
SANITARY SEWER MASTER PLAN

This executive summary presents a brief background of the City of Oroville's (City) wastewater system, the need for this Sanitary Sewer Master Plan, proposed improvements to mitigate existing capacity deficiencies, proposed improvements for anticipated future growth, anticipated costs necessary to fund the improvements, and a financial analysis on how the improvements will be paid for.

ES.1 STUDY OBJECTIVE

Recognizing the importance of planning, developing, and financing wastewater system facilities to provide reliable and enhanced service for existing customers and to serve anticipated growth, the City initiated the preparation of this wastewater system master planning study.

The objectives of the study included the following:

- Establish wastewater system design and planning criteria.
- Review temporary flow monitoring program and data performed by V&A Consulting Engineers.
- Evaluate the capacity of the existing wastewater collection system using computer hydraulic modeling.
- Review existing system and propose improvements to enhance system reliability.
- Recommend improvements needed to service anticipated future growth.
- Develop a Capital Improvement Program (CIP) from the present to the Year 2030, which includes cost estimates and project phasing for the general plan build out.
- Calculate appropriate development impact and sewer service fees to support the CIP.

ES.2 STUDY AREA

The City encompasses 12.1 square miles and is located in Butte County, approximately 65 miles north of Sacramento and 85 miles southeast of Redding. The City's estimated 2008 population was approximately 14,490 persons.

The City owns and operates a sanitary sewer collection system for the benefit of residents and businesses within the City. As of June 2008, the collection system included approximately 66 miles of sanitary sewer, approximately 1,350 manholes, and 7 sewage lift stations. The sewer system conveys wastewater to a treatment plant owned and operated

by the Sewerage Commission – Oroville Region (SC-OR). SC-OR was created in 1973 under a joint powers agreement between the City, Thermalito Water and Sewer District (TWSD), and Lake Oroville Area Public Utility District (LOAPUD). The individual agencies maintain and operate their own wastewater systems that discharge into the SC-OR plant.

ES.3 WASTEWATER SYSTEM EVALUATION

The City's wastewater system was evaluated based on the analysis and design criteria defined in this study. A computer hydraulic sewer model was assembled in MWHSoft's (now Innowyze InfoWater) H2OMap Sewer software using the City's GIS database. All trunk sewer pipes 10 inches in diameter and greater, selected critical 6-inch and 8-inch mains, and sewage pump stations were included in the model and used in evaluating the adequacy of the City's sewer system (Figure ES.1). The hydraulic model combines information on the physical characteristics of the sewer system (pipe sizes, pipe slopes, etc.) and performs calculations to solve a series of mathematical equations to simulate flow in pipes.

A temporary flow monitoring program was conducted from February 7, 2007 to May 9, 2007 to gather flow data at discrete locations in the collection system. This flow data was then used to calibrate the hydraulic model to existing conditions. The calibrated model was then used to analyze the capacity of the collection system.

The following four scenarios were simulated to determine the adequacy of the City's system:

- Existing Dry Weather Flow (Year 2007)
- Future Dry Weather Flow (Year 2030)
- Existing Peak Wet Weather Flow (Year 2007)
- Future Peak Wet Weather Flow (Year 2030)

ES.3.1 Dry Weather Conditions

Dry weather flows were based on existing land use for existing flow and the City's 2030 General Plan for future flow. The City's existing average dry weather flow (ADWF) is estimated to be 1.71 million gallons per day (mgd). By Year 2030, the City's ADWF is anticipated to increase to 6.45 mgd. The dry weather deficiencies are summarized in Table ES.1. A pipe was considered deficient if the peak dry weather flow (PDWF) met or exceeded 0.75 percent of the flow depth in the pipe [i.e., depth to diameter flow ratio (d/D) ≥ 0.75].

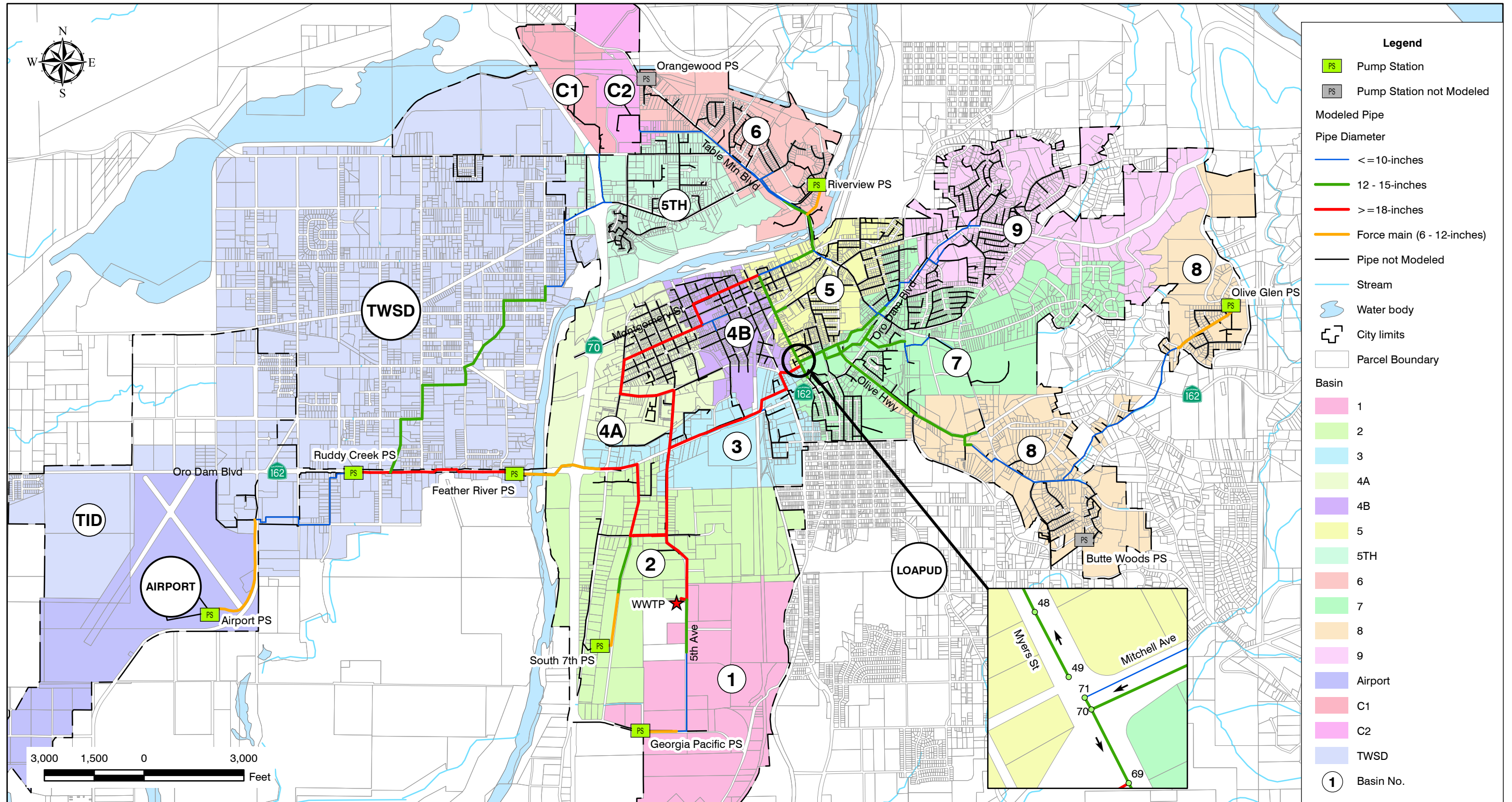


Figure ES.1
MODELED COLLECTION SYSTEM
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CITY OF OROVILLE



ES.3.2 Wet Weather Conditions

Wet weather flows are the sum of the peak dry weather flows, plus infiltration and inflow (I/I) entering the sewer system. The hydraulic model uses advanced calculations to determine the amount of wet weather flow in the sewer collection system, based upon precipitation inputs. Evaluating the adequacy of the City's sewer system capacity included applying a hypothetical 10-Year 24-Hour Design Storm that coincided with PDWF.

The hydraulic model projects peak hour flows of 11.27 mgd and 20.69 mgd for existing and future conditions, respectively during the 10-Year 24-Hour Design Storm. The 10-Year 24-Hour Design Storm totals 4.0 inches in volume with a peak rainfall intensity of 0.64 inches/hour based on the National Oceanographic and Atmospheric Administration's Atlas 2 study. These projected wet weather flows assume no appreciable mitigation to the current I/I rates. The wet weather deficiencies are summarized in Table ES.1. A pipe was considered deficient if the upstream or downstream manhole surcharged to within 3 feet of rim elevation.

ES.4 CAPITAL IMPROVEMENT PROGRAM

The proposed projects consist of new or increased capacity pipelines that are needed to convey peak wet weather flows to the wastewater treatment plant. These proposed improvements, which are discussed in detail in the report, are phased to provide an economical and realistic approach to implementation.

The cost estimates presented in the Capital Improvement Program (CIP) have been prepared for general master planning purposes, to set appropriate budgets and fee schedules that will adequately fund the sewer enterprise and for guidance in project evaluation and implementation. Final costs of projects will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors such as preliminary alignments generation, investigation of alternative routings, and detailed utility and topography surveys.

Knowledge about site-specific conditions for each proposed project is limited at the master planning stage; therefore, the estimated construction costs include a 30 percent contingency to account for unforeseen events and unknown field conditions. The CIP also include an additional 20 percent contingency for project-related costs, comprising engineering, administration, construction inspection, and legal costs.

The improvements for the recommended CIP are presented in Figure ES.2. The CIP construction and total project costs are summarized in Table ES.2 and total \$40,407,000.

Table ES.1 Existing and Future Deficiencies Sanitary Sewer Master Plan City of Oroville			
	Units	Existing Condition (Year 2007)	Future Condition (Year 2030)
Flow Type			
ADWF ⁽¹⁾	mgd ⁽²⁾	1.71	6.45
Minimum DWF	mgd	0.85	2.48
PDWF ⁽³⁾	mgd	2.36	9.49
PWWF ⁽⁴⁾	mgd	11.27	20.69
DWF Pipeline Capacity			
d/D ⁽⁵⁾ < 0.75	---	364	356
0.75 < d/D < 1	---	1	7
d/D = 1	---	1	37
WWF Pipeline Capacity			
d/D ⁽⁵⁾ < 0.75	---	244	201
0.75 < d/D < 1	---	13	12
d/D = 1	---	109	185
WWF Manhole Depth			
SSO ⁽⁶⁾	---	34	82
< 1 feet below rim	---	6	15
1 - 3 ft below rim	---	17	41
3 - 5 feet below rim	---	48	62
> 5 feet below rim	---	259	196
Notes:			
1. ADWF = Average dry weather flow.			
2. mgd = million gallons per day.			
3. PDWF = Peak dry weather flow.			
4. PWWF = Peak wet weather flow.			
5. d/D = Depth to diameter flow ratio.			
6. SSO = Sanitary sewer overflow (hydraulic grade exceeds rim elevation).			

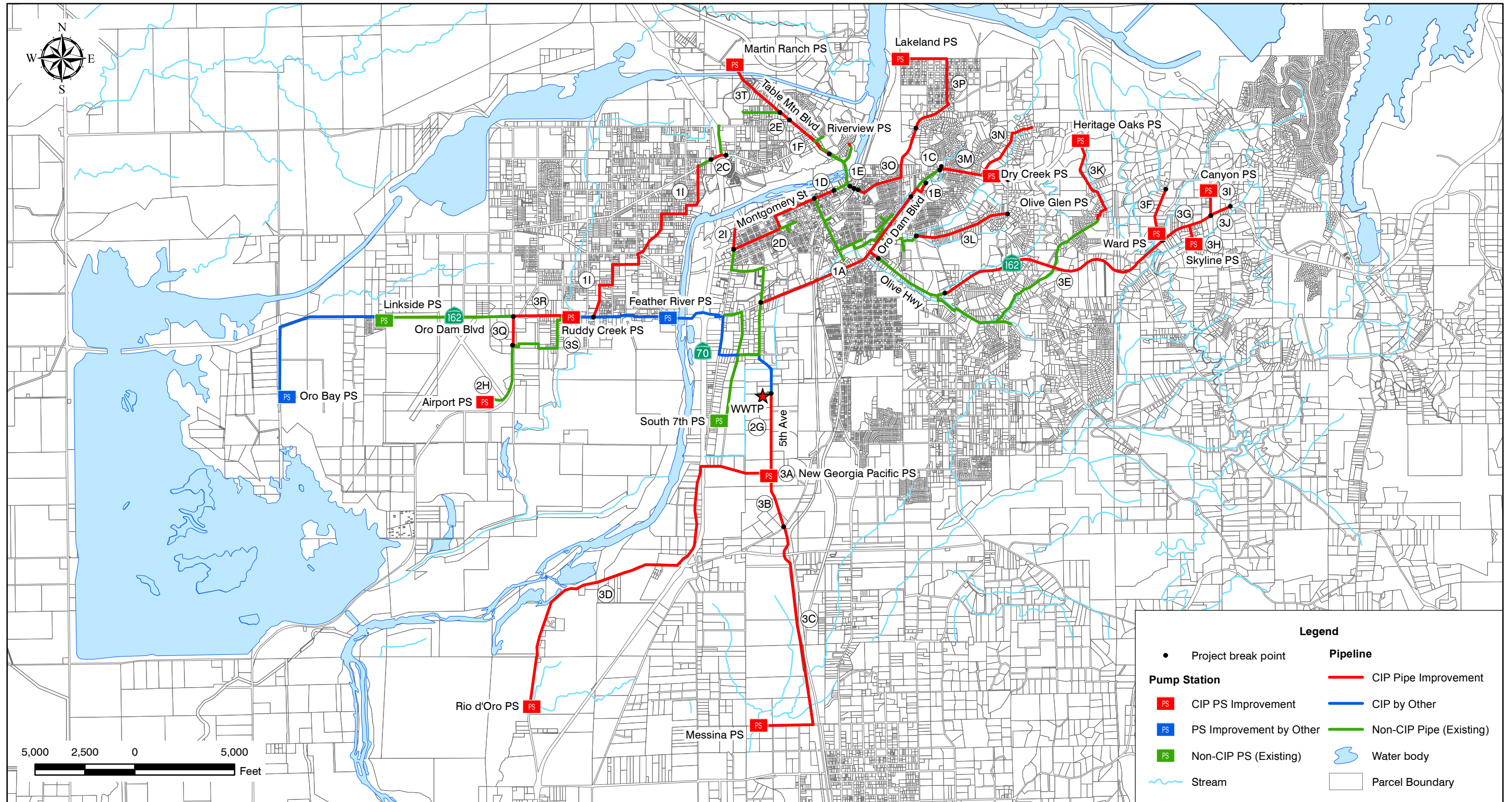


Figure ES.2
RECOMMENDED CAPITAL IMPROVEMENT PROGRAM
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CITY OF OROVILLE



Table ES.2 Capital Improvement Program Sanitary Sewer Master Plan City of Oroville		
Project Number	Project Name	Cost⁽¹⁾
1A	Oroville Dam Boulevard Relief Sewer	\$ 4,584,000
1B	Stanford Avenue Sewer	\$ 318,000
1C	Grace Baptist Church	\$ 42,000
1D	Montgomery Street Sewer	\$ 553,000
1E	Table Mountain Boulevard Sewer I	\$ 53,000
1F	Table Mountain Boulevard Sewer II	\$ 733,000
1I ⁽²⁾	TWSD East Interceptor	\$ 2,205,000
2C	Grand Avenue Sewer	\$ 178,000
2D	Downtown Sewer	\$ 1,689,000
2E	Table Mountain Boulevard Sewer III	\$ 154,000
2G	5th Avenue Sewer	\$ 1,232,000
2H	Airport Pump Station Upgrade	\$ 238,000
2I	Feather River Blvd Sewer	\$ 214,000
3A	New Georgia Pacific Pump Station	\$ 2,564,000
3B	Oroville Industrial Park Sewer	\$ 745,000
3C	Messina Pump Station and Pipeline Expansion	\$ 3,502,000
3D	Rio d'Oro Pump Station and Pacific Heights Road Improvements	\$ 6,257,000
3E	Olive Highway Expansion I	\$ 2,551,000
3F	Ward Pump Station and Pipeline Expansion	\$ 661,000
3G	Olive Highway Expansion II	\$ 563,000
3H	Skyline Pump Station and Pipeline Expansion	\$ 264,000
3I	Canyon Pump Station and Pipeline Expansion	\$ 312,000
3J	Olive Highway Expansion III	\$ 224,000
3K	Heritage Oaks Pump Station and Pipeline Expansion	\$ 951,000
3L	Oroville Quincy Highway Expansion	\$ 994,000
3M	Dry Creek Pump Station and Pipeline Expansion	\$ 799,000
3N	Zepher Way Expansion	\$ 875,000
3O	Orange Avenue Sewer	\$ 1,037,000
3P	Lakeland Pump Station and Pipeline Expansion	\$ 1,342,000
3Q	Larkin Road Bypass Sewer	\$ 307,000
3R	West Oroville Dam Boulevard Expansion	\$ 690,000
3S	Ruddy Creek Pump Station Upgrade	\$ 2,718,000
3T	Martin Ranch Pump Station And Force Main	\$ 858,000
	Total⁽³⁾	\$ 40,407,000

Notes:

1. Based on a 20-Cities ENR of 8,641 (December 2009).
2. Previously identified as Project 2B. Moved to Element 1 due to identified urgency by TWSD. Cost shown for Project 1I reflects City's 75% share based on agreement with TWSD. Total project cost = \$2.94M.
3. Projects 1G (Riverview PS Upgrade), 1H (Ruddy Creek PS Upgrade I), and 2F (Olive Glen PS Upgrade) have been removed from the CIP due to sufficient capacity upon review.

ES.5 PROJECTS OF INTEREST

The CIP identified two near-term projects of interest. Project 1A, the Oroville Dam Boulevard Relief Sewer, is routed along Oroville Dam Boulevard and is intended to serve existing and future growth in the eastern portion of the City. The 10,108-linear-foot project is estimated to cost \$4.58 million. An alignment and utility study was conducted for Project 1A and alternative Projects 1A-Alt and 2A-Alt. This study, the Corridor Study for Oroville Dam Boulevard Relief Sewer TM (Carollo Engineers, July 2012), performed a detailed alignment and utility check for the Oroville Dam Boulevard corridor.

Project 1I, the TWSD East Interceptor Project, was also identified as a project of interest. This project upsizes the existing TWSD East Interceptor to remedy existing capacity deficiencies. TWSD and the City have agreed to share the cost of the project with the City's share being 75 percent of the total. Project 1I is estimated to cost \$2.94 million, with the City's share at \$2.21 million.

ES.6 FINANCIAL ANALYSIS

A financial analysis was conducted to assess the revenue needs for the City based on the CIP program developed in this study and the O&M service level recommendations provided by John Larson, P.E., of Larson Consulting, a sanitary sewer O&M specialist retained to review the City's sewer system program. Revenue sources to maintain, improve, and expand the sewer system come from monthly sewer rates and development impact fees.

Development impact fees were calculated based on the incremental cost method. This method assigns the incremental cost of system expansion needed to serve the new development and recovers it from the new development. The City's existing development impact fee is \$1,123.50, exclusive of the SC-OR connection fee. The recommended development impact fee necessary for the 2012/13 fiscal year to fund future users' share of the CIP is \$1,794.00 per EDU, an increase of 60 percent from current levels.

The City's monthly sewer service rate is paid by existing connections to maintain and make improvements to the sewer system based on existing deficiencies. The City recently adopted a rate schedule with increases programmed over the next three years in accordance with the requirements of Proposition 218. The adopted rate schedule is summarized in Table ES.3. The financial analysis provides rate increase recommendations for two additional years to establish adequate revenues for system deficiency (Element 1) and the TWSD East Interceptor Projects. The proposed rate increase schedule is included in Table ES.3.

Development impact fees and the sewer service rate should be reviewed periodically, not to exceed once every five years, and may need to be adjusted in the future due to uncertainty in forecasting economic conditions.

Table ES.3 Existing and Proposed Sewer Service Rate Structure, Years 2010/11 through 2014/15 Sanitary Sewer Master Plan City of Oroville					
Fiscal Year	2010/11⁽¹⁾	2011/12⁽¹⁾	2012/13⁽¹⁾	2013/14	2014/15
Total Monthly Rate (per EDU)	\$12.24	\$13.82	\$15.73	\$18.07	\$20.99
% Rate Increase	25%	13%	14%	15%	16%
<u>Note:</u> 1. These rates have been approved by the Council in compliance with Proposition 218 requirements.					