APPENDIX E


CITY of MODESTO
Wastewater
Collection
System
Master Plan
Final Draft
March 2007
carollo
engineers

Executive Summary
WASTEWATER COLLECTION SYSTEM MASTER PLAN

ES.1 INTRODUCTION

The City of Modesto (City) owns and operates its own wastewater collection system and associated infrastructure. The collection system serves property within the City limits and some unincorporated areas. The City's Public Works Department (PWD) manages and maintains nearly 600 miles of sanitary sewer (SS) lines, ranging from 4- to 66-inches in diameter. In addition, there are 39 lift stations in the collection system. The Wastewater Treatment Division operates two separate treatment facilities for treating domestic wastewater: the Sutter Avenue Primary Treatment Plant (Primary Plant) and the Jennings Road Secondary Treatment Plant (Secondary Plant). The Primary Plant receives untreated wastewater that is collected by the sanitary sewer system. The raw wastewater undergoes primary treatment in which the solids in the wastewater are removed by settling. A 60-inch diameter primary effluent pipeline transports the clarified effluent from the Primary Plant approximately 6.5 miles to the southwest to the Secondary Plant. The Secondary Plant
provides secondary treatment. The City has been separating food industry process water from the domestic wastewater since 2000. A separate 60-inch diameter pipeline transports the process water to ranch land adjacent to the Secondary Plant. The process water is applied directly to the ranch land. The ranch is also used for disposal of secondary effluent. Most of the food process water is discharged during the canning season, which typically runs from June through September.

ES.2 STUDY AREA

Modesto's 2004 population was approximately 206,000. The study area (Figure ES.1) includes the current City limits, a portion of north Ceres, the unincorporated community of Empire, and some unincorporated County of Stanislaus (County) "islands" dispersed within
the City limits. Through sewer service agreements, wastewater generated by north Ceres and these unincorporated areas is treated by the City. The study area is in accordance with the City's updated Urban Area General Plan Sphere of Influence (SOI). The study area boundary generally follows the City's SOI boundary, the two exceptions being the inclusion of north Ceres and an area designated business park near Kiernan Avenue and Stoddard Road.

ES.3 LAND USE

The City's Urban Area General Plan was used to identify land use information for the study area. Land use is an integral component in determining the amount of wastewater generated within any city. The type of land use in an area will affect the volume and character of the wastewater generated. Existing land use was utilized to develop the initial estimate of wastewater flows for current conditions.
The City's sewer service area is referred to as Modesto Municipal Sewer District No. 1 (MMSD No. 1). MMSD No. 1 currently provides sewer service to approximately 23,800 developed acres. This total includes 906 acres for northern Ceres, 307 acres for Empire, 802 acres for unincorporated County islands, and 1,239 for the Beard Industrial District.

The current City limits encompass approximately 23,000 acres (includes developed and vacant/underdeveloped). The majority of the land use consists of residential and village residential, which account for approximately 14,000 acres, or approximately 60 percent of the total acreage. Commercial, industrial, regional commercial, and business park make up approximately 2,700 acres, or 12 percent of the total. Mixed use and redevelopment planning district land account for 5,100 acres, or approximately 22 percent. The remainder is open space, which totals approximately 1,200 acres or 5 percent of the City. As with most cities in California, the detached single-family home is the predominant residential unit in the City. Approximately 74 percent of the housing units are single-family residences, while multi-family (medium and high densities) and mobile homes account for approximately 26 percent1.

The SOI will encompass approximately 35,000 acres for sewer service connections at build-out. Build-out is defined as full development of all land use classifications within the current SOI and study area boundary.

ES.4 HISTORICAL AND FUTURE GROWTH

The City was incorporated in 1884. Since 1980, the City has grown by 93 percent, from 106,600 to approximately 206,200 persons in 2004. Modesto is the largest incorporated city in Stanislaus County and accounts for approximately 42 percent of the County's population (as of 2000). The total population receiving sewer service from MMSD No. 1 was approximately 220,000. Build-out of the City's SOI is estimated to occur by 2030. The service area population is projected to increase to approximately 355,000. Table ES.1 summarizes the projected population of the service area.

1 City of Modesto Housing Element (2003-2008), adopted by City Council Resolution Number 2004-233, April 27,2004, Community and Economic Development Department.

Table ES.1 Service Area Population
Wastewater Collection System Master Plan
City of Modesto

Year	Estimated Server Service Population[1]
2000	201,100
2001	205,400
2002	211,100
2003	215,600
2004	218,500
2005	219,900
2010	236,800
2015	261,700
2020	290,800
2025	321,800
2030	355,000

ES.5 INDUSTRIAL GROWTH

The City's 2003 Urban Growth Policy Review Report conducted an inventory of vacant and underdeveloped industrial zoned properties within the SOI. The inventory identified 879 acres within the City and 2,370 acres within unincorporated areas in the SOI for industrial and business park development. The Beard Industrial District accounts for approximately 768 of the 2,370 acres that is available for expansion of existing industries or growth of new industries within this tract. It is assumed that industrial zoned land, including the Beard Industrial District will be fully developed by the end of the planning period (2030).

ES.6 COLLECTION SYSTEM

The study area and the existing wastewater collection system were divided among ten sewer service tributary areas, as shown in Figure ES.2. The major trunk sewers range in diameter from 10-inches to 66-inches. There are five major trunk lines that convey flows to the Sutter Avenue Plant: West Trunk, Emerald Trunk, Sutter Trunk, River Trunk, and South Trunk. There are 39 wastewater lift stations in the collection system, 19 of which were incorporated into the collection system hydraulic model. The remaining 20 lift stations were not modeled because they serve small tributary areas. Four of the 39 lift stations are considered major stations: Emerald, Woodland, Scenic Drive, and Thousand Oaks.

ES.7 FLOW MONITORING PROGRAM

Two temporary flow-monitoring programs were conducted to assist in developing the design flow criteria, and correlating actual collection system flows to the modeled flows. Flow monitoring and rain-gauging data were used to calibrate the collection system hydraulic model for dry and wet weather flow. The primary purpose of the program was to measure flow and determine relative flow from different areas of the sewer system. The initial flow monitoring period was conducted over 3-months, from March 6, 2004 through June 11, 2004 at 35 monitoring sites. The second flow monitoring period was conducted over 25-days, from January 6, 2005 through January 30, 2005. The second monitoring program was conducted at 15 flow monitoring sites to capture peak storm events. Figure ES.3 identifies the flow meter sites utilized in the flow monitoring programs.

Flow projections were developed from land use projections. Wastewater flows were calculated by multiplying each land use area by its corresponding flow coefficient. The City's sewer service area average annual flow (AAF) is estimated to be 41.5 mgd at buildout. The average dry weather flow (ADWF) (June through August) is projected to be 42.3 mgd at buildout. ADWF was used to model the capacity of the collection system. The AAF projected at build-out includes flows that will be converted from current septic systems within the unincorporated County "islands" to the wastewater collection system. A summary of the existing and build-out design flow is presented in Table ES.2.

ES.8 STORM DRAIN CROSS CONNECTION REMOVAL

In some areas of the City where there are no permanent storm drain systems, the City uses the sanitary sewer to temporarily drain stormwater runoff and reduce flooding. These cross connections result in dramatic increases in PWWF following a storm event, because storm runoff is routed directly to the collection system. Most of the storm drain cross connections are located within the downtown area and northwest of the downtown area along Tully Drive north and south of Briggsmore Avenue.

Table ES.2 Current and Projected Design Flows Wastewater Collection System Master Plan City of Modesto				
	Annual Average Flow (AAF) (as of 2005) mgd	**Average Dry Weather Flow (ADWF) mgd**	**Peak Dry Weather Flow (PDWF)[1] mgd**	**Peak Wet Weather Flow (PWWF)[2] mgd**
Current	25.8	26.3	38.7	71.7
Build-Out	41.5	42.3	62.3	95.5

Notes:
1. Peak dry weather flow based on modeled max day dry weather flow condition.
2. Derived based on 10-year, 24-hour design storm event, occurring simultaneously with the peak hourly flow.

1. Peak dry weather flow based on modeled max day dry weather flow condition.
2. Derived based on 10-year, 24-hour design storm event, occurring simultaneously with the peak hourly flow.
There are 52 storm drain cross connections where storm water runoff is discharged into the sanitary sewer (SS) system. As part of a separate project, the City is developing conceptual alternatives for removing the cross connections from the wastewater collection system. In lieu of expanding the sanitary sewers to convey combined sanitary and storm sewer in the collection system, the City will be eliminating the cross connections.

ES.9 PROPOSED CAPITAL IMPROVEMENTS

The recommended collection system capital projects are shown in Figure ES.4. The Capital Improvement Program (CIP) was prepared to assist the City in planning and constructing the collection system improvements through buildout of the SOI. The CIP will serve the following purposes:

- Correct hydraulic capacity deficiencies in the existing collection system
- Serve new customers in the Comprehensive Planning District
- Rehabilitate existing reinforced concrete pipes
- Provide reliability to the existing collection system

The improvement projects were prioritized based on the following factors: addressing the most capacity deficient sections; addressing the known overflow problem areas, if any; improving downstream pipelines prior to upstream improvements; serving future developments; annual cost; and the impact of future buildout improvements on existing system facilities.

ES.9.1.1 Highest Priority Collection System Improvements

The highest priority collection system improvements mitigate existing surcharge and potential overflow conditions along the Emerald and Sutter Trunks. The highest priority projects include:

- Emerald Trunk and Emerald Lift Station (E-1, LS No. 17)
- Carpenter Relief Trunk (CR-1)
- Sutter Trunk (S-1, S-2, S-3)
- RCP chemical coating program and CCTV inspection program
- Storm drain cross connection removal program

ES.9.1.2 Capacity Improvement Prioritization

Improvements to existing trunk sewers and lift stations will mitigate surcharge and overflow problems currently experienced in the collection system. These improvements also provide sufficient capacity to convey increased flows resulting from new development. The highest priority capacity improvements include the following:

- West sub-trunk and Hahn Lift Station (W-3, LS No. 19)
- Rumble sub-trunk (R-3)
- Ustick Trunk (U-1)
- Empire Trunk (EM-1). Also referred to as the Yosemite Trunk.
- Lakewood sub-trunk (L-5)
- Scenic Drive Lift Station (City CIP)
- J Street Trunk (DT-2)
- D Street Trunk (DT-3, DT-4)
- Cannery Segregation Line diversion (CSL-1, CSL-2)

ES.9.1.3 New Service Prioritization

Future development within the Comprehensive Planning District's (CPD) will require the construction of trunk sewers to serve new customers. The implementation of these improvements will depend on the City's urban growth policy review and selection of potential areas to be served with urban infrastructure. The CPDs that received a positive Measure "M" vote for sewer service received a higher priority for implementation than those without a positive Measure "M" vote. The high priority new service projects include:

- North Trunk extension (N-1)
- North sub-trunk and lift station (N-4, LS No. 59)

- Dale Trunk and lift station (D-1 through D-6, LS No. 60)
- Sonoma Trunk extension and lift station (SO-1, SO-2, SL No. 61)
- Ustick sub-trunk and lift station (U-2, SL No. 62)
- Rumble sub-trunk (R-5)

ES.9.1.4 Rehabilitation and Reliability Improvements

The highest priority rehabilitation and reliability improvements are for sewers that cross highways and waterways. At build-out of the study area, the sewers at these crossings will convey up to 66 percent of the ADWF. A major collapse or failure at one of these crossings would disrupt the City's ability to provide reliable service. The projects include:

- Emerald Trunk Highway 99 crossing (E-2a, E-2b)
- West Trunk Highway 99 crossing (W-2a, W-2b)
- Sutter Trunk Highway 99 crossing (S-4a, S-4b)
- Ceres Trunk Highway 99 crossing (C-2a, C-2b)
- Beard Brook crossing (BB-1)
- Shackelford crossing (City CIP)

ES.9.1.5 CIP Schedule

The implementation schedule for the collection system capital projects is presented in Table ES.3. The table illustrates the fiscal year in which the projects would be implemented. It was assumed that the high priority projects would be implemented within the first five years of the CIP. The highest priority projects include:

- Rehabilitation of the Emerald Trunk (rehabilitation)
- Carpenter Relief Trunk (capacity improvement)
- Capacity improvement and rehabilitation of the Sutter Trunk (capacity and

rehabilitation)
• Capacity improvement of the D Street Trunk (capacity)
• Storm drain cross connection removal program (capacity)
• Crown spray and CCTV inspection program (rehabilitation)
• New service to various proposed developments within the Coffee/Claratina, Kiernan/Carver and Roselle/Claribel CPDs. (new service)

The lowest priority projects were assigned to the later years of the CIP schedule. The remaining projects were assigned to the mid-range of the CIP schedule in order to balance the amount of projects implemented each year. The results from the wastewater rate study that is currently being developed by the City will likely modify the implementation schedule. However, the concept of implementing the higher priority projects in the early years of the CIP schedule still applies.

Wastewater Master Plan Chapter 4

COLLECTION SYSTEM FACILITIES AND HYDRAULIC MODEL
4.1 INTRODUCTION

This chapter presents an overview of the City of Modesto's (City) wastewater collection system. Also described is the development and calibration of the City's collection system

4.3 SEWER SERVICE AREA

The study area and the existing wastewater collection system were divided into ten sewer service tributary areas as shown in Figure 4.1. Further discussions in this master plan on capital projects are grouped by sewer service area.

• Area 1 is located in the west and northwest section of the City as shown in Figure 4.1. Approximately half of the City's Comprehensive Planning District's (CPD) are located in Area 1, therefore much of the growth and increase in wastewater flow will be experienced in this area's collection system. T he West Trunk and North Trunk are the primary trunk lines conveying wastewater to the Sutter Avenue Plant. The West Trunk runs north-to-south in Grimes Avenue and continues east in Paradise Road before reaching the Sutter Avenue Plant.

4.4 COLLECTION SYSTEM

The existing wastewater collection system consists of approximately 600 miles of sanitary sewer lines ranging in diameter from 4-inches to 66-inches, and 39 wastewater lift stations. The larger trunk sewers range in diameter from 10-inches to 66-inches, and are the major pipelines conveying flows to the Sutter Avenue Plant. Table 4.1 presents a summary of total length of pipe for each diameter in the collection system.

4.4.1 Major Trunk Sewers

There are five major trunk lines that convey flows to the Sutter Avenue Plant, including the West Trunk, Emerald Trunk, Sutter Trunk, River Trunk, and South Trunk. The Cannery Segregation Line conveys cannery by-product water to the Jennings Road Secondary Plant for land disposal.

4.4.1.1 West Trunk

The West Trunk consists of 39- to 60-inch diameter sections and runs from Bangs Avenue to the Sutter Avenue Plant along the western boundary of the study area (Figure 4.1). The West Trunk flows north to south across Highway 99 and through the Woodland Lift Station. Downstream of the lift station, the trunk sewer continues in Grimes Avenue until reaching Paradise Road where the alignment turns east and the size increases to a 60-inch diameter trunk, eventually terminating at the Sutter Avenue Plant. The West Trunk is approximately 8.9 miles long and will convey approximately 35 percent of the City's total average dry weather flow (ADWF) at build-out. The West Trunk conveys all the wastewater flow generated in Area 1 to the Sutter Avenue Plant.

Table 4.1 Collection System Pipeline Summary
Wastewater Collection System Master Plan
City of Modesto

Diameter (inch)	Length (feet)	Diameter (inch)	Length (feet)
	3,856		41,993
4		30	
	2,052,488		38,694
6		33	
	422,891		30,151
8		36	
	168,494		18,493
10		39	
	108,618		5,732
12		42	
	967		6,641
14		45	
	57,563		25,902
15		48	
	15,587		7,831
16		51	
	63,606		26,487
18		54	
	26,895		20,845
21		60	
	36,519		5,415
24		66	
	31,162	Unknown[1]	53,220
27			
		Total	**3,270,050**

Notes:
1. Diameters not provided in GIS data.
2. Source: City provided GIS data.

4.4.1.2 Emerald Trunk

The Emerald Trunk conveys all the flow in Area 2 and ranges in diameter from 21-inches north of Highway 99 to 42-inches near the West Trunk (Figure 4.1). The Emerald Trunk conveys flow north to south through the Emerald Lift Station until reaching John Street where it flows into the West Trunk. This trunk sewer is approximately five miles long and will convey approximately 13 percent of the City's total ADWF at build-out. The existing Emerald Trunk is generally in poor condition, with many segments of the reinforced concrete pipe (RCP) deteriorating or experiencing capacity problems.

4.4.1.3 Sutter Trunk

The Sutter Trunk is the primary sewer conveying flow from Area 3 to the Sutter Avenue Plant. This trunk sewer begins near the intersection of Jefferson and 8th Street and runs south on Jefferson Street, Paradise Avenue and Sutter Avenue Plant, before ending at the Sutter Avenue Plant (Figure 4.1). The Sutter Trunk is approximately 13,000-feet long and will convey approximately 3 percent of the City's total ADWF at build-out.

4.4.1.4 River Trunk

The original River Trunk was installed in the 1940's to collect flows from the canneries in

the Beard Industrial Park. This trunk sewer was later extended parallel to the Tuolumne River to convey flow to the Sutter Avenue. The River Trunk conveys flow through the Beard Industrial Park, across Beard Brook, and ultimately to the Sutter Avenue Plant (Figure 4.1). Areas 4, 5, 7, 8, and 9 of the collection system are also tributary to the River Trunk.
The River Trunk begins at the Sutter Avenue Plant as a 60-inch diameter pipe and runs parallel to the Tuolumne River. The trunk sewer reduces in diameter to 48-inches and crosses under Highway 99 and the Union Pacific Railroad (UPRR). Around B Street and Morton Boulevard, between the UPRR and the Beard Brook crossing, the River Trunk alternates as single and parallel segments with diameters varying between 24- and 48-inches. East of the Beard Brook crossing, the trunk continues in Oregon Drive and Nathan Avenue until reaching Beard Avenue. In this reach the diameter ranges in size from 45-, 48- and 60-inches. The total length of this trunk sewer is approximately five miles. At build-out of the Sphere of Influence (SOI), this trunk will convey approximately 42 percent of the City's ADWF.

4.4.1.5 Cannery Segregation Line

A second River Trunk was constructed in parallel to the original River Trunk. The second River Trunk collected flows from industrial, residential, and downtown areas and flows east to west. This pipeline was converted to the Cannery Segregation Line (CSL) in 1999. The CSL operates during the canning season only (typically between June and September).
The CSL begins at the Sutter Avenue Plant as a 66-inch diameter pipe and runs parallel to the River Trunk and the Tuolumne River (Figure 4.1). It also crosses under Highway 99 and the UPRR. The CSL crosses under the Beard Brook in a 12-, 18-, and 24-inch diameter siphon, where it continues east in Oregon Drive. Between the Beard Brook and Garner Road, the diameter ranges between 12-inches and 48-inches. The total length of this trunk is approximately 12-miles.

4.4.1.6 South Trunk

The South Trunk collects flows from Area 10 south of the Sutter Avenue Plant. This trunk sewer begins at the Sutter Avenue Plant as a 33-inch diameter pipe and proceeds south across the Tuolumne River and continues south in Ustick Road until reaching Imperial

Avenue. This trunk sewer is approximately 3,730-feet long and will convey approximately ten percent of the City's ADWF at build-out.

4.4.2 Secondary Trunk Sewers

Secondary trunks that flow tributary to the major trunk sewers discussed above include the North, Rumble, Rose/Celeste, Santa Rosa, Sonoma, Lakewood, Empire and Ceres Trunks.

4.4.2.1 North Trunk

The 39-inch diameter North Trunk currently terminates at the intersection of Bangs Avenue and Carver Road. From this intersection, the trunk sewer conveys flows west in Bangs Avenue for approximately 5,300 feet to American Avenue. At American Avenue the trunk sewer proceeds south, where it is referred to as the West Trunk (Figure 4.1). The North Trunk will be extended east in Bangs Avenue to serve future development in the Kiernan/Carver, Kiernan/McHenry, Pelandale/McHenry and Hetch Hetchy CPDs in Area 1.

4.4.2.2 Rumble Trunk

The Rumble Trunk is approximately five miles long and ranges in diameter from 12-inches to 33-inches. It conveys flows east to west in the northern portion of Area 1 to the West Trunk. The trunk begins at the confluence with the West Trunk near Rumble Road and Conant Avenue. It continues east where it runs in several streets including Carver Road,

Montclair Drive, and Woodrow Avenue, before terminating at Rumble Road and Hashem Drive.

4.4.2.3 Rose/Celeste Trunk

The Rose/Celeste Trunk, located in the northern half of Area 5, begins at the Thousand Oaks Lift Station and runs east in Scenic Drive, north in Rose Avenue and west on Celeste Drive before ending near the Memorial Medical Center. This trunk sewer ranges in diameter between 21-inches near the Thousand Oaks Lift Station and 10-inches in Celeste Drive. Near the intersection of Rose Avenue and Celeste Drive, the trunk sewer flows through the Rose/Celeste Lift Station. The total length is approximately 11,800 feet. City maintenance personnel reported that this trunk sewer flows at a full to overloaded state year-round. It was reported in the 2003 Rose/Celeste Sewer Capacity Study that the 10-inch diameter pipeline in Celeste Drive becomes clogged with grease and is on the City's high maintenance pipe list.

4.4.2.4 Santa Rosa Trunk

The Santa Rosa Trunk, located in the southern half of Area 5, flows tributary to the River Trunk in Oregon Drive. It begins as a 24-inch diameter pipe in Santa Rosa Avenue, increases to 30-inch diameter, reduces back to a 24-inch diameter and terminates downstream of the Thousand Oaks Lift Station.

4.4.2.5 Sonoma Trunk

The Sonoma Trunk begins at the Scenic Drive Lift Station, runs north in Sonoma Avenue, west in Orangeburg Avenue, and continues up Walnut Tree Drive before ending at Sylvan Avenue, at the southern boundary of the Roselle/Claribel CPD (Figure 4.1). The Sonoma Trunk ranges in diameter from a 33-inch near the lift station to a 27-inch at Sylvan Avenue. At Sylvan Avenue, the 27-inch diameter trunk will be extended north to serve future development within the Roselle/Claribel CPD. The Sonoma Trunk currently conveys wastewater flow generated in the western half of the Village One CPD in the northern half of Area 6. Based on a condition assessment conducted as part of the draft master plan, the Sonoma Trunk was generally found to be in good condition.

4.4.2.6 Lakewood Trunk

The Lakewood Trunk begins at the Scenic Drive Lift Station, runs north in Lakewood Avenue, east in Orangeburg Avenue, and continues north in several streets before ending at the intersection of Litt Road and Sylvan Avenue, at the southern boundary of the Roselle/Claribel CPD (Figure 4.1). The Lakewood Trunk ranges in diameter from a 33-inch near the lift station to a 24-inch at Sylvan Avenue. The Lakewood Trunk currently conveys wastewater flow generated in the eastern half of the Village One CPD in the northern half of Area 6 and will be extended in the future to serve the eastern half of the Roselle/Claribel CPD.

4.4.2.7 Empire Trunk

The Empire Trunk flows tributary to the River Trunk and conveys all the flow from the community of Empire. This 5,000-foot, 10-inch diameter trunk runs west in Yosemite Boulevard and south in McClure Road (Figure 4.1).

4.4.2.8 Ceres Trunk

The Ceres Trunk conveys all the flow from northern Ceres and Area 8 to the River Trunk. The Ceres Trunk crosses under Highway 99 and the Tuolumne River (Figure 4.1). The Tuolumne River crossing is referred to as the Shakelford Crossing. The Ceres Trunk is

approximately 16,000-feet long and ranges in diameter from 21-inches to 24-inches.

4.4.3 Lift Stations

There are 39 wastewater lift stations in the collection system, 19 of which were incorporated into the collection system hydraulic model. The lift stations that were not modeled drain small tributary areas and discharge to sewer mains. Four of the 39 lift stations are considered major stations: Emerald, Woodland, Scenic Drive, and Thousand Oaks. The pump capacities for the four major lift stations are listed in Table 4.2. The 35 secondary lift stations are located on collector sewers. Detailed information on the 39 lift stations including location, pump capacities, well dimensions, motor type and condition assessment comments are included in Appendix E. Table 4.3 summarizes the firm and total capacities of the wastewater lift stations and identifies the 19 lift stations that were modeled.

Table 4.2 Major Lift Stations
Wastewater Collection System Master Plan
City of Modesto

Lift Station	I.D.	Pump Number	Pump Capacity (gpm)	Firm Capacity[1] (gpm)	Total Capacity (gpm)
Woodland	39	1	2,000	14,500	19,000
		2	3,500		
		3	4,500		
		4	4,500		
		5	4,500		
Emerald	17	1	2,800	5,600	10,100
		2	2,800		
		3	4,500		
Thousand Oaks	32	1	2,300	8,275	11,950
		2	3,675		
		3	2,300		
		4	3,675		
Scenic	31	1	800	1,600	9,000
		2	800		
		3	7,000		

Note:
1. Firm capacity is defined as the capacity with the largest pump out of service.

Note:
1. Firm capacity is defined as the capacity with the largest pump out of service.

4.4.3.1 Woodland Lift Station

The Woodland Lift Station was constructed in 1969 on Woodland Avenue at Poust Road (Figure 4.1). This station includes five pumping units with a firm and total capacity of

14,500 gallons per minute (gpm) and 19,000 gpm, respectively.

4.4.3.2 Emerald Lift Station

The Emerald Lift Station was constructed in 1953 on Emerald Avenue on the north side of the MID Lateral No. 4 and south of Laurel Avenue (Figure 4.1). This station includes three pumping units with a firm and total capacity of 5,600 gpm and 10,100 gpm, respectively.

Table 4.3 Lift Station Summary
Wastewater Collection System Master Plan
City of Modesto

Lift Station	I.D.	Firm Capacity (gpm)	Total Capacity (gpm)
Athens[1]	1	250	250
Beardbrook	2	250	250
Benson[1]	3	150	650
California[1]	5	400	800
Carver & Scott[1]	6	600	1,200
Carver & Standiford[1]	7	400	800
Cheyenne & Dutch Hollow	8	300	600
Clayton & N. Martin	10	350	700
Coldwell & N. Olive[1]	11	200	400
College & Orangeburg[1]	14	226	226
El Terino & Fairmont[1]	15	220	220
Codoni	16	870	1,740
Emerald[1]	17	5,600	10,100
Evergreen & Gay	18	240	240
Hahn[1]	19	700	1,400
La Loma[1]	21	300	600
Mark Randy	22	157	157
Maze & Spencer	23	178	356
Muriel	25	177	354
Northgate[1]	26	242	484
Pepsi	27	265	530
Phoenix & Edgebrook	28	100	100
Rose & Celeste[1]	29	600	1,200
Rumble[1]	30	950	1,900
Scenic[1]	31	2,000	7,000
Thousand Oaks[1]	32	8,275	11,950

Table 4.3 Lift Station Summary Wastewater Collection System Master Plan City of Modesto			
Lift Station	**I.D.**	**Firm Capacity (gpm)**	**Total Capacity (gpm)**
Thousand Oaks Auxiliary	33	240	240
Torrid & Diablo	34	300	600
Trask & Encina	35	235	235
Tully & Davis	37	225	450
Woodland[1]	39	14,500	19,000
T.R.R.P	41	300	300
Fleur De Ville	45	100	200
Jefferson[1]	46	1,400	2,800
Centre Plaza Garage	48	Not available	Not available
Centre Plaza North	49	300	600
Orangeburg Park	51	100	200
Holiday Express	55	200	400
Coffee/Claratina[1]	58	1,000	2,000

Note:
1. Lift station included in model.

4.4.3.3 Thousand Oaks Lift Station

The Thousand Oaks Lift Station was originally constructed in 1955 on the south side of Dry Creek at the extension of Coffee Road in Thousand Oaks Park (Figure 4.1). In 1995, the lift station was upgraded to increase its firm and total capacity to 8,275 gpm and 11,950 gpm, respectively.

4.4.3.4 Scenic Drive Lift Station

The Scenic Drive Lift Station was constructed in 1970 on the north side of Dry Creek on Scenic Drive Bend Road (Figure 4.1). Initially, two 1,000 gpm pumping units were installed, and in 1985, one 7,000 gpm unit was installed. Actual performance of the two smaller pumps is around 800 gpm each. Improvements to the Scenic Drive Lift Station are currently being designed. The lift station will be designed to accommodate current and future flows.

4.5 STORM DRAIN CROSS CONNECTIONS AND ROCKWELLS

In some areas where permanent storm drain systems are absent, the City uses the sanitary sewer as a temporary or emergency facility for conveying storm water runoff. The City's draft Storm Drainage Master Plan (2003) reports that the direct disposal of storm water into the sanitary sewer system is performed through special surface inlets. This method of discharge is used to remove limited quantities of water from small locally flooded areas. These cross connections result in dramatic increases in PWWF following a storm event because storm runoff is routed directly to the collection system, and ultimately to the Sutter

Avenue Plant. Most of the discharge points are located within the downtown area and northwest of the downtown area along Tully Drive north and south of Briggsmore Avenue. Independent field verifications and field reconnaissance to locate additional cross connections were outside the scope of this master plan. According to the City's draft Storm Drainage Master Plan (2003), many large areas where outfalls do not currently exist drain into rockwells for subsurface disposal. It is estimated that there are approximately 11,000 rockwells within the City (Figure 4.2). A Rockwell is a hole drilled into the ground and filled with graded rocks and sand. Rockwells are usually located in depressed areas where storm waters are likely to collect and are drilled an average of 25 to 50-feet deep in the ground, often receiving water from a catch basin flowing from the street gutter. Their intended function is to allow storm water runoff to percolate through the rock and sand layers and into the ground. Many rockwells perform well for a few years but eventually lose their capacity of accepting water and require sediment removal and maintenance. Some rockwells lack the capacity to manage storm runoff produced during storm events, resulting in periodic flooding of streets and adjacent properties. Areas with known reported problems are illustrated on Figure 4.2.

4.6 OVERFLOWS

Based on discussions with City staff, review of previous reports, and wet weather flow (WWF) monitoring results, the City's existing collection system has experienced some overflow problems. Figure 4.3 identifies those locations that the City documented as experiencing sanitary sewer overflows (SSO) since January 2000. The date of occurrence and the potential source of the overflows were not available. Therefore, it is uncertain whether the SSO was caused by deficient capacity in the collection system during dry weather flow (DWF) or storm runoff overloading the system.