INITIAL CAPACITY ANALYSIS REPORT

Southeast Regional Wastewater Treatment Plant

Prepared for

Manatee County

GMS #4041C10011

FDEP Permit # FLA012618-01-001
Expiration Date: April 1, 2000

November, 1998

McKIM & CREED

CERTIFICATIONS

I, Edmund J. McAdam, am fully aware of and intend to comply with recommendations and schedules included in this report.

Edmund J. McAdam Date: 12 NOV 98

Edmund J. McAdam, P.E.
Wastewater/Reclaimed Water Manager
Manatee County
4410 66th Street West
Bradenton, Florida 34206

I, A. Street Lee, P.E., attest that the information contained in this report is true and correct to the best of my knowledge. The report was prepared according to sound engineering principles. I have discussed the recommendations and schedules with the permittee or the permittee's delegated representative of the permittee.

Date: 11/11/98

A. Street Lee, P.E.
Senior Project Manager
McKim & Creed & Engineers, P.A.
601 Cleveland Street, Suite 205
Clearwater, FL 33755
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INITIAL CAPACITY ANALYSIS REPORT
Manatee County
Southeast Regional Wastewater Treatment Plant

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1.0 INTRODUCTION

Rule 17-600.405 of the Florida Administrative Code, Planning for Wastewater Facilities Expansion, requires owners of municipal wastewater treatment facilities to conduct the timely planning, design, and construction of facilities necessary to provide proper treatment and reuse or disposal of domestic wastewater and management of domestic wastewater residuals. The rule requires that flows being treated at the wastewater facilities be routinely compared with the permitted capacities of the treatment, residuals, reuse, and disposal facilities. When the three-month average daily flow exceeds 50 percent of the permitted capacity of the treatment plant or reuse and disposal systems, an initial capacity analysis report shall be submitted to the appropriate district office of the Florida Department of Environmental Protection (FDEP).

This initial capacity analysis report for the Manatee County Southeast Regional Wastewater Treatment Plant (SERWTP) was prepared by McKim and Creed with the assistance of the Manatee County Public Works Department.

1.1 Description of Existing Facilities

The SERWTP is located in southeastern Manatee County at 3331 Lena Road, off Highway 64, south of the Manatee River. The original facility, consisting of two (2) 1-MGD steel ring package plants, began operation in 1986. The present Type I facility, which began operation in February of 1988, is an activated sludge treatment plant permitted for 5.4 MGD. Since 1988, modifications to the SERWTP have included the addition of 63- and 86-acre storage lakes, the storage lake pumping systems, and the addition of the Southeast reuse service area which includes the Rosedale Golf Course and Schroeder-Manatee Ranch.

The following paragraphs provide a brief description of the treatment, residuals, reuse, and disposal facilities.

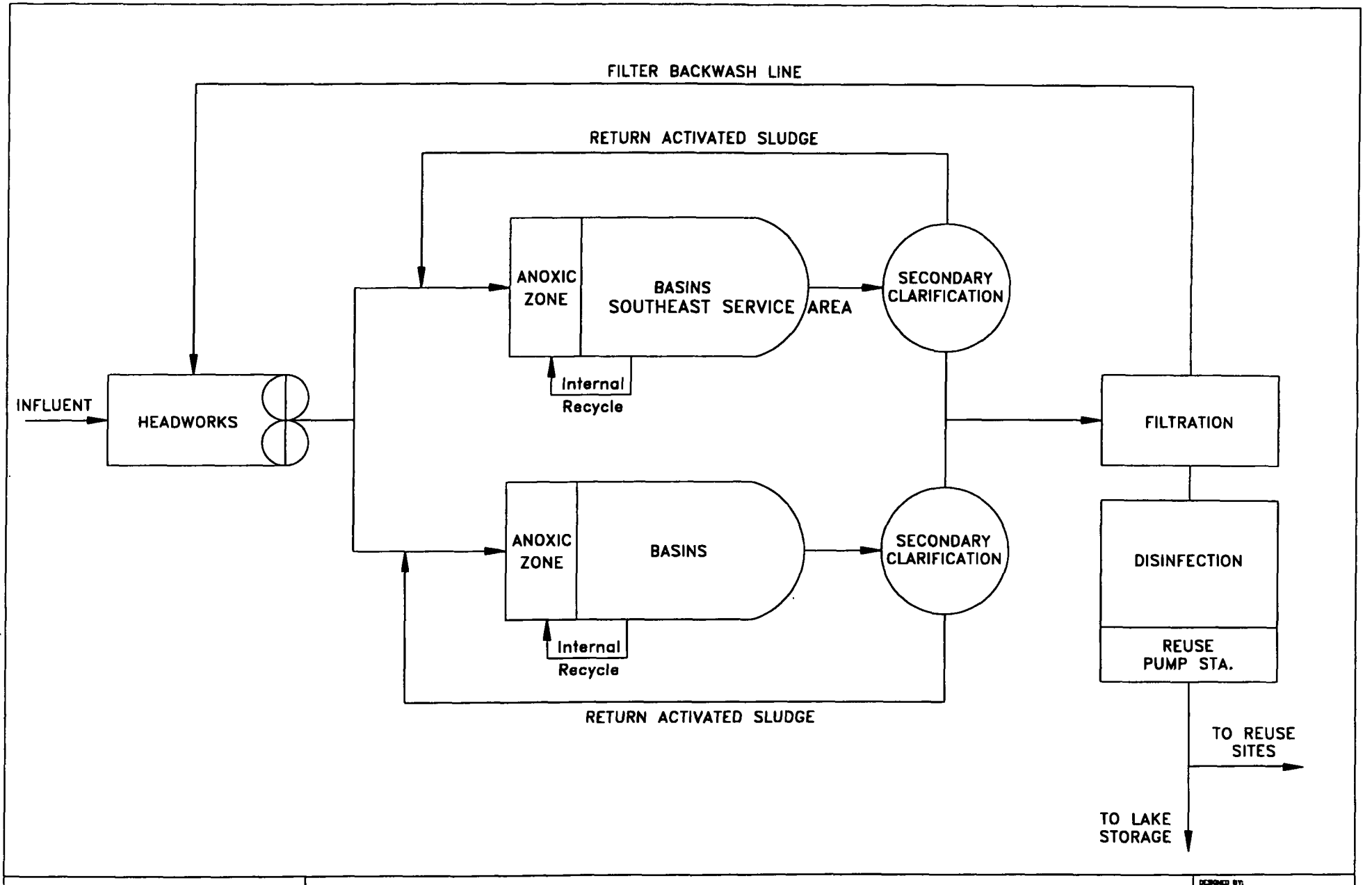
Pumped raw wastewater receives preliminary treatment at the headworks facility. The headworks facility consists of an influent magnetic flow meter, two mechanical bar screens and two vortex de-gritting units.

Following preliminary treatment, the wastewater enters the biological treatment phase. The influent wastewater is mixed with return activated sludge prior to the anoxic basins where biological nitrogen removal takes place. Internal recycle flow from the aeration basins is also pumped back to the anoxic basins. From the anoxic basins, wastewater flows into the aeration basins where BOD reduction takes place in an extended activated sludge process.

The aeration basin effluent is routed to two secondary clarifiers for final clarification. The return activated sludge is collected in the clarifiers through drawtubes and returned to the influent line prior to the anoxic basins. Effluent from the secondary clarifiers then flows to traveling bridge automatic backwash filters for additional solids removal. Filtered effluent is then disinfected using chlorination. Chlorine solution is injected into the waste stream at the head of two chlorine contact chambers. Figure 1 presents a schematic of the liquid stream processes.

Following the chlorine contact chambers, the chlorinated effluent enters either the effluent reuse system or lake storage. If the demand for reuse exceeds the effluent flow of the SERWTP, previously treated effluent from lake storage is pumped back to the plant for re-treatment to meet the reuse demand. Figure 2 presents a schematic of the effluent pumping systems.

In order to operate efficiently, the activated sludge process must be balanced by removing a controlled number of activated sludge organisms. Waste activated sludge (WAS) is removed from the final clarifiers by the WAS pumping system and is pumped to dissolved air flotation thickeners for processing. Thickened sludge is transferred to aerobic digestors for further stabilization. After digestion, the sludge is dewatered using two belt filter presses.



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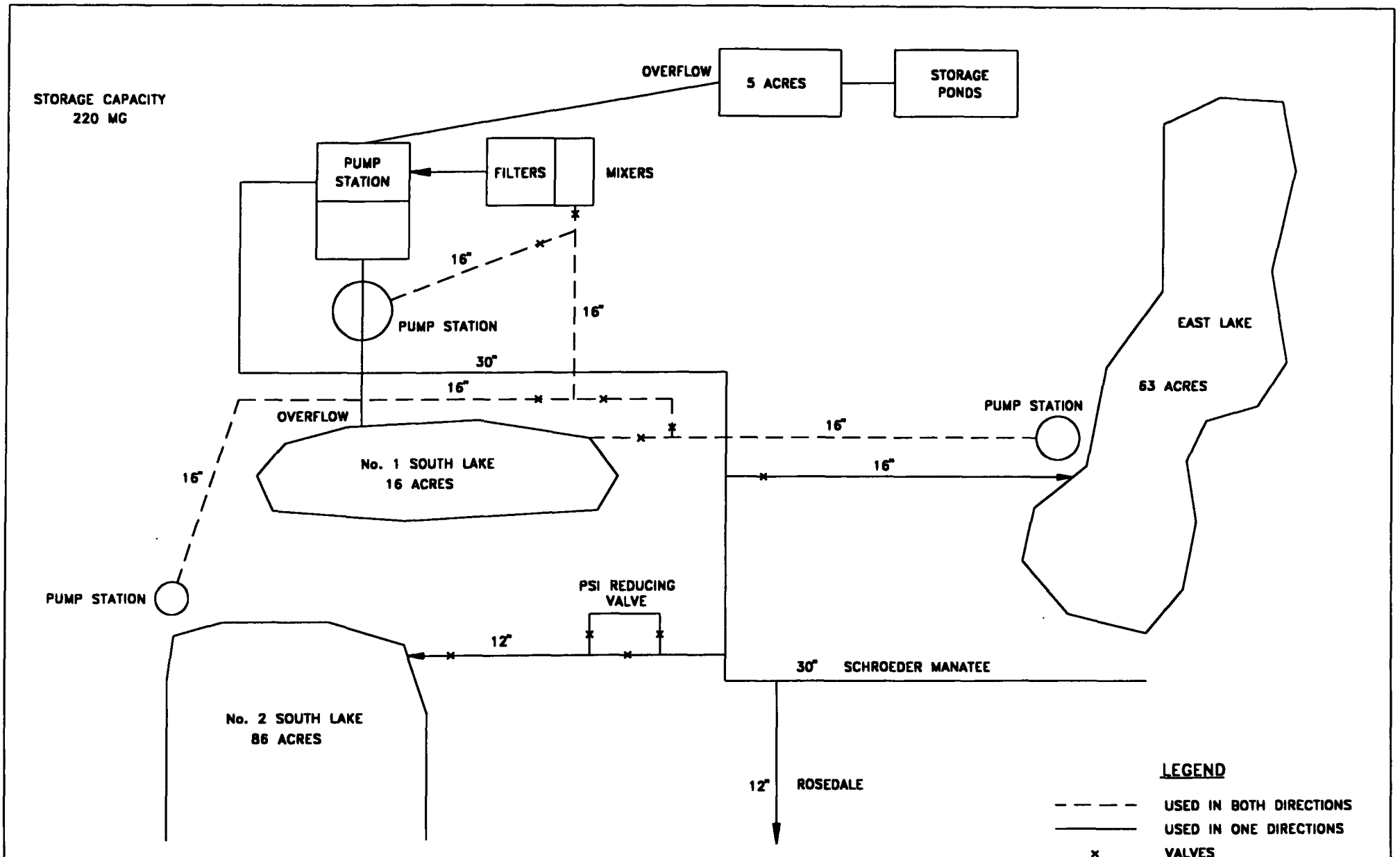
LIQUID STREAM SCHEMATIC

SOUTHEAST REGIONAL WASTEWATER TREATMENT PLANT

DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 8/5/98
PROJ. NUMBER: 1024-0008
REV
FIGURE NUMBER: 1



McKIM&CREED

EFFLUENT PUMPING SYSTEM

SOUTHEAST REGIONAL WASTEWATER TREATMENT PLANT

DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 8/5/98
PROJ. NUMBER: 1024-0008
REV
FIGURE NUMBER: 2

1024\DGN\FIG

Dewatered sludge is then beneficially used for application on nearby agricultural land.

Figure 3 presents a schematic of the solids stream process.

A summary of the existing process equipment is present in Table 1:

Table 1 - Existing Process Equipment Capacities

Liquid Treatment Facilities

Bar Screens	
Number	2 - Mechanical
Type	1 - Manual
Peak Capacity, MGD, each	12
Opening size, inches	.25 - Mechanical 1.0 - Manual
De-gritting Equipment	
Number	2
Type	Vortex
Diameter, ft., each	16
Peak Capacity, MGD, each	20
Anoxic Basins	
Number	2
Volume, MG, each	.576
Mixer type	Mechanical
Number of mixers per basin	2
Motor horsepower, each	15
Aeration Basins	
Number	2
Volume, MG, each	3.09
Aeration type	Two speed, surface
Number of aerators per basin	2
Motor horsepower, each	125/93.75
Number of internal recycle pumps/ basin	2
Motor horsepower, each	50
Secondary Clarifiers	
Number	2
Diameter, ft., each	110
Side water depth, ft.	14
Weir type	V-Notch
Sludge removal mechanism	Draft tube
Scum removal system	Ducking skimmer
Scum handling system	Pneumatic ejector
ADF Capacity, each, MGD	3.8

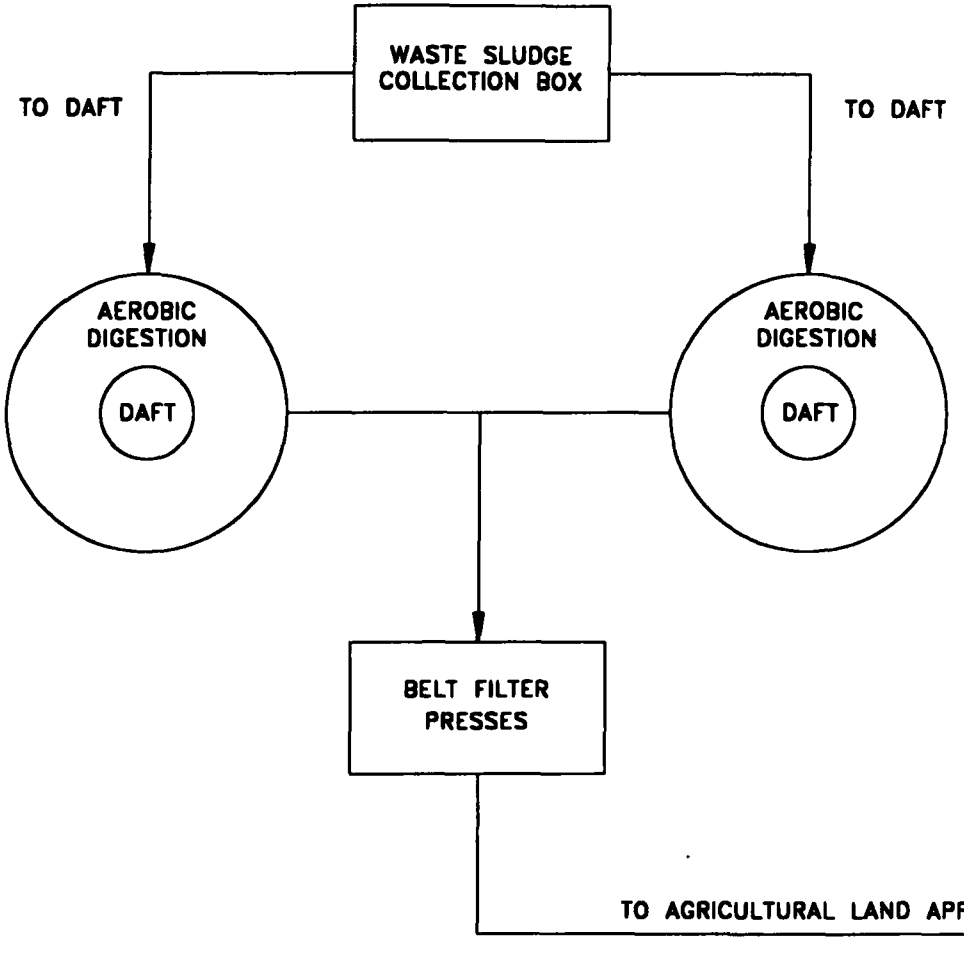
Return Activated Sludge Pumps	
Number	3
Type	Centrifugal
Capacity, gpm, each	2,400
Motor horsepower, each	25
Flash Mixing Basins	
Number	2
Volume, gal., each	2,566
Mixers	
Number	2
Motor horsepower, each	10/4.4
Flocculation Basins	
Number	2
Volume, gal., each	13,464
Flocculators	
Number	2
Motor horsepower, each	1
Sand Filters	
Number	2
Type	Traveling bridge automatic backwash
Filter Area, S.F., each	1,440
Average design flow rate, MGD, each	4.15
Maximum design flow rate, MGD, each	8.3
Chlorine Contact Basins	
Number	2
Capacity, MG, each	0.0807
Combined capacity, MG	0.1615
Peak flow capacity at 15 min. detention time, MGD	15.5
Chlorinators	
Number	2
Total capacity, ppd	4,000
Chlorine feeder No. 1, ppd	2,000
Chlorine feeder No. 2, ppd	2,000

Effluent Reuse System

Variable Speed Effluent Distribution Pumps	
Number	3
Type	Vertical turbine
Capacity, gpm, each	4,000
Motor horsepower, each	300

Solids Treatment Facilities

Waste Activated Sludge Pumps	
Number	2
Type	Centrifugal
Capacity, gpm, each	250
Motor horsepower, each	10
Dissolved Air Flotation Thickener	
Number	2
Diameter, ft., each	38
Motor horsepower, each	1
Aerobic Digestors	
Number	2
Volume, Cu. Ft., each	62,400
Capacity, MG, each	.420
Blowers	
Number	3
Motor horsepower, each	100
Belt Filter Press Feed Pumps	
Number	4
Type	Moyno Progressing Cavity
Capacity, gpm, each	150
Motor horsepower, each	10
Belt Filter Presses	
Number	2*
Belt width, meters	2
Loading rate, lbs/hr, each	1,200
Capture percent	95
Cake solids, percent	18 to 20



CAPACITIES

DAFT 16,000 LBS/DAY EACH
DIGESTORS .420 MG EACH
2 PRESSES 1,200 LBS/HR EACH

McKIM&CREED

SOLID STREAM PROCESS

SOUTHEAST REGIONAL WASTEWATER TREATMENT PLANT

DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:
DATE: 8/5/98
PROJ. NUMBER: 1024-0008
FIGURE NUMBER: 3
REV

1024\DGN\FIG

2.0 EXISTING CONDITIONS

2.1 Permitted Capacities

The plant is currently operating under FDEP Permit No. FLA012618-01, which was issued April 15, 1998. The operating permit will remain in effect until April 1, 2000. The facility is permitted for a three-month average flow of 5.4 MGD.

The currently permitted effluent parameters and limitations are as follows:

PARAMETER	LIMIT	TIME FRAME
Flow (MGD)	5.4 (max.)	Three Month Average
CBOD5 (mg/L)	20 (max.)	Annual Average
TSS (mg/L) (before disinfection)	5.0 (max.)	Annual Average
Fecal Coliform (no. per 100 ml)	25 (max.)	One Time
	0	75% of Time Non-detectable
Total Chlorine Residual (mg/L)	1.0 (min.)	
pH	6.00 - 8.50	

The permit also requires that residuals be sampled after final treatment in accordance with Rule 62-640.700(1)(b) F.A.C., prior to land application. Sampling of the parameters listed below shall occur every three months:

- Total Nitrogen: % dry weight
- Total Phosphorus: % dry weight
- Total Potassium: % dry weight
- Cadmium: mg/kg dry weight
- Copper: mg/kg dry weight
- Lead: mg/kg dry weight
- Nickel: mg/kg dry weight
- Zinc: mg/kg dry weight
- pH: standard units
- Total Solids: %
- Arsenic mg/kg
- Molybdenum mg/kg
- Mercury mg/kg
- Selenium mg/kg

2.2 Flow Metering

The SERWTP measures influent and effluent at the facility. The raw sewage influent meter is a Foxboro 24-inch Magnetic Flow transmitter.

Finished flow from each of the two chlorine contact tanks is metered using 48-inch Cippolletti weirs, each weir is equipped with a Milltronics OCM II ultrasonic level transmitter.

2.2.1 Influent Flow Meter

The magnetic flow transmitter was recently (January 23, 1998) damaged by lightning. The transmitter assembly was replaced with a new Foxboro IA Series, model IMT25. Foxboro provided a calibration of the electronics, by installation of the factory supplied calibration constant. The meter was also tested in comparison to a Controlotron portable transit time meter by AMJ Equipment Corporation of Lakeland , FL. The accuracy of calibration was 0.7% for a 10 minute test. It appears that the meter is operating accurately.

An AGM Signal Isolator was also installed along with the new transmitter in order to provide the loop power supply needed to power all of the devices on the loop thereby minimizing the effects of the signal loop on meter accuracy. The isolator is capable of a maximum of 1600 ohms loop impedance. The measured loop impedance is currently less than 900 ohms. The new loop appears to be appropriately equipped and operating properly.

The influent flow signal is wired to a Foxboro TOTALIZER in the control room. This signal was also tested by logging the analog signal once every second over a one hour period. The resulting signals (over 3,500 samples) were totaled over the time period and compared with the readings on the mechanical totalizer. Based on the excellent correlation (less than 0.1% error) of the data, it appears that the totalizer is properly calibrated.

The influent analog flow signal is sent to a Honeywell multipen recorder. The signal is dampened within the recorder to maintain a narrow line. The instantaneous reading on the analog signal was compared with the recorder values and found to be within acceptable limits.

It appears that the Influent flow meter is now operating properly, and that the recorder and totalizer should provide accurate results.

2.2.2 Effluent Flow Meters

A review of past flow recorder charts indicates that effluent flow meter(s) have been subject to severe, intermittent distortion during several hours of the day. The signal distortion, which affects both meters, apparently results from induced voltage or current leakage from other signal cables sharing the same conduit. The County has corrected this situation by having removed the transducer cable from this conduit and installing it within a dedicated conduit on a different route. Due to the severity of the distortion, it is recommend that all data previously recorded on these meters not be used.

2.3 Monthly Average Daily Flows, Three-Month Average Daily Flows, and Annual Average Daily Flows

The FDEP Guidelines for Preparation of Capacity Analysis Reports states that the report must contain data obtained from records of monthly operating reports showing the monthly average daily flows, three-month average daily flows, and annual average daily flows for the past 10 years or for the length of time the facility has been in operation, whichever is less.

Monthly Average Daily Flow is the total volume of wastewater flowing into a wastewater facility during a calendar month, divided by the number of days in that month and expressed in units of mgd.

Three-month Average Daily Flow is the total volume of wastewater flowing into a wastewater facility during a period of three consecutive months, divided by the number of days in this three-month period and expressed in units of mgd. The three-

month average daily flow also can be calculated by adding the three monthly average daily flows observed during this three-month period and dividing by three. The three-month average daily flow is a rolling average that is to be assessed for each month of the year.

Annual Average Daily Flow is the total volume of wastewater flowing into a wastewater facility during any consecutive 365 days, divided by 365 and expressed in units of MGD.

Tables 2, 3 and 4 present the monthly average daily flows, three-month average daily flows, and annual average daily flows, respectively for the SERWTP.

Table 2

Manatee County SERWTP

Monthly Average Daily Flows (MGD) [1]

Month/Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
January		0.93	1.31	1.65	1.54	1.99	1.81	2.41	2.43	2.40	3.49
February		0.98	1.34	1.76	1.67	2.00	1.85	2.31	2.48	2.53	3.88
March	0.94	1.02	1.60	1.78	1.83	1.97	1.94	2.28	2.72	2.49	3.29
April	0.98	0.92	1.15	1.69	1.56	1.95	1.79	2.12	2.59	2.42	2.72
May	0.78	0.87	1.21	1.62	1.47	1.75	1.70	2.01	2.23	2.34	2.40
June	0.71	0.88	1.06	1.56	1.82	1.74	1.66	2.33	2.34	2.19	2.32
July	0.78	1.08	1.23	1.61	1.81	1.64	1.83	2.23	2.23	2.31	
August	0.86	1.08	1.36	1.63	1.82	1.64	1.89	2.55	2.06	2.45	
September	0.97	1.36	1.24	1.46	1.63	1.76	1.87	2.66	2.11	2.46	
October	0.82	1.65	1.44	1.50	1.73	1.80	2.08	2.74	2.42	2.61	
November	0.88	1.38	1.52	1.44	1.74	1.86	2.24	2.67	2.45	2.94	
December	0.88	1.19	1.40	1.56	1.75	1.81	2.32	2.50	2.41	3.45	

[1] Influent flows for 1988 and 1989 based on original package plant.

Table 3

Manatee County SERWTP

Three-Month Average Daily Flows (MGD) [1]

Month/Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
January		0.90	1.29	1.52	1.52	2.00	1.83	2.32	2.53	2.42	3.29
February		0.93	1.28	1.60	1.59	1.97	1.83	2.35	2.47	2.45	3.61
March		0.98	1.41	1.73	1.68	1.99	1.87	2.33	2.55	2.47	3.55
April		0.97	1.36	1.74	1.69	1.97	1.86	2.24	2.60	2.48	3.29
May	0.90	0.93	1.32	1.69	1.62	1.89	1.81	2.14	2.51	2.43	2.80
June	0.82	0.89	1.14	1.62	1.62	1.81	1.72	2.15	2.38	2.32	2.48
July	0.76	0.94	1.17	1.59	1.70	1.71	1.73	2.19	2.26	2.28	
August	0.79	1.01	1.22	1.60	1.82	1.67	1.79	2.37	2.21	2.32	
September	0.87	1.17	1.28	1.57	1.75	1.68	1.86	2.48	2.13	2.41	
October	0.88	1.36	1.35	1.53	1.73	1.73	1.95	2.65	2.20	2.51	
November	0.89	1.47	1.40	1.47	1.55	1.81	2.06	2.69	2.33	2.67	
December	0.86	1.41	1.45	1.50	1.74	1.82	2.21	2.64	2.43	3.00	

[1] Influent flows for 1988 and 1989 based on original package plant.

Table 4

Manatee County SERWTP

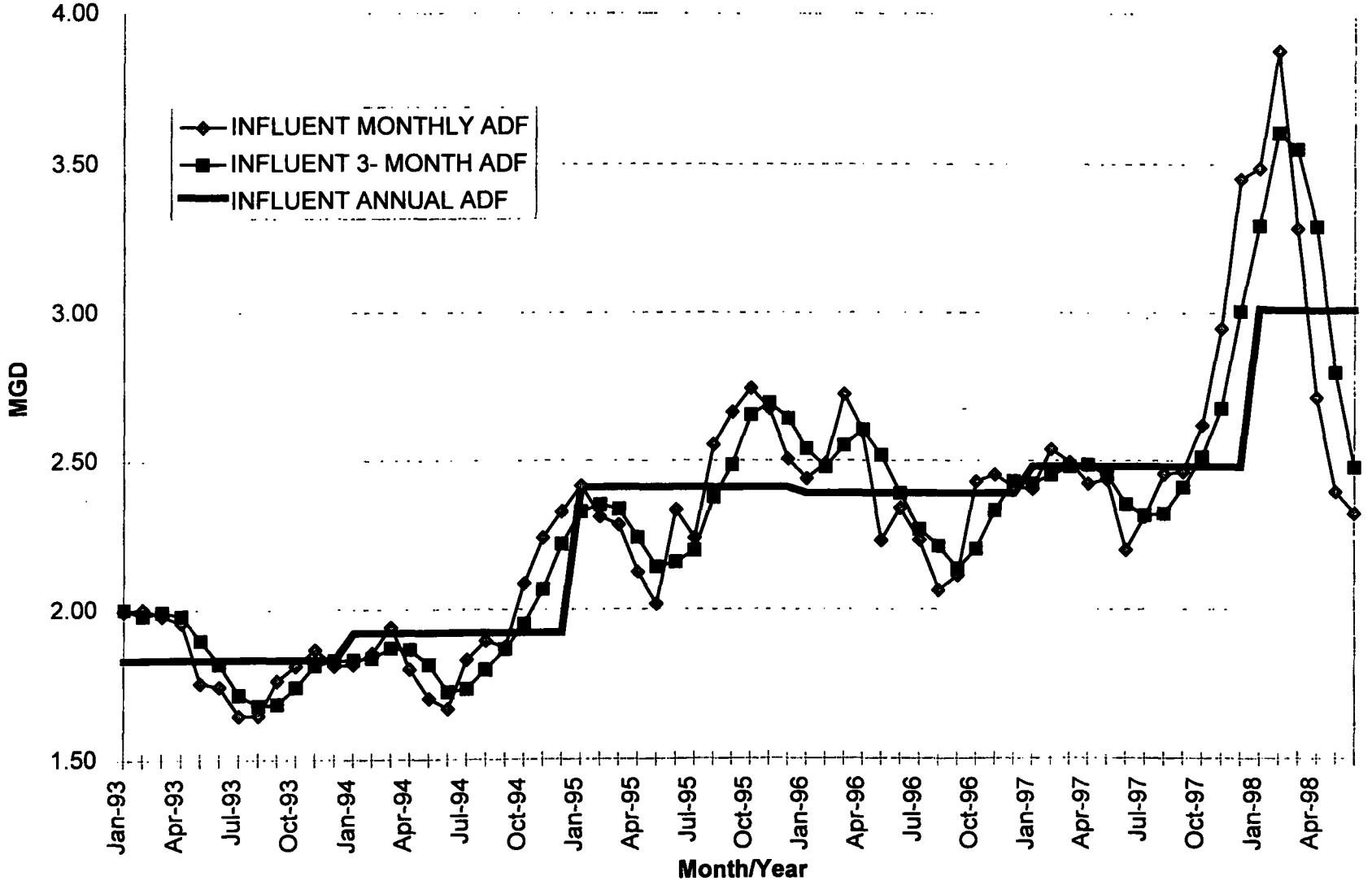
Annual Average Daily Flows (MGD) [1]

Year	Annual Average Daily Flows (MGD)
1988	0.86
1989	1.11
1990	1.33
1991	1.61
1992	1.70
1993	1.83
1994	1.92
1995	2.41
1996	2.39
1997	2.48
1998	3.01

[1] Influent flows for 1988 and 1989 based on original package plant.

The SERWTP monthly average daily flows, three-month average daily flows, and annual average daily flows for the past five years are presented graphically in Figure 4.

Figure 4
SERWTP Monthly ADF, 3-Month ADF & Annual ADF



2.4 Seasonal Variation

The Manatee County SERWTP experiences significant seasonal variations in flow. The seasonal variation(s) were determined by comparing the maximum three-month average daily flow with the annual average daily flow for each of the past ten years. Table 5 presents the annual average daily flow, the maximum three-month average daily flow and the average ratio of the yearly maximum three-month average daily flow to the annual average daily flow for the past ten years. The table also identifies the month(s) of the year when the three-month average daily flow was maximum.

Table 5
Manatee County SERWTP
Seasonal Variations in Flows

Year	Annual ADF (MGD)	Max 3-MADF (MGD)	Max 3-MADF: Annual ADF	Max 3-MADF Month
1988	0.86	0.90	1.05	May
1989	1.11	1.47	1.32	November
1990	1.33	1.45	1.09	December
1991	1.61	1.74	1.08	April
1992	1.70	1.82	1.07	July
1993	1.83	2.01	1.09	January
1994	1.92	2.21	1.15	December
1995	2.41	2.69	1.12	November
1996	2.39	2.60	1.09	April
1997	2.48	3.00	1.20	December
Average			**1.12**	

2.5 Updated Flow and Loading Information

Table 6 presents the criteria used to establish the design capacity of the SERWTP compared with the pollutant concentrations currently (based on 1997 influent monitoring data) being treated at the plant. The information is presented in terms of pollutant concentrations since reported 1997 loadings are based on inaccurate influent flow meter data.

Table 6
Manatee County SERWTP
Design/Current Loadings

Parameter	Design Criteria	Current Loadings
Flow (Annual Average)	5.4 MGD	NA [1]
BOD_5 (Annual Average)	250 mg/l	198 mg/l
TSS (Annual Average)	250 mg/l	212 mg/l

[1] Accurate influent flow data unavailable

All of the current loadings are within the ranges used to establish the design capacity.

3.0 FUTURE CONDITIONS

3.1 Population Projections/Southeast Service Area

The Southeast service area is bordered by the Manatee River on the north; Rye Road and the western two-thirds of Township 35 South, Range 19 East on the east; Sarasota County on the south; and a line extending approximately up the Braden River to 34th Avenue East, thence west to US 301 and south to the Sarasota County line on the west. Tallevast and portions of Samoset and Oneco are also within the study area. The Southeast service area, which encompasses approximately 65,000 acres, is depicted in Figure 5.

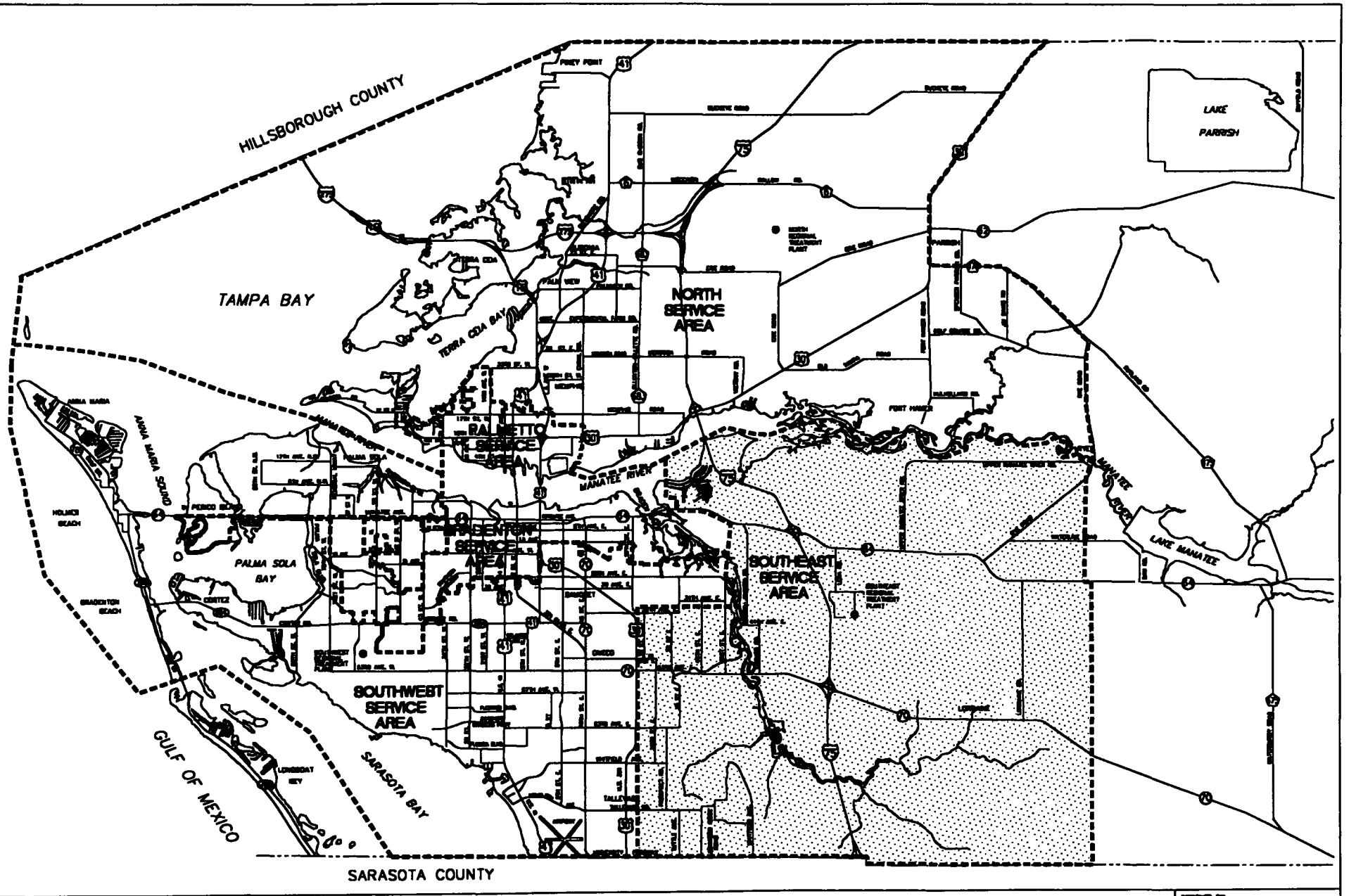
Population projections from 1999 to 2010 for the service area were developed by the Manatee County Planning Department in December 1997, with projections for years 2011 through 2015 calculated by McKim & Creed based on straight line projections of County data. Table 7 presents the projected resident service area population on a yearly basis through 2015.

Table 7

Manatee County SERWTP

Projected Resident Service Area Population

Year	Projected Population
Current	38,835
1999	41,065
2000	43,294
2001	45,523
2002	47,752
2003	49,981
2004	52,210
2005	54,439
2006	56,668
2007	58,897
2008	61,126
2009	63,355
2010	65,584
2011	68,207
2012	70,935
2013	73,772
2014	76,723
2015	79,792



McKIM&CREED

MANATEE COUNTY REGIONAL WASTEWATER COLLECTION SYSTEM

SOUTHEAST REGIONAL WASTEWATER TREATMENT PLANT

DESIGNED BY:	
DRAWN BY:	
CHECKED BY:	
APPROVED BY:	
DATE:	8/5/98
PROJ. NUMBER:	1024-0008
FIGURE NUMBER:	5
REV	

1024\DM\FIG

3.2 Flow Projections/Southeast Service Area

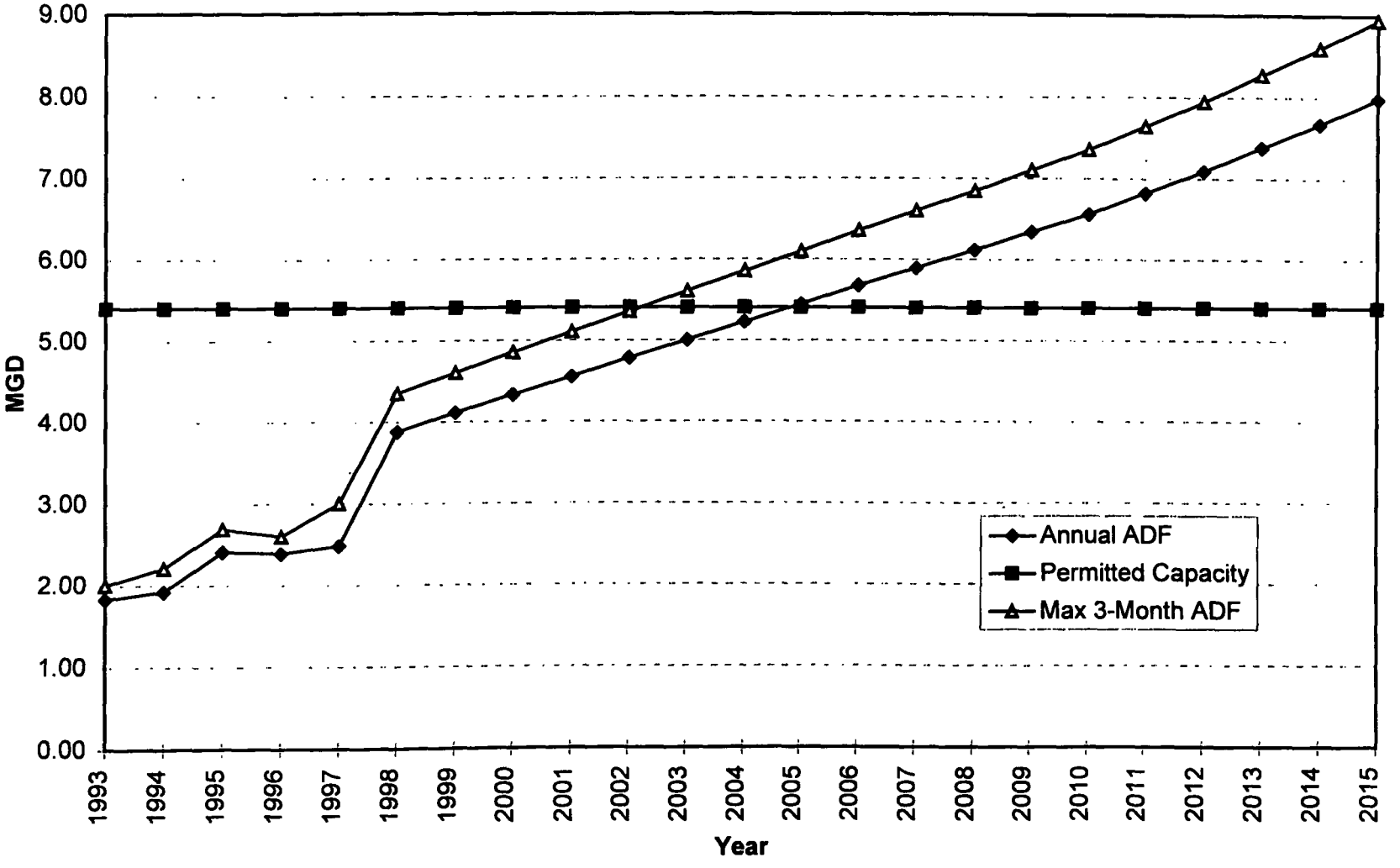
Table 8 presents the projected annual average daily flow and the maximum three-month average daily flow on a yearly basis through 2015. Projected annual average daily flows are based on the population projections presented in Table 8 and a per capita wastewater flow of 100 gallons per day. The 100 gpcd flow rate is based on an evaluation of historical flows in Southeast service area within the County and historical flow records for the wastewater treatment facility. This review indicates per capita flow will not exceed 100 gpcd in the planning period. The County is proceeding with a revision of the per capita rates for the next Comprehensive Plan update (See Data in Appendix A) . The average ratio of the yearly maximum three-month average daily flow to the annual average daily flow, as determined in the section on seasonal variations in flow, was used to project the maximum three-month average daily flows for each year.

The projected annual average daily flows and yearly maximum three-month average daily flows are also presented graphically in Figure 6.

Table 8
Manatee County SERWTP
Projected Wastewater Flows

Year	Projected Annual Average Daily Flows (MGD)	Projected Maximum Three-Month Average Daily Flows (MGD)
1998	3.88	4.35
1999	4.11	4.60
2000	4.33	4.85
2001	4.55	5.10
2002	4.78	5.35
2003	5.00	5.60
2004	5.22	5.85
2005	5.44	6.09
2006	5.67	6.35
2007	5.89	6.60
2008	6.11	6.84
2009	6.34	7.10
2010	6.56	7.35
2011	6.82	7.64
2012	7.09	7.94
2013	7.38	8.27
2014	7.67	8.60
2015	7.98	8.94

Figure 6
Projected Annual Average Daily Flows and Yearly Maximum Three-Month Average Daily Flows



4.0 SUMMARY AND CONCLUSIONS

4.1 Time Required for the Three-month Average Daily Flow to Reach the Permitted Capacity

As indicated in Figure 6, the maximum three-month average daily flows of the SERWTP are projected to reach the permitted capacity (5.4 MGD) in 2002, especially if wet weather conditions persist during peak population times as has occurred in 1997/98.

4.2 Recommendations

Manatee County initiated a dialogue with FDEP immediately after discovering the problems with the influent flow meter. Manatee County is committed to meeting existing permit conditions and to implementing a plan to accommodate projected flows as expeditiously as possible. In addition, as a result of the new influent flow data, the County is considering the preparation of a new operational permit with plans to expand the facility since the modification permit expires on April 1, 2000 and renewal applications are due 180 days prior to expiration.

The following alternatives were identified as options for the County's consideration:

- Re-rate the capacity of the plant based on the available capacity identified above prior to later expansion
- Implement a two stage expansion process
- Expand plant capacity directly to 11.0 MGD

A review of the SERWTP facilities indicates that significant additional capacity is currently available at the existing plant. Table 9 presents a summary of the available capacity of each process.

Table 9

Manatee County SERWTP

Existing Available Capacity

PROCESS	EXISTING AVAILABLE CAPACITY (MGD)
Headworks (overall)	8.0
Screening	24 (peak)
Grit Removal	40 (peak)
Anoxic Basin	7.5
Oxidation Ditch	7.3
Clarifiers[1]	7.6
RAS Pumping	7.5
Effluent Filters[1]	8.3
Disinfection	
Chlorinators	11
Contact Tanks[2]	5.4
WAS Pumping	11
DAF Thickeners	7.5
Aerobic Digestors/Blowers[3]	5.4
Belt Press (with increased operating hours)	11

[1] The existing clarifiers and filters have the hydraulic and/or loading capacity indicated above, however, these processes do not meet current FDEP Class I Reliability Requirements

[2] The existing chlorine contact was designed to meet requirements in effect at the time of original design

[3] The existing aerobic digestor capacity was designed based on criteria in effect in 1988. Current regulations will require this system to be upgraded at the time of plant modification.

Results of the capacity evaluation indicate that with certain exceptions, the plant can be re-rated on paper to a capacity of 7.3 MGD. The noted exceptions include Class I Reliability issues with the clarifiers and filters, insufficient chlorine contact time to meet current regulations and 503 Regulations regarding sludge treatment requirements. The temporary acceptance of sludge produced at the SERWTP at the Manatee County landfill provides an interim solution to the sludge handling issues.

The Class I Reliability issues likely preclude a re-rating of the facility without constructing certain additions.

The two phase expansion process would include initially expanding the existing facility to about 7.3 MGD with a second phase expansion to 11.0 MGD. The following processes must be improved in order to provide a 7.3 MGD facility with Class I Reliability:

- Construct two clarifiers
- Construct two filters
- Expand the chlorine contact tanks
- Expand or replace the existing sludge thickeners and digesters
- Expand or replace the existing sludge digesters/blowers

Project implementation, including design and construction, is estimated at 2-1/2 to 3 years. Wastewater projections indicate that initiation of the second phase expansion will be required as the phase one expansion becomes operational.

Expansion of plant capacity to 11.0 MGD in a single phase will require the improvements identified above as well as an expanded aeration system. The following improvements are necessary in order to expand the plant to a capacity of 11.0 MGD (Class I Reliability).

- Expand headworks
- Add a third train, including anoxic basin, to the oxidation ditches
- Construct two clarifiers
- Expand RAS pumping facilities
- Construct two filters
- Expand the chlorination facilities and chlorine contact tanks
- Expand or replace the existing sludge thickeners and digesters
- Expand or replace the existing sludge digesters/blowers
- Expand WAS pumping facilities

Project implementation, including design and construction, is also estimated at 2-1/2 to 3 years. Although obviously higher in up front costs than the two-phased approach, the total cost of expanding the plant to 11.0 MGD will be lower if accomplished in one phase.

Based on a conference with FDEP officials held on March 12, 1998, it is recommended that the County proceed with expansion of the SERWTP capacity to 11.0 MGD in a single construction contract with possible phased completion times for critical components.

4.3 Expansion Schedules

The following schedule provides Manatee County with a proposed action plan for implementing expansion of the SERWTP facilities.

Action Item	Completion Date
Complete Capacity Analysis Report/ Initiate planning of the necessary expansion	March 1998
Initiate preliminary design of the necessary expansion	July 1998
Preparation of plans and specifications for the necessary expansion	March 1999
Prepare and submit construction permit application to FDEP	March 1999
Construction of Critical Component	July 1999
Place the critical component of the expanded facilities into operation	August 1999
Construct additional items to achieve full 11.0 mgd capacity	July 2001
Place into operation full plant expansion	August 2001

APPENDIX A

FLOW AT SERTP VERSUS RESIDENT AND SEASONAL POPULATION WITHIN THE SERTP SERVICE AREA

MANATEE COUNTY GOVERNMENT

M E M O R A N D U M

DATE: June 29, 1998

TO: Len Bramble, P.E., Public Works Director

FROM: Bob Hall, P.E., Engineering Division Manager

SUBJECT: Flow at SERTP Versus Resident and Seasonal Population Within the SERTP Service Area

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For the purpose of this analysis, resident and seasonal population figures were obtained from Leon Kotecki of the Manatee County Comprehensive Planning Section. These population figures are based on residential permits issued prior to July 1997, available lodging places and seasonally vacant dwelling units:

	SERTP		NRTP		SWRTP	
	Resid. Pop.	Res. & Sea. Pop.	Resid. Pop.	Res. & Sea. Pop.	Resid. Pop.	Red. & Sea. Pop.
Mid Yr. 1997 (Leon K.)	36607	43172	29526	39363	118009	150492
1st Qtr. 1998 (Interpolated)	38280	45140	29960	39920	118720	151410
Mid Yr. 2000 (Leon K.)	43294	51038	31266	41598	120840	154173

Combining these population figures with the December 97 thru May 98 metered influent flow at each of the three plants yields the following results:

	Month	No. of Days	Influent M. Gals.	Influent MGD	Seasonally Adjusted Population	Influent Per Capita GPCD
SERTP	Dec.	31	106.971	3.451	45140	76.45
	Jan.	31	108.101	3.487	45140	77.25
	Feb.	28	108.558	3.877	45140	85.89
	March	31	101.86	3.286	45140	72.79
	April	30	81.438	2.715	38280	70.92
	May	31	74.341	2.398	38280	62.64
	Sub.Tot.	182	581.269	3.194	42853**	74.53
NRTP	Dec.	31	115.172*	3.715	39920	93.06*
	Jan.	31	101.406	3.271	39920	81.94
	Feb.	28	87.407	3.122	39920	78.21
	March	31	101.406	3.271	39920	81.94
	April	30	66.668	2.222	29960	74.17
	May	31	55.923	1.804	29960	60.21
	Sub.Tot.	182	527.982	2.901	36600**	79.26
SWRTP	Dec.	31	551.586	17.793	151410	117.52
	Jan.	31	529.672	17.086	151410	112.85
	Feb.	28	499.457	17.838	151410	117.81
	March	31	532.044	17.163	151410	113.35
	April	30	409.941	13.665	118720	115.1
	May	31	368.504	11.887	118720	100.13
	Sub.Tot.	182	2891.204	15.886	140513**	113.06

* Extraordinary storm events -
8 MGD 13th & 27th
5 MGD 14th & 28th
4 MGD 15th

** Average population over 6 month period

Conclusion

The per capita flow for the collection systems in the SERTP and NRTP service areas is always less than 95 gpcd and I believe this clearly demonstrates that newer residential developments have per capita flows closer to 85 gpcd.

The per capita flow for the SWRTP service area is very close to the 115 gpcd currently used to calculate future flows; however, I believe this is due to the predominance of older collection (clay pipe, etc.) systems with much greater infiltration of groundwater, etc.

Obviously, all future developments will be using PVC pipe with water tight manholes (all new manholes are now vacuum tested) and can be expected to have flows of around 85 gpcd and I am recommending that all future development flows be permitted using 95 gpcd.

BH:svo

cc: David Branning