

Marco Island Utilities Water Treatment Facilities 2007 Capacity Analysis Report

PREPARED FOR: Marco Island Utilities

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The City of Marco Island Utilities Department (MIU) maintains and operates two water treatment plants 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 2006 maximum day demand of the Marco Island service area was 11.28 mgd, or 89 percent of the total system production capacity of 12.67 mgd. The FDEP began requiring capacity analysis reports (CAR) on August 28, 2004 for water systems where the total maximum-day quantity of finished water produced by all treatment plants connected to a water system exceeds 75 percent of the total permitted maximum-day operating capacity of the plants. Due to the high maximum day demand compared to treatment capacity, MIU has been required to submit an updated CAR annually since the FDEP rule was implemented.

The required CAR evaluates the capacity of source, treatment, and storage facilities connected to a water system and contains the following information:

- The capacity of each water treatment plant's source water facilities and treatment facilities; the permitted maximum-day operating capacity and, if applicable, permitted peak operating capacity of each plant; and the useful capacity of each finished-water storage facility;
- The maximum-day and annual average daily quantities of finished water produced by each plant during each of the past ten years or during each of the years the plant has been in operation, whichever is less;
- Projected total water demands – total annual average daily demand and total maximum-day demand including fire-flow demand – for at least the next ten years and projected total finished-water storage need including fire storage for at least the next ten years;
- An estimate of the time required for maximum-day water demand including fire-flow demand to exceed the total permitted maximum-day operating capacity of the plants

and an estimate of the time required for finished-water storage need including fire storage to exceed the existing total useful finished-water storage capacity;

- Recommendations for new or expanded source, treatment, or storage facilities; and
- A recommended schedule showing dates for design, permitting, and construction of recommended new or expanded source.

This updated MIU Water Treatment Facilities CAR evaluates the existing capacity of Marco Island water system's source water, treatment, and storage facilities relative to past and anticipated future drinking water demand. This CAR also discusses potential expansion of existing facilities to reliability meet the projected MIU service area drinking water demands through 2016. WTP operating data through December 2006, previous capacity analysis reports, updated residential and commercial water connection data, population projections, and planned reuse system expansion plans have been utilized to write this report.

Development planning information was obtained from MIU and the City of Marco Island Public Works Department. WTP facilities design and operating capacity information was obtained from the 2006 CAR and other available technical reports.

The updated 2007 MIU Water Treatment System CAR is being submitted within one year of the 2006 MIU Water Treatment System CAR and meets the requirements of the Florida Administration Code (FAC) Section 62.555.348 "Planning for Expansion of Public Water System Source, Treatment, or Storage Facilities".

Marco Island Drinking Water Service Area

The MIU water service area includes all of the incorporated City of Marco Island and Key Marco. Marco Island has an interconnect with the Goodland service area which is currently supplied by Collier County. However MIU has never used this interconnect and there are no plans for adding the Goodland service area to the Marco Island water system. Exhibit 1 shows the Marco Island drinking water service area.

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. Exhibit 2 shows the current and projected service connections in the Marco Island drinking water service area by connection type.

More than 95 percent of the lots on Marco Island have been developed leaving minimal future expansion of irrigation systems using drinking water. A significant number of the residential units remain vacant during the peak season which has made the peak season population 85percent of build out. Some increase in demand will be realized by the eventual increase in residential unit occupancy, however domestic use is relatively small compared to irrigation use. Future increase in drinking water demand will not be significant as shown in the future demand section below.

EXHIBIT 1
 MIU Drinking Water Service Area
Marco Island Utilities 2007 Capacity Analysis Report



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

Land Use	2006 Service Connections	2006 Population ¹	Build Out Service Connections	Build Out Population ¹
Single Family	8,171	12,506	8,296	17,422
Multi-Family	6,424	14,107	6,840	14,364
PUD	2,354	4,125	2,354	4,945
Commercial	2,636	4,634	2,636	5,535
Institutional	21	37	21	42
Recreational	113	113	113	113
Hotel	2,047	4,299	2,047	4,299
Government	2	4	2	4
Total	21,768	39,825	22,250	46,724

¹Population during peak season that results in maximum day demand

Marco Island Raw Water Supply

The raw water for the MIU water treatment facilities come from two sources; one source is fresh surface water from Marco Lakes and the other source is brackish groundwater from a wellfield on Marco Island. The NWTP uses lime softening to treat up to 6.67 mgd of the fresh surface water source, while the SWTP uses RO to treat up to 6.0 mgd of the brackish water source. As further explained in the following sections, the existing raw water pumping facilities and water use allocations are adequate to meet current and future planned WTP feed requirements.

NWTP Raw Water Supply

The Marco Lakes raw water facility is located approximately 9 miles north of Marco Island and includes the following major components:

- Marco Lakes (A & B)
- An interconnection to Henderson Creek that is controlled by a sluice gate that can be opened to allow overflow of creek water into the lakes
- Seven ASR wells with an inflow capacity of 3.0 mgd per well (21.0 mgd total) and discharge flow of 1.5 mgd per well (9.0 mgd total).
- One 500,000-gallon storage tank
- Nine pumps that can transfer up to 20.2 mgd of raw water from the lakes to local storage, to the NWTP or to the ASR wells.

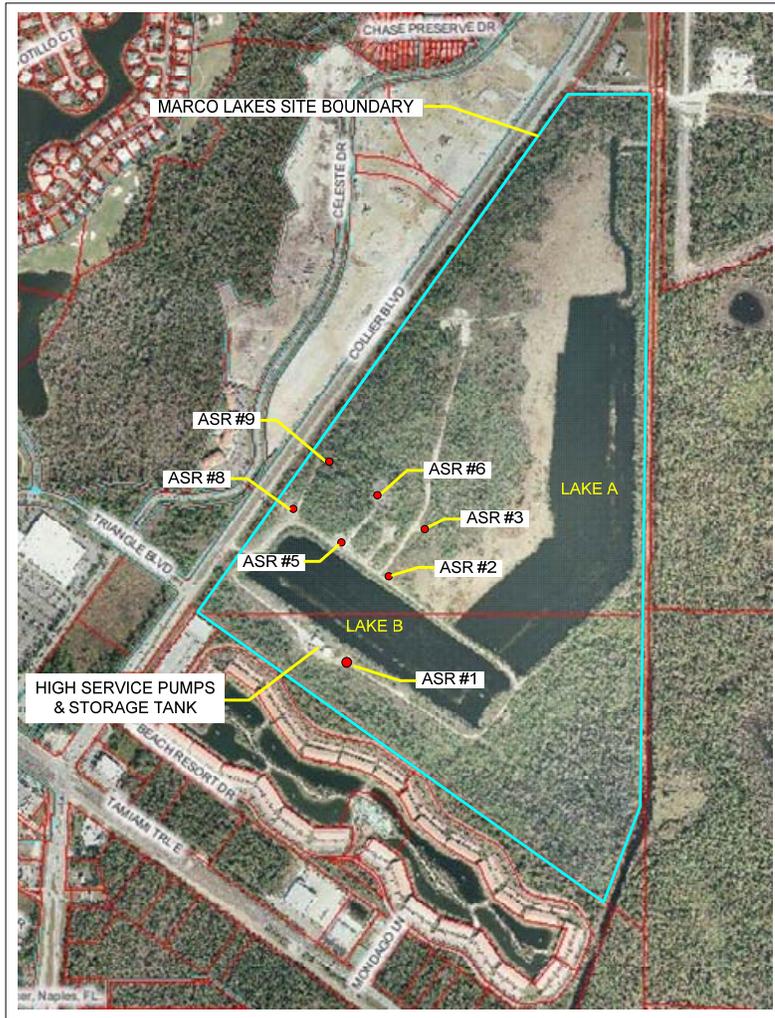
Exhibit 3 shows the layout of the Marco Lakes raw water facility including the layout of the lakes, Henderson Creek interconnect, ASR wells, storage tank and raw water pump station.

The ASR wells provide year-round water supply by allowing storage of large quantities of water during the wet season when water is plentiful for later withdrawal during the dry season when water is limited. The raw water pumps can inject up to 3.0 mgd into each ASR well (up to 21.0 mgd total) for storage during the wet season. MIU can inject water into the ASR wells a maximum of 120 days per year or as the lake levels allow. The maximum that may be injected in the ASR wells is 2,520 MG, however the normal injected volume is closer to 2,100 MG due to limited water availability (low lake levels).

The raw Marco Lakes water is stored in a deep otherwise unused aquifer to minimize groundwater flow of the fresh water away from the well. The ambient water in the target aquifer is higher-density brackish water that helps keep stratification of the different water qualities and minimize mixing of the water. The injected raw water creates a bubble of fresh water that can be recovered later by pumping the aquifer. Even with careful selection of an aquifer that has minimal flow and mixing characteristics, only approximately 70 percent of the injected water is recoverable as fresh water before exceeding drinking water standards for TDS and chloride. The available stored water therefore is approximately 1,470 to 1,765 MG annually depending on lake levels.

EXHIBIT 3

MIU NWTP Marco Lakes Raw Water Source and ASR Site
Marco Island Utilities 2007 Capacity Analysis Report



Each of the seven ASR wells can discharge 1.5 mgd (10.5 mgd total) of the stored water during the dry season to supplement raw water pumping from the lake. The aquifer therefore holds approximately 140 to 170 days of storage at the peak discharge flow of 10.5 mgd when accounting for the 70 percent recovery of the stored water. The current water use permit limits ASR withdrawal to 1,600 MG per year (152 days at 10.5 mgd maximum flow).

The existing water use permit allows MIU to withdraw up to 1,935 MG of water annually from Marco Lakes (5.3 mgd annual average) for direct transfer to the NWTP. In addition, Marco Island can withdraw up to 1,600 MG (4.38 mgd annual average) from the ASR wells. Off-island golf courses use approximately 250 MG of the raw water annually (1 mgd peak flow during dry season) for irrigation. The amount of water therefore available for treatment is 3,285 MG annually (9.0 mgd annual average).

The 20 mgd of pumping from the lakes and 10.5 mgd of pumping from the ASR wells is more than adequate to supply the 7.0 mgd of feedwater needed for the NWTP. The 9.0 mgd of available raw water also exceeds the 7.0 mgd of feedwater needed for the NWTP. Discussed below are expansion plans for the NWTP that will include the need for up to 2.0 mgd of additional feedwater. The Marco Lakes will also be able to supply the required 9.0 mgd of water for the expanded facility without additional future expansion.

SWTP Raw Water Supply

The NWTP is supplied by a Mid-Hawthorne aquifer brackish wellfield that includes 18 wells that are located on the SWTP site, run north from the SWTP along Bald Eagle Dr, and run east from the SWTP along US 92 as shown in Exhibit 4. MIU has decommissioned three of the wells (#3, #6 & #9) due to increasing salinity in the Mid-Hawthorne aquifer. Sites have been reserved for future expansion of the wellfield by three additional wells (#19 - #21) in the event that additional wells are lost to higher salinity. Exhibit 5 shows the rated capacity of each of the brackish water wells. The total capacity of the wells with the largest well out of service is 8.5 mgd, which is more than the 8.0 mgd needed to feed the NWTP at the 6.0 mgd peak production capacity.

EXHIBIT 4

MIU SWTP Brackish Wellfield Layout

Marco Island Utilities 2007 Capacity Analysis Report



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.

The capacity of the existing brackish wellfield is sufficient to meet the feedwater needs of the SWTP and will not require 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.

EXHIBIT 5

SWTP Brackish Wellfield Summary

Marco Island Utilities 2007 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)	0.547
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

Water Treatment, Storage and Pumping Facilities

MIU owns and operates two water treatment plants that are permitted with the Florida Department of Environmental Protection (FDEP) under PWS ID. Number: 5110183. The two plants are the NWTP that lime softens and filters raw water from Marco Lakes surface water supply and the SWTP that desalts brackish groundwater using 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.

Marco Island Lime Softening Water Treatment Plant (NWTP)

The Marco Island Lime Softening Water Treatment Plant (NWTP) is located at Elkcam Circle and Windward Drive on the north end of Marco Island as shown in Exhibit 4. 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 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 NWTP storage tanks will need expansion 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 sections below describe in more detail the finished water storage requirements.

Diurnal Peak Attenuation

An analysis of the diurnal flows from the existing NWTP high service pumps shows that on the current maximum flow day, there is an approximate 700,000-gallon drop in finished water storage tank level during the peak demand time between midnight and noon. This diurnal deficit may increase to approximately 1,000,000 gallons as high service flow from the NWTP is increased to 2016 levels.

The NWTP therefore requires a storage tank that is sized to provide approximately 0.7 MG of useable storage to safely meet current diurnal demands above disinfection contact volume and fire flow storage volume. The NWTP may need up to 1.0 MG of useable storage to meet future anticipated peak diurnal demands assuming the NWTP capacity increases to 8.33 mgd (see expansion recommendations later in this report).

Fire Flow Storage

MIU provides fire protection flow in compliance with the American Water Works Association (AWWA). MIU can provide flow for residential, multi-family, and commercial areas at the medium to higher levels of recommended flows. The assumed fire-flow rates are conservative based on typical AWWA rates. Fire flow storage is based on maintaining storage to maintain the maximum fire flow rate (commercial use) for four (4) hours as shown in Exhibit 6.

EXHIBIT 6

Marco Island Fire Flow Requirements

Marco Island Utilities 2007 Capacity Analysis Report

Land Use	Fire Flow Rate (gpm)	Total Flow (gallons)
Single-family residential	1,500	180,000
Multifamily residential	2,500	300,000
Commercial	3,500	420,000
Maximum four-hour fire flow		840,000

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.

Disinfection Requirements

The NWTP treats a surface water source and is therefore required by the surface water treatment rule and FDEP rules to meet disinfection requirements that include 0.5-log of Giardia after filtration, and 2-log of virus after exposure to open air. The Giardia inactivation is required after filtration and therefore must occur in the finished water storage tanks. Virus inactivation may occur before filtration, but according to new FDEP rules, must happen after exposure to air.

The required chlorine contact concentration-time (CT) for 0.5-log of Giardia inactivation by chloramines at 20 and 25 degrees Celsius is 185 and 125 mg/L-min respectively. The required CT for 2-log virus inactivation by chloramines at 20 and 25 degrees Celsius is 321

and 214 mg/L-min respectively. The 20 to 25-degree temperature range is the normal fluctuation of the Marco Lakes raw water between winter and summer seasons. Given the typical minimum chloramine residual in the finished water of 3.5 mg/L, the accepted baffling factor in the storage tanks of 0.3, and the peak hourly flow out of the tanks, approximately 1.16 MG of storage will be needed to meet virus and Giardia inactivation after the new FDEP rules go into effect sometime in 2008.

Finished Water Pumping

Regulatory Requirements

The FDEP rule 62-555 requires firm high service pumping capacity to meet the greater of the fire flow plus the maximum day demand or the peak hourly demand. The current peak hourly finished water demand (8,500 gpm) is higher than the maximum day demand (4,600 gpm) plus fire flow (3,500 gpm). The high service pumps must therefore meet current and projected peak hour demands which are anticipated to remain greater than the maximum day demand plus fire flow.

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.

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.

Marco Island Reverse Osmosis Water Treatment Plant (SWTP)

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 feedwater. The facility utilizes sand separation, cartridge filtration, sulfuric acid 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.

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. The sections below describe in more detail the finished water storage requirements.

Diurnal Peak Attenuation

An analysis of the diurnal flows from the existing SWTP high service pumps shows that on the current maximum flow day, there is an approximate 1,300,000-gallon drop in finished water storage tank level during the peak demand time between midnight and noon. This diurnal deficit may increase to approximately 2,500,000 gallons as high service flow from the SWTP is increased to 2016 levels.

The SWTP therefore requires a storage tank that is sized to provide approximately 1.5 MG of useable storage to safely meet current diurnal demands above fire flow storage volume. The SWTP will need approximately 2.5 MG of useable storage to meet future anticipated peak diurnal demands.

Fire Flow Storage

MIU needs 840,000 gallons of fire flow storage for four hours of at the combined design fire flow as shown in Exhibit 6 above. This fire flow storage can be met at either facility separately or a combination of excess storage capacity at both facilities.

Finished Water Pumping

Regulatory Requirements

The FDEP rule 62-555 requires firm high service pumping capacity to meet the greater of the fire flow plus the maximum day demand or the peak hourly demand. The current peak hourly finished water demand (10,500 gpm) is higher than the maximum day demand (6,250 gpm) plus fire flow (3,500 gpm). The high service pumps must therefore meet current and projected peak hour demands which are anticipated to remain greater than the maximum day demand plus fire flow. The peak hourly flow at the SWTP is not expected to increase through build out.

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.

Past and Future Water Demands

The Marco Island service area is nearing build out connection and population levels. It is estimated that the current land use is 95percent of the build out estimate. The following tables summarize past and future water demands in the MIU service area. Exhibit 7 shows the recorded water demands and equivalent residential connection (ERC) data for the past 10 years. An ERC is equivalent to one residential development unit. In March 2005, a count was made of all residential development units on Marco Island, empty but buildable lots, and planned but unoccupied or unbuilt condominiums. A record of water ERC added in each year from 2004 through 2006 was also available. Commercial ERC equivalents were calculated by estimating the water used by the commercial accounts (restaurant, hotels, etc.) based on numbers of seats or rooms, and then dividing that demand by a gpd/ERC ratio

equivalent to that of the residential ERC. This yielded an equivalent ERC count for commercial users. Finally, ERC counts prior to 2003 were estimated by extrapolating from 2003-2006 data.

EXHIBIT 7

MIU Service Area 1997-2006 Water ERC and Water Demand data

Marco Island Utilities 2007 Capacity Analysis Report

Year	Water ERC at Year End	Average ERC During Year	ADD (MGD)	Average Usage (GPD/ERC)	MDD (MGD)	Ratio MDD/ADD
1997	19,632	19,459	5.600	288	11.286	2.02
1998	19,978	19,805	7.063	357	11.576	1.64
1999	20,323	20,151	6.594	327	10.494	1.59
2000	20,669	20,496	7.575	370	12.029	1.59
2001	21,015	20,842	7.259	348	11.959	1.65
2002	21,360	21,188	7.379	348	12.185	1.65
2003	21,706	21,533	8.048	374	11.274	1.40
2004	22,096	21,901	8.257	377	10.961	1.33
2005	22,533	22,315	7.850	352	11.485	1.46
2006	22,743	22,638	8.261	365	11.281	1.37
2002 – 2006 Average		1.3% Growth Rate	1.6% Growth Rate	363		1.44

ADD = average daily demand; MDD = maximum day demand; ERC = equivalent residential connection; GPD = gallons per day; MGD = million gallons per day

Future ERC Projections: Year-end ERC estimates were made for years 2007 through 2016 based on the ERC count in the water service area on December 30, 2006, and the projected development of the remaining buildable lots and sites in the City of Marco Island at the same rate as the average growth rate over the last 5 years, which was approximately 1.3% per year. It was assumed that commercial growth would occur at the same rate and stop when residential growth stopped. The ERC at build out was estimated at 23,967.

Future Water Demands: Future average daily water demands (ADD) were projected based on the projection of the future ERC count and a water usage of 363 gpd/ERC, which was the average usage during the past 5 years. Maximum day water demands were calculated using the 2002-2006 average MDD/ADD peaking factor of 1.44. Projected ERC counts and ADD and MDD flows are shown in Exhibit 8 and Exhibit 9. The projection indicates that if Marco Island's population continues to grow at the current 5-year average rate, build out will be reached in 2010 and the MDD will level out at about 12.54 mgd, which is slightly less than the total permitted capacity of the MIU WTP facilities.

Impact of Expanded Reuse: 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 reduce the drinking water demand by the amount measured by the

existing irrigation flow meters. It is planned to switch these systems to reclaimed water in the near future. Exhibit 8 and Exhibit 9 show the impact of the reduced drinking water demand from these condominiums. The reduction in the full 0.56 mgd peak day drinking water demand will not be realized immediately after the conversion due to the limited quantity of reclaimed water that will be available over the next four years during maximum demand days. The reclaimed supply will meet the adjusted reclaimed demand no later than 2011. The maximum day demand after the connection of these condominiums will be adjusted to less than 12 mgd as shown in Exhibit 8.

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 8

MIU Service Area 2007-2016 Projected Water ERC and Water Demand

Marco Island Utilities 2007 Capacity Analysis Report

Year	Projected ADD (MGD)	Projected MDD (MGD)	Adjusted ADD ¹ with Condos (MGD)	Adjusted MDD ¹ with Condos (MGD)	ADD ² with Max Reuse (MGD)	ADD ² with Max Reuse (MGD)
2007	8.33	12.01	8.33	12.01	8.33	12.01
2008	8.47	12.22	8.47	12.22	8.47	12.22
2009	8.60	12.40	8.52	12.32	8.50	12.32
2010	8.68	12.52	8.20	12.14	8.19	12.14
2011	8.70	12.54	8.22	11.98	7.97	11.98
2012	8.70	12.54	8.22	11.98	7.60	11.69
2013	8.70	12.54	8.22	11.98	7.45	11.58
2014	8.70	12.54	8.22	11.98	7.28	11.45
2015	8.70	12.54	8.22	11.98	7.13	11.33
2016	8.70	12.54	8.22	11.98	7.13	11.33

ERC = Equivalent Residential Connection; ADD = Average Daily Demand; MDD = Maximum Day Demand; MGD = million gallons per day

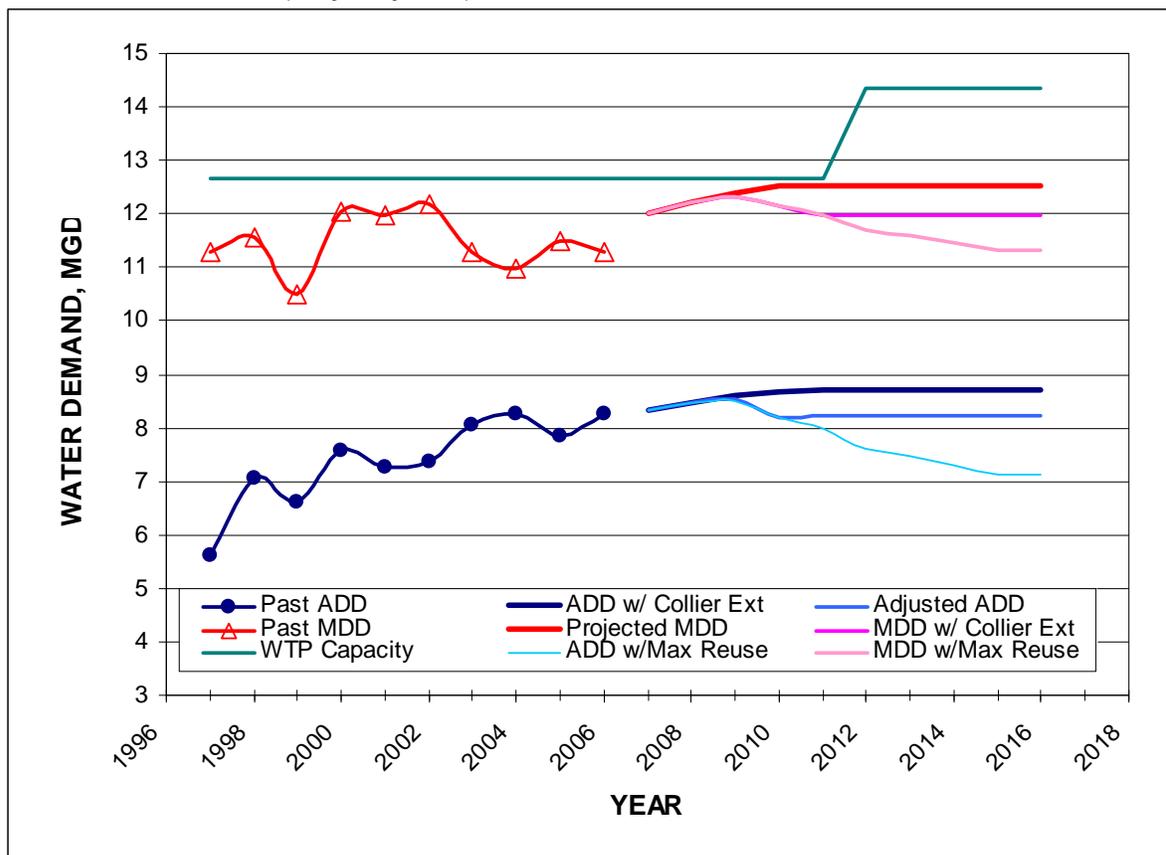
¹Adjusted for planned expansion of the existing reuse system to include condominiums that currently use drinking water for irrigation. ADD and MDD flows are measured values from 2004-2006 irrigation flow meters.

²Adjusted for additional potential reuse system expansion based on total volume of reclaimed water available for reuse.

EXHIBIT 9

MIU Past and Projected Service Area Demands

Marco Island Utilities 2007 Capacity Analysis Report



Planning for Expansion of Source, Treatment, and Storage Facilities

Source Water Expansion

Based on the capacity analysis of the source water systems for the NWTP and SWTP, expansion of these systems is not needed within the next ten years. A potential future addition of ASR wells for the NWTP or Mid-Hawthorne aquifer wells for the SWTP would only be for the purposes of increased reliability.

Finished Water Storage and Pumping Expansion

The finished water storage and pumping facilities located at the SWTP are more than adequate for future build out demands. The NWTP however will need additional finished water storage and pumping capacity to meet future demands and regulations.

Design of a new 4 MG finished water storage tank and 10,000 gpm pump station (expandable to 13,300 gpm) is currently in the design phase. The anticipated project completion for these new facilities that are sized for ultimate build-out of the NWTP is mid-2008.

Water Treatment Expansion

The design and permitted capacity of the MIU NWTP is 6.67 mgd. The design and permitted capacity of the RO system at the SWTP is 6.0 mgd with all six RO skids operating. The total permitted capacity of both WTP facilities is 12.67 mgd. Referencing Exhibit 9, the current total permitted capacity of the WTP facilities should meet the projected MDD of the service area through build out. This assumes that the lime softener and the all six RO skids are in operation on the maximum demand day.

Although the existing facilities are permitted at a capacity that may meet future water demands, it is recommended that a small amount of additional capacity is added as a contingency to take into account the uncertainty of future projections or a possible degradation of the RO WTP water supply resulting in a smaller contribution from this WTP.

No future expansions are now planned for the RO facilities at the SWTP facility. Therefore, this CAR will be limited to a discussion of planning for expansion at the NWTP only.

The Lime Softening equipment at the NWTP is currently approved and permitted at the design capacity of 6.67 mgd. MIU plans to add 1.67 mgd of 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. Because the water demand at build out is projected to be less than the current total permitted capacity of the MIU WTP facilities, an expansion of the NWTP is not time-critical. In Exhibit 10, this expansion is shown to be ready in 2012, which is the current estimate for completion of an expansion. At build out and after a WTP expansion to 14.33 mgd, the projected MDD of 12.54 mgd will be 88 percent of the WTP capacity. The projected MDD will be reduced to 83% of the total WTP capacity once the reuse system is expanded in 2008 as planned. Exhibit 10 shows the planned productions at each WTP from 2007 through 2016, based on the operation of the NWTP near its permitted capacity and the SWTP for peaking on the maximum flow day of the year.

EXHIBIT 10

2006-2016 MIU Projected Service Area Demands and Fresh Water Withdrawals
Marco Island Utilities 2007 Capacity Analysis Report

Year	Projected Avg Day Water Demand (MGD)	Projected Max Day Water Demand (MGD)	NWTP Marco Lakes Max Day Production (MGD)	SWTP Max Day Production (MGD)
2006 ¹	8.33	12.01	6.66	4.61
2007	8.47	12.22	6.67	5.34
2008	8.52	12.32	6.67	5.55
2009	8.20	12.14	6.67	5.13
2010	8.22	11.98	6.67	5.25
2011	8.22	11.98	6.67	5.27
2012	8.22	11.98	8.33	3.61
2013	8.22	11.98	8.33	3.61
2014	8.22	11.98	8.33	3.61
2015	8.33	12.01	8.33	3.61

EXHIBIT 10

2006-2016 MIU Projected Service Area Demands and Fresh Water Withdrawals
Marco Island Utilities 2007 Capacity Analysis Report

Year	Projected Avg Day Water Demand (MGD)	Projected Max Day Water Demand (MGD)	NWTP Marco Lakes Max Day Production (MGD)	SWTP Max Day Production (MGD)
2016	8.22	11.98	8.33	3.61

¹2006 actual flows. LS WTP maximum production day did not coincide with the 2006 Maximum Day in the service area.

Schedule for Expansion

Although the existing MIU water treatment facilities are permitted at a capacity that may meet future water demands, it is recommended that a small amount of additional capacity is added as a contingency to take into account the uncertainty of future projections or a possible degradation of the RO WTP water supply. Based on the information presented in this report, Exhibit 11 shows a possible schedule for the construction of future expansions at the NWTP. The construction projects would be complete by the ends of the years shown, and design and permitting should begin at least two years prior to the end of the year shown.

EXHIBIT 11

MIU WTP Facility Expansion Planning Schedule Through 2016
Marco Island Utilities 2007 Capacity Analysis Report

Year	Description of Expansion Improvements
2008	Expand NWTP Storage and High Service Pumping
2008	Expand Reuse System to Existing Condominiums
2008	Initiate Design of Expansion Improvements
2009-2011	Install 1.67 MGD of Membrane Filtration Capacity
2012	No Further Expansion Planned after 2011

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.