not to meet the redundancy capacity required. An additional 2 MG finished water storage tank will be added to the SWTP by 2012. The sections below describe in more detail the finished water storage requirements.

The SWTP has eight existing high service pumps with a firm capacity of 13,300 gpm. The existing high service pumps meet the current peak and future anticipated hourly flows.

3.5.6 Interlocal Agreements

Interlocal Agreement to Sell Water

Marco Island Utilities (MIU) 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 December 20, 2006 to December 19, 2007 a total of 66,681,200 gallons of water was sold to Collier County. Goodland has only a limited number of available lots for new homes and Key Marco has 110 vacant lots for new homes. Using an estimate for the number of additional Equivalent Residential Connections (ERCs) for the additional homes and multiplying it by 440 gallons per day (gpd) per ERC (i.e., the value for Marco Island), the average daily flow at build out is estimated at 271,000 gallons. Assuming the ratio of maximum daily flow to average daily flow of 1.44 for Marco Island is applicable to Goodland and Key Marco, the maximum daily flow at build out would be 391,000 gpd. The Interlocal Agreement has a maximum monthly limit (i.e., no daily limit) of 30,000,000 gallons of potable water. The planned expansion of the water treatment could provide up to 1,000,000 gpd but the physical reality of the demands of the communities should not even reach half of that value.

Interlocal Agreements to Buy Water from Collier County

MIU and Collier County has an Interlocal Agreement that went into effect in August 2007 where Collier County sells potable water to MIU for distribution to its customers along Mainsail Drive (2 miles north of Marco Island) in the area known as Marco Shores. The annual average daily flow is about 100,000 gallons/day (gpd). As the Marco Shores area is further developed it is expected that the flow will increase to an annual daily average of

about 190,000 gpd within the next ten years. This assumes that the two additional high rise condominiums (with approximately 224 units) permitted for the area will be built and fully occupied within the next ten years.

3.5.7 Treatment and Distribution Losses

Treatment Losses at NWTP

The NWTP losses of raw water 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 80,000 gpd from the blowdown stream that is sent to the wastewater plant from the Zenon filtration system.

Treatment Losses at SWTP

The SWTP operates at 72 to 75% recovery efficiency depending on the salinity of the raw water and age of the membranes. With an annual average daily production of 2.96 million gpd results in a daily loss of raw water of approximately 1,000,000 gpd.

3.6 Water Supply Provided by Other Entities

The area of Key Marco is within the city limits of the City of Marco Island. However, the distribution of water is within the service area of Collier County. The water distributed by Collier County is part of the approximately 66,800,000 gallons per year sold to Collier County by the City for distribution to Goodland and Key Marco (see Section 3.5.6).

3.7 Conservation

3.7.1 Countywide Issues

Collier County has a waiting list of customers for reuse water. To help meet the demand 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.

3.7.2 Local Government Specific Actions, Programs and Regulations

To conserve potable water used for irrigation the City has instituted three programs to help single family and multi-family units to reduce potable water for irrigation.

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. If the potable water exceeded the block rate (i.e., the allowable volume of water at the lowest dollars/1000 gallons) the cost of water increases as each block is exceeded. This has caused homeowners to carefully monitor their irrigation systems so that they do not exceed the block with the lowest rates.

Block Rates for Potable Water for Multifamily (Condo)

In March 2007 the City initiated block rates for multifamily units (i.e., includes condominiums). The block rates 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. For example if a facility has a 2-inch irrigation meter the lowest block rate is for up to 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 irrigation the area in which case that site would be assigned a larger quantity of water for the lower block rate. This program is expected to reduce the amount of potable water used for irrigation.

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 Reuse

3.8.1 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 a 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 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 Marco Island Utilities (MIU) 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 MIU 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.

Local Government Specific Actions, Programs and Regulations

Expanded Reuse

The City is currently connecting 5,593 single family home sites (with about 4,400 existing home) to the sanitary sewer system. At this time 1,705 of the sites have had the sewer lines brought tot heir site. Within the next five years the remaining homes will have sewer lines to their sites. To accommodate the additional wastewater flow the City is expanding and upgrading the wastewater treatment plant. The additional wastewater will become a source of additional reuse water which will result in a reduction is potable water used for irrigation. Two additional projects due for completion this summer include adding an additional 500,000 gallons of storage for reuse water and expansion of the reuse piping system to connect all the condominiums south of Winterberry Drive along Collier Boulevard to the reuse system

At the present time, an average annual flow of 0.48 mgd (0.56 mgd max day) of potable water is used for irrigation by condominiums on or near the existing reuse water main. MIU is currently planning to connect these condominiums to the reuse system and add 500,000 gallons of reuse water storage to reduce the drinking water demand. Currently, there is insufficient reuse water available to meet the additional 0.56 mgd peak day reuse irrigation demand from these additional condominium irrigation systems. As the connection of single family homes to the sanitary sewer is completed, additional reuse water will be available for these additional customers. Exhibit 7 shows the impact of the reduced drinking water demand from converting these condominiums to reuse.

Exhibit 8 also shows additional potential reduction of drinking water demand by conversion of additional irrigation systems on Marco Island to reclaimed water. The total drinking water flow is reduced by the total amount of reclaimed water projected on average and on peak days.

EXHIBIT 7

Marco Island Service Area 2008-2017 Projected Water Demands

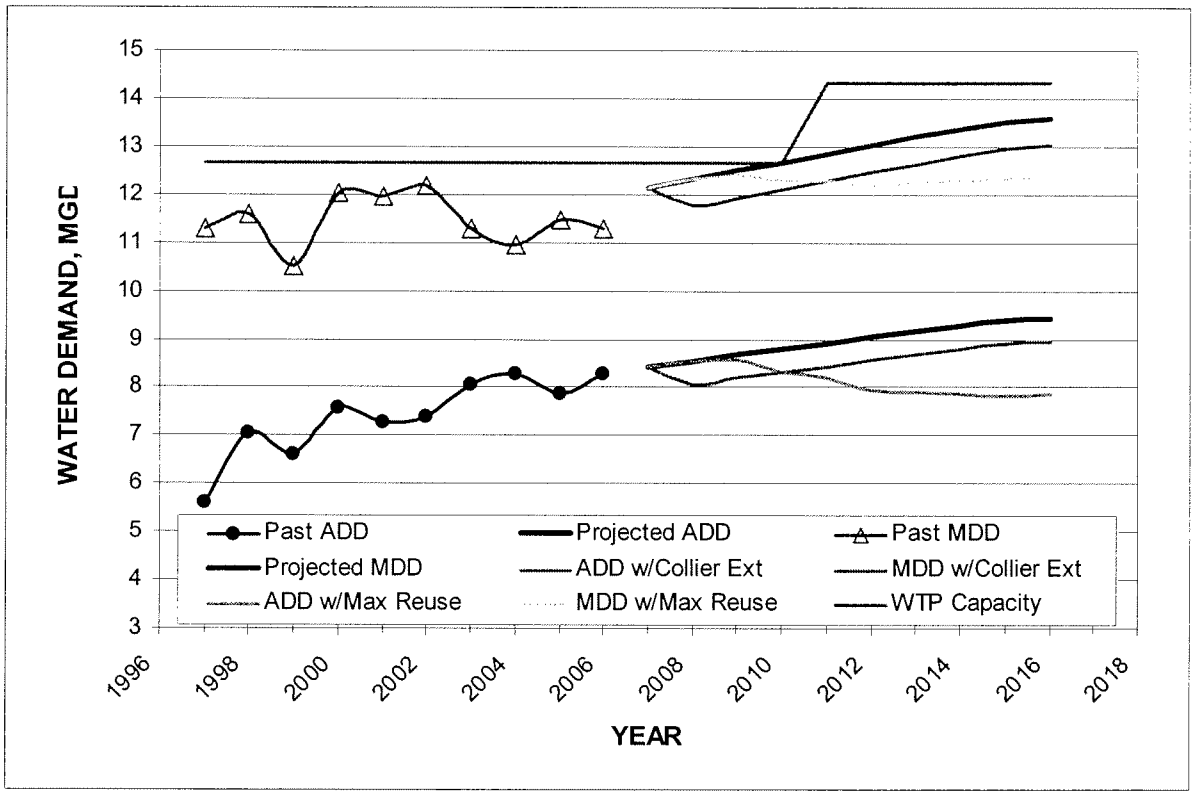
Marco Island Water Treatment Facilities 2008 Capacity Analysis Report

Year	Projected ADD (mgd)	Projected MDD (mgd)	Adjusted ADD[1] with Condo Reuse (mgd)	Adjusted MDD[1] with Condo Reuse (mgd)
2008	8.28	12.01	8.28	12.01
2009	8.35	12.10	8.27	12.02
2010	8.48	12.30	8.00	11.92
2011	8.62	12.50	8.14	11.94
2012	8.76	12.70	8.27	12.13
2013	8.89	12.89	8.41	12.33
2014	9.03	13.09	8.54	12.53
2015	9.16	13.29	8.68	12.72
2016	9.28	13.46	8.80	12.90
2017	9.33	13.53	8.85	12.97

[1]Adjusted for planned expansion of the existing reuse system to include condominiums that currently use drinking water for irrigation. Adjusted ADD and MDD flows are based on measured flows from 2004-2006 irrigation flow meters.

EXHIBIT 8
MIU PAST AND PROJECTED SERVICE AREA DEMANDS

Source: Marco Island Utilities 2007 Capacity Analysis Report



4.0 Capital Improvements

4.1 Capital Improvements Element

The Capital Improvements Element of the City's Comprehensive Plan includes a financially feasible list and description of the planned projects that will result in an expansion of the reuse water and potable water production, storage and distribution facilities necessary to meet the demands of the City of Marco Island through build out.

4.2 Work Plan Projects

MIU has several projects underway or planned to increase potable water production, storage and distribution. The NWTP has two major projects that will increase raw water treatment capacity and increase the storage and distribution of potable water. The source of raw water for the increase in treatment will come from future expansion of the Aquifer, Storage and Recovery System.

MIU is beginning the third year of a seven year program to extend sanitary sewers to the 5,635 single family building lots (with approximately 4,400 existing homes) that were not

originally connected to the sanitary sewer system. Of the approximately 3,230 single family building lots originally connected to the sewer system there are approximately 700 vacant lots. As the City completes the sewer project over the next five years the 4,400 homes will produce upwards of 700,000 gpd (during season) of wastewater that can be treated to make reuse. In addition, as the City approaches build out the additional new homes will produce upwards of 300,000 gpd (during season) of wastewater that can be treated to make reuse. The other planned projects are associated with the production of additional reuse from the increase in wastewater generated, increased storage of reuse, and expansion of the reuse piping to add additional customers to the reuse system. The potable water that is saved by the increase in reuse will partially offset the demand for potable water as the City approaches build out.

4.2 Expansion of the NWTP

The Lime Softening equipment at the NWTP is currently approved and permitted at the design capacity of 6.67 mgd. One option being developed is to add 2 mgd of direct membrane filtration capacity to the NWTP, which will increase the permitted capacity of the NWTP to 8.33 mgd, and the total capacity of both WTP facilities to 14.33 mgd. At build out and after a WTP expansion to 14.33 mgd, the projected MDD of 13.53 mgd will be 95 percent of the WTP capacity. The projected MDD will be reduced to 91 percent of the total WTP capacity once the reuse system is expanded in 2008 as planned.

4.3 Upgrading the Distribution System

The growth of the Island has resulted in areas that are currently served by undersized pipes. These pipes will be replaced by larger pipes. In addition, much of the old water system was installed utilizing Asbestos Concrete Pipe. This old system will be replaced. This will be accomplished over the next 10 years.

5.0 GOALS, OBJECTIVES AND POLICIES

Goals, Objectives, and Policies related to the City's water supply needs are included within the Potable Water sub element of the Infrastructure Element, the Intergovernmental Coordination Element, the Future Land Use Element, the Conservation and Coastal Management Element, and the Capital Improvements Element of the City's Comprehensive Plan as necessary to incorporate and provide reference to this Ten Year Water Supply Facilities Work Plan.

Land Uses and Future Land Use Changes

The remaining 2,000 (estimated) vacant lots for single family homes represent the overwhelming future demand for potable water. The limited remaining lots for condominiums and commercial businesses would only be a small fraction of the potable water demand by the new homes. The project currently underway and those to be constructed address the expected potable water and reuse water demand for build out of the City. Therefore, it is unlikely that there will be a need to further modify the water supply and treatment facilities in the current work plan.

Conserve Potable Water Resources

The brine recovered from the wells that supply the SWTP (i.e., Reverse Osmosis Plant) is of limited supply. As the well field is continually pumped at a high rate the salt concentrations have risen in the old wells to over 20,000 ppm, rendering these wells of no value. Three wells have already be taken out of service and plugged. A fourth well (the second oldest well) is also out of service and expected to be plugged. There is only space for a few new wells to replace those taken out of service. To preserve the well field it is necessary to reduce the total annual pumping rate so the rate of increase in the salt content of the brine is reduced and hopefully stopped. MIU is planning to maximize the use of reuse water, and to increase the capture rain water each year during the rainy season for storage in the ASR wells. The additional rain water captured will allow expansion of the NWTP and preserve the brine well field.

References

1. Marco Island Utilities, 2003-2006 Monthly Operating Reports, Marco Island, FL.
2. Marco Island Utilities, 2005 Analysis of Approved Development Plans to Build Out, Excel file "All-Residential WW-rev 4-li (2).xls", Marco Island, FL.
3. City of Marco Island, 2000 Service Area Boundary Map, Marco Island, FL.
4. Marco Island Utilities, Source Water and Water Treatment Master Plan, Marco Island, FL.