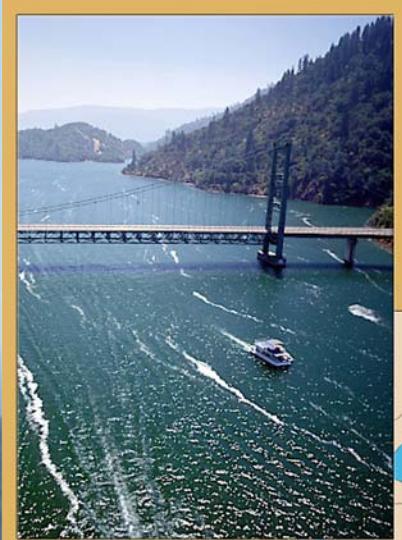




WELCOME TO OROVILLE

Sanitary Sewer Master Plan



FINAL
DRAFT

January 2013

City Of Oroville
SANITARY SEWER MASTER PLAN

TABLE OF CONTENTS

	<u>Page No.</u>
Executive Summary	ES-1
ES.1 STUDY OBJECTIVE	ES-1
ES.2 STUDY AREA	ES-1
ES.3 WASTEWATER SYSTEM EVALUATION.....	ES-2
ES.3.1 Dry Weather Conditions	ES-2
ES.3.2 Wet Weather Conditions	ES-4
ES.4 CAPITAL IMPROVEMENT PROGRAM.....	ES-4
ES.5 PROJECTS OF INTEREST	ES-8
ES.6 FINANCIAL ANALYSIS.....	ES-8
 Chapter 1	1-1
1.1 INTRODUCTION.....	1-1
1.2 STUDY OVERVIEW.....	1-5
1.3 REPORT CONTENTS	1-6
 Chapter 2	2-1
2.1 EXISTING LAND USE	2-1
2.2 BUILD-OUT LAND USE	2-1
 Chapter 3	3-1
3.1 INTRODUCTION.....	3-1
3.2 BASE WASTEWATER FLOW	3-1
3.3 GROUNDWATER INFILTRATION.....	3-1
3.4 AVERAGE DRY WEATHER FLOW.....	3-3
3.5 PEAK DRY WEATHER FLOW.....	3-3
3.6 PEAK WET WEATHER FLOW	3-3
3.7 INFLOW AND INFILTRATION	3-3
 Chapter 4	4-1
4.1 INTRODUCTION.....	4-1
4.2 FLOW MONITORING OF SEWER BASINS	4-1
4.3 RAINFALL MONITORING.....	4-4

4.4	DRY AND WET WEATHER FLOW RESULTS	4-5
4.5	INFLOW AND INFILTRATION ANALYSIS.....	4-7
Chapter 5		5-1
5.1	INTRODUCTION.....	5-1
5.2	COLLECTION SYSTEM FACILITIES	5-1
5.2.1	Pipelines.....	5-1
5.2.2	Pump Stations	5-5
5.3	HYDRAULIC MODEL SELECTION	5-5
5.4	HYDRAULIC MODEL DEVELOPMENT	5-6
5.5	DRY WEATHER FLOW LOADING	5-7
5.5.1	Existing Dry Weather Flow	5-9
5.5.2	Future Flow	5-9
5.6	CALIBRATION	5-20
5.6.1	Dry Weather Flow Calibration	5-20
5.6.2	Wet Weather Flow Calibration.....	5-24
Chapter 6		6-1
6.1	INTRODUCTION.....	6-1
6.2	PLANNING AND DESIGN CRITERIA.....	6-1
6.2.1	Gravity Sewers	6-1
6.3	DESIGN STORM	6-3
6.3.1	Rainfall Analysis	6-3
6.3.2	Selection of Design Storm.....	6-4
6.4	COLLECTION SYSTEM CAPACITY EVALUATION.....	6-7
6.4.1	Existing PDWF Capacity Analysis	6-7
6.4.2	Existing PWWF Capacity Analysis	6-9
6.4.3	Future DWF Capacity Analysis.....	6-9
6.4.4	Future PWWF Capacity Analysis	6-9
6.5	PUMP STATION CAPACITY ANALYSIS.....	6-14
6.6	SUMMARY.....	6-14
6.7	ADDITIONAL ANALYSES.....	6-14
6.7.1	TWSD East Interceptor Capacity Analysis	6-16
6.7.2	Storage Pond Feasibility Study	6-16
6.7.3	Oroville Dam Boulevard Relief Sewer Corridor Study	6-16
Chapter 7		7-1
7.1	INTRODUCTION.....	7-1
7.2	CAPITAL IMPROVEMENT PROGRAM	7-1
7.2.1	CIP Criteria	7-1
7.2.2	Recommended Capital Improvement Program	7-2
7.3	CIP ELEMENTS	7-7
7.4	CIP PHASING	7-41

Chapter 8	8-1
8.1 INTRODUCTION.....	8-1
8.1.1 Capital Improvement Program (CIP)	8-1
8.1.2 Other Agency Obligations	8-2
8.2 DEVELOPMENT IMPACT FEE	8-3
8.2.1 Impact Fee Methodology	8-3
8.2.2 Existing Development Impact Fee Structure	8-6
8.2.3 Future Service Units	8-6
8.2.4 Schedule Impacts.....	8-6
8.2.5 Funding Sources	8-7
8.2.6 Recommended Development Impact Fee.....	8-8
8.3 SEWER SERVICE RATE.....	8-9
8.3.1 Number of Connections.....	8-9
8.3.2 Existing Rate Structure.....	8-9
8.3.3 Current and Future Capital Needs	8-9
8.3.4 Operating Expenses.....	8-11
8.3.5 Analysis of Existing and Future Service Fees	8-13
8.4 PRO FORMA SUMMARY	8-13

LIST OF TABLES

Table ES.1 Existing and Future Deficiencies	ES-5
Table ES.2 Capital Improvement Program	ES-7
Table ES.3 Existing and Proposed Sewer Service Rate Structure, Years 2010/11 through 2014/15	ES-9
Table 2.1 Land Use	2-3
Table 4.1 Rainfall Events	4-5
Table 4.2 Flow Monitoring Program	4-6
Table 4.3 Flow Monitoring by Basin	4-7
Table 4.4 Inflow and Infiltration Analysis	4-9
Table 5.1 Pipe Statistics	5-3
Table 5.2 Pump Stations	5-4
Table 5.3 Data Resolution	5-6
Table 5.4 General Plan and Zoning Categories	5-10
Table 5.5 Existing and Future Land Use Area by Basin	5-11
Table 5.6 Existing and Future Flow Factors by Basin	5-12
Table 5.7 Existing and Future Flow by Basin	5-13
Table 5.8 Existing and Future Flow Summary	5-15
Table 5.9 Dwelling Unit Flow Calculation	5-17
Table 5.10 Dry Weather Flow Calibration Summary	5-21
Table 5.11 Wet Weather Flow Calibration	5-26
Table 5.12 December 2005 Wet Weather Flow Calibration	5-28
Table 6.1 Design Storm Comparison.....	6-4
Table 6.2 Existing and Future Deficiencies	6-12

Table 6.3	Pump Station Capacity Analysis	6-14
Table 7.1	Unit Costs	7-3
Table 7.2	Project List and Cost Summary	7-4
Table 8.1	CIP	8-1
Table 8.2	Project Flow Split	8-5
Table 8.3	CIP Allocation	8-6
Table 8.4	Current Single Residential Unit Development Impact Fees	8-6
Table 8.5	Funding Sources	8-7
Table 8.6	Recommended Development Impact Fee per EDU	8-9
Table 8.7	Current Adopted Rate Schedule	8-9
Table 8.8	Existing Users CIP Allocation	8-10
Table 8.9	Current and Future Capital Needs	8-11
Table 8.10	Revenue Needs Summary	8-12
Table 8.11	Proposed Sewer Service Rate Structure, Years 2010/11 through 2014/15	8-13
Table 8.12	Pro Forma Layout	8-14

LIST OF FIGURES

Figure ES.1	Modeled Collection System	ES-3
Figure ES.2	Recommended Capital Improvement Program	ES-6
Figure 1.1	General Location Map	1-2
Figure 1.2	City Aerial Photo	1-3
Figure 1.3	Utility Service Jurisdictional Boundaries	1-4
Figure 2.1	Existing Land Use	2-2
Figure 2.2	Future Land Use	2-4
Figure 3.1	Wastewater Flow Components	3-2
Figure 3.2	Typical Sources of Infiltration and Inflow	3-4
Figure 3.3	Effects of Infiltration and Inflow	3-5
Figure 4.1	Flow Meter and Rain Gauge Locations	4-2
Figure 4.2	Basin Flow Schematic	4-3
Figure 5.1	Collection System Facilities	5-2
Figure 5.2	Modeled Collection System	5-7
Figure 5.3	Modeled Future Collection System Area	5-14
Figure 5.4	Example Diurnal Curve Flow Meter	5-20
Figure 5.5	Example Dry Weather Flow Calibration Meter 3	5-22
Figure 5.6	Tri-Triangle Synthetic Unit Hydrograph Method	5-24
Figure 5.7	Example Dry Wet Weather Flow Calibration Meter 3	5-27
Figure 6.1	Design Storm Hyetograph	6-5
Figure 6.2	Capacity Analysis – Existing PDWF	6-7
Figure 6.3	Capacity Analysis – Existing PWWF	6-9
Figure 6.4	Capacity Analysis - Future PDWF	6-10
Figure 6.5	Capacity Analysis - Future PWWF	6-11

Figure 7.1	CIP Projects.....	7-5
Figure 7.2	Project 1A	7-7
Figure 7.3	Project 1B	7-8
Figure 7.4	Project 1C	7-9
Figure 7.5	Project 1D	7-10
Figure 7.6	Project 1E	7-11
Figure 7.7	Project 1F	7-12
Figure 7.8	Project 1I.....	7-13
Figure 7.9	Project 2C	7-14
Figure 7.10	Project 2D	7-15
Figure 7.11	Project 2E	7-16
Figure 7.12	Project 2G.....	7-17
Figure 7.13	Project 2H	7-18
Figure 7.14	Project 2I.....	7-19
Figure 7.15	Project 3A	7-20
Figure 7.16	Project 3B	7-21
Figure 7.17	Project 3C	7-22
Figure 7.18	Project 3D	7-23
Figure 7.19	Project 3E	7-24
Figure 7.20	Project 3F	7-25
Figure 7.21	Project 3G	7-26
Figure 7.22	Project 3H	7-27
Figure 7.23	Project 3I.....	7-28
Figure 7.24	Project 3J.....	7-29
Figure 7.25	Project 3K	7-30
Figure 7.26	Project 3L.....	7-31
Figure 7.27	Project 3M.....	7-32
Figure 7.28	Project 3N	7-33
Figure 7.29	Project 3O	7-34
Figure 7.30	Project 3P	7-35
Figure 7.31	Project 3Q	7-36
Figure 7.32	Project 3R	7-37
Figure 7.33	Project 3S	7-38
Figure 7.34	Project 3T	7-39
Figure 7.35	Growth Areas.....	7-41
Figure 7.36	CIP Phasing.....	7-42
Figure 7.37	Project 1A-Alt.....	7-43
Figure 7.38	Project 2A-Alt.....	7-44
Figure 7.39	Project 3B-Alt.....	7-45

APPENDICES

- Appendix A Sanitary Sewer Flow Monitoring and Inflow/Infiltration Study
- Appendix B Hydraulic Model Selection
- Appendix C Survey Detail Sheets
- Appendix D Dry Weather Flow Calibration
- Appendix E Wet Weather Flow Calibration – February 7-15, 2007
- Appendix F Wet Weather Flow Calibration – February 1 - March 1, 2007

- Appendix G Wet Weather Flow Calibration – December 28, 2005 - January 6, 2006
- Appendix H TID East Interceptor
- Appendix J Existing Deficiencies
- Appendix K Unit Cost Analysis
- Appendix L Capital Improvement Program