ATKINS

Alpine and Lakeside Sewer Service Areas

Sewer Master Plan

December 2011

Plan Design Enable

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Prepared For:

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Acronyms

CEQA	California Environmental Quality Act
CIP	Capital Improvement Program
County	County of San Diego
d/D	depth to pipe diameter ratio
District	County's Sanitation District
DU	dwelling unit
du/ac	dwelling units per acre
EDUs	Equivalent Dwelling Units
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
fps	feet per second
GIS	Graphical Information System
gpcd	gallons per capita per day
gpd/ac	gallons per day per acre
gpd/du	gallons per day per dwelling unit
I/I	inflow and infiltration
LAFCO	Local Area Formation Commission
LS-2	Lift Station 2
Master Plan	Alpine SSA and Lakeside SSA Sewer Master Plan Update
Metro	Metropolitan Wastewater System
Metro JPA	Metropolitan Joint Powers Authority
Moreno Study	Moreno Avenue Sewer Basin Study, April 2009
MWWD	Metropolitan Wastewater Department
NASSCO	National Association of Sewer Service Companies
NPDES	National Pollutant Discharge Elimination System
PVC	poly vinyl chloride
RDI&I	Rainfall derived inflow and infiltration
RPMP	Reinforced Plastic Mortar Pipe
SANDAG	San Diego Association of Governments
SSA	Sewer Service Areas
SSMP	Sewer System Management Plan
SSO	Sanitary Sewer Overflows
SWRCB	State Water Resources Control Board
VCP	vitrified clay pipe
WDR	Waste Discharge Requirement

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CHAPTER 1
INTRODUCTION

The County of San Diego (County) is updating Sewer Master Plans (previously prepared in 2002) for its sewer service areas within the San Diego County Sanitation District (District). Due to increased growth, system expansions, and aging infrastructure, the County needs to address its capacity needs and update its 10-year Capital Improvement Program (CIP). This Sewer Master Plan Update addresses the Alpine and Lakeside Sewer Service Areas (SSA).

This introductory chapter to the Alpine SSA and Lakeside SSA Sewer Master Plan Update (Master Plan) provides a summary of the:

- Master Plan Objectives
- Contents and Organization of this Report
- Background Information on the District and SSAs
- Overview of Regulatory Requirements
- Environmental Compliance and Policy Considerations

1.1 Sewer Master Plan Objectives

The objectives of this Master Plan are to evaluate the system capacity and provide a general assessment of the condition of the existing sewer collection system, including its pump stations, in order to develop a comprehensive 10-year CIP. The 10-year CIP includes pipeline and pump station condition and capacity improvement projects, long range maintenance program enhancements and regional treatment and transportation needs and opportunities. This recommended CIP forms the basis for capital facility needs, sewer rate evaluations, and long-range financial plans to be completed in separate financial studies.

1.2 Report Organization

This Master Plan provides a comprehensive review and evaluation of the SSAs' wastewater collection, conveyance, and capacity requirements under existing and future conditions. Based on findings of the evaluation, the Master Plan recommends facility improvements and capital cost requirements to ensure that aging infrastructure remains serviceable and to allow for the continued buildout of the County General Plan.

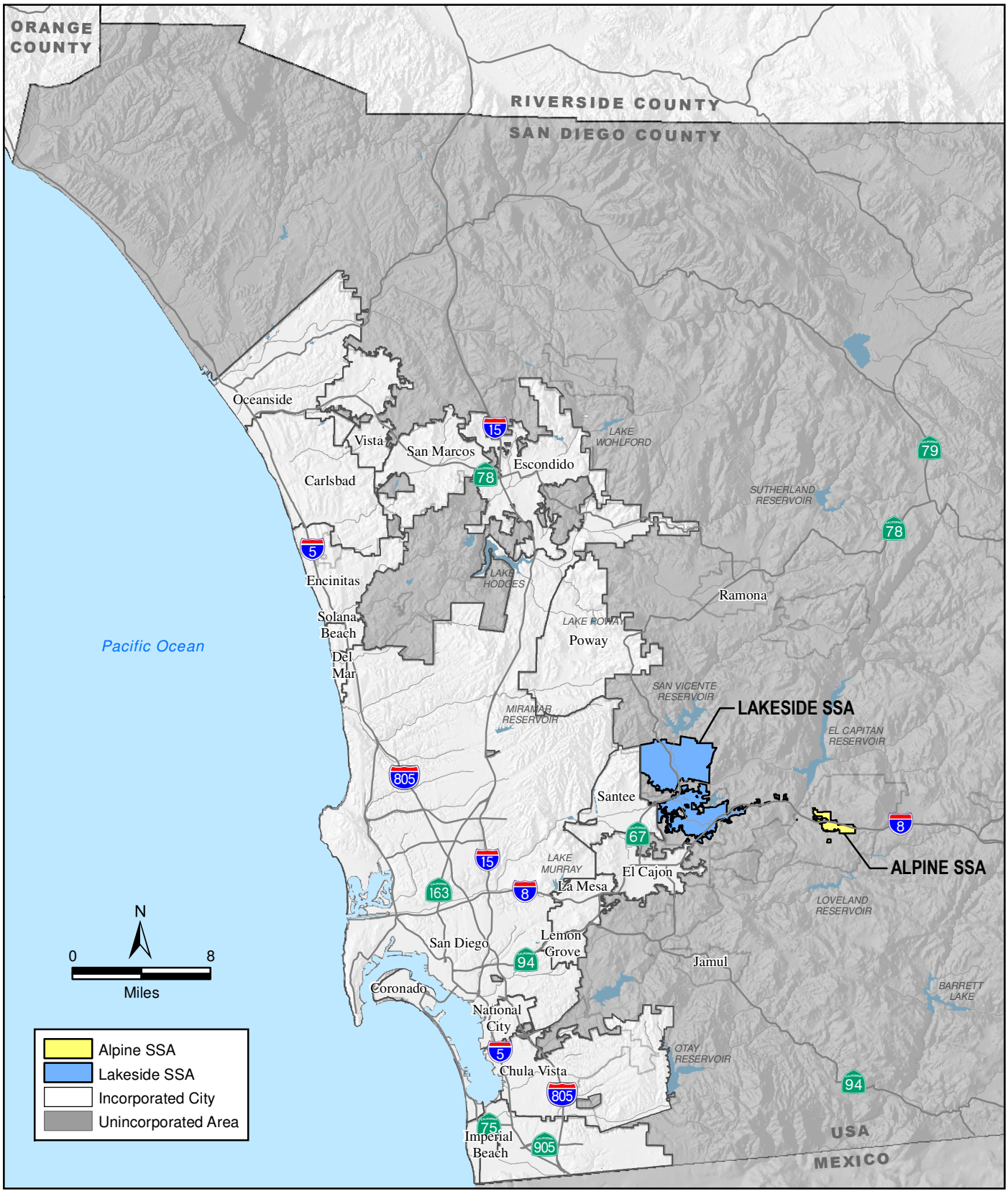
The Master Plan is presented in seven (7) chapters:

- Chapter 1 provides an introduction to the project.
- Chapter 2 presents an overview of the study area and existing wastewater collection facilities.
- Chapter 3 presents an overview of the sewer basins and provides estimates of future wastewater generation rates and regional treatment capacity requirements.
- Chapter 4 presents the methodology and findings of the sewer capacity evaluation, including summaries of hydraulic computer models used to analyze flow conditions.
- Chapter 5 presents a general condition assessment of the Districts' collection system and pump stations and identifies specific condition deficiencies, as well as recommends enhancements to the County's ongoing Video Inspection Program.
- Chapter 6 presents current disposal and reuse activities and a conceptual level evaluation of the District's current disposal costs, briefly explores recycled water supply development, and provides recommendations for further study or County action.
- Chapter 7 presents a recommended 10-year CIP for the Districts' wastewater facilities.

1.3 Background

The County Board of Supervisors serve as the Board of Directors (Governing Board) for the San Diego County Sanitation District, of which the Alpine and Lakeside SSAs are a part of. These two SSAs serve the communities of Alpine and Lakeside, and are maintained by the County of San Diego Wastewater Management Section. Operation and maintenance costs required for each of the SSAs are collected through capacity and service fees assessed to each connection to the sewerage system. While there are two distinct service areas, wastewater flows from Alpine SSA are conveyed through the Lakeside SSA, making the facilities and operation of the two SSAs interrelated, requiring the need for only a single Master Plan to be developed for the two SSAs. The location of the two SSAs is shown on Figure 1-1.

The Alpine and Lakeside SSAs convey all sewer flows into the City of San Diego Metropolitan Wastewater System (Metro) under a comprehensive Regional Wastewater Disposal Agreement enacted between the City of San Diego and the participating agencies within Metro. The Metro Treatment Plant, located in Point Loma, treats sewage from all of the participating agencies. While there are several separate County SSAs within the District (a total of 9), the District is considered one entity by Metro for purposes of capacity rating and its current Metro capacity is 17.503 mgd. Within the District, the SSAs are proportioned, based on historical regional agreements, a share of Metro capacity for the purposes of projecting future regional capacity needs. The Alpine and Lakeside SSAs have been proportioned with a combined 4.841 mgd of Metro Capacity.



PROJECT LOCATION

FIGURE 1-1

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1.3.1 Alpine Sewer Service Area

The Alpine SSA, formerly the Alpine Sanitation District was formed in 1952 by the County Board of Supervisors and serves approximately 1,300 customers within the community of Alpine. Alpine is an unincorporated community of San Diego County located thirty miles east of the City of San Diego within the foothills of the Laguna Mountains. It is bordered on the west by the community of Lakeside and surrounded by Cleveland National Forest land. Alpine started in 1870 as the “Viejas Stage Stop” and was a temporary oasis for stage coach travelers and wagon drivers. Based upon a County Board of Supervisors action, on July 1, 2011 the Alpine Sanitation District was officially reorganized and annexed into the Spring Valley Sanitation District and was renamed the San Diego County Sanitation District.

1.3.2 Lakeside Sanitation District

The Lakeside SSA, formerly the Lakeside Sanitation District was formed in 1955 by the County Board of Supervisors and serves approximately 7,000 customers within the community of Lakeside. Lakeside is an unincorporated community of San Diego County located east of the City of San Diego and west of Alpine. It is bordered on the north by the San Diego River and on the south by Winter Gardens and the City of El Cajon, on the west by the City of Santee, and on the east by the El Capitan Reservoir. Lakeside began as a resort town, but has long held the title of a "cowboy town" or "rodeo town" due to the rural settings, the large percentage of ranches, and the abundant horse ownership in the area. It is also home to an 8-acre permanent rodeo facility known world-wide as the Lakeside Rodeo grounds.

In 2006, the Lakeside Sanitation District inherited a larger sewer service area due to the consolidation of the Lakeside Water District and Riverview Water District and subsequent detachment from Padre Dam Municipal Water District for water and sewer service. The Riverview Water District was dissolved and the Lakeside Water District became the successor agency. As part of this process the Lakeside Water District also became a member of the San Diego County Water Authority. Padre Dam Municipal Water District previously provided sewer service in the Lakeside Water District area. The San Diego County Local Area Formation Commission (LAFCO) recommended detachment from the Padre Dam Municipal Water District and the extension of the Lakeside Sanitation District boundary to include the Lakeside Water District area. The municipal service review concluded that there would be minimal impact on the Lakeside Sanitation District from this boundary adjustment because the area is mostly serviced by septic systems. Based upon a County Board of Supervisors action, on July 1, 2011 the Lakeside Sanitation District was officially reorganized and annexed into the Spring Valley Sanitation District and was renamed the San Diego County Sanitation District.

1.4 Regulatory Requirements

On May 2, 2006, the State Water Resources Control Board (SWRCB) adopted Order 2006-0003, the Statewide General Waste Discharge Requirements (WDRs) for Sanitary Sewer Systems, which requires all federal and state agencies, municipalities, counties, districts, and other public entities that own or operate a sanitary sewer system greater than one mile in length to comply with the elements of the WDRs. The WDRs serve to provide a unified statewide approach for reporting and tracking Sanitary Sewer Overflows (SSO), establishing consistent and uniform requirements for Sewer System Management Plan (SSMP) development and

implementation, establishing consistency in reporting, and facilitating consistent enforcement for violations.

The County's state mandated SSMP was initially approved July 2009 and encompassed all of the separate sanitation and sewer maintenance districts at the time. The SSMP documents include detailed information demonstrating the County's efforts to comply with each of the mandatory and applicable elements required. Revisions are currently being made to the SSMP documents to reflect the reorganization of previously separated sanitation and sewer maintenance districts into the consolidated San Diego County Sanitation District.

1.5 Environmental Compliance

The Districts' Sewer Master Plan is statutorily exempt from the preparation of an Environmental Impact Report (EIR) or a Negative Declaration per Section 15262 of the California Environmental Quality Act (CEQA) guidelines. However, the approval or adoption of this project represents a discretionary action by the County, which is subject to review under CEQA.

1.6 Policy Considerations

The County of San Diego Board of Supervisors has adopted a number of policies which affect wastewater service in the County. These policies were reviewed for their applicability and impact to the SSAs. Appendix A summarizes the policies reviewed. Policy I-106, adopted in 1986, is applicable to Alpine and Lakeside SSAs. The policy was adopted in response to limited available wet weather capacity in the Mission Gorge Trunk Sewer, which is owned and operated by the Metropolitan Wastewater Department (MWWD). The policy established priorities for providing sewer capacity within the Mission Gorge Trunk Sewer, and apply to the Districts, which utilize the Mission Gorge Trunk Sewer for wastewater disposal into Metro. In 1993, MWWD completed construction of the Mission Gorge Pump Station and Force Main to parallel the existing Mission Gorge Trunk Sewer and in 1998 MWWD completed the rehabilitation of the Mission Gorge Trunk Sewer, relieving peak wet weather capacity constraints. Since the capacity constraints in the Mission Gorge Trunk Sewer have been resolved by the completion of the East Mission Gorge Pump Station and related improvements, it is recommended that the District formally repeal the policy.

CHAPTER 2
STUDY AREA

This chapter provides a description of the Master Plan study area including:

- Existing and planned land uses;
- Existing and projected populations;
- Physical attributes of the collection system; and
- Regional wastewater facilities serving the SSAs.

2.1 Study Area Description

The Alpine SSA is located in a rural, unincorporated area of San Diego County along Interstate 8, approximately 30 miles east of the City of San Diego, and 1.5 miles west of the Viejas Casino and Outlet Center. The Alpine SSA boundary is also described as the Town Center boundary in the Alpine Community Plan, amended April 17, 2002. Topographically, the study area varies considerably. Generally, the Alpine SSA drains from the north and the south towards Interstate 8. Terrain ranges in elevation from 1,200 to 2,120 feet. The Alpine SSA and Sphere of Influence boundary, affirmed September 2, 2010, as part of the LAFCO Municipal Service Review Update, includes both developed and undeveloped areas and encompasses approximately 950 and 2,100 acres, respectively.

The Lakeside SSA is located just east of the City of Santee and approximately 15 miles east of the City of San Diego. Generally, Lakeside SSA drains primarily north and west towards Highway 67. Terrain ranges in elevation from 370 to 1,720 feet. The Lakeside SSA and Sphere of Influence boundary, affirmed September 2, 2010, as part of the LAFCO Municipal Service Review Update, includes both developed and undeveloped areas and encompasses approximately 11,300 and 12,600 acres, respectively.

The sewer study area includes parcels within the SSAs, as well as the Sphere of Influence boundaries, permitted parcels outside the SSA and Sphere of Influence boundaries that currently receive service, and the Moreno Avenue Pump Station Special Study Area. The Moreno Avenue Special Study Area was evaluated in the Moreno Avenue Sewer Basin Study, April 2009 (Moreno Study). Figure 2-1 presents the study area for both Districts and their relative location to each other. Appendix B includes the LAFCO boundary maps for the former Alpine Sanitation District and Lakeside Sanitation District.

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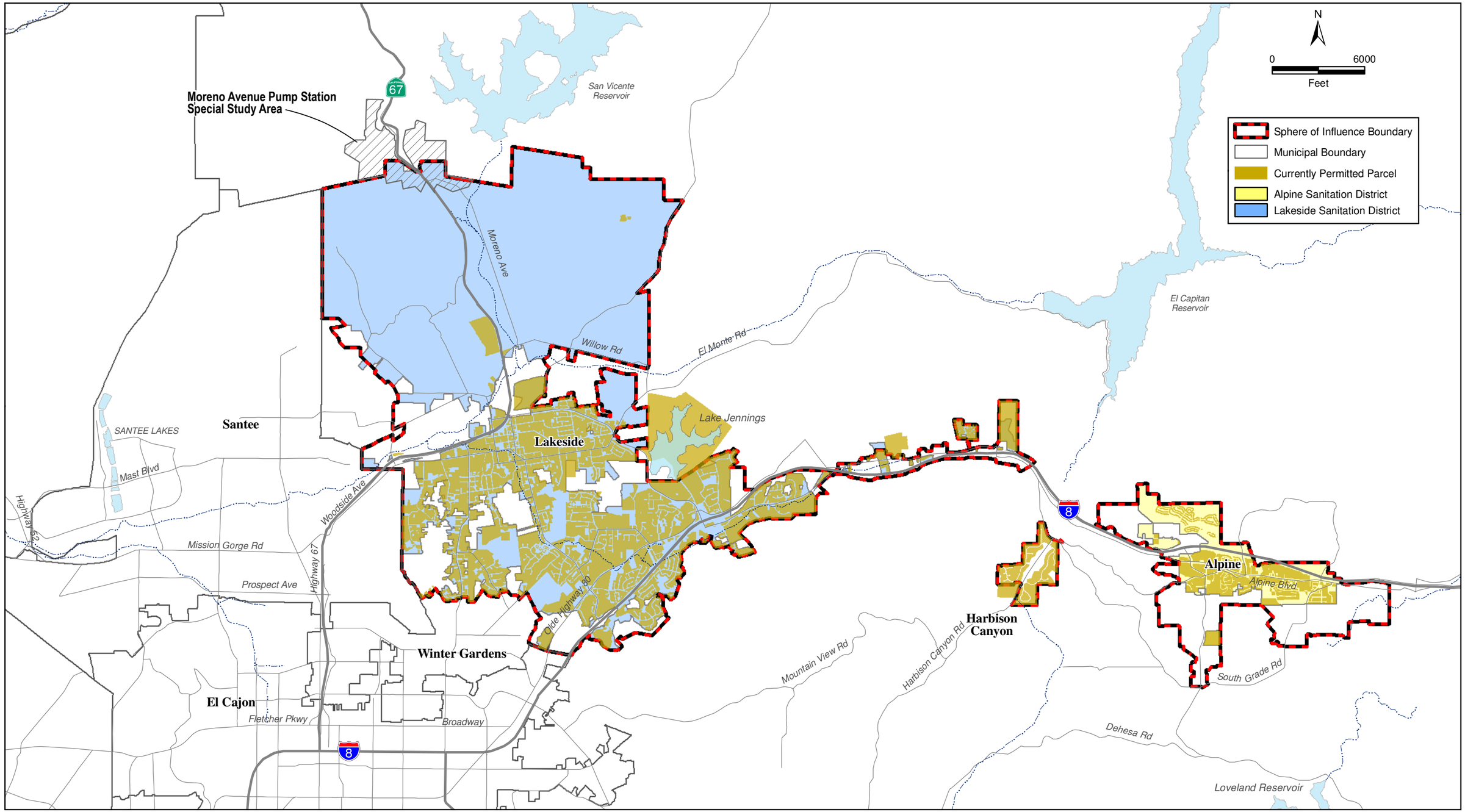

STUDY AREA

FIGURE 2-1

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2.2 Potential Impacts to the Wastewater Collection System

As part of this master plan update, Atkins reviewed the County's sewer permit database and attributed them to the parcel database. Alpine and Lakeside SSAs provide sewer service to permitted parcels, generally located within the current SSA boundaries, with the exception of the Harbison Canyon neighborhood and County-owned park areas surrounding Lake Jennings. Harbison Canyon is served by the Alpine SSA through an Out of District Service Agreement. Within the current Alpine SSA boundary, approximately 90 percent of parcels connect to the sewer system, with the remaining parcels either vacant or on septic systems. Approximately 70 percent of parcels within the current Lakeside SSA boundary, plus 44 parcels immediately adjacent to the boundary, connect to the sewer system. The remainder of parcels in the Lakeside SSA are either vacant or served by onsite septic systems.

This Master Plan considers the future impacts of some private septic system connections to the sewer system, due to potentially failing septic systems in the future. The septic system conversions within the study area are prioritized into four tiers. Current development plans submitted to County Wastewater staff, including those proposed projects discussed in the Moreno Study and a proposed school site in Alpine, were included in Tier 1. San Diego County Code Section 68.312 states that any new building construction or reconstruction where the building is located within 200 feet of an existing public sewer shall connect to a public sewer. Based on this code, parcels within 200 feet of an existing public sewer were included in Tier 2. Properties located outside the required connection distance of 200 feet may request sewer service and, as such, a distance of 1,000 feet was established to determine Tier 3 parcels and the remaining parcels within the study area were included as Tier 4. Each tier is summarized below:

- Tier 1 includes all known future development plans requiring sewer service.
- Tier 2 includes all known future developments and septic conversions for parcels located within 200 feet of the existing sewer system.
- Tier 3 includes all known future developments and septic conversions for parcels located within 1,000 feet of the existing sewer system.
- Tier 4 includes all known future developments and septic conversions for parcels located beyond 1,000 feet of the existing sewer system within the entire study area.

The four Tiers were developed for use in projecting when properties and their projected wastewater flows would be connected to the collection system. Figure 2-2 graphically presents the location of the currently permitted parcels and the four phases of future development and septic system conversions within the study area. Note that the existing gravity and siphon sewers located on Tavern Road in Alpine were not used to determine Tier 2 or Tier 3 parcels because they are owned by the Grossmont Unified School District. There are also a cluster of parcels located within the western boundary of the Lakeside Sphere of Influence, which are either currently being served or would more appropriately be served by Padre Dam Municipal Water District.

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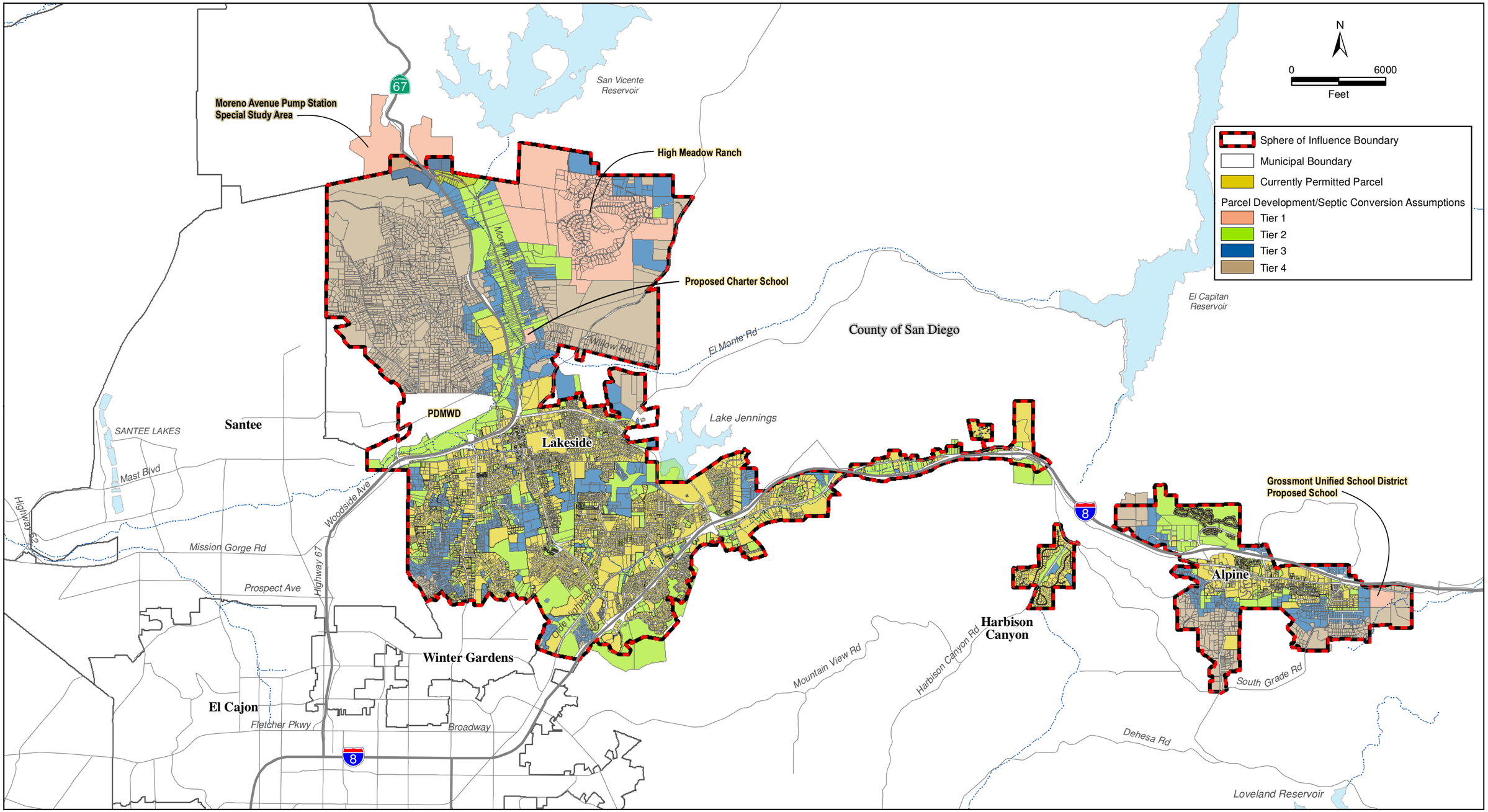

POTENTIAL FUTURE CUSTOMERS

FIGURE 2-2

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2.3 Land Uses

In August of 2011, the County adopted a new General Plan. The General Plan Update establishes future growth and development thresholds for the unincorporated areas of the County. When compared to the former General Plan adopted in 1979, this update concentrated population growth in the western areas of the County where infrastructure and services are more readily available. The evaluations of proposed land uses in this Master Plan was conducted prior to the adoption of the General Plan.

Prior to the adoption of the General Plan, the Board of Supervisors previously endorsed two land use maps (the "Referral Map" and "Draft Land Use Map") for consideration in the EIR for the General Plan Update. Because the Board specifically directed the creation of the Referral Map (May 2008) and it is more intensive than the Draft Land Use Map, it is anticipated that the Referral Map will become the Proposed Project upon the County Board's adoption of the General Plan Update. Therefore, as directed by County staff, the future land uses shown in the Referral Map were used for this analysis. Appendix C includes the Referral Maps for the communities of Alpine and Lakeside.

To document land use and population projections within the study areas, the San Diego Association of Governments (SANDAG) 2030 Regional Growth Forecast was utilized. The primary function of the SANDAG land use model is to produce mid-range and long-range demographic and economic forecasts for the San Diego region. Essential model inputs include assumptions about birth and death trends, international and domestic migration, and national economic and demographic forecasts, as well as forecasts for the California population and economy. These forecasts act as independent driving variables in the model, supplying the overall trend and direction that the local demographics and economy are likely to follow. The forecast utilized (Series 11 – 2030 San Diego Regional Growth Forecast Update) was completed in April 2008 and is the eleventh forecast completed since SANDAG began forecasting in the late 1970s. The Series 11 forecast was generated based on regional land use plans from the June 2006 version of the General Plan Update. For this study, only the existing land use and population projections were extracted from the Series 11 data. The County's Referral Map was used to project future land use.

The land uses within the study area were divided into eight categories; single-family residential, multi-family residential, commercial, industrial, institutional, parks and open space, undeveloped land, and agricultural. Multi-family land uses were defined as having a residential density equal to or greater than 8 dwelling units per acre (du/ac). SANDAG Series 11 existing land use coverage was used as the existing land use and the County's General Plan 2020 Update Referral Map was used for the planned land uses, shown on Figure 2-3 and Figure 2-4, respectively. The land use coverages were overlayed with parcels from the most recent SANGIS parcel database (September 2008). Parcels were attributed with a Master Plan land use category based on the location of the parcel centroid and the SANDAG or General Plan land use overlay. Table 2-1 and Table 2-2 summarize existing and planned dwelling unit counts for residential parcels and acreage for nonresidential parcels for each SSA's study area. Appendix D includes the land use files provided by SANDAG.

Within the Alpine SSA study area, the General Plan shows that all park/open space, agricultural, and vacant land is planned to be developed. Residential growth within the study area shows single family residential units will almost double, while multi-family residential growth approximately triples existing density. Commercial and industrial areas also show consistent

growth within the study area. There is also a slight decrease in institutional acreage, which is attributed to existing institutional areas being redeveloped or rezoned.

Within the Lakeside SSA study area, the General Plan shows all agricultural land and the majority of park/open space and vacant land is planned to be developed. Residential growth within the Lakeside SSA shows single family residential growth is approximately 1.5 times greater than existing density, while multi-family residential growth is approximately 2.5 times greater than existing density. Commercial and industrial areas show consistent growth within the Lakeside SSA. There is a slight decrease in institutional acreage, which is attributed to existing institutional areas being redeveloped or rezoned. Full development of the planned land uses represents the ultimate buildout of the Districts. Population projections are considered in the following section to better understand the timing of future development.

Table 2-1 Existing Land Use

Land Use Category	Existing Land Use						
	Permit	Tier 1	Tier 2	Tier 3	Tier 4	PDMWD	Study Area Total
Alpine SSA							
Single-Family Residential	361 ac	36 ac	54 ac	220 ac	398 ac	0 ac	1,070 ac
Single-Family Residential	1,090 DU	4 DU	59 DU	205 DU	230 DU	0 DU	1,588 DU
Multi-Family Residential	120 ac	0 ac	0 ac	0 ac	9 ac	0 ac	129 ac
Multi-Family Residential	1,288 DU	0 DU	0 DU	0 DU	66 DU	0 DU	1,354 DU
Commercial	58 ac	0 ac	2 ac	2 ac	5 ac	0 ac	67 ac
Industrial	0 ac	0 ac	29 ac	3 ac	0 ac	0 ac	32 ac
Institutional	52 ac	0 ac	7 ac	5 ac	24 ac	0 ac	89 ac
Parks/Recreation/Open Space	0 ac	0 ac	196 ac	14 ac	0 ac	0 ac	210 ac
Agricultural	0 ac	0 ac	16 ac	0 ac	6 ac	0 ac	22 ac
Undeveloped Land/Vacant	13 ac	0 ac	158 ac	131 ac	180 ac	0 ac	482 ac
Total	**604 ac**	**36 ac**	**463 ac**	**376 ac**	**623 ac**	**0 ac**	**2,102 ac**
Lakeside SSA							
Single-Family Residential	2,171 ac	13 ac	698 ac	795 ac	2,140 ac	85 ac	5,902 ac
Single-Family Residential	6,620 DU	3 DU	548 DU	800 DU	1,482 DU	330 DU	9,783 DU
Multi-Family Residential	628 ac	0 ac	22 ac	8 ac	0 ac	16 ac	674 ac
Multi-Family Residential	4,789 DU	0 DU	138 DU	0 DU	0 DU	0 DU	4,927 DU
Commercial	151 ac	0 ac	43 ac	0 ac	0 ac	6 ac	200 ac
Industrial	73 ac	316 ac	116 ac	80 ac	30 ac	93 ac	707 ac
Institutional	261 ac	0 ac	26 ac	31 ac	21 ac	10 ac	349 ac
Parks/Recreation/Open Space	112 ac	402 ac	609 ac	222 ac	403 ac	68 ac	1,816 ac
Agricultural	0 ac	14 ac	163 ac	34 ac	87 ac	0 ac	298 ac
Undeveloped Land/Vacant	61 ac	810 ac	713 ac	461 ac	878 ac	39 ac	2,961 ac
Total	**3,455 ac**	**1,556 ac**	**2,389 ac**	**1,632 ac**	**3,559 ac**	**317 ac**	**12,907 ac**

ac = Acre; DU = dwelling unit; PDMWD = Padre Dam Municipal Water District

Permit = Existing Permitted Parcels

Tier 1 = Known Future Development Parcels

Tier 2 = Parcels within 200 feet of the existing collection system

Tier 3 = Parcels within 1,000 feet of the existing collection system

Tier 4 = Parcels within the study area that are beyond 1,000 feet from the existing collection system

Table 2-2 Planned Land Use

Land Use Category	Planned Land Use						
	Permit	Tier 1	Tier 2	Tier 3	Tier 4	PDMWD	Study Area Total
Alpine SSA							
Single-Family Residential	287 ac	36 ac	309 ac	297 ac	495 ac	0 ac	1,424 ac
Single-Family Residential	813 DU	105 DU	642 DU	702 DU	1,134 DU	0 DU	3,396 DU
Multi-Family Residential	174 ac	0 ac	80 ac	8 ac	0 ac	0 ac	262 ac
Multi-Family Residential	2,577 DU	0 DU	1,180 DU	126 DU	0 DU	0 DU	3,883 DU
Commercial	92 ac	0 ac	37 ac	0 ac	0 ac	0 ac	128 ac
Industrial	5 ac	0 ac	33 ac	71 ac	114 ac	0 ac	223 ac
Institutional	47 ac	0 ac	4 ac	0 ac	14 ac	0 ac	65 ac
Parks/Recreation/Open Space	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac
Agricultural	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac
Undeveloped Land/Vacant	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac
Total	**604 ac**	**36 ac**	**463 ac**	**376 ac**	**623 ac**	**0 ac**	**2,102 ac**
Lakeside SSA							
Single-Family Residential	2,219 ac	1,226 ac	1,646 ac	1,141 ac	2,584 ac	230 ac	9,046 ac
Single-Family Residential	8,077 DU	910 DU	2,459 DU	1,776 DU	2,458 DU	625 DU	16,305 DU
Multi-Family Residential	640 ac	0 ac	66 ac	4 ac	0 ac	16 ac	726 ac
Multi-Family Residential	10,871 DU	0 DU	1,032 DU	64 DU	0 DU	174 DU	12,141 DU
Commercial	167 ac	0 ac	74 ac	2 ac	0 ac	7 ac	250 ac
Industrial	96 ac	316 ac	206 ac	127 ac	30 ac	2 ac	777 ac
Institutional	224 ac	14 ac	26 ac	20 ac	21 ac	0 ac	306 ac
Parks/Recreation/Open Space	108 ac	0 ac	170 ac	149 ac	327 ac	62 ac	817 ac
Agricultural	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac	0 ac
Undeveloped Land/Vacant	0 ac	0 ac	200 ac	189 ac	596 ac	0 ac	985 ac
Total	**3,455 ac**	**1,556 ac**	**2,389 ac**	**1,632 ac**	**3,559 ac**	**317 ac**	**12,907 ac**

ac = Acre; DU = dwelling unit; PDMWD = Padre Dam Municipal Water District

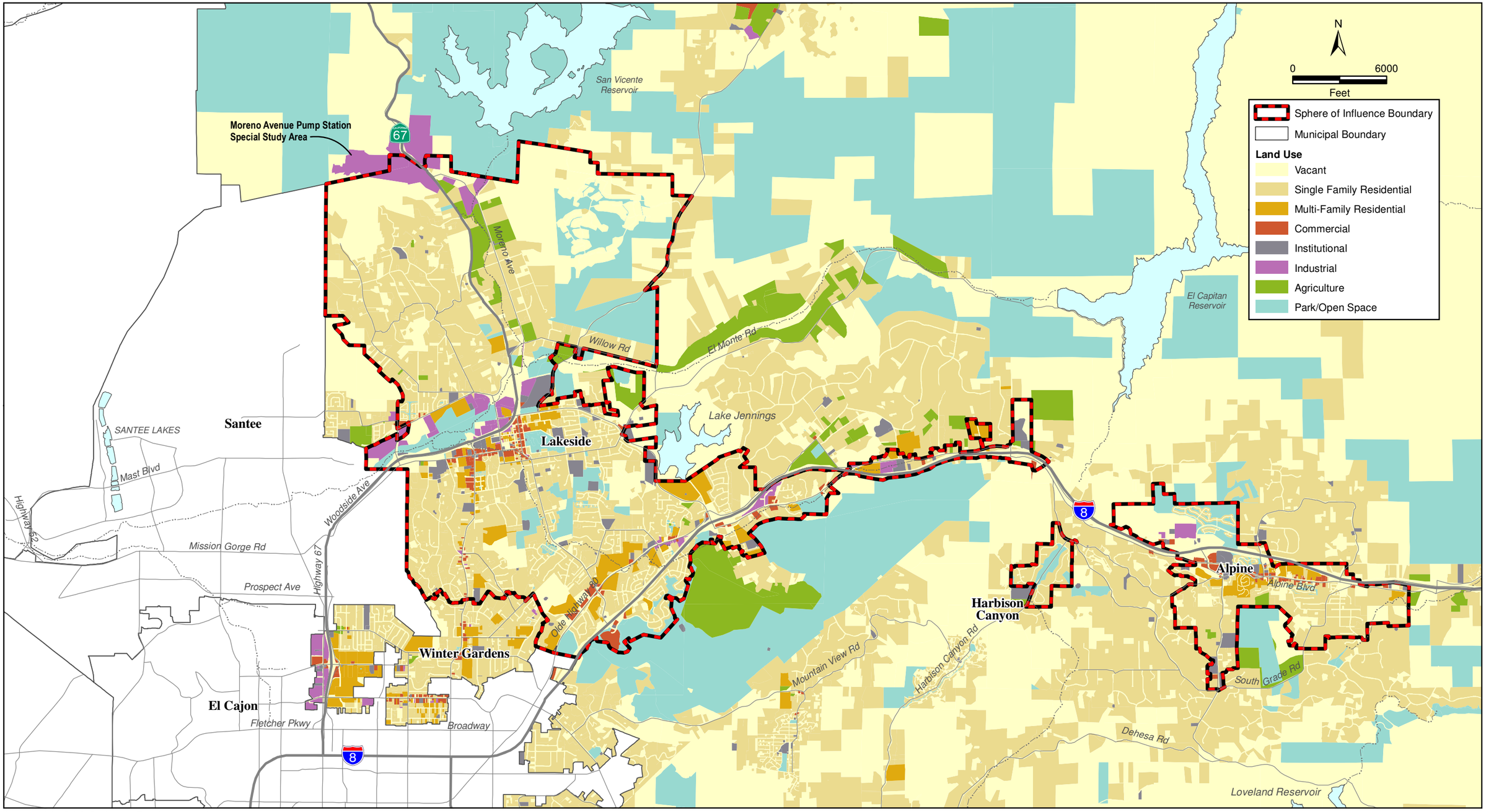
Permit = Existing Permitted Parcels

Tier 1 = Known Future Development Parcels

Tier 2 = Parcels within 200 feet of the existing collection system

Tier 3 = Parcels within 1,000 feet of the existing collection system

Tier 4 = Parcels within the study area that are beyond 1,000 feet from the existing collection system



Source: SANDAG Series 11 Existing Land Use

EXISTING LAND USE

FIGURE 2-3

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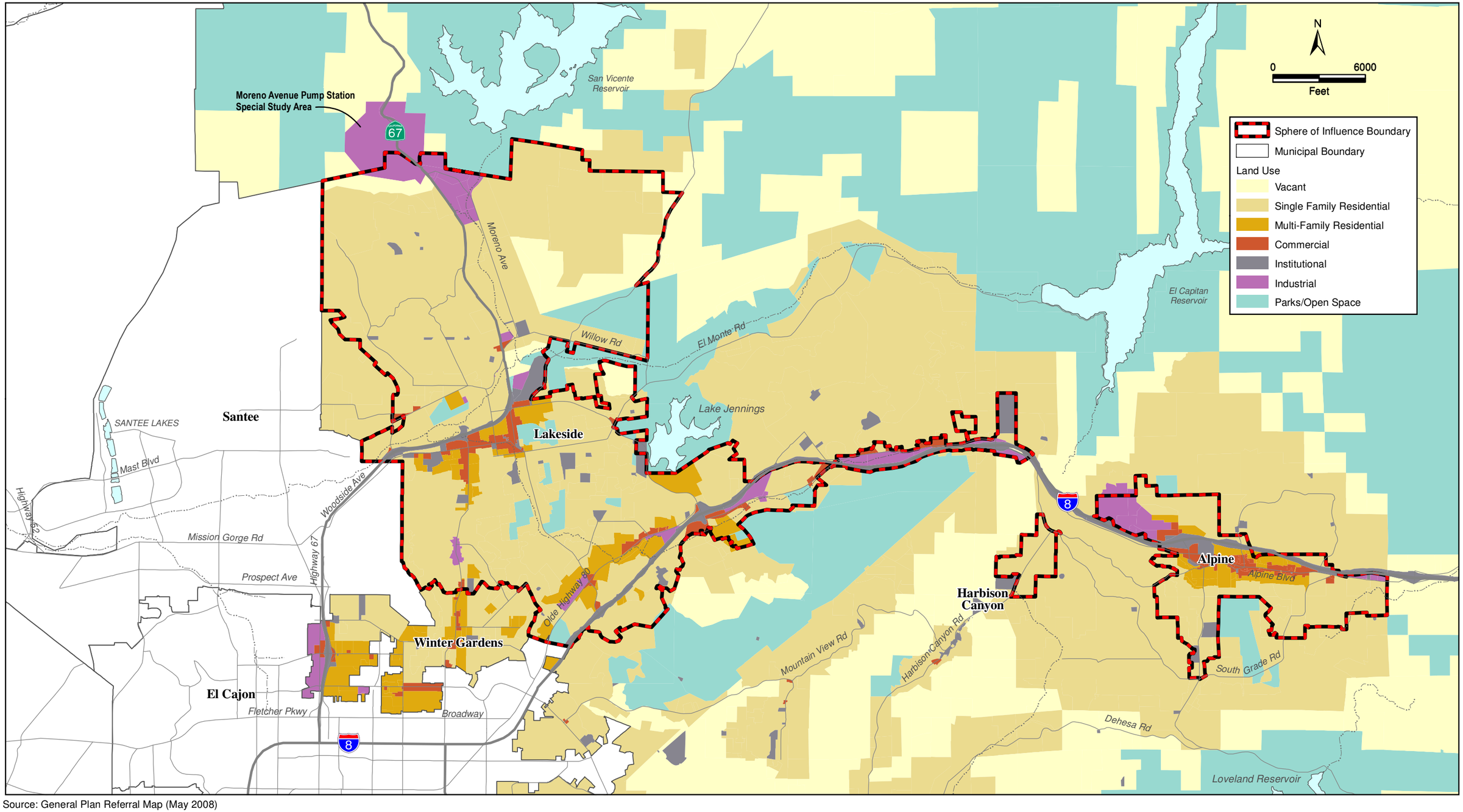

Source: General Plan Referral Map (May 2008)

PLANNED LAND USE

FIGURE 2-4

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2.4 Existing and Forecasted Populations

Residential and employment population estimates for the study area were provided by SANDAG for years 2008, 2015, 2020, 2025, and 2030 at the parcel level and are based on the Series 11 data. SANDAG regional growth model develops their existing estimates from data provided by the US Census Bureau, San Diego County Assessor, local jurisdictions, and the California Department of Finance. Residential populations represent persons residing in a given area. Employment populations represent persons employed and performing work functions in a given area. Table 2-3 summarizes the residential and employment population projections through 2030 for the Alpine and Lakeside SSAs. Although not adjacent to one another, both SSAs use common wastewater conveyance facilities, and their combined population trends are illustrated in Figure 2-5. Appendix E includes the population files provided by SANDAG.

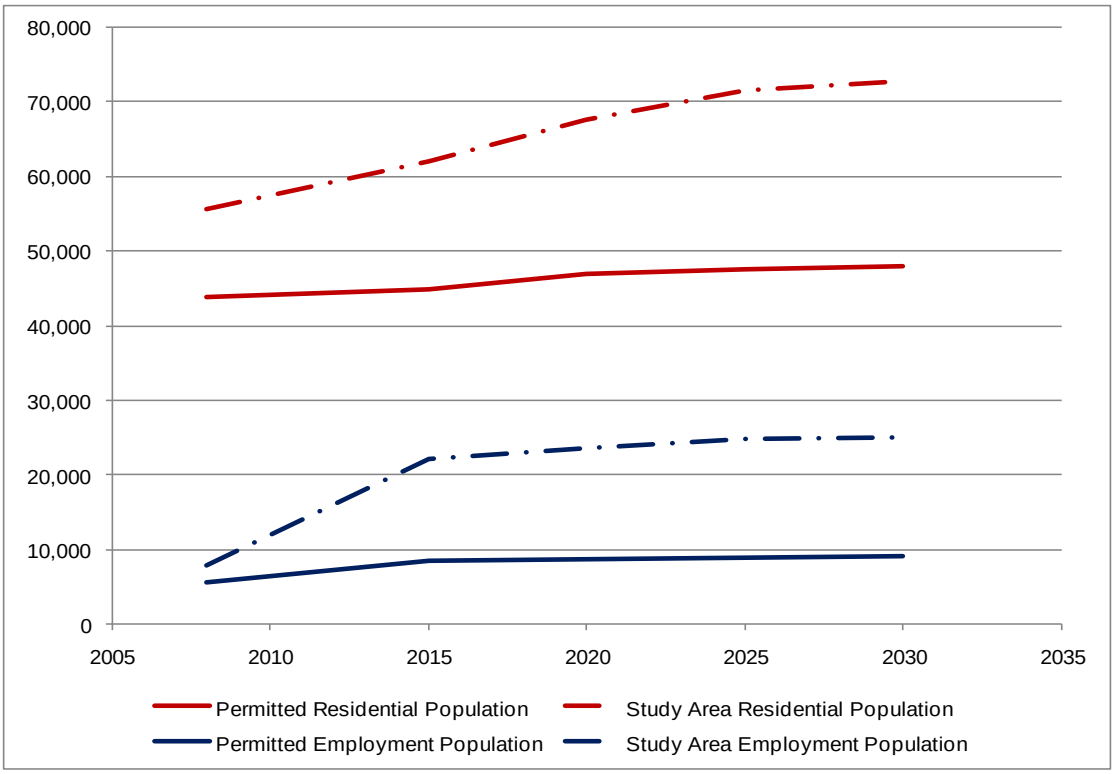
Within the Alpine Sphere of Influence, the population projections show a doubling of residential and employment populations between now and 2030, with the majority of the increases located outside the existing permitted parcels and occurring beyond 2015. Within the current permitted parcels the population projections are generally flat for residential populations and show an increase of 25 percent in employment populations through 2030. Within the Lakeside Sphere of Influence, the population projections show an increase of 30 percent for residential and employment populations between now and 2030. Within the current permitted parcels, the population projections have a mild 15 percent increase in residential populations through 2030.

Table 2-3 Alpine and Lakeside SSAs Existing and Forecasted Populations

Land Use Category	Residential Populations					Employment Populations				
	2008	**2015**	**2020**	**2025**	**2030**	**2008**	**2015**	**2020**	**2025**	**2030**
Alpine SSA										
Permit	5,387	5,557	5,900	5,754	6,226	1,430	1,427	1,584	1,769	1,791
Tier 1	11	0	0	0	0	0	2,000	2,000	2,000	2,000
Tier 2	235	434	1,729	2,576	3,001	116	78	173	219	227
Tier 3	555	944	1,488	1,855	1,939	81	98	225	434	434
Tier 4	805	1,248	1,749	2,910	2,919	139	190	446	620	638
PDMWD	0	0	0	0	0	0	0	0	0	0
Subtotal	**6,993**	**8,183**	**10,866**	**13,096**	**14,085**	**1,766**	**3,793**	**4,428**	**5,042**	**5,090**
Lakeside SSA										
Permit	38,366	39,350	41,009	41,714	41,833	4,160	7,022	7,210	7,227	7,236
Tier 1	14	985	985	985	985	0	6,553	6,553	6,553	6,553
Tier 2	2,061	4,395	5,299	5,321	5,331	1,082	1,998	2,654	2,905	2,954
Tier 3	2,439	2,583	2,764	2,918	2,925	102	1,025	1,039	1,213	1,335
Tier 4	4,234	4,699	4,718	4,802	4,826	345	958	958	991	1,006
PDMWD	1,415	1,753	1,967	2,720	2,731	512	687	818	886	886
Subtotal	**48,528**	**53,765**	**56,742**	**58,460**	**58,632**	**6,202**	**18,243**	**19,232**	**19,775**	**19,970**
TOTAL (Permitted)	**43,753**	**44,907**	**46,910**	**47,469**	**48,059**	**5,590**	**8,449**	**8,794**	**8,996**	**9,027**
TOTAL	**55,521**	**61,948**	**67,608**	**71,556**	**72,717**	**7,968**	**22,036**	**23,660**	**24,817**	**25,060**

PDMWD = Padre Dam Municipal Water District

Figure 2-5 Combined Alpine and Lakeside SSAs Forecasted Population Trends



In general, most of the population growth is occurring beyond 2015 and in areas that are not currently being provided sewer collection services. It is important to note that this type of growth is not required by County Code to connect to the existing collection system unless it is new building construction or reconstruction where the building is located within 200 feet of an existing public sewer. For that reason, phased population projections were developed for the purpose of developing reasonable growth projections for assessment of the existing collection system.

The recommended population projection was developed for assessment of the existing and planned infrastructure based on the four development Tiers that can potential impact the collection system, as described earlier in this Chapter. The four development Tiers include:

- Tier 1 includes all known future development plans requiring sewer service.
- Tier 2 includes all known future developments and septic conversions for parcels located within 200 feet of the existing sewer system.
- Tier 3 includes all known future developments and septic conversions for parcels located within 1,000 feet of the existing sewer system.
- Tier 4 includes all known future developments and septic conversions for parcels located beyond 1,000 feet of the existing sewer system within the entire study area.

The recommended population projections made assumptions on whether to include a specific Tier's population forecast within a specific horizon year. For 2008, or existing, only the populations for permitted parcels were included. For 2015, the populations for all known development (Tier 1) were included with the populations from the permitted parcels as well as population growth from parcels within 200 feet of the existing collection system (Tier 2). In 2020 and 2025, the populations from all parcels within 200 feet of the existing collection system was included (Tier 2). In 2030 the populations from all parcels within 1,000 feet of the existing collection system was included (Tier 3). Populations from the remaining parcels, beyond 1,000 feet from the existing collection system (Tier 4) were included in the buildout scenario, which is beyond the horizon year of 2030. The following bullets provide a summary of the recommended population projection assumptions:

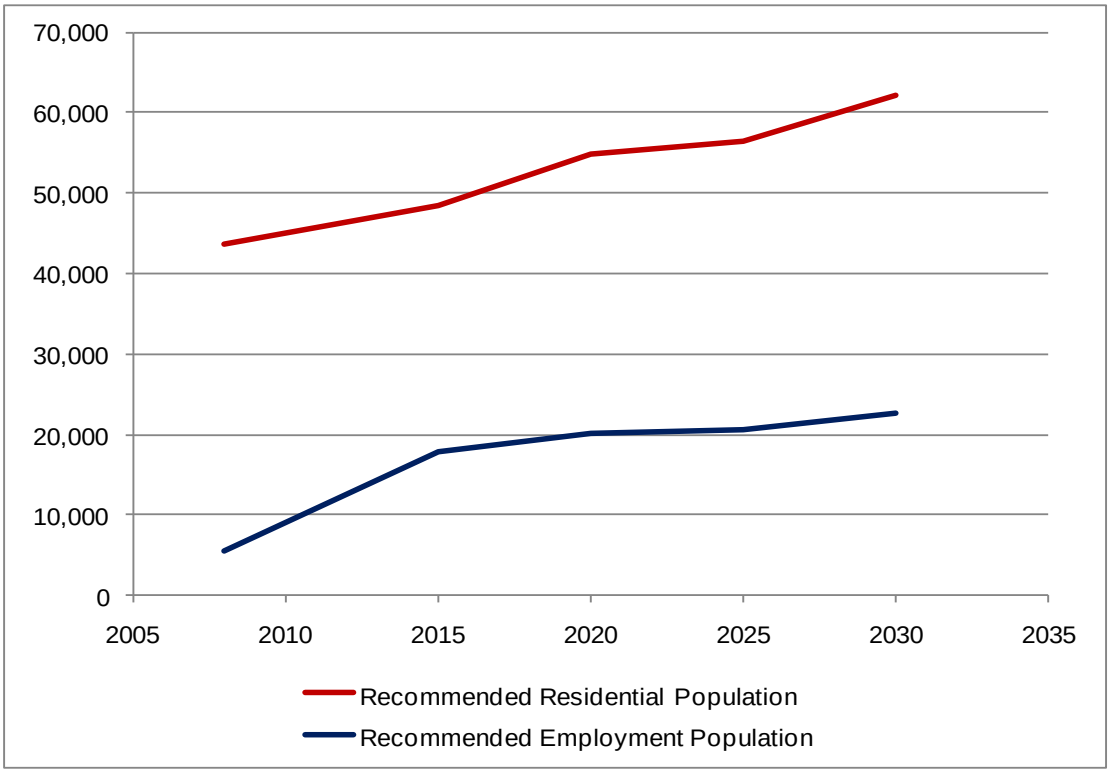
- 2008 = existing permitted population
- 2015 = 2015 permitted population + Tier 1 + (Tier 2 population – 2008 Tier 2 population)
- 2020 = 2020 permitted population + Tier 1 + Tier 2 population
- 2025 = 2025 permitted population + Tier 1 + Tier 2 population
- 2030 = 2030 permitted population + Tier 1 + Tier 2 + Tier 3 population

Table 2-4 summarizes the recommended phased population projections for Alpine and Lakeside SSAs and the population trends are illustrated together in Figure 2-6.

Table 2-4 Alpine and Lakeside SSAs Recommended Phased Populations

	Residential			Employment		
Phase	Alpine	Lakeside	Total	Alpine	Lakeside	Total
2008	5,387	38,366	43,753	1,430	4,160	5,590
2015	5,756	42,669	48,425	3,389	14,491	17,880
2020	7,629	47,293	54,922	3,757	16,417	20,174
2025	8,330	48,020	56,350	3,988	16,685	20,673
2030	11,166	51,074	62,241	4,452	18,078	22,530

Figure 2-6 Combined Alpine and Lakeside SSAs Recommended Phased Population



The use of the recommended phased populations represents a more reasonable growth pattern for the Alpine and Lakeside SSAs, for the interim 5 year projection and the 20 year horizon projection when compared to the overly conservative assumption that the entire study area would be connected to the existing collection system by 2030.

For the 5 year horizon (2015) the recommended phased populations estimate an increase of approximately 10 and 40 percent in residential and employment population. In contrast to 27 and 42 percent growth in residential and employment population, assuming that the entire study area were connected to the existing collection system within that time frame.

For the 20 year horizon (2030) the recommended phased populations estimate an increase of approximately 42 and 300 percent in residential and employment population. In contrast to 66 and 450 percent growth in residential and employment population, assuming that the entire study area were connected to the existing collection system within that time frame.

2.5 Existing Wastewater Collection System

The Alpine and Lakeside SSAs convey all wastewater flows into Metro under a comprehensive Regional Wastewater Disposal Agreement enacted between the City of San Diego and the Metro-participating agencies. Wastewater from the Alpine and Lakeside SSAs flows west and discharges into the County-owned and maintained Lakeside Interceptor. County flows conveyed through the Lakeside Interceptor are joined with flows from Padre Dam Municipal Water District at several locations and drain into the City of San Diego's municipal wastewater collection system at the Mission Gorge Pump Station diversion structure. The diversion structure diverts flows to either the Mission Gorge Pump Station or to the Mission Gorge Trunk Sewer. The existing wastewater collection system and lift stations for each District's study area are shown on Figure 2-7. This figure also illustrates the location of interconnections that allow tributary flows from Padre Dam Municipal Water District.

Wastewater from the Alpine SSA generally flows from east to west and the collection system drains directly into the Lakeside SSA collection system. There are two County-owned lift stations and one private lift station located within Alpine SSA. Wastewater from along Harbison Canyon Road drains to the Harbison Canyon Lift Station and is pumped to the Harbison Force Main and Harbison Canyon Trunk Sewer, which connects to the Galloway Lift Station. The Galloway Lift Station pumps wastewater through the Galloway Force Main into the Flynn Springs Interceptor, which conveys Alpine SSA wastewater flow into the Lakeside SSA collection system. The South Fork Creek Lift Station is a private lift station that pumps to the Tavern Trunk Sewer, which connects to the Alpine Trunk Sewer.

The Lakeside SSAs collection system generally drains from east to west to the Metro connection. There are two private lift stations and one County-owned lift station located within the Lakeside SSA. The County-owned Moreno Lift Station was built by the County to service the High Meadows Ranch development and properties within the Moreno Basin, however the proposed development stalled and the adjacent properties haven't connected rendering no need for operation of the station in recent years. The Lakeside and Cottonwood Interceptors convey the combined wastewater flow from the Alpine and Lakeside SSAs to the Metro connection. Lift station and force main information for the SSAs are summarized in Tables 2-5 and 2-6, respectively.

Table 2-5 Alpine and Lakeside SSAs Lift Stations

Lift Station	Public / Private	Date Installed	No. Pumps	Design Discharge (gpm)	Design TDH (feet)	Hp	RPM	Emergency Storage (gallons)	Backup Power
Alpine SSA									
Galloway Lift Station	Public	1971	2	1220	170	125	1800	66,000	Yes
Harbison Lift Station	Public	1989	2	150	97	15	1760	2,500	Yes
South Fork Lift Station	Private	1978	2	77	49	5	unknown	13,000	No
Lakeside SSA									
Woodcreek Lift Station	Public	1988	2	143	60	7.5	1760	17,000	No
Oak Glen Lift Station	Private	1995	unknown	40	35	unknown	unknown	unknown	No
Moreno Lift Station	Public	1996	--	--	--	--	--	40,000	No

Note: The Galloway Lift Station was upgraded and expanded in 1991.

Table 2-6 Alpine and Lakeside SSAs Force Mains and Siphons

Force Main	Diameter (inches)	Material	Length (feet)
Alpine SSA			
Galloway Force main	12	AC /CI	6,000
Harbison Force main	4	PVC	1,600
South Fork Force main	3	PVC	140
Tavern Road Siphon	4/6	PVC	2,100
Lakeside SSA			
Woodcreek Force main	4	PVC	1,250
Oak Glen Force main	2.5	PVC	300
Moreno Force main	6	PVC	1,600

N

0 6000

Feet

- Sphere of Influence Boundary
- Municipal Boundary
- Alpine SSA
- Lakeside SSA
- Permitted Parcel Outside of SOI
- Gravity Main
- Force Main
- Tributary Sewer - PDMWD
- Lift Station
- PDMWD Connection

San Vicente Reservoir

El Capitan Reservoir

Lake Jennings

Loveland Reservoir

Santee

SANTEE LAKES

Lakeside

Alpine

Harbison Canyon

Winter Gardens

El Cajon

Cottonwood Avenue Diversion Structure

PDMWD IPS

To San Diego

Carlton Hills Diversion Structure

WalMart Parking Lot Diversion Structure

Moreno Ave

Willow Rd

El Monte Rd

Mast Blvd

Woodside Ave

Mission Gorge Rd

Prospect Ave

Highway 67

Highway 52

Olde Highway 80

Mountain View Rd

Harbison Canyon Rd

South Grade Rd

Alpine Blvd

Fletcher Pkwy

Broadway

Dehesa Rd

67

8

LS

PS

EXISTING SEWER SYSTEM

FIGURE 2-7

12/5/2011 KM SD Z:\Projects\IS\SanDiegoCounty\100001472_AsNeeded\14_AlpineLakeside_MasterPlan\mxd\FF\SewerSystemExist_Fig 2-7.mxd

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The South Fork and Oak Glen Lift Stations are privately owned and operated. The County has no responsibility for their operation or maintenance. These private facilities have been included for informational purposes only and no capacity analysis or condition assessment was performed. Summarized below is the contact information for the owners and operators of these private facilities.

South Fork Lift Station

Owner: Alpine Creek Homeowners

Managed by: Associated Professional Services, 7851 Mission Center Court, Suite 200, San Diego, CA 92108
Tel – 619.299.6899

Operated by: Beresfore Equipment Company, 7730 Clairemont Mesa Boulevard, San Diego, CA 92111
Tel – 858.560.9971

Oak Glen Lift Station

Owner: Oak Glen Mobile Home Park
APN: 396-111-01, 03
Margaret Skinner, Executrix of Estate
Tel – 208.365.5795

Emergency: Tel – 619.605.7710

Tables 2-7, 2-8, and 2-9, summarize the gravity collection system facilities within the Alpine and Lakeside SSAs by size, age and material, respectively. The system inventory is based on information contained within the County's Graphical Information System (GIS) database. The GIS database was created for the County Wastewater Section by digitizing the as-built record drawings. The Alpine SSA wastewater collection system consists of 445 manholes, and 106,426 feet (20.2 miles) of gravity sewer. The Lakeside SSA wastewater collection system consists of 1,898 manholes, and 497,061 feet (94.1 miles) of gravity sewer. The information from the tables is also shown in Figures 2-8, 2-9, and 2-10. Figure 2-8 highlights the existing trunk and interceptor sewers, which are also shown in detailed exhibits in Appendix M.

Table 2-7 Gravity Sewer Pipelines by Diameter

Diameter (inches)	Alpine SSA			Lakeside SSA		
	Length		Percent of System (%)	Length		Percent of System (%)
	(feet)	(miles)		(feet)	(miles)	
4	2,115	0.4	2.0	0	0.0	0.0
6	7,754	1.5	7.3	13,266	2.5	2.7
8	84,953	16.1	79.8	357,133	67.6	71.8
10	8,276	1.6	7.8	33,972	6.4	6.8
12	2,409	0.5	2.3	21,416	4.1	4.3
15	0	0.0	0.0	24,333	4.6	4.9
18	0	0.0	0.0	6,438	1.2	1.3
21	0	0.0	0.0	10,012	1.9	2.0
24	0	0.0	0.0	8,714	1.7	1.8
27	0	0.0	0.0	7,173	1.4	1.4
30	0	0.0	0.0	8,606	1.6	1.7
33	0	0.0	0.0	210	0.0	0.0
36	0	0.0	0.0	3,607	0.7	0.7
42	0	0.0	0.0	2,180	0.4	0.4
Unknown	918	0.2	0.9	0	0.0	0.0
TOTAL	**106,426**	**20.2**	**100.0**	**497,061**	**94.1**	**100.0**

Table 2-8 Gravity Sewer Pipelines by Age

Age (Decade)	Alpine SSA			Lakeside SSA		
	Length		Percent of System (%)	Length		Percent of System (%)
	(feet)	(miles)		(feet)	(miles)	
1950 - 1959	14,101	2.7	13.2	328	0.1	0.1
1960 - 1969	3,346	0.6	3.1	191,694	36.3	38.6
1970 -1979	12,607	2.4	11.8	84,274	16.0	17.0
1980 - 1989	4,136	0.8	3.9	51,270	9.7	10.3
1990 - 1999	57,505	10.9	54.0	94,789	18.0	19.1
2000 - 2009	10,087	1.9	9.5	64,695	12.3	13.0
Unknown	4,645	0.9	4.4	10,011	1.9	2.0
TOTAL	**106,426**	**20.2**	**100.0**	**497,061**	**94.1**	**100.0**

Table 2-9 Gravity Sewer Pipelines by Material

Material	Alpine SSA			Lakeside SSA		
	Length		Percent of System (%)	Length		Percent of System (%)
	(feet)	(miles)		(feet)	(miles)	
Acrylonitrile Butadiene Styrene Pipe (ABS)	0	0.0	0.0	1,342	0.3	0.3
Asbestos Cement Pipe (AC)	1,035	0.2	1.0	930	0.2	0.2
Cast Iron Pipe (CI)	240	0.0	0.2	225	0.0	0.0
Ductile Iron Pipe (DI)	0	0.0	0.0	1,341	0.3	0.3
Poly-Vinyl Chloride Pipe (PVC)	68,594	13.0	64.5	153,767	29.1	30.9
Reinforced Plastic Mortar Pipe (RPMP)	0	0.0	0.0	13,386	2.5	2.7
Vitrified Clay Pipe (VCP)	28,930	5.5	27.2	289,938	54.9	58.3
Unknown	7,627	1.4	7.2	36,131	6.8	7.3
TOTAL	**106,426**	**20.2**	**100.0**	**497,061**	**94.1**	**100.0**

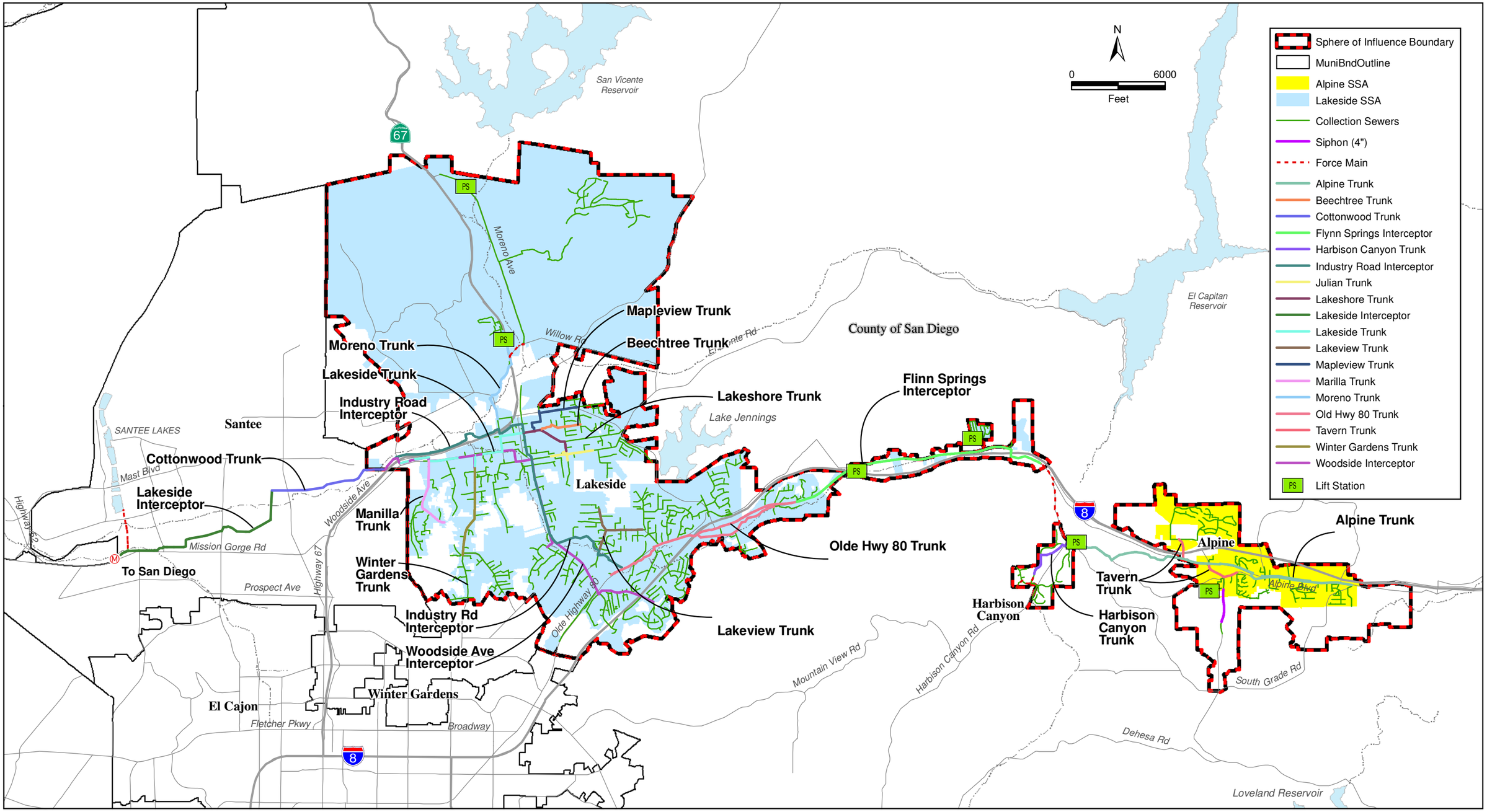
In general, the Alpine SSA includes predominantly 8-inch to 12-inch diameter pipelines constructed of either vitrified clay pipe (VCP) generally before the 1990s or poly vinyl chloride (PVC) pipe in the 1990s and beyond. The Lakeside SSA is very similar to Alpine, only slightly older, and as such contains much more VCP pipeline. The larger sewers in the Lakeside SSA are predominantly from the 1950s and 1970s and were constructed of VCP, unless relief or replacement sewers were constructed after 1990 of PVC. The Lakeside Interceptor ranges from 27-inch to 42-inch in diameter and was constructed of Reinforced Plastic Mortar Pipe (RPMP). The County has observed longitudinal cracking of the RPMP or "Techite" pipe and is currently replacing sections of the Lakeside Interceptor.

2.6 Regional Sewerage Facilities

All wastewater collected from the Alpine and Lakeside SSAs flows into Metro under a comprehensive Regional Wastewater Disposal Agreement enacted between the City of San Diego and the Metro-participating agencies. Alpine and Lakeside SSAs combined flows enter the City's Municipal Collection System and ultimately flow to Metro by way of the County-owned Lakeside Interceptor. The entire San Diego County Sanitation District is considered one entity by Metro for purposes of capacity rating and its current Metro capacity is 17.503 mgd. Within the District, the SSAs are proportioned a share of Metro capacity, based on historical agreements, for the purposes of projecting future regional capacity needs. The Alpine and Lakeside SSAs have been proportioned with a combined total of 4.841 mgd of Metro Capacity.

Regional sewerage facilities are shown in Figure 2-11. Metro facilities include regional sewer interceptors and trunk sewers, pump stations, and treatment and disposal facilities. Wastewater in the Lakeside Interceptor is joined with flows from the Padre Dam Municipal Water District and enters the City's municipal collection system at the Mission Gorge Pump Station diversion structure. Only a portion of Padre Dam Municipal Water District flows are conveyed in the Lakeside Interceptor. The majority of the Padre Dam Municipal Water District flows are conveyed within their collection system to their Reclamation Facility for treatment. Sludge from the Padre Dam Reclamation Facility is returned to the Lakeside Interceptor.

The Mission Gorge Pump Station diversion structure diverts flows into either the Mission Gorge Pump Station or the Mission Gorge Trunk Sewer, which both convey flows to the North Mission Valley Trunk Sewer. The Mission Gorge Pump Station pumps flows through the East Mission Gorge Interceptor to the North Mission Valley Trunk Sewer. Flows are then conveyed through the North Mission Valley Trunk Sewer to the North Metro Interceptor, which conveys flows to Metro Pump Station No. 1. Pump Station No. 1 pumps flows to the City of San Diego's Point Loma Wastewater Treatment Plant for treatment and disposal.



EXISTING GRAVITY MAINS PIPELINE DIAMETERS

FIGURE 2-8

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N

0 6000

Feet

Alpine SSA
Lakeside SSA
Sphere of Influence Boundary

Nominal Age

Unknown
1950-1959
1960-1969
1970-1979
1980-1989
1990-1999
2000-2009

San Vicente Reservoir
El Capitan Reservoir
Lake Jennings
County of San Diego
Santee
SANTEE LAKES
Lakeside
Alpine
Harbison Canyon
El Cajon
Winter Gardens
To Metro
Moreno Ave
Willow Rd
El Monte Rd
Mast Blvd
Mission Gorge Rd
Prospect Ave
Woodside Ave
Highway 67
Highway 52
Olde Highway 80
Fletcher Pkwy
Broadway
Mountain View Rd
Harbison Canyon Rd
Alpine Blvd
South Grade Rd
Dehesa Rd
Loveland Reservoir
67
8
8
M

EXISTING GRAVITY MAINS
PIPELINE AGE

FIGURE 2-9

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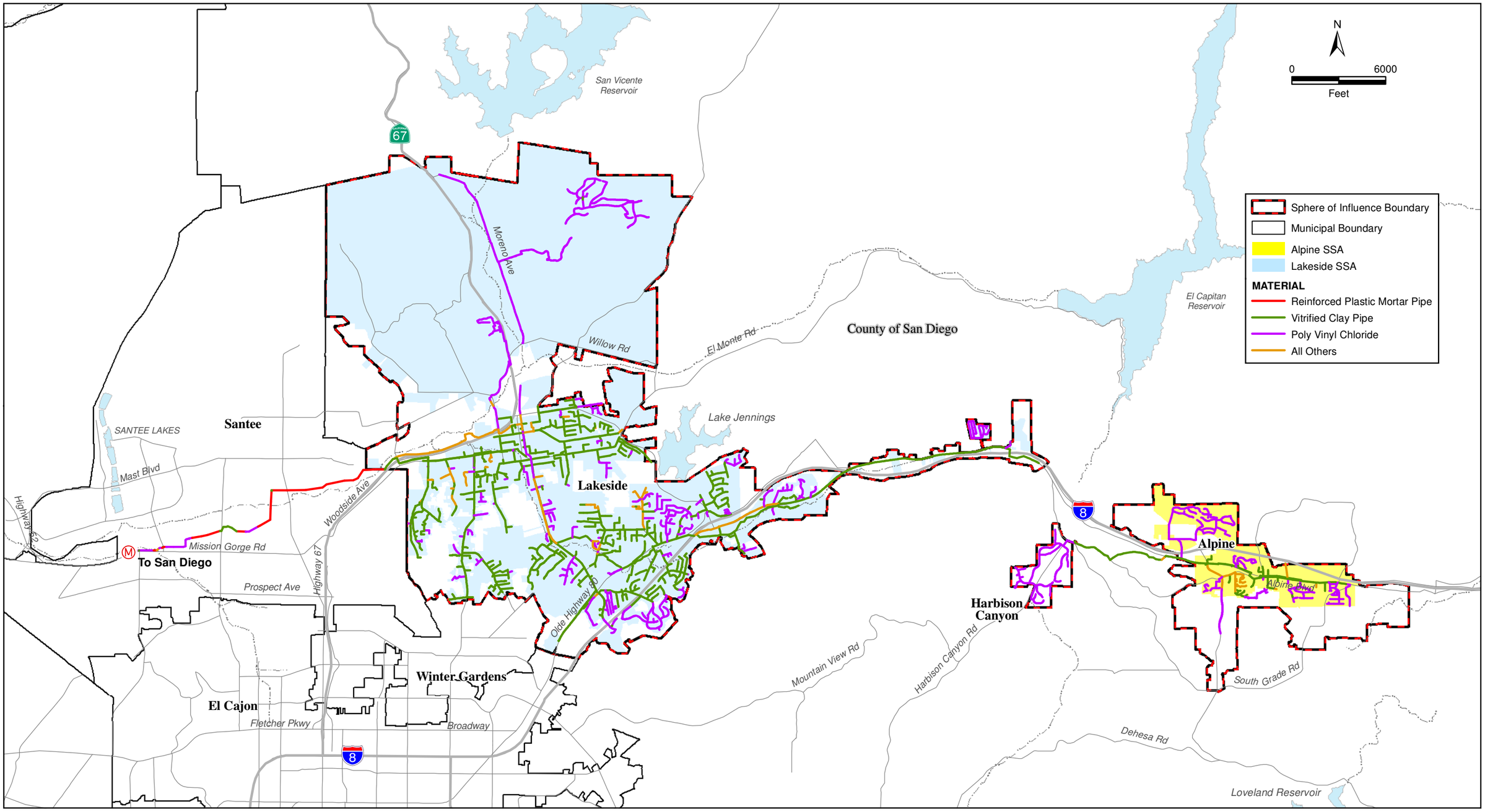

EXISTING GRAVITY MAINS
PIPELINE MATERIAL

FIGURE 2-10

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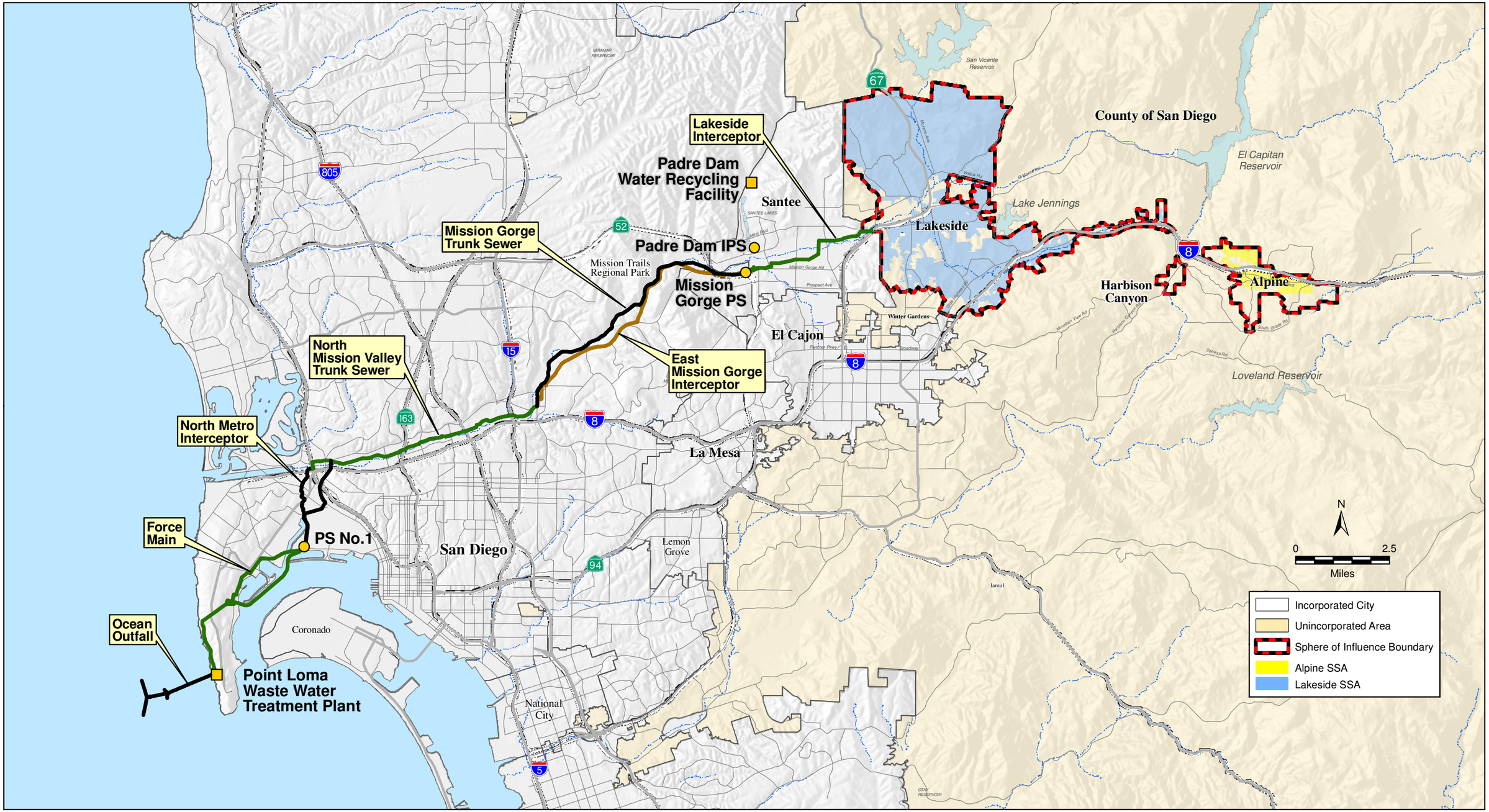

REGIONAL SEWERAGE FACILITIES

FIGURE 2-11

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CHAPTER 3
WASTEWATER GENERATION ANALYSIS

This chapter provides descriptions of the wastewater generation including:

- Existing flow meter data summary;
- Methodology for developing unit generation rates;
- Recommended unit generation rates;
- Estimated future wastewater flows; and
- Metro capacity needs.

3.1 Flow Meters

As described in Chapter 2, wastewater generated within the Alpine and Lakeside SSAs is collected by County-owned facilities that ultimately connect to Metro for treatment and disposal. The combined flows enter Metro through the Lakeside Interceptor and, as such, the District has proportioned approximately 4.841 mgd of their 17.503 mgd of Metro capacity rights to the Alpine and Lakeside SSAs.

The County has installed local sewer flow meters in the SSAs. The Alpine SSA has flow meters at two locations, the Lakeside SSA has flow meters at five locations, and there are six interconnections from Padre Dam Municipal Water District along the Cottonwood Trunk Sewer and the Lakeside Interceptor. Flow meter data used for calibration is included in Appendix F. Figure 3-1 presents the locations of the flow meters and interconnections. The City of San Diego bills the County for wastewater flows from the Alpine and Lakeside SSAs based on readings from a separate Metro meter LS-2, downstream of the Lakeside SSA meters. The City of San Diego bills Padre Dam Municipal Water District based upon the difference in flow between meter PD-1 located along the Lakeside Interceptor near the City's municipal connection and LS-2. Based on meter records and information provided by the County, existing flows from each of the meters are presented in Table 3-1.

3.1.1 Metered Sewer Basins

The existing sewer collection system is metered in several strategic locations to provide accurate flow records to assist in evaluating potential problem areas. This data will assist in hydraulic model calibration, as well as estimating peak dry weather sewer flows.

Table 3-1 Existing Wastewater Flows by Meter

Meter Name	Location	Average Dry Weather Flow (mgd)	Average Wet Weather Flow (mgd)
Alpine SSA			
MA-1	Alpine Blvd, 500 yds west of Tavern Rd	0.26	0.32
MA-2	Arnold Way, east of Harbison Canyon Rd	0.36	0.36
Lakeside SSA			
ML-1	14011 Ridge Hill Rd	0.53	0.58
ML-2	9184 Los Coches Rd	1.17	1.26
ML-3	Riverford Rd & Woodside Ave	0.66	0.69
ML-4	Riverford Rd & Woodside Ave	0.87	1.06
ML-5	9893 Riverford Rd	1.42	1.58
LS-2	Woodside Ave, west of Riverford Rd	3.06	3.29

Notes:
1. Average dry weather flow based on August 2008 data.
2. August 2008 data not available for meter MA-2, September 2008 data was used.
3. Average wet weather flow based on February 2009 data.

Meter MA-1 Sewer Basin

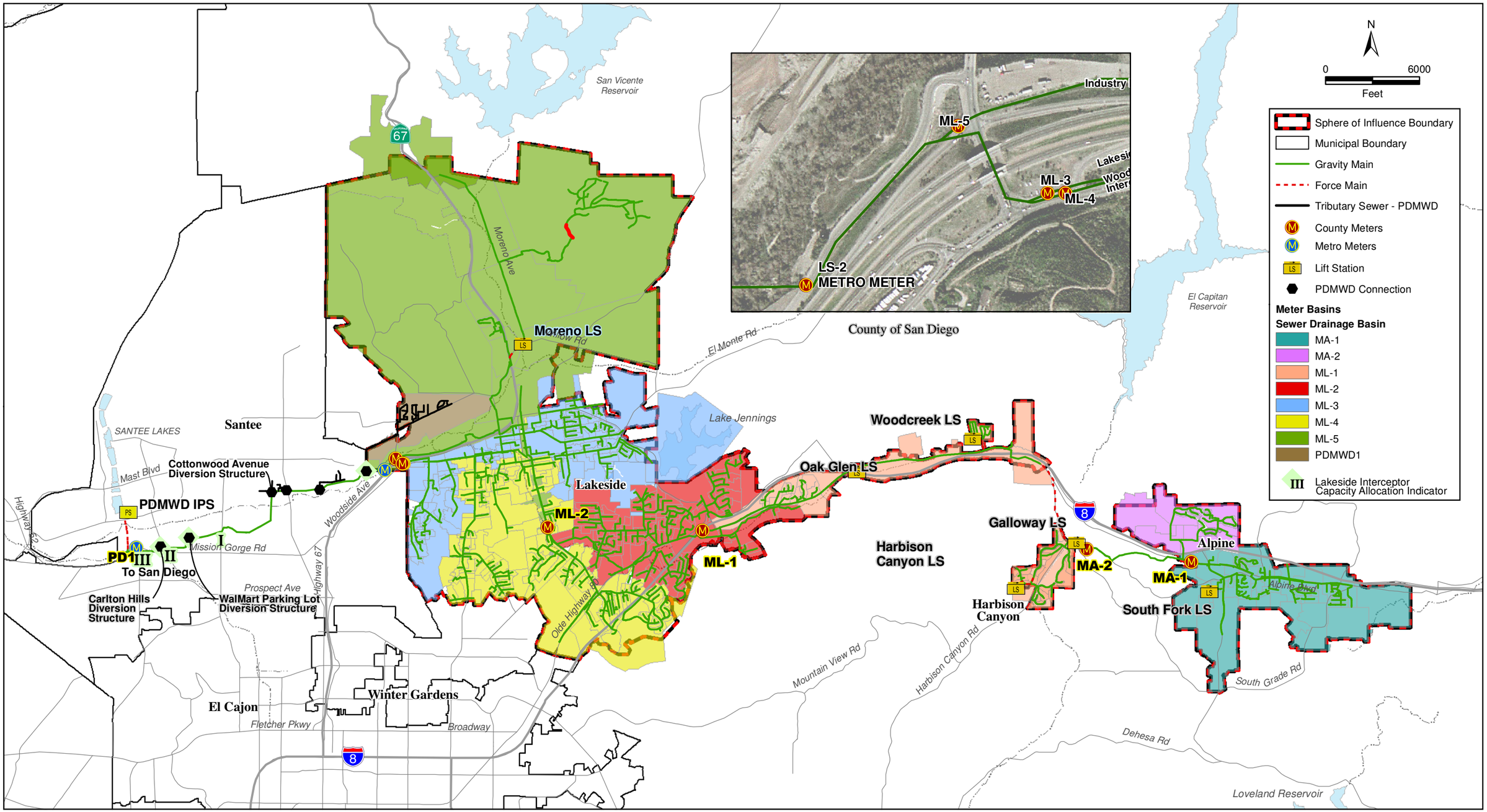
The Meter MA-1 basin encompasses approximately 1,580 acres of the Alpine SSA and extends from Tavern Road east to South Grade Road. The Meter MA-1 basin is bounded to the north by I-8 and primarily parallels Alpine Boulevard. Meter MA-1 is located along the 10-inch Alpine Trunk Sewer and flows within the Basin drain to the Galloway Lift Station.

Meter MA-2 Sewer Basin

The Meter MA-2 basin encompasses approximately 700 acres in the northern portion of the Alpine SSA and extends from Taberna Vista east to Wild Iris Road, north of I-8. Meter MA-2 is located along the 10-inch Alpine Trunk Sewer near Galloway Lift Station. The basin drains south to the Alpine Trunk Sewer and continues west along Alpine Boulevard and Midway Drive to the Galloway Lift Station. The Harbison Canyon Lift Station pumps Harbison Canyon flows into the Harbison Canyon Trunk Sewer, which enters the Alpine Trunk Sewer at the Galloway Lift Station. Meter MA-2 measures flows from the Meter MA-1 and MA-2 basins. The Harbison Canyon neighborhood drains to the Galloway Lift Station, but flows are not metered by Meter MA-2.

Meter ML-1 Sewer Basin

The Meter ML-1 basin encompasses approximately 790 acres along the eastern end of the Lakeside SSA and extends from Arnold Way east to Sierra Alta Way. The Meter ML-1 basin runs parallel to Olde Highway 80 and collects flows tributary to the 15-inch Flynn Springs Interceptor. Meter ML-1 is located on the Olde Highway 80 Trunk Sewer and measures flows from the basin as well as flows from Alpine SSA, including the Harbison Canyon neighborhood.



FLOW MONITORING AND INTER-AGENCY CONNECTIONS

FIGURE 3-1

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Meter ML-2 Sewer Basin

The Meter ML-2 basin encompasses approximately 1,550 acres within the southeastern portion of the Lakeside SSA and is generally bounded by Los Coches Road to the west, Lake Jennings Park Road to the north, Sierra Alta Way to the east, and East Main Street to the south. The basin collects flows tributary to the 12-inch Olde Highway 80 Trunk Sewer and the 12-inch Industry Road Interceptor. Meter ML-2 is located on the west side of Los Coches Road, just north of Meseta Lane. Meter ML-2 also measures flows from the Meter ML-1 basin and Alpine SSA. Flows traveling through Meter ML-2 are split downstream and metered through Meters ML-3 and ML-4.

Meter ML-3 Sewer Basin

The Meter ML-3 basin encompasses approximately 2,160 acres within the middle of the Lakeside SSA. The basin is located north of the Meter ML-2 and ML-4 basins and south of the Meter ML-5 basin and collects flows tributary to the Marilla, Mapleview, Beech, and Julian TS. Meter ML-3 is located on the 15-inch Marilla TS.

Meter ML-4 Sewer Basin

The Meter ML-4 basin encompasses approximately 2,400 acres within the southern portion of the Lakeside SSA and is generally bounded by Winter Gardens Road to the west, Julian Avenue to the north, Los Coches Road to the east, and La Cresta Road to the south. The basin collects flows tributary to the Woodside Avenue, Winter Gardens, and Lakeside Avenue Trunk Sewers. Meter ML-4 is located on the 21-inch Lakeside Trunk Sewer.

Meter ML-5 Sewer Basin

The Meter ML-5 basin encompasses approximately 6,670 acres within the northern portion of the Lakeside SSA and extends from SR-67 north to the Lakeside Sanitation District Sphere of Influence boundary. The basin collects flows tributary to the Moreno Trunk Sewer and the Industry Road Interceptor. Meter ML-5 is located on the 24-inch Industry Road Interceptor.

3.1.2 Lakeside Interceptor

The County has joint ownership of the Lakeside Interceptor with Padre Dam Municipal Water District, although the County operates and maintains it. According to the current agreement between the County and Padre Dam Municipal Water District, signed in 1975, Padre Dam Municipal Water District is allowed to discharge the volume of flow consistent with their Metro capacity. However, there are additional restrictions on the volume of flow that can be sent to various portions of the Interceptor. Table 3-2 summarizes the contract capacities for the various portions of the Lakeside Interceptor.

Table 3-2 Padre Dam Municipal Water District's Capacity in the Lakeside Interceptor

Section	Padre Dam Municipal Water District's Capacity (mgd)
I	1.02
II	1.84
III	2.57

Source: Padre Dam Municipal Water District Integrated Facilities Plan, 2001

Padre Dam Municipal Water District connects into the Lakeside Interceptor in seven general locations, described below:

- The County provides sewer collection services to Padre Dam Municipal Water District residential and commercial areas along the western boundary of Lakeside SSA and enter the Cottonwood Trunk Sewer.
- Flows from approximately 250 Padre Dam Municipal Water District residential customers, as well as commercial and industrial customers, drain to the Cottonwood Trunk Sewer near Jeremy Street.
- Flows from approximately 65 Padre Dam Municipal Water District residential customers drain to the Cottonwood Trunk Sewer along Claudia Avenue.
- Flows from Padre Dam Municipal Water District customers along Cottonwood Avenue drain to the Cottonwood Trunk Sewer at the Cottonwood Avenue Diversion Structure, shown on Figure 3-1.
- Flows from the City of Santee's Town Center drain to the Lakeside Interceptor at the Town Center Diversion Structure.
- Flows from Wal-Mart drain to the Lakeside Interceptor at the Wal-Mart Parking Lot Diversion Structure.
- Flows from Padre Dam Municipal Water District customers in Carlton Hills drain to the Lakeside Interceptor at the Carlton Hills Diversion Structure.

3.2 Wastewater Generation Rates

The purpose of establishing wastewater generation rates is to characterize the existing unit use by either population or land use, and for use in forecasting wastewater flows. The existing metered flows were compared with land use data and population estimates to develop unit wastewater generation rates. Unit generation rates were estimated using two sources for comparison purposes: 1) population estimates compiled by SANDAG (Series 11), and 2) the County's current land use data (Referral Map, May 2008). Based on the findings of the unit generation rate analysis by land use and population, recommended unit rates will be established for use in forecasting future wastewater flows.

3.2.1 Generation Rates Using SANDAG Population

The purpose of estimating population based unit generation rates is to establish the amount of wastewater a typical residential person and non-residential employee generate over a given day in order to assist in forecasting the amount of wastewater that the SSAs can expect through 2030. Per capita unit generation rates are determined through a comparison of the existing SANDAG population data within a given meter basin against the average wastewater flows observed at that flow meter, and industry standard ranges.

SANDAG provided 2008 residential and employment population projections by basin for the SSAs based on Series 11 data. Through an iterative process, per capita generation rates for residential and employment populations were estimated. Table 3-3 summarizes the estimated unit generation rates by population through the flow calibration process. Per capita unit

generation rates were calibrated to within two percent of existing flows based on industry standards.

Typically, design and planning standards for agencies in San Diego County assume per capita wastewater generation rates between 60 to 100 gallons per capita per day (gpcd) for residential and 15 to 35 gpcd for employment populations. Table 3-3 summarizes the flows and calibration for each SSA. Both SSAs had an estimated employment per capita unit generation rate of 25 gpcd. However, the residential per capita unit generation rates differed, 70 gpcd for the Alpine SSA and 65 gpcd for the Lakeside SSA. This difference is consistent with the findings in the previous Master Plan.

Table 3-3 Wastewater Unit Generation Rate Calibration Based on Population

Basin	Existing Population	Unit Generation Rate	Estimated Wastewater Generation
Alpine SSA			
Residential	4,737	70 gpcd	331,590 gpd
Employment	1,263	25 gpcd	31,575 gpd
Subtotal			**0.363 mgd**
		Existing Flow =	**0.357 mgd**
		Calibration =	**1.7 %**
Lakeside SSA			
Residential	39,016	65 gpcd	2,536,040 gpd
Employment	4,327	25 gpcd	108,175 gpd
Subtotal			**2.644 mgd**
		Existing Flow =	**2.593 mgd**
		Calibration =	**2.0 %**

Note: Existing (2008) population data was obtained from SANDAG Series 11 data.
Lakeside SSA metered flows include flows from Harbison Canyon neighborhood.

3.2.2 Generation Rates Using County Land Use Data

The purpose of estimating land use based unit generation rates is to establish the amount of wastewater is generated in a day over an acre of land by general land use types in order to assist in estimating the amount of wastewater that the SSAs can expect at the buildout of the study area. Land use based unit generation rates are determined through a comparison of the existing area per land use type within a given meter basin against the average wastewater flows observed at that flow meter, and industry standard ranges.

As shown in Figure 2-3 of the previous chapter, existing land uses include single-family residential, multi-family residential, industrial, commercial, and institutional. When the GIS land use coverage is overlaid with the County's permitted parcel database, it was possible to estimate the number of single-family and multi-family dwelling units and calculate industrial, commercial, and institutional acreage for each SSA.

Table 3-4 summarizes the calibration of sewer flows for each SSA with estimated unit wastewater generation rates summarized by land use. Unit wastewater generation rates were "calibrated" to within five percent of existing flows by review of 2000 Census data and comparison with the SANDAG populations. The 2004 census data projected an average of 2.72 persons per household for Alpine and 2.83 persons per household for Lakeside. The household population density was calculated at 2.21 persons per household for Alpine and 3.25 persons per household for Lakeside by dividing the estimated dwelling unit counts by the SANDAG population. For the Alpine SSA, the calculated household population density of 2.21 is approximately 0.5 persons per household lower than the community of Alpine's census projection of 2.72. For the Lakeside SSA, the calculated household population density of 3.25 was approximately 0.4 persons per household higher than the community of Lakeside's census projection of 2.83.

Table 3-4 Wastewater Unit Generation Rate Calibration Based on Land Use

Basin	Units	Unit Generation Rate	Estimated Wastewater Generation
Alpine SSA			
Single-Family Residential	851 DU	190 gpd/du	174,400 gpd
Multi-Family Residential	1,288 DU	145 gpd/du	154,560 gpd
Commercial	58.1 ac	250 gpd/ac	14,518 gpd
Industrial	0.0 ac	250 gpd/ac	0 gpd
Institutional	52.2 ac	250 gpd/ac	19,531 gpd
Subtotal			**0.376 mgd**
		Existing Flow =	**0.357 mgd**
		Calibration =	**5.3 %**
Lakeside SSA			
Single-Family Residential	6,863 DU	240 gpd/du	1,589,760 gpd
Multi-Family Residential	5,144 DU	180 gpd/du	925,920 gpd
Commercial	150.6 ac	250 gpd/ac	37,654 gpd
Industrial	72.5 ac	250 gpd/ac	18,129 gpd
Institutional	286.8 ac	250 gpd/ac	65,214 gpd
Subtotal			**2.701 mgd**
		Existing Flow =	**2.593 mgd**
		Calibration =	**4.3 %**

In each SSA the single-family residential land use unit generation rate was first assigned a value equal to the higher of the calculated or census population density multiplied by the calibrated population unit generation rate. The multi-family residential land use unit generation rate was then set equal to 75 percent of the single-family unit generation rate, and the rates were adjusted through an iterative process to reasonably match the estimated residential wastewater generation for each SSA, as presented in Table 3-3. Non-residential land use unit generation rates were set equal to each other and then were adjusted through an iterative process to reasonably match the estimated employment wastewater generation for each District presented in Table 3-3.

Typically, design standards for agencies in San Diego County assume wastewater flows between 200 to 400 gallons per day per dwelling unit (gpd/du) for single-family residential, with multi-family residential ranging from 60 percent to 75 percent of single-family residential, and 500 to 1500 gallons per day per acre (gpd/ac) for non-residential land uses. When compared to typical design standards, the calibrated unit generation rates suggest that the Alpine SSA consists of generally low water use residential customers, and that both SSAs have lower than average employment densities. The lower residential unit generation rates in Alpine are likely due to properties that are used as vacation homes.

3.2.3 Recommended Unit Generation Rates

For future development, it is typical to develop uniform unit generation rates. The County has relatively uniform wastewater generation for land use and population projections based on our unit generation rate analyses. Therefore, for the existing system analysis, the calibrated unit generation rates shown above will be used. For future wastewater generation, more conservative generation rates will be used. The wastewater generation rates used to estimate future flows are summarized in Table 3-5. The City and the County utilize Equivalent Dwelling Units (EDUs) for non-single family residential land uses. The City and County equate an EDU to 280 gpd and 240 gpd, respectively.

Table 3-5 Recommended Unit Generation Rates

Land Use / Population	Recommended Unit Generation Rate	
Land Use		
Single-Family Residential	240	gpd/du
Multi-Family Residential	180	gpd/du
Commercial	500	gpd/ac
Industrial	500	gpd/ac
Institutional	500	gpd/ac
Population		
Residential	70	gpcd
Employment	25	gpcd

3.3 Wastewater Flow Projections

Wastewater flow projections were developed through 2030 and for buildout. Flow projections through 2030 were estimated by applying the recommended population unit generation rates to the recommended phased populations. Buildout wastewater flow projections were determined by applying the land use based unit generation rates to the land use acreages and allowable densities (Referral Map, May 2008). These projections form the basis for sewer input flows to the hydraulic model, and analyses of future capacity needs in the wastewater collection system. Table 3-6 summarizes the estimated future flows based on recommended phasing through 2030 and Table 3-7 summarizes the estimated buildout flow based on the land use for ultimate conditions in each SSA.

Table 3-6 Alpine and Lakeside Wastewater Flow Projections through 2030 (by Population)

Phase	Recommended Phased Population				Unit Generation Rate		Estimated Wastewater Generation (mgd)		
	Alpine SSA		Lakeside SSA						
	Residential	Employment	Residential	Employment	Residential	Employment	Alpine	Lakeside	Total
2008	5,387	1,430	38,366	4,160	70 gpcd	25 gpcd	0.41	2.41	2.82
2015	5,756	3,389	42,669	14,491	70 gpcd	25 gpcd	0.49	3.35	3.84
2020	7,629	3,757	47,293	16,417	70 gpcd	25 gpcd	0.63	3.72	4.35
2025	8,330	3,988	48,020	16,685	70 gpcd	25 gpcd	0.68	3.78	4.46
2030	11,166	4,452	51,074	18,078	70 gpcd	25 gpcd	0.89	4.03	4.92

Table 3-7 Alpine and Lakeside Buildout Wastewater Flow Projections (by Land Use)

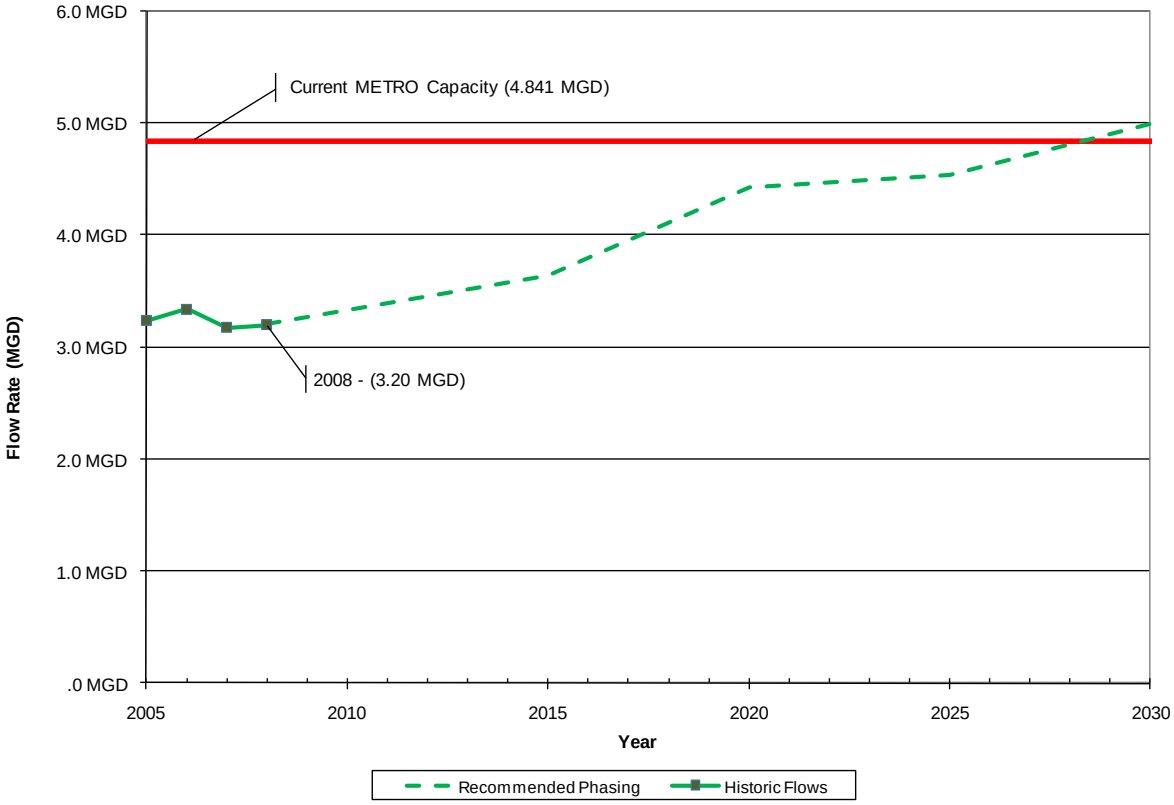
Land Use	Units/Acres		Recommended Unit Generation Rate	Estimated Wastewater Generation (mgd)		
	Alpine	Lakeside		Alpine	Lakeside	Total
Single-Family Residential	3,396 DU	16,305 DU	240 gpd/du	0.82	3.91	4.73
Multi-Family Residential	3,883 DU	12,141 DU	180 gpd/du	0.70	2.19	2.88
Commercial	128 ac	250 ac	500 gpd/ac	0.06	0.12	0.19
Industrial	223 ac	462 ac	500 gpd/ac	0.11	0.23	0.34
Institutional	65 ac	306 ac	500 gpd/ac	0.03	0.15	0.19
Total				**1.72**	**6.61**	**8.33**

3.4 Metro Capacity

The Alpine and Lakeside SSAs convey all sewer flows into the Metro under a comprehensive Regional Wastewater Disposal Agreement enacted between the City of San Diego and the participating agencies within Metro. The District is considered one entity by Metro for purposes of capacity rating and its current Metro capacity is 17.503 mgd. Within the District, the SSAs are proportioned a share of Metro capacity for the purposes of projecting future regional capacity needs. The Alpine and Lakeside SSAs have been proportioned with 4.841 mgd of Metro capacity.

Figure 3-2 shows the proportioned Metro capacity threshold based on the future flow projections in Table 3-6. Based on these projections, the existing proportioned Metro capacity rights for the Alpine and Lakeside SSAs will be reached by year 2030. The County should continue to monitor the rate of future growth within the SSA. To avoid exceeding its capacity rights, the County may consider re-proportioning or acquiring additional Metro capacity or participating in expansion of the Padre Dam Water Reclamation Facility to meet its 2030 capacity needs.

Figure 3-2 Alpine and Lakeside Wastewater Flow Projections (by Population)



3.5 Conclusions

Existing average wastewater flows generated within the Alpine and Lakeside SSAs are approximately 3.0 mgd. Based on the recommended phased SANDAG population projections, the total Alpine and Lakeside SSA average flow rate at 2030 is estimated to be 4.92 mgd. Assuming the buildout of the entire study area, the estimated average flow rate is estimated at approximately 8.3 mgd, which will likely not occur until beyond 2050.

The Metro capacity rights proportioned to the Alpine and Lakeside SSAs are 4.841 mgd. Based on the recommended projections, the average wastewater flow is expected to reach the current Metro capacity around 2030. The County should continue to monitor flows into Metro over the next five to ten years to determine whether the recommended phased populations are consistent with future flow projections. To avoid exceeding its proportioned capacity rights, the County may consider re-proportioning or acquiring additional Metro capacity or participating in expansion of the Padre Dam Water Reclamation Facility to meet its 2030 capacity needs.

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CHAPTER 4
CAPACITY EVALUATION

This chapter provides a description of the capacity analysis performed as part of the Master Plan, and includes:

- Evaluation criteria;
- Model selection, development and calibration;
- Capacity analysis; and
- Potential phased recommended improvements.

4.1 Background

A capacity evaluation of the Alpine and Lakeside SSAs existing wastewater collection systems was completed to identify sewer reaches that may be deficient under recommended design criteria and to identify any upgrades needed to accommodate existing and projected dry and wet weather wastewater flows. Based on the capacity evaluation, phased facility improvements were identified to reduce the potential for sanitary sewer overflows as well as to allow for projected growth within the SSAs.

4.2 Methodology

The principal tool utilized in the capacity analysis was the dynamic hydraulic model. The hydraulic model simulates flow conditions, such as wastewater flow depth, flow rate, and velocity, within pipes and manholes in the SSAs wastewater collection systems. The model selected in this study, InfoWorks CS (Innovyze, Version 8.5), belongs to a class of models referred to as dynamic wave models. These models provide a reasonable representation of hydraulic flow conditions over an extended period of time.

The model was developed using the physical collection system data, existing and forecasted populations, per capita unit generation rates, diurnal patterns, and rainfall events. The model was then calibrated to flow metering records for dry and wet weather conditions. Once the model was calibrated, it was utilized to evaluate the existing collection system under existing and projected dry and wet weather flow conditions in order to identify potential recommended improvements to the existing collection system.

4.3 Flow Monitoring

Flow records from various locations within the Districts' collection systems were used to develop initial diurnal patterns and calibrate the hydraulic model. As discussed in Chapter 3, the County maintains flow meters at seven (7) locations within the collection system and Metro maintains the Meter LS-2 billing meter, which meters combined flows from the Alpine and Lakeside SSAs. These meters continuously record flow, depth and velocity measurements. Flow monitoring data from August 2008 at all of the meters was used to develop initial diurnal patterns and calibrate the existing dry weather hydraulic model scenario. The month of January 2010 was identified as having a rainfall event typical of a 2-year return storm, and was used to calibrate wet weather events.

4.4 Limitations of Hydraulic Modeling

The hydraulic model was utilized as the primary planning tool for the sewer capacity analysis and provides a reasonable representation of actual flow conditions within a sanitary sewer system in response to existing and future sewage loading. The accuracy of the simulation, however, is directly related to the accuracy of the model input data, including physical parameters and sewage loading projections. For example, in a case where roots had entered the sewer causing a blockage, the model would be unable to predict a resulting surcharge condition. Consequently, an understanding of the data sources is critical in interpreting the modeling results.

4.5 Evaluation Criteria

Recommended criteria were developed to evaluate the capacity of the existing collection system under existing and projected dry and wet weather flow conditions. The recommended evaluation criteria were developed by comparing existing County criteria to criteria for similar Southern California sewer agencies. The recommended evaluation criteria are presented in Table 4-1 and will be utilized to identify deficient facilities and size replacement infrastructure. The evaluation criteria presented in this master plan is not intended to replace the County's existing criteria, which shall continue to be utilized for the design of new infrastructure.

4.6 Model Development

The model was developed with the physical collection system data, existing and forecasted populations, per capita unit generation rates, diurnal patterns, and rainfall events. Details regarding the collection system and the application of sewage loading factors and rainfall events are described below.

4.6.1 Collection System Attributes

Data required to create the model includes information describing the physical wastewater collection system, such as physical location, pipe diameters and reach lengths, manhole invert elevations, and estimated pipe roughness coefficients. Model connectivity was reviewed and verified against County As-built records. The physical parameters of the model, including pipe diameter, slope, and roughness coefficients were based principally on the County's GIS records. Where the data appeared to be inaccurate or unclear, data was inferred.

The source of the model attributes was the County's GIS system. Concurrently with this project, the County instituted an ongoing program to improve their GIS system. As the part of the GIS system update, the sewer system attributes were populated in GIS from geo-referenced scanned as-built drawings. This process developed a good data source to build the model from.

Table 4-1 Recommended Evaluation Criteria

Item	Recommended Evaluation Criteria
Gravity Main Criteria	
Minimum Pipe Diameter	8 inches
Minimum Velocity	2 fps at peak flow rate
Manning's Roughness Coefficient	0.013
Maximum Peak d/D Ratio for Existing Sewers	0.50 Peak Dry Weather Flow for dia. ≤ 15-inch
	0.75 Peak Dry Weather Flow for dia. > 15-inch
	0.92 Peak Wet Weather Flow for a 2-year storm
Maximum Peak d/D Design Criteria for New Sewers	0.50 Peak Wet Weather Flow for dia. ≤ 15-inch
	0.75 Peak Wet Weather Flow for dia. > 15-inch
Force Main Criteria	
Minimum Pipe Diameter	4 inches
Minimum Velocity	3 fps
Maximum Velocity	8 fps
Hazen Williams 'C' Factor	130
Siphon Criteria	
Minimum Pipe Diameter	6-inch
Minimum Number of Pipes	2
Minimum Velocity	3 fps at Peak Dry Weather Flow
Hazen Williams 'C' Factor	120
Pump Station Criteria	
Minimum Number of Pumps	2
Minimum Pump Capacity	Duty pumps capable of handling ultimate wet weather capacity
Standby Capacity	100% of largest pump capacity
Emergency Power	Required
Emergency Storage Capacity	6 hour pumping volume at average dry weather flow

4.6.2 Model Loading

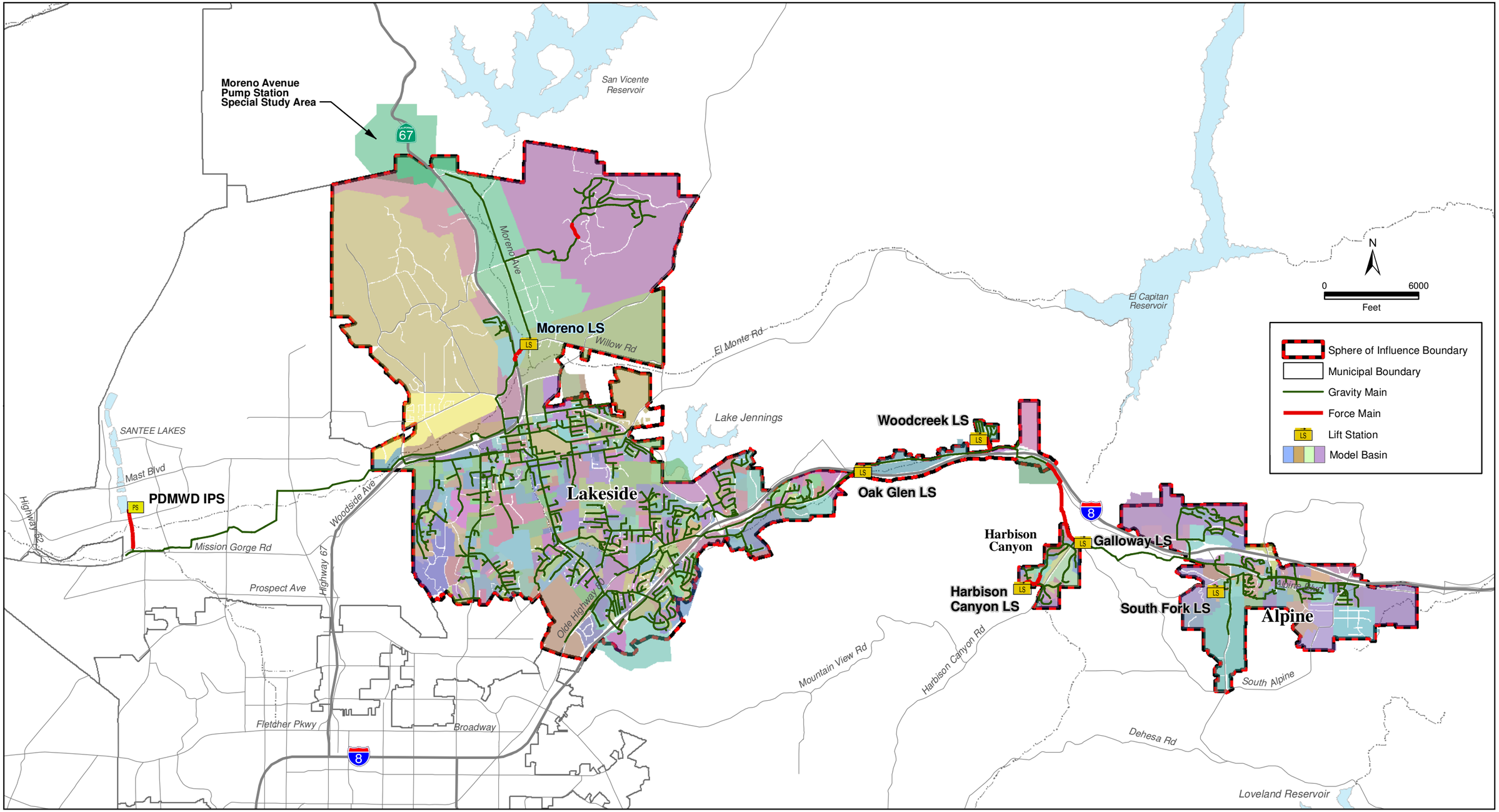
Wastewater flows are generated in the model by applying basin populations to per capita unit generation rates and time-varying hydrographs (diurnal patterns) at the basin's identified tributary node. Populations were applied for existing, interim and ultimate conditions at the parcel level. Each parcel was assigned a corresponding tributary model node based on available lateral information and topography. Model basins were then formed by merging parcels with identical tributary nodes.

The parcel's existing, interim, and ultimate residential and employment populations were summed and input into the model at the basin level. Residential and employment population estimates for the existing and interim conditions were provided by SANDAG. Residential and employment population estimates for the buildout condition were calculated based on proposed land use. Figure 4-1 presents the location of the model basins.

A diurnal pattern is expressed as a varying flow rate over time and is applied to the estimated average residential and employment flows to develop model flow inputs into the collection system. It is necessary to develop multiple diurnal patterns in order to properly model communities with varying types of sewer discharge patterns. For instance residential users typically discharge the most sewage during the early morning and early evening hours, while employment users typically discharge the most sewage in the middle of the day. Initial residential diurnal patterns were developed for both the Alpine and Lakeside SSAs based upon the flow metering data. The flow patterns for the Alpine and Lakeside SSAs are typical of largely residential communities, which exhibit the largest peak in the morning and a smaller peak in the early evening. Employment populations represent only a small portion of the overall flows and as such, diurnal patterns for employment populations were assumed as a typical bell curve with the peak occurring at midday, which is conservative. The shapes of the residential diurnal patterns were refined during the dry weather model calibration to better simulate the observed peaking of the sewage flows. Appendix G includes model basin population projections and diurnal patterns.

4.6.3 Rainfall Events

Rainfall events are applied to the model to identify their potential impacts on the collection system. Rainfall derived inflow and infiltration (RDI&I) flows into the system are modeled by applying infiltration and routing coefficients to rainfall event. These coefficients were refined during the wet weather model calibration to better simulate the observed peaking of the sewage flows. A storm event occurring January 18 to 22, 2010 was selected for use in calibrating the wet weather model. The precipitation readings for the January storm are slightly lower than the two-year design storms for San Diego County. Figure 4-2 presents a comparison of the average daily flows recorded at Meter LS-2 to the average daily rainfall totals at rain gauges in close proximity to the collection system. Figure 4-3 presents the name and location of the rain gauges utilized in this study. Rainfall totals for each gauge are summarized in Appendix H.



ALPINE AND LAKESIDE MODEL BASINS

FIGURE 4-1

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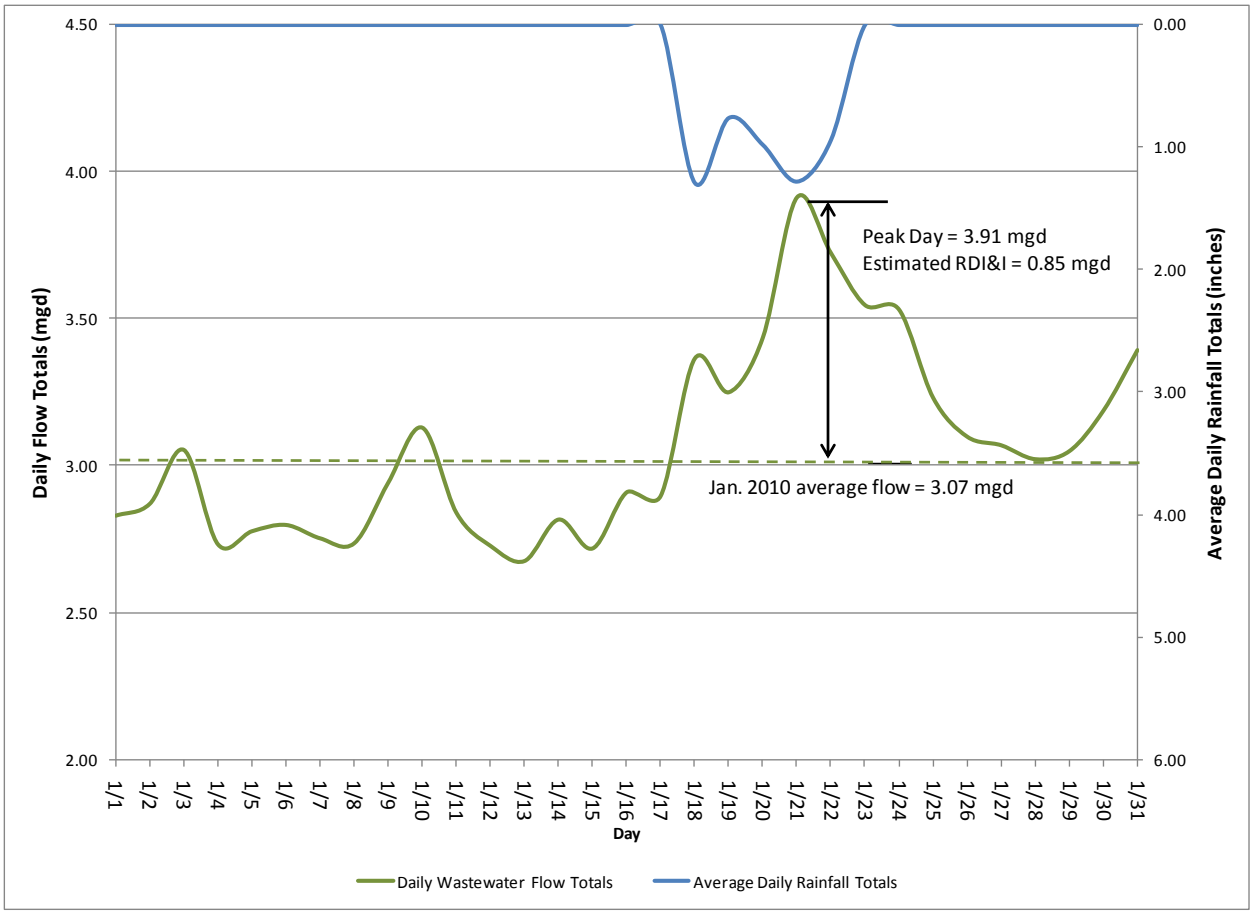
Figure 4-2 Meter LS-2 Wet Weather Flow Assessment



As shown on Figure 4-2, the January storm event produced a peak increase of approximately 0.85 mgd, or a 27 percent increase over average flow, at Meter LS-2 from a storm event that averaged over an inch of rain during its 5 day period. Meter LS-2 measures the total flow from the Alpine and Lakeside SSAs. Based on records for Meter MA-2 (measures Alpine SSA flows upstream of Galloway PS, not including Harbison Canyon), there was a peak increase in flows due to the storm of approximately 0.05 mgd, or 5.9 percent of the total RDI&I measured at Meter LS-2. This suggests that 94 percent of RDI&I occurred within the Lakeside SSA, and 6 percent occurred within the Alpine ASA. These results are not surprising given that the Lakeside SSA is a much larger area and located much closer to the San Diego River Valley.

4.7 Model Calibration

The model was calibrated by refining estimated model parameters under dry and wet weather conditions so that the simulated model flow conditions reasonably approximated the measured flow conditions. Diurnal curves were adjusted for the dry weather calibration such that simulated and recorded wastewater flow and depth hydrographs matched to within a reasonable level of accuracy. Infiltration and routing coefficients were adjusted in the wet weather calibration such that simulated and recorded wastewater peak flows matched to within a reasonable level of accuracy.

4.7.1 Dry Weather Calibration

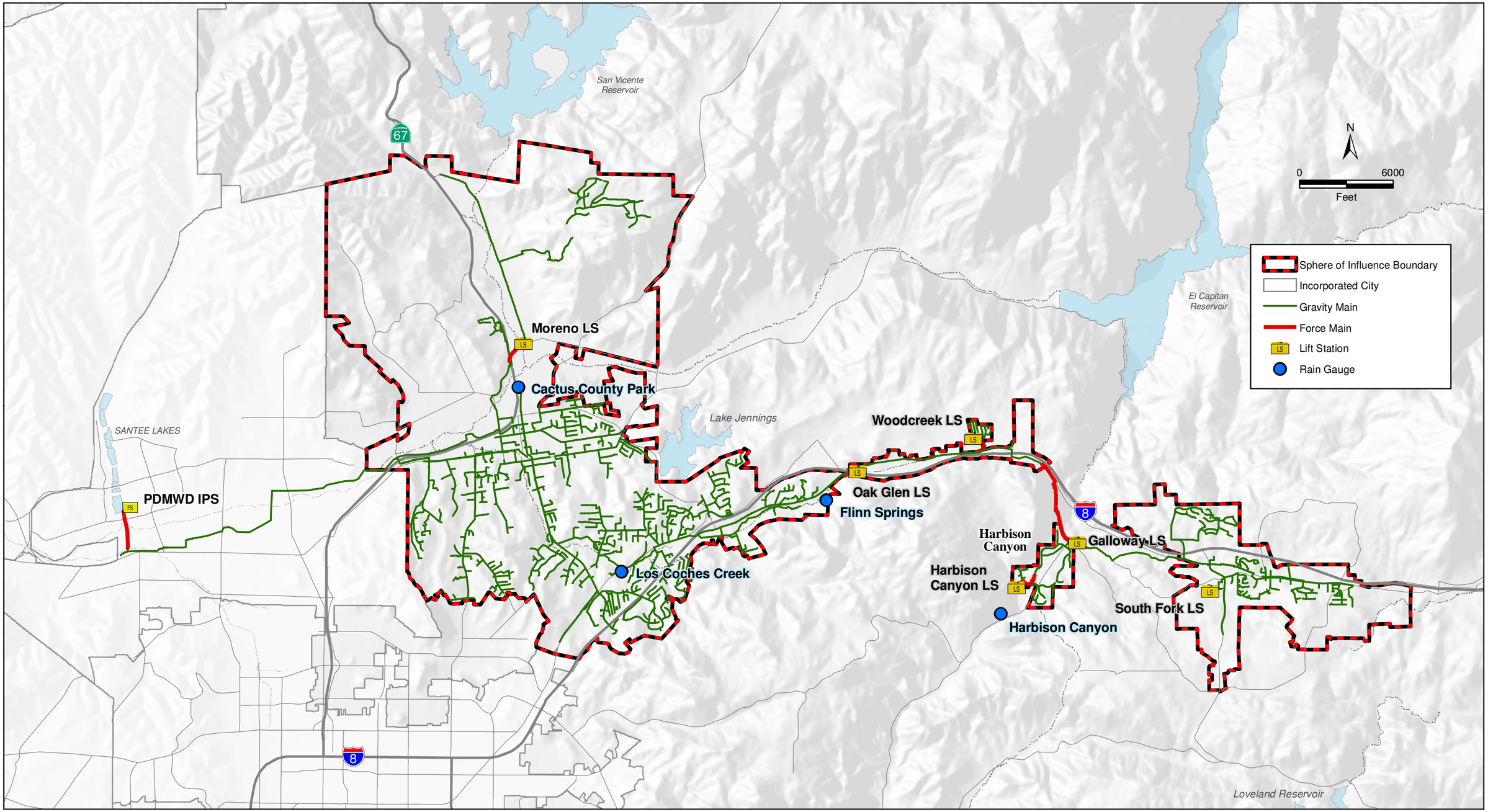
The model was calibrated to dry-weather meter data recorded in the month of August 2008 at the seven County-maintained flow meters. The flow records for August 15th were selected to calibrate volume because they represented the maximum day in that month. Peak flow calibration was based on the highest observed flow recorded in that month. Simulated flow hydrographs at each meter location were compared with recorded discharge measurements. The purpose of the comparison was to allow for refinement of estimated model parameters so that the simulated flow conditions reasonably approximated the measured flow conditions. These parameters generally include diurnal curve patterns and peak to average flow ratios (peaking factors).

Results of the dry weather calibration are best presented graphically, and are shown in Figures 4-4 through 4-10. The typical range of sewer volume and peak flows for dry weather model calibration is within +/– 10 percent of field measurements for master planning purposes. Table 4-2 summarizes the results of the dry weather calibration. Meter ML-1 is located downstream of the Galloway Lift Station's forcemain. The 12 inch diameter forcemain discharges into an 8 inch gravity main and the model is over estimating the attenuation that occurs in the field. The 8 inch gravity main is planned to be replaced with a larger diameter, and the upgrade should produce more laminar flow conditions that the model will allow the model to better simulate.

Table 4-2 Dry Weather Calibration Summary

Meter Name	Volume Calibration	Peak Flow Calibration	Notes
Alpine Sanitation District			
MA-1	+ 8.9%	- 2.0%	
MA-2	- 3.5%	- 11.9%	
Lakeside Sanitation District			
ML-1	- 1.7%	- 46.0%	Pumped flows from Galloway Lift Station not attenuating as model operation would suggest
ML-2	+ 8.1%	- 1.7%	
ML-3	- 0.3%	- 4.1%	
ML-4	+ 7.0%	- 1.1%	
ML-5	- 2.6%	- 14.0%	

Average and peak dry weather flows based on August 2008 data
August 2008 data was not available for meter MA-2, September 2008 data was used



ALPINE AND LAKESIDE RAIN GAUGES

FIGURE 4-3

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Figure 4-4 Dry Weather Calibration at Meter MA-1

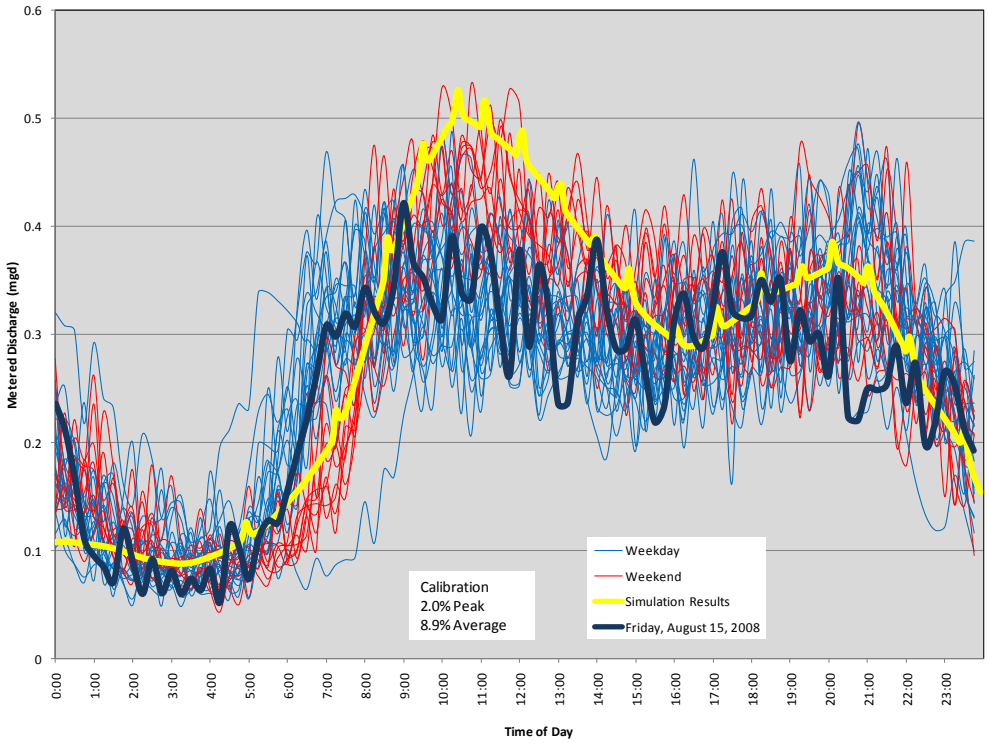
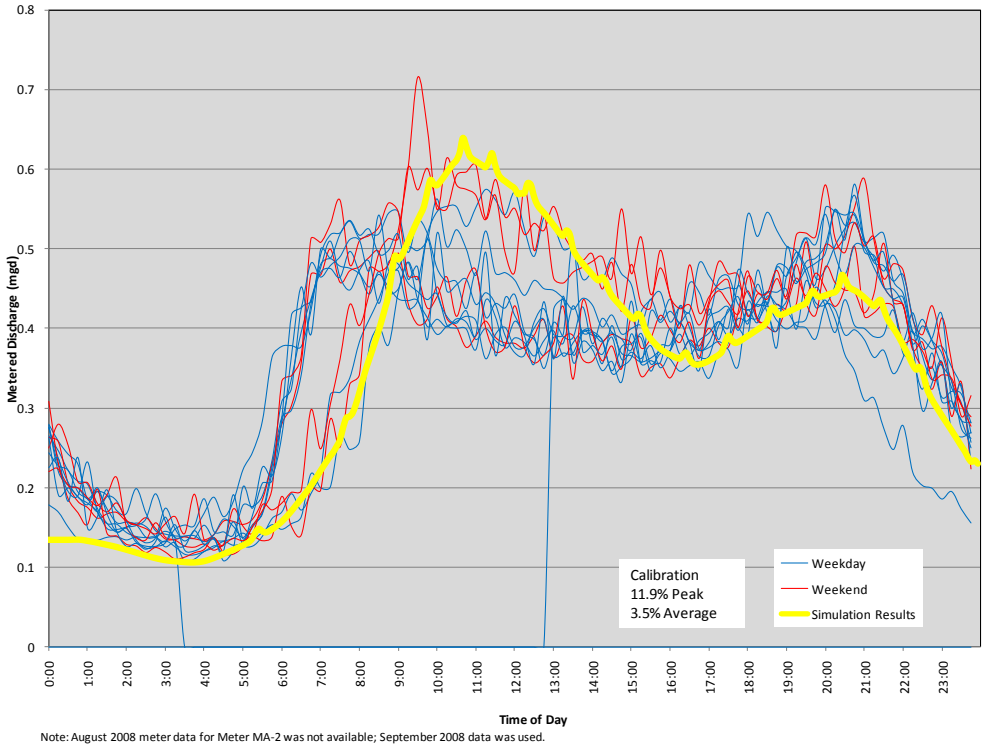


Figure 4-5 Dry Weather Calibration at Meter MA-2



Note: August 2008 meter data for Meter MA-2 was not available; September 2008 data was used.

Figure 4-6 Dry Weather Calibration at Meter ML-1

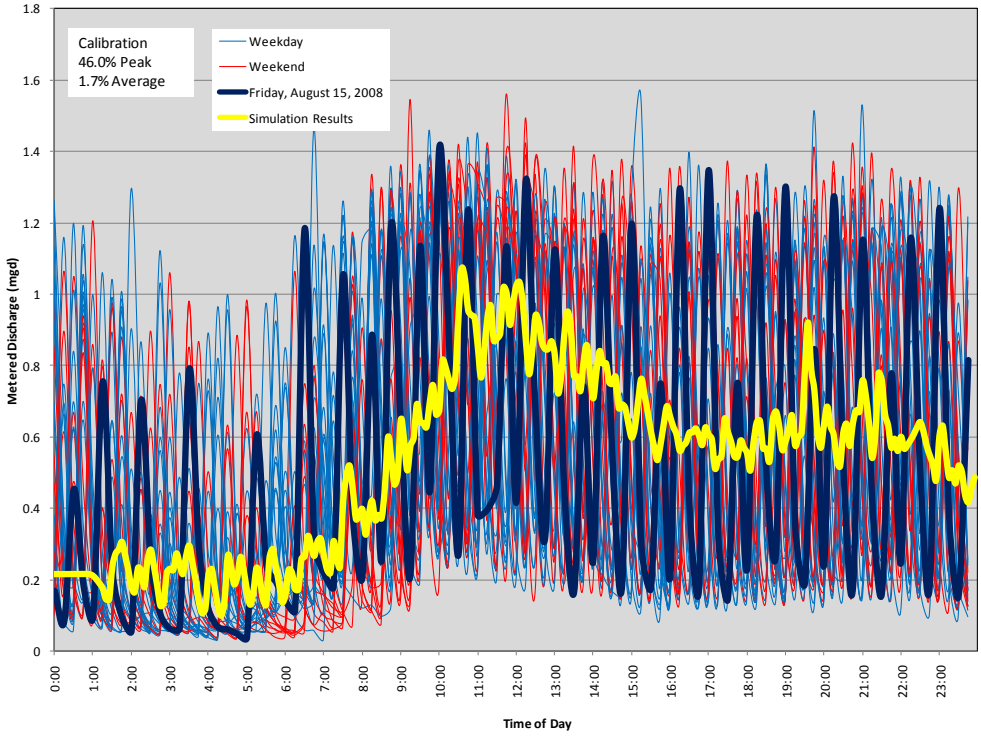


Figure 4-7 Dry Weather Calibration at Meter ML-2

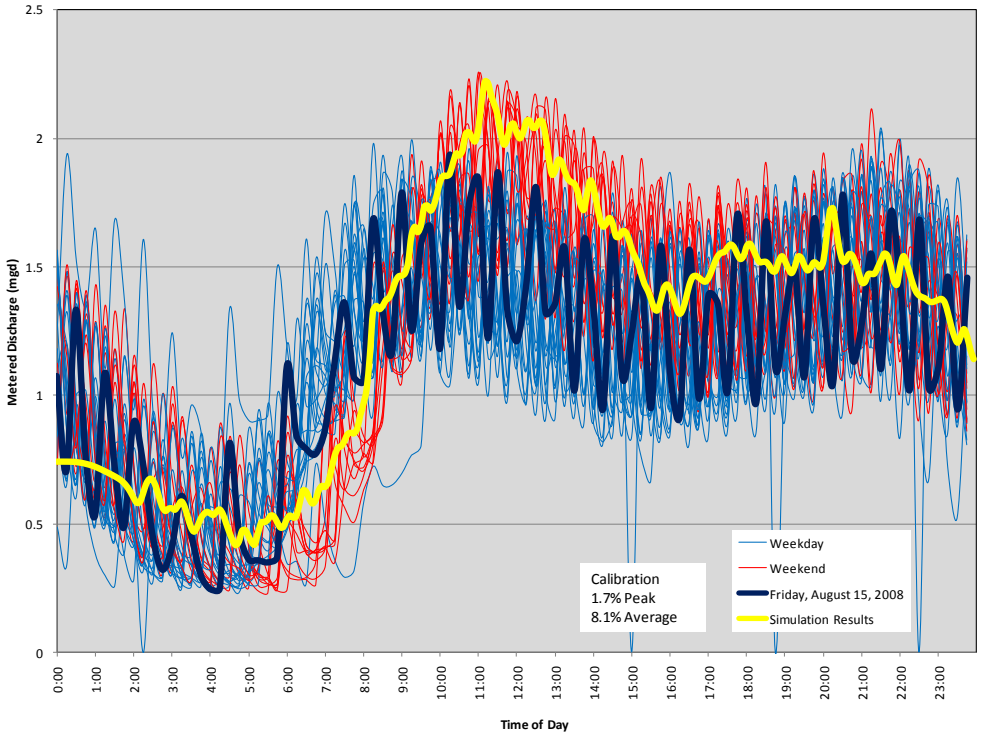


Figure 4-8 Dry Weather Calibration at Meter ML-3

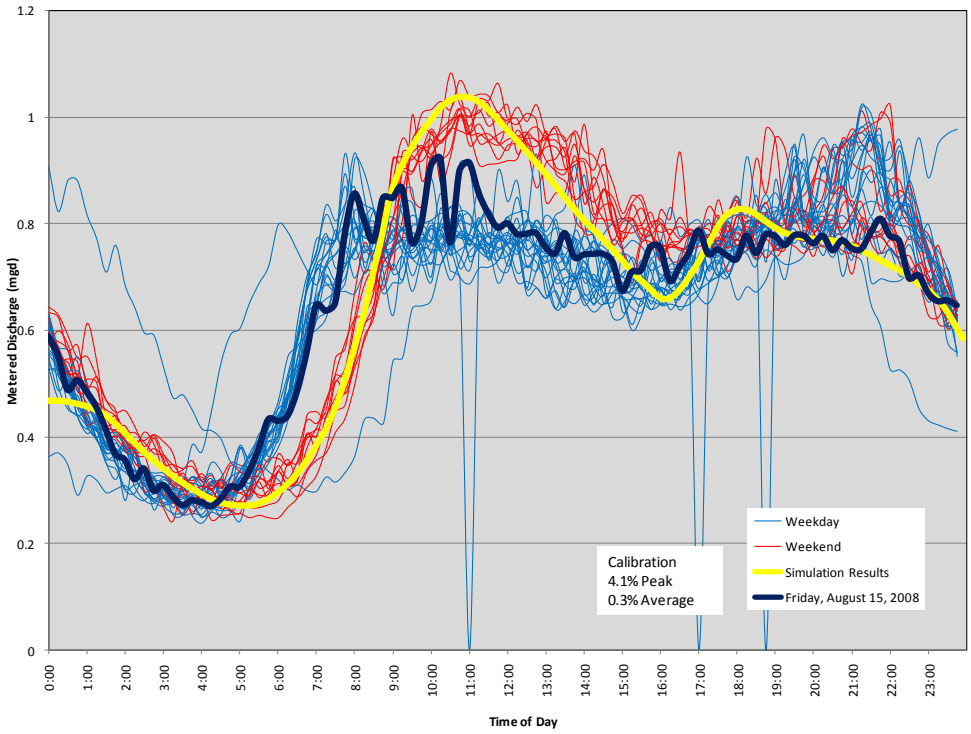


Figure 4-9 Dry Weather Calibration at Meter ML-4

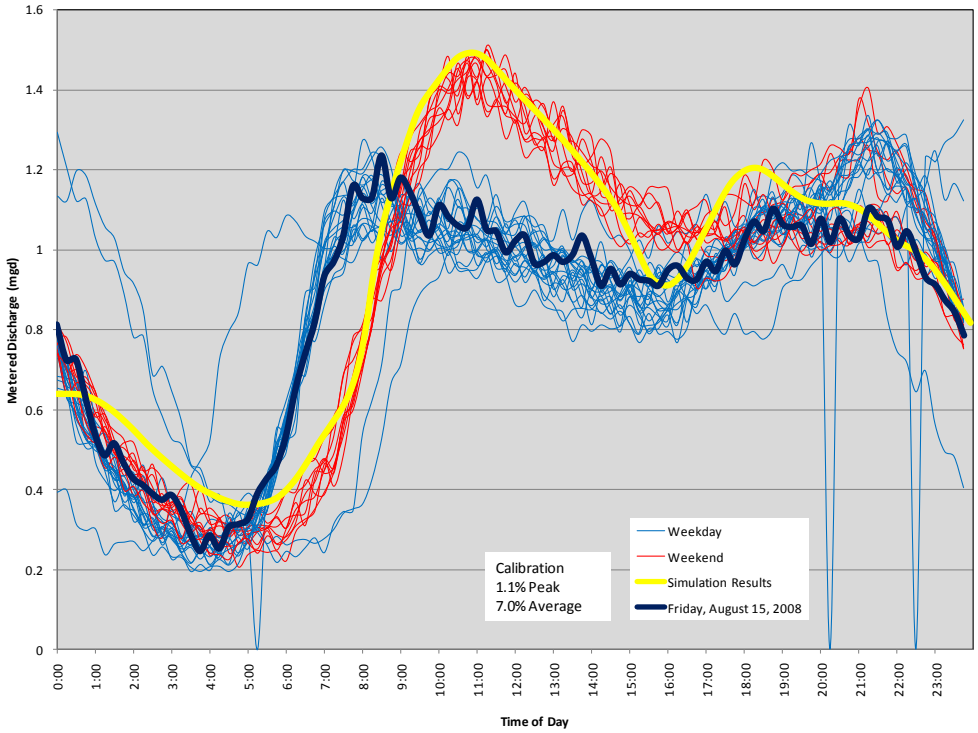
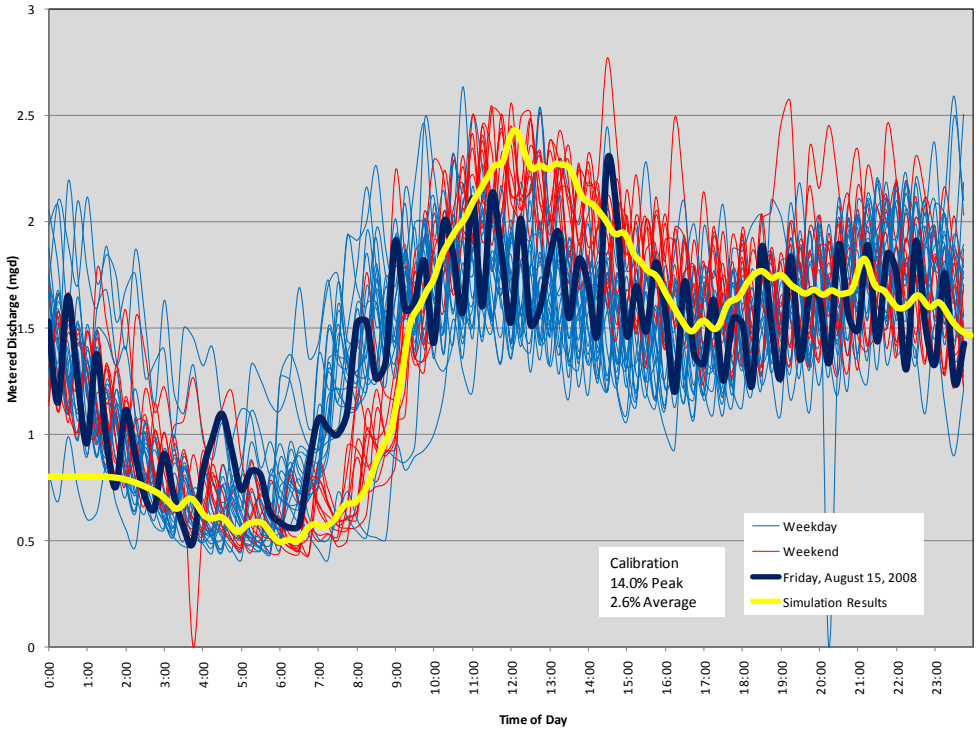


Figure 4-10 Dry Weather Calibration at Meter ML-5



4.7.2 Wet Weather Calibration

The model was calibrated to the peak wet-weather flow event that occurred on January 20, 2010 at the seven County-maintained flow meters. The flow records for January 20 were selected because they represented the largest spike in flows that corresponded with the peak intensity of the storm. Simulated flow hydrographs at each meter location were compared with recorded discharge measurements. The purpose of the comparison was to allow for refinement of estimated model parameters so that the simulated flow conditions reasonably approximated the measured flow conditions. These parameters include the infiltration and routing coefficients. The infiltration coefficient determines what percentage of the rainfall enters the system. The routing coefficient determines how fast or slow the rainfall enters the system.

In general, the system exhibited a significant rapid response to the storm event. Higher infiltration rates during storm events were observed in the Lakeside SSA than in the Alpine SSA. The system's response and wet weather calibration results are best presented graphically and are shown in Figures 4-11 through 4-17. The typical range of sewer peak flow for wet weather model calibration are within +/– 10 percent of field measurements for master planning purposes. Table 4-3 summarizes the results of the wet weather calibration.

Figure 4-11 Wet Weather Calibration at Meter MA-1

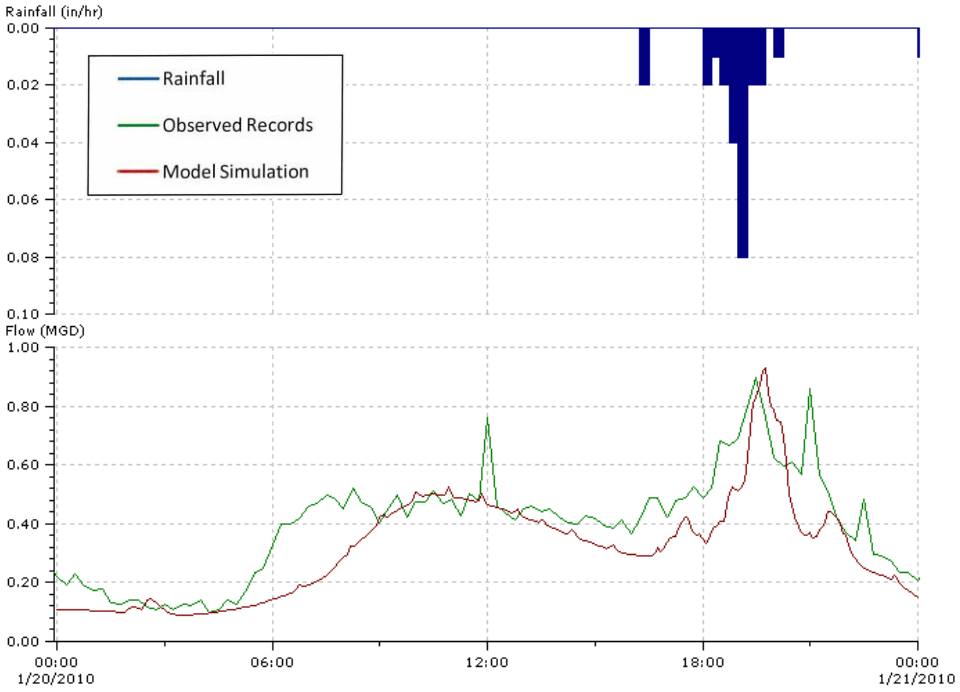


Figure 4-12 Wet Weather Calibration at Meter MA-2

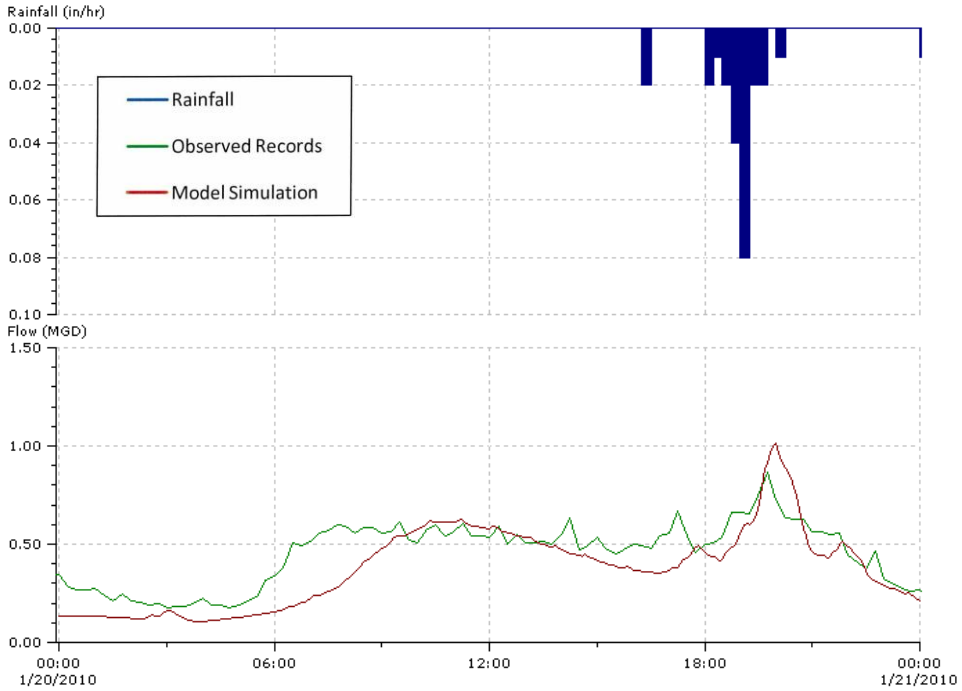


Figure 4-13 Wet Weather Calibration at Meter ML-2

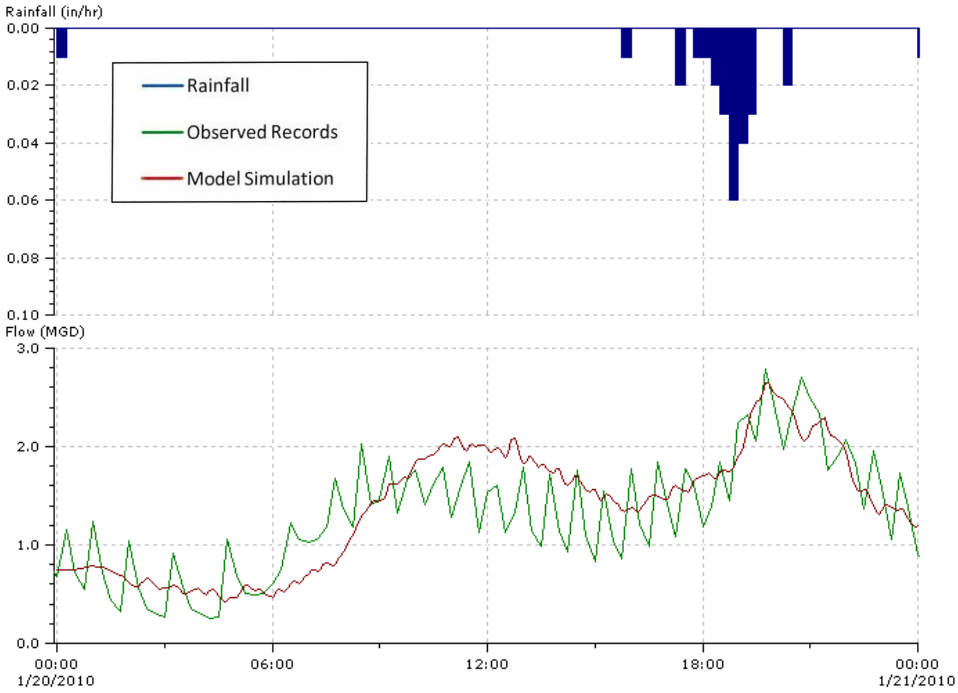


Figure 4-14 Wet Weather Calibration at Meter ML-3

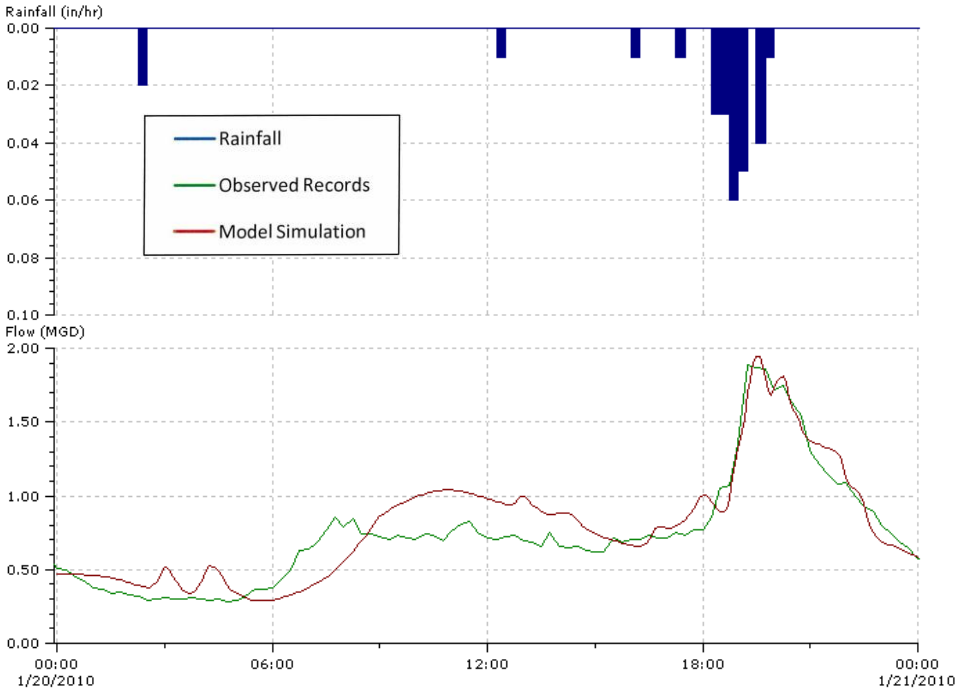


Figure 4-15 Wet Weather Calibration at Meter ML-4

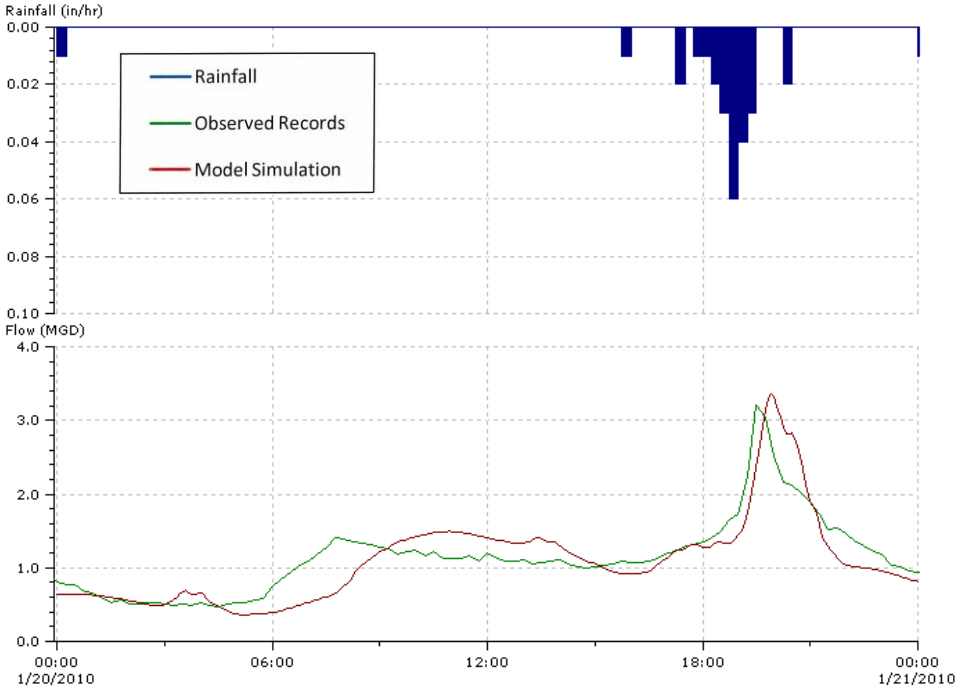


Figure 4-16 Wet Weather Calibration at Meter ML-5

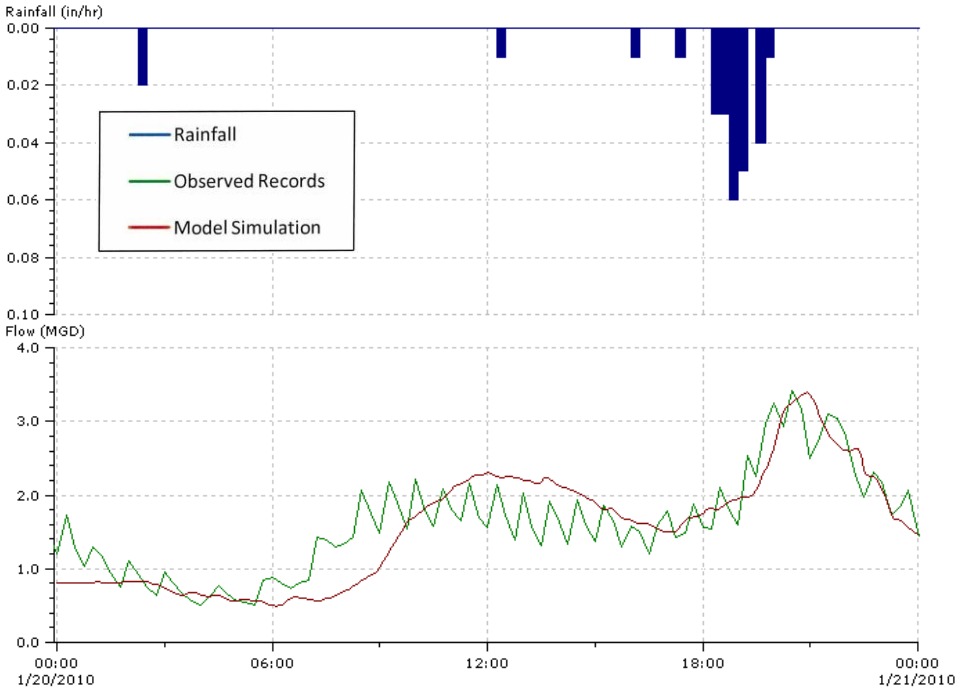


Table 4-3 Wet Weather Calibration Summary

Meter Name	Peak Flow Calibration	Notes
Alpine Sanitation District		
MA-1	+ 3.7%	
MA-2	+ 15.0%	Conservative; model exceeds observed peak flows
Lakeside Sanitation District		
ML-1	N/A	Meter was not operational during calibration period
ML-2	- 5.3%	
ML-3	+ 2.8%	
ML-4	+ 4.6%	
ML-5	- 0.9%	

Based on typical master planning calibration criteria, the hydraulic model is within acceptable ranges when compared to metered flow data and observed rainfall data. Although MA-2's calibration exceeded 10 percent, this is a conservative figure and the rest of the model is within acceptable ranges, so no modifications were made to the model. The model is considered a calibrated model and can be used for future planning scenarios.

4.8 Capacity Analysis

A capacity analysis of the existing collection system was performed under existing and forecasted dry and wet weather flow conditions. Model simulations were performed for the recommended 2030 wastewater generation, discussed in Chapter 3, in order to identify potential improvement projects. The identified improvement projects were then sized to accommodate the buildout flow projections based on the land use. Projects were then evaluated under the existing and recommended 2020 wastewater generation to identify project priority and phasing. Identified improvement projects were evaluated against identified condition related projects presented in the next chapter to form the Capital Improvement Plan presented in Chapter 7.

4.8.1 Lift Stations and Force Mains

The lift stations and force mains owned and operated by the County were evaluated under existing and projected wastewater flows based upon the criteria listed in Table 4-1. Table 4-4 summarizes the existing and future lift station pump capacities. Table 4-5 summarizes the existing and future lift station force main capacities.

The Harbison and Woodcreek Lift Stations have adequate pumping capacity for existing and buildout wastewater flows. The Galloway Lift Station will not have sufficient capacity by 2030 and an additional pump is required to accommodate the increased flows. The Galloway Lift Station has undergone recent improvements to provide space for a third pump, which will allow for additional pumping capacity.

Table 4-4 Lift Station Pump Capacities

Lift Station	Firm Capacity (gpm)	Existing Capacity		2030 Condition		Buildout Condition		2030 Deficiency
		Dry Weather Peak Flow (gpm)	Wet Weather Peak Flow (gpm)	Dry Weather Peak Flow (gpm)	Wet Weather Peak Flow (gpm)	Dry Weather Peak Flow (gpm)	Wet Weather Peak Flow (gpm)	
Alpine SSA								
Galloway Lift Station	1,220	594	833	1,490	1,581	2,003	2,025	361
Harbison Lift Station	150	28	33	29	29	47	47	None
Lakeside SSA								
Woodcreek Lift Station	143	41	46	52	56	54	57	None
Moreno Lift Station	--	--	--	369	831	722	919	Unknown

Table 4-5 Force Main Capacities

Force Main	Existing Diameter (inches)	Existing Pump Firm Capacity (gpm)	Existing Velocity (fps)	Proposed Diameter (inches)	2030 Proposed Pump Firm Capacity (gpm)	Proposed Velocity (fps)
Alpine SSA						
Galloway Force main	12	1,220	3.5	12	1,581	4.5
Harbison Force main	4	150	3.8	4	150	3.8
Lakeside SSA						
Woodcreek Force main	4	143	3.6	4	143	3.6
Moreno Force main	6	--	--	8	831	5.3

The 2009 Moreno Avenue Sewer Basin Study determined the Moreno Avenue Lift Station design capacity would be exceeded by the estimated buildout of the Moreno Avenue Basin. Additionally, the lift station has never been operated, and a thorough evaluation of the lift station's condition was not conducted because the electrical equipment was inoperable which limited access to the facility. It is recommended that the first development to connect to the Moreno Avenue sewer system assist the County in rehabilitating and refurbishing the lift station to accommodate phased development. The new pumps should be sized to accommodate a design flow of 831 gpm.

The existing force mains are able to maintain velocities below 8 fps, based on existing pump operation. As shown in Table 4-4 above, the Galloway Lift Station will require an additional pump to accommodate higher flows by 2030. However, the 12-inch Galloway force main will be able to deliver these flows while maintaining a velocity of 4.5 fps. The Harbison and Woodcreek force mains will not require upgrades to accommodate projected 2030 wastewater flows. The Moreno force main will need to be upsized to an 8-inch force main to deliver anticipated 2030 wastewater flows while maintaining a velocity below 8 fps.

County planning criteria requires lift stations to contain emergency storage capabilities equivalent to a six hour pumping volume at average dry weather flow rates. The existing lift stations' emergency storage basins were evaluated under existing, 2030, and buildout conditions. Table 4-6 summarizes the existing and future lift station storage capacities.

Table 4-6 Storage Capacities

Lift Station	Emergency Storage (gal)	Existing Capacity		2030 Condition		Buildout Condition		2030 Deficiency (gal)
		Average DWF (mgd)	Storage (hours)	Average DWF (mgd)	Storage (hours)	Average DWF (mgd)	Storage (hours)	
Alpine Sanitation District								
Galloway Lift Station	100,000	0.35	6.9	0.89	2.7	1.13	2.1	122,500
Harbison Lift Station	7,500	0.02	9.0	0.02	9.0	0.04	4.5	None
Lakeside Sanitation District								
Woodcreek Lift Station	15,000	0.03	12.0	0.04	9.0	0.05	7.2	None
Moreno Lift Station	50,000	--	--	0.32	3.8	0.50	2.4	30,000

The Woodcreek and Harbison Lift Stations have sufficient storage capacity under existing and buildout conditions. The Galloway Lift Station does meet the required six hour storage criteria under existing conditions but will require additional storage by 2030. The Moreno Lift Station will also require additional emergency storage to accommodate 2030 wastewater flows.

4.8.2 Tavern Road Siphon

The existing 2,100 feet of 4 and 6-inch diameter siphon located in Tavern Road is owned by Grossmont School District and maintained by the County. The siphon is designed to convey flows through the 4-inch diameter pipeline. In the event of a blockage, the 4 inch diameter pipeline will back up and overflow into the 6-inch diameter pipeline. The siphon currently conveys a peak dry weather flow of approximately 3,200 gpd at a velocity of 0.5 feet per second (fps). With such a low peak daily velocity or "cleansing" velocity, it is recommended that the County add the siphon to the list of special maintenance sites.

4.8.3 Gravity Pipelines

The gravity pipelines were evaluated under existing and projected wastewater flows based upon the criteria listed in Table 4-1. Under dry weather flow conditions pipeline capacity projects were identified if the peak flows exceeded a flow depth to pipe diameter (d/D) ratio of 0.50 for pipeline diameters 15 inch and smaller and 0.75 for pipelines greater than 15 inches in diameter. Under wet weather flow conditions pipeline capacity projects were identified if the peak flows exceeded a d/D ratio of 0.92 for all pipeline diameters.

The identified capacity limitations were analyzed for reasonableness by verifying that the capacity constraint reported by the model was a function of a downstream pipe size not extending far enough upstream and/or a pipe slope flatter than adjacent segments. Improvements required to provide adequate capacity for projected flows were then determined through an iterative modeling process. The process consisted of simulating flow conditions after increasing the diameter of downstream portions of the identified reaches. Table 4-7 summarizes the total length of the identified deficiencies in gravity pipeline capacity based on

model condition. A detailed summary of the identified deficiencies in gravity pipeline capacity provided in Appendix I.

Table 4-7 Gravity Pipeline Identified Deficiencies by Model Condition

Model Condition	Length (feet)
Existing Dry Weather	48,568
Existing Wet Weather	43,932
2030 Dry Weather	25,506
2030 Wet Weather	7,340
TOTAL	**125,346**

In summary, the capacity evaluation concluded that the County has a significant quantity of capacity-constrained sewers based on the evaluation criteria, especially under existing flow conditions. Figure 4-17 presents the location of the identified pipeline deficiencies. Identified capacity deficiencies were also evaluated in conjunction with identified condition related projects (presented in Chapter 5) to form the Capital Improvement Plan presented in Chapter 7.

Prior to construction of improvements, it is recommended that the County conduct detailed engineering investigations of the identified reaches that may include field inspections, flow metering during peak flow periods (such as holidays) and under wet-weather conditions, and video inspection to accurately assess the improvements needed.

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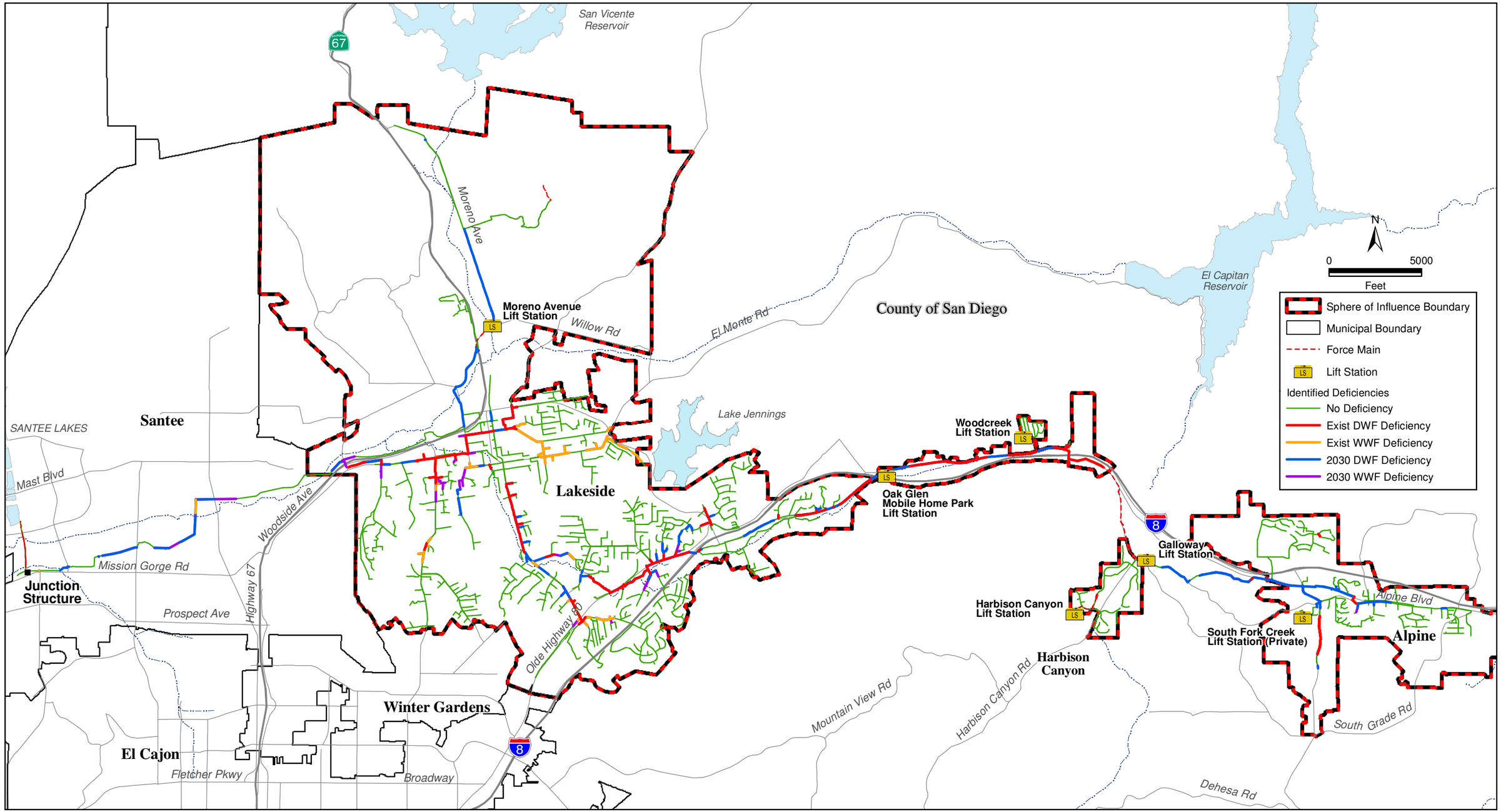

GRAVITY PIPELINE
IDENTIFIED DEFICIENCIES

FIGURE 4-17

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CHAPTER 5
CONDITION ASSESSMENT

This chapter provides a description of the condition assessment performed as part of the Master Plan, and includes:

- Collection system characteristics;
- Current maintenance goals and practices;
- Video inspection and assessment;
- Inspection and assessment results;
- Recommended rehabilitation program;
- Lift station condition assessment; and
- Potential phased recommended improvements.

5.1 Background

A wastewater system condition assessment provides municipalities with valuable information used to determine the funding required to repair and rehabilitate an aging collection system and to prioritize how the funds should be allocated. An assessment is used to identify the existing system conditions and defects which contribute to potential overflows. Such conditions include root intrusion at misaligned joints or cracks, inflow and infiltration (I/I) entering into the system through cracks in pipes or manholes or via illegal storm drain connections, which affect pipe capacity and treatment costs. The condition assessment of the existing collection system was based on the physical inspection of approximately 5 percent of each SSA collection system, which equates to 5,300 linear feet of sewer main in the Alpine SSA system and approximately 24,900 linear feet in the Lakeside SSA system, as well as a visual inspection of the lift stations. The pipeline segments selected for inspection and assessment were proportionate to each material/age category by length for both SSAs.

5.2 Collection System Characteristics

Both SSAs were established in the 1950s when VCP was the most common pipe material used for construction. Gravity pipelines constructed of VCP accompanied the growth in Alpine and Lakeside during the 1950s, 1960s and 1970s, while PVC accompanied the growth in Alpine and Lakeside during and the 1990s and 2000s. Gravity pipeline constructed in the 1980s were almost an even blend of VCP and PVC. Alpine SSA consists of predominantly PVC pipelines from the 1990s and 2000s, while Lakeside SSA consists of predominantly VCP pipelines from the 1960s and 1970s. A breakdown of Alpine SSA total pipeline length of material by age is provided in Table 5-1 and presented graphically in Figure 5-1. A breakdown of Lakeside SSA total pipeline length by material and age is provided in Table 5-2 and presented graphically in Figure 5-2. The pipeline materials presented in the tables and figures below are abbreviated to conserve space and the abbreviations are defined below:

Pipeline Material Abbreviations:

- ABS - Acrylonitrile Butadiene Styrene Pipe
- AC - Asbestos Cement Pipe
- CI - Cast Iron Pipe
- DI - Ductile Iron Pipe
- PVC - Poly-Vinyl Chloride Pipe
- RPMP - Reinforced Plastic Mortar Pipe
- VCP - Vitrified Clay Pipe

Table 5-1 Alpine SSA Gravity Pipeline Length of Material by Age

Age	Material					TOTAL (feet)
	AC	CI	PVC	VCP	Unknown	
1950	0	0	0	15,008	0	15,008
1960	0	40	0	1,077	2,324	3,441
1970	1,428	200	0	11,878	0	13,506
1980	0	0	1,813	2,510	390	4,713
1990	0	0	57,753	300	429	58,482
2000	0	0	9,844	0	32	9,876
Unknown	0	0	0	360	4,429	4,789
TOTAL	1,428	240	69,410	31,133	7,604	**109,815**

Figure 5-1 Alpine SSA Gravity Pipeline Length of Material by Age

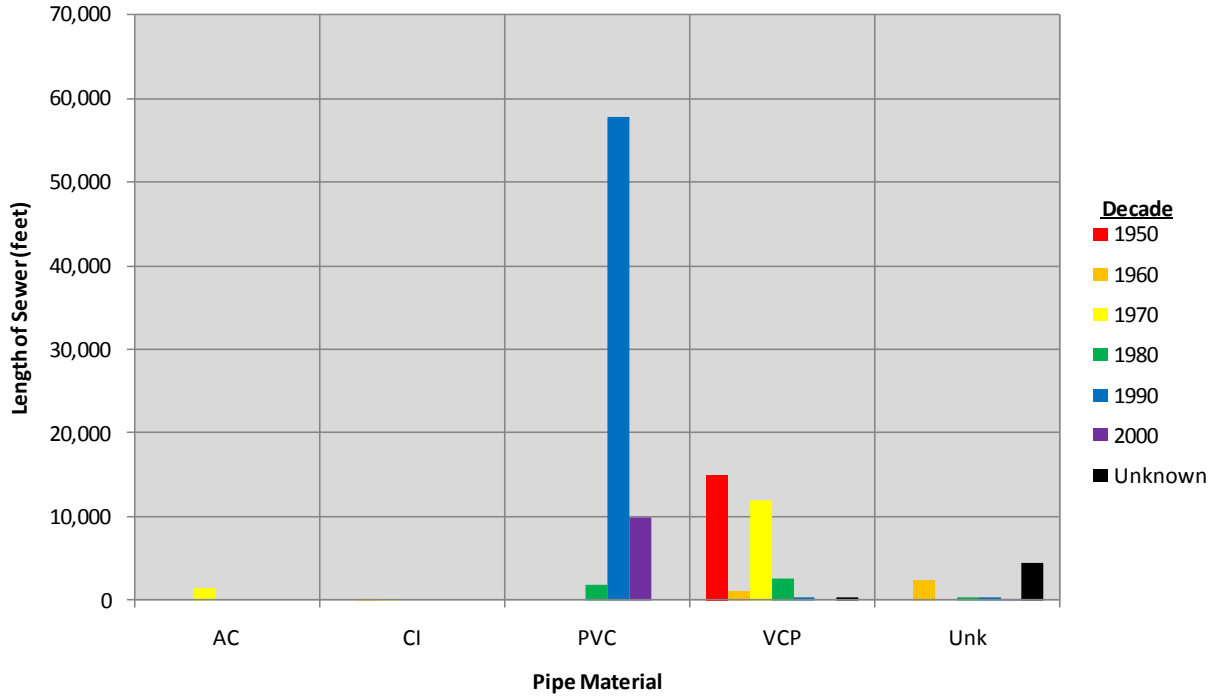
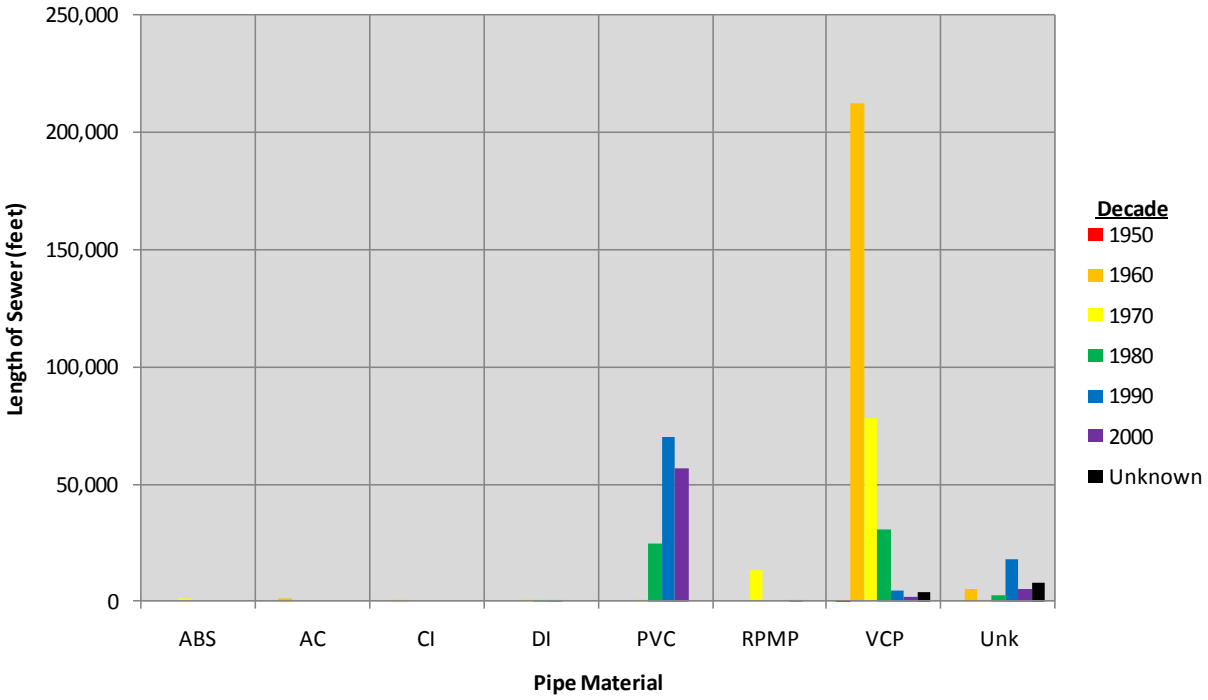


Table 5-2 Lakeside SSA Gravity Pipeline Length of Material by Age

Age	Material								TOTAL (feet)
	ABS	AC	CI	DI	PVC	RPMP	VCP	Unknown	
1950	0	0	0	0	0	0	473	0	473
1960	0	1,306	225	0	0	0	212,579	5,181	219,290
1970	1,597	0	0	216	754	13,361	77,818	5	93,752
1980	0	0	0	795	24,427	0	30,724	2,386	58,331
1990	0	0	0	330	70,289	0	4,571	17,794	92,984
2000	0	0	0	0	56,912	25	2,189	5,370	64,496
Unknown	0	0	0	0	0	0	3,673	7,815	11,488
TOTAL	**1,597**	**1,306**	**225**	**1,341**	**152,382**	**13,386**	**332,027**	**38,550**	**540,814**

Figure 5-2 Lakeside SSA Gravity Pipeline Length of Material by Age



5.3 Current Maintenance Practices

The County's Facility Operations staff conducts routine cleaning and inspection of pipelines within Alpine and Lakeside SSAs, as well as the County's other seven (7) SSAs. The County's goal is to clean the Alpine and Lakeside SSAs pipelines of diameters 15 inches and smaller on a yearly basis. Pipelines larger than 15 inch in diameter require specialized equipment, and as such the County contracts that work when necessary. Additionally, crews clean Special Maintenance locations on a quarterly basis. The Special Maintenance locations within the Alpine and Lakeside SSAs are presented in Figure 5-3 and include several of the County's pipelines with sags and areas identified as having excessive amounts of grease and sludge accumulation and root concentrations. Approximately 5 percent of the pipelines within the Alpine and Lakeside SSAs are video inspected annually.

5.4 Inspection and Assessment

Closed circuit television cameras offer valuable insight to the structural and maintenance condition of underground infrastructure. Video inspection of sewer pipelines is used to evaluate the existence and severity of cracks, misaligned joints, accumulation of roots or silt, and potential sources of infiltration. A representative cross-section of the gravity pipelines within the Alpine and Lakeside SSAs, encompassing 5 percent of the total length of pipe was video inspected for this study. The represented cross section was determined by selecting pipeline by lengths that amounted to five percent of the total length in each material/age (1970s/VCP) category. The analysis of this data assists in determining where rehabilitation is required and which method of repair is most appropriate and cost effective. From this analysis the rehabilitation needs of each SSA are extrapolated. Figure 5-4 presents the sewer pipelines that were inspected.

The video inspection was performed by Houston and Harris and standard observations and severity ratings were documented on video inspection logs, which included various locations of sewer mains with deficiencies including broken or cracked pipe, misaligned joints, grade breaks and rooting. Inspection log reports are provided in Appendix J. The inspection logs were independently reviewed by Atkins and each observation was assessed for its criticality to assist in determining the final pipeline rehabilitation recommendation. The following sections describe the criteria and procedures performed during the inspection and assessment.

5.4.1 Inspection Criteria and Procedures

For the purposes of this project, National Association of Sewer Service Companies (NASSCO) inspection codes and ratings were used. Implementation of the NASSCO codes provides a consistent method in the manner with which the inspection was conducted and the observations noted. A summary of the observation codes used for the CCTV inspection are included in Appendix K. The numeric severity rating (1-5) assigned to the specific structural and/or maintenance observations are also defined. A NASSCO severity rating of one (1) is minor while a severity rating of five (5) is severe. The severity ratings, as noted, are automatically assigned based on the structural and/or maintenance observation noted by the CCTV operator.

5.4.2 Assessment Criteria and Procedures

For each pipeline inspection conducted, the video record and log was independently reviewed as a quality check of the noted observations and respective ratings included in the database results and as confirmation that the data provided for performing the condition assessment was acceptable. The video inspection log for each sewer pipeline segment was analyzed and ranked to indicate the criticality of the asset condition using a scale of A through E to indicate the severity of the pipeline's condition, with E being the worst condition. Table 5-3 provides a summary of the general criticality ranking associated with the severity of the overall condition of the asset, as well as the recommended response time to complete the recommended action.

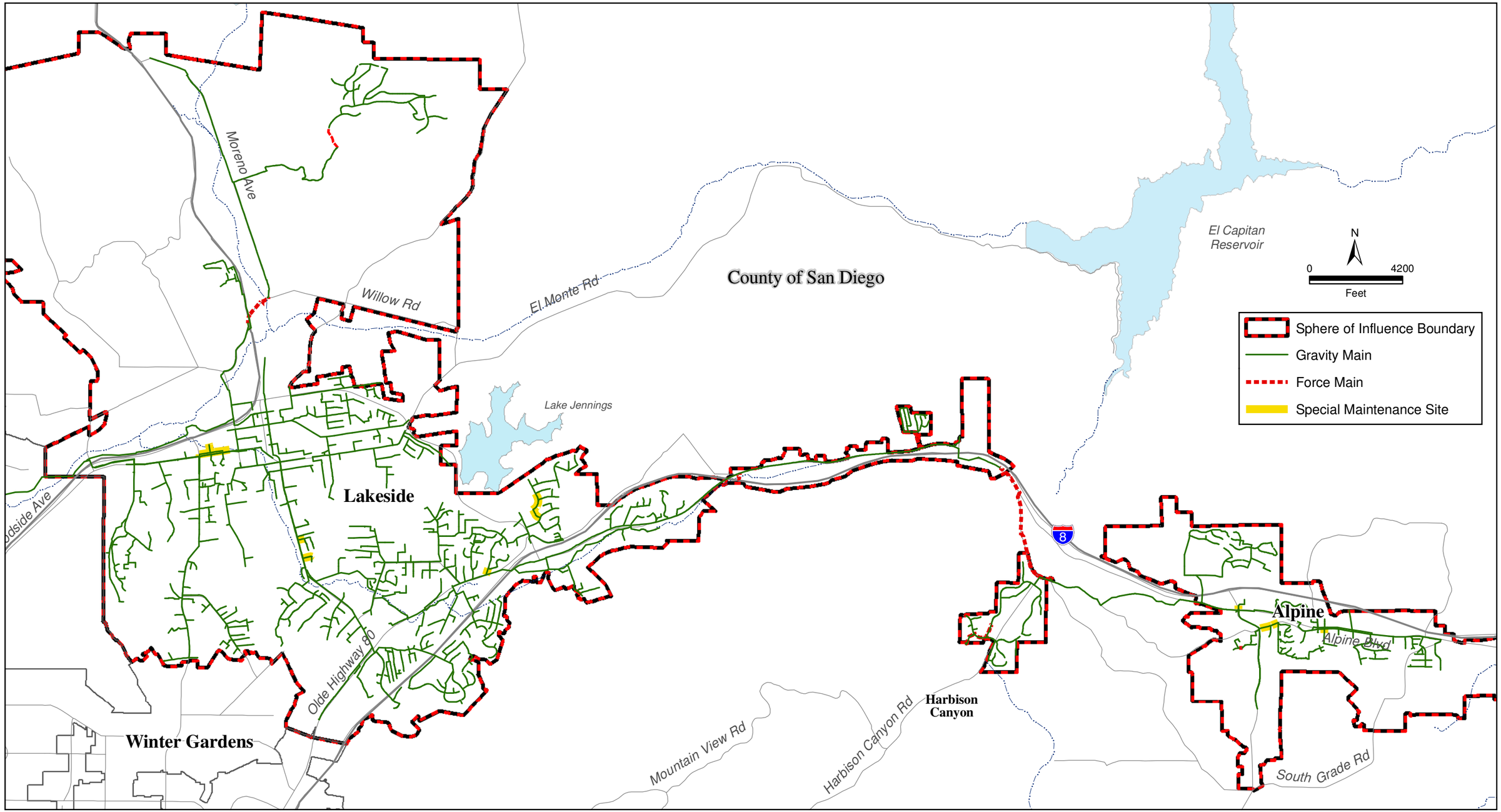
Table 5-3 Condition Severity Ranking

A	B	C	D	E
Good	Adequate	Moderate	Poor	Failing
Maintenance	5+ years	3 to 5 years	1 to 2 years	Immediate

The severity assigned to each pipeline is based on the criteria listed in Table 5-4. To ensure consistency and uniformity in the process, the staff performing the assessment applied the criteria to every inspected pipeline and manhole.

Table 5-4 Condition Assessment Criteria – Severity

Observation	A	B	C	D	E
Cracks • Circular • Longitudinal • Multiple	None	Very small hair line crack(s)	Hair line crack(s) <50% of ID in length	Cracks ≤1/8" wide or >50% of ID in length	Cracks >1/8" wide
Broken Pipe	None	Connecting cracks, no displacement	Connecting cracks, displacement ≤1/4"	Connecting cracks, displacement >1/4"	Collapsed pipe, impassable
Joints - Offset	Minimal	Up to 1/2 of the pipe thickness	1/2 to thickness of the pipe	Thickness of the pipe to 1½ times	> 1½ times the thickness of the pipe
Joints – Separation	None	Gasket exposed	Bell exposed	Dirt exposed at top	Dirt exposed at invert
Roots	Minimal	10% to 35% Fine roots	35% to 60% Fine/medium roots	60% to 80% Medium roots	80% to 100% Tap root(s) visible
Debris Accumulation	Minimal	Sporadic deposits (no rocks)	≤10% of ID (no rocks)	10% to 25% of ID and/or rocks	>25% of ID or impassable
Erosion (typical concrete pipe)	None	Rough surface	Exposed aggregate	Exposed rebar	Missing concrete
Mineral Deposits	None	Minimal (possible infiltration)	≤10% ID thickness	>10% ID thickness	Impassable, heavy mineral deposits
Infiltration	None	Dripping	Seeping	Constant stream	Gushing water
Sag	None	Minimal (probably not perceptible)	≤25% of ID	25% to 75% of ID	>75% of ID
Flow Capacity	Minimal	2/5 or less full	2/5 to 1/2 full	1/2 to 3/4 full	3/4 to totally full



SPECIAL MAINTENANCE SITES

FIGURE 5-3

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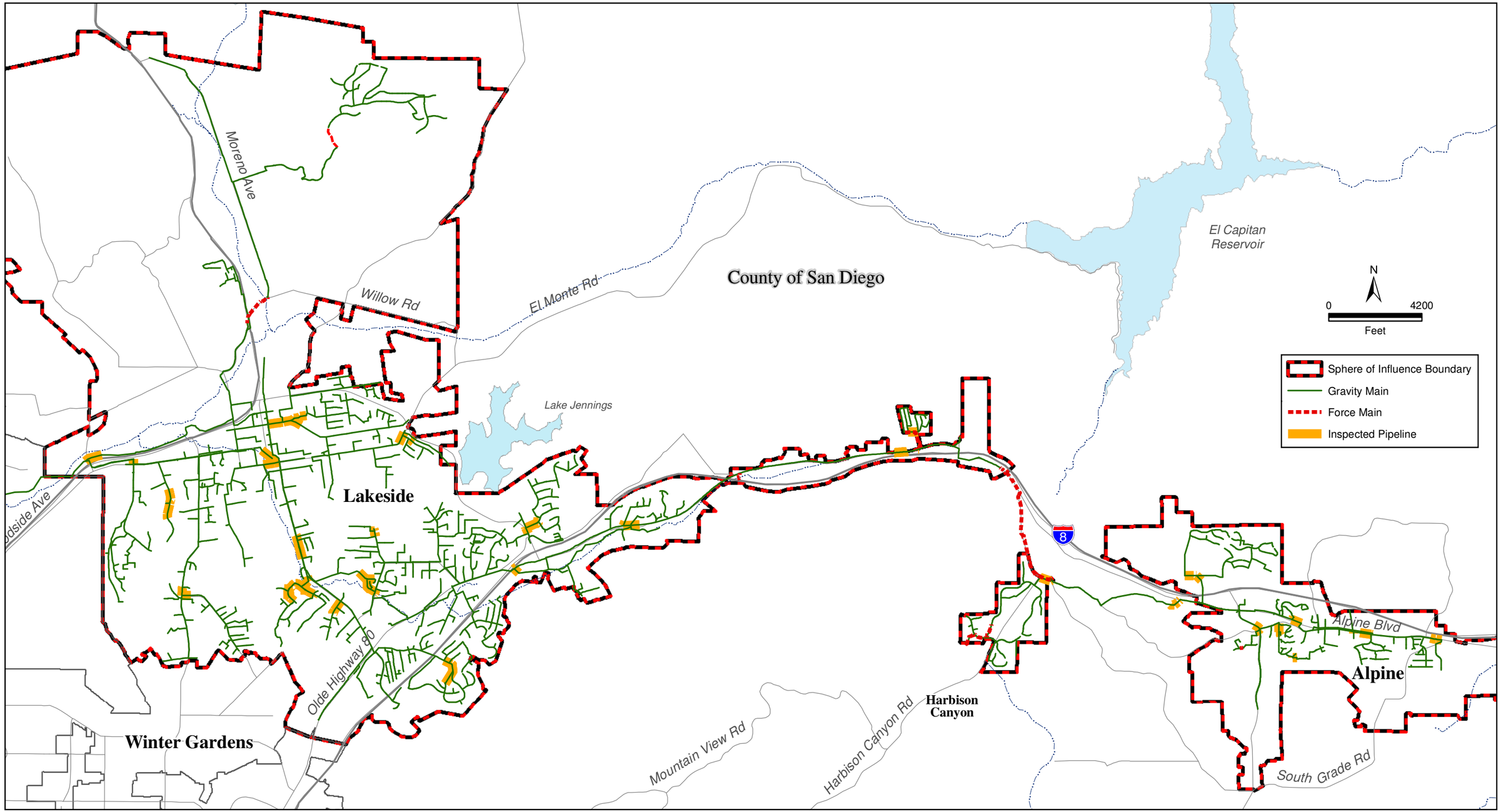

INSPECTED AND ASSESSED GRAVITY PIPELINES

FIGURE 5-4

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Using the applicable observation and severity, a preliminary recommendation for each pipeline segment was determined. Table 5-5 summarizes the preliminary recommendations for each observed condition and severity ranking.

Table 5-5 Preliminary Pipeline Recommendation Criteria

Observation	Condition Criticality Ranking				
	A	B	C	D	E
Cracks • Circular • Longitudinal • Multiple	No Action	No Action or Rehabilitate	No Action or Rehabilitate	Rehabilitate	Rehabilitate or Replace
Broken Pipe	No Action	No Action or Rehabilitate	Point Repair or Rehabilitate/ Replace	Point Repair or Replace	Immediate Point Repair
Joints – Offset	No Action	No Action or Rehabilitate	Point Repair and/or Rehabilitate	Point Repair and/or Rehabilitate/ Replace	Point Repair and/or Rehabilitate/ Replace
Joints – Separation	No Action	Rehabilitate	Rehabilitate	Point Repair and/or Rehabilitate/ Replace	Rehabilitate or Replace
Roots	No Action	Clean and Rehabilitate	Clean and Rehabilitate	Clean and Rehabilitate	Clean and Rehabilitate/ Replace
Debris Accumulation	No Action	Clean	Clean	Clean	Clean
Erosion (typical concrete pipe)	No Action	Rehabilitate	Rehabilitate or Replace	Rehabilitate or Replace	Replace
Mineral Deposits	No Action	No Action or Rehabilitate	Point Repair or Rehabilitate	Rehabilitate	Rehabilitate
Infiltration	No Action	No Action or Rehabilitate	Point Repair or Rehabilitate	Rehabilitate	Rehabilitate
Sag	No Action	No Action	Any Option	Replace	Replace
Flow Capacity	No Action	No Action	No Action	Evaluate Capacity	Evaluate Capacity

5.5 Inspection and Assessment Results

Each of the pipelines inspected were initially evaluated using the NASSCO Rating System and were subsequently more thoroughly assessed by conducting a comprehensive review of the videos, still images, and any additional data available. Prior to scheduling maintenance efforts and/or implementing repair and rehabilitation improvements, information included in the appendices should be further reviewed for additional detailed information pertaining to the overall condition of the pipelines inspected and assessed.

Overall, the pipe segments inspected are generally in good condition. Almost half of the observed pipelines required No Action. However, the system is in need of cleaning with approximately 25 percent of the inspected segments having debris accumulation or deposits in the pipeline. Approximately 25 percent of the observed pipe segments require repairs or rehabilitation. Table 5-6 includes a summary of the assessment findings based on pipe segments. Figure 5-5 graphically present the pipeline inspection and assessment findings by length. Figures 5-6 through 5-9 illustrate the recommendations for the pipelines within the Districts that were inspected and assessed based on age and material. Figure 5-10 and Figure 5-11 present the locations of the recommended actions in the Alpine and Lakeside SSAs, respectively. The recommendations include No Action, Maintenance, and Repair/Rehabilitate. Detailed pipeline recommendations are included in Appendix L.

Table 5-6 Pipeline Inspection and Assessment Findings by Segment and Length

Description	No Action	Maintenance	Repair/Rehabilitate	Total
Alpine SSA				
Number of Segments	12	6	8	26
Length (feet)	1,661	1,259	2,103	5,023
Percentage by Length	33.1%	25.0%	41.9%	100%
Lakeside SSA				
Number of Segments	35	24	20	79
Length (feet)	8,590	6,769	5,153	20,512
Percentage by Length	41.9%	33.0%	25.1%	100%

Figure 5-5 Pipeline Inspection and Assessment Findings by Percentage of Total Length

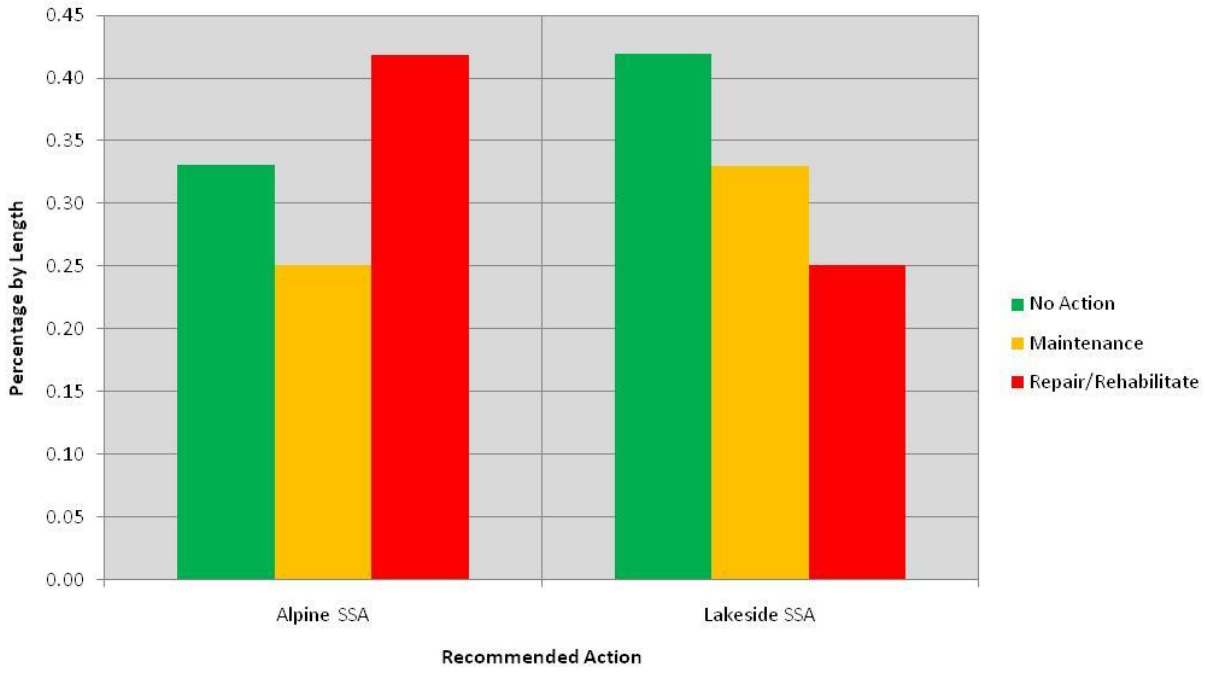


Figure 5-6 Alpine SSA Pipeline Inspection and Assessment Findings by Age

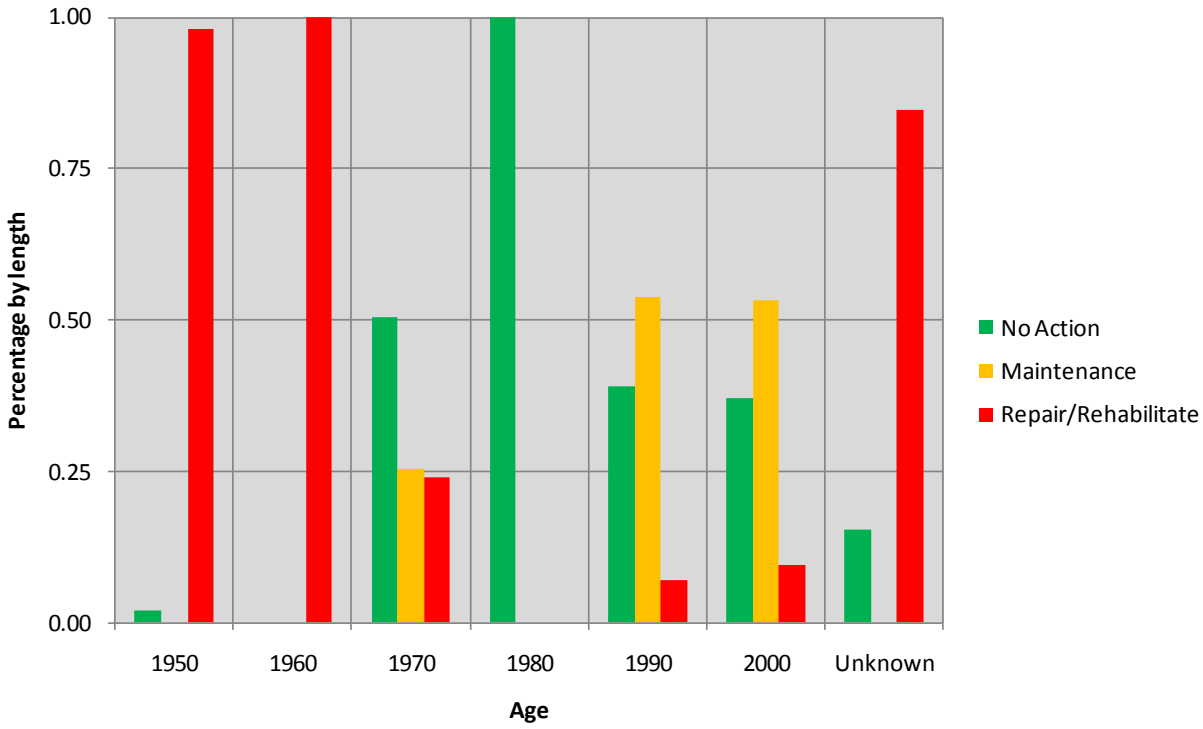


Figure 5-7 Alpine SSA Pipeline Inspection and Assessment Findings by Material

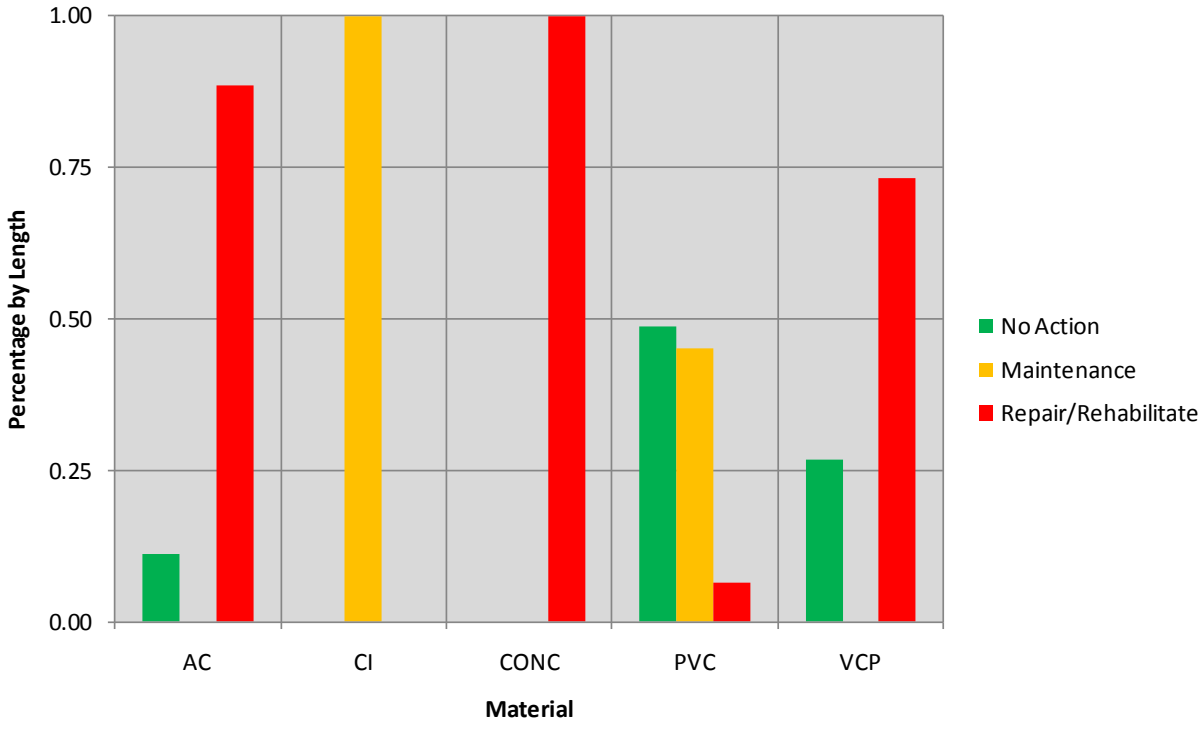


Figure 5-8 Lakeside SSA Pipeline Inspection and Assessment Findings by Age

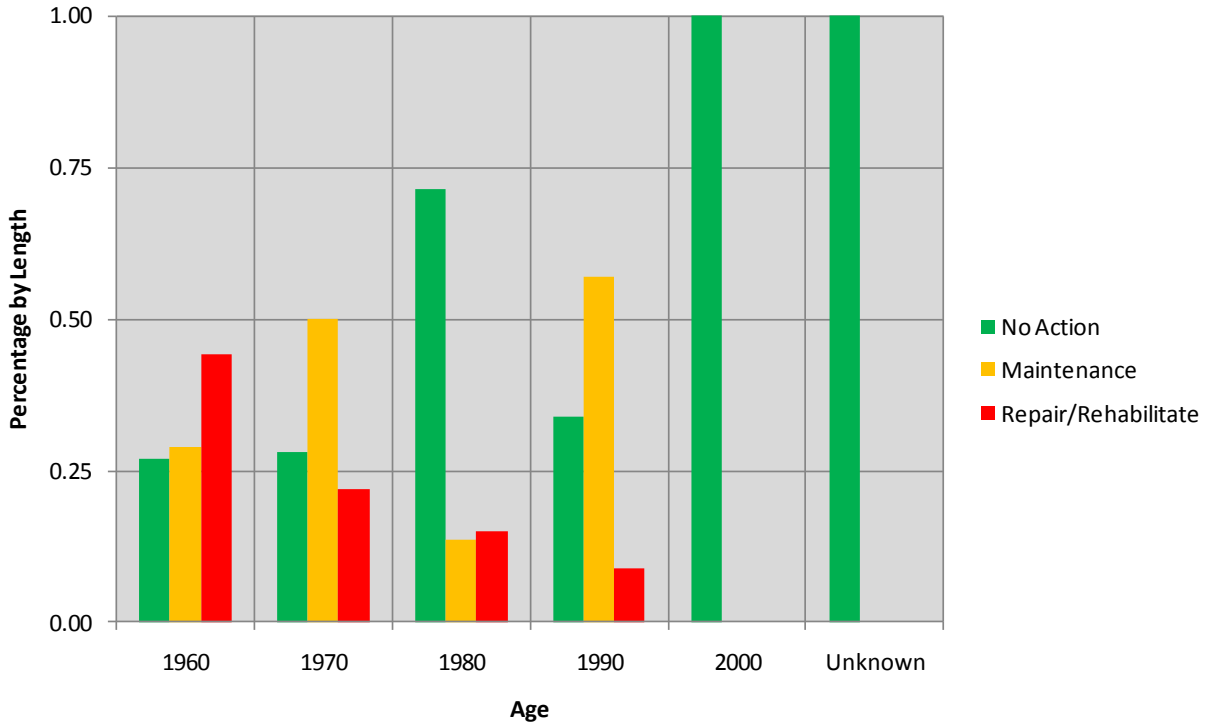
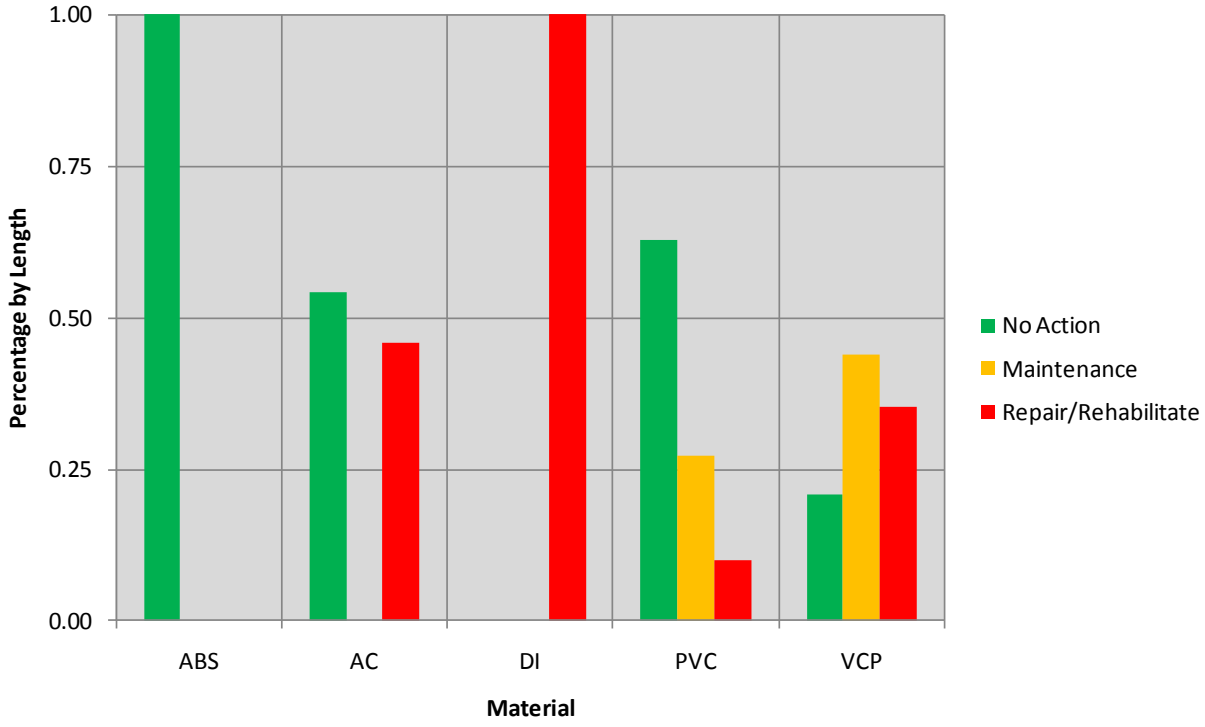


Figure 5-9 Lakeside SSA Pipeline Inspection and Assessment Findings by Material



Based on the inspection of 5 percent of the collection system for the SSAs, it appears that the pipelines in service for more than 50 years and non-PVC materials are likely to need repair or rehabilitation. Extrapolating these results over the entire system, approximately 181,837 feet of pipelines would potentially require rehabilitation or repair. Table 5-7 summarizes the projected length of rehabilitation or repair per SSA.

Table 5-7 Repair/Rehabilitate Extrapolation

District	Percent Repair/Rehabilitate	Extrapolated Length (feet)
Alpine SSA	41.9%	45,985
Lakeside SSA	25.1%	135,852
TOTAL	**27.9%**	**181,837**

It is recommended that the County perform additional video inspection and condition assessment of pipelines constructed with VCP and Unknown pipeline materials which were constructed prior to 1970 and non-PVC pipeline materials which were constructed prior to 1980. Figure 5-12 presents the locations of the recommended pipeline inspection and assessment.

The majority of the recommended pipeline inspection and assessment is located within Lakeside SSA. This coincides with the fact that a majority of the pipelines within Lakeside SSA were constructed in the 1960s of VCP material and are approaching their useful life. Furthermore, the results of the I&I analysis presented in Chapter 4 estimate that 94 percent of the I&I is occurring within Lakeside SSA. The recommended pipeline inspection and assessment within Lakeside SSA may assist the County in significantly reducing the affects of I&I within the collection system.

Table 5-8 summarizes the recommended actions for these older pipelines and extrapolates the likely action required. The extrapolated results suggest that the County would potentially need to rehabilitate approximately 128,500 feet or 24.3 miles of sewer main. Because this estimate is based on a limited inspection of a 5 percent cross section of the overall system, it is recommended that the County initially have 25 percent of the recommended pipeline inspection and assessment done and compare their assessment results to those presented in Table 5-7 to verify that the 5 percent sample properly reflects the typical conditions of the system.

Table 5-8 Recommended Action Extrapolation

Recommended Action	Length Assessed (feet)	Percentage of Total Length	Extrapolated Length (feet)
VCP			
No Action	1,482	19.4%	42,943
Maintenance	2,012	26.3%	58,314
Repair/Rehabilitate	4,148	54.3%	120,239
Other Materials			
No Action	785	37.5%	8,916
Maintenance	588	28.1%	6,675
Repair/Rehabilitate	721	34.4%	8,197

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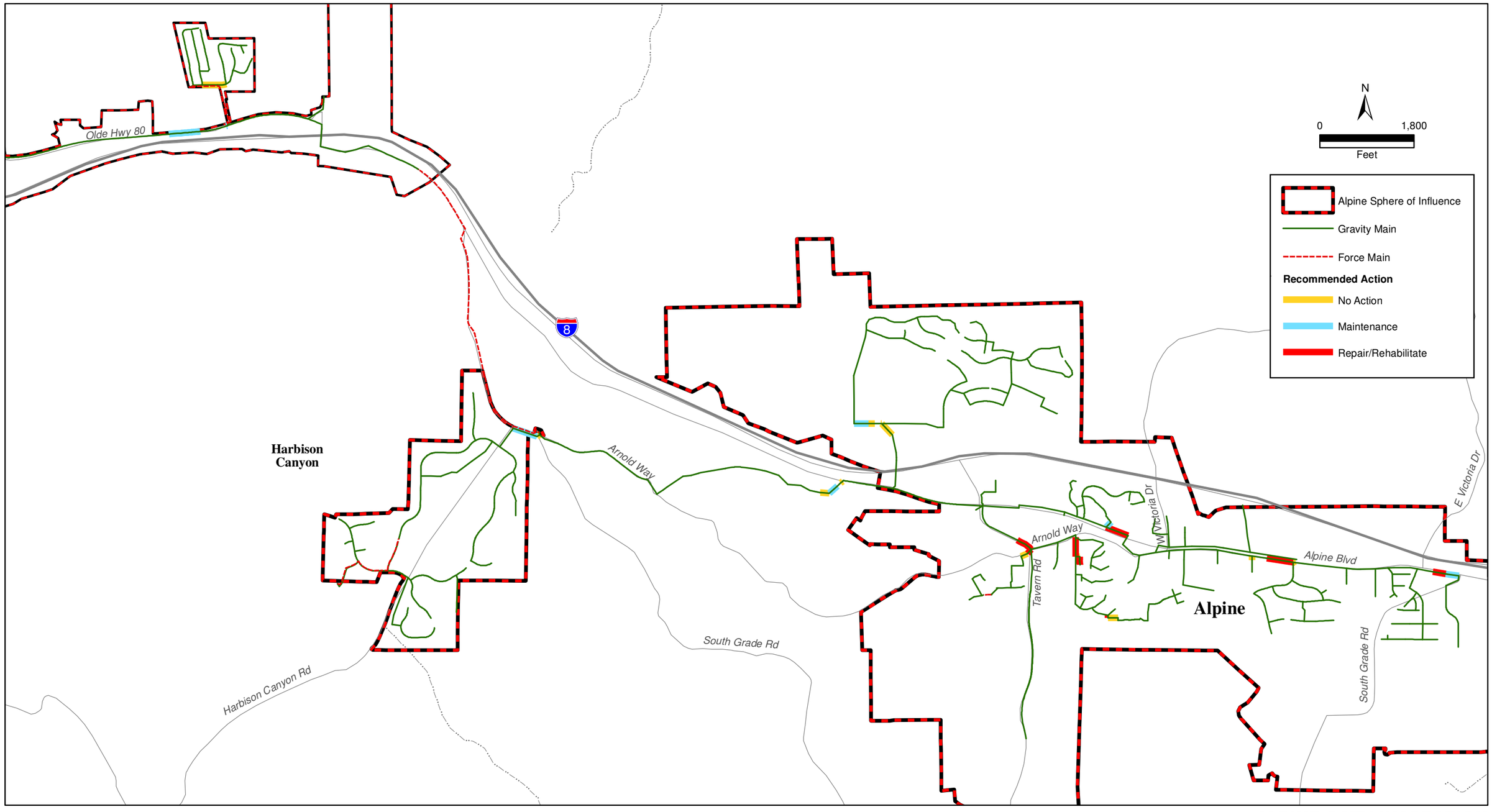

ALPINE CCTV INSPECTION AND ASSESSMENT RECOMMENDED ACTION

FIGURE 5-10

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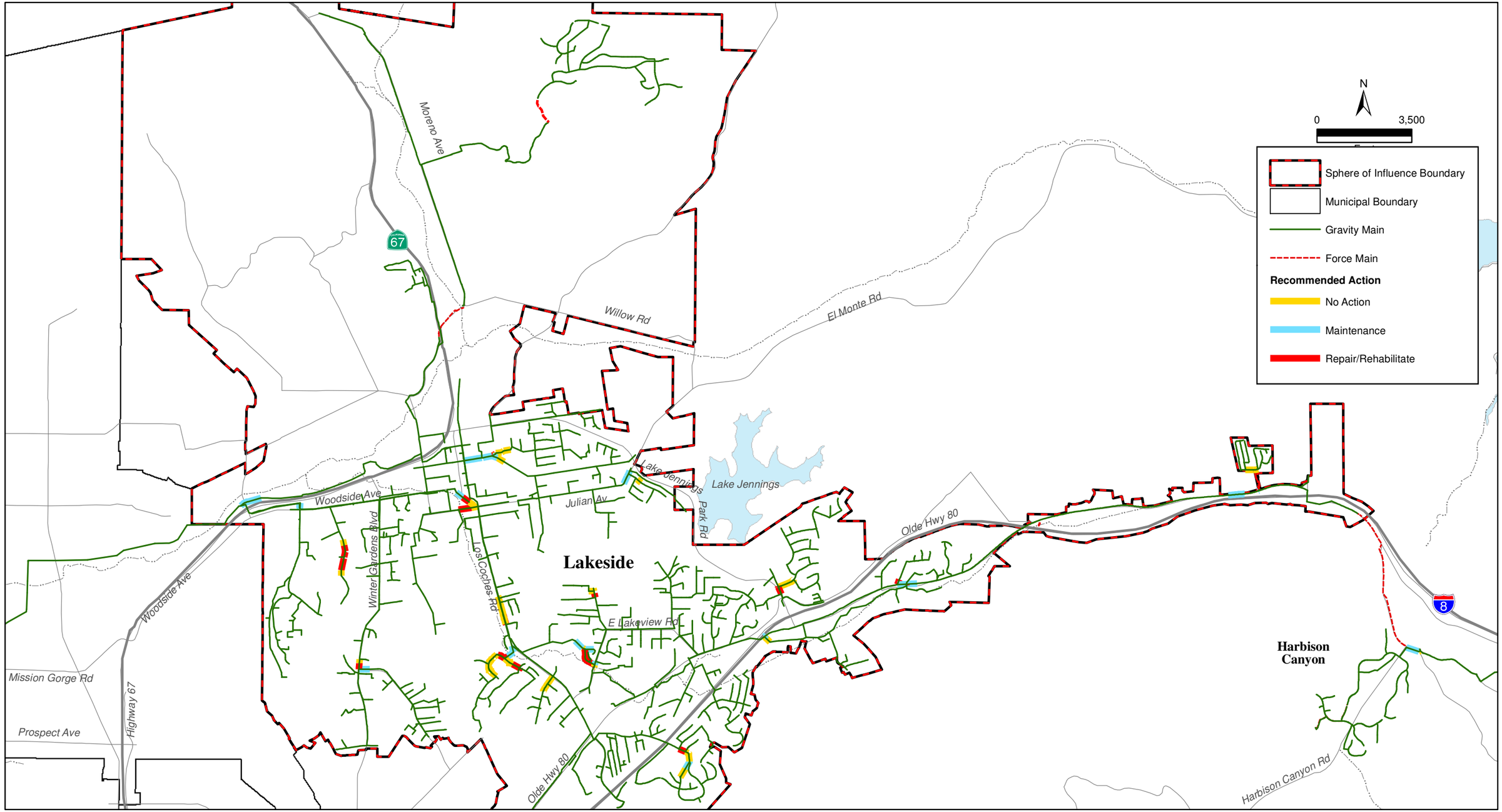

LAKESIDE CCTV INSPECTION AND ASSESSMENT RECOMMENDED ACTION

FIGURE 5-11

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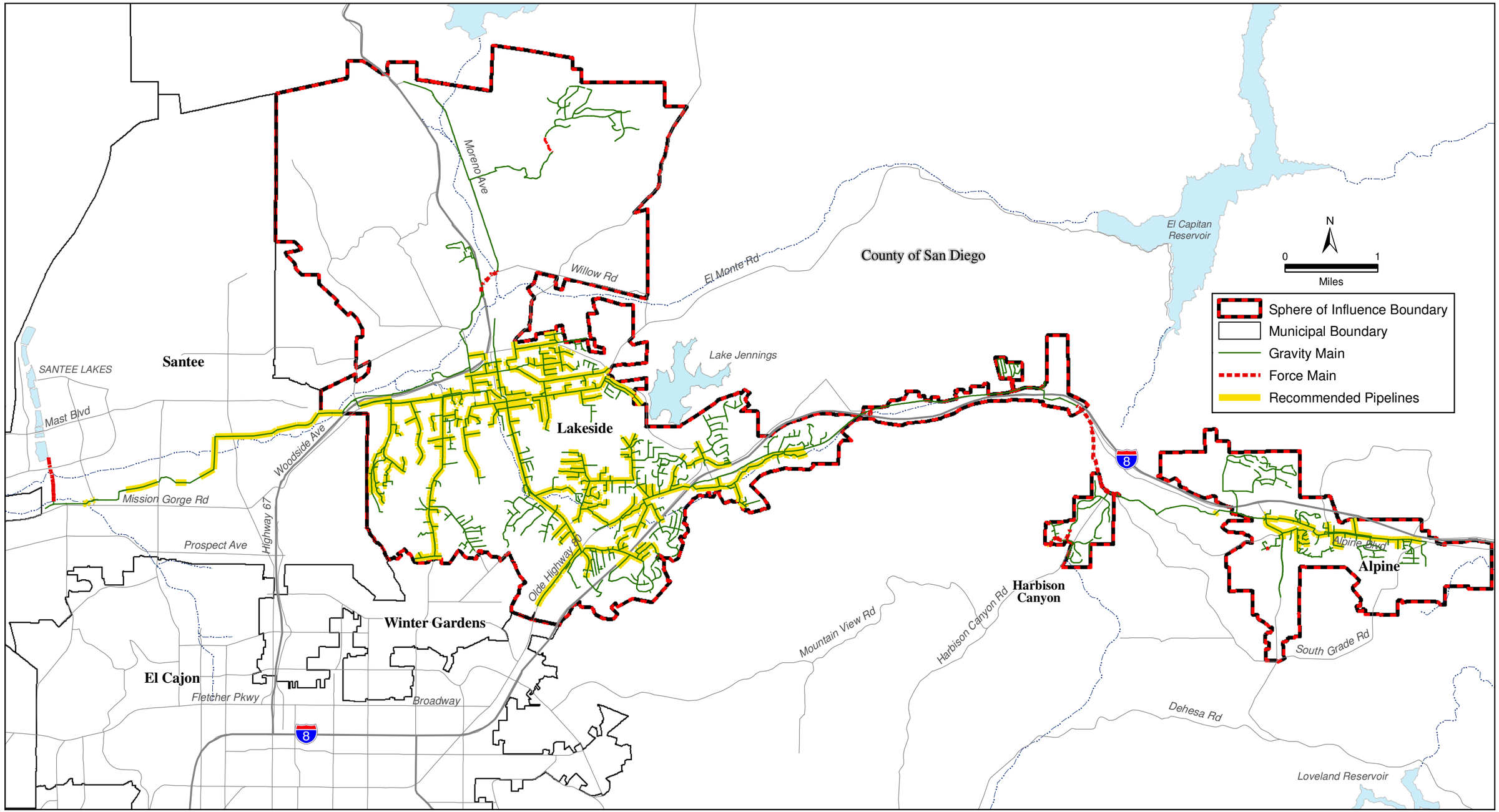

PIPELINES RECOMMENDED FOR INSPECTION AND ASSESSMENT

FIGURE 5-12

12/6/2011 KM SD Z:\Projects\IS\SanDiegoCounty\100001472_AsNeeded\14_AlpineLakeside_MasterPlan\mxd\FF\Recomm_Assess_Fig 5-12.mxd

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5.6 Lift Station Assessment

A visual inspection was performed of the lift stations with County operations staff to assess the physical condition of the facilities. The lift station's structure, wet well, odor control, instrumentation, pumps, and motors were inspected and assessed. Recommended phased condition improvements were based on the visual inspection and current staff maintenance concerns.

All active County-owned or maintained lift stations were assessed including Harbison Canyon, Galloway, and Woodcreek Lift Station. The Moreno Lift Station is not active and a proper site inspection could not be performed because the stations electrical equipment is not operational. The South Fork and Oak Glen Lift Stations are privately owned and maintained and as such were not inspected. The following sections describe each lift station in detail and highlight required improvements.

5.6.1 Harbison Canyon Lift Station

The Harbison Canyon Lift Station was constructed in 1989 and is located at the north-west corner of the Shadow Hills Elementary School property and is accessed via a driveway at the end of Birdie Run Court. The facility is a below-ground Smith and Loveless Pre-packaged Lift Station. The station has a separate dry and wet well and utilizes two centrifugal pumps in the dry well. The below grade dry well is accessed via an elevator. The site is equipped with a 7,500 gallon emergency storage basin and an emergency generator. The pumps and alarms are controlled using a bubbler system. The station is also equipped with an at-grade pump bypass force main tee, which allows the County to pump out the wet well into the force main in the event of a pump failure.

Recommended upgrades include sandblasting and re-coating the station, upgrading the emergency generator, replacing the bubbler with ultrasonic level controls, and performing routine service to the elevator. Based on the capacity analysis performed in Chapter 4, this station does not require any additional capacity upgrades through 2030.

5.6.2 Galloway Lift Station

The Galloway Lift Station was constructed in 1971 and is located at the intersection of Arnold Way and South Grade Road, and was upgraded in 2009. The station has a separate dry and wet well and utilizes two centrifugal pumps in the dry well and has a vacant pump pad for a future third pump. The site is equipped with a 100,000 gallon emergency storage basin and an emergency generator.

The pumps and alarms are controlled using a bubbler system. The station is also equipped with an at grade pump bypass force main tee, which allows the County to pump out the wet well into the force main in the event of a pump failure. The pumps are equipped with variable frequency drives that are currently set to approximately 80 percent of their max speed to avoid surcharging the 10 inch diameter gravity pipeline that the force main discharges into. Currently the pumps are experiencing noticeable vibrations. The pumps are permanently braced and no damage has been observed from the vibrations.

The County has designed and is anticipated to install an enhanced odor control system using Bi-oxide feed and a crane for the existing grinder pump. Recommended upgrades for the station include, replacing the bubbler with ultrasonic level controls and minor modifications to the wet well's mezzanine to enhance general maintenance. The County should also consider allocating funds for pump replacement based on a 10-year life cycle to account for any potential pump damage caused by the vibration.

5.6.3 Woodcreek Lift Station

The Woodcreek Lift Station was constructed in 1988 and is located within the Woodcreek Estates at the intersection of South Plains Court and East Ridge Road. The facility is an above ground Pre-packaged Lift Station. The station sits above the wet well and utilizes the two at grade centrifugal pumps located within the enclosure. The site is equipped with a 15,000 gallon emergency storage basin and an emergency generator. The small station is over 20 years old and it is recommended that the emergency generator be replaced to accommodate new pending CARB requirements and that a corrosion assessment be performed.

5.6.4 Moreno Lift Station

The Moreno Lift Station was built by the County to service the High Meadows Ranch development and properties within the Moreno Basin, however the proposed development stalled and the adjacent properties have not connected rendering no need for operation of the station in recent years. The lift station site is located at the intersection of Willow Street and Moreno Avenue. The lift station has never been operational and will require significant upgrades to the electrical and mechanical equipment to get the station operational. Since the County owns the station, they will be required to upgrade the facility to operational use when development planning at High Meadows Ranch progresses.

CHAPTER 6
WASTEWATER DISPOSAL AND REUSE OPPORTUNITIES/ALTERNATIVES

This chapter summarizes the existing wastewater disposal and potential disposal and reuse opportunities and alternatives available to the Alpine and Lakeside SSAs, and includes:

- Background;
- A summary of the existing disposal system and costs,
- Potential disposal and reuse opportunity by participation in a regional water reclamation facility;
- Potential disposal and reuse opportunity by constructing a small scalping water reclamation facility;
- A summary of costs of disposal and reuse opportunities, and recommendations for further study.

6.1 Background

The Alpine and Lakeside SSAs convey wastewater flows to the City's Municipal Sewage System where it is transported approximately 35 miles through City conveyance lines to the City's Point Loma Wastewater Water Treatment Plant (Metro) for treatment and disposal. The Point Loma Wastewater Treatment Plant utilizes advanced primary treatment before disposal to the ocean, and every five years the City prepares a waiver to the United States Environmental Protection Agency (EPA) for not meeting its secondary treatment standards. The Point Loma Wastewater Treatment Plant is located on a constrained site and currently, the City of San Diego and the participating agencies are actively evaluating alternatives to significantly reduce the wastewater flows to the Point Loma Wastewater Treatment Plant to allow for advanced treatment alternatives to meet secondary standards. This chapter serves to document existing disposal costs for the Alpine and Lakeside SSAs and opportunities to participate in a regional wastewater treatment plant currently being planned by the Padre Dam Municipal Water District. A conceptual plan to construct a scalping plant in the Alpine SSA is also presented.

6.2 Existing Treatment and Disposal

The Alpine and Lakeside SSAs convey wastewater flows to MWWD under a comprehensive Regional Wastewater Disposal Agreement enacted between the City of San Diego and the

MWWD-participating agencies. The EPA has granted the City of San Diego a waiver to its National Pollutant Discharge Elimination System (NPDES) Permit of 1995. The waiver allows the City to continue to operate the 240 mgd Point Loma Wastewater Treatment Plant as an advanced primary treatment facility rather than requiring an upgrade to secondary treatment. A condition of the waiver is to prepare a study that identifies opportunities to reduce flows to Point Loma Wastewater Treatment Plant and maximize water reuse from the waste stream. The Metropolitan Joint Powers Authority (Metro JPA) represents 16 entities, known as Participating Agencies that contribute wastewater to the City's wastewater treatment system, and pay their commensurate share of treatment and disposal costs.

In 2009, the total MWWD treatment and disposal costs were approximately $191.6 Million and the Alpine and Lakeside SSAs portion of those costs was approximately $2.8 Million. The treatment costs have been steadily rising over the decade and could be dramatically affected if the EPA does not grant the City the waiver to its NPDES permit, when it will need to renewed in 2015. The estimated cost to upgrade the Point Loma Wastewater Treatment Plant to full secondary treatment is not accurately known, but is anticipated to be between $1.0B and $1.5 B. At the current County and PA participation percentages, the portion that the County could be expected to pay for the Alpine and Lakeside SSAs could be between $17.5 Million to $26.25 Million.

6.3 Padre Dam Municipal Water District Water Reclamation Facility Expansions

Padre Dam Municipal Water District provides sewer collection services to the City of Santee and some adjacent areas of the County. The wastewater generated within the Padre Dam Municipal Water District sewer service area is conveyed either to the Padre Dam Municipal Water District Water Reclamation Facility or to the Lakeside Interceptor for conveyance to the MWWD system for treatment and disposal. The Padre Dam Municipal Water District Water Reclamation Facility acts as a scalping plant to produce recycled water, while, disposing of its bio-solids back to the MWWD system. Currently the Padre Dam Municipal Water District Water Reclamation Facility treats up to 2.0 mgd of wastewater, sending approximately 1.8 mgd of the treated effluent to the Santee Lakes and existing recycled water customers and 0.2 mgd of the brine back to the MWWD system.

Padre Dam Municipal Water District has recently prepared an engineering report outlining the expansion of its water reclamation facility in a three phased approach. Phase I is an expansion to 4.4 mgd to collect and treat Padre Dam Municipal Water District existing wastewater flows and provide increased recycled water for beneficial reuse, while reducing its imported potable water demands. Phase II is an expansion to 10 mgd with the intent of providing indirect potable reuse through advanced water treatment and conveyance and storage in the El Monte Groundwater Basin. Phase III is an expansion to 20 mgd to serve as a regional wastewater treatment facility with the assumption that the City's NPDES permit waiver is not granted by EPA and that significant investment in regional recycled water, indirect potable reuse, or direct potable reuse projects are made.

Phase I expansion would enable Padre Dam Municipal Water District to increase its recycled water market and also eliminate potable water supplements to augment recycled water supply in the high demand summer months. By making recycled water more available, Padre Dam Municipal Water District would increase recycled water deliveries to the Santee Lakes in the summer months to improve the water quality. This phase doesn't require any significant diversion and/or contribution of wastewater flows from the Alpine and Lakeside SSAs.

Phase II expansion of the water reclamation facility is planned to increase treatment capacity to 10.0 mgd. This expansion is planned with the intent of conveying recycled water through an advanced water treatment, to Helix Water District's El Monte Valley Recharge Project through the indirect potable reuse. The El Monte Valley Recharge Project was conceived in 2006 at a capacity of 5,000 AFY (4.5 mgd) to recharge the groundwater basin in El Monte Valley. The beneficial uses of the groundwater recharge are to restore natural habitats, provide recreational activities, utilize local sand resources, provide new source of water, and reduce the wastewater discharges to the ocean. This phase would require approximately 5.6 mgd of additional existing or future wastewater flows from the City of El Cajon and/or the Alpine and Lakeside SSAs and as such presents an opportunity for the County to re-evaluate regional treatment and disposal costs.

The estimated construction cost for the El Monte Valley Recharge Project ranges from $64M to $153M with the majority of the costs for the water reclamation facility expansion and the advanced water treatment facilities. Assuming that all of the Alpine and Lakeside SSAs wastewater flows are conveyed to the new treatment facility, and that half of the capital costs are proportioned to Helix Water District, the County may be asked to contribute anywhere from $11.2 Million to $26.8 Million, which has the potential to be less of a contribution than the estimated costs for Point Loma Wastewater Treatment Plant upgrades to secondary treatment.

Phase III expansion of the water reclamation facility is planned to increase treatment capacity to 20.0 mgd. This expansion is planned as a regional wastewater treatment and water supply alternative to treat wastewater from the Padre Dam Municipal Water District, El Cajon, and the Alpine, Lakeside and Winter Gardens SSAs and produce advanced treated effluent for use in expanded recycled water markets, indirect potable reuse in the El Monte Groundwater Basin and likely expanded regional indirect potable reuse or direct potable reuse projects. This expansion serves to drive long range regional wastewater disposal and water supply discussions and as such, specific costs have yet to be estimated.

6.4 Concept Plan for Alternative Treatment Facility (Alpine Water Reclamation Facility)

At a conceptual level, the feasibility of a new water recycling facility in Alpine was evaluated for its cost effectiveness. The Rite Aid store, located at Tavern Road and Alpine Boulevard, was the site of the abandoned Alpine WWTP. It is assumed that the proposed Alpine Water Reclamation Facility will be located in the same general location because the Alpine Trunk Sewer is aligned in Alpine Boulevard and at which point conveys approximately 80 percent of the average daily flow in the Alpine SSA, and can convey brine back to the Alpine trunk sewer.

Potential recycled water customers in the immediate vicinity of the proposed Water Reclamation Facility could be served by a proposed loop of recycled water distribution mains in Alpine Boulevard, Arnold Way, and Tavern Road. A few of the potential recycled water customers able to be served by this system are identified below:

- Commercial district along Alpine Boulevard, Arnold Way, and Tavern Road.
- Caltrans. Interstate 8

- Schools/Medical Facilities/Churches.
- Homeowner's Associations

The existing average daily wastewater flows at the proposed Alpine Water Reclamation Facility site would be approximately 0.3 mgd, which may meet anticipated demands from the identified users above. Assuming that the potential customers listed above were able to utilize 0.3 mgd of recycled water, the Water Reclamation Facility would need to be constructed along with approximately 13,000 feet of new recycled water distribution main. Assuming a range of unit costs between $15 and $20 per gallon for the Water Reclamation Facility and $100 o $150 per foot for the distribution system piping, the estimated costs for the new plant and recycled water system could range from approximately $6 Million to $8 Million. While the estimated costs for the proposed Alpine Water Reclamation Facility are higher than the regional alternatives on a unit costs basis, they may be low enough from a capital perspective for a potential developer to fund if water offsets are needed for the project. Furthermore, a detailed water market assessment would need to be conducted to document the potential recycled water demand and the costs of retrofitting existing irrigation systems.

6.5 Summary

The Alpine and Lakeside SSAs currently dispose of their wastewater to the MWWD system for treatment at the Point Loma Wastewater Treatment Plant. The costs of MWWD treatment have been steadily climbing over the last decade and present significant capital risk if the EPA denies the City's NPDES waiver. The City, along with the Participating Agencies has undertaken numerous studies and evaluation of potential regional treatment plants in order to offload the Point Loma Wastewater Treatment Plant. The Padre Dam Municipal Water District Water Reclamation Facility Phase II Expansion may provide the County with the most viable opportunity for the County to shield the financial risk of the Point Loma Wastewater Treatment Plant being required to treat to secondary standards. While a conceptual Alpine Water Reclamation Facility may not make financial sense for the County, with the current water supply climate and the close proximity of potential recycled water customers, a developer seeking water offset credits may see an opportunity for the project. It is recommended that the County closely monitor the regional wastewater treatment and disposal discussions and seek participation in the Padre Dam Municipal Water District Phase II Expansion Project.

CHAPTER 7
PROPOSED CAPITAL IMPROVEMENT PROGRAM

This chapter presents the proposed Capital Improvement Program (CIP) based on the findings of the Master Plan and includes:

- Development of Unit Costs;
- Capital Improvement Project Summary of Cost and Timing; and
- Proposed Condition Upgrades and estimated costs

7.1 Development of Unit Costs

The unit cost estimates reflect full capitalization inclusive of planning, engineering design, environmental, legal, construction, construction management and contract administration. The values are presented in mid-2010 dollars based on an anticipated ENR Construction Cost Index (ENR-CCI) of 9969 for the Los Angeles/Orange County area. These estimates are based on representative available data at the time of this report; however, since prices of materials and labor fluctuate over time, new estimates should be obtained at or near the time of construction of proposed facilities. A scaling factor has been included to account for pipeline projects that are relatively short in distance or have more significant environmental or construction challenges. The CIP has been divided into four phases.

7.1.1 Pipelines

Base unit costs for pipeline material and installation including repaving and system appurtenances that, collectively, constitute principal elements of the wastewater collection system facilities, are presented in Table 7-1.

The unit costs provided above reflect an average cost for full capitalization inclusive of planning, engineering design, environmental, legal, construction (including all appurtenances), construction management and contract administration. Special circumstances (e.g., jacking, trenchless installations, tunnels, etc.) are considered separately on a case-by-case basis. A scaling factor was applied to each project to account for project specific issues such as difficult conditions, constrained access, congested areas, etc.

Table 7-1 Pipeline Unit Costs

Diameter (inches)	Sewer, Gravity ($/LF)
4	200
6	300
8	350
10	425
12	500
15	600
18	650
21	700
24	750
30	850
36	900
39	950
42	1000

7.1.2 Lift Stations

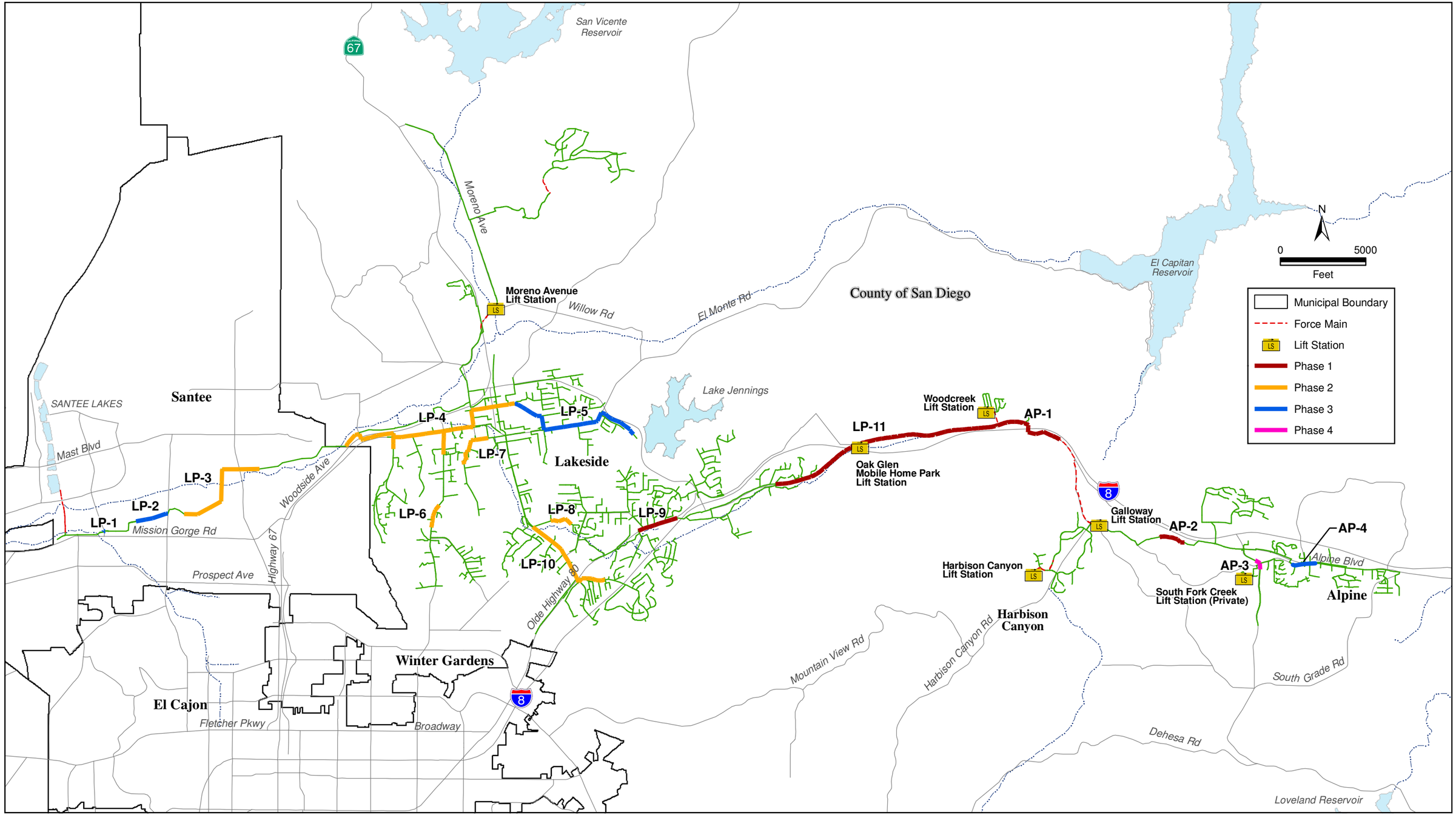
Lift station upgrades are primarily condition related and only the Galloway Lift Station require upgrades to address projected wastewater flows. The Galloway Lift Station will likely require pump replacements and electrical/control upgrades as well as additional emergency storage in Phase 4 estimated at approximately $500,000. The Moreno Lift Station will also require significant upgrades to the mechanical and electrical equipment estimated at approximately $200,000 to get the station up and running.

7.2 Recommended CIP Program

The CIP projects identify facilities needed to meet existing system needs based on the County's design criteria for the wastewater collection systems. As previously discussed, the CIP projects are presented in four major phases of work based on priority needs. The total CIP costs including Phase 1 through 4 are estimated to be $4.8 million for Alpine SSA and $41.4 million for the Lakeside SSAs. These costs are summarized by phase in Table 7-3. Proposed CIP projects recommended for the Alpine and Lakeside SSA's collection systems are listed in Table 7-2, and shown and described in further detail on the subsequent pages.

Table 7-2 CIP Summary

Description	Alpine	Lakeside	Total
Phase I	$2,444,000	$10,895,000	$13,339,000
Phase II	$0	$23,140,000	$23,140,000
Phase III	$1,440,000	$7,525,000	$8,965,000
Phase IV	$920,000	$0	$920,000
Total	**$4,804,000**	**$41,560,000**	**$46,364,000**



CAPITAL IMPROVEMENT PROJECTS

FIGURE 7-1

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ATKINS

Alpine and Lakeside Sewer Service Areas
Sewer Master Plan
December 2011

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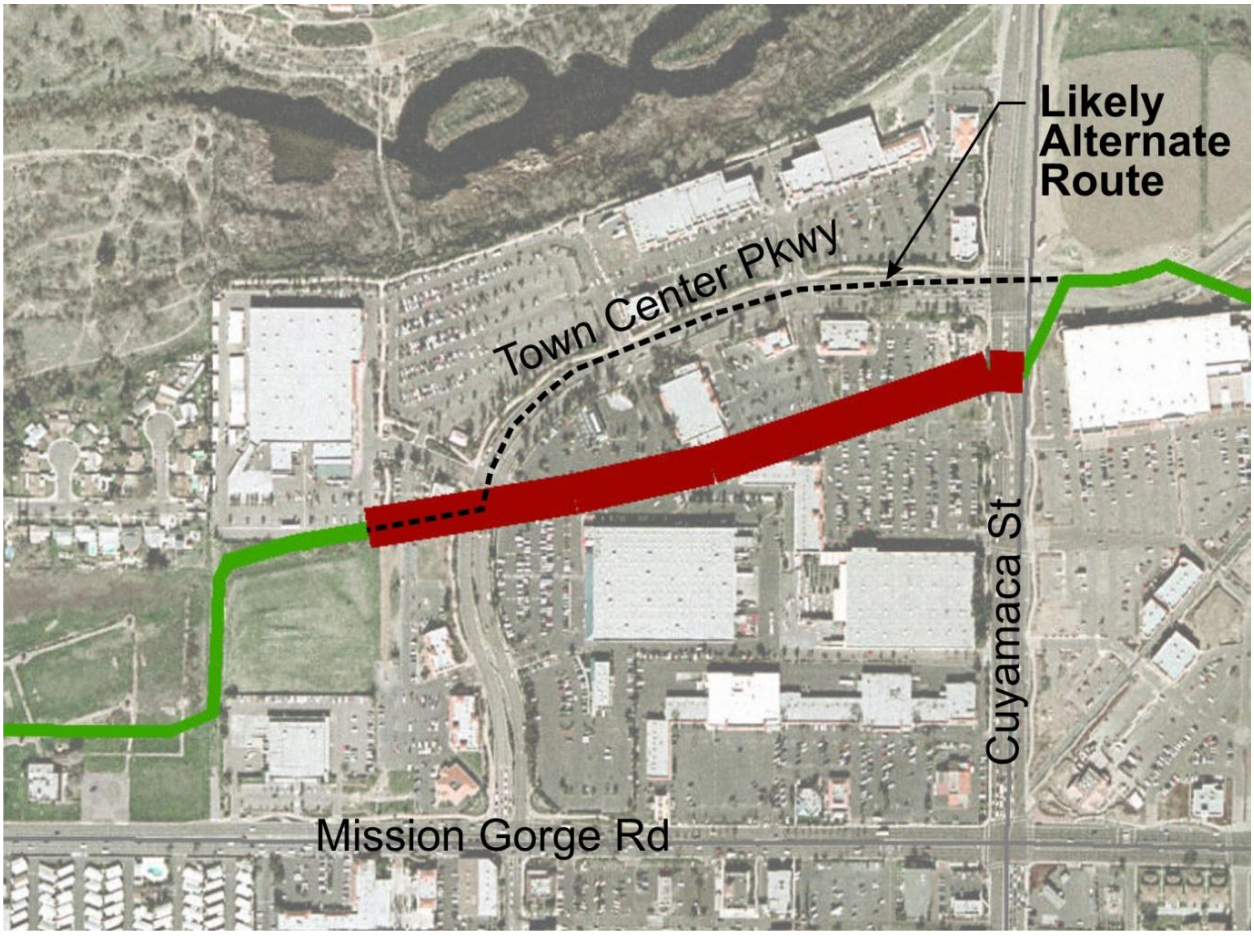
Table 7-3 Alpine & Lakeside Master Plan Capital Improvement Program

CIP #	Type	Project	Description	Units	Base Unit Cost	Scaling Factor	Description	CIP Cost	Priority	Phase				Phased Cost			
										I	II	III	IV	I	II	III	IV
LP-1	Pipeline	Lakeside Interceptor at Carlton Hills and Forrester Creek Sewer Pipeline Replacement Project	Replace approximately 150 feet of existing 27 inch diameter with 36-inch diameter.	150 -LF	$ 900 /LF	3.0	The scaling factor was taken at 3.0 to account for mobilization costs and traffic control for Carlton Hills Boulevard.	$405,000	3	0%	0%	100%	0%	$0	$0	$405,000	$0
LP-2	Pipeline	Lakeside Interceptor in Costco Parking Lot Sewer Pipeline Replacement Project	Replace approximately 2,200 feet of existing 27 inch diameter with 36 inch diameter.	2200 - LF	$ 900 /LF	1.5	The scaling factor was taken at 1.5 to account for construction through businesses parking lot.	$2,970,000	3	0%	0%	100%	0%	$0	$0	$2,970,000	$0
LP-3	Pipeline	Lakeside Interceptor from Magnolia to Transit Center Sewer Pipeline Replacement Project	Replace approximately 6,500 feet of existing 27 inch and 30 inch diameter with 36 inch diameter. Project likely to coincide with other construction or remediation along the river valley.	6500 - LF	$ 900 /LF	1.0	No comment	$5,850,000	2	0%	100%	0%	0%	$0	$5,850,000	$0	$0
LP-4	Pipeline	Lakeside Trunk Sewer Pipeline Replacement Project	Replace approximately 14,000 feet of existing pipeline ranging in diameter from 8 to 27 inch with 12 to 36 inch diameter. Recommended Phase I alignment study because of box culvert along Woodside Avenue.	14000 - LF	$ 679 /LF	1.00 1.05	The base unit cost was taken as a weighted average between the proposed diameters. The scaling factor was taken at 1.05 to account for Caltrans crossing	$200,000 $9,988,000	1 2	100% 0%	0% 100%	0% 0%	0% 0%	$200,000 $0	$0 $9,988,000	$0 $0	$0 $0
LP-5	Pipeline	Lakeshore and Julian Trunk Sewer Pipeline Replacement Project	Replace approximately 8,600 feet of existing 8 and 10 inch diameter pipeline with diameters ranging from 10 to 15 inch.	8600 - LF	$ 508 /LF	1.00	The base unit cost was taken as a weighted average between the proposed diameters. The project is only triggered during wet weather and as such a 2% allocation in Phase I has been included for flow metering	$4,368,000	2	2%	0%	98%	0%	$87,000	$0	$4,281,000	$0
LP-6	Pipeline	Winter Gardens Trunk Sewer Pipeline Replacement Project	Replace approximately 2,000 feet of existing 8 inch diameter with approximately 900 feet of 8 inch diameter and 1,100 feet of 15 inch diameter.	2000 - LF	$ 488 /LF	1.2	The base unit cost was taken as a weighted average between the proposed diameters. The scaling factor was taken at 1.2 to account for traffic control. The 8-inch diameter replacement is driven by the observed condition of the pipeline.	$1,170,000	2	0%	100%	0%	0%	$0	$1,170,000	$0	$0
LP-7	Pipeline	Julian & Prospect Trunk Sewer Pipeline Replacement Project	Replace approximately 2,900 feet of existing 8 inch diameter with approximately 1,800 feet of 12 inch diameter and 1,100 feet of 15 inch diameter.	2900 - LF	$ 538 /LF	1.2	The base unit cost was taken as a weighted average between the proposed diameters. The scaling factor was taken at 1.2 to account for traffic control.	$1,872,000	2	0%	100%	0%	0%	$0	$1,872,000	$0	$0
LP-8	Pipeline	Industry Road (Ha-Hana) Sewer Pipeline Replacement Project	Replace or parallel approximately 900 feet of existing 18 inch diameter with 18 inch diameter at 1% slope. Replacement project assumes uniform slope while parallel project assumes existing vertical alignment.	900 -LF	$ 650 /LF	2.0	The existing vertical alignment of the pipeline causes a significant hydraulic jump that has the potential to cause a sewer overflow. Jack and bore replacement under box culvert. The scaling factor was taken at 2.0 to account for trenchless construction	$1,170,000	2	0%	100%	0%	0%	$0	$1,170,000	$0	$0
LP-9	Pipeline	Olde Highway 80 Sewer Pipeline Replacement Project	Replace approximately 2,400 feet of existing 12 inch diameter with 18 inch diameter.	2400 - LF	$ 650 /LF	1.0	Designed - Construction in 2012	$1,560,000	1	100%	0%	0%	0%	$1,560,000	$0	$0	$0

CIP #	Type	Project	Description	Units	Base Unit Cost	Scaling Factor	Description	CIP Cost	Priority	Phase				Phased Cost			
										I	II	III	IV	I	II	III	IV
LP-10	Pipeline	Los Coches Road Sewer Pipeline Replacement Project	Replace approximately 6,100 feet of existing 8 and 10 inch diameter pipeline with diameters ranging from 12 to 15 inch.	6100 - LF	$ 507 /LF	1.0	The base unit cost was taken as a weighted average between the proposed diameters.	$3,090,000	2	0%	100%	0%	0%	$0	$3,090,000	$0	$0
LP-11	Pipeline	Flinn Springs Interceptor II/III Sewer Pipeline Replacement Project	Replace approximately 13,600 feet of existing pipeline ranging in diameter from 8 to 12 inch with 15 and 18 inch diameter.	13600 - LF	$ 641 /LF	1.0	The base unit cost was taken as a weighted average between the proposed diameters. No Caltrans crossing.	$8,717,000	1	100%	0%	0%	0%	$8,717,000	$0	$0	$0
L-LS	Lift Station	Moreno Lift Station	Upgrade Mechanical and Electrical equipment	1	$200,000	-	N/A	$200,000	1	100%	0%	0%	0%	$200,000	$0	$0	$0
AP-1	Pipeline	Flinn Springs Interceptor I Sewer Pipeline Replacement Project	Replace approximately 4,400 feet of existing 10 inch diameter with 15 inch diameter.	2800 - LF	$ 600 /LF	1.1	Designed - Construction in 2012. Scaling factor includes accommodation for new Air-Vac assembly outside of road ROW	$1,764,000	1	100%	0%	0%	0%	$1,764,000	$0	$0	$0
AP-2	Pipeline	Alpine Interceptor Sewer Pipeline Replacement Project (Midway Drive)	Parallel approximately 1,600 feet of existing 12 inch diameter with 10 inch diameter.	1600 - LF	$ 425 /LF	1.0	No comment	$680,000	1	100%	0%	0%	0%	$680,000	$0	$0	$0
AP-3	Pipeline	Tavern Road Sewer Pipeline Replacement Project	Replace approximately 700 feet of existing 8 inch diameter with 12 inch diameter.	700 -LF	$ 500 /LF	1.2	The scaling factor was taken at 1.2 to account for mobilization	$420,000	4	0%	0%	0%	100%	$0	$0	$0	$420,000
AP-4	Pipeline	Alpine Interceptor Sewer Pipeline Replacement	Replace approximately 1,600 feet of existing 8 inch diameter with 15-inch diameter.	1600 - LF	$ 600 /LF	1.5	The new Alpine High School and road construction moratorium in Alpine Blvd will determine project timing. The scaling factor was taken at 1.5 to account for traffic control and mobilization	$1,440,000	3	0%	0%	100%	0%	$0	$0	$1,440,000	$0
A-LS	Lift Station	Galloway Lift Station Pump and Storage Upgrades	New pumps (3) with capacity of 2,100 gpm & 125,000 gallons of additional storage	1	--	--	N/A	$500,000	4	0%	0%	0%	100%	$0	$0	$0	$500,000

CIP Project:	LP-1 – Lakeside Sewer Interceptor at Carlton Hills and Forrester Creek Sewer Pipeline Replacement Project
Description:	Replace approximately 150 feet of existing 27 inch diameter with 36-inch diameter of the Lakeside Interceptor crossing Carlton Hills
Estimated Construction Cost:	$405,000
Estimated Construction Schedule:	Phase III

CIP Project:	LP-2 – Lakeside Sewer Interceptor in Costco Parking Lot Sewer Pipeline Replacement Project
Description:	Replace approximately 2,200 feet of existing 27 inch diameter with 36 inch diameter of the Lakeside Interceptor within the Costco parking lot. A likely alternative route for the replacement sewer is along Town Center Parkway to avoid disruptions to businesses.
Estimated Construction Cost:	$2,970,000
Estimated Construction Schedule:	Phase III

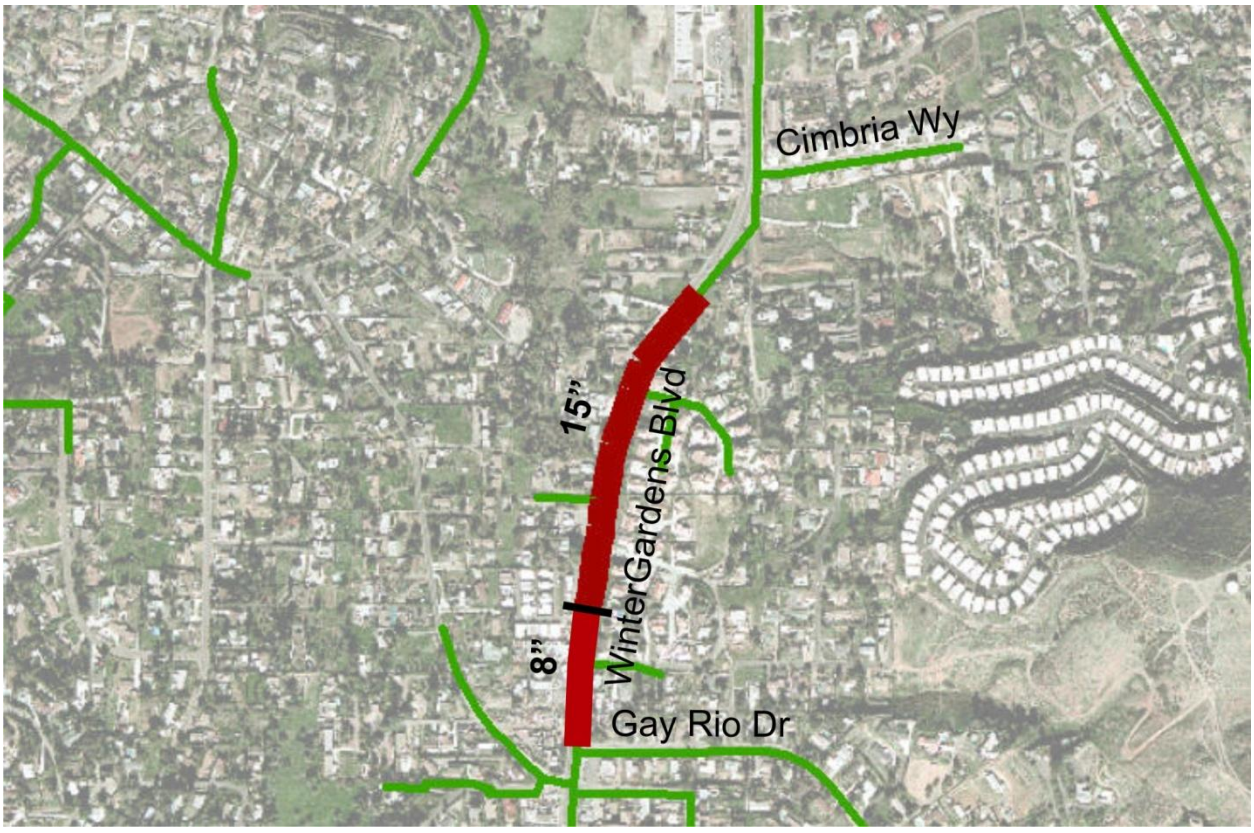


CIP Project:	LP-3 – Lakeside Sewer Interceptor from Magnolia to Transit Center Sewer Pipeline Replacement Project
Description:	Replace approximately 6,500 feet of existing 27 inch and 30 inch diameter with 36 inch diameter. Project will likely coincide with other construction or remediation along the river valley and within the proposed relocation of Las Colinas Detention Facility.
Estimated Construction Cost:	**$**5,850,000
Estimated Construction Schedule:	Phase II

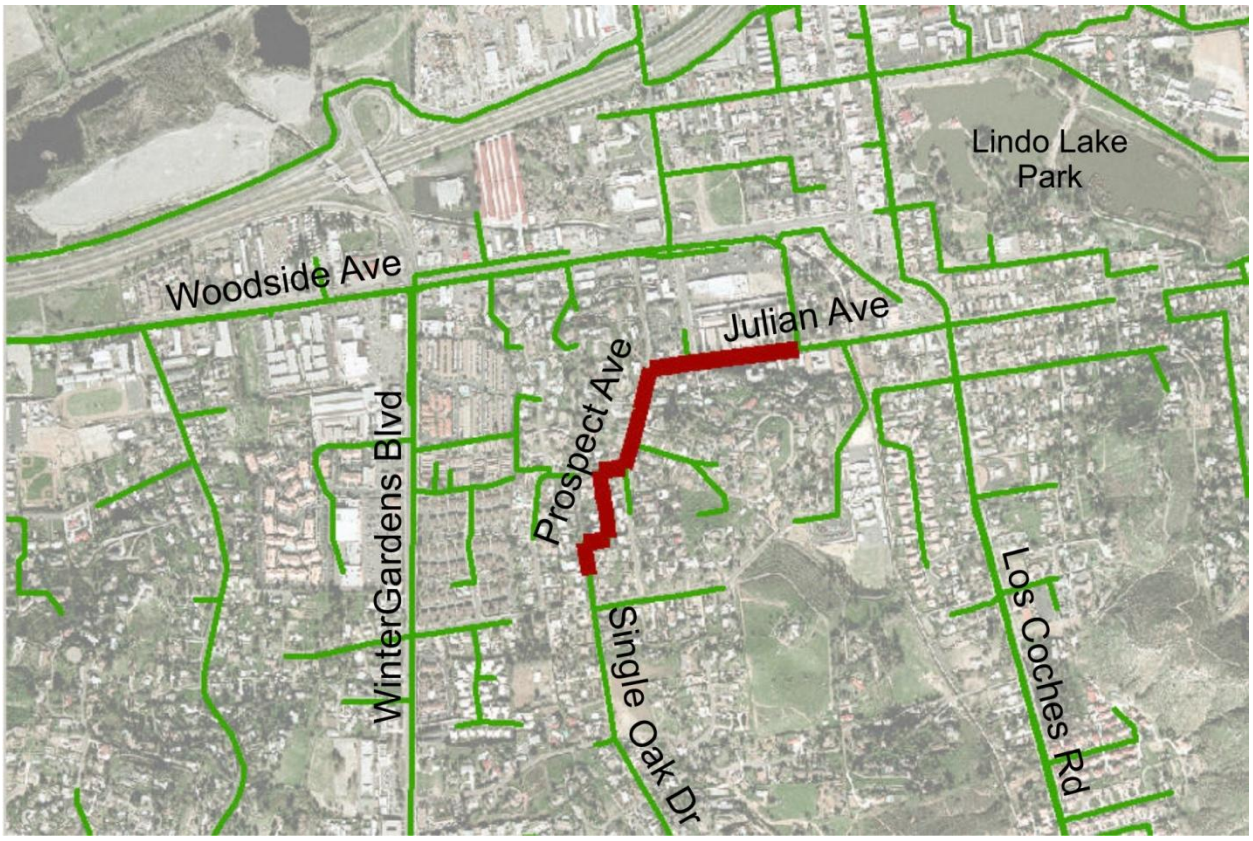
CIP Project:	LP-4 –Lakeside Trunk Sewer Pipeline Replacement Project
Description:	Replace approximately 14,000 feet of existing pipeline ranging in diameter from 8 to 27 inch with 12 to 36 inch diameter. This reach crosses Highway 67. Due to the location of the parallel storm drain along Woodside Avenue, an alternative alignment may need to be evaluated. It is recommended that an alignment study be performed for this project in Phase I.
Estimated Construction Cost:	Phase I: $200,000 Phase II: $9,980,000
Estimated Construction Schedule:	Phase I: Alignment Study Phase II: Project

CIP Project:	LP-5 – Lakeshore and Julian Trunk Sewer Pipeline Replacement Project
Description:	Replace approximately 8,600 feet of existing 8 and 10 inch diameter pipeline with diameters ranging from 10 to 15 inch. The project is required to accommodate wet weather peak flows. Phase I costs are for flow monitoring, with the trunk sewer replacement occurring in Phase III.
Estimated Construction Cost:	Phase I: $218,000 Phase III: $4,150,000
Estimated Construction Schedule:	Phase I: Flow Monitoring Phase III: Project

CIP Project:	LP-6 – Winter Gardens Trunk Sewer Pipeline Replacement Project
Description:	Replace approximately 2,000 feet of existing 8 inch diameter with approximately 900 feet of 8 inch diameter and 1,100 feet of 15 inch diameter. The 8-inch diameter replacement is driven by the observed condition of the pipeline.
Estimated Construction Cost:	$1,170,000
Estimated Construction Schedule:	Phase II



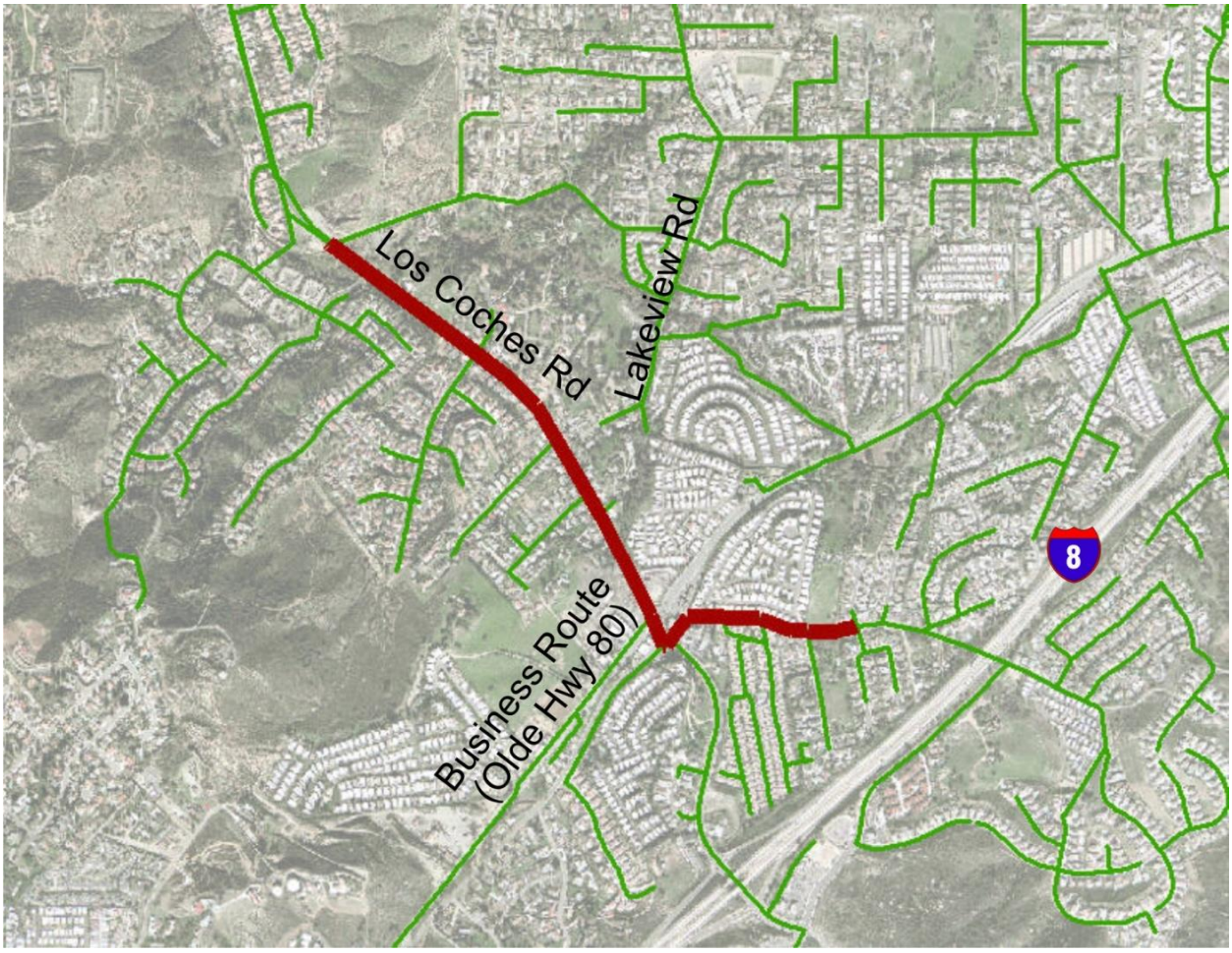
CIP Project:	LP-7 – Julian & Prospect Trunk Sewer Pipeline Replacement Project
Description:	Replace approximately 2,900 feet of existing 8 inch diameter with approximately 1,800 feet of 12 inch diameter and 1,100 feet of 15 inch diameter. This project has been designed; therefore project costs are for construction.
Estimated Construction Cost:	$1,872,000
Estimated Construction Schedule:	Phase II



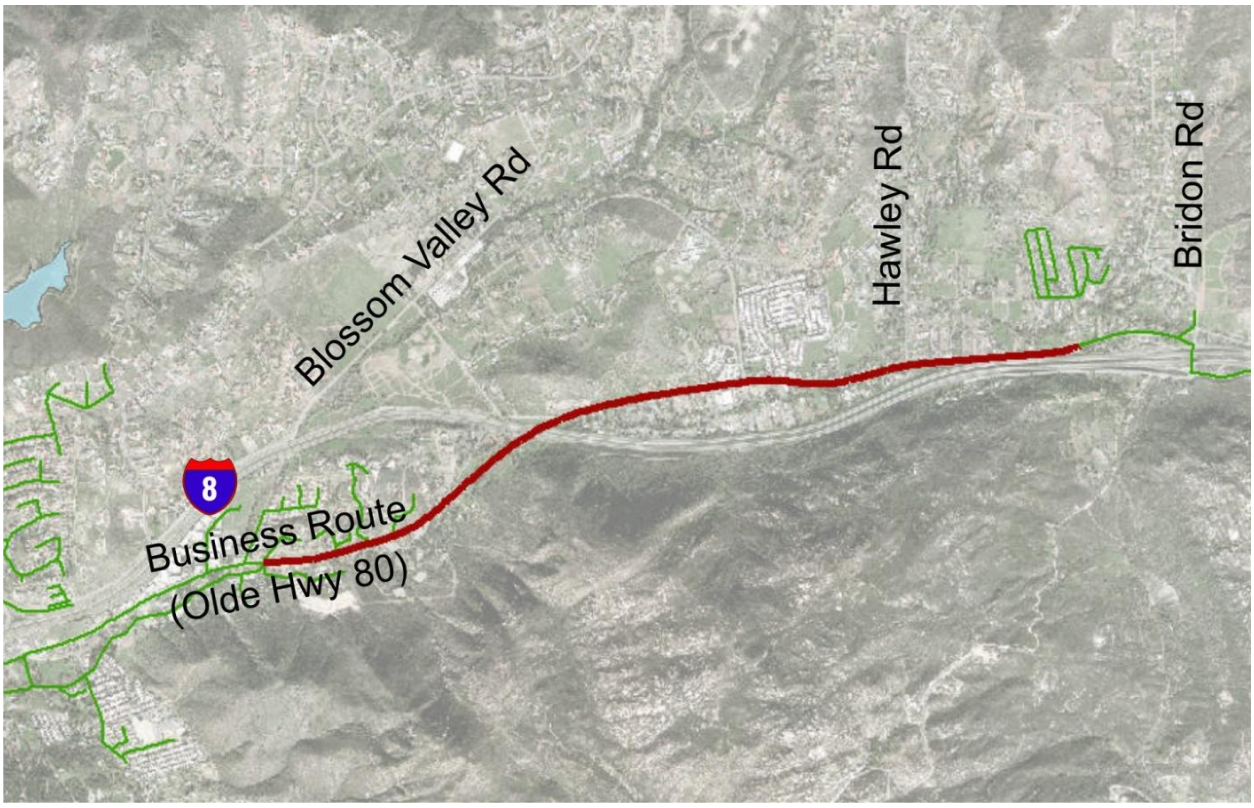
CIP Project:	LP-8 – Industry Road (Ha-Hana) Sewer Interceptor Pipeline Replacement Project
Description:	Replace or parallel approximately 900 feet of existing 18 inch diameter with 18 inch diameter at 1% slope. Replacement project assumes uniform slope while parallel project assumes existing vertical alignment. The existing vertical alignment of the pipeline causes a significant hydraulic jump that has the potential to cause a sewer overflow.
Estimated Construction Cost:	$1,170,000
Estimated Construction Schedule:	Phase II

CIP Project:	LP-9 – Olde Highway 80 Sewer Pipeline Replacement Project
Description:	Replace approximately 2,400 feet of existing 12 inch diameter with 18 inch diameter. This project has been designed; therefore project costs are for construction.
Estimated Construction Cost:	$1,560,000
Estimated Construction Schedule:	Phase I

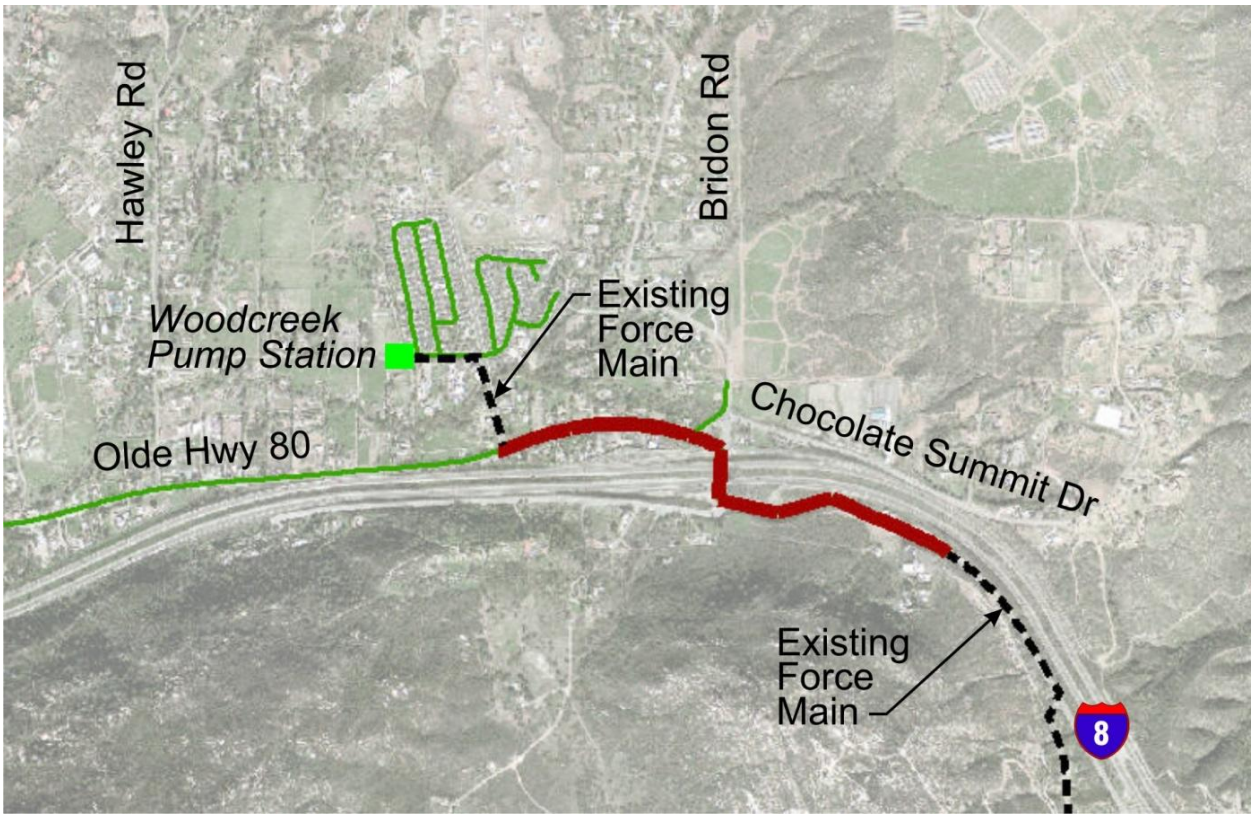
CIP Project:	LP-10 – Los Coches Road Sewer Pipeline Replacement Project
Description:	Replace approximately 6,100 feet of existing 8 and 10 inch diameter pipeline with diameters ranging from 12 to 15 inch.
Estimated Construction Cost:	$3,090,000
Estimated Construction Schedule:	Phase II



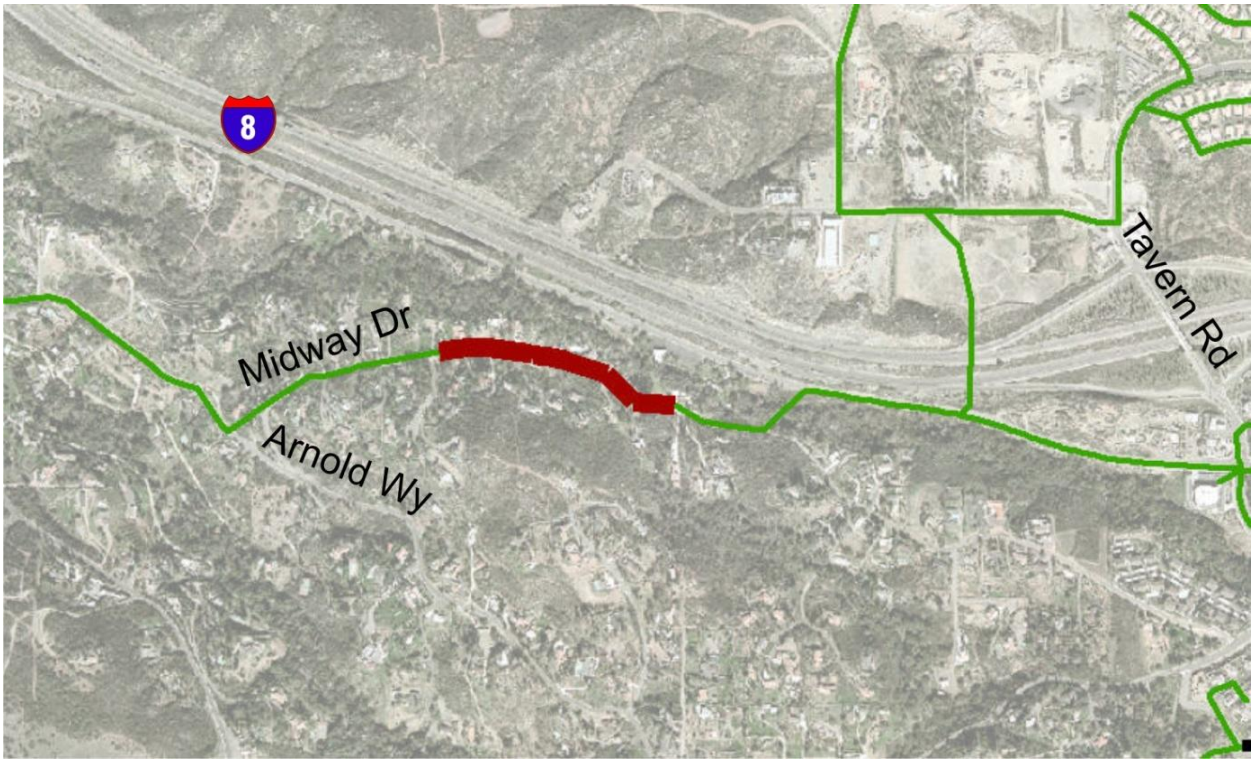
CIP Project:	LP-11 – Flinn Springs Interceptor II/III Sewer Pipeline Replacement Project
Description:	Replace approximately 13,600 feet of existing pipeline ranging in diameter from 8 to 12 inch with 15 and 18 inch diameter. The pipeline crossing Interstate 8 is not required to be upgraded as part of this project.
Estimated Construction Cost:	$8,717,000
Estimated Construction Schedule:	Phase I



CIP Project:	AP-1 - Flinn Springs Interceptor I Sewer Pipeline Replacement Project
Description:	Replace approximately 4,400 feet of existing 10 inch diameter with 15 inch diameter.
Estimated Construction Cost:	$1,764,000
Estimated Construction Schedule:	Phase I



CIP Project:	AP-2 – Alpine Interceptor Midway Drive Sewer Pipeline Replacement Project (Midway Drive)
Description:	Parallel approximately 1,600 feet of existing 12 inch diameter with 10 inch diameter.
Estimated Construction Cost:	$680,000
Estimated Construction Schedule:	Phase I



CIP Project:	AP-3 – Tavern Road Sewer Pipeline Replacement Project
Description:	Replace approximately 700 feet of existing 8 inch diameter with 12 inch diameter.
Estimated Construction Cost:	$420,000
Estimated Construction Schedule:	Phase IV

CIP Project:	AP-4 – Alpine Interceptor Sewer Pipeline Replacement
Description:	Replace approximately 1,600 feet of existing 8 inch diameter with 15-inch diameter. The new Alpine High School and road construction moratorium in Alpine Blvd will determine project timing.
Estimated Construction Cost:	$1,440,000
Estimated Construction Schedule:	Phase III

7.3 Condition Related Projects

As part of the Master Plan, the condition of the lift stations within the Alpine and Lakeside SSA's were evaluated along with the 5 percent cross section of pipelines. A number of proposed projects were developed based upon the results of the condition assessment. Table 7-4 summarizes the estimated costs of the proposed lift station condition upgrades. Table 7-5 summarizes the estimated costs of the proposed pipeline condition upgrades. The total costs for these condition related projects are approximately $180,000 and $100,000 for the Alpine and Lakeside SSAs, respectively. These costs were not included with the Capital Improvement Projects, because they are funded differently.

Table 7-4 Lift Station Rehabilitation Costs

	Estimated Cost
Alpine SSA	
Harbison Canyon Lift Station	
Sandblast and Re-coat	$50,000
Replace Bubbler with Ultrasonic level controls	$30,000
Replace Emergency Generator	$100,000
Alpine SSA Subtotal	**$180,000**
Lakeside SSA	
Woodcreek Lift Station	
Replace Emergency Generator	$100,000
Total	**$280,000**

Table 7-5 Estimated Costs for Pipeline Rehabilitation Projects

Upstream Manhole	Downstream Manhole	Location	Diameter (inches)	Length (feet)	Recommended Action	Estimated Cost
Alpine SSA						
ALMH0266	ALMH0260	Arnold Way	8	108	Spot Repair	$17,558
ALMH0309	ALMH0308	Calle Conejo	6	155	Replace	$35,556
ALMH0288	ALMH0287	Calle Conejo/Easement	8	359	Lining	$73,202
ALMH0321	ALMH0320	Alpine Village Drive	8	48	Sectional Line	$2,832
ALMH0040	ALMH0039	Alpine Boulevard	8	441	Lining	$92,150
ALMH0260	ALMH0259	Tavern Road	8	347	Lining	$72,172
ALMH0066	ALMH0065	Alpine Boulevard	8	268	Lining	$55,414
ALMH0054	ALMH0053		8	511	Clean & Line	$104,924
Subtotal				**2,237**		**$453,809**
Lakeside SSA						
LSMH1032	LSMH1301	Riverview Avenue	8	435	Sectional Line	$2,800
LSMH1029	LSMH1028	Riverview Avenue	8	212	Lining	$46,100
LSMH1028	LSMH1027	Riverview Avenue	8	229	Lining	$50,400
LSMH1127	LSMH1126	Winter Gardens Boulevard	8	220	Lining	$46,300
LSMH1669	LSMH1668	Winter Gardens Boulevard	8	280	Sectional Line	$2,800
LSMH1633	LSMH1632	Los Coches Road	15	401	Sectional Line	$2,800
LSMH1578	LSMH1571	Julian Avenue	15	480	Sectional Line	$5,700
LSMH1532	LSMH1531	Los Coches Road	8	300	Sectional Line	$2,800
LSMH1645	LSMH1644	Calle Lucia Lane	8	56	Sectional Line	$3,500
LSMH1644	LSMH1643	Calle Lucia Lane	8	148	Sectional Line	$3,500
LSMH1671	LSMH1669	Via Diego	8	104	Sectional Line	$2,800
LSMH0270	LSMH0267	Lakeview Road	24	225	Lining	$68,500
LSMH0267	LSMH0262	Lakeview Road	24	570	Clean & Line	$173,500
LSMH0795	LSMH0790	Lakeview Road	8	81	Lining	$20,200
LSMH1336	LSMH1335	Apartment Complex	10	139	Lining	$33,100
LSMH0498	LSMH0497	Harritt Road	8	48	Sectional Line	$2,800
LSMH0497	LSMH0479	Harritt Road	8	284	Lining	$59,400
LSMH1872	LSMH1854	Rancho Canada Road	8	257	Sectional Line	$2,800
LSMH0729	LSMH0728	Chimney Rock Lane	8	200	Sectional Line	$2,800
LSMH0600	LSMH0594	Olde Highway 80	8	61	Sectional Line	$2,800
Total				**4,729**		**$535,400**

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