City of San José

San José /Santa Clara Water Pollution Control Plant Master Plan

TASK NO. 3
PROJECT MEMORANDUM NO. 1
HISTORICAL WASTEWATER FLOWS

FINAL DRAFT
July 2009

in association with

2700 YGNACIO VALLEY ROAD • SUITE 300 • WALNUT CREEK, CALIFORNIA 94598 • (925) 932-1710 • FAX (925) 930-0208

CITY OF SAN JOSÉ

SAN JOSÉ /SANTA CLARA WATER POLLUTION CONTROL PLANT MASTER PLAN

TASK NO. 3
PROJECT MEMORANDUM NO. 1
HISTORICAL WASTEWATER FLOWS

TABLE OF CONTENTS

Page No.

LIST OF TABLES

LIST OF FIGURES

HISTORICAL WASTEWATER FLOWS

1.0 INTRODUCTION

The purpose of this project memorandum (PM) is to examine historically recorded wastewater flows for the San José/Santa Clara Water Pollution Control Plant (WPCP). The evaluation of historical flows will be used to develop projections of future wastewater flows for the purpose of assessing future permit compliance and future capacity needs for the WPCP.

Historical wastewater influent and effluent flows from 1998 to 2007 were used for the analysis. Peaking factors, the ratio of wet weather to dry weather flows, were developed for the purpose of projecting future wastewater flows. Projected flows and peaking factors will be used to evaluate treatment capacity needs. Historical hourly (diurnal) flow variations were examined to determine hourly peaking factors for the purpose of projecting hourly flow variations. Projected hourly flows will also be used for evaluating future capacity needs. In addition, day of the week flow variations were examined to evaluate the historical impacts of commuters for the purpose of determining if commuter impacts need to be accounted for in the projections of future wastewater flows.

The various flow definitions used throughout this PM are listed and defined in Table 1, along with the purpose each will serve in master planning future facilities. Table 1 also includes loading definitions that are used in other PMs.

2.0 RECORDED WASTEWATER FLOWS

The recorded average monthly total influent and effluent wastewater flows at the WPCP for the 10-year period between January 1998 and December 2007 are summarized in Tables 2 and 3 and presented in Figure 1. Tables 2 and 3 also include the average day annual flows (ADAFs) for 1998 to 2007.

As shown in Figure 1, the effluent flow is generally less than the total influent flow. The maximum difference between the average monthly influent and effluent flows over the 10-year period is 19 million gallons per day (mgd), and was in August 2003. On an annually averaged basis, the maximum difference between influent and effluent ADAF is 11 mgd. The difference between the influent and effluent flows is primarily due to treated water that is not discharged to the outfall but is instead diverted for recycled water needs, which range from 3 to 24 mgd, and for process water for the storage lagoons/other WPCP uses, which range from 1.5 to 2.5 mgd. In addition, due to the location of the flow meters, the influent flow is a calculated value, which requires estimation of some of process water streams since they are not all directly metered. The Appendix includes a series of schematics

Table 1	Wastewater Flow and Loading Definitions San José/Santa Clara Water Pollution Control Plant Master Plan City of San José	
Term	**Definition**	**Purpose**
Wastewater Flow Definitions		
ADWIF	Average Dry Weather Influent Flow The average daily flow over any five weekday period between the months of June and October. The maximum of the weekday averages is reported for permit compliance.	To assess future permit compliance.
ADWF[1]	Average Dry Weather Flow The average daily influent flow occurring over the three consecutive lowest flow months in the dry weather season (May through October).	To develop base wastewater flow projections and to provide the basis for sizing certain treatment facilities. Also used to evaluate taking various process units out of service.
ADWEF	Average Dry Weather Effluent Flow The average daily effluent flow occurring over the three consecutive lowest flow months in the dry weather season (May through October).	To assess future permit compliance.
ADAF	Average Daily Annual Flow The average daily flow or loading for an annual period.	To evaluate annual power use.
ADMMF	Average Daily Maximum Month Flow The average daily flow occurring during the peak flow month of the year. Peak flow and peak loadings do not necessarily have to occur in the same month. ADMMF typically occurs in the wet season (November through April).	To size wastewater treatment facilities to meet 30-day National Pollutant Discharge Elimination System (NPDES) permit requirements.
PHWWF	Peak Hour Wet Weather Flow The peak hour flow resulting from a rainfall event.	To set plant hydraulic capacity.
MDWWF	Maximum Day Wet Weather Flow The maximum daily flow occurring in the wet season (November through April).	Used to evaluate ability to meet daily max permit limits.
Wastewater Load Definitions		
ADWL	Average Dry Weather Load The average daily loading occurring over the three consecutive lowest flow months in the	To develop base wastewater load projections and to

Table 1	Wastewater Flow and Loading Definitions San José/Santa Clara Water Pollution Control Plant Master Plan City of San José	
	dry weather season (May through October)	provide the basis for sizing certain treatment facilities.
ADAL	Average Daily Annual Load The average daily loading for an annual period.	To size certain solids facilities (such as lagoons and drying beds) and evaluate annual power use.
ADMML	Average Daily Maximum Month Load The average daily organic or suspended solids loading occurring during the peak loading month of the year. Peak flow and peak loadings do not necessarily have to occur in the same month.	To size wastewater treatment facilities to meet 30-day NPDES permit requirements and sizing for various solids handling facilities including digesters and thickening equipment.
MDDWL	Maximum Day Dry Weather Load The maximum day loading occurring during the dry weather season (May through October).	Together with consideration of diurnal variation, often used to determine aeration demands as well as to check max day requirements.
MDWWL	Maximum Day Wet Weather Load The maximum daily loading occurring in the wet season (November through April).	Together with consideration of diurnal variation, often used to determine aeration demands as well as to check max day requirements.
MWWWL	Maximum Week Wet Weather Load The maximum week loading occurring in the wet season (November through April).	Used in a biological nutrient removal plant to determine the solids retention time for nitrification and denitrification

Note:

(1) This definition for ADWF is equivalent to the Average Dry Weather Effluent Flow (ADWEF) in the WPCP NPDES Permit (No. CA0037842). In this PM, the ADWF averaging period is also used for influent flows (and loads in PM 3.2) for the purpose of developing base wastewater flow and load projections and to size treatment facilities.

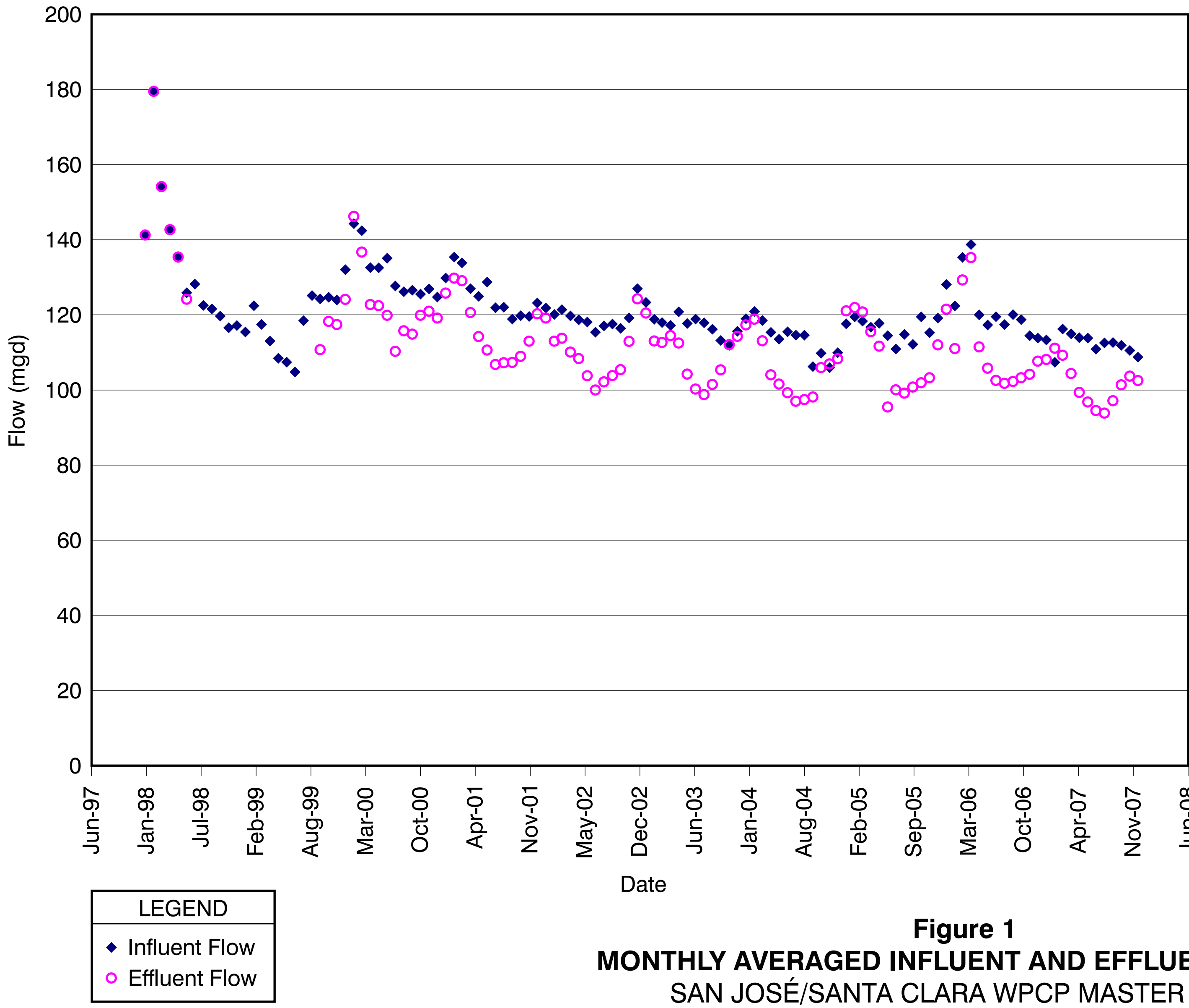


Figure 1
MONTHLY AVERAGED INFLUENT AND EFFLUENT FLOWS
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

sj708f10-7897.ai

Table 2 Recorded Average Monthly Total Influent Flows (mgd)
San José/Santa Clara Water Pollution Control Plant Master Plan
City of San José

Month	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
January	141	115	132	130	122	123	119	118	128	113
February	179	122	144	135	120	119	121	119	122	107
March	154	117	142	134	121	118	118	118	135	116
April	143	113	133	127	120	117	115	117	139	115
May	135	108	133	125	119	121	114	118	120	114
June	126	107	135	129	118	118	115	114	117	114
July	128	105	128	122	115	119	115	111	120	111
August	123	118	126	122	117	118	115	115	117	113
September	122	125	127	119	118	116	106	112	120	113
October	120	124	126	120	116	113	110	119	119	112
November	117	125	127	120	119	112	106	115	114	111
December	117	124	125	123	127	116	110	119	114	109
ADAF	134	117	131	125	119	117	114	116	122	112

Table 3 Recorded Average Monthly Effluent Flows (mgd)
San José/Santa Clara Water Pollution Control Plant Master Plan
City of San José

Month	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
January	141	N/A	124	126	119	120	117	121	121	108
February	179	N/A	146	130	113	113	119	122	111	111
March	154	N/A	137	129	114	113	113	121	129	109
April	143	N/A	123	121	110	114	104	115	135	104
May	135	N/A	122	114	108	112	102	112	111	99
June	124	N/A	120	111	104	104	99	95	106	97
July	N/A	N/A	110	107	100	100	97	100	103	95
August	N/A	N/A	116	107	102	99	97	99	102	94
September	N/A	N/A	115	107	104	101	98	101	102	97
October	N/A	111	120	109	105	105	106	102	103	101
November	N/A	118	121	113	113	112	107	103	104	104
December	N/A	117	119	120	124	114	108	112	108	102
ADAF	N/A	N/A	123	116	110	109	106	109	111	102

N/A = Not available

showing the major unit treatment processes and the flow metering locations. The influent flow to the WPCP is calculated by adding the final effluent and the net recycled water flow (diversion to recycled water Transmission Pump Station minus the recycled water to the WPCP) and the recycled flow to the lagoons (see Figure A-1 in the Appendix). Error in the estimates of process water flows contributes to the error in the influent flow data. Measurement error of the flow meters also contributes to the error in the influent and effluent flows.

The WPCP National Pollutant Discharge Elimination System (NPDES) Permit (No. CA0037842) includes a 167 mgd limit on the average dry weather influent flow (ADWIF) to the WPCP. Therefore ADWIF, defined as the maximum of the average daily flow over any five weekday period between the months of June and October, will be used to assess current and future permit compliance. The WPCP NPDES permit includes a 120 mgd trigger for the average dry weather effluent flow (ADWEF), defined as the average daily effluent flow occurring over the three consecutive lowest flow months in the dry weather season of May through October, discharge to the Artesian Slough via the outfall. The WPCP NPDES permit also includes limitations on pollutant loads discharged to the Artesian Slough, which are based on effluent flows and concentrations. These WPCP NPDES permit limitations require that effluent flows also be used for assessing current and future permit compliance.

The treatment process evaluation will be based on influent flows because the flow diversions for recycled water and process water are located downstream of final chlorination, which is the end of the overall treatment process. Since these diversions do not take place during the treatment process, all of the WPCP treatment processes need to have the necessary capacity to treat the influent flow. The ADWF for the influent flow, defined as the average daily influent flow occurring over the three consecutive lowest flow months in the dry weather season of May through October, as well as the ADMMF and PHWWF for the influent flow, will be used to evaluate current and future treatment process performance and capacity needs. The ADWF, ADMMF, MDWWF and PHWWF flows are calculated because, as noted in Table 1, these parameters will be used to evaluate treatment performance, to provide the basis for process sizing, and to assess regulatory compliance.

In addition, influent flows will also be used as the basis for evaluating compliance with the "Master Agreement for Wastewater Treatment between City of San José, City of Santa Clara and City of Milpitas" (City of San José, 1983) (Tributary Agreement). The Tributary Agreement states that an "Engineering Study" must be completed when the WPCP reaches 85 percent of its designated capacity, beginning with 167 mgd, and for every incremental capacity increase thereafter. The first Engineering Study shall be performed when the mean peak five-day dry weather flow to the WPCP reaches 142 mgd. The mean peak five-day dry weather flow is considered to be equivalent to the ADWIF. The required components of the Engineering Study include an analysis of capacity needs, the size and nature of the proposed facilities to be constructed, a construction timetable, an estimate of total project costs, and an estimate of each of the tributary agencies' share of the project cost.

2.1 Annual, Seasonal, and Peak Influent Flows

Annual, seasonal and peak influent flows were calculated based on the historical record. These flows will be used in the projections of future wastewater flows for the purpose of assessing future capacity needs. The annual, seasonal (dry weather and wet weather) and peak influent flows are summarized in Table 4. The dry weather season, as shown in Table 4, is defined as May 1 to October 31. The ADWIF flows are also shown in Table 4, but as noted previously, the ADWIF will be used for the assessment of regulatory compliance rather than the capacity/treatment performance evaluation. Figure 2 presents the annual, seasonal, and peak influent flows, which will be used for the treatment performance and capacity evaluation, including ADAF, ADWF, ADMMF, MDWWF and PHWWF.

Through the process of determining the PHWWFs for each year, several suspected outliers were identified and removed from the data set. For each year, the maximum hourly flow was identified. On the day that this maximum hourly flow occurred, the hourly flows were plotted to determine if the maximum hourly flow was consistent with the overall shape of the hydrograph. In addition, the precipitation volumes for the day the maximum hourly flow occurred and previous days were obtained to confirm it was associated with a storm event and not resulting from erroneous data. A three standard deviation outlier test was conducted to remove suspected outliers. The basis for the test was the change in flow between consecutive hours over a 24-hour period.

The 1998 PHWWF shown in Table 4 is 330 mgd, and is associated with a storm event that occurred on February 2 -February 3, 1998. The hourly flows reported in the VAX database do not include this peak value due to the absence of data over the early hour morning hours when the peak flow occurred. The peak flow of 330 mgd was cited in the "Wet Weather Reliability and Hydraulic Capacity Project" report (Malcolm Pirnie, 2001). However, the hydrograph presented in Appendix B of the report indicates a peak flow of only 320 mgd for that day. For this analysis, the higher and more conservative flow of 330 mgd was assumed.

Table 4 and Figure 2 show that, with the exception of 1998 and 1999, the ADAF and the ADWF are similar, and within a range of 5 mgd. The dry weather flows have varied between 1998 and 2007, but generally exhibit a decreasing trend. The general decrease in dry weather flows are a result of water conservation measures have been implemented in the WPCP's service area since the early 1990s (Environmental Services Department, 2008). The State Water Quality Control Board order WQ90-5 was implemented in 1990 and established an effluent discharge limit of 120 mgd for flows that affect habitat in the South San Francisco Bay. This limitation prompted implementation of water conservation measures within the WPCP service area. In addition, between 1998 and 2007 the industries

Table 4	Annual, Seasonal and Peak Influent Wastewater Flows (mgd) San José/Santa Clara Water Pollution Control Plant Master Plan City of San José					
	Dry Weather[1]			Wet Weather		
Year	Average Annual ADAF	Average Daily ADWIF	Average Daily ADWF	Average Monthly ADMMF[2]	Max Daily MDWWF	Peak Hour PHWWF[3]
1998	134	134	121	179	246	330
1999	117	127	107	125	140	191
2000	131	139	126	144	183	252
2001	125	133	120	135	156	202
2002	119	121	117	127	165	219
2003	117	121	116	123	138	190
2004	114	118	110	121	149	221
2005	116	121	113	119	153	201
2006	122	129	118	139	175	234
2007	112	116	112	116	128	173

Note:
(1) Dry weather season is defined as May 1 to October 31.
(2) ADMMF typically occurs in the wet weather season. However, ADMMF was determined by taking maximum of all the average monthly flows over the entire year.
(3) PHWWF typically occurs in the wet season since it is a flow that occurs in response to a rain event. However, the PHWWF was determined by taking the maximum of the hourly flows that occurred as a result of a rain event.

in the WPCP service area have changed. The relatively elevated flows measured in 2000 and 2001 were potentially due to the economic bubble in the region that led to relatively abnormal flow from industries that are no longer in the service area. This change in the WPCP service area has led to the general decrease in dry weather flows (Environmental Services Department, 2008).

Table 4 shows that the ADWIFs have generally decreased between 1998 and 2007. The maximum value of 139 mgd occurred in 2000, but is well below the WPCP NPDES permit limitation of 167 mgd, and below the 142 mgd trigger in the Tributary Agreement.

The wet weather flows (ADMMF, MDWWF and PHWWF) have varied over the 10-year period, but are lower in 2007 than in 1998. The flow ratios for ADMMF, MDWWF and PHWWF compared to ADWF for each of the 10 years are presented in Table 5. Similar to the wet weather flows, these ratios have varied over the 10-year period but are lower in 2007 than in 1998. It is difficult to evaluate this trend because the wet weather flows and flow ratios are dependent on several factors including the return periods of the storm events that occurred and the condition of the collection system with respect to the amount of infiltration and inflow generated by storm events. The City of San José, City of Santa Clara,

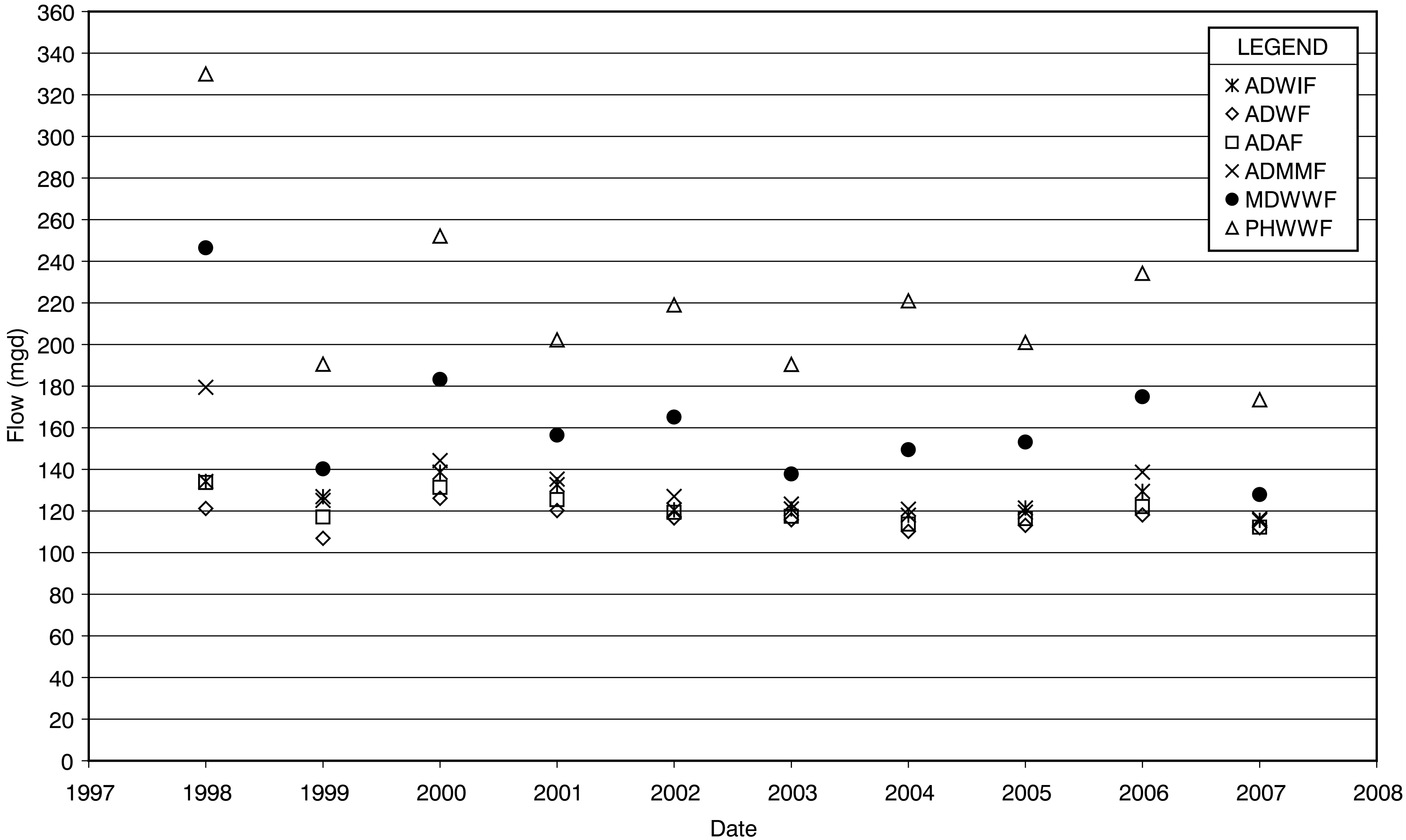


Figure 2
ANNUAL, SEASONAL AND PEAK INFLUENT WASTEWATER FLOWS - ADWIF, ADWF, ADAF, ADMMF AND PHWWF
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

sj509f13-7897.ai

Table 5 Historical Wastewater Flow Ratios
San José/Santa Clara Water Pollution Control Plant Master Plan
City of San José

Year	Flow Ratio				
	ADAF to ADWF	ADWIF to ADWF	ADMMF to ADWF	MDWWF to ADWF	PHWWF to ADWF
1998	1.10	1.11	1.48	2.03	2.72
1999	1.10	1.19	1.17	1.31	1.78
2000	1.04	1.10	1.14	1.45	2.00
2001	1.04	1.10	1.13	1.30	1.68
2002	1.02	1.03	1.09	1.42	1.88
2003	1.01	1.05	1.07	1.19	1.65
2004	1.03	1.07	1.10	1.36	2.01
2005	1.03	1.07	1.06	1.35	1.78
2006	1.03	1.10	1.17	1.48	1.98
2007	1.00	1.03	1.04	1.14	1.55

and tributary agencies have been working to reduce the impact of stormwater infiltration to the sanitary sewer system over the past 10 years.

In addition to the previously mentioned potential reasons for variability in the wet and dry weather flows, especially prior to 2001, the variability in flows may also be due to influent meter calibration problems and different influent measurement methodologies (measured vs. estimated).

Daily and monthly precipitation data were obtained for San José, CA for the period of record, 1893 to 2007. Precipitation is one of the parameters that contributes to WPCP influent flows, therefore, further analysis of precipitation patterns over the 10-year study period was conducted. A ranking analysis on the precipitation data was conducted to compare the precipitation occurring in the wet months of the year within the study period to the wet months of the year over the period of record. The monthly precipitation volumes were ranked from greatest precipitation to lowest precipitation and the return periods were calculated. Table 6 presents the ranks and return periods for the monthly precipitation volumes. The period of record included between 80 and 83 monthly precipitation volumes. A rank of five, for example, would indicate that the monthly precipitation volume was the 5th greatest monthly volume that occurred out of approximately 80 monthly records. Figure 3 presents the monthly precipitation volumes as compared to the average volume for each month over the period of record.

While this is not a storm event based analysis, the monthly precipitation totals provide information on the total volume of rainfall due to storm events. A dry month is characterized by a precipitation volume that is below average and a return period that is relatively low. A

Table 6 Rank and Return Period for the Monthly Precipitation Volumes, San José, California
San José/Santa Clara Water Pollution Control Plant Master Plan
City of San José

	January		February		March		April		November		December	
Year	**Rank**	**Return Period (yrs)**	**Rank**	**Return Period (yrs)**	**Rank**	**Return Period (yrs)**	**Rank**	**Return Period (yrs)**	**Rank**	**Return Period (yrs)**	**Rank**	**Return Period (yrs)**
1998	14	5.9	1	81.0	37	2.2	27	3.1	1.77	26	68	1.2
1999	31	2.6	32	2.5	30	2.8	23	3.7	0.5	59	72	1.1
2000	28	2.9	18	4.5	53	1.6	50	1.7	0.44	61	78	1.0
2001	39	2.1	19	4.3	52	1.6	25	3.4	2.12	22	13	6.2
2002	72	1.1	66	1.2	49	1.7	69	1.2	1.99	24	3	27.0
2003	74	1.1	48	1.7	67	1.2	9	9.3	1.91	25	8	10.1
2004	55	1.5	22	3.7	71	1.2	66	1.3	0.73	55	14	5.8
2005	30	2.7	13	6.2	15	5.5	12	7.0	0.45	60	4	20.3
2006	36	2.3	38	2.1	2	41.5	1	84.0	1.38	34	49	1.7
2007	65	1.3	23	3.5	73	1.1	NA	NA	0.55	58	NA	NA

Notes:
NA = Not Available.
The period of record, excluding years when data were missing, ranged from 80 to 83 years.
Source: Western Regional Climate Center, http://www.wrcc.dri.edu/.

relatively low precipitation month could lead to lower influent flows, because there is less opportunity for storm events to contribute to infiltration and inflow. Therefore, dry months likely lead to the condition of relatively low ADMMF, and also suggest that the MDWWF and PHWWF may be relatively low as well.

Figure 3 shows that for at least three months out of the six month wet season, the monthly rainfall volumes were less than the average monthly rainfall volume for the period of record in 2000, 2002, 2003, 2004, and 2007, and that the return periods for the monthly precipitation volumes are relatively short. The relatively dry months during the wet weather seasons for years 2000, 2002, 2003, 2004, and 2007 may have contributed to the lower ADMMFs, MDWWFs and PHWWFs in these years.

Lower ADMMF, MDWWF and PHWWF flows also result in lower ratios relative to the ADWF. In addition. since 1998, collection system improvements designed to minimize infiltration and inflow have been implemented, and may have contributed to the decrease in flow ratios from 1998 to 2007.

2.2 Day of the Week Influent Flow Variations

A comparison of daily average flows for each day of the week during the dry season between 1998, 2002, and 2007 was made to determine if the proportion of historical wastewater flows received during the week versus the weekend has been different, and if this pattern has changed over the past 10 years. Average daily flows for the dry weather season are presented in Table 7.

Table 7 Dry Weather Season Day of the Week Reported Influent Wastewater Flow Averages (mgd)
San José/Santa Clara Water Pollution Control Plant Master Plan
City of San José

Day of the Week	1998	2002	2007
Monday	127	118	113
Tuesday	127	118	113
Wednesday	126	118	113
Thursday	125	117	113
Friday	124	117	112
Saturday	124	116	111
Sunday	127	116	113

In each of the three years, the lowest flows occurred on Saturdays. However, on a dry weather season averaged basis, there is not a significant day to day variation in flows, with the Saturday flows within 3 mgd of the highest daily flows. These results suggest that over the 10-year period, there has not been a significant net effect of commuting into and out of the service area since the weekday versus weekend flows are not significantly different for any of the three years discussed.

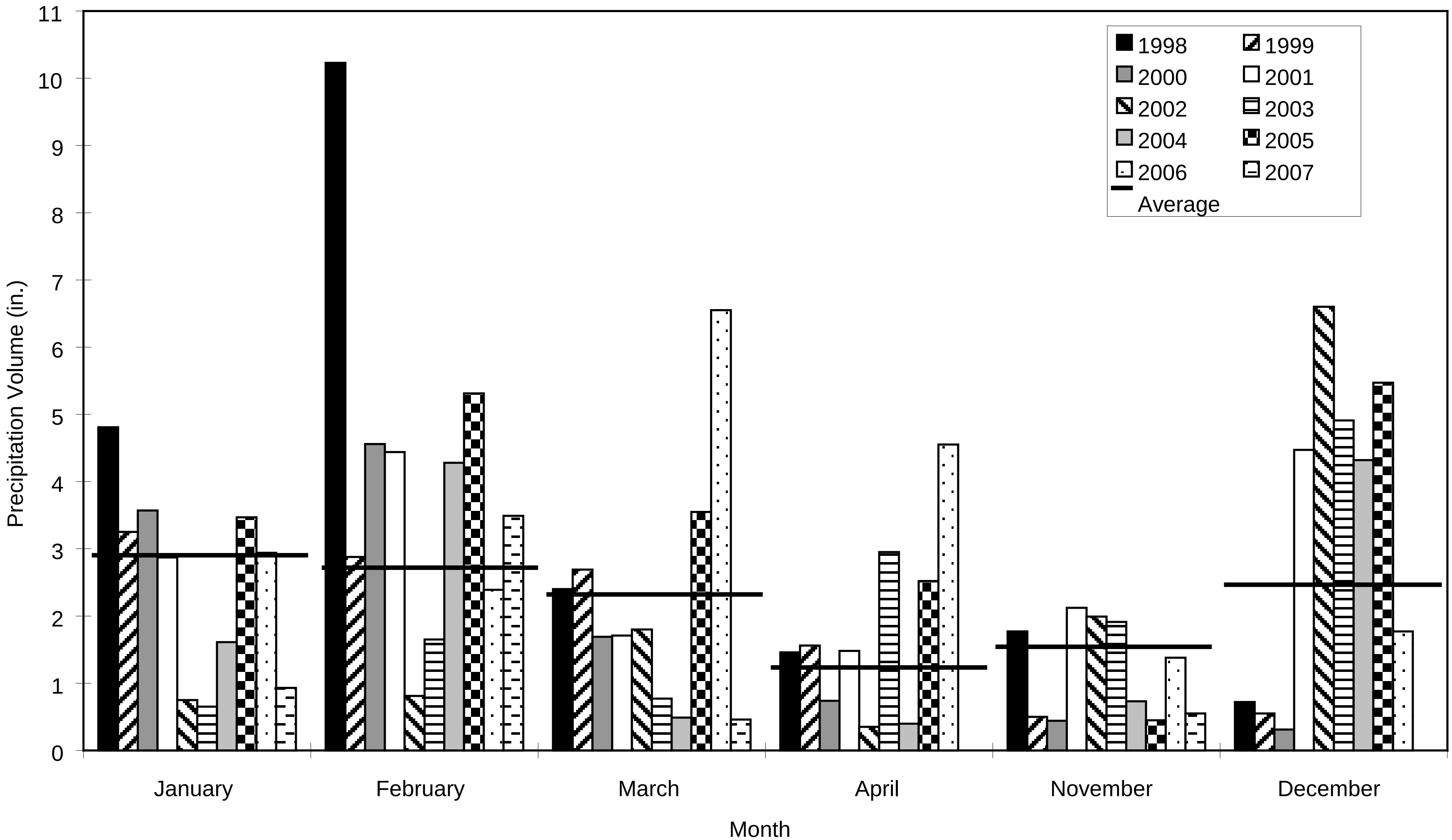


Figure 3
MONTHLY PRECIPITATION VOLUMES AS COMPARED TO THE AVERAGE MONTHLY PRECIPITATION VOLUME OVER THE PERIOD OF RECORD
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

sj509f14-7897.ai

2.3 Diurnal and Daily Influent Flow Variations

To determine the typical flow variation that occurs on a diurnal and daily basis, hourly influent data were analyzed for two different 16-day periods that included 3 weekends and 10 weekdays. The 16-day periods were selected from 1999 and 2007 to allow comparison over a 9-year period (1998 was not selected due to insufficient hourly data). The time periods chosen, September 11 through September 26, 1999 and September 8 through September 23, 2007, do not include holidays or summer vacation. Influent flows for the two 16-day periods are shown in Figures 4 and 5.

Diurnal curves were developed by computing the average of the influent flows that occurred within each hour over each of the 16 days. Ratios of the average hourly flows to daily averaged flow were calculated and are presented in Figure 6. The diurnal curves for 1999 and 2007 are similar, suggesting that the ratios of the hourly flows to the daily average flows on a diurnal basis have not changed significantly between 1999 and 2007. Peak flows, with a peak to average ratio of 1.3, typically occurred at 1:00 p.m. This peak was relatively sustained from 1:00 p.m. to midnight, with ratios varying from 1.1 to 1.3.

Diurnal curves for the weekday and weekends were developed by computing the average of the influent flows that occurred within each hour over the weekdays and the weekends occurring within the 16-day period. Diurnal curves for the weekdays and weekends are shown in Figures 7 and 8, respectively. Comparison of Figures 7 and 8 shows that peak influent flows occurred earlier in the day on weekdays (noon) versus weekends (2:00 p.m.). The ratios of the peak flow to the average flow was greater on the weekends (1.4) than the weekdays (1.3).

Average influent peak hour flows and minimum hour flows were calculated by averaging the maximum and minimum hourly flows that occurred each day over the 16-day periods. Average influent peak hour and minimum hour flow ratios to average daily flows were also calculated and are summarized in Table 8. Note that the peak hour flow ratio or the minimum hour flow ratios are not the same as the peak ratio or minimum ratio of the diurnal curve. This is because the times of the peak hour flows and minimum hour influent flows vary from day to day. While the magnitudes of the average, peak and minimum influent flows are all lower in 2007 than in 1999, the ratios relative to the average flows are similar.

2.4 Dry Weather Effluent Flows

As discussed in Section 2.0, ADWEF will be used for the evaluation of current and future permit compliance with respect to the ADWEF discharge trigger and effluent pollutant load limitations. Projected effluent wastewater flows will be determined from the projected influent wastewater flows less the projected recycled water flows and process flows. Projected wastewater flows and recycled water flows are addressed in PM 3.8 and 3.7,

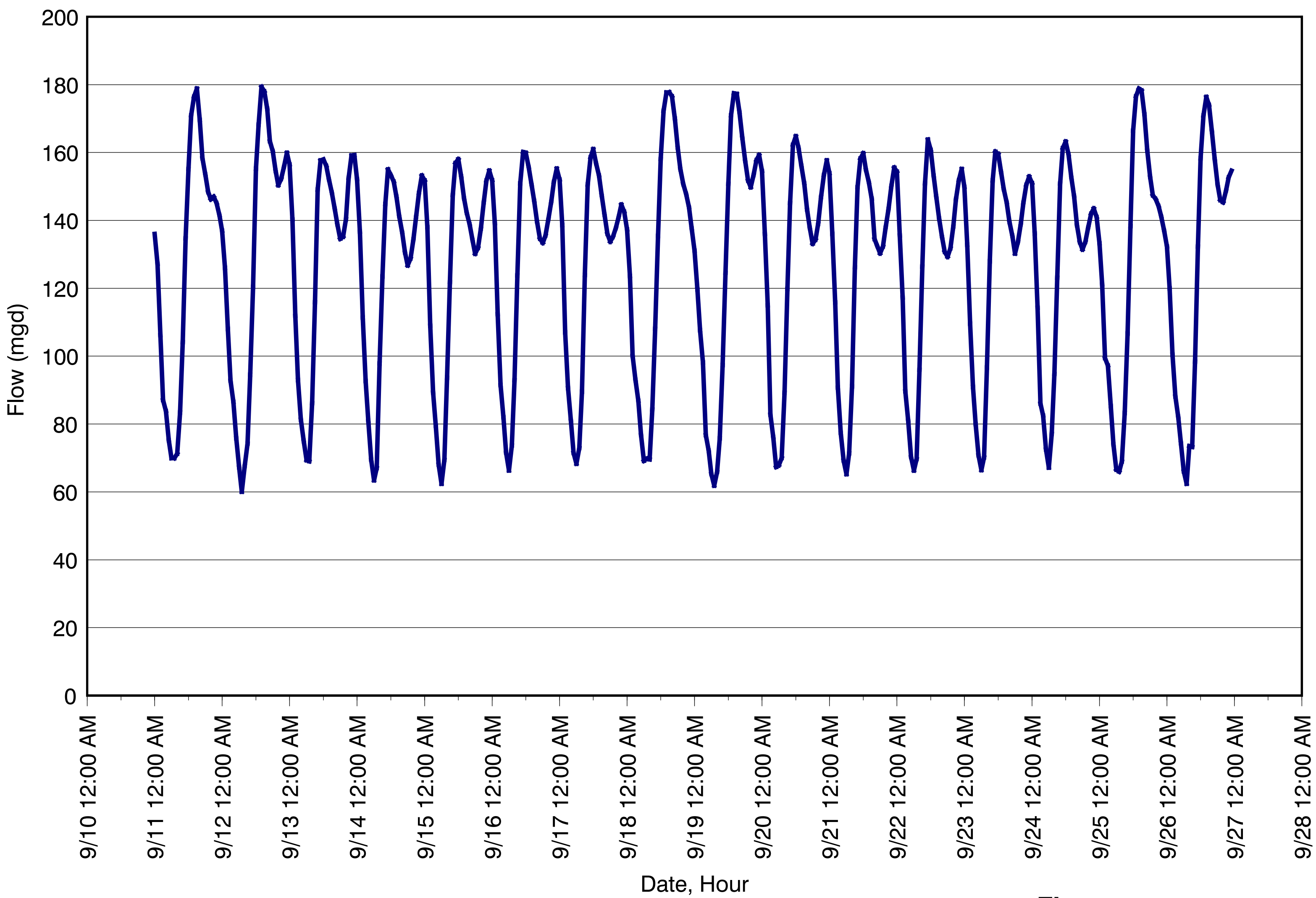


Figure 4
DIURNAL INFLUENT FLOWS FOR
SEPTEMBER 11 TO SEPTEMBER 26, 1999
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

sj808f4-7897.ai

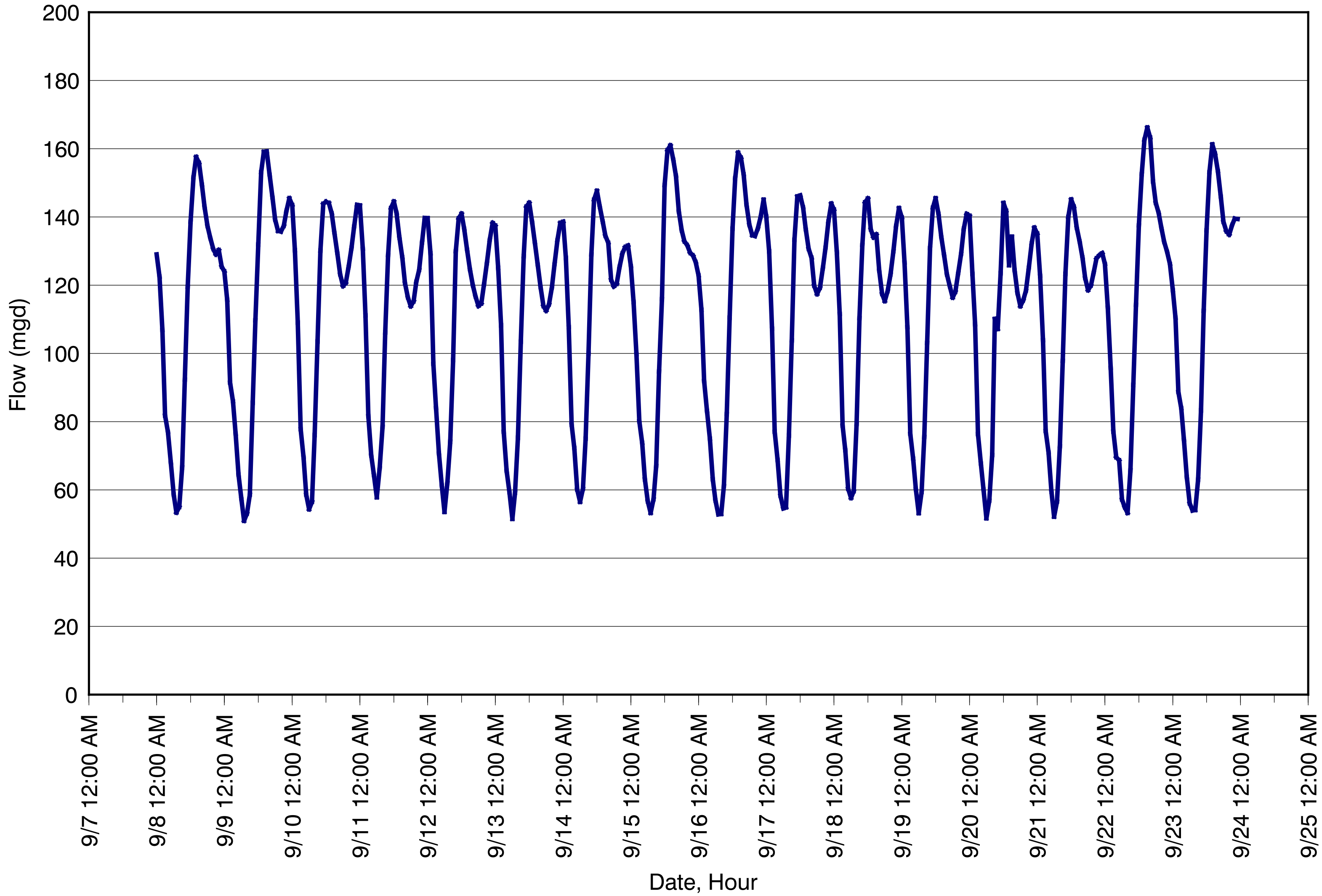


Figure 5
DIURNAL INFLUENT FLOWS FOR
SEPTEMBER 8 TO SEPTEMBER 23, 2007
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

sj808f5-7897.ai

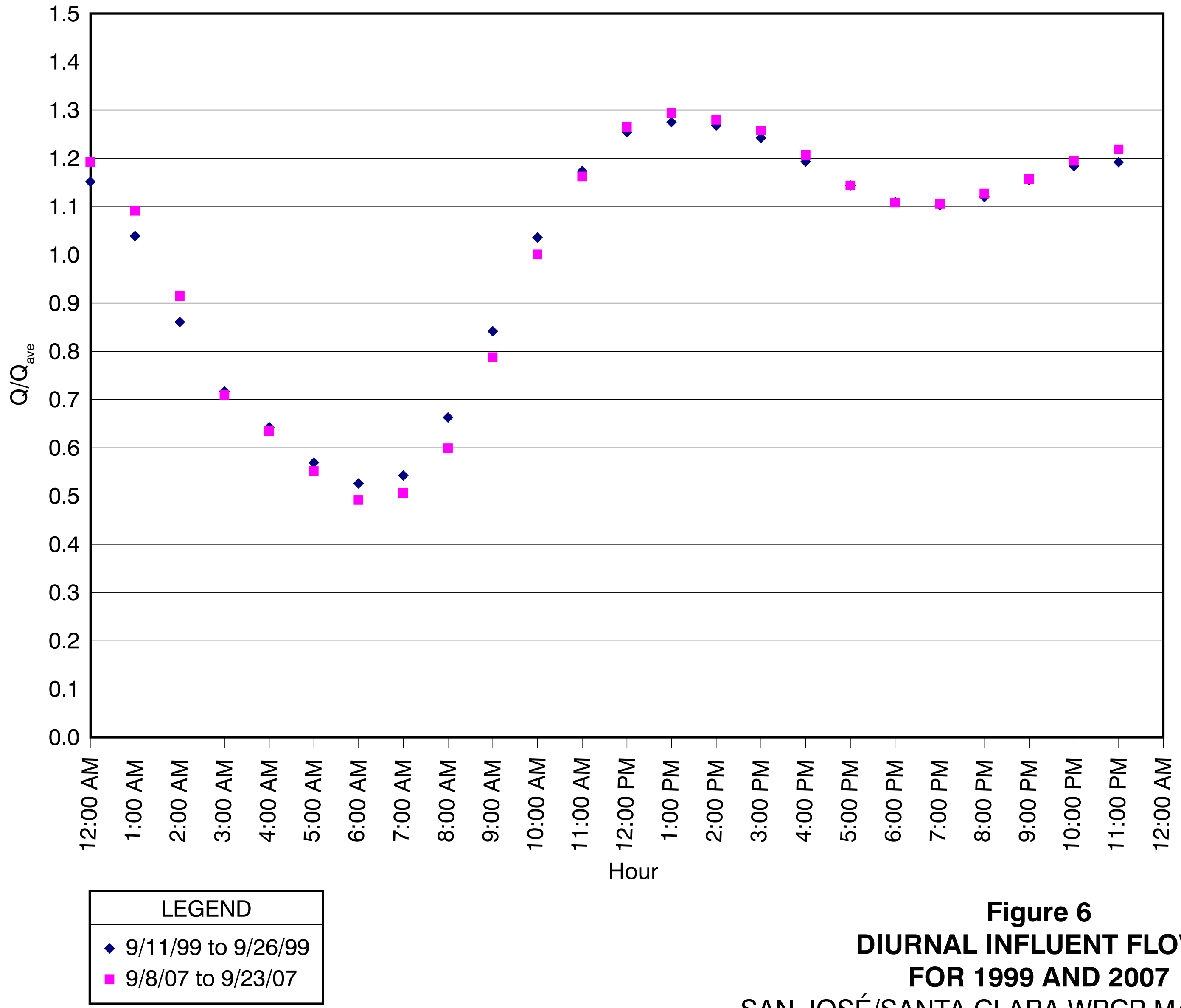


Figure 6
DIURNAL INFLUENT FLOWS
FOR 1999 AND 2007
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

sj808f6-7897.ai

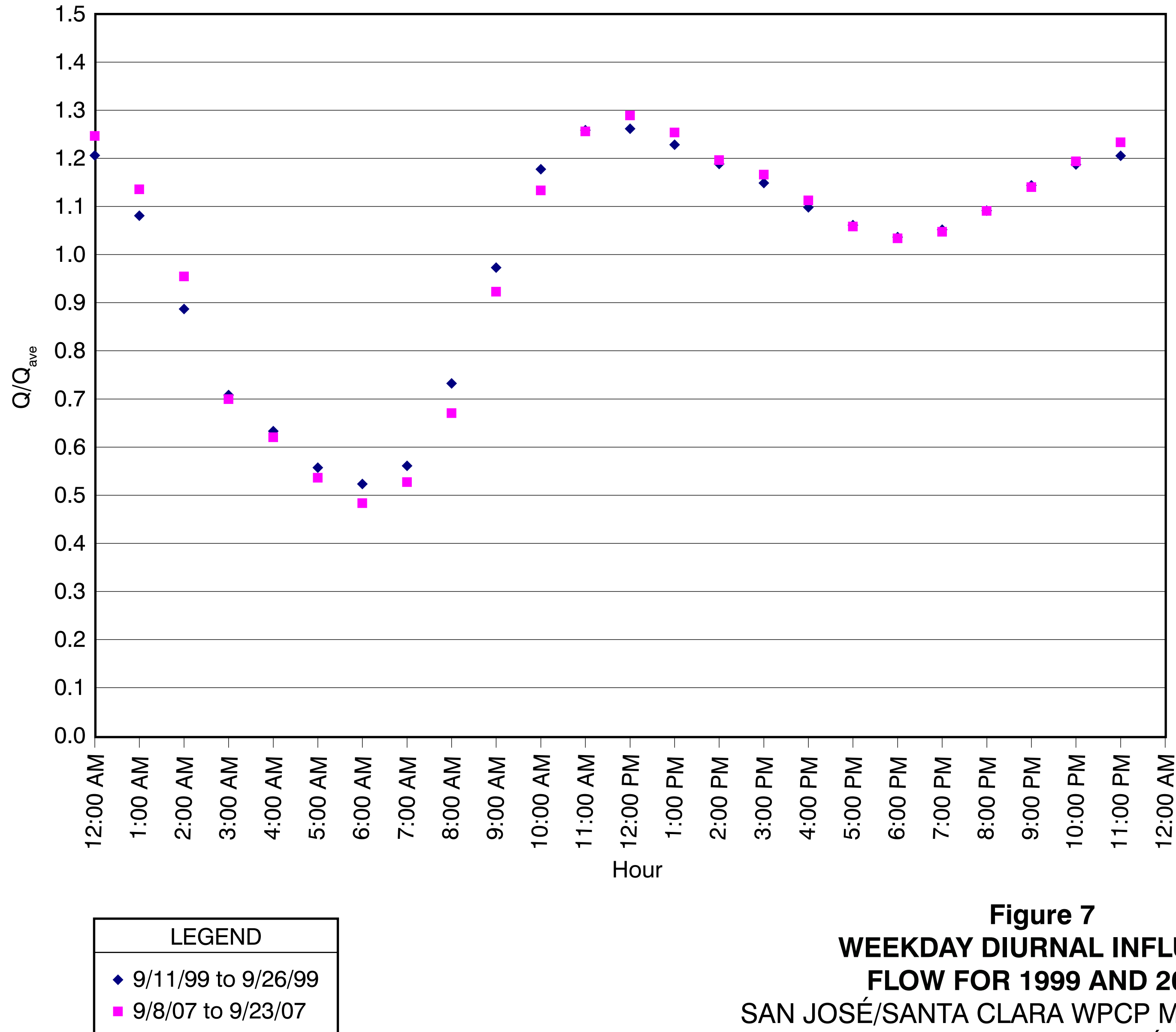


Figure 7
WEEKDAY DIURNAL INFLUENT
FLOW FOR 1999 AND 2007
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

sj808f7-7897.ai

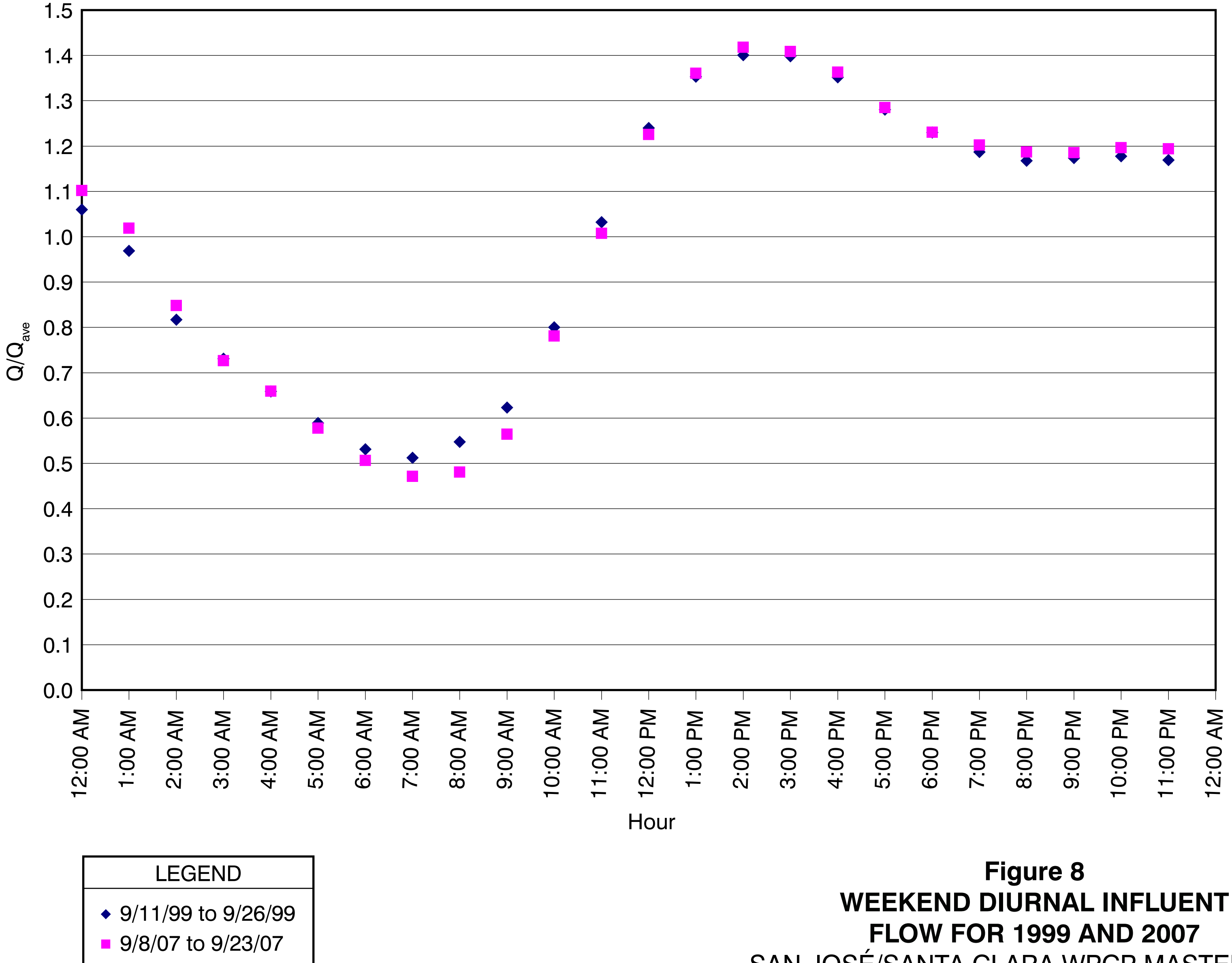


Figure 8
WEEKEND DIURNAL INFLUENT FLOW FOR 1999 AND 2007
SAN JOSÉ/SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

sj808f8-7897.ai

Table 8	Peak Hour and Minimum Hour Flows and Ratios San José/Santa Clara Water Pollution Control Plant Master Plan City of San José	
Condition	**1999**	**2007**
Average Daily Flow for the 16-Day Period, (mgd)	127	113
Average Peak Hour Flow, (mgd)	167	151
Average Peak Hour Flow Ratio	1.31	1.34
Average Minimum Hour Flow, (mgd)	66	54
Average Minimum Hour Flow Ratio	0.52	0.48
Highest Peak Hour Flow during Period, (mgd)	179	166
Highest Peak Hour Flow Ratio during Period	1.41	1.47

respectively. The historical ADWEFs from 1999 to 2007 are presented in Table 9. Consistent with the ADWF for the influent flows, the ADWEF have decreased between 1998 and 2007. This decrease is likely due to water conservation efforts as well as increases in recycled water use.

Table 9	Dry Weather Effluent Flows San José/Santa Clara Water Pollution Control Plant Master Plan City of San José
Year	**Average Daily (ADWEF)**
1998	NA
1999	NA
2000	117
2001	109
2002	104
2003	104
2004	100
2005	101
2006	105
2007	97
NA = Not Available	

3.0 CONCLUSIONS

This PM reports on the influent and effluent flows for the WPCP. The evaluation forms the basis for projecting future wastewater flows for the purpose of assessing current and future regulatory compliance and treatment performance and capacity needs.

The assessment of future regulatory compliance will be based on projected influent flows, per the WPCP NPDES permit definition of ADWIF. In addition, projected ADWIFs will be used assess compliance with the Tributary Agreement. Projected effluent flows will also be used for the regulatory compliance evaluation with respect to the ADWEF discharge limitation and limitations on pollutant loads.

Current and future treatment performance and capacity needs will be based on influent flows. Annual, seasonal, and peak flows, including ADAF, ADWF, ADMMF, MDWWF, and PHWWF, will be used in the evaluation.

The evaluation of historical flows showed that the influent ADWFs have generally decreased between 1998 and 2007. This decrease is likely due to water conservation efforts and changes in the industries within the WPCP service area. The ADWIFs, per the WPCP NPDES permit definition, have also decreased over between 1998 and 2007 and are well below the ADWIF NPDES permit limit of 167 mgd.

The influent ADMMFs, MDWWFs and the PHWWFs have varied over the 10-year period, but are all lower in 2007 than in 1998. Similarly, the flow ratios of the ADMMF to ADWF, MDWWF to ADWF, and PHWWF to ADWF have been lower in recent years. These trends may be due to precipitation patterns, with several relatively dry wet seasons occurring in recent years, as well as improvements in the WPCP collection system pipelines designed to reduce infiltration and inflow.

The evaluation of average daily influent flows for the dry weather season suggested that over the 10-year period, there has not been a significant impact of commuters on weekday versus weekend flows.

Analysis of hourly averaged influent flows indicated that the diurnal curves for 1999 and 2007 are similar, suggesting that the ratios of the hourly influent flows to the daily average influent flows on a diurnal basis have not changed significantly between 1999 and 2007. Peak influent flows occurred at approximately 1:00 p.m. and were relatively sustained until midnight. Separation of the influent diurnal curve into weekday and weekend diurnal curves suggested that peak flows occurred later on the weekends and were greater in magnitude.

Consistent with ADWF for the influent flows, the ADWEFs have decreased between 1998 and 2007. The observed decrease is likely due to implementation of water conservation measures in the WPCP service area (affects both influent and effluent flows) and increases in recycled water use (affects effluent flows).

REFERENCES

REFERENCES

1. City of San José (1983) Master Agreement for Wastewater Treatment between City of San José, City of Santa Clara and City of Milpitas.
2. Environmental Services Department, City of San José (2008) Clean Bay Strategy - South Bay Action Plan, Annual Pollution Prevention Report.

APPENDIX - PROCESS FLOW DIAGRAMS

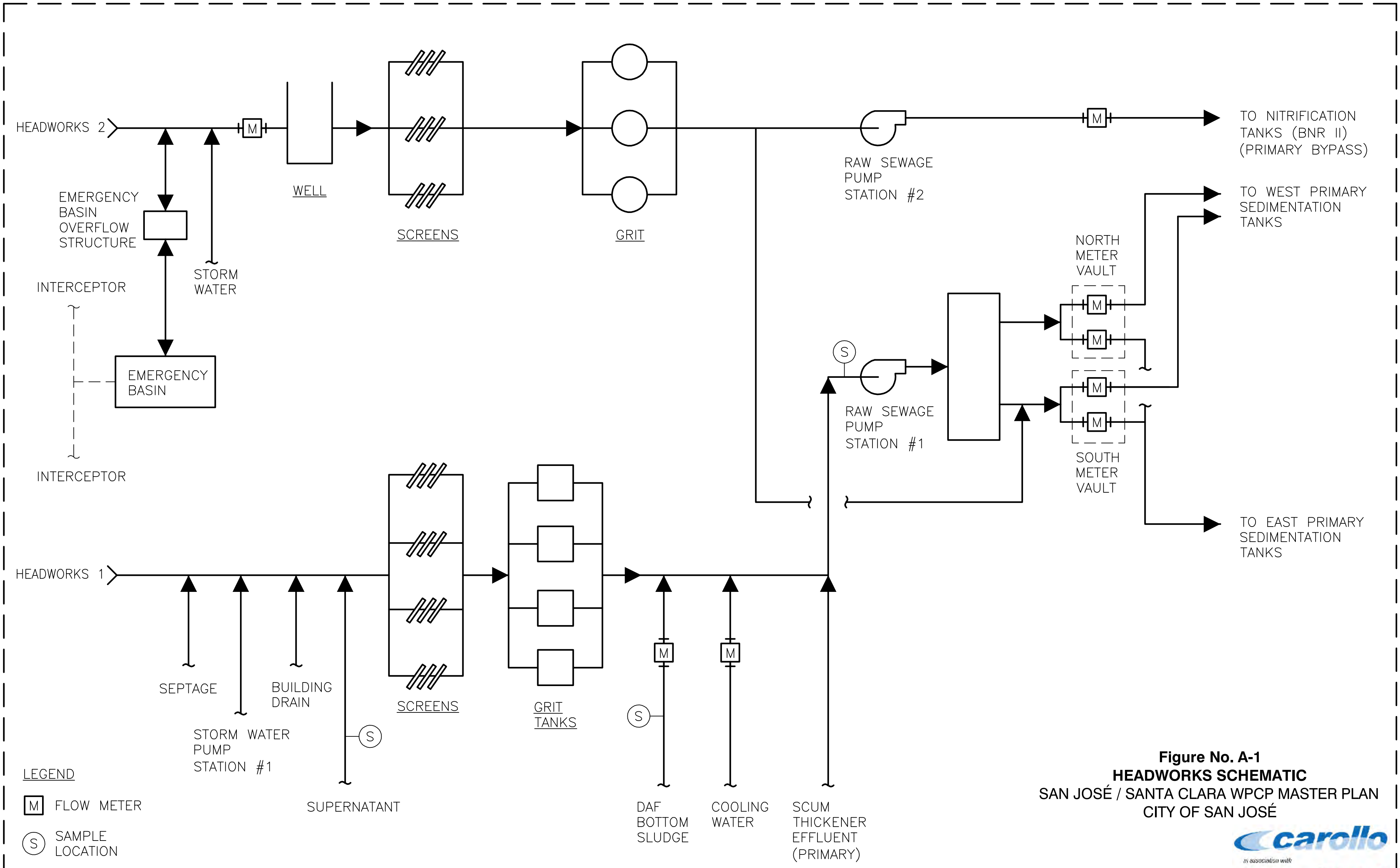


Figure No. A-1
HEADWORKS SCHEMATIC
SAN JOSÉ / SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

carollo
in association with
BROWN AND CALDWELL SOM

H:\Client\SanJose_WCO\7897A00\FIGURE\FIGURE 1 6-03-09 09:45am JRygh XREFS: CarolloBrownCaldwellSomLogo; SomLogo;

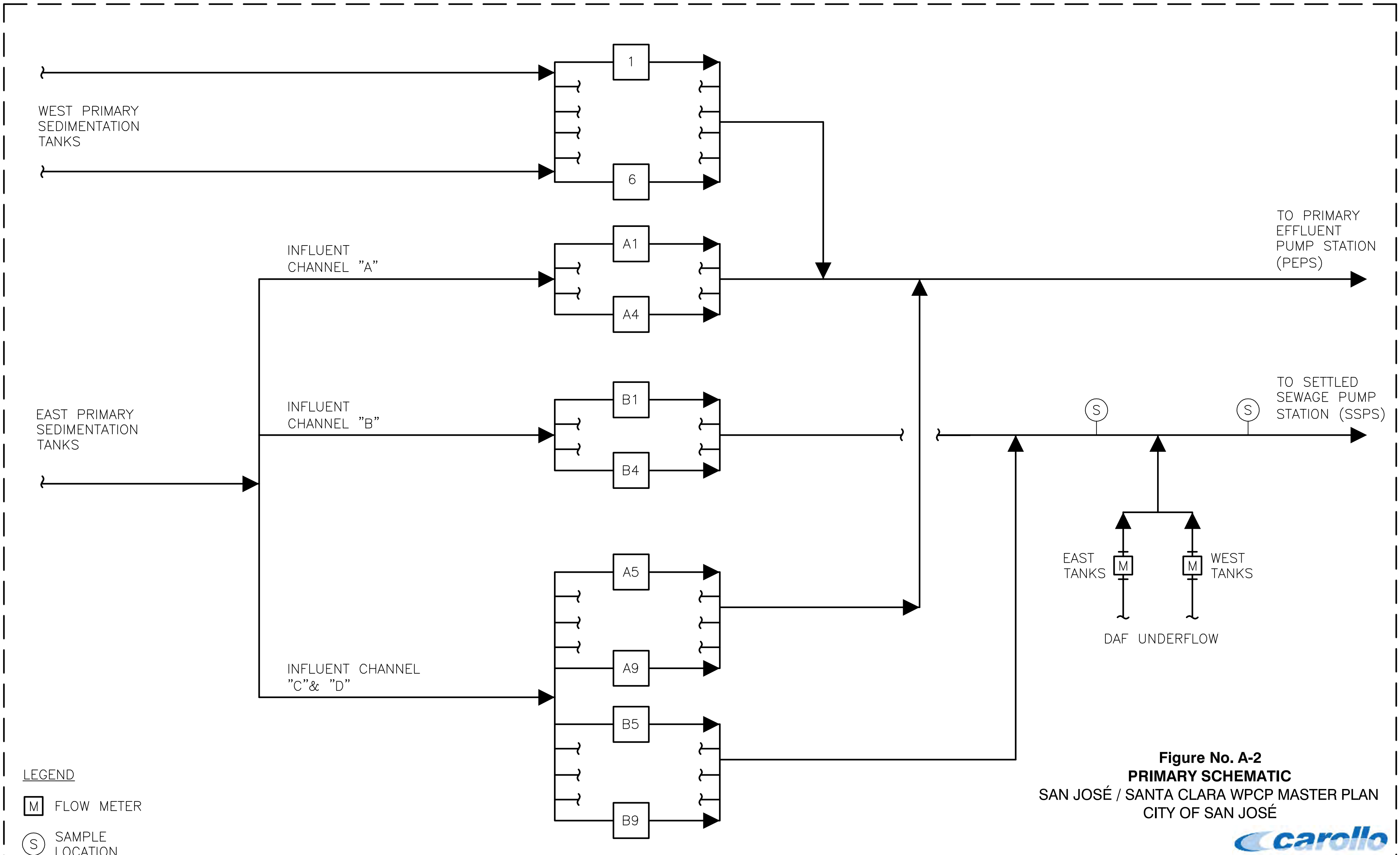
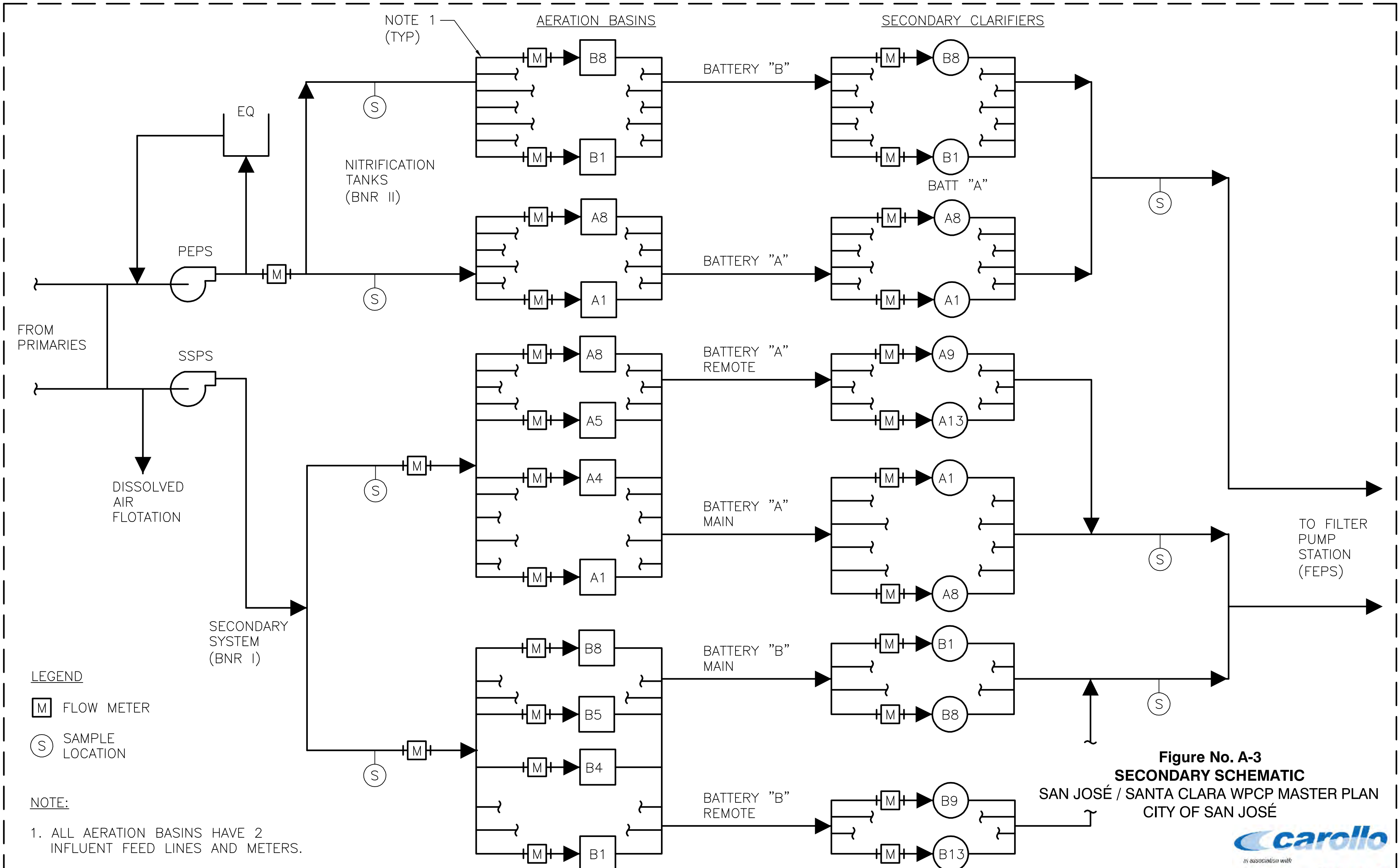


Figure No. A-2
PRIMARY SCHEMATIC
SAN JOSÉ / SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ



NOTE:

1. ALL AERATION BASINS HAVE 2 INFLUENT FEED LINES AND METERS.

Figure No. A-3
SECONDARY SCHEMATIC
SAN JOSÉ / SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

H:\Client\SanJose_WCO\7897A00\FIGURE\FIGURE 3 6-03-09 09:47am JRygh XREFS: CarolloBrownCaldwellSomLogo;

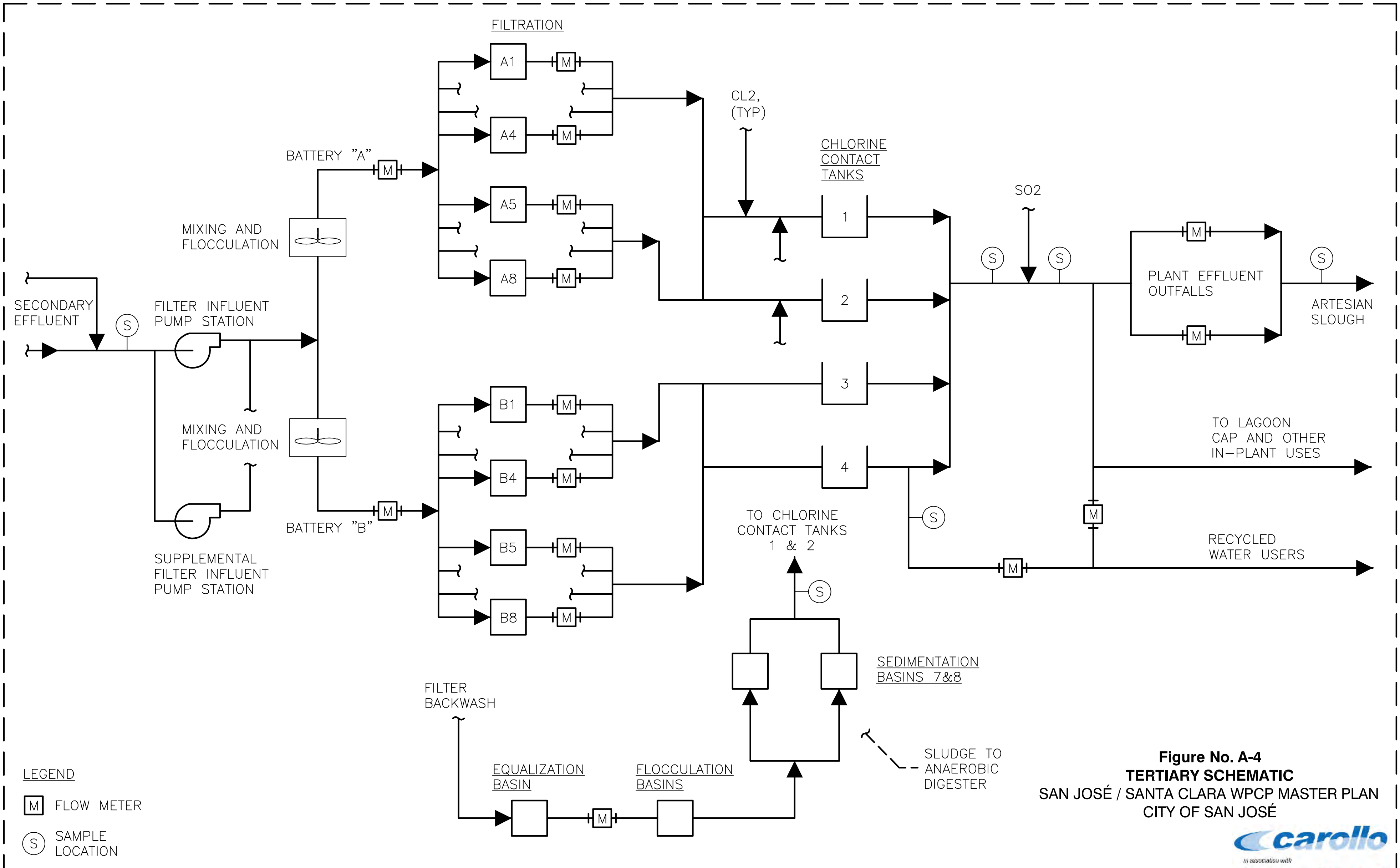


Figure No. A-4
TERTIARY SCHEMATIC
SAN JOSÉ / SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

carollo
in association with
BROWN AND CALDWELL SOM

H:\Client\SanJose_WCO\7897A00\FIGURE\FIGURE 4 6–03–09 09:47am JRygh XREFS: CarolloBrownCaldwellSomLogo;

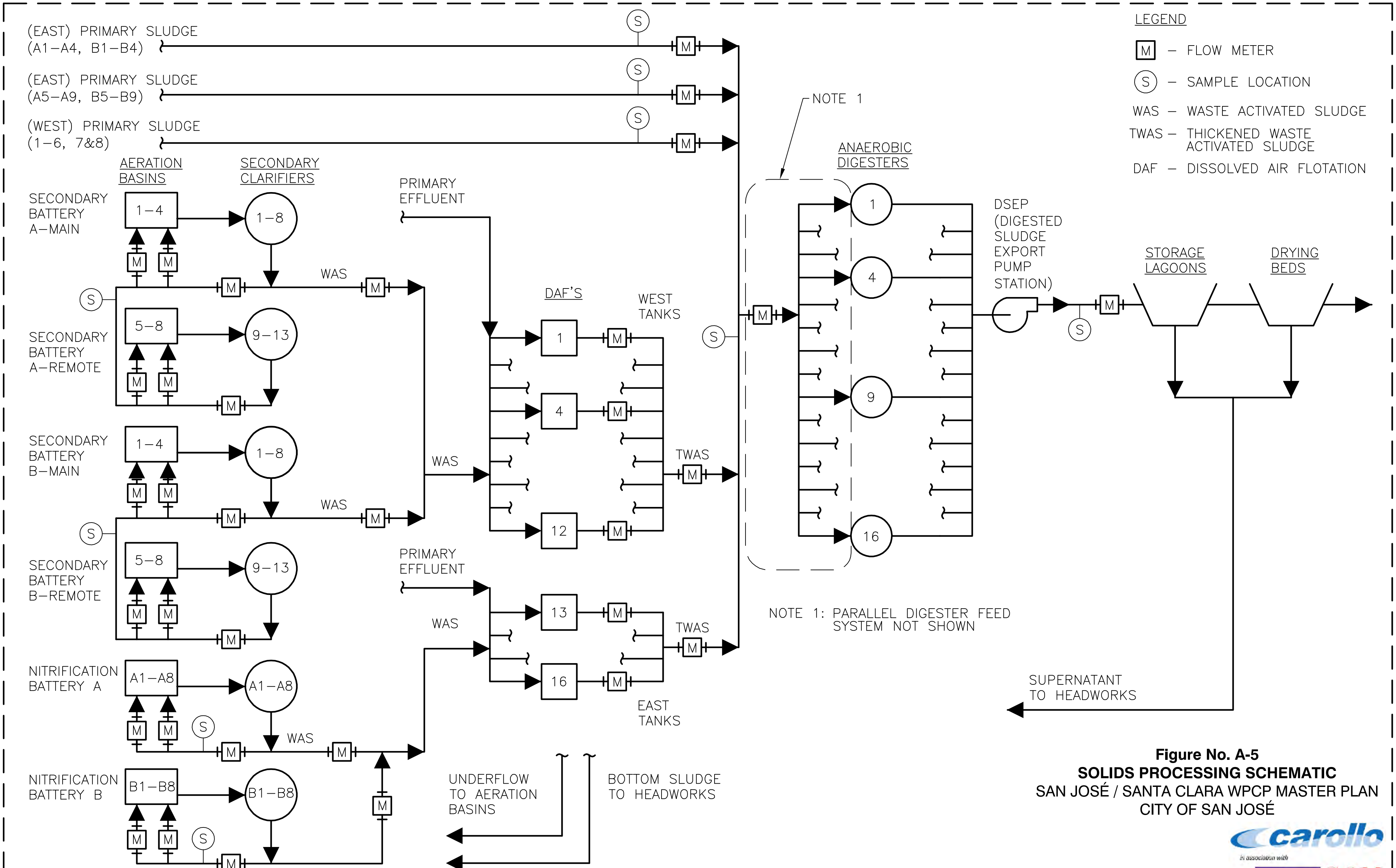


Figure No. A-5
SOLIDS PROCESSING SCHEMATIC
SAN JOSÉ / SANTA CLARA WPCP MASTER PLAN
CITY OF SAN JOSÉ

carollo
In association with
BROWN AND CALDWELL SOM

H:\Client\SanJose_WCO\7897A00\FIGURE\FIGURE 5 6–03–09 09:48am JRygh XREFS: CarolloBrownCaldwellSomLogo;