

THE MARCO ISLAND UTILITY  
COLLIER COUNTY  
PWS I.D. Number: 5110183

SOURCE/TREATMENT/STORAGE CAPACITY ANALYSIS REPORT

Prepared for:

The Department of Environmental Protection  
South District  
P.O. Box 2549  
Fort Myers, Florida 33902-2549

Prepared by:

Water Resource Solutions, Inc.  
2029 Bayside Parkway  
Fort Myers, Florida 33901  
WRS File No. 1140604  
Email: [lholland@wrsolutions.com](mailto:lholland@wrsolutions.com)

  
\_\_\_\_\_  
Lloyd E. Horvath, P.E.

Professional Engineer #25260

Date: 8/14/06

August, 2006

## TABLE OF CONTENTS

	<u>Page</u>
TABLE OF CONTENTS.....	i
LIST OF APPENDICES.....	i
SECTION 1. SUMMARY.....	1
SECTION 2. DESCRIPTION OF PUBLIC WATER SYSTEM.....	3
A. Interconnections and Agreements.....	3
B. Service Area.....	3
C. Fire Protection.....	4
D. PWS Facilities.....	5
SECTION 3. PAST WATER PRODUCTION.....	6
SECTION 4. PROJECTED WATER DEMAND AND FINISHED WATER STORAGE NEED.....	7
SECTION 5. RECOMMENDATIONS FOR NEW OR EXPANDED FACILITIES ..	9

## LIST OF APPENDICES

<b>APPENDIX A</b>	<b>FIGURES</b>
FIGURE 2.1	MAP OF SERVICE AREA
FIGURE 3.1	PAST WATER PRODUCTION FOR THE MARCO ISLAND UTILITY LIME SOFTENING PLANT
FIGURE 3.2	PAST WATER PRODUCTION FOR THE MARCO SHORES LIME SOFTENING PLANT
FIGURE 3.3	PAST WATER PRODUCTION FOR THE REVERSE OSMOSIS PLANT, MACRO ISLAND UTILITY
FIGURE 3.4	PAST TOTAL WATER PRODUCTION FOR THE MARCO ISLAND UTILITY
FIGURE 5.1	PAST AND PROJECTED WATER DEMAND FOR THE MARCO ISLAND UTILITY

## LIST OF APPENDICES - Continued

FIGURE 5.2	ESTIMATE OF WHEN TOTAL MAXIMUM-DAY WATER DEMAND WILL EXCEED TOTAL PERMITTED MAXIMUM-DAY OPERATING CAPACITY FOR THE UTILITY
FIGURE 5.3	ESTIMATE OF WHEN PWS'S TOTAL FINISHED-WATER STORAGE NEED WILL EXCEED EXISTING TOTAL USEFUL FINISHED-WATER STORAGE CAPACITY
<b>APPENDIX B</b>	<b>TABLES</b>
TABLE 2.1	PUBLIC WATER SUPPLY – EXISTING SOURCES, TREATMENT, PUMPING AND FINISHED WATER FACILITIES
TABLE 2.2	SURFACE WATER INTAKE PUMPING STATIONS
TABLE 2.3	WATER TREATMENT PLANTS
TABLE 2.4	HIGH SERVICE PUMP STATIONS
TABLE 2.5	FINISHED WATER STORAGE FACILITIES
TABLE 2.6	CURRENT AND PROJECTED SERVICE CONNECTIONS
TABLE 3.1	PAST WATER PRODUCTION FOR THE MARCO ISLAND UTILITY LIME SOFTENING PLANT
TABLE 3.2	PAST WATER PRODUCTION FOR THE MARCO SHORES LIME SOFTENING PLANT
TABLE 3.3	PAST WATER PRODUCTION FOR THE REVERSE OSMOSIS PLANT, MARCO ISLAND UTILITY
TABLE 3.4	PAST TOTAL WATER PRODUCTION FOR THE MARCO ISLAND UTILITY
TABLE 4.1	PROJECTED WATER USE (SFWMD REPORT)
TABLE 4.2	CITY OF MARCO ISLAND PROJECTED WATER DEMAND AND FINISHED-WATER STORAGE
TABLE 5.1	PLANNED SYSTEM IMPROVEMENTS/EXPANSION

## 1. SUMMARY

Per the American Water Well Association (AWWA), water distribution storage is provided to ensure the reliability of supply, maintain pressure, equalize pumping and treatment rates, reduce the size of transmission mains, and improve operational flexibility and efficiency.

The Marco Island Utility maintains and operates three water treatment plants. These are currently permitted with the Florida Department of Environmental Protection (FDEP) under permit number PWS ID. Number: 5110183. This service area includes Marco Island and Marco Shores. Goodland and Key Marco are not in the Marco Island Utility service area, but the Utility acts as a wholesale potable water provider for both areas.

The three plants are currently permitted for a total daily operating capacity of 13.39 Million Gallons per Day (MGD), (see Table 2-3 for specific plant information).

The service area currently has about an 18,000 year-round and 35,000 peak-season population. Water for drinking and irrigation is limited either by quantity or quality. Natural water available on the island is high in dissolved minerals and must be desalinated prior to use by the utility. Better quality water is available off-island at the Marco Lakes site, located approximately ten (10) miles north of Marco Island, in parts of Section 34, T50S, R26E, and Section 3, T51S, and R26E. Water is supplied to this lake from the Henderson Creek Canal and a series of ASR wells on the Marco Lakes site.

The challenge of the Marco Island Utility is to manage these raw-water resources to cost-effectively meet the evolving needs of the serviced water users. Water demand for the Utility is projected to grow from its present demands for 2005 to projected demands in 2015 as listed in the table below:

	PRESENT DEMAND MGD (2005)	PROJECTED DEMAND MGD (2015)
ADP	7.95	10.8
AMDP	10.9	
MDP	11.9	13.5

\*ADP – Average Daily Production for Year

\*AMDP – Average Maximum Day Production per Month for Year

\*MDP – Maximum Day Production for Year

The seasonal peaking demands for water require innovative solutions to cost-effectively meet supply needs. The ASR wells allow the Utility to store water in peak supply periods (rainy season) and supply water in the peak demand periods (tourist/dry season).

The following work elements are submitted in compliance with the FDEP directive to develop a Source/Treatment/Storage Capacity Analysis Report for the Utility. The completed work elements are consistent with the FDEP requirements.

## **2. DESCRIPTION OF PUBLIC WATER SYSTEM**

The Marco Island Utility is a publicly owned utility.

### **A. INTERCONNECTIONS AND AGREEMENTS**

Three (3) interconnections exist related to this service area.

Two of the interconnects are related to surface water flow, and one is a utility interconnect.

Marco Island Utilities maintains an interconnection, via a water control structure, which allows controlled flow of water from the Henderson Creek Canal into Marco Lakes, when the canal level is above 3.5 feet NGVD.

The utility also maintains an interconnect with Collier County Utilities that is able to provide finished water to the distribution system in case of emergency, however it is currently not in use.

A third interconnect is currently in the final design stage and is proposed to provide about 100 cubic feet of water per second to the Henderson Creek Canal via the Golden Gate Canal during available periods.

Marco Island Utilities does not supply or receive water from any other entity. The interconnect with Collier County Utilities has reportedly never been used.

### **B. SERVICE AREA**

The Marco Island Utilities Service Area includes the City of Marco Island and Marco Shores. The utility also treats wastewater from, and could possibly serve the Isles of Capri with wastewater during the span covered in the City's Master Plan. Marco Island provides bulk water to Collier County, which distributes it to Goodland. The Utility also treats sewer water for North Shore, the City of Marco Island, Goodland, and the Isle of Capri.

Three water treatment plants, including two Lime Softening Plants and a Reverse Osmosis (RO) Plant, supply the Marco Island water system. The system also includes production wells that supply the RO Plant, a surface water supply facility at Marco Lakes, aquifer storage and recovery (ASR) wells, ground storage tanks, high service pumps, and distribution mains. The location of each of the above listed facilities and the extent of the area served is shown on Figure 2-1.

The existing Marco Island water supply system was designed and built in 1969. Subsequently, system capacity was increased to meet demands of the service area as population grew. In 1992, system capacity was increased by the expansion of the RO Plant and wellfield. The RO plant capacity was enlarged from 4 mgd to 5 mgd in 1996. The RO plant capacity was then enlarge from to 6 mgd in 1998

### C. FIRE PROTECTION

Fire protection is an important part of the City of Marco Island water development and storage program. Water levels are maintained at a minimum of 10 feet in the storage tank at the RO plant for fire reserve. Each foot is equivalent to 208,000 gallons. A smaller amount of water is maintained at the lime softening storage facility as backup. This maintains a minimum aggregate amount in storage for fire protection of approximately 2 million gallons.

The Utility provides fire protection flow in compliance with the American Water Works Association (AWWA). The Utility 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. These are flows for two (2) hours at the following rates for the listed land-use areas:

<b>Land Use</b>	<b>Fire-Flow Rates (gpm)</b>	<b>Total Flow (gal)</b>
Single-family residential	1500	180,000
Multifamily residential	2500	300,000
Commercial	3500	<u>420,000</u>

Total two-hour fire-flow = 900,000 gallons

Per policy of the Marco Island Utility, a reserve of 2 mgd is maintained for fire protection.

The high service pumps supplying water directly to the service area can pump 32.9 mgd, see Table 2.1.

#### **D. PWS FACILITIES**

Existing sources, treatment, pumping and finished-water storage facilities are described in Tables 2.1 through 2.5. Service connections by type are summarized in Table 2.6.

The information listed in these tables was established and verified in the Consumptive Use Permitting Process with the South Florida Water Management District (SFWMD) for the issuance of Water Use Permit No. 11-00080-W. This Water Use Permit is for an annual allocation not to exceed 4535 million gallons. This Consumptive Use Permit expires February 8, 2016.

### 3. PAST WATER PRODUCTION

This section describes water production over the past ten (10) years by the Marco Island Utility. The total water production of the utility has been from three operating water treatment plants. These treatment plants are:

- 1) Marco Island Lime Softening Plant
- 2) Marco Shores Lime Softening Plant
- 3) Marco Island Reverse Osmosis Plant

The monthly average daily and average maximum-day quantities of finished water per month are listed in tables 3-1 through 3-3 for each of the three treatment plants. The total monthly average daily and maximum-day per month for the aggregate utility water production is listed in Table 3-4 for the period January 1995 through December 2005.

This data from tables 3.1, 3.2, and 3.3 is presented graphically in Figures 3-1, 3-2, and 3-3. The data presented in Table 3.4 is presented graphically in Table 3.4, where average daily pumping rates for the year are presented along with the maximum daily pumping rate for the same year.

The average daily produced water by the utility has increased from about 6 mgd for the year 1995 to approximately 8 mgd for 2005. The maximum day produced water for a day in the year has been in the range of 11 mgd to 12 mgd for the same period. The max-day pumpage for a year has not shown a similar increase trend as the average daily amount of produced water for a year.

No unusual water demands were used in the analysis. Few major water loss or large maintenance issues were applied. The lime softening plants typically have a maximum of a 1-% loss factor above the represented finished water volume.

The R.O. plant has a 25% use factor above the represented finished volume. The feed water from the wells yields a product stream of 50% and a concentrate stream of 50%. The concentrate stream is then again treated at the same recovery rate, yielding a final finished product stream volume of 75% of the initial feed water volume.

#### 4. PROJECTED WATER DEMAND AND FINISHED WATER STORAGE NEED

To aid in determining the projected water demands for the system, WRS reviewed the following data sources:

- A report prepared by Water Resource Solutions, Inc., entitled "*Application to the Individual Water Use Permit for Public Water Supply, Marco Island Utilities, Section 3, Township 51S, Range 26E and Section 34, Township 50S, Range 26E, Collier County, Florida (WUP No. 11-00080-W)*", October, 2004
- A report prepared by Montgomery, Watson, Harza, Inc. entitled "*City of Marco Island Utility Master Plan*", June, 2004
- American Water Works Association Text, entitled "*Water Distribution Systems Handbook*", 2000

Projected water use demand is described in the October, 2004 WRS Water Use Permit application submitted to the SFWMD. Table 4.1 reproduces the projected population, per capita usage, total annual use, average month use, maximum month use, and ratio of maximum:average use from the report. The average daily per capita use exceeds 400 gallons per day. The data listed in Table 4.1 is accepted and verified by the South Florida Water Management District (SFWMD), and was part of the data base used to approve the current Water Use Consumptive Permit. The unusually high per capita use figure is attributed to the large portion of the daily permitted water use that is applied to private irrigation, public amenities, and golf course irrigation.

Table 4.2 is partially based in part on the information established in Table 4.1. Table 4.2 presents the projected water demand and finished-water storage needs for the next ten years.

A conservative peak-hour to average-day peaking factor of 3.7 is used to calculate the peak-hour demand. Due to the large portion of the water consumed for irrigation (mostly applied at night), the peaking factor is better spread over the total 24-hour period of the day. If sufficient data were available, it is anticipated the actual peaking factor is less than 3.7. The 3.7 peaking factor yields a peak-hour demand for the next ten years, starting from 1.33 mgd currently and increasing to 1.66 mgd for 2015.

Minimum required finished water storage is calculated by multiplying the maximum day treatment capacity of the plant(s) X 25% + required fire storage. Fire storage is established as 2 million gallons per day (mgd) by policy of the City of Marco Island Utility. Since the allocated fire storage of 2 mgd is very conservative, this volume is used as a constant for needed fire storage for Table 4.2, through the year 2015. Twenty-five percent of the max day treatment capacity of 13.40 mgd is 3.35 mgd. This yields minimum required finished water storage of 5.35 mgd. This is within the current storage volume of 7.0 mgd for the utility. An additional 3-4 million gallons of storage is planned in the next two years, but final budgeting is not completed.

## 5. RECOMMENDATIONS FOR NEW OR EXPANDED FACILITIES

Figure 5.1 is a graphical presentation of total annual average daily water demand and total maximum-day water demand. This plot is a graphical representation of the data tabulated for projected water demand in Table 4.2. Based on recent maximum-day water supplied for the year, the projected maximum-day demand graph seems potentially high.

Figure 5.2 includes a plot of the same data as Figure 5.1 with an estimated date/time of exceeding finished water storage. Finished water storage is projected using a maximum-day to average daily demand peaking factor. This figure is conservative based on the demographics of Marco Island. The peaking factor as calculated by dividing the maximum daily pumpage by the average daily production for the year varies from 1.44 in 2005 to a low of 1.26 for 2015. Additional data may be collected at a later date to better define the peaking factor.

The estimated date of exceeding finished water storage is 2010. Figure 5.3 includes a plot of average and maximum daily demand, projected fire flow and projected finished-water storage.

Figure 5.3 shows that the finished-water storage capacity exceeds the total needed storage for the utility through the year 2015. The derivation of when the finished-water storage need will exceed the existing total useful finished-water storage capacity is primarily dependent on the maximum-day demand for the year. This value is projected to increase from 2005 to the year 2015 from 3.1 MGD to 3.4 MGD. This, in combination with the needed fire storage means that the total needed storage projected for the year 2015 of 5.4 MGD is less than the current storage of 7.0 MGD.

Table 5.1 lists the planned improvements/expansions for the next seven (7) years.

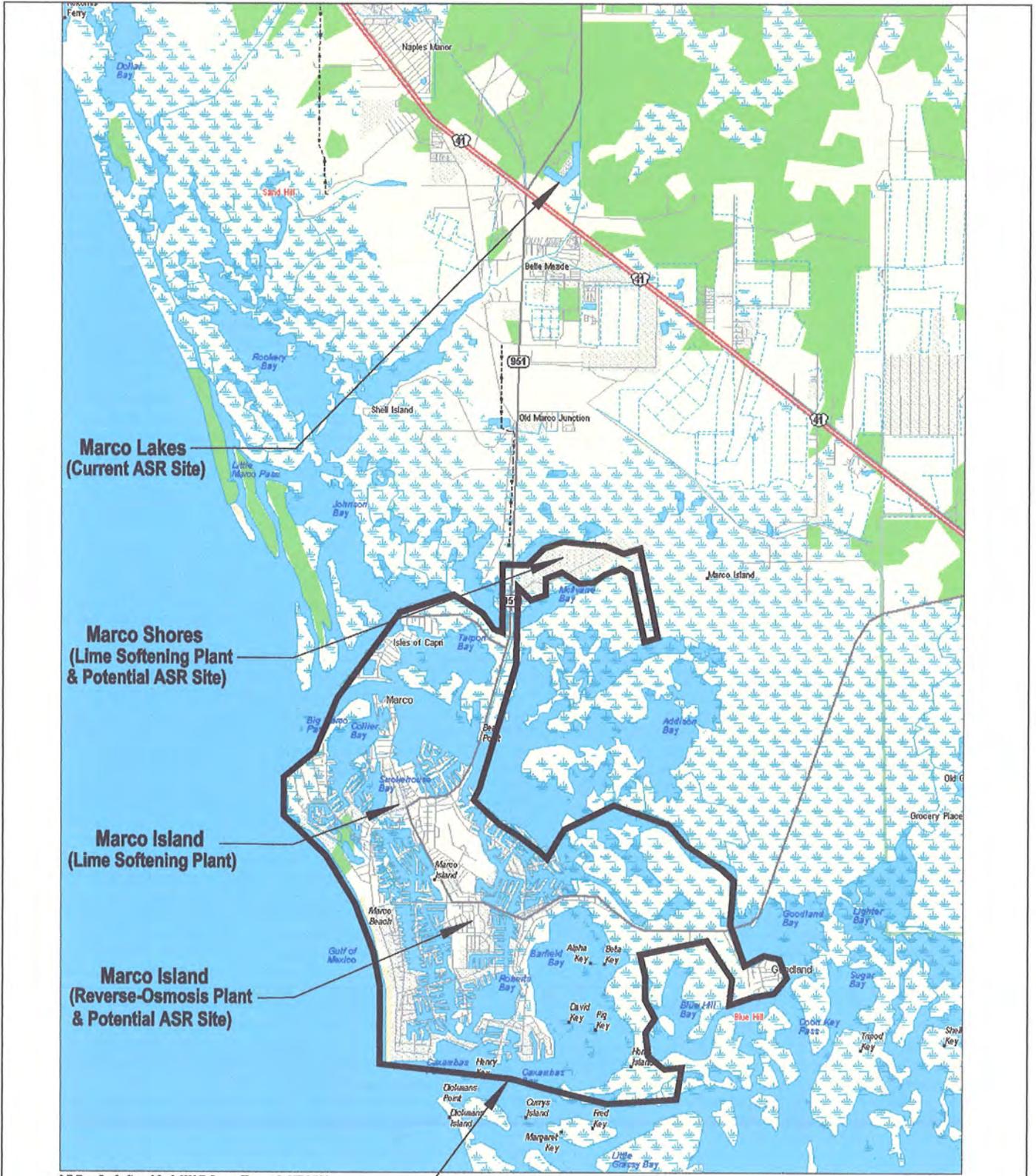
No new high service pumps are needed for the distribution system. The only new high service pumps envisioned for addition at some time will be for transporting water from the lake to the water treatment plants.

# **APPENDIX A**

## **FIGURES**

## LIST OF FIGURES

<i>CHAP. 2</i>	<i>Description of Public Water System</i>
FIGURE 2.1	Map of Service Area
<i>CHAP. 3</i>	<i>Past Water Production</i> <i>(These figures are presented with the same-numbered Tables)</i>
FIGURE 3.1	Past Water Production for the Marco Island Utility Lime Softening Plant
FIGURE 3.2	Past Water Production for the Marco Shores Lime Softening Plant
FIGURE 3.3	Past Water Production for the Reverse Osmosis Plant, Marco Island Utility
FIGURE 3.4	Past Total Water Production for the Marco Island Utility
<i>CHAP. 5</i>	<i>Recommendations for New or Expanded Facilities</i>
FIGURE 5.1	Past and Projected Water Demand for the Marco Island Utility
FIGURE 5.2	Estimate of When Total Maximum-Day Water Demand will Exceed Total Permitted Maximum-Day Operating Capacity for the Utility
FIGURE 5.3	Estimate of When PWS's Total Finished-Water Storage Need Will Exceed Existing Total Useful Finished-Water Storage Capacity



Approximate Service Area Boundary

**Water  
Resource  
Solutions, Inc.**

GEOLOGISTS - HYDROLOGISTS - ENVIRONMENTAL SCIENTISTS

FIGURE: B-1
APPROXIMATE SCALE: 1:100,000
DRAWN BY: NBK
DRWG No.: 1140804h2

FIGURE 2.1 MAP SHOWING THE REGIONAL LOCATION OF THE SERVICE AREA, WATER TREATMENT PLANTS, AND THE LOCATIONS OF CURRENT AND POTENTIAL ASR WELL SITES. MARCO ISLAND UTILITIES.

## Finished Water Lime Softening Plant

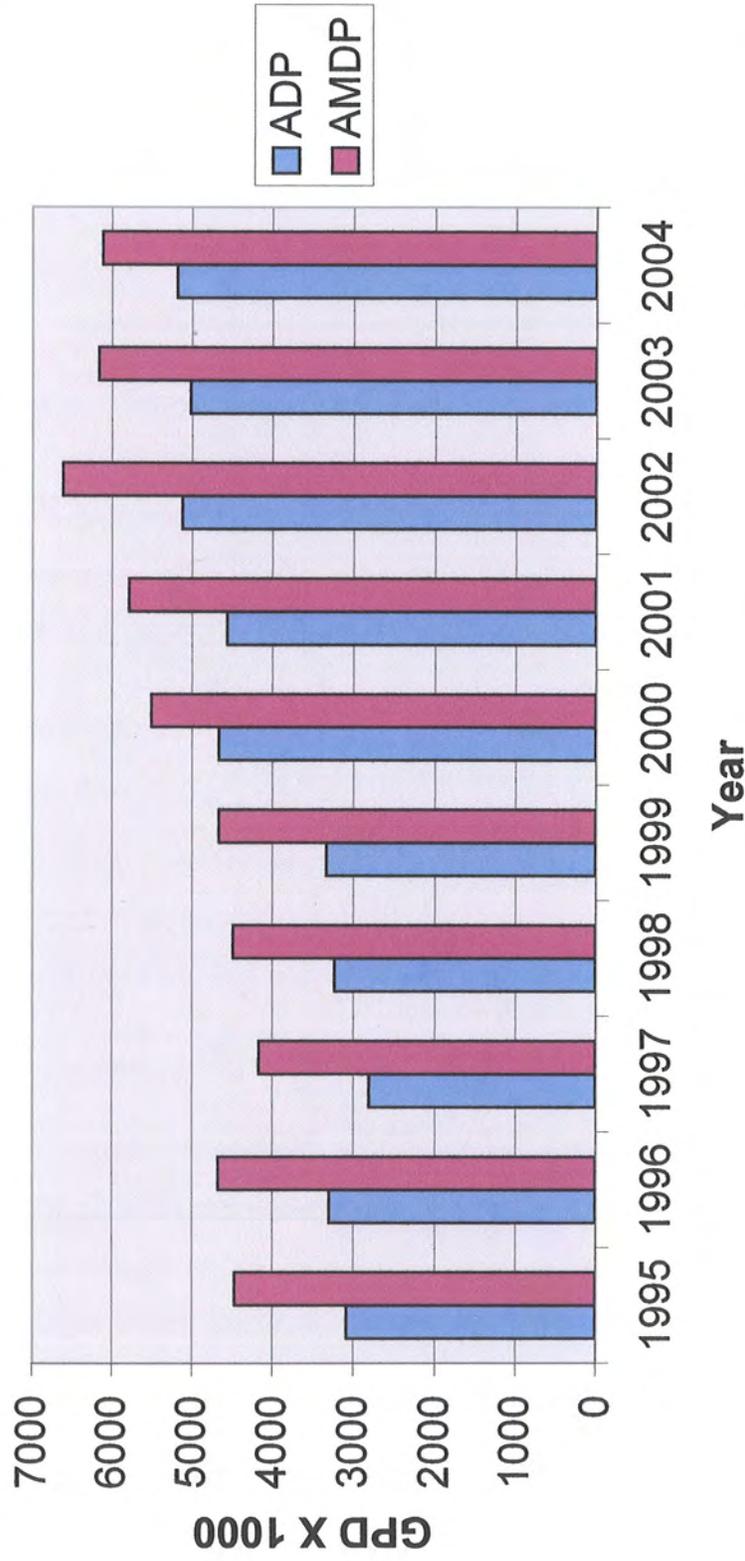


FIGURE 3-1. PAST WATER PRODUCTION FOR THE MARCO ISLAND UTILITY LIME SOFTENING PLANT

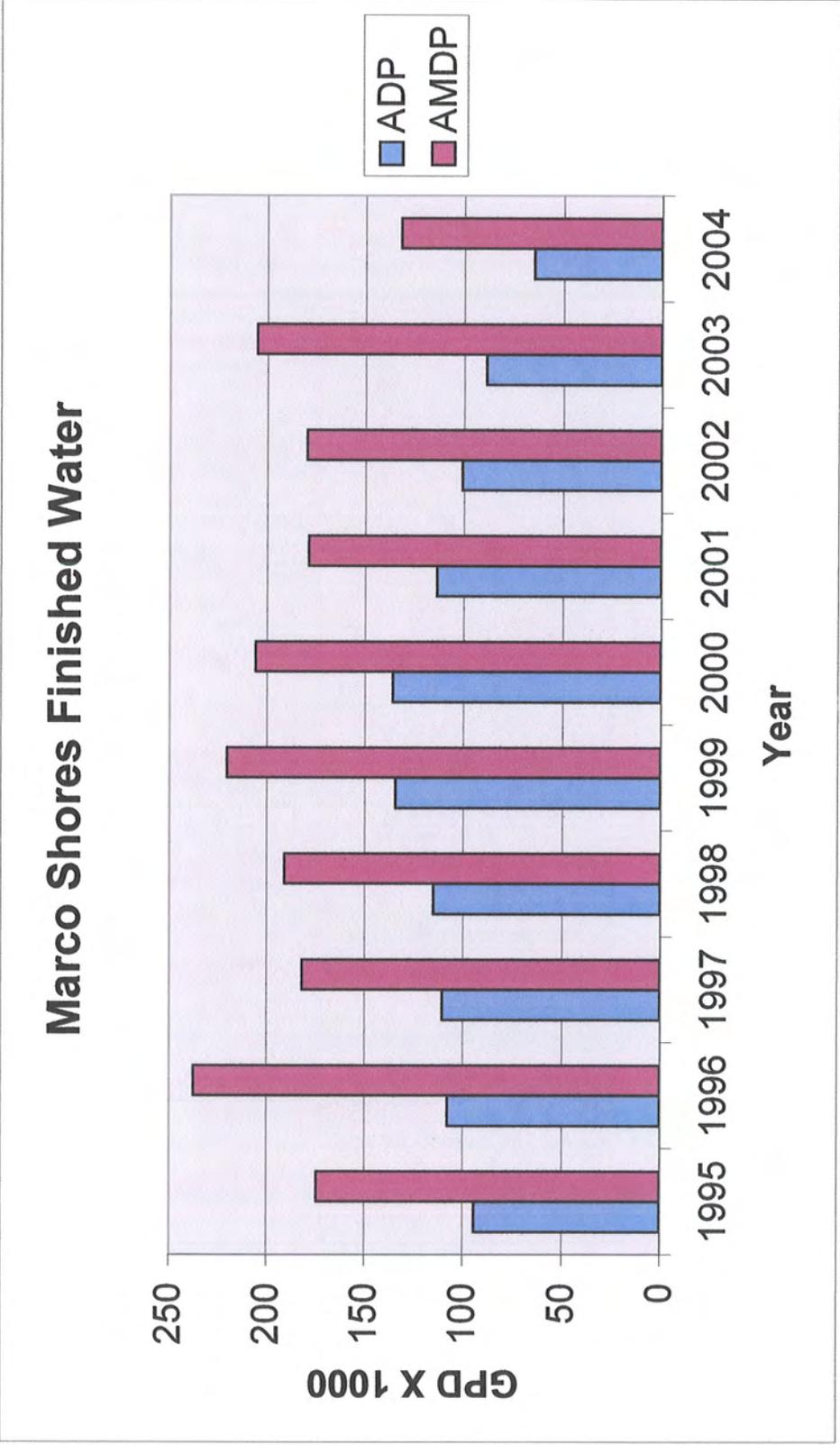


FIGURE 3-2. PAST WATER PRODUCTION FOR THE MARCO SHORES LIME SOFTENING PLANT

### R.O. Plant Finished Water

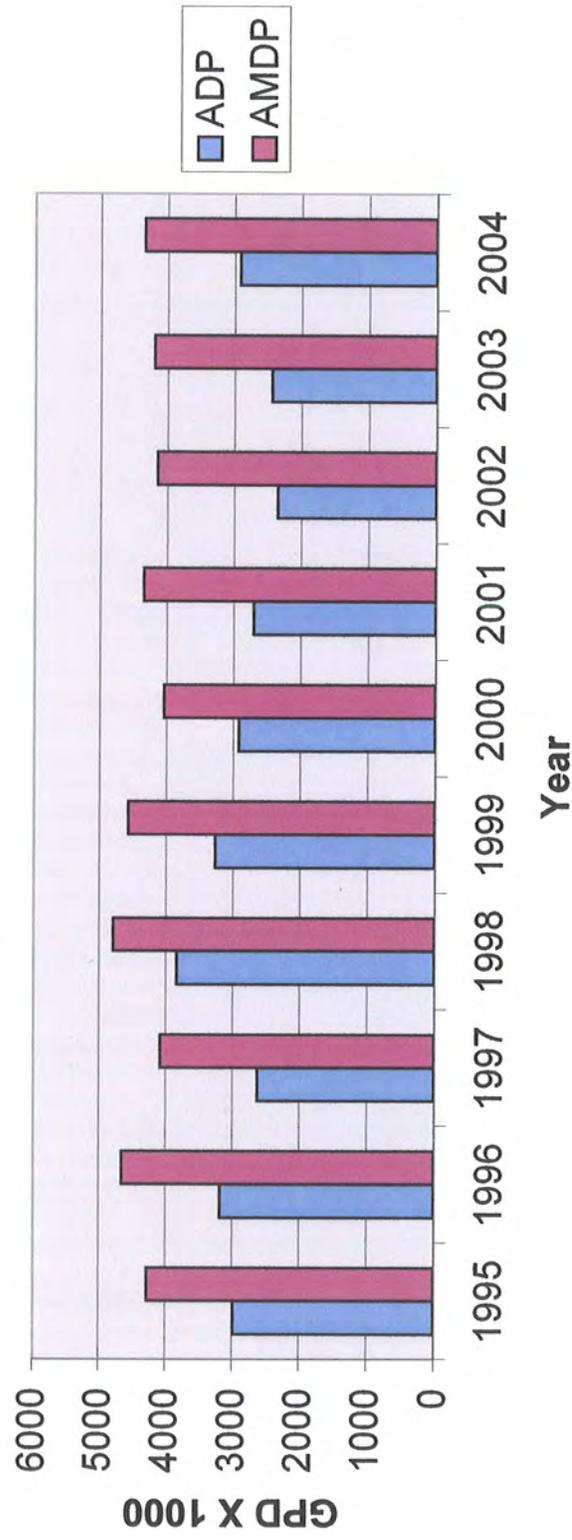


FIGURE 3-3. PAST WATER PRODUCTION FOR THE MARCO ISLAND UTILITY REVERSE OSMOSIS PLANT

### Marco Island Utility Finished Water

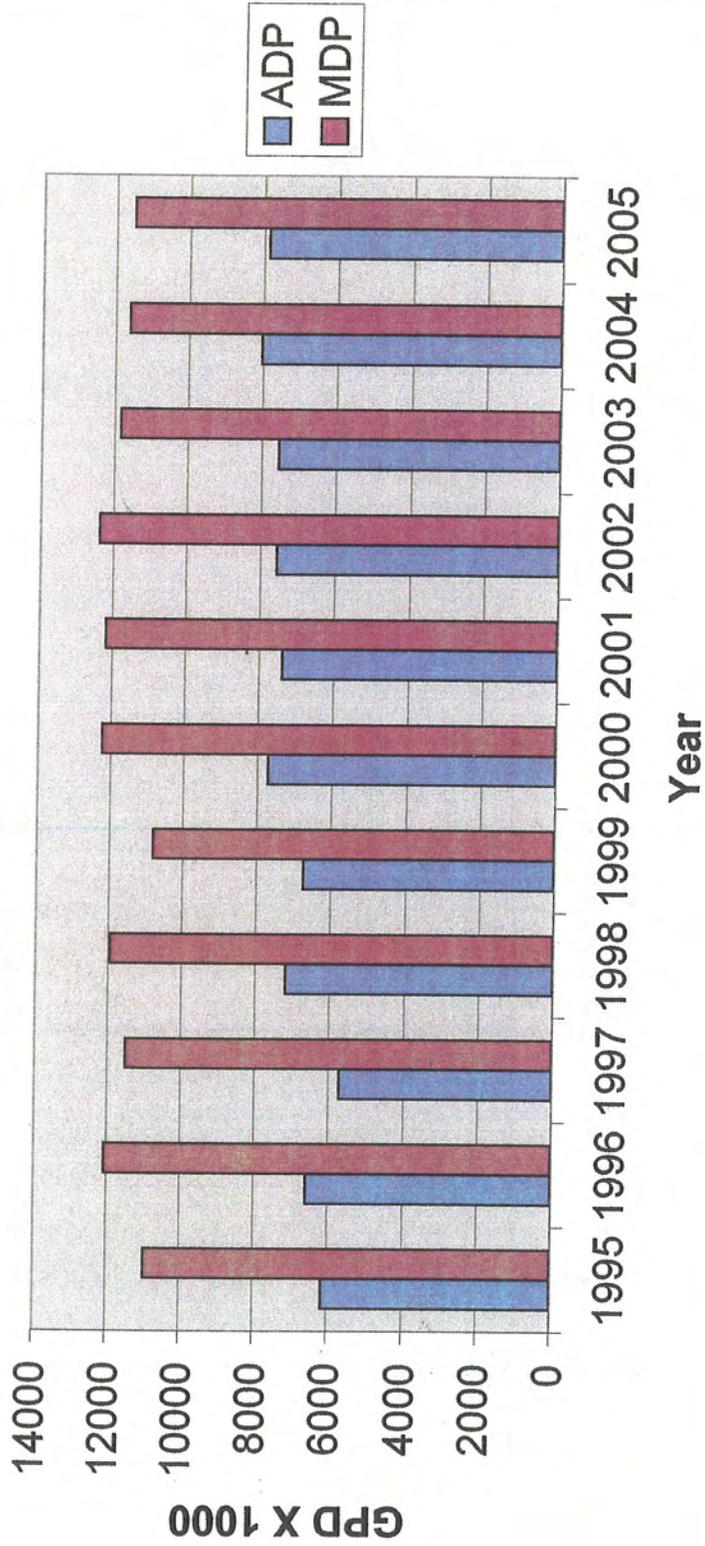


FIGURE 3-4. PAST TOTAL WATER PRODUCTION FOR THE MARCO ISLAND UTILITY

## Marco Island Past & Projected Water

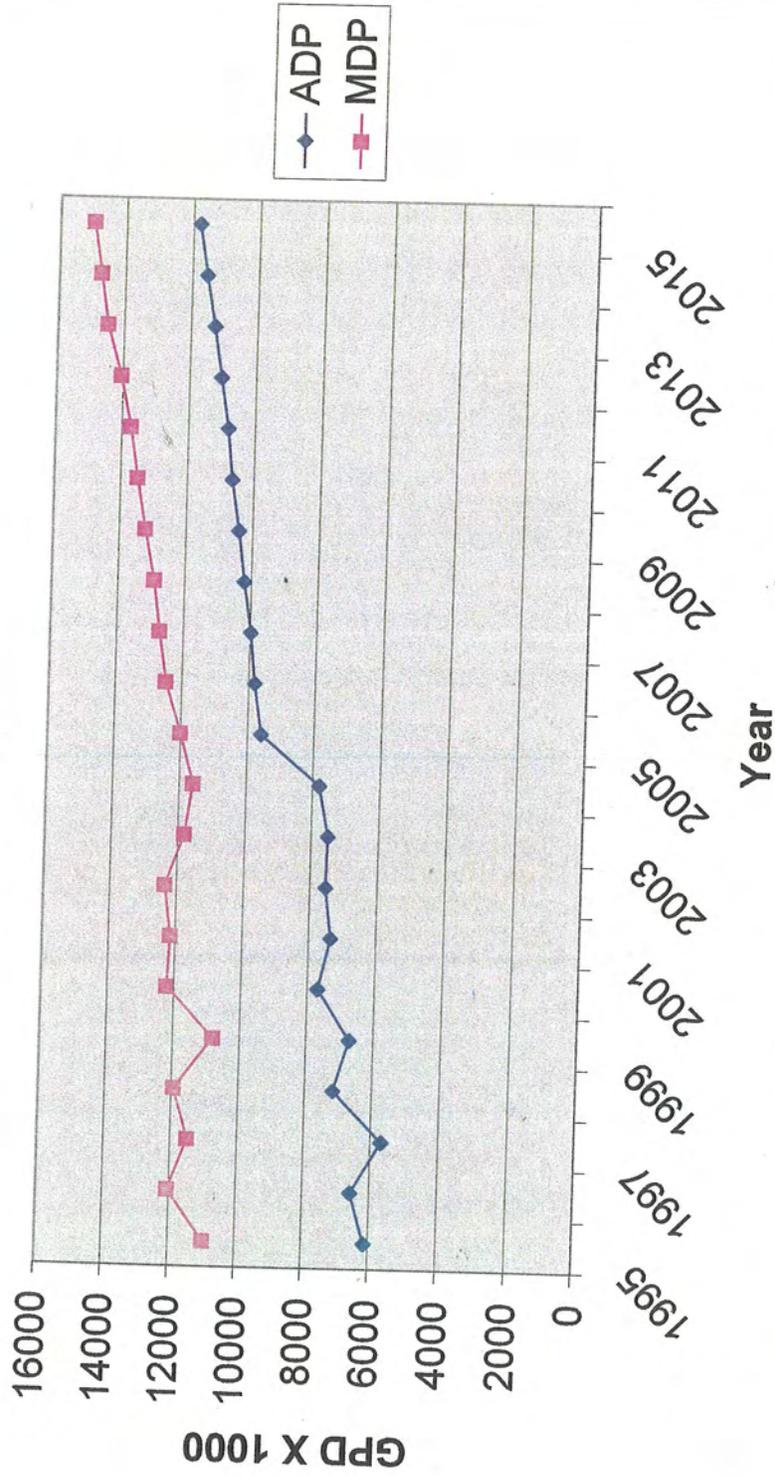


FIGURE 5-1. PAST TOTAL AND PROJECTED TOTAL WATER DEMAND FOR MARCO ISLAND UTILITY

## Marco Island Past & Projected Water

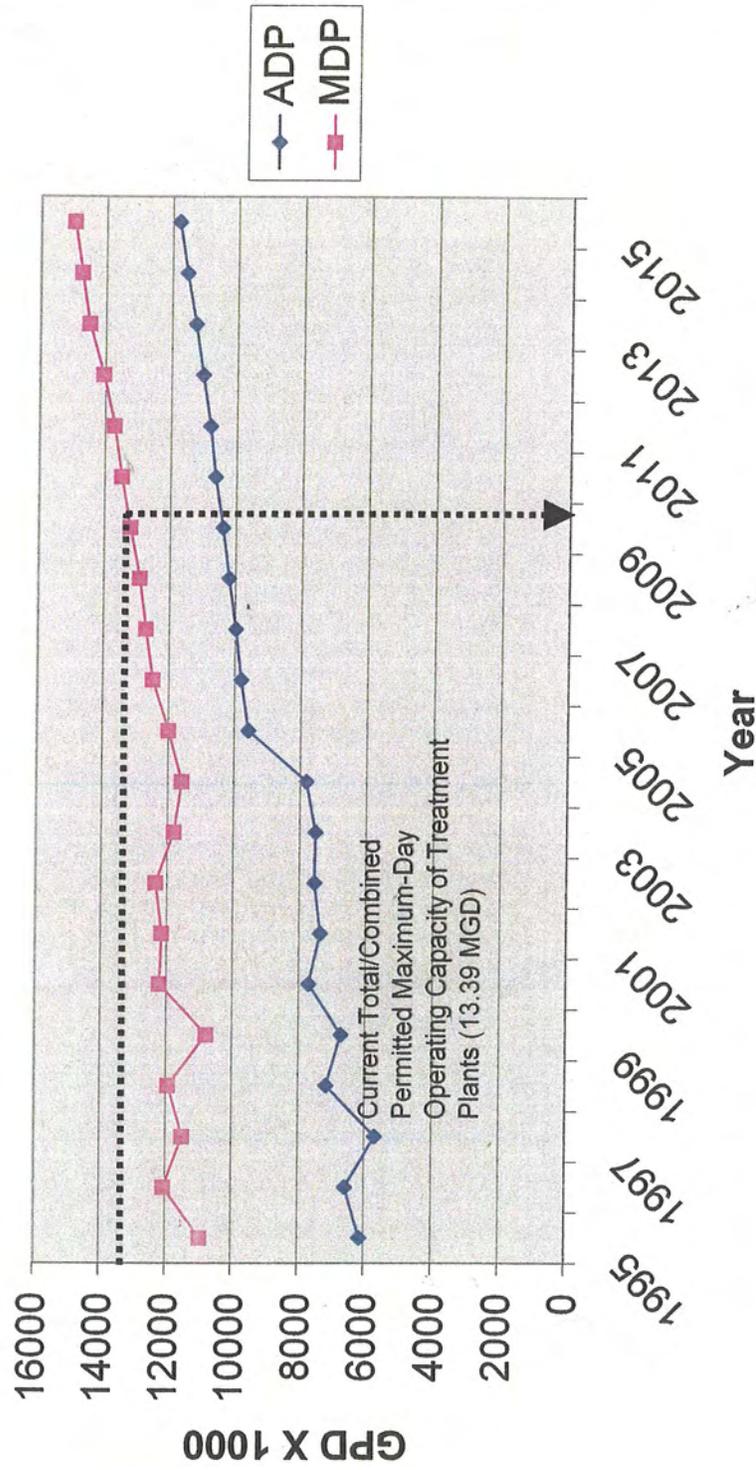


FIGURE 5-2. ESTIMATE OF WHEN TOTAL MAXIMUM-DAY WATER DEMAND WILL EXCEED TOTAL PERMITTED MAXIMUM-DAY OPERATING CAPACITY FOR THE UTILITY

## Marco Island Finished-Water Storage Need

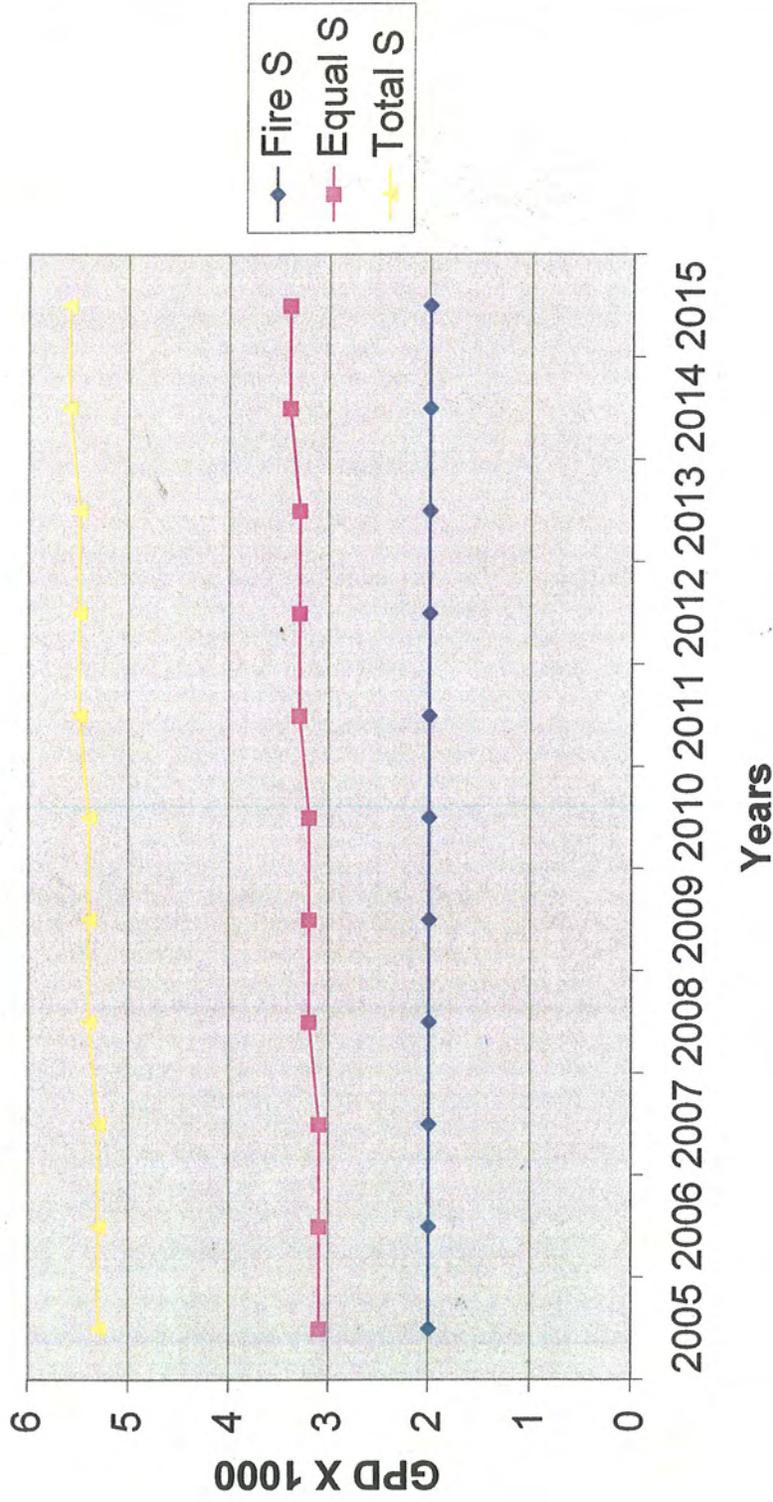


FIGURE 5-3. ESTIMATE OF WHEN PWS's TOTAL FINISHED-WATER STORAGE NEED WILL EXCEED EXISTING TOTAL USEFUL FINISHED-WATER STORAGE CAPACITY (7.0 MGD)

# **APPENDIX B**

## **TABLES**

## LIST OF TABLES

<i>CHAP. 2</i>	<i>Description of Public Water System</i>
TABLE 2.1	Public Water Supply - Existing Sources, Treatment, Pumping and Finished Water Facilities
TABLE 2.2	Surface Water Intake Pumping Stations
TABLE 2.3	Water Treatment Plants
TABLE 2.4	High Service Pump Stations
TABLE 2.5	Finished Water Storage Facilities
TABLE 2.6	Current and Projected Service Connections
<i>CHAP. 3</i>	<i>Past Water Production (Tables and Graphical Plots)</i>
TABLE 3.1	Past Water Production for the Marco Island Utility Lime Softening Plant
TABLE 3.2	Past Water Production for the Marco Shores Lime Softening Plant
TABLE 3.3	Past Water Production for the Reverse Osmosis Plant, Marco Island Utility
TABLE 3.4	Past Total Water Production for the Marco Island Utility
<i>CHAP. 4</i>	<i>Projected Water Demand and Finished Water Storage Need</i>
TABLE 4.1	Projected Water Use (SFWMD Report)
TABLE 4.2	City of Marco Island Projected Water Demand and Finished-Water Storage
<i>CHAP. 5</i>	<i>Recommendations for New or Expanded Facilities</i>
TABLE 5.1	Planned System Improvements/Expansion

**Table 2-1: Public Water Supply - Existing Sources, Treatment, Pumping and Finished Water Facilities**

**Wells**

Name/Location of Well	Pumps from: Source Aquifer	Pumps to: Name/Location of WTP	Design Capacity of Well Pump (MGD)
ASR#1/ Marco Lakes	Basal Hawthorn/Upper Floridan	Marco Island and/or Marco Shores Lime Softening Plants	1.584
ASR#2/ Marco Lakes	Basal Hawthorn/Upper Floridan	Marco Island and/or Marco Shores Lime Softening Plants	1.584
ASR#3/ Marco Lakes	Basal Hawthorn/Upper Floridan	Marco Island and/or Marco Shores Lime Softening Plants	1.584
RO well 1/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.691
RO well 2/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.547
RO well 3/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0
RO well 4/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.216
RO well 5/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.446
RO well 6/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0
RO well 7/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.698
RO well 8/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.648
RO well 9/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0
RO well 10/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.605
RO well 11/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.792
RO well 12/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.756
RO well 13/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.792
RO well 14/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.612
RO well 15/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.432
RO well 16/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.691
RO well 17/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.634
RO well 18/Marco Island RO Wellfield	Mid-Hawthorn	Marco Island RO Plant	0.691

Table 2-2.

Surface Water Intake Pumping Stations

Name/Location of Pumping Station	Pumps from: Surface Water Body	Pumps to: Name/Location of WTP	Number and Capacity of Pumps	Total Design Capacity of Pumping Station (MGD)
Intake Pump Station/ Northeast of High Service Pumping Station-Marco Lakes	Marco Lakes	ASR wells and/or temporary on-site storage tank	2 Pumps/ 2.88 MGD each	5.76 MGD
Intake Pump Station/ Southeast of High Service Pumping Station-Marco Lakes	Marco Lakes	ASR wells and/or temporary on-site storage tank	2 Pumps/ 7.20 MGD each	14.40 MGD

Table 2-3

Water Treatment Plants

Name/Location of Plant	Type of Treatment	Total Design Capacity of Source Facilities (MGD)	Design Capacity of Plant (MGD)		Permitted Operating Capacity of Plant (MGD)	
			Maximum Day	Peak	Maximum Day	Peak
Marco Island Lime Softening	Lime Softening	*20.16	6.67	NA	6.67	NA
Marco Shores Lime Softening	Lime Softening	*20.16	0.72	NA	0.72	NA
Marco Island RO	Membrane	9.251	6.00	NA	6.00	NA

\*Combined capacity of surface water intake pump stations at Marco Lakes.

Table 2-4

High Service Pump Stations

Name/Location of Pumping Station	Pumps from: Surface Water Body/Storage	Pumps to: Name/Location of WTP	Number and Capacity of Pumps	Total Design Capacity of Pumping Station (MGD)
High Service Pumping Station/ Marco Lakes	Marco Lakes	Marco Island and/or Marco Shores Lime Softening Plants	5 pumps/ Average of 6.88 MGD per pump	34.416
High Service Pumping Station/ Marco Island Lime Softening Plant	Ground level storage	Distribution System and/or Marco Island RO Plant	<u>6 pumps:</u> *1: 2,000 gpm **2: 1,200 gpm 3: 1,200 gpm 4: 2,000 gpm 5: 1,200 gpm 4: 2,000 gpm	13.824
High Service Pumping Station/ Marco Island RO Plant	Ground level storage	Distribution System	<u>7 pumps:</u> 1: 400 gpm 2: 1,000 gpm 3: 1,000 gpm 4: 1,000 gpm A: 3,300 gpm B: 3,300 gpm C: 3,300 gpm	19.152

\* To RO Plant

\*\* To RO Plant or Distribution System

9600  
13824000  
13.824

13300  
19152000  
19.152

Table 2-5

Finished Water Storage Facilities

Name/Location of Storage Facility	Type of Storage Facility	Useful Capacity of Storage Facility (MG)		
		Useful Fire Storage Capacity	Useful Equalization Storage Capacity	Total Useful Storage Capacity
Marco Island Lime Softening	Ground level storage tank			1.5
Marco Shores Lime Softening	NA			0.5
Marco Island RO	Ground level storage tank			5.0

TABLE 2-6. CURRENT AND PROJECTED SERVICE CONNECTIONS

	2003 Sewered			2003 Unsewered			Total BO U Total BO p Total 2003 pop		
	BO Units	BO Pop	2003 Pop	BO Units	BO Pop	2003 Pop			
SF	2,970	6,237	4,927	5,326	11,185	7,579	8,296	17,422	12,506
MF	6,566	13,788	13,729	274	576	378	6,840	14,364	14,107
PUD	2,051	4,308	3,539	303	637	586	2,354	4,945	4,125
Comm	2,102	4,414	4,008	534	1,121	626	2,636	5,535	4,634
Inst	11	22	22	10	20	15	21	42	37
Rec	48	100	100	6	13	13	54	113	113
Hotel	2,047	4,299	4,299	0	0	0	2,047	4,299	4,299
Govt	0	0	0	2	4	4	2	4	4
TOTAL							22250	46724	39825

BO = Build-out (assumed to be year 2025)

PAST WATER PRODUCTION BY MARCO ISLAND LIME SOFTENING PLANT (FINISHED WATER) (GALLONS) (x1000)

MONTHLY PARAMETER	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
JAN ADP	3,865	3,463	2,637	2,122	4,644	334	4,950	3,474	5,877	2,634
MDP	5,862	3,994	4,670	3,367	5,001	396	6,120	6,523	6,364	3,994
FEB ADP	3,777	3,640	4,685	4,000	3,590	4,044	4,724	5,338	6,015	5,000
MDP	4,769	4,651	6,664	5,102	4,101	4,509	5,103	6,709	6,562	6,000
MAR ADP	3,692	3,342	2,774	2,395	4,137	5,248	4,623	5,075	5,722	5,000
MDP	5,167	4,070	3,598	3,876	5,247	6,442	5,279	6,650	6,530	6,000
APR ADP	3,554	3,570	2,424	4,077	4,271	5,620	4,811	6,089	3,395	6,000
MDP	5,340	4,467	3,643	4,848	5,190	6,244	6,312	6,507	6,452	6,000
MAY ADP	2,608	3,621	2,455	5,390	3,346	5,808	4,772	6,158	5,475	6,000
MDP	3,460	4,540	3,646	6,575	4,520	6,303	6,228	6,585	6,090	6,000
JUN ADP	1,014	2,371	2,350	2,775	4,204	4,680	4,270	5,166	4,689	6,000
MDP	2,421	4,016	4,783	3,846	5,217	5,700	5,965	7,470	6,369	7,000
JUL ADP	1,721	2,824	3,440	1,908	1,380	4,491	3,592	4,360	4,879	6,000
MDP	3,698	3,986	4,680	3,555	4,319	6,057	5,087	5,843	6,368	6,000
AUG ADP	4,583	3,114	4,081	1,820	2,095	4,587	3,837	5,837	5,610	5,000
MDP	7,069	5,703	4,745	3,741	4,672	5,445	5,418	7,468	6,374	6,000
SEP ADP	2,538	3,182	1,493	1,974	3,778	4,249	4,242	4493	3,110	5,000
MDP	3,984	4,086	3,092	3,865	4,759	5,292	6,010	7,085	3,961	8,000
OCT ADP	2,986	3,185	3,054	4,775	2,066	5,877	4,660	4,361	4,658	6,000
MDP	2,940	4,922	3,864	5,789	4,017	6,847	5,288	5,847	5,589	6,000
NOV ADP	3,016	4,222	2,720	4,972	3,179	5,254	4,705	5,582	4,441	6,000
MDP	4,077	5,086	3,868	5,789	4,454	6,496	6,262	6,633	5,785	6,000
DEC ADP	3,592	3,022	1,573	2,539	3,309	5,759	5,540	5,477	6,320	6,000
MDP	4,790	6,550	2,695	3,460	4,476	6,311	6,303	5,975	7,467	6,000
ANNUAL ADP	3078.833	3296.333	2807.167	3228.917	3333.25	4662.583	4560.5	5117.5	5015.9167	5181.555
MDP	4464.75	4672.583	4162.333	4484.417	4664.417	5503.5	5781.25	6607.917	6159.25	6110.444
MDP/ADP Peaking Factor	1.450143	1.417509	1.482752	1.38883	1.39936	1.180354	1.267679	1.291239	1.2279411	1.179268

TABLE 3-1. PAST WATER PRODUCTION FOR THE MARCO ISLAND UTILITY LIME SOFTENING PLANT

PAST WATER PRODUCTION BY MARCO SHORES LIME SOFTENING PLANT (FINISHED WATER) (GALLONS) (x1000)

MONTHLY PARAMETER	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
JAN ADP	108	116	144	149	147	151	146	144	113	86
JAN MDP	191	159	222	202	380	227	207	190	217	148
FEB ADP	104	165	166	155	183	181	165	151	130	58
FEB MDP	232	295	210	225	304	221	229	200	214	110
MAR ADP	138	136	168	160	185	226	156	152	128	77
MAR MDP	365	370	324	342	309	396	229	203	183	152
APR ADP	94	150	135	117	199	191	142	134	111	88
APR MDP	222	278	206	171	255	253	209	233	246	149
MAY ADP	71	118	123	121	146	175	145	124	87	74
MAY MDP	150	197	214	210	247	257	208	198	182	133
JUN ADP	64	92	82	91	117	113	106	72	79	71
JUN MDP	133	198	127	133	171	160	190	191	271	161
JUL ADP	66	106	65	92	108	84	66	68	70	62
JUL MDP	132	430	168	154	175	145	136	164	113	138
AUG ADP	117	77	68	88	102	71	59	66	41	30
AUG MDP	174	182	110	197	158	105	99	115	96	106
SEP ADP	69	71	73	81	94	55	54	33	25	37
SEP MDP	84	185	118	145	138	85	94	61	79	89
OCT ADP	75	51	102	106	76	103	74	83	71	71
OCT MDP	88	106	127	148	155	177	153	178	299	299
NOV ADP	138	89	110	114	123	149	116	89	87	87
NOV MDP	181	143	192	206	162	197	215	176	137	137
DEC ADP	88	121	90	106	130	130	134	92	124	124
DEC MDP	139	302	162	156	188	244	174	245	423	423
ANNUAL ADP	94.33333	107.6667	110.5	115	134.1667	135.75	113.5833	100.6667	88.83333	64.777
ANNUAL MDP	174.25	237.0833	181.6667	190.75	220.1667	205.5833	178.5833	179.5	205	131.777
MDP/ADP (Peaking Factor)	1.847173	2.202012	1.644042	1.658696	1.640994	1.514426	1.572267	1.783113	2.307692	2.034318

TABLE 3-2. PAST WATER PRODUCTION FOR THE MARCO SHORES LIME SOFTENING PLANT

PAST WATER PRODUCTION BY R.O. PLANT (FINISHED WATER) (GALLONS) (x1000)

MONTHLY PARAMETER	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
JAN	1,595	3,029	4,254	2,133	2,903	3,797	3,784	2,096	2,714	2,634
ADP										
MDP	3,620	4,195	6,616	3,376	4,273	4,421	5,101	3,748	3,978	3,994
FEB	5,111	3,864	2,656	3,960	3,590	4,906	3,978	2,321	3,230	2,684
ADP										
MDP	5,965	4,545	4,249	5,102	4,101	5,921	5,101	3,744	4,539	4,314
MAR	3,710	3200	4,917	2,395	4,137	4,557	3,840	2,985	3,364	3,906
ADP										
MDP	5,410	4200	3,730	3,876	5,247	5,226	4,854	4,712	4,844	4,997
APR	3,037	3,819	3,026	4,077	4,271	3,859	3,784	3,451	3,285	3,707
ADP										
MDP	4,279	4,300	4,728	4,848	5,190	5,105	5,164	4,978	4,896	5,088
MAY	3,543	2,805	2,681	3,907	4,880	3,539	3,636	3,511	1,924	2,930
ADP										
MDP	4,575	4,062	4,728	5,162	5,351	3,877	5,731	4,816	4,290	4,251
JUN	3,088	2,861	1,331	5,636	1,379	1,751	3,174	1,689	1,349	2,793
ADP										
MDP	4,500	5,961	2,726	5,993	3,900	3,173	5,244	3,782	4,784	4,230
JUL	2,535	3,431	849	4,145	1,380	1,952	1,587	1,632	2,189	2,947
ADP										
MDP	3,325	4,335	2,519	3,525	4,319	3,507	3,365	3,258	3,395	4,360
AUG	2,040	2,767	1,482	4,964	2,095	1,005	1,585	1,229	1,191	
ADP										
MDP	3,361	4,136	2,831	6,296	4,672	2,731	4,067	3,872	3,122	
SEP	1,216	2,914	2,357	4,777	2,256	714	746	753	1,191	1,678
ADP										
MDP	2,111	5,116	4,250	6,313	3,971	2,039	2,533	2,214	3,840	3,509
OCT	2,736	2,196	2,667	2,748	4,298	1,574	1,422	3,176	3,037	
ADP										
MDP	4,277	5,078	4,416	4,191	4,992	2,842	3,427	5,489	4,468	
NOV	3,997	3,267	3,000	2,661	4,395	4,179	2,763	3,082	2,905	
ADP										
MDP	5,636	4,201	4,000	3,817	4,803	5,533	4,124	5,552	4,209	
DEC	3,139	4,022	4,300	4,609	3,543	3,125	2,083	2,162	2,807	
ADP										
MDP	4,254	5,219	5,000	4,933	3,992	4,067	3,415	3,597	3,933	
ANNUAL	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
ADP	2978.917	3179.545	2622	3834.333	3260.583	2913.167	2698.5	2340.583	2432.167	2909.875
MDP	4276.083	4649.815	4079.3	4786	4567.583	4036.833	4343.833	4146.833	4191.5	4342.875
MDP/ADP (Peaking Factor)	1.435449	1.462415	1.555797	1.248196	1.400849	1.38572	1.609721	1.771709	1.723361	1.492461

TABLE 3-3. PAST WATER PRODUCTION FOR THE REVERSE OSMOSIS PLANT, MARCO ISLAND UTILITY

MONTHLY PARAMETER		PAST WATER PRODUCTION BY MARCO ISLAND UTILITIES (TOTAL) (FINISHED WATER) (GALLONS) (x1000)											
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
JAN	ADP	5,568	6,608	7,035	4,404	7,694	4,282	8,880	5,714	8,704	5,354	7,447	
	MDP	9,673	8,348	11,508	6,945	9,654	5,044	11,428	10,451	10,559	8,136	9,966	
FEB	ADP	8,992	7,669	7,507	8,115	7,363	9,131	8,867	7,810	9,375	7,742	9,353	
	MDP	10,966	9,491	11,123	10,429	8,506	10,651	10,433	10,653	11,315	10,424	10,932	
MAR	ADP	7,540	6,678	7,859	4,950	8,459	10,031	8,619	8,212	9,214	8,983	9,356	
	MDP	10,942	8,640	7,652	8,094	10,803	12,064	10,362	11,565	11,557	11,149	11,436	
APR	ADP	6,685	7,539	5,585	8,271	8,741	9,670	8,737	9,674	6,791	9,795	8,966	
	MDP	9,841	9,045	8,577	9,867	10,635	11,602	11,685	11,718	11,594	11,237	10,990	
MAY	ADP	6,222	6,544	5,259	9,418	8,372	9,522	8,553	9,793	7,486	9,004	9,336	
	MDP	8,185	8,799	8,588	11,947	10,118	10,437	12,167	11,599	10,562	10,384	11,485	
JUN	ADP	4,166	5,324	3,763	8,502	5,700	6,544	7,550	6,927	6,117	8,864	6,245	
	MDP	7,054	10,175	7,636	9,972	9,288	9,033	11,399	11,443	11,424	11,391	8,739	
JUL	ADP	4,322	6,361	4,354	6,145	2,868	6,527	5,245	6,060	7,138	9,009	7,153	
	MDP	7,155	8,751	7,367	7,234	8,813	9,709	8,588	9,265	9,876	10,498	9,107	
AUG	ADP	6,740	5,958	5,631	6,872	4,292	5,663	5,481	7,132	6,842	5,030	6,953	
	MDP	10,604	10,021	7,686	10,234	9,502	8,281	9,584	11,455	9,592	6,106	8,701	
SEP	ADP	3,823	6,167	3,923	6,832	6,128	5,018	5,042	5,279	4,326	6,715	7,213	
	MDP	6,179	9,387	7,460	10,323	8,868	7,416	8,637	9,360	7,880	11,598	9,031	
OCT	ADP	5,797	5,432	5,823	7,629	6,440	7,554	6,156	7,620	7,766	7,931	6,921	
	MDP	7,305	10,106	8,407	10,128	9,164	9,866	8,868	11,514	10,356	9,632	8,779	
NOV	ADP	7,151	7,578	5,830	7,747	7,697	9,582	7,584	8,753	7,433	9,242	7,465	
	MDP	9,894	9,430	8,060	9,812	9,419	12,226	10,601	12,361	10,131	10,961	9,073	
DEC	ADP	6,819	7,165	5,963	7,254	6,982	9,014	7,757	7,731	9,251	8,601	7,773	
	MDP	9,183	12,071	7,857	8,549	8,656	10,622	9,892	9,817	11,823	10,044	8,905	
ANNUAL	ADP	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
	MDP	6152.083	6585.25	5711	7178.25	6728	7711.5	7372.583	7558.75	7536.917	8022.5	7850.1	
MDP/ADP		10,966	12,071	11,508	11,947	10,803	12,226	12,167	12,361	11,823	11,598	11,485	
(Peaking Factor)		1.782486	1.833036	2.015059	1.664333	1.605678	1.585424	1.650303	1.635323	1.568679	1.445684	1.51418	

TABLE 3-4. PAST TOTAL WATER PRODUCTION FOR THE MARCO ISLAND UTILITY

**TABLE 4.1  
PROJECTED WATER USE**

<b>Year</b>	<b>Projected Population</b>	<b>Per Capita Usage</b>	<b>Total Annual Use (MG)</b>	<b>Average Month Use (MG)</b>	<b>Maximum Month Use (MG)</b>	<b>Ratio Max:Avg</b>
2004	18,300	183,607	3,360	280	385	1:38
2005	18,900	182,857	3,456	288	395	1:37
2006	19,500	181,538	3,540	295	405	1:37
2007	20,100	179,105	3,600	300	412	1:37
2008	20,700	177,971	3,684	307	418	1:36
2009	21,200	177,170	3,756	313	427	1:36
2010	21,600	177,778	3,840	320	435	1:36
2011	22,000	177,273	3,900	325	442	1:36
2012	22,400	177,857	3,984	322	452	1:36
2013	22,900	177,118	4,056	338	462	1:37
2014	23,400	176,410	4,128	344	470	1:37

**TABLE 4.2  
CITY OF MARCO ISLAND PROJECTED WATER DEMAND AND FINISHED-WATER STORAGE**

Parameter	Year										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Service Population (thousands)	18.9	19.5	20.1	20.7	21.2	21.6	22.0	22.4	22.9	23.4	23.9
Per Capita Average Daily Demand, gpcd	455	452	448	446	444	437	427	430	439	442	441
Annual Average Daily Demand (ADD), MGD	8.60	8.83	9.0	9.23	9.43	9.67	9.83	10.1	10.3	10.6	10.8
MDD/ADD Peaking Factor	1.41	1.39	1.38	1.36	1.35	1.33	1.32	1.31	1.29	1.27	1.26
Maximum Day Demand (MDD), MGD	12.1	12.3	12.4	12.6	12.7	12.9	13.0	13.2	13.3	13.5	13.8
PHD/ADD Peaking Factor	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Peak-Hour Demand (PHD), MGD	1.33	1.36	1.39	1.42	1.45	1.49	1.52	1.55	1.59	1.63	1.66
Needed Fire Storage MG	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Needed Equalization Storage, MG	3.1	3.1	3.1	3.2	3.2	3.2	3.3	3.3	3.3	3.4	3.4
Total Needed Storage, MG	5.1	5.1	5.1	5.2	5.2	5.2	5.3	5.3	5.3	5.4	5.4

gpcd = gallons per capita per day, MG = million gallons, MGD = million gallons per day

TABLE 5-1. PLANNED SYSTEM IMPROVEMENTS/EXPANSION

CATEGORY	EXISTING CAPACITY	PLANNED EXPANSION					
		2007 (MGD)	2008 (MGD)	2009 (MGD)	2010 (MGD)	2011 (MGD)	2012 – 2017 (MGD)
Water Treatment Capacity	13.39 MGD			2.88			
Source Water Capacity	10.0 MGD						
ASR Wells (lake source)	6.00 MGD	4.5	1.5				
R.O. Wells	6.00 MGD						
Finished Water Storage	7.0 MGD		2.0	2.0			
High Service Pump Stations (to distribution system)	32.976 MGD						