Draft Planning Document for Marco Island

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EXECUTIVE SUMMARY

Southern States Utilities (SSU) has been providing water and sewer service to Marco Island and Marco Shores since 1989. Numerous evaluations were conducted throughout the years in order to project future water demands and wastewater flows. The projections were used to guide facilities expansions and their funding for Marco Island projects. Due to the continuing rapid growth on the Island, as evidenced by development activity, and the increasing tourist population, as evidenced by large peak seasonal water demands during the past few years, SSU has developed this document in order to update the existing planning information and to help guide SSU's short and long-term planning for water and wastewater facilities at Marco Island and Marco Shores.

Water demands for Marco Island reached a peak maximum daily demand of 10.3 mgd in March, 1994. This peak demand represents an increase of approximately 15 percent over the 1993 peak demand. Since 1991, the peak demands have increased by more than 5 percent each year. The trend necessitates an investigation into per capita consumption, conservation measures, and a firm plan for future facilities for additional raw water supply alternatives and water treatment facilities (WTP). Expansions of both the reverse osmosis (RO) wellfield and RO WTP are recommended in the future in addition to an aquifer storage and recover system (ASR) located at the raw water supply lakes and at the lime softening WTP.

SSU is currently working with the South Florida Water Management District (SFWMD) toward a cooperative funding program. The SFWMD may partially fund an aquifer storage and recovery system proposed by SSU for storing either raw or treated surface water in an underground aquifer during periods of reduced consumption. The water would then be used as needed during peak consumption periods. The SFWMD has not decided when this funding will be awarded.

An analysis of the current residential and commercial water usage patterns for Marco Island revealed excessive usage compared to other systems. Irrigation associated with condominiums and hotels, in particular, was very high. SSU is currently stepping-up water conservation efforts on the Island in order to deter excessive usage of potable water. This effort will support the Water Management Districts' goals of reducing per capita water consumption in the future. An updated conservation plan for Marco Island has been developed by SSU and is attached to this report as Appendix A.

Wastewater flows for Marco Island are not increasing as rapidly as the water demand since a portion of the Island is served by septic tanks. Collier County's franchise area includes a large portion of the Island which is serviced by septic tanks and which remains vacant. No significant increases in wastewater flows are anticipated until Collier County begins to sewer these areas and connect them to SSU's WWTP. Collier County could not provide SSU a schedule for sewering vacant areas or septic areas within their franchise area. Unfortunately, the amount of reclaimed water available for commercial and residential irrigation is limited by wastewater

flows. If reclaimed water were available for commercial and residential irrigation, potable water use could be significantly reduced.

The Marco Shores area is also experiencing rapid growth. Expansions of both the water treatment facilities and the wastewater treatment facilities are recommended in the future in order to accommodate the development plans for the Fairways and Marco Shores Golf and Country Club Developments.

Table of Contents

Section **Page**

EXECUTIVE SUMMARY i

1.0 INTRODUCTION . . . . . 1 - 1

2.0 EXISTING FACILITIES AND DEMANDS . . . . . 2 - 1
2.1 Existing Facilities . . . . . 2 - 1
2.1.1 Water Facilities . . . . . 2 - 1
2.1.2 Wastewater Facilities . . . . . 2 - 3
2.2 Existing Demands . . . . . 2 - 3
2.2.1 Water . . . . . 2 - 3
2.2.2 Wastewater . . . . . 2 - 3

3.0 WATER DEMAND PROJECTIONS . . . . . 3 - 1
3.1 Marco Island . . . . . 3 - 1
3.1.1 Historical Projections . . . . . 3 - 1
3.1.2 Revised Projections . . . . . 3 - 2
3.1.2.1 Projection Based on Historical Data . . . . . 3 - 3
3.1.2.2 Projection Based on Current Demand per Household Data . . 3 - 3
3.2 Conservation . . . . . 3 - 10
3.3 Marco Shores . . . . . 3 - 12
3.4 Demand Projection Summary . . . . . 3 - 14

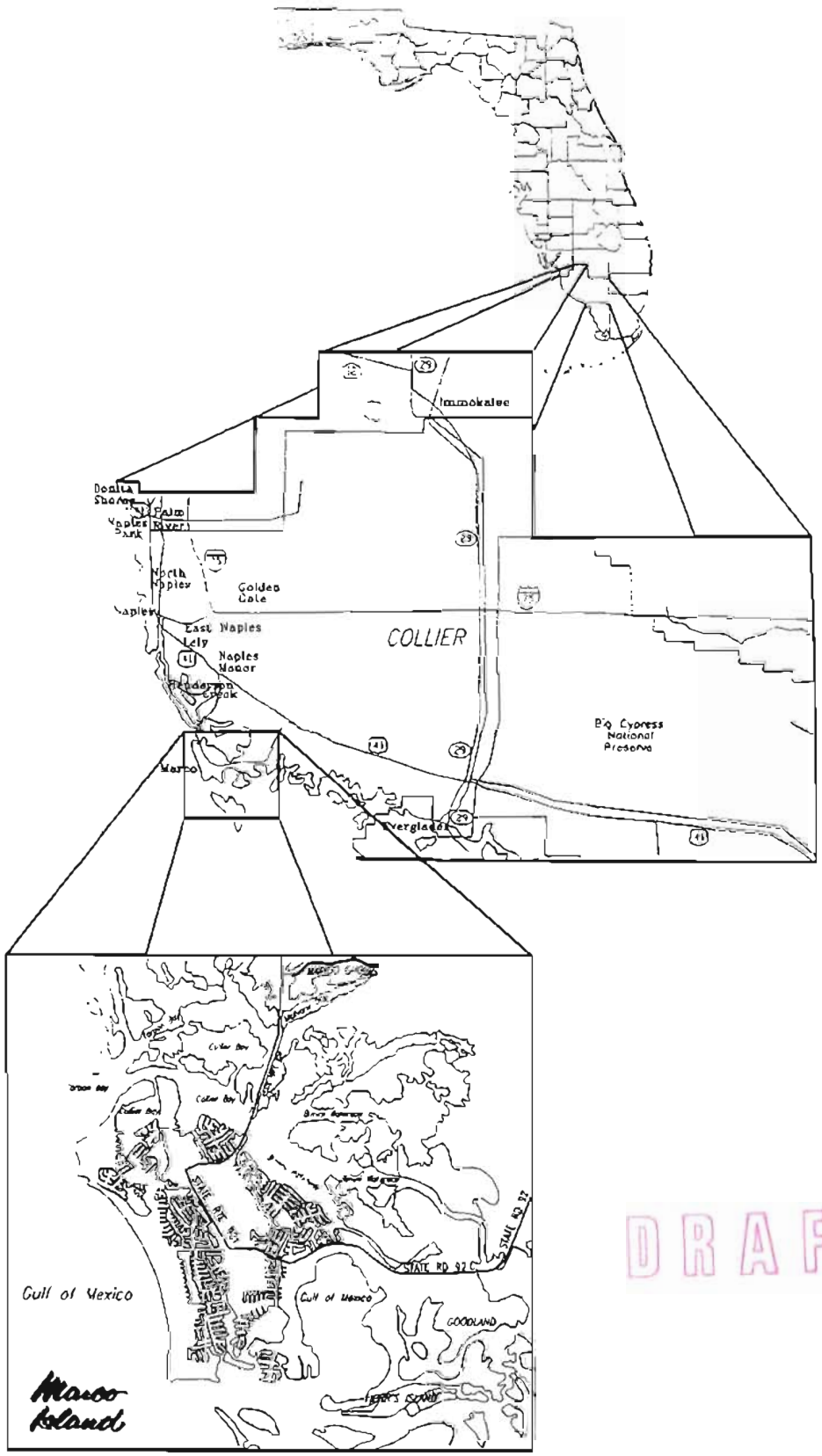
4.0 WASTEWATER FLOW PROJECTIONS . . . . . 4 - 1
4.1 Marco Island . . . . . 4 - 1
4.2 Marco Shores . . . . . 4 - 4

APPENDIX A . . . . . 4 - 11

1.0 INTRODUCTION

The following document was prepared in order to guide Southern States Utilities (SSU) short and long-term planning for water and wastewater facilities at Marco Island and Marco Shores. The document combines information and recommendations from various departments of SSU including Planning and Engineering, Environmental Services, Operations, Customer Service and Rates.

Marco Island is located in the extreme southwest portion of Collier County, approximately 30 miles south of the City of Naples, Florida, as shown on Figure 1-1. Marco Shores is located approximately 3 miles north of the upper edges of the Island off of Highway 951. SSU has been providing water and sewer service to Marco Island and Marco Shores since 1989.



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ENGINEERING

MARCO ISLAND LOCATION MAP

SCALE: N.T.S.

FIGURE 1-1

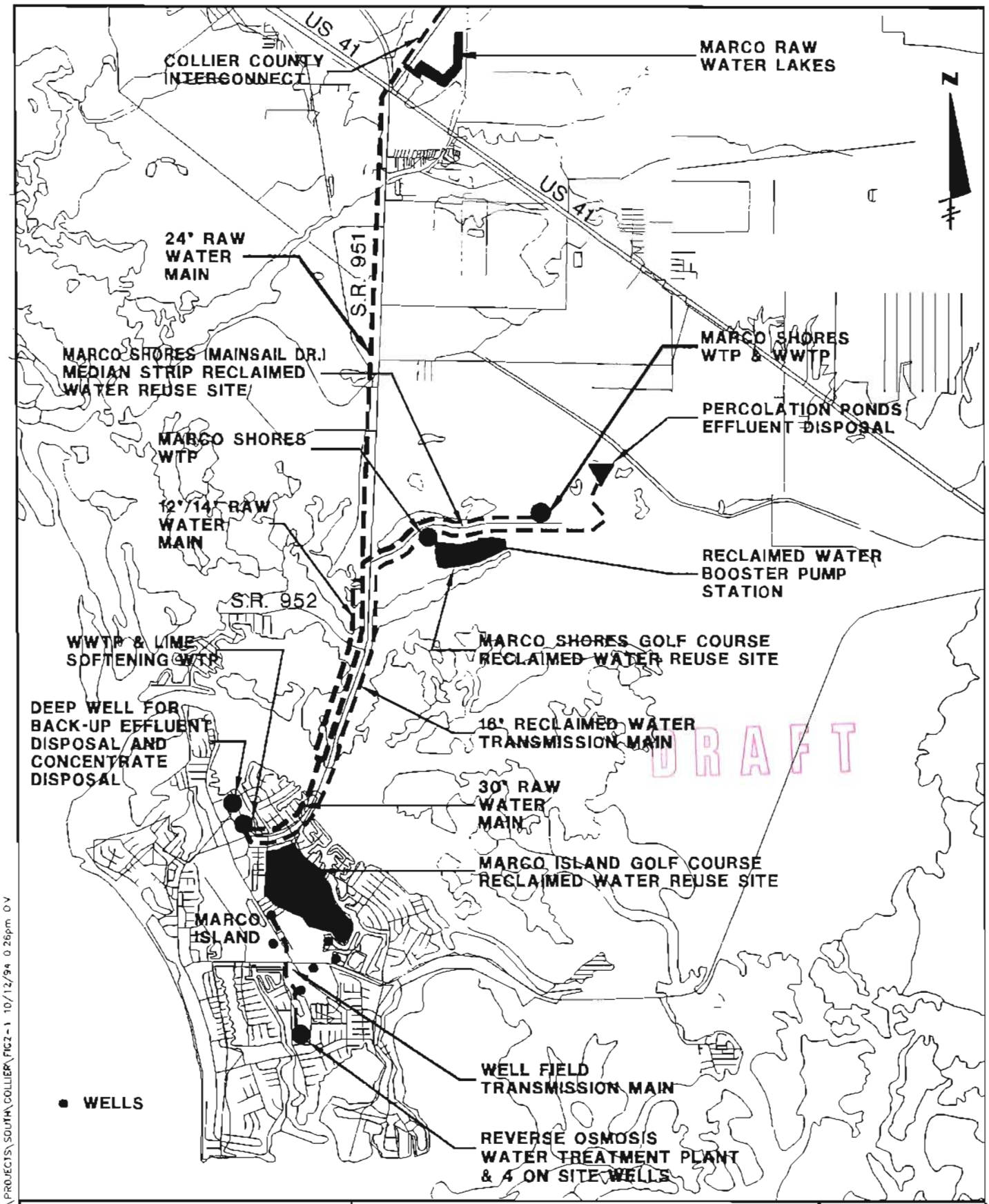
2.0 EXISTING FACILITIES AND DEMANDS

2.1 Existing Facilities

The following section presents a summary of the existing water and wastewater facilities for Marco Island and Marco Shores as shown on Figure 2-1.

2.1.1 Water Facilities

Southern States Utilities (SSU) provides water service to the entire Island of Marco and to the Marco Shores area to the north. The water service areas are shown on Figure 2-2. SSU owns and operates a 5-mgd lime softening water treatment plant (WTP) and a 4-mgd reverse osmosis (RO) WTP on separate sites on Marco Island. SSU owns and operates a 0.72-mgd lime softening WTP at Marco Shores. A summary of the existing water facilities for Marco Island and Marco Shores is provided as Table 2-1. Site plans for the Marco Island Lime Softening WTP and the Marco Island RO WTP are provided as Figures 2-3 and 2-4, respectively. A site plan for the Marco Shores Lime Softening WTP is provided as Figure 2-5.



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MARCO ISLAND EXISTING WATER AND WASTEWATER FACILITIES

SCALE: 1" = 7000'

FIGURE 2-1

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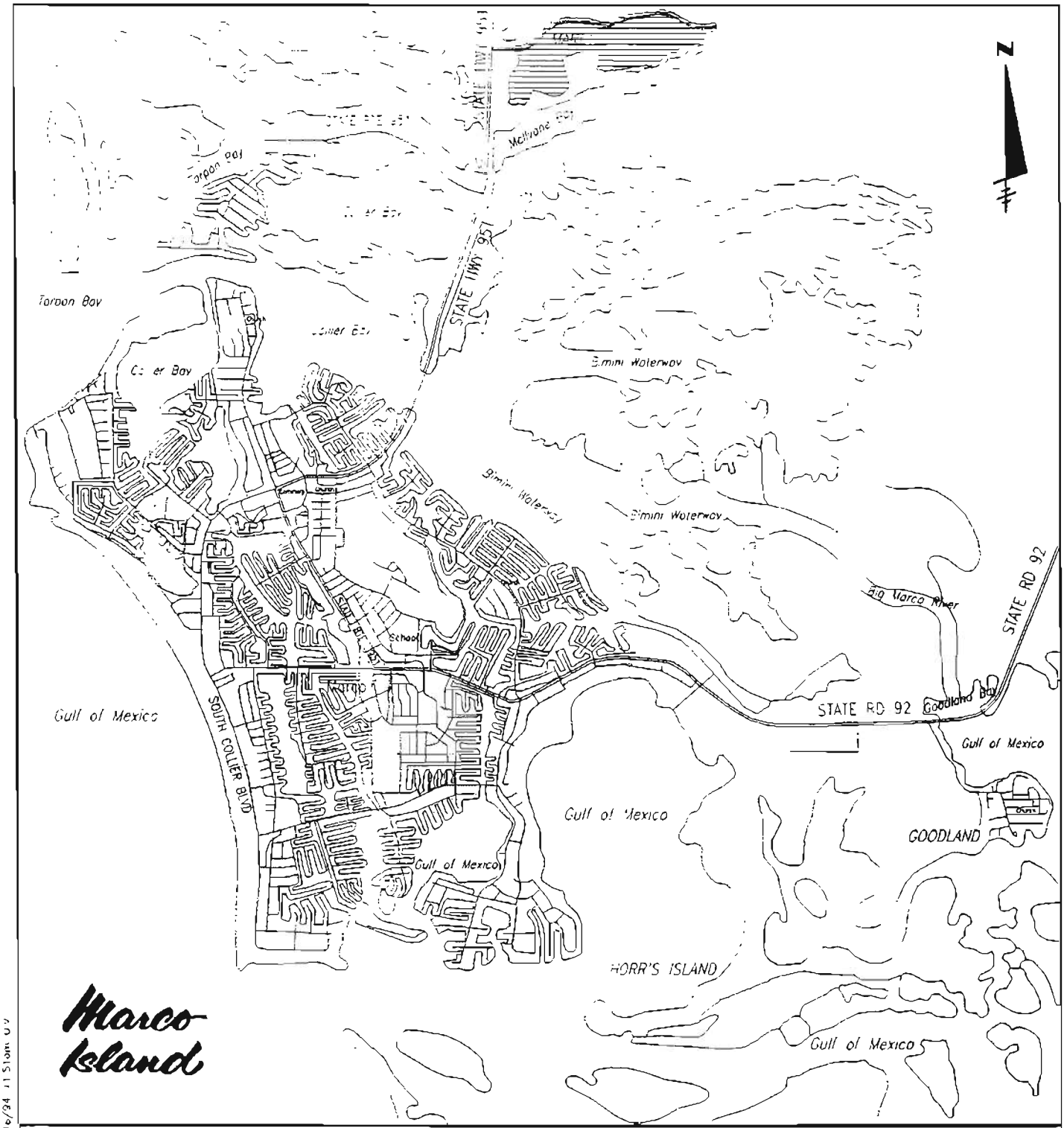

LEGEND:

- MARCO ISLAND (SOUTHERN STATES UTILITIES, INC.)
- MARCO SHORES (SOUTHERN STATES UTILITIES, INC.)

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MARCO ISLAND/MARCO SHORES WATER SERVICE TERRITORY BOUNDARIES

SCALE: 1" = 5,000

FIGURE 2-2

Table 2-1
Existing Water Facilities[d]

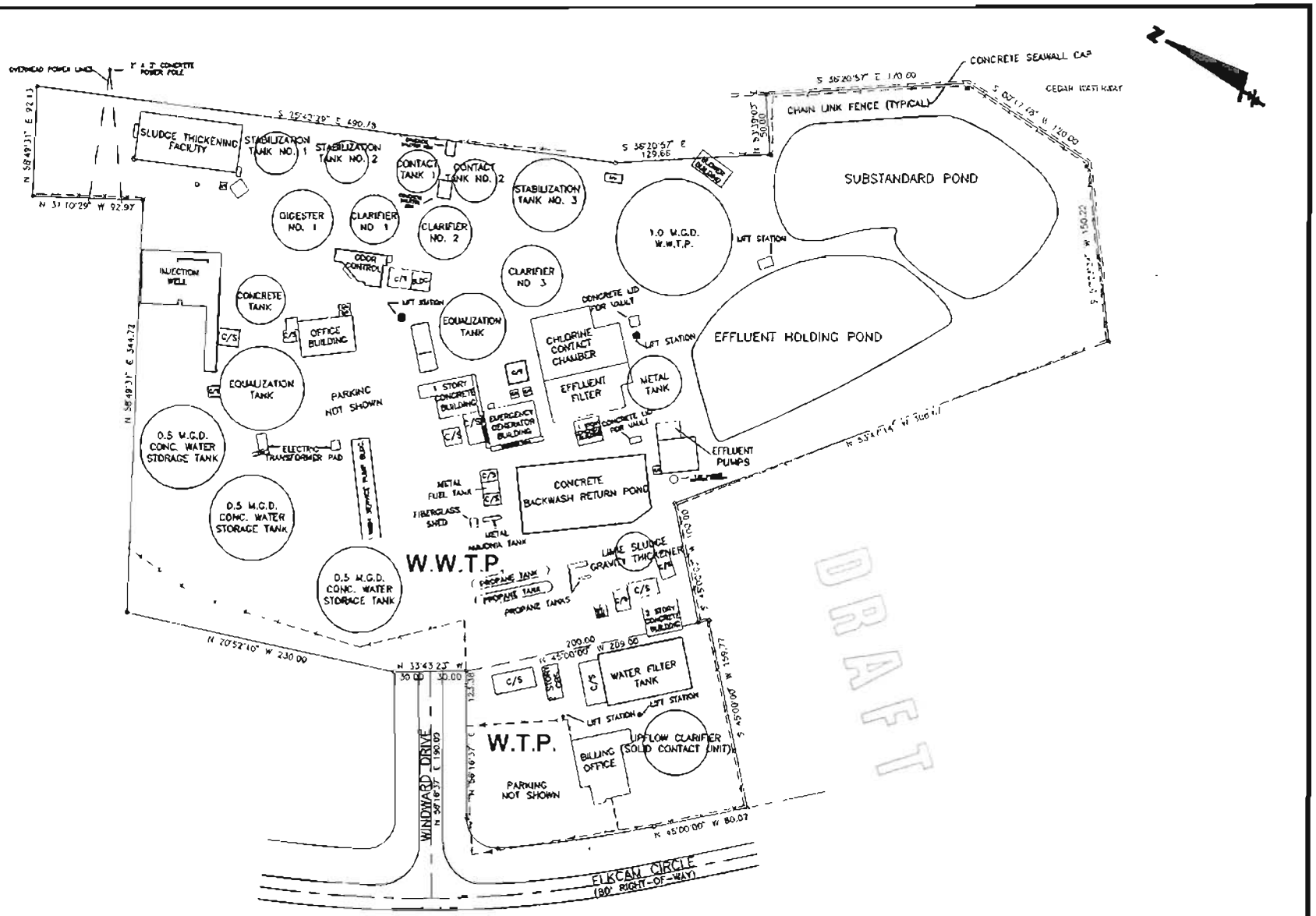
	Marco Island			
	Lime WTP	**RO WTP**	**Marco Shores WTP**	**Total**
Treatment Design Capacity (mgd)	5	4	0.72	9.72
Storage Capacity (mg)	1.5	5	0.5	7.0
Raw Water Supply				
▸ Lakes (mgd)	5		0.3	5.3
▸ Wells (mgd)		4		4.0
▸ Collier County Interconnect[c]	---		---	---
	gpm/hp	gpm/hp	gpm/hp	
High Service Pump Capacity	2,000/125	400/40	300/20	
	1,000/75	1,000/75	1,200/75	
	1,000/75	1,000[a]/75	1,200/75	
	1,800/125	1,000/60		
	1,000/75	3,300/200		
	2,000/125	3,300/200		
		3,300/200		
Total (gpm-hp)	8,800/600	13,300/850	2,700/170	24,800
(mgd)	12.7	19.2	3.9	35.8
Firm[b] Pumping Capacity (mgd)	12.7	14.4	3.9	31.0

[a] Standby pump with gas powered engine.

[b] Based on the largest unit out of service if generators are not available. Generators are available at the Marco Island and Marco Shores lime plants. This summation does not account for the pumping capacity required for fire flow demands. It is also important to note that the actual firm pumping capacity will be reduced when the pumps are operating together on their system head curves.

[c] 12-inch interconnect can accommodate approximately 3-mgd from Collier County. SSU has an "as available" contract with Collier County for 1 mgd. Firm capacity is currently not available from the County for SSU for at least another 2 years.

[d] Capacity available as of January 1, 1995.



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MARCO ISLAND
LIME SOFTENING WATER TREATMENT PLANT AND WASTE WATER TREATMENT PLANT

SCALE: 1" = 125'

FIGURE 2-3

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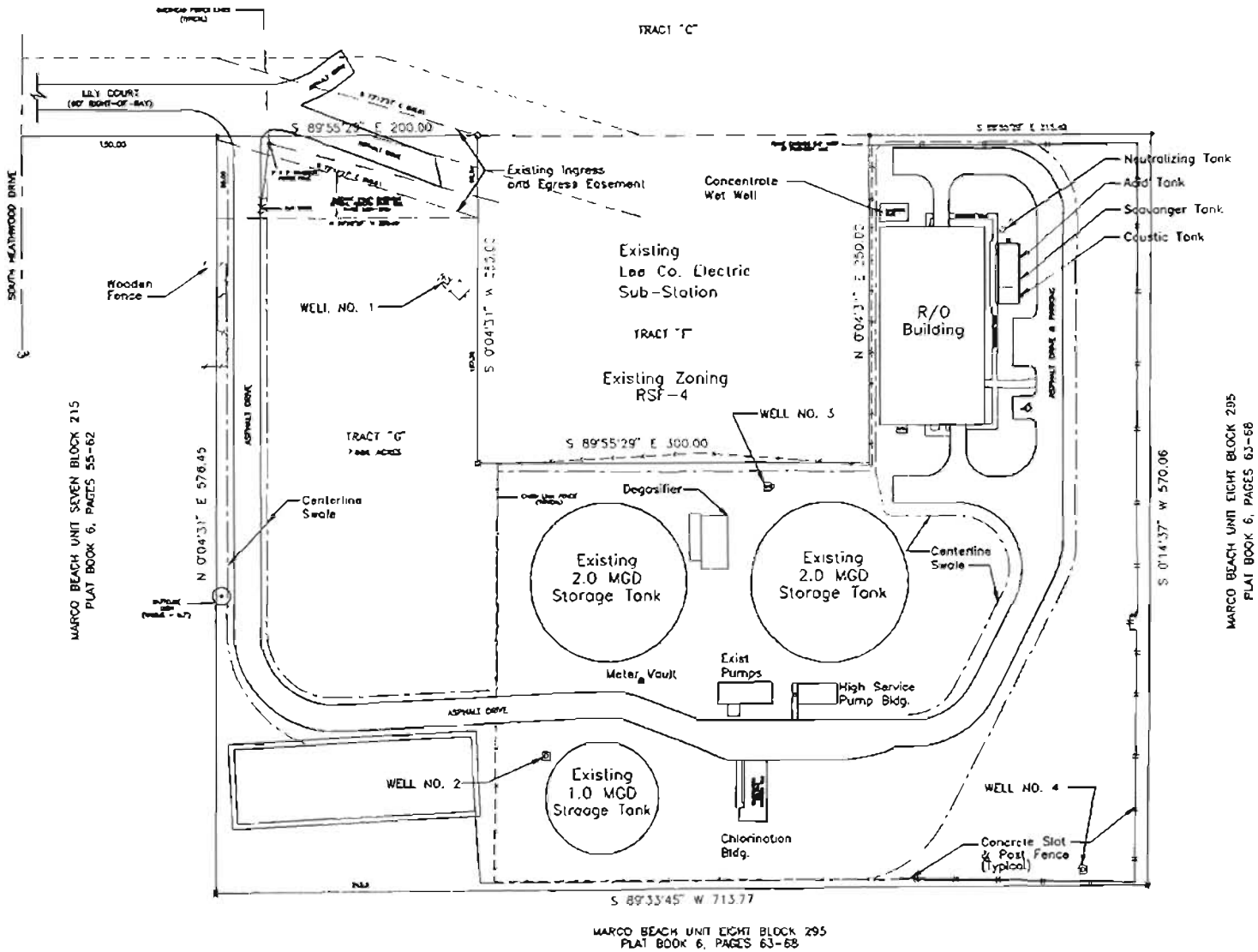

Southern States Utilities ENGINEERING

MARCO ISLAND
4.0 M.G.D. RIVERSE OSMOSIS WATER TREATMENT PLANT

SCALE: 1" = 125'

FIGURE 2-4

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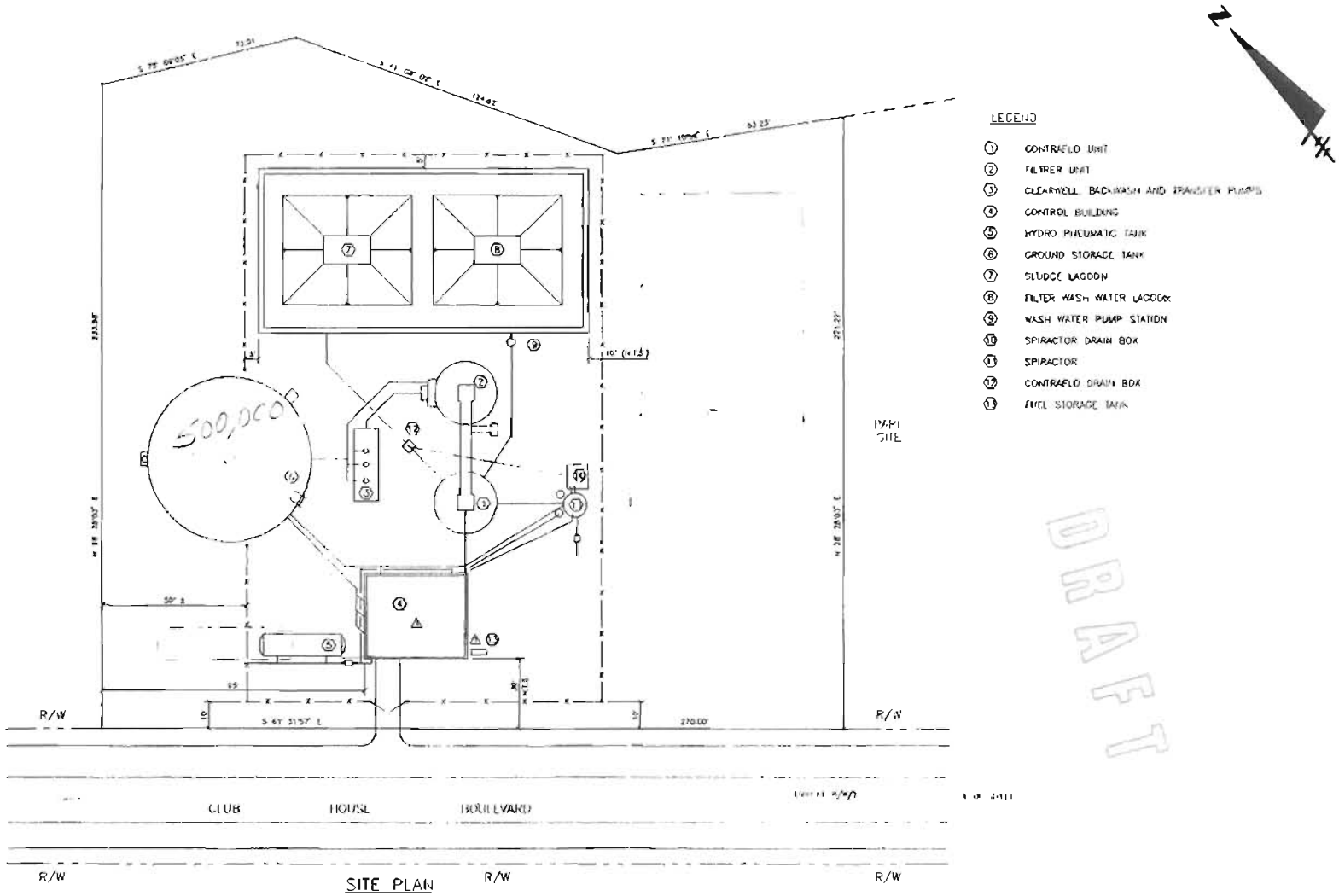


SITE PLAN

SSU Southern States Utilities ENGINEERING

MARCO SHORES WATER TREATMENT PLANT

SCALE: 1" = 60'

FIGURE 2-5

PLOT DATE: Oct 12, 1994 - 12:42:21

Acad 12_c40 C:\DWGS\PROJECTS\SOUTH\COLLIER\FIG2-5 10/12/94 9:42am Q.V

2.1.2 Wastewater Facilities

SSU provides wastewater collection only to limited portions of Marco Island. Collier County and North Marco Utilities also collect wastewater from limited portions of the Island; however, this wastewater is conveyed to the SSU system for treatment at the Marco Island Wastewater Treatment Plant (WWTP). Figure 2-6 depicts the various sewer service areas. The remaining developed areas of the Island are serviced by individual on-site septic tanks systems. The Marco Shores service area is the same for water and wastewater service by SSU.

A summary of the existing wastewater facilities for Marco Island and Marco Shores is provided as Table 2-2. Both facilities use the contact stabilization activated sludge process for treatment of wastewater. Reclaimed water is used for median irrigation and irrigation of the Marco Island and Marco Shores Golf Courses. Percolation ponds also provide for effluent disposal. An injection well located on-site is used as a back-up effluent disposal method and for concentrate disposal from the RO WTP.

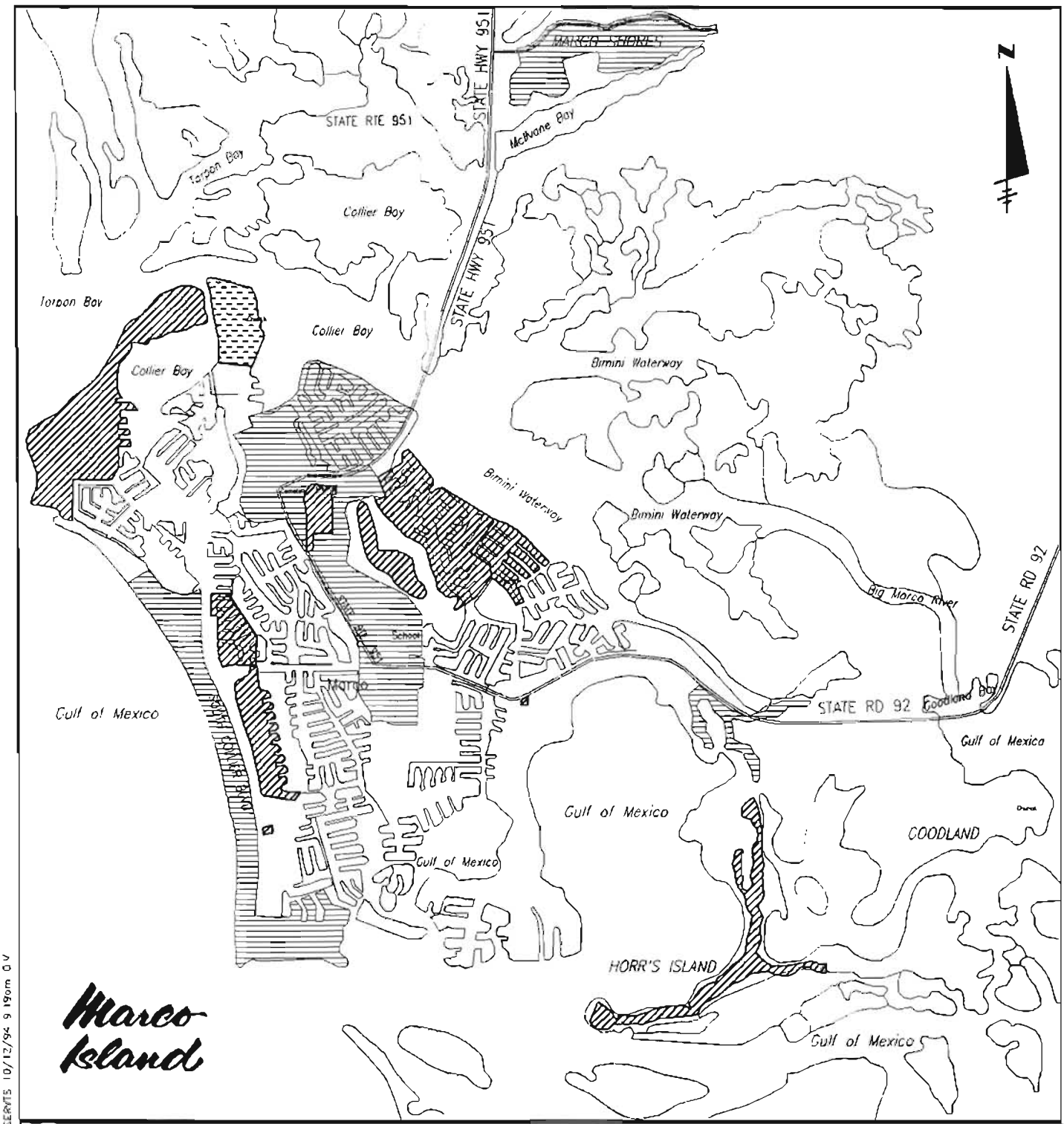
2.2 Existing Demands

2.2.1 Water

Historical water demands for Marco Island are tracked by SSU by summing the daily demands recorded on the Monthly Operating Reports (MOR's) for each of the lime softening and RO facilities. The historical water demands on a maximum daily and average daily flow basis for Marco Island are shown on Figure 2-7. The historical water demands for Marco Shores are shown on Figure 2-8.

2.2.2 Wastewater

Historical wastewater flows for Marco Island based on MOR data are depicted graphically as Figure 2-9. Historical wastewater flows for Marco Shores based on MOR data are depicted graphically as Figure 2-10. The annual average daily flow (AADF), the maximum month average daily flow (MMADF), and three month average daily flow (TMADF) are presented. The values provided for the TMADF represent the highest average flow for any three consecutive months of a given year.



LEGEND:

- OLD MARCO (NORTH MARCO UTILITIES)
- COLLIER COUNTY
- SOUTHERN STATES UTILITIES

NOTE:

WASTEWATER COLLECTED IN THE OLD MARCO AND COLLIER COUNTY SERVICES AREAS IS TREATED IN SSU'S MARCO ISLAND WASTEWATER TREATMENT PLANT

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MARCO ISLAND/MARCO SHORES SEWER SERVICE TERRITORY BOUNDARIES

SCALE: 1" = 5,000

FIGURE 2-6

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Table 2-2
Existing Wastewater Facilities

	Marco Island WWTP	Marco Shores WWTP	Total
Treatment Design Capacity (mgd)	3.5[a]	.09	3.59

Effluent Disposal - combined system for Marco Island and Marco Shores:

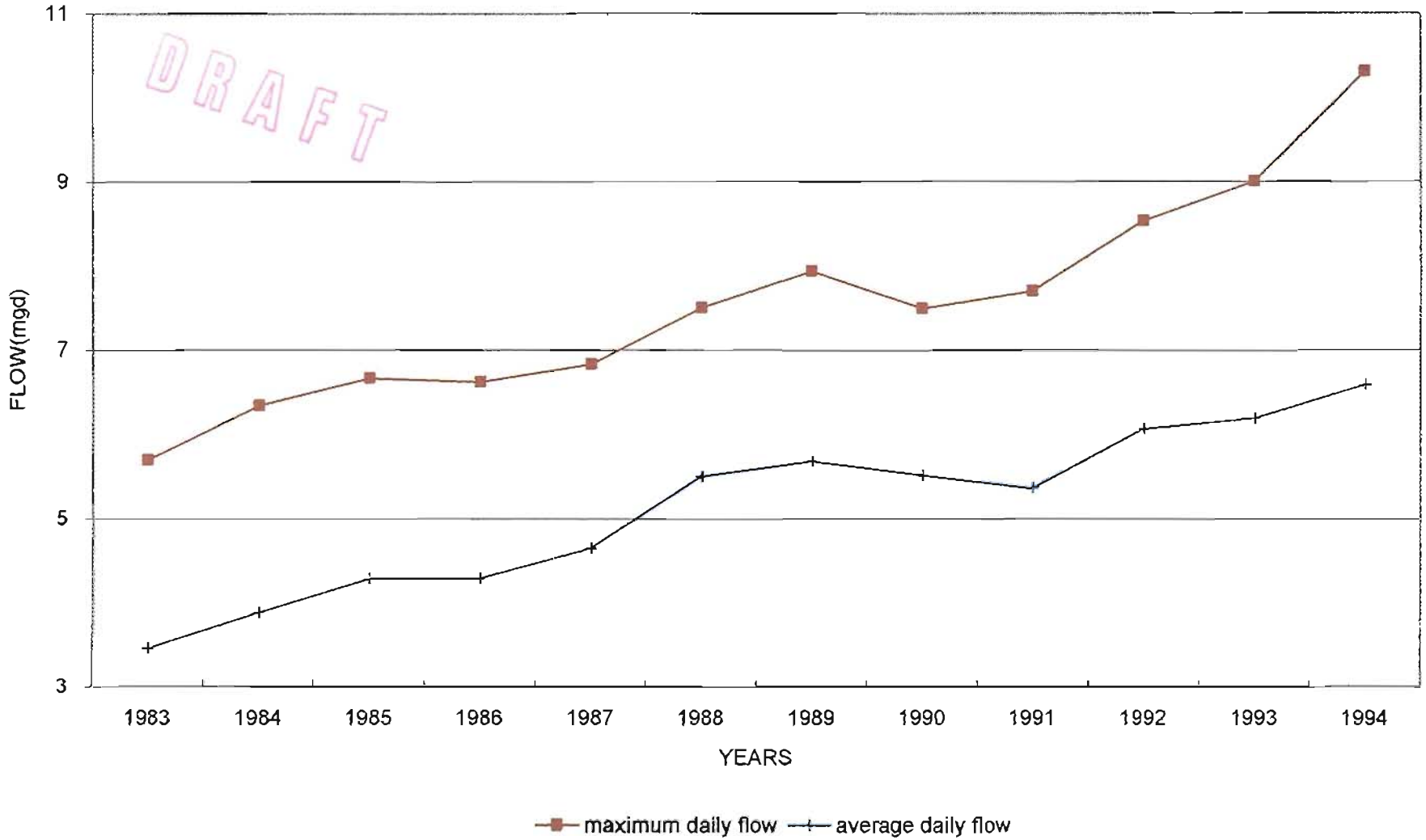
Reuse via Golf Course[b] and Median Irrigation	0.5
Perc Ponds	3.5
Total	**4.0 mgd**
Back-up Injection Well	5.5[c] Back-up

[a] Facility is permitted by FDEP for 3.5-mgd on an average daily basis.

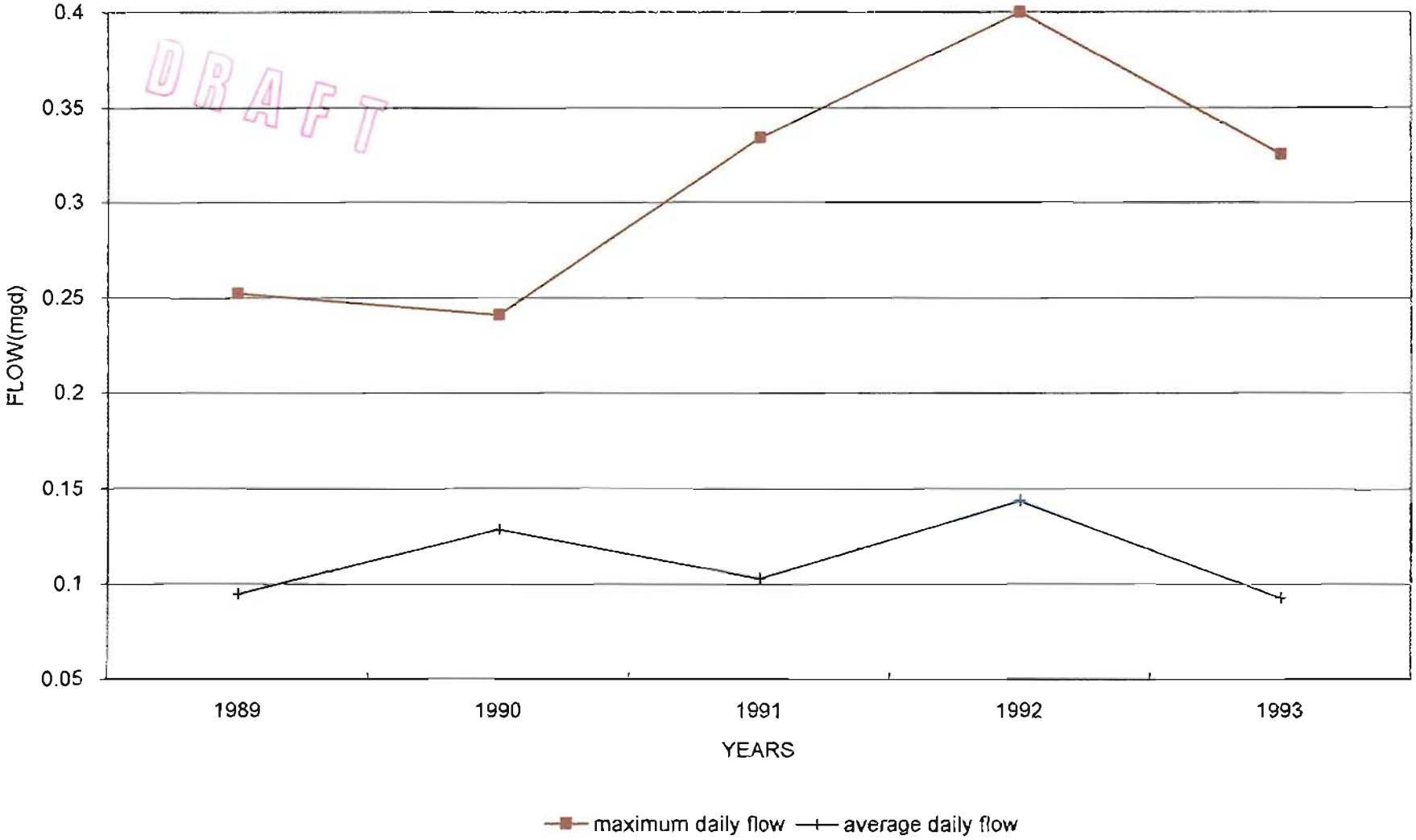
[b] Marco Island and Marco Shores Country Clubs.

[c] Concentrate disposal from RO plant must be deducted (1.33 mgd at 4.0 mgd RO plant flow). The well is permitted for 5.5 mgd.

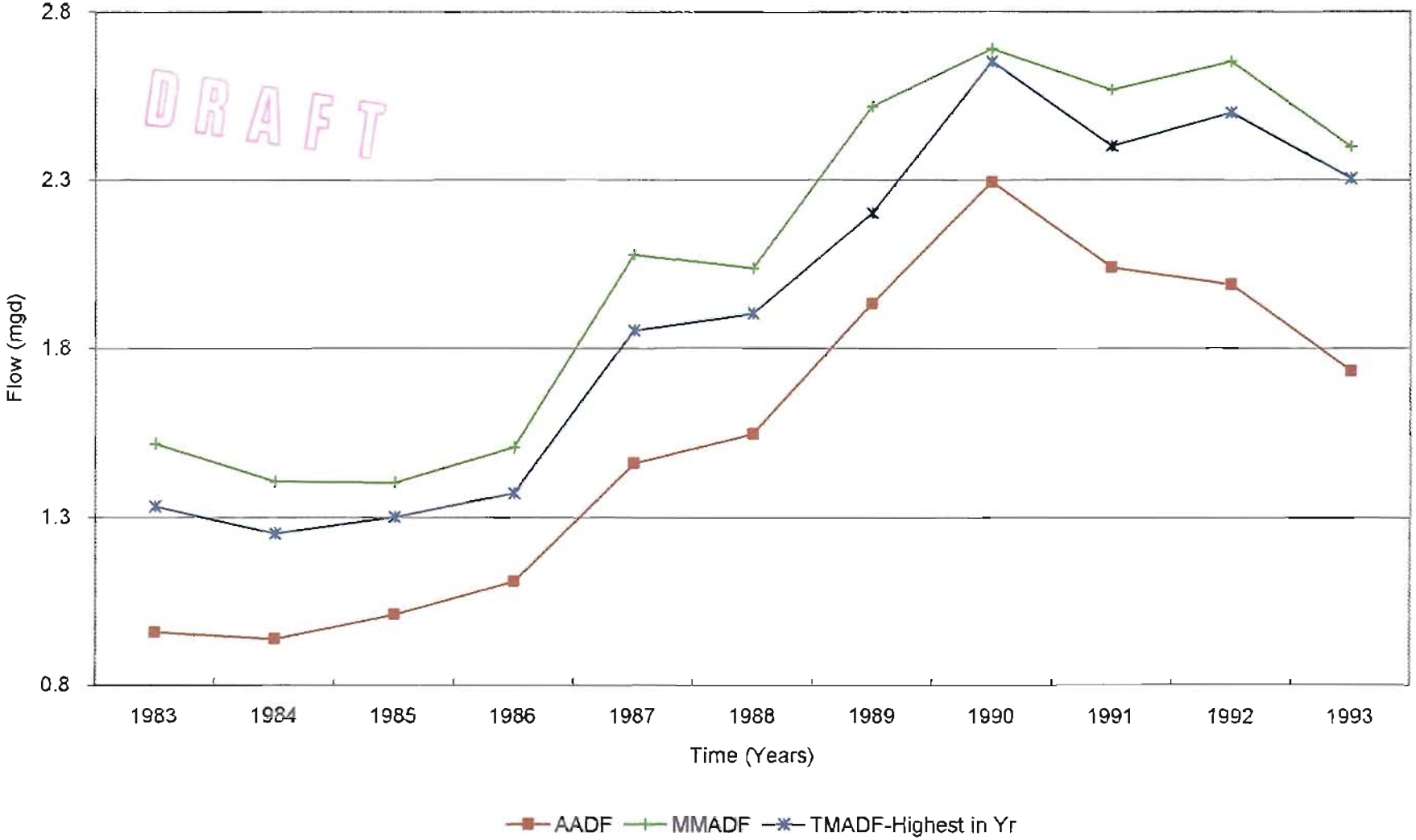
Marco Island Historical Water Demand
Based on MOR Data
Figure 2-7



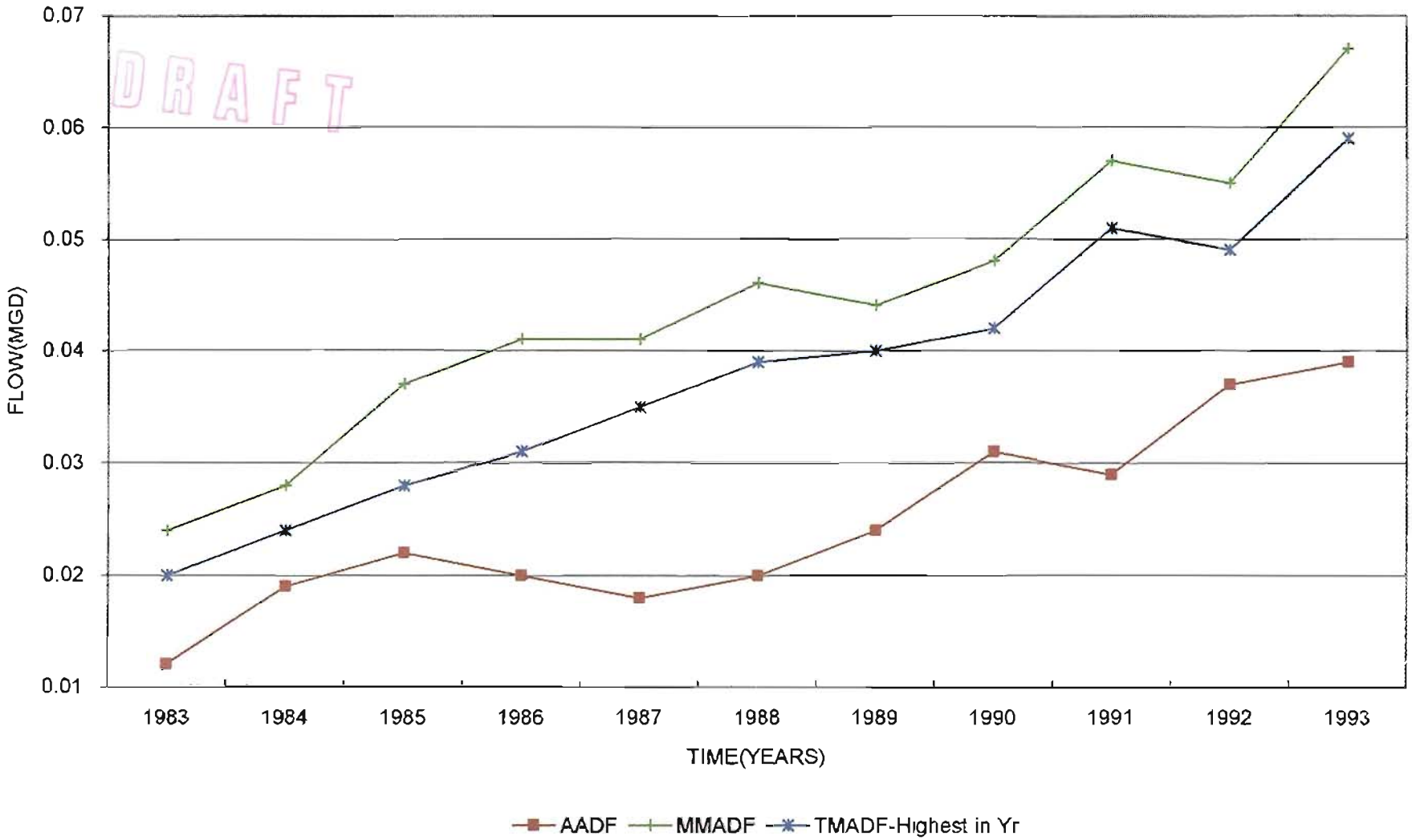
Marco Shores Historical Water Demand
Based on MOR Data
Figure 2-8



Historical Marco Island
Wastewater Flows
Figure 2-9



Marco Shores
Historical Wastewater Flows
Figure 2-10



3.0 WATER DEMAND PROJECTIONS

3.1 Marco Island

Southern States Utilities (SSU) has conducted numerous evaluations throughout the years in order to accurately project future water demands for Marco Island. For Marco Island, water demands have been difficult to forecast due to the large seasonal tourist population, large irrigation demands, and abundant development activity. The water demand projections presented herein attempt to consider the previous projections in addition to new information on water usage, proposed developments, and buildout projections for the Island. The projections should be reviewed and updated annually in order to best project water demands for the Island. The projections were developed in conjunction with the Marco Island Vision Planning Committee. The following sections present the water demand projections developed in previous reports for Marco Island and the revised projections developed herein.

3.1.1 Historical Projections

Figure 3-1 presents water demand projections which were developed during previous evaluations. The projections range from a low of 8.8 millions gallons per day (mgd) in 1995 to a high of 19.26 mgd in the year 2010. The assumptions used to develop each projection are summarized in Table 3-1.

Marco Island Maximum Day Water Demand
Projections from Previous Evaluations
Figure 3-1

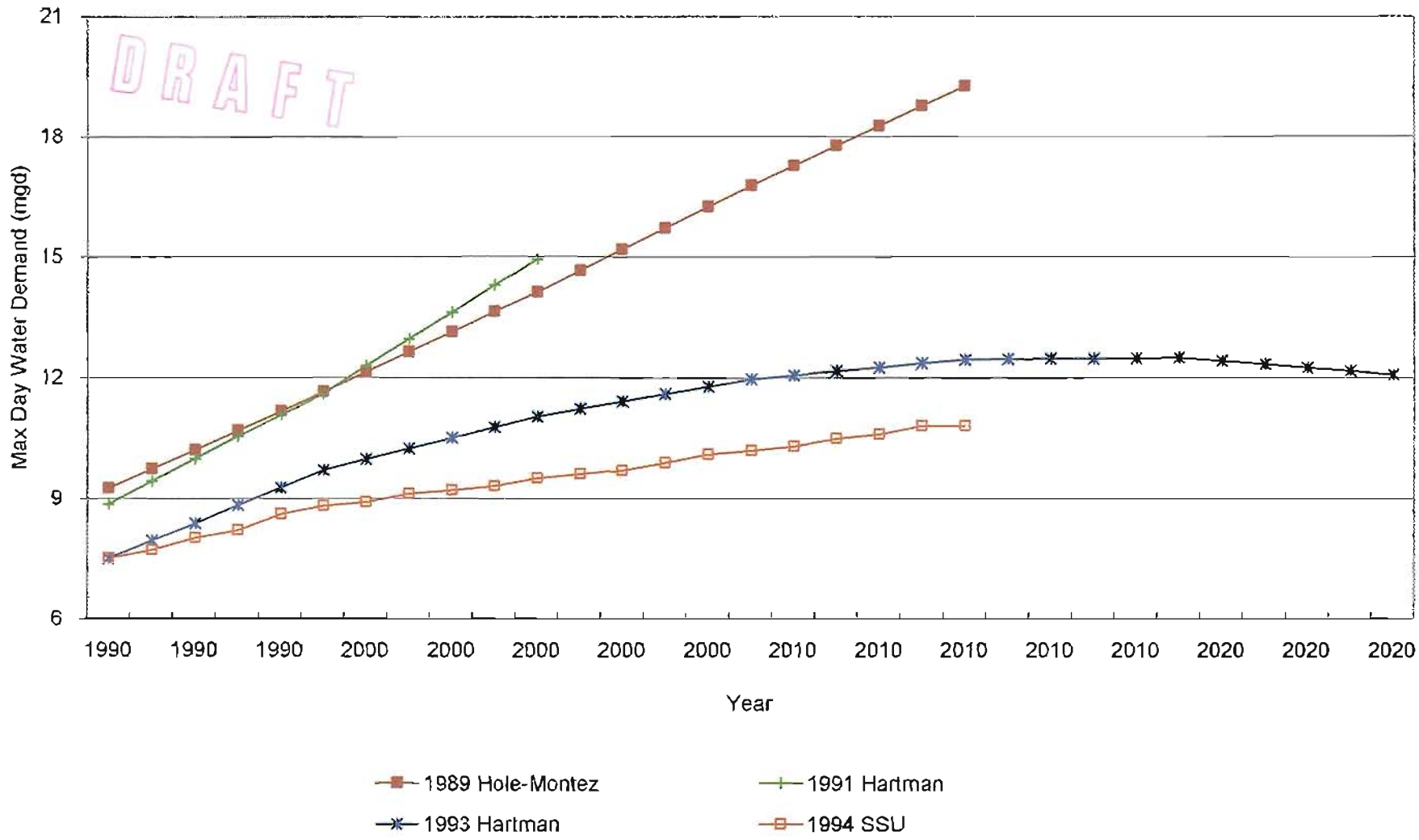


Table 3-1
Historical Water Demand Projections

Projection No.	Developed By	Year Developed	Basis	Does Projection Account for Conservation?
1	Hole-Montez	1989	Housing and population estimates per 1988 Demographic and Economic Profile of Collier County	No
2	SSU	1994	Linear Projection of historical demands	Yes
3	Hartman	1991	Housing unit and population estimates per 1989 Demographic and Economic Profile of Collier County	No
4	Hartman	1993	1990 census data and housing unit projections per 1992 Demographic and Economic Profile of Collier County	Yes
5	Deltona Corporation/ Vensel	1973	Dwelling unit projections x 2.2 people/house x 2.3 occupancy x 362 gpcd	No

3.1.2 Revised Projections

Based on the variability of population estimates for Marco Island, water demand projections may best be determined based on:

1) Historical demand data.

2) Current demand per household data applied to future number of households.

The projections developed using either method must account for adequate capacity during the next few years based on capacity requests from developers. A summary of the latest building activity schedule and capacity requests is provided as Table 3-2. The projections are described in detail in the following sections.

Table 3-2
Marco Island Water Demand for Building Activity Schedule as of July, 1994[a]

Development	By End 1994		By End 1995		1996 - 1999[b]	
	DU's	Average Demand (gallons)	DU's	Average Demand (gallons)	DU's	Average Demand (gallons)
Marco Island						
Riviera Ph. II, Ph. I (formerly Royal Marco)	56 MF	19,600			56 MF	19,600
Dela Park South/Place			62 MF	20, 768		
Dunn Foire			30 - 48 MF	8,550		
Club Regency					70 MF	24,500
Waterside Marketplace					N/A	51,054
Yacht Club of Marco					N/A	22,855
Apollo Oceanview Restaurant			N/A	7,500		
Vintage Bay					85 MF	30,000
Boat Club of Marco			28 MF	8,250		
Cape Marco Ph. I	156 MF	38,760				
Cape Marco Ph. II (Montery)			136 MF	38,760		
Cape Marco Phase III, IV					272 MF	77,520
Marco Island Tennis Club						
Horr's Island/Key Marco			67 SF	94,008	67 SF	94,008
Single-family Homes (SF)	200 SF	160,000	200 SF	160,000	800 SF	640,000
Marco Island Total - MF	212 MF	58,360	274 MF	83,828	483 MF	225,529
Marco Island Total - SF	200 SF	160,000	267 SF	254,008	867 SF	734,008

[a] Average demands shown were requested by developers. In order to project maximum day demand at the plant from these developments, SSU applied the unit demand factors of 1,073 gallons per day per single-family home and 458 gallons per day per multi-family unit. Since the unit demand requested for Horr's Island was greater than 1,073 gallons per day per single-family home, SSU used the requested capacity for Horr's Island.

[b] Demand shown is expected to occur sometime within the 1996 - 1999 timeframe.

DU = Dwelling Units
MF = Multi-family
SF = Single Family

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3.1.2.1 Projection Based on Historical Data

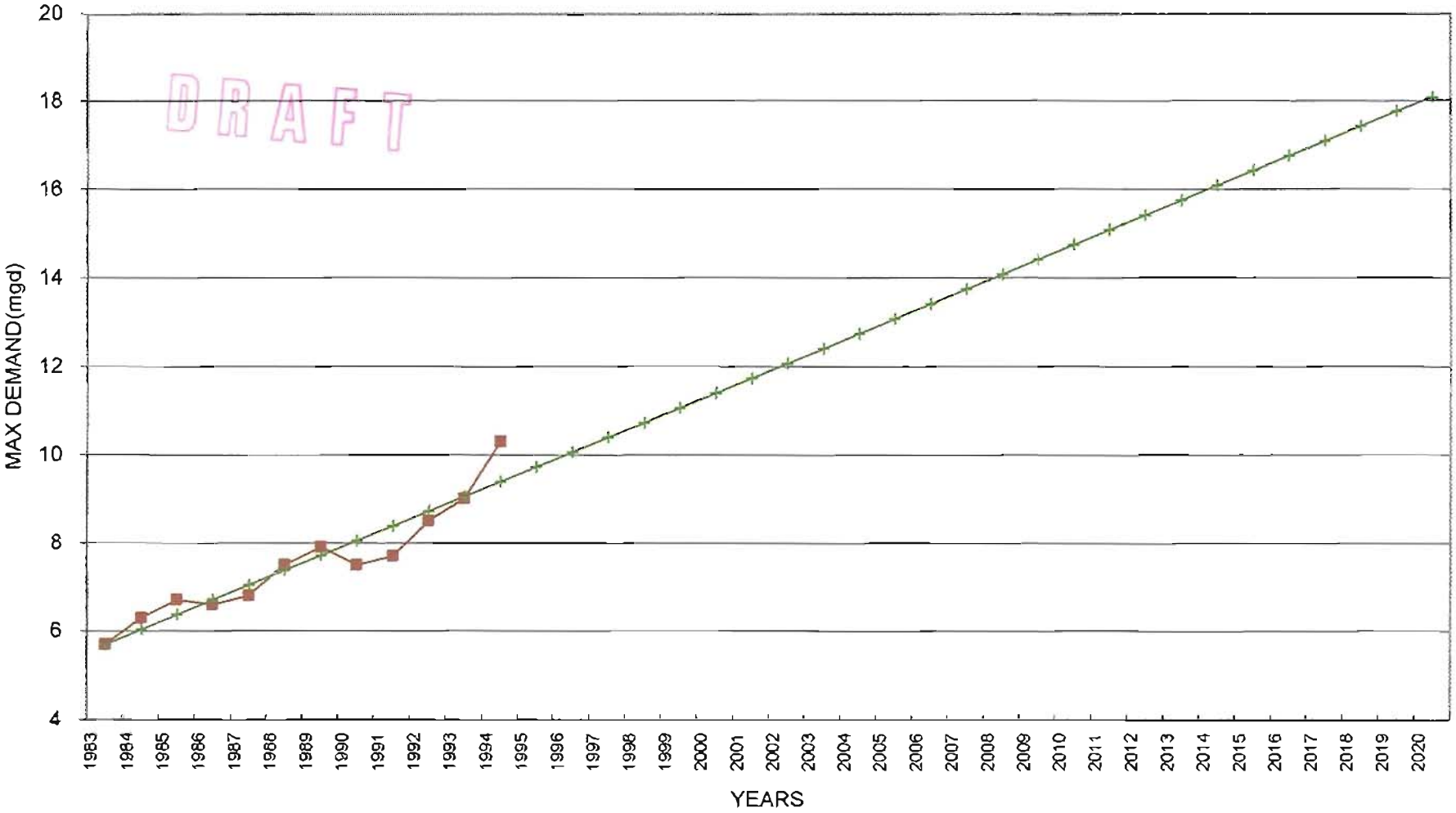
A linear regression of the historical maximum daily demands was conducted in order to project future demand through the year 2020. The resulting projection, is provided as Figure 3-2. The maximum daily demands are projected to range from 9.7 mgd in 1995 to 18.1 mgd in the year 2020. This projection predicts a 1994 maximum daily demand of 9.4 mgd which is much lower than the maximum day demand at 10.3 mgd recorded on the MORs in March, 1994. Although this projection may be representative of later years, it appears to fall below the expected demands over the next few years based on the capacity requests from developers.

3.1.2.2 Projection Based on Current Demand per Household Data

The projection based on current demand per household data was developed using the following methodology: First, data was gathered to determine the number of existing and future household units at buildout. Second, water usage per household was determined. Next, the unit demand was applied to the buildout number of housing units in order to obtain a buildout demand. Finally, an estimation of the annual rate of growth was made to arrive at the annual projections through buildout.

For the second step, two different methods for calculating unit demand factors were developed. One was based on dividing MOR data by total number of existing units. The other was based on dividing residential customer consumption

Marco Island Historical and Projected
Maximum Day Finished Water Demands
Figure 3-2



Based on linear regression of historical max. day demands.

data by the existing number of residential units and dividing multi-family/hotel customer consumption data by the existing number of multi-family/hotel units. Since average customer consumption must be adjusted by peaking factors to determine peak plant demand, the unit demand factors developed for the second method were adjusted to represent maximum daily demands at the plant for residential and multi-family/hotel customers.

1) Determination of Housing Unit Data

A count of existing housing and commercial units based on information collected from the Collier County Tax Appraiser's Office and SSU billing and meter records is provided as Table 3-3. These units do not include the areas of Goodland and Horr's Island. Some 14,852 units were shown to exist on the island as of May, 1994. 58 percent of these are condominium/multi-family units, 14 percent hotel and timeshare units, and 28 percent single-family homes.

Table 3-3
Estimated Number of Housing and Commercial Units On Marco Island[a]

Type	May, 1994	Buildout[b]
Single Family Homes	4,237	8,796
Condominiums/Multi-Family Units	8,556	10,600
Hotels and Timeshare	2,059	2,059
	14,852	21,405

[a] Housing units for Goodland, Horr's Island and Marco Shores are not included.

[b] Buildout is expected to occur sometime between the years 2010 and 2020 (16 - 26 years) in accordance with past and current planning efforts.

Buildout was projected based on the available space remaining and the land use of that space. The buildout units are also provided on Table 3-3. An estimated increase of 4,559 single-family homes is projected to occur sometime within the 16 to 26 year buildout timeframe while an increase of only 2,044 condominium units is projected at buildout. No additional hotel or timeshare units are projected. Again, a review of the December, 1993 edition of the Marco Island Utilities' water properties map reveals that the number of single-family homesites projected at buildout appears reasonable. Thus, existing single-family homes are only currently 48 percent of their growth potential while condominiums and multi-family units are currently 84 percent of their growth potential.

The Demographic and Economic Profile of Collier County, September 1993 edition, projects nearly 34,000 housing units on Marco Island in the year 2010; however, housing count information provided to SSU from the Collier County Long Range Planning Department indicate that only 17,536 dwelling units are projected at buildout. In accordance with the Marco Community Plan Density Analysis prepared by the Deltona Corporation in 1973, it was expected that the total number of living units that could practically be constructed on Marco Island is approximately 22,762 if every parcel were built on. Thus, the buildout estimate of 21,405 units appears reasonable.

2) Determination of Water Usage per Household

A) MOR Data and Total Units

The first method used to calculate water demand per household simply divided the recorded plant demand by the total number of existing dwelling units. The data is provided as Table 3-4. The 1994 average demand was estimated based on plant operating report data from January through September, 1994 and the monthly demands for October through December, 1993 which were adjusted for growth to reflected expected demands for October through December, 1994.

Table 3-4
Existing Usage Information
for Marco Island for 1994

No. of Total Dwelling Units	14,852
Single-family	4,237
Condominiums/Hotels	10,615
1994 Maximum Day Demand from 3/9 MOR	10.3 mgd
Estimated 1994 Average Day Demand[a]	6.3 mgd

	Avg. Day	Max. Day
Gallons per Dwelling Unit[b]	424	694

[a] Estimated average demand for entire year based on the average monthly demands for January through September, 1994 and the monthly demands for October through December, 1993 which were increased to account for expected growth in 1994.

[b] Includes total of single-family and condominium/hotel units.

Using the unit consumption factor of 694 gallons per day per unit, as provided in Table 3-4, for the maximum daily demand and applying it to the 21,405 units projected at buildout, results in a maximum daily demand at buildout of approximately 14.9 mgd.

B) Customer Data by Classification

The second method used to calculate water demand per household involved segregating water use data by classification in order to characterize usage based not only on total units, but on the type of units. SSU currently uses a number of water consumption classifications for Marco Island. These include residential, general service, multi-family, and irrigation.

The residential classification includes both single-family homes and those multi-unit complexes which meter each unit individually rather than having a master meter for the complex. The general service classification includes commercial establishments including hotels. The multi-family classification includes high-rise condominiums which have one or two master meters that meter the entire complex rather than individually metered units. The irrigation classification includes most condominiums and apartment complexes having irrigation meters separate from their potable water meters used for in-home water needs.

The average consumption for each class was calculated for 1993 and 1994, based on SSU billing records. For 1994, the demands were adjusted to reflect the anticipated demands for each classification at the end of 1994. A breakdown of the consumption is provided as Table 3-5.

Table 3-5
Average Daily Consumption for Various Water Classes on Marco Island[a]

Meter Classification	1993 Consumption (mgd)	1993 Percent of Total	1994[b] Consumption (mgd)	1994[b] Percent of Total
Residential	3.40	58	2.92	50
General Service	0.88	15	0.83	14
Multi-Family	0.85	15	0.86	15
Irrigation	0.71	12	1.24	21
Total	**5.84**	**100**	**5.85**	**100**

[a] SSU added the irrigation classification to the billing records during April, 1993.

[b] Based on customer consumption data for January through September, 1994 and the customer consumption data for October through December, 1993 which were increased to account for expected growth in 1994.

Unit demand factors were then calculated for single-family homes, multi-family complexes, and commercial establishments/hotels.

The unit demand calculations for each classification are provided in Table 3-6.

Table 3-6
Unit Consumption Factors per Classification

Classification	1994 Average Demand (mgd)	Number of Units	Average Daily Demand/Unit (gallons)
Residential Single-family homes	2.83[a]	4,237	668
Multi-family and Commercial	3.02[b]	10,615	285
Total	**5.85**	**14,821**	

[a] Based on the 1994 average day demand for January through September for residential classification deducting the estimated average demand for the 811 residential units based on 110 gallons per unit per day.

[b] Includes estimated average daily demand for the 811 residential units based on 110 gallons per unit per day plus irrigation in order to rectify SSU vs. tax appraiser's classifications.

In order to determine the total water demand at the water treatment plant, the average unit demand factors must be adjusted for unaccounted for water and maximum daily demands. Historically at Marco Island, unaccounted for water has averaged approximately 7 percent. Applying this percentage to the unit demand factors results in an average residential demand at the water treatment plant (WTP) of 715 gallons per home per day and an average multi-family and commercial demand at the WTP of 305 gallons per unit per day. Maximum daily demand for the past 3 years (1992 - 1994) has averaged 50 percent higher than the annual average. Thus, a factor of 1.50 should be applied to the average demand at the WTP to derive the maximum day demands at the WTP. Applying the 1.5 factor to the unit consumption factors results in the following:

	Average Day Demand (gallons)/Unit at Source	Average Day Demand (gallons)/Unit at WTP	Maximum Day Demand (gallons)/Unit at WTP
Residential	668	715	1,073
Multi-family	285	305	458

Therefore, conservative maximum day unit demand factors which reflect total plant demands for residential use would apply 1,073 gallons per day per household and for multi-family would apply 458 gallons per day per unit. Applying these factors to the projected number of residential and multi-family/commercial units at buildout results in a maximum day demand at buildout of approximately 15.2 mgd. This projection predicts a 1994 maximum daily demand of 9.4 mgd which is the same 1994 maximum daily demand projected using the linear projection of the historical data. Both projections are much lower than the maximum day demand of 10.3 mgd recorded on the MORs in March, 1994.

Projection

The projection based on current demand per household data may either be made using the buildout demand of:

- 14.9 mgd as developed using the first method of calculating water demand per household data;
- 15.2 mgd as developed using the second method of calculating water demand per household data.

SSU recommends the use of 15.2 mgd as the buildout demand since the method used to obtain this demand more accurately accounts for the increasing proportion of single-family homes in the future.

The projection may either be made using the 1994 demand of:

- 10.3 mgd actual max day for March, 1994;
- 9.4 mgd estimated using the projection based on a linear regression of the historical plant data;

- 9.4 mgd estimated using second method of calculating water demand per household.

SSU recommends the use of 10 mgd as the 1994 maximum daily demand on the basis of the trends experienced over the past 3 years. Since early 1994, recorded low rainfall compared to other years, irrigation demand was higher than anticipated. In addition, according to a number of islanders contacted during the Collier Boulevard reuse survey, record numbers of tourists visited Marco due to the unusually harsh winter experienced in the north part of the United States last year. This combination has appeared to have inflated the 1994 maximum day demand beyond projected levels. Although both projection methods developed herein suggest that the 1994 maximum daily demand should have been approximately 9.4 mgd, SSU suggests the use of 10 mgd as 1994 starting point for future projections as a conservative measure.

Water demand projections were then developed based on a 1994 demand of 10 mgd and a buildout demand of 15.2 mgd in the year 2020. The growth rate was projected to decrease gradually from an initial peak of 4 percent to 1 percent growth rate in later years. The initially high growth rate accounts for the demands from current developer activity. The projection is presented as Figure 3-3. The projection best accounts for current growth trends and projected buildout demands. It also represents a median projection from the previous projections presented as Figure 3-1. It should be updated at least annually to account for new growth trends and the full year of 1994 data.

3.2 Conservation

The next logical step in long-term planning efforts, after water demand projections are calculated, is to assess consumption levels in comparison to regulatory requirements.

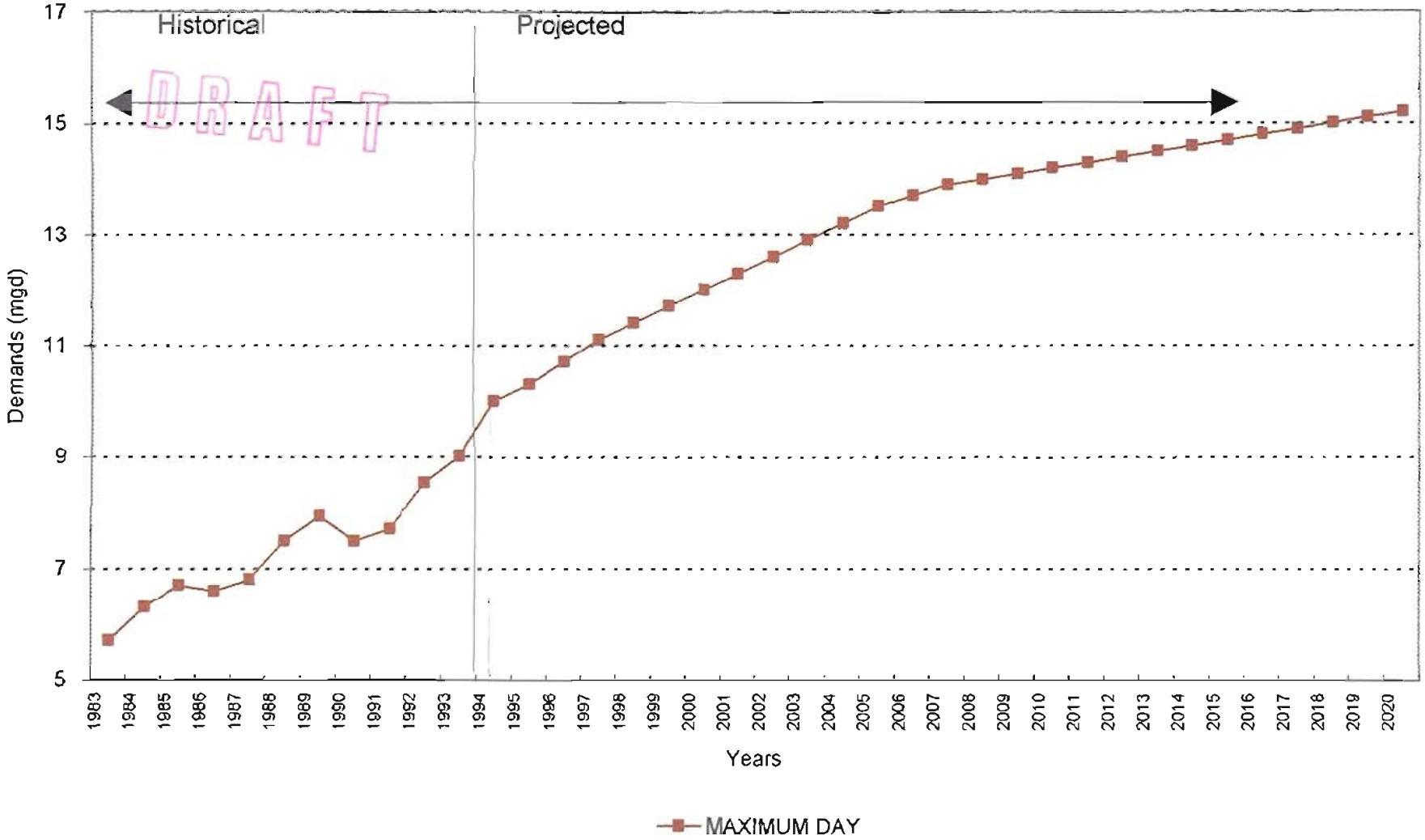
In accordance with the amended version of the 1992 Collier County Growth Management Plan, the minimum level of service standard for potable water for Marco Island is 200 gallons per person per day. The South Florida Water Management District (SFWMD), which regulates Marco Island's water supply, limits consumption to 200 gallons per person per day. Consumption in excess of this amount must be explained. The SFWMD requirement is based on a seasonally adjusted population.

SSU determined per capita consumption for Marco Island on a seasonally adjusted population basis using the following methodology:

1) Determine permanent population assuming:

   - 2.2 people per household.
   - 30% of the homes and condos are occupied during the off-season.

Marco Island Historical and Projected
Finished Water Demands
Figure 3-3



- 54% of the hotels are occupied during the off-season.
- The existing number of dwelling units are as provided in Table 3-3.

2) Determine peak season population assuming:

   - 2.2 people per household.
   - 100% of homes, condos, and hotels are occupied.
   - The existing number of dwelling units are as provided in Table 3-3.

3) Determine seasonally adjusted population assuming that the permanent population is on the Island for 6 months a year and the peak season population is on the Island for 6 months a year.

4) Divide the 1994 annual average demand of 6.321 mgd by the calculated seasonally adjusted population. The calculated population estimates are as follows:

Permanent Population	10,900
Peak Season Population	32,700
Seasonally Adjusted Population	21,800

The permanent population estimate is consistent with population data provided to SSU from the Collier County Long Range Planning Department. The estimate of 2.2 people per dwelling unit is also consistent with data provided to SSU from the Collier County Long Range Planning Department. Based on 1990 census data and a 39 percent dwelling occupancy rate, 2.167 people were calculated per dwelling unit.

The 1994 per capita consumption for Marco Island is 290 gallons per person per day. A calculation of the estimated per capita consumption for Marco Island from 1990 to 1993 using this methodology revealed a fluctuation between 290 gpcd to 329 gpcd. Thus, consumption is excessive on Marco Island and should be curtailed in order to comply with the Water Management District goals.

With the regulatory requirement of 200 gpcd as the target goal, Marco Island could potentially reduce consumption by nearly 2 million gallons per day. The Marco Island Conservation Plan is designed to reduce consumption toward the goal of 200 gpcd. The plan combines conservation education, high-volume user audits, moisture sensing devices, retrofit kits, reuse applications, and water restrictions to help accomplish this goal. A copy of the plan is attached to this document as Appendix A.

3.3 Marco Shores

On Marco Shores, all of the housing units are condo-type units with the exception of the executive airport facilities and the golf course clubhouse and maintenance facilities. A count of existing housing units revealed the following units currently exist in the Marco Shores service area:

Complex	Number of Units
Tropic Schooner	240
Mainsail	184
Airport/Clubhouse	5
Total	**429**

The maximum day water demand thus far for 1994 was 251,000 gallons per day in March. Dividing the 1994 maximum day water demand by 429 units gives a usage of 585 gallons per day per unit. In comparison, there are currently 306 sewer equivalent residential connections (ERC's) and 426 water ERC's located in the Marco Shores service area based on meter number and size records. The difference in the ERC count for water and sewer is attributed to irrigation meters and hose bibbs located at the multi-family complexes. Dividing the 1994 maximum water demand by the current number of ERC's gives a usage of 589 gallons per day per ERC. Thus, the usage per ERC and the usage per unit is essentially the same. Applying this unit demand to the projected number of units expected to be constructed annually allows for a reasonable estimate of projected annual increase in maximum daily water demand. Table 3-7 summarizes the building schedule for Marco Shores based on developer estimates.

Beginning with the 1994 maximum daily demand of 251,000 gallons per day, the annual demands (calculated from the projected number of additional units at 585 gpd per unit) were added to develop the water demand projections through the year 2000. Buildout is anticipated to occur when the Marco Shores Golf and Country Club is completed. This is currently estimated by the developer to occur by the end of the year 2000. Table 3-8 summarizes the projected water demands. In accordance with these projections, the existing capacity of .72 mgd will be exceeded in 1999.

Table 3-7
Marco Shores Building Activity Schedule as of July, 1994

Development	Dwelling Units						
	By End Year 1994	By End Year 1995	By End Year 1996	By End Year 1997	By End Year 1998	By End Year 1999	By End Year 2000
Fairways I	50						
Fairways II		36	50				
Marco Shores Golf & Country Club			48	246	246	246	198
Total	**50**	**36**	**98**	**246**	**246**	**246**	**198**

Table 3-8
Marco Shores Projected Water Demands

Year End	Maximum Day Water Demand (mgd)
1994	.28
1995	.30
1996	.36
1997	.50
1998	.65
1999	.79
2000	.91

4.0 WASTEWATER FLOW PROJECTIONS

4.1 Marco Island

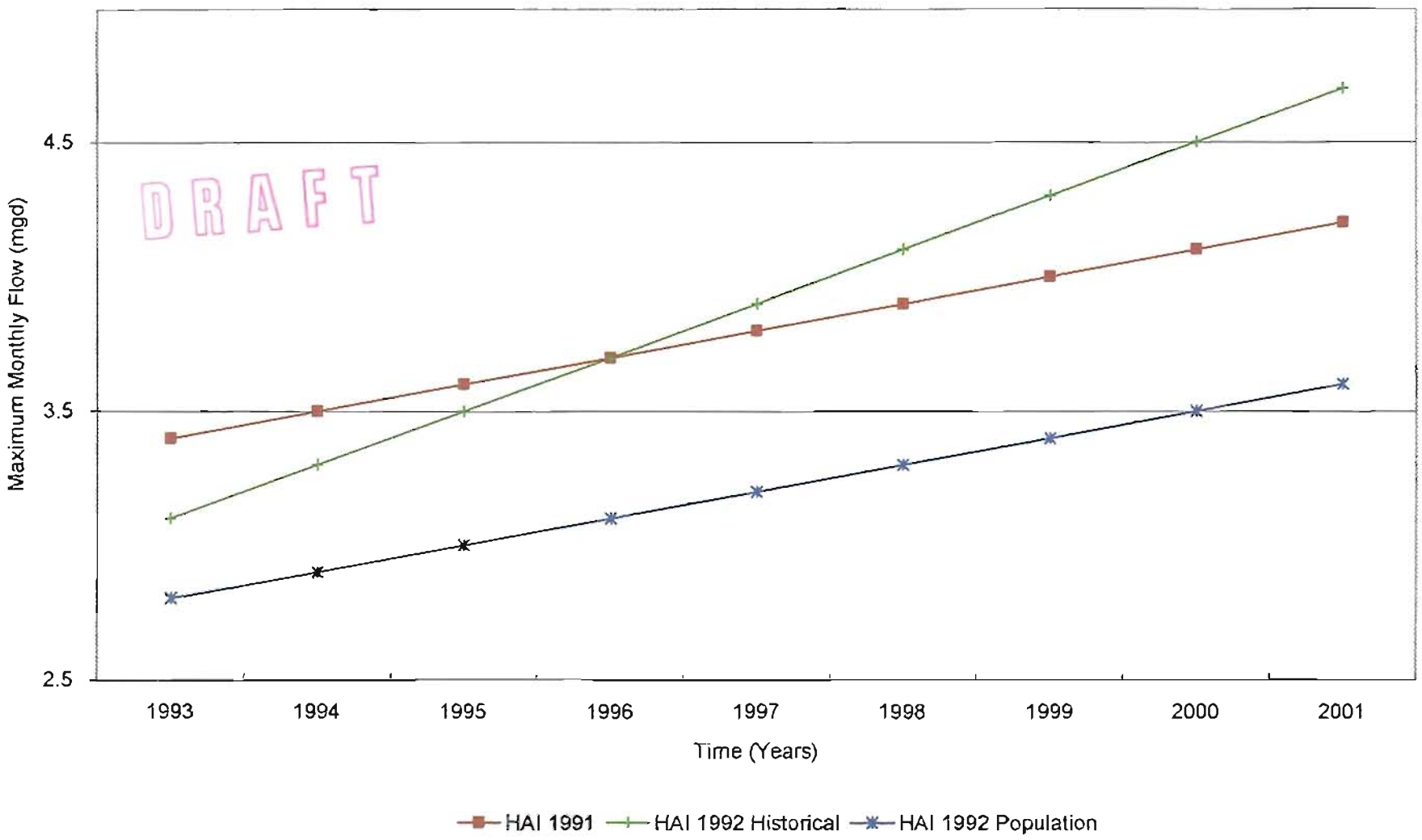
Wastewater flow projections for Marco Island were developed in the 1991 Marco Island Water and Wastewater Master Plan by Hartman and Associates, Inc. (HAI) and more recently in the 1992 Capacity Analysis Report for the Marco Island WWTP by HAI.

The 1991 Master Plan presented three methods of projecting wastewater flows based upon housing unit and population projection data from the September 1989 edition of the Demographic and Economic Profile of Collier County. The wastewater service area was assumed to be expanded to the limits of the water service area. The growth projections were based upon a linear regression of the historical unit growth. The methods vary by using average daily flows, maximum month flows, maximum daily flows, and peak flows. The Master Plan recommended the use of the maximum month average day flow condition as the basis for design of wastewater treatment facilities' improvements. The Capacity Analysis Report used the same housing unit and population projections as the Master Plan. A projection based on population was made in addition to a projection based on a linear regression of historical data. At that time, SSU believed that the projection based on population more accurately indicated growth trends. This belief still holds true since the 1994 maximum monthly average daily flow is currently only 2.438 mgd. The 1992 projection based on population most accurately represents this condition. The projections are presented as Figure 4-1.

All of the previous projections are elevated since the sewer service area was expected to be expanded. To date, Collier County has not begun to expand their service areas beyond those shown previously as Figure 2-5. SSU continues to work with Collier County in their expansion efforts for wastewater service on the Island. Currently, the Marco Island WWTP serves the following:

Classification	Estimated Number of Units
Single-family	1,609
Condominium/Multi-Family	8,556
Hotel and Timeshare	2,059
Total	**12,224**

Marco Island Wastewater Flow
Projections from Previous Evaluations
Figure 4-1



Dividing the 1994 maximum month average daily flow by this number of units results in a wastewater flow of approximately 200 gallons per day per unit. This is a typical usage assuming there are 2.2 people per household.

The original plan for Marco Island was to provide sewer service to sparsely populated portions of the Island via septic tanks on a temporary basis until centralized sewers were constructed. When the area served by septic tanks reached a density of 50 percent, no further development was to be allowed until centralized sewers were able to serve the entire area. Eventually, the entire Island is to be sewered. Thus, the buildout number of units will be the same for water and wastewater, 21,405. Using 200 gallons per day per unit, a buildout wastewater flow of 4.3 mgd is expected. The timing of this buildout, however, is dependent on the County's plans to provide centralized sewer to the unsewered areas of the Island.

To account for adequate capacity during the next few years, development activity and capacity requests are tracked by SSU. A summary of the latest building activity schedule and the requested average wastewater capacity is provided as Table 4-1.

Using the same growth trend as projected in the Capacity Analysis Report based on population projections, with adjustments in the initial years for current flows and development activity, revised projections were developed. The revised projections are presented as Figure 4-2. These projections account for gradual sewer service to currently unserviced areas. They should be revised periodically in accordance with Collier County's plans for expansion of their collection system. In accordance with these projections, the existing capacity would be exceeded by the year 2004.

Table 4-1
Marco Island Wastewater Demand for Building Activity Schedule as of July, 1994[a]

Development	By End 1994		By End 1995		1996 - 1999[b]	
	DU's	Average Demand (gallons)	DU's	Average Demand (gallons)	DU's	Average Demand (gallons)
Marco Island						
Riviera Ph. II, Ph. I (formerly Royal Marco)	56 MF	19,600			56 MF	19,600
Dela Park South/Place			62 MF	17,360		
Dunn Foire			30 - 48 MF	7,500		
Club Regency					70 MF	17,500
Waterside Marketplace					N/A	22,867
Yacht Club of Marco					N/A	7,855
Apollo Oceanview Restaurant			N/A	5,250		
Vintage Bay					85 MF	30,000
Boat Club of Marco			28 MF	8,250		
Cape Marco Ph. I	156 MF	34,000				
Cape Marco Ph. II (Montery)			136 MF	34,000		
Cape Marco Phase III, IV					272 MF	68,000
Marco Island Tennis Club						
Horr's Island/Key Marco			67 SF	62,375	67 SF	62,375
Single-family Homes (SF)	25 SF	7,500	50 SF	15,000	200 SF	60,000
Marco Island Total - MF	212 MF	53,600	274 MF	72,360	483 MF	165,822
Marco Island Total - SF	25 SF	7,500	117 SF	77,375	267 SF	122,375

[a] Average demands shown were requested by developers.

[b] Demand shown is expected to occur sometime within the 1996 - 1999 timeframe.

DU = Dwelling Units
MF = Multi-family
SF = Single Family

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Marco Island Wastewater
Flow Projections
Figure 4-2

4.2 Marco Shores

As presented in Section 3.3, the maximum monthly wastewater flow demand thus far for 1994 was .063 mgd in February; 429 dwelling units currently exist in the Marco Shores service area. Dividing this flow by the current number of ERCs gives a flow of 206 gallons per day per ERC. Dividing this flow by the 429 current number of units gives a flow of 147 gallons per day per unit. There are currently 306 sewer connections (ERC's) in the Marco Shores service area based on meter number and size records. Because the usage per ERC provides a more conservative wastewater usage, it will be applied to the projected number of units expected to be constructed annually. Reference Table 3-7 presented previously for a summary of the building schedule for Marco Shores based on developer estimates. Beginning with the 1994 maximum monthly demand of 63,000 gallons per day, the annual flows (calculated from the projected number of additional units @ 206 gpd per unit) were added to develop the wastewater flow projections through the year 2000. Buildout is anticipated to occur when the Marco Shores Golf and Country Club is completed. This is currently estimated by the developer to occur by the end of the year 2000. Table 4-2 summarizes the wastewater flow projections. In accordance with these projections, the existing capacity of .09 mgd would be exceeded in the year 1996. If the plan for re-rating the facility is approved, the capacity could be increased to 0.14 mgd and the capacity would not be exceeded until 1997.

Table 4-2
Marco Shores Wastewater Flow Projections

Year End	Maximum Month Average Daily Flow (mgd)
1994	.073
1995	.081
1996	.100
1997	.150
1998	.200
1999	.250
2000	.290

APPENDIX A

Marco Island

Water Conservation Plan

References

Hartman & Associates, Inc. January, 1991. Marco Island 10-Year Water and Wastewater Master Plan for SSU Services.

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Hole, Montes and Associates, Inc. August, 1989. Marco Island Water Supply Feasibility Study.

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Deltona Corporation. July, 1973. Marco Community Plan Density Analysis.