South Placer Regional Wastewater and Recycled Water Systems Evaluation

Updated Final Report

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List of Abbreviations

ac	acres
ADWF	average dry weather flow
AFY	acre feet per year
APN	assessor parcel number
BOD	biochemical oxygen demand
BSF	base sanitary flow
BTU	British Thermal Unit
CCI	Construction Cost Index
CEQA	California Environmental Quality Act
CIP	Capital Improvement Program
D/I	Densification/Intensification
DC	Dry Creek
DCWWTP	Dry Creek Wastewater Treatment Plant
DHS	Department of Health Services
du, DU	dwelling unit
DWF	dry weather flow
ea	each
EIR	Environmental Impact Report
ENR	Engineering News Record
ft	feet
FY	fiscal year
gal	gallons
GIS	Geographical Information System
gpd	gallons per day
gpm	gallons per minute
GWI	groundwater infiltration
HP	horsepower, Hewlett-Packard
I/I	Inflow and Infiltration
in	inches
kW	kilowatt
lb/day	pounds per day
MCRT	mean cell residence time
MG	million gallons
mgd	million gallons per day
MLSS	mixed liquor suspended solids
NPDES	National Pollutant Discharge Elimination System
PDWWF	peak day wet weather flow
PG	Pleasant Grove
PGWWTP	Pleasant Grove Wastewater Treatment Plant
PHWWF	peak hour wet weather flow

PMF	peak month flow
PS	pump station
PWWF	peak wet weather flow
RAS	return activated sludge
RDI/I	rainfall dependent infiltration/inflow
ROW	right-of-way
RWQCB	Regional Water Quality Control Board
scfm	standard cubic feet per minute
SCGC	Sun City Golf Course
SMD-2	Placer County Sewer Maintenance District 2
SMD-3	Placer County Sewer Maintenance District 3
SPMUD	South Placer Municipal Utility District
SPWA	South Placer Wastewater Authority
SWRCB	State Water Resources Control Board
Systems Evaluation	Regional Wastewater and Recycled Water Systems Evaluation
TM	technical memorandum
TSS	total suspended solids
UGA	Urban Growth Area
UV	ultraviolet
VS	volatile solids
WAS	waste activated sludge
WOGC	Woodcreek Oaks Golf Course
WRSP	West Roseville Specific Plan
WWF	wet weather flow
WWTP	wastewater treatment plant

Executive Summary

ES-1 Introduction

Created in 2000, the South Placer Wastewater Authority (SPWA) is comprised of three separate agencies: the City of Roseville, the South Placer Municipal Utility District (SPMUD), and Placer County. The City of Roseville owns and operates two regional wastewater treatment facilities: the Pleasant Grove Wastewater Treatment Plant (PGWWTP), and the older Dry Creek Wastewater Treatment Plant (DCWWTP). Additionally, the City of Roseville owns and operates the network of gravity sewers, pump stations, and force mains that serve customers within the City's limits. SPMUD owns and operates gravity sewers, pump stations, and force mains in portions of southern Placer County, including Rocklin and Loomis. Placer County owns and operates gravity sewers, pump stations, and force mains in unincorporated areas of Placer County that are not served by other agencies, including Granite Bay.

Prior to this South Placer Wastewater and Recycled Water Systems Evaluation (Systems Evaluation), the most recent evaluation of regional wastewater and recycled water facilities was conducted in the early 1990's, culminating in 1996, with the preparation of the *1996 Roseville Regional Wastewater Treatment Service Area Master Plan* and the associated Environmental Impact Report (1996 Master Plan and EIR). Since that time, substantial growth in and around the SPWA service area has occurred, and changing demographics in the region have generated wastewater flows and wastewater organic strengths which have differed from those projected a decade ago. Further, continued growth, both within and adjacent to the 2005 SPWA service area boundary, is expected in the future. A number of specific areas with the potential for significant future development have been identified by SPWA, providing the basis for an evaluation of the impacts of future growth on wastewater and recycled water facilities.

NOTE: As part of this Systems Evaluation, a new, 2005 service area boundary was defined (described in Chapter 2 of this report). It should also be noted that June 2004 was the baseline date used for this study. Although the conditions in June 2004 were synonymous with "current" or "existing" conditions at the outset of this project, those terms have been generally avoided in this document, in order to prevent confusion on behalf of the reader, as well as to prevent the document from becoming prematurely "stale." As such, "June 2004" is used consistently throughout this report to describe the conditions at the beginning of the study, while "2005" is generally reserved for definition of the new service area boundary introduced in Chapter 2. In some instances, however, the use of "current" or "existing" could not be avoided.

The purpose of this Systems Evaluation is to provide SPWA with a new baseline characterization of its wastewater and recycled water systems for June 2004 and buildout conditions, and to provide a long-term planning tool for identifying and implementing capital improvement projects.

The 2009 update brings the Systems Evaluation up to date with the following changes: 2006 changes in the SPMUD UGA boundary and land use, and to add Brookfield as an additional UGA; 2008 changes in the land uses and flow projections of the UGAs; and 2009 updates to the H20Map Sewer Model software, changes to the development timeline to reflect reduced rates of residential development, and a proposed rezone for the West Roseville Specific Plan which would result in higher buildout flow estimates. For the purposes of this study, June 2004 is still considered "current" and has not been updated to 2009 conditions.

Figure ES - 1 shows the service area boundaries of the individual SPWA partner agencies.

Wastewater generated in the SPWA service area flows to the two regional treatment facilities, the Dry Creek and Pleasant Grove WWTPs. The boundary between the sewersheds for both WWTPs is shown in **Figure ES - 2**.

Figure ES - 1: SPWA Partner Agencies

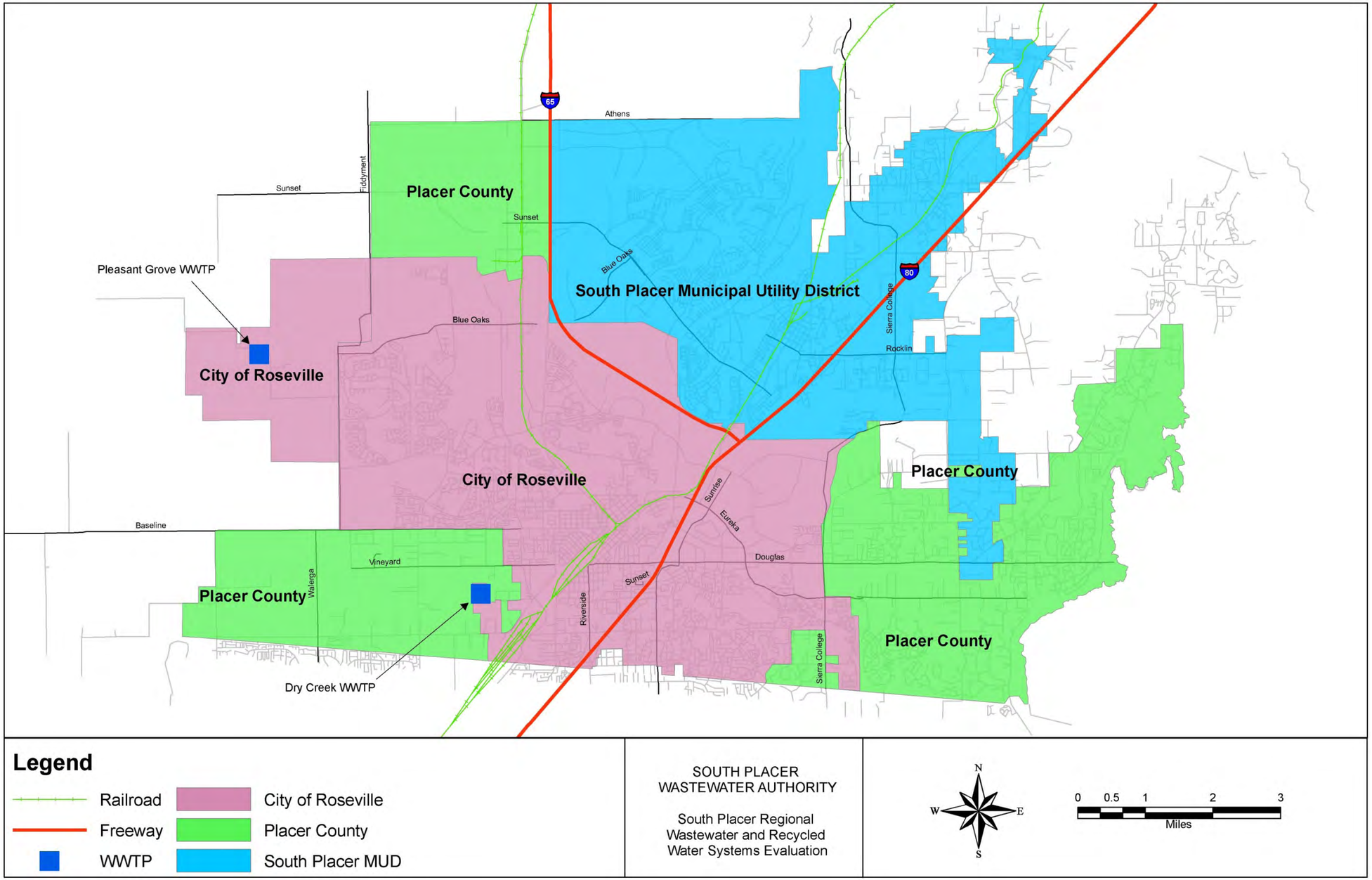
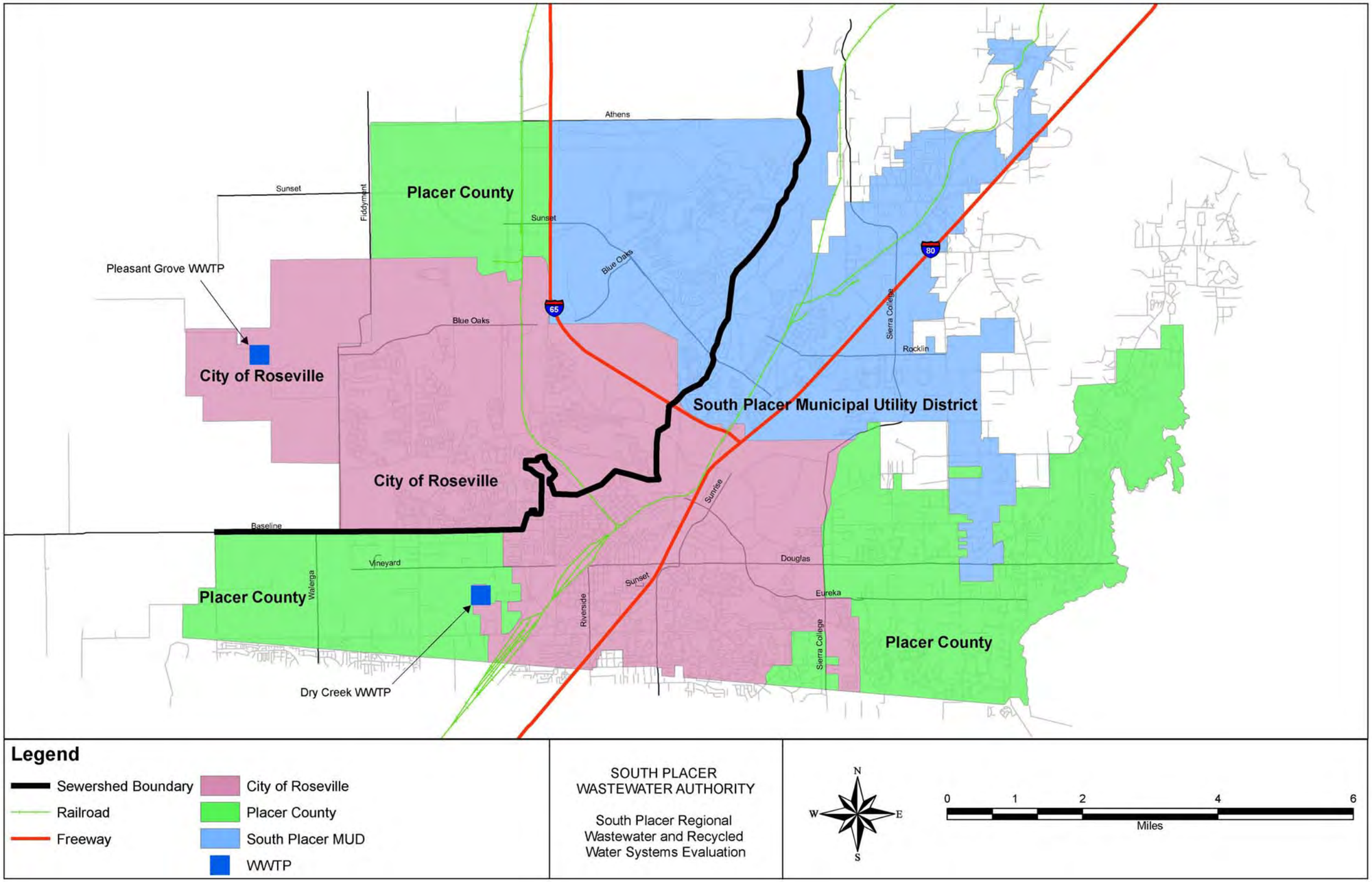


Figure ES - 2: WWTP Sewershed Boundaries



ES-2 Service Area

Since the completion of the 1996 Master Plan and EIR, several areas have been annexed by SPWA partner agencies. These areas include the West Roseville Specific Plan (WRSP) area, Clover Valley Lakes, Loomis Hills Estate and Sierra College in the SPMUD service area, along with six other small annexations. A new service area, referred to as the 2005 Regional Service Area, has been delineated and adopted by the SPWA board. **Figure ES - 3** presents the 2005 Regional Service Area, as well as the 1996 service area for comparison.

Additionally, a number of planning areas have been identified in the areas adjacent to the 2005 Regional Service Area. Twelve of the planning areas (namely those with the most or best available planning information) have been included in this Systems Evaluation, and are referred to as Urban Growth Areas (UGAs). **Table ES - 1** summarizes the included UGAs. The SPWA partner agencies, the 2005 Regional Service Area boundary, and the UGAs are shown in **Figure ES - 4**.

Figure ES - 3: 2005 Regional Service Area

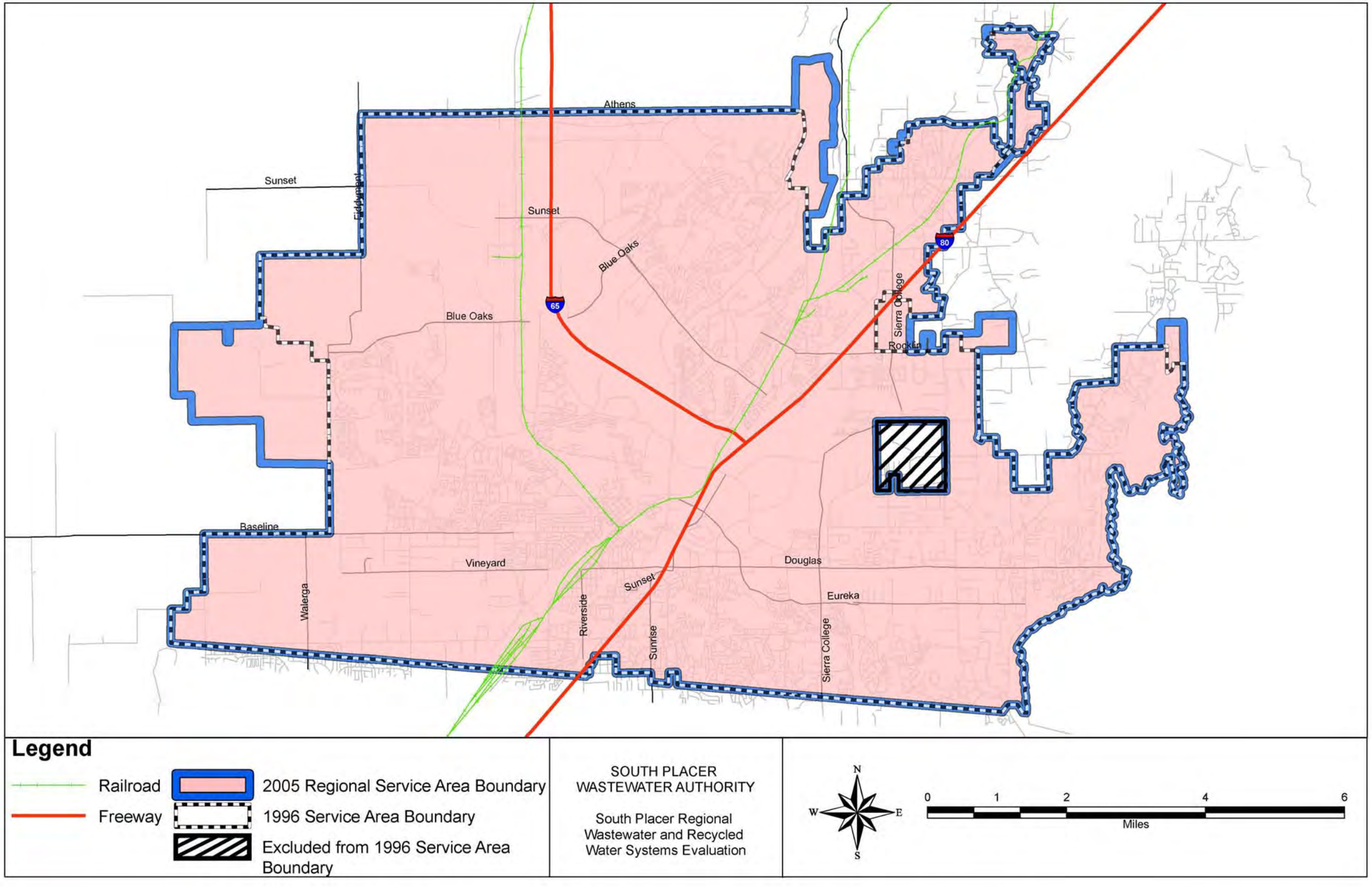


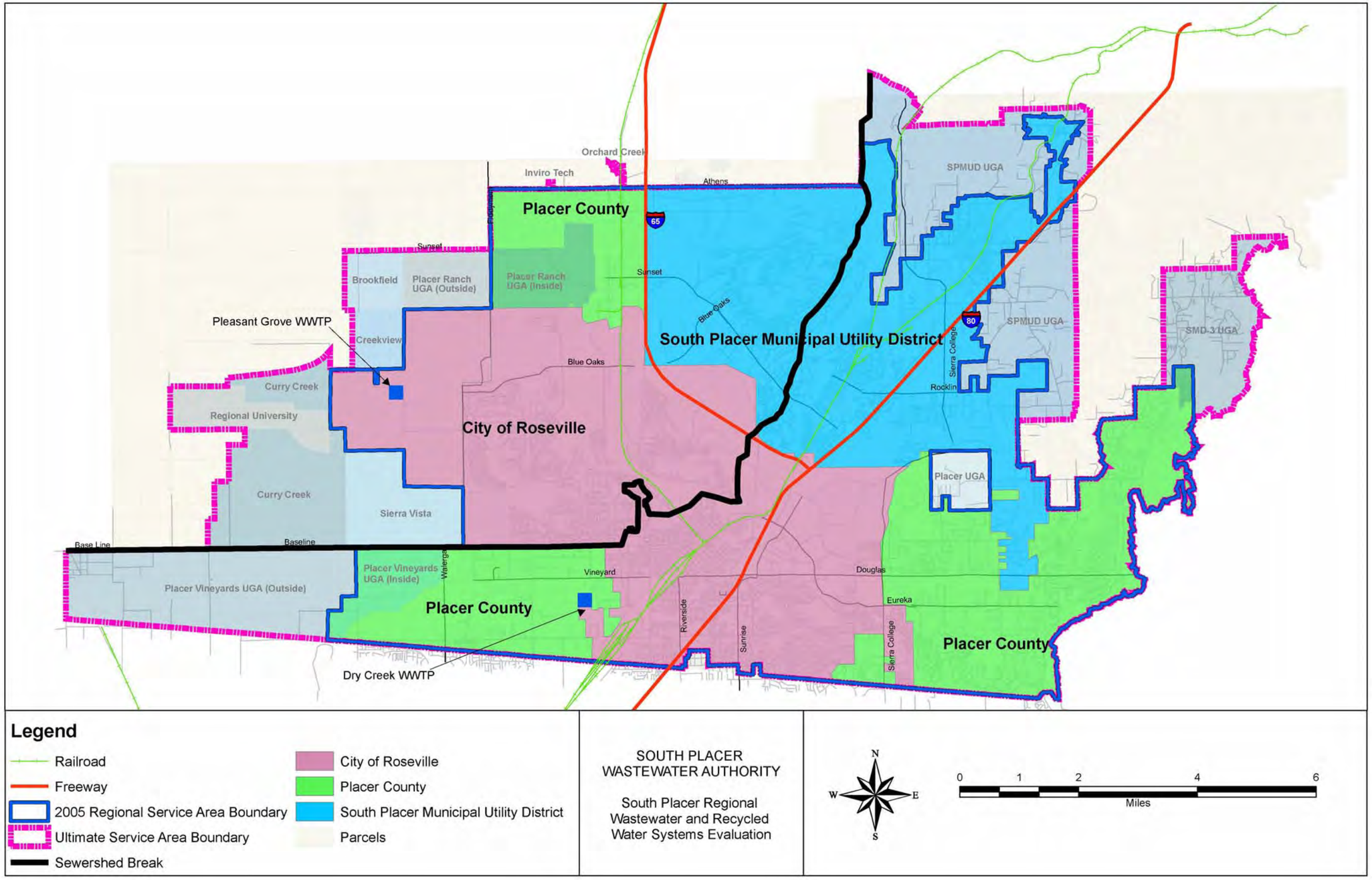
Table ES - 1: Summary of Included UGAs

Urban Growth Area (UGA)	Area Outside 2005 Regional Service Area Boundary (acres)
Curry Creek UGA [2]	3,212
Regional University UGA	1,140
Inviro Tech UGA [3]	5
Placer UGA [4]	630
Orchard Creek [5]	25
Placer Ranch [6]	807
Placer Vineyards [7]	4,806
SMD-3	2,231
SPMUD UGA [8,9]	6,410
Creekview UGA & Panhandle [10]	749
Sierra Vista UGA	1,785
Brookfield UGA [11]	683
TOTAL	**22,483** [1]

Footnotes:

1. Total acres outside of the 1996 Master Plan Regional Service Area boundary (and outside the 2005 Regional Service Area boundary).
2. Preliminary land use estimates for Curry Creek was developed by RMC and approved by Placer County based on land use ratios developed by the West Roseville Specific Plan.
3. As of June 2004, this parcel is served by the County.
4. This square "island" area is not expected to be sewered at buildout due to topography and low development density. To be conservative, however, the impact of the buildout flows projected for this UGA were included in the Systems Evaluation.
5. Placer County plans to sewer this area north of Athens Road via the SPWA regional collection system due to the natural topography of the area.
6. The Placer Ranch UGA is comprised of a total of 2,213 acres, with 1,027 acres located inside the 1996 Master Plan (and 2005) Regional Service Area boundary (i.e., "Placer Ranch Inside"), 807 acres located outside of this boundary (i.e., "Placer Ranch Outside") and 379 acres designated as ROW. Although the Placer Ranch UGA is considered in its entirety (2,213 acres) in this Systems Evaluation, the areas and associated flows from the "inside" and "outside" portions of the UGA are distinguished throughout.
7. The Placer Vineyards UGA is comprised of a total of approximately 5,148 acres, with approximately 1,062 acres located inside the 1996 Master Plan (and 2005) Regional Service Area boundary (i.e., "Placer Vineyards Inside"), and 4,806 acres (including ROW) located outside of this boundary (i.e., "Placer Vineyards Outside"). Although the Placer Vineyards UGA is considered in its entirety (5,148 acres) in this Systems Evaluation, the areas and associated flows from the "inside" and "outside" portions of the UGA are distinguished throughout.
8. SPMUD UGA land use information developed by RMC based on General Plan information for the City of Rocklin and Town of Loomis (November 2005).
9. 2,319 acres was originally considered as the acreage for the SPMUD UGA for the Systems Evaluation. The total acreage shown (6,410 acres) is based on the expanded SPMUD UGA boundary that later (August 2006) was provided. Additional incremental flows were considered as a result of the increased UGA size.
10. "Panhandle" refers to a 238-acre portion of the Reason Farms planning area that is adjacent to the western boundary of the 511- acre Creekviw UGA. Though not considered a UGA, the panhandle area is assumed to contribute wastewater flow to the Creekview UGA.
11. Brookfield was not originally included as a UGA, and was analyzed separately from the other UGAs. Refer to *TM 11a – Impacts to Facilities due to Brookfield UGA* in **Appendix Y** for more information.

Figure ES - 4: SPWA Partner Agencies, 2005 Regional Service Area Boundary, Ultimate Service Area Boundary, and UGAs



The area comprised by the 2005 Regional Service Area and the twelve UGAs considered serves as the Ultimate SPWA Service Area in this Systems Evaluation.

ES-3 Land Use

A Geographical Information System (GIS) land use database was created by assembling land use data from SPWA partner agencies and available planning information sources for the UGAs and/or other planning areas. The varieties of codes used to describe land use categories were consolidated from the relevant land use agencies in the region to facilitate a service area-wide analysis. Service area land uses in three scenarios – June 2004, buildout, and buildout including intensification and rezones – were determined and catalogued in the GIS database. **Table ES - 2** and **Table ES - 3** summarize the June 2004 and buildout land use acreages – which are connected, or anticipated to be connected to the sanitary sewer system – within the DC and PG WWTP sewersheds. **Figure ES - 5** and **Figure ES - 6** illustrate the June 2004 and buildout land uses for parcels in the 2005 Regional Service Area.

Table ES - 2: Summary of June 2004 [1] Land Use within 2005 Regional Service Area Boundary

Land Use Designation	Connected [2] Area (Acres)		Total Connected [2] Area
	Pleasant Grove Sewershed	Dry Creek Sewershed	(Acres)
Commercial	495	1,622	2,117
Heavy Industrial	364	111	475
Light Industrial	616	316	932
Mixed Use	0	7	7
Open Space	1,398	737	2,135
Parks > 10 Acres	247	263	510
Public/Quasi-Public	154	467	621
Residential 1 DU	4,186	9,343	13,529
Residential 2 DU	0	280	280
Residential 3 DU	0	37	37
Residential Multiple DU	380	547	927
Schools	171	418	589
Total Acreage	**8,011**	**14,148**	**22,159**

Footnote:

1. June 2004 conditions represent the baseline conditions for this Systems Evaluation.
2. Connected refers to parcels that are developed (i.e., non-vacant) and sewered (i.e., not on septic tanks).

Table ES - 3: Summary of Buildout Land Use within 2005 Regional Service Area Boundary

Land Use Designation	Buildout Connected Area (Acres)		Total Buildout Connected Area (Acres[1,2])
	Pleasant Grove Watershed [1]	Dry Creek Watershed [2]	
Commercial	2,151	2,915	5,066
Heavy Industrial	1,715	263	1,978
Light Industrial	1,599	637	2,236
Mixed Use	13	12	25
Open Space	7,318	3,502	10,820
Parks > 10 Acres	303	361	664
Public/Quasi-Public	327	878	1,205
Residential 1 DU	7,629	18,859	26,488
Residential 2 DU	0	839	839
Residential 3 DU	9	366	375
Residential Multiple DU	789	635	1,424
Schools	377	540	917
Total Acreage	**22,231**	**29,808**	**52,039**

Footnotes:

1. Includes portion of Placer Ranch UGA within the 2005 Regional Service Area.
2. Includes portion of Placer Vineyard UGA within the 2005 Regional Service Area.

Figure ES - 5: June 2004 Connected Land Use in 2005 Regional Service Area

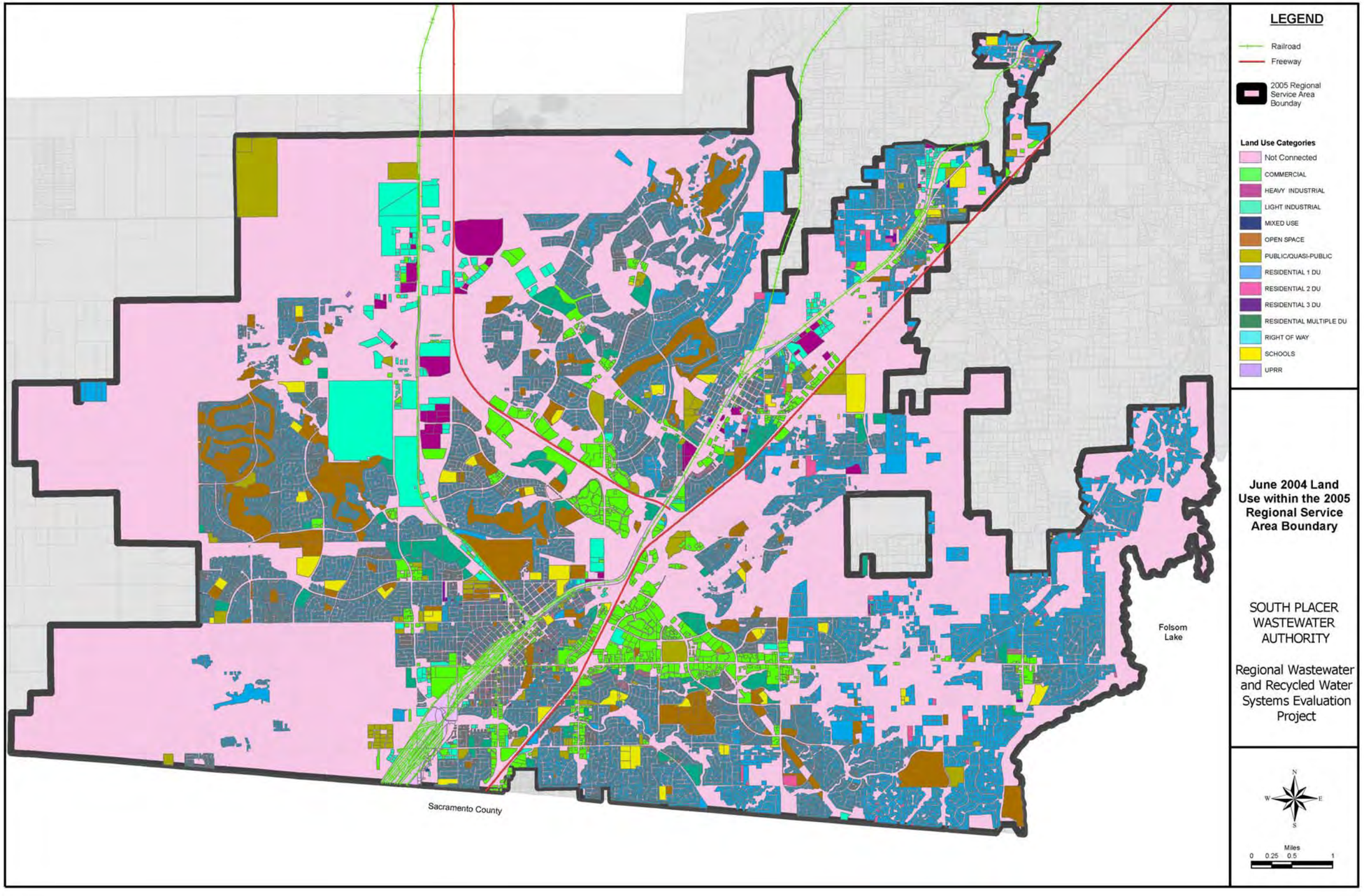
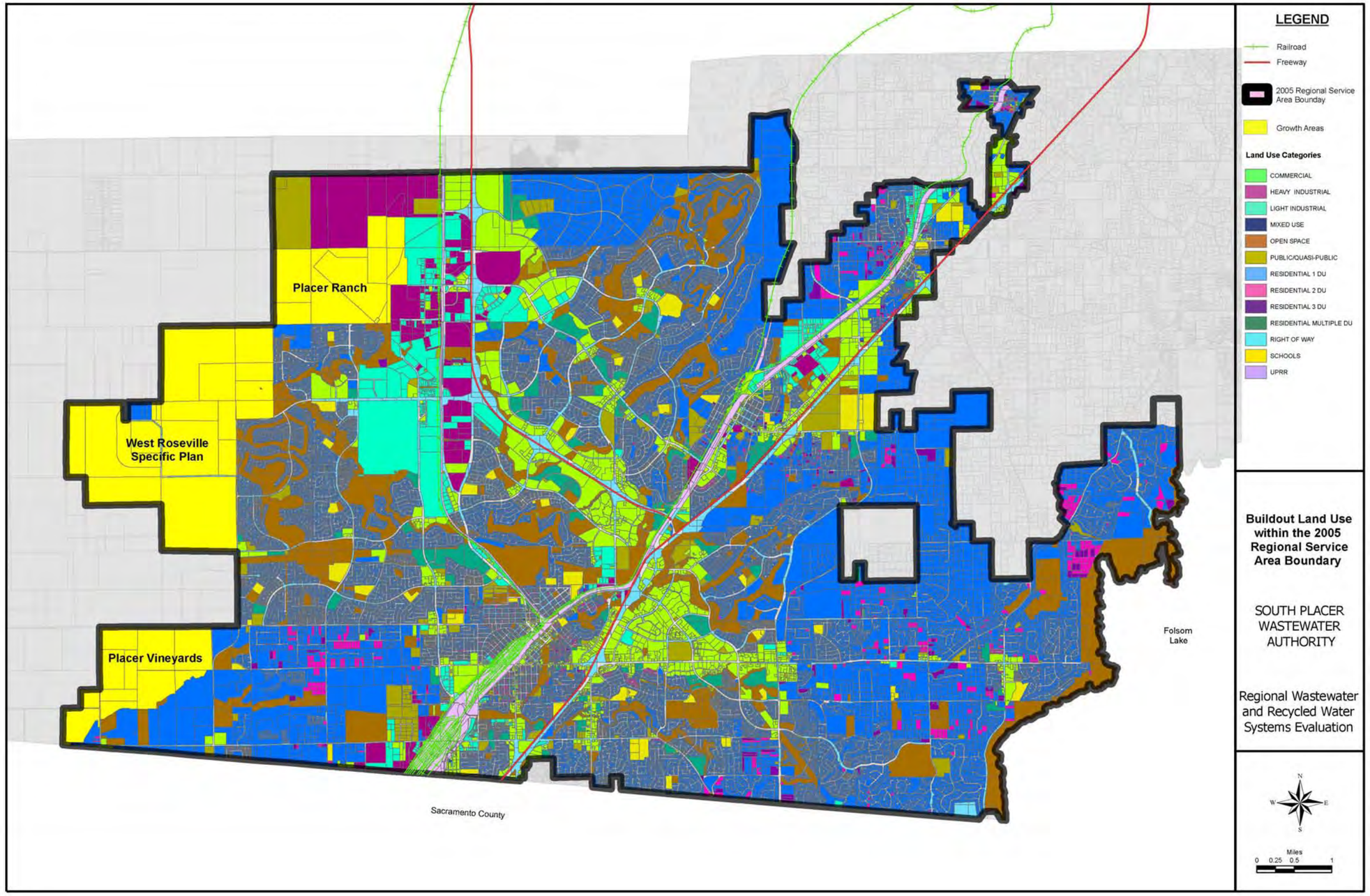


Figure ES - 6: Buildout Land Use in 2005 Regional Service Area



Contrasting June 2004 land uses with those projected at buildout, the service area is projected to densify on both the western and eastern edges, such that the service area will be almost completely sewered by the time it is built out.

ES-4 Unit Flow Factors and Flow Projections

In order to characterize the wastewater flows in the service area, large point sources were first identified. **Table ES - 4** summarizes the point sources and their June 2004 and projected flows.

Table ES - 4: Point Source Flow Summary

Point Source	Location	June 2004 Flow Data Source	June 2004 Flow (gpd)	Projected Buildout Flow (gpd)
Union Pacific Railroad	Roseville	City of Roseville	85,000	85,000
Landfill	Placer County	City of Roseville	5,000	5,000
NEC	Roseville	Flow Monitor Data	700,000	2,000,000
HP	Roseville	City of Roseville	200,000	484,000
Kaiser Hospital	Roseville	Water Use Data	50,000	50,000
Inviro Tech	Placer County	Placer County	20,000	40,000
Formica [1]	Placer County	Placer County	60,000	60,000
Rio Bravo Power Plant	Placer County	Placer County	15,000	15,000

Footnote:

1. Although Formica has recently downsized its operation in Placer County, the point source flows remain in the SPWA model in order to assist in anticipating likely buildout flow and loading scenarios.

Additional wastewater flow characterization was performed by reviewing flow data from permanent flow monitoring sites in Roseville, SPMUD and Placer County from September and October 2004. The data, in addition to water billing data, were used to develop a set of unit flow factors. The unit flow factors provide the estimated wastewater flow generation rates for each of the consolidated land use categories, and were used across the service area to estimate June 2004 wastewater flow conditions and predict those at buildout. **Table ES - 5** presents the unit flow factors developed for base sanitary flow (BSF), the flow type used for trunk sewer modeling purposes, and average dry weather flow (ADWF) – or the average of July, August, and September flows – used for WWTP expansion purposes.

Table ES - 5: BSF and ADWF Unit Flow Factors

Land Use Category	Units	Proposed BSF Unit Flow Factor [1] (for Trunk Sewer Modeling)	Proposed ADWF Unit Flow Factor [2] (for WWTP Flow Projections)	1996 Master Plan Unit Flow Factor
Commercial	gpd per acre	800	850	1,040
Heavy Industrial	gpd per acre	800	850	1,560
Light Industrial	gpd per acre	800	850	1,040
Mixed Use	gpd per acre	2,160	2,300	N/A
Public/Quasi-Public	gpd per acre	620	660	1,040
Schools	gpd per acre	160	170	N/A
Residential 1 DU	gpd per du	180	190	260
Residential 2 DU	gpd per du	180	190	260
Residential 3 DU	gpd per du	180	190	260
Residential Mult. DU [3]	gpd per acre	1,920	2,040	4,160
Open Space	gpd per acre	0	0	0
Parks > 10 Acres	gpd per acre	10	10	N/A
Vacant	gpd per acre	0	0	0

Footnotes:

1. Does not include allowance for GWI. Dry and wet season GWI were applied as gpd/acre rates on a sewershed-specific basis in the hydraulic model for trunk sewer analyses.
2. Includes allowance for dry season GWI, and represents the ADWF to be *generated by each land use category*.
3. The proposed Residential Multiple DU unit flow factor can also be represented as 120 gpd per DU (BSF) or 130 gpd per DU (ADWF).

Based on the unit flow factors and the land use GIS database, buildout flow projections were developed for both the DC and PG WWTP sewersheds. **Table ES - 6** summarizes the projections.

Table ES - 6: Summary of Buildout ADWF

Description of Area	Buildout ADWF (mgd)		Total Buildout ADWF (mgd)
	PGWWTP [1]	DCWWTP [2]	
2005 Regional Service Area [3,4,7,9]	16.02	14.53	30.55
Rezones & Intensifications	0.50	1.81	2.31
2005 SAB w/Rezones & Intensifications	16.52	16.34	32.51
Curry Creek UGA	2.72	--	2.72
Regional University UGA	1.17	--	1.17
Inviro Tech UGA	0.08	--	0.08
Placer UGA	--	0.01	0.01
Orchard Creek	0.02	--	0.02
Placer Ranch [5]	1.27	--	1.27
Placer Vineyards [6]	--	2.23	2.23
SMD-3	--	0.29	0.29
SPMUD UGA	--	1.11	1.11
Creekview UGA & Panhandle [8]	1.06	--	1.06
Sierra Vista UGA	2.10	--	2.10
Brookfield UGA	0.73		0.73
Total ADWF (mgd)	***25.67***	***19.98***	***45.65***

Footnotes:

1. Applies to the Pleasant Grove WWTP sewershed.
2. Applies to the Dry Creek WWTP sewershed.
3. Includes the portion of the Placer Ranch UGA located *within* the 1996 Master Plan and 2005 Regional Service Area boundary (i.e., "Placer Ranch Inside"). (The 1996 Master Plan Regional Service Area boundary and the 2005 Regional Service Area boundary are the same this area).
4. Includes the portion of the Placer Vineyards UGA located *within* the 1996 Master Plan and 2005 Regional Service Area boundary (i.e., "Placer Vineyards Inside").
5. Includes the portion of the Placer Ranch UGA located *outside* the 1996 Master Plan and 2005 Regional Service Area boundary.
6. Includes the portion of the Placer Vineyards UGA located *outside* the 1996 Master Plan and 2005 Regional Service Area boundary.
7. Includes all of the West Roseville Specific Plan (WRSP) area based on 2009 proposed land uses.
8. "Panhandle" refers to a 238-acre portion of the Reason Farms planning area that is adjacent to the western boundary of the 511- acre Creekviw UGA. Though not considered a UGA, the panhandle area is assumed to contribute wastewater flow to the Creekview UGA.
9. Does not include Rezones & Intensifications (redevelopment areas).

Based on planned rezones and intensifications (i.e., redevelopment areas) in the 2005 Regional Service Area, additional incremental flows were identified, and are summarized in **Table ES - 7** below. Rezones and intensifications are addressed in greater detail in Section ES-7 and in Chapter 9.

Table ES - 7: Redevelopment Incremental ADWF

Redevelopment Areas	Incremental ADWF (mgd)		Total Incremental ADWF (mgd)
	DCWWTP	PGWWTP	
Rezones [1]			
Rocklin [2]	0.00	0.00	0.00
Roseville [3]	0.17	0.50	0.67
Subtotal	0.17	0.50	0.67
Intensification			
Rocklin [2]	0.25	0.00	0.25
Roseville [3]	1.39	0.00	1.39
Subtotal	1.64	0.00	1.64
Total	***1.81***	***0.50***	***2.31***

Footnote:
1. Does not include rezone areas with negligible changes in projected flow (-0.01 mgd to 0.04 mgd), or rezone areas that were included in the analysis of intensification areas.
2. Inside SPMUD service area.
3. Inside City of Roseville service area.

Including incremental flow projections for redevelopment areas, the total buildout projected flows for the 2005 Regional Service Area and UGAs are summarized in **Table ES - 8** below.

Table ES - 8: Total Buildout ADWF

Description of Area	Total Buildout ADWF (mgd)		
	PGWWTP	DCWWTP	Total
2005 Regional Service Area	16.02	14.53	30.55
UGAs	9.15	3.64	12.79
Rezones [1]	0.50	0.17	0.67
Intensifications [1]	-	1.64	1.64
Total	***25.67***	***19.98***	***45.65***

Footnotes:
1. Includes incremental ADWF only.

ES-5 Trunk Sewer Evaluation

Prior to the preparation of the Systems Evaluation, development criteria, rather than a hydraulic model, were used to size all sewers and related infrastructure in the SPWA service area. Due to changes in land use and the size of the service area, however, it has become increasingly necessary to develop and utilize a more sophisticated approach to sizing trunk sewers. To that end, the *Unit Flow Factor Sets and Sewer Design Criteria TM* (TM 3a) was developed, and is included as **Appendix G**. TM 3a states that for sewers 15 to 18 inches in diameter or larger, the hydraulic model, described in more detail below, should be used. For smaller sewers, TM 3a provides criteria, including safety and peaking factors, to be used for determining flows and pipe size.

The model developed for the Systems Evaluation includes all trunk sewers in the 2005 Regional Service Area that are greater than or equal to 15 inches in diameter, as well as three pump stations and their associated force mains. The trunk sewer evaluation process involved a series of steps, including 1) initial development of the model, 2) calibration of the model against metered flow and storm data, 3) use of the model to project flow conditions, and 4) development and simulation of model network improvements and extensions to reflect and verify recommended system improvements and extensions.

ES-5.1 Hydraulic Model Development

A computer hydraulic model of the trunk sewer system was developed to:

- help simulate June 2004 and buildout conditions;
- identify June 2004 and buildout deficiencies; and,
- plan for capital improvements to the trunk sewer system.

Both June 2004 and buildout model networks were developed; the buildout model network is comprised of the June 2004 network and a variety of sewer extensions to future developments. **Figure ES - 7** shows the buildout model network, while the total length of modeled pipes in the June 2004 and buildout model networks is summarized in **Table ES - 9**. The SPWA model was developed concurrently with the City of Roseville Sanitary Sewer Model.

Figure ES - 7: Buildout Model Network

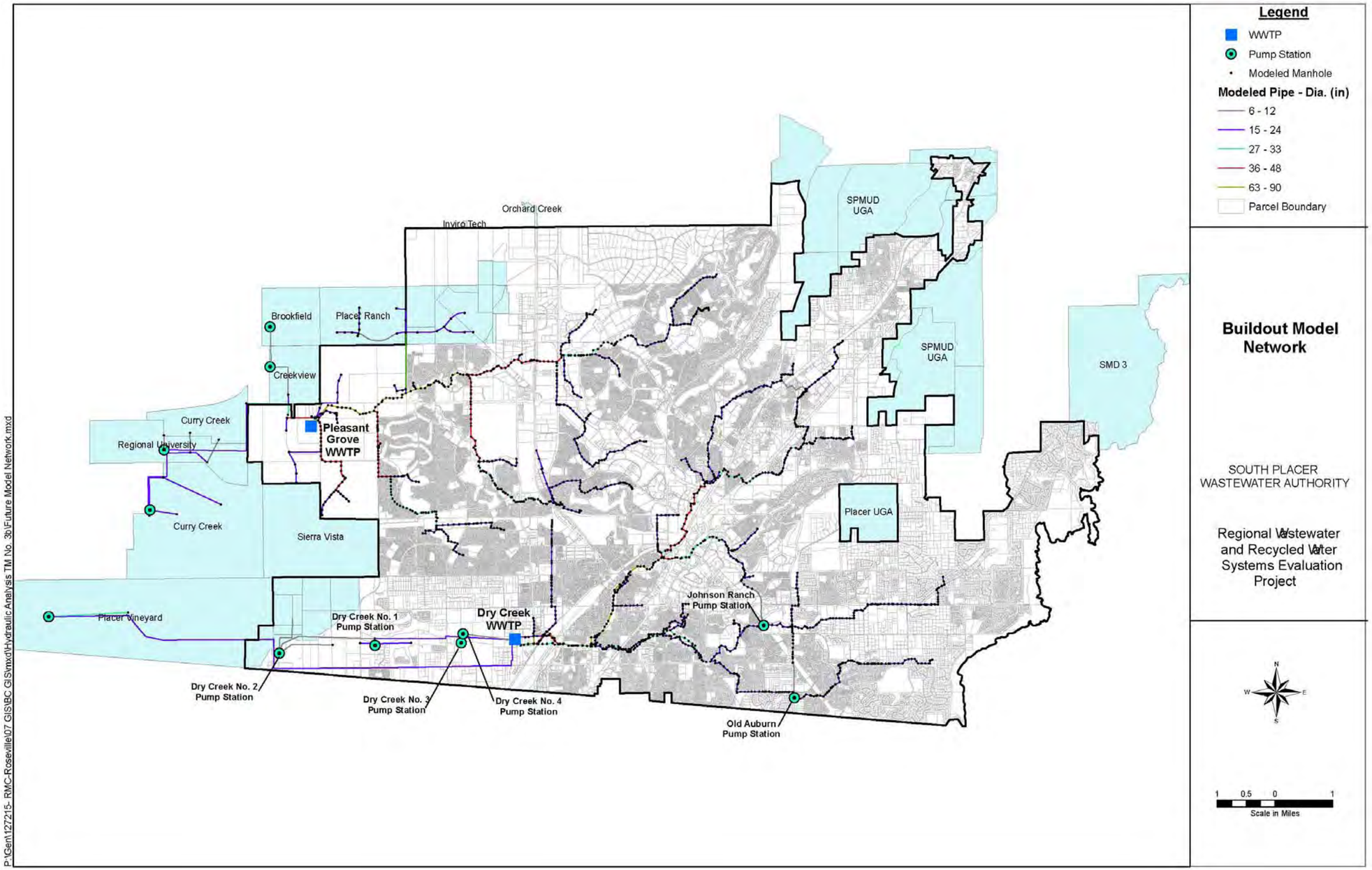


Table ES - 9: Summary of Hydraulic Model Network

Diameter (in)	Length (ft)	
	June 2004	Buildout
6	462	462
8	8,026	8,026
10	8,264	8,264
12	11,405	21,726
15	93,622	102,540
16	8,599	8,539
18	93,644	93,573
20	4,080	4,080
21	33,527	62,190
24	32,801	41,097
27	9,608	23,655
30	26,311	33,570
33	21,508	25,242
36	16,631	19,618
42	30,417	33,494
48	403	4,860
63	8,629	8,629
66	11,286	11,286
72	10,867	10,867
78	5,862	5,862
90	1,082	1,082
Total	**437,035**	**528,663**

ES-5.2 Hydraulic Assessment

Hydraulic assessments were performed to determine separately the performance of 1) the June 2004 system under June 2004 conditions, and 2) the buildout system (i.e., the system within the Ultimate SPWA service area under buildout conditions). Using criteria developed for this Systems Evaluation, deficiencies were identified for unimproved areas of the June 2004 and buildout model networks.

In general, the hydraulic assessment for the June 2004 scenario indicates that the system is hydraulically in very good shape. This assessment is reflected by the relatively few and limited deficiencies that were identified.

The hydraulic assessment of the buildout scenario indicates a variety of deficiencies in the eastern end of the service area, particularly among the trunk sewers conveying flows from the SPMUD, SMD-3, and Placer County UGAs.

ES-5.3 Recommended Trunk Sewer Improvements and Extensions

To address the identified deficiencies, improvement projects were developed for both June 2004 and buildout infrastructure. For areas with trunk sewer infrastructure present in June 2004, recommendations for improvements to the existing facilities were developed. For areas without trunk sewer infrastructure as of June 2004, recommendations for new facilities were developed. and **Figure ES - 8** summarize the recommended improvement projects for the June 2004 system, while **Table ES - 11** and **Figure ES - 9** summarize the recommended improvement (i.e., sewer extension) projects for the buildout system. It should be noted that land use authority responsible for each UGA will be responsible for ensuring that infrastructure identified in **Table ES - 11** is constructed.

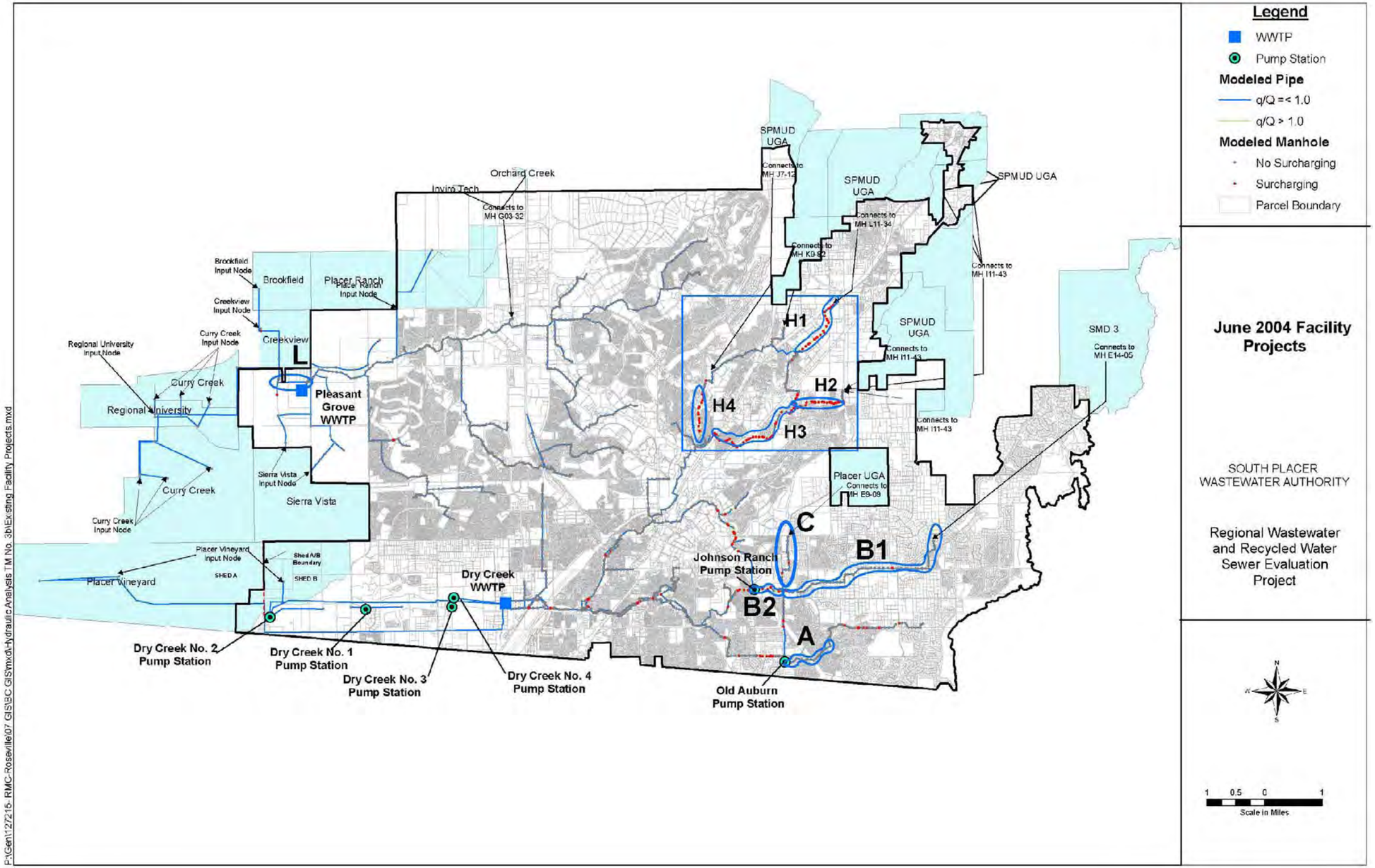
Table ES - 10: Summary of Recommended Facility Improvement Projects within the 2005 Regional Service Area Boundary (addressing Buildout Flows)

Project No. [1]	Agency with Primary Responsibility	Item	Quantity	Estimated Capital Cost [5]	Proposed CIP Budget Cost [2,5]
				($)	($)
1 - Area A	Placer County	18-inch Gravity Sewer	7,500 [3] lf	2,475,000	3,218,000
			Project 1 Subtotal	**2,475,000**	**3,218,000**
2- Area B1 [4]	SMD-3 UGA	21-inch Gravity Sewer	27,000 [3] lf	9,801,000	12,741,000
			Project 2 Subtotal	**9,801,000**	**12,741,000**
3- Area B2	Placer County SMD-3 UGA SPMUD	24-inch Gravity Sewer	4,500 [3] lf	1,868,000	2,428,000
			Project 3 Subtotal	**1,868,000**	**2,428,000**
4- Area C	Placer County SPMUD	21-inch Gravity Sewer	6,000 lf	2,178,000	2,831,000
			Project 4 Subtotal	**2,178,000**	**2,831,000**
7 - Area L	Regional University UGA	30-inch Gravity Sewer	1,500 lf	681,000	885,000
	Curry Creek UGA	36-inch Gravity Sewer	3,000 lf	1,515,000	1,970,000
			Project 7 Subtotal	**2,196,000**	**2,855,000**
			Total Cost	**18,518,000**	**24,073,000**

Footnotes:

1. Projects 1 and 6 address deficiencies as of June 2004. See .
2. Includes 30 percent contingency.
3. Includes 50 percent allowance for alternative alignment.
4. Placer County is evaluating this project to determine if there is a shorter, more efficient routing option that can be accomplished through SMD-2.
5. In 2005 dollars.

Figure ES - 8: Recommended Facility Improvement Projects within the 2005 Regional Service Area Boundary (addressing Buildout Flows)



Footnote:

1. SPMUD will develop necessary improvement projects for Areas H1-H4.

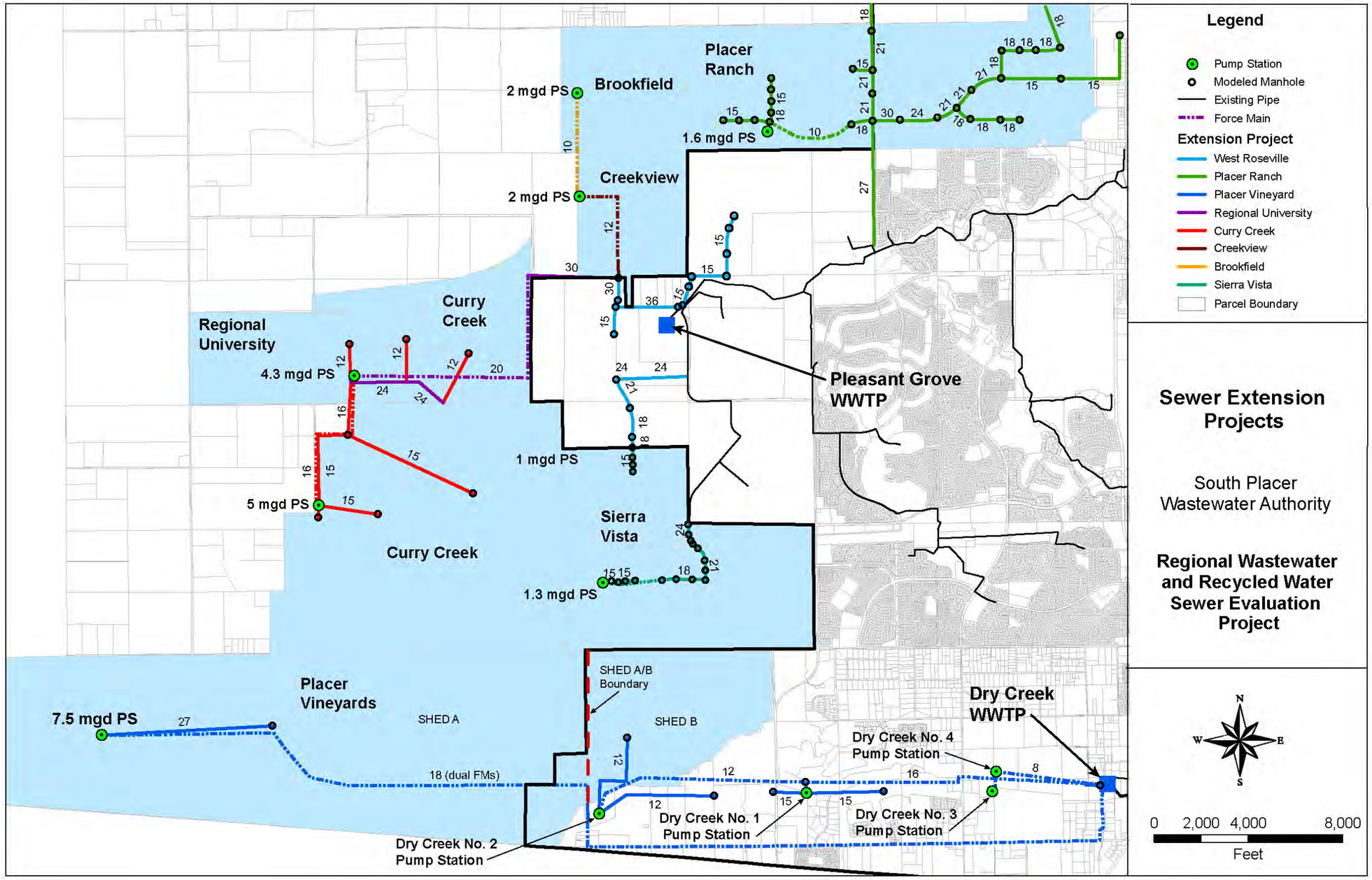
Table ES - 11: Summary of Recommended Sewer Extension Projects [1,2]

UGA [3]	Responsible Land Use Authority	Item	Quantity	Estimated Capital Cost ($)	Proposed CIP Budget Cost [4] ($)
1-Placer Ranch	Placer County	Gravity Sewers	11,700 lf	5,396,000	7,015,000
			Project 1 Subtotal	**5,396,000**	**7,015,000**
2-Placer Vineyards/ West Dry Creek	Placer County	Gravity Sewers	21,500 lf	6,899,000	8,969,000
		Force Mains	72,900 lf	21,525,000	27,983,000
		Pump Stations	4	4,650,000	6,045,000
			Project 2 Subtotal	**33,074,000**	**42,997,000**
3-Regional University	Placer County	Gravity Sewers	7,900 lf	3,392,000	4,410,000
		Force Main	12,000 lf	3,120,000	4,056,000
		Pump Station	1	2,000,000	2,600,000
			Project 3 Subtotal	**8,512,000**	**11,066,000**
4-Curry Creek	Placer County	Gravity Sewers	19,000 lf	5,272,000	6,854,000
		Force Main	7,000 lf	1,568,000	2,039,000
		Lift Station	1	2,000,000	2,600,000
			Project 4 Subtotal	**8,840,000**	**11,492,000**
5-Creekview	City of Roseville	Force Mains	4,100 lf	713,000	927,000
		Pump Stations	1	1,500,000	1,950,000
			Project 5 Subtotal	**2,213,000**	**2,877,000**
7-Brookfield	City of Roseville	Force Mains	4,450 lf	668,000	869,000
		Pump Stations	1	1,500,000	1,950,000
			Project 7 Subtotal	**2,168,000**	**2,819,000**
			Total Cost	**60,203,000**	**78,266,000**

Footnotes:

1. These costs have been developed utilizing a unit cost table representative of municipal sewer projects in the respective SPWA area. Actual sewer infrastructure costs for each extension project will be determined by and will be the responsibility of each UGA.
2. Includes trunk sewers 15 inches and larger in diameter and pump stations and force mains.
3. Trunk sewer facilities for Sierra Vista were not modeled, due to limited available land use data at the time the original modeling was conducted. Instead, Sierra Vista flows were input at nodes adjacent to the WRSP area. Trunk sewer facilities identified in October 2007 are shown in Figure ES-11.
4. Includes 30 percent contingency.

Figure ES - 9: Recommended Sewer Extension Projects



ES-6 Wastewater Treatment Plant Expansions

The Dry Creek WWTP average dry weather flow (ADWF) is approximately 10.5 mgd, with an ADWF hydraulic capacity of 18 mgd. The Pleasant Grove WWTP ADWF is approximately 7 mgd, with an ADWF hydraulic capacity of 12 mgd. As of June 2004, both WWTPs have excess hydraulic capacity and are consistently in compliance with their NPDES discharge permits; however, the organic loadings to the plants are approaching both plants' design capacity. As such, plant improvements will be needed in the near term. Additional improvements will be needed in the longer term to address the increases in projected future flows and loadings as the Ultimate Service Area builds out. The expansion requirements developed for the Systems Evaluation are the product of several steps, including the establishment of projected flows and loadings, the determination of flow and loading peaking factors, the development of facility expansion recommendations to handle the projected flows and loadings at buildout, and the development of a timeline for phasing the construction of the recommended improvements.

ES-6.1 Pleasant Grove

ES-6.1.1 Projected Flows and Peaking Factors

Projected wastewater flows to the SPWA's two regional wastewater treatment facilities, the Dry Creek and Pleasant Grove WWTPs, were used to predict a timeline for needed upgrades and expansions. The projected ADWF to the Pleasant Grove WWTP inside the 2005 Service Area are shown in

Figure ES - 10; projected ADWF for the Ultimate Service Area and including rezones and intensifications is shown in **Figure ES – 11.**

Figure ES - 10**: PGWWTP Inside 2005 Service Area Boundary Contributing Agency Flow Projections**

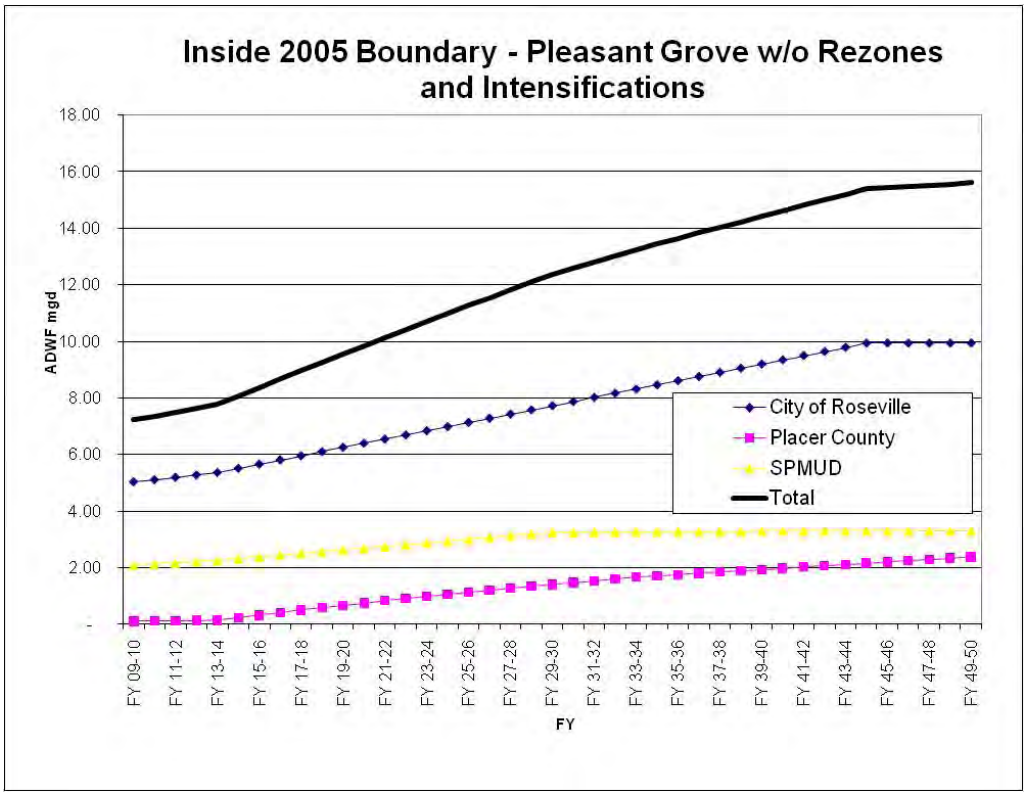
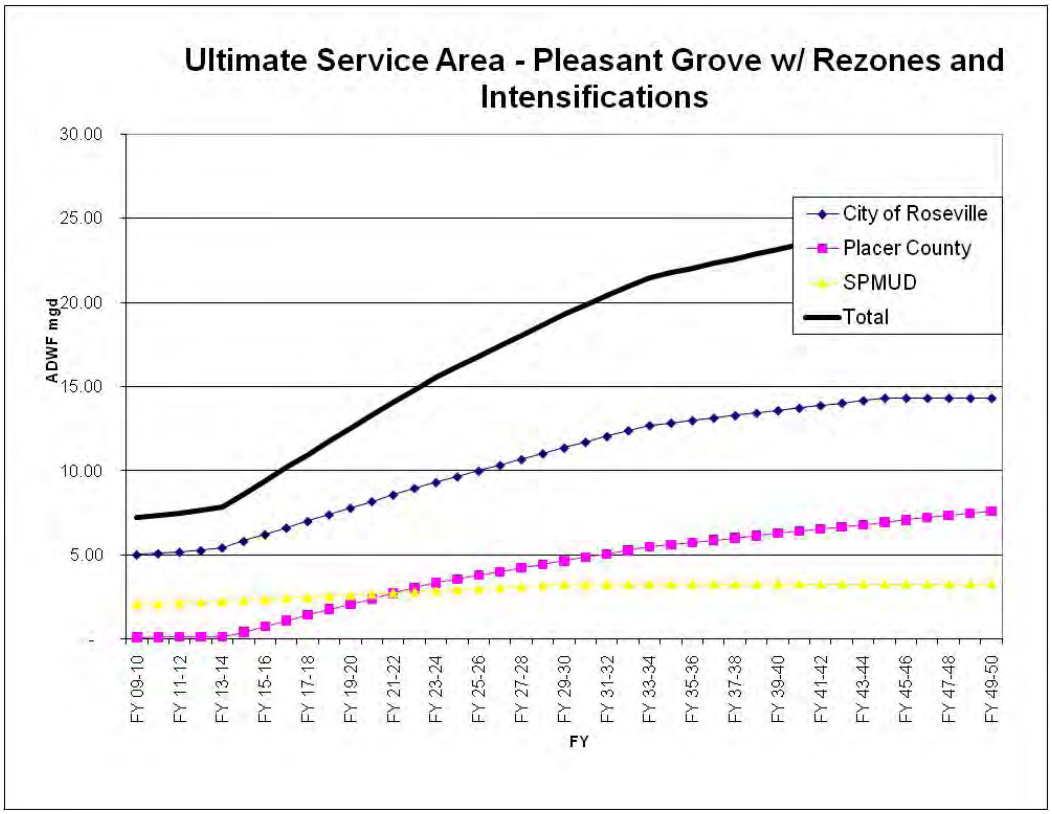


Figure ES - 11: PGWWTP Ultimate Service Area Boundary Contributing Agency Flow Projections



This flow projection was developed based upon a series of assumptions of how the Pleasant Grove sewershed builds out over time, and assumptions of when the UGAs build out. These assumptions are documented in Chapter 4 of the Systems Evaluation and in TM 4b. Buildout flow projections for Pleasant Grove WWTP are summarized in **Table ES – 12**.

Table ES - 12: Summary of Buildout ADWF Projections

Plant	ADWF (mgd)
Pleasant Grove	24 (beyond FY49-50) 27 (ultimate)

ES-6.1.2 Projected Loadings

Total suspended solids (TSS) and biological oxygen demand (BOD) projections were developed based on recent historical TSS and BOD concentrations measured at the PGWWTP. Projected ADWF, TSS and BOD loadings at the PG WWTP are summarized in **Table ES - 13**.

Table ES - 13: Summary of BOD and TSS Loading Projections

Load Type	PGWWTP (Buildout)
Flow (mgd)	
Average Dry Weather Flow (ADWF)	24
Peak Month Flow (PMF) [1]	33.6
Peak Day Wet Weather Flow (PDWWF) [1]	48
Peak Hour Wet Weather Flow (PHWWF) [1]	60
BOD Loading (lb/day)	
Average	57,000
Maximum Month	68,400
TSS Loading (lb/day)	
Average	68,100
Maximum Month	81,700

Footnote:
1. Refer to Chapter 4 for details.

ES-6.1.3 Recommended WWTP Expansions

Recent improvement projects have increased the existing BOD loading capacity to 22,000 lb/day BOD to address BOD loading that was higher than anticipated during design of the plant. Subsequent phases of construction would add both hydraulic capacity and organic capacity to meet the projected needs at buildout.

The proposed expansions and upgrades for the PGWWTP are listed below, while the recommended treatment process is shown in **Figure ES - 12**.

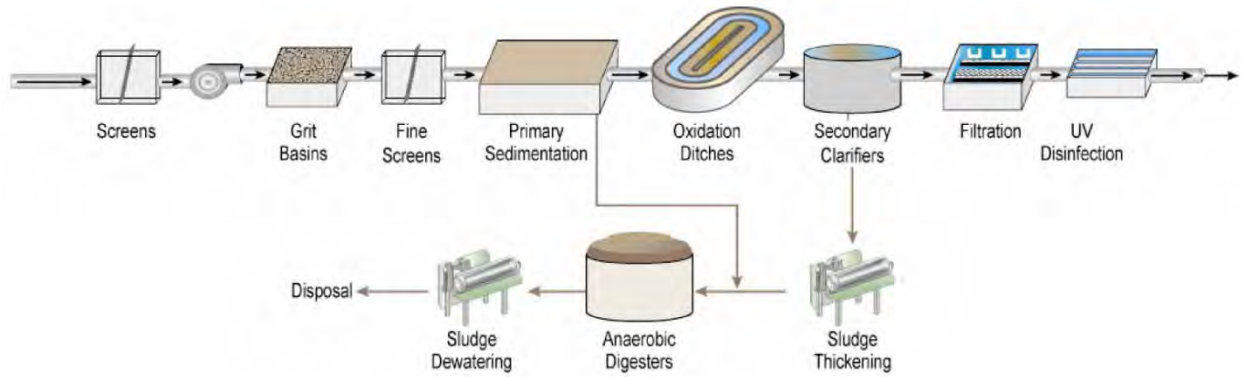
PGWWTP: Phase I Construction (on-line in FY 2010/11)

- Influent pumps (1)
- Grit basins (1)
- Fine screens (2)
- Primary sedimentation (4)
- Odor control (1)
- Oxidation ditches (1)
- Secondary clarifiers (1)
- RAS/WAS pump station (1)
- Tertiary filtration (2)
- UV disinfection (3)
- Centrifuge thickeners (2)
- Building (1)
- Anaerobic digesters (3)
- Building (1)
- Co-generation (1)

PGWWTP: Phase II Construction (on-line FY 2016/17)

- Influent screens (1)
- Grit basins (1)
- Fine screens (1)
- Primary sedimentation (3)
- Oxidation ditches (2)
- Secondary clarifiers (3)
- RAS/WAS pump station (modify)
- Tertiary filtration (4)
- UV disinfection (2)
- Anaerobic digesters (1)
- Building (modify)
- Centrifuge dewatering (1)
- Co-generation (1)
- Standby generator (1)

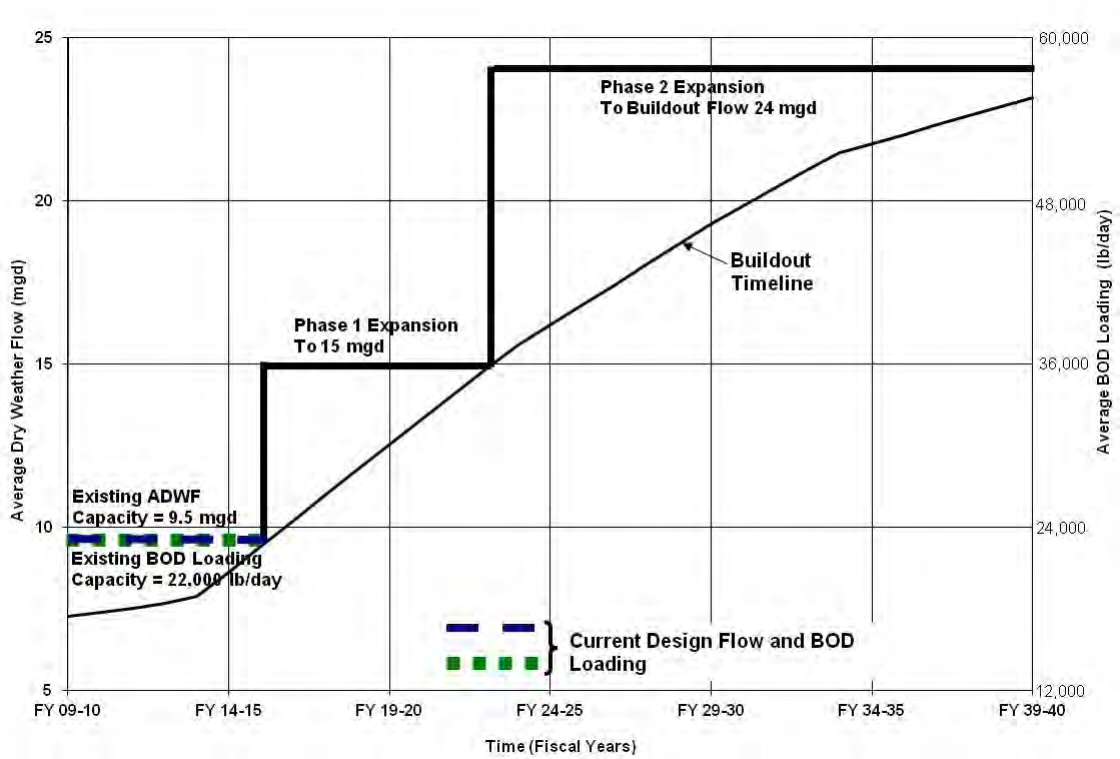
Figure ES - 12: Proposed Expanded and Upgraded PGWWTP Treatment Schematic



At the PGWWTP, the process will be enhanced considerably over time for long-term energy efficiency. In addition to adding fine screens, primary sedimentation basins are proposed to be added to lessen the solids and organic loading on the secondary process, reducing energy consumption, and allowing the expansion of the secondary process to be downsized. This necessitates the handling of more solids, however, and anaerobic digestion and gas handling facilities are proposed as well.

ES-6.1.4 Recommended Construction Phasing and Costs

Figure ES - 13: Recommended PGWWTP Construction Phasing



Footnote:
The buildout timeline depicted includes the Brookfield UGA.

At the PGWWTP, Phase 1 expansion will bring the plant to an ADWF of 15 mgd, while Phase 2 will bring to the plant to its buildout ADWF of 24 mgd.

Table ES - 14: Summary of WWTP Construction Phasing and Planning Level Costs

Construction Phase	Phase 1 Construction			Phase 2 Construction		
Year on-line	FY 2015/16			FY 2022/23		
ADWF Capacity	15 [1] mgd			24 mgd		
Treatment Plant	Construction Cost	Engineering & Admin	Total Cost [1]	Construction Cost	Engineering & Admin	Total Cost [2]
PGWWTP	$46,700,000	$11,700,000	$58,300,000	$48,300,000	$12,100,000	$60,400,000

Footnotes:

1. Refer to Table ES - 6 for projected wastewater flows for the Pleasant Grove sewersheds and WWTPs. Projected flow to the Pleasant Grove WWTP from the area within the 2005 Regional Service Area boundary is approximately 16 mgd.
2. Costs are based on a December 2005 ENR of 8462 and include the following allowances: Sitework 10%, Electrical and Controls 15%, Contingency 30%, and Engineering and Administration 25%. The construction cost estimates are order-of-magnitude estimates as defined by the American Association of Cost Engineers.

The total estimated cost for Phase 1 Pleasant Grove WWTP, which includes both construction costs and engineering and admin costs, is approximately $58 million. Phase 1 is anticipated to be completed by fiscal year 2011. For Phase 2 construction at both plants, the total estimated cost is approximately $101 million. Phase 2 is anticipated to be completed by fiscal year 2017.

ES-6.2 Dry Creek

Dry Creek expansion requirements and recommendations were developed as part of the Dry Creek Wastewater Treatment Plant Initial Assessment (CH2MHill 2008). This section summarizes the conclusions and recommendations of that report.

ES-6.2.1 Projected Flows and Peaking Factors

Projected wastewater flows were used to predict a timeline for needed upgrades and expansions. The projected ADWF to the Dry Creek WWTP inside the 2005 Service Area are shown in **Figure ES – 14**; projected ADWF for the Ultimate Service Area and including rezones and intensifications is shown in **Figure ES – 15.**

Figure ES - 14: DCWWTP Inside 2005 Service Area Boundary Contributing Agency Flow Projections

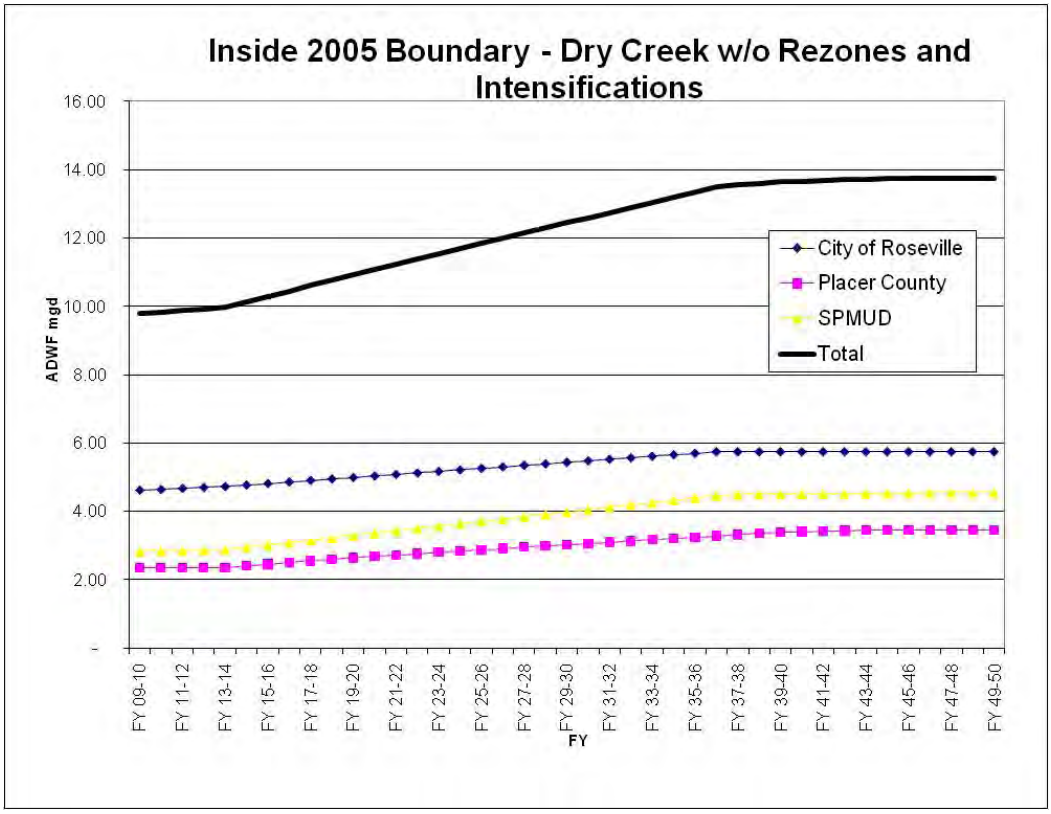
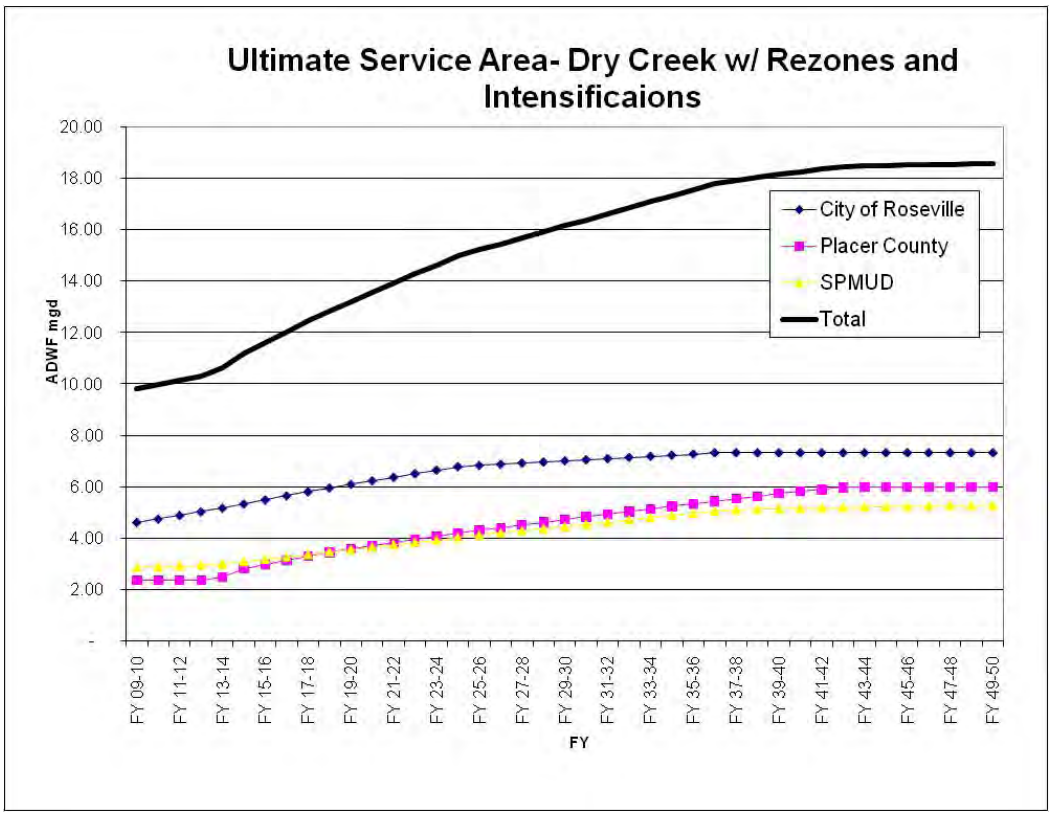


Figure ES - 15: DCWWTP Ultimate Service Area Boundary Contributing Agency Flow Projections



This flow projection was developed based upon a series of assumptions of how the Pleasant Grove sewershed builds out over time, and assumptions of when the UGAs build out. These assumptions are documented in Chapter 4 of the Systems Evaluation and in TM 4b.

Table ES – 15 summarizes the the Phase I and Phase II capacity requirements. These capacity requirements are shown with the projected ADWF growth scenarios in **Figure ES - 19**.

Table ES - 15: Summary of Capacity Requirements

Growth Scenario	ADWF (mgd)
Existing ADWF Capacity	11.5
Phase I ADWF Capacity	14.5
Phase II ADWF Capacity	18

ES-6.2.2 Projected Loadings

Total suspended solids (TSS) and biological oxygen demand (BOD) projections were developed based on data from February 2005 to December 2006. **Table ES -16** summarizes the average annual loading concentrations and peaking factors.

Table ES - 16- Average Annual Solids Loading and Peaking Factors

Parameter	Units	BOD_5	TSS	Design Function
Average Annual Loading	lb/d	23,800	23,500	Nominal loading only; used in estimating operation and maintenance requirements
Average Annual Concentration	mg/L	248	245	Nominal loading only
Peak Month PF	-	1.24	1.31	Sizing aeration basins, based on process requirements; sizing solids handling facilities
Peak Day PF	-	2.00[1]	1.49	Used as a minimum requirement for aeration basins blower peak capacity

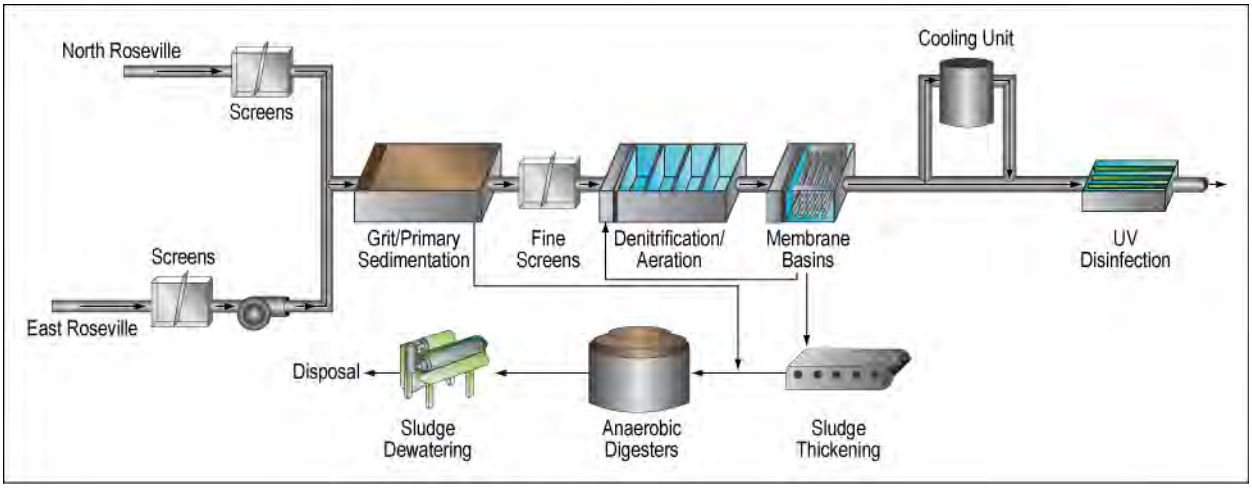
Footnotes:

1. The calculated peak day BOD_5 Loading peaking factor was 1.70. The selected (and applied) BOD_5 peak day peaking factor was 2.0.

ES-6.2.3 Recommended WWTP Expansions

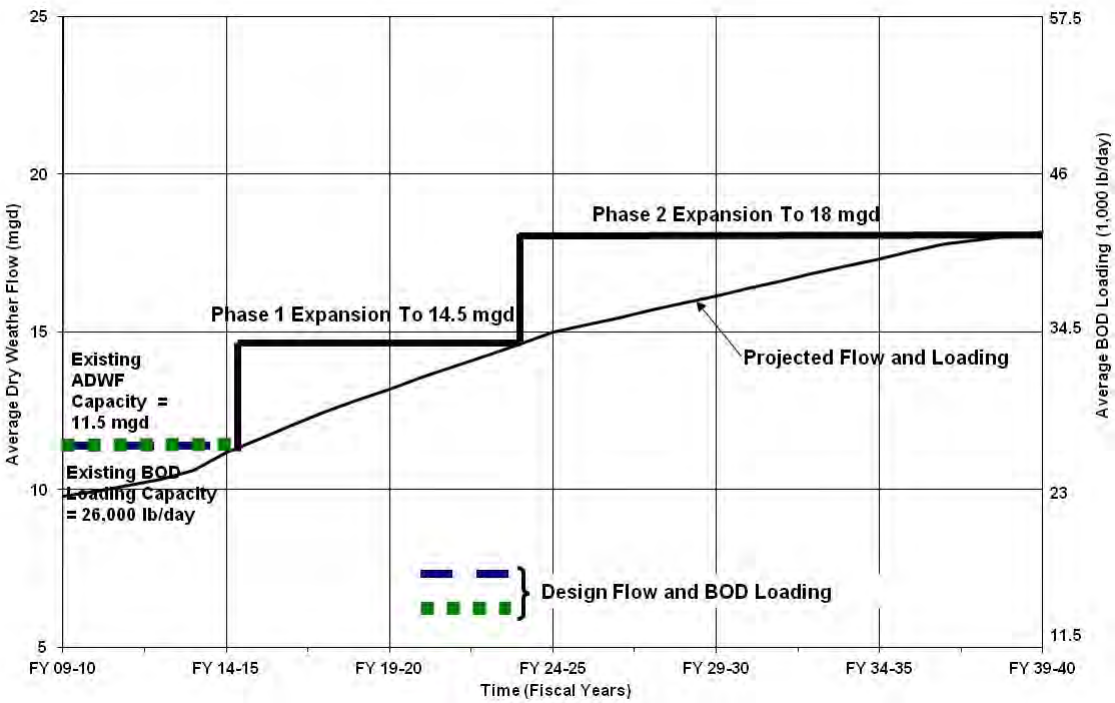
The recommended treatment process is shown in **Figure ES - 16**.

Figure ES - 16: Dry Creek Phase II Treatment Schematic



ES-6.2.4 Recommended Construction Phasing and Costs

Figure ES - 17: Recommended DCWWTP Construction Phasing



Footnote:
Existing and Phase 1&2 capacity taken from CH2MHill 2008

At the DCWWTP, Phase 1 expansion will bring the plant to an ADWF of 14.5 mgd, while Phase 2 will bring to the plant to its buildout ADWF of 18 mgd.

Table ES - 17: Summary of WWTP Construction Phasing and Planning Level Costs

Construction Phase	Phase 1 Construction	Phase 2 Construction
Year on-line	FY 2015/16	FY 2023/24
ADWF Capacity	14.5 mgd	18 mgd
Treatment Plant	Total Capital Costs (May 2008)	Total Capital Costs (May 2008)
DCWWTP	$27,000,000	$71,000,000

ES-7 Recycled Water Systems Evaluation

Recycled water (meeting Title 22 standards for unrestricted reuse) is produced at both the Dry Creek and Pleasant Grove WWTPs, and is being used by customers to irrigate golf courses, parks and streetscape irrigation. The Recycled Water Systems Evaluation was conducted to assist SPWA in the ongoing expansion of a regional water recycling system throughout the service area, including reliable and sustainable service to meet the long-term demands in western Roseville and the UGAs. In doing so, a policy has been developed to supply only as much recycled water to UGAs as each UGA will contribute in wastewater flow – this is referred to as the "committed" supply.

ES-7.1 Market Assessment

An assessment of recycled water markets within the June 2005 and ultimate SPWA service areas was conducted to determine probable and potential recycled water customers and demands. **Table ES - 18** summarizes the predicted recycled water demands from existing (as of June 2004), near future, and UGA customers identified during the market assessment. Demands are associated to either the Dry Creek or the Pleasant Grove WWTP, to create a balance of recycled water demand to available supply. The required effluent discharge into Dry Creek is included as a demand on the Dry Creek system.

Table ES - 18: Summary of Recycled Water Demand Projections

Customer Category	July Day Demand (mgd)	July Day Committed [a,b] Supply (mgd)	Projected July Day Available Supply [d] (mgd)
DCWWTP			
Existing [c]	6.28	6.28	
Near Future	5.29	6.35	
UGAs	3.50	2.81	
Totals	**15.07**	**14.38**	**18.18**
PGWWTP			
Existing [c]	2.23	2.23	
Near Future	5.44	5.44	
UGAs	13.82	9.95	
Totals	**21.49**	**17.62**	**24.8**

Footnote:

a. The City of Roseville will only commit to providing a UGA with a supply of recycled water equal to the amount of wastewater that is generated by the UGA during July ADWF conditions.
b. July flowrates are the design flowrates.
c. As of June 2004.

d. Does not include rezones or intensification, but includes Brookfield flows.

ES-7.2 Recommended RW Projects

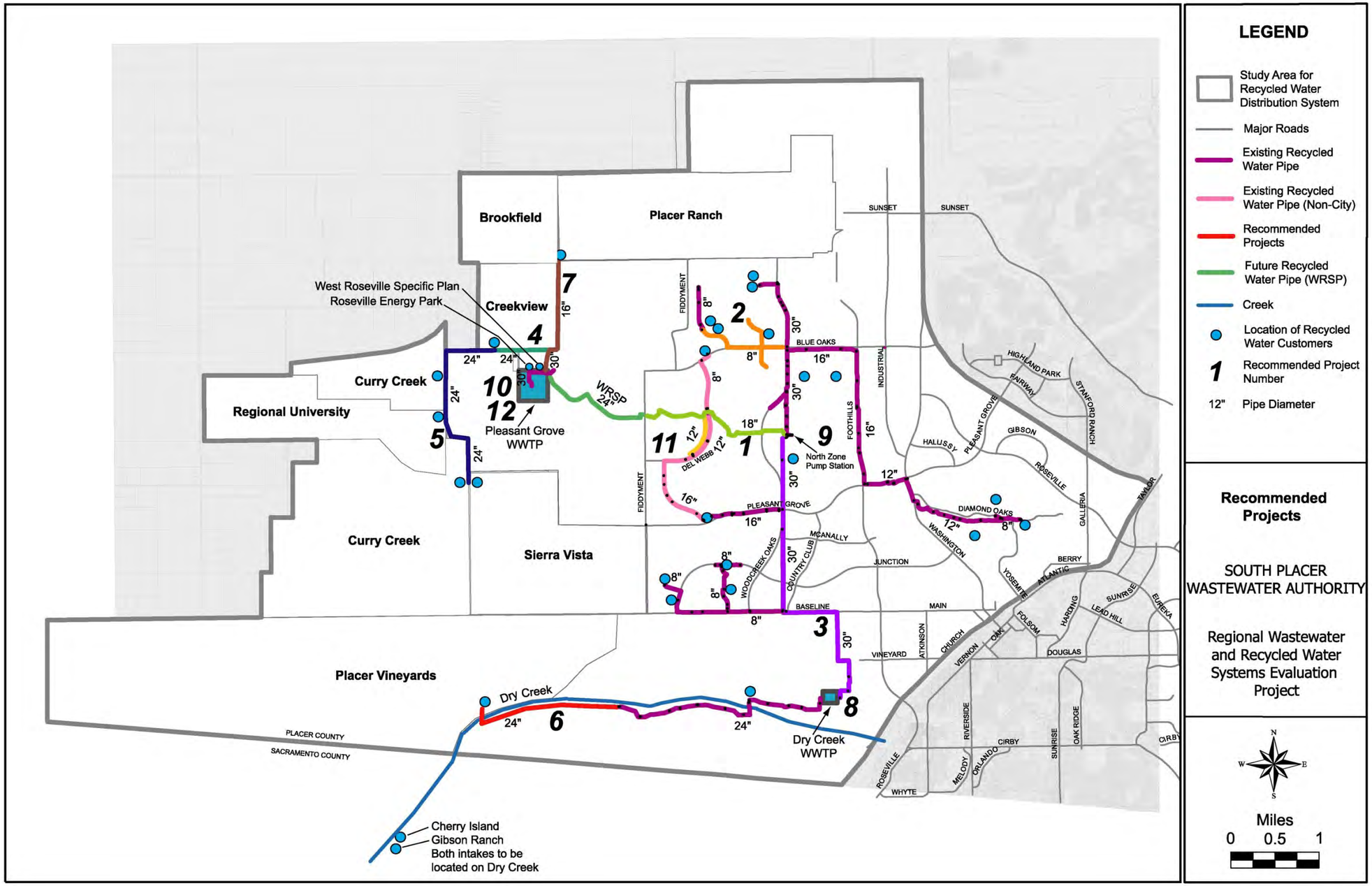
In order to serve the recycled water customers identified during the market assessment, several alternatives were developed. The recommended alternative, Alternative C, was selected because it balances the supply and demand for recycled water between the Pleasant Grove and Dry Creek Wastewater Treatment Plants most effectively, and minimizes capital expenditures. The recommended alternative and its associated projects are summarized in **Figure ES - 18** and **Table ES - 19**.

Table ES - 19: Summary of Recommended Projects for Alternative C

Project No.	Description	Size (in) or flow (gpm)	Length (ft)	Cost [d]
Phase I (in Progress) [a]				
1	18" FM Conversion for RW Use from PGWWTP	18"	9,700	n/a
11	Sun City Pipeline from 18" Converted Force Main (with option to supply WOGC[b] and SCGC[c])	12"	2,700	632,000
2	8" FM Conversion for RW Use	8"	8,900	n/a
3	30" FM Conversion for RW Use South of North Zone Pump Station	30"	19,600	n/a
		Subtotal	**40,900**	**$632,000**
Phase II (Year 2005 to 2010) [a]				
8	DCWWTP one-50 HP pump	1,900 gpm	-	98,000
9	North Zone PS one-50 HP pump	950 gpm	-	57,000
		Subtotal	**-**	**$155,000**
Phase III (Year 2010 to 2025) [a]				
4	Creekview Pipeline	24"	3,300	1,030,000
5	Creekview to Curry Creek North	24"	4,600	1,436,000
	Curry Creek North to Regional University	24"	2,100	655,000
	Regional University to Curry Creek South and Sierra Vista	24"	2,300	718,000
6	Placer Vineyards Pipeline	24"	9,100	2,840,000
7	North from PGWWTP to "Tee"	30"	1,400	546,000
	Pipeline from "Tee" to Placer Ranch PS	16"	5,800	1,207,000
10	PGWWTP three-250 HP pumps	15,360 gpm	-	609,000
12	Addition of 30" Pipe at PGWWTP for Maximum Flow Conveyance	30"	1,700	995,000
		Subtotal	**30,300**	**$10,036,000**
		Total	**71,200**	**$10,823,000**

Footnotes:
a. Recycled water project phasing depends on development timing.
b. Woodcreek Oaks Golf Course
c. Sun City Golf Course
d. In October 2005 dollars.

Figure ES - 18: Recommended Projects for Alternative C



The City's recycled water infrastructure will include the trunk lines from the wastewater treatment plants as well as the storage, pumping and distribution of recycled water within their properties. Recycled water pipelines to the UGAs will be paid for by the UGA developers. Individual UGA developers will be responsible for the construction of the recycled water transmission pipeline from the upstream UGA to their connection point with a pipe diameter appropriate to the peak day July recycled water demand. UGAs will also be responsible for upsizing recycled water pipe upstream of their location. Developers will be required to reimburse the City (or other funding party) if the transmission pipeline is built before the UGA undergoes construction.

In order to provide capability for serving demands that may exceed the committed supply, UGAs accepting recycled water are required to provide storage facilities capable of storing one July day demand (i.e., the total volume of water required to meet demands over a 24-hour period in July). The minimum storage tank volume required for each UGA is included in **Table ES - 20**.

Table ES - 20: Minimum Required Storage Volumes [a]

UGA	Minimum Tank Volume (MG)
Creekview	0.65
Curry Creek North	0.80
Curry Creek South	3.35
Placer Ranch	3.35
Placer Vineyards	5.40
Regional University	1.75
Sierra Vista	1.80
Brookfield & University	0.75

Footnote:

a. Refer to Section 6.4 for more information on the methodology used to determine minimum tank volumes.

ES-8 Intensification and Rezones

Redevelopment, in the form of intensified and/or rezoned parcels and land use categories, was identified in several areas within the cities of Roseville and Rocklin. Once intensified, parcels in these areas will generate higher wastewater flows. Similarly, parcels within Roseville undergoing zoning or development changes will generate higher or lower wastewater flows.

Intensification areas are defined as areas or parcels within Rocklin and Roseville that may intensify in the future. Once intensified, these parcels will generate higher wastewater flows.

Rezone areas are defined as planned development projects, identified since June 2004, with approved or near-certain changes in zoning or development intensity.

ES-8.1 Redevelopment in Roseville and Rocklin

Figure ES - 19 presents the predicted rezone areas in Roseville. **Figure ES-22** presents an area map of the Roseville and Rocklin intensification areas, while **Figure ES - 22** and **Figure ES-24** illustrate the predicted intensifications areas in more detail.

Intensification allows for a denser urban footprint to be analyzed for future land use planning considerations. Intensification was analyzed for the downtown Roseville area, in an area not specifically addressed a specific plan. Similar to the Roseville intensification area, intensification was also analyzed for the downtown Rocklin area, in an area not specifically addressed a specific plan.

Figure ES - 19: Roseville Rezones

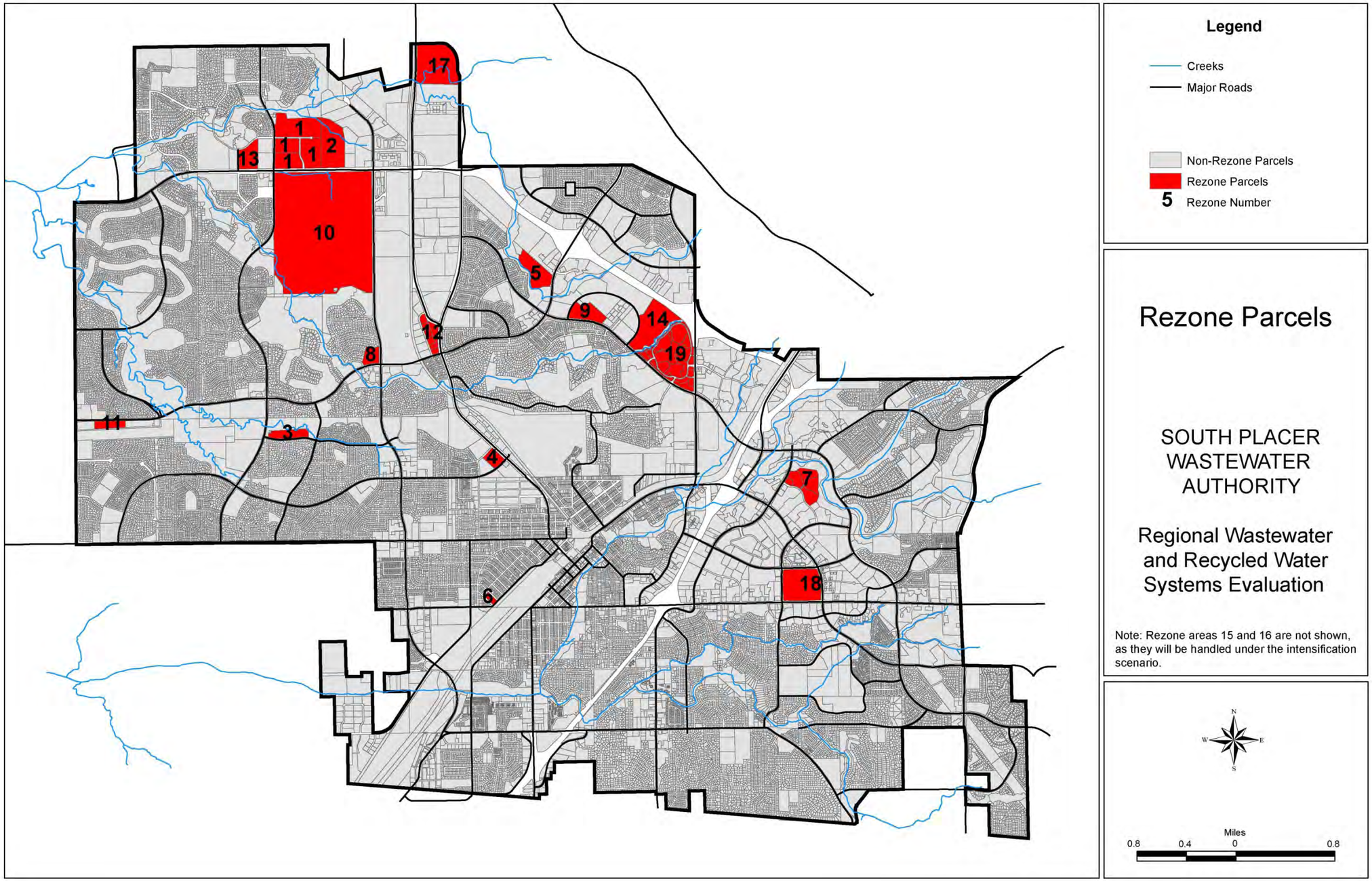


Figure ES - 20: Intensification Area Map

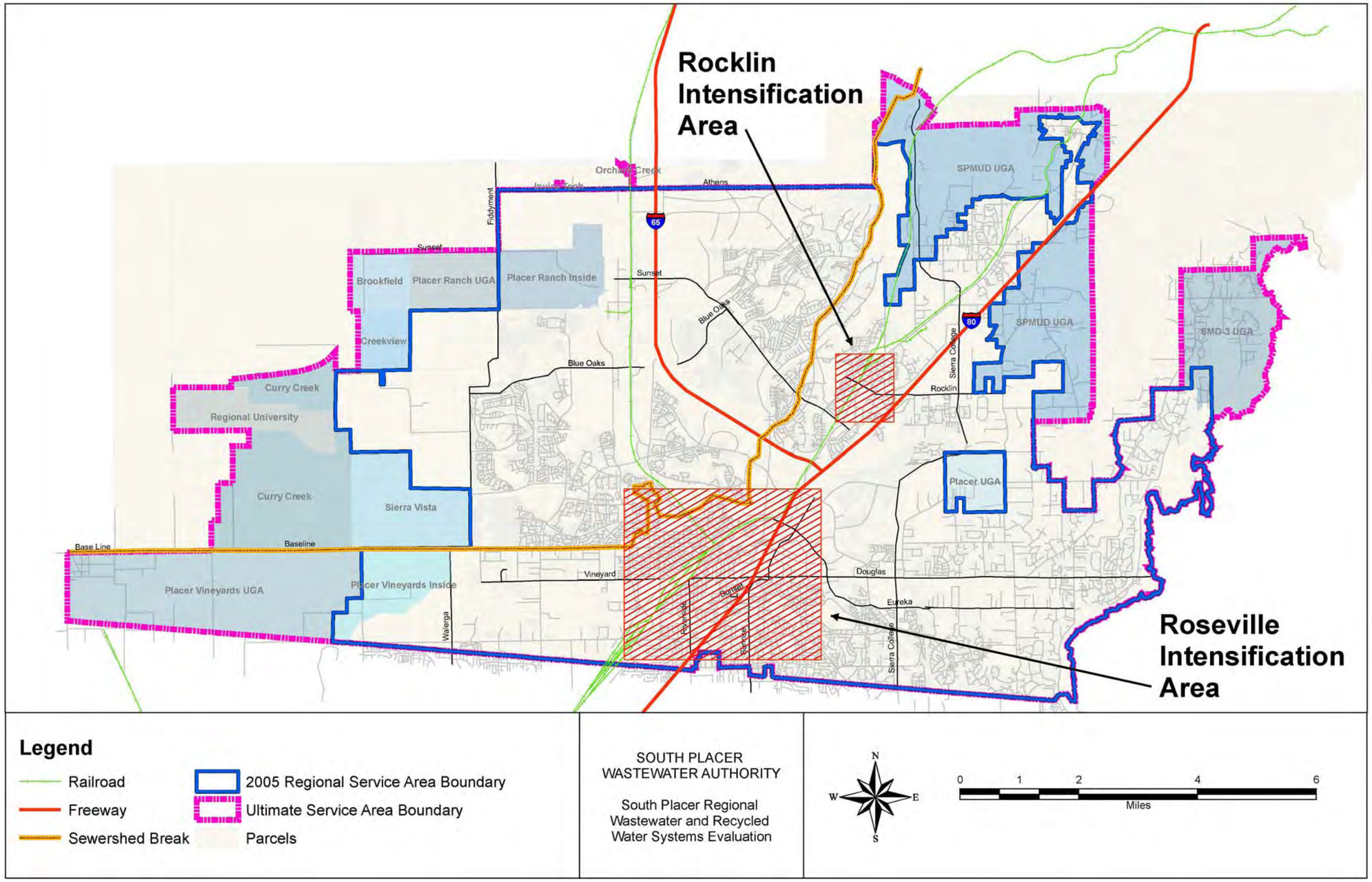


Figure ES - 21: Roseville Intensification

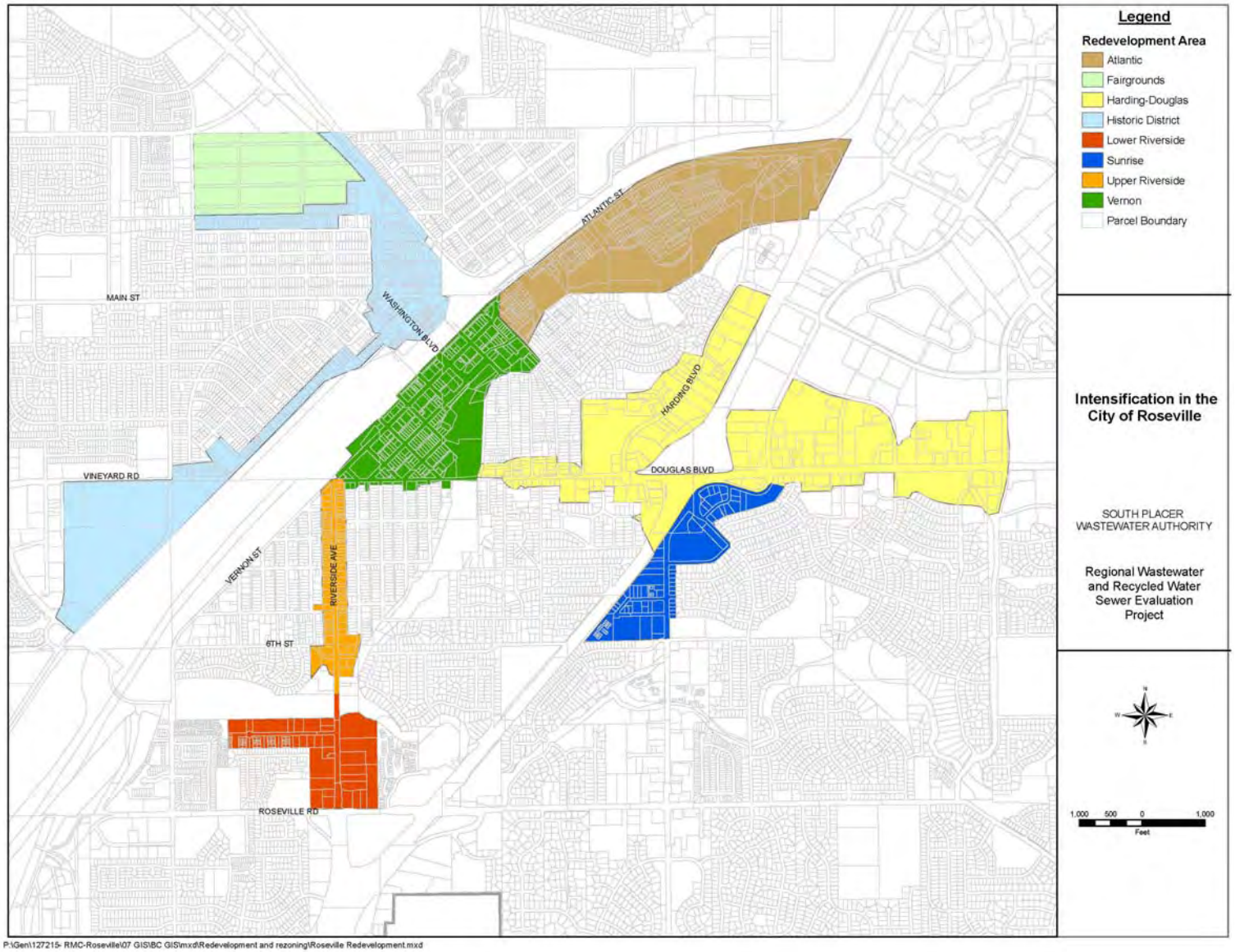
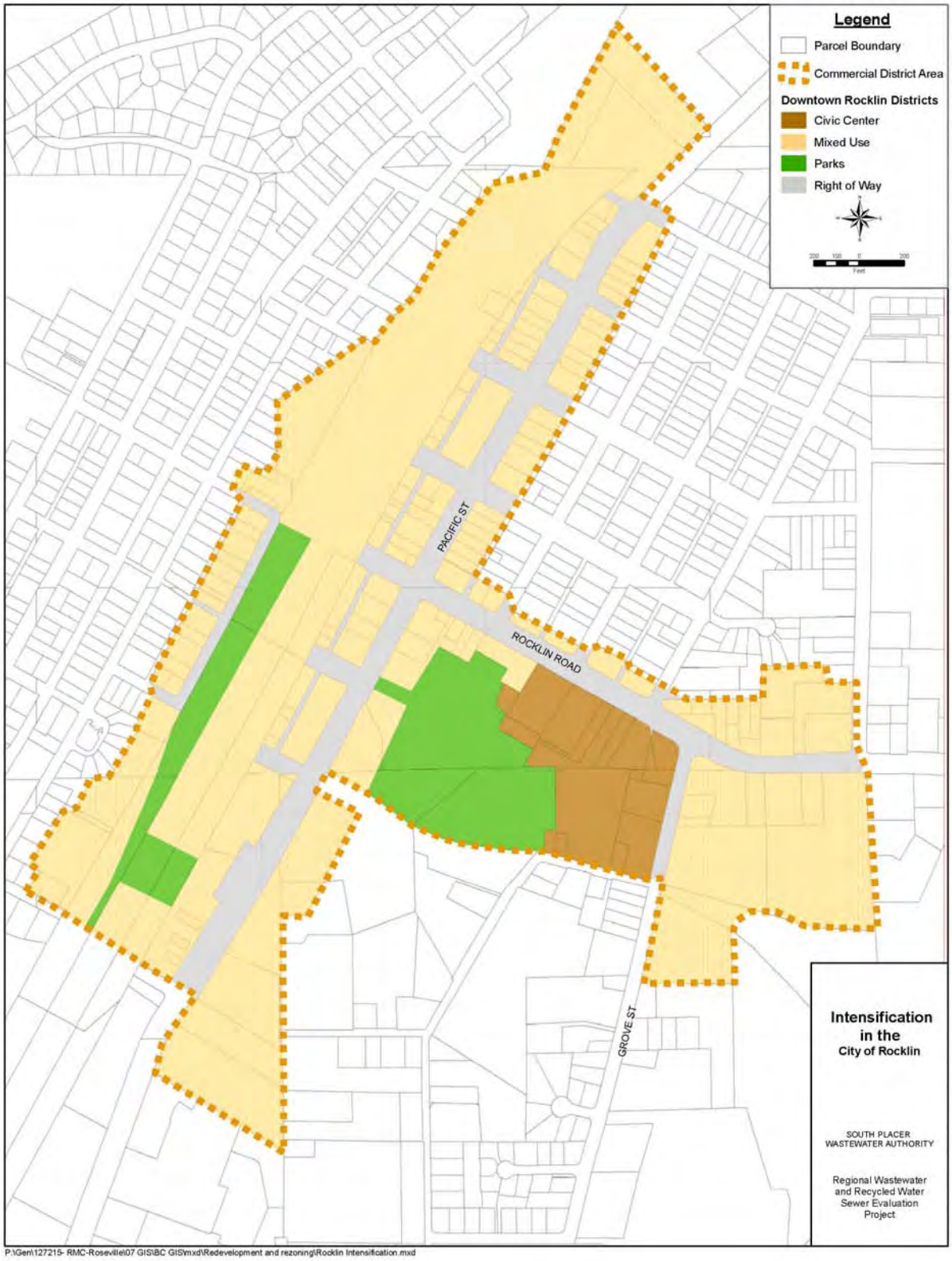


Figure ES - 22: Rocklin Intensification



ES-8.2 Impacts of Redevelopment on Trunk Sewer Evaluation and WWTP Expansion Requirements

The resulting incremental changes in wastewater generation for the identified intensification and rezone areas were determined, and are summarized in **Table ES - 7**; more detailed changes due to intensification are summarized in **Table ES - 21**. Incremental changes in BSF due to rezones equal approximately 0.57 mgd.

Hydraulic model results indicate that the increased system flows due to intensification and rezoning have no adverse effects (above and beyond previously identified deficiencies) on the regional trunk sewer collection system. The only previously identified deficiency downstream of the intensification/rezone areas is in SPMUD, immediately downstream of the Rocklin intensification area. This intensification area did not noticeably change a previously identified buildout deficiency (i.e., surcharging of less than 1 foot).

For the Dry Creek service area, the revised projected ADWF of 21.1 mgd is less than 0.5 percent higher than the ADWF of 21 mgd used for the treatment plant expansion requirements in Chapter 4. For the Pleasant Grove service area, the revised projected ADWF of 24.5 mgd is only 2.1 percent higher than the ADWF of 24 mgd used in Chapter 4.

The relatively small increase in total BSF and ADWF for the trunk sewer and WWTP analyses, respectively, do not impact the recommendations developed in the earlier sections of the Systems Evaluation.

Table ES - 21: Summary of Intensification Impacts to Trunk Sewer and WWTP Analyses

Redevelop-ment Area	SPWA Agency	Area (acres)	June 2004 BSF (mgd)	Redevelop-ment BSF (mgd)	Incre-mental BSF (mgd)	June 2004 ADWF (mgd)	Redevelop-ment ADWF (mgd)	Incre-mental ADWF (mgd)
Atlantic	Roseville	125	0.074	0.142	0.068	0.078	0.151	0.073
Fairgrounds	Roseville	55	0.014	0.055	0.041	0.015	0.059	0.044
Harding-Douglas	Roseville	207	0.165	0.521	0.356	0.176	0.553	0.377
Historic District	Roseville	130	0.126	0.387	0.261	0.134	0.411	0.277
Lower Riverside	Roseville	46	0.037	0.118	0.081	0.039	0.125	0.086
Sunrise	Roseville	45	0.044	0.107	0.063	0.047	0.114	0.067
Upper Riverside	Roseville	21	0.02	0.053	0.033	0.021	0.056	0.035
Vernon	Roseville	67	0.048	0.452	0.404	0.051	0.481	0.43
Rocklin Downtown Plan	SPMUD	135	0.076	0.314	0.238	0.081	0.333	0.252
	Total	***831***	***0.605***	***2.149***	***1.545***	***0.642***	***2.284***	***1.641***

Chapter 1 Introduction

1.2 Progression of the Systems Evaluation

The Systems Evaluation was originally conducted over a period of approximately two years. The first of the TMs, TM 1a (Proposed 2005 Regional Service Area Boundary), was initiated in January 2005, while the final TM, TM 11a (Impacts on Facilities due to Brookfield UGA), was completed in October 2006. Each of the TMs reflected the conditions at the time of production. As part of the June 2007 and December 2009 publication of the Systems Evaluation, Update Sheets were prepared for and appended to TMs as necessary. Since the original publication of this Systems Evaluation in June 2007, however, changes in available data have resulted in the need to identify and update out-of-date information in the TMs and this Systems Evaluation. The newest publications of the TMs, therefore, reflect the information presented in any previous update sheets, as well as any subsequent changes in available data and/or assumptions.

The 2009 publication brings the Systems Evaluation up to date with the following changes: 2006 changes in the SPMUD UGA boundary and land use, and to add Brookfield as an additional UGA; 2008 changes in the land uses and flow projections of the UGAs; and 2009 updates to the H20Map Sewer Model software, changes to the development timeline to reflect reduced rates of residential development, and a proposed rezone for the West Roseville Specific Plan which would result in higher buildout flow estimates.

1.3 Introduction

Southwestern Placer County is a region that has seen significant growth during the last 10 years. Proposed regional developments, and the issue of how the wastewater from those developments and recycled water to those developments will be handled, along with changes to the wastewater characteristics, have indicated a need to evaluate the regional wastewater and recycled water systems. As a result of the master planning conducted by the regional partners of the South Placer Wastewater Authority (City of Roseville, Placer County and the South Placer Municipal Utility District—SPMUD) in the early 1990's, culminating in the 1996 Wastewater Master Plan and EIR, the regional wastewater infrastructure needed to provide wastewater conveyance, treatment and disposal and reuse service have been in place to accommodate the demands for those services over the last 10 years. Recently documented trends in land use, development density, and wastewater flow generation have prompted SPWA to evaluate regional wastewater conveyance, treatment and recycled water infrastructure to assist its members in forecasting system needs over the next two decades.

After identifying background information about the SPWA and its regional systems, and enumerating the objectives of the System Evaluation, this section presents an overview of the report's contents, including appendices.

1.4 Authority and System Background

Created in 2000, the South Placer Wastewater Authority (SPWA) is comprised of three separate agencies: the City of Roseville, the South Placer Municipal Utility District (SPMUD), and Placer County. The City of Roseville, on behalf of the regional partners, owns and operates two regional wastewater treatment facilities: the Pleasant Grove Wastewater Treatment Plant (PGWWTP), and the older Dry Creek Wastewater Treatment Plant (DCWWTP). Additionally, the City of Roseville owns and operates the network of gravity sewers, pump stations, and force mains that serve customers within the City's limits. SPMUD owns and operates gravity sewers, pump stations, and force mains in Rocklin, Loomis, and portions of southern Placer County. Placer County owns and operates gravity sewers, pump stations, and force mains in unincorporated areas of Placer County that are not served by other agencies.

Prior to this Systems Evaluation, the most recent evaluation of regional wastewater and recycled water facilities was the preparation of the 1996 Roseville Regional Wastewater Treatment Service Area Master

Plan and the associated Environmental Impact Report (1996 Master Plan and EIR). Since that time, substantial growth in and around the SPWA service area has occurred, and changing demographics in the region have generated wastewater flows and strengths which have differed from those anticipated a decade ago. Further, continued growth, both within and adjacent to the 2005 SPWA service area boundary, is expected in the future. A number of specific areas with the potential for significant future development have been identified by SPWA partner agencies, providing the basis for an evaluation of the impacts of future growth on existing, as of June 2004, wastewater and recycled water facilities.

The 1996 SPWA service area boundary, which was delineated as part of the 1996 Master Plan and EIR, encompassed approximately 55,000 acres.

NOTE: As part of this Systems Evaluation, a new, 2005 service area boundary was defined (described in Chapter 2 of this report). It should also be noted that June 2004 was the baseline date used for this study. Although the conditions in June 2004 were synonymous with "current" or "existing" conditions at the outset of this project, those terms have been generally avoided in this document, in order to prevent confusion on behalf of the reader, as well as to prevent the document from becoming prematurely "stale." As such, "June 2004" is used consistently throughout this report to describe the conditions at the beginning of the study, while "2005" is generally reserved for definition of the new service area boundary introduced in Chapter 2. In some instances, however, the use of "current" or "existing" could not be avoided.

1.5 Objectives of the Systems Evaluation

The specific need for this Systems Evaluation was precipitated by several factors, including:

- Recent annexations of land by SPWA partner agencies;
- Changes in the development densities inside the 2005 SPWA service area since the 1996 Master Plan and EIR;
- Planned development and redevelopment within the 2005 SPWA service area;
- Significant proposed Urban Growth Areas (UGAs) in the vicinity of the 2005 SPWA service area;
- Wastewater characteristics (i.e., flow and strength) that have changes since the 1996 Master Plan and EIR.

This South Placer Regional Wastewater and Recycled Water Systems Evaluation (Systems Evaluation) has been conducted to accomplish the following:

- Document the June 2004 capacity and loading on regional trunk sewer, wastewater treatment and recycled water infrastructure and facilities present in June 2004;
- Project buildout conditions based upon regional planning documents and planned regional developments in southwestern Placer County; and,
- Present a Regional Systems evaluation, with system deficiencies identified, and capital projects forecasted, which will inform the SPWA partners in identifying their June 2004 and buildout ability to provide service for planned and proposed development.

1.6 Report Content & Development

The results of the Systems Evaluation are presented in the 9 chapters of this report. The content of the report chapters are summarized below:

- **CHAPTER 1 – INTRODUCTION** (this section)

  Chapter 1 introduces the needs of the system, the objectives of the System Evaluation, and the structure of the report.

- **CHAPTER 2 – LAND USE**

  Chapter 2 describes the land use data, service area boundaries, and June 2004 and buildout land use scenarios that were developed and analyzed in this Systems Evaluation. Included in the discussion are former 1996, 2005 and buildout service area boundaries and urban growth areas that have been analyzed for this Systems Evaluation.

- **CHAPTER 3 – UNIT FLOW FACTORS AND FLOW PROJECTIONS**

  Chapter 3 summarizes June 2004 flows and the development of unit wastewater flow factors for the June 2004 and buildout service areas. Subsequent dry weather and wet weather wastewater flows are projected for buildout conditions within the "Ultimate" (i.e., buildout) SPWA Service Area.

- **CHAPTER 4 – TRUNK SEWER EVALUATION**

  Chapter 4 presents the development of the hydraulic model of the regional trunk sewer system, the results of the hydraulic assessment of the system, and the resulting capacity improvement recommendations. The hydraulic assessment was based on the flow projections developed for the Ultimate SPWA Service Area presented in Chapter 3. Chapter 4 also introduces a set of design criteria that were developed to provide a more sophisticated approach to sizing collector and trunk sewers. Appended to Chapter 4 are several TMs in which trunk sewers and related facilities were developed for several urban growth areas.

- **CHAPTER 5 – WASTEWATER TREATMENT PLANT EXPANSION EVALUATION**

  Chapter 5 summarizes the wastewater treatment upgrade and expansion analyses performed for this Systems Evaluation, including the development of flow and loading peaking factors, facility expansion recommendations to handle projected flows and loadings at buildout, and a timeline for phasing the construction of the improvements.

- **CHAPTER 6 – RECYCLED WATER SYSTEMS EVALUATION**

  Chapter 6 analyzes and recommends alternatives for utilizing and conveying June 2004 and buildout recycled water flows within the 2005 service areas of SPWA member agencies, and the UGAs identified in Chapter 2, and presents an implementation plan to construct the recommended recycled water "backbone" infrastructure (i.e., major distribution facilities) in phases.

- **CHAPTER 7 – CEQA EVALUATION**

  Chapter 7 defines a strategy for SPWA's and its member agencies' compliance with California Environmental Quality Act (CEQA) as the agencies address new developments not contemplated in previous CEQA documents, and how CEQA will be addressed in the construction of regional facilities by its members.

- **CHAPTER 8 – INTENSIFICATION AND REZONES**

  Areas in downtown Roseville and Rocklin are being considered by land use authorities for development intensification which could increase wastewater flow generation as compared to June 2004 land use documents. This chapter summarizes the methodology that was used to adjust the System Evaluation's land use database to account for parcels within Rocklin and Roseville that may intensify and/or be rezoned in the future. Once intensified or rezoned, these parcels are projected to generate higher wastewater flows; the revised flows are incorporated into a separate buildout trunk sewer modeling scenario, and the resulting impacts on the regional wastewater facilities are presented.

- **APPENDICES**

Appendix A ***TM 1b – Current and Buildout Land Use***
Appendix B ***TM 1a – Proposed 2005 Regional Service Area Boundary***
Appendix C ***TM 2a – Dry Weather Flow Projection for the 2005 Regional Service Area Boundary***

Appendix D ***TM 2b – Dry Weather Flow Projections for Ultimate Service Area (w/ UGAs)***
Appendix E ***Comparison of 2005 and 1996 Unit Flow Factors***
Appendix F ***TM 2c – Wet Weather Flow Projection for Ultimate Service Area (w/ UGAs)***
Appendix G ***TM 3a – Unit Flow Factor Sets and Sewer Design Criteria***
Appendix H ***TM 3b – Trunk Sewer Hydraulic Analysis***
Appendix I ***Survey Data Summary***
Appendix J ***Corrections to Model Network Data***
Appendix K ***Placer Vineyards TM***
Appendix L ***Placer Ranch TM***
Appendix M ***Riolo Vineyards TM***
Appendix N ***TM 4a – Projected WWTP Flows and Loadings***
Appendix O ***TM 4b – Wastewater Treatment Plant Expansion Requirements***
Appendix P ***TM 4c – DCWWTP Expansion Requirements***
Appendix Q ***TM 4d – Updated Flow Projections***
Appendix R ***TM 5a – Market Assessment for Recycled Water Distribution***
Appendix S ***TM 5b – Alternatives Development and Evaluation for Recycled Water Distribution System***
Appendix T ***Initial CEQA Study Checklist***
Appendix U ***TM 9a – Land Use Scenarios***
Appendix V ***TM 9b – Methodology for Adjusting Land Use for Parcels with Approved or Near-Certain Zoning or Development Changes ("Rezone Parcels")***
Appendix W ***TM 9c – Land Use Intensification Methodology for Parcels within Redevelopment Areas in Roseville and Rocklin***
Appendix X ***TM 9d – Impact on Regional Trunk Sewer System and WWTPs of Land Use Intensification for Parcels within Redevelopment Areas in Roseville and Rocklin***
Appendix Y ***TM 11a – Impacts on Facilities due to Brookfield UGA***
Appendix Z ***CD containing Land Use GIS Database***

Chapter 2 Land Use

2.1 Introduction

This chapter describes the land use databases, service area boundaries, and June 2004 and buildout land use scenarios that were developed and analyzed in this Systems Evaluation. Included in the discussion are summaries of the 1996 and 2005 service area boundaries, as well as the buildout, or "Ultimate" SPWA Service Area boundary, including urban growth areas (UGAs) under consideration in 2005, that has been proposed for this project.

2.1.1 Land Use Evaluation Tasks

The ultimate goal of the land use evaluation is to identify June 2004 and buildout land uses within both the 1996 and 2005 service area boundaries. Specific goals of the land use evaluation were to:

- Review land use categories and densities of developed (as of June 2004) areas within the 1996 and 2005 service area boundaries;
- Develop a "working" land use database for the entire 2005 service area using Geographical Information System (GIS) data from the City of Roseville and Placer County for use throughout the development of this Systems Evaluation; and,
- Delineate a 2005 service area boundary for this Systems Evaluation, referred to henceforth as the 2005 Regional Service Area boundary, by reviewing historical annexations to the partner agencies.

The tasks for this portion of the Systems Evaluation are summarized in Table 2-1.

Table 2-1: Land Use Task Summary

Task	Subtask(s)
Evaluate June 2004 and Proposed Land Uses	• Review June 2004 Land Uses and Development Densities
	• Confirm Proposed and Undeveloped Land Uses
	• Develop a "Working" GIS
	• Delineate 2005 Regional Service Area Boundary

2.1.2 Land Use Database Objectives

The delineation of the 2005 Regional Service Area boundary, development of a land use database, and the subsequent evaluation of June 2004 and buildout land use scenarios are critical to the accurate characterization of June 2004 and buildout wastewater production, and for the planning and design of wastewater collection facilities and treatment systems. The land use database developed for this Systems Evaluation was used to:

- Predict June 2004 and buildout wastewater flows in the service area;
- Develop a hydraulic model to identify June 2004 and buildout deficiencies in the regional trunk sewer system and to plan for future capital improvements;
- Determine routing options for conveying wastewater flows from future UGAs to regional wastewater treatment plants; and,
- Plan for future expansion of wastewater treatment facilities.

2.2 1996 and 2005 Service Area Boundaries

The 1996 Wastewater Master Plan Environmental Impact Report Service Area (1996 Master Plan Regional Service Area) boundary was established with the adoption of the *1996 Roseville Regional*

Wastewater Treatment Service Area Master Plan and certification of the associated EIR. The 2005 Regional Service Area boundary for this Systems Evaluation incorporates ten areas outside of the 1996 Master Plan Regional Service Area, known as "House Keeping Areas," that have been annexed by SPWA partner agencies since 1996. Further discussion of the two service area boundaries and their impacts on this Systems Evaluation is presented below.

2.2.1 1996 Master Plan Regional Service Area Boundary

The 1996 Master Plan Regional Service Area boundary, shown in **Figure 2-1**, was used in this Systems Evaluation in conjunction with updated buildout land use information and unit flow factors. These data were used to generate revised buildout flow projections for the regional treatment and collection system facilities for comparative purposes.

2.2.2 2005 Regional Service Area Boundary

The ten "House Keeping Areas" that have been annexed by SPWA partner agencies since 1996 are shown in **Figure 2-2**. Eight of these areas have been annexed by the South Placer Municipal Utility District (SPMUD); the other two areas, the West Roseville Specific Plan (WRSP) area and the Pleasant Grove Wastewater Treatment Plant, have been annexed by the City of Roseville. The "House Keeping Areas" are described in further detail in *Technical Memorandum (TM) 1a – Proposed 2005 Regional Service Area* Boundary, included in **Appendix B**. In conjunction with this Systems Evaluation, the SPWA Board concurred with the revised regional service area boundary that encompasses all of the annexed areas that are located outside of the 1996 Master Plan Regional Service Area boundary. Thus, the 2005 Regional Service Area boundary is comprised of the 1996 Master Plan Regional Service Area boundary and the boundaries of the ten "House Keeping Areas" shown in Figure 2-2. The 2005 Regional Service Area boundary is shown in **Figure 2-3**.

2.3 Land Use Database Development

The development of the land use database for the 2005 Regional Service Area was a multi-step process that included regional land use data gathering; consolidation of June 2004 land use codes; identification of parcels connected to the wastewater collection system under June 2004 and buildout conditions; development of June 2004 and buildout land use maps for review by the SPWA partner agencies; and verification of the land use data against existing (as of June 2004) General and Specific Plans for Roseville, Rocklin, Loomis, Granite Bay and Placer County.

2.3.1 Land Use Database Information Sources

The land use database for areas within the 2005 Regional Service Area boundary was developed, based on data gathered from the information sources listed in Table 2-2. Final documentation and changes made to the database are discussed in *TM 1b – Current and Buildout Land Use*, included in **Appendix A**. In addition to the sources listed in Table 2-2, planners and developers for each of the UGAs were consulted. The resulting UGA information is presented in Section 2.4.

Figure 2-1: 1996 Master Plan and EIR Regional Service Area Boundary

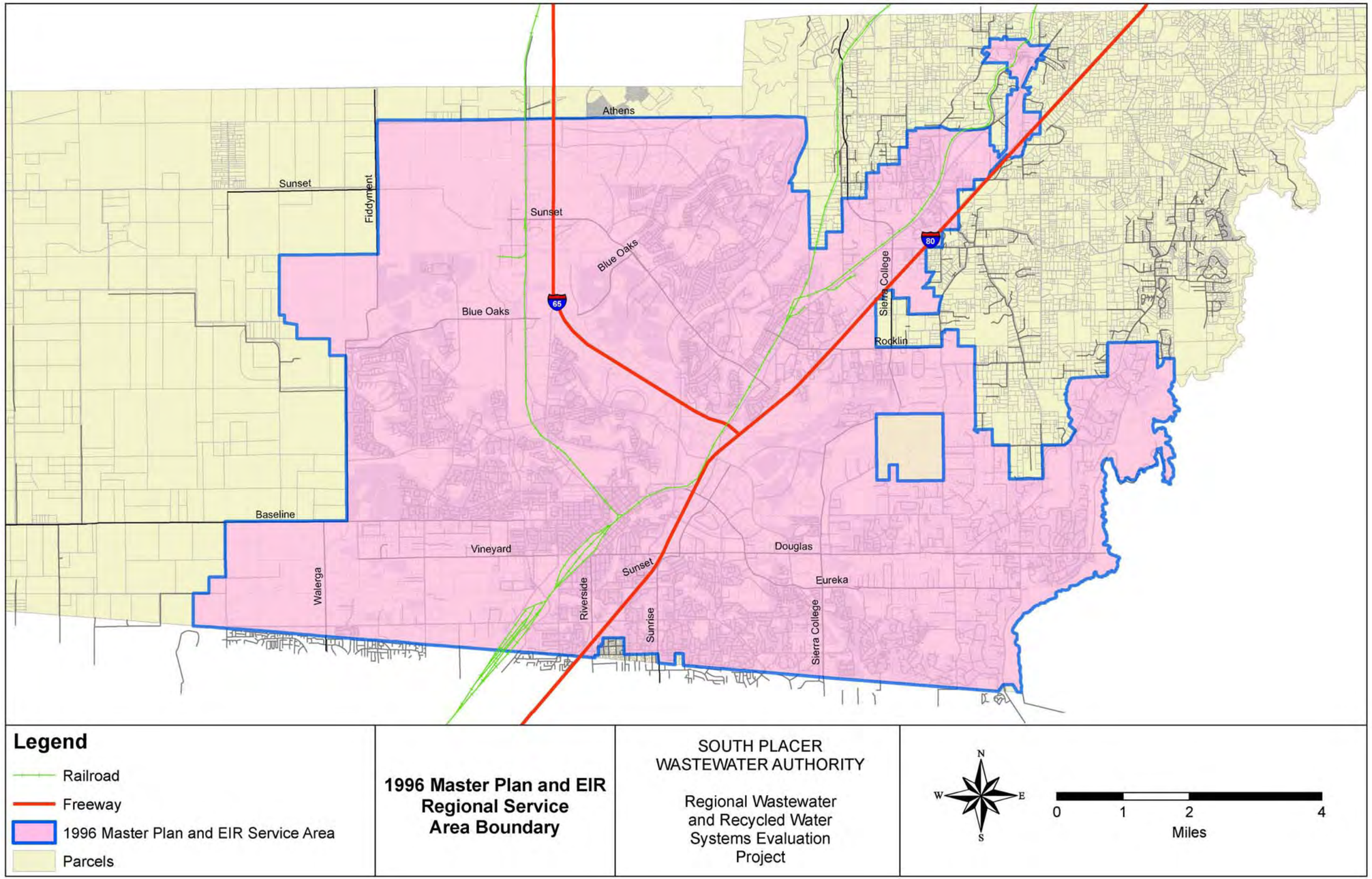


Figure 2-2: 1996 Master Plan Regional Service Area Boundary and "House Keeping Areas"

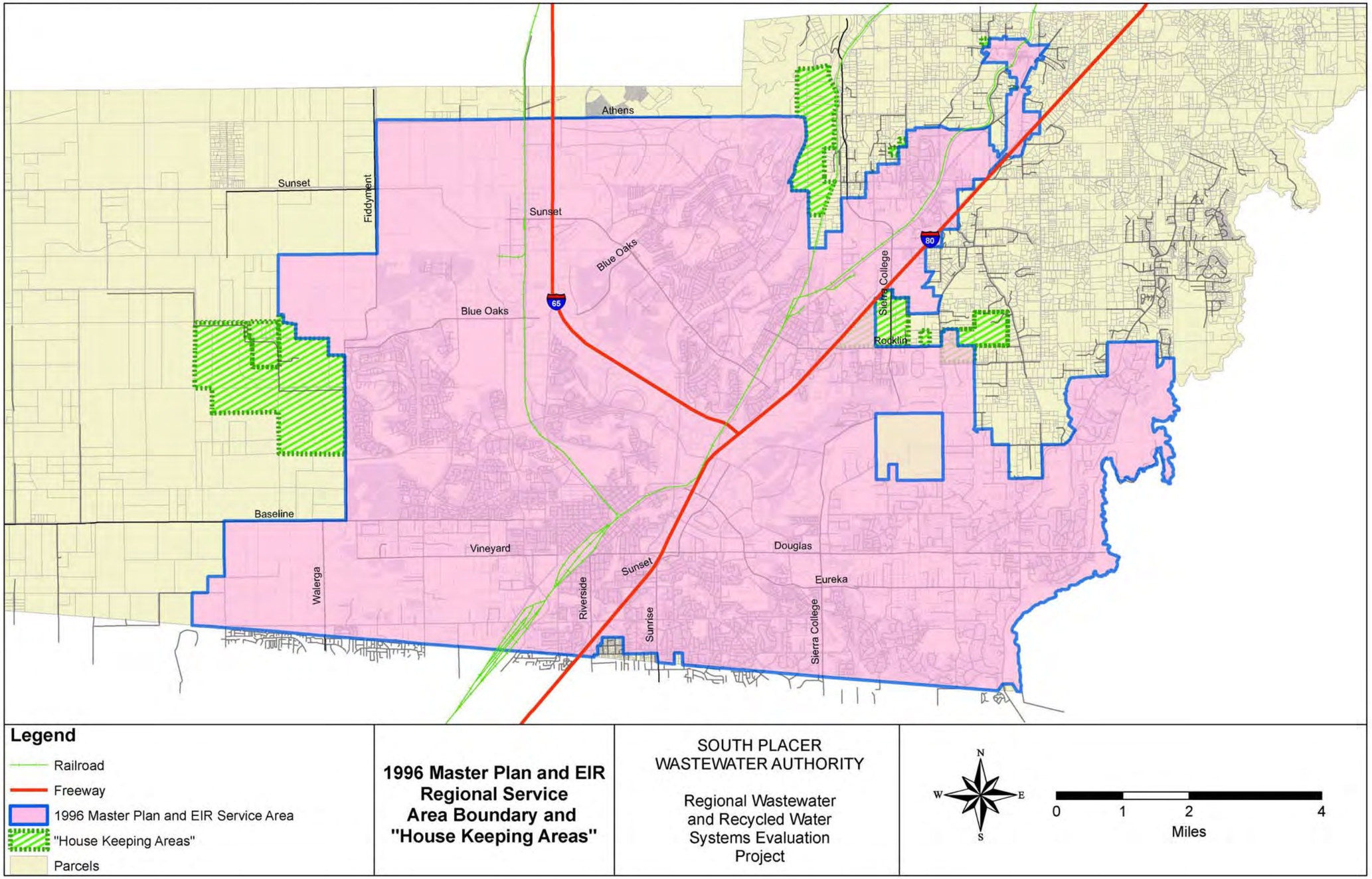


Figure 2-3: 2005 Regional Service Area Boundary

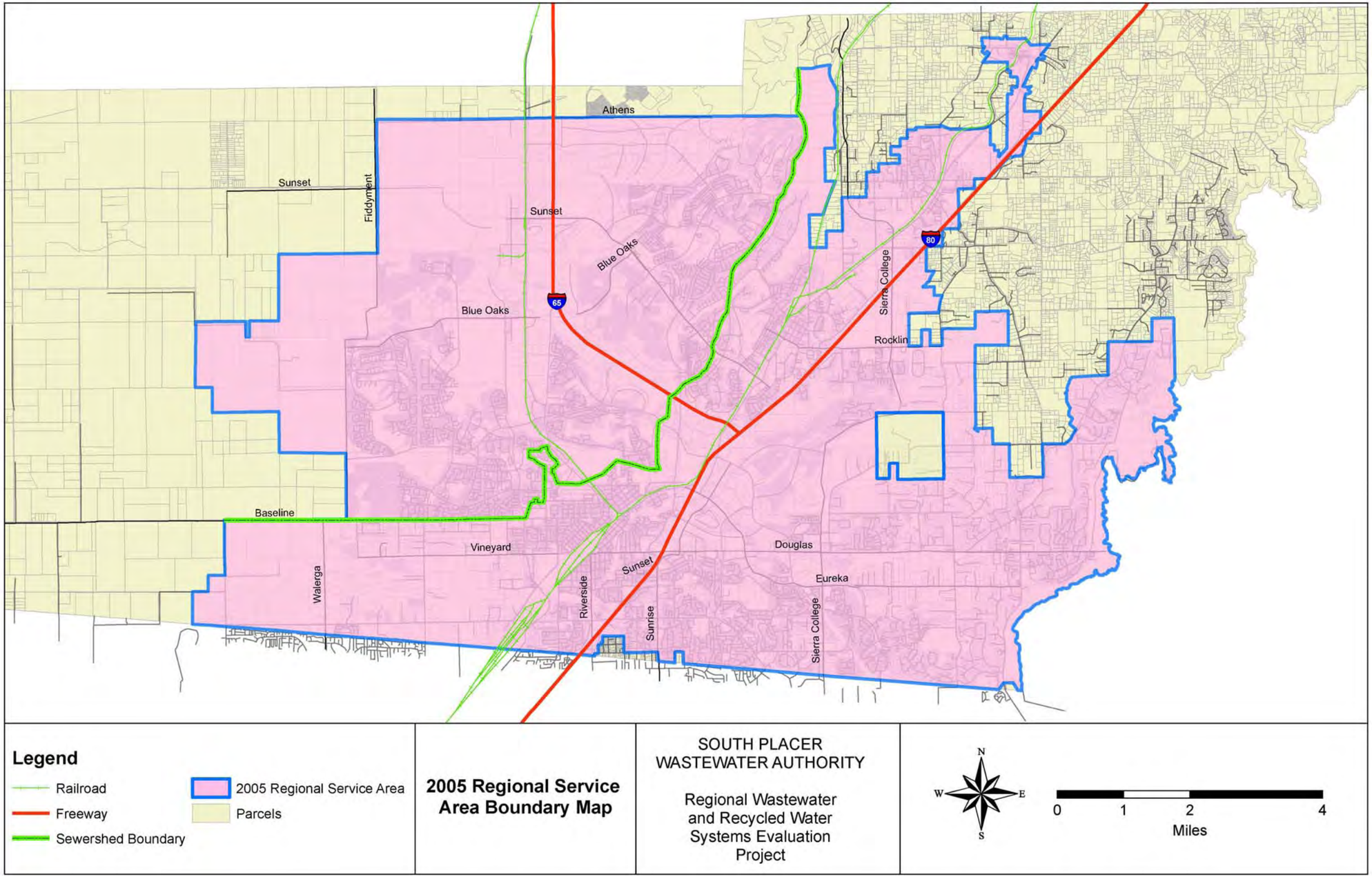


Table 2-2: Land Use Database Information Sources

Data Format	Source
General Plans	City of Roseville (February 2004)
	City of Rocklin (April 1991)
	Town of Loomis (July 2001)
	Placer County (August 1994)
	Granite Bay Community Plan (May 1989)
GIS Data (in ESRI Shapefile Format)	City of Roseville GIS data (Roseville Land Inventory)
	Placer County GIS and County Assessor data
	1996 Master Plan Regional Service Area Boundary, digitized by ESA
	2005 Regional Service Area Boundary, digitized by ESA
Specific Plans	Placer Vineyards (July 2007)
	Placer Ranch (February 2007)
	West Roseville (March 2009)
	Regional University (March 2005)

2.3.2 Consolidation of Land Use Codes

Three "versions" of the land use database were developed through a series of consolidations of land use codes. The first version included approximately 114 land use codes previously used by the City of Roseville and Placer County. For the second version, these 114 codes were consolidated into 17 general land use codes. For the third and final version, the codes were further consolidated, from 17 to 12, to simplify the process of projecting June 2004 and buildout wastewater flows in the hydraulic model. The final consolidation process consolidated all of the non-flow producing land use types into one "Open Space" category and introduced three new land use codes ("Mixed Use," "Schools," and "Parks > 10 Acres"). The process by which land use codes were consolidated is presented in further detail in *TM 1b – Current and Buildout Land Use* in **Appendix A**.

2.3.3 June 2004 Land Use within the 2005 Regional Service Area

In the first version of the land use database, developed parcels were identified by June 2004 land use codes (e.g., "business professional"), while parcels not developed as of June 2004 were denoted as "vacant." Not all of the developed parcels within the 2005 Regional Service Area boundary are connected to the regional collection system, however. These parcels most likely have onsite septic wastewater treatment systems and did not contribute wastewater flow to the regional system as of June 2004. To ensure accurate flow projections and subsequent calibration of the hydraulic model for the June 2004 system, connectivity to the regional collection system was examined for each parcel in the land use database.

A summary of June 2004 land use for connected parcels within the 2005 Regional Service Area is presented in **Table 2-3** and illustrated in **Figure 2-4**. Of the approximately 22,000 connected acres, roughly 67 percent of the area is classified as single family or multi-family residential. Another 10 percent of that area is classified as open space. Under June 2004 conditions, approximately 30,000 acres are either vacant or not connected.

Table 2-3: June 2004 Land Use Summary within the 2005 Regional Service Area

Land Use Designation	June 2004 Connected Area (Acres)		Total June 2004 Connected Area (Acres)
	Pleasant Grove Watershed	Dry Creek Watershed	
Commercial	495	1,622	2,117
Heavy Industrial	364	111	475
Light Industrial	616	316	932
Mixed Use	0	7	7
Open Space	1,398	737	2,135
Parks > 10 Acres	247	263	510
Public/Quasi-Public	154	467	621
Residential 1 DU [a]	4,186	9,343	13,529
Residential 2 DU [b]	0	280	280
Residential 3 DU [c]	0	37	37
Residential Multiple DU [d]	380	547	927
Schools	171	418	589
Total Acreage	**8,011**	**14,148**	**22,159**

Footnotes:
a. One (1) dwelling unit per parcel.
b. Two (2) dwelling units per parcel.
c. Three (3) dwelling units per parcel.
d. Multiple dwelling units per parcel.

2.3.4 Buildout Land Use within the 2005 Regional Service Area

Buildout land use in the 2005 Regional Service Area was identified in the land use database according to General Plan data from the City of Roseville and Placer County. A summary of the buildout land use within the 2005 Regional Service Area is provided in **Table 2-4** and shown in **Figure 2-5**. The buildout land use scenario includes all developed (as of June 2004) parcels (i.e., parcels that are developed as of June 2004 but not connected are assumed to be connected at buildout); new developments in vacant areas; and in cases where the applicable General or Specific Plan permits denser development, the residential redevelopment of developed (as of June 2004) parcels larger than one-half acre that have not been subdivided. In 2009, an update to the West Roseville Specific Plan (WRSP) was proposed and the impacts to the SPWA Systems were evaluated. The update proposed additional densification which would result in an increase of ADWF from 1.70 mgd to 2.07 mgd from the WRSP. Although this update has not been approved, the Systems Evaluation Report has been updated to reflect the findings of this evaluation as the update may occur at a later date and it is considered to be more conservative.

Figure 2-4: June 2004 Land Use for Connected Parcels within the 2005 Regional Service Area Boundary

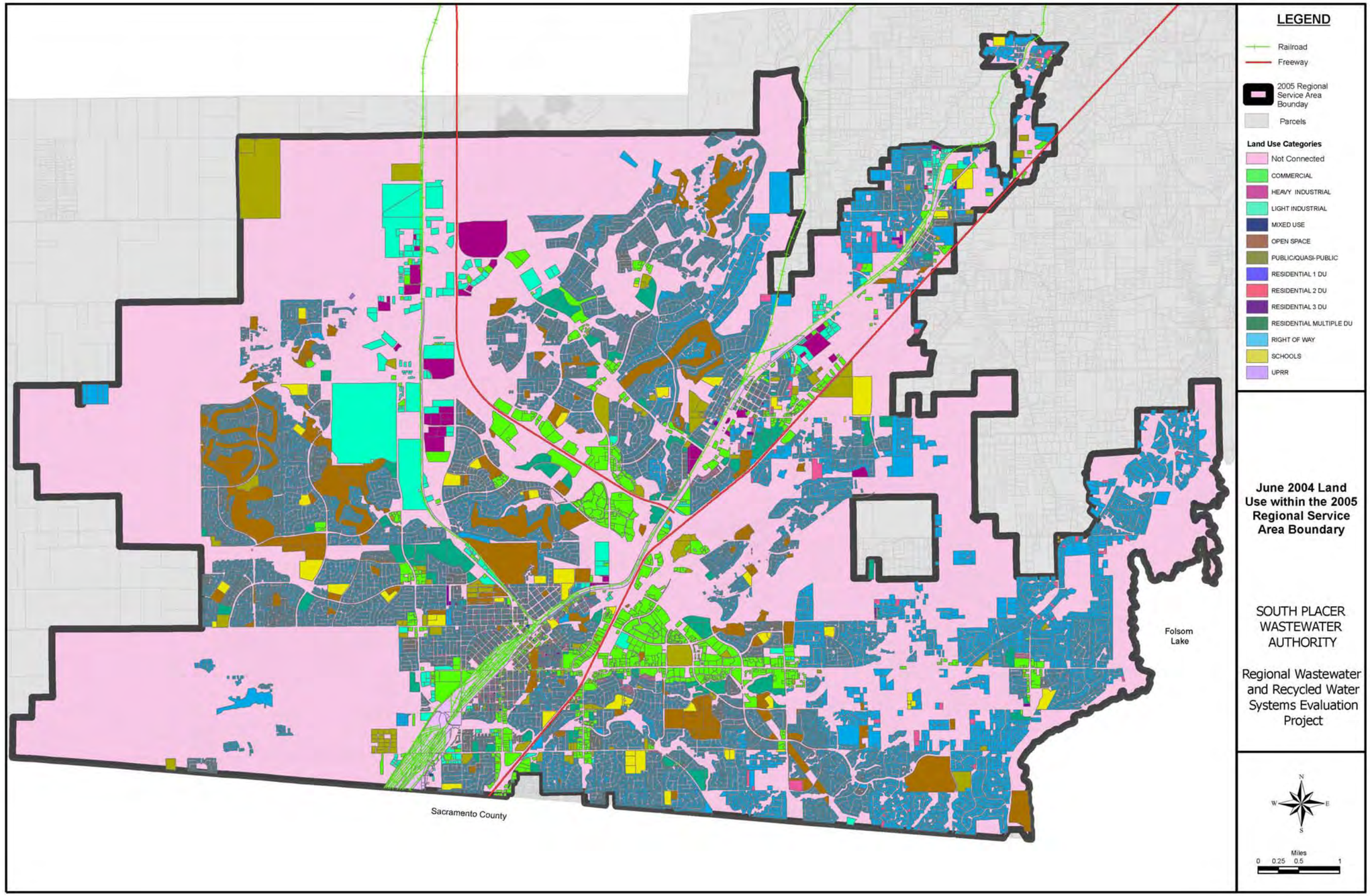


Table 2-4: Buildout Land Use Summary within the 2005 Regional Service Area

Land Use Designation	Buildout Connected Area (Acres)		Total Buildout Connected Area (Acres[1,2])
	Pleasant Grove Watershed [a]	Dry Creek Watershed [b]	
Commercial	2,151	2,915	5,066
Heavy Industrial	1,715	263	1,978
Light Industrial	1,599	637	2,236
Mixed Use	13	12	25
Open Space	7,318	3,502	10,820
Parks > 10 Acres	303	361	664
Public/Quasi-Public	327	878	1,205
Residential 1 DU [c]	7,629	18,859	26,488
Residential 2 DU [d]	0	839	839
Residential 3 DU [e]	9	366	375
Residential Multiple DU [f]	789	635	1,424
Schools	377	540	917
Total Acreage	**22,231**	**29,808**	**52,039**

Footnotes:

a. Includes portion of Placer Ranch UGA within the 2005 Regional Service Area.
b. Includes portion of Placer Vineyard UGA within the 2005 Regional Service Area.
c. One (1) dwelling unit per parcel.
d. Two (2) dwelling units per parcel.
e. Three (3) dwelling units per parcel.
f. Multiple dwelling units per parcel.

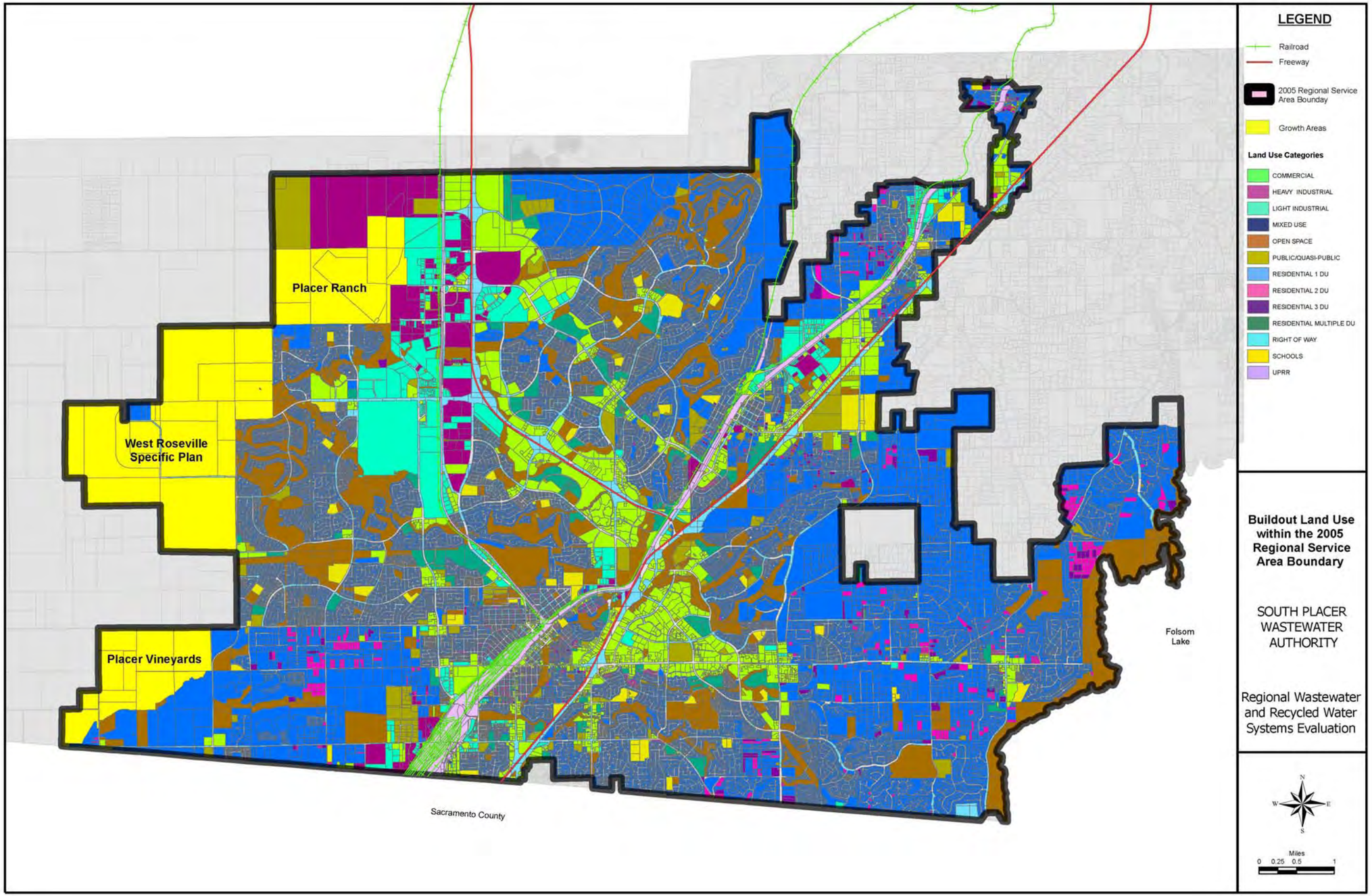
2.4 Urban Growth Areas

The Ultimate SPWA Service Area boundary for this Systems Evaluation is comprised of the 2005 Regional Service Area boundary and the boundaries of the eleven UGAs identified and evaluated for this Systems Evaluation. The UGAs are shown with the buildout land use map in **Figure 2-6**. UGAs are defined as potential future planning areas that are projected to generate wastewater flows requiring sewerage, and that meet one or more of the following criteria:

- The area has been annexed, or is being considered for annexation, by a jurisdiction served by SPWA partner agencies (i.e., Placer County, City of Roseville, or SPMUD).
- The area is part of, or defined as, a Specific Plan Area by the land use planning agency serving one of SPWA member agencies: Placer County, the City of Roseville, the City of Rocklin (served by SPMUD), or the Town of Loomis (served by SPMUD).
- One of the SPWA member agencies has provided documented direction to staff in a public forum to analyze the effects of providing sewer service to the planning area on regional wastewater and recycled water systems.

Two of these planning areas, Placer Ranch and Placer Vineyards, include areas that are located both inside and outside the 1996 Master Plan Regional Service Area boundary (which happens to be coincident with the 2005 Regional Service Area boundary in the immediate vicinity of these UGAs). For this Systems Evaluation, UGAs were considered in their entirety; the areas and associated flows from the "inside" and "outside" portions of UGAs, however, are distinguished throughout. The acreage and land use information source for each UGA are listed in **Table 2-5**.

Figure 2-5: Buildout Land Use within the 2005 Regional Service Area Boundary



The planning areas and properties not being considered as UGAs at this time include AKT North, Amoruso Way (or "Toad Hill Estates"), Reason Farms, and the Landfill Areas. AKT North has not been included due to the lack of planning information for this area at this time and because it does not meet the criteria above. Reason Farms is a detention basin and is not expected to generate any significant wastewater. Amoruso Way has not been included because it is expected that flow projections for future sewerage will be addressed in the Placer Ranch specific plan. The "Landfill Outside" and "Future Landfill Expansion" planning areas not expected to generate wastewater requiring sewerage.

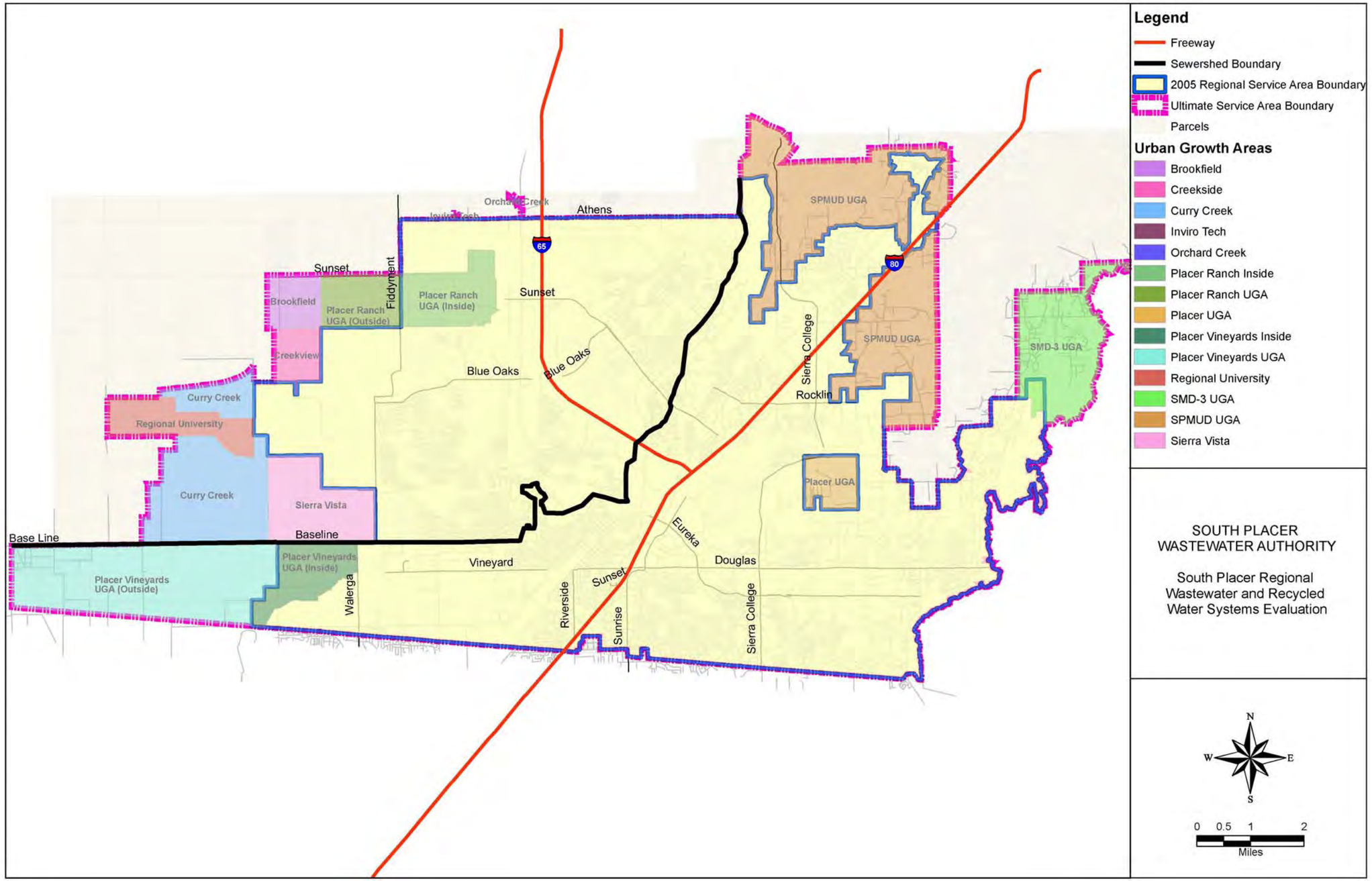
Table 2-5: UGA Acreages and Land Use Information Sources

Urban Growth Area (UGA)	Land Use Information Source	Area Outside 2005 Regional Service Area Boundary (acres)
Curry Creek UGA	Placer County [1]	3,212
Regional University UGA	MacKay & Somps Civil Engineers Inc.	1,140
Inviro Tech UGA [2]	Placer County	5
Placer UGA [3]	Placer County	630
Orchard Creek UGA [4]	Placer County	25
Placer Ranch UGA [5]	Terrance E. Lowell & Associates, Inc.	807
Placer Vineyards UGA [6]	MacKay & Somps Civil Engineers Inc.	4,806
SMD-3 UGA	Placer County	2,231
SPMUD UGA [7]	City of Rocklin & Town of Loomis [8]	6,410
Creekview UGA and Panhandle [9]	MacKay & Somps Civil Engineers Inc.	749
Sierra Vista UGA	MacKay & Somps Civil Engineers Inc.	1,785
Brookfield UGA	Brookfield Land, LLC	683
	Total	***22,483***

Footnotes:

1. Preliminary land use estimates for Curry Creek were developed by RMC and approved by Placer County based on land use ratios developed in the WRSP.
2. As of June 2004, this parcel is served by Placer County, but is outside the 2005 Regional Service Area Boundary.
3. This rectangular "island" area is not expected to be sewered at buildout due to topography and low development density. To be conservative, however, the impacts of the buildout flows projected for this UGA were included in the Systems Evaluation.
4. Placer County plans to provide sewer service to this area.
5. The Placer Ranch UGA is comprised of a total of 2,213 acres, with 1,027 acres located inside the 1996 Master Plan (and 2005) Regional Service Area boundary (i.e., "Placer Ranch Inside"), 807 acres located outside of this boundary (i.e., "Placer Ranch Outside") and 379 acres designated as ROW. Although the Placer Ranch UGA is considered in its entirety (2,213 acres) in this Systems Evaluation, the areas and associated flows from the "inside" and "outside" portions of the UGA are distinguished throughout.
6. The Placer Vineyards UGA is comprised of a total of approximately 5,148 acres, with approximately 1,062 acres located inside the 1996 Master Plan (and 2005) Regional Service Area boundary (i.e., "Placer Vineyards Inside"), and 4,806 acres (including ROW) located outside of this boundary (i.e., "Placer Vineyards Outside"). Although the Placer Vineyards UGA is considered in its entirety (5,148 acres) in this Systems Evaluation, the areas and associated flows from the "inside" and "outside" portions of the UGA are distinguished throughout.
7. 2,319 acres was originally considered as the acreage for the SPMUD UGA for the Systems Evaluation. The total acreage shown (6,410 acres) is based on the expanded SPMUD UGA boundary that later was provided. Due to the very low density of the anticipated development, no additional incremental flows were considered as a result of the increased expanded UGA size.
8. SPMUD UGA land use information was developed by RMC based on General Plan information from the City of Rocklin and the Town of Loomis.
9. "Panhandle" refers to a 238-acre portion of the Reason Farms planning area that is adjacent to the western boundary of the 511-acre Creekview UGA. Though not considered a UGA, the panhandle area is assumed to contribute wastewater flow to the Creekview UGA.

Figure 2-6: 2005 Proposed Regional Service Area Boundary and Future Urban Growth Area Map



2.5 Instructions for Utilizing the Land Use Database

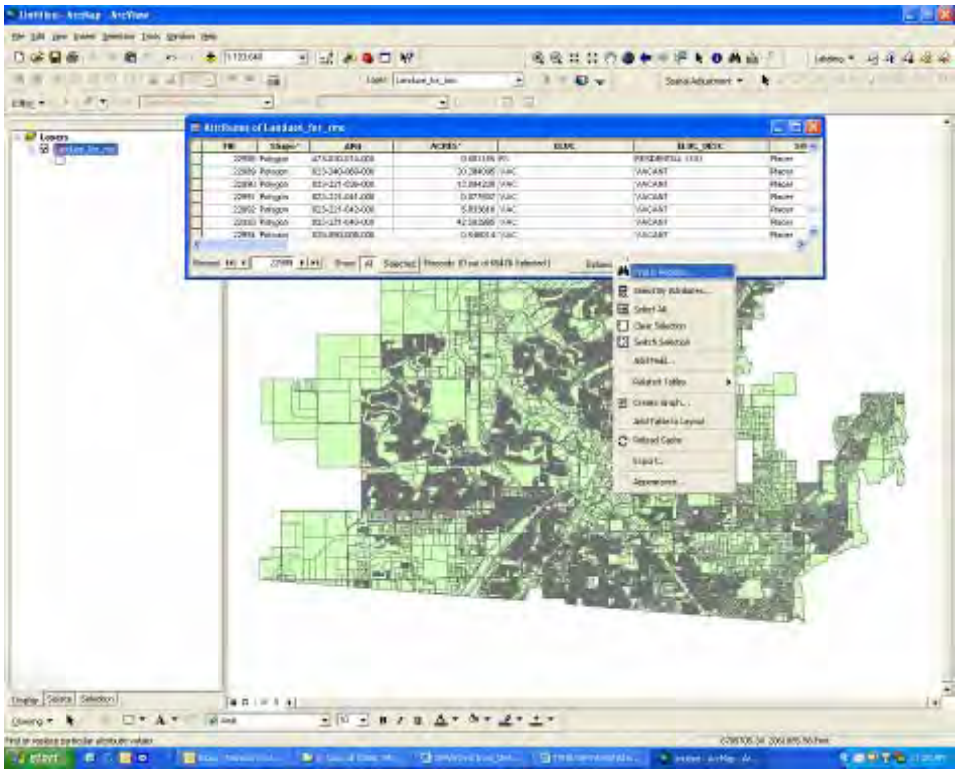
The land use GIS database can be used to determine whether a given development's proposed densities, sewage generation, and so on does not exceed the values considered by this Systems Evaluation. This section is intended to explain the organization of the GIS database and to provide instructions that will allow one to determine exactly how a given parcel or collection of parcels was considered.

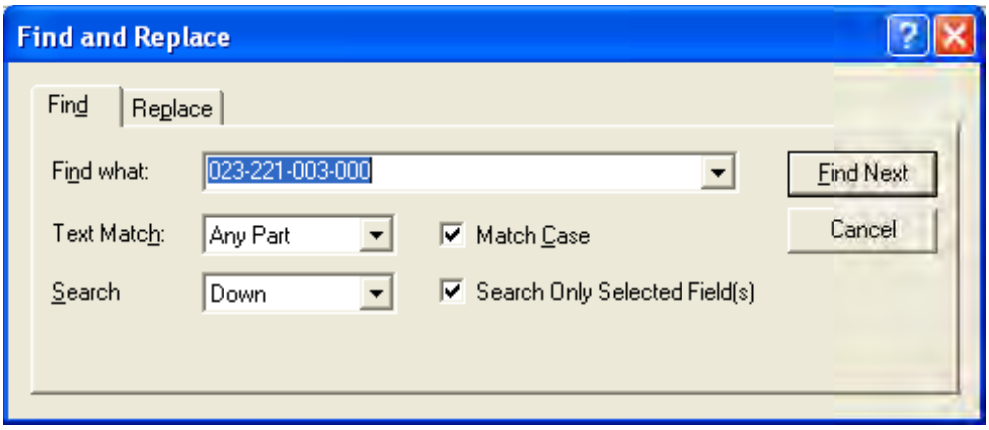
Appendix Z features a CD that contains the GIS database used to develop and store much of the land use information presented in this Systems Evaluation. The database is included as both an ESRI shapefile (for use with ArcGIS software), and as an Excel worksheet (for use with Microsoft Excel). The structure of the database is summarized below:

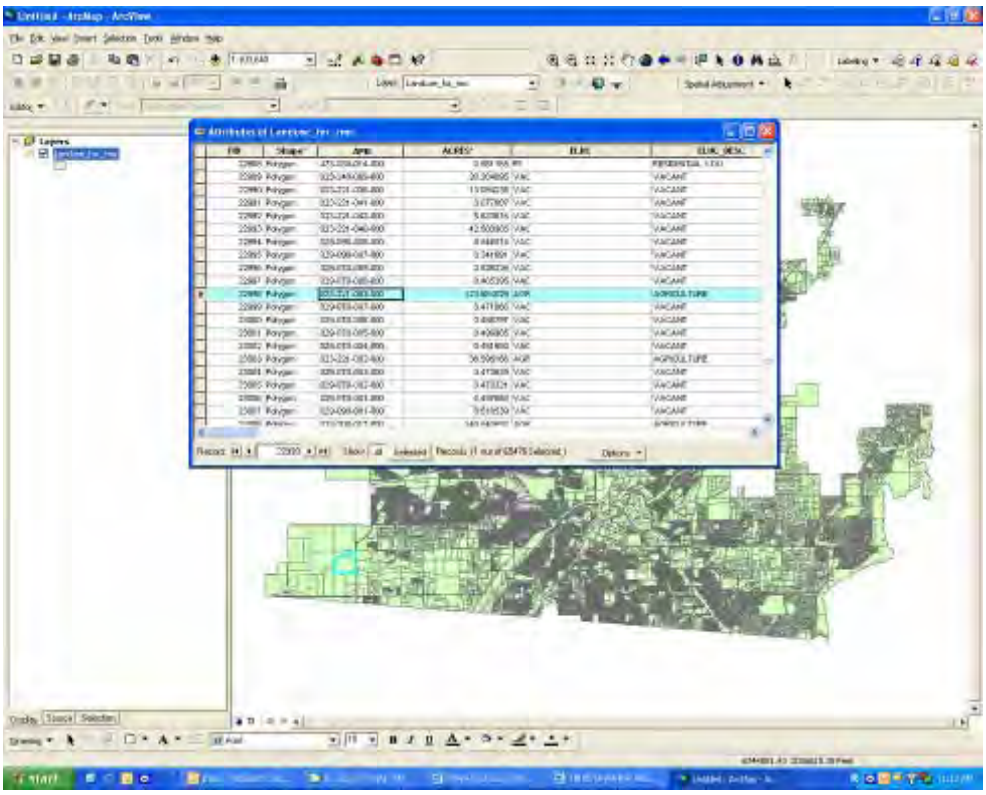
- Each parcel has its own row of information specific to that parcel. There are over 65,000 parcels in the database, so there are over 65,000 rows of information in the database.
- There are many columns in the database. Each column refers to a specific type of data, designated by its "field name." Definitions of fields present in the database are included in an attachment to **Appendix A**.

Although the database may be queried in many different ways, one example is included below.

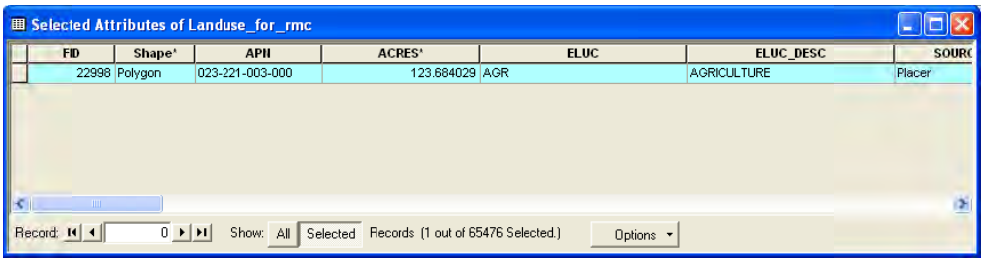
- **To determine the assumed buildout dwelling unit density of a specific parcel – Using ArcMap:**
    - Using the "Find & Replace" tool, enter the parcel's APN and click "find next." The parcel of interest will become highlighted on the map.



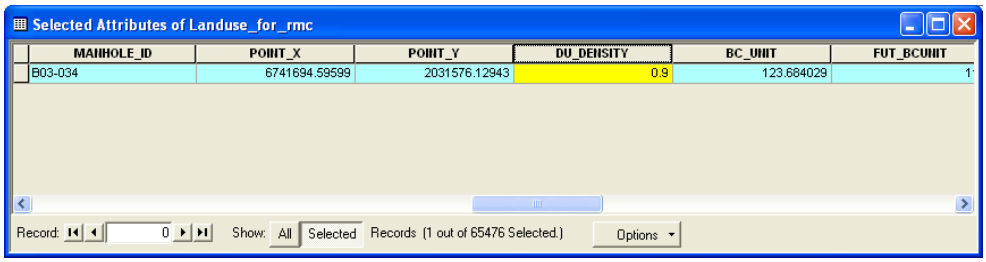




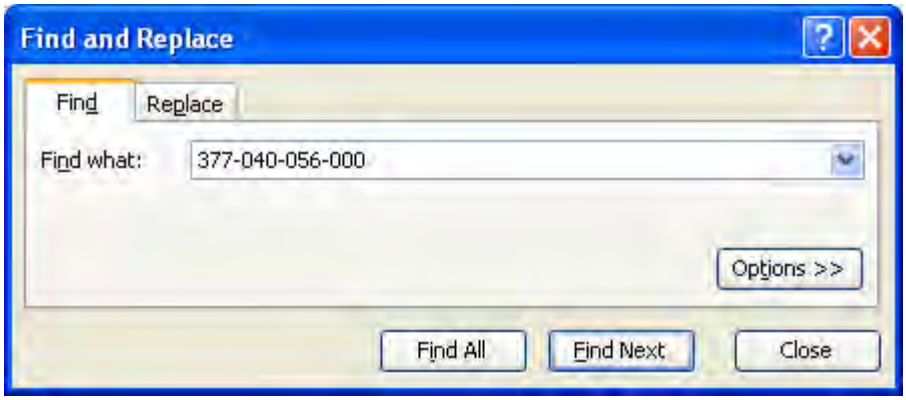
- Click the "Selected" button at the bottom of the Attribute Table to isolate the parcel's database records.

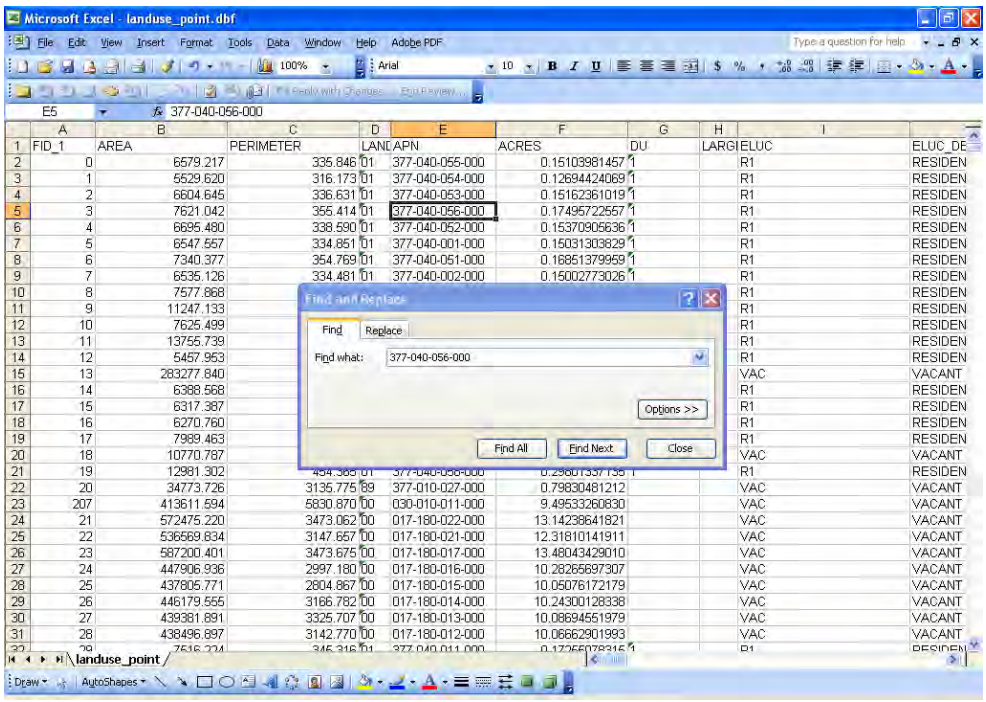


- Scroll to the "DU_Density" field, which will display the buildout dwelling unit density that was assumed for the parcel.

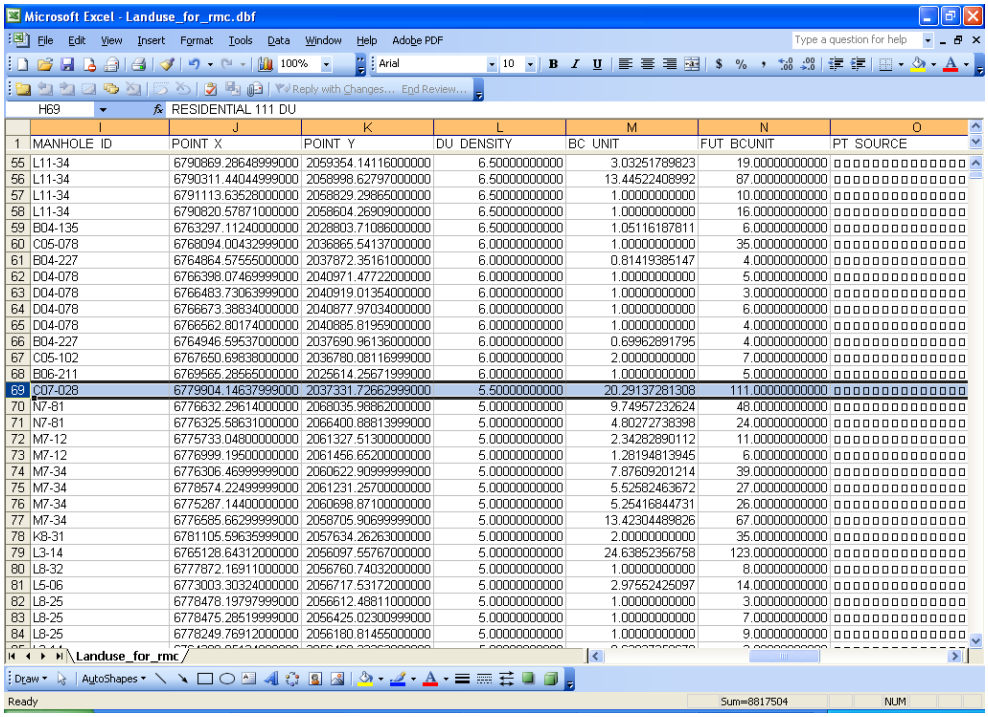


- **To determine the assumed buildout dwelling unit density of a specific parcel – Using Excel:**
  - Using the "Find" tool, enter the parcel's APN and click "find next." The parcel of interest will become highlighted on the screen.





- Click the corresponding row number on the left-hand side of the screen to highlight the parcel's row of database records. Scroll to the "DU_Density" field, which will display the buildout dwelling unit density that was assumed for the parcel.



	I	J	K	L	M	N	O
1	MANHOLE_ID	POINT_X	POINT_Y	DU_DENSITY	BC_UNIT	FUT_BCUNIT	PT_SOURCE
55	L11-34	6790869.28648999000	2059354.14116000000	6.50000000000	3.03251789823	19.00000000000	
56	L11-34	6790311.44044999000	2058998.62797000000	6.50000000000	13.44522408992	87.00000000000	
57	L11-34	6791113.63528000000	2058829.29865000000	6.50000000000	1.00000000000	10.00000000000	
58	L11-34	6790820.57871000000	2058604.26909000000	6.50000000000	1.00000000000	16.00000000000	
59	B04-135	6763297.11240000000	2028803.71086000000	6.50000000000	1.05116187811	6.00000000000	
60	C05-078	6768094.00432999000	2036865.54137000000	6.00000000000	1.00000000000	35.00000000000	
61	B04-227	6764864.57555000000	2037872.35161000000	6.00000000000	0.81419385147	4.00000000000	
62	D04-078	6766398.07469999000	2040971.47722000000	6.00000000000	1.00000000000	5.00000000000	
63	D04-078	6766483.73063999000	2040919.01354000000	6.00000000000	1.00000000000	3.00000000000	
64	D04-078	6766673.38834000000	2040877.97034000000	6.00000000000	1.00000000000	6.00000000000	
65	D04-078	6766562.80174000000	2040885.81959000000	6.00000000000	1.00000000000	4.00000000000	
66	B04-227	6764946.59537000000	2037690.96136000000	6.00000000000	0.69962891795	4.00000000000	
67	C05-102	6767650.69838000000	2036780.08116999000	6.00000000000	2.00000000000	7.00000000000	
68	B06-211	6769565.28565000000	2025614.25671999000	6.00000000000	1.00000000000	5.00000000000	
69	C07-028	6779904.14637999000	2037331.72662999000	5.50000000000	20.29137281308	111.00000000000	
70	N7-81	6776632.29614000000	2068035.98862000000	5.00000000000	9.74957232624	48.00000000000	
71	N7-81	6776325.58631000000	2066400.88813999000	5.00000000000	4.80272738398	24.00000000000	
72	M7-12	6775733.04800000000	2061327.51300000000	5.00000000000	2.34282890112	11.00000000000	
73	M7-12	6776999.19500000000	2061456.65200000000	5.00000000000	1.28194813945	6.00000000000	
74	M7-34	6776306.46999999000	2060622.90999999000	5.00000000000	7.87609201214	39.00000000000	
75	M7-34	6778574.22499999000	2061231.25700000000	5.00000000000	5.52582463672	27.00000000000	
76	M7-34	6775287.14400000000	2060698.87100000000	5.00000000000	5.25416844731	26.00000000000	
77	M7-34	6776585.66299999000	2058705.90699999000	5.00000000000	13.42304489826	67.00000000000	
78	K8-31	6781105.59635999000	2057634.26263000000	5.00000000000	2.00000000000	35.00000000000	
79	L3-14	6765128.64312000000	2056097.55767000000	5.00000000000	24.63852356758	123.00000000000	
80	L8-32	6777872.16911000000	2056760.74032000000	5.00000000000	1.00000000000	8.00000000000	
81	L5-06	6773003.30324000000	2056717.53172000000	5.00000000000	2.97552425097	14.00000000000	
82	L8-25	6778478.19797999000	2056612.48811000000	5.00000000000	1.00000000000	3.00000000000	
83	L8-25	6778475.28519999000	2056425.02300999000	5.00000000000	1.00000000000	7.00000000000	
84	L8-25	6778249.76912000000	2056180.81455000000	5.00000000000	1.00000000000	9.00000000000	

Chapter 3 Unit Flow Factors and Flow Projections

3.1 Introduction

This chapter summarizes the development of unit flow factors and the subsequent dry weather and wet weather wastewater flow projections for buildout conditions within the Ultimate SPWA Service Area. The tasks for this portion of the Systems Evaluation are summarized in Table 3-1.

Table 3-1: Unit Flow Factor and Flow Projections Task Summary

Task	Subtask(s)
Determine Unit Flow Factors and Flow Projections	• Review Available Information
	• Flow Monitoring Planning
	• Flow Monitoring
	• Unit Flow Factors
	• Peaking Factors
	• Flow Projections

3.2 Dry Weather Flow Projections

3.2.1 Dry Weather Flow Monitoring Program

In order to establish "target" flows for a unit flow factor mass balance, average dry weather flow (ADWF) monitoring data from seven permanent flow monitoring sites in Roseville, SPMUD and Placer County were collected and reviewed during September and October 2004. A flow data summary from the monitoring period is presented in **Table 3-2**. Each of the two Roseville sites was located at one of the regional wastewater treatment plants (i.e., the Dry Creek and Pleasant Grove WWTPs). The five remaining sites were located at flumes where SPMUD and Placer County trunk sewers enter Roseville. The flow monitors in the Dry Creek watershed are tributary to the Dry Creek WWTP; similarly, flow monitors in the Pleasant Grove watershed are tributary to the Pleasant Grove WWTP. Hydrographs for the Springview, Strap Ravine and Old Auburn flow monitoring sites exhibited signs of groundwater infiltration (GWI). This assessment was confirmed by performing the unit flow factor mass balance calculations, as well as a review of temporary wet weather flow monitoring data from winter 2005.

Total GWI was estimated by subtracting total base sanitary flow (BSF) projections from total DWF as measured at the WWTP flow monitoring sites. The calculated GWI rate for the Dry Creek WWTP sewershed is approximately 1.70 mgd.

Table 3-2: Measured Flow Permanent Dry Weather Flow Monitoring Sites in September and October 2004

Site Name	Location	Sewershed	BSF (mgd)	GWI (mgd) [1]	ADWF (mgd)
Old Auburn	Placer County	Dry Creek	0.75	0.50	1.25
Strap Ravine	Placer County	Dry Creek	0.73	0.30	1.03
Highlands	SPMUD	Dry Creek	0.08	0.00	0.08
Springview	SPMUD	Dry Creek	2.19	0.80	2.99
Dry Creek WWTP	Roseville	Dry Creek	12.70	1.70	14.40
North Roseville	SPMUD	Pleasant Grove	1.84	0.00	1.84
Pleasant Grove WWTP	Roseville	Pleasant Grove	2.55	0.00	2.55

Footnotes:
1. GWI estimates based watershed area upstream of flow meter.

The resulting areal dry season GWI rates are shown in **Table 3-3**. Dry season GWI was not applied to parks, open space, or Union Pacific Railroad property.

Table 3-3: Dry Season GWI Rates

Sewershed	Tributary Area	Agency	Dry Season GWI Rate (gpd/acre)
DCWWTP	Dry Creek WWTP Flow Monitor	Roseville	20
	Springview Flow Monitor	SPMUD	210
	Highlands Flow Monitor	SPMUD	0
	Strap Ravine Flow Monitor	Placer County	120
	Old Auburn Flow Monitor	Placer County	350
PGWWTP	Pleasant Grove WWTP Flow Monitor	Roseville	0
	North Roseville Flow Monitor	SPMUD	0
	Sunset Industrial Park	Placer County	0

Based on discussions with SPWA partner agencies, seven point sources were identified within the 2005 Regional Service Area as of June 2004. Data for these point sources are summarized in **Table 3-4**. There are also three point sources located within UGAs; the flows from these point sources are included with the UGA flow projections in **Table 3-7**. June 2004 point sources in the 2005 Regional Service Area were identified from flow monitoring data and water billing information. The Placer County Landfill was also identified as a point source, as it generates very little wastewater flow relative to its size. Buildout flow projections from NEC and HP were provided by the City of Roseville and are based on buildout conditions for each development.

Table 3-4: June 2004 and Projected ADWF from Point Sources in the 2005 Regional Service Area

Point Source	Location	June 2004 Flow Data Source	June 2004 ADWF (gpd)	Projected Buildout ADWF (gpd)
Union Pacific Railroad	Roseville	City of Roseville	85,000	85,000
Landfill	Placer County	City of Roseville	5,000	5,000
NEC	Roseville	Flow Monitor Data	700,000	2,000,000
HP	Roseville	City of Roseville	150,000	484,000
Kaiser Hospital	Roseville	Water Use Data	50,000	50,000
Formica	Placer County	Placer County	60,000	60,000
Rio Bravo Power Plant	Placer County	Placer County	15,000	15,000

3.2.2 Unit Flow Factors

Development of unit flow factors included (1) gathering and analyzing land use-specific water billing and flow monitoring data, (2) calculating the corresponding unit flow factors for given land use categories, and (3) testing the appropriateness of the calculated unit factors for the June 2004 system in a mass balance calculation. Unit flow factors were developed using water billing data from the City of Roseville and from dry weather flow monitoring data from the locations listed in Table 3-2.

The unit flow factors, which were used to project BSF and ADWF for the trunk sewer evaluation (Chapter 4) and WWTP expansion evaluation (Chapter 5) segments of this Systems Evaluation, respectively, are presented in **Table 3-5**. BSF unit flow factors do not include dry season groundwater infiltration (GWI), and are therefore lower than the ADWF unit flow factors. Unit flow factors for the single family residential land use category are applied on a per-dwelling unit (du) basis, while unit flow factors for other land uses are applied on an areal basis. **Appendix E** presents a side-by-side comparison of the unit factors used in this Systems Evaluation and those used in the 1996 Master Plan and EIR.

Temporary flow monitoring data (collected following the analysis of data from the seven permanent flow monitoring sites discussed above) indicated wide variations in the unit flow factors for various land use types, and was not considered representative of the entire service area. Water billing data from the City of Roseville and the permanent flow monitoring data from Roseville, SPMUD and Placer County ultimately proved to be more representative of the entire service area. For further information on water billing data, refer to *TM 2b – Dry Weather Flow Projections for Ultimate Service Area (w/ UGAs)* in **Appendix D**.

Table 3-5: BSF and ADWF Unit Flow Factors

Land Use Category	Units	BSF Unit Flow Factor [1] (for Trunk Sewer Modeling)	ADWF Unit Flow Factor [2] (for WWTP Flow Projections)
Commercial	gpd per acre	800	850
Heavy Industrial	gpd per acre	800	850
Light Industrial	gpd per acre	800	850
Mixed Use	gpd per acre	2,160	2,300
Public/Quasi-Public	gpd per acre	620	660
Schools	gpd per acre	160	170
Residential 1 DU	gpd per du	180	190
Residential 2 DU	gpd per du	180	190
Residential 3 DU	gpd per du	180	190
Residential Mult. DU [3]	gpd per acre	1,920	2,040
Open Space	gpd per acre	0	0
Parks > 10 Acres	gpd per acre	10	10
Vacant	gpd per acre	0	0

Footnotes:

1. Does not include allowance for GWI. Dry and wet season GWI were applied as gpd/acre rates on an area-specific basis.
2. Includes allowance for dry season GWI.
3. The proposed Residential Multiple DU unit flow factor can also be represented as 120 gpd per DU (BSF) or 130 gpd per DU (ADWF).

3.2.3 Average Dry Weather Flow Projections

Buildout ADWF projections within the 2005 Regional Service Area were based on the ADWF unit flow factors presented in Table 3-5. The projections do not include the impacts of proposed redevelopment/intensification within Roseville and Rocklin, which was analyzed as a separate scenario and is presented in Chapter 9. Buildout ADWF projections within the 2005 Regional Service Area are presented in **Table 3-6**.

Table 3-6: Buildout ADWF Projections within the 2005 Regional Service Area

Land Use	ADWF Unit Flow Factor	PGWWTP [3]		DCWWTP [4]		2005 Service Area	
		Buildout Units (acres or dus)	Buildout ADWF (mgd)	Buildout Units (acres or dus)	Buildout ADWF (mgd)	Buildout Units (acres or dus)	Buildout ADWF (mgd)
Commercial	850 gpd/ac	1,728	1.47	2,890	2.46	4,618	3.92
Heavy Industrial[1]	850 gpd/ac	1,680	1.43	263	0.22	1,943	1.65
Light Industrial[1]	850 gpd/ac	1,221	1.04	637	0.54	1,858	1.58
Mixed Use	2,300 gpd/ac	-	-	7	0.02	7	0.02
Public/Quasi-Public[1]	660 gpd/ac	282	0.19	851	0.56	1,133	0.75
Schools	170 gpd/ac	258	0.04	540	0.09	798	0.14
Residential 1 DU	190 gpd/du	26,893	5.11	42,866	8.14	69,759	13.25
Residential 2 DU	190 gpd/du	2	0.0004	2,122	0.40	2,124	0.40
Residential 3 DU	190 gpd/du	12	0.002	720	0.14	732	0.14
Residential Multiple DU	2,040 gpd/ac	594	1.21	606	1.24	1,200	2.45
Open Space	0 gpd/ac	6,034	-	3,171	-	9,205	-
Parks > 10 Acres	10 gpd/ac	270	0.003	361	0.004	631	0.01
Point Sources	Varies gpd/ac	1,043	2.56	91	0.14	1,134	2.70
Placer Ranch[2]	Varies gpd/ac	1,027	0.90	-	-	1,027	0.90
West Roseville[5]	Varies gpd/ac	3,162	2.07	-	-	3,162	2.07
Placer Vineyards[2]	Varies gpd/ac	-	-	1,062	0.58	1,062	0.58
Rezones	Varies gpd/ac	-	0.50	-	0.17	-	0.67
Intensification	Varies gpd/ac	-	-	-	1.64	-	1.64
		Totals (mgd)	**16.52**		**16.34**		**32.86**

Footnotes:

1. Does not include the area of those parcels associated with the point sources identified in Table 3-4.
2. Includes the portion of the development located within the 1996 Master Plan Regional Service Area boundary (in this case, the 1996 Master Plan Regional Service Area boundary and the 2005 Regional Service Area boundary are the same).
3. Applies to the Pleasant Grove WWTP sewershed.
4. Applies to the Dry Creek WWTP sewershed.
5. Includes all of WRSP, located entirely inside of the 2005 Regional Service Area boundary, includes 0.37 mgd increase over Jan 2008 data for WRSP rezones

Buildout ADWF projections within the Ultimate SPWA Service Area are based on the proposed ADWF unit flow factors, and include flows generated within the 2005 Regional Service Area boundary and the UGAs, and are presented in **Table 3-7**. These flow projections include the results of proposed redevelopment/intensification within Roseville and Rocklin. Detailed flow projections for each UGA are presented in *TM 2b – Dry Weather Flow Projections for Ultimate Service Area (w/ UGAs)* in **Appendix D**.

Table 3-7: Buildout ADWF Projections for UGAs and the 2005 Regional Service Area

Description of Area	Buildout ADWF (mgd)		Total Buildout ADWF (mgd)
	PGWWTP [1]	DCWWTP [2]	
2005 Regional Service Area [3,4,7]	16.52 [9]	16.34 [9]	32.86
Curry Creek UGA	2.72	-	2.72
Regional University UGA	1.17	-	1.17
Inviro Tech UGA	0.08	-	0.08
Placer UGA	-	0.01	0.01
Orchard Creek UGA	0.02	-	0.02
Placer Ranch UGA [5]	1.27	-	1.27
Placer Vineyards UGA [6]	-	2.23	2.23
SMD-3 UGA	-	0.29	0.29
SPMUD UGA	-	1.11	1.11
Creekview UGA and Panhandle [8]	1.06	-	1.06
Sierra Vista UGA	2.10	-	2.10
Brookfield UGA	0.73	-	0.73
Total ADWF (mgd)	**25.67**	**19.98**	**45.65**

Footnotes:

1. Applies to the Pleasant Grove WWTP sewershed.
2. Applies to the Dry Creek WWTP sewershed.
3. Includes the portion of the Placer Ranch UGA located within the 1996 Master Plan and 2005 Regional Service Area boundary (i.e., “Placer Ranch Inside”). (The 1996 Master Plan Regional Service Area boundary and the 2005 Regional Service Area boundary are the same this area).
4. Includes the portion of the Placer Vineyards UGA located *within* the 1996 Master Plan and 2005 Regional Service Area boundary (i.e., “Placer Vineyards Inside”).
5. Includes the portion of the Placer Ranch UGA located outside the 1996 Master Plan and 2005 Regional Service Area boundary (i.e., “Placer Ranch Outside”).
6. Includes the portion of the Placer Vineyards UGA located outside the 1996 Master Plan and 2005 Regional Service Area boundary (i.e., “Placer Vineyards Inside”).
7. Includes all of the West Roseville Specific Plan (WRSP) area.
8. "Panhandle" refers to a 238-acre portion of the Reason Farms planning area that is adjacent to the western boundary of the 511-acre Creekview UGA. The panhandle area is assumed to contribute wastewater flow to the Creekview UGA.
9. Refer to Table 3-6.

3.3 Wet Weather Flow Projections

Wet weather flow projections were used to perform the hydraulic assessment of the trunk sewer system and to evaluate the expansion requirements of the SPWA regional WWTPs. Wet weather flows were based on flow monitoring data.

3.3.1 Flow Monitoring

Wet weather flow data were collected and evaluated from a network of 43 flow monitors from late January through March 2005. The network consisted of 37 temporary flow monitors and 6 permanent flow monitors. Twenty-seven of the flow monitor sites (including the monitors located at the WWTPs) were within the City of Roseville and were simultaneously utilized for the City of Roseville Sanitary Sewer Model Development Project. The remaining monitors were located in Placer County and SPMUD. Some of the temporary monitors located outside Roseville were located to verify the data from permanent flow monitor sites. A more detailed discussion of the wet weather flow monitoring program is presented in *TM 2c – Wet Weather Flow Projection for Ultimate Service Area (w/ UGAs)* in **Appendix F**. The locations of the flow monitor sites are indicated on **Figure 3-1**.

Precipitation data during the wet weather flow monitoring period were collected at 17 permanent rain gauge sites in the City of Roseville and Placer County, and at one temporary rain gauge site within SPMUD. The rain gauge network provided comprehensive coverage of the entire SPWA service area.

Wet Season GWI

Wet season GWI was determined by comparing ADWF flows at the permanent flow monitor sites in Roseville, SPMUD and Placer County during the 2004 dry season and the 2005 wet season. Wet season GWI was calculated for each area tributary to the permanent flow monitoring sites and was applied to each parcel in the model according the area of the parcel. Wet season GWI is summarized in **Table 3-8**. Based on the results of this analysis, wet season GWI was applied at a rate of 200 gpd/acre and 100 gpd/acre to developed (as of June 2004) parcels in the Dry Creek and Pleasant Grove sewersheds, respectively; wet season GWI was not applied to parks, open space, or Union Pacific Railroad property.

Table 3-8: Estimated Wet Season GWI

Sewershed	Permanent Monitor Location	Tributary Area (acres)	2005 Wet Season ADWF (mgd)	2004 Dry Season ADWF (mgd)	Wet Season GWI (mgd)	Wet Season GWI Rate (gpd/acre)
DCWWTP	Roseville [1]	5,076	6.32	5.09	1.23	242
	SPMUD (Springview)	3,791	3.65	2.99	0.66	174
	Placer County (Strap Ravine)	2,533	1.47	1.03	0.44	174
	Placer County (Old Auburn)	1,555	1.46	1.25	0.21	135
	Total	**12,955**	**12.9**	**10.36 [3]**	**2.54**	**196**
PGWWTP	Roseville [2]	4,064	5.27	4.79	0.48	118
	SPMUD (North Roseville)	1,841	1.96	1.84	0.12	65
	Total	**5,905**	**7.23**	**6.63 [3]**	**0.6**	**102**

Footnotes:

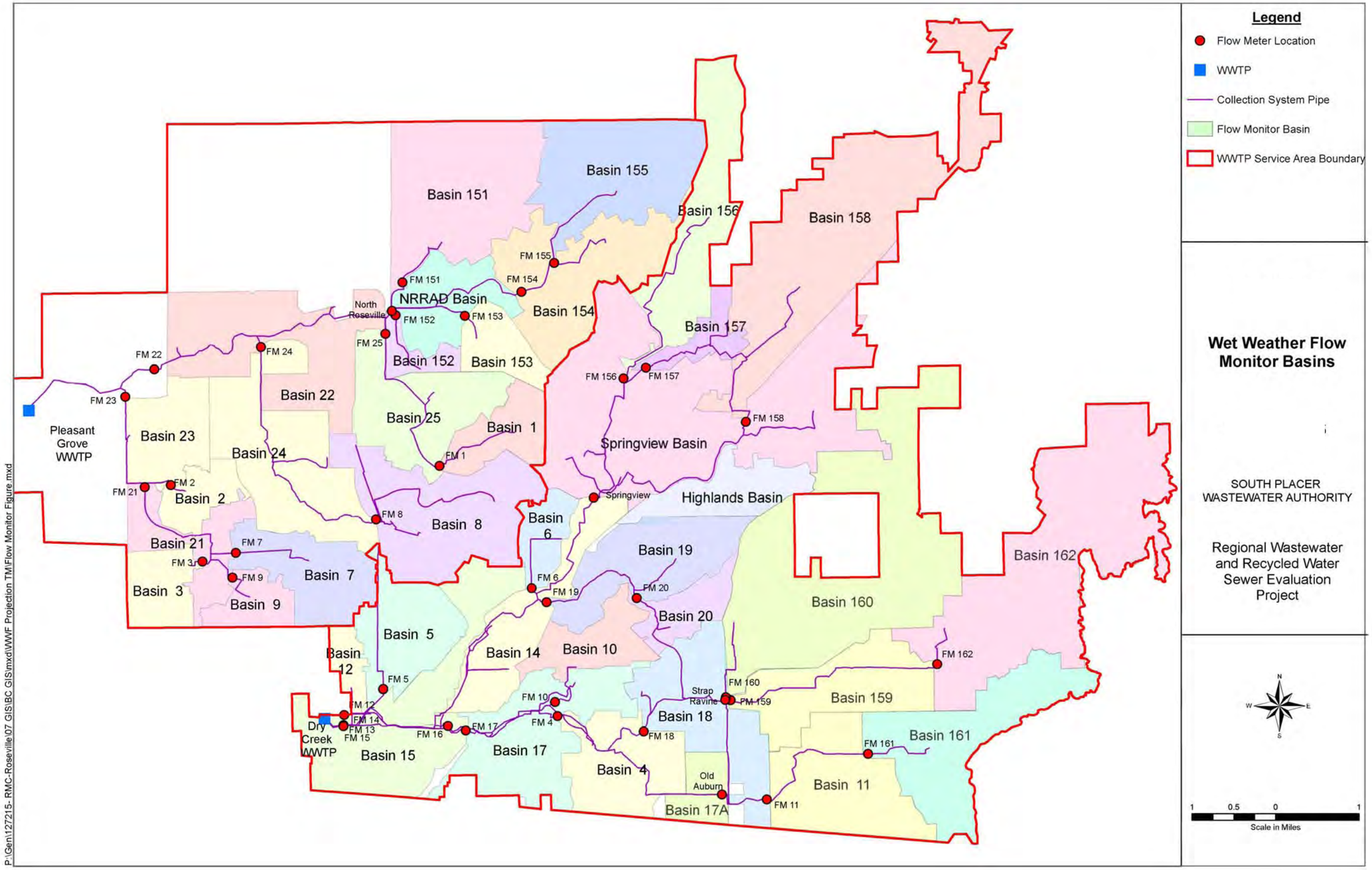
1. Calculated flow rates. Includes the following areas outside of Roseville: Highlands and West Dry Creek.
2. Calculated flow rates. Includes the following areas outside of Roseville: Sunset Industrial Park.
3. 2004 dry season ADWF estimated based on 2005 dry season ADWF data at the Dry Creek and Pleasant Grove WWTPs.

3.3.2 Wet Weather Calibration

The storm event of March 1-2, 2005 was used for wet weather calibration for the SPWA model. This event produced approximately 1.0 inch of rain over 9 hours with a peak hour intensity of about 0.3 inches. Furthermore, monitored flow data from this period exhibited a distinct response to the concurrent rainfall event.

Each wet weather flow monitoring basin was assigned a representative rain gauge to represent the rainfall hyetograph for that basin. Rain gauges were assigned to each basin based on proximity. In most cases, a single rain gauge was used for each basin, but in some cases, the average rainfall from two or more gauges was considered the best representation of the rainfall in the basin.

Figure 3-1: Wet Weather Flow Monitoring Basins



RDI/I Calibration

Rainfall dependent infiltration and inflow (RDI/I) flows were generated using the stormwater modeling functionality included in H2OMap Sewer GIS Professional, Suite 7.0, Update 5 (H2OMap Sewer). For more detailed discussion of the RDI/I calibration process and results, refer to *TM 2c – Wet Weather Flow Projection for Ultimate Service Area (w/ UGAs)* in **Appendix F**.

Wet Weather Calibration Results

Using the calibrated RDI/I parameters (shown in Appendix F) and wet season GWI, the hydraulic model was used to simulate the March 1-2, 2005 storm. The peak hour flows from the model runs at key flow monitoring locations are listed in **Table 3-9**. As with any hydraulic model, wet weather calibration resulted in relatively good matches for some meters, including most of the key flow monitoring sites in the system, while flow data anomalies at other flow meter sites prevented better calibration in some instances. The modeled results at the Dry Creek WWTP flow monitor location was approximately 15 percent lower than the flow monitor data, while modeled results at the Pleasant Grove WWTP flow monitor location was approximately 24 percent higher than the flow monitor data. These discrepancies may be explained by the metering at each WWTP. According to the City of Roseville, there had been problems with the flow monitor at the Dry Creek WWTP. These problems had not been corrected at the time of the wet weather calibration. Although the City had developed average daily flow adjustment factors that are applied to the monitor data, it is unclear if these adjustment factors are valid when applied to hourly flow data. Flows at the Pleasant Grove WWTP monitor are limited by the influent pump station capacity of approximately 9 mgd; in other words, flow backs up in the collection system, and the permanent flow monitor tops off until flows dissipate and the influent pump station "catches up." Were the capacity of the influent pump station increased, a typical diurnal pattern for the influent would likely peak very near the peak for the modeled flows.

Table 3-9: Peak Hour Wet Weather Calibration Results at Key Flow Monitor Locations

Sewershed	Monitor Location	Peak Hour Monitor Flow (mgd)	Peak Hour Model Flow (mgd)
DCWWTP	Dry Creek WWTP	21.1	17.9
	13	6.9	7.1
	14	8.0	7.8
	15	3.4	3.1
	Old Auburn	2.9	3.0
	Strap Ravine	2.3	2.4
	Springview	6.1	6.0
PGWWTP	Pleasant Grove WWTP	9.2	11.4
	22	6.3	8.2
	23	3.6	3.5
	24	2.4	3.3
	25	1.6	1.1
	North Roseville	3.8	4.0
	154	1.8	1.7

3.3.3 I/I Projections for Future Development

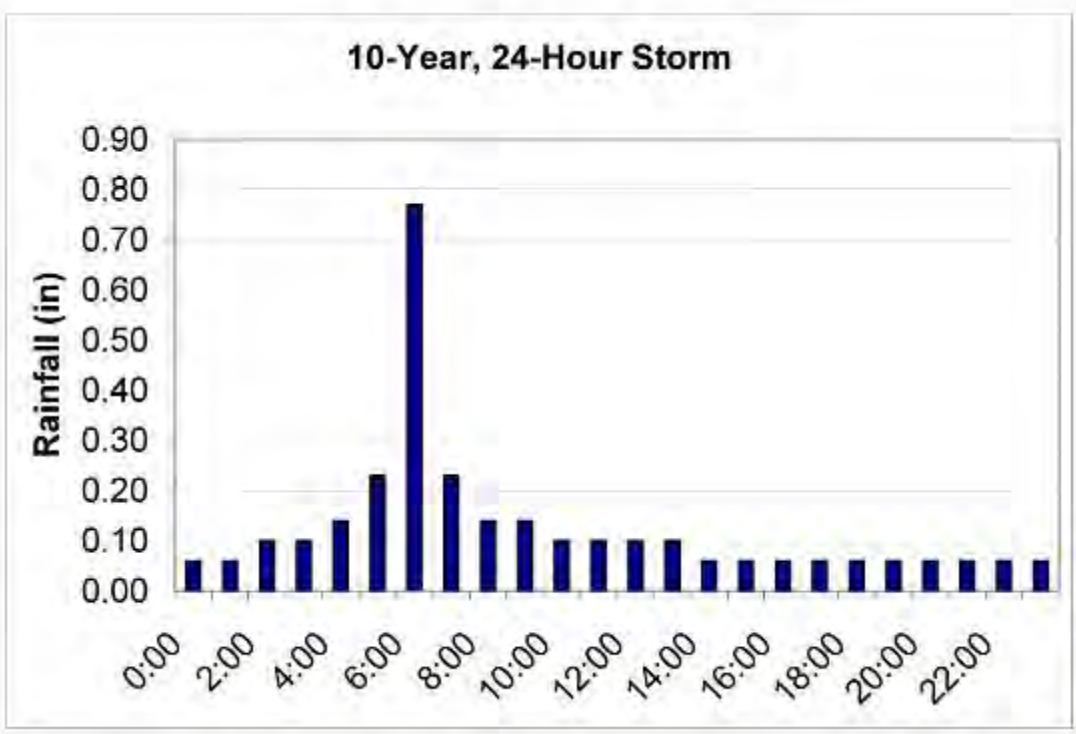
The reader should refer to *TM 2c – Wet Weather Flow Projection for Ultimate Service Area (w/ UGAs)* in Appendix F for information regarding projected wet weather flow contributions from future development.

3.3.4 Design Storm

Based on an examination of regional (i.e., Placer County) practices, the project team's experience with similar planning efforts, and discussion among SPWA staff, a synthetic 24-hour, 10-year frequency design rainfall event was developed as the basis for wet weather capacity assessment. The design rainfall event was developed based on rainfall intensity-duration-frequency (IDF) statistics for Placer County. The IDF statistics are typically presented in the form of curves, which give the long-term average rainfall intensity for various rainfall durations and recurrence frequencies. The magnitude of rainfall is also related to location, as reflected by variations in mean annual rainfall by area. Based on the IDF curves, the rainfall hyetograph for a 10-year frequency, 24-hour duration design storm was developed for the SPWA service area, as shown in **Figure 3-2**. The design storm has a total rainfall of 2.97 inches and a peak hour intensity of 0.77 inches.

For hydraulic modeling purposes, the design storm was assumed to occur at a time such that the peak RDI/I flow generated by the design storm would coincide with the peak hour BSF diurnal pattern (for residential flow input points to the model). It should be noted that this assumption increases the conservatism of the peak wet weather flows, as the actual flow recurrence frequency for such an event (i.e., the simultaneous peaking of design storm RDI/I and diurnal BSF) could be greater than 10 years.

Figure 3-2: Design Storm Hyetograph



3.3.5 Summary of Wet Weather Flow Projections

Using the design storm and the calibrated RDI/I and wet season GWI parameters, the hydraulic model was run to project June 2004 and buildout wet weather flows in the regional trunk sewer system. A summary of the flows at key locations in the system under June 2004 and buildout scenarios is

provided in **Table 3-10**. Based on these projections, the ratios of peak wet weather flow to average dry weather flow for the Dry Creek and Pleasant Grove Sewersheds at buildout are approximately 3.0 and 2.0, respectively.

Table 3-10: Design Storm Peak Wet Weather Flow for June 2004 and Buildout Conditions

Sewershed	Monitor Location	June 2004 Peak Hour Flow (mgd)	Buildout Peak Hour Flow (mgd)	Buildout ADWF (mgd)	Peaking Factor
Dry Creek WWTP	**Dry Creek WWTP**	**28.6**	**48.5**	**19.98**	**3.0**
	13	10.7	16.9		
	14	10.9	21.1		
	15	6.7	7.7		
	Old Auburn	3.2	4		
	Strap Ravine	3	9		
	Springview	7.1	13.8		
Pleasant Grove WWTP	**Pleasant Grove WWTP**	**17.4** [1]	**42.7** [1]	**25.67**	**2.0**
	22	11.2	25.5		
	23	7.3	7.7		
	24	4.6	8.2		
	25	1.6	2.3		
	North Roseville	4.7	9.1		
	154	2.5	3.9		

Footnote:
1. Modeled without the Brookfield development. Refer to TM 11a.

Chapter 4 Trunk Sewer Evaluation

4.1 Introduction

This chapter summarizes the development of the hydraulic model of the regional trunk sewer system, the results of the hydraulic assessment of the system, and the resulting capacity improvement recommendations. The tasks for this portion of the Systems Evaluation are summarized in Table 4-1.

Table 4-1: Trunk Sewer Evaluation Task Summary

Task	Subtask(s)
Trunk Sewer Evaluation	• Model Development
	• Model Calibration
	• Hydraulic Assessment
	• Trunk Sewer System Evaluation

4.2 Criteria

Prior to the preparation of the Systems Evaluation, development criteria, rather than a hydraulic model, were used to size all sewers and related infrastructure in the SPWA service area. Due to changes in land use and the size of the service area, however, it has become increasingly necessary to develop and utilize a more sophisticated approach to sizing trunk sewers. To that end, the *Unit Flow Factor Sets and Sewer Design Criteria TM* (TM 3a) was developed, and is included as **Appendix G**. TM 3a states that for sewers 15 to 18 inches in diameter or larger, the hydraulic model, described in more detail below, should be used. For smaller sewers, TM 3a provides criteria, including safety and peaking factors, to be used for determining flows and pipe size.

4.3 Model Software Information

The hydraulic modeling program used for this project was H_2OMap Sewer GIS Professional, Suite 7.0, Update 5 (H_2OMap Sewer), a software package sold by MWH Soft, Inc. H_2OMap Sewer is a GIS-based modeling program that utilizes a numerical approach to model and analyze sewer flows, and is widely used for hydraulic analyses of collection systems. H_2OMap Sewer offers a "dynamic" model, meaning that time-varying flows are routed through the system using various hydraulic equations. The program differs, however, from other more sophisticated "fully dynamic" models in that it is not well-known for its ability to accurately model the more complicated hydraulics present in collection systems, most notably those at flow splits, weirs, pump stations, and overflowing manholes. (This aspect of the model should be considered when making any recommendation based on the model's results at or very near any of the more complicated structures in the collection system). This program is also being used by the City of Roseville to model its collection system. Using the same software for this project allowed the information developed for the City's model to be directly utilized for the SPWA model.

4.4 Model Network Development

The June 2004 model network includes all trunk sewers in the 2005 Regional Service Area that are greater than or equal to 15 inches in diameter, as well as three pump stations and their associated force mains. Many of these pipes are not SPWA facilities, as they are not joint-use pipelines (i.e., they do not convey flow from all three partner agencies). These pipes, however, in addition to selected 6-, 8-, 10- and 12-inch diameter sewers, were included in the model network to provide a more complete analysis of the regional trunk sewer system. The June 2004 model network is shown on **Figure 4-1**.

Approximately 83 miles of gravity trunk sewers are included in the June 2004 model network. The buildout network includes an additional 100,000 linear feet (lf) of trunk sewer pipe, 67,000 lf of force

mains and five pump stations. The alignments of future pipes were based upon USGS topographic contour data, available data from the West Roseville Specific Plan (WRSP), and planning documents supporting development within UGAs (e.g., Placer Vineyards, Regional University and Placer Ranch). The buildout model network is shown on **Figure 4-2**. The amount of pipeline included in the June 2004 and buildout model network is summarized, by pipe diameter, in **Table 4-2**.

Under separate contracts, RMC conducted several hydraulic modeling studies for areas that will send wastewater flows to regional treatment facilities. Hydraulic modeling TMs for the Placer Vineyards UGA, the Placer Ranch UGA, and the Riolo Vineyards development area were prepared and are presented in **Appendix K**, **Appendix L**, and **Appendix M**, respectively.

Figure 4-1: June 2004 Model Network

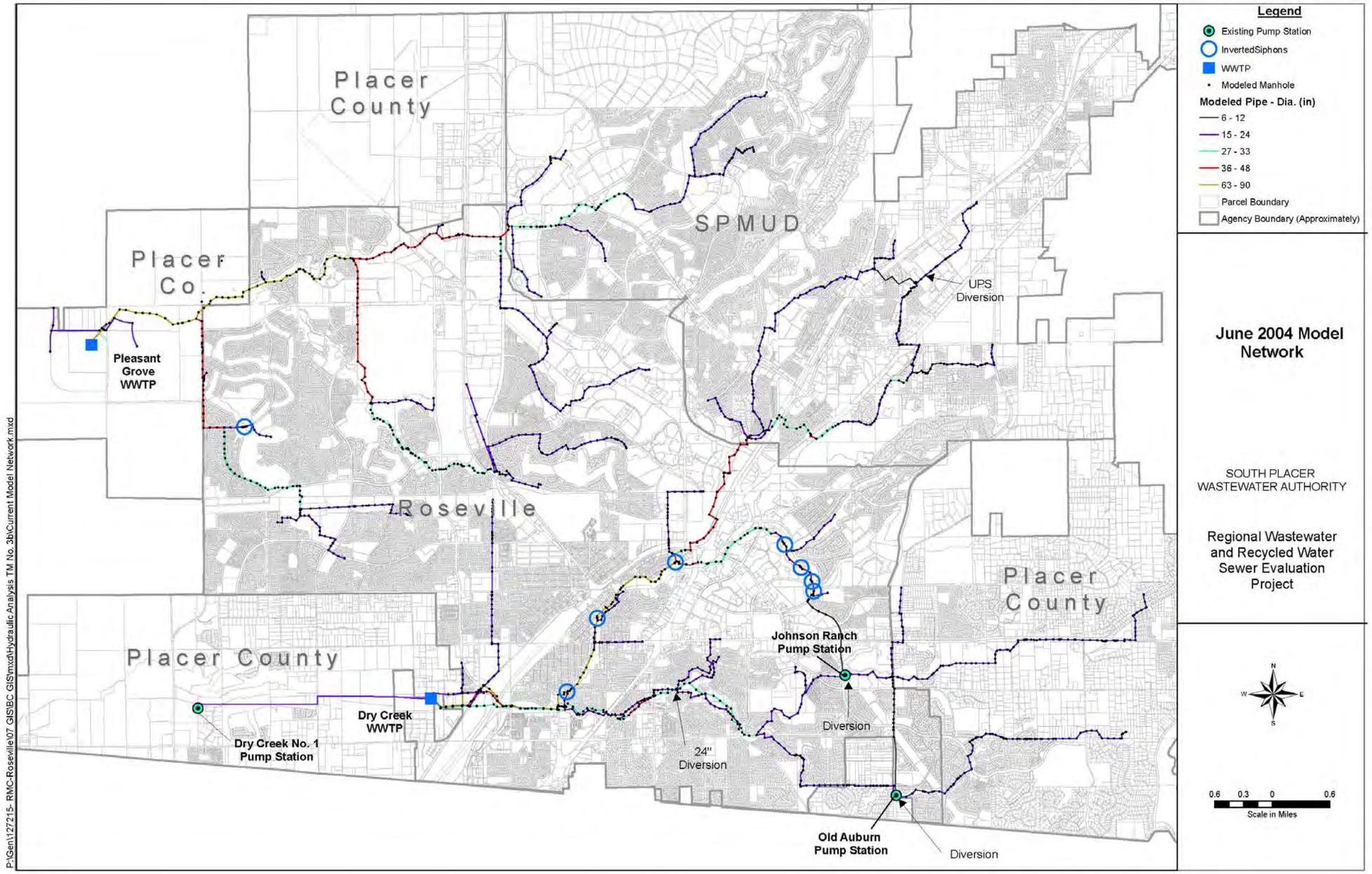


Figure 4-2: Buildout Model Network

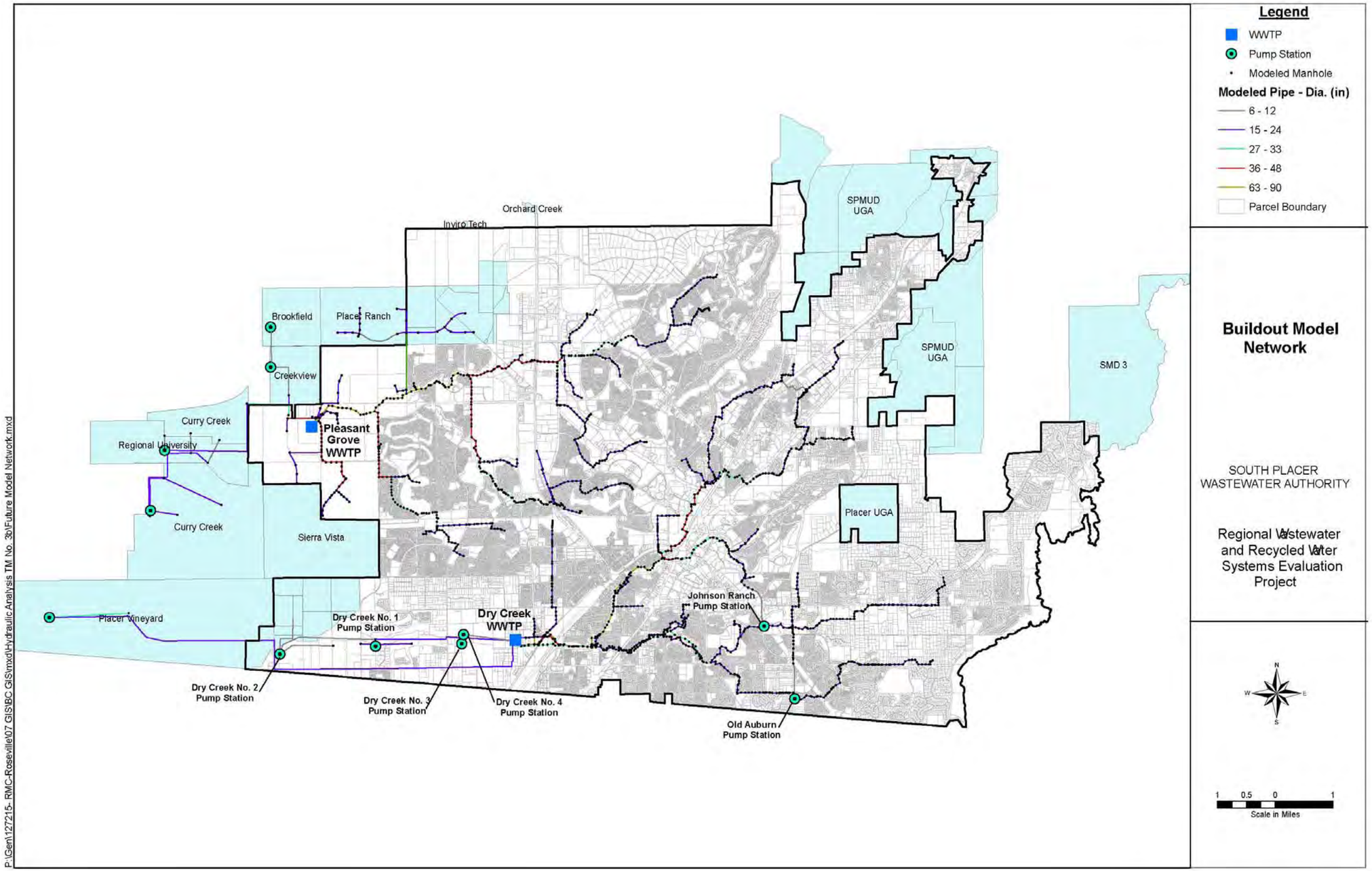


Table 4-2: Model Network Summary - Gravity Sewers

Diameter (in)	Length (ft)	
	June 2004	Buildout
6	462	462
8	8,026	8,026
10	8,264	8,264
12	11,405	21,726
15	93,622	102,540
16	8,599	8,539
18	93,644	93,573
20	4,080	4,080
21	33,527	62,190
24	32,801	41,097
27	9,608	23,655
30	26,311	33,570
33	21,508	25,242
36	16,631	19,618
42	30,417	33,494
48	403	4,860
63	8,629	8,629
66	11,286	11,286
72	10,867	10,867
78	5,862	5,862
90	1,082	1,082
Total	**437,035**	**528,663**

Information about the June 2004 trunk sewers was obtained from several sources. Data for the trunk sewers in Roseville were obtained from the City's hydraulic model of its collection system, which was developed by RMC concurrently with this Systems Evaluation. The City's hydraulic model network was based on the City's GIS of its collection system, as-built drawings, survey data, and discussions with City staff. Trunk sewer information for the Granite Bay (SMD-2) area was obtained from Placer County's sewer GIS. Record drawings were reviewed to develop the model network in SPMUD. Manhole numbers used in the model were provided by the respective SPWA partner agencies.

Survey information was obtained to augment certain areas with missing invert and/or rim elevation data. For each of surveyed manholes, the survey information included the manhole rim elevation and invert elevations for each connecting trunk sewer. Survey information was also obtained at several locations to verify elevation information from other sources. Elevations that were assumed or gathered during supplemental surveying are indicated as such in the model database. A summary of survey information collected for this project is presented in **Appendix I**.

In some areas, pipe invert elevations were estimated using H_2OMap Sewer's Pipe Invert Calculator, a tool for populating gaps in invert data. Using manually entered invert data (i.e., invert data from surveys and record drawings) and slope information, the Pipe Invert Calculator works upstream, calculating pipe inverts using downstream inverts as anchor points and generating upstream values based on pipe lengths and slopes. At any point where the Pipe Invert Calculator encounters an existing invert value, the existing value is preserved and all subsequent upstream inverts are anchored to the most recently encountered

"existing" invert. In this way, the inevitable discrepancies between real and modeled pipe data have been minimized, as the Pipe Invert Calculator is "tethered" at intervals to survey data. Excluding instances wherein the Pipe Invert Calculator encounters and preserves an existing invert, pipe inverts are matched in all cases. Therefore, unless drop manholes were accompanied by record drawings or survey data, elevation changes at drop manholes may not be accurately represented in this model. While these possible misrepresentations do not impede the model's hydraulic computations, model outputs (e.g., hydraulic profiles) should be checked for questionable results (i.e., unanticipated backwater effects) that may be caused by inadvertently misrepresented pipes (NOTE: the model results presented in this report were checked in this manner, and any areas with misrepresented elevations were adjusted as necessary).

In several circumstances, it was determined that pipe inverts assigned by the Pipe Invert Calculator required manual corrections in order to maintain realistic flows within the system. The tables in **Appendix J** list the corrections made.

The June 2004 model network was extended to include proposed trunk sewers and force mains needed to serve future development areas in Roseville and Placer County, located outside of the 2005 Regional Service Area Boundary. Several of the UGAs located to the west of the 2005 Regional Service Area Boundary will require pump stations and force mains to convey their wastewater flows to the WWTPs. The layouts of proposed sewers and force mains are based on preliminary sewer alignments provided in Specific Plans, as well as USGS topographic contour information. Most UGAs and future development areas were connected (loaded) to June 2004 trunk sewers. There are no specific developments identified within the SPMUD UGA at this time, and future trunk sewer extensions were not included in the SPMUD collection system at the request of SPMUD. The model network for the buildout scenario is shown on Figure 4-2.

A standard Manning's friction factor (Manning's *n*) of 0.013 was assigned to each modeled pipe reach. Manning's friction factor is used by H_2OMAP Sewer to determine pipe hydraulic capacities.

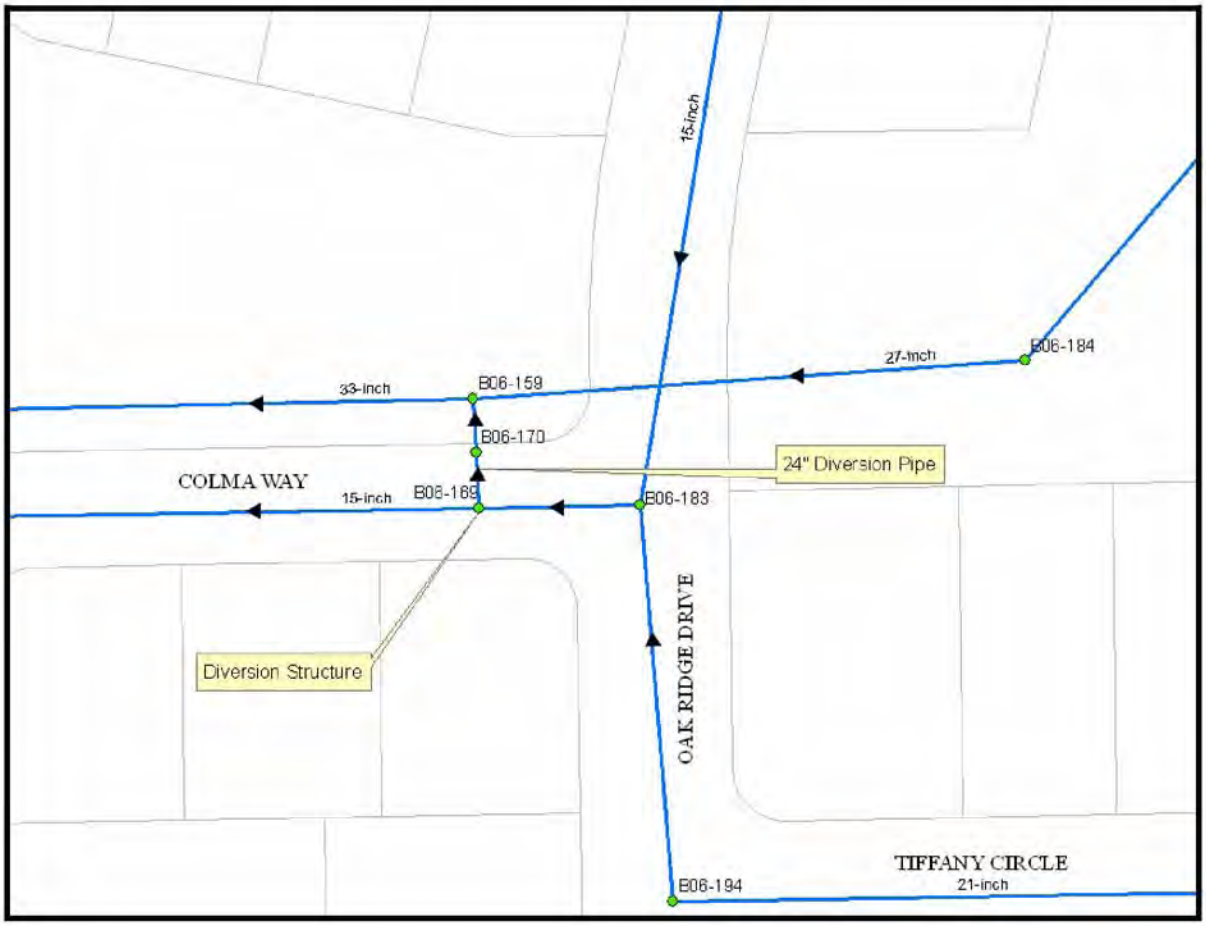
4.4.1 Flow Diversions

The June 2004 model network includes four flow diversions, as shown in Figure 4-1. Three of the diversions are located in Roseville; one diversion is located in SPMUD. H_2OMAP Sewer provides several options for designating the operation of flow diversions. The UPS diversion in SPMUD has movable boards that direct all flow in one direction or the other. In both model networks, this diversion could be simulated by putting all flow into the 10-inch diversion pipeline (directing the flow west) or into the trunk sewer downstream (directing the flow south) of the diversion. The UPS diversion only affects flows in the SPMUD trunk sewer system.

The two diversions upstream of pump stations in Roseville (i.e., the Old Auburn and Johnson Ranch pump stations) were simulated in the model by allowing an amount of flow equal to the pump station capacity to be diverted from the trunk sewer to the pump station.

The final diversion, at manhole B06-169 in Roseville, diverts flow from a local 15-inch sewer through a 24-inch diversion pipe, and on to a 33-inch trunk sewer. This diversion is controlled with a weir structure at the manhole. According to City of Roseville field crews that investigated the diversion, approximately 70 percent of the flow is diverted to the 33-inch trunk sewer and 30 percent remains in the local sewer. This diversion was simulated in the model in the same manner.

Figure 4-3: Roseville Trunk Sewer Diversion at Manhole B06-169



4.4.2 Inverted Siphons

The model network has 8 inverted siphons, as shown in Figure 4-1. All inverted siphons have multiple barrels. Information on the individual barrels for each siphon was obtained from the City of Roseville GIS. Flow was allocated to each barrel based on the carrying capacity of each barrel.

4.4.3 Pump Stations

The June 2004 model network includes the three pump stations (i.e., Johnson Ranch, Old Auburn, and Dry Creek No. 1) shown in Figure 4-1. Pump stations within the City of Roseville and Placer County located on trunk sewers 15 inches in diameter or smaller were not included in the model. Data for the pump stations are presented in **Table 4-3**.

Johnson Ranch and Old Auburn pump stations were designed to operate during peak wet weather flow (PWWF) conditions by transferring flow between trunk sewers, thereby alleviating downstream capacity issues. Each pump station has two pumps, and, as of June 2004, operates in duty/standby mode. It is feasible, however, for these two pump stations to operate with both pumps running, providing additional peak wet weather pumping capacity. According to City of Roseville staff, these two pump stations can operate in a lead/lag mode, as the pump stations are intended to reduce the PWWF events, rather than to convey average dry weather flows. If one of the pumps were to fail, it could be replaced immediately following the PWWF event, when the pump station would be shut down. Table 4-3 presents the capacities of these two pump stations under both duty/standby (i.e., one pump operating) and lead/lag (i.e., both pumps operating) modes.

Dry Creek No. 1 pump station is located in Placer County, west of the Dry Creek WWTP. This pump station operates during dry and wet weather flow conditions with three pumps operating in duty/standby mode. Table 4-3 presents the capacity of this pump station under duty/standby mode (i.e., two pumps operating).

Table 4-3: Model Network Summary - Pump Stations

Facility No.	Facility Name	Pumps and Capacities	Duty/Standby Capacity [1] (mgd)	Lead/Lag Capacity [2] (mgd)
25	Johnson Ranch	2 @1400 gpm	2.02	3.20
26	Old Auburn	2 @ 300 gpm	0.43	0.68
N/A	Dry Creek No. 1	3 @1580 gpm	2.52 [3]	N/A

Footnotes:
1. Pump station capacity with one pump not operating.
2. Pump station capacity with both pumps operating.

4.4.4 Force Mains

Each pump station has an associated force main. Force main information is summarized in **Table 4-4**. The force mains are identified by their associated pump stations. The capacity of each force main is based on a maximum flow velocity of 7 feet per second (fps). The force main analysis did not include an evaluation of hydraulic transients.

Table 4-4: Model Network Summary – Force Mains

Facility No.	Facility Name	Diameter (in)	Length (ft)	Capacity (mgd)
25	Johnson Ranch	12	3,886	3.55
26	Old Auburn	8	3,358	1.58
N/A	Dry Creek No. 1	16	14,100	6.31

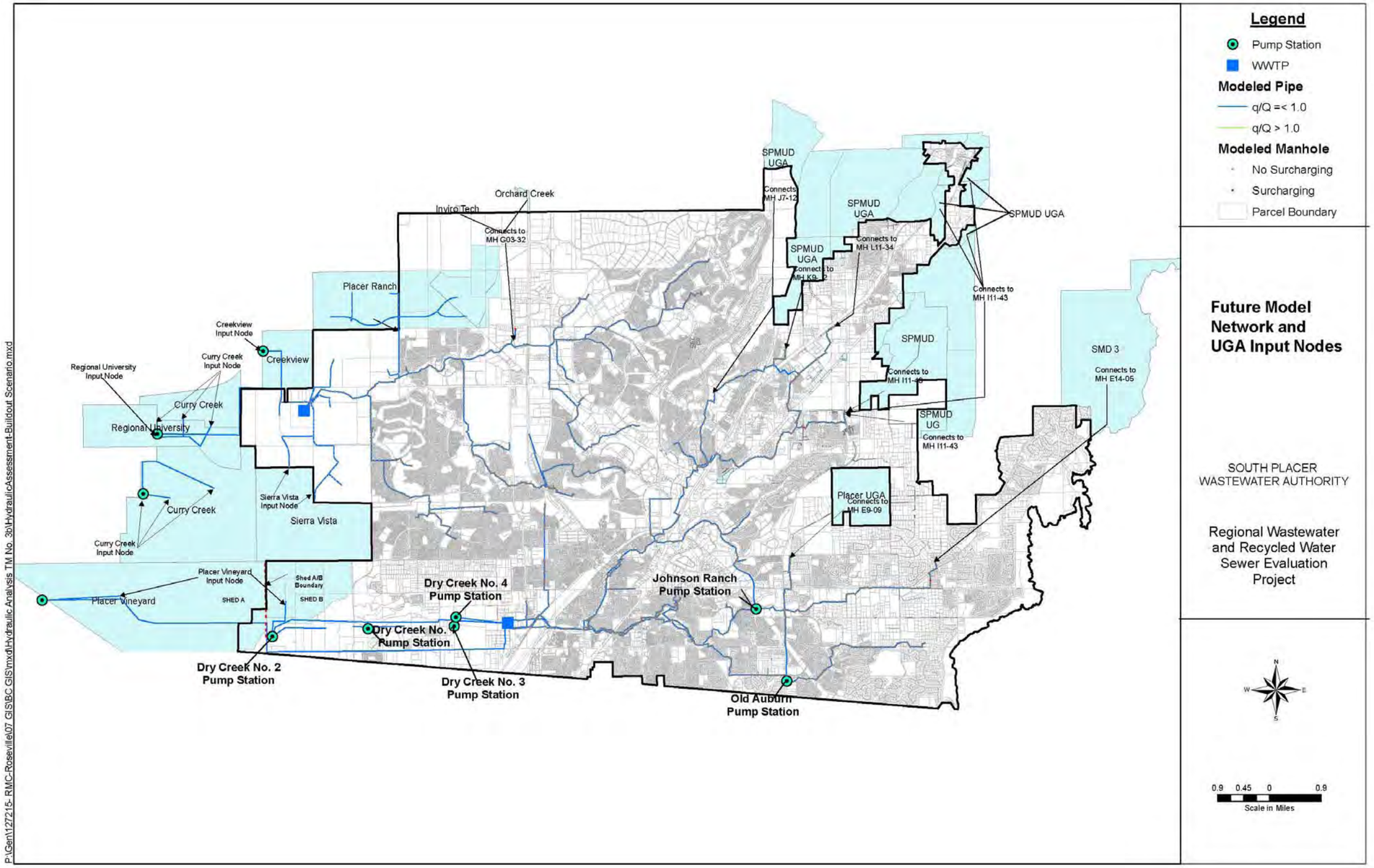
4.4.5 Input Nodes

Manholes in the model network serve as input nodes, or locations where flow is added (loaded) to the model. Loads were assigned to input nodes with the use of Load Allocator, a tool provided by H_2OMap Sewer. For a given GIS land use database, Load Allocator uses an algorithm to determine the closest input node to the centroid of each parcel, and then assigns a link that associates each parcel with an input node. The assignments were modified to account for the network of smaller diameter sewers that is not included in the model network. In most cases, a given input node receives loads from multiple parcels. As such, loads at input nodes are typically a composite value representing multiple loads from a variety of land use categories. Parcel-input node linkages are included in the land use GIS database used for this Systems Evaluation.

Input nodes were also selected for future development areas and UGAs that will contribute wastewater to the regional system. Most new developments and UGAs in the eastern portion of 2005 Regional Service Area were connected to the June 2004 model network. UGAs to the west of the 2005 Regional Service Area boundary were connected to the proposed trunk sewers for those areas. The input nodes receiving wastewater flows from these UGAs are indicated on Figure 4-4.

For the buildout scenario, 1.0 mgd must be diverted from the NEC site south to the 30-inch trunk sewer along Foothills Road, south of Pleasant Grove Blvd. This will eliminate the potential for overloading the existing (as of April 2007) NEC sewer connection.

Figure 4-4: Buildout Model Network and Input Nodes



4.5 Evaluation Criteria

This section summarizes the criteria used during evaluation of the capacity of the June 2004 sewer system and the subsequent sizing of relief sewer facilities. The criteria presented below were used to evaluate results of the hydraulic model.

4.5.1 Flows

The hydraulic performance assessment was conducted using both June 2004 and buildout peak wet weather flows. PWWF included BSF, both dry- and wet-season GWI, and RDI/I. Diurnal curves were applied to BSF to simulate the changes in BSF throughout a day. BSF was applied in the model based on land use and the BSF unit flow factors presented in Table 3-5. The same BSF unit flow factors are presented once more in **Table 4-5** for convenience. Detailed discussion on design flows is presented in *TM 3b – Trunk Sewer Hydraulic Analysis* in **Appendix H**.

Table 4-5: BSF Unit Flow Factors

Land Use Designation	Units	BSF Unit Flow Factor [1]
Commercial	gpd per acre	800
Heavy Industrial	gpd per acre	800
Light Industrial	gpd per acre	800
Mixed Use	gpd per acre	2,160
Public/Quasi-Public	gpd per acre	620
Schools	gpd per acre	160
Residential 1 DU	gpd per DU	180
Residential 2 DU	gpd per DU	180
Residential 3 DU	gpd per DU	180
Residential Multiple DU [2]	gpd per acre	1,920
Open Space	gpd per acre	0
Parks > 10 Acres	gpd per acre	10
Vacant	gpd per acre	0

Footnotes:
1. Does not include allowance for GWI. Dry and wet season GWI were applied as gpd/acre rates on an area-specific basis.
2. The proposed Residential Multiple DU unit flow factor can also be represented as 130 gpd per DU.

Dry season GWI, discussed in *TM 3b – Trunk Sewer Hydraulic Analysis* in **Appendix H**, was applied spatially in the model to areas upstream of the permanent flow monitor sites, as shown in Table 3-3. Dry season GWI was not applied to parks, open space, or Union Pacific Railroad property.

Wet season GWI, also discussed in *TM 2c – Wet Weather Flow Projection for the Ultimate SPWA Service Area* in **Appendix F**, occurs in addition to the dry season GWI. Wet season GWI rates of 200 gpd/acre and 100 gpd/acre were applied to developed parcels in the Dry Creek and Pleasant Grove WWTP sewersheds, respectively. Wet season GWI was not applied to parks, open space, or Union Pacific Railroad property.

Design RDI/I is based on a 10-year 24-hour synthetic rainfall pattern that occurs across the entire service area. For hydraulic modeling purposes, the design storm was assumed to occur at a time such that the peak RDI/I flow generated by the design storm would coincide with the peak hour BSF diurnal pattern (6 a.m. for this Systems Evaluation). It should be noted that this assumption increases the conservatism of the peak wet weather flows, as the actual flow recurrence frequency for such an event (i.e., the simultaneous peaking of design storm RDI/I and diurnal BSF) could be greater than 10 years. Additional discussion on design flows is presented in *TM 3b – Trunk Sewer Hydraulic Analysis* in **Appendix H**.

4.5.2 Gravity Sewers

Gravity trunk sewers existing as of June 2004 were evaluated based on the amount of surcharge exhibited under peak wet weather conditions. Hydraulic capacity of the gravity trunk sewers was used as a secondary criterion during the development of relief sewer improvement projects.

Surcharge

Gravity sewers were evaluated to identify areas with surcharge, which occurs when the hydraulic gradeline is above the crown of the pipe. Significant future growth is anticipated in the Ultimate SPWA Service Area, so a conservative evaluation criterion that allows no surcharging was selected. Relief sewers were considered, as necessary, to eliminate surcharging under PWWF conditions.

In cases where surcharging was caused by "backwatering" from larger diameter pipes into smaller diameter pipes, the surcharge criterion was ignored. Typically, at junctions between larger diameter and smaller diameter pipes, the crowns of the pipes are matched to avoid backwatering. However, due to the method by which H_2OMap Sewer's Pipe Invert Calculator populates gaps in invert data, junctions that are in reality crown-aligned have in some cases been modeled as invert-aligned. In these cases, relief sewers would not alleviate the perceived surcharging.

Capacity

Gravity sewers were also evaluated to identify hydraulic bottlenecks, which occur when the peak flow exceeds the calculated hydraulic capacity of an individual pipe reach. H_2OMAP Sewer calculated the capacities of June 2004 and proposed gravity sewer lines, compared the calculated capacities to the peak flow projected for each pipe reach, and flagged sewer reaches with inadequate capacity to convey their respective peak flows.

4.5.3 Pump Stations

Typically, design of pump stations requires a firm capacity that matches or exceeds the PWWF for current and future conditions. For pump stations with two pumps, firm capacity is defined as the "name plate capacity" of one pump. The second pump is considered a standby pump that only operates if the duty pump fails.

As of June 2004, the Old Auburn and Johnson Ranch pump stations only operate during peak flow events, and only to divert a portion of peak flows from upstream sewers. After discussions with the City, it was decided to allow these pump stations to operate as storm pump stations lead/lag modes (i.e., no standby pumps). This criterion, rather than using the firm capacity of each pump station, was used to evaluate June 2004 and buildout PWWF projections. In contrast, the Dry Creek No. 1 pump station operates at all times and was evaluated under duty/standby mode (i.e., one or two duty pumps operating with the third pump operating only if one of the duty pumps fails).

Additional pump station hydraulic assessments, including surge analysis and field testing of actual pump capacities, were not included in the scope of this Systems Evaluation.

4.5.4 Force Mains

The maximum velocity criterion for force mains is 7 fps. Additional assessments of force mains, including surge analysis, were not included in the scope of this Systems Evaluation. An inability to meet the maximum velocity criterion (e.g., if the criterion was exceeded under design conditions) is considered an approximate indicator of the need to perform further assessment of a force main.

4.6 Hydraulic Model Results

This section presents the results of the hydraulic modeling performed for this Systems Evaluation. The hydraulic assessments of the gravity sewers, pump stations, and force mains in the model network for the trunk sewer system were based on June 2004 and buildout PWWF projections developed for this study.

4.6.1 Gravity Sewer Evaluation

The results of the gravity sewer hydraulic analysis under June 2004 and buildout PWWF conditions are presented in **Figure 4-5** and **Figure 4-6**, respectively. These figures identify manholes in the trunk sewer network that indicate surcharging during PWWF conditions, as well as locations where PWWF exceeds the calculated capacities of the pipelines using Manning's equation. Surcharging due to hydraulic capacity deficiencies occurred under June 2004 and buildout PWWF conditions in several locations, which are discussed in more detail below.

Figure 4-5 and Figure 4-6 show additional surcharging and capacity issues that arise under June 2004 and buildout PWWF conditions that are not discussed below. Surcharging in these cases is caused by backwatering, and capacity issues are localized and minimal. A number of these areas are immediately upstream of inverted siphons. Gravity sewer improvements (or other substantial capital projects) are not required to address these issues.

Gravity Sewer Evaluation – June 2004 PWWF Conditions

Under June 2004 PWWF conditions, surcharging due to hydraulic capacity deficiencies occurred in three general areas. Each of these areas is shown in Figure 4-5. The June 2004 land use scenario is discussed in Chapter 1. Sewer profiles illustrating hydraulic grade lines under June 2004 PWWF conditions are included in *TM 3b – Trunk Sewer Hydraulic Analysis* in **Appendix G**.

Area A – Placer County SMD-2

Area A is located upstream of the Old Auburn permanent flow monitoring site in Placer County. This 15-inch trunk sewer serves the southern portion of Granite Bay. Four of the pipe reaches in this area surcharge for a period of approximately 1 hour during the June 2004 PWWF scenario.

Area E – Roseville

Area E is located in the Pleasant Grove WWTP basin in Roseville, along McAnally Road. This 15- and 18-inch trunk sewer serves a portion of western Roseville. Thirteen of the pipe reaches in this area surcharge for a period of approximately 1 hour during the June 2004 PWWF scenario. Flow monitoring data indicated that this area featured one of the highest rates of RDI/I in the SPWA service area. Modeling results indicated that this surcharging is attributable solely to the high I/I levels; the surcharging was eliminated when model run scenarios were completed with more typical I/I rates for this area. Roseville sewer operations staff indicated that a manhole may have been missing its cover in this area during the flow monitoring period and that the RDI/I rates may therefore have been inflated. City staff also commented that this area has not had historical hydraulic capacity issues. Since the initial analysis performed by RMC, the City has performed further investigations in this area and determined new, reduced I/I parameters that would be appropriate for the area. Using these new parameters, City staff determined that no improvements are required for Area E at this time.

Area K – Roseville

Area K is located in the Dry Creek WWTP basin in Roseville. Area K has several inverted siphons and flat reaches of pipe that cause minor surcharging under June 2004 PWWF conditions. No improvement project is needed.

Gravity Sewer Evaluation – Buildout PWWF Conditions

Under buildout PWWF conditions, pipe reaches in 13 areas are projected to surcharge. Each of these areas is shown in Figure 4-6. The buildout land use scenario is defined in *Chapter 2: Land Use*. Sewer profiles illustrating hydraulic grade lines under buildout PWWF conditions are included in *TM 3b – Trunk Sewer Hydraulic Analysis* in **Appendix H**.

Area A – Placer County

Area A is located upstream of the Old Auburn permanent flow monitoring site in Placer County. This 15-inch trunk sewer serves the southern portion of Granite Bay and the extreme southeast corner of Roseville. Thirteen pipe reaches in this area experience surcharging up to 3 feet for approximately 18 hours due to hydraulic capacity deficiencies in the buildout PWWF scenario. Additional buildout flows in this area include flows from parcels that are connected at low densities (as of June 2004), but are expected to densify in the future, as well as areas that are not sewered (as of June 2004), but which may become sewered in the future.

Area B1 – Placer County SMD-2

Area B1 is located upstream of the Johnson Ranch pump station in Placer County. This 15- and 18-inch trunk sewer serves the northern portion of Granite Bay. A hydraulic analysis was performed in this area both with and without the SMD-3 UGA.

When a PWWF input of 1.85 mgd from the SMD-3 UGA is added to the model along this trunk sewer, 50 pipe reaches experience surcharging of up to 4 feet for approximately 19 hours due to hydraulic capacity deficiencies. There are no hydraulic capacity deficiencies in this area if the SMD-3 UGA were not connected to the regional system in the buildout scenario. In a separate study, Placer County evaluated whether holding PWWF at the June 2004 SMD-3 WWTP would affect the SMD-2 trunk sewer. This study found that a controlled release of 0.5 mgd from SMD-3 into SMD-2 would not adversely affect the trunk sewers in Area B1.

Area B2 – Roseville

Area B2 is located in Roseville, upstream of the Johnson Ranch pump station and downstream of Area B1 and Area C. This 15- and 21-inch trunk sewer serves the northern portion of Granite Bay and a small area of Roseville. Nine pipe reaches in this area experience surcharging of up to 11 feet for approximately 17 hours due to hydraulic capacity deficiencies in the buildout PWWF scenario. The surcharging in area B2 is caused by 1) the proposed SMD-3 UGA and 2) approximately 2,700 acres of future development inside the 2005 Regional Service Area boundary in Placer County and SPMUD (see **Figure 4-7**) whose flows are loaded into the trunk sewer model upstream of Area C, which is tributary to Area B2. SPMUD has commented that some of this future development area may ultimately remain on septic tank service. For the buildout scenario, which includes SMD-3 UGA and the 2,700 acres described above, a 24-inch replacement sewer is needed to resolve hydraulic capacity deficiencies. If SMD-3 is removed from the buildout scenario, nine pipe reaches in this area still experience surcharging of up to 7 feet, and hydraulic relief is still needed. If both SMD-3 and the 2,700 acres described above are removed from the buildout scenario, two 15-inch pipe reaches (that cause a bottleneck downstream of the 18-inch sewer and upstream of the 21-inch trunk sewer) surcharge less than two feet in pipes that are over 23 feet deep. These 15-inch pipe diameters are suspicious and should be investigated. However, no improvement project is needed for this deficiency if both SMD-3 and the 2,700 acres are removed.

Area C – Placer County SMD-2

This 15-inch trunk sewer, as of June 2004, serves the northern portion of Granite Bay and a small area (i.e., several parcels) of Roseville. Future development tributary to Area C includes the Placer UGA (which is a very low density development) and approximately 2,700 acres of additional development within the 2005 Regional Service Area boundary in Placer County and SPMUD (see Figure 4-7). This trunk sewer, as of June 2004, serves approximately 600 acres. SPMUD commented that some of this area may ultimately remain on septic tank service. Sixteen pipe reaches in this area experience surcharging of up to 4 feet for approximately 18 hours due to hydraulic capacity deficiencies in the buildout PWWF scenario as a result of connections in Placer County and SPMUD. If the 2,700 acres described above are removed from the buildout scenario, there is only minor surcharging (i.e., 0.60 feet) in Area C for one flat pipe segment that is approximately 22 feet deep. No improvement project is needed for this deficiency if the 2,700 acres are removed.

Area E – Roseville

Area E is located in the Pleasant Grove WWTP basin in Roseville, along McAnally Road. This 15- and 18-inch trunk sewer serves a portion of western Roseville. Fourteen pipe reaches in this area experience surcharging of up to 6 feet for approximately 2 hours due to hydraulic capacity deficiencies in the buildout PWWF scenario. Flow monitoring data indicated that this area featured one of the highest rates of RDI/I in the SPWA service area. Modeling results indicated that this surcharging is attributable solely to the high I/I levels; the surcharging was eliminated when model run scenarios were completed with more typical I/I rates for this area. Roseville sewer operations staff indicated that a manhole may have been missing its cover in this area during the flow monitoring period and that the RDI/I rates may therefore have been inflated. City staff also commented that this area has not had historical hydraulic capacity issues. Since the initial analysis performed by RMC, the City has performed further investigations in this area and determined new, reduced I/I parameters that would be appropriate for the area. Using these new parameters, City staff determined that no improvements are required for Area E at this time.

Area F – Roseville

Area F is located in the Dry Creek WWTP basin in Roseville. This 15-inch trunk sewer serves a portion of Roseville and SPMUD. Five pipe reaches in this area experience surcharging of up to 2 feet due to hydraulic capacity deficiencies in the buildout PWWF scenario. The hydraulic deficiencies are attributed to four sections of flat pipe. Hydraulic capacity is adequate for the June 2004 PWWF scenario. The pipe is approximately 18 feet deep in the area of surcharge and there is no risk of overflow for the design PWWF. No improvement project is needed.

Area H1, H2, H3 and H4 – SPMUD

A significant number of pipe reaches in Areas H1, H2, H3 and H4 of SPMUD experience surcharging due to inadequate hydraulic capacity in the buildout PWWF scenario. As of June 2004, Area H1 is a 15-inch trunk sewer that experiences up to 6 feet of surcharge for a period of 9 hours in the buildout PWWF scenario. Area H2 is a 12- and 15-inch trunk sewer that experiences up to 13 feet of surcharge for a period of 20 hours in the buildout PWWF scenario. Area H3 is a 24-, 27- and 30-inch trunk sewer that experiences up to 3 feet of surcharge for a period of 13 hours in the buildout PWWF scenario. Area H4 is an 18-inch trunk sewer that experiences up to 2 feet of surcharge for a period of 8 hours in the buildout PWWF scenario.

According to SPMUD, these deficiencies are consistent with the results of the District's wastewater collection system master plan. SPMUD will be identifying appropriate projects to relieve these sewer deficiencies separately.

Area I – Roseville

Area I is located in the Dry Creek WWTP basin in Roseville. Area I has very minor surcharging with the hydraulic gradeline at or just above the crown of the pipe. No improvement project is needed.

Area J – Placer County SMD-2

Area J is located in the Dry Creek WWTP basin in Placer County. Area J has very minor surcharging with the hydraulic gradeline at or just above the crown of the pipe. No improvement project is needed.

Area K – Roseville

Area K is located in the Dry Creek WWTP basin in Roseville. Area K has several inverted siphons and flat reaches of pipe that cause minor surcharging. No improvement project is needed.

Area L – Roseville

Area L is located in West Roseville. Pipe reaches from the proposed 18- and 24-inch trunk sewer, from the intersection of Phillip Road and Westside Drive to the 36-inch stub at the PGWWTP influent junction structure, are undersized for handling PWWF conditions. The hydraulic deficiencies are attributed to the additional flow input into the West Roseville collection system from Creekview, Regional University, and Curry Creek UGAs. To adequately handle the projected PWWF, these pipe reaches should be increased in size from 18 inches to 30 inches, and from and 24 inches to 36 inches. The 36-inch stub out of the PGWWTP influent junction structure is sufficiently sized to convey flow from the WRSP and Creekview, Regional University and Curry Creek UGAs.

Figure 4-5: Hydraulic Assessment – June 2004 Scenario

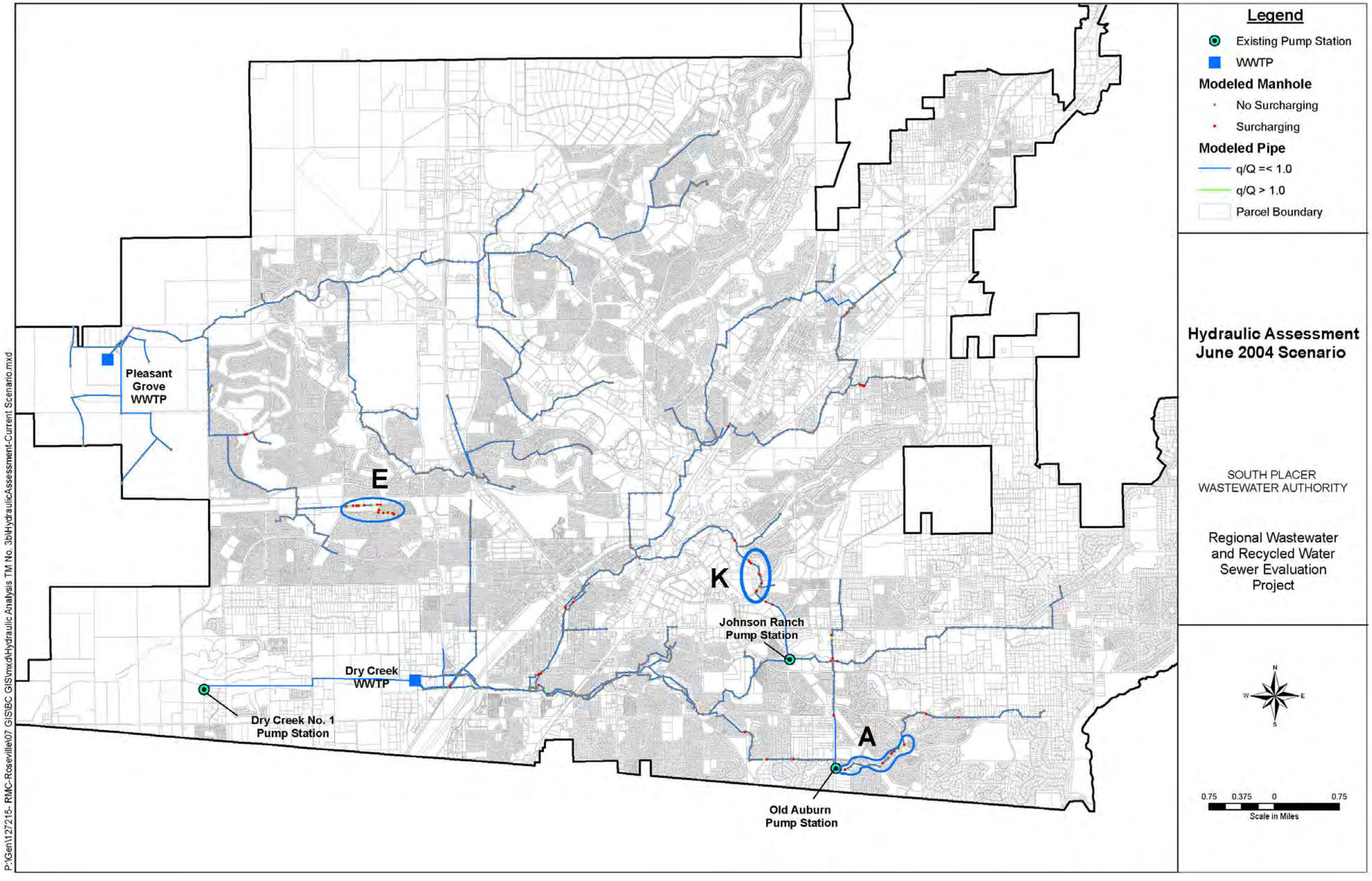


Figure 4-6: Hydraulic Assessment – Buildout Scenario

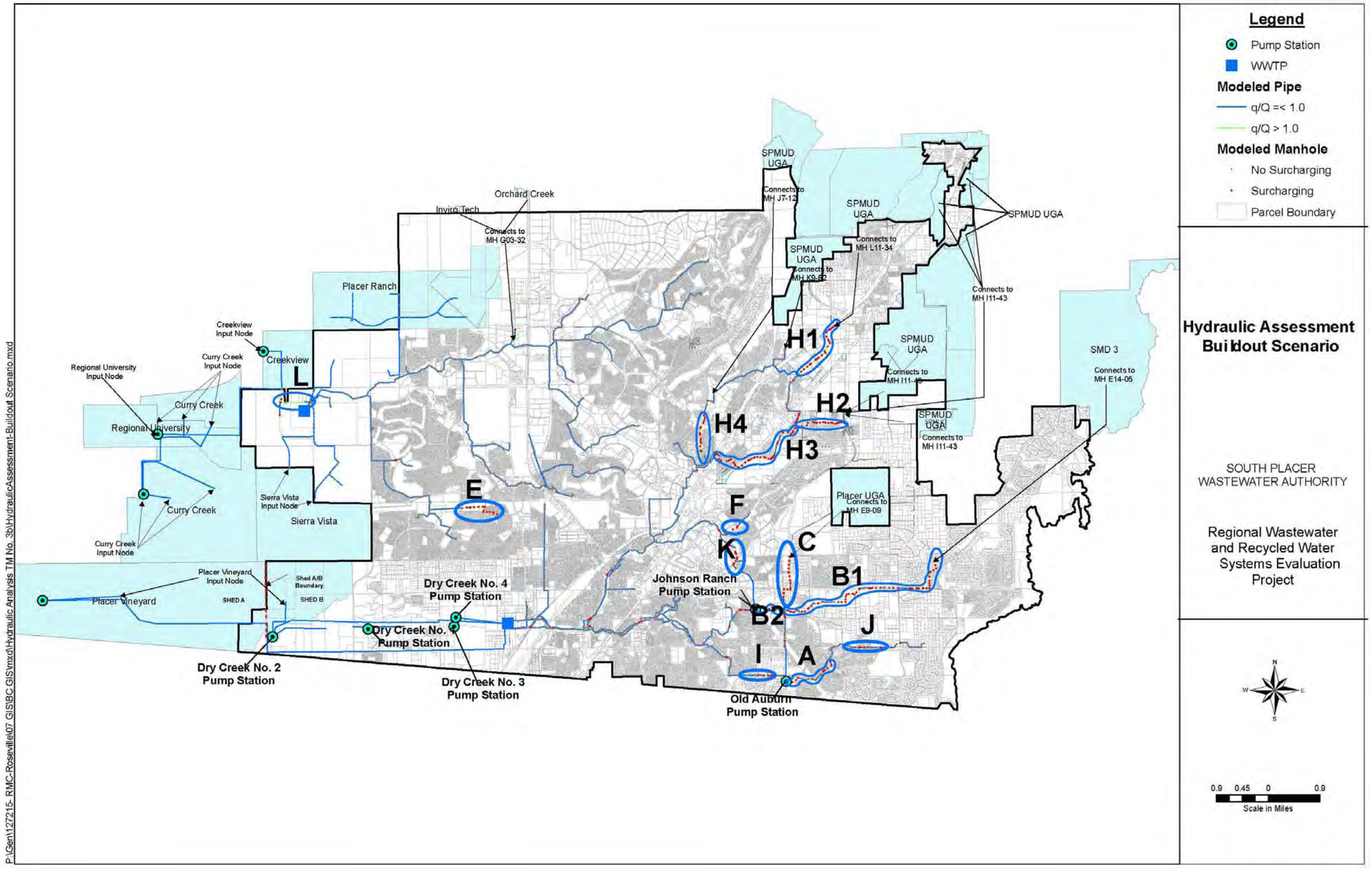
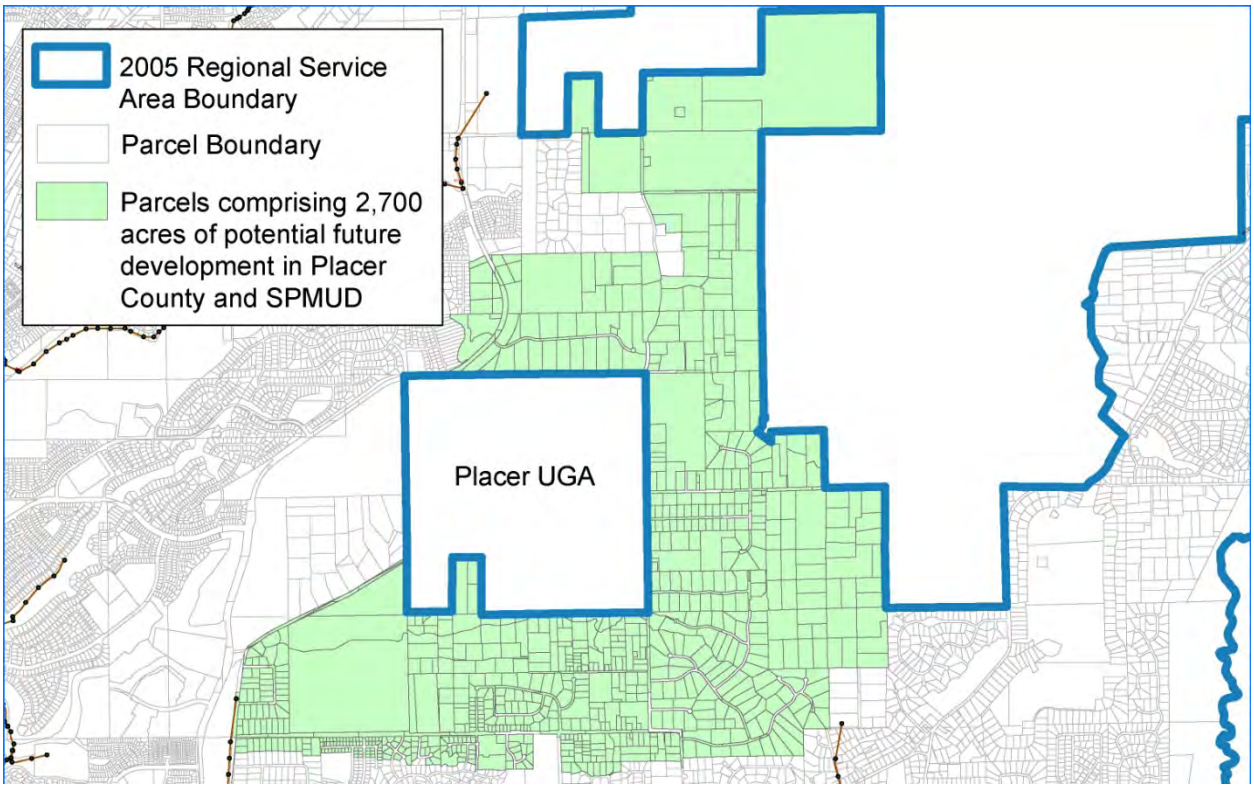


Figure 4-7: Potential Future Development in Placer County and SPMUD



4.6.2 Pump Station and Force Main Evaluation

The results of the pump station and force main hydraulic analyses under June 2004 and buildout PWWF conditions are presented in **Table 4-6** and **Table 4-7**. Capacity issues were determined by comparing the pump station and force main capacities, summarized in Table 4-3 and Table 4-4, with June 2004 and buildout PWWF. All three pump stations and their associated force mains have capacity to meet both June 2004 and buildout PWWF conditions.

Table 4-6: Pump Station Hydraulic Assessment

Facility No.	Facility Name	Duty/Standby Capacity [1] (mgd)	Lead/Lag Capacity [2] (mgd)	June 2004 PWWF (mgd)	Buildout PWWF (mgd)
25	Johnson Ranch	2.02	3.20	0.00 [4]	2.50 [5]
26	Old Auburn	0.43	0.68	0.00 [4]	0.68 [5]
N/A	Dry Creek No. 1	2.52 [3]	N/A	0.14 [6]	1.92

Footnotes:

1. Pump station capacity with one pump not operating.
2. Pump station capacity with both pumps operating.
3. Proposed pump station capacity at buildout with three 60-hp pumps (one standby) each rated at 1,580 gpm. Pump station, as of June 2004, has a capacity of 1.73 mgd with two 20-hp duty pumps and one standby 60-hp pump.
4. Downstream trunk sewer can adequately convey June 2004 PWWF.
5. Buildout PWWF determined by identifying the amount of PWWF above the capacity of the downstream trunk sewers.
6. Based on connected parcels in June 2004. Actual flow metering in October 2005 suggests ADWF may be as high as 0.13 mgd, which would translate to and estimated June 2004 PWWF of 0.3 mgd.

Table 4-7: Force Main Hydraulic Assessment

Facility No.	Facility Name	Design Capacity (mgd)	June 2004 PWWF (mgd)	Buildout PWWF (mgd)
25	Johnson Ranch	3.55	3.20	3.20
26	Old Auburn	1.58	0.68	0.68
N/A	Dry Creek No. 1	6.31	1.73	4.29 [1]

Footnotes:

1. Includes PWWF from the proposed Dry Creek Pump Station No. 2 which will share the common force main. Dry Creek Pump Station No. 2 service area includes Shed B of the Placer Vineyards Specific Plan service area. See **Section 4.7.4** for further discussion.

Pump Station and Force Main Evaluation – June 2004 PWWF Conditions

Under June 2004 PWWF conditions, both the Old Auburn and Johnson Ranch pump stations have adequate capacity. The Dry Creek No. 1 pump station has a capacity of 1.73 mgd and is adequate to meet the June 2004 PWWF of 0.14 mgd.

Pump Station and Force Main Evaluation – Buildout PWWF Conditions

Under buildout PWWF conditions, which include flows from the SMD-3 UGA, the Old Auburn and Johnson Ranch pump station capacities are inadequate if the pump stations are operated in duty/standby mode (i.e., with one pump operating). However, the pump stations have adequate capacity if operated in lead/lag mode (i.e., with two pumps operating). The force mains from both pump stations also have adequate capacity for the buildout PWWF scenarios. Without the SMD-3 UGA, the Johnson Ranch pump station can operate in duty/standby mode and still meet the PWWF conditions.

If the Dry Creek No. 1 pump station is upgraded as outlined in the Dry Creek West Placer Facilities Plan, prepared by The Spink Corporation in November 1999, it will have adequate capacity to meet the buildout PWWF scenario. It is possible, however, that the upgraded pumps may not need to be as large as originally planned in order to meet flow projections for buildout PWWF conditions. Buildout PWWF for the Dry Creek No. 1 pump station is 1.92 mgd, or approximately 24 percent lower than the 2.52 mgd value published in the Dry Creek West Placer Facilities Plan. This difference is likely attributed to the new flow projection criteria utilized for this Systems Evaluation.

As of April 2007, it appears that the 16-inch force main serving Dry Creek No. 1 pump station may have enough capacity (without exceeding the 7 fps maximum velocity criterion) to serve all four pump stations that will eventually serve the West Dry Creek service area. However, due to the complex hydraulics associated with four pump stations sharing a common force main, a detailed hydraulic analysis should be performed prior to selecting this alternative.

4.7 Regional Improvement Projects

This section describes the criteria used for developing and pricing hydraulic capacity improvement projects in the regional collection system. Thirteen projects have been identified to (1) address hydraulic deficiencies by potential improvements to June 2004 facilities or by diverting flow, and (2) to extend service to new development.

4.7.1 Criteria

The following criteria were identified for developing potential improvements to the collection system to accommodate June 2004 and buildout flows:

New Replacement Sewers

New sewers are provided to increase hydraulic capacity and to eliminate capacity-related surcharging. New sewers are sized to replace the existing sewer with a larger diameter sewer.

Minimum size

New sewers will be sized so that the peak hourly flow rate in the relief sewer will not exceed the full pipe capacity.

Slope

New sewers are developed using the slope of the existing sewer or associated sewers. The slopes of the new sewers are constrained by the upstream and downstream invert elevations of the existing sewers. The flow velocities in the new sewers may be less than typical design standards due to the constraints of the existing invert elevations.

Pump Stations

New pump stations were sized with one or more duty pumps and one pump operating in a standby mode (as opposed to the wet weather peaking pump stations, which will operate under lead/lag modes). Duty/standby modes of pump station operation are typical for wastewater pumping stations, and are intended to prevent a sewer overflow in the event that the duty pump fails. The determination of the number of duty pumps will be made during the project design phase (subsequent to this Systems Evaluation).

As of June 2004, the Old Auburn and Johnson Ranch pump stations only operate during peak flow events and divert only a portion of the peak flow from upstream sewers. As noted previously, after discussions with the City, it was decided to change the operating criteria for these pump stations so that they operate as storm pump stations with both pumps in a lead/lag mode (i.e., no standby pump). This criterion, rather than the firm capacity for each pump station, was used to determine if capacity improvements were required.

4.7.2 Capital and Construction Costs

Capital and construction costs presented in this section represent preliminary estimates of the costs to plan and engineer projects, as well as the materials, labor and services necessary to build the proposed projects. The cost estimates are indicative of the cost of construction in the study area. In considering cost estimates, it is important to realize that changes during final design, as well as future changes in the costs of materials, labor and equipment, will cause comparable changes in the estimated costs. Construction cost data presented in this report are not intended to represent the lowest prices that can be achieved, but rather to represent planning-level estimates for budgeting purposes.

The unit capital costs for gravity sewer and force main pipeline construction were developed based on the sewer pipeline replacement costs shown in Tables 2-3 and 2-6 of the City of Roseville Infrastructure Rehabilitation Plan (April 2003). These costs were developed from recent projects in the City of Roseville and include allowances for engineering and administration. The unit capital costs have been adjusted by approximately 8 percent for inflationary considerations since April 2003. Costs for construction of new large diameter sewers would significantly increase if extensive utility relocation and traffic control were required. Pipeline unit capital costs are presented in **Table 4-8**.

Pump station capital and construction costs are based on cost curves from Pumping Station Design, Second Edition by Robert L. Sanks, an industry standard for pump station design. There is no capital cost associated with changing operating modes of the Old Auburn and Johnson Ranch pump stations.

Capital costs were increased by 30 percent to account for contingencies. A contingency allowance is appropriate given the planning level of the capital cost estimates and provides a conservative cost estimate that is suitable for budgeting purposes.

Table 4-8: Pipe Unit Capital Costs (ENR CCI Value = 8435)

Pipe Diameter (in)	Conveyance Type	Pipe Material [1]	Replacement Cost [2]	
			$/ft	$/(diameter [in])
8	Gravity	VCP	164	21
8	Force Main	PVC	120	15
10	Gravity	VCP	205	21
10	Force Main	PVC	150	15
12	Gravity	VCP	246	21
12	Force Main	PVC	174	15
15	Gravity	VCP	292	19
16	Force Main	PVC	224	14
18	Gravity	VCP	330	18
18	Force Main	PVC	250	14
20	Force Main	PVC	260	13
21	Gravity	VCP	363	17
24	Gravity	VCP	415	17
24	Force Main	PVC	312	13
27	Gravity	VCP	437	16
30	Gravity	VCP	454	15
30	Force Main	PVC	360	12
33	Gravity	VCP	463	14
36	Gravity	VCP	505	14
42	Gravity	VCP	544	13
48	Gravity	RCP	622	13
60	Gravity	RCP	713	12
66	Gravity	RCP	713	11
72	Gravity	RCP	778	11

Footnotes:

1. VCP = Vitrified Clay Pipe; PVC = Polyvinyl Chloride; RCP = Reinforced Concrete Pipe.
2. Includes allowance for engineering and administration (including construction management).

4.7.3 Projects in the June 2004 System (Part 1)

The proposed improvements to the June 2004 trunk sewer system are shown in **Figure 4-8**. Improvements were developed to address the capacity problems discussed in previous sections and to prevent capacity-related surcharging in the improved collection system. *This Section (Part 1) does not include projects that are attributed to the SMD-3 UGA and approximately 2,700 acres of future development in Placer County and SPMUD within the 2005 Regional Service Area that is tributary to Area C.*

The improvement projects and their estimated CIP Budgetary Cost estimates (with a 30 percent contingency included) are summarized in **Table 4-9** and *TM 3b - Trunk Sewer Hydraulic Analysis* in **Appendix H**. Prior to constructing these projects, flow monitoring and other site specific investigations should be conducted on the critical line segments to validate and refine the model results. *The entity with Primary Responsibility for the specific improvement project is indicated in Table 4-9 and the project headings listed below.* "Placer County" refers to development within Placer County SMD-2.

Improvement Project 1 – Area A (Primary Responsibility: Placer County)

An 18-inch replacement sewer is needed to improve the hydraulic deficiencies identified in Area A through the hydraulic modeling process. Redirecting flow to another trunk sewer is not feasible. This project extends 5,000 feet from manhole B11-16 to A08-156. This project is located in a sewer easement (existing as of April 2007) between Roseville Parkway and Sierra College Boulevard and a new alignment may be necessary. To conservatively estimate the cost of this new alignment without undertaking site specific investigations, the length of this project was increased by 50 percent over the June 2004 deficient length to develop a higher cost estimating allowance. The determination of the new alignment will be made during design.

Improvement Project 6 – Area E (Primary Responsibility: Roseville)

Due to the uncertainty in the flow monitoring data at this site, additional investigation should be conducted prior to the construction of any replacement sewer in Area E. This project extends 4,000 feet from manhole D03-100 to D02-353. This project is located in the McAnally Road right-of way and along a sewer easement south of Pleasant Grove Boulevard. The need for additional investigation was discussed previously in the June 2004 and buildout gravity sewer evaluation (Section 4.6). The additional investigation should include the following items:

- Flow monitoring during the wet season at Basin 7 as identified in *Chapter 3: Unit Flow Factors and Flow Projections*.
- Elevation survey of approximately 18 manhole inverts between manholes D03-100 to D02-353 to confirm pipe slopes.
- Visual surcharge checks of the pipes in question during heavy rainfall.

RDI/I reduction to levels seen in adjacent sewer basins would also eliminate the need for this improvement project. As a last resort, if the additional investigations do not eliminate the basis of the hydraulic deficiencies identified by the modeling, a 21-inch replacement sewer would be needed to improve the hydraulic deficiencies identified in Area E. For contingency planning purposes, the cost for this project is included in Table 4-9. Since the initial analysis performed by RMC, the City has performed further investigations in this area and determined new, reduced I/I parameters that would be appropriate for the area. Using these new parameters, City staff determined that no improvements are required for Area E at this time.

Improvement Project 7 – Area L (Primary Responsibility: Regional University UGA and Curry Creek UGA)

Although this project is the result of additional flow from UGAs, the sewers in question are part of the June 2004 system; the project has therefore been included in the "Projects in the June 2004 System." This project extends from the intersection of Phillip Road and Westside Drive to an existing (as of June 2004) 36-inch pipe stub that connects with the influent junction structure at the Pleasant Grove WWTP. The deficient sewers in Area L have been designed and should be constructed by early 2006. The deficiencies identified in the model can be corrected if a 30- and 36-inch trunk sewer is constructed in lieu of the planned 18-

and 24-inch trunk sewer. Another option is to route the Regional University force main directly to the 36-inch trunk sewer that connects to the influent junction structure. This 36-inch stub is sufficiently sized to convey PWWF from the WRSP area and Creekview, Regional University and Curry Creek UGAs.

Improvement Project 8 – Area H1, H2, H3 and H4 (Primary Responsibility: SPMUD)

Improvement projects in SPMUD have not been developed at the request of SPMUD, and a cost is not provided in Table 4-9. SPMUD will be separately identifying appropriate projects to relieve these sewer deficiencies.

Table 4-9: June 2004 System Project Summary (Part 1) [4]

Project No.	Agency with Primary Responsibility	Item	Quantity	Unit Cost ($)	Estimated Capital Cost ($)	Proposed CIP Budget Cost [1] ($)
1 - Area A	Placer County	18-inch Gravity	7,500 lf [2]	330	2,475,000	3,218,000
				Project 1 Subtotal	**2,475,000**	**3,218,000**
6 - Area E [3]	Roseville	21-inch Gravity	4,000 lf	363	1,452,000	1,888,000
				Project 6 Subtotal	**1,452,000**	**1,888,000**
7 - Area L	Regional University UGA	30-inch Gravity	1,500 lf	454	681,000	885,000
	Curry Creek UGA	36-inch Gravity	3,000 lf	505	1,515,000	1,970,000
				Project 7 Subtotal	**2,196,000**	**2,855,000**
				Total Cost	**6,123,000**	**7,961,000**

Footnotes:
1. Includes 30 percent contingency
2. Includes 50 percent allowance for alternative alignment
3. This project needed only if additional investigation identifies it as a necessary project
4. This table does not include Projects 2, 3 and 4 which are solely attributed to the SMD-3 UGA and approximately 2,700 acres of future development in Placer County and SPMUD within the 2005 Regional Service Area. These projects are included in **Section 4.7.4**.

4.7.4 Projects in the June 2004 System (Part 2)

The proposed improvements to the June 2004 trunk sewer system are shown on **Figure 4-8**. Improvements were developed to address the hydraulic deficiencies discussed above and to prevent capacity-related surcharging in the improved collection system. *This Section (Part 2) only includes projects that are attributed to the SMD-3 UGA and approximately 2,700 acres of future development in Placer County and SPMUD within the 2005 Regional Service Area that is tributary to Area C.*

The improvement projects and their estimated CIP Budgetary Cost estimates (with a 30 percent contingency included) are summarized in **Table 4-10** and *TM 3b - Trunk Sewer Hydraulic Analysis* in **Appendix G**. Prior to constructing these projects, flow monitoring and other site specific investigations should be conducted on the critical line segments to validate and refine the model results. *The entity with Primary Responsibility for the specific improvement project is indicated in*

Table 4-10 and the project headings listed below. "Placer County" refers to development within Placer County SMD-2.

Improvement Project 2 – Area B1 (Primary Responsibility: SMD-3 UGA)

Based on the model results discussed in Section 4.6, a 21-inch replacement sewer is needed to improve the hydraulic deficiencies identified in Area B1. Redirecting flow to another trunk sewer is not feasible. These deficiencies are solely attributed to the SMD-3 UGA and this project is not needed if the flow from SMD-3 was limited to 0.5 mgd (storage scenario).

Area B1 extends 18,000 feet from manhole E14-05 to B08-042. This project is located upstream of the Johnson Ranch Pump Station in an existing (as of April 2007) sewer easement and in the Douglas Boulevard right-of way; a new alignment, however, may be necessary. To estimate the cost of this new alignment, the length of this project was increased by 50 percent over the June 2004 deficient length to develop a higher cost estimating allowance. The determination of the new alignment will be made the during design phase.

Improvement Project 3 – Area B2 (Primary Responsibility: Placer County, SMD-3 UGA and SPMUD)

A 24-inch replacement sewer is needed to improve the hydraulic deficiencies identified in Area B2. Redirecting flow to another trunk sewer is not feasible. These deficiencies are attributed to the SMD-3 UGA and approximately 2,700 acres of future development in Placer County and SPMUD within the 2005 Regional Service Area. This project is not needed if flows from SMD-3 and the future growth areas within Placer County and SPMUD (upstream of Area C) were directed elsewhere.

Area B2 extends 3,000 feet from manhole B08-042 to B07-405. This project is located upstream of the Johnson Ranch Pump Station in an existing (as of April 2007) sewer easement and a new alignment may be necessary. To estimate the cost of this new alignment, the length of this project was increased by 50 percent over the June 2004 deficient length to develop a higher cost estimating allowance. The determination of the new alignment will be made during design.

Improvement Project 4 – Area C (Primary Responsibility: Placer County and SPMUD)

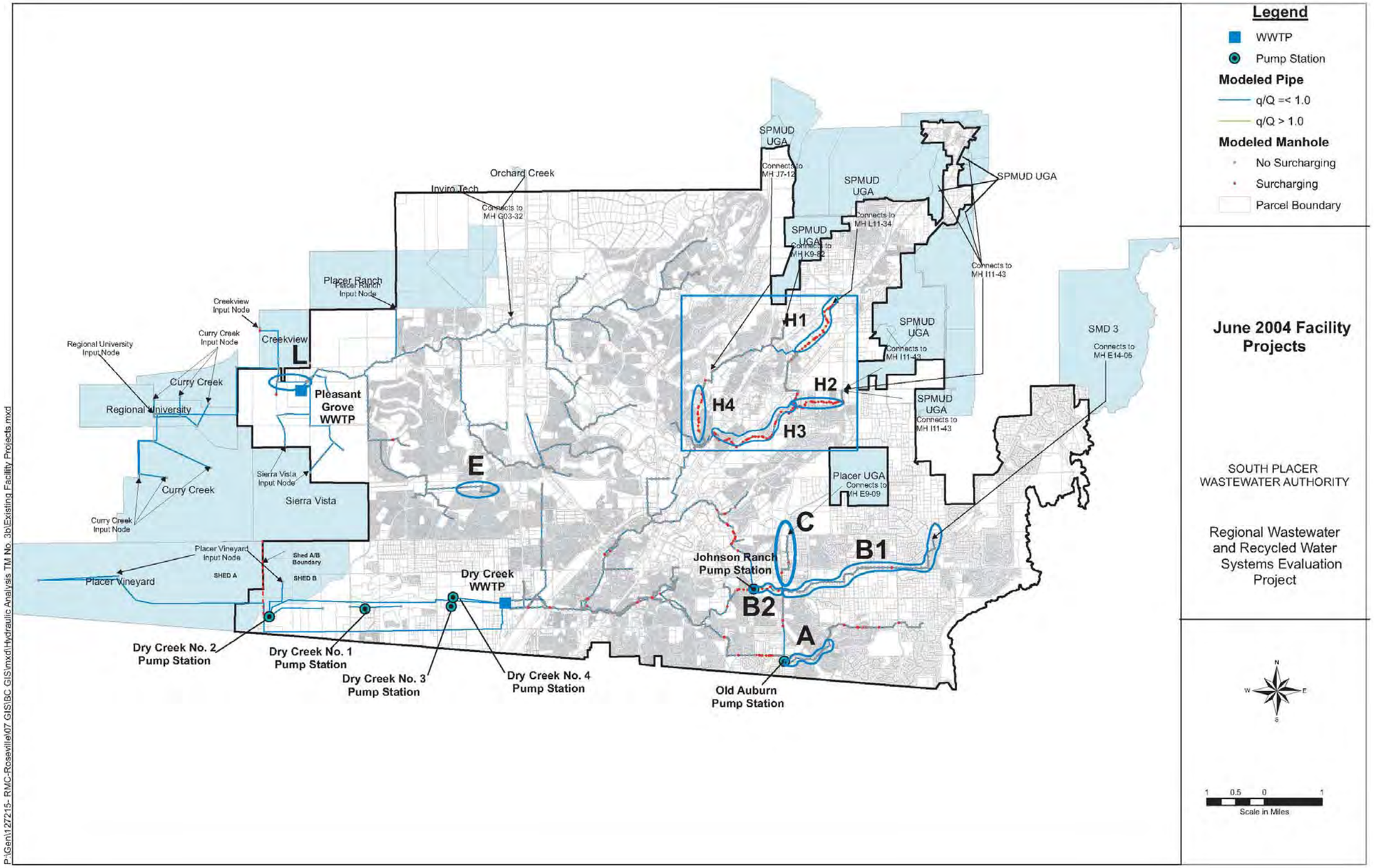
A 21-inch replacement sewer is needed to improve the hydraulic deficiencies identified in Area C. Redirecting flow to another trunk sewer is not feasible. These deficiencies are attributed to 2,700 acres of future development in Placer County and SPMUD within the 2005 Regional Service Area. This project is not needed if flow from the 2,700 acres of future development in Placer County and SPMUD within the 2005 Regional Service Area was directed elsewhere. This project extends 6,000 feet from manhole E9-09 to B08-042. This project is primarily located in the Sierra College Boulevard and Cavitt Stallman Road street right-of way. It extends from the Strap Ravine trunk sewer north to Olive Ranch Road.

Table 4-10: June 2004 Facility Project Summary (Part 2)

Project No.	Agency with Primary Responsibility	Item	Quantity	Unit Cost ($)	Estimated Capital Cost ($)	Proposed CIP Budget Cost [1] ($)
2- Area B1	SMD-3 UGA	21-inch Gravity	27,000 [2] lf	363	9,801,000	12,741,000
				Project 2 Subtotal	**9,801,000**	**12,741,000**
3- Area B2	Placer County SMD-3 UGA SPMUD	24-inch Gravity	4,500 [2] lf	415	1,868,000	2,428,000
				Project 3 Subtotal	**1,868,000**	**2,428,000**
4- Area C	Placer County SPMUD	21-inch Gravity	6,000 lf	363	2,178,000	2,831,000
				Project 4 Subtotal	**2,178,000**	**2,831,000**
				Total Cost	**13,847,000**	**18,000,000**

Footnotes:
1. Includes 30 percent contingency.
2. Includes 50 percent allowance for alternative alignment.

Figure 4-8: Capacity Improvement Projects in the June 2004 System



4.7.5 Projects to Extend Service to New Development Areas

The proposed improvements needed to extend service to the proposed Urban Growth Areas west of Roseville are shown in **Figure 4-9**. Service extension projects are identified by the UGA they serve in **Table 4-11**. Project information was based on information provided by UGA applicants at the time this Systems Evaluation was prepared, and changes may occur over time. The proposed Total Project Costs identified in Table 4-11, which have been developed utilizing a unit cost table representative of municipal sewer projects in the SPWA area, are for informational purposes only. Actual sewer infrastructure costs for each extension project will be the responsibility of the developer.

Extension Project 1 – Placer Ranch

The proposed improvements to extend service into Placer Ranch were identified in the Placer Ranch Specific Plan and were included in the trunk sewer model. Flow from Placer Ranch and some areas of Placer County north of Placer Ranch are introduced into the trunk sewer that is tributary to the Pleasant Grove WWTP. Proposed pipe diameters are included in Figure 4-9 and Table 4-11.

Extension Project 2 – Placer Vineyards and West Dry Creek

The proposed improvements to extend service into Placer Vineyards and West Dry Creek were identified in the Placer Vineyards Specific Plan and the West Dry Creek Facilities Plan and were included in the trunk sewer model. The West Dry Creek service area is located between the Dry Creek WWTP and the Placer Vineyards UGA. The Placer Vineyards UGA includes one pump station, which will roughly serve the area of Placer Vineyards outside the 2005 Regional Service Area (i.e., Shed A), and will pump directly to the Dry Creek WWTP. The area of Placer Vineyards roughly within the 2005 Regional Service Area (i.e., Shed B) will be served by the proposed Dry Creek Pump Station No. 2, which will pump into a common force main serving the Dry Creek Pump Station No. 1, which then flows directly to the Dry Creek WWTP. Two additional pump stations (i.e., No. 3 and No. 4) are also proposed to serve the eastern portion of West Dry Creek, and will share a common force main to the Dry Creek WWTP. Proposed pipe diameters and pump station capacities for the Placer Vineyards UGA and West Dry Creek are included in Figure 4-9 and Table 4-11.

Extension Project 3 – Regional University

The proposed improvements to extend service into the Regional University UGA were previously identified in the Regional University Specific Plan and were included in the trunk sewer model. The Regional University UGA includes one pump station and is able to collect flow from Curry Creek North and South. Flow from the Regional University pump station is pumped (along with flow from Curry Creek South) east through Regional University and north along Watt Avenue to a gravity sewer main on Phillip Road. This gravity main flows east to the West Roseville collection system, tying into the proposed 18-inch gravity sewer at Westside Drive and Phillip Road, and then transitioning to a 24-inch gravity sewer as it heads east to join the existing (as of April 2007) Philip Road sewer. Note that for this gravity sewer option to provide service to Regional University and Curry Creek, the gravity sewers planned for West Roseville (i.e., the 18- and 24-inch sewers) would have to be upsized to 42- and 48-inch sewers, respectively. An alternate alignment would involve pumping directly from Regional University to the 36-inch gravity sewer that ties into the influent junction structure at Pleasant Grove WWTP. The proposed pipe diameters and pump station capacities are included in Figure 4-9 and Table 4-11.

Extension Project 4 – Curry Creek

The proposed improvements to extend service into the Curry Creek were previously identified in the Regional University Master Sewer Study. Pipes in Curry Creek North will flow by gravity into Regional University. Flow from Curry Creek South will be pumped north, where the Curry Creek South force main will tee into the proposed Regional University force main. An alternate alignment for the Curry Creek South force main would involve pumping east across Curry Creek and then north at Watt Avenue to a junction point on the Regional University force main. The proposed pipe diameters and lift station capacity are included in Figure 4-9 and Table 4-11.

Extension Project 5 – Creekview

The proposed improvements to extend service into Creekview were not previously identified. USGS topographic contour information indicates that a pump station will be necessary to transport flow into the West Roseville collection system. The proposed pipe diameters and pump station capacity are included in Figure 4-9 and Table 4-11.

Extension Project 6 – Sierra Vista

The proposed improvements to extend service into Sierra Vista were not previously identified. Flows from Sierra Vista will tie into two sewer stubs along the border of Sierra Vista and West Roseville. It is projected that approximately one third of Sierra Vista service area will be served by the 18-inch trunk sewer in West Roseville, while the remaining two thirds of the Sierra Vista service area will be served by the 24-inch trunk sewer in West Roseville. Most of the Sierra Vista service area can be served by the West Roseville sewer stubs by gravity, although a small area in the southwest portion of Sierra Vista may require a local pump station. The trunk sewer network and corresponding sewer extension project were not established for the Sierra Vista service area.

Extension Project for Brookfield

The proposed improvements to extend service into Brookfield were not previously identified. USGS topographic contour information indicates that a pump station will be necessary to transport flow from a low spot in Brookfield towards Creekview, where flows will be combined and pumped into a common Brookfield-Creekview force main and into the West Roseville collection system. The proposed pipe diameters and pump station capacity are included in Figure 4-9 and Table 4-11.

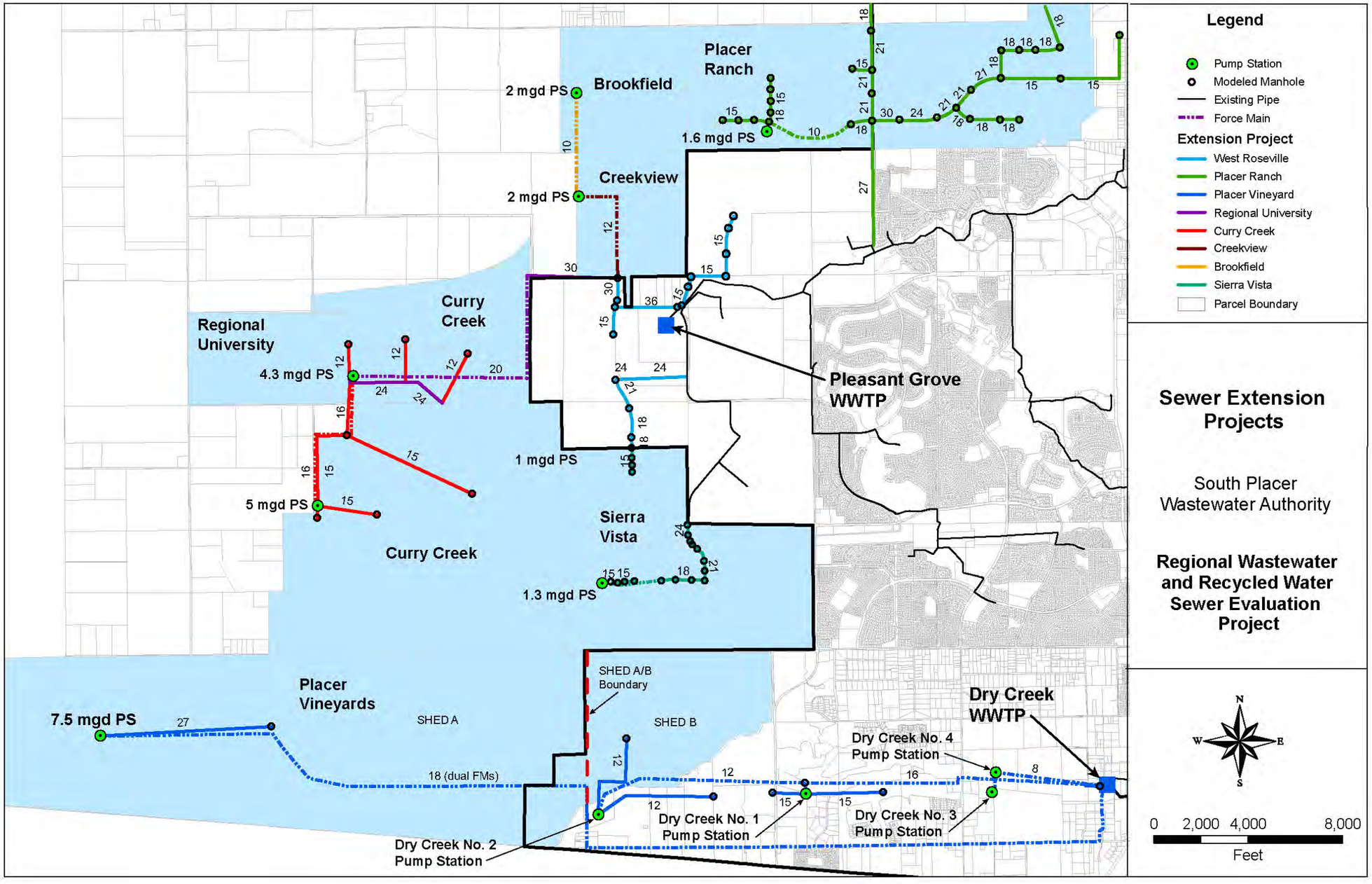
Table 4-11: Sewer Extension Project Summary [1]

Project No.	Item	Quantity	Unit Cost ($)	Estimated Capital Cost ($)	Proposed Total Project Cost [2] ($)
1-Placer Ranch	24-inch gravity [3]	6,000 lf	312	1,872,000	2,434,000
	15-inch gravity	5,700 lf	292	1,664,000	2,164,000
			Project 1 Subtotal	**3,536,000**	**4,598,000**
2-Placer Vineyards/ West Dry Creek	12-inch gravity - PV	4,400 lf	246	1,082,000	1,407,000
	27-inch gravity - PV	7,300 lf	437	3,190,000	4,147,000
	18-inch (dual) force mains - PV	48,000 lf	400 [4]	19,200,000	24,960,000
	7.5 mgd pump station - PV	1 ea	2,750,000	2,750,000	3,575,000
	12-inch gravity - DC	5,100 lf	246	1,255,000	1,631,000
	15-inch gravity - DC	4,700 lf	292	1,372,000	1,784,000
	12-inch force main – DC No. 2	9,500 lf	174	1,653,000	2,149,000
	2.5 mgd pump station – DC No. 2	1 ea	900,000	900,000	1,170,000
	0.6 mgd pump station – DC No. 3	1 ea	400,000	400,000	520,000
	1.2 mgd pump station – DC No. 4	1 ea	600,000	600,000	780,000
	8-inch force main – DC No. 3 and 4	5,600 lf	120	672,000	874,000
			Project 2 Subtotal	**33,075,000**	**42,970,000**
3-Regional University	24-inch gravity	5,000 lf	415	2,075,000	2,698,000
	30-inch gravity	2,900 lf	454	1,317,000	1,712,000
	20-inch force main	12,000 lf	260	3,120,000	4,056,000
	4.4 mgd pump station	1 ea	2,000,000	2,000,000	2,600,000
			Project 3 Subtotal	**8,512,000**	**11,066,000**
4-Curry Creek	12-inch gravity	6,000 lf	246	1,476,000	1,919,000
	15-inch gravity	13,000 lf	292	3,796,000	4,935,000
	16-inch force main	7,000 lf	224	1,568,000	2,038,000
	5 mgd lift station	1 ea	2,000,000	2,000,000	2,600,000
			Project 4 Subtotal	**8,840,000**	**11,492,000**
5-Creekview	12-inch force main	4,100 lf	174	713,000	927,000
	2 mgd pump station	1	1,500,000	1,500,000	1,950,000
			Project 5 Subtotal	**2,213,000**	**2,877,000**
7-Brookfield	10-inch force main	4,450 lf	150	668,000	868,000
	2 mgd pump station	1 ea	1,500,000	1,500,000	1,950,000
			Project 7 Subtotal	**2,168,000**	**2,818,000**
			Total Cost	**60,204,000**	**78,266,000**

Footnotes:

1. This table is for informational purposes only. These costs have been developed utilizing a unit cost table representative of municipal sewer projects in the SPWA area. Actual sewer infrastructure costs for each extension project will be the responsibility of the developer.
2. Includes 30 percent contingency.
3. Based on original planning information supplied by G.C. Wallace, this sewer was previously estimated to be 48 inches in diameter. Refer to **Appendix L** for information.
4. Unit cost for dual 18-inch force mains assumes 60 percent increase in unit cost for a single 18-inch force main ($250/LF x 1.60 = $400/LF)

Figure 4-9: Trunk Sewer Extension Projects



Chapter 5 Wastewater Treatment Plant Expansion Evaluation

5.1 Introduction

The City of Roseville owns and operates two regional wastewater treatment plants (WWTPs) – the Dry Creek WWTP and the Pleasant Grove WWTP – on behalf of the SPWA partner agencies. Flows to both plants are, as of June 2004, well below design flows. The Dry Creek WWTP average dry weather flow is approximately 10.5 mgd, with an ADWF capacity of 18 mgd. Consequently, the plant is well within its discharge flow rate limitations as well. The Pleasant Grove WWTP, as of June 2004, measures ADWF of approximately 7 mgd, with an ADWF capacity of 12 mgd, and is well within its discharge flow rate limitations. Both WWTPs are consistently in compliance with their NPDES discharge permits. Because of the significant increases in wastewater concentration since 2001, the loadings to the plants are, as of April 2007, at both plants' design organic capacity, and plant improvements will be needed in the near term. In addition, SPWA is evaluating regional wastewater systems to determine the effects of projected future flows and loadings as the Service Area builds out. This chapter establishes projected flow and loadings, calculates flow and loading peaking factors, develops facility expansion recommendations to handle the projected flows and loadings at buildout, and presents a timeline for phasing the construction of the improvements. Since the original publication of this report, additional analyses of expansion requirements for the Dry Creek WWTP were completed and documented in the *Dry Creek Wastewater Treatment Plant Initial Assessment (CH2MHill 2008)*. This report summarizes these recommendations and conclusions; additional detail can be found in the Initial Assessment.

5.2 Treatment Plant Flow Distribution

The flow distribution between the two plants was determined based on the June 2004 sewershed and the natural watershed divide in the City of Roseville, where both regional plants are located. The sewershed divide, labeled "June 2004 Sewershed/Watershed Divide" in **Figure 5-10** (*NOTE: Figure 5-1 does not include Brookfield, which is addressed separately in Chapter 8*), generally follows a ridge through the City. However, this line follows the actual sewershed break based on the local sewers installed and in-service within the developed areas. As of June 2004, sewers south and east of the ridge flow to the Dry Creek WWTP and sewers north and west of the ridge flow to the Pleasant Grove WWTP.

The buildout sewershed line is shown in **Figure 5-10**. The sewershed is identical to the June 2004 sewershed within the 2005 Regional Service Area boundary, but will follow the boundary line between Curry Creek and Placer Vineyards in the future. All future sewers will be designed to maintain gravity flow when possible. All development north and west of the divide will be planned to have its flow routed to the Pleasant Grove WWTP, and all development south and west of the divide will be planned to have its flow routed to the Dry Creek WWTP. This buildout sewershed divide was developed for the following reasons:

- The majority of Curry Creek drains west away from both treatment plants. Parts of Curry Creek do drain towards the Regional University Urban Growth Area (UGA) and towards the Pleasant Grove WWTP. Because sewer infrastructure for Curry Creek is not complete at this time, this Systems Evaluation has been conducted under the assumption that all the wastewater generated in the Curry Creek UGA will flow or be pumped north towards the Pleasant Grove WWTP.
- The topography of the area encompassing the majority of Sierra Vista and a portion of Curry Creek is such that the natural drainage path is towards the west, away from both WWTPs. Hence, wastewater generated in these areas will need to be pumped regardless of where it is treated. As such, the same criterion described above applies to these areas (i.e., wastewater will be conveyed to the Pleasant Grove WWTP).
- It was also assumed that because Placer Vineyards is close to the Dry Creek WWTP that the UGA should flow to the Dry Creek WWTP.

Figure 5-11 presents the approximate boundaries between the regional partners. These boundaries reflect the individual partners' areas within the 2005 Regional Service Area boundary.

5.3 Flow Projections

As a result of the economic slowdown beginning in 2008, flow projections for Pleasant Grove WWTP and Dry Creek WWTP have been updated to reflect reduced rates of residential development. In addition, flow projections have been developed for the scenario that Placer Ranch and Placer Vineyard do not develop. The buildout timeline changes have also resulted in changes to the construction phasing timeline. **Figure 5-1** to **Figure 5-3** present the new buildout timelines for the combined treatment plant flows under three scenarios: Inside 2005 Service Area Boundary, Inside 2005 Service Area Boundary without Placer Vineyards/Placer Ranch, and the Ultimate Service Area Boundary including Rezones and Intensifications.

Figure 5-1: Inside 2005 Service Area Boundary Contributing Agency Flow Projections

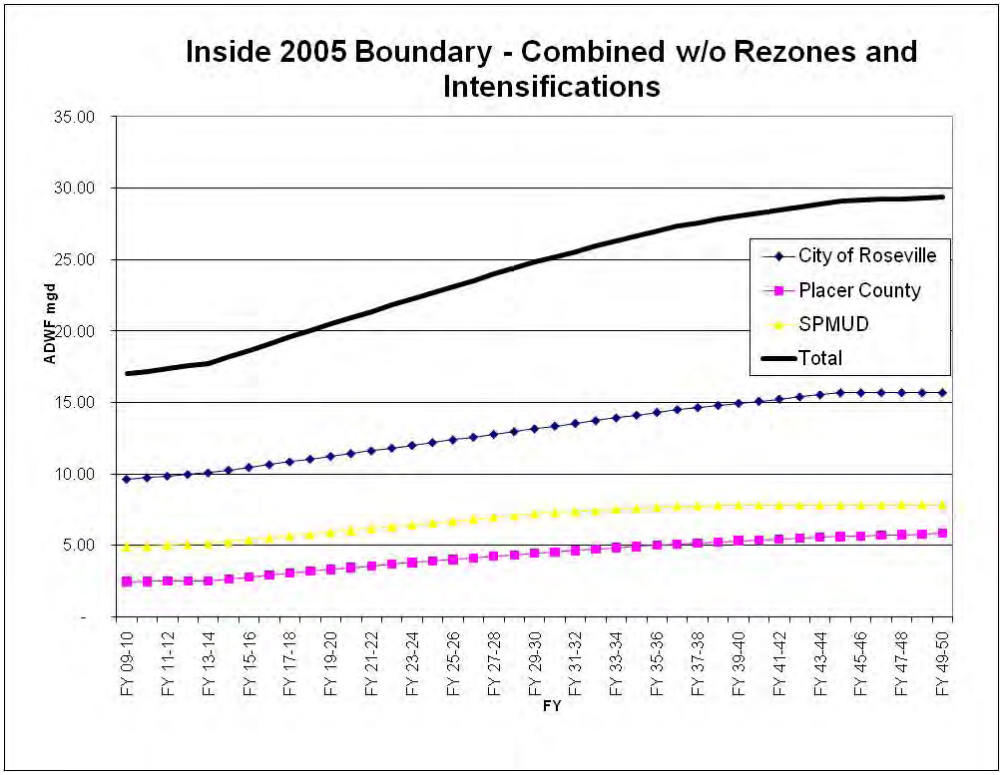


Figure 5-2: Inside 2005 Service Area Boundary Contributing Agency Flow Projections w/o Placer Vineyards or Placer Ranch

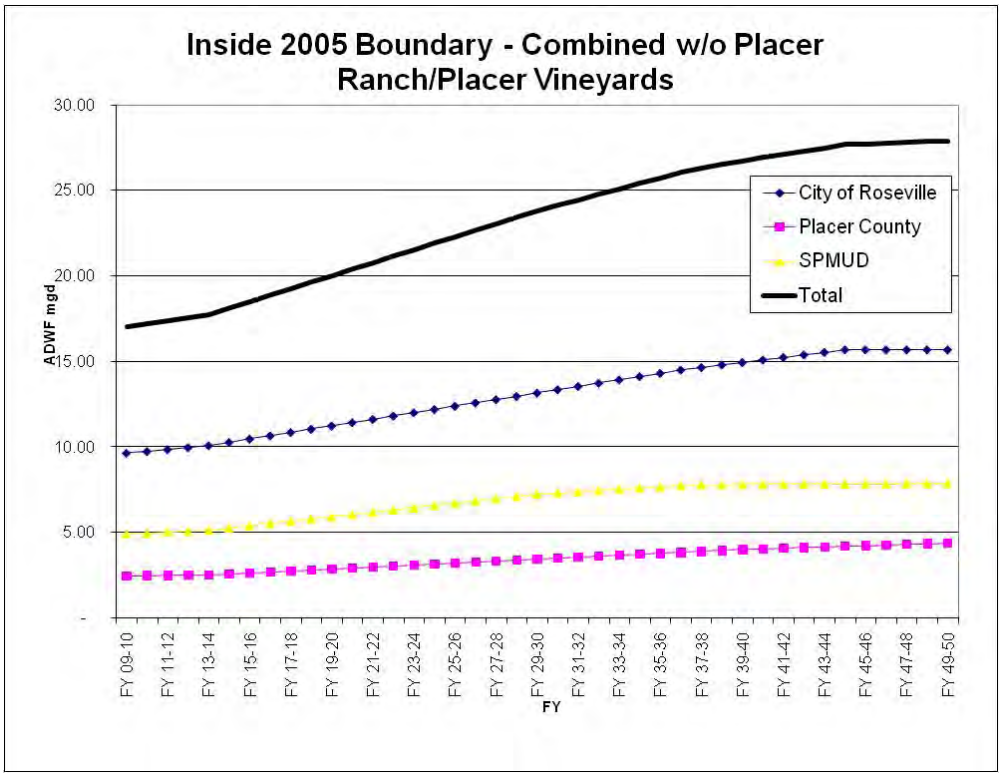
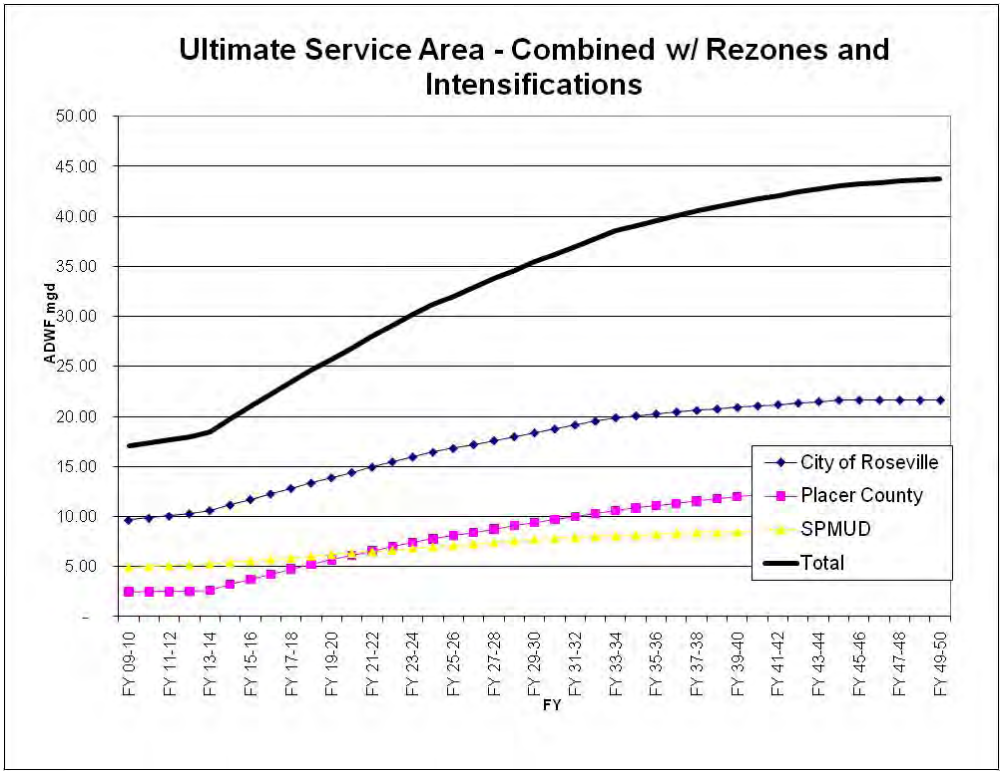


Figure 5-3: Ultimate Service Area Boundary Contributing Agency Flow Projections



5.3.1 Pleasant Grove

Figure 5-1 to **Figure 5-3** present the new buildout timelines for the combined treatment plant flows under three scenarios: Inside 2005 Service Area Boundary, Inside 2005 Service Area Boundary without Placer Ranch, and the Ultimate Service Area Boundary including Rezones and Intensifications.

Figure 5-4: Inside 2005 Service Area Boundary Contributing Agency Flow Projections

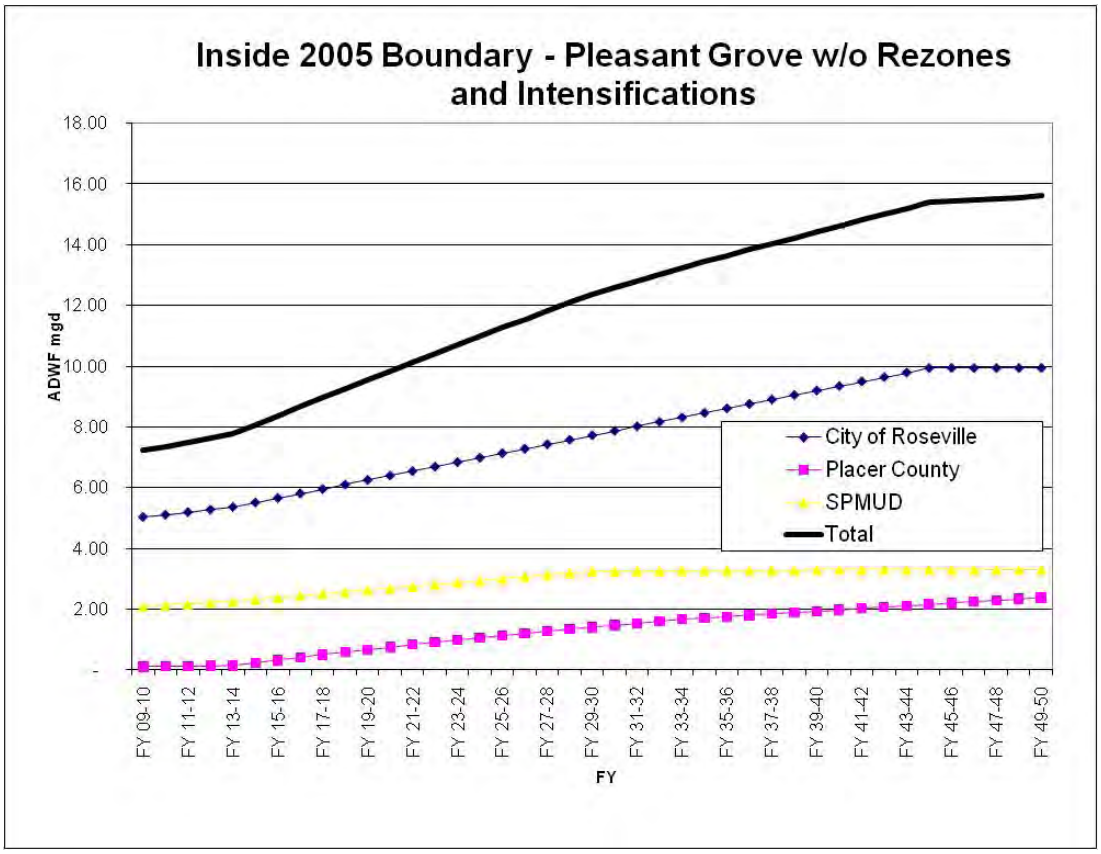


Figure 5-5: Inside 2005 Service Area Boundary Contributing Agency Flow Projections w/o Placer Ranch

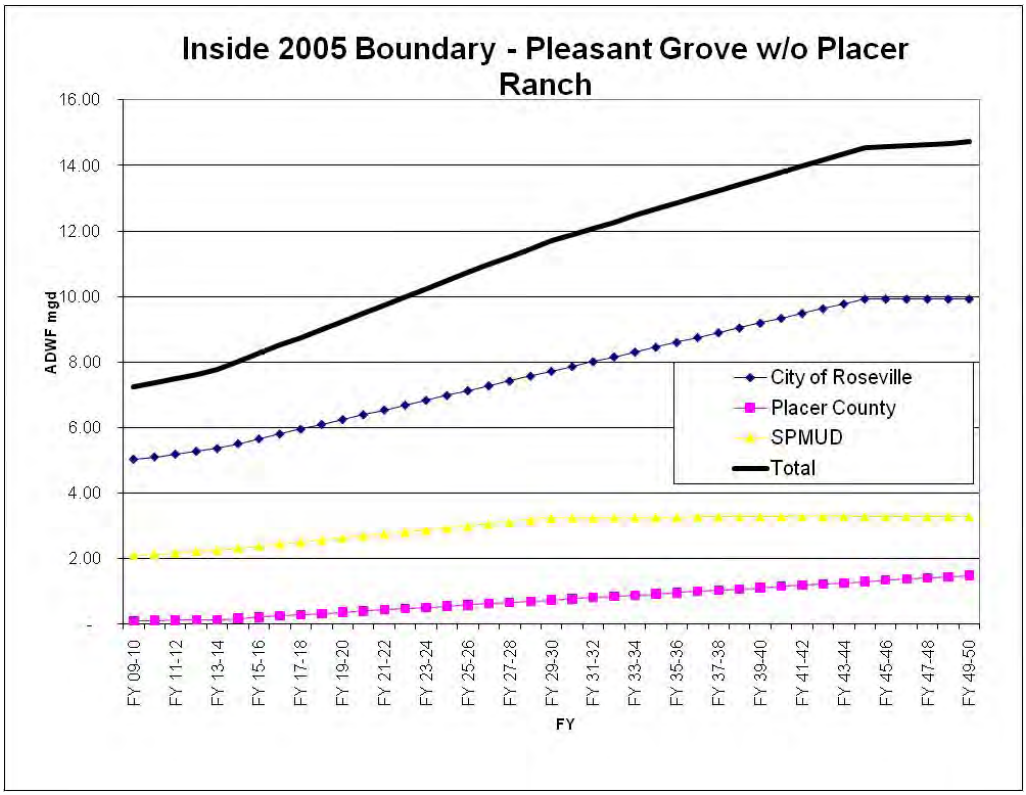
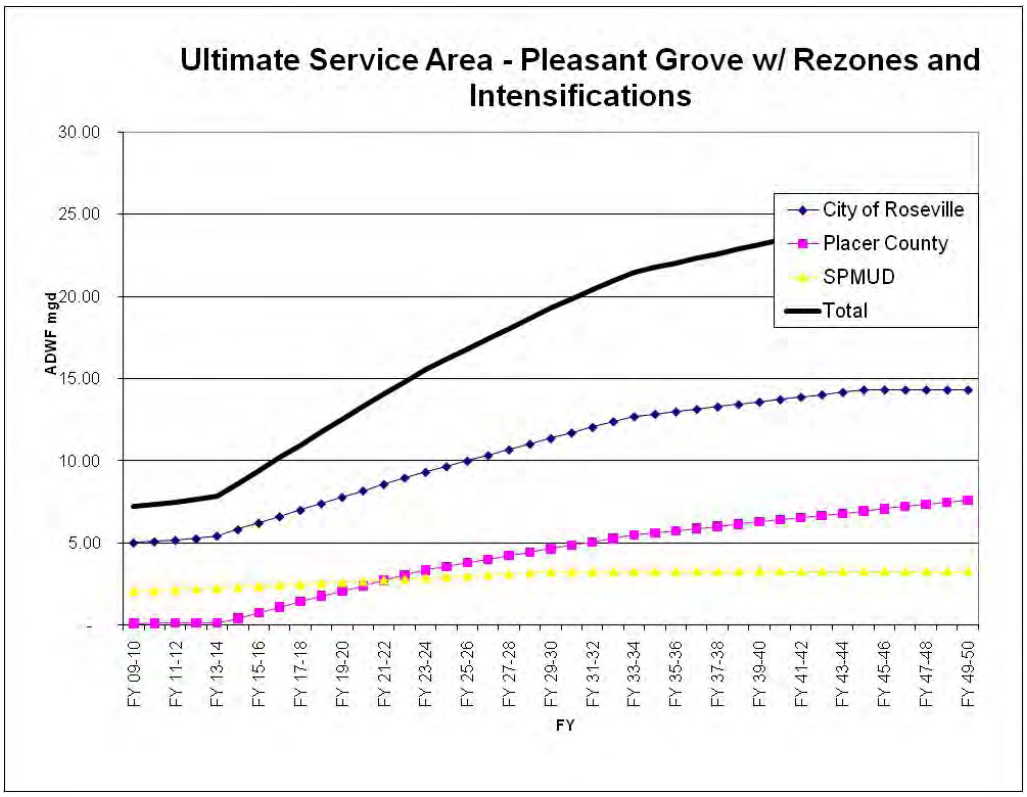


Figure 5-6: Ultimate Service Area Boundary Contributing Agency Flow Projections



5.3.2 Dry Creek

Figure 5-1 to **Figure 5-3** present the new buildout timelines for the combined treatment plant flows under three scenarios: Inside 2005 Service Area Boundary, Inside 2005 Service Area Boundary without Placer Vineyards and the Ultimate Service Area Boundary including Rezones and Intensifications.

Figure 5-7: Inside 2005 Service Area Boundary Contributing Agency Flow Projections

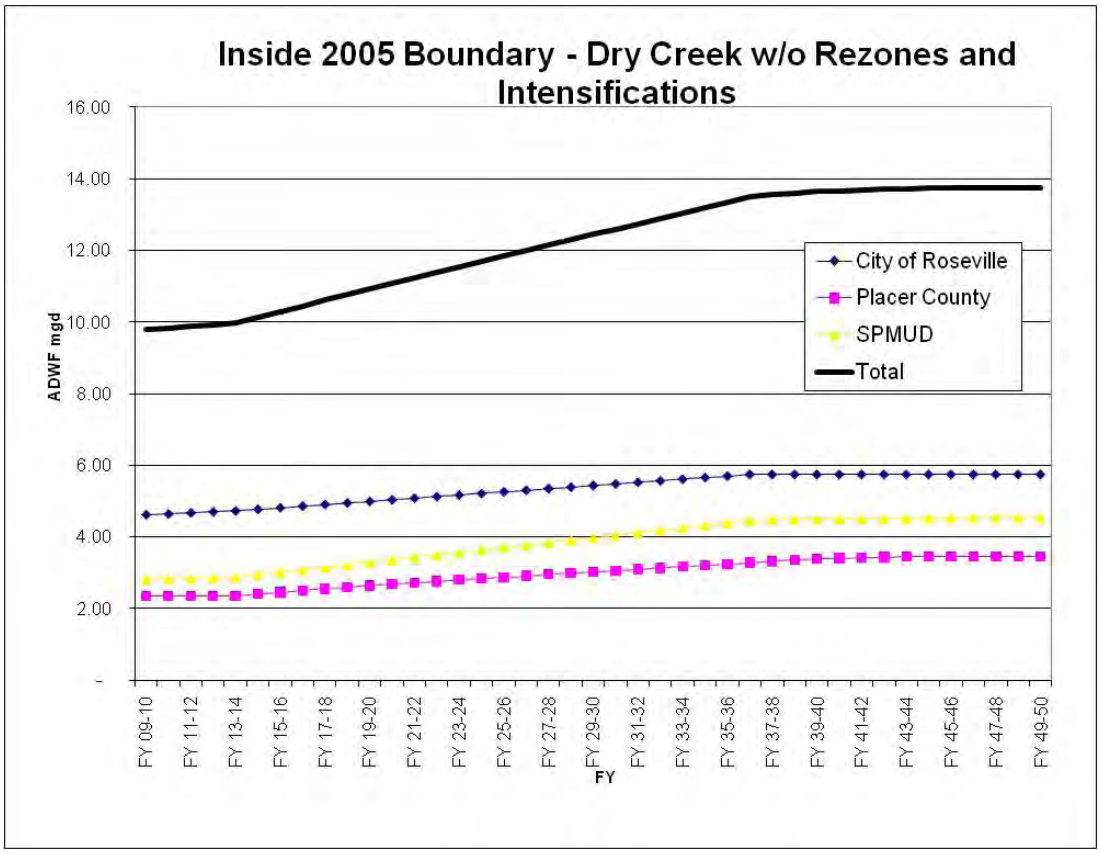


Figure 5-8: Inside 2005 Service Area Boundary Contributing Agency Flow Projections w/o Placer Vineyards

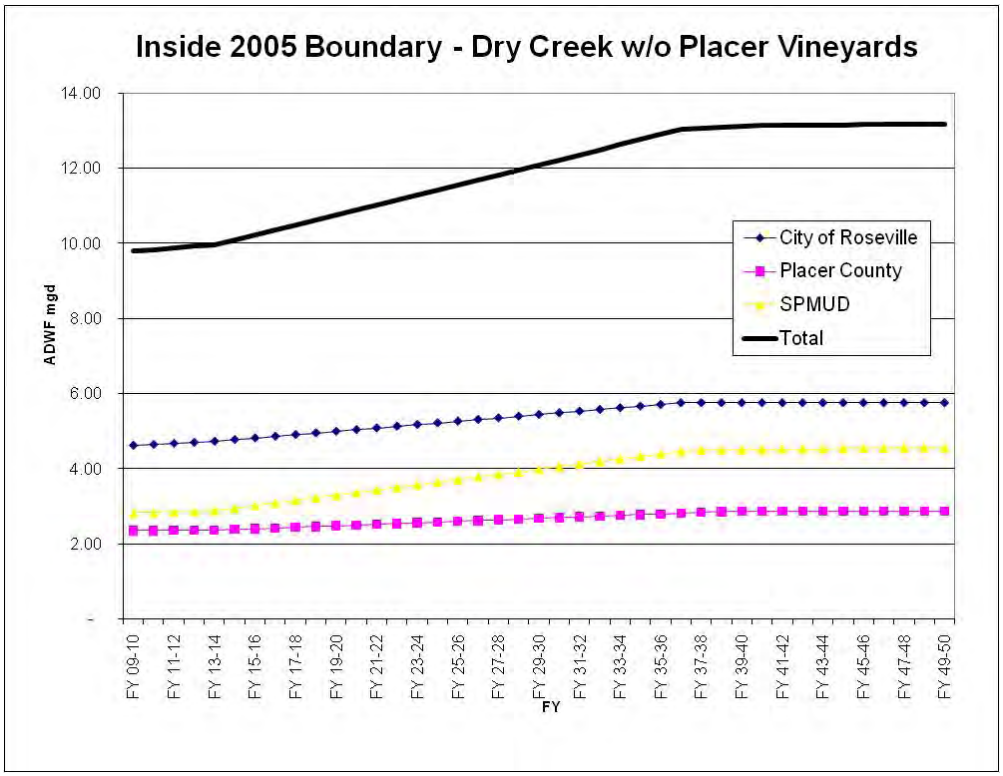
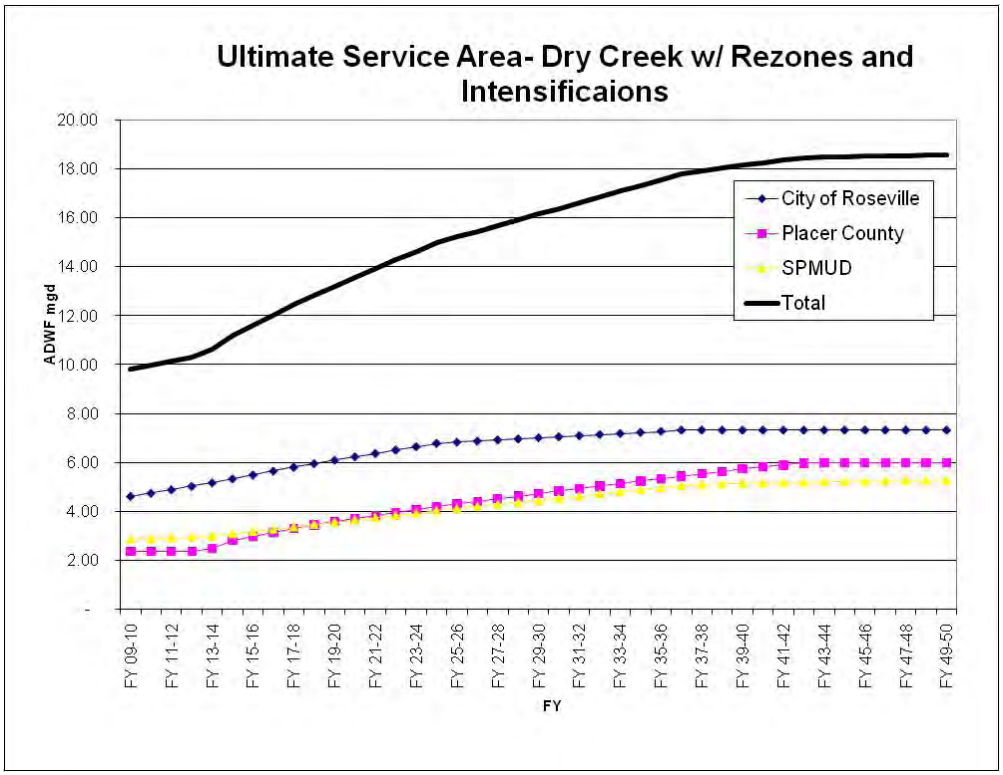


Figure 5-9: Ultimate Service Area Boundary Contributing Agency Flow Projections



5.4 Pleasant Grove Treatment Plant Expansion Requirements & Recommendations

5.4.1 Hydraulic Loading

Buildout Flows with Peaking Factors

Average dry weather flow (ADWF) projections have been prepared under baseline conditions (i.e., without Intensification and not including Brookfield flows) for buildout of the SPWA service area. As stated in Chapter 3, Pleasant Grove WWTP flows are projected to be 25.67 mgd. SPWA has historically used 3 mgd increments of flow in its long-term planning efforts. That convention will also be followed in this Systems Evaluation. Since most of the growth in the SPWA service area will be in the Pleasant Grove service area, there is the potential that the area will not produce wastewater flows to the full 25.67 mgd, therefore a buildout capacity of 24 mgd was evaluated in addition to an ultimate capacity of 27 mgd. This evaluation is described in further detail in TM 4b. The buildout ADWF at Pleasant Grove is summarized in **Table 5-1.**

Table 5-1: ADWF for System Evaluation

Plant	ADWF (mgd)
Pleasant Grove	24 (beyond FY49-50) 27 (ultimate)

Flow Peaking Factors

As part of the modeling effort for the trunk sewers, peak wet weather flow hydrographs were developed. The hydrographs, discussed in greater detail in *TM 2c – Wet Weather Flow Projection for Ultimate Service Area (w/ UGAs)* in **Appendix F**, show the estimated peak day and peak hour flows to each treatment plant at buildout. **Table 5-2** summarizes the results of the peak wet weather modeling for Pleasant Grove.

Table 5-2: Estimated Peak Wet Weather Flows based on Wet Weather Modeling

Plant	Peak Day		Peak Hour	
	Flow (mgd)	Peaking Factor [a]	Flow (mgd)	Peaking Factor [a]
Pleasant Grove	37.1	1.5	46.5	1.8

Footnote:

a. Peaking Factors based on the ADWF at baseline buildout from the model, i.e. 19.98 mgd for Dry Creek and 25.67 mgd for Pleasant Grove.

Figure 5-10: Sewershed Divide for the SPWA Service Area and Potential Future Planning Areas, including UGAs

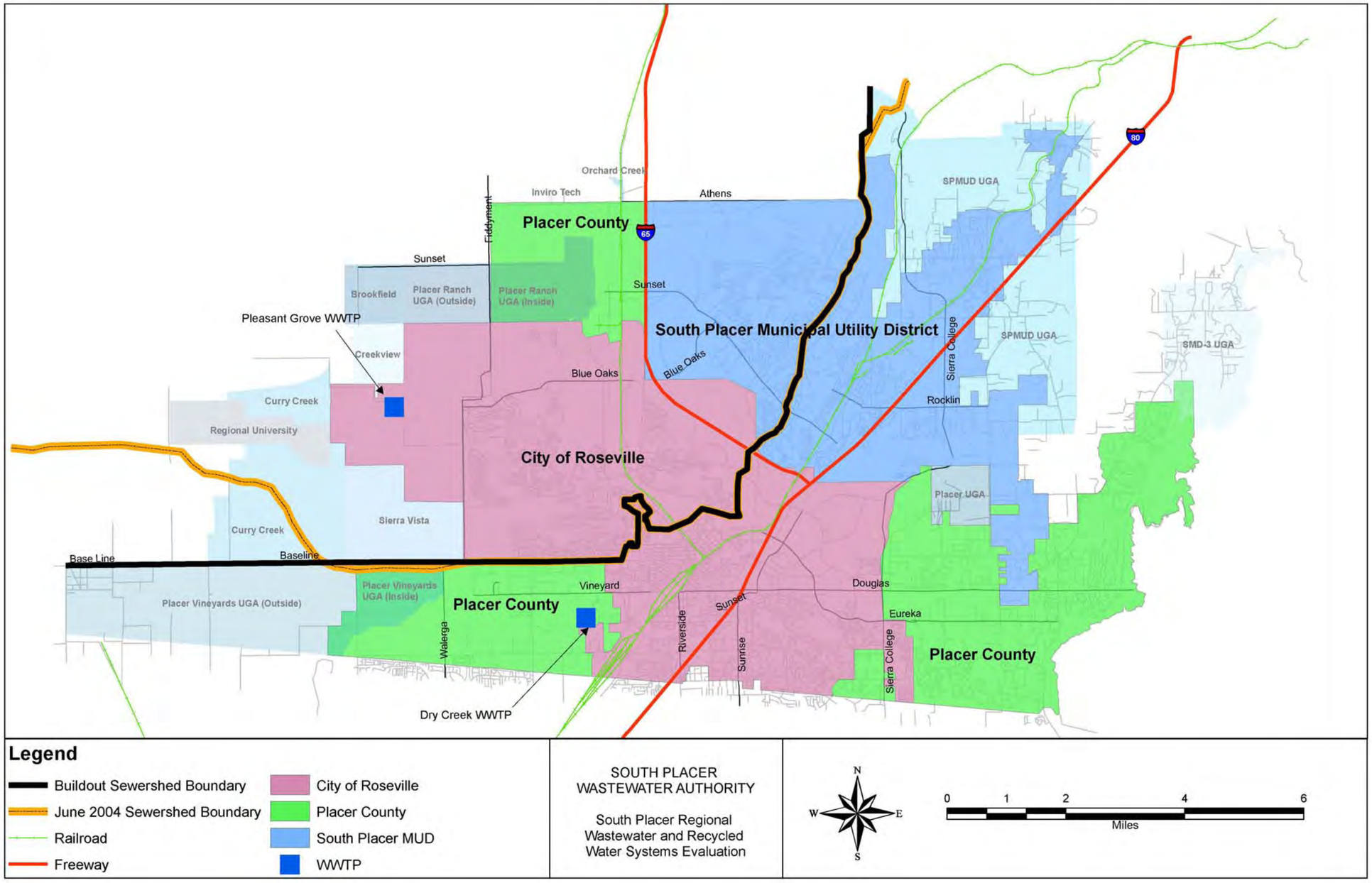
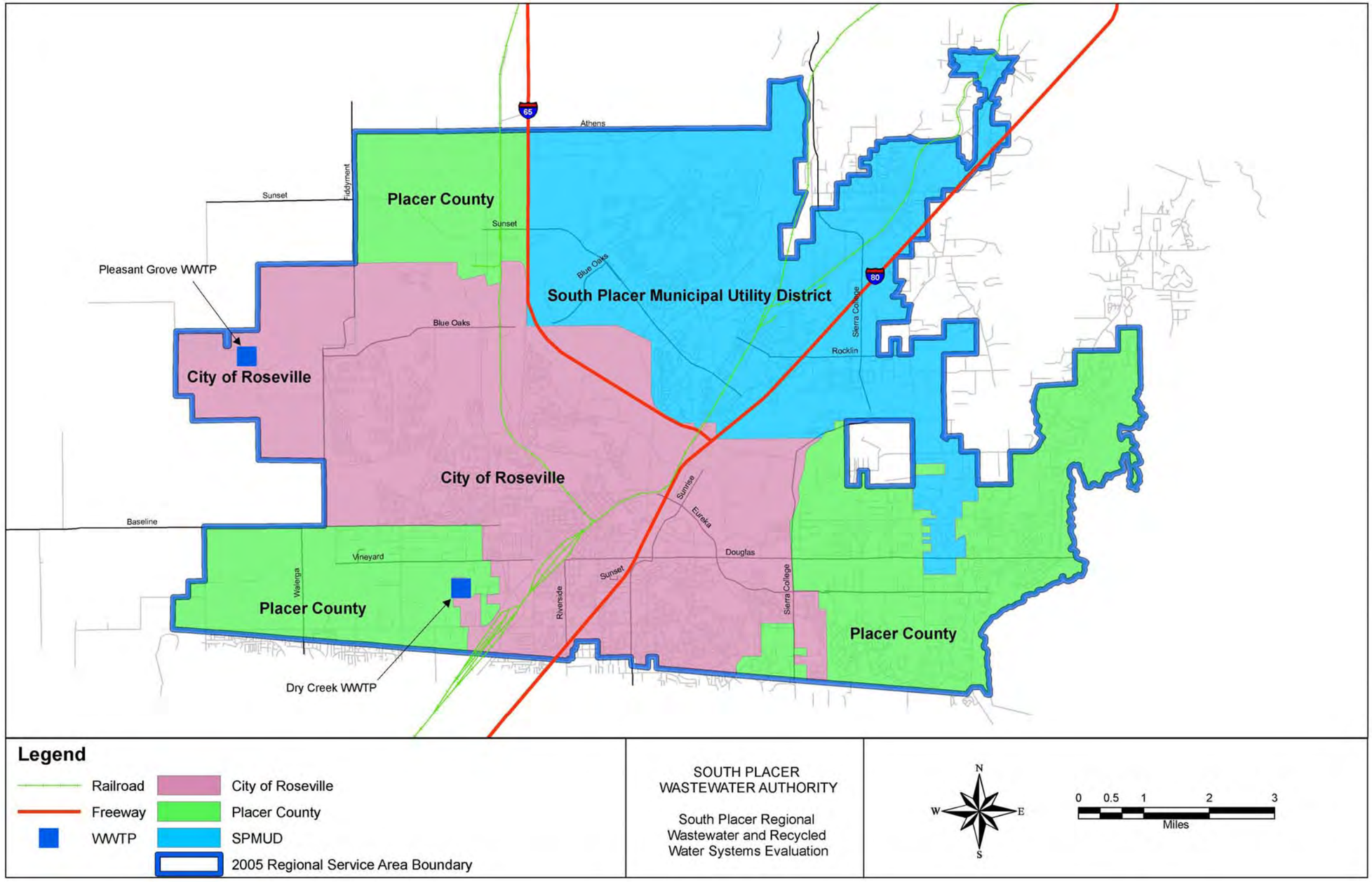


Figure 5-11: Approximate Regional Boundaries between Partner Agencies in SPWA



For Pleasant Grove, low peaking factors are appropriate since the sewers are newer. The model estimated peaking factors of 1.5 and 2.0. Adding a safety factor to the model predictions for planning purposes, the resulting peaking factors for Pleasant Grove are 2.0 for peak day and 2.5 for peak hour.

The maximum monthly flow peaking factor was determined by calculating a 30-day running average of the daily measured flows at the plant dating back to fiscal year 2000/2001 and comparing the maximum monthly flow to the average dry weather flow for the same year. The maximum peak month factor for Dry Creek was 1.39 in 2003/2004. The operating period of Pleasant Grove has been too short to establish a meaningful peak month factor, so a factor of 1.4 will be used for the evaluation of Pleasant Grove.

Peaking Factors and Associated Flows

Applying these peaking factors to the ADWF used for the system evaluation yields the design flows shown in **Table 5-3** for sizing expansion requirements at the two plants.

Table 5-3: Projected Average Dry Weather Flows using Peaking Factors

		Peak Month		Peak Day		Peak Hour	
Plant	**ADWF (mgd)**	**Flow** (mgd)	**Peaking Factor**	**Flow** (mgd)	**Peaking Factor**	**Flow** (mgd)	**Peaking Factor**
Pleasant Grove (buildout)	24	33.6	1.4	48	2.0	60	2.5

Organic and Solids Loading

Wastewater flow rate is used to size those facilities within a wastewater treatment plant that are designed primarily for a specific hydraulic detention time or overflow rate such as screens, primary clarifiers, filters, etc. For other processes, such as the secondary treatment system and solids handling, equally important criteria are organic and solids loadings into the plant. Two of the key indicators of the plant loading are the biochemical oxygen demand (BOD) and the total suspended solids (TSS). The Dry Creek plant was designed in 1990 for an influent BOD concentration of 160 mg/L (ppm) and TSS concentration of 240 mg/L (ppm). The Pleasant Grove plant, designed in 2000, was designed for an influent BOD concentration of 160 mg/L and TSS concentration of 220 mg/L. These concentrations are lower than average municipal wastewater strength, but reflected the service area characteristics at the time, i.e. a primarily residential, relatively sparsely developed community of older homes.

The characteristics of the service area have changed dramatically in the last 5 years. The population has increased by over 20% and the area has become more “suburban” in nature with accompanying changes in lifestyle. Since 2000, the number of restaurants has increased by about 50%, two new microbreweries have opened and a new regional shopping mall has been constructed. A vigorous water conservation program has decreased the volume per capita of wastewater conveyed by the sewers without decreasing the pounds of organics being introduced to the sewer; in effect concentrating the strength of the wastewater. As a result of water conservation and the “suburbanization” of the service area, the concentration of influent BOD and TSS has increased significantly in the last five years as shown in **Figure 5-12** and **Figure 5-13** below.

Figure 5-12: Dry Creek WWTP TSS and BOD Concentrations

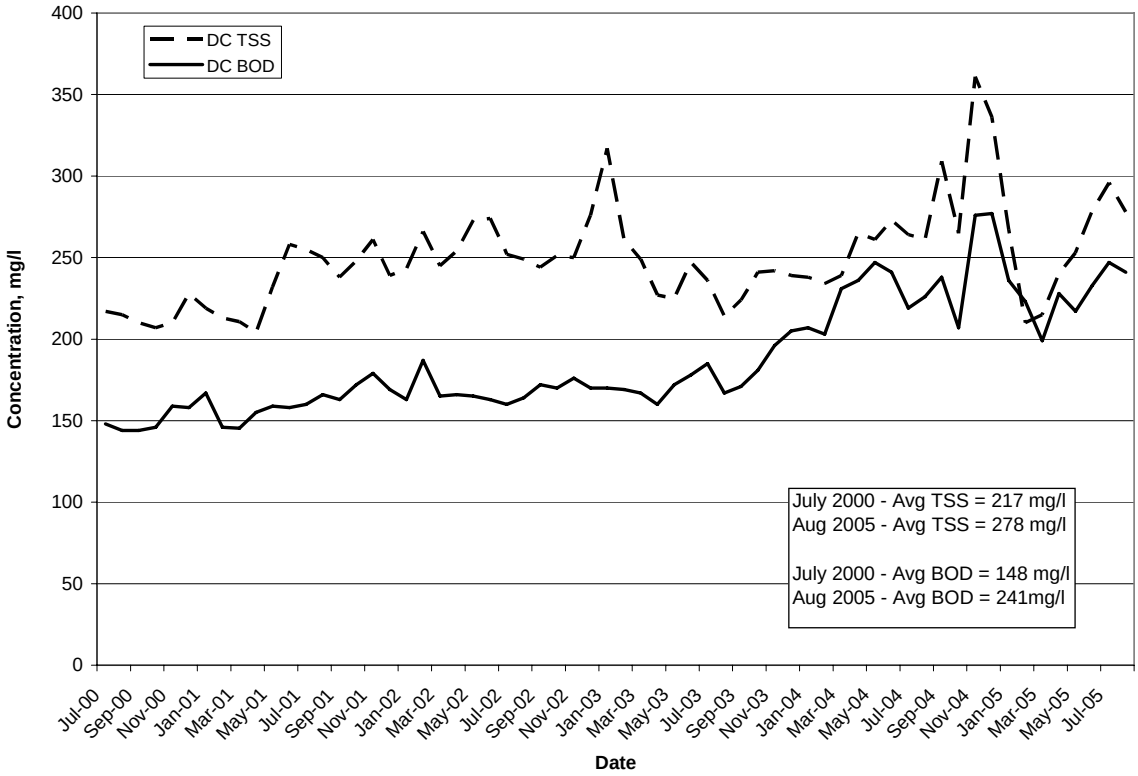
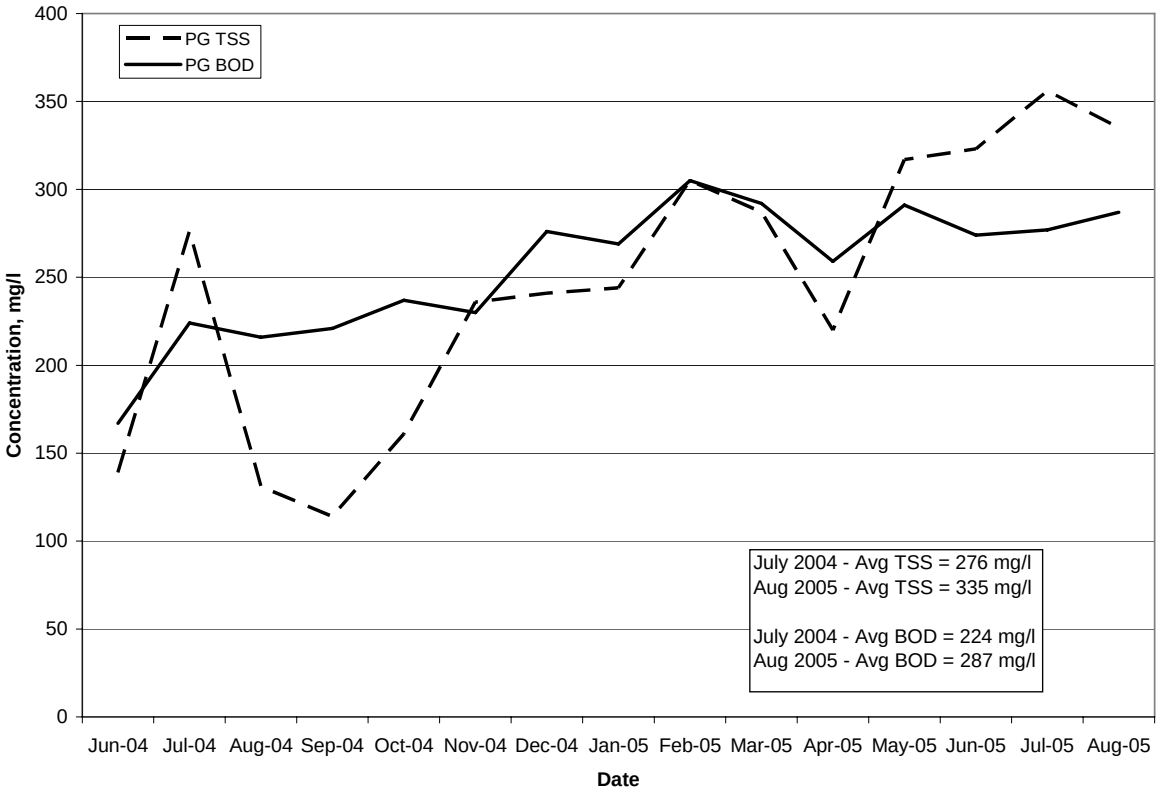


Figure 5-13: Pleasant Grove WWTP TSS and BOD Concentrations



Buildout Scenario Projected Concentrations

For the Pleasant Grove WWTP it is anticipated that the wastewater generated by buildout development within the service area will be similar in nature to the June 2004 flow. Therefore, for planning purposes, the June 2004 dry weather BOD and TSS concentrations will be used to project the loadings associated with the flows at buildout. The average dry weather concentrations for Pleasant Grove are as follows: BOD 285 mg/L and TSS 340 mg/L.

Buildout Scenario Projected Loadings

For this Systems Evaluation, the maximum monthly BOD and TSS loadings were compared to average annual loadings over the period 1991 through 1995 to determine a peaking factor for the peak month loading at each WWTP. The peak month factor for Dry Creek ranged from 1.17 to 1.45 with an average peak month factor of 1.2 for both BOD and TSS. The peak month factor for Pleasant Grove was only 1.1. However, with such a short operating history to draw from, it is more realistic to expect that the peaking factors at Pleasant Grove over time will be similar to that of Dry Creek, i.e. a peak month factor of 1.2.

Table 5-4 summarizes the average, peak day, peak month and peak hour plant influent flows and loadings that are used for the wastewater treatment systems evaluation.

Table 5-4: Projected Influent Flows and Loadings from Peaking Factors

Load Type	PGWWTP (buildout)
Flow (mgd)	
Average Dry Weather Flow (ADWF)	24.0
Peak Month Flow (PMF)	33.6
Peak Day Wet Weather Flow (PDWWF)	48.0
Peak Hour Wet Weather Flow (PHWWF)	60.0
BOD Loading (lb/day)	
ADWF	57,000
Maximum Month	68,400
TSS Loading (lb/day)	
ADWF	68,100
Maximum Month	81,700

5.4.2 Treatment System Evaluation Results and Recommendations

The Pleasant Grove treatment plant was completed in 2004 and reached full flow in February 2005. It was designed for an ADWF of 12 mgd, an average BOD loading of 16,000 lb/day, and an average TSS loading of 22,000 lb/day. The liquid treatment process includes screening and grit removal, influent pumping, secondary treatment/denitrification in oxidation ditches, secondary clarifiers, filtration, and disinfection with sodium hypochlorite. The solids treatment process is sludge dewatering with centrifuges.

The ADWF in 2005 was 6.6 mgd. However, the concentration of influent BOD to the plant is significantly higher than the concentration used during the plant design in 2000. The 2005 ADWF

BOD loading to the plant is 15,400 lb/day, or 96 percent of its nominal design BOD loading. The 2005 ADWF TSS loading is 18,600 lb/day, or 84 percent of the design TSS loading.

The recommended expansion requirements are driven by three factors:

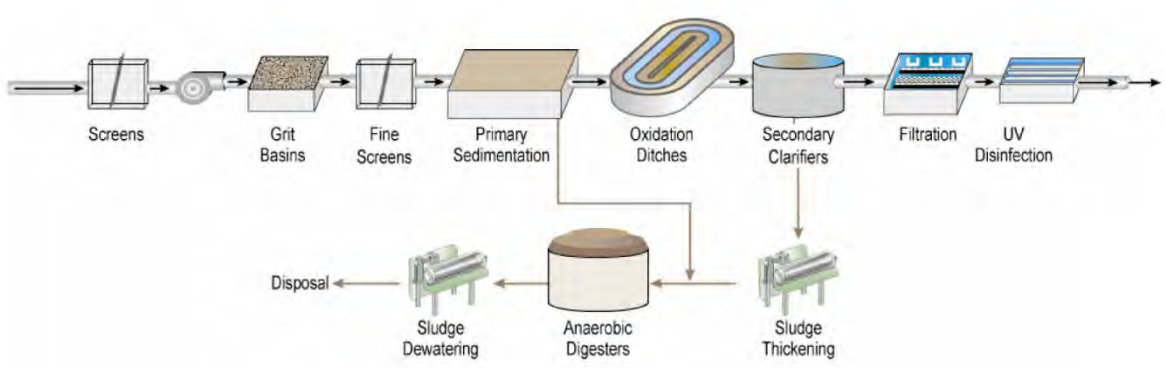
- Flow capacity to meet the anticipated ADWF of 24 mgd and peak hydraulic flow of 60 mgd (and space for a theoretical ultimate ADWF of 27 mgd)
- Organic treatment capacity to meet an anticipated ADWF BOD loading of 57,000 lb/day and a TSS loading of 68,100 lb/day
- Denitrification to meet an expected new NPDES limit of 10 mg/L-N

Two alternatives for expansion of the Pleasant Grove WWTP were initially evaluated. The first alternative expanded the June 2004 treatment process train, i.e. used oxidation ditches without primary sedimentation. The second alternative adds primary sedimentation upstream of the oxidation ditches and adds solids thickening and anaerobic digesters to the solids treatment processes. After initial evaluation of the two alternatives and review by SPWA, the second alternative, adding primary sedimentation, was recommended for the following reasons:

- The total cost of Alternative 2 was approximately 6 percent less than the cost of Alternative 1. Meeting the buildout flows and loadings with the original process train would have required a total of 10 oxidation ditches and 8 centrifuges.
- Improving the sludge processing system by adding thickening and stabilization will eliminate the need for the WAS holding tanks, produce a more stabilized sludge, reduce the volume of sludge for dewatering, and reduce the odors associated with solids handling.
- Adding primary sedimentation will reduce the organic loading on the oxidation ditches and therefore reduce the amount of power needed for the aerators in the oxidation ditches
- The anaerobic digesters will produce methane which can be used in a co-generation process to produce electricity and further reduce the plant's power consumption.
- The addition of fine screens upstream of the primary sedimentation process will remove fine plastics which accumulate in the oxidation ditches, the sludge, and in the recycled water process.

This section focuses on Alternative 2, adding primary sedimentation and expanded solids handling to the Pleasant Grove process train. The resulting treatment processes are illustrated **Figure 5-14**.

Figure 5-14: Pleasant Grove Treatment Schematic



The recommended facilities are presented, by unit process, in the section that follows. The improvements, along with estimated capital costs, are summarized in **Table 5-7**, and the proposed layout for the new facilities is shown on . The design basis for each process expansion or upgrade recommendation is discussed below.

Coarse Screens

The June 2004 screening facility for the East Roseville trunk sewer includes 2 mechanically cleaned bar screens with ½ inch openings. There is a spare channel. The system expansion assumes the addition of one mechanically cleaned bar screen, similar to the two June 2004 screens, in the spare channel.

Influent Pump Station

As of June 2004, the influent pump station includes 2 low-range pumps rated at 9 mgd and 2 high-range pumps rated at 21 mgd. With the largest pump out of service the firm pumping capacity is 39 mgd. There are two spare spaces for additional pumps. The required firm capacity of the influent pump station at buildout is 60 mgd (PHWWF). This would require the addition of one more high range pump. With one large pump out of service, the resulting firm pumping capacity would be 60 mgd. For a theoretical ultimate PHWWF flow of 67.5 mgd, one additional low-range pump would be needed. The firm capacity would then be 69 mgd with the largest unit out of service.

As of June 2004, there are two side stream pumps, each rated at 5.1 mgd. The projected side stream flow at peak day conditions is 4.3 mgd. The June 2004 side stream pumps are adequate for buildout and no additional side stream pumps are needed.

Grit Chambers

The in-plant recycle streams are returned to the main plant flow upstream of the grit basins. These flows consist predominately of filter backwash, but also include spray water, filtrate from dewatering, and would in the future include new filtrate from the solids thickening process. With the addition of the in-plant recycle flows, the effective flow to the grit basins and downstream processes is listed in **Table 5-5**.

As of June 2004, there are two aerated grit chambers, each sized for an overflow rate of 42,900 gpd/sq ft at PHWWF. Using a similar overflow rate, two additional grit chambers would be needed for the buildout and ultimate flow.

Table 5-5: Pleasant Grove Flow to Processes, Including Recycle Streams

Flow Type	Unit	ADWF	Peak Month	PDWWF	PHWWF
At Buildout					
Influent Flow	mgd	24.0	33.6	48.0	60.0
Recycle Flows					
Total Recycle Flows	mgd	3.5	3.7	3.7	3.7
Percent of Influent Flow	%	14.5%	11.0%	7.7%	6.2%
Total Flow with Recycle	mgd	27.5	37.3	51.7	63.7

Fine Screens

The ½ inch coarse screens allow plastics to pass through to downstream treatment processes. The plastics are neutrally buoyant and are not removed through the secondary process. Addition of a fine screen process is proposed to remove plastics.

The fine screens would be sized to pass the buildout PHWWF of 67.5 mgd with provisions to expand if needed for the ultimate flow. For layout and cost estimating purposes this evaluation assumes the addition of three 6 mm (1/4”) band screens, each with a capacity of 22.5 mgd, built

as part of the influent/flow splitting structure for the new primary sedimentation basins. The facility would also include odor control and a screenings washer/compactor to remove organics caught by the screens. One of the key issues to be resolved during predesign is an assessment of the hydraulic profile of the plant to determine whether there is adequate head available for the fine screens.

Primary Sedimentation

Two options are presented for the new primary sedimentation process: rectangular primary sedimentation basins similar to those at Dry Creek, and circular basins. Fewer circular basins would be required and they are usually less costly to construct. However, the space allocated for addition of a primary sedimentation process in the existing (as of June 2004) site plan (up to date as of April 2007) is inadequate for three circular basins. Therefore, for layout and cost estimating purposes, the primary sedimentation process will include seven rectangular primary sedimentation basins, covered for odor control, and associated sludge pumping facilities. One additional primary sedimentation basin would be needed for the ultimate flow. The project will also include a biofilter for odor control of the vented air from primary sedimentation and the fine screens.

Secondary Treatment

As of June 2004, there are three oxidation ditches, each 3.2 MG in volume, and four 125 foot diameter clarifiers. The design of the oxidation ditches for the system expansion is based on producing an effluent with a total nitrogen concentration of less than 10 mg/L-N at a MCRT of 11 days during the summer and 13 days during the winter. The governing criterion for the oxidation ditch sizing is the peak month, wet weather condition with an MCRT of 13 days. Sizing of the clarifiers depends on meeting both a maximum hydraulic loading rate and solids loading rate. As discussed previously with Dry Creek, the sizing of the two components of the secondary treatment process also depends on striking a balance between the oxidation ditch volume and the clarifier area.

For 24 mgd ADWF, the recommendation is therefore to add 3 additional oxidation ditches for a total of 6, and 4 new clarifiers, for a total of 8. The new oxidation ditches would be built to the south of the June 2004 ditches. The new clarifiers, along with a return activated sludge (RAS) pump station, would be built to the south of the June 2004 clarifiers. For an ultimate flow of 27 mgd, one additional oxidation ditch and no additional clarifiers would be required.

Effluent Filtration

As of June 2004, there are six continuous backwash filters, with a filter area of 500 square feet per filter. A filter surface loading of 5 gpm/sq ft corresponds to a flow of 21.6 mgd (approximately peak hour dry weather flow). The loading rate for the June 2004 design PDWWF of 30 mgd would be 6.9 gpm/sq ft.

Similar to Dry Creek WWTP, the number of Pleasant Grove WWTP filters was calculated conservatively based on conventional sizing criteria, which will be refined in a subsequent predesign phase. Adding six additional filters would provide 5 gpm/sq ft for all conditions at buildout except for peak day wet weather. The recommendation is therefore to add six new filters, but to provide space for additional units should future operating experience at the plant indicate that a lower loading rate during wet weather is desirable.

Disinfection

The Pleasant Grove WWTP disinfects with sodium hypochlorite. During the system expansion, the disinfection method would be converted to UV disinfection, which is the disinfectant of choice for the Dry Creek WWTP as well. The proposed UV system will have five channels, with

4 UV banks per channel, similar in configuration to the UV system under design for Dry Creek. It would be built in the same location as the June 2004 chlorine contact channels. For an ultimate flow of 27 mgd, one additional UV channel would be required.

Recycled Water Pumps

The system expansion includes two additional recycled water pumps located in the spare space at the recycled water pump station. Discussion of the recycled water pumps and their associated costs are discussed in 5.5.

Solids Thickening

With the addition of primary sedimentation, the solids handling process will change to include solids thickening and anaerobic digestion prior to solids dewatering. Activated sludge would be wasted to the thickening process on a continuous, 24 hour per day process. This will eliminate the need for the two June 2004 waste activated sludge (WAS) holding tanks, which are a significant source of odor from the plant. There are several types of thickening processes which should be evaluated in predesign.

Centrifuges are higher in cost and have significantly higher power requirements than gravity belt thickeners, but can more easily operate unattended at night and require less odor control. For cost and layout purposes, centrifuges have been used as the thickening process, but further analysis, particularly of power requirements, should be done in predesign. Two thickening centrifuges (one duty and one standby) would be housed in a new solids thickening building. No additional thickeners would be required for an ultimate flow of 27 mgd.

Anaerobic Digesters

Anaerobic digesters would be added for stabilization of the primary sludge and thickened WAS prior to dewatering. Addition of digesters will reduce the volume of sludge going to dewatering, reduce odor problems associated with storage and dewatering of non-stabilized sludge, and produce methane which can be used in co-generation equipment to produce electricity.

Four anaerobic digesters, each 90 feet in diameter and 28 feet deep, would be added. By operating at a slightly higher volatile solids loading rate, the same digesters would be sufficient for the ultimate loads. The digesters would be 90 ft diameter digesters for a total volume of 4.76 million gallons. A new digester control building would house support equipment including heating and mixing equipment for the digesters.

Solids Dewatering

As of April 2007, there are two centrifuges for sludge dewatering with one additional centrifuge under construction. For the buildout flow of 24 mgd, one additional centrifuge would be installed in a spare space in the June 2004 solids handling building for a total of four (three duty and one standby). Assuming an operating period of 6 hours per day for dewatering, the loading per centrifuge would be 230 gpm. No additional centrifuges would be needed for an ultimate ADWF flow of 27 mgd.

Co-Generation Facilities

The options for using digester gas are cogeneration, hot water boilers or waste gas flaring. Cogeneration, also referred to as combined heat and power, uses the digester gas for generation of both power and heat and should be integrated into the new anaerobic digester system. The cogeneration system will be integrated into the digestion process by running on digester gas produced from the anaerobic digesters and producing heat for the digestion process.

A significant amount of electricity could be generated from a co-generation facility at Pleasant Grove. **Table 5-6** summarizes the estimated electrical power production based on average day loadings to the plant.

Table 5-6: Pleasant Grove Potential Co-generation Power Output

Item	Unit	Value
Volatile Solids, average	lb/day	59,030
Volatile Solids Destruction	%	50%
Digester Gas Generation	cu ft/lb VSS destroyed	15
Digester Gas Energy Content	BTU/cubic ft	550
Daily Energy Content	BTU/day	243,498,750
Hourly Energy Content	BTU/hr	10,145,781
Avg. Co-gen Electrical Efficiency	%	34%
Electrical Output	kW	1,010
Electrical Output	hp	1,350

The predesign should select the co-generation equipment based on capital cost, emissions requirements, available subsidies, and the cost of power. For cost estimating and layout purposes, two 500-kW lean burn internal combustion engines are assumed.

Standby Generators

For budgeting purposes, it is assumed that one additional standby power generator would be installed in the space allocated adjacent to Electrical Building No. 1.

5.4.3 Recommended Projects and Phasing

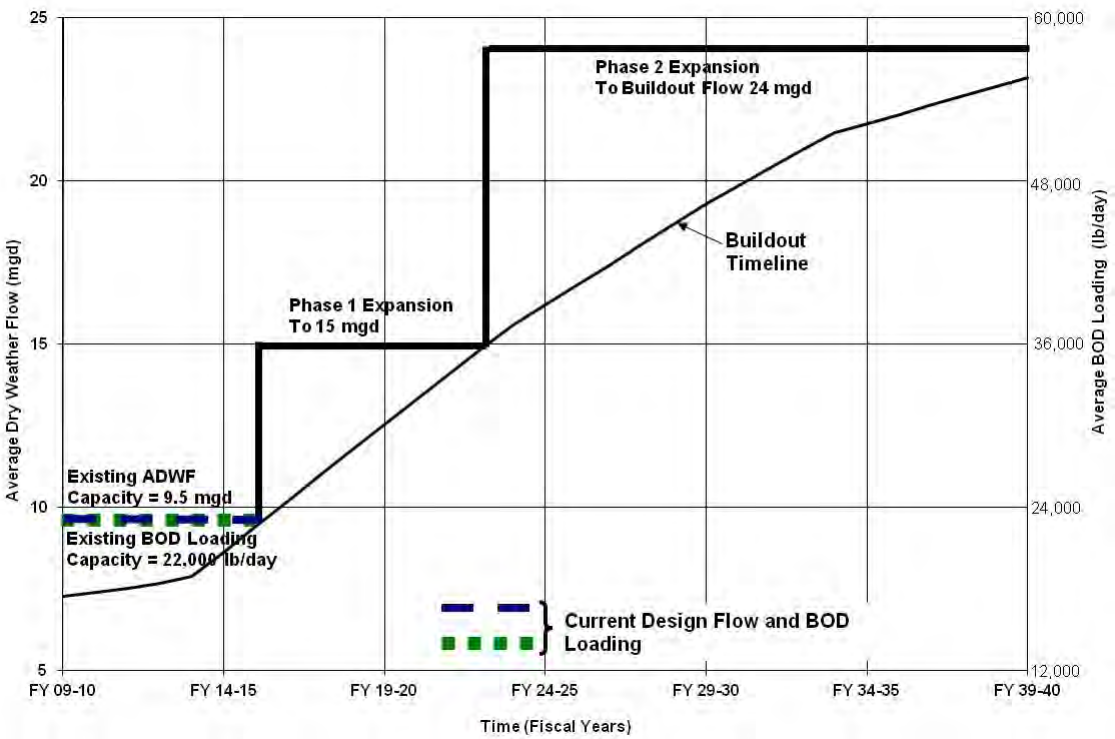
The system expansion would be done in phases. Recent improvement projects have increased the existing BOD loading capacity to 22,000 lb/day BOD . Increased organic treatment capacity was needed in anticipation of changes in the NPDES permits to add a nitrate limit and BOD loading that was higher than anticipated during the design of the plant. Subsequent phases of construction would add both hydraulic and organic capacity to meet the projected needs at buildout. Construction costs are based on a December 2005 ENR of 8462 and include the following allowances: Sitework 10%, Electrical and Controls 15%, Contingency 30%, and Engineering and Administration 25%. The construction cost estimates are order-of-magnitude estimates as defined by the American Association of Cost Engineers. The estimates is based on scale-up or down factors and is normally expected to be accurate within plus 50 percent or minus 30 percent.

Pleasant Grove WWTP Expansion Schedule

Figure 5-15 shows the projected timeline for buildout for construction phasing of the Pleasant Grove WWTP The y-axis shows the influent flows and the corresponding BOD loading. The expansion of the Pleasant Grove plant is proposed to occur in two phases. The first priority at Pleasant Grove is to add organic treatment capacity by constructing primary sedimentation, expanding the aeration capacity, and adding solids thickening and stabilization. The Phase 1 construction would increase the ADWF BOD capacity from the existing capacity of 22,500 lb/day up to 36,000 lb/day and expand the hydraulic capacity to 15 mgd ADWF. SPWA has already expanded the BOD loading capacity from 16,000 lb/day (June 2004 capacity) to 22,500 lb/day. Phase 1 expansion is projected to be required in FY 15-16. The second phase of

construction would be completed in FY 2022/23 and would increase the plant capacity up to the buildout flow estimate of an ADWF of 24 mgd. The second phase of construction would include expansion of all of the processes to meet the flows and loadings well beyond FY 39-40.

Figure 5-15: Pleasant Grove WWTP Construction Phasing



Footnote:

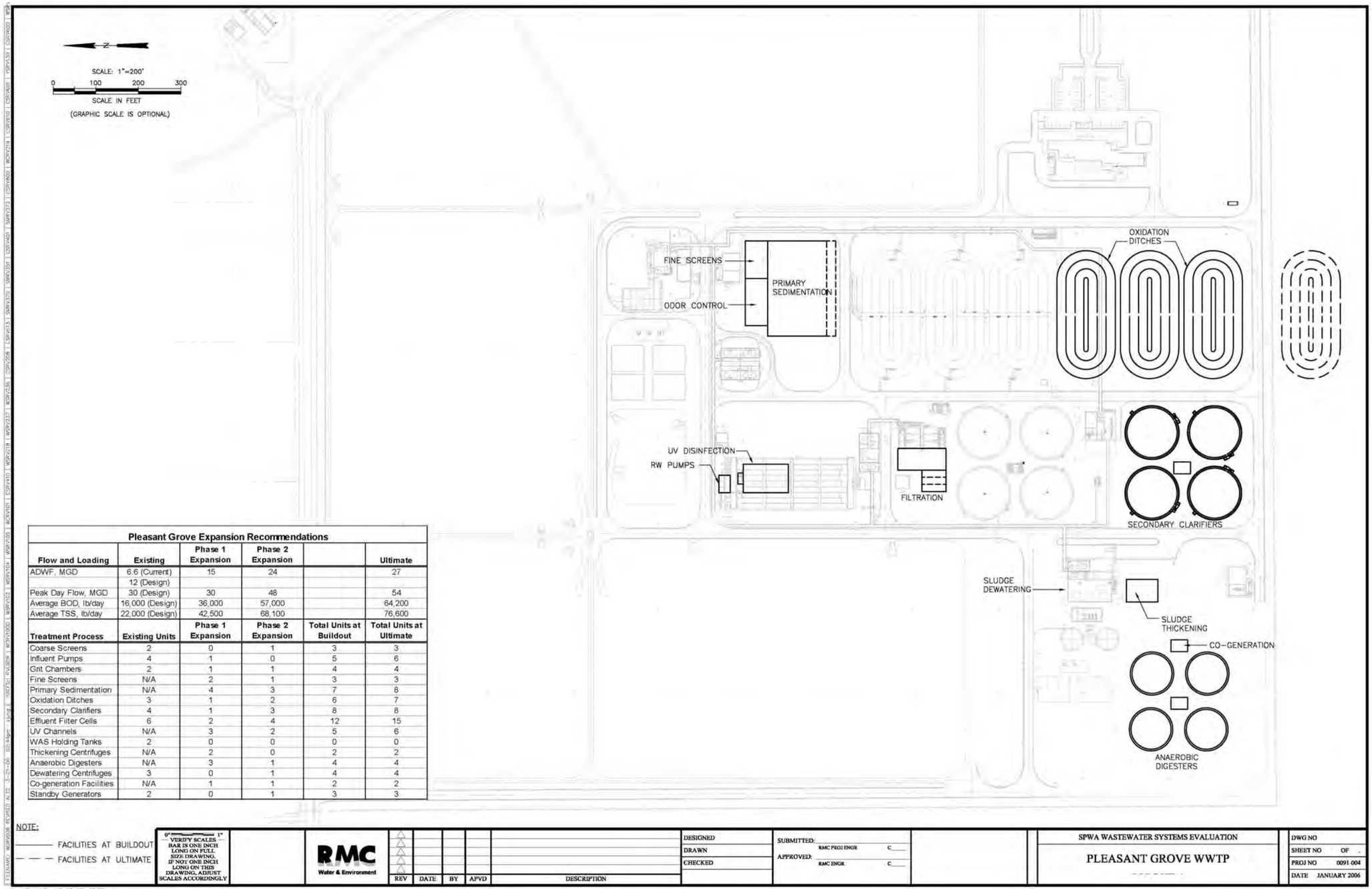
a. Existing capacity data from Carollo, Technical memorandums No.1 & No. 2.

Table 5-7 summarizes the facilities and costs associated with each construction phase. A more detailed estimate is included in *TM 4b – Wastewater Treatment Plant Expansion Requirements* in **Appendix O**.

Table 5-7: Pleasant Grove WWTP Construction Phasing and Estimated Costs

Construction Phase	Phase 1 Construction				Phase 2 Construction			
Year on-line	FY 2010/11				FY 2016/17			
ADWF Capacity	15 mgd				24 mgd			
Process	Number	Construction Cost	Engineering & Admin	Total Cost	Number	Construction Cost	Engineering & Admin	Total Cost
Influent Screens					1	$80,000	$20,000	$100,000
Influent Pumps	1	$140,000	$35,000	$175,000				
Grit Basins	1	$325,000	$82,000	$407,000	1	$325,000	$82,000	$407,000
Fine Screens	2	$443,000	$111,000	$554,000	1	$148,000	$37,000	$185,000
Primary Sedimentation	4	$9,783,000	$2,446,000	$12,229,000	3	$7,337,000	$1,834,000	$9,171,000
Odor Control	1	$120,000	$30,000	$150,000	1	$120,000	$30,000	$150,000
Oxidation Ditches	1	$8,070,000	$2,018,000	$10,088,000	2	$16,140,000	$4,035,000	$20,175,000
Secondary Clarifiers	1	$2,935,000	$734,000	$3,669,000	3	$8,805,000	$2,201,000	$11,006,000
RAS/WAS Pump Station	1	$490,000	$123,000	$613,000	modify	$490,000	$123,000	$613,000
Tertiary Filtration	2	$1,660,000	$420,000	$2,080,000	4	$3,330,000	$830,000	$4,160,000
UV Disinfection	3	$6,984,000	$1,746,000	$8,730,000	2	$4,656,000	$1,164,000	$5,820,000
Centrifuge Thickeners	2	$1,470,000	$368,000	$1,838,000				
Building	1	$1,710,000	$428,000	$2,138,000				
Anaerobic Digesters	3	$8,805,000	$2,201,000	$11,006,000	1	$2,935,000	$734,000	$3,669,000
Building	1	$1,283,000	$321,000	$1,604,000	modify	$428,000	$107,000	$535,000
Centrifuge Dewatering					1	$730,000	$183,000	$913,000
Co-generation	1	$2,445,000	$612,000	$3,057,000	1	$2,445,000	$612,000	$3,057,000
Standby Generator					1	$440,000	$110,000	$550,000
Total		**$46,700,000**	**$11,700,000**	**$58,300,000**		**$48,300,000**	**$12,100,000**	**$60,400,000**

Figure 5-16: Pleasant Grove WWTP Expansion Layout



Pleasant Grove Expansion Recommendations					
Flow and Loading	**Existing**	**Phase 1 Expansion**	**Phase 2 Expansion**		**Ultimate**
ADWF, MGD	6.6 (Current)	15	24		27
	12 (Design)				
Peak Day Flow, MGD	30 (Design)	30	48		54
Average BOD, lb/day	16,000 (Design)	36,000	57,000		64,200
Average TSS, lb/day	22,000 (Design)	42,500	68,100		76,600
Treatment Process	**Existing Units**	**Phase 1 Expansion**	**Phase 2 Expansion**	**Total Units at Buildout**	**Total Units at Ultimate**
Coarse Screens	2	0	1	3	3
Influent Pumps	4	1	0	5	6
Grit Chambers	2	1	1	4	4
Fine Screens	N/A	2	1	3	3
Primary Sedimentation	N/A	4	3	7	8
Oxidation Ditches	3	1	2	6	7
Secondary Clarifiers	4	1	3	8	8
Effluent Filter Cells	6	2	4	12	15
UV Channels	N/A	3	2	5	6
WAS Holding Tanks	2	0	0	0	0
Thickening Centrifuges	N/A	2	0	2	2
Anaerobic Digesters	N/A	3	1	4	4
Dewatering Centrifuges	3	0	1	4	4
Co-generation Facilities	N/A	1	1	2	2
Standby Generators	2	0	1	3	3

5.5 Dry Creek Expansion Requirements and Recommendations

Dry Creek expansion requirements and recommendations were developed as part of the *Dry Creek Wastewater Treatment Plant Initial Assessment (CH2MHill 2008).* This section summarizes the conclusions and recommendations of that report.

5.5.1 Flows and Loadings

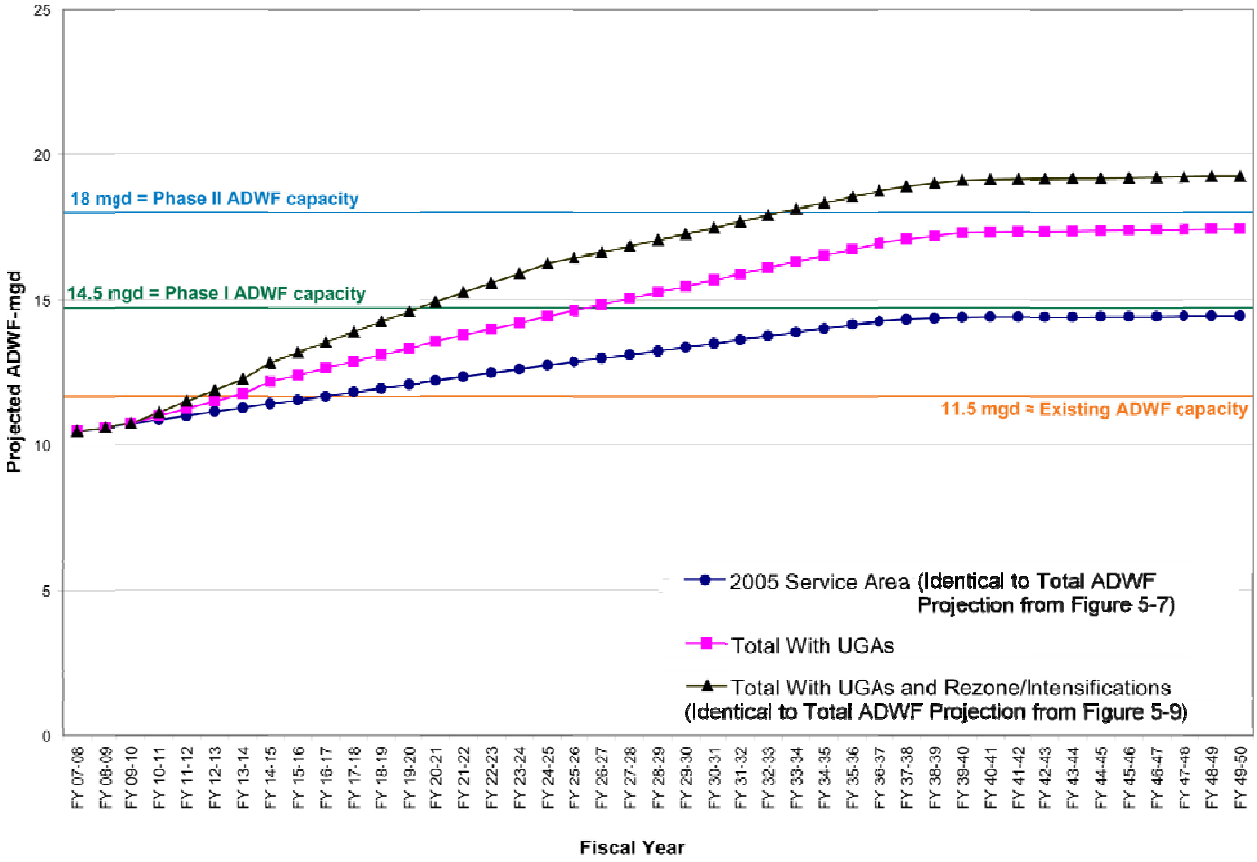
Average Dry Weather Flows

Average Dry Weather Flow (ADWF) projections through fiscal year 2050 for contributory areas to the DCWWTP were developed in *WWTP Projected Loadings and Buildout (TM4a), RMC Water and Environment, December 9, 2005, and subsequently updated January 24, 2008.* The updated flow projections were used in the Initial Assessment to determine capacity requirements. Three growth scenarios were developed in TM4a:

- Growth Scenario 1, the base 2005 Service Area Boundary (SAB), includes service areas that have passed environmental compliance documentation. This scenario adds the projected flows for those service areas through 2050 to the existing flows, resulting in an ADWF projection of 14.4 mgd.
- Growth Scenario 2 includes Urban Growth Areas (UGAs) that have not yet undergone environmental compliance and therefore incorporates a higher degree of uncertainty. Flow projections for the UGAs were made for the City of Roseville, Placer County (PC), Placer Vineyards (PV), South Placer Municipal Utility District (SPMUD), Placer County Sewer Maintenance District 3 (SMD-3), and were added to the 2005 Service Area Boundary projections. This scenario resulted in an ADWF projection of 17.4 mgd.
- Growth Scenario 3 includes the 2005 SAB and UGA flows, plus rezones and intensifications through 2050, and resulted in an ADWF projection of 19.2 mgd.

Therefore, the ADWF projections for the DCWWTP in the year 2050 range between 14.43 mgd to 19.24 mgd, depending on the amount of rezoning, intensification, and environmental permitting that might occur in the future. **Figure 5-17** illustrates the three projected ADWF growth scenarios.

Figure 5-17: Projected ADWF Growth Scenarios



Source: Ch2MHill 2008

Flow Peaking Factors

While the ADWF is usually thought of as the rated capacity of a treatment plant, the design of treatment systems must also accommodate significant variations in influent flow. A treatment plant must be designed to prevent hydraulic overloads and wash out of solids during peak day and peak hour events. It must also be able to meet discharge limits during the sustained higher flows experienced during the peak month of wet weather. This section discusses the flow peaking factors that will be used in the evaluation.

As part of the Initial Assessment, flow analysis was conducted on East Roseville, West Placer, and total plant historical flows from February 2005 to December 2006 to determine peaking factors to describe average and peak flows expected at the plant. **Table 5-8** summarizes the peaking factors (PF) and total projected plant flows through 2050. In Table 1, AAF refers to average annual flow, and PHWWF refers to peak hour wet weather flow.

Table 5-8: Flow Analysis for Total Raw Plant Flow

Parameter	PF Based on ADWF	Scenario 1: 2005 SAB through 2050 (mgd)	Scenario 2: 2005 SAB Plus UGAs through 2050 (mgd)	Scenario 3: 2005 SAB Plus UGAs Plus Intensification through 2050 (mgd)
AAF	1.1	15.9	19.2	21.2
Maximum Day Flow	2.1	31.0	37.4	41.3
Minimum Day Flow	0.9	13.3	16.1	17.7
ADWF	1.0	14.4	17.4	19.2
PHWWF	3.0	43.3	52.3	57.7
Maximum Week Flow	1.8	26.4	31.9	35.2
Maximum Month Flow	1.6	23.5	28.4	31.4
Diurnal Low Flow	0.6	8.3	10.0	11.0
Diurnal High Flow	1.5	21.9	26.4	29.2

Estimated Loadings

Loading projections in the Initial Assessment for BOD_5, TSS, and ammonia were primarily based on data from February 2005 to December 2006. Average concentrations of TKN, total phosphorous, and alkalinity were based on data in September and October 2007. Peaking factors were determined based on comparison of the annual average loading values compared to peak values in the 2005 and 2006 data set. Peaking factors for TKN and total phosphorous were derived from industry standards due to the limited available data set. **Table 2** summarizes the average annual loading concentrations and peaking factors. Projected loadings were derived by applying the average concentration to the projected annual average day flows.

Table 5-9: Average Annual Solids Loading and Peaking Factors

Parameter	Units	BOD_5	TSS	TKN[a]	NH_3-N	TP[a]	Alk	Design Function
Average Annual Loading	lb/d	23,800	23,500	3,800	1,800	600	15,400	Nominal loading only; used in estimating operation and maintenance requirements
Average Annual Concentration	mg/L	248	245	40	19	6.2	160	Nominal loading only
Peak Month PF	-	1.24	1.31	1.2	1.15	1.2	-	Sizing aeration basins, based on process requirements; sizing solids handling facilities
Peak Week PF[b]	-	1.61	1.49	1.6	1.21	1.2	-	Can be used instead of peak month peak flow for sizing aeration basins, etc.
Peak Day PF	-	2.00[c]	2.00	2.2	1.54	1.8	-	Used as a minimum requirement for aeration basins blower peak capacity

[a]The peaking factors for TKN and total phosphorus were derived from Metcalf & Eddy, 2003.

[b]The peak week peaking factor can be used in the place of peak month peak factor applications; however, this value is recommended only for facilities that have regular high peak week loading, such as that due to seasonal, transient loading. This value is not necessary for implementation at DCWWTP but is presented for comparison only.

[c]The calculated peak day BOD_5 Loading peaking factor was 1.70. The selected (and applied) BOD_5 peak day peaking factor was 2.0.

5.5.2 Dry Creek Expansion Recommendations

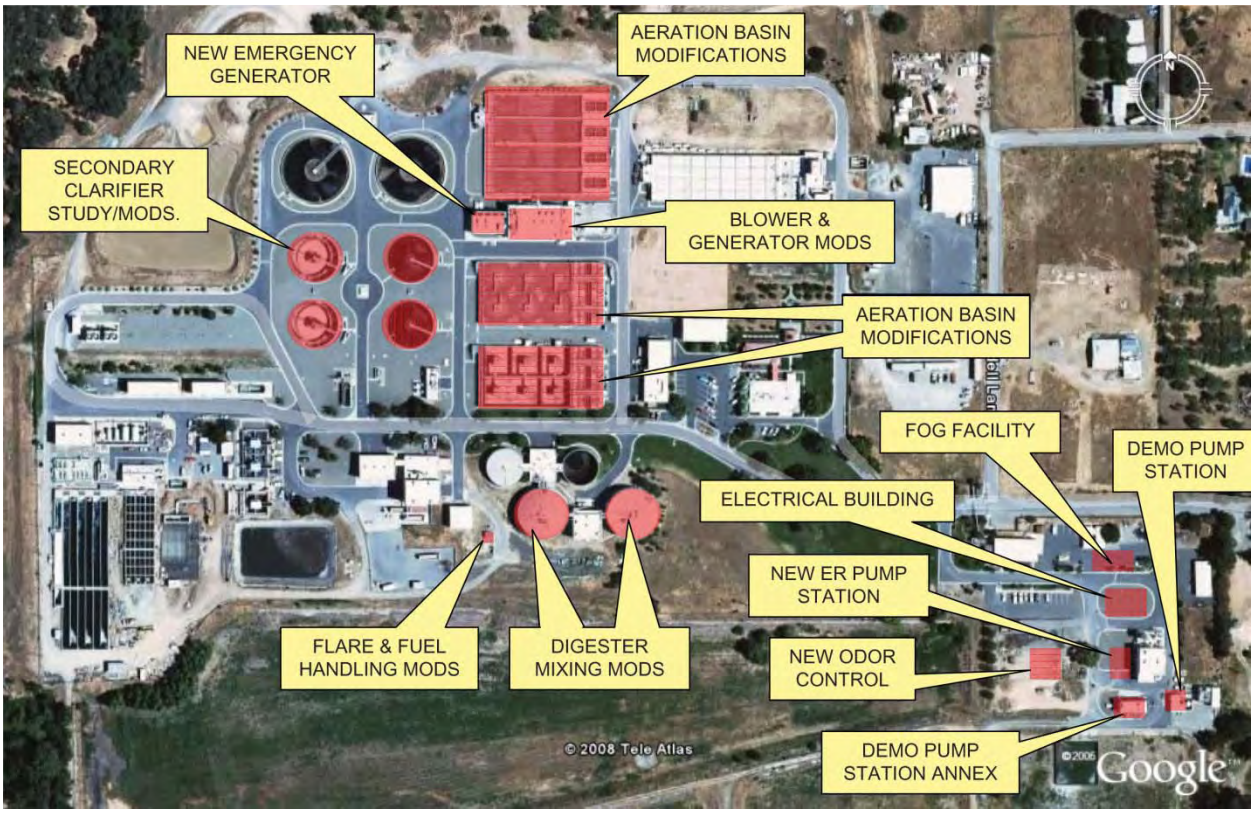
The Initial Assessment analyzed the three growth scenarios described in Section 2.1. To meet the increased demand and potential future regulatory environment, the Initial Assessment suggested a two phase expansion of the plant; Phase I would be responsive to immediate growth through optimization of existing infrastructure, while Phase II would be responsive to long-term growth scenarios as well as to potential future regulations.

5.5.3 Description of Phase I

The Initial Assessment determined that minor modifications recommended in Phase I would allow the existing treatment plant to treat an ADWF of 14.5 mgd and still meet the discharge requirements. A Phase 1 capacity of 14.5 mgd (ADWF) would allow the treatment plant to meet demand through FY 2018-2019 with the most aggressive growth scenario and through FY 2050 with the least aggressive growth scenario.

Phase I recommendations can be considered an optimization of existing infrastructure. Since the existing 1970's era aeration basins and secondary clarifiers are in excellent structural conditions, this equipment could be modified to allow continued service for Phase I (and beyond if required). Potential alternative secondary treatment processes were more expensive than upgrades to the existing conventional activated sludge process, so the selected Phase I secondary process retains the existing treatment process. Secondary effluent will be sent to the existing filters for polishing, and the final effluent will be disinfected with the (under construction as of February 2009) UV system. The Phase I treatment plant layout proposed in the Initial Assessment is shown in Figure 5-18: Phase I Treatment Plant Layout.

Figure 5-18: Phase I Treatment Plant Layout



Source: Ch2MHill 2008

5.5.4 Description of Phase II

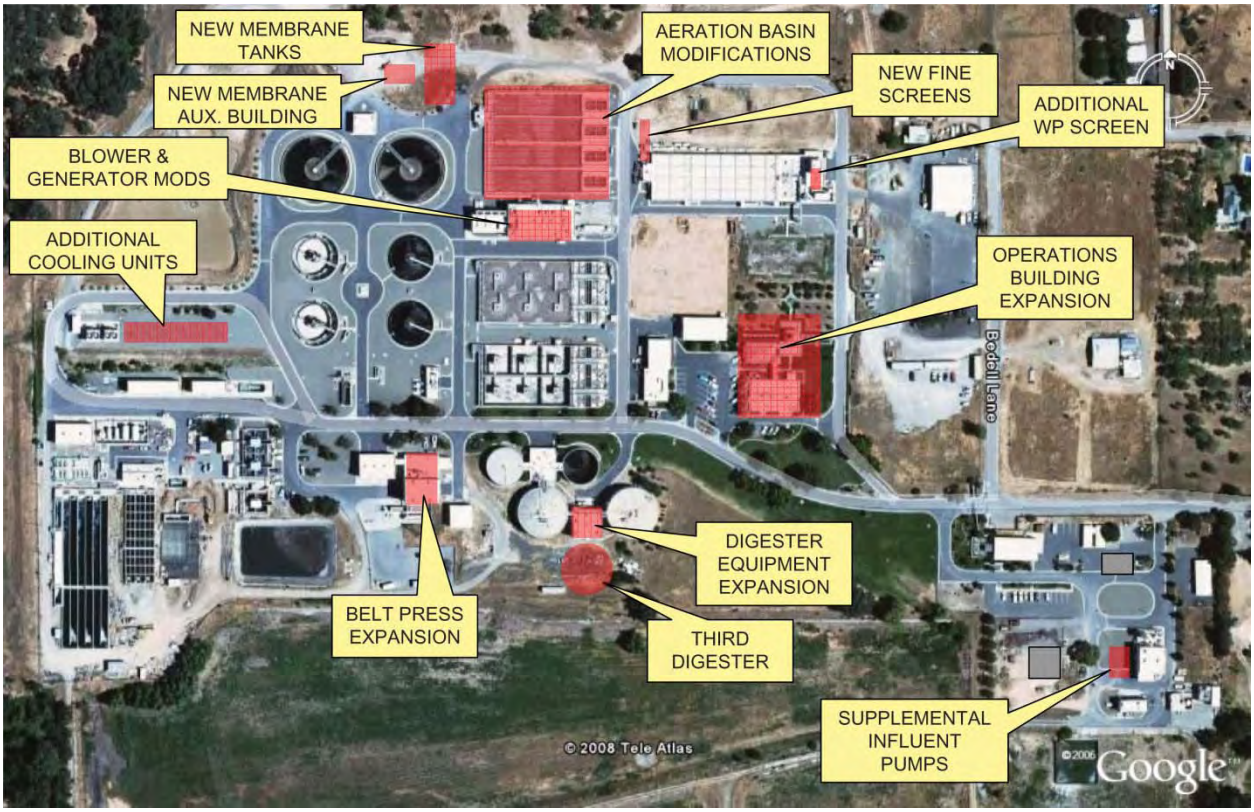
Due to anticipated regulatory requirements for nutrient removal and a growing level of concern regarding the control of contaminants of emerging concern, the Initial Assessment anticipated, for planning and phasing purposes, conversion of the WWTP to a Membrane Bioreactor (MBR) facility for Phase II expansion. A number of changes are recommended as part of this potential conversion, and the overall capital and operational cost is expected to be higher than scaling up the facility as a conventional treatment plant.

The City of Roseville selected an ADWF capacity of 18 mgd for Phase II. With even the most aggressive growth scenario (2005 SAB plus UGA plus rezone/intensification) this capacity allows for almost a 25-year planning horizon. Other scenarios do not reach the 18-mgd ADWF capacity. The final capacity for this phase can be adjusted in the future if required.

Phase II improvements will convert the 1991 aeration basins to membrane bioreactors, and membranes will be added in new membrane tanks. The need for Phase II filtration will be eliminated by the installation of membranes. Membrane permeate will be sent to the then-existing UV system for disinfection. The addition of MBR technology for Phase II loads will require the installation of fine (1mm) screens to remove trash and debris that may tear membrane material.

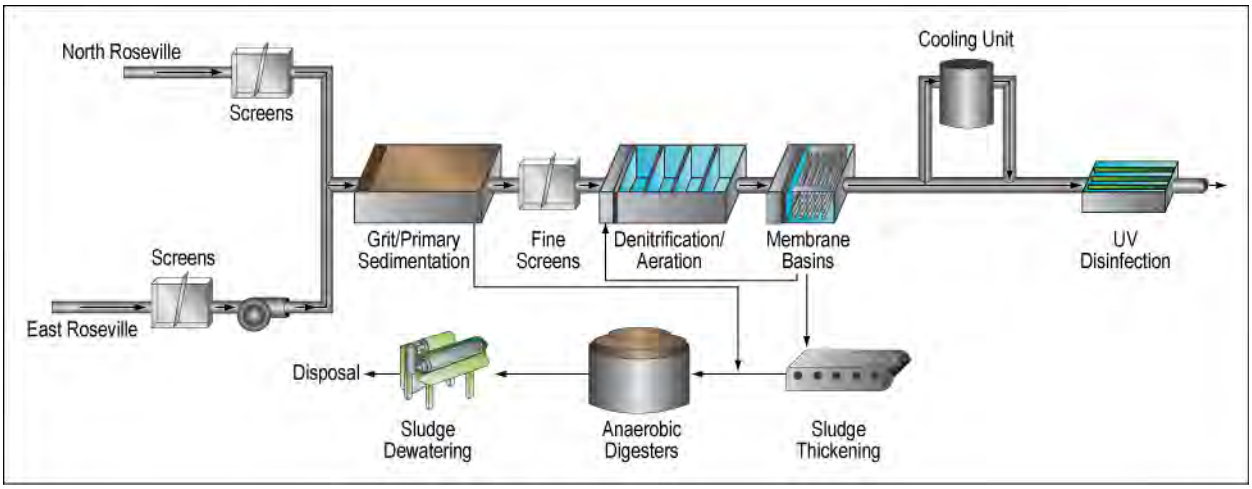
The Initial Assessment also recommended that dewatering should continue to use belt filter presses, rather than convert to a centrifuge process as recommended in the 2006 TM 4B, since belt filter presses appear to result in less fecal coliform reactivation and regrowth. The Phase II treatment plant layout proposed in the Initial Assessment is shown in **Figure 5-19**. A schematic of the proposed treatment process is presented in **Figure 5-20**.

Figure 5-19: Phase II Treatment Plant Layout



Source: Ch2MHill 2008

Figure 5-20: Dry Creek Phase II Treatment Schematic



Overview of Phase I and Phase II Requirements

General design criteria for the Phase I and Phase II improvements are presented in **Table 5-10**. The proposed unit process improvements are more fully described in the Initial Assessment report.

Table 5-10: Dry Creek Phase I and Phase II General Design Criteria

	Units	Existing Operating	Current Capacity	2008 Initial Assessment Phase I Criteria	2008 Initial Assessment Phase II Criteria
GENERAL					
Influent Flows					
Average dry weather (ADWF)	mgd	10.3	11.5	14.5	18
Average annual flow (AAF)	mgd	11.5	12.7	16.0	19.8
Peak day wet weather (PDWWF)[a]	mgd	22.1	25.3	30.5	38.2
Peak hour wet weather (PHWWF)	mgd	26	28.8	43.5	54
Influent Loadings					
Average Annual BOD_5 Concentration	mg/L	248	248	248	248
Average Annual BOD_5 loading	lbs/day	23,800	26,200	33,000	41,000
Peak month BOD_5 loading	lbs/day	29,500	32,500	40,900	51,000
Average Annual TSS Concentration	mg/L	245	245	245	245
Average Annual TSS loading	lbs/day	23,500	25,900	32,600	40,000
Peak month TSS loading	lbs/day	30,800	33,900	42,700	53,000
Average Annual NH_3-N Concentration	mg/L	19	19	19	19
Average Annual NH_3-N loading	lbs/day	1,800	2,000	2,500	3,100
EAST ROSEVILLE PUMP STATION					
Number of Pumps		7	7	5 + 1 Standby	5 + 1 Standby
Capacity, each	gpm	3,000	3,000	6,180	6,875
Horsepower, each	hp	75	75	150	150
EAST ROSEVILLE SCREENS					
Type		Climber	Climber	Climber	Climber
Number		2 + 1 bypass	2 + 1 bypass	2 + 1 bypass	2 + 1 bypass
WEST PLACER SCREENS					
Type		Climber	Climber	Climber	Climber
Number		1 + 1 bypass	1 + 1 bypass	1 + 1 bypass	2 + 1 bypass
FINE SCREENS					
Number		---	---	---	4
Openings	mm	---	---	---	1
Capacity, each	mgd	---	---	---	13.5
GRIT REMOVAL					
Type			Aerated	Aerated	Aerated
Number		2	2	2	2
Detention time @ ADWF	min	13.4	12	10.2	7.7
Detention time @ PDWWF[a]	min	5.6	4.9	4	3.2
PRIMARY TREATMENT					
Primary Sedimentation Basins					
Number		4	4	4	4
Surface area, each	ft^2	4,500	4,500	4,500	4,500

	Units	Existing Operating	Current Capacity	2008 Initial Assessment Phase I Criteria	2008 Initial Assessment Phase II Criteria
Side water depth	ft	10	10	10	10
Overflow rate, all units in service @ ADWF	gal/ft^2*day	570	640	750	1,000
Overflow rate, all units in service @ PDWWF[a]	gal/ft^2*day	1,400	1,600	1,900	2,400
Primary Sludge Pumps					
Number		6	6	6	6
Capacity, each	gpm	150	150	150	150
TDH	ft	22	22	22	22
Horsepower, each	hp	15	15	15	15
Primary Scum Pumps					
Number		1	1	1	2
Capacity, each	gpm	75	75	75	75
TDH	ft	22	22	22	22
Horsepower, each	hp	7.5	7.5	7.5	7.5
AERATION BASINS					
1970s Era Basins					
Number		4	4	4	Not req'd[b]
Side water depth	ft	11.5	11.5	11.5	---
Total volume	MG	3.94	3.94	3.94	---
Aeration system		Mechanical	Mechanical	Fine-bubble	---
1990s Era Basins					
Number		4	4	4	4
Side water depth	ft	15	15	15	15
Total volume	MG	4.24	4.24	4.24	4.24
Aeration system			Fine-bubble diffusers		
Solids separation method			Clarification		Membranes
1970s Era Basins - Blower Systems					
Average air requirements	scfm	---	---	8,000	Not req'd[b]
Peak day air requirements	scfm	---	---	19,000	Not req'd[b]
1990s Era Basins - Blower Systems					
Average air requirements	scfm	8,200	8,300	8,500	22,000
Peak day air requirements	scfm	---	15,000	21,000	46,000
SECONDARY CLARIFIERS					
1970s Era Clarifiers					
Number		4	4	4	Not req'd[b]
Surface area, each		5,670	5,670	5,670	---
1990s Era Clarifiers					
Number		2	2	2	Not req'd[b]
Surface area, each	ft^2	12,270	12,270	12,270	---
Combined					
Total surface area	ft^2	47,200	47,200	47,200	---
Solids loading rate	lb/day*ft^2	19	20	22	---
PDWWF overflow rate	gal/ft^2*day	470	540	650	---
MEMBRANE BIOREACTORS					

	Units	Existing Operating	Current Capacity	2008 Initial Assessment Phase I Criteria	2008 Initial Assessment Phase II Criteria
Number of basins		---	---	---	5
Membrane type		---	---	---	Submerged
Membrane flux rate	gal/ft^2-day	---	---	---	10
Air scour rate	scfm	---	---	---	18,000
Permeate pumps					
Type		---	---	---	Centrifugal
Number		---	---	---	6
Capacity	gpm	---	---	---	600
TDH	ft	---	---	---	20
Horsepower	hp	---	---	---	6
Return activated sludge pumps					
Type		---	---	---	Centrifugal
Number		---	---	---	7
Capacity	gpm	---	---	---	13,000
TDH	ft	---	---	---	10
Horsepower	hp	---	---	---	50
COOLING UNITS					
Number		4	4	4	6
FILTRATION					
Number		3	3	3	Not req'd[b]
Cells per filter		4	4	4	---
Area, each cell		347	347	347	---
Backwash rate	gpm/ft2	12	12	12	---
Backwash pumps					
Type			Vertical Turbine		Not req'd[b]
Number		4	4	4	---
ULTRAVIOLET DISINFECTION					
Number of channels		5	5	5	5
Peak hydraulic capacity, total	mgd	45	45	45	45
SOLIDS FACILITIES					
Sludge Thickening					
Thickener type			Gravity belt		
Number		2	2	2	2
Belt width	m	2	2	2	2
Capacity	gpm/m	200	200	200	200
Thickened sludge	%	5.5	5.5	5.5	5.5
Digestion					
Type			Anaerobic mesophilic digestion		
Number		2	2	2	3
Volume, each	mg	1.19	1.19	1.19	1.19
Sludge mixing type		Gas	Gas	Mechanical	Mechanical
Fog Receiving Facility					
Storage tank capacity	gal	---	---	15,000	
Mixer pump		---	---	Chopper	

	Units	Existing Operating	Current Capacity	2008 Initial Assessment Phase I Criteria	2008 Initial Assessment Phase II Criteria
Sludge Dewatering					
Type			Belt filter press		
Number		3	3	3	4
Belt width, each	m	2	2	2	2
Capacity	gpm/m	75	75	75	75
Cake solids	%	16%	16%	16%	16%
Operating period	hr/day	8	8	8	8

a. PDWWF includes plant drain flows.

b. Equipment and facilities not required for Phase II MBR operation.

5.5.5 Cost Estimates

Initial Phase I and Phase II cost estimates from the Initial Assessment are presented in **Table 5-11**. These estimates are based on material, equipment, and labor pricing as of March 2008. The estimates are considered accurate to -15% to -30% on the low range side, and 20% to 50% on the high range side. The final cost of the project will depend upon the actual labor and material costs, competitive market conditions, final project costs, implementation schedule and other variable factors.

Table 5-11: Phase I and Phase II Cost Estimates

Facility/Process Element	Phase I Improvements	Phase II Improvements
East Roseville Raw Sewage Pumping	***$3,164,000***	***$90,000***
E. Roseville Pumping Station	$2,130,000	n/a
Odor Control Facilities	$264,000	n/a
Emergency Generator	$550,000	n/a
Demolition of ER Pump Station and PS Annex	$150,000	n/a
Pump Modifications	n/a	$90,000
PLC Replacement (10A)	$70,000	n/a
West Placer Screening Facility	***$0***	***$208,000***
Influent Coarse Screens	n/a	$208,000
Aeration Basins	***$2,061,000***	***$1,172,000***
Demo Surface Aerators & Pier Structure	$98,000	n/a
Baffle & Air Mods to Basins 31 & 32	$578,000	n/a
Blower Building Modifications	$754,000	n/a
Blower Building Modifications	n/a	$466,000
ML Recycle Pump Improvements	$561,000	$258,000
Emergency Generation for Blowers	n/a	$448,000
PLC Replacement (30C)	$70,000	n/a

Facility/Process Element	Phase I Improvements	Phase II Improvements
Secondary Clarifiers	***$1,641,000***	***$0***
Secondary Clarifiers	$1,571,000	n/a
PLC Replacement (30D)	$70,000	n/a
Membrane Basins & Equipment	***$0***	***$22,370,000***
Membrane Tanks/Equipment	n/a	$22,370,000
Fine Screens	***$0***	***$2,611,000***
Fine Screens Facility	n/a	$2,611,000
Solids Facilities Improvements	***$3,246,000***	***$6,107,000***
FOG Improvements	$840,000	n/a
Sludge Mixing & Heating	$1,486,000	n/a
Cogeneration (Engine Generator)	$725,000	n/a
Enclosed Flare/Fuel Handling Improvements	$125,000	n/a
Anaerobic Digester	n/a	$5,527,000
Belt Filter Press Addition	n/a	$580,000
PLC Replacement (80H)	$70,000	n/a
Cooling Units	***$0***	***$650,000***
Cooling Unit System	n/a	$650,000
Operations Building Replacement	***$0***	***$2,240,000***
Operations Building	n/a	$2,240,000
Subtotal of Identified Facilities, Direct Costs	**$10,112,000**	**$35,448,000**
Additional Project Facility/Site Costs	***$4,046,000***	***$7,091,000***
Site Yard Piping & Mechanical	$1,517,000	$1,773,000
Site Electrical / I&C/SCADA	$1,517,000	$1,773,000
Site Civil	$1,012,000	$3,545,000
Subtotal of Direct Costs	**$14,158,000**	**$42,539,000**
Additional Project Indirect Costs		
Mobilization/Demobilization	$506,000	$887,000
Contractor's Overheads	$2,883,000	$8,597,000
Contractor's Profit	$1,586,000	$4,729,000
Project Bonds	$666,000	$1,986,000
Subtotal of Direct and Indirect Costs	**$19,799,000**	**$58,738,000**
Additional Project Costs for Scope & Unknowns		

Facility/Process Element	Phase I Improvements	Phase II Improvements
Contingency	$5,940,000	$8,811,000
Total of Direct and Indirect Costs	**$25,739,000**	**$67,549,000**
Additional Project Allowance to Account for Current Conditions in Project Location		
Market Adjustment Factor	$1,287,000	$3,378,000
Total Project Capital Costs, May 2008	**$27,026,000**	**$70,927,000**

Chapter 6 Recycled Water Systems Evaluation

6.1 Introduction

A Recycled Water Systems Evaluation was conducted to assist SPWA in the ongoing expansion of a regional water recycling system throughout its service area, as feasible, to promote responsible water supply management by beneficially reusing available tertiary treated recycled water supplies as new lands develop, and by freeing up local groundwater and surface water supplies for potable uses.

6.1.1 Recycled Water Background

The Dry Creek Wastewater Treatment Plant (DCWWTP) and Pleasant Grove Wastewater Treatment Plant (PGWWTP), both owned and operated by the City of Roseville, produce disinfected tertiary treated recycled water meeting Title 22 standards. As of June 2004, DCWWTP supplies recycled water to 8 customers for irrigation on golf courses, parks and for streetscape irrigation. Recycled water from PGWWTP is planned to be distributed more broadly to western Roseville and Urban Growth Areas (UGAs) in southern Placer County.

6.1.2 Recycled Water Goals

The goal of implementing recycled water projects in the City and throughout the region is to assist local and regional agencies in meeting their long-term water demands in a reliable and sustainable manner. The City of Roseville, as the lead agency for SPWA, plans to expand the distribution of recycled water from the recycled water system boundary which was delineated as part of the 2000 Recycled Water Distribution System Feasibility Study (2000 RWFS); to serve more customers; to maximize the use of available recycled water; and, to reduce the demands for potable water. Work will build upon the work performed for the 2000 RWFS for the City of Roseville. Specific objectives of the Recycled Water System Evaluation include:

- Evaluate recycled water opportunities in Roseville, South Placer County and South Placer Municipal Utility District (SPMUD) service areas
- Identify June 2004, future (near term), and potential future (longer term) recycled water customers
- Identify alternatives to convey recycled water from the PGWWTP and DCWWTP in south and west Roseville to the outlying UGAs
- Evaluate each of the alternatives on the bases of engineering, economic, and environmental considerations
- Develop an implementation plan to strategize project phasing, permitting, and CEQA compliance for the recommended recycled water projects

6.1.3 Recycled Water Study Area

The study area for the recycled water systems evaluation (recycled water study area) expands westward from the study area defined by the 2000 RWFS, and includes the western portion of the City of Roseville (west of Interstate 80 and Highway 65), the western portion of southern Placer County, and north of Roseville city limits to SPWA's 2005 Regional Service Area boundary. The recycled water study area is comprised of residential areas, commercial areas, office parks, industrial parks, golf courses, recreational parks, schools and open space. The recycled water study area is shown in **Figure 6-1**. The area was developed to meet the following general guidelines:

- Include areas adjacent to DCWWTP, PGWWTP and any pipelines existing as of June 2004.
- Include areas where the City has agreed to provide recycled water
- Exclude areas beyond physical barriers, such as freeways and railroads

6.2 Market Assessment

The recycled water market assessment documents the review of recycled water planning documents available as of June 2004, verifies the existing (as of June 2004) recycled water customers within SPWA's 2005 Regional Service Area, and identifies June 2004 and future potential recycled water users. The predominant use of recycled water in the service area is and will be expected for the near term to be landscape irrigation. Recycled water customers are organized into the groups listed below and described in the sub- sections that follow:

- June 2004 recycled water customers
- Existing (June 2004) near future and existing (June 2004) potential, or longer term, recycled water customers
- UGAs

6.2.1 June 2004 Recycled Water Customers

June 2004 recycled water customers were identified based on a review of studies available as of June 2004 and discussions with City staff. From this review and discussion with City staff, there are ten June 2004 recycled water customers. These customers, listed in **Table 6-1**, receive recycled water produced at DCWWTP and PGWWTP. The locations of the June 2004 customers, as well as the recycled water study area boundary, are shown in **Figure 6-1**. The combined demand for these June 2004 customers is approximately 6,526 acre-feet per year (AFY), and a peak (July) day demand of 8.51 mgd.

The first nine *June 2004 recycled water customers* (Demands No. 1-9) in **Table 6-1** use the recycled water for irrigation and therefore have a seasonal demand pattern. Demand No. 10 is meant to maintain a minimum effluent discharge requirement from the DCWWTP. The California Department of Fish and Game (CDFG) has requested to discharge 4 mgd into Dry Creek, year round, to maintain flow in the creek. Three of the June 2004 customers (Morgan Creek Golf Course, Woodcreek Golf Course, and Diamond Oaks Golf Course) have recycled water storage facilities (i.e., ponds) on-site. The Del Webb/Sun City Recycled Water System delivers to the Sun City Golf Course and Sun City streetscape. Customers are supplied recycled water from the recycled water pump station, and have on-site storage available for the golf course irrigation. The presence or lack of on-site storage can impact the design flowrate, which can be especially crucial during summer months; refer to Section 6.2.5 for a more detailed discussion of on-site storage.

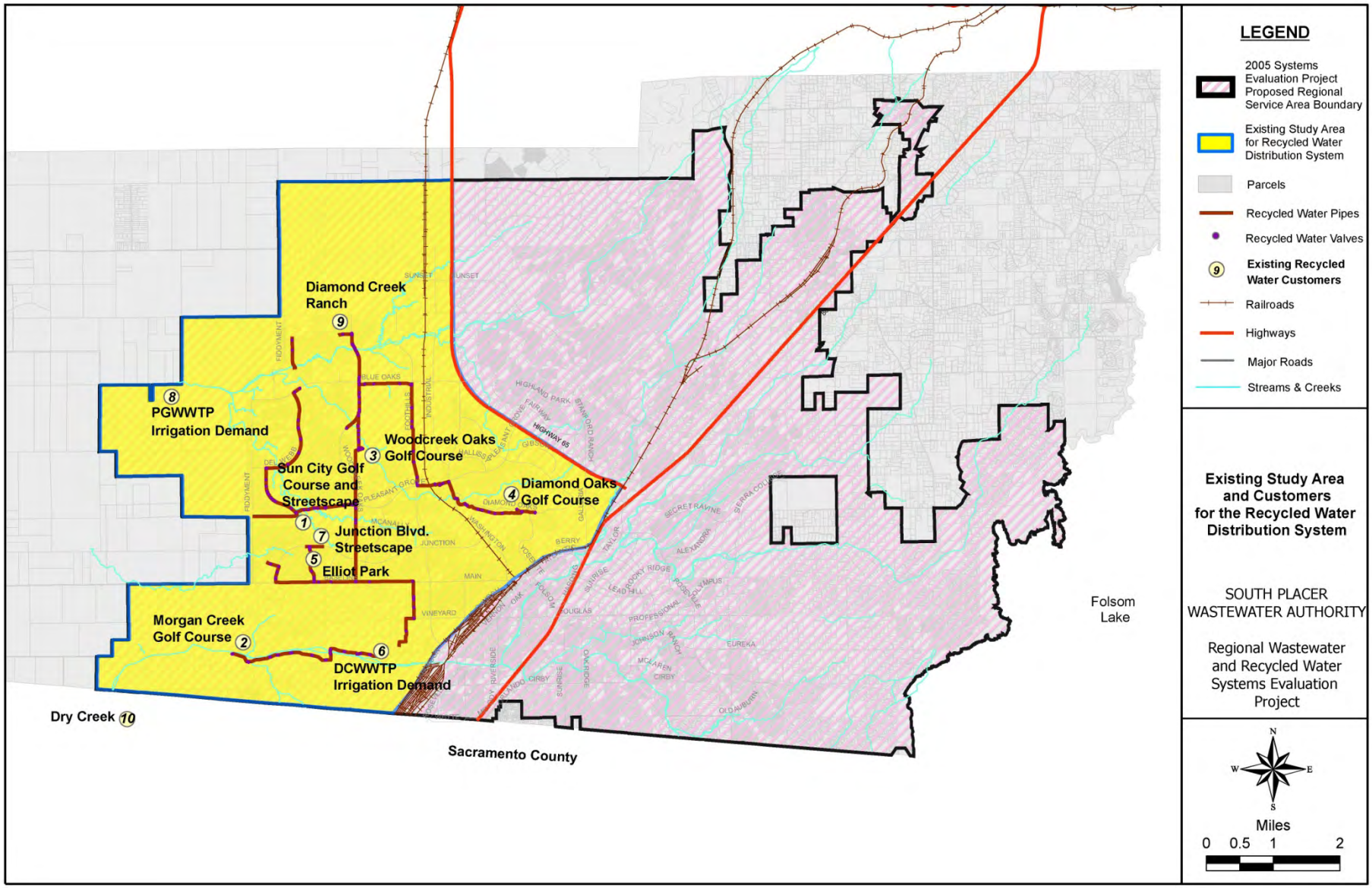
Table 6-1: Existing [a] Recycled Water Customers and Demands

No.	Existing Recycled Water Customer	Annual Demand (AFY)	Peaked for July Day? [i] (Y/N)	Peak Day (July) Demand (mgd)	Usage	On-Site Storage	Probable Source
1a	Sun City Golf Course [b]	589	Y	1.3	Irrigation	On-Site	Either [h]
1b	Sun City Streetscape [c]	58	Y	0.13	Irrigation	None	DCWWTP
2	Morgan Creek Golf Course [e]	565	Y	1.25	Irrigation	On-Site	DCWWTP
3	Woodcreek Oaks Golf Course [d]	408	Y	0.9	Irrigation	On-Site	Either [h]
4	Diamond Oaks Golf Course [e]	333	Y	0.74	Irrigation	On-Site	DCWWTP
5	Elliot Park [d]	29	Y	0.06	Irrigation	None	DCWWTP
6	Dry Creek WWTP Irrigation Demand [d]	18	Y	0.04	Irrigation	None	DCWWTP
7	Junction Blvd. Streetscape [d]	5	Y	0.01	Irrigation	None	DCWWTP
8	Pleasant Grove WWTP Irrigation [f]	18	Y	0.03	Irrigation	None	PGWWTP
9	Diamond Creek Ranch [f]	22	Y	0.05	Irrigation	None	DCWWTP
10	Dry Creek [g]	4,481	N	4	n/a	n/a	DCWWTP
	Total	**6,526**		**8.51**			

Footnotes:

a. As of June 2004.
b. Recycled water peak day demand for the Sun City Golf Course is 1.3 mgd based from billing records per Bryan Buchanan (City of Roseville), May 11, 2006.
c. The Sun City Streetscape demand is calculated by subtracting the Sun City Golf Course demand from the demand listed in Table 5-1 of the Recycled Water Distribution System Feasibility Study, April 2000.
d. Demands from Table 5-1 of Recycled Water Distribution System Feasibility Study, April 2000.
e. Demands from Table 5-2 of Recycled Water Distribution System Feasibility Study, April 2000.
f. Demands from Table 5-3 of Recycled Water Distribution System Feasibility Study, April 2000.
g. Per CDFG, a 4.0 mgd discharge to Dry Creek is required.
4,481 AFY = [(4.0 x 106 gal/d) x (365 d/y)] / 325,851 gal/AF.
h. "Either" indicates that plans are being prepared to supply these customers from either plant. As of June 2004 these customers are supplied by DCWWTP
i. July Day includes a peaking factor of 2.5 times the average day demand.

Figure 6-1: Recycled Water Study Area and June 2004 Recycled Water Customers



6.2.2 Existing Near Future Recycled Water Customers

Existing near future recycled water customers are defined as developed (as of June 2004) areas that will be connected to the recycled water distribution system in the near future. These customers, shown in **Figure 6-2**, were identified based on the following:

- Review of recycled water study reports available as of June 2004,
- Discussion with City staff, and
- Discussion with developers

Table 6-2 lists the annual and peak day delivery demands estimated for each of the identified *existing near future recycled water customers*. This table is an update of Tables 5-2 and 5-3 of the 2000 RWFS. The update was based on discussion with City staff to identify where the most feasible customers are located. Most of the customers will use recycled water for irrigation purposes; Roseville Energy Park will use recycled water for non-contact cooling water. The majority of the future customers listed in Table 6-2 will be directly connected to the recycled water distribution system (i.e., no on-site storage). Large users (e.g., West Roseville Specific Plan, Roseville Energy Park, etc.) will be required to have their own storage facility to meet peak hour demands.

The Sierra View Country Club is an existing golf course located in Roseville, approximately two miles north of the downtown area. The estimated maximum day demand is 1.1 mgd (per Bryan Buchanan, City of Roseville). Recycled water will be delivered to Cherry Island Golf Course and Gibson Ranch via Dry Creek. The probable source of recycled water for each customer was based on the proximity to a particular WWTP and the location(s) of existing recycled water pipeline. An evaluation of one interconnected system versus two separate systems is presented in Section 6.3. For more detailed discussion on the *existing near future and existing potential recycled water customers*, refer to *TM 5a – Recycled Water Market Assessment* in **Appendix R**.

Table 6-2: Existing [a] Near Future Recycled Water Customers and Demands

No.	Existing Near Future Recycled Water Customer	Annual Demand (AFY)	Peaked for July Day? [e] (Y/N)	Peak Day (July) Demand (mgd)	Usage	On-Site Storage	Probable Source
1	Cherry Island Golf Course and Soccer Complex	500	Y	1.1	Irrigation	On-Site	DCWWTP
2	Diamond Creek Park	100	Y	0.22	Irrigation	On-Site	DCWWTP
3	Diamond Oaks Park	22	Y	0.05	Irrigation	None	DCWWTP
4	Eskaton Retirement Community	25	Y	0.05	Irrigation	None	DCWWTP
5	Fiddyment Park (i.e. Veterans Memorial Park - Phase II)	45	Y	0.1	Irrigation	None	DCWWTP
6	Free Run Park	12	Y	0.03	Irrigation	None	DCWWTP
7	Gibson Ranch County Park [b]	1,303	Y	2.87	Irrigation	On-Site	DCWWTP
8	Homestead Elementary School	7	Y	0.02	Irrigation	None	DCWWTP
9	Homestead Park	48	Y	0.11	Irrigation	None	DCWWTP
10	HP Campus Current Landscaping	156	Y	0.34	Irrigation	None	DCWWTP
11	HP Rezone [c]	139	Y	0.31	Irrigation	None	DCWWTP
12	Roseville Energy Park [d]	1,774	N	1.58	Cooling Water	On-Site	PGWWTP
13	Sierra View Country Club [e]	0	n/a	0	n/a	n/a	n/a
14	West Roseville Specific Plan (WRSP)	1,750	Y	3.86	Irrigation	On-Site	PGWWTP
15	Woodcreek West Park (i.e. Bill Sanchee Park)	41	Y	0.09	Irrigation	None	DCWWTP
	Total	**5,922**		**10.73**			

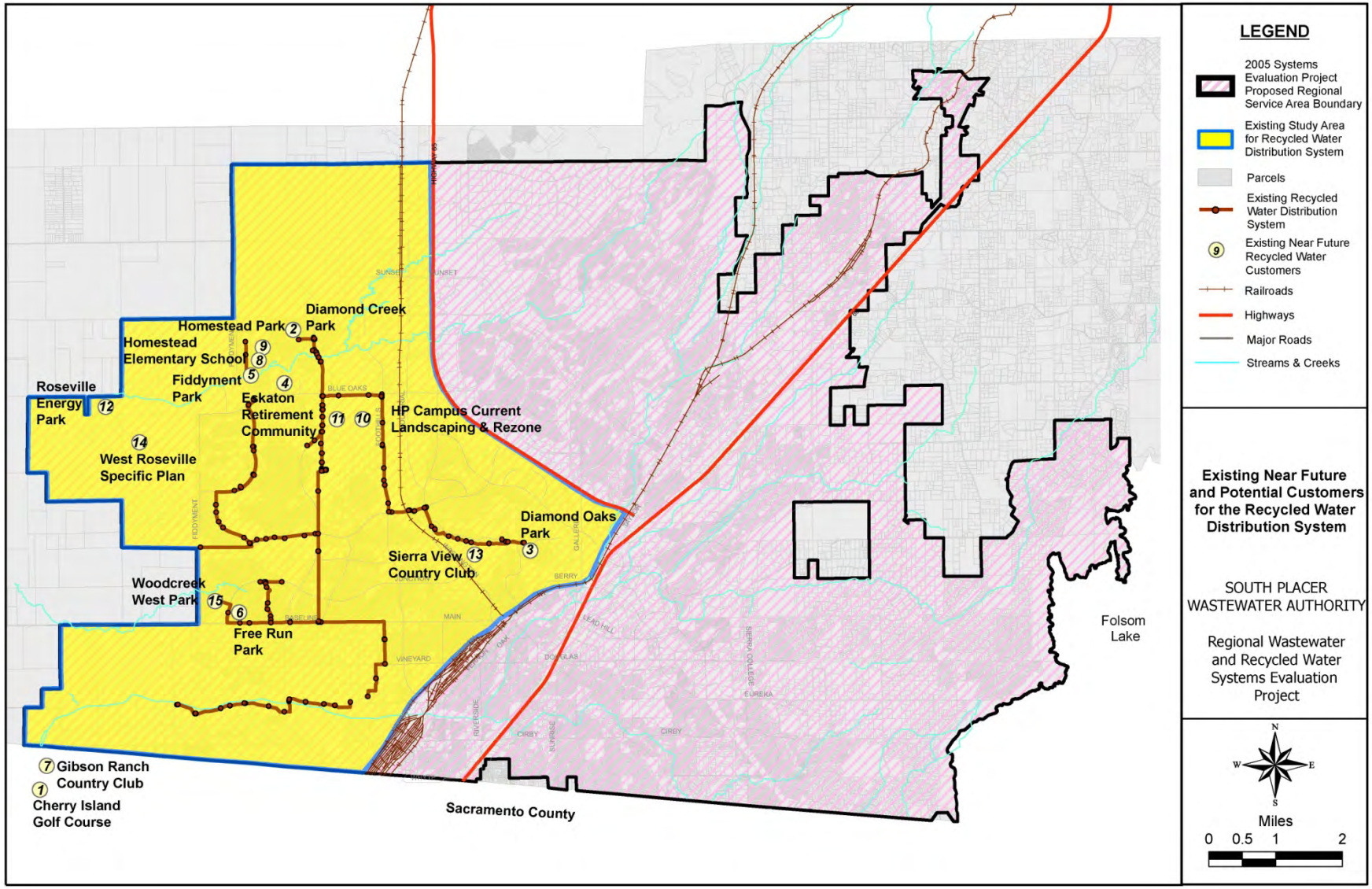
Footnotes:

a. As of June 2004.
b. Park will have a pond. The park also proposes to have recycled water from DCWWTP flow to Dry Creek as credit for diversion by the park downstream (i.e., Dry Creek will be used as a conveyance facility).
c. HP Mourier Water Projection, based on 9/19/05 Land Use Table.
d. Theoretical annual demand. No more than 1,100 gpm will be delivered to Roseville Energy Park. 1.58 mgd = (1,100 gpm) x (1,440 min/d); 1,774 AFY = (1.58 mgd).
e. Per conversation with Art O'Brien (City of Roseville) in August 2007.
f. July Day includes a peaking factor of 2.5 times the average day demand.

Rio Bravo Rocklin Power Plant currently uses water from Placer County Water Agency for their non-contact cooling processes. The feasibility of supply recycled water to Rio Bravo was examined in a memorandum dated November 15, 2006. The memorandum, titled *Feasibility of Recycled Water*

Service to Rio Bravo Rocklin, concluded that, under current water supply strategies, it would be economically infeasible to serve recycled water to Rio Bravo. Rio Bravo Rocklin will therefore not be included as a recycled water customer. The November 15, 2006 memorandum is included as attachment to *TM 5a – Market Assessment for Recycled Water Distribution System* in **Appendix R**.

Figure 6-2: Existing[1] Near Future and Potential Recycled Water Customers



Footnote:

1. As of June 2004.

6.2.3 Irrigation Demand Pattern

Nearly all of the *existing* and *near future recycled water customers* will use recycled water for irrigation purposes. The irrigation demand pattern is an important factor to be considered when evaluating an existing recycled water distribution system and for planning expansions to the distribution system.

Based upon local irrigation demands and precipitation data collected by the Department of Water Resources (DWR), the month with the highest irrigation demand is July. July, therefore, will be used to determine both the July day demand for comparison to the July day supply, along with design flowrates to evaluate the recycled water distribution system. Irrigation demand is not projected in the months of November through February. Local irrigation demands are included in Section 4 of *TM 5a – Market Assessment for Recycled Water Distribution System* in **Appendix R**.

6.2.4 Urban Growth Areas

Urban growth areas (UGAs) with the most recycled water reuse potential are located west of the 2005 Regional Service Area boundary. These UGAs and their recycled water demands are listed in **Table 6-3,** while their locations are shown in **Figure 6-3**. The City's policy for providing recycled water to UGAs, developed as part of this Systems Evaluation, is described below.

UGA Recycled Water Supply Policy

The City will only commit to providing a UGA with a supply of recycled water equal to the amount of wastewater that is generated by the UGA during July ADWF conditions. This supply is henceforth referred to as the "committed [recycled water] supply." In order to provide capability for serving demands that may exceed the committed supply, UGAs accepting recycled water are required to provide storage facilities capable of storing one July day demand (i.e., the total volume of water required to meet demands over a 24-hour period in July). If a UGA's July day demand (or storage volume) exceeds the committed supply, the difference may be met with supplemental supplies, which may include the following:

- Additional available recycled water
- Untreated groundwater
- Potable water supplies

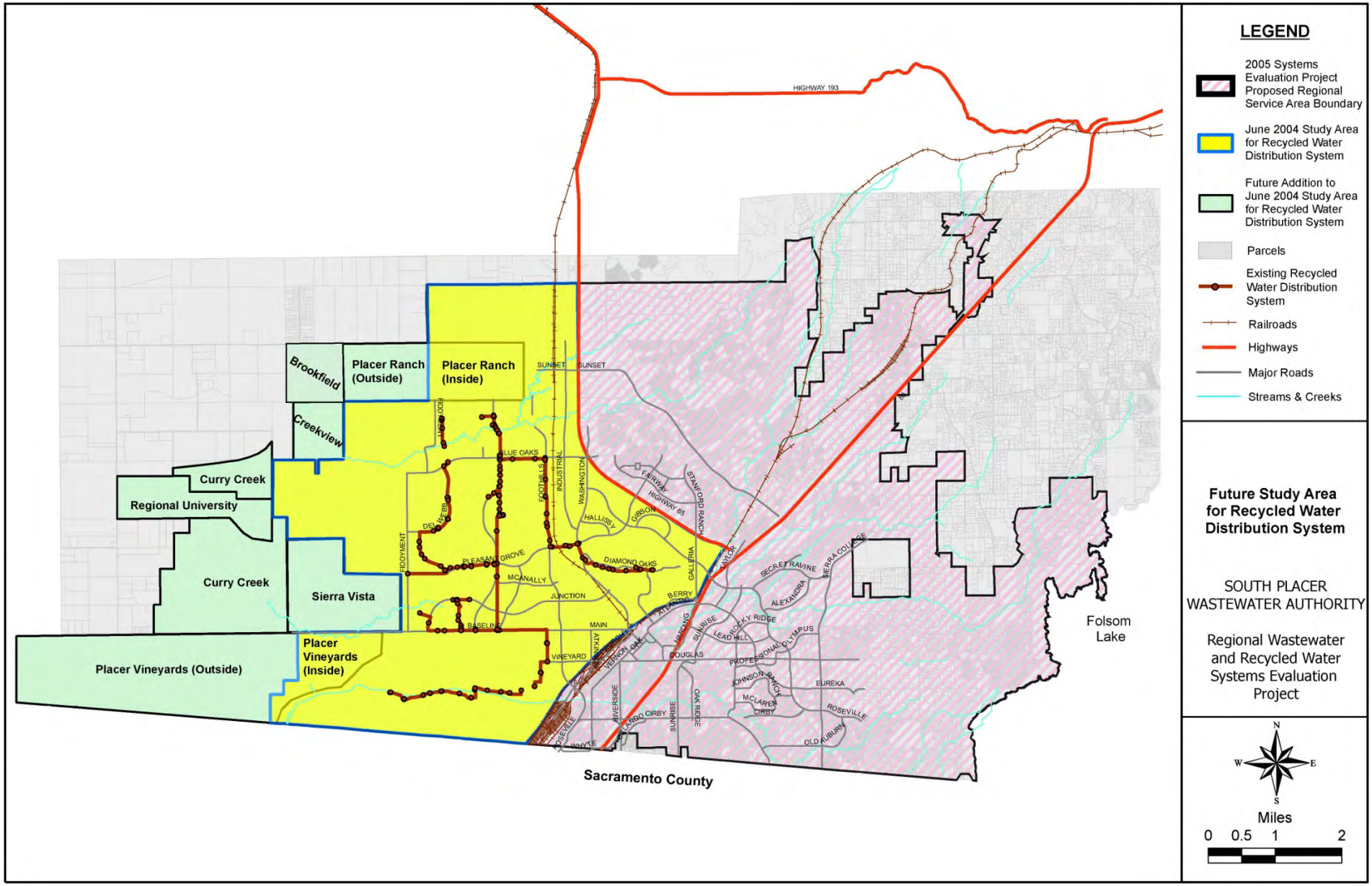
Table 6-3: Urban Growth Area Recycled Water Customers and Demands

Urban Growth Area (UGA) Customer	Annual Demand (AFY)	Project Size (acres)	Peaked for July Day [f]	Peak Day (July) Demand (mgd)	Committed Supply [Assumed ADWF] (mgd)	On-Site Storage	Probable Source
Brookfield [a]	683	211	420	Yes	0.94	0.73	On-Site
Creekview & Panhandle [b]	749	250	562	Yes	1.25	1.06	On-Site
Curry Creek [c]	3,212	728	1,860	Yes	4.11	2.69	On-Site
Regional University [d]	1,140	543	772	Yes	1.72	1.17	On-Site
Placer Ranch [e]	2,213	398	1,494	Yes	3.34	2.17	On-Site
Placer Vineyards [f]	5,148	386	1,580	Yes	3.50	2.81	On-Site
Sierra Vista [i]	1,785	280	1,074	Yes	2.46	2.10	On-Site
Total	**14,930**	**2,796**	**7,762**		**17.32**	**12.76**	

Footnotes:

a. Annual demand and project size estimated by RMC based on UGA size, recycled water project size, and annual demand of neighboring UGAs.
b. Table 2-3, Recycled Water Study for Creekview by Wood Rodgers, July 2007. "Panhandle" refers to a 238-acre portion of Reason Farms adjacent to Creekview. Demand projections include University Campus demand (250 AFY). If Job Center is included instead of University Campus, 250 AFY would be replaced by 189 AFY. Project size includes the sum of all recycled water customer sites.
c. Annual demand and project size estimated by RMC based on UGA size, recycled water project size, and annual demand of neighboring UGAs.
d. Table 3, Recycled Water Master Plan for Regional University, West Yost Associates, December 2006.
e. Table 3-2, Section 2.3, Placer Ranch Recycled Water Study by Hydroscience Engineers, July 2006.
f. Table 3-6, Placer Vineyards Specific Plan Recycled Water Master Plan, Brown and Caldwell, April 2006.
g. July Day includes peaking factor of 2.5 times the average day demand.
h. “Either” indicates that plans are being prepared to supply these customers from either plant.
i. Table 3-1, Draft Sierra Vista Recycled Water Master Plan by HydroScience Engineers, July 2007.

Figure 6-3: Urban Growth Area Recycled Water Customers



6.2.5 Supply and Demand Analysis

As described above, the City will commit to supplying the UGAs with a daily volume of recycled water equal to the amount of wastewater generated by the UGA on an average day in July. If a UGA's July day demand exceeds the committed supply, the difference may be met with supplemental supplies, which may include additional available recycled water, untreated groundwater or potable water supplies, as described in Section 6.2.4. A breakdown of the amount of recycled water delivered per month is included in Attachment C of *TM 5a – Market Assessment for Recycled Water Distribution System* in **Appendix R**.

Recycled water is produced and distributed from both wastewater treatment plants, and it has been determined that each UGA will receive recycled water from the WWTP to which it sends its wastewater. The majority of recycled water currently delivered from the DCWWTP goes to customers in the PGWWTP sewershed, therefore a supply balance is needed between DCWWTP and PGWWTP. A summary of July day demands for all the recycled water customers and the location of the supply are found in Attachment D of *TM 5a – Market Assessment for Recycled Water Distribution System* in **Appendix R**.

Three supply scenarios were evaluated to determine the best balance of demand and supply along with the most appropriate wastewater treatment plant to supply each UGA. As shown in Table 6-1 and Table 6-3, Woodcreek and Sun City Golf Courses could be supplied by either plant along with the potential for Placer Vineyards to also be supplied by either plant. Detailed analyses of each of these scenarios is provided in Attachment D of *TM 5a – Market Assessment for Recycled Water Distribution System* in **Appendix R** and summarized as follows:

- **Scenario A**: Woodcreek and Sun City Golf Courses are supplied from DCWWTP and Placer Vineyards is supplied from PGWWTP.
- **Scenario B**: Woodcreek and Sun City Golf Courses along with Placer Vineyards are supplied from DCWWTP.
- **Scenario C**: Woodcreek and Sun City Golf Courses are supplied from PGWWTP and Placer Vineyards is supplied from DCWWTP.

A summary of this analysis is included in **Table 6-4**.

Table 6-4: Summary of Supply Scenario Analyses

Scenario	DCWWTP		PGWWTP	
	Demand/Available Supply	Committed Supply/Available Supply	Demand/Available Supply	Committed Supply/Available Supply
A	77%	77%	100%	77%
B	105%	97%	77%	60%
C	93%	86%	86%	70%

Footnote: DCWWTP available supply is 18.18 mgd; PGWWTP available supply is 24.80 mgd. These supplies reflect the 2005 Regional Service Area boundary at 2050, plus UGAs. Rezones, intensification, and flows beyond 2050 are not included.

Results of the supply availability analysis indicate there is not an adequate supply of recycled water at the PGWWTP in Alternative A, and at the DCWWTP in Alternative B. Alternative C will operate by connecting Woodcreek Oaks Golf Course and Sun City Golf Course to the Pleasant Grove recycled water shed. Placer Vineyards, the Sun City streetscape, and other existing DCWWTP customers will be supplied recycled water from DCWWTP. Woodcreek Oaks Golf Course, Sun City Golf Course, WRSP, and the remaining UGAs will be supplied by PGWWTP.

Based on the results of this analysis, Scenario C provides the best balance of supply and demand. This Scenario is summarized in **Table 6-5**.

Table 6-5: Summary of Scenario C [a]

Customer Category	July Day Demand (mgd)	July Day Committed Supply (mgd)	July Day Available Supply (mgd)
DCWWTP			
Existing [a]	6.28	6.28	
Near Future	5.29	6.35	
UGAs [b]	3.50	2.81	
Totals	**15.07**	**14.38**	**18.18**
PGWWTP			
Existing [a]	2.23	2.23	
Near Future	5.44	5.44	
UGAs[b]	13.82	9.95	
Totals[c,d]	**21.49**	**17.62**	**24.80**

Footnotes:

a. As of June 2004. Assumes that Sun City Golf Course and Woodcreek Oaks Golf Course are supplied by PGWWTP.
b. Assumes Placer Vineyards is supplied by DCWWTP.
c. Includes development through 2050, excluding rezones and intensification (i.e., NOT buildout).
d. Includes Brookfield flows.

6.2.6 Design Flowrates

Irrigation Design Flowrates

Design flowrates are a combination of irrigation and non-irrigation flowrates. For customers with on-site storage, the July day irrigation demand is spread evenly over 24 hours as the storage tank/pond is filled throughout the day. The peak hour demand is the July day demand divided by 24. Customers without storage facilities will be delivered recycled water during the 9-hour irrigation period. The peak hour demand for non-storage customers is determined by multiplying the daily irrigation demand by 2.67 (2.67 = 24/9), as the entire 24-hour volume of irrigation water is applied in a 9-hour period. In the future it may be necessary to restrict storage filling operations to occur only during the non-irrigation periods of the day; at this time, however, that level of demand management is not necessary.

Non-Irrigation (Industrial) Flowrates

The only customer that will use recycled water for non-irrigation purposes is the Roseville Energy Park, which will use recycled water for industrial purposes. It is assumed that the Roseville Energy Park will use an equal amount year-round. The annual volume of recycled water is divided by 12 to obtain monthly volume, or divided by 365 to obtain daily volume. It is understood that power plant demands can fluctuate; due to a lack of detailed information, however, the simplifying assumptions described above were made.

6.2.7 Pumping Demand

The pumping demands during the irrigation period, along with the hourly peaking factor for all three scenarios, are presented in Attachment D of *TM 5a – Market Assessment for Recycled Water*

Distribution System in **Appendix R**. A summary of those demands for Scenario C is presented in **Table 6-6**.

Table 6-6: Pumping Demands for Scenario C

Customer Category	Customer	Pump Station Demand During Irrigation Period (gpm)	Peaked Hourly? (Y/N)	Peaking Factor
DCWWTP				
Existing [a] Customers	Dry Creek	0 [a]	N	0
	Diamond Oaks Golf Course	514	N	1
	Morgan Creek Golf Course	868 [b]	N	1
	Sun City Streetscape and parks	244	Y	2.7
	Elliot Park	113	Y	2.7
	Dry Creek WWTP	28	N	1
	Junction Streetscape	19	Y	2.7
	Diamond Creek Ranch	94	Y	2.7
	Subtotal	**1,878**	**1,878**	
Existing [a] Near Future Customers	Cherry Island Golf Course and Soccer Complex	0 [a]	N	1
	Diamond Creek Park	413	Y	2.7
	Diamond Oaks Park	94	Y	2.7
	Eskaton Retirement Community	94	Y	2.7
	Fiddyment Park (Vets Mem II)	188	Y	2.7
	Free Run Park	56	Y	2.7
	Gibson Ranch Park	0 [a]	N	1
	Homestead Elementary School	38	Y	2.7
	Homestead Park	206	Y	2.7
	HP Campus Existing Landscape	638	Y	2.7
	HP Rezone	581	Y	2.7
	Sierra View Country Club	0	N	1
	Woodcreek West Park	169	Y	2.7
	Subtotal	**2,475**		
UGAs	Placer Vineyards	2,431 [b]	N	1
	Subtotal	**2,431**		
	Total	**6,784**		
PGWWTP				
Existing [a] Customers	Woodcreek Golf Course	625	N	1
	Sun City Golf Course	903	N	1
	Pleasant Grove WWTP	21	N	1
	Subtotal	**1,549**		
Existing [a] Near Future Customers	Roseville Energy Park	1,097	N	1
	West Roseville Specific Plan (WRSP)	2,681	N	1
	Subtotal	**3,778**		

Customer Category	Customer	Pump Station Demand During Irrigation Period (gpm)	Peaked Hourly? (Y/N)	Peaking Factor
UGAs	Placer Ranch	2,319	N	1
	Regional University	1,194	N	1
	Sierra Vista	1,708	N	1
	Creekview	868	N	1
	Curry Creek	2,854	N	1
	Brookfield & University	653	N	1
	Subtotal	**9,597**		
	Total	**14,924**		

Footnotes:

a. Pumping demands for Dry Creek, Cherry Island, and Gibson Ranch are zero because these demands are conveyed via the creek.

b. Recycled water is not pumped at DCWWTP to serve Morgan Creek Golf Course and Placer Vineyards. Recycled water flows via gravity from the pump station wet well through a 24" recycled water pipe parallel to Dry Creek.

Results from the Trunk Sewer Evaluation portion of this Systems Evaluation (Chapter 4) indicate a total combined wastewater ADWF of 43.0 mgd from the Dry Creek and Pleasant Grove WWTPs. This value indicates there will be sufficient recycled water supply to meet the demands shown above. The projected wastewater flow of 18.2 mgd ADWF to DCWWTP will be sufficient to meet the recycled water demands and maintain the 4 million gallon minimum daily discharge to Dry Creek. The projected ADWF of 24.8 mgd (includes Brookfield flows) to PGWWTP will similarly provide sufficient supply to meet recycled water demands.

6.3 Alternatives Development and Evaluation

With recycled water demands and supply identified, the next step involved the evaluation of how best to meet those demands through extension of the existing infrastructure. This section defines and evaluates recycled water facility alternatives to serve the existing City of Roseville service area and outlying UGAs.

6.3.1 Project Alternatives Development and Evaluation Update

The recycled water setting has changed since the development of the 2000 RWFS, presenting new opportunities and new challenges. Because of these changes, the recommended recycled water project and associated implementation plan included in the 2000 RWFS were revisited. The treatment, storage/pumping, and distribution options identified in the 2000 RWFS formed the basis for project alternative development and evaluation. Additional facility improvements are evaluated herein.

6.3.2 Approach

The following approach was adopted to meet the recycled water system evaluation goals described above:

- Develop a list of conceptual alternatives (including preliminary sizing and alignments, pumping requirements and location and storage requirements) building on the technical work performed in the 2000 RWFS
- Evaluate the advantages and disadvantages of each conceptual alternative, and recommend the preferred alternative

6.3.3 Alternatives Identification

Two basic categories of alternatives are available for the production and distribution of recycled water:

1. Satellite treatment and distribution
2. Centralized treatment with distribution from Pleasant Grove and Dry Creek WWTPs

This section will summarize the costs, advantages and disadvantages, and distribution options of the alternatives.

Satellite Treatment Alternative

Satellite facilities would treat wastewater from local trunk sewers to Title 22 unrestricted reuse standards and likely return solids back to the trunk sewer. Recycled water would be available for use in the vicinity of the satellite plant. Seasonally operated satellite treatment facilities could be used to supply the furthest UGAs from PGWWTP (Placer Ranch) and DCWWTP (Placer Vineyards).

From a cost standpoint, satellite recycled water treatment has become a competitive alternative for recycled water production and delivery to "remote" areas (generally 5 to 10 miles beyond the central WWTP and other recycled water customers). Placer Ranch and Placer Vineyards are the furthest UGAs from PGWWTP, but their distances are not remote enough to offset the capital and O&M costs associated with satellite treatment. It would be unreasonable to pursue the option of satellite recycled water treatment for the following reasons: the PGWWTP and DCWWTP can provide the required recycled water, a recycled water distribution system is being developed, and Placer Ranch and Placer Vineyards are less then 5 miles from the nearest recycled water customer. The option best suited for the given situation would be centralized treatment and distribution from the PGWWTP and DCWWTP, described in detail below.

Centralized Treatment Alternative

As satellite treatment is not recommended, centralized treatment and distribution was evaluated in greater detail for the recycled water systems evaluation. Three pipeline alternatives will be discussed in the following sections.

A hydraulic analysis was performed (using H_2OMap Water, a hydraulic modeling program for the analysis of water distribution systems) to compute the pipeline diameters needed to serve the identified customers, while conforming to a set of hydraulic criteria. The criteria that were used are shown in **Table 6-7**.

Table 6-7: Hydraulic Design Criteria for Model Development

System Component	Unit	Criterion
Minimum Pressure at Customer Connections During Irrigation Period [1]	psi	60 [2]
Minimum Pressure at Customer Connections During Non-irrigation Period	psi	40
Maximum Pressure	psi	120
Minimum Pipe Size (including laterals)	inches	6
Available Pipe Sizes [3]	inches	6, 8, 12, 16, 24, 30
Maximum Head Loss	feet per 1000 feet	5
Velocity Range	fps	2 – 8
Hazen-Williams Coefficient for Headloss Calculation	n/a	130

Footnotes:
1. South zone of Recycled Water System (south of North Zone Pump Station) will have an operating pressure of 30 psi.
2. For customers without a recycled water storage facility.
3. Per Roseville Standards for Recycled Water.

Three distribution alternatives were evaluated in *TM 5b – Alternatives Development and Evaluation for Recycled Water Distribution System* (**Appendix S**) and are summarized below. The selected alternative (Alternative C) only is summarized in the subsequent sections of this chapter.

- **Alternative A: Non-Looped System**

  New recycled water pipe from Pleasant Grove WWTP will connect to existing recycled water pipe along Phillip Road, and follow UGA boundaries around the western border of WRSP and Sierra Vista. The pipe will end at the northern boundary of Placer Vineyards. The pipeline will also run north on the eastern side of Creekview and end at the southwest corner of Placer Ranch. Another internal Placer Ranch pipe will connect to the 30" recycled water pipeline stub on Woodcreek Oaks Boulevard. with a pressure sustaining valve. This configuration will allow recycled water to flow either to or from the North Zone tank. In this alternative, it is assumed that PGWWTP will supply Placer Vineyards.

- **Alternative B: Looped System**

  Recycled water pipelines would follow similar alignments as Alternative A; however, pipe will continue east along the northern border of Placer Vineyards and connect the 24" gravity recycled water line near Dry Creek. Placer Vineyards could be supplied by either DCWWTP or PGWWTP.

- **Alternative C: Additional Flow through West Roseville Specific Plan (WRSP)**

  Recycled water pipelines would follow similar alignments as Alternatives A and B; however, the pipe will end at the northern boundary of Curry Creek South and Sierra Vista as shown in **Figure 6-4**. Placer Vineyards will be supplied recycled water from DCWWTP via the 24" pipeline running parallel to Dry Creek. Placer Vineyards will install a pipe to distribute recycled water from the terminus of the existing 24-inch recycled water pipeline along Dry Creek to a storage tank on West Dyer Lane and 16th Street.

  To balance the recycled water demands on each wastewater treatment plant, recycled water will be distributed from PGWWTP to Woodcreek Oaks Golf Course (WOGC) and Sun City

Golf Course (SCGC). Their pipe connections can be retrofitted to receive recycled water from DCWWTP or PGWWTP as the system grows to best use available recycled water. This will be described more in detail in the following section.

Water will be transferred to WOGC and SCGC via the 24" recycled water pipeline through WRSP and through the 18" converted force main. To minimize the amount of pumping, the WRSP pump station 24" inlet is connected to the to the 24" outlet, which allows bypassing the WRSP pump station. Recycled water can then be sent to the WOGC and SCGC storage facilities directly from the PGWWTP pump station. This configuration provides flexibility for supplying recycled water to the WOGC and SCGC during the 15-hour non-irrigation period. This option is available during the non-irrigation period because the WRSP pump station will not be used. During the irrigation period the bypass will be closed and the pump station will operate normally.

The Sun City Golf Course storage pond can be connected by tying the 18" converted force main in Del Webb Boulevard into an existing 8-inch recycled water main in Del Webb Boulevard. This will serve the purpose of filling the SCGC pond from PGWWTP. The Woodcreek Oaks Golf Course would utilize a portion of the existing 18" recycled water line which will be decommissioned. Recycled water will flow south through the 18" recycled water line from the 18" converted force main/30" converted force main connection to the lake. When completed there will be two connections to the Woodcreek Oaks Golf Course lake, the 18" recycled water line and the 30" converted force main.

The lengths and diameters of new recycled water pipelines, which would be installed for the selected alternative, and the existing force mains, which would be converted to recycled water pipelines, are listed in **Table 6-8**.

Table 6-8: Description of Alternatives

	New Pipe Diameter (inches)	Existing Force Main to be Converted to Recycled Water Pipe (feet)	Length of New Recycled Water Pipe (feet)
Alternative C	30"	-	3,100
	24"	-	21,400
	16"	-	5,800
	12"	-	2,700
	Total	**38,200**	**33,000**

6.3.4 Recycled Water Storage Analysis

Due to the high demand for recycled water, hourly irrigation patterns, and diurnal fluctuations of wastewater effluent availability, an hour-by-hour analysis was conducted to determine the storage requirements and the operational scenarios at the Pleasant Grove and Dry Creek WWTPs to optimize recycled water distribution. The scenarios described assume there will be a storage facility (tank or pond) at each UGA with a volume to store one peak day (July day) of recycled water supply. Diurnal fluctuations in recycled water generation produce a challenge in supplying customers during the irrigation period from 9:00 PM to 6:00 AM for the following reasons: the highest demand for recycled water comes during the period of lowest generation and recycled water must be supplied during the non-irrigation period in addition to the irrigation period to fulfill the total demand of the UGAs.

Alternative C Storage Analysis

Multiple scenarios were evaluated to distribute recycled water to customers to show the amount of storage needed at either DCWWTP or PGWWTP in Alternative C. From the supply availability analysis, the recycled water demand in Alternatives A and B exceeded available supply, therefore a storage analysis was not deemed necessary. From the storage analysis for Alternative C, it was determined that recycled water storage will not be required at PGWWTP if recycled water is distributed to the UGAs as it is generated. Storage is also not required at DCWWTP. For both plants, recycled water will be available to customers during low generation periods. The detailed storage calculations can be found in Attachment A of *TM 5b – Alternatives Development and Evaluation for Recycled Water Distribution System* in **Appendix S**. Detailed scenarios presenting variations in recycled water distribution to customers with storage facilities are presented in **Appendix S**.

Criteria used in ranking the distribution scenarios are based on the necessity of required storage at the treatment plant, availability of supply during all hours of the day, and the peak flow being pumped from the treatment plant pump station. Scenarios that do not require storage at the treatment plant rank higher than those that do; additionally, scenarios that do not have available supply for the demand are infeasible. Peak flow from the treatment plant is evaluated to determine pumping requirements. Maximum flow rates may occur for only a few hours a day, however exceeding the proposed design criteria is not recommended.

Refer to *TM 5b – Alternatives Development and Evaluation for Recycled Water Distribution System* in **Appendix S** for more detailed analyses of the modeled hydraulic performance of the scenarios mentioned above.

6.3.5 Hydraulic Analysis for 24-inch Gravity Line

A hydraulic analysis was completed to determine if the 24” recycled water line from DCWWTP to Morgan Creek Golf Course and Placer Vineyards (PV) could remain a gravity line. The results from this analysis are summarized in Attachment D of *TM 5b – Alternatives Development and Evaluation for Recycled Water Distribution System* in **Appendix S**. The proposed location of the Placer Vineyards recycled water storage tank is on the southwest corner of West Dyer Lane and 16th Street, which is in the center of the Placer Vineyards UGA. The results of the analysis show the 24” pipe can remain gravity flow with certain limitations. The storage facilities must be filled in 24 hours and the (PV) tank must be buried 10 feet to maintain hydraulic head. A fill time of 15 hours representing the non-irrigation period is also not possible. To fill the PV tank when the water level is low, the pipe should be constructed with a deeper profile, as shown in Attachment B of *TM 5b – Alternatives Development and Evaluation for Recycled Water Distribution System* in **Appendix S**, to allow faster fill rates. The required pipe depth is beyond what is feasible for the purposes of distributing recycled water in these circumstances. A gravity line will limit the City’s operational flexibility to supply recycled water. The pipeline also cannot be shut down in the summer months for maintenance or repair.

It is recommended to install a booster pump station at the recycled water pipe stub at Wallerga Road. This will provide the additional head needed to fill the Placer Vineyards tank in a shorter period than 24 hours. It is also recommended to connect the 24” line to the Dry Creek WWTP recycled water pump station or a low head pump to provide pressure for the storage facilities and to two future direct tap customers. The pressurized pipe will allow the City to supply customers with recycled water when it is available. If the 24” line is pressurized from DCWWTP, then the booster pump may not be needed.

6.3.6 Alternative Evaluation

This section will:

- Present the criteria used to evaluate project alternatives identified in Section 6.3.3;
- Show results of the alternatives evaluation; and,
- Present the recommended alternative.

Evaluation Criteria

A set of economic and non-economic criteria addressing specific issues within the recycled water study area has been developed to evaluate the recycled water facilities alternatives. These criteria are found in **Table 6-9**.

Table 6-9: Alternative Evaluation Criteria

Criteria	Description
Meets Recycled Water Demand	Ability to meet total recycled water demand
Estimated Cost	Total Capital Costs
Flexibility	Ease with which (1) recycled water can be delivered from either treatment facility to meet demand, (2) SPWA can adapt to changes in planning assumptions regarding future demand patterns, projected resources or other uncertainties, and (3) system can be phased
Ease of Implementation	Ease with which alternative can be permitted and constructed. This also includes easement acquisition and congestion concerns
Adaptability	Degree of synergy with existing recycled water system and ability to adapt to existing recycled water system
Environmental/Social Impacts	Various impacts including risk of impact to biological systems and construction related impacts (i.e., traffic disruptions)

Unit capital costs for the project alternatives are shown in **Table 6-10**. A flat unit cost of $8 per inch-diameter per linear foot ($/LF-in) is used for pipes installed in developing areas, such as the UGAs. A unit cost of $12/LF-in diameter is used for urban areas where there are existing roads and/or pavement. **Table 6-10** also includes a line item for the connection of the 24" gravity line to the DCWWTP recycled water pump station. The cost only includes the connection; pumping capacity at DCWWTP is addressed in (cost summary table) **Table 6-11**.

Figure 6-4: Recycled Water Distribution System Alternative C – Additional Flow through WRSP

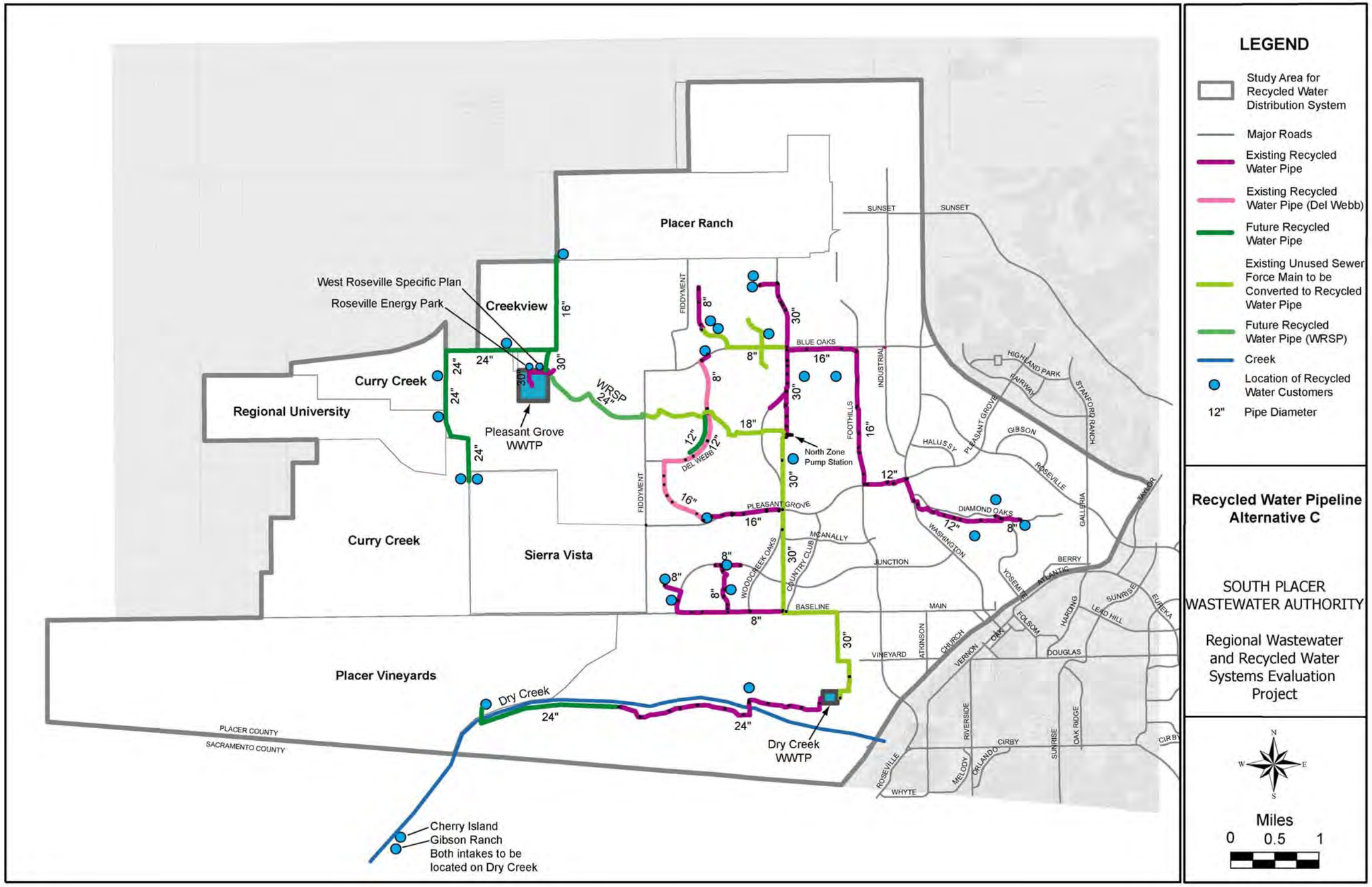


Table 6-10: Unit Capital Costs and Economic Assumptions

Item	Cost [a]
Open Trench Installation	
30" Pipe Installation Cost	$240 /linear foot
24" Pipe Installation Cost	$192 /linear foot
16" Pipe Installation Cost	$128 /linear foot
12" Pipe Installation Cost	$144 /linear foot
Conversion of DCWWTP to pump into 24" gravity line [b]	$60,000
Other Cost Estimate Criteria [c]	
Construction Cost Contingency	30% of pipeline costs
Engineering and Administration	25% of pipeline costs

Footnotes:

a. Unit costs are in October 2005 dollars.
b. Short pipe connection between 24" gravity line and existing recycled water pump station discharge will be required.
c. An overhead markup of 62.5% was applied based on a 30% construction cost contingency a plus a 25% engineering and administration factor to calculate the capital cost. Hence, for budgeting purposes, it is assumed that the contingency and project implementation multiplier is 1.625 (1.00 x 1.30 x 1.25 = 1.625)

6.3.7 Evaluation Results

Preliminary cost estimates, based on the unit costs and economic assumptions in **Table 6-10**, are listed in **Table 6-11**. Detailed cost estimates for the alternatives can be found as an attachment to *TM 5b – Alternatives Development and Evaluation for Recycled Water Distribution System* in **Appendix S**. Criteria from **Table 6-9** were used to evaluate the alternatives and are also included in **Table 6-11**.

Table 6-11: Alternatives Evaluation

Evaluation Criteria (from Table 6-9)	Alternative C – Flow Through WRSP
Meets Recycled Water Demand	High
Estimated Cost [a]	$10,883,000 [b]
Flexibility	
Flexibility to supply RW from more than one plant	High
Adapt to changes in planning assumptions	High
Ability for project phasing	High
Ease of Implementation	
Ease to be designed, permitted, and constructed	High
Easement Acquisition	High
Adaptability	
Degree of synergy with existing recycled water system	High
Environmental/Social Impact	
Biological Impacts and Construction Related Impacts	Low
Utility Congestion	Low
Rank [c]	1

Footnotes:

a. Total capital costs are in October 2005 dollars and include all construction costs, contingencies, and fees.
b. Price includes $60,000 for the retrofit of DCWWTP recycled water pump station to connect the 24" gravity line. Refer to Table 6-10.
c. Qualitative ranking based on analysis of benefits, risks and degrees of impact.

6.3.8 Conclusions

As **Table 6-11** summarizes, Alternative C is the recommended choice, as it is an interconnected system that provides the optimum balance of recycled water supply and demand. Alternative A is a moderately connected system, with Placer Ranch internal recycled water piping connecting to the 30-inch pipe on Woodcreek Oaks Blvd. Alternative B joins both the north and south sections of the distribution system, but there is a considerable distance between Placer Vineyards demand location and the stub of the 24-inch gravity line. To connect the two pipes, 14,400 linear feet of pipe would need to be installed and a piping/pumping modification at DCWWTP would need to be constructed with an additional cost of $2.8 million. Both Alternatives A and B have a recycled water demand that exceeds supply.

Under typical operating scenarios, it is recommended that customers be supplied recycled water by a particular treatment facility; Alternatives B and C allow operational changes to be made in the pipeline system to move recycled water across the distribution system in response to an atypical operating scenario. Looping the southern portion of the distribution system is less beneficial than connecting PGWWTP through the WRSP and converted force main because of the pipeline capital costs and the distance of the customers from the pipeline. The majority of the customers are in the central potion of

Roseville, in close proximity to the North Zone Tank. Therefore, it would be better to have the operational flexibility in that area rather than on the outskirts of the distribution system.

6.4 Implementation Plan

The goal of the recycled water system evaluation is to develop a long-term strategy for the ultimate implementation of recycled water projects in the region. Numerous tasks would need to take place between the completion of the Systems Evaluation and construction of the ultimate buildout, including conceptual engineering, environmental documentation and permitting, public outreach, funding, financing, design, and construction. The following preliminary implementation plan describes the tasks required to implement the recycled water projects and provides an approximate schedule for their completion. The City's pipeline infrastructure will include the trunk line from the wastewater treatment plant, as well as the storage, pumping and distribution of recycled water within the property. Trunk recycled water pipeline sections from the PGWWTP to the UGA may be installed by the City and reimbursed by individual land owners. The recycled pipeline will be built according to phasing described in the following sections. Any interim measures/solutions developed by the UGA developers for receiving recycled water will be approved by the City.

6.4.1 Preferred Alternative

The preferred alternative, Alternative C, has been divided into projects and is shown in **Figure 6-5**. Projects are numbered in no particular order, but are organized according to implementation schedule. Projects shown in **Figure 6-5** are listed in **Table 6-12** that include length and diameter of pipe to be installed. Pipeline costs include contingencies and pump costs include installation. Detailed cost information can be found in Attachment C of *TM 5b – Alternatives Development and Evaluation for Recycled Water Distribution System* in **Appendix S**.

6.4.2 Project Phasing

An implementation strategy for each preferred alternative project phase is presented in this section. The phasing of the preferred alternative (Alternative C) is summarized as follows:

Phase I – This phase includes the existing recycled water distribution system and existing users. Recycled water is supplied from Dry Creek WWTP. This phase also includes the conversion of 8-, 18-, and 30-inch sewage force mains to recycled water pipelines, which is in progress as of June 2004. Woodcreek Oaks Golf Course and Sun City Golf Course will be distributed recycled water from the PGWWTP.

Phase II – This phase expands on the June 2004 distribution system with the addition of *Existing Near Future Recycled Water Customers* from the market assessment (see Section 6.2.2). The new customers will be supplied by DCWWTP. DCWWTP and the North Zone pump station improvements will include the installation of new recycled water pumps.

Phase III – This phase builds from Phase II to include all of the UGAs. Pleasant Grove WWTP will supply recycled water to these customers, except for Placer Vineyards. Two additional duty pumps and one standby pump will be added to the PGWWTP recycled water pump station. At the point when the velocity in 30" pipe from the PGWWTP pump station to the West Roseville Pump Station becomes higher than 8 ft/sec for one hour at a time or more, a new 30" parallel pipe should be constructed. The 24" recycled water line supplying Placer Vineyards will be connected to the DCWWTP pump station.

Figure 6-5: Recommended Projects for Recycled Water Distribution System

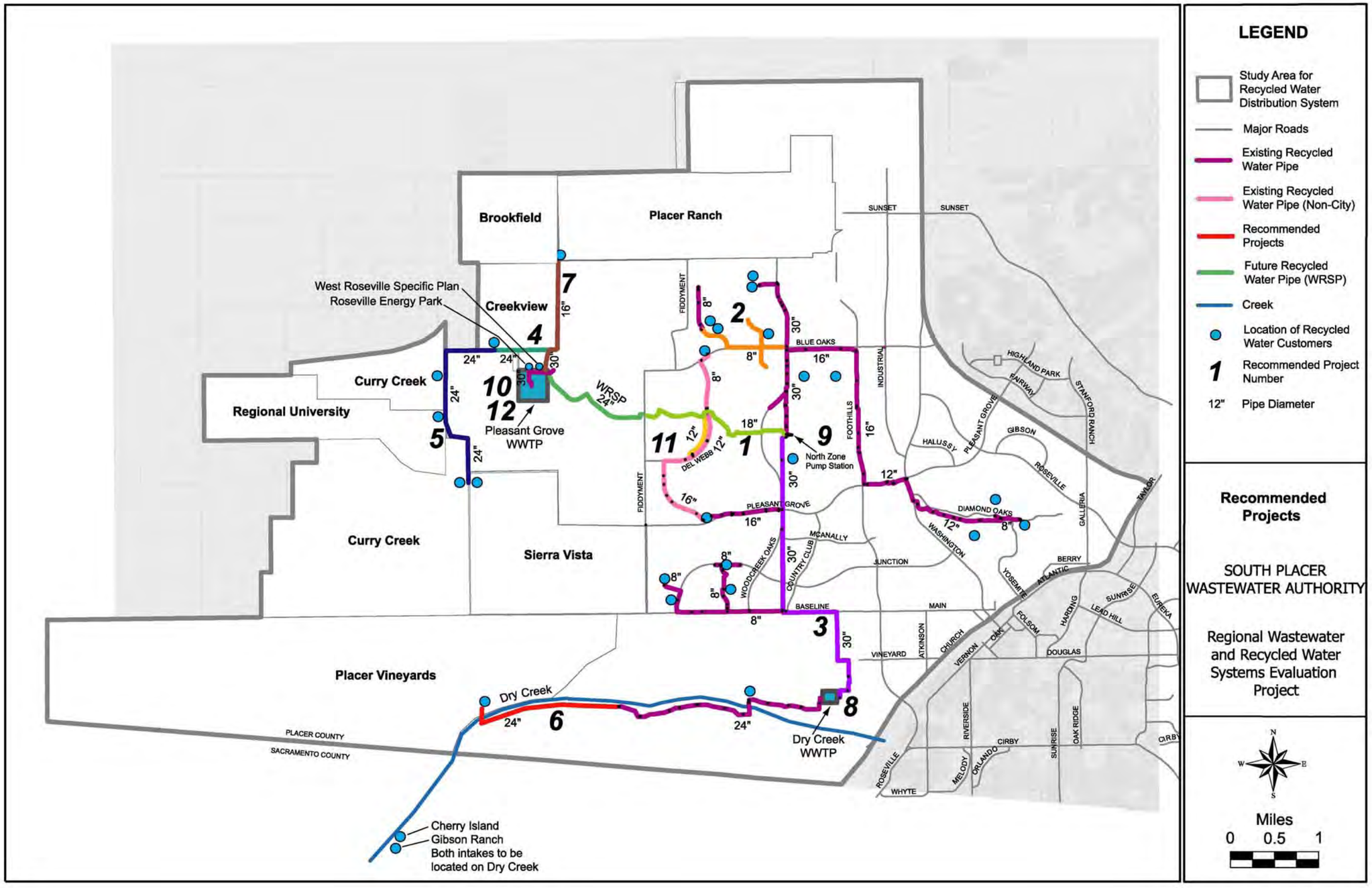


Table 6-12: Recommended Projects and Estimated Capital Cost by Phase

Project No.	Description	Size (in) or flow (gpm)	Length (ft)	Cost
Phase I (in Progress) [a]				
1	18" FM Conversion for RW Use from PGWWTP	18"	9,700	n/a
11	Sun City Pipeline from 18" Converted Force Main (with option to supply WOGC and SCGC)	12"	2,700	632,000
2	8" FM Conversion for RW Use	8"	8,900	n/a
3	30" FM Conversion for RW Use South of North Zone Pump Station	30"	19,600	n/a
		Subtotal	**40,900**	**$632,000**
Phase II (Year 2005 to 2010) [a]				
8	DCWWTP one-50 HP pump	1,900 gpm	-	98,000
9	North Zone PS one-50 HP pump	950 gpm	-	57,000
		Subtotal	**-**	**$155,000**
Phase III (Year 2010 to 2025) [a]				
4	Creekview Pipeline	24"	3,300	1,030,000
5	Creekview to Curry Creek North	24"	4,600	1,436,000
	Curry Creek North to Regional University	24"	2,100	655,000
	Regional University to Curry Creek South and Sierra Vista	24"	2,300	718,000
6	Placer Vineyards Pipeline	24"	9,100	2,840,000
7	North from PGWWTP to "Tee"	30"	1,400	546,000
	Pipeline from "Tee" to Placer Ranch PS	16"	5,800	1,207,000
10	PGWWTP three-250 HP pumps	15,360 gpm	-	609,000
12	Addition of 30" Pipe at PGWWTP for Maximum Flow Conveyance	30"	1,700	995,000
		Subtotal	**30,300**	**$10,036,000**
		Total	**71,200**	**$10,823,000**

Footnotes:
a. Recycled water project phasing depends on development timing.
b. In October 2005 dollars.

Phase I

This phase includes the conversions of 8-, 18-, and 30-inch sewage force mains to recycled water pipelines, which are in progress as of June 2004. The existing 24-inch recycled water pipe connecting the Dry Creek WWTP with the North Zone Pump Station (NZPS) will be decommissioned and the 30" force main will be used instead. An 18-inch force main will also be converted, connecting the NZPS to Pleasant Grove WWTP via the WRSP recycled water pipeline. In the northern portion of Roseville, an 8-inch force main will be converted and connected to an existing 30-inch recycled water pipe. These are shown as Projects 1-3 in **Figure 6-5**. It is recommended the force main conversions be completed before the addition of the

Existing Near Future Recycled Water *Customers* to the network. The pipeline from the converted 18-inch force main to the Sun City Golf Course pond inlet, Project 11, will be constructed during this phase. Additionally, once the 30-inch force main is converted, Woodcreek Oaks Golf Course can be connected to the 18-inch converted force main. Connecting these customers to both PGWWTP and DCWWTP supply will allow the City greater flexibility as both distribution systems are growing.

Phase II

Phase II includes the existing customers and distribution system of Phase I, plus additional recycled water customers as sufficient supply from Dry Creek WWTP becomes available. It is estimated there will be adequate supply in 2012 to provide *Existing Near Future Recycled Water Customers* with recycled water based on projected wastewater flows from *TM 4a – Projected WWTP Flows and Loadings*, included in **Appendix N**. *Existing Near Future Recycled Water Customers* include Cherry Island Golf Course, Diamond Creek Park, Diamond Oaks Park, Eskaton Retirement Community, Fiddyment Park, Free Run Park, Gibson Ranch County Park, Homestead Park, Homestead Elementary School, HP Campus Current Landscaping, HP Rezone, Sierra View Country Club, WRSP, and Woodcreek West Park.

In this phase, the DCWWTP and NZPS will need to be upgraded. Projects 9 and 10 specify the addition of one 50-hp pump at DCWWTP and one 50-hp pump at the NZPS, respectively. Based on the results of the hydraulic model, these additional pumps will be necessary to maintain a minimum pressure of 10 psi for the furthest customers on the recycled water distribution pipeline. The additional pumps will be required during high flow periods. A volume increase to the North Zone storage tank will not be required.

Phase III

Phase III includes all of the customers in Phase II plus the UGAs. New recycled water pipeline installations in Creekview, Curry Creek, Regional University, Sierra Vista, and Placer Ranch are Projects 4, 5, and 7, respectively. UGA construction is scheduled to begin between 2008 and 2010, with buildout estimated to occur in 2025. The installation of two additional duty pumps and one standby pump at PGWWTP (Project 10) will be required to keep a minimum pressure of 10 psi in the pipeline at the customer locations furthest from the WWTP, and to supply recycled water to the Woodcreek Oaks (WOGC) and Sun City Golf Courses (SCGC). The installation of a 30-inch parallel pipe from PGWWTP to the WRSP pump station (Project 12) should occur when the velocity in the existing 30-inch line increases over 8 feet per second. This project should occur before UGA buildout. Recycled water from PGWWTP will be transferred to the WOGC and SCGC through the WRSP pipeline and the 18-inch converted force main. A continuation of the 24-inch pipe will be installed to serve Placer Vineyards, Project 6. The booster pump station at the recycled water pipe stub at Walerga Road should be installed. Before buildout, the 24-inch pipe should be connected to the DCWWTP pump station or a low head pump to maintain the hydraulic head required to fill the Placer Vineyards storage tank.

Urban Growth Area Storage Requirement

UGAs will be required to have a recycled water storage facility with the capacity to store one peak day (July day) demand volume. July demands are identified in Section 6.2. The minimum storage tank volume required for each UGA is listed in Table 6-13.

Table 6-13: Minimum Required Storage Volumes

UGA	Minimum Tank Volume (MG)
Creekview	0.65
Curry Creek North	0.80
Curry Creek South	3.35
Placer Ranch	3.35
Placer Vineyards	5.40
Regional University	1.75
Sierra Vista	1.80
Brookfield & University	0.75

6.4.3 Permitting

The State Water Resources Control Board (SWRCB) and the State Department of Health Services (DHS) have regulatory and permitting authority over recycled water projects in the State of California. The City of Roseville must have a Master Water Reclamation Permit from the Central Valley Regional Water Quality Control Board (RWQCB). When facilities are added to the Recycled Water System, a Title 22 Engineering Report is normally prepared and submitted to DHS. When considered complete, DHS will forward it to the RWQCB, and it will be incorporated into the Master Water Reclamation Permit when that permit is updated.

The City has been operating successfully under Master Reclamation Permit No. 97-147, and it is understood that a new permit has been adopted by the Regional Board recently.

6.4.4 Funding

The following are the possible funding sources for the projects in this report:

- Connection Fees – Currently, the City does not collect a connection fee for recycled water connections. A connection fee analysis could be performed and connection fees collected would fund regional facilities necessary to serve new developments.
- Developer/Community Facilities District – In this financing scenario, developer funded community facilities would be shared through reimbursement agreements.

Pipelines to Urban Growth Areas

Recycled water pipelines to the UGAs will be paid for by the UGA developers. Individual UGA developers will be responsible for the construction of the recycled water transmission pipeline from the upstream UGA to their connection point with a pipe diameter appropriate to the peak day July recycled water demand. UGAs will also be responsible for upsizing recycled water pipe upstream of their location. As an example, Curry Creek North will need an 8-inch pipe to deliver recycled water. The 8-inch section of pipe connecting Creekview downstream to Curry Creek North will be paid for by Curry Creek North. Since three UGAs are downstream, the 8-inch pipe will need to be upsized to a 24-inch pipe. The upsizing cost will be split amongst the other three UGAs, proportional to their recycled water demand. This process is continued down the recycled water pipeline to the Curry Creek South/Sierra Vista connection point. Since Placer Vineyards is the only user on the pipe beyond the Morgan Creek Golf Course connection point, Placer Vineyards will pay the full installation cost of the 24-inch pipe. Further details of pipeline costs are found in an attachment to *TM 5b – Alternatives Development and Evaluation for Recycled*

Water Distribution System in **Appendix S**. Developers will be required to reimburse the City (or other funding party) if the transmission pipeline is built before the UGA undergoes construction.

6.4.5 CEQA/NEPA Compliance

California Environmental Quality Act (CEQA) review will be conducted by the City of Roseville for Regional Facilities. The focus of the CEQA review will be construction-related impacts. UGA CEQA review, including impacts associated with service area growth, changing impacts of discharge on the environment, and cumulative impacts of multiple projects, will be the responsibility of the UGA developers. The letter from the City of Roseville to Jim Durfee dated April 26, 2005 (**Appendix T**) provides guidance for the preparation of environmental impact documents, consistent with the requirements of CEQA, and the needs of SPWA to ensure that it can add regional facilities to meet its member agencies' facility needs when new development areas require service according to SPWA's Agreements.

Chapter 7 CEQA Analysis to Support SPWA Regional Wastewater Service

7.1 Background

The EIR associated with the *1996 Roseville Regional Wastewater Treatment Service Area Master Plan* (1996 Master Plan) was certified by the City of Roseville in November 1996 and was considered by the SPWA in October 2000 as part of the formation of a Joint Powers Agreement (JPA). The JPA was formed by the City of Roseville, SPMUD, and Placer County. The WWTP EIR identifies the wastewater service area and contains the assumptions used to identify and design wastewater conveyance and treatment facilities. Wastewater service within the service areas is based on a first-come, first-served basis as outlined in the Funding Agreement. The purpose of this chapter is to provide SPWA participants and local agencies that function as lead agencies relative to CEQA with the process and scoping guidelines they will need to ensure adequate CEQA documentation is prepared for land use actions that relate to SPWA providing regional wastewater service to areas covered by those actions.

7.2 Adequacy of Certified EIRs (as of June 2004)

Ten annexation areas to be included in the 2005 Regional Service Area are listed in **Table 7-1**. For these areas, CEQA compliance is sufficient to be included in the 2005 Regional Service Area. No further CEQA documentation is necessary.

Table 7-1: Annexation Areas Considered for Inclusion in Regional Service Area, as defined by 2005 Regional Service Area Boundary

Project Name	Service Provider	LAFCO Effective Date	CEQA Compliance	Total Project Acres	Acres Outside of the Regional Service Boundary
West Roseville Specific Plan	City of Roseville	8/18/2004	EIR	3,162	1,966
Pleasant Grove Wastewater Treatment Plant	City of Roseville	4/18/2001	EIR	180	180
Clover Valley Lakes	SPMUD	2/16/1998	EIR	642	642
Loomis Hills Estates	SPMUD	Pending	EIR	322	202
Sierra College	SPMUD	5/1/2003	Negative Declaration	375	244
Poppy Ridge	SPMUD	4/19/2004	Negative Declaration	20	20
Clark Powers Elem. School	SPMUD	3/14/2003	Exemption	10	10
Miller Annexation	SPMUD	9/24/2004	Exemption	10	10
Reyneveld Annexation	SPMUD	2/27/2003	Exemption	3	3
Cook Annexation	SPMUD	3/2/2004	Negative Declaration	0.1	0.1
			Total	***4,724***	***3,277***

7.3 Long Term CEQA Strategy for Projects in SPWA Service Area

7.3.1 CEQA Responsibility and Approval Authority among Local Agencies with Land Use Authority, SPWA and the Participants

The CEQA process for UGAs and/or Densification/Intensification (D/I) projects is initiated by the local jurisdiction with land use authority. This could include any of the following agencies that receive sewer service from SPWA: Placer County, the City of Roseville, the City of Rocklin, and the Town of Loomis. These agencies are collectively referred to as local "Lead Agencies." Local Lead Agencies would be the first agency to take discretionary action relating to the approval of a proposed UGA and/or D/I project. As a result, they would serve as the CEQA Lead Agency and be responsible for the first tier of the CEQA document for the UGA or D/I project.

SPWA serves as a funding and financing authority for the construction of Regional Wastewater Facilities. In doing so, the SPWA acts as a CEQA "Responsible Agency." As a Responsible Agency, SPWA relies on the UGA or D/I project CEQA documentation prepared by the local Lead Agencies when taking discretionary actions related to funding or financing. SPWA does not act as a Lead Agency.

The City of Roseville owns and operates the Regional Wastewater Facilities on behalf of the SPWA partner agencies. In this capacity, the City maintains the necessary permits to process and discharge treated wastewater (i.e., NPDES permits from the Regional Water Quality Control Board), and approves design and carries out construction of any new or expanded Regional Wastewater Facilities. This includes approvals such as construction documents, bid authorizations, and award of construction contracts. In this role, the City acts as a Lead Agency.

7.3.2 Guidance to Ensure Adequate CEQA Review by Local Lead Agencies

The following is intended to assist local Lead Agencies when determining the proper scope and analysis for CEQA documentation of UGA and D/I project wastewater issues.

Wastewater Issues of Concern

In general, the following conditions create CEQA issues of concern for the SPWA, the City of Roseville, or the SPWA partner agencies when fulfilling their future CEQA responsibilities:

- The creation of conditions that may exceed the capacity of Regional Wastewater Facilities;
- The creation of conditions that may exceed the wastewater quantity analyzed or certified in the 1996 WWTP EIR;
- Installation of new Regional Wastewater Facilities;
- Expansion of Regional Wastewater Facilities, including conveyance and recycled water storage and distribution infrastructure;
- Modifications of approved SPWA service area boundaries; and,
- The creation of conditions that exceed permitted discharges from the Regional WWTPs or exceed the ability to handle offsite disposal or reuse of biosolids.

The Scope of CEQA Analysis

In order for the CEQA document prepared for a UGA and/or D/I project to be complete, and therefore adequate for subsequent use by SPWA and partner agencies as discussed above, it must contain project-level analysis of the following, at a minimum:

- Construction and operation of new wastewater collection and conveyance facilities;
- Supply and demand of recycled water and construction and operation of new recycled water storage and distribution infrastructure and facilities;
- Alteration of the quality and/or quantity of discharges from wastewater treatment facilities beyond discharge levels permitted under the current (as of the time of discretionary action by the CEQA lead agency) NPDES discharge permits, and production of biosolids needing offsite disposal and/or reuse in excess of June 2004 permitted capacity;
- Construction and operation of additional wastewater treatment facilities required to serve the proposed UGA or D/I project (beyond those considered documents published as June 2004);
- Delineation of areas in each UGA that are outside the 2005 Regional Service Area boundary, and documentation of 1) wastewater flow and recycled water demands in quantities in excess of what is included in the 1996 Master Plan and EIR or more current documents, and/or 2) wastewater flow and recycled water demands generated from areas outside the 2005 Regional Service Area boundary;
- Inducing growth as a result of removing obstacles of growth;
- Potential cumulative effects associated with other past, present, or foreseeable future projects; and,
- Alternatives analysis for each of the systems (i.e., wastewater collection, treatment, disposal and recycled waster storage and distribution) listed above.

For projects inside the 2005 Regional Service Area boundary, and if those projects are developed at densities consistent with this Systems Evaluation, this Systems Evaluation project can be used as the technical basis for the CEQA analysis. If densities are greater than those in the Systems Evaluation, then the individual CEQA analysis must be developed for the project.

Customized Initial Study Checklist

To further assist local Lead Agencies with the identification and analysis of wastewater and recycled water CEQA issues that may not be specifically covered in the above bullets, a customized "initial study checklist" was developed, and is included in **Appendix T** of this Systems Evaluation. The checklist should be used as a tool to aid in the identification of issues that pertain to the construction and installation of wastewater collection and conveyance infrastructure, recycled water storage and distribution infrastructure, and discharges that could result in, or contribute to, exceeding permitted wastewater treatment and disposal capacity.

Mitigation Measures for Significant Adverse Impacts

It is expected that CEQA documents prepared by local Lead Agencies will identify and provide CEQA analysis for all impacts to Regional Wastewater Facilities necessary to implement the UGA or D/I project. Local Lead Agency CEQA documents prepared for UGA and D/I projects shall only defer mitigation of the construction of WWTPs. All other mitigation measures shall be addressed.

The local Lead Agency would need to ensure, through CEQA mitigation, that building permits for related UGAs and/or D/I projects are withheld until all required permit modifications are secured, and financing for Regional Wastewater Facilities has been approved by the SPWA. As such, a mitigation measure similar to the following should be included in UGA and/or D/I project CEQA documents as appropriate:

Prior to obtaining building permits that would cause total wastewater flows from the UGAs to exceed the flows and loads allocated in the 1996 Master Plan and EIR along with the flow in the most recent certified EIR, the applicant shall demonstrate that the treatment plant and disposal capacity will be expanded consistent with the UGA project and related wastewater analyses contained in the UGA EIR and supporting studies. This includes demonstrating that all necessary permits to discharge the treated flow are in effect. The applicant shall also demonstrate that the timing of the plant expansion will be adequate to serve the UGA without impeding other planned development. Further, the applicant shall implement all relevant mitigation measures identified in the 1996 Master Plan and EIR.

Chapter 8 Systems Evaluation with Brookfield UGA Included

8.1 Introduction

This chapter is intended to examine the impacts of the Brookfield UGA on this Systems Evaluation. The Brookfield UGA is addressed separately in this chapter because it was not originally identified as a UGA for this project, although it was identified as a future planning area. Impacts to land use, the trunk sewer system, WWTP expansion requirements, and the recycled water system are analyzed on an incremental basis – over and above the base results of the Systems Evaluation, were presented in *TM 11a – Impacts on Facilities due to Brookfield UGA* (Appendix Y), and are summarized below. **Figure 8-1** shows the location of the Brookfield UGA in relation to the Pleasant Grove WWTP and other UGAs in the vicinity.

8.2 Brookfield Land Use & Flow Projections

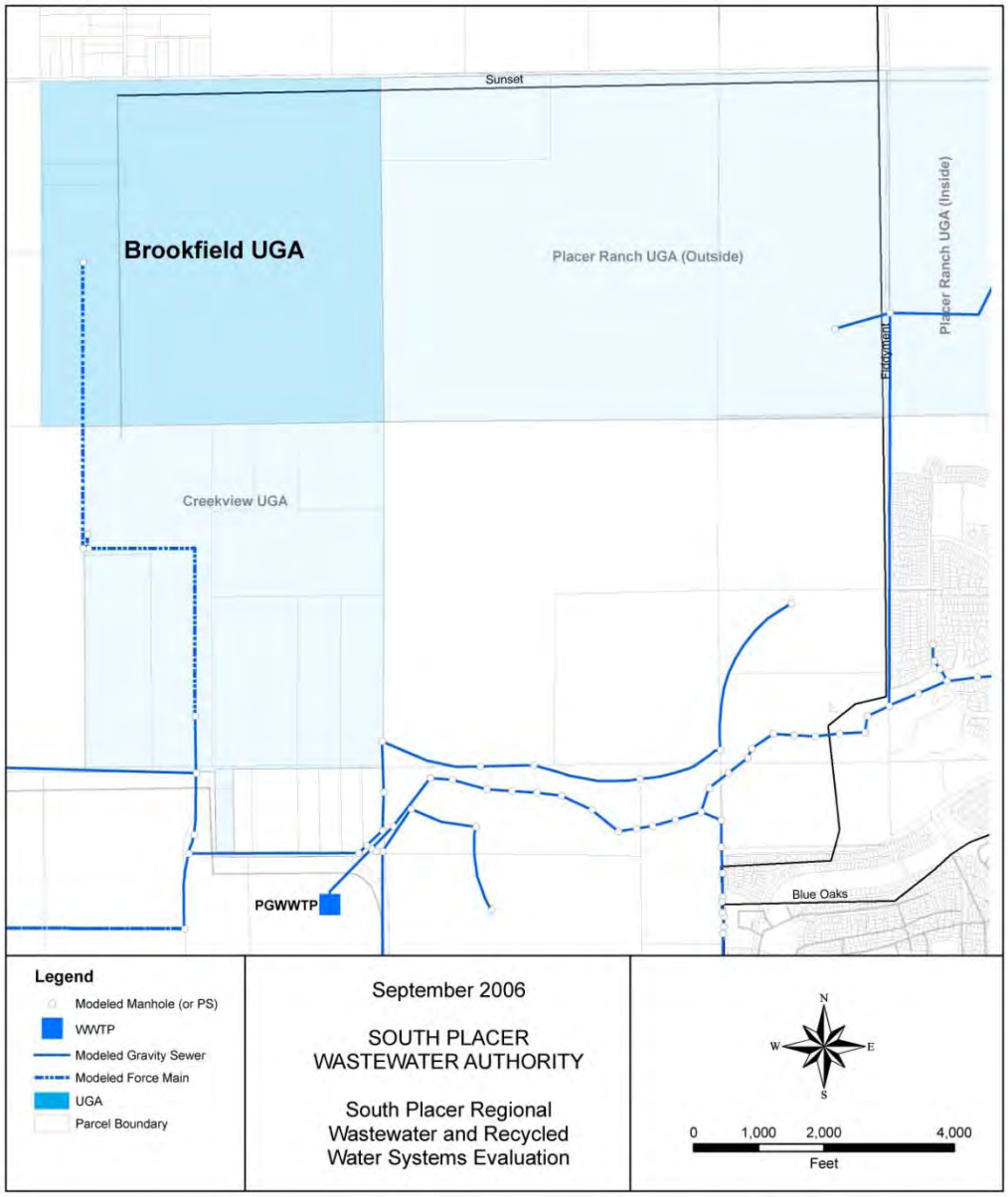
Preliminary land use information provided for this analysis was used to develop flow projections. Unit flow factors measuring the base sanitary flow (BSF), not including groundwater infiltration, from the Systems Evaluation were used to generate projected flows by land use category. The flow projections are presented in **Table 8-1**.

Table 8-1: Land Use and BSF Flow Projections for Brookfield UGA

SPWA Land Use Designation	Acres included in Brookfield UGA	BSF Unit Flow Factor	Units	Buildout BSF Projection (gpd)
Commercial	13.6	800	gpd per acre	10,880
Heavy Industrial	0	800	gpd per acre	0
Light Industrial	0	800	gpd per acre	0
Mixed Use	0	2,160	gpd per acre	0
Public/Quasi-Public	2	620	gpd per acre	1,240
Schools	22	160	gpd per acre	3,520
Residential 1 DU [a]	139.1	180	gpd per du	150,228
Residential 2 DU [b]	173.9	180	gpd per du	375,624
Residential 3 DU	0	180	gpd per du	0
Residential Mult. DU	56.9	1920	gpd per acre	109,248
Open Space	192.1	0	gpd per acre	0
Parks > 10 Acres	0	10	gpd per acre	0
Vacant	0	0	gpd per acre	0
Streets	83.5	0	gpd per acre	0
Total BSF	***683.1***	***--***	***--***	***0.651 mgd***

Footnote:
a. Assumes 6 dwelling units per acre.
b. Assumes 12 dwelling units per acre

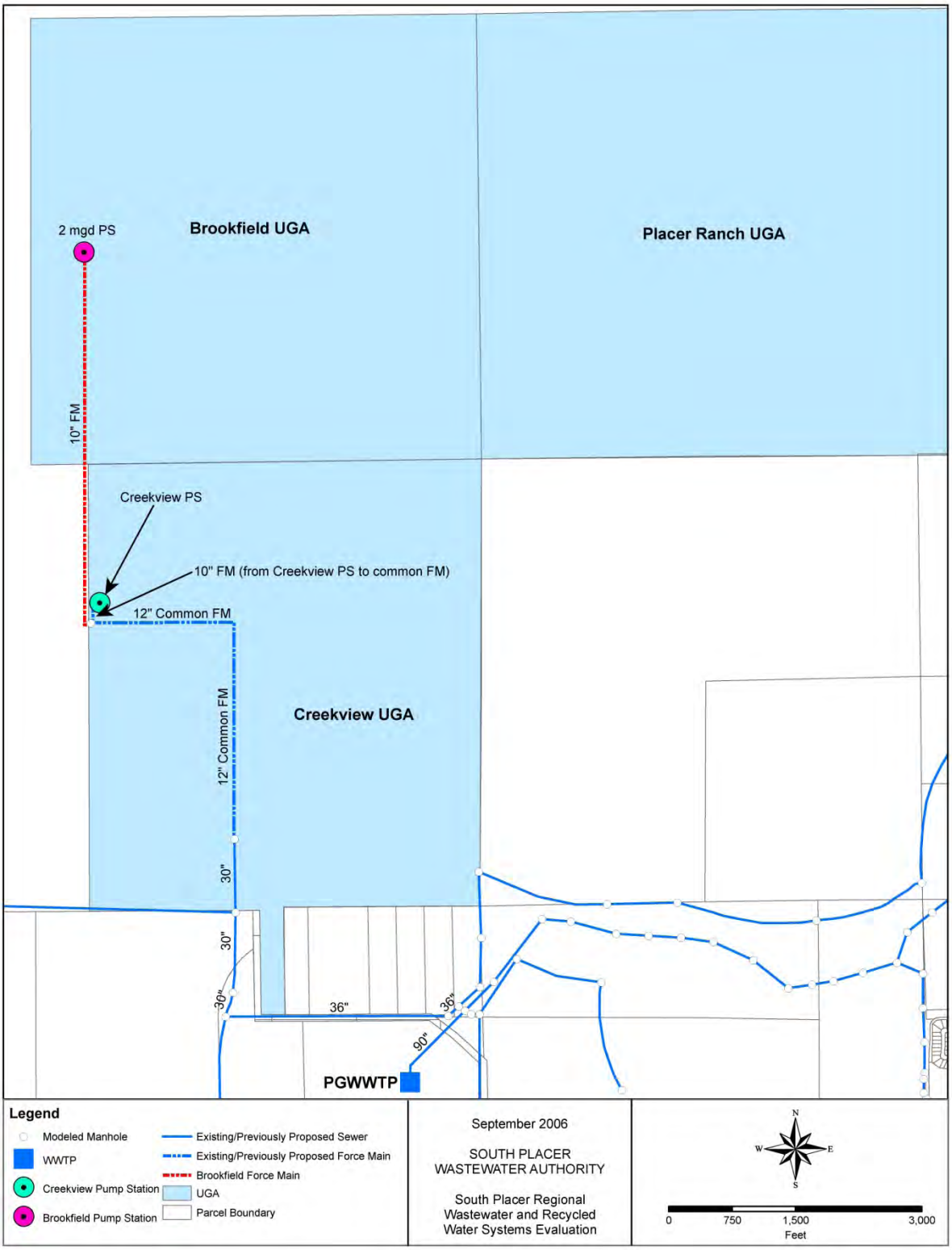
Figure 8-1: Location of Brookfield UGA



8.3 Brookfield Impacts on Trunk Sewer Evaluation

The hydraulic model was used to route projected Brookfield wastewater flows through the trunk sewer system and determine potential impacts of the flows on routing and sizing these sewer pipelines. Based on available land use maps, USGS topographic information, the proposed layout for Placer Parkway, the proposed locations for other trunk sewer facilities in the vicinity, and discussions with City of Roseville staff, it was decided to route Brookfield flows through the Creekview UGA to the south. For planning purposes, it was assumed that Brookfield flows will be pumped from a low spot in the Brookfield UGA to a common force main shared by Creekview and Brookfield. **Figure 8-2** illustrates the proposed layout.

Figure 8-2: Proposed Brookfield Routing



The hydraulic model was run under buildout design conditions (i.e., buildout land use and a design storm) to determine the adequacy of June 2004 and proposed trunk sewer facilities for this area. The model was run with and without the proposed improvements presented in Section 4.5.3 of Chapter 4 (under Improvement Project 7 - Area L). Under design PWWF conditions, approximately 1.66 mgd enters the proposed Brookfield pump station (for planning purposes, the pump station has been assumed to be capable of handling up to 2 mgd). Based on the modeling results, the need for the proposed improvements discussed in Section 4.5.3 of Chapter 4 were reinforced, as significant surcharging along certain reaches would result without those improvements in place. By increasing the sizes of the existing (as of April 2007) 18- and 24-inch gravity sewers to 30- and 36-inches, respectively, as was proposed in Section 4.5.3, there appears to be adequate capacity to accommodate Brookfield. The 10-inch force main that was originally proposed for conveying flows from the Creekview UGA towards the existing (as of April 2007) 18-inch gravity sewer (or the 30-inch gravity sewer after implementing the recommendations in Section 4.5.3 of Chapter 4), was undersized to adequately convey the additional flows from Brookfield. To address this deficiency, the proposed force main, which is now proposed as a common force main, is proposed to be increased to 12-inches. The hydraulic model of the trunk sewer system was revised to reflect that modification. No other deficiencies were observed as a result of including Brookfield flows in the regional trunk sewer system. **Table 8-2** summarizes the collection system capital costs associated with the addition of the Brookfield UGA. Such capital facilities would be expected to be provided by the UGA developer, as well as the facility financing.

Table 8-2: Brookfield Impact on Collection System Capital Costs [1]

Item	Quantity	Unit Cost ($)	Estimated Construction Cost ($)	Estimated Capital Cost [2] ($)
10-inch force main for Brookfield	4,450 lf	150	668,000	868,000
2 mgd pump station for Brookfield	1 ea	1,500,000	1,500,000	1,950,000
		Subtotal	**2,168,000**	**2,818,000**
12-inch common force main for Brookfield and Creekview	4,100 lf	175 [3]	718,000	933,000
10-inch force main for Creekview [4]	4,100 lf	150	(615,000)	(800,000)
		Difference (Subtotal)	**103,000**	**133,000**
		Total Cost	**2,271,000**	**2,951,000**

Footnotes:

1. This table is for informational purposes only. These costs have been developed utilizing a unit cost table representative of municipal sewer projects in the SPWA area. Actual sewer infrastructure costs for each extension project will be the responsibility of the developer(s).
2. Includes 30 percent contingency.
3. Linearly interpolated from PVC force main unit costs in Table 4-8.
4. Previously proposed force main for Creekview UGA.

8.4 Brookfield Impacts on Wastewater Treatment Plant Expansion Requirements

Brookfield flows are planned to be routed to the Pleasant Grove WWTP. As summarized in Table 3-7, total ADWF flows to the PGWWTP, with Brookfield included, are approximately 24.1 mgd. This flow represents a less than 1 percent difference from the ADWF of 24.0 mgd, which has been assumed for expansion requirement and planning purposes at the PGWWTP (see Table 5-1). The sizing of the treatment facilities recommended in Chapter 5 would not be affected by this small change in projected ADWF. No changes are needed to the treatment plant expansion requirements as a result of the addition of the Brookfield UGA. Buildout ADWF projections for Brookfield are presented below in **Table 8-3**.

Table 8-3: Land Use and ADWF Flow Projections for Brookfield UGA

SPWA Land Use Designation	Acres / DUs included in Brookfield UGA	ADWF Unit Flow Factor	Units	Buildout ADWF Projection (gpd)
Commercial	13.6	850	gpd per acre	11,560
Heavy Industrial	0	850	gpd per acre	0
Light Industrial	0	850	gpd per acre	0
Mixed Use	0	2,300	gpd per acre	0
Public/Quasi-Public	2	660	gpd per acre	1,320
Schools	22	170	gpd per acre	3,740
Residential 1 DU [1]	139.1 ac. / 835 DUs	190	gpd per du	158,574
Residential 2 DU [2]	173.9 ac. / 2,087 DUs	190	gpd per du	396,492
Residential 3 DU	0	190	gpd per du	0
Residential Mult. DU	56.9	2,040	gpd per acre	116,076
Open Space	192.1	0	gpd per acre	0
Parks > 10 Acres	0	10	gpd per acre	0
Vacant	0	0	gpd per acre	0
Streets	83.5	0	gpd per acre	0
Total ADWF	***683.1***	***--***	***--***	***0.73*** [3] ***mgd***

Footnote:
1. Assumes 6 dwelling units per acre.
2. Assumes 12 dwelling units per acre.
3. Brookfield developers supplied several sets of preliminary land use data during this project, resulting in range of projected ADWF from 0.69 (the most recent) to 0.73 mgd. The largest of these projections, 0.73 mgd, was used for this analysis.

As discussed in Chapter 9 (which also addresses the impacts on WWTP expansion requirements due to intensification and rezones), the sizing of the treatment facilities recommended in Chapter 4 would not be affected by the small change in projected ADWF due to the addition of the Brookfield UGA. As a result, no changes are needed to the treatment plant expansion requirements for the Pleasant Grove WWTP, as presented in Chapter 4, as a result of the addition of the flows projected for the Brookfield UGA.

As shown on **Figure 9-6**, the buildout revised timeline for the Pleasant Grove WWTP as a result of Brookfield (and intensification and rezones) does not have a significant impact on the recommended sizing or phasing of the expansions at the Pleasant Grove WWTP.

8.5 Brookfield Impacts on Recycled Water System Evaluation

At the time the Recycled Water System Evaluation was conducted, no recycled water demands had been identified for the Brookfield UGA. Due to the preliminary level to which planning for the development has been conducted, no firm recycled water demands have been developed at this time. However, due to the proximity of the Brookfield UGA to proposed recycled water infrastructure in Creekview and Placer Ranch, it is anticipated that delivery of recycled water to meet buildout demands in Brookfield is indeed feasible. The Pleasant Grove WWTP, in addition to the Dry Creek WWTP, will be able to provide all projected recycled water flows to June 2004, proposed and planned demands. In addition, Brookfield's demands could also be met solely by the Pleasant Grove WWTP supply. It is expected that Brookfield, as is the case for all other UGAs, would not be allocated more recycled water on a daily flow basis than Brookfield will produce in July on a daily basis. As the planning process for Brookfield continues,

recycled water demands will be developed; at that time, the sizing of any proposed recycled water infrastructure that would serve Brookfield should be reexamined to ensure adequacy. In the absence of better planning information and firm recycled water demands, inclusion of the Brookfield UGA is not expected to impact the findings and results of the Recycled Water System Evaluation.

8.6 Conclusions

Based on the analyses summarized above, there do not appear to be any significant impacts to the trunk sewer evaluation, WWTP expansion requirements, recycled water system evaluation, or intensification and rezones analysis as a result of including the Brookfield UGA. The additional costs associated with the changes in recommendations for June 2004 and proposed collection system (force main and pump station) facilities are summarized in Table 8-2 above.

Chapter 9 Intensification & Rezones

9.1 Introduction

This chapter is intended to summarize the methodology that was used to adjust the land use database to account for parcels within Rocklin and Roseville that may intensify or be rezoned in the future. Once intensified or rezoned, these parcels may generate higher wastewater flows. The revised flows were incorporated into a separate buildout modeling scenario for the SPWA model.

9.2 Intensification Scenarios

This section is intended to clarify and summarize the land use scenarios that were modeled as part of this Systems Evaluation. Each scenario is intended to represent a model run associated with a specific land use database, which contains the land use category, number of units (e.g., acres or dwelling units), and unit flow factor for each parcel in the SPWA service area associated with that particular scenario. A more detailed discussion is presented in *TM 9a – Land Use Scenarios* in **Appendix U**. The scenarios for this Systems Evaluation are listed below:

June 2004

June 2004 development within the 2005 Regional Service Area boundary, as defined in Chapter 1 *(Land Use)*.

Buildout

Buildout development within the 2005 Regional Service Area boundary based on the City and County General Plans and Specific Plans as of June 2004, plus UGAs outside of the 2005 Regional Service Area boundary.

Buildout Intensification

Buildout with UGAs (as defined in the "Buildout" scenario above) plus any approved or near-certain changes in zoning or development intensity for major planned development projects within Roseville, plus intensification in designated redevelopment areas in Roseville, Loomis, or Rocklin.

Each land use database for the SPWA model includes all parcels within the 2005 Regional Service Area boundary. UGAs located outside of the boundary were handled as "point sources" in the model, as were West Roseville, and the "inside" portions of the Placer Vineyards and Placer Ranch UGAs, all of which are located within the 2005 Regional Service Area boundary (Placer Vineyards and Placer Ranch are both partially inside and partially outside the 2005 Regional Service Area boundary).

9.3 Redevelopment Land Use

The City of Roseville Planning Department provided information on 19 areas with changes in zoning, land use, or development intensity that have been approved since June 2004 or are considered likely to be approved in the near future. The City also provided a GIS shape file with each of these areas shown as a discrete polygon. Based on the GIS rezone area polygons, the specific parcels included in each of the redevelopment (rezone) areas were determined. It should be noted that in some cases, the areas included portions of parcels rather than entire parcels. In these cases, the parcel was considered to be included in the rezone area if the majority of the parcel area fell within the rezone area polygon. A list of the rezone areas is provided in **Table 9-1**. These areas are also illustrated in Figure 9-1. Additional information for these areas is included in *TM 9b – Methodology for Adjusting Land Use for Parcels with Approved or Near-Certain Zoning or Development Changes ("Rezone Parcels")* in **Appendix V**.

The project team, following discussions with the City of Roseville and the City of Rocklin planning departments, provided GIS information on nine areas in Roseville and Rocklin with changes in land use or development intensity that will possibly occur in the future. A list of these redevelopment areas is provided in **Table 9-2**. These areas are also illustrated in **Figure 9-2**, **Figure 9-3**, and **Figure 9-4**. Additional information for the areas provided is included in *TM 9c – Land Use Intensification Methodology for Parcels within Redevelopment Areas in Roseville and Rocklin* in **Appendix W**.

Table 9-1: Redevelopment (Rezone) Areas

Rezone Area	SPWA Agency	Area (acres)	Comments
1	Roseville	96	Light Industrial to Single Family Residential
2	Roseville	45	Light Industrial to Single Family Residential
3	Roseville	13	Single Family Residential to Multi Family Residential
4	Roseville	10	Commercial to Single Family Residential
5	Roseville	26	Commercial to Multi Family Residential
6	Roseville	3	*Part of Historic District redevelopment area*
7	Roseville	32	Commercial to Multi Family Residential
8	Roseville	11	Commercial to Breton Village
9	Roseville	20	Commercial to Multi Family Residential
10	Roseville	287	Hewlett-Packard
11	Roseville	10	Commercial to Multi Family Residential
12	Roseville	17	Commercial to Multi Family Residential
13	Roseville	19	Commercial to Multi Family Residential
14	Roseville	50	Convention Center
15	Roseville	16	*Most of Upper Riverside redevelopment area*
16	Roseville	0.3	*Part of Vernon redevelopment area*
17	Roseville	67	Heavy Industrial to Public/Quasi-Public
18	Roseville	49	Kaiser Hospital
19	Roseville	87	Galleria Mall

Table 9-2: Redevelopment (Intensification) Areas

Redevelopment Area	SPWA Agency	Area (acres)
Atlantic	Roseville	125
Fairgrounds	Roseville	55
Harding-Douglas	Roseville	207
Historic District	Roseville	130
Lower Riverside	Roseville	46
Sunrise	Roseville	45
Upper Riverside	Roseville	21
Vernon	Roseville	67
Rocklin Downtown Plan	SPMUD	135

Using land use GIS information, the project team identified the specific parcels included in each of the redevelopment (intensification) areas. It should be noted that in some cases, the areas included portions

of parcels rather than entire parcels. In these cases, a parcel was considered to be included in the redevelopment area if the majority of the parcel area fell within the redevelopment area boundary. A list of redevelopment (intensification) parcels along with their projected land use (as of June 2004), and proposed redevelopment land use is included in *TM 9c – Land Use Intensification Methodology for Parcels within Redevelopment Areas in Roseville and Rocklin* in **Appendix W**.

In Rocklin, the project team outlined specific land use changes for each parcel in the Downtown Plan. In this case, most of the Commercial and Industrial development will be converted to Mixed Use. The Downtown Plan also includes a new Open Space area that will not generate any flow.

In Roseville, specific redevelopment plans were not available and general assumptions were made about the proposed redevelopment land use category for given redevelopment areas. Two new redevelopment land use categories called *Intense* Commercial/ PQP/ Mixed Use and *Very Intense* Commercial/ PQP/ Mixed Use were developed. The Very Intense Commercial/ PQP/ Mixed Use land use category only occurs in the Historic District and Vernon District redevelopment areas. June 2004 land use categories within the redevelopment areas are anticipated to intensify as follows:

- Commercial to Intense Commercial/ PQP/ Mixed Use or Very Intense Commercial/ PQP/ Mixed Use
- Light Industrial to Intense Commercial/ PQP/ Mixed Use or Very Intense Commercial/ PQP/ Mixed Use
- Heavy Industrial to Intense Commercial/ PQP/ Mixed Use or Very Intense Commercial/ PQP/ Mixed Use
- Mixed Use to Intense Commercial/ PQP/ Mixed Use or Very Intense Commercial/ PQP/ Mixed Use
- Public/ Quasi Public (PQP) to Intense Commercial/ PQP/ Mixed Use or Very Intense Commercial/ PQP/ Mixed Use
- Single-Family Residential to Multi-Family Residential (Note: A limited number of Single-Family Residential parcels were converted to Very Intense Commercial/ PQP/ Mixed Use at the direction of the City of Roseville. These parcels are identified in *TM 9c – Land Use Intensification Methodology for Parcels within Redevelopment Areas in Roseville and Rocklin* in **Appendix W**).

The unchanged parcels within each redevelopment area maintained the unit flow factors specified in and Chapter 4. Similarly, parcels in the redevelopment areas that will be rezoned with land use categories other than Intense of Very Intense Commercial/ PQP/ Mixed Use (e.g., parcels being rezoned from Commercial to Industrial) were assigned unit flow factors according to the information presented in Chapters 3 and 4.

Figure 9-1: Redevelopment (Rezone) Areas in Roseville

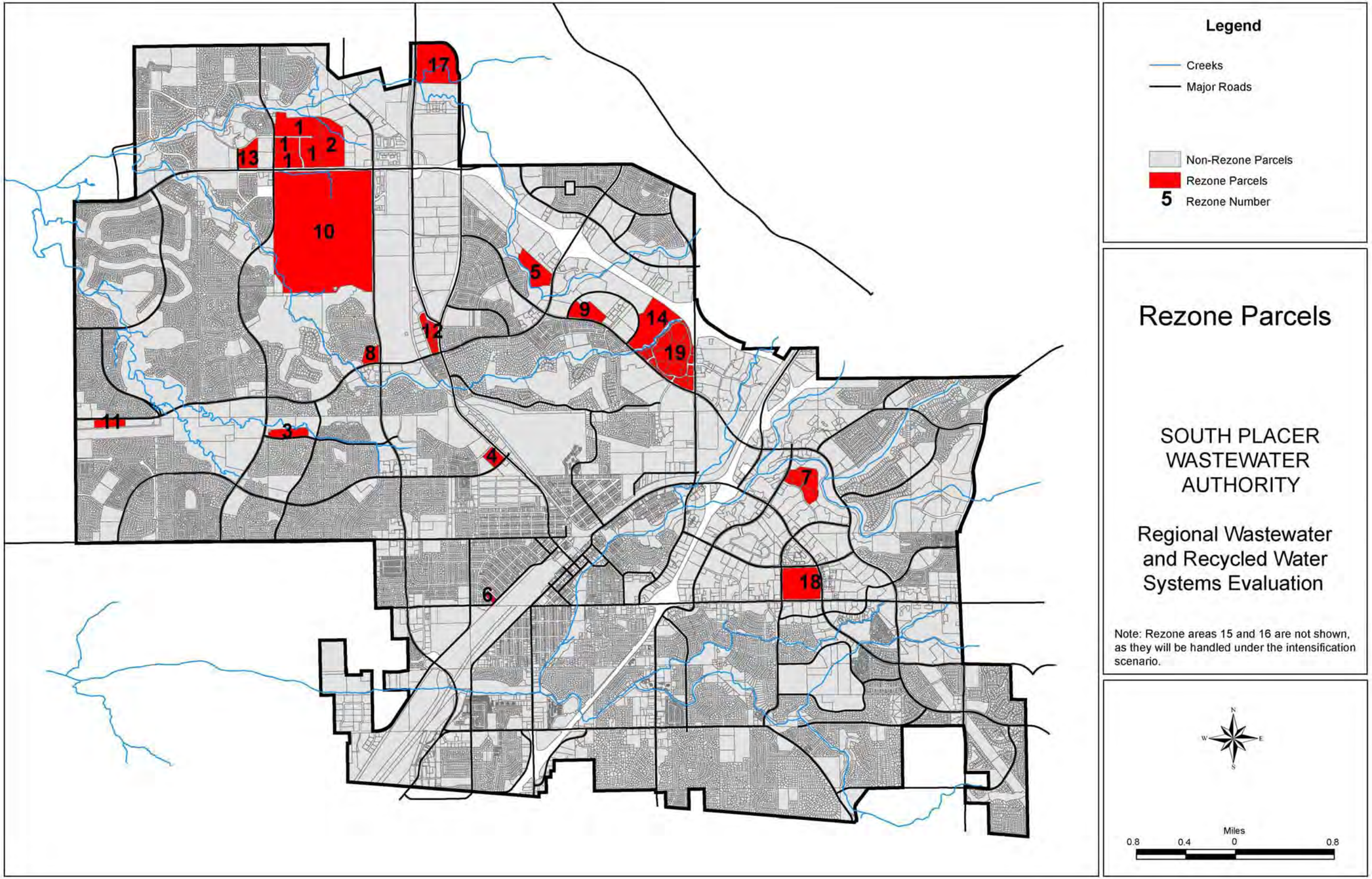


Figure 9-2: Intensification Area Map

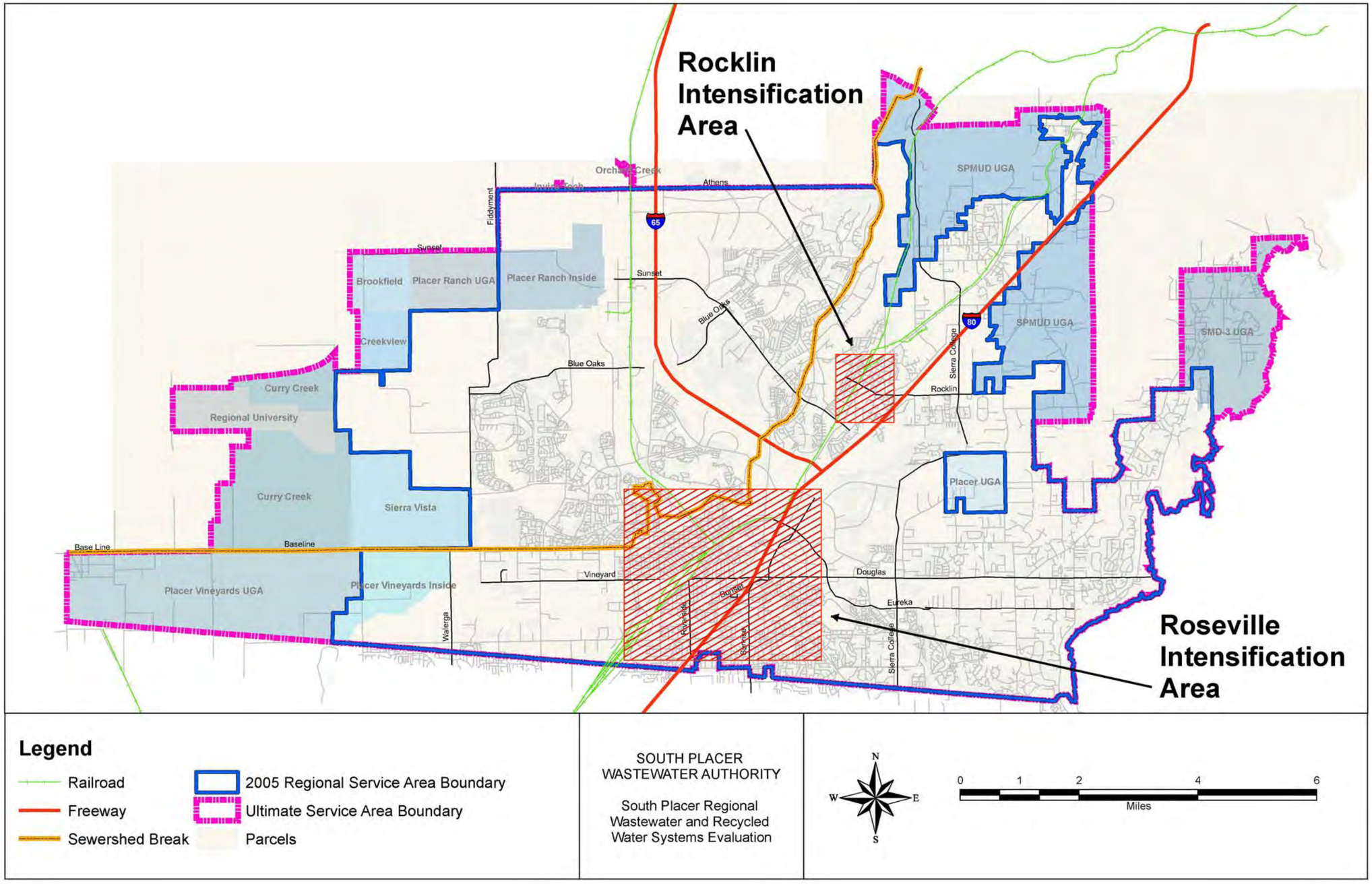


Figure 9-3: Redevelopment (Intensification) Areas in Roseville

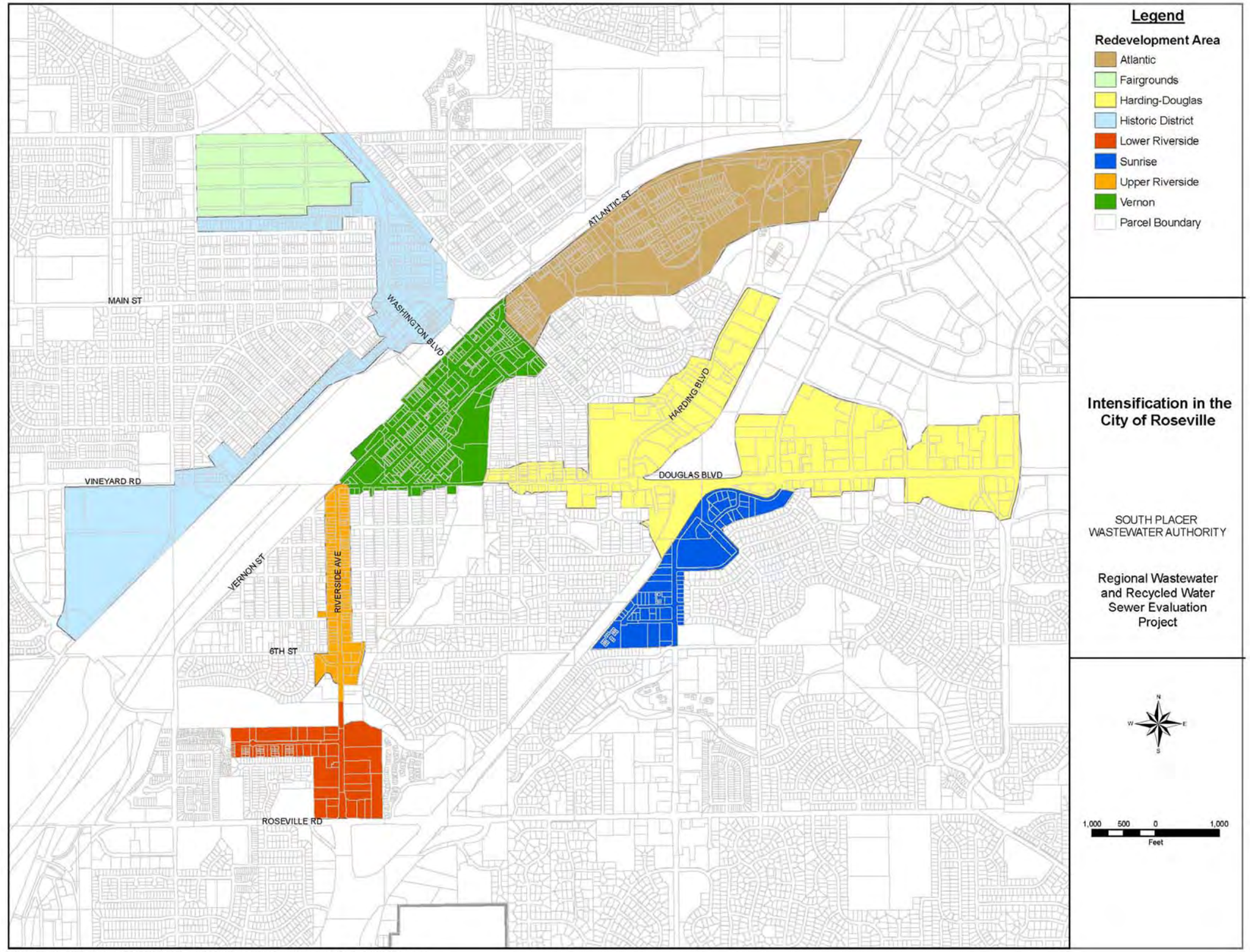
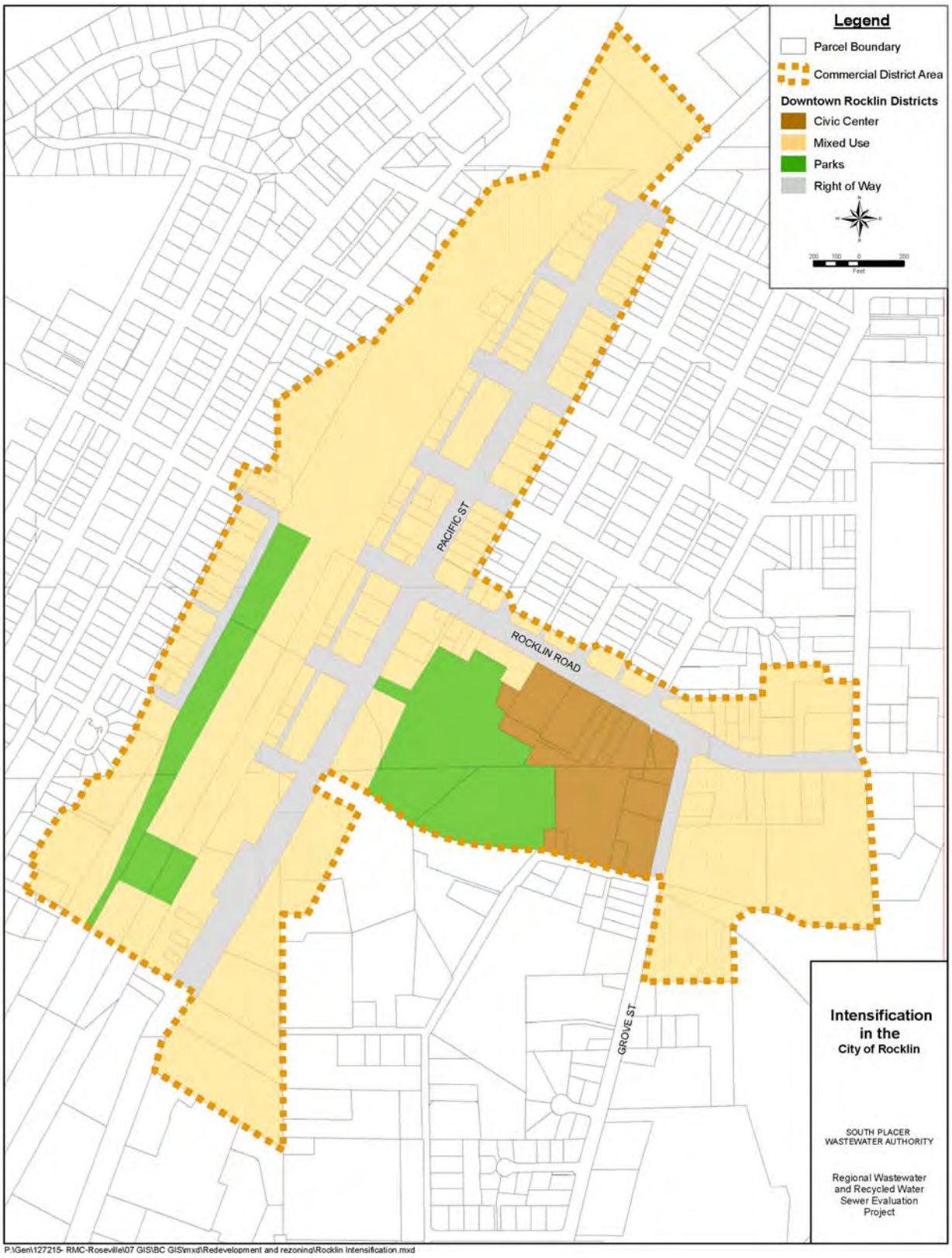


Figure 9-4: Redevelopment Areas in Rocklin



9.4 Updated Unit Flow Factors

The unit flow factors for intensified parcels within the redevelopment areas were increased as necessary to account for the intensification. An analysis performed by the project team indicated that the average floor to area ratio (FAR) in Roseville is 0.25 for retail/office/industrial development, as of June 2004. This information is provided in *TM 9c – Land Use Intensification Methodology for Parcels within Redevelopment Areas in Roseville and Rocklin* in **Appendix W**. The City of Roseville has indicated that future commercial redevelopment FAR may approach an average of 0.80 (i.e., 3.2 times the June 2004 average FAR) in each redevelopment area and an average of 3.0 (i.e., 12 times the June 2004 average FAR) on a limited number of parcels in the Historic District and Vernon District redevelopment areas.

To develop a unit flow factor that adequately represents the amount of base sanitary flow (BSF from trunk sewer analyses) or dry weather flow (ADWF from WWTP analyses) that may be generated in each redevelopment area, the June 2004 commercial average BSF unit flow factor of 800 gpd/acre or ADWF unit flow factor of 850 gpd/acre was multiplied by 3.2 (for 0.80 FAR) and 12 (for 3.0 FAR). The new unit flow factor that was used for the *Intense* Commercial/ PQP/ Mixed Use land use category is 2,560 gpd/acre (BSF) or 2,720 gpd/acre (ADWF). The new unit flow factor that will be used for the *Very Intense* Commercial/ PQP/ Mixed Use land use category is 9,600 gpd/acre (BSF) or 10,200 gpd/acre (ADWF). Both the previously defined unit flow factors and those appended for redevelopment are shown in **Table 9-3** and **Table 9-4** below.

Table 9-3: Average Base Sanitary Flow (BSF) Unit Flow Factors for Trunk Sewer Analyses

Land Use Designation	Units	Trunk Sewer Analyses BSF Unit Flow Factor [1]
Commercial	gpd per acre	800
Heavy Industrial	gpd per acre	800
Light Industrial	gpd per acre	800
Mixed Use	gpd per acre	2,160
Public/Quasi-Public	gpd per acre	620
Schools	gpd per acre	160
Residential 1 DU	gpd per DU	180
Residential 2 DU	gpd per DU	180
Residential 3 DU	gpd per DU	180
Residential 145 gpd/DU [2]	gpd per DU	145
Residential Multiple DU [3]	gpd per acre	1,920
Open Space	gpd per acre	0
Parks > 10 Acres	gpd per acre	10
Vacant	gpd per acre	0
Intense Com/PQP/MU	gpd per acre	2,560
Very Intense Com/PQP/MU	gpd per acre	9,600

Footnotes:

1. Does not include an allowance for dry season GWI. Dry and wet season GWI are applied on an area-specific basis.
2. Weighted Single Family/Multi Family UFF for Rezone Area 1.
3. The proposed Residential Multiple DU unit flow factor can also be represented as 130 gpd per DU.

Table 9-4: Average Dry Weather Flow (ADWF) Unit Flow Factors for WWTP Analyses

Land Use Designation	Units	WWTP Analyses ADWF Unit Flow Factor [1]
Commercial	gpd per acre	850
Heavy Industrial	gpd per acre	850
Light Industrial	gpd per acre	850
Mixed Use	gpd per acre	2,300
Public/Quasi-Public	gpd per acre	660
Schools	gpd per acre	170
Residential 1 DU	gpd per DU	190
Residential 2 DU	gpd per DU	190
Residential 3 DU	gpd per DU	190
Residential 145 gpd/DU [2]	gpd per DU	150
Residential Multiple DU [3]	gpd per acre	2,040
Open Space	gpd per acre	0
Parks > 10 Acres	gpd per acre	10
Vacant	gpd per acre	0
Intense Com/PQP/MU	gpd per acre	2,720
Very Intense Com/PQP/MU	gpd per acre	10,200

Footnotes:

1. Includes allowance for dry season GWI.
2. Weighted Single Family/Multi Family UFF for Rezone Area 1.
3. The proposed Residential Multiple DU unit flow factor can also be represented as 140 gpd per du.

9.5 Redevelopment Impact on Average Flows

Redevelopment resulted in an increase in projected average base sanitary flow (BSF) for the trunk sewer analyses and average dry weather flow (ADWF) for the WWTP analyses. The majority of the rezone area flow changes (areas 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, and 17) were negligible. **Table 9-5** and **Table 9-6** present summaries of the incremental BSF and ADWF, respectively, generated by the rezone and intensification areas.

Table 9-5: Redevelopment Impact on Average Base Sanitary Flow (BSF) for Trunk Sewer Analyses

Redevelopment Areas	Area		Incremental BSF (mgd)		Total Incremental BSF (mgd)
	Name	Acres	DCWWTP	PGWWTP	
Rezones [1]					
Rocklin [2]	n/a	n/a	0.00	0.00	0.00
	Subtotal	*0.00*	*0.00*	*0.00*	*0.00*
Roseville [3]	Rezone areas 1-14, 17-19	555	0.14	0.42	0.56
	Subtotal	*555*	*0.14*	*0.42*	*0.56*
	Rezone Subtotal	**555**	**0.14**	**0.42**	**0.56**
Intensification					
Rocklin [2]	Rocklin Downtown Plan	135	0.24	0.00	0.24
	Subtotal	*135*	*0.24*	*0.00*	*0.24*
Roseville [3]	Atlantic	125	0.07	0.00	0.07
	Fairgrounds	55	0.04	0.00	0.04
	Harding-Douglas	207	0.36	0.00	0.36
	Historic District	130	0.26	0.00	0.26
	Lower Riverside	46	0.08	0.00	0.08
	Sunrise	45	0.06	0.00	0.06
	Upper Riverside	21	0.03	0.00	0.03
	Vernon	67	0.40	0.00	0.40
	Subtotal	*696*	*1.31*	*0.00*	*1.31*
	Intensification Subtotal	**831**	**1.55**	**0.00**	**1.55**
	Total	***1,386***	***1.69***	***0.42***	***2.11***

Footnote:

1. Does not include rezone areas with negligible changes in projected flow (-0.01 mgd to 0.04 mgd), or rezone areas that were included in the analysis of intensification areas.
2. Inside SPMUD service area.
3. Inside City of Roseville service area.

Table 9-6: Redevelopment Impact on Average Dry Weather Flow (ADWF) for WWTP Analyses

Redevelopment Areas	Area		Incremental ADWF (mgd)		Total Incremental ADWF (mgd)
	Name	Acres	DCWWTP	PGWWTP	
Rezones [1]					
Rocklin [2]	n/a	n/a	0.00	0.00	0.00
	Subtotal	0	0.00	0.00	0.00
Roseville [3]	Rezone Areas 1-14, 17-19	555	0.17	0.50	0.67
	Subtotal	555	0.17	0.50	0.67
	Rezone Subtotal	**555**	**0.17**	**0.50**	**0.67**
Intensification					
Rocklin [2]	Rocklin Downtown Plan	135	0.25	0.00	0.25
	Subtotal	135	0.25	0.00	0.25
Roseville [3]	Atlantic	125	0.07	0.00	0.07
	Fairgrounds	55	0.04	0.00	0.04
	Harding-Douglas	207	0.38	0.00	0.38
	Historic District	130	0.28	0.00	0.28
	Lower Riverside	46	0.09	0.00	0.09
	Sunrise	45	0.07	0.00	0.07
	Upper Riverside	21	0.04	0.00	0.04
	Vernon	67	0.43	0.00	0.43
	Subtotal	696	1.39	0.00	1.39
	Intensification Subtotal	**831**	**1.64**	**0.00**	**1.64**
	Total	***1,386***	***1.81***	***0.50***	***2.31***

Footnote:

1. Does not include rezone areas with negligible changes in projected flow (-0.01 mgd to 0.04 mgd), or rezone areas that were included in the analysis of intensification areas.
2. Inside SPMUD service area.
3. Inside City of Roseville service area.

9.6 Hydraulic Model Modifications

The hydraulic model described in Chapter 4 was modified to include the addition of new flows (in excess of June 2004 flow projections) in the redevelopment (intensification and rezone) areas described above. The additional flows were loaded to the trunk sewer manhole nearest each redevelopment area. Applicable diurnal patterns were applied to the base sanitary flow projections. The commercial diurnal pattern was applied to the new *Intense* Commercial/PQP/Mixed Use and *Very Intense* Commercial/ PQP/Mixed Use land use categories. The following intensification/rezone area flow changes were negligible (-0.01 mgd to 0.04 mgd) and were not included in the model:

- Rezone Areas: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 17
- Intensification Areas: Upper Riverside

NOTE: Rezone areas 15 and 16 were handled as part of the Upper Riverside and Vernon redevelopment/intensification areas, respectively.

The remaining intensification/rezone area flow changes ranged from 0.04 mgd to 0.44 mgd. Flow projections for the rezone/intensification areas are presented in *TM 9c – Land Use Intensification Methodology for Parcels within Redevelopment Areas in Roseville and Rocklin* and *TM 9b –*

Methodology for Adjusting Land Use for Parcels with Approved or Near-Certain Zoning or Development Changes ("Rezone Parcels") in **Appendix W** and **Appendix V**, respectively. Total incremental flow projections for the areas are summarized in Table 9-5.

9.7 Trunk Sewer Impact of Intensification

The hydraulic model was run under the "Buildout Intensification" scenario with the intensification and rezone flow changes as described above. The model results indicate that the increased system flows due to intensification and rezoning have no adverse effects (above and beyond previously identified deficiencies) on the trunk sewer collection system. The only previously identified deficiency downstream of the intensification/rezone areas is in SPMUD, immediately downstream of the Rocklin intensification area. This intensification area did not noticeably change the previously identified buildout deficiency (i.e., surcharging of less than 1 foot).

9.8 WWTP Impact of Intensification

9.8.1 Expansion Requirements

The projected ADWF at buildout, including intensification, rezones, and the addition of the Brookfield UGA, is shown below for each service area.

Table 9-7: Total Buildout ADWF

Description of Area	Total Buildout ADWF (mgd)		
	DCWWTP	PGWWTP	Total
2005 Regional Service Area	14.82	15.66	30.49
UGAs	4.43	8.47	12.90
Rezones [1]	0.17	0.50	0.67
Intensifications [1]	1.64	0.00	1.64
Total	***21.06***	***24.63***	**45.70**

Footnotes:
1. Includes incremental ADWF only.

The treatment plant expansion requirements discussed in Chapter 5 were based on the following projected ADWF:

Table 9-8: ADWF for System Evaluation

Treatment Plant	ADWF (mgd)
Dry Creek	18 (buildout)
Pleasant Grove	24 (buildout)

For the Dry Creek service area, the revised projected ADWF of 21.06 mgd is less than 0.5 percent higher than the ADWF of 21 mgd used for the treatment plant expansion requirements in Chapter 5. For the Pleasant Grove service area, the revised projected ADWF of 24.63 mgd is only 2.6 percent higher than the ADWF of 24 mgd used in Chapter 5.

The sizing of the treatment facilities recommended in Chapter 5 would not be affected by these small changes in projected ADWF. No changes are needed to the treatment plant expansion requirements as a result of intensification, rezoning, and the addition of the Brookfield UGA.

9.8.2 Timing of Expansion

The following two figures show the timeline for buildout for each of the service areas, including intensification, rezoning, and the addition of Brookfield UGA. As shown on **Figure 9-5** and **Figure 9-6**, the revised timelines do not have a significant impact on the recommended size or phasing of the expansions at the two treatment plants.

The Dry Creek expansion would take place in two phases. Phase 1 would increase the plant capacity up to 14.5 mgd and would be on line in FY 2015/16. Phase 2 would be completed in FY 2023/24 and would increase the plant capacity up to the buildout flow estimate of 18 mgd, as shown in Figure 9-5.

The Pleasant Grove expansion would also take place in two phases. Phase 1 would increase the plant hydraulic capacity to 15 mgd, and would be on line in FY 2015/16. Phase 2 would be completed in FY 2022/23 and would increase the plant capacity up to the buildout flow estimate of 24 mgd.

Figure 9-5: Dry Creek - Projected Buildout Timeline and Phasing of Expansions

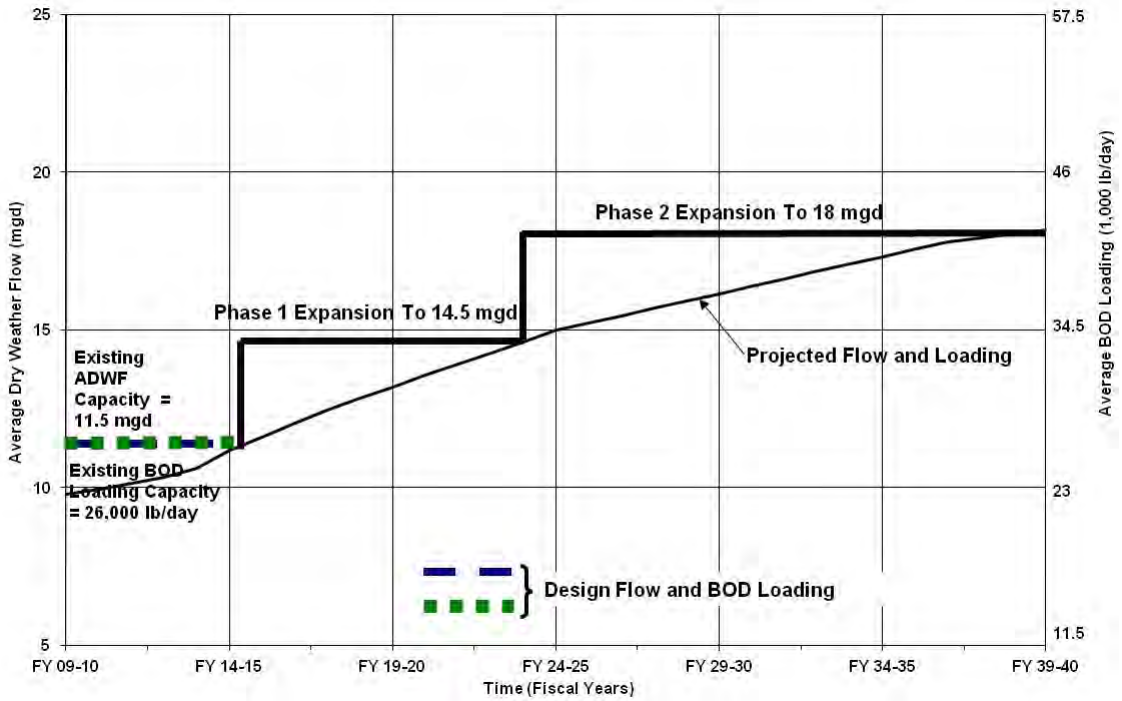
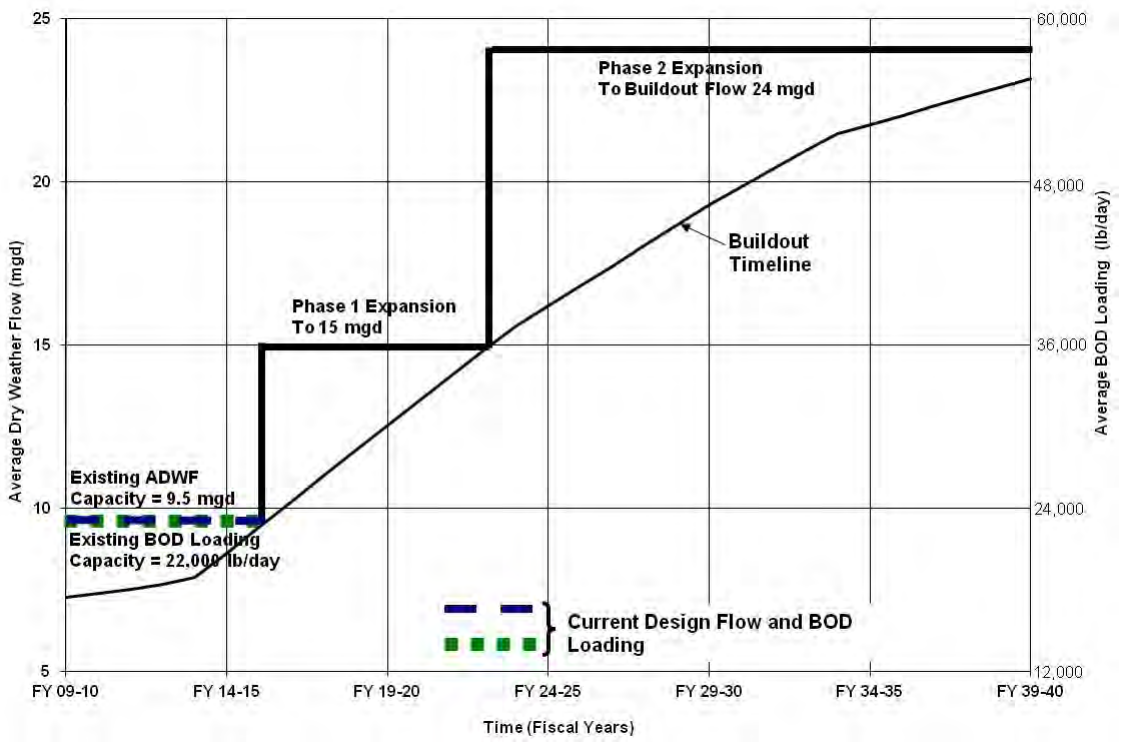


Figure 9-6: Pleasant Grove - Projected Buildout Timeline and Phasing of Expansions



Appendix A TM 1b – Current and Buildout Land Use

Technical Memorandum

SOUTH PLACER WASTEWATER AUTHORITY (SPWA) WASTEWATER AND RECYCLED WATER SYSTEMS EVALUATION PROJECT

Subject:	**June 2004 and Buildout Land Use – (TM No. 1b)**
Prepared For:	Art O'Brien – City of Roseville
Prepared by:	Pete Bellows/Chris Peters – Brown and Caldwell Andy Smith – RMC
Reviewed by:	Dave Richardson/Gisa Ju – RMC
Date:	November 2, 2005; updated October 31, 2006, January 24, 2008 & September 3, 2009
Reference:	0091-004 Task 1

0 Previous TM Publication and Updates

Since the initial publication of technical memorandum (TM) 1b on November 2, 2005, changes in information available for the South Placer Wastewater and Recycled Water Systems Evaluation (Systems Evaluation), as well as changes in the data, have resulted in the need to identify and update out-of-date information. As part of the June 2007 publication of the Systems Evaluation, an Update Sheet was prepared for this TM, and is included in **Attachment A**. Subsequent changes have resulted in the need for further updates of the TM. The newest version of the TM is consistent with the updates summarized in the 2009 Update Sheet which is included in Attachment B.

1 Introduction

This TM documents and provides a summary of the June 2004 and buildout land use estimates for the South Placer Wastewater Authority (SPWA) Systems Evaluation. The identification of the 2005 Regional Service Area boundary, development of the land use database, and evaluation of June 2004 and buildout land use scenarios are critical tasks in order to understand June 2004 and buildout wastewater production to properly plan for and design collection, conveyance, and treatment systems and facilities. The land use database developed for the 2005 Systems Evaluation Project and summarized in this TM will be used to:

- Project June 2004 and buildout wastewater flows for the SPWA Regional Service Area;
- Identify June 2004 deficiencies in the regional collection system and plan for buildout expansion;
- Determine routing options for conveying wastewater flow from buildout urban growth areas (UGAs) to SPWA Regional Treatment Plants; and
- Plan for buildout expansion of wastewater treatment facilities.

The planned rezoning and intensification scenario in Roseville and Rocklin will be handled as a separate scenario for land use planning and are not included in this TM.

This TM is organized as follows:

1. Introduction
2. Land Use Information Sources
3. 1996 and 2005 Regional Service Area Boundaries
4. Land Use within the 2005 Regional Service Area Boundary
5. Buildout Land Use within Urban Growth Areas
6. Land Use Database Documentation

2 Land Use Information Sources

The land use database for areas within the 2005 Regional Service Area boundary was developed by Environmental Science Associates, Inc. (ESA) based on the information sources presented below. In addition to these documented land use sources, ongoing discussions occurred with planners and developers for each of the Urban Growth Areas (UGAs) presented later in this TM. Final documentation and changes made to the land use database developed by ESA are discussed in Section 6 at the conclusion of this TM.

June 2004 General Plans

- City of Roseville (February 2004)
- City of Rocklin (April 1991)
- Town of Loomis (July 2001)
- Placer County (August 1994)
- Granite Bay Community Plan (May 1989)

Geographic Information System (GIS) Data in ESRI Shapefile Format

- City of Roseville GIS data (Roseville Land Inventory (RLI))
- Placer County GIS and County Assessor data
- 1996 Service Area Boundary, digitized by ESA.
- 2005 Regional Service Area Boundary, digitized by ESA.

Specific Plans

- Placer Vineyards (July 2007)
- Placer Ranch (February 2007)
- West Roseville (August 2003)
- Regional University (March 2005)

3 1996 and 2005 Regional Service Area Boundaries

The 1996 Wastewater Master Plan (1996 Master Plan) Environmental Impact Report (EIR) Service Area (Regional Service Area) boundary was established with the adoption of the 1996 Master Plan and associated EIR. The 2005 Systems Evaluation Project Regional Service Area boundary is an update of the 1996 Master Plan EIR Service Area boundary. The update includes ten areas outside of the 1996 Master Plan EIR Service Area (also known as “House-Keeping Areas”) that have been annexed by the SPWA partner agencies since 1996. Further discussion of these two service area boundaries and how they impact this evaluation is presented below.

3.1 1996 Master Plan Service Area Boundary

This 1996 Master Plan EIR Regional Service Area, shown in **Figure 1** at the end of this TM, will be used in the Systems Evaluation Project along with updated buildout land use projections and unit flow factors (developed as part of the Systems Evaluation Project) to generate revised buildout flow projections for the SPWA regional treatment facilities for comparative purposes. The revised buildout flow projections inside the 1996 Regional Service Area will be compared with the 1996 projected buildout flows to provide an update for the connection fee analysis to be performed by the SPWA financial advisor.

3.2 2005 Regional Service Area Boundary

The Systems Evaluation 2005 Regional Service Area boundary is shown in **Figure 2** at the end of this TM and was presented to the SPWA board in January 2005; the boundary was adopted by the SPWA board on March 1, 2006. Further discussion on the development of the Systems Evaluation Project 2005 Regional Service Area boundary is documented in the 2005 Regional Service Area Boundary TM No. 1a dated January 13, 2005.

4 Land Use within the 2005 Regional Service Area

Land use information provides the basis for developing unit wastewater flows and wastewater flow projections. Understanding the nature and distribution of urban development is important for proper planning and staging of sewer collection infrastructure and treatment facilities. Additionally, identification of parcels that are "connected" as of June 2004 to the collection system is required to balance wastewater unit flow factors and calibrate the sewer model for the June 2004 system. The key result from the land use analysis was the development of the land use map and associated database. The land use map and database are each parcel-based.

Land use map development was a multi-step process that included consolidating the June 2004 land use codes into a manageable system; identifying parcels connected to the wastewater collection system for June 2004 and buildout conditions; plotting June 2004 and buildout land use maps for review by the SPWA member agencies; and checking the land use data against June 2004 general plans for Roseville, Rocklin, Loomis, Granite Bay and Placer County. A review of land use maps developed from the project team's database identified some minor discrepancies with the June 2004 published General Plans. These discrepancies were corrected to match the June 2004 General Plan status and are documented in Section 6 at the end of this TM.

4.1 Land Use Code Consolidation

The land use database developed by the project team (version no. 1) included approximately 114 land use codes previously used by the City of Roseville and Placer County. The project team consolidated these 114 codes into 17 general land use codes (version no. 2). The project team then further consolidated the 17 codes into 12 land use codes to simplify the process of projecting June 2004 and buildout wastewater flows in the hydraulic model (version no. 3). The version no. 3 consolidation process lumped all of the non-flow producing land use types into one "Open Space" category and introduced three new land use codes (Mixed Use, Schools and Parks > 10 Acres). The land use code consolidation is presented in Table 1.

Table 1: Consolidated Land Use Codes

Final (Version No. 3) Land Use Code	Version No. 2 Land Use Code	Roseville/Placer County Land Use Code (Version No. 1)
Commercial	Commercial	Auto Sales, Repair Automotive Banks, S&L's, Credit Union Commercial Commercial Recreation Commercial Store Condominium Office Fast Food Restaurant Financial Building Hotel Hotel, Motels, Resorts Mini-Market with Gas Mini-Market, no Gas Miscellaneous Commercial Office Building Office General Office Medical/Dental Residential and Hotel Restaurant Restaurants, Cocktail Lounges Retail Service Station Shopping Center Small Food Suburban Store Theater, Bowling Alley
Heavy Industrial	Heavy Industrial	Food Processing Heavy Industrial Miscellaneous Industrial
Light Industrial	Light Industrial Storage	Business Industrial Park Condominium Industrial Industrial Condominium Light Industrial Light Manufacturing Mini-Storage, Covered Storage Self Storage Uncovered Storage, Wrecking Yard Warehouse
Mixed Use	n/a	Residential and Office Residential and Retail

Final (Version No. 3) Land Use Code	Version No. 2 Land Use Code	Roseville/Placer County Land Use Code (Version No. 1)
Open Space	Agriculture Open Space Parks (Area < 10 Acres) Mining Right of Way	CLCA Restriction, Non-Renewal CLCA Restriction, Under Contract Irrigated Farm Orchards, Vineyards Poultry & Small Animals Rice Crop Vacant, Dry Farm Mineral Rights Mining Claims Mining Quarry Backyard Area Cemetery Cemeteries Creek Area Fairgrounds Golf Course Greenbelt Landscape Easement Open Space Rivers, Lakes, Reservoir, Canal Wetlands, Vernal Pools Camps & Parks, General Non-Profit Camps/Parks Park (Area < 10 Acres) Tennis/Swimming Clubs Highways, Roads, Streets Pipeline R/W Right of Way Utility Easement Parking Lot Parking Lots
Parks > 10 Acres	Parks (Area > 10 Acres)	Park (Area > 10 Acres)
Final (Version No. 3) Land Use Code	Version No. 2 Land Use Code	Roseville/Placer County Land Use Code (Version No. 1)
Public/Quasi Public	Public/Quasi-Public	Church Churches Club Convalescent Hospital Day Care Centers Hospital Hospitals Convalescent Lodges, Halls Misc. Public Buildings Miscellaneous Institutional Preschool Public Building Utilities, Public & Private Utility

Final (Version No. 3) Land Use Code	Version No. 2 Land Use Code	Roseville/Placer County Land Use Code (Version No. 1)
Residential 1 DU	Residential 1 DU Residential Large Lot Mobile Home (Individual)	Condominium Residence on Commercial Land Single Fam Res, Condominium Single Fam Res, Half Plex Single Family Residence Timeshares Mobile Home Outside of Park
Residential 2 DU	Residential 2 DU	2 Single Fam Res, Duplex Duplex
Residential 3 DU	Residential 3 DU	3 Single Fam Res, Triplex Triplex
Residential Multiple DU	Residential Multiple DU Mobile Home (Park)	Apartment Apartments, 4 Units or More Mobile Home in M H Park Mobile Home Park
Schools	n/a	School Schools
Vacant [1]	Vacant	Business Potential Commercial Potential Common Area Industrial Potential Institutional Potential Residential Potential Residential, Auxiliary Imp Vacant Vacant Industrial Vacant, Commercial Vacant, Subdivided Residential

[1] The vacant land use code is only used for the June 2004 land use scenario. For the buildout land use scenario, vacant parcels are assigned the land use category as specified in their respective General Plan.

4.2 June 2004 Land Use within the 2005 Regional Service Area

Currently developed parcels were identified in the original (version no. 1) land use database based on their June 2004 land use code. The original land use database identified parcels that are not currently developed as "vacant". However, not all of the developed parcels within the 2005 Regional Service Area contribute flow to the wastewater collection system. These developed parcels that do not contribute flow most likely have onsite septic wastewater treatment systems. To project June 2004 wastewater flow and calibrate the sewer model for the June 2004 system, parcels that are currently connected to the SPWA collection system were identified. The process used to identify connected parcels is documented in the January 26, 2005 TM No 1c entitled "Identification of Parcels Connected or Not Connected to Sewers in the SPWA Project Area".

Generally, parcels within the City of Roseville were identified as connected based on their development status and the understanding that there are no septic tanks within the City of Roseville. Parcels within SPMUD were identified as connected based on their development status and whether or not they were located in an area designated as septic tank service by SPMUD. Parcels within Placer County were identified as connected if they currently receive a sewer bill from the County. Placer County provided sewer billing information that was linked to the parcel database provided by ESA. Parcels that linked to a sewer bill were designated as connected.

A summary of the June 2004 connected land use within the 2005 Regional Service Area is presented in **Table 2**. The June 2004 connected land use map is shown in **Figure 3** at the end of this TM. There are 22,159 June 2004 connected acres within the 2005 Regional Service Area. Approximately 67 percent of the June 2004 connected land is classified as single or multi-family residential. Approximately 10 percent of the June 2004 connected land is currently classified as open space. Approximately 29,844 acres within the 2005 Regional Service Area is vacant or not connected.

4.3 Buildout Land Use within the 2005 Regional Service Area

Buildout land use in the 2005 Regional Service Area was identified in the original land use database according to General Plan data from the City of Roseville and Placer County. The buildout land use scenario includes all currently developed parcels (currently developed parcels that are not connected are assumed to be connected to the collection system); new developments in vacant areas; and the residential redevelopment of currently developed parcels greater that ½ acre that have not been subdivided where the General Plan or Specific Plan allows denser development. This ½ acre residential redevelopment should not be confused with the redevelopment/intensification scenarios in Roseville and Rocklin that will be presented in the Land Use Intensification TM 9c. Buildout residential redevelopment in Roseville was calculated based development densities allowed by specific plans. In areas outside of Roseville, buildout residential development was calculated based on the historical average development densities for the specific residential land use types. These redevelopment densities are documented in the land use database that will be provided at the end of this project. For the buildout condition, all parcels are considered to be connected to the wastewater collection system even though some land uses in the "Open Space" category do not generate wastewater.

A summary of the buildout land use within the 2005 Regional Service Area is provided in **Table 3**. The buildout land use map is shown in Figure 4 at the end of this TM.

The buildout 2005 Regional Service Area includes portions of two Urban Growth Areas (UGAs), the remainder of which are outside both the 1996 Service Area and the 2005 Regional Service Area. Further explanation of the UGAs is provided in the next section of this TM. The 2005 Regional Service Area also includes "House-Keeping Areas", discussed in TM No. 1a. The largest of those "House-Keeping areas" is the West Roseville Specific Plan. The UGAs and West Roseville are currently comprised of several large parcels that have not been subdivided to reflect the buildout developments.

Table 2: June 2004 Land Use Summary within the 2005 Regional Service Area

Land Use Designation	June 2004 Connected Area (Acres)		Total June 2004 Connected Area (Acres)
	Pleasant Grove Watershed	Dry Creek Watershed	
Commercial	495	1,622	2,117
Heavy Industrial	364	111	475
Light Industrial	616	316	932
Mixed Use	0	7	7
Open Space	1,398	737	2,135
Parks > 10 Acres	247	263	510
Public/Quasi-Public	154	467	621
Residential 1 DU	4,186	9,343	13,529
Residential 2 DU	0	280	280
Residential 3 DU	0	37	37
Residential Multiple DU	380	547	927
Schools	171	418	589
Total Acreage	**8,011**	**14,148**	**22,159**

Table 3: Buildout Land Use Summary within the 2005 Regional Service Area

Land Use Designation	Buildout Connected Area (Acres)		Total Buildout Connected Area (Acres[1,2])
	Pleasant Grove Watershed [1]	Dry Creek Watershed [2]	
Commercial	2,151	2,915	5,066
Heavy Industrial	1,715	263	1,978
Light Industrial	1,599	637	2,236
Mixed Use	13	12	25
Open Space	7,318	3,502	10,820
Parks > 10 Acres	303	361	664
Public/Quasi-Public	327	878	1,205
Residential 1 DU	7,629	18,859	26,488
Residential 2 DU	0	839	839
Residential 3 DU	9	366	375
Residential Multiple DU	789	635	1,424
Schools	377	540	917
Total Acreage	**22,231**	**29,808**	**52,039**

[1] Includes portion of Placer Ranch UGA within the 2005 Regional Service Area.

[2] Includes portion of Placer Vineyards UGA within the 2005 Regional Service Area.

5 Urban Growth Areas

The buildout service area boundary to be used in the Systems Evaluation Project expands upon the 2005 systems evaluation Regional Service Area boundary to include twelve Urban Growth Areas (UGAs) identified at the time of this evaluation. These UGA summaries are provided in **Table 4** and **Table 5**. The UGAs are shown with the buildout land use map in **Figure 5**.

UGAs are defined as potential future planning areas that are projected to generate wastewater flow requiring sewerage and meet one or more of the following criteria:

- The area has been annexed, or is being considered for annexation, into a jurisdiction served by SPWA member agencies (Placer County, City of Roseville, or SPMUD).
- The area is part of, or defined as, a Specific Plan Area by the land use planning agency serving one of SPWA members (Placer County, City of Roseville, and City of Rocklin (served by SPMUD), Town of Loomis (served by SPMUD).
- One of the member agencies has provided documented direction to staff in a public forum to analyze the effects of providing sewer service to the planning area for regional wastewater and recycled water systems.

Two of these proposed development areas, Placer Ranch and Placer Vineyards, include areas that are located inside the 1996 Master Plan EIR Regional Service Area Boundary (which happens to be coincident with the 2005 Regional Service Area Boundary in the immediate vicinity of these UGAs). For this Systems Evaluation, UGAs were considered in their entirety; the areas and associated flows from the "inside" and "outside" portions of UGAs, however, are distinguished throughout.

The planning areas and properties not being considered as UGAs at this time include AKT North, Amoruso Way (or "Toad Hill Estates"), Reason Farms, and the Landfill Areas. AKT North has not been included due to the lack of planning information for this area at this time and because it does not meet the criteria above. Reason Farms is a detention basin and is not expected to generate any significant wastewater. Amoruso Way has not been included because it is expected that flow projections for future sewerage will be addressed in the Placer Ranch specific plan. The "Landfill Outside" and "Future Landfill Expansion" planning areas not expected to generate wastewater requiring sewerage.

Table 4: Urban Growth Areas (Outside 2005 Regional Service Area)

Urban Growth Area (UGA)	Land Use Source	Total Acres [a]
Curry Creek UGA	Placer County [b]	3,212
Regional University UGA	MacKay & Somps Civil Engineers Inc.	1,140
Inviro Tech UGA [c]	Placer County	5
Placer UGA[d]	Placer County	630
Orchard Creek [e]	Placer County	25
Placer Ranch [f]	Terrance E. Lowell & Associates, Inc.	807
Placer Vineyards [g]	MacKay & Somps Civil Engineers Inc.	4,806
SMD-3	Placer County	2,231
SPMUD UGA	City of Rocklin & Town of Loomis [h]	6,410
Creekview UGA & Panhandle [i]	MacKay & Somps Civil Engineers Inc., Wood Rodgers	749
Sierra Vista UGA	MacKay & Somps Civil Engineers Inc.	1,785
Brookfield UGA	Brookfield Land	683
TOTAL		**22,483**

[a] Total acres outside of the 1996 Master Plan EIR and the 2005 Regional Service Area boundary
[b] Preliminary land use estimates for Curry Creek were developed by RMC and approved by Placer County based on land use ratios developed by the West Roseville Specific Plan.
[c] This parcel is currently served by the County.
[d] This square "island" area is not expected to be sewered at buildout due to topography and low development density.
[e] Placer County plans to sewer this area north of Athens Road via the SPWA collection system due to the natural topography of the area.
[f] The Placer Ranch project comprised of a total of 2,213 acres with 1,027 acres located inside the 1996 Master Plan EIR and 2005 Regional Service Area boundary, 807 acres located outside of this boundary and 379 acres designated as ROW. The 807 acres located outside of the 1996 Master Plan EIR Regional Service Area boundary will be considered as a UGA as part of the Systems Evaluation Project.
[g] The Placer Vineyards project comprised of a total of approximately 5,148 acres with approximately 1,062 acres located inside the 1996 Master Plan EIR and 2005 Regional Service Area boundary and 4,806 acres (including ROW) located outside of this boundary. The 4,806 acres located outside of the 1996 Master Plan EIR Regional Service Area boundary will be considered as a UGA as part of the Systems Evaluation Project.
[h] SPMUD UGA land use information developed by RMC based on General Plan information for the City of Rocklin and Town of Loomis.
[i] "Panhandle" refers to a 238-acre portion of the Reason Farms planning area that is adjacent to the western boundary of the 511-acre Creekview UGA. Though not considered a UGA, the panhandle area is assumed to contribute wastewater flow to the Creekview UGA.

Table 5: UGA Land Use Summary

Urban Growth Area	Land Use Category	Area (acres)	Dwelling Units
Curry Creek UGA	Open Space	931	-
	Park > 10 Acres	289	-
	Commercial	161	-
	Heavy Industrial	64	-
	Light Industrial	161	-
	Mixed Use	64	385
	Public/Quasi-Public	161	-
	Schools	96	-
	Residential 1 DU	1,124	8,988
	Residential Multiple DU	161	3,210
	Subtotal	**3,212**	**12,583**
Regional University UGA	Open Space	149	-
	Commercial	22	-
	Heavy Industrial	-	-
	Light Industrial	-	-
	Mixed Use	-	-
	Public/Quasi-Public	10	-
	Schools	31	-
	Residential 1 DU	NA	2,226
	Residential Multiple DU	NA	1,006
	University (Point Source)	364	825
	Subtotal	**1,140**	**4,057**
Inviro Tech UGA	Open Space	-	-
	Commercial	-	-
	Heavy Industrial	-	-
	Light Industrial	5	-
	Mixed Use	-	-
	Public/Quasi-Public	-	-
	Schools	-	-
	Residential 1 DU	-	-
	Residential Multiple DU	-	-
	Subtotal	**5**	**-**

Urban Growth Area	Land Use Category	Area (acres)	Dwelling Units
Placer UGA	Open Space	-	-
	Commercial	-	-
	Heavy Industrial	-	-
	Light Industrial	-	-
	Mixed Use	-	-
	Public/Quasi-Public	-	-
	Schools	-	-
	Residential 1 DU	630	27
	Residential Multiple DU	-	-
	Subtotal	**630**	**27**
Orchard Creek UGA	Open Space	-	-
	Commercial	-	-
	Heavy Industrial	-	-
	Light Industrial	25	-
	Mixed Use	-	-
	Public/Quasi-Public	-	-
	Schools	-	-
	Residential 1 DU	-	-
	Residential Multiple DU	-	-
	Subtotal	**25**	-
Placer Ranch UGA (Outside 2005 Regional Service Area)	Open Space	74	-
	Commercial	67	-
	Heavy Industrial	-	-
	Light Industrial	29	-
	Mixed Use	20	250
	Public/Quasi-Public	21	-
	Schools	30	-
	Residential 1 DU	NA	2,046
	Residential Multiple DU	NA	2,281
	University (Point Source)	168	-
	Subtotal	**807**	**4,577**

Urban Growth Area	Land Use Category	Area (acres)	Dwelling Units
Placer Vineyards UGA (Outside 2005 Regional Service Area)	Open Space	729	-
	Commercial	236	-
	Heavy Industrial	-	-
	Light Industrial	-	-
	Mixed Use	63	NA
	Public/Quasi-Public	119	-
	Schools	140	-
	Residential 1 DU	NA	7,649
	Residential Multiple DU	NA	2,542
	Subtotal	**4,806**	**10,191**
SMD-3 UGA	Open Space	-	-
	Commercial	3	-
	Heavy Industrial	-	-
	Light Industrial	-	-
	Mixed Use	-	-
	Public/Quasi-Public	11	-
	Schools	-	-
	Residential 1 DU	2,169	1,268
	Residential 2 DU	23	14
	Residential Multiple DU	25	250
	Subtotal	**2,231**	**1,532**
SPMUD UGA	Open Space	97	-
	Commercial	99	-
	Heavy Industrial	-	-
	Light Industrial	-	-
	Mixed Use	-	-
	Public/Quasi-Public	-	-
	Schools	-	-
	Residential 1 DU - by 2050	NA	1,200
	Residential 1 DU - after 2050	NA	4,180
	Residential Multiple DU	-	-
	Subtotal - by 2050	**NA**	**1,200**
	Subtotal - after 2050	**6,410**	**5,380**

Urban Growth Area	Land Use Category	Area (acres)	Dwelling Units
Creekview UGA & Panhandle	Open Space	248	-
	Commercial	11	-
	Heavy Industrial	-	-
	Light Industrial	9	-
	Mixed Use	12	NA
	Public/Quasi-Public	3	-
	Schools	11	-
	Residential 1 DU	NA	1,593
	Residential Multiple DU	NA	1,170
	Subtotal	**749**	**2,763**
Sierra Vista UGA	Open Space	412	-
	Commercial	220	-
	Heavy Industrial	-	-
	Light Industrial	-	-
	Mixed Use	43	NA
	Public/Quasi-Public	10	-
	Schools	68	-
	Residential 1 DU	NA	7,799
	Residential Multiple DU	NA	2,399
	Subtotal	**1,785**	**10,198**
Brookfield UGA	Open Space	208	--
	Commercial	14	--
	Heavy Industrial	-	--
	Light Industrial	-	--
	Mixed Use	-	--
	Public/Quasi-Public	2	--
	Schools	22	--
	Residential 1 DU	NA	2,922
	Residential Multiple DU	NA	1,252
	Subtotal	**683**	**4,174**

6 Land Use Database Documentation

The final land use database developed by the project team will be provided to SPWA at the conclusion of this project. A definition table for each field name in the database is provided in **Table 6**. This table also identifies source of data used in each field. During the development of the database, visual map checks were performed comparing maps generated from the database to maps provided in the individual General Plans. During this process, a number of corrections were made to the land use database assuming that the General Plan was the final data source. A summary of each change that was made to the database is provided in **Table 7**.

Table 6: Land Use Database Field Definition

Field Name	Field Definition	Data Source
FID	INTERNAL FEATURE NUMBER	ESRI
SHAPE	FEATURE GEOMETRY	ESRI
APN	ASSESSORS PARCEL NUMBER	PLACER COUNTY, ROSEVILLE
ACRES	PARCEL ACREAGE	ESA
ELUC	JUNE 2004 LAND USE CLASSIFICATION	PLACER COUNTY, ROSEVILLE
ELUC_DESC	JUNE 2004 LAND USE CLASSIFICATION DESCRIPTION	PLACER COUNTY, ROSEVILLE
SOURCE	SOURCE OF JUNE 2004 LAND USE DATA	ESA
GPCLASS	BUILDOUT LAND USE CLASSIFICATION PER GENERAL PLAN	PLACER COUNTY, ROSEVILLE, ROCKLIN
BC_CURRENT	JUNE 2004 LAND USE USING CONSOLIDATED LAND USE CODES	BC
BC_FUTURE	BUILDOUT LAND USE USING CONSOLIDATED LAND USE CODES	BC
MANHOLE_ID	MANHOLE WHERE FLOW IS LOADED IN THE SPWA REGIONAL TRUNK SEWER MODEL (MAY BE DIFFERENT THAN THE ROSEVILLE MODEL MANHOLE_ID)	BC
POINT_X	X-COORDINATE OF THE PARCEL CENTROID TO LOAD FLOW IN THE MODEL	BC
POINT_Y	Y-COORDINATE OF THE PARCEL CENTROID TO LOAD FLOW IN THE MODEL	BC
DU_DENSITY	RESIDENTIAL DEVELOPMENT DENSITY USED TO CALCULATE BUILDOUT DU ON PARCELS GREATER THAN ½ ACRE	ESA
BC_UNIT	JUNE 2004 PARCEL ACRES OR DWELLING UNITS TO CALCULATE FLOW LOAD IN THE MODEL	BC
FUT_BCUNIT	BUILDOUT PARCEL ACRES OR DWELLING UNITS TO CALCULATE FLOW LOAD IN THE MODEL	BC
POINT_SOURCE	IDENTIFICATION OF PARCELS THAT ARE LOADED INTO THE MODEL AS POINT SOURCES	BC
WWTP	WWTP TO WHICH PARCEL IS TRIBUTARY	BC
COMMENTS	MISCELLANEOUS COMMENTS FOR SPECIFIC PARCEL	BC

Table 7: Land Use Database Changes

FID_1	APN	Land Use Database Change
202	032-070-066-000	OPEN SPACE TO LDR FROM ROCKLIN GENERAL PLAN
206	030-030-059-000	OPEN SPACE TO LDR FROM ROCKLIN GENERAL PLAN
1760	044-290-034-000	PQP TO LDR FROM LOOMIS GENERAL PLAN
2027	376-010-008-000	LDR TO PARKS FROM ROCKLIN GENERAL PLAN
4288	044-072-020-000	PQP TO LDR FROM LOOMIS GENERAL PLAN
6830	368-080-021-000	LDR TO PARKS FROM ROCKLIN GENERAL PLAN
7181	044-121-052-000	LI TO COMMERCIAL FROM LOOMIS GENERAL PLAN
7184	044-123-065-000	PARKS TO COMMERCIAL FROM LOOMIS GENERAL PLAN
8168	017-350-057-000	LDR TO PARKS FROM ROCKLIN GENERAL PLAN
15137	016-030-018-000	LDR TO PARKS FROM ROCKLIN GENERAL PLAN
15617	016-240-030-000	LDR TO PARKS FROM ROCKLIN GENERAL PLAN
32428	017-116-006-000	OPEN SPACE TO PARK PER ESA MAP
33530	479-170-006-000	OPEN SPACE TO PARKS PER ESA MAP
34470	017-116-019-000	OPEN SPACE TO PARKS PER ESA MAP
38422	017-370-020-000	COMMERCIAL TO OPEN SPACE PER MAP
40423	017-370-019-000	COMMERCIAL TO LDR6.8 PER ESA MAP
49981	017-116-014-000	OPEN SPACE TO PARKS PER ESA MAP
55999	482-130-008-000	OPEN SPACE TO PARKS PER ESA MAP
56502	017-162-033-000	LDR TO PARKS PER ESA MAP
56958	477-080-004-000	RESIDENTIAL TO OPEN SPACE PER ESA MAP
57003	477-100-016-000	OPEN SPACE TO PARKS PER ESA MAP
60443	468-010-033-000	COMMERCIAL TO PARKS PER ROSEVILLE GENERAL PLAN
60483	048-171-005-000	PQP TO OPEN SPACE PER ESA MAP
63887	NA	OPEN SPACE TO PARKS PER ESA MAP
64468	NA	LDR TO PARKS PER ESA MAP

Figure 1 1996 Wastewater Master Plan EIR Regional Service Area Boundary Map

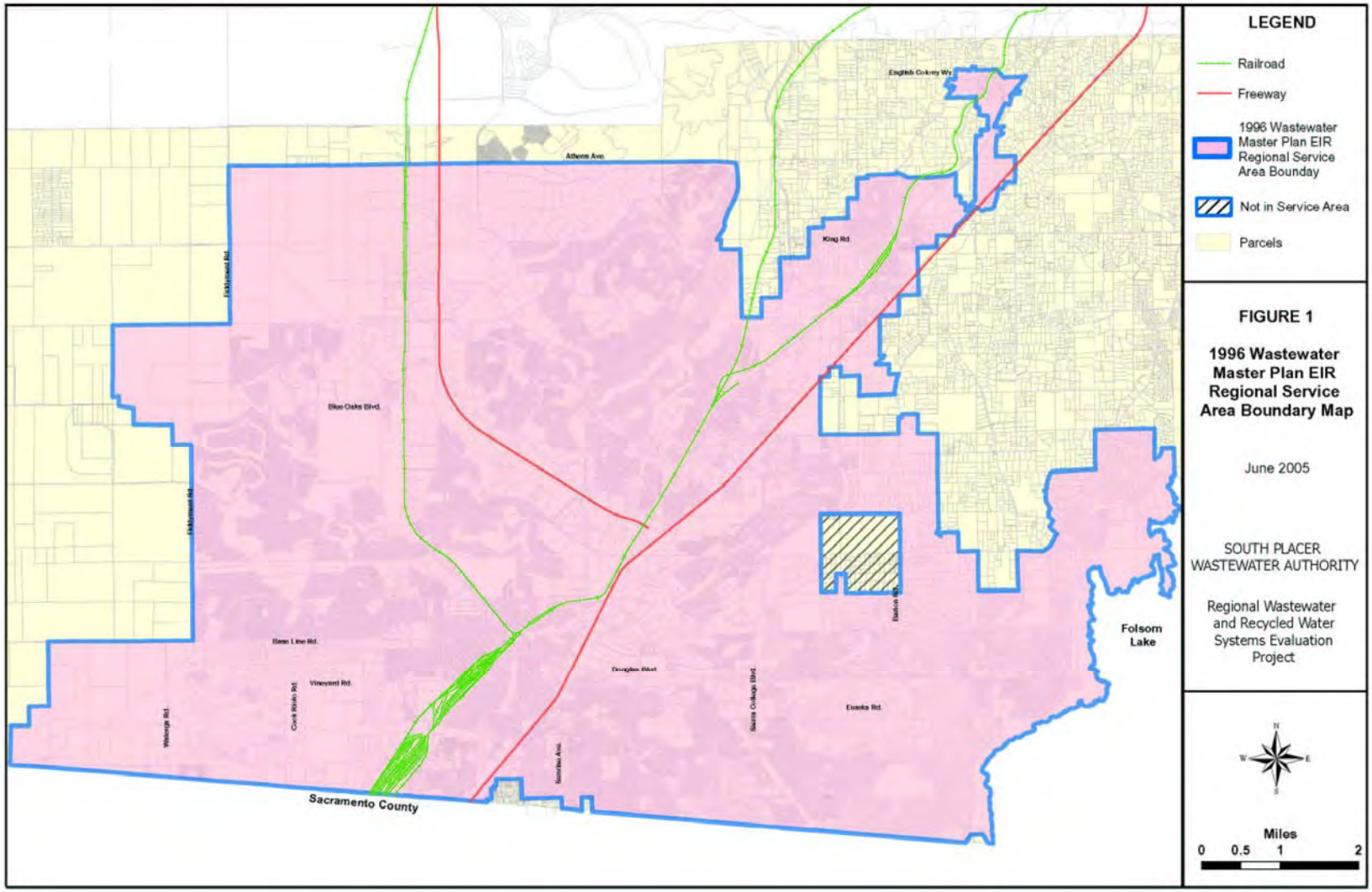


Figure 2 2005 Regional Service Area Boundary Map

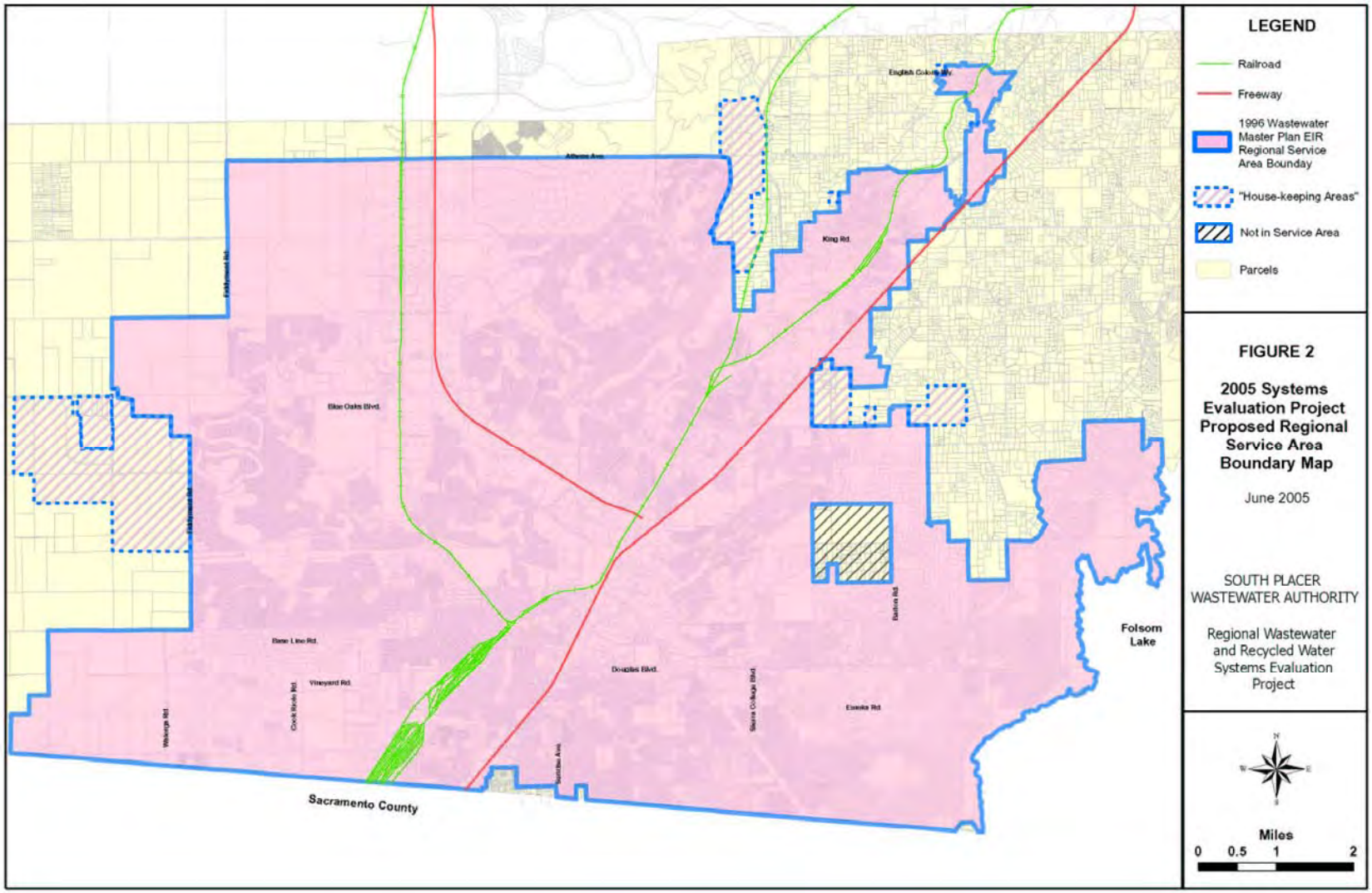


Figure 3 Existing Land Use of Connected Parcels within the 2005 Regional Service Area Boundary

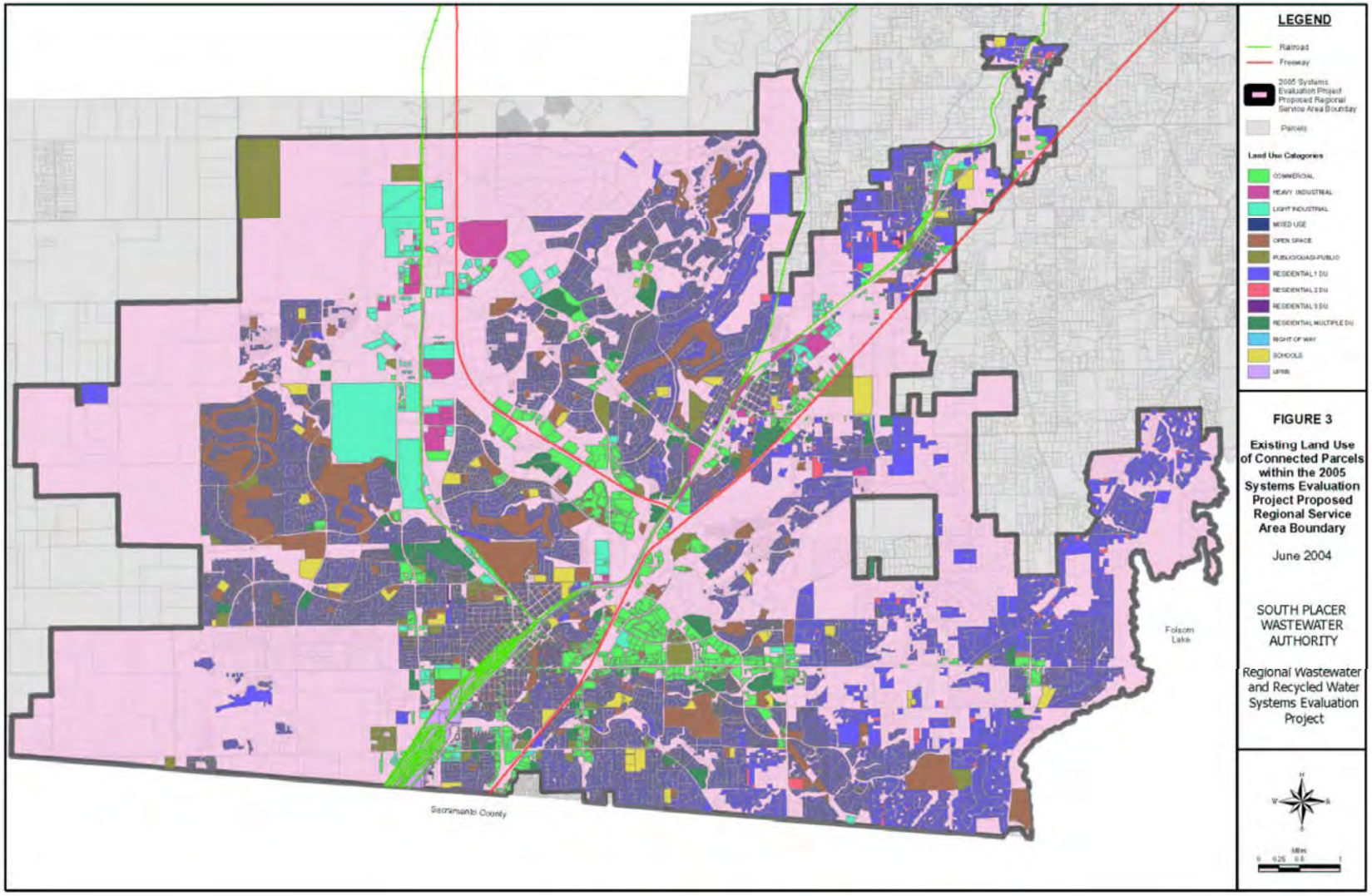


Figure 4: Buildout Land Use within the 2005 Regional Service Area

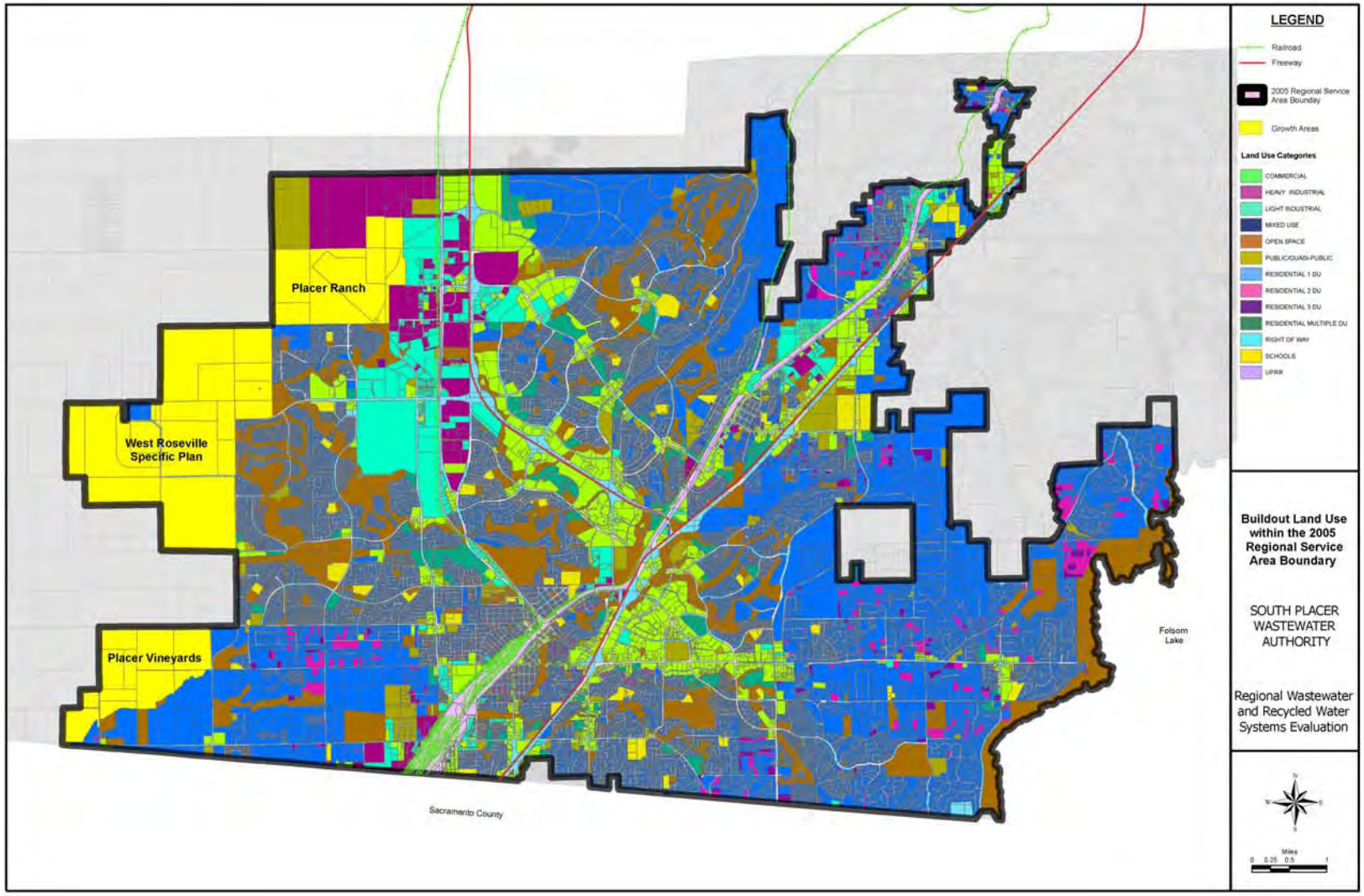
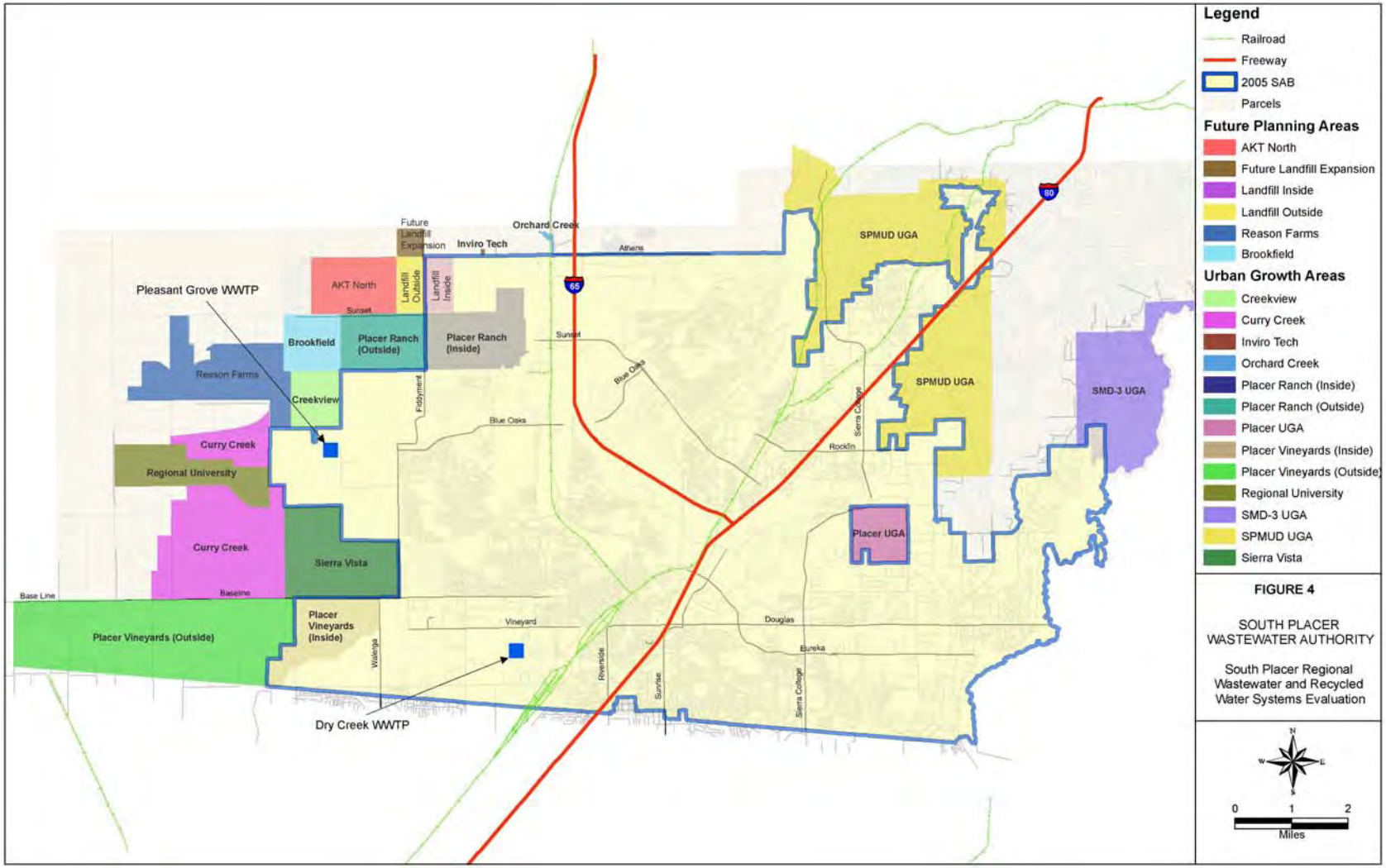


Figure 5 Urban Growth Areas (UGAs) and Planning Areas



Attachment A

June 2007 Update Sheet

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject: **Update for TM 1b**

Prepared For: Art O'Brien, City of Roseville

Prepared by: Andy Smith, RMC

Reviewed by: Dave Richardson, RMC

Date: October 31, 2006

Reference: 0091-04

1 Summary of Update for TM 1b

Since the completion of TM 1b on January 6, 2006, changes in the scope of the South Placer Wastewater and Recycled Water Systems Evaluation, as well as changes in the data available, have resulted in the need to identify out-of-date information, to summarize the updated information, and provide justification as to the need for the update. **Table 1** presents a summary of the updates for TM 1b.

Table 1: Summary of Update for TM 1b

Page	Location	Summary of Outdated Information	Summary of Updated Information	Reason for Update
9	Paragraph 4	Brookfield is not considered as a UGA	Brookfield is considered as a UGA	Sufficient planning data for Brookfield was made available for consideration
10	Table 4	SPMUD UGA = 2,319 acres	SPMUD UGA = 6,410	SPMUD provided an expanded UGA boundary
10	Table 4	Total UGA acreage = 13,791 acres	18,565 acres	Expanded SPMUD boundary and Brookfield
10	Table 4	Brookfield not included	Brookfield: Brookfield Land; 683 acres	Brookfield added as a UGA
11	Table 5	Brookfield not included	Refer to TM 11a for land use summary	Brookfield added as a UGA
13	Table 5	SPMUD UGA = 2,319 acres	SPMUD UGA = 6,410	SPMUD provided an expanded UGA boundary
19	Figure 4	SPMUD UGA included, but does not reflect expanded boundary	Expanded boundary shown in Figure 2-6 of Systems Evaluation report	SPMUD provided an expanded UGA boundary
19	Figure 4	Brookfield included, but not shown as a UGA	Brookfield is considered as a UGA	Brookfield added as a UGA

Attachment B

2009 Update Sheet

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**2009 Update Sheet for TM 1b**
Prepared For:	Art O'Brien, City of Roseville
Prepared by:	Chris van Lienden, RMC
Reviewed by:	Dave Richardson, RMC
Date:	September 3, 2009
Reference:	0091-04

The TM has been modified since it was originally developed in 2005 based on the following updates.

1 2006 Updates

The TM was updated in 2006 to reflect changes in the SPMUD UGA boundary and land use, and to add Brookfield as an additional UGA.

2 2008 Updates

The TM was further updated in 2008 to reflect changes in the land uses and flow projections of the UGAs.

3 2009 Updates

An additional update was prepared in 2009 to reflect the following changes.

3.1 Updates to the H2Omap Sewer Model

Since the 2008 update, the H2Omap Sewer software has been updated which resulted changes to the build-out flow estimates. The flow estimates in the TM has been updated to reflect the most recent model results.

3.2 Changes to the Development Timeline

Flow projections have been updated to reflect reduced rates of residential development due to the economic slowdown beginning in 2008.

3.3 West Roseville Specific Plan Rezone

Buildout flow estimates have been updated to reflect additional inflow from a proposed rezone in the West Roseville Specific Plan (May, 2009). The new land uses and associated average dry weather flow (ADWF) are summarized in Table 1.

Table 1 – West Roseville Specific Plan Rezone Comparison

Connected Land Use Description	Original Developer Agreements		2009 Proposed Update	
	DU or Area (DU or ac)	Flow (mgd)	DU or Area (DU or ac)	Flow (mgd)
1 Residential				
1.1 Low Density Residential	4842 DU	0.92	5963 DU	1.13
1.2 LDR (age restricted)	710 DU	0.13	0 DU	0.00
1.3 Medium Density Residential	1064 DU	0.20	1746 DU	0.33
1.4 High Density Residential	1774 DU	0.23	3229 DU	0.42
2 Open Space	670 ac		696 ac	0.00
2.1 Paseo	15 ac		0 ac	0.00
2.2 Park	251 ac		284 ac	0.00
2.3 Pocket Parks	19 ac		0 ac	0.00
3. Public/Quasi-Public				
3.1 Schools	108 ac	0.02	109 ac	0.02
3.2 Public/Quasi-Public	41 ac	0.02	15 ac	0.01
4 Community Commercial				
4.1 Commercial	34 ac	0.03	56 ac	0.05
4.2 Mixed Use	14 ac	0.03	0 ac	0.00
4.3 Church	0 ac	0.01	0 ac	0.00
5. Business Professional				
5.1 Commercial	20 ac	0.02	18 ac	0.02
6. Light Industrial	74 ac	0.06	75 ac	0.06
7. Industrial	34 ac	0.03	35 ac	0.03
Total		**1.71**		**2.07**

Appendix B TM 1a – Proposed 2005 Regional Service Area Boundary

Technical Memorandum

South Placer Regional Wastewater & Recycled Water Systems Evaluation Project

Subject: Proposed 2005 Regional Service Area Boundary - FINAL

Prepared For: Art O'Brien - City of Roseville
Richard Stein - SPMUD
Ed Wydra - Placer County

Prepared By: Richard Hunn & Brian Grattidge – ESA
Pete Bellows & Chris Peters – B&C
Mai-Tram Le - RMC

Reviewed By: Dave Richardson – RMC

Date: January 13, 2005

Reference: 091-4.01

I. INTRODUCTION

The 1996 Wastewater Master Plan (1996 Master Plan) Environmental Impact Report (EIR) Service Area (Regional Service Area) boundary was established with the adoption of the 1996 Master Plan and associated EIR. The Regional Service Area, shown in Figure 1 of Attachment A, includes the City of Roseville, the South Placer Municipal Utilities District (SPMUD), and three unincorporated areas of Placer County: Sunset, Granite Bay (i.e. SMD-2), and Dry Creek/West Placer. SPMUD includes the City of Rocklin, the Town of Loomis, and portions of unincorporated Placer County, including the community of Penryn. In all, the Regional Service Area covers approximately 54,550 acres.

Since 1996, ten areas outside the service area have been annexed by the SPWA partner agencies. These areas are shown in Figure 1 as "House Keeping Areas." Eight of these areas have been annexed by South Placer Municipal Utility District (SPMUD) and two, the West Roseville Specific Plan and Pleasant Grove Wastewater Treatment Plant, have been annexed by the City of Roseville.

Three of the ten annexed areas are partially located within the Regional Service Area. These areas include portions of the West Roseville Specific Plan, Loomis Hills Estates, and the Sierra College annexations. Annexed areas, which are located outside the Regional Service Area, total approximately 3,277 acres as presented in Table 1. As part of this South Placer Regional Wastewater & Recycled Water Systems Evaluation Project (Project), the South Placer Wastewater Authority (SPWA) partner agencies would like to revise the Regional Service Area boundary to encompass all the annexed areas which are located outside Regional Service Area. With the proposed revisions, the Regional Service Area would then cover approximately 57,827 acres as shown in Figure 2 of Attachment A.

This technical memorandum (TM) presents a summary of the California Environmental Quality Act (CEQA) compliance references and a regional treatment capacity assessment based on up to date estimated unit flow factors for the current service area. The existing CEQA documentation combined with information provided in this TM constitutes the necessary background documentation for revising the Regional Service Area boundary to include the ten annexation areas.

This TM is organized as follows:

I. Introduction
II. Annexation Areas and CEQA Compliance
III. Wastewater Treatment Capacity Assessment
IV. Conclusions

II. ANNEXATION AREAS AND CEQA COMPLIANCE

The ten annexation areas to be included in the proposed Regional Service Area boundary revision are listed in Table 1. Table 1 also shows the effective date of the Local Agency Formation Commission (LAFCO) action for lead agency approval, the type of (CEQA) documentation prepared for each project, the total acreage of each project, and the acres outside of the existing Regional Service Area boundary. All of the annexations have been approved by their respective Lead Agencies. Loomis Hills Estates has been approved by the Town of Loomis, and is already within the town limits, but is in the process of having the entire project area annexed into the SPMUD's service area.

Table 1: Annexation Areas Considered for Inclusion in Regional Service Area

No.	Project Name	Service Provider	LAFCO Effective Date	CEQA Compliance	Total Project Acres	Acres Outside of the Regional Service Area Boundary
1	West Roseville Specific Plan Area	City of Roseville	8/18/2004	EIR	3,162	1,966
2	Pleasant Grove Wastewater Treatment Plant	City of Roseville	4/18/2001	EIR	180	180
3	Clover Valley Lakes	SPMUD	2/26/1998	EIR	642	642
4	Loomis Hills Estates	SPMUD	Pending	EIR	322	202
5	Sierra College	SPMUD	5/1/2003	Negative Declaration	375	244
6	Poppy Ridge	SPMUD	4/19/2004	Negative Declaration	20	20
7	Clark Powers Elem. School	SPMUD	3/14/2003	Exemption	10	10
8	Miller Annexation	SPMUD	9/24/2004	Exemption	10	10
9	Reyneveld Annexation	SPMUD	2/27//2003	Exemption	3	3
10	Cook Annexation	SPMUD	3/2/2004	Negative Declaration	0.1	0.1
				Total	***4,724***	***3,277***

III. WASTEWATER TREATMENT CAPACITY ASSESSMENT

In the CEQA documentation prepared for each annexation area, the effects on the sewer service provider were considered. For the projects that received an exemption, no discernible effect was identified. For the other projects, it was determined that sewer service was available. However, only the West Roseville Specific Plan and Pleasant Grove Wastewater Treatment Plant EIRs considered in detail the possible cumulative impacts of the project with respect to all potential development projects on the ultimate planned treatment capacity of SPWA per the 1996 Master Plan. As such, a supplemental assessment was conducted for the SPMUD service area annexations as part of this Technical Memorandum.

According to personal communication with Richard Stein of SPMUD on December 15, 2004, the eight annexation projects within SPMUD's service area generate wastewater in the amount of approximately 1,100 Equivalent Dwelling Units (EDUs) in excess of those accounted for in the 1996 Master Plan. When annexed by the local jurisdiction with land use authority (e.g. City of Rocklin or Town of Loomis), and committed to service by SPMUD, CEQA documentation was provided. In order to verify the existing CEQA findings that these additional 1,100 EDUs will not rely on the capacity at the two

wastewater treatment plants (WWTPs) that were already effectively assigned to others under the 1996 Master Plan and EIR, an assessment of SPMUD's service area was performed. The results of this assessment demonstrate that, even with the inclusion of these 1,100 EDUs, the total flows estimated from SPMUD under the "build out" scenario would be less than what was previously assumed in the 1996 Master Plan as discussed below.

In Workshop #3 of this Project, the RMC team presented current data indicating that the unit flow rate of 260 gpd/du used in sizing treatment plant capacity in the 1996 Master Plan was higher than current monitored flows and water use records would indicate. The water use records and current monitored flows both indicated the unit flow rate to be approximately 230 gpd/du. The difference between these two unit flow rates provides an allowance for additional EDUs relative to the cumulative analysis of regional WWTP capacity (within the planning context of the 1996 Master Plan and EIR).

The 1996 Master Plan allocated a total of 44,017 equivalent residential dwelling units (single and multi-family) within the SPMUD service area at buildout.[1] With the 30 gpd/du difference between the two unit flow rates, this is equivalent to nearly 5,600 residential dwelling units that contribute 230 gpd/du. This far exceeds the 1,100 dwelling units in question. This data is presented in detail in Table 2.

Table 2: Unit Flow Factors, Estimated Flows and Associated EDUs at Buildout Conditions

Service Provider	Estimated EDUs at Buildout [a]	Estimated Flow per 1996 Master Plan [b] (mgd)	Estimated Flow per 2004 Proposed Unit Flow Factor [c] (mgd)	Excess Flow Difference (mgd)	Excess EDUs per 2004 Proposed Unit Flow Factor [d]
SPMUD	44,017	11.4	10.1	1.3	**5,600**

a. Per 1996 Master Plan
b. Estimated flow is calculated based on a unit flow factor of 260 gpd/edu used in the 1996 Master Plan for sizing treatment facilities.
c. 2004 estimated unit flow factor of 230 gpd/edu is based on 2004 temporary dry weather flow monitoring data for the SPWA area.
d. EDUs rounded downward to the nearest 100 to provide a conservative estimate.

IV. CONCLUSIONS

The addition of the ten annexation areas, shown in Figure 1 of Attachment A, would revise the Regional Service Area beyond the boundary adopted with the 1996 Master Plan. However, the results of the analysis presented above indicated that, from the standpoint of regional wastewater treatment capacity designed for development planned under the 1996 Master Plan, a reduction in actual estimated unit flow factors has resulted in treatment capacity for additional EDUs that would more than adequately compensate for the increase of 1,100 proposed dwelling units in the SPMUD service area.

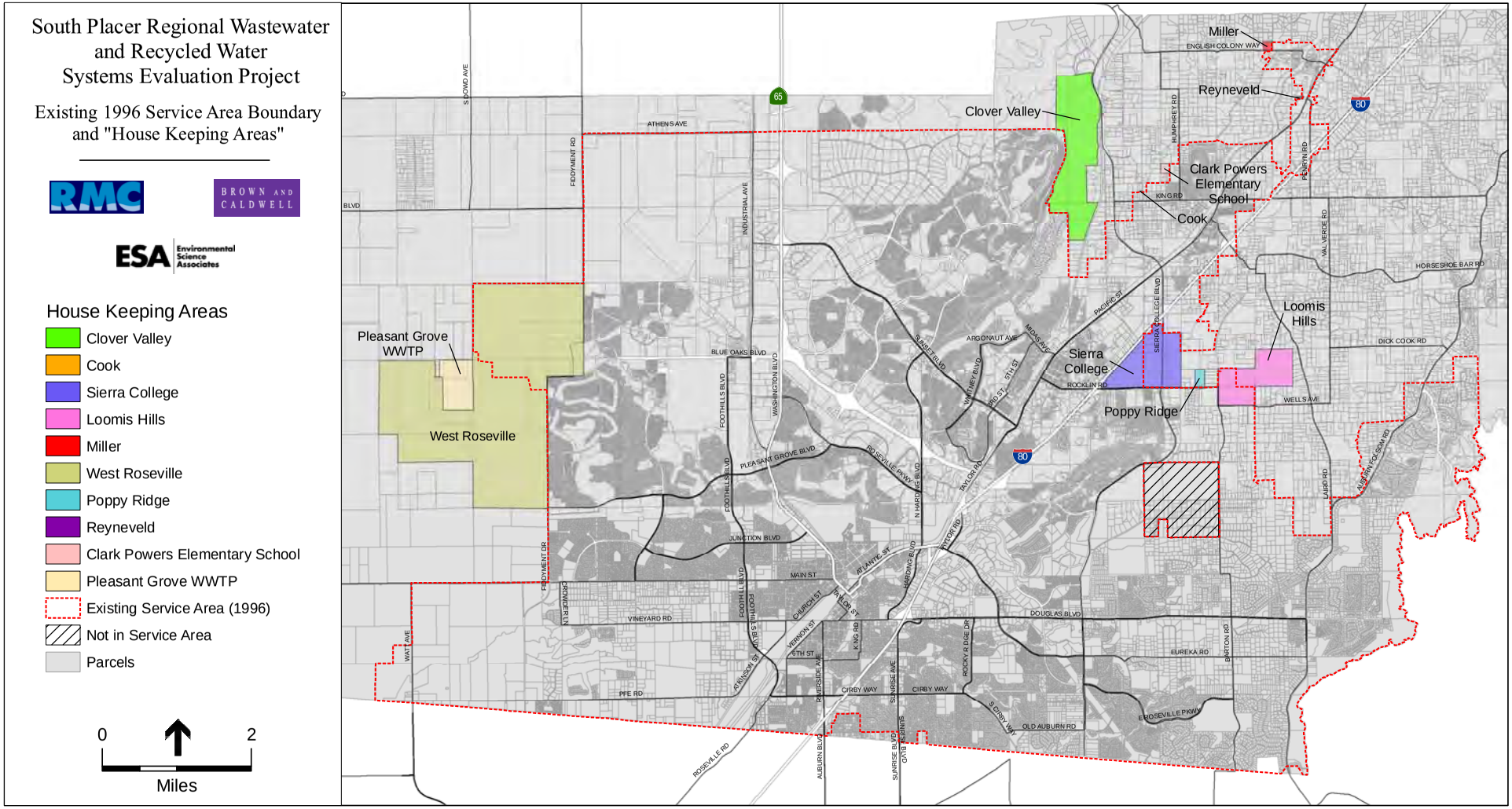
The land use agencies for these ten projects have taken appropriate action, and have prepared documentation in accordance with CEQA. The projects have been annexed by the local sewer service provider, with the exception of Loomis Hills Estates, which is pending annexation into SPMUD. Lastly, the assessment discussed in this TM has shown that the inclusion of these annexed areas will not adversely impair the two treatment plants' ability to serve estimated future "build out" conditions in the Regional Service Area.

In the future, it is recommend that this planned regional treatment plant capacity evaluation/verification be conducted for individual annexations, as was done for the West Roseville Specific Plan, in order to verify that sufficient regional treatment plant capacity is planned for to meet these needs, or to allow for adequate time to plan for adjusting to these needs.

[1] From Table 1B of TM I-4 Supplemental Update of the 1996 Master Plan.

Attachment A

Existing and Proposed Regional Service Area Boundary Maps

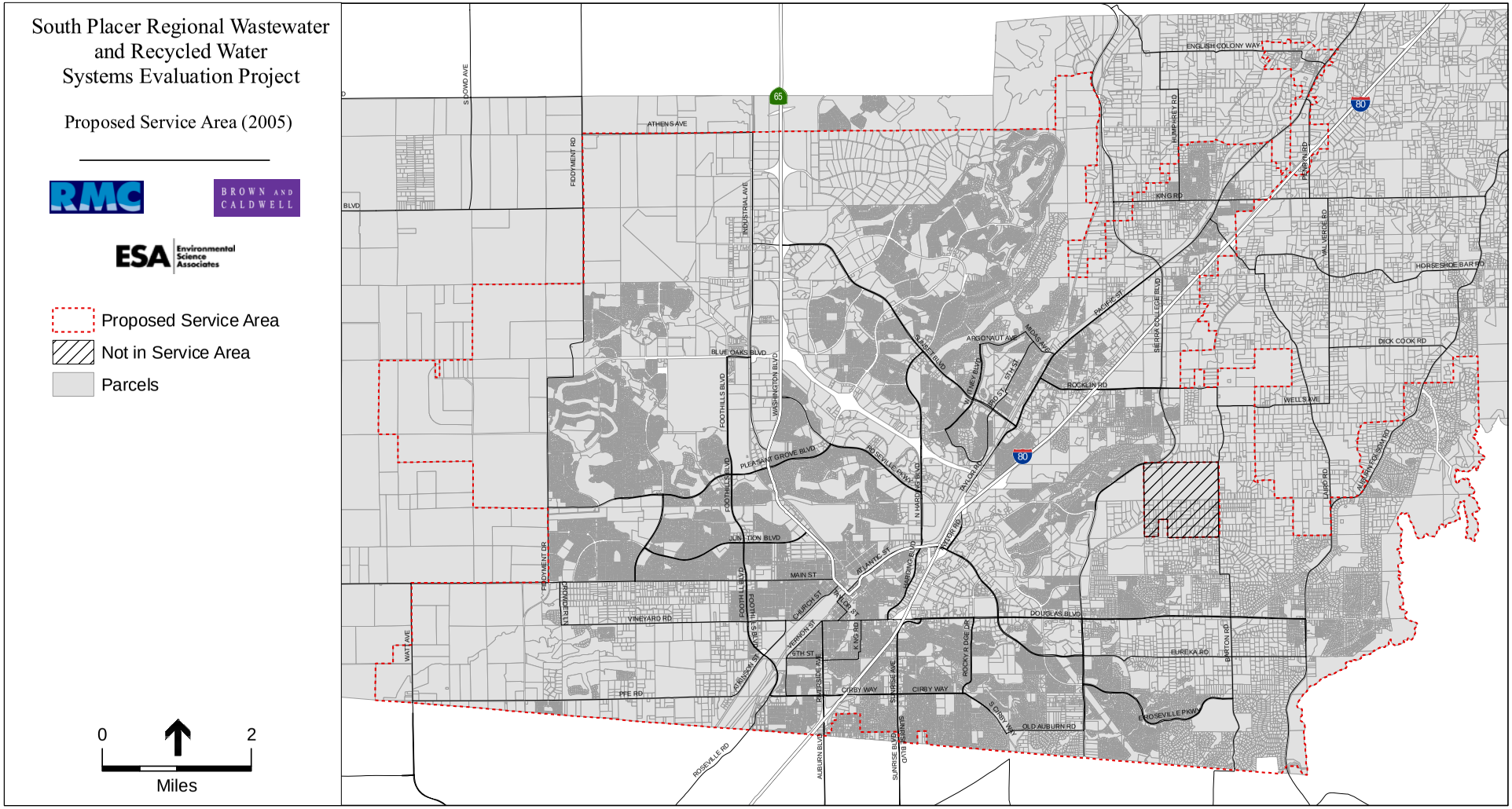


SOURCE: SPWA, 1996; ESA, 1996, 2004

South Placer Regional Wastewater / 204250

Figure 1.0

Existing 1996 Service Area Boundary and "House Keeping Areas"



SOURCE: SPWA, 1996; ESA, 1996, 2004

South Placer Regional Wastewater / 204250

Figure 2.0

Proposed Service Area (2005)

Appendix C TM 2a – Dry Weather Flow Projection for the 2005 Regional Service Area Boundary

Technical Memorandum

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**Dry Weather Flow Projection for the 2005 SPWA Regional Service Area Technical Memorandum – (TM No. 2a)**
Prepared For:	Art O'Brien – City of Roseville
Prepared by:	Pete Bellows/Chris Peters – Brown and Caldwell Andy Smith – RMC
Reviewed by:	Dave Richardson/Gisa Ju – RMC
Date:	October 21, 2005; updated January 24, 2008 & September 3, 2009
Reference:	0091-004 Task 2

0 Previous TM Publication and Updates

Since the initial publication of technical memorandum (TM) 2a on October 21, 2005, changes in information available for the South Placer Wastewater and Recycled Water Systems Evaluation (Systems Evaluation), as well as changes in the data, have resulted in the need to identify and update out-of-date information. The newest version of the TM is consistent with the updates summarized in the 2009 Update Sheet which is included in Attachment A.

1 Introduction

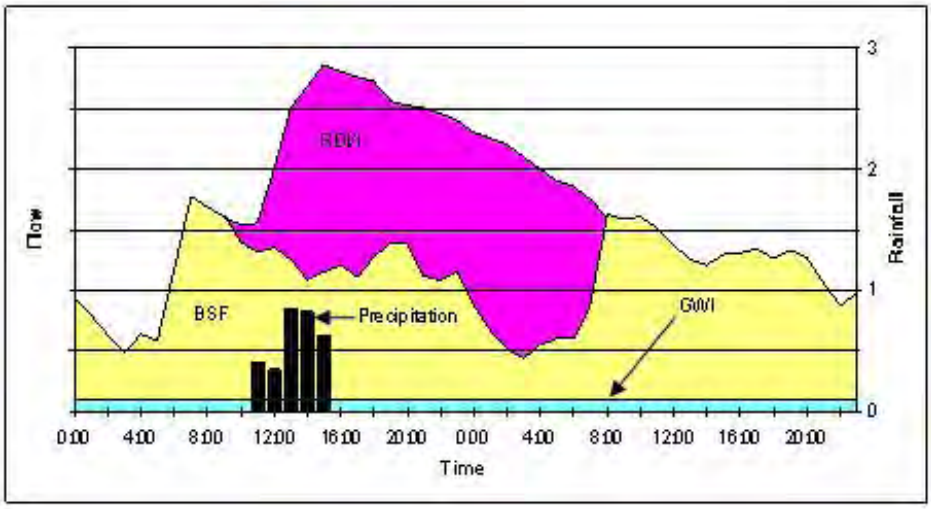
This TM summarizes the average dry weather wastewater flow (ADWF) projections for June 2004 and buildout conditions for the 2005 SPWA Regional Service Area boundary. ADWF projections are used to:

1. Project flows for the analysis of the SPWA wastewater treatment plants
2. Identify changes in average dry weather flow projections (within the 1996 Master Plan EIR Service Area) since the completion of the 1996 Wastewater Master Plan

2 Wastewater Flow Components

Typically, wastewater consists of three components: base sanitary flow (BSF), groundwater infiltration (GWI), and rainfall dependent infiltration and inflow (RDI/I). These components are shown on **Figure 1**. BSF and GWI during dry weather constitute ADWF. Base sanitary flow is generated from residential, commercial, industrial, and public sources that discharge into the wastewater collection system. Base sanitary flow varies during the day in a diurnal pattern with the lowest flow during early morning hours when most people are asleep and businesses are closed, and the highest flow in mid-morning after people prepare for their day's activities. GWI occurs when groundwater levels are above the inverts of the collection system pipes. RDI/I occurs during wet weather conditions and causes the wastewater flow to increase. RDI/I is discussed in a separate TM (TM No. 2c).

Figure 1: Wastewater Components

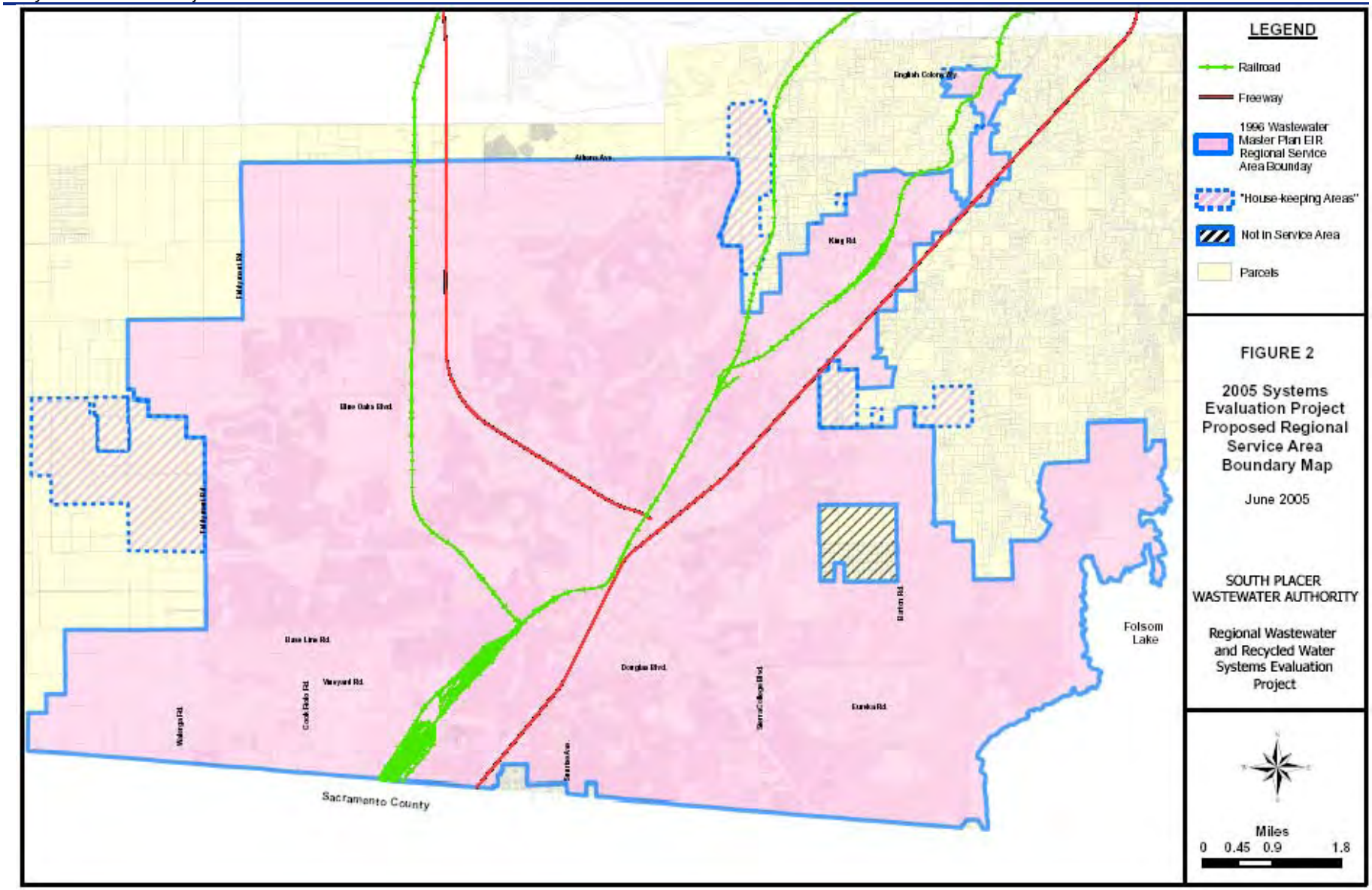


For this project, ADWF is projected on a parcel-by-parcel basis using unit BSF and GWI factors. Land use information is summarized in the *Current and Buildout Land Use TM* (TM No. 1b). Development of unit BSF and GWI factors is discussed below. Individual large or atypical dischargers (customers) were identified and their BSF was projected individually based on historical data.

3 Land Use

A parcel-based land use map of the 2005 SPWA Regional Service Area was developed for this project from specific plan and county assessor's data provided by the City of Roseville and Placer County. The 1996 Wastewater Master Plan Environmental Impact Report service area boundary (Regional Service Area) was revised and June 2004 land use information was assigned to each parcel within the revised Regional Service Area. The process used to revise the Regional Service Area is documented in the January 2005 TM (TM No. 1a) entitled "*Proposed 2005 Regional Service Area Boundary*." A map of the 2005 Regional Service Area is included as **Figure 2**. Development of the land use map (June 2004 and buildout), land use code designations, and connected land use is documented in TM No. 1b.

The land use map and associated database was developed for this project solely to project wastewater flows. This information should not be used for other purposes without consulting the City of Roseville and SPWA.


LEGEND
Railroad
Freeway
1996 Wastewater Master Plan EIR Regional Service Area Boundary
"House-keeping Areas"
Not In Service Area
Parcels
FIGURE 2
2005 Systems Evaluation Project Proposed Regional Service Area Boundary Map
June 2005
SOUTH PLACER WASTEWATER AUTHORITY
Regional Wastewater and Recycled Water Systems Evaluation Project
Folsom Lake
Sacramento County
Miles
0 0.45 0.9 1.8

3.1 Land Use Designations

The team consolidated approximately 114 land use codes previously used by the City of Roseville and Placer County into 17 new land use codes. Those 17 land use codes were further consolidated into 11 land use codes to simplify the process of projecting June 2004 and buildout wastewater flows in the model. Part 2 of the consolidation process aggregated the non-flow producing land use types into one "Open Space" category and introduced three new land use codes (Mixed Use, Schools, and Parks > 10 Acres). Parks were consolidated into the Open Space category with the exception of those parks greater than 10 acres in size. This was done so that these larger parks (typically with restroom facilities) could be accounted for in the flow projections.

3.2 June 2004 Land Use and Connected Parcels

Parcels that are currently connected to the SPWA collection system were identified to project June 2004 wastewater flow and calibrate the sewer model for the June 2004 system. Further discussion on the identification of connected parcels is presented in TM No. 1b.

3.3 Buildout Land Use

The buildout land use is based on buildout within the 2005 Regional Service Area as shown on **Figure 2**. For the buildout condition, all parcels are considered to be connected to the wastewater collection system even though some land uses in the "Open Space" category do not generate wastewater.

June 2004 and buildout land use acreages for connected parcels within the 2005 Regional Service Area are summarized by land use designation in **Table 1** and **Table 2**.

As of June 2004, there were 22,159 connected acres within the 2005 Regional Service Area. Approximately 67 percent of the developed land is classified as single or multi-family residential. Approximately 10 percent of the developed land is classified as open space.

Table 1 - June 2004 Land Use Summary within the 2005 Regional Service Area

Land Use Designation	June 2004 Connected Area (Acres)		Total June 2004 Connected Area (Acres)
	Pleasant Grove Watershed	Dry Creek Watershed	
Commercial	495	1,622	2,117
Heavy Industrial	364	111	475
Light Industrial	616	316	932
Mixed Use	0	7	7
Open Space	1,398	737	2,135
Parks > 10 Acres	247	263	510
Public/Quasi-Public	154	467	621
Residential 1 DU	4,186	9,343	13,529
Residential 2 DU	0	280	280
Residential 3 DU	0	37	37
Residential Multiple DU	380	547	927
Schools	171	418	589
Total Acreage	**8,011**	**14,148**	**22,159**

Table 2 – Buildout Land Use Summary within the 2005 Regional Service Area

Land Use Designation	Buildout Connected Area (Acres)		Total Buildout Connected Area (Acres[1,2])
	Pleasant Grove Watershed[1]	Dry Creek Watershed[2]	
Commercial	2,151	2,915	5,066
Heavy Industrial	1,715	263	1,978
Light Industrial	1,599	637	2,236
Mixed Use	13	12	25
Open Space	7,318	3,502	10,820
Parks > 10 Acres	303	361	664
Public/Quasi-Public	327	878	1,205
Residential 1 DU	7,629	18,859	26,488
Residential 2 DU	0	839	839
Residential 3 DU	9	366	375
Residential Multiple DU	789	635	1,424
Schools	377	540	917
Total Acreage	**22,231**	**29,808**	**52,039**

1 Includes portion of Placer Ranch UGA within the 2005 service area.

2 Includes portion of Placer Vineyards UGA within the 2005 service area.

The 2005 Regional Service Area includes portions of two Urban Growth Areas (UGAs), the remainder of which are outside both the 1996 Service Area and the 2005 Regional Service Area. Projected flows from UGAs will be the subject of a future TM, *Dry Weather Flow Projection for the Ultimate SPWA Service Area (Including UGAs)* (TM No. 2b).

The 2005 Regional Service Area also includes "Housekeeping Areas," areas discussed in TM No. 1a. The largest of those "housekeeping areas" is the West Roseville Specific Plan. Information about proposed development within the Placer Vineyards and Placer Ranch UGAs and West Roseville was obtained from Specific Plans and discussions with developers. The UGAs and West Roseville are comprised, as of June 2004, of several large parcels that have not been subdivided to reflect the proposed future developments. Flow projections from these areas are based on the proposed number of dwelling units, land use acreages, and unit BSF and GWI factors discussed below.

In 2009, an update to the West Roseville Specific Plan (WRSP) was proposed and the impacts to the SPWA Systems were evaluated. The update proposed additional densification which would result in an increase of ADWF from 1.70 mgd to 2.07 mgd from the WRSP. Although this update has not been approved, buildout land uses have been updated to reflect the findings of this evaluation as the update may occur at a later date and it is considered to be more conservative.

4 Point Sources

Eight point sources were identified for the sewer evaluation based on discussions with SPWA member agencies. Information about point sources is summarized in **Table 3**. Point sources were identified from flow monitoring and water billing information. A landfill in Placer County was also identified as a point source because it generates very little wastewater flow in comparison to its land area. Buildout flow

projections from NEC and HP were provided by the City of Roseville and are based on buildout conditions for each development.

Table 3 - June 2004 and Projected ADWF from Point Sources in the 2005 Service Area

Point Source	Location	June 2004 Flow Data Source	June 2004 ADWF (gpd)	Projected Buildout ADWF (gpd)
Union Pacific Railroad	Roseville	City of Roseville	85,000	85,000
Landfill	Placer County	City of Roseville	5,000	5,000
NEC	Roseville	Flow Monitor Data	700,000	2,000,000
HP	Roseville	City of Roseville	150,000	484,000
Kaiser Hospital	Roseville	Water Use Data	50,000	50,000
Formica	Placer County	Placer County	60,000	60,000
Rio Bravo Power Plant	Placer County	Placer County	15,000	15,000

Notes: Flow projections are based upon existing land use and existing land use designations current as of June, 2004, and provide the estimated flows for baseline modeling scenario for SPWA. Rezoning of HP and Kaiser Hospital properties are now better known than in June 2004, and are documented in TM No. 9b, and are included in a "Land Use intensification Scenario".

5 Base Sanitary Unit Flow Factors

Unit BSF factors were developed using the following sources of data:

- City of Roseville Water Billing Data
- Temporary Dry Weather Flow Monitoring Data from selected locations in the SPWA Service Area
- Permanent Flow Monitoring Data from Pleasant Grove and Dry Creek WWTPs
- Permanent Flow Monitoring Data from collection system meters serving SPMUD and Placer County

The basic approach utilized to develop the unit flow factors included gathering and analyzing land use-specific water billing and flow monitoring data and then testing the resulting unit factors for the June 2004 system in a mass balance.

5.1 Roseville Water Billing Data

Unit flow factors were developed from City of Roseville water billing information from December 2003 – March 2004. Water billing data was available for approximately 50 percent of the parcels in Roseville. Water billing information was joined to the parcels in the land use database by Assessor Parcel Number (APN). The parcel database includes land use information that allowed water usage information to be grouped by land use designation. Winter water usage information was primarily evaluated since landscape irrigation is minimal during winter months and water usage is more closely related to wastewater flows. These water demand factors can be correlated to BSF unit flow factors. Historically, BSF is typically 80-90 percent of water demand. This process yielded the following results, presented in **Table 4**.

Table 4 - Water Demand Factors Derived from the Roseville Water Billing Data

Land Use Designation	Water Demand Factor		Typical Base Sanitary Flow Factor Range[1]	
Commercial	1,000	gpd per acre	800-900	gpd per acre
Heavy Industrial	310	gpd per acre	250-280	gpd per acre
Light Industrial	1,000	gpd per acre	800-900	gpd per acre
Mixed Use	2,700	gpd per acre	2,160-2,430	gpd per acre
Public/Quasi-Public	780	gpd per acre	620-700	gpd per acre
Schools	200	gpd per acre	160-180	gpd per acre
Single Family Residential	220	gpd per du	180-200	gpd per du
Residential Multiple DU	1,500	gpd per acre	1,200-1,350	gpd per acre

[1] 80 to 90 percent of the Water Demand Factor

5.2 Temporary Dry Weather Flow Monitoring

Temporary dry weather flow monitoring was conducted at 16 sites for 24 days in September and October 2004. These sites were located in Roseville, Placer County and SPMUD sewer service areas. The intent of this flow monitoring was to isolate single land use types so that unit flow factors could be determined for each monitored land use.

As would be expected in a collection system with diverse development ages and types, the unit flow factors varied widely within each land use category. The reason for this variation is due to the fact that the data is only representative of a very small sample of parcels within the service area. For example, the monitored residential parcels represent approximately 5 percent of the total residential parcels within the study area. These results were used in conjunction with the water use data presented in the previous section. Specific details and information about the temporary dry weather flow monitoring is presented in the October 2005 Flow Monitoring TM (No. 2d).

5.3 Permanent Dry Weather Flow Monitoring

Dry weather flow monitoring data from seven permanent flow monitoring sites in Roseville, SPMUD and Placer County were reviewed to establish "target" flows for the unit flow factor mass balance. Flow data from September and October 2004 was provided by Roseville, SPMUD and Placer County. A flow data summary is presented in **Table 5**. The two sites in Roseville were located at each wastewater treatment plant (WWTP). The five remaining sites were located at flumes where SPMUD and Placer County trunk sewers enter Roseville. The flow monitors in the Dry Creek watershed are tributary to the Dry Creek WWTP. The flow monitors in the Pleasant Grove watershed are tributary to the Pleasant Grove WWTP. Hydrographs for the Springview, Strap Ravine and Old Auburn flow monitoring sites exhibited signs of GWI. This was confirmed during the unit flow factor mass balance procedure and a review of temporary wet weather flow monitoring data from Winter 2005.

6 Groundwater Infiltration (GWI)

GWI occurs when groundwater levels are above the inverts of the collection system pipes and manholes and the pipes and manholes have leaky joints or other defects that allow groundwater to enter the collection system. Groundwater levels vary seasonally and are highest at the end of the wet season and lowest at the end of the dry season, which is typically in September. Higher GWI levels that may occur during wet weather will be addressed in the *Wet Weather Flow Projection TM* (TM No. 2c).

Total GWI is estimated by subtracting total BSF projections from total ADWF as measured at each WWTP flow monitoring site. The total calculated GWI rate for the service area is approximately 1.70 million gallons per day (mgd). For purposes of WWTP expansion planning, the GWI will be distributed evenly across the entire service area. For purposes of collection system modeling, the GWI will be distributed spatially based on the results of the flow monitoring data analysis.

Table 5 - Measured Flow at 2004 Permanent Dry Weather Flow Monitoring Sites, and Estimated GWI from Watershed Lands Upstream of Meter

Site Name	Location	Watershed	BSF (mgd)	GWI (mgd)	ADWF (mgd)
Old Auburn	Placer County	Dry Creek	0.75	0.50	1.25
Strap Ravine	Placer County	Dry Creek	0.73	0.30	1.03
Highlands	SPMUD	Dry Creek	0.08	0.00	0.08
Springview	SPMUD	Dry Creek	2.19	0.80	2.99
Dry Creek WWTP	Roseville	Dry Creek	12.70	1.70	14.40
North Roseville	SPMUD	Pleasant Grove	1.84	0.00	1.84
Pleasant Grove WWTP	Roseville	Pleasant Grove	2.55	0.00	2.55

7 Unit Flow Factor Mass Balance

Unit flow factors from the water data and temporary flow data analysis were used as a starting point to balance the wastewater flows with the permanent flow meter sites. Flow projections for the WWTP analysis are based on unit ADWF factors which include BSF and GWI. This provides a uniform methodology for projecting flows throughout the service area.

Utilizing the total ADWF observed at the Roseville WWTPs (without subtracting GWI), the most representative ADWF unit flow factor set was approximately 85 percent of the winter water use, with the exception of Residential Multiple DU and Heavy Industrial, which are explained below.

The Residential Multiple DU unit flow rate of 2,040 gpd/acre is based on an estimated unit flow factor of 130 gpd per multi-family dwelling unit (which is approximately 70 percent of the wastewater flow of single-family dwelling units) with a development density of 16 units per acre. Multi-family dwelling units typically have fewer occupants than single-family dwelling units and therefore generate less wastewater. The development density of 16 units per acre is the average number of Residential Multiple DU dwelling units/acre in Roseville and SPMUD.

The Heavy Industrial unit flow factor of 250 gpd/acre appeared to be extremely low compared to the Light Industrial unit flow factor and typical Heavy Industrial unit flow factors seen in other cities. Because of this difference, the Heavy Industrial unit flow rate was modified to match the Light Industrial unit flow factor. In the future, any proposed Heavy Industrial land use will be evaluated on the basis of the type of proposed use (e.g., Wet industry, or Dry Industry) and the site specific flow associated with any development or planning proposal.

The June 2004 ADWF mass balance (including GWI) for the 2005 SPWA Regional Service Area is presented in **Table 6**. This projection is within 2 percent of the average total flow of 16.99 mgd measured at Dry Creek and Pleasant Grove WWTPs in September and October 2004.

Table 6 – June 2004 Dry Weather Flow Mass Balance

Land Use	Unit Flow Factor		June 2004 Units (Acres or DU)	June 2004 ADWF (mgd)
Commercial	850	gpd per acre	2,117	1.79
Heavy Industrial[1]	850	gpd per acre	475	0.40
Light Industrial[1]	850	gpd per acre	932	0.79
Mixed Use	2,300	gpd per acre	7	0.02
Public/Quasi-Public[1]	660	gpd per acre	621	0.41
Schools	170	gpd per acre	589	0.10
Residential 1 DU	190	gpd per du	51,285	9.74
Residential 2 DU	190	gpd per du	1,537	0.30
Residential 3 DU	190	gpd per du	306	0.06
Residential Multiple DU	2,040	gpd per acre	927	1.89
Open Space	0	gpd per acre	2,135	0.00
Parks > 10 Acres	10	gpd per acre	510	0.005
Point Sources		varies	1,139	1.16
Total				**16.67**

[1] Land use category does not include area of parcels associated with point sources identified in Table 1.

7.1 Unit Flow Factors

The unit flow factors for WWTP expansion analysis are presented in **Table 7**. Unit flow factors for single family residential are applied on a per dwelling unit (du) basis while unit flow factors for other land uses are on an acreage basis.

As explained previously, the temporary flow monitoring data identified wide variations in the unit flow factors for various land use types and was not representative of the entire service area. Water billing data from the City of Roseville and the permanent flow monitoring data from Roseville, SPMUD and Placer County presented a much broader picture which ultimately proved to be more representative of the entire service area.

Table 7 – 2005 Average Dry Weather Flow (ADWF) Factors

Land Use Designation	Units	2005 Unit Flow Factors WWTP Analysis[1]	1996 Master Plan Unit Flow Factor
Commercial	gpd per acre	850	1,040
Heavy Industrial	gpd per acre	850	1,560
Light Industrial	gpd per acre	850	1,040
Mixed Use	gpd per acre	2,300	N/A
Public/Quasi-Public	gpd per acre	660	1,040
Schools	gpd per acre	170	N/A
Residential 1 DU	gpd per du	190	260
Residential 2 DU	gpd per du	190	260
Residential 3 DU	gpd per du	190	260
Residential Mult. DU [2]	gpd per acre	2,040	4,160
Open Space	gpd per acre	0	0
Parks > 10 Acres	gpd per acre	10	N/A
Vacant	gpd per acre	0	0

[1] Includes allowance for dry season GWI.

[2] The 2005 Residential Multiple DU unit flow factor can also be represented as 130 gpd per du

8 ADWF Unit Flow Factors and Future (Buildout) Flow Projections

Buildout ADWF projections within the 2005 Regional Service Area are based on the unit ADWF factors developed for the WWTP analysis above (includes dry season GWI). These flow projections do not include the results of proposed redevelopment/intensification within Roseville and Rocklin which have been analyzed as a separate scenario and are presented in the *Impact on Regional Trunk Sewer System and WWTPs of Land Use Intensification for Parcels within Redevelopment Areas in Roseville and Rocklin TM* (No 9d). Buildout dry weather flow projections within the 2005 Regional Service Area are presented in **Table 8**.

Table 8 - Buildout ADWF Projections within the 2005 Regional Service Area

Land Use	Unit Flow Factor	PG WWTP[3] Buildout Units (ac or du)	PG WWTP[3] Buildout ADWF (mgd)	DC WWTP[4] Buildout Units (ac or du)	DC WWTP[4] Buildout ADWF (mgd)	2005 Regional Service Area Buildout Units (ac or du)	2005 Regional Service Area Buildout ADWF (mgd)
Commercial	850 gpd/ac	1,728	1.47	2,890	2.46	4,618	3.92
Heavy Industrial[1]	850 gpd/ac	1,680	1.43	263	0.22	1,943	1.65
Light Industrial[1]	850 gpd/ac	1,221	1.04	637	0.54	1,858	1.58
Mixed Use	2,300 gpd/ac	-	-	7	0.02	7	0.02
Public/Quasi-Public[1]	660 gpd/ac	282	0.19	851	0.56	1,133	0.75
Schools	170 gpd/ac	258	0.04	540	0.09	798	0.14
Residential 1 DU	190 gpd/du	26,893	5.11	42,866	8.14	69,759	13.25
Residential 2 DU	190 gpd/du	2	0.0004	2,122	0.40	2,124	0.40
Residential 3 DU	190 gpd/du	12	0.002	720	0.14	732	0.14
Residential Multiple DU	2,040 gpd/ac	594	1.21	606	1.24	1,200	2.45
Open Space	0 gpd/ac	6,034	-	3,171	-	9,205	-
Parks > 10 Acres	10 gpd/ac	270	0.003	361	0.004	631	0.01
Point Sources	Varies gpd/ac	1,043	2.56	91	0.14	1,134	2.70
Placer Ranch[2]	Varies gpd/ac	1,027	0.90	-	-	1,027	0.90
West Roseville[2]	Varies gpd/ac	2,968	2.07	-	-	3,162	2.07
Placer Vineyards[2]	Varies gpd/ac	-	-	1,062	0.58	1,062	0.58
Rezones	Varies gpd/ac		0.50		0.17		0.67
Intensification	Varies gpd/ac		-		1.64		1.64
	Totals (mgd)		**16.52**		**16.34**		**32.86**

[1] Land use category does not include area of parcels associated with point sources identified in Table 1.
[2] Includes portion of development located within the 2005 Regional Service Area.
[3] Pleasant Grove WWTP Service Area
[4] Dry Creek WWTP Service Area

9 1996 Service Area ADWF Projection Comparison

A review of the flow projections for the 1996 Master Plan EIR Service Area boundary was completed. This review compares 1996 and 2005 flow projections within the 1996 Service Area boundary. The flow projection for the 1996 Service Area as calculated in the 1996 Master Plan is 45.6 mgd. This 1996 flow projection utilized the 1996 Master Plan unit flow factors (shown in **Table 7**) to project flows in the service area and different land use assumptions. Since 1996, land use within the service area has changed and the unit flow factors established in this Master Plan have caused the 2005 flow projection within the 1996 Service Area to decrease to 28.7 mgd (shown in **Table 9**). This decrease can be attributed to reductions in the residential unit flow factor and an approximately 20 percent reduction in the development densities. Note that the 28.7 mgd flow projection is less than the 32.5 mgd presented in **Table 8** for the 2005 Regional Service Area. The 2005 Regional Service Area is inclusive of the 1996 Master Plan EIR Service Area, and also includes the "housekeeping areas" (West Roseville, Clover Valley Lakes, and others) documented in TM No. 1a.

Table 9 – Average Dry Weather Flow for the 1996 Service Area with 2005 Unit Flow Factors

		PG WWTP[3]		DC WWTP[4]		2005 Regional Service Area	
Land Use	**Unit Flow Factor**	**Buildout Units** (ac or du)	**Buildout ADWF** (mgd)	**Buildout Units** (ac or du)	**Buildout ADWF** (mgd)	**Buildout Units** (ac or du)	**Buildout ADWF** (mgd)
Commercial	850 gpd/ac	1,728	1.47	2,864	2.43	4,592	3.90
Heavy Industrial[1]	850 gpd/ac	1,680	1.43	263	0.22	1,943	1.65
Light Industrial[1]	850 gpd/ac	1,221	1.04	637	0.54	1,858	1.58
Mixed Use	2,300 gpd/ac	-	-	7	0.02	7	0.02
Public/Quasi-Public[1]	660 gpd/ac	282	0.19	829	0.55	1,111	0.73
Schools	170 gpd/ac	258	0.04	394	0.07	652	0.11
Residential 1 DU	190 gpd/du	26,671	5.07	40,956	7.78	67,627	12.85
Residential 2 DU	190 gpd/du	2	0.0004	2,122	0.40	2,124	0.40
Residential 3 DU	190 gpd/du	12	0.002	720	0.14	732	0.14
Residential Multiple DU	2,040 gpd/ac	594	1.21	606	1.24	1,200	2.45
Open Space	0 gpd/ac	4,004	-	3,290	-	7,294	-
Parks > 10 Acres	10 gpd/ac	270	0.003	360	0.004	630	0.01
Point Sources	Varies gpd/ac	1,043	2.56	91	0.14	1,134	2.70
Placer Ranch[2]	Varies gpd/ac	1,027	0.90	-	-	1,027	0.90
West Roseville[2]	Varies gpd/ac	1,316	0.67	-	-	1,316	0.67
Placer Vineyards[2]	Varies gpd/ac	-	-	1,062	0.58	1,062	0.58
	Totals (mgd)		**14.58**		**14.11**		**28.69**

[1] Land use category does not include area of parcels associated with point sources identified in Table 1.
[2] Includes portion of development located within the 2005 Regional Service Area.
[3] Pleasant Grove WWTP Service Area
[4] Dry Creek WWTP Service Area

Attachment A

2009 Update Sheet

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**2009 Update Sheet for TM 2a**
Prepared For:	Art O'Brien, City of Roseville
Prepared by:	Chris van Lienden, RMC
Reviewed by:	Dave Richardson, RMC
Date:	September 3, 2009
Reference:	0091-04

The TM has been modified since it was originally developed in 2005 based on the following updates.

1 2006 Updates

The TM was updated in 2006 to reflect changes in the SPMUD UGA boundary and land use, and to add Brookfield as an additional UGA.

2 2008 Updates

The TM was further updated in 2008 to reflect changes in the land uses and flow projections of the UGAs.

3 2009 Updates

An additional update was prepared in 2009 to reflect the following changes.

3.1 Updates to the H2Omap Sewer Model

Since the 2008 update, the H2Omap Sewer software has been updated which resulted changes to the build-out flow estimates. The flow estimates in the TM has been updated to reflect the most recent model results.

3.2 Changes to the Development Timeline

Flow projections have been updated to reflect reduced rates of residential development due to the economic slowdown beginning in 2008.

3.3 West Roseville Specific Plan Rezone

Buildout flow estimates have been updated to reflect additional inflow from a proposed rezone in the West Roseville Specific Plan (May, 2009). The new land uses and associated average dry weather flow (ADWF) are summarized in Table 1.

Table 1 – West Roseville Specific Plan Rezone Comparison

Connected Land Use Description	Original Developer Agreements		2009 Proposed Update	
	DU or Area (DU or ac)	Flow (mgd)	DU or Area (DU or ac)	Flow (mgd)
1 Residential				
1.1 Low Density Residential	4842 DU	0.92	5963 DU	1.13
1.2 LDR (age restricted)	710 DU	0.13	0 DU	0.00
1.3 Medium Density Residential	1064 DU	0.20	1746 DU	0.33
1.4 High Density Residential	1774 DU	0.23	3229 DU	0.42
2 Open Space	670 ac		696 ac	0.00
2.1 Paseo	15 ac		0 ac	0.00
2.2 Park	251 ac		284 ac	0.00
2.3 Pocket Parks	19 ac		0 ac	0.00
3. Public/Quasi-Public				
3.1 Schools	108 ac	0.02	109 ac	0.02
3.2 Public/Quasi-Public	41 ac	0.02	15 ac	0.01
4 Community Commercial				
4.1 Commercial	34 ac	0.03	56 ac	0.05
4.2 Mixed Use	14 ac	0.03	0 ac	0.00
4.3 Church	0 ac	0.01	0 ac	0.00
5. Business Professional				
5.1 Commercial	20 ac	0.02	18 ac	0.02
6. Light Industrial	74 ac	0.06	75 ac	0.06
7. Industrial	34 ac	0.03	35 ac	0.03
Total		**1.71**		**2.07**

Appendix D TM 2b – Dry Weather Flow Projections for Ultimate Service Area (w/ UGAs)

Technical Memorandum

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**Average Dry Weather Flow Projection for the Ultimate SPWA Service Area (Including Urban Growth Areas) -- (TM No. 2b)**
Prepared For:	Art O'Brien – City of Roseville
Prepared by:	Pete Bellows/Chris Peters – Brown and Caldwell Andy Smith – RMC
Reviewed by:	Dave Richardson/Gisa Ju – RMC
Date:	November 4, 2005; updated October 31, 2006, January 24, 2008 & September 3, 2009
Reference:	0091-004 Task 2

0 Previous TM Publication and Updates

Since the initial publication of technical memorandum (TM) 2b on November 4, 2005, changes in information available for the South Placer Wastewater and Recycled Water Systems Evaluation (Systems Evaluation), as well as changes in the data, have resulted in the need to identify and update out-of-date information. As part of the June 2007 publication of the Systems Evaluation, an Update Sheet was prepared for this TM, and is included in **Attachment B**. Subsequent changes have resulted in the need for further updates of the TM. The newest version of the TM is consistent with the updates summarized in the 2009 Update Sheet which is included in **Attachment C**.

1 Introduction

This TM summarizes the average dry weather wastewater flow (ADWF) projections for buildout conditions within the Ultimate SPWA service area. This includes flows generated within the 2005 Regional Service Area boundary and flows generated within the Urban Growth Areas (UGAs) located outside the 2005 Regional Service Area boundary. ADWF projections are used to project flows for the analysis of the SPWA wastewater treatment plants.

This TM is a supplement to the *Dry Weather Flow Projection for the 2005 Regional Service Area TM* (TM No. 2a) which summarized flow projections within the 2005 Regional Service Area. Further discussion of wastewater flow components, flow monitoring, development of the base sanitary flow (BSF) unit factors, and groundwater infiltration (GWI) is presented in TM No. 2a.

2 Buildout Land Use

Development of the buildout land use map (including UGAs), land use code designations, and connected land use is documented in the *June 2004 and Buildout Land Use TM* (TM No. 1b). Buildout land use is based on buildout within the Ultimate Service Area as shown in **Figure 1**. For the buildout condition, all parcels are considered to be connected to the wastewater collection system even though some land uses in the "Open Space" category do not generate wastewater. Buildout land use acreages for connected parcels within the Ultimate Service Area are summarized in **Table 1** and **Table 2**. Detailed land use summaries for each UGA are provided in **Attachment A** and TM No. 1b.

The total buildout acreage within the SPWA Ultimate Service Area is 74,522 acres. This includes 30,637 acres in the Pleasant Grove watershed and 43,253 acres in the Dry Creek watershed.

Table 1: Buildout Land Use Summary within the 2005 Regional Service Area

Land Use Designation	Buildout Connected Area (Acres)		Total Buildout Connected Area (Acres[1,2])
	Pleasant Grove Watershed[1]	Dry Creek Watershed[2]	
Commercial	2,151	2,915	5,066
Heavy Industrial	1,715	263	1,979
Light Industrial	1,599	637	2,236
Mixed Use	13	12	25
Open Space	7,318	3,502	10,820
Parks > 10 Acres	303	361	664
Public/Quasi-Public	327	878	1,206
Residential 1 DU	7,629	18,859	26,488
Residential 2 DU	0	839	839
Residential 3 DU	9	366	375
Residential Multiple DU	789	635	1,424
Schools	377	540	917
Total Acreage	**22,231**	**29,808**	**52,039**

[1] Includes portion of Placer Ranch UGA within the 2005 Regional Service Area.
[2] Includes portion of Placer Vineyards UGA within the 2005 Regional Service Area.

Table 2: Buildout Land Use Summary within Urban Growth Areas

Urban Growth Area (UGA)	Buildout Connected Area (Acres)		Total Buildout Connected Area (Acres)
	Pleasant Grove Watershed	Dry Creek Watershed	
Curry Creek UGA	3,212	--	3,212
Regional University UGA	1,140	--	1,140
Inviro Tech UGA	5	--	5
Placer UGA	--	630	630
Orchard Creek	25	--	25
Placer Ranch [1]	807	--	807
Placer Vineyards [1]	--	4,806	4,806
SMD-3	--	2,231	2,231
SPMUD UGA	--	6,410	6,410
Creekview UGA [2]	749		749
Sierra Vista UGA	1,785		1,785
Brookfield UGA	683		683
Total Acreage	**8,406**	**14,077**	**22,483**

[1] Does not include portions of Placer Ranch or Placer Vineyards UGAs within the 2005 Regional Service Area.
[2] "Panhandle" refers to a 238-acre portion of the Reason Farms planning area that is adjacent to the western boundary of the 511-acre Creekview UGA. Though not considered a UGA, the panhandle area is assumed to contribute wastewater flow to the Creekview UGA.

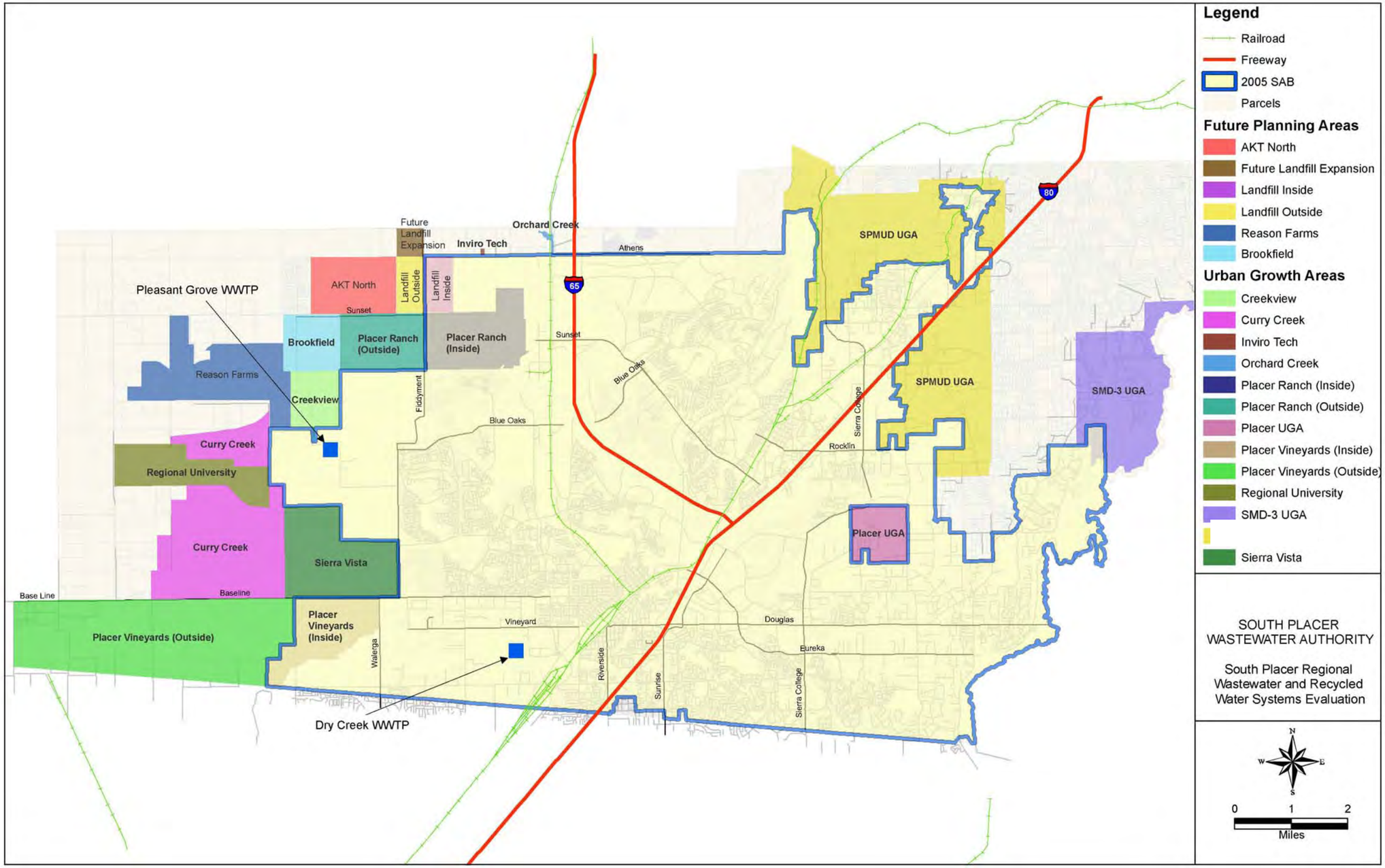


Figure 1 – Buildout Land Use Map Including UGAs

3 Point Sources

Seven existing point sources were identified within the 2005 Regional Service Area based on discussions with SPWA member agencies. Information about point sources is summarized in **Table 3**. There are also three point sources located within UGAs. These point source flows are included with the UGA flow projections presented later in this TM and the UGA flow projection worksheets provided in **Attachment A**. Existing point sources in the 2005 Regional Service Area were identified from flow monitoring and water billing information. The Placer County Landfill was also identified as a point source because it generates very little wastewater flow in comparison to its land area. Buildout flow projections from NEC and HP were provided by the City of Roseville and are based on buildout conditions for each development.

Table 3: June 2004 and Buildout ADWF from Point Sources in the June 2004 Service Area

Point Source	Location	Current Flow Data Source	Current ADWF (gpd)	Projected Buildout ADWF (gpd)
Union Pacific Railroad	Roseville	City of Roseville	85,000	85,000
Landfill	Placer County	City of Roseville	5,000	5,000
NEC	Roseville	Flow Monitor Data	700,000	2,000,000
HP	Roseville	City of Roseville	150,000	484,000
Kaiser Hospital	Roseville	Water Use Data	50,000	50,000
Formica	Placer County	Placer County	60,000	60,000
Rio Bravo Power Plant	Placer County	Placer County	15,000	15,000

Notes: Flow projections are based upon existing land use and existing land use designations current as of June 2004, and will provide the estimated flows for baseline modeling scenario for SPWA. Rezoning of HP and Kaiser Hospital properties are now better known than in June 2004, and are documented in TM No. 9b, and are included in a "Land Use intensification Scenario".

4 Unit Flow Factors

Information about the development of unit flow factors used for the WWTP expansion analysis is discussed in the Dry Weather Flow Projection for the 2005 Regional Service Area TM (TM No. 2a). The 2005 unit flow factors for the buildout scenario are presented in **Table 4**. Unit flow factors for single family residential are applied on a per dwelling unit (du) basis while unit flow factors for other land uses are applied on an acreage basis.

Table 4: 2005 Average Dry Weather Flow (ADWF) Factors

Land Use Designation	Units	2005 Unit Flow Factors WWTP Analysis[1]	1996 Master Plan Unit Flow Factor
Commercial	gpd per acre	850	1,040
Heavy Industrial	gpd per acre	850	1,560
Light Industrial	gpd per acre	850	1,040
Mixed Use	gpd per acre	2,300	N/A
Public/Quasi-Public	gpd per acre	660	1,040
Schools	gpd per acre	170	N/A
Residential 1 DU	gpd per du	190	260
Residential 2 DU	gpd per du	190	260
Residential 3 DU	gpd per du	190	260
Residential Mult. DU	gpd per acre	2,040[2]	4,160
Open Space	gpd per acre	0	0
Parks > 10 Acres	gpd per acre	10	N/A
Vacant	gpd per acre	0	0

[1] Includes allowance for dry season GWI.
[2] The 2005 Residential Multiple DU unit flow factor can also be represented as 130 gpd per du

5 Buildout Flow Projections

Buildout ADWF projections within the Ultimate SPWA Service Area are based on the unit ADWF factors developed for the WWTP analysis above (includes dry season GWI). These flow projections include the results of proposed redevelopment/intensification within Roseville and Rocklin, which were analyzed as a separate scenario and are presented in detail in the *Intensification Land Use TM* (TM No. 9c). Buildout ADWF projections within the 2005 Regional Service Area are presented in **Table 5**. Buildout average dry weather flow projections within the Ultimate SPWA Service Area (including UGAs) are presented in **Table 6**. Detailed flow projections for each UGA are presented in **Attachment A** at the end of this TM.

Table 5: Buildout ADWF Projections within 2005 Regional Service Area

Land Use	Unit Flow Factor	PG WWTP[3] Buildout Units (ac or du)	PG WWTP[3] Buildout ADWF (mgd)	DC WWTP[4] Buildout Units (ac or du)	DC WWTP[4] Buildout ADWF (mgd)	2005 Regional Service Area Buildout Units (ac or du)	2005 Regional Service Area Buildout ADWF (mgd)
Commercial	850 gpd/ac	1,728	1.47	2,890	2.46	4,618	3.92
Heavy Industrial[1]	850 gpd/ac	1,680	1.43	263	0.22	1,943	1.65
Light Industrial[1]	850 gpd/ac	1,221	1.04	637	0.54	1,858	1.58
Mixed Use	2,300 gpd/ac	-	-	7	0.02	7	0.02
Public/Quasi-Public[1]	660 gpd/ac	282	0.19	851	0.56	1,133	0.75
Schools	170 gpd/ac	258	0.04	540	0.09	798	0.14
Residential 1 DU	190 gpd/du	26,893	5.11	42,866	8.14	69,759	13.25
Residential 2 DU	190 gpd/du	2	0.0004	2,122	0.40	2,124	0.40
Residential 3 DU	190 gpd/du	12	0.002	720	0.14	732	0.14
Residential Multiple DU	2,040 gpd/ac	594	1.21	606	1.24	1,200	2.45
Open Space	0 gpd/ac	6,034	-	3,171	-	9,205	-
Parks > 10 Acres	10 gpd/ac	270	0.003	361	0.004	631	0.01
Point Sources	Varies gpd/ac	1,043	2.56	91	0.14	1,134	2.70
Placer Ranch[2]	Varies gpd/ac	1,027	0.90	-	-	1,027	0.90
West Roseville[2]	Varies gpd/ac	3,162	2.07	-	-	3,162	1.70
Placer Vineyards[2]	Varies gpd/ac	-	-	1,062	0.58	1,062	0.58
Rezones	Varies gpd/ac	-	0.50	-	0.17	-	0.67
Intensification	Varies gpd/ac	-	-	-	1.64	-	1.64
	Total (mgd)		**16.52**		**16.34**		**32.86**

[1] Land use category does not include area of parcels associated with point sources identified in **Table 3**.
[2] Includes portion of development located within the 2005 Regional Service Area.
[3] Pleasant Grove WWTP Service Area
[4] Dry Creek WWTP Service Area
[5] Includes all of WRSP, located entirely inside of the 2005 Regional Service Area boundary

Table 6: Buildout ADWF Projections within Ultimate SPWA Service Area

Description of Area	Buildout ADWF (mgd)		Total Buildout ADWF (mgd)
	PGWWTP[3]	DCWWTP[4]	
2005 Regional Service Area	16.52	16.34	32.86
Curry Creek UGA	2.72	-	2.72
Regional University UGA	1.17	-	1.17
Inviro Tech UGA	0.08	-	0.08
Placer UGA	-	0.01	0.01
Orchard Creek UGA	0.02	-	0.02
Placer Ranch UGA	1.27	-	1.27
Placer Vineyards UGA	-	2.23	2.23
SMD-3 UGA	-	0.29	0.29
SPMUD UGA	-	1.11	1.11
Creekview UGA and Panhandle[5]	1.06	-	1.06
Sierra Vista UGA	2.10	-	2.10
Brookfield UGA	0.73	-	0.73
Total ADWF (mgd)	**25.67**	**19.99**	**45.64**

[1] Includes portion of Placer Ranch UGA within the 2005 Regional Service Area.
[2] Includes portion of Placer Vineyards UGA within the 2005 Regional Service Area.
[3] Pleasant Grove WWTP Service Area
[4] Dry Creek WWTP Service Area
[5] "Panhandle" refers to a 238-acre portion of the Reason Farms planning area that is adjacent to the western boundary of the 511-acre Creekview UGA. The panhandle area is assumed to contribute wastewater flow to the Creekview UGA.

Attachment A

Urban Growth Area Flow Projections

CURRY CREEK UGA

PLEASANT GROVE WATERSHED

Connected Land Use Description	Units	DU or Area (acres)	Unit Flow Factor (gpd)	(gpd)
OPEN SPACE	Acres	931	-	-
COMMERCIAL	Acres	161	850	136,850
HEAVY INDUSTRIAL	Acres	64	850	54,400
LIGHT INDUSTRIAL	Acres	161	850	136,850
MIXED USE	Acres	64	2,300	147,200
PUBLIC/QUASI-PUBLIC	Acres	161	660	106,260
SCHOOLS	Acres	96	170	16,320
RESIDENTIAL 1 DU	DU	8,988	190	1,707,720
RESIDENTIAL 2 DU	DU	-	190	-
RESIDENTIAL 3 DU	DU	-	190	-
RESIDENTIAL MULTIPLE DU	DU	3,210	130	417,300
Total				2,722,900
Total (mgd)				**2.72**

REGIONAL UNIVERSITY UGA

PLEASANT GROVE WATERSHED

Connected Land Use Description	Units	DU or Area (acres)	Unit Flow Factor (gpd)	(gpd)
OPEN SPACE	Acres	149	-	-
COMMERCIAL	Acres	22	850	18,870
HEAVY INDUSTRIAL	Acres	-	850	-
LIGHT INDUSTRIAL	Acres	-	850	-
MIXED USE	Acres	-	2,300	-
PUBLIC/QUASI-PUBLIC	Acres	10	660	6,864
SCHOOLS	Acres	31	170	5,270
RESIDENTIAL 1 DU	DU	2,226	190	422,940
RESIDENTIAL 2 DU	DU	-	190	-
RESIDENTIAL 3 DU	DU	-	190	-
RESIDENTIAL MULTIPLE DU	DU	1,006	130	130,780
Point Sources				
UNIVERSITY				582,600
Total				1,167,324
Total (mgd)				**1.17**

INVIRO TECH UGA

PLEASANT GROVE WATERSHED

Connected Land Use Description	Units	DU or Area (acres)	Unit Flow Factor (gpd)	(gpd)
OPEN SPACE	Acres	0	0	0
COMMERCIAL	Acres	0	850	0
HEAVY INDUSTRIAL	Acres	0	850	0
LIGHT INDUSTRIAL	Acres	0	850	0
MIXED USE	Acres	0	2,300	0
PUBLIC/QUASI-PUBLIC	Acres	0	660	0
SCHOOLS	Acres	0	170	0
RESIDENTIAL 1 DU	DU	0	190	0
RESIDENTIAL 2 DU	DU	0	190	0
RESIDENTIAL 3 DU	DU	0	190	0
RESIDENTIAL MULTIPLE DU	DU	0	130	0
Point Sources				
INVIRO TECH				80,000
Total				80,000
Total (mgd)				**0.08**

PLACER RANCH UGA (OUTSIDE 2005 REGIONAL SERVICE AREA)

PLEASANT GROVE WATERSHED

Connected Land Use Description	Units	DU or Area (acres)	Unit Flow Factor (gpd)	(gpd)
OPEN SPACE	Acres	74	-	-
COMMERCIAL	Acres	67	850	56,610
HEAVY INDUSTRIAL	Acres	-	850	-
LIGHT INDUSTRIAL	Acres	29	850	24,650
MIXED USE	Acres	20	2,300	46,460
PUBLIC/QUASI-PUBLIC	Acres	21	660	14,058
SCHOOLS	Acres	30	170	5,100
RESIDENTIAL 1 DU	DU	2,046	190	388,683
RESIDENTIAL 2 DU	DU	-	190	-
RESIDENTIAL 3 DU	DU	-	190	-
RESIDENTIAL MULTIPLE DU	DU	2,281	130	296,582
Point Sources				
UNIVERSITY [a]				440,000
Total				1,272,143
Total [b] (mgd)				**1.27**

Footnotes:
(a) Does not include faculty housing, which is included in the Residential categories above.
(b) 1.27 mgd does not include flows from "offsite" areas.

CREEKVIEW UGA & PANHANDLE [a]

PLEASANT GROVE WATERSHED

Connected Land Use Description	Units	DU or Area (acres)	Unit Flow Factor (gpd)	(gpd)
OPEN SPACE	Acres	248	-	-
COMMERCIAL	Acres	11	850	9,435
HEAVY INDUSTRIAL	Acres	-	850	-
LIGHT INDUSTRIAL	Acres	9	850	7,225
MIXED USE	Acres	12	2,300	27,600
PUBLIC/QUASI-PUBLIC	Acres	3	660	2,046
SCHOOLS	Acres	11	170	1,785
RESIDENTIAL 1 DU	DU	1,593	190	302,670
RESIDENTIAL 2 DU	DU		190	-
RESIDENTIAL 3 DU	DU		190	-
RESIDENTIAL MULTIPLE DU	DU	1,170	130	152,100
Total				502,861
Point Sources *(From Panhandle Area)*				
From North Panhandle Area [a,b]				
MDH (Faculty Housing)	DU	96	190	18,240
Commercial (Hotel)	DU	150	190	28,500
Commercial (Athletic Club)	acres	1	850	850
From South Panhandle Area [c]				
University [d]	acres	221	2,304	509,184
Total (mgd)				**1.06**

Footnotes:

(a) "North Panhandle" refers to the portion of the Reason Farms panhandle that is north of Pleasant Grove Creek; this area is adjacent to the western boundary of the Creekview UGA. This area is assumed to contribute wastewater flow to the Creekview UGA.

(b) As of July 2007, several development scenarios were under consideration for the North Panhandle area. The scenarios associated with the highest flow estimates are included here.

(c) The entire "Panhandle" area comprises approximately 238 acres. Subtracting 17 acres (Wood Rodgers) for the North Panhandle area yields 221 acres remaining for a proposed private university in the "South Panhandle" area.

(d) The unit flow factor for the university was derived by dividing the total flow projection for the university in the Placer Ranch UGA (0.68 mgd) by its corresponding acreage (295 acres), yielding 2,304 gpad.

SIERRA VISTA UGA

PLEASANT GROVE WATERSHED

Connected Land Use Description	Units	DU or Area (acres)	Unit Flow Factor (gpd)	(gpd)
OPEN SPACE [a]	Acres	412	-	-
COMMERCIAL	Acres	220	850	187,000
HEAVY INDUSTRIAL	Acres	-	850	-
LIGHT INDUSTRIAL	Acres	-	850	-
MIXED USE [b]	Acres	43	2,300	98,900
PUBLIC/QUASI-PUBLIC	Acres	10	660	6,600
SCHOOLS	Acres	68	170	11,492
RESIDENTIAL 1 DU	DU	7,799	190	1,481,810
RESIDENTIAL 2 DU	DU	-	190	-
RESIDENTIAL 3 DU	DU	-	190	-
RESIDENTIAL MULTIPLE DU	DU	2,399	130	311,870
Total				2,097,672
Total (mgd)				**2.10**

Footnotes:
(a) Estimated area. At zero gpd/acre, however, this estimate does not impact flow projections

(b) Differs from 78,900 gpd calculated in the Sierra Vista Sanitary Sewer Master Plan (MSCE, July 2007).

BROOKFIELD UGA

PLEASANT GROVE WATERSHED

Connected Land Use Description	Units	DU or Area (acres)	Unit Flow Factor (gpd)	(gpd)
OPEN SPACE	Acres	208	-	-
COMMERCIAL	Acres	14	850	11,560
HEAVY INDUSTRIAL	Acres	-	850	-
LIGHT INDUSTRIAL	Acres	-	850	-
MIXED USE	Acres	-	2,300	-
PUBLIC/QUASI-PUBLIC	Acres	2	660	1,320
SCHOOLS	Acres	22	170	3,740
RESIDENTIAL 1 DU	DU	835	190	158,650
RESIDENTIAL 2 DU	DU	2,087	190	396,530
RESIDENTIAL 3 DU	DU	-	190	-
RESIDENTIAL MULTIPLE DU	DU	1,252	130	162,760
Total				734,560
Total[1] (mgd)				**0.73**

Footnotes:
[1]Brookfield developers supplied several sets of preliminary land use data during this project, resulting in a range of projected ADWF from 0.69 (the most recent) to 0.73 mgd. The largest of these projections, 0.73 mgd, was used for this analysis.

PLACER UGA

DRY CREEK WATERSHED

Connected Land Use Description	Units	DU or Area (acres)	Unit Flow Factor (gpd)	(gpd)
OPEN SPACE	Acres	-	-	-
COMMERCIAL	Acres	-	850	-
HEAVY INDUSTRIAL	Acres	-	850	-
LIGHT INDUSTRIAL	Acres	-	850	-
MIXED USE	Acres	-	2,300	-
PUBLIC/QUASI-PUBLIC	Acres	-	660	-
SCHOOLS	Acres	-	170	-
RESIDENTIAL 1 DU	DU	27	190	5,130
RESIDENTIAL 2 DU	DU	-	190	-
RESIDENTIAL 3 DU	DU	-	190	-
RESIDENTIAL MULTIPLE DU	DU	-	130	-
Total				5,130
Total (mgd)				**0.01**

PLACER VINEYARDS UGA (OUTSIDE 2005 REGIONAL SERVICE AREA [a,b])

DRY CREEK WATERSHED

Connected Land Use Description	Units	DU or Area (acres)	Unit Flow Factor (gpd)	(gpd)
OPEN SPACE [c]	Acres	729	-	-
COMMERCIAL	Acres	236	850	200,600
HEAVY INDUSTRIAL	Acres	-	850	-
LIGHT INDUSTRIAL	Acres	-	850	-
MIXED USE	Acres	63	2,300	143,750
PUBLIC/QUASI-PUBLIC	Acres	119	660	78,540
SCHOOLS	Acres	140	170	23,800
RESIDENTIAL 1 DU	DU	7,649	190	1,453,310
RESIDENTIAL 2 DU	DU	-	190	-
RESIDENTIAL 3 DU	DU	-	190	-
RESIDENTIAL MULTIPLE DU	DU	2,542	130	330,460
Total				2,230,460
Total (mgd)				**2.23**

Footnotes:
(a) There is an area of approximately 150 acres inside Placer Vineyards Shed A, but within the 2005 Regional Service Area Boundary. Mike Smith of MSCE provided land use information for this area in September 2007. Flow projections for this area were therefore subtracted from Shed A and added to the Shed B flows to represent the total flow from within the 2005 Regional Service Area Boundary.

(b) For convenience, the boundary for Shed A is henceforth assumed to be contiguous with the 2005 SAB and the area represented by the ADWF presented above.
(c) Estimated area. At zero gpd/acre, however, this estimate does not impact flow projections

SMD-3 UGA

DRY CREEK WATERSHED

Connected Land Use Description	Units	DU or Area (acres)	Unit Flow Factor (gpd)	(gpd)
OPEN SPACE	Acres	-	-	-
COMMERCIAL	Acres	3	850	2,550
HEAVY INDUSTRIAL	Acres	-	850	-
LIGHT INDUSTRIAL	Acres	-	850	-
MIXED USE	Acres	-	2,300	-
PUBLIC/QUASI-PUBLIC	Acres	11	660	7,260
SCHOOLS	Acres	-	170	-
RESIDENTIAL 1 DU	DU	1,268	190	240,920
RESIDENTIAL 2 DU	DU	14	190	2,660
RESIDENTIAL 3 DU	DU	-	190	-
RESIDENTIAL MULTIPLE DU	DU	250	130	32,500
Total				285,890
Total (mgd)				**0.29**

SPMUD UGA

DRY CREEK WATERSHED

Connected Land Use Description	Units	DU or Area (acres)	Unit Flow Factor (gpd)	(gpd)
OPEN SPACE	Acres	97	-	-
COMMERCIAL	Acres	99	850	84,150
HEAVY INDUSTRIAL	Acres	-	850	-
LIGHT INDUSTRIAL	Acres	-	850	-
MIXED USE	Acres	-	2,300	-
PUBLIC/QUASI-PUBLIC	Acres	-	660	-
SCHOOLS	Acres	-	170	-
RESIDENTIAL 1 DU - by 2050 [a]	DU	1,200	190	228,000
RESIDENTIAL 1 DU - after 2050 [a]	DU	4,180	190	794,200
RESIDENTIAL 2 DU	DU	-	190	-
RESIDENTIAL 3 DU	DU	-	190	-
RESIDENTIAL MULTIPLE DU	DU	-	130	-
Total				1,106,350
Total - by 2050 [a] (mgd)				**0.23**
Total - after 2050 [a] (mgd)				**1.11**

Footnotes:
a) Based on information provided by SPMUD, a total of 5,380 DUs are expected in the SPMUD UGA at ultimate buildout. However, SPMUD projects that only 1,200 of these DUs will be built within the planning horizon (2050) of this study, leaving 4,180 DUs for later buildout.

Attachment B

June 2007 TM Update Sheet

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject: **Update for TM 2b**

Prepared For: Art O'Brien, City of Roseville

Prepared by: Andy Smith, RMC

Reviewed by: Dave Richardson, RMC

Date: October 31, 2006

Reference: 0091-04

1 Summary of Update for TM 2b

Since the completion of TM 2b on November 4, 2005, changes in the scope of the South Placer Wastewater and Recycled Water Systems Evaluation, as well as changes in the data available, have resulted in the need to identify out-of-date information, to summarize the updated information, and provide justification as to the need for the update. **Table 1** presents a summary of the updates for TM 2b.

Table 1: Summary of Update for TM 2b

Page	Location	Summary of Outdated Information	Summary of Updated Information	Reason for Update
1	Paragraph 4	Total Ultimate Service Area acreage = 29,724 (PG); 36,070 (DC); 65,794 (Total)	Total Ultimate Service Area acreage = 30,407 (PG); 40,161 (DC); 70,568 (Total)	Expanded SPMUD boundary and Brookfield
2	Table 2	SPMUD UGA = 2,319 acres	SPMUD UGA = 6,410	SPMUD provided an expanded UGA boundary
2	Table 2	Brookfield not included	Brookfield: Pleasant Grove Watershed, 683 acres	Brookfield added as a UGA
2	Table 2	Total UGA acreage = 7,549 (PG); 6,242 (DC); 13,791 (Total)	Total UGA acreage = 8,232 (PG); 10,333 (DC); 18,565 (Total)	Expanded SPMUD boundary and Brookfield
3	Figure 1	SPMUD UGA included, but does not reflect expanded boundary	Expanded boundary shown in Figure 2-5 of Systems Evaluation report	SPMUD provided an expanded UGA boundary
3	Figure 1	Brookfield included, but not shown as a UGA	Brookfield is considered as a UGA	Brookfield added as a UGA
7	Table 6	Brookfield not included	Brookfield: 0.73 mgd (PG)	Brookfield added as a UGA
n/a	Attachment A	Brookfield not included	Refer to TM 11a for land use summary	Brookfield added as a UGA

Attachment C

2009 Update Sheet

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**2009 Update Sheet for TM 2b**
Prepared For:	Art O'Brien, City of Roseville
Prepared by:	Chris van Lienden, RMC
Reviewed by:	Dave Richardson, RMC
Date:	September 3, 2009
Reference:	0091-04

The TM has been modified since it was originally developed in 2005 based on the following updates.

1 2006 Updates

The TM was updated in 2006 to reflect changes in the SPMUD UGA boundary and land use, and to add Brookfield as an additional UGA.

2 2008 Updates

The TM was further updated in 2008 to reflect changes in the land uses and flow projections of the UGAs.

3 2009 Updates

An additional update was prepared in 2009 to reflect the following changes.

3.1 Updates to the H2Omap Sewer Model

Since the 2008 update, the H2Omap Sewer software has been updated which resulted changes to the build-out flow estimates. The flow estimates in the TM has been updated to reflect the most recent model results.

3.2 Changes to the Development Timeline

Flow projections have been updated to reflect reduced rates of residential development due to the economic slowdown beginning in 2008.

3.3 West Roseville Specific Plan Rezone

Buildout flow estimates have been updated to reflect additional inflow from a proposed rezone in the West Roseville Specific Plan (May, 2009). The new land uses and associated average dry weather flow (ADWF) are summarized in Table 1.

Table 1 – West Roseville Specific Plan Rezone Comparison

Connected Land Use Description	Original Developer Agreements		2009 Proposed Update	
	DU or Area (DU or ac)	Flow (mgd)	DU or Area (DU or ac)	Flow (mgd)
1 Residential				
1.1 Low Density Residential	4842 DU	0.92	5963 DU	1.13
1.2 LDR (age restricted)	710 DU	0.13	0 DU	0.00
1.3 Medium Density Residential	1064 DU	0.20	1746 DU	0.33
1.4 High Density Residential	1774 DU	0.23	3229 DU	0.42
2 Open Space	670 ac		696 ac	0.00
2.1 Paseo	15 ac		0 ac	0.00
2.2 Park	251 ac		284 ac	0.00
2.3 Pocket Parks	19 ac		0 ac	0.00
3. Public/Quasi-Public				
3.1 Schools	108 ac	0.02	109 ac	0.02
3.2 Public/Quasi-Public	41 ac	0.02	15 ac	0.01
4 Community Commercial				
4.1 Commercial	34 ac	0.03	56 ac	0.05
4.2 Mixed Use	14 ac	0.03	0 ac	0.00
4.3 Church	0 ac	0.01	0 ac	0.00
5. Business Professional				
5.1 Commercial	20 ac	0.02	18 ac	0.02
6. Light Industrial	74 ac	0.06	75 ac	0.06
7. Industrial	34 ac	0.03	35 ac	0.03
Total		**1.71**		**2.07**

Appendix E Comparison of 2005 and 1996 Unit Flow Factors

Land Use Category	Units	BSF Unit Flow Factor (for Trunk Sewer Modeling)	ADWF Unit Flow Factor (for WWTP Flow Projections)	1996 Master Plan Unit Flow Factor
Commercial	gpd per acre	800	850	1,040
Heavy Industrial	gpd per acre	800	850	1,560
Light Industrial	gpd per acre	800	850	1,040
Mixed Use	gpd per acre	2,160	2,300	N/A
Public/Quasi-Public	gpd per acre	620	660	1,040
Schools	gpd per acre	160	170	N/A
Residential 1 DU	gpd per du	180	190	260
Residential 2 DU	gpd per du	180	190	260
Residential 3 DU	gpd per du	180	190	260
Residential Mult. DU [3]	gpd per acre	1,920	2,040	4,160
Open Space	gpd per acre	0	0	0
Parks > 10 Acres	gpd per acre	10	10	N/A
Vacant	gpd per acre	0	0	0

Appendix F TM 2c – Wet Weather Flow Projection for Ultimate Service Area (w/ UGAs)

Technical Memorandum

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**Wet Weather Flow Projection for the Ultimate SPWA Service Area (Including Urban Growth Areas) (TM No. 2c)**
Prepared For:	Art O'Brien – City of Roseville
Prepared by:	Pete Bellows/Chris Peters – Brown and Caldwell Andy Smith – RMC
Reviewed by:	Dave Richardson/Gisa Ju – RMC
Date:	January 17, 2006; updated January 24, 2008 & September 3, 2009
Reference:	0091-004 Task 2

0 Previous TM Publication and Updates

Since the initial publication of technical memorandum (TM) 2c on January 17, 2006, changes in information available for the South Placer Wastewater and Recycled Water Systems Evaluation (Systems Evaluation), as well as changes in the data, have resulted in the need to identify and update out-of-date information. The newest version of the TM is consistent with the updates summarized in the 2009 Update Sheet which is included in Attachment B.

1 Introduction

This TM summarizes the wet weather wastewater flow projections for buildout conditions within the Ultimate SPWA service area. This includes flows generated within the proposed 2005 Service Area boundary and flows generated within the Urban Growth Areas (UGAs) located outside the proposed 2005 Service Area boundary. Wet weather flow projections are used with the hydraulic model to perform the hydraulic assessment of the collection system and for the analysis of the SPWA wastewater treatment plants. Wet weather flows are based on flow monitoring data which are presented in the *Flow Monitoring TM* (TM No. 2d).

2 Wastewater Flow Components

Typically, wastewater consists of three components: base sanitary flow (BSF), groundwater infiltration (GWI), and rainfall dependent infiltration and inflow (RDI/I). These components are shown on **Figure 1:** . BSF and GWI during dry weather constitute ADWF. ADWF components were previously discussed in the *Dry Weather Flow Projection TM* (TM No. 2a). GWI can vary seasonally as rainfall causes localized groundwater levels to rise during the winter. This phenomenon occurs within the SPWA service area and results in increased GWI in some areas during the wet season. RDI/I occurs during rainfall conditions and causes the wastewater flow to increase. Together, BSF, GWI, wet season GWI, and RDI/I constitute wet weather flow.

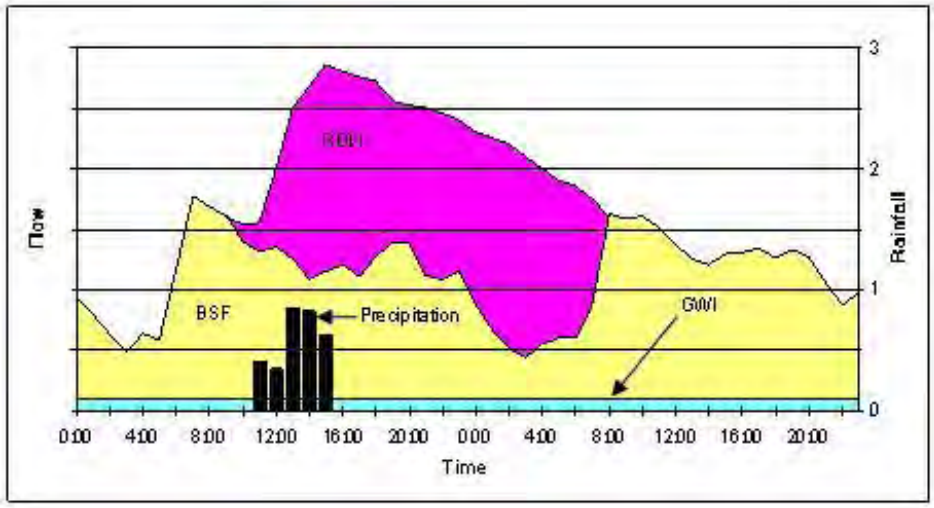


Figure 1: Wastewater Components

3 Wet Weather Flow and Precipitation Data

Wet weather flow data was collected at 43 locations during the winter of 2005. The monitor network consisted of 37 temporary flow monitors and 6 permanent flow monitors. Twenty-seven of the flow monitor sites (including the WWTP monitors) were within the City of Roseville and were utilized for the Roseville Hydraulic Modeling Project. The rest of the monitors were located in Placer County and SPMUD. Some of the temporary monitors located outside of Roseville were located to verify the data from several permanent meter sites. For the wet weather analysis, flow data from the network were evaluated from late January through March 2005. The flow monitor locations utilized for the SPWA wet weather flow projections are listed in **Table 1** and are shown on **Figure 2**.

Precipitation information during the wet weather flow monitoring period was collected at 17 permanent rain gauge sites in the City of Roseville and Placer County and one temporary rain gauge sites in SPMUD. The rain gauge network provided comprehensive coverage over the entire SPWA service area.

Further discussion and analysis of the wet weather flow and rainfall monitoring data is presented in the *Flow Monitoring TM* (TM No. 2d).

Table 1: Temporary and Permanent Wet Weather Flow Monitors – Winter 2005

Number	Meter Type	Location	Pipe Diameter (in)
1	Temporary	Roseville	18
2	Temporary	Roseville	15
3	Temporary	Roseville	15
4	Temporary	Roseville	15
5	Temporary	Roseville	21
6	Temporary	Roseville	18
7	Temporary	Roseville	24
8	Temporary	Roseville	30
9	Temporary	Roseville	18
10	Temporary	Roseville	18
11	Temporary	Roseville	15
12	Temporary	Roseville	21
13	Temporary	Roseville	42
14	Temporary	Roseville	66
15	Temporary	Roseville	33
17	Temporary	Roseville	21
18	Temporary	Roseville	24
19	Temporary	Roseville	36
20	Temporary	Roseville	24
21	Temporary	Roseville	33
22	Temporary	Roseville	72
23	Temporary	Roseville	36
24	Temporary	Roseville	42
25	Temporary	Roseville	21
151	Temporary	SPMUD	20
152	Temporary	SPMUD	18
153	Temporary	SPMUD	18
154	Temporary	SPMUD	24
155	Temporary	SPMUD	21
156	Temporary	SPMUD	15
157	Temporary	SPMUD	18
158	Temporary	SPMUD	18
161	Temporary	Placer County	15
162	Temporary	Placer County	15
North Roseville	Permanent	SPMUD	36
Springview	Permanent	SPMUD	42
Strap Ravine	Permanent	Placer County	15
Old Auburn	Permanent	Placer County	18

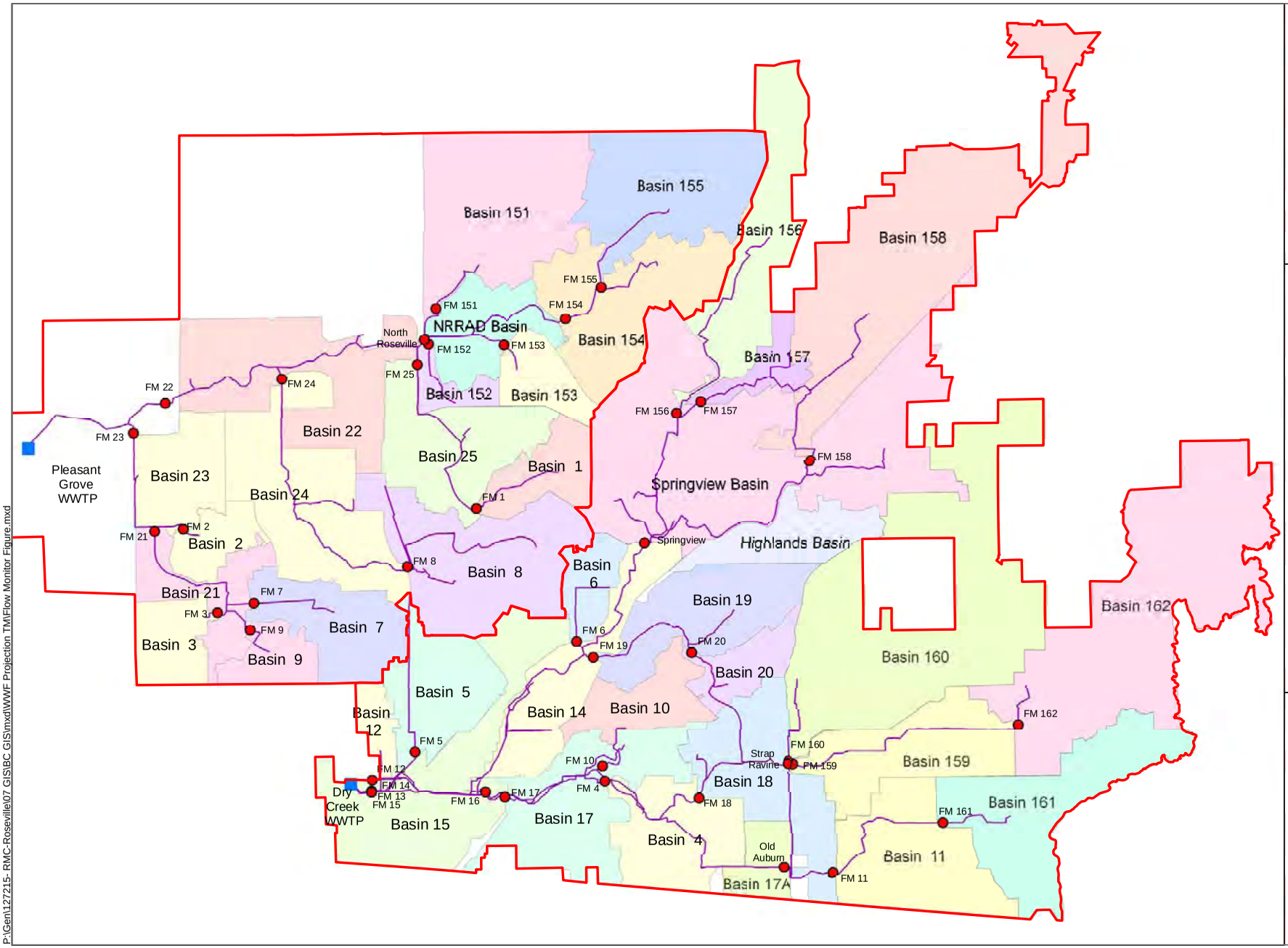


FIGURE 2

Wet Weather Flow Monitor Basins

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Regional Wastewater and Recycled Water Sewer Evaluation Project

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4 RDI/I Modeling with H_20MAP Sewer Pro

The hydraulic analysis of the SPWA collection system is being performed using H_2OMAP Sewer Pro, a commercially available modeling program. The program has several modules that can be used to simulate RDI/I. The modules are calibrated using flow monitor and precipitation data described above. Once the model is calibrated, a design storm is applied to develop design RDI/I flow projections. Design RDI/I and wet weather GWI are combined with design base flows to compute predicted design peak wet weather flows and identify collection system deficiencies.

RDI/I is modeled within H_2OMAP Sewer Pro using the modules to simulate storm water runoff. H_2OMAP Sewer Pro has a unit hydrograph module with four different unit hydrograph methods for projecting runoff. The tri-triangle method was utilized to simulate RDI/I because it is widely used for projecting RDI/I, it is very flexible and it can be readily used to simulate RDI/I. The module simulates how much of and how quickly RDI/I enters the collection system from the contributing basins and subbasins.

The parameters needed to simulate RDI/I with the tri-triangle module are illustrated in Figure 3. Up to three synthetic hydrographs and three corresponding sets of parameters are defined for each basin, representing the fast, medium, and slow response components of the total RDI/I hydrograph. Each synthetic hydrograph has an associated time to peak (T) and recession constant (K) that defines the shape of its respective hydrograph and a rainfall volume factor (R) percentage that determines the volume of RDI/I. These parameters are adjusted during wet weather calibration to vary how much and how quickly rainfall enters the collection system and how long it takes the flow to recede, until a reasonable match is obtained between the actual monitored wet weather hydrograph and the RDI/I projection. In some cases, only one or two synthetic hydrographs are needed to calibrate the RDI/I.

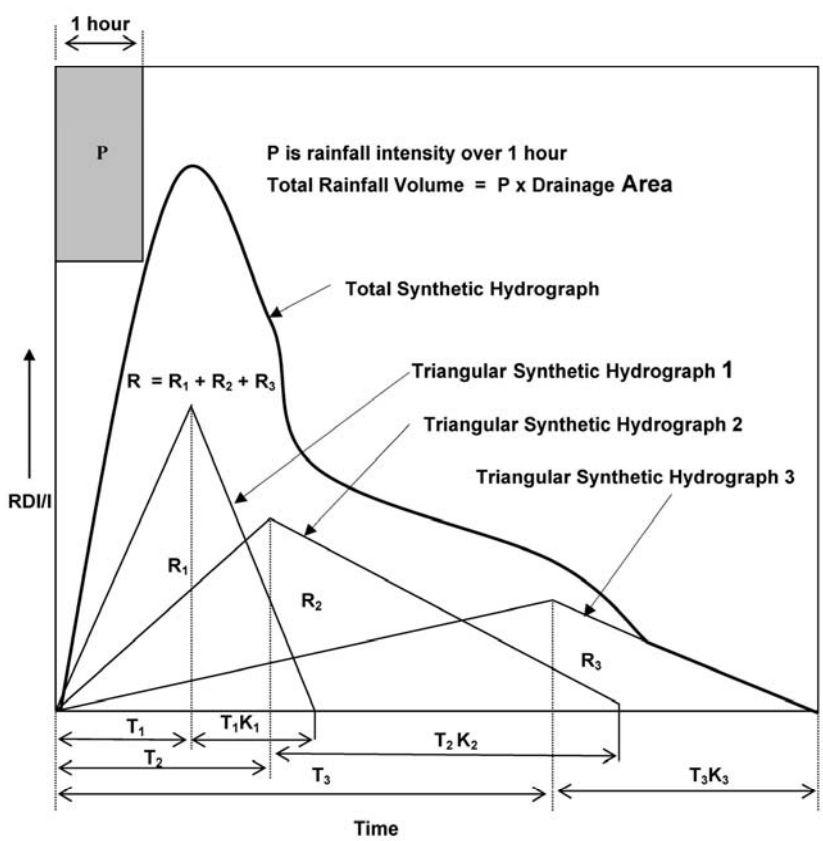


Figure 3: Tri-Triangle Synthetic Hydrograph Method

5 RDI/I Calibration

RDI/I calibration was performed by adjusting the parameters in H_2OMAP Sewer Pro until the modeled flow at the wet weather flow monitor sites reasonably simulates flow monitor data for an actual storm event. Once the model is calibrated, the design storm rainfall profile can be applied to predict design RDI/I responses. A key assumption is that the design storm response will be similar to that of the calibrated storm event. Therefore it is important that the conditions of the calibration event (e.g., antecedent soil and groundwater conditions, magnitude and intensity of rainfall) be as close as possible to the desired design storm condition. The storm on March 1-2, 2005 was chosen as the calibration event because it was the largest storm during the flow monitoring period and there was a reasonable flow response at most of the flow monitoring locations.

The goal for calibration is to match the peak measured flow with the peak modeled flow and the general shape of the flow response (e.g., time to peak and duration and slope of hydrograph recession). However, as with any model, some flow monitor sites calibrate better than others. This was observed previously during the dry weather model calibration. For this model, calibration at critical locations on the trunk sewers entering Roseville from Placer County and SPMUD and trunk sewers within Roseville was successful. Flow data anomalies at some flow meter sites prevented better calibration at those locations.

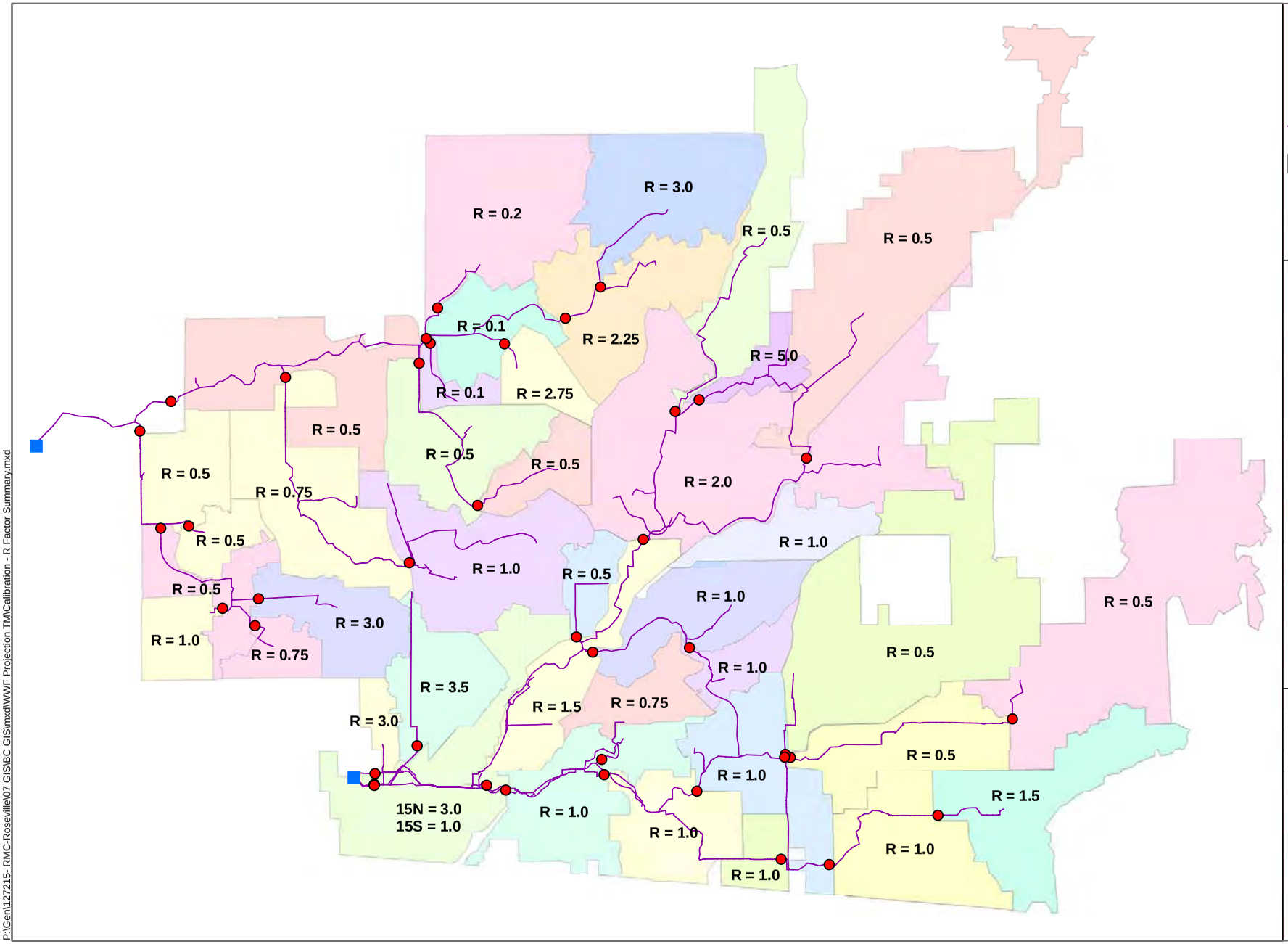
The calibration constants for the March 1-2 storm for each flow monitor basin are listed in **Table 2**. The plots of the model flow and flow monitor data are provided at the end of this TM in Attachment A. **Figure 4** shows the wet weather flow monitor basins that were used to calibrate the model and their relative R factors.

Relatively low R factors ($\leq$ 1.5%) generally indicate a “tight” system with low rates of RDI/I. Some of the higher R factors ($\geq$ 3%) were found in the older areas of Roseville where pipes and laterals may have a higher level of deterioration, thus allowing more I/I into the system.

Table 2: RDI/I Calibration Parameters for March 1-2, 2005 Storm Event

		Hydrograph 1[b]			Hydrograph 2[b]			Hydrograph 3[b]		
Flow Monitor Basin	Total R[a] (%)	R_1 (% of R)	T_1	K_1	R_2 (% of R)	T_2	K_2	R_3 (% of R)	T_3	K_3
1	0.5	60	1	2	40	8	3	0	24	2
2	0.5	60	2	0.5	40	6	3	0	24	2
3	1.0	75	1	1	25	8	3	0	24	2
4	1.0	60	1.5	1	40	8	3	0	24	2
5	3.5	65	2	2	35	6	3	0	24	2
6	0.5	60	1	2	40	8	3	0	24	2
7	3.0	70	1.5	1	30	6	3	0	24	2
8	1.0	50	2	0.75	50	8	3	0	24	2
9	0.75	75	1	1	25	8	3	0	24	2
10	0.75	70	2	1	30	8	3	0	24	2
11[d]	1.0	30	1	2	60	8	3	10	24	0.5
12	3.0	65	2	2	35	6	3	0	24	2
14	1.5	80	2	2	20	8	3	0	24	2
15N	3.0	65	2	2	35	6	3	0	24	2
15S	1.0	65	2	1	35	6	3	0	24	2
17/17A[c]	1.0	70	2	1	30	6	3	0	24	2
18	1.0	80	2	2	20	8	3	0	24	2
19	1.0	80	2	2	20	8	3	0	24	2
20	1.0	80	2	2	20	8	3	0	24	2
21	0.5	60	2	0.5	40	6	3	0	24	2
22	0.5	75	2	2	25	8	3	0	24	2
23	0.5	65	2	0.5	35	6	3	0	24	2
24	0.75	75	5.5	2	25	8	3	0	24	2
25	0.5	50	1	2	50	8	3	0	24	2
151	0.2	0	1	0.5	100	6	0.5	0	24	2
152	0.1	5	1	2	70	8	1	25	24	2
153	2.75	0	0.5	0.5	50	8	0.5	50	24	0.5
154	2.25	10	1	2	10	8	1	80	24	1
155	3.0	10	0.5	2	90	8	3	0	24	2
156	0.5	40	2	2	40	8	3	20	24	2
157	5.0	0	1	0.5	80	6	0	20	24	2
158	0.5	40	2	2	40	8	3	20	24	2
161	1.5	7	1	2	50	7	1	43	24	0.5
162	0.5	20	2	2	40	8	3	40	24	2
North Roseville	0.1	0	0.5	1	80	6	0.5	20	24	2
Springview	2.0	5	2	2	30	8	3	65	24	2
Strap Ravine[e]	0.5	40	1	1	45	8	1	15	24	2

[a] Total percent of rainfall volume that enters the collection system as RDI/I
[b] Refer to Figure 2 for R, T, and K coefficient definitions. R_1, R_2, and R_3 are a percentage of Total R (total 100%)
[c] Flow from Monitor Basin 17A flows through the area representing Basin 4 but is tributary to flow monitor 17.
d Data from Flow Monitor Basin 11 represents the majority of the area tributary to the Old Auburn flow monitor.
e Data from the Strap Ravine Flow Monitor Basin represents the area tributary to the flow monitors 159 and 160.



Legend

- Flow Meter Location
- WWTP
- Collection System Pipe
- Flow Monitor Basin
- R — % of rainfall volume that enters system as RDI/I

FIGURE 4

Wet Weather Flow Monitor Basins with Calibration R Factors

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Regional Wastewater and Recycled Water Sewer Evaluation Project

N W E S

1 0.5 0 1
Scale in Miles

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6 Wet Season GWI

Wet season GWI occurs in addition to the dry season GWI that was defined in the *Dry Weather Flow Projection TM* (TM No. 2a). Wet season GWI was determined by comparing average daily flows at the permanent flow monitor sites in Roseville, SPMUD and Placer County during the 2004 dry season and 2005 wet season. Wet weather GWI was calculated for each area tributary to the permanent flow monitoring sites and was applied to each parcel in the model according the area of the parcel. Wet weather GWI is summarized in **Table 3** and **Table 4**. Based on the results of this analysis, a wet season GWI rate of 200 gpd/acre was applied to currently developed parcels in the Dry Creek watershed. A wet season GWI rate of 100 gpd/acre was applied to currently developed parcels in the Pleasant Grove watershed. Wet season GWI was not applied to parks, open space, or Union Pacific Railroad property.

Table 3: Estimated Wet Season GWI in the Dry Creek Watershed

Permanent Monitor Location	Tributary Area (acres)	2005 Wet Season ADWF (mgd)	2004 Dry Season ADWF (mgd)	Wet Season GWI (mgd)	Wet Season GWI Rate (gpd/acre)
Roseville[a]	5,076	6.32	5.09	1.23	242
SPMUD (Springview)	3,791	3.65	2.99	0.66	174
Placer County (Strap Ravine)	2,533	1.47	1.03	0.44	174
Placer County (Old Auburn)	1,555	1.46	1.25	0.21	135
Dry Creek WWTP	**12,955**	**12.90**	**10.36[b]**	**2.54**	**196**

[a] Calculated flow rates. Includes the following areas outside of Roseville: Highlands and West Dry Creek
[b] 2004 dry season ADWF estimated based on 2005 dry season ADWF data at Dry Creek and Pleasant Grove WWTP

Table 4: Estimated Wet Season GWI in the Pleasant Grove Watershed

Permanent Monitor Location	Tributary Area (acres)	2005 Wet Season ADWF (mgd)	2004 Dry Season ADWF (mgd)	Wet Season GWI (mgd)	Wet Season GWI Rate (gpd/acre)
Roseville[a]	4,064	5.27	4.79	0.48	118
SPMUD (North Roseville)	1,841	1.96	1.84	0.12	65
Pleasant Grove WWTP	**5,905**	**7.23**	**6.63[b]**	**0.60**	**102**

[a] Calculated flow rates. Includes the following areas outside of Roseville: Sunset Industrial Park
[b] 2004 dry season ADWF estimated based on 2005 dry season ADWF data at Dry Creek and Pleasant Grove WWTP

7 RDI/I Projections

The hydraulic model was run to simulate the March 1-2, 2005 storm using the calibrated RDI/I parameters and GWI. The peak flows from the model runs at key flow monitoring locations on the trunk sewers are listed in **Table 5**. The peak hour model results matched the flow data relatively well at the key flow monitoring sites in the system. Some of the other monitoring sites did not calibrate as well, particularly the sites where the dry weather calibration did not match the monitored flows. The model results at the Dry Creek WWTP calibration point was approximately 15 percent low. The model results at the Pleasant Grove WWTP calibration point was approximately 24 percent high. This may be explained by the metering at each WWTP. According to the City of Roseville, there have been some flow monitor problems at the Dry Creek WWTP for some time. The City has developed some average daily flow adjustment factors that are applied to the monitor data. It is not clear if these adjustment factors are as accurate when applied to hourly flow data. Flows at the Pleasant Grove WWTP monitor are limited (flow backs up in the collection system) by the influent pump station capacity of approximately 9 mgd. A typical diurnal pattern shape would normally peak very close to the modeled flow. This case is presented in the calibration hydrographs in **Attachment A**.

Table 5: Peak Wet Weather Flow at Key Flow Monitoring Sites for March 1-2, 2005 Storm Event

Monitor Location	Peak Hour Monitor Flow (mgd)	Peak Hour Model Flow (mgd)
Dry Creek Watershed		
Dry Creek WWTP	21.10	17.89
13	6.88	7.11
14	7.98	7.82
15	3.43	3.10
Old Auburn	2.85	2.99
Strap Ravine	2.31	2.41
Springview	6.08	6.00
Pleasant Grove Watershed		
Pleasant Grove WWTP	9.19	11.38
22	6.27	8.21
23	3.57	3.50
24	2.43	3.31
25	1.60	1.13
North Roseville	3.76	3.98
154	1.75	1.72

8 Future RDI/I

In order to project flows from future development, reasonable assumptions for future I/I were made based on trends in the existing system. I/I from future development may not appear immediately, but most likely will occur over time as the system deteriorates. I/I from future development was projected in the model by applying the following I/I parameters to the future development parcels. These rates coincide with I/I rates in some of the newer developed areas within the SPWA service area.

- Urban Growth Areas and West Roseville: R_t = 0.5% distributed evenly between R_1 and R_2 (T_1=2, K_1=2, T_2=8, K_2=3) and 100 gpad wet season GWI.
- Infill Development: Utilize the same RDI/I parameters and GWI rate as surrounding developed areas (GWI: 100 gpad in PG basin, 200 gpad in DC basin).
- RDI/I and wet season GWI are not applied to future parks or open space.
- Due to the extremely low development density in the Placer UGA (10 acres/du), RDI/I and wet season GWI were only applied to 1 acre per developed parcel.

9 Design Storm

RDI/I flows are dependent on several factors including rainfall amount. RDI/I flows are typically projected using a design storm event. For this project, a 10-year, 24-hour design storm was chosen to project peak wet weather flows in the model. This is the design condition adopted by Sacramento County and recently required by the Central Valley Regional Water Quality Control Board in an order to the City of Folsom. The design storm hyetograph was developed utilizing Table 5-A-1 (elevation (h) = 150 feet) from the Placer County Flood Control and Water Conservation District Stormwater Management Manual (September 1, 1990). The peak rainfall hour was set at 6 a.m. so that the peak RDI/I response (which would normally occur about 1-2 hours after the rainfall for a typical basin) roughly coincides with the peak hour of the dry weather profiles to give a conservative flow response in the collection system. The 24-hour rainfall and peak intensity for the 10-year design storm are listed in **Table 6**. The design storm hyetograph is shown in Figure 5.

Table 6: Design Storm Volumes

Design Storm Recurrence Frequency	24-hour Rainfall Volume (inches)	Peak 6-hour Rainfall Volume (inches)	Peak 1-hour Rainfall Volume (inches)
10-year	2.97	1.65	0.77

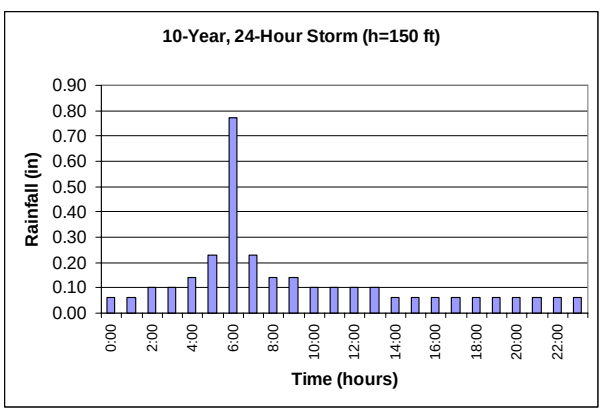


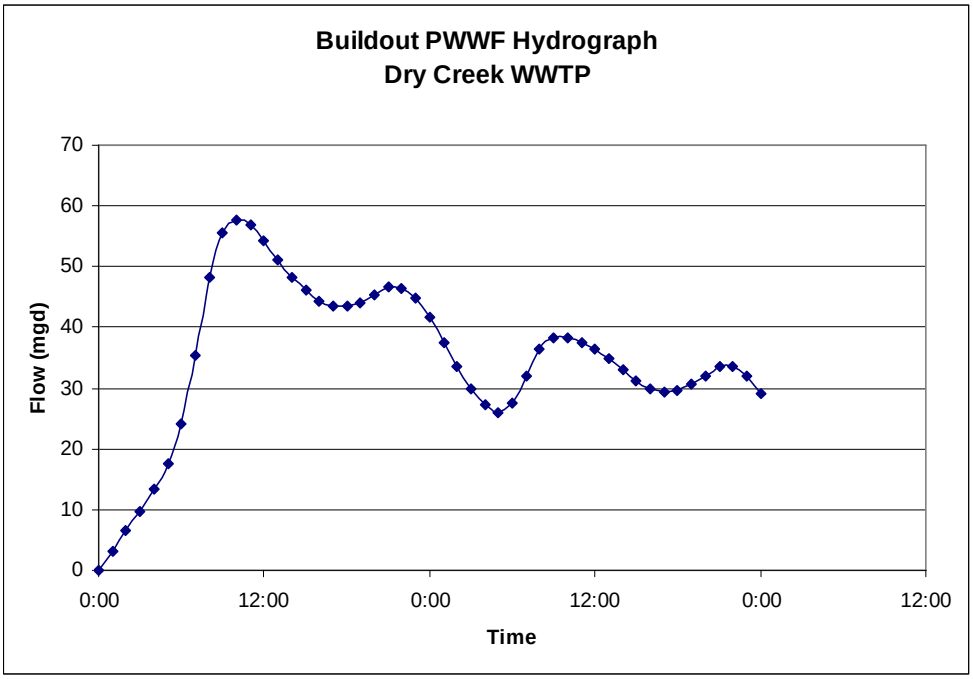
Figure 5: Design Storm Hyetograph

10 Wet Weather Flow Projection

The hydraulic model was used to project June 2004 and buildout wet weather flows under 10-year design storm conditions using the calibration and future RDI/I parameters and GWI values previously presented. The design storm peak wet weather flows at the key monitor locations are listed for current and buildout conditions in **Table 7**. Design flow hydrographs for buildout conditions at Dry Creek and Pleasant Grove WWTPs are shown in and **Figure 7**. Based on these projections, the ratios of peak hour wet weather flow to average dry weather flow for the Dry Creek and Pleasant Grove WWTPs at buildout are approximately 2.4 and 1.7, respectively.

Table 7: 10-Year Design Storm Peak Wet Weather Flow for Current and Buildout Conditions

Monitor Location	Current ADWF (mgd)	Buildout ADWF (mgd)	Current Peak Hour Flow (mgd)	Buildout Peak Hour Flow (mgd)
Dry Creek Watershed				
Dry Creek WWTP	9.34	19.99	25.7	48.5
13			10.4	12.2
14			10.9	25.3
15			6.5	8.6
Old Auburn			3.4	3.4
Strap Ravine			3.0	8.1
Springview			7.1	14.7
Pleasant Grove Watershed				
Pleasant Grove WWTP	7.33	25.67	14.7	42.7
22			11.2	25.3
23			7.3	7.7
24			4.6	7.8
25			1.6	2.3
North Roseville			4.7	9.1
154			2.5	3.9



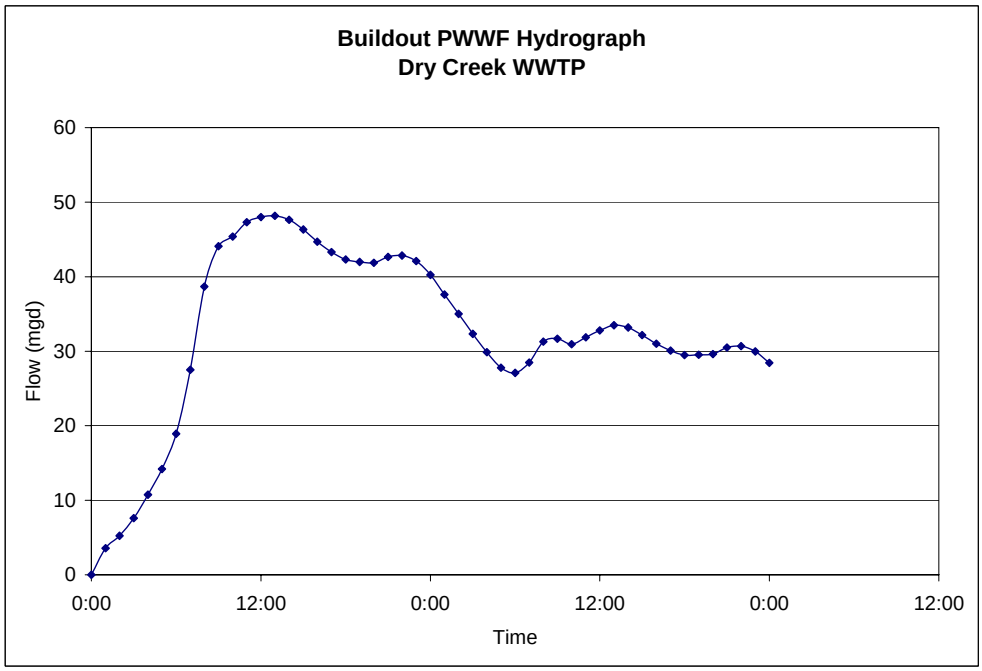
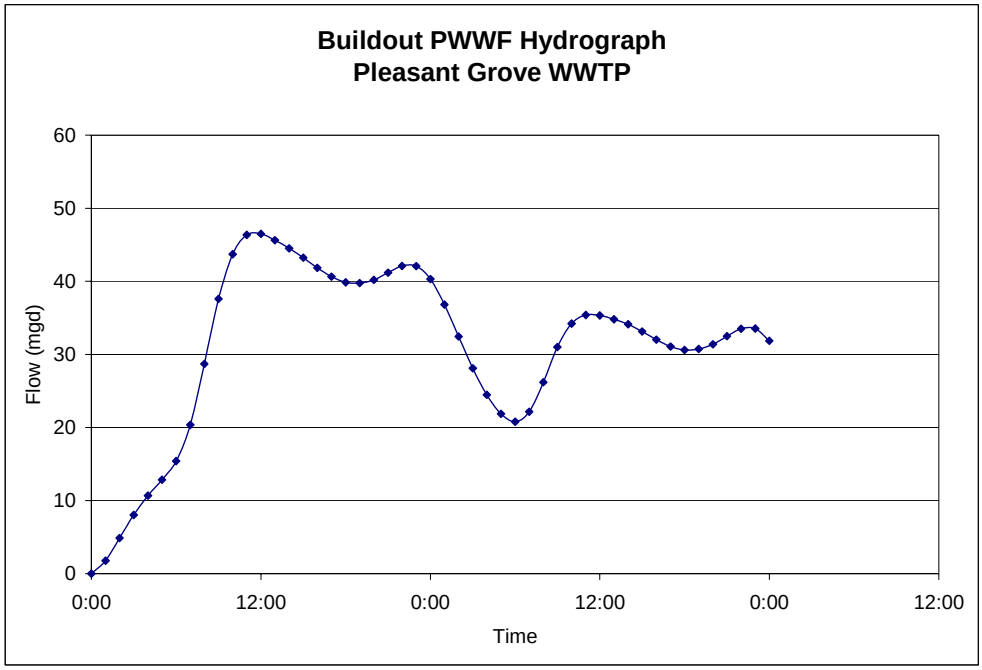


Figure 6: Dry Creek WWTP – Design Flow Hydrograph



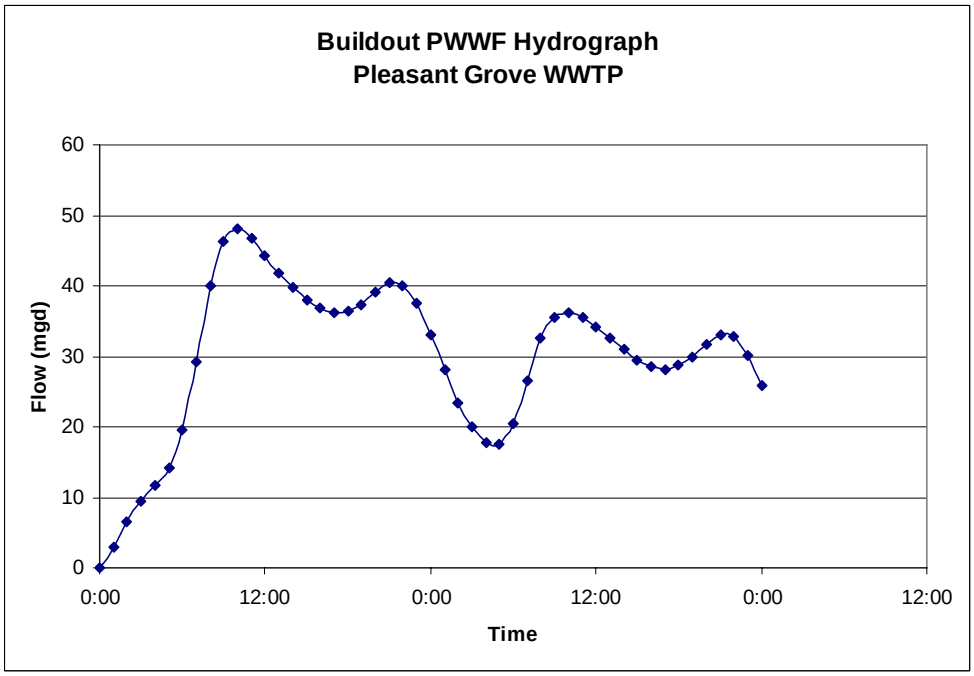
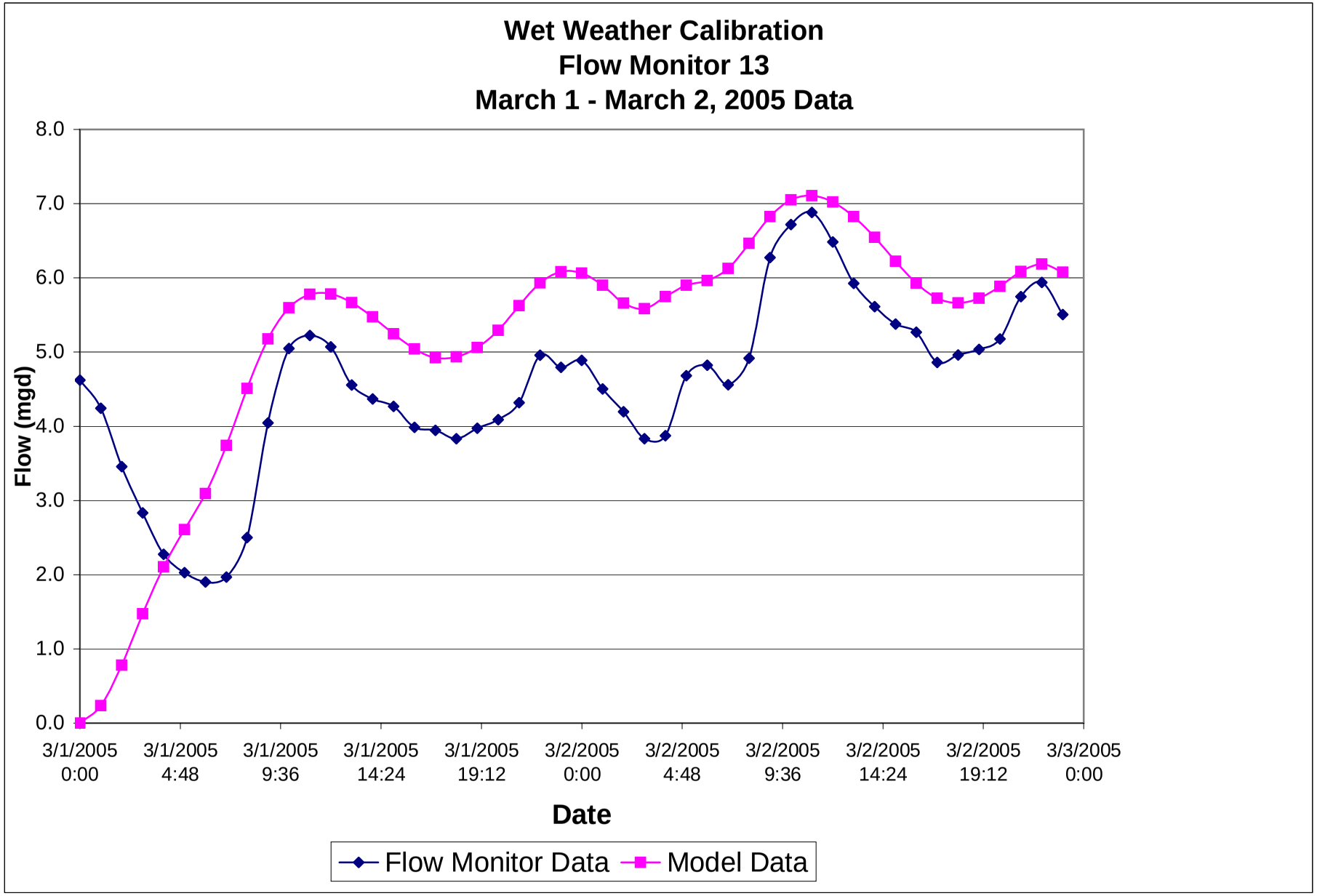


Figure 7: Pleasant Grove WWTP – Design Flow Hydrograph

Attachment A

Model Calibration Hydrographs


Wet Weather Calibration
Flow Monitor 13
March 1 - March 2, 2005 Data
Flow (mgd)
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
3/1/2005 0:00
3/1/2005 4:48
3/1/2005 9:36
3/1/2005 14:24
3/1/2005 19:12
3/2/2005 0:00
3/2/2005 4:48
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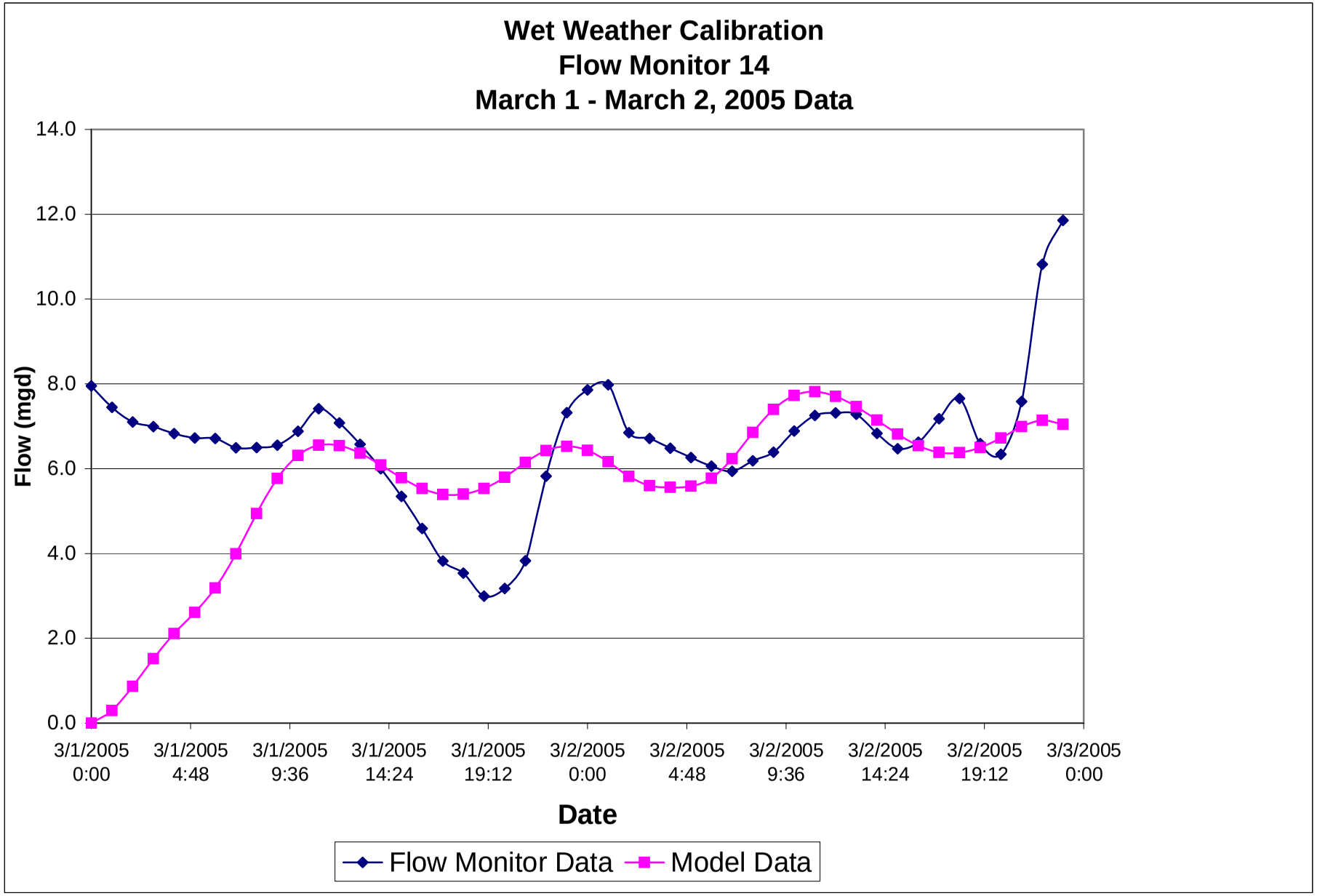
Date
Flow Monitor Data
Model Data


Wet Weather Calibration
Flow Monitor 14
March 1 - March 2, 2005 Data
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Flow (mgd)
3/1/2005 0:00
3/1/2005 4:48
3/1/2005 9:36
3/1/2005 14:24
3/1/2005 19:12
3/2/2005 0:00
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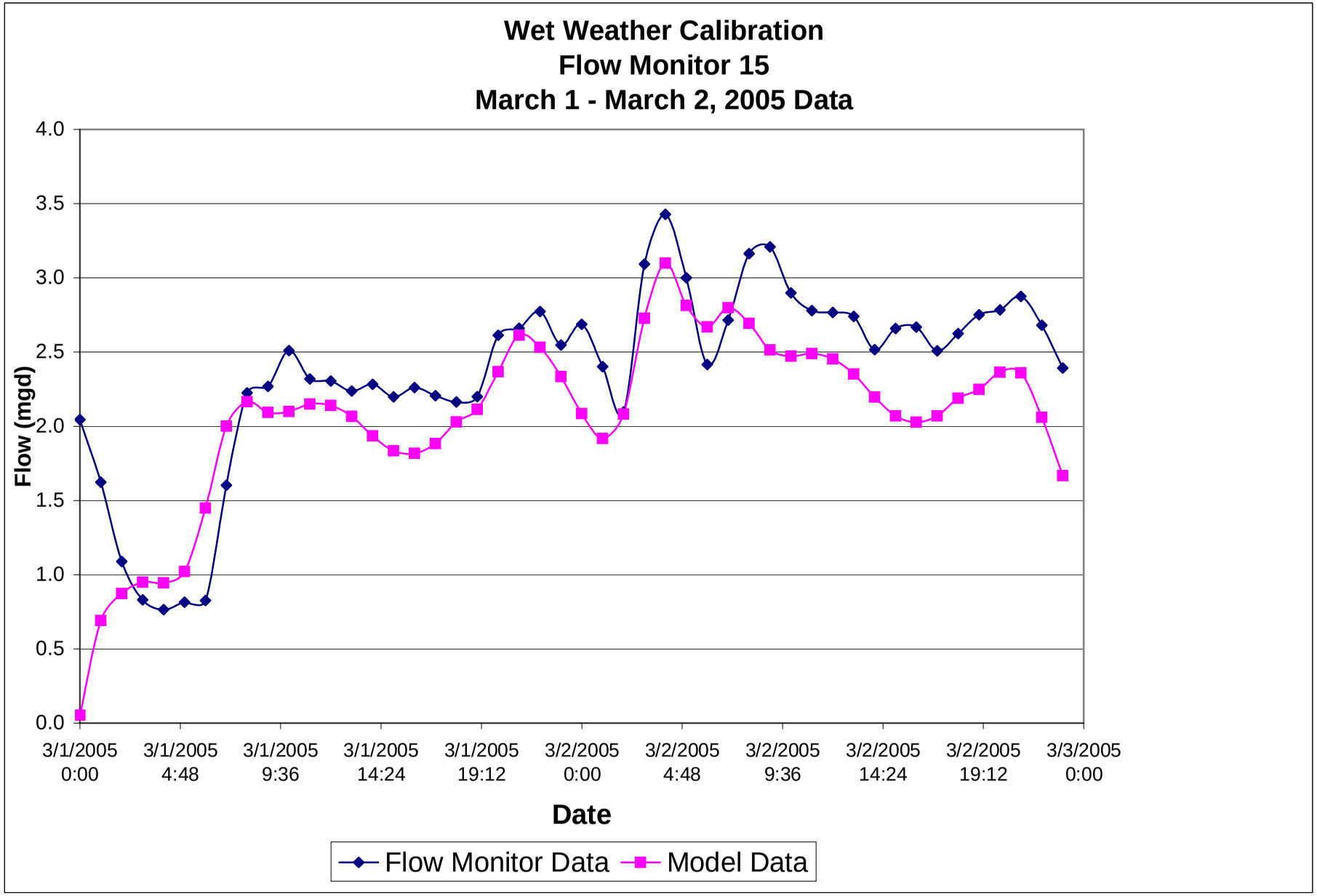
Date
Flow Monitor Data
Model Data


Wet Weather Calibration
Flow Monitor 15
March 1 - March 2, 2005 Data
Flow (mgd)
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3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
3/1/2005 0:00
3/1/2005 4:48
3/1/2005 9:36
3/1/2005 14:24
3/1/2005 19:12
3/2/2005 0:00
3/2/2005 4:48
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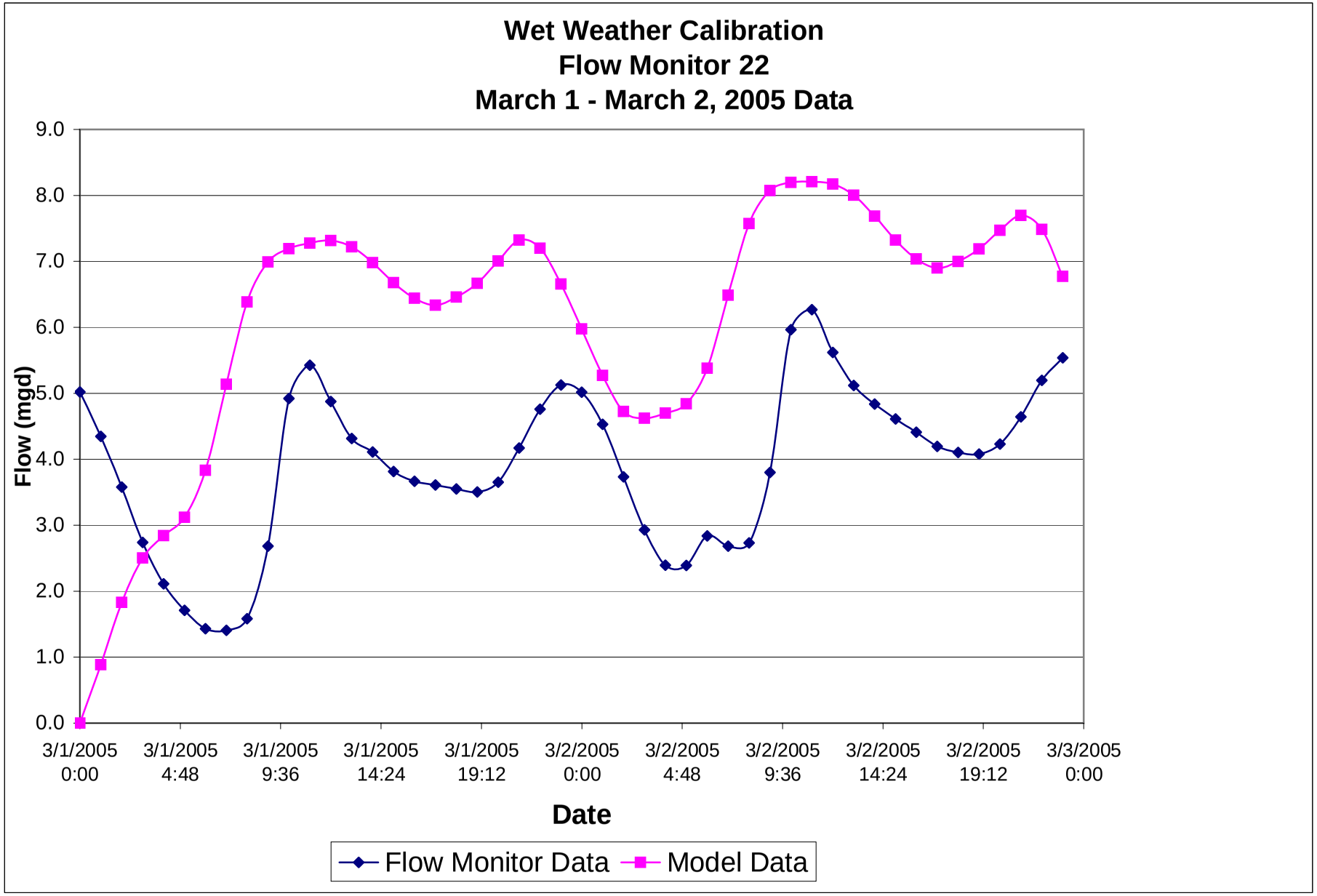
Date
Flow Monitor Data
Model Data


Wet Weather Calibration
Flow Monitor 22
March 1 - March 2, 2005 Data
Flow (mgd)
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
3/1/2005 0:00
3/1/2005 4:48
3/1/2005 9:36
3/1/2005 14:24
3/1/2005 19:12
3/2/2005 0:00
3/2/2005 4:48
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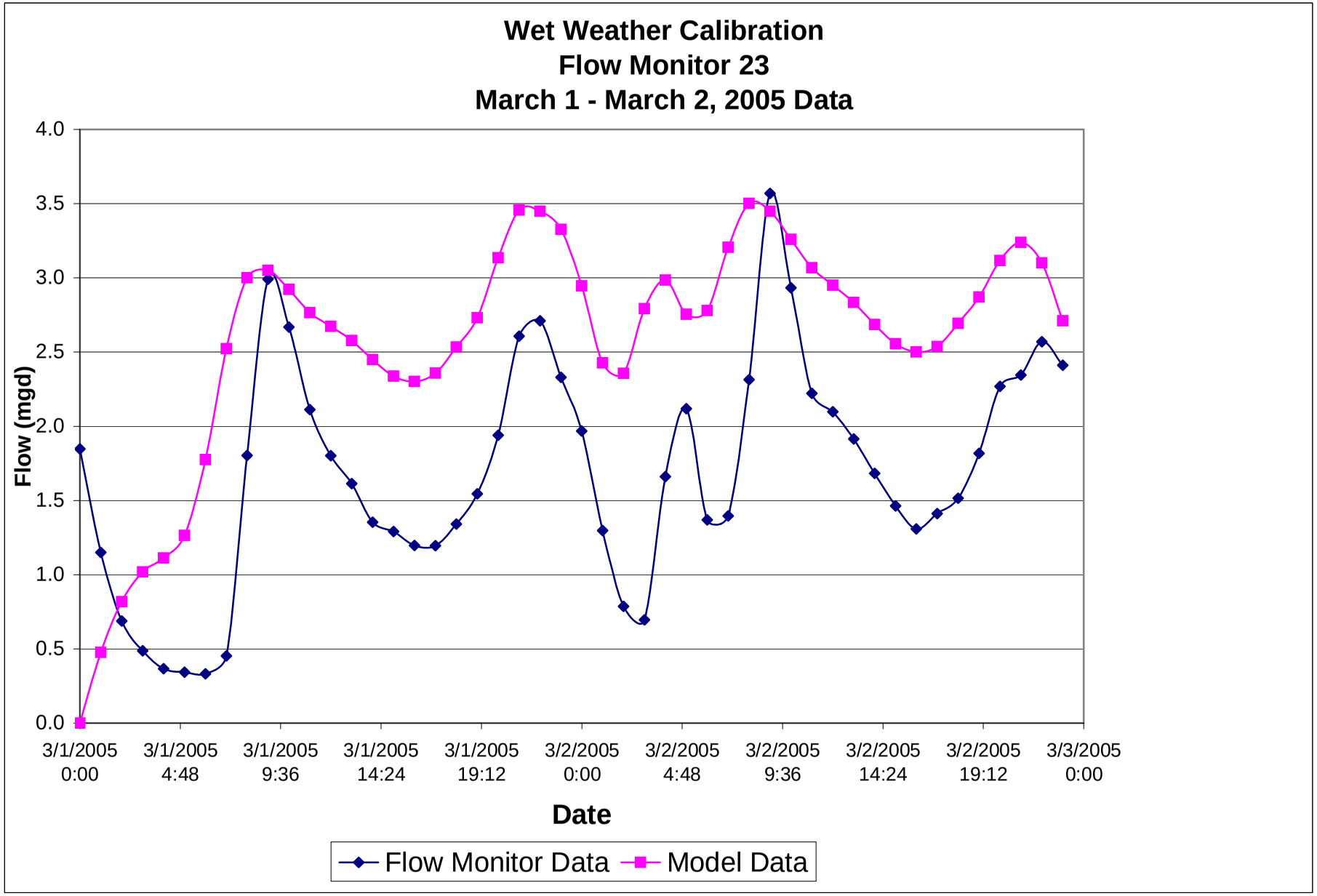
Date
Flow Monitor Data
Model Data


Wet Weather Calibration
Flow Monitor 23
March 1 - March 2, 2005 Data
Flow (mgd)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
3/1/2005 0:00
3/1/2005 4:48
3/1/2005 9:36
3/1/2005 14:24
3/1/2005 19:12
3/2/2005 0:00
3/2/2005 4:48
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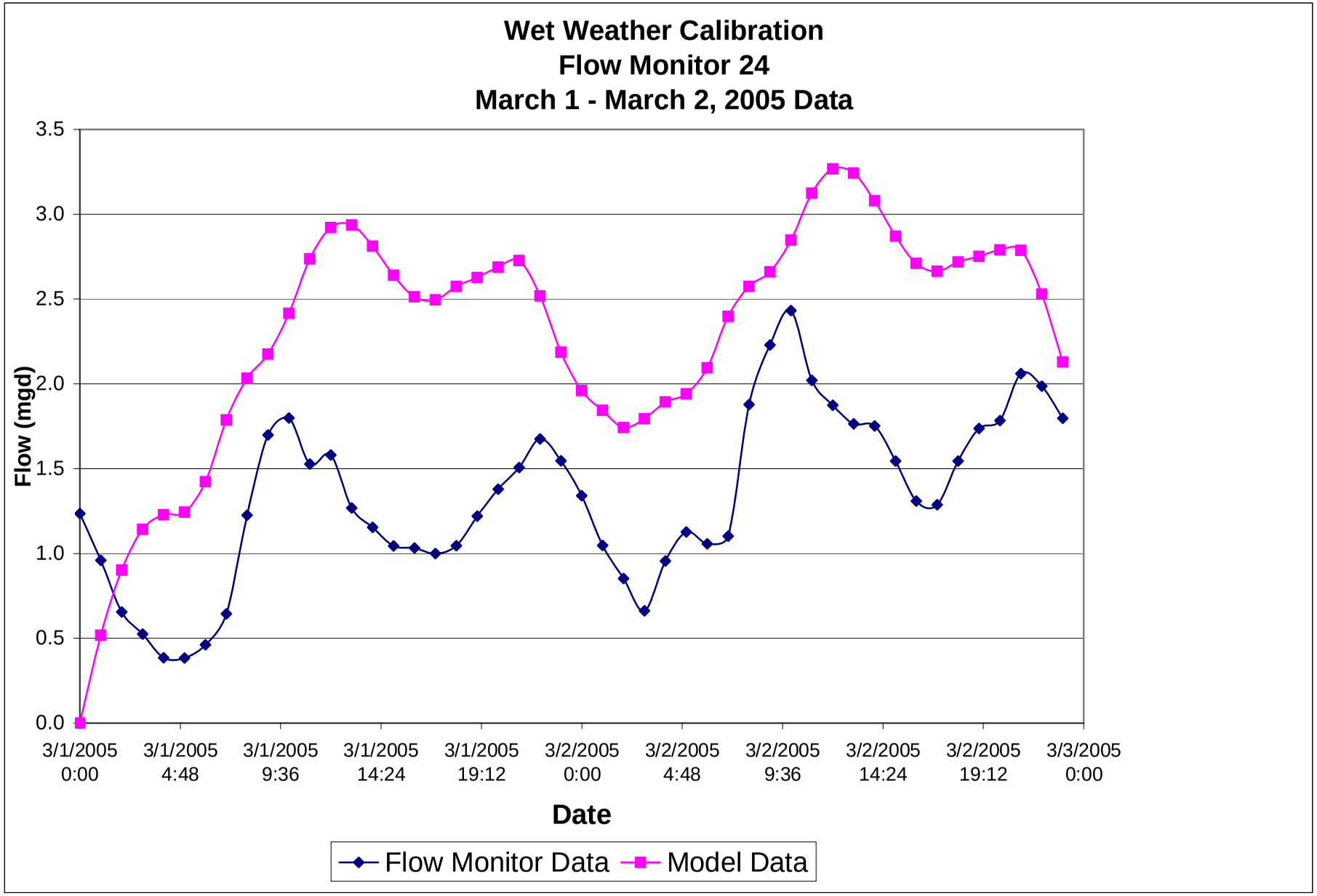
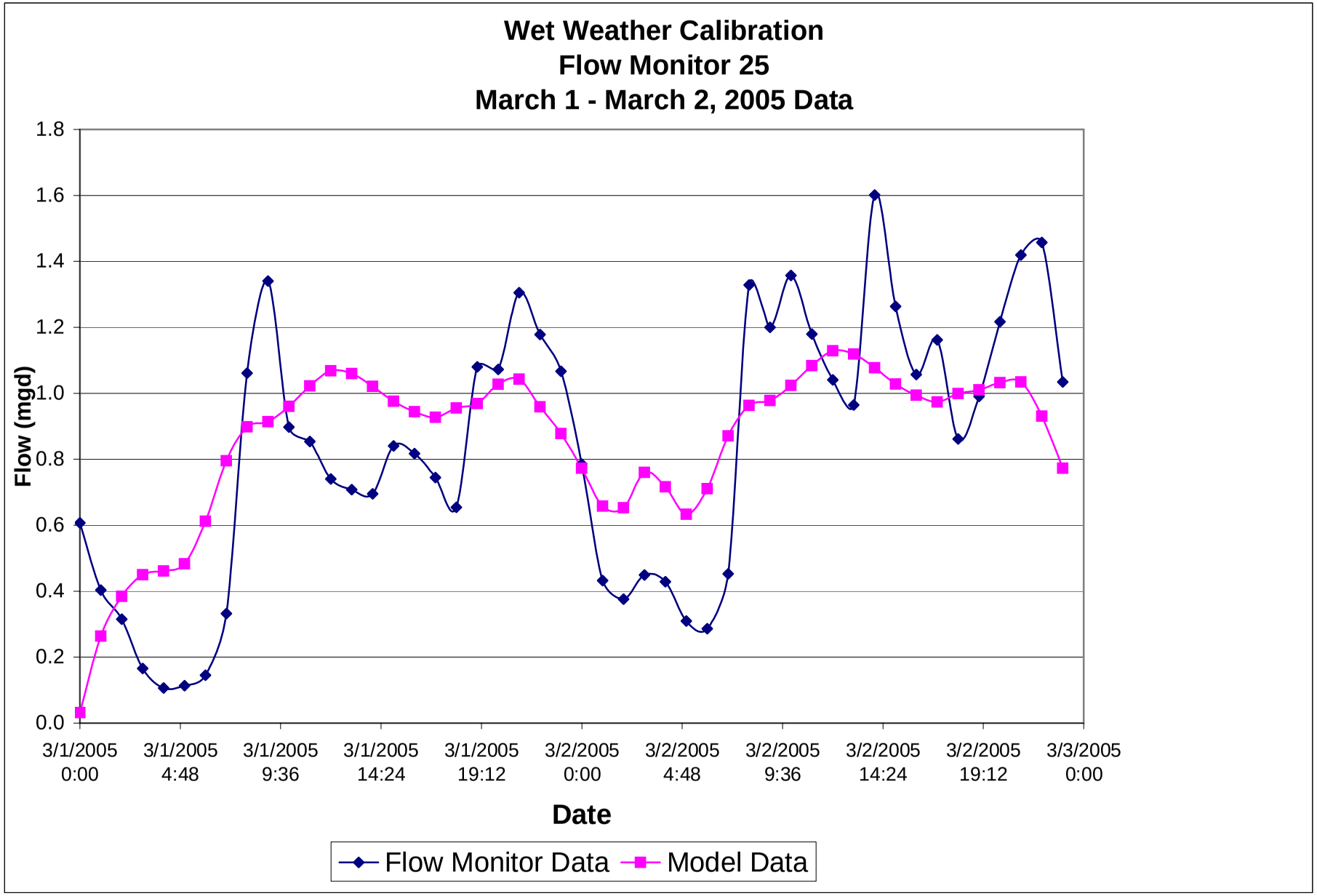
Date
Flow Monitor Data
Model Data


Wet Weather Calibration
Flow Monitor 24
March 1 - March 2, 2005 Data
Flow (mgd)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
3/1/2005 0:00
3/1/2005 4:48
3/1/2005 9:36
3/1/2005 14:24
3/1/2005 19:12
3/2/2005 0:00
3/2/2005 4:48
3/2/2005 9:36
3/2/2005 14:24
3/2/2005 19:12
3/3/2005 0:00
Date
Flow Monitor Data
Model Data


Wet Weather Calibration
Flow Monitor 25
March 1 - March 2, 2005 Data
Flow (mgd)
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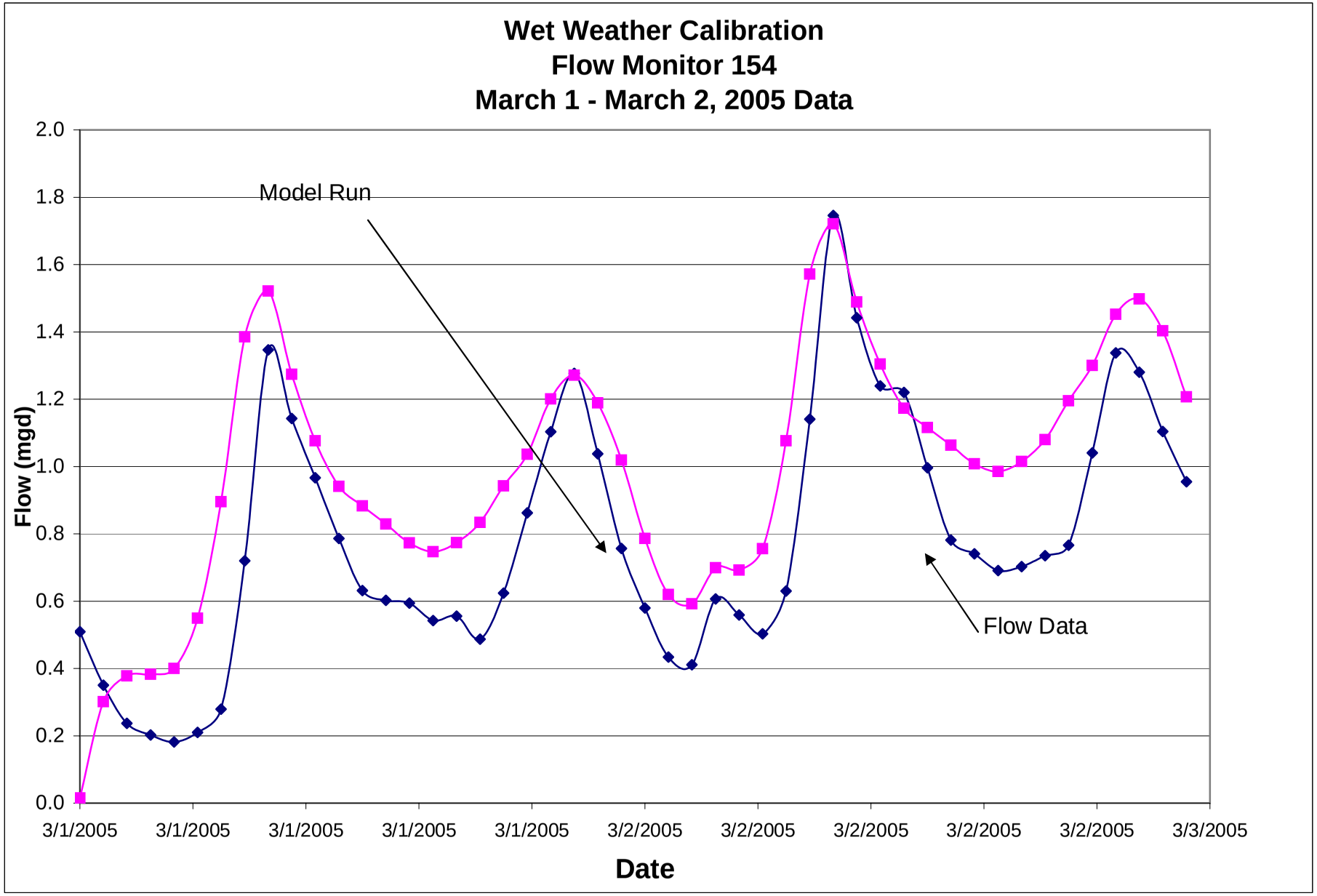
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
3/1/2005 0:00
3/1/2005 4:48
3/1/2005 9:36
3/1/2005 14:24
3/1/2005 19:12
3/2/2005 0:00
3/2/2005 4:48
3/2/2005 9:36
3/2/2005 14:24
3/2/2005 19:12
3/3/2005 0:00
Date
Flow Monitor Data
Model Data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Flow Monitor 154
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Flow Data
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0.4
0.2
0.0
3/1/2005
3/1/2005
3/1/2005
3/1/2005
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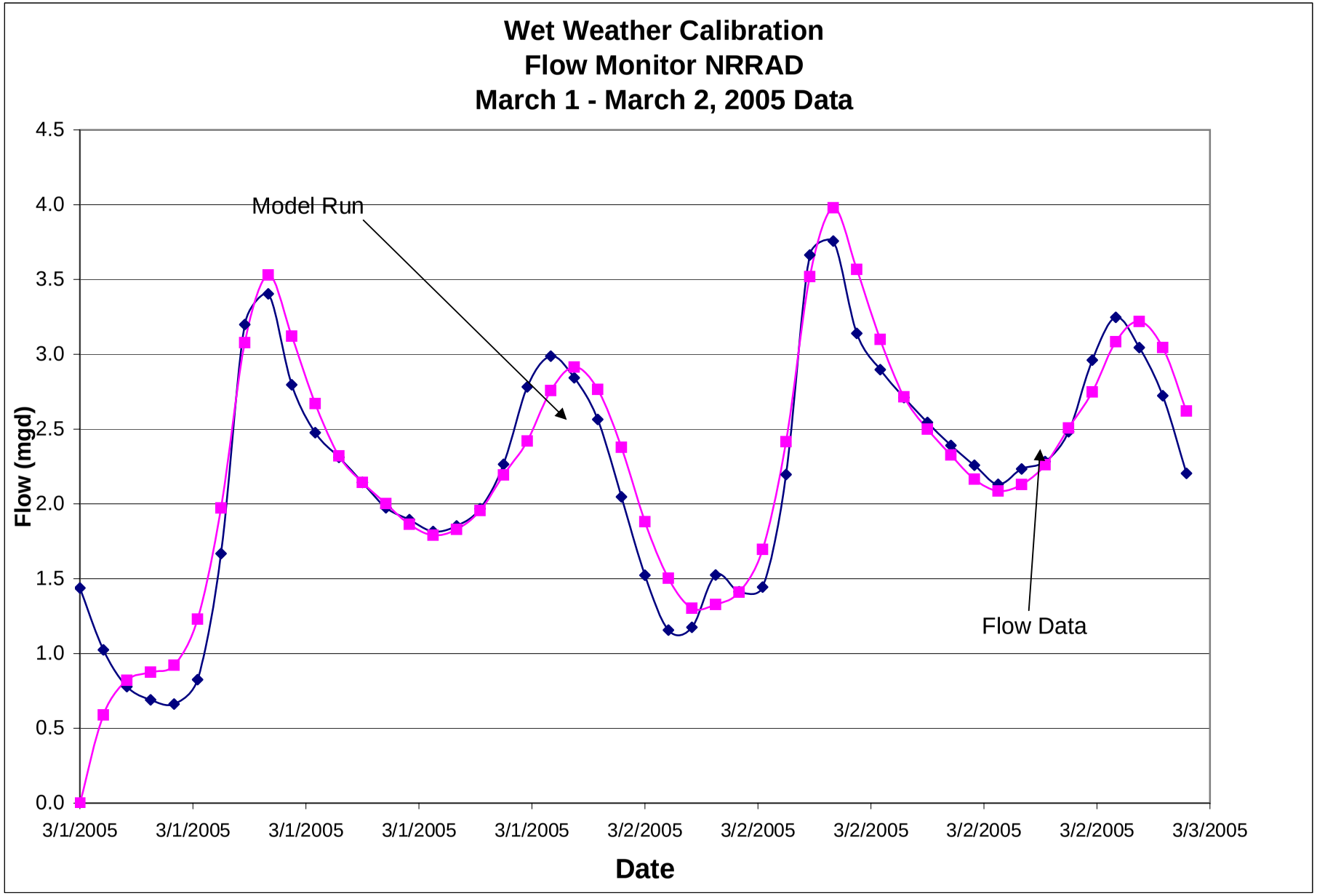
3/2/2005
3/2/2005
3/2/2005
3/2/2005
3/3/2005
Date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Flow Monitor NRRAD
March 1 - March 2, 2005 Data
Model Run
Flow Data
Flow (mgd)
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2.0
1.5
1.0
0.5
0.0
3/1/2005
3/1/2005
3/1/2005
3/1/2005
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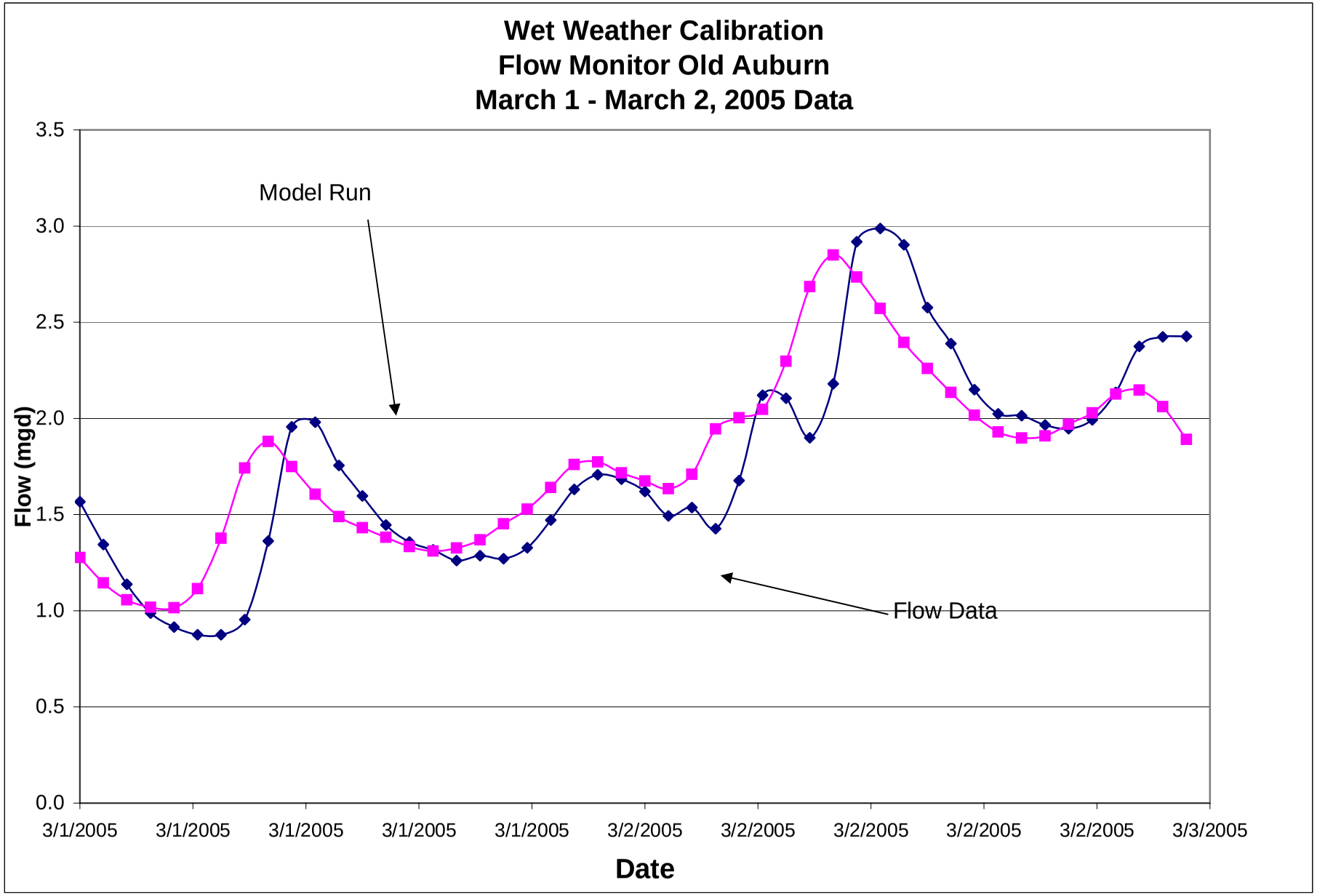
3/2/2005
3/2/2005
3/2/2005
3/2/2005
3/2/2005
3/3/2005
Date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Flow Monitor Old Auburn
March 1 - March 2, 2005 Data
Model Run
Flow Data
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3/1/2005
3/1/2005
3/1/2005
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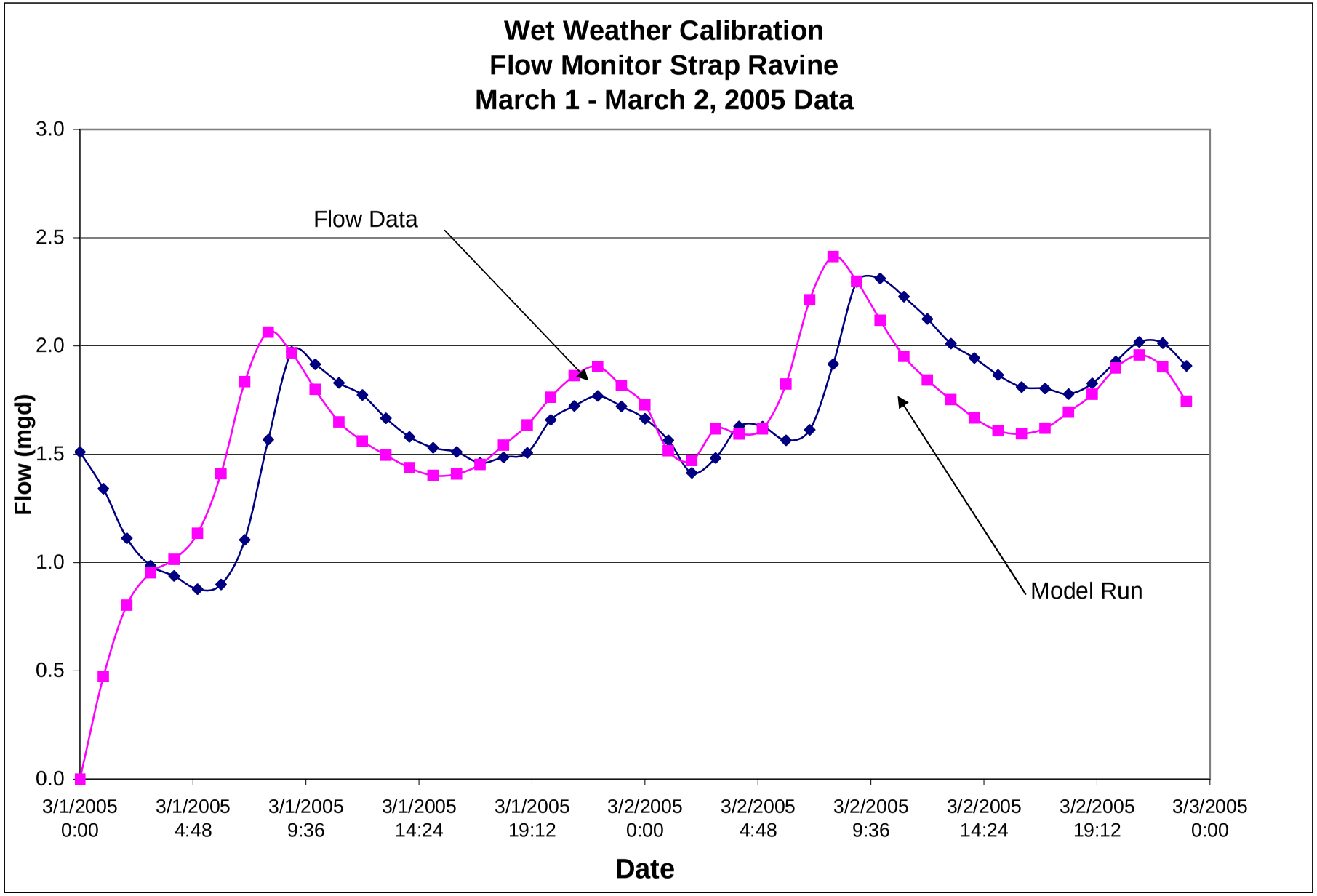
3/2/2005
3/2/2005
3/2/2005
3/2/2005
3/3/2005
Date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March 1 - March 2, 2005 Data
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Flow Data
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3/1/2005 9:36
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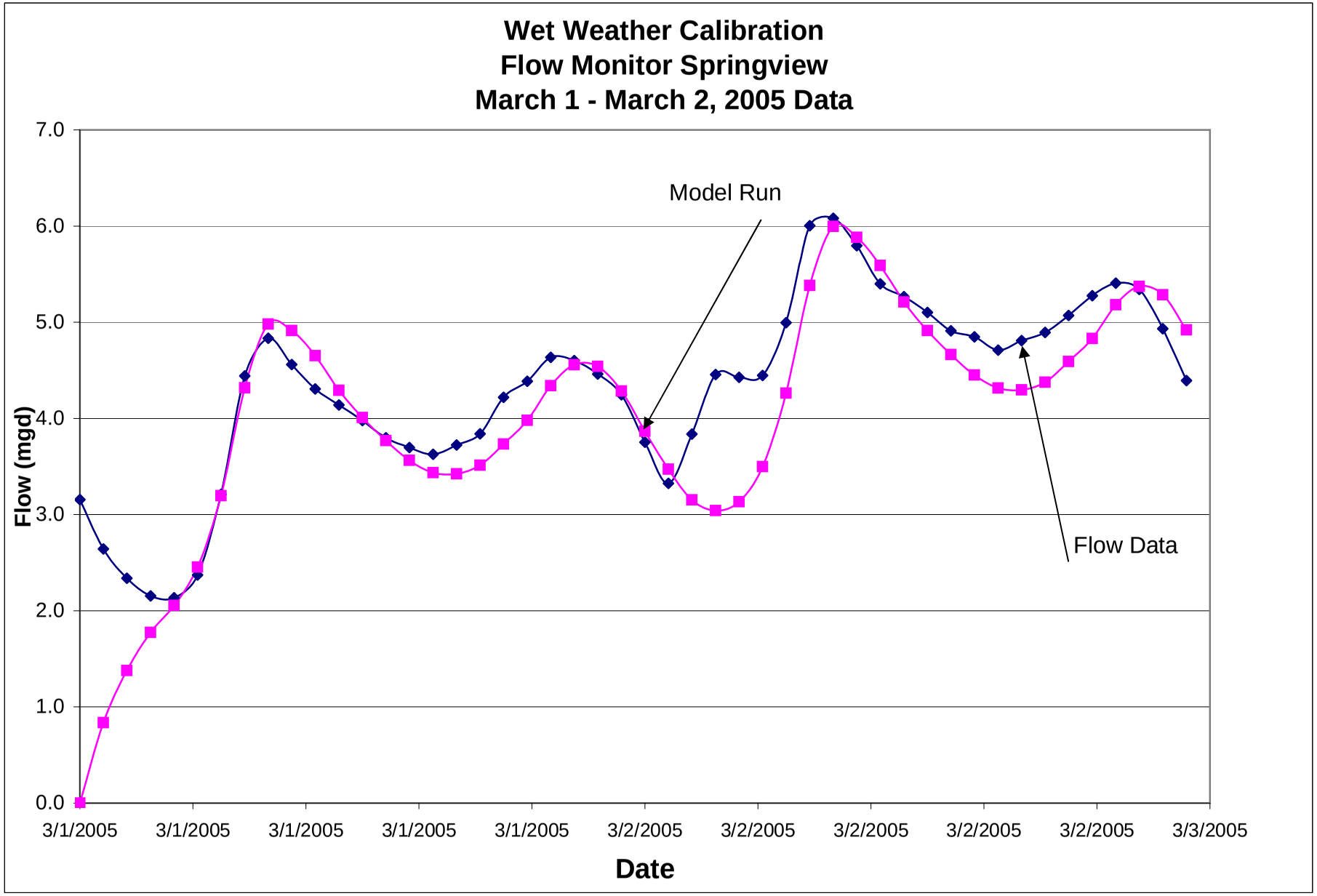
3/2/2005 9:36
3/2/2005 14:24
3/2/2005 19:12
3/3/2005 0:00
Date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Flow Monitor Springview
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Flow Data
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3/1/2005
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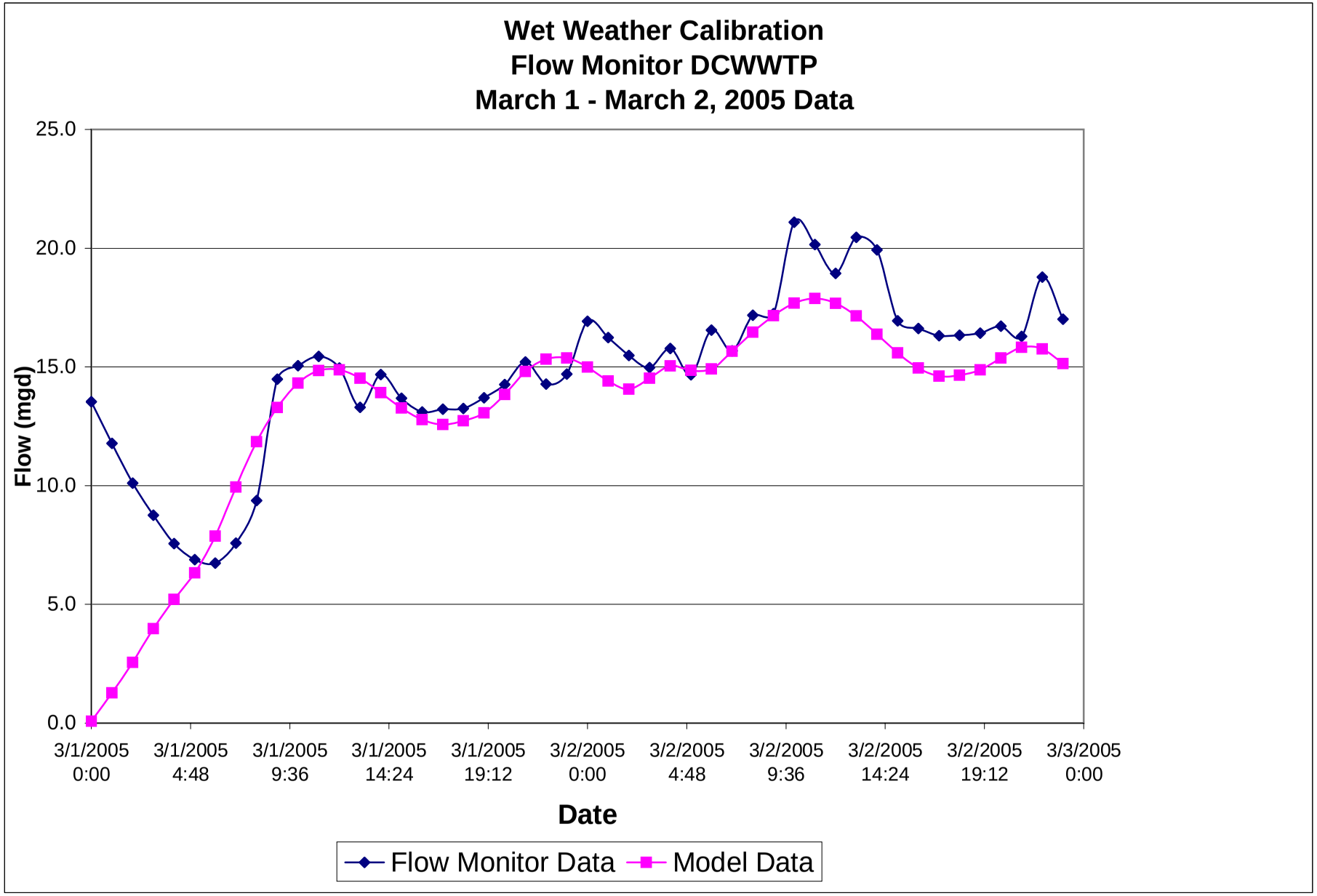
3/2/2005
3/3/2005
Date


Wet Weather Calibration
Flow Monitor DCWWTP
March 1 - March 2, 2005 Data
Flow (mgd)
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5.0
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3/1/2005 0:00
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3/1/2005 9:36
3/1/2005 14:24
3/1/2005 19:12
3/2/2005 0:00
3/2/2005 4:48
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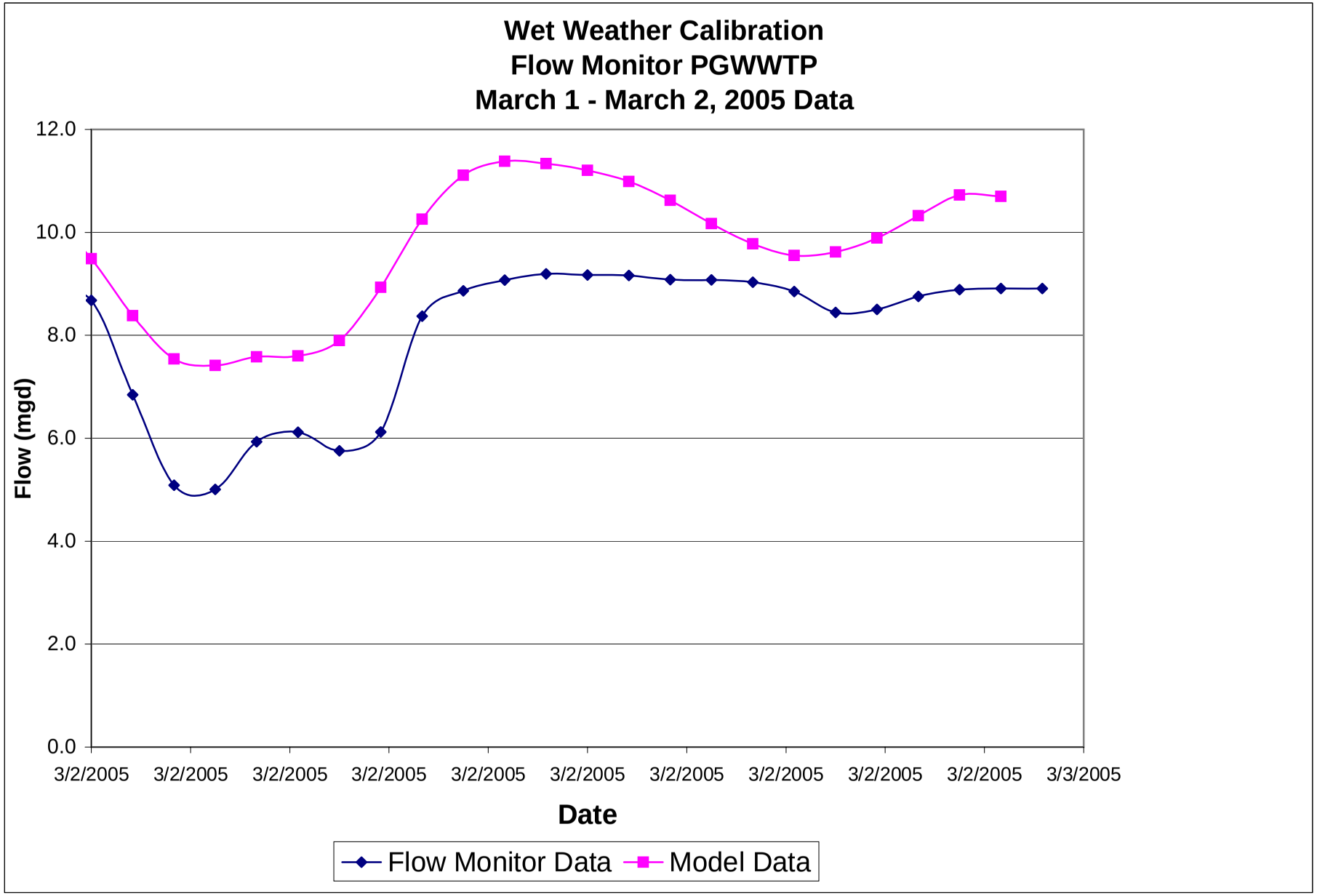
3/2/2005 19:12
3/3/2005 0:00
Date
Flow Monitor Data
Model Data


Wet Weather Calibration
Flow Monitor PGWWTP
March 1 - March 2, 2005 Data
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6.0
4.0
2.0
0.0
Flow (mgd)
3/2/2005
3/2/2005
3/2/2005
3/2/2005
3/2/2005
3/2/2005
3/2/2005
3/2/2005
3/2/2005
3/2/2005
3/3/2005
Date
Flow Monitor Data
Model Data

Attachment B

2009 Update Sheet

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**2009 Update Sheet for TM 2c**
Prepared For:	Art O'Brien, City of Roseville
Prepared by:	Chris van Lienden, RMC
Reviewed by:	Dave Richardson, RMC
Date:	September 3, 2009
Reference:	0091-04

The TM has been modified since it was originally developed in 2005 based on the following updates.

1 2006 Updates

The TM was updated in 2006 to reflect changes in the SPMUD UGA boundary and land use, and to add Brookfield as an additional UGA.

2 2008 Updates

The TM was further updated in 2008 to reflect changes in the land uses and flow projections of the UGAs.

3 2009 Updates

An additional update was prepared in 2009 to reflect the following changes.

3.1 Updates to the H2Omap Sewer Model

Since the 2008 update, the H2Omap Sewer software has been updated which resulted changes to the build-out flow estimates. The flow estimates in the TM has been updated to reflect the most recent model results.

3.2 Changes to the Development Timeline

Flow projections have been updated to reflect reduced rates of residential development due to the economic slowdown beginning in 2008.

3.3 West Roseville Specific Plan Rezone

Buildout flow estimates have been updated to reflect additional inflow from a proposed rezone in the West Roseville Specific Plan (May, 2009). The new land uses and associated average dry weather flow (ADWF) are summarized in Table 1.

Table 1 – West Roseville Specific Plan Rezone Comparison

Connected Land Use Description	Original Developer Agreements		2009 Proposed Update	
	DU or Area (DU or ac)	Flow (mgd)	DU or Area (DU or ac)	Flow (mgd)
1 Residential				
1.1 Low Density Residential	4842 DU	0.92	5963 DU	1.13
1.2 LDR (age restricted)	710 DU	0.13	0 DU	0.00
1.3 Medium Density Residential	1064 DU	0.20	1746 DU	0.33
1.4 High Density Residential	1774 DU	0.23	3229 DU	0.42
2 Open Space	670 ac		696 ac	0.00
2.1 Paseo	15 ac		0 ac	0.00
2.2 Park	251 ac		284 ac	0.00
2.3 Pocket Parks	19 ac		0 ac	0.00
3. Public/Quasi-Public				
3.1 Schools	108 ac	0.02	109 ac	0.02
3.2 Public/Quasi-Public	41 ac	0.02	15 ac	0.01
4 Community Commercial				
4.1 Commercial	34 ac	0.03	56 ac	0.05
4.2 Mixed Use	14 ac	0.03	0 ac	0.00
4.3 Church	0 ac	0.01	0 ac	0.00
5. Business Professional				
5.1 Commercial	20 ac	0.02	18 ac	0.02
6. Light Industrial	74 ac	0.06	75 ac	0.06
7. Industrial	34 ac	0.03	35 ac	0.03
Total		**1.71**		**2.07**

Appendix G TM 3a – Unit Flow Factor Sets and Sewer Design Criteria

Technical Memorandum

South Placer Regional Wastewater & Recycled Water Systems Evaluation Project

Subject: Unit Flow Factor Sets and Sewer Design Criteria –TM No. 3a

Prepared For: Art O'Brien – City of Roseville

Prepared By: Mai-Tram Le - RMC; revised by Gisa Ju - RMC

Reviewed By: Dave Richardson - RMC
Pete Bellows – BC

Date: May 25, 2005; Final revision September 18, 2006

Reference: 0091-4.02

This technical memorandum (TM) provides a definition of the unit flow factors that have been developed and used in analyses of treatment and trunk sewer facilities as part of the South Placer Regional Wastewater and Recycled Water Systems Evaluation Project (Project). The TM also proposes criteria to be used by developers for design of new sewer facilities.

The various analyses and their associated application are as follows:

1. **Treatment Plant Analyses** – A set of average dry weather unit flow factors has been developed for the entire South Placer Wastewater Authority (SPWA) service area. These factors include the average flow coming from various areas based on specific land use designations, along with a base dry weather groundwater infiltration (GWI) component across the service area. The average unit flow factors were developed using water use and flow monitoring data, as presented in TM 2a, "Dry Weather Flow Projection for 2005 Service Area." For example, the unit flow factor for single-family residential dwelling units, regardless of density, is 190 gpd, of which 10 gpd represents the dry weather GWI component. The unit flow factors used for treatment plant analyses are presented in **Table 1**.

2. **Hydraulic Model Calibration and Trunk Sewer Analyses** – The dry weather flows used for model calibration and analyses of trunk sewers consists of base sanitary flows (BSF) which have been developed using the same unit flow factor concept as for the treatment plant analyses discussed above. However, the dry weather GWI component of the unit flow factors has been included on an areal basis based on actual measured flows, rather than having been considered as a uniform base dry weather GWI load across the service area.

   Trunk Sewer analyses also include additional components of wet weather GWI and rainfall-dependent infiltration and inflow (RDI/I) that vary across the SPWA service area to reflect actual conditions as verified by the wet weather flow monitoring data. The wet weather GWI factors are specific to each wastewater treatment plant (WWTP) service area and were determined from analysis of WWTP flows to be 200 gpd/acre in the Dry Creek WWTP basin and 100 gpd/acre in the Pleasant Grove WWTP basin. The GWI rates and RDI/I parameters used in the trunk sewer model are documented in TM 2c, "Wet Weather Flow Projection for the Ultimate SPWA Service Area."

Table 1 – Average Dry Weather Unit Flow Factors Used for Treatment Plant Analyses

Land Use Designation	Units	Flow Factor (gpd/unit)[1]
Commercial	gpd per acre	850
Heavy Industrial	gpd per acre	850
Light Industrial	gpd per acre	850
Mixed Use	gpd per acre	2,300
Public/Quasi-Public	gpd per acre	660
Schools	gpd per acre	170
Residential 1 DU	gpd per DU	190
Residential 2 DU	gpd per DU	190
Residential 3 DU	gpd per DU	190
Residential Multiple DU[2]	gpd per acre or gpd per DU	2,040 or 130
Open Space	gpd per acre	0
Parks > 10 Acres	gpd per acre	10
Vacant	gpd per acre	0

[1] Includes allowance for dry season GWI.
[2] Future development projects should use the factor that results in the highest flow .

3. **Design Flow Standards (Criteria) for Sizing Infrastructure** – For sizing future infrastructure facilities, the hydraulic model of the trunk sewer system should be used for pipes 15 to 18 inches in diameter and larger. For smaller facilities, the average dry weather unit flow factors for the treatment plant analyses can be used along with a safety factor of 2.0 and appropriate peaking factors. The safety factor of 2.0 will be used to factor the average dry weather unit flow factor in order to:
    1. Account for changes that may occur over time in the behavior of residential and nonresidential contributors to the sewer systems, such as increased indoor water use;
    2. Account for changes in environmental conditions (higher groundwater table and consequent higher GWI) and changes in infrastructure (aging pipes, etc.);
    3. Provide for safety to adequately size the infrastructure to avoid any sanitary sewer overflows due to under-sizing;
    4. Account for the increasing friction losses (increase in the roughness coefficient) due to pipe aging; and,
    5. Account for nominal pipe diameter decreases due to accumulation of material adhering to the walls of the sewer piping and restricting capacity.

    Peak wet weather flows will be accounted for using a system-wide peaking factor. A peaking factor curve was developed based on the following assumptions:
    - Single family residential development at 4 DU/acre
    - Design average dry weather flow (ADWF) based on a unit flow rate of 190 gpd/DU times a safety factor of 2.0

- Diurnal peaking factor ranging from 1.8 to 3.0 depending on area size (reflects the attenuation of peak flows through the sewer system as the tributary area increases – refer to Footnote 4 in Table 2))
- GWI at 150 gpd/acre
- RDI/I at 700 gpd/acre, estimated based on model parameters used for new development UGAs (Note: New development RDI/I parameters were assumed to be similar to those determined by flow monitoring and model calibration for relatively new areas of the system; see TM 2c for discussion.)
- Peak diurnal flow concurrent with peak RDI/I flow

The resultant peaking factor curve is presented in **Figure 1**. **Table 2** below shows the derivation of the peaking factor curve for areas ranging from 10 to 750 acres. (NOTE: the values in Table 2 are meant to support the derivation of the peaking factor curve, rather than to be published as design standards).

Table 2 - Derivation of Proposed Roseville/SPWA Design Peaking Factor Curve[1]

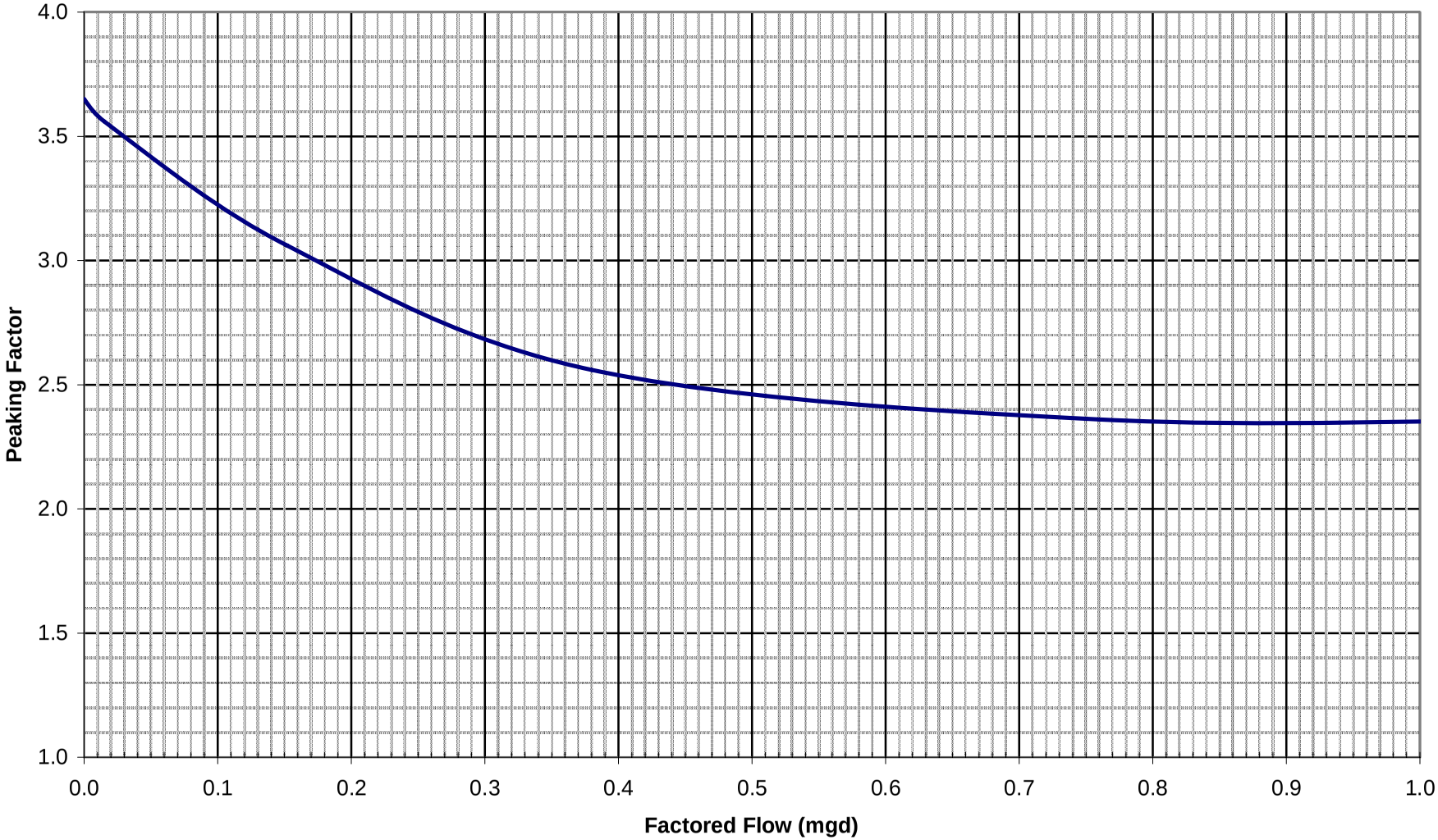
Area (acres)	No. of DUs[1]	ADWF (mgd)[2]	Factored Flow (mgd)[3]	Diurnal PF[4]	Wet GWI (mgd)[5]	Peak RDI/I (mgd)[6]	PWWF (mgd)[7]	Peaking Factor	PF Curve
0			0						3.65
10	40	0.0076	0.0152	3.0	0.0015	0.0070	0.054	3.56	3.56
100	400	0.076	0.152	2.5	0.015	0.070	0.47	3.06	3.06
250	1,000	0.19	0.38	2.0	0.038	0.175	0.97	2.56	2.56
500	2,000	0.38	0.76	1.8	0.075	0.350	1.79	2.36	2.36
750	3,000	0.57	1.14	1.8	0.11	0.53	2.69	2.36	2.36

[1] Based on single-family residential development at 4 DUs/acre. 4 DUs/acre is considered to be a typical density for single family residences, and is not intended to be used as a design criterion.
[2] Based on 190 gpd/DU
[3] Based on safety factor of 2.0
[4] The diurnal PF values in this analysis are based on the peaking factor used for residential flows (PF = 1.8) in the hydraulic model, which was derived from dry weather flow monitoring data. Since that derivation was based on a large area, the PF value is increased progressively as the area decreases in order to account for decreased attenuation of peak flows. Selection of the upper limit of that range is based on engineering judgment and experience with similar analyses.
[5] Based on 150 gpd/acre
[6] Based on 700 gpd/acre
[7] Assumes peak RDI/I coincides with peak diurnal

Attachment A includes an example calculation illustrating the application of the peaking factor curve.

At the direction of SPWA member agencies, several planning-level criteria were developed to aid developers in the sizing and configuration of pump station and force main facilities. These criteria are presented in **Attachment B**.

Figure 1
Proposed SPWA Design Peaking Factor Curve



ATTACHMENT A:
Example Design Flow Analysis for Sewers Smaller than 18-inches

Example calculation for application of peaking factor curve for 400-unit single family subdivision:

ADWF:

(400 DUs)*(190 gpd/DU) = **76,000 gpd = ADWF**

Factored Flow:

(ADWF)*(2.0) = (76,000 gpd)*(2.0) = **152,000 gpd = Factored Flow**

PWWF:

(Factored flow)*(3.05[a]) = (152,000)*(3.05) = **464,000 gpd = PWWF**

Per City of Roseville Improvement Standards, page SS-5, a 10-inch sewer at minimum slope is adequate for this PWWF.

[a] From Figure 1: Proposed SPWA Design Peaking Factor Curve

ATTACHMENT B:
Recommended Planning Level Criteria for Pump Stations and Force Mains

Table B-1 presents planning-level criteria for the design of pump stations and force mains within the SPWA service area; these criteria should be confirmed during design.

Table B-1: Recommended Planning Level Criteria for Pump Stations and Force Mains

Pump Stations	
Capacity	PWWF from hydraulic model (or ADWF – *factored flow* – with storage capacity)
Storage	24 hours, or 8 hours with an emergency generator
Operation	Lead/lag for duty pump(s), plus 1 standby pump
Maximum Pump Cycles	6 cycles/hour
Force Mains	
Headloss	Hazen-Williams roughness coefficient (C-factor) of 120
Maximum Velocity	7-10 feet per second
Minimum Velocity	3.5 feet per second

NOTE: Hydraulic transient, surge, and odor control analyses will need to be performed during final design.

Appendix H TM 3b – Trunk Sewer Hydraulic Analysis

Technical Memorandum

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**Trunk Sewer Hydraulic Analysis (TM No. 3b)**
Prepared For:	Art O'Brien – City of Roseville
Prepared by:	Pete Bellows/Chris Peters – Brown and Caldwell Andy Smith – RMC
Reviewed by:	Dave Richardson/Gisa Ju – RMC
Date:	April 14, 2006; updated January 24, 2008 & September 3, 2009
Reference:	0091-004 Task 3

0 Previous TM Publication and Updates

Since the initial publication of technical memorandum (TM) 3b on April 14, 2006, changes in information available for the South Placer Wastewater and Recycled Water Systems Evaluation (Systems Evaluation), as well as changes in the data, have resulted in the need to identify and update out-of-date information. As part of the June 2007 publication of the Systems Evaluation, an Update Sheet was prepared for this TM, and is included in **Attachment E**. Subsequent changes have resulted in the need for further updates of the TM. The newest version of the TM is consistent with the updates summarized in the 2009 Update Sheet which is included in Attachment F.

1 Introduction

This TM summarizes the results of the hydraulic assessment of the SPWA collection system and the necessary hydraulic improvements, using a set of assumptions and criteria for identifying constraints in the system under conservative design conditions. The hydraulic assessment and development of hydraulic improvements is based on the hydraulic model of trunk sewers in the SPWA collection system. The results of the hydraulic assessment were used to develop potential capital improvement projects. Although the potential projects provide SPWA with a starting point for evaluating the magnitude of regional trunk sewer system improvements, they should be refined with site specific field and engineering evaluations.

The hydraulic assessment is based on the flow projections for the ultimate service area presented in TM 2b (Dry Weather Flow Projection) and TM 2c (Wet Weather Flow Projection).

2 Hydraulic Model Development

The development of the hydraulic model network included the development of pipeline network information, development of pump station and force main information, selection of input nodes and delineation of input node tributary areas.

2.1 Collection System Model

The hydraulic modeling program used for this project is H_2OMAP Sewer Pro, a product of MWH Soft, Inc. This software is widely used for hydraulic analysis of collection systems. It is also being used by the City of Roseville to model its collection system. Using the same software for this project allows the information developed for the City's model to be directly utilized for this model.

2.2 Model Network Development

The June 2004 network of sewer pipes for the hydraulic model includes all trunk sewers in the SPWA member agencies service areas that are greater than or equal to 15 inches in diameter. They are included in the hydraulic model to provide a complete analysis of the regional collection system. The June 2004 model network is shown on Figure 1.

Approximately 83 miles of gravity trunk sewers, 3 pump stations and 4 miles of force main are included in the June 2004 model network. The buildout network includes approximately 100 miles of trunk sewer pipe, 10 pump stations and 19 miles of force main. Alignments of buildout pipes included in the model network were based upon USGS topographic contour data and available data from the West Roseville Specific Plan, and planning documents supporting development within Urban Growth Areas (UGAs) such as Placer Vineyards, Regional University and Placer Ranch. The buildout model network is shown on Figure 2. The amount of pipeline included in the model network is summarized by diameter in Table 1 (gravity pipe) and Table 3 (force main pipe).

Table 1 – Model Network Gravity Pipe Summary

	Length (ft)	
Diameter (in)	June 2004	Buildout
6	462	462
8	8,026	8,026
10	8,264	8,264
12	11,405	21,726
15	93,622	102,540
16	8,599	8,539
18	93,644	93,573
20	4,080	4,080
21	33,527	62,190
24	32,801	41,097
27	9,608	23,655
30	26,311	33,570
33	21,508	25,242
36	16,631	19,618
42	30,417	33,494
48	403	4,860
63	8,629	8,629
66	11,286	11,286
72	10,867	10,867
78	5,862	5,862
90	1,082	1,082
Total	**437,035**	**528,663**

Information on the existing (June 2004) trunk sewers was obtained from several sources. Information on the trunk sewers in Roseville was obtained from the City's hydraulic model of its collection system. The City's hydraulic model network was based on the City's GIS of the collection system, as-built drawings, survey data, and discussions with City staff. Trunk sewer information for the Granite Bay (SMD-2) area

was obtained from Placer County's sewer GIS. Record drawings were reviewed to develop the model network in SPMUD. Manhole numbers used in the model were provided by each respective SPWA member agency. In some instances there were duplicate manhole numbers along the borders between Roseville and Placer County. In this case, Roseville's manhole numbers were used. For reference, duplicate Placer County manhole numbers are shown on the project summary tables in Attachment C.

Survey information was obtained for some missing invert and rim elevation data. The survey information included the rim elevation and invert elevation of each connecting trunk sewer. Survey information was also obtained at several locations to verify elevation information from other sources. In some areas, pipe invert elevations were estimated using features within H_2OMAP Sewer Pro. Based on given slopes, H_2OMAP Sewer Pro can interpolate invert elevations based on elevations upstream and downstream of the pipe reaches that are missing invert data. This is a very useful modeling feature, but does not always yield accurate elevations in the model. This is the type of data that needs to be field verified by SPWA members as the members proceed forward to identify precise capital projects.

The June 2004 network was extended to include the proposed gravity trunk sewers and force mains serving the buildout development areas in Roseville and Placer County on the west side of the 2005 Service Area boundary. UGAs located to the west of the 2005 Service Area will require pump stations and force mains to convey their wastewater to the SPWA treatment plants. The proposed sewers and force mains are based on preliminary sewer alignments provided in specific plans and USGS topographic contour information. Most UGAs and buildout development areas were connected (loaded) to trunk sewers existing as of June 2004. There are no specific planned developments identified within the SPMUD service area at this time, and future sewer extensions were not included in the SPMUD collection system at SPMUD's request. The model network for the buildout scenario is shown on Figure 2.

The industry standard Manning's friction factor of 0.013 was assigned to each modeled pipe reach. Manning's friction factor is used by H_2OMAP Sewer Pro to determine pipe hydraulic capacities.

Figure 1 – June 2004 Model Network

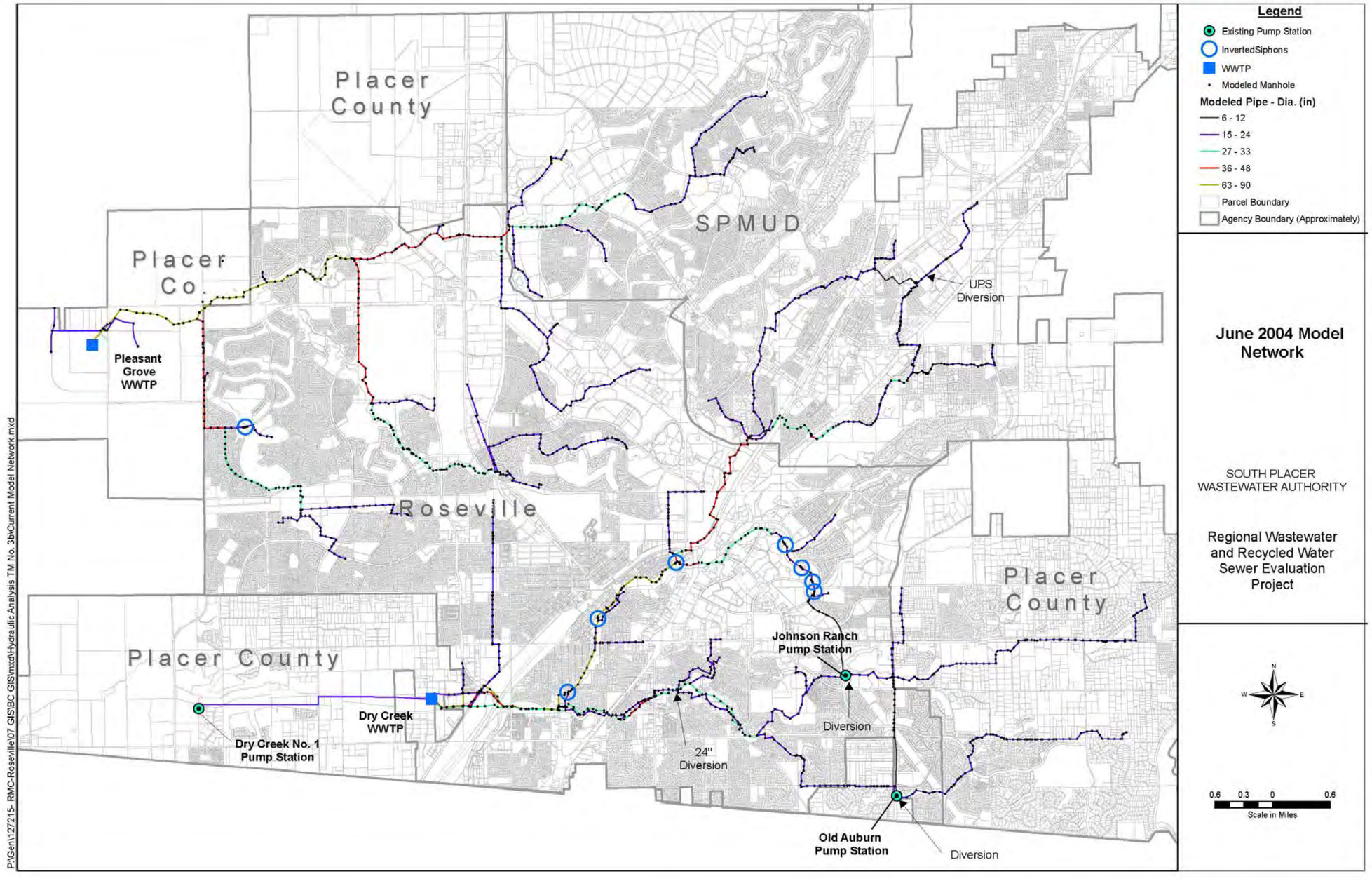
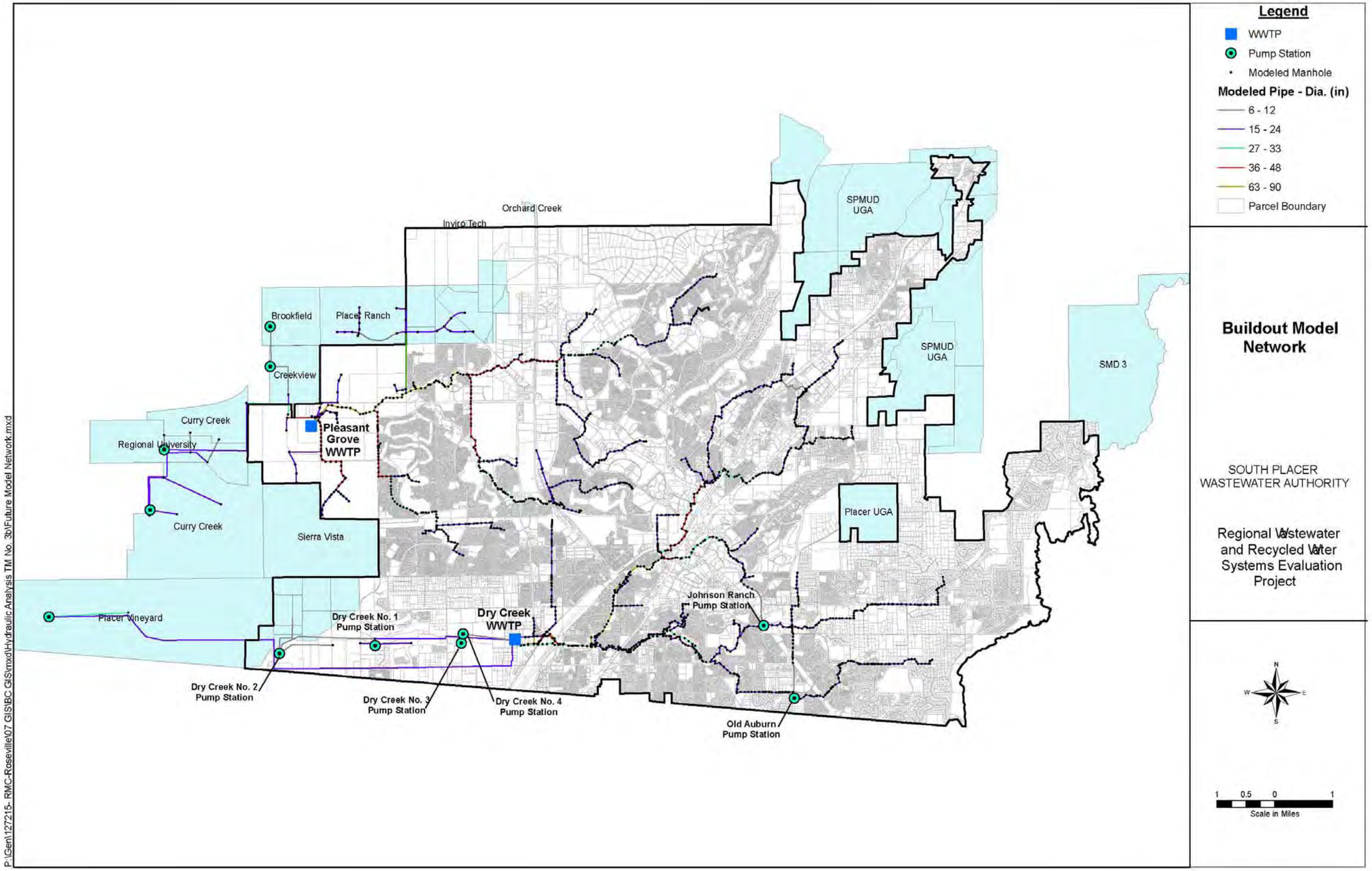


Figure 2 – Buildout Model Network



2.3 Flow Diversions

The model network includes four flow diversions which are shown on Figure 1. Three of the diversions are located in Roseville and one diversion is located in SPMUD. H_2OMAP Sewer Pro has several options for designating the operation of flow diversions. The UPS diversion in SPMUD has movable boards that direct all flow one direction or the other. In the hydraulic model, this diversion was simulated by putting all flow into the 10-inch diversion pipeline (west) or into the trunk sewer downstream (south) of the diversion. The UPS diversion only affects flow in the SPMUD system. The two diversions upstream of the pump stations in Roseville (Old Auburn and Johnson Ranch) were simulated in the model by allowing an amount of flow equal to the pump station capacity (with all pumps operating) to divert from the trunk sewer to the pump station. The final diversion, at manhole B06-169 in Roseville, diverts flow from the local 15-inch sewer through the 24-inch diversion pipe, to the 33-inch trunk sewer. This diversion is controlled with a weir structure at the manhole. According to City of Roseville field crews that investigated the diversion, approximately 70 percent of the flow is diverted to the 33-inch trunk sewer and 30 percent remains in the local sewer. This diversion was simulated in the model in the same manner. The diversion structure at manhole B06-169 is illustrated in Figure 3.

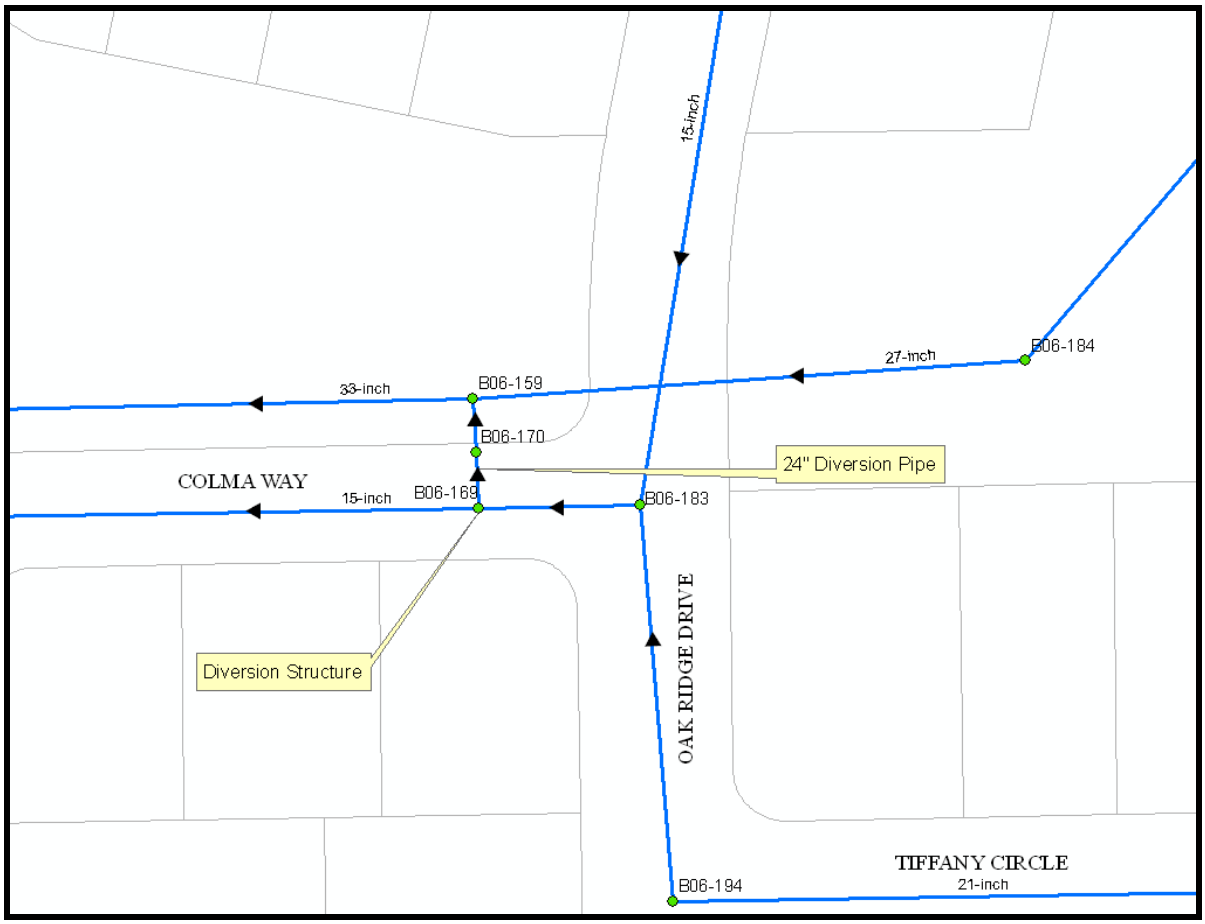


Figure 3 – Roseville Trunk Sewer Diversion at Manhole B06-169

2.4 Inverted Siphons

The model network has 8 inverted siphons which are shown on Figure 1. All inverted siphons have multiple barrels. Information on the individual barrels for each siphon was obtained the City of Roseville GIS. Flow was allocated to each barrel within H_2OMAP Sewer Pro based on the cross-sectional area of each barrel.

2.5 Pump Stations

The model of the June 2004 trunk sewers includes three pump stations which are shown on Figure 1. Other pump stations within the City of Roseville and Placer County that are not included in the model are not located on trunk sewers that are 15 inches in diameter or larger. Information on the pump stations are presented in Table 2.

Johnson Ranch and Old Auburn pump stations are located in the City of Roseville. These two pump stations were designed to operate during peak wet weather flow events to transfer flow between trunk sewers and alleviate downstream capacity issues. These pump stations each have two pumps and, as of June 2004, operate in duty/standby mode with the standby pump operating only if the duty unit fails. It is feasible for these two pump stations to operate with both pumps running, providing additional peak wet weather pumping capacity. The City of Roseville staff has identified that these two pump stations can operate in a lead/lag mode because the pump stations are intended to reduce the peak wet weather flow events, and the pump stations are not needed to convey average dry weather flows. If a pump within the pump station were to fail, it could be replaced immediately after the peak wet weather flow event, when the pump station was shut down under normal operation. Table 2 presents the capacity of these two pump stations with either one or both pumps operating.

Dry Creek No. 1 pump station is located in Placer County, west of the Dry Creek WWTP. This pump station operates during dry and wet weather with three pumps in duty/standby mode. Table 2 presents the capacity of this pump station with two pumps operating.

Table 2 – Pump Stations and Capacity Designations

Facility No.	Facility Name	Pumps	Duty/Standby Capacity[1] (mgd)	Lead/Lag Capacity[2] (mgd)
25	Johnson Ranch	2@1400 gpm	2.02	3.20
26	Old Auburn	2@300 gpm	0.43	0.68
NA	Dry Creek No. 1	3@1580 gpm	2.52[3]	NA

[1] Pump station capacity with one pump out of service
[2] Pump station capacity with both pumps operating
[3] Proposed pump station capacity at buildout with three 60 hp pumps (one standby) each rated at 1580 gpm. As of June 2004, pump station has a capacity of 1.73 mgd with two 20-hp duty pumps and one standby 60-hp pump.

2.6 Force Mains

Each pump station has an associated force main. Force main information is summarized in Table 3. The force mains are identified by their associated pump stations. The capacity of the force mains is based on a maximum flow velocity of 7 fps. The force main analysis does not include evaluation of hydraulic transients.

Table 3 – Force Mains

Facility No.	Facility Name	Diameter (in)	Length (ft)	Capacity (mgd)
25	Johnson Ranch	12	3,886	3.55
26	Old Auburn	8	3,358	1.58
NA	Dry Creek No. 1	16	14,100	6.31

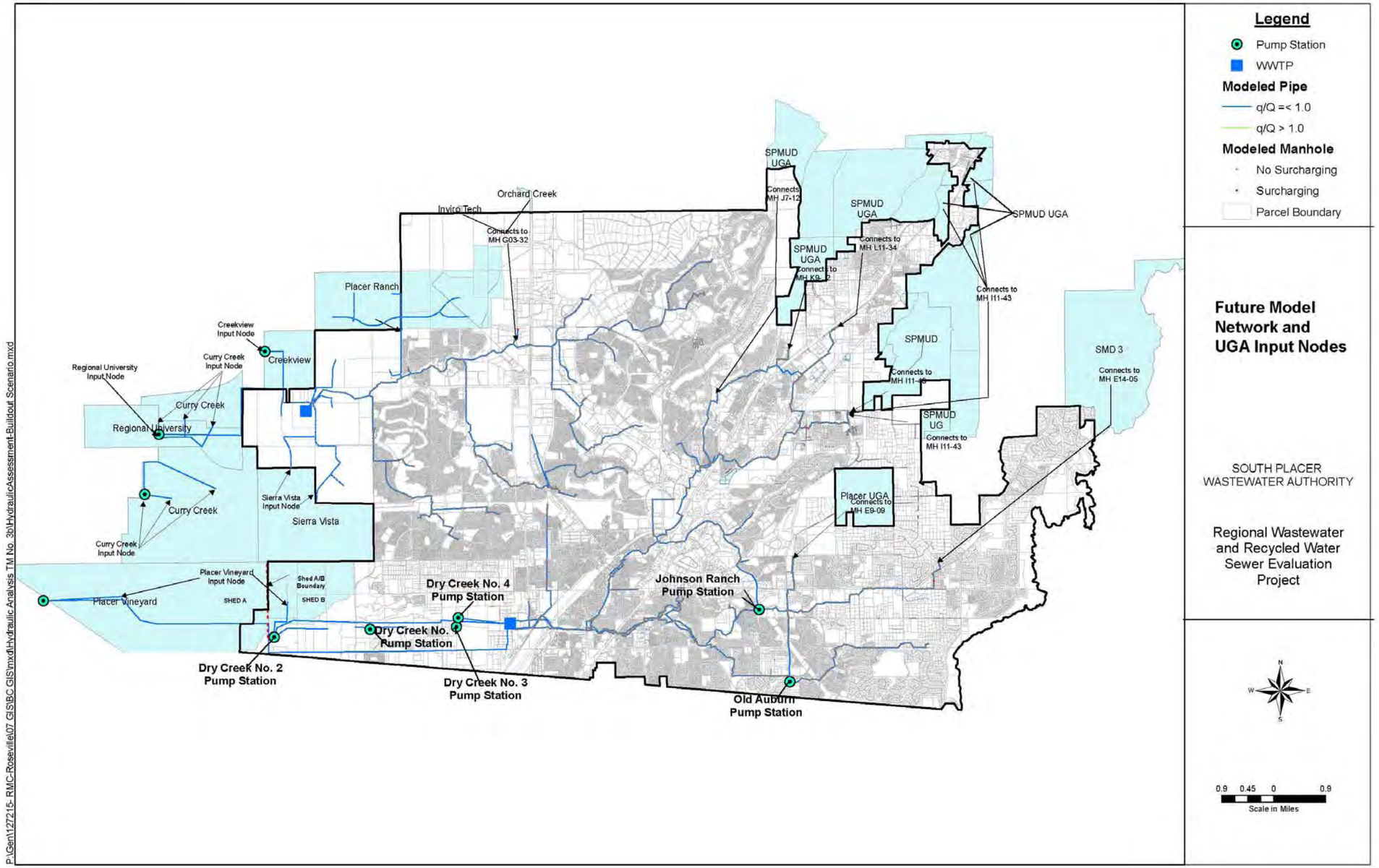
2.7 Input Nodes

The model network contains input nodes at locations where flow is added to the model. Input nodes were located at each manhole in the model network. The amount of flow at the input nodes is based on the number of surrounding parcels and their land use designation. Parcels were generally assigned to the nearest pipe network input node using the Load Allocator feature within H_2OMAP Sewer Pro. The assignments were modified to account for the network of smaller diameter sewers that are not included in the model network. Each parcel in the model database has a corresponding input node associated with it.

Input nodes were also selected for future development areas, large point sources and UGAs that will contribute wastewater to the regional system. Most new developments, large point sources and UGAs in the eastern portion of regional service area were connected to the June 2004 model network. New developments to the west of the 2005 Service Area boundary were connected to the proposed trunk sewers indicated in the buildout trunk sewer network. The input nodes that receive wastewater flow from these UGAs are indicated on Figure 4.

The HP and NEC point sources were loaded as indicated on Figure 4. For the buildout scenario at NEC, 1.0 mgd must be diverted from the NEC site south to the 30-inch trunk sewer along Foothills Road, south of Pleasant Grove Blvd. This will eliminate the potential for overloading the existing NEC sewer connection.

Figure 4 – Buildout Model Network and Input Nodes



3 Evaluation Criteria

This section summarizes the criteria for evaluating the capacity of the June 2004 sewer system and for sizing relief sewer facilities, as potential capital projects. The criteria were used to evaluate results of the hydraulic model.

3.1 Flows

The hydraulic assessment was performed using June 2004 and buildout peak wet weather flows. Peak wet weather flows include base sanitary flow (BSF), dry season and wet season groundwater infiltration (GWI) and rainfall dependent infiltration and inflow (RDI/I). A diurnal curve was applied to BSF to simulate the changes in BSF throughout a day. Base sanitary flows, defined in the Dry Weather Flow Projection TM (No. 2a), were applied in the model based on land use and the unit flow factors presented in Table 4.

Table 4 – Base Sanitary Flow Unit Flow Factors

Land Use Designation	Units	BSF Unit Flow Factor[1]
Commercial	gpd per acre	800
Heavy Industrial	gpd per acre	800
Light Industrial	gpd per acre	800
Mixed Use	gpd per acre	2,160
Public/Quasi-Public	gpd per acre	620
Schools	gpd per acre	160
Residential 1 DU	gpd per DU	180
Residential 2 DU	gpd per DU	180
Residential 3 DU	gpd per DU	180
Residential Multiple DU[2]	gpd per acre	1,920
Open Space	gpd per acre	0
Parks > 10 Acres	gpd per acre	10
Vacant	gpd per acre	0

[1] Does not include an allowance for dry season GWI. Dry and wet season GWI are applied on an area-specific basis.
[2] The proposed Residential Multiple DU unit flow factor can also be represented as 130 gpd per DU.

Dry season GWI, defined in the Dry Weather Flow Projection TM (No. 2a), was applied spatially in the model to areas upstream of the permanent flow monitor sites as shown in Table 5. Dry season GWI was not applied to parks, open space, or Union Pacific Railroad property.

Table 5 – Dry Season GWI Rates

Basin	Tributary Area	Agency	GWI Rate
Pleasant Grove	Pleasant Grove WWTP Flow Monitor	Roseville	0 gpd/acre
Pleasant Grove	North Roseville Flow Monitor	SPMUD	0 gpd/acre
Pleasant Grove	Sunset Industrial Park	Placer County	0 gpd/acre
Dry Creek	Dry Creek WWTP Flow Monitor	Roseville	20 gpd/acre
Dry Creek	Springview Flow Monitor	SPMUD	210 gpd/acre
Dry Creek	Highlands Flow Monitor	SPMUD	0 gpd/acre
Dry Creek	Strap Ravine Flow Monitor	Placer County	120 gpd/acre
Dry Creek	Old Auburn Flow Monitor	Placer County	350 gpd/acre

Wet season GWI, defined in the Wet Weather Flow Projection TM (No. 2c), occurs in addition to the dry season GWI. Based on the results of this analysis, a wet season GWI rate of 200 gpd/acre was applied to developed parcels in the Dry Creek watershed. A wet season GWI rate of 100 gpd/acre was applied to developed parcels in the Pleasant Grove watershed. Wet season GWI was not applied to parks, open space, or Union Pacific Railroad property.

Design RDI/I is based on a 10-year 24-hour synthetic rainfall pattern that occurs across the entire service area. RDI/I flows are dependent on several factors including rainfall amount. RDI/I flows are typically projected using a design storm event. For this project, a 10-year, 24-hour design storm was chosen to project peak wet weather flows in the model. *Note: This is the design condition adopted by Sacramento County and recently required by the Central Valley Regional Water Quality Control Board in an order (official document adopted by the Board) to the City of Folsom.* The design storm hyetograph was developed utilizing Table 5-A-1 (elevation (h) = 150 feet) from the Placer County Flood Control and Water Conservation District Stormwater Management Manual (September 1, 1990). The peak rainfall hour was set at 6 a.m. so that the peak RDI/I response (which would normally occur about 1-2 hours after the rainfall for a typical basin) roughly coincides with the peak hour of the dry weather profiles to give a conservative flow response in the collection system. Further discussion on design flows is presented in the Wet Weather Flow Projection TM (No. 2c).

3.2 Pipe Network

June 2004 gravity sewers were evaluated primarily by the amount of surcharge that occurs within them under peak wet weather conditions. Hydraulic capacity, defined as the ratio of the peak flow in the pipe divided by capacity of the pipe, is used as a secondary evaluation criterion to develop relief sewer improvement projects. Additional pipe network evaluation criteria are provided below.

3.2.1 Surcharge

Gravity sewers were evaluated to identify areas with surcharge. Surcharge occurs when the hydraulic gradeline is above the crown of the pipe, indicating that the pipe would be flowing under pressure during

surcharge conditions. The study area is anticipating significant growth in the future, so a conservative evaluation criterion of "no surcharging" was selected. Relief sewers were considered as potential capital projects to eliminate surcharging under peak wet weather flow conditions.

The exception to this criterion is surcharging that is the result of "backwatering" from larger diameter pipes into smaller diameter pipes. Typically, at junctions between larger diameter and smaller diameter pipes, the crowns of the pipes are matched to avoid "backwatering". However, some pipe invert information that was used to develop the hydraulic model indicates that the crowns may not be matched at all junctions. In these cases, constructing relief sewers would not alleviate the "backwatering caused" surcharging.

3.2.2 Capacity

June 2004 sewers were also evaluated to identify hydraulic bottlenecks. Bottlenecks occur when the peak flow exceeds the calculated hydraulic capacity of an individual pipe reach. The modeling software program H_2OMAP Sewer Pro was used to determine the capacity of the June 2004 and buildout gravity sewer lines. H_2OMAP Sewer Pro compares the calculated capacity of each pipeline to the peak flow and flags sewer reaches which have capacities that are less than the peak flows.

3.3 Pump Stations

Typically, pump stations need rated capacities that match or exceed the peak hourly wet weather flow (PWWF) for current and future conditions. As of June 2004, the Old Auburn and Johnson Ranch pump stations divert some of the peak flow from the sewers where they are located. After discussions with the City, it was decided to allow these pump stations to be modeled to operate as peak wet weather pump stations with two pumps operating in a lead/lag mode (no standby pump). This criterion, rather than rating their capacity with one pump operating, was used to evaluate June 2004 and buildout PWWF projections. In contrast, the Dry Creek No. 1 pump station operates at all times and was evaluated with the first and/or second pump operating and the third pump considered a standby pump that only operates if one of the duty pumps fails.

Additional detailed hydraulic assessments including surge analysis and field testing of actual pump capacities was beyond the scope of this Systems Evaluation.

3.4 Force Mains

The maximum velocity criterion for force mains is 7 feet per second (fps). Additional assessment of force mains, including surge analysis, was beyond the scope of this System Evaluation. The maximum velocity criterion was considered as an approximate indicator of the need to perform further assessment of a force main (if the criterion were exceeded under design conditions, for example).

4 Hydraulic Model Results

This section presents the results of the hydraulic modeling. The hydraulic evaluation of gravity sewers utilized the model network and the June 2004 and buildout PWWF projections developed for this study.

4.1 June 2004 Gravity Sewer Evaluation

The results of the gravity sewer hydraulic analysis under June 2004 PWWF conditions are presented on Figure 5. The June 2004 land use scenario is defined in the June 2004 and Buildout Land Use TM (No. 1b) and consists of the parcels connected to the system as of June 2004. This figure identifies manholes in the trunk sewer network with surcharging and where the peak wet weather flows exceed the calculated

capacities of the pipelines using Manning's equation in the model. Sewer profiles illustrating the hydraulic grade line at the time of PWWF are included in Attachment A.

Both hydraulic capacity deficiencies and backwater surcharging occurred under June 2004 PWWF conditions in a limited number of locations. Under June 2004 PWWF conditions, notable hydraulic capacity surcharging occurred in three general areas. Each of these areas is shown in Figures 5. Additional discussion on each of these pipe reaches is presented in the following sections.

The figures also show other surcharging and capacity issues that arise under June 2004 peak flow conditions but which are not included in the areas of concern discussed above. The surcharging is caused by backwatering and the capacity issues are localized and minimal. A number of these areas are immediately upstream of the inverted siphons. Gravity sewer improvements (or other substantial capital projects) are not needed to address these issues.

4.1.1 Area A – Placer County SMD-2

Area A is located upstream of the Old Auburn permanent flow monitoring site in Placer County. This 15-inch trunk sewer serves the southern portion of Granite Bay. Four of these pipe reaches surcharge for a period of approximately 1 hour during the June 2004 PWWF scenario.

4.1.2 Area E – Roseville

Area E is located in the Pleasant Grove WWTP basin in Roseville, along McAnally Road. This 15 and 18-inch trunk sewer serves a portion of western Roseville. Thirteen of these pipe reaches surcharge for a period of approximately 1 hour during the June 2004 PWWF scenario. Flow monitoring data indicated that this area had one of the highest rates of RDI/I in the SPWA service area. Modeling results indicated that this surcharging is solely attributable to the high I/I levels. The surcharging was eliminated when model run scenarios were completed with more typical I/I rates for this area. Roseville sewer operations staff indicated that a manhole may have been missing its cover in this area during the flow monitoring period and that the RDI/I rates may be inflated. City staff also commented that this area has not had historical hydraulic capacity issues. The City should perform an additional investigation in this area prior to considering the construction of relief sewers.

4.1.3 Area K – Roseville

Area K is located in the Dry Creek WWTP basin in Roseville. Area K has several inverted siphons and flat reaches of pipe that cause minor surcharging during June 2004 PWWF conditions. No improvement project is needed.

4.2 Buildout Gravity Sewer Evaluation

The results of the gravity sewer hydraulic analysis under buildout PWWF conditions are presented on Figure 6. The buildout land use scenario is defined in the June 2004 and Buildout Land Use TM (No. 1b). This figure identifies manholes in the trunk sewer network with surcharging and where the peak wet weather flows exceed the calculated capacities of the pipelines using Manning's equation in the model. Sewer profiles illustrating the hydraulic grade line at the time of PWWF are included in Attachment B.

Both hydraulic capacity deficiencies and backwater surcharging occurred under buildout PWWF conditions in a limited number of locations. Under buildout PWWF conditions, pipe reaches in 13 areas are projected to surcharge. Each of these areas is shown in Figure 6. Additional discussion on each of these pipe reaches is presented in the following sections.

The figures also show other surcharging and capacity issues that arise under June 2004 and buildout peak flow conditions but which are not included in the areas of concern discussed above. The surcharging is caused by backwatering and the capacity issues are localized and minimal. A number of these areas are

immediately upstream of the inverted siphons. Gravity sewer improvements (or other substantial capital projects) are not needed to address these issues.

4.2.1 Area A – Placer County SMD-2 and Roseville

Area A is located upstream of the Old Auburn permanent flow monitoring site in Placer County. This 15-inch trunk sewer serves the southern portion of Granite Bay and the extreme southeast corner of Roseville. Thirteen pipe reaches in this area experience surcharging up to 3 feet for approximately 18 hours due to hydraulic capacity deficiencies for the buildout PWWF scenario.

4.2.2 Area B1 – Placer County SMD-2

Area B1 is located upstream of the Johnson Ranch pump station in Placer County. This 15 and 18-inch trunk sewer serves the northern portion of Granite Bay. A hydraulic analysis was performed in this area both with and without the SMD-3 UGA.

When a PWWF input of 1.85 mgd from the SMD-3 UGA is introduced into the model on this trunk sewer, fifty pipe reaches experience surcharging up to 4 feet for approximately 19 hours due to hydraulic capacity deficiencies. There are no hydraulic capacity deficiencies in this area if the SMD-3 UGA were not connected to the SPWA system for the buildout scenario. In a separate study, Placer County evaluated whether holding peak wet weather flows at the existing (as of June 2004) SMD-3 WWTP would affect the SMD-2 trunk sewer. This study showed that a controlled release of 0.5 mgd from SMD-3 into SMD-2 would not adversely affect the trunk sewers in Area B1.

4.2.3 Area B2 – Roseville

Area B2 is located in Roseville upstream of the Johnson Ranch pump station and downstream of Area B1 and Area C. This 15 and 21-inch trunk sewer serves the northern portion of Granite Bay and a small area of Roseville. Nine pipe reaches in this area experience surcharging up to 11 feet for approximately 17 hours due to hydraulic capacity deficiencies for the buildout PWWF scenario. The surcharging in area B2 is caused by the proposed SMD-3 UGA and approximately 2,700 acres of future development in Placer County and SPMUD that is loaded into the trunk sewer model upstream of Area C, which is tributary to Area B2. SPMUD has commented that some of this future development area may ultimately remain on septic tank service. For the buildout growth scenario (including SMD-3 UGA and approximately 2700 acres of future development in Placer County and SPMUD) a 24-inch replacement sewer is needed to resolve hydraulic capacity deficiencies. Without SMD-3, nine pipe reaches in this area experience surcharging up to 7 feet due to the future development in Placer County and SPMUD upstream of Area C and hydraulic relief is still needed. Without SMD-3 and the 2,700 acres of future development in Placer County and SPMUD, the two 15-inch pipe reaches (bottleneck downstream of the 18-inch and upstream of the 21-inch) surcharge less than two feet in pipes over 23 feet deep. These 15-inch pipe diameters are suspicious and should be investigated. However, no improvement project is needed for this deficiency.

4.2.4 Area C – Placer County SMD-2

Area C is tributary to Area B2 and is located along the Roseville City boundary. As of June 2004, this 15-inch trunk sewer serves the northern portion of Granite Bay and a small area of Roseville (several parcels). Future development tributary to Area C includes the Placer UGA (very low density development) and approximately 2,700 acres of additional development within the 2005 Service Area in Placer County and SPMUD. As of June 2004, this trunk sewer serves approximately 600 acres. SPMUD commented that some of this area may ultimately remain on septic tank service. Sixteen pipe reaches in this area experience surcharging up to 4 feet for approximately 18 hours due to hydraulic capacity deficiencies for the buildout PWWF scenario as a result of connections in Placer County and SPMUD. If these 2,700 acres of additional development are not loaded to the trunk sewer in Area C there is only

minor surcharging (0.60 ft) for one flat pipe segment that is approximately 22 feet deep. No improvement project is needed for this deficiency.

4.2.5 Area E – Roseville

Area E is located in the Pleasant Grove WWTP basin in Roseville, along McAnally Road. This 15 and 18-inch trunk sewer serves a portion of western Roseville. Fourteen pipe reaches in this area experience surcharging up to 6 feet for approximately 2 hours due to hydraulic capacity deficiencies for the buildout PWWF scenario. Flow monitoring data indicated that this area had one of the highest rates of RDI/I in the SPWA service area. Modeling results indicated that this surcharging is solely attributable to the high I/I levels. The surcharging was eliminated when model runs were completed with more typical I/I rates for this part of Roseville. Also, Roseville sewer operations staff indicated that a manhole may have been missing its cover in this area during the flow monitoring period and that the RDI/I rates may be inflated. City staff also commented that this area has not had historical hydraulic capacity issues. The City should perform an additional investigation in this area prior to considering the construction of relief sewers.

4.2.6 Area F – Roseville

Area F is located in the Dry Creek WWTP basin in Roseville. This 15-inch trunk sewer serves a portion of Roseville and SPMUD. Five pipe reaches in this area experience minor surcharging during the buildout PWWF scenario with the hydraulic grade line less than two feet above the crown of the pipe (but 16 feet below grade). The hydraulic deficiencies are attributed four sections of flat pipe. The pipe is approximately 18 feet deep in the area of surcharge and there is no risk of overflow for the design PWWF. No improvement project is needed.

4.2.7 Area H1, H2, H3 and H4 – SPMUD

A significant number of pipe reaches in Areas H1, H2, H3 and H4 of SPMUD experience surcharging due to inadequate hydraulic capacity for the buildout PWWF scenario. Area H1 is an existing 15-inch trunk sewer that experiences up to six feet of surcharge for a period of 9 hours for the buildout PWWF. Area H2 is an existing 12 and 15-inch trunk sewer that experiences up to 13 feet of surcharge for a period of 20 hours for the buildout PWWF. Area H3 is an existing 24, 27 and 30-inch trunk sewer that experiences up to 3 feet of surcharge for a period of 13 hours for the buildout PWWF. Area H4 is an existing 18-inch trunk sewer that experiences up to 2 feet of surcharge for a period of 8 hours for the buildout PWWF.

According to SPMUD, these deficiencies are consistent with the results of their current (as of June 2004) wastewater collection system master plan. SPMUD will be identifying appropriate projects to relieve these sewer deficiencies separately.

4.2.8 Area I – Roseville

Area I is located in the Dry Creek WWTP basin in Roseville. Area I has very minor surcharging with the hydraulic gradeline at, or just above, the crown of the pipe. No improvement project is needed.

4.2.9 Area J – Placer County SMD-2

Area J is located in the Dry Creek WWTP basin in Placer County. Area J has very minor surcharging with the hydraulic gradeline at, or just above, the crown of the pipe. No improvement project is needed.

4.2.10 Area K – Roseville

Area K is located in the Dry Creek WWTP basin in Roseville. Area K has several inverted siphons and flat reaches of pipe that cause minor surcharging. No improvement project is needed.

4.2.11 Area L – Roseville

Area L is located in West Roseville. The proposed 18-inch and 24-inch pipe reaches from the intersection of Phillip Road and Westside Drive to the existing 36-inch stub at the PGWWTP influent junction structure are undersized for PWWF. The hydraulic deficiencies are attributed to the additional flow input into the West Roseville collection system from Creekview, Regional University, and Curry Creek UGAs. To carry the projected PWWF, these pipe reaches should be increased in size from 18-inches to 30-inches and 24-inches to 36-inches. The existing 36-inch stub out of the PGWWTP influent junction structure has is sufficiently sized to convey flow from the West Roseville Specific plan and Creekview, Regional University and Curry Creek UGAs.

Figure 5 –Hydraulic Assessment – June 2004 Scenario

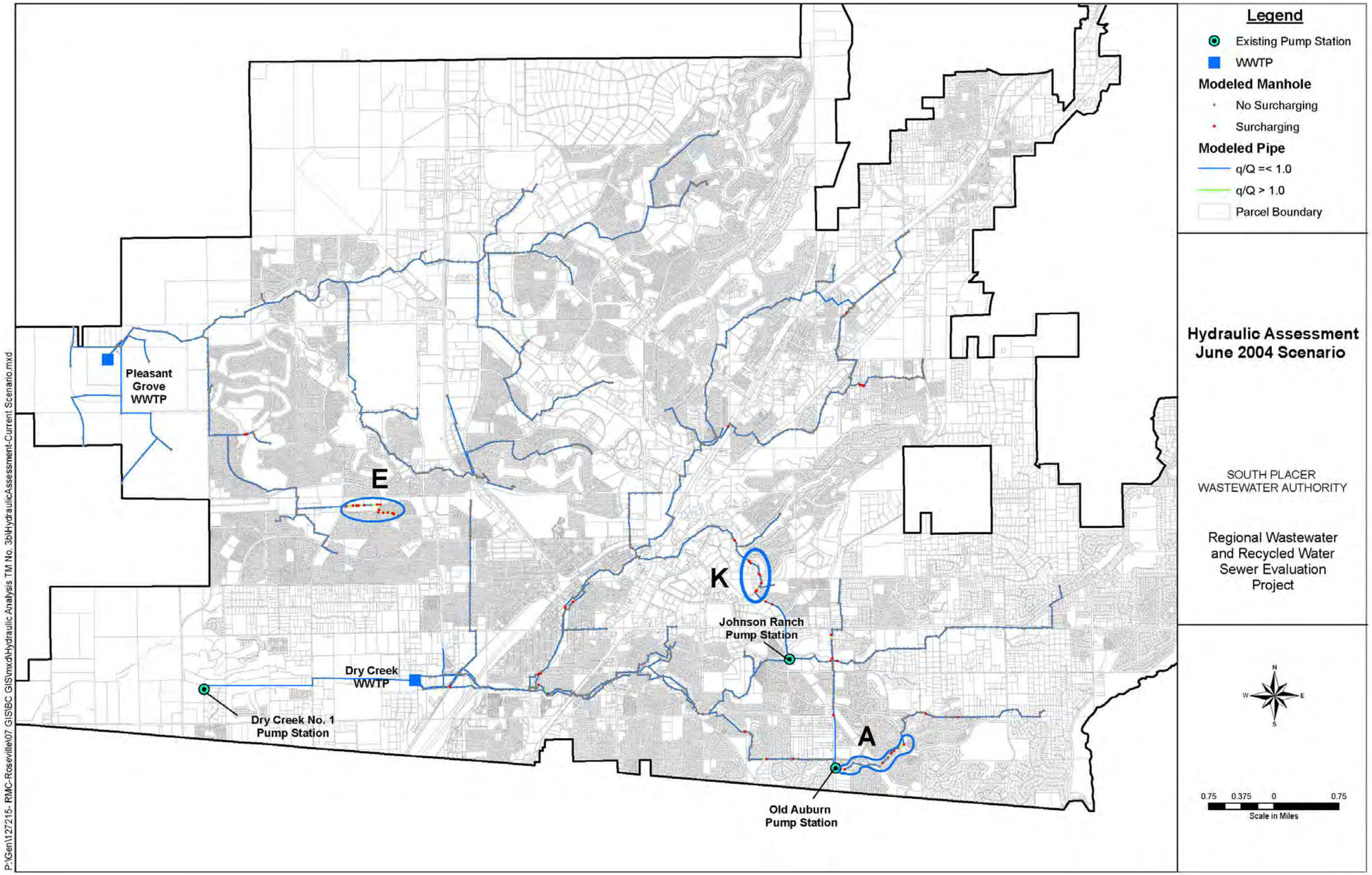
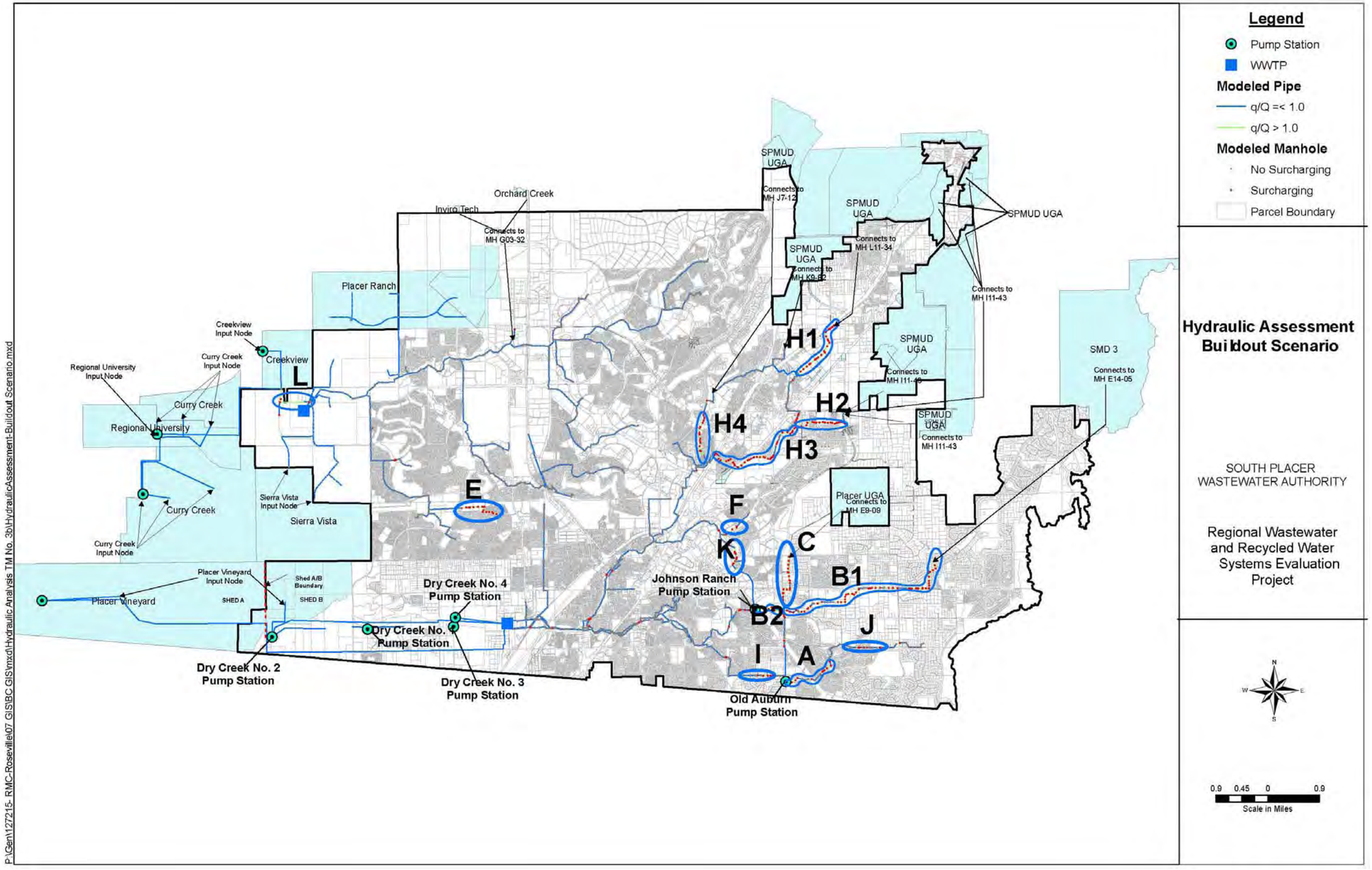


Figure 6 –Hydraulic Assessment – Buildout Scenario



4.3 Pump Station and Force Main Evaluation

The results of the pump station and force main hydraulic analysis under June 2004 and buildout PWWF conditions are presented in Table 6 and Table 7. Capacity issues with pump stations are determined by comparing the pump station capacities with the June 2004 and buildout PWWF. The capacities of the pump stations and force mains are based on information summarized in Table 2 and Table 3. All three pump stations and their associated force mains have capacity to meet the buildout PWWF. Buildout PWWF at Dry Creek No. 1 pump station is approximately 24 percent lower than values published in the Dry Creek West Placer Facilities Plan prepared by The Spink Corporation in November 1999. This difference is likely attributed to the new flow projection criteria utilized for this evaluation.

Table 6 – Pump Station Hydraulic Assessment

Facility No.	Facility Name	Duty/Standby (one pump) Capacity[1] (mgd)	Lead/Lag (two pump) Capacity[2] (mgd)	June 2004 PWWF (mgd)	Buildout PWWF (mgd)
25	Johnson Ranch	2.02	3.20	0.00[4]	2.50[5]
26	Old Auburn	0.43	0.68	0.00[4]	0.68[5]
NA	Dry Creek No. 1	2.52[3]	NA	0.14[6]	1.92[7]

[1] Pump station capacity with one pump not operating
[2] Pump station capacity with both pumps operating
[3] Proposed pump station capacity at buildout with three 60 hp pumps (one standby) each rated at 1580 gpm. As of June 2004, pump station has a capacity of 1.73 mgd with two 20-hp duty pumps and one standby 60-hp pump.
[4] Downstream trunk sewer can adequately convey June 2004 PWWF
[5] Buildout PWWF determined by identifying the amount of PWWF above the capacity of the downstream trunk sewers
[6] This is based on connected parcels in June 2004. Actual flow metering in October 2005 suggests Average Day Weather Flow may be as high as 0.13 mgd, which would translate to an estimated Peak Wet Weather flow of 0.3 mgd.
[7] Per *Dry Creek No. 1 PS Flows – Memo 1.1* (RMC, May 17, 2007)

Table 7 – Force Main Hydraulic Assessment

Facility No.	Facility Name	Design Capacity (mgd)	June 2004 PWWF (mgd)	Buildout PWWF (mgd)
25	Johnson Ranch	3.55	3.20	3.20
26	Old Auburn	1.58	0.68	0.68
NA	Dry Creek No. 1	6.31	1.73	4.29[1,2]

[1] Includes PWWF from the proposed Dry Creek Pump Station No. 2 which will share the common force main. Dry Creek Pump Station No. 2 service area includes Shed B of the Placer Vineyards Specific Plan service area. See Section 5.4 for further discussion.
[7] Per Dry Creek No. 1 PS Flows – Memo 1.1 (May 17, 2007)

4.3.1 June 2004 PWWF Conditions

For June 2004 PWWF, the Old Auburn and Johnson Ranch pump stations have adequate capacity because the downstream trunk sewer systems have adequate capacity and flow is not diverted to the pump stations. As of June 2004, the Dry Creek pump station has a capacity of 1.73 mgd because it has not been expanded to serve buildout conditions. This is adequate to meet the June 2004 PWWF of 0.14 mgd. The force mains for all three pump stations have adequate capacity for June 2004 PWWF scenarios.

4.3.2 Buildout PWWF Conditions

For buildout PWWF (including the SMD-3 UGA), the Old Auburn and Johnson Ranch pump station capacities with one pump operating are inadequate. However, the pump stations have adequate capacity if operated with two pumps in lead/lag mode. The force mains also have adequate capacity for the June 2004 and buildout PWWF scenarios. Without the SMD-3 UGA, the Johnson Ranch pump station can operate with one pump and still meet the PWWF conditions.

The Dry Creek No. 1 pump station also has adequate capacity to meet the buildout PWWF scenario. However, this pump station may need to be upgraded as outlined in the Dry Creek facility plan to meet flow projections for the buildout condition. It is possible that these pumps may not need to be as large as originally planned. The buildout PWWF for the Dry Creek No. 1 pump station is 1.92 mgd versus the design capacity of 2.52 mgd. The force mains for all three pump stations (Old Auburn, Johnson Ranch and Dry Creek No. 1) have adequate capacity for the buildout PWWF scenarios. It appears that the existing 16-inch force main serving Dry Creek No. 1 pump station may have enough capacity (without exceeding the 7 fps maximum velocity criteria) to serve all four pump stations that will eventually serve the West Dry Creek service area. However, due to the complex hydraulics associated with four pump stations sharing a common force main, a detailed hydraulic analysis should be performed prior to selecting this alternative.

5 Improvement Projects

This section describes the criteria used for developing and pricing hydraulic capacity improvement projects in the regional and regional partners' collection system. Thirteen projects have been identified to (1) address hydraulic deficiencies by potential improvements to existing facilities or by diverting flow, and (2) to extend service to new development.

5.1 Criteria

Criteria were identified for developing potential improvements to the collection system to accommodate June 2004 and buildout flows.

5.1.1 New Replacement Sewers

New replacement sewers are provided to increase hydraulic capacity and to eliminate capacity-related surcharging. New sewers are sized to replace the sewer existing as of June 2004 with a larger diameter sewer.

5.1.2 Minimum size

New replacement sewers will be sized so that the peak hourly flow rate in the replacement sewer will not exceed the full pipe capacity.

5.1.3 Slope

New replacement sewers are developed using the slope of the existing (June 2004) sewer or associated sewers. The slopes of the new sewers are constrained by the upstream and downstream invert elevations of the sewers existing of June 2004. The flow velocities in the new sewers may be less than typical design standards due to the constraint of the June 2004 invert elevations.

5.1.4 Pump Stations

New pump stations have been sized with one or more duty pumps and one pump operating in a standby mode (as opposed to the wet weather peaking pump stations). Duty/standby pump station operations are

typical for wastewater pumping stations to prevent a sewer overflow in the event that the duty pump fails. The determination of the number of duty pumps will be made during the project design phase (subsequent to this Systems Evaluation).

As of June 2004, the Old Auburn and Johnson Ranch pump stations only operate during peak flow events and only to divert some of the peak flow from where they are located. After discussions with the City staff, it was decided to identify the operating criteria for these pump stations so that they operate as peak wet weather pump stations with capacity defined as "both pumps in a lead/lag mode (no standby pump)". These criteria were used to determine if capacity improvements are required.

5.2 Capital and Construction Costs

Capital and construction costs presented in this TM represent preliminary cost estimates of the costs to plan and engineer projects, and the materials, labor and services necessary to build the proposed projects. The cost estimates are indicative of the cost of construction in the study area. In considering cost estimates, it is important to realize that changes during final design, as well as future changes in the cost of material, labor and equipment, will cause comparable changes in the estimated costs. Construction cost data given in this report are not intended to represent the lowest prices that can be achieved, but rather to represent planning-level estimates for budgeting purposes.

The unit capital costs for gravity sewer and force main pipeline construction were developed based on the sewer pipeline replacement costs shown in Tables 2-3 and 2-6 of the City of Roseville Infrastructure Rehabilitation Plan (April 2003). These costs were developed from recent projects in the City of Roseville and include allowances for engineering and administration (including construction management). The unit capital costs have been adjusted by approximately 8 percent for increasing construction cost considerations since April 2003. Costs for construction of new large diameter sewers would significantly increase if extensive utility relocation and traffic control were required. Pipeline unit capital costs are presented in Table 8.

Pump station capital and construction costs are based on cost curves from Pumping Station Design, Second Edition by Robert L. Sanks. This reference book is an industry standard for pump station design. There is no capital cost associated with changing operating modes/capacity definitions of the Old Auburn and Johnson Ranch pump stations.

Capital costs were increased by 30 percent to account for contingencies. A contingency allowance is appropriate given the planning level of the capital cost estimates and provides a conservative cost estimate that is suitable for budgeting purposes.

Table 8 –Pipe Unit Capital Costs (ENR CCI Value = 8435)

Pipe Diameter (in)	Conveyance	Pipe Material[1]	Replacement Cost[1]	
			$/ft	$/dia-inch
8	Gravity	VCP	164	21
8	Force Main	PVC	120	15
10	Gravity	VCP	205	21
10	Force Main	PVC	150	15
12	Gravity	VCP	246	21
12	Force Main	PVC	174	15
15	Gravity	VCP	292	19
16	Force Main	PVC	224	14
18	Gravity	VCP	330	18
18	Force Main	PVC	250	14
20	Force Main	PVC	260	13
21	Gravity	VCP	363	17
24	Gravity	VCP	415	17
24	Force Main	PVC	312	13
27	Gravity	VCP	437	16
30	Gravity	VCP	454	15
30	Force Main	PVC	360	12
33	Gravity	VCP	463	14
36	Gravity	VCP	505	14
42	Gravity	VCP	544	13
48	Gravity	RCP	622	13
60	Gravity	RCP	713	12
66	Gravity	RCP	713	11
72	Gravity	RCP	778	11

[1] Includes allowance for engineering and administration (including construction management)

5.3 Projects for June 2004 Facilities (Part 1)

The proposed improvements to the June 2004 collection system are shown on Figure 7. Improvements were developed to address the hydraulic deficiencies discussed above and to prevent capacity-related surcharging in the improved collection system. *This Section (Part 1) does not include projects that are attributed to the SMD-3 UGA and approximately 2,700 acres of future development in Placer County and SPMUD within the 2005 Service Area that is tributary to Area C.*

The improvement projects and their estimated CIP Budgetary Cost estimates (with a 30 percent contingency included) are summarized in Table 9 and Attachment C. Prior to constructing these projects, flow monitoring and other site specific investigations should be conducted on the critical line segments to validate and refine the model results. *The entity with Primary Responsibility for the specific improvement project is indicated in Table 9 and the project headings listed below.* "Placer County" refers to development within Placer County SMD-2.

5.3.1 Improvement Project 1 – Area A (Primary Responsibility: Placer County)

An 18-inch replacement sewer is needed to improve the hydraulic deficiencies identified in Area A through the hydraulic modeling process. Redirecting flow to another trunk sewer is not feasible. This project extends 5,000 feet from manhole B11-16 to A08-156. This project is located in an existing sewer easement between Roseville Parkway and Sierra College Boulevard and a new alignment may be necessary. To conservatively estimate the cost of this new alignment without undertaking site specific investigations, the length of this project was increased by 50 percent over the June 2004 deficient length to develop a higher cost estimating allowance. The determination of the new alignment will be made during design.

5.3.2 Improvement Project 6 – Area E (Primary Responsibility: Roseville)

An additional investigation is needed in Area E prior to the construction of any replacement sewer. This project extends 4,000 feet from manhole D03-100 to D02-353. This project is located in the McAnally Road street right-of way and a sewer easement south of Pleasant Grove Road. Additional investigation is needed due to the uncertainty in the flow monitoring data at this site. This was previously discussed in the June 2004 and buildout gravity sewer evaluation (Section 4). The additional investigation should include the following items:

- Flow monitoring during the wet season at Basin 7 as identified in the Wet Weather Flow Projection TM (No. 3b).
- Elevation survey of approximately 18 manhole inverts between manholes D03-100 to D02-353 to confirm pipe slopes.
- Visual surcharge checks of the pipes in question during heavy rainfall.

RDI/I reduction to levels seen in adjacent sewer basins would also eliminate the need for this improvement project. As a last resort, if the additional investigations did not eliminate the basis of the hydraulic deficiencies identified by the modeling, a 21-inch replacement sewer would be needed to improve the hydraulic deficiencies identified in Area E. For contingency planning purposes, the cost for this project is included in Table 8. Since the initial analysis performed by RMC, the City has performed further investigations in this area and determined new, reduced I/I parameters that would be appropriate for the area. Using these new parameters, City staff determined that no improvements for Area E are required at this time. The analysis performed by the City has been included as **Attachment D**.

5.3.3 Improvement Project 7 – Area L (Primary Responsibility: Regional University UGA and Curry Creek UGA)

This project extends from the intersection of Phillip Road and Westside Drive to the existing 36-inch pipe stub that connects with the influent junction structure at Pleasant Grove WWTP. The deficient sewers in Area L have been designed and will be constructed in early 2006. The deficiencies identified in the model can be corrected if 30-inch and 36-inch pipe is constructed in lieu of the planned 18-inch and 24-inch trunk sewer. Another option is to route the Regional University force main directly to the 36-inch pipe that connects with the influent junction structure. This 36-inch stub is sufficiently sized to convey PWWF from the West Roseville Specific Plan area and Creekview, Regional University and Curry Creek UGAs.

5.3.4 Improvement Project 8 – Area H1, H2, H3 and H4 (Primary Responsibility: SPMUD)

Improvement projects in SPMUD have not been developed at the request of SPMUD and a cost is not provided in Table 8. SPMUD will be identifying appropriate projects to relieve these sewer deficiencies separately.

Table 9 – June 2004 Facility Project Summary (Part 1)[4]

Project No.	Primary Responsibility	Item	Quantity	Unit Cost ($)	Estimated Capital Cost ($)	Proposed CIP Budget Cost[1] ($)
1-Area A	Placer County	18-inch Gravity	7,500[2] lf	330	2,475,000	3,218,000
Project 1 Subtotal					**2,475,000**	**3,218,000**
6- Area E[3]	Roseville	21-inch Gravity	4,000 lf	363	1,452,000	1,888,000
Project 6 Subtotal					**1,452,000**	**1,888,000**
7- Area L	Regional Univ. UGA Curry Creek UGA	30-inch Gravity	1,500 lf	454	681,000	885,000
		36-inch Gravity	3,000 lf	505	1,515,000	1,970,000
Project 7 Subtotal					**2,196,000**	**2,855,000**
Total Cost					**6,123,000**	**7,961,000**

[1] Includes 30 percent contingency
[2] Includes 50 percent allowance for alternative alignment
[3] This project needed only if additional investigation identifies it as a necessary project
[3] This Table does not include Projects 2, 3 and 4 which are solely attr buted to the SMD-3 UGA and approximately 2,700 acres of future development in Placer County and SPMUD within the 2005 Service Area. These projects are included in Section 5.4.

5.4 Projects for June 2004 Facilities (Part 2)

The proposed improvements to the June 2004 collection system are shown on Figure 7. Improvements were developed to address the hydraulic deficiencies discussed above and to prevent capacity-related surcharging in the improved collection system. *This Section (Part 2) only includes projects that are attributed to the SMD-3 UGA and approximately 2,700 acres of future development in Placer County and SPMUD within the 2005 Service Area that is tributary to Area C.*

The improvement projects and their estimated CIP Budgetary Cost estimates (with a 30 percent contingency included) are summarized in Table 10 and Attachment C. Prior to constructing these projects, flow monitoring and other site specific investigations should be conducted on the critical line segments to validate and refine the model results. *The entity with Primary Responsibility for the specific improvement project is indicated in Table 10 and the project headings listed below.* "Placer County" refers to development within Placer County SMD-2.

5.4.1 Improvement Project 2 – Area B1 (Primary Responsibility: SMD-3 UGA)

Based on the model results discussed in Section 4, a 21-inch replacement sewer is needed to improve the hydraulic deficiencies identified in Area B1. Redirecting flow to another trunk sewer is not feasible. These deficiencies are solely attributed to the SMD-3 UGA and this project is not needed if the flow from SMD-3 was limited to 0.5 mgd (storage scenario).

Area B1 extends 18,000 feet from manhole E14-05 to B08-042. This project is located upstream of the Johnson Ranch Pump Station in an existing sewer easement and in the Douglas Boulevard street right-of way; a new alignment may be necessary. To estimate the cost of this new alignment, the length of this project was increased by 50 percent over the June 2004 deficient length to develop a higher cost estimating allowance. The determination of the new alignment will be made during design.

5.4.2 Improvement Project 3 – Area B2 (Primary Responsibility: Placer County, SMD-3 UGA and SPMUD)

A 24-inch replacement sewer is needed to improve the hydraulic deficiencies identified in Area B2. Redirecting flow to another trunk sewer is not feasible. These deficiencies are attributed to the SMD-3 UGA and approximately 2,700 acres of future development in Placer County and SPMUD within the 2005 Service Area. This project is not needed if flows from SMD-3 and the future growth areas within Placer County and SPMUD (upstream of Area C) were directed elsewhere.

Area B2 extends 3,000 feet from manhole B08-042 to B07-405. This project is located upstream of the Johnson Ranch Pump Station in an existing sewer easement and a new alignment may be necessary. To estimate the cost of this new alignment, the length of this project was increased by 50 percent over the June 2004 deficient length to develop a higher cost estimating allowance. The determination of the new alignment will be made during design.

5.4.3 Improvement Project 4 – Area C (Primary Responsibility: Placer County and SPMUD)

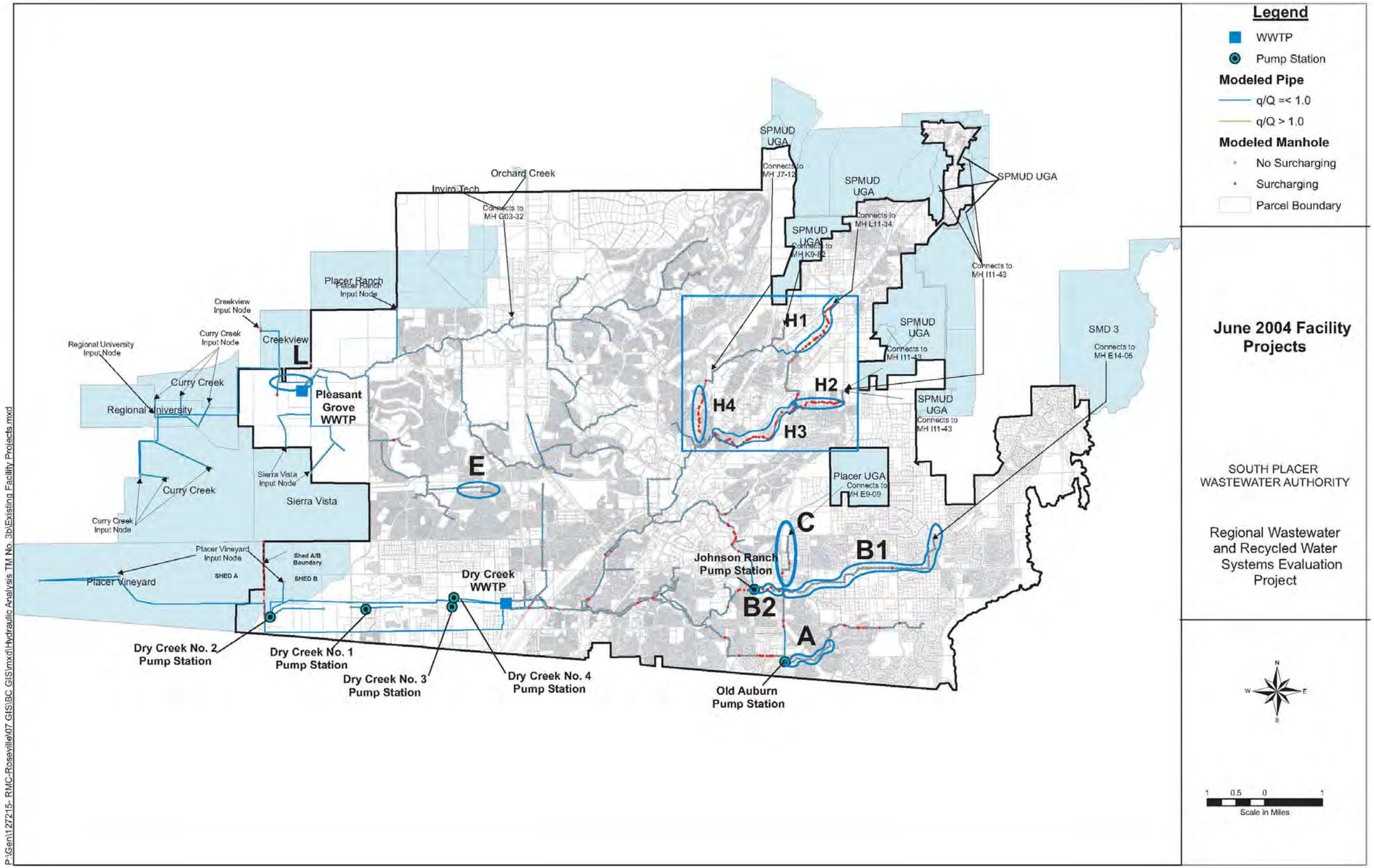
A 21-inch replacement sewer is needed to improve the hydraulic deficiencies identified in Area C. Redirecting flow to another trunk sewer is not feasible. These deficiencies are attributed to 2,700 acres of future development in Placer County and SPMUD within the 2005 Service Area. This project is not needed if flow from the 2,700 acres of future development in Placer County and SPMUD within the 2005 Service Area was directed elsewhere. This project extends 6,000 feet from manhole E9-09 to B08-042. This project is primarily located in the Sierra College Boulevard and Cavitt Stallman Road street right-of way. It extends from the Strap Ravine trunk sewer north to Olive Ranch Road.

Table 10 – June 2004 Facility Project Summary (Part 2)

Project No.	Primary Responsibility	Item	Quantity	Unit Cost ($)	Estimated Capital Cost ($)	Proposed CIP Budget Cost[1] ($)
2- Area B1	SMD-3 UGA	21-inch Gravity	27,000[2] lf	363	9,801,000	12,741,000
Project 2 Subtotal					**9,801,000**	**12,741,000**
3- Area B2	Placer County SMD-3 UGA SPMUD	24-inch Gravity	4,500[2] lf	415	1,868,000	2,428,000
Project 3 Subtotal					**1,868,000**	**2,428,000**
4- Area C	Placer County SPMUD	21-inch Gravity	6,000 lf	363	2,178,000	2,831,000
Project 4 Subtotal					**2,178,000**	**2,831,000**
Total Cost					**13,847,000**	**18,000,000**

[1] Includes 30 percent contingency
[2] Includes 50 percent allowance for alternative alignment

Figure 7 – June 2004 Facility Projects



5.5 Projects to Extend Service

The proposed improvements needed to extend service to the proposed UGAs west of Roseville are shown on Figure 8. Service extension projects are identified by the UGA they serve in Table 11. Project information is based on information provided by UGA applicants at the time of this evaluation and changes may evolve over time. The proposed Total Project Costs identified in Table 10 are for informational purposes only. These costs have been developed utilizing a unit cost table representative of municipal sewer projects in the SPWA area. Actual sewer infrastructure costs for each extension project will be the responsibility of the developer.

NOTE: Proposed sewer infrastructure for the Placer Ranch and Sierra Vista UGAs were provided by developers after the original publication date (April 2006) of this TM. Although the sizes and alignments of the subsequently proposed trunk sewers are included Figure 8, Table 11 contains the estimates from the original publication of this TM.

5.5.1 Extension Project 1 – Placer Ranch

The proposed improvements to extend service into Placer Ranch were identified in the Placer Ranch Specific Plan and were included in the trunk sewer model. Flow from Placer Ranch and some areas of Placer County north of Placer Ranch are introduced into the existing trunk sewer that is tributary to the Pleasant Grove WWTP. Proposed pipe diameters are included in Figure 8 and Table 11.

5.5.2 Extension Project 2 – Placer Vineyards and West Dry Creek

The proposed improvements to extend service into Placer Vineyards and West Dry Creek were identified in the Placer Vineyards Specific Plan and the West Dry Creek Facilities Plan and were included in the trunk sewer model. The West Dry Creek service area is located between the Dry Creek WWTP and the Placer Vineyards UGA. The Placer Vineyards UGA includes one pump station. This pump station will roughly serve the area of Placer Vineyards outside the 2005 Service Area (Shed A). This pump station will pump directly to the Dry Creek WWTP. The area of Placer Vineyards roughly within the 2005 Service Area (Shed B) will be served by the proposed Dry Creek Pump Station No. 2. Dry Creek Pump Station No. 2 will pump into a common force main already serving the existing Dry Creek Pump Station No. 1 which flows directly to the Dry Creek WWTP. Two additional pump stations (No. 3 and No. 4) to serve the eastern portion of West Dry Creek are also proposed and will share a common force main to the Dry Creek WWTP. Proposed pipe diameters and pump station capacities for the Placer Vineyards UGA and West Dry Creek are included in Table 11 and Figure 8.

5.5.3 Extension Project 3 – Regional University

The proposed improvements to extend service into the Regional University UGA were identified in the Regional University Specific Plan and were included in the trunk sewer model. The Regional University UGA includes one pump station and is able to collect flow from Curry Creek North and South. Flow from the Regional University pump station is pumped (along with flow from Curry Creek South) east through Regional University and north along Watt Avenue to a gravity sewer main on Phillip Road. This gravity main flows east to the West Roseville collection system, tying into the proposed 18-inch gravity sewer at Westside Drive and Phillip Road transitioning to a 24-inch as the proposed gravity sewer heads east to join the existing Philip Road. Note that for this gravity sewer option to provide service to Regional University and Curry Creek, the gravity sewers planned for West Roseville (the 18-inch/24-inch) would have to be upsized to 42-inch and 48-inch, respectively. An alternate alignment is to pump directly from Regional University to the 36-inch gravity sewer that ties into the influent junction structure at Pleasant Grove WWTP. The proposed pipe diameters and pump station capacities are included in Figure 8 and Table 11.

5.5.4 Extension Project 4 – Curry Creek

The proposed improvements to extend service into Curry Creek were identified in the Regional University Master Sewer Study. Pipes in Curry Creek North will flow by gravity into Regional University. Flow from Curry Creek South will be pumped north where the Curry Creek South force main will tee into the proposed Regional University force main. An alternate alignment for the Curry Creek South force main is to go east across Curry Creek and then north at Watt Avenue to a junction point on the Regional University force main. The proposed pipe diameters and lift station capacity are included in Figure 8 and Table 11.

5.5.5 Extension Project 5 – Creekview

The proposed improvements to extend service into Creekview were not previously identified. USGS topographic contour information indicates that a pump station will be necessary to transport flow into the West Roseville collection system. The proposed pipe diameters and pump station capacity are included in Figure 8 and Table 11.

5.5.6 Extension Project 6 – Sierra Vista

The proposed improvements to extend service into Sierra Vista were not previously identified. Flows from Sierra Vista will tie into two existing sewer stubs along the border of Sierra Vista and West Roseville. Approximately 1/3 of Sierra Vista is projected in our modeling to be served to the 18-inch trunk sewer in West Roseville and 2/3 of the area is projected to be served to the 24-inch trunk sewer in West Roseville. A trunk sewer network and corresponding sewer extension project had not been established for the Sierra Vista service area at the original publication date of this TM.

5.5.7 Extension Project 7 – Brookfield

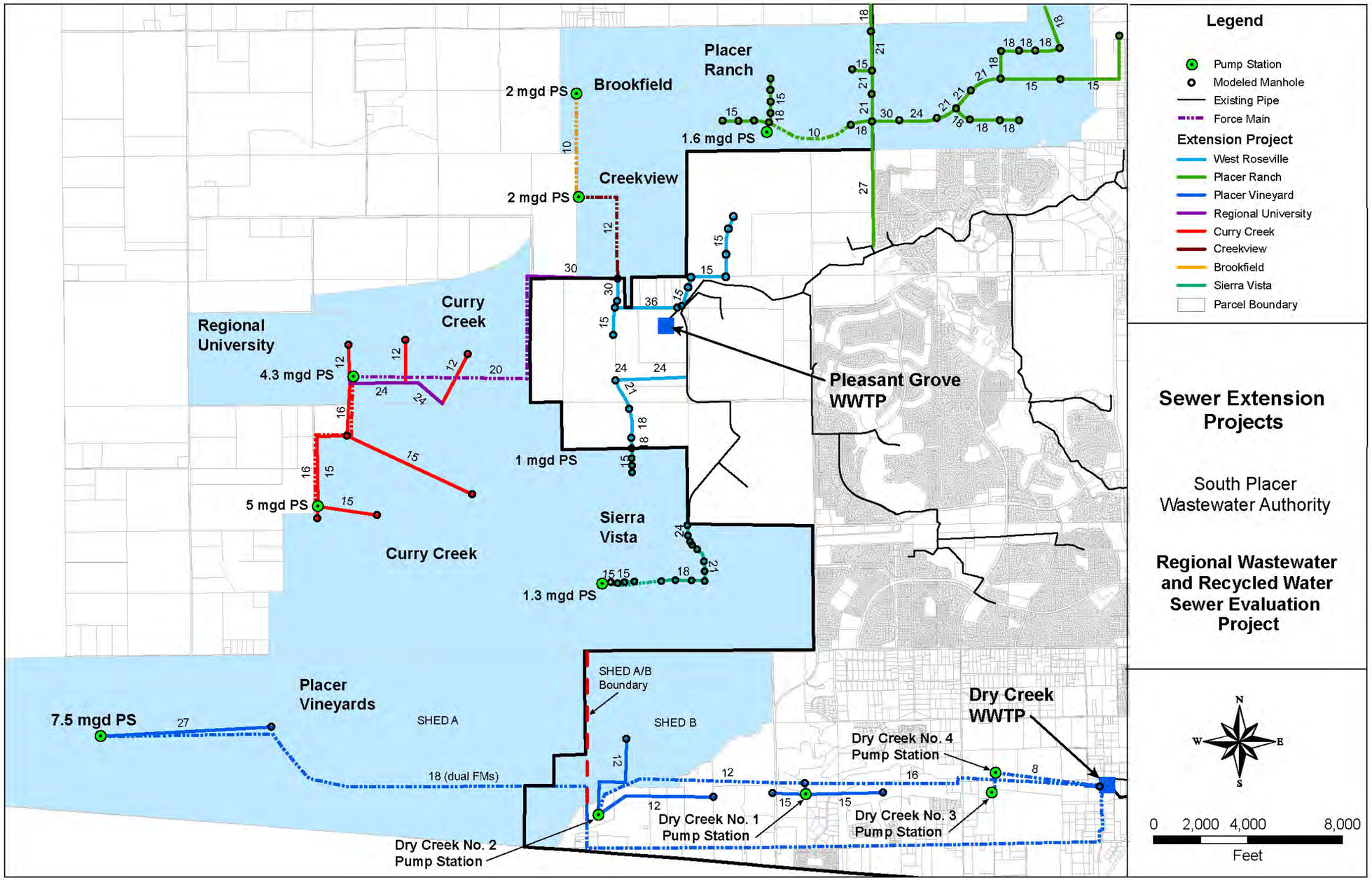
The proposed improvements to extend service into Brookfield were not previously identified. USGS topographic contour information indicates that a pump station will be necessary to transport flow from a low spot in Brookfield towards Creekview, where flows will be combined and pumped into a common Brookfield-Creekview force main and into the West Roseville collection system. The proposed pipe diameters and pump station capacity are included in Figure 8 and Table 11.

Table 11 – Sewer Extension Project Summary[1]

Project No.	Item	Quantity	Unit Cost ($/unit)	Estimated Capital Cost ($)	Proposed Total Project Cost[2] ($)
1-Placer Ranch	48-inch gravity	6,000 lf	622	3,732,000	4,852,000
	15-inch gravity	5,700 lf	292	1,664,000	2,164,000
Project 1 Subtotal				**5,396,000**	**7,016,000**
2-Placer Vineyards/ West Dry Creek	12-inch gravity - PV	4,400 lf	246	1,082,000	1,407,000
	27-inch gravity - PV	7,300 lf	437	3,190,000	4,147,000
	18-inch (dual) force mains - PV	48,000 lf	400[3]	19,200,000	24,960,000
	7.5 mgd pump station - PV	1 ea	2,750,000	2,750,000	3,575,000
	12-inch gravity - DC	5,100 lf	246	1,255,000	1,631,000
	15-inch gravity - DC	4,700 lf	292	1,372,000	1,784,000
	12-inch force main – DC No. 2	9,500 lf	174	1,653,000	2,149,000
	2.5 mgd pump station – DC No. 2	1 ea	900,000	900,000	1,170,000
	0.6 mgd pump station – DC No. 3	1 ea	400,000	400,000	520,000
	1.2 mgd pump station – DC No. 4	1 ea	600,000	600,000	780,000
	8-inch force main – DC No. 3 and 4	5,600 lf	120	672,000	874,000
Project 2 Subtotal				**33,075,000**	**42,997,000**
3-Regional University	24-inch gravity	5,000 lf	415	2,075,000	2,698,000
	30-inch gravity	2,900 lf	454	1,317,000	1,712,000
	20-inch force main	12,000 lf	260	3,120,000	4,056,000
	4.4 mgd pump station	1 ea	2,000,000	2,000,000	2,600,000
Project 3 Subtotal				**8,512,000**	**11,066,000**
4-Curry Creek	12-inch gravity	6,000 lf	246	1,476,000	1,919,000
	15-inch gravity	13,000 lf	292	3,796,000	4,935,000
	16-inch force main	7,000 lf	224	1,568,000	2,038,000
	5 mgd lift station	1 ea	2,000,000	2,000,000	2,600,000
Project 4 Subtotal				**8,840,000**	**11,492,000**
5-Creekview	12-inch force main	4,100 lf	174	713,000	927,000
	2 mgd pump station	1 ea	1,500,000	1,500,000	1,950,000
Project 5 Subtotal				**2,213,000**	**2,877,000**
7-Brookfield	10-inch force main	4,450 lf	150	668,000	868,000
	2 mgd pump station	1 ea	1,500,000	1,500,000	1,950,000
Project 7 Subtotal				**2,168,000**	**2,818,000**
Total Cost				**60,204,000**	**78,266,000**

[1] Proposed Sewer Extension Project Cost Table is for informational purposes only. These costs have been developed utilizing a unit cost table representative of municipal sewer projects in the SPWA area. Actual sewer infrastructure costs for each extension project will be the responsibility of the developer.
[2] Includes 30 percent contingency
[3] Unit cost for dual 18-inch force mains assumes 60 percent increase in unit cost for a single 18-inch force main ($250/LF x 1.60 = $400/LF)

Figure 8 – Trunk Sewer Extension Projects

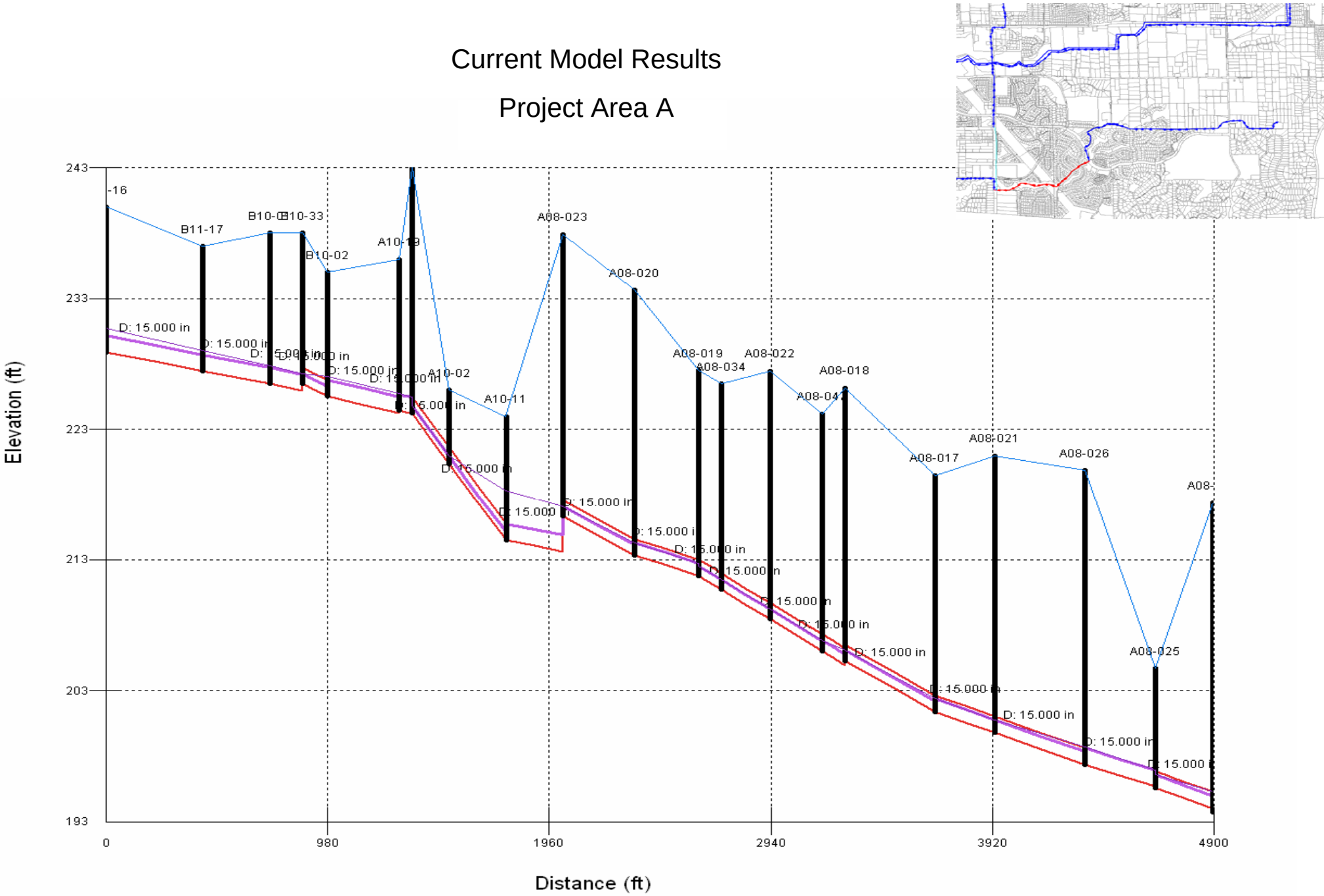


Attachment A

Sewer Profiles – June 2004 Scenario

Current Model Results

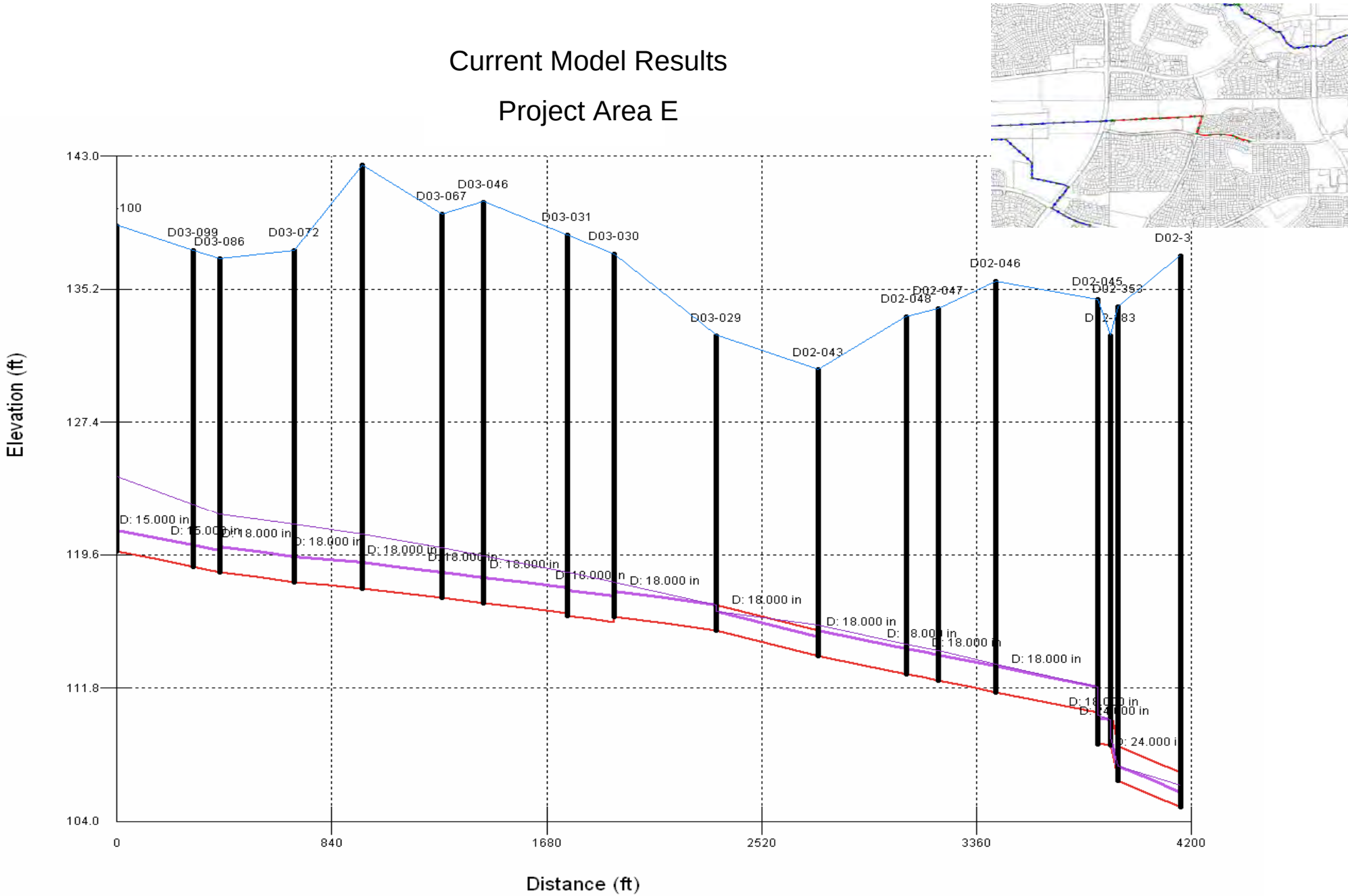
Project Area A



Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Current Model Results

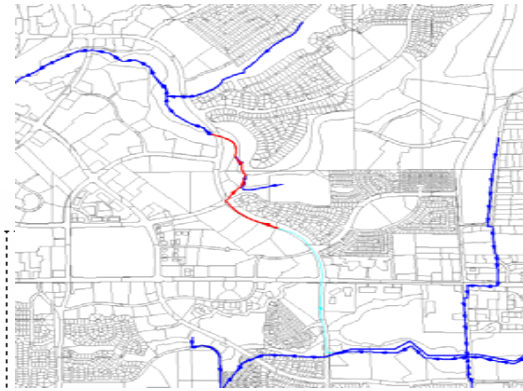
Project Area E

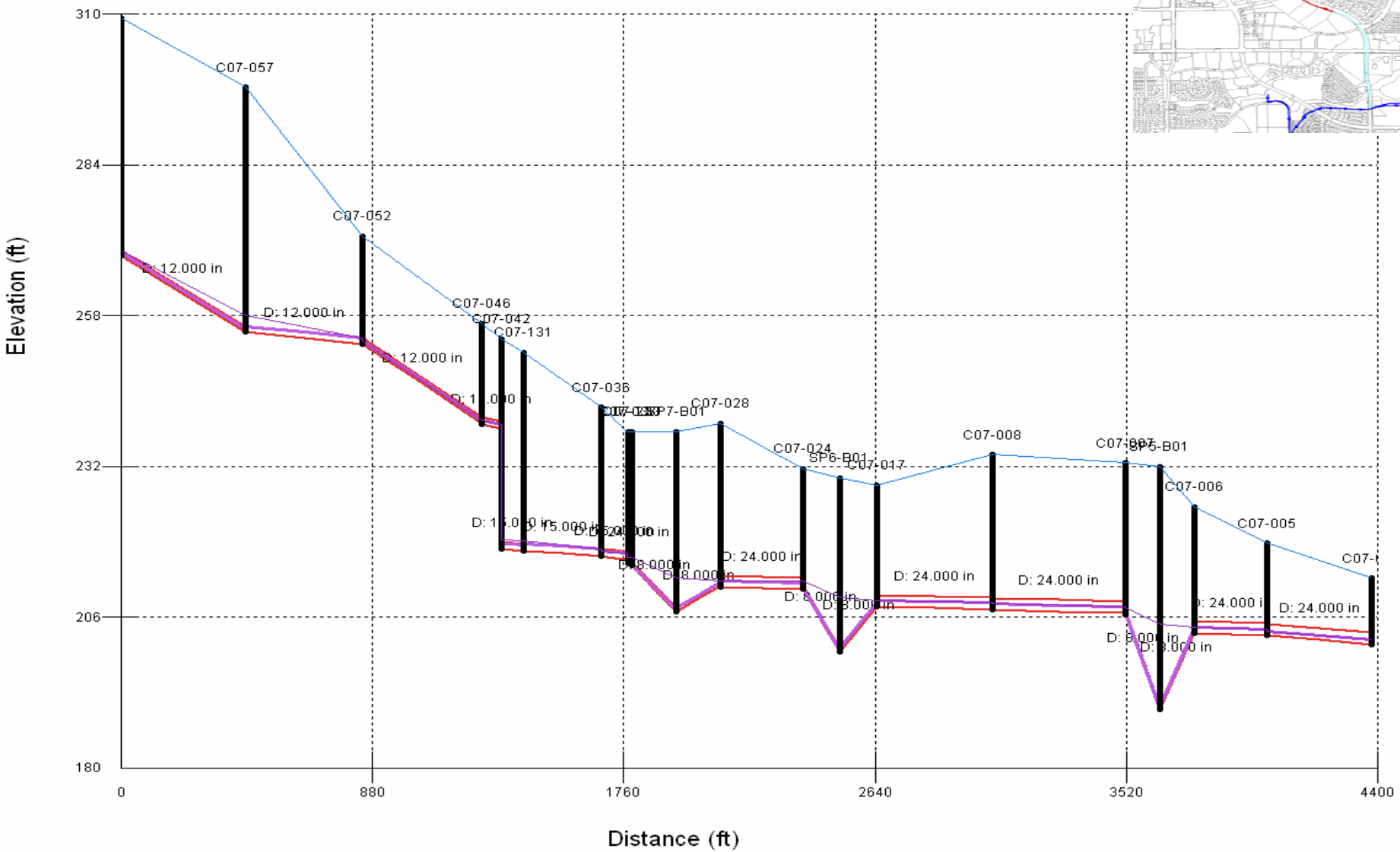


Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Current Model Results

Project Area K





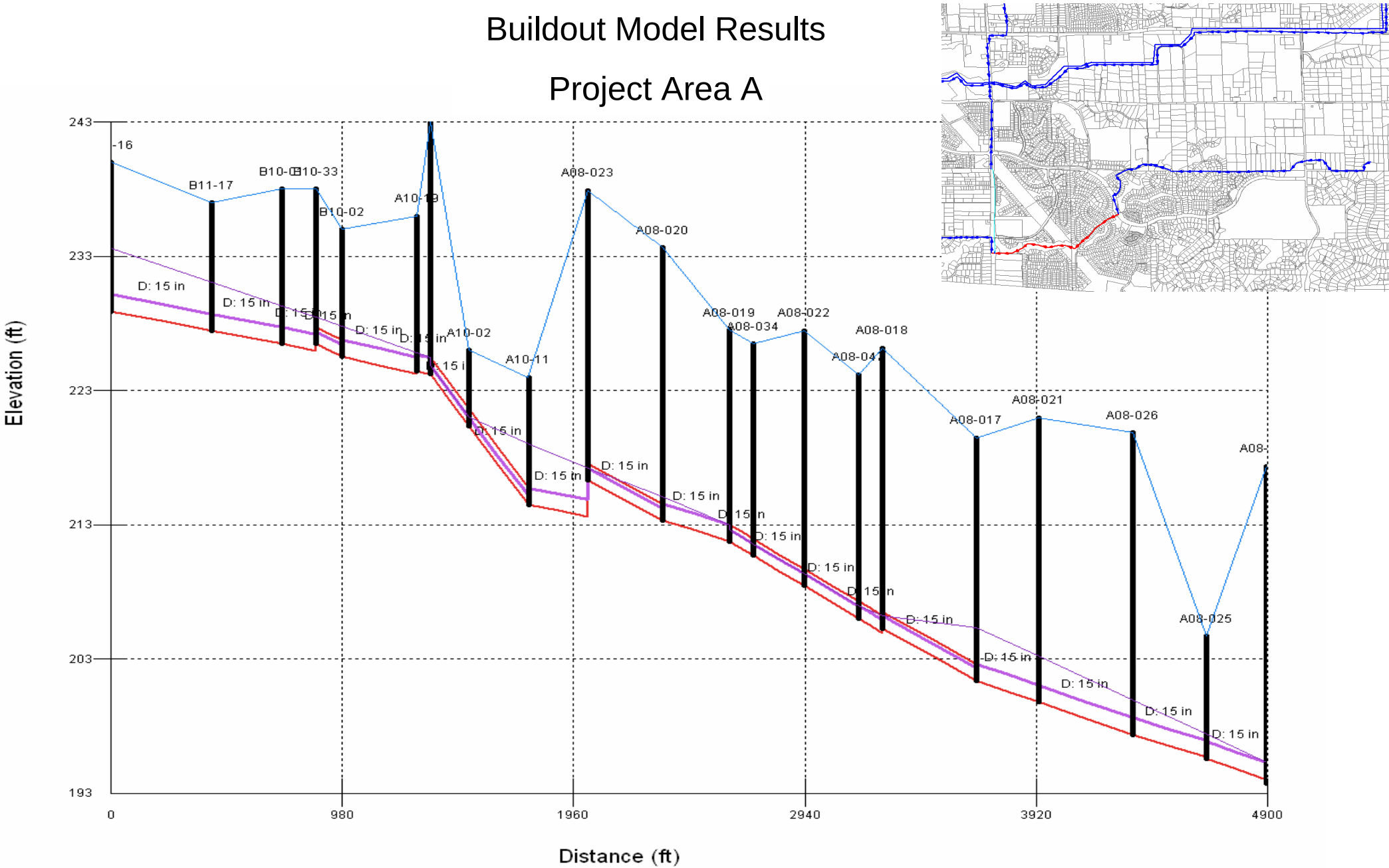
Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Attachment B

Sewer Profiles – Buildout Scenario

Buildout Model Results

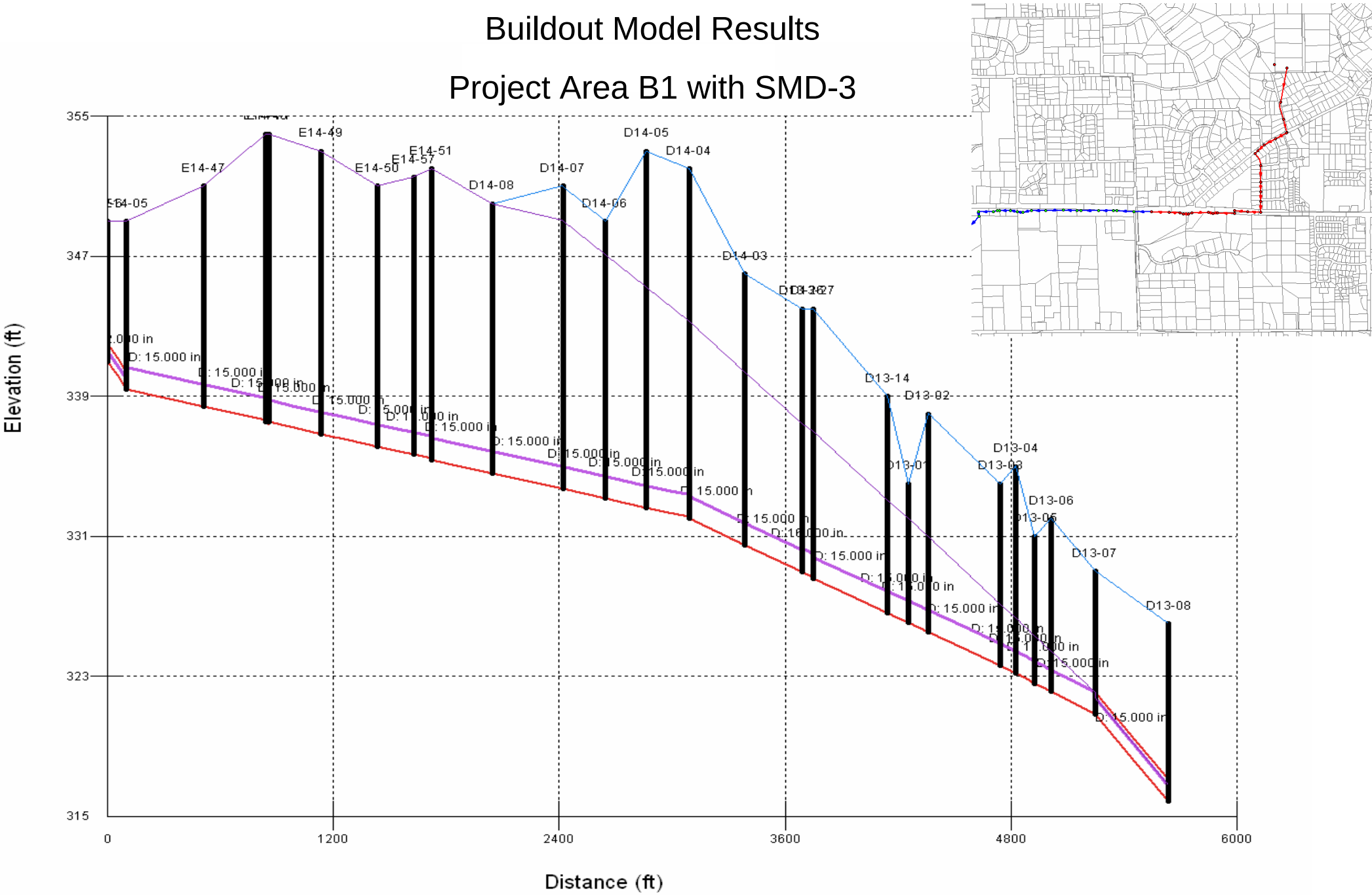
Project Area A



Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Buildout Model Results

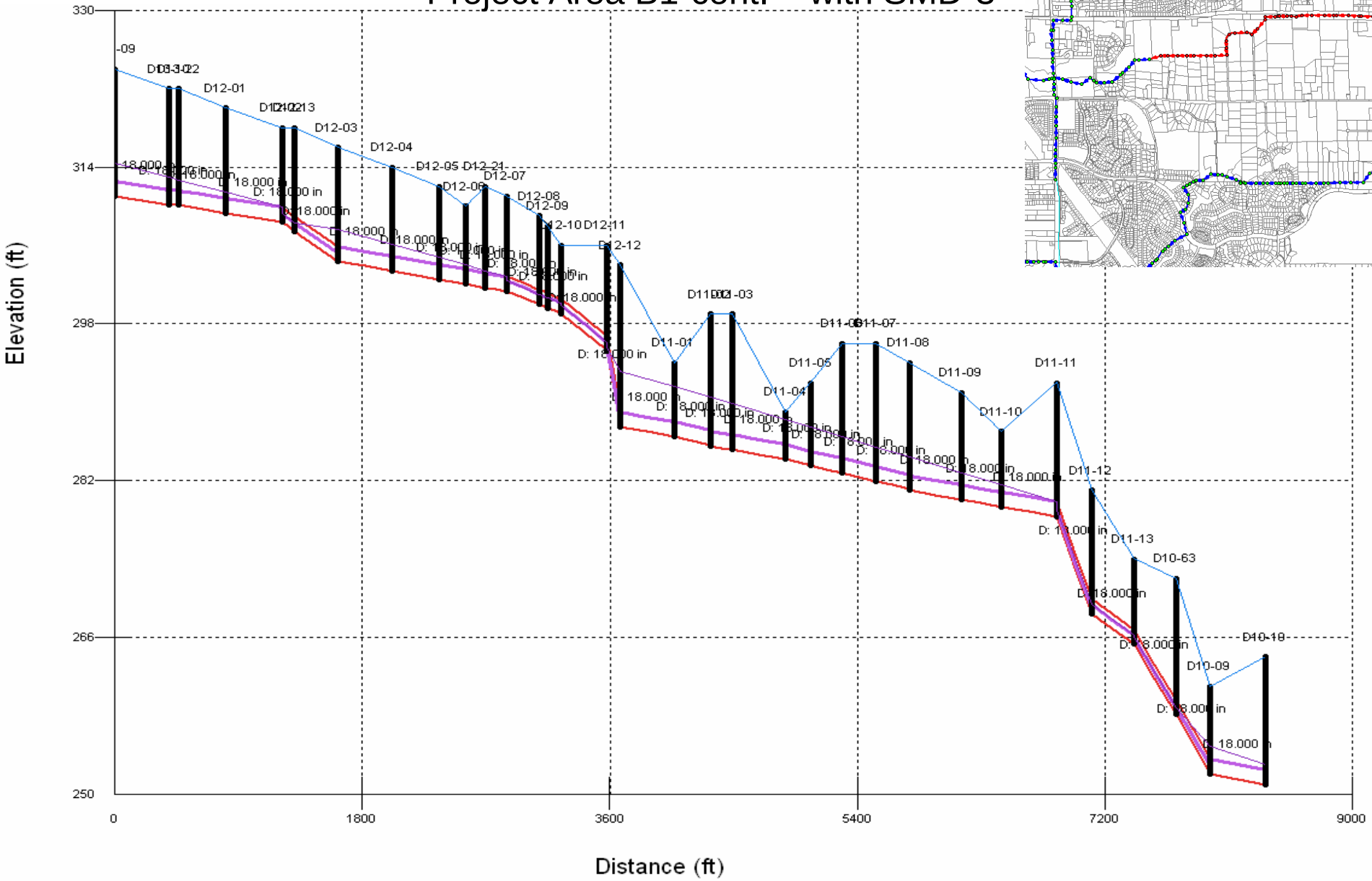
Project Area B1 with SMD-3

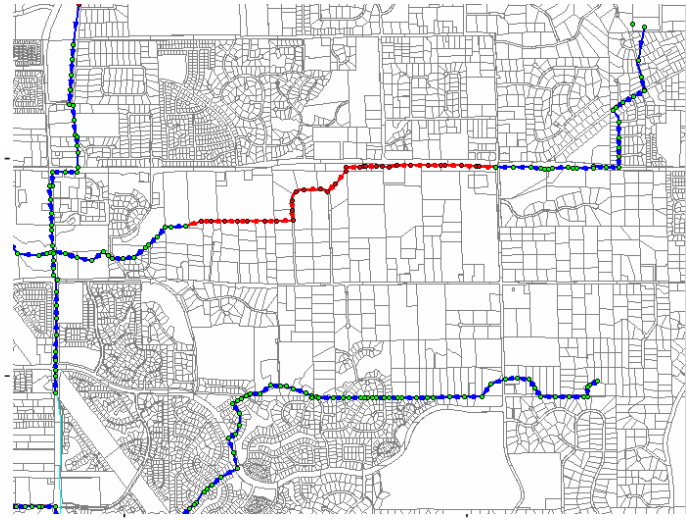


Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Buildout Model Results

Project Area B1-cont. – with SMD-3

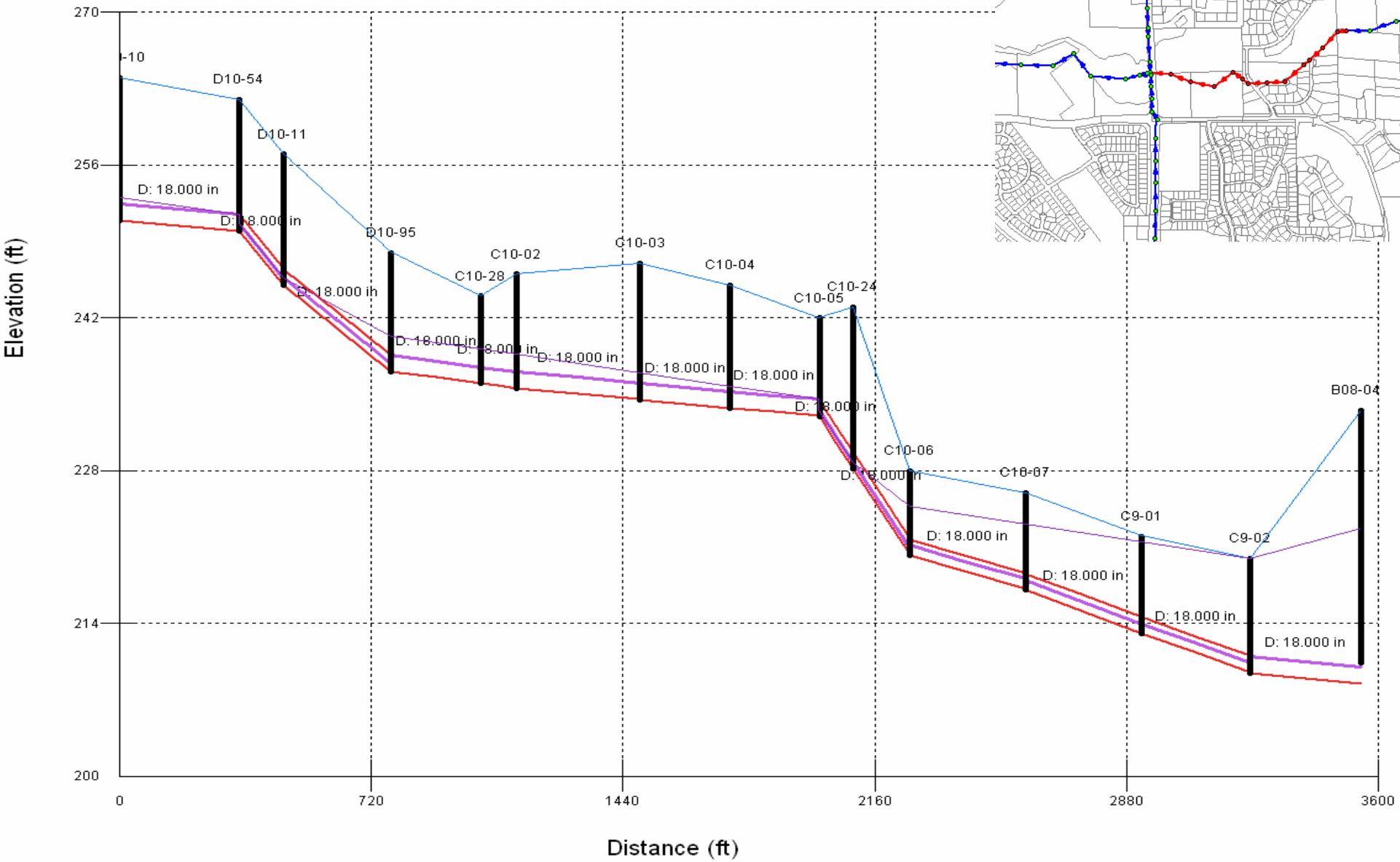


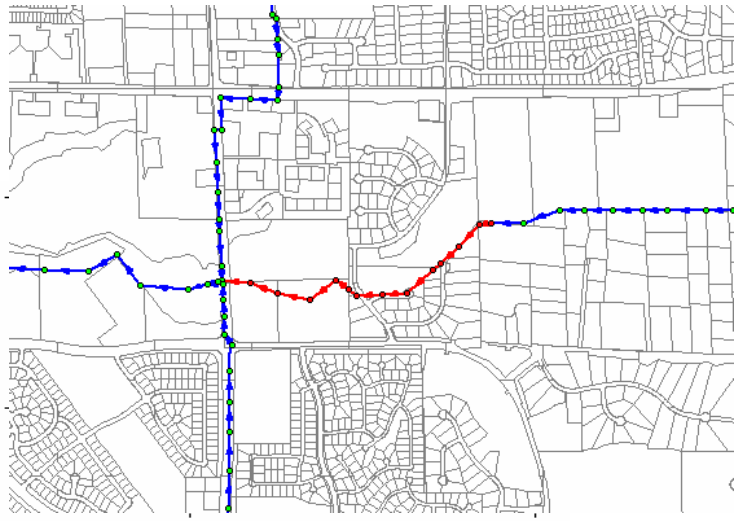


Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Buildout Model Results

Project Area B1-cont. – with SMD-3

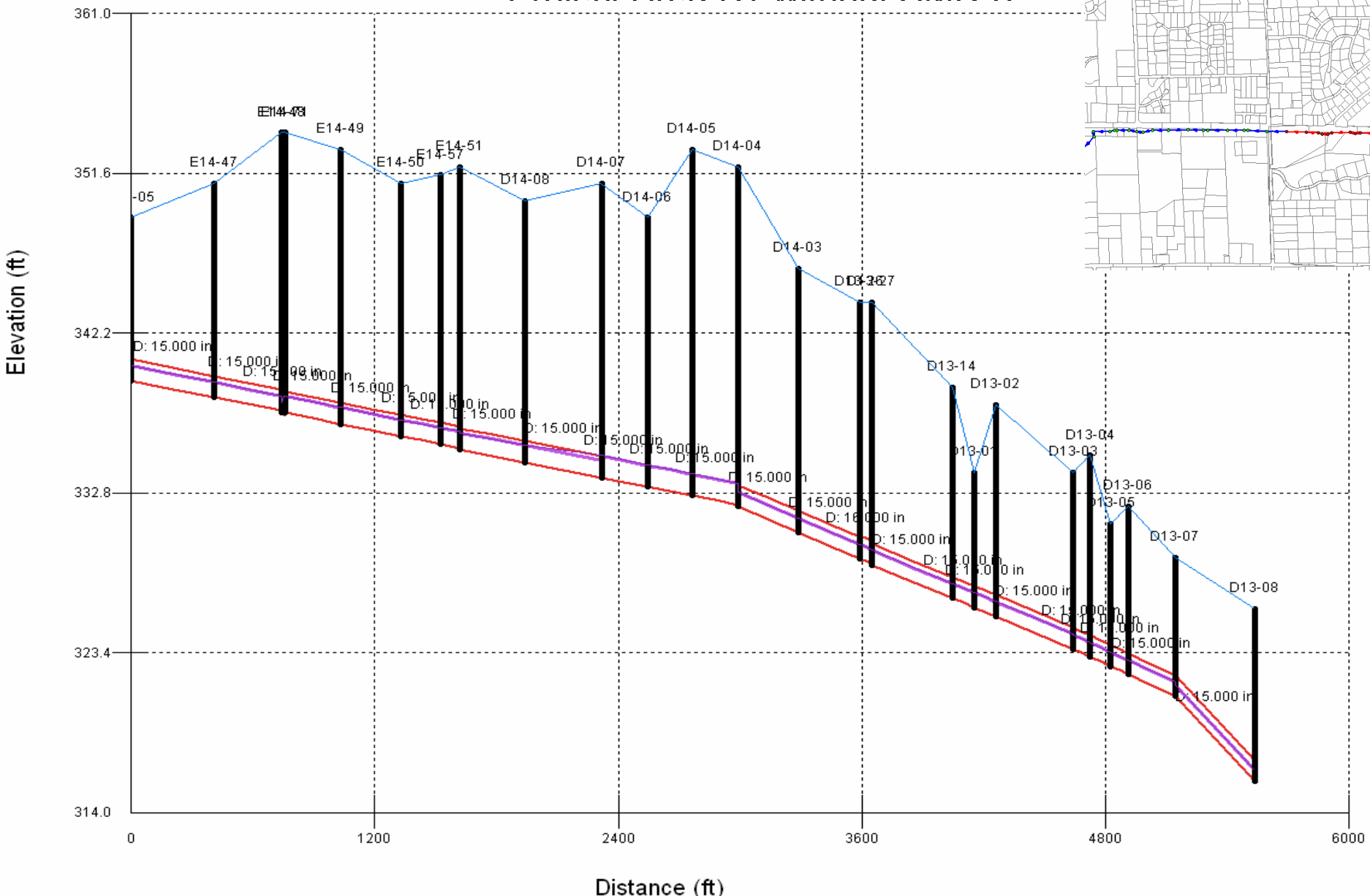


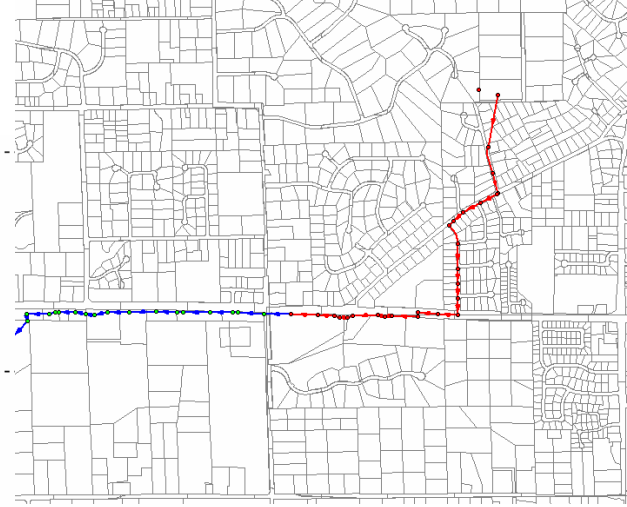


Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Buildout Model Results

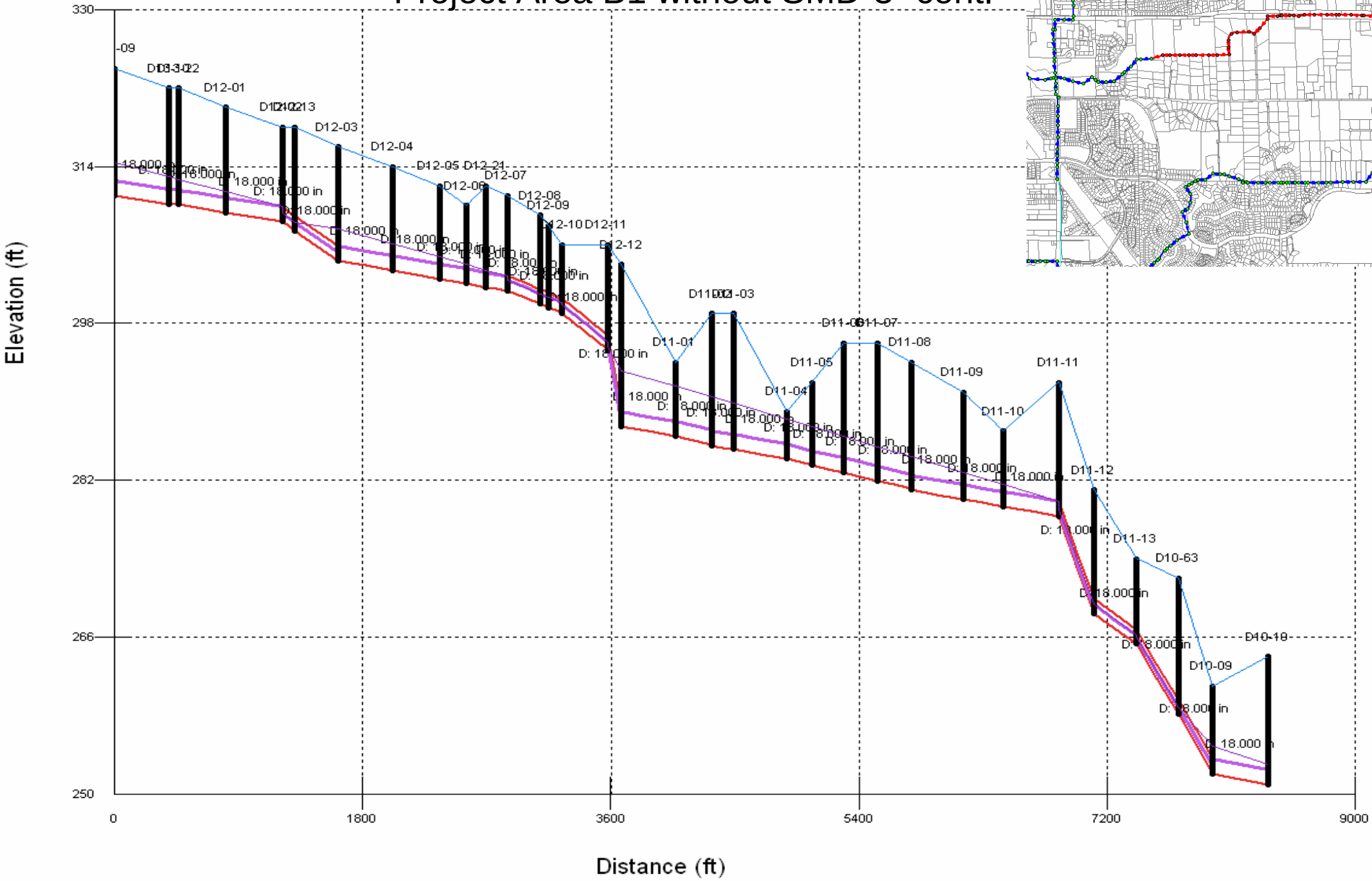
Project Area B1 without SMD-3





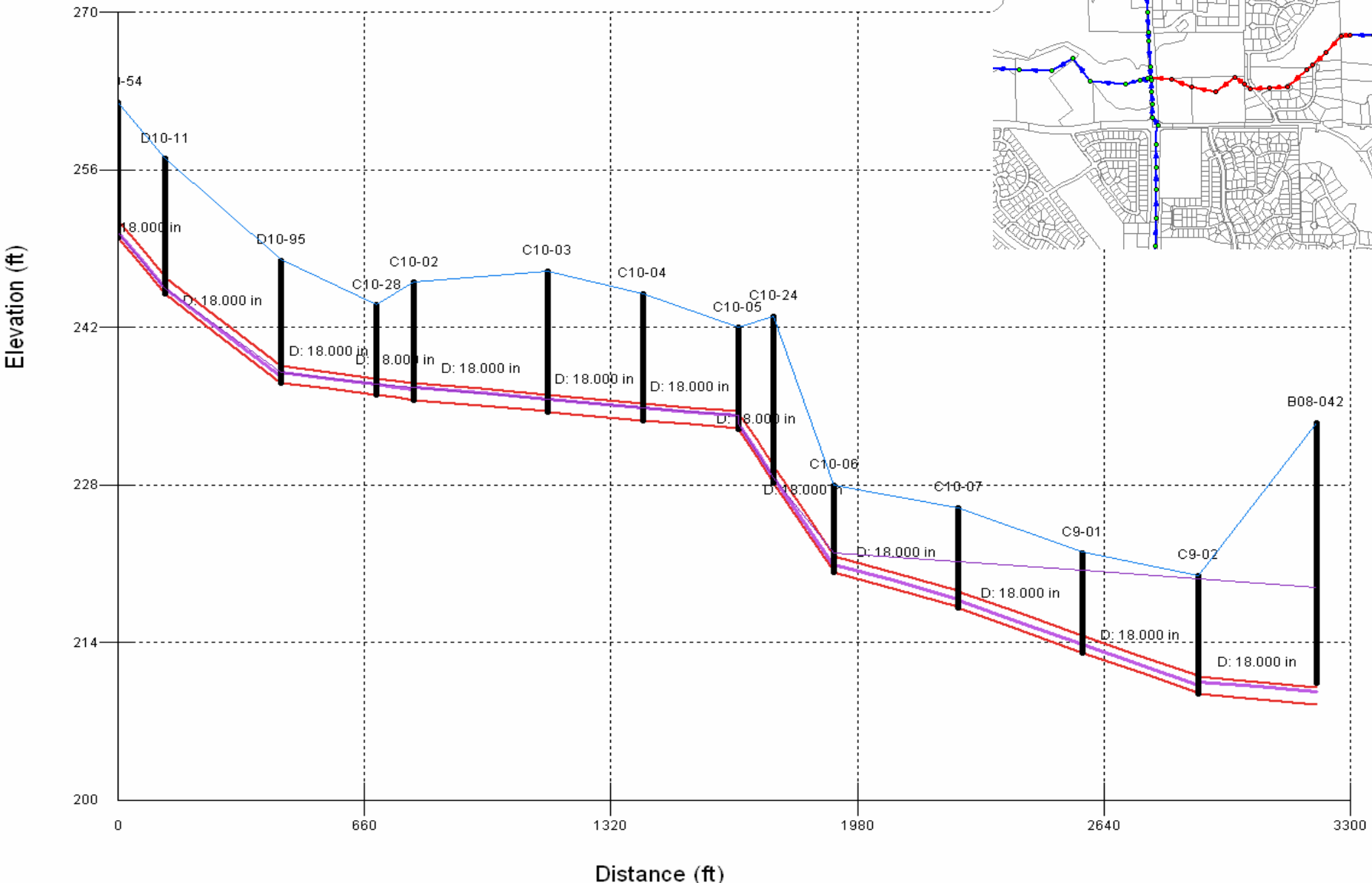
Buildout Model Results

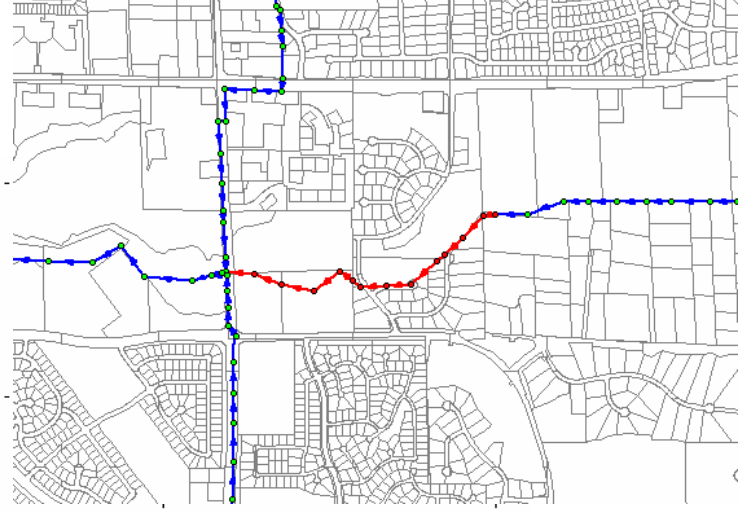
Project Area B1 without SMD-3 -cont.



Buildout Model Results

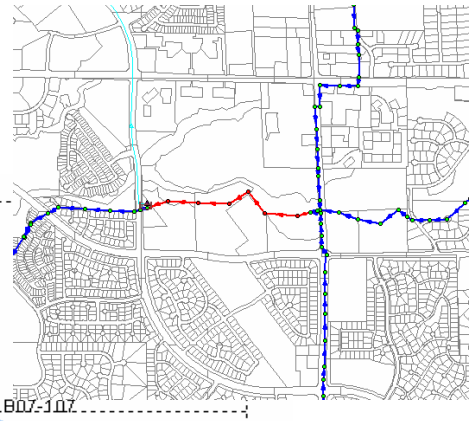
Project Area B1 without SMD-3 –cont.

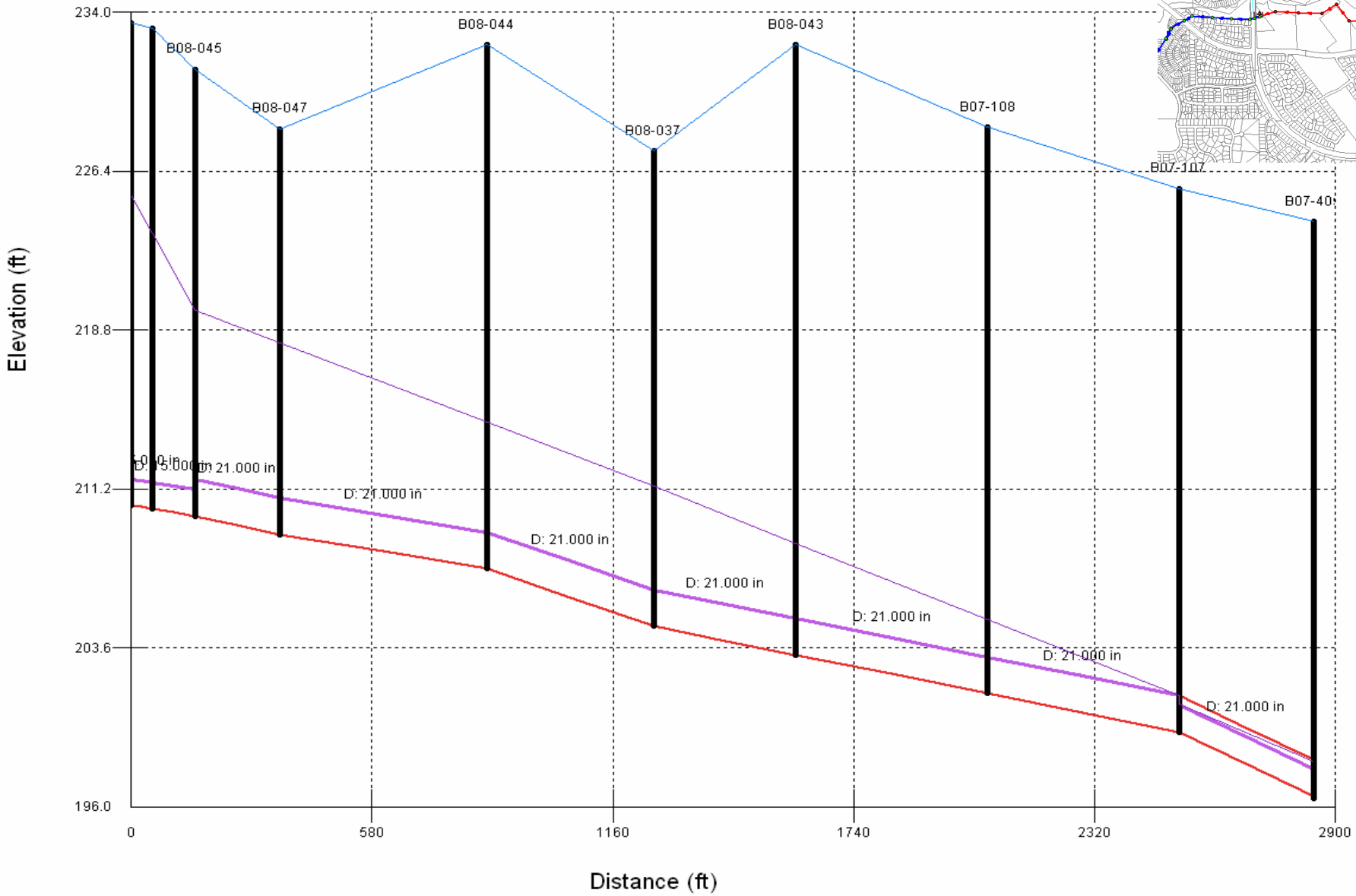




Buildout Model Results

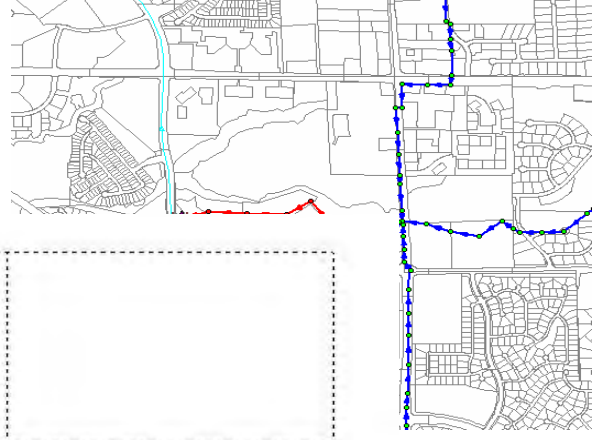
Project Area B2 – with SMD-3

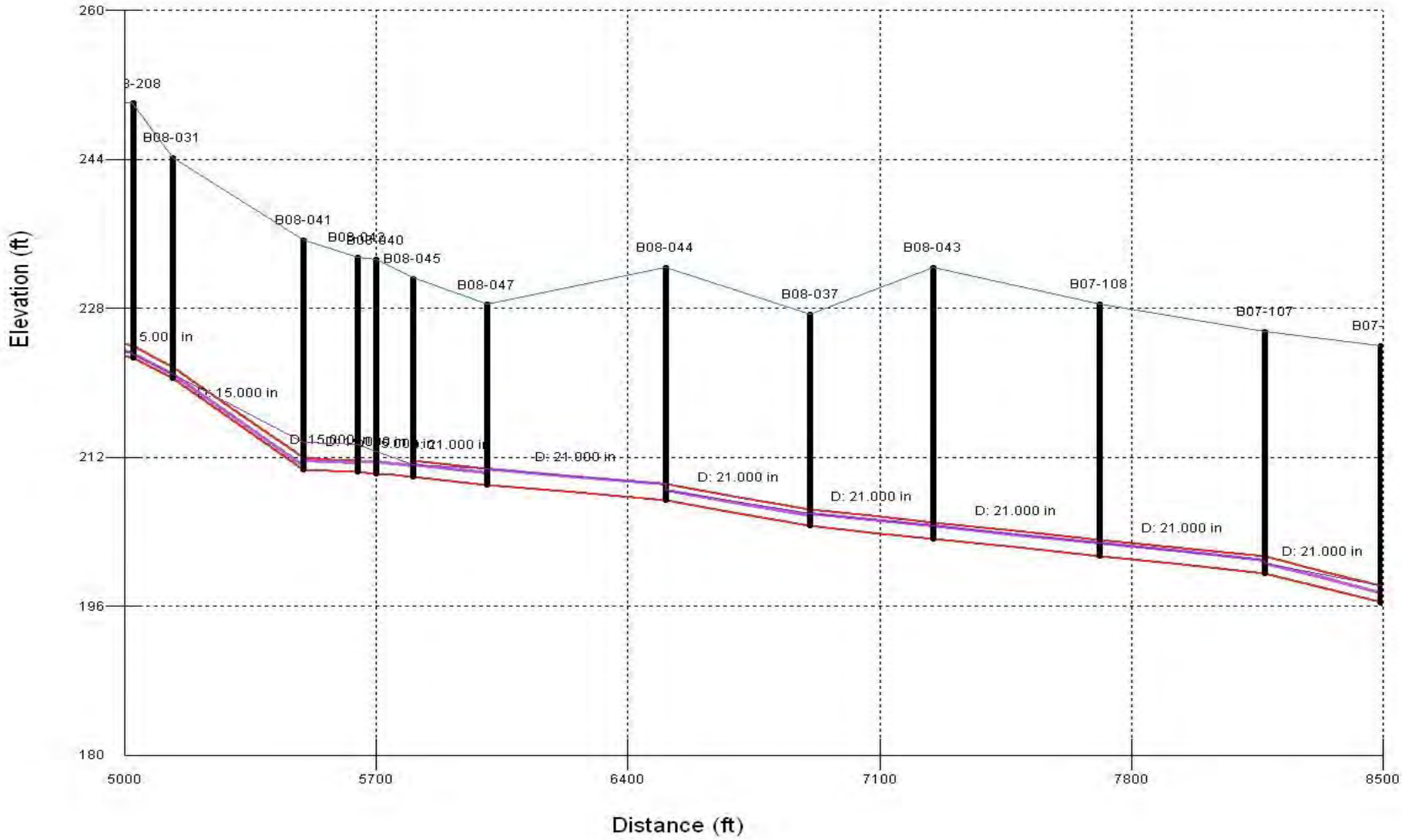




Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

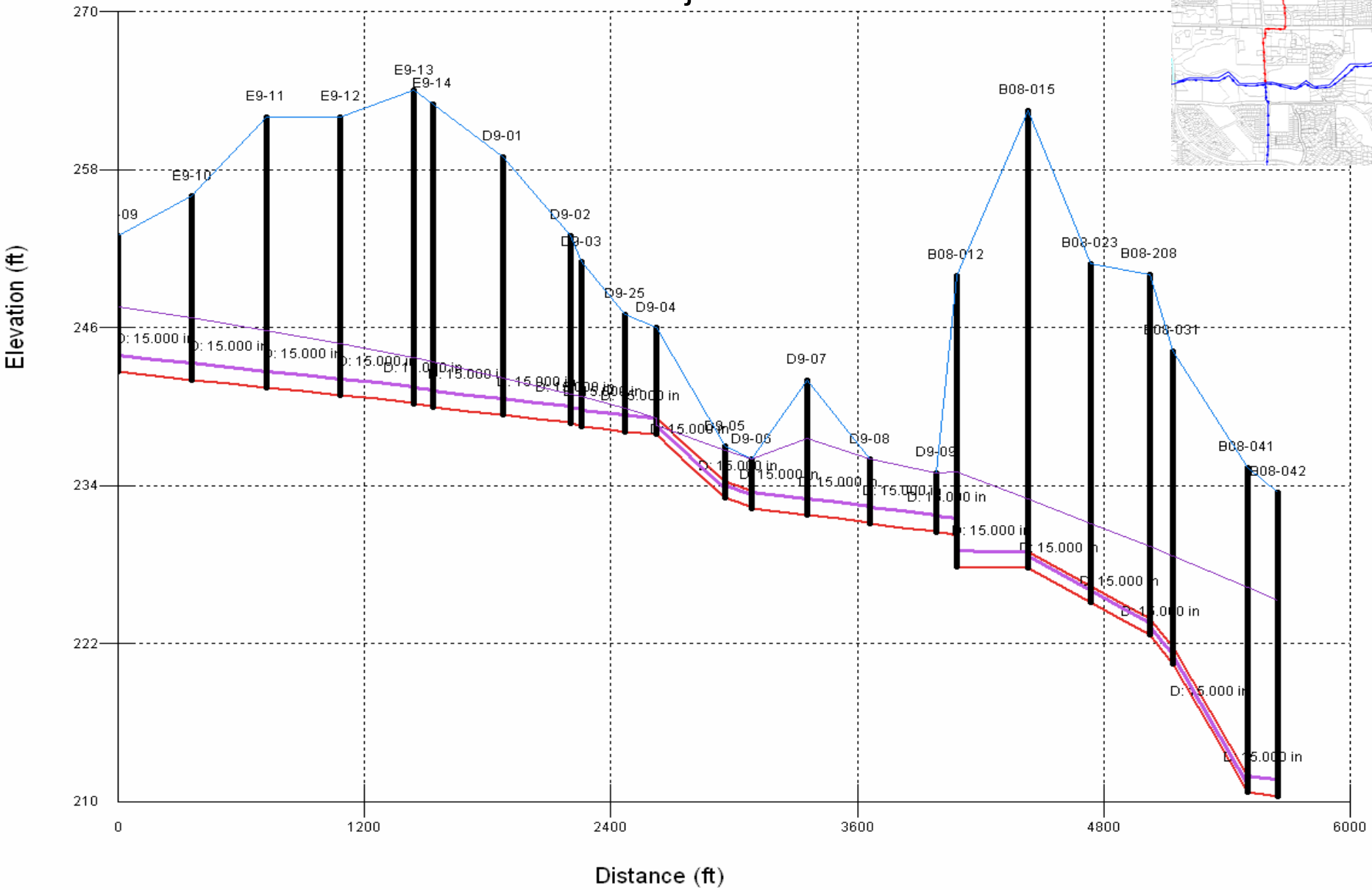
Buildout Model Results
Project Area B2 (not including SMD-3 and development outside of SMD-2 Service Area)

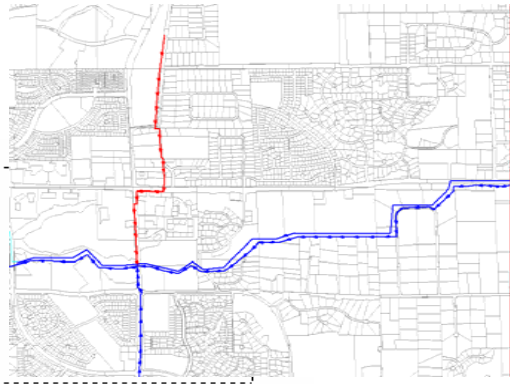




Buildout Model Results

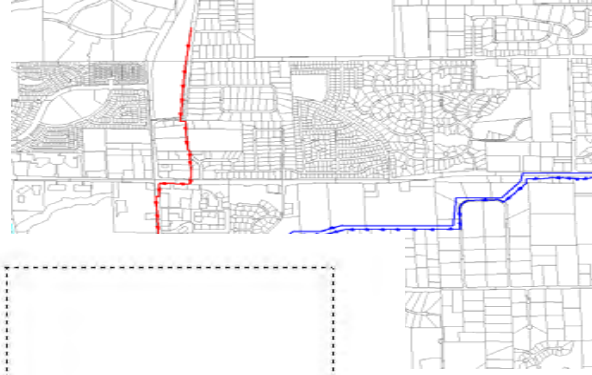
Project Area C

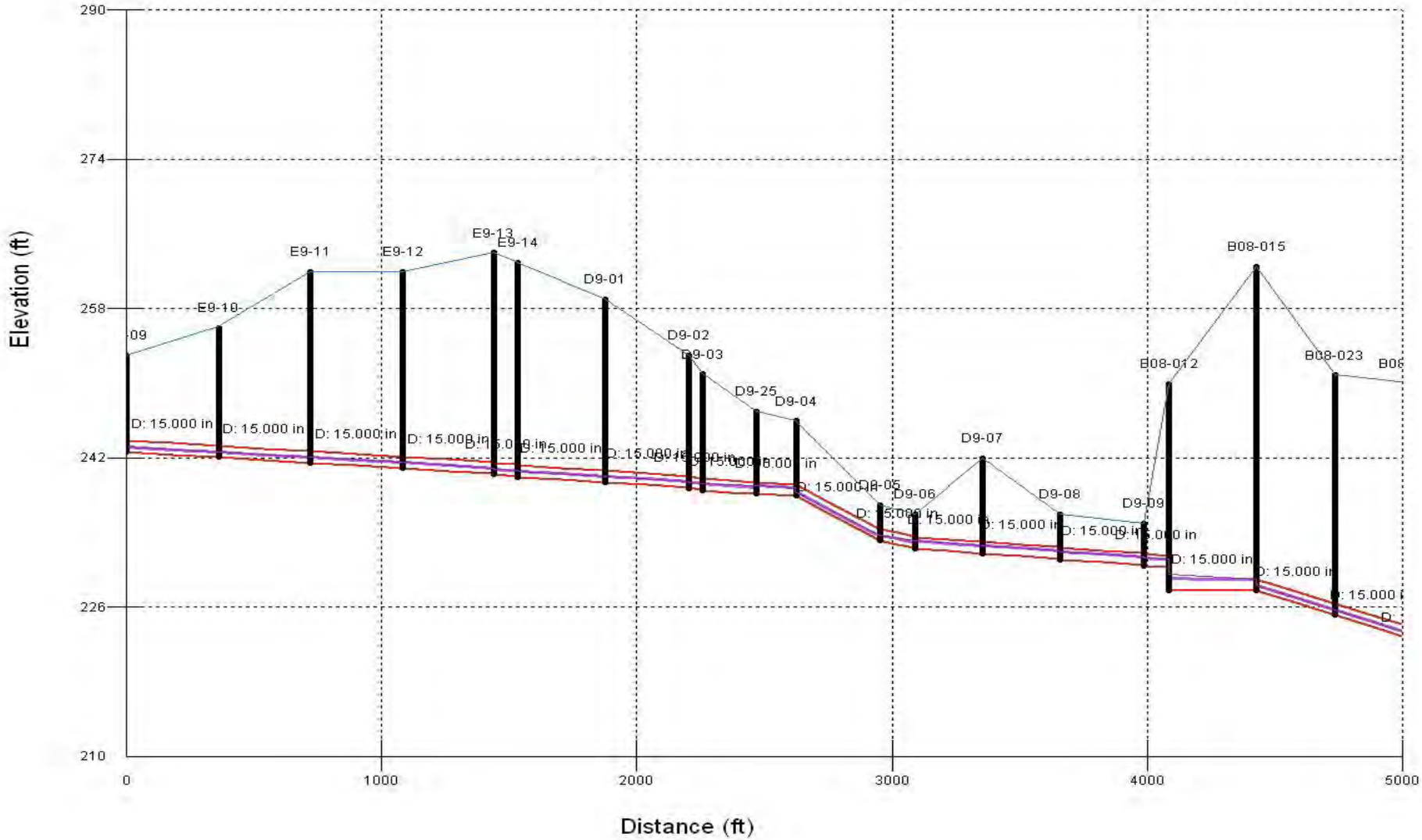




Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

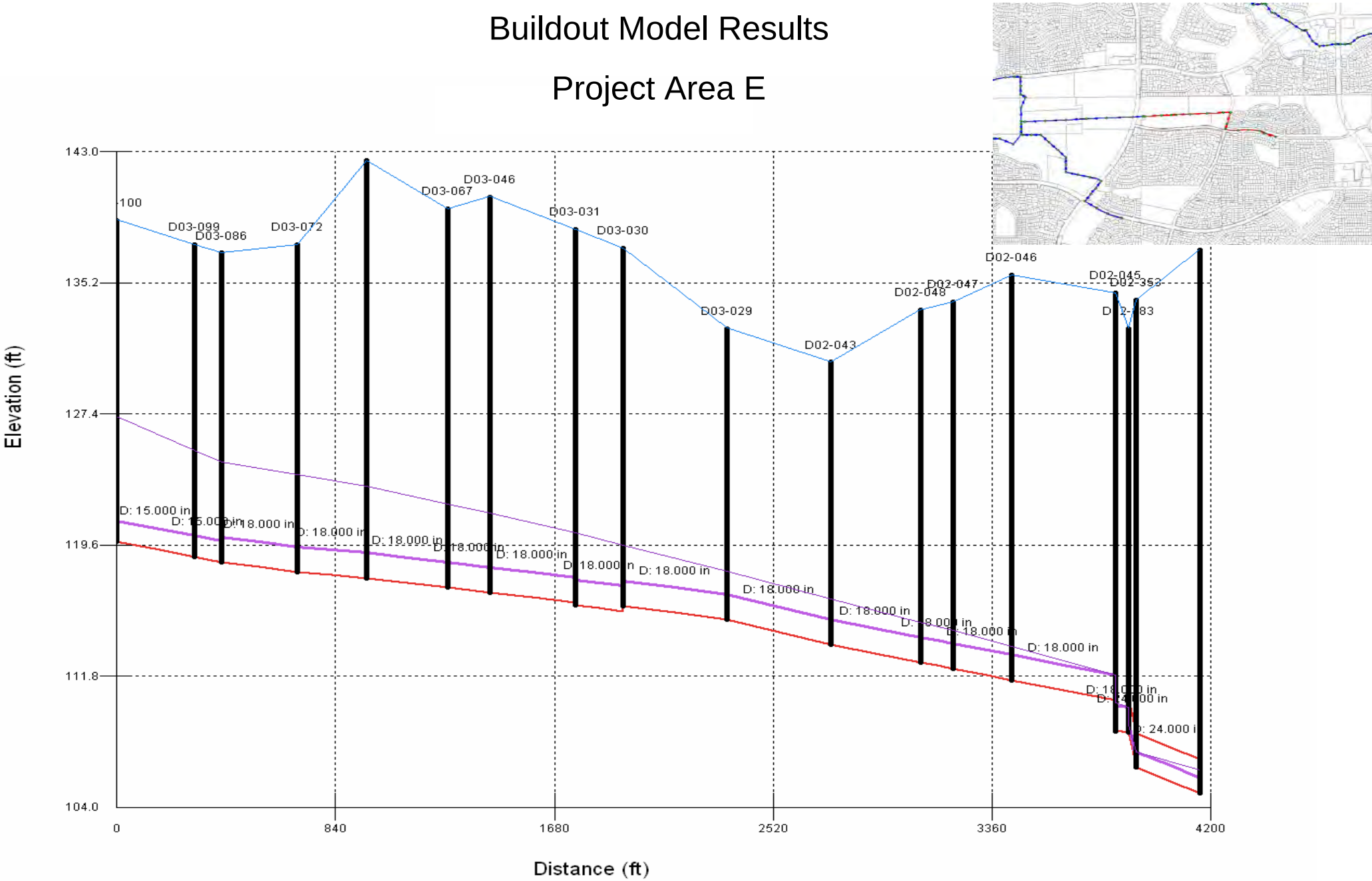
Buildout Model Results
Project Area C (not including development outside of SMD-2 Service Area)





Buildout Model Results

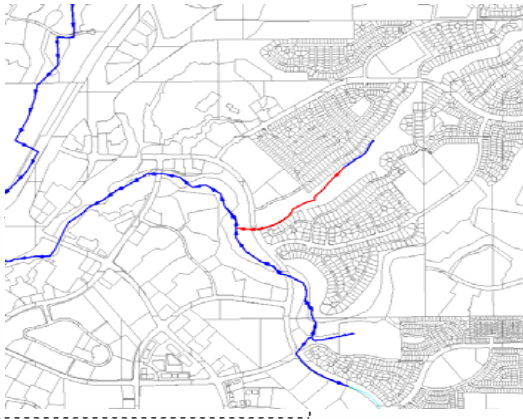
Project Area E

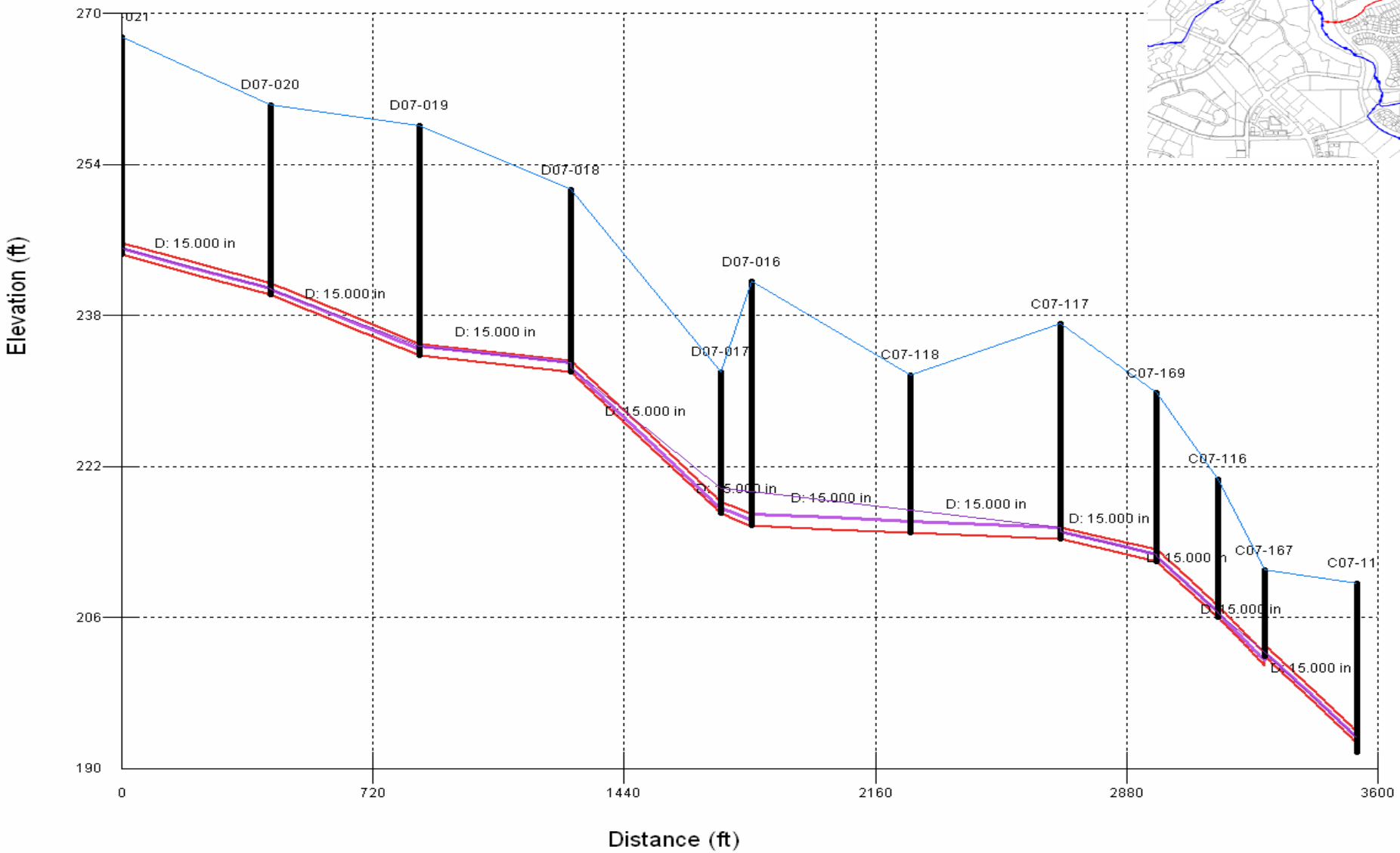


Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Buildout Model Results

Project Area F

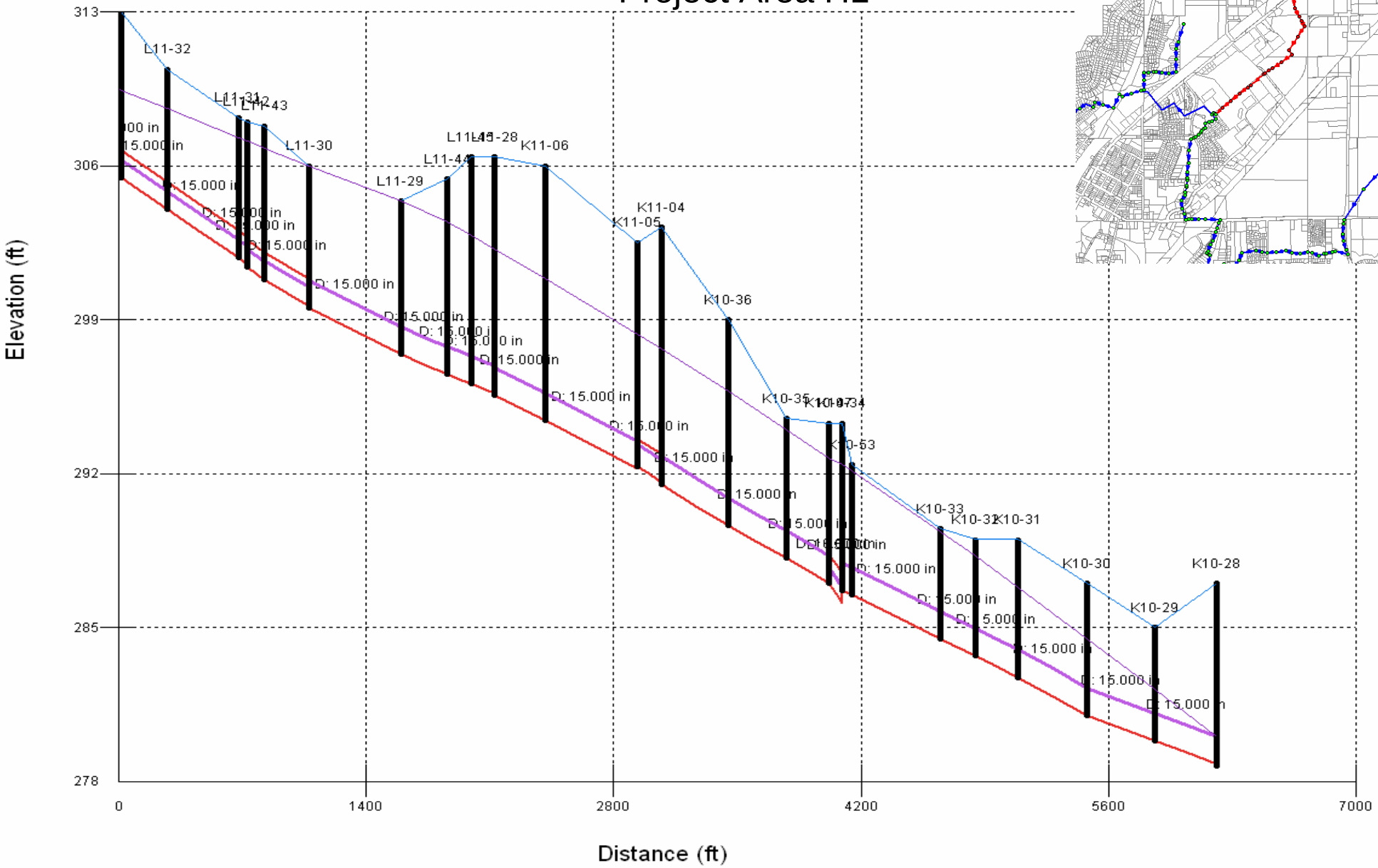


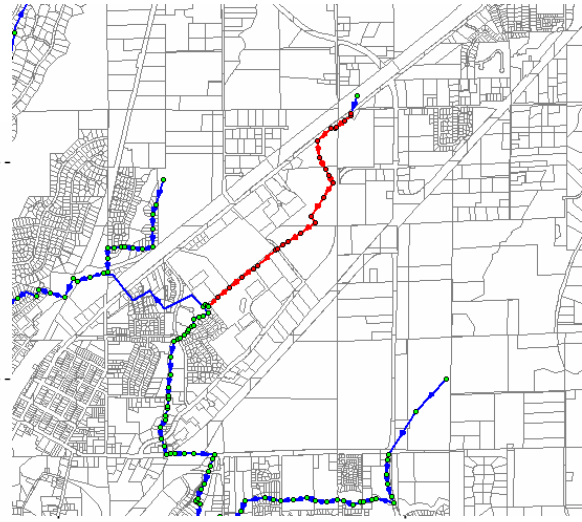


Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Buildout Model Results

Project Area H1

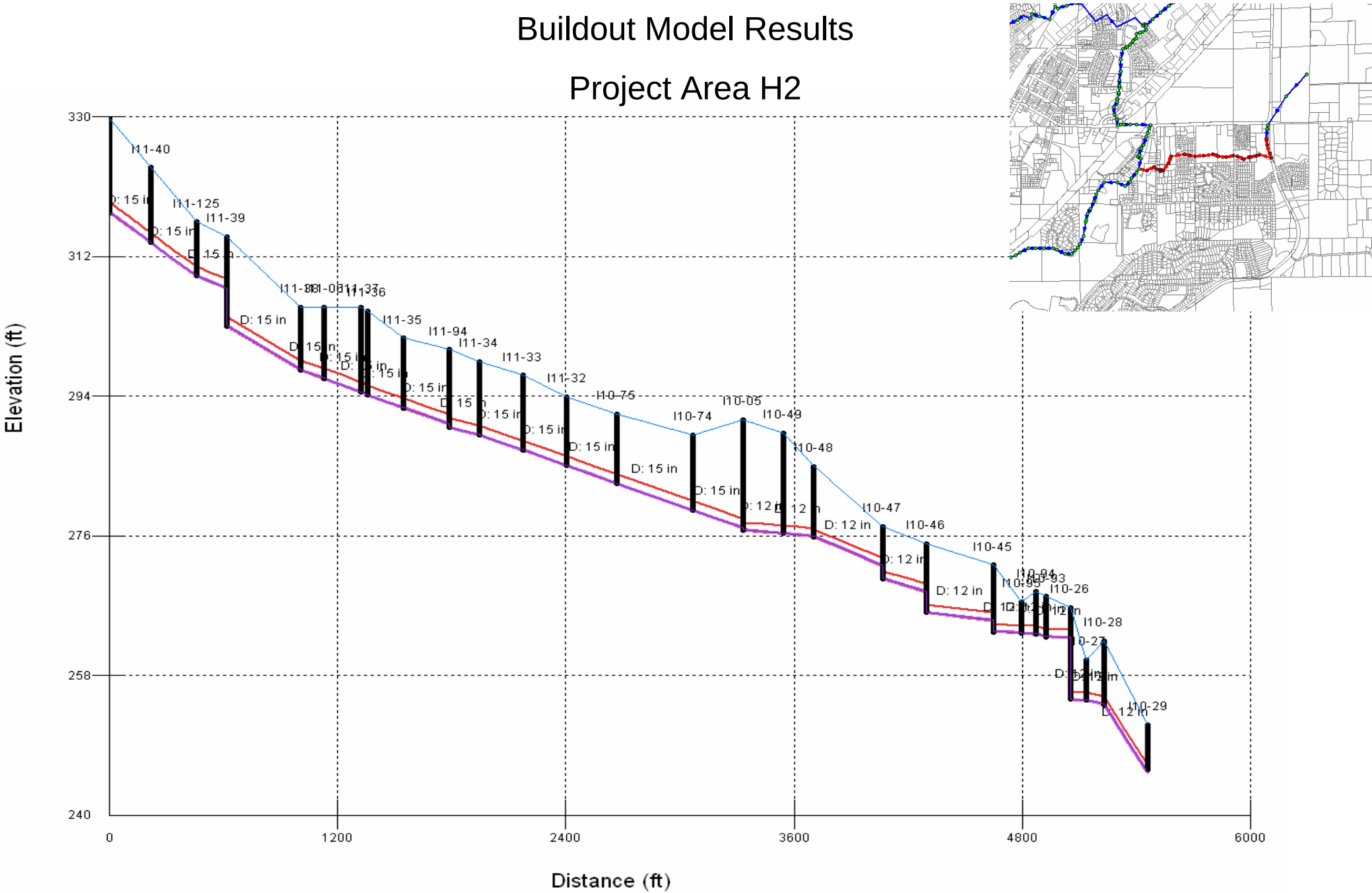




Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Buildout Model Results

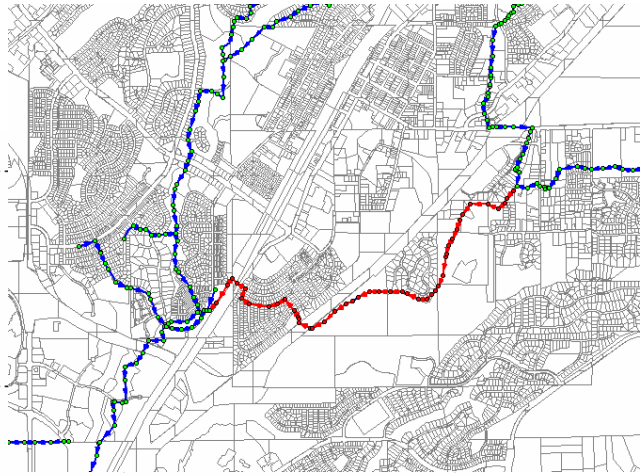
Project Area H2

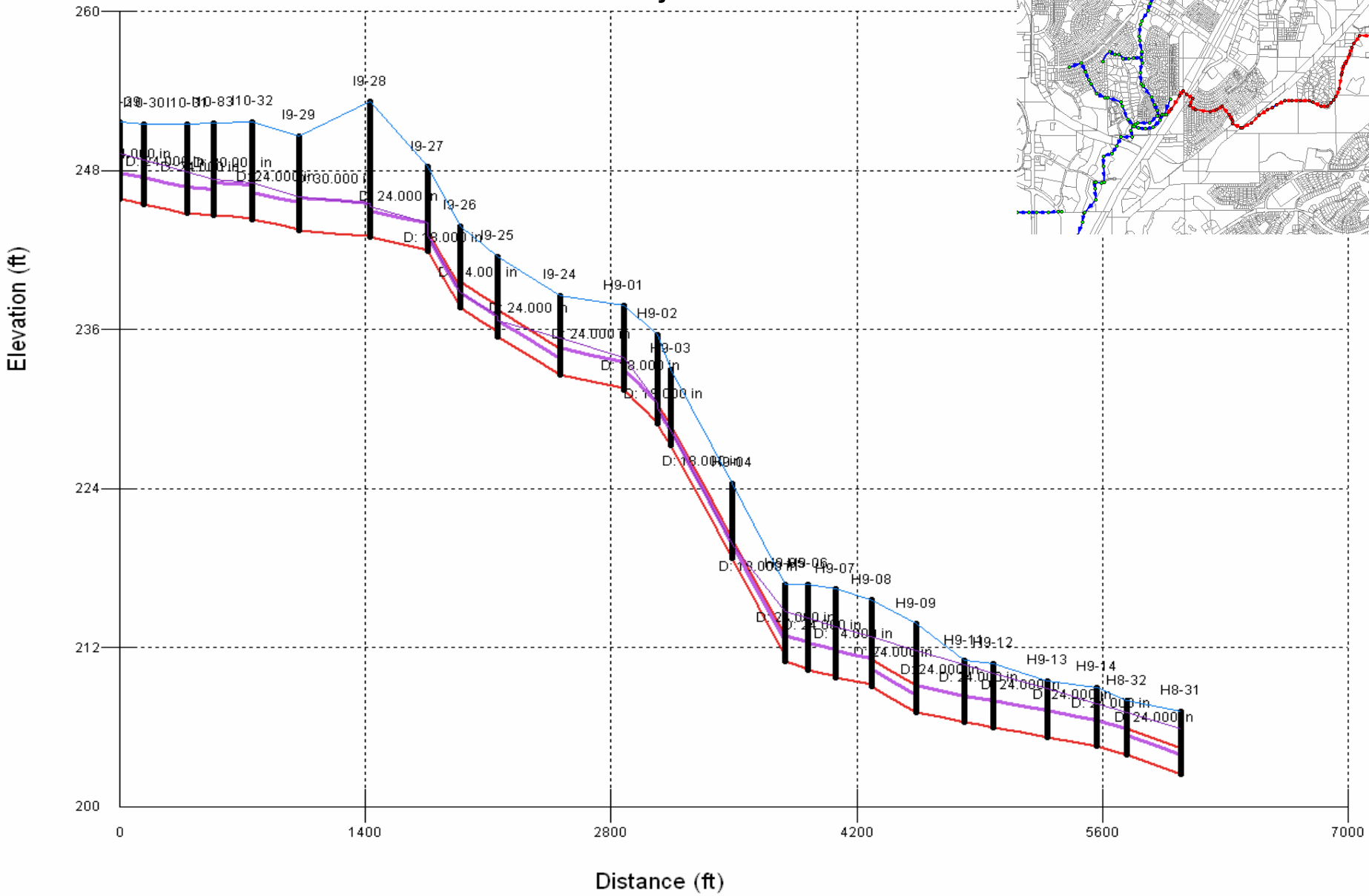


Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Buildout Model Results

Project Area H3

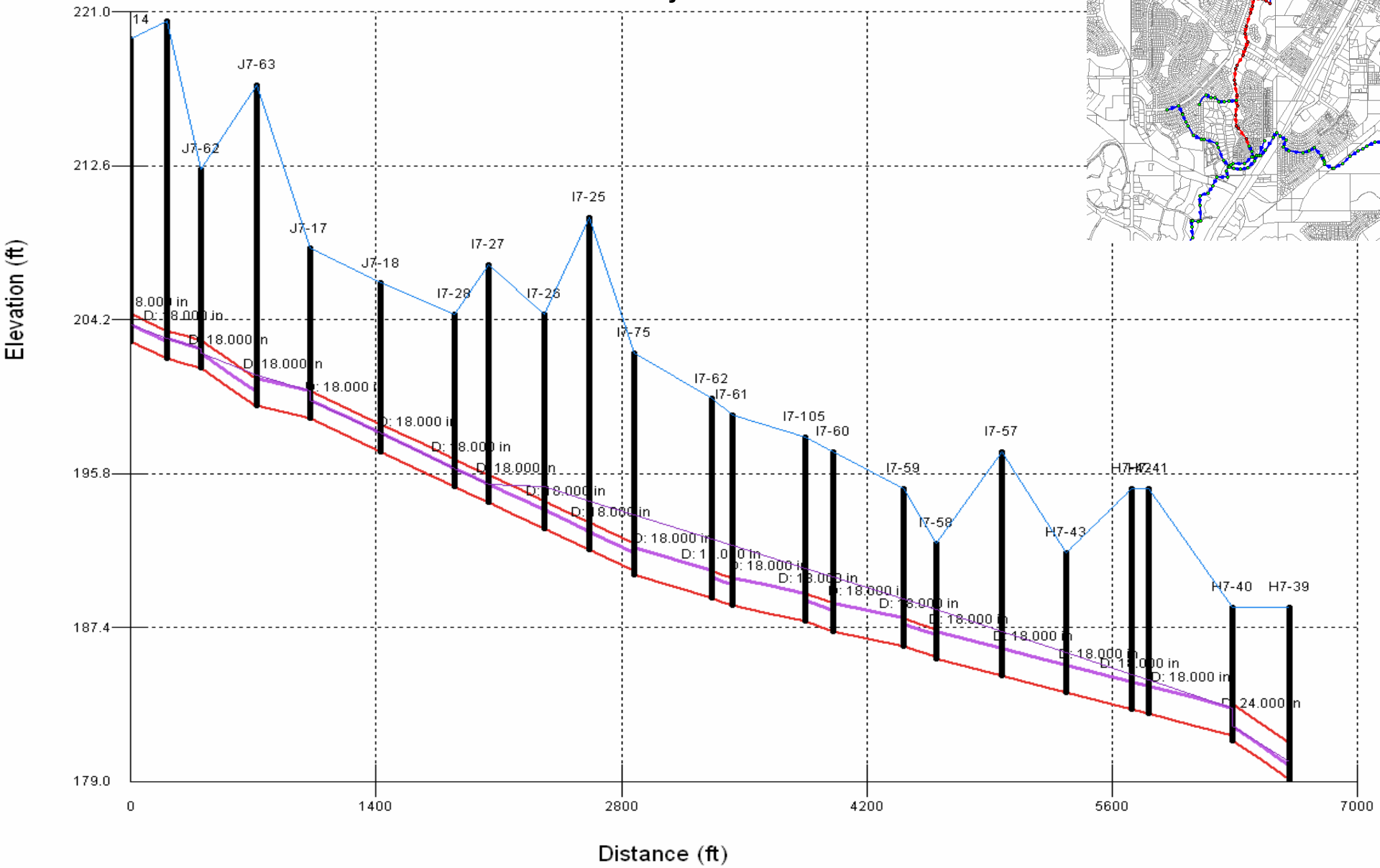


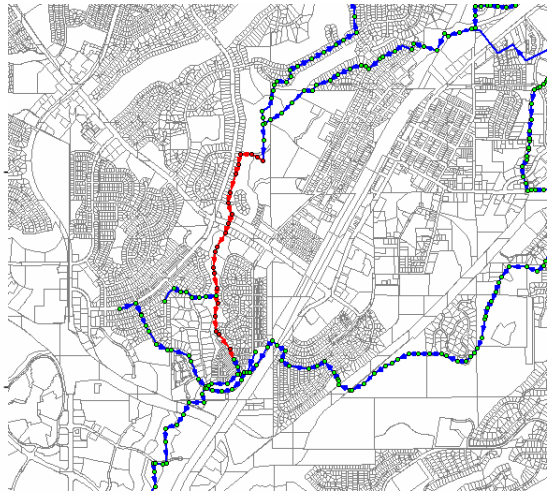


Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Buildout Model Results

Project Area H4

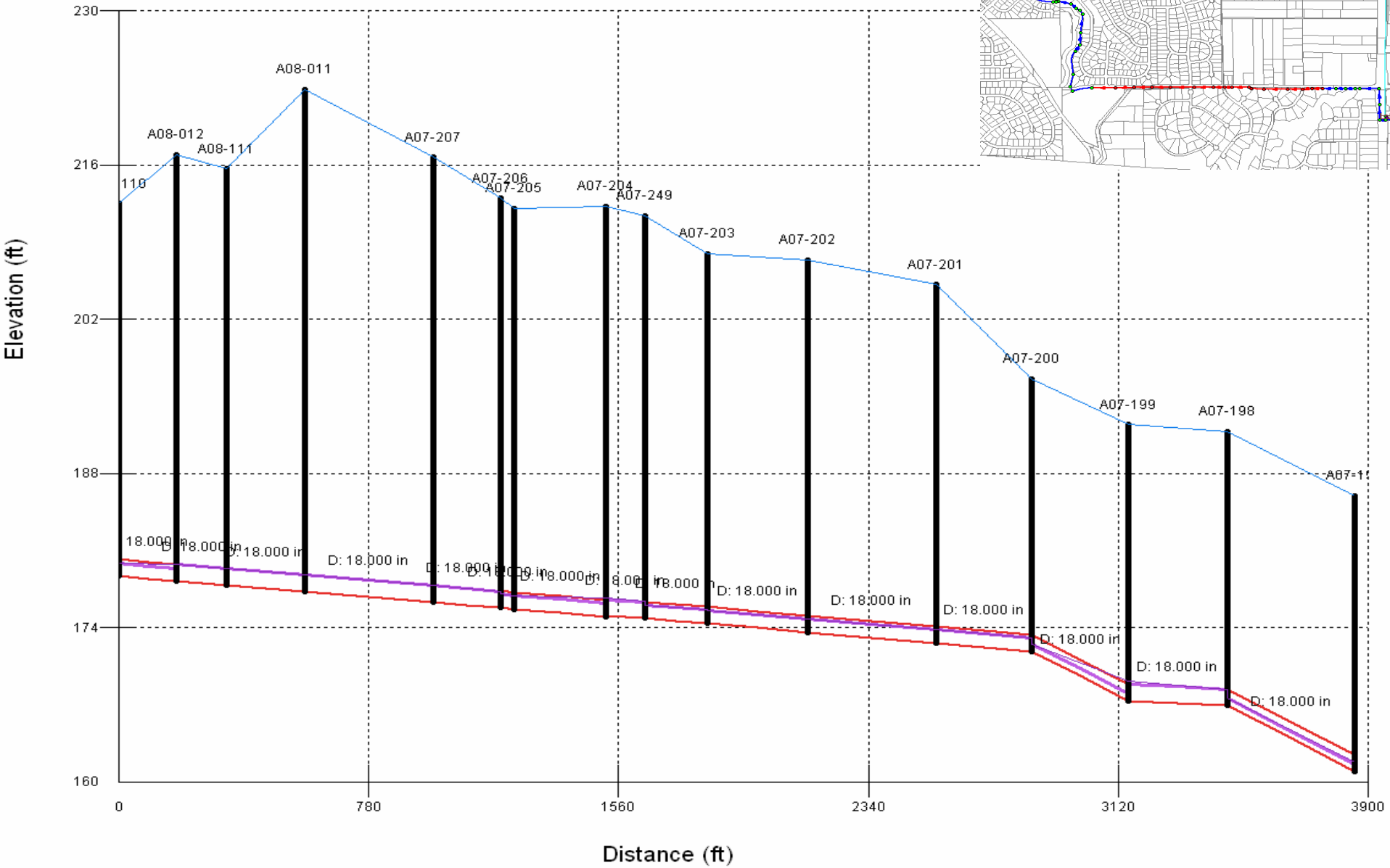




Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Buildout Model Results

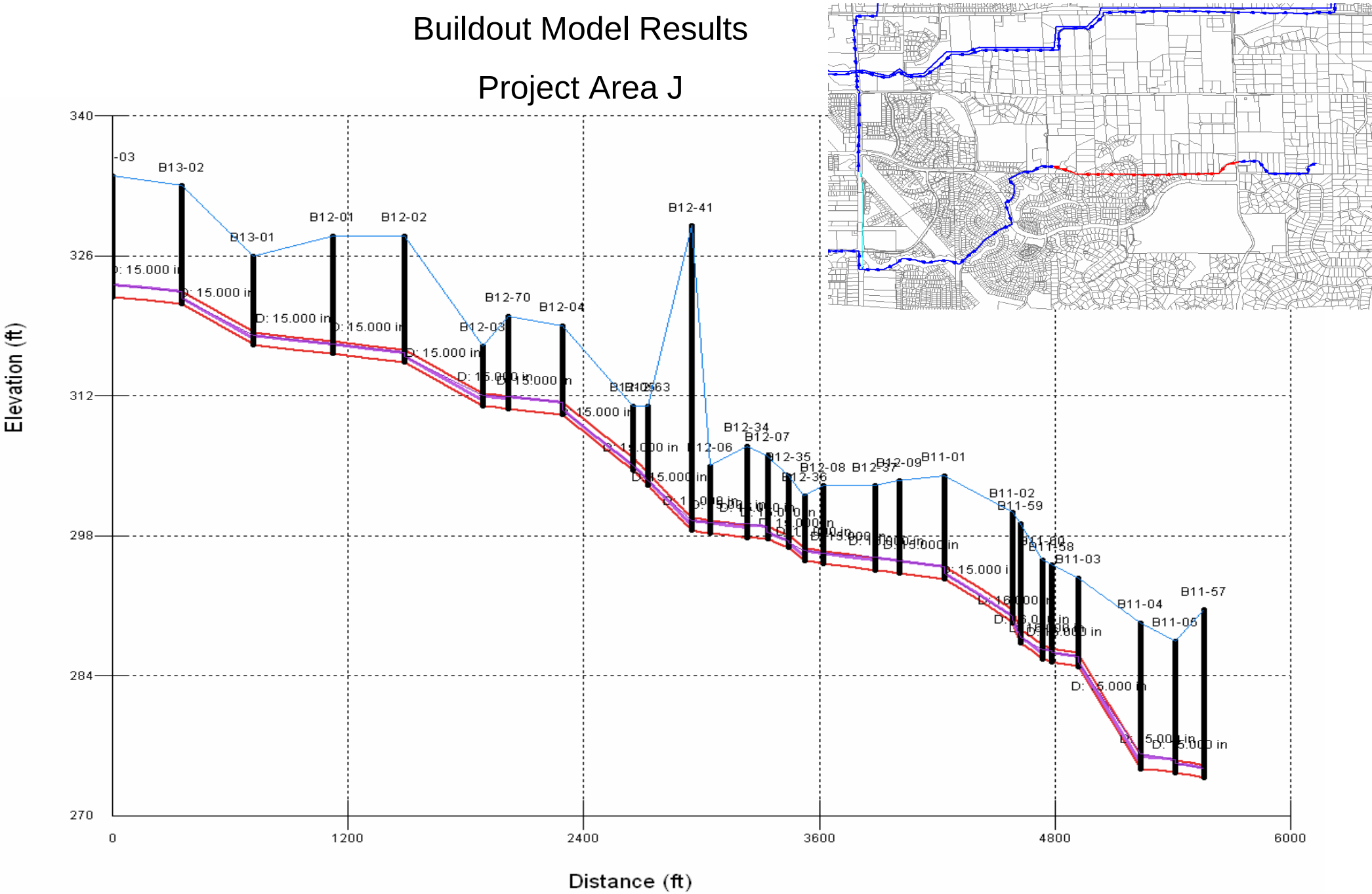
Project Area I



Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Buildout Model Results

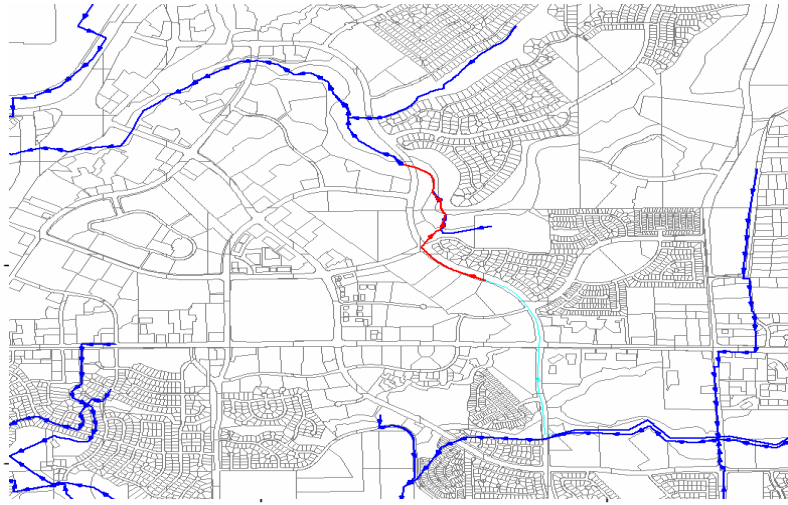
Project Area J

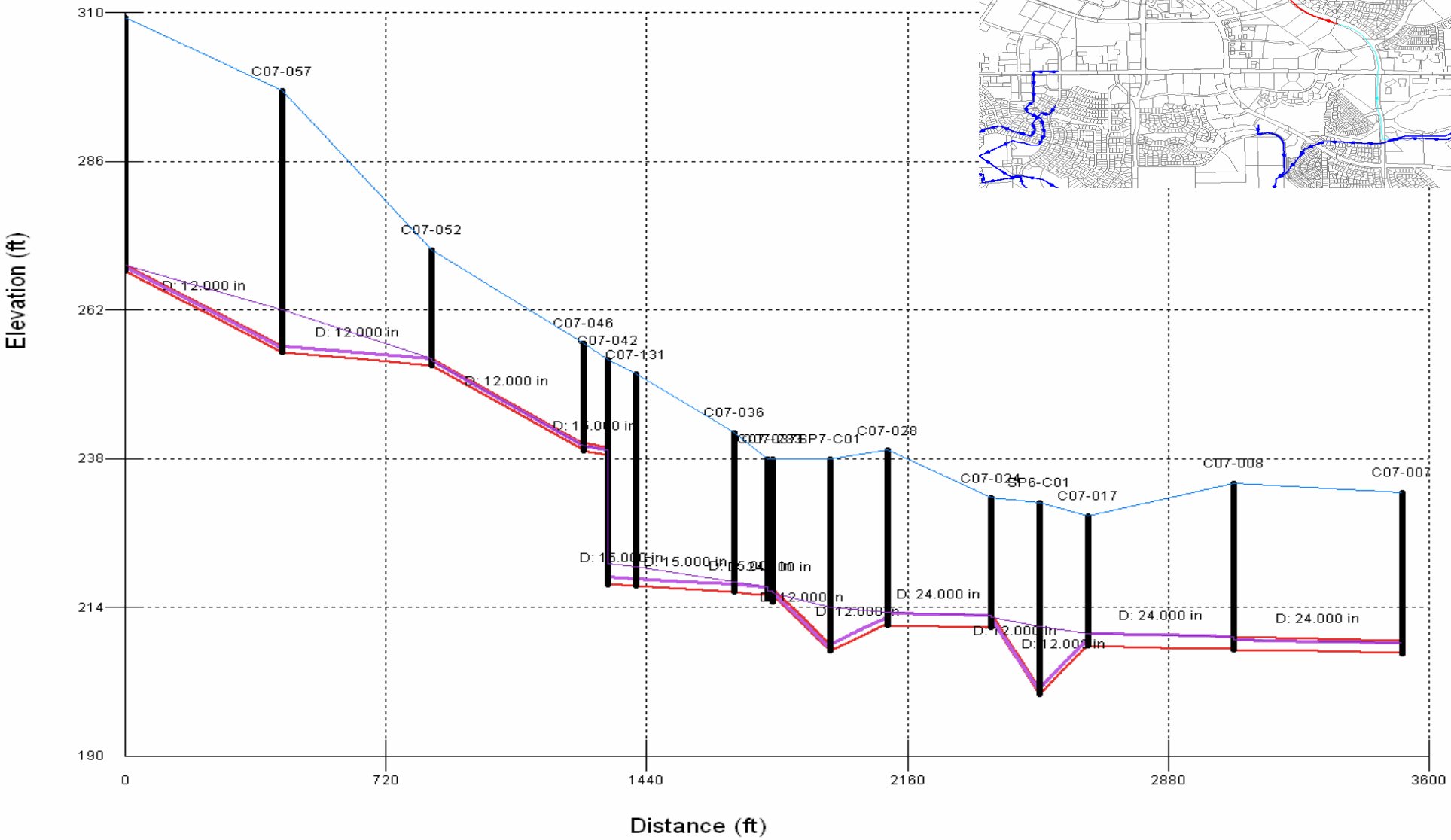


Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Buildout Model Results

Project Area K





Note: Pipe shown in red, HGL shown in purple and ground elevation shown in blue

Attachment C

June 2004 Facility Project Summary Tables

SPWA Sewer Evaluation

Pipe Capacity Analysis

Project A

Pipe ID	Upstream Manhole	Placer County Upstream Manhole[1]	Downstream Manhole	Placer County Downstream Manhole[1]	Upstream Invert	Downstream Invert	Upstream Manhole Rim Elevation	Upstream Manhole Depth (ft)	Existing Diameter (inches)	Length (feet)	Slope	Existing PWWF (MGD)	Existing PWWF q/Q	Future PWWF (MGD)	Future PWWF q/Q	Manhole HGL Elevation (ft)	Crown Elevation (ft)	Surcharging in Manhole (ft)	Improved Diameter (inches)
B11-16	B11-16	B11-16	B11-17	B11-17	228.92	227.44	240.00	11.08	15	429	0.003	2.63	1.07	3.20	1 30	233.60	230.17	3.43	18
B11-17	B11-17	B11-17	B10-01	B10-01	227.44	226.49	237.00	9.56	15	294	0.003	2.65	1.12	3.22	1 35	231.08	228 69	2.39	18
B10-01	B10-01	B10-01	B10-33	B10-33	226.49	225.93	238.00	11.51	15	146	0.004	2.67	1.03	3.24	1 25	229.33	227.74	1.59	18
B10-33	B10-33	B10-33	B10-02	B10-02	226.49	225.55	238.00	11.51	15	108	0.009	2.69	0.69	3.25	0 83	228.45	227.74	0.71	18
B10-02	B10-02	B10-02	A10-19	A10-19	225.55	224.24	235.00	9.45	15	319	0.004	2.71	1 01	3.28	1 22	227.79	226 80	0.99	18
A10-19	A10-19	A10-19	A10-01	A10-01	224.43	224.23	236.00	11.57	15	56	0.004	2.72	1.09	3.29	1 32	225.83	225 68	0.15	18
A10-01	A10-01	A10-01	A10-02	A10-02	224.24	220.37	243.00	18.76	15	165	0.023	2.72	0.42	3.30	0 51	224.88	225.49	0.00	18
A10-02	A10-02	A10-02	A10-11	A10-11	220.37	214.50	226.00	5.63	15	250	0.023	2.73	0.43	3.31	0 52	221.01	221 62	0.00	18
A10-11	A10-11	A10-11	A08-023	A10-03	214.50	213.62	224.00	9.50	15	250	0.004	2.92	1.18	3.58	1.44	219.07	215.75	0.00	18
11686	A08-023	A10-03	A08-020	A10-04	216.32	213.33	237.90	21.58	15	318	0.009	2.92	0.72	3.58	0 88	217.23	217 57	0.00	18
11688	A08-020	A10-04	A08-019	A10-05	213.33	211.76	233.64	20.31	15	285	0.005	2.92	0.94	3.58	1.15	215.10	214 58	0.00	18
113542	A08-019	A10-05	A08-034	-	211.76	210.70	227.50	15.74	15	101	0 01	2.91	0 68	3.57	0 83	212.63	213 01	0.00	18
113543	A08-034	-	A08-022	A10-06	210.70	208.47	226.48	15.78	15	213	0.011	2.91	0.68	3.57	0 83	211.57	211 95	0.00	18
74279	A08-022	A10-06	A08-047	-	208.47	206.05	227.48	19.02	15	230	0 01	2.91	0.68	3.57	0 83	209.34	209.72	0.00	18
113544	A08-047	-	A08-018	A10-07	206.05	204.96	224.18	18.13	15	104	0.011	3.09	0.72	3.75	0 87	206.95	207 30	0.00	18
11694	A08-018	A10-07	A08-017	A10-08	205.28	201.39	226.16	20.89	15	399	0 01	3.08	0.75	3.75	0 91	206.21	206 53	0.00	18
11696	A08-017	A10-08	A08-021	A10-09	201.39	199.80	219.46	18.08	15	261	0.006	3.13	0.96	3.78	1.16	205.36	202 64	2.72	18
11698	A08-021	A10-09	A08-026	A9-51	199.80	197.37	220.99	21.20	15	398	0.006	3.13	0.96	3.77	1.15	203.22	201 05	2.18	18
11700	A08-026	A9-51	A08-025	A9-01	197.37	195.70	219.85	22.48	15	311	0.005	3.12	1.02	3.77	1 23	199.97	198 62	1.35	18
11702	A08-025	A9-01	A08-156	-	195.60	194.03	204.70	9.10	15	255	0.006	3.11	0.95	3.82	1.16	197.44	196 85	0.59	18
									Total Length	**4,893**									

1. Placer County Manhole IDs are based on County GIS. Corresponding Placer County manhole IDs are estimated and field verification may be required.

SPWA Sewer Evaluation

Pipe Capacity Analysis

Project B1

Pipe ID	Upstream Manhole	Downstream Manhole	Upstream Invert	Downstream Invert	Upstream Manhole Rim Elevation	Upstream Manhole Depth (ft)	Existing Diameter (inches)	Length (feet)	Slope	Existing PWWF (MGD)	Existing PWWF q/Q	Future PWWF (MGD)	Future PWWF q/Q	Manhole HGL Elevation (ft)	Crown Elevation (ft)	Surcharging in Manhole (ft)	Improved Diameter (inches)
E14-05	E14-05	E14-47	339.40	338.42	349.00	9.60	15	412	0.002	1.17	0.58	3.60	1.76	349.00	340.65	8.35	21
E14-47	E14-47	E14-48	338.42	337.64	351.00	12.58	15	329	0.002	1.19	0.58	3.60	1.77	351.00	339.67	11.33	21
E14-48	E14-48	E14-71	337.54	337.35	354.00	16.46	15	16	0.012	1.38	0.30	3.80	0.83	354.00	338.79	15.21	21
E14-71	E14-71	E14-49	337.52	336.85	354.00	16.48	15	276	0.002	1.38	0.67	3.81	1.85	354.00	338.77	15.23	21
E14-49	E14-49	E14-50	336.85	336.14	353.00	16.15	15	298	0.002	1.38	0.68	3.80	1.86	353.00	338.10	14.90	21
E14-50	E14-50	E14-57	336.14	335.68	351.00	14.86	15	194	0.002	1.39	0.68	3.79	1.86	351.00	337.39	13.61	21
E14-57	E14-57	E14-51	335.68	335.45	351.50	15.82	15	96	0.002	1.39	0.68	3.78	1.85	351.50	336.93	14.57	21
E14-51	E14-51	D14-08	335.35	334.59	352.00	16.65	15	322	0.002	1.44	0.71	3.83	1.88	352.00	336.60	15.40	21
D14-08	D14-08	D14-07	334.59	333.70	350.00	15.41	15	374	0.002	1.44	0.71	3.82	1.87	350.00	335.84	14.16	21
D14-07	D14-07	D14-06	333.70	333.17	351.00	17.30	15	225	0.002	1.51	0.74	3.87	1.90	349.04	334.95	14.09	21
D14-06	D14-06	D14-05	333.17	332.65	349.00	15.83	15	220	0.002	1.51	0.74	3.86	1.90	347.11	334.42	12.69	21
D14-05	D14-05	D14-04	332.65	332.11	353.00	20.35	15	227	0.002	1.54	0.76	3.88	1.90	345.23	333.90	11.33	21
D14-04	D14-04	D14-03	332.01	330.50	352.00	19.99	15	296	0.005	1.70	0.57	4.13	1.38	343.26	333.26	10.00	21
D14-03	D14-03	D13-26	330.50	328.96	346.00	15.50	15	302	0.005	1.70	0.57	4.12	1.38	340.37	331.75	8.62	21
D13-26	D13-26	D13-27	328.96	328.66	344.00	15.04	16	60	0.005	1.71	0.49	4.13	1.17	337.42	330.29	7.13	21
D13-27	D13-27	D13-14	328.56	326.60	344.00	15.44	15	395	0.005	1.72	0.59	4.16	1.41	337.01	329.81	7.20	21
D13-14	D13-14	D13-01	326.60	326.07	339.00	12.40	15	107	0.005	1.73	0.59	4.15	1.41	333.08	327.85	5.23	21
D13-01	D13-01	D13-02	326.07	325.54	334.00	7.93	15	107	0.005	1.73	0.59	4.16	1.41	332.02	327.32	4.70	21
D13-02	D13-02	D13-03	325.54	323.62	338.00	12.46	15	384	0.005	1.74	0.59	4.17	1.41	330.96	326.79	4.17	21
D13-03	D13-03	D13-04	323.62	323.17	334.00	10.38	15	81	0.006	1.74	0.56	4.16	1.34	327.13	324.87	2.26	21
D13-04	D13-04	D13-05	323.17	322.60	335.00	11.83	15	102	0.006	1.75	0.56	4.18	1.34	326.32	324.42	1.90	21
D13-05	D13-05	D13-06	322.60	322.12	331.00	8.40	15	86	0.006	1.75	0.56	4.19	1.34	325.30	323.85	1.44	21
D13-06	D13-06	D13-07	322.12	320.83	332.00	9.88	15	232	0.006	1.76	0.56	4.20	1.35	324.43	323.37	1.06	21
D13-07	D13-07	D13-08	320.83	315.84	329.00	8.17	15	392	0.013	1.77	0.38	4.22	0.89	321.75	322.08	0.00	21
D13-08	D13-08	D13-09	315.84	311.29	326.00	10.16	15	390	0.012	1.78	0.39	4.27	0.94	316.81	317.09	0.00	21
D13-09	D13-09	D13-10	311.04	310.18	324.00	12.96	18	399	0.002	1.79	0.57	4.28	1.35	314.85	312.54	2.31	21
D13-10	D13-10	D13-22	310.18	310.10	322.00	11.82	18	67	0.001	1.79	0.76	4.32	1.84	313.26	311.68	1.58	21
D13-22	D13-22	D12-01	310.10	309.30	322.00	11.90	18	344	0.002	1.80	0.55	4.34	1.32	312.99	311.60	1.39	21
D12-01	D12-01	D12-02	309.30	308.42	320.00	10.70	18	406	0.002	1.80	0.57	4.35	1.37	311.59	310.80	0.79	21
D12-02	D12-02	D12-13	308.42	307.42	318.00	9.58	18	95	0.011	1.81	0.26	4.35	0.62	309.28	309.92	0.00	21
D12-13	D12-13	D12-03	307.42	304.38	318.00	10.58	18	309	0.01	1.82	0.27	4.38	0.65	308.30	308.92	0.00	21
D12-03	D12-03	D12-04	304.38	303.38	316.00	11.62	18	402	0.002	1.81	0.53	4.40	1.30	308.00	305.88	2.12	21
D12-04	D12-04	D12-05	303.38	302.54	314.00	10.62	18	336	0.002	1.82	0.54	4.41	1.30	306.31	304.88	1.43	21
D12-05	D12-05	D12-06	302.54	302.05	312.00	9.46	18	190	0.003	1.83	0.53	4.43	1.28	304.89	304.04	0.85	21
D12-06	D12-06	D12-21	302.05	301.69	310.00	7.95	18	145	0.002	1.83	0.54	4.44	1.31	304.08	303.55	0.53	21
D12-07	D12-07	D12-08	301.30	299.97	311.00	9.70	18	243	0.005	1.83	0.36	4.44	0.88	302.39	302.80	0.00	21
D12-08	D12-08	D12-09	299.97	299.60	309.00	9.03	18	60	0.006	1.83	0.34	4.44	0.83	301.01	301.47	0.00	21
D12-09	D12-09	D12-10	299.60	299.06	308.00	8.40	18	96	0.006	1.83	0.36	4.45	0.87	300.68	301.10	0.00	21
D12-10	D12-10	D12-11	299.06	295.27	306.00	6.94	18	330	0.011	1.83	0.25	4.45	0.61	299.91	300.56	0.00	21
D12-11	D12-11	D12-12	295.17	287.58	306.00	10.83	18	102	0.075	1.83	0.10	4.47	0.24	295.67	296.67	0.00	21
D12-12	D12-12	D11-01	287.48	286.50	304.00	16.52	18	386	0.003	1.83	0.53	4.47	1.30	293.56	288.98	4.58	21
D12-21	D12-21	D12-07	301.69	301.30	312.00	10.31	18	155	0.003	1.83	0.54	4.43	1.30	303.46	303.19	0.27	21
D11-01	D11-01	D11-02	286.50	285.62	294.00	7.50	18	265	0.003	1.83	0.47	4.47	1.14	291.91	288.00	3.91	21
D11-02	D11-02	D11-03	285.52	285.15	299.00	13.48	18	162	0.002	1.83	0.56	4.48	1.38	290.79	287.02	3.77	21
D11-03	D11-03	D11-04	285.15	284.18	299.00	13.85	18	385	0.003	1.83	0.54	4.48	1.31	290.09	286.65	3.44	21
D11-04	D11-04	D11-05	284.18	283.49	289.00	4.82	18	184	0.004	1.83	0.44	4.47	1.07	288.44	285.68	2.76	21
D11-05	D11-05	D11-06	283.49	282.78	292.00	8.51	18	230	0.003	1.83	0.48	4.47	1.18	287.65	284.99	2.65	21
D11-06	D11-06	D11-07	282.78	281.94	296.00	13.22	18	243	0.003	1.82	0.46	4.47	1.12	286.65	284.28	2.37	21
D11-07	D11-07	D11-08	281.94	281.10	296.00	14.06	18	242	0.003	1.82	0.45	4.47	1.12	285.60	283.44	2.16	21
D11-08	D11-08	D11-09	281.00	280.05	294.00	13.00	18	376	0.003	1.81	0.53	4.49	1.31	284.55	282.50	2.05	21
D11-09	D11-09	D11-10	280.05	279.32	291.00	10.95	18	293	0.002	1.81	0.53	4.51	1.33	282.90	281.55	1.35	21
D11-10	D11-10	D11-11	279.32	278.32	287.00	7.68	18	404	0.002	1.82	0.54	4.52	1.33	281.61	280.82	0.79	21
D11-11	D11-11	D11-12	278.32	268.45	292.00	13.68	18	251	0.039	1.82	0.14	4.55	0.34	278.92	279.82	0.00	21
D11-12	D11-12	D11-13	268.45	265.31	281.00	12.55	18	309	0.01	1.83	0.27	4.56	0.66	269.34	269.95	0.00	21
D11-13	D11-13	D10-63	265.31	258.11	274.00	8.69	18	304	0.024	1.86	0.18	4.61	0.44	266.01	266.81	0.00	21
D10-63	D10-63	D10-09	258.11	252.18	272.00	13.89	18	250	0.024	1.86	0.18	4.62	0.44	258.81	259.61	0.00	21
D10-09	D10-09	D10-10	252.08	251.00	261.00	8.92	18	404	0.003	1.86	0.53	4.63	1.32	254.97	253.58	1.39	21
D10-10	D10-10	D10-54	250.90	249.99	264.00	13.10	18	340	0.003	1.86	0.53	4.65	1.32	253.09	252.40	0.69	21
D10-54	D10-54	D10-11	249.99	245.00	262.00	12.01	18	128	0.039	1.86	0.14	4.66	0.35	250.60	251.49	0.00	21
D10-11	D10-11	D10-95	244.95	237.09	257.00	12.05	18	309	0.025	1.87	0.17	4.68	0.43	245.64	246.45	0.00	21
D10-95	D10-95	C10-28	237.09	235.99	248.00	10.91	18	256	0.004	1.87	0.42	4.70	1.05	240.48	238.59	1.89	21
C10-28	C10-28	C10-02	235.99	235.56	244.00	8.01	18	101	0.004	1.87	0.42	4.70	1.06	239.26	237.49	1.77	21

SPWA Sewer Evaluation

Pipe Capacity Analysis

Project B1 - Cont.

Pipe ID	Upstream Manhole	Downstream Manhole	Upstream Invert	Downstream Invert	Upstream Manhole Rim Elevation	Upstream Manhole Depth (ft)	Existing Diameter (inches)	Length (feet)	Slope	Existing PWWF (MGD)	Existing PWWF q/Q	Future PWWF (MGD)	Future PWWF q/Q	Manhole HGL Elevation (ft)	Crown Elevation (ft)	Surcharging in Manhole (ft)	Improved Diameter (inches)
C10-02	C10-02	C10-03	235.56	234.56	246.00	10.44	18	356	0.003	1.88	0.52	4.72	1.31	238.77	237.06	1.71	21
C10-03	C10-03	C10-04	234.46	233.75	247.00	12.54	18	256	0.003	1.92	0.53	4.76	1.33	237.05	235.96	1.09	21
C10-04	C10-04	C10-05	233.75	233.03	245.00	11.25	18	256	0.003	1.92	0.53	4.77	1.32	235.79	235.25	0.54	21
C10-05	C10-05	C10-24	232.93	228.15	242.00	9.07	18	95	0.05	1.91	0.13	4.77	0.31	233.51	234.43	0.00	21
C10-24	C10-24	C10-06	228.15	220.31	243.00	14.85	18	162	0.048	1.91	0.13	4.77	0.32	228.73	229.65	0.00	21
C10-06	C10-06	C10-07	220.21	217.14	228.00	7.79	18	333	0.009	1.92	0.29	4.78	0.73	224.85	221.71	3.14	21
C10-07	C10-07	C9-01	217.04	213.10	226.00	8.96	18	333	0.012	1.92	0.26	4.79	0.65	223.20	218.54	4.66	21
C9-01	C9-01	C9-02	213.10	209.52	222.00	8.90	18	307	0.012	1.92	0.26	4.81	0.65	221.54	214.60	6.94	21
C9-02	C9-02	B08-042	209.42	208.50	220.00	10.58	18	317	0.003	1.92	0.52	4.82	1.31	220.00	210.92	9.08	24

Total Length **17,839**

SPWA Sewer Evaluation
Pipe Capacity Analysis
Project B2

Pipe ID	Upstream Manhole	Placer County Upstream Manhole[1]	Downstream Manhole	Placer County Downstream Manhole[1]	Upstream Invert	Downstream Invert	Upstream Manhole Rim Elevation	Upstream Manhole Depth (ft)	Existing Diameter (inches)	Length (feet)	Slope	Existing PWWF (MGD)	Existing PWWF q/Q	Future PWWF (MGD)	Future PWWF q/Q	Manhole HGL Elevation (ft)	Crown Elevation (ft)	Surcharging in Manhole (ft)	Improved Diameter (inches)
11825	B08-042	C9-03	B08-040	C9-M5	210.41	210.26	233.52	23.12	15	52	0.003	3.03	1.37	8 07	3.65	226.03	211.66	14.37	24
11826	B08-040	C9-M5	B08-045	-	210.26	209.91	233.23	22 97	15	102	0.003	3.03	1.24	8 07	3.30	224.08	211.51	12.57	24
11827	B08-045	-	B08-047	-	209.91	209.03	231.26	21 35	21	205	0.004	3.73	0.55	9 05	1.34	220.27	211.66	8.60	24
11828	B08-047	-	B08-044	-	209.03	207.38	228.43	19.40	21	498	0.003	3.72	0 63	9 04	1.53	218.67	210.78	7.88	24
11829	B08-044	-	B08-037	-	207.38	204.63	232.44	25 05	21	402	0.007	3.71	0.44	9 06	1.07	214.78	209.13	5.64	24
11830	B08-037	-	B08-043	-	204.63	203.26	227.37	22.74	21	342	0.004	3.84	0.59	9 26	1.42	211.63	206.38	5.25	24
11831	B08-043	-	B07-108	-	203.26	201.42	232.44	29.17	21	461	0.004	3.83	0.59	9 24	1.43	208.83	205.01	3.82	24
12891	B07-108	-	B07-107	-	201.42	199.59	228.49	27 06	21	461	0.004	3.82	0.59	9 21	1.42	205.07	203.17	1.90	24
12892	B07-107	-	B07-405	-	199.59	196.50	225.56	25 98	21	324	0.01	3.81	0.38	9.19	0.92	200.90	201.34	0.00	24
									Total Length	**2,846**									

1. Placer County Manhole Ds are based on County GIS. Corresponding Placer County manhole IDs are estimated and field verification may be required.

SPWA Sewer Evaluation

Pipe Capacity Analysis

Project C

Pipe ID	Upstream Manhole	Placer County Upstream Manhole[1]	Downstream Manhole	Placer County Downstream Manhole[1]	Upstream Invert	Downstream Invert	Upstream Manhole Rim Elevation	Upstream Manhole Depth (ft)	Existing Diameter (inches)	Length (feet)	Slope	Existing PWWF (MGD)	Existing PWWF q/Q	Future PWWF (MGD)	Future PWWF q/Q	Manhole HGL Elevation (ft)	Crown Elevation (ft)	Surcharging in Manhole (ft)	Improved Diameter (inches)
E9-09	E9-09	E9-09	E9-10	E9-10	242.62	242.04	253.00	10 38	15	360	0.002	0.59	0.35	3 58	2.13	253.00	243.87	9.13	21
E9-10	E9-10	E9-10	E9-11	E9-11	242.04	241.46	256.00	13 96	15	360	0.002	0.67	0.40	3 58	2.13	255.64	243.29	12.35	21
E9-11	E9-11	E9-11	E9-12	E9-12	241.46	240.88	262.00	20 54	15	363	0.002	0.68	0.41	3 52	2.10	253.00	242.71	10.29	21
E9-12	E9-12	E9-12	E9-13	E9-13	240.88	240.30	262.00	21.12	15	356	0.002	0.68	0.40	3.47	2.06	250.42	242.13	8.29	21
E9-13	E9-13	E9-13	E9-14	E9-14	240.20	240.02	264.00	23 80	15	93	0.002	0.67	0 36	3.40	1.85	247.95	241.45	6.50	21
E9-14	E9-14	E9-14	D9-01	D9-01	239.92	239.36	263.00	23 08	15	345	0.002	0.79	0.47	3 60	2.13	247.34	241.17	6.17	21
D9-01	D9-01	D9-01	D9-02	D9-02	239.36	238.80	259.00	19 64	15	324	0.002	0.80	0.46	3 54	2.03	244.78	240.61	4.16	21
D9-02	D9-02	D9-02	D9-03	D9-03	238.70	238.59	253.00	14 30	15	55	0.002	0.80	0.43	3.49	1.87	242.45	239.95	2.50	21
D9-03	D9-03	D9-03	D9-25	D9-25	238.49	238.10	251.00	12 51	15	211	0.002	0.95	0.53	3.72	2.07	242.06	239.74	2.32	21
D9-25	D9-25	D9-25	D9-04	D9-04	238.10	237.90	247.00	8.90	15	154	0.001	1.00	0.66	3.74	2.48	240.39	239.35	1.04	21
D9-04	D9-04	D9-04	D9-05	D9-05	237.89	233.08	246.00	8.11	15	331	0.015	1.06	0.21	3.78	0.75	238.70	239.14	0.00	21
D9-05	D9-05	D9-05	D9-06	D9-06	233.08	232.35	237.00	3.92	15	134	0.005	1.10	0.36	3 80	1.23	237.00	234.33	2.67	21
D9-06	D9-06	D9-06	D9-07	D9-07	232.25	231.76	236.00	3.75	15	266	0.002	1.12	0.62	3 84	2.14	236.00	233.50	2.50	21
D9-07	D9-07	D9-07	D9-08	D9-08	231.76	231.21	242.00	10 24	15	304	0.002	1.12	0.63	3.79	2.13	237.74	233.01	4.73	21
D9-08	D9-08	D9-08	D9-09	D9-09	231.11	230.53	236.00	4.89	15	329	0.002	1.11	0.63	3.75	2.13	236.00	232.36	3.64	21
D9-09	D9-09	D9-09	B08-012	B08-012	230.43	230.25	235.00	4.57	15	97	0.002	1.12	0.62	3.72	2.06	235.00	231.68	3.32	21
11819	B08-012	D9-10	B08-015	D9-11	227.80	227.74	249.99	22.19	15	345	0.0002	1.16	2.12	3.77	6.92	236.01	229.05	6.97	21
11821	B08-015	D9-11	B08-023	D9-12	227.74	225.14	262.50	34.76	15	306	0.008	1.09	0.28	3 53	0.91	233.94	228.99	4.95	21
11822	B08-023	D9-12	B08-208	D9-43	225.14	222.68	250.89	25.75	15	289	0.009	1.08	0.28	3 50	0.91	232.02	226.39	5.63	21
9353385	B08-208	D9-43	B08-031	D9-13	222.68	220.50	250.03	27 35	15	111	0.02	1.15	0.20	3 55	0.61	230.19	223.93	6.26	21
11823	B08-031	D9-13	B08-041	C9-04	220.50	210.68	244.21	23.71	15	364	0.027	1.14	0.17	3 54	0.52	229.45	221.75	7.70	21
11824	B08-041	C9-04	B08-042	C9-03	210.68	210.41	235.39	24.71	15	150	0.002	1.14	0.64	3 53	1.99	227.03	211.93	15.10	21
									Total Length	**5,647**									

1. Placer County Manhole Ds are based on County GIS. Corresponding Placer County manhole IDs are estimated and field verification may be required.

SPWA Sewer Evaluation
Pipe Capacity Analysis
Project E

Pipe ID	Upstream Manhole	Downstream Manhole	Upstream Invert	Downstream Invert	Upstream Manhole Rim Elevation	Upstream Manhole Depth (ft)	Existing Diameter (inches)	Length (feet)	Slope	Existing PWWF (MGD)	Existing PWWF q/Q	Future PWWF (MGD)	Future PWWF q/Q	Manhole HGL Elevation (ft)	Crown Elevation (ft)	Surcharging in Manhole (ft)	Improved Diameter (inches)
16608	D03-100	D03-099	119.80	118.90	138.94	19.15	15	298	0.003	3.11	1.36	3.43	1.50	127.26	121.05	6.21	21
16607	D03-099	D03-086	118.90	118.59	137.50	18.60	15	104	0.003	3.11	1.36	3.43	1.50	125.25	120.15	5.10	21
16604	D03-086	D03-072	118.59	118.00	136.97	18.38	18	294	0.002	3.11	1.02	3.49	1.15	124.55	120.09	4.46	21
16599	D03-072	D03-069	118.00	117.64	137.50	19.50	18	263	0.001	3.11	1.22	3.48	1.37	123.77	119.50	4.27	21
2957	D03-069	D03-067	117.64	117.07	142.50	24.86	18	315	0.002	3.52	1.22	3.89	1.35	123.08	119.14	3.94	21
2844	D03-067	D03-046	117.07	116.78	139.62	22.55	18	159	0.002	3.67	1.27	4.05	1.40	122.05	118.57	3.48	21
2845	D03-046	D03-031	116.78	116.19	140.32	23.54	18	330	0.002	3.67	1.27	4.04	1.40	121.48	118.28	3.20	21
2902	D03-031	D03-030	116.03	115.67	138.41	22.38	18	180	0.002	3.87	1.27	4.25	1.40	120.31	117.53	2.78	21
2903	D03-030	D03-029	115.97	115.17	137.27	21.30	18	400	0.002	3.87	1.27	4.24	1.39	119.60	117.47	2.13	21
2229	D03-029	D02-043	115.17	113.65	132.50	17.33	18	400	0.004	3.85	0.92	4.33	1.03	118.04	116.67	1.37	21
2232	D02-043	D02-048	113.65	112.63	130.48	16.83	18	341	0.003	3.84	1.03	4.32	1.16	116.41	115.15	1.26	21
2234	D02-048	D02-047	112.63	112.25	133.61	20.99	18	125	0.003	3.83	1.03	4.30	1.15	115.03	114.13	0.90	21
2200	D02-047	D02-046	112.25	111.58	134.09	21.84	18	225	0.003	3.95	1.06	4.42	1.19	114.52	113.75	0.77	21
2202	D02-046	D02-045	111.58	110.38	135.67	24.09	18	400	0.003	3.94	1.06	4.41	1.18	113.57	113.08	0.49	21
17110	D02-045	D02-183	108.53	108.47	134.62	26.09	18	50	0.001	4.59	1.94	5.01	2.12	110.24	110.03	0.21	21
							Total Length	**3,883**									

Attachment D

City of Roseville Area E Sewer Capacity Evaluation

Environmental Utilities Department
Engineering Division
2005 Hilltop Circle
Roseville, California 95747

City of Roseville Wastewater Collection System Study

TASK 3. RMC SYSTEMS EVALUATION REPORT/TM 3b – AREA E EVALUATION

TITLE: AREA E SEWER CAPACITY EVALUATION

EXECUTIVE SUMMARY

The purpose of this technical memorandum (TM) is to implement recommendations provided by RMC regarding Area E, located within Basin 7 in the City of Roseville service area. Per the South Placer Wastewater Authority (SPWA) Wastewater and Recycled Water Systems Evaluation Project (TM No. 3b), RMC identified potential sewer capacity constraints in Area E and recommended the City conduct further infiltration and inflow (I/I) studies to evaluate this area prior to considering the relief sewer improvement project with a proposed budget cost of $1,888,000. This TM presents the results of the I/I evaluation.

RMC performed a capacity analysis of the collection system using a computerized hydraulic model to simulate flow conditions in the system. The model was used to determine peak hydraulic flows in each pipeline segment and compare them to the available capacity. Capacity shortcomings were identified by RMC but further investigation of the area was recommended prior to any potential improvements.

Approach and Analysis - The model determines peak flows using a combination of unit wastewater flow criteria and peak rainfall dependent infiltration and inflow (I/I) criteria. The analysis presented herein was conducted by evaluating the sensitivity of the model to varying R values and to determine if a reduced R value would result in lesser surcharging or lesser required improvements to the system. Further, the system in Basin 7 was evaluated to determine if a reduced R value is justified.

Determination of R Value - To assess the validity of the model analysis, the magnitude of pipe flow was measured in the field during a rainfall event. The rainfall event was simulated in the model and the resultant depth ratio measured in the field was compared to the modeled depth ratio to gain a correlation. I/I data included in the model was adjusted slightly to determine the differences in pipe flow depth. The sensitivity of these adjustments to variations in depth was determined. Visual field inspections of actual pipe flow were conducted during storm events between February and May 2007. The winter of 2007 did not yield significant storm intensities or rainfall volumes so the storms observed were not comparable with the storms RMC utilized (March 2005 storms) for calibration of the model during the RMC study. The measured storm (winter 2007) intensity was approximately 4 times less than the March 2005 storms. Regardless, the data obtained from the storm (observed between February and May 2007) with the highest peak intensity was used to calculate pipeline hydraulic values [referred to as the depth-to-diameter (d/D) ratio]. These values were compared to capacity values obtained from hydraulic model simulations. Multiple model simulations were performed with varying R values (ranging from 0.5 to 3) to calibrate the R value for the storm event measured to that used with the model. Five pipe segments from Area E were selected for the study. The hydraulically modeled d/D was found to be larger than the d/D from the visual field inspections (approximately in the range of 122-200% greater) when an R value of 3 was used. This difference progressively reduced as smaller R values were used. For the final simulation with an R value of 0.5, the hydraulically modeled d/D was still larger than the field obtained d/D data by approximately 13 to 55 percent. The trend of a reduced d/D differential correlating to a reduced R value indicates that a very small R value is likely reflective of the system in Area E.

This difference is likely a reflection of an overestimated R value as determined by RMC in their study.

Sensitivity of R Value to Surcharging - A sensitivity analysis was conducted using the City's buildout model for peak wet weather flow. This analysis was conducted to determine whether the R value was appropriately responding to the hydraulic activity in the collection system and subsequently to correlate the R value with the potential to surcharge the system. The R factor for Basin 7 was varied, and the corresponding d/D obtained was observed and noted. Values of R ranging from 0.5 to 3.0 were used. These maximum and minimum values were used since 3.0 was the value utilized for Basin 7 when the model was calibrated in the RMC study and 0.5 was the lowest value utilized for the City's basins per the RMC study. The model results indicate that all five segments selected for the evaluation would surcharge at an R value of 3 and d/D values would decrease with a corresponding decrease in the R value. Below an R value of 2.5, none of the segments surcharged.

Correlation to Age of Infrastructure - The approximate age of infrastructure in the various basins was identified and compared with the R values utilized in the RMC study for the respective basins. Based upon a qualitative inspection, the following general trends were noted.

- Infrastructure installed prior to the 1960s had an R value of 3 or greater
- Infrastructure installed from the 1960s to 1980s had values in the range of 0.75 to 1
- Infrastructure installed from the 1990s to 2000s had the lowest R values ranging between 0.5 and 1.

Area E infrastructure was constructed within the 1980s to 1990s and would be expected to produce an R value between 0.5 and 1 as RMC modeled throughout the system. However, RMC modeled an R value of 3 in Area E which is significantly higher than the remainder of the system. This indicates that the surcharging in Area E, described in the RMC study, is likely based on unreasonably high I/I.

Interviews were conducted with the City's wastewater collection system staff to obtain an event history for Area E. Staff indicated that there had not been any history of surcharging in Area E.

Conclusions & Recommendations - The following conclusions were derived from this analysis:

- Peak flows and related surcharging are directly related to the R value as used in the model. Model sensitivity analysis showed that below an R value of 2.5, none of the segments in Basin 7 surcharged.

- The significant difference between visually obtained d/D values in comparison with d/D values hydraulically modeled is likely due to an overestimated R value utilized for Basin 7. In this study, the R value was reduced to 0.5 to bring the modeled and visually obtained values within a 55 percent difference. The R value of 3 utilized by RMC for Basin 7 can likely be reduced.

- Qualitative observations of the correlation between infrastructure age and R values for the entire City showed that the utilization of an R value of 0.5 to 1 for Basin 7, based on the infrastructure installation time frame, would provide much more consistency with the R values utilized for the City's basins per the RMC study.

- Interviews conducted with wastewater collection system staff indicated that there had not been any known surcharging events in Area E during the winter of 2005, when the RMC study was conducted.

- Even though a specific R value could not be selected for Basin 7, based on the above observations combined with engineering judgment, the R value is more likely in the range of 0.5 to 1.0 and quite possibly less than 0.5.

- Area E is not likely to surcharge from a design storm event provided the R value for the area is 2.5 or less. Since the analysis indicates the R value for Area E to range from 0.5 to 1.0, and quite possibly less than 0.5, it is not likely that surcharging will occur from a design storm event.

- With the absence of any potential surcharge conditions under a design storm event, no improvements are required at this time.

- No conclusion has been drawn for why RMC needed to simulate an R value of 3.0 in Area E. RMC concluded in TM 3B that extraneous inflow may have occurred through an open manhole causing a higher calibrated flow from the storm. Such a condition was not evident during our field walks.

- Staff should accelerate the condition assessment of pipe segments in Area E by performing video inspection and defect coding to investigate any potential for increased I/I not observed by this evaluation.

BACKGROUND

This TM is to implement recommendations provided by RMC regarding Area E, in a report titled TM3B. Area E is located in the Pleasant Grove Wastewater Treatment Plant basin in the City of Roseville along McAnally Drive. The entire City of Roseville service area is subdivided into drainage basins. The study area for this analysis (Area E) falls within Basin 7. This study area was selected as the domain for the analysis. Figure 1 shows a map of the study area.

Per the South Placer Wastewater Authority (SPWA) Wastewater and Recycled Water Systems Evaluation Project (TM No. 3b), RMC identified potential sewer capacity constraints in Area E and recommended that the City conduct further I/I studies to evaluate this area prior to considering an improvement project in Area E, to extend over a 4,000 foot segment from MH D03-100 to D02-353. The proposed budget cost for this improvement project was $1,888,000.

This TM is presented in four parts.

The first part includes verifying model calibration: this involves analyzing data obtained from visual field inspections and comparing this data with hydraulically modeled data to determine the accuracy of I&I assumptions used in the hydraulic model.

The second part is a model sensitivity analysis, which was conducted to determine the models sensitivity to d/D values for varying R values in Basin 7.

The third part involves conducting a qualitative inspection of the correlation between infrastructure age and R values (defined in the following paragraphs). This inspection is to determine whether the R value utilized by RMC for Basin 7 is consistent with R values used for other similar basins in the City.

The final part of this TM includes conducting interviews with the City's wastewater collection system staff to obtain an event history for Area E.

Legend

- Manholes
- Mains

Study Area Location Map – Pipe Segment from MH D03-100 to D02-356

Figure 1

N W E S

1 inch equals 300 feet

The magnitude of the resulting rainfall dependent infiltration and inflow (RDII) response is typically described by the percentage of the rainfall volume (called the R value or R factor). The R value can vary from storm to storm, depending on such factors as the degree of soil saturation (due to antecedent rainfall) prior to the storm event. R values also vary by area depending on the age and condition of the sewer system, depth of pipes, pipe materials, and hydrogeologic and topographic characteristics. The H2OMap Sewer Professional software uses the R value in simulating the effect on flow due to wet weather events.

The amount of infiltration and inflow produced during a storm consumes pipeline capacity and reduces the ability of the pipeline to convey municipal wastewater. The collection systems capacity for different segments is measured as the depth of water in the pipe (referred to as the d/D ratio). For the City, the d/D criterion for design is a 0.7. Once the design criterion is exceeded, a replacement of the segment is considered. The replacement criteria d/D for the City is 1.0. Pipe capacity d/D values have a maximum value of 1.0. The pipe is considered as being surcharged at a d/D of 1.0.

Since the R factor utilized in the hydraulic modeling impacts the collection systems capacity, this factor was analyzed.

PART 1: MODEL CALIBRATION VERIFICATION - FIELD INVESTIGATION & ASSOCIATED MODELING

Visual field inspections were conducted during storm events that occurred between February and May 2007 to measure flow depths in pipe segments in the project area. The purpose of obtaining this data was to confirm the R value used in the model.

A total of three storms (occurring between February and May 2007) were observed for the study. Data was collected during the storms by dipping a rod into various manholes and measuring the depth of flow in the pipes.

Table 1 shows the data collection dates for this study and the data used for the RMC study.

Table 1. Rainfall Data

Date	Duration Recorded (hours)	Total Rainfall (inches)	Peak Hr Intensity (in/hr)
Feb 9th 2007	8	0.12	0.04
Feb 22nd 2007	9	0.44	0.08
May 2nd 2007	9	0.28	0.04
Calibration Storm*	9	1.0	0.3**

*Storm utilized by RMC in their study for calibration of RDII factors. This was the storm event of March 1-2, 2005.
** The peak hour intensity of the RMC calibration storm is approximately four times that of the most intense storm observed between February and May 2007.

Although the three storms measured yielded relatively short durations, low rainfall and low peak intensity, the February 22, 2007 storm was selected for this study because it provided the greatest peak hour intensity. Five of the segments which provided the greatest pipe capacity (d/D) values in the RMC study under design storm conditions, were selected for the study. Pipe capacity values, were also computed for these segments with data obtained from the field. Table 2 shows this field data.

Table 2. Pipe capacity data for the storm event of February 22 2007

Pipe Segment	Diameter (inches)	Slope	d/D from Visual Inspection of Flow Depth	Estimated Flow (MGD)*
D03-100 to D03-099	15	0.0029	0.43	2.2
D03-099 to D03-086	15	0.0030	0.40	2.3
D03-031 to D03-030	18	0.0020	0.33	3.0
D03-030 to D03-029	18	0.0020	0.33	3.0
D03-069 to D03-072	18	0.0014	0.35	2.5

*Flow calculated based on pipe slope, pipe diameter and Manning's of 0.013

The d/D values based on the visual field observations were compared with the d/D values obtained from the hydraulic simulation of the current scenario model described below.

Comparison of Model Output (Current Scenario) and Field Data - The rainfall event with the highest intensity during the February to May 2007 field investigation (the February 22, 2007 storm) was selected and modeled for the current scenario.

A hyetograph was developed based on this rainfall data for a 2.5 hr duration. Rainfall data, in the form of storm intensity (in inches per hour) over specific time duration, was obtained from a permanent rain gauge station (Fire Station No. 2) located in the Basin 7 area and maintained by the City. This data was loaded into the hydraulic model, then applied to manholes in the selected domain in Basin 7 and modeled. Using the hydraulic model, peak wet weather flows for this scenario were simulated using an R value of 3 (the value utilized for Basin 7 per the RMC report). Additional iterations were performed as necessary, with varying R values, and are discussed below. The five study segments were selected, and analyzed.

As shown in Table 3a, the d/D obtained for the current scenario model run (with R=3) was compared with the d/D values obtained from the visual inspection

- The hydraulically modeled d/D was found to be larger than the d/D calculated from the visual field inspections approximately 122-200% greater.

Table 3a. Comparison between field obtained and hydraulically modeled pipe capacity values using an R=3.0

Pipe Segment	d/D from Visual Inspection	d/D from Modeling, R=3.0	Approximate Percent Differential (%)
D03-100 to D03-099*	0.45	1.00	+122
D03-099 to D03-086	0.40	1.00	+150
D03-031 to D03-030	0.33	1.00	+200
D03-030 to D03-029	0.33	1.00	+200
D03-069 to D03-072	0.35	0.82	+135

Since the difference in the modeled data and field data was very large, a second iteration was performed with a lower R value. The reason for lowering the R value was an attempt to simulate reduced d/D results for the hydraulically modeled data to obtain a closer comparison to the visually observed data. An R value of 2.5 was selected and modeled.

- As shown in Table 3b, the hydraulically modeled d/D was still found to be much larger than the d/D calculated from the visual field inspections (approximately in the range of 80-130% greater).

Table 3b. Comparison between field obtained and hydraulically modeled pipe capacity values using an R=2.5

Pipe Segment	d/D from Visual Inspection	d/D from Modeling, R=2.5	Approximate Percent Differential (%)
D03-100 to D03-099*	0.45	0.81	+80
D03-099 to D03-086	0.40	0.80	+100
D03-031 to D03-030	0.33	0.76	+130
D03-030 to D03-029	0.33	0.76	+130
D03-069 to D03-072	0.35	0.72	+105

With the difference between the hydraulically modeled the field data still being very large, a third iteration was performed, and again, the R value was lowered for this run. An R value of 1.0 was selected and modeled.

- As shown in Table 3c, the hydraulically modeled d/D was found to be still larger than the d/D calculated from the visual field inspections (approximately in the range of 20-57% greater).

Table 3c. Comparison between field obtained and hydraulically modeled pipe capacity values using an R=1.0

Pipe Segment	d/D from Visual Inspection	d/D from Modeling, R=1.0	Approximate Percent Differrential (%)
D03-100 to D03-099*	0.45	0.54	+20
D03-099 to D03-086	0.40	0.54	+35
D03-031 to D03-030	0.33	0.52	+57
D03-030 to D03-029	0.33	0.52	+57
D03-069 to D03-072	0.35	0.50	+43

Since there was a significant difference between the modeled data and field data, a fourth and final iteration was run with an R value of 0.5. A minimum value of 0.5 was selected because from the RMC study of all the City's basins, the lowest R value was a 0.5.

- As shown in Table 3d, the hydraulically modeled d/D was found to be larger than the d/D calculated from the visual field inspections for four out of the five segments (approximately in the range of 13-55% greater). For one segment however, D03-100 to D03-099, field data and hydraulically modeled data were the same.

Table 3d. Comparison between field obtained and hydraulically modeled pipe capacity values using an R=0.5

Pipe Segment	d/D from Visual Inspection	d/D from Modeling, R=0.5	Approximate Percent Differential (%)
D03-100 to D03-099*	0.45	0.45	0
D03-099 to D03-086	0.40	0.45	+13
D03-031 to D03-030	0.33	0.43	+30
D03-030 to D03-029	0.33	0.51	+55
D03-069 to D03-072	0.35	0.43	+23

The difference in d/D values between modeled and field data progressively decreased with decreasing R values. However, with an R value of 0.5 the difference in d/D values was still

significant (up to 55%), over some segments in the domain. To further investigate the correlation of R and d/D will asymptotically approach a value of R not much lower that 0.5. This suggests it is sufficient to cease further analysis and conclude that R is significantly lower than a value of 3 as assumed in the model by RMC and is likely at a value significantly less than 1 and likely less than 0.5.

PART 2: MODEL SENSITIVITY ANALYSIS

The model sensitivity analysis was conducted to determine how the R value affected the potential to surcharge the system during a design storm event. The R factor for Basin 7 was varied, and the corresponding d/D was observed and noted. The R value at which a surcharge condition is indicated was then determined. The existing buildout model developed by RMC for the City of Roseville Sanitary Sewer Model Development Project (Sewer Project) was used for this analysis.

Sensitivity Test - Buildout Scenario - Peak wet weather flow scenarios (for buildout) were modeled. Values of R ranging from 0.5 to 3.0 were used. The five study segments, selected in the Visual Field Investigation section, were analyzed and results plotted. A plot showing the pipe capacity (represented as d/D) with varying R's for the study segments is shown in Figure 2. A legend of plotted segments is presented in Table 4.

Figure 2. Sensitivity Analyses for R factor

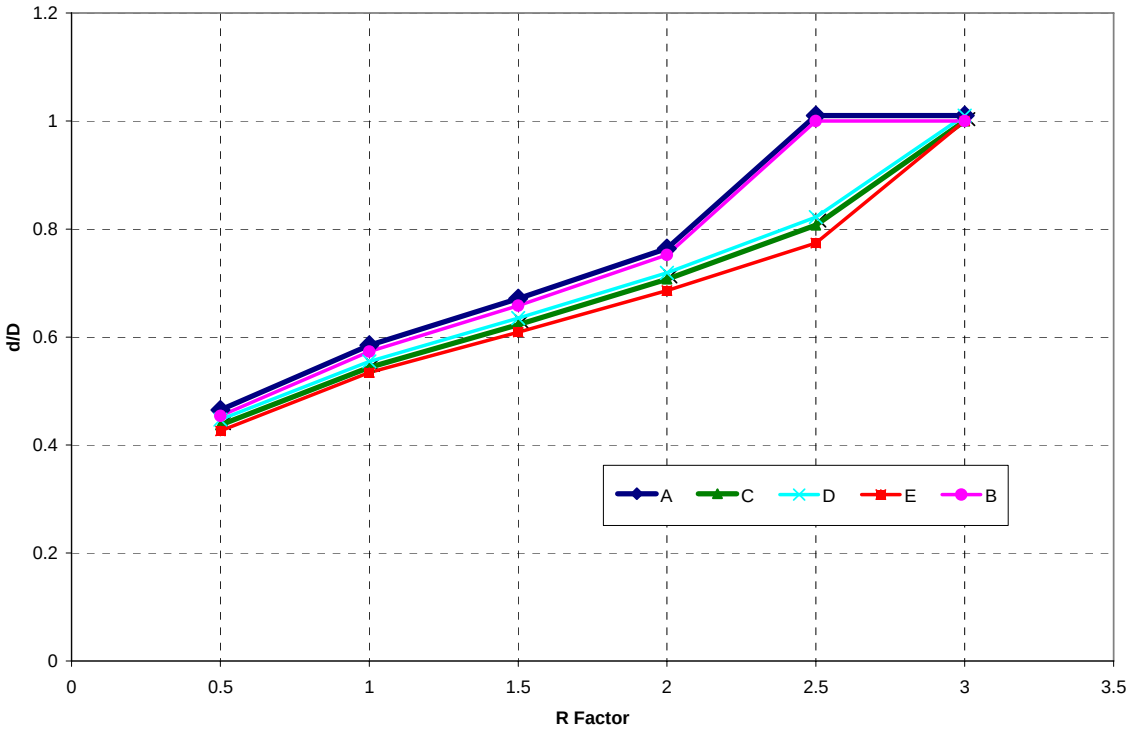


Table 4 presents a legend for this chart.

Table 4. Legend for Plotted Segments

Plotted Curve	A	B	C	D	E
Pipe Segment	D03-100 to D03-099	D03-099 to D03-086	D03-030 to D03-029	D03-031 to D03-030	D03-069 to D03-072

From the data (see Figure 2), the following observations were made

- All five segments selected showed a decrease in d/D values with a corresponding decrease in the R value

    - All five segments surcharged at an R value of 3.
    - Three out of the five segments, curves C, D & E, showed a steady decrease in the d/D value with a corresponding decrease in the R value.
    - The other two segments (curves A & B), surcharged for R values between the range of 2.5 to 3.0. For R values below 2.5, there was a steady decrease in the d/D values with a corresponding decrease in the R value.

PART 3: INFRASTRUCTURE AGE AND R VALUE INSPECTION

As previously mentioned, the entire City of Roseville service area is subdivided into twenty-three drainage basins. The approximate age of infrastructure in the various basins was found and compared with the R values utilized (in the RMC study) for the respective basins. The data is shown in Table 5.

Table 5. Infrastructure Age and R factors for City of Roseville

Basin	R value	Approximate Installation Dates
1	0.5	1990s to 2000s
2	0.5	1990s
3	1	2000s
4	1	1970s to 1980s
5	3.5	1950s to 1960s
6	0.5	1990s to 2000s
7	3	1980s to 1990s
8	1	1970s to 2000s
9	0.75	1990s
10	0.75	Late 1980s
12	3	1980s to 1990s
14	1.5	1950s to 1960s
15N	3	1910s to 1920s
15S	1	1960s to 1990s
17	1	1960s to 1980s
18	1	1980s to 2000s
19	1	2000s
20	1	1990s to 2000s
21	0.5	1990s
22	0.5	1990s to 2000s
23	0.5	1990s
24	0.75	Late 1980s to 2000s
25	0.5	1990s to 2000s

A qualitative inspection was conducted and a correlation between R value and installation date of infrastructure was observed.

The data showed the following general trends[1]:

- Infrastructure installed prior to the 1960s had an R value of 3 or greater.
- Infrastructure installed from the 1960s to 1980s had values in the range of 0.75 to 1.
- Infrastructure installed from the 1990s to 2000s had the lowest R values ranging between 0.5 and 1.

The R value utilized for the Area E study area was compared with these general trends and an inconsistency was observed. The infrastructure in the study area was constructed within the 1980s to 1990s time frame. Infrastructure installed in this time frame was shown to typically have a maximum R value of 1. However, the RMC report utilized an R value of 3, which seemed high from these initial observations.

PART 4: STAFF INTERVIEWS

Interviews were conducted with the City's wastewater collection system staff to obtain a history of any probable surcharging events that may have occurred in the past, and specifically during the winter of 2005, the period over which the RMC study was conducted. Staff indicated that there had not been any known incidence of surcharging in Area E since the sewer infrastructure in that area was installed.

Conclusion & Recommendations - The following conclusions and recommendations were derived from this analysis:

- Peak flows and related surcharging are directly related to the R value as used in the model. Model sensitivity analysis showed that below an R value of 2.5, none of the segments in Basin 7 surcharged.

- The significant difference between visually obtained d/D values in comparison with d/D values hydraulically modeled is likely due to an overestimated R value utilized for Basin 7. In this study, the R value was reduced to a 0.5 to bring the modeled and visually obtained values within a 55% difference. The R value of 3 utilized by RMC for Basin 7 can likely be reduced.

- Qualitative observations of the correlation between infrastructure age and R values for the entire City showed that the utilization of an R value of 0.5 to 1 for Basin 7, based on the infrastructure installation time frame, would provide much more consistency with the R values utilized for the City's basins per the RMC study.

- Interviews conducted with wastewater collection system staff indicated that there had not been any known surcharging events in Area E during the winter of 2005, when the RMC study was conducted.

- Even though a specific R value could not be selected for Basin 7, based on the above observations combined with engineering judgment, the R value is more likely in the range of 0.5 to 1.0 and quite possibly less than 0.5.

- Area E is not likely to surcharge from a design storm event provided the R value for the area is 2.5 or less. Since the analysis indicates the R value for Area E to range from 0.5 to 1.0, and quite possibly less than 0.5, it is not likely that surcharging will occur from a design storm event.

[1] Only one basin, basin 12, did not follow these general trends. The R value for this basin could be overstated in the RMC study.

- With the absence of any potential surcharge conditions under a design storm event, no improvements are required at this time.

- No conclusion has been drawn for why RMC needed to simulate an R value of 3.0 in Area E. RMC concluded in TM 3B that extraneous inflow may have occurred through an open manhole causing a higher calibrated flow from the storm. Such a condition was not evident during our field walks.

- Staff should accelerate the condition assessment of pipe segments in Area E by performing video inspection and defect coding to investigate the potential for increased I/I not observed by this evaluation.

Attachment E

June 2007 TM Update Sheet

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject: **Update for TM 3b**

Prepared For: Art O'Brien, City of Roseville

Prepared by: Andy Smith, RMC

Reviewed by: Dave Richardson, RMC

Date: October 31, 2006

Reference: 0091-04

1 Summary of Update for TM 3b

Since the completion of TM 3b on April 14, 2006, changes in the scope of the South Placer Wastewater and Recycled Water Systems Evaluation, as well as changes in the data available, have resulted in the need to identify out-of-date information, to summarize the updated information, and provide justification as to the need for the update. **Table 1** presents a summary of the updates for TM 3b.

Table 1: Summary of Update for TM 3b

Page	Location	Summary of Outdated Information	Summary of Updated Information	Reason for Update
1	Paragraph 6	Future model network includes 10 pump stations	Future model network includes 11 pump stations	One pump station for the Brookfield UGA was added
5	Figure 2	Does not include Brookfield; un-expanded SPMUD UGA included	Brookfield is considered as a UGA, and a pump station and force main have been modeled in the UGA. The SPMUD UGA boundary has been expanded. Refer to Figure ES-7 in the Systems Evaluation report for an updated version of this figure.	Expanded SPMUD boundary and Brookfield
9	Figure 4	Does not include Brookfield; un-expanded SPMUD UGA included	Refer to TM 11a for Brookfield configuration. Refer to Figure ES-7 for expanded SPMUD UGA boundary.	Expanded SPMUD boundary and Brookfield
13	Paragraph 4	Deficiency for Area D	Discussion of Area D no longer necessary	Deficiencies have been addressed by City of Roseville; Area D no longer a problem
15	Paragraph 2	Deficiency for Area D	Discussion of Area D no longer necessary	Deficiencies have been addressed by City of Roseville; Area D no longer a problem
17	Figure 5	Deficiency shown for Area D	Identification of Area D no longer necessary	Deficiencies have been addressed by City of Roseville; Area D no longer a problem

(continued on next page)

Table 1 (cont'd)

Page	Location	Summary of Outdated Information	Summary of Updated Information	Reason for Update
18	Figure 6	Deficiency shown for Area D	Identification of Area D no longer necessary	Deficiencies have been addressed by City of Roseville; Area D no longer a problem
23	Paragraph 4	Improvement project for Area D	Improvements for Area D no longer necessary	Deficiencies have been addressed by City of Roseville; Area D no longer a problem
24	Table 9	Costs included for Area D improvement project; total cost = $8,000,000	Improvements (and costs) for Area D no longer necessary; total cost = $7,961,000	Deficiencies have been addressed by City of Roseville; Area D no longer a problem
27	Figure 7	Improvement project shown for Area D	Improvements for Area D no longer necessary	Deficiencies have been addressed by City of Roseville; Area D no longer a problem
29	n/a	Extension project for Brookfield not included	Refer to TM 11a for trunk sewer information for Brookfield	Brookfield added as a UGA
30	Table 11	Costs for extension to Brookfield not included	Refer to TM 11a for trunk sewer cost information for Brookfield	Brookfield added as a UGA
31	Figure 8	Extension project for Brookfield not shown	Refer to TM 11a for trunk sewer information for Brookfield	Brookfield added as a UGA
n/a	Attachment A	Sewer profile(s) for Area D	Sewer profile(s) for Area D no longer necessary	Deficiencies have been addressed by City of Roseville; Area D no longer a problem

Attachment F

2009 Update Sheet

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**2009 Update Sheet for TM 3b**
Prepared For:	Art O'Brien, City of Roseville
Prepared by:	Chris van Lienden, RMC
Reviewed by:	Dave Richardson, RMC
Date:	September 3, 2009
Reference:	0091-04

The TM has been modified since it was originally developed in 2005 based on the following updates.

1 2006 Updates

The TM was updated in 2006 to reflect changes in the SPMUD UGA boundary and land use, and to add Brookfield as an additional UGA.

2 2008 Updates

The TM was further updated in 2008 to reflect changes in the land uses and flow projections of the UGAs.

3 2009 Updates

An additional update was prepared in 2009 to reflect the following changes.

3.1 Updates to the H2Omap Sewer Model

Since the 2008 update, the H2Omap Sewer software has been updated which resulted changes to the build-out flow estimates. The flow estimates in the TM has been updated to reflect the most recent model results.

3.2 Changes to the Development Timeline

Flow projections have been updated to reflect reduced rates of residential development due to the economic slowdown beginning in 2008.

3.3 West Roseville Specific Plan Rezone

Buildout flow estimates have been updated to reflect additional inflow from a proposed rezone in the West Roseville Specific Plan (May, 2009). The new land uses and associated average dry weather flow (ADWF) are summarized in Table 1.

Table 1 – West Roseville Specific Plan Rezone Comparison

Connected Land Use Description	Original Developer Agreements		2009 Proposed Update	
	DU or Area (DU or ac)	Flow (mgd)	DU or Area (DU or ac)	Flow (mgd)
1 Residential				
1.1 Low Density Residential	4842 DU	0.92	5963 DU	1.13
1.2 LDR (age restricted)	710 DU	0.13	0 DU	0.00
1.3 Medium Density Residential	1064 DU	0.20	1746 DU	0.33
1.4 High Density Residential	1774 DU	0.23	3229 DU	0.42
2 Open Space	670 ac		696 ac	0.00
2.1 Paseo	15 ac		0 ac	0.00
2.2 Park	251 ac		284 ac	0.00
2.3 Pocket Parks	19 ac		0 ac	0.00
3. Public/Quasi-Public				
3.1 Schools	108 ac	0.02	109 ac	0.02
3.2 Public/Quasi-Public	41 ac	0.02	15 ac	0.01
4 Community Commercial				
4.1 Commercial	34 ac	0.03	56 ac	0.05
4.2 Mixed Use	14 ac	0.03	0 ac	0.00
4.3 Church	0 ac	0.01	0 ac	0.00
5. Business Professional				
5.1 Commercial	20 ac	0.02	18 ac	0.02
6. Light Industrial	74 ac	0.06	75 ac	0.06
7. Industrial	34 ac	0.03	35 ac	0.03
Total		**1.71**		**2.07**

Appendix I Survey Data Summary

MANHOLE DIPSHEET

DATE OF SURVEY: 06-17-2005 POINT NUMBER: 7043

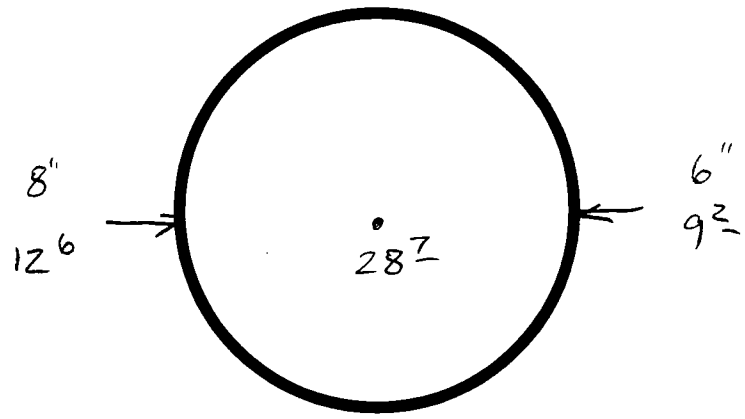
FACILITY TYPE/ No.: SS A04-147 STREET NAME: Off Portside Cir
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET:

NEAREST ADDRESS # 840

SPECIAL MARKINGS:

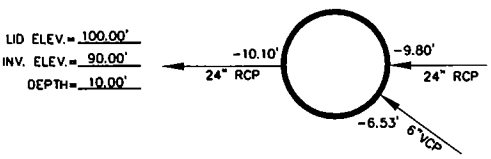
LID ELEV.= 150.0'
INV. ELEV.=
DEPTH=



NOTE: NON-FLOWING MATERIAL @ BOTTOM OF MH PREVENTED DETECTION OF INLETS OR OUTLETS.

no out detected ..

EXAMPLE



ANDREGG GEOMATICS
www.andregg.com
800-400-7072

PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS, MS

X:\Idd2\1225701\dwg\1225701 DIPSHEET.dwg, 05/31/05 08:57:30am, Jasong

MANHOLE DIPSHEET

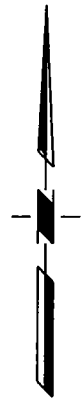
DATE OF SURVEY: 06-17-2005 POINT NUMBER: 7037

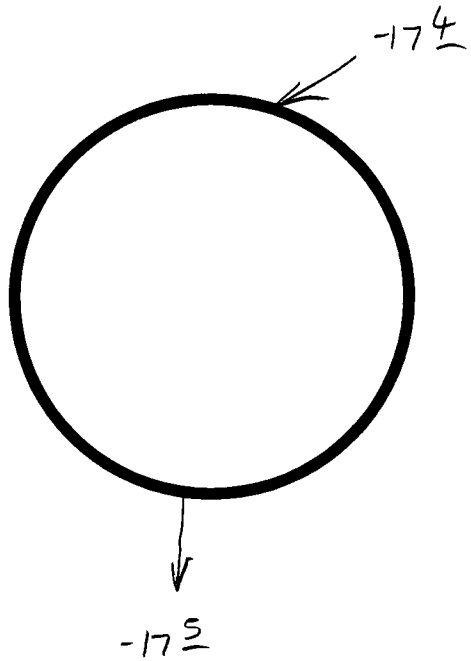
FACILITY TYPE/ No.: SS C06-022 STREET NAME: _____
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: _____

NEAREST ADDRESS # _____

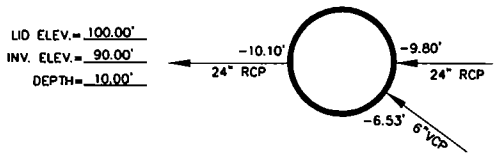
SPECIAL MARKINGS: _____





LID ELEV.= 158.1'
INV. ELEV.= 140.6'
DEPTH= 17.5'

EXAMPLE



ANDREGG GEOMATICS
www.andregg.com
800-400-7072

PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, MS

X:\dd2\1225701\dwg\1225701 DIPSHEET.dwg, 05/31/05 08:57:30am, Jasong

MANHOLE DIPSHEET

DATE OF SURVEY: 06-17-2005

POINT NUMBER: 7038

FACILITY TYPE/ No.: SS COS-089
(SS, SD, ELEC, TEL)

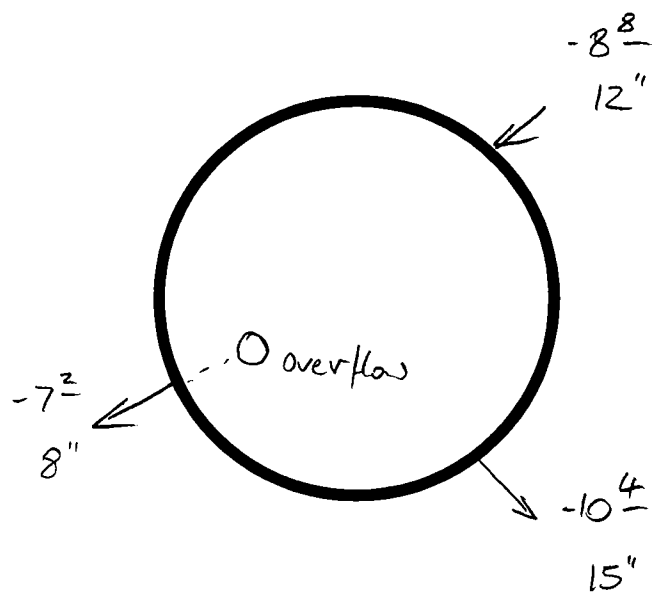
STREET NAME: Atlantic St

NEAREST CROSS STREET: Yosemite St

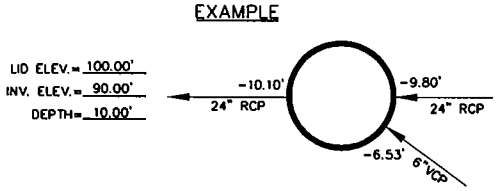
NEAREST ADDRESS # @ Intx

SPECIAL MARKINGS:

LID ELEV.= 165.0'
INV. ELEV.= 154.6'
DEPTH= 10.4'



EXAMPLE



ANDREGG GEOMATICS
www.andregg.com
800-400-7072

PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS, MS

X:\ldd2\122570\1\dwg\1225701 DIPSHEET.dwg, 05/31/05 08:57:30am, Jasong

MANHOLE DIPSHEET

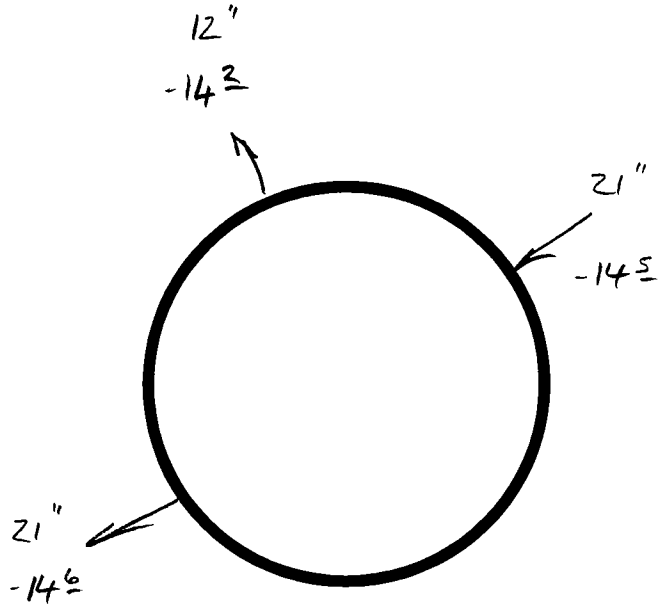
DATE OF SURVEY: 06-17-2005 POINT NUMBER: 7035

FACILITY TYPE/ No.: SS B07-405 STREET NAME: (Pump Station)
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: E. Roseville Pkwy

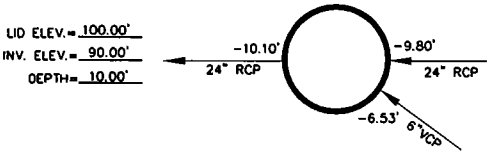
NEAREST ADDRESS # _____

SPECIAL MARKINGS: _____



LID ELEV.= 211.0'
INV. ELEV.= 196.6'
DEPTH= 14.4'

EXAMPLE



ANDREGG GEOMATICS
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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS, MS

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-17-2005 POINT NUMBER: 7036

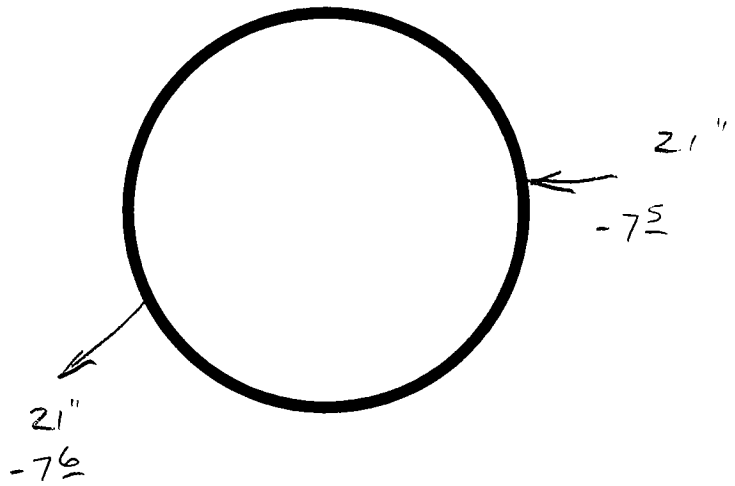
FACILITY TYPE/ No.: SS D07-107 STREET NAME: /
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: E - Roseville Pkwy

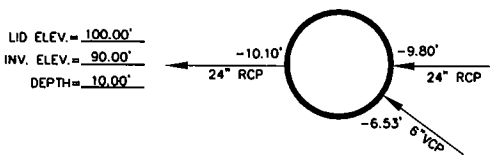
NEAREST ADDRESS # /

SPECIAL MARKINGS:

LID ELEV.= 206.9'
INV. ELEV.= 199.3'
DEPTH= 7.6'



EXAMPLE



ANDREGG GEOMATICS
www.andregg.com
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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS, MS

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6/20 RosC

MANHOLE DIPSHEET

Pic 3,4,5

DATE OF SURVEY: 06-17-2005 POINT NUMBER: 7042

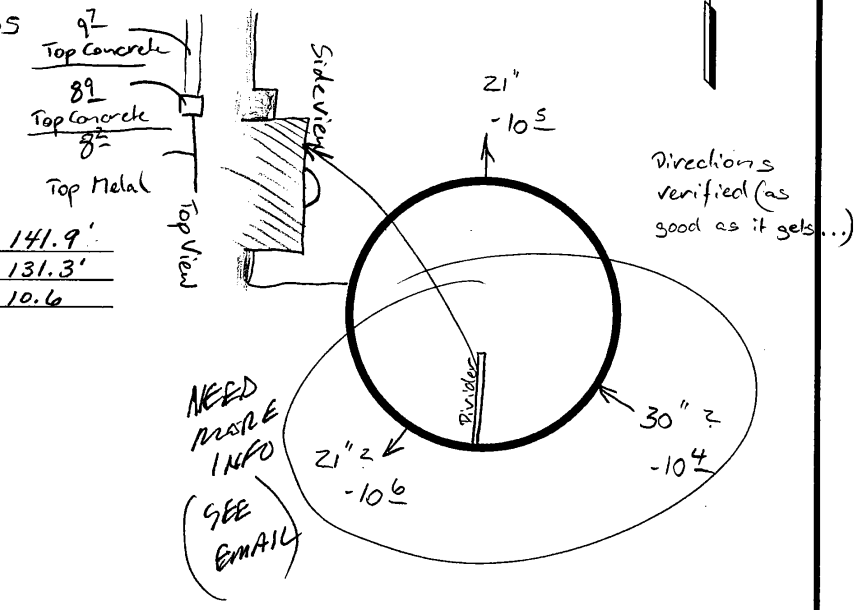
FACILITY TYPE/ No.: SS B06-169 STREET NAME: Coloma Wy
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Oak Ridge

NEAREST ADDRESS # 1305 Coloma Way

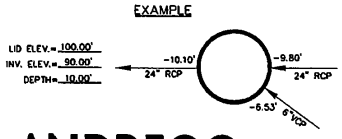
SPECIAL MARKINGS:

07-20-2005
SS, RZ



LID ELEV.= 141.9'
INV. ELEV.= 131.3'
DEPTH= 10.6

EXAMPLE



ANDREGG GEOMATICS
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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, MS

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MANHOLE DIPSHEET

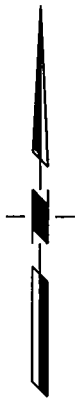
DATE OF SURVEY: 06-17-2005 POINT NUMBER: 7042

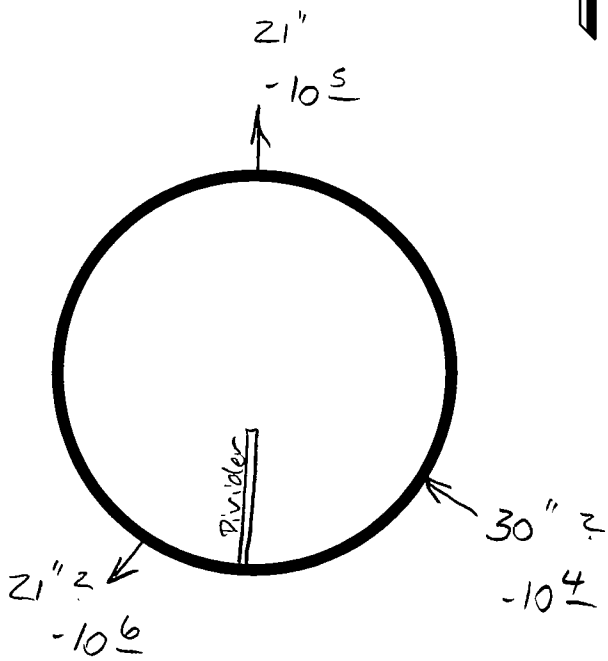
FACILITY TYPE/ No.: SS B06-169 STREET NAME: Coloma Wy
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Oak Ridge

NEAREST ADDRESS # 1305

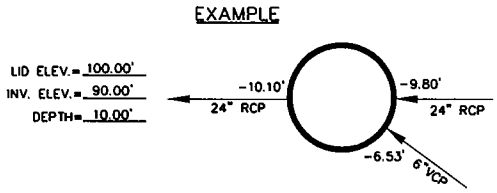
SPECIAL MARKINGS:





LID ELEV.= 141.9'
INV. ELEV.= 131.3'
DEPTH= 10.6

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, MS

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MANHOLE DIPSHEET

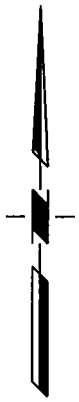
DATE OF SURVEY: 06-17-2005 POINT NUMBER: 7042

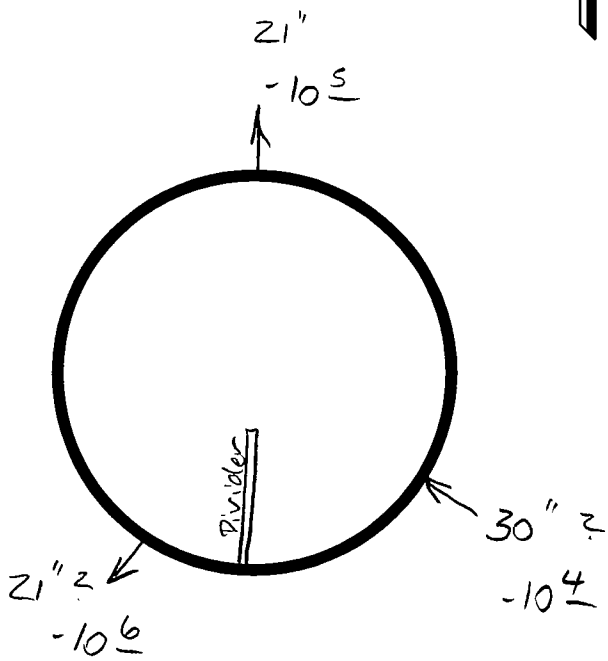
FACILITY TYPE/ No.: SS B06-169 STREET NAME: Coloma Wy
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Oak Ridge

NEAREST ADDRESS # 1305

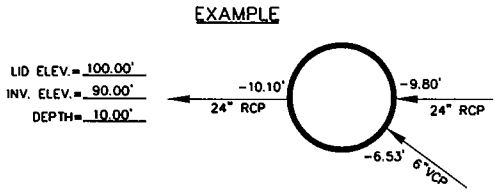
SPECIAL MARKINGS:





LID ELEV.= 141.9'
INV. ELEV.= 131.3'
DEPTH= 10.6

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, MS

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-17-2005 POINT NUMBER: 7041

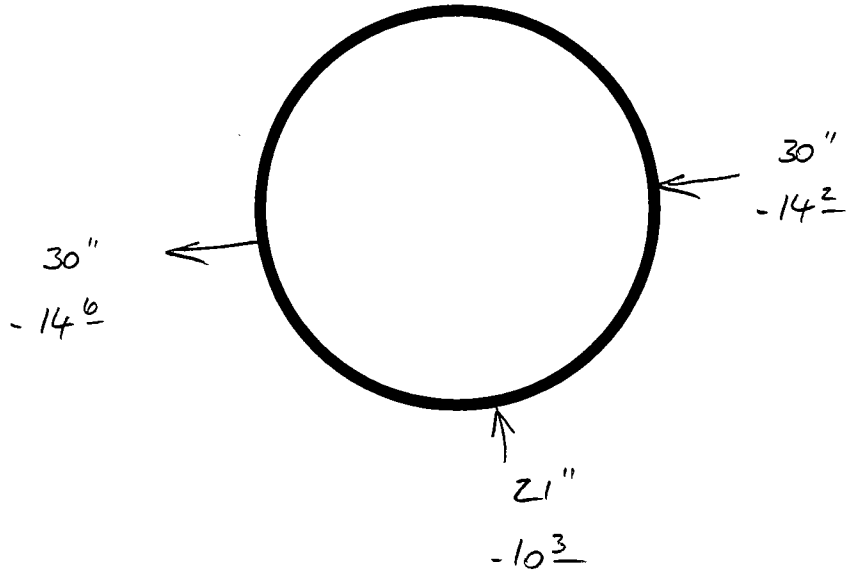
FACILITY TYPE/ No.: SS B06-159 STREET NAME: Coloma
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Oakridge

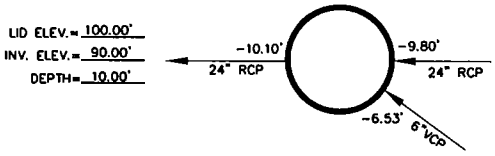
NEAREST ADDRESS # 1305

SPECIAL MARKINGS: ± 40' N of Coloma

LID ELEV.= 141.8
INV. ELEV.= 127.2
DEPTH= 14.6'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS, MS

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-17-2005

POINT NUMBER: 7039

FACILITY TYPE/ No.: B05-343
(SS, SD, ELEC, TEL)

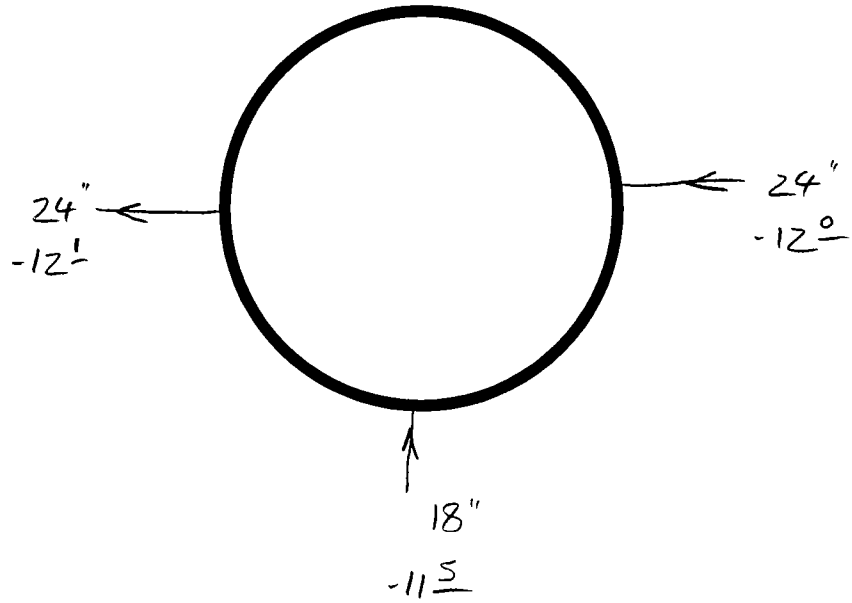
STREET NAME: Douglas

NEAREST CROSS STREET: Judah / Park

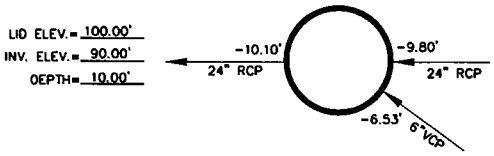
NEAREST ADDRESS # (Bridge over Dry Creek)

SPECIAL MARKINGS:

LID ELEV.= 142.6'
INV. ELEV.= 130.5'
DEPTH= 12.1'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, MS

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MANHOLE DIPSHEET

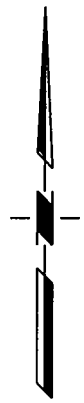
DATE OF SURVEY: B05-039 POINT NUMBER: 7040

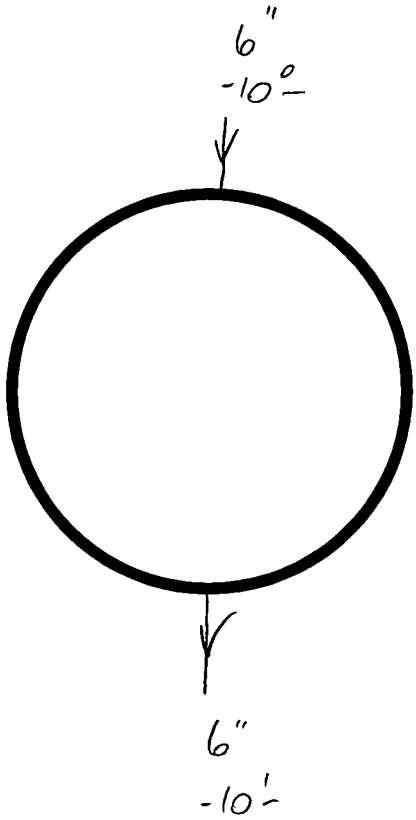
FACILITY TYPE/ No.: SS B05-039 STREET NAME: Keehner
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Douglas

NEAREST ADDRESS # 222

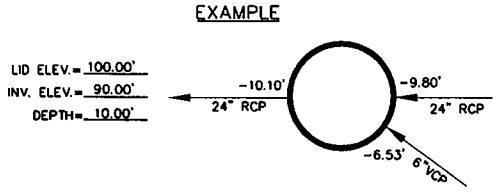
SPECIAL MARKINGS: abandoned ?





LID ELEV.= 165.8'
INV. ELEV.= 155.7'
DEPTH= 10.1'

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS, MS

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-17-2005 POINT NUMBER: 7044

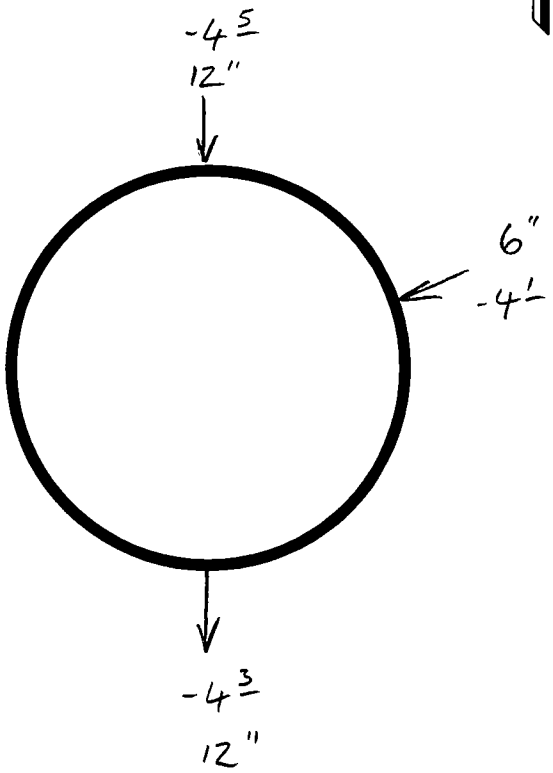
FACILITY TYPE/ No.: SS B04-061 STREET NAME: Vernon St
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Sixth

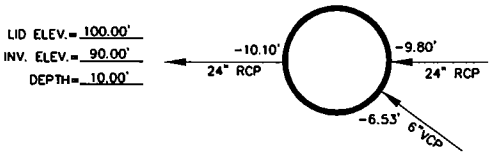
NEAREST ADDRESS # 1600

SPECIAL MARKINGS:

LID ELEV.= 133.8'
INV. ELEV.= 129.5'
DEPTH= 4.3'



EXAMPLE



ANDREGG GEOMATICS
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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS/MS

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Rose

MANHOLE DIPSHEET

Blue: P5061351 Pic #1

DATE OF SURVEY: 07-20-2005 POINT NUMBER: 7090

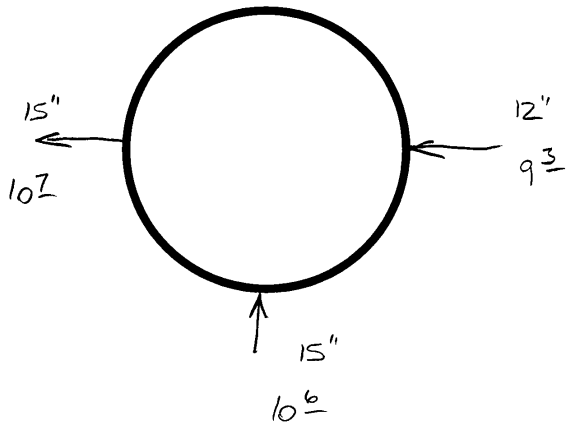
FACILITY TYPE/ No.: SS A08-156 STREET NAME: Hazel
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Old Auburn Rd

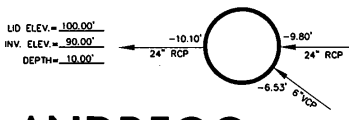
NEAREST ADDRESS # @ SW-Section of Intx

SPECIAL MARKINGS:

LID ELEV.= 200.344
INV. ELEV.= 189.644
DEPTH= 10.7



EXAMPLE



ANDREGG GEOMATICS
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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, RZ

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MANHOLE DIPSHEET

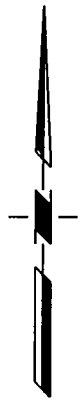
DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7031

FACILITY TYPE/ No.: SS A08-26 STREET NAME: Bike path
(SS, SD, ELEC, TEL)

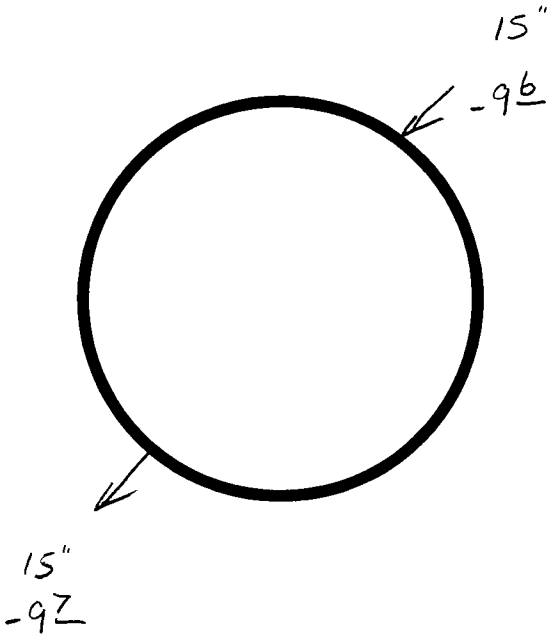
NEAREST CROSS STREET: Sierra College Blvd

NEAREST ADDRESS # (± 100' W of fork in Bikepath)

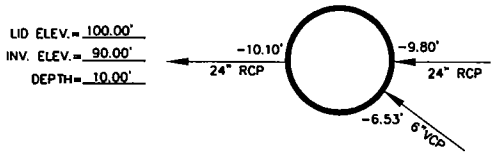
SPECIAL MARKINGS:



LID ELEV.= 207.4'
INV. ELEV.= 197.7'
DEPTH= 9.7'



EXAMPLE



ANDREGG GEOMATICS
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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, MS

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005

POINT NUMBER: 7030 (PC #2,3)

FACILITY TYPE/ No.: SS A08-025
(SS, SD, ELEC, TEL)

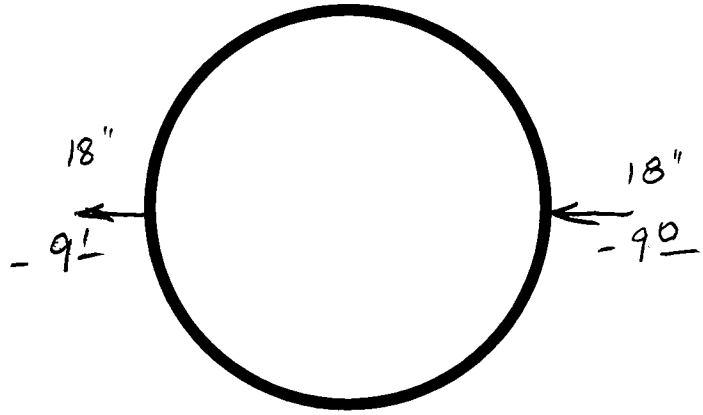
STREET NAME: Bike Path East of Sierra College

NEAREST CROSS STREET: Sierra College

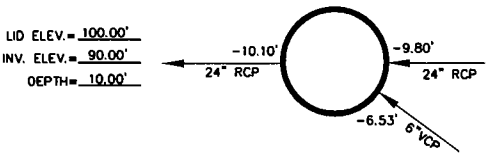
NEAREST ADDRESS # (@ Pond)

SPECIAL MARKINGS:

LID ELEV.= 204.7'
INV. ELEV.= 195.6'
DEPTH= 9.1'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

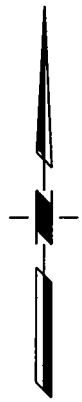
DATE OF SURVEY: 06·13·2005 POINT NUMBER: 7029 (P.C #1)

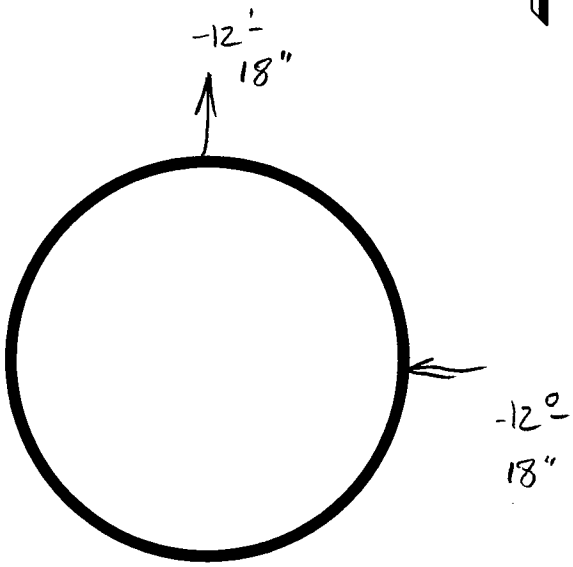
FACILITY TYPE/ No.: SS A08·024 STREET NAME: Sierra College
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Old Auburn

NEAREST ADDRESS # (opposite Bikepath to E)

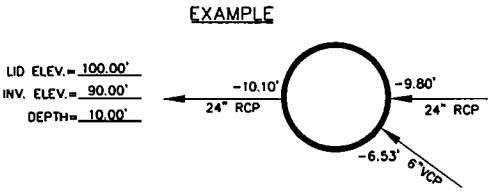
SPECIAL MARKINGS:





LID ELEV.= 205.4'
INV. ELEV.= 193.3'
DEPTH= 12.1'

EXAMPLE



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PROJECT: Roseville MH	PROJECT NUMBER: 12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

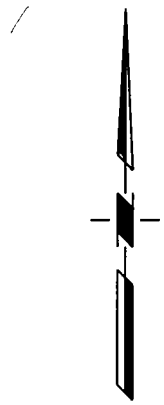
DATE OF SURVEY: 06-17-2005 POINT NUMBER: 7045

FACILITY TYPE/ No.: SS D 05-124 STREET NAME: Diamond Oaks Rd
(SS, SD, ELEC, TEL)

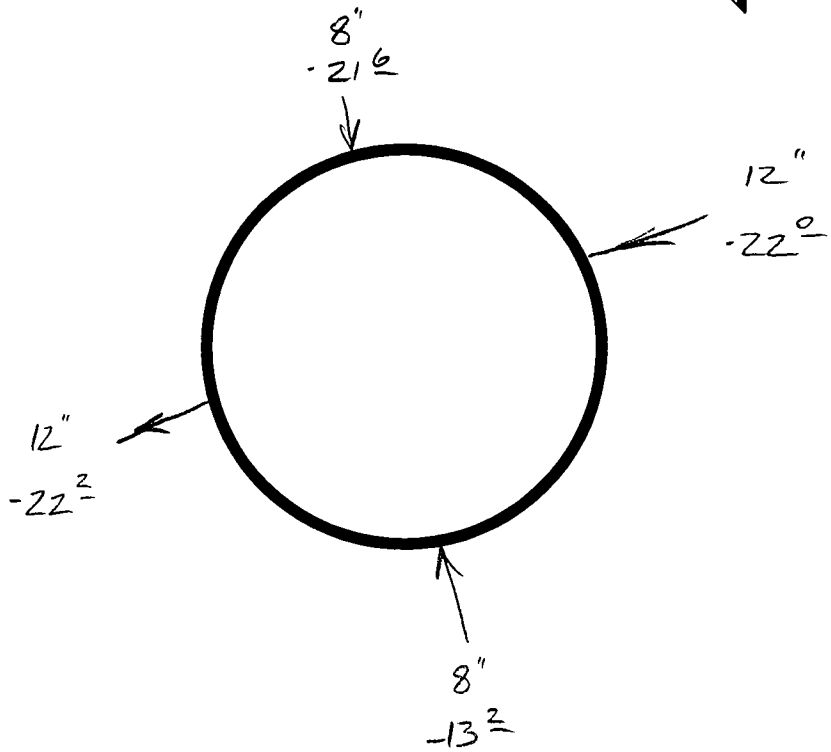
NEAREST CROSS STREET: Martha Wy

NEAREST ADDRESS # @ Intx

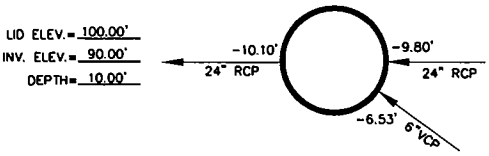
SPECIAL MARKINGS:



LID ELEV.= 178.0'
INV. ELEV.= 155.8'
DEPTH= 22.2'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS, MS

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7015

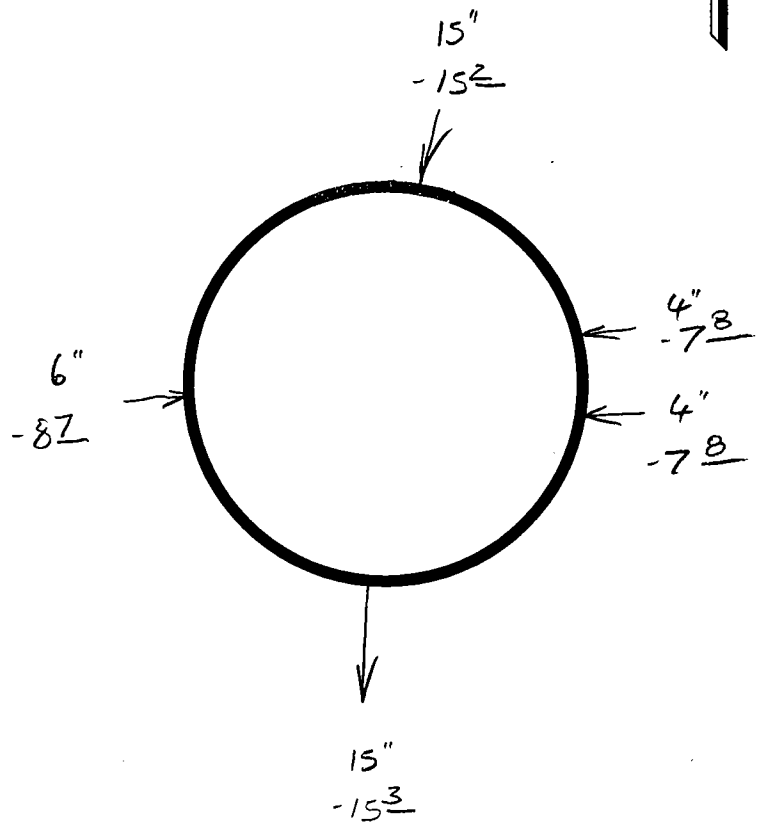
FACILITY TYPE/ No.: SS E14-50 STREET NAME: Joe Rodgers
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Almond Knoll

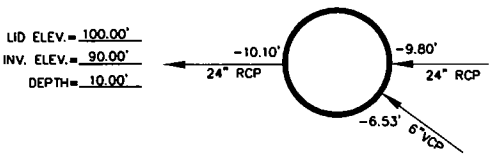
NEAREST ADDRESS # 8307

SPECIAL MARKINGS:

LID ELEV.= 354.2'
INV. ELEV.= 338.9'
DEPTH= 15.3'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7027

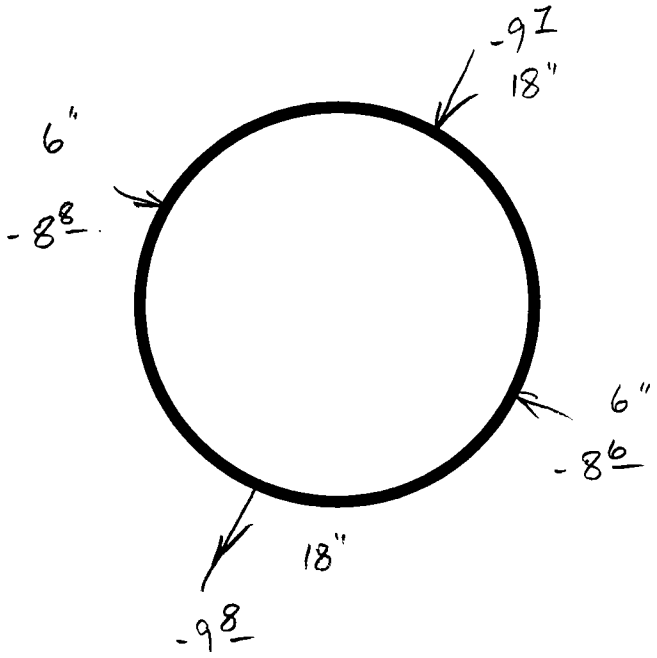
FACILITY TYPE/ No.: SS B11-123 STREET NAME: Elmhurst Dr
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Richford Ln

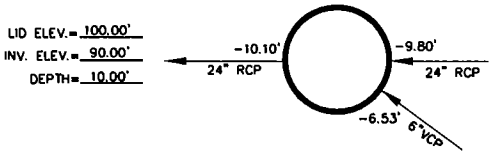
NEAREST ADDRESS # 9874

SPECIAL MARKINGS:

LID ELEV.= 276.8'
INV. ELEV.= 267.0'
DEPTH= 9.8'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

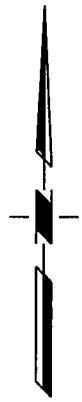
DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7025

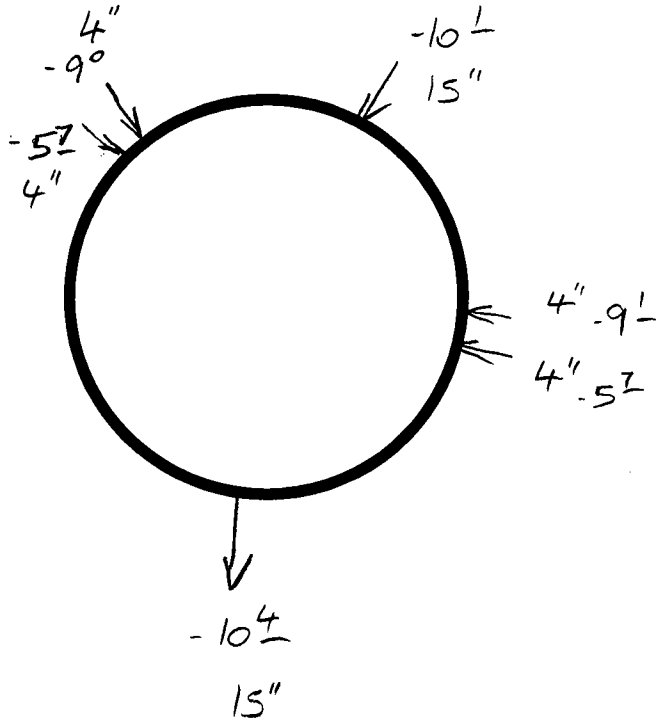
FACILITY TYPE/ No.: SS B11-75 STREET NAME: Richford LN
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: E-Roseville Pkwy

NEAREST ADDRESS # 9403

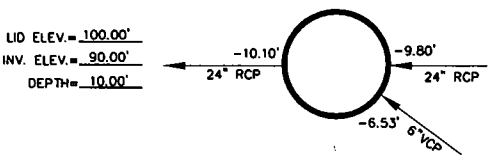
SPECIAL MARKINGS:





LID ELEV.= 264.3'
INV. ELEV.= 253.9'
DEPTH= 10.4'

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS/JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06·13·2005 POINT NUMBER: 7017

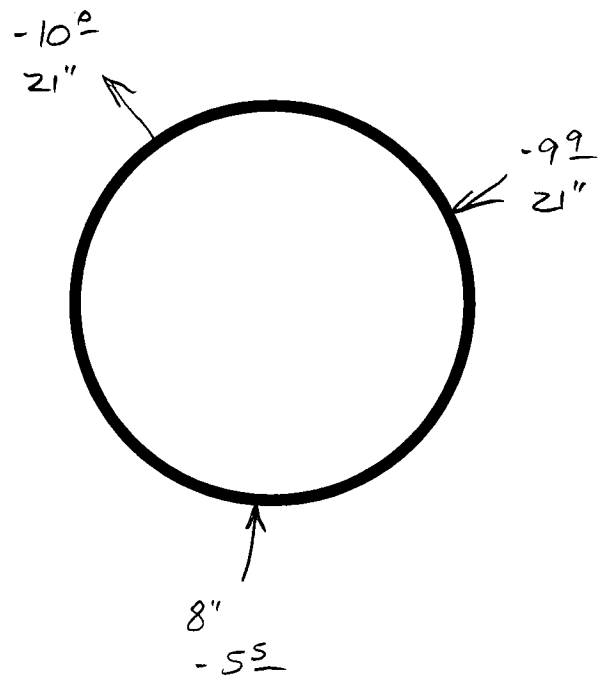
FACILITY TYPE/ No.: SS B11-60 STREET NAME: Elmhurst
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Swan Lake

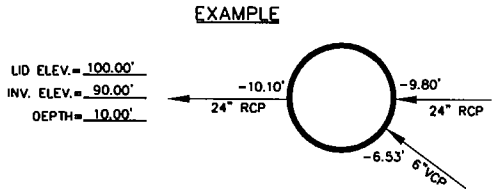
NEAREST ADDRESS # @ mtx

SPECIAL MARKINGS:

LID ELEV.= 295.6'
INV. ELEV.= 285.6'
DEPTH= 10.0'



EXAMPLE



ANDREGG GEOMATICS
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PROJECT: Roseville MH	PROJECT NUMBER: 12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7018

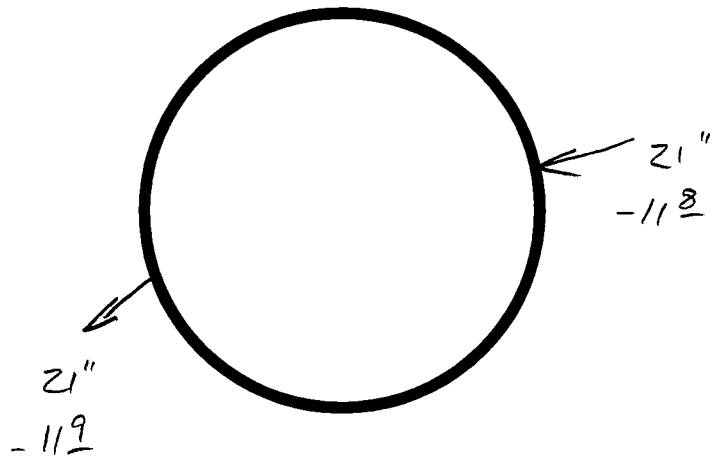
FACILITY TYPE/ No.: SS B11-59 STREET NAME: Elmhurst
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Linda Creek

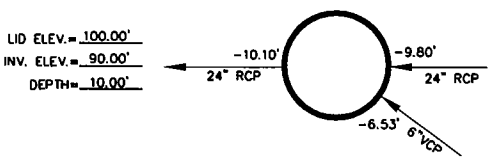
NEAREST ADDRESS # 9769

SPECIAL MARKINGS:

LID ELEV.= 299.2'
INV. ELEV.= 287.3'
DEPTH= 11.9'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

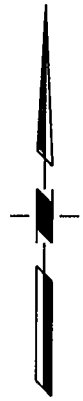
DATE OF SURVEY: 06·13-2005 POINT NUMBER: 7016

FACILITY TYPE/ No.: SS B11-58 STREET NAME: Elm Hurst Dr
(SS, SD, ELEC, TEL)

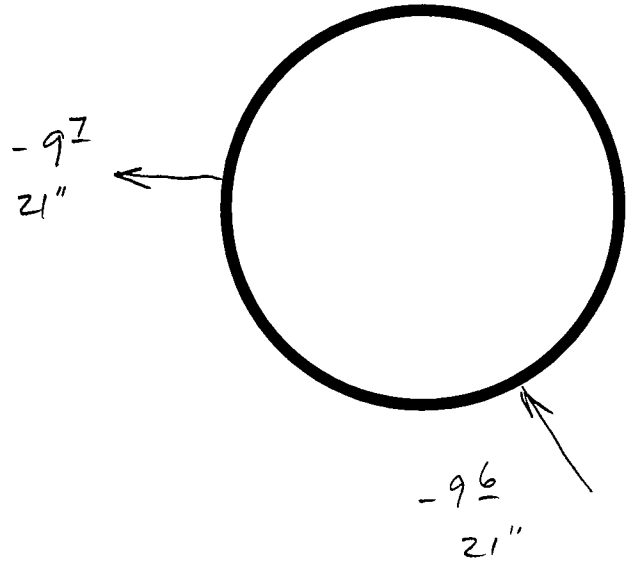
NEAREST CROSS STREET: Swan Lake Dr

NEAREST ADDRESS # @ Intx Swan Lake / Elm Hurst

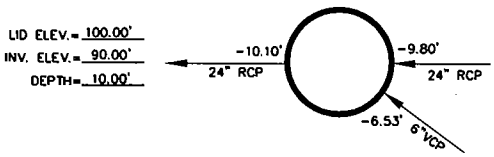
SPECIAL MARKINGS:



LID ELEV.= 295.1'
INV. ELEV.= 285.4'
DEPTH= 9.7'



EXAMPLE



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PROJECT: Roseville MH	PROJECT NUMBER: 12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7024

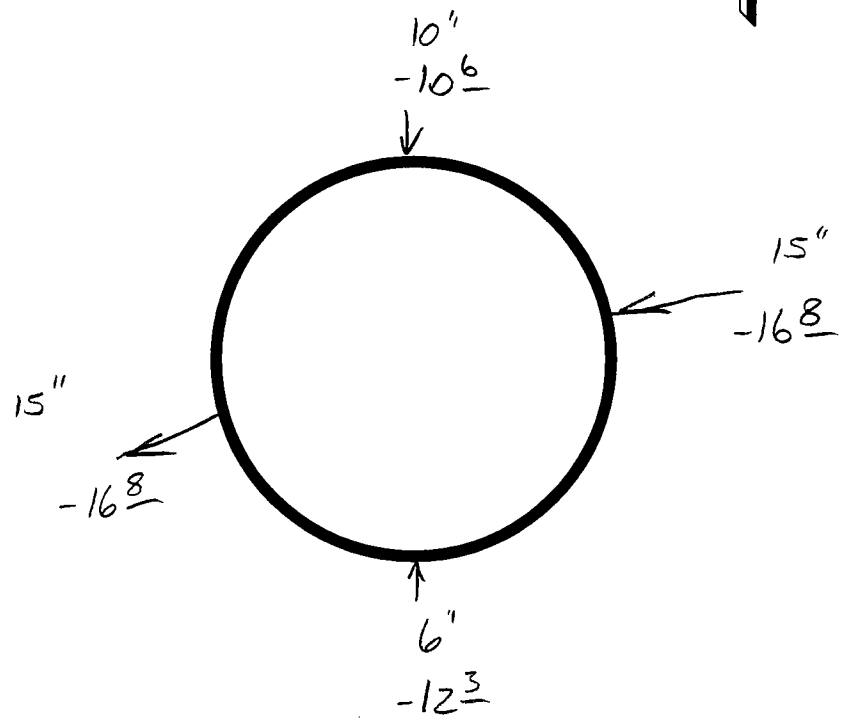
FACILITY TYPE/ No.: SS B11-57 STREET NAME: Elmhurst
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Twin Schools

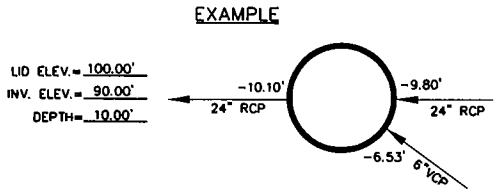
NEAREST ADDRESS # @ Intx

SPECIAL MARKINGS:

LID ELEV.= 290.6'
INV. ELEV.= 273.8'
DEPTH= 16.8'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

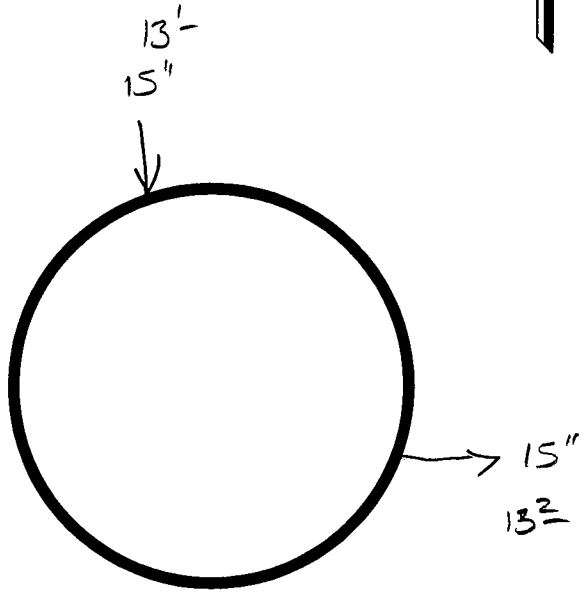
DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7026

FACILITY TYPE/ No.: SS B11-14 STREET NAME: E. Roseville Pkwy
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Richford

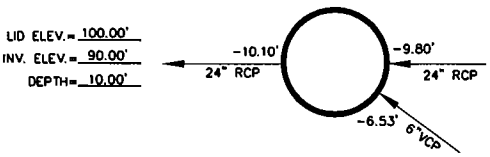
NEAREST ADDRESS # @ Intx

SPECIAL MARKINGS:



LID ELEV.= 260.9'
INV. ELEV.= 247.7
DEPTH= 13.2'

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7022

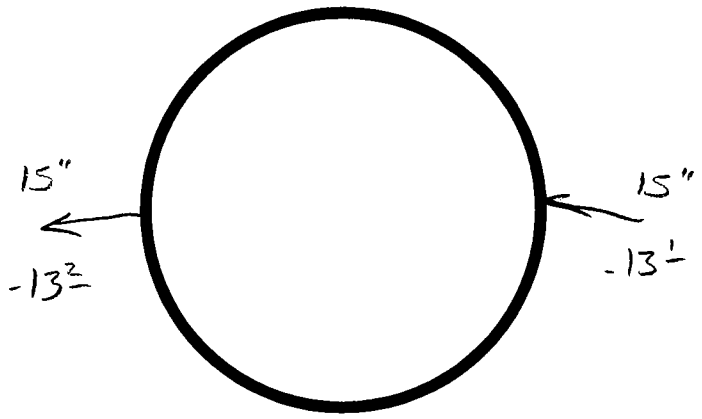
FACILITY TYPE/ No.: SS B11-05 STREET NAME: Elmhurst
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Twin Schools

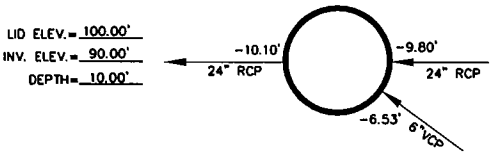
NEAREST ADDRESS #

SPECIAL MARKINGS:

LID ELEV.= 287.5
INV. ELEV.= 274.3
DEPTH= 13.2'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

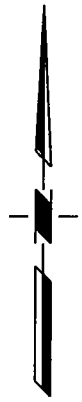
DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7021

FACILITY TYPE/ No.: SS B11 - 04 STREET NAME: Elmhurst
(SS, SD, ELEC, TEL)

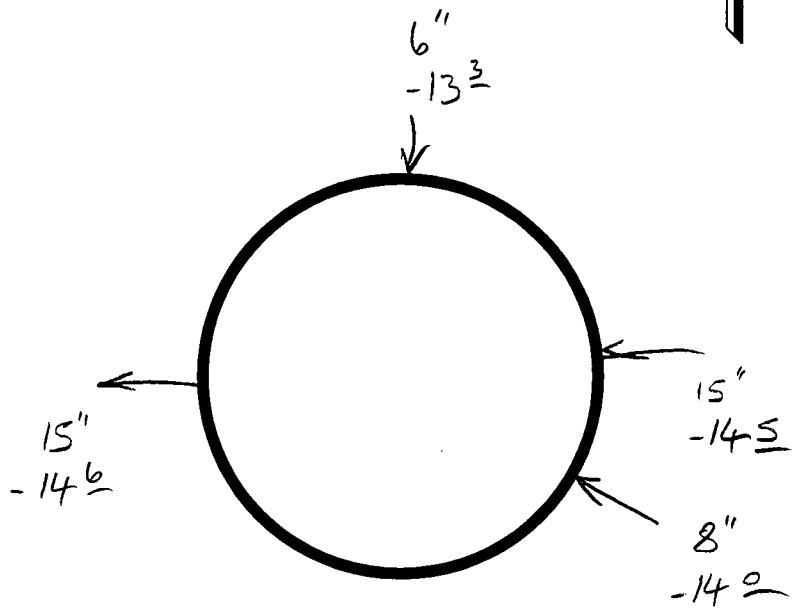
NEAREST CROSS STREET: Twin Schools

NEAREST ADDRESS # 9815

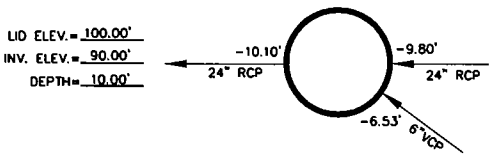
SPECIAL MARKINGS:



LID ELEV.= 289.3
INV. ELEV.= 274.7
DEPTH= 14.6



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7020

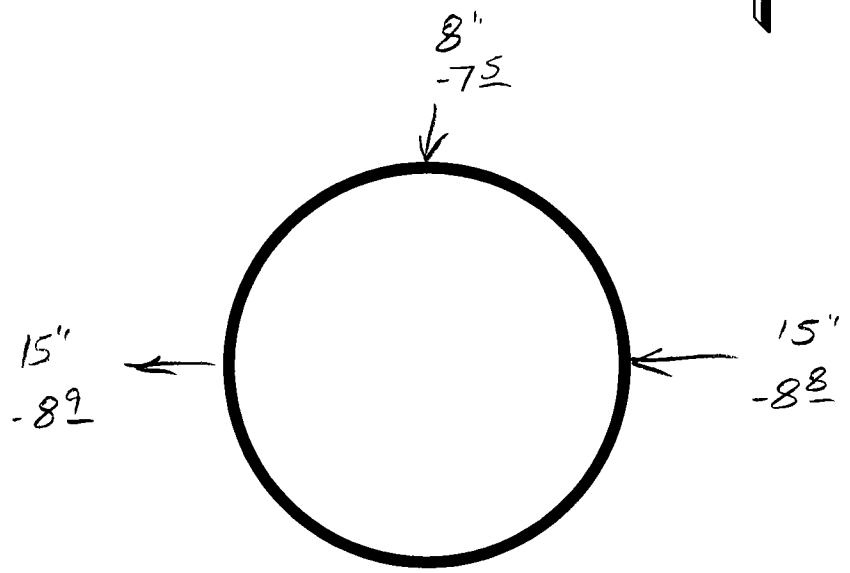
FACILITY TYPE/ No.: SS B11-03 STREET NAME: Elmhurst
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Swan Lake

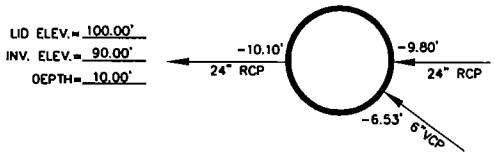
NEAREST ADDRESS # 9804

SPECIAL MARKINGS:

LID ELEV.= 293.8'
INV. ELEV.= 284.9
DEPTH= 8.9'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

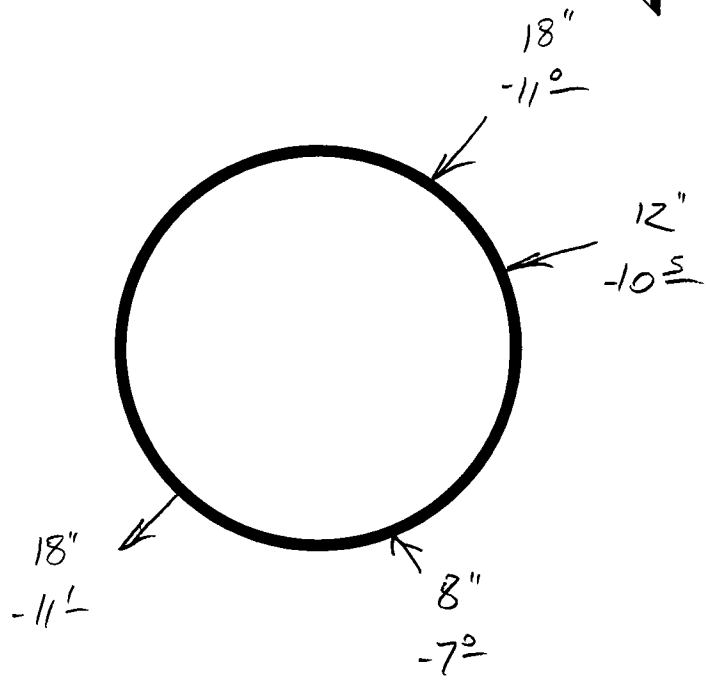
DATE OF SURVEY: 06-13-2006 POINT NUMBER: 7019

FACILITY TYPE/ No.: SS B11-02 STREET NAME: Linda Creek
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Elm Hurst

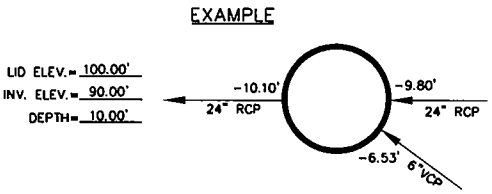
NEAREST ADDRESS # @ Intx

SPECIAL MARKINGS:



LID ELEV.= 300.4
INV. ELEV.= 289.3
DEPTH= 11.1

EXAMPLE



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PROJECT: Roseville MH	PROJECT NUMBER: 12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

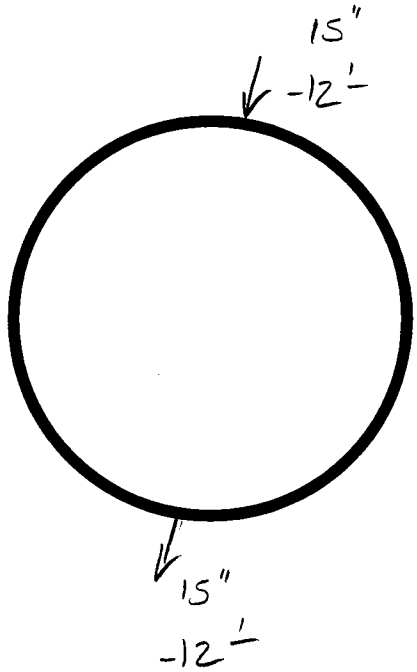
DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7028

FACILITY TYPE/ No.: SS B10-33 STREET NAME: Swan Lake Dr.
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Beckenridge Ct

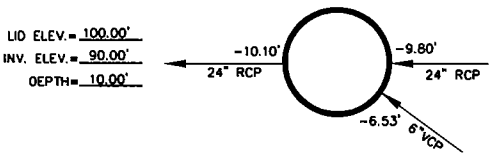
NEAREST ADDRESS # @ Intx

SPECIAL MARKINGS:



LID ELEV.= 240.7'
INV. ELEV.= 228.6'
DEPTH= 12.1'

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7014

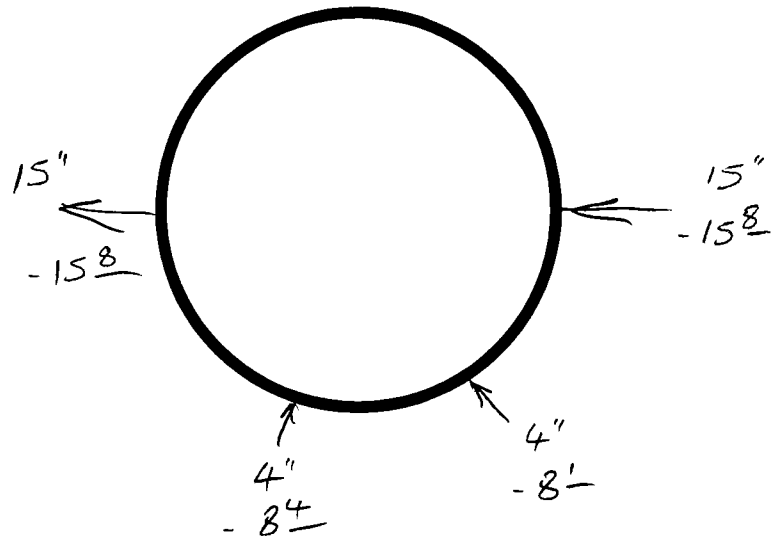
FACILITY TYPE/ No.: SS E14-57 STREET NAME: Joe Rodgers
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Almond Knoll Ct

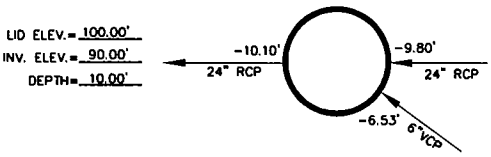
NEAREST ADDRESS # Joe Rodgers #8317

SPECIAL MARKINGS:

LID ELEV.= 354.4'
INV. ELEV.= 338.6'
DEPTH= 15.8'



EXAMPLE



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PROJECT: Roseville MH	PROJECT NUMBER: 12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

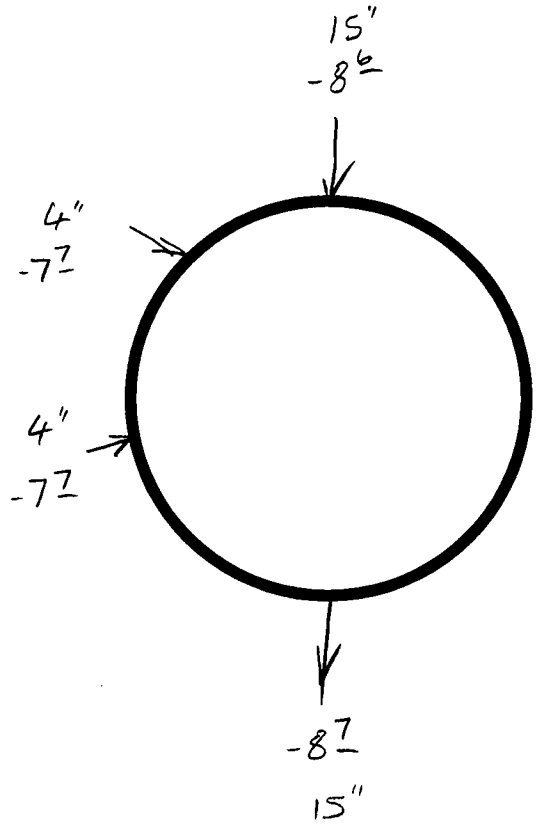
DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7012

FACILITY TYPE/ No.: M 8-92 STREET NAME: Rawhide
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Rawhide Ct

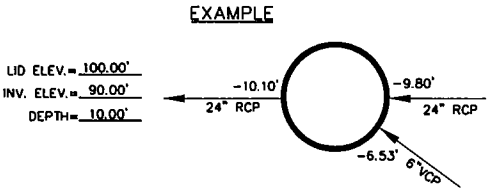
NEAREST ADDRESS # Rawhide #3914

SPECIAL MARKINGS:



LID ELEV.= 303.3'
INV. ELEV.= 294.6'
DEPTH= 8.7'

EXAMPLE



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PROJECT: Roseville MH	PROJECT NUMBER: 12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

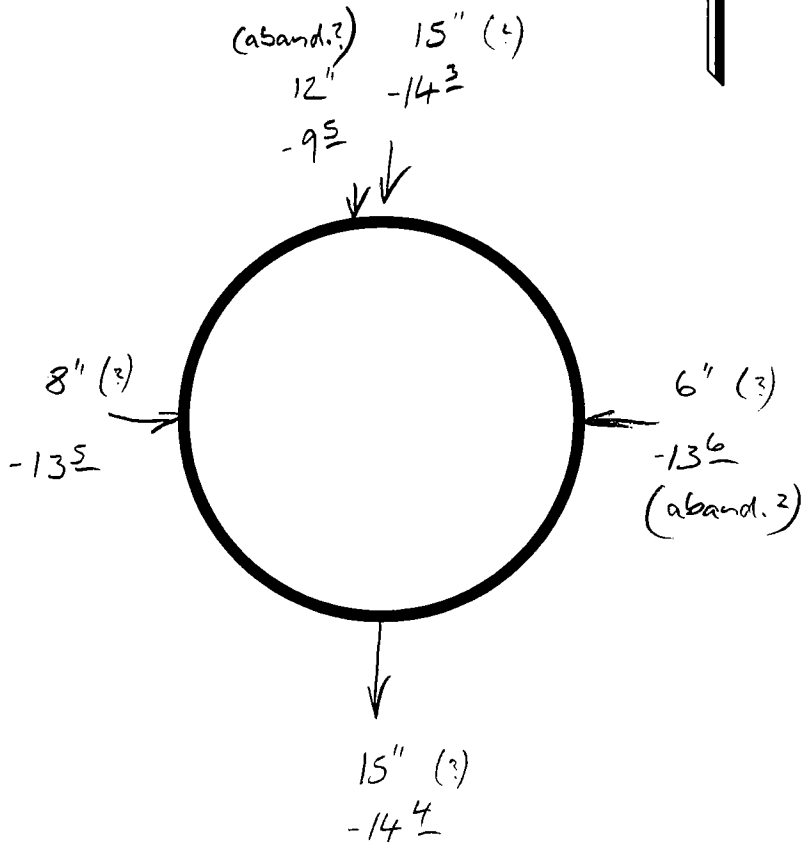
DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7013

FACILITY TYPE/ No.: SS M6-12 STREET NAME: Park Dr
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Victory Dr

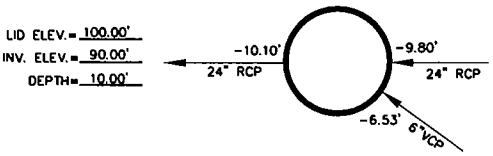
NEAREST ADDRESS # (SE Section Intx Park/Victory)

SPECIAL MARKINGS:



LID ELEV.= 170.6'
INV. ELEV.= 156.2'
DEPTH= 14.4'

EXAMPLE



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PROJECT: Roseville MH	PROJECT NUMBER: 12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

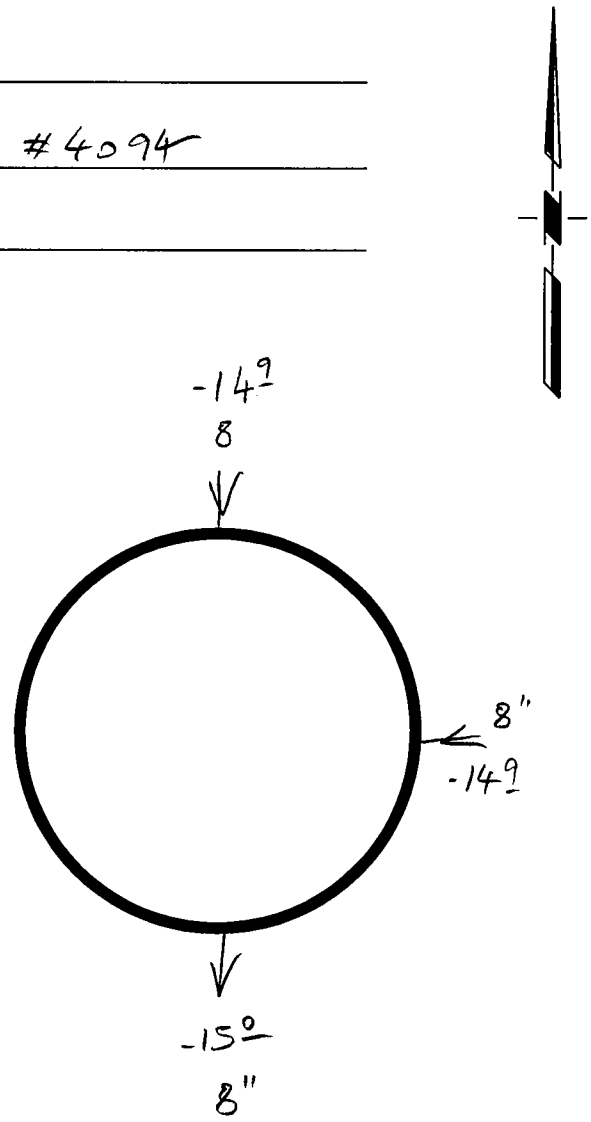
DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7010

FACILITY TYPE/ No.: SS L8-37 STREET NAME: Rawhide
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Buckskin

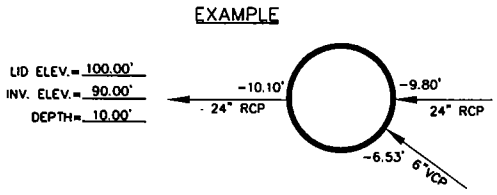
NEAREST ADDRESS # Rawhide #4094

SPECIAL MARKINGS:



LID ELEV.= 274.0'
INV. ELEV.= 259.0'
DEPTH= 15.0'

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

05061351

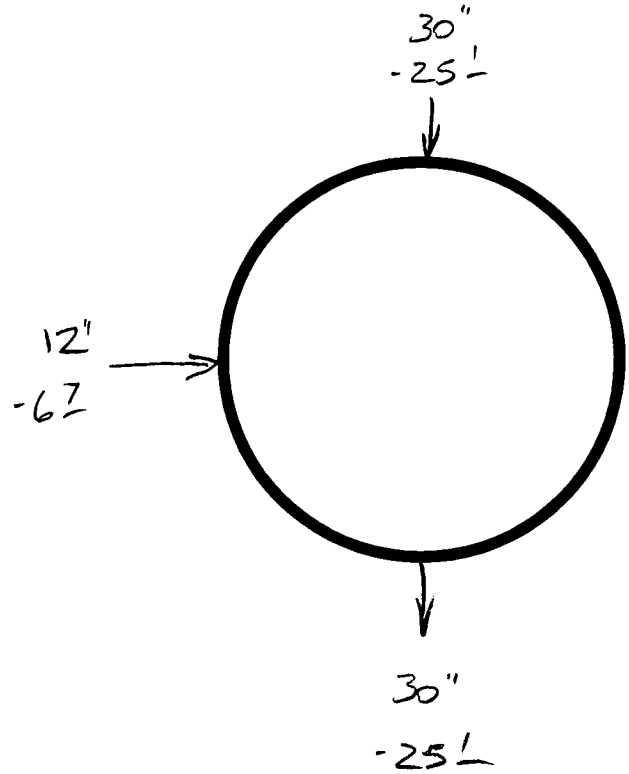
DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7081

FACILITY TYPE/ No.: SS L4.19 STREET NAME: Sunset
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Blue Oaks

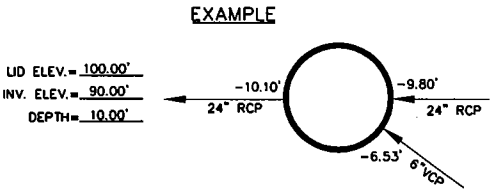
NEAREST ADDRESS # Sunset #2121 (@ Creek Crossing)

SPECIAL MARKINGS:



LID ELEV.= 144.7
INV. ELEV.= 119.6
DEPTH= 25.1

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
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MANHOLE DIPSHEET

05061331

A-29

DATE OF SURVEY: 07-01-2005

POINT NUMBER: 7080

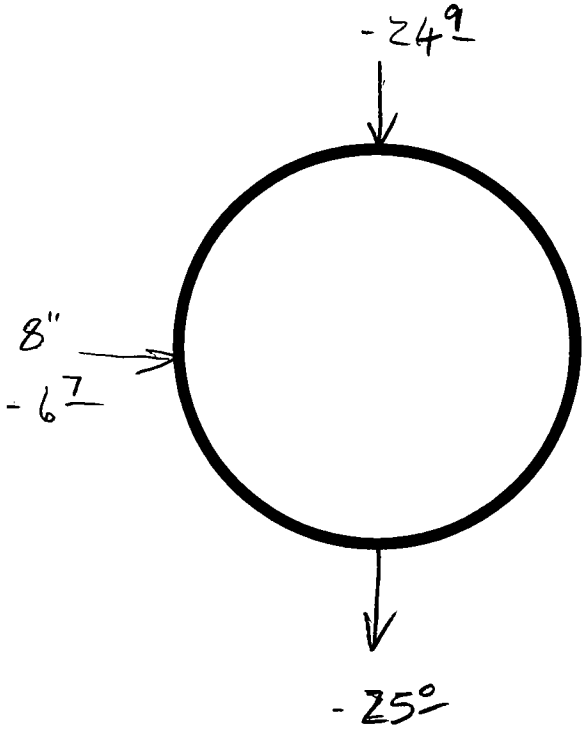
FACILITY TYPE/ No.: SS L4-16
(SS, SD, ELEC, TEL)

STREET NAME: Sunset

NEAREST CROSS STREET: Blue Oaks

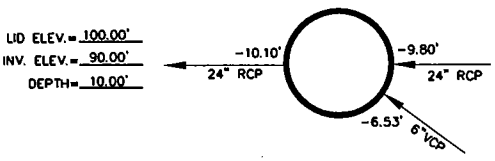
NEAREST ADDRESS # #2121 (@ Creek Crossing

SPECIAL MARKINGS:



LID ELEV.= 144.9
INV. ELEV.= 119.9
DEPTH= 25.0

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS / JC

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MANHOLE DIPSHEET

05061351

Pic #75

DATE OF SURVEY: 0701-2005

POINT NUMBER: 7061

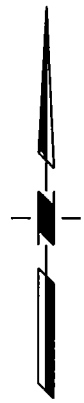
FACILITY TYPE/ No.: SS K10-34
(SS, SD, ELEC, TEL)

STREET NAME: Dominguez Rd

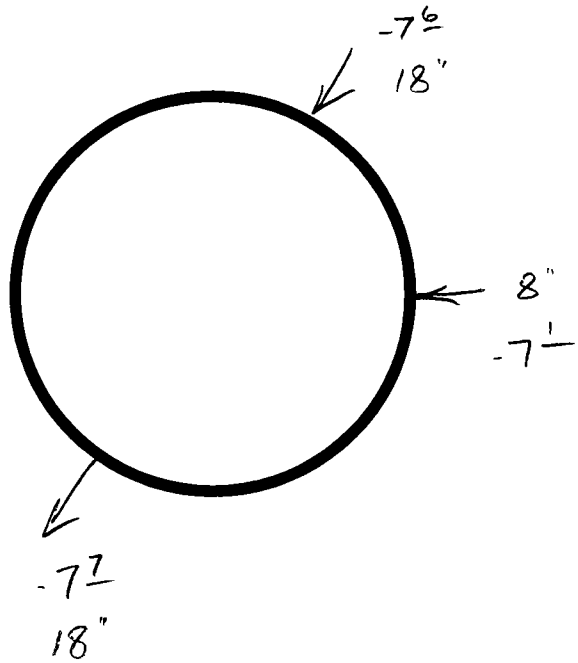
NEAREST CROSS STREET: Granite

NEAREST ADDRESS # @ Creek crossing

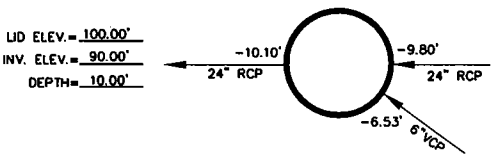
SPECIAL MARKINGS:



LID ELEV.= 296.5
INV. ELEV.= 288.8
DEPTH= 7.7



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
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MANHOLE DIPSHEET

DATE OF SURVEY: 06.13.2005 POINT NUMBER: 7009

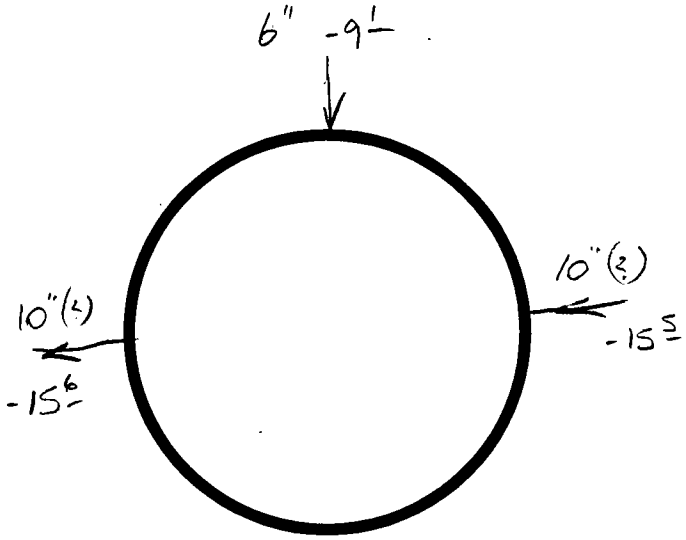
FACILITY TYPE/ No.: SS K8.23 STREET NAME: Argonaut
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Kennedy

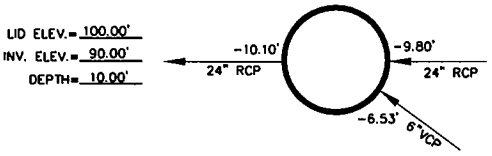
NEAREST ADDRESS # Argonaut # 3360

SPECIAL MARKINGS:

LID ELEV.= 239.8'
INV. ELEV.= 224.2'
DEPTH= 15.6'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

05061351

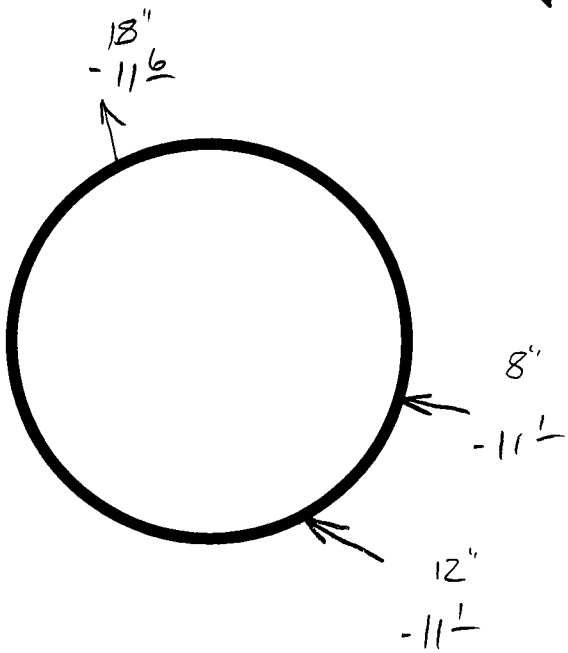
DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7076

FACILITY TYPE/ No.: SS K4-05 STREET NAME: off
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Big Sky

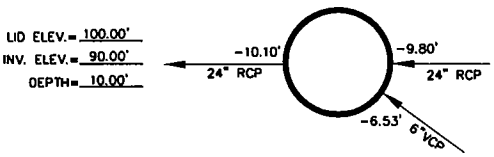
NEAREST ADDRESS # 2130 Big Sky

SPECIAL MARKINGS:



LID ELEV.= 158.0
INV. ELEV.= 146.4
DEPTH= 11.6

EXAMPLE



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MANHOLE DIPSHEET

05061351

DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7078

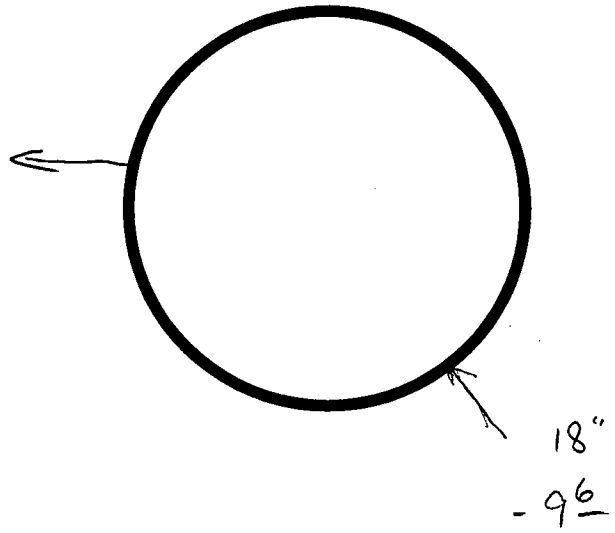
FACILITY TYPE/ No.: SS R4-03 STREET NAME: off
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Blue Oaks

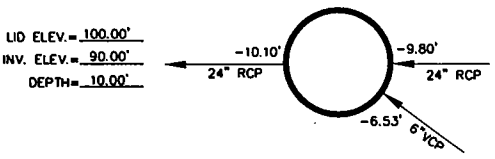
NEAREST ADDRESS #

SPECIAL MARKINGS: (SMUD Easement)

LID ELEV.= 136.6
INV. ELEV.= 126.8
DEPTH= 9.8



EXAMPLE



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CLIENT:	CREW:
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MANHOLE DIPSHEET

05061351

DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7079

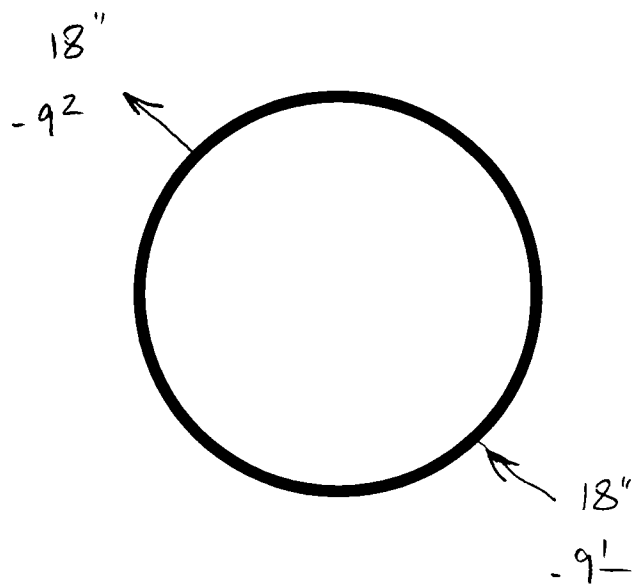
FACILITY TYPE/ No.: SS K4-02 STREET NAME:
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Blue Oaks

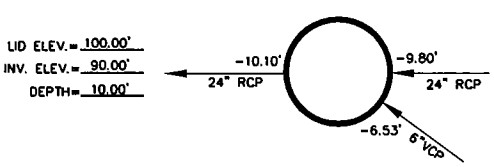
NEAREST ADDRESS #

SPECIAL MARKINGS: (SMUD Easement)

LID ELEV.= 137.4
INV. ELEV.= 128.2
DEPTH= 9.2



EXAMPLE



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Roseville MH	12257-01
CLIENT:	CREW: SS/JC

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MANHOLE DIPSHEET

05061331

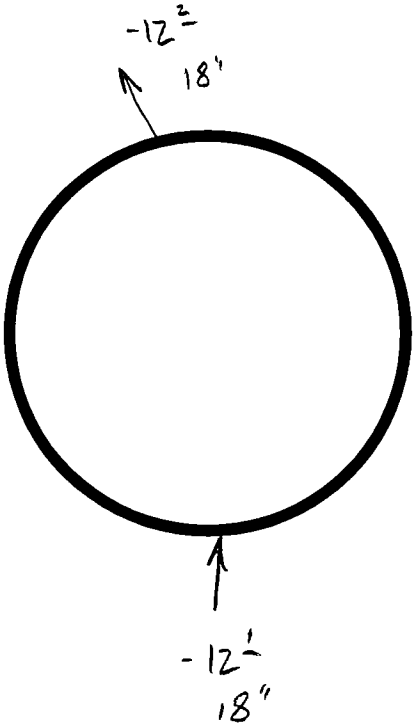
DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7077

FACILITY TYPE/ No.: SS K4-01 STREET NAME: off
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Big Sky

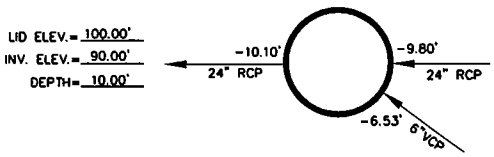
NEAREST ADDRESS # 2130 Big Sky

SPECIAL MARKINGS:



LID ELEV.= 142.8
INV. ELEV.= 130.6
DEPTH= 12.2

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

05061351

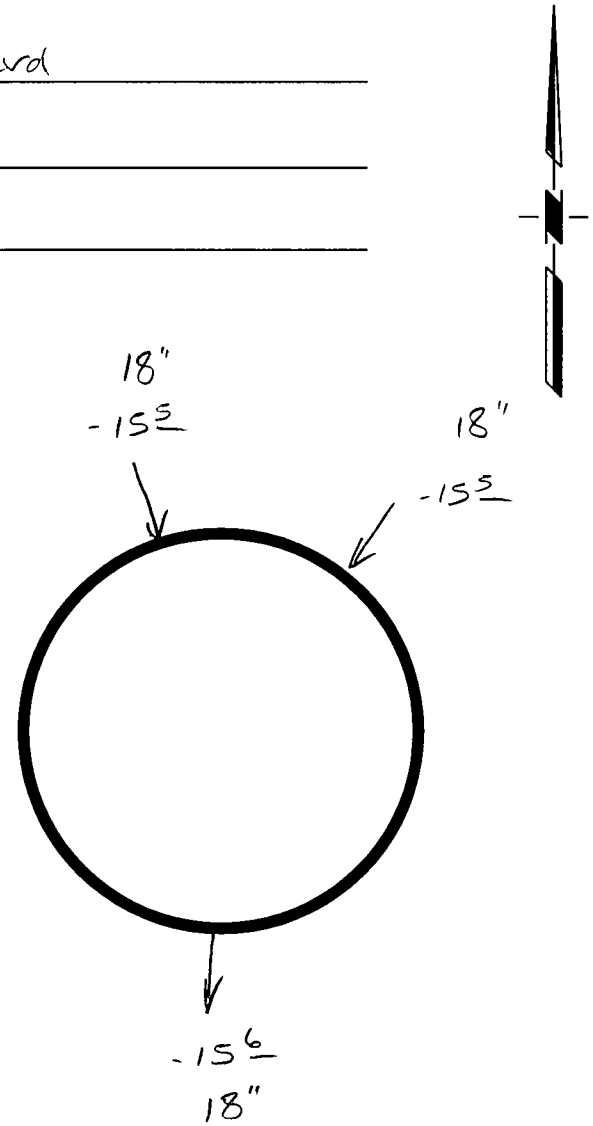
DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7063

FACILITY TYPE/ No.: SS J7-59 STREET NAME: Off
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Whitney Blvd

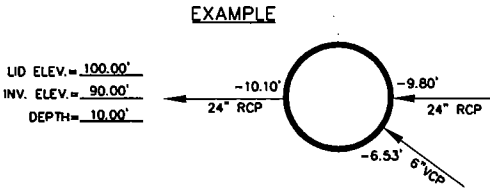
NEAREST ADDRESS #

SPECIAL MARKINGS:



LID ELEV.= 225.3
INV. ELEV.= 209.7
DEPTH= 15.6

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS/JC

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MANHOLE DIPSHEET

05061351

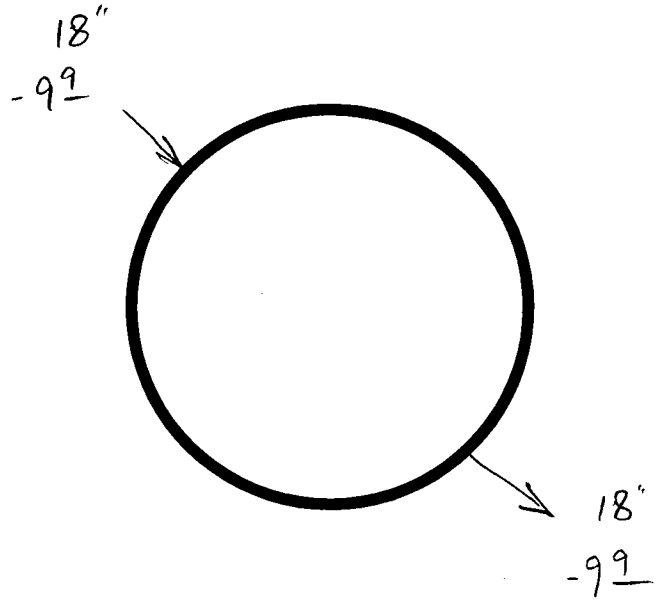
DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7064

FACILITY TYPE/ No.: SS J 7-58 STREET NAME: Off
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET:

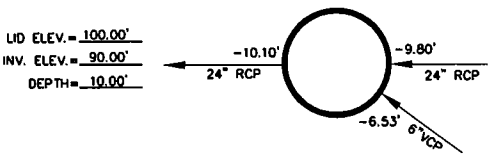
NEAREST ADDRESS #

SPECIAL MARKINGS:



LID ELEV.= 219.3
INV. ELEV.= 209.4
DEPTH= 9.9

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
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MANHOLE DIPSHEET

05061351

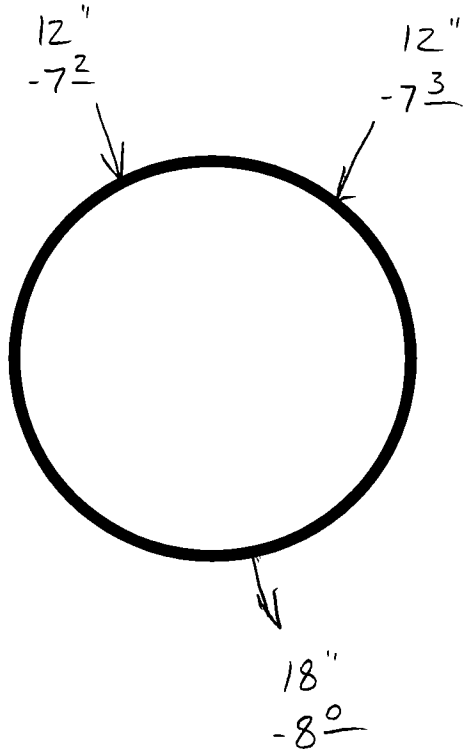
DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7065

FACILITY TYPE/ No.: SS J7-11 STREET NAME: Off
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Village Oaks Dr

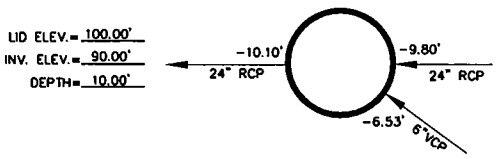
NEAREST ADDRESS #

SPECIAL MARKINGS:



LID ELEV.= 218.5
INV. ELEV.= 210.5
DEPTH= 8.0

EXAMPLE



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Roseville MH	12257-01
CLIENT:	CREW: SS/JC

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MANHOLE DIPSHEET

05061351

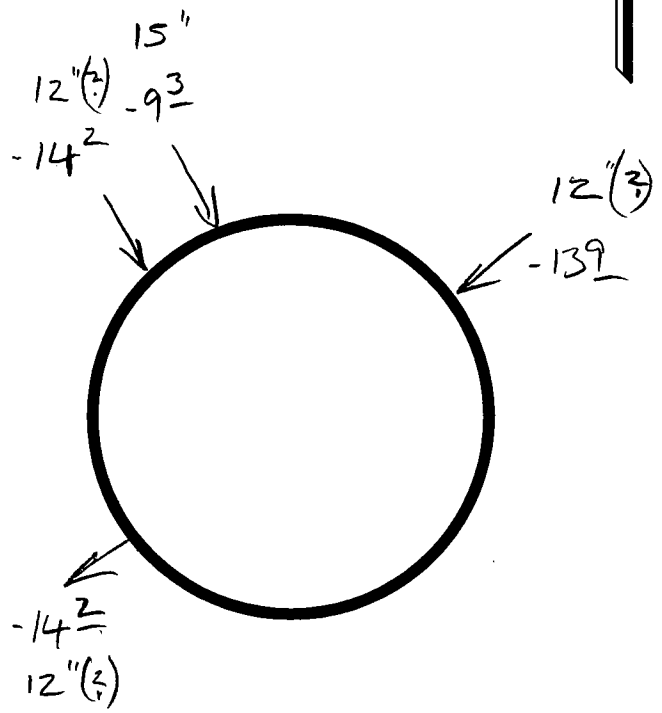
DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7083

FACILITY TYPE/ No.: SS 111-39 STREET NAME: Sierra College
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: El Don

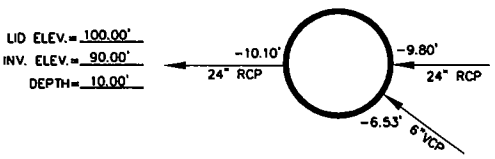
NEAREST ADDRESS #

SPECIAL MARKINGS:



LID ELEV.= 317.2
INV. ELEV.= 303.0
DEPTH= 14.2

EXAMPLE



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Roseville MH	12257-01
CLIENT:	CREW: SS / JC

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MANHOLE DIPSHEET

05061351

DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7060

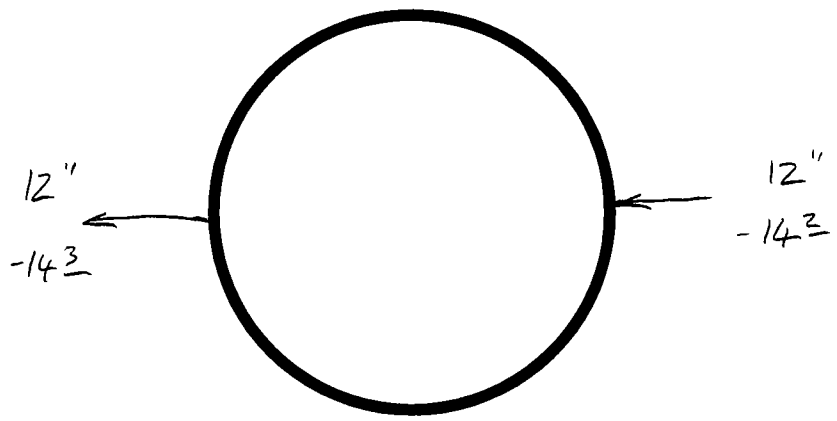
FACILITY TYPE/ No.: SS 110-48 (not labeled) STREET NAME: Off
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: El Don Dr / Corona Cir

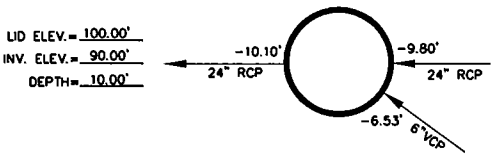
NEAREST ADDRESS # Corona Cir # 4708

SPECIAL MARKINGS:

LID ELEV.= 293.5
INV. ELEV.= 279.2
DEPTH= 14.3



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12253-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

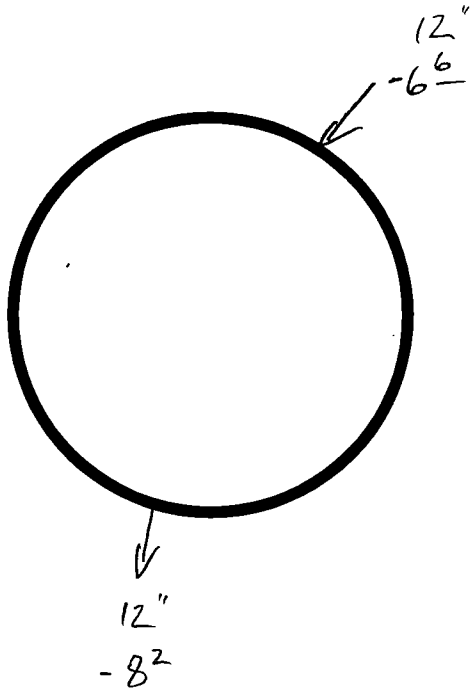
DATE OF SURVEY: 07-01-2005 (05061351) POINT NUMBER: 7087

FACILITY TYPE/ No.: SS 110-47 (not labeled) STREET NAME: off
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Corona Cir

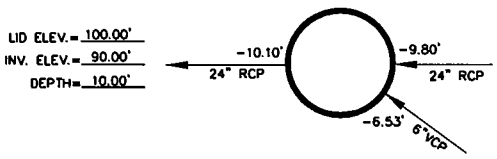
NEAREST ADDRESS # Corona Cir #4718

SPECIAL MARKINGS: along Creek



LID ELEV.= 282.0
INV. ELEV.= 273.8
DEPTH= 8.2

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

05061331

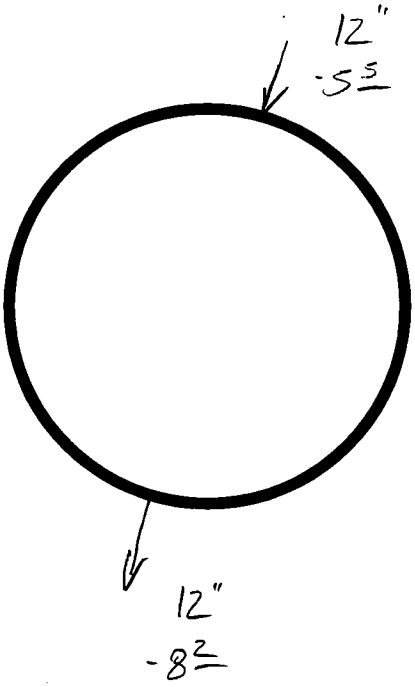
DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7086

FACILITY TYPE/ No.: SS / 10-46 (not labeled) STREET NAME: off
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Corona Cir

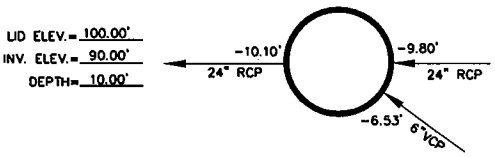
NEAREST ADDRESS # Corona Cir # 4718

SPECIAL MARKINGS: along Creek



LID ELEV.= 277.6
INV. ELEV.= 269.4
DEPTH= 8.2

EXAMPLE



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Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

05061351

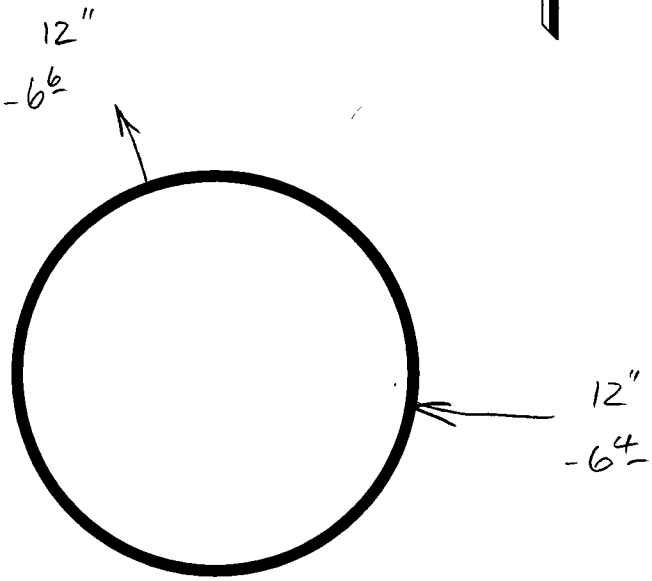
DATE OF SURVEY: 06-30-2005 POINT NUMBER: 7055

FACILITY TYPE/ No.: SS 1 10-45 (not labeled) STREET NAME: DW # 4635 4645
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Arrowhead

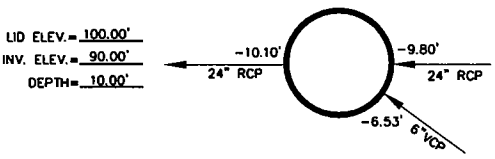
NEAREST ADDRESS # 4645

SPECIAL MARKINGS:



LID ELEV.= 274.8
INV. ELEV.= 268.2
DEPTH= 6.6

EXAMPLE



ANDREGG GEOMATICS
www.andregg.com
800-400-7072

PROJECT:	PROJECT NUMBER:
Roseville MH's	12257-01
CLIENT:	CREW: SS/JC

x:\dd2\1225701\dwg\1225701 DIPSHEET.dwg, 05/31/05 08:57:30am, Jasong

MANHOLE DIPSHEET

(PC 05061351)

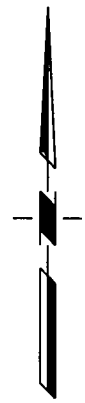
DATE OF SURVEY: 06-30-2005 POINT NUMBER: 7051

FACILITY TYPE/ No.: SS 110-29 ? STREET NAME: /
(SS, SD, ELEC, TEL)

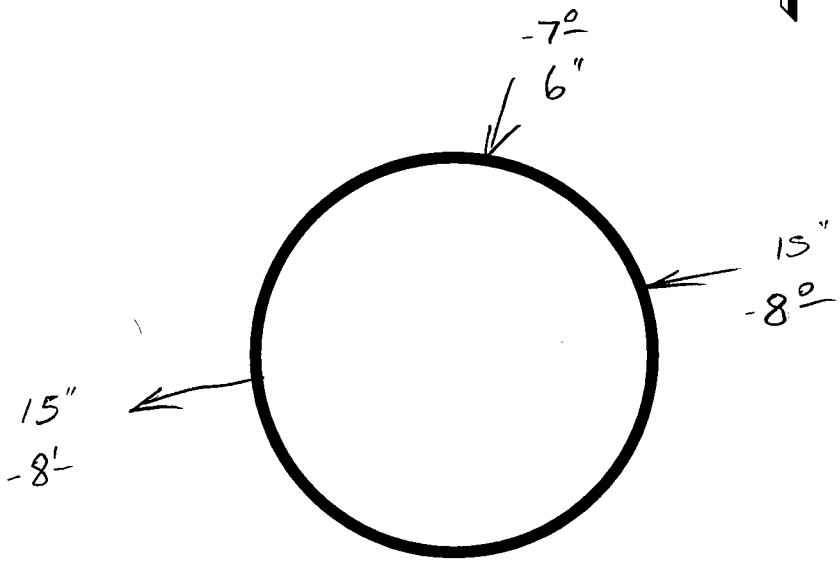
NEAREST CROSS STREET: Aguilar Rd

NEAREST ADDRESS # 5500 Aguilar Rd

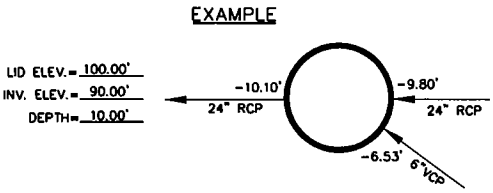
SPECIAL MARKINGS: Back @ Parking Lot for Apts



LID ELEV.= 264.7
INV. ELEV.= 256.6
DEPTH= 8.1



EXAMPLE



ANDREGG GEOMATICS
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PROJECT:	PROJECT NUMBER:
Roseville MH's	12257-01
CLIENT:	CREW:
	SS/JC

X:\Idd2\1225701\dwg\1225701 DIPSHEET.dwg, 05/31/05 08:57:30am, Jasong

MANHOLE DIPSHEET

(DC 05061351)

DATE OF SURVEY: 06-30-2005

POINT NUMBER: 7050

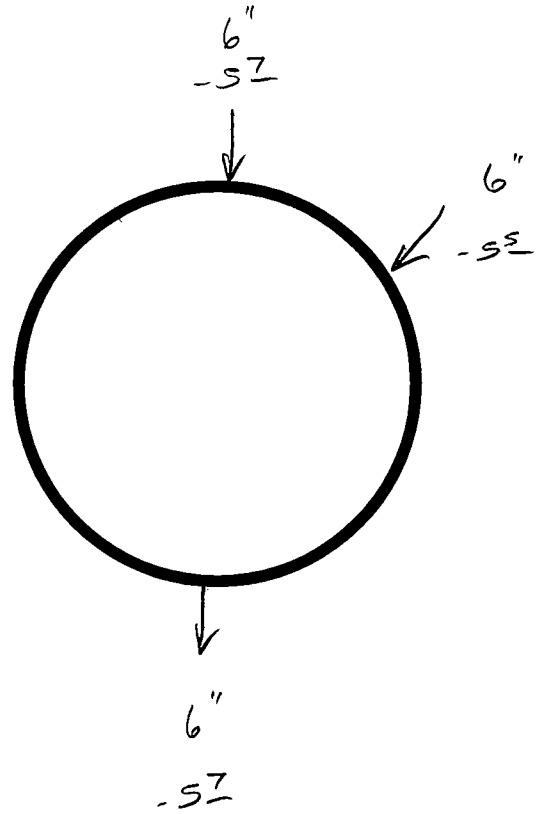
FACILITY TYPE/ No.: SS 1 10-26
(SS, SD, ELEC, TEL)

STREET NAME: Aguilar Rd

NEAREST CROSS STREET: Arrowhead Dr

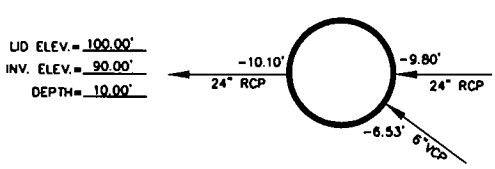
NEAREST ADDRESS # 5500

SPECIAL MARKINGS:



LID ELEV.= 275.6
INV. ELEV.= 269.9
DEPTH= 5.7

EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH's	12257-01
CLIENT:	CREW: SS/JC

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SPINUD

MANHOLE DIPSHEET

05061351

DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7069

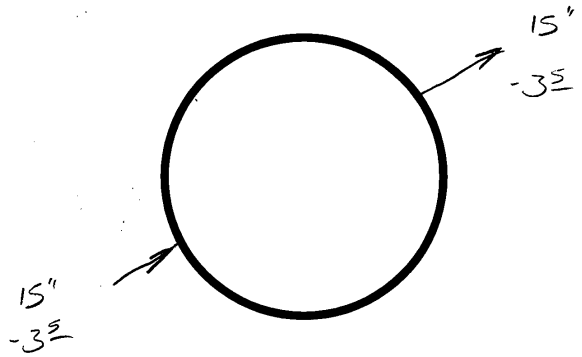
FACILITY TYPE/ No.: SS I7-70 STREET NAME: Bryce
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Rainier

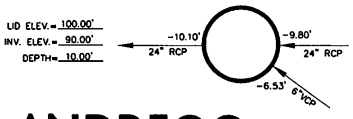
NEAREST ADDRESS # @E - Int x (near Antelope Creek)

SPECIAL MARKINGS:

LID ELEV.= 191.7'
INV. ELEV.= 188.2'
DEPTH= 3.5'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS/JC

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MANHOLE DIPSHEET

05061351

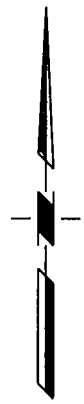
DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7073

FACILITY TYPE/ No.: SS 17-54 STREET NAME: Bryce Wy
(SS, SD, ELEC, TEL)

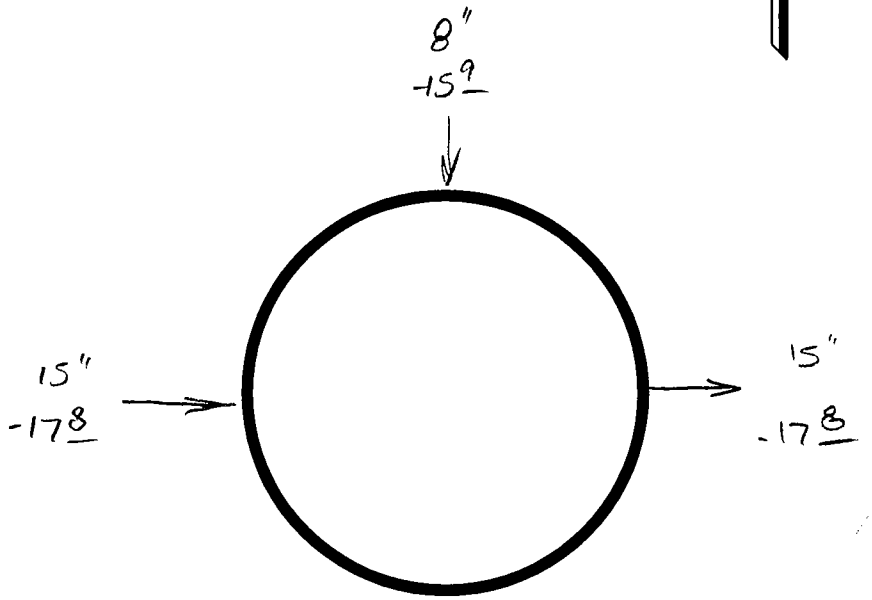
NEAREST CROSS STREET:

NEAREST ADDRESS # #6100

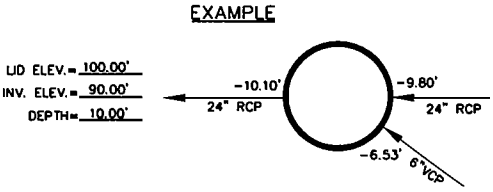
SPECIAL MARKINGS: Backyard



LID ELEV.= 206.2
INV. ELEV.= 188.4
DEPTH= 17-8



EXAMPLE



ANDREGG GEOMATICS
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PROJECT:	PROJECT NUMBER:
Roseville MH	12253.01
CLIENT:	CREW:
	SS/JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7005

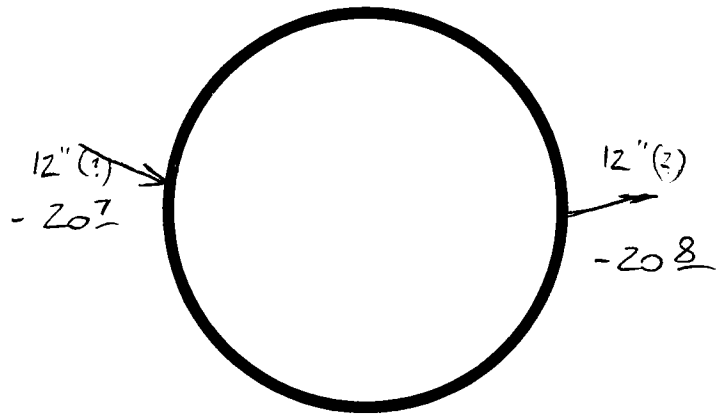
FACILITY TYPE/ No.: SS 17-51 STREET NAME: Rainer
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Lassen

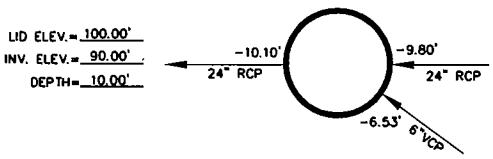
NEAREST ADDRESS # Rainer #6195

SPECIAL MARKINGS:

LID ELEV.= 209.7'
INV. ELEV.= 188.9'
DEPTH= 20.8'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7004

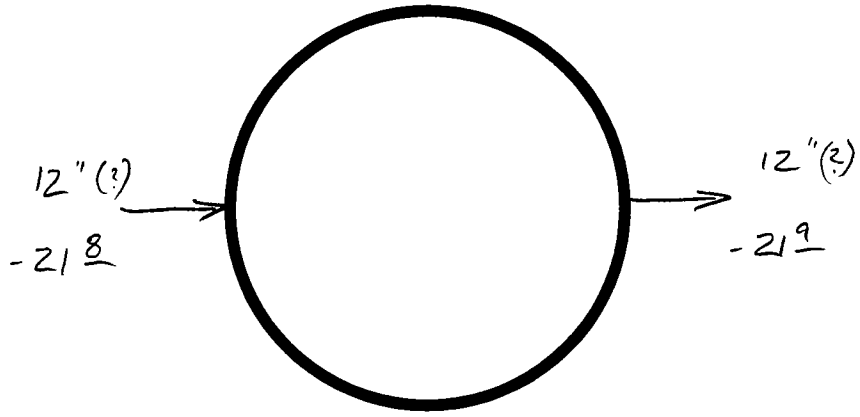
FACILITY TYPE/ No.: SS 17-50 STREET NAME: Rainer
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Lassen

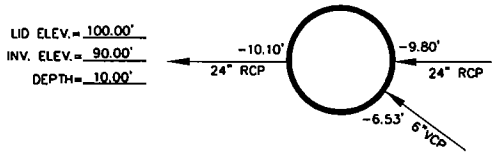
NEAREST ADDRESS # Rainer # 6180

SPECIAL MARKINGS:

LID ELEV.= 211.1'
INV. ELEV.= 189.2'
DEPTH= 21.9



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

05061331

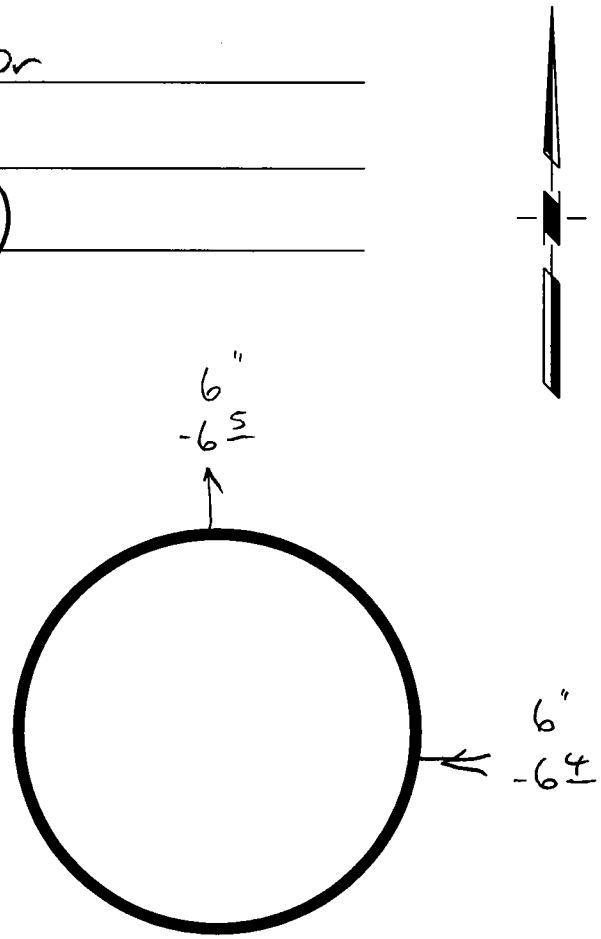
DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7082

FACILITY TYPE/ No.: SS 16-60 STREET NAME: Fairway Dr
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Zircon Dr

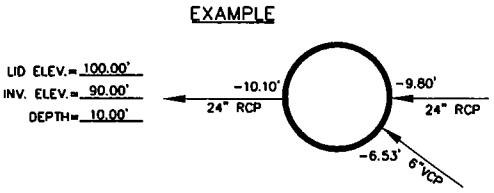
NEAREST ADDRESS # @ Intx

SPECIAL MARKINGS: (Dead ?)



LID ELEV.= 224.3
INV. ELEV.= 217.8
DEPTH= 6.5

EXAMPLE



ANDREGG GEOMATICS
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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW: SS/JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2006 POINT NUMBER: 7002

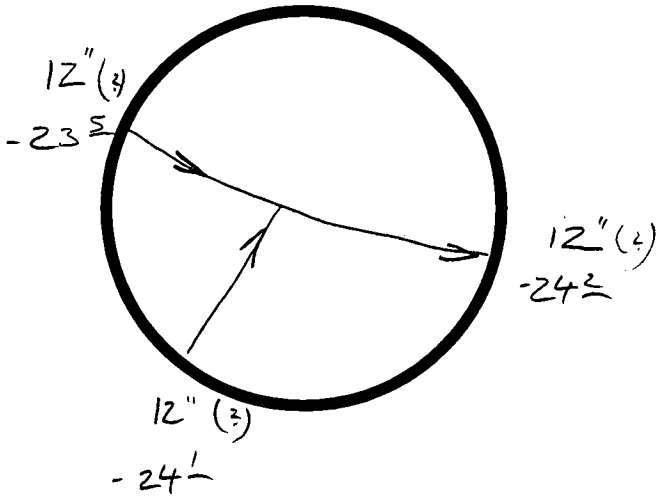
FACILITY TYPE/ No.: SS 16-53 STREET NAME: Casa Del Oro
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Casa del Oro / Rainer

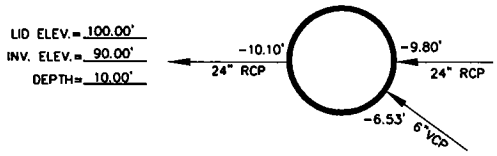
NEAREST ADDRESS # Rainer #6095

SPECIAL MARKINGS:

LID ELEV.= 214.0'
INV. ELEV.= 189.8'
DEPTH= 24.2'



EXAMPLE



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PROJECT: Roseville MH	PROJECT NUMBER: 12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7003

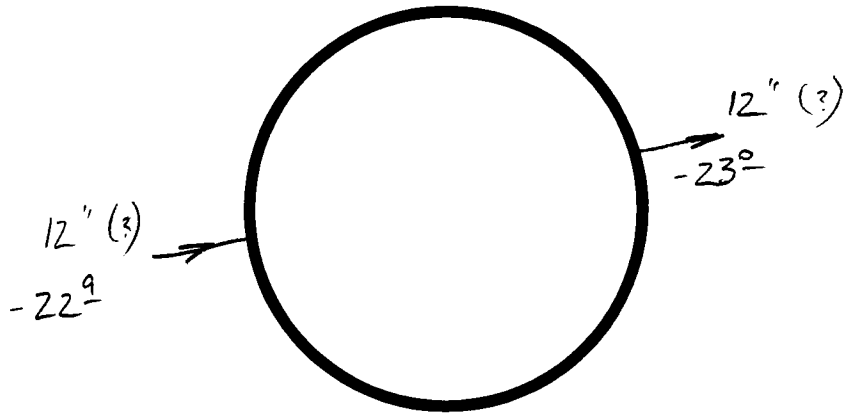
FACILITY TYPE/ No.: SS 16-52 STREET NAME: Rainer
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Lassen

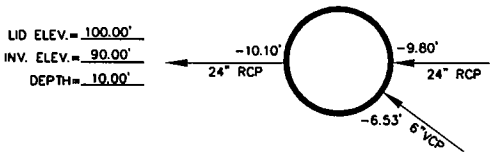
NEAREST ADDRESS # Rainer #6125

SPECIAL MARKINGS:

LID ELEV.= 212.5'
INV. ELEV.= 189.5'
DEPTH= 23.0'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

05061351

DATE OF SURVEY: 07-01-2005 POINT NUMBER: 7066

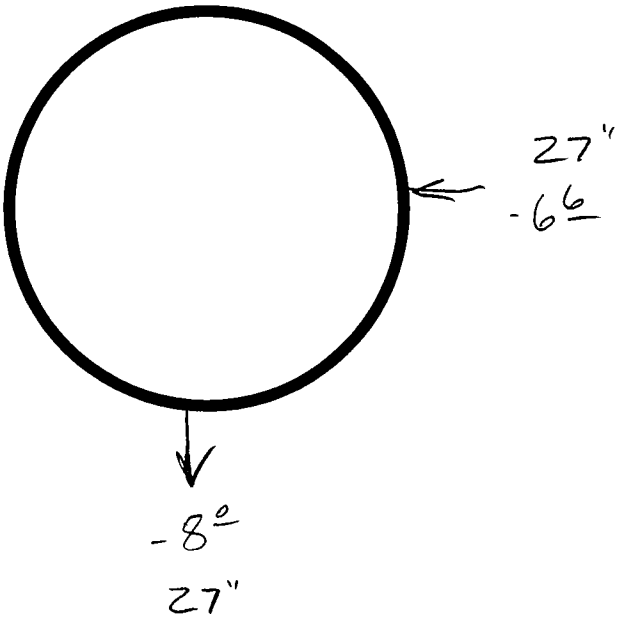
FACILITY TYPE/ No.: H7 - 140 (not labeled, Green "X") STREET NAME: Off
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Spring View Dr

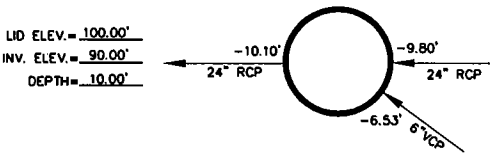
NEAREST ADDRESS # SMUD Yard

SPECIAL MARKINGS:

LID ELEV.= 202.9
INV. ELEV.= 194.9
DEPTH= 8.0



EXAMPLE



ANDREGG GEOMATICS
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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7007

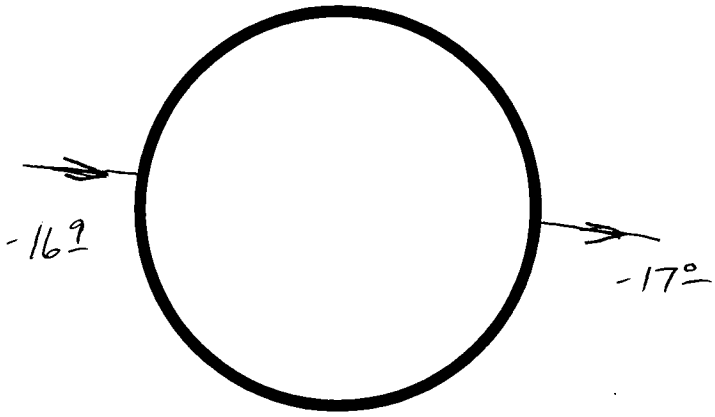
FACILITY TYPE/ No.: SS H 7-127 STREET NAME: Spring View
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: (Creek Crossing)

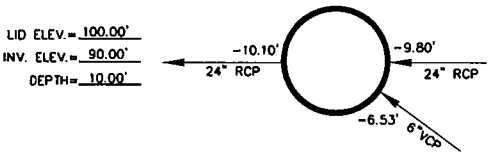
NEAREST ADDRESS # Spring View 5907

SPECIAL MARKINGS:

LID ELEV.= 192.0'
INV. ELEV.= 175.0'
DEPTH= 17.0'



EXAMPLE



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PROJECT: Roseville MH	PROJECT NUMBER:
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005

POINT NUMBER: 7008 (calc) (8001/8002)

FACILITY TYPE/ No.: SS H7-89
(SS, SD, ELEC, TEL)

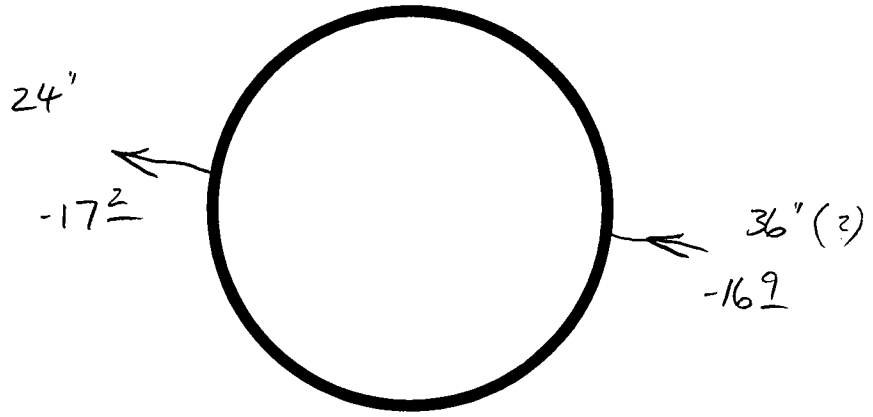
STREET NAME: Spring View

NEAREST CROSS STREET:

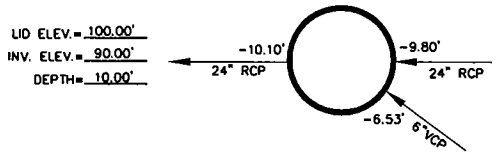
NEAREST ADDRESS # Parking Lot App. Complex

SPECIAL MARKINGS:

LID ELEV.= 195.2'
INV. ELEV.= 178.0'
DEPTH= 17.2'



EXAMPLE



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PROJECT: Roseville MH	PROJECT NUMBER: 12257-01
CLIENT:	CREW: SS, JC

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MANHOLE DIPSHEET

DATE OF SURVEY: 06-13-2005 POINT NUMBER: 7011

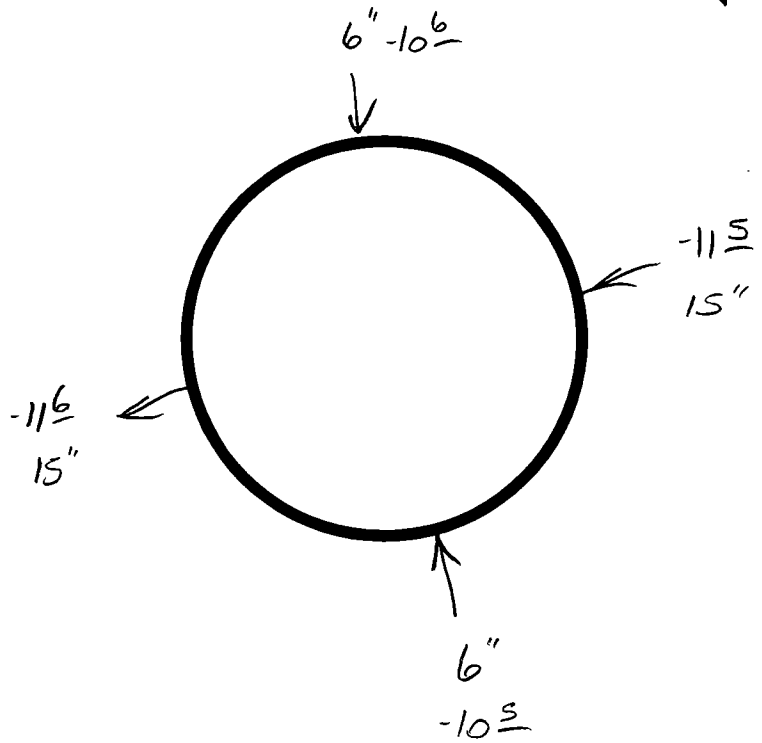
FACILITY TYPE/ No.: SS M9-18 STREET NAME: Rawhide
(SS, SD, ELEC, TEL)

NEAREST CROSS STREET: Woodglen

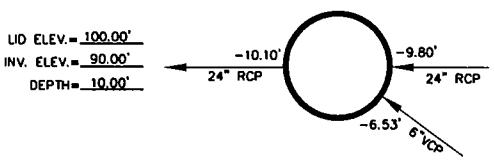
NEAREST ADDRESS # Rawhide # 3901

SPECIAL MARKINGS:

LID ELEV.= 309.0'
INV. ELEV.= 297.4'
DEPTH= 11.6'



EXAMPLE



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PROJECT:	PROJECT NUMBER:
Roseville MH	12257-01
CLIENT:	CREW:
	SS, JC

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Appendix J Corrections to Model Network Data

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
8140	131.400	127.743	365.66	24
8142	127.743	123.735	401.00	24
8144	123.735	120.733	300.05	24
8146	120.733	109.163	359.53	24
8148	109.163	109.023	34.79	24

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
72015	91.013	90.763	257.57	33
72017	90.563	90.174	392.44	36
72019	90.174	89.780	397.67	36
72021	89.780	89.439	344.57	36
72023	89.439	88.960	399.61	36

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
9299819	74.050	73.983	130.72	72
118907	74.201	74.050	289.54	72
9299817	74.304	74.201	198.24	72
9299816	74.390	74.304	165.93	72
9299814	74.562	74.390	329.82	72
9304661	74.735	74.562	332.37	72
9299810	74.917	74.735	351.43	72
9299808	75.043	74.917	241.58	72
9299806	75.190	75.043	282.73	72
9299864	75.450	75.190	499.77	72
9299863	75.590	75.450	269.41	72
9299803	75.741	75.590	290.21	72
9299801	75.912	75.741	329.66	72

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
93465301	196.800	196.418	38.18	12

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
118646	132.023	131.309	285.62	18
15915	131.309	130.656	261.22	18
9299910	130.656	130.600	22.49	18
9299912	130.500	129.387	370.98	18
9300010	133.299	131.000	294.77	18
9300011	134.391	133.299	134.82	15
9300012	139.550	134.391	271.52	15
9300013	140.121	139.550	105.77	15
9300016	142.834	140.121	330.85	15
9300018	142.947	142.834	75.12	15
9300020	145.601	142.947	379.20	15
9300022	148.549	145.601	278.06	15
9300024	149.845	148.549	370.28	15
9300025	151.288	149.845	412.27	15
9370702	132.517	132.389	106.00	18
9370704	132.389	132.023	304.97	18

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
14806	129.417	128.807	287.00	12
14807	128.807	128.120	335.10	12
14809	128.120	127.772	169.72	12
14811	127.772	127.279	240.69	12
14813	127.279	127.195	39.84	12
10102	159.955	158.990	419.54	10
10103	158.990	157.872	385.59	10
10104	157.872	157.492	190.33	10
10982	157.492	156.391	423.20	10
10983	156.391	156.200	76.50	10
10984	154.600	154.478	48.62	10
10985	154.478	154.417	24.57	10
10987	154.223	154.159	25.29	10
10988	154.159	154.048	44.65	10
10990	154.048	153.444	241.69	10
10992	153.444	153.169	109.89	10
10993	153.169	152.995	69.55	10
9332642	154.417	154.223	77.73	10

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
14166	128.303	127.904	266.03	18
14168	127.904	127.505	265.97	18
14169	127.505	127.364	93.77	18
14170	127.364	127.220	96.23	18
14171	127.220	126.869	234.00	18
14173	126.869	126.340	353.00	18
14175	126.340	125.954	257.00	18
14177	125.954	125.608	231.00	18
14178	125.608	125.300	205.00	18
14362	131.283	130.790	224.18	15
14364	130.790	130.077	324.03	15
14365	130.077	129.538	245.00	15
14367	129.538	129.143	179.86	15
14368	129.143	129.089	24.38	15
14371	129.052	128.746	138.96	15
15774	132.164	131.915	155.91	15
15787	129.277	127.697		27
15788	127.697	126.702		27
15791	131.300	130.807	223.89	21
15806	133.499	133.224	124.79	15
15807	133.224	132.972	168.46	15
15827	132.972	132.514	207.85	15
15832	132.514	131.915	272.65	15
16211	128.746	128.303	201.57	15
9299925	129.089	129.052	16.74	15
9300028	131.400	131.451	21.91	24
9300029	131.451	131.500	21.14	24
9300030	131.639	131.500	63.05	30

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
9317266	242.207	226.669	209.41	6
9317265	226.669	211.944	235.98	6
9317267	251.823	242.207	227.32	6
9317268	256.524	251.823	246.13	6
9348547	264.644	251.823	128.22	6
9317269	270.457	256.524	209.51	6
9317270	287.333	270.457	206.06	6
9348546	290.963	270.457	366.19	6
9317271	295.854	287.333	122.42	6
9317509	297.481	295.854	242.94	6
9317272	308.945	295.854	269.93	6
9317508	301.292	297.481	293.15	6
9317510	309.148	297.481	223.07	6
9317507	306.021	301.292	295.58	6
9317515	318.792	301.292	337.19	6
9317279	310.780	306.021	290.18	6
9317506	325.326	306.021	378.52	6
9317273	316.587	310.780	354.08	6
9317278	324.234	310.780	252.41	6
9317511	328.656	325.051	231.09	6
9317512	325.051	323.579	294.50	6
9317277	329.942	316.587	287.20	6
9317513	323.579	321.824	350.96	6
9317514	321.824	318.792	374.31	6
103570	201.846	192.700	265.87	15
9317233	206.013	200.943	135.14	15
9317173	211.944	206.013	173.95	15
103568	214.294	211.944	274.14	15
103566	214.983	214.294	430.67	15

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
9323937	163.673	162.963	142.00	6
9370304	162.963	161.973	198.00	6
9323939	161.973	161.375	119.50	6
9275	161.535	160.900	126.93	6
9323941	161.375	160.900	95.00	6
9277	160.900	156.875	243.98	6
9279	157.420	156.875	181.65	6
9292	156.840	155.575	253.05	6
16436	156.875	155.575	260.01	6
9284	158.243	156.840	280.68	6
9300146	158.749	158.243	101.12	6
9282	160.737	158.243	166.27	6
9290	160.171	156.840	297.45	6
16437	155.575	153.970	320.98	6
9300143	154.677	153.970	141.44	8
122509	158.735	158.611	45.92	4
9287	163.358	162.056	213.54	6
9289	162.056	160.171	308.93	6
9219	158.511	156.540	394.22	6
9220	156.540	154.955	317.01	6
9218	157.518	154.955	298.00	8
9217	158.059	157.518	154.44	8
9216	158.611	158.059	157.76	8
9303	153.970	152.263	341.36	6
17057	153.052	152.263	157.76	6
44003	153.126	152.263	172.59	6
9224	158.007	154.683	410.32	6
9225	154.683	153.984	86.35	6
9210	154.955	153.984	277.55	8
9223	154.462	153.984	95.58	6
9222	156.197	154.462	346.97	6
110550	152.263	150.392	374.21	6
9309	150.392	150.185	58.94	8
17168	156.522	156.028	98.71	6
9269	156.028	153.550	247.79	6
9316	153.550	151.748	360.45	6
9317	151.748	149.871	375.36	6
9311	150.185	149.871	125.72	8
9229	156.784	154.878	158.83	6
9230	154.878	153.455	284.51	6
9221	158.292	156.197	218.28	6
9231	153.455	153.005	90.17	6
9211	153.984	153.005	279.79	8
9228	155.548	153.005	264.93	6
9227	157.011	155.548	292.68	6
9331	160.633	159.399	246.73	6
9272	159.399	156.670	245.84	6
9318	156.670	153.550	260.00	6
9312	149.871	149.187	273.67	8
9236	153.647	152.051	319.22	6
9213	153.005	152.051	272.41	8
9234	153.388	152.051	267.32	6
9233	155.398	153.388	402.02	6
16442	152.051	149.494	269.19	8
9257	151.952	151.047	181.05	6
9245	151.047	149.494	310.65	6
9243	151.211	149.494	343.52	6
9241	152.861	151.211	329.88	6
9239	153.692	152.861	166.32	6
9250	148.708	148.387	64.12	6
9248	149.187	148.437	301.21	8
9255	149.494	148.876	176.64	8
9252	148.387	147.967	169.81	10
9254	148.876	147.118	502.21	8
9318436	155.846	155.683	32.46	6
9318424	155.715	155.535	36.00	6
15272	155.683	155.535	37.19	8
15266	147.118	146.630	325.31	12
9316763	154.301	153.642	188.19	8
9318420	156.742	155.715	205.50	6
9318430	155.535	154.483	262.81	8
9351933	154.968	154.483	48.50	8
9316765	153.642	152.926	204.75	8
9351932	151.651	146.156	78.50	8
15267	146.630	146.156	316.03	12
9316777	148.094	147.618	135.92	8
9369447	153.697	153.532	33.00	6
15273	154.483	153.532	237.79	8
9316775	148.415	148.094	91.90	8
9316773	148.607	148.415	51.92	8
9316769	152.198	148.607	147.15	8
9316767	152.926	152.198	207.97	8
9316779	147.618	147.170	127.97	8
9316771	153.314	148.607	95.28	8

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
9369448	153.532	152.907	156.21	8
15274	152.907	152.225	195.02	8
9343538	152.454	152.225	45.82	6
9316781	147.170	146.792	107.96	8
15268	146.156	145.648	338.81	12
15275	152.225	151.480	212.81	8
9343002	151.704	151.480	44.80	6
9316783	146.792	146.418	106.95	8
9343003	151.480	150.946	152.69	8
9316789	145.917	145.440	95.48	8
9316785	146.418	145.917	139.13	8
9316787	151.067	145.917	306.56	8
15276	150.946	150.345	171.71	8
15277	150.345	145.238	170.22	12
15269	145.648	145.238	273.10	15
9316790	145.440	145.238	134.49	8
15271	154.284	152.907	393.41	8
15278	145.238	144.735	335.50	15
9304748	150.655	150.186	312.63	6
9322468	155.922	155.740	36.40	6
15270	155.740	154.284	415.90	8
9322467	155.939	155.740	39.77	6
110835	150.186	148.297	198.89	6
15279	144.735	144.285	299.50	15
9304747	151.310	148.297	223.23	6
111110	148.297	146.897	243.85	6
110385	146.897	144.024	421.80	6
9338325	144.024	143.856	42.02	6
15280	144.285	143.856	286.00	15
15281	143.856	140.917	213.00	15
15282	140.917	137.297	263.00	15
9304947	174.846	172.834	122.72	6
8204	172.834	171.416	218.11	6
8205	171.416	170.449	193.34	6
8203	174.373	170.449	338.25	6
10066	171.462	170.502	192.02	6
101262	166.095	164.755	267.96	6
10068	170.502	169.562	188.00	6
10069	169.562	167.118	488.76	6
10063	168.864	167.118	349.06	6
16747	170.449	168.864	317.14	6
10062	169.147	168.864	56.70	6
101180	170.619	169.147	294.42	6
101186	166.293	165.679	122.73	6
101263	167.304	165.679	324.89	6
9300177	173.810	173.178	126.38	6
10076	165.679	164.646	206.67	6
10074	164.755	163.814	188.35	6
10089	173.178	171.255	384.62	6
10070	167.118	164.651	493.51	6
111910	165.344	164.651	138.67	6
111922	167.656	165.999	331.58	6
10086	166.283	163.197	617.31	6
101190	167.494	166.283	242.25	6
10077	164.646	162.446	439.97	6
10075	163.814	162.446	273.51	6
111912	165.245	164.651	118.93	6
10078	162.446	162.276	34.04	6
10087	163.197	162.276	184.15	6
10090	171.255	169.227	405.57	6
10091	169.227	167.930	259.25	6
101194	165.430	163.286	428.80	6
101192	167.250	166.283	193.41	6
101193	166.972	165.999	194.73	6
10085	163.314	162.276	207.66	6
10083	165.045	163.314	346.19	6
10082	166.051	165.045	201.13	6
101195	166.960	166.051	181.86	6
111906	162.697	161.311	395.81	8
10100	162.276	161.311	192.93	6
10071	164.651	162.325	465.07	6
10072	163.286	162.325	192.13	6
10059	165.999	163.684	462.92	6
10081	165.648	165.045	120.54	6
10093	167.930	166.466	292.80	6
101197	167.032	166.051	196.28	6
101198	162.643	161.311	266.28	6
101200	167.468	165.996	294.46	6
10080	165.996	165.648	69.54	6
111949	169.583	168.490	218.77	6
111943	169.204	168.490	142.81	6
10170	171.183	170.280	361.53	6
9300201	171.477	171.183	117.38	6
10094	166.466	165.191	255.06	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
10095	165.927	165.191	147.26	6
10079	166.969	165.648	264.30	6
118654	169.435	166.969	493.06	6
10096	165.191	163.960	246.15	6
10073	162.325	159.960	473.00	6
10101	161.311	159.960	385.97	8
10171	170.280	169.440	335.95	6
10172	169.440	168.490	190.00	6
10060	163.684	161.357	465.48	6
10084	165.261	163.314	389.30	6
101206	166.277	165.261	203.23	6
111926	164.652	162.396	451.23	6
111939	170.046	169.440	121.25	6
101202	167.771	166.969	160.38	6
10173	168.490	165.943	509.40	6
10174	165.943	164.443	299.89	6
10097	163.960	162.769	238.34	6
10175	164.443	162.080	472.55	6
106425	166.618	165.943	135.00	6
111941	170.775	170.242	106.51	6
111838	169.304	168.796	101.62	6
10053	168.796	168.536	51.96	6
111836	169.637	168.796	168.23	6
10169	166.918	165.943	195.00	6
10052	162.396	160.604	358.41	6
101205	162.598	159.960	527.61	6
10061	161.357	158.989	473.44	6
10102	159.960	158.990	419.54	10
111924	160.604	160.229	75.00	6
10176	162.080	159.847	446.64	6
10167	170.242	167.843	479.88	6
10168	167.843	166.918	185.00	6
111945	170.754	170.194	111.96	6
10098	162.769	159.851	583.46	6
10177	159.847	158.800	209.42	6
111932	169.701	166.918	556.74	6
10165	170.194	168.793	280.36	6
10166	168.793	167.843	190.00	6
9326588	160.229	157.871	471.62	6
10103	158.990	157.870	385.59	10
10164	171.144	170.194	190.00	6
10054	168.536	166.036	500.00	6
111935	169.747	167.843	380.93	6
101208	161.829	158.989	568.01	6
111953	169.198	168.793	81.10	6
10163	171.655	171.144	102.10	6
10178	158.800	157.823	195.37	6
101264	162.317	161.829	97.53	6
10162	172.544	171.655	177.84	6
10099	159.851	157.490	472.37	6
10104	157.870	157.490	190.33	10
10179	158.543	157.823	144.00	6
111951	173.244	172.544	140.00	6
111870	166.036	164.161	375.00	6
10058	160.753	157.871	576.34	6
101215	161.047	160.753	58.88	6
10180	157.823	155.938	447.89	6
101214	161.028	160.753	54.93	6
10055	164.161	163.354	161.40	6
101213	163.648	163.354	58.74	6
111930	160.587	158.543	408.78	6
10982	157.490	156.390	423.20	10
10983	156.390	156.200	76.50	10
10057	162.358	160.753	321.10	6
10056	163.354	162.358	199.12	6
10984	154.600	154.480	48.62	10
10985	154.480	154.420	24.57	10
10987	154.220	154.160	25.29	10
9332642	154.420	154.220	77.73	10
10994	155.938	154.160	476.55	6
10995	154.160	154.050	22.07	6
10988	154.160	154.050	44.65	10
10990	154.050	153.440	241.69	10
10992	153.440	153.170	109.89	10
10993	153.170	153.000	69.55	10
111927	169.709	167.930	355.62	6
9304935	149.986	148.419	313.42	6
9338368	145.836	144.196	327.98	6
17078	148.419	146.659	351.95	6
9370702	132.520	132.390	106.00	18
112053	137.792	136.318	421.02	8
9300162	144.196	142.617	315.80	6
112085	147.981	147.496	97.09	6
16543	147.496	146.496	199.83	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
16542	146.496	144.486	402.07	6
17077	146.659	144.486	434.66	6
9370704	132.390	132.020	304.97	18
16540	142.617	141.041	315.22	6
16533	141.041	138.822	443.78	6
16544	136.318	134.822	427.47	8
118646	132.020	131.310	285.62	18
9300165	144.486	142.986	299.98	6
9300166	142.986	141.330	331.17	6
9338055	141.875	141.330	109.11	6
16535	134.822	134.165	187.65	8
112090	149.747	147.496	450.22	6
9297233	142.986	143.764	155.62	6
16208	148.975	146.496	495.76	6
9300025	151.290	149.840	412.27	15
9300024	149.840	148.550	370.28	15
9300022	148.550	145.600	278.06	15
9300020	145.600	142.950	379.20	15
9300018	142.950	142.830	75.12	15
9300016	142.830	140.120	330.85	15
100513	141.330	140.120	241.98	6
9300013	140.120	139.550	105.77	15
9300012	139.550	134.390	271.52	15
9300011	134.390	133.300	134.82	15
9299908	134.165	133.300	173.05	6
15915	131.310	130.660	261.22	18
9299914	143.379	142.935	126.66	8
9300015	142.935	142.830	30.14	8
9300010	133.300	131.000	294.77	18
9299910	130.660	130.600	22.49	18
9349531	134.787	134.390	79.49	8
14473	153.432	152.186	249.09	6
9299916	152.186	151.290	179.23	6
14472	153.877	153.432	89.08	6
9298853	135.873	134.787	217.14	6
9325159	154.602	153.877	145.00	6
9299912	130.500	129.390	370.98	18
14533	151.156	143.379	407.42	6
14554	136.688	135.873	163.00	6
9300008	137.766	137.117	129.82	6
9351470	137.117	136.822	59.08	6
14553	136.822	136.688	41.75	6
9304922	131.815	130.983	184.93	6
9299918	141.765	139.550	598.72	6
9300026	137.556	136.822	146.87	6
14531	155.837	151.156	245.18	6
14546	142.222	141.765	123.51	6
14545	137.205	136.435	307.81	6
14544	137.543	137.205	135.24	6
14543	138.604	137.543	212.21	6
14542	138.139	137.543	238.51	6
9319250	202.727	202.341	110.19	8
74653	202.341	202.217	24.82	8
9319248	203.301	203.192	31.10	8
9319249	203.192	202.217	195.00	8
9319247	204.218	203.192	205.08	8
74657	205.203	204.218	197.06	8
13039	208.092	202.092	400.00	8
9300084	202.217	202.092	25.00	8
13045	193.501	189.505	399.55	8
13041	202.092	196.572	400.00	8
13043	196.572	193.501	409.53	8
13047	189.505	185.500	400.48	8
15501	185.500	181.779	372.17	8
15504	181.779	181.515	105.29	10
15506	181.515	175.787	179.00	10
15503	183.165	181.515	55.00	8
104242	177.896	177.657	59.79	6
9338254	190.735	188.475	113.00	8
15502	188.475	183.165	177.00	8
15669	153.881	150.563	255.23	8
15670	150.563	140.839	154.35	8
9300035	152.833	150.427	481.22	6
15508	175.787	175.225	224.85	10
15512	175.388	175.225	65.00	10
9338255	176.253	175.388	173.01	6
15808	177.657	173.187	148.99	6
9300041	163.160	160.638	126.07	6
15667	160.638	157.447	375.40	8
15668	157.447	153.881	208.56	8
114733	173.467	172.642	165.00	6
76924	172.642	171.867	155.00	6
76926	171.867	171.272	119.00	6
76928	171.272	170.412	172.00	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
15671	140.839	140.470	184.30	12
76930	170.412	169.239	234.63	6
9299946	149.857	149.081	155.20	6
15673	162.945	156.932	240.52	6
15672	140.470	140.334	68.39	12
15690	141.013	140.334	194.17	8
15689	141.522	141.013	145.36	8
15809	173.187	166.800	212.90	6
15810	167.818	166.800	127.22	6
14379	150.427	149.127	260.00	6
14384	149.081	148.300	156.38	6
14380	149.127	148.327	160.00	6
9304920	175.225	168.329	282.63	10
9369681	168.621	168.329	83.49	8
76932	169.239	168.506	146.65	6
110673	168.506	168.329	44.12	6
15677	141.734	140.334	400.12	6
9300083	211.658	210.308	270.00	4
13053	207.568	189.417	275.00	8
104243	153.922	153.448	94.90	6
13049	210.308	209.433	250.00	8
15719	140.334	139.941	196.13	12
104246	164.514	158.735	192.63	6
13051	210.071	208.558	302.76	6
13052	208.558	207.568	275.00	8
13050	209.433	208.558	249.99	8
14383	148.327	147.327	200.01	6
14385	148.300	147.327	194.52	6
15495	189.417	175.918	375.00	8
15811	166.800	157.266	317.81	6
15497	176.077	175.918	31.99	6
14386	147.327	147.050	55.34	6
104245	159.522	158.735	196.67	6
15496	176.481	176.077	80.77	6
15676	143.121	141.734	396.20	6
15674	156.932	155.896	295.88	6
15675	155.896	143.121	308.59	6
15499	175.918	167.656	340.00	8
15513	168.329	167.656	224.56	10
9338001	147.050	146.537	102.72	6
14387	147.875	146.537	167.27	6
15817	153.448	149.235	156.01	6
104249	160.038	159.035	200.72	6
15812	157.266	156.536	182.38	6
104247	162.221	157.420	120.03	6
14388	146.537	145.657	97.73	6
15818	149.235	144.417	365.00	6
15813	156.536	155.560	244.06	6
15814	158.735	155.560	264.62	6
15720	139.941	139.402	269.54	12
15721	141.226	139.402	364.75	6
15657	143.496	141.776	344.00	6
9300027	157.420	153.900	176.00	6
14391	144.417	143.542	175.00	6
14390	145.657	143.542	234.98	6
15655	151.344	145.912	388.00	6
15656	145.912	143.496	302.00	6
104248	144.790	144.311	119.70	6
15658	141.776	140.519	251.45	6
15659	140.519	139.402	248.13	10
13075	172.964	167.274	145.91	6
15409	155.560	141.710	692.49	6
13076	167.274	166.649	125.00	6
13077	167.619	166.649	193.93	6
15724	139.586	138.681	181.04	6
15515	167.656	157.367	374.15	10
13078	166.649	165.349	260.00	6
15484	170.333	165.349	124.62	6
9363862	143.542	141.200	260.19	6
15820	144.311	142.580	432.82	6
15722	139.402	138.930	314.56	15
15723	138.930	138.681	166.47	15
15486	165.349	163.984	273.00	6
15816	141.710	141.125	117.01	6
9363863	141.200	141.125	15.05	6
15487	165.729	163.984	349.07	6
15652	141.878	140.519	302.01	10
15794	159.035	156.885	429.98	6
15725	138.681	138.127	369.06	15
15795	156.885	152.760	275.00	6
104255	153.900	152.760	285.00	6
74372	141.860	141.200	132.00	6
15650	144.906	143.448	324.00	10
15651	143.448	141.878	349.00	10

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
15485	166.099	165.349	150.00	6
15821	142.580	140.958	405.43	6
15729	140.277	139.877	80.00	6
15822	140.958	140.313	161.39	6
15819	141.125	140.313	270.89	8
15492	161.465	152.625	170.00	6
15730	139.877	138.127	175.00	6
14334	142.852	141.860	248.00	6
15653	151.919	150.069	185.00	6
14333	148.020	142.852	272.00	6
15654	150.069	145.829	212.00	6
15649	145.829	144.906	204.94	10
15488	163.984	157.381	320.22	6
15728	141.277	139.877	140.00	6
15796	152.760	150.260	250.00	6
15516	157.367	148.589	381.63	10
15642	148.589	148.123	137.00	10
15493	152.625	149.224	155.00	6
15494	149.224	148.589	127.00	6
13070	170.640	161.834	400.28	6
15799	137.631	136.231	280.00	6
13079	172.696	161.296	380.00	6
15823	140.313	139.570	225.00	8
15802	135.960	135.300	302.82	15
15798	156.220	152.760	231.00	6
13080	161.296	157.381	391.51	6
13069	162.350	161.834	103.19	6
15644	148.123	147.651	135.00	10
15726	138.127	137.868	173.00	15
15648	146.435	145.829	134.75	10
15483	149.274	148.589	137.00	8
15489	157.381	156.138	248.67	6
15491	156.138	149.224	267.97	6
15646	147.651	147.140	146.00	10
15647	147.140	146.435	201.36	10
15732	136.640	135.960	311.22	15
15803	135.302	134.831	214.36	15
15800	136.231	134.831	280.00	6
13072	161.834	160.222	201.52	6
15727	137.868	137.540	218.37	15
15731	137.540	136.660	400.00	15
13073	160.222	158.255	131.09	6
15638	155.577	152.944	351.07	6
15640	152.944	146.435	235.00	6
74443	138.476	137.540	187.13	8
15828	140.457	138.807	165.00	6
13068	164.035	162.350	337.05	6
15825	139.570	135.620	395.00	8
15469	157.868	155.228	120.00	6
15804	134.831	134.120	323.00	15
15482	150.572	149.274	370.99	8
15474	154.777	151.577	160.00	6
15475	151.577	150.572	200.86	6
15829	138.807	136.807	200.00	6
15473	152.448	151.577	174.30	6
15470	155.228	153.952	255.26	6
15471	153.952	152.448	300.70	6
15639	155.654	152.944	271.00	6
15637	157.700	155.577	283.00	6
13074	158.255	156.469	357.34	6
13064	156.469	155.228	248.09	6
15805	134.120	133.500	280.00	15
15801	141.100	133.500	380.00	6
13056	166.708	165.578	226.11	6
15826	135.620	132.970	265.00	8
15806	133.500	133.220	124.79	15
15807	133.220	132.970	168.46	15
13063	161.396	156.469	246.38	6
13061	162.441	161.396	209.00	6
15468	155.387	153.952	287.07	6
15481	152.087	150.572	303.00	6
13057	165.578	163.922	236.61	6
15830	136.807	133.737	306.97	6
13062	161.871	161.396	95.00	6
15467	159.467	155.387	100.00	6
15827	132.970	132.510	207.85	15
15831	133.737	132.510	245.38	6
13058	163.922	161.199	389.00	6
15787	129.280	127.697	343.45	27
15788	127.697	126.702	216.40	27
15832	132.510	131.910	272.65	15
13059	161.199	157.303	389.59	6
13060	157.303	155.387	383.10	6
16394	158.655	157.303	270.42	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
9338258	159.570	158.655	183.00	6
15476	161.095	159.570	305.00	6
15478	156.607	154.912	339.00	6
15479	154.912	153.797	222.80	6
15480	153.797	152.087	342.00	6
9300029	131.450	131.500	21.14	24
14364	130.790	130.080	324.03	15
9300030	131.640	131.500	63.05	30
9300028	131.400	131.450	21.91	24
15791	131.300	130.810	223.89	21
14362	131.280	130.790	224.18	15
14365	130.080	129.540	245.00	15
14367	129.540	129.140	179.86	15
14368	129.140	129.090	24.38	15
9299925	129.090	129.050	16.74	15
15772	133.170	132.660	313.82	15
15773	132.660	132.160	273.74	15
15774	132.160	131.910	155.91	15
14371	129.050	128.750	138.96	15
15771	133.212	133.170	25.98	15
15770	133.461	133.212	156.00	15
15517	160.361	159.431	186.10	6
15767	136.237	135.533	370.58	15
16211	128.750	128.300	201.57	15
15746	134.960	132.660	230.00	6
14166	128.300	127.900	266.03	18
15780	133.411	132.160	250.23	6
15518	160.381	159.431	190.00	6
15768	135.533	134.673	455.25	15
15769	134.573	134.183	244.00	15
15747	134.602	133.212	278.00	6
15765	136.679	136.237	232.65	15
16297	134.783	134.773	119.71	10
14168	127.900	127.510	265.97	18
15519	159.431	156.148	252.51	6
14169	127.510	127.360	93.77	18
15775	137.088	136.238	170.00	6
14170	127.360	127.220	96.23	18
16296	135.224	134.783	147.00	10
15776	136.238	135.403	167.00	6
15520	156.148	149.990	123.16	6
15777	135.403	134.683	144.00	6
15779	134.683	133.411	254.44	6
14171	127.220	126.870	234.00	18
15521	152.345	151.560	157.00	6
15523	151.560	149.990	313.99	6
15764	137.406	136.679	382.40	15
9338023	139.872	137.406	154.14	6
16328	137.714	136.100	322.86	8
16294	136.100	135.224	292.00	10
14173	126.870	126.340	353.00	18
15762	137.968	137.406	295.78	15
16293	137.000	136.100	225.00	8
9300031	140.857	139.872	197.01	6
15522	152.995	151.560	287.00	6
15524	149.990	148.112	375.64	6
15761	138.486	137.968	272.89	15
15778	136.640	134.683	391.40	6
16292	137.660	137.000	165.00	8
14175	126.340	125.950	257.00	18
15759	139.187	138.486	368.65	15
15754	141.603	140.857	149.10	6
16327	138.804	137.714	259.57	8
15753	142.263	141.603	132.02	6
9304918	141.202	140.552	130.00	6
15752	142.448	141.603	169.13	6
14177	125.950	125.610	231.00	18
15757	139.498	139.187	164.17	15
16290	140.552	138.512	408.00	6
16291	138.512	137.660	213.00	8
16356	150.160	146.500	183.00	6
16355	148.112	146.500	322.44	6
121851	139.815	139.498	166.38	15
14178	125.610	125.300	205.00	18
9331755	143.698	139.498	175.00	6
9300060	158.742	157.839	180.52	6
9300039	143.632	142.612	102.00	6
16320	144.336	142.468	373.69	6
16277	139.518	138.608	182.00	6
16278	138.608	136.640	393.60	6
12716	179.347	171.411	358.96	6
12715	181.364	179.347	310.30	6
12730	159.238	157.839	96.43	6
17051	188.855	181.364	151.94	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
16325	140.867	140.136	146.25	6
16326	140.136	138.804	317.00	8
16321	142.468	142.249	43.71	6
16324	142.249	140.867	142.48	6
121850	140.053	139.815	198.69	15
12713	191.167	188.855	231.24	6
16288	142.612	139.772	284.00	6
16289	139.772	138.512	315.00	8
16358	159.041	147.561	400.00	6
16359	147.561	146.999	56.20	6
16360	146.999	143.554	344.49	6
16357	146.500	143.554	294.57	6
16317	146.739	144.336	480.60	6
16318	145.296	144.336	192.01	6
12714	182.173	181.364	161.84	6
12700	189.021	180.566	173.97	6
12731	157.839	156.260	315.93	6
14075	146.772	146.139	181.00	6
16287	143.942	142.612	266.00	6
9331756	145.423	143.698	345.00	6
16284	140.783	139.772	252.79	8
12732	156.260	155.496	152.68	6
16348	140.496	140.053	368.80	15
9338269	146.139	144.747	397.74	6
16286	144.877	143.942	187.00	6
9300038	145.823	145.423	80.00	6
16311	141.936	140.136	359.99	6
16315	148.145	146.739	281.21	6
12717	171.411	169.562	369.79	6
16322	144.269	142.249	404.00	6
12701	180.566	172.918	201.28	6
12702	174.843	172.918	149.25	6
16276	140.628	138.608	403.96	6
16361	143.554	142.189	273.03	6
16282	141.800	140.783	254.13	8
16313	148.334	146.739	319.00	6
9300037	148.765	148.145	124.02	6
16281	144.100	141.800	230.00	6
12707	172.527	169.691	354.38	6
16346	140.754	140.496	215.35	15
12729	160.413	156.260	415.35	6
12718	169.562	168.554	201.42	6
12733	155.496	153.811	336.99	6
12738	153.811	152.878	93.34	8
12722	167.280	165.955	264.84	6
9286972	150.216	149.068	164.00	6
12720	168.554	167.280	254.99	6
12709	169.691	168.497	149.28	6
9305068	165.955	164.331	324.94	6
16363	142.189	141.279	182.00	6
16364	141.279	140.754	104.96	6
12728	162.215	160.413	360.43	6
16309	145.764	141.936	255.22	6
12708	170.431	169.691	148.00	6
12727	163.019	162.215	160.72	6
9305070	164.331	163.019	262.35	6
16285	154.509	144.877	301.00	6
12739	152.878	150.078	70.00	8
16300	143.936	141.936	400.11	6
14074	148.189	146.139	410.06	6
16306	149.068	146.528	298.85	6
16307	146.528	145.764	114.00	6
16275	142.043	140.628	283.00	6
16274	143.333	142.043	257.94	6
14069	144.747	143.333	404.00	6
14073	144.583	143.333	250.06	6
14079	151.033	144.583	258.00	6
9300036	157.901	154.509	106.00	6
14071	145.833	144.583	249.99	6
12736	162.491	154.729	119.41	6
12737	154.729	153.811	305.81	6
16312	150.582	148.334	280.99	6
16352	143.336	142.568	153.59	6
16314	152.971	148.145	377.00	6
9305069	167.576	164.331	180.27	6
12726	164.489	163.019	147.05	6
16344	141.073	140.754	265.81	15
12721	168.350	167.280	214.00	6
16305	153.097	149.068	237.00	6
12710	168.497	164.223	312.02	6
12735	159.894	154.729	344.37	6
12734	164.213	159.894	254.03	6
12703	172.918	164.743	383.78	6
12704	173.711	164.743	224.20	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
16308	151.646	145.764	346.00	6
16279	146.571	143.431	314.00	6
16280	143.431	141.800	407.73	8
16342	141.453	141.073	108.68	12
16353	142.568	141.453	222.99	6
9300058	164.613	164.213	80.00	6
12719	174.715	168.554	354.27	6
12711	164.223	162.251	143.91	6
9300062	163.611	160.594	100.58	6
16161	141.400	140.970	427.00	12
12705	164.743	164.034	141.84	6
12712	162.251	160.594	331.37	6
76330	150.078	143.628	379.40	8
12741	143.628	143.314	184.60	12
12706	164.034	162.251	356.58	6
14072	155.931	144.583	283.71	6
16391	146.807	144.100	541.52	6
9300034	141.954	141.453	143.08	10
9300033	149.701	141.954	146.17	6
74441	150.267	149.701	113.24	6
16301	152.813	150.863	390.00	6
16302	150.863	148.923	388.00	6
16304	148.923	146.528	357.50	6
16303	156.762	148.923	305.00	6
16298	154.650	146.246	322.00	6
16299	146.246	143.936	461.93	6
14068	154.313	143.333	341.00	6
16238	157.417	154.313	194.00	6
12690	166.915	164.034	144.08	6
16240	154.890	150.911	180.87	6
14070	150.911	145.833	338.51	6
12672	152.571	150.816	351.00	6
12671	154.416	152.571	369.00	6
12670	154.941	154.416	104.98	6
12675	160.121	156.256	351.42	6
12669	156.256	154.941	263.02	6
12673	150.816	146.616	350.00	6
12668	158.256	156.256	400.00	6
9351659	143.314	142.474	494.39	12
13419	144.272	143.431	210.41	8
12667	160.071	158.256	363.03	6
114973	145.297	144.272	205.00	6
16163	142.474	141.836	375.00	12
16157	141.836	141.400	256.60	12
113755	144.344	143.628	143.18	6
16149	152.422	150.582	368.00	6
16148	144.103	142.043	412.00	6
12691	160.594	159.544	210.00	6
12436	159.544	158.514	205.99	6
12435	160.259	159.544	143.00	6
12674	146.616	144.873	348.57	6
9305101	144.373	143.913	268.93	12
12434	161.838	160.259	315.71	6
114929	149.173	148.494	194.00	10
12433	162.208	161.838	74.00	6
13754	150.953	149.373	450.08	10
13506	151.638	150.953	137.05	6
12660	147.673	145.273	240.09	6
13459	147.472	146.772	140.00	6
9338242	163.100	162.208	178.55	6
12422	163.737	163.100	127.35	6
12420	164.812	163.737	214.96	6
13460	146.772	144.888	376.73	6
13418	144.888	144.272	154.00	8
12418	165.664	165.501	32.58	6
12419	165.574	164.812	152.44	6
13753	151.543	150.573	193.62	6
13505	152.132	151.638	98.66	6
12438	158.514	157.721	226.68	8
12664	157.974	157.067	259.00	8
9351401	144.798	144.473	191.41	12
121847	158.177	157.721	130.39	6
12665	157.067	156.154	261.00	8
12666	156.154	154.941	346.64	8
12662	159.004	158.458	155.97	8
12663	158.458	157.974	138.35	8
9305100	154.920	154.345	115.00	6
13503	153.156	152.132	204.88	6
12636	166.225	154.345	440.00	6
13417	145.335	144.888	127.66	8
109744	155.484	152.263	161.05	6
13499	151.939	150.953	197.22	8
9305102	163.319	162.208	222.20	6
114962	151.223	150.563	132.10	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
74927	154.339	151.482	285.69	6
13436	150.551	149.991	112.00	6
12428	164.952	163.319	326.68	6
13455	150.563	148.579	396.82	6
13457	148.579	147.472	221.36	6
9298790	155.090	153.156	386.77	6
12648	152.390	151.825	113.00	6
13415	145.825	145.335	139.98	8
13438	149.991	145.825	249.49	6
12661	161.403	158.458	155.00	6
106889	144.648	142.474	434.88	6
12425	170.611	170.140	94.19	6
12426	170.140	164.952	129.71	6
12637	154.345	148.977	178.96	6
12639	151.482	148.977	250.55	6
13497	152.967	151.939	146.79	8
13751	154.002	151.543	491.78	6
12427	167.148	164.952	109.78	6
13423	151.149	146.229	246.00	6
13413	146.229	145.825	115.46	8
13435	153.212	150.551	266.03	6
13434	157.532	153.212	216.00	6
9299901	152.263	149.871	299.00	6
9299902	149.871	144.648	136.00	6
12652	145.432	144.798	372.52	12
12440	157.721	156.842	250.95	8
12659	156.288	147.673	350.20	6
13721	166.958	163.682	91.00	6
13724	155.116	153.567	154.90	6
13725	153.567	152.967	120.09	8
13453	150.890	148.579	191.05	6
13744	155.182	154.002	203.51	6
12640	148.977	147.972	125.60	6
13437	156.592	149.991	220.00	6
13496	159.924	152.967	183.08	6
110387	157.530	149.871	207.00	6
12650	150.275	145.432	146.78	6
12649	151.825	150.275	310.00	6
111421	159.721	155.484	339.00	6
12431	164.651	163.319	266.51	6
13742	158.788	155.182	93.90	6
13739	156.296	155.182	192.00	6
12441	156.842	156.198	184.26	8
13454	156.039	150.563	304.23	6
13501	156.426	155.090	267.34	6
114972	158.551	156.426	425.00	6
13723	154.773	153.567	172.28	8
13422	150.691	147.023	131.00	6
13412	147.023	146.229	226.79	8
12647	151.941	150.275	125.22	6
13433	154.740	153.212	218.36	6
114913	156.960	154.740	111.01	6
12641	147.972	146.550	177.73	6
114959	156.980	154.740	112.00	6
13737	156.536	156.296	48.00	6
12634	149.652	147.972	210.00	6
13741	160.753	158.788	84.00	6
12424	177.795	170.140	332.83	6
12630	156.400	151.300	300.00	6
12632	151.300	149.652	206.00	6
12642	146.550	146.094	91.25	6
109715	161.835	157.530	287.00	6
12643	146.094	145.432	389.45	12
9317560	152.627	151.102	304.96	6
13736	157.416	156.536	176.00	6
13740	161.238	160.753	94.96	6
12470	156.198	154.847	270.09	6
12509	154.847	152.627	443.98	6
12457	180.372	179.679	138.54	6
12456	181.525	179.679	230.69	6
13500	157.691	156.426	253.00	6
13421	151.780	147.023	339.79	6
114971	158.681	157.691	198.00	6
114970	158.868	158.681	37.30	6
12658	158.798	156.288	313.76	6
13749	160.289	154.002	455.60	6
12631	151.925	151.300	125.11	6
13495	163.142	159.924	275.03	6
12629	153.208	146.094	158.09	6
13735	159.259	156.296	411.54	6
13432	155.800	154.740	211.95	6
12646	155.771	151.941	266.00	6
12644	157.506	155.771	347.00	6
13719	163.682	157.623	374.00	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
13717	157.623	156.271	270.41	8
13722	156.271	154.773	214.00	8
13714	157.131	156.271	172.00	6
13452	154.206	150.890	394.74	6
12625	146.449	146.094	208.87	10
114960	155.997	151.780	105.42	6
12430	166.151	164.651	300.05	6
12508	155.571	154.847	144.70	6
12429	167.189	166.151	207.52	6
12645	157.275	155.771	98.94	6
13729	160.237	159.259	135.87	6
13748	162.693	160.289	155.08	6
114961	148.432	148.062	73.92	6
13411	148.062	147.023	297.00	8
13733	159.995	159.259	147.31	6
13429	157.959	156.730	245.72	6
13430	156.730	155.800	186.00	6
12468	161.982	157.975	200.38	6
12469	157.975	156.198	355.43	6
13431	160.400	155.800	230.01	6
114914	163.200	160.400	140.00	6
12504	173.294	155.571	295.39	6
114967	158.650	157.691	191.68	6
114969	159.630	158.681	189.71	6
13449	156.875	155.107	104.00	6
13450	155.107	154.206	180.15	6
13730	162.840	161.630	242.00	6
12510	151.102	149.728	274.79	6
16175	155.125	153.208	273.80	6
12628	162.566	153.208	265.86	6
12623	146.880	146.449	215.71	10
12458	179.679	178.139	285.33	6
13732	160.605	159.995	122.00	6
13731	161.630	160.605	205.00	6
12459	182.177	178.066	82.22	6
12460	178.139	170.524	253.82	6
12610	149.728	147.847	376.30	10
12600	161.913	160.237	335.15	6
12621	147.237	146.880	178.33	10
13428	164.312	156.730	236.93	6
12614	147.546	147.237	154.75	10
12503	181.798	173.294	174.26	6
13427	168.112	164.312	190.00	6
13727	168.767	160.237	310.17	6
12461	170.524	168.605	191.90	6
16178	170.625	168.605	202.01	6
13783	167.475	160.400	228.21	6
12617	160.597	156.739	182.00	6
13410	149.025	148.062	275.00	8
13420	159.173	149.025	253.70	6
12507	173.140	155.571	335.94	6
12465	168.605	165.895	271.01	6
12466	165.895	163.716	435.68	6
12467	163.716	157.975	287.09	6
13494	165.127	163.142	397.00	6
12612	147.847	147.546	150.27	10
12627	165.416	162.566	285.00	6
12626	166.443	165.416	205.30	6
13713	164.106	156.271	391.73	6
12501	151.191	149.728	292.56	6
16174	161.294	155.125	323.00	6
16173	163.044	161.294	152.16	6
12619	151.233	147.237	135.00	6
12618	156.739	151.233	126.00	6
12616	161.862	156.739	83.43	6
12615	152.243	151.233	202.12	6
13726	171.419	168.767	204.03	6
12609	148.109	147.847	104.68	10
13746	169.524	165.518	250.35	6
13745	179.924	165.518	477.00	6
13747	165.518	159.586	355.24	6
13716	159.586	157.623	436.13	8
12598	162.948	161.913	207.00	6
13451	156.602	154.206	479.09	6
12597	163.323	161.913	282.00	6
9305104	164.784	163.716	106.72	6
13448	157.252	155.107	428.99	6
12505	177.141	173.140	215.10	6
13782	171.217	167.475	231.00	6
9305099	155.618	152.243	135.00	6
16168	172.176	171.217	137.00	6
13426	165.797	164.312	296.99	6
13493	171.469	165.127	242.99	6
9358732	172.157	171.469	137.62	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
13491	172.789	172.157	126.49	6
13409	150.440	149.025	283.04	8
13407	155.624	150.440	287.99	6
12462	180.480	179.445	207.11	6
12500	152.489	151.191	259.51	6
12595	164.384	163.323	212.18	6
13406	152.143	150.440	131.00	6
12463	179.445	178.590	170.86	6
12464	178.590	168.605	356.62	6
12490	153.390	152.489	180.27	6
13709	168.794	167.721	214.51	6
13710	167.721	165.975	349.33	6
13712	170.051	164.106	297.25	6
13711	165.975	160.755	435.00	6
13715	160.755	159.586	259.81	8
13708	170.434	168.794	328.00	6
12471	178.120	165.644	402.44	6
12455	167.636	165.895	348.29	6
13405	154.350	152.143	147.15	6
13404	159.983	154.350	131.00	6
12607	148.871	148.109	305.00	10
13492	175.593	171.469	158.03	6
12476	177.247	169.567	374.63	6
13447	158.559	157.252	261.50	6
12472	165.644	162.101	186.46	6
114916	171.623	170.042	225.86	6
13770	178.649	173.930	363.02	6
13490	174.031	172.789	248.42	6
12592	166.032	164.384	329.61	6
13425	167.372	165.797	315.09	6
13424	170.042	167.372	333.77	6
12489	160.012	153.390	310.90	6
12593	173.263	164.384	317.11	6
13397	151.919	150.440	295.85	8
13398	156.548	151.919	308.59	6
12481	162.101	160.301	159.31	6
12483	160.301	160.012	28.89	6
13707	168.985	167.721	252.64	6
13706	179.557	168.985	334.58	6
12590	166.700	166.032	133.71	6
114966	181.057	179.557	120.00	6
13673	178.285	176.026	143.00	6
13780	175.460	170.042	135.45	6
13672	178.837	178.285	92.00	6
13685	162.442	160.755	281.13	8
13684	168.378	162.442	306.00	6
13676	171.706	162.442	272.48	8
13675	173.788	171.706	208.21	6
13674	176.026	171.706	120.00	6
13446	160.454	158.559	379.00	6
12444	177.049	173.021	194.58	6
12591	166.914	166.032	176.42	6
13444	164.654	161.619	105.00	6
13445	161.619	160.454	233.00	6
12499	154.491	152.489	400.54	6
12488	164.281	160.012	156.93	6
13771	173.930	172.165	353.00	6
13403	163.008	154.350	333.00	6
12442	175.856	174.463	92.82	6
12443	174.536	173.021	302.98	6
12454	169.426	167.636	358.00	6
13375	167.514	163.256	266.17	6
12606	149.726	148.871	342.00	10
12605	150.598	149.726	249.12	8
13705	169.819	168.985	166.87	6
13704	172.185	169.819	140.00	6
12479	163.850	162.101	349.75	6
13396	152.749	151.919	166.00	8
13683	163.373	162.442	139.00	6
12477	169.567	166.804	336.96	6
12478	166.804	163.850	206.56	6
114924	177.122	174.622	100.00	6
13383	166.789	166.012	111.00	6
13382	167.126	166.012	222.76	6
12604	151.458	150.598	245.60	8
12487	166.310	164.281	134.40	6
13443	162.674	161.619	211.00	6
13703	170.594	169.819	154.96	6
13376	170.531	163.256	291.00	6
12453	170.324	169.426	179.57	6
12498	155.607	154.491	223.16	6
13489	175.884	174.031	370.48	6
13488	177.661	175.884	355.43	6
13487	179.086	177.661	285.00	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
13486	178.216	177.661	111.00	6
12588	163.419	156.278	341.67	6
12586	165.945	163.419	421.00	6
114965	173.414	172.789	125.00	6
13692	167.298	163.600	217.53	8
13701	172.789	171.537	250.43	6
13702	171.537	170.594	188.62	6
12445	173.021	171.685	267.28	6
12451	171.685	170.324	272.16	6
13384	166.012	164.827	118.49	6
12486	170.649	166.310	289.27	6
13385	166.983	164.827	98.00	6
12603	152.270	151.458	232.00	8
12589	156.278	153.501	231.42	6
13442	161.620	160.454	333.00	6
13774	172.985	170.626	196.56	6
13773	172.165	170.626	307.77	6
13778	174.622	170.122	180.00	6
12602	152.429	152.270	45.47	8
12601	153.501	152.429	63.09	8
13399	164.668	154.093	423.00	6
13395	154.093	152.749	268.67	8
13400	158.968	154.093	195.00	6
13671	181.255	178.837	403.00	6
12447	176.914	174.038	221.26	6
13681	167.994	167.199	159.00	6
13682	167.199	163.373	318.86	6
16171	171.183	170.324	171.69	6
13668	173.714	171.706	401.70	8
13697	172.840	170.594	188.75	6
12485	167.494	166.310	236.71	6
12484	168.099	167.494	121.13	6
12473	173.359	171.462	87.00	6
12448	174.038	172.540	299.55	6
12450	172.540	171.685	171.05	6
12497	156.714	155.607	221.27	6
13377	163.256	161.195	412.07	6
12475	169.524	166.804	340.00	6
12474	171.462	169.524	387.70	6
13775	170.626	169.828	159.68	6
13680	168.134	167.199	187.00	6
12585	159.506	153.501	353.24	8
12584	160.885	159.506	394.00	8
13441	162.338	161.620	205.23	6
12583	162.258	160.885	392.15	8
13693	163.600	162.258	248.61	6
13386	164.827	158.602	239.44	6
13776	176.237	169.828	112.44	6
9305105	168.116	167.494	124.51	6
13700	174.345	172.789	311.16	6
13699	174.920	174.345	115.00	6
13378	161.195	156.385	236.95	6
9305103	173.181	169.524	129.67	6
12571	153.525	152.429	313.16	8
13380	156.385	155.394	198.25	6
13394	155.394	154.093	260.29	8
13373	164.447	163.037	282.00	6
13374	163.037	161.195	230.17	6
13390	158.602	157.382	244.03	6
13389	159.858	158.602	251.23	6
12496	157.819	156.714	221.11	6
13392	157.382	155.394	283.98	6
13678	170.179	167.199	317.00	6
13485	178.102	175.884	443.61	6
9359832	179.632	171.183	281.65	6
12446	176.544	174.038	313.24	6
13669	186.025	181.255	300.00	6
12494	162.782	157.819	342.27	6
13779	170.122	162.158	362.00	6
13387	162.158	159.858	230.01	6
13696	176.171	172.840	302.84	6
12493	167.036	162.782	293.37	6
12491	169.906	168.890	101.66	6
12492	168.890	167.036	370.80	6
13484	180.332	178.102	82.00	6
12495	158.397	157.819	115.47	6
13483	179.457	178.102	270.94	6
13482	180.257	179.457	160.00	6
13481	180.262	179.457	161.00	6
13767	168.360	162.158	310.10	6
13777	169.828	168.360	293.47	6
12579	164.074	162.262	362.31	6
12582	162.262	159.506	250.54	6
12581	163.462	162.262	240.00	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
13439	163.273	162.338	267.00	8
12580	164.757	163.462	259.00	6
13379	160.310	156.385	224.29	6
13388	160.581	159.858	144.47	6
13402	158.127	157.382	149.04	6
13663	186.302	176.894	192.00	6
13664	176.894	175.699	239.00	6
13667	175.699	173.714	397.00	8
13665	193.810	175.699	308.00	6
13698	180.605	174.345	231.84	6
13766	170.272	168.360	382.26	6
13371	169.259	164.940	215.93	6
13372	164.940	163.037	190.37	6
12449	178.605	172.540	379.04	6
13381	156.502	155.394	221.63	6
13695	178.777	176.171	252.99	6
13691	163.591	162.258	381.00	8
13768	163.158	162.158	200.00	6
13677	171.419	170.179	248.06	6
122619	156.947	156.502	89.00	6
12569	154.991	153.525	418.98	8
12567	155.676	154.991	195.75	8
12575	174.241	172.794	289.24	6
74272	172.794	171.769	205.00	18
13690	171.769	163.591	174.00	8
12573	175.786	174.241	309.16	6
13662	176.784	175.699	310.00	8
13661	180.157	176.784	249.83	6
13368	172.726	166.457	208.96	6
13370	166.457	164.940	303.25	6
13369	167.297	166.457	168.00	6
12574	174.833	174.241	118.52	6
12565	156.400	155.676	206.79	8
12572	177.436	175.786	329.97	6
102792	170.393	166.457	131.21	6
13660	178.469	176.784	337.00	6
13686	172.770	171.769	286.00	6
12559	157.967	156.400	313.41	6
12547	164.727	164.271	130.13	6
12557	159.650	157.967	336.47	6
12555	161.482	159.650	183.22	6
12564	157.646	156.400	356.00	8
12548	165.067	164.271	159.19	6
13659	179.969	178.469	299.99	6
12558	161.318	157.967	335.04	6
12554	161.183	159.650	306.78	6
12549	164.271	161.183	346.93	6
12556	167.826	159.650	204.42	6
12563	158.529	157.646	252.37	8
12553	162.461	161.183	245.59	6
12562	159.388	158.529	171.75	6
12550	163.327	162.461	173.31	6
12552	165.759	162.461	370.62	6
12551	173.755	165.759	299.49	6
12560	174.602	173.754	169.47	6
12561	173.754	159.388	273.12	6
9305098	160.651	159.388	252.55	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
9304947	174 846	172 834	122 72	6
8204	172 834	171 416	218 11	6
8205	171 416	170 449	193 34	6
8203	174 373	170 449	338 25	6
10066	171 462	170 502	192 02	6
101262	166 095	164 755	267 96	6
10068	170 502	169 562	188 00	6
10069	169 562	167 118	488 76	6
10063	168 864	167 118	349 06	6
16747	170 449	168 864	317 14	6
10062	169 147	168 864	56 70	6
101180	170 619	169 147	294 42	6
101186	166 293	165 679	122 73	6
101263	167 304	165 679	324 89	6
9300177	173 810	173 178	126 38	6
10076	165 679	164 646	206 67	6
10074	164 755	163 814	188 35	6
10089	173 178	171 255	384 62	6
10070	167 118	164 651	493 51	6
111910	165 344	164 651	138 67	6
111922	167 656	165 999	331 58	6
10086	166 283	163 197	617 31	6
101190	167 494	166 283	242 25	6
10077	164 646	162 446	439 97	6
10075	163 814	162 446	273 51	6
111912	165 245	164 651	118 93	6
10078	162 446	162 276	34 04	6
10087	163 197	162 276	184 15	6
10090	171 255	169 227	405 57	6
10091	169 227	167 930	259 25	6
101194	165 430	163 286	428 80	6
101192	167 250	166 283	193 41	6
101193	166 972	165 999	194 73	6
10085	163 314	162 276	207 66	6
10083	165 045	163 314	346 19	6
10082	166 051	165 045	201 13	6
101195	166 960	166 051	181 86	6
111906	162 697	161 311	395 81	8
10100	162 276	161 311	192 93	6
10071	164 651	162 325	465 07	6
10072	163 286	162 325	192 13	6
10059	165 999	163 684	462 92	6
10081	165 648	165 045	120 54	6
10093	167 930	166 466	292 80	6
101197	167 032	166 051	196 28	6
101198	162 643	161 311	266 28	6
101200	167 468	165 996	294 46	6
10080	165 996	165 648	69 54	6
111949	169 583	168 490	218 77	6
111943	169 204	168 490	142 81	6
10170	171 183	170 280	361 53	6
9300201	171 477	171 183	117 38	6
10094	166 466	165 191	255 06	6
10095	165 927	165 191	147 26	6
10079	166 969	165 648	264 30	6
118654	169 435	166 969	493 06	6
10096	165 191	163 960	246 15	6
10073	162 325	159 960	473 00	6
10101	161 311	159 960	385 97	8
10171	170 280	169 440	335 95	6
10172	169 440	168 490	190 00	6
10060	163 684	161 357	465 48	6
10084	165 261	163 314	389 30	6
101206	166 277	165 261	203 23	6
111926	164 652	162 396	451 23	6
111939	170 046	169 440	121 25	6
101202	167 771	166 969	160 38	6
10173	168 490	165 943	509 40	6
10174	165 943	164 443	299 89	6
10097	163 960	162 769	238 34	6
10175	164 443	162 080	472 55	6
106425	166 618	165 943	135 00	6
111941	170 775	170 242	106 51	6
111838	169 304	168 796	101 62	6
10053	168 796	168 536	51 96	6
111836	169 637	168 796	168 23	6
10169	166 918	165 943	195 00	6
10052	162 396	160 604	358 41	6
101205	162 598	159 960	527 61	6
10061	161 357	158 989	473 44	6
10102	159 960	158 990	419 54	10
111924	160 604	160 229	75 00	6
10176	162 080	159 847	446 64	6
10167	170 242	167 843	479 88	6
10168	167 843	166 918	185 00	6
111945	170 754	170 194	111 96	6
10098	162 769	159 851	583 46	6
10177	159 847	158 800	209 42	6
111932	169 701	166 918	556 74	6
10165	170 194	168 793	280 36	6
10166	168 793	167 843	190 00	6
9326588	160 229	157 871	471 62	6
10103	158 990	157 870	385 59	10
10164	171 144	170 194	190 00	6
10054	168 536	166 036	500 00	6
111935	169 747	167 843	380 93	6
101208	161 829	158 989	568 01	6
111953	169 198	168 793	81 10	6
10163	171 655	171 144	102 10	6
10178	158 800	157 823	195 37	6
15501	185 500	181 779	372 17	8
15504	181 779	181 515	105 29	10
15506	181 515	175 787	179 00	10
15503	183 165	181 515	55 00	8
104242	177 896	177 657	59 79	6
9338254	190 735	188 475	113 00	8
15502	188 475	183 165	177 00	8
15669	153 881	150 563	255 23	8
15670	150 563	140 839	154 35	8
9300035	152 833	150 427	481 22	6
15508	175 787	175 225	224 85	10
15512	175 388	175 225	65 00	10
9338255	176 253	175 388	173 01	6
15808	177 657	173 187	148 99	6
9300041	163 160	160 638	126 07	6
15667	160 638	157 447	375 40	8
15668	157 447	153 881	208 56	8
114733	173 467	172 642	165 00	6
76924	172 642	171 867	155 00	6
76926	171 867	171 272	119 00	6
76928	171 272	170 412	172 00	6
15671	140 839	140 470	184 30	12
76930	170 412	169 239	234 63	6
9299946	149 857	149 081	155 20	6
15673	162 945	156 932	240 52	6
15672	140 470	140 334	68 39	12
15690	141 013	140 334	194 17	8
15689	141 522	141 013	145 36	8

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
101264	162 317	161 829	97 53	6
10162	172 544	171 655	177 84	6
10099	159 851	157 490	472 37	6
10104	157 870	157 490	190 33	10
10179	158 543	157 823	144 00	6
111951	173 244	172 544	140 00	6
111870	166 036	164 161	375 00	6
10058	160 753	157 871	576 34	6
101215	161 047	160 753	58 88	6
10180	157 823	155 938	447 89	6
101214	161 028	160 753	54 93	6
10055	164 161	163 354	161 40	6
101213	163 648	163 354	58 74	6
111930	160 587	158 543	408 78	6
10982	157 490	156 390	423 20	10
10983	156 390	156 200	76 50	10
10057	162 358	160 753	321 10	6
10056	163 354	162 358	199 12	6
10984	154 600	154 480	48 62	10
10985	154 480	154 420	24 57	10
10987	154 220	154 160	25 29	10
9332642	154 420	154 220	77 73	10
10994	155 938	154 160	476 55	6
10995	154 160	154 050	22 07	6
10988	154 160	154 050	44 65	10
10990	154 050	153 440	241 69	10
10992	153 440	153 170	109 89	10
10993	153 170	153 000	69 55	10
111927	169 709	167 930	355 62	6
9304935	149 986	148 419	313 42	6
9338368	145 836	144 196	327 98	6
17078	148 419	146 659	351 95	6
9370702	132 520	132 390	106 00	18
112053	137 792	136 318	421 02	8
9300162	144 196	142 617	315 80	6
112085	147 981	147 496	97 09	6
16543	147 496	146 496	199 83	6
16542	146 496	144 486	402 07	6
17077	146 659	144 486	434 66	6
9370704	132 390	132 020	304 97	18
16540	142 617	141 041	315 22	6
16533	141 041	138 822	443 78	6
16544	136 318	134 822	427 47	8
118646	132 020	131 310	285 62	18
9300165	144 486	142 986	299 98	6
9300166	142 986	141 330	331 17	6
9338055	141 875	141 330	109 11	6
16535	134 822	134 165	187 65	8
112090	149 747	147 496	450 22	6
9297233	142 986	143 764	155 62	6
16208	148 975	146 496	495 76	6
9300025	151 290	149 840	412 27	15
9300024	149 840	148 550	370 28	15
9300022	148 550	145 600	278 06	15
9300020	145 600	142 950	379 20	15
9300018	142 950	142 830	75 12	15
9300016	142 830	140 120	330 85	15
100513	141 330	140 120	241 98	6
9300013	140 120	139 550	105 77	15
9300012	139 550	134 390	271 52	15
9300011	134 390	133 300	134 82	15
9299908	134 165	133 300	173 05	6
15915	131 310	130 660	261 22	18
9299914	143 379	142 935	126 66	8
9300015	142 935	142 830	30 14	8
9300010	133 300	131 000	294 77	18
9299910	130 660	130 600	22 49	18
9349531	134 787	134 390	79 49	8
14473	153 432	152 186	249 09	6
9299916	152 186	151 290	179 23	6
14472	153 877	153 432	89 08	6
9298853	135 873	134 787	217 14	6
9325159	154 602	153 877	145 00	6
9299912	130 500	129 390	370 98	18
14533	151 156	143 379	407 42	6
14554	136 688	135 873	163 00	6
9300008	137 766	137 117	129 82	6
9351470	137 117	136 822	59 08	6
14553	136 822	136 688	41 75	6
9304922	131 815	130 983	184 93	6
9299918	141 765	139 550	598 72	6
9300026	137 556	136 822	146 87	6
14531	155 837	151 156	245 18	6
14546	142 222	141 765	123 51	6
14545	137 205	136 435	307 81	6
14544	137 543	137 205	135 24	6
14543	138 604	137 543	212 21	6
14542	138 139	137 543	238 51	6
9319250	202 727	202 341	110 19	8
74653	202 341	202 217	24 82	8
9319248	203 301	203 192	31 10	8
9319249	203 192	202 217	195 00	8
9319247	204 218	203 192	205 08	8
74657	205 203	204 218	197 06	8
13039	208 092	202 092	400 00	8
9300084	202 217	202 092	25 00	8
13045	193 501	189 505	399 55	8
13041	202 092	196 572	400 00	8
13043	196 572	193 501	409 53	8
13047	189 505	185 500	400 48	8
14334	142 852	141 860	248 00	6
15653	151 919	150 069	185 00	6
14333	148 020	142 852	272 00	6
15654	150 069	145 829	212 00	6
15649	145 829	144 906	204 94	10
15488	163 984	157 381	320 22	6
15728	141 277	139 877	140 00	6
15796	152 760	150 260	250 00	6
15516	157 367	148 589	381 63	10
15642	148 589	148 123	137 00	10
15493	152 625	149 224	155 00	6
15494	149 224	148 589	127 00	6
13070	170 640	161 834	400 28	6
15799	137 631	136 231	280 00	6
13079	172 696	161 296	380 00	6
15823	140 313	139 570	225 00	8
15802	135 960	135 300	302 82	15
15798	156 220	152 760	231 00	6
13080	161 296	157 381	391 51	6
13069	162 350	161 834	103 19	6
15644	148 123	147 651	135 00	10
15726	138 127	137 868	173 00	15
15648	146 435	145 829	134 75	10
15483	149 274	148 589	137 00	8
15489	157 381	156 138	248 67	6
15491	156 138	149 224	267 97	6
15646	147 651	147 140	146 00	10
15647	147 140	146 435	201 36	10

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
15809	173 187	166 800	212 90	6
15810	167 818	166 800	127 22	6
14379	150 427	149 127	260 00	6
14384	149 081	148 300	156 38	6
14380	149 127	148 327	160 00	6
9304920	175 225	168 329	282 63	10
9369681	168 621	168 329	83 49	8
76932	169 239	168 506	146 65	6
110673	168 506	168 329	44 12	6
15677	141 734	140 334	400 12	6
9300083	211 658	210 308	270 00	4
13053	207 568	189 417	275 00	8
104243	153 922	153 448	94 90	6
13049	210 308	209 433	250 00	8
15719	140 334	139 941	196 13	12
104246	164 514	158 735	192 63	6
13051	210 071	208 558	302 76	6
13052	208 558	207 568	275 00	8
13050	209 433	208 558	249 99	8
14383	148 327	147 327	200 01	6
14385	148 300	147 327	194 52	6
15495	189 417	175 918	375 00	8
15811	166 800	157 266	317 81	6
15497	176 077	175 918	31 99	6
14386	147 327	147 050	55 34	6
104245	159 522	158 735	196 67	6
15496	176 481	176 077	80 77	6
15676	143 121	141 734	396 20	6
15674	156 932	155 896	295 88	6
15675	155 896	143 121	308 59	6
15499	175 918	167 656	340 00	8
15513	168 329	167 656	224 56	10
9338001	147 050	146 537	102 72	6
14387	147 875	146 537	167 27	6
15817	153 448	149 235	156 01	6
104249	160 038	159 035	200 72	6
15812	157 266	156 536	182 38	6
104247	162 221	157 420	120 03	6
14388	146 537	145 657	97 73	6
15818	149 235	144 417	365 00	6
15813	156 536	155 560	244 06	6
15814	158 735	155 560	264 62	6
15720	139 941	139 402	269 54	12
15721	141 226	139 402	364 75	6
15657	143 496	141 776	344 00	6
9300027	157 420	153 900	176 00	6
14391	144 417	143 542	175 00	6
14390	145 657	143 542	234 98	6
15655	151 344	145 912	388 00	6
15656	145 912	143 496	302 00	6
104248	144 790	144 311	119 70	6
15658	141 776	140 519	251 45	6
15659	140 519	139 402	248 13	10
13075	172 964	167 274	145 91	6
15409	155 560	141 710	692 49	6
13076	167 274	166 649	125 00	6
13077	167 619	166 649	193 93	6
15724	139 586	138 681	181 04	6
15515	167 656	157 367	374 15	10
13078	166 649	165 349	260 00	6
15484	170 333	165 349	124 62	6
9363862	143 542	141 200	260 19	6
15820	144 311	142 580	432 82	6
15722	139 402	138 930	314 56	15
15723	138 930	138 681	166 47	15
15486	165 349	163 984	273 00	6
15816	141 710	141 125	117 01	6
9363863	141 200	141 125	15 05	6
15487	165 729	163 984	349 07	6
15652	141 878	140 519	302 01	10
15794	159 035	156 885	429 98	6
15725	138 681	138 127	369 06	15
15795	156 885	152 760	275 00	6
104255	153 900	152 760	285 00	6
74372	141 860	141 200	132 00	6
15650	144 906	143 448	324 00	10
15651	143 448	141 878	349 00	10
15485	166 099	165 349	150 00	6
15821	142 580	140 958	405 43	6
15729	140 277	139 877	80 00	6
15822	140 958	140 313	161 39	6
15819	141 125	140 313	270 89	8
15492	161 465	152 625	170 00	6
15730	139 877	138 127	175 00	6
14169	127 510	127 360	93 77	18
15775	137 088	136 238	170 00	6
14170	127 360	127 220	96 23	18
16296	135 224	134 783	147 00	10
15776	136 238	135 403	167 00	6
15520	156 148	149 990	123 16	6
15777	135 403	134 683	144 00	6
15779	134 683	133 411	254 44	6
14171	127 220	126 870	234 00	18
15521	152 345	151 560	157 00	6
15523	151 560	149 990	313 99	6
15764	137 406	136 679	382 40	15
9338023	139 872	137 406	154 14	6
16328	137 714	136 100	322 86	8
16294	136 100	135 224	292 00	10
14173	126 870	126 340	353 00	18
15762	137 968	137 406	295 78	15
16293	137 000	136 100	225 00	8
9300031	140 857	139 872	197 01	6
15522	152 995	151 560	287 00	6
15524	149 990	148 112	375 64	6
15761	138 486	137 968	272 89	15
15778	136 640	134 683	391 40	6
16292	137 660	137 000	165 00	8
14175	126 340	125 950	257 00	18
15759	139 187	138 486	368 65	15
15754	141 603	140 857	149 10	6
16327	138 804	137 714	259 57	8
15753	142 263	141 603	132 02	6
9304918	141 202	140 552	130 00	6
15752	142 448	141 603	169 13	6
14177	125 950	125 610	231 00	18
15757	139 498	139 187	164 17	15
16290	140 552	138 512	408 00	6
16291	138 512	137 660	213 00	8
16356	150 160	146 500	183 00	6
16355	148 112	146 500	322 44	6
121851	139 815	139 498	166 38	15
14178	125 610	125 300	205 00	18
9331755	143 698	139 498	175 00	6
9300060	158 742	157 839	180 52	6
9300039	143 632	142 612	102 00	6
16320	144 336	142 468	373 69	6
16277	139 518	138 608	182 00	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
15732	136 640	135 960	311 22	15
15803	135 302	134 831	214 36	15
15800	136 231	134 831	280 00	6
13072	161 834	160 222	201 52	6
15727	137 868	137 540	218 37	15
15731	137 540	136 660	400 00	15
13073	160 222	158 255	131 09	6
15638	155 577	152 944	351 07	6
15640	152 944	146 435	235 00	6
74443	138 476	137 540	187 13	8
15828	140 457	138 807	165 00	6
13068	164 035	162 350	337 05	6
15825	139 570	135 620	395 00	8
15469	157 868	155 228	120 00	6
15804	134 831	134 120	323 00	15
15482	150 572	149 274	370 99	8
15474	154 777	151 577	160 00	6
15475	151 577	150 572	200 86	6
15829	138 807	136 807	200 00	6
15473	152 448	151 577	174 30	6
15470	155 228	153 952	255 26	6
15471	153 952	152 448	300 70	6
15639	155 654	152 944	271 00	6
15637	157 700	155 577	283 00	6
13074	158 255	156 469	357 34	6
13064	156 469	155 228	248 09	6
15805	134 120	133 500	280 00	15
15801	141 100	133 500	380 00	6
13056	166 708	165 578	226 11	6
15826	135 620	132 970	265 00	8
15806	133 500	133 220	124 79	15
15807	133 220	132 970	168 46	15
13063	161 396	156 469	246 38	6
13061	162 441	161 396	209 00	6
15468	155 387	153 952	287 07	6
15481	152 087	150 572	303 00	6
13057	165 578	163 922	236 61	6
15830	136 807	133 737	306 97	6
13062	161 871	161 396	95 00	6
15467	159 467	155 387	100 00	6
15827	132 970	132 510	207 85	15
15831	133 737	132 510	245 38	6
13058	163 922	161 199	389 00	6
15787	129 280	127 697	343 45	27
15788	127 697	126 702	216 40	27
15832	132 510	131 910	272 65	15
13059	161 199	157 303	389 59	6
13060	157 303	155 387	383 10	6
16394	158 655	157 303	270 42	6
9338258	159 570	158 655	183 00	6
15476	161 095	159 570	305 00	6
15478	156 607	154 912	339 00	6
15479	154 912	153 797	222 80	6
15480	153 797	152 087	342 00	6
9300029	131 450	131 500	21 14	24
14364	130 790	130 080	324 03	15
9300030	131 640	131 500	63 05	30
9300028	131 400	131 450	21 91	24
15791	131 300	130 810	223 89	21
14362	131 280	130 790	224 18	15
14365	130 080	129 540	245 00	15
14367	129 540	129 140	179 86	15
14368	129 140	129 090	24 38	15
9299925	129 090	129 050	16 74	15
15772	133 170	132 660	313 82	15
15773	132 660	132 160	273 74	15
15774	132 160	131 910	155 91	15
14371	129 050	128 750	138 96	15
15771	133 212	133 170	25 98	15
15770	133 461	133 212	156 00	15
15517	160 361	159 431	186 10	6
15767	136 237	135 533	370 58	15
16211	128 750	128 300	201 57	15
15746	134 960	132 660	230 00	6
14166	128 300	127 900	266 03	18
15780	133 411	132 160	250 23	6
15518	160 381	159 431	190 00	6
15768	135 533	134 673	455 25	15
15769	134 573	134 183	244 00	15
15747	134 602	133 212	278 00	6
15765	136 679	136 237	232 65	15
16297	134 783	134 773	119 71	10
14168	127 900	127 510	265 97	18
15519	159 431	156 148	252 51	6
16274	143 333	142 043	257 94	6
14069	144 747	143 333	404 00	6
14073	144 583	143 333	250 06	6
14079	151 033	144 583	258 00	6
9300036	157 901	154 509	106 00	6
14071	145 833	144 583	249 99	6
12736	162 491	154 729	119 41	6
12737	154 729	153 811	305 81	6
16312	150 582	148 334	280 99	6
16352	143 336	142 568	153 59	6
16314	152 971	148 145	377 00	6
9305069	167 576	164 331	180 27	6
12726	164 489	163 019	147 05	6
16344	141 073	140 754	265 81	15
12721	168 350	167 280	214 00	6
16305	153 097	149 068	237 00	6
12710	168 497	164 223	312 02	6
12735	159 894	154 729	344 37	6
12734	164 213	159 894	254 03	6
12703	172 918	164 743	383 78	6
12704	173 711	164 743	224 20	6
16308	151 646	145 764	346 00	6
16279	146 571	143 431	314 00	6
16280	143 431	141 800	407 73	8
16342	141 453	141 073	108 68	12
16353	142 568	141 453	222 99	6
9300058	164 613	164 213	80 00	6
12719	174 715	168 554	354 27	6
12711	164 223	162 251	143 91	6
9300062	163 611	160 594	100 58	6
16161	141 400	140 970	427 00	12
12705	164 743	164 034	141 84	6
12712	162 251	160 594	331 37	6
76330	150 078	143 628	379 40	8
12741	143 628	143 314	184 60	12
12706	164 034	162 251	356 58	6
14072	155 931	144 583	283 71	6
16391	146 807	144 100	541 52	6
9300034	141 954	141 453	143 08	10
9300033	149 701	141 954	146 17	6
74441	150 267	149 701	113 24	6
16301	152 813	150 863	390 00	6
16302	150 863	148 923	388 00	6
16304	148 923	146 528	357 50	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
16278	138 608	136 640	393 60	6
12716	179 347	171 411	358 96	6
12715	181 364	179 347	310 30	6
12730	159 238	157 839	96 43	6
17051	188 855	181 364	151 94	6
16325	140 867	140 136	146 25	6
16326	140 136	138 804	317 00	8
16321	142 468	142 249	43 71	6
16324	142 249	140 867	142 48	6
121850	140 053	139 815	198 69	15
12713	191 167	188 855	231 24	6
16288	142 612	139 772	284 00	6
16289	139 772	138 512	315 00	8
16358	159 041	147 561	400 00	6
16359	147 561	146 999	56 20	6
16360	146 999	143 554	344 49	6
16357	146 500	143 554	294 57	6
16317	146 739	144 336	480 60	6
16318	145 296	144 336	192 01	6
12714	182 173	181 364	161 84	6
12700	189 021	180 566	173 97	6
12731	157 839	156 260	315 93	6
14075	146 772	146 139	181 00	6
16287	143 942	142 612	266 00	6
9331756	145 423	143 698	345 00	6
16284	140 783	139 772	252 79	8
12732	156 260	155 496	152 68	6
16348	140 496	140 053	368 80	15
9338269	146 139	144 747	397 74	6
16286	144 877	143 942	187 00	6
9300038	145 823	145 423	80 00	6
16311	141 936	140 136	359 99	6
16315	148 145	146 739	281 21	6
12717	171 411	169 562	369 79	6
16322	144 269	142 249	404 00	6
12701	180 566	172 918	201 28	6
12702	174 843	172 918	149 25	6
16276	140 628	138 608	403 96	6
16361	143 554	142 189	273 03	6
16282	141 800	140 783	254 13	8
16313	148 334	146 739	319 00	6
9300037	148 765	148 145	124 02	6
16281	144 100	141 800	230 00	6
12707	172 527	169 691	354 38	6
16346	140 754	140 496	215 35	15
12729	160 413	156 260	415 35	6
12718	169 562	168 554	201 42	6
12733	155 496	153 811	336 99	6
12738	153 811	152 878	93 34	8
12722	167 280	165 955	264 84	6
9286972	150 216	149 068	164 00	6
12720	168 554	167 280	254 99	6
12709	169 691	168 497	149 28	6
9305068	165 955	164 331	324 94	6
16363	142 189	141 279	182 00	6
16364	141 279	140 754	104 96	6
12728	162 215	160 413	360 43	6
16309	145 764	141 936	255 22	6
12708	170 431	169 691	148 00	6
12727	163 019	162 215	160 72	6
9305070	164 331	163 019	262 35	6
16285	154 509	144 877	301 00	6
12739	152 878	150 078	70 00	8
16300	143 936	141 936	400 11	6
14074	148 189	146 139	410 06	6
16306	149 068	146 528	298 85	6
16307	146 528	145 764	114 00	6
16275	142 043	140 628	283 00	6
13415	145 825	145 335	139 98	8
13438	149 991	145 825	249 49	6
12661	161 403	158 458	155 00	6
106889	144 648	142 474	434 88	6
12425	170 611	170 140	94 19	6
12426	170 140	164 952	129 71	6
12637	154 345	148 977	178 96	6
12639	151 482	148 977	250 55	6
13497	152 967	151 939	146 79	8
13751	154 002	151 543	491 78	6
12427	167 148	164 952	109 78	6
13423	151 149	146 229	246 00	6
13413	146 229	145 825	115 46	8
13435	153 212	150 551	266 03	6
13434	157 532	153 212	216 00	6
9299901	152 263	149 871	299 00	6
9299902	149 871	144 648	136 00	6
12652	145 432	144 798	372 52	12
12440	157 721	156 842	250 95	8
12659	156 288	147 673	350 20	6
13721	166 958	163 682	91 00	6
13724	155 116	153 567	154 90	6
13725	153 567	152 967	120 09	8
13453	150 890	148 579	191 05	6
13744	155 182	154 002	203 51	6
12640	148 977	147 972	125 60	6
13437	156 592	149 991	220 00	6
13496	159 924	152 967	183 08	6
110387	157 530	149 871	207 00	6
12650	150 275	145 432	146 78	6
12649	151 825	150 275	310 00	6
111421	159 721	155 484	339 00	6
12431	164 651	163 319	266 51	6
13742	158 788	155 182	93 90	6
13739	156 296	155 182	192 00	6
12441	156 842	156 198	184 26	8
13454	156 039	150 563	304 23	6
13501	156 426	155 090	267 34	6
114972	158 551	156 426	425 00	6
13723	154 773	153 567	172 28	8
13422	150 691	147 023	131 00	6
13412	147 023	146 229	226 79	8
12647	151 941	150 275	125 22	6
13433	154 740	153 212	218 36	6
114913	156 960	154 740	111 01	6
12641	147 972	146 550	177 73	6
114959	156 980	154 740	112 00	6
13737	156 536	156 296	48 00	6
12634	149 652	147 972	210 00	6
13741	160 753	158 788	84 00	6
12424	177 795	170 140	332 83	6
12630	156 400	151 300	300 00	6
12632	151 300	149 652	206 00	6
12642	146 550	146 094	91 25	6
109715	161 835	157 530	287 00	6
12643	146 094	145 432	389 45	12
9317560	152 627	151 102	304 96	6
13736	157 416	156 536	176 00	6
13740	161 238	160 753	94 96	6
12470	156 198	154 847	270 09	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
16303	156 762	148 923	305 00	6
16298	154 650	146 246	322 00	6
16299	146 246	143 936	461 93	6
14068	154 313	143 333	341 00	6
16238	157 417	154 313	194 00	6
12690	166 915	164 034	144 08	6
16240	154 890	150 911	180 87	6
14070	150 911	145 833	338 51	6
12672	152 571	150 816	351 00	6
12671	154 416	152 571	369 00	6
12670	154 941	154 416	104 98	6
12675	160 121	156 256	351 42	6
12669	156 256	154 941	263 02	6
12673	150 816	146 616	350 00	6
12668	158 256	156 256	400 00	6
9351659	143 314	142 474	494 39	12
13419	144 272	143 431	210 41	8
12667	160 071	158 256	363 03	6
114973	145 297	144 272	205 00	6
16163	142 474	141 836	375 00	12
16157	141 836	141 400	256 60	12
113755	144 344	143 628	143 18	6
16149	152 422	150 582	368 00	6
16148	144 103	142 043	412 00	6
12691	160 594	159 544	210 00	6
12436	159 544	158 514	205 99	6
12435	160 259	159 544	143 00	6
12674	146 616	144 873	348 57	6
9305101	144 373	143 913	268 93	12
12434	161 838	160 259	315 71	6
114929	149 173	148 494	194 00	10
12433	162 208	161 838	74 00	6
13754	150 953	149 373	450 08	10
13506	151 638	150 953	137 05	6
12660	147 673	145 273	240 09	6
13459	147 472	146 772	140 00	6
9338242	163 100	162 208	178 55	6
12422	163 737	163 100	127 35	6
12420	164 812	163 737	214 96	6
13460	146 772	144 888	376 73	6
13418	144 888	144 272	154 00	8
12418	165 664	165 501	32 58	6
12419	165 574	164 812	152 44	6
13753	151 543	150 573	193 62	6
13505	152 132	151 638	98 66	6
12438	158 514	157 721	226 68	8
12664	157 974	157 067	259 00	8
9351401	144 798	144 473	191 41	12
121847	158 177	157 721	130 39	6
12665	157 067	156 154	261 00	8
12666	156 154	154 941	346 64	8
12662	159 004	158 458	155 97	8
12663	158 458	157 974	138 35	8
9305100	154 920	154 345	115 00	6
13503	153 156	152 132	204 88	6
12636	166 225	154 345	440 00	6
13417	145 335	144 888	127 66	8
109744	155 484	152 263	161 05	6
13499	151 939	150 953	197 22	8
9305102	163 319	162 208	222 20	6
114962	151 223	150 563	132 10	6
74927	154 339	151 482	285 69	6
13436	150 551	149 991	112 00	6
12428	164 952	163 319	326 68	6
13455	150 563	148 579	396 82	6
13457	148 579	147 472	221 36	6
9298790	155 090	153 156	386 77	6
12648	152 390	151 825	113 00	6
12460	178 139	170 524	253 82	6
12610	149 728	147 847	376 30	10
12600	161 913	160 237	335 15	6
12621	147 237	146 880	178 33	10
13428	164 312	156 730	236 93	6
12614	147 546	147 237	154 75	10
12503	181 798	173 294	174 26	6
13427	168 112	164 312	190 00	6
13727	168 767	160 237	310 17	6
12461	170 524	168 605	191 90	6
16178	170 625	168 605	202 01	6
13783	167 475	160 400	228 21	6
12617	160 597	156 739	182 00	6
13410	149 025	148 062	275 00	8
13420	159 173	149 025	253 70	6
12507	173 140	155 571	335 94	6
12465	168 605	165 895	271 01	6
12466	165 895	163 716	435 68	6
12467	163 716	157 975	287 09	6
13494	165 127	163 142	397 00	6
12612	147 847	147 546	150 27	10
12627	165 416	162 566	285 00	6
12626	166 443	165 416	205 30	6
13713	164 106	156 271	391 73	6
12501	151 191	149 728	292 56	6
16174	161 294	155 125	323 00	6
16173	163 044	161 294	152 16	6
12619	151 233	147 237	135 00	6
12618	156 739	151 233	126 00	6
12616	161 862	156 739	83 43	6
12615	152 243	151 233	202 12	6
13726	171 419	168 767	204 03	6
12609	148 109	147 847	104 68	10
13746	169 524	165 518	250 35	6
13745	179 924	165 518	477 00	6
13747	165 518	159 586	355 24	6
13716	159 586	157 623	436 13	8
12598	162 948	161 913	207 00	6
13451	156 602	154 206	479 09	6
12597	163 323	161 913	282 00	6
9305104	164 784	163 716	106 72	6
13448	157 252	155 107	428 99	6
12505	177 141	173 140	215 10	6
13782	171 217	167 475	231 00	6
9305099	155 618	152 243	135 00	6
16168	172 176	171 217	137 00	6
13426	165 797	164 312	296 99	6
13493	171 469	165 127	242 99	6
9358732	172 157	171 469	137 62	6
13491	172 789	172 157	126 49	6
13409	150 440	149 025	283 04	8
13407	155 624	150 440	287 99	6
12462	180 480	179 445	207 11	6
12500	152 489	151 191	259 51	6
12595	164 384	163 323	212 18	6
13406	152 143	150 440	131 00	6
12463	179 445	178 590	170 86	6
12464	178 590	168 605	356 62	6
12490	153 390	152 489	180 27	6
13709	168 794	167 721	214 51	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
12509	154 847	152 627	443 98	6
12457	180 372	179 679	138 54	6
12456	181 525	179 679	230 69	6
13500	157 691	156 426	253 00	6
13421	151 780	147 023	339 79	6
114971	158 681	157 691	198 00	6
114970	158 868	158 681	37 30	6
12658	158 798	156 288	313 76	6
13749	160 289	154 002	455 60	6
12631	151 925	151 300	125 11	6
13495	163 142	159 924	275 03	6
12629	153 208	146 094	158 09	6
13735	159 259	156 296	411 54	6
13432	155 800	154 740	211 95	6
12646	155 771	151 941	266 00	6
12644	157 506	155 771	347 00	6
13719	163 682	157 623	374 00	6
13717	157 623	156 271	270 41	8
13722	156 271	154 773	214 00	8
13714	157 131	156 271	172 00	6
13452	154 206	150 890	394 74	6
12625	146 449	146 094	208 87	10
114960	155 997	151 780	105 42	6
12430	166 151	164 651	300 05	6
12508	155 571	154 847	144 70	6
12429	167 189	166 151	207 52	6
12645	157 275	155 771	98 94	6
13729	160 237	159 259	135 87	6
13748	162 693	160 289	155 08	6
114961	148 432	148 062	73 92	6
13411	148 062	147 023	297 00	8
13733	159 995	159 259	147 31	6
13429	157 959	156 730	245 72	6
13430	156 730	155 800	186 00	6
12468	161 982	157 975	200 38	6
12469	157 975	156 198	355 43	6
13431	160 400	155 800	230 01	6
114914	163 200	160 400	140 00	6
12504	173 294	155 571	295 39	6
114967	158 650	157 691	191 68	6
114969	159 630	158 681	189 71	6
13449	156 875	155 107	104 00	6
13450	155 107	154 206	180 15	6
13730	162 840	161 630	242 00	6
12510	151 102	149 728	274 79	6
16175	155 125	153 208	273 80	6
12628	162 566	153 208	265 86	6
12623	146 880	146 449	215 71	10
12458	179 679	178 139	285 33	6
13732	160 605	159 995	122 00	6
13731	161 630	160 605	205 00	6
12459	182 177	178 066	82 22	6
12605	150 598	149 726	249 12	8
13705	169 819	168 985	166 87	6
13704	172 185	169 819	140 00	6
12479	163 850	162 101	349 75	6
13396	152 749	151 919	166 00	8
13683	163 373	162 442	139 00	6
12477	169 567	166 804	336 96	6
12478	166 804	163 850	206 56	6
114924	177 122	174 622	100 00	6
13383	166 789	166 012	111 00	6
13382	167 126	166 012	222 76	6
12604	151 458	150 598	245 60	8
12487	166 310	164 281	134 40	6
13443	162 674	161 619	211 00	6
13703	170 594	169 819	154 96	6
13376	170 531	163 256	291 00	6
12453	170 324	169 426	179 57	6
12498	155 607	154 491	223 16	6
13489	175 884	174 031	370 48	6
13488	177 661	175 884	355 43	6
13487	179 086	177 661	285 00	6
13486	178 216	177 661	111 00	6
12588	163 419	156 278	341 67	6
12586	165 945	163 419	421 00	6
114965	173 414	172 789	125 00	6
13692	167 298	163 600	217 53	8
13701	172 789	171 537	250 43	6
13702	171 537	170 594	188 62	6
12445	173 021	171 685	267 28	6
12451	171 685	170 324	272 16	6
13384	166 012	164 827	118 49	6
12486	170 649	166 310	289 27	6
13385	166 983	164 827	98 00	6
12603	152 270	151 458	232 00	8
12589	156 278	153 501	231 42	6
13442	161 620	160 454	333 00	6
13774	172 985	170 626	196 56	6
13773	172 165	170 626	307 77	6
13778	174 622	170 122	180 00	6
12602	152 429	152 270	45 47	8
12601	153 501	152 429	63 09	8
13399	164 668	154 093	423 00	6
13395	154 093	152 749	268 67	8
13400	158 968	154 093	195 00	6
13671	181 255	178 837	403 00	6
12447	176 914	174 038	221 26	6
13681	167 994	167 199	159 00	6
13682	167 199	163 373	318 86	6
16171	171 183	170 324	171 69	6
13668	173 714	171 706	401 70	8
13697	172 840	170 594	188 75	6
12485	167 494	166 310	236 71	6
12484	168 099	167 494	121 13	6
12473	173 359	171 462	87 00	6
12448	174 038	172 540	299 55	6
12450	172 540	171 685	171 05	6
12497	156 714	155 607	221 27	6
13377	163 256	161 195	412 07	6
12475	169 524	166 804	340 00	6
12474	171 462	169 524	387 70	6
13775	170 626	169 828	159 68	6
13680	168 134	167 199	187 00	6
12585	159 506	153 501	353 24	8
12584	160 885	159 506	394 00	8
13441	162 338	161 620	205 23	6
12583	162 258	160 885	392 15	8
13693	163 600	162 258	248 61	6
13386	164 827	158 602	239 44	6
13776	176 237	169 828	112 44	6
9305105	168 116	167 494	124 51	6
13700	174 345	172 789	311 16	6
12493	167 036	162 782	293 37	6
12491	169 906	168 890	101 66	6
12492	168 890	167 036	370 80	6
13484	180 332	178 102	82 00	6
12495	158 397	157 819	115 47	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
13710	167 721	165 975	349 33	6
13712	170 051	164 106	297 25	6
13711	165 975	160 755	435 00	6
13715	160 755	159 586	259 81	8
13708	170 434	168 794	328 00	6
12471	178 120	165 644	402 44	6
12455	167 636	165 895	348 29	6
13405	154 350	152 143	147 15	6
13404	159 983	154 350	131 00	6
12607	148 871	148 109	305 00	10
13492	175 593	171 469	158 03	6
12476	177 247	169 567	374 63	6
13447	158 559	157 252	261 50	6
12472	165 644	162 101	186 46	6
114916	171 623	170 042	225 86	6
13770	178 649	173 930	363 02	6
13490	174 031	172 789	248 42	6
12592	166 032	164 384	329 61	6
13425	167 372	165 797	315 09	6
13424	170 042	167 372	333 77	6
12489	160 012	153 390	310 90	6
12593	173 263	164 384	317 11	6
13397	151 919	150 440	295 85	8
13398	156 548	151 919	308 59	6
12481	162 101	160 301	159 31	6
12483	160 301	160 012	28 89	6
13707	168 985	167 721	252 64	6
13706	179 557	168 985	334 58	6
12590	166 700	166 032	133 71	6
114966	181 057	179 557	120 00	6
13673	178 285	176 026	143 00	6
13780	175 460	170 042	135 45	6
13672	178 837	178 285	92 00	6
13685	162 442	160 755	281 13	8
13684	168 378	162 442	306 00	6
13676	171 706	162 442	272 48	8
13675	173 788	171 706	208 21	6
13674	176 026	171 706	120 00	6
13446	160 454	158 559	379 00	6
12444	177 049	173 021	194 58	6
12591	166 914	166 032	176 42	6
13444	164 654	161 619	105 00	6
13445	161 619	160 454	233 00	6
12499	154 491	152 489	400 54	6
12488	164 281	160 012	156 93	6
13771	173 930	172 165	353 00	6
13403	163 008	154 350	333 00	6
12442	175 856	174 463	92 82	6
12443	174 536	173 021	302 98	6
12454	169 426	167 636	358 00	6
13375	167 514	163 256	266 17	6
12606	149 726	148 871	342 00	10
13667	175 699	173 714	397 00	8
13665	193 810	175 699	308 00	6
13698	180 605	174 345	231 84	6
13766	170 272	168 360	382 26	6
13371	169 259	164 940	215 93	6
13372	164 940	163 037	190 37	6
12449	178 605	172 540	379 04	6
13381	156 502	155 394	221 63	6
13695	178 777	176 171	252 99	6
13691	163 591	162 258	381 00	8
13768	163 158	162 158	200 00	6
13677	171 419	170 179	248 06	6
122619	156 947	156 502	89 00	6
12569	154 991	153 525	418 98	8
12567	155 676	154 991	195 75	8
12575	174 241	172 794	289 24	6
74272	172 794	171 769	205 00	18
13690	171 769	163 591	174 00	8
12573	175 786	174 241	309 16	6
13662	176 784	175 699	310 00	8
13661	180 157	176 784	249 83	6
13368	172 726	166 457	208 96	6
13370	166 457	164 940	303 25	6
13369	167 297	166 457	168 00	6
12574	174 833	174 241	118 52	6
12565	156 400	155 676	206 79	8
12572	177 436	175 786	329 97	6
102792	170 393	166 457	131 21	6
13660	178 469	176 784	337 00	6
13686	172 770	171 769	286 00	6
12559	157 967	156 400	313 41	6
12547	164 727	164 271	130 13	6
12557	159 650	157 967	336 47	6
12555	161 482	159 650	183 22	6
12564	157 646	156 400	356 00	8
12548	165 067	164 271	159 19	6
13659	179 969	178 469	299 99	6
12558	161 318	157 967	335 04	6
12554	161 183	159 650	306 78	6
12549	164 271	161 183	346 93	6
12556	167 826	159 650	204 42	6
12563	158 529	157 646	252 37	8
12553	162 461	161 183	245 59	6
12562	159 388	158 529	171 75	6
12550	163 327	162 461	173 31	6
12552	165 759	162 461	370 62	6
12551	173 755	165 759	299 49	6
12560	174 602	173 754	169 47	6
12561	173 754	159 388	273 12	6
9305098	160 651	159 388	252 55	6
13699	174 920	174 345	115 00	6
13378	161 195	156 385	236 95	6
9305103	173 181	169 524	129 67	6
12571	153 525	152 429	313 16	8
13380	156 385	155 394	198 25	6
13394	155 394	154 093	260 29	8
13373	164 447	163 037	282 00	6
13374	163 037	161 195	230 17	6
13390	158 602	157 382	244 03	6
13389	159 858	158 602	251 23	6
12496	157 819	156 714	221 11	6
13392	157 382	155 394	283 98	6
13678	170 179	167 199	317 00	6
13485	178 102	175 884	443 61	6
9359832	179 632	171 183	281 65	6
12446	176 544	174 038	313 24	6
13669	186 025	181 255	300 00	6
12494	162 782	157 819	342 27	6
13779	170 122	162 158	362 00	6
13387	162 158	159 858	230 01	6
13696	176 171	172 840	302 84	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)
13483	179 457	178 102	270 94	6
13482	180 257	179 457	160 00	6
13481	180 262	179 457	161 00	6
13767	168 360	162 158	310 10	6
13777	169 828	168 360	293 47	6
12579	164 074	162 262	362 31	6
12582	162 262	159 506	250 54	6
12581	163 462	162 262	240 00	6
13439	163 273	162 338	267 00	8
12580	164 757	163 462	259 00	6
13379	160 310	156 385	224 29	6
13388	160 581	159 858	144 47	6
13402	158 127	157 382	149 04	6
13663	186 302	176 894	192 00	6
13664	176 894	175 699	239 00	6

Pipe ID	Upstream Invert	Downstream Invert	Pipe Length (feet)	Pipe Diameter (inches)

Appendix K Placer Vineyards TM

Technical Memorandum

Subject:	**Placer Vineyards Pump Station and Forcemain Capacity Analysis -- Final**
Prepared For:	Kent MacDiarmid, The MacDiarmid Company; Mike Smith, MacKay and Somps
Prepared by:	Chris Peters/Pete Bellows – Brown and Caldwell
Reviewed by:	Dave Richardson/Austin Peterson – RMC
Date:	May 31, 2006
Reference:	0163-001.00

1 Introduction

This technical memorandum (TM) summarizes the results of a hydraulic assessment for the proposed pump station and force main system that will serve the Placer Vineyards Urban Growth Area (UGA). This TM will identify pump station and force main sizes for the two development scenarios in the Placer Vineyards UGA: Base Plan and Blueprint Plan. Land use data for the development of flow projections was provided by MacKay and Somps.

Wastewater flow from Placer Vineyards Shed A and Shed B is tributary to two proposed pump stations upstream of the Dry Creek Wastewater Treatment Plan (DCWWTP). Each pump station will have its own force main system. The Placer Vineyards pump station, serving Shed A, will pump directly to the DCWWTP. Shed B will be served by Dry Creek Pump Station No. 2, which also serves a small area of unincorporated development in Placer County directly south of Shed B. The force main for Dry Creek Pump Station No. 2 will connect to the existing 16-inch force main serving Dry Creek Pump Station No. 1. A map of the proposed Placer Vineyards pump station and force main system is shown in Figure 1.

2 Flow Projections

Flow projections for base sanitary and wet weather flows were developed with the land use information provided by MacKay and Somps and unit wastewater flow generation criteria established as part of the South Placer Wastewater Authority (SPWA) trunk sewer evaluation (Trunk Sewer Hydraulic Analysis TM No. 3b). The Average Base Sanitary Unit Flow Factors used for the trunk sewer evaluation are presented in Table 1. A summary of the average base sanitary flow (BSF) projections for each development scenario is provided in Table 2 through Table 5.

To develop the peak wet weather flow (PWWF) projection, wet weather flow (groundwater infiltration (GWI) and inflow) was applied to each developed parcel on an acreage basis. A wet season GWI rate of 200 gpd/acre was applied to developed parcels in the DCWWTP service area. Wet season GWI was not applied to parks or open space. Inflow is based on a 10-year 24-hour synthetic rainfall pattern that occurs across the entire service area. Inflow is dependent on several factors including rainfall amount. For the SPWA project, a 10-year, 24-hour design storm was chosen to project peak wet weather flows in the model. Further discussion on design flows is presented in the SPWA Wet Weather Flow Projection TM No. 2c. The 10-year PWWF, including base sanitary flow, for each development scenario is provided in Table 6.

Table 1 – Average Base Sanitary Unit Flow Factors

Land Use Designation	Units	Trunk Sewer Analyses Unit Flow Factor[1]
Commercial	gpd per acre	800
Heavy Industrial	gpd per acre	800
Light Industrial	gpd per acre	800
Mixed Use	gpd per acre	2,160
Public/Quasi-Public	gpd per acre	620
Schools	gpd per acre	160
Residential 1 DU	gpd per DU	180
Residential 2 DU	gpd per DU	180
Residential 3 DU	gpd per DU	180
Residential Multiple DU[2]	gpd per acre	1,920
Open Space	gpd per acre	0
Parks > 10 Acres	gpd per acre	10
Vacant	gpd per acre	0

[1] Does not include an allowance for dry season GWI. Dry and wet season GWI are applied on an area-specific basis.
[2] The proposed Residential Multiple DU unit flow factor can also be represented as 130 gpd per DU.

Table 2 – Average Base Sanitary Flow Projection – Shed A Base Plan

Land use	Area (ac)	Dwelling Units (du)	Unit Flow Factor	Total Flow (mgd)
Single Family Residential	2,598	7,983	180 gpd/du	1.44
Multi-Family Residential	171	2,551	130 gpd/du	0.33
Mixed Use	67	844	2,160 gpd/ac	0.14
Commercial	176		800 gpd/ac	0.14
School	140		160 gpd/ac	0.02
Public/Quasi-Public	179	218	620 gpd/ac	0.11
Total	3,331	11,596		2.18

Table 3 – Average Base Sanitary Flow Projection – Shed B Base Plan

Land use	Area (ac)	Dwelling Units (du)	Unit Flow Factor	Total Flow (mgd)
Single Family Residential	568	2,149	180 gpd/du	0.39
Multi-Family Residential	20	293	130 gpd/du	0.04
Commercial	25		800 gpd/ac	0.02
Public/Quasi-Public	27	94	620 gpd/ac	0.02
Total	640	2,536		0.47

Table 4 – Average Base Sanitary Flow Projection – Shed A Blueprint Plan

Land use	Area (ac)	Dwelling Units (du)	Unit Flow Factor	Total Flow (mgd)
Single Family Residential	2,388	10,536	180 gpd/du	1.90
Multi-Family Residential	271	4,872	130 gpd/du	0.63
Mixed Use	90	1,378	2,160 gpd/ac	0.19
Commercial	222		800 gpd/ac	0.18
School	190		160 gpd/ac	0.03
Public/Quasi-Public	137	621	620 gpd/ac	0.09
Total	3,298	17,407		3.02

Table 5 – Average Base Sanitary Flow Projection – Shed B Blueprint Plan

Land use	Area (ac)	Dwelling Units (du)	Unit Flow Factor	Total Flow (mgd)
Single Family Residential	470	2,769	180 gpd/du	0.50
Multi-Family Residential	49	870	130 gpd/du	0.11
Mixed Use	23	354	2,160 gpd/ac	0.05
Commercial	25		800 gpd/ac	0.02
School	30		160 gpd/ac	0.01
Public/Quasi-Public	30	231	620 gpd/ac	0.02
Total	627	4,224		0.71

Table 6 – Shed A and Shed B Peak Wet Weather Flow Projection

Scenario	Base Sanitary Flow (mgd)	Peak Wet Weather Flow (mgd)	Resultant Peaking Factor[1]
Shed A – Base Plan	2.18	7.33	3.36
Shed B – Base Plan	0.47	1.62	3.45
Shed A – Blueprint Plan	3.02	8.93	2.96
Shed B – Blueprint Plan	0.71	2.08	2.93

[1] Resultant Peaking Factor is a function of land use category, applicable BSF diurnal pattern and developed area for GWI and Inflow flow components (excludes open space and parks). GWI and Inflow are approximately constant for each plan scenario. Resultant peaking factor is lower for the Blueprint Plan due to a higher base sanitary flow.

3 Criteria for Sizing Pump Stations and Force Mains

Pump stations are sized so that the rated capacities that match or exceed the PWWF. For the force mains, the maximum velocity criterion is 7 feet per second (fps) with a Hazen-Williams C factor of 120. Also, the maximum allowable system head (static head, velocity head and minor head losses) is limited to 200 feet.

4 Hydraulic Model

The hydraulic modeling program used for this analysis is H_2OMAP Sewer Pro, a product of MWH Soft, Inc. This model is currently being used by SPWA to perform an evaluation of the regional trunk sewer system. To perform the hydraulic analysis for this study, the 10-year PWWF from Shed A and Shed B was allocated in the hydraulic model to a "dummy" trunk sewer pipe upstream of each respective pump station. These flow input nodes are shown on Figure 1, Figure 2 and Figure 3.

5 Hydraulic Model Results

After the flows were loaded into the hydraulic model, the model was run for each scenario. Flows were identified in the model pipes and were used to size each pump station and associated force main. The results of this analysis are presented below. The pump station and force main sizing is also indicated on Figure 2 and Figure 3.

5.1 Placer Vineyards Pump Station and Force Main

The model results indicate that a 7.33 mgd pump station is needed to transport the PWWF for the Base Plan scenario. The associated force main for this scenario must also be able to handle this flow and should be sized as a single 24-inch force main (velocity of 3.6 fps) or a dual 18-inch force main (velocity of 3.2 fps). For the Blueprint Plan scenario, a 8.93 mgd pump station is needed to transport the PWWF. The associated force main should be sized as a single 26-inch force main (velocity of 3.8 fps) or a dual 20-inch force main (velocity of 3.2 fps). Smaller force main sizes were tested in the model but were not feasible due to the high head losses associated with the long force main length. Using smaller force main diameters is only feasible if a second pump station is operated.

There are a number of advantages associated with operating a dual force main system with the Placer Vineyard pump station. These advantages include:

- Increased reliability and redundancy in the case of force main failure.
- Ability to handle a wider range of flows (one force main handles peak BSF; both force mains handle PWWF).
- Ability to sequence the force main construction over time as development occurs.
- Ability to shut down a force main for maintenance.
- Possibly less sulfide generation than in a single force main.

There are also some disadvantages associated with operating a dual force main system with the Placer Vineyard pump station. These disadvantages include:

- Increased cost to install additional force main.
- Additional land needed to install additional force main.
- More maintenance on a dual force main (twice as much pipe to maintain).

A cost-benefit analysis should be performed to fully understand the value of each advantage and disadvantage of the dual force main system. It is possible that the higher initial costs of a dual force main system may be outweighed by the long-term risk and maintenance savings.

5.2 Dry Creek No. 2 Pump Station and Force Main

Dry Creek No. 2 pump station is sized to receive flow from Placer Vineyards Shed B and some unincorporated areas of Placer County (directly south of Shed B). The contribution from Placer Vineyards Shed B is shown in Table 6. The model results indicate that a 2.30 mgd pump station (1.62 mgd from Shed B) is needed to transport the PWWF for the Base Plan scenario. The associated force main for this scenario must also be able to handle this flow and should be sized as a single 12-inch force main (velocity of 4.5 fps). For the Blueprint Plan scenario, a 2.77 mgd pump station (2.08 mgd from Shed B) is needed to transport the PWWF. The associated force main should also be sized as a single 12-inch force main (velocity of 5.5 fps).

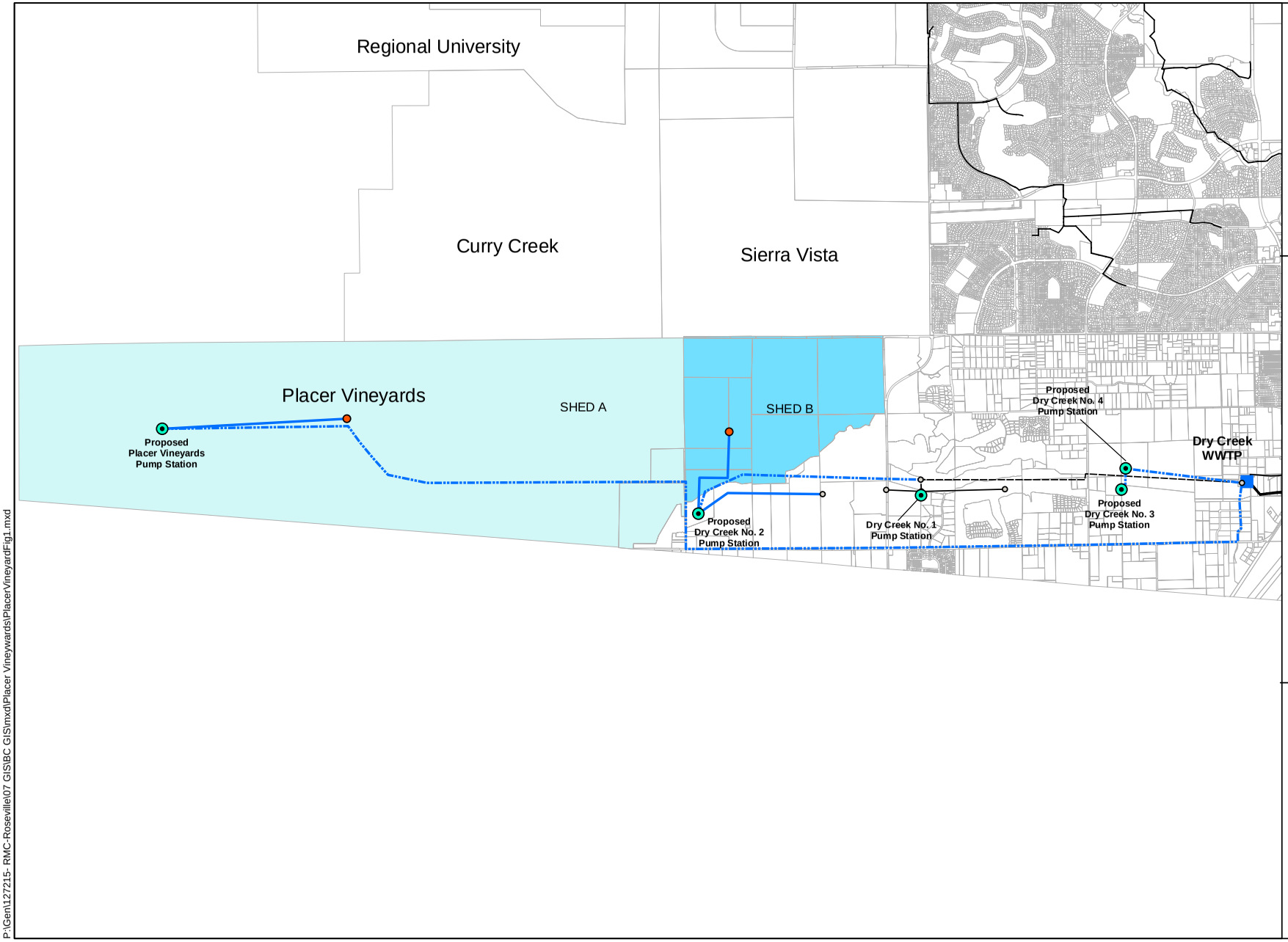


FIGURE 1

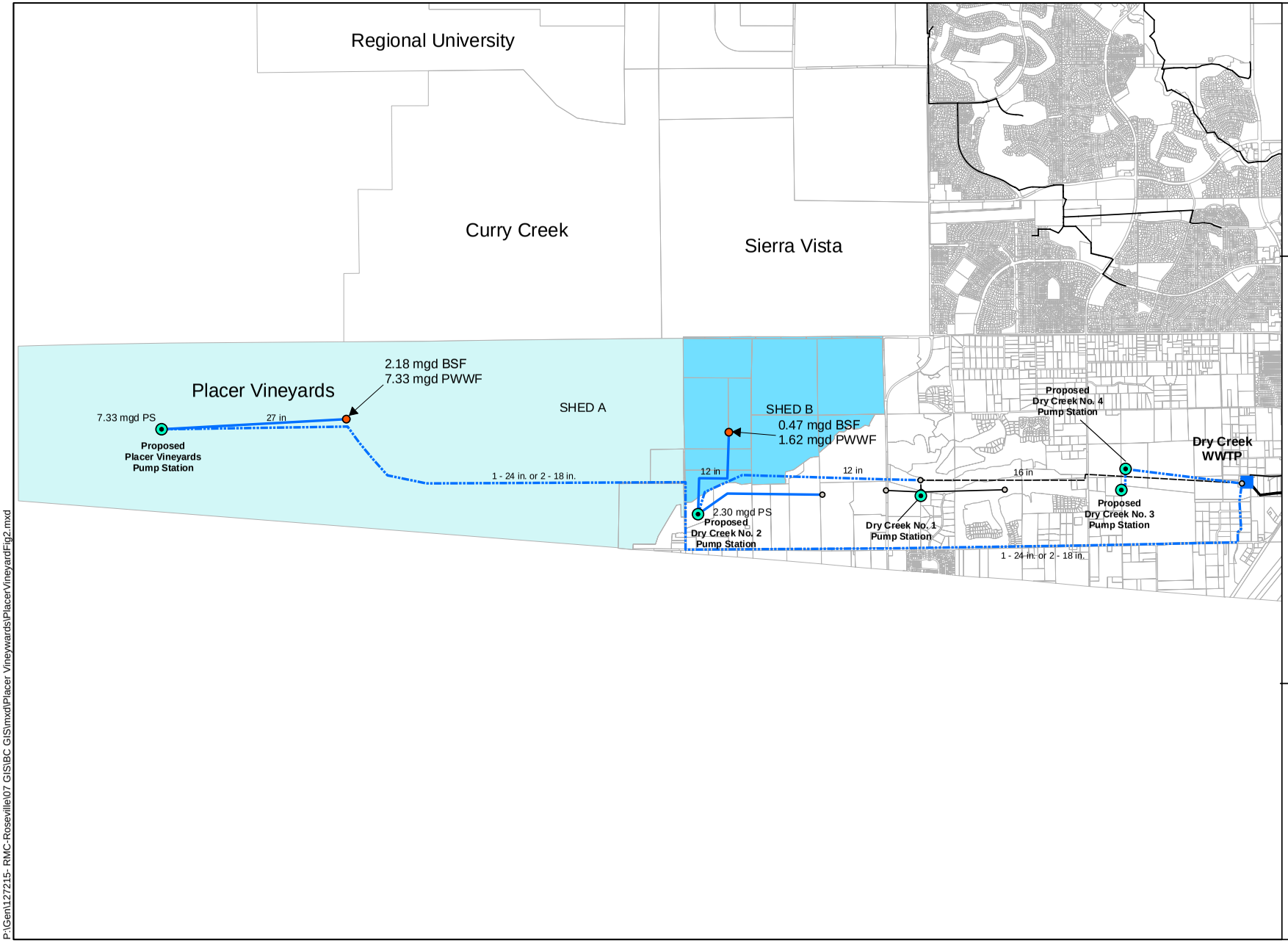
Placer Vineyards Model Network

May 2006

PLACER VINEYARDS

Pump Station and Force Main Capacity Analysis

P:\Gen\127215- RMC-Roseville\07 GIS\BC GIS\mxd\Placer Vineywards\PlacerVineyardFig1.mxd



Legend

- Pump Station
- WWTP
- Modeled Manhole
- Flow Input Node
- Existing Gravity Main
- Existing Force Main
- Proposed Force Main
- Proposed Gravity Pipe
- Watershed A
- Watershed B
- Parcel Boundary

FIGURE 2

Base Plan Pump Station and Force Main Sizing

May 2006

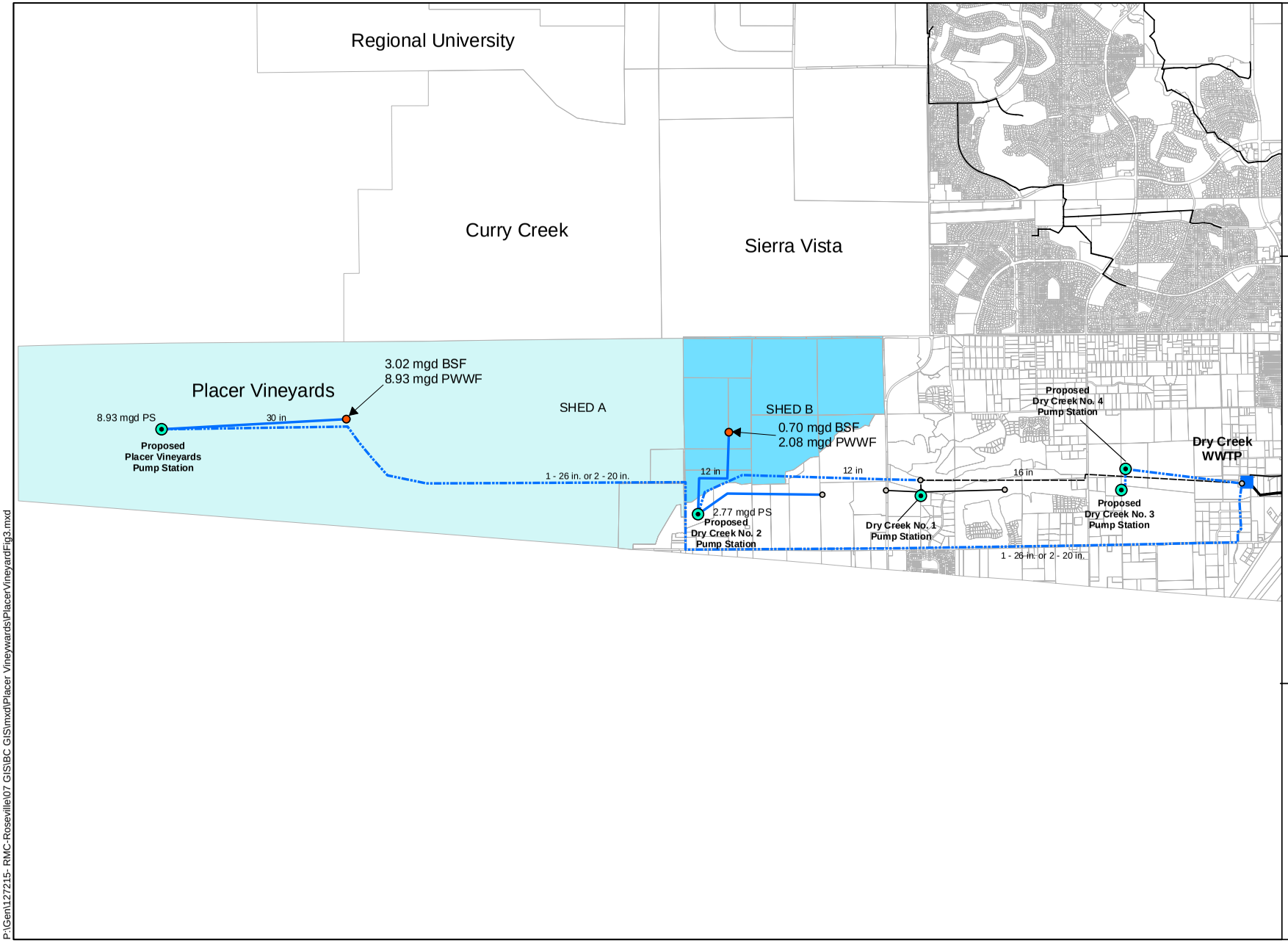
PLACER VINEYARDS

Pump Station and Force Main Capacity Analysis

N
W E
S

3,000 1,500 0 3,000
Feet

P:\Gen\127215- RMC-Roseville\07 GIS\BC GIS\mxd\Placer Vineywards\PlacerVineyardFig2.mxd



Legend

- Pump Station
- WWTP
- Modeled Manhole
- Flow Input Node
- Existing Gravity Main
- Existing Force Main
- Proposed Force Main
- Proposed Gravity Pipe
- Watershed A
- Watershed B
- Parcel Boundary

FIGURE 3

Blueprint Plan Pump Station and Force Main Sizing

May 2006

PLACER VINEYARDS

Pump Station and Force Main Capacity Analysis

N
W E
S

3,000 1,500 0 3,000
Feet

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Appendix L Placer Ranch TM

DRAFT Technical Memorandum

Placer Ranch Hydraulic Modeling

Subject:	**Hydraulic Modeling TM**
Prepared For:	Regina Reusser, G.C. Wallace
Prepared by:	Andy Smith, RMC
Reviewed by:	Dave Richardson, RMC
Date:	December 22, 2006
Reference:	0190-001

1 Introduction

The purpose of this technical memorandum (TM) is to document hydraulic modeling work performed for the Placer Ranch development in Placer County. As part of the 2005 South Placer Wastewater Authority (SPWA) Regional Wastewater and Recycled Water Systems Evaluation Project (2005 SPWA Systems Evaluation), land use projections provided by G.C. Wallace (GCW) for Placer Ranch, unit flow factors developed for the 2005 SPWA Systems Evaluation, and SPWA's assumptions for the routing of flows (both from within Placer Ranch and from "offsite" areas to the north and east of the development) were used to size several trunk sewers that will serve the development and convey its sewage towards the Pleasant Grove Wastewater Treatment Plant.

The analysis documented in this TM differs from the analysis described above by using GCW's own assumptions about the routing of Placer Ranch and "offsite" flows (but still uses GCW land use assumptions and SPWA unit flow factors). The work documented in this TM also follows criteria, set forth by SPWA, to be used by developers for the design of new sewer facilities.

This TM is organized as follows:

- Introduction
- Land Use and Flow Projections
- Model Development
- Model Results

2 Land Use and Flow Projections

GCW provided RMC with AutoCAD drawing files showing the projected land uses within the Placer Ranch development. The land use categories included in the GCW data were converted to SPWA land use categories for use with 2005 SPWA unit flow factors. **Table 1** shows the land use categories provided by GCW and their corresponding SPWA land use categories. **Table 2** provides the corresponding 2005 SPWA average dry weather flow (ADWF) and base sanitary flow (BSF) unit flow factors used for this study.

Table 1: Land Use Categories

Land Use Category Provided by G.C. Wallace	2005 SPWA Land Use Category
BP	Commercial
C	Commercial
ES	Schools
HDR	Residential Mult. DU
LC	Open Space
LDR	Residential Multiple DU
LI	Light Industrial
MDR	Residential Multiple DU
MS	Schools
MU	Mixed Use
NC	Commercial
Offsite 1	Light Industrial
Offsite 2	Light Industrial
Offsite 3	Light Industrial
Offsite 4	Light Industrial
Offsite 5	Light Industrial
Offsite 6	Public/Quasi-Public
Offsite 7	Light Industrial
Offsite 8	Light Industrial
OP	Commercial
OS	Open Space
PARK	Open Space
PARK	Parks > 10 Acres
PQP	Public/Quasi-Public
US-OS	Open Space
UZ	University - No Flow [a]
UZ	University [a]
UZ-FH	Residential Multiple DU
UZ-OS	Open Space
UZ-SH	Residential Mult. DU

Footnotes:

a. The University land use category was identified by GCW as a point source. The smaller two of three "University" parcels were therefore assumed to contribute zero flow, while the largest of the three parcels was assigned the entire point source flow.

Table 2: 2005 SPWA Unit Flow Factors

Land Use Category	Units	BSF Unit Flow Factor [a] (for Trunk Sewer Modeling)	ADWF Unit Flow Factor [b] (for WWTP Flow Projections)
Commercial	gpd per acre	800	850
Heavy Industrial	gpd per acre	800	850
Light Industrial	gpd per acre	800	850
Mixed Use	gpd per acre	2,160	2,300
Public/Quasi-Public	gpd per acre	620	660
Schools	gpd per acre	160	170
Residential 1 DU	gpd per du	180	190
Residential 2 DU	gpd per du	180	190
Residential 3 DU	gpd per du	180	190
Residential Multiple DU [c]	gpd per du	180	190
Residential Mult. DU [d]	gpd per acre	1,920	2,040
Open Space	gpd per acre	0	0
Parks > 10 Acres	gpd per acre	10	10
Vacant	gpd per acre	0	0

Footnotes:

a. Does not include allowance for GWI. Dry and wet season GWI were applied as gpd/acre rates on a sewershed-specific basis in the hydraulic model for trunk sewer analyses.
b. Includes allowance for dry season GWI, and represents the ADWF to be treated
c. The Residential Multiple DU unit flow factor is used to describe larger, un-subdivided parcels with a known number of dwelling units.
d. The Residential Mult. DU unit flow factor can also be represented as 120 gpd per DU (BSF) or 130 gpd per DU (ADWF).

A point source was also named within the Placer Ranch service area. The University land use category was designated by GCW as point source that contributes 500,000 gallons per day (gpd) of wastewater to the system.

A wet season groundwater infiltration (GWI) flowrate of 100 gpd/acre was also included in this analysis. This flowrate is consistent with the hydraulic modeling performed for the 2005 SPWA Systems Evaluation. Wet season GWI was not applied to parks and open spaces.

3 Model Development

A hydraulic model was developed to verify sewer locations, sizes, and slopes necessary to serve Placer Ranch. The hydraulic model used to conduct this work was H2OMap Sewer GIS Professional Suite, Version 8, Update # 4 (H2OMap Sewer). The model for this study was built upon the hydraulic model used for the 2005 SPWA Systems Evaluation, which is described in a TM published in April 2006 by SPWA, titled *Trunk Sewer Capacity Analysis – TM 3b* (SPWA TM 3b). The model was adapted and expanded using data supplied by GCW, including AutoCAD drawing files and other information for the Placer Ranch Sewer Study.

3.1 Load Allocation

Load Allocator, a module for H2OMap Sewer, was used to assign the wastewater flows from each of the parcels shown in the GCW AutoCAD data to a manhole in the hydraulic model. The Load Allocator manhole assignments match similar assignments indicated in the AutoCAD data provided by GCW. Wastewater flows for each land use category were further assigned to one of several diurnal curves (e.g., a residential curve) developed for the SPWA hydraulic model, in order to better reflect time-varying flows for a more realistic extended period hydraulic simulation.

The assumptions used in this analysis to route flows within Placer Ranch, as well as flows from the eight "offsite" areas to the north and east of the development, are documented in telephone discussion notes , dated June 2006, regarding wastewater flow routing in the vicinity of Placer Ranch. Additionally, a TM titled *Placer Ranch Flow Projection Comparison* was prepared in June 2006 that compared flow projections made by GCW and SPWA. The telephone discussion notes and the *Placer Ranch Projection Comparison* TM are included for reference in **Attachment C**.

3.2 Sewer Sizing Criteria

A TM titled *Unit Flow Factor Sets and Sewer Design Criteria – TM 3a* (SPWA TM 3a), published by SPWA in October 2006, provides criteria to be used by developers for the sizing of future sewer infrastructure. SPWA TM 3a states that the hydraulic model of the trunk sewer system should be used to design sewers 18 inches in diameter and larger. For the design of sewers smaller than 18 inches in diameter, ADWF unit flow factors, a safety factor, and an appropriate peaking factor should be used. These criteria were followed for this study. For a more detailed discussion of both methods, refer to TM 3a in **Attachment A**.

The data supplied by GCW included diameter and slope information for all sewers in the study. However, since the GCW diameters and slopes were developed using out-of-date unit flow factors, many of the diameters and slopes were oversized, and were therefore modified following the allocation of flows using 2005 SPWA unit flow factors. In cases where the slope provided by GCW exceeded the minimum slope necessary to attain a velocity of 2 feet per second (fps) at full pipe conditions, the original slope was used; otherwise, the minimum slope needed to reach 2 fps was substituted.

4 Model Results

The hydraulic model was used to size sewers 18 inches in diameter and larger. The remaining sewers were sized using the methodology provided in SPWA TM 3a. An extended period simulation was run to verify the adequacy of the sewer locations, sizes, and slopes developed. **Figure 1** identifies the sewers that were sized with each method. **Figure 2** identifies the sizes of all modeled sewers, and features the pipe ID numbers assigned by H2OMap Sewer. It should be noted that the trunk sewer that exits the Placer Ranch service area and flows south into the City of Roseville has been sized as a 27-inch diameter pipe. The hydraulic analysis for this line indicated that a 24-inch pipe may also be suitable; a diameter of 27 inches was chosen to maintain conservatism.

Figure 3 shows the same information as Figure 2, but manhole ID numbers are shown instead of pipe IDs. Additional information for the modeled pipes (e.g., slope information) and manholes (e.g., load information), is included in **Tables B-1** and **B-2**, respectively, in **Attachment B**.

Figure 1: Sewer Sizing by Methodology

Figure 2: Model Sewer Sizes and Pipe ID Numbers

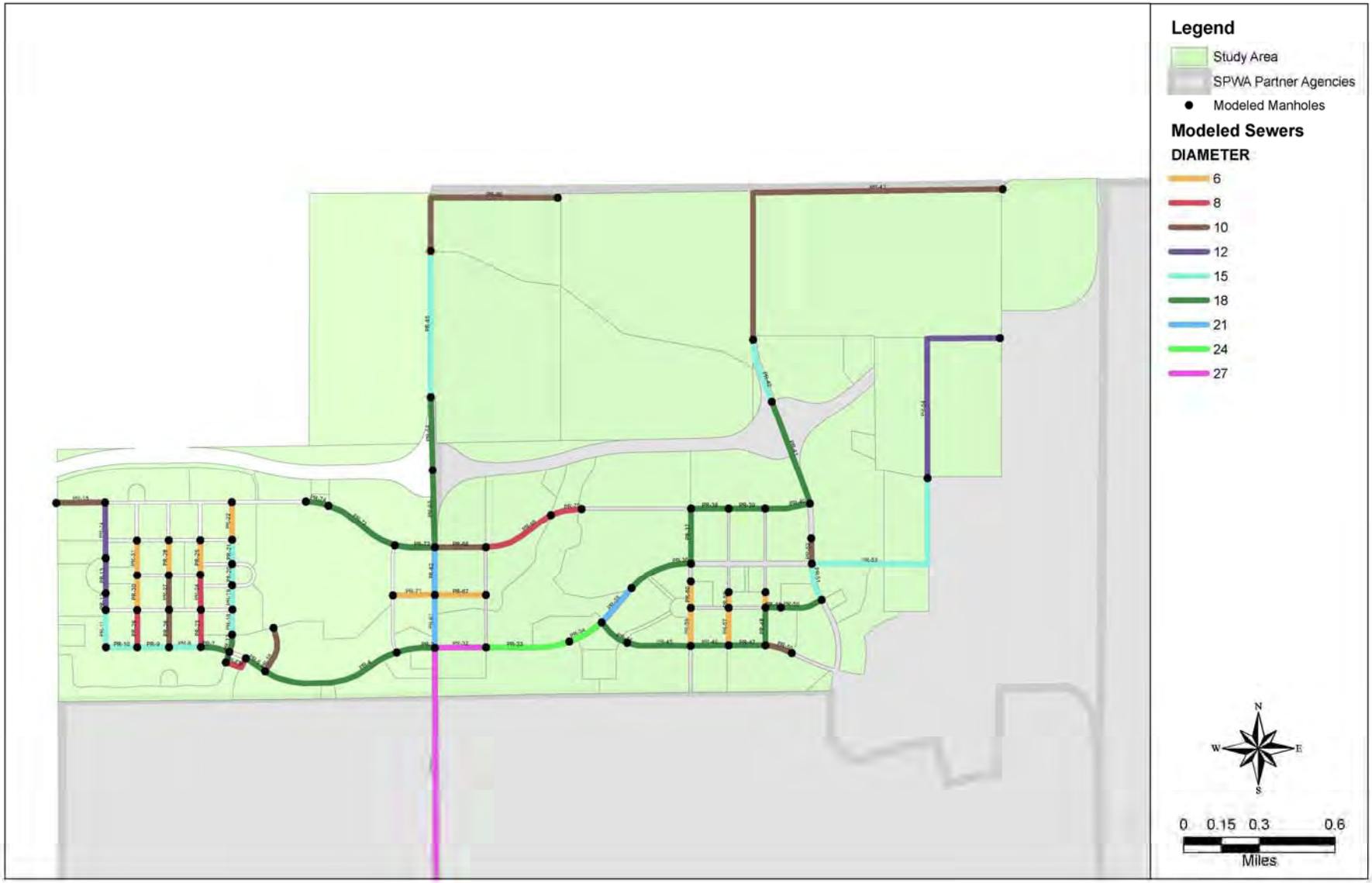
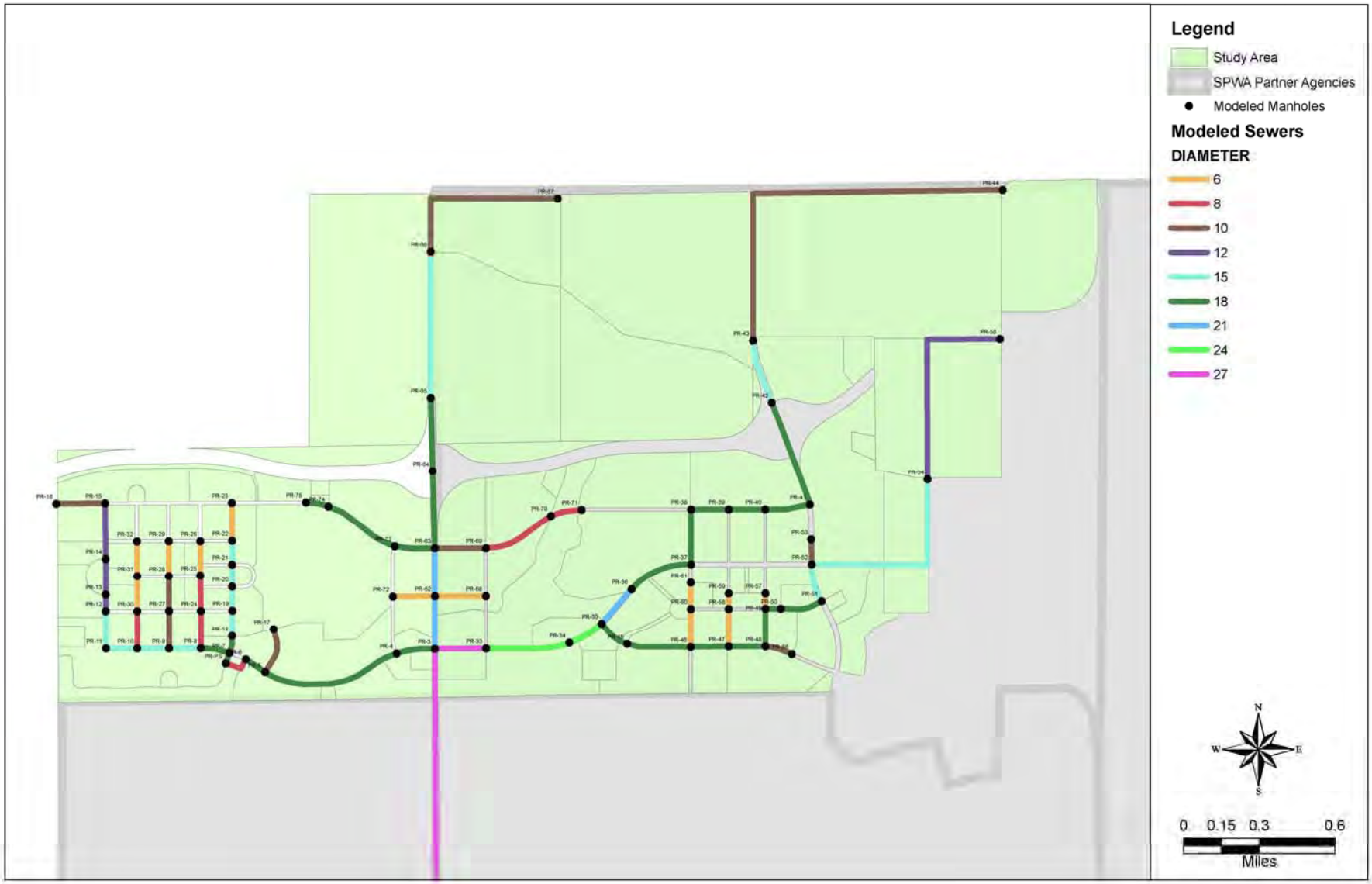


Figure 3: Model Sewer Sizes and Manhole ID Numbers



Attachment A: SPWA TM 3a

Technical Memorandum

South Placer Regional Wastewater & Recycled Water Systems Evaluation Project

Subject: Unit Flow Factor Sets and Sewer Design Criteria –TM No. 3a (FINAL)

Prepared For: Art O'Brien – City of Roseville

Prepared By: Mai-Tram Le - RMC; revised by Gisa Ju - RMC

Reviewed By: Dave Richardson - RMC
Pete Bellows – BC

Date: May 25, 2005; Final revision October 3, 2006

Reference: 0091-4.02

This technical memorandum (TM) provides a definition of the unit flow factors that have been developed and used in analyses of treatment and trunk sewer facilities as part of the South Placer Regional Wastewater and Recycled Water Systems Evaluation Project (Project). The TM also proposes criteria to be used by developers for design of new sewer facilities.

The various analyses and their associated application are as follows:

1. **Treatment Plant Analyses** – A set of average dry weather unit flow factors has been developed for the entire South Placer Wastewater Authority (SPWA) service area. These factors include the average flow coming from various areas based on specific land use designations, along with a base dry weather groundwater infiltration (GWI) component across the service area. The average unit flow factors were developed using water use and flow monitoring data, as presented in TM 2a, "Dry Weather Flow Projection for 2005 Service Area." For example, the unit flow factor for single-family residential dwelling units, regardless of density, is 190 gpd, of which 10 gpd represents the dry weather GWI component. The unit flow factors used for treatment plant analyses are presented in **Table 1**.

2. **Hydraulic Model Calibration and Trunk Sewer Analyses** – The dry weather flows used for model calibration and analyses of trunk sewers consists of base sanitary flows (BSF) which have been developed using the same unit flow factor concept as for the treatment plant analyses discussed above. However, the dry weather GWI component of the unit flow factors has been included on an areal basis based on actual measured flows, rather than having been considered as a uniform base dry weather GWI load across the service area.

   Trunk Sewer analyses also include additional components of wet weather GWI and rainfall-dependent infiltration and inflow (RDI/I) that vary across the SPWA service area to reflect actual conditions as verified by the wet weather flow monitoring data. The wet weather GWI factors are specific to each wastewater treatment plant (WWTP) service area and were determined from analysis of WWTP flows to be 200 gpd/acre in the Dry Creek WWTP basin and 100 gpd/acre in the Pleasant Grove WWTP basin. The GWI rates and RDI/I parameters used in the trunk sewer model are documented in TM 2c, "Wet Weather Flow Projection for the Ultimate SPWA Service Area."

Table 1 – Average Dry Weather Unit Flow Factors Used for Treatment Plant Analyses

Land Use Designation	Units	Flow Factor (gpd/unit)[1]
Commercial	gpd per acre	850
Heavy Industrial	gpd per acre	850
Light Industrial	gpd per acre	850
Mixed Use	gpd per acre	2,300
Public/Quasi-Public	gpd per acre	660
Schools	gpd per acre	170
Residential 1 DU	gpd per DU	190
Residential 2 DU	gpd per DU	190
Residential 3 DU	gpd per DU	190
Residential Multiple DU[2]	gpd per acre or gpd per DU	2,040 or 130
Open Space	gpd per acre	0
Parks > 10 Acres	gpd per acre	10
Vacant	gpd per acre	0

[1] Includes allowance for dry season GWI.
[2] Future development projects should use the factor that results in the highest flow .

3. **Design Flow Standards (Criteria) for Sizing Infrastructure** – For sizing future infrastructure facilities, the hydraulic model of the trunk sewer system should be used for pipes 18 inches in diameter and larger. For smaller facilities, the average dry weather unit flow factors for the treatment plant analyses can be used along with a safety factor of 2.0 and appropriate peaking factors. The safety factor of 2.0 will be used to factor the average dry weather unit flow factor in order to:
    1. Account for changes that may occur over time in the behavior of residential and nonresidential contributors to the sewer systems, such as increased indoor water use;
    2. Account for changes in environmental conditions (higher groundwater table and consequent higher GWI) and changes in infrastructure (aging pipes, etc.);
    3. Provide for safety to adequately size the infrastructure to avoid any sanitary sewer overflows due to under-sizing;
    4. Account for the increasing friction losses (increase in the roughness coefficient) due to pipe aging; and,
    5. Account for nominal pipe diameter decreases due to accumulation of material adhering to the walls of the sewer piping and restricting capacity.

    Peak wet weather flows will be accounted for using a system-wide peaking factor. A peaking factor curve was developed based on the following assumptions:
    - Single family residential development at 4 DU/acre
    - Design average dry weather flow (ADWF) based on a unit flow rate of 190 gpd/DU times a safety factor of 2.0

- Diurnal peaking factor ranging from 1.8 to 3.0 depending on area size (reflects the attenuation of peak flows through the sewer system as the tributary area increases – refer to Footnote 4 in Table 2))
- GWI at 150 gpd/acre
- RDI/I at 700 gpd/acre, estimated based on model parameters used for new development UGAs (Note: New development RDI/I parameters were assumed to be similar to those determined by flow monitoring and model calibration for relatively new areas of the system; see TM 2c for discussion.)
- Peak diurnal flow concurrent with peak RDI/I flow

The resultant peaking factor curve is presented in **Figure 1**. **Table 2** below shows the derivation of the peaking factor curve for areas ranging from 10 to 750 acres. (NOTE: the values in Table 2 are meant to support the derivation of the peaking factor curve, rather than to be published as design standards).

Table 2 - Derivation of Proposed Roseville/SPWA Design Peaking Factor Curve[1]

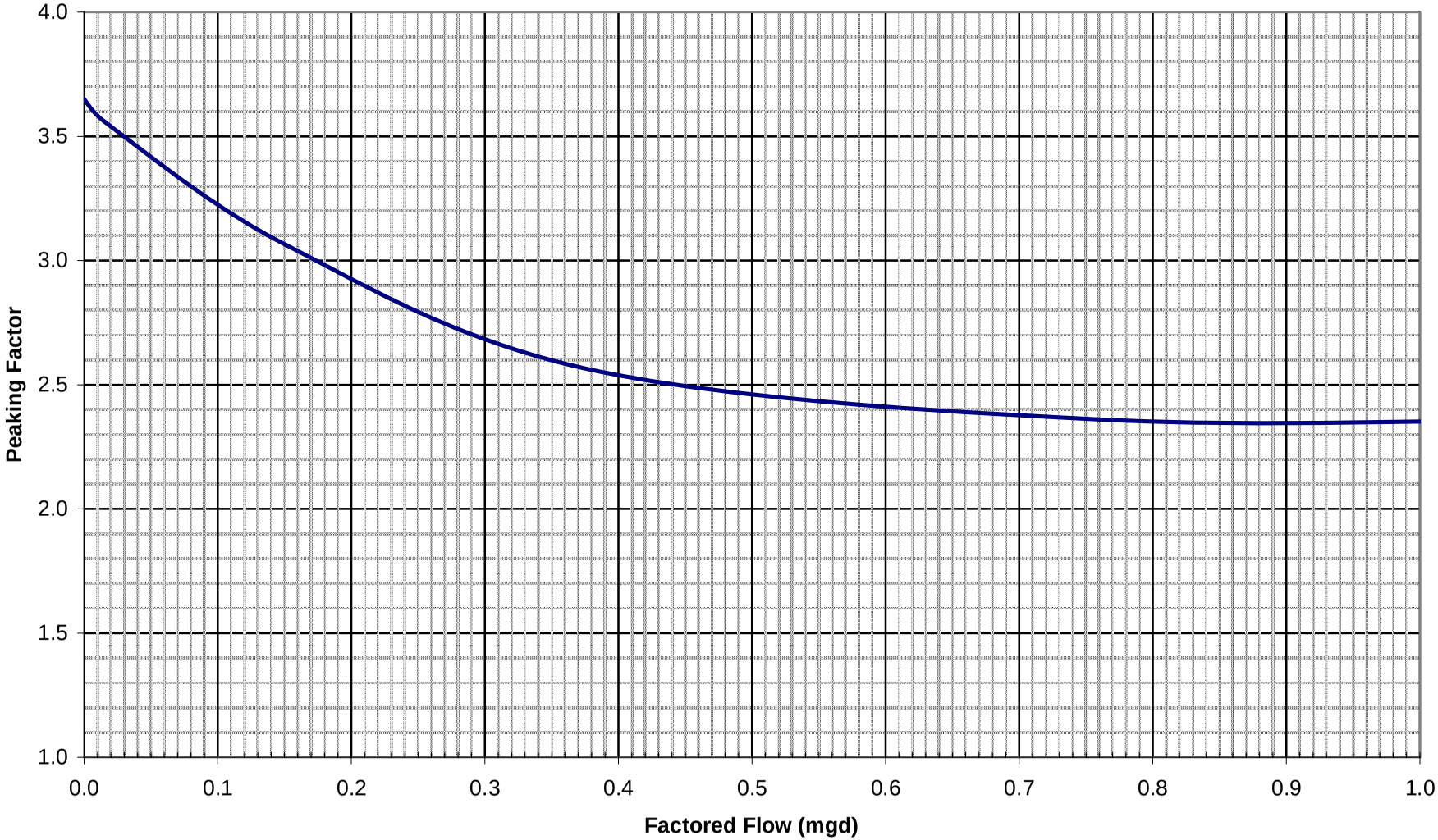
Area (acres)	No. of DUs[1]	ADWF (mgd)[2]	Factored Flow (mgd)[3]	Diurnal PF[4]	Wet GWI (mgd)[5]	Peak RDI/I (mgd)[6]	PWWF (mgd)[7]	Peaking Factor	PF Curve
0			0						3.65
10	40	0.0076	0.0152	3.0	0.0015	0.0070	0.054	3.56	3.56
100	400	0.076	0.152	2.5	0.015	0.070	0.47	3.06	3.06
250	1,000	0.19	0.38	2.0	0.038	0.175	0.97	2.56	2.56
500	2,000	0.38	0.76	1.8	0.075	0.350	1.79	2.36	2.36
750	3,000	0.57	1.14	1.8	0.11	0.53	2.69	2.36	2.36

[1] Based on single-family residential development at 4 DUs/acre. 4 DUs/acre is considered to be a typical density for single family residences, and is not intended to be used as a design criterion.
[2] Based on 190 gpd/DU
[3] Based on safety factor of 2.0
[4] The diurnal PF values in this analysis are based on the peaking factor used for residential flows (PF = 1.8) in the hydraulic model, which was derived from dry weather flow monitoring data. Since that derivation was based on a large area, the PF value is increased progressively as the area decreases in order to account for decreased attenuation of peak flows. Selection of the upper limit of that range is based on engineering judgment and experience with similar analyses.
[5] Based on 150 gpd/acre
[6] Based on 700 gpd/acre
[7] Assumes peak RDI/I coincides with peak diurnal

Attachment A includes an example calculation illustrating the application of the peaking factor curve.

At the direction of SPWA member agencies, several planning-level criteria were developed to aid developers in the sizing and configuration of pump station and force main facilities. These criteria are presented in **Attachment B**.

Figure 1
SPWA Design Peaking Factor Curve



ATTACHMENT A:
Example Design Flow Analysis for Sewers Smaller than 18-inches

Example calculation for application of peaking factor curve for 400-unit single family subdivision:

ADWF [a]:

(400 DUs)*(190 gpd/DU) = **76,000 gpd = ADWF**

Factored Flow:

(ADWF)*(2.0) = (76,000 gpd)*(2.0) = **152,000 gpd = Factored Flow**

PWWF:

(Factored flow)*(3.05 [b]) = (152,000)*(3.05) = **464,000 gpd = PWWF**

Per City of Roseville Improvement Standards, page SS-5, a 10-inch sewer at minimum slope is adequate for this PWWF.

[a] Based on ADWF unit flow factors (as opposed to base sanitary flow unit flow factors, which do not allow for dry season GWI)

[b] From Figure 1: SPWA Design Peaking Factor Curve

ATTACHMENT B:
Recommended Planning Level Criteria for Pump Stations and Force Mains

Table B-1 presents planning-level criteria for the design of pump stations and force mains within the SPWA service area; these criteria should be confirmed during design.

Table B-1: Recommended Planning Level Criteria for Pump Stations and Force Mains

Pump Stations	
Capacity	PWWF (hydraulic modeling required for pipes 18 inches and larger)
Storage	24 hours, or 8 hours with an emergency generator
Operation	Lead/lag for duty pump(s), plus 1 standby pump
Maximum Pump Cycles	6 cycles/hour
Force Mains	
Headloss	Hazen-Williams roughness coefficient (C-factor) of 120
Maximum Velocity	7-10 feet per second
Minimum Velocity	3.0 feet per second

NOTE: Hydraulic transient, surge, and odor control analyses will need to be performed during final design.

Attachment B: Tables B-1 and B-2

Table B-1: Modeled Pipe Information

H2OMap Sewer Pipe ID	Upstream Manhole ID	Downstream Manhole ID	Diameter (in)	Length (ft)	Slope (ft/ft)
PR-1	PR-3	PR-OUTLET	27	4,457	0.0014
PR-10	PR-11	PR-10	15	657	0.0019
PR-11	PR-12	PR-11	15	780	0.0019
PR-12	PR-13	PR-12	12	353	0.0025
PR-13	PR-14	PR-13	12	747	0.0025
PR-14	PR-15	PR-14	12	1,165	0.0025
PR-15	PR-16	PR-15	10	1,026	0.0050
PR-16	PR-17	PR-5	10	986	0.0025
PR-17	PR-18	PR-7	18	369	0.0016
PR-18	PR-19	PR-18	15	533	0.0050
PR-19	PR-20	PR-19	15	501	0.0050
PR-20	PR-21	PR-20	15	460	0.0050
PR-21	PR-22	PR-21	15	501	0.0035
PR-22	PR-23	PR-22	6	796	0.0050
PR-23	PR-24	PR-8	8	780	0.0050
PR-24	PR-25	PR-24	8	739	0.0050
PR-25	PR-26	PR-25	6	722	0.0050
PR-26	PR-27	PR-9	10	788	0.0025
PR-27	PR-28	PR-27	10	730	0.0035
PR-28	PR-29	PR-28	6	730	0.0050
PR-29	PR-30	PR-10	8	780	0.0050
PR-3	PR-4	PR-3	18	788	0.0035
PR-30	PR-31	PR-30	6	739	0.0050
PR-31	PR-32	PR-31	6	722	0.0050
PR-32	PR-33	PR-3	27	1,097	0.0074
PR-33	PR-34	PR-33	24	1,757	0.0007
PR-34	PR-35	PR-34	24	797	0.0008
PR-35	PR-36	PR-35	21	948	0.0009
PR-36	PR-37	PR-36	18	1,401	0.0012
PR-37	PR-38	PR-37	18	1,157	0.0012
PR-38	PR-39	PR-38	18	788	0.0012
PR-39	PR-40	PR-39	18	763	0.0012
PR-4	PR-5	PR-4	18	2,964	0.0012
PR-40	PR-41	PR-40	18	945	0.0012
PR-41	PR-42	PR-41	18	2,286	0.0012
PR-42	PR-43	PR-42	15	1,365	0.0014
PR-43	PR-44	PR-43	10	8,305	0.0025
PR-44	PR-45	PR-35	18	705	0.0096
PR-45	PR-46	PR-45	18	1,335	0.0012
PR-46	PR-47	PR-46	18	794	0.0012
PR-47	PR-48	PR-47	18	768	0.0018
PR-48	PR-49	PR-48	18	794	0.0012
PR-49	PR-50	PR-49	18	326	0.0012
PR-5	PR-6	PR-5	18	485	0.0015
PR-50	PR-51	PR-50	18	892	0.0012
PR-51	PR-52	PR-51	15	809	0.0023
PR-52	PR-53	PR-52	10	521	0.0030
PR-53	PR-54	PR-52	15	4,215	0.0015

Table B-1: Modeled Pipe Information

H2OMap Sewer Pipe ID	Upstream Manhole ID	Downstream Manhole ID	Diameter (in)	Length (ft)	Slope (ft/ft)
PR-54	PR-55	PR-54	12	4,465	0.0020
PR-55	PR-56	PR-48	10	579	0.0025
PR-56	PR-57	PR-49	6	322	0.0050
PR-57	PR-58	PR-47	6	791	0.0050
PR-58	PR-59	PR-58	6	325	0.0050
PR-59	PR-60	PR-46	6	798	0.0050
PR-6	PR-7	PR-PS	18	234	0.0050
PR-60	PR-61	PR-60	6	547	0.0050
PR-61	PR-62	PR-3	21	1,129	0.0009
PR-62	PR-63	PR-62	21	1,002	0.0009
PR-63	PR-64	PR-63	18	1,614	0.0059
PR-64	PR-65	PR-64	18	1,545	0.0015
PR-65	PR-66	PR-65	15	3,060	0.0025
PR-66	PR-67	PR-66	10	3,770	0.0025
PR-67	PR-68	PR-62	6	1,071	0.0050
PR-68	PR-69	PR-63	10	1,071	0.0078
PR-69	PR-70	PR-69	8	1,558	0.0038
PR-7	PR-8	PR-7	18	612	0.0019
PR-70	PR-71	PR-70	8	655	0.0035
PR-71	PR-72	PR-62	6	876	0.0093
PR-72	PR-73	PR-63	18	838	0.0019
PR-73	PR-74	PR-73	18	1,636	0.0019
PR-74	PR-75	PR-74	18	482	0.0019
PR-8	PR-9	PR-8	15	665	0.0015
PR-9	PR-10	PR-9	15	665	0.0015

Table B-2: Modeled Manhole Information

H2OMap Sewer Manhole ID	Load 1 (mgd)	Load Type	Load 2 (mgd)	Load Type	Load 3 (mgd)	Load Type	Load 5 (mgd)	Load Type	Subwatershed Area (acres)	Rainfall Hyetograph	RDI/I Hydrograph
PR-10	0.0231	RESIDENTIAL		COMMERCIAL		INDUSTRIAL	0.00099	GWI	9.87	DESIGNSTORMREV	UGA
PR-11		RESIDENTIAL	0.0036	COMMERCIAL		INDUSTRIAL	0.00058	GWI	5.79	DESIGNSTORMREV	UGA
PR-12		RESIDENTIAL	0.0032	COMMERCIAL		INDUSTRIAL	0.00201	GWI	20.07	DESIGNSTORMREV	UGA
PR-13		RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0	GWI	0.00	DESIGNSTORMREV	UGA
PR-14	0.0090	RESIDENTIAL	0.0016	COMMERCIAL		INDUSTRIAL	0.00172	GWI	17.23	DESIGNSTORMREV	UGA
PR-15	0.0710	RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0.00564	GWI	56.36	DESIGNSTORMREV	UGA
PR-16		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA
PR-17		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA
PR-18	0.1224	RESIDENTIAL		COMMERCIAL		INDUSTRIAL	0.00199	GWI	19.88	DESIGNSTORMREV	UGA
PR-19		RESIDENTIAL	0.0126	COMMERCIAL		INDUSTRIAL	0.00058	GWI	5.82	DESIGNSTORMREV	UGA
PR-20		RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0	GWI	0.00	DESIGNSTORMREV	UGA
PR-21		RESIDENTIAL	0.0126	COMMERCIAL		INDUSTRIAL	0.00058	GWI	5.82	DESIGNSTORMREV	UGA
PR-22	0.1337	RESIDENTIAL		COMMERCIAL		INDUSTRIAL	0.00234	GWI	23.37	DESIGNSTORMREV	UGA
PR-23	0.0291	RESIDENTIAL		COMMERCIAL		INDUSTRIAL	0.00202	GWI	20.23	DESIGNSTORMREV	UGA
PR-24		RESIDENTIAL	0.0096	COMMERCIAL		INDUSTRIAL	0.00045	GWI	4.46	DESIGNSTORMREV	UGA
PR-25		RESIDENTIAL	0.0096	COMMERCIAL		INDUSTRIAL	0.00045	GWI	4.46	DESIGNSTORMREV	UGA
PR-26	0.0232	RESIDENTIAL		COMMERCIAL		INDUSTRIAL	0.00099	GWI	9.92	DESIGNSTORMREV	UGA
PR-27	0.0345	RESIDENTIAL		COMMERCIAL		INDUSTRIAL	0.00137	GWI	13.71	DESIGNSTORMREV	UGA
PR-28	0.0345	RESIDENTIAL		COMMERCIAL		INDUSTRIAL	0.00137	GWI	13.71	DESIGNSTORMREV	UGA
PR-29	0.0235	RESIDENTIAL		COMMERCIAL		INDUSTRIAL	0.001	GWI	10.05	DESIGNSTORMREV	UGA
PR-3		RESIDENTIAL	0.0325	COMMERCIAL		INDUSTRIAL	0.00174	GWI	17.44	DESIGNSTORMREV	UGA
PR-30	0.0090	RESIDENTIAL		COMMERCIAL		INDUSTRIAL	0.00072	GWI	7.16	DESIGNSTORMREV	UGA
PR-31		RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0	GWI	0.00	DESIGNSTORMREV	UGA
PR-32	0.0238	RESIDENTIAL		COMMERCIAL		INDUSTRIAL	0.00101	GWI	10.15	DESIGNSTORMREV	UGA
PR-33		RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0	GWI	0.00	DESIGNSTORMREV	UGA
PR-34	0.0673	RESIDENTIAL	0.0113	COMMERCIAL		INDUSTRIAL	0.00676	GWI	67.57	DESIGNSTORMREV	UGA
PR-35		RESIDENTIAL	0.0214	COMMERCIAL		INDUSTRIAL	0.00361	GWI	36.14	DESIGNSTORMREV	UGA
PR-36		RESIDENTIAL	0.0694	COMMERCIAL		INDUSTRIAL	0.00867	GWI	86.68	DESIGNSTORMREV	UGA
PR-37		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA
PR-38		RESIDENTIAL	0.0143	COMMERCIAL	0.0467	INDUSTRIAL	0.00763	GWI	76.26	DESIGNSTORMREV	UGA
PR-39		RESIDENTIAL	0.0140	COMMERCIAL		INDUSTRIAL	0.00175	GWI	17.46	DESIGNSTORMREV	UGA
PR-4	0.0478	RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0.00288	GWI	34.57	DESIGNSTORMREV	UGA
PR-40		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA
PR-41		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA
PR-42		RESIDENTIAL	0.0077	COMMERCIAL	0.2055	INDUSTRIAL	0.02694	GWI	269.36	DESIGNSTORMREV	UGA
PR-43		RESIDENTIAL		COMMERCIAL	0.5158	INDUSTRIAL	0.06448	GWI	644.79	DESIGNSTORMREV	UGA
PR-44		RESIDENTIAL		COMMERCIAL	0.0971	INDUSTRIAL	0.01214	GWI	121.42	DESIGNSTORMREV	UGA
PR-45	0.0725	RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0.00466	GWI	46.62	DESIGNSTORMREV	UGA
PR-46		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA
PR-47	0.0931	RESIDENTIAL	0.0004	COMMERCIAL		INDUSTRIAL	0.00398	GWI	76.23	DESIGNSTORMREV	UGA
PR-48		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA

Table B-2: Modeled Manhole Information

H2OMap Sewer Manhole ID	Load 1 (mgd)	Load Type	Load 2 (mgd)	Load Type	Load 3 (mgd)	Load Type	Load 5 (mgd)	Load Type	Subwatershed Area (acres)	Rainfall Hyetograph	RDI/I Hydrograph
PR-49		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA
PR-5	0.0242	RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0.00192	GWI	19.23	DESIGNSTORMREV	UGA
PR-50		RESIDENTIAL	0.0091	COMMERCIAL		INDUSTRIAL	0.00114	GWI	11.40	DESIGNSTORMREV	UGA
PR-51	0.0216	RESIDENTIAL	0.0015	COMMERCIAL	0.0161	INDUSTRIAL	0.00301	GWI	30.08	DESIGNSTORMREV	UGA
PR-52		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA
PR-53		RESIDENTIAL	0.0178	COMMERCIAL	0.0846	INDUSTRIAL	0.01279	GWI	127.94	DESIGNSTORMREV	UGA
PR-54		RESIDENTIAL		COMMERCIAL	0.0497	INDUSTRIAL	0.00621	GWI	62.12	DESIGNSTORMREV	UGA
PR-55		RESIDENTIAL		COMMERCIAL	0.1414	INDUSTRIAL	0.01767	GWI	176.74	DESIGNSTORMREV	UGA
PR-56	0.0836	RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0.00313	GWI	31.35	DESIGNSTORMREV	UGA
PR-57		RESIDENTIAL	0.0032	COMMERCIAL		INDUSTRIAL	0.0004	GWI	4.04	DESIGNSTORMREV	UGA
PR-58		RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0	GWI	0.00	DESIGNSTORMREV	UGA
PR-59		RESIDENTIAL	0.0032	COMMERCIAL		INDUSTRIAL	0.0004	GWI	4.04	DESIGNSTORMREV	UGA
PR-6		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA
PR-60		RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0	GWI	0.00	DESIGNSTORMREV	UGA
PR-61		RESIDENTIAL	0.0184	COMMERCIAL		INDUSTRIAL	0.0023	GWI	23.04	DESIGNSTORMREV	UGA
PR-62		RESIDENTIAL	0.0221	COMMERCIAL		INDUSTRIAL	0.00276	GWI	44.41	DESIGNSTORMREV	UGA
PR-63		RESIDENTIAL	0.0232	COMMERCIAL		INDUSTRIAL	0.0029	GWI	28.97	DESIGNSTORMREV	UGA
PR-64		RESIDENTIAL		COMMERCIAL	0.0234	INDUSTRIAL	0.00293	GWI	29.28	DESIGNSTORMREV	UGA
PR-65		RESIDENTIAL	0.1894	COMMERCIAL	0.1801	INDUSTRIAL	0.05307	GWI	530.66	DESIGNSTORMREV	UGA
PR-66		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA
PR-67		RESIDENTIAL		COMMERCIAL	0.0774	INDUSTRIAL	0.00967	GWI	96.72	DESIGNSTORMREV	UGA
PR-68		RESIDENTIAL	0.0191	COMMERCIAL		INDUSTRIAL	0.00239	GWI	23.88	DESIGNSTORMREV	UGA
PR-69		RESIDENTIAL	0.0310	COMMERCIAL		INDUSTRIAL	0.00387	GWI	38.73	DESIGNSTORMREV	UGA
PR-7		RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0	GWI	0.00	DESIGNSTORMREV	UGA
PR-70		RESIDENTIAL	0.0029	COMMERCIAL		INDUSTRIAL	0.00047	GWI	4.74	DESIGNSTORMREV	UGA
PR-71		RESIDENTIAL	0.0000	COMMERCIAL	0.0453	INDUSTRIAL	0.00566	GWI	56.60	DESIGNSTORMREV	UGA
PR-72		RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0	GWI	0.00	DESIGNSTORMREV	UGA
PR-73		RESIDENTIAL	0.0384	COMMERCIAL		INDUSTRIAL	0.0048	GWI	47.97	DESIGNSTORMREV	UGA
PR-74		RESIDENTIAL	0.0024	COMMERCIAL		INDUSTRIAL	0.00039	GWI	3.89	DESIGNSTORMREV	UGA
PR-75		RESIDENTIAL	0.5080	COMMERCIAL		INDUSTRIAL	0.01635	GWI	163.52	DESIGNSTORMREV	UGA
PR-8	0.0810	RESIDENTIAL	0.0000	COMMERCIAL		INDUSTRIAL	0.00643	GWI	64.29	DESIGNSTORMREV	UGA
PR-9	0.0229	RESIDENTIAL	0.0077	COMMERCIAL		INDUSTRIAL	0.00194	GWI	19.41	DESIGNSTORMREV	UGA
PR-OUTLET	0.0000	RESIDENTIAL	0.0000	COMMERCIAL	0.0000	INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA
PR-PS		RESIDENTIAL		COMMERCIAL		INDUSTRIAL		GWI	0.00	DESIGNSTORMREV	UGA

Attachment C: June 13, 2006 Telephone Discussion Notes & Placer Ranch Flow Projection Comparison TM

Telephone Discussion Notes

Placer Ranch Flow Distribution

Subject:	**Placer Ranch and vicinity flow routing**		
RMC		**Other Party**	
Employee:	Austin Peterson, Dave Richardson	**Contact:**	Ed Wydra, Placer County; Mike Zacharia, City of Roseville
Date:	6/13/06	**Company/Agency:**	
Time:	4:45	**Phone:**	
Project Number:		**Address:**	

1. Purpose of Discussion

A discrepancy has been found between how wastewater flows were routed in and around the Placer Ranch (PR) development by G.C. Wallace, the engineer for the PR development, and RMC as part of the SPWA Systems Evaluation Project. RMC developed a Technical Memorandum (TM) titled *Placer Ranch Flow Projection Comparison – Draft dated June 12, 2006*, that compared the routing assumptions between the two and identified the appropriate flows that should be used to size the trunk sewer and creek crossing along Fiddyment Road. This TM has been attached to these notes.

2. Discussion Summary

1. Summarized the findings of the TM. Briefly, the SPWA hydraulic model routes OFFSITE areas 1, 4, 5, and 7 through Placer Ranch and into the trunk sewer along Fiddyment Road. OFFSITE 6 is outside of the SPWA service area and was not included in the hydraulic model. OFFSITE areas 2, 3, and 8 were routed south (outside of Placer Ranch) in the hydraulic model. G.C. Wallace routed all the OFFSITE areas through Placer Ranch.

2. Discussed which areas are tributary to the trunk sewer along Fiddyment Road for determining the design wastewater flow to size the pipe.

3. Discussed which areas are tributary to Placer Ranch for determining the design wastewater flow used to size their internal conveyance infrastructure.

3. Key Conclusions

1. The SPWA model and findings included in the TMs previously prepared as part of the South Placer Regional Wastewater and Recycled Water Systems Evaluation will NOT be modified due to the design decisions made regarding routing flows in and around PR as part of this discussion.

Assumptions for determining the areas tributary to the Fiddyment Ranch Road Trunk Sewer

1. This sewer should be designed (at a minimum) to convey wastewater flows from the entire Placer Ranch development and all OFFSITE areas 1, 2, 3, 4, 5, 6, 7, and 8.

2. The creek crossing may need to be larger due to any wastewater contribution downstream of PR. For example if Fiddyment Ranch Phase II connects to the sewer, those flows should be considered when sizing the pipe.

3. Land use for OFFSITE area 6 will be considered as Public/Quasi-Public (Unit Flow Factor = 620 gpd/acre).

4. This flow has been calculated in the attached TM under the G.C. Wallace scenario 2 (using the 2005 unit flow factors) and is a BSF of 3.70 and PWWF of 8.25 mgd.

Assumptions for sizing the Placer Ranch Infrastructure

1. Interior infrastructure in PR will be sized to convey wastewater in PR and OFFSITE areas 1, 4, 5, 6, 7, and 8.

2. OFFSITE areas 2 and 3 will continue to be routed south outside of the PR service area.

3. Land use for OFFSITE area 6 will be considered as Public/Quasi-Public (Unit Flow Factor = 620 gpd/acre).

Technical Memorandum

Subject:	**Placer Ranch Flow Projection Comparison -- Draft**
Prepared For:	Art O'Brien – City of Roseville
Prepared by:	Chris Peters – Brown and Caldwell
Reviewed by:	Dave Richardson/Austin Peterson – RMC
Date:	June 12, 2006
Reference:	0091-004 Task 3

1 Introduction

This technical memorandum (TM) summarizes the results of a comparative study of the base sanitary flow (BSF) projections for the Placer Ranch Urban Growth Area (UGA) from two sources. Flow projections from Placer Ranch and areas north/east of Placer Ranch are being used to size a trunk sewer pipe serving this area. This trunk sewer, referred to as the Placer Ranch trunk sewer, was originally sized using flow projections prepared by G.C. Wallace. The G.C. Wallace flow projections were developed utilizing unit flow factors from the 1996 Roseville Regional Wastewater Treatment Service Area Master Plan by Montgomery Watson. These unit flow factors have since been revised as part of the 2005 South Placer Wastewater Authority (SPWA) Wastewater and Recycled Water Systems Evaluation Project, which is also the second source of base sanitary flow projections for this comparative study.

This study is being performed due to significant differences in the flow projections from the two sources of data. This TM will clarify the differences and reasons behind the difference in the two flow projections. A map of the area tributary to the trunk sewer in question is provided in **Figure 1**.

2 Land Use and Flow Projections

Land use and flow projection information for parcels tributary to the Placer Ranch trunk sewer are shown in **Table 1**. The land use information for the two flow projections was relatively constant with only one significant exception. For the G.C. Wallace flow projection, there were approximately 1,200 additional "offsite" light industrial acres that were not included in the SPWA land use. These 1,200 additional acres include approximately 310 acres outside the SPWA service area, 310 acres of landfill area (very minimal flow), and 510 acres of industrial development to the east of Placer Ranch that was not included in the SPWA projection. Only industrial areas to the north of Placer Ranch were included in the SPWA flow projection at the direction of SPWA staff.

The G.C. Wallace flow projection also included some unusually high unit flow factors that may or may not reflect the actual flows that will be generated in Placer Ranch. This includes a unit flow factor of 6,000 gpd/acre for schools (including the university) and 29,750 gpd/acre for mixed use that appears to be an error.

The land use and unit flow factor differences stated above account for the flow projection differences identified in **Table 1**. When using the 2005 SPWA unit flow factors, the difference between the G.C. Wallace flow projection and the SPWA flow projection are primarily explained by the offsite industrial land use differences.

Table 1 – Placer Ranch Trunk Sewer Land Use and Flow Projection Comparison

PLACER RANCH TRUNK SEWER BASE SANITARY FLOW PROJECTIONS											
		GC WALLACE LAND USE				GC WALLACE LAND USE				SPWA LAND USE	
			1996 SPWA	Base			2005 SPWA	Base		2005 SPWA	Base
		DU or	Unit	Sanitary		DU or	Unit	Sanitary		DU or	Unit	Sanitary
		Area	Flow	Flow		Area	Flow	Flow		Area	Flow	Flow
Land Use Description	**Units**	**(acres)**	**Factor (gpd)**	**(gpd)**		**(acres)**	**Factor (gpd)**	**(gpd)**		**(acres)**	**Factor (gpd)**	**(gpd)**
OPEN SPACE	Acres	64	190	12,160		64	0	0		352	0	0
COMMERCIAL	Acres	387	1,600	619,200		387	800	309,600		408	800	326,400
HEAVY INDUSTRIAL	Acres	0	2,500	0		0	800	0		0	800	0
LIGHT INDUSTRIAL	Acres	320	2,500	800,000		320	800	256,000		335	800	268,240
MIXED USE	Acres	34	29,750	1,011,500		34	2,160	73,440		34	2,160	72,792
PUBLIC/QUASI-PUBLIC	Acres	39	1,600	62,400		39	620	24,180		0	620	0
SCHOOLS	Acres	40	6,000	240,000		40	160	6,400		40	160	6,400
RESIDENTIAL 1 DU	DU	3,712	400	1,484,800		3,712	180	668,160		3,417	180	615,042
RESIDENTIAL 2 DU	DU	0	400	0		0	180	0		0	180	0
RESIDENTIAL 3 DU	DU	0	400	0		0	180	0		0	180	0
RESIDENTIAL MULTIPLE DU	DU	2,977	400	1,190,800		2,977	130	387,010		2,976	130	386,932
Point Sources												
University	Acres	168	6,000	1,008,000		168	NA	500,000		168	NA	440,000
Offsite - Light Industrial	Acres	1,842	2,500	4,605,000		1,842	800	1,473,600		991	NA	449,000
		Total		11,033,860		Total		3,698,390		Total		2,564,806
Without Fiddyment Ranch		**Total BSF (mgd)**		**11.03**		**Total BSF (mgd)**		**3.70**		**Total BSF (mgd)**		**2.56**
Without Fiddyment Ranch		**Total PWWF (mgd)**		**25.38**		**Total PWWF (mgd)**		**8.25**		**Total PWWF (mgd)**		**5.70**
With Fiddyment Ranch						**Total PWWF (mgd)**		**8.94**		**Total PWWF (mgd)**		**6.39**

Appendix M Riolo Vineyards TM

Memorandum

Subject:	**Dry Creek No. 1 Pump Station Flows – Memo 1.1**
Prepared For:	Mike Smith, MacKay and Somps
Prepared by:	Andy Smith, RMC
Reviewed by:	Dave Richardson, RMC
Date:	May 17, 2007
Reference:	0201-002

1 Background

RMC was asked by MacKay and Somps to prepare several figures that identify projected wastewater flows to, and in the vicinity of, the Dry Creek West Placer Community Facilities District # 1 and 2, Sewer Lift Station 1 (Dry Creek No. 1 Pump Station and Dry Creek No. 2 Pump Station, respectively). Refer to Dry Creek No. 1 Pump Station Flows Memorandums 1, 2, and 3, dated October 18, 2006, November 11, 2006, and March 7, 2007, respectively, for summaries of previous investigations in and around this area. The purpose of this memorandum is to update the flows presented in the memo dated October 18, 2006 (Memo 1), and to investigate the impacts of the updated flows on the sewers in vicinity of Dry Creek Nos. 1 and 2 Pump Stations.

2 Hydraulic Model Modifications

The projected base sanitary flow (BSF) for one of two areas tributary to the Dry Creek No. 2 Pump Station, which includes the Riolo Vineyards development, was increased from 0.185 mgd to 0.218 mgd, in order to include "offsite" flows, as well as flows from a school and church whose modeled flows had previously been tributary to Dry Creek No. 1 Pump Station. The subbasin acreage associated with the area tributary to Dry Creek No. 2 Pump Station was also adjusted to include the area associated with the offsite flows and school and church flows.

3 Flow Projections

Two figures are presented in the following pages: Riolo Vineyards/Placer Vineyards Model Network – Base Plan (**Figure 1**), and Riolo Vineyards/Placer Vineyards Model Network – Blueprint Plan (**Figure 2**). Both figures focus on the area surrounding the proposed Riolo Vineyards development in southern Placer County[1]. The base sanitary flow (BSF) and peak wet weather flow (PWWF) projections shown in the figures are based on hydraulic modeling results. The hydraulic model used to generate the results was developed using 1) land use information from the Placer Vineyards Specific Plan Sewer Master Plan (Base Plan) and the Placer Vineyards Specific Plan Sewer Master Plan – Blueprint Alternative (Blueprint), 2) information from the land use GIS database developed for the South Placer Wastewater Authority (SPWA) South Placer Regional Wastewater and Recycled Water Systems Evaluation (Systems Evaluation), and 3) BSF unit flow factors developed for the SPWA Systems Evaluation.

[1] The gravity sewer and force main alignments shown in Figures 1 and 2 are for preliminary planning purposes only, and do not necessarily reflect the plans most recently discussed by the City of Roseville, SPWA, etc.

The results indicate that approximately 1.92 million gallons per day (mgd) of wastewater will enter the Dry Creek No. 1 pump station during PWWF conditions, independent of Placer Vineyards projected flows. Under the Base Plan scenario, approximately 2.37 mgd of wastewater from the proposed Dry Creek No. 2 pump station will join the flows from the Dry Creek No. 1 pump station in a common force main, totaling approximately 4.29 mgd under PWWF conditions. Under the Blueprint scenario, approximately 2.85 mgd of wastewater from the Dry Creek No. 2 pump station will join the flows from the Dry Creek No. 1 pump station, totaling approximately 4.77 mgd under PWWF conditions. As stated above, the flows entering the Dry Creek No. 1 pump station are independent of the Placer Vineyards Specific Plan scenario.

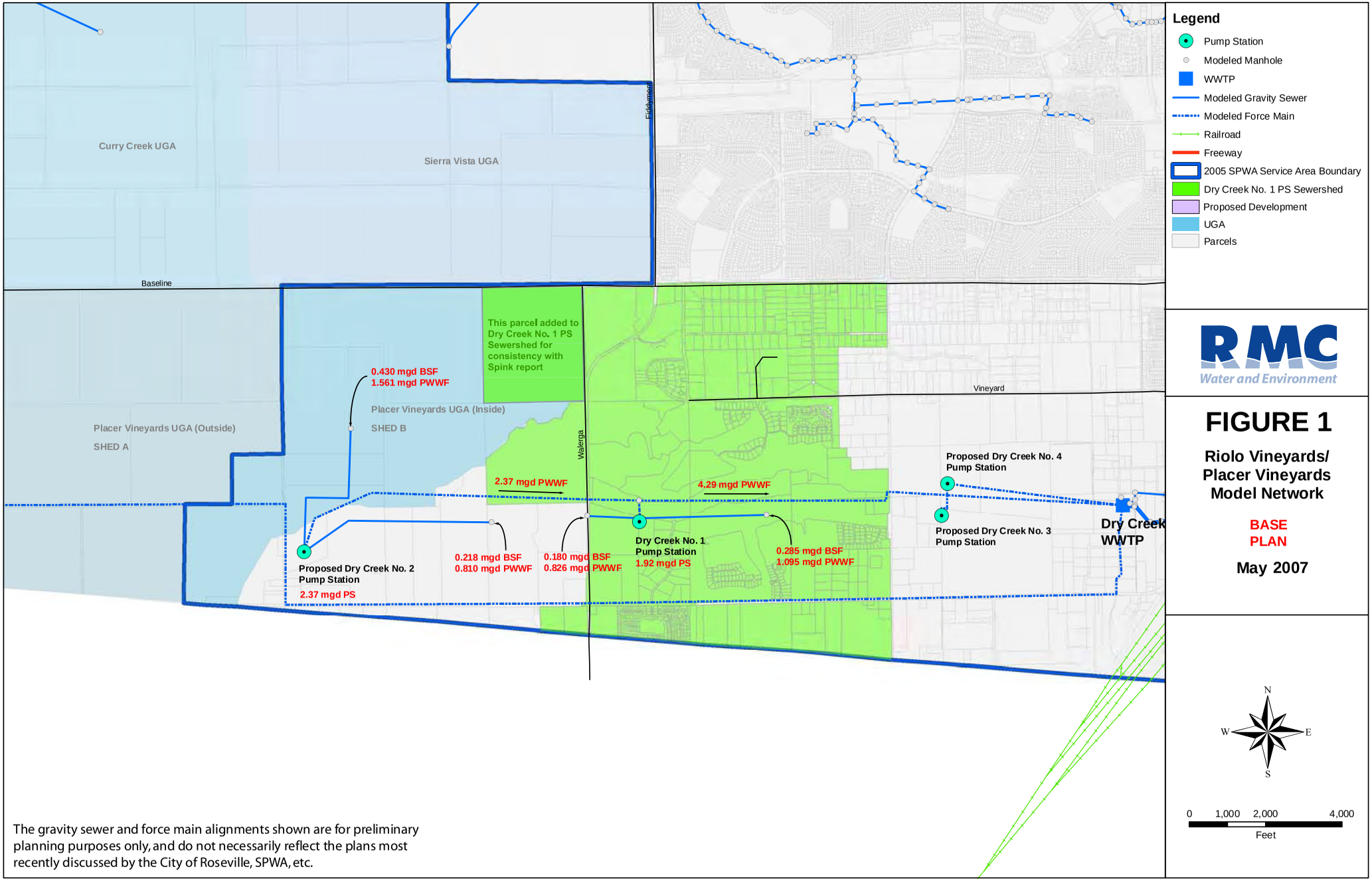


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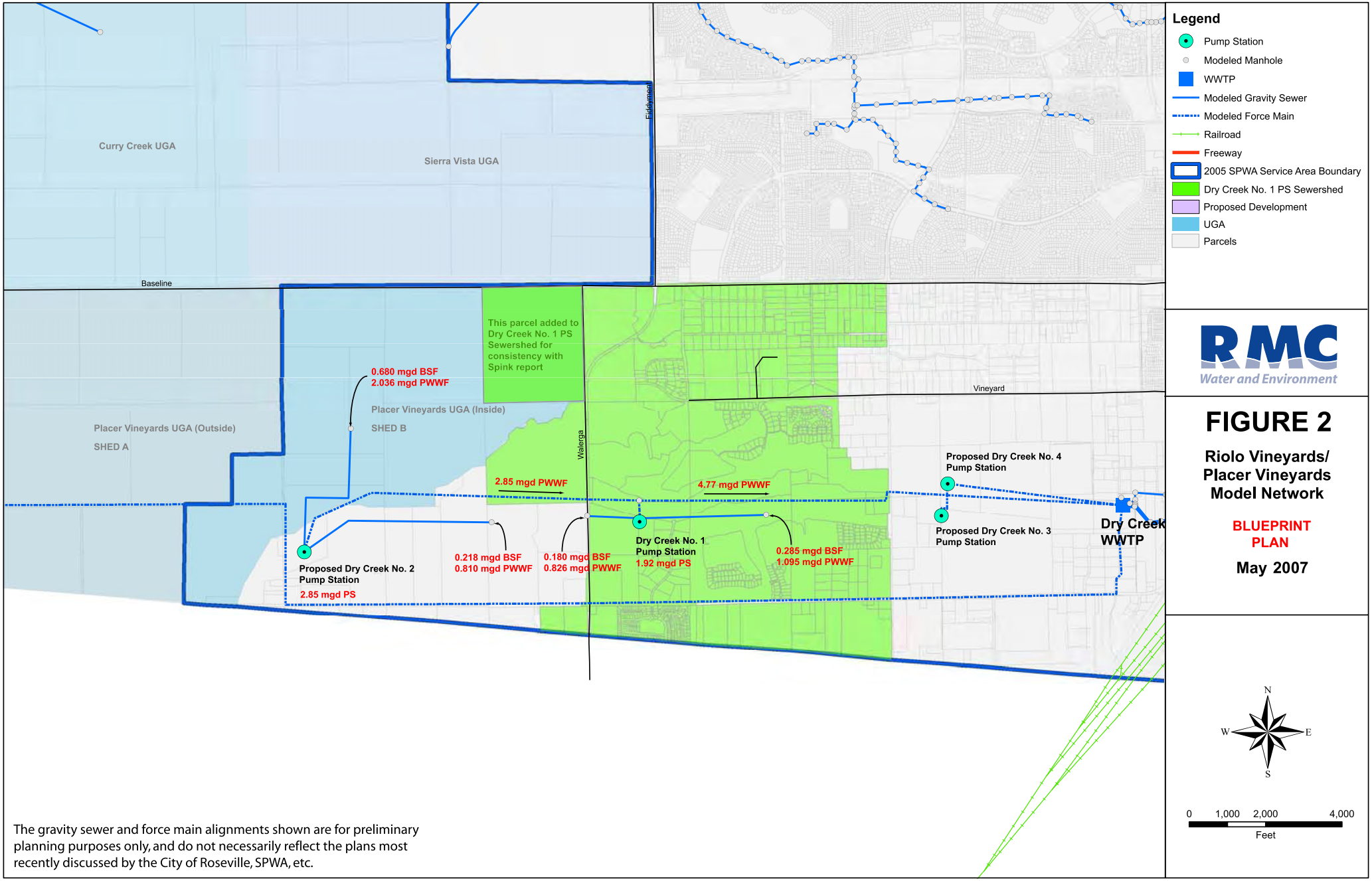
FIGURE 1

Riolo Vineyards/ Placer Vineyards Model Network

BASE PLAN

May 2007

The gravity sewer and force main alignments shown are for preliminary planning purposes only, and do not necessarily reflect the plans most recently discussed by the City of Roseville, SPWA, etc.



RMC Water and Environment

FIGURE 2

Riolo Vineyards/ Placer Vineyards Model Network

BLUEPRINT PLAN

May 2007

The gravity sewer and force main alignments shown are for preliminary planning purposes only, and do not necessarily reflect the plans most recently discussed by the City of Roseville, SPWA, etc.

Memorandum

Subject:	**Dry Creek No. 1 Pump Station Flows – Memo 2.1**
Prepared For:	Mike Smith, MacKay and Somps
Prepared by:	Andy Smith, RMC
Reviewed by:	Dave Richardson, RMC
Date:	May 16, 2007
Reference:	0201-001

1 Background

RMC was asked by MacKay and Somps to analyze the impacts of including a proposed development (including a school and church located directly to the south of the development) in the vicinity of the Dry Creek West Placer Community Facilities District # 1, Sewer Lift Station 1 (Dry Creek No. 1 Pump Station). Refer to Dry Creek No. 1 Pump Station Flows Memorandums 1, 2, and 3, dated October 18, 2006, November 11, 2006, and March 7, 2007, respectively, for summaries of previous investigations in and around this area. The purpose of this memorandum is to investigate the impacts of including flows from the proposed development (and the school and church to the south) to a proposed 8-inch diameter gravity sewer.

2 Hydraulic Model Modifications

Based on the information provided by MacKay and Somps, a new manhole (i.e., node) and 8-inch diameter gravity sewer were added to the hydraulic model to convey the wastewater flows from the proposed development to the Dry Creek No. 1 Pump Station. The flows from the parcels occupied by the proposed development and the school and church to the south were subtracted from nodes tributary to the proposed Dry Creek Nos. 2 and 1 Pump Stations, respectively, and reapplied to the new manhole. The subbasin acreages associated with the proposed development (and the school and church to the south) were similarly subtracted and reapplied.

3 Modeled Flow Projections

Two figures are presented in the following pages: Riolo Vineyards/Placer Vineyards Model Network – Base Plan (**Figure 1**), and Riolo Vineyards/Placer Vineyards Model Network – Blueprint Plan (**Figure 2**). Both figures focus on the area surrounding the proposed Riolo Vineyards development in southern Placer County[1]. The BSF and peak wet weather flow (PWWF) projections shown in the figures are based on hydraulic modeling results, which are presented below. The hydraulic model used to generate the results was developed using 1) land use information from the Placer Vineyards Specific Plan Sewer Master Plan (Base Plan) and the Placer Vineyards Specific Plan Sewer Master Plan – Blueprint Alternative (Blueprint), 2) information from the hydraulic model and land use GIS database developed for the South Placer Wastewater Authority (SPWA) South Placer Regional Wastewater and Recycled Water Systems Evaluation (Systems Evaluation), 3) BSF unit flow factors developed for the SPWA Systems Evaluation, and 4) information provided by MacKay and Somps.

[1] The gravity sewer and force main alignments shown in Figures 1 and 2 are for preliminary planning purposes only, and do not necessarily reflect the plans most recently discussed by the City of Roseville, SPWA, etc.

Model Results

The hydraulic model results indicate that approximately 0.826 million gallons per day (mgd) of wastewater would be conveyed through the existing 12-inch gravity sewer during PWWF conditions, independent of Placer Vineyards projected flows, and that approximately 0.182 mgd of wastewater would be conveyed through the proposed 8-inch gravity sewer during PWWF conditions, also independent of Placer Vineyards projected flows. The 0.182 mgd includes approximately 240 dwelling units associated with the development introduced in Section 1, as well as a school and church located directly south of this development. Approximately 2.10 mgd of wastewater would enter the Dry Creek No. 1 pump station during PWWF conditions, also independent of Placer Vineyards projected flows. Under the Base Plan scenario, approximately 2.18 mgd of wastewater from the proposed Dry Creek No. 2 pump station would join the flows from the Dry Creek No. 1 pump station in a common force main, totaling approximately 4.28 mgd under PWWF conditions. Under the Blueprint scenario, approximately 2.65 mgd of wastewater from the Dry Creek No. 2 pump station would join the flows from the Dry Creek No. 1 pump station, totaling approximately 4.75 mgd under PWWF conditions. As stated above, the flows entering the Dry Creek No. 1 pump station are independent of the potential flows from the Placer Vineyards Specific Plan scenario.

4 Analysis and Conclusions

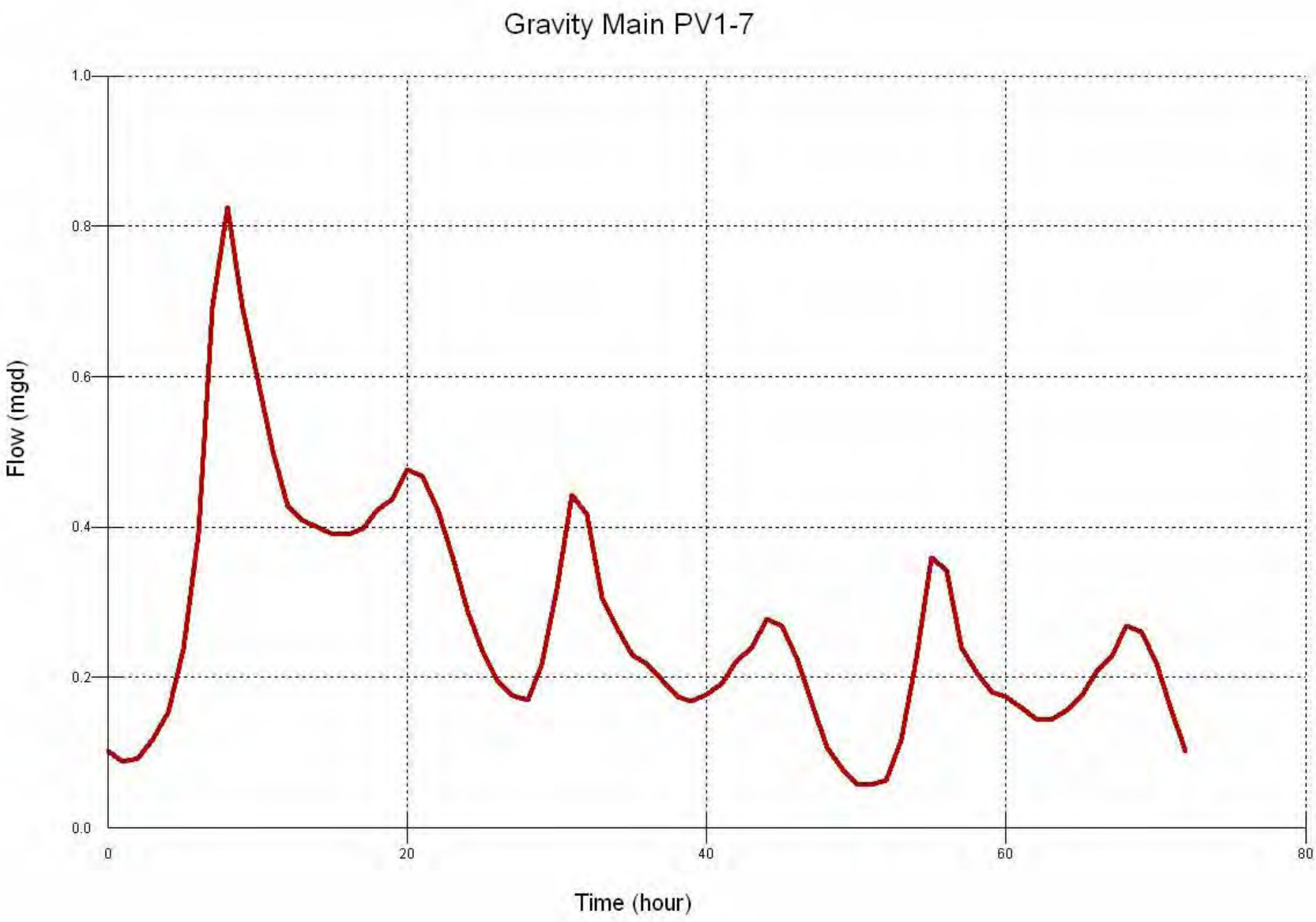
Flowing full at a slope of 0.002[2], the hydraulic capacity of the existing 12-inch diameter gravity sewer is 1.03 mgd. Based on the hydraulic model results, and if the proposed 8-inch sewer were to tie into the existing 12-inch sewer upstream of the pump station, 1.01 mgd would be conveyed through the downstream end of the existing 12-inch diameter gravity sewer during PWWF conditions. The hydraulic capacity of the sewer is greater than the 1.01 mgd PWWF indicated by the hydraulic modeling analysis performed for this memorandum. As such, it appears that there would be adequate capacity in the existing 12-inch diameter gravity sewer (to handle peak wastewater flows directed to it under the conditions described in this memorandum) if the hydraulic model methodology were used. **Attachment A** presents the model results for time-varying flow (not including the 0.182 mgd from the proposed 8-inch sewer) in the existing 12-inch diameter gravity sewer.

Flows to Dry Creek No. 1 pump station were previously estimated and presented in the Dry Creek West Placer Community Facilities District (CFD) # 1 Sewer Lift Station 1 and Pressure Sewers Preliminary Facilities Plan, prepared by the Spink Corporation in 1999. The Spink report presented a peak flow criteria of 2.314 mgd to the Dry Creek No. 1 pump station, which is greater than the 2.10 mgd PWWF indicated by the hydraulic modeling analysis performed for this memorandum. As such, it appears that there is adequate capacity at the Dry Creek No. 1 pump station to handle peak wastewater flows from the sewershed defined in **Figures 1 and 2**, including the proposed development described in Section 1.

[2] Per the Dry Creek West Placer Gravity Sewer "B" plans, dated February 14, 2001, the existing 12-inch gravity sewer has a slope of 0.002 feet/feet.

Attachment A

Modeling Results for Existing
12-inch Diameter Gravity Sewer


Gravity Main PV1-7
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
0
20
40
60
80
Time (hour)

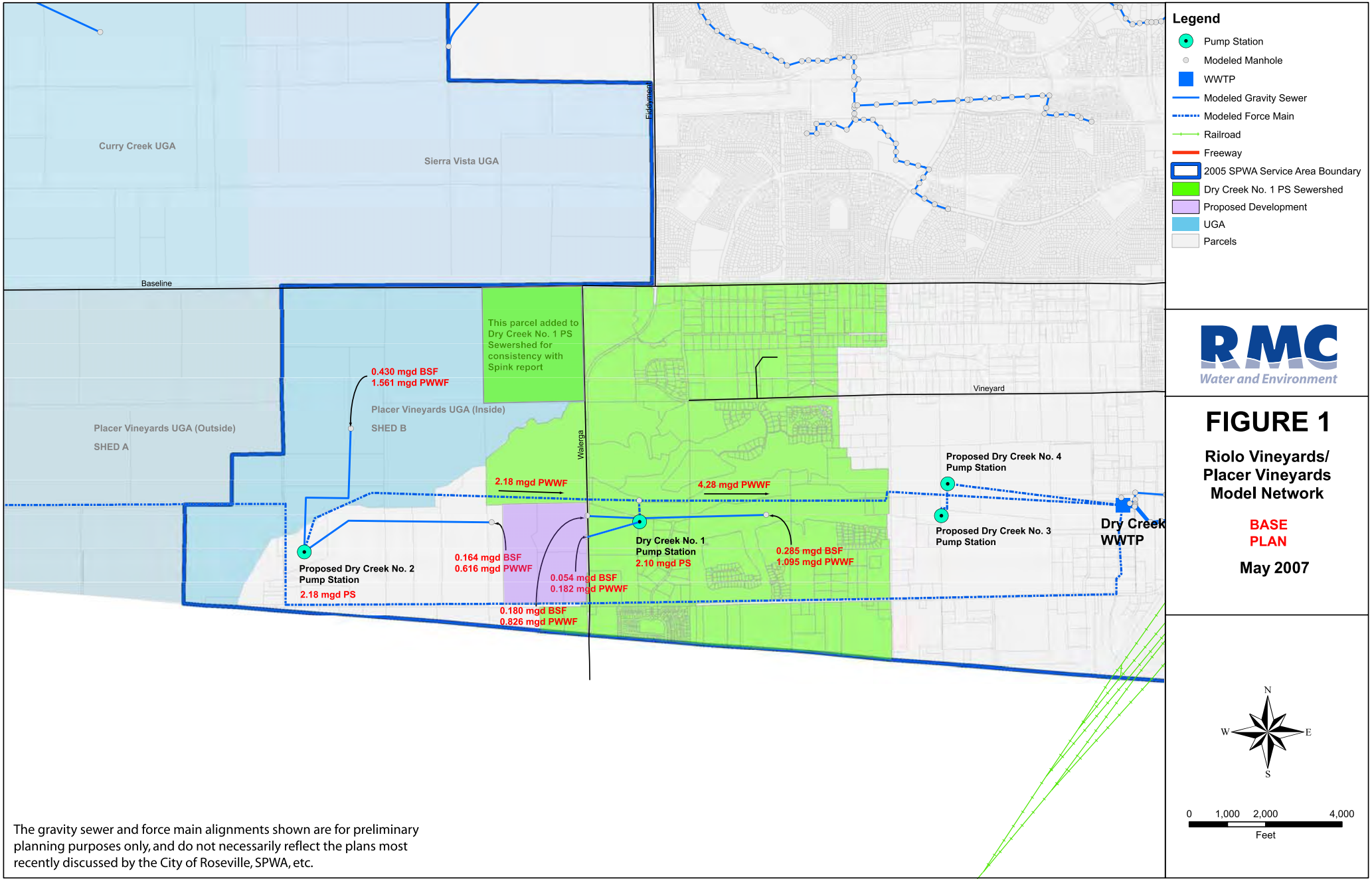


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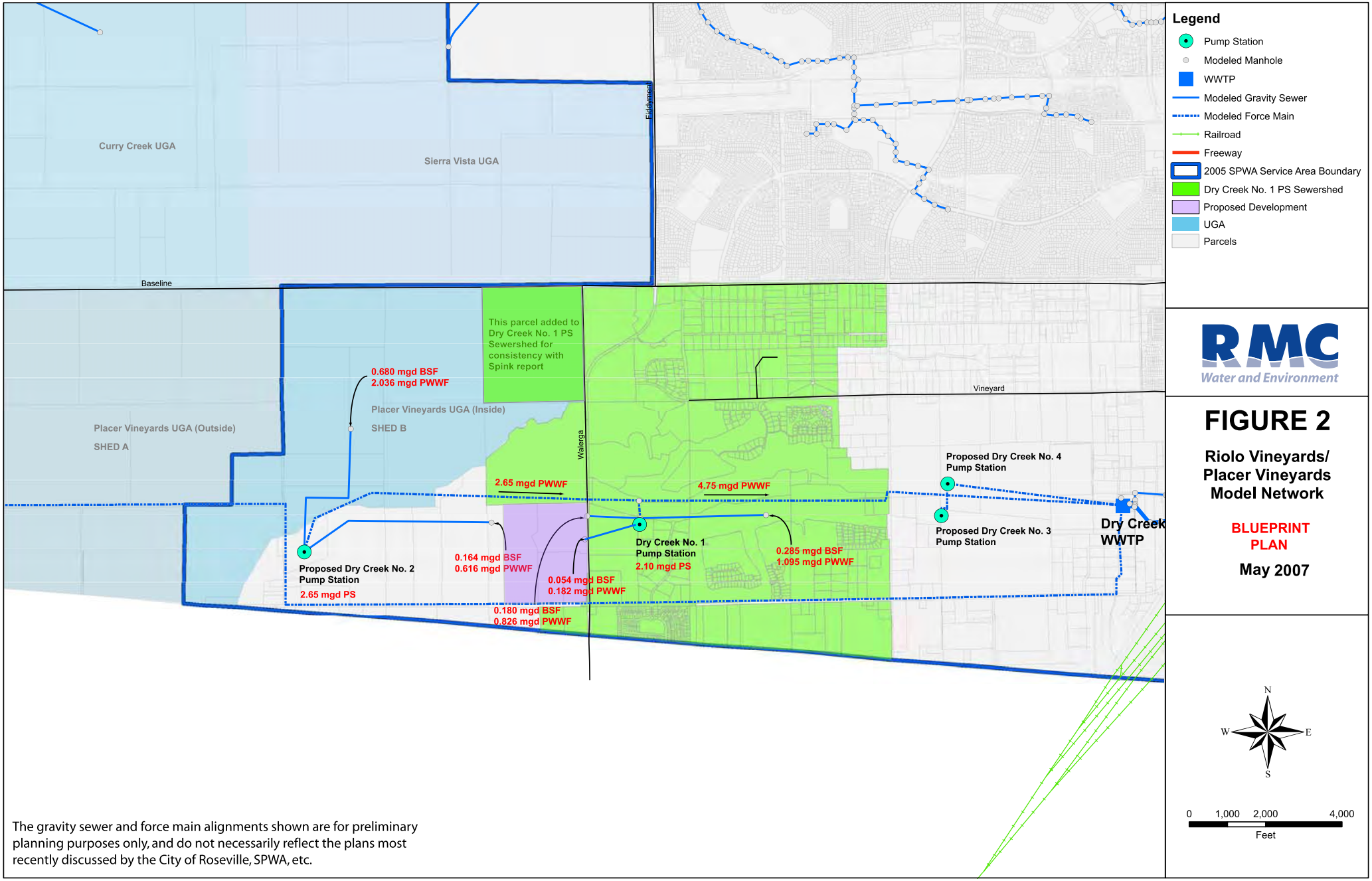
FIGURE 1

Riolo Vineyards/ Placer Vineyards Model Network

BASE PLAN

May 2007

The gravity sewer and force main alignments shown are for preliminary planning purposes only, and do not necessarily reflect the plans most recently discussed by the City of Roseville, SPWA, etc.



RMC Water and Environment

FIGURE 2

Riolo Vineyards/ Placer Vineyards Model Network

BLUEPRINT PLAN

May 2007

The gravity sewer and force main alignments shown are for preliminary planning purposes only, and do not necessarily reflect the plans most recently discussed by the City of Roseville, SPWA, etc.

Memorandum

Subject:	**Dry Creek No. 1 Pump Station Flows – Memo 3.1**
Prepared For:	Tim Stevens, MacKay and Somps
Prepared by:	Andy Smith, RMC
Reviewed by:	Dave Richardson, RMC
Date:	March 7, 2007
Reference:	0201-002

1 Background

RMC was asked by MacKay and Somps to analyze the impacts of including a proposed development in the vicinity of the Dry Creek West Placer Community Facilities District # 1, Sewer Lift Station 1 (Dry Creek No. 1 Pump Station). Refer to Dry Creek No. 1 Pump Station Flows Memorandums 1, 2, and 3, dated October 18, 2006, November 11, 2006, and March 7, 2007, respectively, for summaries of previous investigations in and around this area. The purpose of this memorandum is to investigate the impacts of including flows from the proposed development (and a school and church located directly to the south) in the existing 12-inch diameter gravity sewer to Dry Creek No. 1 Pump Station.

2 Hydraulic Model Modifications

The projected base sanitary flow (BSF) for the proposed development was applied to the node at the upstream end of the existing 12-inch gravity sewer. The subbasin acreage associated with the proposed development (and the school and the church to the south) was similarly applied. A manhole (i.e., node) and 8-inch diameter gravity sewer, which had been added during previous investigations by RMC to convey flows from the proposed development, were deleted from the hydraulic model.

3 Modeled Flow Projections

Two figures are presented in the following pages: Riolo Vineyards/Placer Vineyards Model Network – Base Plan (**Figure 1**), and Riolo Vineyards/Placer Vineyards Model Network – Blueprint Plan (**Figure 2**). Both figures focus on the area surrounding the proposed Riolo Vineyards development in southern Placer County[1]. The BSF and peak wet weather flow (PWWF) projections shown in the figures are based on hydraulic modeling results, which are presented below. The hydraulic model used to generate the results was developed using 1) land use information from the Placer Vineyards Specific Plan Sewer Master Plan (Base Plan) and the Placer Vineyards Specific Plan Sewer Master Plan – Blueprint Alternative (Blueprint), 2) information from the hydraulic model and land use GIS database developed for the South Placer Wastewater Authority (SPWA) South Placer Regional Wastewater and Recycled Water Systems Evaluation (Systems Evaluation), 3) BSF unit flow factors developed for the SPWA Systems Evaluation, and 4) information provided by MacKay and Somps.

Model Results

The hydraulic model results indicate that approximately 0.997 million gallons per day (mgd) of wastewater would be conveyed through the existing 12-inch gravity sewer during PWWF conditions,

[1] The gravity sewer and force main alignments shown in Figures 1 and 2 are for preliminary planning purposes only, and do not necessarily reflect the plans most recently discussed by the City of Roseville, SPWA, etc.

independent of Placer Vineyards projected flows. This flow includes approximately 240 dwelling units associated with the development introduced in Section 1. Approximately 2.09 mgd of wastewater would enter the Dry Creek No. 1 pump station during PWWF conditions, also independent of Placer Vineyards projected flows. Under the Base Plan scenario, approximately 2.18 mgd of wastewater from the proposed Dry Creek No. 2 pump station would join the flows from the Dry Creek No. 1 pump station in a common force main, totaling approximately 4.27 mgd under PWWF conditions. Under the Blueprint scenario, approximately 2.65 mgd of wastewater from the Dry Creek No. 2 pump station would join the flows from the Dry Creek No. 1 pump station, totaling approximately 4.74 mgd under PWWF conditions. As stated above, the flows entering the Dry Creek No. 1 pump station are independent of the potential flows from the Placer Vineyards Specific Plan scenario.

4 Analysis and Conclusions

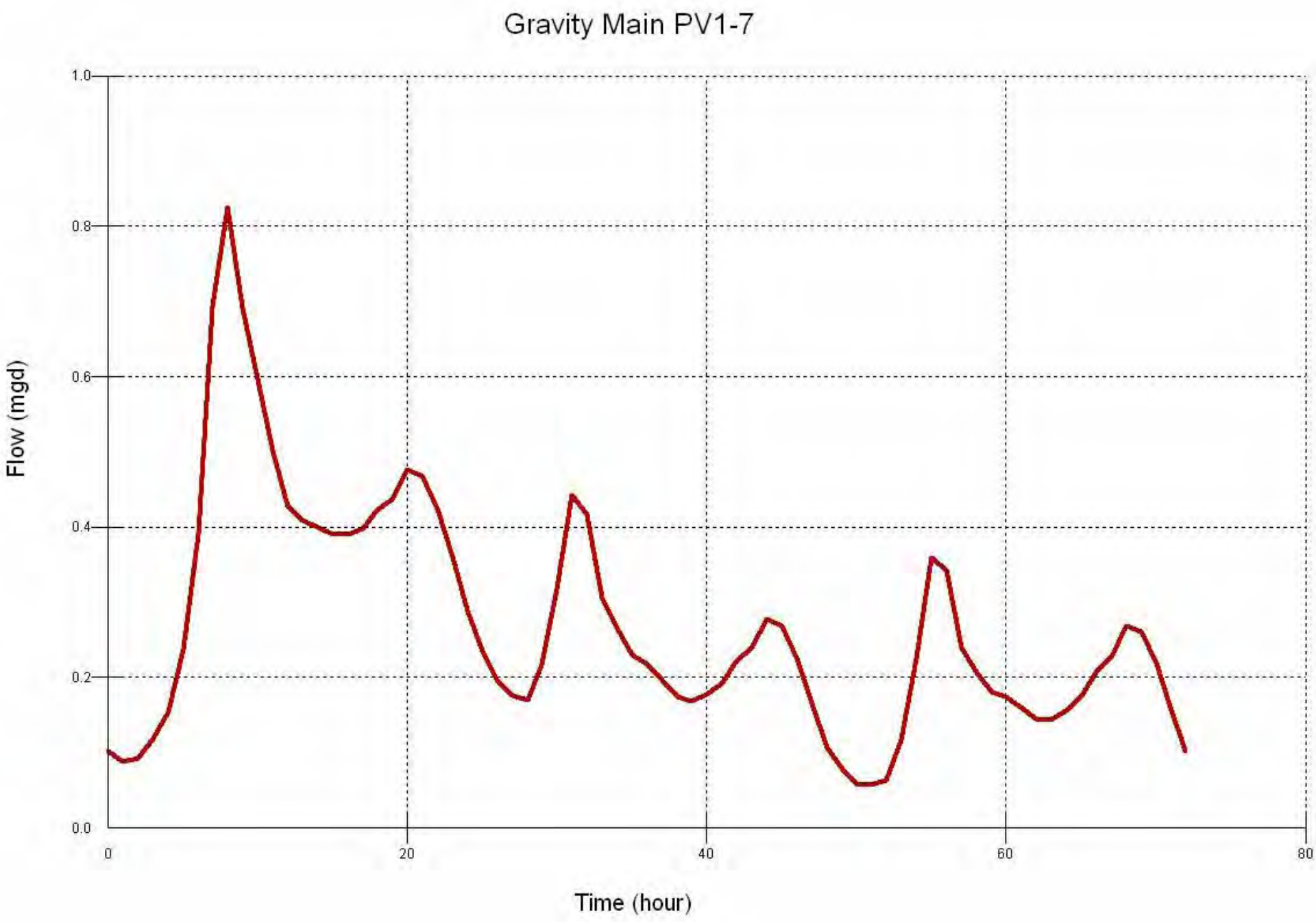
Flowing full at a slope of 0.002[2], the hydraulic capacity of the existing 12-inch diameter gravity sewer is 1.03 mgd. Based on the hydraulic model results, 0.997 mgd would be conveyed through the existing 12-inch diameter gravity sewer during PWWF conditions. The hydraulic capacity of the sewer is greater than the 0.997 mgd PWWF indicated by the hydraulic modeling analysis performed for this memorandum. As such, it appears that there would be adequate capacity in the existing 12-inch diameter gravity sewer (to handle peak wastewater flows from the proposed development described in Section 1) if the hydraulic model methodology were used. **Attachment A** presents the model results for time-varying flow in the existing 12-inch diameter gravity sewer.

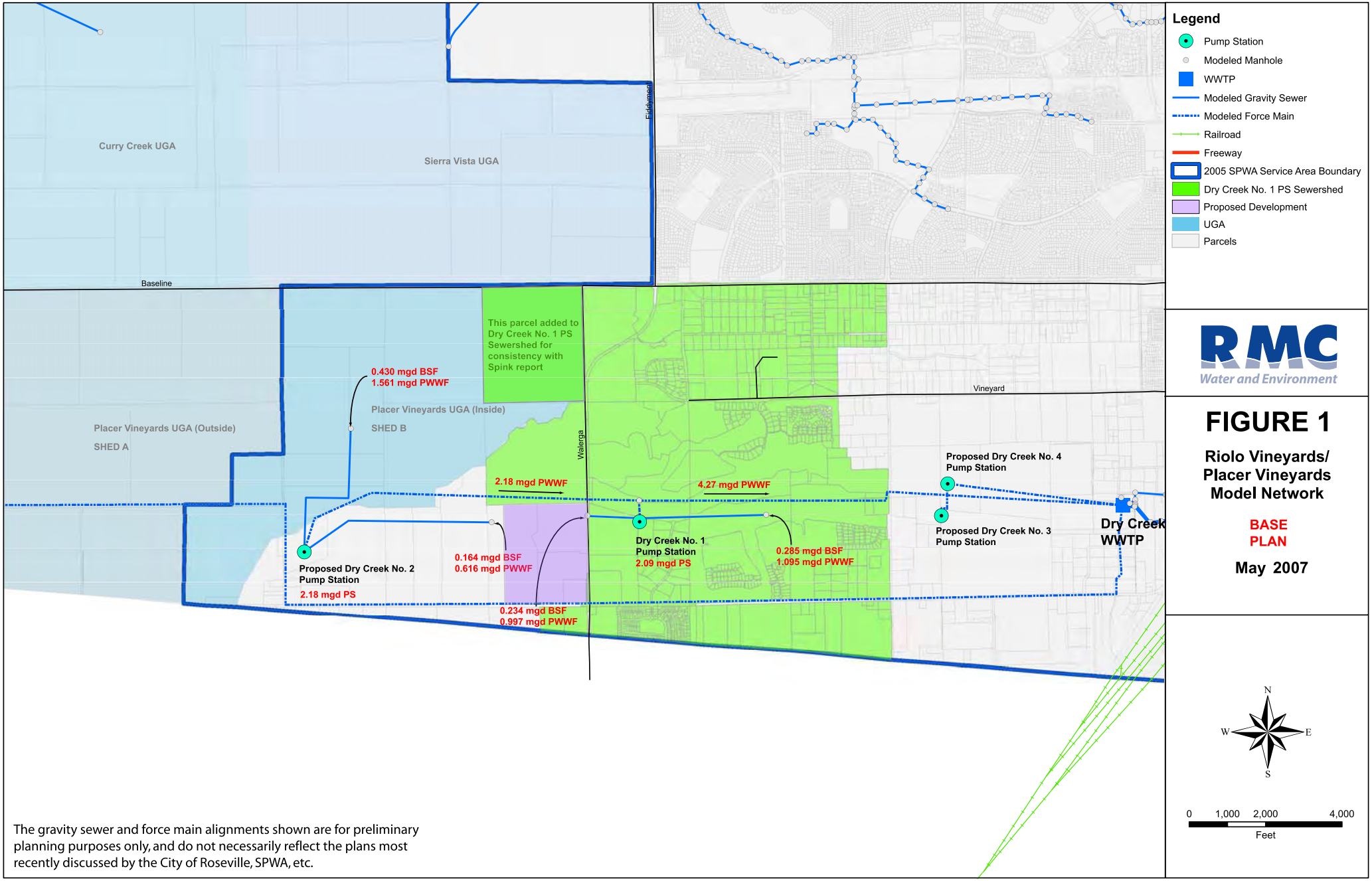
Flows to Dry Creek No. 1 pump station were previously estimated and presented in the Dry Creek West Placer Community Facilities District (CFD) # 1 Sewer Lift Station 1 and Pressure Sewers Preliminary Facilities Plan, prepared by the Spink Corporation in 1999. The Spink report presented a peak flow criteria of 2.314 mgd to the Dry Creek No. 1 pump station, which is greater than the 2.09 mgd PWWF indicated by the hydraulic modeling analysis performed for this memorandum. As such, it appears that there is adequate capacity at the Dry Creek No. 1 pump station to handle peak wastewater flows from the sewershed defined in **Figures 1 and 2**, including the proposed development described in Section 1.

[2] Per the Dry Creek West Placer Gravity Sewer "B" plans, dated February 14, 2001, the existing 12-inch gravity sewer has a slope of 0.002 feet/feet.

Attachment A

Modeling Results for Existing
12-inch Diameter Gravity Sewer


Gravity Main PV1-7
Flow (mgd)
1.0
0.8
0.6
0.4
0.2
0.0
0
20
40
60
80
Time (hour)



RMC Water and Environment

FIGURE 1

Riolo Vineyards/ Placer Vineyards Model Network

BASE PLAN

May 2007

The gravity sewer and force main alignments shown are for preliminary planning purposes only, and do not necessarily reflect the plans most recently discussed by the City of Roseville, SPWA, etc.

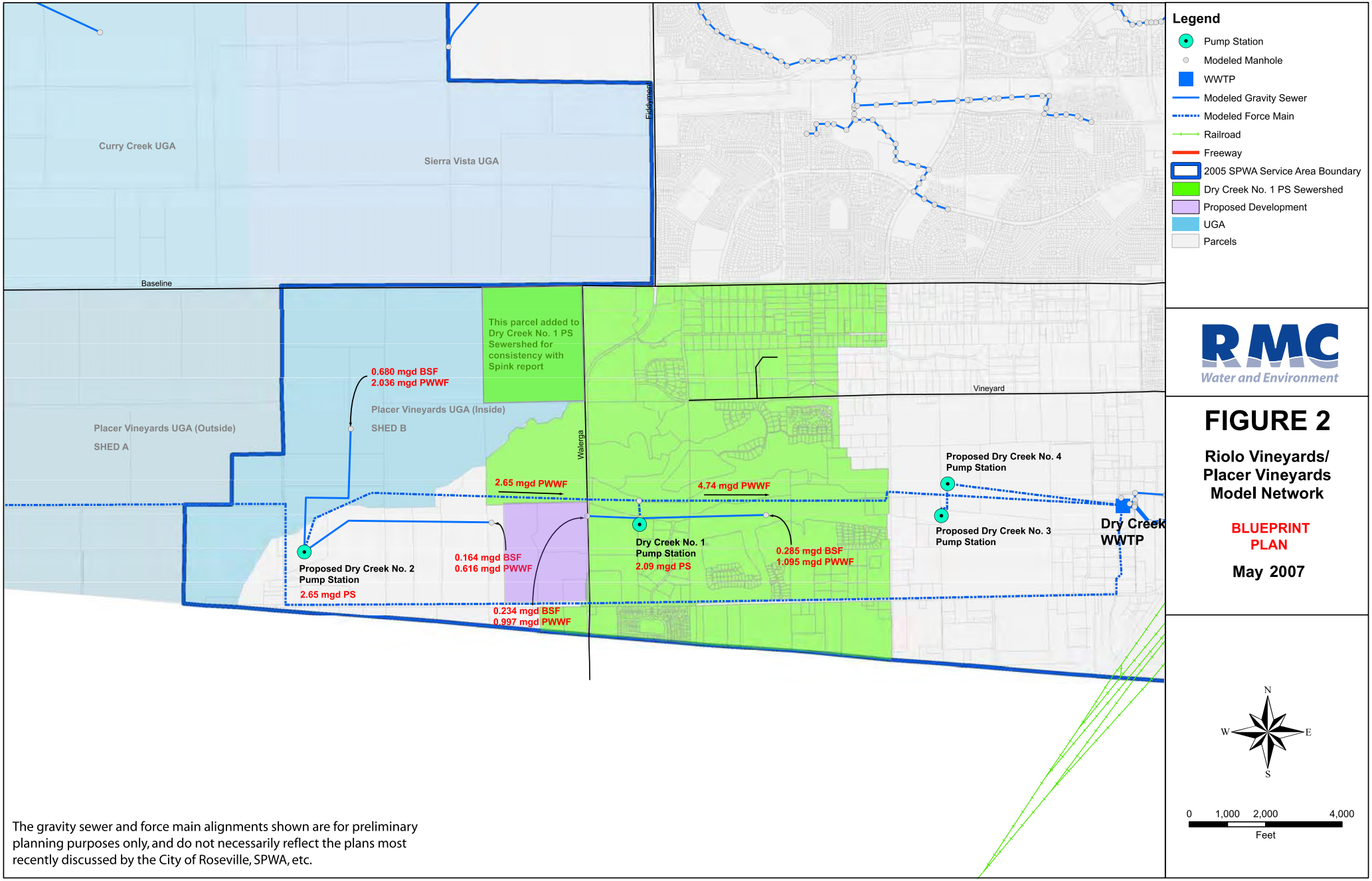


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FIGURE 2

Riolo Vineyards/ Placer Vineyards Model Network

BLUEPRINT PLAN

May 2007

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Appendix N TM 4a – Projected WWTP Flows and Loadings

Technical Memorandum

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**Wastewater Treatment Plant Project Loadings and Buildout – (TM No. 4a)**
Prepared For:	Art O'Brien – City of Roseville
Prepared by:	Austin Peterson – RMC
Reviewed by:	Dave Richardson – RMC Marilyn Bailey – RMC
Date:	February 8, 2006; updated January 24, 2008
Reference:	0091-004 Task 4

0 Previous TM Publication and Updates

Since the initial publication of technical memorandum (TM) 4a on February 8, 2006, changes in information available for the South Placer Wastewater and Recycled Water Systems Evaluation (Systems Evaluation), as well as changes in the data, have resulted in the need to identify and update out-of-date information. As part of the June 2007 publication of the Systems Evaluation, an Update Sheet was prepared for this TM, and is included in **Attachment B**. This newest publication of TM 4a reflects the information presented in the previous update sheet, as well as any subsequent changes in available data and/or assumptions.

1 Introduction

As part of its wastewater and recycled water systems evaluation project, the South Placer Wastewater Authority (SPWA) has reevaluated its existing Unit Flow Factors presented in the 1996 Roseville Regional Wastewater Treatment Service Area Master Plan. The 1996 Unit Flow Factors overestimate projected future volumes of wastewater generated in the service area. Revised Unit Flow Factors and Average Dry Weather Flow (ADWF) Projections are presented in the *Dry Weather Flow Projection for the Ultimate SPWA Service Area (Including Urban Growth Areas) TM No.2b*.

In addition to experiencing infill development within the service area boundary, the service area is experiencing conversion of agricultural and open land on the outskirts of the service area to residential and commercial development. These potential future planning areas outside of the service area are called Urban Growth Areas when they are formally recognized by members of SPWA as requiring planning for sewerage expansion. Realistic projections of the wastewater generated from new developments are critical in determining the timing and extent of expansions needed at the two existing wastewater treatment plants (WWTPs).

This TM analyzes the flow distribution between the two Roseville WWTPs (Dry Creek and Pleasant Grove) and evaluates the organic loadings associated with the wastewater. This information will be used in a subsequent TM to identify options for treating the projected buildout flows and loadings at the two treatment plants.

This TM is organized as follows:

- Introduction
- Flow Distribution Between the Two Plants
- Buildout Timeline
- Loading Projections
- Conclusion

2 Flow Distribution between the Two Plants

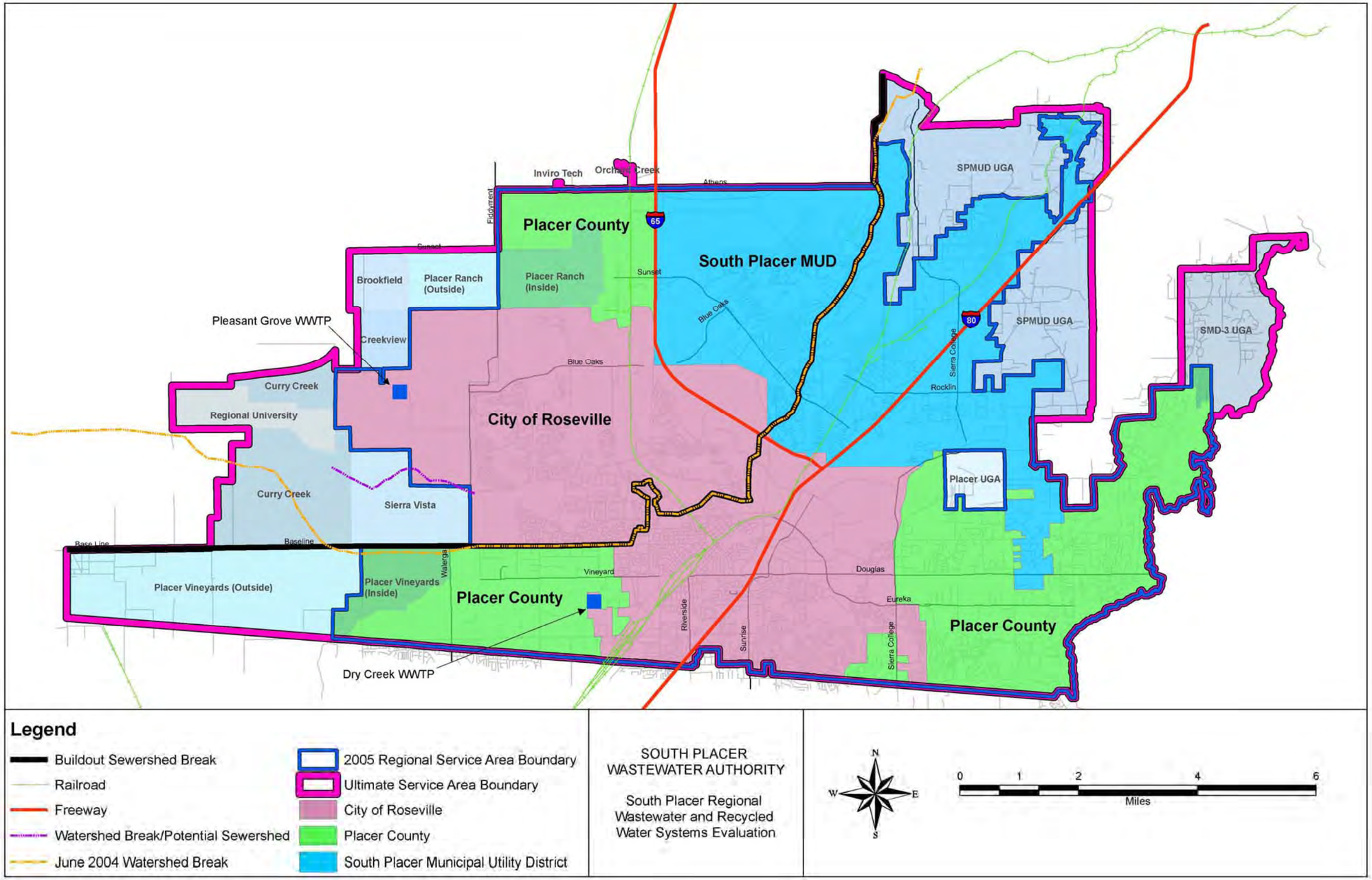
The flow distribution between the two plants was determined based on the existing (as of June 2004) sewershed and the natural watershed divide in the City of Roseville. The sewershed divide (labeled June 2004 Watershed Break in Figure 1) generally follows a ridge through the City. However, this line follows the actual sewershed break based on the local sewers installed and in-service within the developed areas. Sewers south and east of the ridge flow to the Dry Creek WWTP and sewers north and west of the ridge flow to the Pleasant Grove WWTP.

The buildout sewershed line is shown in **Figure 1**. The sewershed is identical to the June 2004 sewershed for the developed areas in central Roseville and Rocklin, but will follow the boundary line between Curry Creek and Placer Vineyards in the future. All future sewers will be designed to maintain gravity flow when possible. All development north of the divide will be planned to have its flow routed to the Pleasant Grove WWTP and all development south of the divide will be planned to have its flow routed to the Dry Creek WWTP. This buildout sewershed divide was developed for the following reasons:

- The majority of Curry Creek drains west away from both treatment plants. Parts of Curry Creek do drain towards the Regional University UGA and towards the Pleasant Grove WWTP. Because sewer infrastructure for Curry Creek is not complete at this time, it is determined that all the flow will flow or be pumped north towards the Pleasant Grove WWTP.
- The majority of Sierra Vista and a portion of Curry Creek are located between two ridges (see Figure 1) and the natural drainage path is west away from both WWTPs. Hence, wastewater generated in these areas will need to be pumped regardless of where it is treated. As such, the same criterion described above applies to these areas.
- It was also assumed that because Placer Vineyards is close to the Dry Creek WWTP, the UGA should flow to the Dry Creek WWTP.

Figure 1 also presents the approximate boundaries between the regional partners.

Figure 1: Sewershed Divide for the 2005 SPWA Regional Service Area UGAs



3 Buildout Timeline

The methodology for calculating the ADWF projections was discussed in TM 2b. This section describes the schedule for buildout of the 2005 Regional Service Area in order to plan for expansion. The City of Roseville is estimated to reach a population of about 129,000 by the year 2020 (West Roseville Specific Plan and Sphere of Influence Amendment FEIR, 2004). For the communities of Rocklin and Loomis, aggregated population growth can continue to approximately 2022 before the planned buildout population is reached, assuming an annual population growth rate of about 4.5 percent.

Estimated buildout dates for the UGAs are based on information provided by the land owners and are presented in **Table 1** and **Table 2**. **Attachment A** presents annual ADWF generation projections until 2050 by service area and by SPWA Partner Agency, for each WWTP. **Figure 2** and **Figure 3** provide a graphical illustration of the annual ADWF generation projections by service area.

Table 1: Estimated Buildout Dates for the Dry Creek Service Area

Service Area	Projected ADWF (mgd)	Estimated Construction Start Date	Estimated Buildout Date
2005 Service Area – Roseville	6.14	N/A	2020 [a]
2005 Service Area – Placer County	3.00	N/A	2025
2005 Service Area – SPMUD [b]	4.72	N/A	2050
	0.11	2050	N/A
UGA - Placer Vineyards [c]	0.58	2009	2025
UGA - Placer Vineyards [d]	2.23	2009	2025
UGA - SMD-3	0.29	N/A	2025
UGA – SPMUD [e]	0.48	N/A	2050
	0.63	2050	N/A
UGA - Placer	0.01	N/A	2025
Rezones	0.17	2010	2019
Intensification	1.64	2010	2025
Total DC Watershed – by 2050	**19.25**		
Total DC Watershed – at buildout	**19.99**		

Footnotes:

a. Based on population projections presented in the West Roseville Specific Plan and Sphere of Influence Amendment FEIR, 2004
b. Based on information provided by SPMUD, a total of 17,895 equivalent dwelling units (EDUs) are expected in the SPMUD service area, within the 2005 Service Area, at ultimate buildout. However, SPMUD projects that only 17,566 of these EDUs will be built within the planning horizon (2050) of this study, leaving 328 EDUs for later buildout.
c. Inside 2005 Regional Service Area
d. Outside 2005 Regional Service Area
e. Based on information provided by SPMUD, a total of 5,380 DUs are expected in the SPMUD UGA at ultimate buildout. However, SPMUD projects that only 1,200 of these DUs will be built within the planning horizon (2050) of this study, leaving 4,180 DUs for later buildout.

Table 2: Estimated Buildout Dates for the Pleasant Grove Service Area

Service Area	Projected ADWF (mgd)	Estimated Construction Start Date	Estimated Buildout Date
2005 Service Area – Roseville	8.07 [a]	N/A	2020 [b]
2005 Service Area – Placer County	1.58	N/A	2025
2005 Service Area – SPMUD [c]	3.34	N/A	2050
	0.06	2050	N/A
West Roseville [d]	1.70	N/A	2015 [e]
UGA - Inviro Tech	0.08	N/A	2015
UGA - Placer Ranch [d]	0.90	2008	2025
UGA - Placer Ranch [f]	1.27	2008	2025
UGA - Curry Creek	2.72	2010 [g]	2025 [h]
UGA - Regional University	1.17	2010 [g]	2025 [h]
UGA - Orchard Creek	0.02	2010 [g]	2025 [i]
UGA – Creekview & Panhandle [j,l]	1.06	2008	2025
UGA - Sierra Vista [j]	2.10	2008	2025
UGA – Brookfield	0.73	2013	2033
Rezones	0.50	2013	2023
Intensification	-	N/A	N/A
Total PG Watershed [k] – by 2050	25.24		
Total PG Watershed [k] – at Buildout	25.30		

Footnotes:

a. Excludes West Roseville
b. Based on population projections presented in the West Roseville Specific Plan and Sphere of Influence Amendment FEIR, 2004
c. Based on information provided by SPMUD, a total of 17,895 (EDUs) are expected in the SPMUD service area, within the 2005 Service Area, at ultimate buildout. However, SPMUD projects that only 17,566 of these EDUs will be built within the planning horizon (2050) of this study, leaving 328 EDUs for later buildout.
d. Inside 2005 Service Area.
e. Estimated buildout date for predominately all residential development in West Roseville which accounts for 87% of the wastewater generated in the area. All other development is anticipated to be built out by 2025.
f. Outside 2005 Service Area.
g. A start date of 2010 is assumed pending updated information from developer.
h. Buildout date source: DKS Associates Table 1 Super-Cumulative Development Scenarios for Western Placer County EIRs (9/16/05).
i. A buildout date of 2025 is assumed pending updated information from developer.
j. Formally know as West Roseville MOU Remainder.
k. The following areas were not included in the timeline estimate: Reason Farms, Landfill, AKT North, and Amoruso Way. Reason Farms is a detention basin and will not generate any wastewater. The Landfill will generate minimal wastewater and has been included as a point source in the Pleasant Grove Service Area calculations. There has not been sufficient planning done on AKT North to estimate the wastewater flows generated in this area. It is planned to have Amoruso Way wastewater generation incorporated into Placer Ranch.
l. "Panhandle" refers to a 238-acre portion of the Reason Farms planning area that is adjacent to the western boundary of the 511-acre Creekview UGA. Though not considered a UGA, the panhandle area is assumed to contribute wastewater flow to the Creekview UGA

Figure 2: Dry Creek Service Area Annual ADWF Generation Projections with UGAs, Rezones, and Intensification

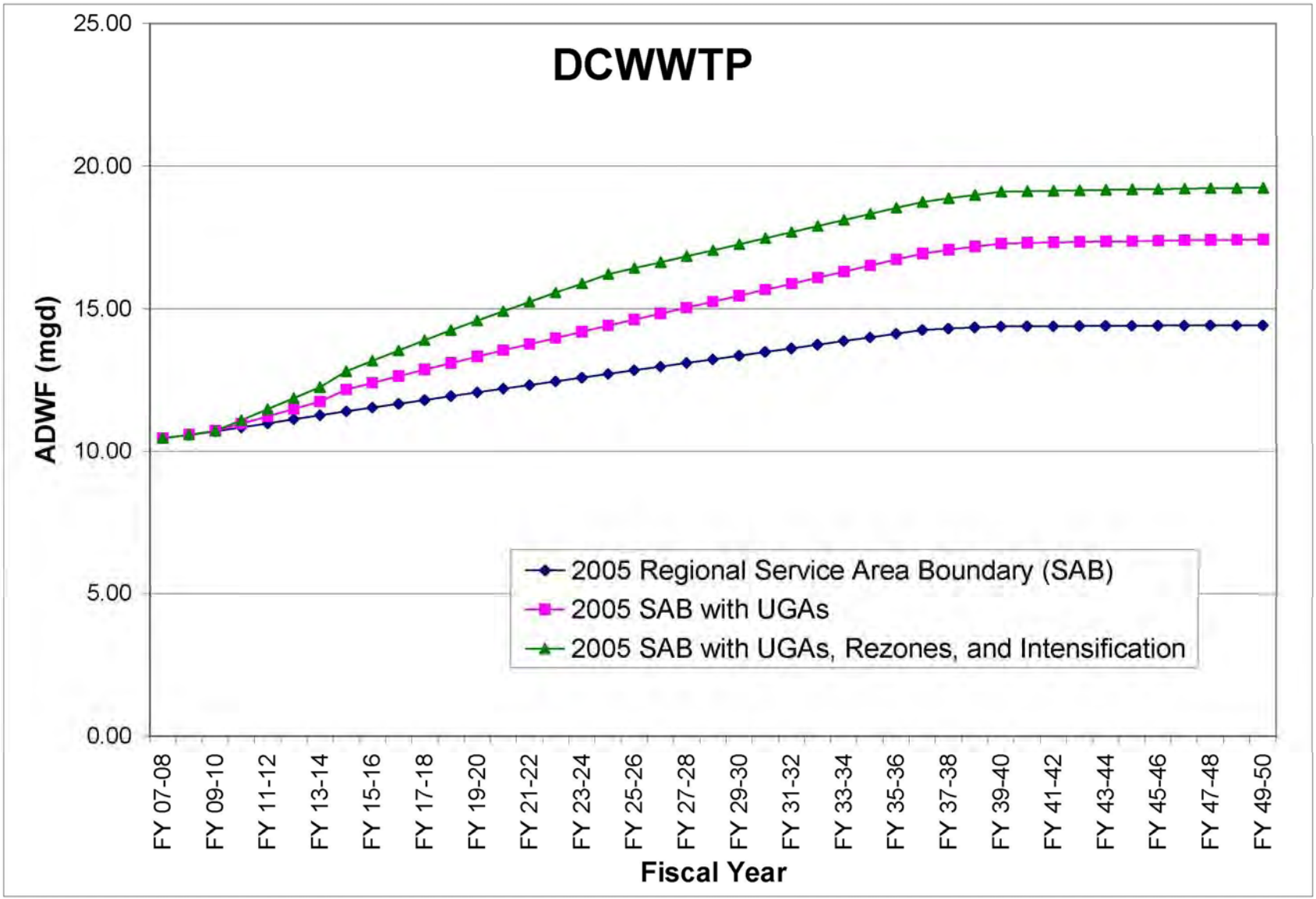
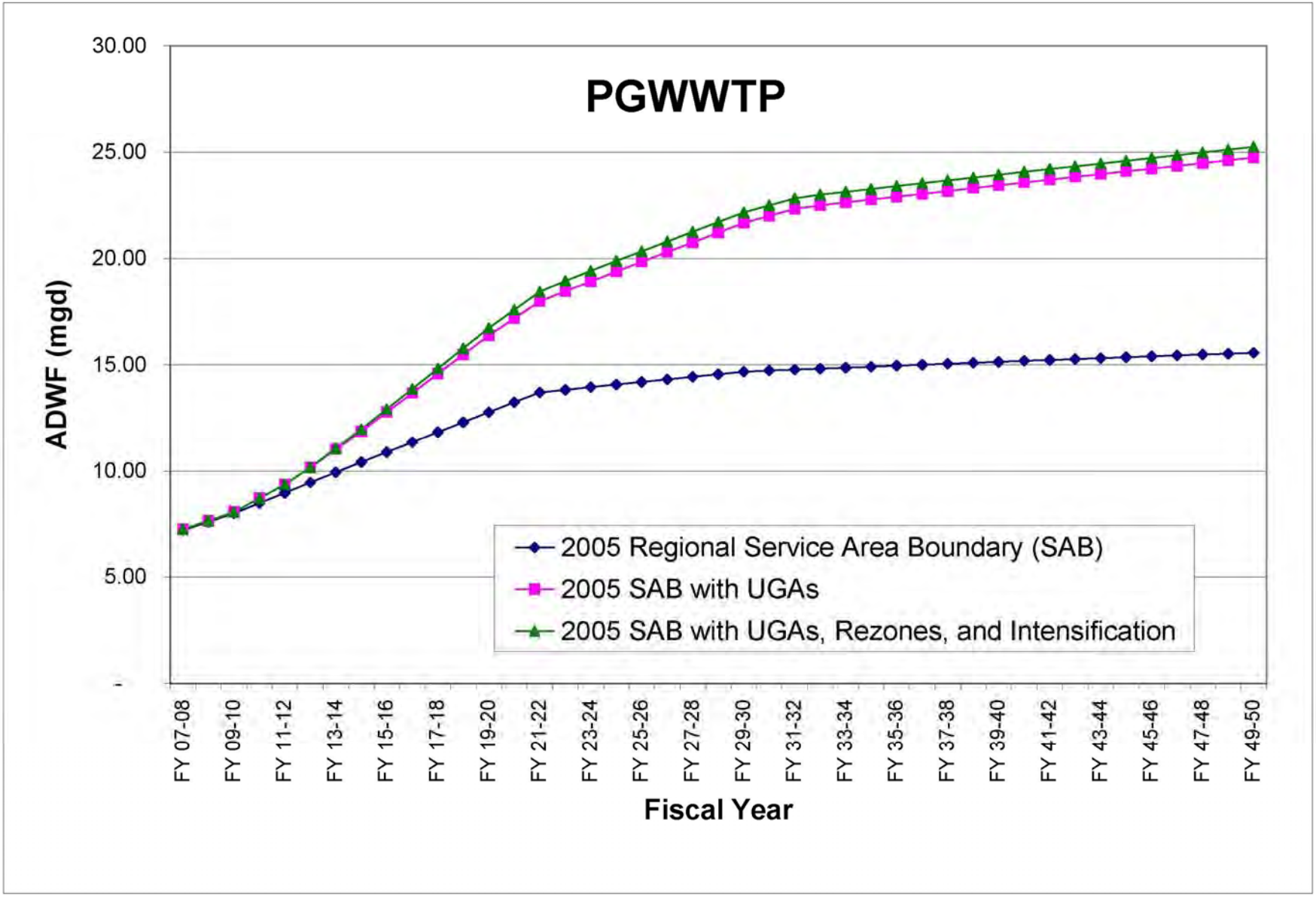


Figure 3: Pleasant Grove Service Area Annual ADWF Generation Projections with UGAs, Rezones, and Intensification



4 Loading Projections

Wastewater flow rate is used to size those facilities within a wastewater treatment plant that are designed primarily for a specific hydraulic detention time or overflow rate such as screens, primary clarifiers, filters, etc. For other processes, such as the secondary treatment system and solids handling, equally important criteria are organic and solids loadings into the plant. Two of the key indicators of the plant loading are the biochemical oxygen demand (BOD) and the total suspended solids (TSS). The Dry Creek plant was designed in 1990 for an influent BOD concentration of 160 mg/l and TSS concentration of 240 mg/l. The Pleasant Grove plant, designed in 2000, was designed for an influent BOD concentration of 160 mg/l and TSS concentration of 220 mg/l. These concentrations are lower than average municipal wastewater strength, but reflected the service area characteristics at the time, i.e. a primarily residential, relatively sparsely developed community of older homes.

The characteristics of the service area have changed dramatically since 2000. The population has increased by over 20% and the area has become more suburban in nature with accompanying changes in lifestyle. Since 2000, the number of restaurants has increased by about 50%, two new microbreweries have opened, and a new regional shopping mall has been constructed. A vigorous water conservation program has decreased the volume per capita of wastewater conveyed by the sewers without decreasing the pounds of organics being introduced to the sewer, effectively concentrating the strength of the wastewater. As a result of water conservation and the “suburbanization” of the service area, the concentration of influent BOD and TSS has increased significantly since 2000 as shown in **Figure 4** and **Figure 5** below.

Figure 4: Dry Creek TSS and BOD Concentrations

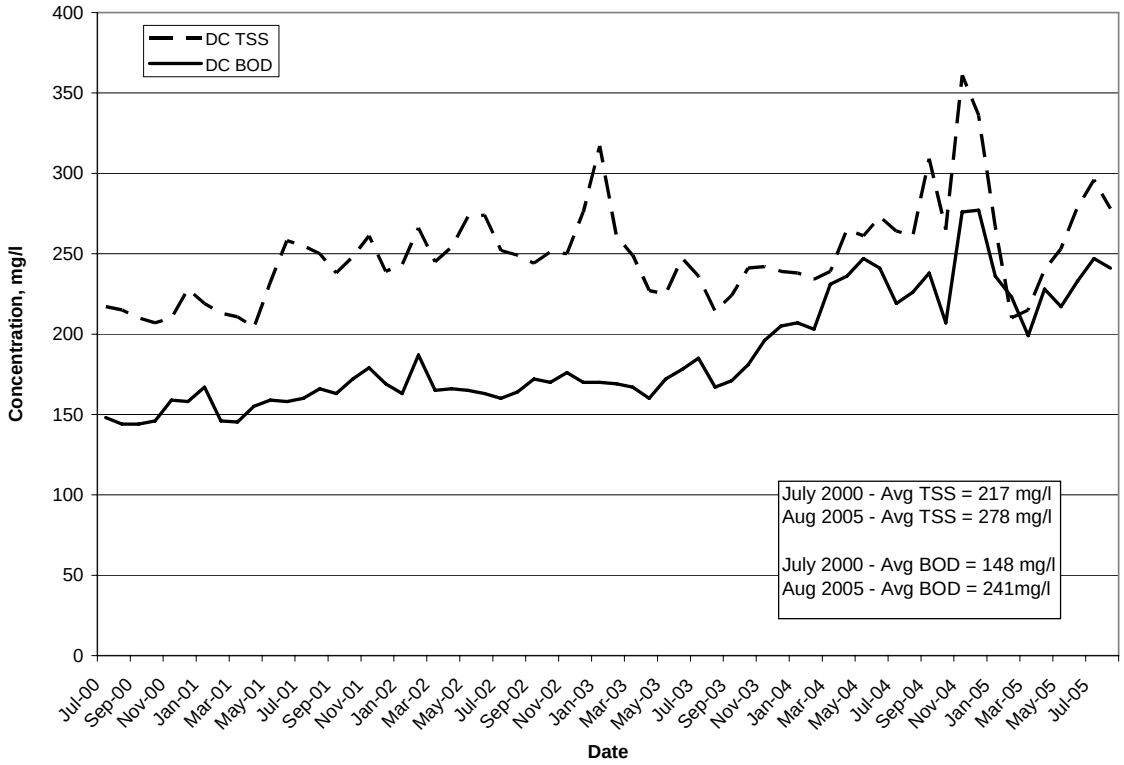
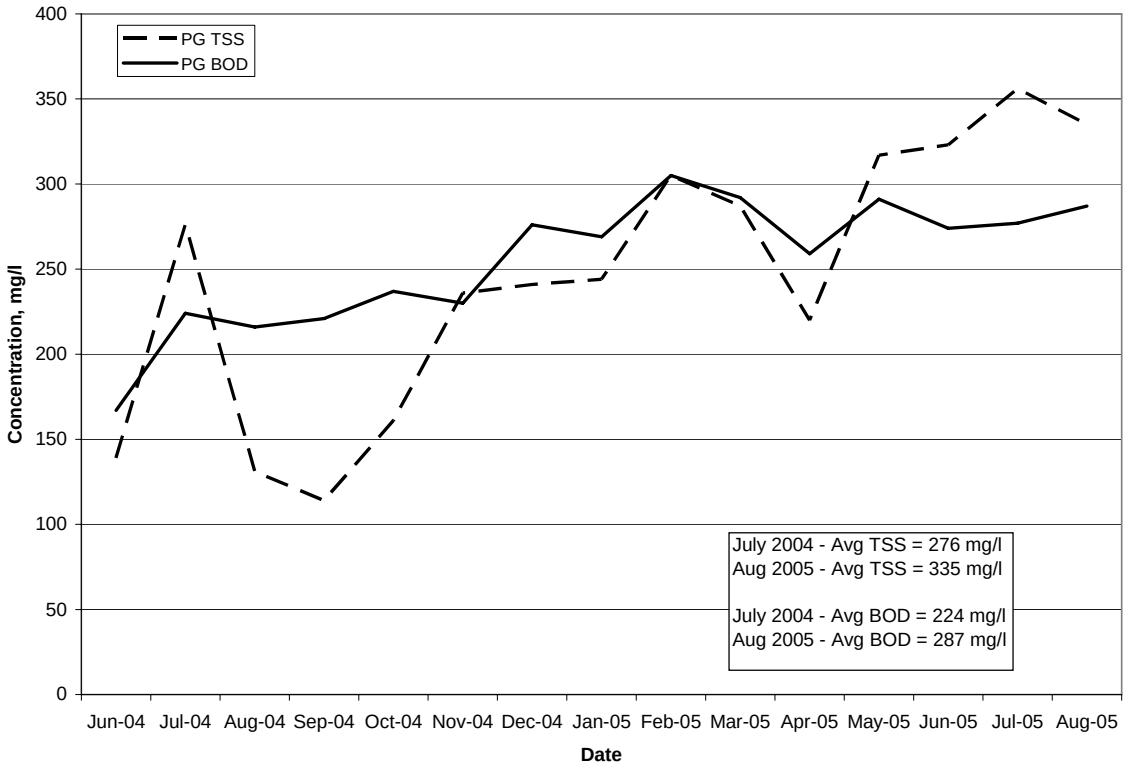


Figure 5: Pleasant Grove TSS and BOD Concentrations



For the Pleasant Grove plant it is anticipated that the wastewater generated by future development within the service area will be similar in nature to the existing flow. Therefore, for planning purposes, the existing dry weather BOD and TSS concentrations will be used to project the loadings associated with the flows at buildout. The average dry weather concentrations for Pleasant Grove in 2050 are as follows: BOD 285 mg/l and TSS 340 mg/l.

For the Dry Creek plant, the current average dry weather concentrations of BOD and TSS are, respectively, 266 mg/l and 280 mg/l. The existing Dry Creek plant is a blend of lower concentration wastewater from older developments combined with higher concentration wastewater from the newer developments. It is expected that the wastewater associated with future development will be similar in nature to that within the Pleasant Grove service area, i.e. it will be higher in concentration. The resulting BOD and TSS concentrations at Dry Creek will therefore be a blend of the existing wastewater and future, higher concentration wastewater, prorated by flow. The resulting projected average dry weather BOD and TSS concentrations for Dry Creek in 2050 are as follows: BOD 275 mg/l and TSS 310 mg/l.

Table 3 below summarizes the projected BOD and TSS loadings in fiscal year 2050 for the two plants.

Table 3: Projected Dry Weather BOD and TSS Loadings

Plant	ADWF in 2050, mgd	BOD		TSS	
		mg/l	lb/day	mg/l	lb/day
Dry Creek	19.24	275	44,200	310	49,800
Pleasant Grove	25.24	285	60,000	340	71,600

5 Conclusion

The projected average dry weather flows for the service area were estimated by using revised Unit Flow Factors and information on the 2050 conditions of the existing service areas and new urban growth areas. The resulting projected average dry weather flow in 2050 is 19.24 mgd for the Dry Creek WWTP and 25.24 mgd for the Pleasant Grove WWTP.

The BOD and TSS concentrations have increased at a rapid pace since 2000. However, the concentrations have reached a point typical of a stable suburban service area. The concentrations are not anticipated to increase significantly past the current numbers. Therefore it is recommended to design for a BOD concentration of 275 mg/l and a TSS concentration of 310 mg/l for Dry Creek and for BOD of 285 mg/l and TSS of 340 mg/l for Pleasant Grove.

Attachment A

Annual ADWF Generation Projections by WWTP – To 2050

	FY 07-08	FY 08-09	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30	FY 30-31	FY 31-32	FY 32-33
Dry Creek Service Area																										
2005 Service Area - Roseville	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
2005 Service Area - PC	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
2005 Service Area - PC -PV indside 2005 SAB	-	-	-	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
2005 Service Area - SPMUD	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
2005 Service Area - Total (mgd)	0.12	0.12	0.13	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
UGA - Placer Vineyards-Outside 2005 SAB	-	-	-	0.11	0.11	0.11	0.11	0.11	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
UGA - SMD-3	-	-	-	-	-	-	-	0.17	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UGA - SPMUD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
UGA - Placer	-	-	-	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-	-	-	-	-
Total With UGAs (mgd)	0.12	0.12	0.13	0.26	0.26	0.26	0.26	0.43	0.23	0.23	0.23	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Rezones	-	-	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Intensification	-	-	-	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	-	-	-	-	-	-	-	-
Total with UGAs & Rezones/Intesification (mgd)	0.12	0.12	0.13	0.38	0.39	0.39	0.39	0.56	0.36	0.36	0.36	0.35	0.34	0.33	0.33	0.33	0.33	0.33	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
2005 Service Area - Cumulative (mgd)	10.47	10.59	10.72	10.86	11.00	11.14	11.28	11.42	11.55	11.68	11.81	11.95	12.08	12.21	12.34	12.47	12.59	12.72	12.85	12.98	13.11	13.24	13.36	13.49	13.62	13.75
Total With UGAs - Cumulative (mgd)	10.47	10.60	10.73	10.98	11.24	11.49	11.75	12.18	12.41	12.64	12.87	13.10	13.33	13.55	13.76	13.98	14.19	14.41	14.62	14.83	15.04	15.25	15.46	15.67	15.88	16.10
Total With UGAs & Rezones/Intensification - Cumulative (mgd)	10.47	10.60	10.73	11.10	11.49	11.87	12.26	12.82	13.18	13.54	13.90	14.25	14.59	14.92	15.24	15.57	15.89	16.22	16.43	16.64	16.85	17.06	17.27	17.48	17.69	17.91

	FY 33-34	FY 34-35	FY 35-36	FY 36-37	FY 37-38	FY 38-39	FY 39-40	FY 40-41	FY 41-42	FY 42-43	FY 43-44	FY 44-45	FY 45-46	FY 46-47	FY 47-48	FY 48-49	FY 49-50
Dry Creek Service Area																	
2005 Service Area - Roseville	0.04	0.04	0.04	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-
2005 Service Area - PC	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-	-	-	-	-	-	-	-	-
2005 Service Area - PC -PV indside 2005 SAB	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-	-	-	-	-	-	-	-	-
2005 Service Area - SPMUD	0.06	0.06	0.06	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
2005 Service Area - Total (mgd)	0.13	0.13	0.13	0.13	0.06	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
UGA - Placer Vineyards-Outside 2005 SAB	0.06	0.06	0.06	0.06	0.06	0.06	0.06	-	-	-	-	-	-	-	-	-	-
UGA - SMD-3	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - SPMUD	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
UGA - Placer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total With UGAs (mgd)	0.21	0.21	0.21	0.20	0.13	0.11	0.11	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
Rezones	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Intensification	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total with UGAs & Rezones/Intesification (mgd)	0.21	0.21	0.21	0.20	0.13	0.11	0.11	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
2005 Service Area - Cumulative (mgd)	13.87	14.00	14.13	14.26	14.31	14.35	14.39	14.39	14.40	14.40	14.40	14.41	14.41	14.42	14.42	14.43	14.43
Total With UGAs - Cumulative (mgd)	16.31	16.52	16.73	16.94	17.07	17.18	17.30	17.32	17.33	17.35	17.36	17.38	17.39	17.41	17.42	17.43	17.43
Total With UGAs & Rezones/Intensification - Cumulative (mgd)	18.12	18.33	18.54	18.75	18.88	18.99	19.11	19.13	19.14	19.16	19.17	19.19	19.20	19.22	19.23	19.24	19.24

	FY 07-08	FY 08-09	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30	FY 30-31
Dry Creek Service Area																								
By SPWA Partner Agency																								
City of Roseville	4.97	5.01	5.06	5.22	5.39	5.56	5.73	5.90	6.07	6.24	6.41	6.57	6.72	6.87	7.02	7.17	7.32	7.47	7.51	7.55	7.59	7.63	7.67	7.71
Placer County	2.48	2.50	2.53	2.69	2.84	2.99	3.15	3.47	3.60	3.72	3.85	3.97	4.09	4.20	4.31	4.42	4.53	4.64	4.74	4.84	4.94	5.04	5.13	5.23
SPMUD	3.02	3.08	3.14	3.20	3.26	3.32	3.39	3.45	3.52	3.58	3.65	3.71	3.78	3.84	3.91	3.98	4.04	4.11	4.18	4.25	4.32	4.39	4.46	4.54
Total	10.47	10.60	10.73	11.10	11.49	11.87	12.26	12.82	13.18	13.54	13.90	14.25	14.59	14.92	15.24	15.57	15.89	16.22	16.43	16.64	16.85	17.06	17.27	17.48

	FY 31-32	FY 32-33	FY 33-34	FY 34-35	FY 35-36	FY 36-37	FY 37-38	FY 38-39	FY 39-40	FY 40-41	FY 41-42	FY 42-43	FY 43-44	FY 44-45	FY 45-46	FY 46-47	FY 47-48	FY 48-49	FY 49-50
Dry Creek Service Area																			
By SPWA Partner Agency																			
City of Roseville	7.75	7.79	7.83	7.87	7.91	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95
Placer County	5.33	5.43	5.53	5.62	5.72	5.81	5.91	6.00	6.09	6.09	6.09	6.09	6.09	6.09	6.09	6.09	6.09	6.09	6.09
SPMUD	4.61	4.69	4.76	4.84	4.91	4.98	5.02	5.04	5.06	5.08	5.10	5.11	5.13	5.14	5.15	5.17	5.18	5.19	5.20
Total	17.69	17.91	18.12	18.33	18.54	18.75	18.88	18.99	19.11	19.13	19.14	19.16	19.17	19.19	19.20	19.22	19.23	19.24	19.24

	FY 07-08	FY 08-09	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30	FY 30-31	FY 31-32	FY 32-33
Pleasant Grove Service Area																										
2005 Service Area - Roseville (Includes 1.70 mgd from WRSP)	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	-	-	-	-	-	-	-	-	-	-	-
2005 Service Area - PC	0.00	0.00	0.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
2005 Service Area - PC (PR inside 2005 SAB)	-	-	-	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.01	0.01	0.01
2005 Service Area - SPMUD	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.00	0.00	0.00
2005 Service Area - Total (mgd)	0.40	0.40	0.40	0.48	0.48	0.48	0.48	0.48	0.47	0.47	0.47	0.47	0.47	0.46	0.46	0.13	0.13	0.13	0.12	0.12	0.12	0.12	0.12	0.05	0.05	0.05
UGA - Invirotech	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - Placer Ranch outside 2005 SAB	-	-	-	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.01	0.01	0.01
UGA - Curry Creek	-	-	-	-	-	-	-	-	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
UGA - Regional University	-	-	-	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-	-
UGA - Orchard Creek	-	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
UGA - Sierra Vista	-	-	-	-	-	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	-
UGA - Creekview	-	-	-	-	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-
UGA - Brookfield	-	-	-	-	-	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Total With UGAs (mgd)	0.41	0.41	0.41	0.65	0.65	0.81	0.85	0.85	0.90	0.90	0.90	0.90	0.90	0.81	0.81	0.47	0.47	0.47	0.46	0.46	0.46	0.46	0.46	0.33	0.33	0.17
Rezones	-	-	-	-	-	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-	-	-	-	-	-	-	-	-	-
Intensification	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total with UGAs & Rezones/Intesification (mgd)	0.41	0.41	0.41	0.65	0.65	0.81	0.90	0.90	0.95	0.95	0.95	0.95	0.95	0.86	0.86	0.52	0.47	0.47	0.46	0.46	0.46	0.46	0.46	0.33	0.33	0.17
2005 Service Area - Cumulative (mgd)	7.20	7.60	8.01	8.49	8.97	9.45	9.94	10.42	10.89	11.36	11.84	12.31	12.78	13.24	13.71	13.83	13.96	14.08	14.20	14.33	14.45	14.57	14.69	14.73	14.78	14.83
Total With UGAs - Cumulative (mgd)	7.25	7.65	8.06	8.71	9.36	10.18	11.02	11.87	12.78	13.68	14.58	15.48	16.38	17.18	17.99	18.46	18.92	19.39	19.85	20.30	20.76	21.22	21.67	22.00	22.33	22.50
Total With UGAs & Rezones/Intensification - Cumulative (mgd)	7.25	7.65	8.06	8.71	9.36	10.18	11.07	11.97	12.93	13.88	14.83	15.78	16.73	17.58	18.44	18.96	19.42	19.89	20.35	20.80	21.26	21.72	22.17	22.50	22.83	23.00

	FY 33-34	FY 34-35	FY 35-36	FY 36-37	FY 37-38	FY 38-39	FY 39-40	FY 40-41	FY 41-42	FY 42-43	FY 43-44	FY 44-45	FY 45-46	FY 46-47	FY 47-48	FY 48-49	FY 49-50
Pleasant Grove Service Area																	
2005 Service Area - Roseville (Includes 1.70 mgd from WRSP)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2005 Service Area - PC	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
2005 Service Area - PC (PR inside 2005 SAB)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
2005 Service Area - SPMUD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-	-	-	-	-
2005 Service Area - Total (mgd)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
UGA - Invirotech	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - Placer Ranch outside 2005 SAB	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
UGA - Curry Creek	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
UGA - Regional University	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - Orchard Creek	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - Sierra Vista	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - Creekview	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - Brookfield	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total With UGAs (mgd)	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Rezones	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Intensification	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total with UGAs & Rezones/Intesification (mgd)	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
2005 Service Area - Cumulative (mgd)	14.87	14.92	14.96	15.01	15.06	15.10	15.15	15.19	15.24	15.28	15.32	15.36	15.40	15.45	15.49	15.53	15.57
Total With UGAs - Cumulative (mgd)	22.64	22.77	22.90	23.04	23.17	23.31	23.44	23.57	23.70	23.83	23.96	24.09	24.22	24.35	24.48	24.61	24.74
Total With UGAs & Rezones/Intensification - Cumulative (mgd)	23.14	23.27	23.40	23.54	23.67	23.81	23.94	24.07	24.20	24.33	24.46	24.59	24.72	24.85	24.98	25.11	25.24

UPDATED PROJECTIONS

	FY 07-08	FY 08-09	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30	FY 30-31	FY 31-32	FY 32-33
Pleasant Grove Service Area																										
By SPWA Partner Agency																										
City of Roseville	5.04	5.38	5.72	6.05	6.39	6.89	7.43	7.98	8.52	9.07	9.61	10.16	10.71	11.25	11.80	12.00	12.16	12.32	12.48	12.63	12.79	12.95	13.11	13.27	13.42	13.42
Placer County	0.21	0.21	0.22	0.48	0.74	0.99	1.29	1.58	1.93	2.28	2.63	2.97	3.31	3.57	3.82	4.07	4.32	4.57	4.81	5.05	5.29	5.53	5.77	5.94	6.11	6.27
SPMUD	2.00	2.06	2.12	2.18	2.24	2.29	2.35	2.41	2.47	2.53	2.59	2.65	2.71	2.77	2.82	2.88	2.94	3.00	3.06	3.12	3.18	3.24	3.30	3.30	3.30	3.31
Total	7.25	7.65	8.06	8.71	9.36	10.18	11.07	11.97	12.93	13.88	14.83	15.78	16.73	17.58	18.44	18.96	19.42	19.89	20.35	20.80	21.26	21.72	22.17	22.50	22.83	23.00

UPDATED PROJECTIONS

	FY 33-34	FY 34-35	FY 35-36	FY 36-37	FY 37-38	FY 38-39	FY 39-40	FY 40-41	FY 41-42	FY 42-43	FY 43-44	FY 44-45	FY 45-46	FY 46-47	FY 47-48	FY 48-49	FY 49-50
Pleasant Grove Service Area																	
By SPWA Partner Agency																	
City of Roseville	13.42	13.42	13.42	13.42	13.42	13.42	13.42	13.42	13.42	13.42	13.42	13.42	13.42	13.42	13.42	13.42	13.42
Placer County	6.40	6.53	6.66	6.79	6.92	7.05	7.18	7.31	7.44	7.57	7.70	7.83	7.96	8.09	8.22	8.35	8.48
SPMUD	3.31	3.31	3.32	3.32	3.33	3.33	3.33	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34
Total	23.14	23.27	23.40	23.54	23.67	23.81	23.94	24.07	24.20	24.33	24.46	24.59	24.72	24.85	24.98	25.11	25.24

Attachment B

June 2007 TM Update Sheet

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject: **Update for TM 4a**

Prepared For: Art O'Brien, City of Roseville

Prepared by: Andy Smith, RMC

Reviewed by: Dave Richardson, RMC

Date: June 21, 2007

Reference: 0091-04

1 Summary of Update for TM 4a

Since the completion of TM 4a on February 8, 2006, changes in the scope of the South Placer Wastewater and Recycled Water Systems Evaluation, as well as changes in the data available, have resulted in the need to identify out-of-date information, to summarize the updated information, and provide justification as to the need for the update. **Table 1** presents a summary of the updates for TM 4a.

Table 1: Summary of Update for TM 4a

Page	Location	Summary of Outdated Information	Summary of Updated Information	Reason for Update
3	Figure 1	Does not include Brookfield; un-expanded SPMUD UGA included	Brookfield is considered as a UGA. The SPMUD UGA boundary has been expanded. Refer to Figures ES-4 and 2-6 in the Systems Evaluation report for updated versions of the information shown in this figure.	Expanded SPMUD boundary and Brookfield
4	Figure 2	Shows incorrect SPMUD/Placer County boundaries	The boundary between SPMUD and Placer County near the Placer UGA has been adjusted. Refer to Figure ES-1in the Systems Evaluation report for updated versions of the information shown in this figure.	Error in depiction of SPMUD/Placer County boundaries
5	Table 1	Based on incorrectly drawn boundaries between SPMUD and Placer County, approximately 0.1 mgd of ADWF from SPMUD is attributed to Placer County (the 0.1 mgd still goes to DC WWTP)	0.1 mgd of ADWF should be subtracted from Placer County and added to SPMUD ADWF	Error in depiction of SPMUD/Placer County boundaries
6	Table 2	Brookfield not included	Refer to TM 11a for flow projections.	Brookfield added as a UGA

Page	Location	Summary of Outdated Information	Summary of Updated Information	Reason for Update
7	Tables 3a, 3b, 4a, 4b	Brookfield not included; Based on incorrectly drawn boundaries between SPMUD and Placer County, approximately 0.1 mgd of ADWF from SPMUD is attributed to Placer County	Refer to TM 11a for Brookfield flow projection information; 0.1 mgd of ADWF should be subtracted from Placer County and added to SPMUD ADWF	Brookfield added as a UGA; error in depiction of SPMUD/Placer County boundaries
8	Figure 3	Buildout timeline for DCWWTP	Refer to TM 4b for updated methodology and buildout timeline	To more realistically reflect future growth
9	Figure 4	Buildout timeline for PFWWTP	Refer to TM 4b for updated methodology and buildout timeline	To more realistically reflect future growth
9	Figure 4	Brookfield not reflected in timeline	Refer to TM 9d for Brookfield impacts	Brookfield added as a UGA
12	Table 5	Brookfield/intensification not reflected in ADWF projections	Refer to TM 9d for Brookfield/intensification impacts	Intensification and Brookfield

Attachment C

Update Sheet 2 - February 2009 Updates

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**Update 2 for TM 4a**
Prepared For:	Art O'Brien, City of Roseville
Prepared by:	Chris van Lienden, RMC
Reviewed by:	Marilyn Bailey and Dave Richardson, RMC
Date:	February 25, 2009
Reference:	0091-04

1 Summary of Update 2 for TM 4a

Since the completion of TM 4a on February 8, 2006 and subsequent update on January 24, 2008, CH2MHill has developed the Dry Creek Wastewater Treatment Plant (WWTP) Initial Assessment (CH2MHill 2008). The Initial Assessment performed additional analysis on loading and peaking factors at the Dry Creek WWTP, superseding that information contained in TM 4A. Information regarding loading and peaking factors in TM 4a Section 4 pertaining to the Dry Creek WWTP should therefore be disregarded. Information relating to Pleasant Grove WWTP remains valid. The results and recommendations of the Initial Assessment are summarized in TM 4c.

Attachment D

Update Sheet 3 - August 2009 Updates

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**Update 3 for TM 4a**
Prepared For:	Art O'Brien, City of Roseville
Prepared by:	Chris van Lienden, RMC
Reviewed by:	Dave Richardson, RMC
Date:	August 19, 2009
Reference:	0091-04

1 Summary of Update 3 for TM 4a

Since the completion of TM 4a on February 8, 2006 and subsequent updates on January 24, 2008 and February 25, 2009 new flow projections for Pleasant Grove WWTP and Dry Creek WWTP have been developed. Buildout flow estimates have been updated to reflect additional inflow from a proposed update to the West Roseville Specific Plan (May, 2009). The flow projections have also been updated to reflect reduced rates of residential development due to the economic slowdown beginning in 2008. The new flow projections and construction phasing timelines are presented in TM 4d. While the methodology and results of the TM 4a analysis are still valid, the specific numerical data contained in TM 4a regarding flow projections should therefore be disregarded in favor of the numerical values in TM 4d.

Appendix O TM 4b – Wastewater Treatment Plant Expansion Requirements

Technical Memorandum

South Placer Regional Wastewater & Recycled Water Systems Evaluation Project

Subject: Wastewater Treatment Plants Expansion Requirements (TM 4b)

Prepared For: Art O'Brien – City of Roseville

Prepared by: Marilyn Bailey – RMC
Austin Peterson – RMC
Lea Fisher

Reviewed by: Dave Richardson – RMC

Date: March 28, 2006 – revised August 19, 2009

Reference: 0091-004

1 Introduction

The South Placer Wastewater Authority (SPWA) is evaluating its wastewater systems to determine the effects of infill development and conversion of agricultural and open land to residential and commercial development. As part of this effort, the additional treatment plant flows and loadings from the projected growth have been analyzed in the following Technical Memoranda:

- *Dry Weather Flow Projection for the Ultimate SPWA Service Area (Including Urban Growth Areas) TM No.2b* dated *November 4, 2005,* which developed new unit flow factors and Average Dry Weather Flow Projections
- *Wet Weather Flow Projection for the Ultimate SPWA Service Area (Including Urban Growth Areas) TM No.2c dated December 1, 2005* which developed wet weather flow projections and used a hydraulic model for assessment of the collection system and peak flows into the treatment plants.
- *WWTP Projected Loadings and Buildout (TM 4a) dated December 9, 2005,* which analyzed flow distribution from the service area to the two WWTPs, developed a timeline for service area buildout, and projected future BOD and suspended solids loadings to the plants

This technical memorandum (TM 4b) establishes flow and loading peaking factors, develops facility expansion recommendations to handle the projected flows and loadings at buildout, and presents a timeline for phasing the construction of the improvements.

TM 4b is organized as follows:

1. Introduction
2. Flows and Loadings
3. Dry Creek Expansion Recommendations
4. Pleasant Grove Expansion Recommendations
5. Construction Phasing and Estimated Costs

2 Flows and Loadings

2.1 Average Dry Weather Flows

Average dry weather flows (ADWF) for projected buildout of the SPWA service area were developed in TM 2b as follows; Dry Creek WWTP at 19.99 mgd and Pleasant Grove WWTP at 25.67 mgd. The SPWA has historically used 3 mgd increments of flow in its long-term planning efforts. That convention will also be followed for this TM. Therefore, the ADWF to be used for long-term master planning will be rounded up to the nearest 3 mgd increment, or 21 mgd for Dry Creek. Since most of the growth in the SPWA service area will be in the Pleasant Grove service area, there is the potential that the area will not produce wastewater flows to the full 25.67 mgd, therefore a buildout capacity of 24 mgd was evaluated in addition to an ultimate capacity of 27 mgd.

This TM uses the following ADWF's for evaluation of the wastewater systems.

Table 1 ADWF for System Evaluation

Plant	ADWF (mgd)
Dry Creek	21 (buildout)
Pleasant Grove	24 (buildout) 27 (ultimate)

2.2 Flow Peaking Factors

While the ADWF is usually thought of as the rated capacity of a treatment plant, the design of treatment systems must also accommodate significant variations in influent flow. A treatment plant must be designed to prevent hydraulic overloads and wash out of solids during peak day and peak hour events. It must also be able to meet discharge limits during the sustained higher flows experienced during the peak month of wet weather. This section discusses the flow peaking factors that will be used in the evaluation of both plants.

2.2.1 Peak Day and Peak Hour

As part of the modeling effort for the trunk sewers, Brown and Caldwell developed peak wet weather flow hydrographs. The hydrographs, which are discussed in more detail in TM 2c, show the estimated peak day and peak hour flows to each treatment plant at buildout. Table 2 summarizes the results of the peak wet weather modeling.

Table 2 –Estimated Peak Wet Weather Flows from Wet Weather Model

Plant	Peak Day		Peak Hour	
	Flow (mgd)	Peaking Factor (1)	Flow (mgd)	Peaking Factor (1)
Dry Creek	40.2	2.0	48.2	2.4
Pleasant Grove	37.1	1.5	46.5	1.8

(1) Peaking Factors based on the ADWF at buildout from the model, i.e. 19.99 mgd for Dry Creek and 25.67 mgd for Pleasant Grove

The peaking factors that have been historically used at Dry Creek are 2.5 for peak day and 3.0 for peak hour. The wet weather model may not fully account for continued degradation of existing sewers and I/I from new sewers as they age. Therefore, to provide a safety factor, the historical peaking factors of 2.5 and 3.0 will continue to be used for planning purposes for Dry Creek. For Pleasant Grove, lower peaking factors are appropriate since the sewers are newer. The model estimated peaking factors of 1.5 and 1.8. Adding a safety factor to the model predictions for planning purposes, the resulting peaking factors for Pleasant Grove are 2.0 for peak day and 2.5 for peak hour.

2.2.2 Peak Month

The maximum monthly flow peaking factor was determined by calculating a 30-day running average of the daily measured flows at the plant dating back to fiscal year 2000/2001and comparing the maximum monthly flow to the average dry weather flow for the same year. The maximum peak month factor for Dry Creek was 1.39 in 2003/2004. Rounding up, a peak month flow factor of 1.4 will be used in the system evaluation. The operating period of Pleasant Grove has been too short to establish a meaningful peak month factor, so the same factor of 1.4 will be used for the evaluation of Pleasant Grove.

2.3 Projected Plant Influent Flows

Table 3 summarizes the plant influent flows that will be used for sizing expansion requirements at the two plants.

Table 3 – Plant Influent Flows for System Evaluation

Plant	ADWF (mgd)	Peak Month		Peak Day		Peak Hour	
		Peaking Factor	Flow (mgd)	Peaking Factor	Flow (mgd)	Peaking Factor	Flow (mgd)
Dry Creek	21	1.4	29.4	2.5	52.5	3.0	63
Pleasant Grove (buildout)	24	1.4	33.6	2.0	48	2.5	60
Pleasant Grove (ultimate)	27	1.4	37.8	2.0	54	2.5	67.5

2.4 Estimated Loadings

TM 4a analyzed the biochemical oxygen demand (BOD) and total suspended solids (TSS) data from the past five years to determine the influent loading to each plant. The dry weather BOD and TSS concentrations determined in TM 4a were as follows:

- Dry Creek: BOD 275 mg/l and TSS 310 mg/l
- Pleasant Grove: BOD 285 mg/l and TSS 340 mg/l

The maximum monthly BOD and TSS loadings were compared to average annual loadings to determine a peaking factor for the peak month at each WWTP. Average annual loadings were calculated by averaging the daily measured loading for each fiscal year at the plant. The data used in the analysis for Dry Creek dates back to fiscal year 2000/2001. Data for Pleasant Grove is only available since the plant began operating in 2004. The plant experienced an initial phase in period between June 2004 and January 2005 during which time the flow rate was incrementally increased. Since February 2004 the plant has been treating approximately 6.6 mgd and the loading values used in this analysis are based on data collected since that time.

The maximum monthly loading was found by calculating a 30-day running average of the daily measured loadings at the plant and selecting the highest value. The peak month factor for Dry Creek ranged from 1.17 to 1.45 with an average peak month factor of 1.2 for both BOD and TSS. The peak month factor for Pleasant Grove was only 1.1. However, with such a short operating history to draw from, it is more realistic to expect that the peaking factors at Pleasant Grove over time will be similar to that of Dry Creek, i.e. a peak month factor of 1.2.

Table 4 summarizes the projected BOD and TSS loadings at the two treatment plants.

Table 4 Projected Influent Loadings

Plant	ADWF	BOD		TSS	
	(mgd)	(mg/l)	(lb/day)	(mg/l)	(lb/day)
Dry Creek	21	275	48,200	310	54,300
Maximum Month Factor		1.2		1.2	
Pleasant Grove (buildout)	24	285	57,000	340	68,100
Pleasant Grove (ultimate)	27	285	64,200	340	76,600
Maximum Month Factor		1.2		1.2	

2.5 Design Flows and Loadings

Table 5 summarizes the plant influent flows and loadings that will be used for the wastewater systems evaluation.

Table 5 Projected Influent Flows and Loadings

	Dry Creek	Pleasant Grove (buildout)	Pleasant Grove (ultimate)
Flow (mgd)			
Average Dry Weather Flow (ADWF)	21.0	24	27
Peak Month Flow (PMF)	29.4	33.6	37.8
Peak Day Wet Weather Flow (PDWWF)	52.5	48.0	54.0
Peak Hour Wet Weather Flow (PHWWF)	63.0	60.0	67.5
BOD Loading (lb/day)			
Average	48,200	57,000	64,200
Maximum Month	57,800	68,400	77,000
TSS Loading (lb/day)			
Average	54,300	68,100	76,600
Maximum Month	65,200	81,700	91,900

3 Dry Creek Expansion Recommendations

The Dry Creek WWTP liquid treatment processes include screening and grit removal, primary treatment, secondary treatment including denitrification, effluent filtration, and disinfection with gaseous chlorine (soon to be replaced with UV disinfection). A portion of the effluent passes through cooling units to keep the blended effluent within the required temperature range for discharge. The solids handling process includes gravity belt thickeners, anaerobic digesters, and belt press dewatering.

The Dry Creek plant, originally constructed in 1974, was expanded in 1991 to treat an ADWF of 18 mgd. Beginning in June of 2004 part of the flow has been diverted to the new Pleasant Grove plant, so the current ADWF to Dry Creek is only 10.5 mgd, or 58 percent of its design flow.

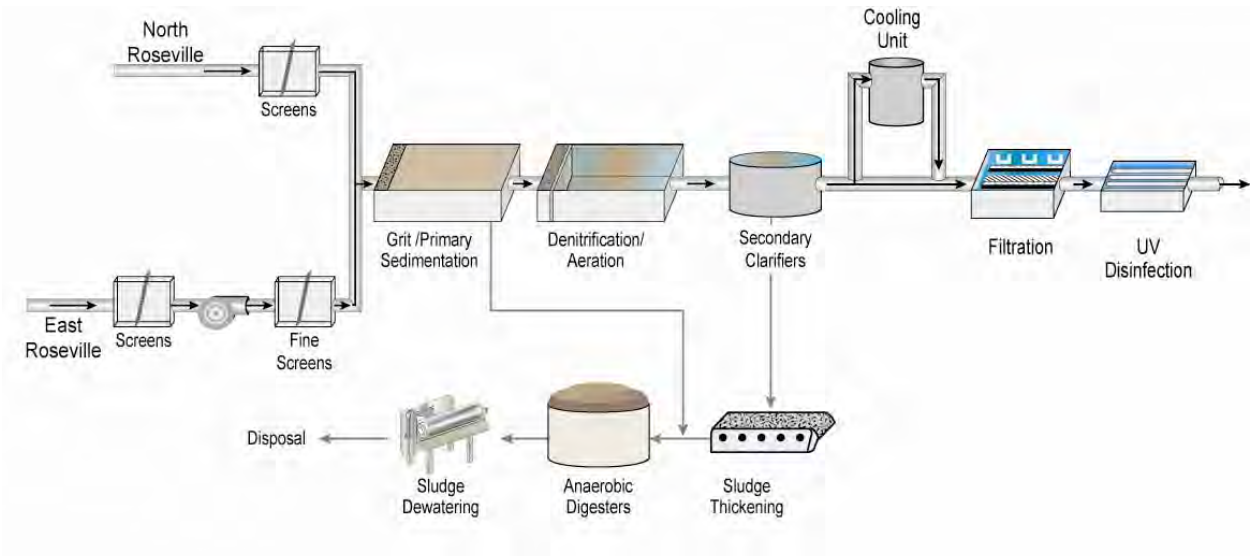
Equally as important as the hydraulic capacity of a plant is its organic treatment capacity. The 1991 expansion of the plant was based on an influent BOD concentration of 160 mg/l for an average BOD loading of 24,000 lb/day. As discussed earlier in this TM, the concentrations of influent BOD has significantly increased since 1991. Since the completion of the diversion of flow to Pleasant Grove in February 2005, the average BOD loading to the Dry Creek plant has been 21,500 lb/day, or 89 percent of its design BOD capacity.

The recommended expansion requirements are driven by four factors:

- Flow capacity to meet the anticipated ADWF of 21 mgd and peak hydraulic flow of 63 mgd.
- Organic treatment capacity to meet an anticipated BOD loading of 48,200 lb/day and a TSS loading of 54,300 lb/day
- Denitrification to meet an expected new NPDES limit of 10 mg/l-N
- Replacement of older, under-performing facilities

The proposed treatment process for the system expansion is similar to that of the existing plant, with the exception of the addition of fine screens, and is illustrated below on Figure 1.

Figure 1 Dry Creek Treatment Schematic



The recommended facilities are summarized in Table 26 – Dry Creek Design Criteria and the proposed layout for the new facilities is shown on Figure 2. Both are included at the end of this TM. The design basis for each process is discussed below.

3.1 Headworks

Wastewater enters the Dry Creek plant via the East Roseville gravity sewer and the North Roseville force main. The East Roseville flow is screened and pumped at the plant, and was sized in 1991 for an ADWF of 12 mgd. The North Roseville force main has a separate screening facility at the plant and is sized for an ADWF of 6 mgd. Most of the flow diverted to the new Pleasant Grove treatment plant came from the North Roseville force main, so the flow currently entering the plant through the force main is small.

Routing of trunk sewers for the new Urban Growth Areas has not been finalized as of this writing. For the purposes of this analysis it is assumed that up to 6 mgd of dry weather flow, including flows from Placer Vineyards and potentially West Dry Creek, will enter the plant through the North Roseville force main. The remaining 15 mgd of dry weather flow will enter through the influent pump station. This assumption should be revisited as the routing of the trunk sewers serving the new UGA's is better established.

3.1.1 Coarse Screens

The existing screening facility for the East Roseville trunk sewer includes 2 mechanically cleaned bar screens with ¾ inch openings and a manually cleaned bypass screen. There is an existing spare channel. The system expansion assumes the addition of one mechanically cleaned bar screen in the existing spare channel.

3.1.2 Influent Pump Station

The existing East Roseville influent pump station consists of 7 pumps which are divided between two pump stations. Each of the 75 HP pumps is sized for 3,000 gpm giving a firm pumping capacity with one pump out of service of 26 mgd.

The influent pump station should be designed to pump a projected PHWWF of 45 mgd, which corresponds to the ADWF of 15 mgd entering the plant through the pump station. Variable speed pumps are needed to accommodate the range of flows expected, from an existing diurnal minimum dry weather flow of about 5 mgd to a projected peak hour flow of 45 mgd. The system expansion includes a new influent pump station would contain 5 variable speed pumps, 4 duty and 1 standby. Assuming the same 60 feet of head as the existing pump station, each pump would be sized for a maximum capacity of 8,000 gpm (11.5 mgd) and a motor size of 175 HP. During dry weather flow, 1 to 3 pumps would operate to cover the diurnal variation of dry weather flows. For the peak hour flows of 45 mgd, 4 pumps would operate with the fifth pump as standby. The pumps would be housed in a new influent pump station to the west of the existing screenings facility.

3.1.3 Fine Screens

The Dry Creek plant does not currently have fine screens. The only screens are the mechanically screened bar screens with ¾ inch openings. The coarse screens allow plastics to pass through to downstream treatment processes. The plastics accumulate in the digesters and detrimentally impact the quality of the digested sludge. Addition of a fine screen process is proposed to remove the fine plastics from the treatment process. For layout and cost estimating purposes, the fine screens are assumed to be part of the new influent pump station. During predesign, consideration should also be given to locating the fine screens downstream of the influent pump station near the grit basins so that the screened

materials could be handled above grade and so that a single fine screening facility would handle flows from both the influent pump station and the North Roseville force main.

The fine screens are sized to pass the PHWWF of 45 mgd entering the plant via the pump station. For layout and cost estimating purposes this evaluation assumes the addition of three 6 mm (1/4") band screens, each with a capacity of 15 mgd. The facility would also include odor control and a screenings washer/compactor to remove organics caught by the screens.

3.2 Grit Removal

There are two existing aerated grit basins each 640 square feet and a volume of 6400 cubic feet. At the 1991 design ADWF of 18 mgd, the overflow rate is 9.8 gpm/sf and the detention time is 7.7 minutes.

Sizing of new grit removal basins would also be based on a hydraulic loading rate. However, the in-plant recycle streams, such as such as filter backwash and the filtrate from the solids thickening and dewatering processes, are returned to the main plant flow upstream of the grit basins. For Dry Creek, this adds an additional 5 to 9 percent of flow, so the effective flow to the grit basins and downstream processes is higher than the influent flow to the plant. The estimated flow rates for the recycle streams and the resulting flow rates for process sizing are shown in the following table:

Table 6 Dry Creek Flow to Processes, Including Recycle Streams

		ADWF	Peak Month	PDWWF	PHWWF
Influent Flow	mgd	21.0	29.4	52.5	63.0
Recycle Flows					
Spray water and washdown	mgd	0.2	0.3	0.3	0.3
Backwash Recycle	mgd	0.6	1.4	1.9	1.9
Dewatering Recycle	mgd	0.3	0.4	0.4	0.4
GBT Recycle	mgd	0.5	0.6	0.6	0.5
Total Recycle Flows	mgd	1.5	2.6	3.1	3.1
Percent of Influent Flow	%	7.2%	9.0%	5.9%	4.9%
Total Flow with Recycle	mgd	**22.5**	**32.0**	**55.6**	**66.1**

One additional aerated grit basin similar in size and configuration to the existing units is recommended. . Three aerated grit basins would have a total surface area of 1,920 square feet and a volume of 19,200 cubic feet. The resulting design criteria for three aerated grit basins would be as follows:

Table 7 Dry Creek Grit Basin Sizing Criteria

Grit Basin Criteria	ADWF (22.5 mgd)	Peak Day (55.6 mgd)
Overflow Rate, gpm/sf	8.2	20.2
Detention Time, minutes	9.2	3.7

Addition of a third grit basin will also require one additional grit blower, grit pump, grit classifier, and grit cyclone similar in size and configuration to the two existing units of each type.

3.3 Primary Sedimentation

There are four existing primary sedimentation basins. Each is 225 feet long, 20 feet wide, and 10 feet deep. The current design surface overflow rate is 1,000 gpd/sf (at ADWF of 18 mgd) and 2,500 gpd/sf (at PDWWF of 45 mgd).

Sizing new primary sedimentation basins would be based on a hydraulic surface loading rate using the effective flow rates, including recycle streams, shown in Table 6. The grit and sedimentation basins are constructed with one grit basin serving two primary sedimentation basins. Keeping this configuration would mean adding the primary sedimentation basins in multiples of two. The following table shows the design surface loading rates and the actual overflow rates resulting from adding two or four additional sedimentation basins.

Table 8 Dry Creek Primary Sedimentation Sizing

		ADWF	Peak Month	PDWWF	PHWWF
Flow Rate	mgd	22.50	32.00	55.60	66.10
Maximum Design Overflow Rate	gpd/sf	1,000	1,200	1,600	2,500
Total Area Required	sf	22,500	26,667	34,750	26,440
Existing Area	sf	18,000	18,000	18,000	18,000
Additional Area Required	sf	4,500	8,667	16,750	8,440
Additional Basins Needed	ea	1.0	2.0	4.0	2.0
Actual overflow rate w/ 6 basins	gpd/sf	820	1,160	2,010	2,390

Adding two new sedimentation basins would meet the design overflow rates for all conditions except for the peak day wet weather flow, although the process would be operating near its maximum recommended capacity for the peak month during wet weather. The recommendation is therefore to add two new primary sedimentation basins, but to provide space for two additional units should future operating experience at the plant indicate that a lower overflow rate during wet weather is desirable.

The two new primary sedimentation basins would require the addition of three primary sludge pumps and one primary scum pump. The new sedimentation basins and the additional grit basin would be located to the north of the existing basins.

3.4 Odor Control

The new influent pump station, fine screens, grit basin, and primary sedimentation basins would be covered for odor control. The recommended odor control system for the new processes is soil bed biofilters located near or adjacent to the new process structures.

3.5 Secondary Treatment Process

The secondary aeration configuration at Dry Creek includes denitrification basins ahead of the secondary aeration basins. There are eight existing aeration basins; four from the original plant design in 1974 and four from the 1991 expansion. There are six secondary clarifiers, four from the original plant design and two from the 1991 expansion. The aeration basins and clarifiers from the original 1974 plant are smaller, shallower, and less efficient than the corresponding basins from 1991. For all of the secondary treatment alternatives, it is assumed that the older aeration basins and clarifiers will be replaced with new units. The development of expansion alternatives therefore considers only the 1991 basins as existing.

The secondary treatment processes, including the denitrification basins, aeration basins and the secondary clarifiers, are affected by both hydraulic and the organic loading rates. Aeration basins are sized to

maintain a certain inventory (pounds) of microorganisms to provide the desired solids residence time. Sizing the secondary treatment process is a balance between the aeration basin volume versus the solids loading to the clarifiers. For example, operating the plant at a high mixed liquor concentration in the aeration basins reduces the needed volume of the aeration basins, but results in a high solids loading to the clarifiers which, in turn, must be sized larger to accommodate the solids loading. Conversely, a low mixed liquor concentration increases the required volume in the aeration basins but reduces the required clarifier area since the solids loading would be lower.

The sizing criteria discussed in the following sections is based on modification of the sizing used in the 1991 expansion to accommodate the higher influent BOD loading currently experienced, and review of the plant operation during the heavy storms of early January 2006 in which the plant influent flow was 28 to 30 mgd. During that storm, everything in the plant was on line except the old mechanical aeration basins. There was some carryover of solids from the secondary clarifiers. Effectively, the plant was pushed to the limit but was able to meet permit limits due to good work by the operators.

The design of the aeration basins for the system expansion is based on producing an effluent with a total nitrogen concentration of less than 10 mg/l-N with a mean cell residence time (MCRT) of 11 days during the summer and 13 days during the winter. The governing criteria for the aeration basin sizing is the peak month, wet weather condition with an MCRT of 13 days. For the clarifiers at Dry Creek, the peak day loading conditions were the governing conditions.

Two options for sizing the aeration basins and clarifiers were considered. The first option uses a mixed liquor suspended solids (MLSS) concentration of 2,500 mg/l in the summer and 3,000 mg/l in the winter. The second option uses a MLSS of 3,000 mg/in the summer and 3,500 mg/in the winter. The following table summarizes the process sizing for the two options. For the clarifiers, as shown in Table 9, the governing sizing criteria at the lower MLSS concentration is the hydraulic loading and, for the higher MLSS concentration, it is the solids loading rate.

Table 9 Dry Creek Secondary Treatment Sizing

		Option 1	Option 2
Aeration Basin Sizing			
Governing Condition		Peak Month	Peak Month
Total Sludge Produced	lb/day	31,800	31,800
MCRT Required	days	13	13
Required Solids for MCRT	lb	413,400	413,400
Design MLSS	mg/l	3,000	3,500
Required Basin Volume for MCRT	MG	16.5	14.2
Volume Existing Basins (1)	MG	4.2	4.2
Additional Volume Needed	MG	12.3	10.0
Additional Basins Needed	ea	12	10
Clarifier Sizing			
Governing Condition		PDWWF	PDWWF
Flow	mgd	55.60	66.10
Anticipated Total RAS Flow	mgd	36.00	40.00
MLSS	mg/l	3,000	3,500
Max Hydraulic Overflow Rate	gal/sqft-day	700	700
Maximum Solids Loading Rate	lb/sqft-day	32	32
Req'd Area for Hydraulic Loading	sqft	79,400	94,400
Req'd Area for Solids Loading	sqft	71,600	96,800
Area Existing Clarifiers (1)	sqft	24,500	24,500

		Option 1	Option 2
Additional Area Needed	sqft	54,900	72,300
Additional Clarifiers Needed	ea	5	6
(1) Volume and Area of existing aeration basins and clarifiers include only those added built duirng the 1991 Expansion. For both options it is assumed that the older aeration basins and clarifiers built in 1974 would be replaced.			

The better match between aeration basin and clarifier volume appears to be Option 2, which is designed for the higher MLSS concentration. One more clarifier is needed for this option, but it is less expensive to construct and operate than the two additional aeration basins needed for Option 1. The recommendation is therefore to add 10 additional nitrification/aeration basins for a total of 14 basins. Four of the new aeration basins would be replacements for the older basins from 1974. The remaining six aeration basins would be located north of the 1991 basins. The new basins will be similar in configuration to the 1991 basins except that the anoxic zone, which constitutes about 20 percent of the basin volume, will be physically separated from the aeration zone. This will prevent the backflow between the anoxic and aeration zones that currently diminishes the effectiveness of the anoxic zone. The cost estimate includes an allowance for retrofitting the existing anoxic basins to minimize the cross-circuiting between basins.

The peak air demand at buildout is estimated to be 35,300 scfm. Currently there are three motor driven blower and one engine driven blower, each sized at 8,775 scfm. One additional motor driven blower would be needed to meet the projected air demands with the fifth blower acting as standby. The additional blower would be located in the spare space in the existing blower building.

For the clarifiers, six additional 125 ft diameter clarifiers are needed, for a total of 8 clarifiers. The four smaller clarifiers and RAS pump station from 1974 will be replaced with two new clarifiers and a RAS pump station similar in configuration to the 1991 clarifiers. The remaining four new clarifiers and a new RAS pump station will be located north of the 1991 clarifiers.

3.6 Effluent Cooling

The Dry Creek plant has 4 effluent cooling units with space for an additional 6 units. The projected buildout flow of 21 mgd is approximately 20 percent higher than the original ADWF design of 18 mgd. Assuming the cooing unit sizing increases by the same ratio, one additional cooling unit would be needed. It would be installed in one of the spare spaces.

3.7 Effluent Filtration

There are three existing filters, each with four 347 square foot cells per filter. The total existing surface area is 4,164 sq ft, or 3,817 sq ft with one cell out of service for backwash. They were designed to maintain a filter surface loading of less than 5 gpm/sq ft (Department of Health Services (DHS) guidelines for Title 22 reuse) at 27 mgd (peak hour dry weather flow). The loading rate for the current PDWWF of 45 mgd would be 7.9 gpm/sf with one cell out of service.

The filters must meet the DHS loading criteria of 5 gpm/sf for the peak hour of the ADWF, which is assumed to have a peaking factor of 1.5 over the ADWF. For the system expansion, a more conservative design criteria is recommended. Even though it is unlikely that recycled water would be used for irrigation during the peak wet weather day and thus would not have to meet the 5 gpm/sf loading rate recommended by DHS, the effluent must still meet a turbidity limit of less than 2 ntu. Maintaining the surface loading rate closer to 5 gpm/sf during PDWWF will help the plant meet the effluent turbidity of 2 ntu during wet weather events. The following table shows the design surface loading rates and the

actual overflow rates resulting from adding two or three additional filters similar in size and configuration to the existing filters.

Table 10 Dry Creek Filter Loading Rates

		ADWF	Peak Hour of ADWF	Peak Month	PDWWF
Flow Rate	mgd	22.50	33.75	32.00	55.60
Desired Design Overflow Rate	gpm/sf	5	5	5	5
Existing Filter Area (1)	sf	3817	3817	3817	3817
Area per Additional Filter	sf	347	347	347	347
Overflow Rate with 2 new filters	gpm/sf	2.37	3.55	3.37	5.86
Overflow Rate with 4 new filters	gpm/sf	1.96	2.94	2.78	4.84
(1) With one cell out of service for backwashing					

Adding two additional filters would meet the DHW Title 22 criteria for all conditions except peak day wet weather. The recommendation is therefore to add two new filters, but to provide space for an additional unit should future operating experience at the plant indicate that a lower overflow rate during wet weather is desirable. The new filters would be located to the east of the existing filters. New waste backwash pumps and a larger backwash pipe would also be required to handle the additional flow.

3.8 Disinfection

The Dry Creek WWTP is in the process of converting from disinfection with gaseous chlorine to UV disinfection. The proposed UV system is designed for a peak day plant influent flow of 45 mgd and will have five channels, with 4 UV banks per channel. Based on a ratio of the peak day plant influent flow rates (52.5 mgd/45 mgd, or 1.17), one additional UV channel is needed to meet the future flow rates, for a total of 6 channels. The new channel would be built to the east of the five proposed UV channels. The cost estimate assumes that the initial 5 UV channels are already in place.

3.9 Solids Thickening

There are two existing, 2 meter wide gravity belt thickeners. Based on discussion with plant staff, it is assumed that the thickening process would operate 24 hours per day. As shown in the table below, a single belt thickener is adequate to meet the projected thickening requirements under both ADWF and peak month conditions. The second existing belt thickener would function as the redundant unit, or both could be put in service to shorten the thickening time below 24 hours per day. No additional thickening facilities are required.

Table 11 Dry Creek Solids Thickening Sizing

		ADWF	Peak Month
WAS Production	lb/day	27,550	31,800
WAS Production	mgd	0.46	0.49
Hours of Operation	hrs/day	24	24
WAS Flow to Thickeners	gpm	319	340
Maximum GBT Loading Rate	gpm/unit	400	400
Required Number of Thickeners	ea	1	1

3.10 Solids Stabilization

There are two existing anaerobic digesters, each 90 feet in diameter with a volume of 1.18 million gallons. Currently a single digester is used with a volatile solids loading rate of 0.13 lb VS/cf-day and a detention time of about 14.5 days. The second digester acts as a redundant unit. The future digesters were sized for the peak month solids production using two methods. The first replicates the existing loading criteria, i.e. a volatile solids loading rate of 0.13 lb VS/cf-day with a redundant digester available. The second method assumes an overall volatile solids loading rate of 0.10 lb VS/cf-day with no redundant digester. The results of the analysis are shown below.

Table 12 Dry Creek Digester Sizing

		Option 1	Option 2
Peak Month Solids Production	lb/day	72,980	72,980
Peak Month VSS Production	lb/day	57,980	57,980
VSS Design Criteria	lb VSS/cf/day	0.13	0.10
Total Volume Needed	MG	3.3	4.3
Volume per Digester	MG	1.18	1.18
Total Digesters Needed			
Duty	ea	3	4
Standby	ea	1	--
Total	ea	4	4

Both methods yield the same result; a total of 4 digesters are needed. For cost estimating and layout purposes, the two new digesters are assumed to be the same size and configuration as the existing digesters. Support equipment, including heating, mixing, and gas handling facilities would also be required.

If the City wants to move towards Class A solids production in the future, the configuration of the digesters will likely be different to accommodate the Class A technology. The predesign for the new solids handling system should evaluate in detail the potential need for Class A solids and revise the digester layout accordingly.

3.11 Solids Dewatering

There are three existing 2-meter belt presses. Due to age and condition of the existing units, the ability to obtain drier solids, and odor control, the City is evaluating replacing the belt presses with centrifuges. The centrifuges will produce a drier sludge and therefore reduce hauling costs; however the power requirement of a centrifuge is much higher than that of a belt press. With either technology the dewatering process would be limited to approximately 7 hours per day to avoid the need for additional staffing outside of the normal work shifts. If one unit is out of service, redundancy could be provided by operating for a longer period until the unit is repaired.

The following table compares belt presses versus centrifuges for dewatering at Dry Creek.

Table 13 Dry Creek Dewatering Options

		Belt Press	Centrifuge
Governing Condition		Peak Month	Peak Month
Digested Sludge Flow	gpd	243,380	243,380
Dry Solids Loading	lb/day	43,990	43,990
Hours of Operation	hr	7	7
Sludge Flow to Dewatering	gpm	580	580
Number of Units Needed	ea	5	2
Loading per Duty Unit	gpm	120	300
Installed Horsepower per unit	HP	15	400
Cake Dry Solids	%	16	20

For layout and cost estimating purposes, the centrifuge option will be included. Assuming a centrifuge capacity of 250 – 350 gpm, which is similar to the units at Pleasant Grove, two duty centrifuges would be required.

3.12 Recycled Water Pumps

One additional recycled water pump would be located in the spare space at the existing recycled water pump station. Discussion of the recycled water pumps and their associated costs are discussed in the Recycled Water technical memorandum.

4 Pleasant Grove Expansion Recommendations

The Pleasant Grove treatment plant was completed in 2004 and reached full flow in February 2005. It was designed for an ADWF of 12 mgd, an average BOD loading of 16,000 lb/day, and an average TSS loading of 22,000 lb/day. The liquid treatment process includes screen and grit removal, influent pumping, secondary treatment/denitrification in oxidation ditches, secondary clarifiers, filtration, and disinfection with sodium hypochlorite. The solids treatment process is sludge dewatering with centrifuges.

The ADWF in 2005 was 6.6 mgd. However, the concentration of influent BOD to the plant is significantly higher than the concentration used during the plant design in 2000. The current BOD loading to the plant is 15,400 lb/day, or 96 percent of its nominal design BOD loading. The current TSS loading is 18,600 lb/day, or 84 percent of the design TSS loading.

The recommended expansion requirements are driven by three factors:

- Flow capacity to meet the anticipated ADWF of 24 mgd and peak hydraulic flow of 60 mgd (and space for an ultimate ADWF of 27 mgd)
- Organic treatment capacity to meet an anticipated BOD loading of 57,000 lb/day and a TSS loading of 68,100 lb/day
- Denitrification to meet an expected new NPDES limit of 10 mg/l-N

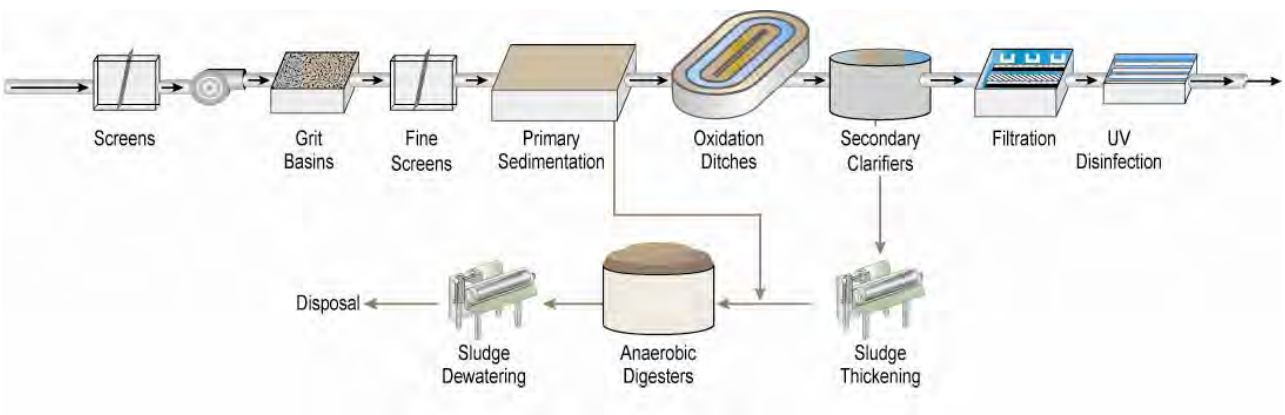
Two alternatives for expansion of the Pleasant Grove WWTP were initially evaluated. The first alternative expanded the existing treatment process train, i.e. used oxidation ditches without primary sedimentation. The second alternative adds primary sedimentation upstream of the oxidation ditches and adds solids thickening and anaerobic digesters to the solids treatment processes. After initial evaluation

of the two alternatives and review by SPWA, the second alternative, adding primary sedimentation, was recommended for the following reasons:

- The total cost of Alternative 2 was approximately 6 percent less than the cost of Alternative 1. Meeting the buildout flows and loadings with the original process train would have required a total of 10 oxidation ditches and 8 centrifuges.
- Improving the sludge processing system by adding thickening and stabilization will eliminate the need for the WAS holding tanks, produce a more stabilized sludge, reduce the volume of sludge for dewatering, and reduce the odors associated with solids handling.
- Adding primary sedimentation will reduce the organic loading on the oxidation ditches and therefore reduce the amount of power needed for the aerators in the oxidation ditches
- The anaerobic digesters will produce methane which can be used in a co-generation process to produce electricity and reduce the plant's power consumption.
- The addition of fine screens upstream of the primary sedimentation process will remove fine plastics which currently accumulate in the oxidation ditches, the sludge, and in the recycled water process.

The rest of the TM focuses on the alternative of adding primary sedimentation and expanded solids handling to the Pleasant Grove process train. The resulting treatment processes are illustrated in Figure 3.

Figure 3 Pleasant Grove Treatment Schematic



The recommended facilities are summarized in Table 27 – Pleasant Grove Design Criteria and the proposed layout for the new facilities is shown on Figure 4. Both are included at the end of this TM.

The design basis for each process is discussed below.

4.1 Preliminary Treatment

4.1.1 Coarse Screens

The existing screening facility for the East Roseville trunk sewer includes 2 mechanically cleaned bar screens with ½ inch openings. There is an existing spare channel. The system expansion assumes the addition of one mechanically cleaned bar screen, similar to the two existing, in the existing spare channel.

4.1.2 Influent Pump Station

The existing influent pump station includes 2 low-range pumps rated at 9 mgd and 2 high-range pumps rated at 21 mgd. With the largest pump out of service the firm pumping capacity is 39 mgd. There are two spare spaces for additional pumps. The required firm capacity of the influent pump station at buildout is 60 mgd (PHWWF). This would require the addition of one more high range pump. With one large pump out of service, the resulting firm pumping capacity would be 60 mgd. For an ultimate PHWWF flow of 67.5 mgd, one additional low-range pump. The firm capacity would then be 69 mgd with the largest unit out of service.

There are two existing side stream pumps, each rated at 5.1 mgd. The projected side stream flow at peak day conditions is 4.3 mgd. The existing side stream pumps are adequate for buildout and no additional side stream pumps are needed.

4.1.3 Grit Chambers

The in-plant recycle streams are returned to the main plant flow upstream of the grit basins. These flows consist predominately of filter backwash, but also include spray water, filtrate from dewatering, and the new filtrate from the solids thickening process. With the addition of the in-plant recycle flows, the effective flow to the grit basins and downstream processes is as follows:

Table 14 Pleasant Grove Flow to Processes, Including Recycle Streams

		ADWF	Peak Month	PDWWF	PHWWF
At Buildout					
Influent Flow	mgd	24.0	33.6	48.0	60.0
Recycle Flows					
Spray water and washdown	mgd	0.2	0.3	0.3	0.3
Backwash Recycle	mgd	2.4	2.4	2.4	2.4
Dewatering Recycle	mgd	0.3	0.3	0.3	0.3
Thickening Recycle	mgd	0.6	0.7	0.7	0.7
Total Recycle Flows	mgd	3.5	3.7	3.7	3.7
Percent of Influent Flow	%	14.5%	11.0%	7.7%	6.2%
Total Flow with Recycle	mgd	**27.5**	**37.3**	**51.7**	**63.7**
At Ultimate					
Influent Flow	mgd	27	37.8	54	67.5
Total Recycle Flows	mgd	4.4	4.6	4.6	4.6
Total Flow with Recycle	mgd	**31.4**	**42.4**	**58.6**	**72.1**

There are two existing aerated grit chambers, each sized for an overflow rate of 42,900 gpd/sf at PHWWF. Using a similar overflow rate, two additional grit chambers would be needed for the buildout and ultimate flow as shown below.

Table 15 Pleasant Grove Grit Basin Sizing

		Buildout	Ultimate
Design Flow (PHWWF)	mgd	63.7	72.1
Design Overflow Rate	gpd/sf	42,900	42,900
Total Area Required	sqft	1,480	1,680
Existing Area	sqft	840	840
Additional Area Required	sqft	640	840
Additional Basins Needed	ea	2	2

4.1.4 Fine Screens

The ½ inch coarse screens allow plastics to pass through to downstream treatment processes. The plastics are neutrally buoyant and are not removed through the secondary process. Addition of a fine screen process is proposed to remove plastics.

The fine screens would be sized to pass the buildout PHWWF of 67.5 mgd with provisions to expand if needed for the ultimate flow. For layout and cost estimating purposes this evaluation assumes the addition of three 6 mm (1/4") band screens, each with a capacity of 22.5 mgd, built as part of the influent/flow splitting structure for the new primary sedimentation basins. The facility would also include odor control and a screenings washer/compactor to remove organics caught by the screens. One of the key issues to be resolved during predesign is an assessment of the hydraulic profile of the plant to determine whether there is adequate head available for the fine screens.

4.2 Primary Sedimentation

The following table summarizes the design criteria and required number of basins needed for a new primary sedimentation process.

Table 16 Pleasant Grove Primary Sedimentation Sizing

		ADWF	Peak Month	PDWWF	PHWWF
Flow Rate	mgd	27.5	37.3	51.7	63.7
Maximum Design Overflow Rate	gpd/sf	1,000	1,200	1,600	2,500
Area Required	sf	27,500	31,083	32,313	25,480
Rectangular Basins					
Length	ft	230	230	230	230
Width	ft	20	20	20	20
Area per Basin	sf	4,600	4,600	4,600	4,600
Number of Basins Needed	ea	6	7	7	6
Circular Basins					
Diameter	ft	125	125	125	125
Area per Basin	sf	12,266	12,266	12,266	12,266
Number of Basins Needed	ea	3	3	3	3

Two options are shown, rectangular primary sedimentation basins similar to those at Dry Creek, and circular basins. Fewer circular basins would be required and they are usually less costly to construct.

However, the space allocated for addition of a primary sedimentation process in the existing site plan is inadequate for three circular basins. Therefore, for layout and cost estimating purposes, the primary sedimentation process will include seven rectangular primary sedimentation basins, covered for odor control, and associated sludge pumping facilities. One additional primary sedimentation basin would be needed for the ultimate flow. The project will also include a biofilter for odor control of the primary sedimentation and the fine screens.

4.3 Secondary Treatment

There are three existing oxidation ditches, each 3.2 MG in volume, and four existing 125 ft diameter clarifiers. The design of the oxidation ditches for the system expansion is based on producing an effluent with a total nitrogen concentration of less than 10 mg/l-N at a mean cell residence time (MCRT) of 11 days during the summer and 13 days during the winter. The governing criteria for the oxidation ditch sizing is the peak month, wet weather condition with an MCRT of 13 days. Sizing of the clarifiers depends on meeting both a maximum hydraulic loading rate and solids loading rate. As discussed previously with Dry Creek, the sizing of the two components of the secondary treatment process also depends on striking a balance between the oxidation ditch volume and the clarifier area.

Two options for sizing the oxidation ditches and clarifiers were considered. The first option uses a mixed liquor suspended solids (MLSS) concentration of 2,500 mg/l in the summer and 3,000 mg/l in the winter. The second option uses a MLSS of 3,000 mg/in the summer and 3,500 mg/in the winter. The following table summarizes the process sizing for the two options at buildout flows and loadings.

Table 17 Pleasant Grove Secondary Treatment Sizing

		Option 1	Option 2
Oxidation Ditch Sizing			
Governing Condition		Peak Month	Peak Month
Total Secondary Sludge Produced	lb/day	36,730	36,730
MCRT Required	days	13	13
Required Solids for MCRT	lb	477,490	477,490
Design winter time MLSS	mg/l	3,000	3,500
Required Basin Volume for MCRT	MG	19.1	16.4
Volume Existing Basins	MG	9.6	9.6
Additional Volume Needed	MG	9.5	6.8
Additional Ditches Needed	ea	3	2
Clarifier Sizing			
Flow	mgd	37.3	37.3
Anticipated Total RAS Flow	mgd	24.00	30.00
MLSS	mg/l	3,000	3,500
Max Hydraulic Overflow Rate	gal/sqft-day	400	400
Maximum Solids Loading Rate	lb/sqft-day	20	20
Req'd Area for Hydraulic Loading	sqft	93,300	93,300
Req'd Area for Solids Loading	sqft	76,700	98,200
Area Existing Clarifiers	sqft	49,100	49,100
Additional Area Needed	sqft	44,200	49,100
Additional Clarifiers Needed	ea	4	4

The peak month loadings were the governing criteria for both the oxidation ditches and the clarifiers. The clarifier sizing is set by the hydraulic loading rate in Option 1 and by the solids loading rate in Option 2. Both options require the addition of four new clarifiers.

Based on an estimated peak oxygen demand of 90,000 lb/day, approximately 2,500 HP of installed aerators would be needed. For Option 1 with 3 additional oxidation ditches, this would be 420 HP per ditch. For Option 2 with only 2 additional ditches, the installed horsepower would be 500 HP per basin would be difficult to install with the ditch configuration and would detrimentally affect the denitrification performance of the anoxic zones. The recommendation is therefore to add 3 additional oxidation ditches for a total of 6, and 4 new clarifiers, for a total of 8.

The new oxidation ditches would be built to the south of the existing ditches. The new clarifiers, along with a RAS pump station, would be built to the south of the existing clarifiers.

For an ultimate flow of 27 mgd, one additional oxidation ditch and no additional clarifiers would be required.

4.4 Effluent Filtration

There are six existing continuous backwash filters, with a filter area of 500 square feet per filter. At a maximum filter surface loading of 5 gpm/sq ft (Department of Health Services guidelines for Title 22 reuse, this corresponds to a capacity of 21.6 mgd (approximately peak hour dry weather flow). The loading rate for the current design PDWWF of 30 mgd would be 6.9 gpm/sf

The filters must meet the DHS loading criteria of 5 gpm/sf for the peak hour of the ADWF, which is assumed to have a peaking factor of 1.5 over the ADWF. For the system expansion, a more conservative design criteria is recommended. Even though it is unlikely that recycled water would be used for irrigation during the peak wet weather day and thus would not have to meet the 5 gpm/sf loading rate recommended by DHS, the effluent must still meet a turbidity limit of less than 2 ntu. Maintaining the surface loading rate closer to 5 gpm/sf during PDWWF will help the plant meet the effluent turbidity of 2 ntu during wet weather events. The following table shows the design surface loading rates and the actual overflow rates resulting from adding additional filters similar in size and configuration to the existing filters.

Table 18 Pleasant Grove Filters Sizing Criteria

		ADWF	Peak Hour of ADWF	Peak Month	PDWWF
Buildout Flow Rate	mgd	27.5	41.25	37.3	51.7
Desired Design Overflow Rate	gpm/sf	5	5	5	5
Existing Filter Area	sf	3,819	5,729	5,181	7,181
Area per Additional Filter	sf	500	500	500	500
Overflow Rate with 6 addn'l filters (1)	sf	3.18	4.77	4.32	5.98
Overflow Rate with 8 addn'l filters(1)	gpm/sf	2.73	4.09	3.70	5.13
Ultimate Flow Rate	mgd	31.4	47.0	42.4	58.6
Overflow Rate with 9 addn'l filters(1)	gpm/sf	2.9	4.4	3.9	5.4

(1) Filter area assumes all units in service since filters are continuous backwash

Adding six additional filters would meet the DHW Title 22 criteria for all conditions at buildout except for peak day wet weather. The recommendation is therefore to add six new filters, but to provide space for additional units should future operating experience at the plant indicate that a lower overflow rate during wet weather is desirable. For an ultimate flow of 27 mgd, a total of 9 additional filters would be required, or 3 more than are added for buildout conditions. The original plant layout only provided space for four additional filters, so the filter layout will require additional analysis during predesign.

4.5 Disinfection

The Pleasant Grove WWTP currently disinfects with sodium hypochlorite. During the system expansion the disinfection method would be converted to UV disinfection. The proposed UV system will have five channels, with 4 UV banks per channel, similar in configuration to the UV system currently under design for Dry Creek. It would be built in the same location as the existing chlorine contact channels.

For an ultimate flow of 27 mgd, one additional UV channel would be required.

4.6 Recycled Water Pumps

The system expansion includes two additional recycled water pumps located in the spare space at the existing recycled water pump station. Discussion of the recycled water pumps and their associated costs are discussed in the Recycled Water technical memorandum

4.7 Solids Thickening

With the addition of primary sedimentation, the solids handling process will change to include solids thickening and anaerobic digestion prior to solids dewatering. Activated sludge would be wasted to the thickening process on a continuous, 24 hour per day process. This will eliminate the need for the two existing waste activated sludge (WAS) holding tanks, which are a significant source of odor from the plant.

There are several types of thickening processes which should be evaluated in predesign. The following table shows a comparison of gravity belt thickeners versus centrifuges.

Table 19 Pleasant Grove Sludge Thickening Options

		Gravity Belt Thickener	Centrifuge
Governing Condition		Peak Month	Peak Month
WAS Production	lb/day	36,730	36,730
WAS Production	mgd	0.57	0.57
Hours of Operation	hrs/day	24	24
WAS Flow to Thickeners	gpm	396	396
Maximum Unit Loading Rate	gpm/unit	400	400
Required Number of Thickeners			1
Duty	ea	1	1
Standby	ea	1	1
Total	ea	2	2

Centrifuges are higher in cost and have significantly higher power requirements than gravity belt thickeners, but can more easily operate unattended at night and require less odor control. For cost and layout purposes, centrifuges have been used as the thickening process, but further analysis, particularly of power requirements, should be done in predesign. Two thickening centrifuges (one duty and one standby) would be housed in a new solids thickening building.

No additional thickeners would be required for an ultimate flow of 27 mgd.

4.8 Anaerobic Digesters

Anaerobic digesters would be added for stabilization of the primary sludge and thickened WAS prior to dewatering. Addition of digesters will reduce the volume of sludge going to dewatering, reduce odor problems associated with storage and dewatering of non-stabilized sludge, and produce methane which can be used in co-generation equipment to produce electricity. The following table shows the sizing criteria used for new digesters at Pleasant Grove.

Table 20 Pleasant Grove Digester Sizing

		Buildout	Ultimate
Peak Month Solids Production	lb/day	86,640	97,465
Peak Month VSS Production	lb/day	69,220	77,864
VSS Design Criteria	lb VSS/cf/day	0.10	0.11
Total Volume Needed	MG	5.2	5.3
Digesters			
Diameter	ft	90	90
Side Water Depth	ft	28	28
Total Volume, each	MG	1.3	1.3
Total Digesters Needed		4	4
Detention Time	days	18.3	16.3

Four anaerobic digesters, each 90 ft in diameter and 28 ft deep, would be added. By operating at a slightly higher volatile solids loading rate, the same digesters would be sufficient for the ultimate loads. The digesters would be 90 ft diameter digesters for a total volume of 4.76 million gallons. A new digester control building would house support equipment including heating and mixing equipment for the digesters.

4.9 Solids Dewatering

There are three existing centrifuges for sludge dewatering. (the third centrifuge is currently in construction) For the buildout flow of 24 mgd, one additional centrifuge would be installed in a spare space in the existing solids handling building for a total of four (three duty and one standby). Assuming an operating period of 6 hours per day for dewatering, the loading per centrifuge would be 230 gpm.

No additional centrifuges would be needed for an ultimate ADWF flow of 27 mgd.

Table 21 Pleasant Grove Dewatering Criteria

		Buildout	Ultimate
Governing Condition		Peak Month	Peak Month
Digested Sludge Flow	gpd	290,500	326,800
Dry Solids Loading	lb/day	52,030	58,530
Hours of Operation	hr	7	7
Sludge Flow to Dewatering	gpm	690	780
Loading per Duty Unit	gpm	230	260
Number of Units Needed			
Duty	ea	3	3
Standby	ea	1	1
Total	ea	4	4
Installed Horsepower per unit	HP	400	400
Cake Dry Solids	%	20	20

4.10 Co-Generation Facilities

The options for using digester gas are cogeneration, hot water boilers or waste gas flaring. Cogeneration, also referred to as combined heat and power (CHP), uses the digester gas for generation of both power and heat and should be integrated into the new anaerobic digester system. The cogeneration system will be integrated into the digestion process by running on digester gas produced from the anaerobic digesters and producing heat for the digestion process.

The following table summarizes the three primary types of co-generation currently in use at wastewater treatment plants.

Table 22 Cogeneration Technology Comparison

	Internal Combustion Engine	Microturbine	Fuel Cell
Advantages	• High power efficiency • Can be overhauled on-site • Operates on low-pressure gas	• Fewer moving parts • Compact size • Low emission • No cooling required	• Can be installed outdoors • No combustion • Very low emission • Low noise
Disadvantages	• High maintenance costs • Requires cooling system • High levels of low frequency noise • Must be installed in a building for noise control	• High capital cost • Lower mechanical efficiency • Lower electrical efficiency • Major overhaul or replacement after 10 years	• Highest capital cost • Emerging technology without an extensive installation history • Major overhaul after 3-5 years
Installation	Indoors	Outdoors	Outdoors
Air Emissions	Relatively high	Low emissions	Very low emissions
Electrical Efficiency	22-40%	18-27%	43%

A significant amount of electricity could be generated from a co-generation facility at Pleasant Grove. The following table summarizes the estimated electrical power production based on average day loadings to the plant.

Table 23 Pleasant Grove Potential Co-generation Power Output

Item	Unit	Value
Volatile Solids, average	lb/day	59,030
Volatile Solids Destruction	%	50%
Digester Gas Generation	cu ft/lb VSS destroyed	15
Digester Gas Energy Content	BTU/cf	550
Total Energy Content	BTU/day	243,498,750
Total Energy Content	BTU/hr	10,145,781
Avg. Co-gen Electrical Efficiency	%	34%
Electrical Output	kw	1,010
Electrical Output	hp	1,350

The predesign should select the co-generation equipment based on capital cost, emissions requirements, available subsidies, and the cost of power. For cost estimating and layout purposes, two 500-kW lean burn internal combustion engines are assumed.

4.11 Standby Generators

For budgeting purposes, it is assumed that one additional standby power generator would be installed in the space allocated adjacent to Electrical Building No. 1.

5 Construction Phasing and Estimated Costs

The system expansion at each plant would be done in phases. For each plant, the first priority would be to add organic capacity since the current BOD loading is higher than anticipated during design of the plants. Increased organic treatment capacity is also needed in anticipation of changes in the NPDES permits to add a nitrate limit. Subsequent phases of construction would add both hydraulic and organic capacity to meet the projected needs at buildout. Phasing the construction will allow SPWA to evaluate the actual versus projected rate of growth in the service area and adjust the timing of expansions accordingly.

Construction costs are based on a December 2005 ENR of 8462 and include the following allowances:

- Sitework 10%
- Electrical and Controls 15%
- Contingency 30%
- Engineering and administration 25%

The construction costs are an order of magnitude estimate as defined by the American Association of Cost Engineers. The estimate is based on scale-up or down factors and is normally expected to be accurate within plus 50 percent or minus 30 percent.

The buildout timelines for both plants were developed and presented in the TM titled Wastewater Treatment Plant Projected Loadings and Buildout TM 4a. The timelines presented here have been modified to more realistically reflect future growth. This was accomplished by 1) staggering the start

date of the UGAs to more accurately reflect the level of effort associated with approval of a UGA by local land use authorities and 2) extending the buildout dates to fiscal year 2030-31 to more accurately reflect historical absorption rates in the region.

The changes that were made to the timeline presented in TM 4a at the Dry Creek Wastewater Treatment Plant include:

1. Modifying the buildout date for the 2005 Roseville Service Area from 2020 to 2015
2. Extending the estimated buildout date for Placer Vineyards to fiscal year 2030

The changes that were made to the timeline presented in TM 4a at the Pleasant Grove WWTP include:

1. Extending the buildout date for Placer Ranch to fiscal year 2030
2. Pushing the start date for Curry Creek to fiscal year 2014 and extending the buildout date to fiscal year 2034
3. Pushing back the start date for Creekview and Sierra Vista to fiscal year 2010
4. Extending the buildout date for Creekview, Sierra Vista, Regional University, and Orchard Creek to fiscal year 2030

5.1 Dry Creek Expansion

Figure 5 shows the projected timeline for buildout for construction phasing of the Dry Creek plant. The y-axis shows the influent flows and the corresponding BOD loading. The expansion of the Dry Creek plant is proposed to occur in two phases. The first priority at Dry Creek is to add organic treatment capacity in response to the increased BOD concentrations in the influent. The Phase 1 construction would increase the BOD capacity from the current 24,000 lb/day up to 34,500 lb/day, which corresponds to an influent flow of 15 mgd, and would be on line in FY 2010/11. Phase 1 would include a new influent pump station, fine screens, new aeration basins and clarifiers north of the existing aeration basins, an additional digester, and new centrifuges for dewatering. The second phase of construction would be completed in FY 2016/17 and would increase the plant capacity up to the buildout flow estimate of 21 mgd. The second phase of construction would include new grit and primary sedimentation basins, the replacement of the older aeration basins and clarifiers, and expansion of other facilities for the increased hydraulic load.

Figure 5 Dry Creek Construction Phasing

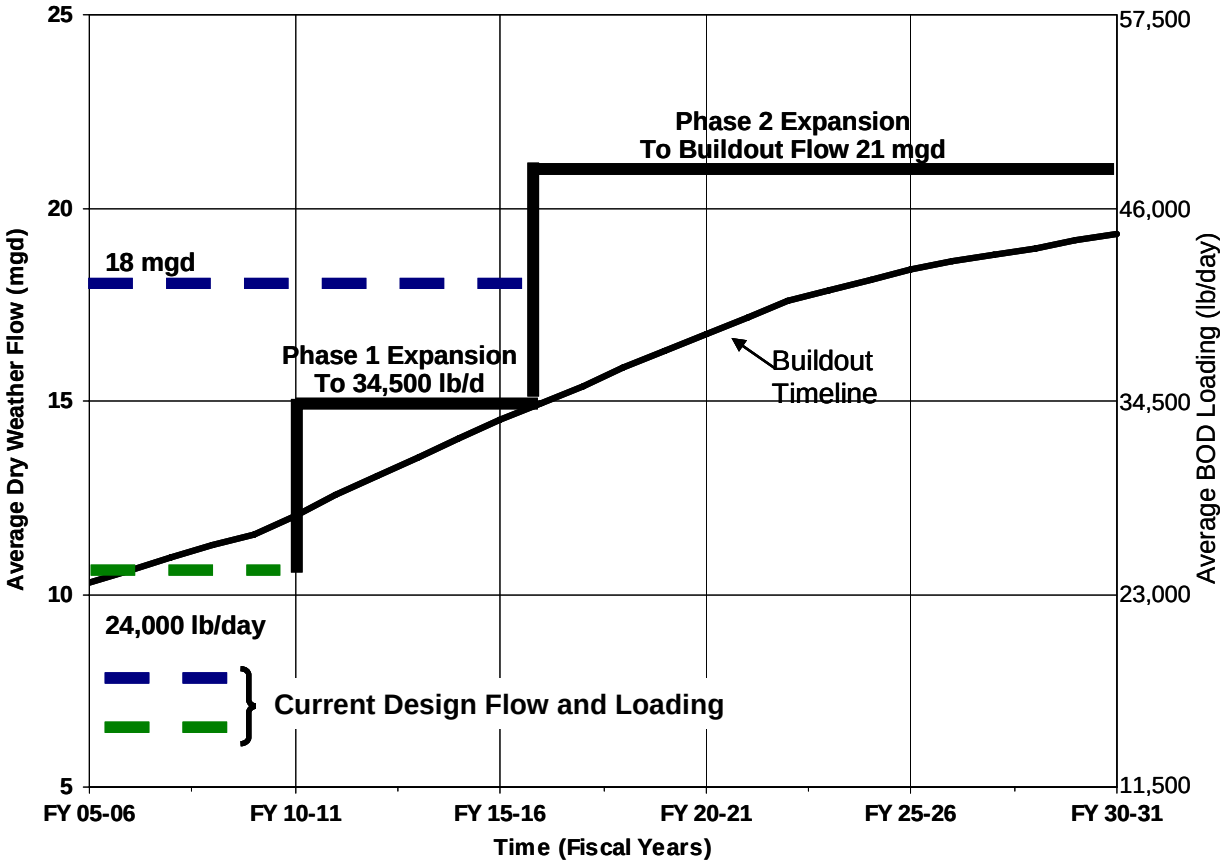


Table 24 summarizes the facilities and costs associated with each construction phase. A more detailed estimate is included in the Attachments.

Table 24 Dry Creek Construction Phasing and Estimated Costs

Construction Phase	Phase 1 Construction				Phase 2 Construction			
Year on-line	FY 2010/11				FY 2016/17			
ADWF Capacity	15 mgd				21 mgd			
Process	Number	Construction Cost	Eng & Admin	Total Cost	Number	Construction Cost	Eng & Admin	Total Cost
Influent Screens	1	$80,000	$20,000	$100,000				
Influent Pumps	4	$1,938,000	$430,000	$2,368,000	1	$342,000	$143,000	$485,000
Fine Screens	2	$500,000	$110,000	$610,000	1	$89,000	$37,000	$126,000
Odor Control	1	$120,000	$30,000	$150,000	1	$120,000	$30,000	$150,000
Grit Basins					1	$330,000	$83,000	$413,000
Primary Sedimentation					2	$4,890,000	$1,223,000	$6,113,000
Aeration Basins	6	$17,610,000	$4,400,000	$22,010,000	4	$11,740,000	$2,940,000	$14,680,000
Blower	1	$330,000	$83,000	$413,000				
Rehab Exst Anoxic Zones	1	$330,000	$83,000	$413,000				
Secondary Clarifiers	4	$11,740,000	$2,940,000	$14,680,000	2	$5,870,000	$1,470,000	$7,340,000
RAS/WAS Pump Station	1	$980,000	$245,000	$1,225,000	1	$980,000	$245,000	$1,225,000
Tertiary Filtration					2	$1,660,000	$415,000	$2,075,000
Waste Backwash Pumps					1	$110,000	$28,000	$138,000
UV Disinfection					1	$2,330,000	$583,000	$2,913,000
Anaerobic Digesters	1	$2,940,000	$730,000	$3,670,000	1	$2,940,000	$730,000	$3,670,000
Dewatering Centrifuges	2	$1,470,000	$368,000	$1,838,000				
Cooling Units					2	$650,000	$163,000	$813,000
Totals		**$38,000,000**	**$9,400,000**	**$47,400,000**		**$32,100,000**	**$8,100,000**	**$40,200,000**

5.2 Pleasant Grove Expansion

Figure 6 shows the projected timeline for buildout for construction phasing of the Pleasant Grove plant The y-axis shows the influent flows and the corresponding BOD loading. The expansion of the Pleasant Grove plant is proposed to occur in two phases. The first priority at Pleasant Grove is to add organic treatment capacity by constructing primary sedimentation, expand the aeration capacity, and add solids thickening and stabilization. The Phase 1 construction would increase the BOD capacity from the current 16,000 lb/day up to 36,000 lb/day and expand the hydraulic capacity to 15 mgd. The Phase 1 construction should take place quickly since the plant is already near its organic treatment capacity. It is expected that predesign, environmental permitting, final design, and construction will take approximately 4 years. The Phase 1 construction could therefore be on line in FY 2010/11. The second phase of construction would be completed in FY 2016/17 and would increase the plant capacity up to the buildout flow estimate of 24 mgd. The second phase of construction would include expansion of all of the processes to meet the buildout flows and loadings.

Figure 6 Pleasant Grove Construction Phasing

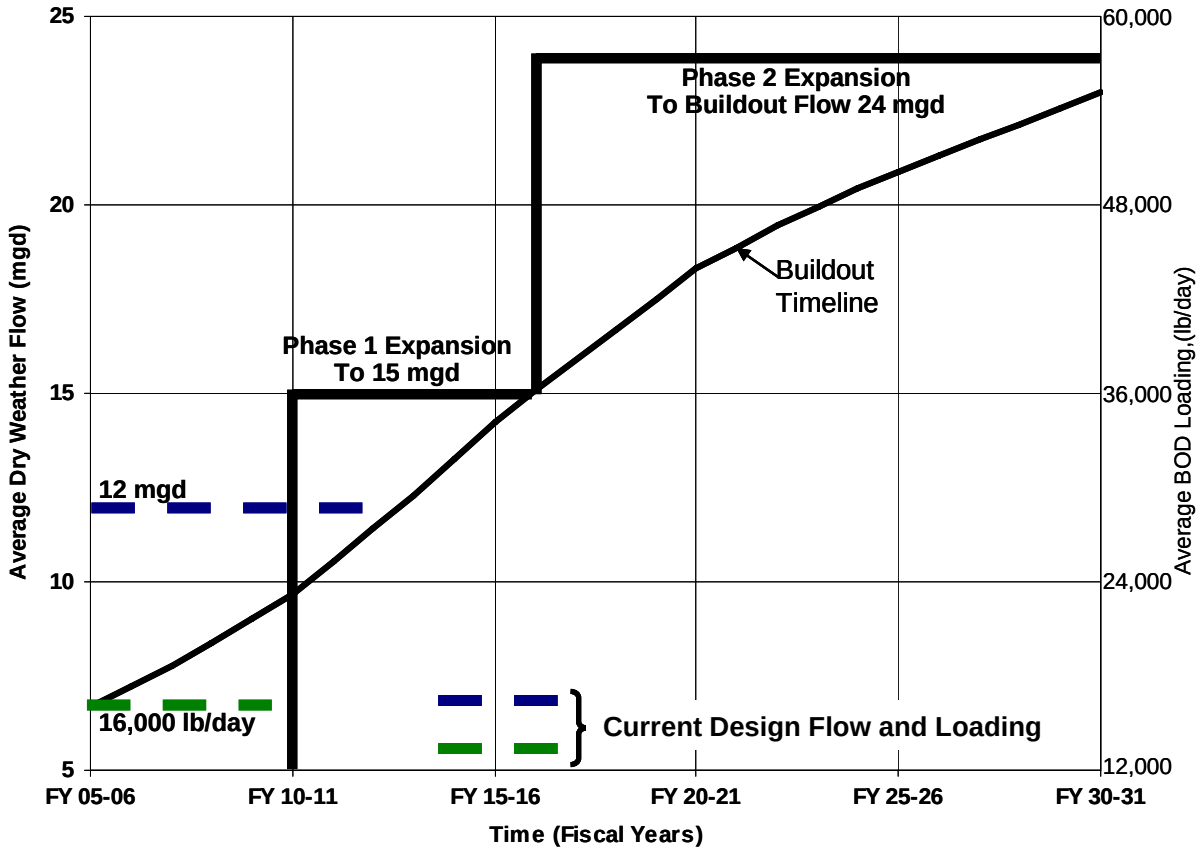


Table 25 summarizes the facilities and costs associated with each construction phase. A more detailed estimate is included in the Attachments.

Table 25 Pleasant Grove Construction Phasing and Estimated Costs

Construction Phase Year on-line ADWF Capacity	Phase 1 Construction FY 2010/11 15 mgd				Phase 2 Construction FY 2016/17 24 mgd			
Process	**Number**	**Construction Cost**	**Engineering & Admin**	**Total Cost**	**Number**	**Construction Cost**	**Engineering & Admin**	**Total Cost**
Influent Screens					1	$80,000	$20,000	$100,000
Influent Pumps	1	$140,000	$35,000	$175,000				
Grit Basins	1	$325,000	$82,000	$407,000	1	$325,000	$82,000	$407,000
Fine Screens	2	$443,000	$111,000	$554,000	1	$148,000	$37,000	$185,000
Primary Sedimentation	4	$9,783,000	$2,446,000	$12,229,000	3	$7,337,000	$1,834,000	$9,171,000
Odor Control	1	$120,000	$30,000	$150,000	1	$120,000	$30,000	$150,000
Oxidation Ditches	1	$8,070,000	$2,018,000	$10,088,000	2	$16,140,000	$4,035,000	$20,175,000
Secondary Clarifiers	1	$2,935,000	$734,000	$3,669,000	3	$8,805,000	$2,201,000	$11,006,000
RAS/WAS Pump Station	1	$490,000	$123,000	$613,000	modify	$490,000	$123,000	$613,000
Tertiary Filtration	2	$1,660,000	$420,000	$2,080,000	4	$3,330,000	$830,000	$4,160,000
UV Disinfection	3	$6,984,000	$1,746,000	$8,730,000	2	$4,656,000	$1,164,000	$5,820,000
Centrifuge Thickeners	2	$1,470,000	$368,000	$1,838,000				
Building	1	$1,710,000	$428,000	$2,138,000				
Anaerobic Digesters	3	$8,805,000	$2,201,000	$11,006,000	1	$2,935,000	$734,000	$3,669,000
Building	1	$1,283,000	$321,000	$1,604,000	modify	$428,000	$107,000	$535,000
Centrifuge Dewatering					1	$730,000	$183,000	$913,000
Co-generation	1	$2,445,000	$612,000	$3,057,000	1	$2,445,000	$612,000	$3,057,000
Standby Generator					1	$440,000	$110,000	$550,000
Total		**$46,700,000**	**$11,700,000**	**$58,300,000**		**$48,300,000**	**$12,100,000**	**$60,400,000**

Table 26 Dry Creek Design Criteria for Buildout Flows and Loadings

Process	Units	Existing	Buildout
Influent Loadings			
Average Dry Weather Flow (ADWF)	mgd	18	21
Diurnal Peak Hour Flow	mgd	27	31.5
Peak Day Wet Weather Flow (PDWWF)	mgd	45	52.5
Peak Hour Wet Weather Flow	mgd	54	63
Average BOD Concentration	mg/l	160	275
Average BOD Load	lb/day	24,000	48,100
Peak Month BOD Peaking Factor	--		1.2
Average TSS Concentration	mg/l	240	310
Average TSS Load	lb/day	36,000	54,300
Peak Month TSS Peaking Factor	--		1.2
Average NH_3-N Concentration	mg/l		28
Average NH_3-N Load	lb/day		4,900
Screening			
Climber Screens	ea	2	3
Channel Velocity at PHWWF	fps	1.6	1.9
Bypass Manual Screen	ea	1	1
Influent Pump Station (excludes North Roseville force main)			
Number	ea	7	5
Capacity, ea	gpm	3000	8000
Horsepower	HP	75	175
Fine Screens			
Band Screens, Size	in		1/4
Number	ea	--	3
Capacity, ea	mgd		15
Grit Removal			
Type		Aerated	Aerated
Number of Basins	ea	2	3
Detention time at ADWF	min	7.8	9.2
Primary Sedimentation			
Number of Basins	ea	4	6
Size			
Length	ft	225	225
Width	ft	20	20
Side Water Depth (SWD)	ft	10	10
Overflow Rate at			
ADWF	gpd/sf	1,000	820
PDWWF	gpd/sf	2,500	2,030
Odor Control			
Type		Biofilter	

Process	Units	Existing	Buildout
Denitrification and Aeration Basins			
Number of Basins	ea	8 (Note [a])	14
Size of New Basins			
Anoxic Basins			
Length	ft		60
Width	ft		45
Side Water Depth (SWD)	ft		15
Aeration Basins			
Length	ft		150
Width	ft		45
Side Water Depth (SWD)	ft		15
Target MCRT at ADWF	days		11
Design MLSS at ADWF	mg/l		3,000
Peak Air Demand	scfm		35,300
Number of Blowers	ea	4	5
Secondary Clarifiers			
Number of Clarifiers	ea	6 (Note [b])	8
Diameter	ft		125
SWD	ft		16
Overflow Rate at			
ADWF	gpd/sf		230
PDWWF	gpd/sf		570
Total RAS Flow at ADWF	mgd		14
Total WAS Produced at ADWF	lb/day		27,500
Number of RAS Pump Stations	ea	2	3
Cooling Units			
Number	ea	4	6
Filtration			
Number of Filters	ea	3	5
Cells per Filter	ea	4	4
Area per Cell	sf	347	347
Total Filter Area	sf	4,164	6,940
Filter Loading (one cell out of service)	gpm/sf		
ADWF		3.2	2.4
PDWWF		7.9	5.9
Waste Backwash Pumps	ea	2	3
Disinfection			
Type		Ultraviolet Disinfection	
Design Dose	mj/cm sq	100	100
Number of Channels	ea	5	6
Number of UV Banks per channel	ea	4	4
Recycled Water Pumps			
Number	ea	3	4

Process	Units	Existing	Buildout
Sludge Thickening			
Type		Gravity Belt Thickeners	
Number of Units, Duty/Standby	ea	1/1	1/1
Size	meters		2
Hours of Operation	hrs		24
WAS Production at ADWF	mgd		0.46
Hydraulic Loading	gpm/meter		160
Thickened Sludge Concentration	%		5
Sludge Digestion			
Type		Anaerobic Digesters	
Number of Digesters	ea	2	4
Diameter	ft	90	90
SWD	ft	25	25
Total Volume	MG	2.4	4.8
Volatile Solids Loading Rate	lb/cf/dy	0.083	0.10
Detention @ ADWF	days	24	23
Sludge Control Buildings	ea	1	2
Sludge Dewatering			
Type		Centrifuges	
Number of Units	ea	N/A	2
Size	gpm		250-350
Hours of Operation	hrs		7
Digested Sludge Production at ADWF	gpd		205,000
Loading per centrifuge	gpm		245
Cake Dry Solids	%		20

Notes

[a] The four oldest aeration basins will be replaced with four new basins matching the size and configuration of the new basins

[b] The four oldest clarifiers will be replaced with two new 125 ft diameter clarifiers and a new RAS pump station

Table 27 Pleasant Grove Design Criteria for Expansion

Process	Units	Existing	Buildout	Ultimate
Influent Loadings				
Average Dry Weather Flow (ADWF)	mgd	12	24	27
Diurnal Peak Hour Flow	mgd	18	36	40.5
Peak Day Wet Weather Flow (PDWWF)	mgd	30	48	54
Peak Hour Wet Weather Flow (PHWWF)	mgd	36	60	67.5
Average BOD Concentration	mg/l	160	285	285
Average BOD Load	lb/day	16,000	57,000	64,000
Peak Month BOD Peaking Factor	--		1.2	1.2
Average TSS Concentration	mg/l	220	340	340
Average TSS Load	lb/day	22,000	68,000	77,000
Peak Month TSS Peaking Factor	--		1.2	1.2
Average NH_3-N Concentration	mg/l		28	28
Average NH_3-N Load	lb/day		5,600	6,300
Preliminary Treatment				
Screens	ea	2	3	3
Channel Velocity at PHWWF	fps	0.86	0.95	1.1
Raw Sewage Pumps	ea	4	5	6
Low Range, 9 mgd	ea	2	2	3
High Range, 21 mgd	ea	2	3	3
Aerated Grit Chambers	ea	2	4	4
Width	ft	14	14	14
Length	ft	30	30	30
Overflow Rate at ADWF	gpd/sf	14,300	14,300	16,100
Fine Screens				
Type		N/A	Band Screens	
Size			1/4	1/4
Number			3	4
Primary Sedimentation				
Number of Basins	ea	N/A	7	8
Size of New Basins				
Length	ft		225	225
Width	ft		20	20
Side Water Depth (SWD)	ft		10	10
Overflow Rate at				
ADWF	gpd/sf		870	850
PDWWF	gpd/sf		1,620	1,590
Odor Control				
Type			Biofilter	
Secondary Treatment				
Type			Oxidation Ditches	
Number	ea	3	6	7
Volume, each	MG	3.2	3.2	3.2
Target MCRT @ ADWF	days		11	11
Design MLSS at ADWF	mg/l		3,000	3,000

Process	Units	Existing	Buildout	Ultimate
Secondary Clarifiers				
Number of Clarifiers	ea	4	8	8
Diameter	ft	125	125	125
SWD	ft	14	14	14
Overflow Rate at				
ADWF	gpd/sf	326	290	320
PDWWF	gpd/sf	610	530	600
Total RAS Flow at ADWF	mgd		16	16
Total WAS Produced at ADWF	b/day		32,000	36,000
Number of RAS Pump Stations	ea	1	2	2
Filtration				
Number of Filters	ea	6	12	15
Cells per Filter	ea	10	10	10
Area per Cell	sf	50	50	50
Total Filter Area	sf	3,000	6,000	7,500
Filter Loading (all cells in service)				
ADWF	gpm/sf	3.3	3.3	2.9
PDWWF	gpm/sf	7.7	6.0	5.4
Disinfection				
Type		Chlorine	Ultraviolet Disinfection	
Design Dose	mj/cm sq	N/A	100	100
Number of Channels	ea		5	6
Number of UV Banks per channel	ea		4	4
Recycled Water Pumps				
Number	ea	2	4	4
Sludge Holding Tanks				
Number of Units	ea	2	N/A	N/A
Volume	MG	0.34		
Detention Time	days	2		
Sludge Thickening				
Type		N/A	Centrifuges	
Number of Units, Duty/Standby	ea		1/1	1/1
Size	gpm		350-450	350-450
Hours of Operation	hrs		24	24
WAS Production at ADWF	mgd		0.52	0.54
Loading per centrifuge at ADWF	gpm		360	375
Thickened Sludge Concentration	%		5	5

Process	Units	Existing	Buildout	Ultimate
Sludge Digestion				
Type		N/A	Anaerobic Digesters	
Number of Digesters	ea		4	4
Diameter	ft		90	90
SWD	ft		28	28
Total Volume	MG		5.2	5.2
Volatile Solids Loading Rate	b/cf/dy		0.10	0.11
Detention @ ADWF	days		22	19
Sludge Control Buildings	ea		1	1
Sludge Dewatering				
Type			Centrifuges	
Number of Units, Duty/Standby	ea	2/1	3/1	3/1
Size	gpm		250-350	250-350
Hours of Operation	hrs		7	7
Digested Sludge Production at ADWF	gpd		245,500	276,200
Loading per centrifuge at ADWF	gpm		195	220
Cake Dry Solids	%		20	20
Co-Generation				
Type			TBD	
Size	kW		1000	1000
Standby Generators				
Number		2	3	3

ATTACHMENT A
COST ESTIMATES

Dry Creek Cost Estimate

Process	Quantity	Unit Price	ENR	Current ENR	Adjust Unit Cost	Total Process Cost	Sitework,Electrical & I&C @ 25%	Conting @ 30%	Total Construction Cost	E&A @ 25%	Total Cost
Coarse Screens	1	$50,000	8435	8462	$50,160	$50,000	$63,000	$19,000	$80,000	$20,000	$100,000
Influent Pump Station	1	$1,400,000	8435	8462	$1,404,481	$1,404,000	$1,755,000	$527,000	$2,280,000	$570,000	$2,850,000
Fine Screens	3	$120,000	8462	8462	$120,000	$360,000	$450,000	$135,000	$590,000	$148,000	$738,000
Odor Control	1	$150,000	8462	8462	$150,000	$150,000	$188,000	$56,000	$240,000	$60,000	$300,000
Grit Basins	1	$200,000	8435	8462	$200,640	$201,000	$251,000	$75,000	$330,000	$83,000	$413,000
Primary Sedimentation	2	$1,500,000	8435	8462	$1,504,801	$3,010,000	$3,763,000	$1,129,000	$4,890,000	$1,223,000	$6,113,000
Aeration Basins	10	$1,800,000	8435	8462	$1,805,762	$18,058,000	$22,573,000	$6,772,000	$29,350,000	$7,338,000	$36,688,000
Blower	1	$200,000	8435	8462	$200,640	$201,000	$251,000	$75,000	$330,000	$83,000	$413,000
Rehab Exst Anoxic Zones	1	$200,000	8462	8462	$200,000	$200,000	$250,000	$75,000	$330,000	$83,000	$413,000
Secondary Clarifiers	6	$1,800,000	8435	8462	$1,805,762	$10,835,000	$13,544,000	$4,063,000	$17,610,000	$4,403,000	$22,013,000
RAS/WAS Pump Station	2	$600,000	8435	8462	$601,921	$1,204,000	$1,505,000	$452,000	$1,960,000	$490,000	$2,450,000
Tertiary Filtration	2	$500,000	8271	8462	$511,546	$1,023,000	$1,279,000	$384,000	$1,660,000	$415,000	$2,075,000
Waste Backwash Pumps	1	$70,000	8462	8462	$70,000	$70,000	$88,000	$26,000	$110,000	$28,000	$138,000
UV Disinfection	1	$1,400,000	8271	8462	$1,432,330	$1,432,000	$1,790,000	$537,000	$2,330,000	$583,000	$2,913,000
Anaerobic Digesters	2	$1,800,000	8435	8462	$1,805,762	$3,612,000	$4,515,000	$1,355,000	$5,870,000	$1,468,000	$7,338,000
Centrifuges	2	$450,000	8435	8462	$451,440	$903,000	$1,129,000	$339,000	$1,470,000	$368,000	$1,838,000
Cooling Units	2	$200,000	8462	8462	$200,000	$400,000	$500,000	$150,000	$650,000	$163,000	$813,000
Total									**$70,000,000**	**$17,506,000**	**$87,506,000**

Pleasant Grove Cost Estimate

Process	Quantity	Unit Price	ENR	Current ENR	Adjust Unit Cost	Total Process Cost	Sitework,Electrical & I&C @ 25%	Conting @ 30%	Total Construction Cost	E&A @ 25%	Total Cost
Influent Screens	1	$50,000	8435	8462	$50,160	$50,000	$63,000	$19,000	$80,000	$20,000	$100,000
Influent Pumps	1	$85,000	8435	8462	$85,272	$85,000	$106,000	$32,000	$140,000	$35,000	$175,000
Grit Basins	2	$200,000	8462	8462	$200,000	$400,000	$500,000	$150,000	$650,000	$163,000	$813,000
Fine Screens	3	$120,000	8462	8462	$120,000	$360,000	$450,000	$135,000	$590,000	$148,000	$738,000
Primary Sedimentation	7	$1,500,000	8435	8462	$1,504,801	$10,534,000	$13,168,000	$3,950,000	$17,120,000	$4,280,000	$21,400,000
Odor Control	1	$150,000	8435	8462	$150,480	$150,000	$188,000	$56,000	$240,000	$60,000	$300,000
Oxidation Ditches	3	$4,600,000	7840	8462	$4,964,949	$14,895,000	$18,619,000	$5,586,000	$24,210,000	$6,053,000	$30,263,000
Secondary Clarifiers	4	$1,800,000	8435	8462	$1,805,762	$7,223,000	$9,029,000	$2,709,000	$11,740,000	$2,935,000	$14,675,000
RAS/WAS Pump Station	1	$600,000	8435	8462	$601,921	$602,000	$753,000	$226,000	$980,000	$245,000	$1,225,000
Tertiary Filtration	6	$500,000	8271	8462	$511,546	$3,069,000	$3,836,000	$1,151,000	$4,990,000	$1,248,000	$6,238,000
UV Disinfection	5	$1,400,000	8271	8462	$1,432,330	$7,162,000	$8,953,000	$2,686,000	$11,640,000	$2,910,000	$14,550,000
Centrifuge Thickeners	2	$450,000	8435	8462	$451,440	$903,000	$1,129,000	$339,000	$1,470,000	$368,000	$1,838,000
Building	3500	$300	8462	8462	$300	$1,050,000	$1,313,000	$394,000	$1,710,000	$428,000	$2,138,000
Anaerobic Digesters	4	$1,800,000	8435	8462	$1,805,762	$7,223,000	$9,029,000	$2,709,000	$11,740,000	$2,935,000	$14,675,000
Building	3500	$300	8462	8462	$300	$1,050,000	$1,313,000	$394,000	$1,710,000	$428,000	$2,138,000
Centrifuge Dewatering	1	$450,000	8435	8462	$451,440	$451,000	$564,000	$169,000	$730,000	$183,000	$913,000
Co-gen units	1000	$3,000	8435	8462	$3,010	$3,010,000	$3,763,000	$1,129,000	$4,890,000	$1,223,000	$6,113,000
Standby Generator	1	$270,000	8462	8462	$270,000	$270,000	$338,000	$101,000	$440,000	$110,000	$550,000
Total									**$94,990,000**	**$23,752,000**	**$118,742,000**

Attachment B

October 2006 TM Update Sheet

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject: **Update for TM 4b**

Prepared For: Art O'Brien, City of Roseville

Prepared by: Andy Smith, RMC

Reviewed by: Dave Richardson, RMC

Date: October 31, 2006

Reference: 0091-04

1 Summary of Update for TM 4b

Since the completion of TM 4b on March 28, 2006, changes in the scope of the South Placer Wastewater and Recycled Water Systems Evaluation, as well as changes in the data available, have resulted in the need to identify out-of-date information, to summarize the updated information, and provide justification as to the need for the update. **Table 1** presents a summary of the updates for TM 4b.

Table 1: Summary of Update for TM 4b

Page	Location	Summary of Outdated Information	Summary of Updated Information	Reason for Update
2	Table 2	Brookfield/intensification not reflected in flow projections/peaking factors	Refer to TM 9d for Brookfield/intensification impacts	Intensification and Brookfield
24	Figure 5	Intensification not reflected in timeline	Refer to TM 9d for Brookfield/intensification impacts	Intensification in DC sewershed
26	Figure 6	Brookfield not reflected in timeline	Refer to TM 9d for Brookfield/intensification impacts	Brookfield added as a UGA

Attachment C

Update Sheet 2 - February 2009 Updates

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**Update 2 for TM 4b**
Prepared For:	Art O'Brien, City of Roseville
Prepared by:	Chris van Lienden, RMC
Reviewed by:	Marilyn Bailey and Dave Richardson, RMC
Date:	February 25, 2009
Reference:	0091-04

1 Summary of Update 2 for TM 4b

Since the completion of TM 4b on March 28, 2006 and subsequent update on October 31, 2006, CH2MHill has developed the Dry Creek Wastewater Treatment Plant (WWTP) Initial Assessment (CH2MHill 2008). This document makes new recommendations for improvements to the Dry Creek WWTP to meet predicted regulatory and capacity requirements, superseding that information contained in TM 4a. Information in TM 4b pertaining to the Dry Creek WWTP should therefore be disregarded. Information pertaining to Pleasant Grove WWTP remains valid. The results and recommendations of the Initial Assessment are summarized in TM 4c.

2 References

1. CH2MHill 2008, "Dry Creek Wastewater Treatment Plant Initial Assessment"

Attachment D

Update Sheet 3 - August 2009 Updates

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**Update 3 for TM 4b**
Prepared For:	Art O'Brien, City of Roseville
Prepared by:	Chris van Lienden, RMC
Reviewed by:	Dave Richardson, RMC
Date:	August 19, 2009
Reference:	0091-04

1 Summary of Update 3 for TM 4b

Since the completion of TM 4a on February 8, 2006 and subsequent updates on January 24, 2008 and February 25, 2009 new flow projections for Pleasant Grove WWTP and Dry Creek WWTP have been developed. Buildout flow estimates have been updated to reflect additional inflow from a proposed update to the West Roseville Specific Plan (May, 2009). The buildout timeline projections have also been updated to reflect reduced rates of residential development due to the economic slowdown beginning in 2008. The buildout timeline changes have also resulted in changes to the construction phasing timeline. The new flow projections and construction phasing timelines are presented in TM 4d. While the methodology and results of the TM 4b analysis are still valid, the specific numerical data contained in TM 4b regarding flow projections and construction phasing timelines should therefore be disregarded in favor of the specific numerical values in TM 4d. Note that the information presented on Dry Creek WWTP in TM 4b has been superseded by the Dry Creek WWTP Initial Assessment, which is summarized in TM 4c. The new flow projections presented in TM 4dfor the Dry Creek WWTP are valid, however.

Appendix P TM 4c – DCWWTP Expansion Requirements

Technical Memorandum

South Placer Regional Wastewater & Recycled Water Systems Evaluation Project

Subject: Dry Creek Wastewater Treatment Plant Expansion Requirements (TM 4c)

Prepared For: Art O'Brien – City of Roseville

Prepared by: Chris van Lienden – RMC

Reviewed by: Dave Richardson – RMC
Marilyn Bailey – RMC

Date: February 25, 2009

Reference: 0091-004

1 Introduction

As part of its wastewater and recycled water systems evaluation project, the South Placer Wastewater Authority (SPWA) developed expansion recommendations for the Dry Creek Wastewater Treatment Plant (WWTP) and the Pleasant Grove WWTP. These were documented in a Technical Memorandum, *Wastewater Treatment Plants Expansion Requirements, (TM 4b), RMC Water and Environment, March 28, 2006, and subsequent update October 31, 2006*. Since the completion of TM 4b, additional analyses of expansion requirements were developed for the Dry Creek WWTP. The updated analyses were documented in the *Dry Creek Wastewater Treatment Plant Initial Assessment (CH2MHill 2008).* The Initial Assessment developed revised recommendations for improvements to the Dry Creek WWTP based on updated flow and loading estimates and predicted regulatory and capacity requirements. The Initial Assessment supersedes the content of TM 4b as it relates to the Dry Creek WWTP.

This technical memorandum (TM 4c) summarizes the revised design requirements and facility expansion recommendations presented in the Dry Creek Wastewater Treatment Plant Initial Assessment.

TM 4c is organized as follows:

1. Introduction
2. Flows and Loadings
3. Dry Creek Expansion Recommendations
4. Construction Phasing and Estimated Costs

2 Flows and Loadings

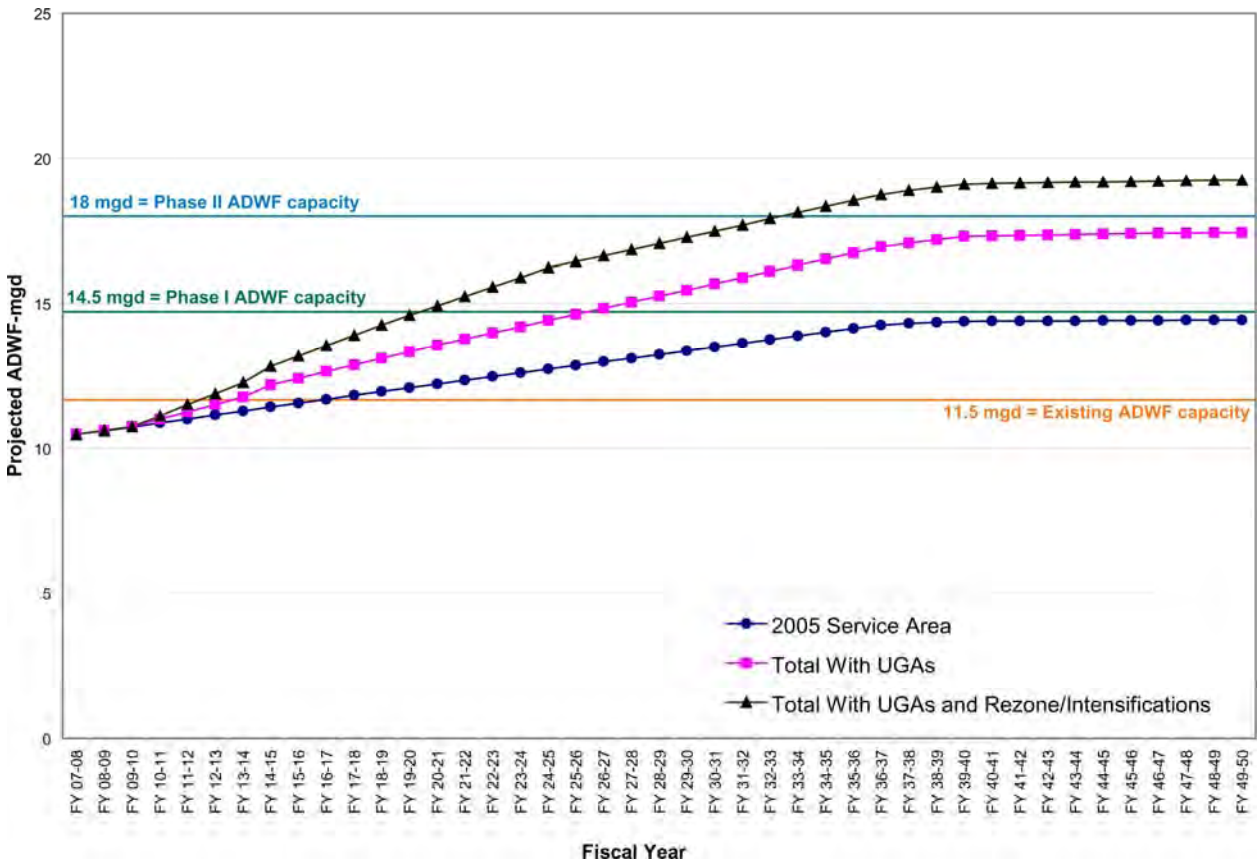
2.1 Average Dry Weather Flows

Average Dry Weather Flow (ADWF) projections through fiscal year 2050 for contributory areas to the DCWWTP were developed in *WWTP Projected Loadings and Buildout (TM4a), RMC Water and Environment, December 9, 2005, and subsequently updated January 24, 2008.* The updated flow projections were used in the Initial Assessment to determine capacity requirements. Three growth scenarios were developed in TM4a:

- Growth Scenario 1, the base 2005 Service Area Boundary (SAB), includes service areas that have passed environmental compliance documentation. This scenario adds the projected flows for those service areas through 2050 to the existing flows, resulting in an ADWF projection of 14.4 mgd.
- Growth Scenario 2 includes Urban Growth Areas (UGAs) that have not yet undergone environmental compliance and therefore incorporates a higher degree of uncertainty. Flow projections for the UGAs were made for the City of Roseville, Placer County (PC), Placer Vineyards (PV), South Placer Municipal Utility District (SPMUD), Placer County Sewer Maintenance District 3 (SMD-3), and were added to the 2005 Service Area Boundary projections. This scenario resulted in an ADWF projection of 17.4 mgd.
- Growth Scenario 3 includes the 2005 SAB and UGA flows, plus rezones and intensifications through 2050, and resulted in an ADWF projection of 19.2 mgd.

Therefore, the ADWF projections for the DCWWTP in the year 2050 range between 14.43 mgd to 19.24 mgd, depending on the amount of rezoning, intensification, and environmental permitting that might occur in the future. **Figure 1** illustrates the three projected ADWF growth scenarios.

Figure 1 Projected ADWF Growth Scenarios



Source: Ch2MHill 2008

2.2 Flow Peaking Factors

While the ADWF is usually thought of as the rated capacity of a treatment plant, the design of treatment systems must also accommodate significant variations in influent flow. A treatment plant must be designed to prevent hydraulic overloads and wash out of solids during peak day and peak hour events. It must also be able to meet discharge limits during the sustained higher flows experienced during the peak month of wet weather. This section discusses the flow peaking factors that will be used in the evaluation.

As part of the Initial Assessment, flow analysis was conducted on East Roseville, West Placer, and total plant historical flows from February 2005 to December 2006 to determine peaking factors to describe average and peak flows expected at the plant. **Table 1** summarizes the peaking factors (PF) and total projected plant flows through 2050. In Table 1, AAF refers to average annual flow, and PHWWF refers to peak hour wet weather flow.

Table 1 - Flow Analysis for Total Raw Plant Flow

Parameter	PF Based on ADWF	Scenario 1: 2005 SAB through 2050 (mgd)	Scenario 2: 2005 SAB Plus UGAs through 2050 (mgd)	Scenario 3: 2005 SAB Plus UGAs Plus Intensification through 2050 (mgd)
AAF	1.1	15.9	19.2	21.2
Maximum Day Flow	2.1	31.0	37.4	41.3
Minimum Day Flow	0.9	13.3	16.1	17.7
ADWF	1.0	14.4	17.4	19.2
PHWWF	3.0	43.3	52.3	57.7
Maximum Week Flow	1.8	26.4	31.9	35.2
Maximum Month Flow	1.6	23.5	28.4	31.4
Diurnal Low Flow	0.6	8.3	10.0	11.0
Diurnal High Flow	1.5	21.9	26.4	29.2

2.3 Estimated Loadings

Loading projections in the Initial Assessment for BOD_5, TSS, and ammonia were primarily based on data from February 2005 to December 2006. Average concentrations of TKN, total phosphorous, and alkalinity were based on data in September and October 2007. Peaking factors were determined based on comparison of the annual average loading values compared to peak values in the 2005 and 2006 data set. Peaking factors for TKN and total phosphorous were derived from industry standards due to the limited available data set. **Table 2** summarizes the average annual loading concentrations and peaking factors. Projected loadings were derived by applying the average concentration to the projected annual average day flows.

Table 2 - Average Annual Solids Loading and Peaking Factors

Parameter	Units	BOD_5	TSS	TKN[a]	NH_3-N	TP[a]	Alk	Design Function
Average Annual Loading	lb/d	23,800	23,500	3,800	1,800	600	15,400	Nominal loading only; used in estimating operation and maintenance requirements
Average Annual Concentration	mg/L	248	245	40	19	6.2	160	Nominal loading only
Peak Month PF	-	1.24	1.31	1.2	1.15	1.2	-	Sizing aeration basins, based on process requirements; sizing solids handling facilities
Peak Week PF[b]	-	1.61	1.49	1.6	1.21	1.2	-	Can be used instead of peak month peak flow for sizing aeration basins, etc.
Peak Day PF	-	2.00[c]	2.00	2.2	1.54	1.8	-	Used as a minimum requirement for aeration basins blower peak capacity

[a]The peaking factors for TKN and total phosphorus were derived from Metcalf & Eddy, 2003.

[b]The peak week peaking factor can be used in the place of peak month peak factor applications; however, this value is recommended only for facilities that have regular high peak week loading, such as that due to seasonal, transient loading. This value is not necessary for implementation at DCWWTP but is presented for comparison only.

[c]The calculated peak day BOD_5 Loading peaking factor was 1.70. The selected (and applied) BOD_5 peak day peaking factor was 2.0.

3 Dry Creek Expansion Recommendations

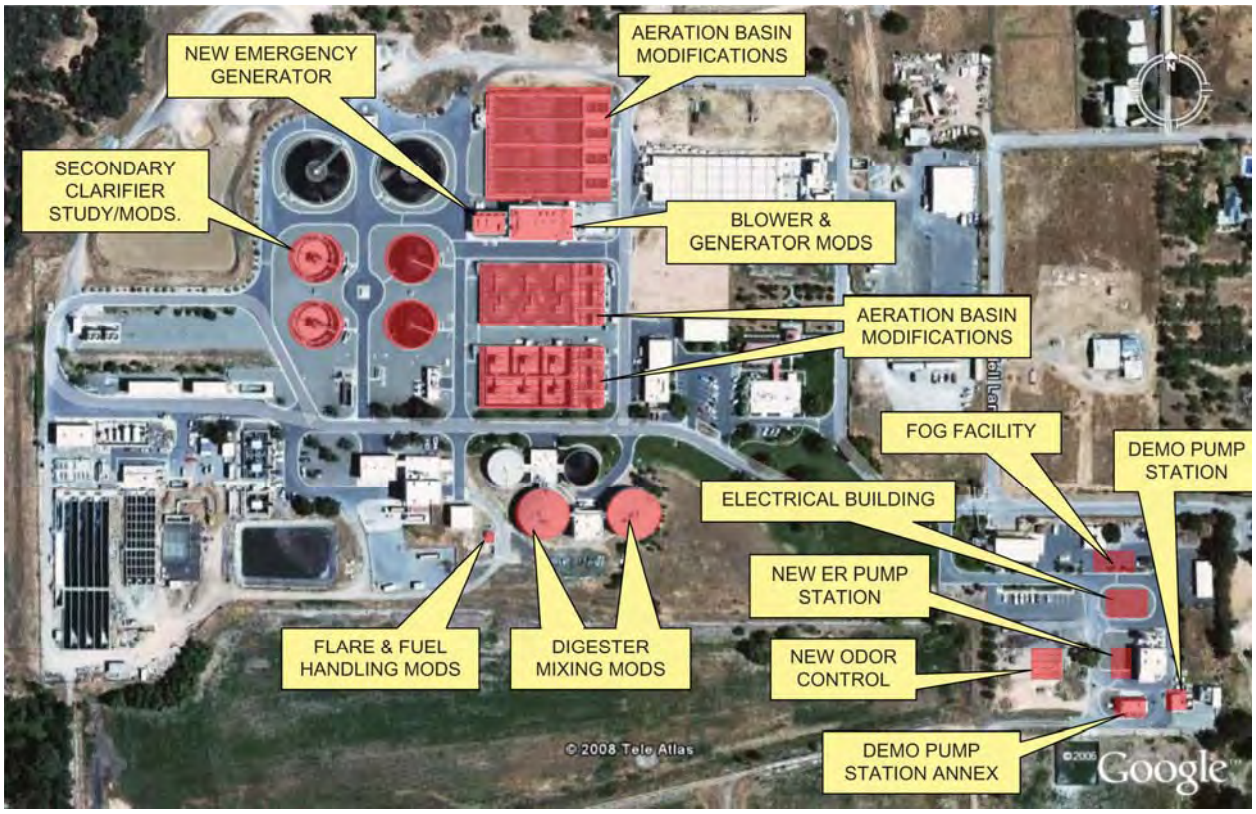
The Initial Assessment analyzed the three growth scenarios described in Section 2.1. To meet the increased demand and potential future regulatory environment, the Initial Assessment suggested a two phase expansion of the plant; Phase I would be responsive to immediate growth through optimization of existing infrastructure, while Phase II would be responsive to long-term growth scenarios as well as to potential future regulations.

3.1.1 Description of Phase I

The Initial Assessment determined that minor modifications recommended in Phase I would allow the existing treatment plant to treat an ADWF of 14.5 mgd and still meet the discharge requirements. A Phase 1 capacity of 14.5 mgd (ADWF) would allow the treatment plant to meet demand through FY 2018-2019 with the most aggressive growth scenario and through FY 2050 with the least aggressive growth scenario.

Phase I recommendations can be considered an optimization of existing infrastructure. Since the existing 1970's era aeration basins and secondary clarifiers are in excellent structural conditions, this equipment could be modified to allow continued service for Phase I (and beyond if required). Potential alternative secondary treatment processes were more expensive than upgrades to the existing conventional activated sludge process, so the selected Phase I secondary process retains the existing treatment process. Secondary effluent will be sent to the existing filters for polishing, and the final effluent will be disinfected with the (under construction as of February 2009) UV system. The Phase I treatment plant layout proposed in the Initial Assessment is shown in **Figure 2**.

Figure 2 – Phase I Treatment Plant Layout



Source: Ch2MHill 2008

3.1.2 Description of Phase II

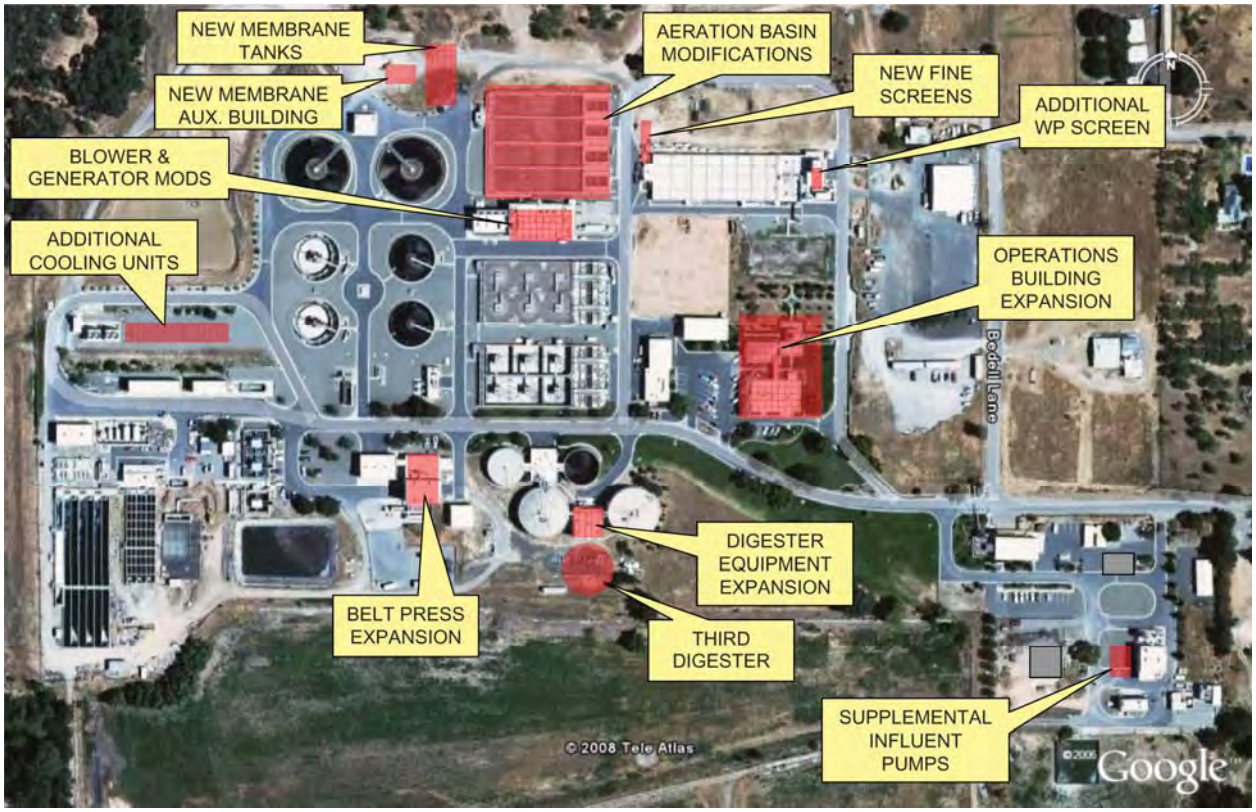
Due to anticipated regulatory requirements for nutrient removal and a growing level of concern regarding the control of contaminants of emerging concern, the Initial Assessment anticipated, for planning and phasing purposes, conversion of the WWTP to a Membrane Bioreactor (MBR) facility for Phase II expansion. A number of changes are recommended as part of this potential conversion, and the overall capital and operational cost is expected to be higher than scaling up the facility as a conventional treatment plant.

The City of Roseville selected an ADWF capacity of 18 mgd for Phase II. With even the most aggressive growth scenario (2005 SAB plus UGA plus rezone/intensification) this capacity allows for almost a 25-year planning horizon. Other scenarios do not reach the 18-mgd ADWF capacity. The final capacity for this phase can be adjusted in the future if required.

Phase II improvements will convert the 1991 aeration basins to membrane bioreactors, and membranes will be added in new membrane tanks. The need for Phase II filtration will be eliminated by the installation of membranes. Membrane permeate will be sent to the then-existing UV system for disinfection. The addition of MBR technology for Phase II loads will require the installation of fine (1mm) screens to remove trash and debris that may tear membrane material.

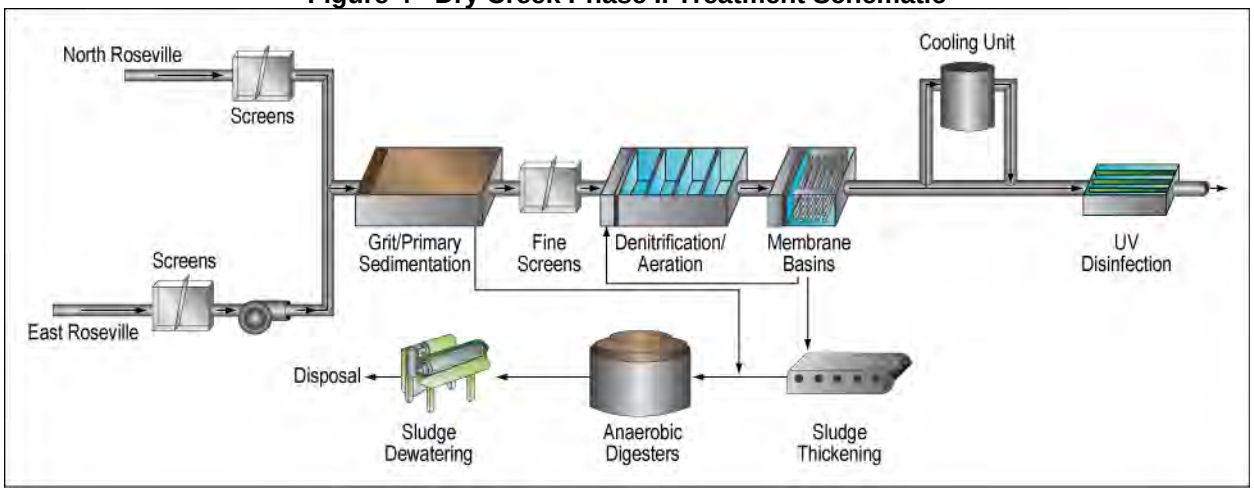
The Initial Assessment also recommended that dewatering should continue to use belt filter presses, rather than convert to a centrifuge process as recommended in the 2006 TM 4B, since belt filter presses appear to result in less fecal coliform reactivation and regrowth. The Phase II treatment plant layout proposed in the Initial Assessment is shown in **Figure 3**. A schematic of the proposed treatment process is presented in **Figure 4**.

Figure 3 – Phase II Treatment Plant Layout



Source: Ch2MHill 2008

Figure 4 - Dry Creek Phase II Treatment Schematic



3.1.3 Overview of Phase I and Phase II Requirements

General design criteria for the Phase I and Phase II improvements are presented in **Table 3**. The proposed unit process improvements are more fully described in the Initial Assessment report.

Table 3 – Dry Creek Phase I and Phase II General Design Criteria

	Units	Existing Operating	Current Capacity	2008 Initial Assessment Phase I Criteria	2008 Initial Assessment Phase II Criteria
GENERAL					
Influent Flows					
Average dry weather (ADWF)	mgd	10.3	11.5	14.5	18
Average annual flow (AAF)	mgd	11.5	12.7	16.0	19.8
Peak day wet weather (PDWWF)[a]	mgd	22.1	25.3	30.5	38.2
Peak hour wet weather (PHWWF)	mgd	26	28.8	43.5	54
Influent Loadings					
Average Annual BOD_5 Concentration	mg/L	248	248	248	248
Average Annual BOD_5 loading	lbs/day	23,800	26,200	33,000	41,000
Peak month BOD_5 loading	lbs/day	29,500	32,500	40,900	51,000
Average Annual TSS Concentration	mg/L	245	245	245	245
Average Annual TSS loading	lbs/day	23,500	25,900	32,600	40,000
Peak month TSS loading	lbs/day	30,800	33,900	42,700	53,000
Average Annual NH_3-N Concentration	mg/L	19	19	19	19
Average Annual NH_3-N loading	lbs/day	1,800	2,000	2,500	3,100
EAST ROSEVILLE PUMP STATION					
Number of Pumps		7	7	5 + 1 Standby	5 + 1 Standby
Capacity, each	gpm	3,000	3,000	6,180	6,875
Horsepower, each	hp	75	75	150	150
EAST ROSEVILLE SCREENS					
Type		Climber	Climber	Climber	Climber
Number		2 + 1 bypass	2 + 1 bypass	2 + 1 bypass	2 + 1 bypass
WEST PLACER SCREENS					
Type		Climber	Climber	Climber	Climber
Number		1 + 1 bypass	1 + 1 bypass	1 + 1 bypass	2 + 1 bypass
FINE SCREENS					
Number		---	---	---	4
Openings	mm	---	---	---	1
Capacity, each	mgd	---	---	---	13.5
GRIT REMOVAL					
Type			Aerated	Aerated	Aerated
Number		2	2	2	2
Detention time @ ADWF	min	13.4	12	10.2	7.7

	Units	Existing Operating	Current Capacity	2008 Initial Assessment Phase I Criteria	2008 Initial Assessment Phase II Criteria
Detention time @ PDWWF[a]	min	5.6	4.9	4	3.2
PRIMARY TREATMENT					
Primary Sedimentation Basins					
Number		4	4	4	4
Surface area, each	ft^2	4,500	4,500	4,500	4,500
Side water depth	ft	10	10	10	10
Overflow rate, all units in service @ ADWF	gal/ft^2*day	570	640	750	1,000
Overflow rate, all units in service @ PDWWF[a]	gal/ft^2*day	1,400	1,600	1,900	2,400
Primary Sludge Pumps					
Number		6	6	6	6
Capacity, each	gpm	150	150	150	150
TDH	ft	22	22	22	22
Horsepower, each	hp	15	15	15	15
Primary Scum Pumps					
Number		1	1	1	2
Capacity, each	gpm	75	75	75	75
TDH	ft	22	22	22	22
Horsepower, each	hp	7.5	7.5	7.5	7.5
AERATION BASINS					
1970s Era Basins					
Number		4	4	4	Not req'd[b]
Side water depth	ft	11.5	11.5	11.5	---
Total volume	MG	3.94	3.94	3.94	---
Aeration system		Mechanical	Mechanical	Fine-bubble	---
1990s Era Basins					
Number		4	4	4	4
Side water depth	ft	15	15	15	15
Total volume	MG	4.24	4.24	4.24	4.24
Aeration system			Fine-bubble diffusers		
Solids separation method			Clarification		Membranes
1970s Era Basins - Blower Systems					
Average air requirements	scfm	---	---	8,000	Not req'd[b]
Peak day air requirements	scfm	---	---	19,000	Not req'd[b]
1990s Era Basins - Blower Systems					
Average air requirements	scfm	8,200	8,300	8,500	22,000
Peak day air requirements	scfm	---	15,000	21,000	46,000
SECONDARY CLARIFIERS					
1970s Era Clarifiers					
Number		4	4	4	Not req'd[b]
Surface area, each		5,670	5,670	5,670	---
1990s Era Clarifiers					

	Units	Existing Operating	Current Capacity	2008 Initial Assessment Phase I Criteria	2008 Initial Assessment Phase II Criteria
Number		2	2	2	Not req'd[b]
Surface area, each	ft^2	12,270	12,270	12,270	---
Combined					
Total surface area	ft^2	47,200	47,200	47,200	---
Solids loading rate	$lb/day*ft^2$	19	20	22	---
PDWWF overflow rate	gal/ft^2*day	470	540	650	---
MEMBRANE BIOREACTORS					
Number of basins		---	---	---	5
Membrane type		---	---	---	Submerged
Membrane flux rate	gal/ft^2-day	---	---	---	10
Air scour rate	scfm	---	---	---	18,000
Permeate pumps					
Type		---	---	---	Centrifugal
Number		---	---	---	6
Capacity	gpm	---	---	---	600
TDH	ft	---	---	---	20
Horsepower	hp	---	---	---	6
Return activated sludge pumps					
Type		---	---	---	Centrifugal
Number		---	---	---	7
Capacity	gpm	---	---	---	13,000
TDH	ft	---	---	---	10
Horsepower	hp	---	---	---	50
COOLING UNITS					
Number		4	4	4	6
FILTRATION					
Number		3	3	3	Not req'd[b]
Cells per filter		4	4	4	---
Area, each cell		347	347	347	---
Backwash rate	gpm/ft2	12	12	12	---
Backwash pumps					
Type		Vertical Turbine			Not req'd[b]
Number		4	4	4	---
ULTRAVIOLET DISINFECTION					
Number of channels		5	5	5	5
Peak hydraulic capacity, total	mgd	45	45	45	45
SOLIDS FACILITIES					
Sludge Thickening					
Thickener type		Gravity belt			
Number		2	2	2	2
Belt width	m	2	2	2	2
Capacity	gpm/m	200	200	200	200

	Units	Existing Operating	Current Capacity	2008 Initial Assessment Phase I Criteria	2008 Initial Assessment Phase II Criteria
Thickened sludge	%	5.5	5.5	5.5	5.5
Digestion					
Type		Anaerobic mesophilic digestion			
Number		2	2	2	3
Volume, each	mg	1.19	1.19	1.19	1.19
Sludge mixing type		Gas	Gas	Mechanical	Mechanical
Fog Receiving Facility					
Storage tank capacity	gal	---	---	15,000	
Mixer pump		---	---	Chopper	
Sludge Dewatering					
Type		Belt filter press			
Number		3	3	3	4
Belt width, each	m	2	2	2	2
Capacity	gpm/m	75	75	75	75
Cake solids	%	16%	16%	16%	16%
Operating period	hr/day	8	8	8	8

a. PDWWF includes plant drain flows.

b. Equipment and facilities not required for Phase II MBR operation.

4 Cost Estimates

Initial Phase I and Phase II cost estimates from the Initial Assessment are presented in **Table 4**. These estimates are based on material, equipment, and labor pricing as of March 2008. The estimates are considered accurate to -15% to -30% on the low range side, and 20% to 50% on the high range side. The final cost of the project will depend upon the actual labor and material costs, competitive market conditions, final project costs, implementation schedule and other variable factors.

Table 4 – Phase I and Phase II Cost Estimates

Facility/Process Element	Phase I Improvements	Phase II Improvements
East Roseville Raw Sewage Pumping	***$3,164,000***	***$90,000***
E. Roseville Pumping Station	$2,130,000	n/a
Odor Control Facilities	$264,000	n/a
Emergency Generator	$550,000	n/a
Demolition of ER Pump Station and PS Annex	$150,000	n/a
Pump Modifications	n/a	$90,000
PLC Replacement (10A)	$70,000	n/a
West Placer Screening Facility	***$0***	***$208,000***

Facility/Process Element	Phase I Improvements	Phase II Improvements
Influent Coarse Screens	n/a	$208,000
Aeration Basins	***$2,061,000***	***$1,172,000***
Demo Surface Aerators & Pier Structure	$98,000	n/a
Baffle & Air Mods to Basins 31 & 32	$578,000	n/a
Blower Building Modifications	$754,000	n/a
Blower Building Modifications	n/a	$466,000
ML Recycle Pump Improvements	$561,000	$258,000
Emergency Generation for Blowers	n/a	$448,000
PLC Replacement (30C)	$70,000	n/a
Secondary Clarifiers	***$1,641,000***	***$0***
Secondary Clarifiers	$1,571,000	n/a
PLC Replacement (30D)	$70,000	n/a
Membrane Basins & Equipment	***$0***	***$22,370,000***
Membrane Tanks/Equipment	n/a	$22,370,000
Fine Screens	***$0***	***$2,611,000***
Fine Screens Facility	n/a	$2,611,000
Solids Facilities Improvements	***$3,246,000***	***$6,107,000***
FOG Improvements	$840,000	n/a
Sludge Mixing & Heating	$1,486,000	n/a
Cogeneration (Engine Generator)	$725,000	n/a
Enclosed Flare/Fuel Handling Improvements	$125,000	n/a
Anaerobic Digester	n/a	$5,527,000
Belt Filter Press Addition	n/a	$580,000
PLC Replacement (80H)	$70,000	n/a
Cooling Units	***$0***	***$650,000***
Cooling Unit System	n/a	$650,000
Operations Building Replacement	***$0***	***$2,240,000***
Operations Building	n/a	$2,240,000
Subtotal of Identified Facilities, Direct Costs	**$10,112,000**	**$35,448,000**
Additional Project Facility/Site Costs	***$4,046,000***	***$7,091,000***

Facility/Process Element	Phase I Improvements	Phase II Improvements
Site Yard Piping & Mechanical	$1,517,000	$1,773,000
Site Electrical / I&C/SCADA	$1,517,000	$1,773,000
Site Civil	$1,012,000	$3,545,000
Subtotal of Direct Costs	**$14,158,000**	**$42,539,000**
Additional Project Indirect Costs		
Mobilization/Demobilization	$506,000	$887,000
Contractor's Overheads	$2,883,000	$8,597,000
Contractor's Profit	$1,586,000	$4,729,000
Project Bonds	$666,000	$1,986,000
Subtotal of Direct and Indirect Costs	**$19,799,000**	**$58,738,000**
Additional Project Costs for Scope & Unknowns		
Contingency	$5,940,000	$8,811,000
Total of Direct and Indirect Costs	**$25,739,000**	**$67,549,000**
Additional Project Allowance to Account for Current Conditions in Project Location		
Market Adjustment Factor	$1,287,000	$3,378,000
Total Project Capital Costs, May 2008	**$27,026,000**	**$70,927,000**

5 References

1. CH2MHill 2008, "Dry Creek Wastewater Treatment Plant Initial Assessment"
2. RMC 2006, "South Placer Regional Wastewater and Recycled Water Systems Evaluation; Wastewater Treatment Plant Project Loadings and Buildout (TM No. 4a)"

Appendix Q TM 4d – Updated Flow Projections

Technical Memorandum

South Placer Regional Wastewater & Recycled Water Systems Evaluation Project

Subject: Updated Flow Projections (TM 4d)

Prepared For: Art O'Brien – City of Roseville

Prepared by: Chris van Lienden – RMC

Reviewed by: Dave Richardson – RMC

Date: August 25, 2009

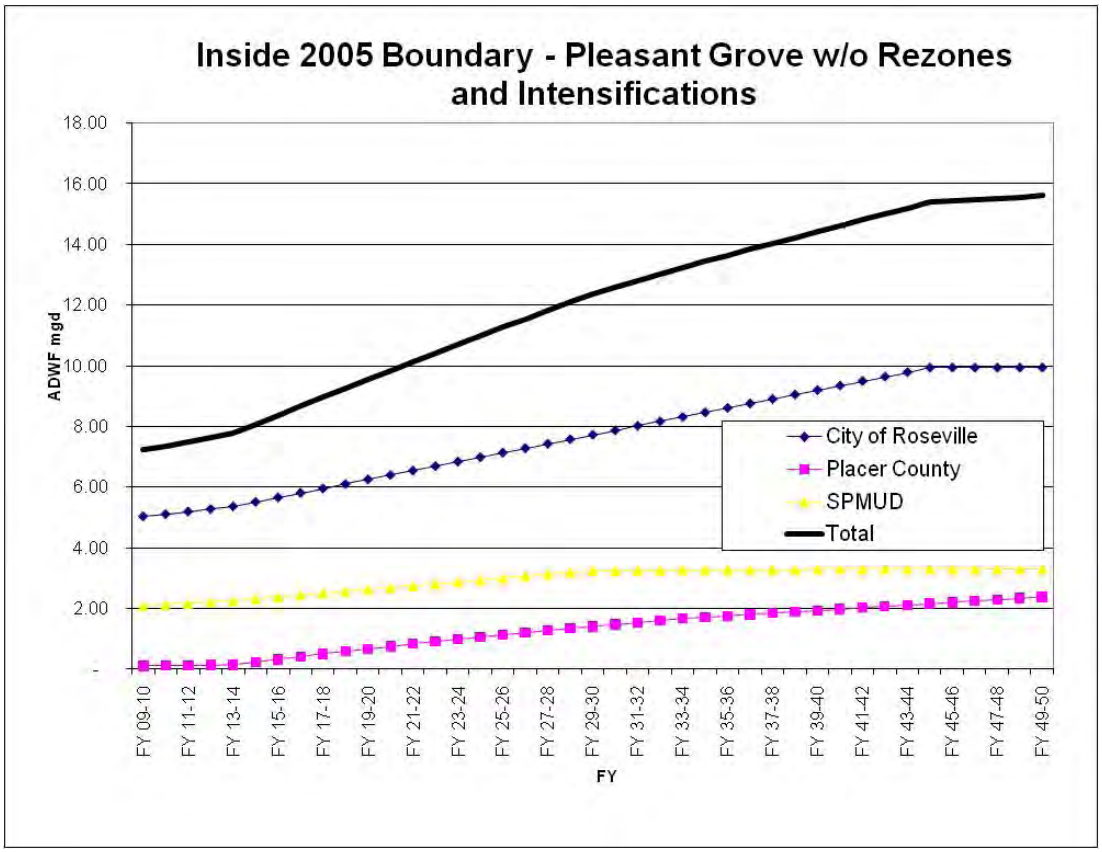
Reference: 0091-004

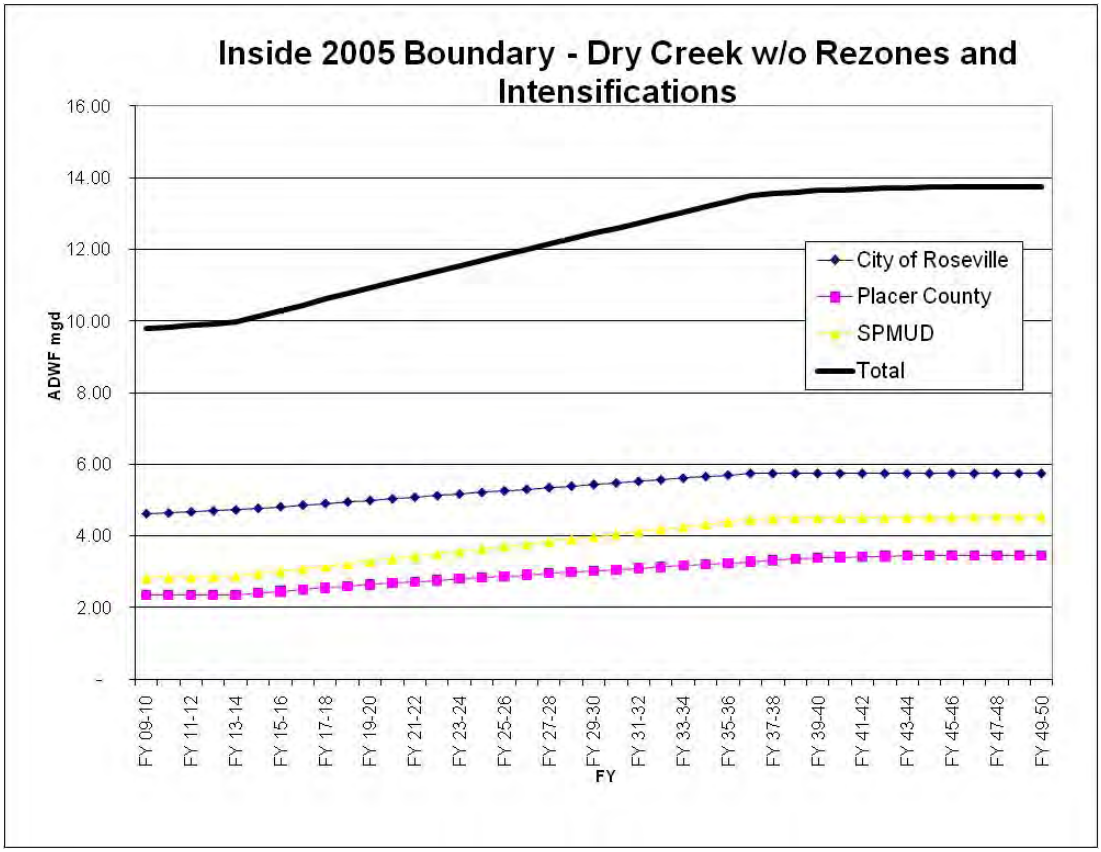
1 Introduction

As a result of the economic slowdown beginning in 2008, flow projections for Pleasant Grove WWTP and Dry Creek WWTP have been updated to reflect reduced rates of residential development. In addition, flow projections have been developed for the scenario that Placer Ranch and Placer Vineyard do not develop. The buildout timeline changes have also resulted in changes to the construction phasing timeline. Figures 1-4 present the new buildout timelines. Figures 5 and 6 present new construction timeline projections based on the updated flow projections. The new projections indicate that Pleasant Grove Phase 2 will not be required until FY 22/23 and Dry Creek Phase 2 will not be required until FY 23/24.

Data for the flow projections is included in Attachment A.

Figure 1a-c Inside 2005 Service Area Boundary Contributing Agency Flow Projections




Inside 2005 Boundary - Dry Creek w/o Rezones and Intensifications
ADWF mgd
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
-
City of Roseville
Placer County
SPMUD
Total
FY 09-10
FY 11-12
FY 13-14
FY 15-16
FY 17-18
FY 19-20
FY 21-22
FY 23-24
FY 25-26
FY 27-28
FY 29-30
FY 31-32
FY 33-34
FY 35-36
FY 37-38
FY 39-40
FY 41-42
FY 43-44
FY 45-46
FY 47-48
FY 49-50
FY

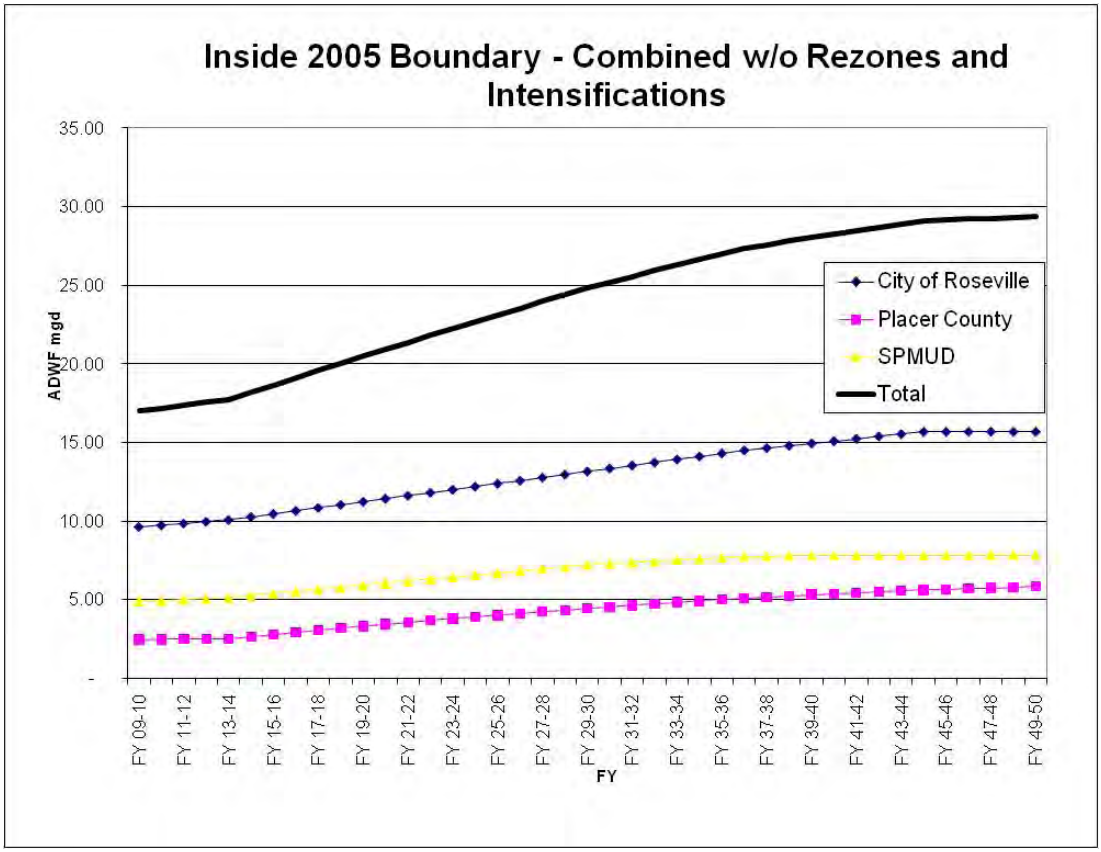

Inside 2005 Boundary - Combined w/o Rezones and Intensifications
ADWF mgd
35.00
30.00
25.00
20.00
15.00
10.00
5.00
-
City of Roseville
Placer County
SPMUD
Total
FY 09-10
FY 11-12
FY 13-14
FY 15-16
FY 17-18
FY 19-20
FY 21-22
FY 23-24
FY 25-26
FY 27-28
FY 29-30
FY 31-32
FY 33-34
FY 35-36
FY 37-38
FY 39-40
FY 41-42
FY 43-44
FY 45-46
FY 47-48
FY 49-50
FY

Figure 2a-c - Inside 2005 Service Area Boundary Contributing Agency Flow Projections w/o Pleasant Grove or Placer Ranch

Figure 2a

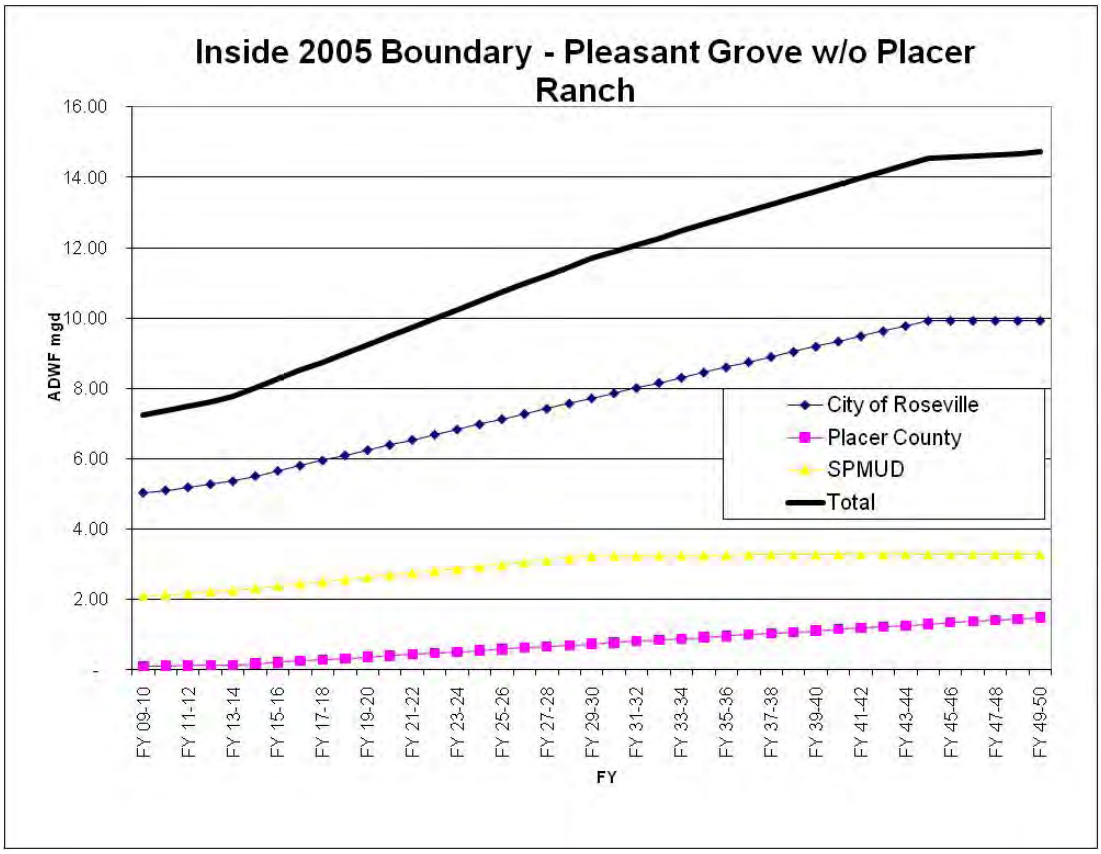


Figure 2b

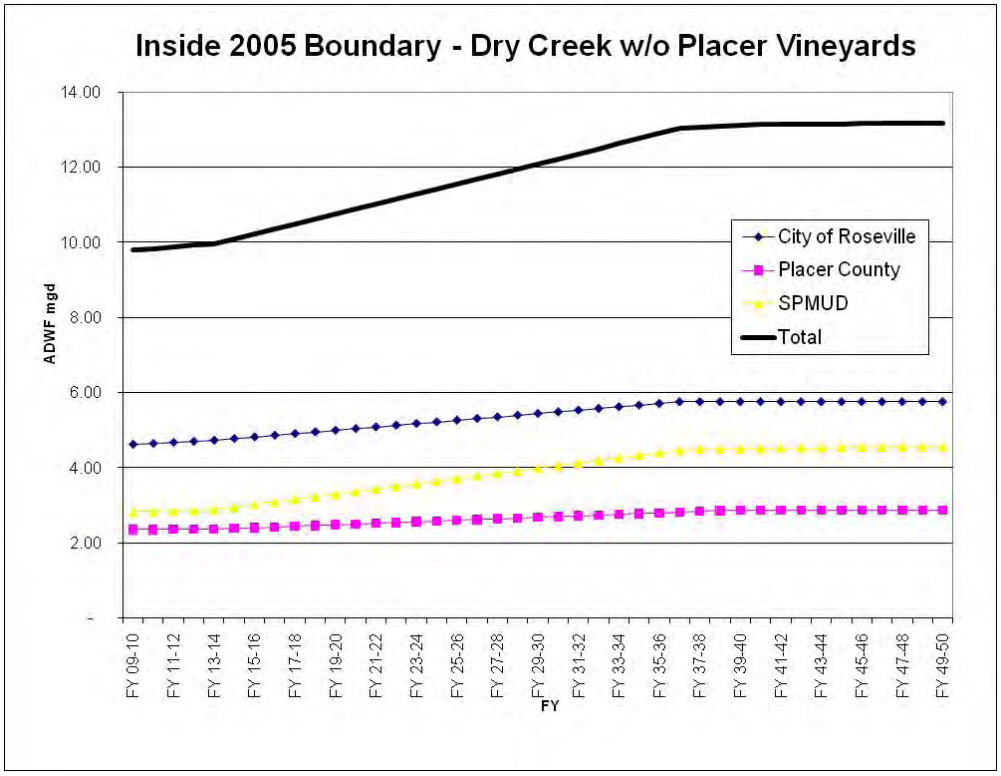


Figure 2c

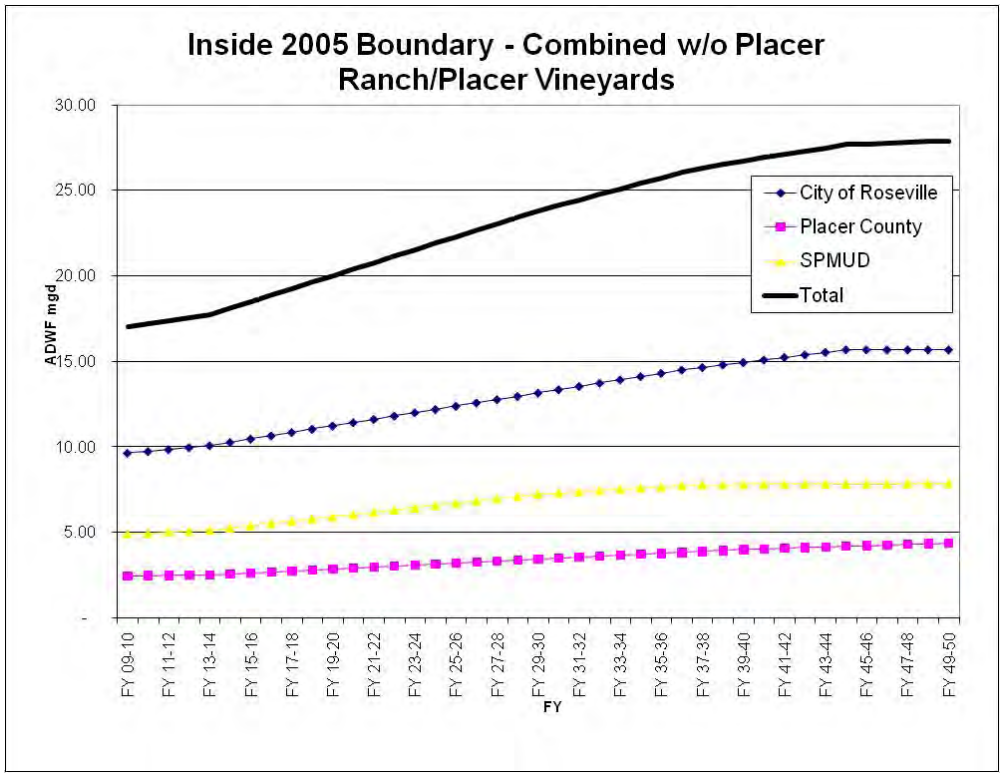


Figure 3a-c - Ultimate Service Area Boundary Contributing Agency Flow Projections

Figure 3a

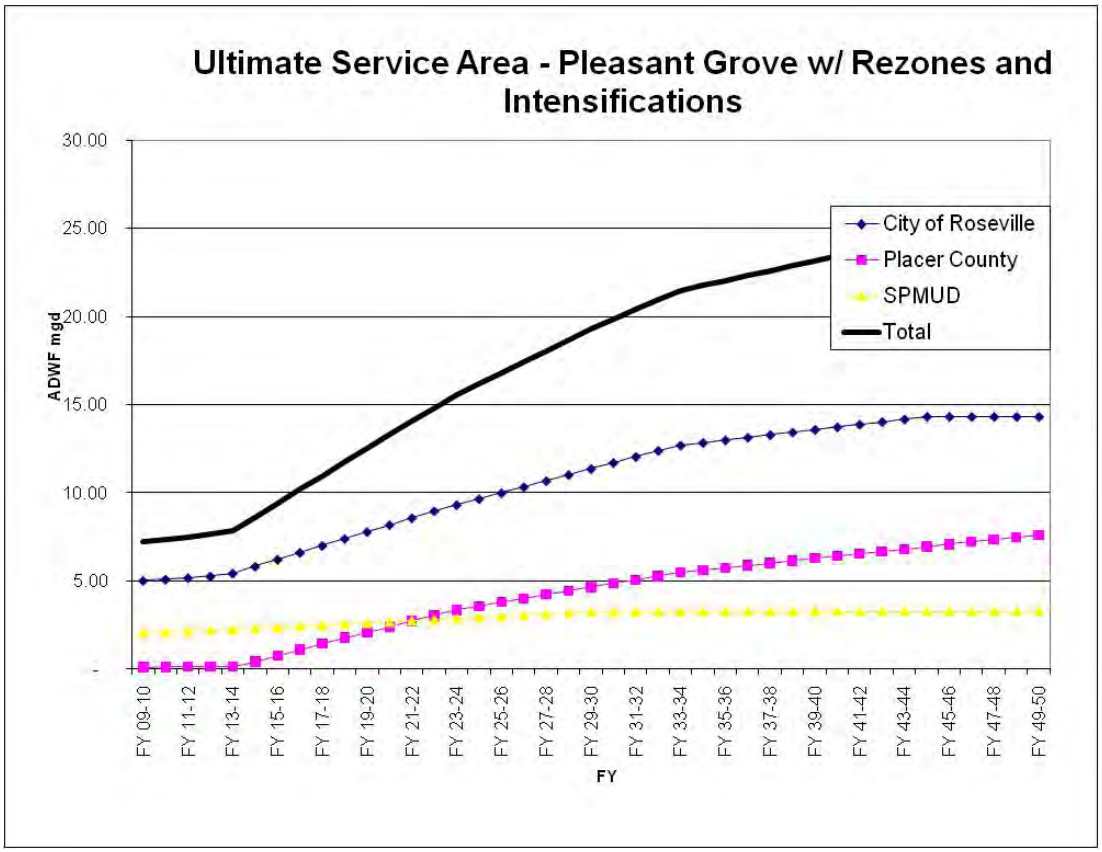


Figure 3b

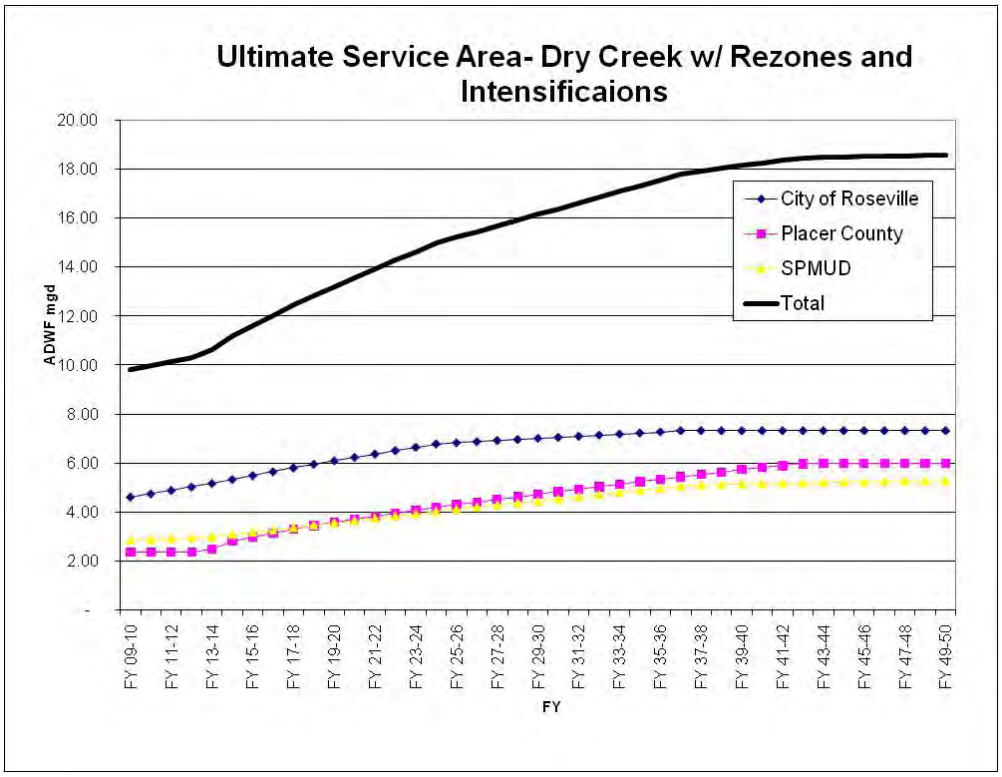


Figure 3c

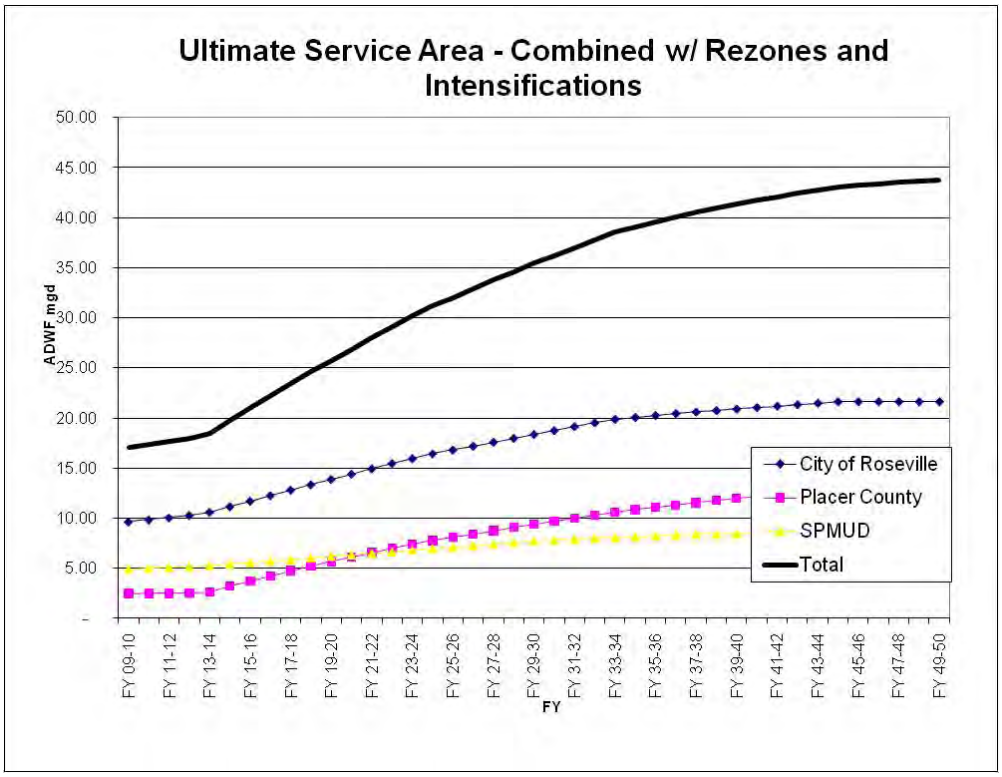


Figure 4 - Pleasant Grove WWTP Flow Projections by Growth Scenario

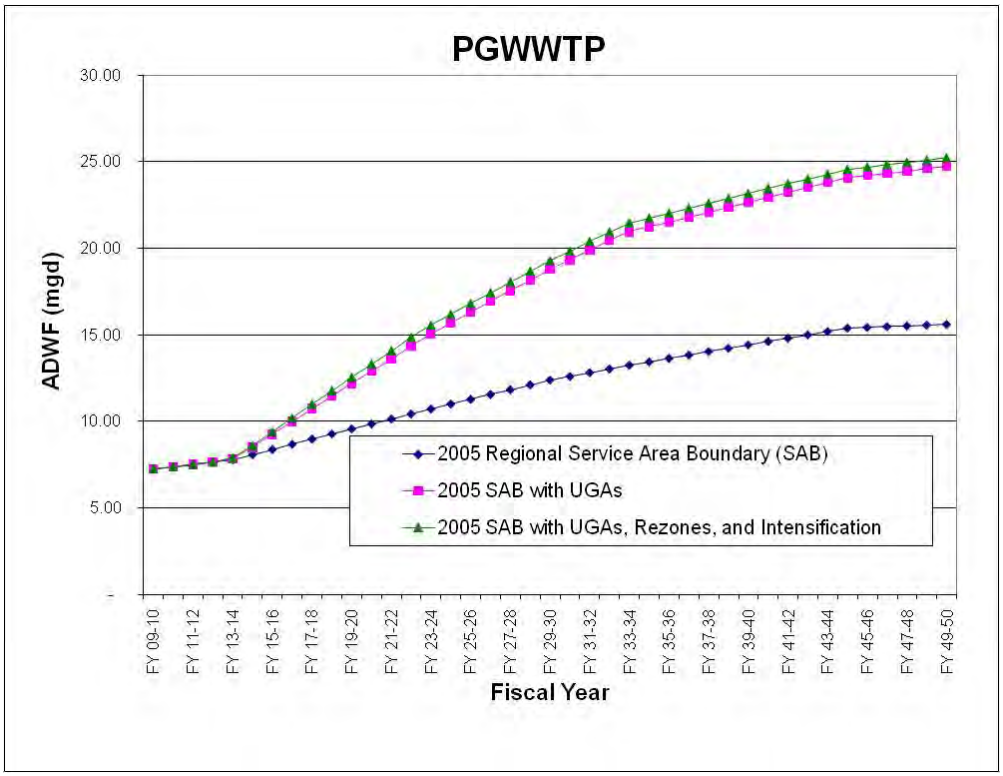


Figure 5 - Dry Creek WWTP Flow Projections by Growth Scenario

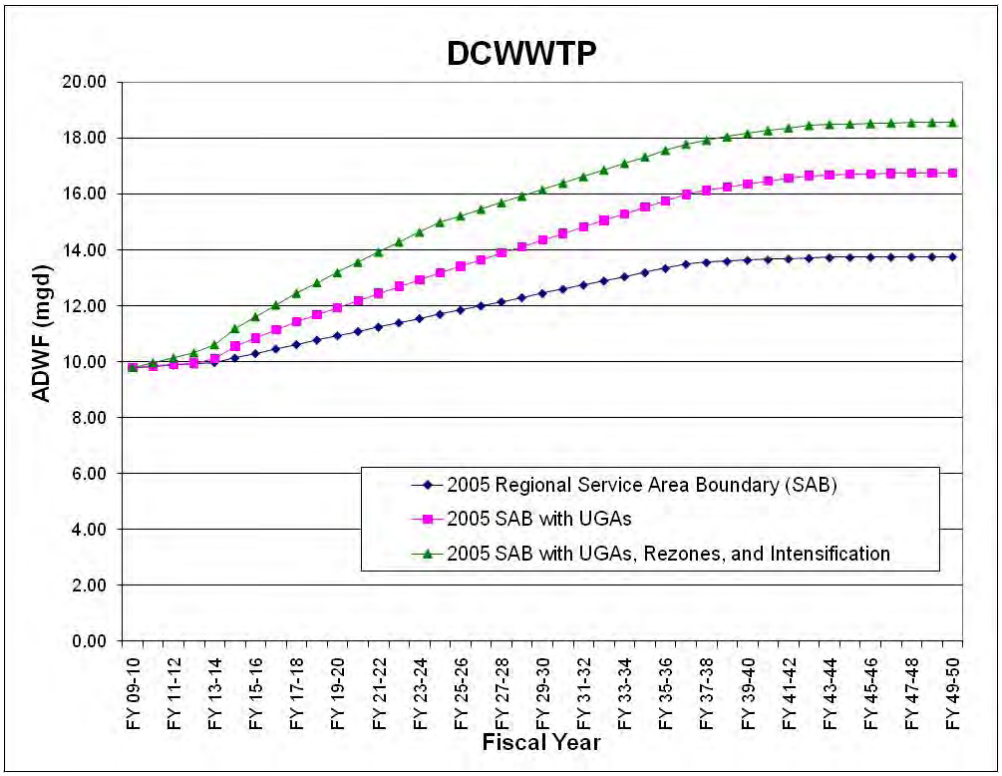
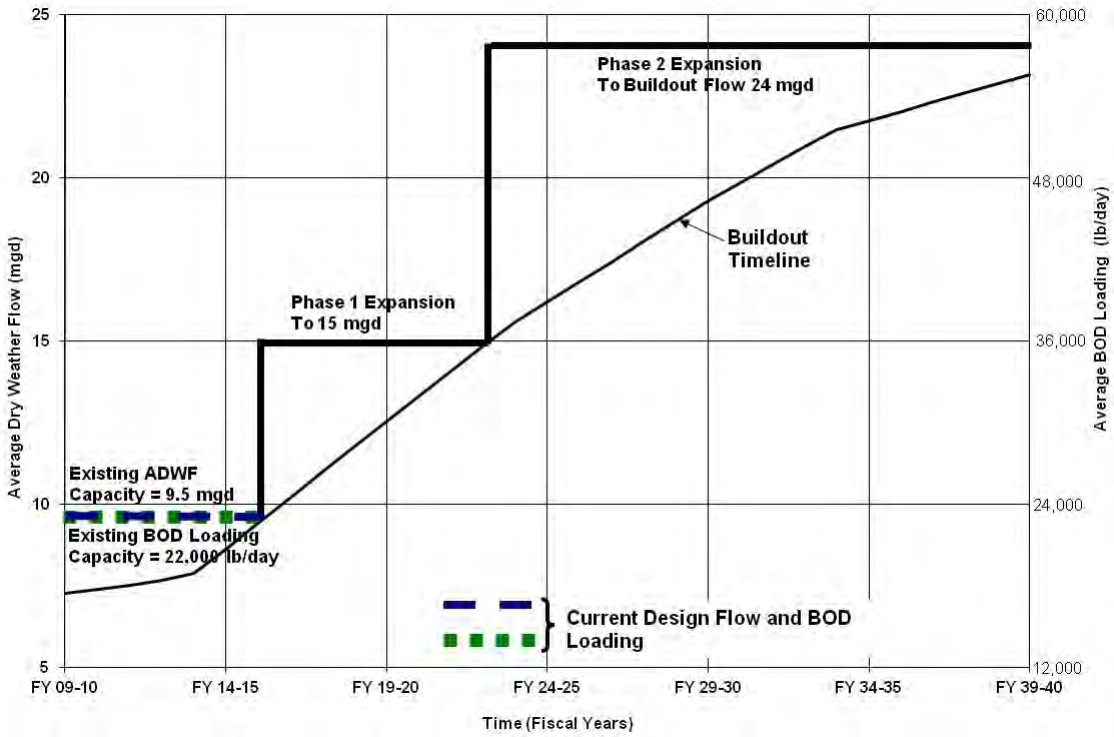


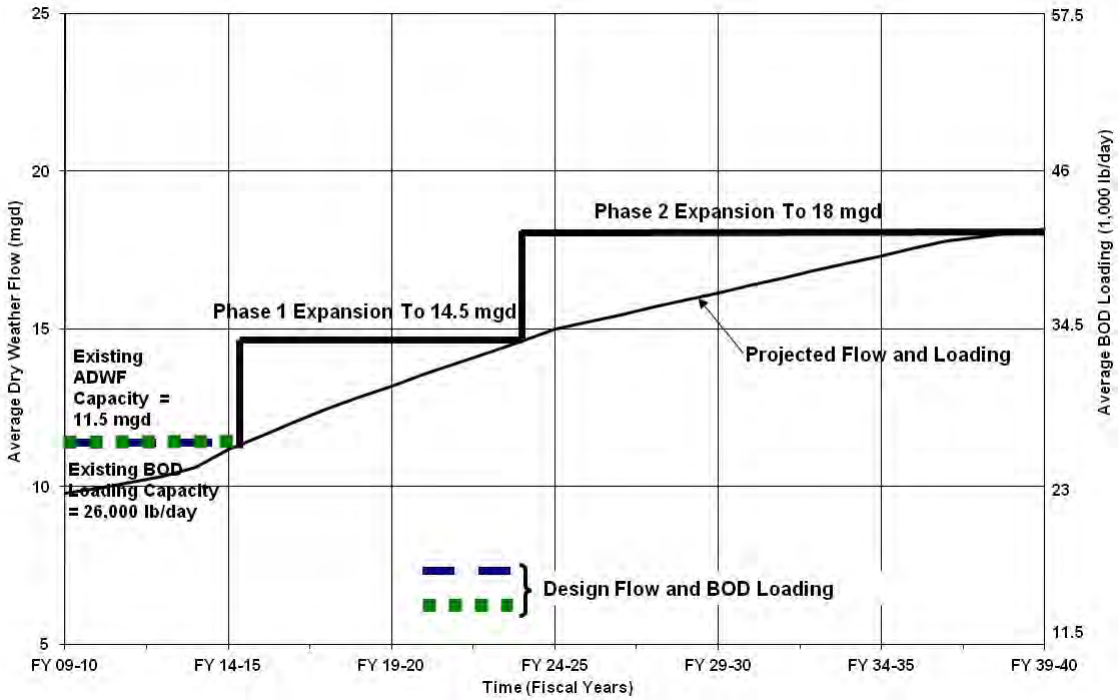
Figure 6 - Pleasant Grove Construction Phasing[a]



Footnote:

a. Existing capacity data from Carollo, Technical memorandums No.1 & No. 2.

Figure 7 - Dry Creek Construction Phasing[a]



Footnote:

a. Existing and Phase 1 & 2 capacity taken from CH2MHill 2008

2 References

1. Carollo 2007, "Technical Memorandum No. 1: Influent Flow Characteristics"
2. Carollo 2006, "Technical Memorandum No. 2: Immediate Aeration Options"
3. CH2MHill 2008, "Dry Creek Wastewater Treatment Plant Initial Assessment"

Attachment A

Annual ADWF Generation Projections by WWTP – To 2050

UPDATED PROJECTIONS

	Total Current ADWF Through 08-09 (mgd)	FY 09-10	FY 10-11	FY 11-12	FY 12-13	FY 13-14	FY 14-15	FY 15-16	FY 16-17	FY 17-18	FY 18-19	FY 19-20	FY 20-21	FY 21-22	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27	FY 27-28	FY 28-29	FY 29-30	FY 30-31	FY 31-32	FY 32-33	FY 33-34	FY 34-35	FY 35-36
Pleasant Grove Service Area																												
2005 Service Area - Roseville (Includes 2.07 mgd from WRSP@ buildout)	4.97	0.07	0.07	0.09	0.09	0.09	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
2005 Service Area - PC	0.10	0.01	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
2005 Service Area - PC (PR inside 2005 SAB)	0.00	-	-	-	-	-	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.01	0.01
2005 Service Area - SPMUD	2.06	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00
2005 Service Area - Total (mgd)	7.13	0.12	0.12	0.14	0.14	0.14	0.30	0.30	0.30	0.30	0.30	0.29	0.29	0.29	0.29	0.29	0.28	0.28	0.28	0.28	0.28	0.27	0.22	0.22	0.22	0.22	0.20	0.20
UGA - Invirotech[a]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - Placer Ranch outside 2005 SAB	0.00	-	-	-	-	-	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.01	0.01
UGA - Curry Creek	0.00	-	-	-	-	-	-	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
UGA - Regional University	0.00	-	-	-	-	-	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-
UGA - Orchard Creek	0.00	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-
UGA - Sierra Vista	0.00	-	-	-	-	-	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	-	-
UGA - Creekview	0.00	-	-	-	-	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-	-
UGA - Brookfield	0.00	-	-	-	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	-	-	-
Total With UGAs (mgd)	7.13	0.12	0.12	0.14	0.14	0.18	0.67	0.74	0.74	0.74	0.74	0.72	0.72	0.72	0.72	0.72	0.62	0.62	0.62	0.62	0.62	0.61	0.55	0.55	0.55	0.52	0.28	0.28
Rezones-City of Roseville	0.00	-	-	-	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-	-	-	-	-	-	-	-	-	-	-	-	-
Intensification-City of Roseville	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total with UGAs & Rezones/Intesification (mgd)	7.13	0.12	0.12	0.14	0.14	0.23	0.72	0.79	0.79	0.79	0.79	0.77	0.77	0.77	0.77	0.72	0.62	0.62	0.62	0.62	0.62	0.61	0.55	0.55	0.55	0.52	0.28	0.28
2005 Service Area - Cumulative (mgd)	7.13	7.25	7.36	7.50	7.63	7.77	8.07	8.37	8.67	8.97	9.27	9.55	9.84	10.13	10.42	10.71	10.99	11.27	11.55	11.83	12.11	12.38	12.60	12.81	13.03	13.24	13.44	13.64
Total With UGAs - Cumulative (mgd)	7.13	7.25	7.37	7.51	7.65	7.83	8.50	9.24	9.99	10.73	11.47	12.19	12.91	13.62	14.34	15.06	15.68	16.30	16.93	17.55	18.17	18.78	19.34	19.89	20.44	20.96	21.24	21.53
Total With UGAs & Rezones/Intensification - Cumulative (mgd)	7.13	7.25	7.37	7.51	7.65	7.88	8.60	9.39	10.19	10.98	11.77	12.54	13.31	14.07	14.84	15.56	16.18	16.80	17.43	18.05	18.67	19.28	19.84	20.39	20.94	21.46	21.74	22.03
Ultimate Service Area																												
By SPWA Partner Agency																												
City of Roseville (includes Rezones and Intensifications)	4.97	5.04	5.11	5.20	5.28	5.45	5.84	6.24	6.63	7.02	7.41	7.80	8.20	8.59	8.98	9.32	9.66	10.01	10.35	10.69	11.03	11.37	11.72	12.06	12.40	12.70	12.85	13.00
Placer County	0.10	0.12	0.13	0.14	0.15	0.17	0.43	0.77	1.11	1.46	1.79	2.11	2.42	2.73	3.05	3.36	3.58	3.80	4.02	4.24	4.46	4.66	4.87	5.08	5.28	5.49	5.62	5.76
SPMUD	2.06	2.10	2.13	2.17	2.22	2.26	2.32	2.38	2.44	2.51	2.57	2.63	2.69	2.75	2.81	2.88	2.94	3.00	3.06	3.12	3.18	3.25	3.25	3.25	3.26	3.26	3.27	3.27
Total		7.25	7.37	7.51	7.65	7.88	8.60	9.39	10.19	10.98	11.77	12.54	13.31	14.07	14.84	15.56	16.18	16.80	17.43	18.05	18.67	19.28	19.84	20.39	20.94	21.46	21.74	22.03
Dry Creek Service Area																												
2005 Service Area - Roseville	4.59	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
2005 Service Area - PC	2.35	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
2005 Service Area - PC -PV indside 2005 SAB	0.00	-	-	-	-	-	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
2005 Service Area - SPMUD	2.82	0.01	0.01	0.01	0.01	0.01	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
2005 Service Area - Total (mgd)	9.76	0.04	0.04	0.05	0.05	0.05	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
UGA - Placer Vineyards-Outside 2005 SAB	0.00	-	-	-	-	0.11	0.11	0.11	0.11	0.11	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
UGA - SMD-3	0.00	-	-	-	-	-	0.17	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
UGA - SPMUD	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
UGA - Placer	0.00	-	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-	-	-	-	-	-	-	-
Total With UGAs (mgd)	9.76	0.04	0.04	0.05	0.05	0.16	0.45	0.29	0.29	0.29	0.26	0.25	0.25	0.25	0.25	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.24	0.24	0.24	0.23	0.23	0.23
Rezones-City of Roseville	0.00	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Intensification in City of Rocklin (SPMUD Svc Area)	0.00		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-	-	-	-	-	-	-	-	-	-
Intensification in City of Roseville	0.00		0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	-	-	-	-	-	-	-	-	-	-	-
Total Intensification	0.00	-	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	-	-	-	-	-	-	-	-	-	-	-
Total with UGAs & Rezones/Intesification (mgd)	9.76	0.04	0.16	0.18	0.18	0.29	0.58	0.42	0.42	0.42	0.38	0.36	0.36	0.36	0.36	0.35	0.35	0.24	0.24	0.24	0.23	0.23	0.24	0.24	0.24	0.23	0.23	0.23
2005 Service Area - Cumulative (mgd)	9.76	9.79	9.83	9.88	9.92	9.97	10.13	10.29	10.45	10.62	10.78	10.93	11.08	11.24	11.39	11.55	11.70	11.85	12.00	12.15	12.30	12.45	12.60	12.75	12.90	13.05	13.20	13.34
Total With UGAs - Cumulative (mgd)	9.76	9.80	9.84	9.89	9.94	10.10	10.55	10.84	11.13	11.42	11.68	11.93	12.19	12.44	12.69	12.93	13.17	13.41	13.65	13.88	14.11	14.35	14.58	14.82	15.05	15.29	15.52	15.75
Total With UGAs & Rezones/Intensification - Cumulative (mgd)	9.76	9.80	9.96	10.14	10.32	10.61	11.19	11.61	12.03	12.45	12.83	13.19	13.56	13.92	14.28	14.63	14.98	15.22	15.46	15.69	15.92	16.16	16.39	16.63	16.86	17.10	17.33	17.56
Ultimate Service Area																												
By SPWA Partner Agency																												
City of Roseville (includes Rezones and Intensifications)	4.59	4.62	4.75	4.89	5.03	5.17	5.33	5.49	5.64	5.80	5.95	6.09	6.23	6.36	6.50	6.64	6.78	6.82	6.87	6.91	6.95	7.00	7.04	7.09	7.13	7.18	7.22	7.27
Placer County	2.35	2.35	2.35	2.35	2.36	2.47	2.80	2.96	3.13	3.30	3.44	3.57	3.70	3.83	3.96	4.07	4.19	4.30	4.40	4.51	4.62	4.72	4.82	4.93	5.03	5.13	5.23	5.33
SPMUD (includes intensifications)	2.82	2.83	2.86	2.90	2.94	2.97	3.07	3.16	3.26	3.35	3.45	3.54	3.64	3.73	3.83	3.92	4.02	4.10	4.19	4.27	4.35	4.44	4.52	4.61	4.70	4.79	4.87	4.96
Total		9.80	9.96	10.14	10.32	10.61	11.19	11.61	12.03	12.45	12.83	13.19	13.56	13.92	14.28	14.63	14.98	15.22	15.46	15.69	15.92	16.16	16.39	16.63	16.86	17.10	17.33	17.56

Footnote:

a. Total Flow at Buildout includes 0.04 mgd of Current Flow applied to 2005 service area - PC

UPDATED PROJECTIONS

	FY 36-37	FY 37-38	FY 38-39	FY 39-40	FY 40-41	FY 41-42	FY 42-43	FY 43-44	FY 44-45	FY 45-46	FY 46-47	FY 47-48	FY 48-49	FY 49-50
Pleasant Grove Service Area														
2005 Service Area - Roseville (Includes 2.07 mgd from WRSP@ buildout)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-	-	-	-	-
2005 Service Area - PC	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
2005 Service Area - PC (PR inside 2005 SAB)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
2005 Service Area - SPMUD	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-	-	-	-	-
2005 Service Area - Total (mgd)	0.20	0.20	0.20	0.20	0.20	0.19	0.19	0.19	0.19	0.04	0.04	0.04	0.04	0.04
UGA - Invirotech[a]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - Placer Ranch outside 2005 SAB	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
UGA - Curry Creek	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
UGA - Regional University	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - Orchard Creek	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - Sierra Vista	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - Creekview	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - Brookfield	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total With UGAs (mgd)	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.13	0.13	0.13	0.13	0.13
Rezones-City of Roseville	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Intensification-City of Roseville	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total with UGAs & Rezones/Intesification (mgd)	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.13	0.13	0.13	0.13	0.13
2005 Service Area - Cumulative (mgd)	13.83	14.03	14.22	14.42	14.62	14.81	15.00	15.19	15.38	15.43	15.47	15.52	15.56	15.61
Total With UGAs - Cumulative (mgd)	21.81	22.09	22.38	22.66	22.95	23.23	23.51	23.79	24.07	24.20	24.33	24.46	24.60	24.73
Total With UGAs & Rezones/Intensification - Cumulative (mgd)	22.31	22.59	22.88	23.16	23.45	23.73	24.01	24.29	24.57	24.70	24.83	24.96	25.10	25.23
Ultimate Service Area														
By SPWA Partner Agency														
City of Roseville (includes Rezones and Intensifications)	13.15	13.29	13.44	13.59	13.74	13.88	14.03	14.18	14.32	14.32	14.32	14.32	14.32	14.32
Placer County	5.89	6.02	6.16	6.29	6.42	6.55	6.69	6.82	6.95	7.09	7.22	7.35	7.48	7.62
SPMUD	3.27	3.28	3.28	3.29	3.29	3.29	3.29	3.29	3.29	3.29	3.29	3.29	3.29	3.29
Total	22.31	22.59	22.88	23.16	23.45	23.73	24.01	24.29	24.57	24.70	24.83	24.96	25.10	25.23
Dry Creek Service Area														
2005 Service Area - Roseville	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-
2005 Service Area - PC	0.02	0.02	0.02	0.02	-	-	-	-	-	-	-	-	-	-
2005 Service Area - PC -PV indside 2005 SAB	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-	-	-	-	-	-
2005 Service Area - SPMUD	0.07	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	-
2005 Service Area - Total (mgd)	0.15	0.07	0.04	0.04	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	-
UGA - Placer Vineyards-Outside 2005 SAB	0.06	0.06	0.06	0.06	0.06	0.06	0.06	-	-	-	-	-	-	-
UGA - SMD-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UGA - SPMUD	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
UGA - Placer	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total With UGAs (mgd)	0.23	0.14	0.12	0.12	0.10	0.10	0.09	0.03	0.02	0.02	0.02	0.02	0.01	0.00
Rezones-City of Roseville	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Intensification in City of Rocklin (SPMUD Svc Area)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Intensification in City of Roseville	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Intensification	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total with UGAs & Rezones/Intesification (mgd)	0.23	0.14	0.12	0.12	0.10	0.10	0.09	0.03	0.02	0.02	0.02	0.02	0.01	0.00
2005 Service Area - Cumulative (mgd)	13.49	13.56	13.60	13.64	13.67	13.69	13.71	13.73	13.74	13.74	13.75	13.75	13.76	13.76
Total With UGAs - Cumulative (mgd)	15.98	16.12	16.24	16.36	16.46	16.55	16.65	16.68	16.70	16.71	16.73	16.74	16.75	16.75
Total With UGAs & Rezones/Intensification - Cumulative (mgd)	17.79	17.93	18.05	18.17	18.27	18.36	18.46	18.49	18.51	18.52	18.54	18.55	18.56	18.56
Ultimate Service Area														
By SPWA Partner Agency														
City of Roseville (includes Rezones and Intensifications)	7.31	7.31	7.31	7.31	7.31	7.31	7.31	7.31	7.31	7.31	7.31	7.31	7.31	7.31
Placer County	5.43	5.53	5.63	5.73	5.81	5.89	5.96	5.98	5.98	5.98	5.98	5.98	5.98	5.98
SPMUD (includes intensifications)	5.04	5.09	5.11	5.13	5.15	5.17	5.18	5.20	5.21	5.23	5.25	5.26	5.27	5.27
Total	17.79	17.93	18.05	18.17	18.27	18.36	18.46	18.49	18.51	18.52	18.54	18.55	18.56	18.56

Footnote:

a. Total Flow at Buildout includes 0.04 mgd of Current Flow applied to 2005 service area - PC

Appendix R TM 5a – Market Assessment for Recycled Water Distribution

Technical Memorandum

South Placer Regional Wastewater & Recycled Water Systems Evaluation Project

Subject:	**Market Assessment for Recycled Water Distribution System (TM 5a)**
Prepared For:	Art O'Brien – City of Roseville Ed Wydra – Placer County
Prepared by:	Mai-Tram Le Amanda Schmidt Glenn Hermanson
Reviewed by:	Dave Richardson
Date:	February 8, 2007; updated October 31, 2006, February 11, 2008, & September 3, 2009
Reference:	091-4.05

0 Previous TM Publication and Updates

Since the initial publication of technical memorandum (TM) 5a on February 8, 2007, changes in information available for the South Placer Wastewater and Recycled Water Systems Evaluation (Systems Evaluation), as well as changes in the data, have resulted in the need to identify and update out-of-date information. As part of the June 2007 publication of the Systems Evaluation, an Update Sheet was prepared for this TM, and is included in **Attachment E**. Subsequent changes have resulted in the need for further updates of the TM. The newest version of the TM is consistent with the updates summarized in the 2009 Update Sheet which is included in Attachment F.

1 Introduction

This recycled water market assessment TM documents the review of existing recycled water planning documents, verifies the current recycled water customers within the South Placer Wastewater Authority's (SPWA) regional service area, and identifies existing and future potential recycled water users as part of the South Placer Regional Wastewater and Recycled Water Systems Evaluation Project. The purpose of this evaluation is to provide a regional planning update of the existing City of Roseville's (City) recycled water studies.

This TM is organized as follows:

- Introduction
- Existing Recycled Water Customers
- Existing Near Future Recycled Water Customers
- Irrigation Demand Pattern
- Urban Growth Areas (UGAs)
- Demand and Supply Analysis
- Design Flowrates
- Bibliography

2 Existing Recycled Water Customers

Existing recycled water customers were identified based on a review of existing studies and discussions with City staff. From this review and discussion with City staff, there are ten existing recycled water customers. The location of these existing customers and the existing recycled water service area boundary is shown in **Figure 1** (Attachment A). The combined demand for these existing customers is approximately 6,526 acre-feet per year (AFY), and a peak (July) day demand of 8.51 mgd.

The first nine *existing recycled water customers* in **Table 1** use the recycled water for irrigation and therefore have a seasonal demand pattern. Demand No. 10 is to maintain a minimum effluent discharge requirement from the Dry Creek Wastewater Treatment Plant (DCWWTP). The California Department of Fish and Game (CDFG) has requested to discharge 4 mgd into Dry Creek year round to maintain flow in the creek. Three of the nine existing customers (Morgan Creek Golf Course, Woodcreek Golf Course, and Diamond Oaks Golf Course) have recycled water storage facilities (i.e., ponds) on-site. The Del Webb/Sun City Recycled Water System delivers to the Sun City Golf Course and Sun City streetscape. Customers are supplied recycled water from the recycled water pump station, and have on-site storage available for the golf course irrigation. The presence or lack of on-site storage can impact the design flowrate, which can be especially crucial during summer months; refer to Section 6 for a more detailed discussion of on-site storage.

Table 1: Existing Recycled Water Customers and Demands

No.	Existing Recycled Water Customer	Annual Demand (AFY)	Peaked for July Day? [h] (Y/N)	Peak Day (July) Demand (mgd)	Usage	On-Site Storage	Probable Source
1a	Sun City Golf Course [a]	589	Y	1.3	Irrigation	On-Site	Either [g]
1b	Sun City Streetscape [b]	58	Y	0.13	Irrigation	None	DCWWTP
2	Morgan Creek Golf Course [d]	565	Y	1.25	Irrigation	On-Site	DCWWTP
3	Woodcreek Oaks Golf Course [c]	408	Y	0.9	Irrigation	On-Site	Either [g]
4	Diamond Oaks Golf Course [d]	333	Y	0.74	Irrigation	On-Site	DCWWTP
5	Elliot Park [c]	29	Y	0.06	Irrigation	None	DCWWTP
6	Dry Creek WWTP Irrigation Demand [c]	18	Y	0.04	Irrigation	None	DCWWTP
7	Junction Blvd. Streetscape [c]	5	Y	0.01	Irrigation	None	DCWWTP
8	Pleasant Grove WWTP Irrigation [e]	18	Y	0.03	Irrigation	None	PGWWTP
9	Diamond Creek Ranch [e]	22	Y	0.05	Irrigation	None	DCWWTP
10	Dry Creek [f]	4,481	N	4	n/a	n/a	DCWWTP
	Total	**6,526**		**8.51**			

Footnotes:

a. Recycled water peak day demand for the Sun City Golf Course is 1.3 mgd based from billing records per Bryan Buchanan (City of Roseville), May 11, 2006.
b. The Sun City Streetscape demand is calculated by subtracting the Sun City Golf Course demand from the demand listed in Table 5-1 of the Recycled Water Distribution System Feasibility Study, April 2000.
c. Demands from Table 5-1 of Recycled Water Distribution System Feasibility Study, April 2000.
d. Demands from Table 5-2 of Recycled Water Distribution System Feasibility Study, April 2000.
e. Demands from Table 5-3 of Recycled Water Distribution System Feasibility Study, April 2000.
f. Per CDFG, a 4.0 mgd discharge to Dry Creek is required.
4,481 AFY = [(4.0 x 10^6 gal/d) x (365 d/y)] / 325,851 gal/AF.
g. "Either" indicates that plans are being prepared to supply these customers from either plant.
h. July Day includes a peaking factor of 2.5 times the average day demand.

3 Existing Near Future Recycled Water Customers

Existing near future recycled water customers are defined as currently developed areas that will be connected to the recycled water distribution system in the near future. These customers, shown in **Figure 2** (Attachment A), were identified based on the following:

- Review of existing recycled water study reports,
- Discussion with City staff, and
- Discussion with developers

Table 2 lists the annual and peak day delivery demands estimated for each of the identified *existing near future recycled water customers*. This table is an update of Table 5-2 and 5-3 of the Roseville Recycled Water Distribution System Feasibility Study, dated April 2000. The update was based on discussion with City staff to identify where the most feasible customers are located. Most of the customers will use

recycled water for irrigation purposes; Roseville Energy Park will use recycled water for non-contact cooling water. The majority of the future customers listed in Table 2 will be directly connected to the recycled water distribution system (i.e., no on-site storage). Large users (e.g., West Roseville Specific Plan, Roseville Energy Park, etc.) will be required to have their own storage facility to meet peak hour demands.

The Sierra View Country Club is an existing golf course located in Roseville, approximately two miles north of the downtown area. Although a recycled water demand of 1.1 mgd for this golf course had been assumed in the February 2007 publication of this TM, the golf course has since indicated to the City of Roseville that it no longer intends to accept any recycled water (per Art O'Brien, City of Roseville).

Recycled water will be delivered to Cherry Island Golf Course and Gibson Ranch via Dry Creek. The probable source of recycled water for each customer was based on the proximity to a particular WWTP and location of existing recycled water pipeline. An evaluation of one interconnected system versus two separate systems will be conducted in TM 5b: Alternatives Development & Evaluation Technical Memorandum.

Table 2: Existing Near Future Recycled Water Customers and Demands

No.	Existing [a] Near Future Recycled Water Customer	Annual Demand (AFY)	Peaked for July Day? [f] (Y/N)	Peak Day (July) Demand (mgd)	Usage	On-Site Storage	Probable Source
1	Cherry Island Golf Course and Soccer Complex	500	Y	1.1	Irrigation	On-Site	DCWWTP
2	Diamond Creek Park	100	Y	0.22	Irrigation	On-Site	DCWWTP
3	Diamond Oaks Park	22	Y	0.05	Irrigation	None	DCWWTP
4	Eskaton Retirement Community	25	Y	0.05	Irrigation	None	DCWWTP
5	Fiddyment Park (i.e. Veterans Memorial Park - Phase II)	45	Y	0.1	Irrigation	None	DCWWTP
6	Free Run Park	12	Y	0.03	Irrigation	None	DCWWTP
7	Gibson Ranch County Park [b]	1,303	Y	2.87	Irrigation	On-Site	DCWWTP
8	Homestead Elementary School	7	Y	0.02	Irrigation	None	DCWWTP
9	Homestead Park	48	Y	0.11	Irrigation	None	DCWWTP
10	HP Campus Current Landscaping	156	Y	0.34	Irrigation	None	DCWWTP
11	HP Rezone [c]	139	Y	0.31	Irrigation	None	DCWWTP
12	Roseville Energy Park [d]	1,774	N	1.58	Cooling Water	On-Site	PGWWTP
13	Sierra View Country Club [e]	0	n/a	0	n/a	n/a	n/a
14	West Roseville Specific Plan (WRSP)	1,750	Y	3.86	Irrigation	On-Site	PGWWTP
15	Woodcreek West Park (i.e. Bill Sanchee Park)	41	Y	0.09	Irrigation	None	DCWWTP
	Total	**5,922**		**10.73**			

Footnotes:

a. As of June 2004
b. Park will have a pond. The park also proposes to have recycled water from DCWWTP flow to Dry Creek as credit for diversion by the park downstream (i.e., Dry Creek will be used as a conveyance facility).
c. HP Mourier Water Projection, based on 9/19/05 Land Use Table.
d. Theoretical annual demand. No more than 1,100 gpm will be delivered to Roseville Energy Park. 1.58 mgd = (1,100 gpm) x (1,440 min/d); 1,774 AFY = (1.58 mgd).
e. Per conversation with Art O'Brien (City of Roseville) in August 2007.
f. July Day includes a peaking factor of 2.5 times the average day demand.

Rio Bravo Rocklin Power Plant currently uses water from Placer County Water Agency for their non-contact cooling processes. The feasibility of Rio Bravo to use recycled water was examined in a memorandum dated November 15, 2006. The memorandum, titled *Feasibility of Recycled Water Service to Rio Bravo Rocklin*, concluded that, under current water supply strategies, it would be economically infeasible to serve recycled water to Rio Bravo. Rio Bravo Rocklin will therefore not be included as a recycled water customer. The November 15, 2006 memorandum is included in **Attachment B**.

4 Irrigation Demand Pattern

Nearly all of the *existing* and *future recycled water customers* will be using recycled water for irrigation purposes. The irrigation demand pattern is an important factor to be considered when evaluating an existing recycled water distribution system and for planning expansions to the distribution system.

Typical local irrigation demands by month are shown in **Table 3**. Evapotranspiration rates are from the California Irrigation Management Information System (CIMIS) database. The precipitation data shown is based on 1850-1998 historical data for Sacramento collected by the California Department of Water Resources (DWR). Irrigation demand for turf grasses is calculated using the following equation (HydroScience, 2000):

$$ID = \frac{(ET - Pe_p)l_r}{e_i}$$

Where:

ID = Irrigation demand in inches

ET = Evapotranspiration for turf grasses in the City

P = Average precipitation, DWR

E_p = Precipitation irrigation efficiency, 0.8. Assumes 20% of rainfall during growing season is lost to evaporation, runoff, etc.

l_r = Loss rate, equal to 1.1 This assumes that approximately 10% of the applied water passes through the grass root zone and it lost.

e_t = Irrigation efficiency, equal to 0.8 to 0.9 depending on season. This assumes that 10 to 20% of the applied irrigation is lost to evaporation.

For additional details on the evapotranspiration and irrigation demand calculations, refer to the Roseville Recycled Water Distribution System Feasibility Study, dated April 2000.

Table 3: Typical Local Irrigation Demands [a]

Month	ET-Turf Grass (inches)	Precipitation (inches)	Irrigation Demand (inches)	Percentage of Annual Irrigation Demand
January	0.88	3.57	0.0	0%
February	1.36	3.24	0.0	0%
March	2.48	2.45	0.6	1%
April	3.76	1.52	3.3	8%
May	4.96	0.71	5.7	13%
June	6.16	0.24	8.0	18%
July	6.80	0.02	9.2	21%
August	5.84	0.04	8.0	18%
September	4.48	0.24	5.8	13%
October	2.96	0.97	2.8	6%
November	1.28	1.68	0.0	0%
December	0.80	3.63	0.0	0%
Total	**41.76**	**18.31**	**43.4**	**100%**

Footnotes:

a. Demands from Table 4-1 of Recycled Water Distribution System Feasibility Study, April 2000.

The highest irrigation demand occurs in July; at 9.2 inches, this demand is used to determine July day demand. July day demand for irrigation purposes is 2.5 times the annual demand and is determined by:

$$\frac{43.4}{12} \times 2.5 = 9.2$$

In the months of November through February, negative irrigation demand values were deemed as zero irrigation demand. Irrigation demand is not projected during those months.

5 Urban Growth Areas

Urban growth areas (UGAs) west of the City of Roseville are deemed *future potential recycled water customers*. Due to topography, it was determined that, at the time this TM was prepared, it would not be cost effective to serve recycled water to areas east of Highway 65 and Interstate 80 in the City of Roseville. All UGAs west of the City of Roseville are listed in **Table 4** and shown in **Figure 3** (Attachment A). The City's policy for providing recycled water to UGAs, developed as part of this TM, is described below.

5.1 UGA Recycled Water Supply Policy

The City will only commit to providing a UGA with a supply of recycled water equal to the amount of wastewater that is generated by the UGA during July ADWF conditions. This supply is henceforth referred to as the "committed [recycled water] supply." In order to provide capability for serving demands that may exceed the committed supply, UGAs accepting recycled water are required to provide storage facilities capable of storing one July day demand (i.e., the total volume of water required to meet demands over a 24-hour period in July). If a UGA's July day demand (or storage volume) exceeds the

committed supply, the difference may be met with supplemental supplies, which may include the following:

- Additional available recycled water
- Untreated groundwater
- Potable water supplies

Table 4: Urban Growth Area Recycled Water Customers and Demands

Urban Growth Area (UGA) Customer	UGA Size (acres)	RW Project Size (acres)	Annual Demand (AFY)	Peaked for July Day [g]	Peak Day (July) Demand (mgd)	Committed Supply [Assumed ADWF] (mgd)	On-Site Storage	Probable Source
Brookfield [a]	683	211	420	Yes	0.94	0.73	On-Site	PGWWTP
Creekview & Panhandle [b]	749	250	562	Yes	1.25	1.06	On-Site	PGWWTP
Curry Creek [c]	3,212	728	1,860	Yes	4.11	2.69	On-Site	PGWWTP
Regional University [d]	1,140	543	772	Yes	1.72	1.17	On-Site	PGWWTP
Placer Ranch [e]	2,213	398	1,494	Yes	3.34	2.17	On-Site	PGWWTP
Placer Vineyards [f]	5,148	386	1,580	Yes	3.50	2.81	On-Site	Either [h]
Sierra Vista [i]	1,785	280	1,074	Yes	2.46	2.10	On-Site	PGWWTP
Total	**14,930**	**2,796**	**7,762**		**17.32**	**12.76**		

Footnotes:

a. Annual demand and project size estimated by RMC based on UGA size, recycled water project size, and annual demand of neighboring UGAs.
b. Table 2-3, Recycled Water Study for Creekview by Wood Rodgers, July 2007. "Panhandle" refers to a 238-acre portion of Reason Farms adjacent to Creekview. Demand projections include University Campus demand (250 AFY). If Job Center is included instead of University Campus, 250 AFY would be replaced by 189 AFY. Project size includes the sum of all recycled water customer sites.
c. Annual demand and project size estimated by RMC based on UGA size, recycled water project size, and annual demand of neighboring UGAs.
d. Table 3, Recycled Water Master Plan for Regional University, West Yost Associates, December 2006.
e. Table 3-2, Section 2.3, Placer Ranch Recycled Water Study by Hydroscience Engineers, July 2006.
f. Table 3-6, Placer Vineyards Specific Plan Recycled Water Master Plan, Brown and Caldwell, April 2006.
g. July Day includes peaking factor of 2.5 times the average day demand.
h. "Either" indicates that plans are being prepared to supply these customers from either plant.
i. Table 3-1, Draft Sierra Vista Recycled Water Master Plan by HydroScience Engineers, July 2007.

6 Demand and Supply Analysis

As described, the City will commit to supplying the UGAs with a daily volume of recycled water equal to the amount of wastewater generated by the UGA on an average day in July. If a UGA's July day demand exceeds the committed supply, the difference may be met with supplemental supplies, which may include additional available recycled water, untreated groundwater or potable water supplies, as described in Section 5.1. A breakdown of the amount of recycled water delivered per month is included in **Attachment C**.

Recycled water is produced and distributed from both wastewater treatment plants; and it has been determined that each UGA receive recycled water from the WWTP that it sends its wastewater. The majority of recycled water currently delivered from the DCWWTP goes to customers in the PGWWTP sewershed, therefore a supply balance is needed between DCWWTP and PGWWTP. A summary of July

day demands for all the recycled water customers and the location of the supply are found in **Attachment D**.

Three supply scenarios were evaluated to determine the best balance of demand and supply along with the most appropriate wastewater treatment plant to supply each UGA. As shown in Tables 1 and 4, Woodcreek and Sun City Golf Courses could be supplied by either plant along with the potential for Placer Vineyards to also be supplied by either plant. Detailed analyses of each of these scenarios is provided in Attachment D and summarized as follows:

- **Scenario A**: Woodcreek and Sun City Golf Courses are supplied from DCWWTP and Placer Vineyards is supplied from PGWWTP.
- **Scenario B**: Woodcreek and Sun City Golf Courses along with Placer Vineyards are supplied from DCWWTP.
- **Scenario C**: Woodcreek and Sun City Golf Courses are supplied from PGWWTP and Placer Vineyards is supplied from DCWWTP.

A summary of this analysis is included in **Table 5**.

Table 5: Summary of Supply Scenario Analyses

	DCWWTP		PGWWTP	
Scenario	Demand/Available Supply	Committed Supply/Available Supply	Demand/Available Supply	Committed Supply/Available Supply
A	76%	76%	92%	74%
B	95%	91%	78%	62%
C	83%	80%	87%	71%

Footnote: DCWWTP available supply is 18.18 mgd; PGWWTP available supply is 24.80 mgd. These supplies reflect the 2005 Regional Service Area boundary at 2050, plus UGAs. Rezones, intensification, and flows beyond 2050 are not included.

Results of the supply availability analysis indicate there is not adequate supply of recycled water at the DCWWTP in Alternative B. The ratio of demand to available supply in Alternative A was above 90% and deemed too high. Alternative C will operate by connecting Woodcreek Oaks Golf Course and Sun City Golf Course to the Pleasant Grove recycled water shed. Placer Vineyards, the Sun City streetscape, and other existing DCWWTP customers will be supplied recycled water from DCWWTP. Woodcreek Oaks Golf Course, Sun City Golf Course, West Roseville Specific Plan, and the remaining UGAs will be supplied by PGWWTP.

Based on the results of this analysis, Scenario C provides the best balance of supply and demand. This Scenario is summarized in **Table 6**.

Table 6: Summary of Scenario C

Customer Category	July Day Demand (mgd)	July Day Committed Supply (mgd)	July Day Available Supply (mgd)
DCWWTP			
Existing [a]	6.28	6.28	
Near Future	5.29	6.35	
UGAs [b]	3.50	2.81	
Totals [c]	**15.07**	**14.38**	**18.18**
PGWWTP			
Existing [a]	2.23	2.23	
Near Future	5.44	5.44	
UGAs [b]	13.82	9.95	
Totals [c,d]	**21.49**	**17.62**	**24.80**

Footnotes:

a. As of June 2004. Assumes that Sun City Golf Course and Woodcreek Oaks Golf Course are supplied by PGWWTP.
b. Assumes Placer Vineyards is supplied by DCWWTP.
c. Includes development through 2050, excluding rezones and intensification (i.e., NOT buildout).
d. Includes Brookfield flows.

7 Design Flowrates

7.1 Irrigation Design Flowrates

Design flowrates are a combination of irrigation and non-irrigation flowrates. For the purposes of evaluating the existing recycled water distribution system and sizing the expansion of the distribution system, it will be assumed that irrigation occurs evenly throughout the month of July, and that the July day irrigation demand is equal to the average day demand times 2.5. This assumption is reasonable when considering the conservatism of the irrigation demand equation presented in Section 4.

For customers with on-site storage, the July day irrigation demand is spread evenly over 24 hours as the storage tank/pond is filled throughout the day. The peak hour demand is the July day demand divided by 24. Customers without storage facilities will be delivered recycled water during the 9-hour irrigation period. The peak hour demand for non-storage customers is determined by multiplying the daily irrigation demand by 2.67 (2.67 = 24/9), as the entire 24-hour volume of irrigation water is applied in a 9-hour period. In the future it may be necessary to restrict storage filling operations to occur only during the non-irrigation periods of the day; at this time, however, that level of demand management is not necessary.

7.2 Non-Irrigation (Industrial) Flowrates

The only customer that will use recycled water for non-irrigation purposes is the Roseville Energy Park; instead, recycled water will be used for industrial purposes. It is assumed that the Roseville Energy Park will use an equal amount year-round. The annual volume of recycled water is divided by 12 to obtain monthly volume, or divided by 365 to obtain daily volume. It is understood that power plant demands can

fluctuate; due to a lack of detailed information, however, the simplifying assumptions described above were made.

7.3 Pumping Demand

The pumping demands during the irrigation period along with the hourly peaking factor for all three scenarios are presented in **Attachment D**. A summary of those demands for Scenario C is presented in **Table 7**.

Table 7: Pumping Demands

Customer Category	Customer	Pump Station Demand During Irrigation Period (gpm)	Peaked Hourly? (Y/N)	Peaking Factor
DCWWTP				
Existing Customers	Dry Creek	0 [a]	N	0
	Diamond Oaks Golf Course	514	N	1
	Morgan Creek Golf Course	868 [b]	N	1
	Sun City Streetscape and parks	244	Y	2.7
	Elliot Park	113	Y	2.7
	Dry Creek WWTP	28	N	1
	Junction Streetscape	19	Y	2.7
	Diamond Creek Ranch	94	Y	2.7
	Subtotal	**1,878**		
Existing Near Future Customers	Cherry Island Golf Course and Soccer Complex	0 [a]	N	1
	Diamond Creek Park	413	Y	2.7
	Diamond Oaks Park	94	Y	2.7
	Eskaton Retirement Community	94	Y	2.7
	Fiddyment Park (Vets Mem II)	188	Y	2.7
	Free Run Park	56	Y	2.7
	Gibson Ranch Park	0 [a]	N	1
	Homestead Elementary School	38	Y	2.7
	Homestead Park	206	Y	2.7
	HP Campus Existing Landscape	638	Y	2.7
	HP Rezone	581	Y	2.7
	Sierra View Country Club	0	n/a	n/a
	Woodcreek West Park	169	Y	2.7
	Subtotal	**2,475**		
UGAs	Placer Vineyards	2,431 [b]	N	1
	Subtotal	**2,431**		
	Total	**6,784**		
PGWWTP				
Existing Customers	Woodcreek Golf Course	625	N	1
	Sun City Golf Course	903	N	1
	Pleasant Grove WWTP	21	N	1
	Subtotal	**1,549**		
Existing Near Future Customers	Roseville Energy Park	1,097	N	1
	West Roseville Specific Plan (WRSP)	2,681	N	1
	Subtotal	**3,778**		

Customer Category	Customer	Pump Station Demand During Irrigation Period (gpm)	Peaked Hourly? (Y/N)	Peaking Factor
UGAs	Placer Ranch	2,319	N	1
	Regional University	1,194	N	1
	Sierra Vista	1,708	N	1
	Creekview	868	N	1
	Curry Creek	2,854	N	1
	Brookfield & University	653	N	1
	Subtotal	**9,597**		
	Total	**14,924**		

Footnote:

a. Pumping demands for Dry Creek, Cherry Island, and Gibson Ranch are zero because these demands are conveyed via the creek.
b. Recycled water is not pumped at DCWWTP to serve Morgan Creek Golf Course and Placer Vineyards. Recycled water flows via gravity from the pump station wet well through a 24" recycled water pipe parallel to Dry Creek.

8 Bibliography

Brown and Caldwell. Placer Vineyards Blueprint Alternative Recycled Water Master Plan. August 2006.

California Energy Commission. Roseville Energy Park Commission Decision. April 2005.

HydroScience Engineers. City of Roseville Recycled Water Distribution System Feasibility Study. April 2000.

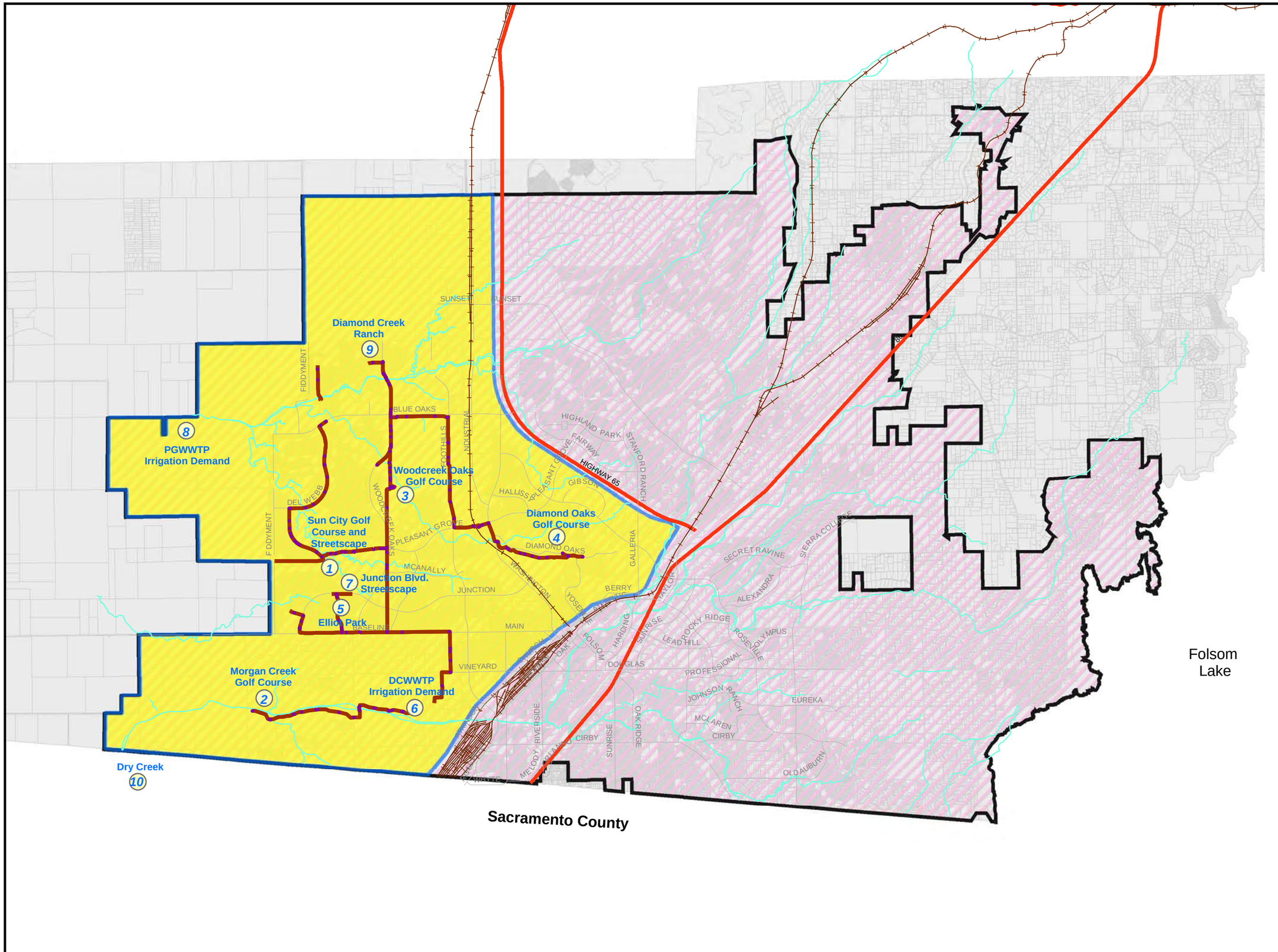
HydroScience Engineers. Placer Ranch Recycled Water Study. November 2006.

HydroScience Engineers. Recycled Water Study for West Roseville Specific Plan Area. May 2003.

West Yost Associates. Recycled Water Master Plan for Regional University. December 2006.

Attachment A

TM Figures



LEGEND

- 2005 Systems Evaluation Project Proposed Regional Service Area Boundary
- Existing Study Area for Recycled Water Distribution System
- Parcels
- Recycled Water Pipes
- Recycled Water Valves
- 9 Existing Recycled Water Customers
- Railroads
- Highways
- Major Roads
- Streams & Creeks

Figure 1

Existing Study Area and Customers for the Recycled Water Distribution System

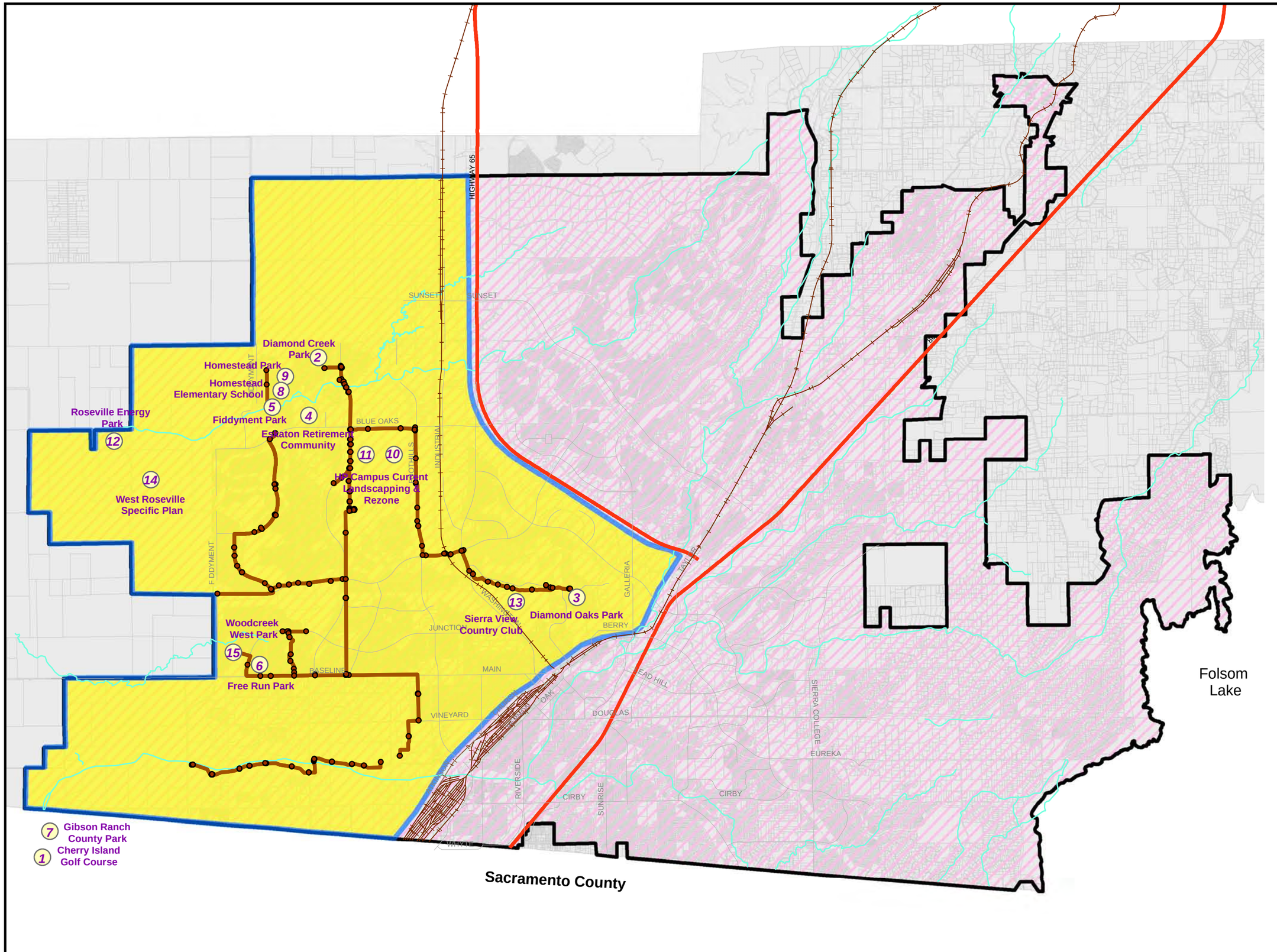
SOUTH PLACER WASTEWATER AUTHORITY

Regional Wastewater and Recycled Water Systems Evaluation Project

N W E S

Miles

0 0.5 1 2



LEGEND

- 2005 Systems Evaluation Project Proposed Regional Service Area Boundary
- Existing Study Area for Recycled Water Distribution System
- Parcels
- Existing Recycled Water Distribution System
- 9 Existing Near Future Recycled Water Customers
- Railroads
- Highways
- Major Roads
- Streams & Creeks

Figure 2

Existing Near Future and Potential Customers for the Recycled Water Distribution System

SOUTH PLACER WASTEWATER AUTHORITY

Regional Wastewater and Recycled Water Systems Evaluation Project

N
W E
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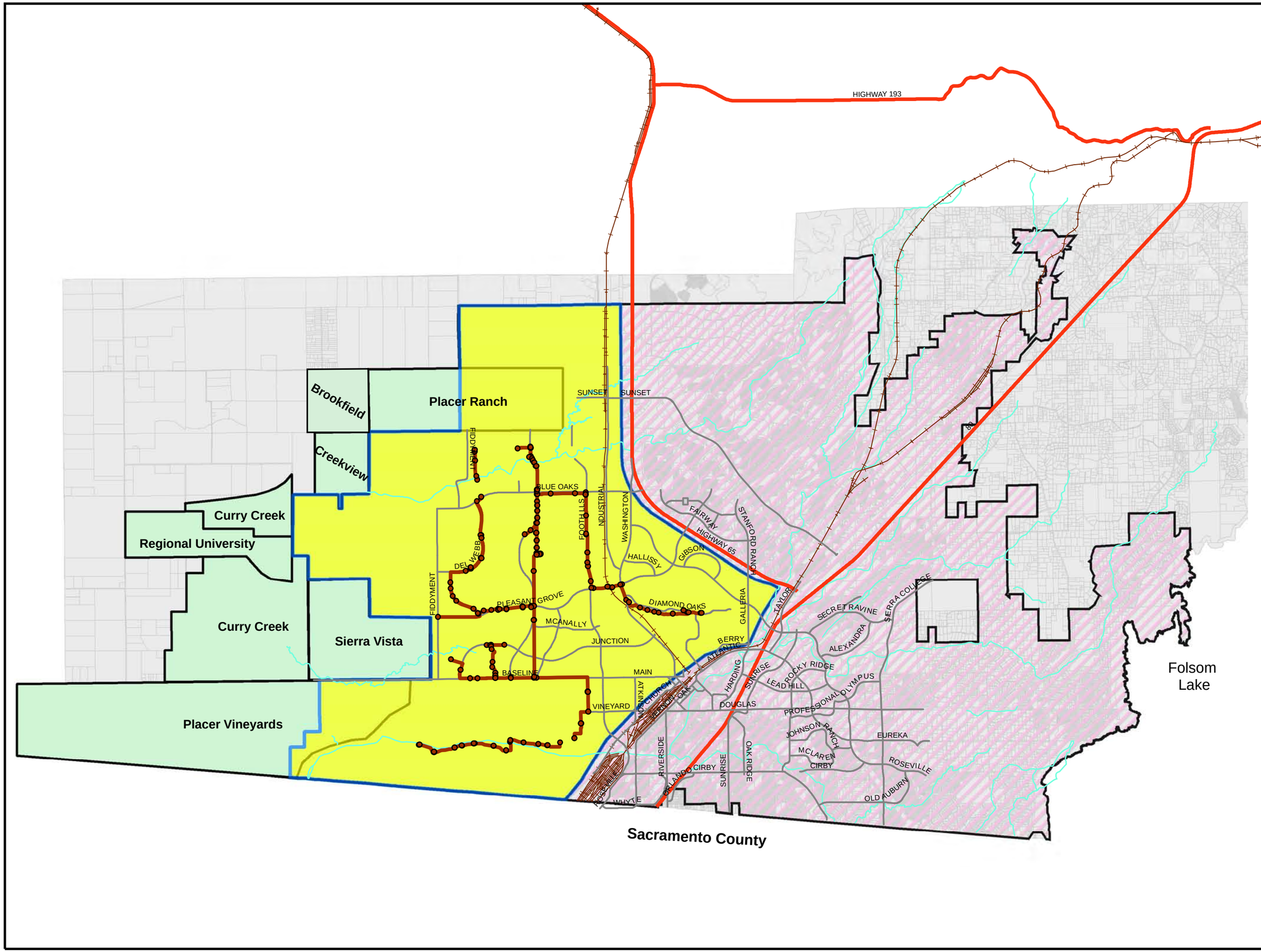


LEGEND

- 2005 Systems Evaluation Project Proposed Regional Service Area Boundary
- Existing Study Area for Recycled Water Distribution System
- Future Addition to Existing Study Area for Recycled Water Distribution System
- Parcels
- Existing Recycled Water Distribution System
- Railroads
- Highways
- Major Roads
- Streams & Creeks

Figure 3

Future Study Area for Recycled Water Distribution System

SOUTH PLACER WASTEWATER AUTHORITY

Regional Wastewater and Recycled Water Systems Evaluation Project

N
W E
S

Miles

0 0.5 1 2

Attachment B

Feasibility of Recycled Water Service to Rio Bravo
Memorandum, November 15, 2006

CITY OF ROSEVILLE CALIFORNIA

Memorandum

Environmental Utilities – Recycled Water

To: Derrick Whitehead, *Director Environmental Utilities*
Art O'Brien, *Wastewater Utility Manager*

From: Bryan Buchanan, *Senior Engineer*

Date: November 15, 2006

Subject: Feasibility of Recycled Water Service to Rio Bravo Rocklin

City staff met with Jack Snider, Manager of the Rio Bravo Rocklin Ultra Power facility on September 8, 2006. Information obtained from that meeting was used to analyze the feasibility of converting the Rio Bravo Rocklin Ultra Power facility from potable cooling water to recycled water.

Currently Rio Bravo utilizes potable water from PCWA for industrial cooling The cooling water is used in two towers and runs through approximately 10cycles before it is blown down and replaced with a fresh supply The trigger for blowing down cooling water is a TDS of approximately 2000ppm. Since TDS is the controlling factor in blowing down and replacing cooling water, it is logical that if higher TDS source water were used, there would be an increase in water usage equal to the ratio of TDS. The TDS of PCWA water in that area is approximately 47ppm TDS of City recycled water is approximately 375ppm This translates to an increased demand of 8X. Rio Bravo had an August 2006 demand of 14,603CCF or 352,356gallons per day. Following this rationale, the approximate August day demand for recycled water is 2.8mg.

Rio Bravo discharges high TDS blow down that does not evaporate to the sanitary sewer Under current operations approximately 15,000gallons/day is discharged to the sanitary sewer. Again, using the previous reasoning, there would be an increase of approximately 105,000gallons/day of discharge to the sanitary sewer. Using the City's Municipal Code to calculate the regional sewer connection fee for low strength dischargers, 105,000gallons/day is 329sewer units. At $5,500per unit, the regional sewer connection fee would be $1 8million.

To provide for system reliability and peaking capacity on the Rio Bravo site, a storage tank equal to one peak day demand is advisable. Assuming $0.60/gallon for the capital cost of a storage tank, the on-site tank would cost approximately 2.8mg x $0.60/gallon = $1 68million

The cost to provide recycled water to the Rio Bravo Power Facility has two components, the up front capital cost and the increased monthly cost of using recycled water The up front capital cost is

Storage Tank.....	$1,680,000
Sewer Connection Fee.....	$1,800,000

Distribution Main to Serve.	$2,000,000 ???
Total...	$5,480,000

There is also an increase in the monthly utility charge between potable and recycled water due to the increase in demand. Assuming average day demand = peak day / 1 5 and operating 344days per year, the annual recycled water demand would be approximately 2,000acre-ft. Assuming the PCWA commodity rate for potable water is 20% higher than the City's potable rate and using the City's current rate for recycled water, there would be an annual increase of $138,000 for using recycled water.

The Rio Bravo Manager has indicated that the company policy requires a 24month return on investment to justify a capital expenditure. Coupled with the fact the actual monthly metered water charge for recycled water will likely be greater than the commodity rate currently charged by PCWA, it is unlikely Rio Bravo would be willing to fund this conversion

Spending $5,480,000 to add a 2,000AF/year customer is $2,740/AF. This is well above the $418/AF the City currently pays for potable water supply There may be other factors making conversion of Rio Bravo more attractive. A power plant is an ideal year round recycled water customer. Unfortunately it does not appear feasible converting Rio Bravo to recycled water.

Rio Bravo Rocklin - Ultra Power

Cooling Water Demand	Source	Source TDS ppm	Reject TDS ppm	Average Daily	Rate $/AF	Annual Cost 344days	Increase
Current Cooling Water Usage	PCWA	47	2,000	234,904	240	$59,521	
Proposed City Recycled Water	Roseville	375	2,000	1,874,234	100	$197,876	**$138,355**

Connection Fee for Increased Discharge	Current (gpd)	Proposed (gpd)	Increase (gpd)	0-25k gal unit=/250gpd	25k - 75k unit=/325gpd	75k - 105k unit=/400gpd	Total Units	Connection Fee $5500/unit
Discharge Increase	15,000	119,681	105,000	100	154	75	329	**$1,808,654**
Storage for Reliability	Peak Day	2.8mg	@0.60 / gal	**$1,680,000**				

Assumptions:

Ave day = peak day / 1.5
Peak month - Aug06 - 14,603ccf
Peak day = 14,600 * 100 * 7.48 / 31

Attachment C

Urban Growth Area
Annual Demand Breakdown

Curry Creek					
Month	Percent of Annual Demand	Recycled Water Demand (AF)	Recycled Water Demand (MG)	Committed Supply (MG)	Recycled Water Provided (MG)
Jan	0.00	0	0	84	0
Feb	0.00	0	0	76	0
Mar	1.38	26	8	84	8
Apr	7.60	141	46	82	46
May	13.13	244	80	84	80
Jun	18.43	343	112	82	82
Jul	21.20	394	128	84	84
Aug	18.43	343	112	84	84
Sep	13.36	248	81	82	81
Oct	6.45	120	39	84	39
Nov	0.00	0	0	82	0
Dec	0.00	0	0	84	0
	Totals	**1,860**	**606**	**993**	**504**

Regional University					
Month	Percent of Annual Demand	Recycled Water Demand (AF)	Recycled Water Demand (MG)	Committed Supply (MG)	Recycled Water Provided (MG)
Jan	0.00	0	0	36	0
Feb	0.00	0	0	33	0
Mar	1.38	11	3	36	3
Apr	7.60	59	19	35	19
May	13.13	101	33	36	33
Jun	18.43	142	46	35	35
Jul	21.20	164	53	36	36
Aug	18.43	142	46	36	36
Sep	13.36	103	34	35	34
Oct	6.45	50	16	36	16
Nov	0.00	0	0	35	0
Dec	0.00	0	0	36	0
	Totals	**772**	**252**	**427**	**212**

Placer Ranch					
Month	Percent of Annual Demand	Recycled Water Demand (AF)	Recycled Water Demand (MG)	Committed Supply (MG)	Recycled Water Provided (MG)
Jan	0.00	0	0	67	0
Feb	0.00	0	0	61	0
Mar	1.38	21	7	67	7
Apr	7.60	114	37	65	37
May	13.13	196	64	67	64
Jun	18.43	275	90	65	65
Jul	21.20	317	103	67	67
Aug	18.43	275	90	67	67
Sep	13.36	200	65	65	65
Oct	6.45	96	31	67	31
Nov	0.00	0	0	65	0
Dec	0.00	0	0	67	0
	Totals	**1,494**	**487**	**792**	**403**

Placer Vineyards					
Month	Percent of Annual Demand	Recycled Water Demand (AF)	Recycled Water Demand (MG)	Committed Supply (MG)	Recycled Water Provided (MG)
Jan	0.00	0	0	87	0
Feb	0.00	0	0	79	0
Mar	1.38	22	7	87	7
Apr	7.60	120	39	84	39
May	13.13	207	68	87	68
Jun	18.43	291	95	84	84
Jul	21.20	335	109	87	87
Aug	18.43	291	95	87	87
Sep	13.36	211	69	84	69
Oct	6.45	102	33	87	33
Nov	0.00	0	0	84	0
Dec	0.00	0	0	87	0
	Totals	**1,580**	**515**	**1,026**	**474**

Creekview & Panhandle					
Month	Percent of Annual Demand	Recycled Water Demand (AF)	Recycled Water Demand (MG)	Committed Supply (MG)	Recycled Water Provided (MG)
Jan	0.00	0	0	33	0
Feb	0.00	0	0	30	0
Mar	1.38	8	3	33	3
Apr	7.60	43	14	32	14
May	13.13	74	24	33	24
Jun	18.43	104	34	32	32
Jul	21.20	119	39	33	33
Aug	18.43	104	34	33	33
Sep	13.36	75	24	32	24
Oct	6.45	36	12	33	12
Nov	0.00	0	0	32	0
Dec	0.00	0	0	33	0
	Totals	**562**	**183**	**387**	**175**

Brookfield					
Month	Percent of Annual Demand	Recycled Water Demand (AF)	Recycled Water Demand (MG)	Committed Supply (MG)	Recycled Water Provided (MG)
Jan	0.00	0	0	23	0
Feb	0.00	0	0	20	0
Mar	1.38	6	2	23	2
Apr	7.60	32	10	22	10
May	13.13	55	18	23	18
Jun	18.43	77	25	22	22
Jul	21.20	89	29	23	23
Aug	18.43	77	25	23	23
Sep	13.36	56	18	22	18
Oct	6.45	27	9	23	9
Nov	0.00	0	0	22	0
Dec	0.00	0	0	23	0
	Totals	**420**	**137**	**266**	**125**

Sierra Vista					
Month	Percent of Annual Demand	Recycled Water Demand (AF)	Recycled Water Demand (MG)	Committed Supply (MG)	Recycled Water Provided (MG)
Jan	0.00	0	0	65	0
Feb	0.00	0	0	59	0
Mar	1.38	15	5	65	5
Apr	7.60	82	27	63	27
May	13.13	141	46	65	46
Jun	18.43	198	64	63	63
Jul	21.20	228	74	65	65
Aug	18.43	198	64	65	64
Sep	13.36	143	47	63	47
Oct	6.45	69	23	65	23
Nov	0.00	0	0	63	0
Dec	0.00	0	0	65	0
	Totals	**1,074**	**350**	**767**	**340**

Attachment D

Irrigation Demand Period Pumping Demands and Hourly Peaking Factors

Customer Category	Customer	Peaked Hourly? (Y/N)	July Day Demand (mgd)	Committed Supply [ADWF] (mgd)
Existing Customers	Dry Creek	N	4.00	
	Woodcreek Golf Course	N	0.90	
	Diamond Oaks Golf Course	N	0.74	
	Morgan Creek Golf Course	N	1.25	
	Sun City Golf Course	N	1.30	
	Sun City Streetscape and parks	Y	0.13	
	Elliot Park	Y	0.06	
	Dry Creek WWTP	N	0.04	
	Pleasant Grove WWTP	N	0.03	
	Junction Streetscape	Y	0.01	
	Diamond Creek Ranch	Y	0.05	
	Subtotal		**8.51**	**8.51**
Existing Near Future Customers	Cherry Island Golf Course and Soccer Complex	N	1.10	
	Diamond Creek Park	Y	0.22	
	Diamond Oaks Park	Y	0.05	
	Eskaton Retirement Community	Y	0.05	
	Fiddyment Park (Vets Mem II)	Y	0.10	
	Free Run Park	Y	0.03	
	Gibson Ranch Park	N	2.87	
	Homestead Elementary School	Y	0.02	
	Homestead Park	Y	0.11	
	HP Campus Existing Landscape	Y	0.34	
	HP Rezone	Y	0.31	
	Roseville Energy Park	N	1.58	
	Sierra View Country Club	N	0.00	
	West Roseville Specific Plan (WRSP)	N	3.86	
	Woodcreek West Park	Y	0.09	
	Subtotal		**10.73**	**10.73**
UGAs	Placer Vineyards	N	3.50	2.81
	Placer Ranch	N	3.34	2.17
	Regional University	N	1.72	1.16
	Sierra Vista	N	2.46	2.10
	Creekview & Panhandle	N	1.25	1.06
	Curry Creek	N	4.11	2.72
	Brookfield & University	N	0.94	0.73
	Subtotal		**17.32**	**12.75**
	Total		**36.56**	**31.99**

Scenario A

Customer Category	Customer	July Day Demand (mgd)	Committed Supply [ADWF] (mgd)	Pump Station Demand During Irrigation Period (gpm)	Peaked Hourly? (Y/N)	Peaking Factor
DCWWTP (17.43 mgd)						
Existing Customers	Dry Creek	4.00		0	N	0
	Woodcreek Golf Course	0.90		625	N	1
	Diamond Oaks Golf Course	0.74		514	N	1
	Morgan Creek Golf Course	1.25		868	N	1
	Sun City Golf Course	1.30		903	N	1
	Sun City Streetscape and parks	0.13		244	Y	2.7
	Elliot Park	0.06		113	Y	2.7
	Dry Creek WWTP	0.04		28	N	1
	Junction Streetscape	0.01		19	Y	2.7
	Diamond Creek Ranch	0.05		94	Y	2.7
	Subtotal	**8.48**	**8.48**	**3,313**		
Existing Near Future Customers	Cherry Island Golf Course and Soccer Complex	1.10		0	N	1
	Diamond Creek Park	0.22		413	Y	2.7
	Diamond Oaks Park	0.05		94	Y	2.7
	Eskaton Retirement Community	0.05		94	Y	2.7
	Fiddyment Park (Vets Mem II)	0.10		188	Y	2.7
	Free Run Park	0.03		56	Y	2.7
	Gibson Ranch Park	2.87		0	N	1
	Homestead Elementary School	0.02		38	Y	2.7
	Homestead Park	0.11		206	Y	2.7
	HP Campus Existing Landscape	0.34		638	Y	2.7
	HP Rezone	0.31		581	Y	2.7
	Sierra View Country Club	0.00		0	N	1
	Woodcreek West Park	0.09		169	Y	2.7
	Subtotal	**5.29**	**5.29**	**2,475**		
	Total	**13.77**	**13.77**	**5,788**		
	% of Supply	**79.0%**	**79.0%**			
PGWWTP (24.74 mgd)						
Existing Customers	Pleasant Grove WWTP	0.03		21	N	1
	Subtotal	**0.03**	**0.03**	**21**		
Existing Near Future Customers	Roseville Energy Park	1.58		1,097	N	1
	West Roseville Specific Plan (WRSP)	3.86		2,681	N	1
	Subtotal	**5.44**	**5.44**	**3,778**		
UGAs	Placer Vineyards	3.50	2.81	2,431	N	1
	Placer Ranch	3.34	2.17	2,319	N	1
	Regional University	1.72	1.17	1,194	N	1
	Sierra Vista	2.46	2.10	1,708	N	1
	Creekview & Panhandle	1.25	1.06	868	N	1
	Curry Creek	4.11	2.72	2,854	N	1
	Brookfield & University	0.94	0.73	653	N	1
	Subtotal	**17.32**	**12.76**	**12,028**		
	Total	**22.79**	**18.23**	**15,826**		
	% of Supply	**92.1%**	**73.7%**			

Scenario B

Customer Category	Customer	July Day Demand (mgd)	Committed Supply [ADWF] (mgd)	Pump Station Demand During Irrigation Period (gpm)	Peaked Hourly? (Y/N)	Peaking Factor
DCWWTP (17.43 mgd)						
Existing Customers	Dry Creek	4.00		0	N	0
	Woodcreek Golf Course	0.90		625	N	1
	Diamond Oaks Golf Course	0.74		514	N	1
	Morgan Creek Golf Course	1.25		868	N	1
	Sun City Golf Course	1.30		903	N	1
	Sun City Streetscape and parks	0.13		244	Y	2.7
	Elliot Park	0.06		113	Y	2.7
	Dry Creek WWTP	0.04		28	N	1
	Junction Streetscape	0.01		19	Y	2.7
	Diamond Creek Ranch	0.05		94	Y	2.7
	Subtotal	**8.48**	**8.48**	**3,406**		
Existing Near Future Customers	Cherry Island Golf Course and Soccer Complex	1.10		0	N	1
	Diamond Creek Park	0.22		413	Y	2.7
	Diamond Oaks Park	0.05		94	Y	2.7
	Eskaton Retirement Community	0.05		94	Y	2.7
	Fiddyment Park (Vets Mem II)	0.10		188	Y	2.7
	Free Run Park	0.03		56	Y	2.7
	Gibson Ranch Park	2.87		0	N	1
	Homestead Elementary School	0.02		38	Y	2.7
	Homestead Park	0.11		206	Y	2.7
	HP Campus Existing Landscape	0.34		638	Y	2.7
	HP Rezone	0.31		581	Y	2.7
	Sierra View Country Club	0.00		0	N	1
	Woodcreek West Park	0.09		169	Y	2.7
	Subtotal	**5.29**	**5.29**	**2,475**		
UGAs	Placer Vineyards	3.50	2.81	2,431	N	1
	Subtotal	**3.50**	**2.81**	**2,431**		
	Total	**17.27**	**16.58**	**8,312**		
	% of Supply	**99.1%**	**95.1%**			
PGWWTP (24.74 mgd)						
Existing Customers	Pleasant Grove WWTP	0.03		21	N	1
	Subtotal	**0.03**	**0.03**	**21**		
Existing Near Future Customers	Roseville Energy Park	1.58		1,097	N	1
	West Roseville Specific Plan (WRSP)	3.86		2,681	N	1
	Subtotal	**5.44**	**5.44**	**3,778**		
UGAs	Placer Ranch	3.34	2.17	2,319	N	1
	Regional University	1.72	1.16	1,194	N	1
	Sierra Vista	2.46	2.10	1,708	N	1
	Creekview & Panhandle	1.25	1.06	868	N	1
	Curry Creek	4.11	2.72	2,854	N	1
	Brookfield & University	0.94	0.73	653	N	1
	Subtotal	**13.82**	**9.94**	**9597**		
	Total	**19.29**	**15.41**	**13,396**		
	% of Supply	**78.0%**	**62.3%**			

Scenario C

Customer Category	Customer	July Day Demand (mgd)	Committed Supply [ADWF] (mgd)	Pump Station Demand During Irrigation Period (gpm)	Peaked Hourly? (Y/N)	Peaking Factor
DCWWTP (17.43 mgd)						
Existing Customers	Dry Creek	4.00		0	N	0
	Diamond Oaks Golf Course	0.74		514	N	1
	Morgan Creek Golf Course	1.25		868	N	1
	Sun City Streetscape and parks	0.13		244	Y	2.7
	Elliot Park	0.06		113	Y	2.7
	Dry Creek WWTP	0.04		28	N	1
	Junction Streetscape	0.01		19	Y	2.7
	Diamond Creek Ranch	0.05		94	Y	2.7
	Subtotal	**6.28**	**6.28**	**1,878**		
Existing Near Future Customers	Cherry Island Golf Course and Soccer Complex	1.10		0	N	1
	Diamond Creek Park	0.22		413	Y	2.7
	Diamond Oaks Park	0.05		94	Y	2.7
	Eskaton Retirement Community	0.05		94	Y	2.7
	Fiddyment Park (Vets Mem II)	0.10		188	Y	2.7
	Free Run Park	0.03		56	Y	2.7
	Gibson Ranch Park	2.87		0	N	1
	Homestead Elementary School	0.02		38	Y	2.7
	Homestead Park	0.11		206	Y	2.7
	HP Campus Existing Landscape	0.34		638	Y	2.7
	HP Rezone	0.31		581	Y	2.7
	Sierra View Country Club	0.00		0	N	1
	Woodcreek West Park	0.09		169	Y	2.7
	Subtotal	**5.29**	**5.29**	**2,475**		
UGAs	Placer Vineyards	3.50	2.81	2,431	N	1
	Subtotal	**3.50**	**2.81**	**2,431**		
	Total	**15.07**	**14.38**	**6,784**		
	% of Supply	**86.5%**	**82.5%**			
PGWWTP (24.74 mgd)						
Existing Customers	Woodcreek Golf Course	0.90		625	N	1
	Sun City Golf Course	1.30		903	N	1
	Pleasant Grove WWTP	0.03		21	N	1
	Subtotal	**2.23**	**2.23**	**1,549**		
Existing Near Future Customers	Roseville Energy Park	1.58		1,097	N	1
	West Roseville Specific Plan (WRSP)	3.86		2,681	N	1
	Subtotal	**5.44**	**5.44**	**3,778**		
UGAs	Placer Ranch	3.34	2.17	2,319	N	1
	Regional University	1.72	1.16	1,194	N	1
	Sierra Vista	2.46	2.10	1,708	N	1
	Creekview & Panhandle	1.25	1.06	868	N	1
	Curry Creek	4.11	2.72	2,854	N	1
	Brookfield & University	0.94	0.73	653	N	1
	Subtotal	**13.82**	**9.94**	**9,597**		
	Total	**21.49**	**17.61**	**14,924**		
	% of Supply	**86.9%**	**71.2%**			

Attachment E

June 2007 TM Update Sheet

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject: **Update for TM 5a**

Prepared For: Art O'Brien, City of Roseville

Prepared by: Andy Smith, RMC

Reviewed by: Dave Richardson, RMC

Date: October 31, 2006

Reference: 0091-04

1 Summary of Update for TM 5a

Since the completion of TM 5a on November 29, 2005 (followed by an update in February 2006), changes in the scope of the South Placer Wastewater and Recycled Water Systems Evaluation, as well as changes in the data available, have resulted in the need to identify out-of-date information, to summarize the updated information, and provide justification as to the need for the update. **Table 1** presents a summary of the updates for TM 5a.

Table 1: Summary of Update for TM 5a

Page	Location	Summary of Outdated Information	Summary of Updated Information	Reason for Update
4	Table 3	Formica is not included as Existing Potential RW Customer in report	Formica RW demand eliminated in Systems Evaluation	Formica plant to be shut down
5	Table 4	Placer Vineyards source of Recycled Water	Placer Vineyards will be supplied RW from DCWWTP	Update on location of RW supply
9	Table 8	Sun City Golf Course and streetscape Irrigation demand change	Updated July flowrates in Table 6-5 of Systems Evaluation report	Update based on water records at Sun City Golf Course
9	Table 8	Source of recycled water for Woodcreek Oaks Golf Course (WOGC)	WOGC served by PGWWTP (noted in Systems Evaluation report)	Reflects recommended operating scenario from Alternatives Assessment
9	Table 8	Placer Vineyards source of Recycled Water	Placer Vineyards will be supplied RW from DCWWTP (noted in TM 5b and Systems Evaluation report)	Update on location of RW supply
12	Paragraph 1	Projected WW flow to PGWWTP and DCWWTP	DCWWTP ADWF = 19.33 mgd; PGWWTP ADWF = 23.4 mgd (noted in Systems Evaluation report)	Updates from Chapter 5 WWTP Expansion

Attachment F

2009 Update Sheet

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**2009 Update Sheet for TM 5a**
Prepared For:	Art O'Brien, City of Roseville
Prepared by:	Chris van Lienden, RMC
Reviewed by:	Dave Richardson, RMC
Date:	September 3, 2009
Reference:	0091-04

The TM has been modified since it was originally developed in 2005 based on the following updates.

1 2006 Updates

The TM was updated in 2006 to reflect changes in the SPMUD UGA boundary and land use, and to add Brookfield as an additional UGA.

2 2008 Updates

The TM was further updated in 2008 to reflect changes in the land uses and flow projections of the UGAs.

3 2009 Updates

An additional update was prepared in 2009 to reflect the following changes.

3.1 Updates to the H2Omap Sewer Model

Since the 2008 update, the H2Omap Sewer software has been updated which resulted changes to the build-out flow estimates. The flow estimates in the TM has been updated to reflect the most recent model results.

3.2 Changes to the Development Timeline

Flow projections have been updated to reflect reduced rates of residential development due to the economic slowdown beginning in 2008.

3.3 West Roseville Specific Plan Rezone

Buildout flow estimates have been updated to reflect additional inflow from a proposed rezone in the West Roseville Specific Plan (May, 2009). The new land uses and associated average dry weather flow (ADWF) are summarized in Table 1.

Table 1 – West Roseville Specific Plan Rezone Comparison

Connected Land Use Description	Original Developer Agreements		2009 Proposed Update	
	DU or Area (DU or ac)	Flow (mgd)	DU or Area (DU or ac)	Flow (mgd)
1 Residential				
1.1 Low Density Residential	4842 DU	0.92	5963 DU	1.13
1.2 LDR (age restricted)	710 DU	0.13	0 DU	0.00
1.3 Medium Density Residential	1064 DU	0.20	1746 DU	0.33
1.4 High Density Residential	1774 DU	0.23	3229 DU	0.42
2 Open Space	670 ac		696 ac	0.00
2.1 Paseo	15 ac		0 ac	0.00
2.2 Park	251 ac		284 ac	0.00
2.3 Pocket Parks	19 ac		0 ac	0.00
3. Public/Quasi-Public				
3.1 Schools	108 ac	0.02	109 ac	0.02
3.2 Public/Quasi-Public	41 ac	0.02	15 ac	0.01
4 Community Commercial				
4.1 Commercial	34 ac	0.03	56 ac	0.05
4.2 Mixed Use	14 ac	0.03	0 ac	0.00
4.3 Church	0 ac	0.01	0 ac	0.00
5. Business Professional				
5.1 Commercial	20 ac	0.02	18 ac	0.02
6. Light Industrial	74 ac	0.06	75 ac	0.06
7. Industrial	34 ac	0.03	35 ac	0.03
Total		**1.71**		**2.07**

Appendix S TM 5b – Alternatives Development and Evaluation for Recycled Water Distribution System

Technical Memorandum

South Placer Regional Wastewater & Recycled Water Systems Evaluation Project

Subject:	**Alternatives Development and Evaluation for Recycled Water Distribution System**
Prepared For:	Art O'Brien – City of Roseville Ed Wydra – Placer County
Prepared by:	Amanda Schmidt Glenn Hermanson Andy Smith
Reviewed by:	Dave Richardson
Date:	February 8, 2007
Reference:	0091.05

1 Introduction

The objectives of this TM are to define and evaluate recycled water facilities alternatives to serve the existing City of Roseville (City) service area and Urban Growth Areas (UGAs).

This TM is organized as follows:

- Introduction
- Alternatives Development
- Alternatives Evaluation
- Implementation Plan
- Bibliography

1.1 Project Alternative Definition

Each recycled water project alternative is defined as the combination of the treatment, storage/pumping, and distribution options (supply side) necessary to serve targeted users located in a given service area (demand side). Alternatives for delivering recycled water were evaluated using H_2ONet hydraulic modeling software.

The development of the recycled water project alternatives involved defining the following components for each alternative:

- **Service Area:** Where would recycled water be used?

  Recycled water will be used in the existing Roseville service area (generally in the vicinities of the regional WWTPs; north and west of I-80/UPRR) in addition to Urban Growth Areas.

  Recycled water will be used as irrigation for business parks, commercial, multi-family developments, golf courses, parks, and streetscape. Industrial customers will use recycled water for non-contact cooling processes.

- **Treatment:** Where would recycled water be produced?

Recycled water would be produced at the Pleasant Grove Wastewater Treatment Plant (PGWWTP) and at the Dry Creek Wastewater Treatment Plant (DCWWTP) to supply customers in the existing service area and UGAs.

An option of satellite treatment will be evaluated for Placer Vineyards (PV) and Placer Ranch (PR) UGAs. Satellite treatment would consist of seasonally operated treatment facilities to treat wastewater from the UGA before it reaches the WWTP. Treated recycled water would be directly pumped back to the corresponding UGA.

- **Storage:** How much recycled water would need to be stored and where?

  Each UGA will be required to have a storage facility to hold recycled water. The minimum operational storage volume of each UGA storage tank is equal to the maximum day demand of recycled water.

  The existing 1.5 MG storage tank at the North Zone Pump Station (NZPS) will be utilized to hold recycled water supplied by DCWWTP and a supplemental supply will be provided from PGWWTP.

  The need for operational storage at PGWWTP and DCWWTP will be evaluated.

- **Distribution:** How would recycled water be distributed to the different users?

  In general, pipelines will be located in major corridors (roadways or along property boundaries), but have flexibility in the specific alignment.

1.2 Project Alternatives Development and Evaluation Update

The recycled water setting has changed since the development of the April 2000 Recycled Water Distribution Feasibility Study (RWFS), presenting new opportunities and new challenges. Because of these changes, the recommended recycled water project and associated implementation plan included in the 2000 RWFS were revisited. The treatment, storage/pumping, and distribution options identified in the 2000 RWFS formed the basis for project alternative development and evaluation. Existing facilities are listed in **Table 1**. Additional facility improvements will be evaluated in the following sections.

Table 1: Storage and Pumping Facilities

Existing Storage and Pumping Facilities Used in the Hydraulic Model		
North Zone Storage Tank	(Feet)	**North Zone Pump Station**
Base Elevation (floor)	123.0	Pumps
Minimum Water Level	5.0	2 duty pumps, 1 standby
Maximum Water Level	16.5	Pump Curve (all three pumps)
Initial Water Level (for modeling)	5.0	Design Point: 950 gpm at 140 feet
Diameter	124.0	Shutoff Head: 0 gpm at 234 feet
Datum for all elevations: Sea Level (0 feet)		High Flow: 1,338 gpm at 0 feet
		Pumps water from Storage Tank
Dry Creek Pump Station		**Pleasant Grove Pump Station**
Pumps		Pumps
3 duty pumps, 1 standby		2 duty pumps
Pump Curve (all four pumps)		Pump Curve (both pumps)
Design Point: 1,900 gpm at 124.6 feet		Design Point: 5,120 gpm at 124 feet
Shutoff Head: 0 gpm at 206 feet		Shutoff Head: 0 gpm at 192 feet
High Flow: 2,480 gpm at 0 feet		High Flow: 7,680 gpm at 0 gpm
Pumps from a wet well with a water surface elevation of 114 ft.		Pumps from a wet well with a surface elevation of 90 ft.

1.3 Approach

The following approach was adopted to meet the TM objectives described above:

- Develop a list of conceptual alternatives (including preliminary sizing and alignments, pumping requirements and location and storage requirements) building on the technical work of the 2000 Recycled Water Distribution Feasibility Study
- Evaluate the pros and cons of each conceptual alternative to find the preferred alternative

2 Alternatives Development

This section presents the recycled water facilities alternatives that were developed by:

- Considering the different options available for each project component
- Combining these options to form logical project alternatives
- Developing the necessary technical information necessary to define and evaluate each alternative

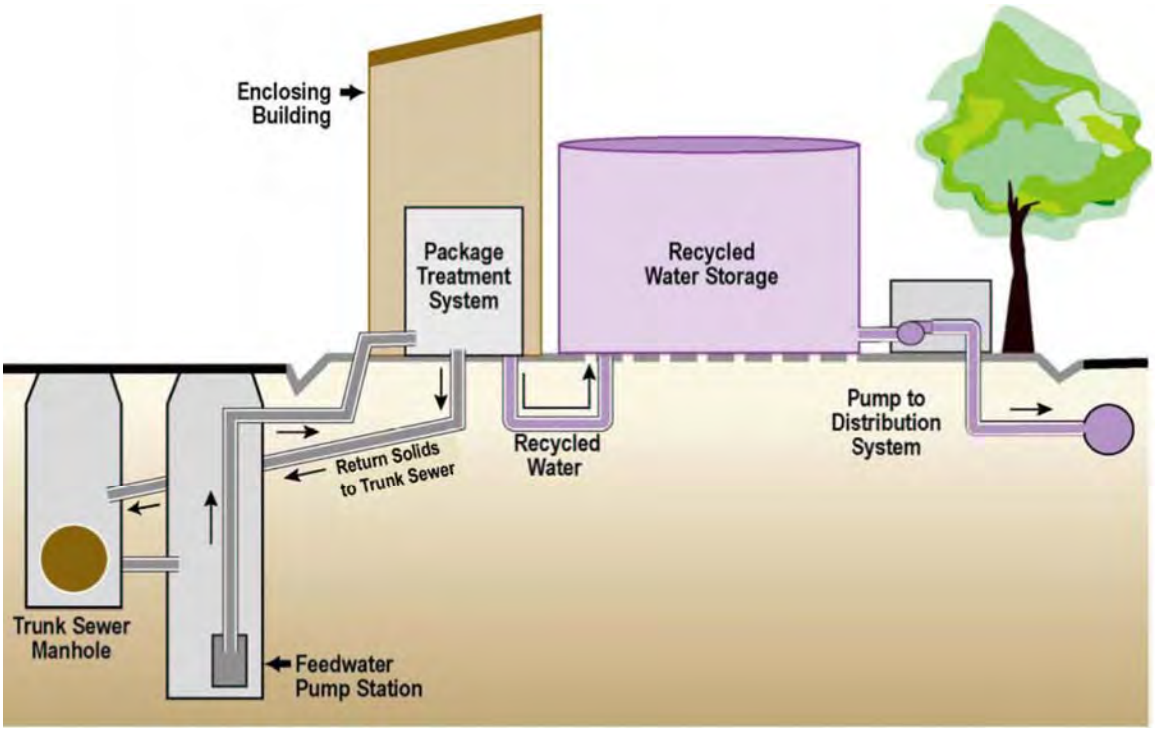
2.1 Alternatives Identification

Two basic categories of options are available for the production of recycled water: centralized treatment with distribution from Pleasant Grove and Dry Creek WWTPs, and satellite treatment and distribution. This section will discuss satellite treatment, detail the treatment process, costs, and advantages and disadvantages (relative to centralized treatment). Distribution options and pipeline alignments along with storage requirements will also be discussed in this section.

2.1.1 Satellite Treatment

Satellite facilities would treat the wastewater from local trunk sewers to tertiary standards and likely return solids back to the trunk sewer. Recycled water would be available for use in the vicinity of the satellite plant. A conceptual illustration of a facility is shown in **Figure 1**. Seasonally operated satellite treatment could be used to supply the furthest UGA from PGWWTP, which is Placer Ranch and DCWWTP which is Placer Vineyards.

Figure 1: Conceptual Illustration of Satellite Recycled Water Facility



The treatment technology most widely used currently for new satellite treatment facilities is a membrane bioreactor (MBR). This technology combines the secondary biological process with the filtration process in a single reactor, an aeration tank with submerged membranes. RMC gathered data from ten satellite plants ranging in size from 0.3 mgd to 10 mgd (RMC, 2004). Information gathered included capital cost, MBR equipment costs, and operation and maintenance (O&M) costs for the surveyed satellite treatment facilities (all costs are expressed in 2004 dollars). Using this information, RMC has investigated the degree to which satellite treatment facilities could be more cost effective than serving recycled water from the central treatment plant through a pipeline.

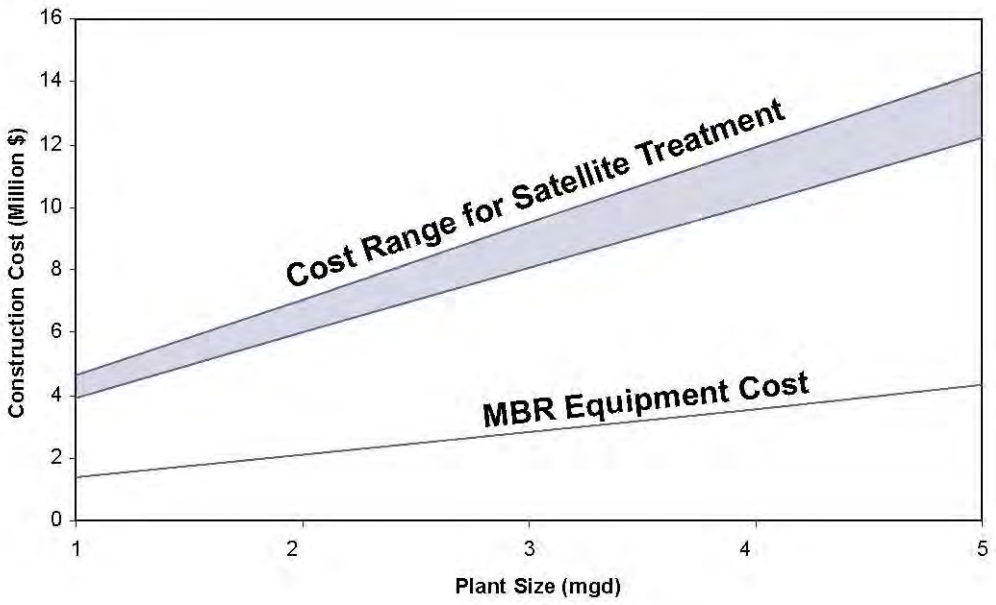
Footprint Size

Footprint sizes can vary widely; from the available data it was extrapolated that a plant size ranging from 1 to 5 mgd would require approximately 4 acres of land. This would be an appropriate land assumption for PR and PV because their demands are 3.34 and 5.4 mgd, respectively. This footprint requirement includes space for the treatment process, as well as for a distribution pump station. It does not include land requirements for recycled water storage, which might add an additional acre of land depending upon tank configuration and surrounding land use.

Construction Costs

Capital costs varied widely due to the variety in construction and operation of each plant. A cost curve was developed based on MBR quotes from Zenon and US Filter and construction cost information from interviewed satellite treatment facilities, shown in **Figure 2**.

Figure 2: Planning Level Cost Guidelines – Construction Cost ($ 2004)



A reasonable construction cost estimate for PR is $12.5 million (including MBR equipment costs). Similarly, PV construction cost estimate would be $18.75 million. Placer Vineyards costs were extrapolated from the graph. This does not include the cost of land. Also this does not include the cost of recycled water storage and distribution facilities, since these costs are paid for by the developer in both the satellite and central treatment options. For reference, from this estimate, MBR equipment costs would be approximately $3.25 million for PR and $4.75 million for PV.

Operation and Maintenance Costs

Annual O&M Costs are shown on **Figure 3** below. Again, the annual cost for each plant varies. This variability is due to different unit processes and different approaches to operation and maintenance that each plant employs. From the information obtained in Figure 3, annual operation and maintenance costs will be approximately $300,000 for PR and $500,000 for PV per year.

Figure 3: Comparison of Annual O&M Cost to Plant Size ($ 2004)

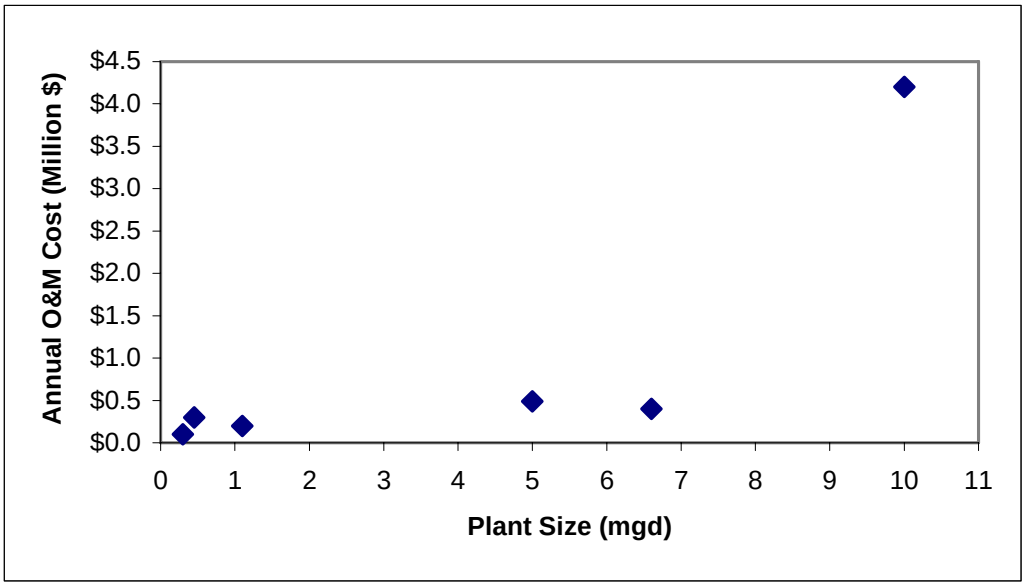


Table 2 provides a cost summary to build and operate a satellite treatment facility at PR and PV. Total present value cost for PR would be $17.4 million and PV would be $27 million.

Table 2: Satellite Treatment Cost Summary

Cost [a]	Placer Ranch	Placer Vineyards
Construction Costs	$12,500,000	$18,750,000
Present Value O&M Cost [b]	$9,905,000	$8,176,000
Total Present Value Cost for Satellite Treatment Alternative	**$17,405,000**	**$26,926,000**
Pipeline Cost for Centralized Transmission Treatment Alternative [c]	**$1,207,000**	**$2,840,000**
Low Cost Alternative	**Centralized**	**Centralized**

Footnotes:

a. 2004 dollars, no inflation assumed
b. Present value is calculated over a 20 year period. Assumed inflation rate 3%, interest rate 5%, therefore the discount rate 2%.
c. Cost to install recycled water pipeline including contingency factors. See Section 4.2 and Attachment C.

Conclusions

Feasibility of satellite recycled water treatment can be determined by comparing its cost effectiveness to the development or expansion of centralized water recycling and transmission of recycled water to the use site.

Note: From a cost standpoint, satellite recycled water treatment has become a competitive alternative for recycled water production and delivery to remote areas; generally 5 to 10 miles beyond the central WWTP and other recycled water customers. PR and PV are the furthest UGAs from Pleasant Grove WWTP, but their distances are not remote enough to offset the capital and O&M costs associated with satellite treatment. PR and PV are both adjacent to other recycled water

customers (UGAs) and, depending on the location where recycled water is delivered, are only 1 to 3 miles from the nearest customer.

Proposed recycled water pipelines will distribute water to UGAs along a path towards PR and PV. It would be unreasonable to pursue the option of satellite recycled water treatment because of the following reasons: the PGWWTP and DCWWTP can provide the required recycled water, a recycled water distribution system is currently being developed, and PR and PV are less then 5 miles from the nearest recycled water customer. The option best suited for the given situation would be a centralized treatment and distribution from the Pleasant Grove and Dry Creek WWTPs. Incidentally, if recycled water were needed to be distributed to regions within South Placer Wastewater Authority (SPWA) service area further from the WWTPs, (e.g. Granite Bay, Rocklin, or Loomis) at some point in the future satellite treatment may be the best choice.

2.1.2 Description of Pipeline Alternatives

A hydraulic analysis using H_2O Net was performed to compute the pipeline diameter needed to serve the identified customers while conforming to a set of hydraulic criteria. The set of hydraulic criteria that was used is shown in **Table 3**.

Table 3: Hydraulic Design Criteria for Model Development

System Component	Unit	Value
Minimum Pressure at Customer Connections During Irrigation Period [a]	psi	60 [b]
Minimum Pressure at Customer Connections During Non-irrigation Period	psi	40
Maximum Pressure	psi	120
Minimum Pipe Size (including laterals)	inches	6
Available Pipe Sizes [c]	inches	6, 8, 12, 16, 24, 30
Maximum Head Loss	feet per 1000 feet	5
Velocity Range	feet per second	2 – 8
Hazen-Williams Coefficient for Headloss Calculation	n/a	130

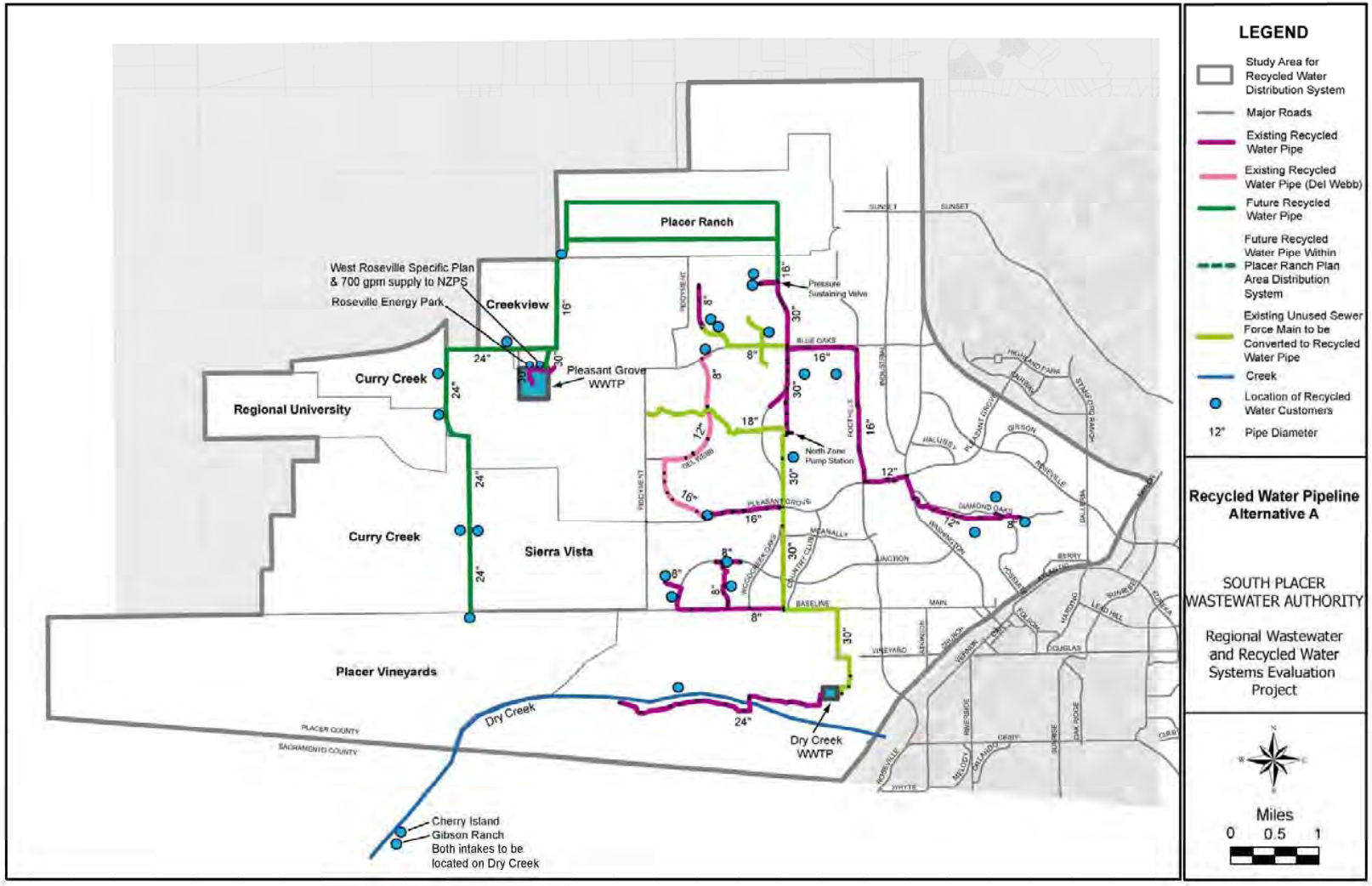
Footnotes:

a. South zone of Recycled Water System (south of North Zone Pump Station) will have an operating pressure of 30 psi
b. This pressure is for customers without a recycled water storage facility.
c. Per Roseville Standards for Recycled Water.

Since satellite treatment is not recommended for currently anticipated demands, there are three distribution alternatives that will be evaluated in this TM. The following alternatives are described below.

- **Alternative A: Non-Looped System.** New pipe from Pleasant Grove WWTP will connect to existing recycled water pipe along Phillip Road, and follow UGA boundaries around the western border of West Roseville Specific Plan and Sierra Vista. The pipe will end at the northern boundary of Placer Vineyards as shown in **Figure 4**. The pipeline will also run north on the eastern side of Creekview and end at the southwest corner of Placer Ranch. An internal Placer Ranch pipe will connect to the 30" recycled water pipeline stub on Woodcreek Oaks Blvd. with a pressure sustaining valve. This configuration will allow recycled water to flow either to or from the North Zone tank. In this alternative, it is assumed that PGWWTP will supply Placer Vineyards.

Figure 4: Map of Alternative A – Non-Looped System



- **Alternative B: Looped System.** Recycled water pipelines would follow similar alignments as Alternative A, however pipe will continue east along the northern border of Placer Vineyards and connect the 24" gravity recycled water line near Dry Creek as shown in **Figure 5**. Placer Vineyards could be supplied by either DCWWTP or PGWWTP. The 24" gravity line may need to be pressurized; therefore changes may be required at the DCWWTP recycled water pump station. Currently recycled water flows by gravity from the chlorine contact basins to Morgan Creek Golf Course. Additional pumping will most likely be required to have the necessary hydraulic head to reach Morgan Creek Golf Course and Placer Vineyards. This will be described in more detail later in the TM.
- **Alternative C: Additional Flow through West Roseville Specific Plan.** New pipe from PGWWTP will connect existing recycled water pipe along Phillip Road, and follow UGA boundaries around the western border of West Roseville Specific Plan and Sierra Vista. The pipe will end at the northern boundary of Curry Creek South and Sierra Vista as shown in **Figure 6**. The pipeline will also run north on the eastern side of Creekview and end at the southwestern corner of Placer Ranch. Placer Vineyards will be supplied recycled water from DCWWTP via the 24" pipeline running parallel to Dry Creek. Placer Vineyards will install a pipe to distribute recycled water from the terminus of the existing 24-inch recycled water pipeline along Dry Creek to a storage tank on West Dyer Lane and 16th Street.

  To balance the recycled water demands on each wastewater treatment plant, recycled water will be distributed from PGWWTP to Woodcreek Oaks Golf Course (WOGC) and Sun City Golf Course (SCGC). Their pipe connections can be retrofitted to receive recycled water from DCWWTP or PGWWTP as the system grows to best use available recycled water. This will be described more in detail in the following section.

  Water will be transferred to WOGC and SCGC via the 24" recycled water pipeline through West Roseville Specific Plan and through the 18" converted force main. To minimize the amount of pumping, the WRSP pump station 24" inlet is connected to the to the 24" outlet, which allows bypassing the WRSP pump station. Recycled water can then be sent to the WOGC and SCGC storage facilities directly from the PGWWTP pump station. This configuration provides flexibility for supplying RW to the WOGC and SCGC during the 15-hour non-irrigation period. This option is available during the non-irrigation period because the WRSP pump station will not be used. During the irrigation period the bypass will be closed and the pump station will operate normally.

  The Sun City Golf Course storage pond can be connected by tying the 18" converted force main in Del Webb Boulevard into an existing 8-inch recycled water main in Del Webb Boulevard. This will serve the purpose of filling the SCGC pond from PGWWTP. The Woodcreek Oaks Golf Course would utilize a portion of the existing 18" recycled water line which will be decommissioned. Recycled water will flow south through the 18" recycled water line from the 18" converted force main/30" converted force main connection to the lake. When completed there will be two connections to the Woodcreek Oaks Golf Course lake, the 18" recycled water line and the 30" converted force main.

Figure 5: Map of Alternative B – Looped System

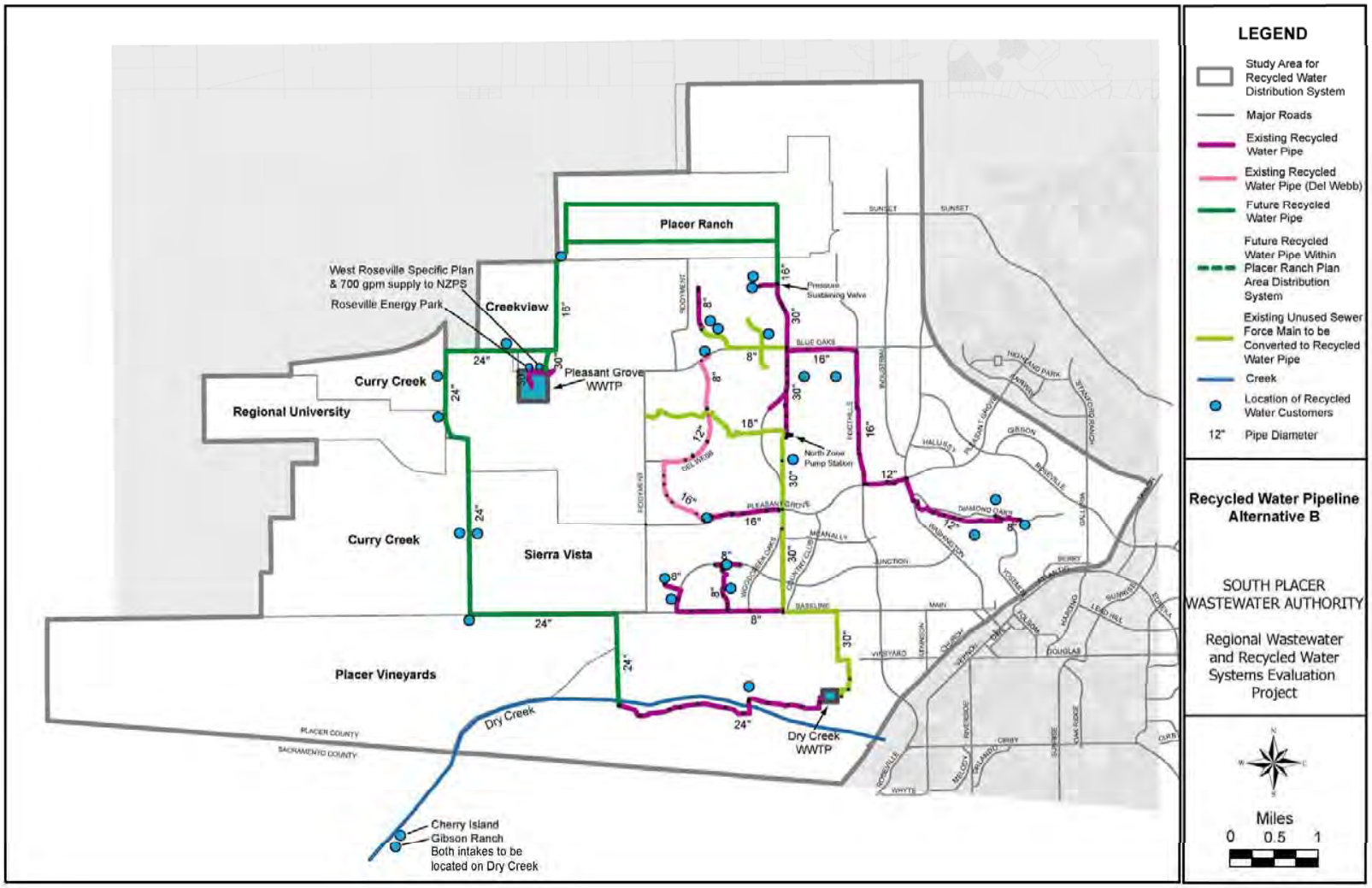


Figure 6: Map of Alternative C – Additional Flow through West Roseville Specific Plan

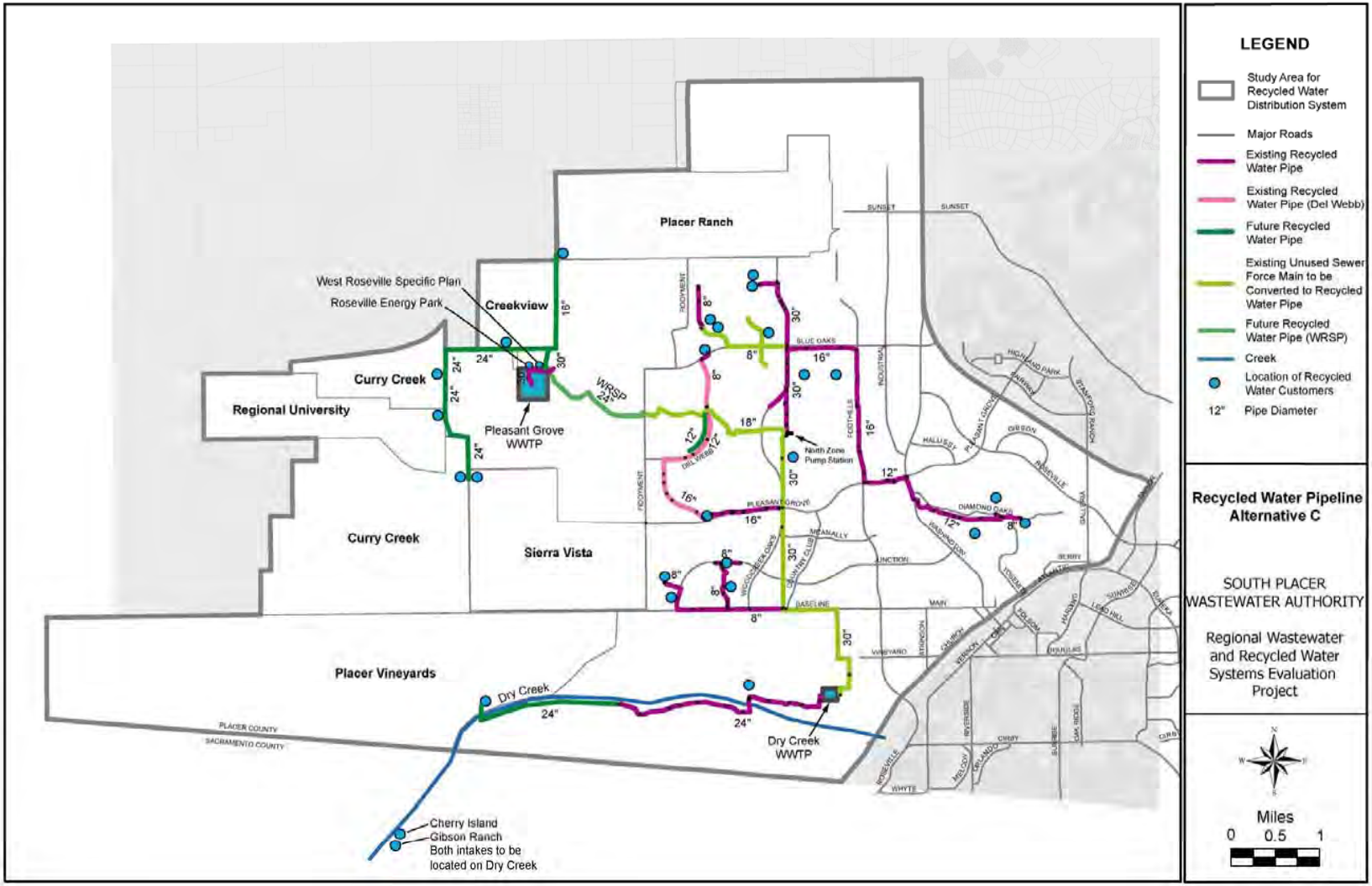


Table 4 lists the lengths and diameters of new recycled water pipelines that would be installed for each alternative and the existing force mains that will be converted to recycled water pipes. Alternative B has the largest amount of pipe installed because the northern and southern sections of the City are connected.

Table 4: Description of Alternatives

	New Pipe Diameter (inches)	Existing Force Main to be Converted to Recycled Water Pipe (feet)	Length of New RW Pipe (feet)
All Three Alternatives	30”	19,600	-
	18”	9,700	-
	8”	8,900	-
	Total	**38,200**	**-**
Alternative A	30”	-	3,100
	24”	-	23,000
	16”	-	7,300
	Total	**38,200**	**33,400**
Alternative B	30”	-	3,100
	24”	-	37,300
	16”	-	7,300
	Total	**38,200**	**47,700**
Alternative C	30”	-	3,100
	24”	-	21,400
	16”	-	5,800
	12”	-	2,700
	Total	**38,200**	**33,000**

2.1.3 Recycled Water Storage Analysis

Due to the high demand for recycled water, hourly irrigation patterns, and diurnal fluctuations of wastewater effluent, an hour-by-hour analysis has been conducted to determine the storage requirement and the operational scenarios at the Pleasant Grove and Dry Creek WWTPs to optimize recycled water distribution. Scenarios are developed assuming there will be a storage facility (tank or pond) at each UGA with a volume to store one peak day (July day) of recycled water demand. Diurnal fluctuations in recycled water generation produce a challenge in supplying customers during the irrigation period from 9:00 PM to 6:00 AM for the following reasons: the highest demand for recycled water comes during the period of lowest generation and recycled water must be supplied during the non-irrigation period in addition to the irrigation period to fulfill the total demand of the UGAs.

Alternative C Storage Analysis

Multiple scenarios were evaluated to distribute recycled water to customers to show the amount of storage needed at either DCWWTP or PGWWTP in Alternative C. From the supply availability analysis, the recycled water demand in Alternatives A and B exceeded available supply, therefore a storage analysis was not deemed necessary. From the storage analysis, it was determined that recycled water storage will not be required at PGWWTP if recycled water is distributed to the UGAs as it is generated. Storage is

also not required at DCWWTP. The detailed storage calculations can be found in **Attachment A** and are summarized in **Table 5**. The following scenarios present variations in recycled water distribution to customers with storage facilities.

Pleasant Grove WWTP Distribution Scenarios:

- 24-hour Distribution – Recycled water would be distributed equally to all customers over a 24 hour period. For UGAs, the storage tank is filled evenly through the day. Recycled water generated in excess of the water supplied to the UGAs will be discharged to the creek.
- 15-hour Distribution – Recycled water would be distributed to customers over the non-irrigation 15-hour period (from 6:00 AM to 9:00 PM). In this scenario, while water could be distributed during the irrigation period, it is assumed that all water produced during this time period will be discharged to the creek
- Equal Tank Fill – Recycled water would be distributed as it is generated and all UGA storage facilities are filled at the same rate. Once a tank is full, remaining water will be supplied to other storage facilities until all are filled. Excess water will be discharged to the creek after all the tanks are full. Four recycled water pumps will be required to pump the maximum effluent flow rate.
- Two Tank Fill – Recycled water would be distributed as it is generated and two UGA storage tanks will be filled at a time. Excess recycled water generated after all tanks are filled will be discharged to the creek. Four recycled water pumps will be required to pump the maximum effluent flow rate.
- Capped Flow Distribution – Recycled water would be distributed as generated but will not exceed a maximum flow rate of 16,000 gpm and water generated in excess of 16,000 gpm will be discharged to the creek. In this scenario, a minimum pressure of 10 psi will be at the furthest UGAs, with only three pumps operating at the PGWWTP recycled water pump station.

Dry Creek WWTP Distribution Scenarios:

- 24-hour Distribution – Recycled water would be distributed equally to creek customers over a 24 hour period.
- 15-hour Distribution – Recycled water would be only distributed to creek customers during the non-irrigation 15-hour period (from 6:00 AM to 9:00 PM).
- Creek Distribution – Recycled water would be distributed as it is generated to fill the North Zone Pump Station tank and to customers with storage facilities. Excess water from the filling the tank and pipeline distribution will be discharged to the creek. Creek customers will be supplied with recycled water until demand is fulfilled.
- Proportional Flow to Creek Customers – Recycled water would be distributed as it is generated to fill the North Zone Pump Station tank and to customers with storage facilities. Excess water from the filling the tank and pipeline distribution will be discharged to the creek. Creek customers will be supplied proportionally to volume demanded. This distribution is more theoretical because the creek customer's demands will be fulfilled at the same time. In proportional flow more recycled water is distributed to Gibson Ranch than Cherry Island per hour because the recycled water demand at Gibson Ranch is higher than Cherry Island.

Table 5: Storage Analysis for Alternative C

Scenario	Available RW to Supply to Customers During Low Generation Period	Required Storage at DCWWTP	Peak Flow Distributed through RW Pipeline (gpm)	Rank [a]
PGWWTP				
24-hour Distribution	No	Yes, 1.6 MG	14,300	4 (tie)
15-hour Distribution	No	Yes, 0.96 MG	20,700	4 (tie)
Equal Tank Fill	Yes	None	24,740 [b]	1 (tie)
Two Tank Fill	Yes	None	24,740 [b]	1 (tie)
Capped Flow Distribution	Yes	None	16,000	3
DCWWTP				
24-hour Distribution	No	Yes, 2.3 MG	8,511	4
15-hour Distribution	No	Yes, 0.58 MG	8,511	3
Creek Distribution	Yes [c]	None	8,511	1
Proportional Flow to Creek Customers	Yes [c]	None	8,511	2

Footnotes:

a. Qualitative ranking based on analysis of required storage, supply and peak flow distribution.
b. These two scenarios would require a velocity greater than 10 ft/sec in the existing 30" recycled water pipe at the PGWWTP.
c. There is supply deficiency between 4:00 AM and 6:00 AM. From 4:00 AM 5:00 AM an additional supply of 14,422 gallons is needed; between 5:00 AM 6:00 AM an addition supply of 71,664 gallons is needed. This supply deficit of ~86,000 gallons can be eliminated if customers with storage facilities (like golf courses) are supplied more water during periods of higher recycled water generation

Criteria used in ranking the distribution scenarios are based on the necessity of required storage at the treatment plant, availability of supply during all hours of the day, and the peak flow being pumped from the treatment plant pump station. Scenarios that do not require storage at the treatment plant rank higher than those that do; additionally, scenarios that do not have available supply for the demand are infeasible. Peak flow from the treatment plant is evaluated to determine pumping requirements. Maximum flow rates may occur for only a few hours a day, however exceeding the proposed design criteria is not recommended.

According to the hydraulic model and the storage analysis, in both the Equal Tank Fill and Two Tank Fill scenarios the maximum flowrate pumped between approximately 12:00 PM and 12:00 AM will exceed the velocity design criteria of 8 ft/sec in the 30" pipe from the PGWWTP pump station to the West Roseville Specific Plan Pump Station. This is assuming all UGAs are receiving the peak day demand at buildout. The velocity in that section of pipe (maximum 11 ft/sec) will be above 8 ft/sec for 13 hours per day and the 10 ft/sec for 3 hours per day. This daily maximum flow will peak during July and a total of four pumps would be needed to maintain pressure at the furthest UGAs from the PGWWTP.

It was concluded that this maximum flowrate and velocity would not be acceptable. To reduce the amount of flow in the 30" pipe, a new 30" pipe should be installed parallel to the existing pipe from the recycled water pump station to the junction of the West Roseville Specific Plan pump station. It is recommended to monitor the pipe velocity over time to identify when and the length of time it is over 8 ft/sec. In the future, a parallel pipe can be installed. The 30" parallel pipe is being included as a recommended project. It is recognized that this additional 30" parallel pipe will only be needed at buildout and if the UGAs

develop as indicated herein. It is recommended to revisit this analysis approximately every 5 years to confirm the need for this parallel pipe.

Another option to reduce the maximum flow in the 30" pipe is to "shave off" the peak flow rate and pump a maximum of 16,000 gpm from the pump station. Any flow in excess of the 16,000 gpm would be discharged to Pleasant Grove Creek. This would keep the velocity in the pipe around 7.5 ft/sec. A downside to this alternative is that there will be less flexibility to supply all customers in a 24 hour period. It will take 24 hours to supply all recycled water customers by capping the flow at 16,000 gpm while it will take 20 hours to supply recycled water customers by pumping the maximum flow rate. On an average day with normal fluctuations in recycled water generation, this option leaves approximately 650,000 gallons of water after all the excess water has been "shaved off". This scenario can be problematic if recycled water generation is lower than average on a summer day. At buildout this would not be ideal with respect excess supply and limited operational flexibility. The Two Tank or Equal Tank Fill is the recommended fill scenario.

For DCWWTP, distributing recycled water to the creek customers when available is the best operational scenario. There is enough supply at DCWWTP to serve customers south of the North Zone pump station and the customers from the 24" gravity line. The creek customers have storage ponds; therefore there is flexibility to fill throughout the day. As mentioned in Footnote C from Table 5,**Error! Reference source not found.** the demand exceeds supply from 4:00 to 6:00 AM. The supply deficit of 86,086 gallons can be eliminated if customers with storage facilities are supplied extra recycled water during period with excess supply.

2.1.4 Hydraulic Analysis for 24-inch Gravity Line

A hydraulic analysis was completed to determine if the 24" recycled water line from DCWWTP to Morgan Creek Golf Course and Placer Vineyards (PV) could remain a gravity line. The proposed location of the (PV) recycled water storage tank is on the southwest corner of West Dyer Lane and 16th Street, in the center of UGA. The pipeline alignment used in this analysis through (PV) is along West Dyer Lane. The results of the analysis show the 24" pipe can remain gravity flow with certain limitations. The storage facilities must be filled in 24 hours and the (PV) tank must be buried 10 feet to maintain hydraulic head. A fill time of 15 hours representing the non-irrigation period is also not possible. To fill the PV tank when the water level is low, the pipe should be constructed with a deeper profile, as shown in **Attachment B**, to allow faster fill rates. The required pipe depth is beyond what is feasible for the purposes of distributing recycled water in these circumstances. A gravity line will limit the City's operational flexibility to supply recycled water. The pipeline also cannot be shut down in the summer months for maintenance or repair.

It is recommended to install a booster pump station at the recycled water pipe stub at Wallerga Road. This will provide the additional head needed to fill the Placer Vineyards tank in a shorter period than 24 hours. It is also recommended to connect the 24" line to the Dry Creek WWTP recycled water pump station or a low head pump to provide pressure for the storage facilities and to two future direct tap customers. The pressurized pipe will allow the City to supply customers with recycled water when it is available. If the 24" line is pressurized from DCWWTP, then the booster pump may not be needed.

3 Alternatives Evaluation

This Section will:

- Present criteria that will be used to evaluate project alternatives identified in Section 2
- Show results of the alternatives evaluation
- Present the alternative that is recommended

3.1 Evaluation Criteria

A set of economic and non-economic criteria addressing specific issues within the planning area will be developed to evaluate the recycled water facilities alternatives. These criteria are found in **Table 6** as follows:

Table 6: Alternative Evaluation Criteria

Criteria	Description
Meets Recycled Water Demand	Ability to meet total recycled water demand
Estimated Cost	Total Capital Costs
Flexibility	Ease with which (1) recycled water can be delivered from either treatment facility to meet demand, (2) SPWA can adapt to changes in planning assumptions regarding future demand patterns, projected resources or other uncertainties, and (3) system can be phased
Ease of Implementation	Ease with which alternative can be permitted and constructed. This also includes easement acquisition and congestion concerns
Adaptability	Degree of synergy with existing recycled water system and ability to adapt to existing recycled water system
Environmental/Social Impacts	Various impacts including risk of impact to biological systems and construction related impacts (i.e. traffic disruptions)

Capital cost for the project alternatives are shown in **Table 7**. A flat cost of $8/LF-in diameter is used for 16" diameter to 30" diameter pipes installed in developing areas, like the UGAs. A cost of $12/LF-in diameter is used for urban areas where there are existing roads and/or pavement. **Table 6** also includes a line item for the connection of the 24" gravity line to the DCWWTP recycled water pump station. The cost only includes the connection; pumping capacity at DCWWTP is addressed in **Table 9**.

Table 7: Economic Assumptions and Unit Costs

Item	Cost [a]
Open Trench Installation	
30" Pipe Installation Cost	$240 /linear foot
24" Pipe Installation Cost	$192 /linear foot
16" Pipe Installation Cost	$128 /linear foot
12" Pipe Installation Cost	$144 /linear foot
Conversion of DCWWTP to pump into 24" gravity line [b]	$60,000
Other Cost Estimate Criteria [c]	
Construction Cost Contingency	30% of pipeline costs
Engineering and Administration	25% of pipeline costs

Footnotes:

a. Unit costs are in October 2005 dollars.
b. Short pipe connection between 24" gravity line and existing recycled water pump station discharge will be required.
c. An overhead markup of 62.5% was applied based on a 30% construction cost contingency a plus a 25% engineering and administration factor to calculate the capital cost. Hence, for budgeting purposes, it is assumed that the contingency and project implementation multiplier is 1.625 (1.00 x 1.30 x 1.25 1.625)

3.2 Evaluation Results

3.2.1 Alternatives Evaluation

Preliminary cost estimates based upon economic assumptions in **Table 7** are listed in **Table 8**. Detailed cost estimates for the alternatives can be found in **Attachment C**. Criteria from **Table 6** are used to evaluate the two alternatives and are listed in **Table 8**.

Table 8: Alternatives Evaluation

Evaluation Criteria (from Table 6)	Alternative A – Non-Looped System	Alternative B – Looped System	Alternative C – Flow Through WRSP
Meets Recycled Water Demand	High	High	High
Estimated Cost [a]	$11,002,000	$15,321,000 [b]	$10,883,000 [b]
Flexibility			
Flexibility to supply RW from more than one plant	Medium	High	High
Adapt to changes in planning assumptions	Medium	High	High
Ability for project phasing	Medium	Medium	High
Ease of Implementation			
Ease to be designed, permitted, and constructed	High	Medium	High
Easement Acquisition	High	High	High
Adaptability			
Degree of synergy with existing recycled water system	High	Medium	High
Environmental/Social Impact			
Biological Impacts and Construction Related Impacts	Low	Low	Low
Utility Congestion	Low	Low	Low
Rank [c]	2	3	1

Footnotes:

a. Total capital costs are in October 2005 dollars and include all construction costs, contingencies, and fees.
b. Price includes $60,000 for the retrofit of DCWWTP recycled water pump station to connect the 24" gravity line. Refer to Table 7.
c. Qualitative ranking based on analysis of benefits, risks and degrees of impact.

3.3 Conclusions

Based upon the evaluation presented in **Table 8**, Alternative C is the recommended choice because it is an interconnected system that provides the optimum balance of recycled water supply and demand. Alternative A is a moderately connected system, with Placer Ranch internal recycled water piping connecting to the 30" pipe on Woodcreek Oaks Blvd. Alternative B joins both the north and south sections of the distribution system, but there is a considerable distance between Placer Vineyards demand location and the stub of the 24" gravity line. To connect the two pipes, 14,400 linear feet of pipe would need to be installed and a piping/pumping modification at DCWWTP would need to be constructed with an additional cost of $2.8 million. Both Alternatives A and B have a recycled water demand that exceeds supply.

It is recommended that under typical operating scenarios, customers be supplied recycled water by a particular treatment facility; Alternatives B and C allow operational changes to be made in the pipeline system to move recycled water across the distribution system in response to an atypical operating scenario. Looping the southern portion of the distribution system is less beneficial than connecting PGWWTP through the West Roseville Specific Plan and converted force main because of the pipeline capital costs and the distance of the customers from the pipe. The majority of the customers are in the central potion of Roseville, in close proximity to the North Zone Tank. It would be better to have the operational flexibility in that area rather than on the outskirts of the distribution system.

4 Implementation Plan

The goal of the Recycled Water System Evaluation is to develop a long-term strategy for the ultimate implementation recycled water projects in the region. Numerous tasks would need to take place between the completion of the Systems Evaluation and construction of the ultimate buildout, including conceptual engineering, environmental documentation and permitting, public outreach, funding, financing, design, and construction. This draft implementation plan describes the tasks required to implement the recycled water projects and provides an approximate schedule for their completion. The City's pipeline infrastructure will include the trunk line from the wastewater treatment plant as well as the storage, pumping and distribution of recycled water within the property. Trunk recycled water pipeline sections from the PGWWTP to the Urban Growth Area will be installed by the City and reimbursed by individual land owners. The recycled pipeline will be built according to phasing described in the following sections. Any interim measures/solutions developed by the UGA developers for receiving recycled water will be approved by the City.

4.1 Preferred Alternative

The preferred alternative is Alternative C with recycled water sent from PGWWTP to supply Woodcreek Oaks and Sun City Golf Courses. This system will be described in detail and individual projects will be identified in the following sections. The recycled water system has been divided into projects and is shown in **Figure 7**. Projects are numbered in no particular order, but are organized according to implementation schedule. Projects shown in Figure 7 are listed in **Table 9** with length and diameter of pipe that will be installed. Pipeline costs include contingencies and pump costs include installation. Detailed cost information is found in **Attachment C**.

4.2 Project Phasing

An implementation strategy for each preferred alternative project phase is presented in this section. The phasing of the preferred alternative is summarized as follows:

Phase I – This phase includes the existing recycled water distribution system and existing users. Recycled water is supplied from Dry Creek WWTP. This phase also includes the conversion of 8", 18", and 30" force mains to recycled water pipelines, which is currently in progress. Woodcreek Oaks Golf Course and Sun City Golf Course will be supplied recycled water from the PGWWTP.

Phase II – This phase expands on the current distribution system with the addition of "Existing Near Future Recycled Water Customers" from the RW Market Assessment (RMC, 2005). The new customers will be supplied by Dry Creek WWTP. DCWWTP and the North Zone pump station will install new recycled water pumps.

Phase III – This phase builds from Phase II to include all Urban Growth Areas. Pleasant Grove WWTP will supply recycled water to these customers except for Placer Vineyards. Two additional duty pumps and one standby pump will be added to the PGWWTP recycled water pump station. At the point when the velocity in 30" pipe from the PGWWTP pump station to the West Roseville Pump Station become higher than 8 ft/sec for a hours at a time a new 30" parallel pipe should be constructed. The 24" line supplying Placer Vineyards will be connected to the DCWWTP pump station.

Figure 7: Recommended Projects for Recycled Water Distribution System

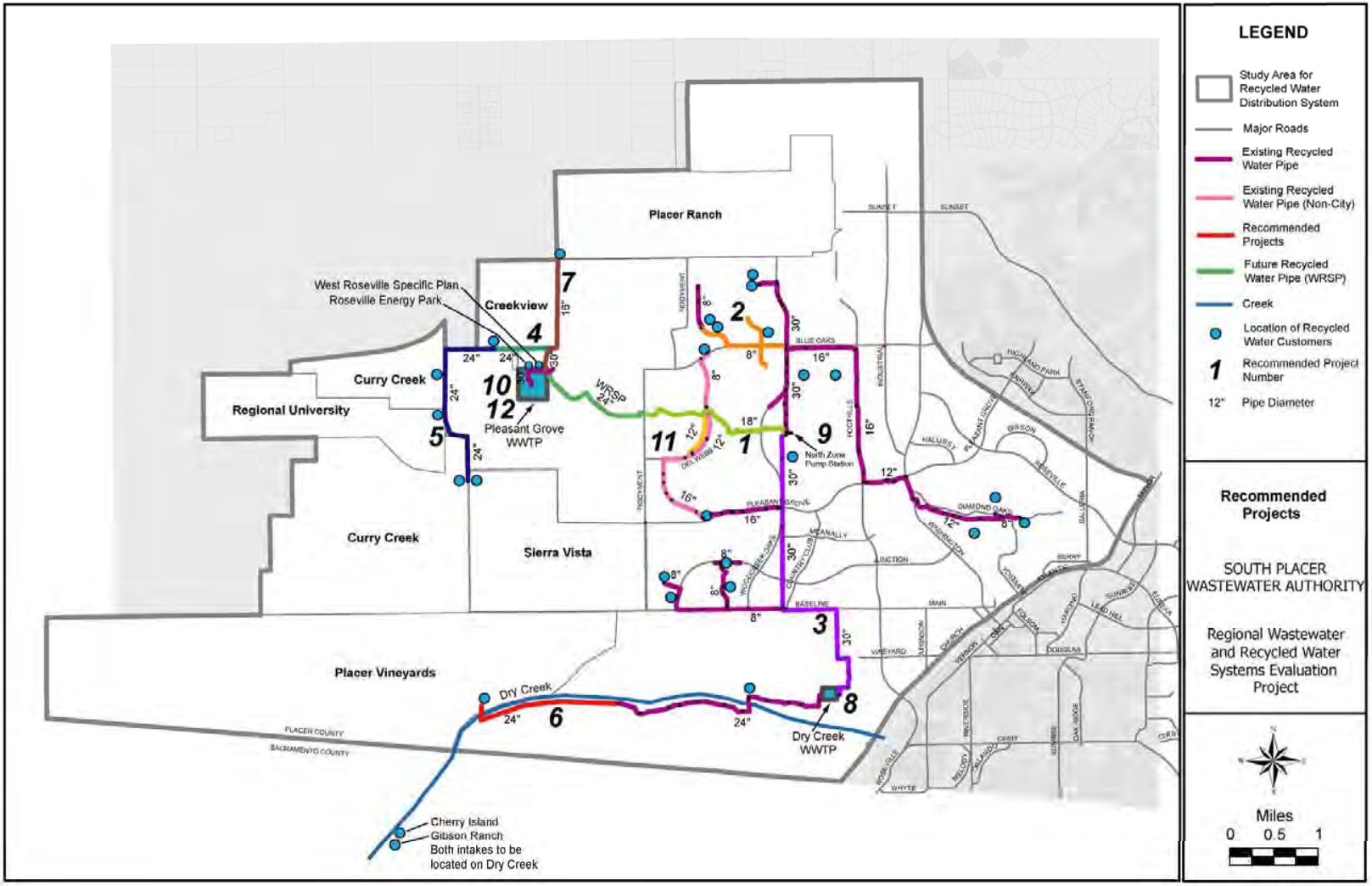


Table 9: Recommended Projects by Phase

Project No.	Description	Size (in.) or flow (gpm)	Length (ft.)	Cost
	Phase I (in Progress) [a]			
1	18" FM Conversion for RW Use from PGWWTP	18"	9,700	n/a
11	Sun City Pipeline from 18" Converted Force Main (with option to supply WOGC and SCGC)	12"	2,700	632,000
2	8" FM Conversion for RW Use	8"	8,900	n/a
3	30" FM Conversion for RW Use South of North Zone Pump Station	30"	19,600	n/a
		Subtotal	**40,900**	**$632,000**
	Phase II (Year 2005 to 2010) [a]			
8	DCWWTP one-50 HP pump	1,900 gpm	-	98,000
9	North Zone PS one-50 HP pump	950 gpm	-	57,000
		Subtotal	**-**	**$155,000**
	Phase III (Year 2010 to 2025) [a]			
4	Creekview Pipeline	24"	3,300	1,030,000
5	Creekview to Curry Creek North	24"	4,600	1,436,000
	Curry Creek North to Regional University	24"	2,100	655,000
	Regional University to Curry Creek South and Sierra Vista	24"	2,300	718,000
6	Placer Vineyards Pipeline	24"	9,100	2,840,000
7	North from PGWWTP to "Tee"	30"	1,400	546,000
	Pipeline from "Tee" to Placer Ranch PS	16"	5,800	1,207,000
10	PGWWTP three-250 HP pumps	15,360 gpm	-	609,000
12	Addition of 30" Pipe at PGWWTP for Maximum Flow Conveyance	30"	1,700	995,000
		Subtotal	**30,300**	**$10,036,000**
Total			**71,200**	**$10,823,000**

Footnotes:

a. Recycled water project phasing depends on development timing.

4.2.1 Phase I

This phase includes the conversion of 8", 18", and 30" sewer force main (FM) to recycled water pipe, which is in progress. The existing 24" recycled water pipe connecting the Dry Creek WWTP with the North Zone Pump Station (NZPS) will be decommissioned and the 30" FM will be used instead. An 18" FM will also be converted connecting the NZPS to Pleasant Grove WWTP via the West Roseville Specific Plan recycled water pipeline. In the northern portion of Roseville, an 8" FM will be converted and connected to an existing 30" recycled water pipe. These are Projects #1 through #3 from Figure 7. It is recommended the FM conversions be completed before the addition of the "Existing Near Future Recycled Water Customers" (referenced from the SPWA Recycled Water Market Assessment) to the network. The pipeline from the converted 18" force main to the Sun City Golf Course pond inlet, Project

#11, will be constructed during this phase. Additionally, once the 30" force main is converted Woodcreek Oaks Golf Course can be connected to the 18" converted force main. Connecting these customers to both PGWWTP and DCWWTP supply will allow the City greater flexibility as both distribution systems are growing.

4.2.2 Phase II

Phase II includes the existing customers and distribution system of Phase I, plus additional recycled water customers as sufficient supply from Dry Creek WWTP is available. Projected wastewater flows from the SPWA Projected WWTP Projected Loadings and Buildout TM 4a, estimates there will be adequate supply in 2012 to provide "Existing Near Future Recycled Water Customers" (identified in the Market Assessment TM) with recycled water. "Existing Near Future Recycled Water Customers" include Cherry Island Golf Course, Diamond Creek Park, Diamond Oaks Park, Eskaton Retirement Community, Fiddyment Park, Free Run Park, Gibson Ranch County Park, Homestead Park, Homestead Elementary School, HP Campus Current Landscaping, HP Rezone, Sierra View Country Club, West Roseville Specific Plan, and Woodcreek West Park.

In this phase, the Dry Creek WWTP and North Zone pump stations will need to be upgraded. Projects #8 and #9 specify the addition of one 50 hp pump at DCWWTP and one 50 hp pump at NZPS, respectively. Based on the hydraulic model, these additional pumps will be necessary to maintain a minimum pressure of 10 psi for the furthest customers on the recycled water distribution pipeline. The additional pumps will be required during high flow periods. A volume increase to the North Zone storage tank will not be required.

4.2.3 Phase III

Phase III includes all of the customers in Phase II plus the Urban Growth Areas. New recycled water pipeline installations to Creekview, Curry Creek, Regional University, Sierra Vista, and Placer Ranch are Projects #4, #5, and #7. The Urban Growth Areas will begin construction in 2008 through 2010, with buildout of the recycled water service area estimated to be completed in 2025. Based on the hydraulic model two additional duty pumps and one standby pump will be required at the Pleasant Grove WWTP recycled water pump station. The additional pumps will be required to keep a minimum pressure of 10 psi in the pipeline at the furthest customers and to supply recycled water to the Woodcreek Oaks (WOGC) and Sun City Golf Courses (SCGC). Upgrades to the Pleasant Grove WWTP pump station is Project #10. The installation of a 30" parallel pipe from PGWWTP to the West Roseville Specific Plan pump station (Project #12) should occur when the velocity in the existing 30" line increases over 8 ft/sec. This project should occur before UGA buildout. Recycled water from PGWWTP will be transferred to the WOGC and SCGC through the West Roseville Specific Plan pipeline and the 18" converted force main. A continuation of the 24" pipe will be installed to serve Placer Vineyards, Project #6. The booster pump station at the recycled water pipe stub at Wallerga Road should be installed. Before complete buildout the 24" pipe should be connected to the DCWWTP pump station or a low head pump to maintain the hydraulic head required to fill the Placer Vineyards storage tank.

4.2.4 Urban Growth Area Storage Requirement

UGAs will be required to have a recycled water storage facility with the capacity to store one peak day (July day) demand volume. July demands have been documented in the SPWA Market Assessment TM (RMC, November 2005). The minimum storage tank volume required for each UGA is listed in **Table 10**.

Table 10: Minimum Required Storage Volumes

UGA	Minimum Tank Volume (gal)
Creekview	619,000
Curry Creek North	777,000
Curry Creek South	3,334,000
Placer Ranch	3,340,000
Placer Vineyards	5,400,000
Regional University	1,720,000
Sierra Vista	1,788,000

4.3 Permitting

The State Water Resources Control Board (SWRCB) and the State Department of Health Services (DHS) have regulatory and permitting authority over recycled water projects in the State of California. The City of Roseville must have a Master Water Reclamation Permit from the Central Valley Regional Water Quality Control Board (RWQCB). The City has Master Reclamation Permit No. 97-147, and it is understood that a new permit has been adopted by the Regional Board recently.

4.4 Funding

The following are the possible funding sources for the projects in this report:

- Connection Fees – Currently, the City does not collect a connection fee for recycled water connections. A connection fee analysis could be performed and connection fees collected would fund regional facilities necessary to serve new developments.
- Developer/Community Facilities District – In this financing scenario, developer funded community facilities would be shared through reimbursement agreements.

4.4.1 Pipelines to Urban Growth Areas

Recycled water pipeline to the UGAs will be paid for by the Urban Growth Area developers. Individual UGA developers will be responsible for the construction of the recycled water transmission pipeline from the upstream UGA to their connection point with a pipe diameter appropriate to the peak day July recycled water demand. UGAs will also be responsible for upsizing recycled water pipe upstream of their location. As an example, Curry Creek North will need an 8” pipe to deliver recycled water. The 8” section of pipe connecting Creekview downstream to Curry Creek North will be paid for by Curry Creek North. Since 3 UGAs are downstream, the 8” pipe will need to be upsized to a 24” pipe. The upsizing cost will be split amongst the other 3 UGAs proportional to their recycled water demand. This process is continued down the recycled water pipe to Curry the Creek South/Sierra Vista connection point. Since Placer Vineyards is the only user on the pipe after the Morgan Creek Golf Course connection point, Placer Vineyards will pay the full installation cost of the 24” pipe. Further details of pipeline costs are found in **Attachment D**. Developers will be required to reimburse the City (or other funding party) if the transmission pipeline is built before the UGA undergoes construction.

4.5 CEQA/NEPA Compliance

CEQA review will be conducted by the City of Roseville for Regional Facilities. Mainly construction-related impacts will be addressed in the CEQA review. Urban Growth Area CEQA/NEPA review will be the responsibility of the UGA developers. The letter from the City of Roseville to Jim Durfee dated April

26, 2005 provides guidance for the preparation of environmental impact documents, consistent with the requirements of the California Environmental Quality Act (CEQA).

5 Bibliography

RMC Water and Environment. Sacramento Regional County Sanitation District (SRCSD) Recycled Water Satellite Facility Study, June 2004.

RMC Water and Environment. SPWA Recycled Water Market Assessment, November 2005.

Attachment A

Storage Analysis

Pleasant Grove Wastewater Treatment Plant Supply Analysis for Alternative C

24-hour Recycled Water Distribution

Hour	Effluent Flow into Chlorine Contact Basin (gal)	Flow to NZ Tank for WOGC & SCGC (gal)	Roseville Energy Park (gal)	Curry Creek North (gal)	Curry Creek South (gal)	Regional University (gal)	Placer Ranch (gal)	Creekview (gal)	Sierra Vista (gal)	WRSP (gal)	Recycled Water sent to Creek (gal)	Flow Leaving Plant to be pumped in distribution system (gpm)	Supply and Demand Check
		gpd 2,200,756	gpd 1,584,000	gpd 776,816	gpd 3,333,321	gpd 1,720,000	gpd 3,340,000	gpd 618,353	gpd 1,787,689	gpd 3,862,911			
6:00	495,990	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	0	14,267	-360,022
7:00	468,297	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	0	14,267	-387,715
8:00	506,357	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	0	14,267	-349,655
9:00	630,722	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	0	14,267	-225,291
10:00	805,945	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	0	14,267	-50,067
11:00	918,425	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	0	14,267	62,413
12:00	1,147,888	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	291,875	14,267	0
13:00	1,189,344	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	333,332	14,267	0
14:00	1,124,924	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	268,911	14,267	0
15:00	1,228,780	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	372,768	14,267	0
16:00	1,189,133	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	333,120	14,267	0
17:00	1,137,710	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	281,697	14,267	0
18:00	1,067,559	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	211,546	14,267	0
19:00	1,315,420	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	459,408	14,267	0
20:00	1,478,473	146,717	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	622,460	14,267	0
21:00	1,484,376	0	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	775,081	11,822	0
22:00	1,411,328	0	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	702,032	11,822	0
23:00	1,102,712	0	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	393,417	11,822	0
0:00	1,114,271	0	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	404,976	11,822	0
1:00	965,261	0	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	255,966	11,822	0
2:00	793,996	0	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	84,701	11,822	0
3:00	707,325	0	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	0	11,822	-1,970
4:00	600,729	0	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	0	11,822	-108,566
5:00	531,435	0	66,000	32,367	138,888	71,667	139,167	25,765	74,487	160,955	0	11,822	-177,860
Totals	**23,416,401**	**2,200,756**	**1,584,000**	**776,816**	**3,333,321**	**1,720,000**	**3,340,000**	**618,353**	**1,787,689**	**3,862,911**	**5,791,290**		

Pleasant Grove Wastewater Treatment Plant Supply Analysis for Alternative C

15-hour Recycled Water Distribution

Hour	Effluent Flow into Chlorine Contact Basin (gal)	Flow to NZ Tank for WOGC & SCGC (gal)	Roseville Energy Park (gal)	Curry Creek North (gal)	Curry Creek South (gal)	Regional University (gal)	Placer Ranch (gal)	Creekview (gal)	Sierra Vista (gal)	WRSP (gal)	Recycled Water sent to Creek (gal)	Flow Leaving Plant to be pumped in distribution system (gpm)	Supply and Demand Check
		gpd 2,200,756	gpd 1,584,000	gpd 776,816	gpd 3,333,321	gpd 1,720,000	gpd 3,340,000	gpd 618,353	gpd 1,787,689	gpd 3,862,911			
6:00	495,990	146,717	66,000	0	0	0	0	0	0	0	283,273	3,545	0
7:00	468,297	146,717	66,000	0	0	0	0	0	0	0	255,580	3,545	0
8:00	506,357	146,717	66,000	0	0	0	0	0	0	0	293,640	3,545	0
9:00	630,722	146,717	66,000	0	0	0	0	0	0	0	418,005	3,545	0
10:00	805,945	146,717	66,000	0	0	0	0	0	0	0	593,228	3,545	0
11:00	918,425	146,717	66,000	0	0	0	0	0	0	0	705,708	3,545	0
12:00	1,147,888	146,717	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	0	20,700	-94,102
13:00	1,189,344	146,717	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	0	20,700	-52,646
14:00	1,124,924	146,717	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	0	20,700	-117,066
15:00	1,228,780	146,717	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	0	20,700	-13,210
16:00	1,189,133	146,717	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	0	20,700	-52,857
17:00	1,137,710	146,717	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	0	20,700	-104,280
18:00	1,067,559	146,717	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	0	20,700	-174,431
19:00	1,315,420	146,717	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	0	20,700	73,431
20:00	1,478,473	146,717	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	236,483	20,700	0
21:00	1,484,376	0	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	389,103	18,255	0
22:00	1,411,328	0	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	316,055	18,255	0
23:00	1,102,712	0	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	7,439	18,255	0
0:00	1,114,271	0	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	18,998	18,255	0
1:00	965,261	0	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	0	18,255	-130,011
2:00	793,996	0	66,000	51,788	222,221	114,667	222,667	41,224	119,179	257,527	0	18,255	-301,276
3:00	707,325	0	66,000	0	0	0	0	0	0	0	641,325	1,100	0
4:00	600,729	0	66,000	0	0	0	0	0	0	0	534,729	1,100	0
5:00	531,435	0	66,000	0	0	0	0	0	0	0	465,435	1,100	0
Totals	**23,416,401**	**2,200,756**	**1,584,000**	**776,816**	**3,333,321**	**1,720,000**	**3,340,000**	**618,353**	**1,787,689**	**3,862,911**	**5,159,003**		

Pleasant Grove Wastewater Treatment Plant Supply Analysis for Alternative C

Equal Tank Fill

Hour	Effluent Flow into Chlorine Contact Basin (gal)	Flow to NZ Tank for WOGC & SCGC (gal)	Roseville Energy Park (gal)	Curry Creek North (gal)	Curry Creek South (gal)	Regional University (gal)	Placer Ranch (gal)	Creekview (gal)	Sierra Vista (gal)	WRSP (gal)	Recycled Water sent to Creek (gal)	Flow Leaving Plant to be pumped in distribution system (gpm)	Supply and Demand Check
		gpd 2,200,756	gpd 1,584,000	gpd 776,816	gpd 3,333,321	gpd 1,720,000	gpd 3,340,000	gpd 618,353	gpd 1,787,689	gpd 3,862,911			
6:00	495,990	146,717	66,000	40,468	40,468	40,468	40,468	40,468	40,468	40,468	0	8,267	0
7:00	468,297	146,717	66,000	36,511	36,511	36,511	36,511	36,511	36,511	36,511	0	7,805	0
8:00	506,357	146,717	66,000	41,949	41,949	41,949	41,949	41,949	41,949	41,949	0	8,439	0
9:00	630,722	146,717	66,000	59,715	59,715	59,715	59,715	59,715	59,715	59,715	0	10,512	0
10:00	805,945	146,717	66,000	84,747	84,747	84,747	84,747	84,747	84,747	84,747	0	13,432	0
11:00	918,425	146,717	66,000	100,815	100,815	100,815	100,815	100,815	100,815	100,815	0	15,307	0
12:00	1,147,888	146,717	66,000	133,596	133,596	133,596	133,596	133,596	133,596	133,596	0	19,131	0
13:00	1,189,344	146,717	66,000	139,518	139,518	139,518	139,518	139,518	139,518	139,518	0	19,822	0
14:00	1,124,924	146,717	66,000	152,034	152,034	152,034	152,034		152,034	152,034	0	18,749	0
15:00	1,228,780	146,717	66,000	169,344	169,344	169,344	169,344		169,344	169,344	0	20,480	0
16:00	1,189,133	146,717	66,000		195,283	195,283	195,283		195,283	195,283	0	19,819	0
17:00	1,137,710	146,717	66,000		184,999	184,999	184,999		184,999	184,999	0	18,962	0
18:00	1,067,559	146,717	66,000		170,968	170,968	170,968		170,968	170,968	0	17,793	0
19:00	1,315,420	146,717	66,000		220,541	220,541	220,541		220,541	220,541	0	21,924	0
20:00	1,478,473	146,717	66,000		253,151	253,151	253,151		253,151	253,151	0	24,641	0
21:00	1,484,376	0	66,000		472,792		472,792			472,792	0	24,740	0
22:00	1,411,328	0	66,000		448,443		448,443			448,443	0	23,522	0
23:00	1,102,712	0	66,000		345,571		345,571			345,571	0	18,379	0
0:00	1,114,271	0	66,000		349,424		349,424			349,424	0	18,571	0
1:00	965,261	0	66,000							899,261	0	16,088	0
2:00	793,996	0	66,000								727,996	1,100	0
3:00	707,325	0	66,000								641,325	1,100	0
4:00	600,729	0	66,000								534,729	1,100	0
5:00	531,435	0	66,000								465,435	1,100	0
Totals	**23,416,401**	**2,200,756**	**1,584,000**	**958,697**	**3,599,868**	**1,983,639**	**3,599,868**	**637,319**	**1,983,639**	**4,499,129**	**2,369,485**		

Pleasant Grove Wastewater Treatment Plant Supply Analysis for Alternative C

Two Tank Fill

Hour	Effluent Flow into Chlorine Contact Basin (gal)	Flow to NZ Tank for WOGC & SCGC (gal)	Roseville Energy Park (gal)	Curry Creek North (gal)	Curry Creek South (gal)	Regional University (gal)	Placer Ranch (gal)	Creekview (gal)	Sierra Vista (gal)	WRSP (gal)	Recycled Water sent to Creek (gal)	Flow Leaving Plant to be pumped in distribution system (gpm)	Supply and Demand Check
		gpd 2,200,756	gpd 1,584,000	gpd 776,816	gpd 3,333,321	gpd 1,720,000	gpd 3,340,000	gpd 618,353	gpd 1,787,689	gpd 3,862,911			
6:00	495,990	146,717	66,000	141,637				141,637			0	8,267	0
7:00	468,297	146,717	66,000	127,790				127,790			0	7,805	0
8:00	506,357	146,717	66,000	146,820				146,820			0	8,439	0
9:00	630,722	146,717	66,000	209,002				209,002			0	10,512	0
10:00	805,945	146,717	66,000	296,614				296,614			0	13,432	0
11:00	918,425	146,717	66,000			352,854			352,854		0	15,307	0
12:00	1,147,888	146,717	66,000			467,585			467,585		0	19,131	0
13:00	1,189,344	146,717	66,000			488,314			488,314		0	19,822	0
14:00	1,124,924	146,717	66,000			456,103			456,103		0	18,749	0
15:00	1,228,780	146,717	66,000		508,032		508,032				0	20,480	0
16:00	1,189,133	146,717	66,000		488,208		488,208				0	19,819	0
17:00	1,137,710	146,717	66,000		462,496		462,496				0	18,962	0
18:00	1,067,559	146,717	66,000		427,421		427,421				0	17,793	0
19:00	1,315,420	146,717	66,000		551,352		551,352				0	21,924	0
20:00	1,478,473	146,717	66,000		632,878		632,878				0	24,641	0
21:00	1,484,376	0	66,000		709,188		709,188				0	24,740	0
22:00	1,411,328	0	66,000							1,345,328	0	23,522	0
23:00	1,102,712	0	66,000							1,036,712	0	18,379	0
0:00	1,114,271	0	66,000							1,048,271	0	18,571	0
1:00	965,261	0	66,000							899,261	0	16,088	0
2:00	793,996	0	66,000								727,996	1,100	0
3:00	707,325	0	66,000								641,325	1,100	0
4:00	600,729	0	66,000								534,729	1,100	0
5:00	531,435	0	66,000								465,435	1,100	0
Totals	**23,416,401**	**2,200,756**	**1,584,000**	**921,863**	**3,779,574**	**1,764,856**	**3,779,574**	**921,863**	**1,764,856**	**4,329,572**	**2,369,485**		

Pleasant Grove Wastewater Treatment Plant Supply Analysis for Alternative C

Capped Flow of 16,000 gpm

Max flow 16,000 gpm		gpd	gpd	gpd	gpd	gpd	gpd	gpd	gpd	gpd			
Max flow 960,000 gal/hr		2,200,756	1,584,000	776,816	3,333,321	1,720,000	3,340,000	618,353	1,787,689	3,862,911			
Hour	Effluent Flow into Chlorine Contact Basin (gal)	Flow to NZ Tank for WOGC & SCGC (gal)	Roseville Energy Park (gal)	Curry Creek North (gal)	Curry Creek South (gal)	Regional University (gal)	Placer Ranch (gal)	Creekview (gal)	Sierra Vista (gal)	WRSP (gal)	Recycled Water sent to Creek (gal)	Flow Leaving Plant to be pumped in distribution system (gpm)	Supply and Demand Check
6:00	495,990	146,717	66,000	40,468	40,468	40,468	40,468	40,468	40,468	40,468	0	8,267	0
7:00	468,297	146,717	66,000	36,511	36,511	36,511	36,511	36,511	36,511	36,511	0	7,805	0
8:00	506,357	146,717	66,000	41,949	41,949	41,949	41,949	41,949	41,949	41,949	0	8,439	0
9:00	630,722	146,717	66,000	59,715	59,715	59,715	59,715	59,715	59,715	59,715	0	10,512	0
10:00	805,945	146,717	66,000	84,747	84,747	84,747	84,747	84,747	84,747	84,747	0	13,432	0
11:00	918,425	146,717	66,000	100,815	100,815	100,815	100,815	100,815	100,815	100,815	0	15,307	0
12:00	1,147,888	146,717	66,000	106,755	106,755	106,755	106,755	106,755	106,755	106,755	187,888	16,000	0
13:00	1,189,344	146,717	66,000	106,755	106,755	106,755	106,755	106,755	106,755	106,755	229,344	16,000	0
14:00	1,124,924	146,717	66,000	106,755	106,755	106,755	106,755	106,755	106,755	106,755	164,924	16,000	0
15:00	1,228,780	146,717	66,000	124,547	124,547	124,547	124,547		124,547	124,547	268,780	16,000	0
16:00	1,189,133	146,717	66,000		149,457	149,457	149,457		149,457	149,457	229,133	16,000	0
17:00	1,137,710	146,717	66,000		149,457	149,457	149,457		149,457	149,457	177,710	16,000	0
18:00	1,067,559	146,717	66,000		149,457	149,457	149,457		149,457	149,457	107,559	16,000	0
19:00	1,315,420	146,717	66,000		149,457	149,457	149,457		149,457	149,457	355,420	16,000	0
20:00	1,478,473	146,717	66,000		149,457	149,457	149,457		149,457	149,457	518,473	16,000	0
21:00	1,484,376	0	66,000		178,800	178,800	178,800		178,800	178,800	524,376	16,000	0
22:00	1,411,328	0	66,000		178,800	178,800	178,800		178,800	178,800	451,328	16,000	0
23:00	1,102,712	0	66,000		298,000		298,000			298,000	142,712	16,000	0
0:00	1,114,271	0	66,000		298,000		298,000			298,000	154,271	16,000	0
1:00	965,261	0	66,000		298,000		298,000			298,000	5,261	16,000	0
2:00	793,996	0	66,000		242,665		242,665			242,665	0	13,233	0
3:00	707,325	0	66,000		213,775		213,775			213,775	0	11,789	0
4:00	600,729	0	66,000		178,243		178,243			178,243	0	10,012	0
5:00	531,435	0	66,000							465,435	0	8,857	0
Totals	**23,416,401**	**2,200,756**	**1,584,000**	**809,016**	**3,442,583**	**1,913,899**	**3,442,583**	**684,469**	**1,913,899**	**3,908,018**	**3,517,179**		

Dry Creek Wastewater Treatment Plant Recycled Water Supply Analysis for Alternative C

24-hour Distribution

Hour	Effluent Flow into Chlorine Contact Basin (gal)	RW Pumped to North & South Zone (gal)	Flow in 24" RW Line (gal)	Recycled Water to Cherry Island (gal)	Recycled Water to Gibson Ranch (gal)	Flow to meet min. Fish and Game Req. (gal)	Excess flow in Creek (gal)	Total Flow Down the Creek (gal)	Flow Leaving Plant to be pumped in distribution system gal/hr	Flow Leaving Plant gal/min	Supply and Demand Check
			gpd 6,647,168	gpd 1,103,689	gpd 2,876,213	gpd 4,000,000					
6:00	409,722	84,120	276,965	45,987	119,842	166,666	0	332,495	361,085	6,018	-283,859
7:00	386,846	84,120	276,965	45,987	119,842	166,666	0	332,495	361,085	6,018	-306,735
8:00	418,286	84,120	276,965	45,987	119,842	166,666	0	332,495	361,085	6,018	-275,295
9:00	521,019	84,120	276,965	45,987	119,842	166,666	0	332,495	361,085	6,018	-172,561
10:00	665,766	84,120	276,965	45,987	119,842	166,666	0	332,495	361,085	6,018	-27,815
11:00	758,682	84,120	276,965	45,987	119,842	166,666	65,102	397,597	361,085	6,018	0
12:00	948,234	84,120	276,965	45,987	119,842	166,666	254,653	587,148	361,085	6,018	0
13:00	982,480	84,120	276,965	45,987	119,842	166,666	288,899	621,394	361,085	6,018	0
14:00	929,264	84,120	276,965	45,987	119,842	166,666	235,684	568,179	361,085	6,018	0
15:00	1,015,056	84,120	276,965	45,987	119,842	166,666	321,476	653,971	361,085	6,018	0
16:00	982,305	84,120	276,965	45,987	119,842	166,666	288,724	621,220	361,085	6,018	0
17:00	939,826	84,120	276,965	45,987	119,842	166,666	246,246	578,741	361,085	6,018	0
18:00	881,876	84,120	276,965	45,987	119,842	166,666	188,296	520,791	361,085	6,018	0
19:00	1,086,627	84,120	276,965	45,987	119,842	166,666	393,046	725,542	361,085	6,018	0
20:00	1,221,320	84,120	276,965	45,987	119,842	166,666	527,739	860,234	361,085	6,018	0
21:00	1,226,196	233,700	276,965	45,987	119,842	166,666	383,036	715,531	510,665	8,511	0
22:00	1,165,853	233,700	276,965	45,987	119,842	166,666	322,693	655,188	510,665	8,511	0
23:00	910,916	233,700	276,965	45,987	119,842	166,666	67,755	400,250	510,665	8,511	0
0:00	920,464	233,700	276,965	45,987	119,842	166,666	77,304	409,799	510,665	8,511	0
1:00	797,372	233,700	276,965	45,987	119,842	166,666	0	332,495	510,665	8,511	-45,789
2:00	655,895	233,700	276,965	45,987	119,842	166,666	0	332,495	510,665	8,511	-187,265
3:00	584,299	233,700	276,965	45,987	119,842	166,666	0	332,495	510,665	8,511	-258,862
4:00	496,243	233,700	276,965	45,987	119,842	166,666	0	332,495	510,665	8,511	-346,917
5:00	439,002	233,700	276,965	45,987	119,842	166,666	0	332,495	510,665	8,511	-404,159
Totals	**19,343,548**	**3,365,100**	**6,647,168**	**1,103,689**	**2,876,213**	**3,999,984**	**3,660,651**	**11,640,537**			

Dry Creek Wastewater Treatment Plant Recycled Water Supply Analysis for Alternative C

15-hour Distribution

Hour	Effluent Flow into Chlorine Contact Basin (gal)	RW Pumped to North & South Zone (gal)	Flow in 24" RW Line (gal)	Recycled Water to Cherry Island (gal)	Recycled Water to Gibson Ranch (gal)	Flow to meet min. Fish and Game Req. (gal)	Excess flow in Creek (gal)	Total Flow Down the Creek (gal)	Flow Leaving Plant to be pumped in distribution system gal/hr	Flow Leaving Plant gal/min	Supply and Demand Check
			gpd 6,647,168	gpd 1,103,689	gpd 2,876,213	gpd 4,000,000					
6:00	409,722	84,120	276,965	0	0	0	48,636	48,636	361,085	6,018	0
7:00	386,846	84,120	276,965	0	0	0	25,760	25,760	361,085	6,018	0
8:00	418,286	84,120	276,965	0	0	0	57,200	57,200	361,085	6,018	0
9:00	521,019	84,120	276,965	0	0	0	159,934	159,934	361,085	6,018	0
10:00	665,766	84,120	276,965	0	0	0	304,680	304,680	361,085	6,018	0
11:00	758,682	84,120	276,965	73,579	191,748	266,667	0	531,993	361,085	6,018	-134,397
12:00	948,234	84,120	276,965	73,579	191,748	266,667	55,155	587,148	361,085	6,018	0
13:00	982,480	84,120	276,965	73,579	191,748	266,667	89,401	621,394	361,085	6,018	0
14:00	929,264	84,120	276,965	73,579	191,748	266,667	36,185	568,179	361,085	6,018	0
15:00	1,015,056	84,120	276,965	73,579	191,748	266,667	121,978	653,971	361,085	6,018	0
16:00	982,305	84,120	276,965	73,579	191,748	266,667	89,226	621,220	361,085	6,018	0
17:00	939,826	84,120	276,965	73,579	191,748	266,667	46,747	578,741	361,085	6,018	0
18:00	881,876	84,120	276,965	73,579	191,748	266,667	0	531,993	361,085	6,018	-11,202
19:00	1,086,627	84,120	276,965	73,579	191,748	266,667	193,548	725,542	361,085	6,018	0
20:00	1,221,320	84,120	276,965	73,579	191,748	266,667	328,241	860,234	361,085	6,018	0
21:00	1,226,196	233,700	276,965	73,579	191,748	266,667	183,537	715,531	510,665	8,511	0
22:00	1,165,853	233,700	276,965	73,579	191,748	266,667	123,194	655,188	510,665	8,511	0
23:00	910,916	233,700	276,965	73,579	191,748	266,667	0	531,993	510,665	8,511	-131,743
0:00	920,464	233,700	276,965	73,579	191,748	266,667	0	531,993	510,665	8,511	-122,195
1:00	797,372	233,700	276,965	73,579	191,748	266,667	0	531,993	510,665	8,511	-245,287
2:00	655,895	233,700	276,965	0	0	0	145,230	145,230	510,665	8,511	0
3:00	584,299	233,700	276,965	0	0	0	73,633	73,633	510,665	8,511	0
4:00	496,243	233,700	276,965	0	0	0	0	0	510,665	8,511	-14,422
5:00	439,002	233,700	276,965	0	0	0	0	0	510,665	8,511	-71,664
Totals	**19,343,548**	**3,365,100**	**6,647,168**	**1,103,689**	**2,876,213**	**4,000,000**	**2,082,288**	**10,062,190**			

Dry Creek Wastewater Treatment Plant Recycled Water Supply Analysis for Alternative C

Creek Distribution

Hour	Effluent Flow into Chlorine Contact Basin (gal)	RW Pumped to North & South Zone (gal)	Flow in 24" RW Line (gal)	Recycled Water to Cherry Island (gal)	Recycled Water to Gibson Ranch (gal)	Flow to meet min. Fish and Game Req. (gal)	Excess flow in Creek (gal)	Total Flow Down the Creek (gal)	Flow Leaving Plant to be pumped in distribution system gal/hr	Flow going to pipe disribution gpm	Supply and Demand Check
			gpd 6,647,168	gpd 1,103,689	gpd 2,876,213	gpd 4,000,000					
6:00	409,722	84,120	276,965	16,212	16,212	16,212	0	48,636	361,085	6,018	0
7:00	386,846	84,120	276,965	8,587	8,587	8,587	0	25,760	361,085	6,018	0
8:00	418,286	84,120	276,965	19,067	19,067	19,067	0	57,200	361,085	6,018	0
9:00	521,019	84,120	276,965	53,311	53,311	53,311	0	159,934	361,085	6,018	0
10:00	665,766	84,120	276,965	101,560	101,560	101,560	0	304,680	361,085	6,018	0
11:00	758,682	84,120	276,965	132,532	132,532	132,532	0	397,597	361,085	6,018	0
12:00	948,234	84,120	276,965	195,716	195,716	195,716	0	587,148	361,085	6,018	0
13:00	982,480	84,120	276,965	207,131	207,131	207,131	0	621,394	361,085	6,018	0
14:00	929,264	84,120	276,965	189,393	189,393	189,393	0	568,179	361,085	6,018	0
15:00	1,015,056	84,120	276,965	217,990	217,990	217,990	0	653,971	361,085	6,018	0
16:00	982,305	84,120	276,965		310,610	310,610	0	621,220	361,085	6,018	0
17:00	939,826	84,120	276,965		289,370	289,370	0	578,741	361,085	6,018	0
18:00	881,876	84,120	276,965		260,396	260,396	0	520,791	361,085	6,018	0
19:00	1,086,627	84,120	276,965		362,771	362,771	0	725,542	361,085	6,018	0
20:00	1,221,320	84,120	276,965		430,117	430,117	0	860,234	361,085	6,018	0
21:00	1,226,196	233,700	276,965		357,765	357,765	0	715,531	510,665	8,511	0
22:00	1,165,853	233,700	276,965			655,188	0	655,188	510,665	8,511	0
23:00	910,916	233,700	276,965			400,250	0	510,665	510,665	8,511	0
0:00	920,464	233,700	276,965				409,799	1,330,263	510,665	8,511	0
1:00	797,372	233,700	276,965				286,706	1,084,078	510,665	8,511	0
2:00	655,895	233,700	276,965				145,230	801,125	510,665	8,511	0
3:00	584,299	233,700	276,965				73,633	657,932	510,665	8,511	0
4:00	496,243	233,700	276,965				0	496,243	510,665	8,511	-14,422
5:00	439,002	233,700	276,965				0	439,002	510,665	8,511	-71,664
Totals	**19,343,548**	**3,365,100**	**6,647,168**	**1,141,500**	**3,152,530**	**4,207,968**	**915,369**	**13,421,056**			

Dry Creek Wastewater Treatment Plant Recycled Water Supply Analysis for Alternative C

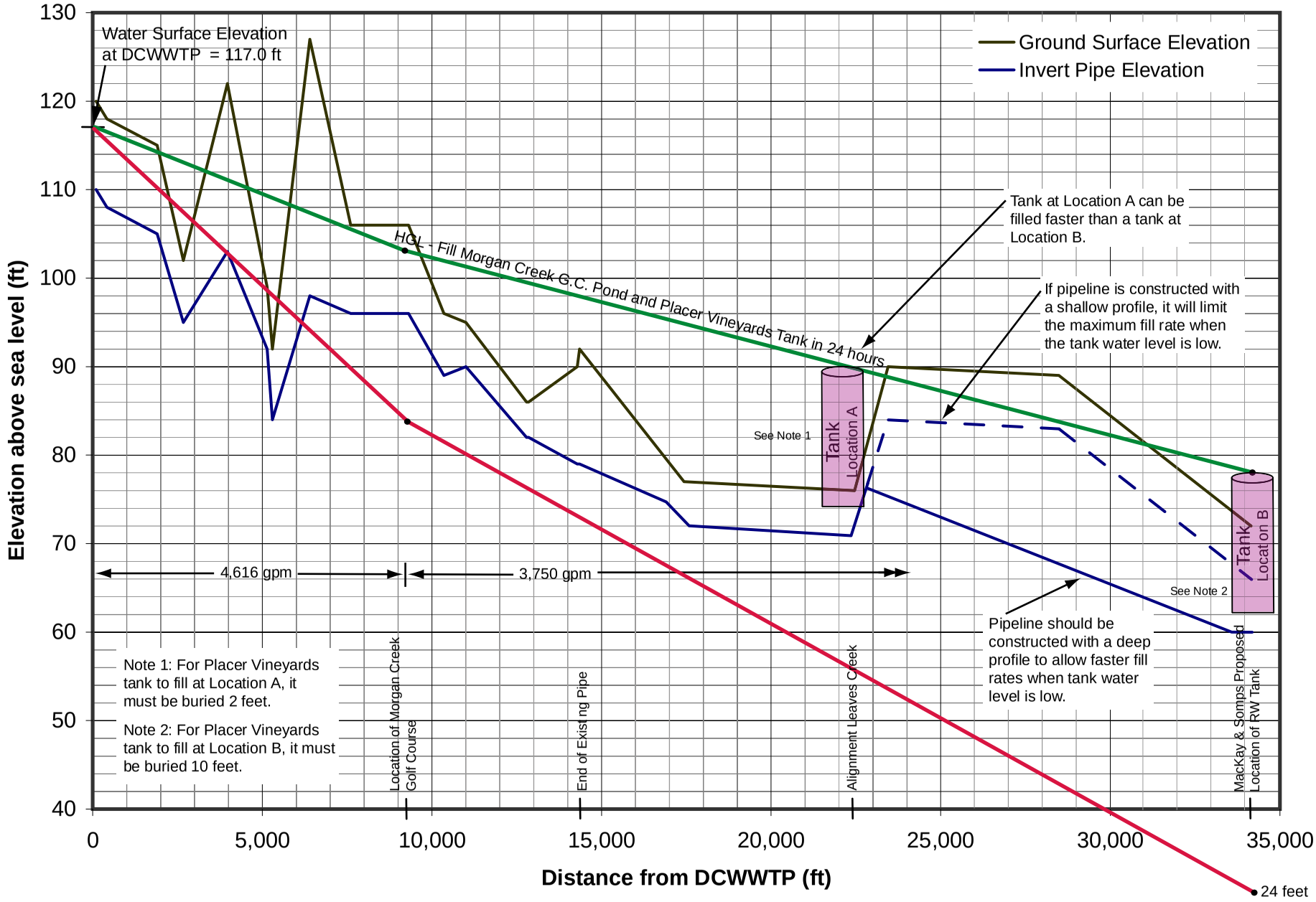
Proportional Flow to Creek Customers

			gpd	gpd	gpd	gpd					
			6,647,168	1,103,689	2,876,213	4,000,000					
		7,979,902		0.14	0.36	0.50					
Hour	Effluent Flow into Chlorine Contact Basin (gal)	RW Pumped to North & South Zone (gal)	Flow in 24" RW Line (gal)	Recycled Water to Cherry Island (gal)	Recycled Water to Gibson Ranch (gal)	Flow to meet min. Fish and Game Req. (gal)	Excess flow in Creek (gal)	Total Flow Down the Creek (gal)	Flow Leaving Plant to be pumped in distribution system gal/hr	Flow Leaving Plant gpm	Supply and Demand Check
6:00	409,722	84,120	276,965				48,636	48,636	361,085	6,018	0
7:00	386,846	84,120	276,965				25,760	25,760	361,085	6,018	0
8:00	418,286	84,120	276,965				57,200	57,200	361,085	6,018	0
9:00	521,019	84,120	276,965	22,120	57,645	80,168	0	159,934	361,085	6,018	0
10:00	665,766	84,120	276,965	42,140	109,817	152,724	0	304,680	361,085	6,018	0
11:00	758,682	84,120	276,965	54,991	143,307	199,299	0	397,597	361,085	6,018	0
12:00	948,234	84,120	276,965	81,208	211,627	294,314	0	587,148	361,085	6,018	0
13:00	982,480	84,120	276,965	85,944	223,970	311,480	0	621,394	361,085	6,018	0
14:00	929,264	84,120	276,965	78,584	204,790	284,805	0	568,179	361,085	6,018	0
15:00	1,015,056	84,120	276,965	90,450	235,712	327,809	0	653,971	361,085	6,018	0
16:00	982,305	84,120	276,965	85,920	223,908	311,392	0	621,220	361,085	6,018	0
17:00	939,826	84,120	276,965	80,045	208,597	290,099	0	578,741	361,085	6,018	0
18:00	881,876	84,120	276,965	72,030	187,710	261,051	0	520,791	361,085	6,018	0
19:00	1,086,627	84,120	276,965	100,349	261,509	363,685	0	725,542	361,085	6,018	0
20:00	1,221,320	84,120	276,965	118,978	310,056	431,200	0	860,234	361,085	6,018	0
21:00	1,226,196	233,700	276,965	98,964	257,900	358,666	0	715,531	510,665	8,511	0
22:00	1,165,853	233,700	276,965				655,188	655,188	510,665	8,511	0
23:00	910,916	233,700	276,965				400,250	400,250	510,665	8,511	0
0:00	920,464	233,700	276,965				409,799	409,799	510,665	8,511	0
1:00	797,372	233,700	276,965				286,706	286,706	510,665	8,511	0
2:00	655,895	233,700	276,965				145,230	145,230	510,665	8,511	0
3:00	584,299	233,700	276,965				73,633	73,633	510,665	8,511	0
4:00	496,243	233,700	276,965				0	0	510,665	8,511	-14,422
5:00	439,002	233,700	276,965				0	0	510,665	8,511	-71,664
Totals	**19,343,548**	**3,365,100**	**6,647,168**	**1,011,722**	**2,636,547**	**3,666,693**	**2,102,404**	**9,417,366**			

Attachment B

24-inch Gravity Line Hydraulic Analysis

Hydraulic Analysis of 24" RW Pipe from DCWWTP to Placer Vineyards Recycled Water Tank



Attachment C

Detailed Cost Analysis

Preliminary Construction Cost Estimate for
Recycled Water System Evaluation Improvements
Alternative A

Project No.	Capital Construction Item	Size	Length	Unit Cost[1]	OH Factor[2]	Total Amount
1	18" FM Converted for RW Use from PGWWTP	18 in.	9,700 ft			n/a
1 Total			**9,700 ft**			
2	8" FM Converted for RW Use	8 in.	8,900 ft			n/a
2 Total			**8,900 ft**			
3	30" FM Converted for RW Use South of NZPS	30 in.	19,600 ft			n/a
3 Total			**19,600 ft**			
4	Creekview Pipeline	24 in.	3,300 ft	192 $/LF	1.625	$ 1,029,600
4 Total			**3,300 ft**			**$ 1,030,000**
5	Creekview to Curry Creek North	24 in.	4,600 ft	192 $/LF	1.625	$ 1,435,200
	Curry Creek North to Regional University	24 in.	2,100 ft	192 $/LF	1.625	$ 655,200
	Regional Univ. to Curry Creek S. & Sierra Vista	24 in.	8,100 ft	192 $/LF	1.625	$ 2,527,200
5 Total			**14,800 ft**			**$ 4,618,000**
6	Placer Vineyards Pipeline	24 in.	4,900 ft	192 $/LF	1.625	$ 1,528,800
6 Total			**4,900 ft**			**$ 1,529,000**
7	North from PGWWTP to "Tee"	30 in.	1,400 ft	240 $/LF	1.625	$ 546,000
	Pipeline from "Tee" to Placer Ranch PS	16 in.	5,800 ft	128 $/LF	1.625	$ 1,206,400
	From Placer Ranch Pipeline to 30" RW Stub	16 in.	1,500 ft	128 $/LF	1.625	$ 312,000
7 Total			**8,700 ft**			**$ 2,065,000**
8	DCWWTP Pump Station Improvements (1 50 HP pump)	1,900 gpm	n/a	$60,000	1.625	$ 97,500
8 Total						**$ 98,000**
9	North Zone Pump Station Improvements (1 50 HP pump)	950 gpm	n/a	$35,000	1.625	$ 56,900
9 Total						**$ 57,000**
10	PGWWTP Pump Station Improvement (3 250 HP pumps)	15,360 gpm	n/a	$375,000	1.625	$ 609,400
10 Total						**$ 610,000**
11	Addition of 30" Pipe at PGWWTP for Maximum Flow Conveyance	30 in.	1,700 ft	360 $/LF	1.625	$ 994,500
11 Total			**1,700 ft**			**$ 995,000**
Grand Total			**71,600 ft**			**$ 11,002,000**

Notes:

1 Unit costs based upon a $8/LF in diameter for rural areas (Urban Growth Areas) and $12/LF in diameter for urban areas (existing roadway or paving)

2 An overhead markup of 62.5% was applied based on a 25% engineering and administration factor plus a 30% construction cost contingency to calculate the capital cost. Hence, for budgeting purposes, it is assumed that the contingency and project implementation multiplier is 1.625 (1.00 x 1.25 x 1.30 1.625)

Preliminary Construction Cost Estimate for
Recycled Water System Evaluation Improvements
Alternative B

Project No.	Capital Construction Item	Size	Length	Unit Cost[1]	OH Factor[2]	Total Amount
1	18" FM Converted for RW Use from PGWWTP	18 in.	9,700 ft			n/a
1 Total			**9,700 ft**			
2	8" FM Converted for RW Use	8 in.	8,900 ft			n/a
2 Total			**8,900 ft**			
3	30" FM Converted for RW Use South of NZPS	30 in.	19,600 ft			n/a
3 Total			**19,600 ft**			
4	Creekview Pipeline	24 in.	3,300 ft	192 $/LF	1.625	$ 1,029,600
4 Total			**3,300 ft**			**$ 1,030,000**
5	Creekview to Curry Creek North	24 in.	4,600 ft	192 $/LF	1.625	$ 1,435,200
	Curry Creek North to Regional University	24 in.	2,100 ft	192 $/LF	1.625	$ 655,200
	Regional Univ. to Curry Creek S. & Sierra Vista	24 in.	8,100 ft	192 $/LF	1.625	$ 2,527,200
5 Total			**14,800 ft**			**$ 4,618,000**
6	Placer Vineyards to 24" Gravity Line	24 in.	19,200 ft	192 $/LF	1.625	$ 5,990,400
6 Total			**19,200 ft**			**$ 5,991,000**
7	North from PGWWTP to "Tee"	30 in.	1,400 ft	240 $/LF	1.625	$ 546,000
	Pipeline from "Tee" to Placer Ranch PS	16 in.	5,800 ft	128 $/LF	1.625	$ 1,206,400
	From Placer Ranch Pipeline to 30" RW Stub	16 in.	1,500 ft	128 $/LF	1.625	$ 312,000
7 Total			**8,700 ft**			**$ 2,065,000**
8	DCWWTP Pump Station Improvements (1 50 HP pump)	1,900 gpm	n/a	$60,000	1.625	$ 97,500
8 Total						**$ 98,000**
9	North Zone Pump Station Improvements (1 50 HP pump)	950 gpm	n/a	$35,000	1.625	$ 56,900
9 Total						**$ 57,000**
10	PGWWTP Pump Station Improvement (2 250 HP pumps)	10,240 gpm	n/a	$250,000	1.625	$ 406,300
10 Total						**$ 407,000**
11	Addition of 30" Pipe at PGWWTP for Maximum Flow Conveyance	30 in.	1,700 ft	360 $/LF	1.625	$ 994,500
11 Total			**1,700 ft**			**$ 995,000**
Grand Total			**85,900 ft**			**$ 15,261,000**

Notes:

1 Unit costs based upon a $8/LF in diameter for rural areas (Urban Growth Areas) and $12/LF in diameter for urban areas (existing roadway or paving)

2 An overhead markup of 62.5% was applied based on a 25% engineering and administration factor plus a 30% construction cost contingency to calculate the capital cost. Hence, for budgeting purposes, it is assumed that the contingency and project implementation multiplier is 1.625 (1.00 x 1.25 x 1.30 = 1.625)

Preliminary Construction Cost Estimate for
Recycled Water System Evaluation Improvements
Alternative C

Project No.	Capital Construction Item	Size	Length	Unit Cost[1]	OH Factor[2]	Total Amount
1	18" FM Converted for RW Use from PGWWTP	18 in.	9,700 ft			n/a
1 Total			**9,700 ft**			
2	8" FM Converted for RW Use	8 in.	8,900 ft			n/a
2 Total			**8,900 ft**			
3	30" FM Converted for RW Use South of NZPS	30 in.	19,600 ft			n/a
3 Total			**19,600 ft**			
4	Creekview Pipeline	24 in.	3,300 ft	192 $/LF	1.625	$ 1,029,600
4 Total			**3,300 ft**			**$ 1,030,000**
5	Creekview to Curry Creek North	24 in.	4,600 ft	192 $/LF	1.625	$ 1,435,200
	Curry Creek North to Regional University	24 in.	2,100 ft	192 $/LF	1.625	$ 655,200
	Regional Univ. to Curry Creek S. & Sierra Vista	24 in.	2,300 ft	192 $/LF	1.625	$ 717,600
5 Total			**9,000 ft**			**$ 2,808,000**
6	Placer Vineyards Pipeline	24 in.	9,100 ft	192 $/LF	1.625	$ 2,839,200
6 Total			**9,100 ft**			**$ 2,840,000**
7	North from PGWWTP to "Tee"	30 in.	1,400 ft	240 $/LF	1.625	$ 546,000
	Pipeline from "Tee" to Placer Ranch PS	16 in.	5,800 ft	128 $/LF	1.625	$ 1,206,400
7 Total			**7,200 ft**			**$ 1,753,000**
8	DCWWTP Pump Station Improvements (1 50 HP pump)	1,900 gpm	n/a	$60,000	1.625	$ 97,500
8 Total						**$ 98,000**
9	North Zone Pump Station Improvements (1 50 HP pump)	950 gpm	n/a	$35,000	1.625	$ 56,900
9 Total						**$ 57,000**
10	PGWWTP Pump Station Improvement (3 250 HP pumps)	15,360 gpm	n/a	$375,000	1.625	$ 609,400
10 Total						**$ 610,000**
11	Sun City Pipeline from 18" Converted Force Main	12 in.	2,700 ft	144 $/LF	1.625	$ 631,800
11 Total			**2,700 ft**			**$ 632,000**
12	Addition of 30" Pipe at PGWWTP for Maximum Flow Conveyance	30 in.	1,700 ft	360 $/LF	1.625	$ 994,500
12 Total			**1,700 ft**			**$ 995,000**
Grand Total			**71,200 ft**			**$ 10,823,000**

Notes:

1 Unit costs based upon a $8/LF in diameter for rural areas (Urban Growth Areas) and $12/LF in diameter for urban areas (existing roadway or paving)

2 An overhead markup of 62.5% was applied based on a 25% engineering and administration factor plus a 30% construction cost contingency to calculate the capital cost. Hence, for budgeting purposes, it is assumed that the contingency and project implementation multiplier is 1.625 (1.00 x 1.25 x 1.30 1.625)

Attachment D

Urban Growth Area Cost Details

Urban Growth Area Individual Recycled Water Pipeline Costs

Urban Growth Areas July Peak Day Demands and Pipeline Requirements

Segment	Location	Length (ft)	Diameter (in)	Upsize Diameter	Total Downstream Demand (mgd)	Placer Ranch Demand (mgd)	Creekview Demand (mgd)	Curry Creek North Demand (mgd)	Regional University Demand (mgd)	Curry Creek South Demand (mgd)	Sierra Vista Demand (mgd)	Placer Vineyards Pipe Demand (mgd)
1	PGWWTP to "Tee"	1,389	8	30	11.577	3.340	0.618	0.778	1.720	3.333	1.788	0
2	"Tee" to Creekview	3,292	8	24	8.237	0	0.618	0.778	1.720	3.333	1.788	0
3	Creekview to Curry Creek North	4,582	8	24	7.618	0	0	0.778	1.720	3.333	1.788	0
4	Curry Creek North to Regional Univ.	2,097	12	24	6.841	0	0	0	1.720	3.333	1.788	0
5	Regional Univ to Curry Creek South and Sierra Vista	4,708	24	n/a	5.121	0	0	0	0	3.333	1.788	0
6	"Tee" to Placer Ranch	5,789	16	n/a	3.340	3.340	0	0	0	0	0	0
7	Placer Vineyards Pipeline	9,100	24	n/a	3.443	0	0	0	0	0	0	5.400

UGAs Individual Costs to Install Recycled Water Pipeline *

						July Peak Day Recycled Water Demand in mgd							
						3.340	0.618	0.778	1.720	3.333	1.788		
Segment	Location	Length (ft)	Diameter (in)	Segment Cost	Cost to Upsize to Necessary Diameter	Placer Ranch Pipe Cost	Creekview Pipe Cost	Curry Creek North Pipe Cost	Regional University Pipe Cost	Curry Creek South Pipe Cost	Sierra Vista Pipe Cost	Placer Vineyards Pipe Cost	**Total Cost of Pipe Segment from UGAs**
1	PGWWTP to "Tee"	1,389	8	$88,896	$244,464	$96,178	$17,806	$22,392	$49,529	$95,977	$51,478	$0	**$333,360**
2	"Tee" to Creekview	3,292	8	$210,688	$421,376	$0	$210,688	$43,010	$95,135	$184,352	$98,879	$0	**$632,064**
3	Creekview to Curry Creek North	4,582	8	$293,248	$586,496	$0	$0	$293,248	$147,467	$285,759	$153,270	$0	**$879,744**
4	Curry Creek North to Regional Univ.	2,097	12	$201,312	$201,312	$0	$0	$0	$201,312	$131,032	$70,280	$0	**$402,624**
5	Regional Univ to Curry Creek South and Sierra Vista	4,708	16	$903,936	$0	$0	$0	$0	$0	$588,362	$315,574	$0	**$903,936**
6	"Tee" to Placer Ranch	5,789	16	$740,992	$0	$740,992	$0	$0	$0	$0	$0	$0	**$740,992**
7	Placer Vineyards Pipeline	9,100	24	$1,747,200	$0	$0	$0	$0	$0	$0	$0	$1,747,200	**$1,747,200**
	Total	**30,957**		**$4,186,272**	**$1,453,648**	**$837,170**	**$228,494**	**$358,650**	**$493,443**	**$1,285,482**	**$689,481**	**$1,747,200**	**$5,639,920**

* Costs do not include contingencies

Appendix T Initial CEQA Study Checklist

CITY OF
ROSEVILLE
TRADITION • PRIDE • PROGRESS

Environmental Utilities
2005 Hilltop Circle
Roseville, California 95747-9704

April 26, 2005

Jim Durfee
Deputy Director
County of Placer: Department of Facility Services
11476 C Avenue
Auburn, CA 95603

Subject: Regional Wastewater and Recycled Water Systems Evaluation Project - Process for Analyzing Urban Growth Areas (UGA's) Seeking Service from Regional Facilities--**REVISED**

Dear Jim:

Please disregard our letter of March 16, 2005 and replace it in its entirety with the following.

As part of our South Placer Wastewater Authority's (SPWA) *Regional Wastewater and Recycled Water Systems Evaluation Project,* we have been receiving information regarding developments seeking services from regional trunk sewers and the two regional treatment plants. We appreciate the time and attention your staff and the landowners have invested in preparing information for our use as we evaluate the proposed contributions of wastewater and use of recycled water in these urban growth areas (UGA's). As you interface with UGA landowners, there is essential project information they will need to develop and provide to the Systems Evaluation Project Team:

Project Information List
For each UGA, we request that the required analyses and project information listed in Table 1 be submitted to enable our Systems Evaluation Project Team to prepare the proper engineering evaluations for regional trunk sewer, recycled water, and treatment facilities. This information list is not necessarily the same as the project information list required as part of the CEQA documentation.

CEQA Documentation
The County, as the local land use authority, will be the lead agency for CEQA for each UGA. SPWA will be a responsible agency under CEQA for purposes of financing regional wastewater infrastructure, such as: providing regional interceptor capacity, supplying recycled water from regional facilities, and providing expanded wastewater treatment facilities. It is our expectation that the County will rely on the 1996 Master Plan and Master Plan EIR as base documents for CEQA documentation, and will build on

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that documentation for each UGA CEQA document using information in the Systems Evaluation Project Report. Eventually, upon completion of the Systems Evaluation Project Report, each UGA CEQA document will reference the Systems Evaluation Project Report to support their CEQA Analyses.

The County must identify in the CEQA documentation issues that pertain to the construction and installation of wastewater collection and conveyance infrastructure, and treated wastewater discharges that could result in or contribute to exceeding currently permitted wastewater capacity or discharge limits. Emphasis must be placed on cumulative impacts. Attachment A provides specific guidance on the preparation of the CEQA document.

Please do not hesitate to contact us if you have any further questions.

Sincerely,

Derrick Whitehead
Environmental Utilities Director

c. Art O'Brien/City of Roseville
Jerry Loscalzo/SPMUD
Fred Yeager/ Placer County Planning Director

Table 1: Project Information List for UGA's

CATEGORIES	REQUIRED ANALYSES AND PROJECT INFORMATION
Urban Growth Area Boundaries	▪ Boundary of Urban Growth Area ▪ Land Use in Urban Growth Area *(Acres by Land Use Type)* ▪ Equivalent Dwelling Units (EDUs) to be Served ▪ Comparison of UGA proposed land uses and EDUs with land uses and EDUs in current SPWA Service Area
Analyses on Wastewater Flow and Characteristics	▪ Average Dry Weather Flow [a] ➢ To be Conveyed by the Collection System ➢ To be Treated at the Regional Treatment Facilities ▪ Peak Wet Weather Flow [a] ➢ To be Conveyed by the Collection System ➢ To be Treated at the Regional Treatment Facilities ▪ Flow Characteristics at Buildout for non-typical developments *(e.g. testing and laboratory facilities, manufacturing facilities, etc.)* ➢ Organic/Solids Loading Strength *(as compared to typical domestic strength)* ➢ Pre-Treatment Requirements ➢ Variable Flow Frequency/Duration *(e.g. batch large volume discharge, continuous 24/7 operations)*
New Wastewater Conveyance Infrastructure	▪ Location of Conveyance Routes ▪ Rights-of-Way ▪ Conveyance Pipeline Size, Length ▪ Pipeline Operations *(e.g. Gravity/Force Main)* ▪ Connection to Existing Conveyance System or to Regional Treatment Plant ▪ Pump Station ▪ Other Physical Features
New Infrastructure/ Flow Phasing	▪ Wastewater Flow Growth Rate *(e.g. expected EDU absorption rate)* ▪ Infrastructure Phasing ▪ Buildout Year
Recycled Water Analyses	▪ Estimated Average Day (mgd) and Annual Demands (AFY) ▪ Sizing of Storage Facilities for Maximum Day & Peak Hour Demands [b] ▪ Distribution Infrastructures ➢ Location of Storage Facility and Distribution Routes ➢ Rights-of-Way ➢ Distribution Pipeline Size, Length ➢ Connection to Existing Distribution System [b] ➢ Pump Station ➢ Other Physical Features
Additional Approvals/Permits Affecting Project Development	List all other approvals/permits affecting project developments *(e.g. LAFCO approval, public right-of-way permits, etc.)*
Cumulative Impact Analyses	Discuss and present cumulative impact analyses for the proposed project Cumulative impact is defined as the impact that will be created by the proposed project for the regional wastewater (collection and treatment) and recycled water facilities when analyzed in addition to past, present, or foreseeable future development projects.

[a] Calculated based on proposed land use and EDUs generated by the new service area using collection system and treatment plant flow factors presented in the City of Roseville's *Roseville Regional Wastewater Treatment Service Area Master Plan* (May 1996)

[b] Future recycled water system connection from UGAs will be required to have storage facilities to meet maximum day and peak hour demand The maximum recycled water volume allotment to the UGAs will equal the volume of wastewater received by the regional treatment facilities from the UGAs. Maximum day and peak hour demands currently used by the City of Roseville are found in *Recycled Water Distribution System Feasibility Study, April 2000*, and *Recycled Water Study for West Roseville Specific Plan Area May 21, 2003*

ATTACHMENT A

GUIDANCE FOR ENVIRONMENTAL AND TECHNICAL ANALYSES

Background

The City of Roseville (City), the South Placer Municipal Utility District (District), and the County of Placer (County) entered into a Joint Powers Agreement (JPA) and formed the South Placer Wastewater Authority (SPWA) in October 2000. The SPWA was created for the purposes of, among other duties, funding and financing of Regional Wastewater Facilities. The SPWA and the Participants (City, District, and County) entered into a Funding Agreement and an Operations Agreement. The Funding Agreement established the revenue, debt service, and flow obligations among the Participants. The Operations Agreement recognized the City's role in owning, operating, and maintaining the Regional Wastewater Facilities.

The 1996 *Roseville Regional Wastewater Treatment Service Area Master Plan EIR* (WWMP EIR) was certified by the City of Roseville in November 1996 and was considered by the SPWA in October 2000 as part of the formation of the JPA. The Master Plan identifies the wastewater service area and contains the assumptions used to identify and design for wastewater conveyance and treatment. Wastewater service within the current service area is based on a first come first serviced basis as outlined in the Funding Agreement.

The above agreements outline responsibilities and approval authorities among SPWA Participants that create specific CEQA compliance needs. The roles and CEQA responsibilities of each involved agency are described herein. The purpose of this document is to provide SPWA Participants and local agencies that prepare CEQA documents with the process and scoping guidance they will need to ensure adequate CEQA documentation is prepared for discretionary approvals required by the above-described agreements.

For the purpose of this guidance document, Urban Growth Areas (UGAs) are defined as areas located wholly or in part outside the current service area. Densification/Intensification projects (D/I Project) are defined as areas located within the current service area where proposed zone changes would result in an increase in wastewater generation compared to current assumptions.

Process for SPWA and Participant Involvement in UGA and/or D/I Projects

When local agencies with land use authority propose new UGAs or D/I Projects, it is appropriate for the local jurisdiction to consult with SPWA and Participant staff to ensure a comprehensive analysis of related wastewater impacts, including appropriate CEQA documentation. This effort should proceed in two phases and be based on the most recent available information as discussed below.

Phase 1: Early Consultation The first phase should involve early consultation between the landowner's engineers and SPWA and Participant staff. The goal of early consultation is to identify and agree upon the project's wastewater treatment and recycled water demands, parameters for cumulative flow analysis, and potential impacts to conveyance and treatment facilities. This effort should rely on the technical analyses contained in the *Regional Wastewater and Recycled Water Systems Flow Evaluation* (currently in progress). Once agreement is reached on project generated wastewater and recycled water demands, and related conveyance, treatment and storage requirements; system upgrades necessary to accommodate the project can be identified.

Phase 2: CEQA Documentation. Phase two of the consultation process focuses on CEQA documentation. During this phase, upgrades to the wastewater system identified during Phase 1 would be incorporated in the CEQA document prepared by the local agency with land use authority (i.e., the CEQA local Lead Agency). It is recommended that any new or modified Regional Wastewater Facilities identified during Phase 1, as needed to serve the UGA or D/I Project, be incorporated into CEQA document project description and identified as off-site improvements. The related CEQA analysis should address construction and operation of these facilities at a "project-level" so that no subsequent or supplemental CEQA review is required.

This phased process helps to ensure that CEQA documentation will be adequate for any and all discretionary actions as discussed in the following sections.

CEQA Responsibility and Approval Authority Among Local Agencies with Land Use Authority, the SPWA, and the Participants

As discussed above, the CEQA process for UGA and/or D/I Projects is initiated by the local jurisdiction with land use authority. This could include any of the following agencies that receive sewer service from the SPWA: Placer County, the City of Roseville, the City of Rocklin, and the Town of Loomis. These agencies are collectively referred to as "local Lead Agencies."

Local Lead Agencies. Local Lead Agencies would be the first agency to take discretionary action relating to the approval of a proposed UGA and/or D/I project. As a result, they would serve as the **CEQA Lead Agency** and be responsible for preparation of the first tier CEQA document for the UGA or D/I project.

Local Lead Agencies should carefully follow the guidance provided herein to ensure the CEQA documentation for wastewater issues prepared by their agency will be adequate for all future related discretionary actions. To ensure proper coordination, distribution of the CEQA Notice of Preparation (NOP) and/or any early consultation materials initiated or distributed by the local Lead Agency in accordance with CEQA Guidelines Section 15063 (g), shall include the SPWA and SPWA Participants. This coordination will be extremely important to ensure the local Lead Agency CEQA document remains adequate

for future SPWA and Participant actions subject to CEQA. It will also be important to ensure that the most current cumulative wastewater flow scenario is used for related analyses (to be provided by the SPWA as discussed below).

Since the UGAs will generate wastewater flow and require recycled water supply, capital facilities (e.g. wastewater treatment plants) will need to be modified, expanded, or constructed to accommodate the UGAs and possibly D/I Projects. Impacts from new or modified capital facilities that are required to serve new UGAs or D/I projects, including any increased discharge of treated wastewater to the creeks, must be analyzed in the CEQA documentation prepared for the UGA or D/I Project.

The SPWA. The SPWA serves as a funding and financing authority for the construction of Regional Wastewater Facilities. In doing so, the SPWA acts as a **CEQA Responsible Agency**. As a Responsible Agency, the SPWA relies on the UGA or D/I Project CEQA documentation prepared by local Lead Agencies when taking discretionary actions related to funding or financing. The SPWA does not act as a Lead Agency.

In the capacity of a Responsible Agency, the SPWA will respond to CEQA notices for early consultation, including NOPs or other similar consultation requests, and provide comment as appropriate to ensure the local Lead Agency's CEQA document includes the proper scope and analysis for wastewater issues. This includes providing the local Lead Agency with the most current assumptions for wastewater cumulative analysis. The SPWA will similarly comment on draft CEQA documents as necessary to identify any inadequacies that could prevent the SPWA from fulfilling its statutory CEQA responsibilities when taking future funding or financing discretionary actions, or to consider modifications to the Funding and Operations Agreement as discussed below under Other Approvals for UGA Projects.

The City of Roseville. The City of Roseville owns and operates the Regional Wastewater Facilities on behalf of the Participants. In this capacity, the City maintains the necessary permits to process and discharge treated wastewater (i.e. NPDES permits from the Regional Water Quality Control Board), and approves design and carries out construction of any new or expanded Regional Wastewater Facilities. This includes approvals such as construction documents, bid authorizations, and award of construction contracts. In this role, the City acts as a **CEQA Lead Agency**. However, when taking discretionary actions related to Regional Wastewater Facilities, the City relies on the UGA or D/I Project CEQA document prepared by the local Lead Agency. As such, the City of Roseville needs to review UGA and/or D/I project NOPs or other similar consultation requests issued by local Lead Agencies to ensure the CEQA document includes the appropriate scope and "project-level" analysis of Regional Wastewater Facilities. The City of Roseville will similarly comment on the draft CEQA document to ensure it can be found adequate for future discretionary construction and operation related approvals, and to consider modifications to the Funding and Operations Agreement as discussed below under Other Approvals for UGA Projects.

The City of Roseville relies on the SPWA, acting as a CEQA Responsible Agency, for related construction financing approvals.

Other SPWA and Participant Approvals needed for UGA Projects. For those UGAs located outside (in whole or in part) the current regional service area boundary, it is important to recognize that the service area boundary is only modified by agreement among the SPWA and Participants. It is therefore paramount that CEQA documentation for UGAs be adequate for both the SPWA and Participants so they can take their own discretionary actions relating to modification of the Funding and Operations Agreement to include land area outside the current service area or flows beyond those envisioned by the SPWA at its formation as documented in the *1996 Regional Wastewater Treatment Service Area Master Plan EIR*. As such, Participant agencies should also review UGA or D/I project NOPs, or other similar consultation requests issued by local Lead Agencies, to ensure the proposed scope and analysis for CEQA documents will be adequate for this future action. Participant agencies will similarly comment on the draft CEQA document to ensure it will be found adequate for this future discretionary action.

Guidance to Ensure Adequate CEQA Review by Local Lead Agencies

The following is intended to assist local Lead Agencies when determining the proper scope and analysis for CEQA documentation of UGA and D/I project wastewater issues.

Wastewater Issues of Concern. In general, the following conditions create CEQA issues of concern for the SPWA, the City of Roseville, or the Participants when fulfilling their future CEQA responsibilities related to their approval authorities as discussed above:

- The creation of conditions that may exceed the capacity of Regional Wastewater Facilities;
- The creation of conditions that may exceed the wastewater quantity analyzed or certified in the Wastewater Master Plan (WWMP) EIR;
- Installation of new Regional Wastewater Facilities;
- Expansion of existing Regional Wastewater Facilities, including conveyance and recycled water storage and distribution infrastructure;
- Modifications of approved SPWA service area boundaries; and,
- The creation of conditions that exceed permitted discharges from the Regional Wastewater Treatment Plants or exceed the ability to handle offsite disposal or reuse of biosolids.

The Scope of CEQA Analysis. In order for the CEQA document prepared for a UGA and/or D/I Project to be complete and therefore adequate for use by subsequent SPWA and Participant agencies as discussed above, it must contain project-level analyses of the following, at a minimum:

- Construction and Operation of new wastewater collection and conveyance facilities;
- Supply and Demand of Recycled Water and construction and operation of new recycled water storage and distribution infrastructure and facilities;

- Alteration of the quality and/or quantity of discharges from wastewater treatment facilities beyond discharge levels permitted under the current NPDES discharge permits, and production of biosolids needing offsite disposal and/or reuse in excess of current permitted capacity;
- Construction and operation of additional wastewater treatment facilities required to serve the proposed UGA or D/I Project (beyond those considered in current documents);
- Delineation of areas in each UGA that are outside the current service area boundary and documentation of wastewater flow and recycled water demands in quantities greater than what is included in the 1996 WW Master Plan EIR or reallocation of wastewater flow and recycled water demands as compared to those shown in the 1996 WW Master Plan EIR or more current documents;
- Inducing growth as a result of removing obstacles to growth;
- Potential cumulative effects associated with other past, present, or foreseeable future projects.
- Alternatives Analysis for each of the systems (wastewater collection, treatment, disposal and recycled water storage and distribution) listed above.

Customized Initial Study Checklist. To further assist local Lead Agencies with the identification and analysis of wastewater and recycled water CEQA issues that may not be specifically covered in the above bullets, a customized Initial Study checklist was developed (Table A-1). The checklist should be used as a tool to aid in the identification of issues that pertain to the construction and installation of wastewater collection and conveyance infrastructure, recycled water storage and distribution infrastructure, and discharges that could result in, or contribute to, exceeding currently permitted wastewater treatment and disposal capacity.

Mitigation Measures for Significant Adverse Impacts. It is expected that CEQA documents prepared by local Lead Agencies will identify and provide project-level CEQA analysis for all Regional Wastewater Facilities necessary to implement the UGA or D/I Project. Local Lead Agency CEQA documents prepared for UGA and D/I Projects may not include mitigation that defers to a future date analysis of the construction and operation of required Regional Wastewater Facilities. Project-level analysis of these facilities is required in the local Lead Agency CEQA document in order to fulfill the other related SPWA and Participant CEQA actions as discussed in this guidance document.

Although no deferred wastewater mitigation should be included in local Lead Agency CEQA documents, it possible that mitigation may be required to ensure that required Regional Wastewater Facilities are permitted, constructed and operational prior to their need. Although the City of Roseville would serve as applicant for any required modification to Regional Water Quality Control Board waste discharge permits, the local Lead Agency would need to ensure through CEQA mitigation that building permits for related UGA and/or D/I Projects are withheld until all required permit modifications are secured and financing for Regional Wastewater Facilities has been approved by the

SPWA. As such, a mitigation measure similar to the following should be included in UGA and/or D/I Project CEQA documents as appropriate:

Prior to obtaining building permits that would cause total wastewater flows from the UGA to exceed the flow allocated in the Wastewater Master Plan EIR along with the flow in the most recent certified EIR, the applicant shall demonstrate that the treatment plant capacity will be expanded consistent with the UGA project and related wastewater analyses contained in the UGA EIR and supporting studies. This includes demonstrating that all necessary permits to discharge the treated flow are in effect. The applicant shall also demonstrate that the timing of the plant expansion will be adequate to serve the UGA without impeding other planned development. Further, the applicant shall implement all relevant mitigation measures identified in the Wastewater Master Plan EIR

TABLE A -1: ENVIRONMENTAL CHECKLIST

Issue	*Potentially Significant Impact*	*Less-than-Significant with Mitigation Incorporation*	*Less-than-Significant Impact*	*No Impact*
1. HYDROLOGY AND WATER QUALITY:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☐
b) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion of siltation on- or off-site?	☐	☐	☐	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☐	☐
d) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☐
e) Otherwise substantially degrade water quality?	☐	☐	☐	☐
f) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☐
g) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☐
h) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☐
i) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☐
j) Increase the currently allocated treated wastewater discharge documented in the 1996 Wastewater Master Plan EIR, or otherwise substantially degrade water quality, or increase or result in alteration of discharges from the regional wastewater treatment facilities?	☐	☐	☐	☐

Issue	*Potentially Significant Impact*	*Less-than-Significant with Mitigation Incorporation*	*Less-than-Significant Impact*	*No Impact*
k) Place within a 100-year flood hazard area wastewater conveyance and/or recycled water storage and distribution infrastructure and facilities which would impede or redirect flood flows?	☐	☐	☐	☐
2. UTILITIES AND SERVICE SYSTEMS:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☐
b) Exceed existing permitted wastewater treatment and discharge requirements of the Central Valley Regional Water Quality Control Board or other applicable regulatory agency or exceeds the quantity of wastewater flow considered and documented in existing certified EIRs (e g WWMP EIR)?	☐	☐	☐	☐
c) Result in a determination by the local wastewater collection system provider (e g. City of Roseville, SPMUD, Placer County,or the regional wastewater conveyance, treatment, and disposal provider (SPWA) which serves or may serve the project that it does not have adequate capacity to serve the project's projected wastewater flow over and above meeting the provider's existing commitments?	☐	☐	☐	☐
d) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effect?	☐	☐	☐	☐
e) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☐
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☐
g) Comply with federal, state, and local statues and regulations related to solid waste?	☐	☐	☐	☐
h) Would the wastewater and/or recycled water portion of the project result in substantial adverse physical impacts associated with the provision of new or physically altered utility facilities, need for new or physically altered utility facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				

Issue	*Potentially Significant Impact*	*Less-than-Significant with Mitigation Incorporation*	*Less-than-Significant Impact*	*No Impact*
Wastewater treatment and/or biosolids disposal/reuse?	☐	☐	☐	☐
Wastewater conveyance?	☐	☐	☐	☐
Recycled water storage?	☐	☐	☐	☐
Recycled water distribution?	☐	☐	☐	☐
3. AESTHETICS:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☐
b) Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic?	☐	☐	☐	☐
c) Substantially degrade the existing character or quality of the site and its surroundings?	☐	☐	☐	☐
d) Create a new source of substantial light or glare, which would affect day or nighttime views in the area?	☐	☐	☐	☐
4. AGRICULTURAL RESOURCES:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the FMMP of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☐
b) Conflict with existing agricultural use Williamson Act contract?	☐	☐	☐	☐
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of farmland to non-agricultural use?	☐	☐	☐	☐
5. AIR QUALITY:				
Would the construction and operation of the wastewater collection and treatmeut, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐	☐

Issue	*Potentially Significant Impact*	*Less-than-Significant with Mitigation Incorporation*	*Less-than-Significant Impact*	*No Impact*
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☐	☐
d) Expose sensitive receptors to substantial pollutant concentrations, including diesel emissions from temporary construction activities?	☐	☐	☐	☐
e) Results in changes to the wastewater and/or recycled water facilities that would create objectionable odors affecting a substantial number of people.	☐	☐	☐	☐
6. BIOLOGICAL RESOURCES:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish & Game or US Fish & Wildlife Service?	☐	☐	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish & Game or US Fish & Wildlife Service?	☐	☐	☐	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☐

Issue	*Potentially Significant Impact*	*Less-than-Significant with Mitigation Incorporation*	*Less-than-Significant Impact*	*No Impact*
7. CULTURAL RESOURCES:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribntion infrastructure portion of the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064 5?	☐	☐	☐	☐
b) Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to §15064.5?	☐	☐	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☐
8. GEOLOGY AND SOILS:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☐	☐
i Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42				
ii. Strong seismic ground shaking?				
iii Seismic-related ground failure, including liquefaction?				
iv. Landslides?				
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☐
c) Be located on geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on-or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☐

Issue	*Potentially Significant Impact*	*Less-than-Significant with Mitigation Incorporation*	*Less-than-Significant Impact*	*No Impact*
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☐
9. HAZARDS AND HAZARDOUS MATERIALS:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials, including materials used to treat wastewater and/or sanitize recycled water, into the environment?	☐	☐	☐	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☐
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☐
e) For a project located within an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for the people residing or working in the project area?	☐	☐	☐	☐
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☐
g) Impair implementation or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☐
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☐
10. LAND USE AND PLANNING:				

Issue	*Potentially Significant Impact*	*Less-than-Significant with Mitigation Incorporation*	*Less-than-Significant Impact*	*No Impact*
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Physically divide an established community?	☐	☐	☐	☐
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☐
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☐
11. MINERAL RESOURCES:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☐
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☐
12. NOISE:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☐
b) Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels?	☐	☐	☐	☐
c) A substantial temporary or periodic increase in ambient noise levels in the project vicinity?	☐	☐	☐	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☐

Issue	*Potentially Significant Impact*	*Less-than-Significant with Mitigation Incorporation*	*Less-than-Significant Impact*	*No Impact*
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☐
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☐
13. POPULATION AND HOUSING:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Result in wastewater treatment system improvements that would remove an obstacle or facilitate unplanned population growth?	☐	☐	☐	☐
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☐
c) Displace substantial numbers of people necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☐
14. PUBLIC SERVICES				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Would the wastewater and/or recycled water portion of the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☐	☐
Police protection?	☐	☐	☐	☐
School?	☐	☐	☐	☐
Parks?	☐	☐	☐	☐
Other public facilities	☐	☐	☐	☐

Issue	*Potentially Significant Impact*	*Less-than-Significant with Mitigation Incorporation*	*Less-than-Significant Impact*	*No Impact*
15. RECREATION:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☐
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☐
16. TRANSPORTATION / TRAFFIC:				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Result in temporary increases in traffic congestion, circulation vehicle movement, emergency access, and/ or parking capacity?	☐	☐	☐	☐
b) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i e , result in a substantial increase in either the number of vehicle trips, the volume to capacity ration on roads, or congestions at intersections)?	☐	☐	☐	☐
c) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for the designated roads or highways?	☐	☐	☐	☐
d) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☐
e) Substantially increase hazards due to a design feature (e g , sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☐
f) Result in inadequate emergency access?	☐	☐	☐	☐
g) Result in inadequate parking capacity?	☐	☐	☐	☐
h) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g , bus turnouts, bicycle racks)?	☐	☐	☐	☐

Issue	*Potentially Significant Impact*	*Less-than-Significant with Mitigation Incorporation*	*Less-than-Significant Impact*	*No Impact*
17. MANDATORY FINDINGS OF SIGNIFICANCE				
Would the construction and operation of the wastewater collection and treatment, and/or recycled water storage and distribution infrastructure portion of the project:				
a) Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☐
b) Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☐	☐
c) Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☐

Appendix U TM 9a – Land Use Scenarios

Memorandum

South Placer Regional Wastewater and Recycled Water Systems Evaluation Project
City of Roseville Sanitary Sewer Model Development Project

Subject:	Land Use Scenarios (TM 9a) - FINAL
Prepared for:	Art O'Brien – City of Roseville Kenneth Glotzbach – City of Roseville Kelye McKinney – City of Roseville
Prepared by:	Gisa Ju, RMC
Reviewed by:	Dave Richardson/Glenn Hermanson, RMC Pete Bellows/Chris Peters, BC Richard Hunn/Brian Grattidge, ESA
Date:	August 15, 2005
Reference:	0091-3.05; 0091-4.01

The purpose of the memorandum is to clarify and summarize the land use scenarios to be modeled as part of the Roseville Sanitary Sewer Model Development Project and the SPWA Regional Wastewater Systems Evaluation Project. Each scenario is intended to represent a model run associated with a specific land use database, which will contain the land use category, number of units (e.g., acres or dwelling units), and unit flow factor for each parcel in the Roseville and/or SPWA service area associated with that particular scenario. The intent is to utilize the same land use databases for both projects to minimize any possible discrepancies between the Roseville and SPWA models.

The proposed scenarios for each project are listed below:

City of Roseville Model

1. Current - June 2004 development.
2. Future buildout development based on the City's General Plan and Specific Plans as of June 2004, plus any approved or near-certain changes in zoning or development intensity for major planned development projects (anticipated to be approximately 10 to 12 parcels) identified since 2004.
3. Future Intensification Future (as defined in Scenario 2 above) plus intensification in designated redevelopment areas.

Note: a potential fourth scenario representing 2005 current development will be created by City staff after delivery of the model to the City.

Each land use database for the City of Roseville model will include all parcels within the current City limits except West Roseville.

SPWA Model

1. Current - June 2004 development within the 2005 proposed service area boundary (as defined in previous Technical Memoranda).
2. Future buildout development within the 2005 proposed service area boundary based on the City and County General Plans and Specific Plans as of June 2004, plus UGAs outside of the 2005 service area boundary.
3. Future Intensification Future with UGAs (as defined in Scenario 2 above) plus any approved or near-certain changes in zoning or development intensity for major planned development projects within Roseville, plus intensification in designated redevelopment areas in Roseville, Loomis, or Rocklin.

Each land use database for the SPWA model will include all parcels within the 2005 proposed service area boundary. UGAs located outside of the boundary will be handled as "point sources" in the model, as will West Roseville, Placer Vineyard UGA, and Placer Ranch UGA (all located within the 2005 service area boundary).

Summary

The table below shows a comparison of the proposed scenarios for the City of Roseville and SPWA models. More detailed documentation on the development of land use data for all scenarios will be included in the respective Existing and Future Land Use TMs for each project.

Scenario	City of Roseville Model	SPWA Model
1	June 2004 Development	June 2004 Development + 2005 SPWA Service Area
2	Build-out per General Plan / Specific Plans + other near-certain major project and rezones	Build-out per applicable General Plans + UGA areas outside 2005 service area
3	Build-out per General Plan / Specific Plans + other near-certain major project and rezones + City Redevelopment Projects	Build-out per applicable General Plans + UGA areas outside 2005 service area + Other near-certain major project and rezones + Redevelopment Projects in Roseville, Loomis and Rocklin

Appendix V TM 9b – Methodology for Adjusting Land Use for Parcels with Approved or Near-Certain Zoning or Development Changes ("Rezone Parcels")

Technical Memorandum

South Placer Regional Wastewater and Recycled Water Systems Evaluation Project
City of Roseville Sanitary Sewer Model Development Project

Subject:	Methodology for Adjusting Land Use for Parcels with Approved or Near-Certain Zoning or Development Changes ("Rezone Parcels") (TM No. 9b) - FINAL
Prepared for:	Art O'Brien – City of Roseville Kenneth Glotzbach – City of Roseville
Prepared by:	Gisa Ju, RMC
Reviewed by:	Dave Richardson, RMC Pete Bellows/Chris Peters, BC
Date:	Revised October 24, 2005; Finalized October 27, 2006
Reference:	0091-3.05; 0091-4.01

The purpose of the memorandum is to recommend the methodology to be used to adjust the land use database being used to compute flows for the Roseville and SPWA sewer models to account for parcels identified since June 2004 as having zoning or development changes. These "rezones" will be incorporated into the future modeling scenarios for the Roseville and SPWA models.

The City of Roseville Planning Department provided information on 19 areas with changes in zoning, land use, or development intensity that have been approved since June 2004 or are considered likely to be approved in the near future. The list and description of these areas are attached in the document titled "Zoning, Land Use changes and development intensifications" provided by the City on September 28, 2005. The City also provided a GIS shape file with each of these areas shown as a discrete polygon.

Based on the GIS rezone area polygons, RMC determined the specific parcels included in each of the rezone areas. It should be noted that in some cases, the areas included portions of parcels rather than entire parcels. In these cases, the parcel was considered to be included in the rezone area if the majority of the parcel area fell within the rezone area polygon.

The attached table lists the rezone parcels, along with their current and originally projected land use and proposed rezone land use. Most of the rezones are conversions from non-residential to residential uses. The comments column in the table indicates the proposed method of calculating the land use information or flow for each parcel based on the rezone information. Where a rezone area includes multiple parcels, it is generally proposed that the total residential units be distributed to all of the included parcels in proportion to parcel area. Proposed unit flow factors for base sanitary flow (BSF) and average dry weather flow (ADWF) are shown in **Table 1**.

Table 1: Proposed BSF and ADWF Unit Flow Factors

Land Use Category	Units	Proposed BSF Unit Flow Factor [1] (for Trunk Sewer Modeling)	Proposed ADWF Unit Flow Factor [2] (for WWTP Flow Projections)
Commercial	gpd per acre	800	850
Heavy Industrial	gpd per acre	800	850
Light Industrial	gpd per acre	800	850
Mixed Use	gpd per acre	2,160	2,300
Public/Quasi-Public	gpd per acre	620	660
Schools	gpd per acre	160	170
Residential 1 DU	gpd per du	180	190
Residential 2 DU	gpd per du	180	190
Residential 3 DU	gpd per du	180	190
Residential Mult. DU [3]	gpd per acre	1,920	2,040
Open Space	gpd per acre	0	0
Parks > 10 Acres	gpd per acre	10	10
Vacant	gpd per acre	0	0

Footnotes:

1. Does not include allowance for GWI. Dry and wet season GWI were applied as gpd/acre rates on an area-specific basis.
2. Includes allowance for dry season GWI.
3. The proposed Residential Multiple DU unit flow factor can also be represented as 120 gpd per DU (BSF) or 130 gpd per DU (ADWF).

The unit flow factor used for the residential development would depend on the density, as follows:

- Low density residential 180/190 gpd/DU for BSF/ADWF
- Medium to high density residential 120/130 gpd/DU for BSF/ADWF

Two of the rezone areas (Nos. 15 and 16) are part of areas identified for redevelopment by the City of Roseville. Flows for parcels in these areas will be handled under the land use "intensification" scenario and will be addressed in a subsequent memorandum to be prepared in conjunction with the SPWA Wastewater Systems Evaluation Project.

Zoning, Land Use changes and development intesifications

1) LONGMEADOW --AMEND THE GENERAL PLAN LAND USE DESIGNATION, REZONE, FROM INDUSTRIAL TO 145 LDR RESIDENTIAL UNITS ON 32.9 ACRES, 399 MDR RESIDENTIAL UNITS ON 45.8 ACRES, 3 ACRES OF PARK AND 7.6 ACRES OF OPENSPACE
Submitted 6/12/03
Approved 4/7/04

2) FIDDYMENT 44 RZ 03-09
AMEND THE GENERAL PLAN LAND USE DESIGNATION, REZONE, AND ESTABLISH A DEVELOPMENT AGREEMENT PROVIDES FOR 142 RESIDENTIAL UNITS ON 44.53 ACRES
Submitted 9/4/03
Approved 4/6/05

3) NWRSP PCL 77 ROSEPARK RZ 03-12
TO REZONE FROM BUSINESS PROFESSIONAL (BP/SA-NW) TO MEDIUM DENSITY RESIDENTIAL (MDR 8.24) PROVIDES FOR 86 LDR RESIDENTIAL UNITS, OPEN SPACE (OS) AND PQP
Submitted 12/5/03
Approved 7/7/04

4) NWRSP 37 -LEGACY--AMEND THE GENERAL PLAN LAND USE DESIGNATION, REZONE, FROM COMMERCIAL TO 71 LDR RESIDENTIAL UNITS ON 10.4 ACRES.
Submitted 11/07/03
Approved 10/06/04

5) NCRSP 18C AMEND THE GENERAL PLAN LAND USE DESIGNATION, REZONE, FROM BUSSINESS PROFESSIONAL TO 249 MDR RESIDENTIAL UNITS ON 26.43 ACRES.
Submitted 7/01/03
Approved 2/18/04

6) CHURCH STREET STATION
CHANGE ZONING FROM M1 TO R3 PROVIDES FOR 48 LDR RESIDENTIAL UNITS.
Submitted 7/11/03
Approved 8/4/04

7) NERSP PARCEL 16 STONEPOINTE AMEND THE GENERAL PLAN LAND USE DESIGNATION, REZONE, FROM RESEARCH AND DEVELOMENT TO 575 MDR AND HDR RESIDENTIAL UNITS ON 44 ACRES.
Submitted 4/2/03
Approved 3/16/05

8) NWRSP PCL 11 RZ 04-04
MODIFY ZONING FROM COMMUNITY COMMERCIAL TO 6.7 ACRES COMMUNITY COMMERCIAL (CC/SA/-NW) AND 6.7 ACRES ATTACHED HOUSING RESIDENTIAL (R3) PROVIDES FOR 53 RESIDENTIAL UNITS AND 4.0 ACRES COMMUNITYY COMMERCIAL (CC/SA-NW)
Submitted 9/2/04
Approved 7/20/05

9) NCRSP PCL 44 RZ 04-08
20.44 ACRES FROM BUSINESS PROFESSIONAL/SPECIAL AREA-NORTH CENRAL (BP/SA-NC) TO R3 (ATTACHED HOUSING-MDR12) PROVIDES FOR 244 RESIDENTIAL UNITS.
Submitted 12/23/2004
Approved 07/20/05

10) HP AMEND THE GENERAL PLAN LAND USE DESIGNATION, REZONE, LIGHT INDUSTRIAL TO 794 HDR UNITS ON 43.7 ACRES, 1,203 MDR UNITS ON 119.4 ACRES, 2 LDR UNIS ON .7 ACRES, COMMUNITY COMMERCAIL ON 11 ACRES, BUSINESS PROFESIONAL ON 50 ACRES, PUBLIC QUASI PUBLIC ON 16.2 ACRES AND 45.9 ACRES OF OPEN SPACE.
NOT YET SUBMITTED.

11) NRSP PCL 41 AMEND THE GENERAL PLAN LAND USE DESIGNATION, REZONE, FROM COMMUNIT COMMERCIAL TO 125 MDR RESIDENTIAL UNITS ON 9.7 ACRES.
Submitted 12/29/04
Approved NO ACTION TAKEN YET

12) NIRSP DIAMOND PLAZA CONDOMINIUMS AMEND THE GENERAL PLAN LAND USE DESIGNATION, REZONE, FROM GENERAL COMMECAIL TO 202 LDR RESIDENTIAL UNITS ON 13.4 ACRES.
Submitted 3/28/04
Approved NO ACTION TAKEN YET

13) DIAMOND CREEK AMEND THE GENERAL PLAN LAND USE DESIGNATION, REZONE, TO RESIDENTIAL. NO APPLICATION RECEIVFED ON THIS REQUEST

14) NCRSP PCL 40 SPA 04-06
INCREASE IN FAR FROM .4 TO .8 FOR NCRSP PARCELS 40, A,B,C ALLOWING BUILDINGS UP TO 10 STORIES
Submitted 12/23/2004
Approved 07/20/05

15) 416 RIVERSIDE (Riverside Corridor) RZ 04-07

TO DEVELOP A SPECIFIC PLAN DOCUMENT FOR THE RIVERSIDE GATEWAY PROJECT, THE PROJECT WILL ADD 550,000 SQ FT OF MIXED USE COMMERCIAL AND RESIDENTIAL
Submitted 11/05/04
Not yet acted upon

16) RZ 04-02 CIVIC PLAZA PROJECT RZ 04-02
TO REZONE PROPERTY FROM PLANNED DEVELOPMENT (PD 3272) & COMMERCIAL BUSINESS DISTRICT (CBD) TO COMMERCIAL BUSINESS DISTRICT (CBD) PROVDES FOR A 56,000 SQUARE FOOT BUILDING WITH COMMERCAIL GROUND FLOOR AND OFFICES ABOVE ALONG WITH A 5LEVEL PARKING GARAGE.
Submitted 6/4/04
Approved 7/6/05

17) SOUTH PLACER JUSTICE CENTER

18) KAISER

Roseville Rezone Parcels

Rezone Area	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Rezone Land Use	DUs	Comments
1	017-115-083-000	17.5	UNCONNECTED	LIGHT INDUSTRIAL	RESIDENTIAL 100 DU	100	544 DUs (LDR/MDR) on 4 parcels; apply **145 gpd/DU** weighted SF/MF UFF.
1	017-115-084-000	14.3	UNCONNECTED	LIGHT INDUSTRIAL	RESIDENTIAL 81 DU	81	
1	017-115-085-000	24.5	UNCONNECTED	LIGHT INDUSTRIAL	RESIDENTIAL 139 DU	139	
1	017-115-086-000	39.2	UNCONNECTED	LIGHT INDUSTRIAL	RESIDENTIAL 224 DU	224	
2	017-115-018-000	44.5	UNCONNECTED	LIGHT INDUSTRIAL	RESIDENTIAL 142 DU	142	142 DUs (**SF UFF**)
3	017-370-019-000	13.4	UNCONNECTED	RESIDENTIAL 91 DU	RESIDENTIAL 86 DU	86	86 DUs (**MF UFF**) plus OS and PQP; ignore PQP (probably small area)?
4	015-350-022-000	9.6	UNCONNECTED	COMMERCIAL	RESIDENTIAL 71 DU	71	71 DUs (**SF UFF**)
5	363-020-036-000	26.4	UNCONNECTED	COMMERCIAL	RESIDENTIAL 249 DU	249	249 DUs (**MF UFF**)
6	012-184-008-000	1.4	UNCONNECTED	LIGHT INDUSTRIAL	RESIDENTIAL 24 DU	24	48 DUs (**MF UFF**) split between 2 parcels
6	012-184-009-000	1.5	UNCONNECTED	LIGHT INDUSTRIAL	RESIDENTIAL 24 DU	24	
7	048-460-018-000	1.9	UNCONNECTED	COMMERCIAL	RESIDENTIAL 33 DU	33	575 DUs (**MF UFF**) on 5 parcels
7	048-460-019-000	7.3	UNCONNECTED	COMMERCIAL	RESIDENTIAL 130 DU	130	
7	048-460-020-000	7.8	UNCONNECTED	COMMERCIAL	RESIDENTIAL 139 DU	139	
7	048-460-021-000	7.6	UNCONNECTED	COMMERCIAL	RESIDENTIAL 135 DU	135	
7	048-460-022-000	7.8	UNCONNECTED	COMMERCIAL	RESIDENTIAL 138 DU	138	
8	477-080-005-000	10.7	UNCONNECTED	COMMERCIAL	Breton Village		53 DUs (SF UFF) plus 4 acres commercial; calculate flow as point source = **13,000 gpd**
9	363-010-011-000	20.4	UNCONNECTED	COMMERCIAL	RESIDENTIAL 244 DU	244	244 DUs (**MF UFF**)
10	017-230-051-000	287*	HP	HP	HP		* Northern and western portion of parcel (Areas A and B, not including existing campus). 1,997 MF Dus; 2 SF Dus; 11 acres commercial; 50 acres business professional; 16.2 ac. PQP; 45.9 acres open space. Calculated flow = **320,000 gpd** (rezone area). Add future flow from existing campus = 270,000 gpd (per Art O'Brien). Total HP point source flow = **590,000 gpd**.
10	017-230-051-000	198	HP	HP	HP		Future flow from existing campus = **270,000 gpd** (per Art O'Brien)
11	017-162-069-000	9.7	UNCONNECTED	COMMERCIAL	RESIDENTIAL 125 DU	125	125 DUs (**MF UFF**)
12	017-410-019-000	2.3	UNCONNECTED	COMMERCIAL	RESIDENTIAL 28 DU	28	202 DUs (**MF UFF**) on 7 parcels
12	017-410-020-000	2.0	UNCONNECTED	COMMERCIAL	RESIDENTIAL 24 DU	24	
12	017-410-021-000	2.2	UNCONNECTED	COMMERCIAL	RESIDENTIAL 26 DU	26	
12	017-410-022-000	2.0	UNCONNECTED	COMMERCIAL	RESIDENTIAL 24 DU	24	
12	017-410-035-000	5.0	UNCONNECTED	COMMERCIAL	RESIDENTIAL 59 DU	59	
12	017-410-041-000	1.6	COMMERCIAL	COMMERCIAL	RESIDENTIAL 19 DU	19	
12	017-410-042-000	1.8	UNCONNECTED	COMMERCIAL	RESIDENTIAL 22 DU	22	
13	017-115-032-000	19.0	UNCONNECTED	COMMERCIAL	RESIDENTIAL 285 DU	285	50/50% MDR and HDR. Assume average 15 DU/ac, total 285 DUs (**MF UFF**)
14	363-010-009-000	50.0	UNCONNECTED	COMMERCIAL	Convention Center		Increase from 0.4 to 0.8 FAR; use 3,300 gpd/ac UFF (~4 x commercial UFF) = **165,000 gpd**
15	014-011-004-000	0.3	COMMERCIAL	COMMERCIAL	See TM 9c		Most of Upper Riverside redevelopment area; ~0.8 FAR; **handle as intensification area**
15	014-011-008-000	0.4	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-011-009-000	0.3	COMMERCIAL	COMMERCIAL	See TM 9c		

Roseville Rezone Parcels

Rezone Area	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Rezone Land Use	DUs	Comments
15	014-013-002-000	0.1	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	See TM 9c		
15	014-013-003-000	0.1	RESIDENTIAL 3 DU	RESIDENTIAL 3 DU	See TM 9c		
15	014-013-004-000	0.1	MIXED USE	MIXED USE	See TM 9c		
15	014-013-005-000	0.2	MIXED USE	MIXED USE	See TM 9c		
15	014-013-006-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-013-007-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-013-008-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-013-009-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-013-010-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-013-011-000	0.1	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	See TM 9c		
15	014-024-003-000	0.2	UNCONNECTED	COMMERCIAL	See TM 9c		
15	014-024-004-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-024-005-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-024-006-000	0.2	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	See TM 9c		
15	014-024-007-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-024-008-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-024-009-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-024-010-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-033-005-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-033-007-000	0.4	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-033-008-000	0.5	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-033-009-000	0.4	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-033-014-000	0.4	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	See TM 9c		
15	014-033-028-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-033-029-000	0.2	UNCONNECTED	COMMERCIAL	See TM 9c		
15	014-053-003-000	0.3	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-053-004-000	0.2	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	See TM 9c		
15	014-053-005-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-053-006-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-053-007-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-053-008-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-053-023-000	0.5	MIXED USE	MIXED USE	See TM 9c		
15	014-091-013-000	0.1	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	See TM 9c		
15	014-091-014-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-091-015-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-091-016-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-091-017-000	0.2	RESIDENTIAL 3 DU	RESIDENTIAL 3 DU	See TM 9c		
15	014-091-018-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		

Roseville Rezone Parcels

Rezone Area	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Rezone Land Use	DUs	Comments
15	014-091-019-000	0.3	UNCONNECTED	COMMERCIAL	See TM 9c		
15	014-091-020-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-091-021-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-091-022-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-141-012-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-141-013-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-141-014-000	0.2	UNCONNECTED	COMMERCIAL	See TM 9c		
15	014-141-015-000	0.2	UNCONNECTED	COMMERCIAL	See TM 9c		
15	014-141-016-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-141-017-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-141-019-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-141-020-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-141-021-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-141-022-000	0.2	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	See TM 9c		
15	014-141-023-000	0.3	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-141-026-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-141-027-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-191-016-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-191-017-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-191-018-000	0.2	UNCONNECTED	COMMERCIAL	See TM 9c		
15	014-191-019-000	0.2	MIXED USE	MIXED USE	See TM 9c		
15	014-191-020-000	0.2	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	See TM 9c		
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15	014-191-022-000	0.3	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-191-023-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-191-024-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-191-025-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-251-011-000	0.4	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-251-012-000	0.4	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	See TM 9c		
15	014-251-013-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-251-014-000	0.2	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-251-015-000	0.1	UNCONNECTED	COMMERCIAL	See TM 9c		
15	014-251-016-000	0.1	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	See TM 9c		
15	014-251-021-000	0.4	COMMERCIAL	COMMERCIAL	See TM 9c		
15	014-251-027-000	1.2	COMMERCIAL	COMMERCIAL	See TM 9c		
16	013-123-001-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		Small part of Vernon redevelopment area; 56,000 sq ft com/off bldg w/garage; **handle as intensification area**
16	013-123-002-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		
16	013-123-003-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		
16	013-123-004-000	0.1	COMMERCIAL	COMMERCIAL	See TM 9c		
17	017-122-001-000	67.0	UNCONNECTED	HEAVY INDUSTRIAL	PUBLIC/QUASI-PUBLIC		South Placer Justice Center. Use standard **PQP UFF**.

Roseville Rezone Parcels

Rezone Area	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Rezone Land Use	DUs	Comments
18	048-010-030-000	49.2	Kaiser Hospital	Kaiser Hospital	Kaiser Hospital		Expansion from 378K to 1.08M sq. ft. Increase flow in proportion to expansion square footage. Per City, future flow = **118,000 gpd**.
19	363-010-025-000	1.8	COMMERCIAL	COMMERCIAL	Galleria Mall		Galleria Mall expansion. Total 1.8M sq. ft. Per City, future flow = 238,250 gpd. Distribute to parcels based on **2,700 gpd/acre** UFF.
19	363-010-027-000	1.6	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-028-000	4.3	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-029-000	7.6	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-030-000	6.0	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-031-000	4.1	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-032-000	9.9	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-033-000	1.3	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-034-000	7.6	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-035-000	1.3	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-036-000	12.5	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-037-000	1.6	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-038-000	2.2	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-039-000	1.4	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-040-000	2.3	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-041-000	4.2	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-042-000	0.4	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-043-000	7.8	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-044-000	2.4	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-045-000	4.3	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-061-000	1.6	COMMERCIAL	COMMERCIAL	Galleria Mall		
19	363-010-062-000	0.8	COMMERCIAL	COMMERCIAL	Galleria Mall		
Abbreviations:							
DU	Dwelling unit						
UFF	Unit flow factor						
SF	Single family						
MF	Multi-family						
CC	Commercial						
FAR	Floor-area ratio						

Appendix W TM 9c – Land Use Intensification Methodology for Parcels within Redevelopment Areas in Roseville and Rocklin

Technical Memorandum

SOUTH PLACER WASTEWATER AUTHORITY (SPWA) WASTEWATER AND RECYCLED WATER SYSTEMS EVALUATION PROJECT

Subject: **Land Use Intensification Methodology for Parcels within Redevelopment Areas in Roseville and Rocklin -- Final (TM No. 9c)**

Prepared For: Art O'Brien – City of Roseville

Prepared by: Pete Bellows/Chris Peters – Brown and Caldwell

Reviewed by: Dave Richardson/Gisa Ju – RMC

Date: May 31, 2006

Reference: 0091-004 Task 9

1 Introduction

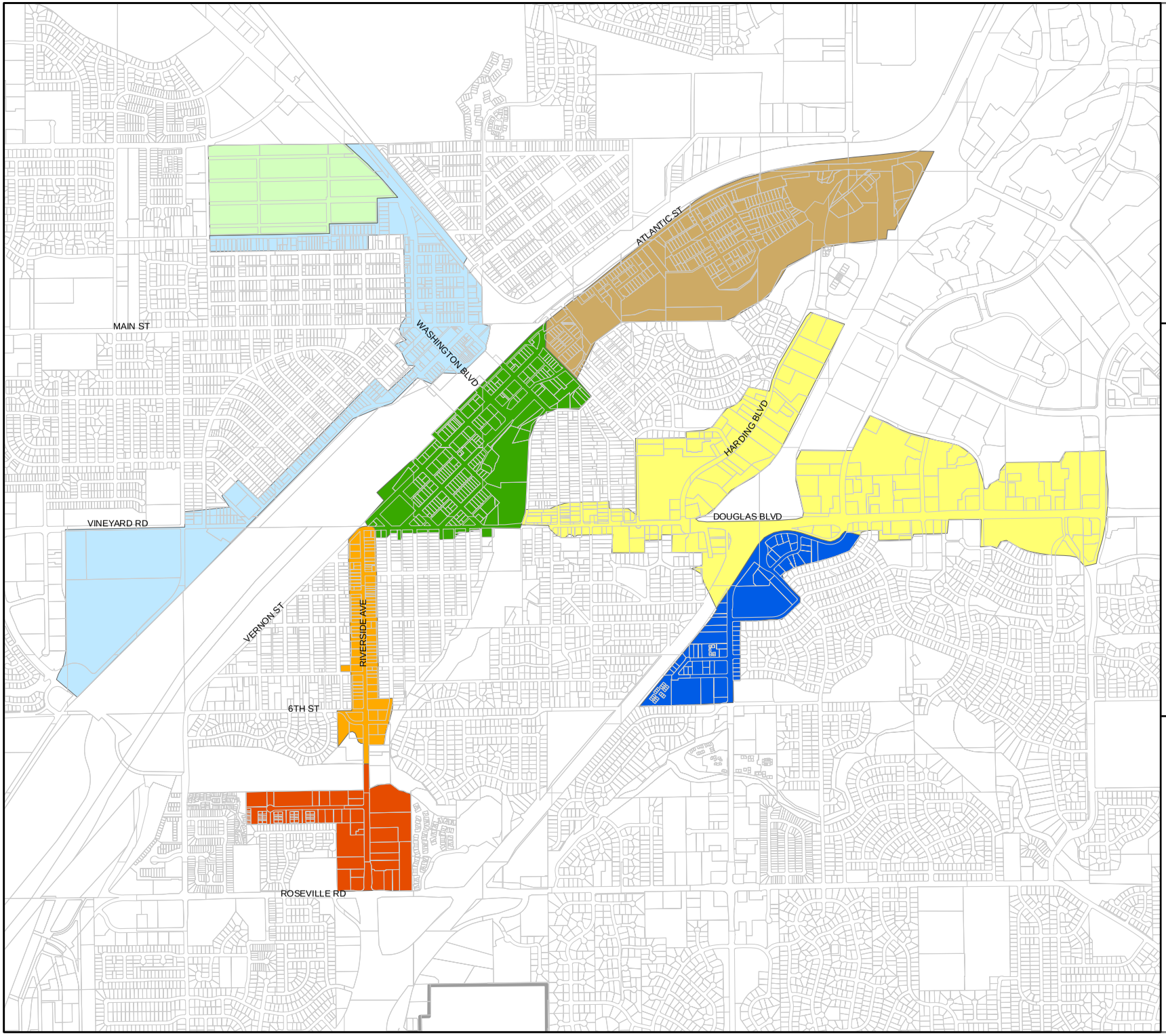
This technical memorandum (TM) summarizes the proposed methodology to be used to adjust the land use database to account for parcels within Rocklin and Roseville that may intensify in the future. Once intensified, these parcels will generate higher wastewater flows. The revised flows will be incorporated into a separate future modeling scenario for the Roseville and SPWA models.

2 Redevelopment Areas

Environmental Science Associates (ESA), following discussions with the City of Roseville and the City of Rocklin planning departments, provided GIS information on nine areas in Roseville and Rocklin with changes in land use or development intensity that will possibly occur in the future. A list of these redevelopment areas is provided in Table 1. These areas are also illustrated in Figure 1 and Figure 2. Further description of these areas provided by ESA is included in Attachment A.

Table 1 – SPWA Redevelopment Areas

Redevelopment Area	SPWA Agency	Area (acres)
Atlantic	Roseville	125
Fairgrounds	Roseville	55
Harding-Douglas	Roseville	207
Historic District	Roseville	130
Lower Riverside	Roseville	46
Sunrise	Roseville	45
Upper Riverside	Roseville	21
Vernon	Roseville	67
Rocklin Downtown Plan	SPMUD	135



Legend

Redevelopment Area

- Atlantic
- Fairgrounds
- Harding-Douglas
- Historic District
- Lower Riverside
- Sunrise
- Upper Riverside
- Vernon
- Parcel Boundary

FIGURE 1

Redevelopment in the City of Roseville

February 2006

SOUTH PLACER WASTEWATER AUTHORITY

Regional Wastewater and Recycled Water Sewer Evaluation Project

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S

1,000 500 0 1,000
Feet

P:\Gen\127215- RMC-Roseville\07 GIS\BC GIS\mxd\Redevelopment and rezoning\Roseville Redevelopment.mxd

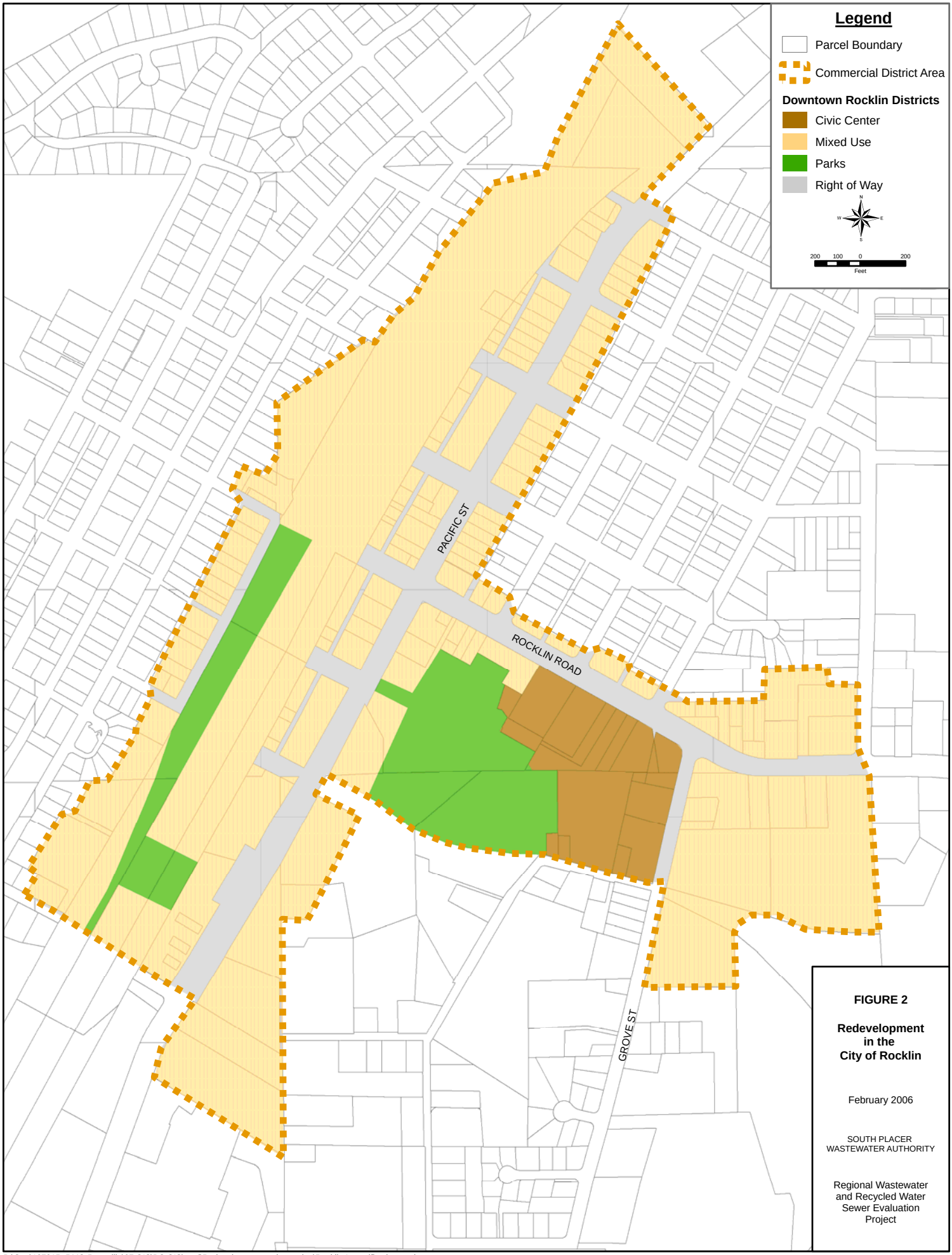

FIGURE 2

Redevelopment in the City of Rocklin

February 2006

SOUTH PLACER WASTEWATER AUTHORITY

Regional Wastewater and Recycled Water Sewer Evaluation Project

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3 Redevelopment Land Use

Using land use GIS information, Brown and Caldwell identified the specific parcels included in each of the redevelopment areas. It should be noted that in some cases, the areas included portions of parcels rather than entire parcels. In these cases, a parcel was considered to be included in the redevelopment area if the majority of the parcel area fell within the redevelopment area boundary. A list of redevelopment parcels along with their current, projected land use, and proposed redevelopment land use is included in Attachment B.

In Rocklin, ESA outlined specific land use changes for each parcel in the Downtown Plan. In this case, most of the Commercial and Industrial development is converting to Mixed Use. The Downtown Plan also includes a new Open Space area that will not generate any flow.

In Roseville, specific redevelopment plans were not available and general assumptions were made about the proposed redevelopment land use category. Two new redevelopment land use categories called Intense Commercial/PQP/Mixed Use and Very Intense Commercial/PQP/Mixed Use were developed. The Very Intense Commercial/PQP/Mixed Use land use category only occurs in the Historic District and Vernon District redevelopment areas. Current land use categories within the redevelopment areas are anticipated to intensify as listed below.

- Commercial to Intense Commercial/PQP/Mixed Use or Very Intense Commercial/PQP/Mixed Use
- Light Industrial to Intense Commercial/PQP/Mixed Use or Very Intense Commercial/PQP/Mixed Use
- Heavy Industrial to Intense Commercial/PQP/Mixed Use or Very Intense Commercial/PQP/Mixed Use
- Mixed Use to Intense Commercial/PQP/Mixed Use or Very Intense Commercial/PQP/Mixed Use
- Public/Quasi Public (PQP) to Intense Commercial/PQP/Mixed Use or Very Intense Commercial/PQP/Mixed Use
- Single-Family Residential to Multi-Family Residential (Note: A limited number of Single-Family Residential Parcels were converted to Very Intense Commercial/PQP/Mixed Use at the direction of the City of Roseville. These parcels are identified in Attachment B.)

In Roseville, the following land use categories within the redevelopment areas will not change and will retain the unit flow factors identified in the Trunk Sewer Capacity Analysis TM (No.3b).

- Open Space (Note: A limited number of Open Space Parcels were converted to Very Intense Commercial/PQP/Mixed Use at the direction of the City of Roseville. These parcels are identified in Attachment B.)
- Parks > 10 Acres
- Multi-Family Residential
- Schools

4 Redevelopment Unit Flow Factors for Trunk Sewer and WWTP Analyses

The unit flow factors for parcels within the redevelopment areas must be increased to account for the intensification. An analysis performed by ESA indicated that the average floor to area ratio (FAR) in Roseville is currently 0.25 for retail/office/industrial development. A copy of the ESA memo is provided in Attachment A. The City of Roseville has indicated that future commercial redevelopment FAR may approach an average of 0.80 (3.2 times the current average FAR) in each redevelopment area and an average of 3.0 (12 times the current average FAR) on a limited number of parcels in the Historic District and Vernon District redevelopment areas.

To develop a unit flow factor that adequately represents the amount of base sanitary flow (BSF – trunk sewer analysis) or dry weather flow (ADWF – WWTP analysis) that may be generated in each redevelopment area, the current commercial average BSF unit flow factor of 800 or ADWF unit flow factor of 850 gpd/acre was multiplied by 3.2 (for 0.80 FAR) and 12 (for 3.0 FAR). The new unit flow factor that will be used for the *Intense* Commercial/PQP/Mixed Use land use category is 2,560 gpd/acre (BSF) or 2,720 gpd/acre (ADWF). The new unit flow factor that will be used for the *Very Intense* Commercial/PQP/Mixed Use land use category is 9,600 gpd/acre (BSF) or 10,200 gpd/acre (ADWF). The unchanged parcels within each redevelopment area will maintain the unit flow factors specified in the Trunk Sewer Capacity Analysis TM No.3b or Dry Weather Flow Projection TM No. 2a. These unit flow factors are shown in Table 2 and Table 3 below.

Table 2 – Average Base Sanitary Flow (BSF) Unit Flow Factors for Trunk Sewer Analyses

Land Use Designation	Units	Trunk Sewer Analyses BSF Unit Flow Factor[1]
Commercial	gpd per acre	800
Heavy Industrial	gpd per acre	800
Light Industrial	gpd per acre	800
Mixed Use	gpd per acre	2,160
Public/Quasi-Public	gpd per acre	620
Schools	gpd per acre	160
Residential 1 DU	gpd per DU	180
Residential 2 DU	gpd per DU	180
Residential 3 DU	gpd per DU	180
Residential Multiple DU[2]	gpd per acre	1,920
Open Space	gpd per acre	0
Parks > 10 Acres	gpd per acre	10
Vacant	gpd per acre	0
Intense Com/PQP/MU	gpd per acre	2,560
Very Intense Com/PQP/MU	gpd per acre	9,600

[1] Does not include an allowance for dry season GWI. Dry and wet season GWI are applied on an area-specific basis.
[2] The proposed Residential Multiple DU unit flow factor can also be represented as 130 gpd per DU.

Table 3 – Average Dry Weather Flow (ADWF) Unit Flow Factors for WWTP Analyses

Land Use Designation	Units	WWTP Analyses ADWF Unit Flow Factor[1]
Commercial	gpd per acre	850
Heavy Industrial	gpd per acre	850
Light Industrial	gpd per acre	850
Mixed Use	gpd per acre	2,300
Public/Quasi-Public	gpd per acre	660
Schools	gpd per acre	170
Residential 1 DU	gpd per DU	190
Residential 2 DU	gpd per DU	190
Residential 3 DU	gpd per DU	190
Residential Multiple DU[2]	gpd per acre	2,040
Open Space	gpd per acre	0
Parks > 10 Acres	gpd per acre	10
Vacant	gpd per acre	0
Intense Com/PQP/MU	gpd per acre	2,720
Very Intense Com/PQP/MU	gpd per acre	10,200

[1] Includes allowance for dry season GWI.
[2] The proposed Residential Multiple DU unit flow factor can also be represented as 130 gpd per du

5 Redevelopment Impact on Average Base Sanitary Flow (BSF) and Average Dry Weather Flow (ADWF)

Redevelopment will cause an increase in average base sanitary flow for the trunk sewer analyses and average dry weather flow for the WWTP analyses. Table 4 and Table 5 present a summary of the current average base sanitary flow and average dry weather flow generated by each redevelopment area and the impact of intensification in these areas. Redevelopment impact on the trunk sewer hydraulic capacity and the projected increase in flows to each WWTP will be presented in the Impact of Intensification TM No. 9d.

Table 4 –Redevelopment Impact on Average Base Sanitary Flow (BSF) for Trunk Sewer Analyses

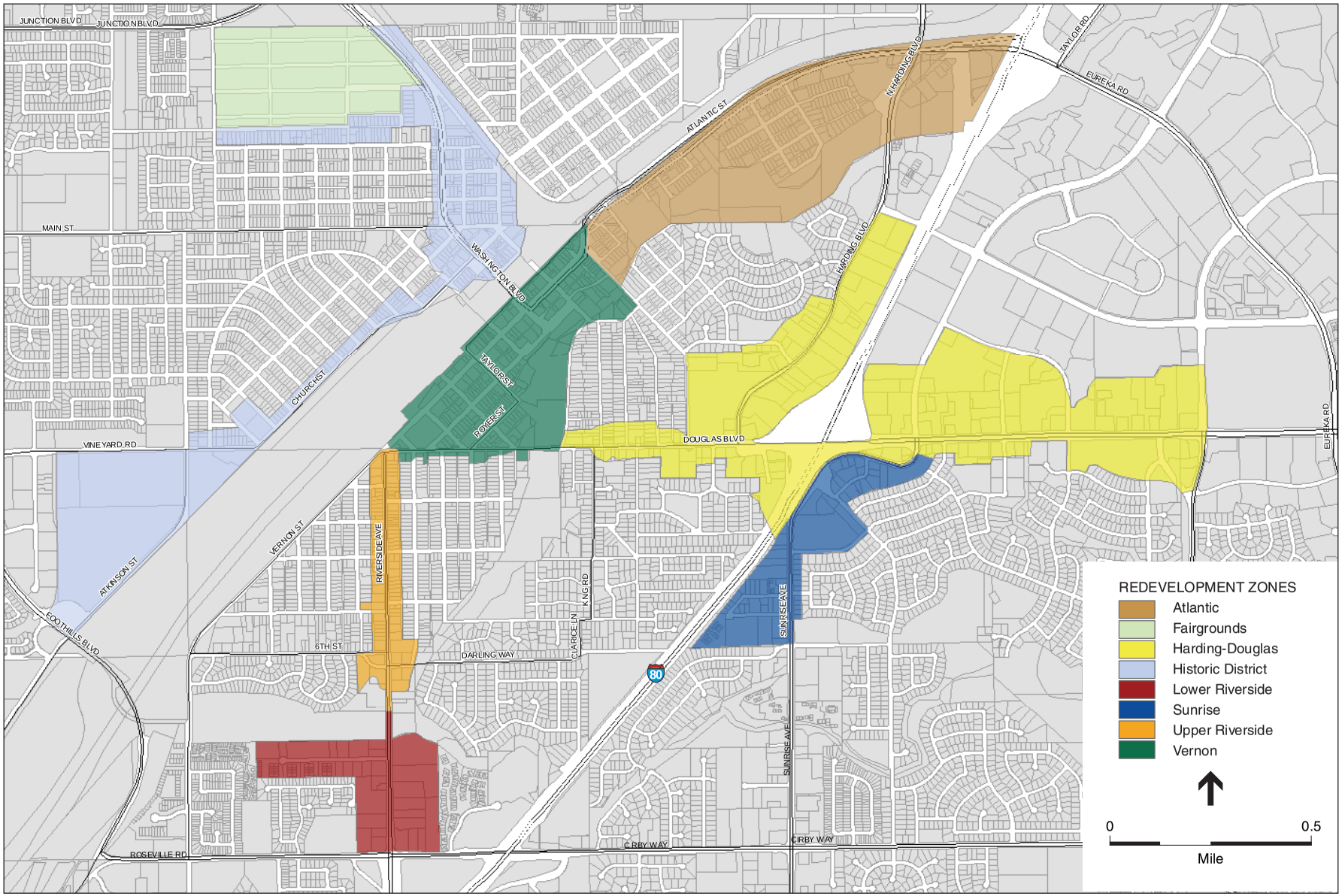
Redevelopment Area	SPWA Agency	Area (acres)	Current BSF (mgd)	Redevelopment BSF (mgd)
Atlantic	Roseville	125	0.074	0.142
Fairgrounds	Roseville	55	0.014	0.055
Harding-Douglas	Roseville	207	0.165	0.521
Historic District	Roseville	130	0.126	0.387
Lower Riverside	Roseville	46	0.037	0.118
Sunrise	Roseville	45	0.044	0.107
Upper Riverside	Roseville	21	0.020	0.053
Vernon	Roseville	67	0.048	0.452
Rocklin Downtown Plan	SPMUD	135	0.076	0.314
Total		**831**	**0.605**	**2.149**

Table 5 –Redevelopment Impact on Average Dry Weather Flow (ADWF) for WWTP Analyses

Redevelopment Area	SPWA Agency	Area (acres)	Current ADWF (mgd)	Redevelopment ADWF (mgd)
Atlantic	Roseville	125	0.078	0.151
Fairgrounds	Roseville	55	0.015	0.059
Harding-Douglas	Roseville	207	0.176	0.553
Historic District	Roseville	130	0.134	0.411
Lower Riverside	Roseville	46	0.039	0.125
Sunrise	Roseville	45	0.047	0.114
Upper Riverside	Roseville	21	0.021	0.056
Vernon	Roseville	67	0.051	0.481
Rocklin Downtown Plan	SPMUD	135	0.081	0.333
Total		**831**	**0.642**	**2.284**

Attachment A

ESA Technical Memoranda



SOURCE: City of Roseville, 2005; and ESA, 2005

South Placer Regional Wastewater and Recycled Water Systems Evaluation Project . 204250

Figure 1

Planned Redevelopment Zones in the City of Roseville

ESA

8950 Cal Center Drive
Building 3, Suite 300
Sacramento, CA 95826
916.564.4500 phone
916.564.4501 fax

memorandum

date September 1, 2005

to Dave Richardson, RMC

from Brian Grattidge, ESA
Richard Hunn, ESA

subject Roseville FAR Assumptions

As part of the regional sewer system evaluation for the South Placer Wastewater Authority, the consultant team is identifying areas within the existing service boundary where non-residential land use may intensify; thereby increasing the sewer flows for already developed parcels. In order to identify "intensification areas" within the City of Roseville, (more specifically, the Roseville "Infill" area), we must establish the following:

1. The typical existing level of non-residential development (the "intensity"); which is typically described in terms of Floor to Area Ratio (FAR).[1]
2. The potential FAR in areas identified for future intensification.

Existing data sources do not describe FAR on a city-wide or regional level. While the FAR for a specific parcel can be calculated from site plans, this is not practical for a large scale evaluation. Therefore, this analysis relies on assumed FAR developed by City planning staff, and used in the City's traffic model. These assumptions are as follows:

1. Retail 0.21 FAR
2. Office 0.30 FAR
3. Industrial 0.25 FAR

In some cases, the City has assumed 0.35 FAR for office (business professional) uses. The general plan, while not specifying a FAR limit, assumes that non-residential development will have a FAR of 0.40 or less.

[1] FAR is calculated by identifying the gross square footage of all structures on a parcel, and dividing by the square footage of the parcel. For example a 2500 square foot building on a 10,000 square foot parcel would have an FAR of 0.25 (2500 / 10,000). If that same building had two stories, the FAR would be 0.5 ([2 x 2500] / 10,000).

ESA Community Development

8950 Cal Center Drive
Building 3, Suite 300
Sacramento, CA 95826
916.564.4500 phone
916.564.4501 fax

www.esassoc.com

memorandum

date January 17, 2006

to Dave Richardson/RMC

from Richard Hunn
Brian Grattidge

subject SPWA Land Use Intensification Analysis - Rocklin Downtown Plan

ESA has reviewed the "Downtown Rocklin Plan Preliminary Wastewater Evaluation," dated October 2005 (attached). This draft document contains information on wastewater transmission and generation within the proposed Downtown Rocklin Plan area. The Downtown Rocklin Plan is a revitalization plan for the downtown commercial area, roughly centered on Rocklin Road and Pacific Street. The study area includes 313 acres, most of which is residential. Within this study area, approximately 117 acres are proposed for commercial/residential mixed-use and public uses.

For comparison, we have shown the existing land uses and general plan classifications used in the SPWA Regional Wastewater System Evaluation. These land uses are shown in Figure 1 and the current General Plan classes (used in the system evaluation) are shown in Figure 2. The proposed land uses in the Downtown Plan are shown in Figure 3. Table 1 shows the proposed changes in land use for the Downtown Rocklin Plan area.[1]

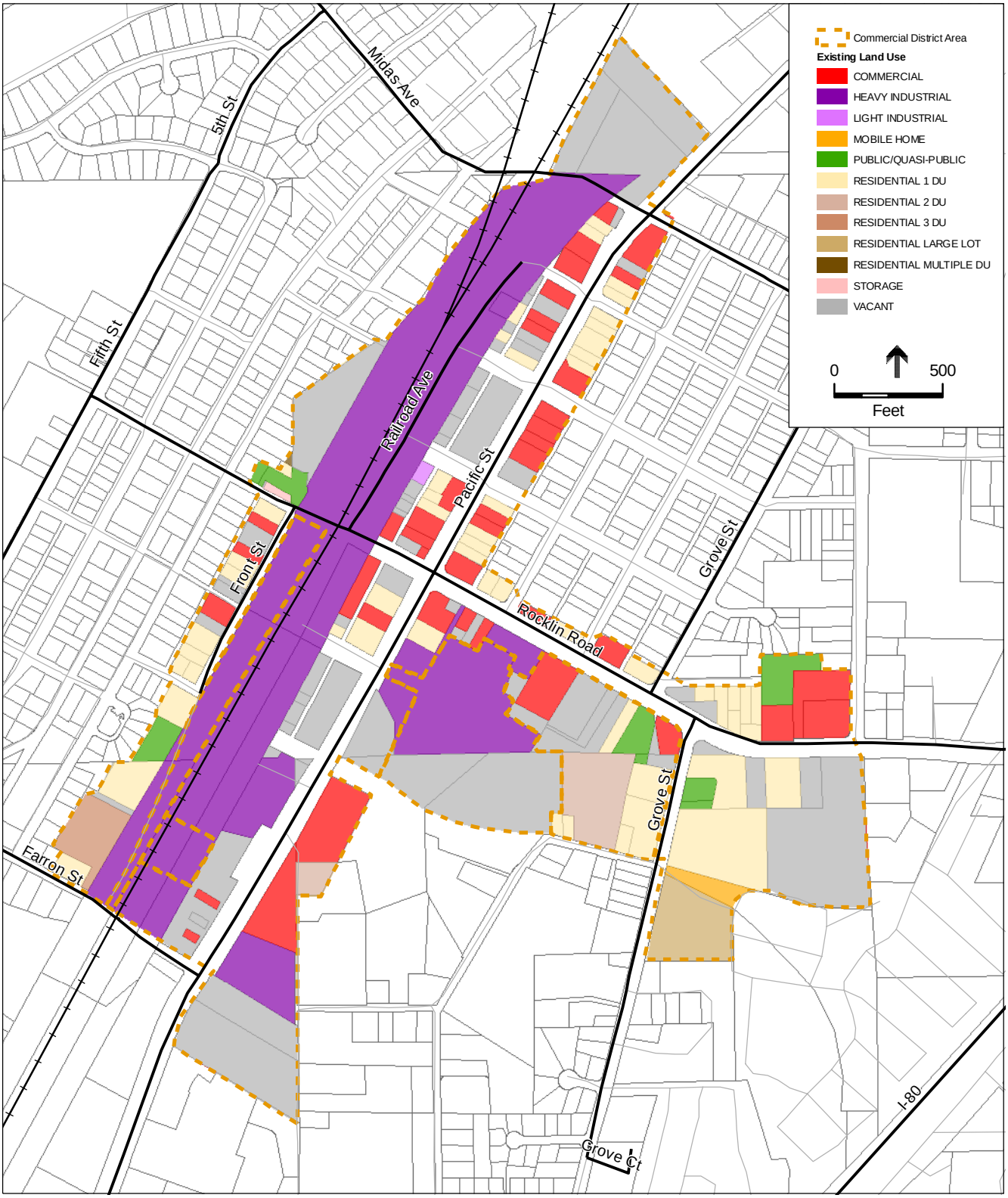
TABLE 1
CURRENT AND PROPOSED LAND USE ACREAGE

Category	Current General Plan	Proposed Downtown Plan	Difference
Commercial	106.5	0.0	-106.5
Mixed Use	0.0	104.5	+104.5
Light Industrial	2.1	0.0	-2.1
Residential–Medium High Density	10.7	0.0	-10.7
Public/Quasi Public	12.8	10.2	-2.6
Park (Open Space)	0.0	17.4	+17.4
Total	***132.1***	***132.1***	--

[1] Note that the calculated acreages in Table 1 do not exactly match Table 2 in the attached memo. This is due to minor differences in right of way boundaries and in how parcels are divided by land use categories. However, because the difference in acreage is only 1 percent, we chose to estimate land use change with the acreages from the SPWA model for consistency.

As shown, the major land use changes would include:

- Changing the designation of about 79 percent of the downtown area from commercial to mixed-use, which would add a substantial residential component;
- Eliminating light industrial and residential land uses;
- Reducing the public/quasi-public area; and
- Designating 17.4 acres of park area (open space)

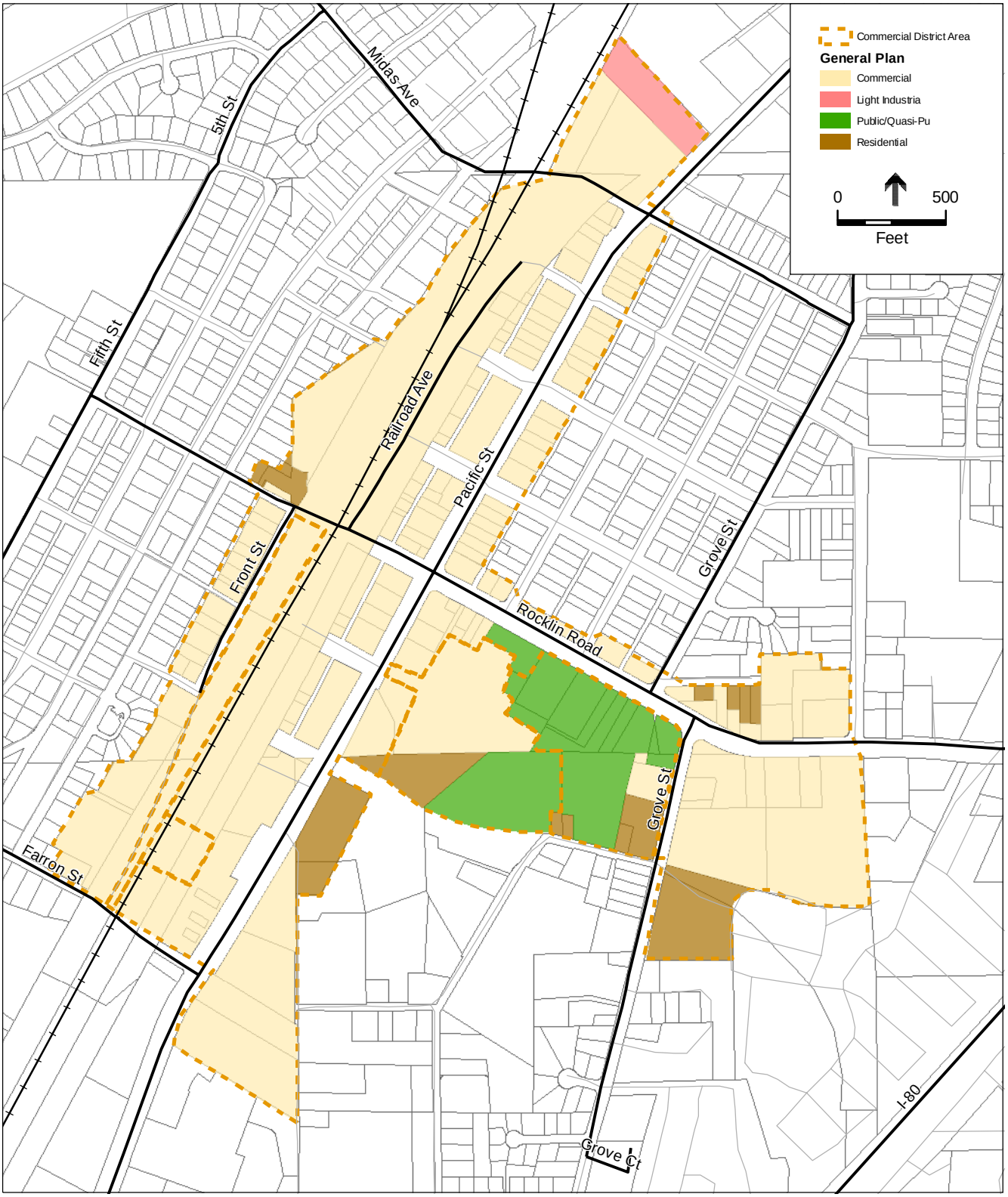


SPWA Land Use Intensification Analysis . 204250

SOURCE: Placer County, 2004; ESA, 2005

Figure 1

Existing Land Use for Downtown Rocklin

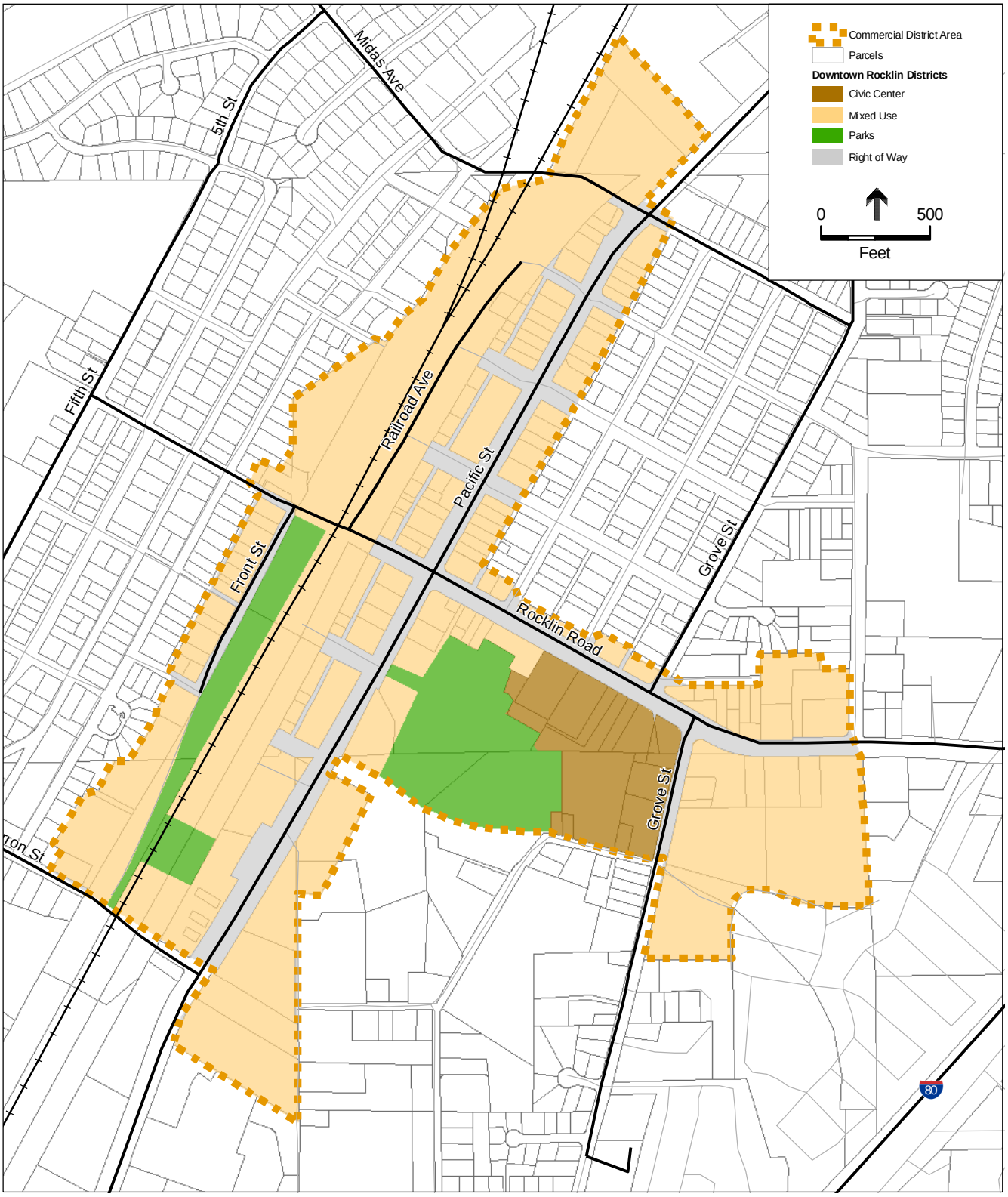


SPWA Land Use Intensification Analysis . 204250

SOURCE: Placer County, 2004; ESA, 2005

Figure 2

General Plan for
Downtown Rocklin



SPWA Land Use Intensification Analysis. 204250

SOURCE: Placer County, 2004; ESA, 2005

Figure 3

Downtown Rocklin Plan

Attachment B

Redevelopment Land Use Table

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Atlantic	Roseville	013-011-001-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-011-004-000	0.21	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-011-005-000	0.21	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-011-006-000	0.20	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-011-009-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-011-010-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-011-011-000	0.17	RESIDENTIAL 3 DU	RESIDENTIAL 3 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-011-012-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-011-013-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-011-015-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-011-016-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-011-017-000	0.10	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-011-018-000	0.64	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-011-019-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-011-022-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-011-023-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-011-025-000	0.00	OPEN SPACE	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	013-011-026-000	0.09	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-011-027-000	0.08	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-001-000	0.27	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-012-002-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-003-000	1.31	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-004-000	0.08	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	013-012-006-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-007-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-008-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-009-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-010-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-011-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-012-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-013-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-014-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-015-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-016-000	0.20	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-017-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-018-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Atlantic	Roseville	013-012-019-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-012-021-000	0.04	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	013-012-022-000	0.62	RESIDENTIAL 2 DU	RESIDENTIAL 4 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-013-001-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-013-002-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-013-003-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-013-004-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-013-005-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-013-006-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-013-007-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-013-008-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-013-009-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-013-010-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-013-011-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-013-012-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-006-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-007-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-009-000	0.34	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-010-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-013-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-015-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-020-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-022-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-024-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-025-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-026-000	0.06	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-027-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-030-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-031-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-032-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-033-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-035-000	0.51	RESIDENTIAL 1 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-037-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-038-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-039-000	0.53	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Atlantic	Roseville	013-022-040-000	0.31	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Atlantic	Roseville	013-022-041-000	0.25	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-022-042-000	0.20	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-022-043-000	0.62	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-022-044-000	0.08	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-022-045-000	0.07	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-046-000	0.07	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-047-000	0.69	UNCONNECTED	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-048-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-050-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-051-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-052-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-053-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-058-000	0.24	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-060-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-061-000	0.54	RESIDENTIAL 1 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-062-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-063-000	0.17	UNCONNECTED	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-064-000	0.17	UNCONNECTED	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-022-065-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-023-005-000	0.31	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-023-006-000	0.46	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-023-007-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-023-008-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-023-009-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-023-010-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-023-011-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-023-012-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-023-013-000	0.10	OPEN SPACE	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	013-024-001-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-002-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-003-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-004-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-005-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-010-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-012-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-014-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Atlantic	Roseville	013-024-015-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-016-000	0.09	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-017-000	0.09	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-019-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-020-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-021-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-022-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-023-000	0.17	UNCONNECTED	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-024-000	0.34	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-025-000	0.09	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-024-026-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-004-000	0.23	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-005-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-007-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-008-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-011-000	0.23	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-012-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-015-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-016-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-017-000	0.34	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-018-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-019-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-020-000	0.11	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-021-000	0.11	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-025-022-000	0.11	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-030-005-000	2.09	RESIDENTIAL 1 DU	RESIDENTIAL 8 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-030-007-000	0.23	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	013-030-008-000	13.60	Parks - 10acres	Parks - 10acres	Parks - 10acres
Atlantic	Roseville	013-040-003-000	3.73	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	013-040-004-000	5.84	RESIDENTIAL 1 DU	RESIDENTIAL 35 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-040-005-000	2.04	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	013-051-001-000	0.11	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-051-002-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-051-003-000	0.11	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-051-004-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-051-005-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Atlantic	Roseville	013-051-006-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-051-007-000	0.12	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-051-008-000	0.12	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-051-009-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-051-010-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-051-011-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-051-012-000	0.36	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-051-013-000	0.11	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-051-014-000	0.12	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-052-001-000	0.31	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-052-002-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-052-005-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-052-006-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-052-007-000	0.17	UNCONNECTED	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-052-008-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-052-009-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-053-001-000	0.31	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-053-004-000	1.11	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Atlantic	Roseville	013-053-007-000	0.22	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-053-008-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-053-009-000	0.38	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-053-011-000	0.19	RESIDENTIAL 3 DU	RESIDENTIAL 3 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-053-012-000	0.65	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-053-013-000	0.26	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-053-014-000	1.23	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Atlantic	Roseville	013-060-002-000	0.38	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-061-005-000	0.19	SCHOOLS	SCHOOLS	SCHOOLS
Atlantic	Roseville	013-061-006-000	0.68	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-062-005-000	0.23	UNCONNECTED	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-062-009-000	7.01	SCHOOLS	SCHOOLS	SCHOOLS
Atlantic	Roseville	013-062-010-000	0.11	UNCONNECTED	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-062-011-000	0.11	UNCONNECTED	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-063-001-000	0.23	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-063-003-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-063-004-000	1.18	RESIDENTIAL 2 DU	RESIDENTIAL 7 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-063-005-000	0.29	UNCONNECTED	OPEN SPACE	OPEN SPACE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Atlantic	Roseville	013-063-006-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-063-007-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-063-008-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-063-009-000	0.11	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-003-000	0.13	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-004-000	0.13	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-005-000	0.12	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-006-000	0.12	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-007-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-008-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-009-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-010-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-011-000	0.14	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-012-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-013-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-014-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-074-015-000	0.31	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-075-001-000	0.20	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-075-002-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-075-003-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-075-004-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-075-005-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-075-006-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-075-010-000	0.90	UNCONNECTED	RESIDENTIAL 6 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-075-011-000	0.23	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	013-075-012-000	0.25	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-075-013-000	0.48	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	013-076-001-000	0.21	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	013-076-002-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-076-003-000	0.18	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-076-004-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-076-005-000	0.09	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	013-200-001-000	0.29	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-002-000	0.27	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-003-000	0.22	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-004-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Atlantic	Roseville	013-200-005-000	0.29	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-006-000	0.20	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-007-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-008-000	0.22	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-011-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-012-000	0.56	RESIDENTIAL 1 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-013-000	0.07	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-014-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-015-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-016-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-017-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-019-000	0.29	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-020-000	0.33	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-021-000	0.39	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-022-000	0.25	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-023-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-024-000	0.33	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-025-000	0.16	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-026-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-027-000	0.10	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-028-000	0.24	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-029-000	0.29	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	013-200-030-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Atlantic	Roseville	015-110-006-000	0.17	OPEN SPACE	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-120-001-000	0.10	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Atlantic	Roseville	015-120-002-000	1.50	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Atlantic	Roseville	015-120-003-000	0.56	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-120-004-000	6.61	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-120-009-000	0.28	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-120-012-000	0.01	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-120-013-000	0.59	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	015-120-014-000	0.24	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-120-015-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	015-120-016-000	0.05	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-120-017-000	0.29	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	015-120-018-000	0.11	UNCONNECTED	OPEN SPACE	OPEN SPACE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Atlantic	Roseville	015-130-016-000	10.41	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-130-020-000	3.27	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-130-021-000	1.17	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	015-130-022-000	0.23	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-140-004-000	0.17	UNCONNECTED	HEAVY INDUSTRIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	015-140-007-000	5.01	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-150-002-000	0.34	UNCONNECTED	HEAVY INDUSTRIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	015-150-003-510	0.20	UNCONNECTED	HEAVY INDUSTRIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	015-150-006-000	2.46	UNCONNECTED	HEAVY INDUSTRIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	015-150-007-000	1.05	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-150-008-000	0.67	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-150-009-000	0.45	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-150-010-000	0.13	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-150-012-000	0.94	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	015-150-016-000	0.43	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	015-150-017-000	0.22	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-150-020-000	0.25	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-150-021-000	0.08	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	015-150-022-000	0.50	UNCONNECTED	OPEN SPACE	OPEN SPACE
Atlantic	Roseville	015-150-023-000	1.77	UNCONNECTED	HEAVY INDUSTRIAL	INTENSE COM/PQP/MU
Atlantic	Roseville	015-150-024-000	0.20	UNCONNECTED	HEAVY INDUSTRIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-010-016-000	1.28	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-010-017-000	2.93	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-010-018-000	2.11	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-040-023-000	0.00	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-040-025-000	2.61	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-040-026-000	1.18	UPRR	UPRR	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-040-027-000	21.12	UPRR	UPRR	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-071-003-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-071-004-000	0.30	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-071-005-000	0.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-071-007-000	0.06	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-071-008-000	0.16	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-071-010-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-001-000	0.26	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-002-000	0.26	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Downtown Plan	Rocklin	010-072-003-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-005-000	0.07	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-006-000	0.07	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-007-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-008-000	0.04	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-009-000	0.06	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-010-000	0.06	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-012-000	0.17	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-013-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-014-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-015-000	0.17	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-072-016-000	0.23	UPRR	UPRR	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-091-017-000	0.52	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-091-018-000	0.16	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-091-019-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-091-020-000	0.16	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-091-021-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-092-010-000	0.35	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-092-012-000	0.34	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-092-013-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-092-014-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-092-015-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-092-016-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-112-001-000	0.10	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-112-019-000	0.08	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-112-022-000	0.01	UNCONNECTED	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-112-030-000	0.48	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-121-001-000	1.38	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-121-002-000	0.08	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-121-004-000	0.15	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-121-005-000	0.23	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-121-006-000	0.15	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-001-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-002-000	0.25	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-003-000	0.10	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-004-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Downtown Plan	Rocklin	010-122-005-000	0.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-007-000	0.19	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-009-000	0.04	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-010-000	0.07	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-011-000	0.04	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-012-000	0.11	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-013-000	0.15	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-015-000	0.13	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-016-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-122-017-000	0.05	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-131-006-000	0.35	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-131-007-000	0.35	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-131-008-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-131-010-000	0.26	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-131-011-000	0.26	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-132-007-000	0.01	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-132-008-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-132-009-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-132-010-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-132-012-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-132-017-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-132-018-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-132-019-000	0.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-132-022-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-132-023-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-134-020-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-134-021-000	0.20	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-136-023-000	0.35	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-136-024-000	0.26	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-144-002-000	0.16	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-144-003-000	0.32	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-144-004-000	0.16	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-144-005-000	0.20	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-144-006-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-144-007-000	0.08	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-144-008-000	0.16	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Downtown Plan	Rocklin	010-144-018-000	0.22	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-154-001-000	0.32	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-154-015-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-154-017-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-154-018-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-154-019-000	0.16	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-154-020-000	0.33	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-161-003-000	0.42	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-161-004-000	0.07	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-161-005-000	0.07	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-161-011-000	0.25	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-161-013-000	0.45	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-161-015-000	0.34	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-161-016-000	0.34	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-162-001-000	1.19	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-162-002-000	0.07	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-162-003-000	0.14	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-162-004-000	0.07	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-162-005-000	0.29	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-162-006-000	0.07	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-001-000	1.00	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-002-000	0.34	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-004-000	0.07	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-005-000	0.14	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-007-000	1.14	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-009-000	0.34	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-012-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-013-000	0.14	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-014-000	0.07	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-015-000	0.63	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-016-000	0.09	UNCONNECTED	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-017-000	0.78	UNCONNECTED	SCHOOLS	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-018-000	1.00	UNCONNECTED	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-019-000	0.43	UNCONNECTED	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-021-000	0.46	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-170-023-000	0.68	HEAVY INDUSTRIAL	HEAVY INDUSTRIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Downtown Plan	Rocklin	010-170-024-000	6.76	HEAVY INDUSTRIAL	HEAVY INDUSTRIAL	OPEN SPACE
Downtown Plan	Rocklin	010-170-025-000	0.48	UNCONNECTED	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-005-000	0.20	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-011-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-031-000	0.20	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-044-000	0.18	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-045-000	0.21	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-047-000	0.23	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-049-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-051-000	0.37	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-055-000	0.57	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-060-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-061-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-065-000	0.83	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-067-000	1.01	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-068-000	1.02	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-180-069-000	0.17	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-191-001-000	8.64	UPRR	UPRR	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-191-002-000	4.77	UPRR	UPRR	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-191-003-000	3.75	UPRR	UPRR	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-191-012-000	1.67	HEAVY INDUSTRIAL	HEAVY INDUSTRIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-191-013-000	1.96	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-191-014-000	0.11	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-191-015-000	0.08	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-191-016-000	0.06	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-191-017-000	1.47	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-191-018-000	2.13	HEAVY INDUSTRIAL	HEAVY INDUSTRIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-191-021-000	1.64	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-191-022-000	3.40	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-210-001-000	0.35	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-210-002-000	1.97	RESIDENTIAL 3 DU	RESIDENTIAL 9 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-210-007-000	0.14	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-210-013-000	0.61	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-210-018-000	0.53	RESIDENTIAL 1 DU	RESIDENTIAL 2 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-210-020-000	0.95	RESIDENTIAL 1 DU	RESIDENTIAL 4 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-230-001-000	0.03	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Downtown Plan	Rocklin	010-230-002-000	0.09	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-230-003-000	1.84	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-230-005-000	5.78	UNCONNECTED	PUBLIC/QUASI-PUBLIC	OPEN SPACE
Downtown Plan	Rocklin	010-230-006-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-230-008-000	0.54	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-001-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-002-000	2.66	RESIDENTIAL 2 DU	RESIDENTIAL 13 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-004-000	3.24	RESIDENTIAL 1 DU	RESIDENTIAL 16 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-009-000	0.34	UNCONNECTED	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-010-000	0.13	UNCONNECTED	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-023-000	0.96	RESIDENTIAL 1 DU	RESIDENTIAL 4 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-024-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-025-000	0.68	RESIDENTIAL 1 DU	RESIDENTIAL 3 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-026-000	0.19	UNCONNECTED	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-027-000	0.06	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-028-000	1.12	RESIDENTIAL 1 DU	RESIDENTIAL 5 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-029-000	0.47	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-030-000	0.86	RESIDENTIAL 1 DU	RESIDENTIAL 4 DU	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-031-000	0.51	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-240-032-000	5.79	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Downtown Plan	Rocklin	010-270-008-000	2.72	RESIDENTIAL 1 DU	RESIDENTIAL 13 DU	INTENSE COM/PQP/MU
Fairgrounds	Roseville	011-010-001-000	2.70	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Fairgrounds	Roseville	011-010-002-000	4.45	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Fairgrounds	Roseville	011-010-003-000	4.45	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Fairgrounds	Roseville	011-020-001-000	3.44	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Fairgrounds	Roseville	011-020-002-000	6.25	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Fairgrounds	Roseville	011-020-004-000	6.23	OPEN SPACE	OPEN SPACE	OPEN SPACE
Fairgrounds	Roseville	011-030-001-000	0.97	OPEN SPACE	OPEN SPACE	OPEN SPACE
Fairgrounds	Roseville	011-030-003-000	3.50	OPEN SPACE	OPEN SPACE	OPEN SPACE
Fairgrounds	Roseville	011-030-006-000	4.58	OPEN SPACE	OPEN SPACE	OPEN SPACE
Fairgrounds	Roseville	011-040-001-000	4.45	OPEN SPACE	OPEN SPACE	OPEN SPACE
Fairgrounds	Roseville	011-040-003-000	1.51	OPEN SPACE	OPEN SPACE	OPEN SPACE
Fairgrounds	Roseville	011-050-003-000	2.01	OPEN SPACE	OPEN SPACE	OPEN SPACE
Fairgrounds	Roseville	011-050-004-000	6.13	OPEN SPACE	OPEN SPACE	OPEN SPACE
Fairgrounds	Roseville	011-060-001-000	4.23	SCHOOLS	SCHOOLS	SCHOOLS
Harding-Douglas	Roseville	013-182-009-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Harding-Douglas	Roseville	013-182-010-000	0.24	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-182-020-000	0.22	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-182-021-000	0.23	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-182-037-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-182-038-000	0.03	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-182-040-000	0.05	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-182-042-000	0.04	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-182-045-000	0.03	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-182-047-000	0.09	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-182-049-000	0.07	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-182-051-000	0.09	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-182-054-000	0.32	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-182-055-000	0.01	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-182-056-000	0.49	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-183-007-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-183-008-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-183-009-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-183-015-000	0.07	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-183-016-000	0.06	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-183-017-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-183-018-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-183-019-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-183-020-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-183-033-000	0.10	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-183-035-000	0.19	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-183-036-000	0.07	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-183-038-000	0.03	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-183-040-000	0.32	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-192-005-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-192-006-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-192-007-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-192-008-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-192-009-000	0.19	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-192-014-000	0.26	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-192-026-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-192-027-000	0.65	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Harding-Douglas	Roseville	013-192-028-000	0.06	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-192-031-000	0.09	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-192-032-000	0.08	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-192-033-000	0.03	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-192-034-000	0.11	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-192-035-000	0.26	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-194-012-000	0.22	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-194-013-000	0.21	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-194-027-000	0.31	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-194-029-000	0.16	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-194-031-000	0.26	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-194-032-000	0.20	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-211-005-000	0.70	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	013-211-006-000	1.46	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	013-211-009-000	0.52	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-211-010-000	0.52	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-211-017-000	15.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-211-018-000	2.81	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-211-019-000	1.04	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-002-000	1.31	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-003-000	3.39	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-006-000	0.57	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-012-000	1.08	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-013-000	1.35	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-014-000	3.51	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-018-000	3.27	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-022-000	0.79	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-023-000	1.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-026-000	0.90	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-027-000	0.40	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-031-000	2.40	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-032-000	2.08	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-036-000	2.12	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-037-000	1.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-038-000	2.73	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-039-000	1.83	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Harding-Douglas	Roseville	013-212-041-000	2.06	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-042-000	0.56	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-045-000	2.45	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-046-000	2.74	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-212-047-000	2.16	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-213-001-000	1.56	UNCONNECTED	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-213-002-000	2.04	UNCONNECTED	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-213-008-000	3.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-213-009-000	0.64	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-213-013-000	0.62	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-213-014-000	1.85	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-213-022-000	3.01	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-213-023-000	0.98	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-213-024-000	0.90	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-213-025-000	1.08	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-213-026-000	1.02	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-213-027-000	11.97	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-002-000	0.57	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-003-000	0.38	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-004-000	0.80	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-008-000	0.21	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-009-000	0.25	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-010-000	0.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-011-000	0.42	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-014-000	1.85	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-015-000	0.56	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-017-000	0.76	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-018-000	0.31	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-020-000	0.28	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-022-000	0.56	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-024-000	0.48	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-026-000	0.48	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-270-028-000	0.95	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-280-001-000	0.55	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-280-002-000	0.66	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-280-004-000	0.66	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Harding-Douglas	Roseville	013-280-005-000	3.30	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-280-007-000	0.39	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-280-008-000	0.55	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-280-011-000	0.11	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-280-013-000	1.21	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-280-015-000	1.83	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-280-016-000	1.21	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-280-017-000	0.74	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	013-280-018-000	2.39	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-113-023-000	0.16	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-113-026-000	0.36	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-113-027-000	0.18	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-113-028-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	014-113-029-000	0.34	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Harding-Douglas	Roseville	014-113-030-000	0.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-113-049-000	0.16	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-120-007-000	1.13	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-120-034-000	0.19	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-120-035-000	0.24	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-120-036-000	2.23	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-120-054-000	0.37	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-120-055-000	0.39	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-120-057-510	0.31	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-120-061-000	0.86	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-120-062-000	0.05	OPEN SPACE	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	014-120-067-000	0.21	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-120-068-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-130-033-000	0.11	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-130-043-000	0.66	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-130-046-000	0.03	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	014-130-047-000	0.08	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	014-130-049-000	0.47	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-130-050-000	0.64	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-130-051-000	0.43	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-130-052-000	0.46	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-130-053-000	1.29	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Harding-Douglas	Roseville	014-130-055-000	1.28	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-130-056-000	0.58	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-183-027-000	0.05	OPEN SPACE	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	014-183-029-000	2.99	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-332-009-000	0.37	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-333-013-000	0.47	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-333-014-000	0.53	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-333-015-000	1.23	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-333-016-000	0.09	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-333-019-000	0.31	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-333-020-000	0.87	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-450-041-000	0.24	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-450-046-000	0.39	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-450-047-000	0.03	UNCONNECTED	OPEN SPACE	OPEN SPACE
Harding-Douglas	Roseville	014-450-051-000	1.02	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-450-053-000	0.23	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-450-054-000	0.27	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	014-450-055-000	0.13	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-010-079-000	2.82	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-010-080-000	0.37	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-260-032-000	1.06	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-260-036-000	0.80	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-260-044-000	0.56	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-260-045-000	0.58	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-260-046-000	1.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-340-034-000	11.09	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-420-006-000	0.68	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-420-016-000	0.69	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-420-017-000	0.68	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-420-018-000	0.99	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-001-000	3.52	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-003-000	6.69	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-004-000	1.02	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-005-000	0.94	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-006-000	0.99	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-007-000	1.44	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Harding-Douglas	Roseville	048-520-008-000	4.21	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-009-000	4.28	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-010-000	1.11	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-011-000	0.57	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-012-000	0.80	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-013-000	0.57	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-014-000	1.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-022-000	0.49	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-023-000	0.49	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-024-000	5.38	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-025-000	2.37	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-026-000	1.99	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-027-000	1.30	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Harding-Douglas	Roseville	048-520-028-000	0.92	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	011-061-001-000	0.16	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-061-002-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-061-003-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-061-004-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-061-005-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-061-006-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-061-007-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-061-008-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-061-009-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-061-010-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-061-011-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-061-012-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-062-001-000	0.19	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-062-002-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-062-003-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-062-004-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-062-005-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-062-006-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-062-007-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-062-008-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-062-013-000	2.24	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	011-063-002-000	0.12	UNCONNECTED	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Historic District	Roseville	011-063-004-000	0.81	UNCONNECTED	RESIDENTIAL 4 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-063-005-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-071-002-000	0.24	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-071-003-000	0.24	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-071-004-000	0.24	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-071-005-000	0.24	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-071-006-000	0.24	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-071-007-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-071-008-000	0.19	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-072-001-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-072-002-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-072-003-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-072-004-000	0.21	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-072-005-000	0.34	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-072-006-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-072-007-000	0.25	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-072-008-000	0.25	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-081-002-000	0.08	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-081-004-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-081-010-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-081-011-000	0.23	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-081-012-000	0.08	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-081-013-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-081-014-000	0.51	RESIDENTIAL 1 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-081-015-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-081-016-000	0.20	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-082-001-000	0.10	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-082-002-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-082-004-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-082-005-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-082-007-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-082-008-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-082-010-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-082-011-000	0.10	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-082-012-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-082-013-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Historic District	Roseville	011-082-014-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-082-015-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-091-002-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-091-003-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-091-004-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-091-005-000	0.37	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-091-006-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-091-007-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-091-008-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-091-009-000	0.27	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-091-010-000	0.27	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-091-013-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-091-014-000	0.22	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-100-003-000	0.12	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-100-004-000	0.12	RESIDENTIAL 3 DU	RESIDENTIAL 3 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-100-005-000	0.05	UNCONNECTED	OPEN SPACE	OPEN SPACE
Historic District	Roseville	011-100-006-000	0.05	UNCONNECTED	OPEN SPACE	OPEN SPACE
Historic District	Roseville	011-101-002-000	0.09	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-101-003-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-101-004-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-101-005-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-101-006-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-101-007-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-101-008-000	0.11	RESIDENTIAL 3 DU	RESIDENTIAL 3 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-101-009-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-101-010-000	0.02	UNCONNECTED	OPEN SPACE	OPEN SPACE
Historic District	Roseville	011-101-011-000	0.70	UNCONNECTED	RESIDENTIAL 4 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-101-012-000	0.24	UNCONNECTED	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-102-004-000	0.08	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-102-007-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-102-008-000	0.10	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-102-009-000	0.04	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-102-010-000	0.08	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-102-011-000	0.08	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-103-004-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-103-005-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Historic District	Roseville	011-103-006-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-103-007-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-103-008-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-103-011-000	0.17	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Historic District	Roseville	011-103-013-000	0.30	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	011-104-001-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-002-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-003-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-004-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-005-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-006-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-008-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-009-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-010-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-011-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-012-000	0.09	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-013-000	0.09	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-014-000	0.09	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-104-015-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-141-001-000	0.24	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-141-002-000	0.24	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-141-003-000	0.24	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-141-004-000	0.24	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	011-142-003-000	0.10	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	011-142-004-000	0.12	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-142-005-000	0.11	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-142-006-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-142-007-000	0.11	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-142-008-000	0.08	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-142-009-000	0.08	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-142-010-000	0.16	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-142-011-000	0.16	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	011-142-014-000	0.19	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	011-142-015-000	0.13	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	011-143-002-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-003-000	0.16	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Historic District	Roseville	011-143-004-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-005-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-006-000	0.19	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-143-007-000	0.14	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-143-008-000	0.48	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-009-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-010-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-011-000	0.16	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-012-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-013-000	0.05	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-014-000	0.06	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-015-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-016-000	0.10	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-018-000	0.13	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-143-019-000	0.10	RESIDENTIAL 3 DU	RESIDENTIAL 3 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-144-001-000	0.48	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Historic District	Roseville	011-144-002-000	0.16	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	011-144-004-000	0.16	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	011-145-001-000	0.22	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	011-145-003-000	0.12	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-145-004-000	0.09	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-145-005-000	0.48	UNCONNECTED	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-145-006-000	0.13	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Historic District	Roseville	011-145-007-000	0.09	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	011-146-001-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-146-004-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-146-005-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-146-006-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-146-007-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-146-008-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-146-011-000	0.16	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-146-012-000	0.16	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-146-013-000	0.16	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-146-014-000	0.16	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-146-016-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-146-017-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Historic District	Roseville	011-146-018-000	0.16	UNCONNECTED	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-146-019-000	0.16	UNCONNECTED	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-146-020-000	0.13	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-146-021-000	0.08	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	011-146-024-000	0.19	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-146-025-000	0.13	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-147-002-000	0.23	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-147-003-000	0.23	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-147-006-000	0.25	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-147-007-000	0.36	UNCONNECTED	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-147-008-000	0.14	UNCONNECTED	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-147-009-000	0.38	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-147-010-000	0.21	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-147-011-000	0.10	UNCONNECTED	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-147-012-000	0.24	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-147-014-000	0.48	UNCONNECTED	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	011-147-015-000	0.45	UNCONNECTED	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-114-004-000	0.10	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-114-005-000	0.33	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-114-006-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-114-007-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-114-008-000	0.17	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-114-010-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-114-011-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-114-012-000	0.11	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-114-014-000	0.26	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-114-015-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-120-001-510	0.09	UPRR	UPRR	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-121-001-000	0.32	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-121-002-000	0.18	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-121-003-000	0.91	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-121-007-000	0.08	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-121-009-000	0.09	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-121-012-000	0.02	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-121-013-000	0.01	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-121-014-000	0.03	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Historic District	Roseville	012-122-001-000	0.65	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-122-003-000	0.46	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-123-001-000	0.34	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-123-002-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-123-003-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-123-004-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-123-005-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-123-008-000	0.17	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Historic District	Roseville	012-123-009-000	0.34	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-123-010-000	0.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-123-011-000	0.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-123-012-000	0.08	RESIDENTIAL 3 DU	RESIDENTIAL 3 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-123-013-000	0.26	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-123-014-000	0.23	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-124-001-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-124-002-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-124-004-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-124-005-000	0.04	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-124-007-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-124-008-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-124-009-000	0.11	OPEN SPACE	OPEN SPACE	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-143-010-000	0.42	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-143-011-000	0.14	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-143-012-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-144-010-000	0.14	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-144-011-000	0.14	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Historic District	Roseville	012-144-012-000	0.14	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-144-013-000	0.28	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-151-005-000	0.20	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-151-006-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-151-007-000	0.17	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-151-008-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-151-009-000	0.14	RESIDENTIAL 3 DU	RESIDENTIAL 3 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-151-010-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-151-022-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-152-006-000	0.14	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Historic District	Roseville	012-152-008-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-152-009-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-152-010-000	0.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-152-011-000	0.60	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-152-012-000	0.07	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-152-013-000	0.15	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-152-014-000	0.14	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-152-015-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-152-016-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-152-021-000	0.08	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-152-022-000	0.07	UNCONNECTED	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-153-009-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-153-010-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-153-011-000	0.17	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-153-012-000	0.17	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-153-013-000	0.23	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-153-014-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-153-015-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-153-016-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-171-012-000	0.22	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-171-013-000	0.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-171-014-000	0.29	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-171-028-000	0.20	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-172-009-000	0.14	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-172-010-000	0.14	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-172-012-000	0.14	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-172-029-000	0.28	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-173-003-000	0.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-173-004-000	0.28	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-173-005-000	0.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-173-006-000	0.06	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-173-007-000	0.09	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Historic District	Roseville	012-181-007-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-181-008-000	0.14	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-181-009-000	0.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-181-010-000	0.21	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Historic District	Roseville	012-181-011-000	0.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-181-012-000	0.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-001-000	0.14	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-004-000	0.14	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-005-000	0.14	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-006-000	0.14	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-007-000	0.14	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-008-000	0.16	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-009-000	0.09	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-010-000	0.14	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-011-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-183-012-000	0.14	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-013-000	0.14	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-014-000	0.14	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-015-000	0.14	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-016-000	0.15	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-017-000	0.27	UNCONNECTED	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Historic District	Roseville	012-183-018-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-183-019-000	0.28	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-184-008-000	1.40	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-184-009-000	1.52	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-185-011-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-185-012-000	0.14	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-185-013-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-185-024-000	0.14	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Historic District	Roseville	012-185-025-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Historic District	Roseville	012-200-001-000	0.12	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-002-000	0.16	UNCONNECTED	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-004-000	0.05	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-005-000	0.05	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-006-000	0.05	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-007-000	0.08	UNCONNECTED	OPEN SPACE	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-008-000	0.07	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-009-000	0.06	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-010-000	0.18	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-011-000	0.23	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Historic District	Roseville	012-200-012-000	0.19	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-013-000	0.14	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-014-000	0.06	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-015-000	0.08	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-016-000	0.04	UNCONNECTED	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-017-000	0.13	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-022-000	0.07	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-023-000	0.08	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-024-000	0.06	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-025-000	0.07	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-026-000	0.02	UNCONNECTED	OPEN SPACE	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-027-000	0.11	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	012-200-028-000	0.17	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Historic District	Roseville	473-050-001-000	4.81	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	473-050-002-000	22.20	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	473-050-013-000	33.37	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	473-060-001-000	1.59	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Historic District	Roseville	473-060-002-000	7.50	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-001-000	1.09	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-002-000	0.58	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-003-510	0.06	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-003-520	0.06	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-003-530	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-003-540	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-003-550	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-003-560	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-003-570	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-003-580	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-003-590	0.07	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-003-600	0.07	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-004-510	0.06	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-004-520	0.06	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-004-530	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-004-540	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-004-550	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-004-560	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Lower Riverside	Roseville	472-150-004-570	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-004-580	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-004-590	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-004-600	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-004-610	0.06	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-004-620	0.06	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-005-510	0.05	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-005-520	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-005-530	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-005-540	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-005-550	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-005-560	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-005-570	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-005-580	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-150-005-590	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-001-000	0.60	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-002-510	0.06	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-002-520	0.06	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-002-530	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-002-540	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-002-550	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-002-560	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-002-570	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-002-580	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-002-590	0.07	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-002-600	0.07	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-003-000	0.60	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-004-510	0.06	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-004-520	0.06	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-004-530	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-004-540	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-004-550	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-004-560	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-004-570	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-004-580	0.03	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-160-004-590	0.07	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Lower Riverside	Roseville	472-160-004-600	0.07	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-002-000	1.51	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-003-000	0.47	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-004-000	2.82	UNCONNECTED	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-005-000	0.51	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-006-000	0.76	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-007-000	1.35	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-008-000	0.63	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-009-000	0.50	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-010-000	0.90	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-011-000	0.56	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-012-000	0.55	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-013-000	0.55	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-014-000	0.46	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-015-000	0.61	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-016-000	0.19	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-017-000	3.76	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-020-000	1.66	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-029-000	0.85	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-031-000	1.40	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-170-032-000	0.54	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-250-003-000	5.00	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-250-006-000	1.96	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-250-007-000	3.91	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-250-008-000	1.52	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-250-009-000	1.04	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-250-010-000	2.91	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-250-013-000	1.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-250-014-000	0.74	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-250-016-000	1.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Lower Riverside	Roseville	472-250-017-000	0.85	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-183-015-000	0.30	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-232-010-000	1.91	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-232-016-000	0.28	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-232-019-000	0.81	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-232-020-000	0.80	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Sunrise	Roseville	014-232-021-000	0.62	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-242-014-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-242-016-000	0.21	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-243-012-000	1.21	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-243-014-000	7.74	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-014-000	1.69	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-270-018-000	1.31	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-022-000	3.78	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-270-025-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-026-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-027-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-028-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-029-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-030-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-031-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-032-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-033-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-034-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-035-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-036-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-037-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-038-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-039-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-040-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-041-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-042-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-043-000	2.69	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-270-044-000	0.42	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-371-005-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-371-006-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-371-007-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-371-008-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-371-009-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-373-001-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-373-002-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-373-003-000	0.15	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Sunrise	Roseville	014-373-004-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-373-005-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-431-001-000	0.22	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-431-002-000	0.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-431-003-000	0.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-431-006-000	0.29	UNCONNECTED	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Sunrise	Roseville	014-431-007-000	0.30	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-431-008-000	0.29	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-431-009-000	0.25	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-431-010-000	0.41	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-432-005-000	0.30	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-432-006-000	0.83	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-432-007-000	0.21	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-432-008-000	0.23	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-432-010-000	0.12	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-432-011-000	0.17	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-432-012-000	0.16	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-432-013-000	0.16	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Sunrise	Roseville	014-432-014-000	0.66	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-018-000	0.33	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-031-000	0.47	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-032-000	0.26	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-038-000	0.46	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-047-000	0.39	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-048-000	0.22	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-050-000	0.28	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-051-000	0.26	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-060-000	0.66	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-061-000	0.28	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-062-000	0.37	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-063-000	0.31	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-065-000	0.89	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-072-000	0.88	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-073-000	0.36	UNCONNECTED	OPEN SPACE	OPEN SPACE
Sunrise	Roseville	014-440-075-000	1.20	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-076-000	0.59	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Sunrise	Roseville	014-440-077-000	0.02	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-440-078-000	0.09	UNCONNECTED	OPEN SPACE	OPEN SPACE
Sunrise	Roseville	014-440-079-000	0.45	UNCONNECTED	OPEN SPACE	OPEN SPACE
Sunrise	Roseville	014-450-039-000	0.68	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-450-052-000	2.98	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-460-001-000	0.90	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-460-002-000	0.02	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-460-003-000	0.02	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-460-004-000	0.02	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-460-005-000	0.02	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-460-006-000	0.02	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-460-007-000	0.02	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-460-008-000	0.04	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-460-009-000	0.28	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Sunrise	Roseville	014-460-010-000	0.31	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-011-004-000	0.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-011-008-000	0.39	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-011-009-000	0.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-013-002-000	0.11	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Upper Riverside	Roseville	014-013-003-000	0.12	RESIDENTIAL 3 DU	RESIDENTIAL 3 DU	RESIDENTIAL MULTIPLE
Upper Riverside	Roseville	014-013-004-000	0.12	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-013-005-000	0.17	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-013-006-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-013-007-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-013-008-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-013-009-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-013-010-000	0.12	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-013-011-000	0.06	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Upper Riverside	Roseville	014-024-003-000	0.17	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-024-004-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-024-005-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-024-006-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Upper Riverside	Roseville	014-024-007-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-024-008-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-024-009-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-024-010-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Upper Riverside	Roseville	014-033-005-000	0.20	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-033-007-000	0.43	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-033-008-000	0.45	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-033-009-000	0.40	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-033-014-000	0.43	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Upper Riverside	Roseville	014-033-018-000	0.35	UNCONNECTED	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Upper Riverside	Roseville	014-033-028-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-033-029-000	0.17	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-053-003-000	0.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-053-004-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Upper Riverside	Roseville	014-053-005-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-053-006-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-053-007-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-053-008-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-053-023-000	0.47	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-084-034-000	0.58	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-084-036-000	0.94	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-091-013-000	0.10	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Upper Riverside	Roseville	014-091-014-000	0.08	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-091-015-000	0.08	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-091-016-000	0.09	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-091-017-000	0.18	RESIDENTIAL 3 DU	RESIDENTIAL 3 DU	RESIDENTIAL MULTIPLE
Upper Riverside	Roseville	014-091-018-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-091-019-000	0.35	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-091-020-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-091-021-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-091-022-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-091-023-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-091-024-000	0.23	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-091-025-000	0.12	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-141-012-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-141-013-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-141-014-000	0.18	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-141-015-000	0.18	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-141-016-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-141-017-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Upper Riverside	Roseville	014-141-019-000	0.12	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-141-020-000	0.12	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-141-021-000	0.11	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-141-022-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Upper Riverside	Roseville	014-141-023-000	0.35	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-141-026-000	0.09	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-141-027-000	0.09	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-191-016-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-191-017-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-191-018-000	0.18	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-191-019-000	0.17	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-191-020-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Upper Riverside	Roseville	014-191-021-000	0.35	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-191-022-000	0.35	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-191-023-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-191-024-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-191-025-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-251-011-000	0.36	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-251-012-000	0.36	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-251-013-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-251-014-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-251-015-000	0.09	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-251-016-000	0.08	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Upper Riverside	Roseville	014-251-021-000	0.35	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	014-251-027-000	1.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	472-180-009-000	0.47	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	472-180-010-000	0.44	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	472-180-012-000	0.46	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	472-180-013-000	0.45	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Upper Riverside	Roseville	472-180-014-000	0.80	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-070-001-000	0.05	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-070-004-000	0.35	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-071-001-000	0.17	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-071-002-000	0.17	UNCONNECTED	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-071-003-000	0.17	UNCONNECTED	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-071-004-000	0.35	UNCONNECTED	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Vernon	Roseville	013-071-006-000	0.13	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-071-007-000	0.04	UNCONNECTED	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-071-009-000	0.22	UNCONNECTED	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-071-010-000	0.13	UNCONNECTED	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-072-001-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-072-002-000	0.12	UNCONNECTED	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-072-003-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-072-004-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-072-005-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-072-006-000	0.20	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-072-007-000	0.16	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-072-008-510	0.26	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-072-009-000	0.08	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-072-010-000	0.34	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-072-011-000	0.17	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-072-012-000	0.51	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-073-002-000	0.10	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-073-011-000	0.25	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-073-015-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-073-016-000	0.01	UNCONNECTED	OPEN SPACE	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-073-017-000	0.18	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-073-019-000	0.10	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-073-020-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-073-021-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-091-002-000	0.35	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-091-003-000	0.53	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-091-008-000	0.10	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-091-009-000	0.21	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-092-005-510	0.09	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-092-006-000	0.09	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-092-007-000	0.17	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-092-008-000	0.14	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-092-009-000	0.10	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-092-010-000	0.11	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-092-011-000	0.18	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-092-014-000	0.52	UNCONNECTED	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Vernon	Roseville	013-093-001-000	0.34	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-093-003-000	0.39	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-093-004-000	0.05	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-093-005-000	0.07	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-093-006-000	0.25	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-093-007-000	0.60	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-093-008-000	0.10	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-093-009-000	0.33	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-094-001-510	1.53	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-100-004-000	0.47	UNCONNECTED	OPEN SPACE	OPEN SPACE
Vernon	Roseville	013-100-005-000	0.44	OPEN SPACE	OPEN SPACE	OPEN SPACE
Vernon	Roseville	013-101-001-000	0.23	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-101-002-000	0.21	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-101-004-000	0.25	LIGHT INDUSTRIAL	LIGHT INDUSTRIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-101-006-000	0.03	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-101-008-000	0.32	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Vernon	Roseville	013-101-009-000	0.44	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-101-011-000	0.65	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Vernon	Roseville	013-101-012-000	0.13	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Vernon	Roseville	013-101-013-000	0.24	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-101-014-000	0.59	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-101-016-000	1.05	UNCONNECTED	OPEN SPACE	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-101-018-000	0.48	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-101-021-000	0.63	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-101-022-000	1.08	UNCONNECTED	OPEN SPACE	OPEN SPACE
Vernon	Roseville	013-101-023-000	0.18	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Vernon	Roseville	013-120-001-000	0.46	UNCONNECTED	OPEN SPACE	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-121-002-000	0.34	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-121-003-000	0.11	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-121-004-000	0.23	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-121-005-000	0.11	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-121-006-000	0.11	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-122-001-000	0.18	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-122-002-000	0.08	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-122-003-000	0.09	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-122-004-000	0.17	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Vernon	Roseville	013-122-005-000	0.10	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-122-009-000	0.31	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-122-010-000	0.21	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-122-011-000	0.17	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-122-012-000	0.07	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-123-001-000	0.09	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-123-002-000	0.09	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-123-003-000	0.09	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-123-004-000	0.09	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-123-008-000	0.26	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-123-009-000	0.60	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-123-010-000	0.14	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-123-014-000	0.06	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-123-016-000	0.05	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-123-017-000	0.38	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-123-018-000	0.41	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Vernon	Roseville	013-123-019-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-123-020-000	0.35	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-124-006-000	0.17	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-124-007-000	0.17	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-124-008-000	0.17	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-124-011-000	0.34	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-124-017-000	0.54	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-124-018-000	0.30	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-124-022-000	0.33	OPEN SPACE	OPEN SPACE	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-124-023-000	0.55	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-131-001-000	0.15	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-131-002-000	0.89	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-131-003-000	0.32	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-131-004-000	0.10	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-131-005-000	0.12	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-131-006-000	0.14	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-131-007-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-131-008-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-131-013-000	0.11	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-131-014-000	0.09	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Vernon	Roseville	013-131-016-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-131-017-000	0.09	UNCONNECTED	OPEN SPACE	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-131-019-000	8.00	OPEN SPACE	OPEN SPACE	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-131-020-000	0.74	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Vernon	Roseville	013-131-021-000	0.13	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-131-022-000	0.12	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-151-004-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-152-002-000	0.19	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-152-004-000	0.17	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Vernon	Roseville	013-152-005-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-152-006-000	0.28	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-152-007-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-152-008-000	0.10	RESIDENTIAL 3 DU	RESIDENTIAL 3 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-152-009-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-152-010-000	0.69	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-152-011-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-152-012-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-152-016-000	0.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-152-017-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-152-018-000	0.16	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-153-001-000	0.23	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-153-003-000	0.17	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Vernon	Roseville	013-153-004-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-153-005-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-153-006-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-153-007-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-153-008-000	0.14	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Vernon	Roseville	013-153-009-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-153-013-000	0.49	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-153-014-000	0.20	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-153-019-000	0.26	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-153-021-000	0.06	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-153-022-000	0.06	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-153-023-000	0.43	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-154-001-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-002-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Vernon	Roseville	013-154-003-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-004-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-005-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-006-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-007-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-008-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-009-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-010-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-154-011-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-012-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-013-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-014-000	0.14	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-015-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-016-000	0.14	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-154-017-000	0.28	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-161-001-000	0.22	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-161-002-000	0.12	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-162-001-000	2.88	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-163-001-000	0.05	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-163-003-000	0.18	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-163-004-000	0.17	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-163-005-000	0.21	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-164-001-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-164-002-000	0.12	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-164-003-900	0.12	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-164-004-000	0.12	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-164-005-000	0.18	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-164-009-000	0.11	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-164-010-000	0.06	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-164-011-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-164-012-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-164-013-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-164-014-000	0.16	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-164-015-000	0.15	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-164-016-000	0.25	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-164-017-000	0.13	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Vernon	Roseville	013-164-018-000	0.68	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU
Vernon	Roseville	013-171-002-000	0.05	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-171-003-000	0.10	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-171-004-000	0.16	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-171-005-000	0.07	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Vernon	Roseville	013-171-006-000	0.06	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-171-007-000	0.10	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-171-008-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-171-009-000	0.12	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Vernon	Roseville	013-171-010-000	0.23	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-172-007-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-172-008-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-172-009-000	0.17	RESIDENTIAL 2 DU	RESIDENTIAL 2 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-172-010-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	013-172-011-000	0.14	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-172-012-000	0.21	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-172-013-000	0.88	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-172-014-000	0.12	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-172-016-000	0.16	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-172-017-000	0.36	MIXED USE	MIXED USE	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-172-018-000	0.00	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-172-019-000	6.03	OPEN SPACE	OPEN SPACE	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-172-020-000	0.34	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	013-172-021-000	0.10	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-172-022-000	0.76	COMMERCIAL	COMMERCIAL	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-250-013-000	0.37	UPRR	UPRR	VERY INTENSE COM/PQP/MU
Vernon	Roseville	013-250-014-000	0.37	UPRR	UPRR	VERY INTENSE COM/PQP/MU
Vernon	Roseville	014-091-001-000	0.20	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	014-091-002-000	0.19	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	014-092-001-000	0.17	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	014-092-024-000	0.11	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	014-092-025-000	0.17	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	014-093-001-000	0.17	MIXED USE	MIXED USE	INTENSE COM/PQP/MU
Vernon	Roseville	014-093-024-000	0.18	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	014-101-022-000	0.52	COMMERCIAL	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	014-101-024-000	0.05	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE

Roseville and Rocklin Redevelopment Parcels

Redevelopment Area	City	APN	Parcel Area (ac.)	Current Database Existing Land Use	Current Database Future Land Use	Proposed Redevelopment Land Use
Vernon	Roseville	014-101-025-000	0.19	RESIDENTIAL 1 DU	RESIDENTIAL 1 DU	RESIDENTIAL MULTIPLE
Vernon	Roseville	014-102-029-000	0.09	UNCONNECTED	COMMERCIAL	INTENSE COM/PQP/MU
Vernon	Roseville	014-102-032-000	0.46	PUBLIC/QUASI-PUBLIC	PUBLIC/QUASI-PUBLIC	INTENSE COM/PQP/MU

Appendix X TM 9d – Impact on Regional Trunk Sewer System and WWTPs of Land Use Intensification for Parcels within Redevelopment Areas in Roseville and Rocklin

Update Sheet

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject: **Update for TM 9d**

Prepared For: Art O'Brien, City of Roseville

Prepared by: Andy Smith, RMC

Reviewed by: Dave Richardson, RMC

Date: June 21, 2007

Reference: 0091-04

1 Summary of Update for TM 9d

Since the completion of TM 9d on October 11, 2006, changes in the scope of the South Placer Wastewater and Recycled Water Systems Evaluation, as well as changes in the data available, have resulted in the need to identify out-of-date information, to summarize the updated information, and/or provide justification as to the need for the update. **Table 1** presents a summary of the updates for TM 9d.

Table 1: Summary of Update for TM 9d

Page	Location	Summary of Outdated Information	Summary of Updated Information	Reason for Update
2	Table 2	Based on incorrectly drawn boundaries between SPMUD and Placer County, approximately 0.1 mgd of ADWF from SPMUD is attributed to Placer County (the 0.1 mgd still goes to DC WWTP)	0.1 mgd of ADWF should be subtracted from Placer County and added to SPMUD ADWF	Error in depiction of SPMUD/Placer County boundaries

Technical Memorandum

SOUTH PLACER WASTEWATER AUTHORITY (SPWA) WASTEWATER AND RECYCLED WATER SYSTEMS EVALUATION PROJECT

Subject:	**Impact on Regional Trunk Sewer System and WWTPs of Land Use Intensification for Parcels within Redevelopment Areas in Roseville and Rocklin (TM No. 9d) - FINAL**
Prepared For:	Art O'Brien – City of Roseville
Prepared by:	Pete Bellows, Chris Peters – Brown and Caldwell Marilyn Bailey – RMC
Reviewed by:	Dave Richardson, Gisa Ju – RMC
Date:	July 7, 2006; Revised October 11, 2006
Reference:	0091-004 Task 9

1 Introduction

This technical memorandum (TM) summarizes the results of the hydraulic assessment of the SPWA trunk sewer collection system and WWTPs using the intensification land use and flow projection assumptions presented in *TM 9b - Methodology for Adjusting Land Use for Parcels with Approved or Near-Certain Zoning or Development Changes ("Rezone Parcels")* and *TM 9c - Land Use Intensification Methodology for Parcels within Redevelopment Areas in Roseville and Rocklin*. The trunk sewer hydraulic assessment was performed using the SPWA trunk sewer hydraulic model (buildout scenario) which is documented in *TM 3b – Trunk Sewer Capacity Analysis*. WWTP expansion requirements were developed in *TM 4b – Wastewater Treatment Plants Expansion Requirements.*

2 Hydraulic Model Development

The hydraulic model of the SPWA trunk sewer system was modified to include the addition of new flows (in excess of current flow projections) in the intensification and rezone areas documented in TM 9b and 9c. The additional flows were loaded to the trunk sewer manhole nearest each intensification or rezone area. Applicable diurnal patterns were applied to the base sanitary flow projections. The commercial diurnal pattern was applied to the new Intense Commercial/PQP/Mixed Use and Very Intense Commercial/PQP/Mixed Use land use categories. The following intensification/rezone area flow changes were negligible (-0.01 mgd to 0.04 mgd) and were not included in the model:

- Rezone Areas[1]: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 17
- Intensification Areas: Upper Riverside

The remaining intensification/rezone area flow changes ranged from 0.04 mgd to 0.44 mgd. Flow projections for the rezone/intensification areas are presented in TM 9b and 9c. Total incremental flow projections for the areas are summarized in Table 1 below.

[1] Rezone areas 15 and 16 were handled as part of the Upper Riverside and Vernon redevelopment/intensification areas, respectively.

Table 1: Projected Incremental Redevelopment BSF

Redevelopment Areas	Incremental BSF (mgd)
Rezones	0.565
Intensification	1.512

3 Trunk Sewer Impact of Intensification

The hydraulic model (buildout scenario) was run with the intensification and rezone flow changes as documented. The model results indicate that the increased system flows due to intensification and rezoning have no adverse effects (above and beyond previously identified deficiencies) on the trunk sewer collection system. The only previously identified deficiency downstream of the intensification/rezone areas is in SPMUD, immediately downstream of the Rocklin intensification area. This intensification area did not noticeably change the previously identified buildout deficiency (surcharge < 1 ft.).

4 WWTP Impact of Intensification

4.1 Expansion Requirements

The projected ADWF at buildout, including intensification, rezones, and the addition of the Brookfields UGA, is shown below for each service area.

Table 2: Projected ADWF for Each Service Area

Dry Creek Service Area	Projected ADWF (mgd)
2005 Service Area - Roseville	6.23
2005 Service Area - PC	3.00
2005 Service Area - SPMUD	4.83
UGA - Placer Vineyards	3.89
UGA - SMD-3	0.29
UGA - SPMUD	1.09
UGA - Placer	0.01
Rezone	0.13
Intensification - Roseville	1.38
Intensification - SPMUD	0.25
Total DC Watershed	**21.1**

Pleasant Grove Service Area	Projected ADWF (mgd)
2005 Service Area - Roseville	8.07
2005 Service Area - PC	1.58
2005 Service Area - SPMUD	3.4
West Roseville	1.7
UGA - Invirotech	0.04
UGA - Placer Ranch	2.19
UGA - Curry Creek	2.72
UGA - Regional University	1.16
UGA - Orchard Creek	0.02
UGA - Sierra Vista	2.04
UGA - Creekview	0.47
UGA - Brookfield	0.73
Rezone	0.47
Total PG watershed	**24.59**

The treatment plant expansion requirements in TM 4b were based on the following projected ADWF:

Table 3: ADWF for System Evaluation

Plant	ADWF (mgd)
Dry Creek	21 (buildout)
Pleasant Grove	24 (buildout) 27 (ultimate)

For the Dry Creek service area, the revised projected ADWF of 21.1 mgd is less than 0.5 percent higher than the ADWF of 21 mgd used for the treatment plant expansion requirements in TM 4b. For the Pleasant Grove service area, the revised projected ADWF of 24.6 mgd is only 2.5 percent higher than the ADWF of 24 mgd used in TM 4b.

The sizing of the treatment facilities recommended in TM 4b would not be affected by these small changes in projected ADWF. No changes are needed to the treatment plant expansion requirements in TM4b as a result of intensification, rezoning, and the addition of the Brookfields UGA.

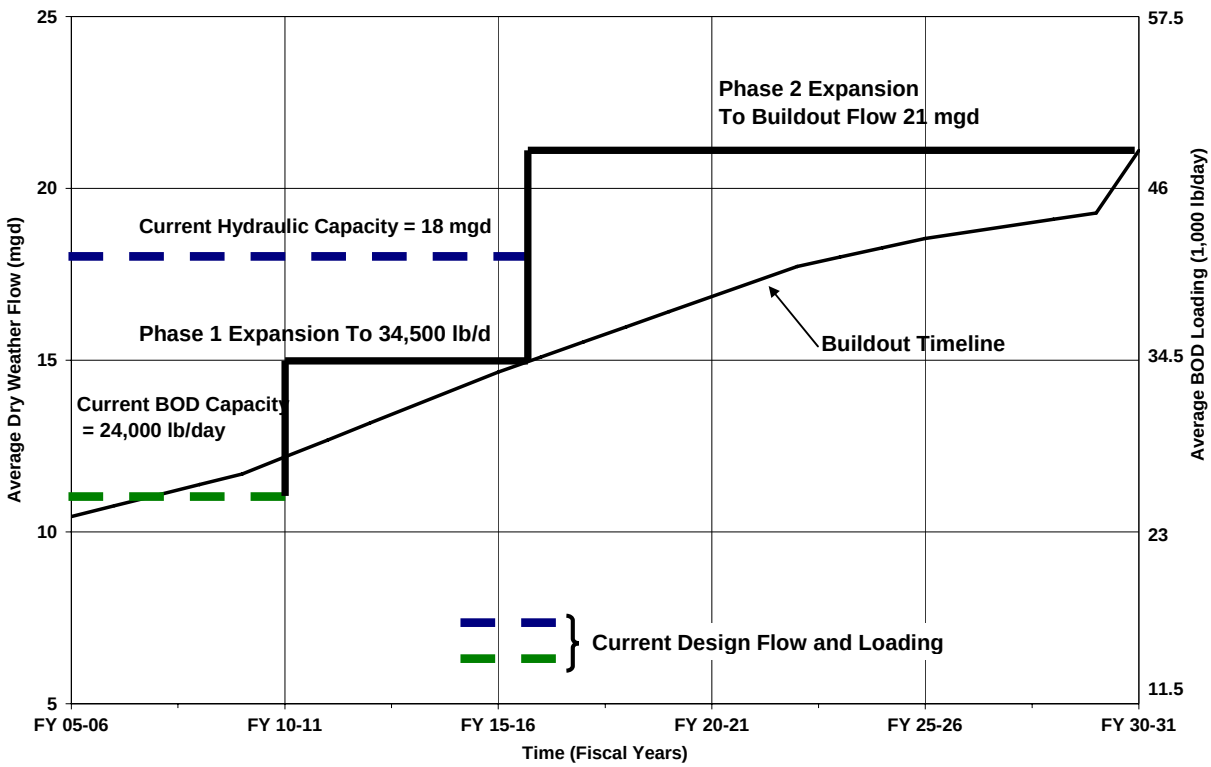
4.2 Timing of Expansion

The following two figures show the effect of intensification, rezoning, and the addition of the Brookfields UGA on the timeline for buildout for each of the service areas. As shown on Figures 1 and 2, the revised timelines do not have a significant impact on the recommended size or phasing or size of the expansions at the two treatment plants.

The Dry Creek expansion would take place in two phases. Phase 1 would increase the BOD capacity to 34,500 lb/day and would be on line in FY 2010/11. Phase 2 would be completed in FY 2016/17 and would increase the plant capacity up to the buildout flow estimate of 21.1 mgd (21 mgd, as shown in Figure 1).

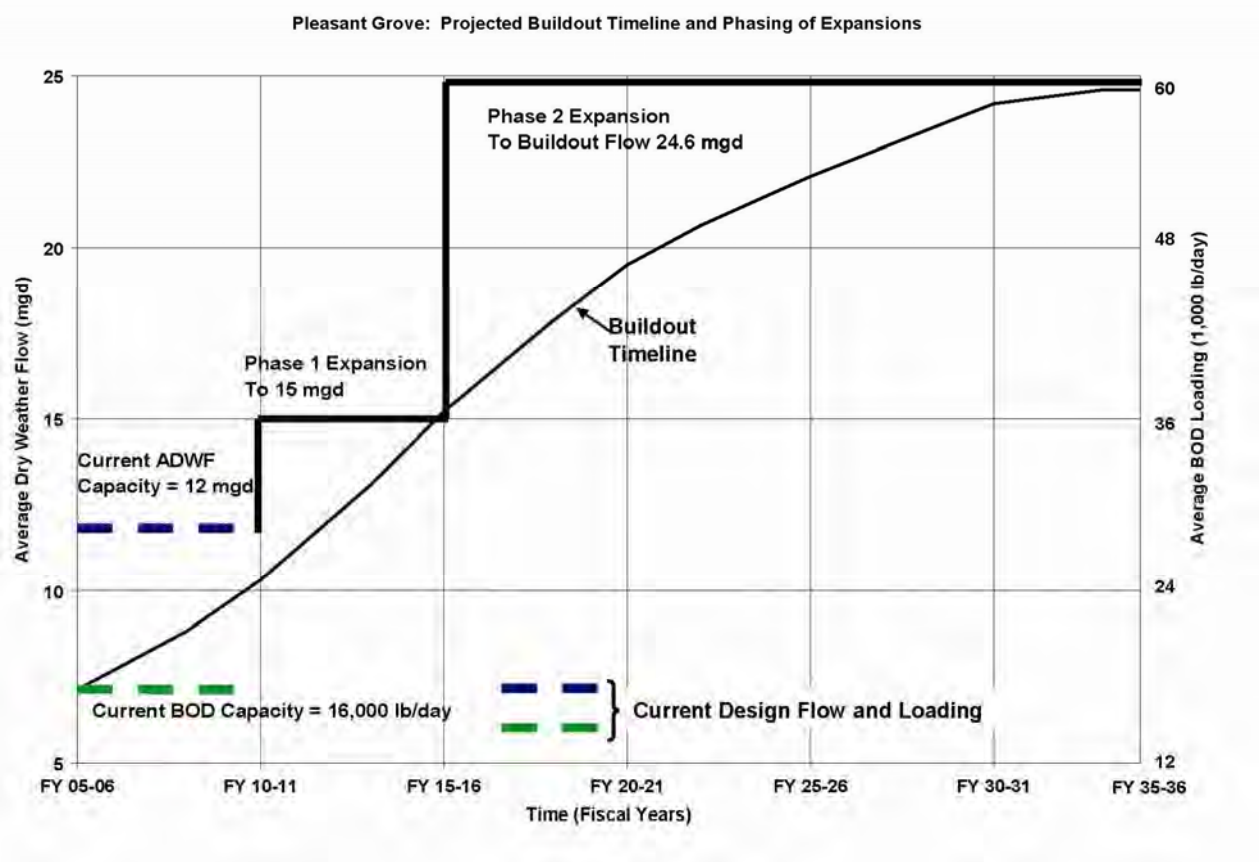
The Pleasant Grove expansion would also take place in two phases. Phase 1 would increase the BOD capacity to 36,000 lb/day, expand the hydraulic capacity to 15 mgd, and would be on line in FY 2010/11. Phase 2 would be completed in FY 2015/16 and would increase the plant capacity up to the buildout flow estimate of 24.6 mgd (25 mgd).

Figure 1 Dry Creek: Projected Buildout Timeline and Phasing of Expansions



NOTE: For planning purposes, it is assumed that intensification will occur at the end of the buildout timeline; hence, the short, steep section at the end of the buildout timeline curve.

Figure 2: Pleasant Grove - Projected Buildout Timeline and Phasing of Expansions



Appendix Y TM 11a – Impacts on Facilities due to Brookfield UGA

Technical Memorandum

South Placer Regional Wastewater and Recycled Water Systems Evaluation

Subject:	**Impacts on Facilities due to Brookfield UGA (TM 11a) - FINAL**
Prepared For:	Art O'Brien, City of Roseville
Prepared by:	Andy Smith, RMC
Reviewed by:	Dave Richardson, RMC
Date:	October 13, 2006; Revised October 20, 2006
Reference:	0091-04 Task 11

1 Introduction

This technical memorandum (TM) is intended to examine the impacts of the Brookfield UGA on the South Placer Regional Wastewater and Recycled Water Systems Evaluation (Systems Evaluation). The Brookfield UGA is addressed separately in this TM because it was not originally identified as a UGA for this project, although it was identified as a future planning area. Impacts to land use, the trunk sewer system, WWTP expansion requirements, and the recycled water system are analyzed on an incremental basis – over and above the base results of the previous TMs for this Systems Evaluation – and are presented below. **Figure 1** shows the location of the Brookfield UGA in relation to the Pleasant Grove WWTP and other UGAs in the vicinity.

2 Brookfield Land Use & Flow Projections

Preliminary land use information provided for this analysis (**Attachment A**) was used to develop flow projections. Unit flow factors measuring the base sanitary flow (BSF), not including groundwater infiltration, from the Systems Evaluation were used to generate projected flows by land use category. The flow projections are presented in **Table 1**.

Figure 1: Location of Brookfield UGA

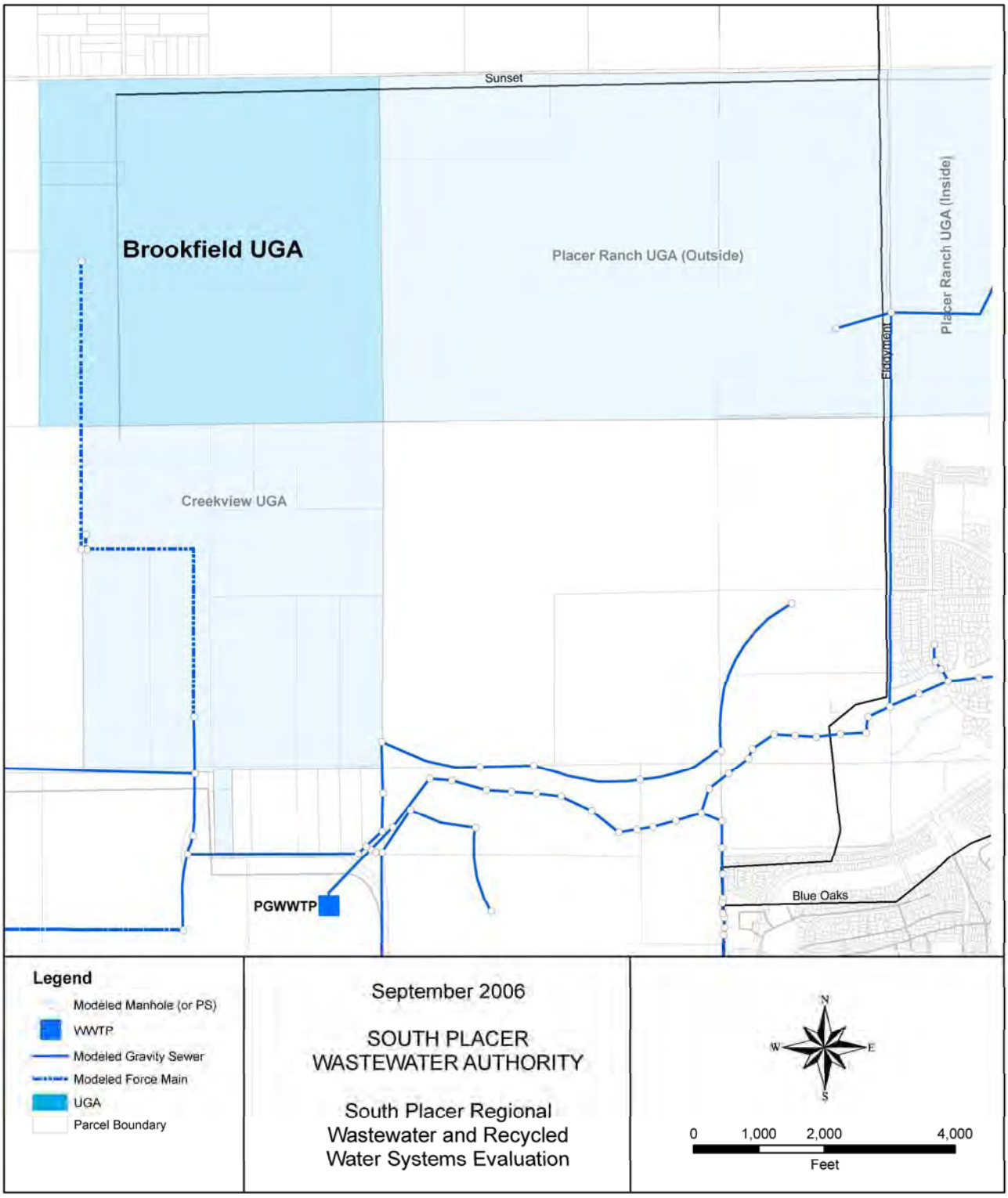


Table 1: Land Use and BSF Flow Projections for Brookfield UGA

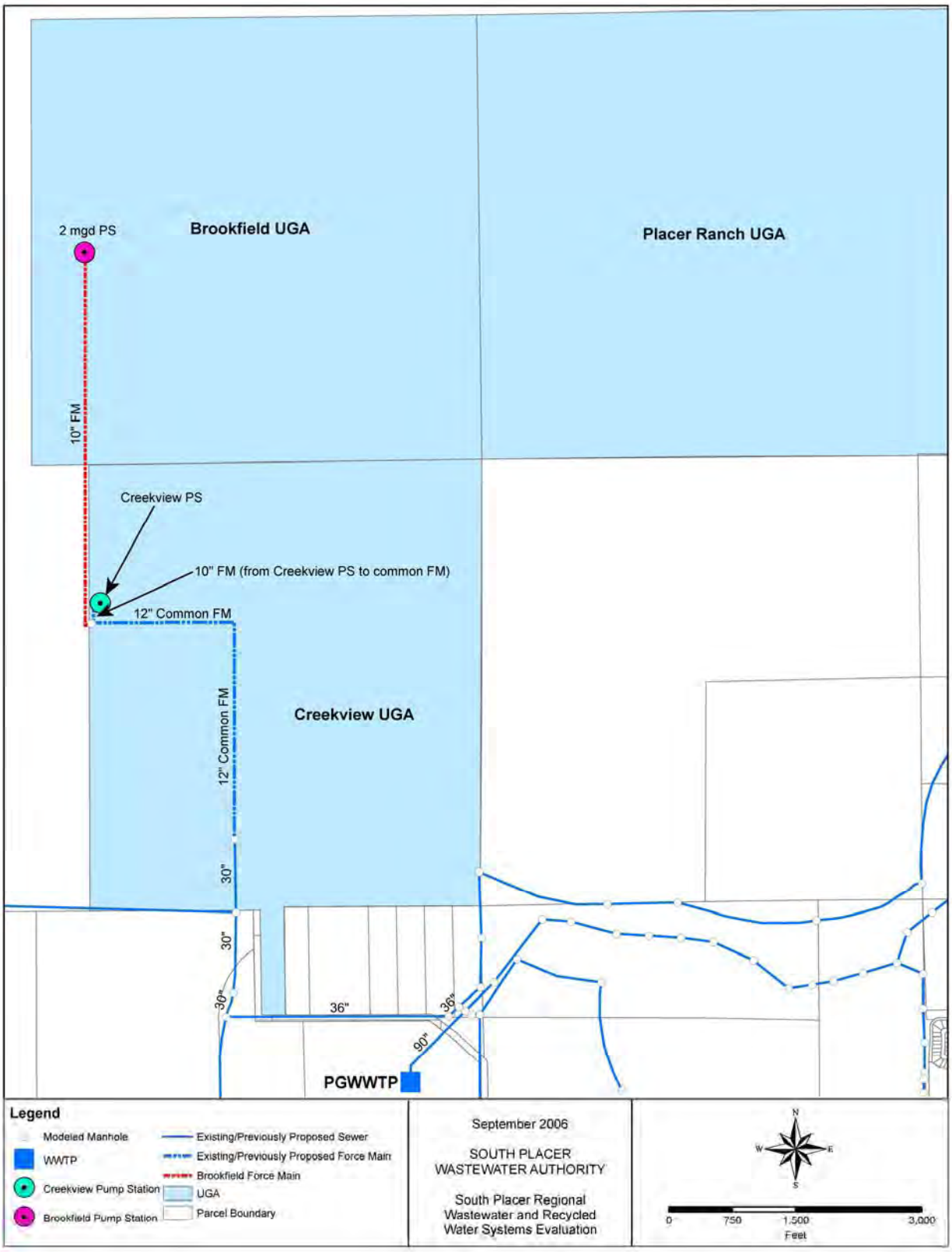
SPWA Land Use Designation	Acres included in Brookfield UGA	BSF Unit Flow Factor	Units	Buildout BSF Projection (gpd)
Commercial	13.6	800	gpd per acre	10,880
Heavy Industrial	0	800	gpd per acre	0
Light Industrial	0	800	gpd per acre	0
Mixed Use	0	2,160	gpd per acre	0
Public/Quasi-Public	2	620	gpd per acre	1,240
Schools	22	160	gpd per acre	3,520
Residential 1 DU [1]	139.1	180	gpd per du	150,228
Residential 2 DU [2]	173.9	180	gpd per du	375,624
Residential 3 DU	0	180	gpd per du	0
Residential Mult. DU	56.9	1920	gpd per acre	109,248
Open Space	192.1	0	gpd per acre	0
Parks > 10 Acres	0	10	gpd per acre	0
Vacant	0	0	gpd per acre	0
Streets	83.5	0	gpd per acre	0
Total	***683.1***	***--***	***--***	***0.65 mgd***

Footnote:
1. Assumes 6 dwelling units per acre.
2. Assumes 12 dwelling units per acre.

3 Brookfield Impacts on Trunk Sewer Evaluation

The hydraulic model was used to route projected Brookfield wastewater flows through the trunk sewer system and determine potential impacts of the flows on routing and sizing these sewer pipelines. Based on available land use maps, USGS topographic information, the proposed layout for Placer Parkway, the proposed locations for other trunk sewer facilities in the vicinity, and discussions with City of Roseville staff, it was decided to route Brookfield flows through the Creekview UGA to the south. For planning purposes, it was assumed that Brookfield flows will be pumped from a low spot in the Brookfield UGA to a common force main shared by Creekview and Brookfield. **Figure 2** illustrates the proposed layout.

Figure 2: Proposed Brookfield Routing



The hydraulic model was run under future design conditions (i.e., buildout land use and a design storm) to determine the adequacy of existing and proposed trunk sewer facilities for this area. The model was run with and without the proposed improvements presented in TM 3b (under Improvement Project 7 - Area L). Under design PWWF conditions, approximately 1.66 mgd enters the proposed Brookfield pump station (for planning purposes, the pump station has been assumed to be capable of handling up to 2 mgd). Based on the modeling results, the need for the proposed improvements in TM 3b were reinforced, as significant surcharging along certain reaches would result without those improvements in place. By increasing the sizes of the existing 18- and 24-inch gravity sewers to 30- and 36-inches, respectively, as was proposed in TM 3b, there appears to be adequate capacity to accommodate Brookfield. The 10-inch force main that was originally proposed for conveying flows from the Creekview UGA towards the existing 18-inch gravity sewer (or the 30-inch gravity sewer after implementing the recommendations in TM 3b), was undersized to adequately convey the additional flows from Brookfield. To address this deficiency, the proposed force main, which is now proposed as a common force main, is proposed to be increased to 12-inches. The hydraulic model of the trunk sewer system was revised to reflect that modification. No other deficiencies were observed as a result of including Brookfield flows in the SPWA trunk sewer system. **Table 2** summarizes the collection system capital costs associated with the addition of the Brookfield UGA. Such capital facilities would be expected to be provided by the UGA developer, as well as the facility financing.

Table 2: Brookfield Impact on Collection System Capital Costs [1]

Item	Quantity	Unit Cost ($)	Estimated Construction Cost ($)	Estimated Capital Cost [2] ($)
10-inch force main for Brookfield	4,450 lf	150	668,000	868,000
2 mgd pump station for Brookfield	1 ea	1,500,000	1,500,000	1,950,000
		Subtotal	**2,168,000**	**2,818,000**
12-inch common force main for Brookfield and Creekview	4,100 lf	175 [3]	718,000	933,000
10-inch force main for Creekview [4]	4,100 lf	150	(615,000)	(800,000)
		Difference (Subtotal)	**103,000**	**133,000**
		Total Cost	**2,271,000**	**2,951,000**

Footnotes:
1. This table is for informational purposes only. These costs have been developed utilizing a unit cost table representative of municipal sewer projects in the SPWA area. Actual sewer infrastructure costs for each extension project will be the responsibility of the developer(s).
2. Includes 30 percent contingency.
3. Linearly interpolated from PVC force main unit costs presented in TM 3b.
4. Previously proposed force main for Creekview UGA.

4 Brookfield Impacts on Wastewater Treatment Plant Expansion Requirements

The impact of the Brookfield UGA on WWTP expansion requirements was included in the analyses discussed in TM 9d, which should be referred to for a more detailed discussion. Brookfield flows are planned to be routed to the Pleasant Grove WWTP. Buildout ADWF projections for Brookfield are presented in **Table 3**.

Table 3: Land Use and ADWF Flow Projections for Brookfield UGA

SPWA Land Use Designation	Acres / DUs included in Brookfield UGA	ADWF Unit Flow Factor	Units	Buildout ADWF Projection (gpd)
Commercial	13.6	850	gpd per acre	11,560
Heavy Industrial	0	850	gpd per acre	0
Light Industrial	0	850	gpd per acre	0
Mixed Use	0	2,300	gpd per acre	0
Public/Quasi-Public	2	660	gpd per acre	1,320
Schools	22	170	gpd per acre	3,740
Residential 1 DU [1]	139.1 ac. / 835 DUs	190	gpd per du	158,574
Residential 2 DU [2]	173.9 ac. / 2,087 DUs	190	gpd per du	396,492
Residential 3 DU	0	190	gpd per du	0
Residential Mult. DU	56.9	2,040	gpd per acre	116,076
Open Space	192.1	0	gpd per acre	0
Parks > 10 Acres	0	10	gpd per acre	0
Vacant	0	0	gpd per acre	0
Streets	83.5	0	gpd per acre	0
Total	***683.1***	**--**	**--**	***0.73*** [3] ***mgd***

Footnote:
1. Assumes 6 dwelling units per acre.
2. Assumes 12 dwelling units per acre.
3. Brookfield developers supplied several sets of preliminary land use data during this project, resulting in range of projected ADWF from 0.69 (the most recent) to 0.73 mgd. To be conservative, a 5% safety factor has been applied to the most recent ADWF projection.

As discussed in TM 9d (which also addresses the impacts on WWTP expansion requirements due to intensification and rezones), the sizing of the treatment facilities recommended in TM 4b would not be affected by the small change in projected ADWF due to the addition of the Brookfield UGA. As a result, no changes are needed to the treatment plant expansion requirements for the Pleasant Grove WWTP, as presented in TM 4b, as a result of the addition of the flows projected for the Brookfield UGA.

As presented in TM 9d (Impacts on Facilities due to Intensification), the buildout revised timeline for the Pleasant Grove WWTP as a result of Brookfield (and intensification and rezones) does not have a significant impact on the recommended sizing or phasing of the expansions at the Pleasant Grove WWTP.

5 Brookfield Impacts on Recycled Water System Evaluation

At the time the Recycled Water System Evaluation was conducted, no recycled water demands had been identified for the Brookfield UGA. Due to the preliminary level to which planning for the development has been conducted, no firm recycled water demands have been developed at this time. However, due to the proximity of the Brookfield UGA to proposed recycled water infrastructure in Creekview and Placer Ranch, it is anticipated that future delivery of recycled water to Brookfield is indeed feasible. The Pleasant Grove WWTP, in addition to the Dry Creek WWTP, will be able to provide all projected recycled water flows to existing, proposed and planned demands. In addition, Brookfield's demands could also be met solely by the Pleasant Grove WWTP supply. It is expected that Brookfield, as is the case for all other UGAs, would not be allocated more recycled water on a daily flow basis than

Brookfield will produce in July on a daily basis. As the planning process for Brookfield continues, recycled water demands will be developed; at that time, the sizing of any proposed recycled water infrastructure that would serve Brookfield should be reexamined to ensure adequacy. In the absence of better planning information and firm recycled water demands, inclusion of the Brookfield UGA is not expected to impact the findings and results of the Recycled Water System Evaluation.

6 Conclusions

Based on the analyses summarized above, there do not appear to be any significant impacts to the trunk sewer evaluation, WWTP expansion requirements, recycled water system evaluation, or intensification and rezones analysis as a result of including the Brookfield UGA. The additional costs associated with the changes in recommendations for existing and proposed collection system (force main and pump station) facilities are summarized in **Table 2** above.

Attachment A:

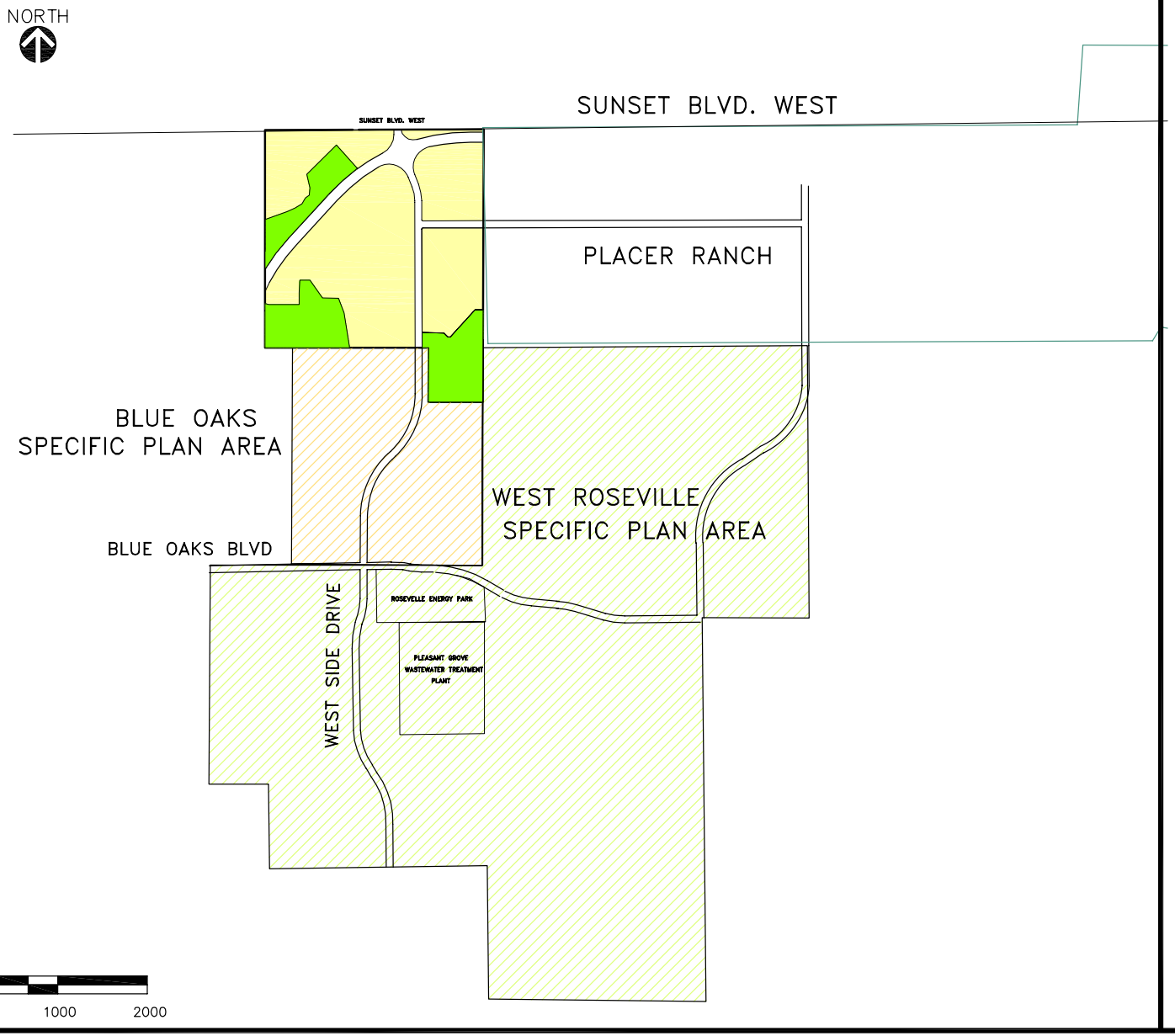
Land Use Planning Information for Brookfield UGA

Brookfield Sunset
Specific Plan

Placer County, California

Regional Exhibit

August 15, 2005



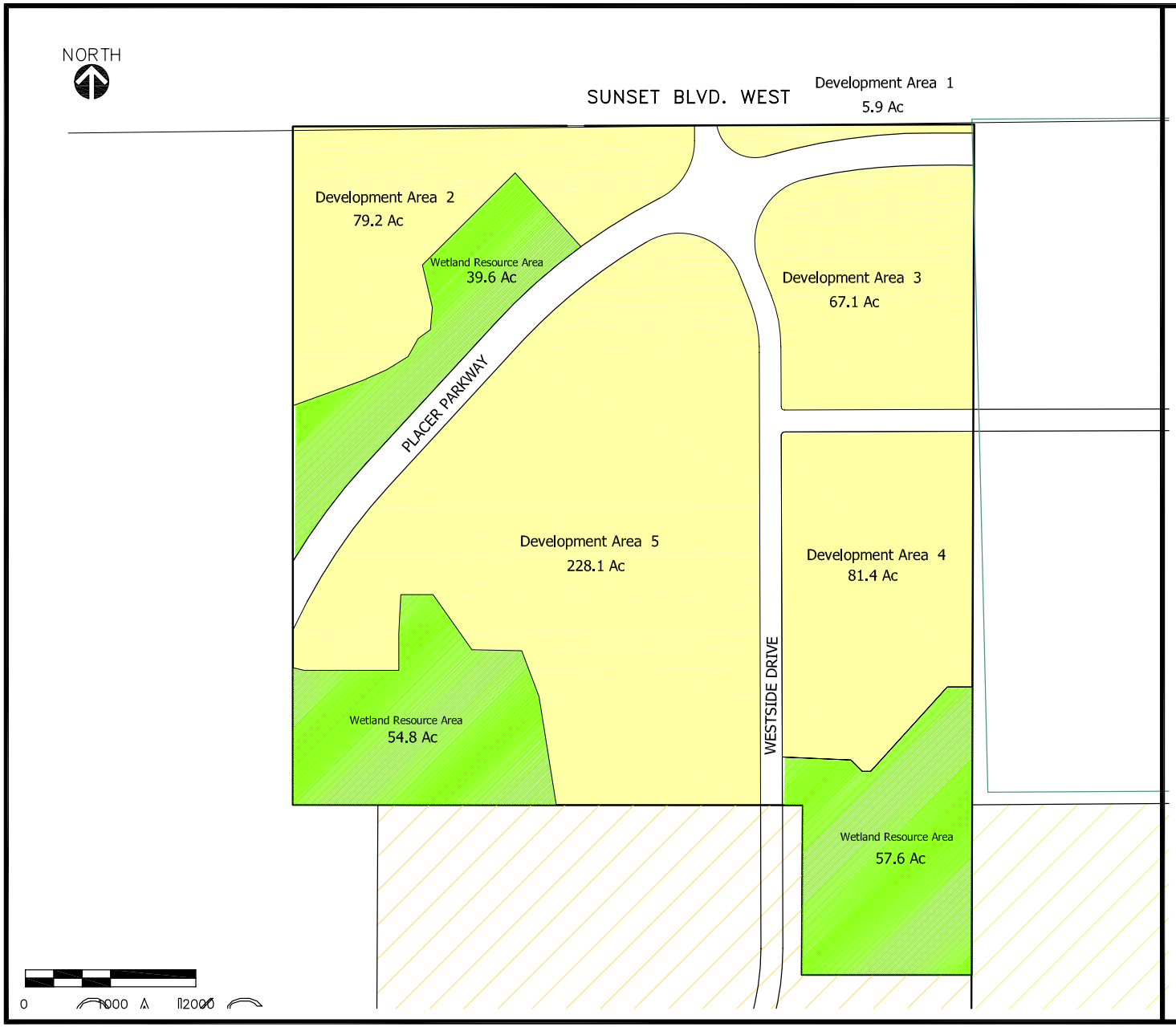
CLAYBAR ENGINEERING INC.
9354 ELK GROVE-FLORIN ROAD
ELK GROVE, CA 95624
Ph.: 916-684-7301
Fax: 916-684-2627

Brookfield Sunset
Specific Plan

Placer County, California

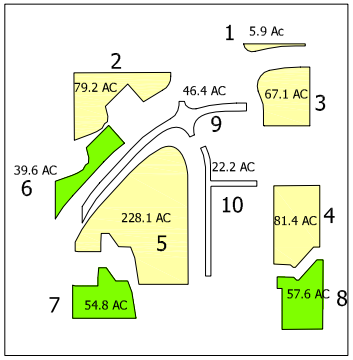
Land Use Exhibit

August 15, 2005



Legend

Land Use	Acres	Units
Development Area	461.7	
WR Wetland Resources	152.0	
Major Road R/W	68.6	
Total	682.3	



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Brookfield Sunset
Conceptual Land Use Model
High Density Alternative

LAND USE SUMMARY

	Gross Acres	Reisdential Acres Weighting Percent	Acres Allocated to Residential
Low Density Residential	139.1	37.61%	370
Medium Density Residential	173.9	47.01%	
High Density Residential	56.9	15.38%	
Office/Retail	13.6		
Institutional (Fire Station)	2.0		
Parks	40.1		
Schools	22.0		
Open Space Corridors/Wetland Resourc	152.0		
Major Roads and Transit Corridors	68.6		
Collector Street	14.9		
Total Acres	**683.2**		

Total Population	**6,679**

Total Model Acres	***683.2***

RESIDENTIAL CHARACTERISTICS

	Average Household Size	% of Dwelling Units by Type	% Vacancy	Number of Dwelling Units	Population
Low Density Residential	2.95	20%	0	835	2,463
Medium Density Residential	2.95	50%	0	2,087	2,463
High Density Residential	2.1	30%	0	1,252	1,753
	2.70	**100%**		**4,174**	**6,679**

	Average Housing Units per Acre	Density Range	Relative Density Weighting Factor	Percentage of Density Weighting Factor	Cumulative Residential Weighting Factor
Low Density Residential	6	1 to 8	1.00	1.00	1.00
Medium Density Residential	12	8 to 18	0.50	2.50	1.25
High Density Residential	22	18 to 40	0.27	1.50	0.41
Total Residential Net Acres	**370**				2.66
Average Residential Net Density	**11.28**				

	ADT/ DUE	ADT/Acre	Total Estimated ADT
Low Density Residential	10	60	8,349
Medium Density Residential	10	120	20,872
High Density Residential	8	176	10,018
Retail		400	5,453
Institutional		120	240
Parks		20	801
Schools		300	6,600
TOTAL ADT			52,334

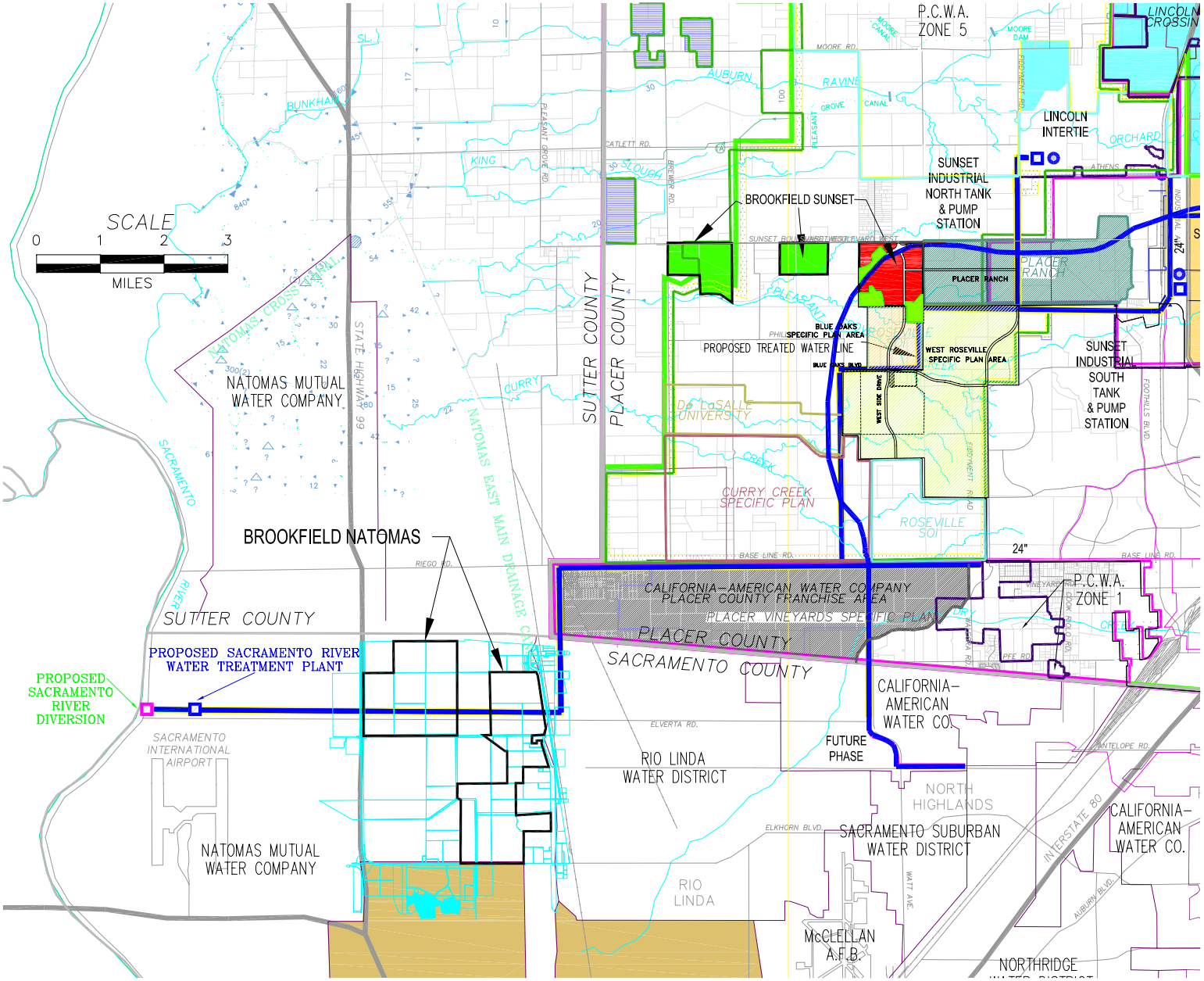
PARK LAND AREA REQUIRED

	Park Acres/ 1000 Residents	Acres Required
Active Park Acres	6	40.07
Open Space	3	20.04

SCHOOL LAND REQUIRED

	Grade K-5	Grade 6-8	Grade 9-12
Low Density Residential	0.365	0.158	0.227
Medium Density Residential	0.365	0.073	0.227
High Density Residential	0.073	0.028	0.067
Total Enrollment	**1,158**	**319**	**747**
School Capacity Design Enrollment	600	1000	1800
Number of Schools Required	**2**	**0**	**0**
Acres per School	11	25	50
School Acres Required	21.23	7.98	20.76
Total School Area Required		**49.97**	

PCWA REGIONAL MASTER PLAN



Appendix Z CD containing Land Use GIS Database