City of Santa Paula Wastewater System Master Plan

City of Santa Paula

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970 Ventura Street Santa Paula, CA 93060

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CHAPTER 1 - EXECUTIVE SUMMARY

OVERVIEW

The City of Santa Paula Wastewater Master Plan (WSMP) is an update of a Master Plan done in 2005. This plan provides recommendations and an implementation plan for improvements and operations for the City's sanitary sewer collection system. The plan addresses the current sanitary sewer needs and will assist in providing for the future needs of the City.

The City constructed a Water Recycling Facility (WRF) for the treatment of sewage generated by the City to replace the original 1939 vintage waste water treatment plant. The new WRF began operations in May of 2010. The new facility has a normal operating capacity of 3.15 MGD with a final build-out capacity of 4.2 MGD, and a peak operating capacity of 7.0 MGD. The process design is a Membrane Bio-Reactor (MBR) and reduces energy costs by more than 35%. The facility has a footprint of only 1.5 acres, and is completely enclosed for maximum odor and noise control.

PURPOSE

The City of Santa Paula provides wastewater collection and treatment for local residents. Existing facilities require maintenance and improvements to maintain the integrity of the system. Additional improvements may also be needed to accommodate the planned growth of the City. Consequently, the City needs to monitor and evaluate the hydraulic capacity and the condition of the existing sewer system, and plan for infrastructure replacement and improvement projects. In January 2012, the City adopted the 2011 Sanitary Sewer Management Program. The City continues to provide long-term maintenance for the system in order to preserve and provide adequate collection and transportation of local wastewater. The City expects to contract the operation and maintenance of the sewer system to a third party.

ANALYSIS

Collection system flows were estimated based on data acquired from various sources, including the 2005 Master Plan, projects built since

2005 and projected projects planned within the city sphere of influence. In 2005, an analysis of the daily pattern of flow (Diurnal Flow) was conducted due to the fact that wastewater flow in a sewer system varies throughout the day. The daily peak flow is a critical flow for analysis of the collection system. This is because the peak (highest) flow in the sewer will have the highest depth. If the flow line (depth) is too great, the free discharge of laterals may be impeded, creating backups.

For purposes of this study, and following the 2005 study, a peaking factor of 2.0 times the average daily flow was used to estimate the peak day flow. The new wastewater treatment plant measures current daily inflows. The WRF is reporting an average daily flow of 1.97 MGD (see figure 3-1). The 2012 flow values are taken from new flow monitoring equipment within the new WRF. 2012 system flows are significantly lower than the reported 2005 flows.

To maintain a conservative approach, Table 3-1 and 3-2 kept the flow rates suggested in the 2005 Master Plan rather than the 2012 flows. The diurnal flow patterns, both weekday and weekend, are not subject to significant change. However the flows, average and peak, will increase in relation to the total population that is served. The estimated future average dry-weather flow from Table 3-2 is 3.61 MGD at build out.

Table 3-3 presents factored system flows which adjust the values from Table 3-1 and 3-2, resulting in a future average dry weather flow of 2.87 MGD. Using the peaking factor of 2.0, the expected future peak flow is 5.7 MGD. Although provided in Table 3-3, these lower flow values are not used in the system modeling.

Gravity sewer systems are subject to migration of clear water, Infiltration and Inflow (I/I) from the outside. The volume of clear water that enters a sewer system has an adverse effect on the hydraulic capacity of the sewers. Consequently, an I/I evaluation was conducted for a portion of the City as a component of the 2005 study. The nature of the wet weather flow patterns validated an assumption that most of the clear water in the Santa Paula sewer system can be attributed to inflow. The sum of the maximum I/I plus the peak hourly flow is 7.0 MGD, which approximately 2.6 times the average day flow. For analysis purposes in this report, the peak wet weather flow rate of 3.0 times the average flow as determined in 2005 has been used.

Sources of inflow should be eliminated where practical, since inflow utilizes sewer capacity and is costly to treat. These sources should be addressed through maintenance by identifying and repairing broken pipes, repairing leaking pipe joints, replacement of the lining of offset manhole castings, eliminating below grade manhole covers subject to ponding, and potential sources of inflow. Diligent observation of the system for surcharge and backflow is required during wet weather. Regulations regarding spillage of sewage are becoming increasingly strict. In accordance with CMOM[1] in the event of a spill, the City may be required to prove that its system was adequately designed and maintained. Operational procedure has been implemented with the City's adoption of the 2011 Sanitary Sewer Management Program.

The collection system has been modeled in order to determine the hydraulic capacity of the main sewer lines. Modeling is a tool used to evaluate the capacity of pipes in a sewer system. The model is a mathematical analysis. For this study, the model consists of an Excel spreadsheet created utilizing Manning's equation to calculate the sewer capacity in terms of percent full pipe. The spreadsheet approach was used because it can be readily used by City staff and other engineers without the need for special software or training. This model was run for current (2012 flows) and peak flow, under dry and wet-weather conditions.

RESULTS

Prior to the 2005 study, the City had no standard criteria for the design, analysis, and construction of sewer systems. The criteria, which was established and included in the 2005 study has become the adopted criteria. In 2005, two segments of sewer were determined to be undersized for existing conditions. A 10-inch segment is located at Main Street near Blanchard School between manholes 2D43 and 2E05. The other sewer was a 20-inch segment located in Harvard Boulevard between manholes 4D06 and 4D09.

The future flow data input in the Model showed future capacity problems in the following sewer segments:

1 Capacity, Management, Operations, and Maintenance (CMOM) regulations of the U.S. Environmental Protection Agency.

- 18 & 20-inch sewer from Harvard Boulevard and Fourth Street West along Harvard to Vernon Street.

- 8-inch sewer along Steckel Drive from Harvard Boulevard north to Main Street.

- 8-inch sewer east along Santa Paula Street to Walden Street, south along Walden and Elm Streets to Harvard Blvd.

- 10-inch sewer from near the south end of Walden Street, south to West Main Street and onto Elm Street.

- 8-inch sewer from the south end of Walden Street, south to beginning of 10-inch section stated directly above.

- 10-inch sewer on Pamela Lane, south from Venus Avenue to the beginning of the 10-inch section stated two sections above.

- With the new routing of the East Area 1 Project, 8-inch sewer east from Santa Clara & 12th Street to Hallock Drive, pending installation of new FM to intersection of Santa Clara and 12th from new lift station at the end of Hallock Drive.

CONDITION ASSESSMENT

Sewer repair and rehabilitation is an ongoing process, as sewers will continue to deteriorate and fail over time. The City has been vigilant in their efforts to maintain the system. In continuing the effort, the 2011 Sanitary Sewer Management Program was adopted, which contains system procedures for daily maintenance activities.

Review of videotapes, has made it apparent that the central or older portion of the City has more problem areas than other areas within the collection system. The City's two lift stations were inspected and both lift stations are in the process of being upgraded.

SUMMARY OF RECOMMENDATIONS

Based on the information in this report, the following summary is recommended:

1. **System Condition Assessment and Cleaning Program**

    - Utilizing the 2011 Sewer Management as a guide, find a qualified contractor to operate and manage the city wastewater collection system.

2. **Capacity Improvements**

    - The Adams, Fagan, and East Area developments will require improvements and upgrades to the existing system. As a result, capacity upgrades, in general, should be scheduled based on development schedules. The exception is the upgrade in Harvard Boulevard which is independent of development activity, and should receive a high priority.

CONCLUSION

The City of Santa Paula has provided adequate collection of wastewater from its residents for more than 60 years. The City is diligent in operating and maintaining its system including, assessment of capacity and condition on a regular basis. The projects identified in this report are limited to known conditions. As new information is gathered, the priority of projects should be dynamic such that critical projects, projects that could affect the health and wellbeing of residents, receive top priority.

CHAPTER 2 - INTRODUCTION

This section provides an overview of the Santa Paula area and wastewater collection.

BACKGROUND

The City of Santa Paula provides wastewater collection and treatment for local residents. An evaluation of the hydraulic capacity and condition assessment allows the City to plan for infrastructure replacement and improvement projects. In addition, the City needs to develop and implement a long-term maintenance plan to continue to provide adequate collection and transportation of local wastewater.

STUDY OBJECTIVES AND SCOPE

This study provides recommendations and an implementation plan for improvements to Santa Paula's sanitary sewer system. The plan addresses the current situation and sanitary sewer needs as well as the future needs of the City. The following is a list of activities used to define present and future wastewater projects.

- Data on the existing collection system.
- Data on present and future land use was reviewed.
- Present and future flows in Equivalent Residential Units (ERU) were defined.
- The existing system was broken down into collection basins for analysis purposes.
- Interviews with City staff were conducted to confirm or clarify assumptions on sewage flow rates.
- A review of existing diurnal flow curves and recent wastewater treatment plant flow records were conducted to assess peak flow rates and Infiltration and Inflow (I/I) in the sewer system.
- Existing videotape logs and portions of videotapes of the sewer system were reviewed to assess the condition of existing sewers.

- The 2005 sewer model of the existing collection system main trunk sewers was updated to assess present and future flow impact on the system capacity.

- A sewer model of the existing collection system with reinforcements to the main trunk sewers was developed to define projects to meet present and future capacity needs.

- Sewer project recommendations were developed based on present capacity needs, future capacity needs, and limited condition assessment.

- A plan for implementation of projects was developed.

STUDY AREA DESCRIPTION

The City of Santa Paula is located in Ventura County between the mountain foothills and the Santa Clara River. It is one of the oldest cities in Ventura County. Incorporated in 1902, land use within the City reflects 100 years of building and development. The City has had a wastewater collection and treatment system since the late 1930's. The wastewater system consists of approximately 60 miles of collection lines, with pipeline diameters from 6 to 24 inches, 0.5 miles of force mains, 1190 manholes and two lift stations. The collection lines in the City have been constructed over a number of years since the wastewater system first began in the 1930's. The City residents generate approximately 2 million gallons per day of sewage. The wastewater is delivered by gravity to the wastewater reclamation facility located in the southwest portion of the City. The wastewater reclamation facility is new, having begun to accept wastewater in May of 2010.

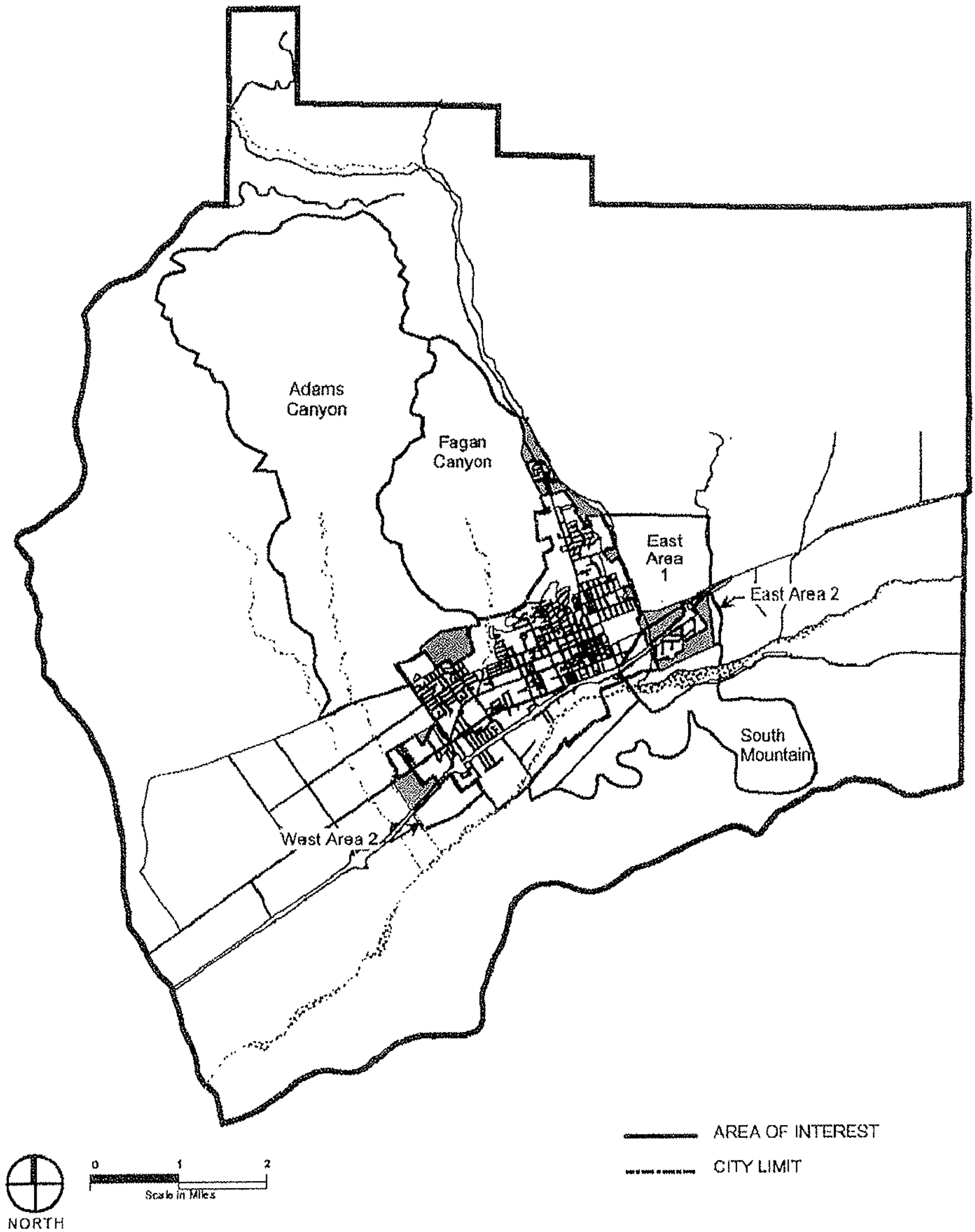
Operations of the City wastewater treatment plant are conducted by Santa Paula Water LLC. This is under a design, build, operate and finance contract. The collection system has been operated by city staff, but most recently operations of a collection system have been conducted by Southwest Water. The City has a population of 29,100 and is located in a warm area approximately 10 miles from the Pacific Ocean.

The City's Public Works Department oversees management of all water and wastewater issues for the City. The Public Works Director is responsible for the operational management of the system. For day-to-day administrative concerns, the City Manager exercises the

City's authority in approving the Department's financial transactions and in proposing policies and procedures. All internal accounting, including billing and capital improvements budgeting, is the responsibility of the Public Works Department in cooperation with other City Departments.

The 2011 Sanitary Sewer Management Program defines the wastewater collection system operational responsibility requirements. The City plans to contract with a qualified firm (the "Contractor") to operate and manage the City's wastewater collection system. Such management shall comprise of full and autonomous operation of the collection system including management of any subcontracts. Services shall include, general management of operations, equipment repair and replacement (on behalf of and in cooperation with the City), assisting the City with identification of upgrades and expansion projects, and related support functions. The Contractor will be responsible to respond to spills, leaks and overflows in accordance with State law.

The City is surrounded by agricultural land and has experienced steady growth in recent years. **Figure 2-1** shows the sphere of influence of the City and proposed expansion areas within the sphere of influence. The proposed expansion areas are primarily residential.



Expansion Areas

Figure 2-1

CHAPTER 3 - SYSTEM DATABASE

The analysis of the current sewer system is dependent upon review of existing data. The sources of data are also used as a basis for projecting future conditions. This section describes the data sources used and their relevance for this study.

DATABASE SOURCES

Several sources of information were collected and used to establish a database for the Santa Paula Sewer System. The sources included:

- Local land use and zoning maps
- Parcel maps
- Selected local development plans
- City General Plan
- Available collection system maps detailing sewer sizes and slopes
- Potable water records
- Number of water connections
- Number of sewer connections
- Wastewater treatment plant flow records
- Other relevant planning studies

The main objective for the data base review was to determine the volume of flow and how the flow is collected throughout the sewer system. Once a database was established, a model of the system was created.

CURRENT FLOW CONDITIONS

The analysis of a sewer system is reliant upon expected flow generation information to provide evaluation of the system and allow making correct engineering judgments. One of the most important sources of data is the land use plans and zoning information for the City.

Presently, the City has defined geographic boundaries in which residential, commercial, public, and industrial areas are defined. Each group generates wastewater, which enters the sewer system and is ultimately treated at the wastewater treatment plant. **Figure 3-2** displays the current zoning for the City of Santa Paula. The zoning map further defines the areas in terms such as single-family residential, high-density residential, light industrial, etc. The map shows the location of the various sewer customers. Location is essential for determination of the flow associated with specific segments of the collection system.

Individual pipes (laterals) carry wastewater flow from homes or buildings to the sewer main pipe. The sewer pipe must be adequately sized to carry the flow that accumulates from each lateral. As flow moves through the sewer segments, the flow increases with other lateral connections as well as other sewer pipe connections. The location and type of sewer user e.g. single family residential, commercial, industrial, etc., is used to estimate the flow and accumulation of flow in specific sewer segments.

FIGURE 3-1. MONTHLY INFLUENT FLOW AVERAGES

Month	Average Flow (MGD)
May-11	2.02
Jun-11	2.03
Jul-11	2.03
Aug-11	2.01
Sep-11	1.96
Oct-11	1.96
Nov-11	1.93
Dec-11	1.92
Jan-12	1.94
Feb-12	1.94
Mar-12	1.95
Apr-12	2.00
ANNUAL AVERAGE	**1.97**

Typical dry-weather wastewater flow for 2003 was reported as approximately 2.4 million gallons per day (MGD) based on WWTF flow data. Based on current plan operation, (see Figure 3-1) the annual average flow for 2011-2012 is approximately 1.97 MGD. Referencing **Table 3-1** for current inflow data and using the 2003 estimated flow projection, flows have been decreased by (1.97/2.5)=21%. This total flow needs to be allocated to wastewater customers in order to establish a reasonable model of the collection system. Since the majority of the flow in Santa Paula is residential, the simplest way to break down the wastewater flow is in equivalent residential units (ERUs). Based on City data from 2003, there were 6,621 residential customers, 678 commercial customers and nine industrial customers. Since this data was collected, an estimated 280 additional residential customers have been added, yielding approximately 6,901 current residential customers.

The following is a description of the methodology used to determine ERU values. For this report, an ERU is defined as one residence with 3.5 people and an average wastewater flow rate of 85[2] gallons per person per day[3] (297.5 gallons per day per ERU). **Table 3-1** lists the existing water customers in Santa Paula and the existing potable water demand.

The table also lists the estimated wastewater flow and ERU values for the various customers. The existing wastewater flows were estimated in the following manner:

The "small customers" were defined as single-family residences and small businesses. This was determined based on water meter sizes as small customers have water meters of 2 inches or smaller. Since an estimated 6,901 customers are residential, a wastewater flow of 1.97 MGD was estimated based on the ERU definition. An additional 0.2 MGD was estimated for the 600 or so other small customers, based on the assumption that the average small business is roughly equal to one ERU. The difference between the potable water demand and the estimated wastewater flow is assumed to be water that is used for landscape, irrigation etc.

Wastewater flow for the other water users with meters larger than 2 inches was estimated on a case-by-case basis. For example, zero wastewater flow was attributed to local parks. Although parks may have rest rooms, the flow was assumed to be intermittent and negligible, and therefore, disregarded. Likewise, most water used by schools is for landscape irrigation, so the wastewater percent was estimated at only 20% of the total potable water used. Other users such as apartments and mobile home parks had wastewater flow estimated based on 75% of the water use, assuming 25 % of the water was used for irrigation.

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2 Based on plant meter data for May 2 through May 9, 2004.

3 Based on 2.4 mgd and 29,000 people.

Table 3-1
Existing Customers and Estimated Average Flows
Wastewater System

Location	Customer Type	Units	Potable Water Demand (AF/yr)	Potable Water Demand (gpm)	ERUs	Wastewater Average Dry Weather Flow (MGD)
City Center	Small Customers		4,753	2,947	7387	2.198
1144 Ventura St	Grace Thille School		28.15	17.45	10	0.003
141 Steckle Dr	Glen City Elementary School		2.21	1.4	1	0.000
736 Ojai Rd	City of Santa Paula - Mill Park		1.94	1.2	0	0.000
City Center	City of Santa Paula - Vet Memorial Park		4.99	3.1	0	0.000
1330 Harvard Blvd (E)	City of Santa Paula - DMV		10.96	6.8	8	0.002
1360 Harvard Blvd (E)	City of Santa Paula - Harding Park		8.95	5.5	0	0.000
332 San Clemente St	City of Santa Paula - Obregon Park		5.95	3.7	0	0.000
1430 Santa Clara St	City Concrete/TDI SOUTHDO		10.94	6.8	25	0.007
City Center	Las Piedras Park		12.87	8.0	0	0.000
City Center	Teague Park		10.96	6.8	0	0.000
115 Peck Rd (N)	Blanchard School		13.47	8.4	4	0.001
1305 Laurel Rd #A	Thelma Bedell School		11.37	7.1	3	0.001
7680 Pine Grove Rd	Far West Resort		12.75	7.9	29	0.009
7400 Pine Grove Road	Far West Resorts Tent Park		6.52	4.0	15	0.004
430 10th St (N)	McKevett School		6.90	4.3	2	0.001
145 4th St (N)	Santa Paula SR Apt Association		5.74	3.6	13	0.004
135 4th St	Santa Paula SR Apt Association		5.18	3.2	12	0.004
309 Olive St (N)	Santa Paula Union High School District		10.58	6.6	3	0.001
798 Harvard Blvd (E)	Caltrans		8.60	5.3	0	0.000
1198 Harvard Blvd (E)	Caltrans		13.62	8.4	0	0.000
342 Palm Ave (S)	Caltrans		10.87	6.7	0	0.000
602 Ventura St	Isbell School		42.41	26.3	12	0.004
1149 Santa Paula (E)	Barbara Webster School		11.25	7.0	3	0.001
299 Santa Cruz St	Mountain View Mobile Home		11.81	7.3	27	0.008
710 Harvard Blvd	Mountain View Mobile Home		11.67	7.2	26	0.008

Table 3-1
Existing Customers and Estimated Average Flows
Wastewater System

Location	Customer Type	Units	Water Demand (AF/yr)	Water Demand (gpm)	ERUs	Wastewater Average Dry Weather Flow (MGD)
400 Craig Drive	400 Mobile Home Estates		27.36	17.0	62	0.018
15245 Telegraph (W)	Twyford Plant Laboratories Inc		16.03	9.9	48	0.014
103 Peck Road	Saticoy Lemon Association		23.59	14.6	53	0.016
825 10th St (N)	Santa Paula Memorial Hospital		11.53	7.1	35	0.010
1500 Richmond Rd	Oak Mobile Home Estates		25.17	15.6	57	0.017
500 Santa Maria (W)	Rancho Santa Paula Mobile Home		15.73	9.8	35	0.010
501 Santa Maria (W)	Rancho Santa Paula Mobile Home		15.98	9.9	36	0.011
720 Santa Maria	Anacapa Mobile Home		16.93	10.5	38	0.011
273 Santa Paula (W)	Santa Paula Cemetary		24.27	15.0	0	0.000
801 Santa Paula (W)	Middle Road Mutual- 4" Meter		15.54	9.6	0	0.000
801 Santa Paula (W)	Middle Road Mutual- 6" Meter		40.12	24.9	0	0.000
1141 Cummings Rd #2	Limonera Co- 6" Meter		42.86	26.6	0	0.000
1142 Cummings Rd #1	Limonera Co- 8" Meter		91.51	56.7	0	0.000
15433 Telegraph (W)	West Santa Paula Mobile Home Park		74.37	46.1	167	0.050
600 Todd Rd	County Jail		32.89	20.4	74	0.022
220 March St	HPV Developments		16	9.9	36	0.011
Coronadu Circle	Residential	84 SFD	37.33	23.1	84	0.025
Santa Anna St	CEDC Developments		17.78	11.0	40	0.012
Magnolia Drive	Residential	12 SFD	9.33	5.8	12	0.004
	TOTALS		5,588	3,465	8,357	2.5

ERUs from City	6,901	Residential
Flow (based on 85 gal/cap/day)	2,053,048	Gallons per day
Flow from commerical and industrial	433,008	Gallons per day
Industrial and commercial ERUs	1,456	Commercial/Ind
Total present ERUs	8,357	

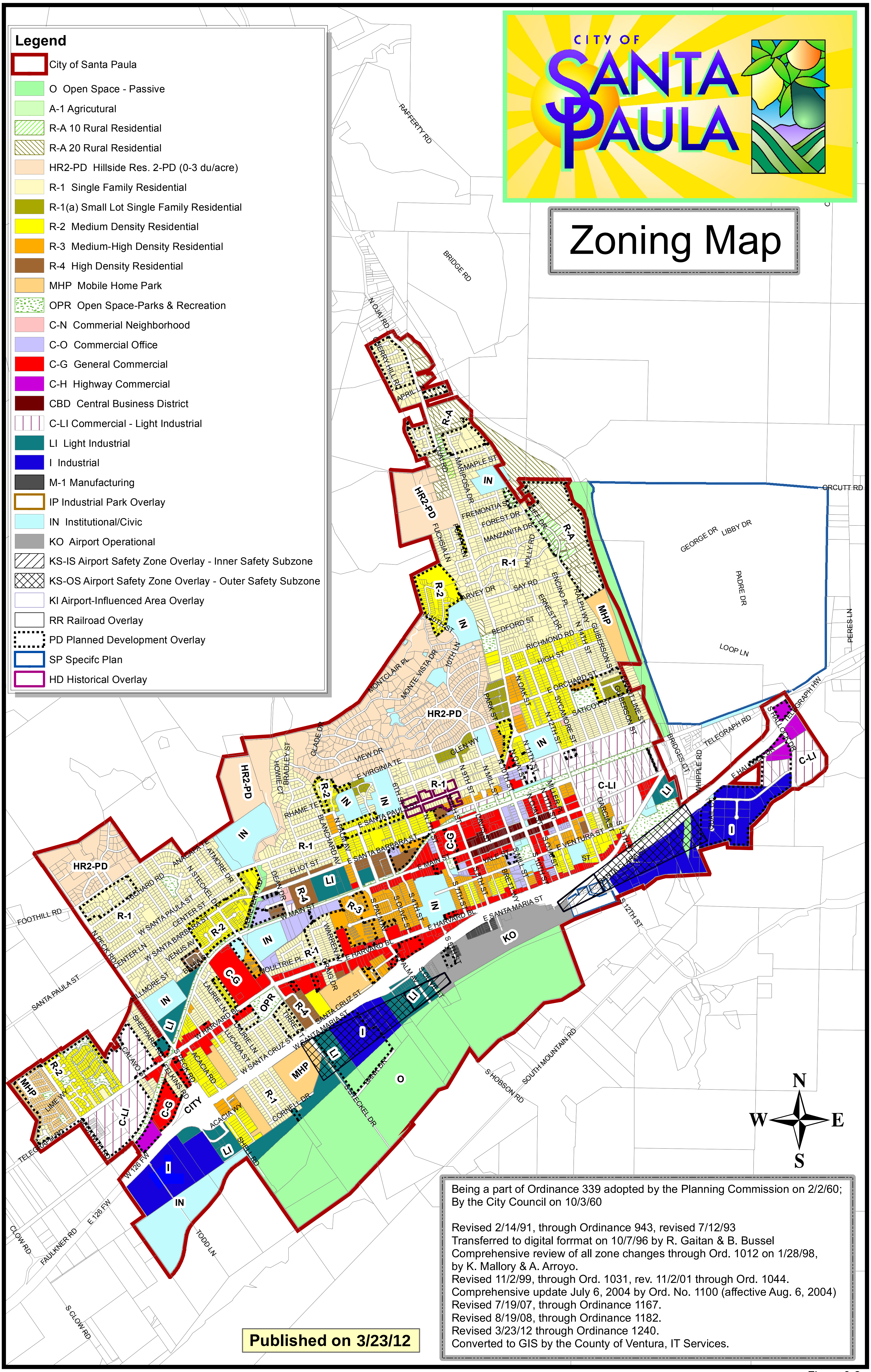

City of Santa Paula
Zoning Map
Legend
City of Santa Paula
O Open Space - Passive
A-1 Agricultural
R-A 10 Rural Residential
R-A 20 Rural Residential
HR2-PD Hillside Res. 2-PD (0-3 du/acre)
R-1 Single Family Residential
R-1(a) Small Lot Single Family Residential
R-2 Medium Density Residential
R-3 Medium-High Density Residential
R-4 High Density Residential
MHP Mobile Home Park
OPR Open Space-Parks & Recreation
C-N Commerial Neighborhood
C-O Commercial Office
C-G General Commercial
C-H Highway Commercial
CBD Central Business District
C-LI Commercial - Light Industrial
LI Light Industrial
I Industrial
M-1 Manufacturing
IP Industrial Park Overlay
IN Institutional/Civic
KO Airport Operational
KS-IS Airport Safety Zone Overlay - Inner Safety Subzone
KS-OS Airport Safety Zone Overlay - Outer Safety Subzone
KI Airport-Influenced Area Overlay
RR Railroad Overlay
PD Planned Development Overlay
SP Specifc Plan
HD Historical Overlay
Being a part of Ordinance 339 adopted by the Planning Commission on 2/2/60;
By the City Council on 10/3/60
Revised 2/14/91, through Ordinance 943, revised 7/12/93
Transferred to digital forrmat on 10/7/96 by R. Gaitan & B. Bussel
Comprehensive review of all zone changes through Ord. 1012 on 1/28/98,
by K. Mallory & A. Arroyo.
Revised 11/2/99, through Ord. 1031, rev. 11/2/01 through Ord. 1044.
Comprehensive update July 6, 2004 by Ord. No. 1100 (affective Aug. 6, 2004)
Revised 7/19/07, through Ordinance 1167.
Revised 8/19/08, through Ordinance 1182.
Revised 3/23/12 through Ordinance 1240.
Converted to GIS by the County of Ventura, IT Services.
Published on 3/23/12
N
W
E
S

Figure 3-2

The total existing wastewater flow predicted by the model is 2.5 MGD. The estimated wastewater flow is substantially lower than the inflow reported at the new WRF. The flow monitors located at the influent to the WRF recorded an average daily flow of 1.97 MGD. The new WRF flow is 20% less than the projected system flows. This would indicate that the current system model is conservative and additional review and model adjustment might be warranted but was not included in the update.

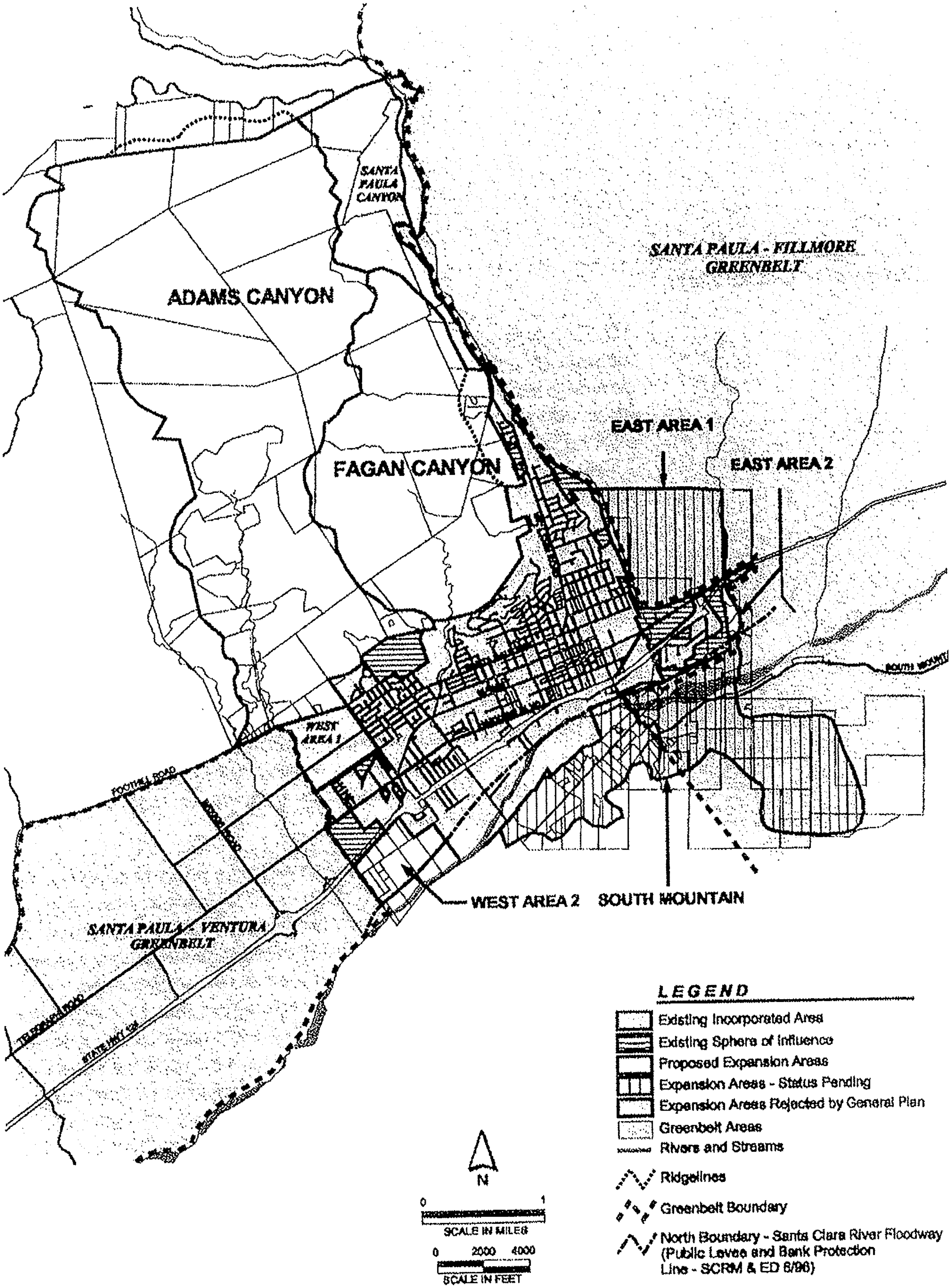
FUTURE FLOW CONDITIONS

The City of Santa Paula has a general plan for growth of the community within their Sphere of Influence. **Figure 3-3** is a map showing the expansion areas surrounding the City. Based on information provided by the City Planning Department, and the City's General plan, **Table 3-2** was developed. The table is similar to **Table 3-1**; however, anticipated future flows are included. **Table 3-3** incorporates Table 3-1 and 3-2 by listing current and future flow values from these tables; however it also applies the calculated factor of 21% to these flows and lists those values as well.

The development of East Area One will create the need for a new lift station east of the Santa Paula Creek. The latest plans for the project show the development will construct a new lift station near the end of Lemonwood Drive (Lemonwood 2) south of Highway 126. This location will also serve most of East Area 2 with most of the flows to the City’s Lemonwood 1 lift station being redirected to the new Lemonwood 2 lift station. The Lemonwood 1 lift station would still operate, however at a much lower flow rate and could serve as backup to Lemonwood 2 during maintenance operations or during an emergency condition which adds redundancy to the system.

Future ERUs were calculated based on the anticipated water use. On **Table 3-2**, the potable water demand and number of residential units are noted. The wastewater was calculated based on the assumption that 75% of potable water sold to the residential customers would enter the collection system as wastewater. The remaining 25% would be water used for lawn maintenance and would not enter the sanitary sewer system. The estimated wastewater flow was used to determine future ERUs based on the definition of one ERU equivalent to 3.5 people and 85 gallons per person per day of projected flow. Wastewater from other users such as commercial, schools, etc., was estimated on a case-by-case basis.

Using the aforementioned method to estimate future wastewater flow in the collection system results in an estimated future wastewater flow of 3.61 MGD (from Table 3-2), with a factored flow of 2.87 MGD (from Table 3-3).



CITY OF SANTA PAULA
FUTURE GROWTH AREAS

Figure 3-3

Table 3-2
Future Customers and Average Flows
Wastewater System

Location	Customer Type	Units	Water Demand (AF/yr)	Water Demand (gpm)	ERUs	Wastewater Average Dry Weather Flow (MGD)
City Center	Small Customers		4,753	2,947	7387	2.1976
City Center	Allowance for Fill-in		235	146	365	0.1086
1144 Ventura St	Grace Thille School		28.15	17.45	10	0.0030
141 Steckle Dr	Glen City Elementary School		0.88	0.5	1	0.0003
736 Ojai Rd	City of Santa Paula - Mill Park		1.94	1.2	0	0.0000
City Center	City of Santa Paula - Vet Memorial Park		1.00	0.6	0	0.0000
1330 Harvard Blvd (E)	City of Santa Paula - DMV		10.96	6.8	8	0.0024
1360 Harvard Blvd (E)	City of Santa Paula - Harding Park		1.79	1.1	0	0.0000
332 San Clemente St	City of Santa Paula - Obregon Park		1.19	0.7	0	0.0000
1430 Santa Clara St	City Concrete/TDI SOUTHDO		10.94	6.8	25	0.0074
City Center	Las Piedras Park		2.57	1.6	0	0.0000
City Center	Teague Park		4.38	2.7	0	0.0000
115 Peck Rd (N)	Blanchard School		5.39	3.3	3	0.0009
1305 Laurel Rd #A	Thelma Bedell School		11.37	7.1	7	0.0021
7680 Pine Grove Rd	Far West Resort		12.75	7.9	29	0.0086
7400 Pine Grove Road	Far West Resorts Tent Park		6.52	4.0	15	0.0045
430 10th St (N)	McKevett School		2.76	1.7	2	0.0006
145 4th St (N)	Santa Paula SR Apt Association		5.74	3.6	13	0.0039
135 4th St	Santa Paula SR Apt Association		5.18	3.2	12	0.0036
309 Olive St (N)	Santa Paula Union High School District		4.23	2.6	3	0.0009
798 Harvard Blvd (E)	Caltrans		0.00	0.0	0	0.0000
1198 Harvard Blvd (E)	Caltrans		0.00	0.0	0	0.0000
342 Palm Ave (S)	Caltrans		0.00	0.0	0	0.0000
602 Ventura St	Isbell School		42.41	26.3	12	0.0036
1149 Santa Paula (E)	Barbara Webster School		4.50	2.8	3	0.0009
299 Santa Cruz St	Mountain View Mobile Home		11.81	7.3	27	0.0080

Table 3-2
Future Customers and Average Flows
Wastewater System

Location	Customer Type	Units	Water Demand (AF/yr)	Water Demand (gpm)	ERUs	Wastewater Average Dry Weather Flow (MGD)
710 Harvard Blvd	Mountain View Mobile Home		11.67	7.2	26	0.0077
400 Craig Drive	400 Mobile Home Estates		27.36	17.0	62	0.0184
15245 Telegraph (W)	Twyford Plant Laboratories Inc		16.03	9.9	48	0.0143
103 Peck Road	Saticoy Lemon Association		4.72	2.9	11	0.0033
825 10th St (N)	Santa Paula Memorial Hospital		11.53	7.1	35	0.0104
1500 Richmond Rd	Oak Mobile Home Estates		25.17	15.6	57	0.0170
500 Santa Maria (W)	Rancho Santa Paula Mobile Home		15.73	9.8	35	0.0104
501 Santa Maria (W)	Rancho Santa Paula Mobile Home		15.98	9.9	36	0.0107
720 Santa Maria	Anacapa Mobile Home		16.93	10.5	38	0.0113
273 Santa Paula (W)	Santa Paula Cemetary		4.85	3.0	0	0.0000
801 Santa Paula (W)	Middle Road Mutual- 4" Meter		3.11	1.9	7	0.0021
801 Santa Paula (W)	Middle Road Mutual- 6" Meter		8.02	5.0	18	0.0054
1141 Cummings Rd #2	Limonera Co- 6" Meter		42.86	26.6	96	0.0286
1142 Cummings Rd #1	Limonera Co- 8" Meter		91.51	56.7	206	0.0613
15433 Telegraph (W)	West Santa Paula Mobile Home Park		74.37	46.1	167	0.0497
600 Todd Rd	County Jail		32.89	20.4	74	0.0220
220 March St	HPV Developments		16	9.9	36	0.0107
Coronadu Circle	Residential	84 SFD	37.33	23.1	84	0.0250
Santa Anna St	CEDC Developments		17.78	11.0	40	0.0119
Magnolia Drive	Residential	12 SFD	9.33	5.8	12	0.0036
CITY CENTER TOTAL			5647.63	3,501.8	9010	2.6805
Fagan	SF Residences	450 units	247	153.2	450	0.1339
Fagan	MF Residences	0 units	0	0.0	0	0.0000
Fagan	Commercial	1.75 acres	6	3.7	12	0.0036
Fagan	Schools	10 acres	120	74.4	60	0.0179

Table 3-2
Future Customers and Average Flows
Wastewater System

Location	Customer Type	Units	Water Demand (AF/yr)	Water Demand (gpm)	ERUs	Wastewater Average Dry Weather Flow (MGD)
Fagan	Golf course/parks/landscaped commons	238 acres	143	88.7	0	0.0000
FAGAN TOTAL			516	319.9	522	0.1553
Adams	SF Residences	495 units	188	116.6	495	0.1473
Adams	MF Residences	0 units	0	0.0	0	0.0000
Adams	Commercial	0 SF	0	0.0	0	0.0000
Adams	Schools	0 acres	0	0.0	0	0.0000
Adams	Golf course/parks/landscaped commons	0 acres	0	0.0	0	0.0000
ADAMS TOTAL			188	116.6	495	0.1473
East Area 1	SF Residences	1,500 units	667	413.6	1500	0.4463
East Area 1	MF Residences	0 units	0	0.0	0	0.0000
East Area 1	Commercial	435,000 SF	30	18.6	60	0.0179
East Area 1	Schools	8.5 acres	26	16.1	52	0.0155
East Area 1	Parks/landscaped commons	163.5 acres	72	44.6	0	0.0000
EAST AREA 1 TOTAL			795	492.9	1612	0.4796
East Area 2	Commercial/Industrial	1,600,830 SF	74	45.9	221	0.0657
EAST AREA 2 TOTAL			74	45.9	221	0.0657
So. Mtn	Golf course/parks	15 acres	33	20.5	0	0.0000
So. Mtn Total			33	20.5	0	0.0000
West Area 2	Commercial	1,900,000 SF	122	75.6	275	0.0818
	Parks/open space	125 acres	55	34.1	0	0.0000
West Area 2 Total			122	75.6	275	0.0818
GRAND TOTAL			7,376	4,573	12,135	3.6102

Table 3-3
Existing and Future Factored Flows
Wastewater System

Location	Customer Type	Exisiting Wastewater Average Dry Weather Flow (MGD)	Future Wastewater Average Dry Weather Flow (MGD)	Ex. Factored Wastewater Average Dry Weather Flow (MGD)	Fut. Factored Wastewater Average Dry Weather Flow (MGD)
City Center	Small Customers	2.198	2.198	1.745	1.745
City Center	Allowance for Fill-in	0.000	0.109	0.000	0.086
1144 Ventura St	Grace Thille School	0.003	0.003	0.002	0.002
141 Steckle Dr	Glen City Elementary School	0.000	0.000	0.000	0.000
736 Ojai Rd	City of Santa Paula - Mill Park	0.000	0.000	0.000	0.000
City Center	City of Santa Paula - Vet Memorial Park	0.000	0.000	0.000	0.000
1330 Harvard Blvd (E)	City of Santa Paula - DMV	0.002	0.002	0.002	0.002
1360 Harvard Blvd (E)	City of Santa Paula - Harding Park	0.000	0.000	0.000	0.000
332 San Clemente St	City of Santa Paula - Obregon Park	0.000	0.000	0.000	0.000
1430 Santa Clara St	City Concrete/TDI SOUTHDO	0.007	0.007	0.006	0.006
City Center	Las Piedras Park	0.000	0.000	0.000	0.000
City Center	Teague Park	0.000	0.000	0.000	0.000
115 Peck Rd (N)	Blanchard School	0.001	0.001	0.001	0.001
1305 Laurel Rd #A	Thelma Bedell School	0.001	0.002	0.001	0.002
7680 Pine Grove Rd	Far West Resort	0.009	0.009	0.007	0.007
7400 Pine Grove Road	Far West Resorts Tent Park	0.004	0.004	0.004	0.004
430 10th St (N)	McKevett School	0.001	0.001	0.000	0.000
145 4th St (N)	Santa Paula SR Apt Association	0.004	0.004	0.003	0.003
135 4th St	Santa Paula SR Apt Association	0.004	0.004	0.003	0.003
309 Olive St (N)	Santa Paula Union High School District	0.001	0.001	0.001	0.001
798 Harvard Blvd (E)	Caltrans	0.000	0.000	0.000	0.000
1198 Harvard Blvd (E)	Caltrans	0.000	0.000	0.000	0.000
342 Palm Ave (S)	Caltrans	0.000	0.000	0.000	0.000
602 Ventura St	Isbell School	0.004	0.004	0.003	0.003
1149 Santa Paula (E)	Barbara Webster School	0.001	0.001	0.001	0.001

Table 3-3
Existing and Future Factored Flows
Wastewater System

Location	Customer Type	Exisiting Wastewater Average Dry Weather Flow (MGD)	Future Wastewater Average Dry Weather Flow (MGD)	Ex. Factored Wastewater Average Dry Weather Flow (MGD)	Fut. Factored Wastewater Average Dry Weather Flow (MGD)
299 Santa Cruz St	Mountain View Mobile Home	0.008	0.008	0.006	0.006
710 Harvard Blvd	Mountain View Mobile Home	0.008	0.008	0.006	0.006
400 Craig Drive	400 Mobile Home Estates	0.018	0.018	0.015	0.015
15245 Telegraph (W)	Twyford Plant Laboratories Inc	0.014	0.014	0.011	0.011
103 Peck Road	Saticoy Lemon Association	0.016	0.003	0.013	0.003
825 10th St (N)	Santa Paula Memorial Hospital	0.010	0.010	0.008	0.008
1500 Richmond Rd	Oak Mobile Home Estates	0.017	0.017	0.013	0.013
500 Santa Maria (W)	Rancho Santa Paula Mobile Home	0.010	0.010	0.008	0.008
501 Santa Maria (W)	Rancho Santa Paula Mobile Home	0.011	0.011	0.009	0.009
720 Santa Maria	Anacapa Mobile Home	0.011	0.011	0.009	0.009
273 Santa Paula (W)	Santa Paula Cemetary	0.000	0.000	0.000	0.000
801 Santa Paula (W)	Middle Road Mutual- 4" Meter	0.000	0.002	0.000	0.002
801 Santa Paula (W)	Middle Road Mutual- 6" Meter	0.000	0.005	0.000	0.004
1141 Cummings Rd #2	Limonera Co- 6" Meter	0.000	0.029	0.000	0.023
1142 Cummings Rd #1	Limonera Co- 8" Meter	0.000	0.061	0.000	0.049
15433 Telegraph (W)	West Santa Paula Mobile Home Park	0.050	0.050	0.039	0.039
600 Todd Rd	County Jail	0.022	0.022	0.017	0.017
220 March St	HPV Developments	0.011	0.011	0.009	0.009
Coronadu Circle	Residential	0.025	0.025	0.020	0.020
Santa Anna St	CEDC Developments	0.012	0.012	0.009	0.009
Magnolia Drive	Residential	0.004	0.004	0.003	0.003
CITY CENTER TOTAL		2.486	2.680	1.974	2.128
Fagan	SF Residences		0.134	0.000	0.106
Fagan	MF Residences		0.000	0.000	0.000
Fagan	Commercial		0.004	0.000	0.003

Table 3-3
Existing and Future Factored Flows
Wastewater System

Location	Customer Type	Exisiting Wastewater Average Dry Weather Flow (MGD)	Future Wastewater Average Dry Weather Flow (MGD)	Ex. Factored Wastewater Average Dry Weather Flow (MGD)	Fut. Factored Wastewater Average Dry Weather Flow (MGD)
Fagan	Schools		0.018	0.000	0.014
Fagan	Golf course/parks/landscaped commons		0.000	0.000	0.000
FAGAN TOTAL			0.155	0.000	0.123
Adams	SF Residences		0.147	0.000	0.117
Adams	MF Residences		0.000	0.000	0.000
Adams	Commercial		0.000	0.000	0.000
Adams	Schools		0.000	0.000	0.000
Adams	Golf course/parks/landscaped commons		0.000	0.000	0.000
ADAMS TOTAL			0.147	0.000	0.117
East Area 1	SF Residences		0.446	0.000	0.354
East Area 1	MF Residences		0.000	0.000	0.000
East Area 1	Commercial		0.018	0.000	0.014
East Area 1	Schools		0.015	0.000	0.012
East Area 1	Parks/landscaped commons		0.000	0.000	0.000
EAST AREA 1 TOTAL			0.480	0.000	0.381
East Area 2	Commercial/Industrial		0.066	0.000	0.000
EAST AREA 2 TOTAL			0.066	0.000	0.052
So. Mtn	Golf course/parks		0.000	0.000	0.000
So. Mtn Total			0.000	0.000	0.000
West Area 2	Commercial		0.082	0.000	0.065
West Area 2 Total			0.082	0.000	0.065
GRAND TOTAL		2.486	3.610	1.974	2.866

CHAPTER 4 — DIURNAL FLOW CURVES

Wastewater flow in a sewer system is not uniform, but varies throughout the day. For example, late night and early morning flows in the collection system are low. As businesses open and people get ready for work, school or other daily activities, the flow in the collection system rises. An analysis of the daily pattern of flow (Diurnal Flow) is necessary to correctly model Santa Paula's sewer system.

DEVELOPMENT OF EXISTING DIURNAL FLOW CURVES

The Santa Paula WRF has a chart recorder that records flow to the plant throughout the day. Flows into the plant in May 2012 were compared with the diurnal flow curves in the 2005 study. In the 2005 study, annual flow charts were reviewed to determine an average diurnal curve (**Figure 4-1**). **Figure 4-1** shows the typical pattern of flow through the wastewater treatment facility. The diurnal flow curve having late night and early morning low flow and peak flow at mid-morning followed by a second peak occurring in the early evening.

All of the reviewed flow monitoring data was consistent in relation to the shape of the diurnal curve. **Figure 4-1** shows the flow rate begins to increase after 4:00 AM and peaks at approximately 10:00 AM. Weekend flow peaks at approximately 12:00 PM. Similarly, daily flow data from 2012 peaks just before 11:00AM. The daily peak flow is a critical flow for analysis of the collection system. This is because the peak (highest) flow in the sewer will have the highest depth. The depth of flow in a sewer is critical. If the flow line (depth) is higher than lateral or other sewer connections, thereby preventing free discharge of flow, back-ups could occur. Back up of sanitary sewage in homes and businesses is a public health concern. **Figure 4-2** depicts daily flow rates from May of 2010 to December of 2011; further review of this model gives reinforcement to the average daily flow rate of 1.97 MGD mentioned below.

DEVELOPMENT OF FUTURE FLOW

The diurnal flow patterns, both weekday and weekend, have not substantially changed. However the flows, average and peak, are expected to increase. The total number of ERUs is expected to increase, resulting in a projected flow of 2.87 MGD at build out. Using the peaking factor of 2.0, the expected future peak flow is 5.74 MGD; by the factored flow referenced in **Table 3-3**.

FIG 4-1

Figure 4-1: Comparison of Santa Paula Diurnal Flow (MGD) between 2005 and 2012

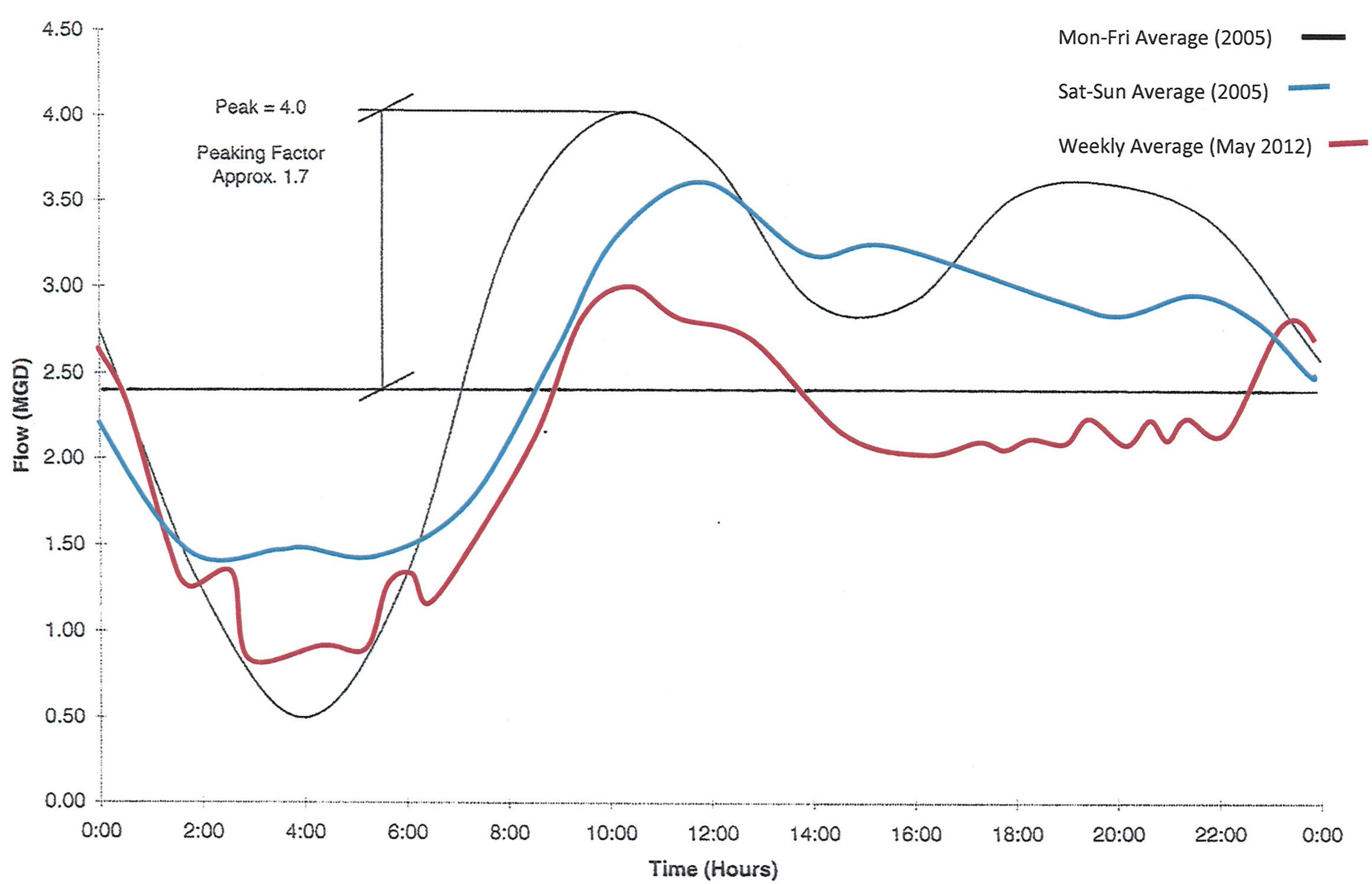
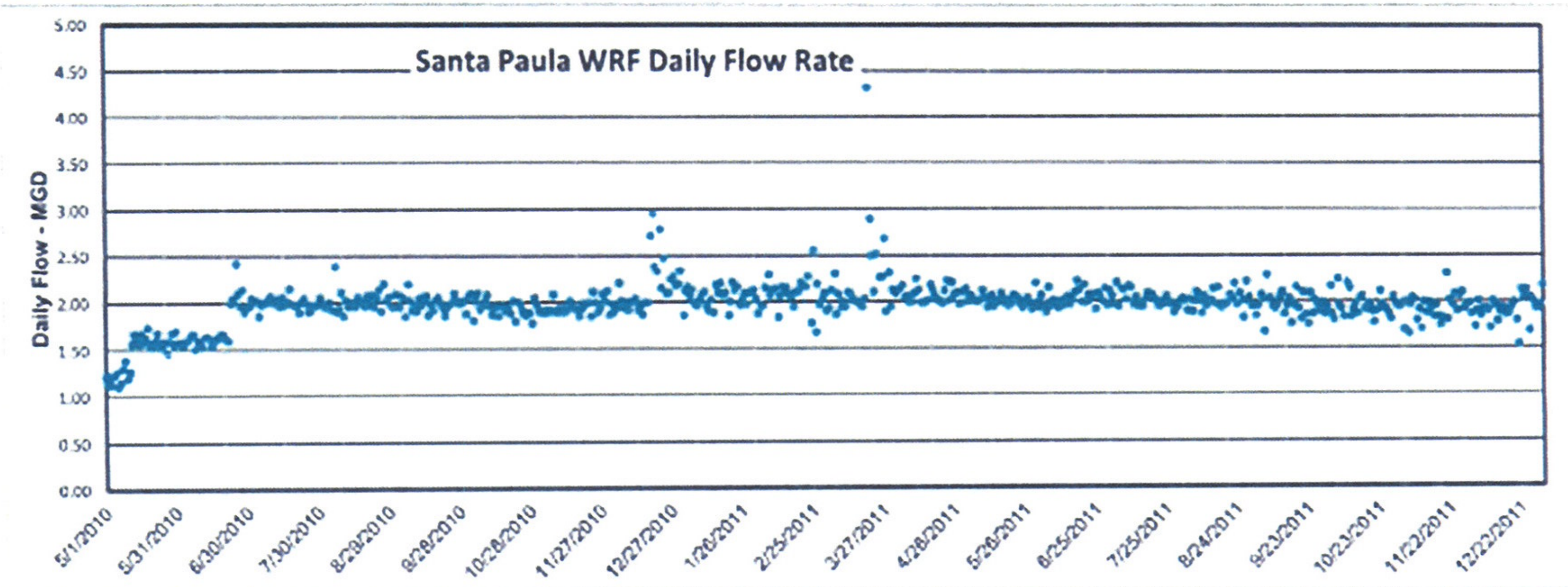


Figure 4-2


Santa Paula WRF Daily Flow Rate
Daily Flow - MGD
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
5/1/2010
5/31/2010
6/30/2010
7/30/2010
8/29/2010
9/28/2010
10/28/2010
11/27/2010
12/27/2010
1/26/2011
2/25/2011
3/27/2011
4/26/2011
5/26/2011
6/25/2011
7/25/2011
8/24/2011
9/23/2011
10/23/2011
11/22/2011
12/22/2011

CHAPTER 5 - INFILTRATION AND INFLOW ANALYSIS

Gravity sewer systems are subject to migration of clear water from the outside. The volume of clear water that enters a sewer system has an adverse effect on the hydraulic capacity of the sewers. Understanding the existing sewer conditions includes an evaluation of the additional clear water component of the wastewater flow.

REVIEW OF PAST DOCUMENTATION

Infiltration and Inflow (I&I) is clear water that enters the sewer system. Ground water that enters sewer pipes through cracks and weak joints is termed infiltration. Infiltration is usually present when the groundwater table is high and/ or when rain saturates the soil surrounding the sewer pipes, manholes and laterals. Inflow is clear water that enters the sewer system during rain events. Pick holes in manhole covers, off set manhole rims, cross connections from storm water catch basins, roof and foundation drains and illegal sump pump connections are all sources of inflow. Large quantities of I/I in a sewer system reduce the capacity of the sewers and adversely affect the hydraulic capacity of the wastewater treatment plant. Communities that experience flow rates in excess of 120 gallons per capita per day (gpcd) are required by EPA to perform a Sewer System Evaluation Survey (SSES) to define clear water sources and identify a plan for I&I removal.

Based on the Santa Paula's wastewater treatment plant records, the average daily flow appears to have dropped from the reported flow rate of approximately 85 gpcd. Excessive I&I are not evident in the sewer system. In the 2005 study, the average monthly rainfall totals in Ventura County for the past 10 years were reviewed (January 1994-September 2004, see Appendix). The wettest month in the 10-year period was February 1998. Daily wastewater treatment plant flow records for February 1998 and February 20 through 28, 2004 were reviewed. **Table 5-1**, from the 2005 study shows the average day wastewater rate and recorded precipitation. The data shown indicates that average wet weather daily flow was about 2.0 times the average dry weather daily flow. The table also shows that peaking occurs quickly and dissipates quickly. This is indicative of inflow rather than infiltration since infiltration usually dissipates gradually over time. After a rain event, infiltration dissipates over time because clear water continues to find its way into the system via high ground during the rain event. When the rain stops the inflow of clear water also stops.

Table 5-1
WWTP Flow and Precipitation

Date	WWTF Flow (MGD)	Precipitation (in)			
		Station 97 Port Hueneme	Station 101 Piru	Station 152 Camarillo	Station 156 Oxnard
2/20/98	2.56	0.00	0.00		
2/21/98	2.59	0.17	0.35		
2/22/98	3.32	0.61	1.97		
2/23/98	4.62	1.76	3.94		
2/24/98	3.24	0.01	0.08		
2/25/98	2.74	0.00	0.00		
2/26/98	2.65	0.00	0.00		
2/27/98	2.54	0.00	0.00		
2/28/98	2.61	0.00	0.00		
2/20/04	2.32		0.00	0.00	0.00
2/21/04	2.48		0.00	0.50	0.52
2/22/04	2.63		0.20	0.36	0.82
2/23/04	2.65		0.20	0.01	0.00
2/24/04	2.28		0.00	0.00	0.00
2/25/04	3.50		0.04	1.46	3.05
2/26/04	3.23		0.00	0.41	0.09
2/27/04	ND		0.00	0.00	0.00
2/28/04	2.25		0.00	0.00	0.00

(shaded box) Indicates high WWTF flow and local precipitation

Precipitation from CIMIS data base, Ventura daily reports water or saturated soil conditions which can linger weeks beyond a rain event. Inflow, however, flows directly into the sewer during the rain event, so when the rain stops the direct inflow of clear water also stops.

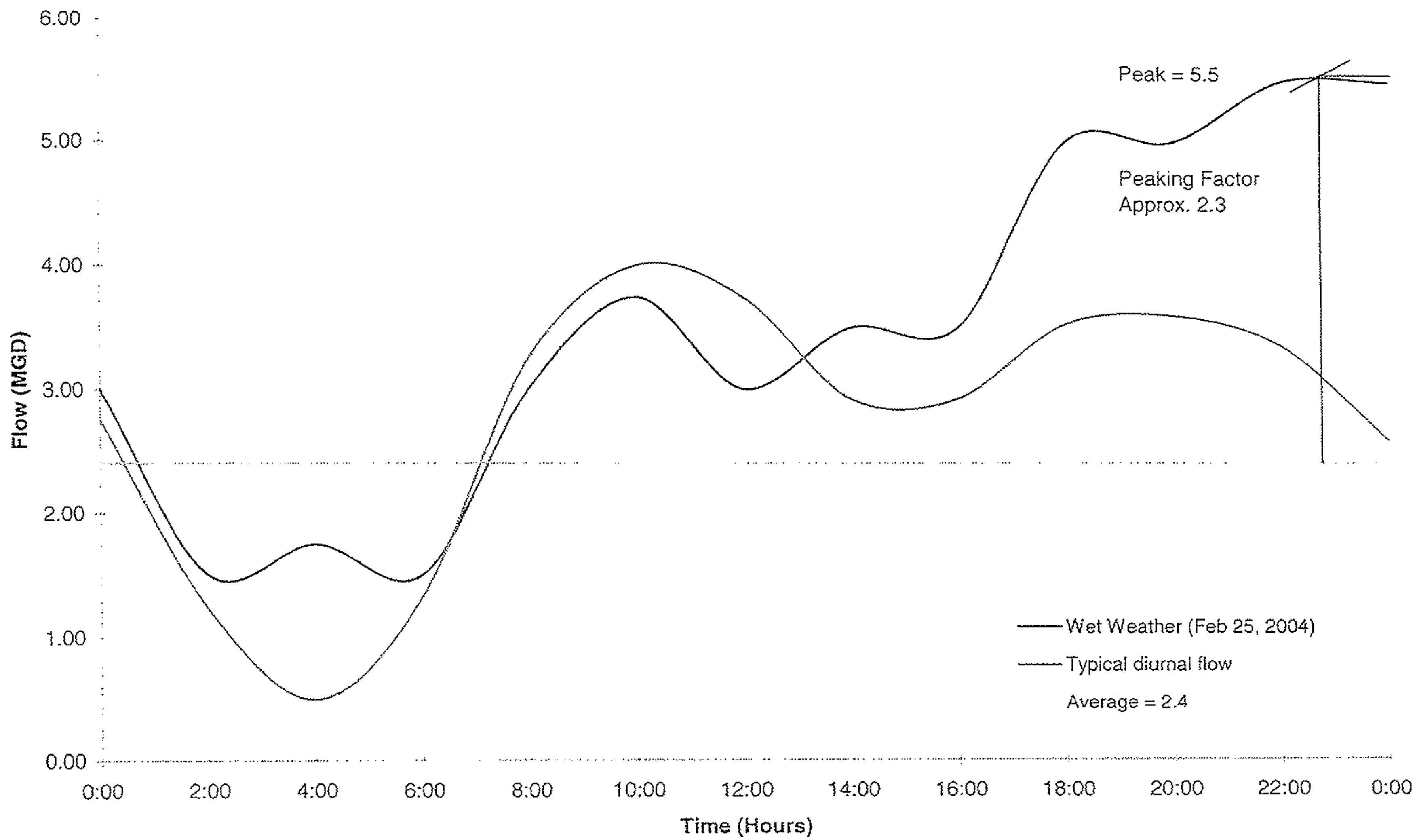
REVIEW OF WET WEATHER FLOW INFORMATION

Figure 5-1 and **Figure 5-2** show the diurnal flow curve relationship determined in 2005 that was used to determine peaking factors. During the afternoon of February 25, 2004 through the early morning hours of February 26, 2004, the flow rate was much larger than usual. The difference in flow between the curves is most probably I/I. The nature of the flow pattern validates the assumption that most of the clearwater in the Santa Paula sewer system can be attributed to inflow.

Because the rainfall occurred in the evening and early morning, the flow to the wastewater treatment plant peaked at approximately 5.5 MGD. If the rainfall had occurred during midday, the peak flow would have been greater. Consequently, the following assumptions were made. As noted on **Figure 5-1** the maximum I&I rate is 2.75 MGD. The peak hourly flow (see diurnal flow curve **Figure 4-2**) is 4.28 MGD. The sum of the maximum I&I plus the peak hourly flow is 7.03 MGD, which is approximately 2.6 times the average day flow. For analysis purposes in this report, the 2005 study values were not changed and a peak wet weather flow rate of 3.0 times the average flow was used.

Sources of inflow should be eliminated if possible, since inflow utilizes sewer capacity and is costly to treat. The new inflow data at the WRF suggests lower flows in the system overall. This may be due to the methods of measuring the flows provided by the new WRF.

Santa Paula Estimated I/I



I/I = 5.5-2.4=3.1 MGD
Worst Case (Sat-Sun Peak)
I/I = 4.28+3.1 = 7.38
Pea[illegible] Factor
7.3[illegible] =3.08

Figure 5.1

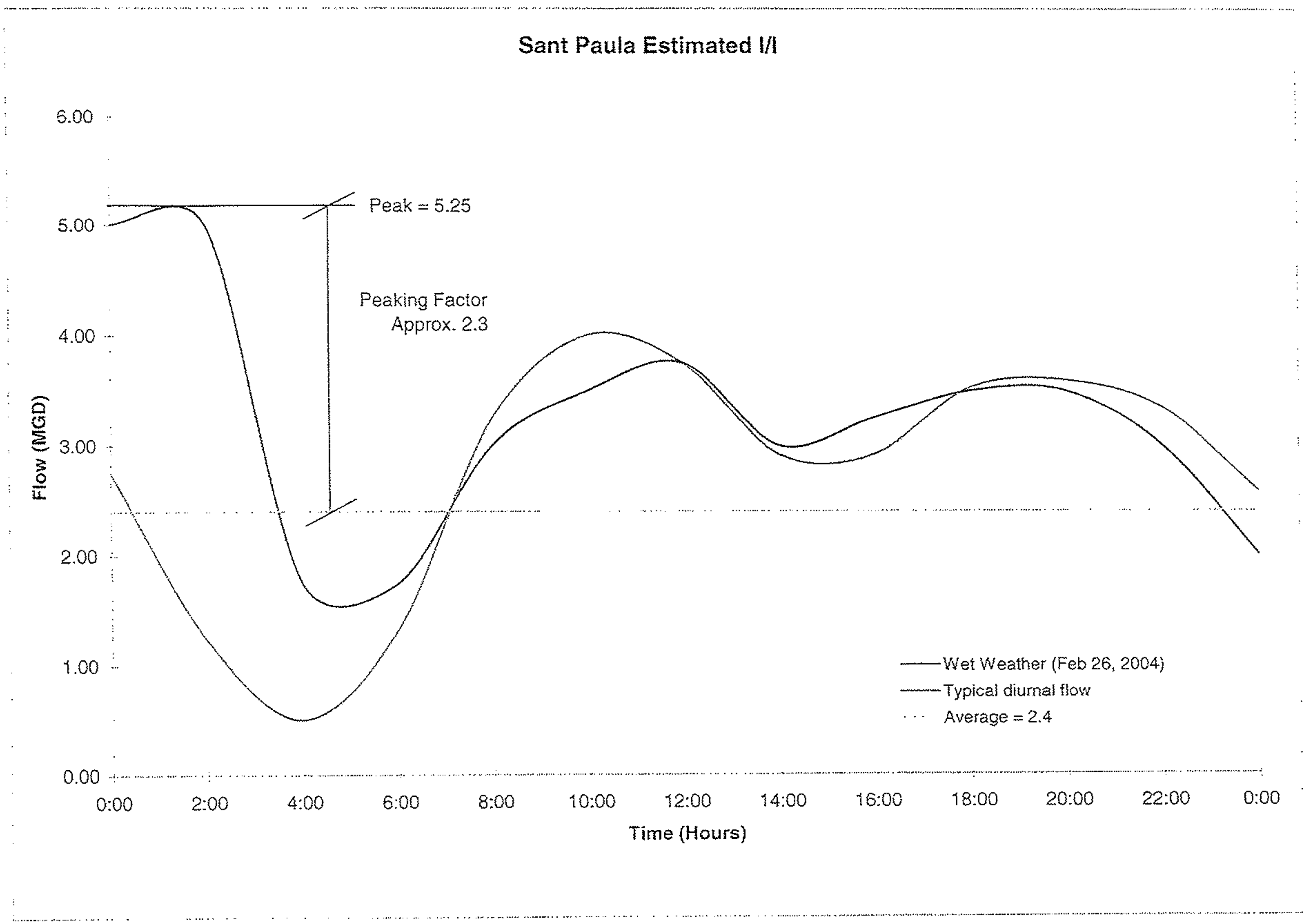

Sant Paula Estimated I/I
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Flow (MGD)
Peak = 5.25
Peaking Factor
Approx. 2.3
0:00
2:00
4:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
0:00
Time (Hours)
Wet Weather (Feb 26, 2004)
Typical diurnal flow
Average = 2.4

Figure 5-2

CHAPTER 6 SEWER FLOW MODEL

Sewer modeling is a tool used to evaluate the capacity of pipes in a sewer system. The model is a mathematical analysis. Features of the sewer system such as, the pipe diameter, the slope of the pipe, the material of construction, and the maximum depth of flow are defined and put into the computer model. The model then uses mathematical equations to calculate the capacity of the sewer segment.

The collection system was modeled in order to determine the hydraulic capacity of the main sewer lines. The model is an Excel program that utilizes Manning's equation to calculate the sewer capacity in terms of percent full pipe.

MODEL CRITERIA

The sewer model was developed based on the criteria noted on **Table 6-1**. The peaking factors an ERU flow components were developed based on actual flow data as discussed in previous chapters of this report.

The model formulas were based on the Manning Equation:

$$V=(1.486/n)r^{2/3}\ s^{1/2}$$

Where:

V=velocity
n=roughness coefficient
r=hydraulic radius
s=slope

This criteria for pipe noted in **Table 6.1** indicates n equal to 0.013 for clay or concrete pipe and 0.011 for PVC. A roughness coefficient of 0.012 was used in the equation since existing pipe materials were not readily known.

MODEL INPUT

The City's collection system has not been substantially altered since the 2005 Wastewater Master Plan. The model developed and calibrated from 2005 was used in this update. The section below describes the development of the system model.

Table 6-1
Wastewater System Criteria

Criterion	Value	Comment
Average Dry Weather Flow (ADWF)	Measured quantity of flow over a dry weather period / time period	Should be equal to flow generation
Peak Dry Weather Flow (PDWF) Avg flow < 2 cfs Avg flow between 2 and 8 cfs Avg flow over 8 cfs	 2.5 x ADWF 2.25 x ADWF 2.0 x ADWF	Peak flow measured over a period of dry weather
Peak Wet Weather Flow (PWWF)	3 x ADWF	Based on Parsons Preliminary Design Report for the Wastewater Treatment Facility
Wastewater Generation	Residential Units x Persons per Household x Per Capita Generation	For commercial/industrial users, use Equivalent Residential Units
Equivalent Residential Units (ERUs) for commercial and industrial customers	1 for services up to 2-inch Large services based on water use and estimated wastewater flow as described in Chapter 3	Based on water service size
Persons per household	Apts: 2.5 Existing Houses: 3.5 New Houses: 3.5	Estimates based on Downtown Improvement Plan Report, to be verified with City General Plan

Table 6-1
Wastewater System Criteria (cont.)

Criterion	Value	Comment
Per Capita Generation	85 gallons/person/day	Based on average treatment plant flows and 2004 population estimates
Manning "n"	0.013 for VCP and concrete 0.011 for PVC and HDPE	
Maximum Depth of Flow	d/D = 0.5 for PDWF, 12 inch pipes and smaller d/D = 0.67 for PDWF, 15-inch pipes and larger d/D = 0.75 for PWWF	
Minimum Velocity	At least 2 fps when flowing half full	
Maximum Velocity	Not more than 8 fps	
Minimum sewer size	8 inch	6-inch can be used where the following conditions are met: • slope of 0.0080 or greater • length of 200 feet or less • serves 10 units or less
Minimum slopes	0.0080 for 6-inch 0.0044 for 8-inch 0.0036 for 10-inch 0.0024 for 12-inch 0.0016 for 15-inch 0.0014 for 18-inch 0.0010 for 21-inch and larger	

Table 6-1
Wastewater System Criteria

Criterion	Value	Comment
Substandard slope	To be reviewed and approved on case-by-case basis	
Location of Manholes	Maximum 350 ft spacing At changes is slope At changes in alignment At points of reverse curvature At junctions in mains At upstream ends of all mains longer than 200 ft	
Standard Depth	Pipe invert to be 8-ft below curb invert	

The collection system was broken into sewer basins. **Figure 6-1** shows the collection system and the basin designations. **Figure 6-1** also shows the relationship between the basins as the flow combines in the main trunk sewers. Use of the basin approach allows the model to define flow for a specific region or regions.

In the 2005 study, two weeks of flow monitoring were conducted November 30 through December 13, 2004, to verify the flow assumptions from particular basins.

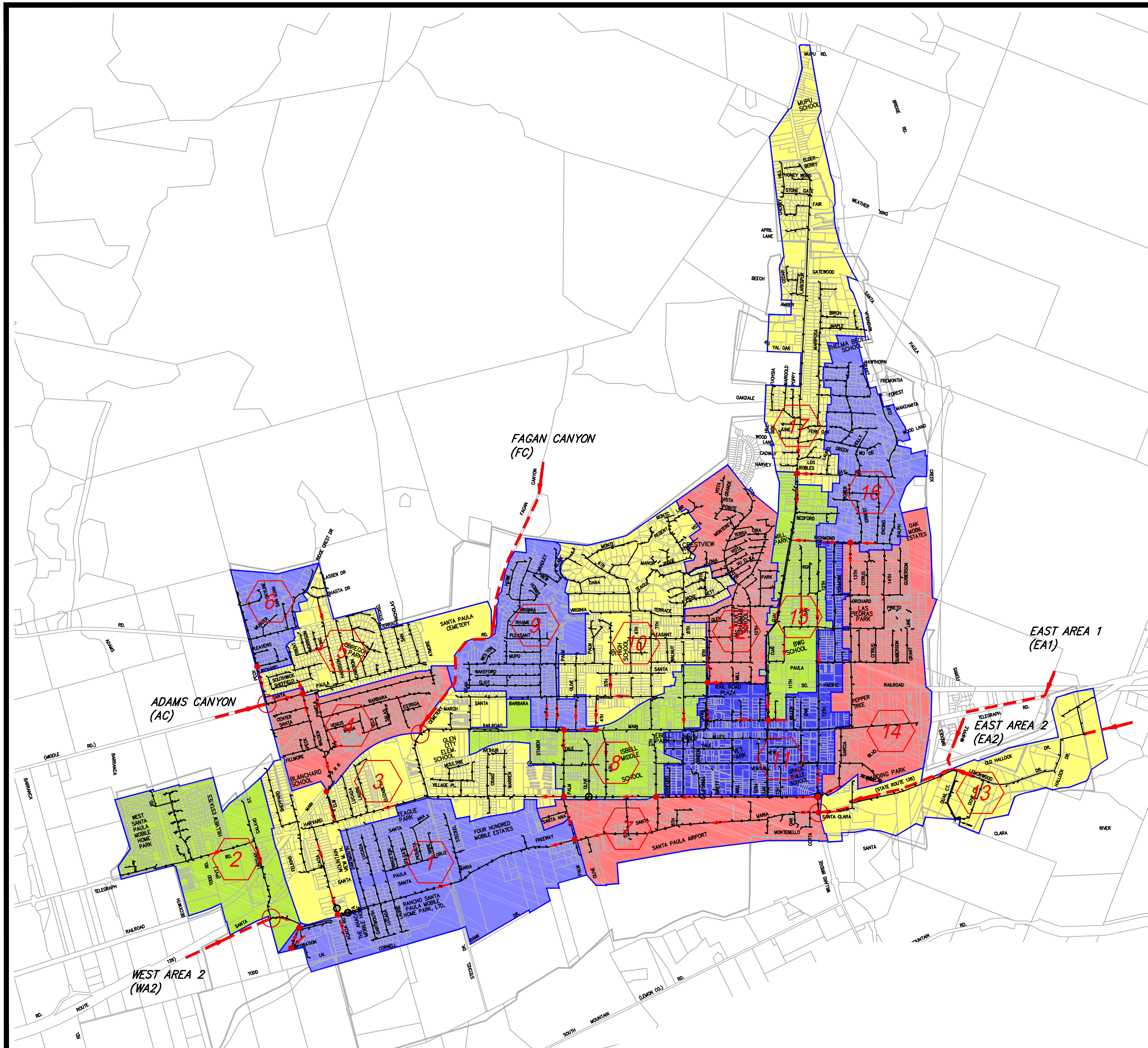
Flow data collected from MH 2E04 and MH 7E02 did correlate with the model and the measured flow was within 3% and 19% respectively of the modeled flows.

Figure 6-2 shows the concentration points for flow input into the model and pipes analyzed. Also noted on the figure is the ERU count for each specific basin. The ERU count was based on the number of parcels, the zoning designation and the large customers as defined in Chapter 3. **Table 6-2** and **Table 6-3** are the Excel spreadsheets that make up the model of the existing conditions.

The sewer segment, diameter and slope were input to the model. The manning equation was then used to calculate the flow at 50% and 67% full. Based on the size of the sewer, the maximum flow depth criteria noted in **Table 6-1** (50% for 12-inch pipes and smaller, 67% for 15-inch pipes and larger and 75% for peak wet weather flow all pipe sizes) and the ERU criteria, the maximum flow in terms of ERU was calculated. The calculated ERU was then compared to the estimated ERU and a determination was made regarding the flow rate as less than capacity, at capacity or above capacity. Sewer segments that were determined to be at or above capacity were analyzed further; see **Table 6-4** through **Table 6-8**, to determine the actual flow rate and depth of flow. Additionally, the upstream sewer segments were modeled to determine the limits of the capacity problem

MODEL RESULTS

The model was run using the existing daily peak flow conditions. Based on the percent full criteria, only two segments of sewer were determined to be above capacity. A 10-inch segment is located at Main Street near Blanchard School between manholes 2D43 and 2E05. The other sewer is a 20-inch segment located in Harvard Blvd.



ZONE ID	ERU COUNT	CONTRIBUTING ZONES
ZONE 1	530	1+2+3+7
ZONE 2	873	2+WA2
ZONE 3	1542	3+4+8+FC
ZONE 4	1118	4+5+6+AC
ZONE 5	391	5
ZONE 6	215	6
ZONE 7	146	7+13+14
ZONE 8	365	8+9+11
ZONE 9	416	9+10
ZONE 10	546	10
ZONE 11	647	11+12+15
ZONE 12	515	12
ZONE 13	1890	13+EA1+EA2
ZONE 14	375	14+16
ZONE 15	336	15+17
ZONE 16	298	16
ZONE 17	504	17

LEGEND

- CONCENTRATION POINT
- FLOW DIRECTION
- ZONE ID
- P.O.C. TO EXISTING SYSTEM

2000' 1000' 0' 2000' 4000'

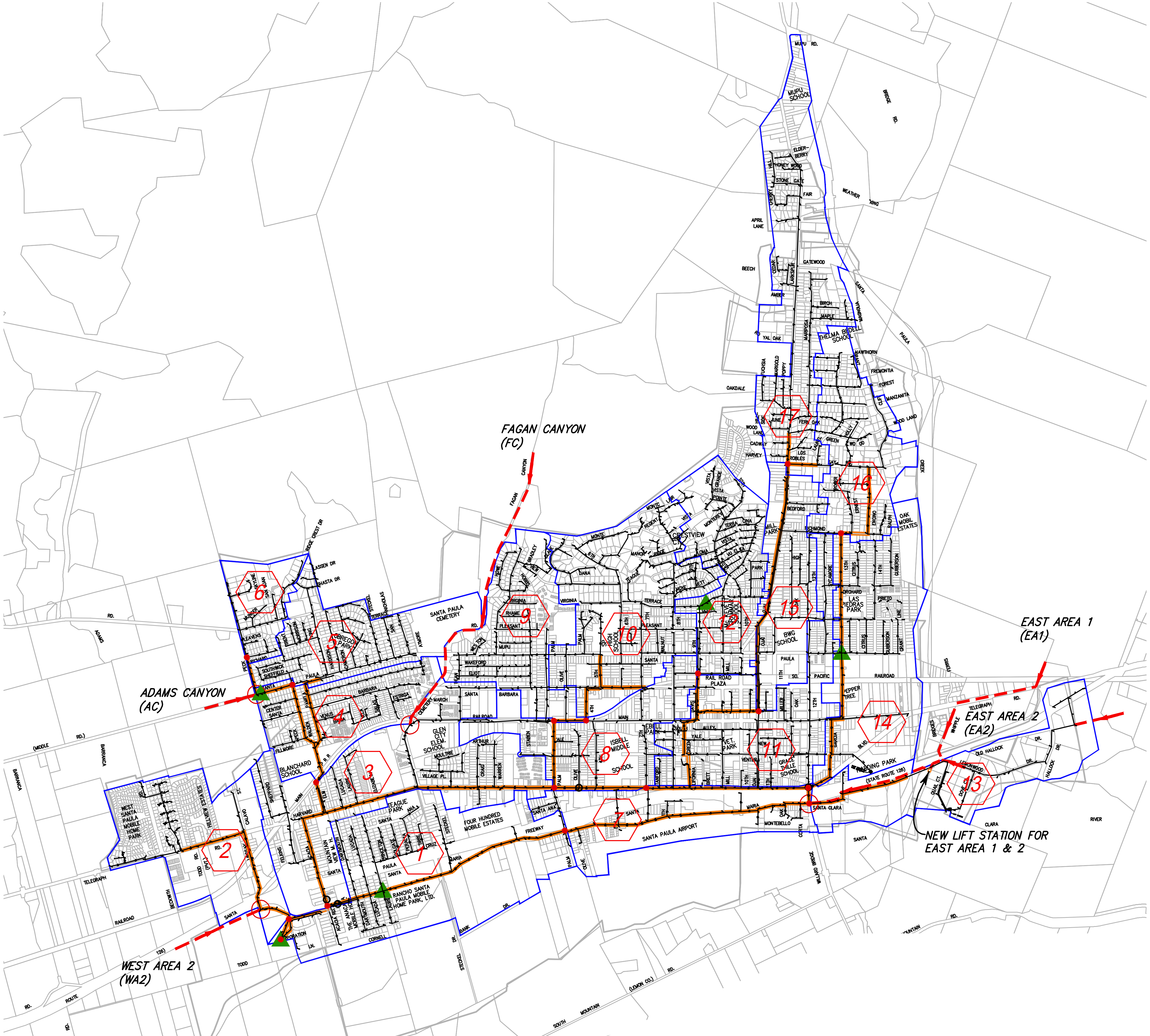
GRAPHIC SCALE: 1"=2000'

CITY OF SANTA PAULA WASTEWATER SYSTEM MASTER PLAN

SEWER BASINS

June 2012 | FIGURE 6-1

J:\LM14521\Eng\Santa Paula Master Plans\Sewer Master Plan\4521–Sewer Master Plan Exhibits.dwg Jun 07, 2012, 1:36pm djaedtke



ZONE ID	ERU COUNT	CONTRIBUTING ZONES
ZONE 1	530	1+2+3+7
ZONE 2	873	2+WA2
ZONE 3	1542	3+4+8+FC
ZONE 4	1118	4+5+6+AC
ZONE 5	391	5
ZONE 6	215	6
ZONE 7	146	7+13+14
ZONE 8	365	8+9+11
ZONE 9	416	9+10
ZONE 10	546	10
ZONE 11	647	11+12+15
ZONE 12	515	12
ZONE 13	1890	13+EA1+EA2
ZONE 14	375	14+16
ZONE 15	336	15+17
ZONE 16	298	16
ZONE 17	504	17

LEGEND

- PIPES ANALYZED
- FLOW METER LOCATIONS
- CONCENTRATION POINT
- FLOW DIRECTION
- 7 ZONE ID
- P.O.C. TO EXISTING SYSTEM

2000' 1000' 0' 2000' 4000'

GRAPHIC SCALE: 1"=2000'

CITY OF SANTA PAULA WASTEWATER SYSTEM MASTER PLAN

PIPELINE ANALYZED IN THE MODEL

June 2012

FIGURE 6-2

J:\LM14521\Eng\Santa Paula Master Plans\Sewer Master Plan\4521-Sewer Master Plan Exhibits.dwg Jun 07, 2012, 1:36pm djaedtke

City of Santa Paula

Table 6-2
Existing Conditions - Dry Weather

Flow Calculation Data		
Persons Per Household =	3.5	
Per Capita Generation =	85	gpd
Generation Per Household =	297.5	gpd
=	0.00046	cfs
Peaking Factor =	2	
Peaked Generation =	0.000921	cfs
Manning's 'n' =	0.011	

ERU Count	
Zone 1	530
Zone 2	598
Zone 3	1020
Zone 4	623
Zone 5	391
Zone 6	215
Zone 7	146
Zone 8	365
Zone 9	416
Zone 10	546
Zone 11	647
Zone 12	515
Zone 13	57
Zone 14	375
Zone 15	336
Zone 16	298
Zone 17	504
Total =	**7582**

Collection Zone	FROM MH #	TO MH#	Pipe Dia. (in.)	Slope (ft/ft)	1/2 Full Capacity- (dia. <= 12") (cfs)	2/3 Full Capacity- (dia. > 12") (cfs)	ERU's Served at Capacity	ERU's Served	Contributing Zones	Peaked Flow Rate (cfs)	Percent Full
17	7H10	7H09	8	0.0202	0.930	1.458	1010	504	17	0.464	< 50%
17	7I01	7H10	8	0.0260	1.055	1.655	1145	465		0.428	< 50%
17	7H22	7H10	6	0.0084	0.279	0.437	302	27		0.025	< 50%
17	7I17	7I16	8	0.0253	1.041	1.632	1130	465		0.428	< 50%
16	8G05	8G03	12	0.0198	2.716	4.257	2949	298	16	0.274	< 50%
16	8G24	8G05	10	0.0029	0.639	1.002	694	283	.95*16	0.261	< 50%
16	8H11	8H09	10	0.0039	0.741	1.162	805	179	.6*16	0.165	< 50%
15	7E11	7E04	8	0.0220	0.971	1.522	1054				
15	7E09	7E03	8	0.0193	0.909	1.425	987				
15	**Parallel Pipes**		8		1.880	2.947	2041	840	15+17	0.774	< 50%
14	7D28	7D26	12	0.0032	1.092	1.711	1185	673	14+16	0.620	< 50%
13	7C15	7C14	8	0.0040	0.414	0.649	449	57	13	0.052	< 50%
12	6E11	6E12	10	0.0171	1.552	2.433	1685	515	12	0.474	< 50%
11	5D30	5D29	18	0.0020	2.545	3.989	4331	2002	11+12+(15+17)	1.844	< 67%
11	6D20	6D19	18	0.0012	1.971	3.090	3355	1970	(.95*11)+12+(15+17)	1.814	< 67%
11	6D29	6D20	12	0.0015	0.747	1.172	811	615	.95*11	0.566	< 50%
11	7D25	7D24	10	0.0040	0.751	1.177	815	582	.90*11	0.536	< 50%
10	5E19	5E14	8	0.0028	0.346	0.543	376	191	.35*10	0.176	< 50%
10	5E10	5E14	8	0.0084	0.600	0.940	651	246	.45*10	0.226	< 50%
10	5E16	5E17	8	0.0116	0.705	1.105	765	546	10	0.503	< 50%
9	4D34	4D33	8	0.0200	0.926	1.451	1005	962	9+10	0.886	< 50%
9	4D36	4D34	8	0.0134	0.758	1.188	823	374	.9*9	0.345	< 50%
9	4E01	4D36	8	0.0143	0.783	1.227	850	374		0.345	< 50%
9	4E05	4E01	8	0.0156	0.818	1.282	888	374		0.345	< 50%
9	4E06	4E05	8	0.0050	0.463	0.726	502	354	.85*9	0.326	< 50%
8	4D06	4D09	20	0.0008	2.131	3.341	3628	3329	8+9+10+11+12+15+17	3.066	< 67%
8	4D26	4D27	15	0.0020	1.565	2.453	2663	1017	(.15*8)+9+10	0.936	< 67%
8	4D27	4D06	15	0.0020	1.565	2.453	2663	1017		0.936	< 67%
8	4D32	4D31	12	0.0076	1.682	2.637	1826	999	(.1*8)+9+10	0.920	< 50%
8	5D04	4D07	18	0.0009	1.707	2.676	2906	2258	(.7*8)+11+12+15+17	2.079	< 67%
8	5D22	5D05	18	0.0008	1.609	2.523	2739	2239	(.65*8)+11+12+15+17	2.062	< 67%
7	5C07	5C05	18	0.0032	3.219	5.046	5479	876	7+13+(14+16)	0.807	< 67%
7	7C14	7C13	18	0.0056	4.258	6.675	7248	730	13+(14+16)	0.672	< 67%
7	7C13	7C07	18	0.0030	3.116	4.885	5304	730		0.672	< 67%
6	2F01	2E48	8	0.0103	0.664	1.041	721	215	6	0.198	< 50%
5	2E42	2E34	10	0.0200	1.678	2.631	1822	391	5	0.360	< 50%
5	2E45	2E43	8	0.0040	0.414	0.649	449	91		0.084	< 50%
5	2E40	2E42	8	0.0035	0.387	0.607	420	276		0.254	< 50%
4	2D43	2D44	10	0.0025	0.593	0.930	644	1229	4+5+6	1.132	> 50%
4	2D42	2D43	10	0.0025	0.593	0.930	644	1229		1.132	> 50%
4	2E04	2D42	10	0.0025	0.593	0.930	644	1229		1.132	> 50%
4	2E05	2E04	10	0.0025	0.593	0.930	644	1229		1.132	> 50%
4	2E06	2E05	8	0.0094	0.635	0.995	689	500	(.3*4)+(.25*5)+6	0.460	< 50%
4	2E12	2E06	8	0.0086	0.607	0.952	659	500		0.460	< 50%
4	2D08	2E05	10	0.0025	0.593	0.930	644	827	(.7*4)+5	0.762	> 50%
4	2E17	2D08	10	0.0025	0.593	0.930	644	827		0.762	> 50%
3	2C15	2C14	24	0.0021	5.615	8.803	9558	5578	3+4+8	5.137	< 67%
3	3D19	3D20	24	0.0010	3.875	6.074	6595	4298	(.95*3)+8	3.958	< 67%
3	2D49	2D51	24	0.0010	3.875	6.074	6595	5527	(.95*3)+4+8	5.090	< 67%
3	3D21	3D18	8	0.0060	0.507	0.795	550	816	.8*3	0.752	> 50%
3	2D45	2D46	10	0.0096	1.163	1.823	1262	1229	4+5+6	1.132	< 50%
2	1C04	1C08	15	0.0124	3.896	6.108	6632	598	2	0.551	< 67%
2	1D08	1D17	12	0.0066	1.568	2.458	1702	239	.4*2	0.220	< 50%
2	1D09	1D08	8	0.0058	0.498	0.781	541	179	.3*2	0.165	< 50%
2	1D10	1D09	8	0.0058	0.498	0.781	541	179	.3*2	0.165	< 50%
1	2C01	PLANT	36	0.0010	11.425	17.910	19446	7582	1+2+3+7	6.983	< 67%
1	3C04	3C03	21	0.0020	3.838	6.017	6533	1088	(.4*1)+7+13	1.002	< 67%
1	3C05	3C04	21	0.0013	3.095	4.851	5267	1088		1.002	< 67%
1	3C06	3C05	21	0.0020	3.838	6.017	6533	956	(.15*1)+7+13	0.880	< 67%

City of Santa Paula

Table 6-3
Existing Conditions - Wet Weather

Flow Calculation Data		
Persons Per Household =	3.5	
Per Capita Generation =	85	gpd
Generation Per Household =	297.5	gpd
=	0.00046	cfs
Peaking Factor =	3	
Peaked Generation =	0.001381	cfs
Manning's 'n' =	0.011	

ERU Count	
Zone 1	530
Zone 2	598
Zone 3	1020
Zone 4	623
Zone 5	391
Zone 6	215
Zone 7	146
Zone 8	365
Zone 9	416
Zone 10	546
Zone 11	647
Zone 12	515
Zone 13	57
Zone 14	375
Zone 15	336
Zone 16	298
Zone 17	504
Total =	**7582**

Collection Zone	FROM MH #	TO MH#	Pipe Dia. (in.)	Slope (ft/ft)	3/4 Full Capacity- (cfs)	ERU's Served at Capacity	ERU's Served	Contributing Zones	Peaked Flow Rate (cfs)	Percent Full
17	7H10	7H09	8	0.0202	1.697	1228	504	17	0.696	< 75%
17	7I01	7H10	8	0.0260	1.925	1393	465		0.642	< 75%
17	7H22	7H10	6	0.0084	0.508	367	27		0.037	< 75%
17	7I17	7I16	8	0.0253	1.899	1375	465		0.642	< 75%
16	8G05	8G03	12	0.0198	4.953	3586	298	16	0.412	< 75%
16	8G24	8G05	10	0.0029	1.166	844	283	.95*16	0.391	< 75%
16	8H11	8H09	10	0.0039	1.352	979	179	.6*16	0.247	< 75%
15	7E11	7E04	8	0.0220	1.771	1282				
15	7E09	7E03	8	0.0193	1.658	1200				
15	**Parallel Pipes**		8		3.429	2482	840	15+17	1.160	< 75%
14	7D28	7D26	12	0.0032	1.991	1441	673	14+16	0.929	< 75%
13	7C15	7C14	8	0.0040	0.755	546	57	13	0.079	< 75%
12	6E11	6E12	10	0.0171	2.830	2049	515	12	0.711	< 75%
11	5D30	5D29	18	0.0020	4.641	3360	2002	11+12+(15+17)	2.765	< 75%
11	6D20	6D19	18	0.0012	3.595	2603	1970	(.95*11)+12+(15+17)	2.720	< 75%
11	6D29	6D20	12	0.0015	1.363	987	615	.95*11	0.849	< 75%
11	7D25	7D24	10	0.0040	1.369	991	582	.90*11	0.804	< 75%
10	5E19	5E14	8	0.0028	0.632	457	191	.35*10	0.264	< 75%
10	5E10	5E14	8	0.0084	1.094	792	246	.45*10	0.339	< 75%
10	5E16	5E17	8	0.0116	1.286	931	546	10	0.754	< 75%
9	4D34	4D33	8	0.0200	1.688	1222	962	9+10	1.329	< 75%
9	4D36	4D34	8	0.0134	1.382	1000	374	.9*9	0.517	< 75%
9	4E01	4D36	8	0.0143	1.428	1034	374		0.517	< 75%
9	4E05	4E01	8	0.0156	1.491	1079	374		0.517	< 75%
9	4E06	4E05	8	0.0050	0.844	611	354	.85*9	0.488	< 75%
8	4D06	4D09	20	0.0008	3.887	2815	3329	8+9+10+11+12+15+17	4.597	> 75%
8	4D26	4D27	15	0.0020	2.854	2066	1017	(.15*8)+9+10	1.404	< 75%
8	4D27	4D06	15	0.0020	2.854	2066	1017		1.404	< 75%
8	4D32	4D31	12	0.0076	3.068	2222	999	(.1*8)+9+10	1.379	< 75%
8	5D04	4D07	18	0.0009	3.113	2254	2258	(.7*8)+11+12+15+17	3.118	> 75%
8	5D22	5D05	18	0.0008	2.935	2125	2239	(.65*8)+11+12+15+17	3.092	> 75%
7	5C07	5C05	18	0.0032	5.870	4251	876	7+13+(14+16)	1.210	< 75%
7	7C14	7C13	18	0.0056	7.766	5623	730	13+(14+16)	1.008	< 75%
7	7C13	7C07	18	0.0030	5.684	4116	730		1.008	< 75%
6	2F01	2E48	8	0.0103	1.212	877	215	6	0.297	< 75%
5	2E42	2E34	10	0.0200	3.061	2216	391	5	0.540	< 75%
5	2E45	2E43	8	0.0040	0.755	546	91		0.126	< 75%
5	2E40	2E42	8	0.0035	0.706	511	276		0.381	< 75%
4	2D43	2D44	10	0.0025	1.082	783	1229	4+5+6	1.697	> 75%
4	2D42	2D43	10	0.0025	1.082	783	1229		1.697	> 75%
4	2E04	2D42	10	0.0025	1.082	783	1229		1.697	> 75%
4	2E05	2E04	10	0.0025	1.082	783	1229		1.697	> 75%
4	2E06	2E05	8	0.0094	1.157	838	500	(.3*4)+(.25*5)+6	0.690	< 75%
4	2E12	2E06	8	0.0086	1.107	801	500		0.690	< 75%
4	2D08	2E05	10	0.0025	1.082	783	827	(.7*4)+5	1.142	> 75%
4	2E17	2D08	10	0.0025	1.082	783	827		1.142	> 75%
3	2C15	2C14	24	0.0021	10.241	7416	5578	3+4+8	7.703	< 75%
3	3D19	3D20	24	0.0010	7.067	5117	4298	(.95*3)+8	5.936	< 75%
3	2D49	2D51	24	0.0010	7.067	5117	5527	(.95*3)+4+8	7.633	> 75%
3	3D21	3D18	8	0.0060	0.925	669	816	.8*3	1.127	> 75%
3	2D45	2D46	10	0.0096	2.121	1535	1229	4+5+6	1.697	< 75%
2	1C04	1C08	15	0.0124	7.106	5146	598	2	0.826	< 75%
2	1D08	1D17	12	0.0066	2.859	2070	239	.4*2	0.330	< 75%
2	1D09	1D08	8	0.0058	0.909	658	179	.3*2	0.248	< 75%
2	1D10	1D09	8	0.0058	0.909	658	179	.3*2	0.248	< 75%
1	2C01	PLANT	36	0.0010	20.837	15088	7582	1+2+3+7	10.471	< 75%
1	3C04	3C03	21	0.0020	7.000	5069	1088	(.4*1)+7+13	1.503	< 75%
1	3C05	3C04	21	0.0013	5.644	4087	1088		1.503	< 75%
1	3C06	3C05	21	0.0020	7.000	5069	956	(.15*1)+7+13	1.320	< 75%

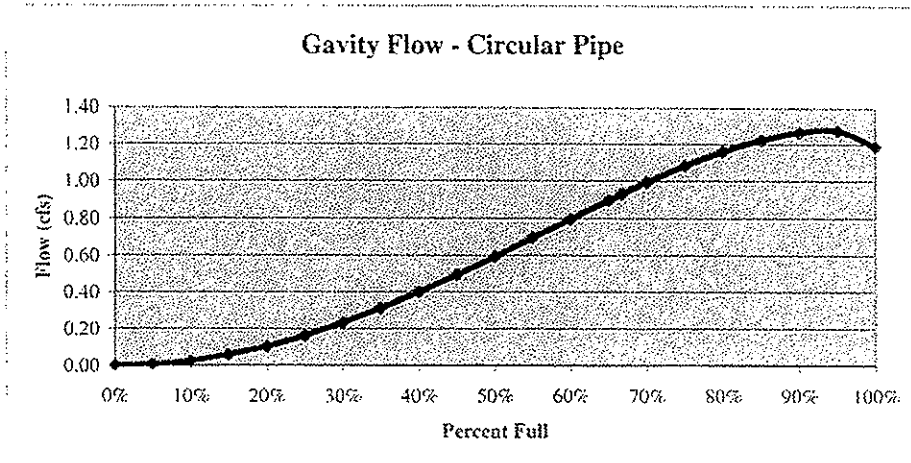
Table 6-4
Zone 4 MH 2E08 - 2E05 PDWF

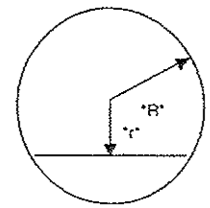
Circular Channel Hydraulics

Manning's Equation

Channel Data

Q =	0.5990 cfs	0.39	MGD
dia =	10 inches	0.83	feet
n =	0.012	50.2%	% Full
s =	0.0025 feet/foot		
Normal Depth =	0.42 feet		
v =	2.19 fps		
Velocity Head $h_{v1} = v^2/2g$	0.07 feet		
Area =	0.27 ft^2		
Wetted Perimeter =	1.31 feet		
Hydraulic Radius =	0.21 feet		
Top Width =	4.00 feet		
Froude Number =	1.47		





Working Cells
Solves Manning's Eqn for all depths then uses vlookup to find the solution. Use caution when pipe is in the range of 95% full, there can be more than one flow depth for a given flow rate.

Diameter Factor (divides diameter in 1/1000ths)	Flow Q (dia 0.833)	Depth d	Hydraulic Radius R_h (s 0.00250)	Velocity v (n 0.012)	"r" ("R" 0.417)	Area A	Wetted Perimeter Wp	Hydraulic Radius R_h
0.000	0.00	0.000	0	0	0.417	0.000	0	0
0.050	0.01	0.042	0.027	0.56	0.375	0.010	0.376	0.027
0.100	0.02	0.083	0.053	0.87	0.333	0.028	0.536	0.053
0.150	0.06	0.125	0.077	1.12	0.292	0.051	0.663	0.077
0.200	0.10	0.167	0.100	1.34	0.250	0.078	0.773	0.100
0.250	0.16	0.208	0.122	1.52	0.208	0.107	0.873	0.122
0.300	0.23	0.250	0.142	1.69	0.167	0.138	0.966	0.142
0.350	0.31	0.292	0.161	1.83	0.125	0.170	1.055	0.161
0.400	0.40	0.333	0.179	1.96	0.083	0.204	1.141	0.179
0.450	0.49	0.375	0.194	2.08	0.042	0.238	1.226	0.194
0.500	0.59	0.417	0.208	2.18	0.000	0.273	1.309	0.208
0.550	0.70	0.458	0.221	2.26	0.042	0.307	1.392	0.221
0.600	0.80	0.500	0.231	2.33	0.083	0.342	1.477	0.231
0.650	0.90	0.542	0.240	2.39	0.125	0.375	1.563	0.240
0.667	0.93	0.556	0.243	2.41	0.139	0.386	1.593	0.243
0.700	0.99	0.583	0.247	2.44	0.167	0.408	1.652	0.247
0.750	1.08	0.625	0.251	2.47	0.208	0.439	1.745	0.251
0.800	1.16	0.667	0.253	2.48	0.250	0.468	1.845	0.253
0.850	1.22	0.708	0.253	2.47	0.292	0.494	1.955	0.253
0.900	1.26	0.750	0.248	2.45	0.333	0.517	2.082	0.248
0.950	1.28	0.792	0.239	2.38	0.375	0.535	2.242	0.239
1.000	1.19	0.833	0.208	2.18	0.417	0.545	2.618	0.208

Table [illegible]-5

Zone 4 MH 2E04 - 2D42 PDWF

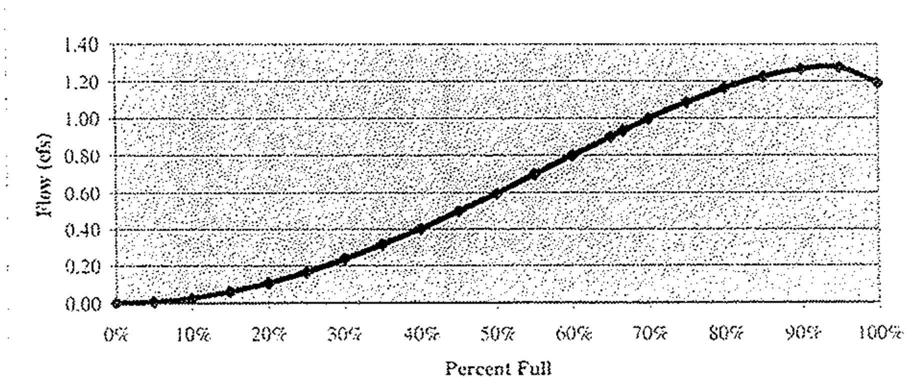
Circular Channel Hydraulics

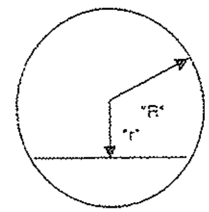
Manning's Equation

Channel Data

Q =	1.2660	cfs	0.82	MGD
dia =	10	inches	0.83	feet
n =	0.012		90.1%	% Full
s =	0.0025	feet/foot		
Normal Depth =	0.75	feet		
v =	2.45	fps		
Velocity Head $h_{v1} = v^2/2g$	0.09	feet		
Area =	0.52	ft^2		
Wetted Perimeter =	2.08	feet		
Hydraulic Radius =	0.25	feet		
Top Width =	5.27	feet		
Froude Number =	1.38			

Gavity Flow - Circular Pipe





Working Cells
Solves Manning's Eqn for all depths then uses vlookup to find the solution. Use caution when pipe is in the range of 95% full, there can be more than one flow depth for a given flow rate.

Diameter Factor (divides diameter in 1/1000ths)	Flow Q	Depth d	Hydraulic Radius R_h	Velocity v	"r"	Area A	Wetted Perimeter Wp	Hydraulic Radius R_h
	dia		s	n	"R"			
	0.833		0.00250	0.012	0.417			
0.000	0.00	0.000	0	0	0.417	0.000	0	0
0.050	0.01	0.042	0.027	0.56	0.375	0.010	0.376	0.027
0.100	0.02	0.083	0.053	0.87	0.333	0.026	0.536	0.053
0.150	0.06	0.125	0.077	1.12	0.292	0.051	0.663	0.077
0.200	0.10	0.167	0.100	1.34	0.250	0.078	0.773	0.100
0.250	0.16	0.208	0.122	1.52	0.208	0.107	0.873	0.122
0.300	0.23	0.250	0.142	1.69	0.167	0.138	0.966	0.142
0.350	0.31	0.292	0.161	1.83	0.125	0.170	1.055	0.161
0.400	0.40	0.333	0.179	1.96	0.083	0.204	1.141	0.179
0.450	0.49	0.375	0.194	2.08	0.042	0.238	1.226	0.194
0.500	0.59	0.417	0.208	2.18	0.000	0.273	1.309	0.208
0.550	0.70	0.458	0.221	2.26	0.042	0.307	1.392	0.221
0.600	0.80	0.500	0.231	2.33	0.083	0.342	1.477	0.231
0.650	0.90	0.542	0.240	2.39	0.125	0.375	1.563	0.240
0.667	0.93	0.556	0.243	2.41	0.139	0.386	1.593	0.243
0.700	0.99	0.583	0.247	2.44	0.167	0.403	1.652	0.247
0.750	1.08	0.625	0.251	2.47	0.208	0.439	1.745	0.251
0.800	1.16	0.667	0.253	2.48	0.250	0.468	1.845	0.253
0.850	1.22	0.708	0.253	2.47	0.292	0.494	1.955	0.253
0.900	1.26	0.750	0.248	2.45	0.333	0.517	2.082	0.248
0.950	1.28	0.792	0.239	2.38	0.375	0.535	2.242	0.239
1.000	1.19	0.833	0.208	2.18	0.417	0.545	2.618	0.208

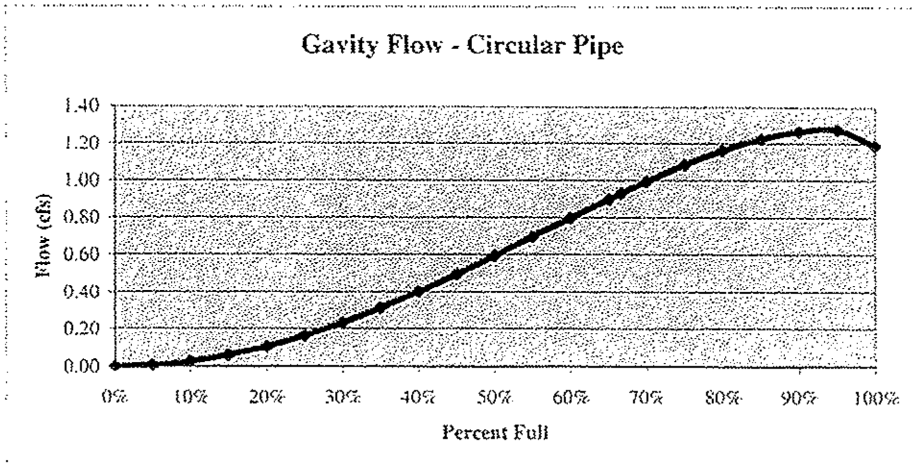
Table 6-6
Zone 4 MH 2E04 - 2D42 PWWF

Circular Channel Hydraulics

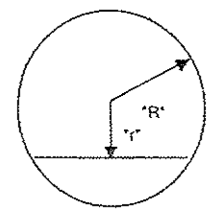
Manning's Equation

Channel Data

Q =	1.6970 cfs	1.10	MGD
dia =	10 inches	0.83	feet
n =	0.012	100.0%	% Full
s =	0.0025 feet/foot		
Normal Depth =	0.83 feet		
v =	3.11 fps		
Velocity Head $h_v = v^2/2g$	0.15 feet		
Area =	0.55 ft^2		
Wetted Perimeter =	2.62 feet		
Hydraulic Radius =	0.21 feet		
Top Width =	5.53 feet		
Froude Number =	1.75		



Working Cells
Solves Manning's Eqn for all depths then uses vlookup to find the solution. Use caution when pipe is in the range of 95% full, there can be more than one flow depth for a given flow rate.



Diameter Factor (divides diameter in 1/1000ths)	dia 0.833 Flow Q	Depth d	s 0.00250 Hydraulic Radius R_h	n 0.012 Velocity v	"R" 0.417 "r"	Area A	Wetted Perimeter Wp	Hydraulic Radius R_h
0.000	0.00	0.000	0	0	0.417	0.000	0	0
0.050	0.01	0.042	0.027	0.55	0.375	0.010	0.376	0.027
0.100	0.02	0.083	0.053	0.87	0.333	0.028	0.536	0.053
0.150	0.06	0.125	0.077	1.12	0.292	0.051	0.663	0.077
0.200	0.10	0.167	0.100	1.34	0.250	0.078	0.773	0.100
0.250	0.16	0.208	0.122	1.52	0.208	0.107	0.873	0.122
0.300	0.23	0.250	0.142	1.69	0.167	0.138	0.966	0.142
0.350	0.31	0.292	0.161	1.83	0.125	0.170	1.055	0.161
0.400	0.40	0.333	0.179	1.96	0.083	0.204	1.141	0.179
0.450	0.49	0.375	0.194	2.08	0.042	0.238	1.226	0.194
0.500	0.59	0.417	0.208	2.18	0.000	0.273	1.309	0.208
0.550	0.70	0.458	0.221	2.26	0.042	0.307	1.392	0.221
0.600	0.80	0.500	0.231	2.33	0.083	0.342	1.477	0.231
0.650	0.90	0.542	0.240	2.39	0.125	0.375	1.563	0.240
0.667	0.93	0.556	0.243	2.41	0.139	0.386	1.593	0.243
0.700	0.99	0.583	0.247	2.44	0.167	0.408	1.652	0.247
0.750	1.08	0.625	0.251	2.47	0.208	0.439	1.745	0.251
0.800	1.16	0.667	0.253	2.48	0.250	0.468	1.845	0.253
0.850	1.22	0.708	0.253	2.47	0.292	0.494	1.955	0.253
0.900	1.26	0.750	0.248	2.45	0.333	0.517	2.082	0.248
0.950	1.28	0.792	0.239	2.38	0.375	0.535	2.242	0.239
1.000	1.19	0.833	0.208	2.18	0.417	0.545	2.618	0.208

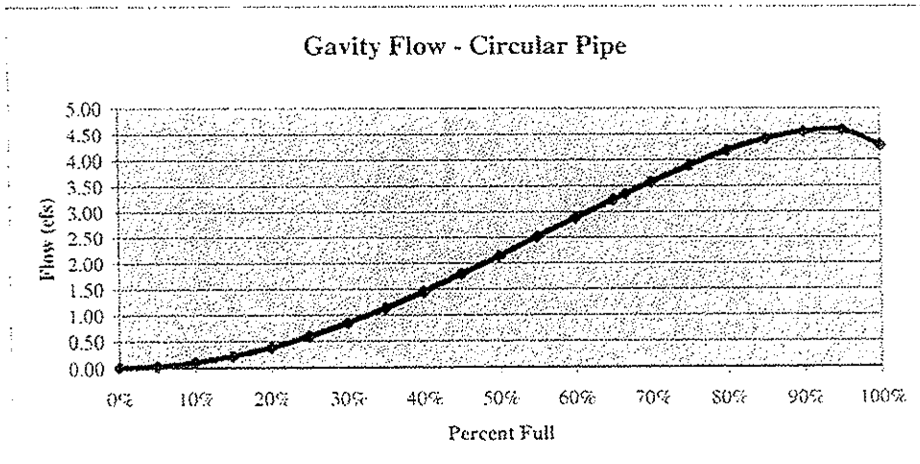
Table 6-7
Zone 8 MH 4D06 - 4D09 PDWF

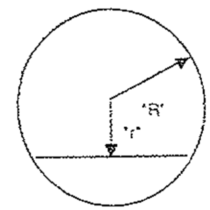
Circular Channel Hydraulics

Manning's Equation

Channel Data

Q =	3.3730 cfs		2.18	MGD
dia =	20 inches		1.67	feet
n =	0.012		67.1%	% Full
s =	0.0008 feet/foot			
Normal Depth =	1.12 feet			
v =	2.17 fps			
Velocity Head $h_{v1} = v^2/2g$	0.07 feet			
Area =	1.56 ft^2			
Wetted Perimeter =	3.20 feet			
Hydraulic Radius =	0.49 feet			
Top Width =	9.19 feet			
Froude Number =	0.93			





Working Cells
Solves Manning's Eqn for all depths then uses vlookup to find the solution. Use caution when pipe is in the range of 95% full, there can be more than one flow depth for a given flow rate.

	dia		s	n	"R"			
	1.667		0.00080	0.012	0.833			
Diameter Factor (divides diameter in 1/1000ths)	Flow Q	Depth d	Hydraulic Radius R_h	Velocity v	"r"	Area A	Wetted Perimeter Wp	Hydraulic Radius R_h
0.000	0.00	0.000	0	0	0.833	0.000	0	0
0.050	0.02	0.083	0.054	0.50	0.750	0.041	0.752	0.054
0.100	0.09	0.167	0.106	0.78	0.667	0.114	1.073	0.106
0.150	0.21	0.250	0.155	1.01	0.583	0.205	1.326	0.155
0.200	0.37	0.333	0.201	1.20	0.500	0.311	1.545	0.201
0.250	0.58	0.417	0.244	1.37	0.417	0.427	1.745	0.244
0.300	0.83	0.500	0.285	1.52	0.333	0.550	1.932	0.285
0.350	1.12	0.583	0.322	1.65	0.250	0.681	2.110	0.322
0.400	1.44	0.667	0.357	1.76	0.167	0.815	2.282	0.357
0.450	1.78	0.750	0.388	1.86	0.083	0.952	2.451	0.388
0.500	2.13	0.833	0.417	1.95	0.000	1.091	2.618	0.417
0.550	2.50	0.917	0.441	2.03	0.083	1.229	2.785	0.441
0.600	2.86	1.000	0.463	2.10	0.167	1.367	2.954	0.463
0.650	3.22	1.083	0.480	2.15	0.250	1.501	3.126	0.480
0.667	3.34	1.112	0.485	2.16	0.278	1.546	3.186	0.485
0.700	3.57	1.167	0.494	2.19	0.333	1.631	3.304	0.494
0.750	3.89	1.250	0.503	2.21	0.417	1.755	3.491	0.503
0.800	4.17	1.333	0.507	2.23	0.500	1.871	3.690	0.507
0.850	4.39	1.417	0.505	2.22	0.583	1.976	3.910	0.505
0.900	4.54	1.500	0.497	2.20	0.667	2.068	4.163	0.497
0.950	4.58	1.583	0.477	2.14	0.750	2.141	4.484	0.477
1.000	4.26	1.667	0.417	1.95	0.833	2.182	5.236	0.417

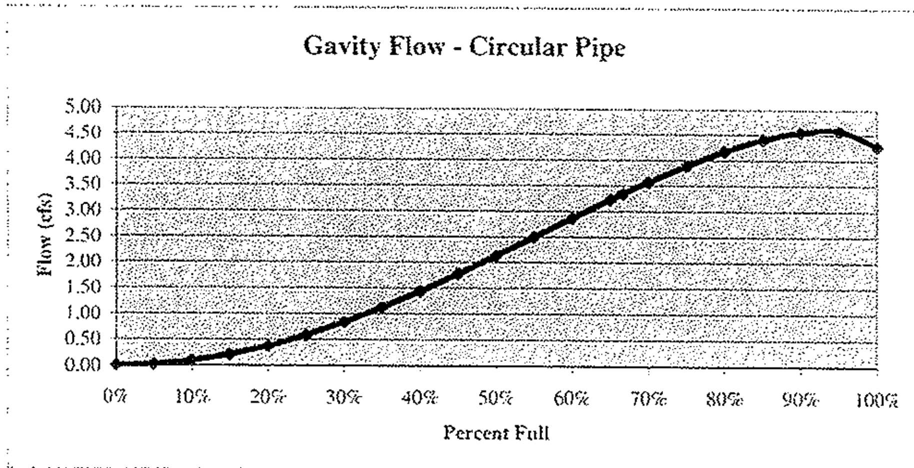
Table 6-8
Zone 8 MH 4D06 - 4D09 PWWF

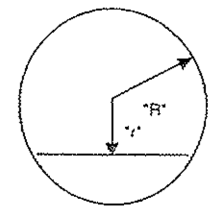
Circular Channel Hydraulics

Manning's Equation

Channel Data

Q =	4.4440 cfs		2.87	MGD
dia =	20 inches		1.67	feet
n =	0.012		86.4%	% Full
s =	0.0008 feet/foot			
Normal Depth =	1.44 feet			
v =	2.22 fps			
Velocity Head $h_{v1} = v^2/2g$	0.08 feet			
Area =	2.00 ft²			
Wetted Perimeter =	3.98 feet			
Hydraulic Radius =	0.50 feet			
Top Width =	10.34 feet			
Froude Number =	0.89			





Working Cells
Solves Manning's Eqn for all depths then uses vlookup to find the solution. Use caution when pipe is in the range of 95% full, there can be more than one flow depth for a given flow rate.

	dia		s	n	"R"			
	1.667		0.00080	0.012	0.833			
Diameter Factor (divides diameter in 1/1000ths)	Flow Q	Depth d	Hydraulic Radius R_h	Velocity v	"r"	Area A	Wetted Perimeter Wp	Hydraulic Radius R_h
0.000	0.00	0.000	0	0	0.833	0.000	0	0
0.050	0.02	0.083	0.054	0.50	0.750	0.041	0.752	0.054
0.100	0.09	0.167	0.106	0.78	0.667	0.114	1.073	0.106
0.150	0.21	0.250	0.155	1.01	0.583	0.205	1.326	0.155
0.200	0.37	0.333	0.201	1.20	0.500	0.311	1.545	0.201
0.250	0.58	0.417	0.244	1.37	0.417	0.427	1.745	0.244
0.300	0.83	0.500	0.285	1.52	0.333	0.550	1.932	0.285
0.350	1.12	0.583	0.322	1.65	0.250	0.681	2.110	0.322
0.400	1.44	0.667	0.357	1.76	0.167	0.815	2.262	0.357
0.450	1.78	0.750	0.388	1.86	0.083	0.952	2.451	0.388
0.500	2.13	0.833	0.417	1.95	0.000	1.091	2.618	0.417
0.550	2.50	0.917	0.441	2.03	0.083	1.229	2.785	0.441
0.600	2.86	1.000	0.463	2.10	0.167	1.367	2.954	0.463
0.650	3.22	1.083	0.480	2.15	0.250	1.501	3.126	0.480
0.667	3.34	1.112	0.485	2.16	0.278	1.546	3.186	0.485
0.700	3.57	1.167	0.494	2.19	0.333	1.631	3.304	0.494
0.750	3.89	1.250	0.503	2.21	0.417	1.755	3.491	0.503
0.800	4.17	1.333	0.507	2.23	0.500	1.871	3.690	0.507
0.850	4.39	1.417	0.505	2.22	0.583	1.976	3.910	0.505
0.900	4.54	1.500	0.497	2.20	0.667	2.068	4.163	0.497
0.950	4.58	1.583	0.477	2.14	0.750	2.141	4.484	0.477
1.000	4.26	1.667	0.417	1.95	0.833	2.182	5.236	0.417

between manholes 4D06 and 4D09. **Figure 6-3** shows the system deficiencies.

The model was also run using wet weather flow conditions. The results showed deficiencies in the same sewer segments.

The model assumes that the wet weather peak flow is spread evenly throughout the basins. Since the analysis indicates that high wet weather flow is inflow related (See Chapter 5), the clear water entering the collection system is likely not evenly distributed throughout the basins as the model suggests. However, without a detailed survey of the entire sewer system, the actual locations of inflow cannot be determined. A detailed survey would involve test procedures such as smoke testing of sanitary sewers and dye testing of storm sewers to locate leaks and cross connections in the sewer system. Additionally, a field inspection of all manholes within the system would need to be performed. Exfiltration tests and a cost comparison for rehabilitation verses treatment of the wastewater would be necessary.

The future wastewater flow conditions were modeled. Projected flows have been obtained from the City zoning information and known information on pending projects. The new inflows were added to the existing system. **Figure 6-1** shows how the new developments could be connected to the system. East Area 1 & 2 will connect to the City via a new lift station and force main and take advantage of the existing system capacity of the Southern Trunk. **Figure 6-4** also shows deficiencies within the existing system based on the future flows. **Table 6-9** and **Table 6-10** show the results of future flow in the model.

The future flow data input in the model showed future capacity problems in the following sewer segments:

- 12-inch sewer, east along Harvard Blvd. and north along Garcia and Thirteenth Streets
- 8-inch sewer, heading west along the southern side of SR 126 after crossing the Santa Paula Creek, to 12th street.
- 36, and 24-inch sewers from the Wastewater Treatment Plant east to Acacia Road, north to Harvard Blvd. east to Steckel Drive
- 8-inch sewer along Steckel Drive north to Main Street

City of Santa Paula

Table 6-9
Future Conditions - Dry Weather

(Amended Version)

Flow Calculation Data		
Persons Per Household =	3.5	
Per Capita Generation =	85	gpd
Generation Per Household =	297.5	gpd
=	0.00046	cfs
Peaking Factor =	2	
Peaked Generation =	0.000921	cfs
Manning's 'n' =	0.011	

ERU Count		ERU Count Expansion		
Zone 1	530			
Zone 2	598	West Area 2		275
Zone 3	1020	Fagan Canyon		522
Zone 4	623	Adams Canyon		495
Zone 5	391			
Zone 6	215			
Zone 7	146			
Zone 8	365			
Zone 9	416			
Zone 10	546			
Zone 11	647			
Zone 12	515			
Zone 13	57	East Area 1 & 2	1612+221=	1833
Zone 14	375			
Zone 15	336			
Zone 16	298			
Zone 17	504			
Total =	**7582**		**Total =**	**3125**

Collection Zone	FROM MH #	TO MH#	Pipe Dia. (in.)	Slope (ft/ft)	1/2 Full Capacity- (dia. <= 12") (cfs)	2/3 Full Capacity- (dia. > 12") (cfs)	ERU's Served at Capacity	ERU's Served	Contributing Zones	Peaked Flow Rate (cfs)	Percent Full
17	7H10	7H09	8	0.0202	0.930	1.458	1010	504	17	0.464	< 50%
17	7I01	7H10	8	0.0260	1.055	1.655	1145	465		0.428	< 50%
17	7H22	7H10	6	0.0084	0.279	0.437	302	27		0.025	< 50%
17	7I17	7I16	8	0.0253	1.041	1.632	1130	465		0.428	< 50%
16	8G05	8G03	12	0.0198	2.716	4.257	2949	298	16	0.274	< 50%
16	8G24	8G05	10	0.0029	0.639	1.002	694	283	.95*16	0.261	< 50%
16	8H11	8H09	10	0.0039	0.741	1.162	805	179	.6*16	0.165	< 50%
15	7E11	7E04	8	0.0220	0.971	1.522	1054				
15	7E09	7E03	8	0.0193	0.909	1.425	987				
15	**Parallel Pipes**		8		1.880	2.947	2041	840	15+17	0.774	< 50%
14	7D28	7D26	12	0.0032	1.092	1.711	1185	673	14+16	0.620	< 50%
13	7C15	7C14	8	0.0040	0.414	0.649	449	1890	(13+EA1+EA2)	1.741	> 50%
12	6E11	6E12	10	0.0171	1.552	2.433	1685	515	12	0.474	< 50%
11	5D30	5D29	18	0.0020	2.545	3.989	4331	2002	11+12+(15+17)	1.844	< 67%
11	6D20	6D19	18	0.0012	1.971	3.090	3355	1970	(.95*11)+12+(15+17)	1.814	< 67%
11	6D29	6D20	12	0.0015	0.747	1.172	811	615	.95*11	0.566	< 50%
11	7D25	7D24	10	0.0040	0.751	1.177	815	582	.90*11	0.536	< 50%
10	5E19	5E14	8	0.0028	0.346	0.543	376	191	.35*10	0.176	< 50%
10	5E10	5E14	8	0.0084	0.600	0.940	651	246	.45*10	0.226	< 50%
10	5E16	5E17	8	0.0116	0.705	1.105	765	546	10	0.503	< 50%
9	4D34	4D33	8	0.0200	0.926	1.451	1005	962	9+10	0.886	< 50%
9	4D36	4D34	8	0.0134	0.758	1.188	823	374	.9*9	0.345	< 50%
9	4E01	4D36	8	0.0143	0.783	1.227	850	374		0.345	< 50%
9	4E05	4E01	8	0.0156	0.818	1.282	888	374		0.345	< 50%
9	4E06	4E05	8	0.0050	0.463	0.726	502	354	.85*9	0.326	< 50%
8	4D06	4D09	20	0.0008	2.131	3.341	3628	3329	8+9+10+11+12+15+17	3.066	< 67%
8	4D26	4D27	15	0.0020	1.565	2.453	2663	1017	(.15*8)+9+10	0.936	< 67%
8	4D27	4D06	15	0.0020	1.565	2.453	2663	1017	(.15*8)+9+10	0.936	< 67%
8	4D32	4D31	12	0.0076	1.682	2.637	1826	999	(.1*8)+9+10	0.920	< 50%
8	5D04	4D07	18	0.0009	1.707	2.676	2906	2258	(.7*8)+11+12+15+17	2.079	< 67%
8	5D22	5D05	18	0.0008	1.609	2.523	2739	2239	(.65*8)+11+12+15+17	2.062	< 67%
7	5C07	5C05	18	0.0032	3.219	5.046	5479	2709	7+13+(14+16)+EA1&2	2.495	< 67%
7	7C14	7C13	18	0.0056	4.258	6.675	7248	2563	13+(14+16)+EA1&2	2.361	< 67%
7	7C13	7C07	18	0.0030	3.116	4.885	5304	2563		2.361	< 67%
6	2F01	2E48	8	0.0103	0.664	1.041	721	215	6	0.198	< 50%
5	2E42	2E34	10	0.0200	1.678	2.631	1822	391	5	0.360	< 50%
5	2E45	2E43	8	0.0040	0.414	0.649	449	91		0.084	< 50%
5	2E40	2E42	8	0.0035	0.387	0.607	420	276		0.254	< 50%
4	2D43	2D44	10	0.0025	0.593	0.930	644	1724	(4+AC)+5+6	1.588	> 50%
4	2D42	2D43	10	0.0025	0.593	0.930	644	1724		1.588	> 50%
4	2E04	2D42	10	0.0025	0.593	0.930	644	1724		1.588	> 50%
4	2E05	2E04	10	0.0025	0.593	0.930	644	1724		1.588	> 50%
4	2E06	2E05	8	0.0094	0.635	0.995	689	995	(.3*4)+(.25*5)+6+AC	0.916	> 50%
4	2E12	2E06	8	0.0086	0.607	0.952	659	995		0.916	> 50%
4	2D08	2E05	10	0.0025	0.593	0.930	644	827	(.7*4)+5	0.762	> 50%
4	2E17	2D08	10	0.0025	0.593	0.930	644	827		0.762	> 50%
3	2C15	2C14	24	0.0021	5.615	8.803	9558	6595	(3+FC)+4+8	6.074	< 67%
3	3D19	3D20	24	0.0010	3.875	6.074	6595	4820	(.95*3)+8+FC	4.439	< 67%
3	2D49	2D51	24	0.0010	3.875	6.074	6595	6544	(.95*3)+4+8+FC+AC	6.027	< 67%
3	3D21	3D18	8	0.0060	0.507	0.795	550	1338	.8*3+FC	1.232	> 50%
3	2D45	2D46	10	0.0096	1.163	1.823	1262	1724	(4+AC)+5+6	1.588	> 50%
2	1C04	1C08	15	0.0124	3.896	6.108	6632	873	(2+WA2)	0.804	< 67%
2	1D08	1D17	12	0.0066	1.568	2.458	1702	239	.4*2	0.220	< 50%
2	1D09	1D08	8	0.0058	0.498	0.781	541	179	.3*2	0.165	< 50%
2	1D10	1D09	8	0.0058	0.498	0.781	541	179	.3*2	0.165	< 50%
1	2C01	PLANT	36	0.0010	11.425	17.910	19446	10707	1+2+3+7	9.861	< 67%
1	3C04	3C03	21	0.0020	3.838	6.017	6533	2921	(.4*1)+7+13	2.690	< 67%
1	3C05	3C04	21	0.0013	3.095	4.851	5267	2921	(.4*1)+7+13	2.690	< 67%
1	3C06	3C05	21	0.0020	3.838	6.017	6533	2789	(.15*1)+7+13	2.568	< 67%

City of Santa Paula

Table 6-10
Future Conditions - Wet Weather

(Amended Version)

Flow Calculation Data		
Persons Per Household =	3.5	
Per Capita Generation =	85	gpd
Generation Per Household =	297.5	gpd
=	0.00046	cfs
Peaking Factor =	3	
Peaked Generation =	0.001381	cfs
Manning's 'n' =	0.011	

ERU Count		ERU Count Expansion		
Zone 1	530			
Zone 2	598	West Area 2		275
Zone 3	1020	Fagan Canyon		522
Zone 4	623	Adams Canyon		495
Zone 5	391			
Zone 6	215			
Zone 7	146			
Zone 8	365			
Zone 9	416			
Zone 10	546			
Zone 11	647			
Zone 12	515			
Zone 13	57	East Area 1 & 2	1612+221=	1833
Zone 14	375			
Zone 15	336			
Zone 16	298			
Zone 17	504			
Total =	**7582**		**Total =**	**3125**

Collection Zone	FROM MH #	TO MH#	Pipe Dia. (in.)	Slope (ft/ft)	3/4 Full Capacity- (cfs)	ERU's Served at Capacity	ERU's Served	Contributing Zones	Peaked Flow Rate (cfs)	Percent Full
17	7H10	7H09	8	0.0202	1.697	1228	504	17	0.696	< 75%
17	7I01	7H10	8	0.0260	1.925	1393	465		0.642	< 75%
17	7H22	7H10	6	0.0084	0.508	367	27		0.037	< 75%
17	7I17	7I16	8	0.0253	1.899	1375	465		0.642	< 75%
16	8G05	8G03	12	0.0198	4.953	3586	298	16	0.412	< 75%
16	8G24	8G05	10	0.0029	1.166	844	283	.95*16	0.391	< 75%
16	8H11	8H09	10	0.0039	1.352	979	179	.6*16	0.247	< 75%
15	7E11	7E04	8	0.0220	1.771	1282				
15	7E09	7E03	8	0.0193	1.658	1200				
15	**Parallel Pipes**		8		3.429	2482	840	15+17	1.160	< 75%
14	7D28	7D26	12	0.0032	1.991	1441	673	14+16	0.929	< 75%
13	7C15	7C14	8	0.0040	0.755	546	1890	(13+EA1+EA2)	2.610	> 75%
12	6E11	6E12	10	0.0171	2.830	2049	515	12	0.711	< 75%
11	5D30	5D29	18	0.0020	4.641	3360	2002	11+12+(15+17)	2.765	< 75%
11	6D20	6D19	18	0.0012	3.595	2603	1970	(.95*11)+12+(15+17)	2.720	< 75%
11	6D29	6D20	12	0.0015	1.363	987	615	.95*11	0.849	< 75%
11	7D25	7D24	10	0.0040	1.369	991	582	.90*11	0.804	< 75%
10	5E19	5E14	8	0.0028	0.632	457	191	.35*10	0.264	< 75%
10	5E10	5E14	8	0.0084	1.094	792	246	.45*10	0.339	< 75%
10	5E16	5E17	8	0.0116	1.286	931	546	10	0.754	< 75%
9	4D34	4D33	8	0.0200	1.688	1222	962	9+10	1.329	< 75%
9	4D36	4D34	8	0.0134	1.382	1000	374	.9*9	0.517	< 75%
9	4E01	4D36	8	0.0143	1.428	1034	374		0.517	< 75%
9	4E05	4E01	8	0.0156	1.491	1079	374		0.517	< 75%
9	4E06	4E05	8	0.0050	0.844	611	354	.85*9	0.488	< 75%
8	4D06	4D09	20	0.0008	3.887	2815	3329	8+9+10+11+12+15+17	4.597	> 75%
8	4D26	4D27	15	0.0020	2.854	2066	1017	(.15*8)+9+10	1.404	< 75%
8	4D27	4D06	15	0.0020	2.854	2066	1017	(.15*8)+9+10	1.404	< 75%
8	4D32	4D31	12	0.0076	3.068	2222	999	(.1*8)+9+10	1.379	< 75%
8	5D04	4D07	18	0.0009	3.113	2254	2258	(.7*8)+11+12+15+17	3.118	> 75%
8	5D22	5D05	18	0.0008	2.935	2125	2239	(.65*8)+11+12+15+17	3.092	> 75%
7	5C07	5C05	18	0.0032	5.870	4251	2709	7+13+(14+16)+EA1&2	3.741	< 75%
7	7C14	7C13	18	0.0056	7.766	5623	2563	13+(14+16)+EA1&2	3.540	< 75%
7	7C13	7C07	18	0.0030	5.684	4116	2563		3.540	< 75%
6	2F01	2E48	8	0.0103	1.212	877	215	6	0.297	< 75%
5	2E42	2E34	10	0.0200	3.061	2216	391	5	0.540	< 75%
5	2E45	2E43	8	0.0040	0.755	546	91		0.126	< 75%
5	2E40	2E42	8	0.0035	0.706	511	276		0.381	< 75%
4	2D43	2D44	10	0.0025	1.082	783	1724	(4+AC)+5+6	2.381	> 75%
4	2D42	2D43	10	0.0025	1.082	783	1724		2.381	> 75%
4	2E04	2D42	10	0.0025	1.082	783	1724		2.381	> 75%
4	2E05	2E04	10	0.0025	1.082	783	1724		2.381	> 75%
4	2E06	2E05	8	0.0094	1.157	838	995	(.3*4)+(.25*5)+6+AC	1.374	> 75%
4	2E12	2E06	8	0.0086	1.107	801	995		1.374	> 75%
4	2D08	2E05	10	0.0025	1.082	783	827	(.7*4)+5	1.142	> 75%
4	2E17	2D08	10	0.0025	1.082	783	827		1.142	> 75%
3	2C15	2C14	24	0.0021	10.241	7416	6595	(3+FC)+4+8	9.108	< 75%
3	3D19	3D20	24	0.0010	7.067	5117	4820	(.95*3)+8+FC	6.656	< 75%
3	2D49	2D51	24	0.0010	7.067	5117	6544	(.95*3)+4+8+FC+AC	9.037	> 75%
3	3D21	3D18	8	0.0060	0.925	669	1338	.8*3+FC	1.848	> 75%
3	2D45	2D46	10	0.0096	2.121	1535	1724	(4+AC)+5+6	2.381	> 75%
2	1C04	1C08	15	0.0124	7.106	5146	873	(2+WA2)	1.206	< 75%
2	1D08	1D17	12	0.0066	2.859	2070	239	.4*2	0.330	< 75%
2	1D09	1D08	8	0.0058	0.909	658	179	.3*2	0.248	< 75%
2	1D10	1D09	8	0.0058	0.909	658	179	.3*2	0.248	< 75%
1	2C01	PLANT	36	0.0010	20.837	15088	10707	1+2+3+7	14.786	< 75%
1	3C04	3C03	21	0.0020	7.000	5069	2921	(.4*1)+7+13	4.034	< 75%
1	3C05	3C04	21	0.0013	5.644	4087	2921	(.4*1)+7+13	4.034	< 75%
1	3C06	3C05	21	0.0020	7.000	5069	2789	(.15*1)+7+13	3.851	< 75%

- 8-inch sewer east along Santa Paula Street to Walden Street, south along Walden and Elm Streets to Harvard Blvd.

The connection point for the future flow from East Area 1 and East Area 2 is assumed to be the main trunk sewer that is south of the Santa Paula Freeway (SR 126). This sewer presently acts as a relief sewer for the main trunk sewer along Harvard Blvd.

The Harvard Blvd main is a high priority replacement project and the City has completed from Twelfth Street to Tenth and is currently working on the section from Tenth to Seventh Street. East Area 1, East Area 2, and Zone 13 utilize 1890 ERUs of capacity in the sewer south of SR 126 and this would eliminate some of the overflow/relief capability for the Harvard Blvd. sewer. However, connection of East Area 1 & 2 will provide an upgrade to the Force Main over the Santa Paula Creek Bridge, and a new lift station at the end of Lemonwood Drive. The proposed service for East Area 1 is through East Area 2 and into Zone 13. The development of this project will replace the connecting line from the lift station over the Santa Paula Creek to the Santa Maria Street connection. The new sewer main south of SR 126 would be sized to convey all of the future flows from East Area 1, East Area two, and the existing flows from Zone 13. **Table 6-11** and **Table 6-12** show model results with modifications to sewer segments that were at capacity.

RECOMMENDATIONS

Figure 6-4 shows future system capacity deficiencies based on the model results. The immediate improvements are based on the existing capacity needs. The future improvements are based on development needs.

City of Santa Paula

Table 6-11
Future Reinforcements - Dry Weather

(Amended Version)

Flow Calculation Data		
Persons Per Household =	3.5	
Per Capita Generation =	85	gpd
Generation Per Household =	297.5	gpd
=	0.00046	cfs
Peaking Factor =	2	
Peaked Generation =	0.000921	cfs
Manning's 'n' =	0.011	

[box] - required pipe size PVC

ERU Count		ERU Count Expansion		
Zone 1	530			
Zone 2	598	West Area 2		275
Zone 3	1020	Fagan Canyon		522
Zone 4	623	Adams Canyon		495
Zone 5	391			
Zone 6	215			
Zone 7	146			
Zone 8	365			
Zone 9	416			
Zone 10	546			
Zone 11	647			
Zone 12	515			
Zone 13	57	East Area 1 & 2	1612+221=	1833
Zone 14	375			
Zone 15	336			
Zone 16	298			
Zone 17	504			
Total =	**7582**	**Total =**		**3125**

Collection Zone	FROM MH #	TO MH#	Pipe Dia. (in.)	Slope (ft/ft)	1/2 Full Capacity- (dia. <= 12") (cfs)	2/3 Full Capacity- (dia. > 12") (cfs)	ERU's Served at Capacity	ERU's Served	Contributing Zones	Peaked Flow Rate (cfs)	Percent Full
17	7H10	7H09	8	0.0202	0.930	1.458	1010	504	17	0.464	< 50%
17	7I01	7H10	8	0.0260	1.055	1.655	1145	465		0.428	< 50%
17	7H22	7H10	6	0.0084	0.279	0.437	302	27		0.025	< 50%
17	7I17	7I16	8	0.0253	1.041	1.632	1130	465		0.428	< 50%
16	8G05	8G03	12	0.0198	2.716	4.257	2949	298	16	0.274	< 50%
16	8G24	8G05	10	0.0029	0.639	1.002	694	283	.95*16	0.261	< 50%
16	8H11	8H09	10	0.0039	0.741	1.162	805	179	.6*16	0.165	< 50%
15	7E11	7E04	8	0.0220	0.971	1.522	1054				
15	7E09	7E03	8	0.0193	0.909	1.425	987				
15	**Parallel Pipes**		8		1.880	2.947	2041	840	15+17	0.774	< 50%
14	7D28	7D26	12	0.0032	1.092	1.711	1185	673	14+16	0.620	< 50%
13	7C15	7C14	15	0.0040	2.400	3.750	4071	1890	(13+EA1+EA2)	1.741	< 67%
12	6E11	6E12	10	0.0171	1.552	2.433	1685	515	12	0.474	< 50%
11	5D30	5D29	18	0.0020	2.545	3.989	4331	2002	11+12+(15+17)	1.844	< 67%
11	6D20	6D19	18	0.0012	1.971	3.090	3355	1970	(.95*11)+12+(15+17)	1.814	< 67%
11	6D29	6D20	12	0.0015	0.747	1.172	811	615	.95*11	0.566	< 50%
11	7D25	7D24	10	0.0040	0.751	1.177	815	582	.90*11	0.536	< 50%
10	5E19	5E14	8	0.0028	0.346	0.543	376	191	.35*10	0.176	< 50%
10	5E10	5E14	8	0.0084	0.600	0.940	651	246	.45*10	0.226	< 50%
10	5E16	5E17	8	0.0116	0.705	1.105	765	546	10	0.503	< 50%
9	4D34	4D33	8	0.0200	0.926	1.451	1005	962	9+10	0.886	< 50%
9	4D36	4D34	8	0.0134	0.758	1.188	823	374	.9*9	0.345	< 50%
9	4E01	4D36	8	0.0143	0.783	1.227	850	374		0.345	< 50%
9	4E05	4E01	8	0.0156	0.818	1.282	888	374		0.345	< 50%
9	4E06	4E05	8	0.0050	0.463	0.726	502	354	.85*9	0.326	< 50%
8	4D06	4D09	20	0.0008	2.131	3.341	3628	3329	8+9+10+11+12+15+17	3.066	< 67%
8	4D26	4D27	15	0.0020	1.565	2.453	2663	1017	(.15*8)+9+10	0.936	< 67%
8	4D27	4D06	15	0.0020	1.565	2.453	2663	1017	(.15*8)+9+10	0.936	< 67%
8	4D32	4D31	12	0.0076	1.682	2.637	1826	999	(.1*8)+9+10	0.920	< 50%
8	5D04	4D07	18	0.0009	1.707	2.676	2906	2258	(.7*8)+11+12+15+17	2.079	< 67%
8	5D22	5D05	18	0.0008	1.609	2.523	2739	2239	(.65*8)+11+12+15+17	2.062	< 67%
7	5C07	5C05	18	0.0032	3.219	5.046	5479	2709	7+13+(14+16)+EA1&2	2.495	< 67%
7	7C14	7C13	18	0.0056	4.258	6.675	7248	2563	13+(14+16)+EA1&2	2.361	< 67%
7	7C13	7C07	18	0.0030	3.116	4.885	5304	2563		2.361	< 67%
6	2F01	2E48	8	0.0103	0.664	1.041	721	215	6	0.198	< 50%
5	2E42	2E34	10	0.0200	1.678	2.631	1822	391	5	0.360	< 50%
5	2E45	2E43	8	0.0040	0.414	0.649	449	91		0.084	< 50%
5	2E40	2E42	8	0.0035	0.387	0.607	420	276		0.254	< 50%
4	2D43	2D44	15	0.0025	1.905	3.000	3257	1724	(4+AC)+5+6	1.588	< 67%
4	2D42	2D43	15	0.0025	1.905	3.000	3257	1724		1.588	< 67%
4	2E04	2D42	15	0.0025	1.905	3.000	3257	1724		1.588	< 67%
4	2E05	2E04	15	0.0025	1.905	3.000	3257	1724		1.588	< 67%
4	2E06	2E05	10	0.0094	1.260	1.970	1368	995	(.3*4)+(.25*5)+6+AC	0.916	< 50%
4	2E12	2E06	10	0.0086	1.200	1.880	1303	995		0.916	< 50%
4	2D08	2E05	12	0.0025	1.070	1.671	1162	827	(.7*4)+5	0.762	< 50%
4	2E17	2D08	12	0.0025	1.070	1.671	1162	827		0.762	< 50%
3	2C15	2C14	24	0.0021	5.615	8.803	9558	6595	(3+FC)+4+8	6.074	< 67%
3	3D19	3D20	24	0.0010	3.875	6.074	6595	4820	(.95*3)+8+FC	4.439	< 67%
3	2D49	2D51	24	0.0010	3.875	6.074	6595	6544	(.95*3)+4+8+FC+AC	6.027	< 67%
3	3D21	3D18	12	0.0060	1.650	2.545	1791	1338	.8*3+FC	1.232	< 50%
3	2D45	2D46	12	0.0096	2.060	3.230	2236	1724	(4+AC)+5+6	1.588	< 50%
2	1C04	1C08	15	0.0124	3.896	6.108	6632	873	(2+WA2)	0.804	< 67%
2	1D08	1D17	12	0.0066	1.568	2.458	1702	239	.4*2	0.220	< 50%
2	1D09	1D08	8	0.0058	0.498	0.781	541	179	.3*2	0.165	< 50%
2	1D10	1D09	8	0.0058	0.498	0.781	541	179	.3*2	0.165	< 50%
1	2C01	PLANT	36	0.0010	11.425	17.910	19446	10707	1+2+3+7	9.861	< 67%
1	3C04	3C03	21	0.0020	3.838	6.017	6533	2921	(.4*1)+7+13	2.690	< 67%
1	3C05	3C04	21	0.0013	3.095	4.851	5267	2921	(.4*1)+7+13	2.690	< 67%
1	3C06	3C05	21	0.0020	3.838	6.017	6533	2789	(.15*1)+7+13	2.568	< 67%

City of Santa Paula

Table 6-12
Future Reinforcements - Wet Weather

(Amended Version)

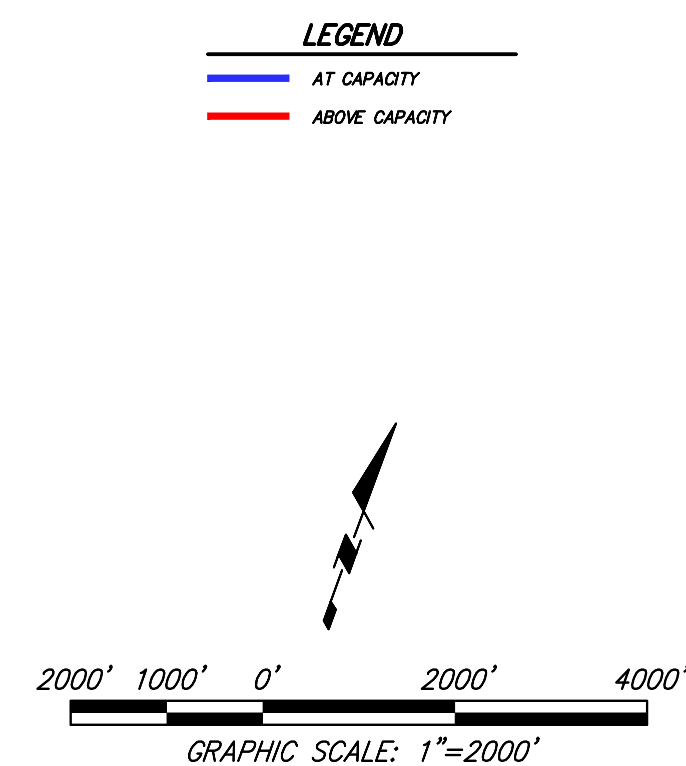
Flow Calculation Data		
Persons Per Household =	3.5	
Per Capita Generation =	85	gpd
Generation Per Household =	297.5	gpd
=	0.00046	cfs
Peaking Factor =	3	
Peaked Generation =	0.001381	cfs
Manning's 'n' =	0.011	

[box] - required pipe size PVC

ERU Count	
Zone 1	530
Zone 2	598
Zone 3	1020
Zone 4	623
Zone 5	391
Zone 6	215
Zone 7	146
Zone 8	365
Zone 9	416
Zone 10	546
Zone 11	647
Zone 12	515
Zone 13	57
Zone 14	375
Zone 15	336
Zone 16	298
Zone 17	504
Total =	**7582**

ERU Count Expansion		
West Area 2		275
Fagan Canyon		522
Adams Canyon		495
East Area 1 & 2	1612+221=	1833
Total =		**3125**

Collection Zone	FROM MH #	TO MH#	Pipe Dia. (in.)	Slope (ft/ft)	3/4 Full Capacity- (cfs)	ERU's Served at Capacity	ERU's Served	Contributing Zones	Peaked Flow Rate (cfs)	Percent Full
17	7H10	7H09	8	0.0202	1.697	1228	504	17	0.696	< 75%
17	7I01	7H10	8	0.0260	1.925	1393	465		0.642	< 75%
17	7H22	7H10	6	0.0084	0.508	367	27		0.037	< 75%
17	7I17	7I16	8	0.0253	1.899	1375	465		0.642	< 75%
16	8G05	8G03	12	0.0198	4.953	3586	298	16	0.412	< 75%
16	8G24	8G05	10	0.0029	1.166	844	283	.95*16	0.391	< 75%
16	8H11	8H09	10	0.0039	1.352	979	179	.6*16	0.247	< 75%
15	7E11	7E04	8	0.0220	1.771	1282				
15	7E09	7E03	8	0.0193	1.658	1200				
15	**Parallel Pipes**		8		3.429	2482	840	15+17	1.160	< 75%
14	7D28	7D26	12	0.0032	1.991	1441	673	14+16	0.929	< 75%
13	7C15	7C14	15	0.0040	4.390	3178	1890	(13+EA1+EA2)	2.610	< 75%
12	6E11	6E12	10	0.0171	2.830	2049	515	12	0.711	< 75%
11	5D30	5D29	18	0.0020	4.641	3360	2002	11+12+(15+17)	2.765	< 75%
11	6D20	6D19	18	0.0012	3.595	2603	1970	(.95*11)+12+(15+17)	2.720	< 75%
11	6D29	6D20	12	0.0015	1.363	987	615	.95*11	0.849	< 75%
11	7D25	7D24	10	0.0040	1.369	991	582	.90*11	0.804	< 75%
10	5E19	5E14	8	0.0028	0.632	457	191	.35*10	0.264	< 75%
10	5E10	5E14	8	0.0084	1.094	792	246	.45*10	0.339	< 75%
10	5E16	5E17	8	0.0116	1.286	931	546	10	0.754	< 75%
9	4D34	4D33	8	0.0200	1.688	1222	962	9+10	1.329	< 75%
9	4D36	4D34	8	0.0134	1.382	1000	374	.9*9	0.517	< 75%
9	4E01	4D36	8	0.0143	1.428	1034	374		0.517	< 75%
9	4E05	4E01	8	0.0156	1.491	1079	374		0.517	< 75%
9	4E06	4E05	8	0.0050	0.844	611	354	.85*9	0.488	< 75%
8	4D06	4D09	21	0.0008	4.830	3497	3329	8+9+10+11+12+15+17	4.597	< 75%
8	4D26	4D27	15	0.0020	2.854	2066	1017	(.15*8)+9+10	1.404	< 75%
8	4D27	4D06	15	0.0020	2.854	2066	1017	(.15*8)+9+10	1.404	< 75%
8	4D32	4D31	12	0.0076	3.068	2222	999	(.1*8)+9+10	1.379	< 75%
8	5D04	4D07	21	0.0009	5.120	3707	2258	(.7*8)+11+12+15+17	3.118	< 75%
8	5D22	5D05	21	0.0008	4.830	3497	2239	(.65*8)+11+12+15+17	3.092	< 75%
7	5C07	5C05	18	0.0032	5.870	4251	2709	7+13+(14+16)+EA1&2	3.741	< 75%
7	7C14	7C13	18	0.0056	7.766	5623	2563	13+(14+16)+EA1&2	3.540	< 75%
7	7C13	7C07	18	0.0030	5.684	4116	2563		3.540	< 75%
6	2F01	2E48	8	0.0103	1.212	877	215	6	0.297	< 75%
5	2E42	2E34	10	0.0200	3.061	2216	391	5	0.540	< 75%
5	2E45	2E43	8	0.0040	0.755	546	91		0.126	< 75%
5	2E40	2E42	8	0.0035	0.706	511	276		0.381	< 75%
4	2D43	2D44	15	0.0025	3.480	2520	1724	(4+AC)+5+6	2.381	< 75%
4	2D42	2D43	15	0.0025	3.480	2520	1724		2.381	< 75%
4	2E04	2D42	15	0.0025	3.480	2520	1724		2.381	< 75%
4	2E05	2E04	15	0.0025	3.480	2520	1724		2.381	< 75%
4	2E06	2E05	10	0.0094	2.280	1651	995	(.3*4)+(.25*5)+6+AC	1.374	< 75%
4	2E12	2E06	10	0.0086	2.180	1578	995		1.374	< 75%
4	2D08	2E05	12	0.0025	1.920	1390	827	(.7*4)+5	1.142	< 75%
4	2E17	2D08	12	0.0025	1.920	1390	827		1.142	< 75%
3	2C15	2C14	24	0.0021	10.241	7416	6595	(3+FC)+4+8	9.108	< 75%
3	3D19	3D20	24	0.0010	7.067	5117	4820	(.95*3)+8+FC	6.656	< 75%
3	2D49	2D51	30	0.0010	13.980	10123	6544	(.95*3)+4+8+FC+AC	9.037	< 75%
3	3D21	3D18	12	0.0060	2.970	2150	1338	.8*3+FC	1.848	< 75%
3	2D45	2D46	12	0.0096	3.760	2722	1724	(4+AC)+5+6	2.381	< 75%
2	1C04	1C08	15	0.0124	7.106	5146	873	(2+WA2)	1.206	< 75%
2	1D08	1D17	12	0.0066	2.859	2070	239	.4*2	0.330	< 75%
2	1D09	1D08	8	0.0058	0.909	658	179	.3*2	0.248	< 75%
2	1D10	1D09	8	0.0058	0.909	658	179	.3*2	0.248	< 75%
1	2C01	PLANT	36	0.0010	20.837	15088	10707	1+2+3+7	14.786	< 75%
1	3C04	3C03	21	0.0020	7.000	5069	2921	(.4*1)+7+13	4.034	< 75%
1	3C05	3C04	21	0.0013	5.644	4087	2921	(.4*1)+7+13	4.034	< 75%
1	3C06	3C05	21	0.0020	7.000	5069	2789	(.15*1)+7+13	3.851	< 75%



CITY OF SANTA PAULA WASTEWATER SYSTEM MASTER PLAN

SYSTEM CAPACITY DEFICIENCIES (EXISTING)

June 2012

FIGURE 6-3

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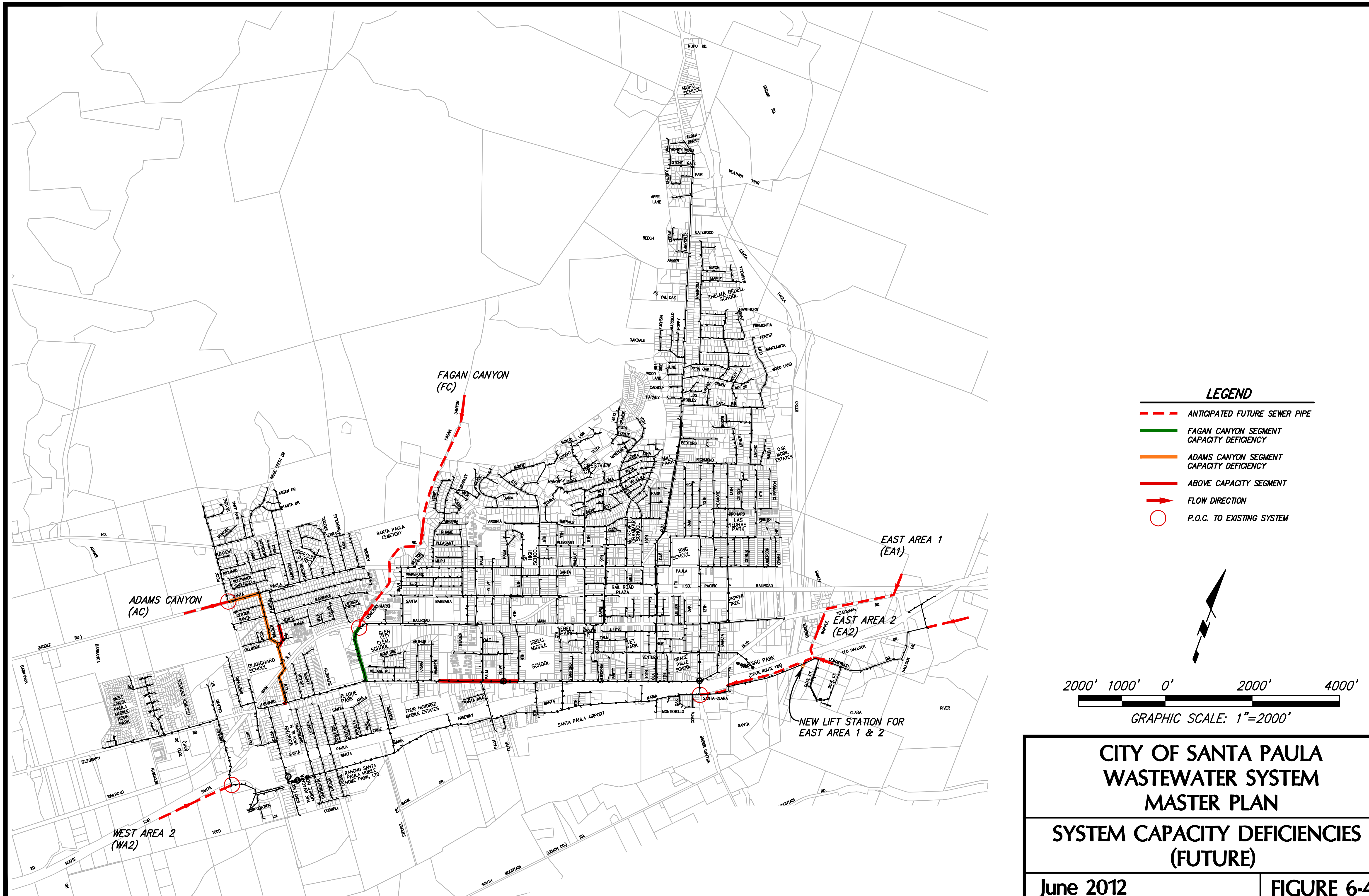

CITY OF SANTA PAULA WASTEWATER SYSTEM MASTER PLAN

SYSTEM CAPACITY DEFICIENCIES (FUTURE)

June 2012

FIGURE 6-4

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CHAPTER 7 INTERCEPTOR PHYSICAL CONDITION

The City of Santa Paula's wastewater collection system is comprised of sewer pipes over 30 years old as well as newer pipes. As the condition of the pipes deteriorates, obstructions from broken pieces and roots can cause hydraulic restrictions in the system. This section discusses the condition of the existing collection system. The discussion, however, is limited to sections of the collection system that have been videotaped and cleaned since 2002. Additionally, known deficiencies identified by operations and City Staff are included.

CONDITION ASSESSMENT OBJECTIVES

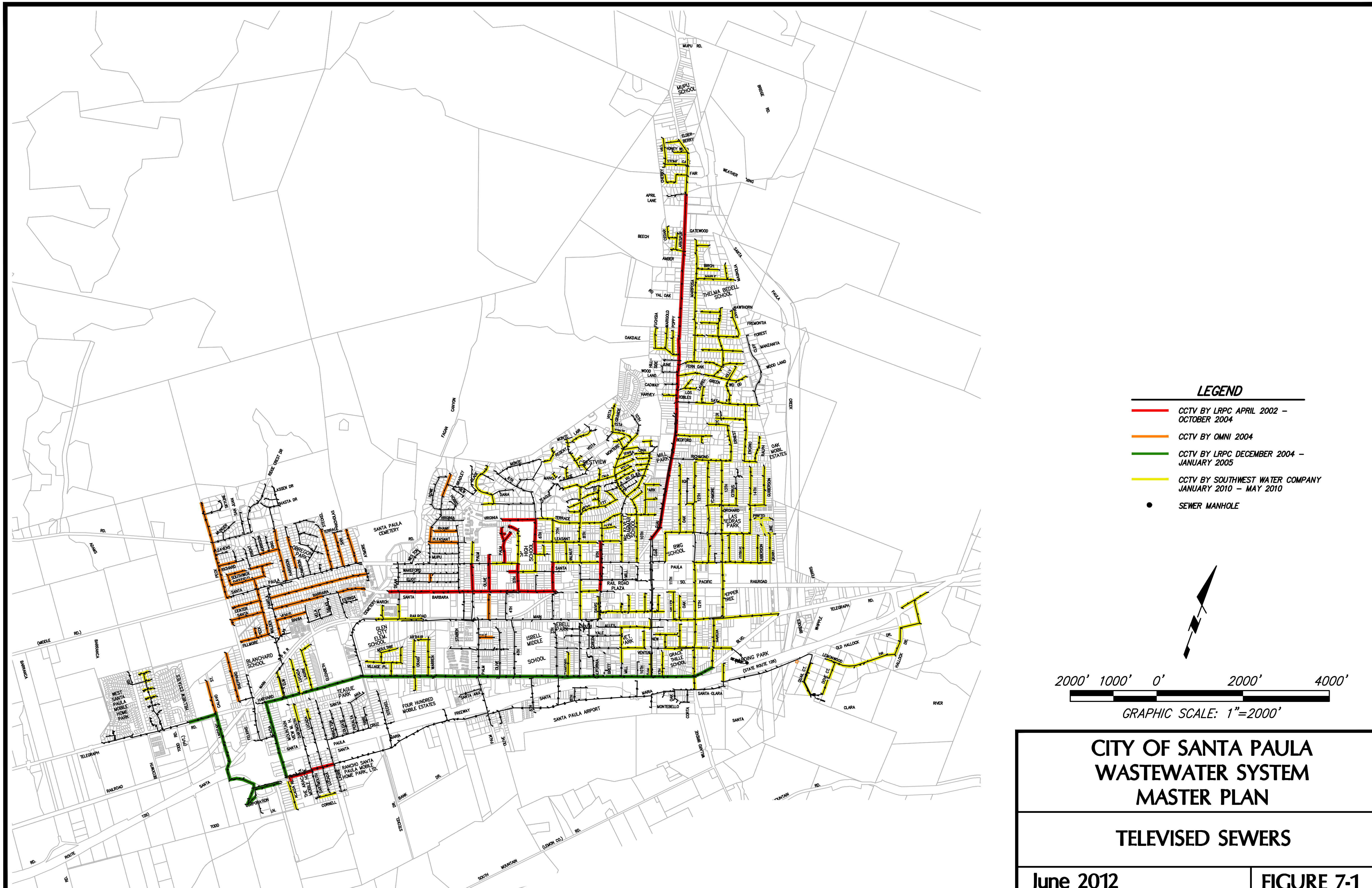
The main objective of the condition assessment is to identify segments of the sewer system that are in need of replacement or repair. The sources for the condition assessment include video of internal television inspections, a field inspection of representative manholes and interviews with City Staff and others.

Sewer repair and rehabilitation is an ongoing process. Although repair or replacement of sewer segments is recommended in this chapter, sewers will continue to deteriorate and fail over time. The City, therefore, must be vigilant in their efforts to maintain the system. To this end, this section recommends a plan for immediate sewer rehabilitation as well as a plan for continual observance and corrections within the system.

INTERNAL TELEVISION INSPECTIONS

Figure 7-1 shows the collection system and high lights the areas that have been televised since 2002. The logs and videotapes were reviewed and sewer segments in need of rehabilitation and repair were noted.

The review of videotapes shows that the central or older portion of the City has more problem areas within the collection system. Information gathered from videotaping will need to be prioritized and included in the City's annual budget for sewer maintenance and repair.



CITY OF SANTA PAULA WASTEWATER SYSTEM MASTER PLAN

TELEVISED SEWERS

June 2012

FIGURE 7-1

J:\LM14521\Eng\Santa Paula Master Plans\Sewer Master Plan\4521-Sewer Master Plan Exhibits.dwg Jun 07, 2012, 1:47pm djaedtke

INTERCEPTOR FIELD INSPECTIONS

An inspection of selected manholes and the City's two lift stations was conducted as part of this study. Because of the onerous task of inspecting all City manholes, only a representative portion was inspected. The inspection found nine manholes in poor condition out of 31 observed. It would be prudent for the City to inspect manholes in the vicinity of those noted in poor condition. As a long-term goal, the City should set an annual plan for sewer and manhole inspections and rehabilitation.

The City's two lift stations are in poor condition; but are presently in the process of being rehabilitated. The older of the two lift stations is located in G. Harding Park and provides service for the public rest rooms. The station includes a four-foot diameter wet well with two submersible pumps. Access to the pump station and valve chamber is through a cast plate cover set at or below grade. The pump station is subject to flooding because the access cover is not sealed and structural settlement and/or design has caused the station to be located below finished grade and subject to ponding. This station is over 25 years old and has reached the end of its useful service life. The City is replacing this station, which will eliminate the possibility of clear water, associated with flooding, into the sewer system.

Lemonwood Industrial Park, south of SR 126, is the site for the City's other lift station (Lemonwood 1). This lift station consists of a six-foot diameter wet well with two dry-pit centrifugal pumps. The pump station is over 15-years old and the design and/or layout of the station is in need of further investigation. Of particular concern is the location of the inlet pipes relating to the overall depth of the wet well. Very limited capacity appears to be available without backing up flow into incoming pipes. In light of the condition and potential future development in the area, this station would be in the City's best interest. Completion of the EA1 improvements described in chapter 3 will result in diversion of most of the flow to this older lift station and substantially correct the concern described above.

CHAPTER 8 ONGOING MAINTENANCE AND SYSTEM OPERATIONAL RESPONSIBILITIES

OVERVIEW

The City's Public Works Department oversees management of all water and wastewater issues for the City. The Public Works Director is responsible for the operational management of the system. For day-to-day administrative concerns, the City Manager exercises the City's authority in approving the Department's financial transactions and in proposing policies and procedures. All internal accounting, including billing and capital improvements budgeting, is the responsibility of the Public Works Department in cooperation with other City Departments.

Operations of the City wastewater treatment plant is conducted by Santa Paula Water LLC. This is under a design, build, operate and finance contract.

Historically, the wastewater collection system has been operated by City staff, but recent operations of the collection system have been conducted by Southwest Water. The City is re-advertising a wastewater collection system operations contract. The remainder of this section describes the collection system maintenance requirements.

COLLECTION SYSTEM OPERATIONS & MAINTENANCE

- The Operator will operate and maintain the present collection system as described in this document and report collection system activities to the CITY on a monthly basis in writing.

- The operator shall operate, maintain, and repair the City's wastewater collection systems. The operator shall diligently respond to all service calls for wastewater line stoppages, overflows, breaks, or emergencies regarding wastewater collection and treatment, and in no event later than one (1) hour after being notified of such incidents. When appropriate, the operator will install service cleanouts on service laterals to facilitate future maintenance. The operator shall provide properly certified employees as required by federal, state, and local laws to provide leadership of crews for proper decision making in performing their tasks. The operator shall be responsible for training of personnel to maintain their certification and improve their knowledge. The operator will be responsible for all necessary reporting to the State of California Water Board.

- The operator shall be responsible for the following: clean a minimum twenty-five percent (25%, which is estimated to = 79,200 ft.) and video a minimum of ten percent (10%, which is accordingly estimated to be 7,920 ft.) of the City's sanitary sewer lines which were cleaned in the City's sanitary sewer collection system each year. This percentage is based upon the total gravity sanitary sewer footage in Santa Paula estimated to be 316,800 feet. The Operator will also clean all designated "Hot Spots" within the City's sanitary sewer collection system on a mutually agreed upon schedule. The Operator must prepare and maintain an active list of known problem areas within the City's sanitary sewer and prepare a proposed maintenance schedule which will be provided to City annually on or before May 30th of each year.

- The operator shall inspect twenty percent (20%) of the sanitary gravity wastewater lines. The operator will work with the City to determine the priority of the gravity wastewater lines needing to be cleaned. The operator will also inspect manholes for corrosion, deterioration, leaks, proper flow, sand accumulation, coating, depressions, repair or schedule for repair as required; a geographic positioning system (GPS) reading will be taken on each manhole inspected. The operator will televise the identified trouble spots in the system and note service connection locations. This will ensure that all blockages, sources of odors or breaks have been cleaned or identified. Consideration of the location and traffic control will be given to determine the best time to perform the work. In addition, direction of flow in the sewer system will be considered to reduce the potential for damage from water being forced back up the homeowners' service line and into their residence. The operator will schedule for repairing any problem that requires attention.

- Service Complaints: The operator must promptly respond to all collection system call-outs to assess initial: The Operator, City or property owner responsibility. If the problem is a clearable blockage within City's sanitary sewer lines, and not within property owner's lateral line, The Operator must promptly perform the needed service and clear sewage line blockages in City's sanitary sewer lines. If the blockage cannot be cleared using available equipment, The Operator will bypass the affected area and notify City of the situation. The City will contact The Operator within 30 minutes, and instruct The Operator to contact and hire a subcontractor or rent out appropriate equipment. If The Operator does not receive a response from the City within 30 minutes of The Operator's notification to City, The Operator's on-scene coordinator must exercise best professional judgment to contract for a subcontractor or to rent necessary and appropriate equipment for use by The Operator personnel to use to clear the blockage. The City will be billed for non-clearable blockages to its sanitary sewer lines, and repairs. For 7 sewer lines owned by multi-unit complexes, The Operator will report any blockages to The City and to any other appropriate public agency.

- Provide updates for record keeping and documentation of record drawings associated with the wastewater collection and treatment system, and repairs, maintenance, and construction. Updates shall be submitted to the City's engineering staff for recording at a minimum of once per quarter. The operator shall provide a qualified person to maintain system records and drawings on the City's GIS system.

- Sanitary Sewer Overflows. The Operator must use its best reasonable efforts to prevent sanitary sewer overflows (SSOs) from entering the City's municipal separate storm sewer system (MS4). In the Event The Operator discovers that a SSO entered the City's MS4, The Operator must immediately notify City and prepare all required reports to the Regional Water Quality control Board, the Office of Emergency Services and all other agencies to which reports are required to be made.

- City Inquiries: The Operator must respond within two (2) working days to all City inquiries.

- Removal of blockage and repair of collection line breaks in the wastewater collection lines will occur only within public easements or as directed by the City. Work on collection lines on private property will be a change in scope. The cleaning of house laterals on private property shall not be the operator's responsibility unless there is a circumstance where the private property line problem may have been caused by the operator performance of their duties on the City's system.

- The operator will work with the City to televise collection systems for new development and street construction/repairs.

- For noisy manhole lids, the operator will inspect for defects and replace them if necessary. The operator will clean debris from lip, then place sealant between lid and ring and reinstall cover.

- Leaks in manholes will be repaired by chemical grouting, hydraulic cementing, or external excavation and sealing, welding, or fiberglass, epoxy repair or City approved coatings application.

- Perform smoke testing of lines where suspected inflows could be a major source of high flow during rain events and make point repairs with equipment provided by the City.

- When a lift station alarm condition occurs and the station is equipped with an automatic monitoring system, it will notify after normal hours personnel. If the alarm is sounded during normal work hours, a crew will be dispatched immediately to diagnose and correct the problem. After normal hours, the on-call person will be notified by the alarm system and will proceed to the area to diagnose within one hour and repair the problem. All effort will be expended to prevent, or minimize, any spill.

- City's sanitary sewer Lift Stations: The Operator will operate and maintain two sanitary sewer lift stations. Twice a year the operator will conduct lift station pump calibrations, one physical and one via SCADA. Calibrations will also be made after major repairs and replacements of pumps.

- The operator will exercise generators on a monthly basis under load conditions to assure proper operation when needed for emergencies.

- The operator will set up a program that identifies which lines are repetitive problem areas, such as sag lines, and provide appropriate cleaning as necessary.

- Actively pursue operations that reduce the generation of odors in collection system, lift stations and wastewater treatment plants. Provide cockroach abatement annually.

- Perform emergency and other repairs to manholes, lift stations and wastewater collection lines and wastewater treatment plants that generate odors, allow for overflows and/or enable inflow or infiltration of rainwater.

- Provide technical and operating wastewater system information (non-engineering) for operations, grant, loan and bond application preparation efforts of the City.

- Prepare correspondence for submission to federal, state and local regulatory agencies in response to sanitary sewer overflows and any other inquiries about the system.

- The Operator shall develop and maintain a crew for emergency operations and repairs of all aspects of the Wastewater Collection System when needed.

- The Operator must use its best reasonable efforts to prevent sanitary sewer overflows (SSOs) from entering the City's municipal separate storm sewer system (MS4). In the event that a SSO entered the City's MS4, The operator must immediately notify City and prepare all required reports to the Regional Water Quality Control board, the Office of Emergency Services and all other agencies to which reports are required to be made.

- The operator shall control, maintain and monitor the collection system on a 24-hour per day, seven-day per week schedule, using an alarm system to notify the city of any potential need for immediate attention. The alarm systems automatically forward notice of emergency until response is made.

- The operator shall provide an emergency telephone number to the public, the telephone company and the Police Department Dispatch Operations for afterhours contact to on-call personnel, to ensure prompt handling of any problems. On-call personnel shall respond within one (1) hour of all calls for incidents that cannot be resolved over the phone.

- The operator's business office shall be open, at a minimum, during the same hours and on the same business days as those observed by the CITY, or as mutually agreed upon to reflect local custom and practice.

- The operator shall be responsible for all Maintenance and Repairs for the System and will purchase materials and services necessary to perform the scope of work directly or through the City's purchasing system.

- Annually, except for the first year of this agreement, the operator will by October 1 of each year develop a schedule and priority of cleaning and inspection by closed circuit television of the required portion of the City Collection System. Within 60 days of the selection of an operator, a schedule of cleaning and TV inspection shall be developed and approved by the City's Public Works Department for the first year of operation. All inspection will be coordinated with City staff and a schedule of the annual work will be mutually agreed upon by October 1 of the year proceeding the date of work.

- During tenure, the operator will maintain computer records of all maintenance work completed and provide copies of all video inspections on DVD or other approved medium to the Department of Public Works on an annual basis by January 1.

- The operator shall assist the City in creating and/or revising ordinances with regard to utilities operation responsibilities.

- The operator shall utilize computer and software systems that are compatible with City systems unless otherwise approved by the City.

- The operator shall submit a list of recommended capital improvements by January 1 of each year. This submittal shall include the priority for potential projects and the justification for that priority. An estimate of the cost to implement the projects shall also be a part of that submittal.

- The operator shall support the preparation of information necessary to submit grant applications, loan requests and/or bond issues pursued and authorized by the City. The operator shall provide operational data as necessary for design and construction of systems improvements.

- The operator shall provide management and/or other key personnel capable of maintaining and creating statistical and text based reports utilizing conventional business software such as Microsoft Office. Reports shall provide charts and graphs to illustrate the subject as needed.

- The operator will manage the City's Grease Trap Inspections Program ordinance. Revisions and changes will be recommended to the City, as appropriate. From there, a field program of notifications will be furnished to the City's code enforcement group of violations and the monitoring of installations.

- The operator will manage the City's Industrial Pretreatment Program ordinance and be responsible for any additional sampling required on permit holders. Revisions and changes will be recommended to the City, as appropriate. The operator will manage a field program of notifications for the City's code enforcement group and the monitoring and sampling of industries; meeting all State of California Requirements.

- The operator must comply with the City's existing Sanitary Sewer Management Program the first year and modify it for subsequent years as approved by the Director of Public Works. The operator shall create a trackable schedule for all service deliverables within 30 days of contract date. Schedules shall be mutually agreed upon with the City.

FINANCIAL ACTIVITIES AND PROJECT RECORDS

- The operator shall maintain the Project's financial books and accounting records for those activities performed by the operator in general conformity with municipal accounting standards. The operator will utilize existing computer hardware and software as designated by the City. The operator shall acquire goods and services for the project in compliance with existing State laws and regulations.

- The operator shall maintain in good condition any City's operating equipment, buildings, materials, supplies, documents, manuals, specification copies used by the operator and shall duly account to the CITY as a fiduciary thereof for those possessions until the time the City assumes the responsibilities relating to the respective function for which the property was utilized by the operator. The operator shall report to the City the status and conditions of such properties in the quarterly report. The operator shall assist the City in the enforcement of warranties, guarantees, and licenses with timely notification of equipment failures if appropriate.

- The operator shall acquire or create and implement an Asset Management System that can provide monthly reports to the City regarding operational activities and non-routine maintenance expenditures.

- The operator shall organize, set up, and implement a central store for the purpose of controlling inventory used in the maintenance and operations of the Collection system and track all goods received or expended by work order activities. The operator shall provide statistics of these activities in a quarterly report to the City Public Works Department.

- The operator shall provide personnel dedicated to the activities of the two above points.

- The operator shall submit an operating budget, including a list of Capital Expenditures with budget information for the next fiscal year.

- The operator shall provide detailed analysis of the City's Collection system needs of repair or replacement and deliver a priority listing and cost estimates to justify any budget request for the reported needs.

- The operator shall keep copies of all correspondence to and from regulatory agencies with regard to the operation and maintenance of the Collection system. Such records will become property of the City and shall include, but not be limited to Waste Discharge or NPDES reporting requirements.

EMERGENCIES

- Emergencies within The operator's capabilities should be resolved in a timely manner.

- In any emergency affecting the safety of persons or property, the operator may act without written approvals, at The Operator's discretion, to prevent threatened damage, injury or loss of life.

- If the City unreasonably refuses to approve the emergency work, failure to perform any such emergency work shall not impose upon The Operator any liability for errors or omissions.

HAZARDOUS WASTE

- Any hazardous waste generated by the operator in any of its activities will be disposed of by the operator, in accordance with applicable federal and state laws.