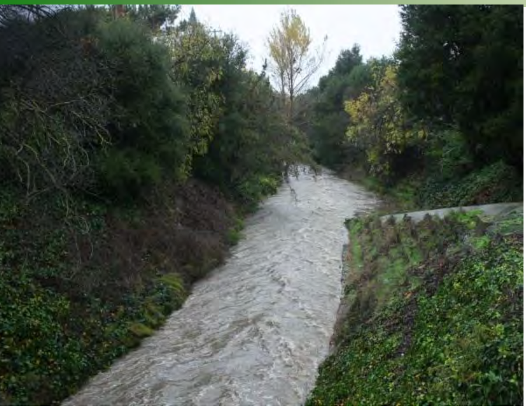

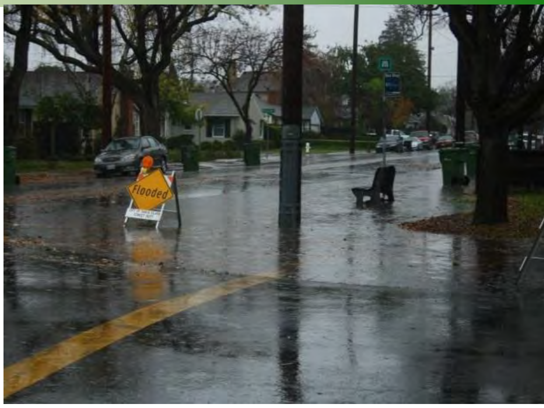

City of Santa Clara
Storm Drain Master Plan

Department of Public Works

December 2015

Prepared by

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

City of Santa Clara
Storm Drain Master Plan

Santa Clara, California

December 2015

Prepared for:

City of Santa Clara
Department of Public Works
Design Division

Designers Attest:

The following report has been prepared under the supervision of the undersigned, who hereby certifies that he is a Registered Civil Engineer in the State of California.

Prepared by:

11/13/15

CHARLES D. ANDERSON, RCE No. 43776 (Date)

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

REGISTERED PROFESSIONAL ENGINEER
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STATE OF CALIFORNIA

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List of Abbreviations

BCDC	Bay Area Conservation and Development Commission
CCTV	Closed-circuit television (video surveillance)
CFS	cubic feet per second
CGP	Construction General Permit
CIP	capital improvement program
CMP	corrugated metal pipe
DHI	Danish Hydraulic Institute
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	flood insurance rate map
FIS	flood insurance study
FT	feet
GIS	geographic information system
HEC-HMS	hydrologic modeling system
HEC-RAS	river analysis system
HGL	hydraulic grade line
LID	low impact development
LiDAR	Light Detection and Ranging
MAP	mean annual precipitation
MRP	Municipal Regional Permit
MU	MIKE URBAN
NAVD	North American Veridical Datum of 1988
NFIP	National Flood Insurance Program

NOAA	National Oceanic and Atmospheric Administration
RCP	reinforced concrete pipe
ROW	Right of Way
RWCQB	Regional Water Quality Control Board
S&W	Schaaf & Wheeler
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SDMP	storm drain master plan
SQ.MI	square mile
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey

Executive Summary

This storm drain master plan (SDMP) establishes a prioritized capital improvements program to reduce the risk of flooding within the City of Santa Clara (City). The identified storm drain system improvement projects prolong the life of existing infrastructure and provide a 10-year (10% annual exceedance) storm capacity throughout the City, and 100-year (1% annual exceedance) storm capacity at pump stations and facilities identified as critical in the event of emergency. Moderate priority improvement projects are identified to provide 10-year (10% annual exceedance) storm conveyance throughout the City. Low priority capital improvement projects are identified to provide 100-year (1% annual exceedance) storm conveyance throughout the City.

Study Objectives

The basic objective of this master plan document is to provide an examination of the flood risks within the City limits and recommend actions necessary to accomplish appropriate levels of service for storm drain systems owned by the City so as to appropriately manage flood risks. Several tasks have been undertaken and completed as part of this study:

- Conversion of CAD-based storm drain maps to geographic information systems (GIS) data
- Collection of field data to build an existing conditions model of the storm drainage network
- Use of Santa Clara Valley Water District hydraulic models to develop coincident boundary conditions for the major drainage ways into which storm drains outfall
- Assessment of the performance of existing storm drainage systems
- Identification of capital improvements to reduce flood risk
- Prioritization of capital improvements for risk reduction and cost benefit
- Establishment of a prioritized Capital Improvement Program (CIP) for storm drainage
- Estimation of project costs for the prioritized CIP based on current ENR indices

In accordance with California Environmental Quality Act (CEQA) Guidelines, Section 15262 {Statutory Exemptions), this SDMP is considered a planning study and therefore adoption of this document is exempt from the requirements to prepare Environmental Impact Reports (EIR) or Negative Declarations (ND). However, on a project-specific basis, CEQA must be satisfied for any major capital improvement project described in this report that will be implemented by the City in the future, through the preparation of an appropriate EIR or ND.

Background

The City's storm drainage system consists of storm drain pipes with outfalls to creeks. In some instances, for example along San Tomas Aquino Creek, the creeks are routed through underground culverts. The majority of the City's system has capacity for the 2-year storm in the pipes. Some known, recurring problem areas have been identified by City staff. The majority of the system performs well in a 10-year storm as well, with most flooding confined to the streets.

Santa Clara generally drains in a south to north direction, from Interstate 280 to San Francisco Bay. The natural channels to which storm drain systems discharge are often at higher elevations than the surrounding ground, a condition known as "perched" channels. This condition exacerbates the flood risk because during periods of intense rainfall and storm water runoff, water levels in the major drainage channels can be sufficiently elevated to diminish or preclude gravity discharge from the City's storm drainage systems. Storm water backs up into the system, may surcharge (pressurize) the system and overflow into the streets and surrounding properties. The perched nature of the major channels that drain Santa Clara also complicates the capital improvements necessary to provide an acceptable level of service for storm drainage. Rather than cut off drainage areas and divert the flow into a receiving water, it is often necessary to provide additional storm drainage capacity in the south to north direction, which results in longer storm drain improvement projects than would otherwise be necessary.

Work Products

This master plan is intended to function as a multipurpose storm drain system resource guide for the City's staff and residents. City engineers responsible for the storm drain capital improvements should find sufficient background information and data in this document to serve as the basis for storm drainage Capital Improvement Program (CIP) implementation and/or modification. Improvement descriptions, maps, project costs, and other modeling data have been included in the appendices of this report.

System Evaluation

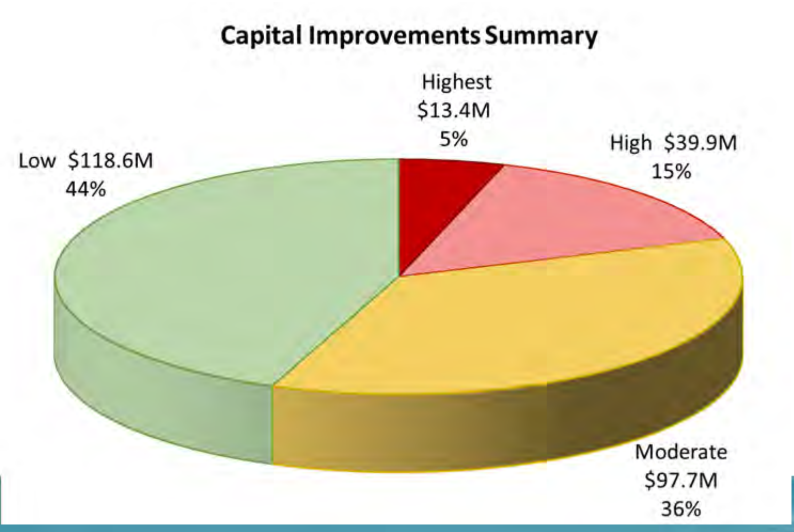
Six MIKE URBAN rainfall-runoff models have been developed for the City, each containing independent drainage networks. Detailed review, field investigations, analysis, and modeling of the area's storm drainage system lead to several conclusions. These conclusions have been utilized to recommend improvements to the system intended to reduce flood risk within the City. The recommended improvements are preliminary in nature and are based on currently available information. Detailed project designs will ultimately require more data, including utility locations, which remain to be obtained. Two dimensional model results have been used to analyze the extent of significant flooding (defined as more than one foot in average depth) for the 26,581 individual parcels within the City (Table ES-1). Flooding greater than a foot in depth is regarded as problematic regardless of whether such flooding results in significant property damage. Furthermore, such flooding is generally shown as a Special Flood Hazard Area by FEMA on its Flood Insurance Rate Maps (FIRMs), and properties located within such areas may be subject to the mandatory purchase of flood insurance.

Table ES-1: Existing Flood Risk in Santa Clara

Event	Flooding < 1 ft		Flooding ≥ 1 ft		Total Flooding	
	# Parcels	% of Total	# Parcels	% of Total	# Parcels	% of Total
2-year	285	1.09	10	0.03	295	1.12
10-year	1,835	7.00	205	0.79	2,040	7.79
100-year	3,775	14.4	565	2.15	4,340	16.5

Capital Improvement Program

A Capital Improvement Program, consisting of projects with four priority levels, has been developed based on model results and suggested improvements. The $250 million in improvements recommended by this master plan are based on the capacity of the existing system and the need to correct identified deficiencies. Improvements are broken down into four priority levels shown in Table ES-2. Recommended improvements are intended for public rights-of-way and



other City-owned property, not private facilities or private property.

Table ES-2: Storm Facility CIP Summary

Priority	Service Level Goal	CIP Cost	Length (ft)	Pipes	Pumps (cfs)
Highest	Eliminate significant 2-yr flooding and flooding near critical facilities	$13,400,000	13,450	63	0
High	Eliminate remaining 2-yr flooding and significant 10-yr flooding	$39,900,000	33,000	146	0
Moderate	Eliminate 10-year flooding and significant 100-year flooding	$97,700,000	73,630	325	120
Low	Eliminate 100-yr flooding (does not include creek overflow)	$118,600,000	118,790	526	235
Total		**$269,500,000**	**238,870**	**1,060**	**355**

Future Development

The CIP does not include the cost of new facilities related solely to new development (e.g., pipeline extensions to serve areas that are currently undeveloped). These new facilities would be constructed as part of the new developments, and are not included in the CIP. The CIP discussed within this report does not account for future land use changes as it is anticipated that the majority of currently proposed land use changes may result in a decrease in runoff. Much of the future development within the City is anticipated to be in the form of infill projects- where impervious surfaces may actually decrease. While this type of development may in fact reduce stormwater flows to the system, a detailed study should be conducted at the expense of the developer to more accurately analyze any impacts. In addition, some developments may occur in areas where the existing or possibly improved downstream systems are currently undersized. The City may request assistance from developers to improve the system and in turn be reimbursed for improvements made to the existing system.

Conclusion

This Master Plan provides a tool for citizens and officials of the City to use in their efforts to reduce both nuisance flooding, and the likelihood of more serious storm water related hazards to private and/or public property. This study and proposed CIP is merely the conceptual starting point. It is anticipated that City staff and/or their consultants will perform more detailed studies and alternatives analyses to identify the most affordable and effective improvement projects with information gathered as part of the design process, including detailed topography, utility conflicts, available easements and rights-of-way, construction impacts, and long-term operation and maintenance.

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Chapter 1. Introduction

1.1. Overview

This Storm Drain Master Plan provides a capacity analysis of existing storm drain collection systems, a discussion of drainage design standards, and recommended improvement projects to reduce the risk of flooding within the City with estimated costs. Its primary focus is on City-owned drainage facilities (although certain facilities owned by others are discussed and analyzed if those facilities affect property within the City) and should be used to guide the City in planning, financing, engineering, and maintaining its own infrastructure. Each chapter of this report is intended to help the City identify problems, manage resources, and provide cost-effective and comprehensive solutions.

This chapter provides a general discussion of drainage and flood management systems and issues currently affecting the City, historic flooding, and a summary timeline of regulatory floodplain mapping efforts within the City. It also describes the Master Plan objectives, explains the criteria used to evaluate storm drain system performance, and presents a summary of data acquired as part of the storm drain master planning process. Existing hydrologic and environmental settings of the City are described along with flood protection and storm drain facilities.

1.2. Setting

Santa Clara lies on the alluvial plain of Santa Clara Valley. Soil deposits on the valley floor are characteristic of alluvial fan development. Calabazas Creek, Saratoga Creek, San Tomas Aquino Creek and Guadalupe River and its tributaries deposited fans of coarser sands and gravel at their banks during flood events, with finer materials spreading out through the flatter areas between creeks. As a result, many of Santa Clara Valley's creeks are "perched" so that their banks act as a natural levee of sorts and during flood stage, water surface elevations within a creek might be higher than the adjacent ground elevation. Where the natural levees are not sufficiently high to prevent creek flooding, artificial levees and structural floodwalls have been constructed. Figure 1-1: West to East Cross Section of Santa Clara near Tasman Drive shows a typical topographic cross section cut west to east through the heart of Santa Clara.

The study area is defined primarily by the City limits, which covers an area of approximately 18.4 square miles. The study area is bound by California Highway 237 to the north, Sunnyvale to the west, Guadalupe River and San Jose to the east, and Stevens Creek Boulevard to the south. The area is mostly flat (with a ground slope less than 1%) and urban, with elevations ranging between 25 feet and 180 feet on the 1988 North American Vertical Datum (NAVD88). Figure 1-2: Santa Clara Drainage Systems~~Figure 1-2: Santa Clara Drainage Systems~~ shows the location and setting of the City of Santa Clara relevant to its storm drainage systems.

1.3. Climate

Santa Clara has a subtropical Mediterranean climate, consisting of warm, sunny summers with relatively light rainfall during winters. The average annual high temperature is 71.3°F, and the average annual low temperature is 45.5°F. Summertime averages range from 50°F to 82°F, while wintertime averages range from 38°F to 67°F. Mean annual precipitation varies throughout the City, from about 13 inches at low elevations closer to San Francisco Bay to 16 inches at higher elevations. The City-wide average is 14.5 inches per year, the vast majority of which occurs during winter months. Precipitation within the City occurs entirely as rainfall, and snowmelt is not a process that significantly affects runoff in the City or receiving water bodies.

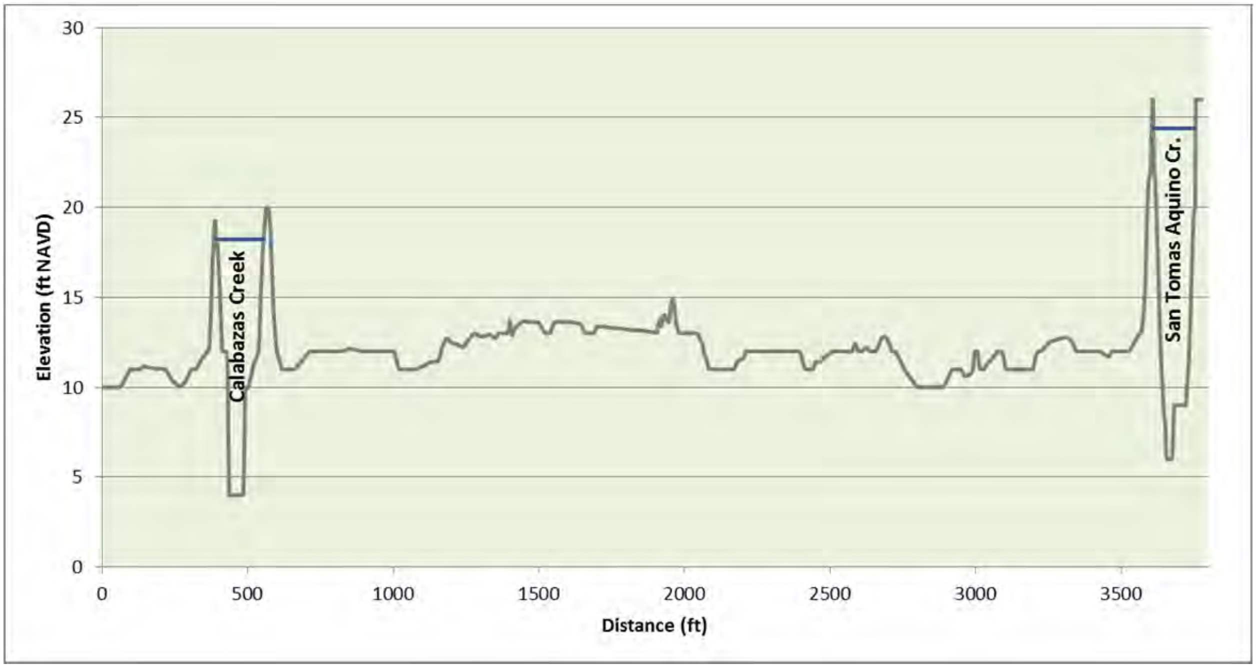

Figure 1-1: West to East Cross Section of Santa Clara near Tasman Drive with 100-year Water Surface

1.4. Flood Protection Facilities

Runoff generated by precipitation within the City and some surrounding area is conveyed through various manmade flood protection systems. Runoff captured by the storm drain networks is discharged through a combination of gravity outfalls and pump stations into three ephemeral creeks (Calabazas Creek, Saratoga Creek, and San Tomas Aqunio Creek) and the Guadalupe River (Figure 1-2). These networks can interact with one another through overflow connections and surface flows; therefore, changes to one system can potentially impact the performance of other systems.

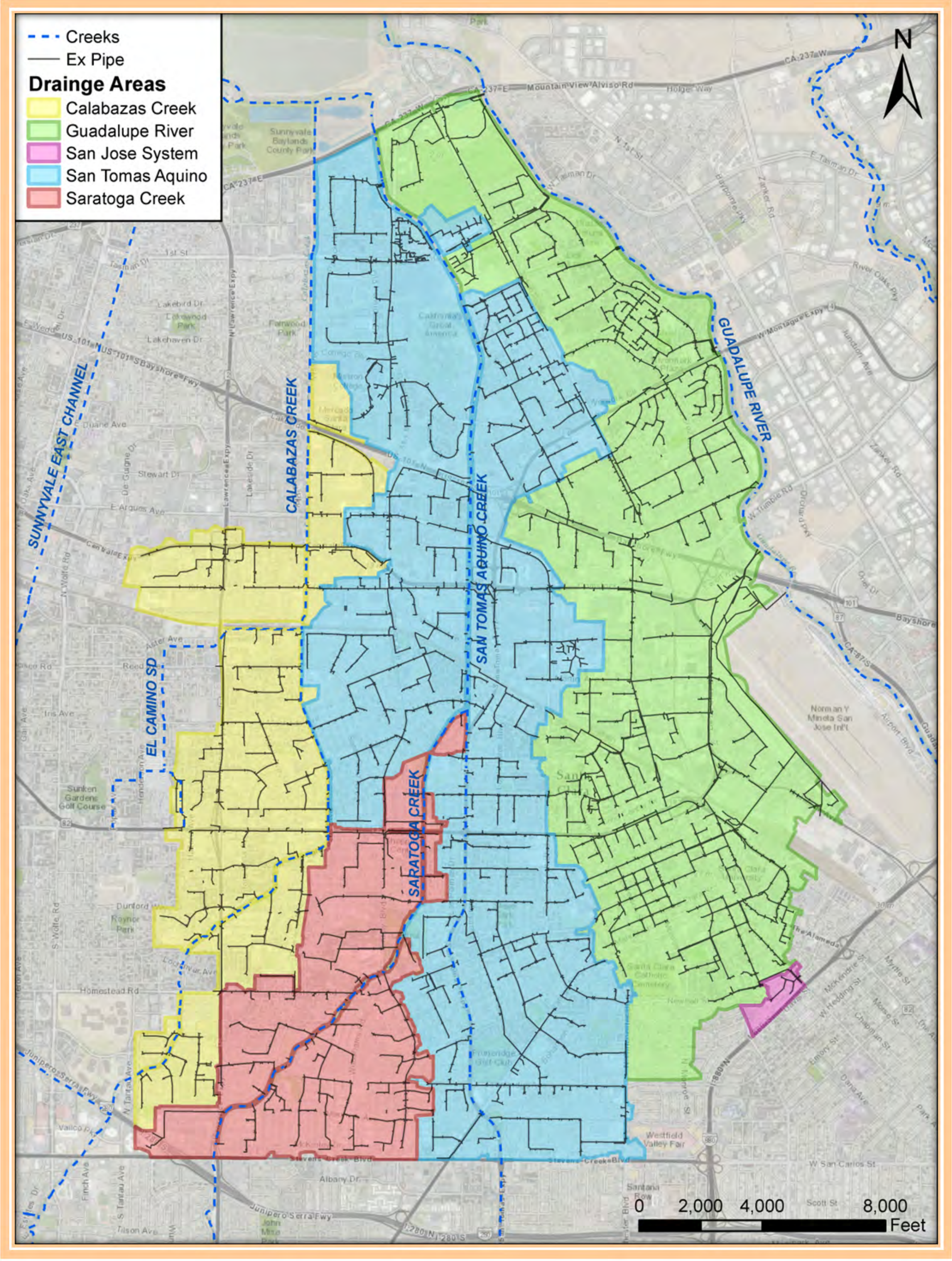

Figure 1-2: Santa Clara Drainage Systems

1.5. History of Flooding within Santa Clara

Historical flooding information can be valuable in highlighting areas of recurring problems and prioritizing future improvements. Areas with known flooding problems have been identified by Schaaf & Wheeler and City employees; areas of known drainage issues are detailed in Chapter 2. Figure 1-3 shows flooding and high channel flow caused by the December 12, 2014 storm.

Figure 1-3: Flooding and High Channel Flow during December 12, 2014 Storm
Flooding at Benton and Los Padres (top left), high flows in Calabazas Creek (top right), flooding at Washington and Santa Clara St. (bottom left), and flooding on Avenida del Lago (bottom right).

Flooding locations during a 100-year storm event were identified in the 2009 FEMA Flood Insurance Study (FIS) for Santa Clara County. Zones A and AE are 100-year floodplains. The largest contributor to 100-year flooding in Santa Clara is spill from San Tomas Aquino Creek due to capacity restrictions in the long culvert reach. Figure 1-4 shows the FEMA flood zones in Santa Clara. More detailed mapping is available on the FEMA web site (www.msc.fema.gov).

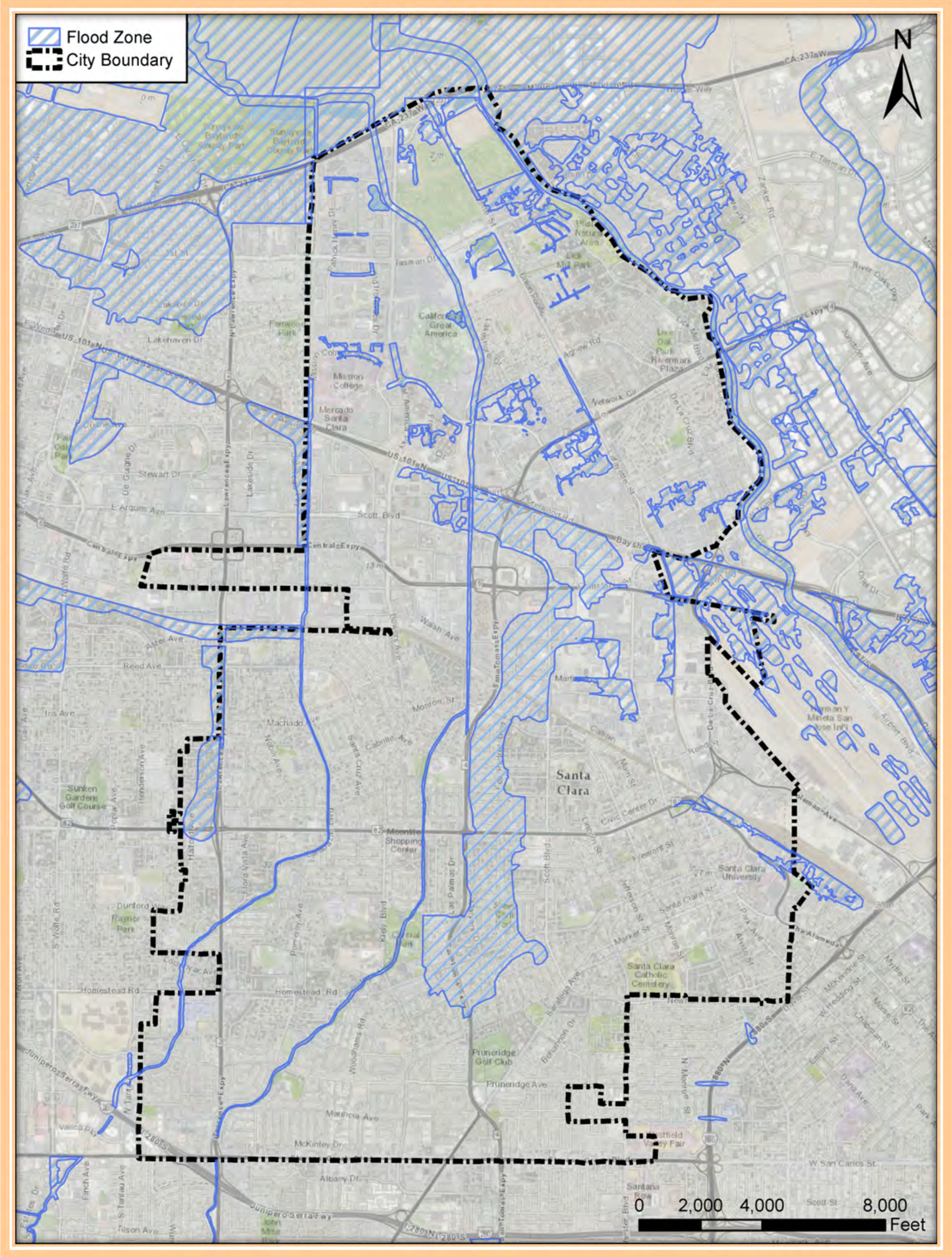

Figure 1-4: FEMA Flood Zones in Santa Clara

1.6. System Ownership

City-provided CAD files include ownership data. While most of the storm drainage systems within the study area are City-owned, some components are owned by others, including Santa Clara County, Santa Clara Valley Water District, the City of San Jose, and the City of Sunnyvale. Other parts of the system are privately owned. Ownership data provided is assumed to be current and accurate in the development of capital improvements.

1.7. Regional Storm Water Coordination

A variety of agencies and municipalities maintain storm drainage systems within the study area. The most significant of these is the Santa Clara Valley Water District (SCVWD), which maintains jurisdiction over the three major creeks and one river running through the City. Projects including outfalls and pump stations will require coordination with SCVWD to comply with regulations and permitting requirements.

County roads (including Central Expressway, Lawrence Expressway, and San Tomas Expressway) and many of the storm drain collection systems within them fall within Santa Clara County's jurisdiction. Projects that cross or connect to County roads will require coordination with the Roads and Airports Department. Likewise, Caltrans maintains State roads, including Highway 101 and El Camino Real, and will require coordination for projects within their jurisdiction.

1.8. Recent Flood Protection Measures

The City of Santa Clara has been working to alleviate inadequacies in the existing storm drain system by making system improvements. Some recent activity has focused on the potential for dredging the Tasman channel to the Eastside Basin and annual maintenance of catch basins.

1.9. Master Plan Process

Santa Clara's storm drain system performance has been analyzed using the level of service criteria established herein to identify deficiencies and recommend capital improvements. Several tasks have been completed to reach this goal:

1. Develop a storm drain geographical information system (GIS) built using City CAD block maps. The GIS data is used to create the hydraulic model. Network features include: manhole invert and rim elevations, pipe length and diameter, and watershed runoff characteristics.
2. Review existing data and field verify where necessary to complete representative models of the system.
3. Establish storm drainage analysis methodologies and performance criteria with City staff.
4. Analyze the major creeks using 10- and 100-year hydrologic flows to establish boundary conditions for storm drain system models.
5. Perform hydrologic and hydraulic analyses of the existing storm drain facilities throughout Santa Clara for 2-, 10-, and 100-year events based on methodology established in the Santa Clara County Drainage Manual. System deficiencies on City-owned facilities are categorized in terms of the risk to public safety, property, and infrastructure.
6. Identify projects that will improve storm drain system performance.
7. Outline a prioritized Capital Improvement Program (CIP) for storm drainage infrastructure.
8. Project and summarize capital improvement costs for the CIP.

1.10. References

- City of Santa Clara Standard Specifications for Public Works Construction. City of Santa Clara Public Works Department. Web. Accessed May 2015. <santaclaraca.gov/index.aspx?page=1498>.
- General Construction Permit. State Water Resources Control Board: Division of Water Quality. (Order 2009-0009-DWQ as amended by 2010-0014-DWQ). (2010).
- Municipal Regional Stormwater NPDES Permit No. CAS612008. California Regional Water Quality Control Board: San Francisco Bay Region. (Order R2-2009-0074). (2009).
- Santa Clara County Drainage Manual. (2007).
- Santa Clara County Flood Insurance Study. Federal Emergency Management Agency (2009).
- Various Technical Documents. Santa Clara Valley Urban Runoff Pollution Prevention Program. Web. June 2011. <http://www.scvurppp-w2k.com>.

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Chapter 2. Data

2.1. Data Sources

Schaaf & Wheeler reviewed and utilized readily available land use, topographic, geological, geographical, and storm drain system data within the Santa Clara Storm Drain Master Plan Area (study area). Available data, while mostly complete and accurate, had some missing or incorrect information. Efforts have been made to improve and add to the collective data. Where necessary, assumptions and engineering judgment are used to complete remaining data gaps. This chapter summarizes the findings and data acquired as part of the Santa Clara Storm Drain Master Plan (SCSDMP). Data limitations, assumptions, and impacts are also summarized herein.

2.1.1. Topography and Aerial Imagery

All project data and results are in vertical datum NAVD88 (feet) and the State Plane (California Zone III) coordinate system. Santa Clara County's 2006 1-foot contours, derived from LiDAR point data, have been obtained from the SCVWD GIS database. Additional 2010 American Recovery and Reinvestment Act (ARRA) LiDAR point data obtained from the USGS EarthExplorer system are used to fill remaining data gaps. Both datasets consist of elevation data measured on the NAVD88 datum. This high resolution aerial data provides topographic information with an accuracy of half of a foot (plus or minus 0.5 foot) for ground returns where no water ponding occurs. To perform hydrologic and hydraulic analyses, a terrain model of the City and surrounding area has been built from these LiDAR-based datasets. In addition, 2011 high-resolution aerial imagery from the USGS library and Google satellite imagery have been used.

2.1.2. GIS Data

The most current City system data was provided to Schaaf and Wheeler in CAD drawing (.dwg) format. The storm system elements have been imported into GIS and skeletonized only as needed to remain within software parameters for the number of system elements. Node depth (at manholes and other junction structures) and pipe diameter attributes are populated in GIS from CAD text labels. Data from the City's storm system CAD file have been supplemented with depths from a separate Excel document provided by the City. Initial data included diameters for approximately 90% (8,089) of the 8,452 pipes included in the GIS for the modeling area, and depths for approximately 88% (7,421) of the 8,452 nodes (manholes, catch basins, pumps, and outfalls).

The National Land Cover Database (NLCD) impervious dataset has been downloaded to estimate the typical imperviousness of each land use type in the City, a process described in detail in Section 2.2: Land Use Data and Runoff Characteristics. Other GIS data used for this master plan include city limits, existing catchment delineations, parcels, land use zoning, and streets.

Schaaf & Wheeler identified missing data in the documents provided by the City, as well as items in need of verification. Information needed to create an accurate model of the system included:

- Missing pipe diameters
- Size and capacity of Eastside and Westside detention basins
- Missing node depths
- Verification of some pipe diameters and node depths
- Some outfall elevations

Measures have taken to collect or approximate data necessary to compile a master plan level analysis. These steps include measurements described in Section 2.1.4 and estimation techniques described in Section 2.5 of this chapter.

2.1.3. Pump Stations

There are eleven major pump stations and eleven smaller pump stations within the Santa Clara model area. These pump stations were previously visited by Schaaf & Wheeler as part of the City of Santa Clara's 2010 Storm Drain Pump Station Evaluation, with the exception of one smaller station on Central Expressway. No upgrades have been completed since the evaluation report was compiled in 2010. Record drawings acquired from the City for all major pump stations and some smaller stations are summarized in Table 2-1. 18 pump stations are included in the models. Three of the remaining four (City Hall West/East and the Police Pistol Range)are smaller pump stations that mainly drain small areas to the larger pipe system, and are assumed to have adequate capacity. The Tasman Pump Station is not modeled, as the pumps are intended to drain the sump and the 2010 pump station evaluation indicates that the pumps are currently turned off entirely.

Table 2-1: Pump Station Record Drawing Summary

Pump Station	As-Built Date	Revision Date	Included in Model
Bowers Ave Underpass	Nov 3, 1967	Mar 15, 1976	Yes
Central Expressway (County PS)	N/A	N/A	Yes
City Hall (West Wing)	N/A	N/A	No
City Hall (East Wing)	N/A	N/A	No
De La Cruz (Tri-Level)	Aug 16, 1967	Jul 30, 1969	Yes
Eastside	Feb 22, 1973	N/A	Yes
Fairway Glen	Dec 9, 1988	Aug 22, 1990	Yes
Freedom Circle	Apr 3, 2000	Mar 29, 2001	Yes
Gianera	Aug 1, 1986	N/A	Yes
Golf Course	Mar 13, 1985	N/A	Yes
Lake Santa Clara	Mar 21, 1986	N/A	Yes
Lakeside	Aug 5, 1997	May 11, 1999	Yes
Lafayette Over/Underpass	Oct 17, 1975	N/A	Yes
Lafayette Shulman	N/A	N/A	Yes
Lafayette Subway	Nov 13, 1935	Apr 20, 1936	Yes
Laurelwood	Dec 16, 1985	N/A	Yes
Lick Mill	Jun 1981	Apr 18, 1988	Yes
Nelo-Victor	May 6, 2002	N/A	Yes
Police Pistol Range	N/A	N/A	No
Rambo	Dec 6, 2000	Jun 10, 2003	Yes
Tasman	N/A	N/A	No
Westside	November 11, 1975	N/A	Yes

2.1.4. Field Measurements and Record Drawings

Schaaf & Wheeler examined system profiles and identified irregularities in the modeled system data (e.g. potentially incorrect pipe diameters and invert elevations). These irregularities were compared with profile plots from the City's storm drain CAD. If City CAD confirmed an irregularity, City and County record drawings have been reviewed by to verify City-provided data or fill data gaps. Record drawings are assumed to be accurate and up-to-date.

In cases where record drawings are not sufficient to complete system verification, selective field measurements of pipe sizes, layout, and invert depth have been taken. Field information was collected by Schaaf & Wheeler or relayed to Schaaf & Wheeler by the City. Corrections are entered into the storm drain network GIS files with data sources noted. Because storm drain systems are designed for pressure flow and surcharge, the system's hydraulic grade lines (HGLs) are not governed by open channel flow dynamics. For this reason, correct pipe diameters are a more critical component of the model than the accuracy of invert elevations.

2.1.5. Catchments

Beginning with the City's existing Storm Drain Basin Plan map in PDF format, catchments have been traced into GIS. These catchments are altered as needed based on the GIS terrain model, system layouts, and street locations to create more accurate boundaries. To build a more detailed model, catchments have been further divided so that each of 3,976 catch basins in the system is paired with its own tributary drainage area.

Including all pipes and nodes in the model with a higher level of detail better reflects the way drainage physically enters the storm drain network and preserves the full capacity of the system. Delineation of the catchments relies on elevations and grades from the terrain model, aerial imagery, street and pipe network layouts, and the location of catch basins.

2.2. Land Use Data and Runoff Characteristics

National Resource Conservation Service (NRCS) Curve Numbers (CN) are assigned to each catchment in accordance with the 2007 Santa Clara County Drainage Manual methodology. Curve Numbers are empirical parameters used to predict runoff or infiltration from runoff excess. These rainfall runoff characteristics are estimated based on land use, soil classification, and percent impervious surface.

2.2.1. Land Use

Models have been built to represent current land use conditions. The City does not maintain GIS data that depicts existing land use. Existing land uses are developed by Schaaf & Wheeler using zoning information and aerial imagery. Starting with the City's Zoning Designations, land use types are consolidated in GIS from 20 categories to nine (Table 2-2) based on the Santa Clara County Drainage Manual Curve Number tables. The consolidated City Zoning Designations used as a starting point are shown in Figure 2-1.

Two additional categories are added for Rights-of-Way and Open Water. Rights-of-Way polygons are created for streets, which are not included in Zoning GIS polygons. Open Water polygons were created by separating large water features such as ponds and retention basins, from Land Use polygons. Zoning designations are generally used in General Plans for future land use. Research was done to change zoning into existing land use categories. Parcels designated as "Planned Development" or "Planned Industrial" are reclassified based on aerial imagery and General Plan designations. In locations where redevelopment has occurred or zoning designations are not representative of current conditions, designations have been altered to reflect existing land cover using aerial and street level imagery. Model drainage areas extend into Sunnyvale and San Jose. In these areas, it is necessary to extend land use polygons based on Sunnyvale and San Jose zoning maps and aerial imagery. The existing land use conditions and categories for CN calculation are shown in Figure 2-2.

Table 2-2: Zoning Designation and Consolidated Land Use categories.

Zoning Designation	Land Use Type
Agricultural	Agricultural
Commercial Park	Commercial
Community Commercial	Commercial
Downtown Commercial	Commercial
Thoroughfare Commercial	Commercial
Neighborhood Commercial	Commercial
General Office	Commercial or Industrial[1]
Professional and Administrative Office	Commercial or Industrial[1]
Heavy Industrial	Industrial
Light Industrial	Industrial
Single Family	Low Density Residential
Duplex	Low Density Residential
Low Density Multiple Dwelling	Low or Medium Density Residential[1]
Medium Density Multiple Dwelling	Medium or High Density Residential[1]
Moderate Density Multiple Dwelling	Medium or High Density Residential[1]
Public or Quasi-Public	Public, Open Space, or Parks/Open Space[1]
Planned Development	Varies[1]
Planned Development - Master Community	Varies[1]
Planned Industrial	Varies[1]
Historical Combining	Varies[1]

[1] *A desktop survey of current aerial and street level imagery was performed to determine land use type*

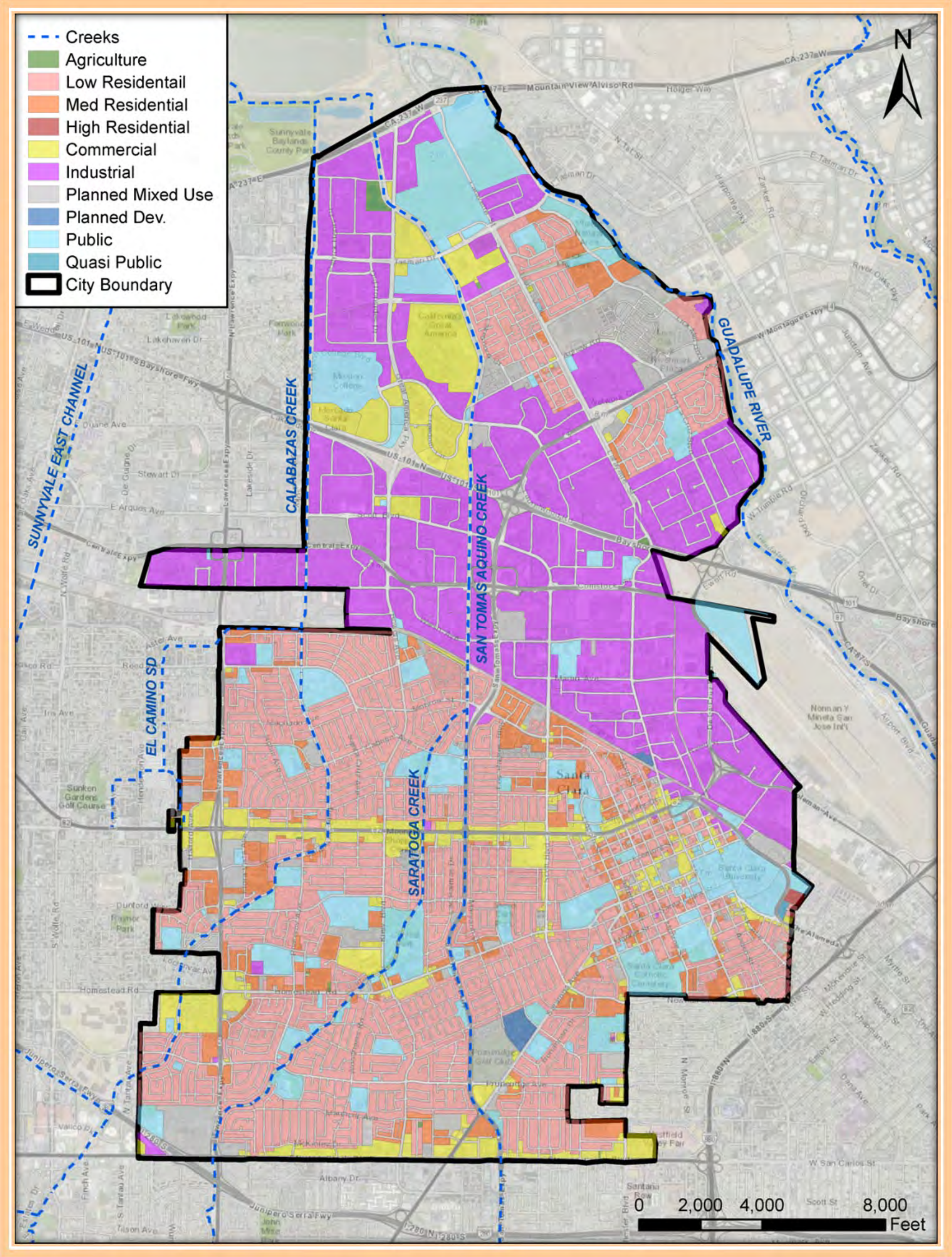

Figure 2-1: Santa Clara Zoning Map (After Consolidation)

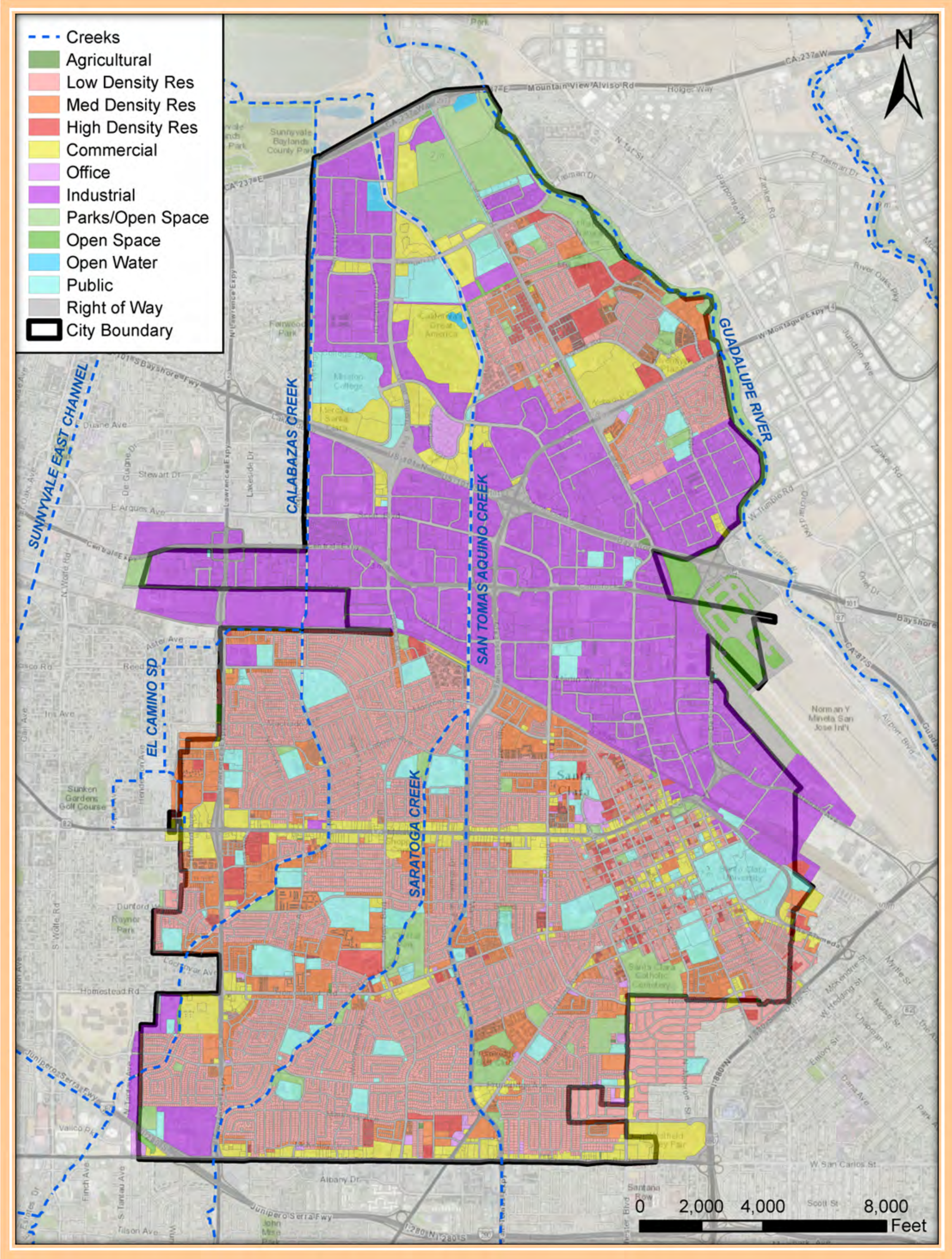

Figure 2-2: Existing Land Use Map

Existing land use in the Santa Clara model area, summarized in Table 2-3, is primarily residential and industrial; interspersed with parks, commercial development, and public lands (schools and City/County property).

Table 2-3: Model Area Land Use Summary

Land Use Type	Area (Acre)	Percent
Agricultural	3.5	< 0.1%
Commercial	1,005	7.8%
High Density Residential	287	2.2%
Industrial	3,165	24.5%
Single Family Residential	2,934	22.7%
Medium Density Residential	936	7.2%
Office	81	0.6%
Open Space	256	2.0%
Open Water	23	0.2%
Parks/Open Space	697	5.4%
Public	832	6.5%
Right of Way	2,689	20.8%

2.2.2. Future Land Use

The City is currently close to build-out with very few empty lots. The majority of future development will involve the redevelopment of sites, such as infill projects. Future development will need to comply with C.3 requirements of the Municipal Regional Permit (MRP) for the Bay Area. These requirements to treat storm water runoff may result in a reduction of impervious surface. In addition, there is a small portion of the City in the Southwestern corner that requires hydromodification management plans (HMP) for developments over one acre in size. C.3 measures are typically only designed to target 2-year storm runoff, and are not anticipated to significantly reduce 10-year peak discharge; however, redevelopment in Santa Clara will generally not increase the 10-year flow. The C.3 and hydromodification requirements of the MRP are discussed in detail in Chapter 7. It is not anticipated that future development will impact the City's storm drainage system; in fact, it is possible that future development will reduce the overall flows in the City's system. The current land use condition is considered the worst case condition and CIPs developed under the existing condition should meet or exceed future conditions. Impacts of planned development can be analyzed in detail by the storm drain model created for the Storm Drain Master Plan; however, these detailed studies are not part of this contract.

2.2.3. Percent Impervious Surface

Percent impervious surface is estimated for each of the 11 land use types from three sources: 2011 National Land Cover Dataset (NLCD) impervious surface data, County Drainage Manual assumptions, and aerial imagery. From the NLCD Landsat-based dataset, GIS is used to calculate an average percent impervious surface for each land use designation.

Values from the NLCD analysis are compared to County Drainage Manual assumptions and checked against aerial imagery of the City to estimate final percent impervious values used for modeling. Percent impervious values for each land use type are summarized in Table 2-4.

Table 2-4: Percent Impervious Surface Comparison and Assumed Model Values

Land Use Type	Percent Impervious Surface		
	County Manual	NLCD 2011	Model
Agricultural	1	58.3	40
Commercial	80	74.3	75
Industrial	80	78.9	80
Single Family Res.	25	52.5	50
Medium Density Res.	37.5	59.4	55
High Density Res.	50	65.2	65
Open Space	0	46.5	20[1]
Open Water	100	N/A	100
Parks/Open Space	10	20.6	20
Public	80	52.5	55
Right of Way	90	66.2	85[1]

[1]Values approximated using calculations based on aerial imagery

2.2.4. Soil Classification

The NRCS has classified soils into four hydrologic soil groups (A, B, C, and D) according to their infiltration rates. Group A soils have low runoff potential when thoroughly wet and typically consist of sand or gravel type soils. Group B soils are moderately well draining when thoroughly wet and consist of loamy sand or sandy loam textures. Group C soils have moderately high runoff potential when thoroughly wet and consist of loam, silt loam, sandy clay loam, clay loam, and silty clay loam textures. Group D soils have high runoff potential when thoroughly wet and consist of clayey textures. All soils with a water table within 24-inches of the surface are in Group D. The City of Santa Clara model area consists of 1.1% Group A soils, 13.9% Group C soils, and 84.9% Group D soils, as shown in Figure 2-3.

2.2.5. Runoff Curve Numbers

Runoff Curve Numbers (CNs) are assigned to each catchment in the models based on land use and soil classifications as shown in Table 2-5.

Table 2-5: NRCS Curve Numbers by Land Use and Soil Group

Land Use Type	% Impervious	Curve Number (AMC II) by Soil Group			
		A	B	C	D
Agricultural	40	39	52	66	71
Commercial	75	35	48	66	70
High Density	65	35	48	66	70
Industrial	80	35	48	66	70
Single Family	50	35	48	66	70
Medium Density	55	35	48	66	70
Open Space	20	38	50	69	76
Open Water	100	100	100	100	100
Parks/Open Space	20	34	48	66	70
Public	55	35	48	66	70
Right of Way	85	95	95	95	95

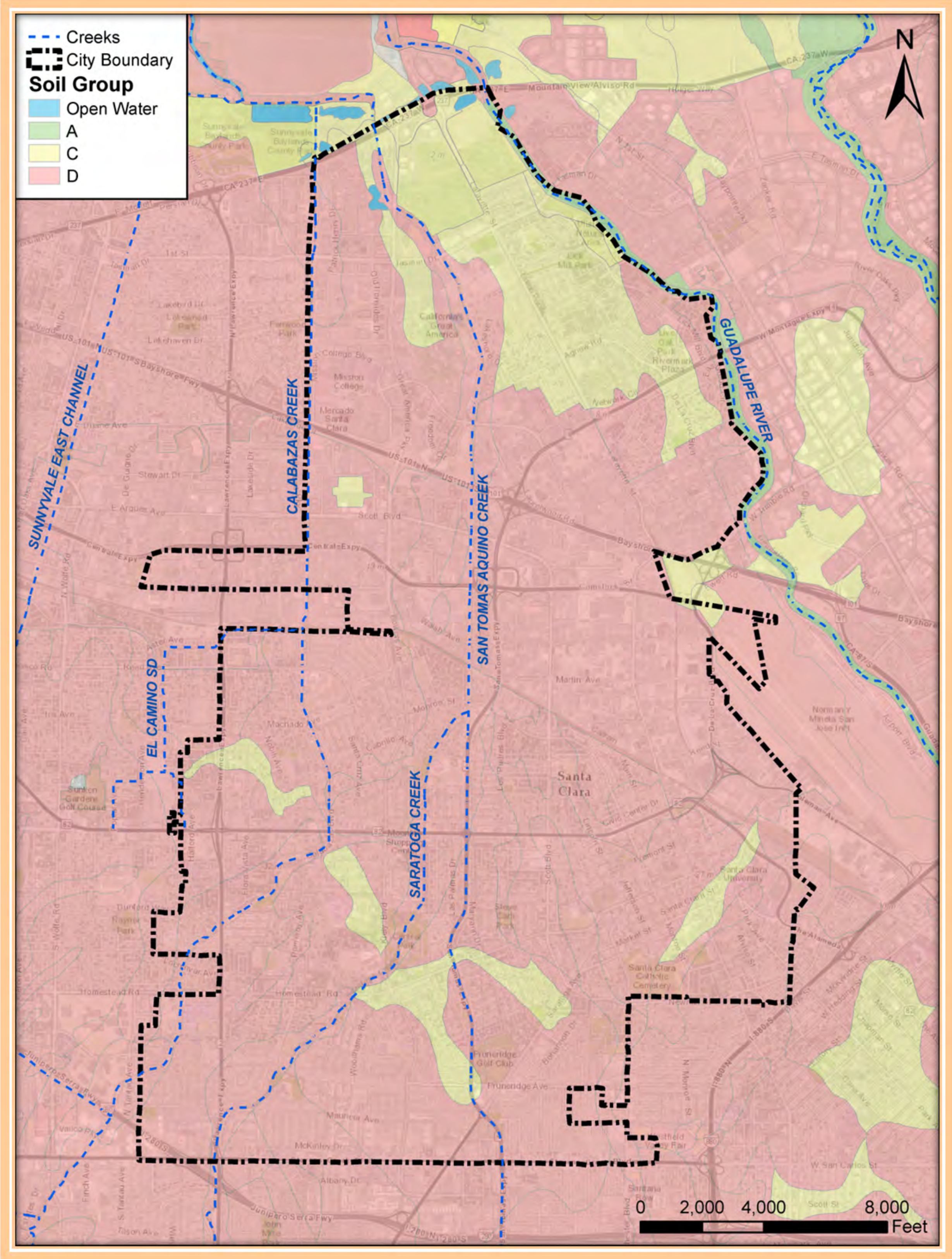

Figure 2-3: NRCS Soil Classification in Study Area and Immediate Vicinity

2.3. Data Quality

There is some variation and inconsistency in the quality and accuracy of available data. GIS files preserve spatial accuracy after conversion from CAD drawings. While a large amount of information was present in City CAD files at the start of the study, depths and rim elevations at nodes (manholes, inlets, and outfalls) were largely un-sourced and without datum information and some depths were not recorded. In some instances, CAD and City-provided Excel spreadsheet data did not match. For these conflicts, CAD data was assumed to be more accurate and up-to-date than the spreadsheet data. Record drawings have been used as available, and field investigations have been performed as necessary to complete the data set.

The City has an estimated 200 linear miles of pipe (8,452 links) and 8,452 nodes (including manholes, catch basins, pump stations, detention basins, and outfalls) in the study area. The hydraulic model contains all known pipes 6 inches in diameter or larger, belonging to Santa Clara, Sunnyvale, San Jose, Santa Clara Valley Water District, Santa Clara County, and some private entities. After an initial model was built and missing data were estimated or interpolated, results revealed some locations where further verification was necessary. The methods described in Section 2.4 have been used to assign missing data.

2.3.1. Modeled Data Assumptions

To create a uniform ground surface for hydraulic modeling, rim elevations at all system nodes have been extracted to the system node shapefile from the LiDAR terrain model, consisting of elevation data from the 2006 Santa Clara County flyover and the 2010 ARRA San Francisco Coast flyover. Invert elevations are assigned to each node based on depths from City provided data and field measurements.

Where node depths are unknown, record drawings have been reviewed wherever possible; otherwise, invert elevations are assumed or interpolated for modeling purposes. Unknown catch basin inverts are assigned assuming a minimum pipe cover of three feet where the catch basin is positioned at the end of a line (i.e. where there is no pipe upstream of the catch basin). For other unknown inverts, elevations are interpolated between upstream and downstream nodes with assigned inverts using the interpolation tool in the MIKE URBAN (MU) model, providing a sufficient estimate of missing data for a master plan level analysis, given that most storm drain pipes are surcharged under design storm events of interest, and once surcharged, storm drain pipe slope (and therefore inverts) do not affect hydraulic analyses.

Inverts and ground elevations in the model have been checked manually for irregularity (e.g. ground elevations below the top of pipes, negative pipe slopes, and incorrect pipe diameters), and corrected as necessary. Small spatial inaccuracies in the GIS have been corrected using the storm drain system CAD drawing, the record drawings and field measurement. Pipe diameters from both CAD and GIS have been assumed based on the connecting pipes or the pipe location (e.g. laterals with unknown diameter are assumed to be 12 inches). At critical hydraulic locations, missing pipe diameters have been found using field measurement. The terrain model is used to approximate rim elevations and surface areas for the Westside and Eastside Basins. Elevations extracted at five different points on the top rim of each basin have been averaged to estimate the top elevation of the basins. Depths and cross sections are taken from record drawings.

2.4. Future Use of Models

The models developed for this SDMP are developed to Santa Clara County Drainage Manual standards and can be used to analyze future development impacts to the existing system or alternative improvements that are not part of this SDMP. It is recommended that the models are continually updated when new information is received or when improvement projects are completed. The models should serve as a tool that the City can use to further analyze the storm drain system.

Chapter 3. Master Planning Methodology

3.1. Overview

The criteria used to evaluate storm drain system performance must be technically sound yet simple to understand and apply. Ideally, the same methodology used to analyze system performance for this report will also continue to be used for future infrastructure design. Schaaf & Wheeler applied NRCS hydrology methods to estimate storm runoff from current land uses for the Santa Clara Storm Drain Master Plan. This method is being used along with MIKE URBAN by DHI storm drain modeling software to evaluate system performance, identify deficiencies and recommend necessary improvements. Physical parameters used in the model are based on the City's GIS data and other information detailed in Chapter 2 - Data. Storm drain evaluation criteria described in the following section have been discussed with and agreed upon by the City.

3.2. Evaluation Criteria

The NRCS Unit Hydrograph Method is used to estimate storm water runoff in Santa Clara in accordance with the 2007 Santa Clara County Drainage Manual. The County Drainage Manual was developed to provided consistent design and evaluation criteria for storm drainage throughout Santa Clara County. The Unit Hydrograph method allows for the development of a flood hydrograph using a design storm, an appropriate infiltration technique, varying antecedent moisture condition, storage within the watershed, and a synthetic unit hydrograph.

The storm duration used for rainfall simulation is 24 hours, the standard Santa Clara County Drainage Manual storm duration. The storm pattern used in the models is based upon the three-day December 1955 rainfall event, still considered to be the storm of record for northern California. The pattern intensity values have been adjusted to preserve local rainfall statistics within Santa Clara County, can be found in Appendix D of the County Drainage Manual, and are reproduced here as Figure 3-1.

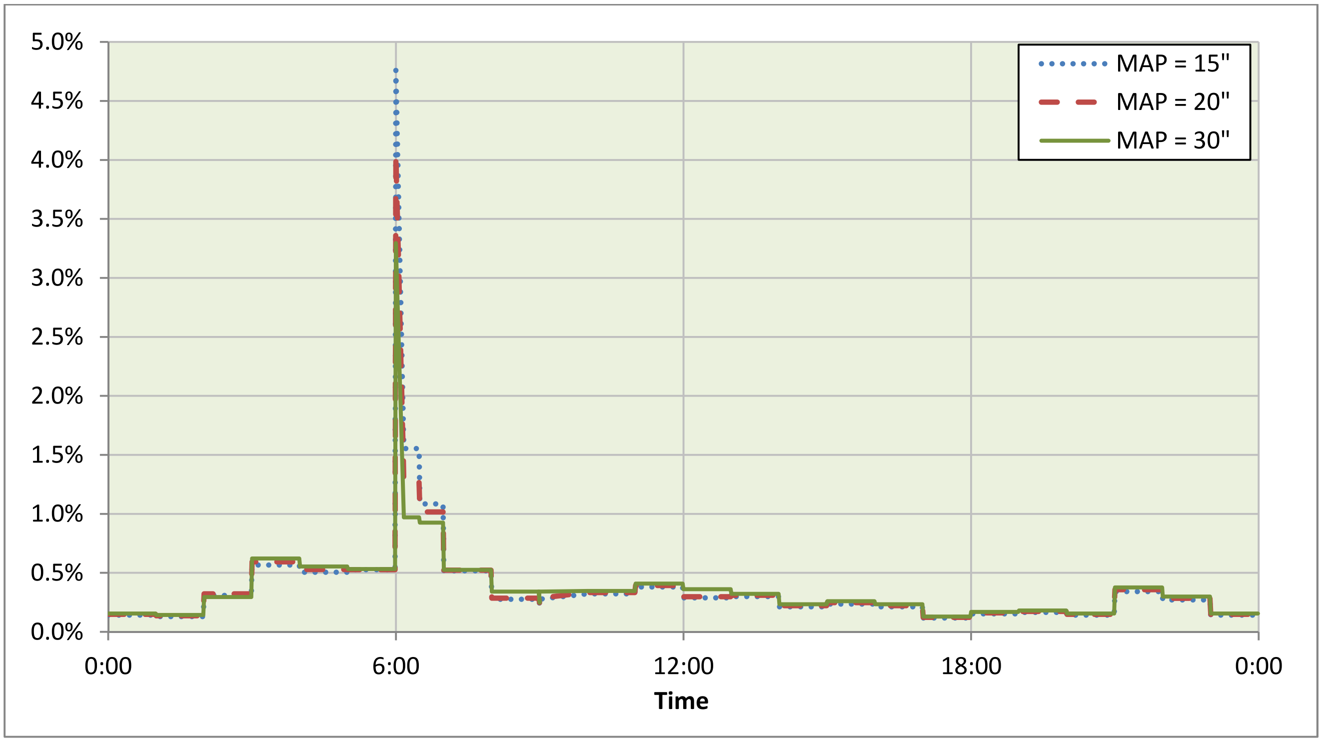

Figure 3-1: 24-hour Design Storm from County Drainage Manual

Using these design storms, hydrologic and one dimensional (1-D) hydraulic models have been created for the 2-year, 10-year and 100-year events. The 2-year event has been modeled with free creek outfalls to identify data inaccuracies and the highest priority areas for improvement. The 10-year and 100-year storm events are used as the design events for the storm drain system evaluation. The 10-year level-of-service standard is consistent with the City's design standard for general storm drain system conveyance, while the 100-year level-of-service is consistent with standards for design of facilities near pump stations and other critical areas, as determined by the Public Works Department. Additional two dimensional (2-D) models built for the 10-year and 100-year events more accurately estimate the extent and depth of flooding.

Improvements are recommended to reduce the 10-year hydraulic grade to no higher than 0.5 foot above the gutter elevation at any location, and the 100-year hydraulic grade to a level at or below building pad elevations without unsafe conditions in streets or parking lots. These criteria minimize the risk to private property and public safety and are common standards used throughout the Bay Area by other jurisdictions.

3.3. Modeling Software

The Danish Hydraulic Institute (DHI) MIKE-URBAN (MU) software with MOUSE solver is selected to model the City of Santa Clara storm drain system because it is tested and reliable software with a GIS interface. MU is a package of software programs designed by DHI for the analysis, design and management of urban drainage systems, including storm water sewers and sanitary sewers. The MU model works within the ArcMap GIS interface and can simulate runoff, open channel flow, pipe flow, water quality, sediment transport, and two dimensional surface flow. The City's modeling package consists of three interrelated products:

1. MOUSE is a group of hydrologic, hydraulic, water quality and sediment transport modeling modules which can be used together or used independently. The modules used in the Santa Clara storm drain model include the Surface Runoff Module, which computes surface runoff using one of five computational methods; and the Hydrodynamic Pipe Flow Module, which calculates an implicit finite-difference numerical solution of the St. Venant flow equations for the modeled pipe network.
2. MIKE FLOOD (MIKE 21) is an additional two dimensional modeling module which simulates flows, waves, sediments, and overland flows. It computes two dimensional flows over a given surface using an implicit finite difference solver method with elevation and manning's roughness valued defined on a rectangular grid. This module can be connected to 1-D pipe network elements and run simultaneously with the MOUSE module.
3. MIKE-URBAN (MU) is an ArcMap based program which includes tools specifically designed to develop urban drainage models. MU provides a graphical user interface for data input and editing and serves as a bridge between ArcMap GIS and the MOUSE modeling program. Capabilities of MU include import and export of model data, network editing and gap-filling, catchment delineation, and network simplification. MU can also be used to present results including plan, longitudinal, and cross-section views; animation of results; presentation of flooding including water depth and pressure; and overlay of results on background graphics such as maps or aerial photos

Due to restrictions on the number of links (pipes) in a single model, the City's storm drain network is separated into six areas: Calabazas, Calabazas-San Tomas, Saratoga-San Tomas, San Tomas-Guadalupe North, San Tomas-Guadalupe Central, and San Tomas-Guadalupe South. The entire area contributing runoff to Santa Clara's pipe system is first split into four sub-areas defined by the major drainage channels (Calabazas Creek, Saratoga Creek, San Tomas Aquino Creek, and Guadalupe River), where there would be no exchange of surface flows between models.

The large area between San Tomas Aquino Creek and Guadalupe River requires further division into three separate models due to the large number of pipes in the area. The first of these models (San Tomas – Guadalupe North) consists of pipes draining to Guadalupe River through Nelo-Victor Pump Station and all outfalls to its north, as well as outfalls to San Tomas Aquino north of Highway 101. The second (San Tomas-Guadalupe Central) consists of pipes connecting to Laurelwood Pump Station and the outfall at Trimble Road near San Jose International Airport. The third (San Tomas-Guadalupe South) consists entirely of those pipes south of Central Expressway, draining to San Tomas Aquino Creek from the east. Each model includes a conveyance network (pipe, nodes, pump stations, outfalls, etc.) and the catchments contributing runoff to the network. Rough boundaries for these six models are shown in Figure 3-2.

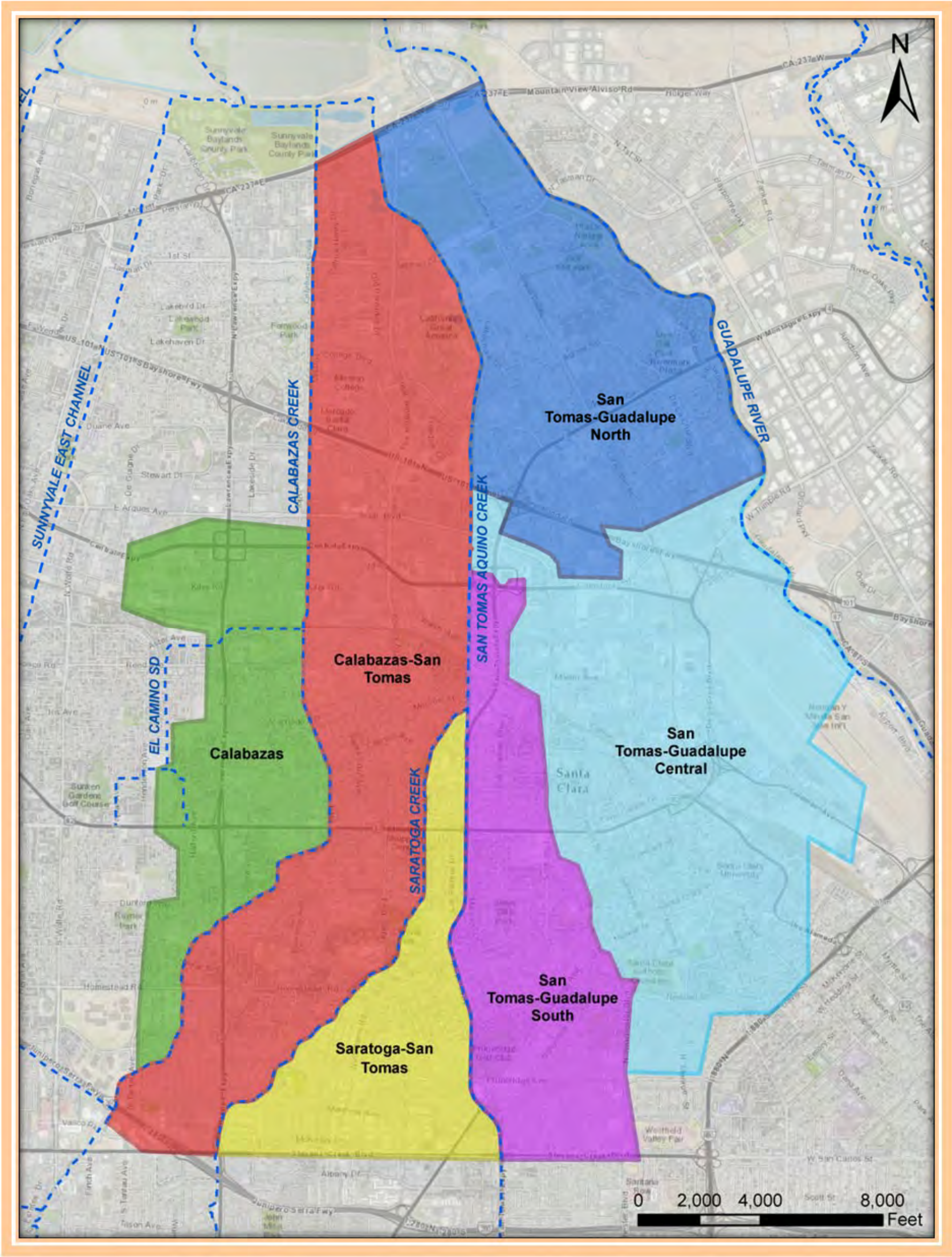

Figure 3-2: Approximate Extents of Individual Model Areas

3.3.1. Operation

Three separate calculations are performed by MU for the City models. First a runoff calculation estimates the amount of water entering the storm drain system during a design rainfall event. Second a network flow calculation replicates how the storm drain system will convey flows to outlet locations. Flows resulting from the runoff calculation are used as inflows for the subsequent network flow calculation. The third calculation, simulating two dimensional overland flows, is run simultaneously with the pipe flow model. Urban link connections between the network nodes and one or more grid elements of the LiDAR surface model, allow for exchange of flow between the two models as shown in Figure 3-3.

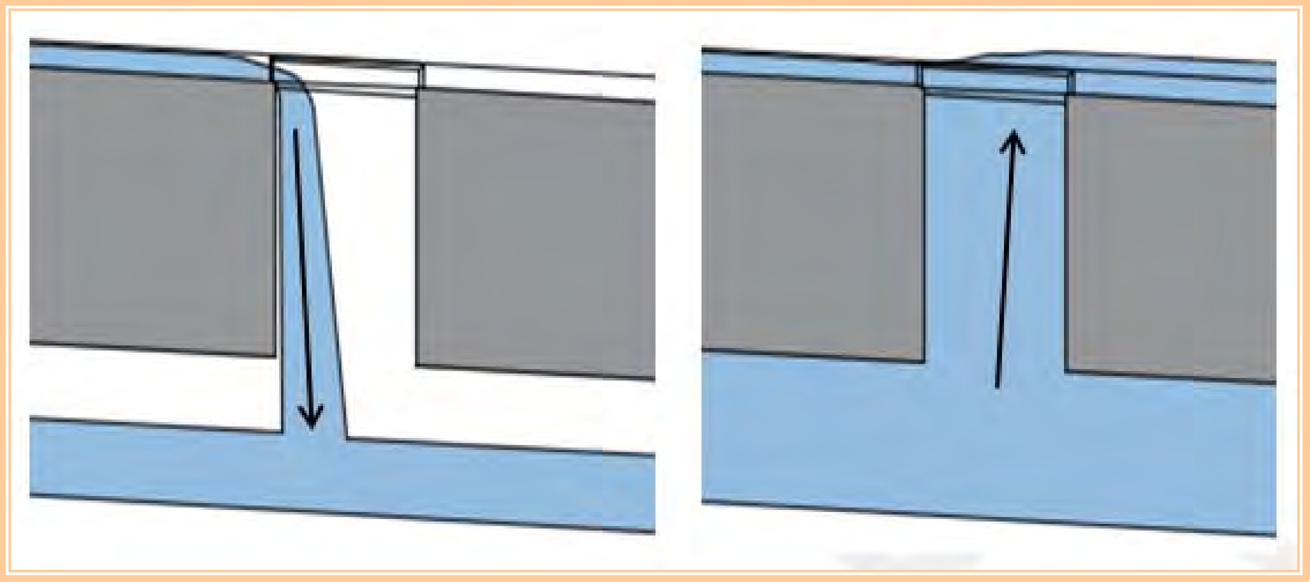

Figure 3-3: Flow into SD System from Surface (L) and Surcharging Flow to Surface from SD (R)

The MU runoff model offers a choice of infiltration methods. The City storm drain models use the NRCS dimensionless unit hydrograph method (UHM) to calculate surface runoff which uses CN to describe infiltration capabilities. A simulation can be started at any point during the chosen design storm to assess surface runoff for any period of the design storm, with computations made based on a user-specified time step. The runoff time steps are chosen to be at 5-minute intervals.

The MU network flow model also offers a choice of three flow description approximations: Diffusive Wave, Dynamic Wave, and Kinematic Wave; distinguished by the set of forces each takes into account. The Santa Clara storm drain models use the most comprehensive flow description, Dynamic Wave, which incorporates the effects of gravitational, friction, pressure gradient and inertial forces. Because it accounts for all major forces affecting flow conditions, this equation allows the model to accurately simulate fast transients and backwater profiles. For a one-dimensional pipe flow simulation, flooding at a node is accommodated by the insertion of an artificial “basin” above the node which will store water when the water level rises above the ground level. The surface area of the “basin” gradually increases (up to a maximum of 1000 times the node surface area) with rising water levels at the node, replicating the effects of flooding.

Water stored in the “basin” begins to reenter the system when the outflow from the node becomes greater than the inflow. The pipe flow simulation can be executed using either a constant or variable time step, and can be run for any portion of the time interval specified by the input rainfall time series and corresponding calculated runoff hydrograph.

However, the MIKE FLOOD ground surface model can be coupled with the MU network flow computation to improve accuracy and resolution in determining the depth and extend of flooding. Instead of an artificial “basin”, links to the LiDAR terrain model spread outflows over connected two-dimensional grid elements. The model routes flow over land, enabling more accurate computation of the spatial distribution of flood water and allowing for exchange between otherwise physically disconnected pipe systems.

3.3.2. Input and Output

MU surface runoff calculations require two types of input data: boundary data and urban catchment data. Boundary data for the run-off computation consists of an input rainfall time series representing the design storm event for the model and water surface elevation time series at the outlet nodes representing the 10- and 100-year water surface elevations in the creeks. Urban catchment data includes the pipe network and boundaries of each drainage catchment, along with relevant physical and hydrologic parameters including surface area and parameters used to calculate basin lag time. Drainage catchments for the study area are shown in Figure 3-4. While the majority of the City drains directly into the pipe system, a few drainage areas consist of open space or parks that drain directly into the adjacent stream.

MU network flow calculations require three types of inputs: network element data (links and nodes), operational data (pump curves for the 18 modeled pump stations, flap gates, and Eastside and Westside Retention Basins), and boundary data (rainfall and creek/river water surface elevations). Network elements consist of nodes (which can include manholes, catch basins, pump stations, retention/detention basins, and outfalls) and links (which can include pipes, culverts, and open channel cross sections). Parameters required to describe links include the name of upstream and downstream nodes (“to node” and “from node”), shape (circular, egg shaped, defined cross section, etc) and dimensions, material or roughness, and upstream and downstream node invert elevation. Geometry and data corresponding to network elements are imported from GIS shapefiles. Connections to urban catchments are defined within the MU interface as node elements where catchment runoff enters the network. Boundary data can include direct results of runoff calculations based on rainfall input, external loadings, inflow discharges, external water levels at interaction points with receiving waters (outfalls), or pump performance curves.

Pump stations are modeled as a functional relationship between two nodes. The upstream node is modeled as the pump station wet well and/or forebay. Because nodes are all considered circular manholes, record drawings have been used to convert rectangular wet well dimensions to an equivalent diameter as necessary. This ensures that pump cycling in the wet well is as close to reality as possible. The downstream node connects the pump to the outfall pipe(s). Flows are modeled as a relationship between water surface elevations in the wet well and flow rates into the downstream node.

Output from the pipe flow computation includes the calculated water level at each node, discharges, water level in network branches, discharge in network branches, velocity in network branches, water volume in the system, and time step data. Output is viewed using GIS, MU, or the MIKE-VIEW program. Results may be displayed in plan-view or as a profile for a selected network section, and may be viewed as a temporal animation or at maximum or minimum values. Additional outputs which can be derived from MU pipe flow results using GIS and include: water depth, flooding level, pressure in closed conduits, percentage pipe filling, and the flow calculated for each link.

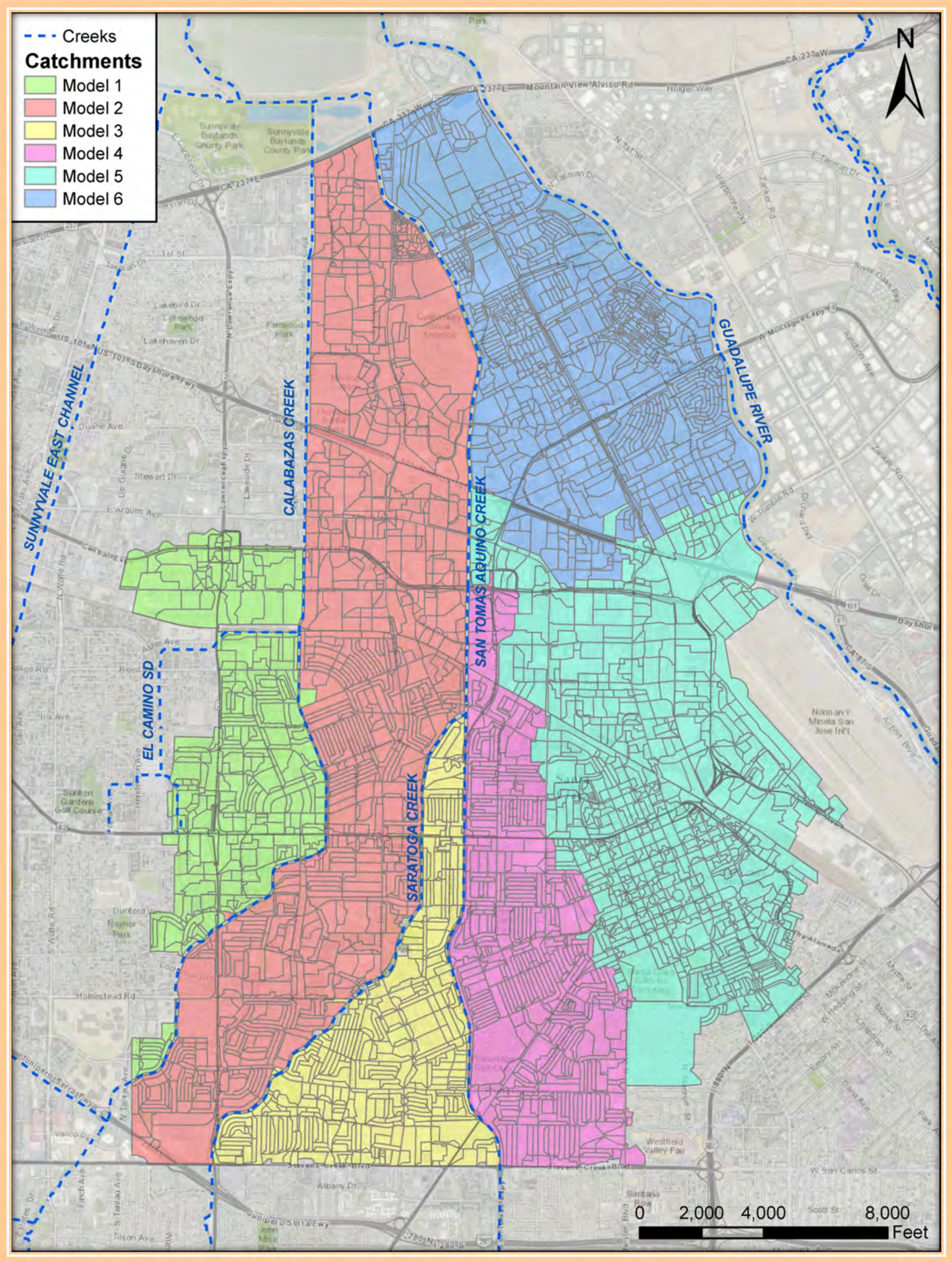

Figure 3-4: Santa Clara Storm Drain System Catchments

Additional inputs required by the MIKE FLOOD two-dimensional model include: a user-defined rectangular grid size, a digital elevation model (DEM), 2-D model boundaries, and polygons defining Manning's roughness coefficients (*n*) as shown in Table 3-1. Surface manning's roughness values are based on blockage characteristics typical of each land cover type. The model assigns average elevations and Manning's *n* values to each rectangular grid cell. Additional optional inputs include initial conditions and boundaries. Initial conditions are defined as either constant or spatially varied water surface elevations over the model area.

Table 3-1: 2-D Overland Model Surface Roughness Values

Land Use Type	Manning's n
Streets	0.025
Public/Parks/Open	0.035
Commercial/Industrial	0.070
Residential	0.100

Outputs of the 2-D model are surface depth and flux magnitude in raster grid format. MIKE FLOOD results can be viewed in the MIKE ZERO interface or in GIS. Depth and velocity output grids can be saved at a user-defined time interval and can be animated. Additional inundation statistics that can be calculated and stored in separate rasters are maximum water depth and flux magnitude. A summary of inputs and outputs is listed in Table 3-2.

Table 3-2: Summary of Inputs and Outputs for Each Model Element

Model	Inputs	Outputs
Runoff	Boundary Data • Rainfall time series Urban Catchment Data • Drainage catchments • Lag time • Curve number	Runoff hydrographs for each individual catchment
Pipe Flow	Storm Drain Network • Nodes (catch basins, manholes, outfalls, etc) • Links (pipes, culverts, open channels) Operational Data • Catchment connections • Pump curves • Junction Losses Boundary Data • Catchment runoff hydrographs • Water surface elevation time series	Water level at each node Water level in network links Velocity in network links Water volume in the system Discharges
Overland	Rectangular grid size 2D model boundaries Surface elevations (DEM) Storm drain node couplings Surface roughness based on land use	Depth of water in each cell Flux of flow in each cell

3.4. Hydrologic Calculations

Methods used in this master plan to estimate peak storm water flow rates and volumes require the input of precipitation data. Since it is impossible to anticipate the impact of every conceivable storm, precipitation frequency analyses are often used to design facilities that control storm runoff. A common practice is to construct a design storm, which is a rainfall pattern used in hydrologic models to estimate surface runoff. A design storm is used in lieu of a single historic storm event to ensure that local rainfall statistics (i.e. depth, duration and frequency) are preserved. When combined with regional specific data for land use and loss rates, the model should produce runoff estimates that are consistent with frequency analyses of gauged stream-flow in the Santa Clara County area. In other words, the 2-, 10-, and 100-year design storm patterns used for MU modeling create results consistent with 2-, 10-, and 100-year storm runoff events.

Precipitation frequency analyses are based on concepts of probability and statistics. Engineers generally assume that frequency (probability) of a rainfall event is coincident with frequency of direct storm water runoff, although runoff is determined by a number of factors (particularly land use conditions in the basin) in addition to the precipitation event. Because the County's 24-hour pattern has been adjusted to preserve local statistics, there is increased confidence in the runoff predictions created by the City models.

3.4.1. Mean Annual Precipitation

Mean Annual Precipitation (MAP) information is taken from the Santa Clara Valley Water District Isohyet map, which has been digitized into GIS. The SCVWD isohyet map indicates a MAP varying between 13 and 16 inches per year within the study area (Figure 3-5).

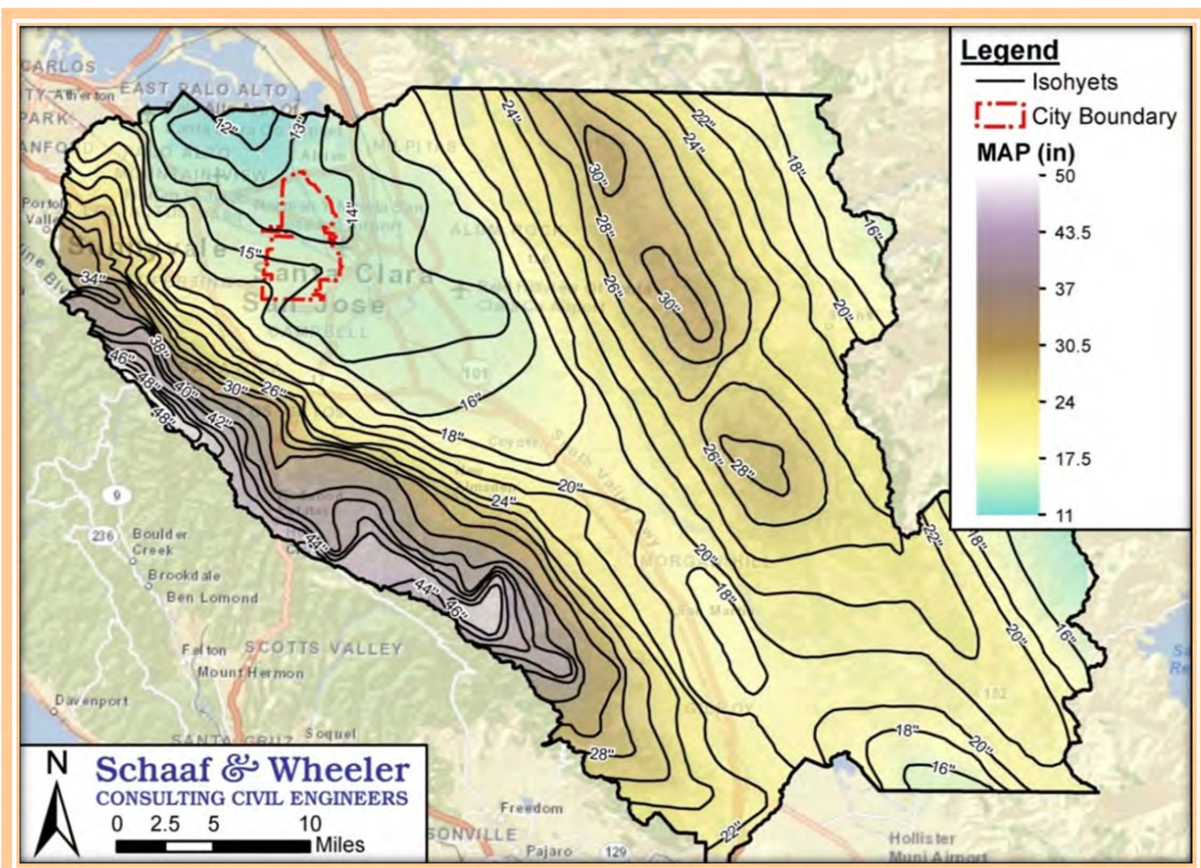

Figure 3-5: SCVWD Mean Annual Precipitation Map

From the isohyet contours, a continuous, county-wide raster is created. GIS zonal statistics tools are used to find the spatially averaged MAP within each catchment. Varying rainfall depths are applied to each catchment in the models based on average catchment MAP as described in Section 3.4.2.

3.4.2. Rainfall Depth and Pattern

The rainfall distribution pattern for the Santa Clara Storm Drain Master Plan is obtained from the County Drainage Manual. The County's rainfall pattern is distributed in 5-minute time increments with a fraction of the total rainfall apportioned to each 5-minute increment. The total depth of each pattern is based on the mean annual precipitation taken from the Isohyet GIS layer.

The Santa Clara County Drainage Manual provides the following equation to calculate the total rainfall depth for each MAP and storm frequency:

$$X_{T,D} = A_{T,D} + \left(B_{T,D} * MAP\right)$$

Where: $X_{T,D}$ = precipitation depth for a specific return period and storm duration (inches),

T = return period (years),

D = storm duration (hours),

$A_{T,D}$ & $B_{T,D}$ = dimensionless coefficients from County Drainage Manual Tables B-1 and B-2

MAP = Mean Annual Precipitation (inches)

The precipitation intensity, $i_{T,D}$ is given by:

$$i_{T,D} = \frac{x_{T,D}}{D}$$

Because the MAP over the City of Santa Clara varies by 4 inches, four different MAP rainfall patterns are applied to catchments in the models to replicate that variation. The four patterns are applied based on ranges of spatially averaged catchment MAP, as shown in Table 3-3. Fractions of rainfall for the 2-yr, 10-yr, and 100-yr are shown in Table 3-4. These fractions are then multiplied by the depths listed in Table 3-3 to get a rainfall pattern in inches. The rainfall pattern in inches per 5-min interval for MAP 13 is show in Figure 3-6.

Table 3-3: MAP Patterns Applied to Model Catchments

Pattern MAP	Catchment MAP	2-yr Depth (in)	10-yr Depth (in)	100-yr Depth (in)
13”	12.5” - 13.5”	1.57	2.68	3.98
14”	13.5” - 14.5”	1.66	2.84	4.22
15”	14.5” - 15.5”	1.76	3.01	4.46
16”	15.5” - 16.5”	1.86	3.17	4.71

Table 3-4: MAP 13 24-Hour Rainfall Patterns

	Rainfall Fractions (%)		
Time (Starting)	**2-yr**	**10-yr**	**100-yr**
0:00	0.0173	0.0384	0.0674
1:00	0.0159	0.0352	0.0618
2:00	0.0650	0.1006	0.1375
3:00	0.1197	0.1874	0.2555
4:00	0.1067	0.1668	0.2274
5:00	0.1838	0.2570	0.3217
6:00	0.3702	0.5795	0.8149
6:10	0.1441	0.2122	0.2856
6:30	0.0462	0.0866	0.1319
7:00	0.0385	0.0721	0.1099
8:00	0.0539	0.1010	0.1539
9:00	0.0635	0.1190	0.1814
10:00	0.0481	0.0902	0.1374
11:00	0.0500	0.0938	0.1429
12:00	0.0259	0.0576	0.1011
13:00	0.0288	0.0640	0.1123
14:00	0.0260	0.0576	0.1011
15:00	0.0144	0.0320	0.0562
16:00	0.0187	0.0416	0.0730
17:00	0.0202	0.0448	0.0786
18:00	0.0173	0.0384	0.0674
19:00	0.0418	0.0928	0.1629
20:00	0.0332	0.0736	0.1292
21:00	0.0173	0.0384	0.0674
22:00	0.0173	0.0384	0.0674
23:00	0.0159	0.0352	0.0618

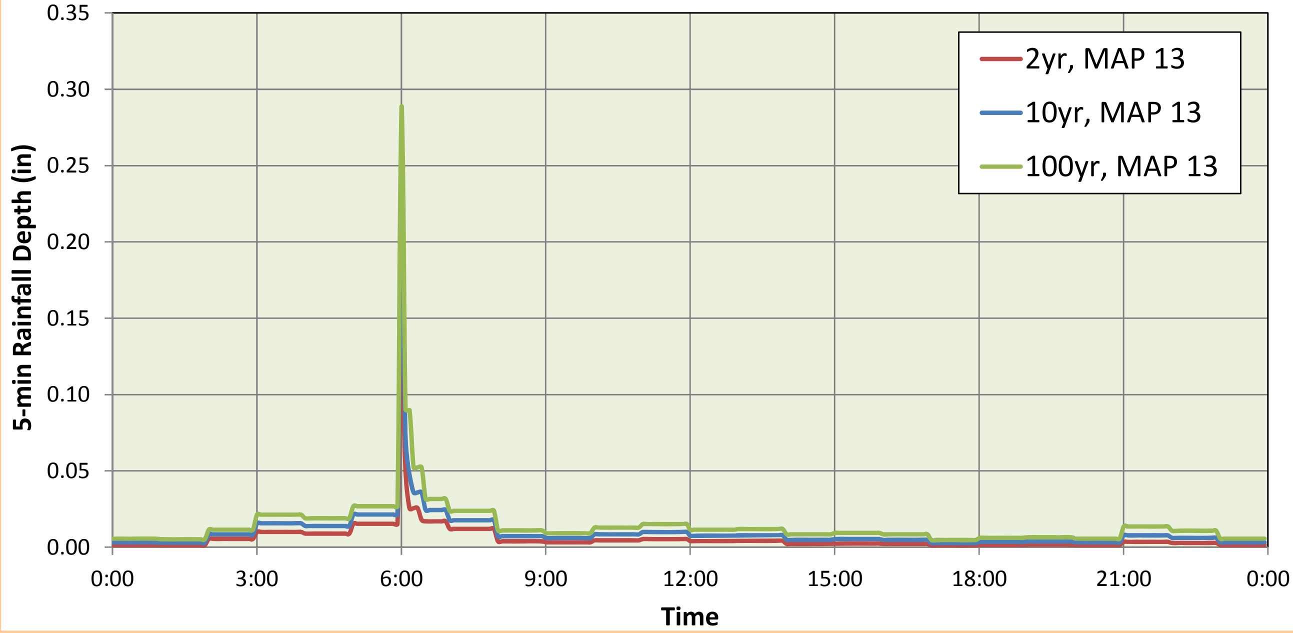

Figure 3-6: 2-, 10-, and 100-year MAP 13 Rainfall Patterns (inches)

3.5. Catchment Data

Santa Clara is divided into drainage areas, called catchments, as described in Section 2.3.5. The catchment delineations completed by Schaaf & Wheeler rely on engineering judgment and experience using contours, lot lines, storm drainage system, and aerial imagery. Urban catchment data includes the boundaries of each drainage catchment, along with relevant physical and hydrologic parameters including surface area, land use characteristics, and parameters used to calculate basin lag times.

3.5.1. Unit Hydrograph

A unit hydrograph is a numerical representation of the time response of catchment runoff caused by one inch of excess rainfall applied uniformly over a unit of time. Many different techniques are available to estimate unit hydrographs. The NRCS-dimensionless unit hydrograph is used in the Santa Clara storm drain models as it matches the County's specified unit hydrograph methodology. Direct runoff is estimated by subtracting soil infiltration and other losses from the rate of rainfall. Uniform loss, which accounts for constant infiltration of rainfall into the soil, is a function of both soil type and ground cover (i.e. vegetation type or land use).

3.5.2. NRCS Curve Number

The NRCS Curve Number (CN) methodology is used to determine storm water runoff from each catchment with design precipitation. Curve numbers are used to characterize basin infiltration and runoff potential based on a combination of land use and soil characteristics discussed in Chapter 2 and a parameter known as antecedent moisture condition, or AMC. AMC is defined as the moisture content of a soil prior to any precipitation event. AMC is characterized by the NRCS as:

AMC I	Soils are dry
AMC II	Average conditions
AMC III	Heavy rainfall, saturated soil

The County Drainage Manual specifies a calibrated AMC value to properly convert the rainfall event's frequency of occurrence into the equivalent frequency of runoff event. AMCs used for each set of models are summarized in Table 3-5.

Table 3-5: Antecedent Moisture Conditions for Each Set of Models.

Return Period	AMC	Condition
2-yr	II 1/4	Slightly higher saturation than average
10-yr	II 1/2	Mid way between average and saturated
100-yr	II 1/2	Mid way between average and saturated

Curve numbers vary from 0 to 100, with a CN of 0 representing no runoff from a basin and a CN of 100 meaning that all precipitation will run off. As shown in Table 2-5, County Drainage Manual pervious surface curve numbers are applied to the Santa Clara model based on land use and soil type. Land use and soil type polygons have been intersected with Santa Clara's catchments, and the appropriate CN applied to each resulting intersected polygon. Each catchment is then assigned a pervious, area-weighted mean CN. The pervious CN for each catchment is adjusted to AMC II 1/4 and AMC II 1/2 for use in 2-, 10-, and 100-year analysis. Impervious areas are assigned a CN of 100 and overall weighted curve numbers are calculated for each catchment polygon.

3.5.3. Basin Lag

For urban storm drain systems, basin lag generally consists of three components: roof or overland flow, gutter flow, and pipe flow. Because the MU pipe flow model accounts for lag time through pipe systems, roof and gutter flow are properties that are calculated as inputs for catchments.

Due to the relatively small size and mild slope of the delineated catchments, an alternative lag equation has been chosen. A modified SCS lag equation expresses basin lag time as:

$$T_l = \max\left(\frac{l^{0.8}(S+1)^{0.7}}{1900Y^{0.5}}, 0.083\right) + 0.083$$

Where: T_l = lag time (hours)

l = longest flow path length (feet)

Y = average basin slope (%)

And $S = \frac{1000}{CN} - 10$ with CN = weighted catchment curve number

This equation uses basin length, slope, and curve number (which is a function of land use and soil type) to estimate basin lag. A minimum lag of 5 minutes in the street is set based on engineering judgment. The overall minimum basin lag time is 10 minutes to account for roof top drainage through individual properties to the street. (This minimum lag is consistent with the County Drainage Manual.) Schaaf & Wheeler used the County's 2006 LiDAR topography data and GIS tools to estimate basin flow paths and slopes. Weighted Curve Number calculation is discussed in detail in Section 3.5.2.

3.6. Model Calculations

MU pipe flow calculations require network data, operational data, and boundary data as input. Network data consists of the pipe network elements including nodes (manholes, outlets, and storage nodes) and links (pipes, culverts, and open channels).

Detailed analyses of peak storm water discharge are performed by the MU program, which also determines the flow condition in each drainage system element. The MU and MIKE FLOOD technical manuals may be referenced for a more detailed description.

3.6.1. Links

Parameters required to describe model links include the name of upstream and downstream nodes, pipe shape and dimensions, material or roughness, and upstream and downstream inverts. Structural system elements including gates and weirs are all modeled as functional relationships connecting two nodes in the system, or associated with one node in the case of free flow out of the system. Operational data consists of parameters which describe how these elements function in the network. Boundary data for the pipe flow computation can include any external loading, inflow discharges, water levels at interaction points with receiving waters, as well as the results of a run-off calculation.

Pipes are modeled as one-dimensional closed conduit links which connect two nodes in the models. The conduit link is described by a constant cross-section along its length, constant bottom slope, and straight alignment. Unsteady flow in closed conduits is calculated using conservation of continuity and momentum equations, distinguishing between pipes flowing partially full (free surface flow), and those flowing full (pressurized flow). Most pipes within the Santa Clara model are modeled as reinforced concrete pipe (RCP) with a Manning's '*n'* of 0.01333 or corrugated metal pipe (CMP) with an 'n' of 0.025.

3.6.2. Junction Losses

Parameters required to describe nodes include *x* and *y* coordinates of the node, a unique name, node type (junction, outlet or basin), depth and invert levels, and water levels at outlets. Hydraulic losses at junctions (manholes, inlets, intersections) can be significant in pressurized drainage systems. Losses can vary due to construction methods, condition, and shape. Schaaf & Wheeler performed a sensitivity analysis of the loss coefficients used in MU to determine the most realistic model parameters. The MU Weighted Inlet Energy Method is used for this study.

3.6.3. 2D Overland Flow

Exchanges of water between the surface model and the pipe flow model are described by urban links, which calculate the interaction of water when network nodes are overtopped or when overland flow enters the pipe network. The exchange of water is calculated in three different ways depending upon the depth of flooding on the surface. If a surface is not flooded during a time step, flow is calculated as if the outlet is a free flowing weir. If the surface is flooded, a submerged weir equation is used. If the flooding depth is great enough, exchange of flow can be calculated using an orifice equation. Calculations are based on user-defined inlet area and maximum flow parameters. Catch basin inlets were field measured and found to have an average of 1.75 square feet of open area. Inlet areas were set to 1.5 square feet assuming 15% blockage due to brush and leaves building up on the grate.

3.6.4. Pump Stations

Santa Clara's storm drain system relies heavily on pump stations to move runoff from pipe networks to creeks which flow to San Francisco Bay. The models include a total of 22 pump stations within the study area, 18 of which are included in the models. Modeling these stations correctly is important to ensure the accuracy of calculations. Pumps are modeled as a functional relationship between the water level of the inlet node and the flow to the outlet node. MU requires starting and stopping water levels at the inlet node and a capacity curve of inlet node water level versus flow through the pump.

Pump head-discharge curves have been obtained from pump manufacturers if possible. Otherwise a representative curve based on provided pump station capacity information is used. Because it is difficult to accurately include pump station piping and appurtenances in the MU models, it is necessary to modify, or de-rate pump curves to account for losses that occur between the inlet node (the pump station wet well) and the outlet node (the beginning of a force main or pump discharge manifold). Losses include minor loss due to fittings, valves, expansions, contractions, and pipe spools.

The pump discharge velocity is calculated for each head value based on the manufacturer's pump curve flow rate (cfs) and the discharge outlet cross-sectional area (sf).

Velocity Equation

$$V = Q/A$$

Where: A = area of the discharge pipe (ft^2) = $\pi(D/2)2$

Q = pump discharge from the manufacturer's curve (cfs)

D = diameter of the discharge pipe (ft)

V = velocity of discharge (ft/s)

The calculated velocity at each head level is used to calculate corresponding friction head loss through discharge piping using the Hazen-Williams friction loss equation. Friction loss is calculated for all elements not included in the model, which consists of piping between the pump outlet and the beginning of the force main or the pump discharge manifold, depending on the station layout. Hazen-Williams friction losses are calculated using the following equation:

Friction Loss Equation

$$H_f = L\left(\frac{V^2}{0.115 * C * D^{0.63}}\right)^{1.5}$$

Where: $D =$ pump discharge pipe diameter (in)

$L =$ length of pump discharge pipe (ft)

$V =$ velocity of discharge (ft/s)

$H_f =$ minor losses in head due to friction

The length of piping and number of fixtures (bends, tees, valves, reducers, etc) is determined using available pump station record drawings. The calculated discharge velocity at each head level is used to calculate minor losses through fixtures based on the minor loss equation from the County Drainage Manual. The resulting friction and minor losses are summed and subtracted from the original head value to create the de-rated pump curves (included in Appendix A). A sample curve is shown in Figure 3-7.

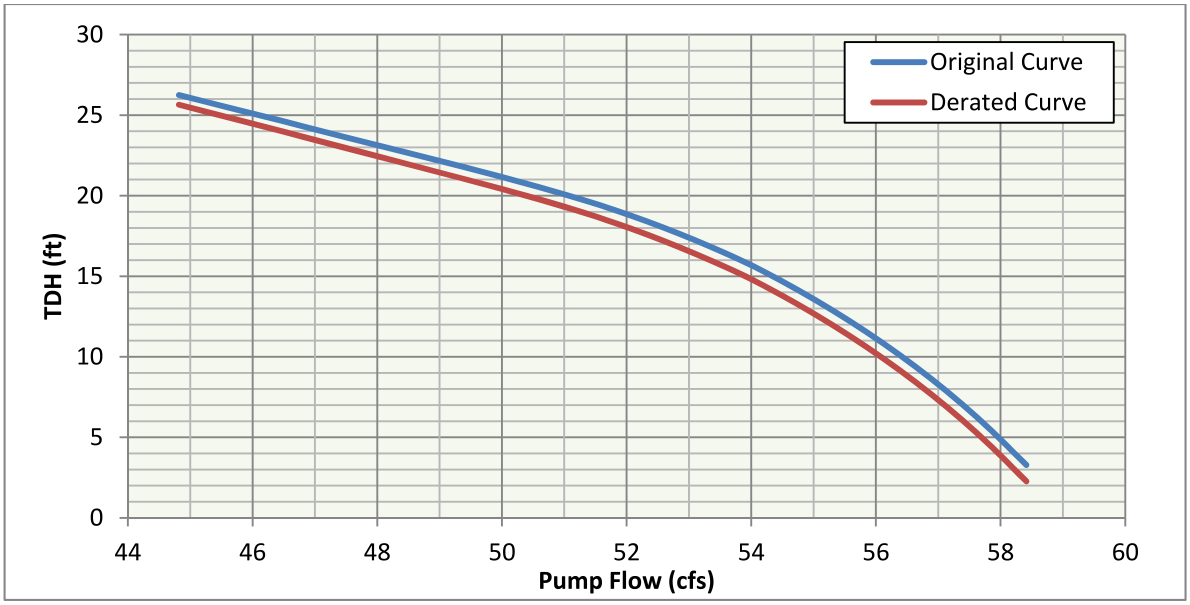

Figure 3-7: Original and De-Rated Pump Curves for Laurelwood 150 HP pumps.

3.6.5. Outlet Boundary Conditions

Pipe network outlets can be modeled with either a free outfall or a water surface elevation (fixed or variable with time) which captures backwater effects due to receiving water levels. The modeled system contains 215 outfalls. All outlets are modeled as free outfalls for the 2-year event as the creek water surface elevations are not expected to be high enough to affect the outflow to the creeks in smaller storm events. 10- and 100-year stage hydrographs are calculated for each outlet using water surface elevation time series outputs from HEC-RAS were created using the same rainfall time series data used as inputs for runoff calculation in MU. This ensures that the timing of the peak water surface elevation at each outfall occurs based on the size and lag of each major watershed. An example of stage boundary conditions is shown in Figure 3-8.

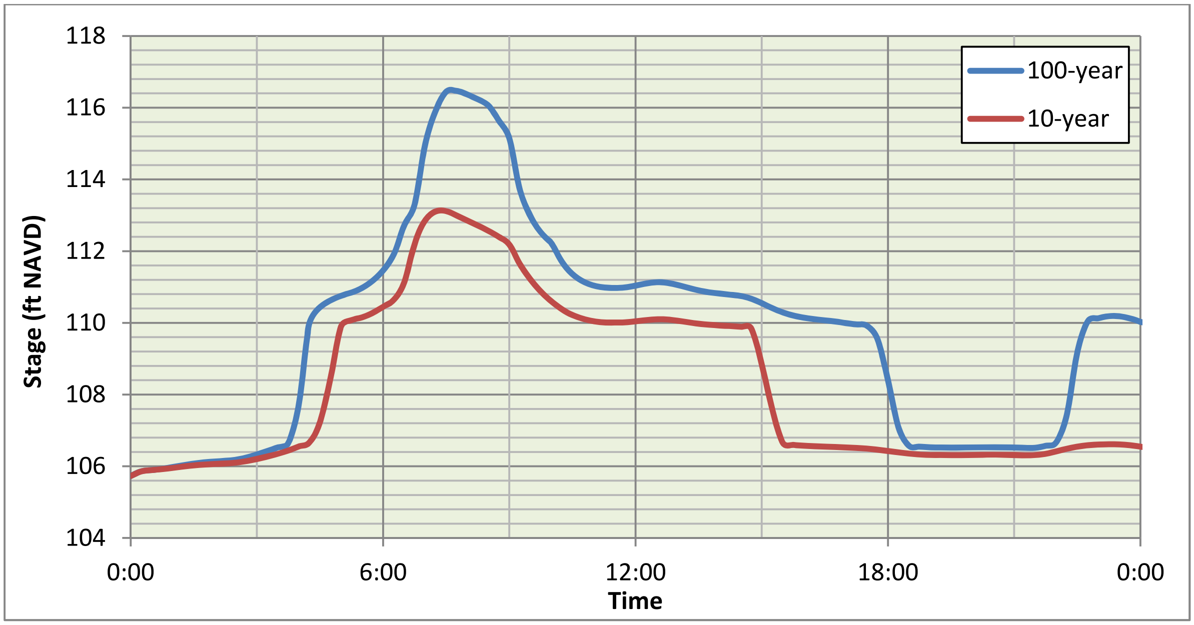

Figure 3-8: Stage Hydrographs Used as Boundary Conditions for Outfalls 14-OF3.

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Chapter 4. Interface with SCVWD Facilities

4.1. Limits of SCVWD Jurisdiction

The Santa Clara Valley Water District (SCVWD) manages potable water, groundwater, flood protection, and stream stewardship on behalf of Santa Clara County. The City lies within two of the five major watersheds (Guadalupe Watershed and West Valley Watershed) managed by Santa Clara Valley Water District (Figure 4-1).

The City has adopted the “Guidelines and Standards for Land Use near Streams: A Manual of Tools, Standards, and Procedures to Protect Streams and Streamside Resource in Santa Clara County” (Resolution No. 8545, July 18, 2005) which clarifies and streamlines local permitting for streamside activities. It also provides design standards and various guidelines for property owners and developers.

Coordination with SCVWD will be required for the construction of master plan improvements located on stream banks. This includes the alternation of existing outfalls, or the construction of new outfalls. The City should also coordinate with SCVWD during the design of improvements that alter the floodplain.

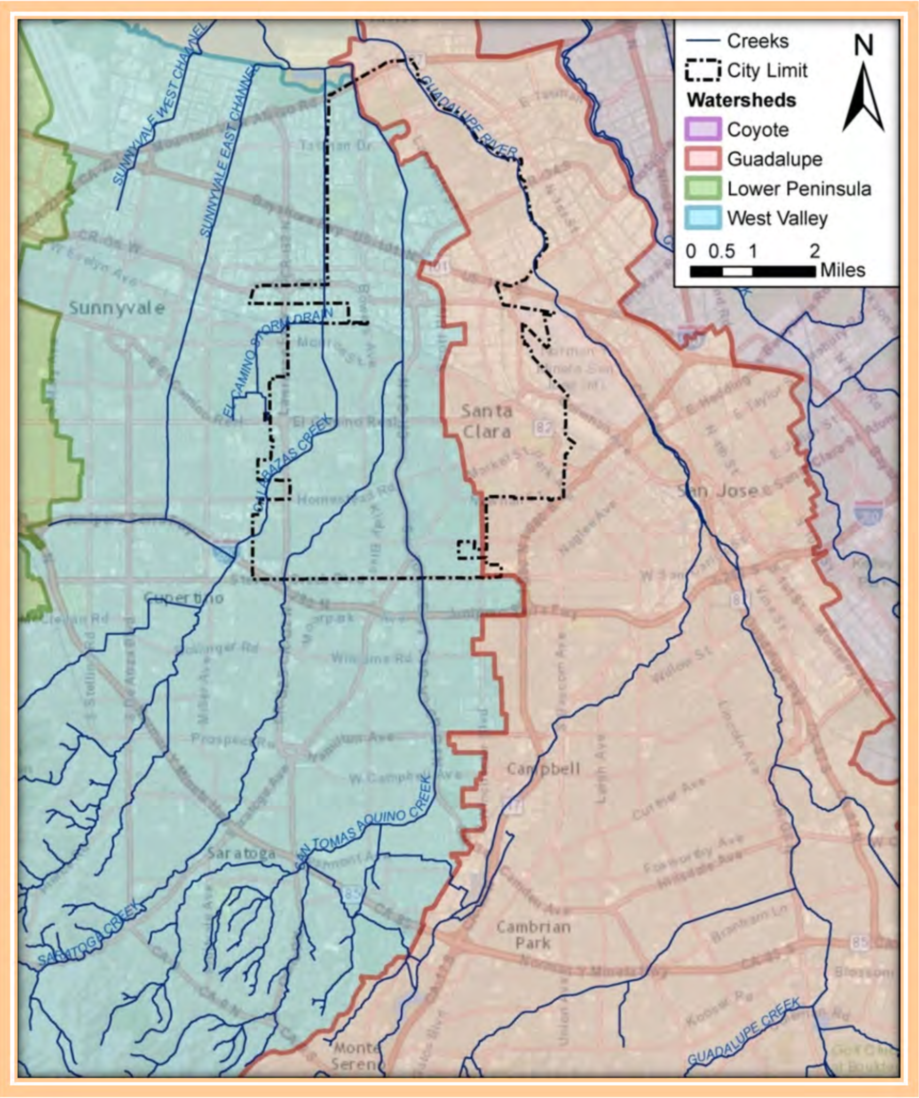

Figure 4-1: Santa Clara Valley Water District Watersheds and Creeks

4.2. Flood Hazards and FEMA Regulations

Santa Clara Valley Water District is responsible for flood protection from the creeks and rivers draining through the City and into San Francisco Bay. SCVWD is currently performing a number of studies and projects such as the Calabazas Creek Capacity improvement Project, intended to remove 2,250 parcels from the 100-year floodplain downstream of Miller Avenue.

Typical insurance policies do not cover the potentially devastating consequences of flooding. Even after a catastrophic event wherein houses and businesses are completely destroyed, property owners remain liable for their mortgage balances without the equity to cover them. The National Flood Insurance Program (NFIP) was created in 1968 for the expressed purpose of providing flood coverage even in the absence of a Presidential declaration of disaster. The intent of flood insurance is to proactively prepare for future flood damages on an equitable basis nation-wide. Mapped special flood hazard areas in the City are shown in Figure 1-4.

4.2.1. National Flood Insurance Program (NFIP)

The NFIP as administered by the Federal Emergency Management Agency (FEMA) allows property owners within participating communities to purchase insurance that protects against losses from flooding. Most banks require mortgage holders to purchase flood insurance if the property is located in a FEMA floodplain. Damages to structures and contents are covered by the flood insurance, which may be purchased through residential and commercial insurance agents. For Santa Clara to participate in the NFIP, the City must adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction and substantial improvements to existing structures in Special Flood Hazard Areas. In return, the Federal Government will make flood insurance available in the City.

4.2.2. Santa Clara's Participation in the NFIP

The National Flood Insurance Act of 1968 allows FEMA to make flood insurance available only where the community has adopted adequate floodplain management regulations. Santa Clara joined the NFIP in the 1970s, and FEMA/FIA issued the first Flood Insurance Rate Map (FIRM) including the City of Santa Clara in 1980. The current effective FIRM for Santa Clara is dated May 18, 2009. The City of Santa Clara is Community No. 060350. Santa Clara, through FEMA's Community Rating System (CRS) is currently a class 8 community. Properties in flood zones obtain a 10% discount on flood insurance, with a 5% discount for properties out of flood zones.

4.3. Flooding from San Francisco Bay

According to preliminary flood hazard maps based on coastal hazards released by FEMA, tidal flooding from San Francisco Bay (elevation 11 feet NAVD) extends south to Bunker Hill Lane. Tidal flooding does not influence this SDMP other than the impact of tidal backwater on water surface elevations within the major creeks.

4.4. Impact of Storm Drain System Improvements on Receiving Waters

Because some of the improvements identified in Chapter 5 increase or redistribute local discharges into receiving waters, additional analyses have been completed to ensure that no significant changes to water surface elevations and discharge characteristics in the creeks and rivers managed by the SCVWD occur. A detailed discussion of these analysis is provided in Section 7.7.

Chapter 5. Evaluation of Storm Drain Systems

5.1. Overview

A performance analysis of Santa Clara's storm drain system is the primary focus of the storm drain master plan. This chapter describes Santa Clara's storm drainage facilities and known drainage system issues within Santa Clara in detail. Flooding depths predicted by the two-dimensional model are presented for 10-year and 100-year events assuming the existing land use condition. Improvement projects that are required to alleviate or minimize flooding based on the 10- and 100-year performance standards are identified and prioritized herein.

5.2. Evaluation of Storm Drain Capacity

Santa Clara's storm drain system has been analyzed with current land use conditions during the design 2-year, 10-year, and 100-year storms. Areas of significant flooding based on past occurrences and results of the MIKE URBAN models are discussed herein, and improvement projects are recommended based on required additional flow capacity. Projects have been developed by upsizing existing pipes in the MU model until the following conditions are met:

1. No significant flooding occurs for the 2-year event;
2. Flooding is contained within the street right of way (i.e., top of curb) for the 10-year event; and
3. Flooding poses no threat to structures for the 100-year event.

Areas of significant potential flooding are recognized herein. Improvements are recommended to improve system performance to the 100-year capacity. It is impossible to entirely remove predicted flooding throughout the project area, either due to local topography (for example, at minor 'bathtub' areas that can occur in parking lots where private systems are not modeled) or flooding that is caused by a creek, but the majority of model-predicted flooding can be mitigated with the capital improvements proposed herein.

Parcels are considered "flooded" if the depth of water in any location on the parcel is one foot or greater. This consideration reflects FEMA's definition of a Special Flood Hazard Area as an area with flooding greater than one foot in average depth. Containment within the right of way and threats to structures can be estimated by examining the number of "flooded" parcels and the extent of modeled flooding.

5.2.1. Design Criteria

The City of Santa Clara's published drainage design criteria state that:

- Storm drain pipe system shall be designed to convey the 10-year event flow.
- The storm drain pipe system near storm drain pump stations shall be designed to convey the 100-year event flow.

Initial city-wide models were developed to analyze the 2-year, 10-year and 100-year events for existing conditions. (The 2-year event is used as a surrogate for the 3-year event because it is calibrated and detailed in the County Drainage Manual.) These models revealed that the majority of the City's storm drain system does not meet the published criteria. After discussing the results of the existing conditions models, the City has elected to formulate a CIP that eliminates significant 2-year flooding above street level, contains 10-year storm water runoff within the streets (i.e. below top of curb), and prevents damage to structures and property from the 100-year storm water runoff.

5.3. Prioritizing Deficiencies and Needed Capital Improvements

Storm drain systems in Santa Clara (both City-owned systems and those owned by others) convey the majority of storm water runoff toward the major creeks and river through storm drain systems consisting of gutters, catch basins, pipes and pump station facilities. Although site-specific drainage characteristics (i.e. on the scale of individual parcels) have not necessarily been analyzed, and future refinement of the model could more precisely account for these site-specific drainage characteristics, the character and priorities of recommended system improvements are based on the results of a complete systematic modeling process that includes both pipe flow in the storm drain system and overland flow in adjacent streets and properties.

Recommended improvements have been prioritized based on the results of the above process, combined with consideration of the anticipated severity of flooding at each location and the benefit/cost relationship of proposed improvements. The following color code is used to highlight project prioritization:

Priority	Description
Highest Priority	Projects under this category eliminate areas of 2-year flooding with significant depths, or address areas where City staff has indicated frequent and/or significant historical flooding issues. These projects improve conditions at locations with the deepest and longest-duration flooding situations.
High Priority	Projects under this category eliminate areas with any 2-year flooding; eliminate 10-year flooding where the depth exceeds 12 inches; or areas where 100-year flooding is potentially extreme. These projects are generally aimed at eliminating 2-year flooding beyond nuisance levels.
Moderate Priority	These improvements are intended to contain 10-year flooding within the street right-of-way and eliminate significant 100-year flooding. The duration and depth of flooding corrected by a moderate priority improvement is less than that of a high priority improvement.
Low Priority	Low priority improvements are aimed at providing a 100-year level of service; that is, with 100-year flooding contained within or immediately adjacent to the street right-of-way. The areas of flooding addressed by low priority projects is much smaller and briefer in duration than those of moderate and high priority projects.

This section summarizes improvements to City-owned systems needed to achieve a level of service characterized by flooding no greater than top of curb level for a 10-year event, and a minimal likelihood of damage to structures for a 100-year event. Improvements have been grouped together to reflect projects that could feasibly be undertaken simultaneously. Project naming conventions use major street names where possible, and projects reference the City block book pages. Project names and unique numerical IDs assigned to each project identify improvements in maps and tables. Subsequent discussion of system capacity, deficiencies, and CIPs is split by drainage area. A map of these drainage areas is shown in Figure 5-1. Some areas within City Limits drain directly to adjacent streams rather than into the storm drain system and are therefore not included in the models.

Low priority projects are not discussed in project-specific detail , as there are a large number of these projects, and they will likely not be constructed in the foreseeable future, certainly not before the storm drain master plan is updated. A complete set of CIP tables including existing pipe size, recommended pipe size, and improvement cost breakdowns for all priorities are provided as Appendix B.

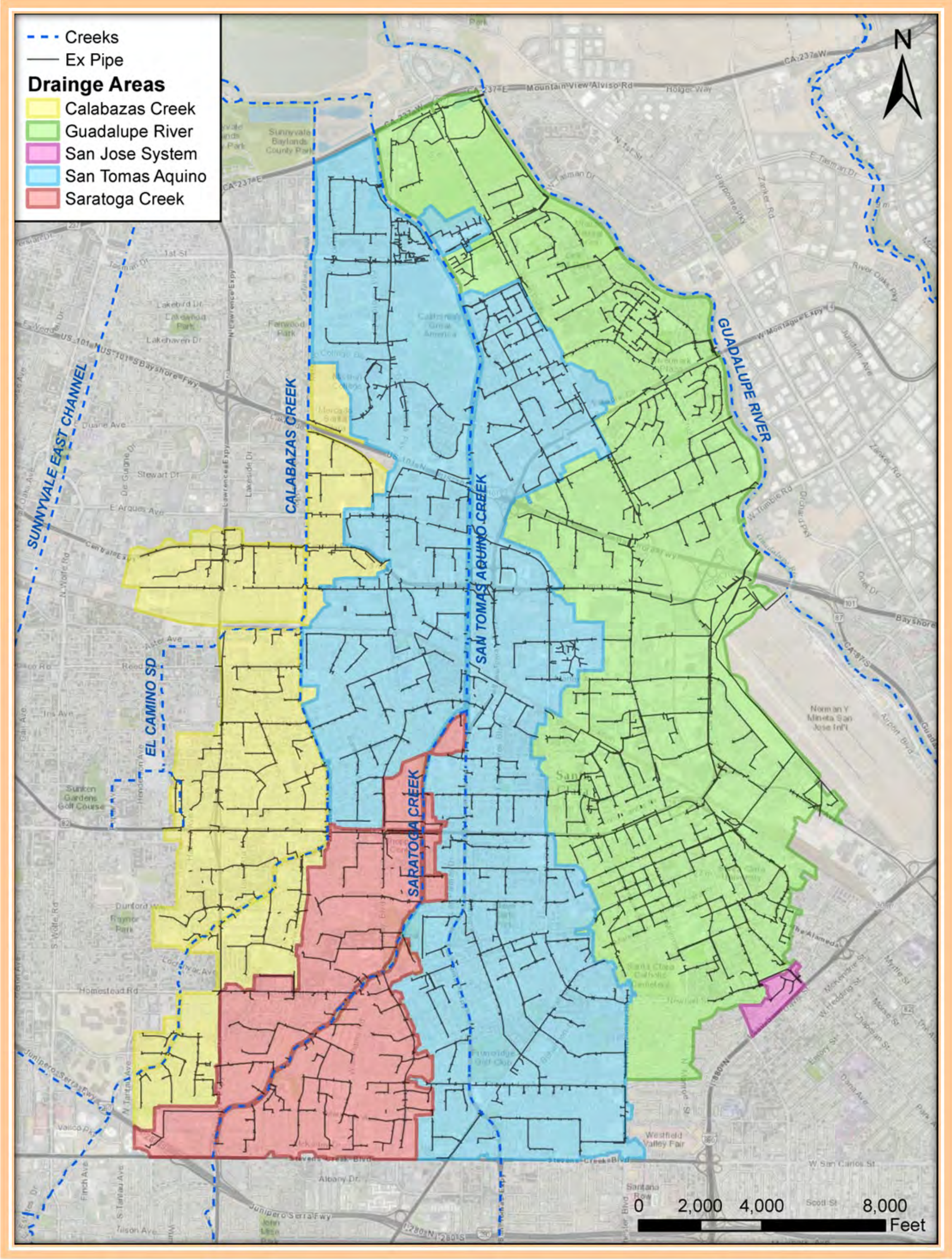

Figure 5-1: Drainage Areas and Associated Existing Storm Drain Pipe Systems

5.4. Santa Clara System Evaluation

The modeled drainage area is approximately 18.9 square miles. The modeled collection system within Santa Clara City limits consists of 8,179 pipe segments, 8,400 nodes, and 215 outlets. The project area has a total of 1,024,750 linear feet (194 miles) of modeled storm drain pipe equal to or greater than 6 inches in diameter. A summary of drainage areas is shown in Table 5-1.

Table 5-1: Storm Drain Network Model Summary

Drainage Area	# Pipes	Pipe Length (ft)	Pipe Length mi)	# Nodes	# Inlets	# Pumps to Creek/River
Calabazas Creek	1,026	137,280	26.0	1,087	527	1
Saratoga Creek	801	106,620	20.2	847	448	0
San Tomas Aquino	3,104	373,570	70.8	3,189	1,618	6
Guadalupe River	3,248	407,280	77.1	3,247	1,621	5
Total	**8,179**	**1,024,750**	**194.1**	**8,400**	**4,214**	**12**

Some projects will also affect surrounding drainage areas. As a result, “highest” and “high” priority projects in one drainage area may reduce the amount of flooded parcels in other drainage areas where no “highest” or “high” priority projects are recommended. In some cases, the number of flooded parcels in an area does not decrease because localized low points have filled where there is a private catch basin that has not been included in the models as there is a large number of private systems with little information available. Projects in these areas are still beneficial in decreasing depth and duration of flooding surrounding localized low points.

5.4.1. Calabazas Creek

The Calabazas Creek drainage area covers 2.9 square miles of the study area. MU results for existing conditions are shown in Figure 5-3 through Figure 5-8.

Identified Deficiencies

The most significant flooding in this area occurs near Central Expressway and Lawrence Expressway and is primarily influenced by County-owned storm drain pipes surcharging due to high water levels in Calabazas Creek. The MU 2-D existing conditions models indicate that 3 parcels are flooded for a 2-year storm, 61 parcels are flooded for a 10-year storm, and 119 parcels are flooded for a 100-year storm. (Note, the 100-year flooding extents shown in these figures ignore creek overflows so that 100-year interior flooding caused only by storm drain system deficiencies that the City could correct can be identified. This is modeled by assuming backflow prevention at all outfalls throughout the City. The remediation of flooding caused by creek overflows is largely outside of the City’s control.)

Known Problem Areas

No known problem areas were identified by Schaaf and Wheeler or City staff in this drainage area.

Prioritized Improvements

Two high priority projects (Figure 5-9 through Figure 5-12) in this area are aimed at reducing minor 2-year flooding and some significant 10-year flooding between Nobili Ave and Calabazas Creek.

Nine moderate priority projects (Figure 5-13 through Figure 5-18) provide a 10-year level of service to the entire drainage area. The City may need to progressively re-prioritize moderate priority projects based on funding, other utility improvements, land use changes, and condition assessments.

Twelve low priority projects (Figure 5-19 through Figure 5-24) are recommended to alleviate significant 100-year flooding. These projects may only get built if there are significant changes to land use, roadway, or redevelopment projects in the area.

Intermediate flooding scenarios are summarized in Table 5-2. High and Moderate priority projects providing up to a 10-year level of service in the area are described by Table 5-3. Flooded area for each CIP priority level is shown in Figure 5-2.

Table 5-2: Parcels Flooded after Completion of Projects in Calabazas Drainage Area

Priority	Existing	Highest	High	Moderate	Low
2-yr	0	0	0	0	0
10-yr	22	22	17	16	13
100-yr	86	86	80	46	29

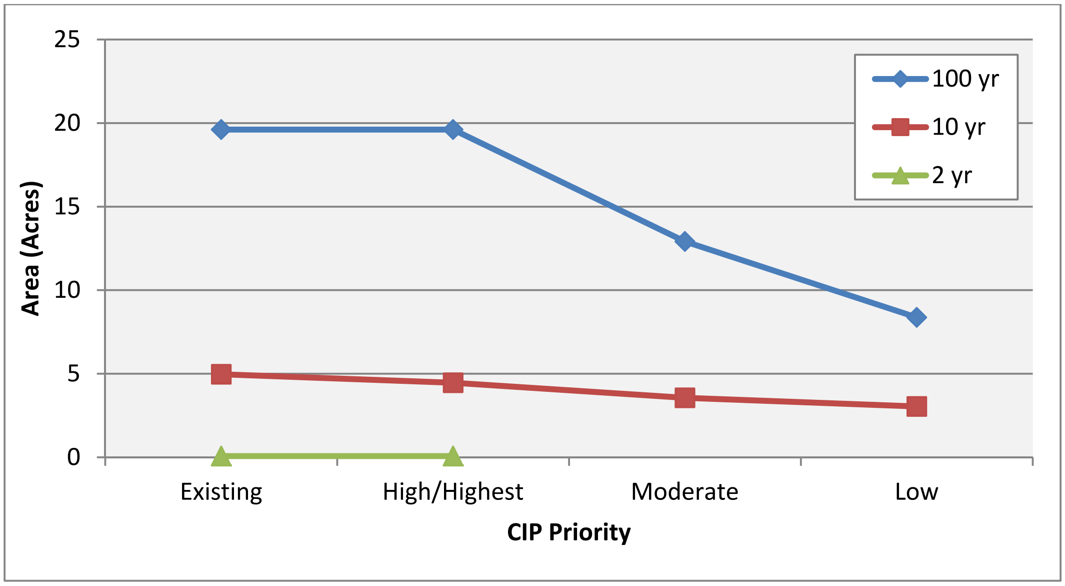

Figure 5-2: Modeled Flooded Area in Calabazas Creek Drainage Area for each CIP Priority Level

The county-owned systems on Lawrence Expressway and Central Expressway and the Sunnyvale-owned pipes in Kifer Road experience significant flooding in the 10- and 100-year conditions (Figure 5-5 and Figure 5-7). This is mostly due to high stages in Calabazas Creek during these storms. Reducing this flooding will require modification to the creek by the Santa Clara Valley Water District or installation of pump stations at these locations, presumably by the County of Santa Clara. As such these flooding conditions are largely outside of the City's control. City CIP projects in this area help alleviate flooding assuming the County systems are eventually rehabilitated and sized correctly. Assuming that projects are completed on systems owned by others to ensure drainage is conveyed to Calabazas Creek, post-CIP flooding for this area is shown in Figure 5-25.

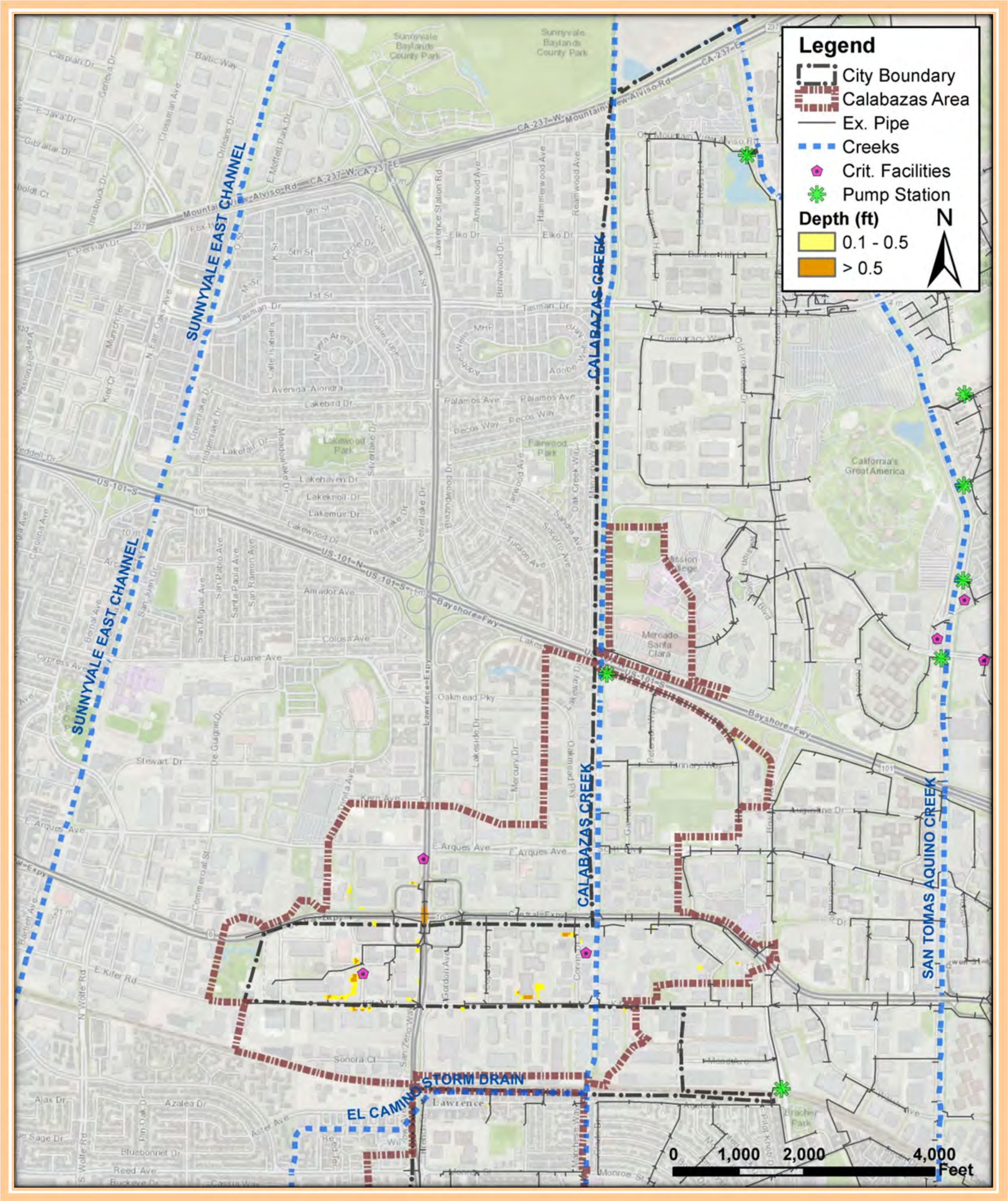

Figure 5-3: 2-year Flooding with Existing Conditions in Northern Calabazas Creek Drainage Area

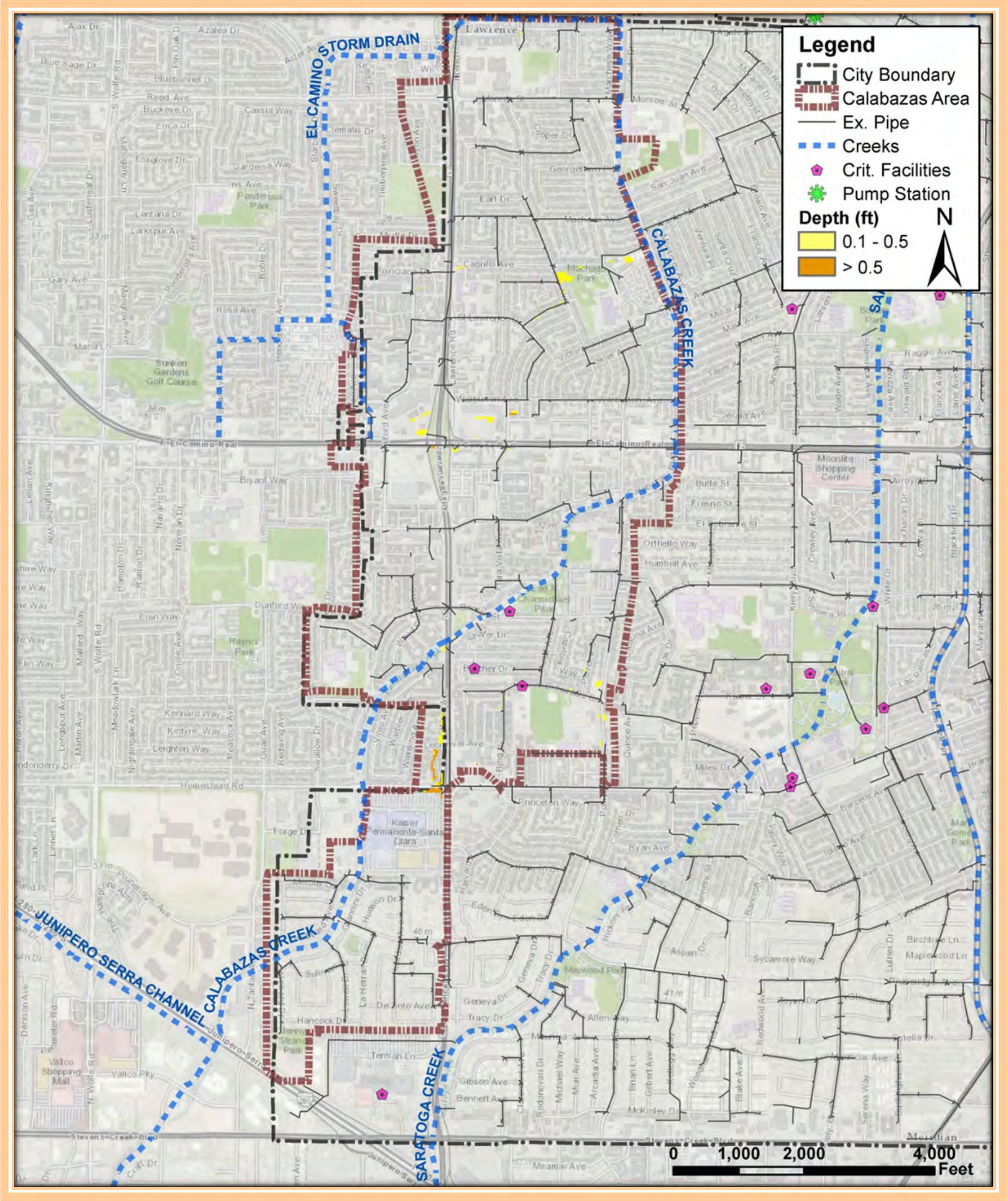

Figure 5-4: 2-Year Flooding with Existing Conditions in Southern Calabazas Creek Drainage Area

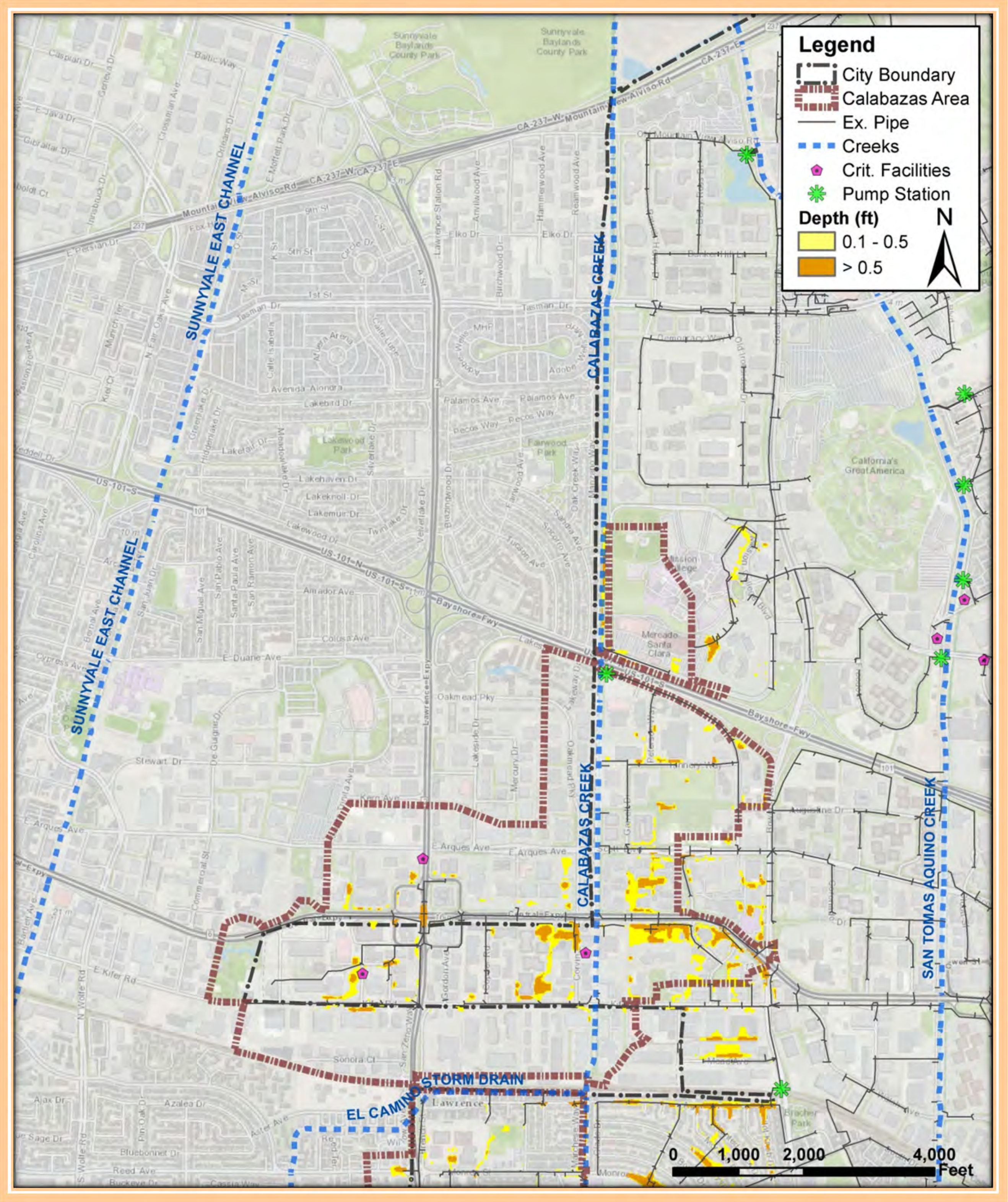

Figure 5-5: 10-Year Flooding with Existing Conditions in Northern Calabazas Creek Drainage Area

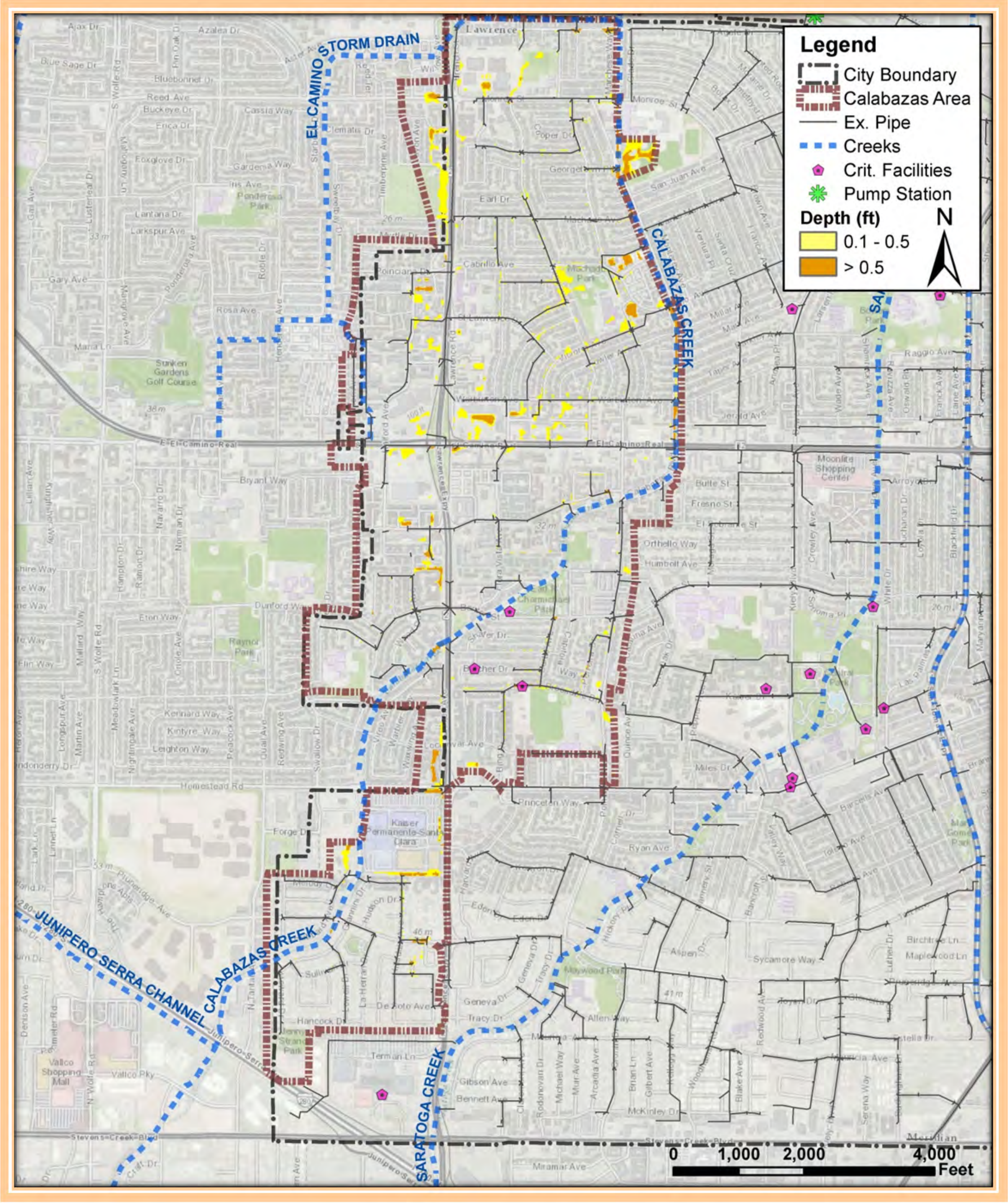

Figure 5-6: 10-Year Flooding with Existing Conditions in Southern Calabazas Creek Drainage Area

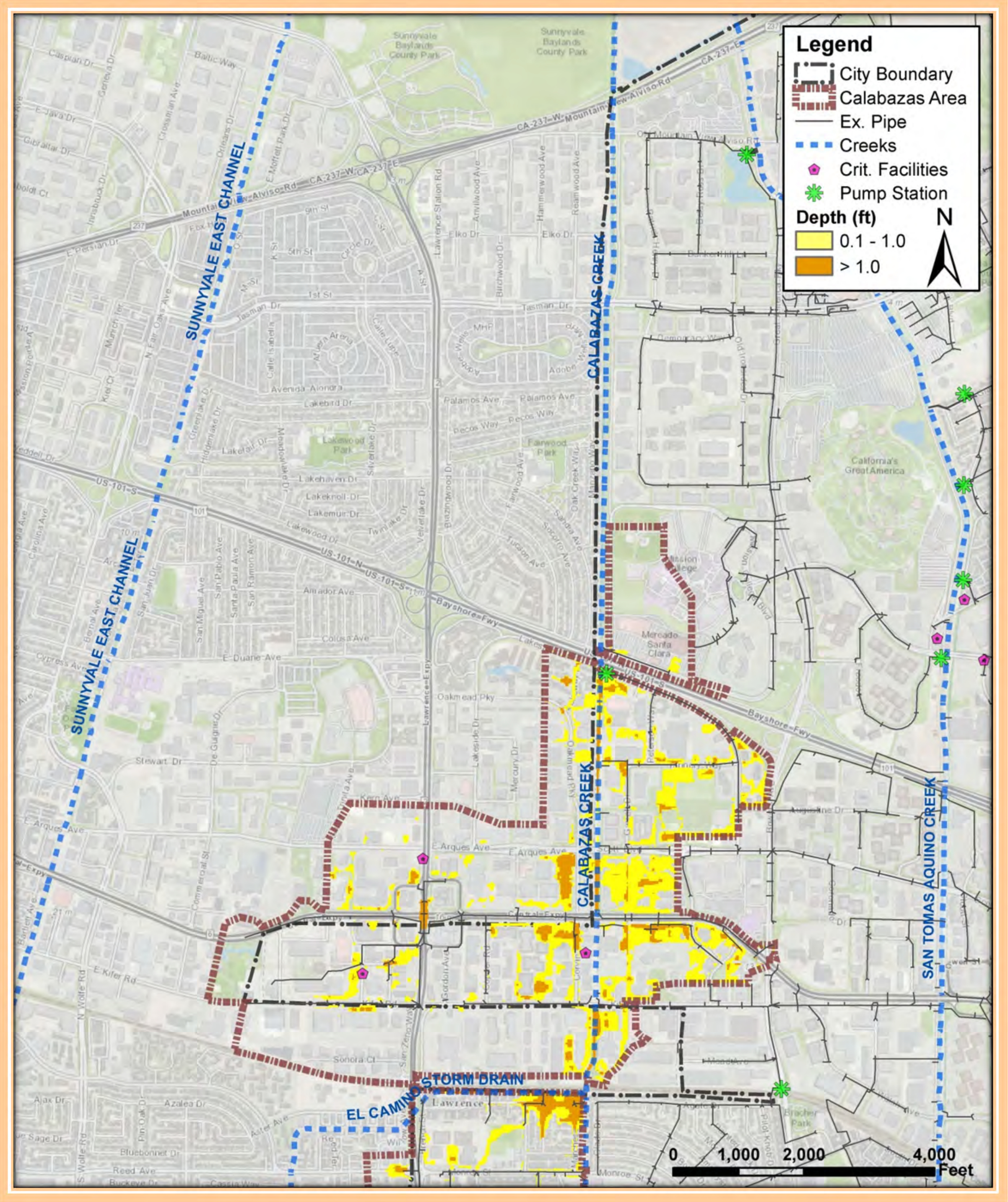

Figure 5-7: 100-Year Flooding with Existing Conditions in Northern Calabazas Creek Drainage Area

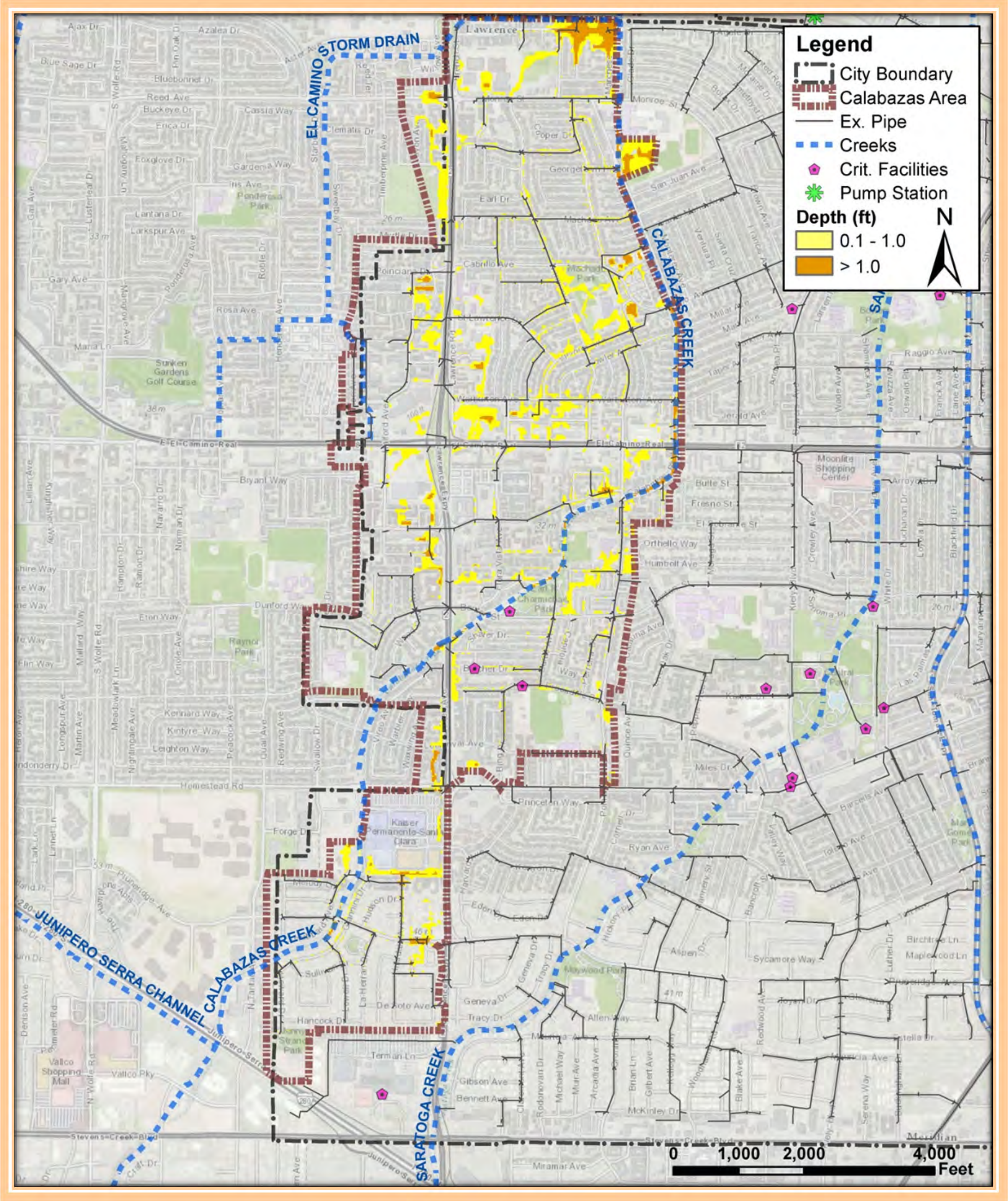

Figure 5-8: 100-Year Flooding with Existing Conditions in Southern Calabazas Creek Drainage Area

Table 5-3: High and Moderate Priority Projects for Calabazas Creek Drainage Area

Project No.	Project Name	Priority	Block Book Pg.	Description
11	Fowler and Calabazas	High	42	Some flooding occurs between Calabazas Creek and Nobili Ave due to undersized pipes. Upsizing these pipes is recommended to eliminate 2-year flooding and reduce 10-year flooding.
18	St Lawrence and Calabazas	High	41, 51, 52	Some 2-year flooding occurs on Fowler Ave. Upsizing pipes on Fowler Ave and Townsend Ave is recommended to eliminate minor 2-year flooding and reduce 10-year flooding.
24	El Camino Real and Calabazas	Moderate	41, 42	Significant 10-year flooding occurs around El Camino Real. Upsizing pipes in El Camino Real that drain to Calabazas Creek is recommended.
26	Halford and Tamarack	Moderate	40, 41	10-year flooding occurs west of Lawrence Expressway on Halford Ave. Upsizing pipes on Halford Ave is recommended.
35	Machado	Moderate	51	Upsizing pipes on Machado Ave to 21” further alleviates minor 10-year flooding. Prior completion of the St. Lawrence and Calabazas project must is required.
37	Melody	Moderate	10	10-year flooding occurs near Calabazas Creek on Melody Ln. Upsizing pipes in this location to 18” is recommended.
45	St Ignatius	Moderate	42	Significant 10-year flooding occurs south of St. Ignatius Pl. Upsizing these pipes to 21” is recommended.
46	Tahoe and Enochs	Moderate	60	10-year flooding occurs near a critical facility on Semiconductor Drive. Upsizing pipes in Tahoe Way and Enochs St is recommended.
47	Tannery	Moderate	72	10-year flooding occurs upstream of Garrett Dr on Tannery Way. Upsizing a short length of pipe at Tannery Way and Garrett Dr to 18” is recommended.
48	Victoria	Moderate	42	10-year flooding occurs north of Victoria Ave upstream of Townsend Ave. Upsizing pipes in Victoria Ave is recommended. Prior completion of the Fowler and Calabazas project is required.
51	Warburton and Nobili	Moderate	41, 42	10-year flooding occurs around Warburton Ave due to undersized pipes. Upsizing a short reach of pipes in this location to 18” is recommended.

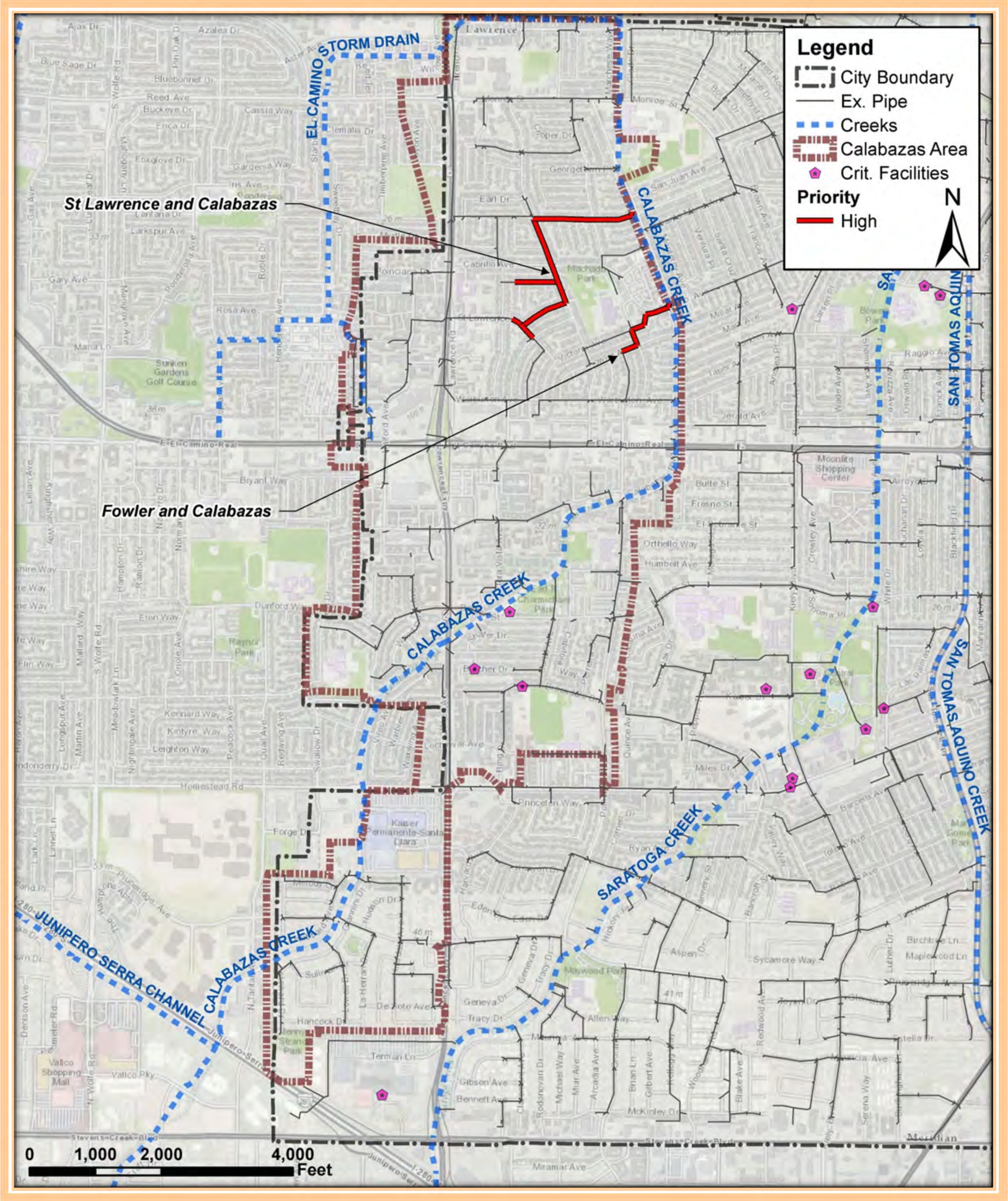

Figure 5-9: Southern Calabazas Creek Drainage Area High Priority Improvement Projects

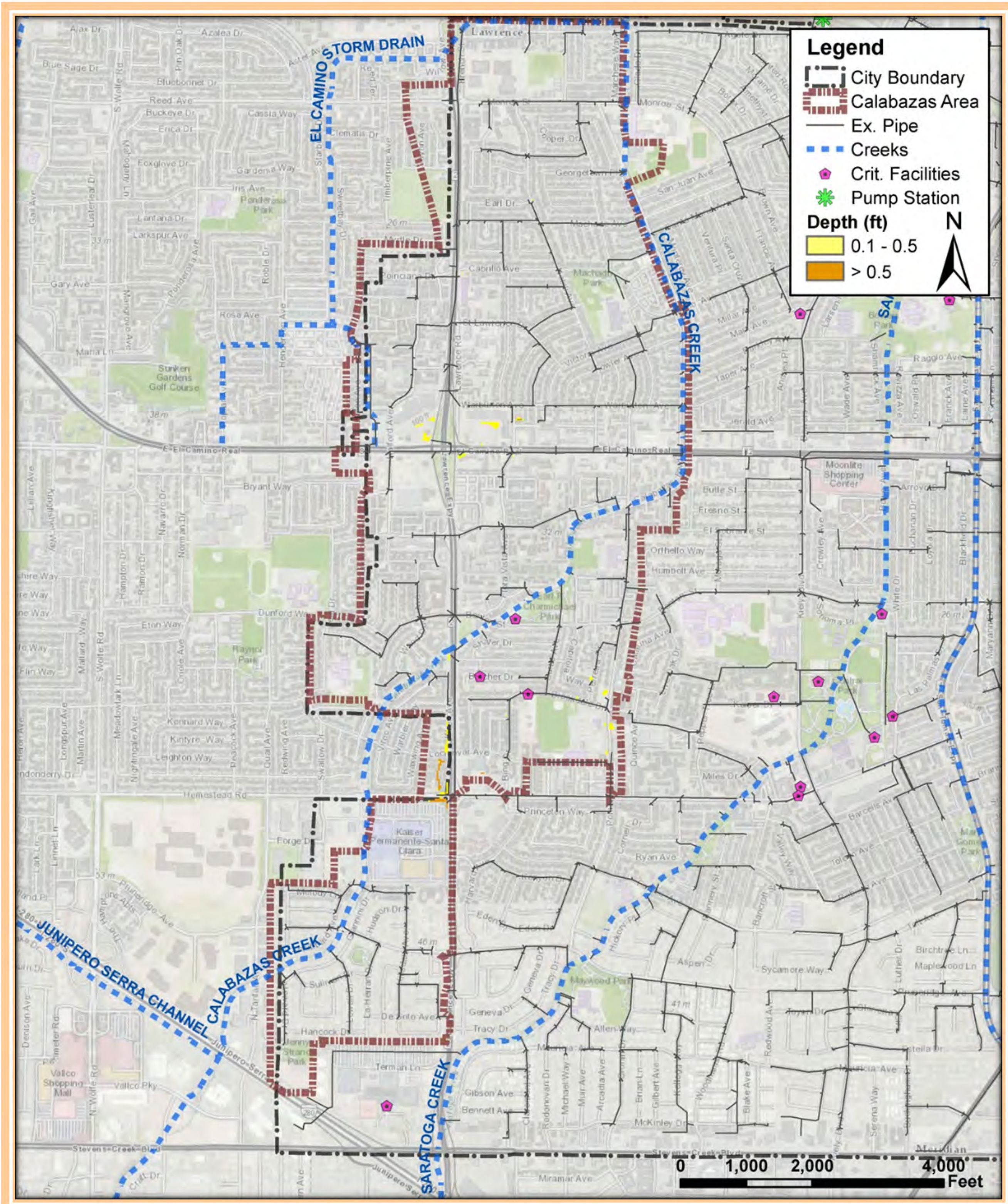

Figure 5-10: 2-Year flooding in Southern Calabazas Creek Drainage Area with High Priority CIPs

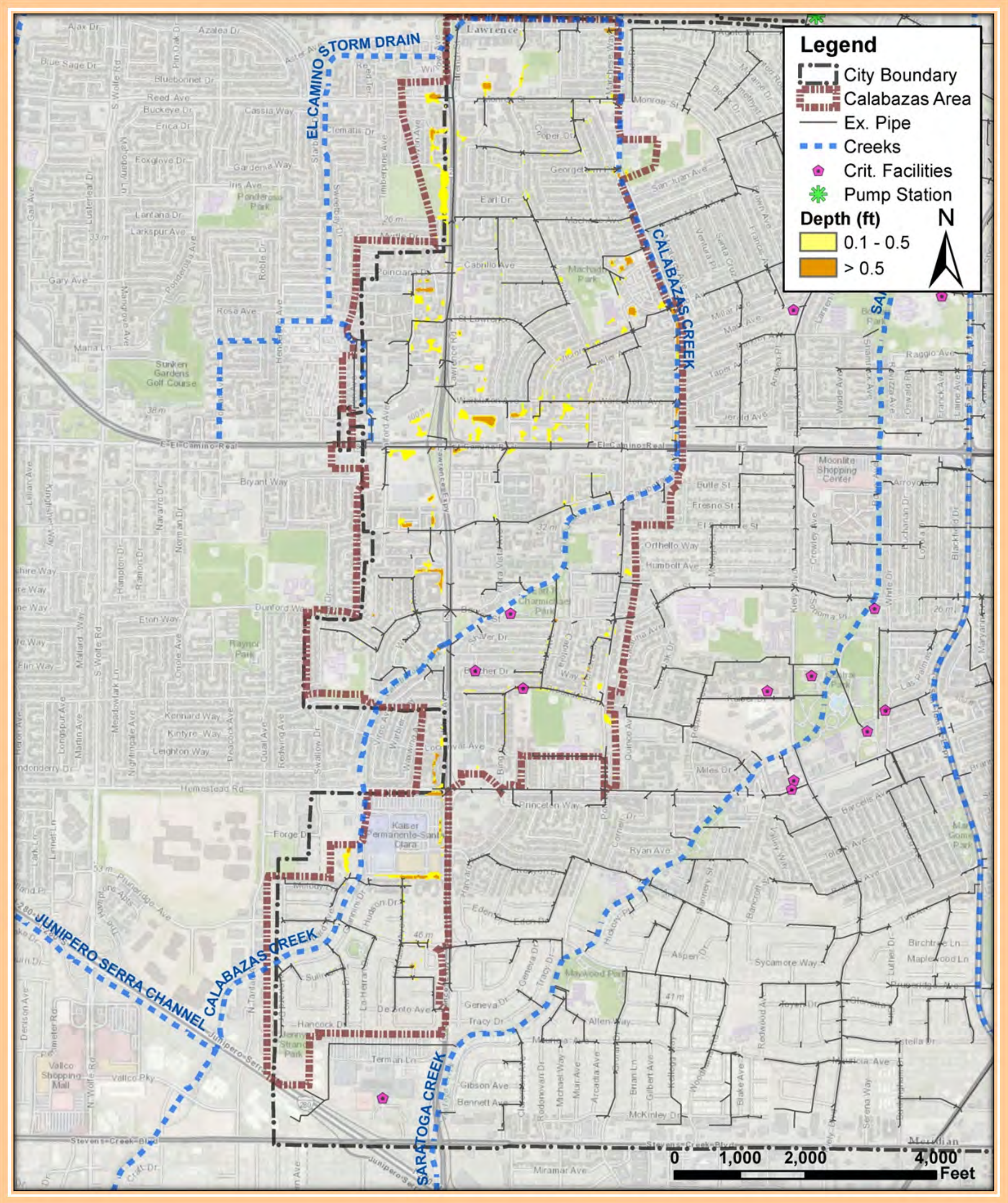

Figure 5-11: 10-Year Flooding in Southern Calabazas Creek Drainage Area with High Priority CIPs

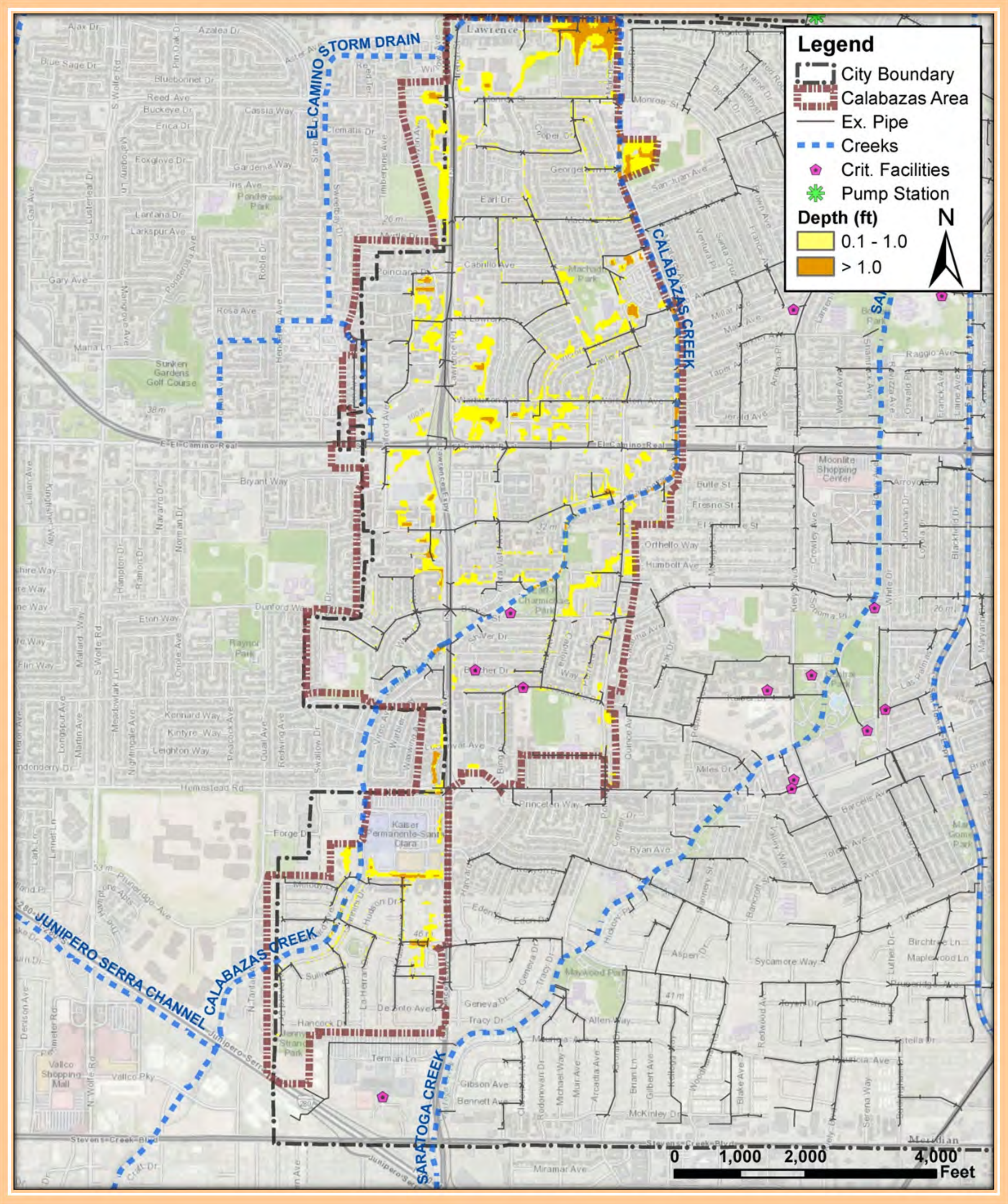

Figure 5-12: 100-Year flooding in Southern Calabazas Creek Drainage Area with High Priority CIPs

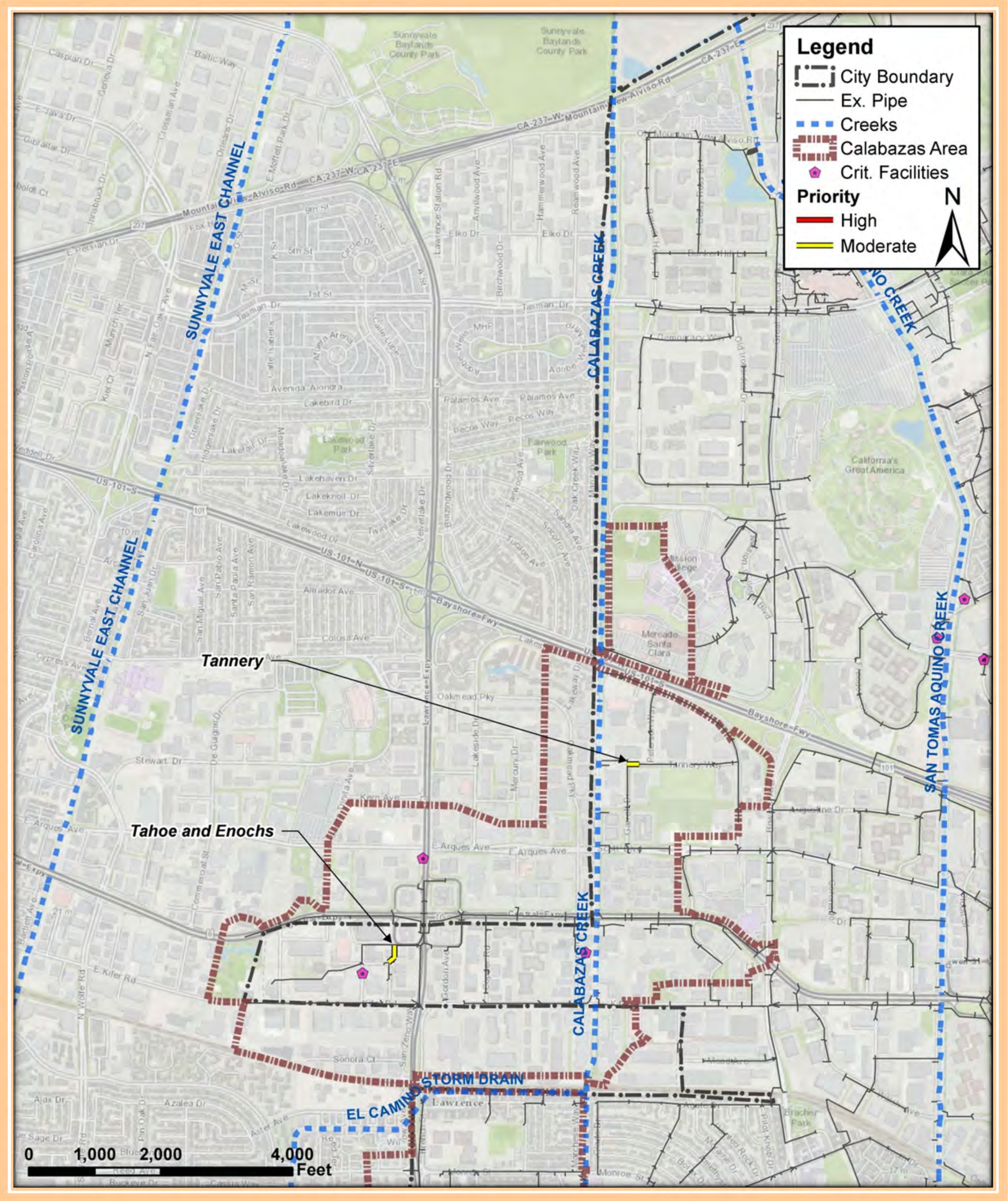

Figure 5-13: Northern Calabazas Creek Drainage Area Moderate Priority Improvement Projects

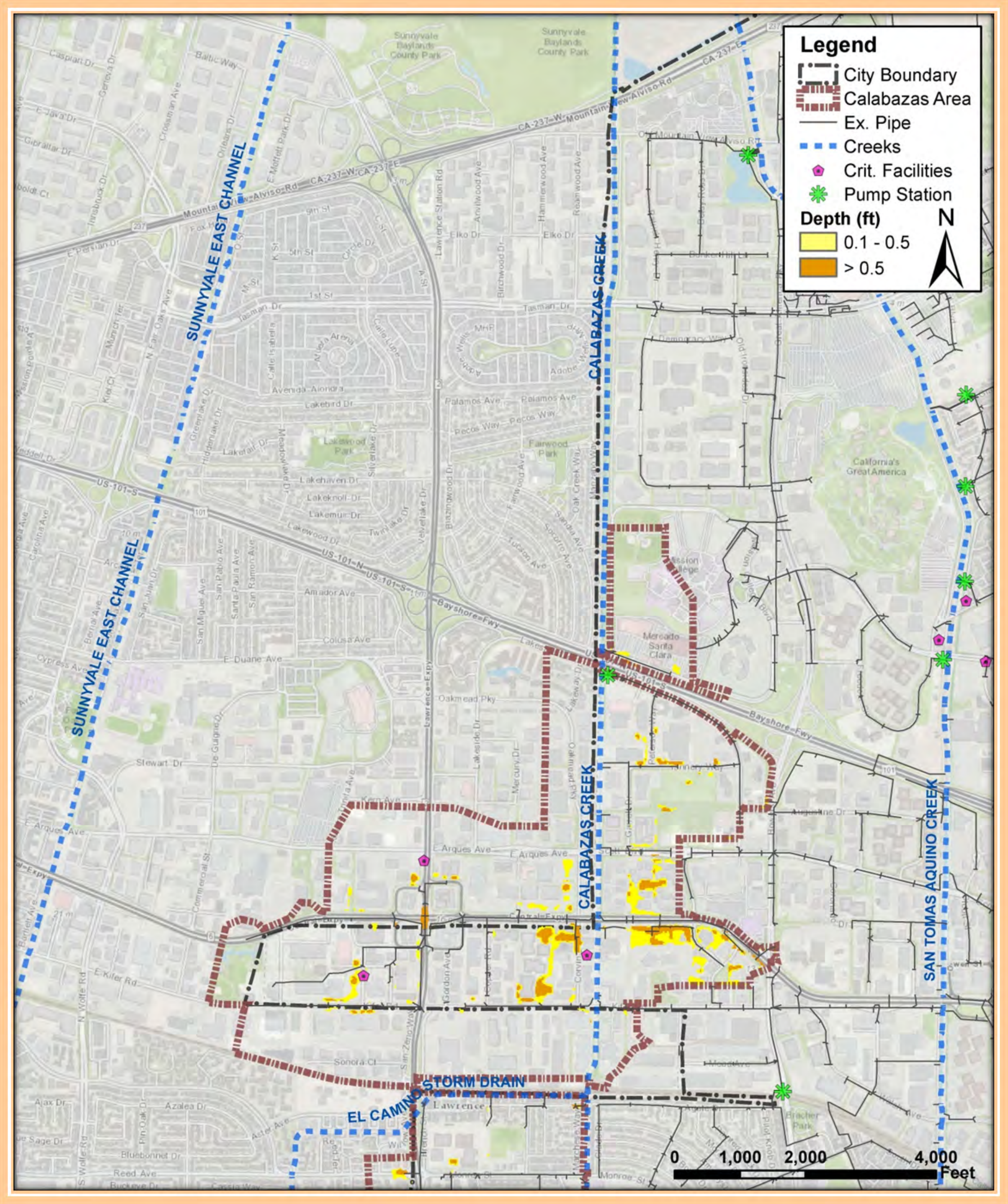

Figure 5-14: 10-Year Flooding in Northern Calabazas Creek Drainage Area with Moderate Priority CIPs

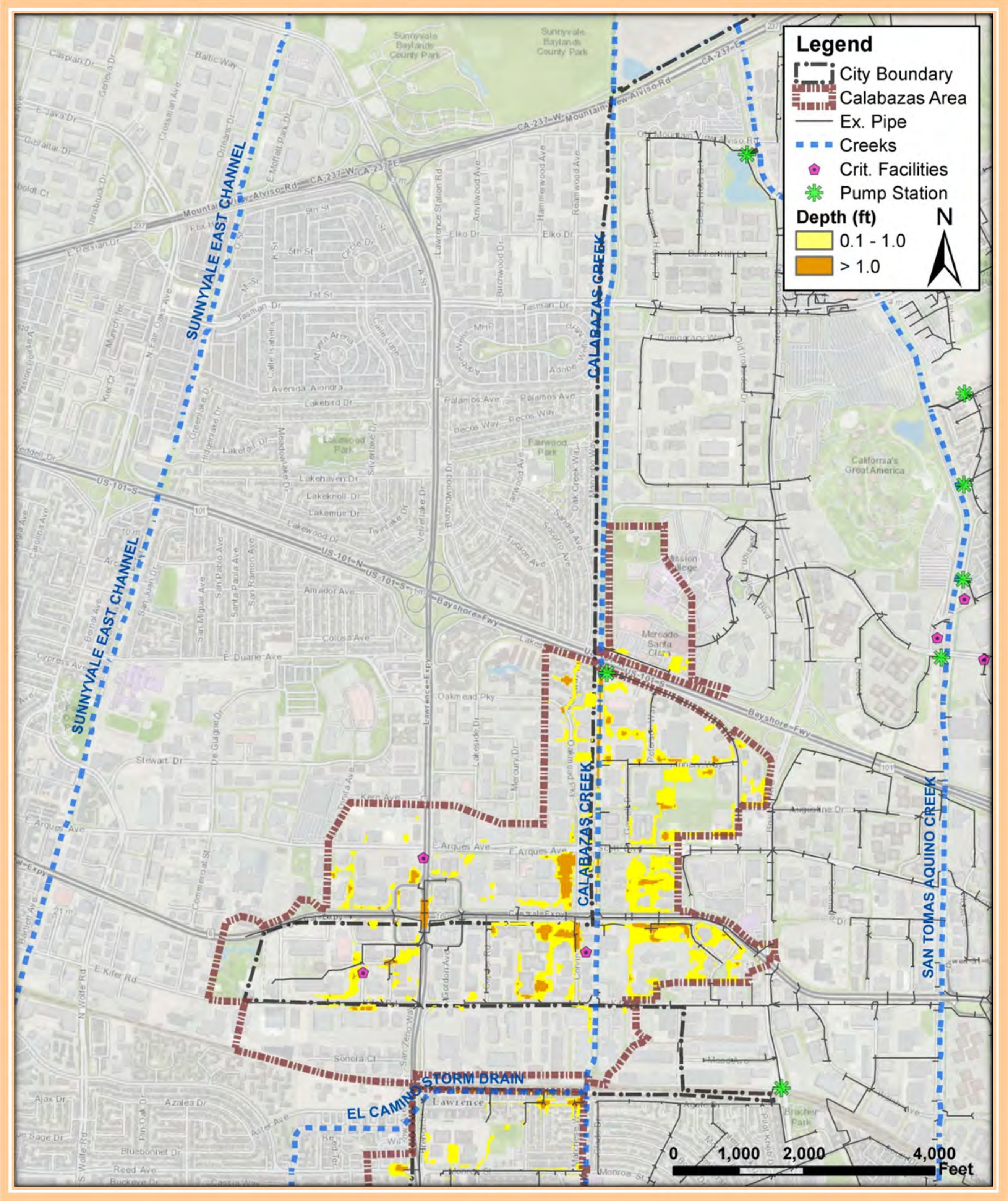

Figure 5-15: 100-Year Flooding in Northern Calabazas Creek Drainage Area with Moderate Priority CIPs

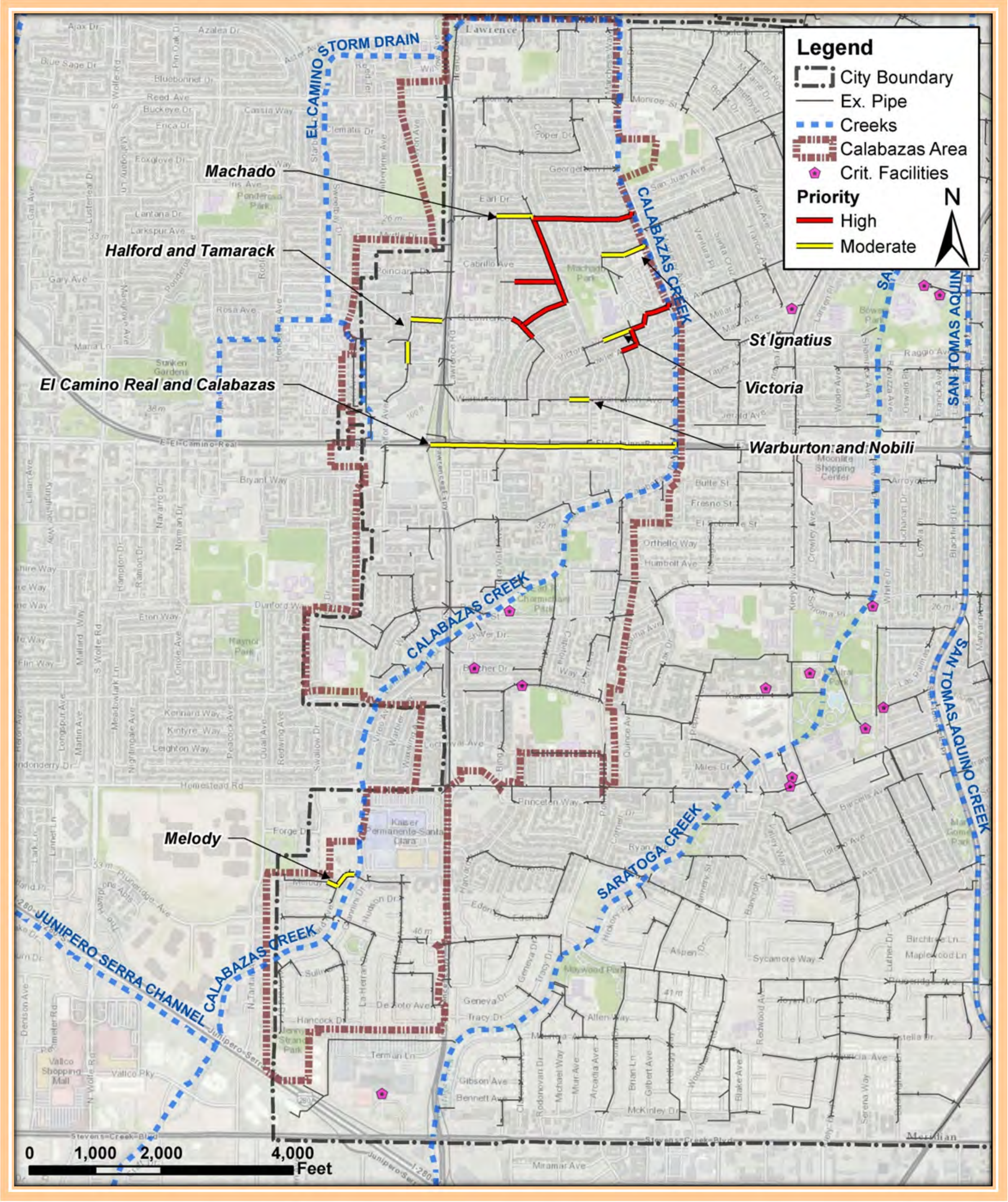

Figure 5-16: Southern Calabazas Creek Drainage Area Moderate Priority Improvement Projects

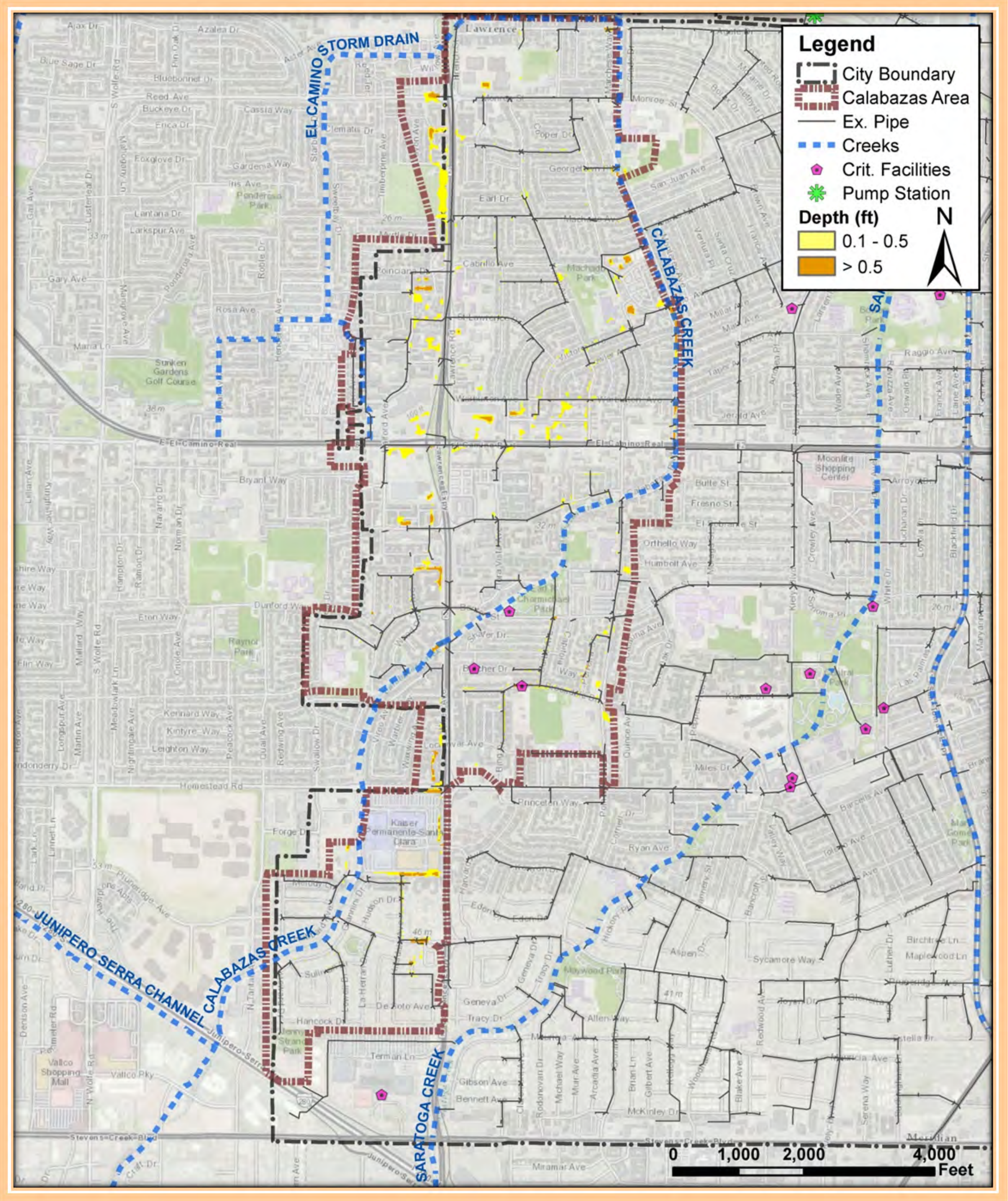

Figure 5-17: 10-Year Flooding in Southern Calabazas Creek Drainage Area with Moderate Priority CIPs

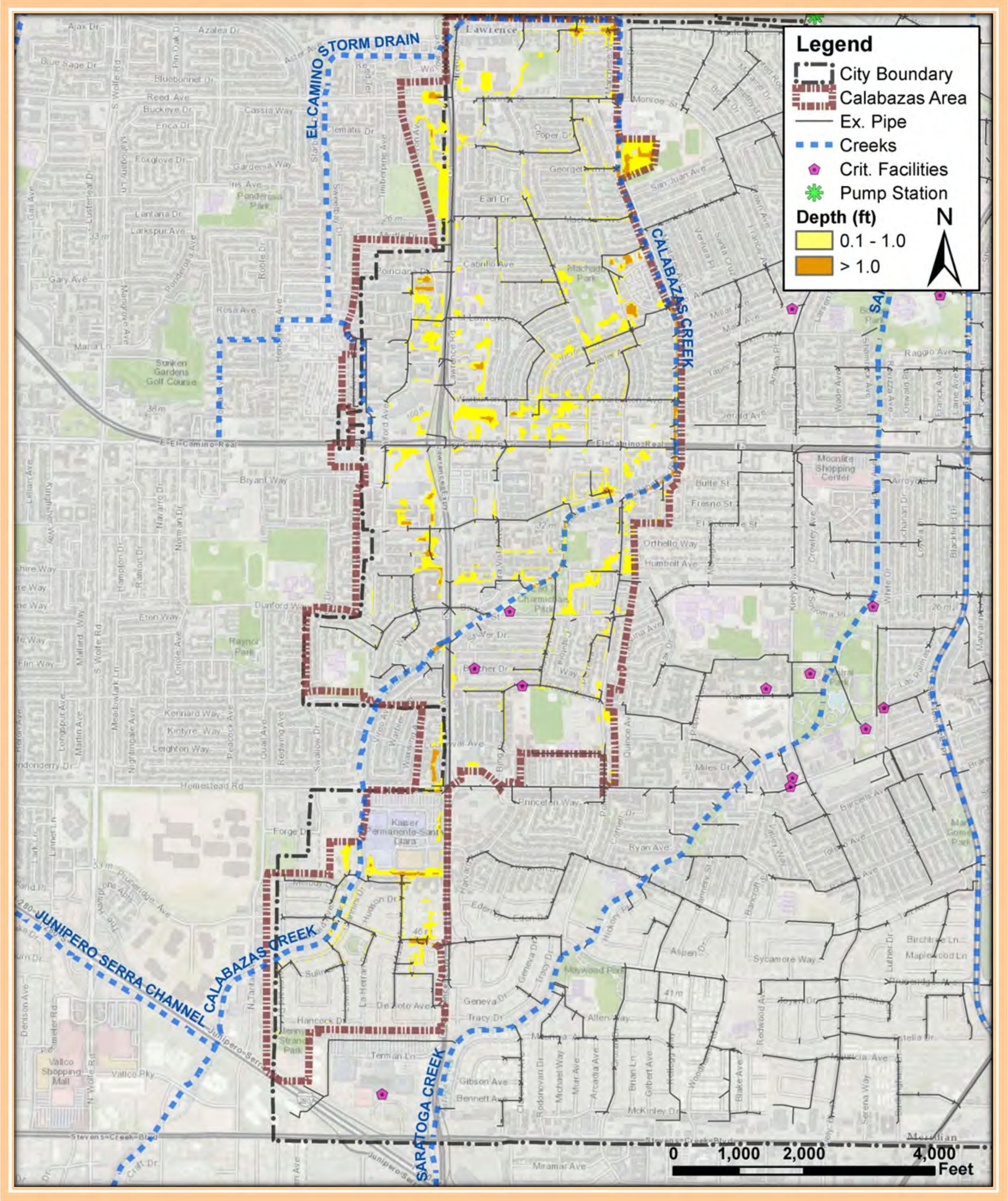

Figure 5-18: 100-Year Flooding in Southern Calabazas Creek Drainage Area with Moderate Priority CIPs

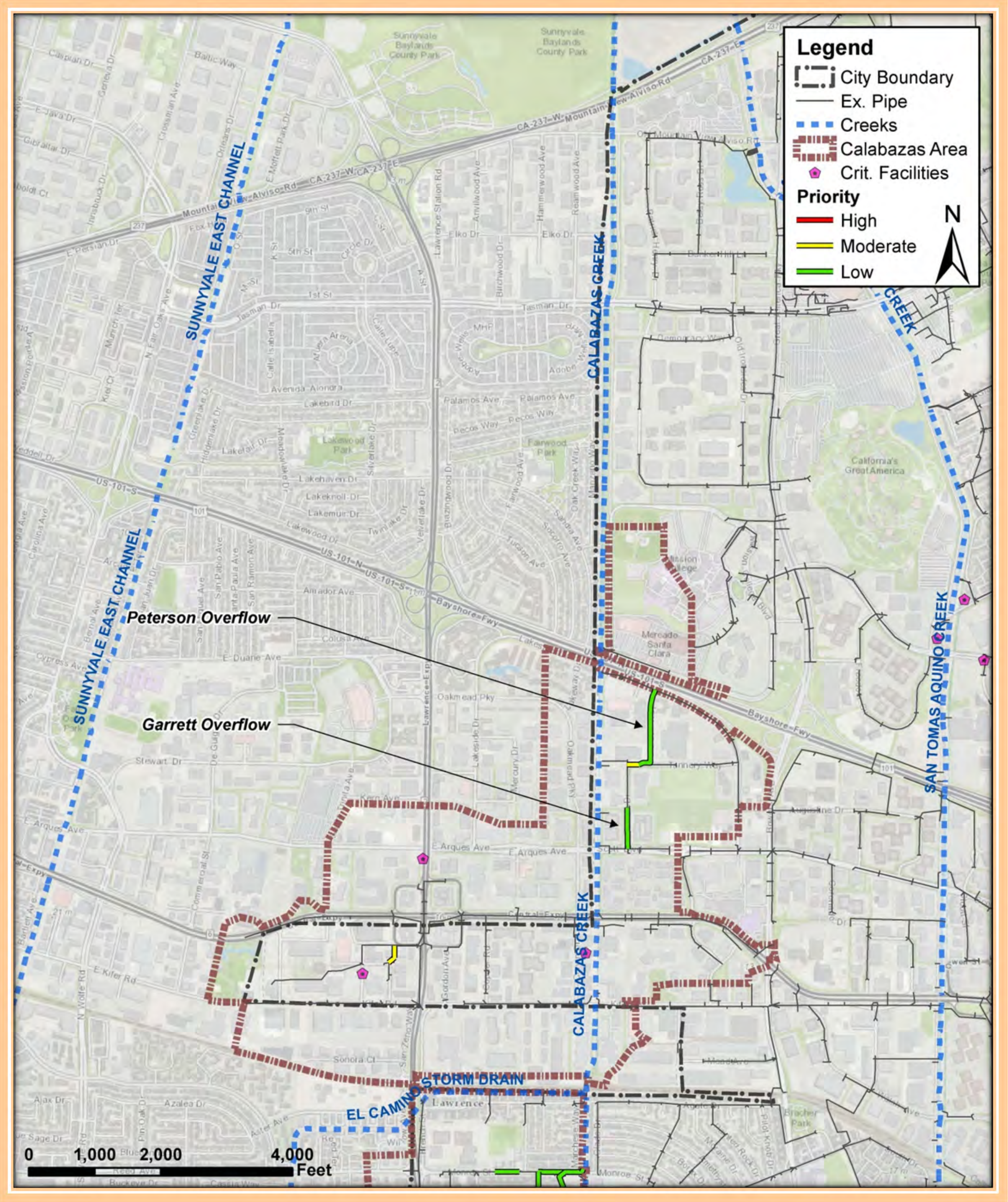

Figure 5-19: Northern Calabazas Creek Drainage Area Low Priority Improvement Projects

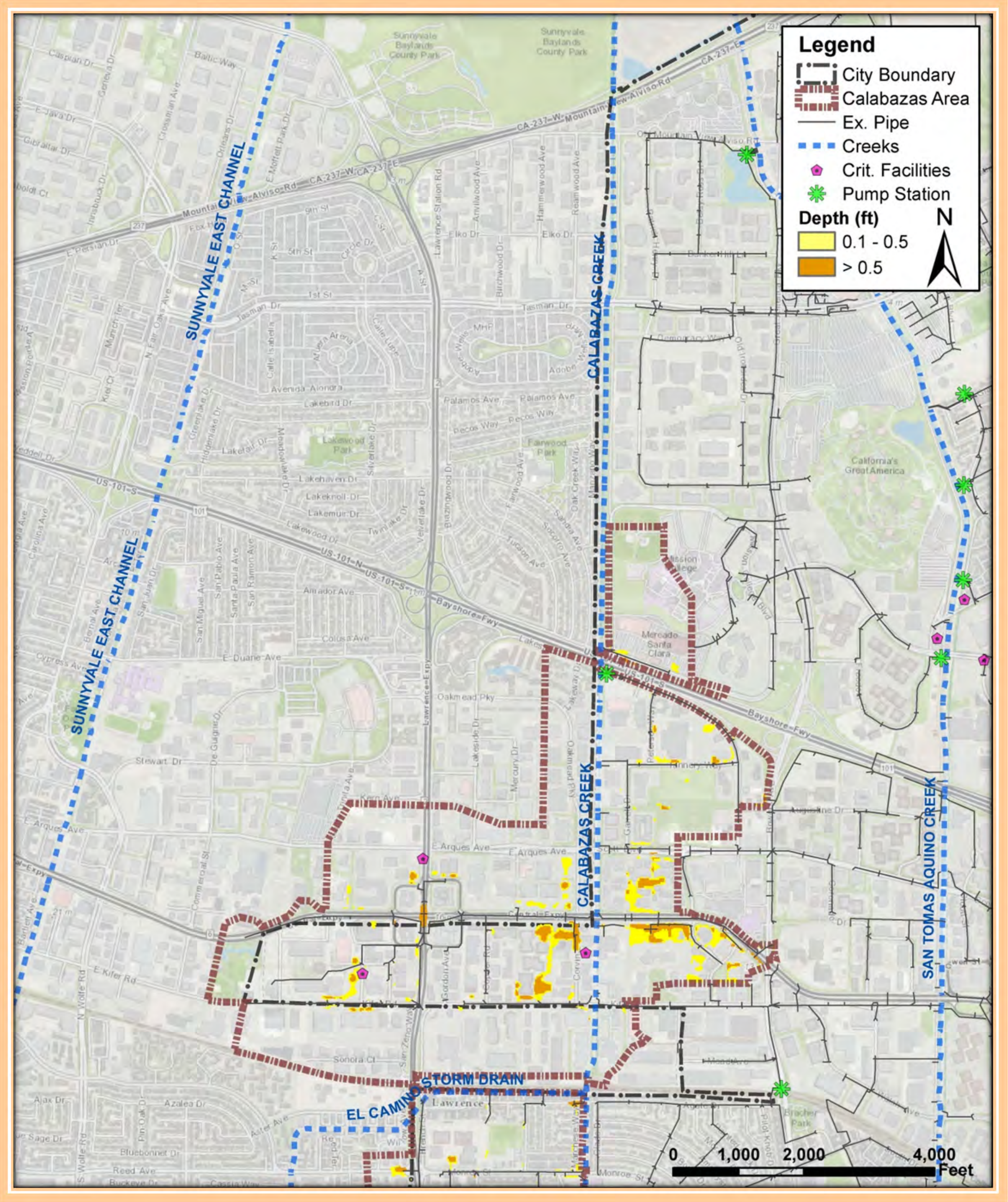

Figure 5-20: 10-Year Flooding in Northern Calabazas Creek Drainage Area with Low Priority CIPs

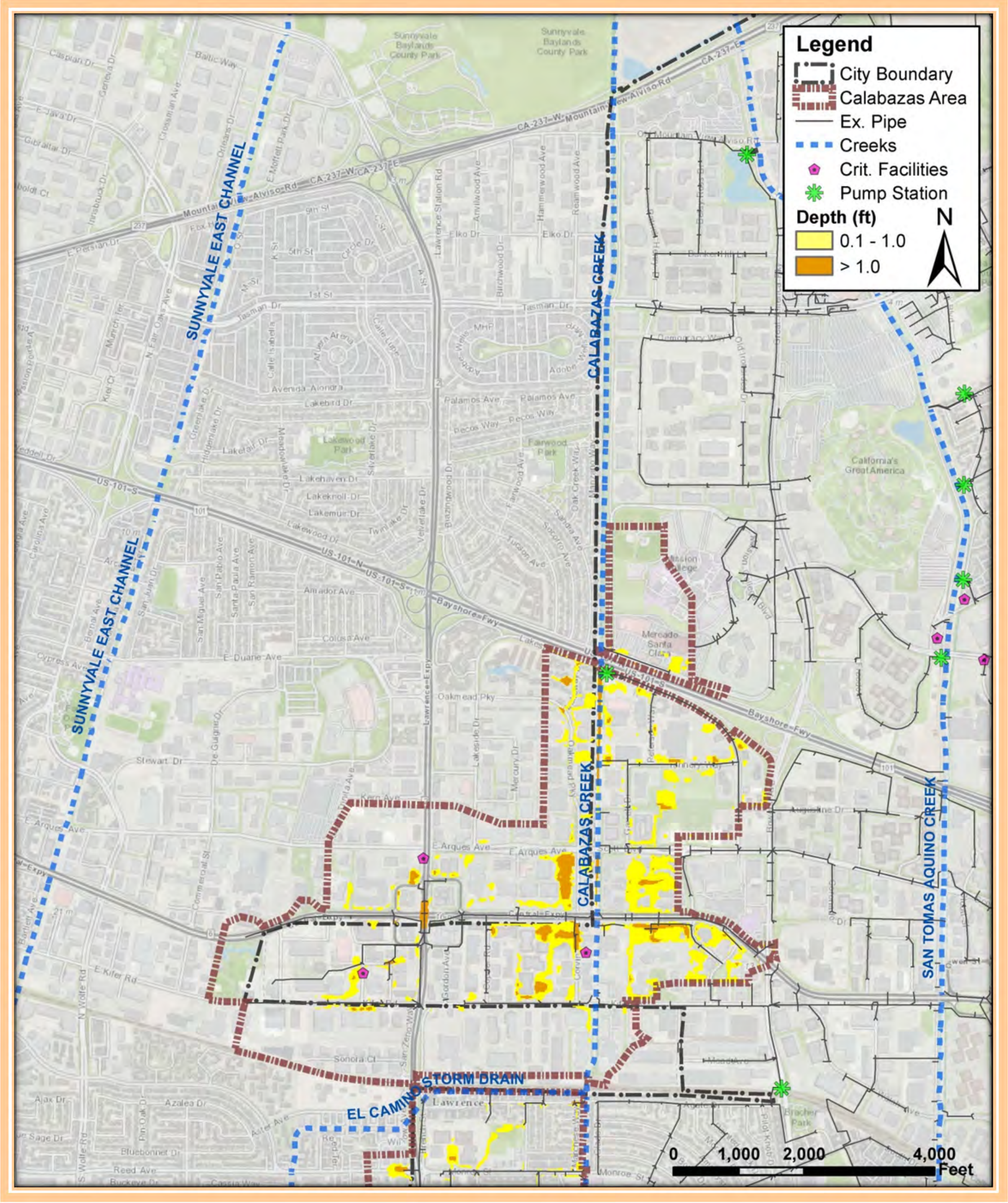

Figure 5-21: 100-Year Flooding in Northern Calabazas Creek Drainage Area with Low Priority CIPs

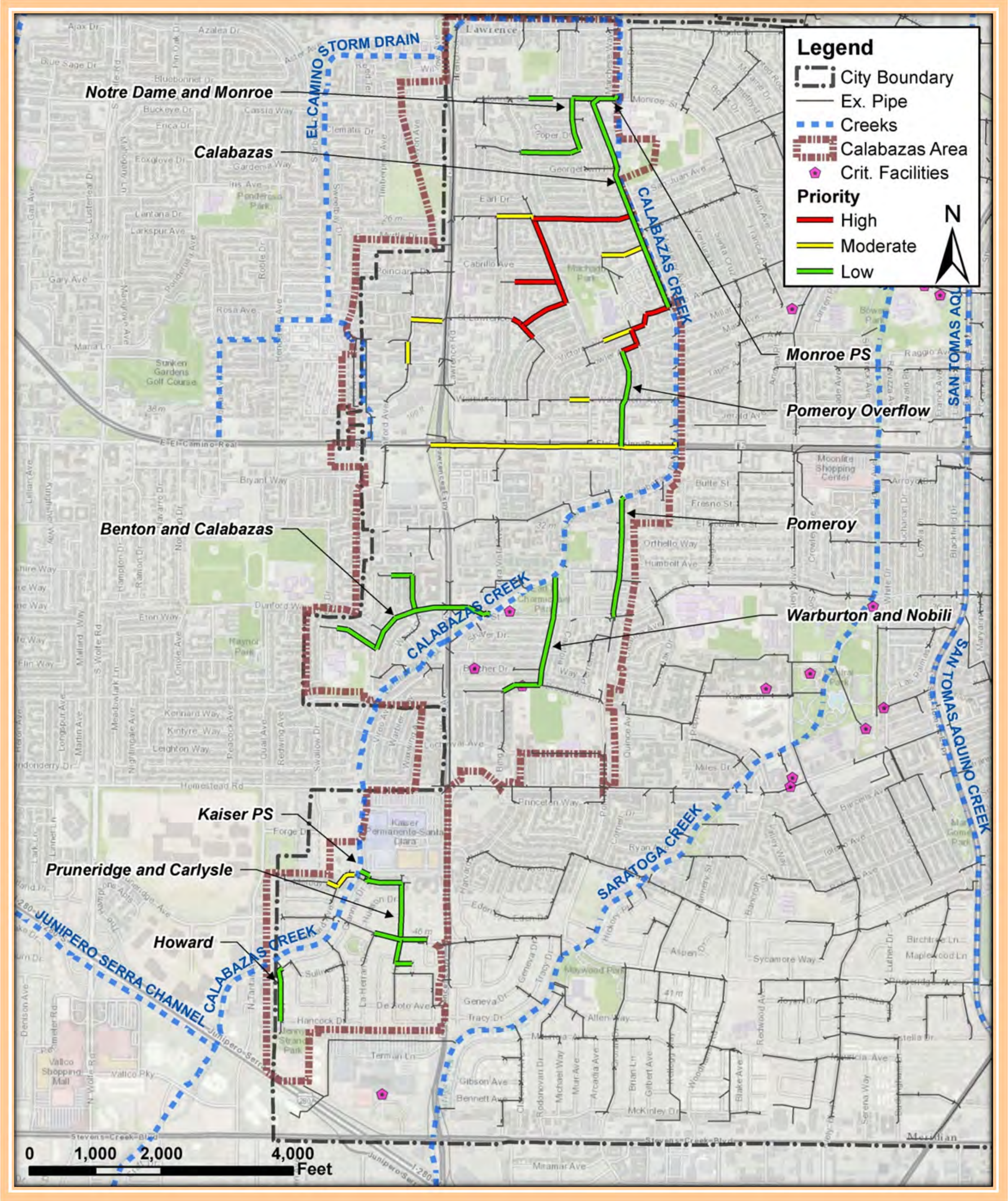

Figure 5-22: Southern Calabazas Creek Drainage Area Low Priority Improvement Projects

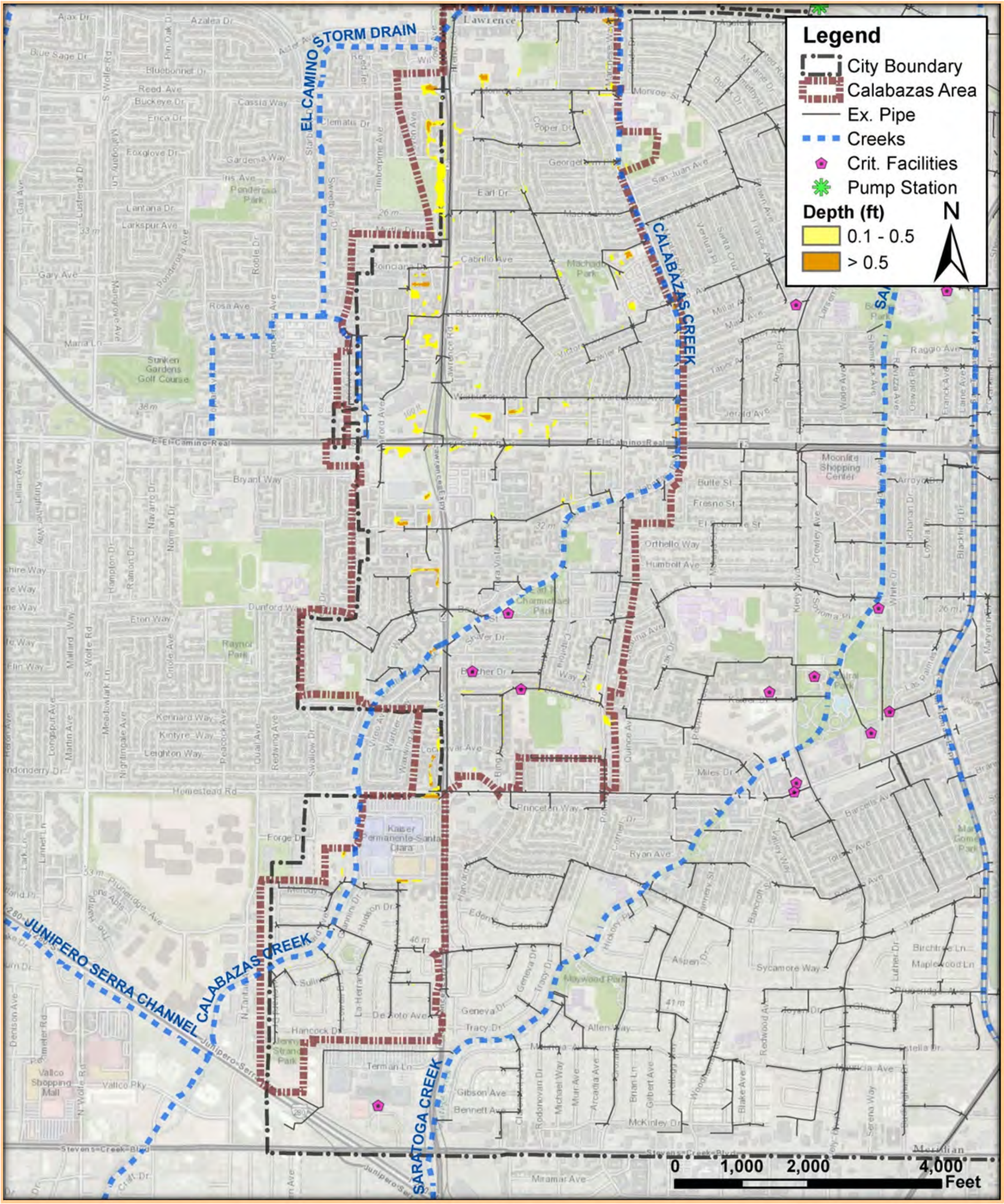

Figure 5-23: 10-Year Flooding in Southern Calabazas Creek Drainage Area with Low Priority CIPs

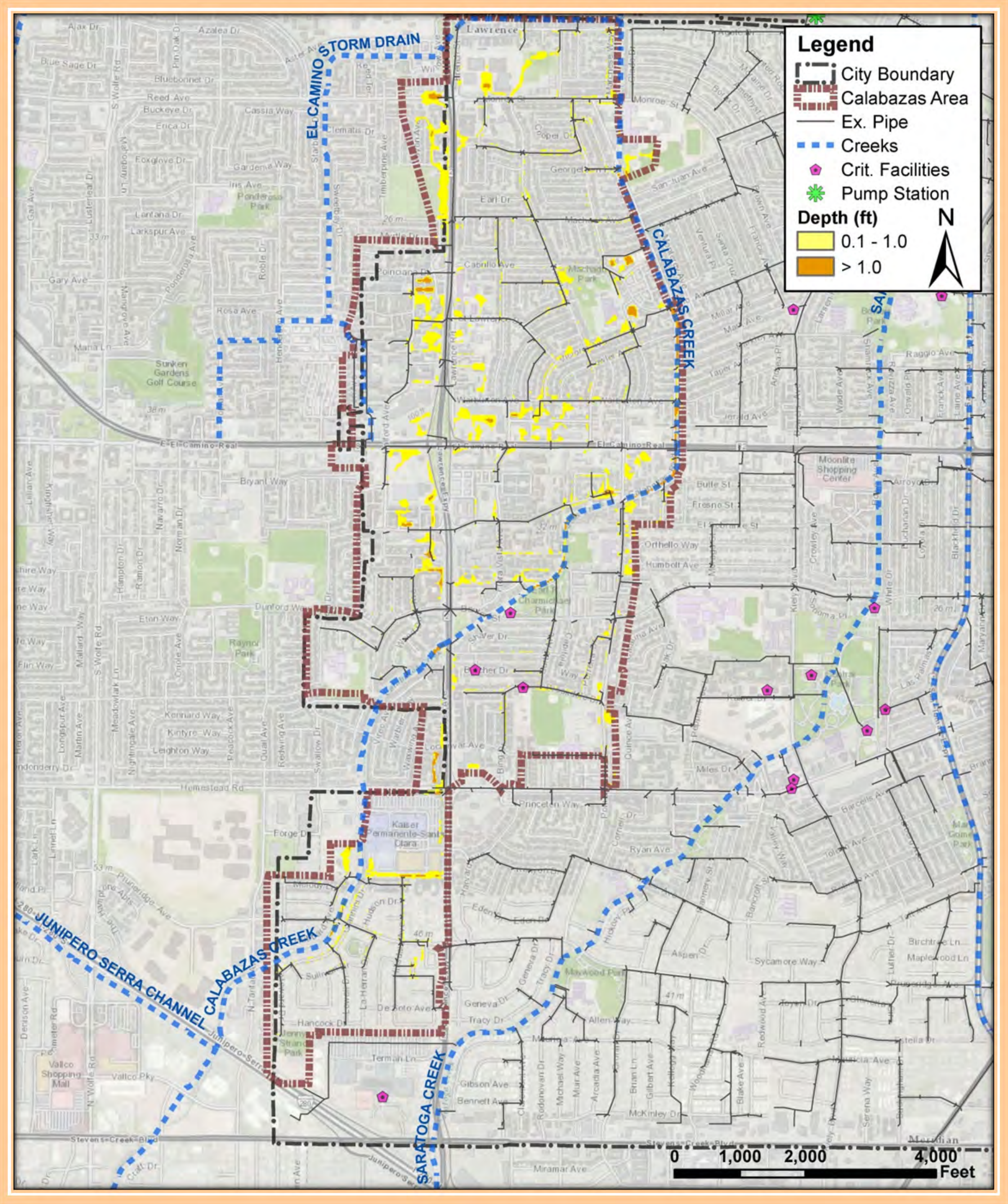

Figure 5-24: 100-Year Flooding in Southern Calabazas Creek Drainage Area with Low Priority CIPs

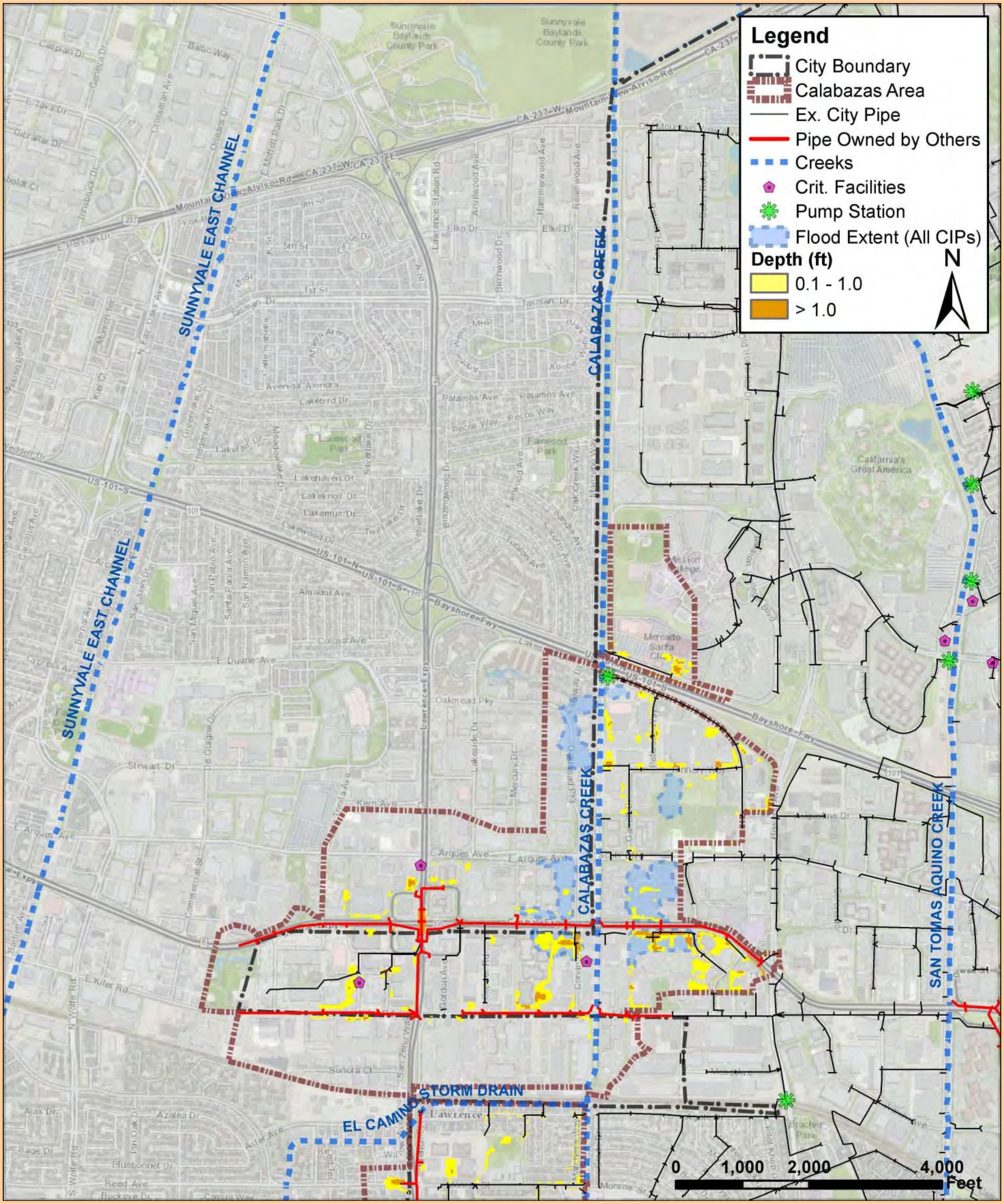

Figure 5-25: 100-year Flooding with Improvements to Systems Owned by Others (shown in Red) Areas Previously Flooded with all City Improvement Projects in Place are Highlighted in Blue

5.4.2. Saratoga Creek

The Saratoga Creek drainage area covers 2.2 square miles of the study area. MU results for existing conditions are shown in Figure 5-27 through Figure 5-29.

Identified Deficiencies

The most expansive flooding in this area occurs just south of El Camino Real during 10- and 100-year rainfall. This flooding occurs mostly due to undersized pipes in the area. The MU 2-D existing conditions models indicate that 12 parcels are flooded for a 2-year storm, 58 parcels are flooded for a 10-year storm, and 111 parcels are flooded for a 100-year storm.

Known Problem Areas

No known problem areas were identified by Schaaf and Wheeler or City staff in this drainage area.

Prioritized Improvements

No highest or high priority projects are recommended for the Saratoga Creek drainage area. However, high priority projects in the adjacent San Tomas Aquino Creek drainage area heavily benefit this area in a 10-year event.

Two moderate priority projects (Figure 5-30 through Figure 5-32) are recommended to reduce 10-year flooding. The City may need to progressively re-prioritize moderate priority projects based on funding, other utility improvements, land use changes, and condition assessments.

Eleven low priority (Figure 5-33 through Figure 5-35) projects are recommended for this area to reduce threats to structures during a 100-year event. These projects may only get built if there are significant changes to land use, roadway, or redevelopment projects in the area.

Intermediate flooding scenarios are summarized in Table 5-4. A description of moderate priority projects is shown in Table 5-5. Flooded area as a function of completing each CIP priority level is shown in Figure 5-26.

While high priority flooding may persist, the magnitude and duration of flooding have decreased. Flooding remains in localized low points that are unable to drain to the modeled system once filled.

Table 5-4: Parcels Flooded after Completion of Projects in the Saratoga Creek Drainage Area.

Priority	Existing	Highest	High	Moderate	Low
2-yr	1	1	0	0	0
10-yr	2	2	1	0	0
100-yr	7	7	6	5	0

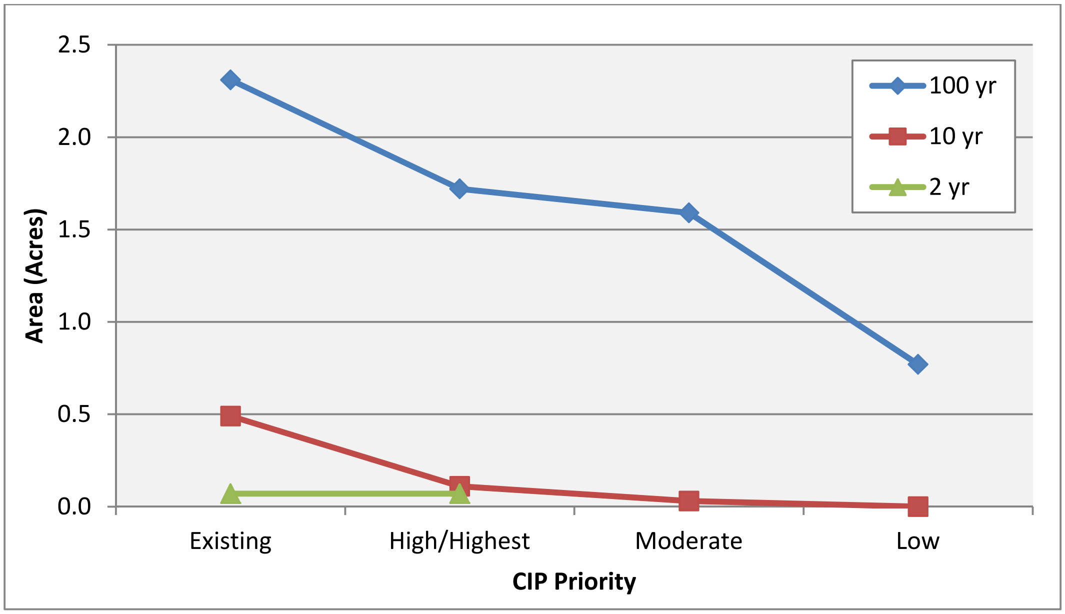

Figure 5-26: Modeled Flooded Area in Saratoga Creek Drainage Area for each CIP Priority Level.

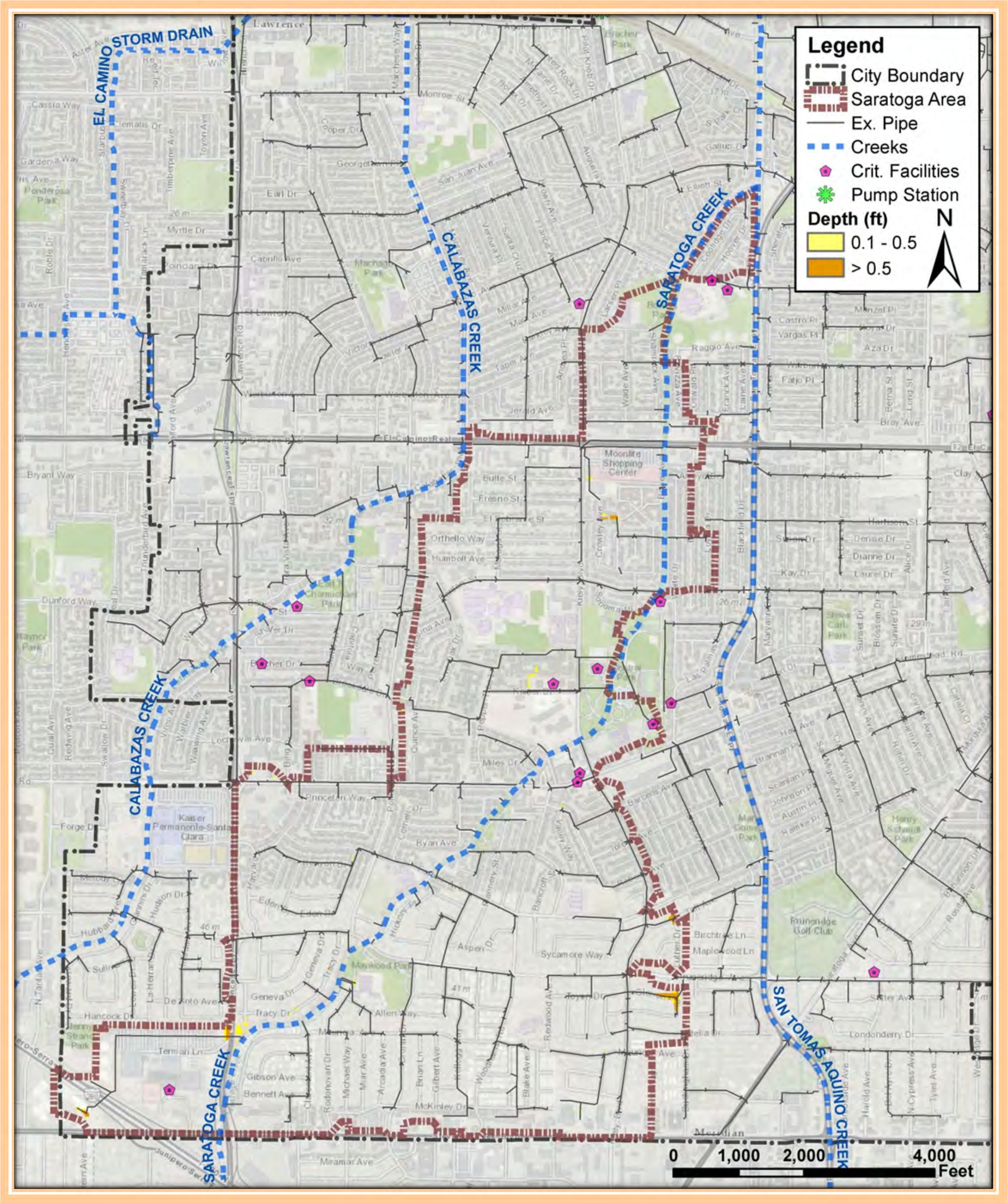

Figure 5-27: 2-Year Flooding with Existing Conditions in Saratoga Creek Drainage Area

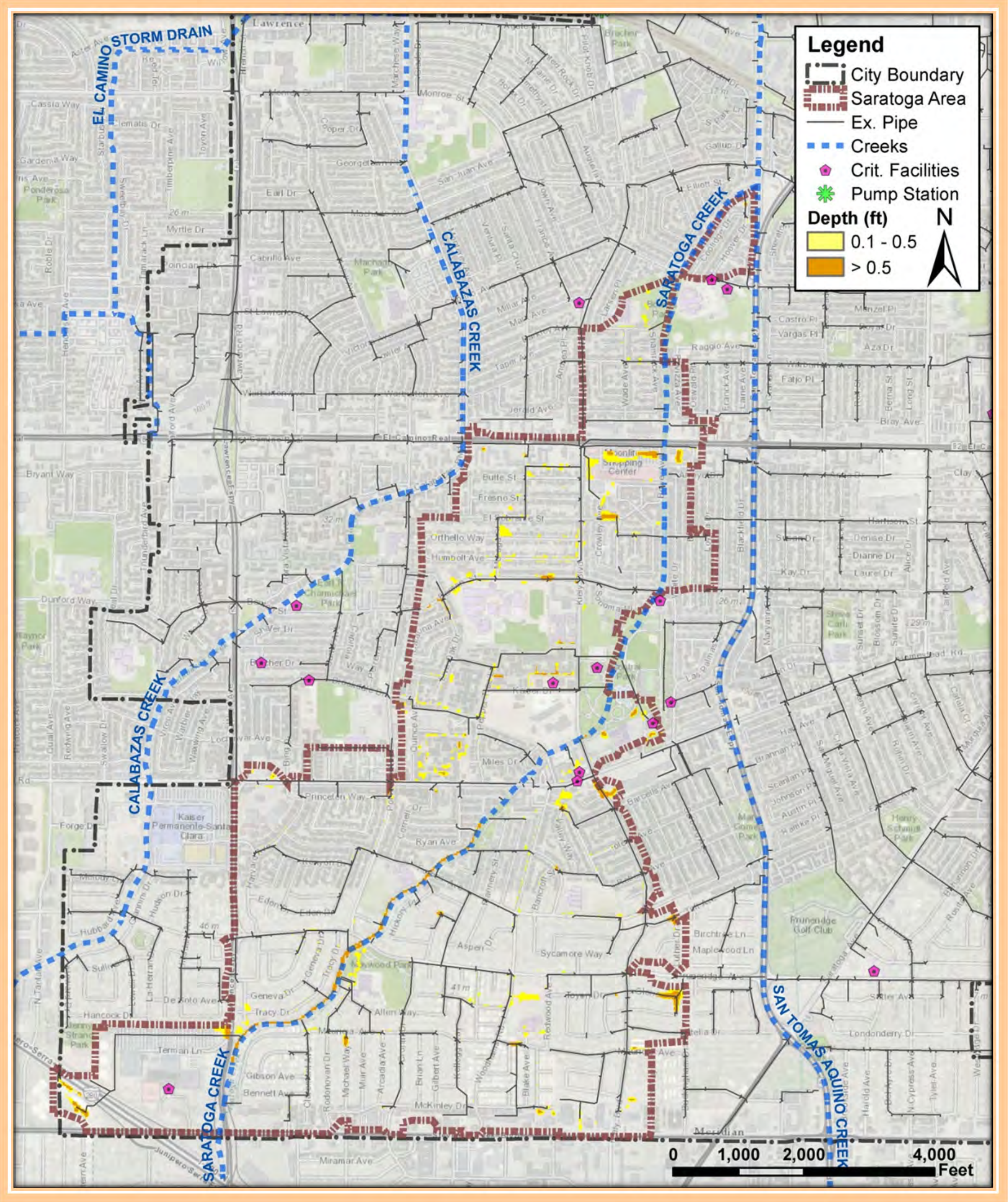

Figure 5-28: 10-Year Flooding with Existing Conditions in Saratoga Creek Drainage Area

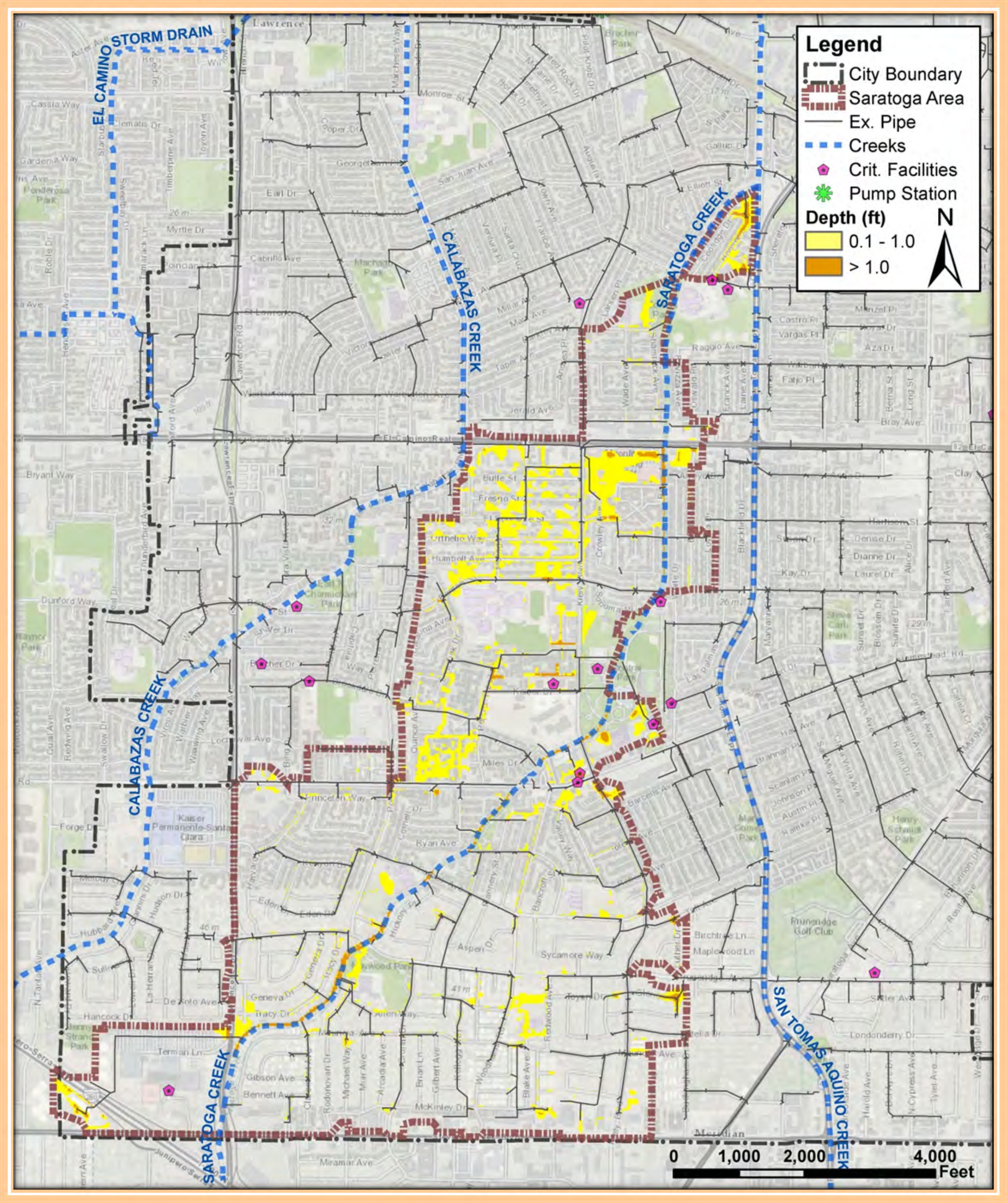

Figure 5-29: 100-Year Flooding with Existing Conditions in Saratoga Creek Drainage Area

Table 5-5: Moderate Priority Projects for Saratoga Creek Drainage Area

Project No.	Project Name	Priority	Block Book Pg.	Description
30	Kiely	Moderate	13, 23	Pipes along Kiely are undersized to convey the 10-year event. Upsizing existing 21” to 30” pipes is recommended to alleviate flooding in this drainage area and San Tomas Aquino drainage area.
41	Princeton and Homestead	Moderate	22	Pipes on Princeton and Homestead are undersized to convey the 10-year event. Upsizing existing 15” and 24” pipes to 21” and 30” pipes is recommended.

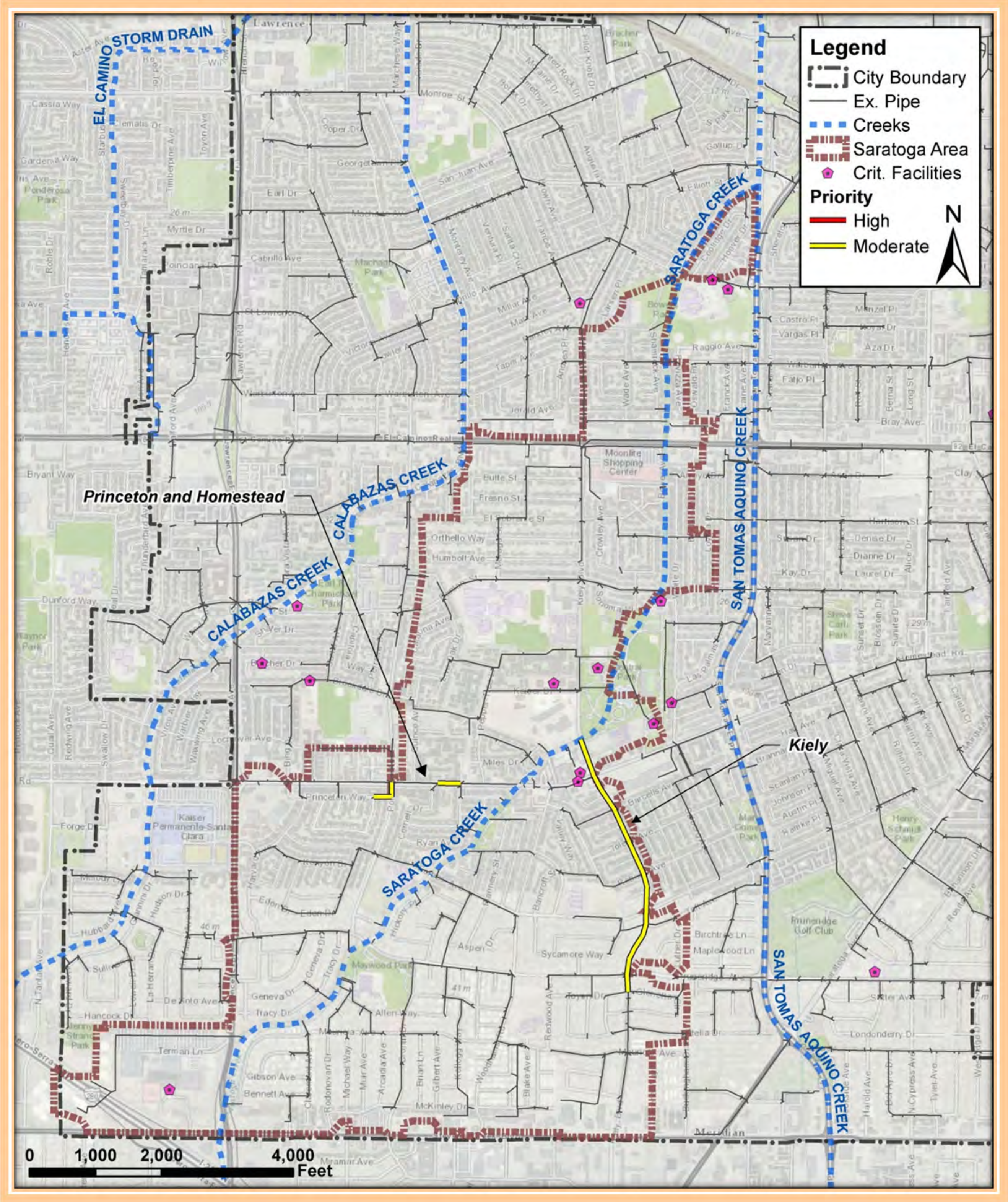

Figure 5-30: Saratoga Creek Drainage Area Moderate Priority Improvement Projects

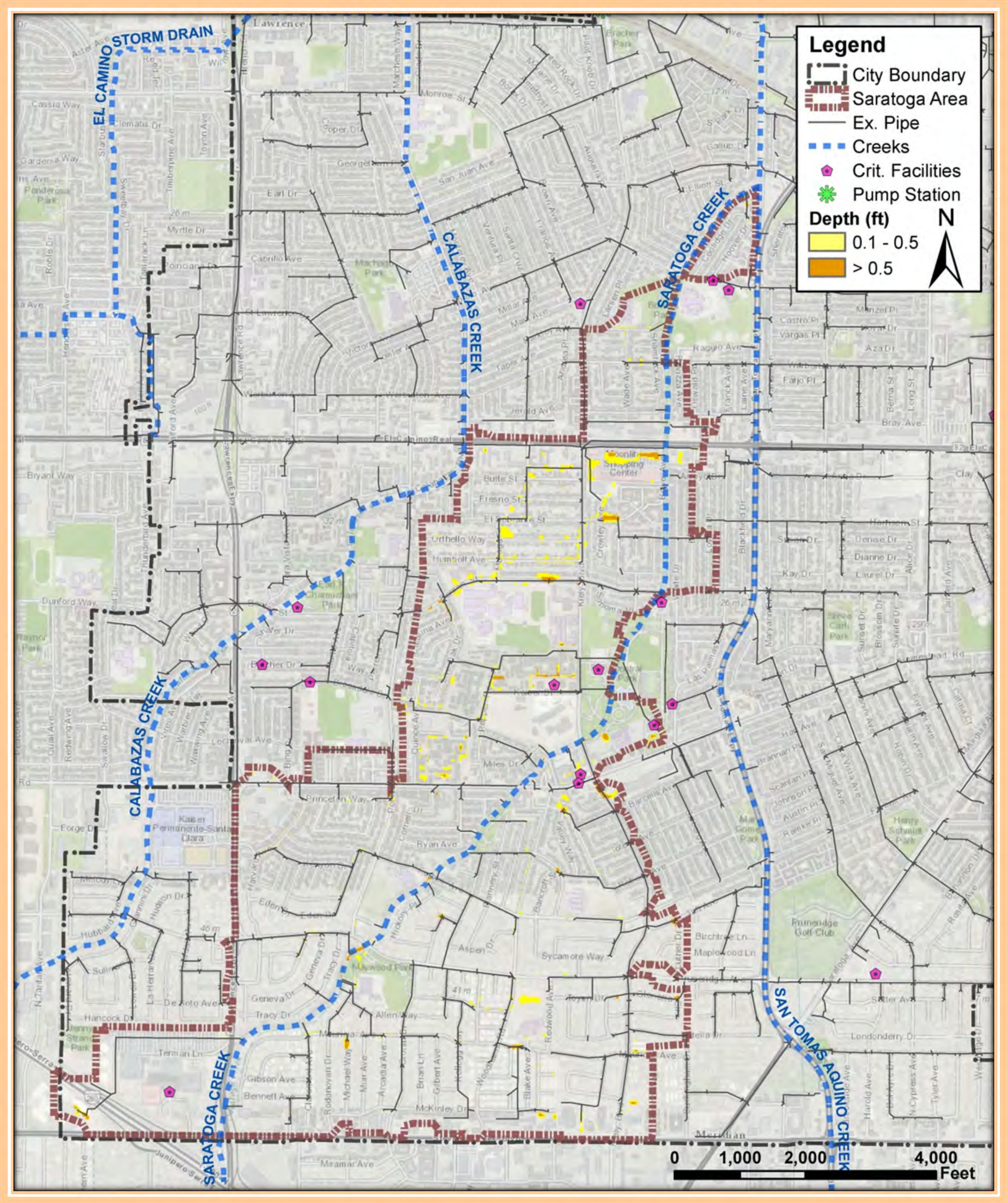

Figure 5-31: 10-Year Flooding in Saratoga Creek Drainage Area with Moderate Priority CIPs

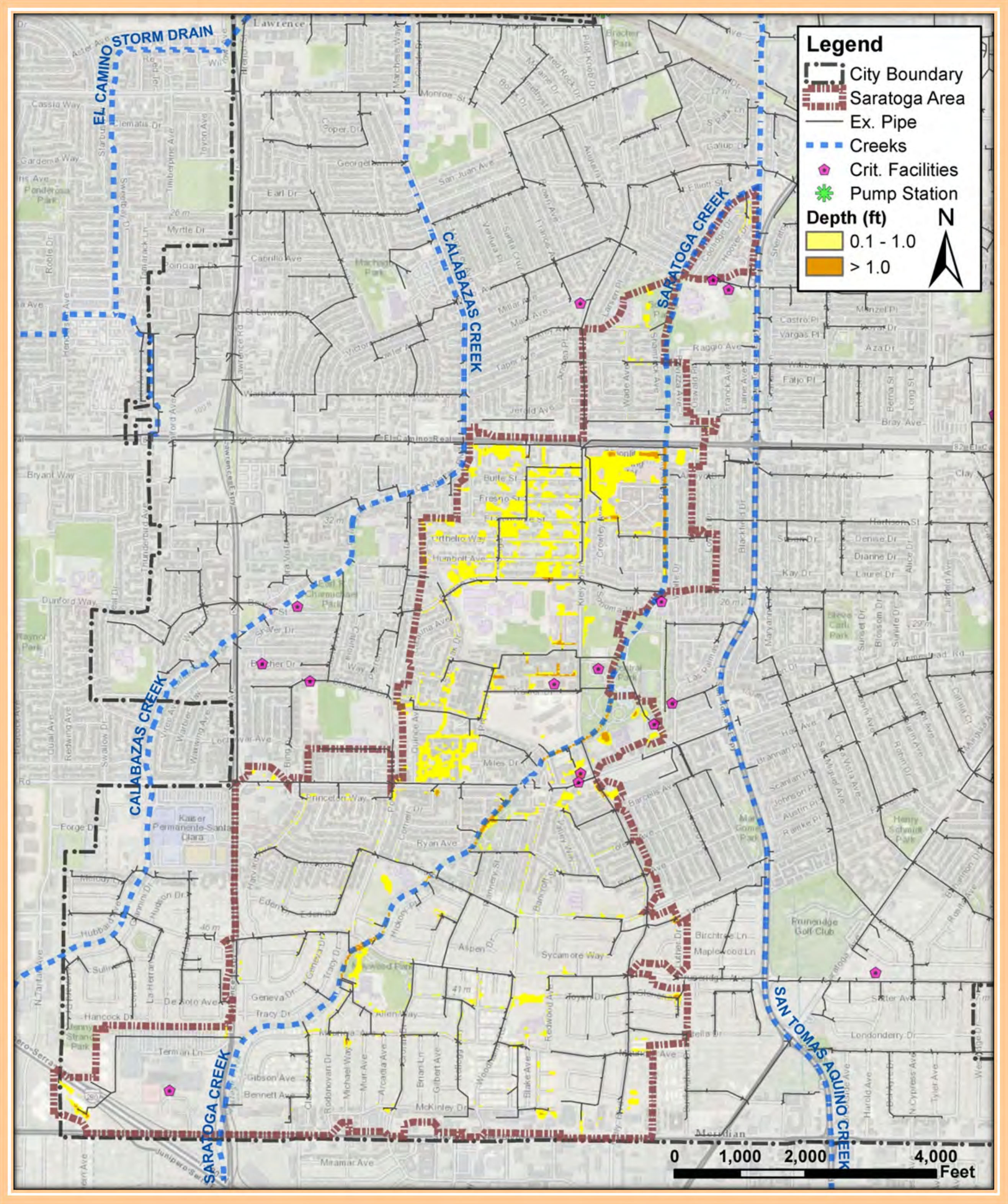

Figure 5-32: 100-Year Flooding in Saratoga Creek Drainage Area with Moderate Priority CIPs

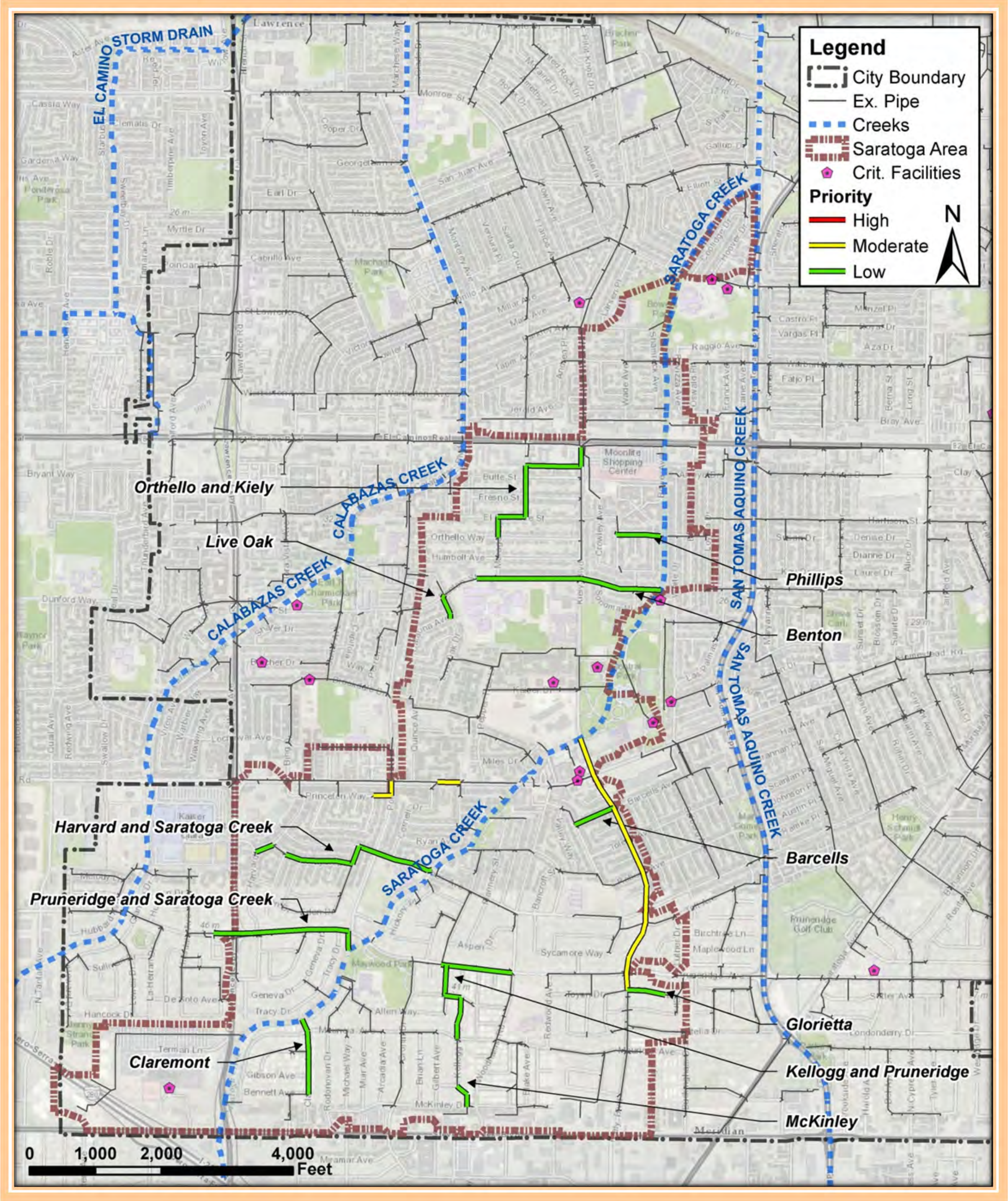

Figure 5-33: Saratoga Creek Drainage Area Low Priority Improvement Projects

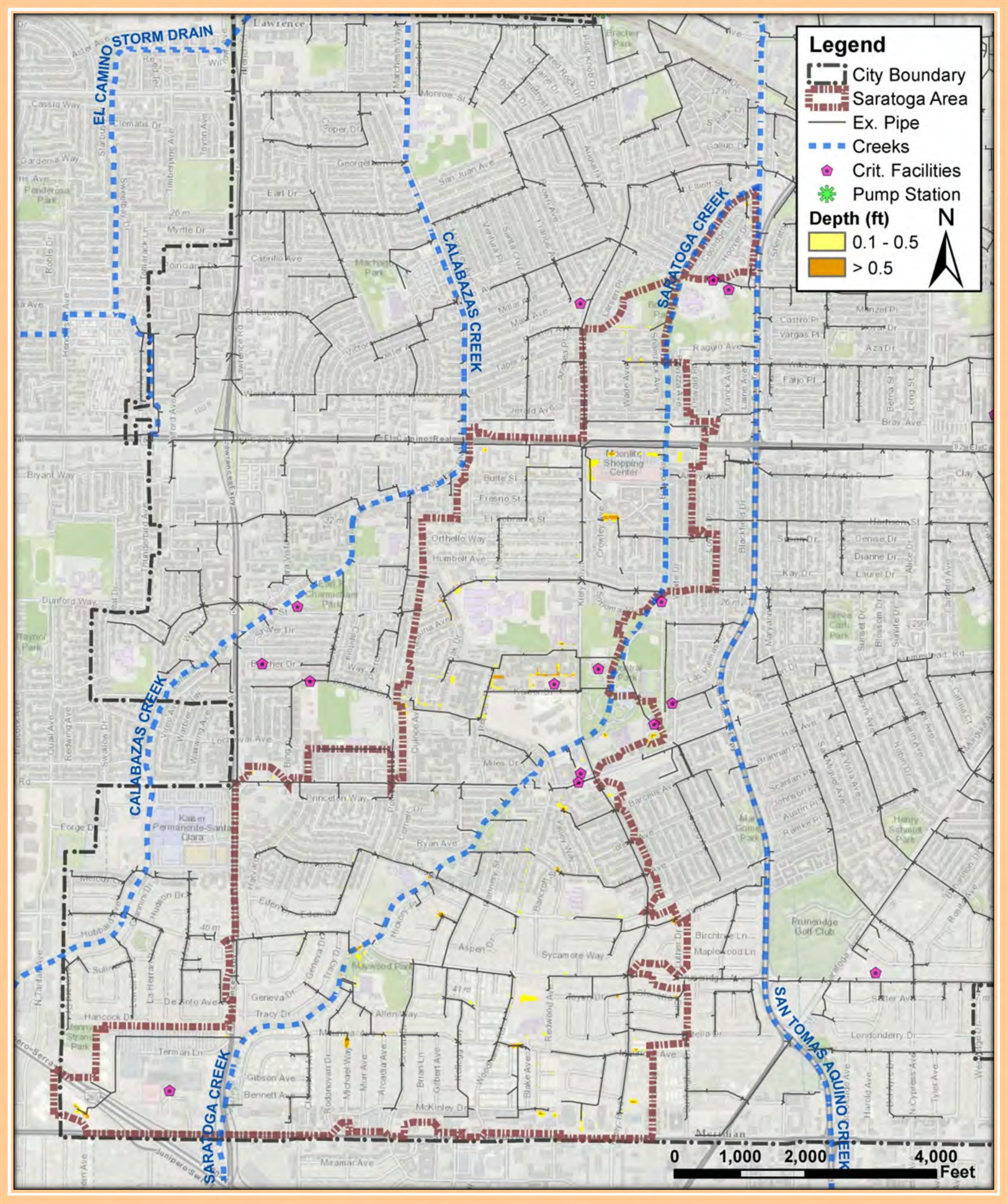

Figure 5-34: 10-Year Flooding in Saratoga Creek Drainage Area with Low Priority CIPs

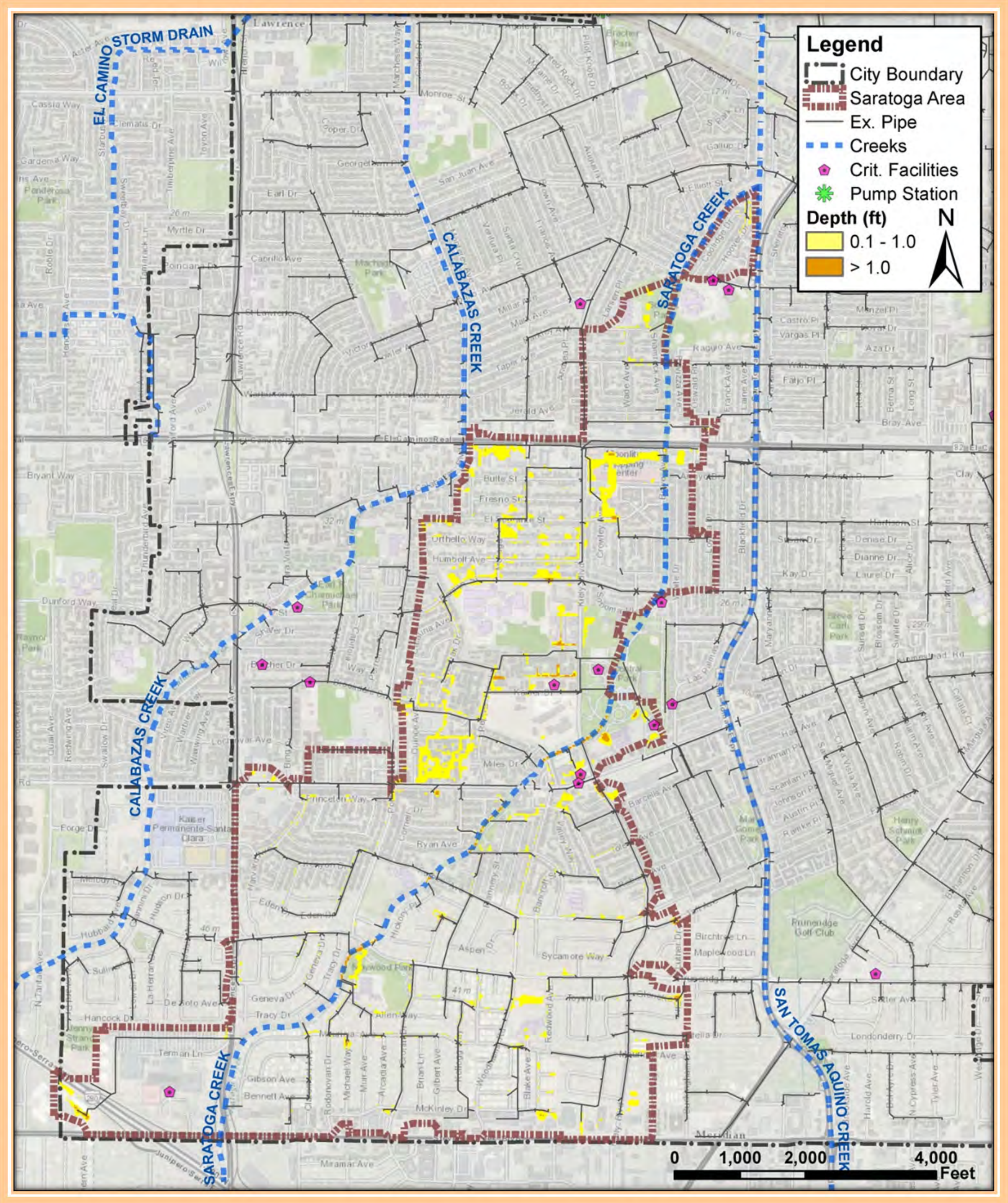

Figure 5-35: 100-Year Flooding in Saratoga Creek Drainage Area with Low Priority CIPs

5.4.3. San Tomas Aquino Creek

The San Tomas Aquino Creek makes up the largest drainage area, covering 7.3 square miles of the study area. MU results for existing conditions are shown in Figure 5-37 through Figure 5-42. (Note the 100-year flooding extents shown in these figures ignore creek overflows, which are substantial from San Tomas Aquino Creek. This is done so that the underlying 100-year flooding caused by local storm drain deficiencies is visible. Creek overflow from San Tomas Aquino Creek is outside City control. The special flood hazard area created by the creek spills is, however, recognized when setting capital improvement priorities.)

Identified Deficiencies

Flooding occurs during the 2-year event near Los Padres Boulevard between El Camino Real and Saratoga Avenue. Additional significant 10-year flooding occurs in residential areas near Agate Drive, between Bowers and San Tomas Aquino Creek south of Highway 101, in residential areas around Los Padres Boulevard, and at Pruneridge Golf Course. Significant 100-year flooding is shown west of San Tomas Aquino Creek and south of the railroad near San Tomas Expressway.

Flooding shown in commercial parking lots south of the Great America Amusement park occurs because private drainage systems in the lot are not modeled; however, this flooding remains contained in the parking lots.

Known Problem Areas

The system on Los Padres Boulevard has historically experienced frequent flooding upstream of Benton Street in neighborhoods as far southeast as Winchester Boulevard.

Prioritized Improvements

Four highest priority projects (Figure 5-43 through Figure 5-44) are recommended in the San Tomas Aquino Creek drainage area. These projects are primarily to address known flooding issues upstream of Los Padres and Benton, and significant modeled 2-year flooding.

Four high priority projects (Figure 5-45 through Figure 5-52) are recommended in this area to address remaining 2-year flooding and significant 10-year flooding in the neighborhoods around Agate Drive and at Homestead Road and Kiely Boulevard.

Seventeen moderate priority projects (Figure 5-53 through Figure 5-58) are recommended in the area to address 10-year flooding concerns around Los Padres Blvd., in the neighborhood south of Agate Drive, and in commercial development north of the railroad around Scott Blvd. The City may need to progressively re-prioritize moderate priority projects based on funding, other utility improvements, land use changes, and condition assessments.

Twenty eight low priority projects (Figure 5-59 through Figure 5-64) are recommended in the area to reduce flood risk for structures in the area in a 100-year event.

Intermediate flooding scenarios are summarized in Table 5-6. A description of Moderate priority projects is shown in Table 5-7~~Table 5-7~~. Flooded area for each CIP priority level is shown in Figure 5-36.

Table 5-6: Parcels Flooded after Completion of Projects in San Tomas Aquino Creek Drainage Area

Priority	Existing	Highest	High	Moderate	Low
2-yr	3	1	0	0	0
10-yr	150	145	126	3	2
100-yr	347	282	240	77	23

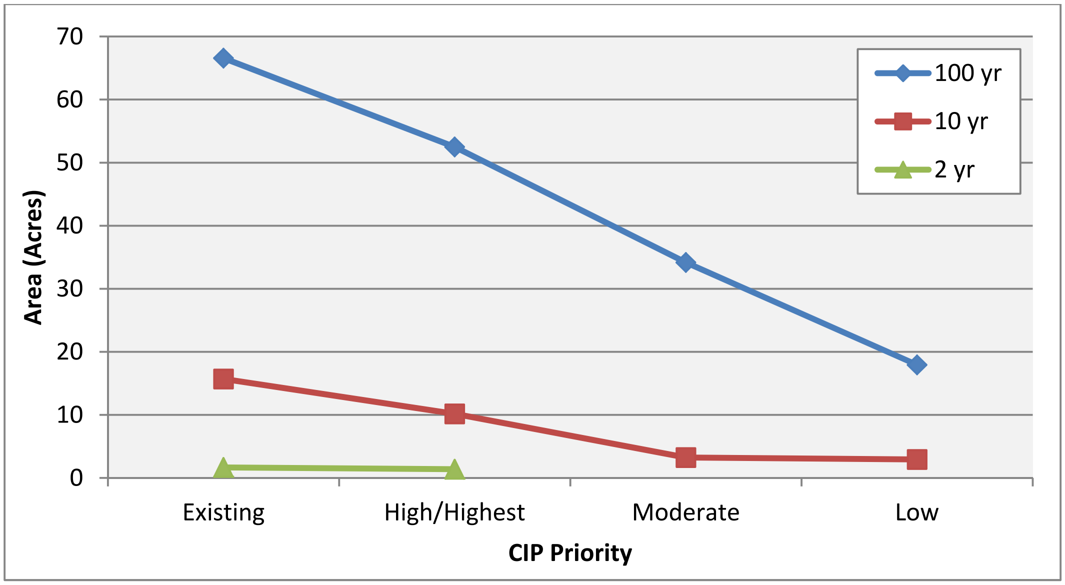

Figure 5-36: Modeled Flooded Area in San Tomas Aquino Creek Drainage Area for ach CIP Priority Level

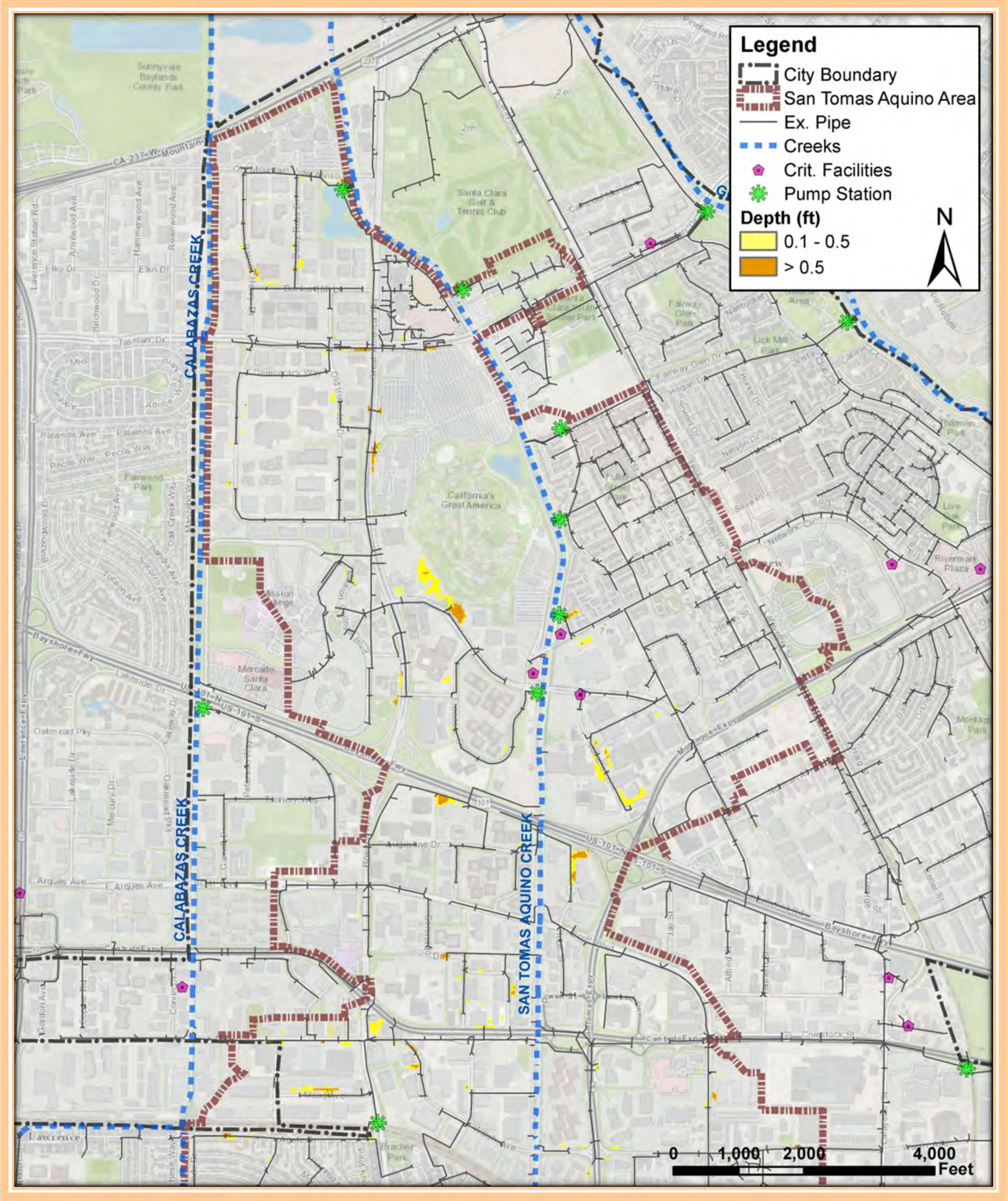

Figure 5-37: 2-Year Flooding with Existing Conditions in Northern San Tomas Aquino Creek Drainage Area

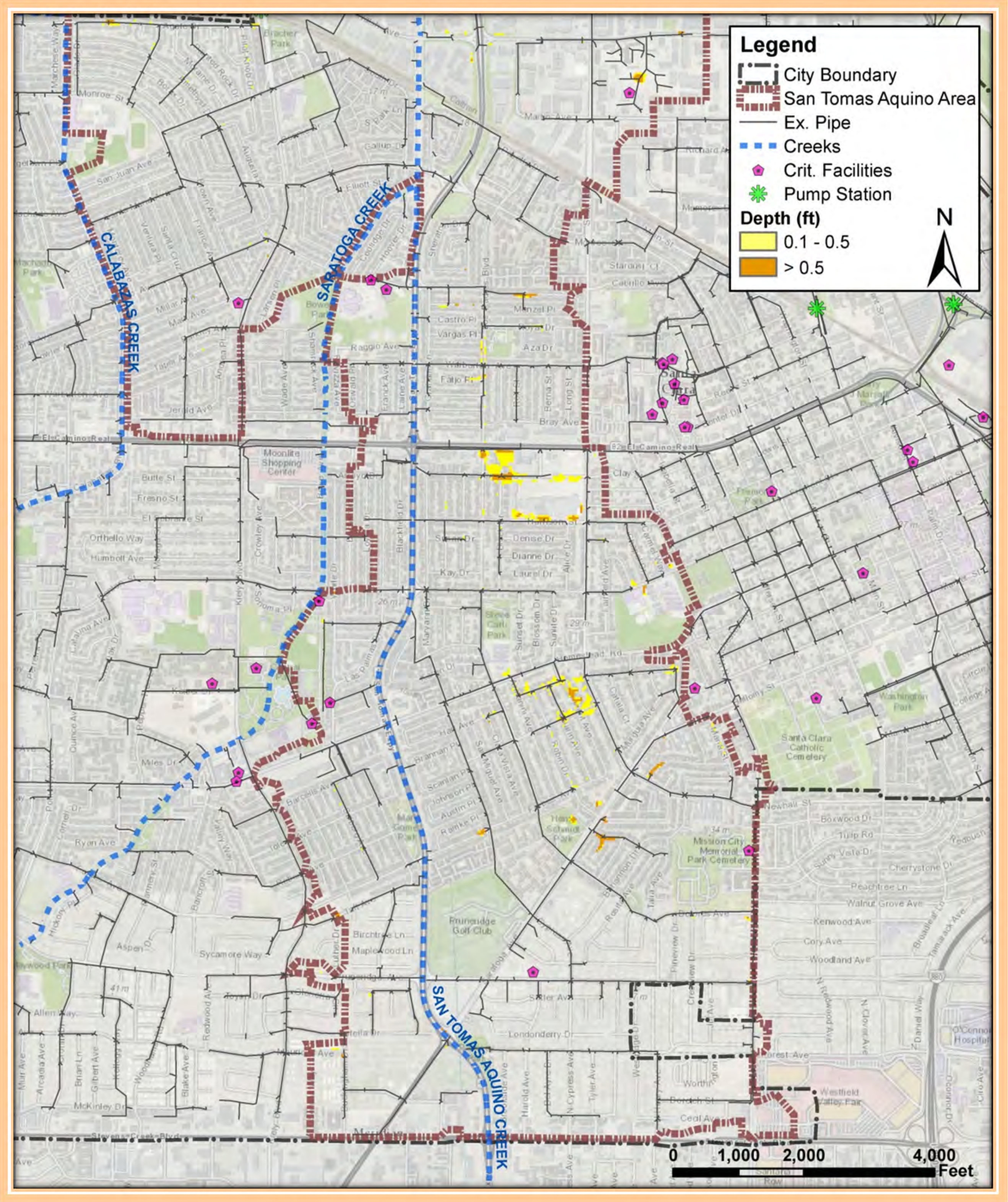

Figure 5-38: 2-Year Flooding with Existing Conditions in Southern San Tomas Aquino Creek Drainage Area

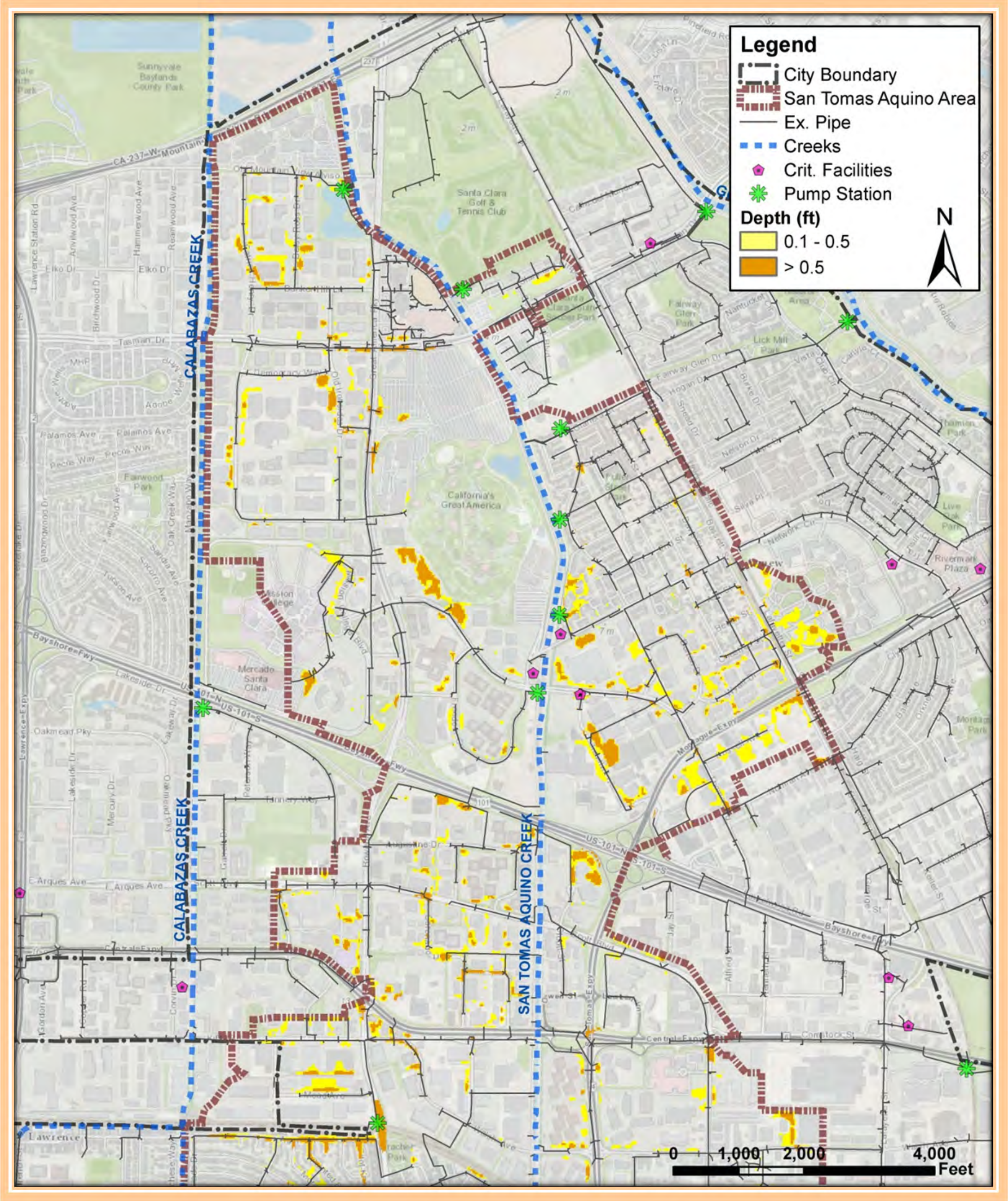

Figure 5-39: 10-Year Flooding with Existing Conditions in Northern San Tomas Aquino Creek Drainage Area

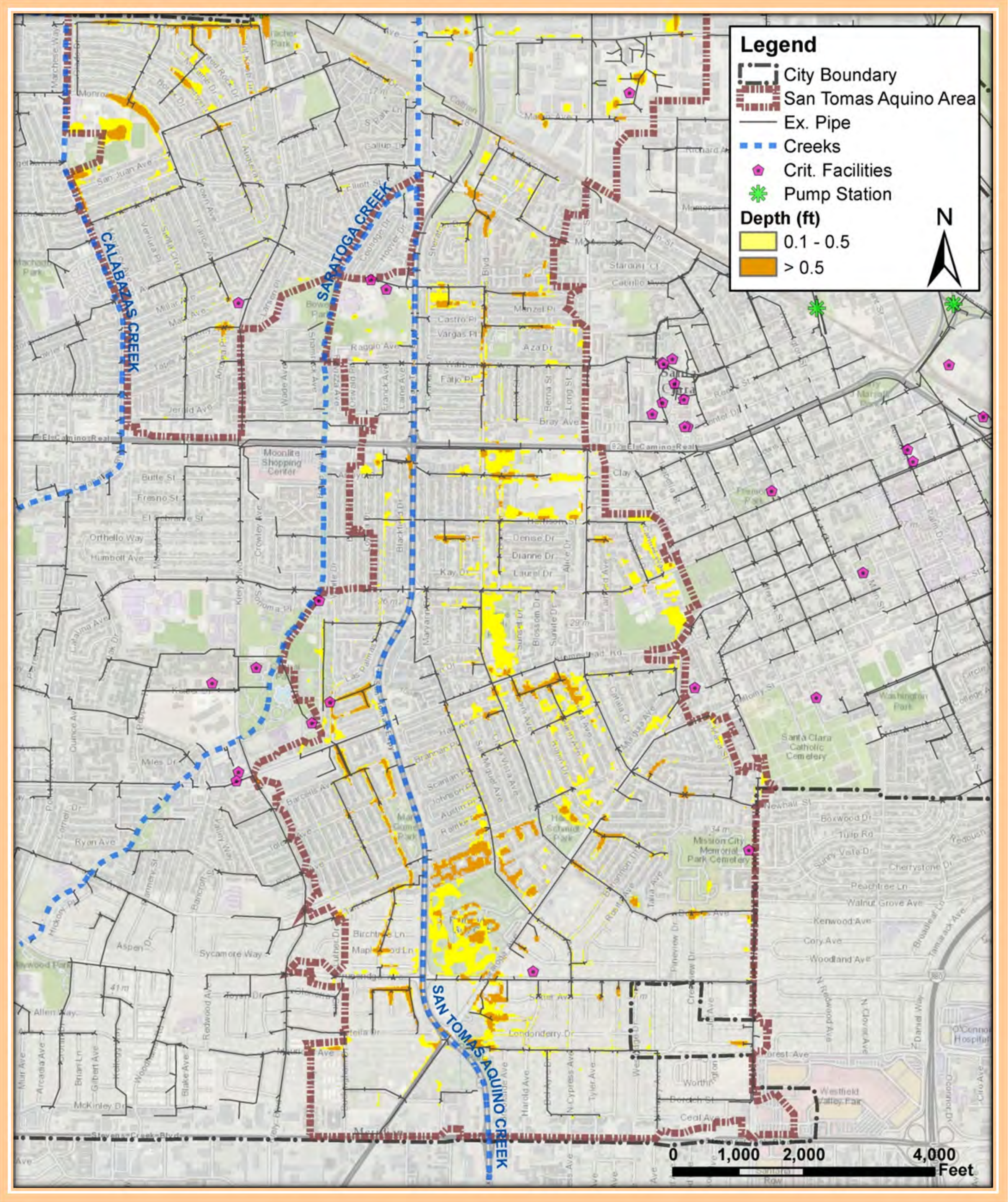

Figure 5-40: 10-Year Flooding with Existing Conditions in Southern San Tomas Aquino Creek Drainage Area

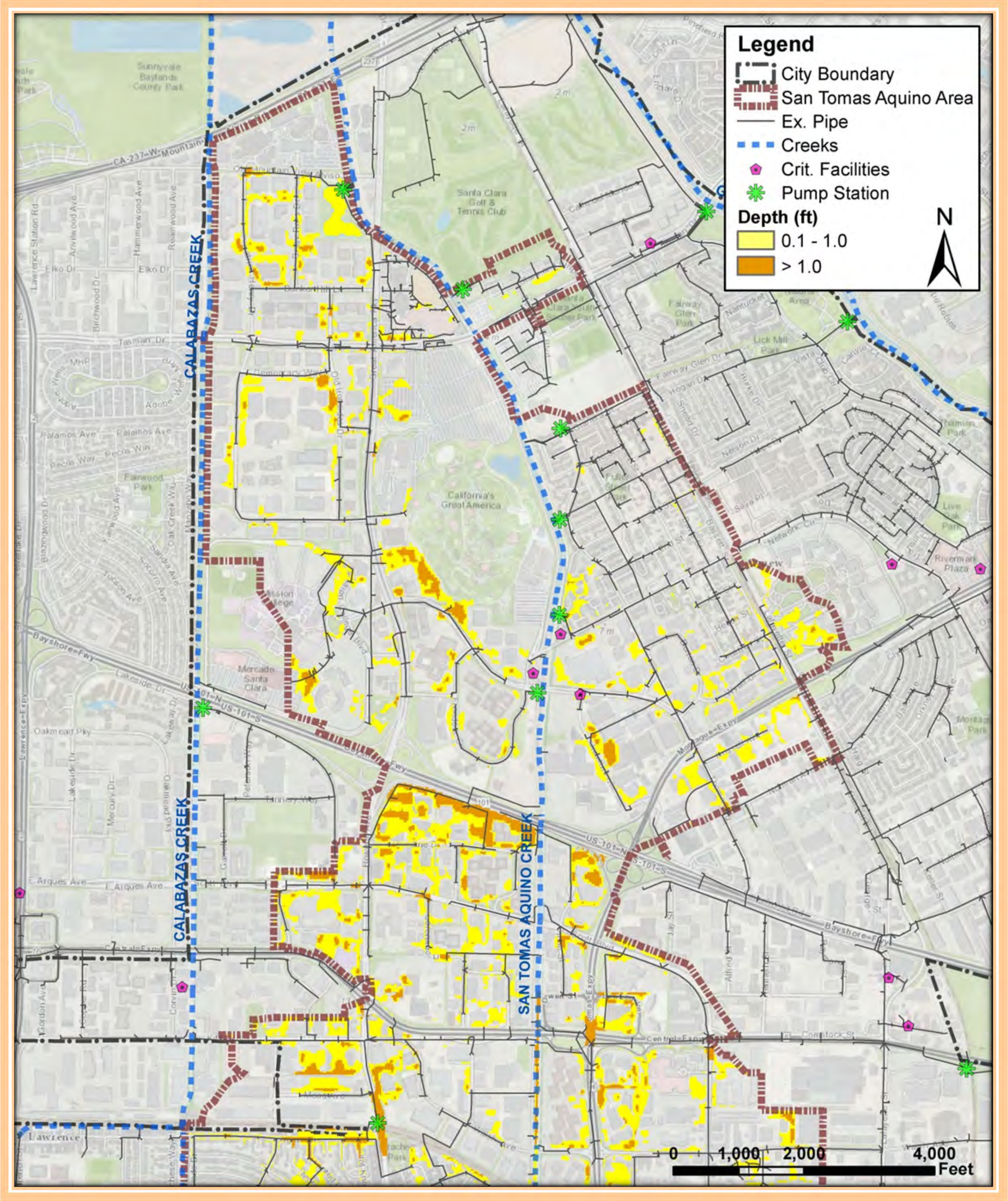

Figure 5-41: 100-Year Flooding with Existing Conditions in Northern San Tomas Aquino Creek Drainage Area

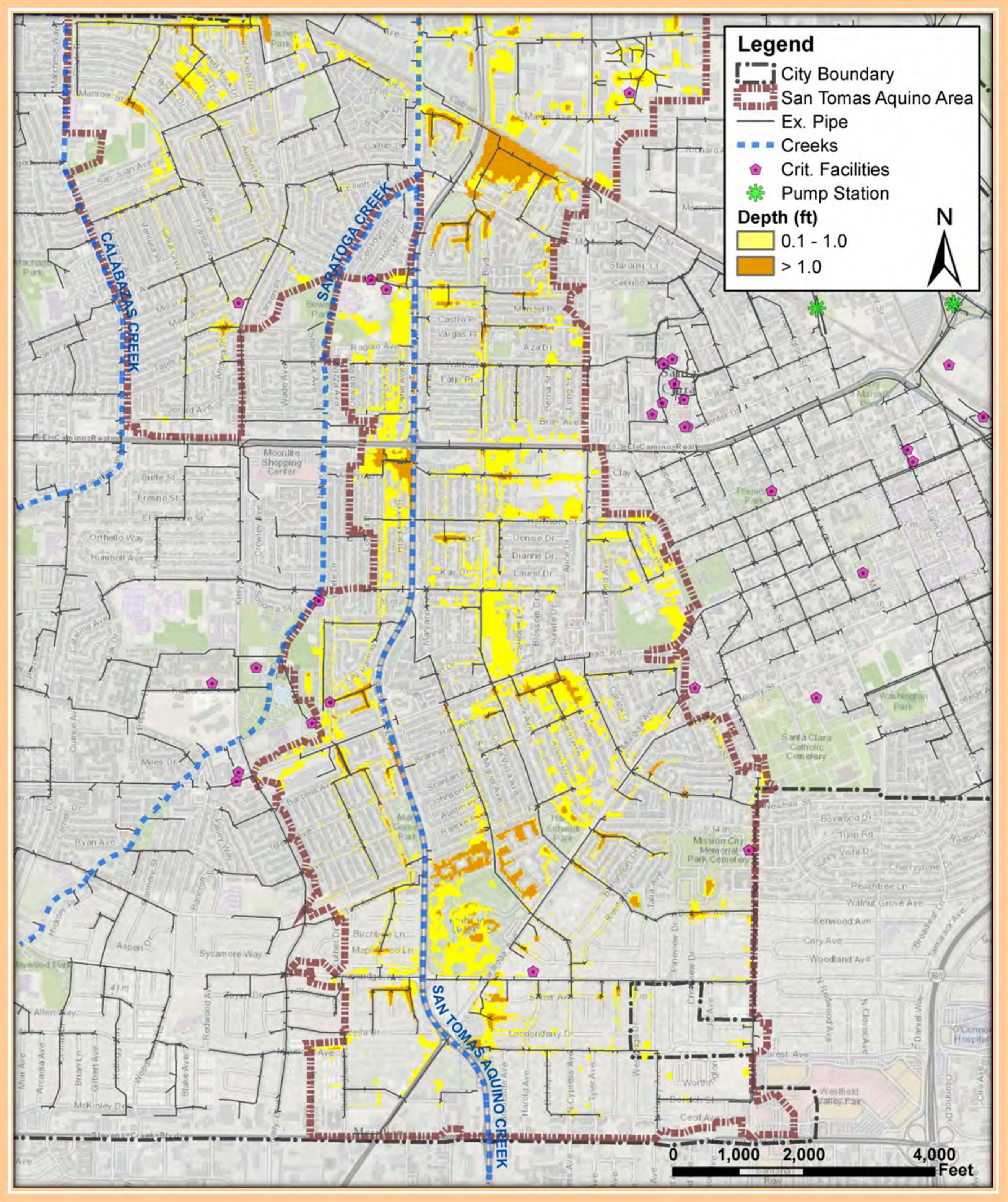

Figure 5-42: 100-Year Flooding with Existing Conditions in Southern San Tomas Aquino Creek Drainage Area

Table 5-7: Highest, High and Moderate Priority Projects for San Tomas Aquino Creek Drainage Area

Project No.	Project Name	Priority	Block Book Pg.	Description
1	Anna	Highest	34, 35	Significant flooding occurs north of Anna Dr. and Block Dr. Upsizing these pipes and adding catch basins is recommended.
2	Harrison	Highest	34, 35	Significant flooding occurs north of Harrison St. in commercial and residential development. Upsizing existing pipes is recommended to reduce significant 2-year and 10-year flooding
3	Homestead and Maryann	Highest	24, 25, 34, 35	The area around Los Padres Blvd has experienced frequent flooding. Upsizing pipes between the neighborhood southeast of Homestead and Los Padres and the outfalls on Benton St and Maryann Dr.
4	Los Padres and Warburton	Highest	44, 45	Flooding occurs on Warburton Ave. east of San Tomas Expressway. Upsizing existing 10” to 18” pipes is recommended to reduce significant 2-year flooding.
6	Agate and Bowers	High	52, 53, 63	Significant 2-year flooding occurs in the neighborhoods south of Agate Dr. Upsizing existing pipes in the neighborhood and on Bowers Ave. is recommended.
8	Burton	High	85	2-year and significant 10-year flooding occurs in the commercial development on Juliette Lane. Upsizing pipes on Burton Dr to alleviate the system on Juliette is recommended.
12	Homestead and Layton	High	24	Some 2-year and significant 10-year flooding occurs around Homestead Rd., west of San Tomas Expwy. Upsizing existing pipes on Layton Ct. and Homestead Rd. is recommended.
17	Royal and Cabrillo	High	44, 45	Some 2-year flooding remains between Harrison and the railroad after installing highest priority projects. Upsizing existing pipes from Royal Dr. to San Tomas Aquino is recommended.
19	Bowers and Chromite	Moderate	53	Some flooding in the neighborhood south of Agate Dr. is caused by flooding from the system on Chromite Dr. Upsizing the existing pipes on Chromite Dr. is recommended. Prior construction of the Caltrain and San Tomas Aquino project is recommended.
20	Bowers and Monroe	Moderate	43, 53, 54	Some 10-year flooding occurs on Bowers Ave. downstream of Mark Ave. Upsizing existing pipes on Bowers Ave. and Monroe St. is recommended.
21	Caltrain and San Tomas Aquino	Moderate	53, 54, 64	Some flooding in the neighborhood south of Agate Dr. is caused by flooding from the system on Chromite Dr. Upsizing pipes around the railroad to the outfall near Northwestern Pkwy is recommended.
22	Condensa	Moderate	63, 64	10-year flooding occurs around Kifer Rd. and Bowers Ave. Upsizing existing 54” pipe to 72” pipe is recommended. This project is intended to address flooding issues that remain after constructing the Agate and Bowers project.
23	De La Pena and Homestead	Moderate	25, 26	10-year flooding occurs in the neighborhood southeast of Homestead Rd. and Los Padres Blvd. Upsizing existing pipes on Homestead Rd. and De La Pena Ave. is recommended. Prior construction of the Homestead and Maryann project is required.

Table 5-7: Highest, High and Moderate Priority Projects for San Tomas Aquino Creek Drainage Area

Project No.	Project Name	Priority	Block Book Pg.	Description
25	Forbes	Moderate	25	10-year flooding occurs around Forbes Ave. Upsizing existing 10" pipe to 12" pipe is recommended.
27	Harold and San Tomas Aquino	Moderate	15, 24, 25	Significant 10- and 100-year flooding occurs at Pruneridge Golf Club and in the neighborhoods southwest of Pruneridge Ave. and Saratoga Ave. due to high stage in San Tomas Aquino. Connecting systems on Forest Ave., Pruneridge Ave., and Saratoga Ave. with new pipes and upsizing existing pipes from Harold Ave. to Los Olivos Dr. and Homestead Rd. is recommended.
28	Juanita and Saratoga	Moderate	25, 26	Significant 10-year flooding depths occur on Juanita Dr. Upsizing existing pipes on Juanita Dr. and Saratoga Ave. is recommended.
29	Juliette	Moderate	74, 75, 85	Upsizing existing pipes in the commercial development around Juliette Ln is recommended to reduce significant 10-year flooding is recommended. Prior construction of the Burton project is required.
32	Lake Santa Clara Pump Station	Moderate	84, 85	Flows to the Rambo pump station are too high in the 10-year event. Connecting the Rambo PS system to the Lake Santa Clara station and upsizing the pumps is recommended.
33	Landeros and Gamblin	Moderate	14	10-year flooding occurs in the neighborhoods around Landeros Dr. and Gamblin Dr. Upsizing existing pipes in this area is recommended.
34	Los Padres	Moderate	25	10-year flooding occurs around Los Padres Dr. upstream of Homestead Rd. Upsizing existing 24" pipe on Los Padres Dr. is recommended. Prior construction of the Homestead and Maryann project is required.
38	Oakmead and Scott	Moderate	72, 73	Some 10-year flooding occurs on Scott in the adjacent Calabazas Creek drainage area. Upsizing existing pipes on Oakmead Village Dr and Scott Blvd is recommended.
39	Patricia	Moderate	24	The outfall pipe on Patricia Dr. is undersized for 10- and 100-year events. Upsizing this pipe from 15" to 21" is recommended.
41	Richard and Scott	Moderate	55, 64, 65, 74	10- and 100-year flooding occurs in the development east of Scott Blvd. between Martin Ave. and Highway 101. Upsizing existing pipe on Richard Ave. and Scott Blvd. is recommended.
42	Salberg and Barcells	Moderate	14, 24	10-year flooding occurs on Salberg Ave. and Barcells Ave. Upsizing existing 12" and 15" pipe on Salberg and Barcells is recommended. Prior construction of the Homestead and Layton is required.
43	Scott and Anna	Moderate	35	10-year flooding occurs east of Scott Blvd. near Anna Dr. upsizing existing 12" to 18" pipe on Scott and Anna is recommended. Prior construction of the Anna project is required.

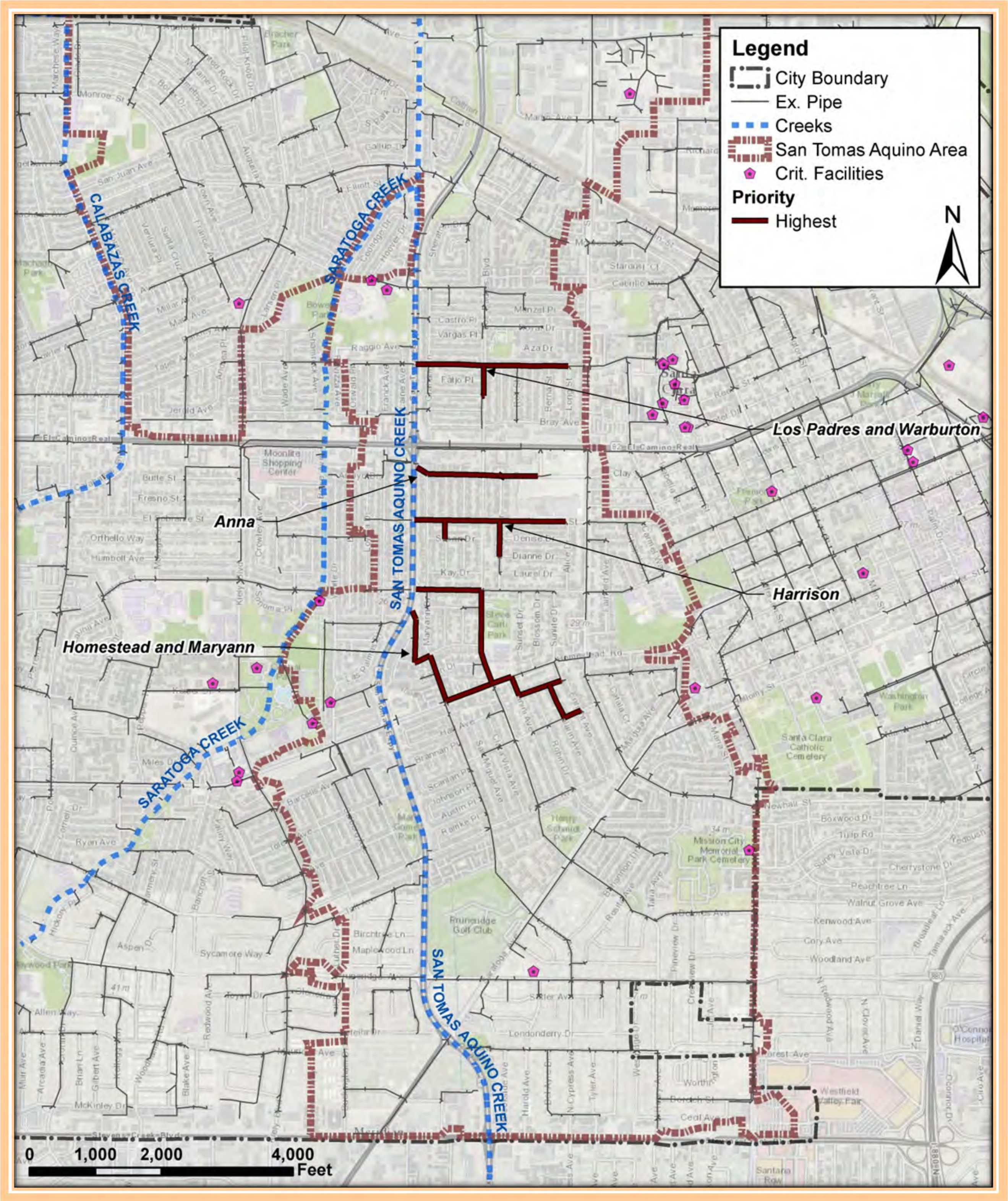

Figure 5-43: Southern San Tomas Aquino Creek Drainage Area Highest Priority Improvement Projects

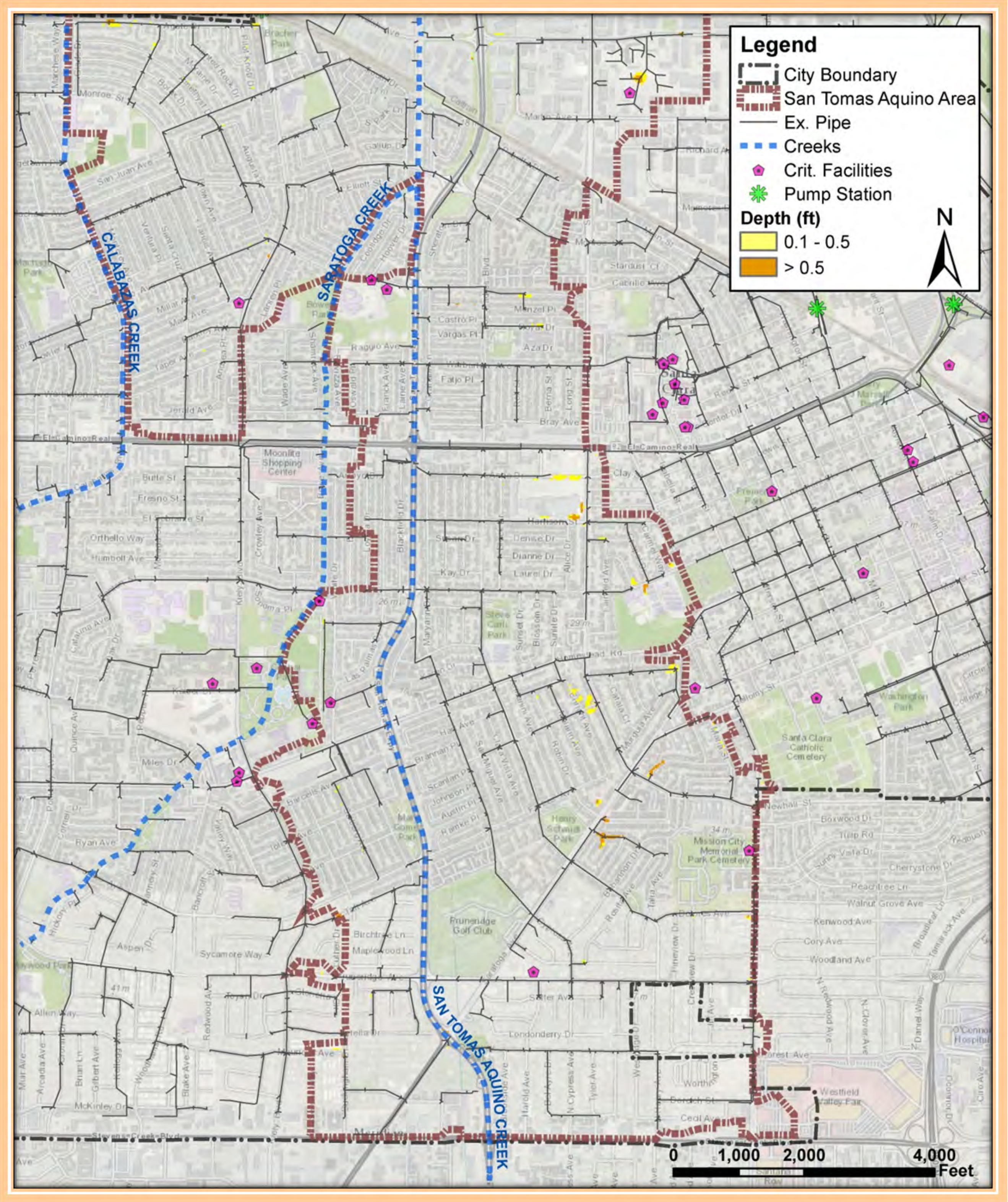

Figure 5-44: 2-Year Flooding in Southern San Tomas Aquino Creek Drainage Area with Highest Priority CIPs

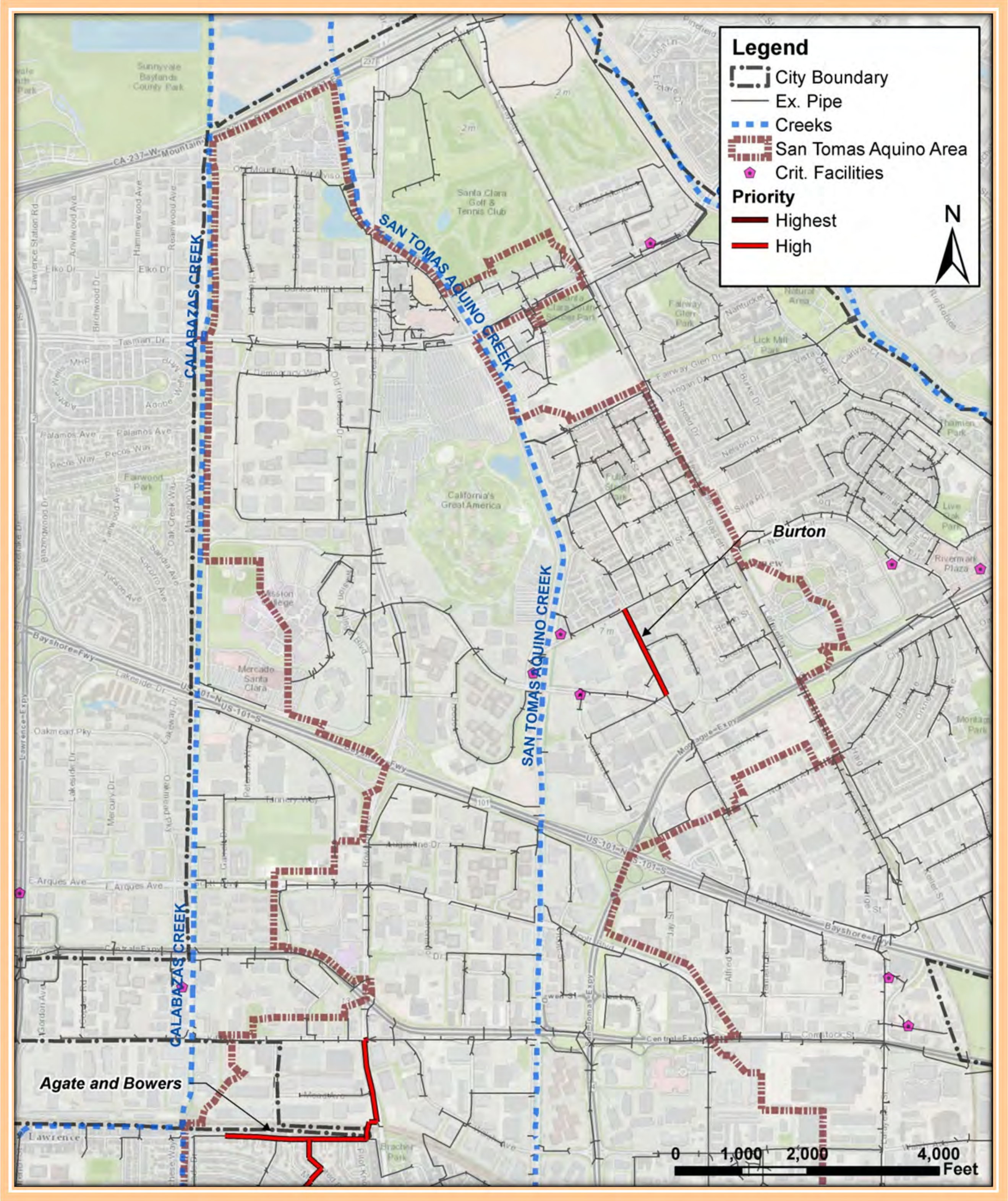

Figure 5-45: Northern San Tomas Aquino Creek Drainage Area High Priority Improvement Projects

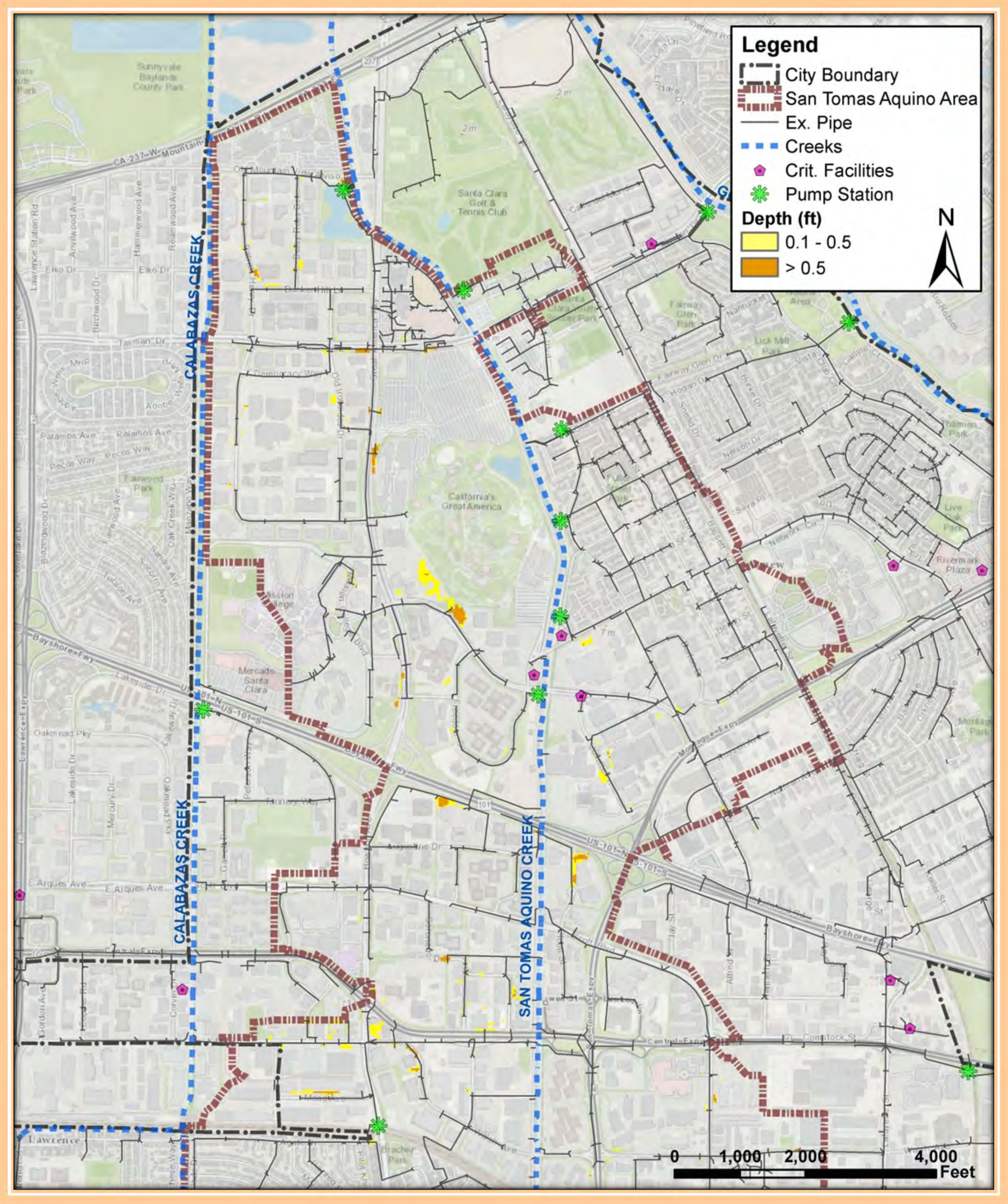

Figure 5-46: 2-Year flooding in Northern San Tomas Aquino Creek Drainage Area with High Priority CIPs

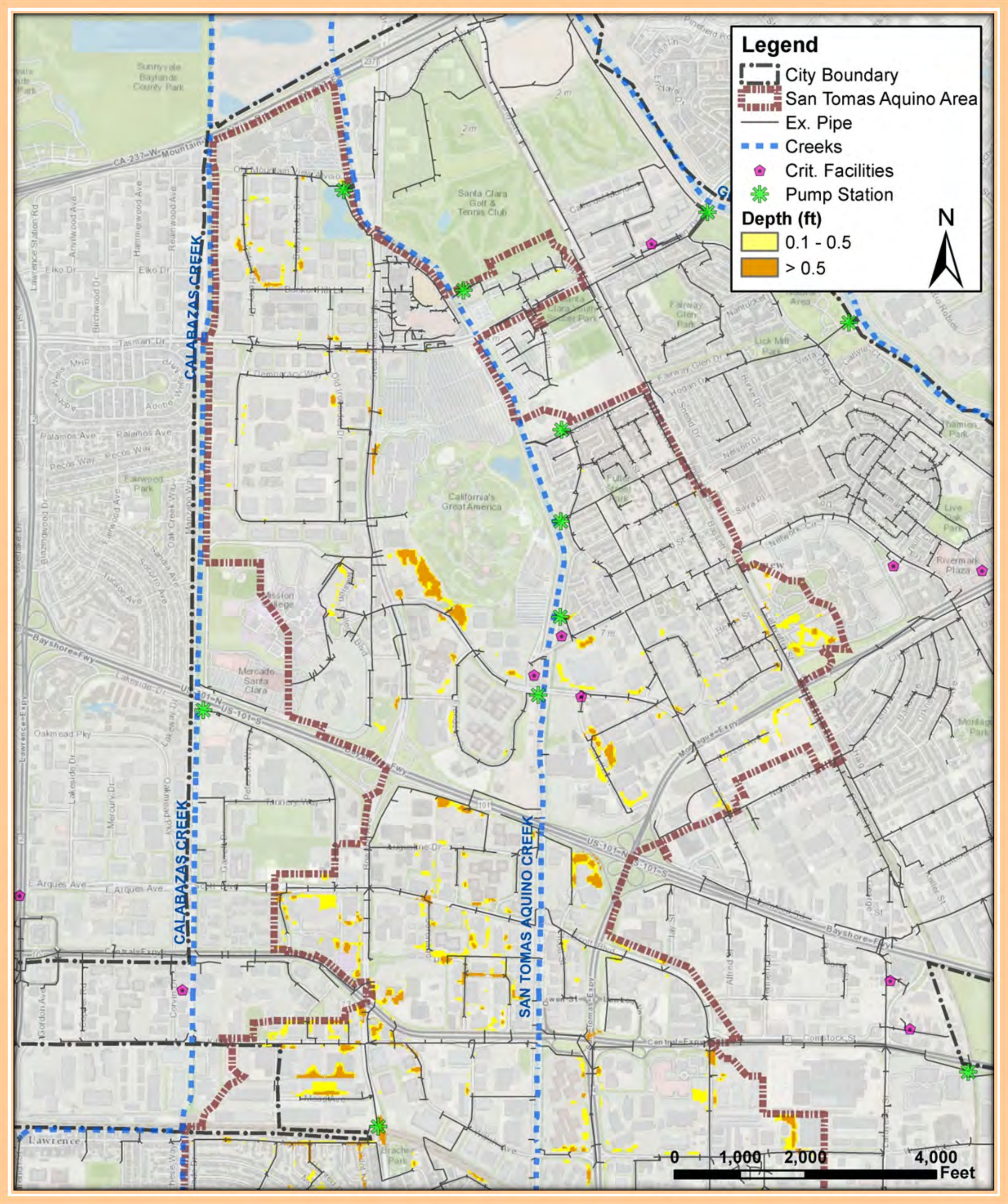

Figure 5-47: 10-Year Flooding in Northern San Tomas Aquino Creek Drainage Area with High Priority CIPs

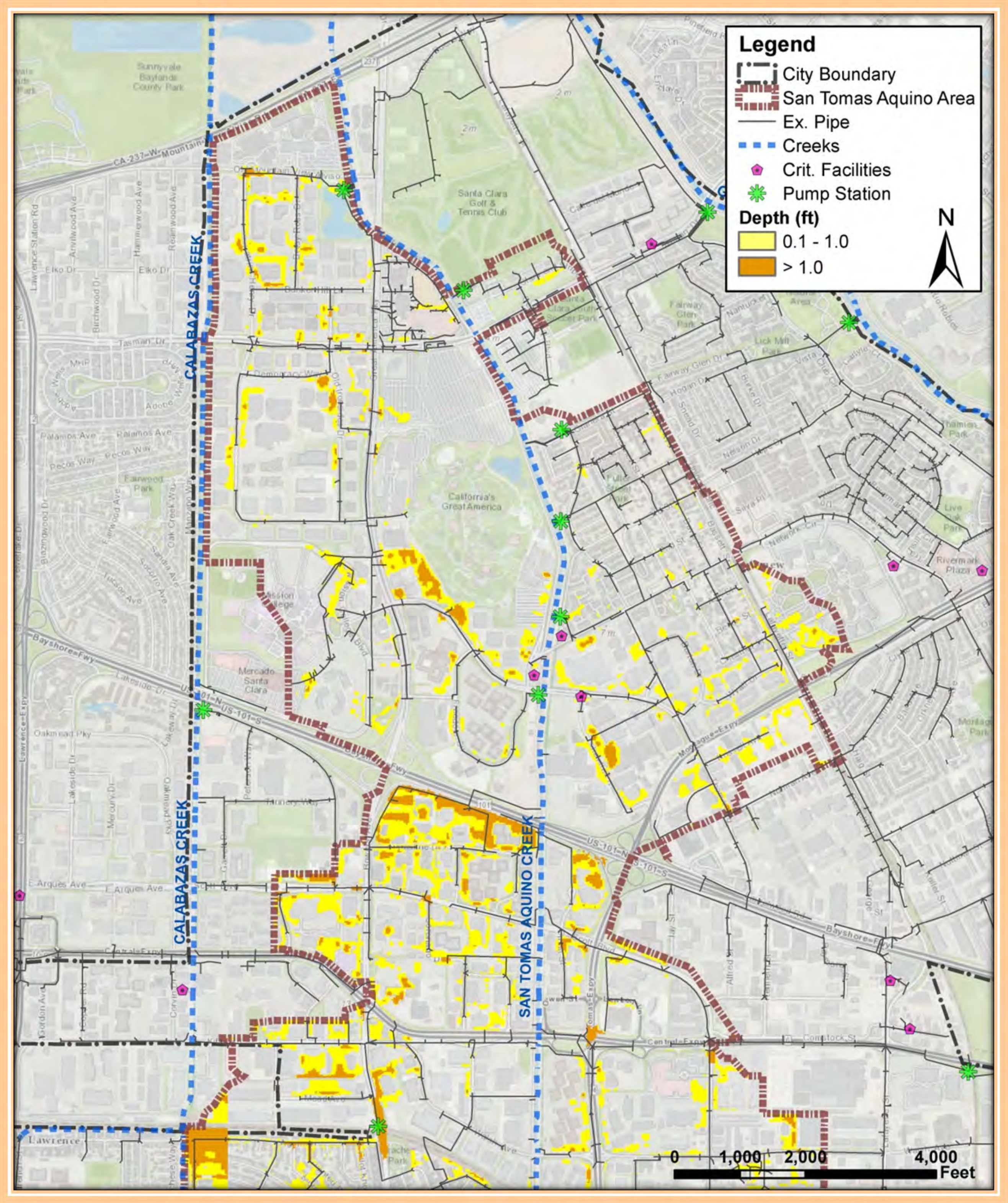

Figure 5-48: 100-Year Flooding in Northern San Tomas Aquino Creek Drainage Area with High Priority CIPs

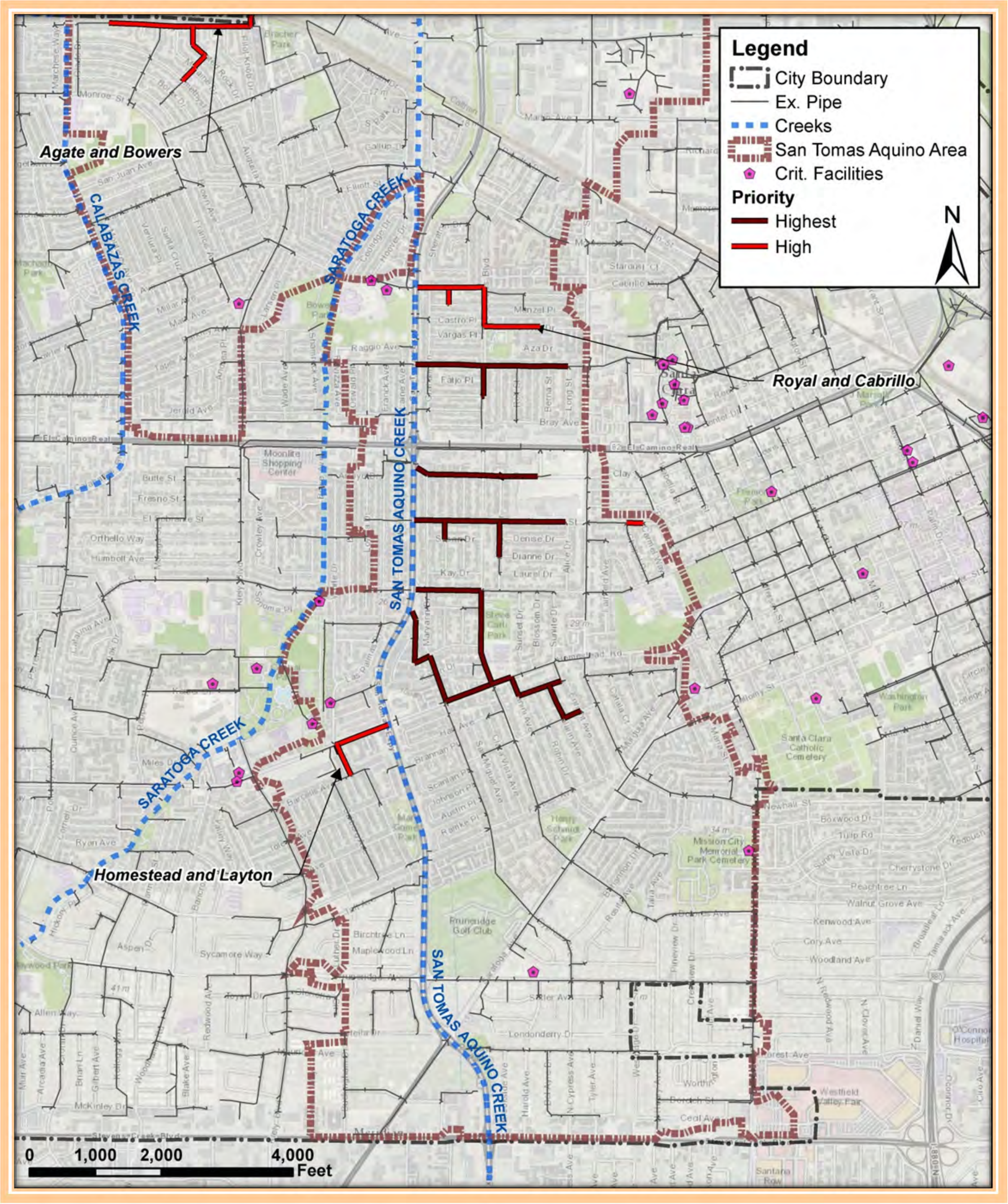

Figure 5-49: Southern San Tomas Aquino Creek Drainage Area High Priority Improvement Projects

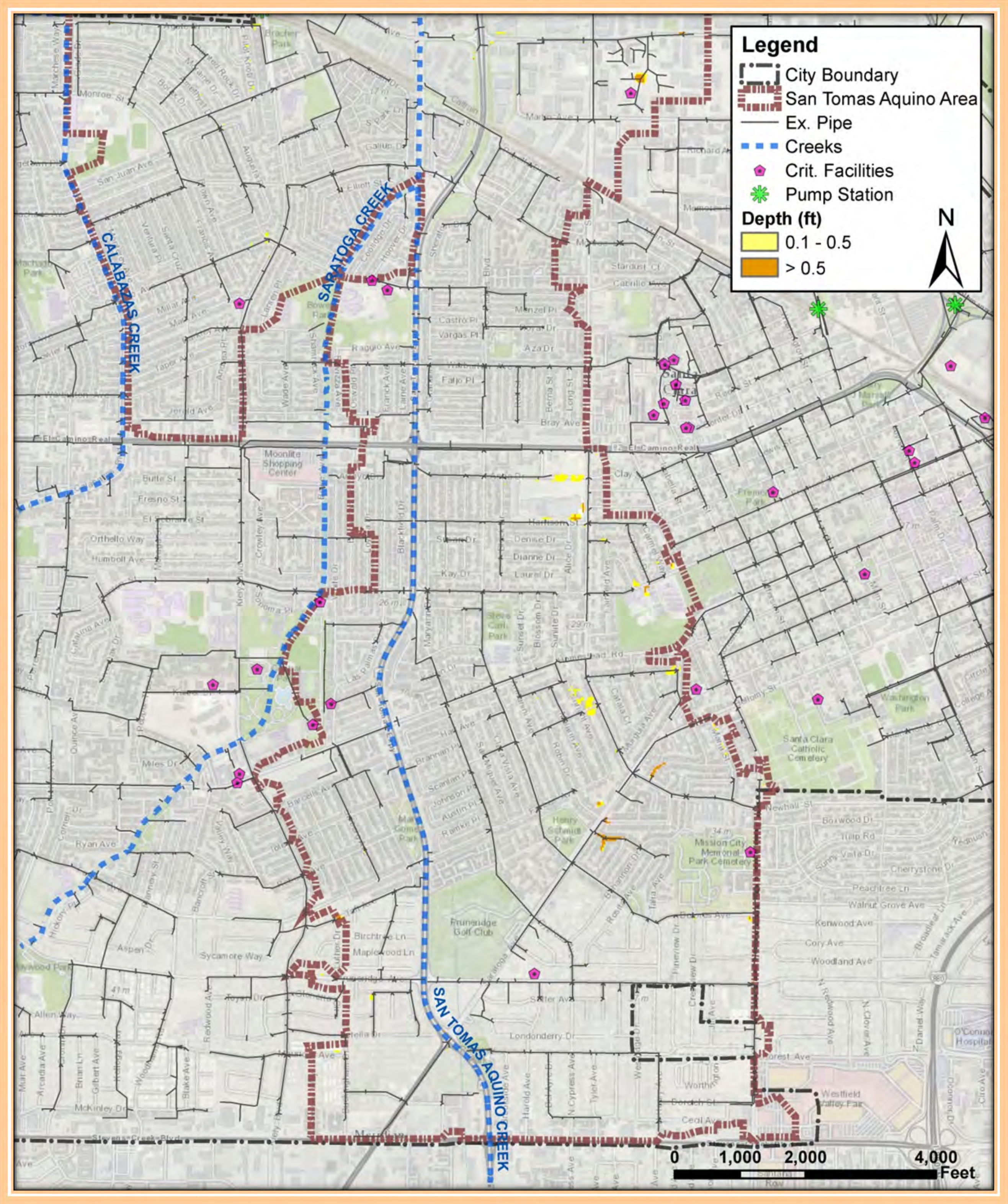

Figure 5-50: 2-Year Flooding in Southern San Tomas Aquino Creek Drainage Area with High Priority CIPs

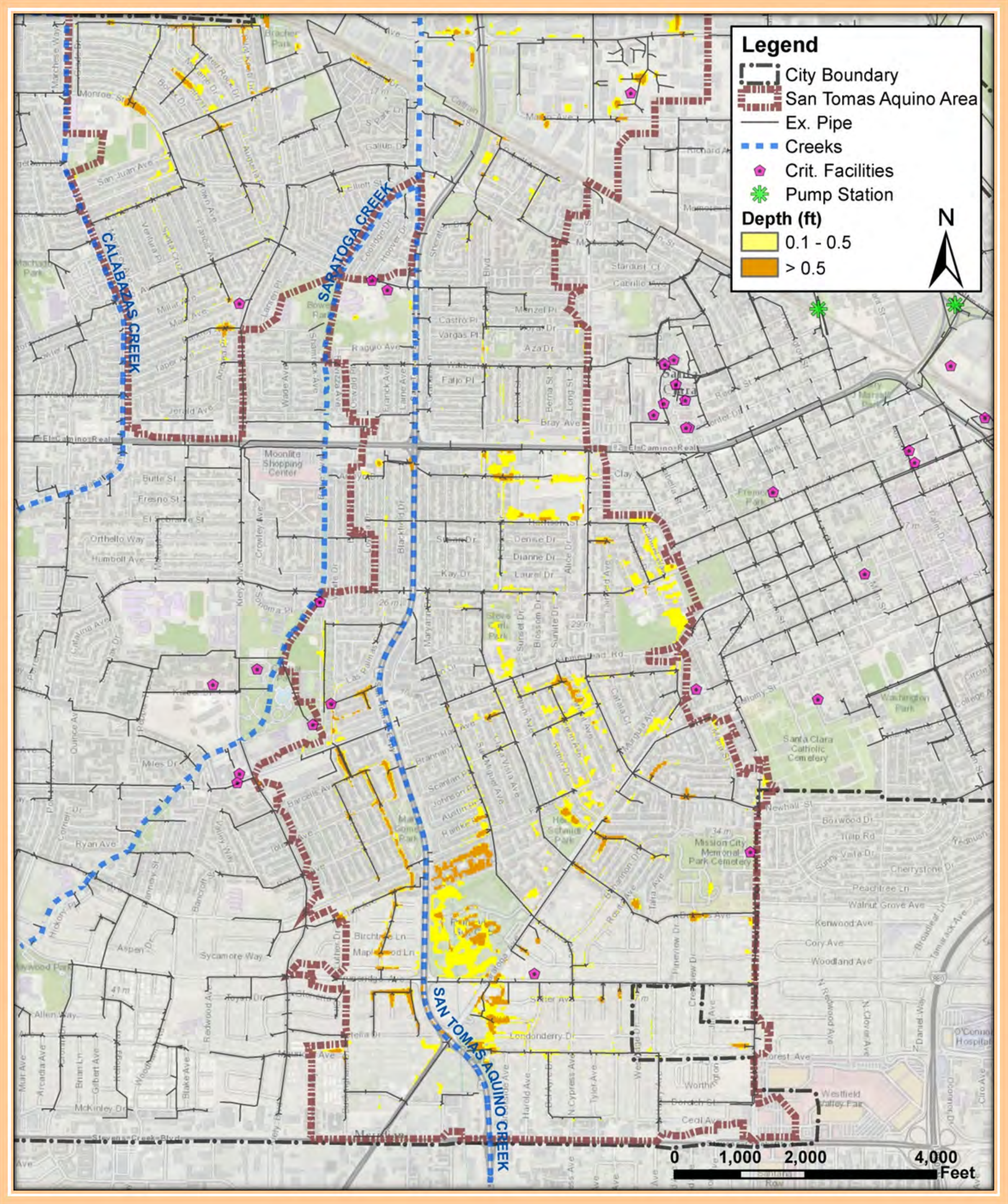

Figure 5-51: 10-Year Flooding in Southern San Tomas Aquino Creek Drainage Area with High Priority CIPs

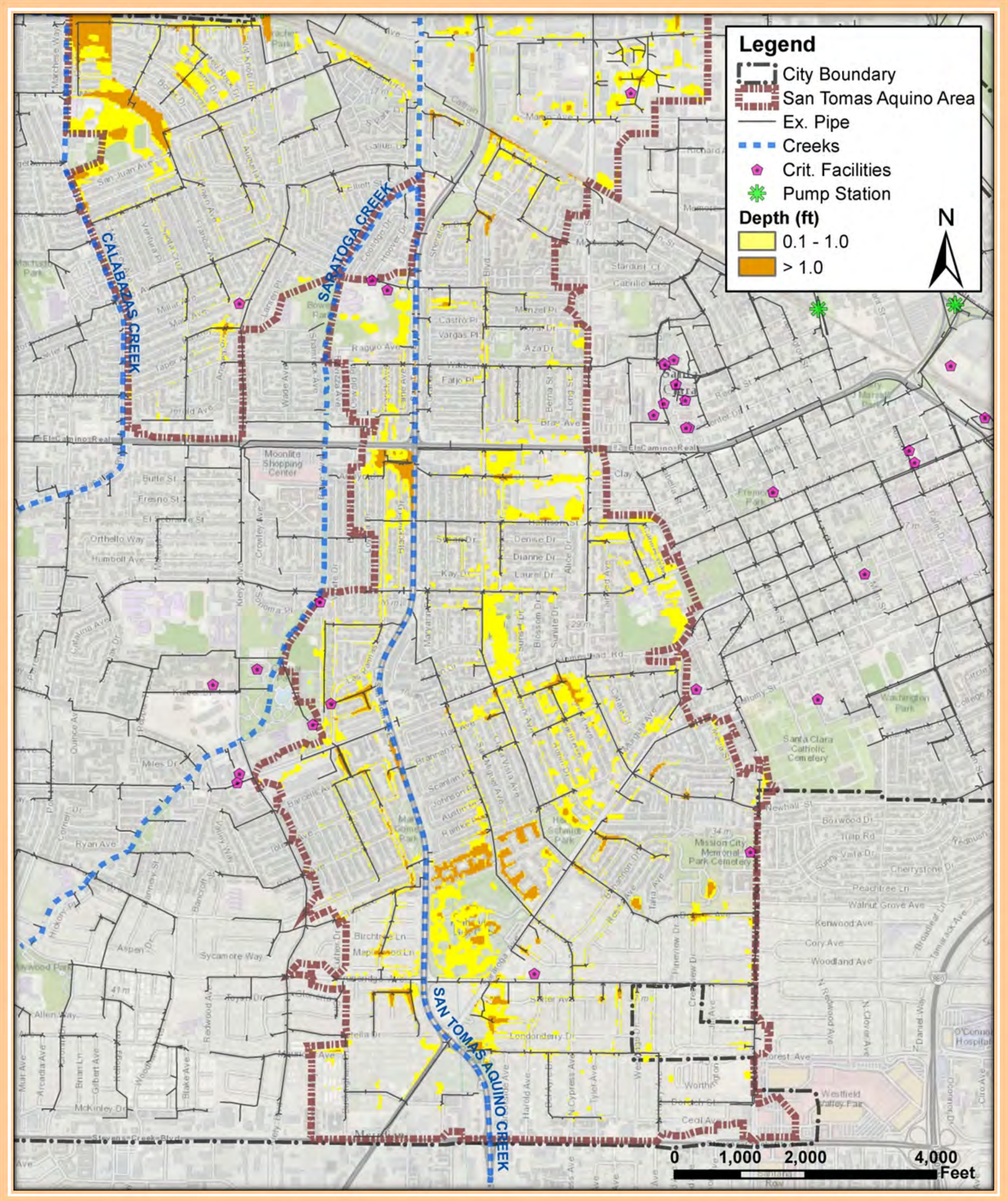

Figure 5-52: 100-Year Flooding in Southern San Tomas Aquino Creek Drainage Area with High Priority CIPs

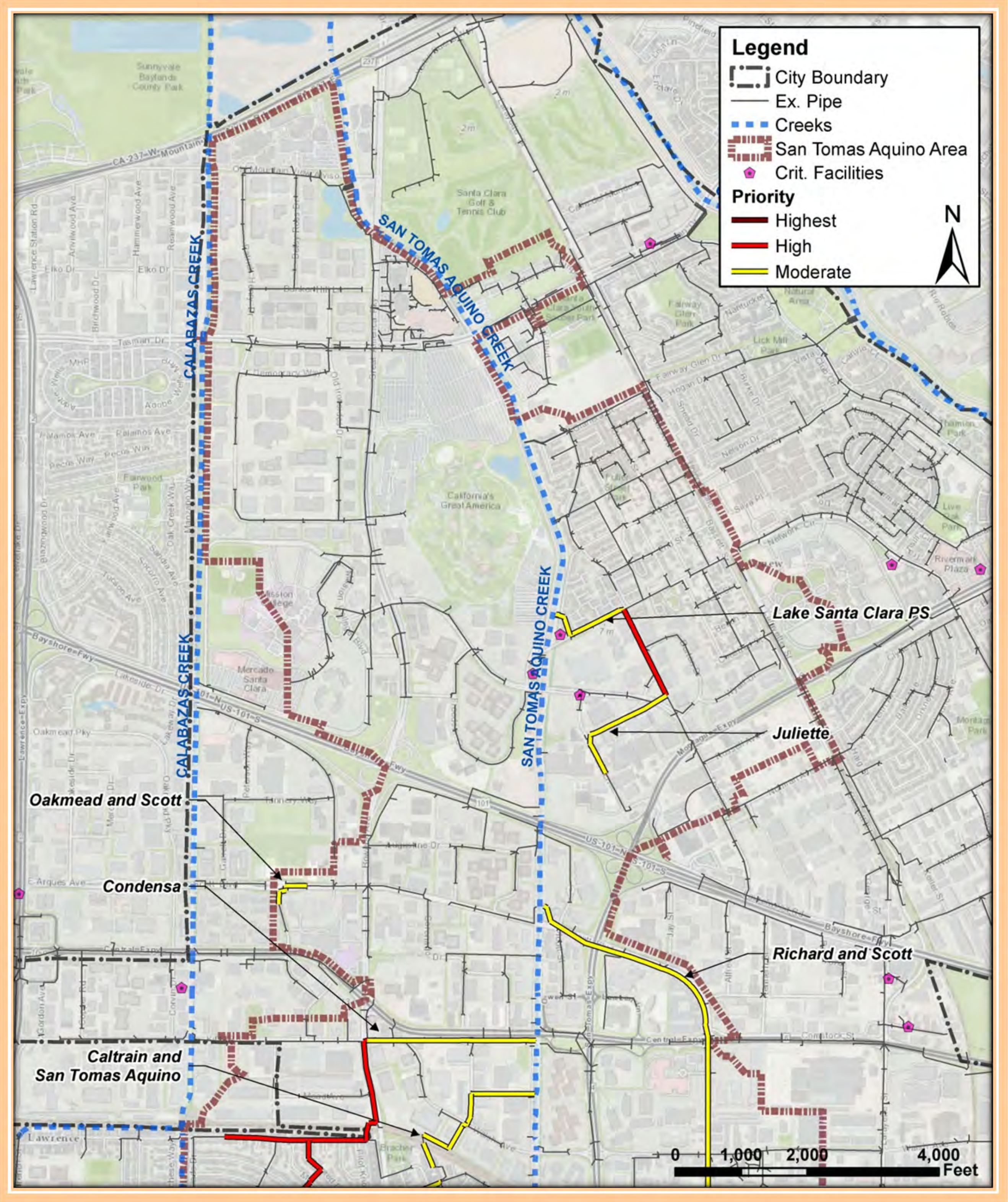

Figure 5-53: Northern San Tomas Aquino Creek Drainage Area Moderate Priority Improvement Projects

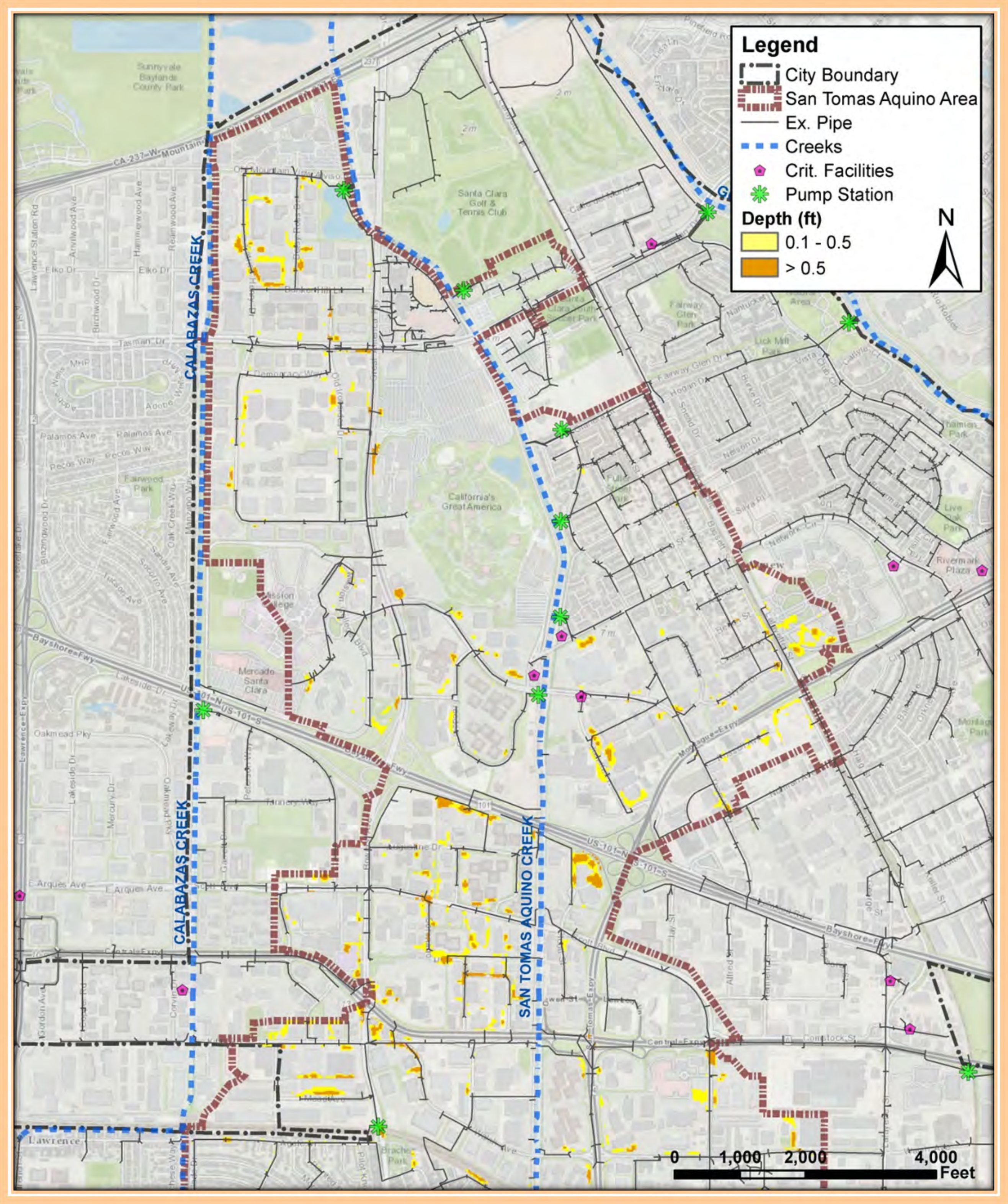

Figure 5-54: 10-Year Flooding in Northern San Tomas Aquino Creek Drainage Area with Moderate Priority CIPs

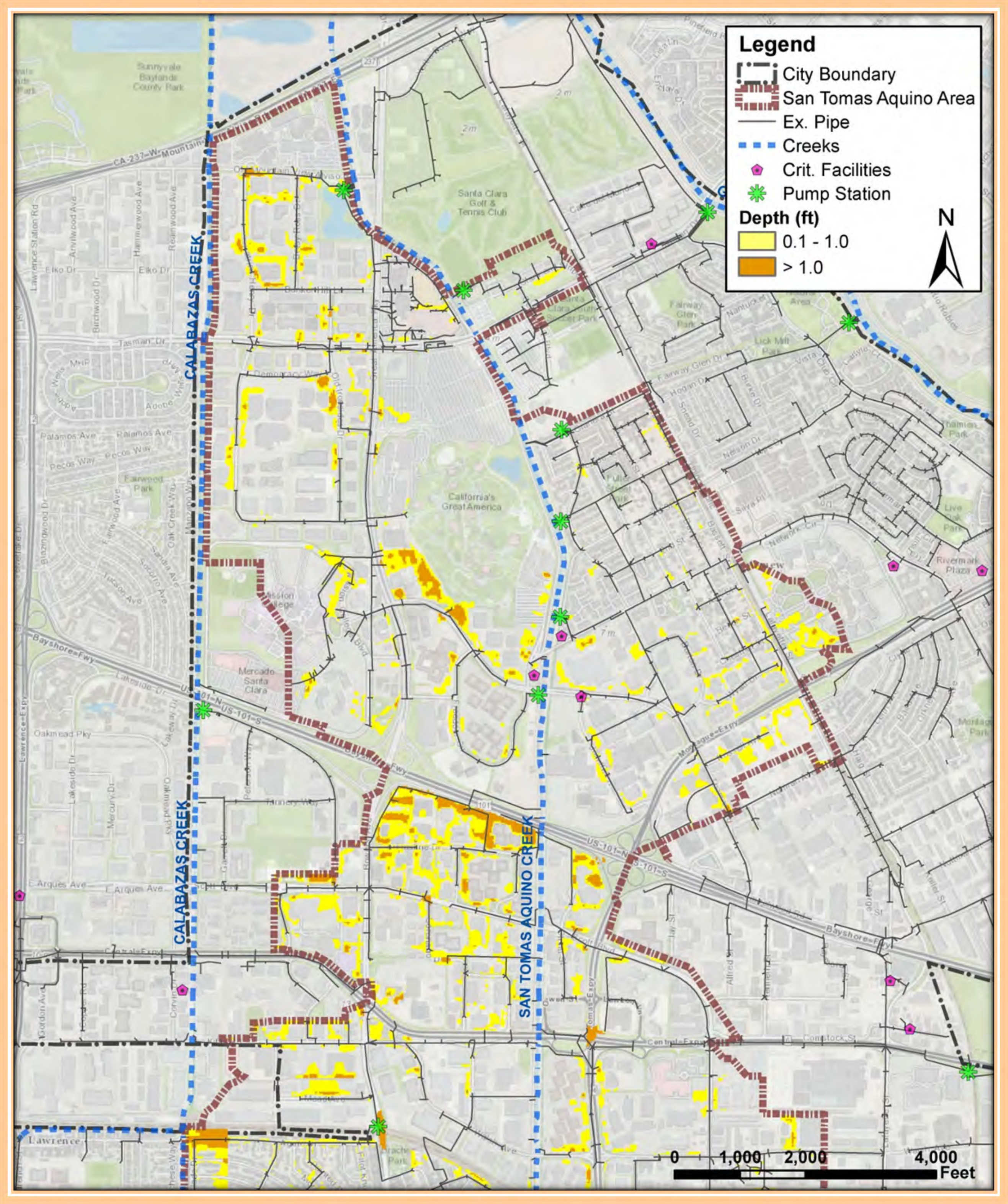

Figure 5-55: 100-Year Flooding in Northern San Tomas Aquino Creek Drainage Area with Moderate Priority CIPs

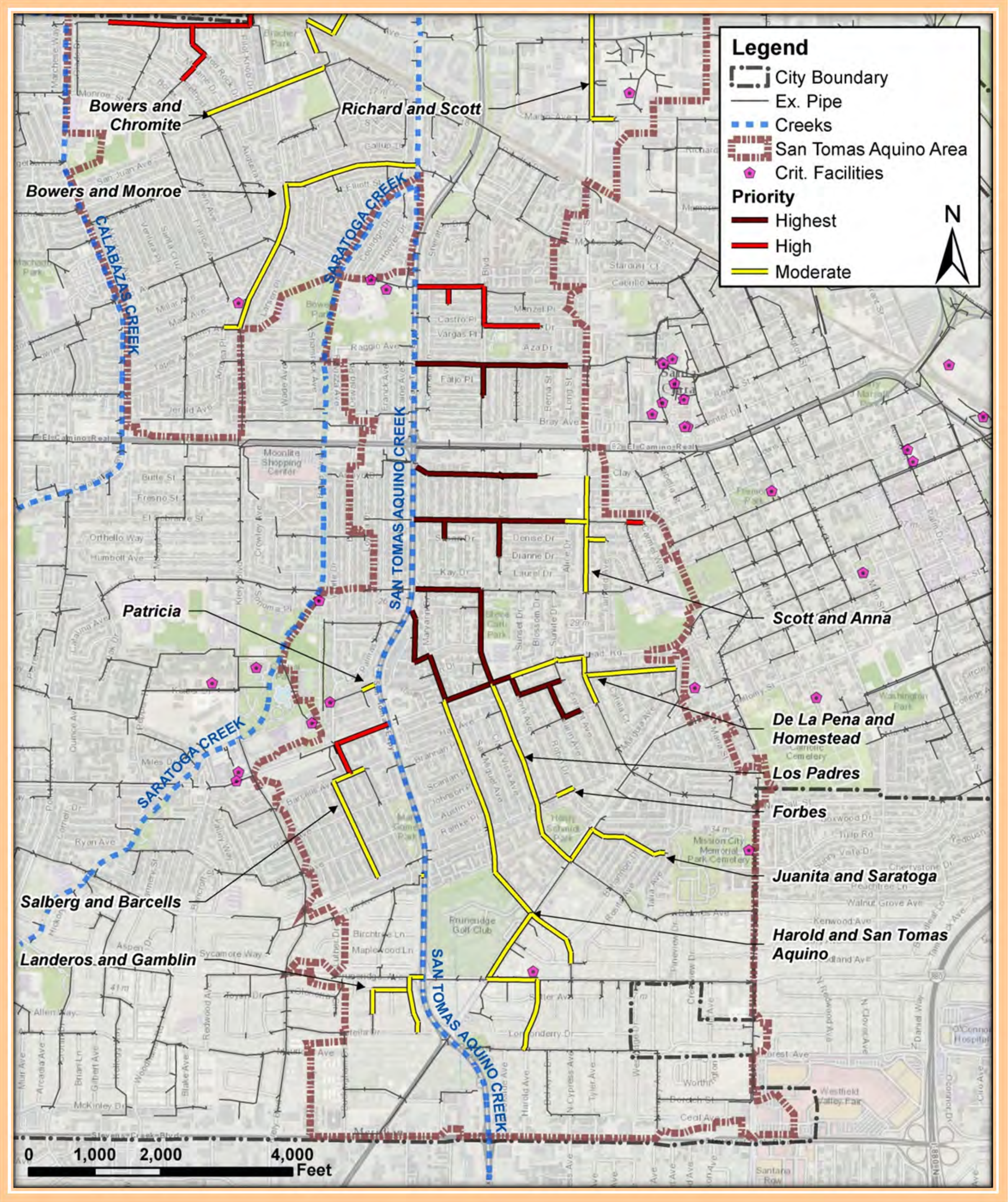

Figure 5-56: Southern San Tomas Aquino Creek Drainage Area Moderate Priority Improvement Projects

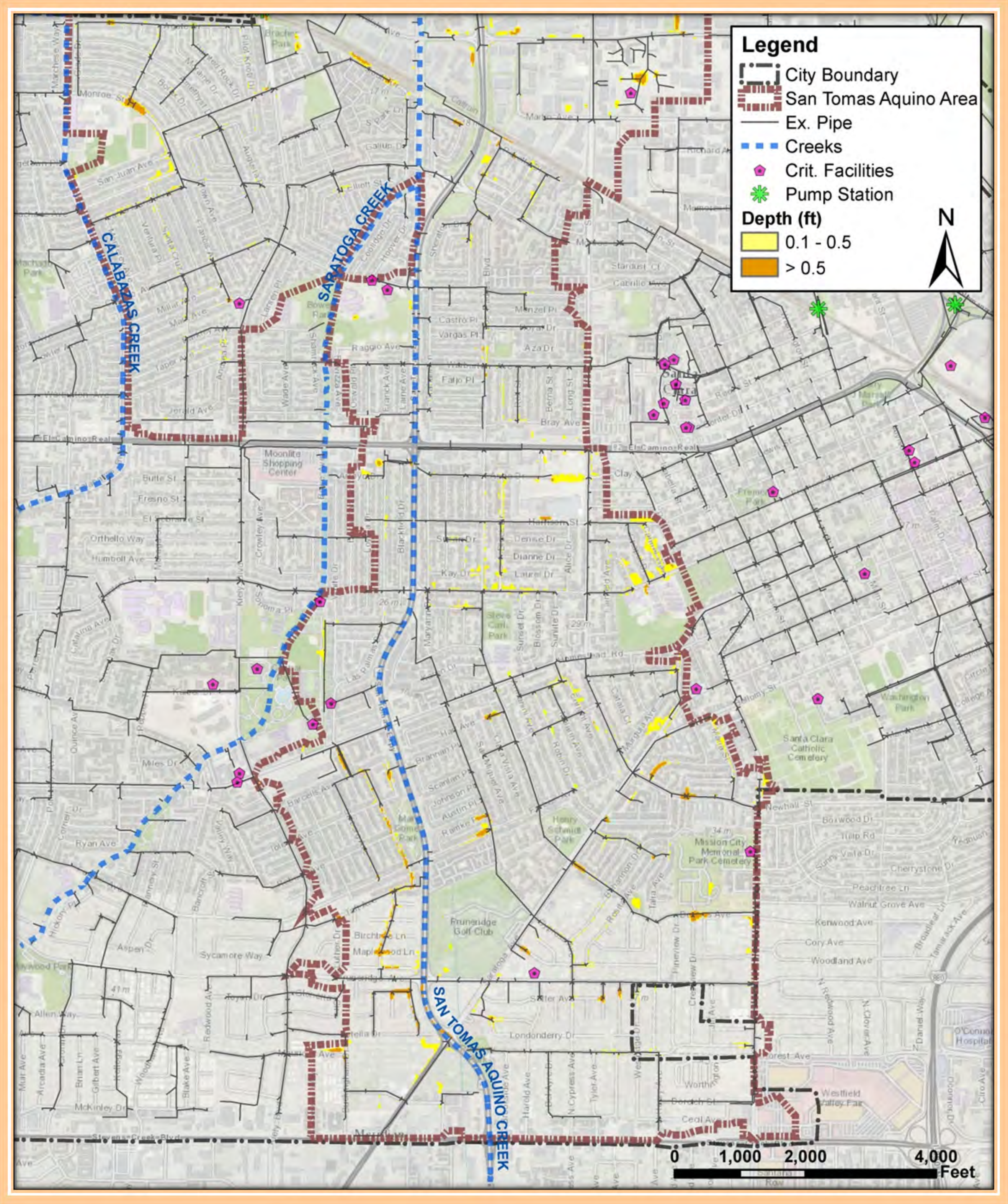

Figure 5-57: 10-Year Flooding in Southern San Tomas Aquino Creek Drainage Area with Moderate Priority CIPs

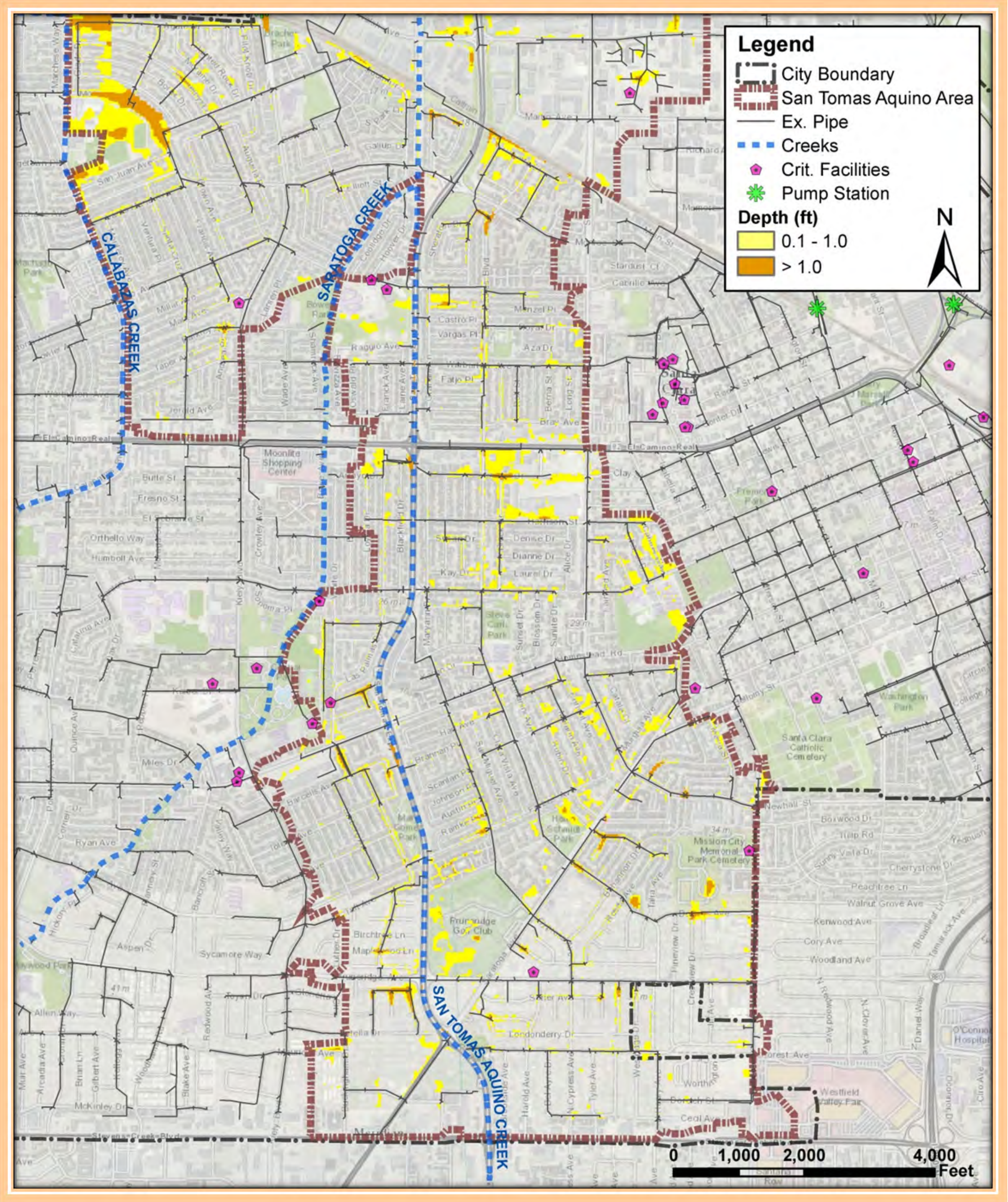

Figure 5-58: 100-Year Flooding in Southern San Tomas Aquino Creek Drainage Area with Moderate Priority CIPs

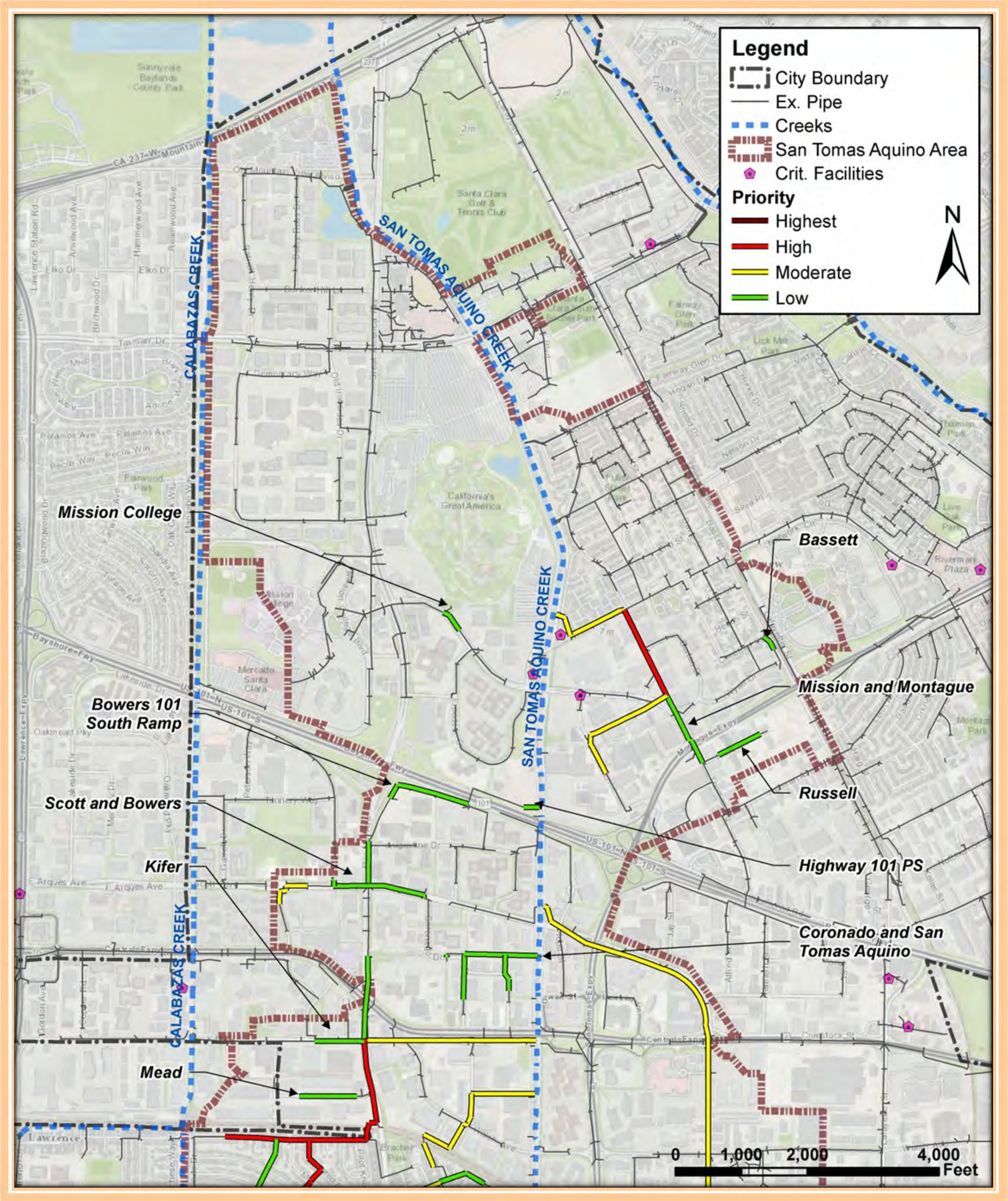

Figure 5-59: Northern San Tomas Aquino Creek Drainage Area Low Priority Improvement Projects

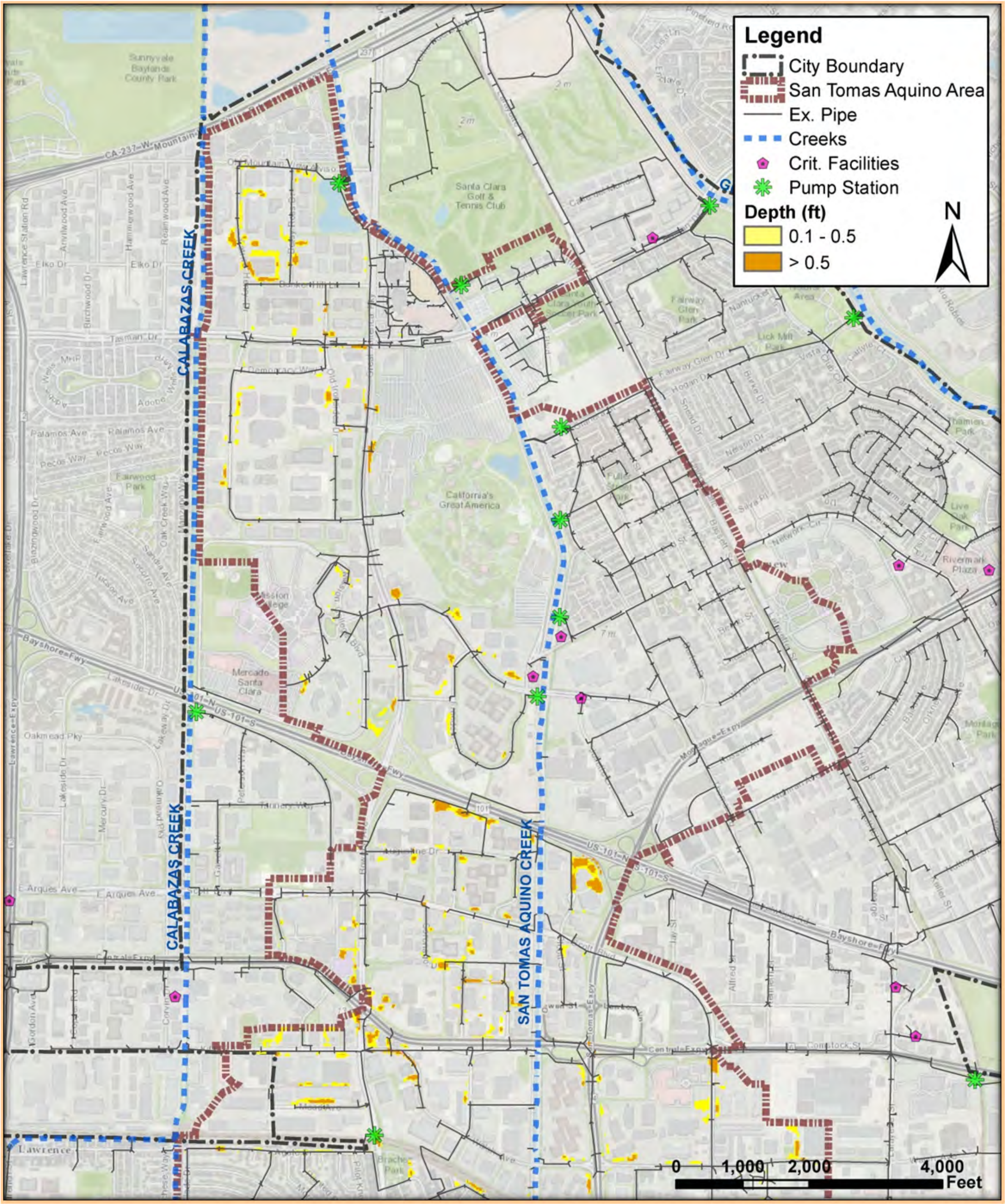

Figure 5-60: 10-Year Flooding in Northern San Tomas Aquino Creek Drainage Area with Low Priority CIPs

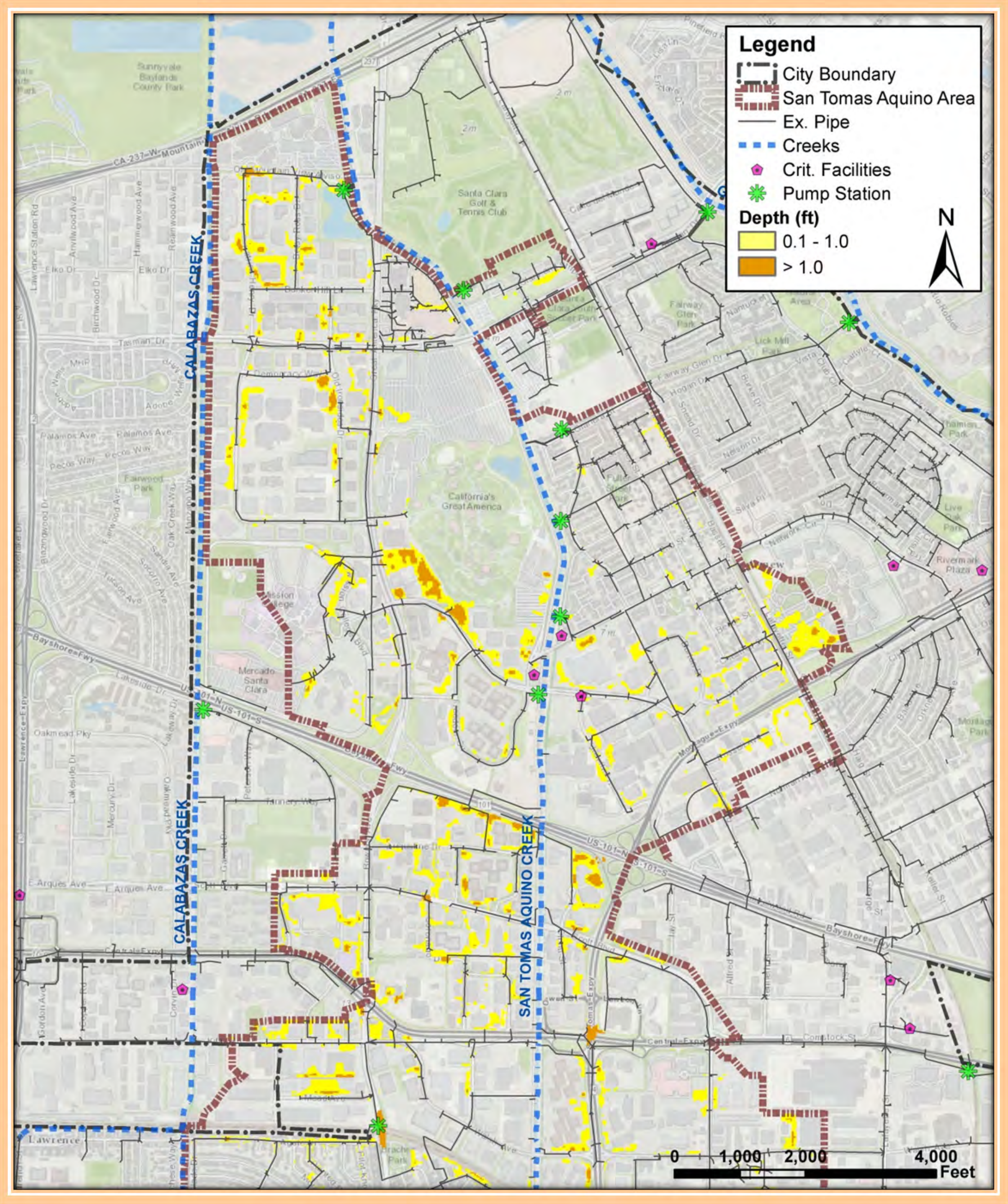

Figure 5-61: 100-Year Flooding in Northern San Tomas Aquino Drainage Area with Low Priority CIPs

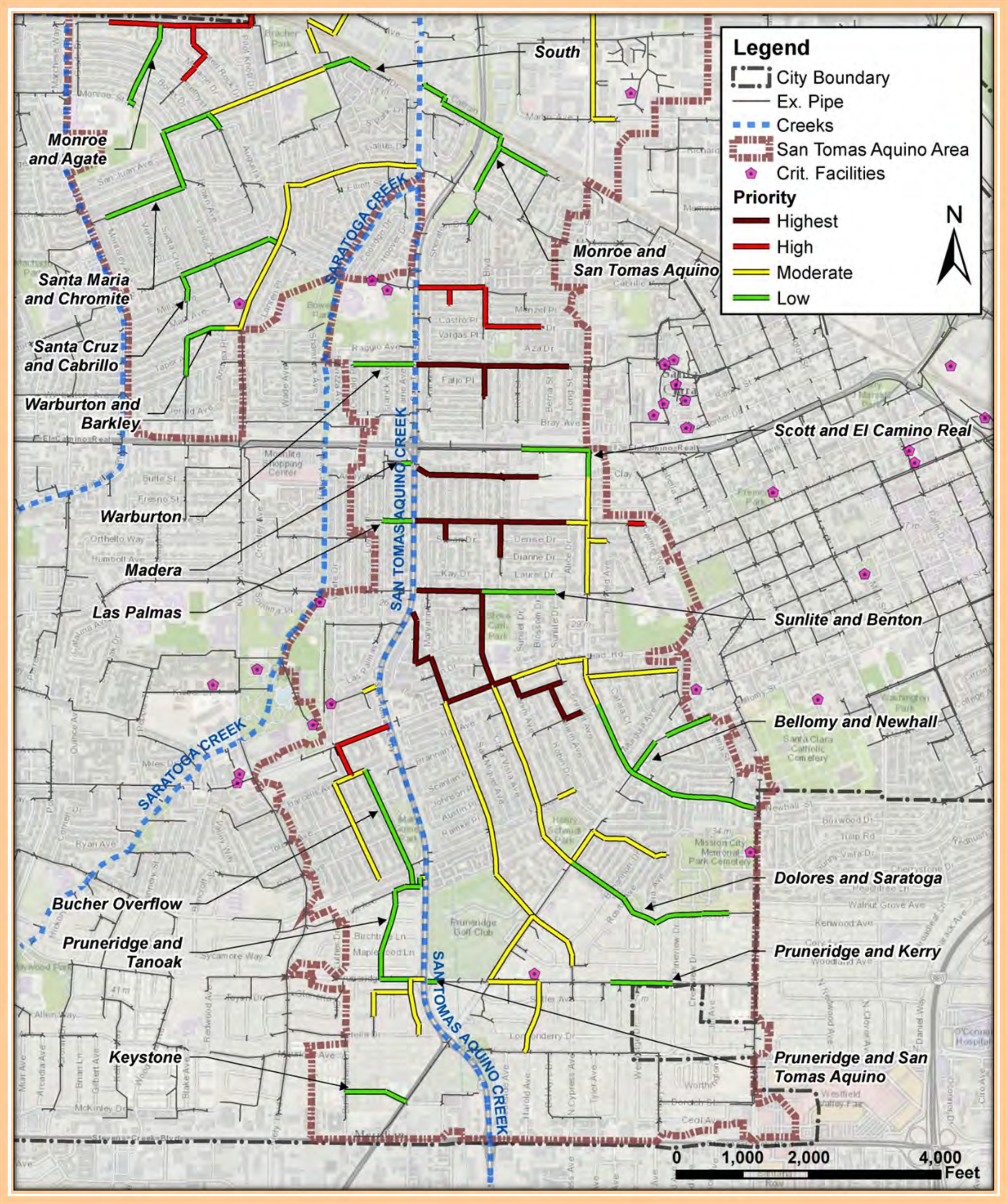

Figure 5-62: Southern San Tomas Aquino Creek Drainage Area Low Priority Improvement Projects

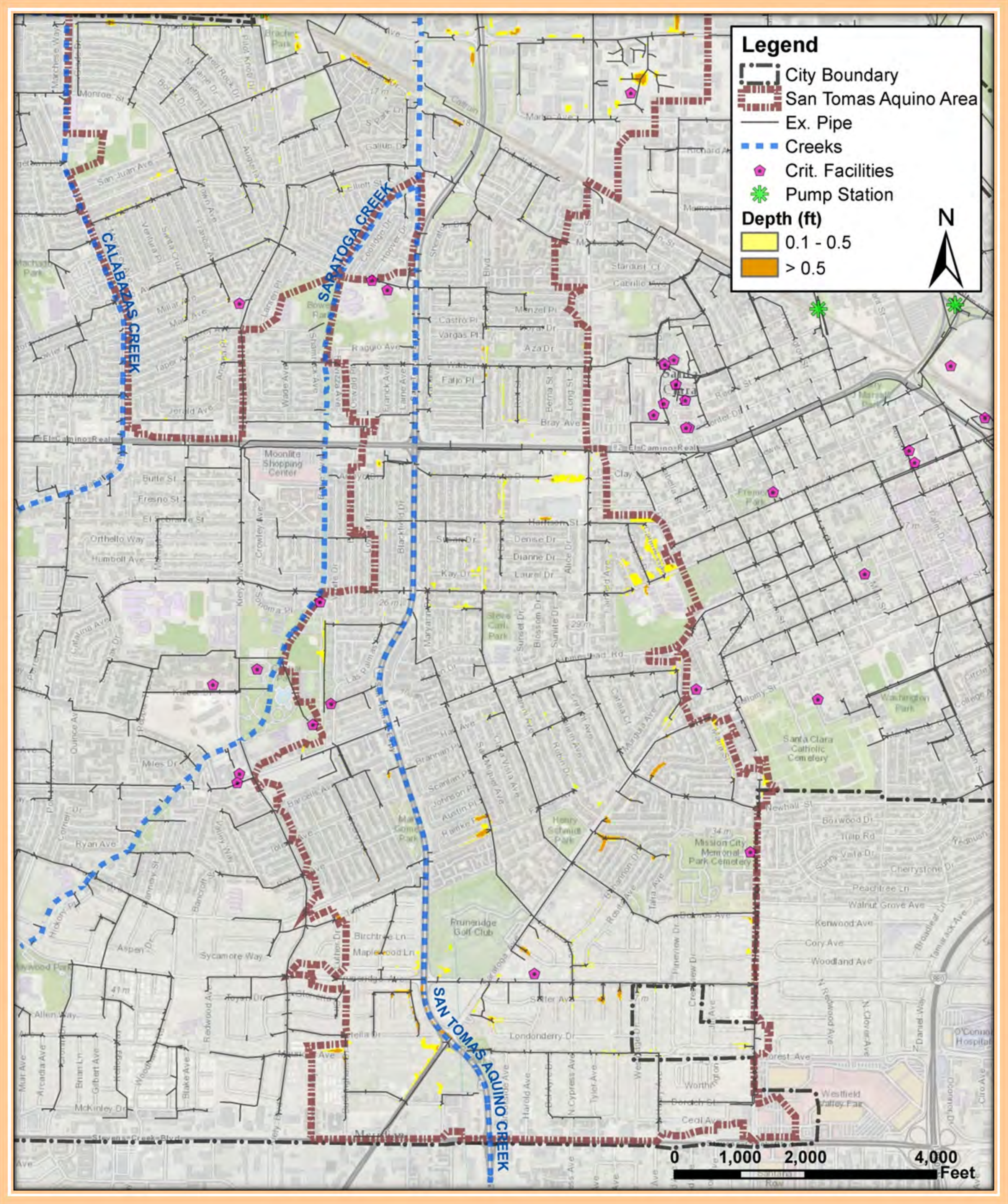

Figure 5-63: 10-Year Flooding in Southern San Tomas Aquino Creek Drainage Area with Low Priority CIPs

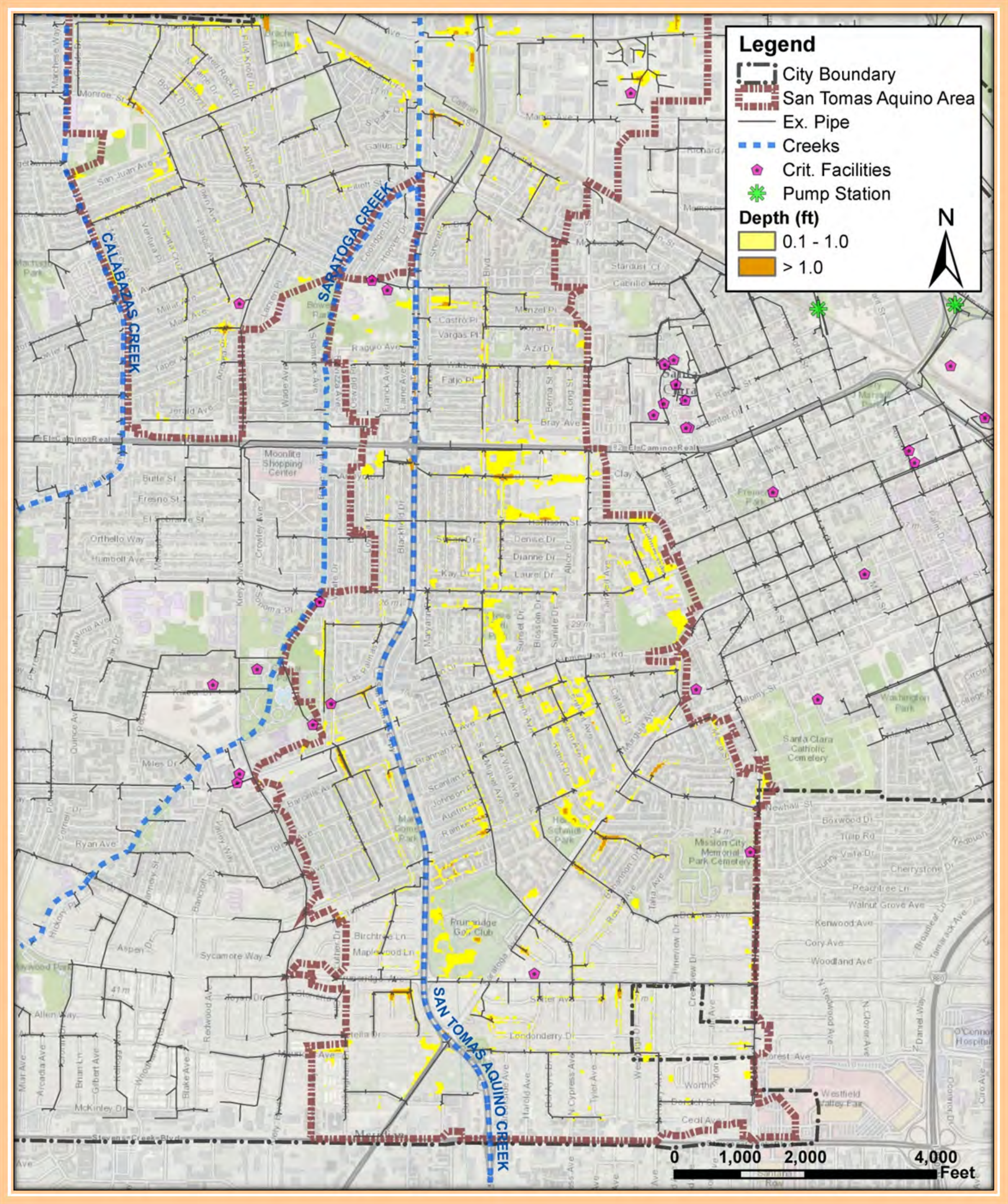

Figure 5-64: 100-Year Flooding in Southern San Tomas Aquino Creek Drainage Area with Low Priority CIPs

5.4.4. Guadalupe River

The Guadalupe River drainage area covers 6.3 square miles of the study area. MU results for existing conditions are shown in Figure 5-66 through Figure 5-71. (Note the 100-year flooding extents shown in these figures ignore river overflows and tidal inundation so as not to mask the underlying flooding as described for Calabazas Creek, Saratoga Creek and San Tomas Aquino Creek.)

Identified Deficiencies

The most significant 2-year flooding occurs on Newhall Street near the connection to San Jose's system at Newhall Street and Washington Street and upstream of De La Cruz Boulevard due to undersized pipes. Significant 10-year flooding occurs north of Hwy 101 near Lafayette Street and Montague Expressway due to undersized pipes connecting to systems in the San Tomas Aquino drainage area and to the Fairway Glen pump station. Significant 100-year flooding occurs upstream of Laurelwood pump station. This is caused by undersized pipes leading to the pump station. Much of this runoff drains to the Nelo-Victor pump station.

Known Problem Areas

The intersection of Santa Clara Street and Washington Street frequently floods during rainfall events.

Prioritized Improvements

One highest priority project (Figure 5-72 and Figure 5-73) is recommended to resolve the known flooding issue at Santa Clara Street and Washington Street. This project involves construction of catch basins at each corner on the intersection and connection the nearby storm drain system at Santa Clara Street and Jackson Street.

Six high priority projects (Figure 5-74 through Figure 5-81) are recommended in this area to address 2-year and significant 10-year flooding at Norman Avenue and Lafayette Street and on Newhall Street near Washington Street.

Six moderate priority projects (Figure 5-82 through Figure 5-87) are recommended in this area to address modeled 10-year flooding problems between Scott Blvd and De La Cruz Blvd and significant 100-year flooding at Laurelwood pump station. The City may need to progressively re-prioritize moderate priority projects based on funding, other utility improvements, land use changes, and condition assessments.

25 low priority projects (Figure 5-88 through Figure 5-93) are recommended to reduce 100-year flooding between Scott Blvd and El Camino Real, upstream of UPRR near Scott Blvd, and on Norman Avenue and Lafayette Street. These projects may only get built if there are significant changes to land use, roadway, or redevelopment projects in the area. Intermediate flooding scenarios are summarized in Table 5-8. A description of Highest, High, and Moderate priority projects is shown in Table 5-9. Flooded area for each CIP priority level is shown in Figure 5-65.

Table 5-8: Parcels Flooded after Completion of Projects in Guadalupe River Drainage Area

Priority	Existing	Highest	High	Moderate	Low
2-yr	4	2	0	0	0
10-yr	205	196	156	30	19
100-yr	564	499	418	195	88

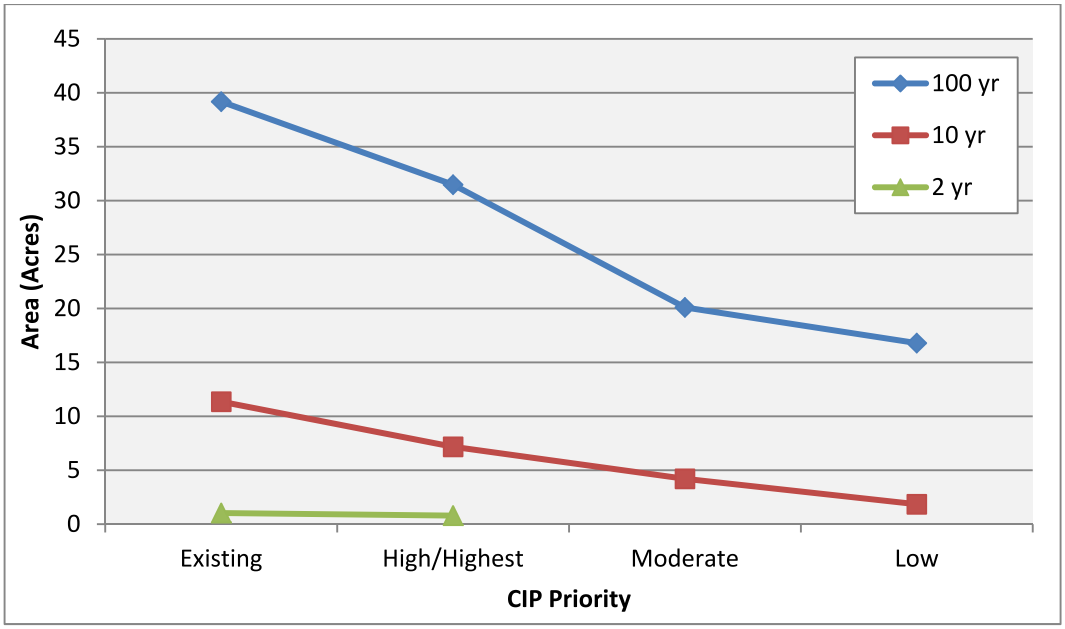

Figure 5-65: Modeled Flooded Area in Guadalupe River Drainage Area for each CIP Priority Level

The one highest priority project is identified to reduce flooding in a known problem area. Due to modeling restrictions on the size of grid elements and the way the model averages elevations within grid elements, such localized flooding is not shown in the model results. The additional decrease in flooded parcels in the Guadalupe River drainage area is a direct result of highest priority projects in the adjacent San Tomas Aquino Creek drainage area

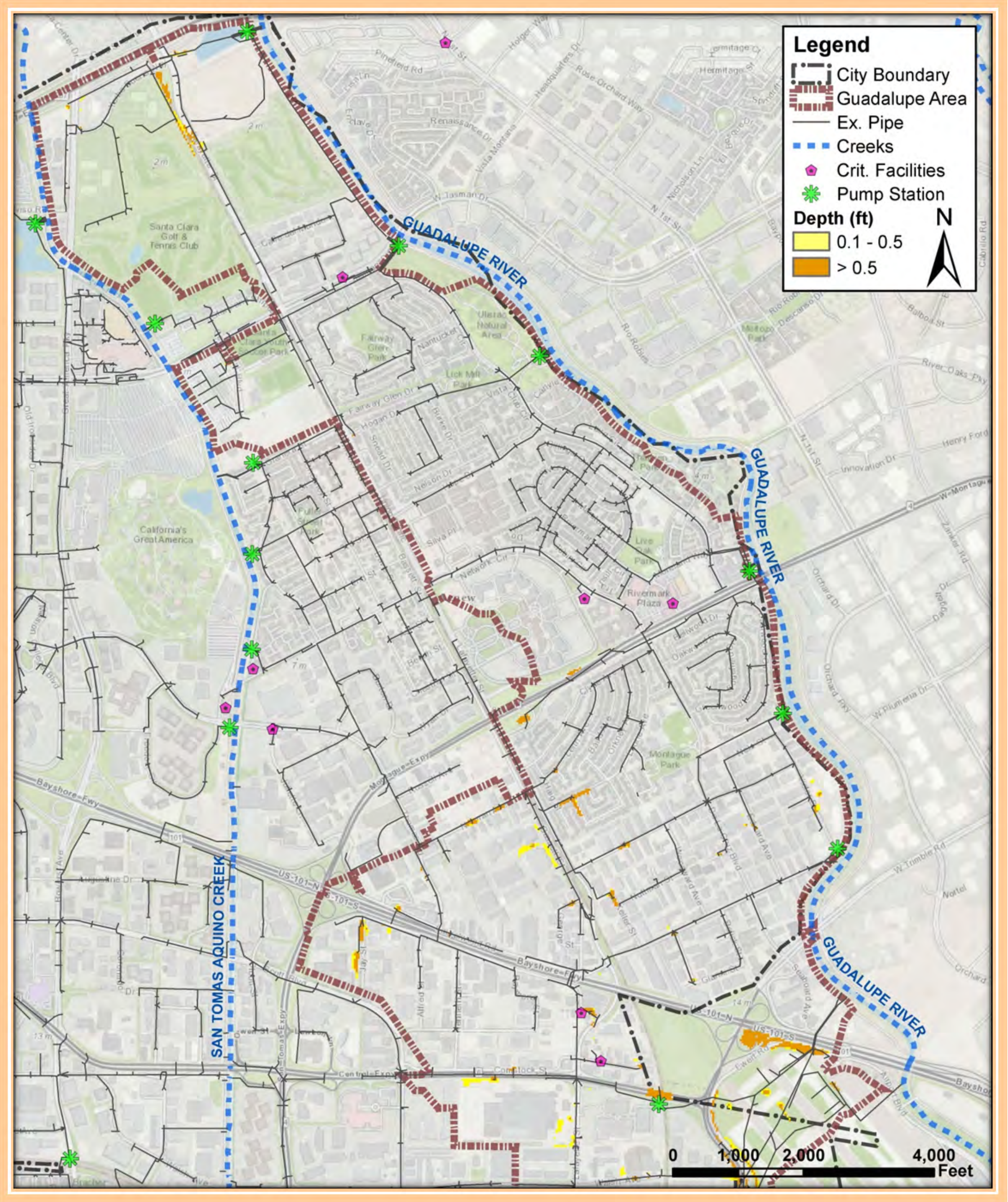

Figure 5-66: 2-Year Flooding with Existing Conditions in Northern Guadalupe River Drainage Area

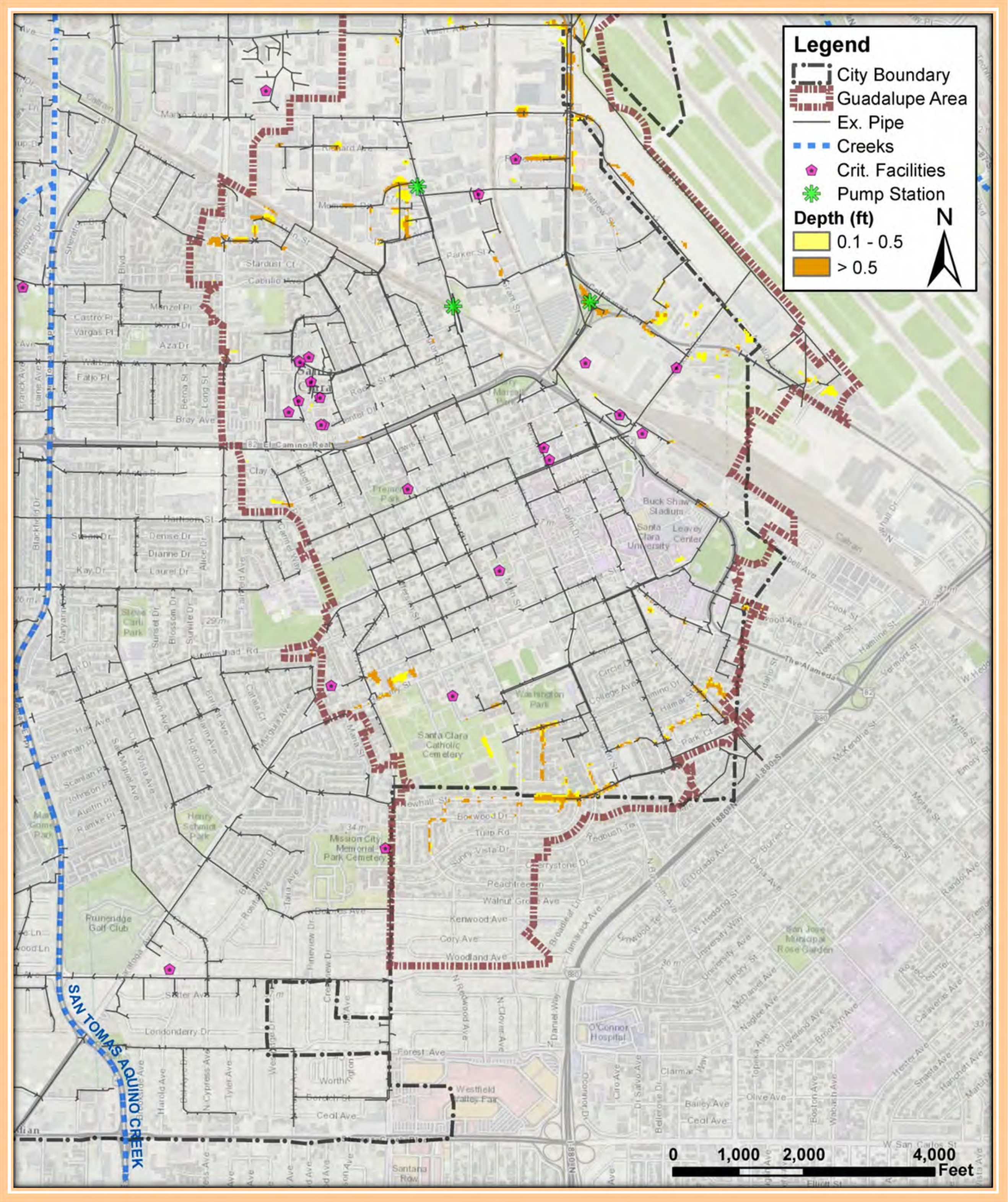

Figure 5-67: 2-Year Flooding with Existing Conditions in Southern Guadalupe River Drainage Area

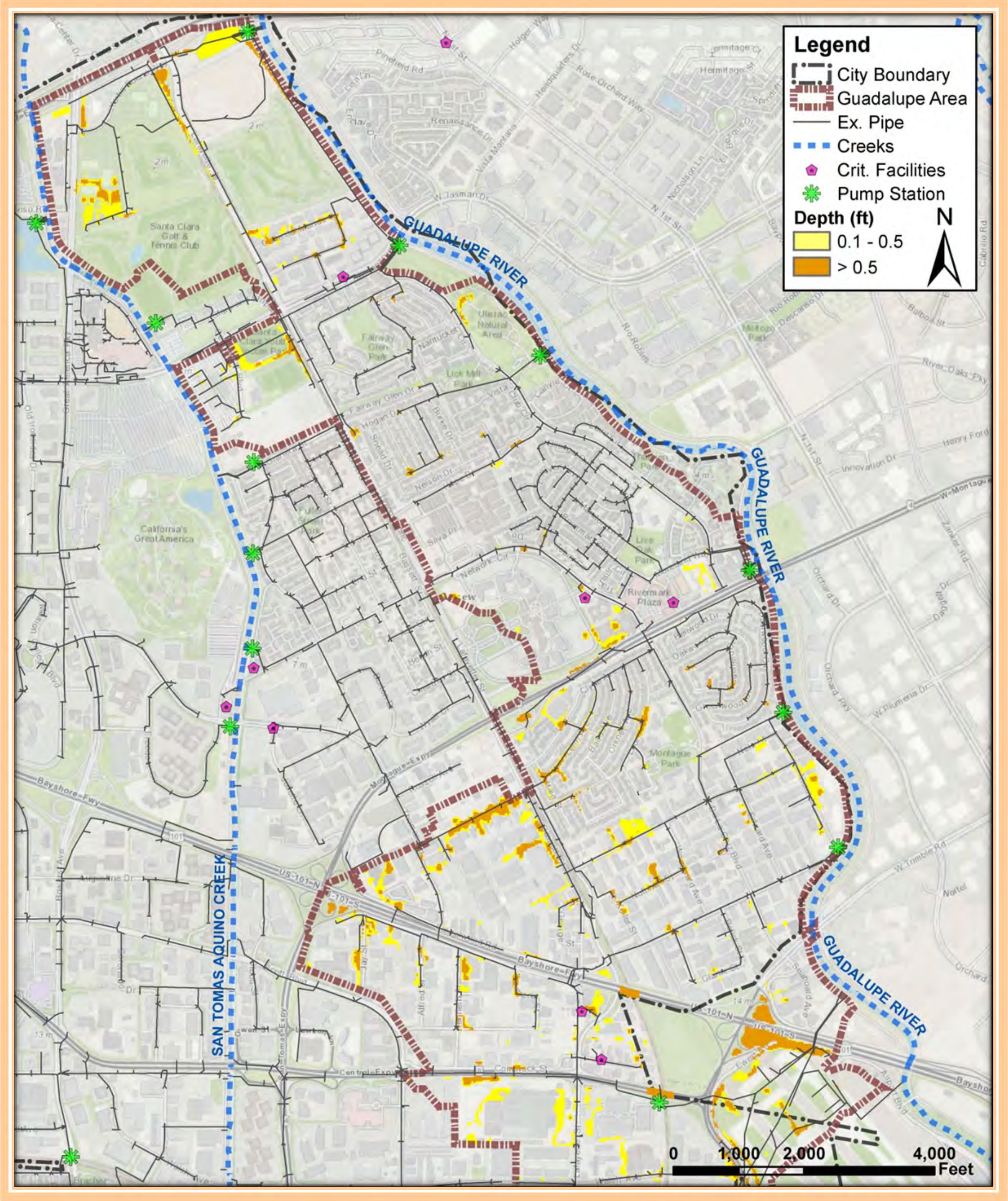

Figure 5-68: 10-Year Flooding with Existing Conditions in Northern Guadalupe River Drainage Area

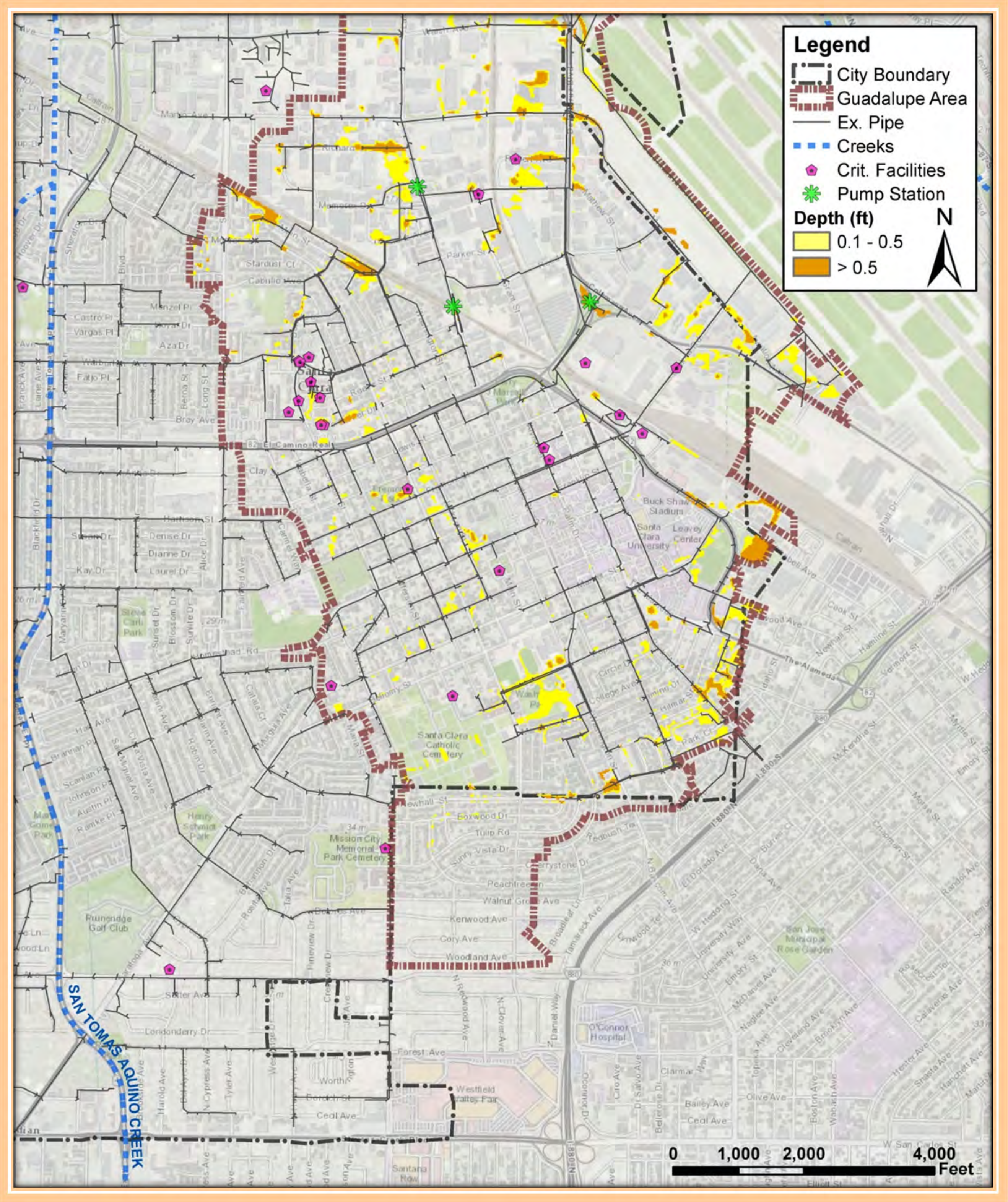

Figure 5-69: 10-Year Flooding with Existing Conditions in Southern Guadalupe River Drainage Area

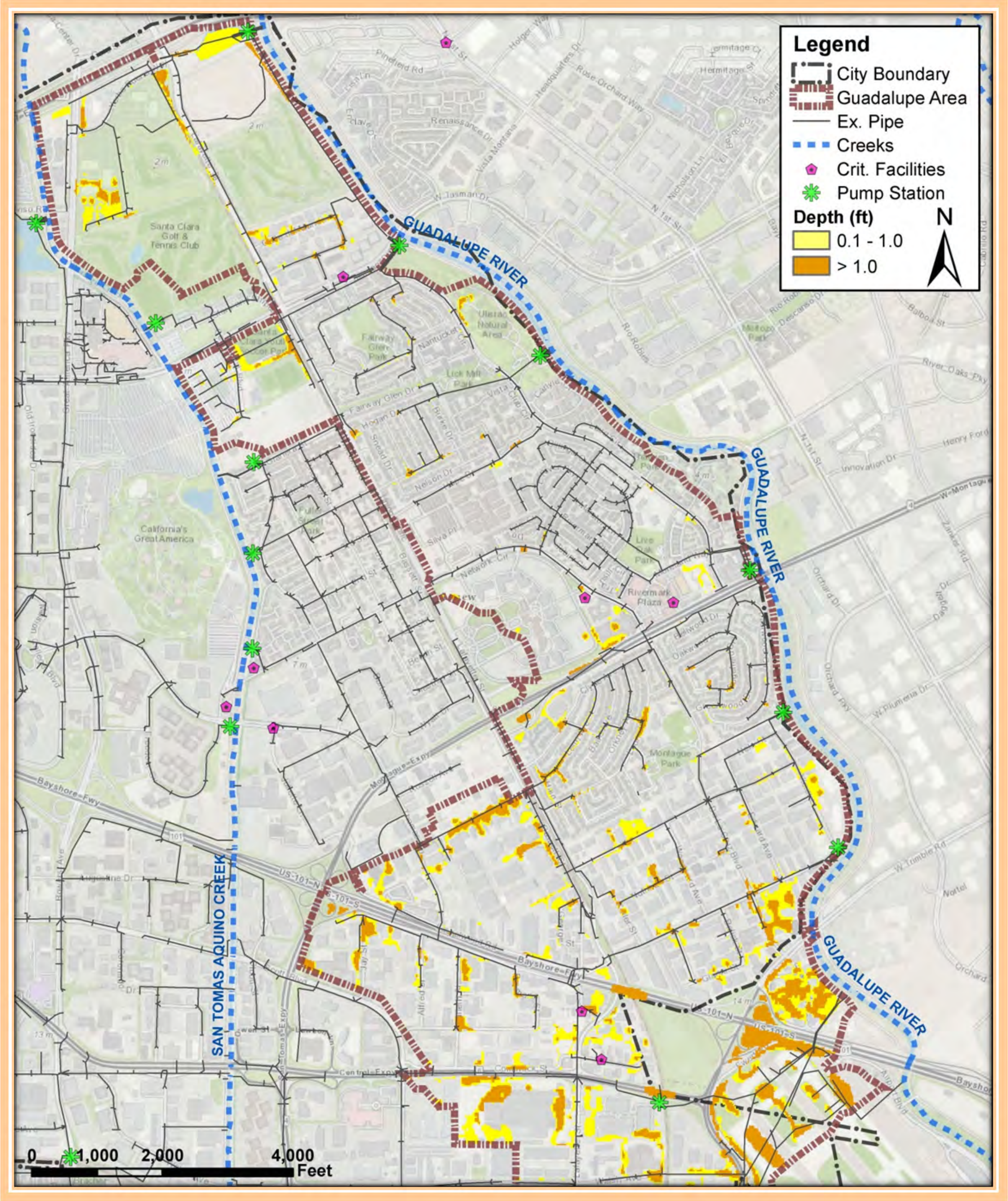

Figure 5-70: 100-Year Flooding with Existing Conditions in Northern Guadalupe River Drainage Area

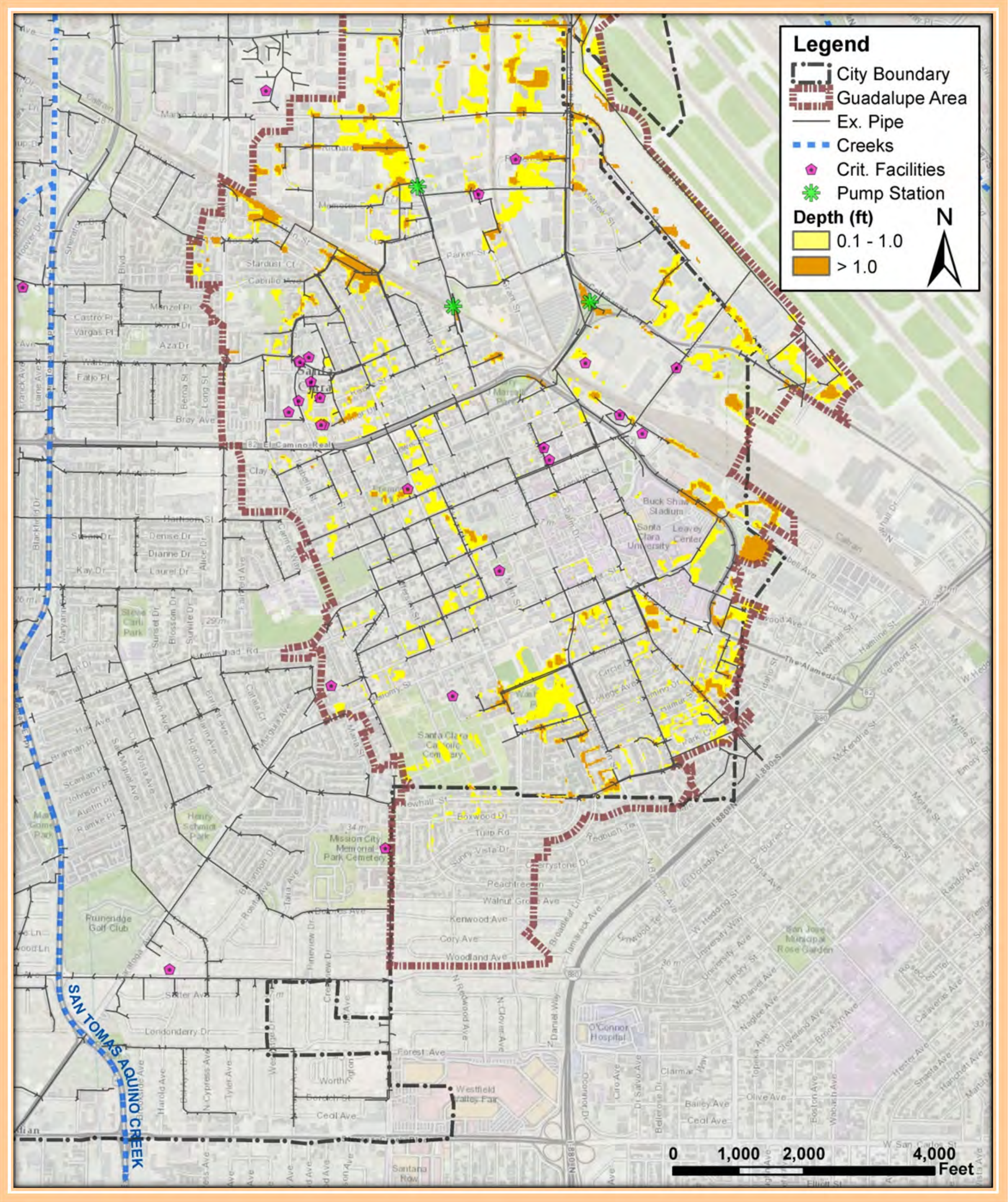

Figure 5-71: 100-Year Flooding with Existing Conditions in Southern Guadalupe River Drainage Area

Table 5-9: Highest, High and Moderate Priority Projects for Guadalupe River Drainage Area

Project No.	Project Name	Priority	Block Book Pg.	Description
5	Washington and Santa Clara	Highest	37	Frequent flooding occurs near St Clare School. Adding catch basins and connecting to the nearby storm main is recommended.
7	Alviso	High	28, 38	2-year flooding occurs on Alviso Street. Upsizing existing 10” to 18” pipe to 24” pipe is recommended.
10	De La Cruz and Guadalupe	High	57, 58	2-year and 10-year flooding occurs on Martin Avenue and in the system upstream of Martin Avenue. Upsizing existing 33” pipes on De La Cruz to 72” is recommended.
13	Leith	High	76, 86, 87	2-year and significant 10-year flooding occurs upstream of Lafayette St. in the commercial development around Norman Ave. Upsizing existing 48” pipes in Leith Ave. is recommended.
14	Main and Shulman	High	46, 56	2-year and significant 10-year flooding occurs in residential development south of the UPRR on Main Street. Upsizing existing pipes connecting Main St. to the large line on Lafayette St. is recommended.
15	Manchester and Washington	High	27, 28	2-year and 10-year flooding occurs on Roxbury St. and Manchester Dr. and affects the nearby Elementary School campus. Upsizing pipes in Manchester St. and Washington St. is recommended.
16	Park and Bellomy	High	28, 29, 38	2-year flooding occurs on Park Avenue. Upsizing existing 10”, 15”, and 18” pipe downstream of the connection to San Jose’s system is recommended.
31	Lafayette and Laurelwood	Moderate	56, 57, 66, 67, 68	An extensive length of pipe along Lafayette leading to Laurelwood pump station is undersized to convey 10- and 100-year events. Upsizing these pipes is recommended. While prior construction of the De La Cruz and Guadalupe project isn’t required, it is recommended to address 2-year flooding initially.
36	Main	Moderate	46, 55, 56	Significant 10-year flooding occurs upstream of UPRR on Main Street. Upsizing existing 12” and 18” pipe is recommended.
47	Victor	Moderate	78	10-year event flooding occurs in the development on the east side of Victor Street. Upsizing existing pipes on Victor Street is recommended.
49	Walsh	Moderate	56	Constructing a new overflow on Walsh Avenue connecting the system on Lafayette Street to the system on Scott Blvd to alleviate high flows to Lafayette pump station is recommended.
50	Walsh and De La Cruz	Moderate	56, 57	Existing pipe downstream of Walsh Avenue on De La Cruz is undersized. Upsizing and regrading existing pipe on Walsh Avenue to redirect flows is recommended. Prior to construction of the Lafayette and Laurelwood project is required.

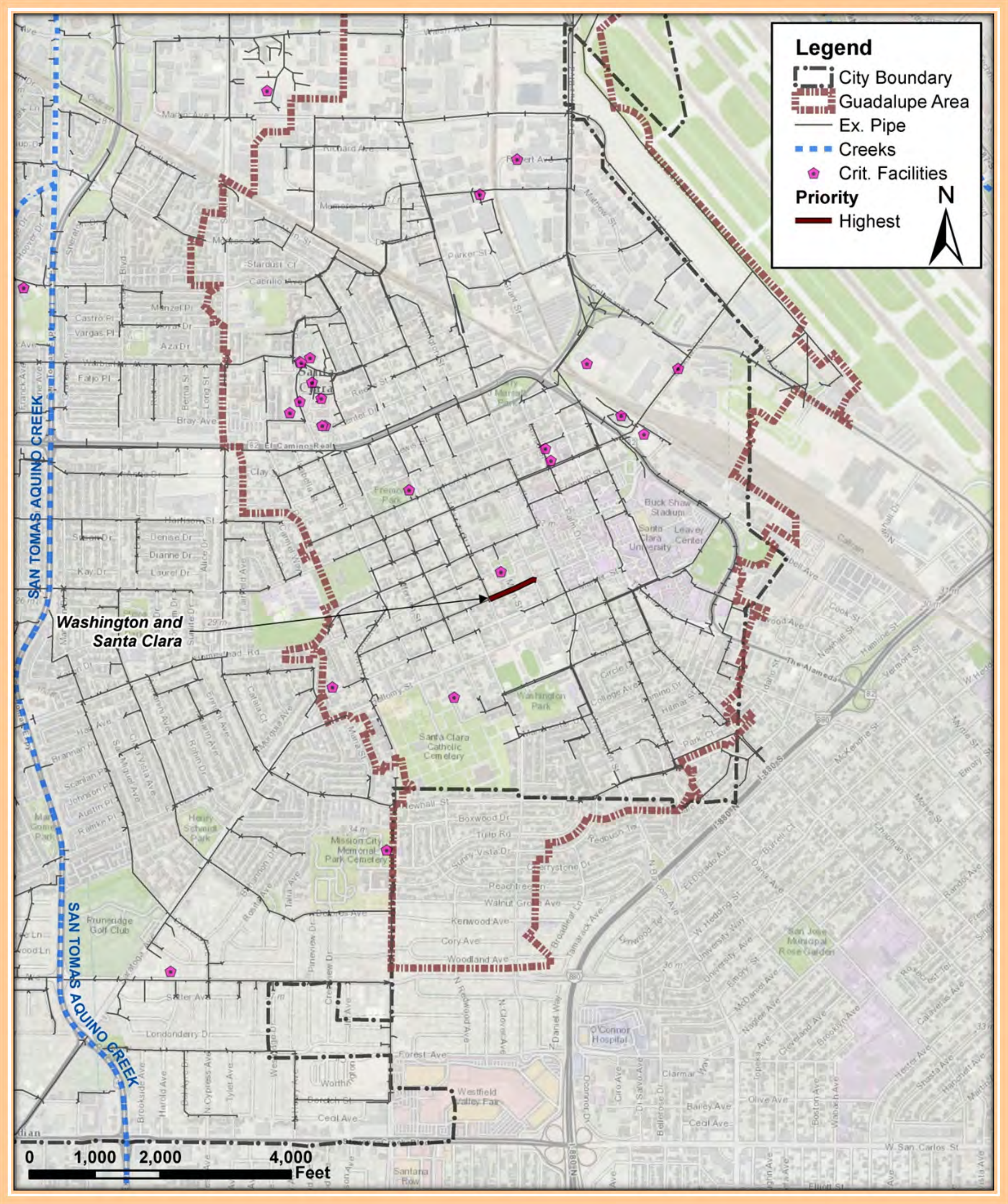

Figure 5-72: Southern Guadalupe River Drainage Area Highest Priority Improvement Projects

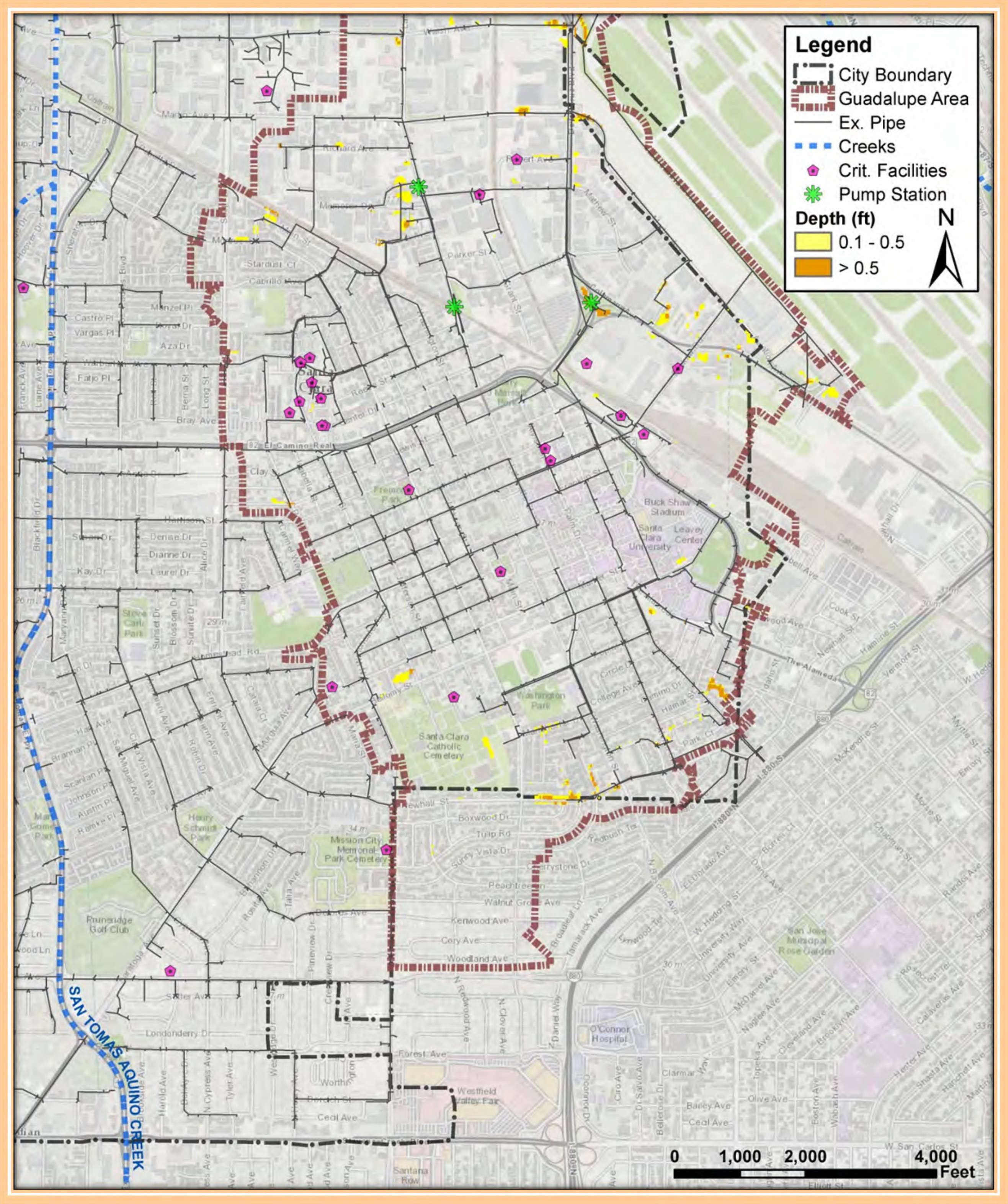

Figure 5-73: 2-Year Flooding in Southern Guadalupe River Drainage Area with Highest Priority CIPs

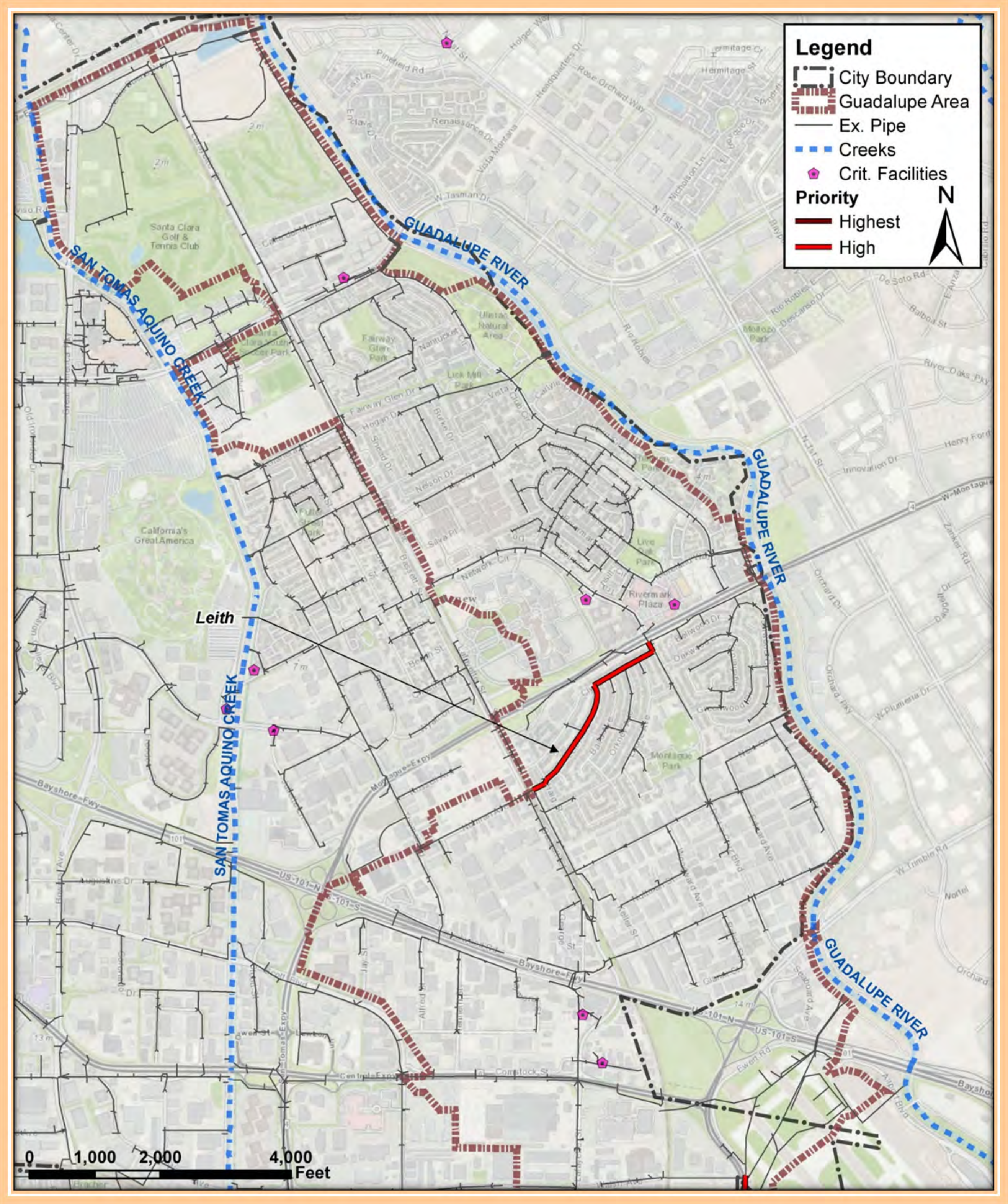

Figure 5-74: Northern Guadalupe River Drainage Area High Priority Improvement Projects

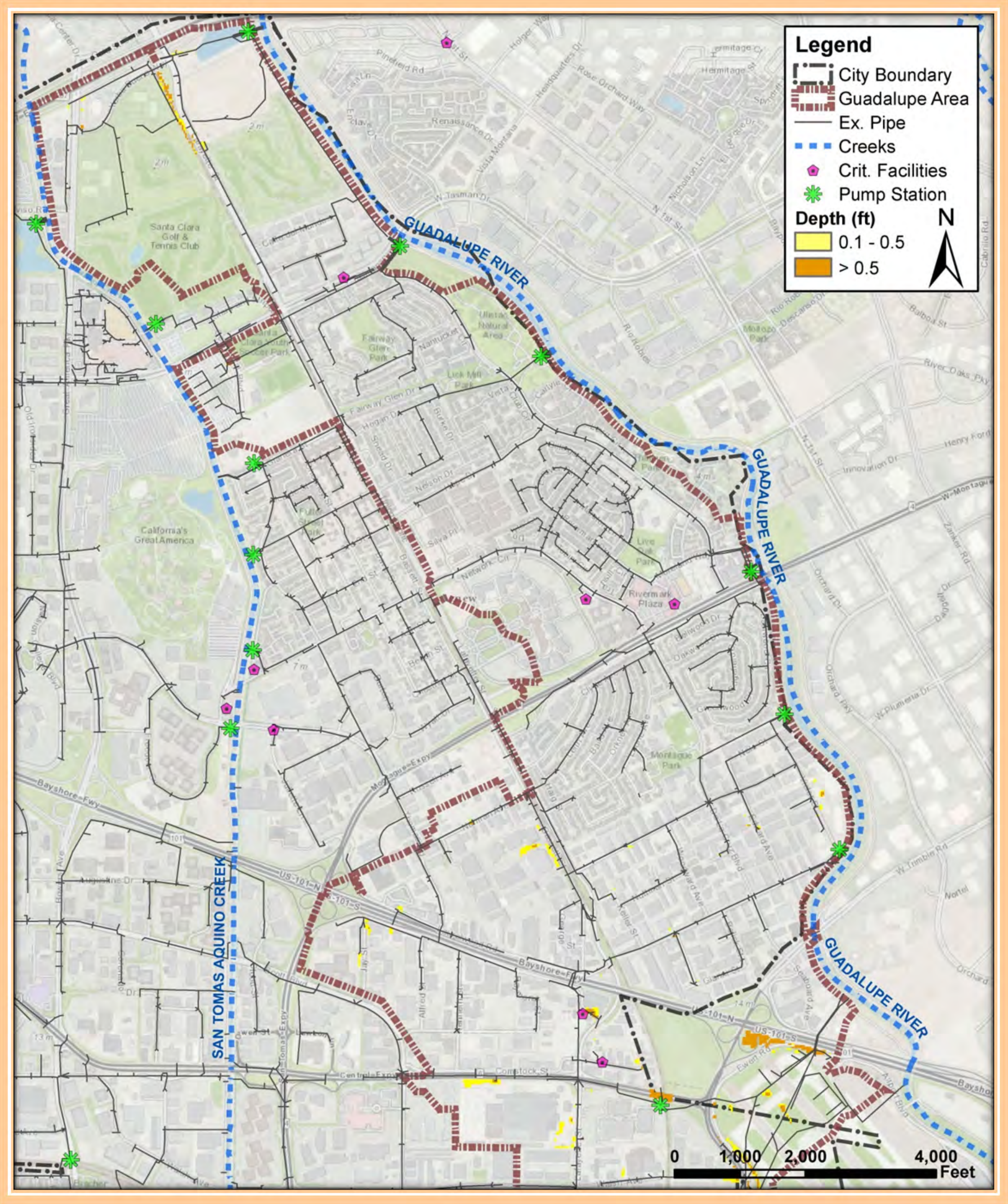

Figure 5-75: 2-Year Flooding in Northern Guadalupe Drainage Area with High Priority CIPs

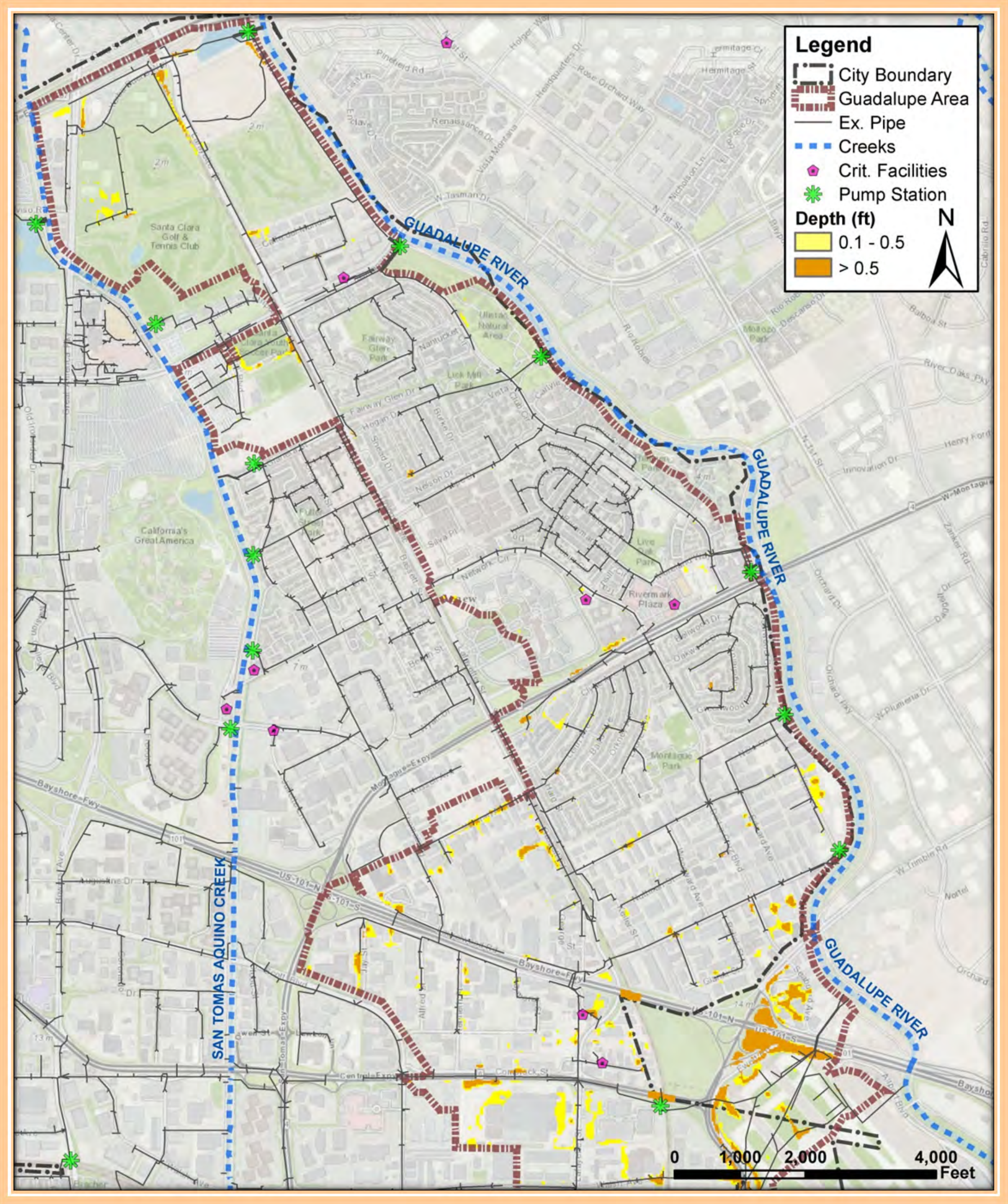

Figure 5-76: 10-Year Flooding in Northern Guadalupe River Drainage Area with High Priority CIPs

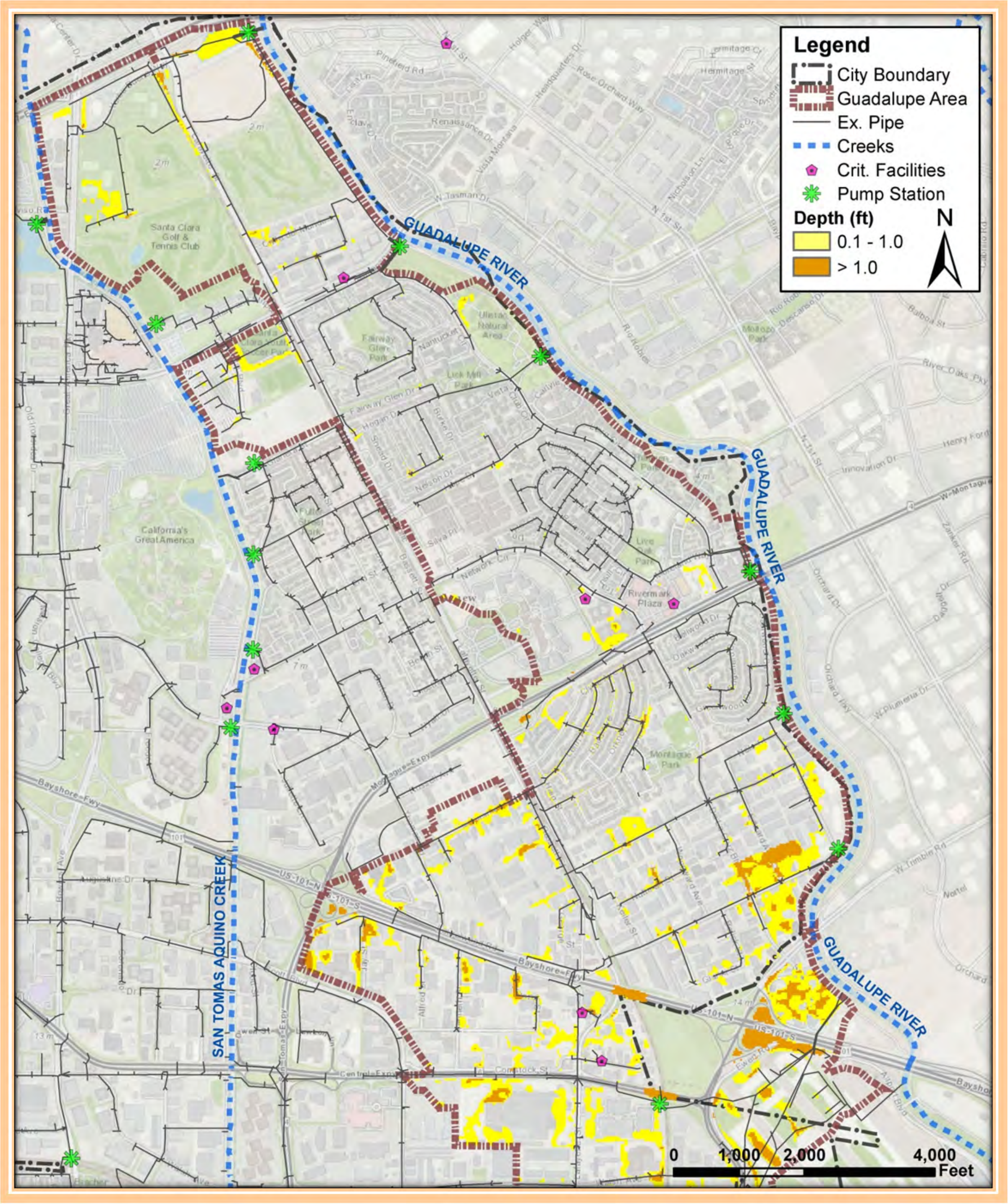

Figure 5-77: 100-Year Flooding in Northern Guadalupe River Drainage Area with High Priority CIPs

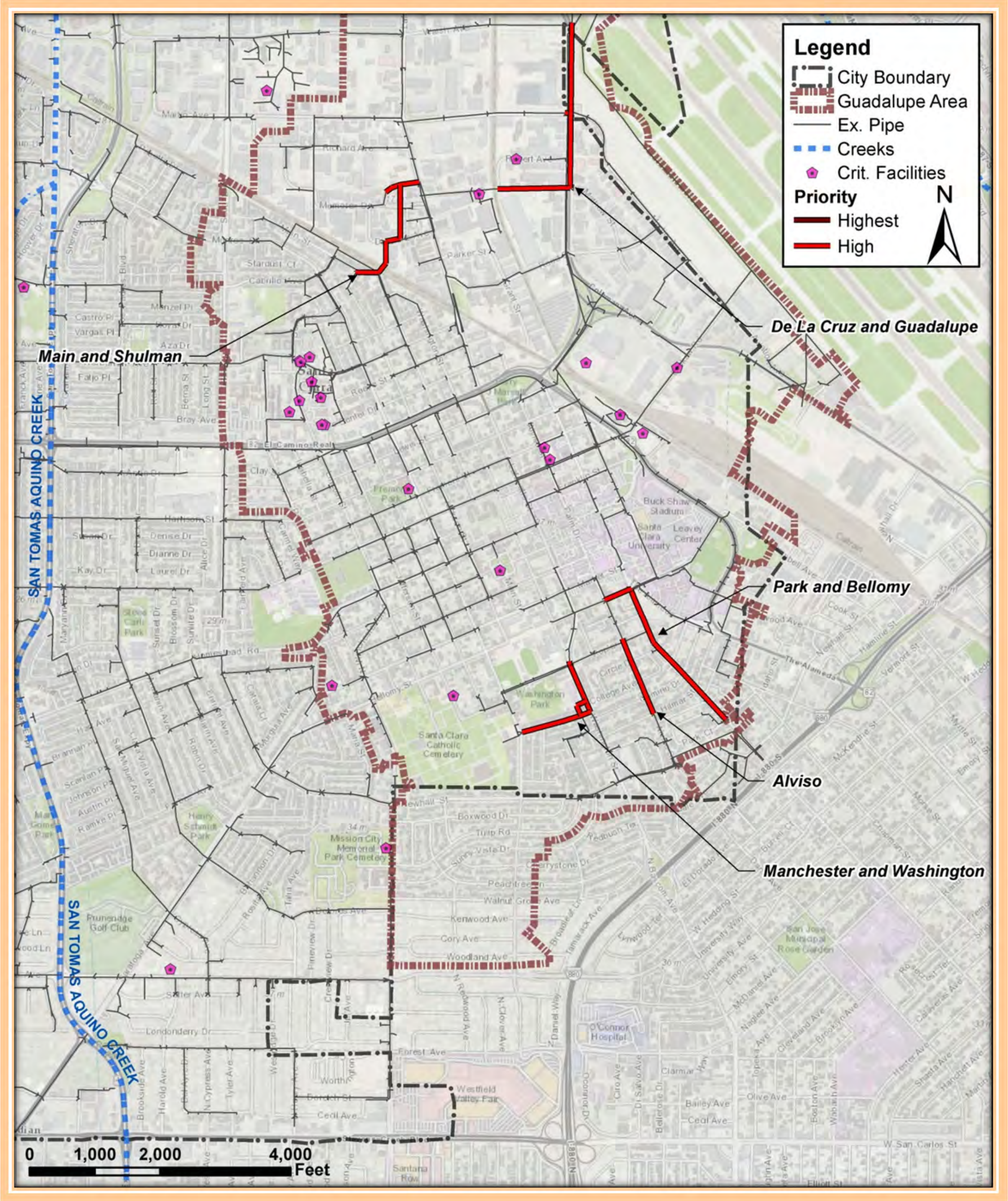

Figure 5-78: Southern Guadalupe River Drainage Area High Priority Improvement Projects

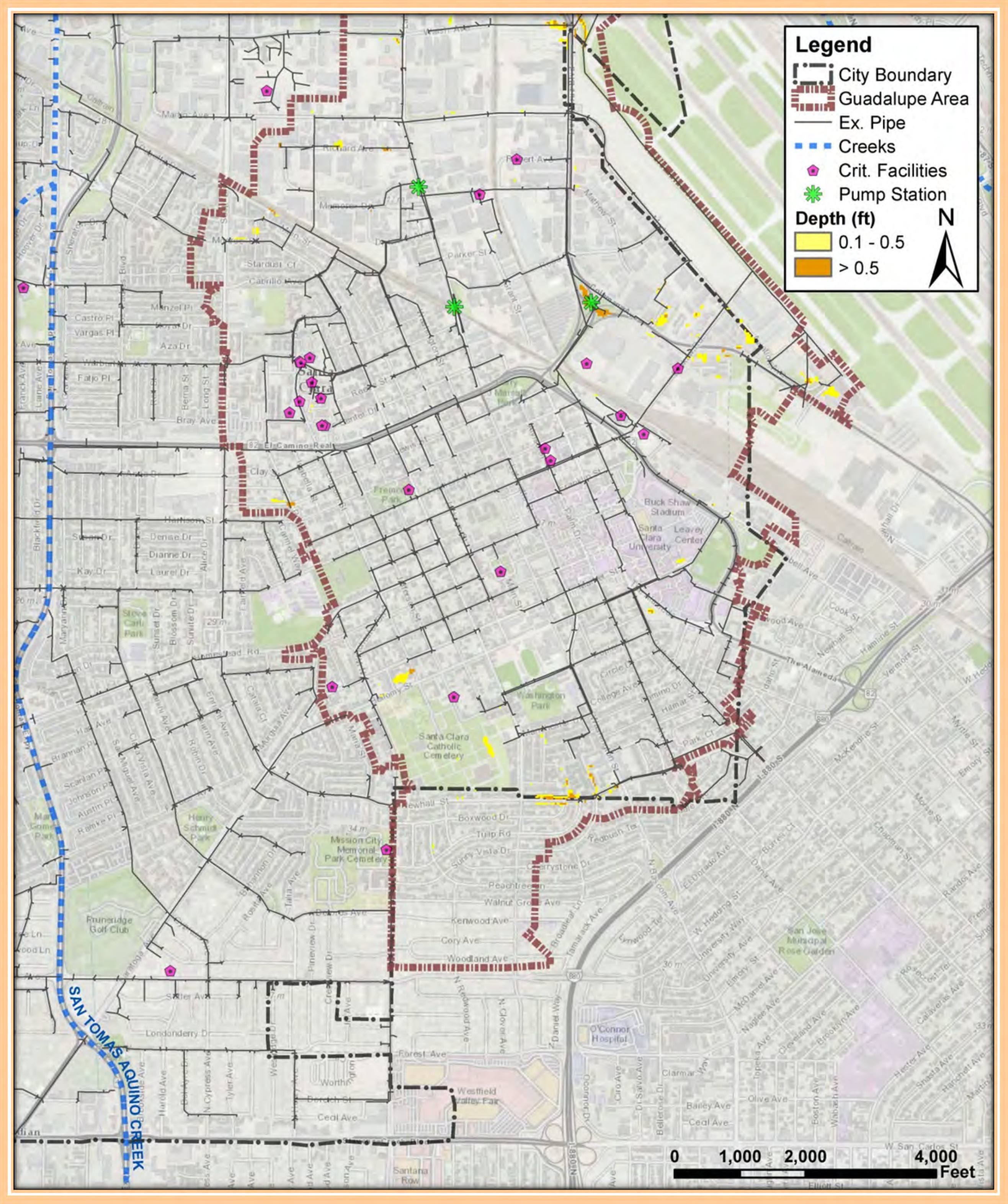

Figure 5-79: 2-Year Flooding in Southern Guadalupe River Drainage Area with High Priority CIPs

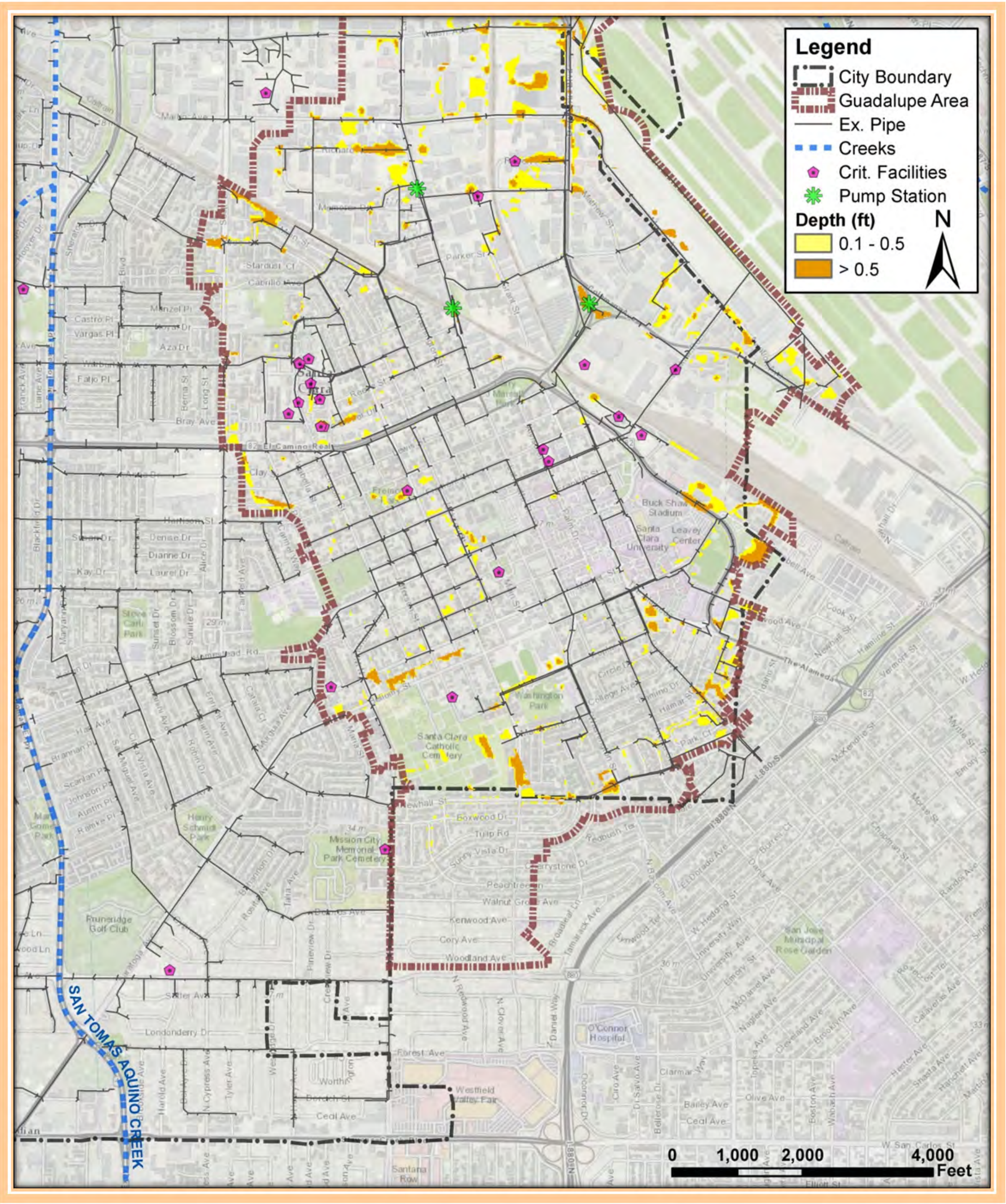

Figure 5-80: 10-Year Flooding in Southern Guadalupe River Drainage Area with High Priority CIPs

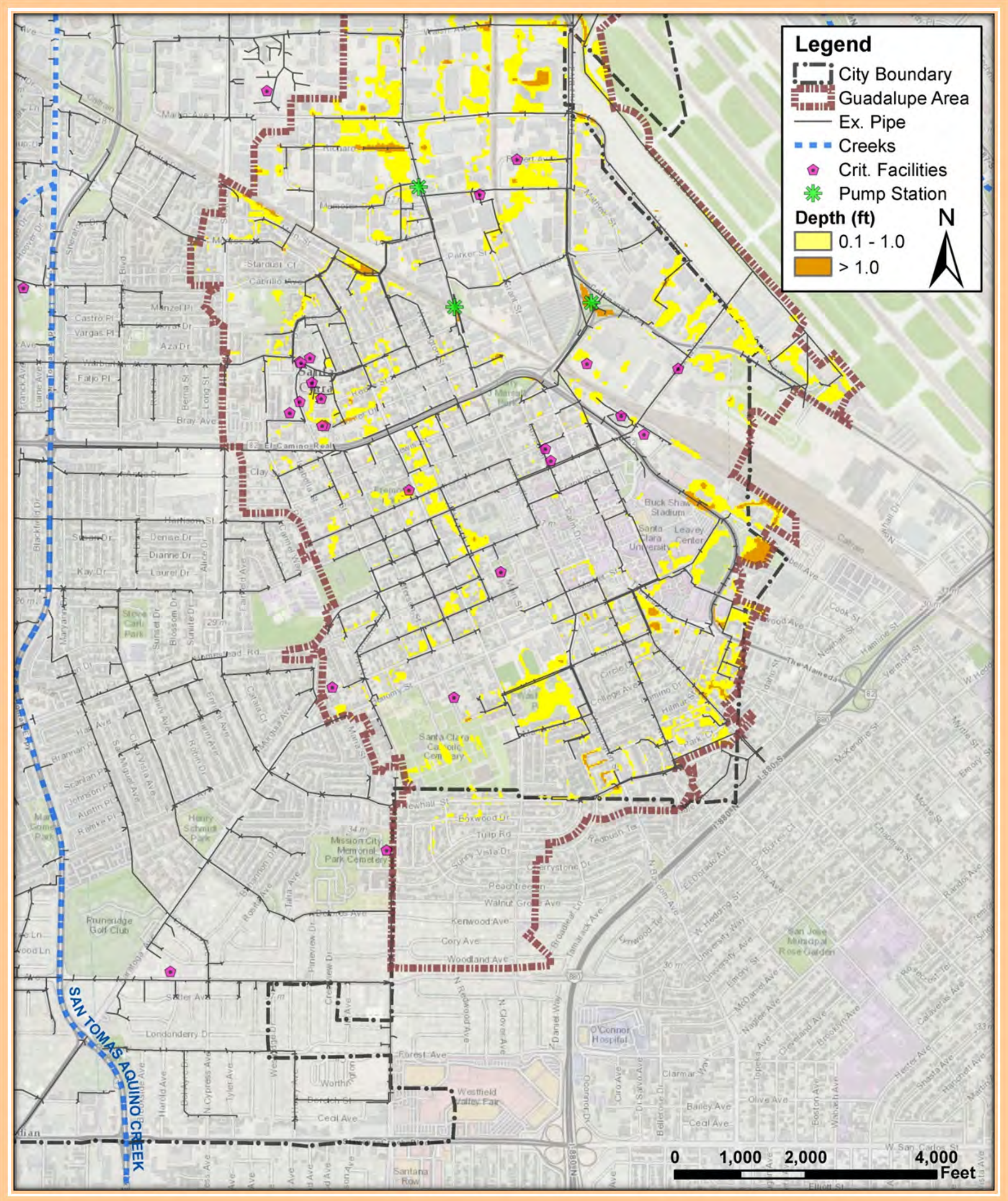

Figure 5-81: 100-Year Flooding in Southern Guadalupe River Drainage Area with High Priority CIPs

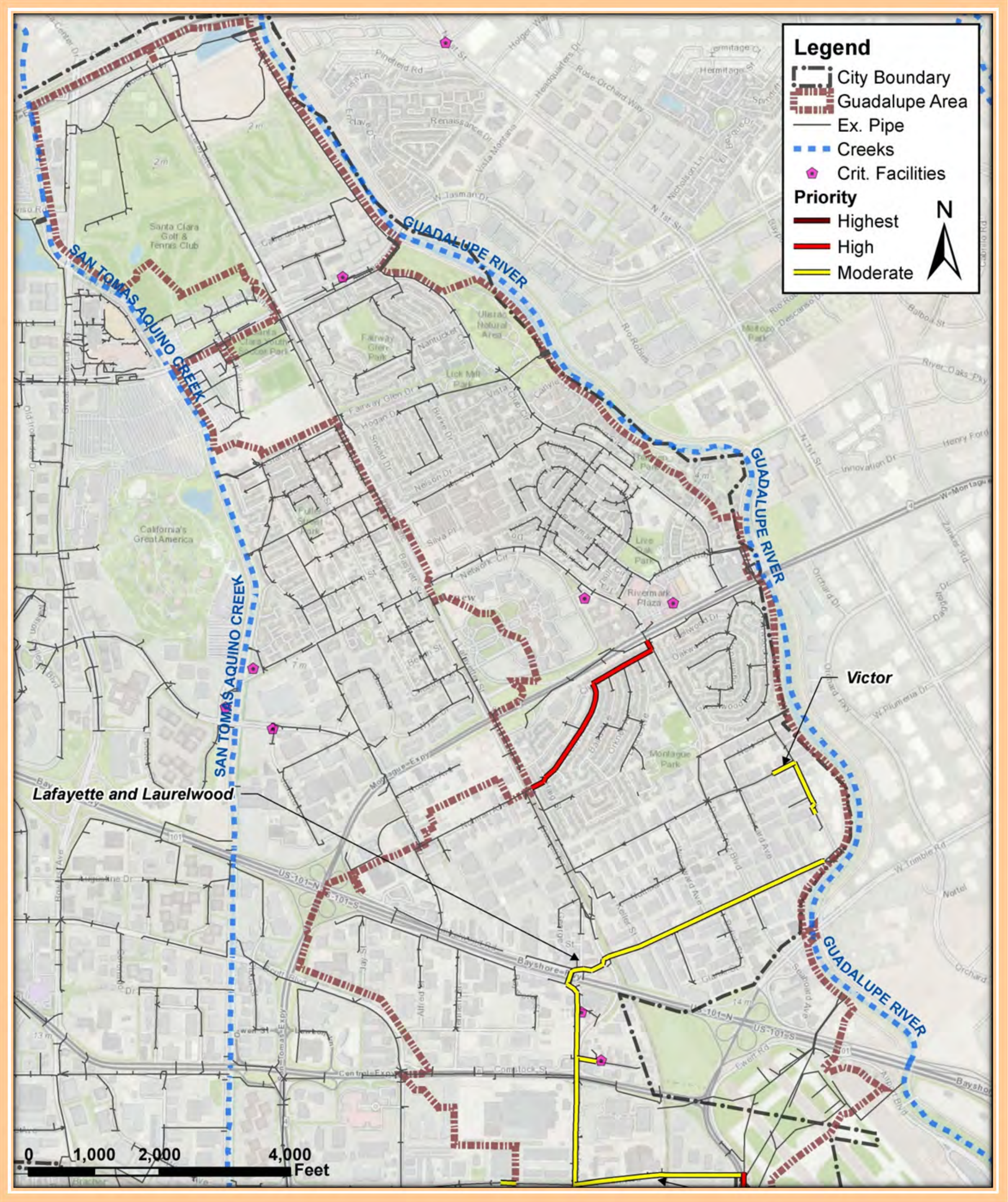

Figure 5-82: Northern Guadalupe River Drainage Area Moderate Priority Improvement Projects

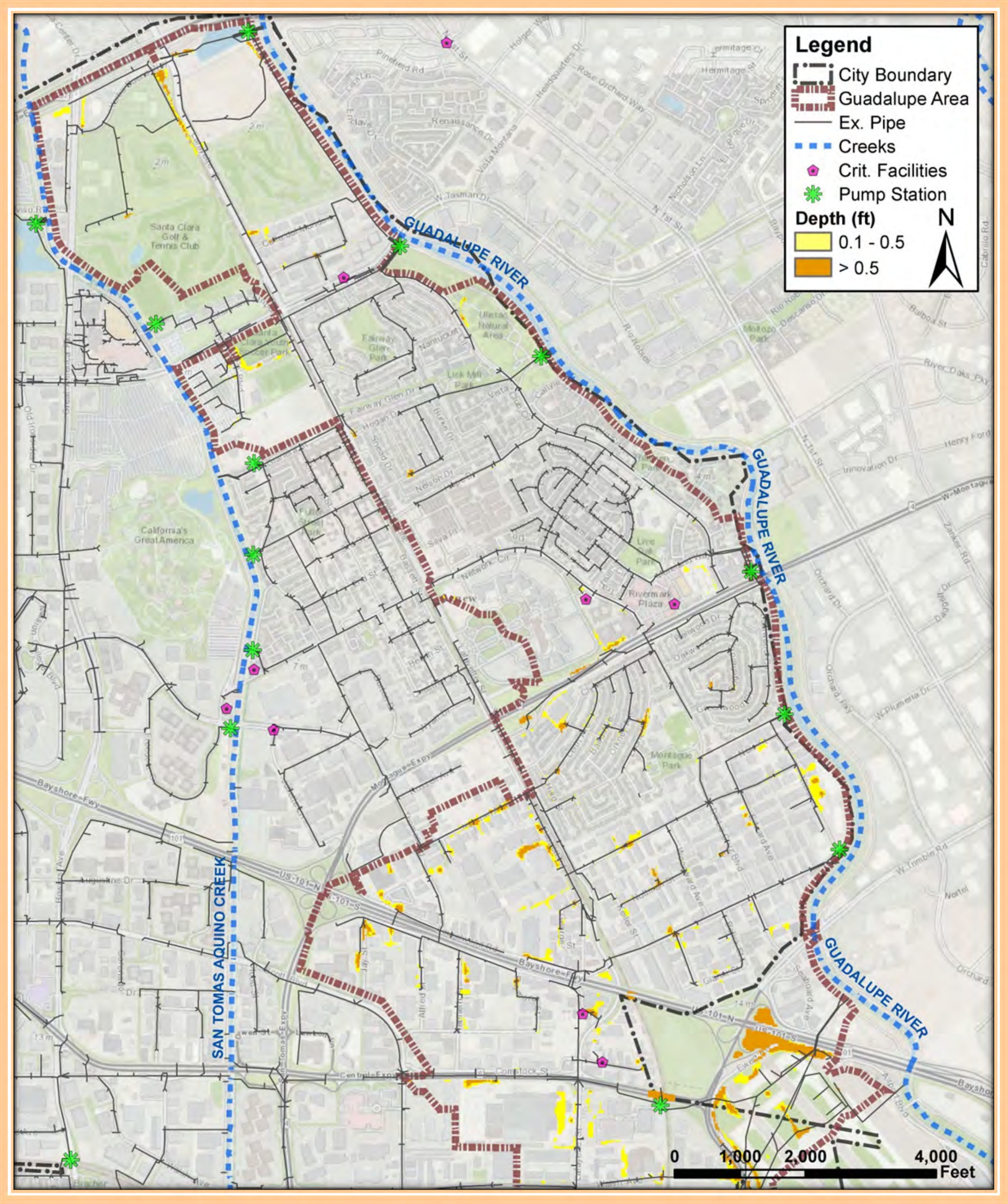

Figure 5-83: 10-Year Flooding in Northern Guadalupe River Drainage Area with Moderate Priority CIPs

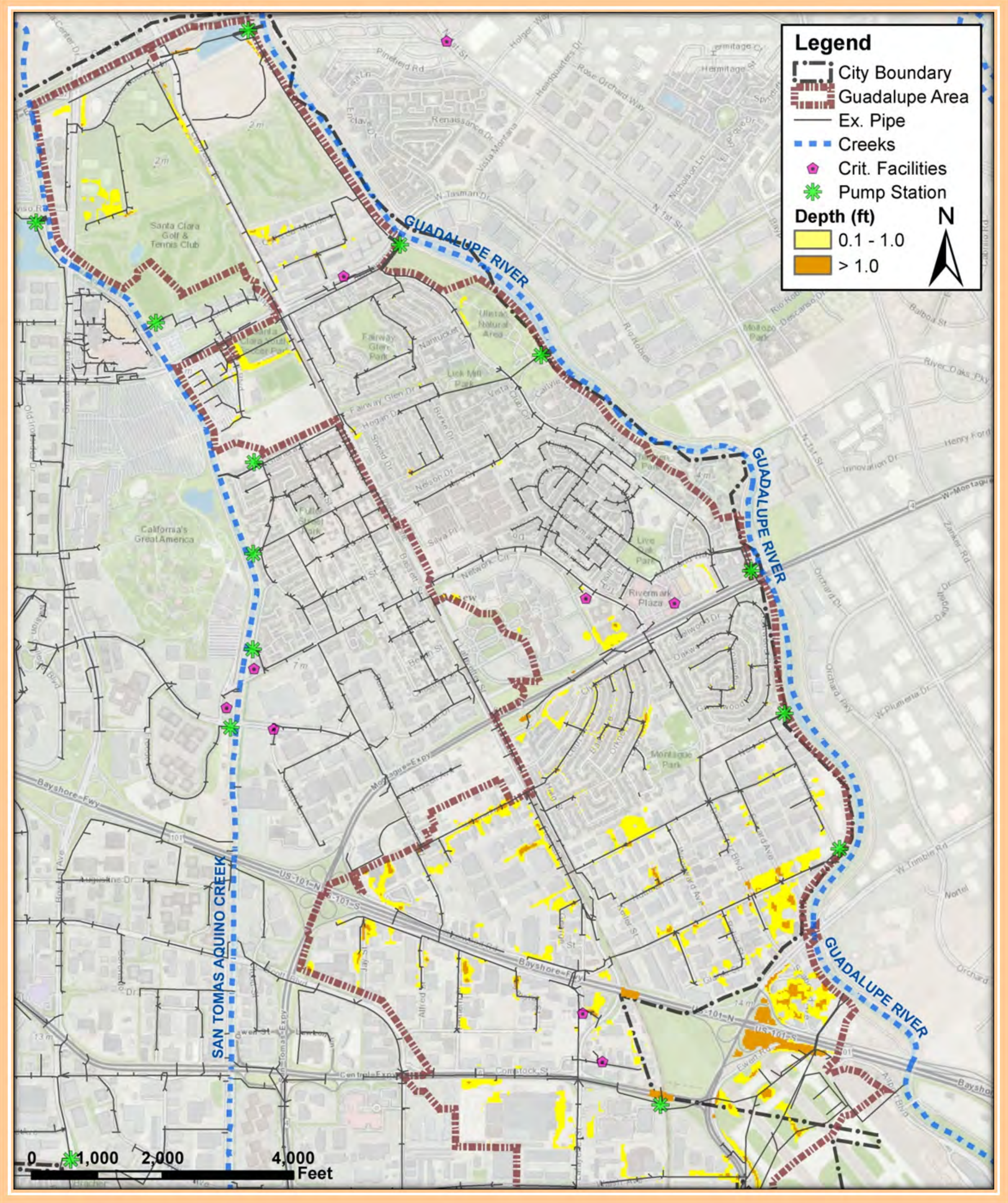

Figure 5-84: 100- Year Flooding in Northern Guadalupe River Drainage Area with Moderate Priority CIPs

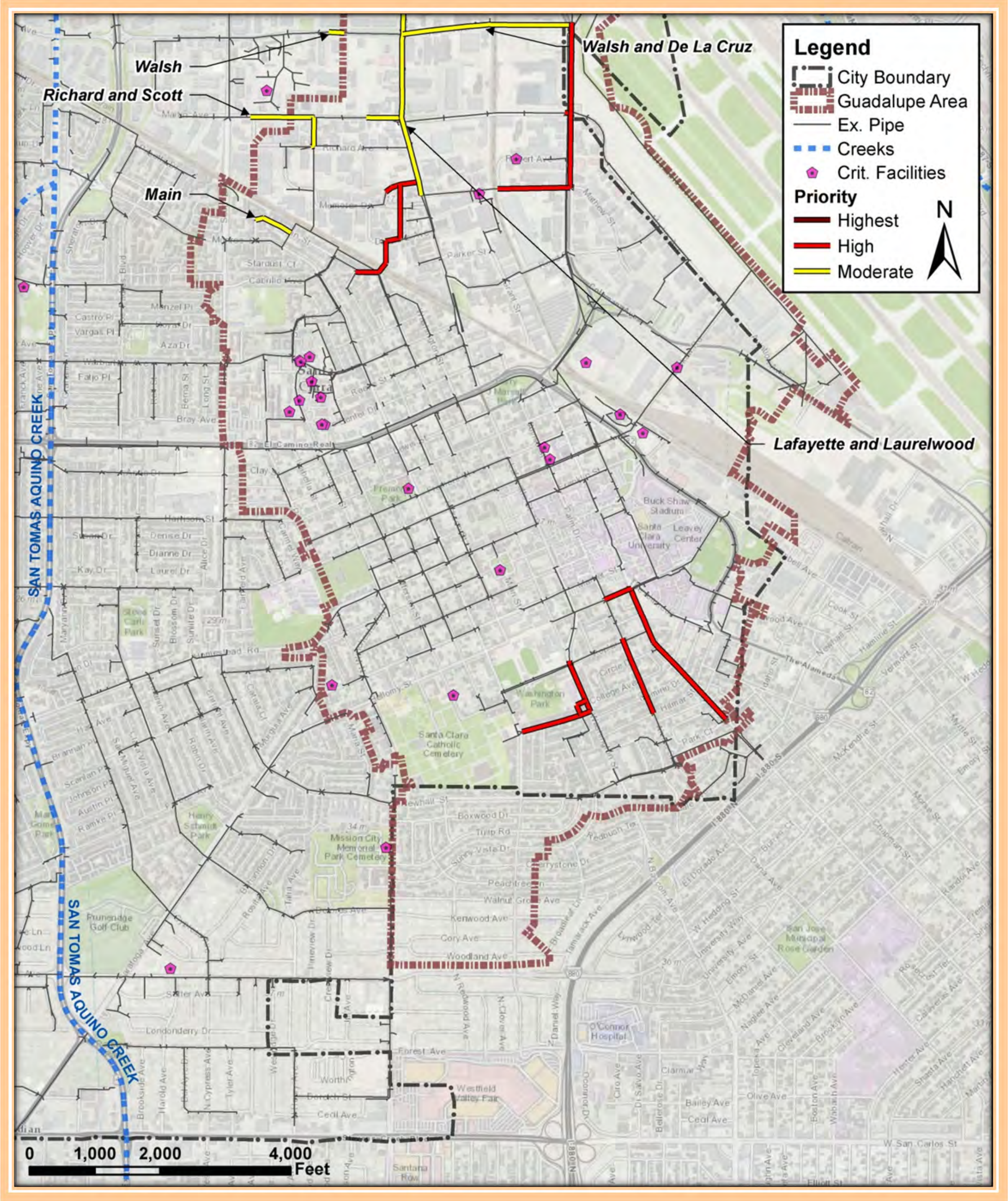

Figure 5-85: Southern Guadalupe River Drainage Area Moderate Priority Improvement Projects

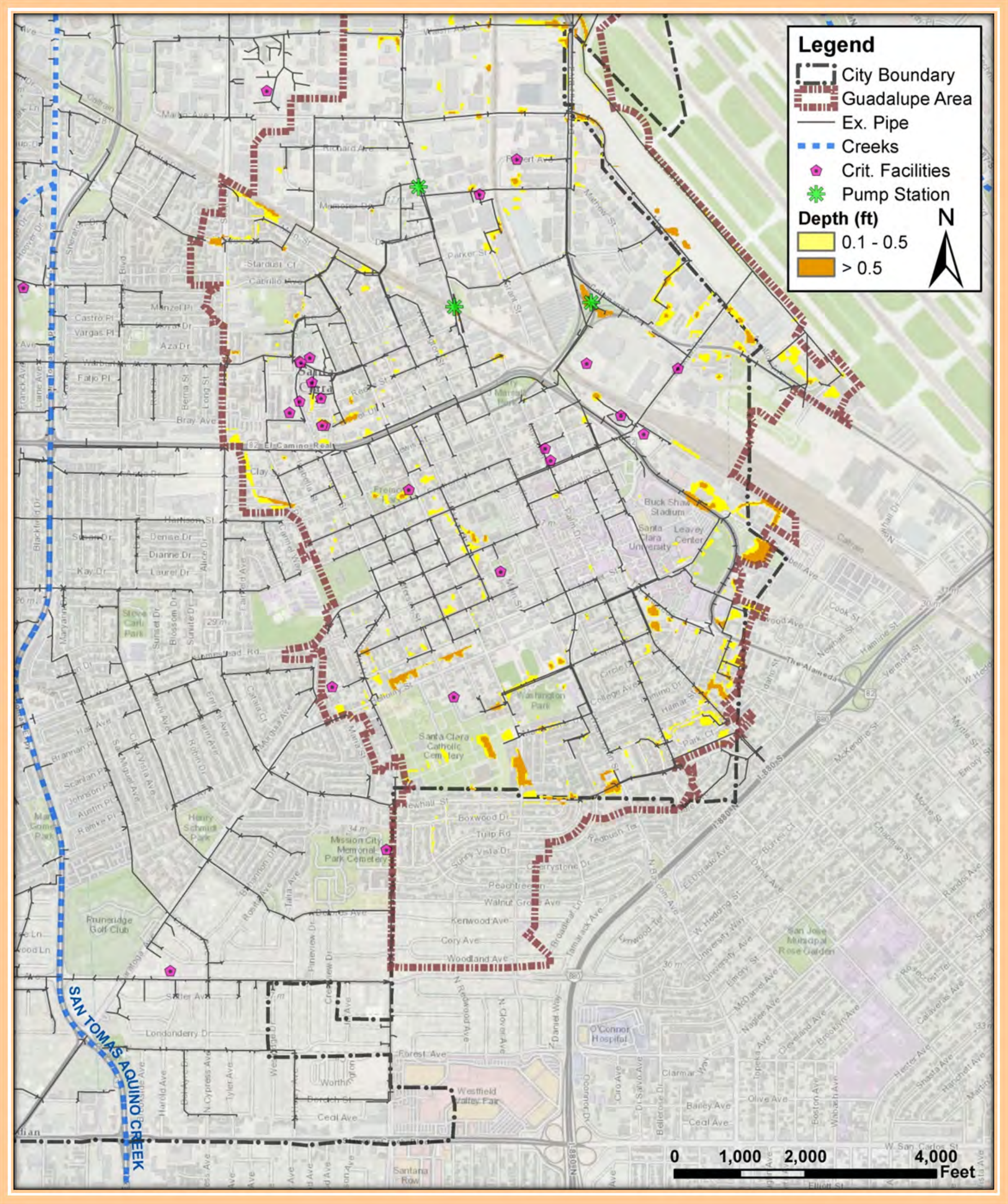

Figure 5-86: 10-Year Flooding in Southern Guadalupe River Drainage Area with Moderate Priority CIPs

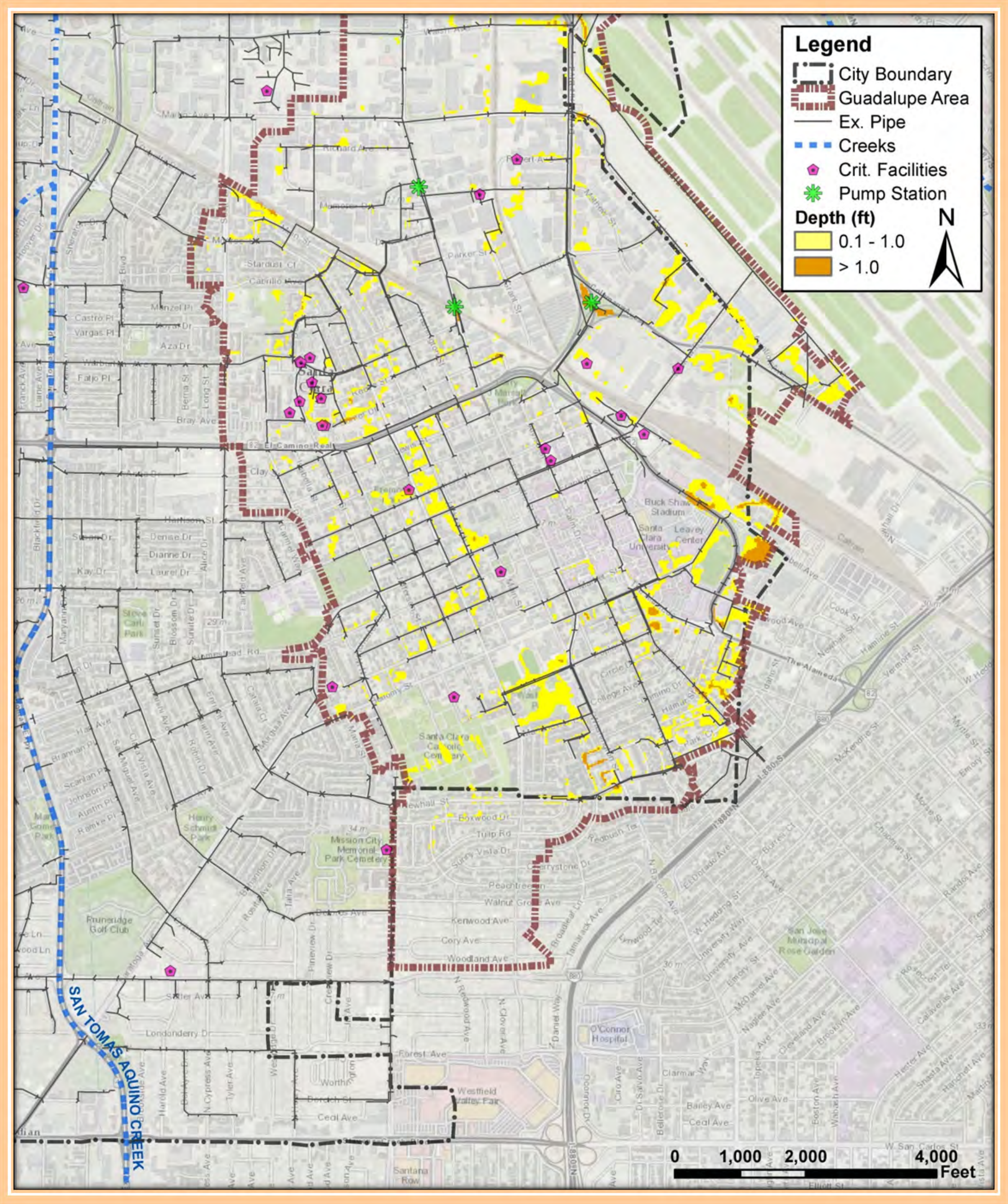

Figure 5-87: 100-Year Flooding in Northern Guadalupe River Drainage Area with Moderate Priority CIPs

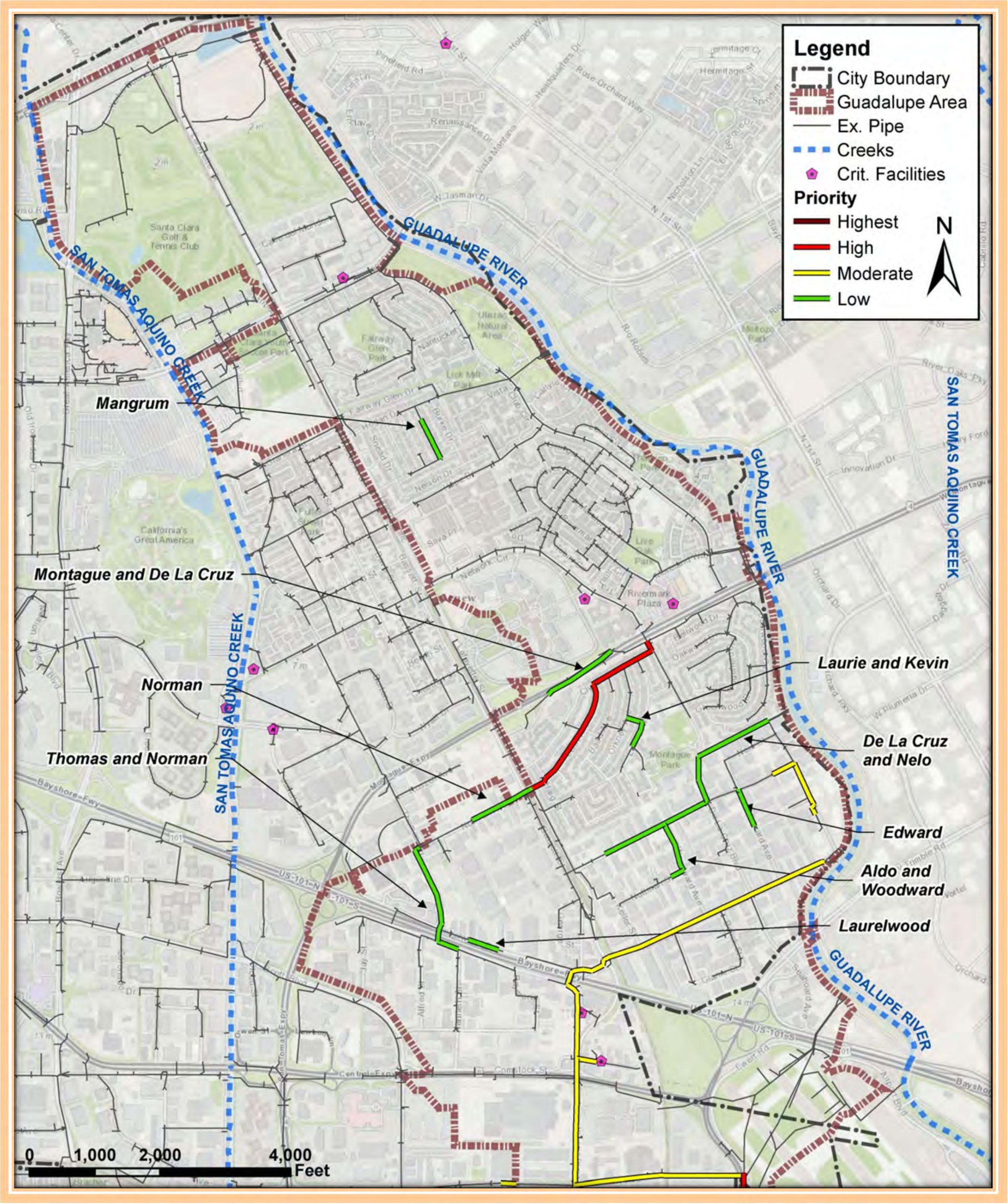

Figure 5-88: Northern Guadalupe River Drainage Area Low Priority Improvement Projects

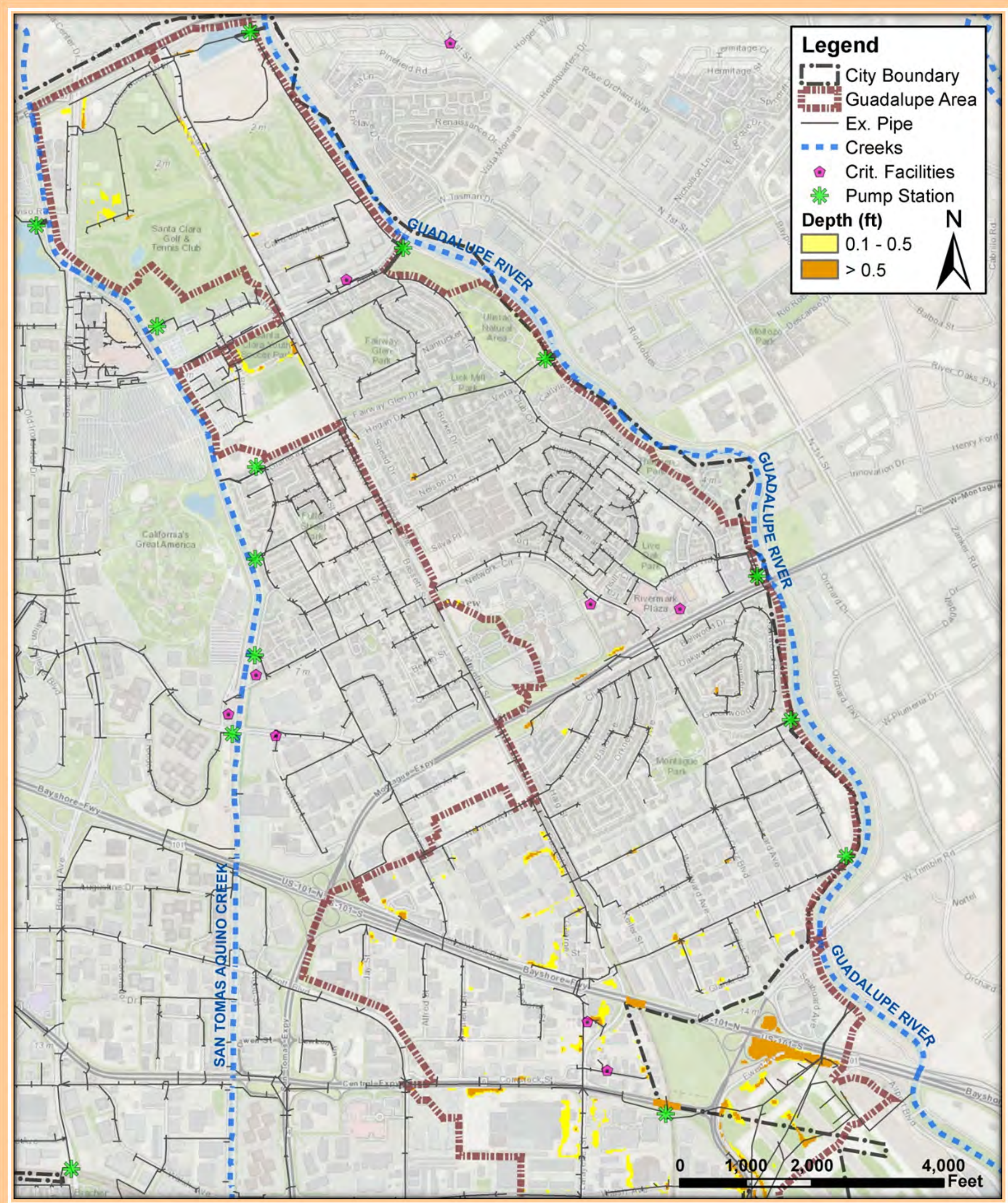

Figure 5-89: 10-Year Flooding in Northern Guadalupe River Drainage Area with Low Priority CIPs

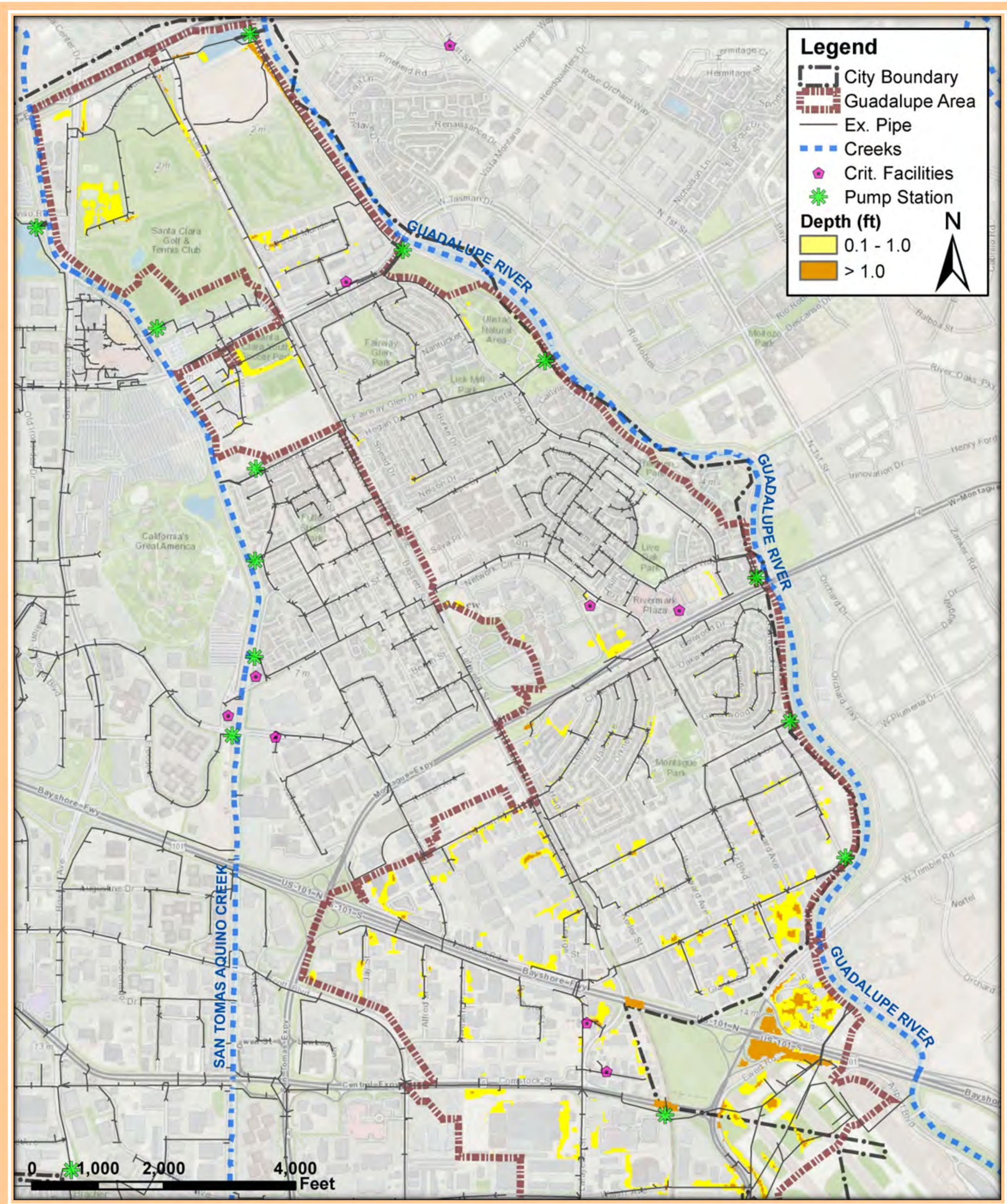

Figure 5-90: 100- Year Flooding in Northern Guadalupe River Drainage Area with Low Priority CIPs

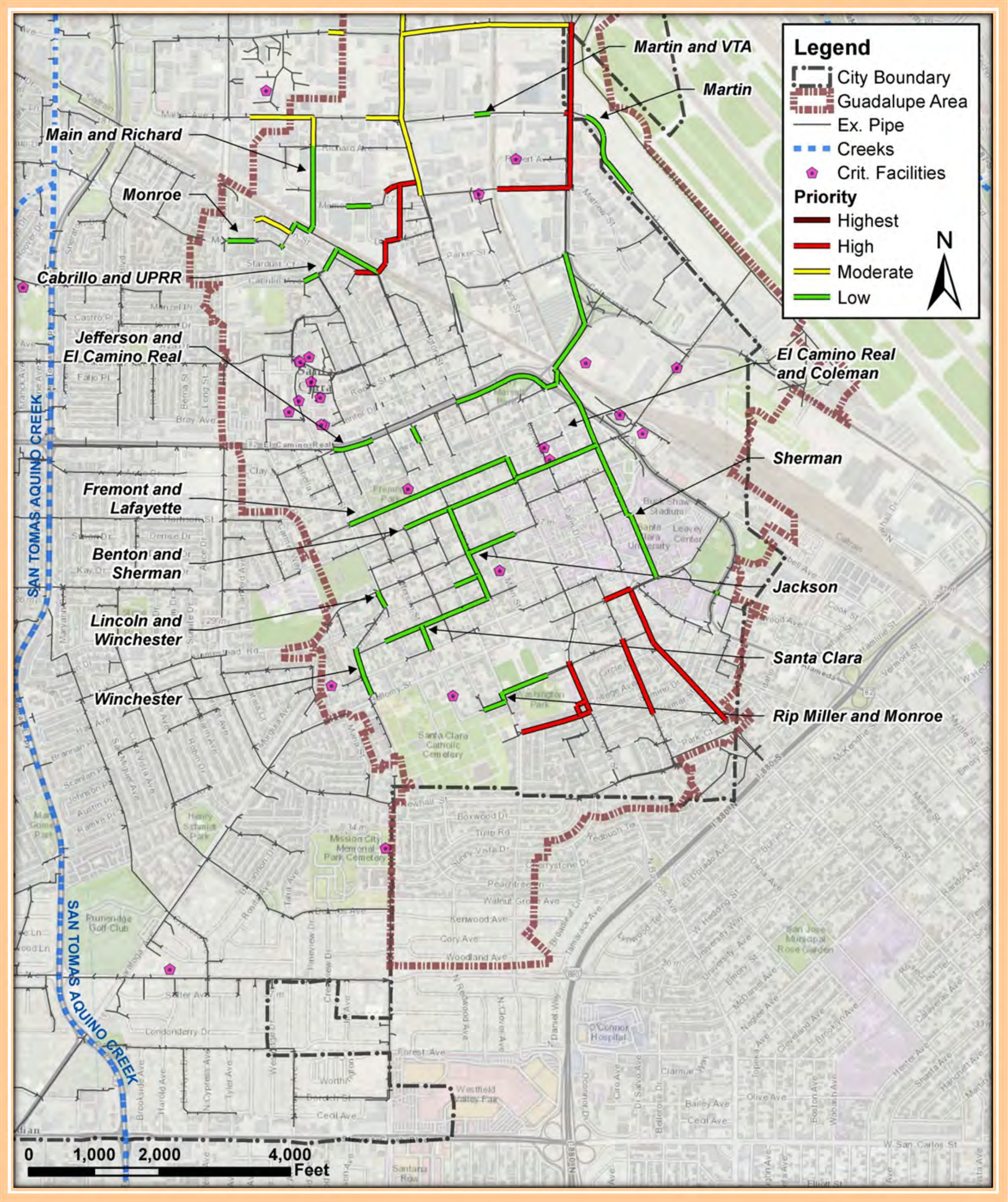

Figure 5-91: Southern Guadalupe River Drainage Area Low Priority Improvement Projects

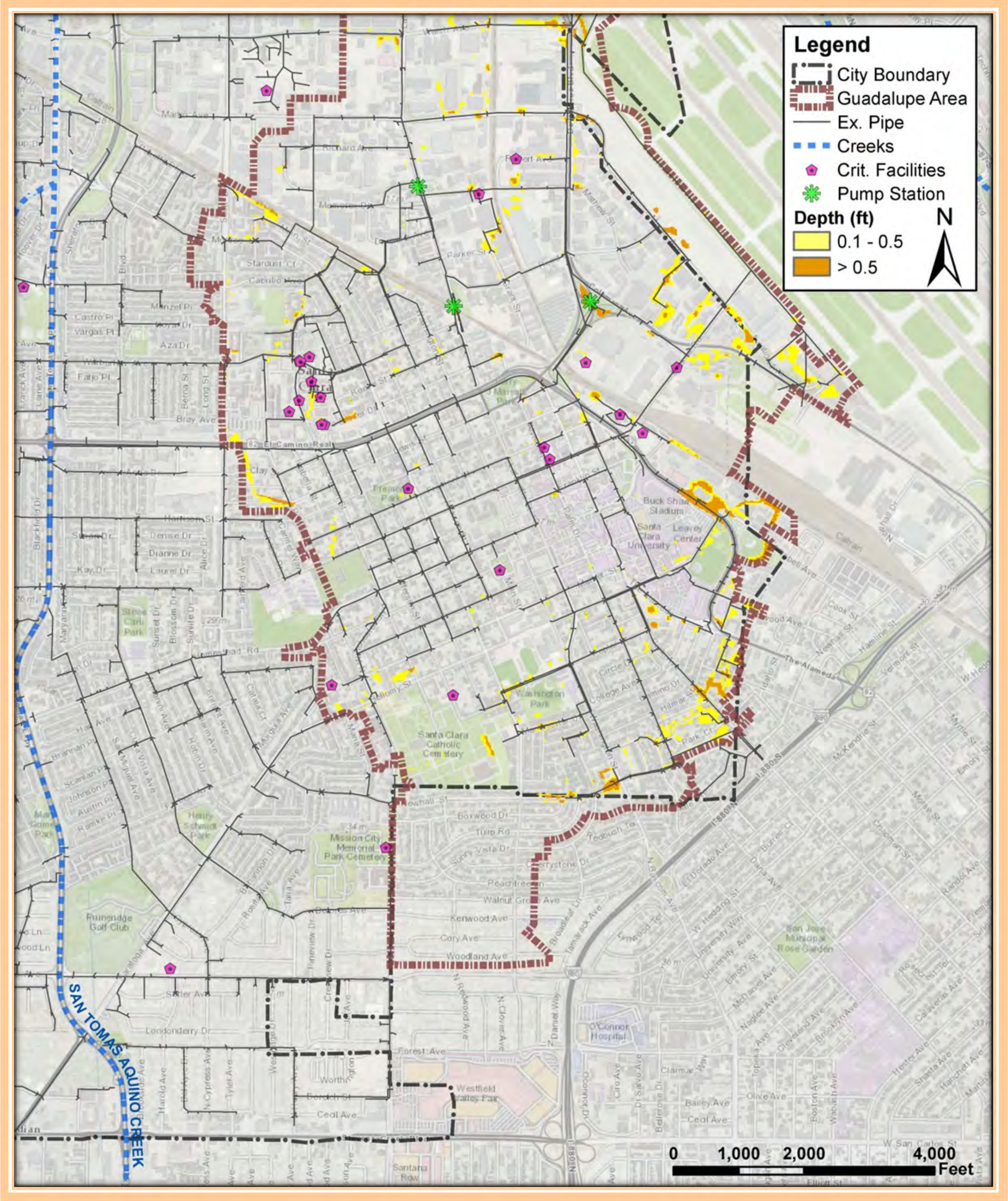

Figure 5-92: 10-Year Flooding in Southern Guadalupe River Drainage Area with Low Priority CIPs

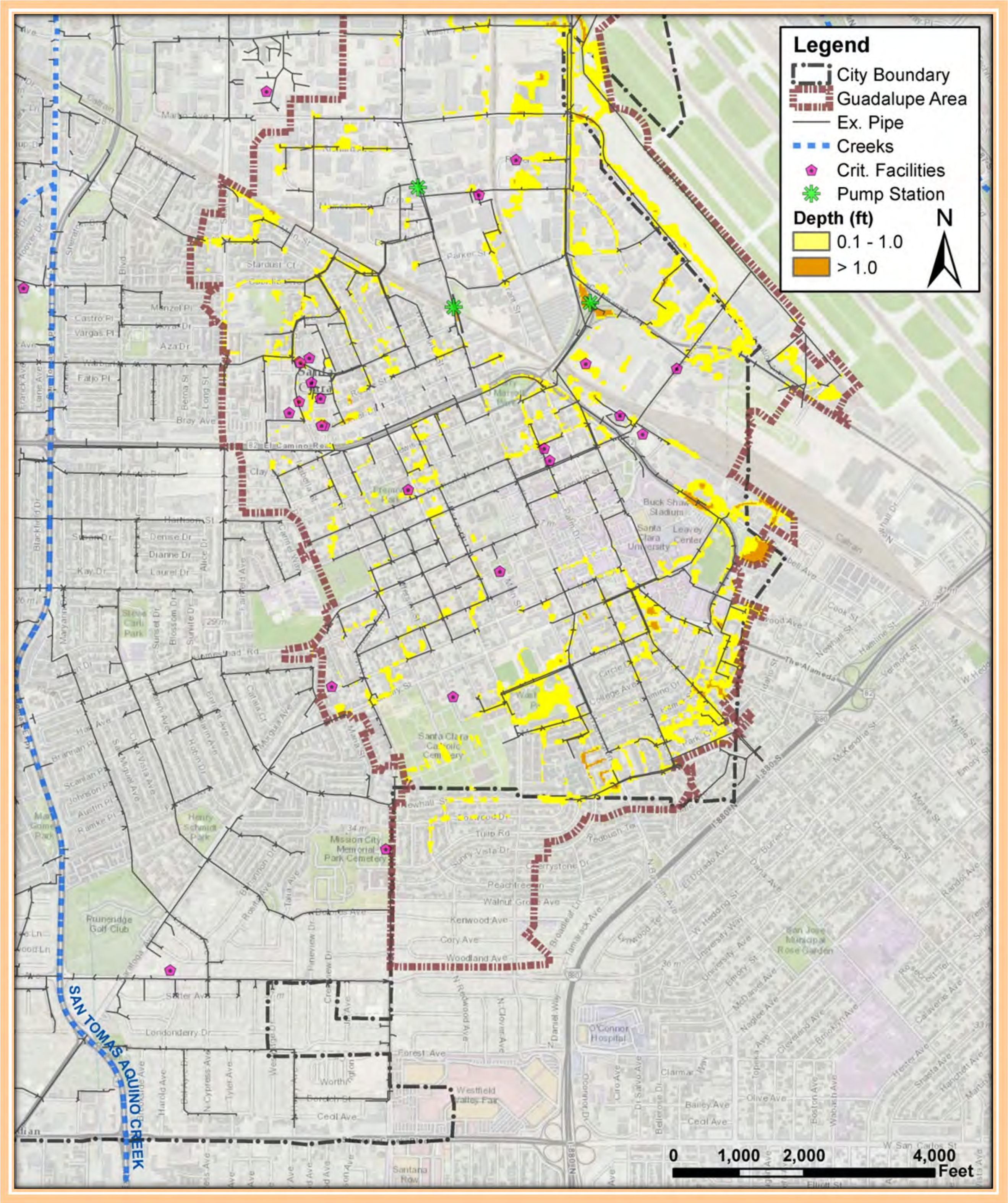

Figure 5-93: 100-Year Flooding in Southern Guadalupe River Drainage Area with Low Priority CIPs

Chapter 6. Pump Stations

6.1. Overview

The City of Santa Clara Water and Sewer Utilities Department maintains pumps and controls at 21 pump stations within the City. One additional County maintained pump station is included in the models (Central Expressway). Pump stations are mostly located in the northern half of the City, where runoff from storm drain collection systems must be pumped over or through levees into Calabazas Creek, San Tomas Aquino Creek, and the Lower Guadalupe River. Existing pump station capacities are generally sufficient for runoff from the existing system; however, improvement projects require upgrades to one pump station (Lake Santa Clara pump station) under moderate priority improvements, as well as construction of three new pump stations under low priority improvements.

A map of current City pump station locations is shown in Figure 6-1.

6.2. Performance Criteria

According to current City standards, pump facilities (including pumps, forebays, and appurtenances) should be designed to convey 100-year inflows from surface runoff and storm drain collection systems within the pump's drainage area.

MU models include 18 pump stations with de-rated pump curves and set levels based on as-built drawings and other City-provided data. City Hall West/East and the Police Pistol range pump stations are not included in the model as they drain a relatively small area and do not generally affect the performance of the storm drain system. Tasman pump station has been excluded as the station is intended to drain the station forebay, but the 2010 pump station evaluation has indicated the station is currently not in operation. Models have been set up to simulate pump performance and cycling as accurately as possible with available data.

6.3. Pump Station Evaluations

A full evaluation of stormwater pump stations operated by the City was performed in 2010. The report summarized the location of each pump station, drainage areas for those discharging to creeks and rivers, design capacity, pump types and appurtenances, evaluation of performance, and replacement cost and schedule for each pump station. Table 6-1 contains some of the essential data for the pump stations from the evaluation.

Since the time of the 2010 evaluation, nine pump stations have been due for renovation (City Hall East, City Hall West, Fairway Glen, Golf Course, Lafayette Subway, Lake Santa Clara, Laurelwood, Lick Mill, and Tasman). No additional pump stations are due for renovation in the next five years. Additional, current pump station performance issues have been identified by City staff. Necessary renovations and issues at these pump stations are summarized in Table 6-2.

MU models have shown that the capacity of the modeled pump stations is sufficient under existing conditions, assuming that all pump stations can operate at their intended capacity. While the models indicate that most of the City's existing stations also have adequate capacity with improvements in place, one moderate priority improvement project will necessitate an upgrade to Lake Santa Clara pump station, as the installation of an overflow increases the drainage area to the pump station in high runoff events. Three low priority improvement projects are recommended that include installation of new pump stations. These are suggested in areas that drain to flap gated gravity outfalls where high creek levels cause surcharge in the storm drain system.

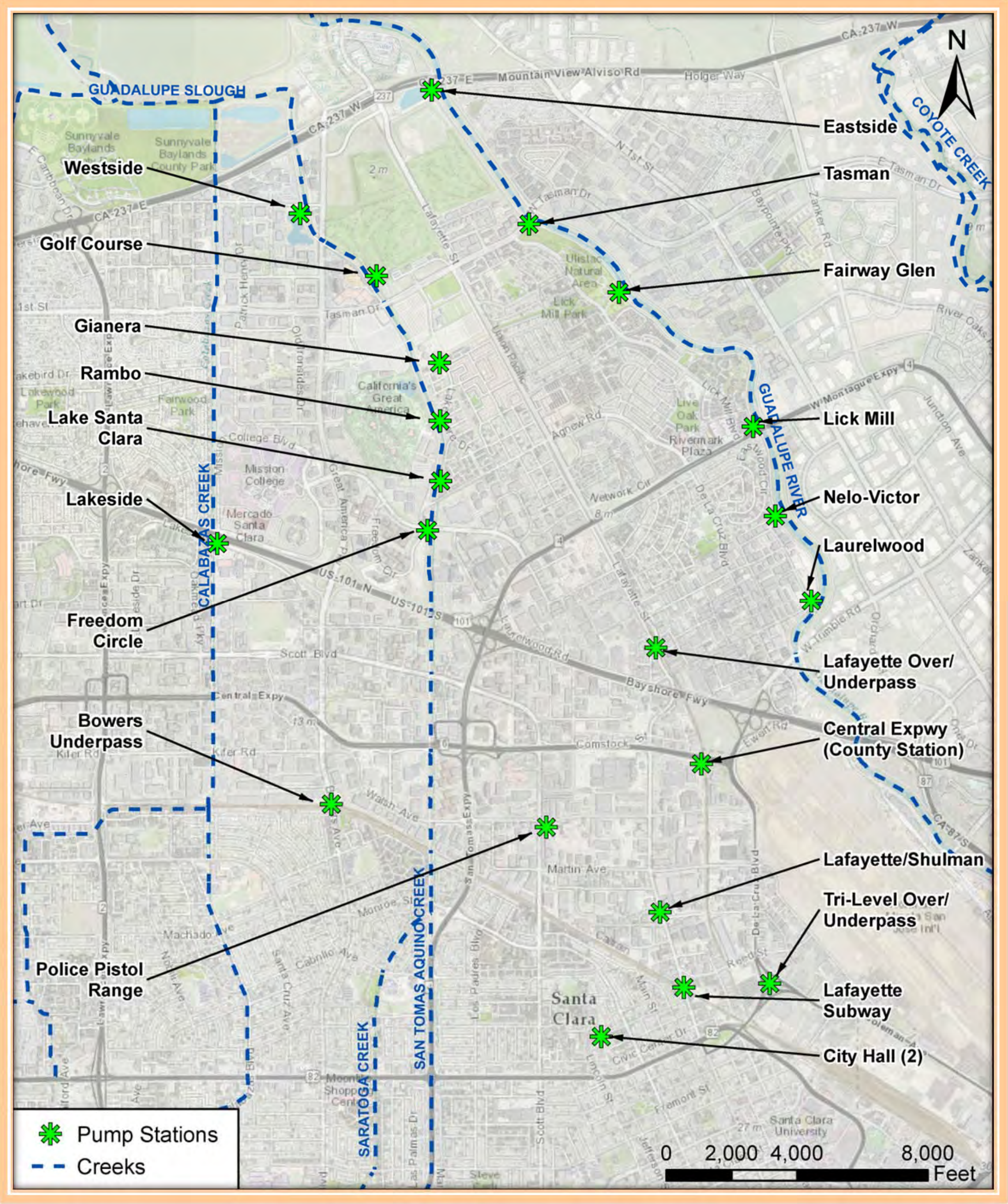

Figure 6-1: Santa Clara Pump Station Locations

Table 6-1: Santa Clara Storm Water Pump Station Summary

Pump Stations Draining to Guadalupe River					
Station	**Originally Constructed**	**Last Upgraded**	**Next Scheduled Upgrade**	**Drainage Area**	**Design Capacity**
Eastside Retention Basin	1973	2005	2030	566 acres	50,000 gpm
Fairway Glen	1989		2039	355 acres	111,500 gpm
Lick Mill	1988		2038	620 acres	105,500 gpm
Nelo Victor	1986	2004	2029	157 acres	78,150 gpm
Laurelwood	1986		2036	308 acres	59,150 gpm
Pump Stations Draining to San Tomas Aquino Creek					
Station	**Originally Constructed**	**Last Upgraded**	**Next Sched. Upgrade**	**Drainage Area**	**Design Capacity**
Westside Retention Basin	1975	2001	2026	854 acres	64,500 gpm
Golf Course	1987		2037	54 acres	11,100 gpm
Gianera	1978	1996	2021	58 acres	17,500 gpm
Rambo	1986	2001	2026	351 acres	61,200 gpm
Lake Santa Clara	1986		2036	20 acres	not listed
Freedom Circle	2001		2026	46 acres	35,200 gpm
Pump Stations Draining to Calabazas Creek					
Station	**Originally Constructed**	**Last Upgraded**	**Next Sched. Upgrade**	**Drainage Area**	**Design Capacity**
Lakeside	1998		2023	103 acres	30,000 gpm
Lift Stations within the City Storm Drain System					
Station	**Originally Constructed**	**Last Upgraded**	**Next Sched. Upgrade**	**Drainage Area**	**Design Capacity**
Bowers Ave Underpass	1974		2024	n/a	2,750 gpm
City Hall – East Wing	1964		2039	n/a	not listed
City Hall – West Wing	1964		2039	n/a	not listed
Lafayette Over/Under	1976		2026	n/a	2,300 gpm
Lafayette Subway	1963	1995	2038	n/a	200 gpm
Police Pistol Range	1979		2029	n/a	not listed
Shulman	1979		2029	n/a	600 gpm
Tasman	1990		2040	n/a	not listed
Tri-Level Underpass	1968	1975	2025	n/a	not listed

Table 6-2: Current Pump Station Issues and Suggested Renovations

Pump Station	Issues	Suggested Renovation
Bowers Over/Under	• Equipment out of date	Station overdue for 25th year renovations. Replace pumps, motors, electrical equipment, piping, and other equipment as necessary.
Eastside	• Retention pond needs to be dredged • Electrical problems causing excessive cycling	Dredge channel. Evaluate controls and level monitoring equipment to resolve cycling issue.
Freedom Circle	• No headwall or slope protection at outfall	Add slope protection to prevent erosion from undermining the pedestrian-bicycle path.
Laurelwood	• Overdue for equipment upgrade • Floats swing when pumps start, causing excessive cycling • Erosion present around outfall	New level monitoring system and replacement of sackcrete slope protection should be done along with pump, motor, and equipment upgrade.
Lick Mill	• Trash screen blinding causing excessive cycling • Undermining in station forebay	Consider reconfiguration of forebay to include tiered screens or full capture to meet NPDES requirements.
Nelo-Victor	• Needs new PLC	Update or replace PLC.
Rambo	• Needs new PLC	Update or replace PLC.
Santa Clara Golf Course	• Electrical room has experienced settling • Erosion present around outfall	Add or replace sack-crete slope protection.
Tri-Level Underpass	• Equipment out of date	Station overdue for 25th year renovations. Replace pumps, motors, electrical equipment, piping, and other equipment as necessary.
Westside	• Retention pond needs to be dredged • Electrical problems causing excessive cycling	Dredge channel. Evaluate controls and level monitoring equipment to resolve cycling issue.

6.4. New Pump Stations

As part of the Santa Clara CIP, three new pump stations and one pump station upgrade have been suggested. Pump station details are summarized in Table 6-3 and project locations are shown in Figure 6-2.

Table 6-3: New and Upgraded Pump Stations

Pump Station	Priority	Type	Capacity (cfs)	CIP Cost
Lake Santa Clara PS	Moderate	Upgrade	120	$9,000,000
Hwy 101 PS	Low	New	90	$6,800,000
Kaiser PS	Low	New	25	$2,000,000
Monroe PS	Low	New	120	$9,000,000
Total			**355**	**$26,800,000**

Figure 6-2: New Pump Stations and Upgrades Suggested as Part of CIP

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Chapter 7. Regulatory and Environmental Considerations

7.1. Overview

National, regional, and local regulatory guidelines and requirements did not necessarily affect how the storm drain systems were developed, but will need to be taken into consideration when implementing the master plan improvements recommended in Chapter 5. Consideration should be taken in the following areas:

- Floodplain management
- Storm water management
- Surface water protection
- Groundwater protection
- Riparian and wetland protection

The most significant regulatory requirements for storm water management in Santa Clara are found in the State of California's Construction General Permit (CGP) and the San Francisco Bay Municipal Regional Storm Water Permit (MRP) under the National Pollutant Discharge Elimination System (NPDES). This chapter provides a general outline of the various guidelines and legal and regulatory requirements applicable for floodplain management, storm water management, surface water and groundwater protection and riparian and wetland protection.

City and private projects within the riparian corridor or near a wetland may also be required to have environmental and water quality permits from the Santa Clara County Valley Water District (SCVWD), San Francisco Bay Area Regional Water Quality Control Board (RWQCB), California Department of Fish and Game, and the United States Army Corps of Engineers (USACE).

7.2. ~~City of Santa Clara~~Local Policy

The City of Santa Clara is responsible for ensuring compliance with Federal and State laws that regulate storm water. The City operates under the MRP (discussed in Section 7.3), through programs and policies which are outlined in the City Code Chapter 13.20: Storm Drains and Discharges:

(http://www.codepublishing.com/ca/santaclara/mobile/?pg=SantaClara13/SantaClara1320.html#13.20.010)

All master plan improvement projects are subject to City policy. The following sites provide additional useful information on City and County policies:

Storm Water Management
http://www.sccity.org/media/uploads/2012/08/13/files/2010_SWMP_Santa_Clara_City.pdf

Planning and Inspection Department
http://santaclaraca.gov/index.aspx?page=2445

Department of Public Works
http://santaclaraca.gov/index.aspx?page=1210

City of Santa Clara 2010-2035 General Plan

http://santaclaraca.gov/government/departments/planning-inspection/planning-division/general-plan

Santa Clara County Hydromodification Management Plan
http://eoainc.com/hmp_final_draft/

7.3. Development and the Municipal Regional Storm Water Permit

The City of Santa Clara is a member of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) which assists in managing a shared common Municipal Regional Storm Water NPDES Permit to discharge storm water to the San Francisco Bay which can be found here:

http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/mrp.shtml

The City is required to meet all storm water management requirements set forth by the MRP. The current MRP was adopted October 14, 2009 (Order no. R2-2009-0074), and became effective as of December 1, 2009. In February of 2015, the Regional Board released a draft MRP 2.0 which is meant to replace the 2009 permit by the end of 2015.

The MRP outlines the State's requirements for municipal agencies in the San Francisco Bay Area to address the water quality and flow-related impacts of stormwater runoff. The MRP is a comprehensive permit that requires activities related to construction sites, industrial sites, illegal discharges and illicit connections, new development, and municipal operations. The permit also requires a public education program, implementing targeted pollutant reduction strategies, and a monitoring program to help characterize local water quality conditions and to begin evaluating the overall effectiveness of the permit's implementation.

A 2013-2014 Work Plan developed by SCVURPPP (February 2013) provides detailed information regarding which required actions of the permit will be implemented at the Program level, co-permittee (i.e. City) level, and/or coordinated at the regional level. Co-permittee assistance with a Program- or regional-level activity consists of participation in ad hoc task groups or committees, review and approval of products, and/or sponsoring projects of regional benefit. The Program participates in many co-permittee activities by assisting with or developing guidance for implementation.

The requirements of the MRP will need to be considered during construction of all master plan improvements.

7.3.1. New Development and Redevelopment

Provision C.3 of the MRP outlines requirements for the use of post-construction storm water controls for new development and redevelopment projects meeting certain criteria. Post-construction storm water controls are permanent elements of a project intended to reduce pollutants in storm water and/or erosive flows after the project is completed. Measures include source control, low-impact development (LID) site design, and storm water treatment measures. Requirements apply to:

- Projects that create and/or replace 10,000 square feet or more of impervious surface
- Special land use projects defined in the MRP (including uncovered parking, restaurants, auto service facilities, and retail gasoline outlets) that create and/or replace 5,000 square feet or more of impervious surface;
- As of December 1, 2012, small projects (2,500 sq. ft. to 10,000 sq. ft. of impervious surface) that are not part of a larger development plan are also required to implement site design measures to treat runoff.

Redevelopment projects are those located on a previously developed site and will add or replace impervious surface. Projects that replace 50 percent or less of existing impervious surface are only required to treat runoff from the portion of the site that is redeveloped. Projects that replace more than 50 percent of existing impervious surface must treat runoff from the entire site.

Provision C.3.d requires that site design measures be hydraulically sized to treat site runoff. The SCVURPP C.3 storm water handbook (http://www.scvurppp-w2k.com/c3_handbook_2012.shtml) was written to assist developers, builders, and project applicants calculate pre- and post-project runoff and size site design measures to meet requirements of the Bay Area MRP. The handbook includes further guidance for implementation of individual treatment and site design measures, including best uses, advantages, limitations, vegetation requirements for landscape-based measures, standard details, and maintenance requirements.

7.3.2. Trash Load Reduction

Provision C.10 of the MRP outlines trash reduction requirements. Permittees are required to implement control measures reducing trash loads from baseline (2009) levels to meet the following percent-reduction schedule:

1. 60% by July 1, 2016;
2. 70% by July 1, 2017;
3. 80% by July 1, 2019;
4. 100% (no adverse impact to receiving waters) by July 1, 2022

Permittees are required to maintain trash load reduction plans describing implemented and planned trash reduction actions and trash generation areas where actions are or will be implemented. Annual reporting requirements include a detailed summary and schedule of trash control actions performed, updated trash generation area maps, operations and maintenance reports for installed systems, receiving water observations, volume removed for most recent five years of hot spot cleanup, and general progress toward attainment of a full trash capture system. It may be beneficial to implement planned trash reduction actions in conjunction with nearby improvements to the storm drain system suggested in this master plan.

7.3.3. Low Impact Development

As of December 1, 2011, the MRP requires Low Impact Development (LID) treatment requirements for all new development and redevelopment projects. The term LID refers to practices that reduce water quality impacts by preserving and re-creating natural landscape features, minimizing imperviousness, and using storm water as a resource, rather than a waste product. These measures include rainwater harvesting/reuse, infiltration, and evapotranspiration. If these measures are deemed infeasible, then bio-treatment can be used. It is likely in the future more and more emphasis will be placed on using the following technologies on construction sites recommended by the Water Board:

1. Bio-retention and Rain Gardens
2. Rooftop Gardens
3. Sidewalk Storage
4. Vegetated Swales, Buffers and Strips; Tree Preservation
5. Roof Leader Disconnection
6. Rain Barrels and Cisterns
7. Permeable Pavers
8. Soil Amendments
9. Impervious Surface Reduction and Disconnection
10. Pollution Prevention and Good Housekeeping

Because of the emphasis that the MRP puts towards using LID, there are numerous regional groups tracking the most up to date technologies on LID and the corresponding NPDES regulations. The following sites contain useful information for municipal staff, developers, general public, and elected officials to keep abreast with trends and policies in the often changing arena.

City of Santa Clara Public Works

http://santaclaraca.gov/index.aspx?page=126

CASQA

http://www.casqa.org/LID/tabid/240/Default.aspx

California State Water Resources Control Board

http://www.waterboards.ca.gov/water_issues/programs/low_impact_development/

SCVURPPP

http://www.scvurppp-w2k.com/

U.C. Davis

http://extension.ucdavis.edu/unit/center_for_water_and_land_use/low_impact.asp

BASMAA Development Committee

http://basmaa.org/BoardandCommittees/Development.aspx

Urban Design Tool

http://lid-stormwater.net/index.html

7.3.4. C.3 and Hydro-modification

Hydromodification ("hydrograph modification") is defined as a change in timing, peak discharge, and volume of runoff from a site resulting from land development. Development can result in faster rates and greater volumes of runoff. In natural channels, these high, fast flows can result in erosion. Hydromodification management (HM) requirements apply to projects that:

- Create and/or replace one acre or more of impervious surface
- Increase the amount of impervious surface on the site compared to the pre-project condition
- Are located in the drainage area of a creek that is susceptible to erosion (Natural creeks with drainages areas that consist of less than 65% impervious surface)

For projects that require HM measures, increases in runoff flow and volume must be managed such that post-project runoff does not exceed estimated pre-project runoff rates and durations. Hydromodification management requirements are discussed in detail in Appendix E of the SCVURPPP C.3 Handbook. The HM applicability map for Santa Clara is also shown in Appendix E.

7.3.5. Changes in MRP 2.0

The new permit that is expected to be issued sometime in 2015 does not drastically change the permit requirements. The MRP 2.0 maintains the same C3 size threshold of 10,000 square feet of impervious, but removes the grandfathering and states that special projects will no longer be allowed at the termination of MRP 2.0. In order to use LID credits for Special Projects, a feasibility/infeasibility report must be submitted.

In addition, the MRP 2.0 requires inspection of treatment measures during construction as opposed to within 45 days of installation. Pervious pavement and pavers are required to be inspected during construction and regular inspections post installation. HMP requirements remain the same in MRP 2.0.

7.4. Construction General Permit (CGP)

The State of California requires that dischargers obtain permit coverage for projects with construction activities that disturb one or more acres in accordance with Construction General Permit Order 2009-0009-DWQ. Construction activity subject to this permit includes clearing, grading, and land disturbances such as stockpiling or excavation. The permit excludes certain regular maintenance activities from obtaining coverage (e.g., routine maintenance of original line and grade, hydraulic capacity, or original purpose of the facility).

The CGP requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP includes a Water Pollution Prevention Drawing that identifies and locates Best Management Practices (BMPs) within the limits of work, and storm water discharge monitoring and sampling requirements. All master plan improvement projects are subject to the requirements of the CGP.

7.5. USACE

Under Section 404 of the Clean Water Act (CWA), the United States Army Corps of Engineers (USACE) regulates certain activities that "discharge dredged or fill material into waters of the United States." Waters of the U.S. are defined to generally include such resources as tidal waters, most rivers, lakes, and streams, and certain types of wetlands. Channel stabilization and stream maintenance activities that propose to place fill, e.g. culverts, gabions, rock rip rap, logs, etc., in the channel must obtain a permit from USACE.

USACE issues two types of permits under Section 404: general permits and standard (individual) permits. General permits are issued by USACE to streamline the permit process, while individual permits are more rigorously reviewed and are reserved for projects that impact more than 1/3 acre of tidal waters or non-tidal waters greater than 1/2 acre. Specifically, the USACE Nationwide Permit (NWP) program authorizes 43 different categories of activities, each of which is governed by specific conditions for the particular NWP, as well as 27 general conditions that apply to all NWPs.

A permit will need to be obtained from USACE for the construction of improvements that will impact waters of the US. This includes the alternation of existing outfalls, the construction of new outfalls, and any construction in a marsh, wetland, or tidal waters.

7.6. San Francisco Bay Conservation and Development Commission (BCDC)

On a regional level, the San Francisco Bay Conservation and Development Commission (BCDC) regulates projects proposing to fill, extract materials, or change the use of water, land, or structures in or around San Francisco Bay. Fill is very broadly defined to include (1) solid fill, such as dirt, concrete, wood, and structures, (2) pile-supported fill, such as fixed boat piers and docks, (3) floating fill, such as floating docks, houseboats, and vessels moored for extended periods of time, and even (4) structures cantilevered over the Commission's jurisdiction. The Commission's permit jurisdiction includes San Francisco Bay which is defined as any area within the greater San Francisco Bay up to mean high tide (except in areas of tidal marsh where the Commission's jurisdiction extends to 5 feet above mean sea level) and a "shoreline band" that extends 100 feet inland from areas subject to tidal action.

A study will need to be completed to determine which projects in Santa Clara fall under BCDC jurisdiction. Only the alternation of existing outfalls, the installation of new outfalls, and the replacement of creek culverts are expected to require permits.

7.7. Drainage Impacts of Improvement Projects

Construction of some of the CIP projects will increase or redistribute local flow into the receiving creeks. Certain highest, high and moderate priority projects will involve modification of existing outfalls and one pump station, requiring coordination with the Santa Clara Valley Water District. In order to evaluate the impact of the CIP on those receiving waters, outflows for the existing system and the improved system have been analyzed and compared in the District HEC-RAS models. Results show that the proposed improvement projects do not significantly impact the receiving creek systems. With the exception of San Tomas Aquino Creek, planned improvements do not significantly increase local discharges to the creeks and river. In addition, the storm drain runoff response to the coincident storm is shorter than the overall creek discharge response, which means the inflow hydrographs from the storm drain system are entering the creek before the peak flow in the creek systems occur, and thus there is little impact to 100-year creek discharges and water surface profiles.

As part of the evaluation of the storm drain systems described in Chapter 5, coincident water surface boundary conditions at each gravity outfall or pump station are calculated using the methodology described in Section 3.6.5. After improvements are identified, the consequent change to the receiving water surface boundary conditions is analyzed for two reasons: 1) to ensure storm drain system performance under improved conditions; and 2) to ascertain whether there are significant changes to water surface elevations and discharge characteristics in the creeks and river managed by the Santa Clara Valley Water District, noting that a change does not always mean an impact.

Changes and impacts to 100-year discharges and water surface profiles have been evaluated for Calabazas Creek, Saratoga Creek, San Tomas Aquino Creek, and the Guadalupe River. During coincident two-year and ten-year design events, creek and river levels are generally sufficiently low that free outfall conditions govern storm drain system performance, so an impact analysis has not been completed for these storms. Furthermore, no significant impacts are identified during the 100-year storm event, which indicates that there are also no significant impacts during more frequent storm events.

7.7.1. Impact to Calabazas Creek

The Lakeside Pump Station and 52 gravity outfalls discharge to Calabazas Creek from the Santa Clara side. As described in Chapter 5, two new outfalls to the creek are proposed as high priority capital improvements and three new outfalls are proposed as moderate priority capital improvements. Figure 7-1 shows the creek hydrograph and the storm drain hydrographs during the 100-year design, 24-hour storm event. There is very little increase in the storm drain inflow to Calabazas Creek due to improvements to the system. The 100-year profiles for Calabazas Creek are provided as Figure 7-2 through Figure 7-5, comparing water surface elevations after the highest, high and moderate priority CIP is completed, to water surface elevations with the existing storm drain system. The profiles show a very small increase in water surface elevation upstream of Highway 101 and UPRR Bridges; however, the increase is minimal and does not result in any additional overflow in terms of location or volume. The impacts of low priority CIPs are not considered herein, since such improvements are not likely to be completed in the foreseeable future.

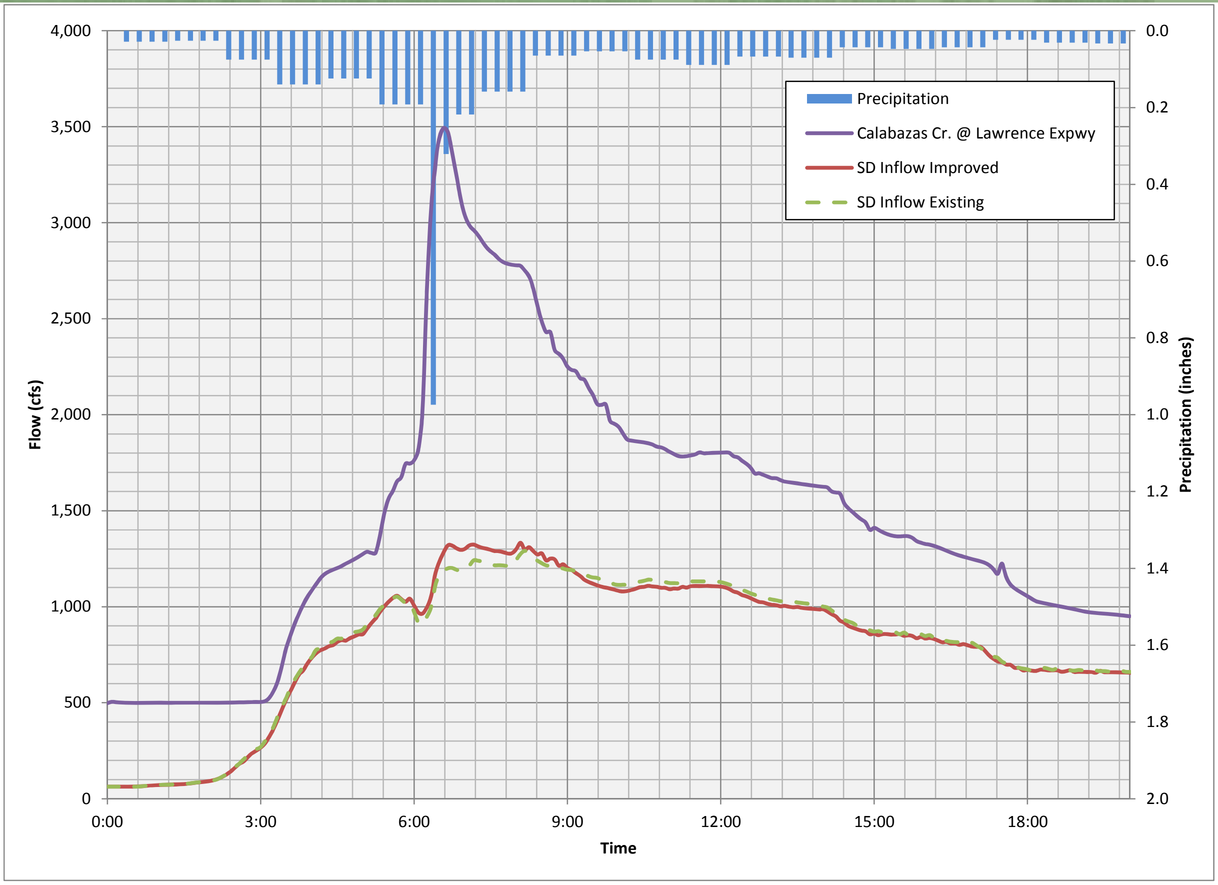

Figure 7-1: Calabazas Creek 100-year Water Surface Profiles for Existing and Improved Storm Drain System

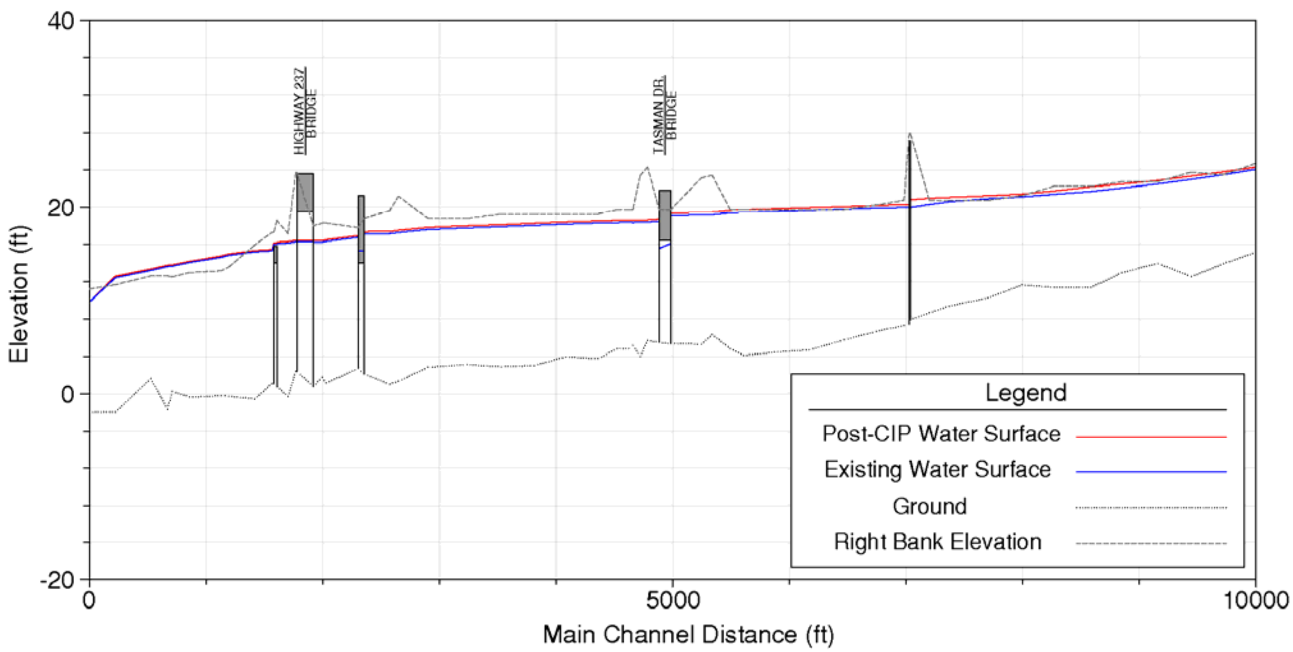

Figure 7-2: Calabazas Creek 100-year Water Surface Profiles for Existing and Improved Storm Drain System.

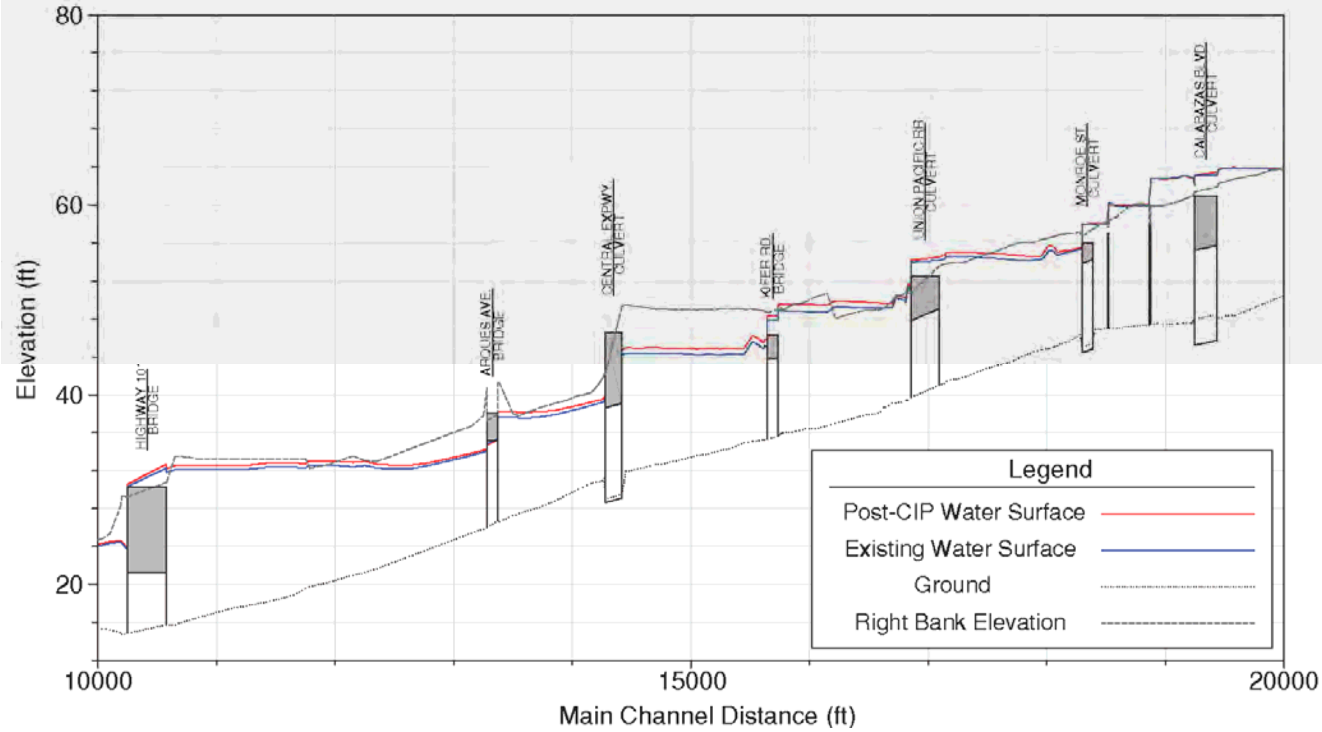

Figure 7-3: Calabazas Creek 100-year Water Surface Profiles for Existing and Improved Storm Drain System.

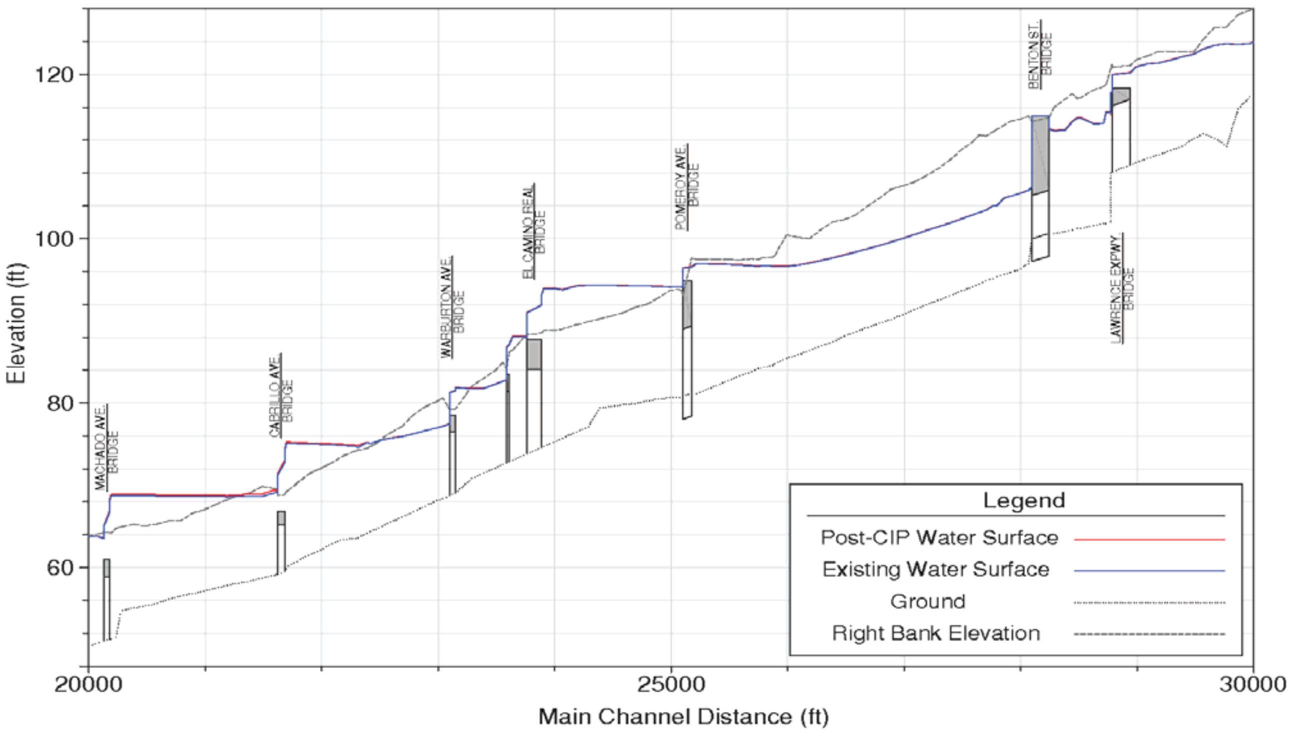

Figure 7-4: Calabazas Creek 100-year Water Surface Profiles for Existing and Improved Storm Drain System.

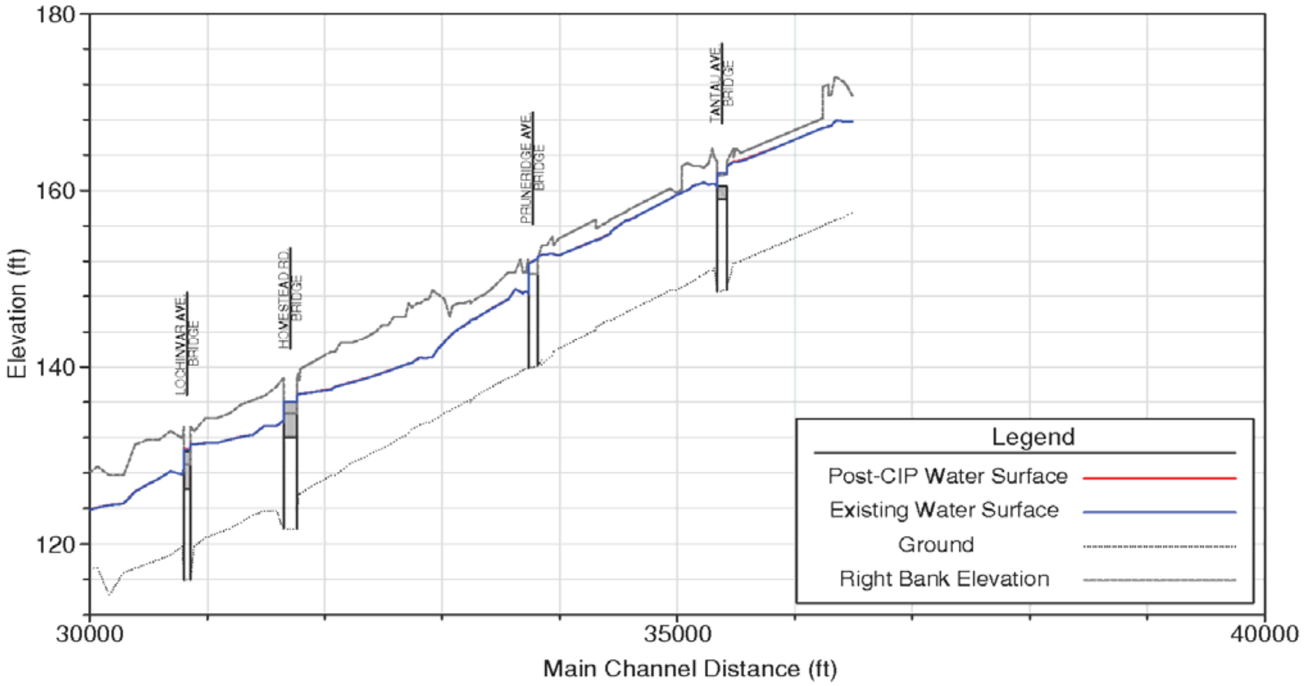

Figure 7-5: Calabazas Creek 100-year Water Surface Profiles for Existing and Improved Storm Drain System.

7.7.2. Impact to Saratoga Creek

There are no pump station outfalls to Saratoga Creek, but there are 45 gravity outfall discharges. As described in Chapter 5, one new outfall to the creek is proposed as a moderate priority capacity capital improvement. The storm drain outfalls response is much quicker than the overall creek response to rainfall, resulting in about a two hour lag between the peak of the creek and the peak of the storm drain outfalls. In addition, the storm drain inflows represent only 15% of the flow in the creek after the CIP is completed. Both these factors reduce the impacts the storm drain system improvements have on the capacity of the creek. Figure 7-6 depicts the hydrographs for the creek system and the storm drain system during the 100-year design 24-hour storm. The 100-year profiles for Saratoga Creek are provided as Figure 7-7 and Figure 7-8, comparing water surface elevations after the highest, high and moderate priority CIP is completed, to water surface elevations with the existing storm drain system. The profiles show very little difference between the existing storm drain inflows and the improved storm drain inflows after the CIPs are completed. The impacts of low priority CIPs are not considered herein, since such improvements are not likely to be completed in the foreseeable future.

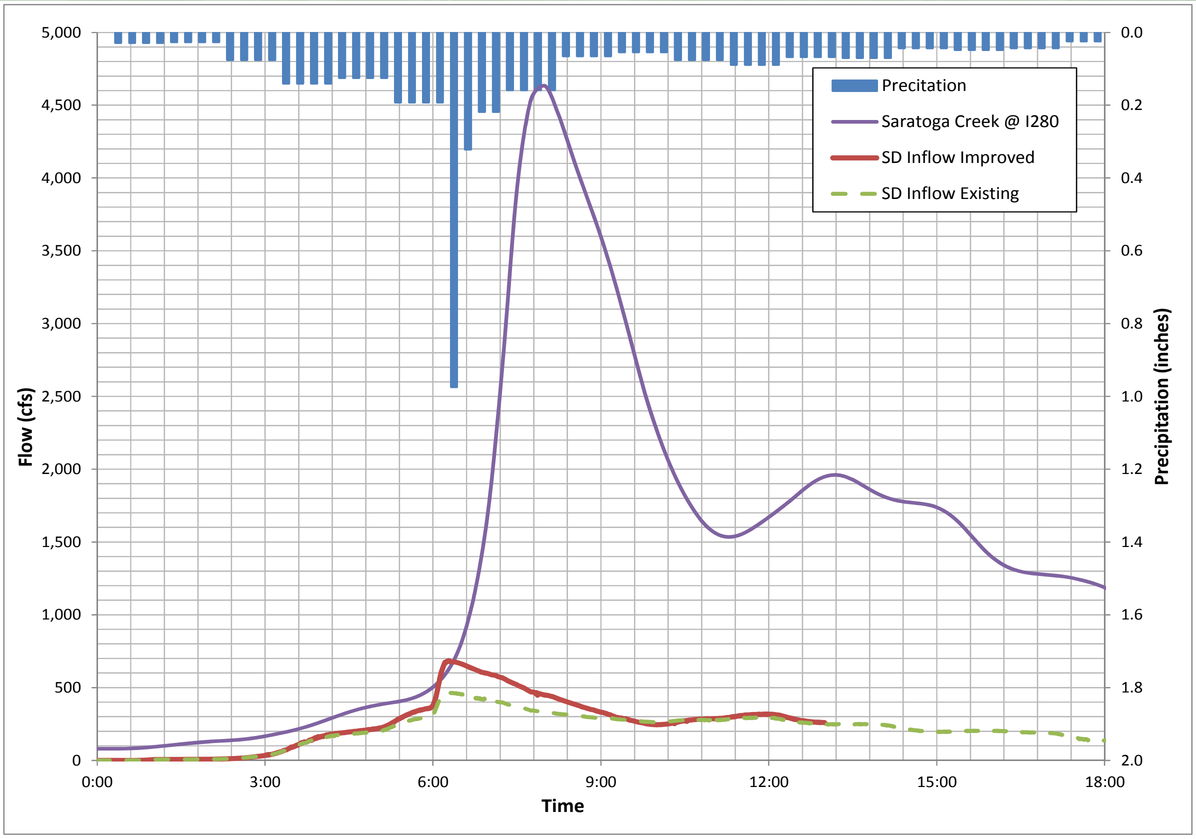

Figure 7-6: Saratoga Creek and Storm Drain Hydrographs.

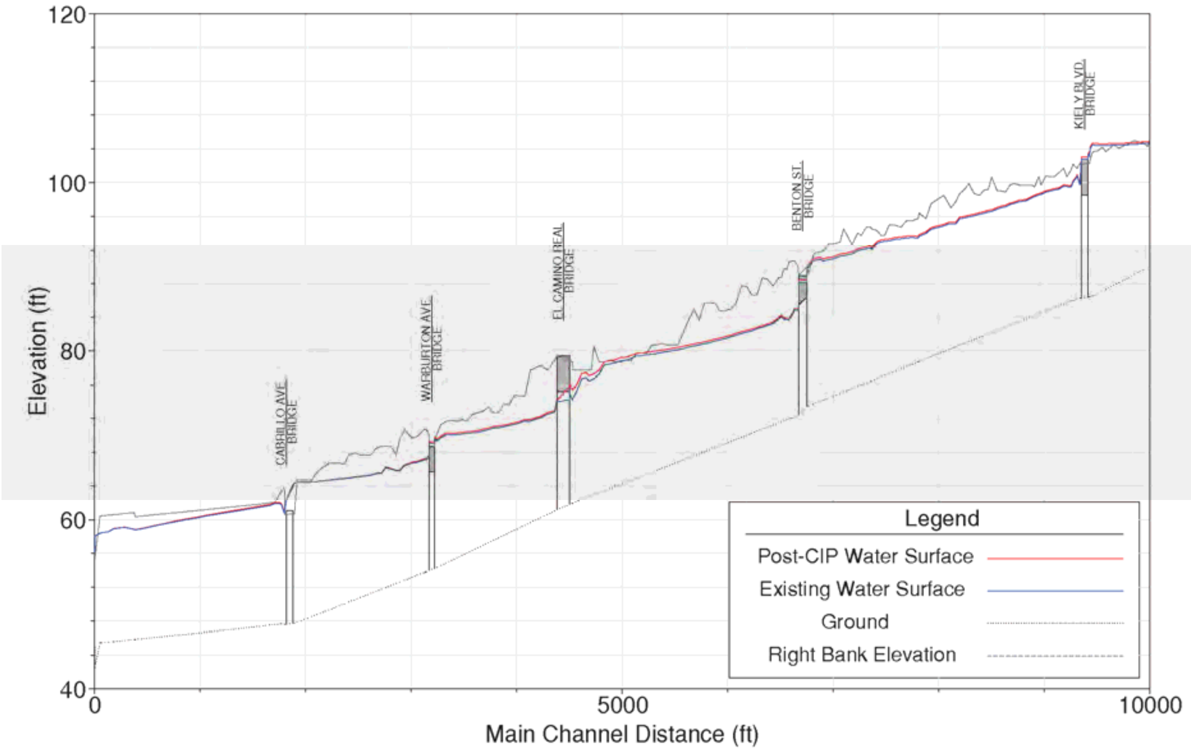

Figure 7-7: Saratoga Creek 100-year Water Surface Profiles for Existing and Improved Storm Drain System.

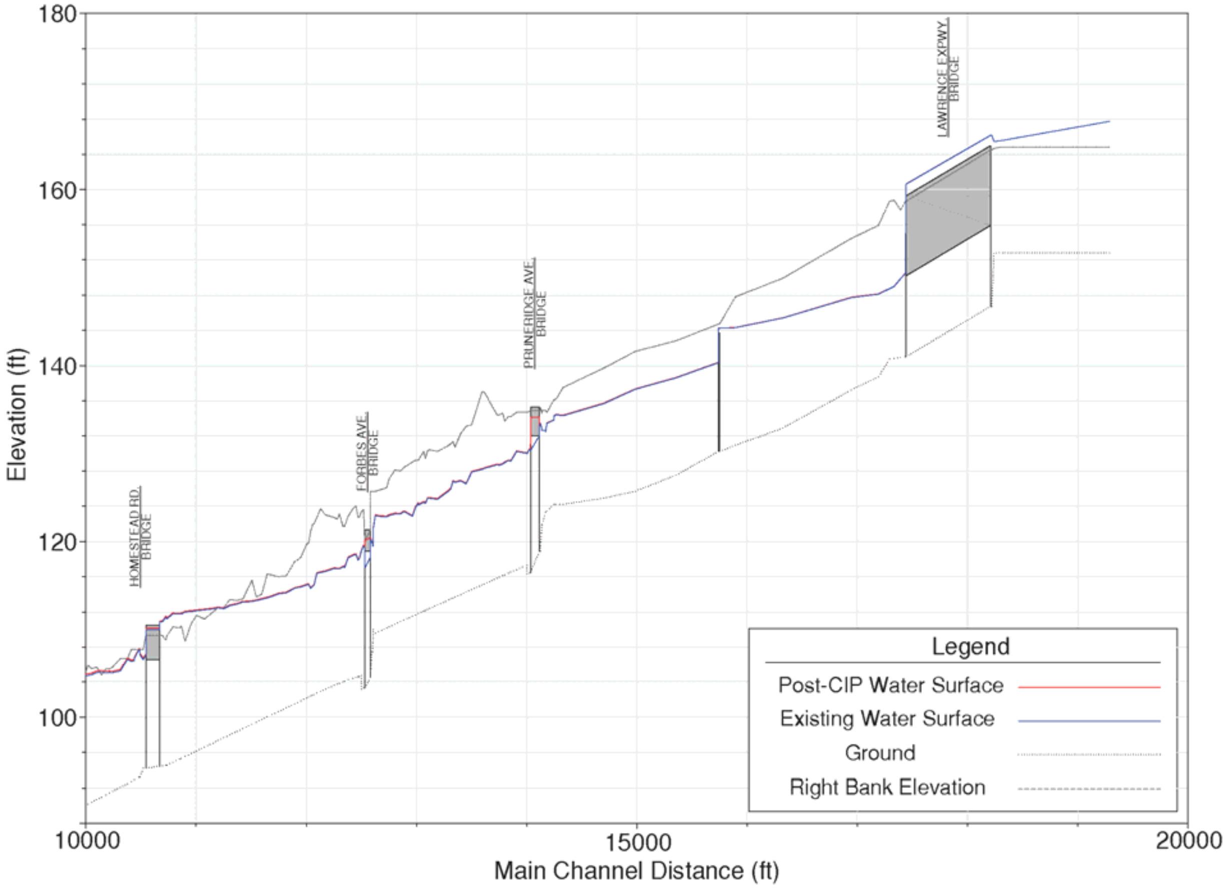

Figure 7-8: Saratoga Creek 100-year Water Surface Profiles for Existing and Improved Storm Drain System.

7.7.3. Impact to San Tomas Aquino Creek

Six pump stations outfall to San Tomas Aquino Creek between Highway 101 and Highway 237, and there are 80 gravity outfall discharges within City limits. As described in Chapter 5, five new creek outfalls are proposed as part of the highest priority CIP, the high priority CIP shows two additional outfalls, and the moderate priority CIP calls for yet another six. The storm drain inflows are roughly 30 percent of the creek flow and the timing difference between the peak creek discharge and the maximum storm drain inflow is about an hour. Although the improvements to the storm drain system do increase local inflows to the creek, the increase does not impact the water surface elevation beyond the existing storm drain outfall locations. Figure 7-9 depicts the hydrographs for the creek system and the storm drain system during the 100-year design 24-hour storm. High frequency fluctuations in the storm drain inflows are caused by pump cycling at Freedom Circle, Lake Santa Clara, and Rambo. The 100-year profiles for San Tomas Aquino Creek are provided as Figure 7-10 through Figure 7-15, comparing water surface elevations after the moderate priority CIP is completed, to water surface elevations with the existing storm drain system. Peak flows are added accordingly to show the increase in flows due to the existing and CIP storm drain inflows.

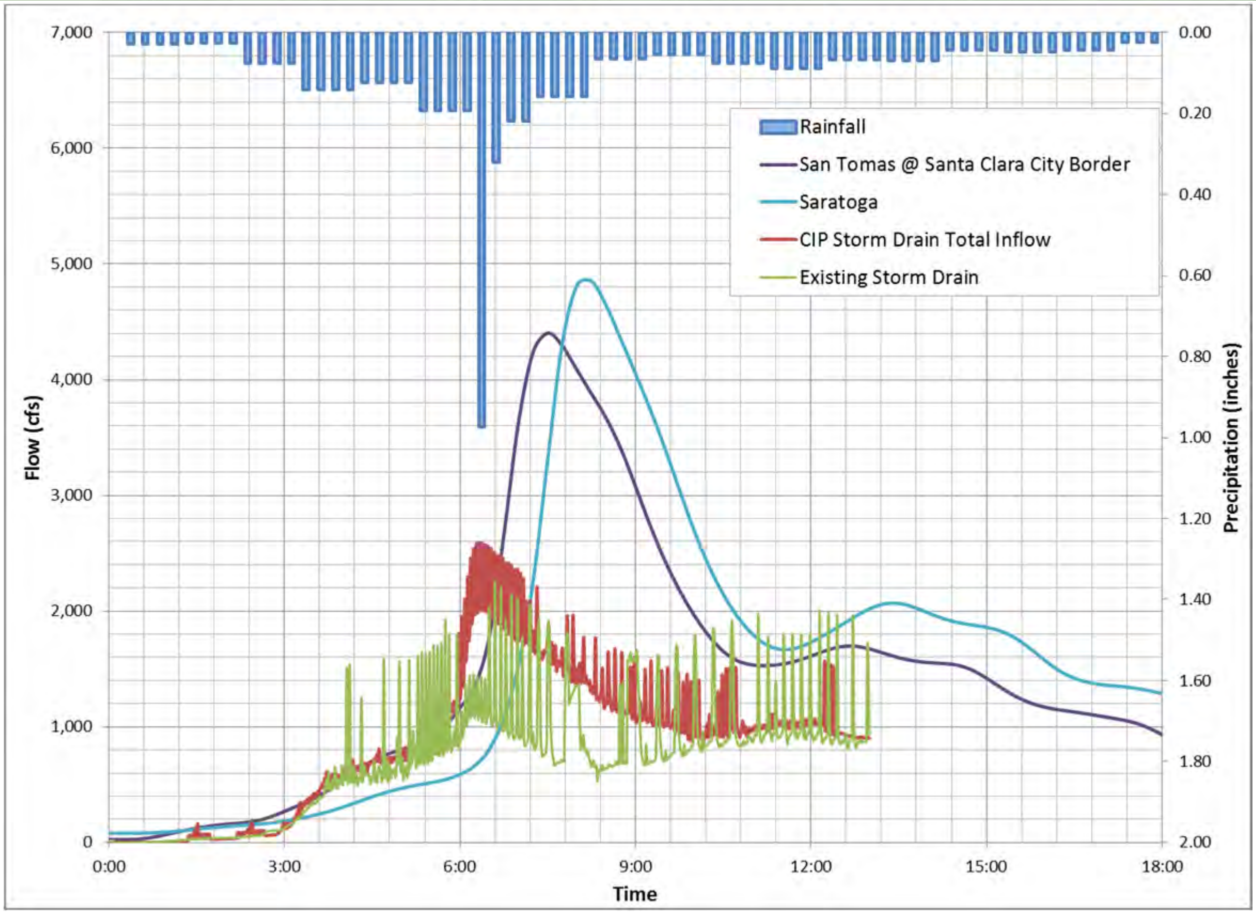

Figure 7-9: San Tomas Aquino Creek and Storm Drain Hydrographs (fluctuations due to pump cycling)

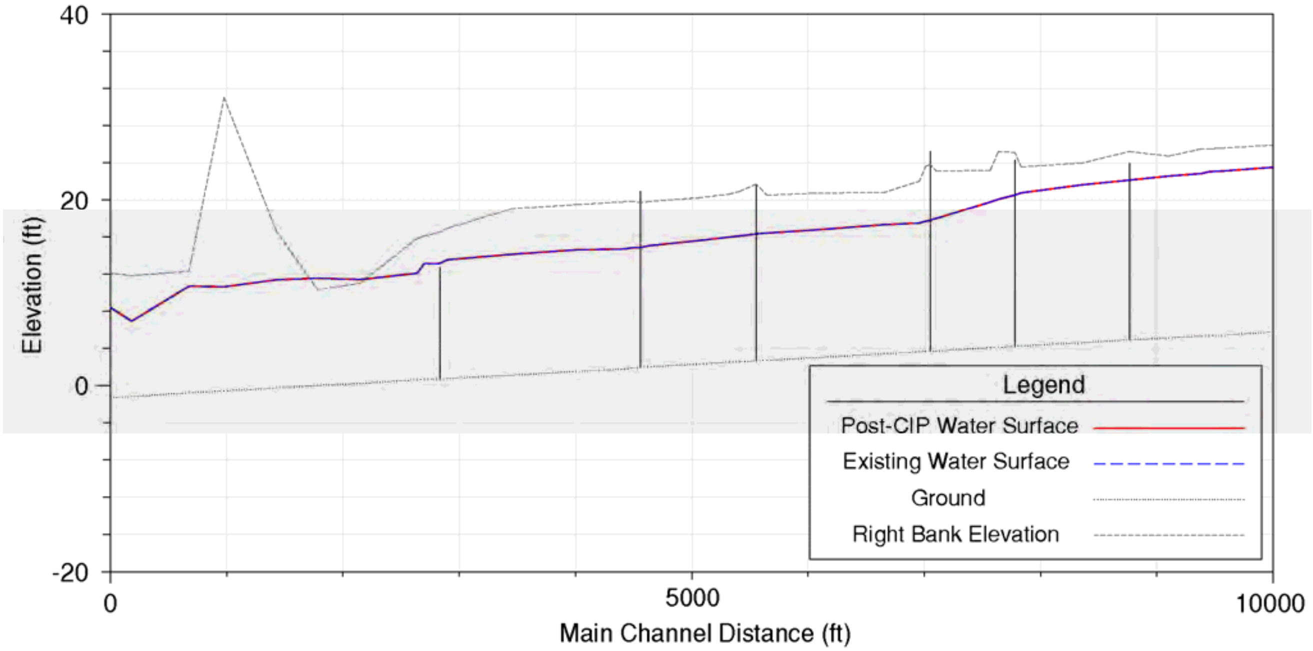

Figure 7-10: San Tomas Aquino Creek 100-year Water Surface Profiles for Existing and Improved System.

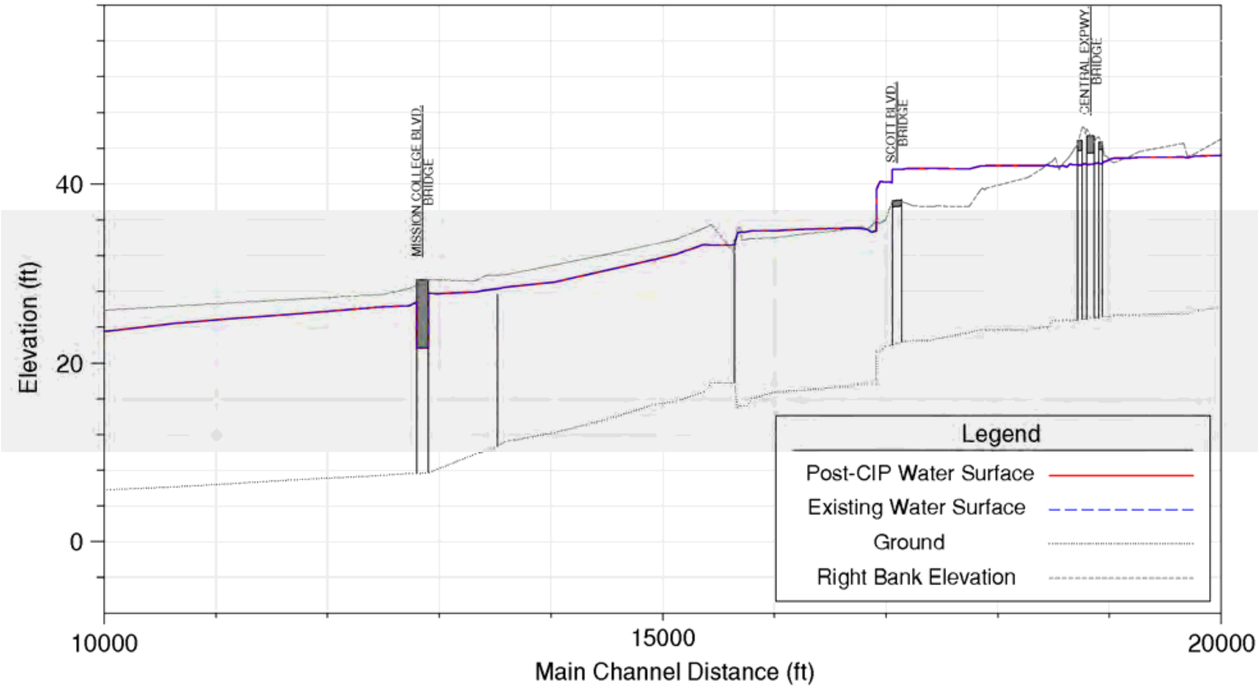

Figure 7-11: San Tomas Aquino Creek 100-year Water Surface Profiles for Existing and Improved System

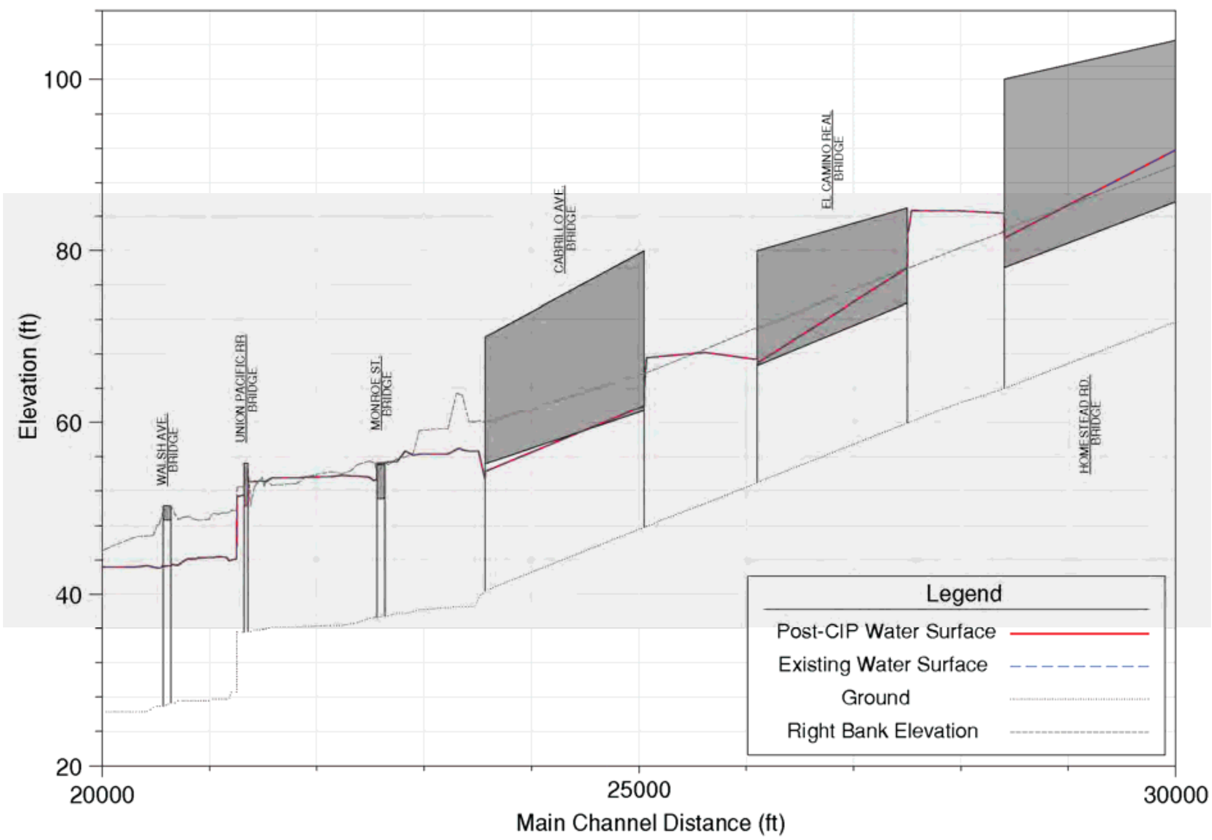

Figure 7-12: San Tomas Aquino Creek 100-year Water Surface Profiles for Existing and Improved System

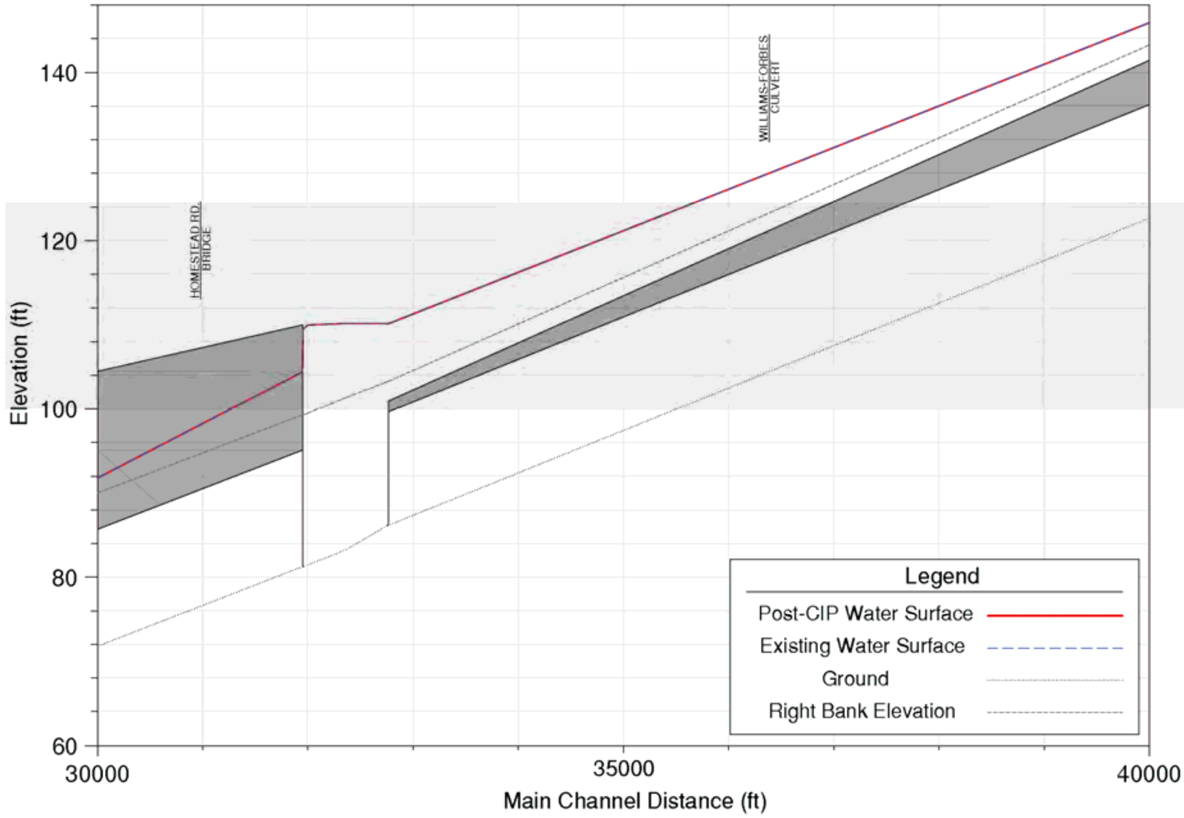

Figure 7-13: San Tomas Aquino Creek 100-year Water Surface Profiles for Existing and Improved System

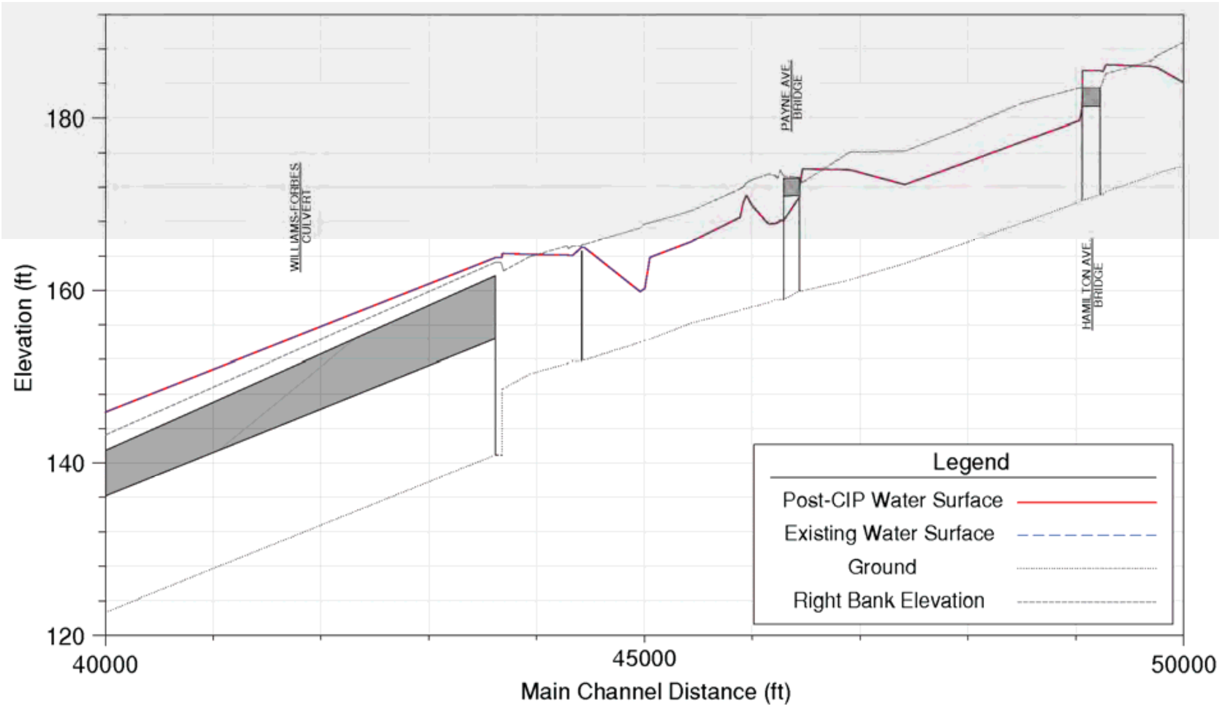

Figure 7-14: San Tomas Aquino Creek 100-year Water Surface Profiles for Existing and Improved System

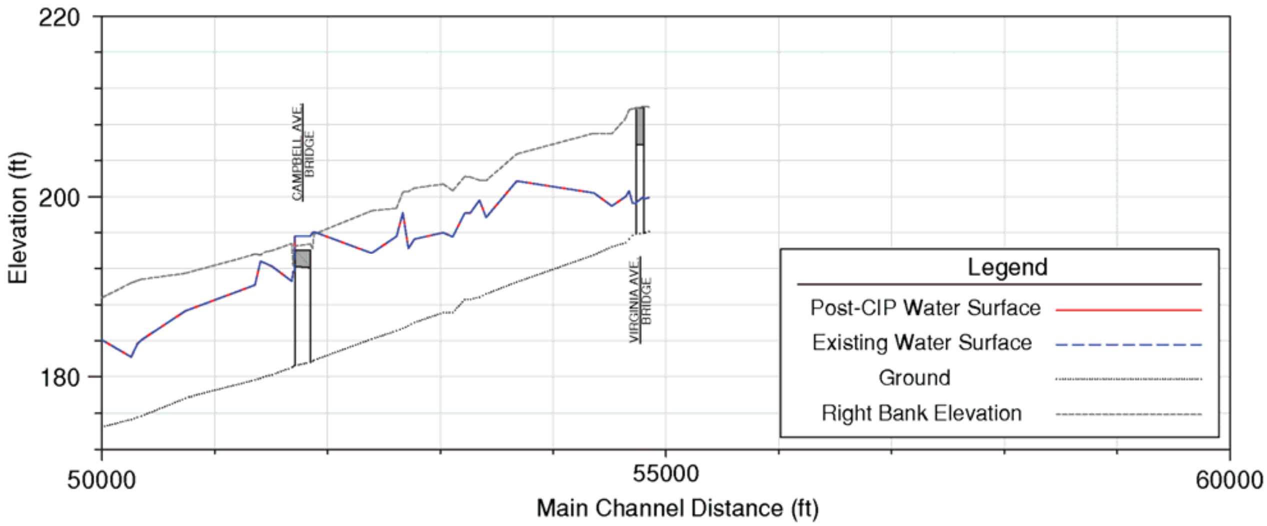

Figure 7-15: San Tomas Aquino Creek 100-year Water Surface Profiles for Existing and Improved System

7.7.4. Impact to the Guadalupe River

Six pump stations discharge to the Guadalupe River between Highway 101 and Highway 237, and there are seven additional gravity outfalls from the Santa Clara side. As described in Chapter 5, only one new river outfall is proposed by the moderate priority CIP. The Guadalupe River drains more than 150 square miles of tributary area and as a result, peak river discharge occurs nearly 8 hours later than peak local discharge, during extreme runoff events. The peak river flow is around 19,000 cfs, while the peak storm drain inflow is only 1,330 cfs. It is anticipated that the addition of one gravity outfall from Laurelwood Avenue (Figure 5-82) will not impact maximum 100-year water surface elevations in the Guadalupe River. Furthermore, there are no planned expansions in capacity to any of the six pump stations that presently discharge to the river. For this reason, no updates have been made to the Guadalupe River models. Figure 7-16 shows the rainfall response difference between the River and the storm drain system during the County's 72-hour event. It is not possible to change the hydrology on the Guadalupe River, so instead, the storm drain system is modeled on the same storm as the District's existing model. This figure shows that the river levels are relatively low when the peak of the local storm runoff discharges into the River.

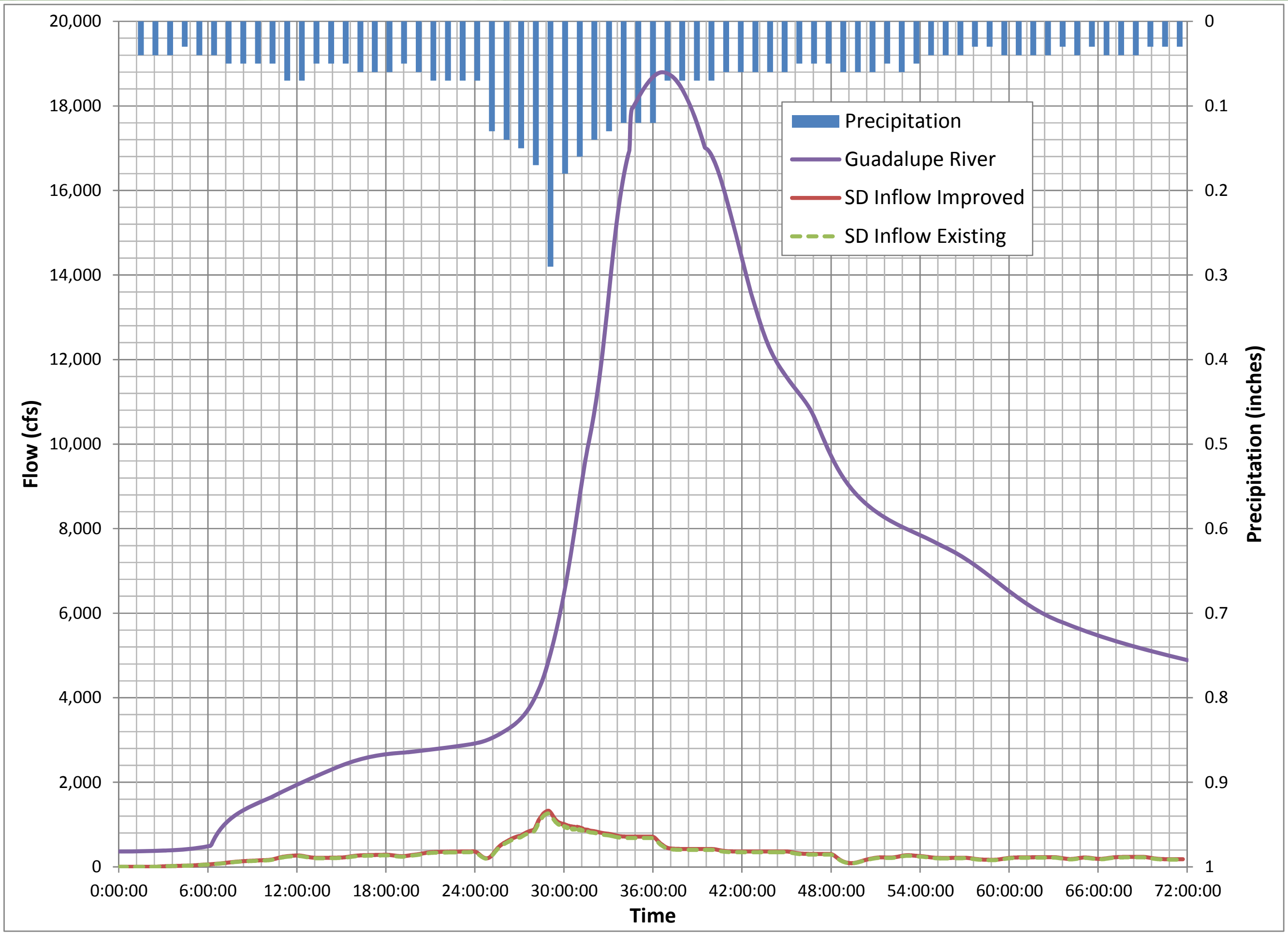

Figure 7-16: Guadalupe River and Storm Drain Hydrographs, District's 72-hour storm.

Chapter 8. Operations, Maintenance, and Replacement

This Chapter provides an overview of anticipated ongoing maintenance schedules, which include periodic replacement of major storm system components.

8.1. General Maintenance Criteria

It is recommended that the City regularly inspect the storm drain system facilities. This Master Plan does not comment on the condition of the storm drain system as a condition assessment was not part of the scope of work. The majority of the system is reinforced concrete pipe (RCP) which tends to have a longer life span than corrugated metal pipe (CMP). Regular inspection enables the City to keep a record of and repair deteriorating catch basins, manholes, and storm drain pipes and maintain a clean system. Trash capture systems should be regularly cleaned according to manufacturer recommendations to ensure proper performance during the wet season.

Table 8-1~~Table 8-1~~ presents very general criteria that may be useful in establishing maintenance regimens. Again, City staff will have the best feel for the necessary frequency and extent of ongoing maintenance on a system-by-system basis. Also, maintenance needs will fluctuate depending upon seasonal and annual factors, particularly the amount of precipitation; and to a lesser extent, the general climate.

It is vitally important that all collection, storage, and pumping systems be in working order prior to the start of the wet season near the end of October. Realizing the limited number of maintenance staff, and the limited number of hours in a year, it is a given that certain items will have higher priorities than others.

Table 8-1: Storm System Maintenance Guidelines

Category	Schedule
Inlet inspection	annually (summer-fall)
Inlet cleaning	as required (ongoing)
Storm drain pipe cleaning	continuous if possible (ongoing)
Channel cleaning	annually (fall)
Detention basin dredging	every ten years
Trash capture device cleaning	prior to wet season and after large storms
Pump stations	See Section 8.3

8.2. Storm Drain Collection System Maintenance

The storm drain system cannot function if one of its components is plugged, and whether hydraulic analysis says criteria are met, blocked inlets or pipes will cause flooding; potentially with serious consequences. Although even the most rigorous maintenance programs cannot prevent all problems during every event, it is important that problems do not accumulate.

Based on system history, the most significant problems occur in residential areas where tree leaves and debris block inlets and commercial areas where trash can build up in the curb gutters. The majority of the City is flat with mildly sloped which allows for sediment and debris to deposit in the pipes. Another area of concern is where so-called “self-cleansing” velocities of two feet per second (2 ft/s) are not maintained even with significant runoff. This may occur in larger diameter pipelines, particularly in the terminal drainage areas near pump stations, where the collection system has been designed to handle the 100-year discharge, and pipes are continuously submerged in water.

Maintenance techniques may include grate cleaning, inlet flushing, pipe flushing (hydro-jetting), balls and mandrels for cleaning, vactoring (similar to sanitary sewers), and personnel physically entering storm pipes to remove accumulated debris by hand.

8.3. Storm Water Pump Station Maintenance

Each pump station should have a bound copy of its site-specific operations and maintenance manual on site; and all personnel need to be familiar with the contents of the manuals. Proper equipment lubrication and maintenance following manufacturer's recommendations is essential to efficient operation and longevity, particularly when one considers how infrequent pump operation may be. For this reason it is also recommended that any pump station control system that does not automatically alternate lead and lag pump status be retrofitted so that each pump within a station operates roughly the same number of hours every year.

Large axial flow pumps are the predominant pump type in the system. Shafts and bearings need to be periodically balanced and/or replaced. The frequency of inspection (where pumps need to be pulled out of the building) will vary depending upon the L-10 bearing life rating of the pump in question. The AFBMA (the Anti-Friction Bearing Manufacturers Association) defines L-10 as the bearing life associated with a 90% reliability when operating under conventional conditions, i.e., after a stated amount of time, 90% of a group of identical bearings will not yet have developed metal fatigue. Average bearing life, or the L-50, is defined as the operating hours at which half of the group of bearings fail and the rest continue to operate. The AFBMA defines average life (L-50) statistically as three to five times the L-10 life.

Manufacturer's maintenance instructions for engine drive units and standby engine-generators should be followed exactly, particularly while the engine is under warranty. Maintenance schedules depend somewhat on whether the engine is used as the prime pump driver (as in most stations), or is on standby (such as for backup power generation). A typical schedule of maintenance based on references provided by Cummins/Onan (Sanks, 1989) is provided in Table 8-2, giving both operating hours and calendar time.

Diesel engine generators should be operated at full power for at least 15 to 30 minutes after reaching operating temperatures once a month to eliminate carbon deposits. Unfortunately, without significant storm water inflow to the station, generators cannot be run under load for any significant length of time (the water quickly runs out). Pump stations can be designed with recirculation piping so that the engines and pumps can be tested and exercised; however, it may be cost prohibitive to retrofit a recirculation system onto existing pump stations

Table 8-2: Typical Maintenance Frequency for Engines and Generator Sets

Maintenance Task	Operating Time	Calendar
Inspect fuel, oil level, coolant	8 hr	1 mo
Inspect air cleaner, battery	50 hr	1 yr
Clean governor linkage, breather, air cleaner	100 hr	1 yr
Clean fuel filter, replace oil filter, change	200 hr	1 yr
Clean commutator, collector rings, relays, cooling system; inspect brushes, valve clearances, starting and stopping systems, water pump	500 hr	1 yr
Check injectors, grind valves (if required), remove carbon, clean oil passages, replace secondary fuel filter, clean generator, grease bearings	1000 hr	---

8.4. System Replacement

Most of the City's pipes and structures are constructed with reinforced concrete. Reinforced concrete pipes (RCP) are expected to last 50 years or more in non-corrosive environments, while corrugated metal pipes (CMP) are more prone to corrosion and require replacement at 50 years. System breaks, joint misalignment, and other problems do occur, of course, so periodic collection system rehabilitation has been included with the estimated annual maintenance cost.

The 2010 Storm Drain Pump Station Evaluation contains a replacement schedule for all of the City's pump stations. On average, pumping equipment is expected to last anywhere from 20 to 30 years, provided a proper maintenance schedule is followed. The evaluation assumes a 25-year replacement schedule for all equipment within the pump stations. The replacement schedule, adjusted to present cost values, is shown in Table 8-3.

Table 8-3: Long-Term Pump Station Replacement Schedule

Pump Station	25th Year	Replacement Cost	50th Year	Replacement Cost	75th Year	Replacement Cost
Bowers Ave Underpass	1999	$340,000	2024	$10,000	2049	$340,000
City Hall – East Wing	1989	$170,000	2014	$10,000	2039	$170,000
City Hall – West Wing	1989	$170,000	2014	$10,000	2039	$170,000
Eastside Retention Basin	2030	$910,000	2055	$350,000	2080	$910,000
Fairway Glen	2014	$3,490,000	2039	$660,000	2064	$3,490,000
Freedom Circle	2026	$1,430,000	2051	$1,310,000	2076	$1,430,000
Gianera	2021	$1,420,000	2046	$310,000	2071	$1,420,000
Golf Course	2012	$740,000	2037	$430,000	2062	$740,000
Lafayette Over\Underpass	2001	$290,000	2026	$10,000	2051	$290,000
Lafayette Subway	1988	$270,000	2013	$10,000	2038	$270,000
Lake Santa Clara	2011	$430,000	2036	$20,000	2061	$430,000
Lakeside	2023	$1,110,000	2048	$680,000	2073	$1,110,000
Laurelwood	2011	$1,180,000	2036	$730,000	2061	$1,180,000
Lick Mill	2013	$3,070,000	2038	$1,320,000	2063	$3,070,000
Nelo Victor	2029	$1,780,000	2054	$430,000	2079	$1,780,000
Police Pistol Range	2004	$170,000	2029	$10,000	2054	$170,000
Rambo	2026	$1,310,000	2051	$740,000	2076	$1,310,000
Shulman	2004	$120,000	2029	$10,000	2054	$120,000
Tasman	2015	$220,000	2040	$10,000	2065	$220,000
Tri-Level Underpass	2000	$190,000	2025	$10,000	2050	$190,000
Westside Retention Basin	2026	$1,310,000	2051	$770,000	2076	$1,310,000

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Chapter 9. Capital Improvement Plan

9.1. Overview

Chapters 5 and 6 discuss Santa Clara's storm drain collection system and recommend prioritized capital improvements to address known and modeled deficiencies. This chapter provides a Capital Improvement Program (CIP) that recognizes these priorities. The CIP provides an overall guideline for the City to use as a tool in preparing annual budgets. Exigent circumstances and future in-field experiences may necessitate deviations from the Storm Drain CIP. A master plan is intended to be a tool for planning. Capital improvement priorities are not intended to be hard and fast.

The CIP does not include the cost of new facilities related to new development (e.g., pipeline extensions to serve areas that are currently undeveloped). These new facilities may be constructed as part of the new developments, and are not included in the CIP.

9.2. Capital Improvements Priorities

The proposed CIP for storm drainage in Santa Clara is broken into four priority levels for the purpose of funding and implementation. The total cost summary for CIP projects is shown for each priority level in Table 9-1.

Table 9-1: Summary of CIP Costs Based on Priority Level (total project cost)

Priority Level	Cost
Highest Priority Capital Improvements	$13,350,000
High Priority Capital Improvements	$39,870,000
Moderate Priority Capital Improvements	$97,700,000
Low Priority Capital Improvements	$118,600,000
Total Capital Improvement Program	**$269,500,000**

The above costs include at least an additional 40% for design, administration, and construction management, and contingency. Project subtotals (cost of pipe demolition and replacement), construction totals (including traffic control, mobilization, demobilization, and contingency), and CIP totals (including design and engineering costs) are detailed in Appendix B.

9.3. Open Trench Improvements

Two essential types of projects are traditionally utilized to increase storm drain system capacity:

- Install a new relief storm drain parallel to the system lacking capacity, or
- Replace the overloaded pipe with larger diameter pipe in the same alignment.

The two alternatives can be made equivalent to one another using the following formula, assuming that pipe material and length are equal:

$$D_R = (D_e^{2.63} + D_p^{2.63})^{0.38}$$

Where D_R = diameter of replacement pipe;

D_e = diameter of overloaded pipe; and

D_p = diameter of parallel relief drain.

Assuming the existing pipe is adequate in terms of condition, the installation of a new parallel pipe is typically more cost effective than pipe replacement because the required pipe size is smaller and the existing pipe does not need to be removed. This does not take into account the long term maintenance associated with a parallel system. The selection of a capacity improvement strategy will vary from project to project, and be governed by field constraints such as conflicting utilities, rights-of-way, environmental concerns, permit requirements and traffic control.

9.4. Trenchless Improvements

Traditional cut and cover methods of construction will likely be employed for a large portion of the storm drain improvements. However, the utilization of trenchless methods such as bore and jack, directional drilling, cured-in-place pipe (CIPP), slip-lining, pipe bursting, and others, may increasingly find application in special circumstances where existing development encroaches upon the pipe alignment, or disruption of other services and land uses is too costly. These trenchless methods also have their own constraints and should be chosen based on pipe material, access, and other site specific circumstances.

Rehabilitating CMPs accounts for the majority of condition related improvement. Using a CIPP is the preferred method for rehabilitating CMP storm drains or culverts because of the ease of installation and the liner will provide structural stability. Although a CIPP decreases the diameter slightly, it will typically maintain or improve the hydraulic characteristics of the storm drain facility due to the lower roughness coefficients. A detailed analysis should be completed during detailed design to determine if a CIPP liner will maintain adequate capacity for a given site.

9.5. Cost Basis for Improvements

Costs have been estimated using information from other projects, cost estimating guides (*2014 Current Construction Costs,* Saylor Publications, Inc.), and engineering judgment. All estimates are based on the ENR May 2015 index of 11,173. The cost per linear foot of improvement used for the pipe cost estimates are given in Table 9-2, and assume replacement pipe is installed using the open trench method *(note that these costs <u>do not</u> include the cost of design, administration, and contingency included in all other tables).* Costs are likely to vary greatly depending on site specific circumstances and the economic climate at the time of bidding; in some cases it may be more practical to use trenchless methods or a parallel pipe for construction. These cost estimates are also based on larger scaled projects and thus, the replacement of shorter lengths of pipe as individual projects may incur significantly higher costs due to the nature of construction work.

As per our estimates, connection (manhole or catch basin) replacement cost estimates depend on connecting pipe diameters and depth and ranged from $12,134 (18-inch pipe with three feet of cover) to $28,911 (96-inch pipe with 20 feet of cover). New outfall costs are estimated to be $40,000 per new outfall. It should be noted that wide variations in actual outfall costs are expected due to location of outfall, whether energy dissipation is required, environmental concerns, etc. Since most of these improvement projects are expected to qualify for negative declarations from permitting agencies, these costs do not include permitting or any environmental documentation. Unit costs for three feet of pipe cover are shown in Table 9-2. More detailed unit costs, accounting for greater pipe cover depths are provided in Appendix C.

Table 9-2: Storm Drain Replacement Unit Costs for 3 feet of pipe cover

Diameter (inches)	2015 Dollar per Linear foot of Pipe	2015 Dollar Per Connection
12	$217	$11,870
18	$270	$12,134
21	$301	$12,266
24	$330	$12,398
27	$375	$12,530
30	$408	$12,662
33	$445	$12,794
36	$481	$12,926
42	$558	$13,190
48	$641	$13,454
54	$738	$14,559
60	$827	$14,860
66	$937	$16,176
72	$1,084	$16,510
84	$1,463	$18,849
96	$1,742	$20,721

Note: These costs do not include increases for design, administration, and for contingency included in all other tables. Unit costs are based on an average 3 feet of ground cover over the pipe. Greater cover will raise estimated costs.

9.6. Capital Improvement Program

9.6.1. Storm Drain Improvement CIP

The CIP costs and pipe lengths based on priority level are summarized in Table 9-3~~Table 9-3~~ and Figure 9-1~~Figure 9-1~~. Individual project costs are summarized in Table 9-4~~Table 9-4~~. Maps of the improvement priorities with pipe diameters are shown in Chapter 5. Detailed project sheets with required replacement pipe and alternative parallel pipe diameters are included in Appendix D.

Table 9-3: Summary of Prioritized SDMP CIP - Project Costs

System		Highest[1]	High[1]	Moderate[1]	Low[2]	Total
Calabazas	Length (ft)	--	6,100	7,660	21,360	35,120
	Cost	--	$5,200,000	$5,500,000	$29,700,000	$40,400,000
Saratoga	Length (ft)	--	--	4,990	14,610	19,600
	Cost	--	--	$4,800,000	$9,800,000	$14,600,000
San Tomas	Length (ft)	12,750	10,930	46,170	44,740	114,590
	Cost	$13,000,000	$14,800,000	$60,200,000	$41,600,000	$129,600,000
Guadalupe	Length (ft)	700	15,970	14,810	38,080	69,560
	Cost	$400,000	$19,900,000	$27,200,000	$37,500,000	$85,000,000
Total	**Length (ft)**	**13,450**	**33,000**	**73,630**	**118,790**	**238,870**
	Cost	**$13,400,000**	**$39,900,000**	**$97,700,000**	**$118,600,000**	**$269,500,000**

1. *Projects that improve capacity for the 2- and 10-year storm event condition.*
2. *Projects that improve capacity for the 100-year storm event.*

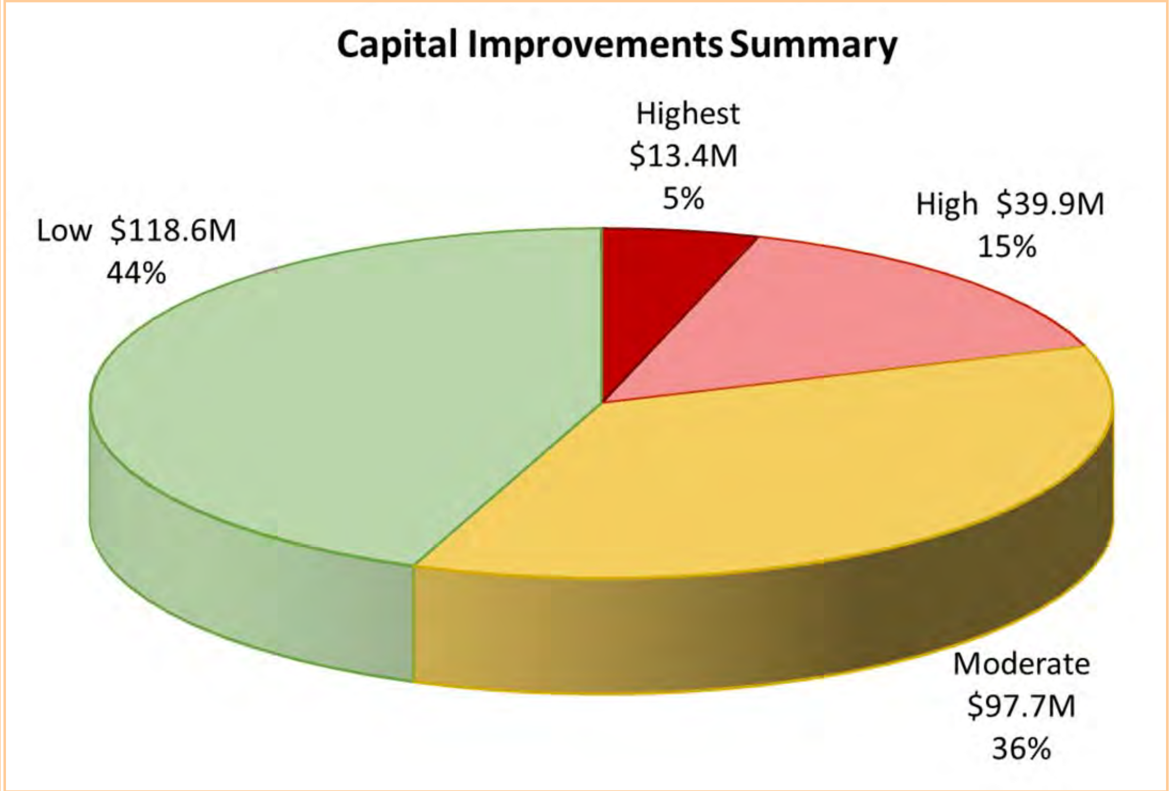

Figure 9-1: Storm Drain CIP Summary Chart

Table 9-4: Prioritized Storm Drain System CIP

ID	Pipe Projects	Priority	Pipe Length	Connections	Outfalls	Pump Station	CIP Total
1	**Anna**	**Highest**	**2,044**	**12**	**1**		**$1,950,000**
2	**Harrison**	**Highest**	**3,182**	**15**	**1**		**$2,390,000**
3	**Homestead and Maryann**	**Highest**	**4,691**	**21**	**1**		**$7,040,000**
4	**Los Padres and Warburton**	**Highest**	**2,833**	**12**	**1**		**$1,620,000**
5	**Washington and Santa Clara**	**Highest**	**695**	**3**	**0**		**$350,000**
6	Agate and Bowers	High	4,950	19	0		$7,700,000
7	Alviso	High	1,242	5	0		$700,000
8	Burton	High	1,468	6	0		$2,830,000
9	Carmel and Harrison	High	252	1	0		$130,000
10	De La Cruz and Guadalupe	High	3,985	17	0		$6,270,000
11	Fowler and Calabazas	High	1,302	8	1		$1,410,000
12	Homestead and Layton	High	1,516	9	1		$2,020,000
13	Leith	High	3,166	14	0		$5,160,000
14	Main and Shluman	High	2,454	12	0		$4,510,000
15	Manchester and Washington	High	2,281	14	0		$1,380,000

Table 9-4: Prioritized Storm Drain System CIP

ID	Pipe Projects	Priority	Pipe Length	Connections	Outfalls	Pump Station	CIP Total
16	Park and Bellomy	High	2,931	12	0		$1,840,000
17	Royal and Cabrillo	High	2,736	11	1		$2,100,000
18	St Lawrence and Calabazas	High	4,798	19	1		$3,820,000
19	Bowers and Chromite	Moderate	1,941	10	0		$2,330,000
20	Bowers and Monroe	Moderate	4,630	14	1		$4,020,000
21	Caltrain and San Tomas Aquino	Moderate	2,789	15	1		$4,110,000
22	Condensa	Moderate	2,578	11	1		$5,430,000
23	De La Pena and Homestead	Moderate	3,310	18	0		$2,860,000
24	El Camino Real and Calabazas	Moderate	3,832	14	1		$3,030,000
25	Forbes	Moderate	279	1	0		$140,000
26	Halford and Tamarack	Moderate	805	3	0		$470,000
27	Harold and San Tomas Aquino	Moderate	6,760	27	0		$8,340,000
28	Juanita and Saratoga	Moderate	1,813	11	0		$1,050,000
29	Juliette	Moderate	1,955	15	0		$2,350,000
30	Kiely	Moderate	4,150	15	1		$4,180,000
31	Lafayette and Laurelwood	Moderate	10,469	47	0		$21,890,000
32	Lake Santa Clara PS	Moderate	1,390	10	1	$9,030,000	$10,710,000
33	Landeros and Gamblin	Moderate	2,010	8	1		$1,460,000
34	Los Padres	Moderate	3,040	12	0		$3,030,000
35	Machado	Moderate	590	3	0		$360,000
36	Main	Moderate	591	3	0		$420,000
37	Melody	Moderate	509	4	1		$360,000
38	Oakmead and Scott	Moderate	682	4	0		$450,000
39	Patricia	Moderate	197	2	1		$250,000
40	Princeton and Homestead	Moderate	839	4	0		$620,000
41	Richard and Scott	Moderate	8,295	29	1		$11,210,000
42	Salberg and Barcells	Moderate	2,119	7	0		$1,280,000
43	Scott and Anna	Moderate	2,390	9	0		$1,180,000
44	St Ignatius	Moderate	695	3	1		$460,000
45	Tahoe and Enochs	Moderate	296	4	0		$230,000
46	Tannery	Moderate	180	1	0		$170,000
47	Victor	Moderate	882	5	0		$650,000
48	Victoria	Moderate	455	2	0		$260,000
49	Walsh	Moderate	233	1	0		$130,000
50	Walsh and De La Cruz	Moderate	2,632	12	0		$4,070,000
51	Warburton and Nobili	Moderate	299	1	0		$170,000
52	Aldo and Woodward	Low	3,114	12	0		$2,300,000
53	Barcells	Low	646	2	0		$340,000
54	Bassett	Low	256	2	0		$170,000

Table 9-4: Prioritized Storm Drain System CIP

ID	Pipe Projects	Priority	Pipe Length	Connections	Outfalls	Pump Station	CIP Total
55	Bellomy and Newhall	Low	4,462	19	0		$2,520,000
56	Benton	Low	2,837	9	1		$2,300,000
57	Benton and Calabazas	Low	3,619	18	1		$2,820,000
58	Benton and Sherman	Low	3,959	21	0		$4,390,000
59	Bowers 101 South Ramp	Low	1,350	4	0		$1,730,000
60	Bowers Overflow	Low	1,317	1	0		$690,000
61	Brookdale and Calabazas Creek	Low	2,255	11	1		$1,620,000
62	Bucher Overflow	Low	1,934	2	0		$1,800,000
63	Cabrillo and UPRR	Low	1,326	7	0		$870,000
64	Calabazas	Low	3,462	4	0		$4,630,000
65	Claremont	Low	1,167	5	1		$700,000
66	Coronado and San Tomas Aquino	Low	2,430	14	0		$1,800,000
67	De La Cruz and Nelo	Low	1,922	3	0		$1,820,000
68	Dolores and Saratoga	Low	2,756	13	0		$2,140,000
69	Edward	Low	329	3	0		$250,000
70	El Camino Real and Coleman	Low	4,413	17	0		$6,830,000
71	Fremont and Lafayette	Low	2,959	13	0		$2,140,000
72	Garrett Overflow	Low	630	2	0		$360,000
73	Glendenning and Pruneridge Golf Club	Low	1,015	5	0		$570,000
74	Glorietta	Low	585	3	0		$360,000
75	Harvard and Saratoga Creek	Low	2,784	11	1		$1,890,000
76	Howard	Low	840	4	0		$510,000
77	Hwy 101 PS	Low	234	1	1	$6,810,000	$7,190,000
78	Jackson	Low	1,930	9	0		$1,300,000
79	Jefferson and El Camino Real	Low	609	6	0		$570,000
80	Kaiser PS	Low	800	6	1	$2,000,000	$2,890,000
81	Kellogg and Pruneridge	Low	2,449	10	0		$1,660,000
82	Keystone	Low	959	6	0		$610,000
83	Kifer	Low	758	6	0		$660,000
84	Las Palmas	Low	460	6	1		$420,000
85	Laurelwood	Low	483	3	0		$280,000
86	Laurie and Kevin	Low	655	3	0		$370,000
87	Lincoln and Winchester	Low	269	2	0		$230,000
88	Live Oak	Low	387	3	0		$240,000
89	Madera	Low	152	2	1		$180,000
90	Main and Richard	Low	1,739	8	0		$1,450,000
91	Mangrum	Low	670	2	0		$370,000
92	Martin	Low	1,422	3	0		$1,070,000
93	Martin and VTA	Low	240	2	0		$190,000

Table 9-4: Prioritized Storm Drain System CIP

ID	Pipe Projects	Priority	Pipe Length	Connections	Outfalls	Pump Station	CIP Total
94	McKinley	Low	386	5	0		$280,000
95	Mead	Low	880	2	0		$460,000
96	Memorex	Low	370	2	0		$190,000
97	Mission and Montague	Low	1,179	6	0		$1,540,000
98	Mission College	Low	378	2	0		$320,000
99	Monroe	Low	451	2	0		$290,000
100	Monroe and Agate	Low	1,366	6	0		$980,000
101	Monroe and San Tomas Aquino	Low	3,511	15	1		$3,300,000
102	Monroe Pump Station	Low	50	2	1	$9,030,000	$9,248,000
103	Montague and De La Cruz	Low	1,180	4	0		$630,000
104	Norman	Low	1,033	4	0		$1,500,000
105	Notre Dame and Monroe	Low	2,740	11	0		$2,050,000
106	Orthello and Kiely	Low	2,663	12	0		$1,660,000
107	Peterson Overflow	Low	1,308	5	0		$1,160,000
108	Phillips	Low	711	5	0		$410,000
109	Pomeroy	Low	1,856	12	1		$1,670,000
110	Pomeroy Overflow	Low	1,500	4	0		$1,170,000
111	Pruneridge and Carlysle	Low	2,304	9	0		$1,560,000
112	Pruneridge and Kerry	Low	946	4	0		$800,000
113	Pruneridge and Saratoga Creek	Low	2,361	7	1		$1,830,000
114	Pruneridge and Tanoak	Low	2,455	14	1		$2,520,000
115	Rip Miller and Monroe	Low	1,235	5	0		$630,000
116	Russell	Low	715	4	0		$470,000
117	Santa Clara	Low	2,103	13	0		$1,250,000
118	Santa Cruz and Cabrillo	Low	2,015	9	0		$1,260,000
119	Santa Maria and Chromite	Low	3,212	13	0		$2,310,000
120	Scott and Bowers	Low	2,248	10	0		$1,970,000
121	Scott and El Camino Real	Low	1,435	6	0		$1,060,000
122	Sherman	Low	2,237	19	0		$3,890,000
123	Sherman and De La Cruz	Low	742	2	0		$1,430,000
124	South	Low	742	3	0		$460,000
125	Sunlite and Benton	Low	1,114	4	0		$630,000
126	The Alameda	Low	41	1	0		$68,000
127	Thomas and Norman	Low	1,906	9	0		$2,650,000
128	Warburton	Low	919	5	1		$570,000
129	Warburton and Barkley	Low	1,184	4	0		$660,000
130	Winchester	Low	740	3	0		$510,000

Total: $269,500,000

9.6.2. Operating and Maintenance Costs

Existing storm drainage infrastructure and new improvements to be constructed from the CIP must be operated and maintained. Facility maintenance and replacement guidelines are presented in Chapter 8.

The 2010 Storm Drain Pump Station Evaluation recommended a sinking fund based on maintenance and replacement costs associated with the City's pump stations. The goal of the fund is to budget and allocate sufficient funds to replace/upgrade major pump station equipment as it becomes necessary. The report recommended placing a minimum of $1.73 million per year into the fund based on a 5% annual inflation rate and a 2% interest rate for the fund.

Based on these regimens and input from City staff, the following annual funding levels are recommended for facility operation, preventative maintenance, and the mandated Nonpoint Source Control Program in Table 9-5.

Table 9-5: Annual Operational, Maintenance and Replacement Costs

Category	Annual Cost
Maintenance	$900,000
Urban Runoff Pollution Prevention Program (Including Trash Capture Cleaning)	$900,000
Pump Station Maintenance	$1,700,000
Total Annual Costs	**$3,500,000**

Appendices

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Appendix A. De-Rated Pump Curves

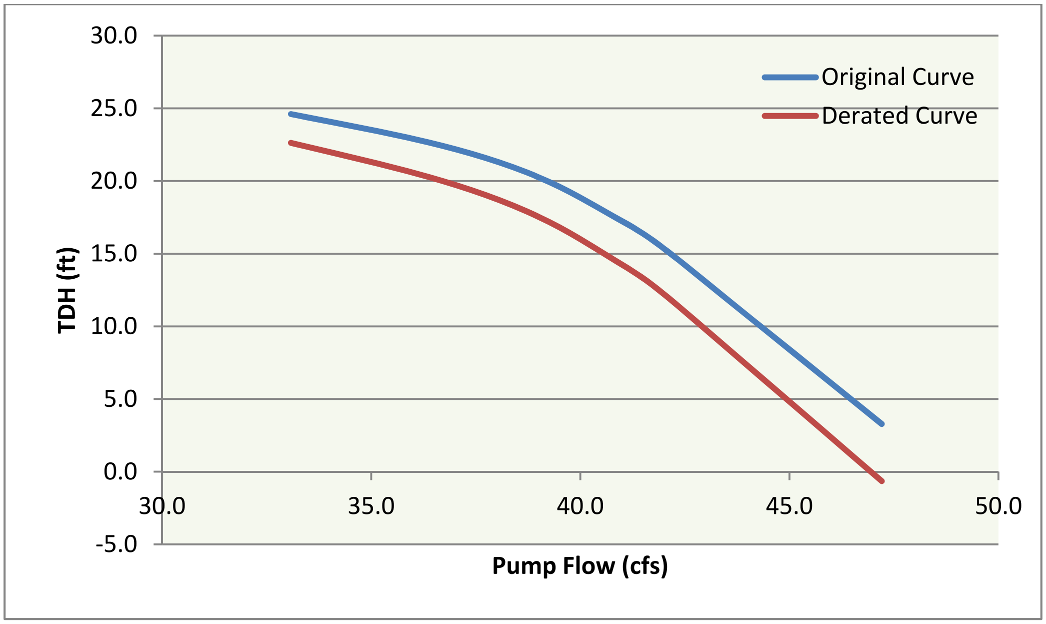

Figure A-1: Eastside 105hp pump curves

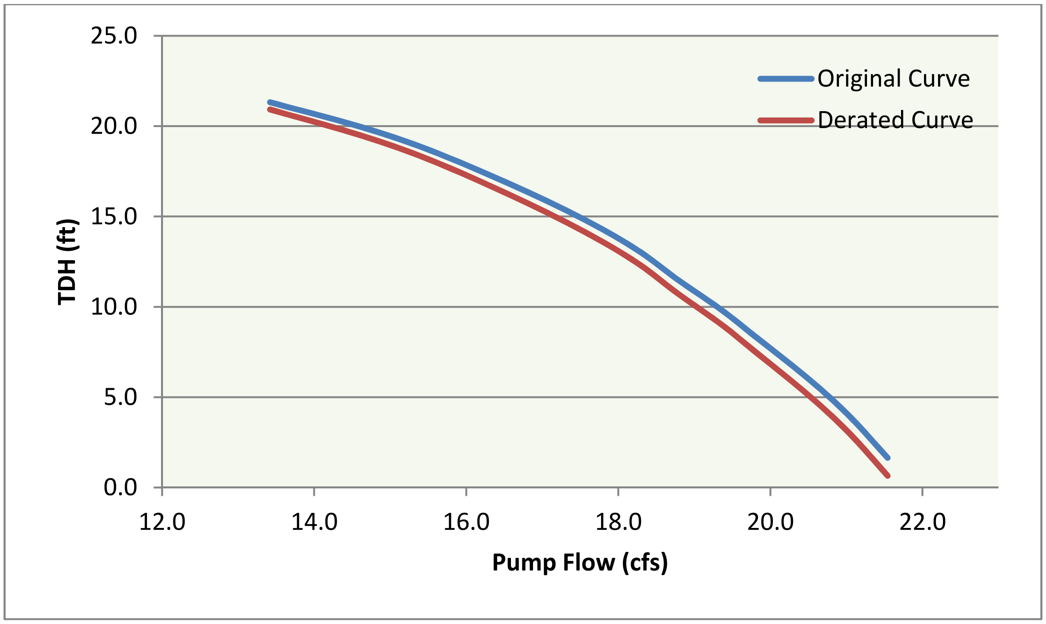

Figure A-2: Eastside 50hp pump curves

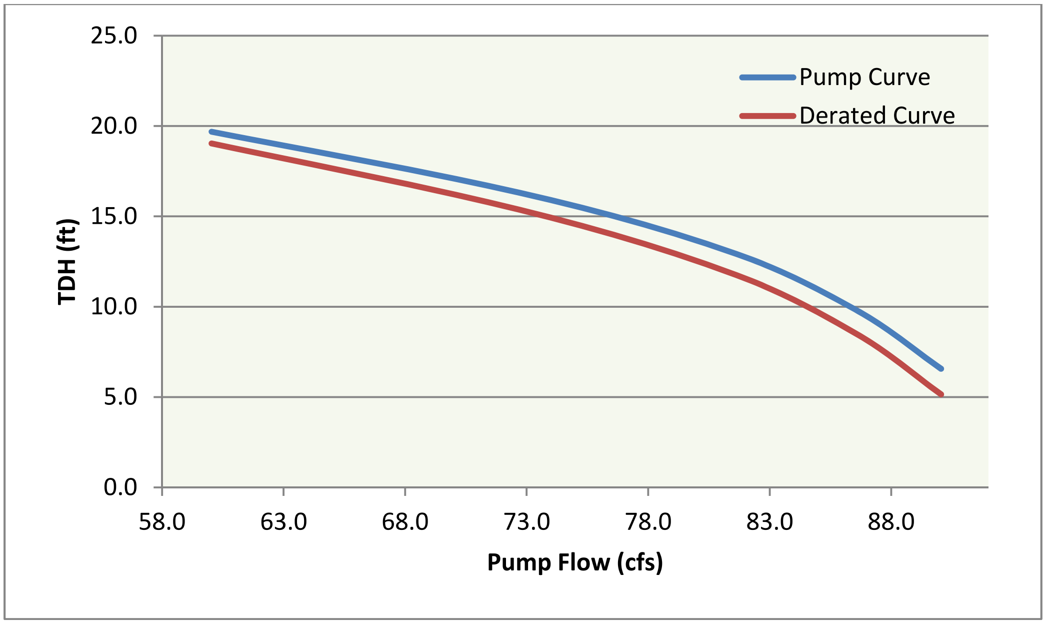

Figure A-3: Fairway Glen 335hp pump curves

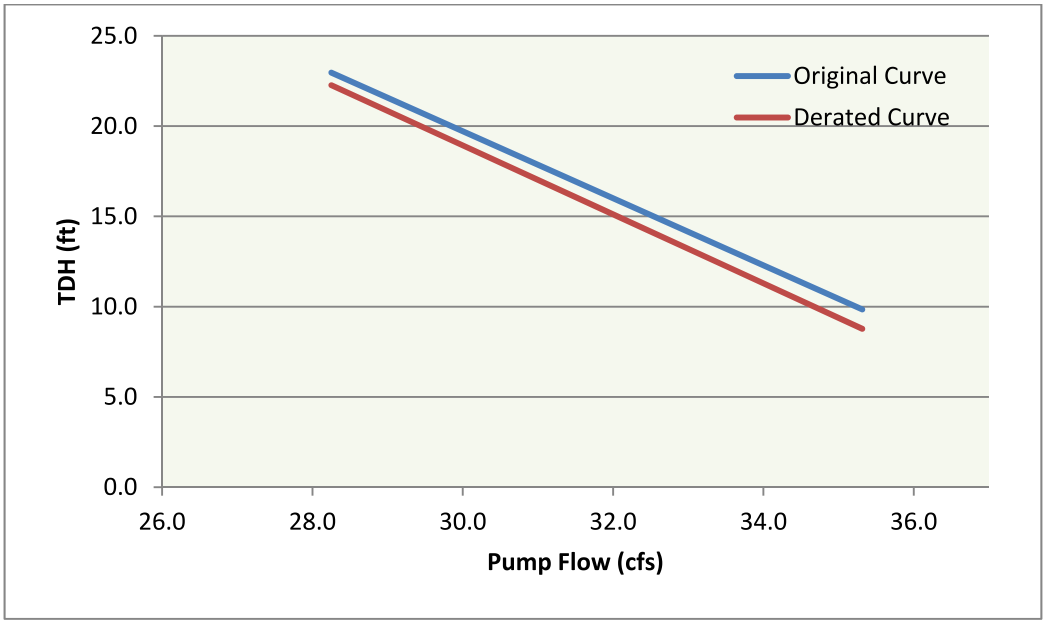

Figure A-4: Fairway Glen 150hp pump curves

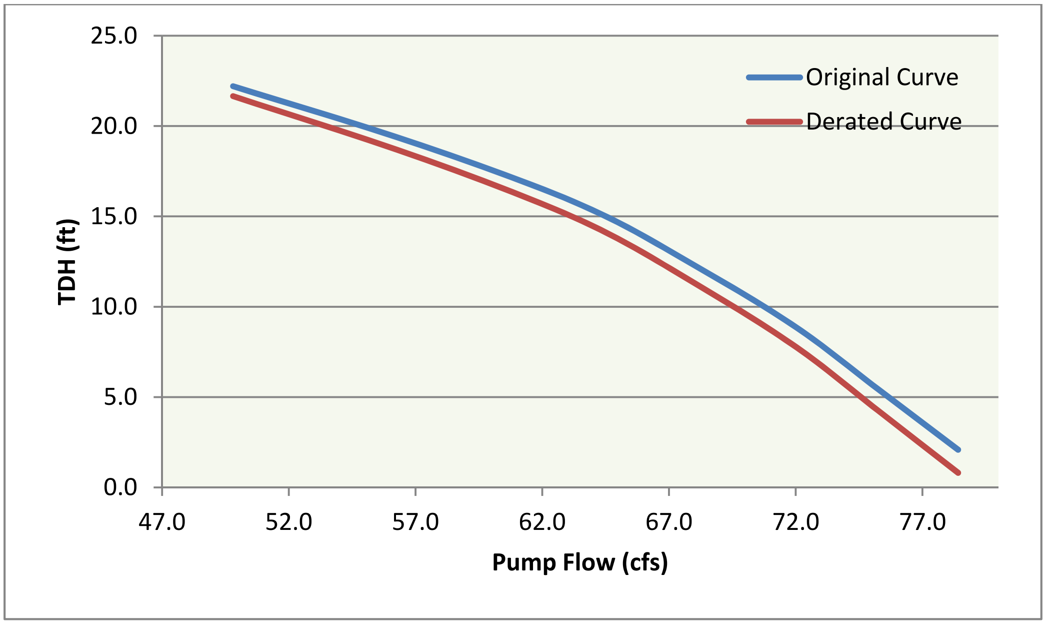

Figure A-5: Freedom Circle 75hp pump curves

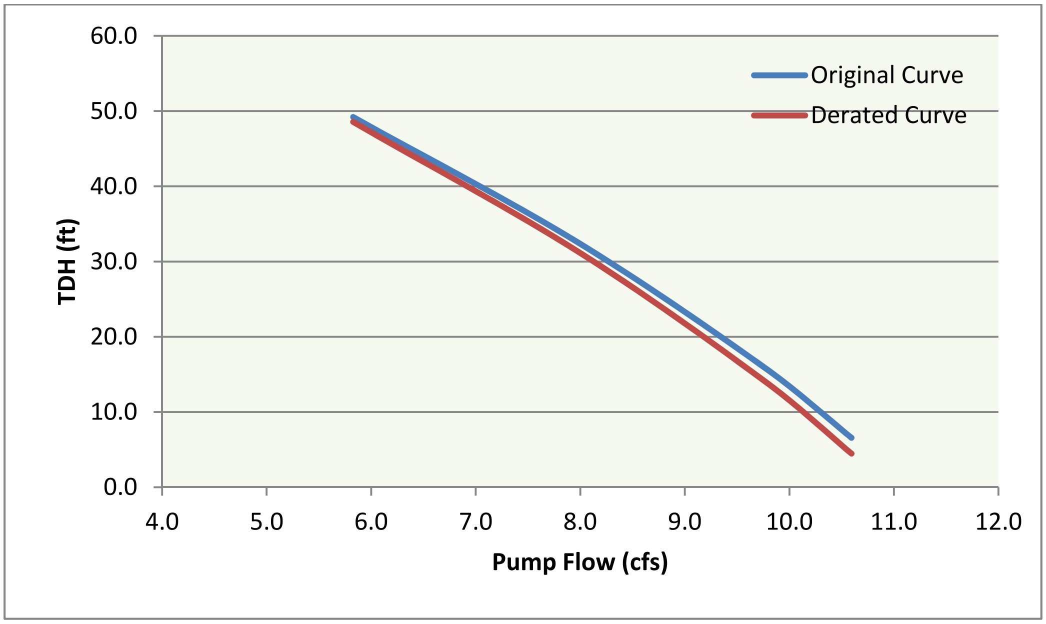

Figure A-6: Freedom Circle 35hp pump curves

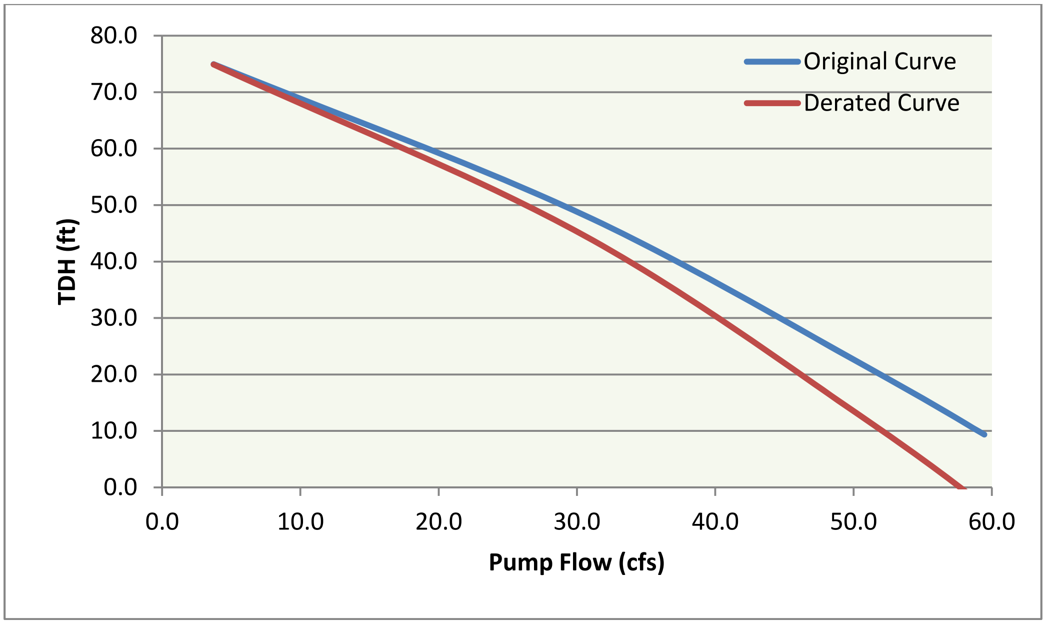

Figure A-7: Gianera 77hp pump curves

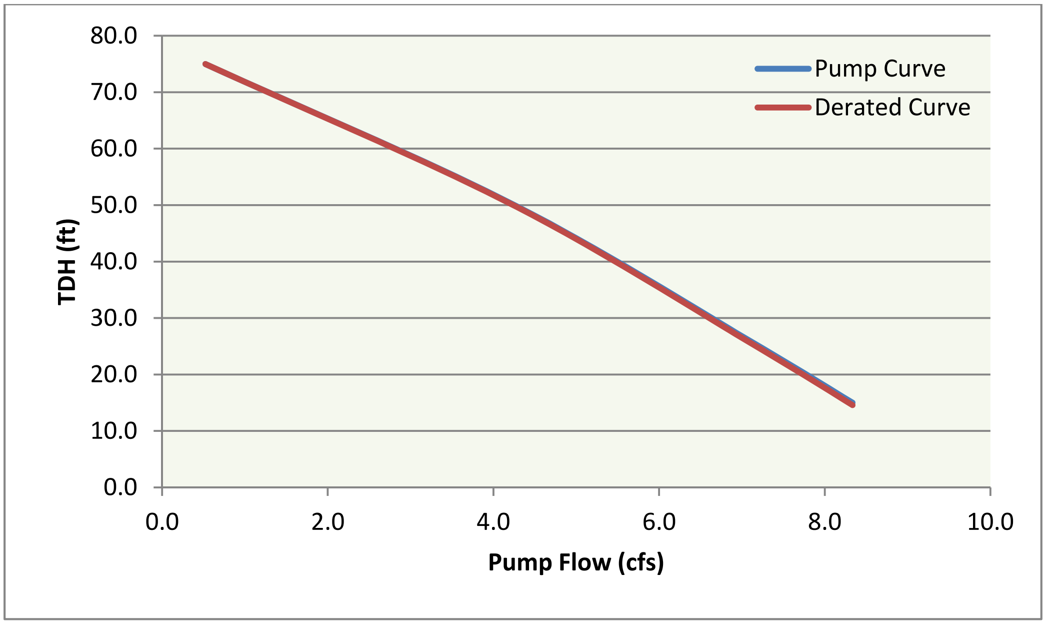

Figure A-8: Gianera 60hp pump curves

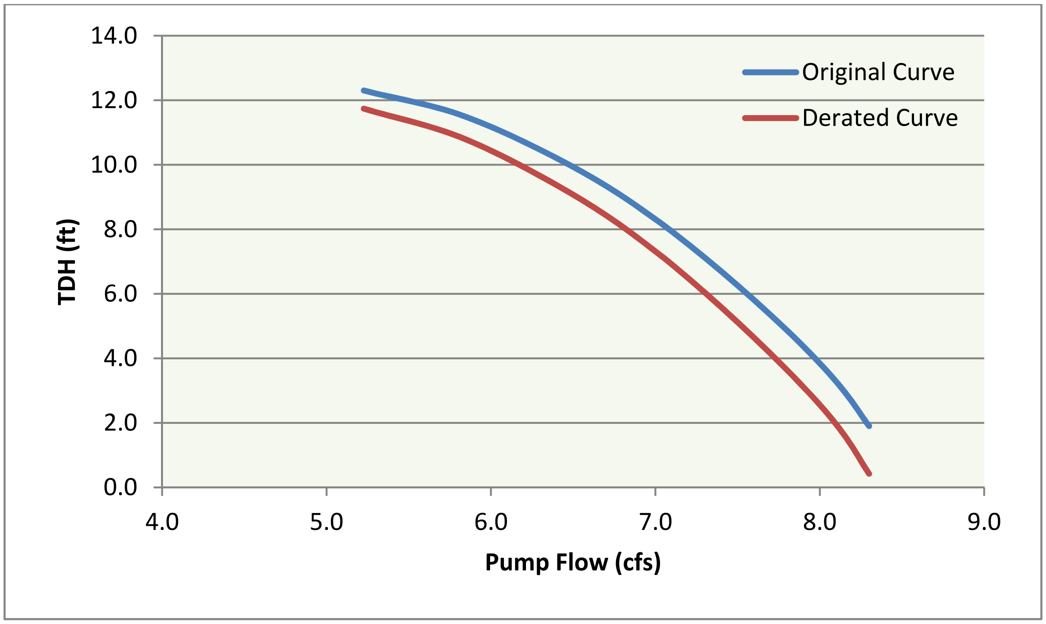

Figure A-9: Golf Course 35hp pump curve

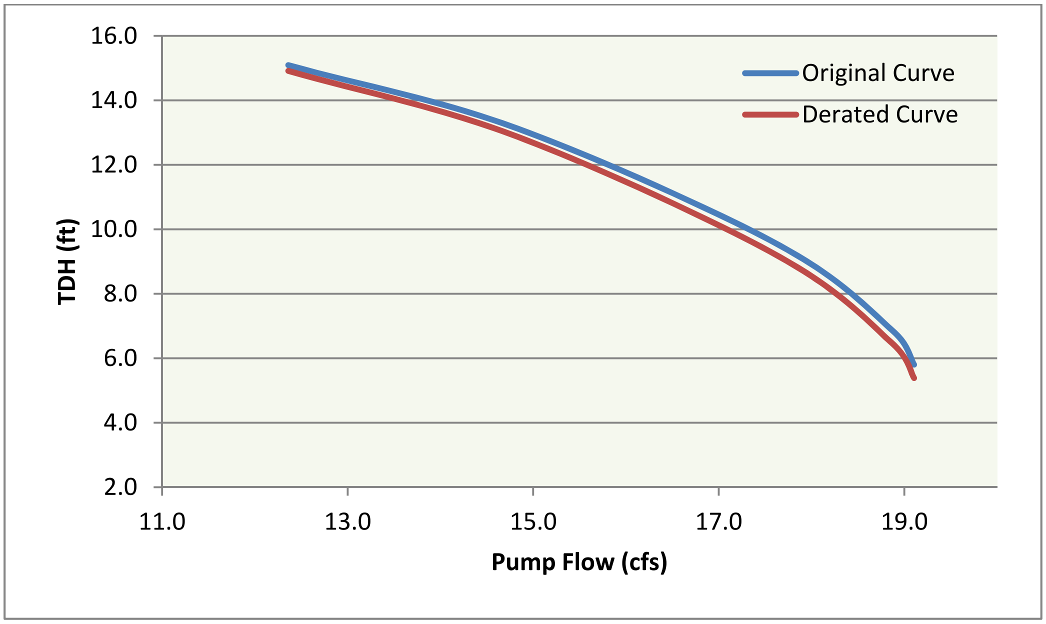

Figure A-10: Lakeside 60hp pump curves

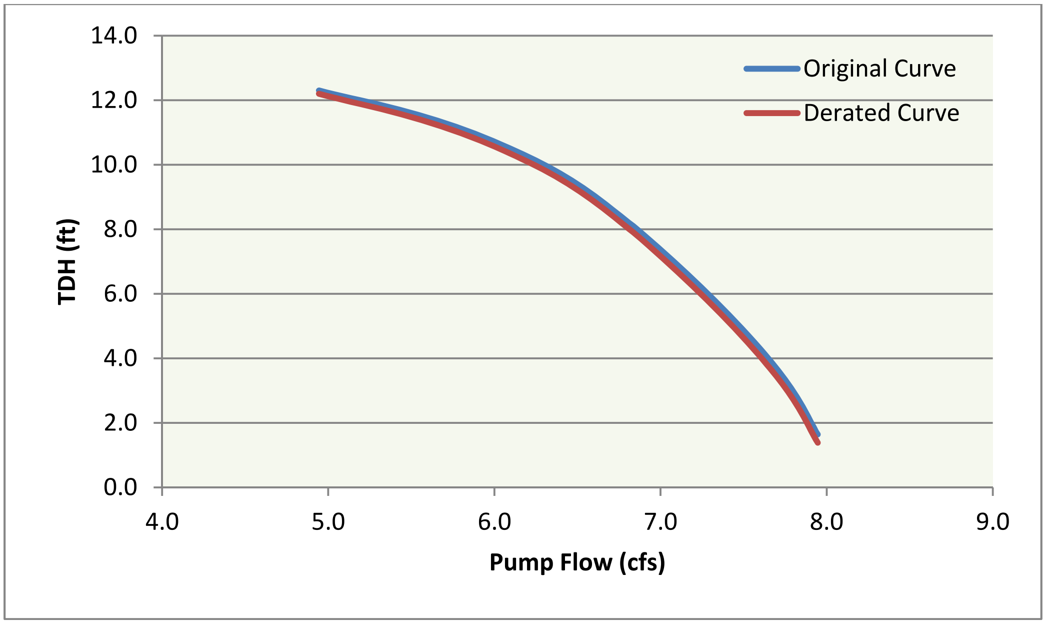

Figure A-11: Lakeside 30hp pump curves

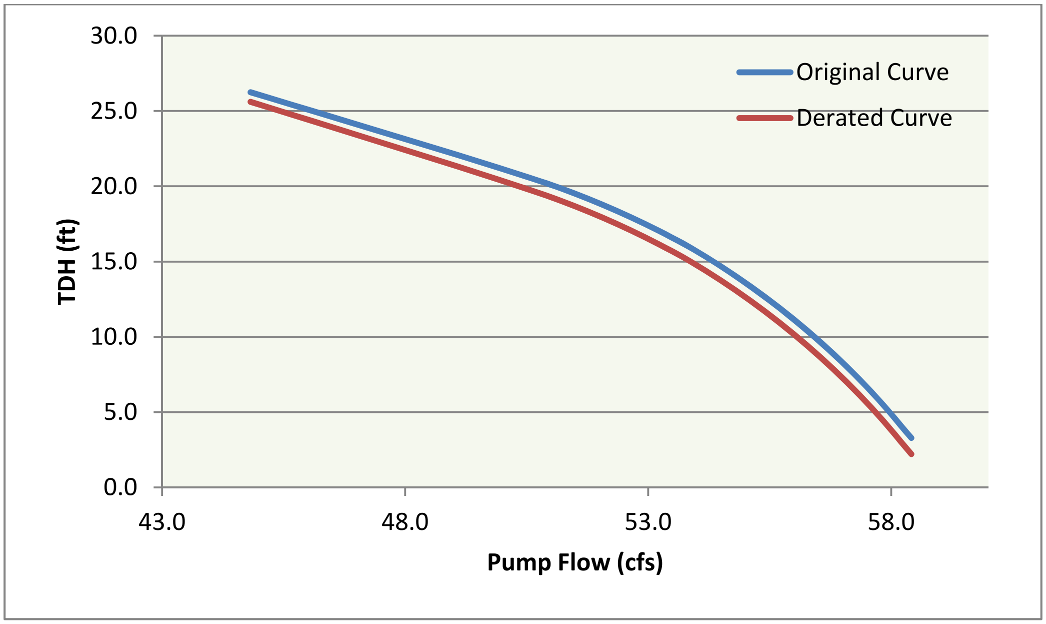

Figure A-12: Laurelwood 150hp pump curves

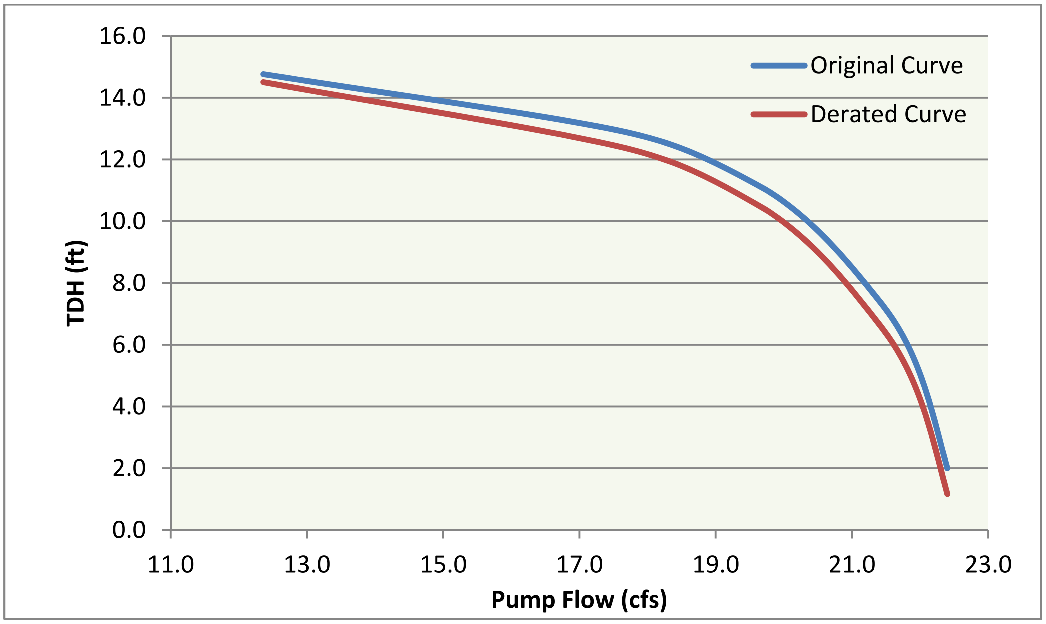

Figure A-13: Laurelwood 60hp pump curves

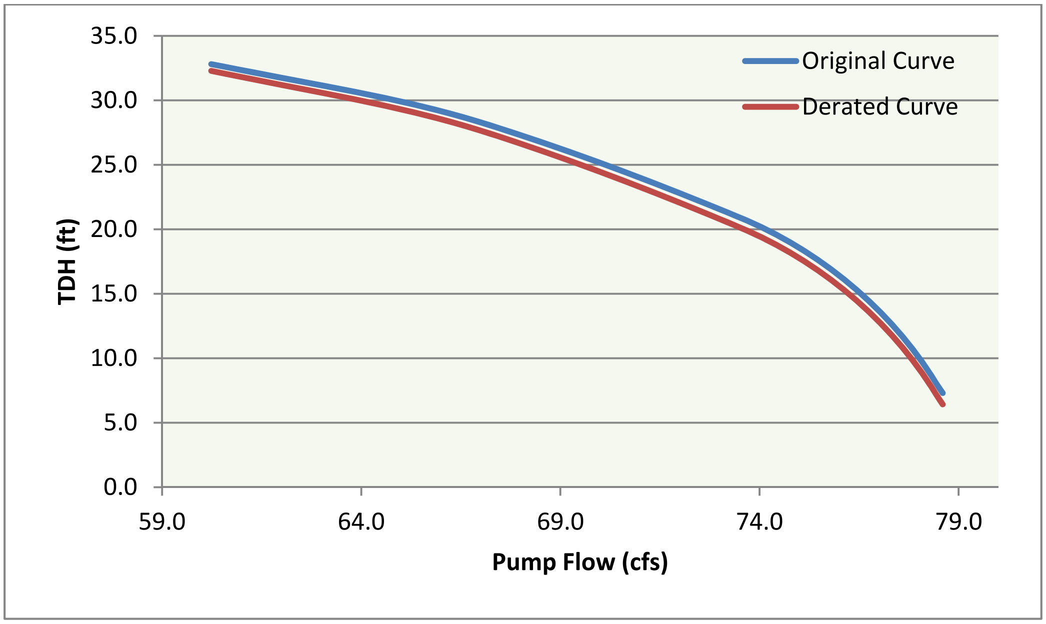

Figure A-14: Lick Mill 320hp pump curves

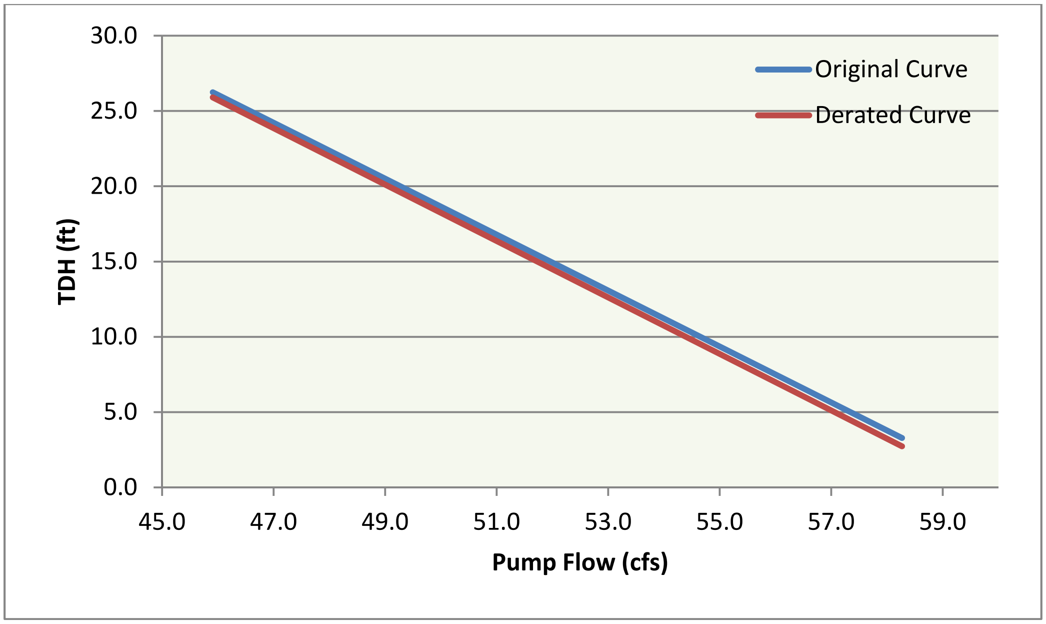

Figure A-15: Nelo-Victor 135hp pump curves

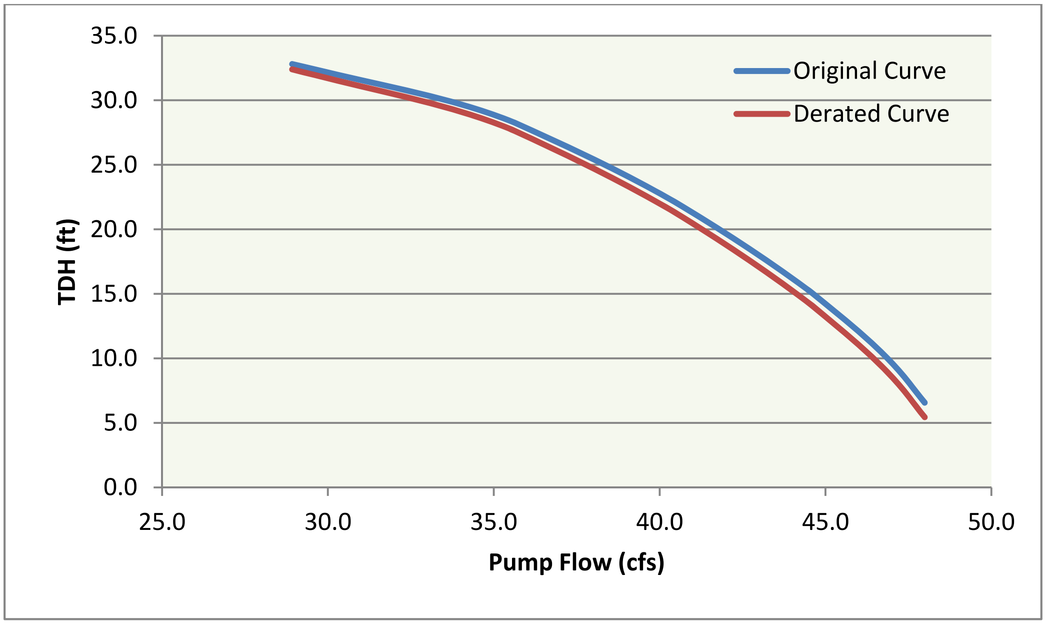

Figure A-16: Rambo 150hp pump curves

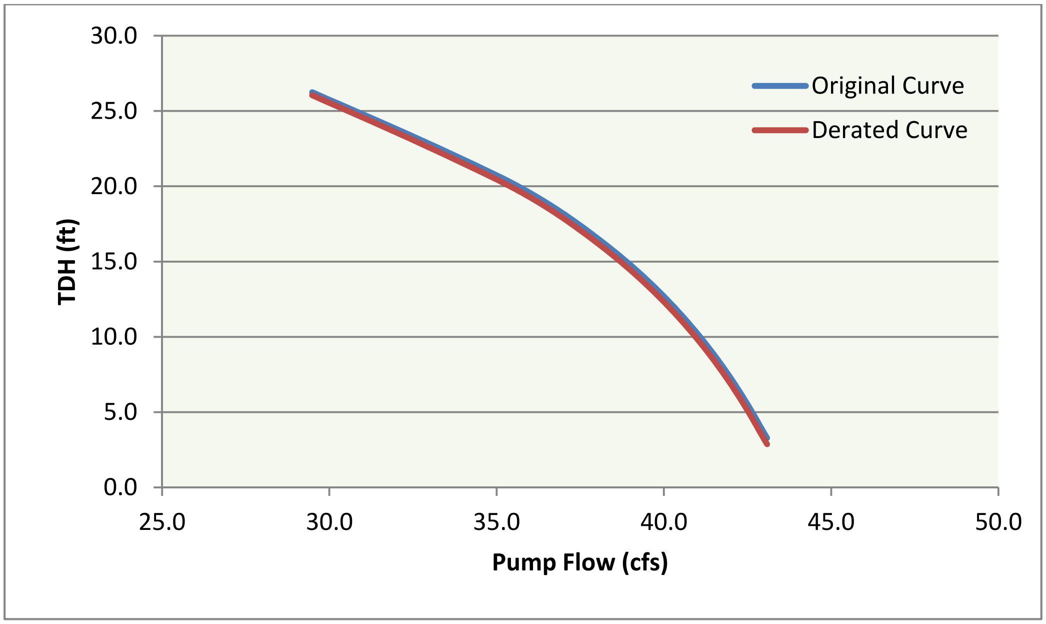

Figure A-17: Westside 150hp pump curves

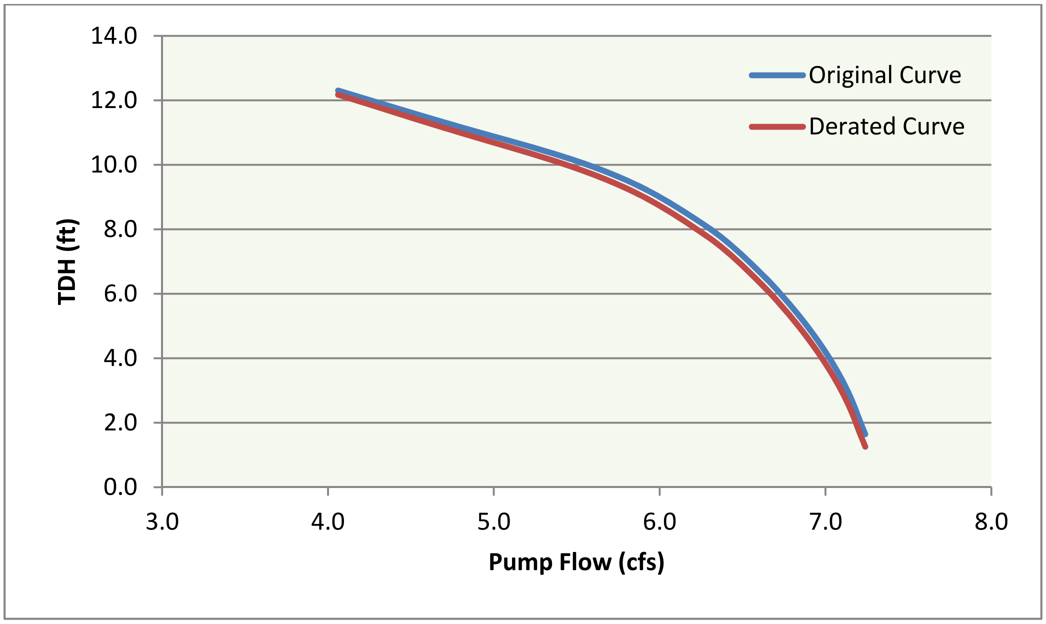

Figure A-18: Westside 25hp pump curves

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Appendix B. Detailed CIP

Table B-1: Capital Improvement Program project and priority summary

ID	Pipe Projects	Priority	Pipe Length	Connections	Outfalls	Project Subtotal[1]	Construction Total[2]	CIP Total[3]
1	**Anna**	**Highest**	**2,044**	**12**	**1**	$1,050,000	$1,630,000	$1,950,000
2	**Harrison**	**Highest**	**3,182**	**15**	**1**	$1,290,000	$2,000,000	$2,390,000
3	**Homestead and Maryann**	**Highest**	**4,691**	**21**	**1**	$3,810,000	$5,900,000	$7,040,000
4	**Los Padres and Warburton**	**Highest**	**2,833**	**12**	**1**	$880,000	$1,360,000	$1,620,000
5	**Washington and Santa Clara**	**Highest**	**695**	**3**	**0**	$190,000	$290,000	$350,000
6	Agate and Bowers	High	4,950	19	0	$2,760,000	$4,280,000	$7,700,000
7	Alviso	High	1,242	5	0	$380,000	$590,000	$700,000
8	Burton	High	1,468	6	0	$1,530,000	$2,370,000	$2,830,000
9	Carmel and Harrison	High	252	1	0	$72,000	$110,000	$130,000
10	De La Cruz and Guadalupe	High	3,985	17	0	$3,390,000	$5,260,000	$6,270,000
11	Fowler and Calabazas	High	1,302	8	1	$760,000	$1,180,000	$1,410,000
12	Homestead and Layton	High	1,516	9	1	$1,090,000	$1,700,000	$2,020,000
13	Leith	High	3,166	14	0	$2,790,000	$4,330,000	$5,160,000
14	Main and Shluman	High	2,454	12	0	$1,090,000	$1,680,000	$4,510,000
15	Manchester and Washington	High	2,281	14	0	$740,000	$1,150,000	$1,380,000
16	Park and Bellomy	High	2,931	12	0	$1,000,000	$1,550,000	$1,840,000
17	Royal and Cabrillo	High	2,736	11	1	$1,130,000	$1,750,000	$2,100,000
18	St Lawrence and Calabazas	High	4,798	19	1	$2,070,000	$3,210,000	$3,820,000
19	Bowers and Chromite	Moderate	1,941	10	0	$1,260,000	$1,950,000	$2,330,000
20	Bowers and Monroe	Moderate	4,630	14	1	$2,180,000	$3,380,000	$4,020,000
21	Caltrain and San Tomas Aquino	Moderate	2,789	15	1	$2,220,000	$3,440,000	$4,110,000
22	Condensa	Moderate	2,578	11	1	$2,930,000	$4,540,000	$5,430,000
23	De La Pena and Homestead	Moderate	3,310	18	0	$1,550,000	$2,400,000	$2,860,000
24	El Camino Real and Calabazas	Moderate	3,832	14	1	$1,640,000	$2,530,000	$3,030,000
25	Forbes	Moderate	279	1	0	$74,000	$120,000	$140,000
26	Halford and Tamarack	Moderate	805	3	0	$260,000	$400,000	$470,000
27	Harold and San Tomas Aquino	Moderate	6,760	27	0	$4,510,000	$6,990,000	$8,340,000
28	Juanita and Saratoga	Moderate	1,813	11	0	$570,000	$890,000	$1,050,000
29	Juliette	Moderate	1,955	15	0	$1,270,000	$1,970,000	$2,350,000
30	Kiely	Moderate	4,150	15	1	$2,260,000	$3,500,000	$4,180,000
31	Lafayette and Laurelwood	Moderate	10,469	47	0	$10,110,000	$15,670,000	$21,890,000
32	Lake Santa Clara PS	Moderate	1,390	10	1	$5,790,000	$8,970,000	$10,710,000

ID	Pipe Projects	Priority	Pipe Length	Connections	Outfalls	Project Subtotal[1]	Construction Total[2]	CIP Total[3]
33	Landeros and Gamblin	Moderate	2,010	8	1	$790,000	$1,230,000	$1,460,000
34	Los Padres	Moderate	3,040	12	0	$1,640,000	$2,540,000	$3,030,000
35	Machado	Moderate	590	3	0	$190,000	$300,000	$360,000
36	Main	Moderate	591	3	0	$230,000	$350,000	$420,000
37	Melody	Moderate	509	4	1	$200,000	$310,000	$360,000
38	Oakmead and Scott	Moderate	682	4	0	$240,000	$370,000	$450,000
39	Patricia	Moderate	197	2	1	$130,000	$200,000	$250,000
40	Princeton and Homestead	Moderate	839	4	0	$330,000	$510,000	$620,000
41	Richard and Scott	Moderate	8,295	29	1	$6,060,000	$9,390,000	$11,210,000
42	Salberg and Barcells	Moderate	2,119	7	0	$690,000	$1,070,000	$1,280,000
43	Scott and Anna	Moderate	2,390	9	0	$640,000	$1,000,000	$1,180,000
44	St Ignatius	Moderate	695	3	1	$250,000	$390,000	$460,000
45	Tahoe and Enochs	Moderate	296	4	0	$120,000	$190,000	$230,000
46	Tannery	Moderate	180	1	0	$89,000	$140,000	$170,000
47	Victor	Moderate	882	5	0	$350,000	$540,000	$650,000
48	Victoria	Moderate	455	2	0	$140,000	$220,000	$260,000
49	Walsh	Moderate	233	1	0	$68,000	$110,000	$130,000
50	Walsh and De La Cruz	Moderate	2,632	12	0	$2,200,000	$3,410,000	$4,070,000
51	Warburton and Nobili	Moderate	299	1	0	$88,000	$140,000	$170,000
52	Aldo and Woodward	Low	3,114	12	0	$1,240,000	$1,920,000	$2,300,000
53	Barcells	Low	646	2	0	$180,000	$280,000	$340,000
54	Bassett	Low	256	2	0	$93,000	$140,000	$170,000
55	Bellomy and Newhall	Low	4,462	19	0	$1,360,000	$2,110,000	$2,520,000
56	Benton	Low	2,837	9	1	$1,240,000	$1,920,000	$2,300,000
57	Benton and Calabazas	Low	3,619	18	1	$1,520,000	$2,360,000	$2,820,000
58	Benton and Sherman	Low	3,959	21	0	$2,370,000	$3,680,000	$4,390,000
59	Bowers 101 South Ramp	Low	1,350	4	0	$930,000	$1,440,000	$1,730,000
60	Bowers Overflow	Low	1,317	1	0	$370,000	$580,000	$690,000
61	Brookdale and Calabazas Creek	Low	2,255	11	1	$880,000	$1,360,000	$1,620,000
62	Bucher Overflow	Low	1,934	2	0	$970,000	$1,510,000	$1,800,000
63	Cabrillo and UPRR	Low	1,326	7	0	$470,000	$730,000	$870,000
64	Calabazas	Low	3,462	4	0	$2,500,000	$3,880,000	$4,630,000
65	Claremont	Low	1,167	5	1	$380,000	$590,000	$700,000
66	Coronado and San Tomas Aquino	Low	2,430	14	0	$970,000	$1,510,000	$1,800,000
67	De La Cruz and Nelo	Low	1,922	3	0	$990,000	$1,530,000	$1,820,000
68	Dolores and Saratoga	Low	2,756	13	0	$1,150,000	$1,790,000	$2,140,000
69	Edward	Low	329	3	0	$140,000	$220,000	$250,000

ID	Pipe Projects	Priority	Pipe Length	Connections	Outfalls	Project Subtotal[1]	Construction Total[2]	CIP Total[3]
70	El Camino Real and Coleman	Low	4,413	17	0	$3,690,000	$5,720,000	$6,830,000
71	Fremont and Lafayette	Low	2,959	13	0	$1,150,000	$1,790,000	$2,140,000
72	Garrett Overflow	Low	630	2	0	$190,000	$300,000	$360,000
73	Glendenning and Pruneridge Golf Club	Low	1,015	5	0	$310,000	$480,000	$570,000
74	Glorietta	Low	585	3	0	$190,000	$300,000	$360,000
75	Harvard and Saratoga Creek	Low	2,784	11	1	$1,020,000	$1,580,000	$1,890,000
76	Howard	Low	840	4	0	$270,000	$420,000	$510,000
77	Hwy 101 PS	Low	234	1	1	$3,880,000	$5,650,000	$7,190,000
78	Jackson	Low	1,930	9	0	$710,000	$1,100,000	$1,300,000
79	Jefferson and El Camino Real	Low	609	6	0	$310,000	$480,000	$570,000
80	Kaiser PS	Low	800	6	1	$1,560,000	$2,310,000	$2,890,000
81	Kellogg and Pruneridge	Low	2,449	10	0	$900,000	$1,390,000	$1,660,000
82	Keystone	Low	959	6	0	$330,000	$510,000	$610,000
83	Kifer	Low	758	6	0	$360,000	$550,000	$660,000
84	Las Palmas	Low	460	6	1	$230,000	$350,000	$420,000
85	Laurelwood	Low	483	3	0	$150,000	$230,000	$280,000
86	Laurie and Kevin	Low	655	3	0	$200,000	$310,000	$370,000
87	Lincoln and Winchester	Low	269	2	0	$130,000	$200,000	$230,000
88	Live Oak	Low	387	3	0	$130,000	$200,000	$240,000
89	Madera	Low	152	2	1	$98,000	$150,000	$180,000
90	Main and Richard	Low	1,739	8	0	$790,000	$1,220,000	$1,450,000
91	Mangrum	Low	670	2	0	$200,000	$310,000	$370,000
92	Martin	Low	1,422	3	0	$580,000	$900,000	$1,070,000
93	Martin and VTA	Low	240	2	0	$100,000	$150,000	$190,000
94	McKinley	Low	386	5	0	$150,000	$230,000	$280,000
95	Mead	Low	880	2	0	$260,000	$390,000	$460,000
96	Memorex	Low	370	2	0	$110,000	$160,000	$190,000
97	Mission and Montague	Low	1,179	6	0	$830,000	$1,280,000	$1,540,000
98	Mission College	Low	378	2	0	$170,000	$260,000	$320,000
99	Monroe	Low	451	2	0	$160,000	$250,000	$290,000
100	Monroe and Agate	Low	1,366	6	0	$530,000	$820,000	$980,000
101	Monroe and San Tomas Aquino	Low	3,511	15	1	$1,780,000	$2,760,000	$3,300,000
102	Monroe Pump Station	Low	50	2	1	$4,960,000	$7,260,000	$9,248,000
103	Montague and De La Cruz	Low	1,180	4	0	$340,000	$530,000	$630,000
104	Norman	Low	1,033	4	0	$810,000	$1,250,000	$1,500,000
105	Notre Dame and Monroe	Low	2,740	11	0	$1,110,000	$1,720,000	$2,050,000
106	Orthello and Kiely	Low	2,663	12	0	$900,000	$1,400,000	$1,660,000

ID	Pipe Projects	Priority	Pipe Length	Connections	Outfalls	Project Subtotal[1]	Construction Total[2]	CIP Total[3]
107	Peterson Overflow	Low	1,308	5	0	$630,000	$970,000	$1,160,000
108	Phillips	Low	711	5	0	$220,000	$340,000	$410,000
109	Pomeroy	Low	1,856	12	1	$900,000	$1,400,000	$1,670,000
110	Pomeroy Overflow	Low	1,500	4	0	$630,000	$980,000	$1,170,000
111	Pruneridge and Carlysle	Low	2,304	9	0	$840,000	$1,310,000	$1,560,000
112	Pruneridge and Kerry	Low	946	4	0	$430,000	$670,000	$800,000
113	Pruneridge and Saratoga Creek	Low	2,361	7	1	$990,000	$1,530,000	$1,830,000
114	Pruneridge and Tanoak	Low	2,455	14	1	$1,360,000	$2,120,000	$2,520,000
115	Rip Miller and Monroe	Low	1,235	5	0	$340,000	$530,000	$630,000
116	Russell	Low	715	4	0	$250,000	$390,000	$470,000
117	Santa Clara	Low	2,103	13	0	$680,000	$1,050,000	$1,250,000
118	Santa Cruz and Cabrillo	Low	2,015	9	0	$680,000	$1,050,000	$1,260,000
119	Santa Maria and Chromite	Low	3,212	13	0	$1,250,000	$1,930,000	$2,310,000
120	Scott and Bowers	Low	2,248	10	0	$1,070,000	$1,660,000	$1,970,000
121	Scott and El Camino Real	Low	1,435	6	0	$570,000	$890,000	$1,060,000
122	Sherman	Low	2,237	19	0	$2,100,000	$3,260,000	$3,890,000
123	Sherman and De La Cruz	Low	742	2	0	$770,000	$1,200,000	$1,430,000
124	South	Low	742	3	0	$250,000	$390,000	$460,000
125	Sunlite and Benton	Low	1,114	4	0	$340,000	$530,000	$630,000
126	The Alameda	Low	41	1	0	$37,000	$60,000	$68,000
127	Thomas and Norman	Low	1,906	9	0	$1,430,000	$2,210,000	$2,650,000
128	Warburton	Low	919	5	1	$310,000	$480,000	$570,000
129	Warburton and Barkley	Low	1,184	4	0	$360,000	$550,000	$660,000
130	Winchester	Low	740	3	0	$270,000	$420,000	$510,000
					Total			**$269,500,000**

[1]Project subtotals do not include markups for traffic control, mobilization/demobilization, design and engineering, or contingency (detailed in Table B-2).

[2]Construction cost includes 5% markup for traffic control, 10% markup for mobilization/demobilization, and 40% markup for contingency.

[3]CIP Total includes an additional 20% markup for Engineering and Inspection

Table B-2: Detailed highest priority CIP subtotals.

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
Anna										
IMP 35-MH11 x 35-MH10	15	48	260	$476	$27	$130,900	1	$13,454		
IMP 35-MH12 x 35-MH11	15	30	177	$291	$27	$56,400	1	$12,662		
IMP 35-MH13 x 35-MH12	15	24	123	$230	$27	$31,500	1	$12,398		
IMP 34-MH15 x 34-OF4	21	48	198	$476	$34	$101,000	1	$13,454	1	
IMP 34-MH16 x 34-MH15	18	48	283	$476	$27	$142,500	1	$13,454		
IMP 34-MH17 x 34-MH16	18	48	280	$476	$27	$141,000	1	$13,454		
IMP 35-CB22 x 35-MH11	12	18	63	$186	$23	$13,300	1	$12,134		
IMP 35-MH10 x 34-MH17	18	48	301	$476	$27	$151,400	1	$13,454		
IMP 35-MH14 x 35-MH13	15	24	260	$230	$27	$66,700	2	$24,796		
NEW 35-CB1 x 35-MH11		12	56	$149	$0	$8,300	1	$11,870		
NEW 35-CB2 x 35-MH13		12	21	$149	$0	$3,100	1	$11,870		
NEW 35-CB3 x 35-MH12		12	22	$149	$0	$3,300	1	$11,870		
			2,044			**$850,000**		**$160,000**	**$40,000**	**$1,050,000**
Harrison										
IMP 34-CB3 x 34-MH20	12	18	15	$186	$23	$3,300	1	$12,134		
IMP 34-CB33 x 34-OF7	21	42	15	$410	$34	$6,500	1	$13,190	1	
IMP 34-MH19 x 34-CB33	21	42	160	$410	$34	$70,900	1	$13,190		
IMP 34-MH20 x 34-MH19	18	42	289	$410	$27	$131,000	1	$13,190		
IMP 34-MH21 x 34-MH20	18	42	274	$410	$27	$119,700	1	$13,190		
IMP 34-MH25 x 34-CB3	12	18	274	$186	$23	$60,000	1	$12,134		
IMP 35-CB28 x 35-MH23	12	18	34	$186	$23	$7,100	1	$12,134		
IMP 35-MH20 x 34-MH21	18	42	299	$410	$27	$130,600	1	$13,190		
IMP 35-MH21 x 35-MH20	18	42	267	$410	$27	$116,700	1	$13,190		
IMP 35-MH22 x 35-MH21	15	30	353	$291	$27	$112,400	1	$12,662		
IMP 35-MH23 x 35-MH22	15	30	330	$291	$27	$105,100	1	$12,662		
IMP 35-MH24 x 35-MH23	15	24	137	$230	$27	$35,100	1	$12,398		
IMP 35-MH25 x 35-MH24	15	24	192	$230	$27	$49,200	1	$12,398		
IMP 35-MH31 x 35-MH21	12	18	268	$186	$23	$56,200	1	$12,134		
IMP 35-MH34 x 35-MH31	12	18	276	$186	$23	$60,500	1	$12,134		
			3,182			**$1,060,000**		**$190,000**	**$40,000**	**$1,290,000**
Homestead and Maryann										
IMP 24-MH15 x 24-MH6	33	72 x 72	449	$1,080	$46	$505,500	1	$16,510		
IMP 24-MH4 x 24-MH1	33	72 x 72	150	$1,080	$46	$168,900	1	$16,510		
IMP 24-MH6 x 24-MH4	33	72 x 72	140	$1,080	$46	$157,600	1	$16,510		
IMP 25-MH16 x 25-MH4	15	42	311	$410	$27	$136,000	1	$13,190		
IMP 25-MH17 x 25-MH16	15	36	228	$349	$27	$85,700	1	$12,926		
IMP 25-MH18 x 25-MH17	15	36	260	$349	$27	$97,700	1	$12,926		
IMP 25-MH19 x 25-MH18	15	24	198	$230	$27	$50,800	1	$12,398		
IMP 25-MH26 x 25-MH18	10	30	288	$291	$23	$90,600	1	$12,662		
IMP 25-MH32 x 25-MH26	10	30	268	$291	$23	$84,400	1	$12,662		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 25-MH33 x 25-MH32	10	15	275	$167	$23	$52,500	1	$12,002		
IMP 25-MH4 x 25-MH3	24	66	311	$724	$34	$235,400	1	$16,176		
IMP 24-MH1 x 24-MH3	36	72 x 72	241	$1,080	$46	$271,500	1	$16,510		
IMP 24-MH12 x 24-MH13	27	66	112	$724	$43	$85,900	1	$16,176		
IMP 24-MH13 x 24-MH14	27	66	52	$724	$43	$41,100	1	$16,176		
IMP 24-MH14 x 24-MH44	27	66	103	$724	$43	$81,400	1	$16,176		
IMP 24-MH2 x 34-MH45	36	72 x 72	405	$1,080	$46	$455,700	1	$16,510		
IMP 24-MH3 x 24-MH2	36	72 x 72	20	$1,080	$46	$22,500	1	$16,510		
IMP 24-MH44 x 24-MH15	27	66	134	$724	$43	$109,000	1	$16,176		
IMP 25-MH3 x 24-MH12	27	66	351	$724	$43	$269,000	1	$16,176		
IMP 34-MH43 x 34-OF11	36	72 x 72	140	$1,080	$46	$157,900	1	$16,510	1	
IMP 34-MH45 x 34-MH43	36	72 x 72	256	$1,080	$46	$288,600	1	$16,510		
			4,691			**$3,450,000**		**$320,000**	**$40,000**	**$3,810,000**
Los Padres and Warburton										
IMP 44-CB4 x 44-OF4	18	24	29	$230	$27	$7,500	1	$12,398	1	
IMP 44-MH17 x 44-CB4	18	24	161	$230	$27	$41,300	1	$12,398		
IMP 44-MH19 x 44-MH17	18	24	455	$230	$27	$121,900	1	$12,398		
IMP 45-MH18 x 44-MH19	18	24	393	$230	$27	$105,200	1	$12,398		
IMP 45-MH19 x 45-MH18	15	21	269	$209	$27	$66,200	1	$12,266		
IMP 45-MH20 x 45-MH19	15	21	243	$209	$27	$62,400	1	$12,266		
IMP 45-MH21 x 45-MH20	12	18	236	$186	$23	$56,000	1	$12,134		
IMP 45-MH22 x 45-MH21	12	18	250	$186	$23	$57,000	1	$12,134		
IMP 45-MH23 x 45-MH22	12	18	301	$186	$23	$68,900	1	$12,134		
IMP 45-MH32 x 45-MH18	10	18	230	$186	$23	$48,300	1	$12,134		
IMP 45-MH34 x 45-MH32	10	18	230	$186	$23	$48,300	1	$12,134		
IMP 45-MH35 x 45-MH34	8	18	36	$186	$23	$7,600	1	$12,134		
			2,833			**$690,000**		**$150,000**	**$40,000**	**$880,000**
Washington and Santa Clara										
IMP 37-MH64 x 37-MH63	12	18	26	$186	$23	$5,500	2	$24,269		
IMP 37-MH65 x 37-MH64	12	18	438	$186	$23	$92,000	1	$12,134		
NEW SantaClaraSt 2		18	230	$186	$0	$42,900	1	$12,134		
			695			**$140,000**		**$50,000**	**$0**	**$190,000**
Highest Priority Totals:			**13,445**			**$6,200,000**		**$870,000**	**$160,000**	**$7,230,000**

[1]Project subtotals do not include markups for traffic control, mobilization/demobilization, design and engineering, or contingency. See Table B-1 for total CIP costs.

Table B-3: Detailed high priority CIP subtotals.

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
Agate and Bowers										
IMP 52-MH4 x 52-MH5	15	30	495	$291	$27	$157,600	2	$25,324		
IMP 52-MH5 x 52-MH6	15	30	291	$291	$27	$92,700	1	$12,662		
IMP 52-MH6 x 52-MH7	21	36	245	$349	$34	$93,700	1	$12,926		
IMP 52-MH7 x 53-MH1	21	48	256	$476	$34	$130,600	1	$13,454		
IMP 53-MH1 x 53-MH2	12	48	524	$476	$23	$261,900	1	$13,454		
IMP 53-MH11 x 53-MH1	15	27	286	$267	$27	$84,000	1	$12,530		
IMP 53-MH12 x 53-MH11	15	27	252	$267	$27	$74,100	1	$12,530		
IMP 53-MH17 x 53-MH12	15	18	234	$186	$27	$49,900	1	$12,134		
IMP 53-MH18 x 53-MH17	12	18	26	$186	$23	$5,600	1	$12,134		
IMP 53-MH19 x 53-MH18	12	18	241	$186	$23	$50,600	1	$12,134		
IMP 53-MH2 x 53-MH3	30	54	227	$557	$44	$136,600	1	$14,559		
IMP 53-MH20 x 53-MH19	12	18	32	$186	$23	$6,600	1	$12,134		
IMP 53-MH3 x 53-MH4	30	54	135	$557	$44	$81,200	1	$14,559		
IMP 53-MH4 x 63-MH47	36	60	268	$630	$46	$181,600	1	$14,860		
IMP 63-MH29 x 63-MH31	48	72	56	$854	$59	$55,800	1	$16,510		
IMP 63-MH38 x 63-MH29	42	60	400	$630	$58	$310,200	1	$14,860		
IMP 63-MH44 x 63-MH38	42	60	404	$630	$58	$304,400	1	$14,860		
IMP 63-MH47 x 63-MH48	36	60	117	$630	$46	$81,500	1	$14,860		
IMP 63-MH48 x 63-MH44	42	60	461	$630	$58	$327,000	1	$14,860		
Jack and Bore under RR										**$3,200,000**
			4,950			**$2,490,000**		**$271,000**	**$0**	**$5,960,000**
Alviso										
IMP 28-MH10 x 38-MH117	12	24	319	$230	$23	$80,700	1	$12,398		
IMP 28-MH14 x 28-MH10	10	24	330	$230	$23	$83,500	1	$12,398		
IMP 28-MH18 x 28-MH14	10	24	273	$230	$23	$69,100	1	$12,398		
IMP 28-MH27 x 28-MH18	10	18	275	$186	$23	$57,700	2	$24,269		
IMP 38-MH117 x 38-MH115	18	24	45	$230	$27	$12,100	1	$12,398		
			1,242			**$303,000**		**$74,000**	**$0**	**$380,000**
Burton										
IMP 85-MH56 x 85-MH52	48	72	123	$854	$59	$124,800	1	$16,510		
IMP 85-MH60 x 85-MH56	48	72	471	$854	$59	$466,000	1	$16,510		
IMP 85-MH64 x 85-MH60	48	72	66	$854	$59	$65,500	1	$16,510		
IMP 85-MH67 x 85-MH64	48	72	237	$854	$59	$234,500	1	$16,510		
IMP 85-MH68 x 85-MH67	48	72	171	$854	$59	$160,700	1	$16,510		
IMP 85-MH73 x 85-MH68	48	72	400	$854	$59	$365,000	2	$33,020		
			1,468			**$1,418,000**		**$116,000**	**$0**	**$1,530,000**
Carmel and Harrison										
IMP 36-MH22 x 35-MH28	10	15	252	$167	$23	$48,100	2	$24,005		
			252			**$48,000**		**$24,000**	**$0**	**$72,000**
De La Cruz and Guadalupe										

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 57-MH32 x 57-MH33	33	42	360	$410	$46	$164,000	1	$13,190		
IMP 57-MH33 x 57-MH34	33	54	400	$557	$46	$241,100	1	$14,559		
IMP 57-MH34 x 58-MH16	33	54	285	$557	$46	$171,900	1	$14,559		
IMP 58-MH1 x 68-MH14	33	72	184	$854	$46	$165,100	1	$16,510		
IMP 58-MH11 x 58-MH9	33	72	108	$854	$46	$96,900	1	$16,510		
IMP 58-MH12 x 58-MH11	33	72	233	$854	$46	$209,800	1	$16,510		
IMP 58-MH14 x 58-MH12	33	72	350	$854	$46	$314,900	1	$16,510		
IMP 58-MH16 x 58-MH17	33	72	60	$854	$46	$54,300	1	$16,510		
IMP 58-MH17 x 58-MH14	33	72	457	$854	$46	$411,300	2	$33,020		
IMP 58-MH4 x 58-MH1	33	72	453	$854	$46	$407,500	1	$16,510		
IMP 58-MH5 x 58-MH4	33	72	495	$854	$46	$445,500	1	$16,510		
IMP 58-MH6 x 58-MH5	33	72	119	$854	$46	$106,800	1	$16,510		
IMP 58-MH7 x 58-MH6	33	72	233	$854	$46	$209,400	1	$16,510		
IMP 58-MH9 x 58-MH7	33	72	86	$854	$46	$77,300	1	$16,510		
IMP 67-MH24 x 67-MH23	15	18	39	$186	$27	$9,000	1	$12,134		
IMP2 58-MH16 x 58-MH8	72	78	36	$854	$88	$34,100	1	$16,510		
			3,897			**$3,120,000**		**$269,000**	**$0**	**$3,390,000**
Fowler and Calabazas										
IMP 42-MH10 x 42-MH9	21	48	221	$476	$34	$112,800	1	$13,454		
IMP 42-MH12 x 42-MH11	18	48	122	$476	$27	$61,500	1	$13,454		
IMP 42-MH14 x 42-MH12	18	48	164	$476	$27	$82,400	1	$13,454		
IMP 42-MH15 x 42-MH14	18	48	210	$476	$27	$109,600	1	$13,454		
IMP 42-MH20 x 42-MH15	18	42	250	$410	$27	$113,400	1	$13,190		
IMP NRV 42-MH9 x 42-OF2	21	24	58	$230	$34	$16,500	1	$12,398	1	
IMP 42-MH11 x 42-MH10	21	48	23	$476	$34	$11,700	2	$26,908		
IMP 42-MH21 x 42-MH20	15	36	255	$349	$27	$95,800	1	$12,926		
			1,302			**$604,000**		**$119,000**	**$40,000**	**$760,000**
Homestead and Layton										
IMP 24-MH22 x 24-OF2	30	60	50	$630	$44	$33,900	1	$14,860	1	
IMP 24-MH23 x 24-MH22	30	60	179	$630	$44	$121,100	1	$14,860		
IMP 24-MH24 x 24-MH23	30	60	136	$630	$44	$91,700	1	$14,860		
IMP 24-MH25 x 24-MH24	30	60	66	$630	$44	$44,500	1	$14,860		
IMP 24-MH26 x 24-MH25	30	60	406	$630	$44	$273,700	1	$14,860		
IMP 24-MH27 x 24-MH26	15	24	19	$230	$27	$5,300	1	$12,398		
IMP 24-MH29 x 24-MH27	18	24	144	$230	$27	$40,200	1	$12,398		
IMP 24-MH30 x 24-MH26	18	54	152	$557	$27	$88,900	2	$29,118		
IMP 24-MH32 x 24-MH30	18	54	363	$557	$27	$212,100	1	$14,559		
			1,516			**$911,000**		**$143,000**	**$40,000**	**$1,090,000**
Leith										
IMP 76-MH10 x 76-MH9	48	66	203	$724	$59	$163,400	1	$16,176		
IMP 76-MH2 x 86-MH36	48	66	438	$724	$59	$342,900	1	$16,176		
IMP 76-MH7 x 76-MH2	48	66	297	$724	$59	$232,500	1	$16,176		
IMP 76-MH8 x 76-MH7	48	66	192	$724	$59	$150,300	1	$16,176		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 76-MH9 x 76-MH8	48	66	76	$724	$59	$59,200	1	$16,176		
IMP 86-MH36 x 87-MH56	48	66	283	$724	$59	$221,700	1	$16,176		
IMP 87-MH25 x 87-MH24	48	66	20	$724	$59	$17,100	1	$16,176		
IMP 87-MH26 x 87-MH25	48	66	32	$724	$59	$26,200	1	$16,176		
IMP 87-MH33 x 87-MH26	48	66	110	$724	$59	$91,600	1	$16,176		
IMP 87-MH37 x 87-MH33	48	66	265	$724	$59	$226,300	1	$16,176		
IMP 87-MH40 x 87-MH37	48	66	231	$724	$59	$191,800	1	$16,176		
IMP 87-MH44 x 87-MH40	48	66	274	$724	$59	$227,800	1	$16,176		
IMP 87-MH46 x 87-MH44	48	66	273	$724	$59	$226,700	2	$32,352		
IMP 87-MH56 x 87-MH46	48	66	472	$724	$59	$369,600	1	$16,176		
			3,166			**$2,547,000**		**$243,000**	**$0**	**$2,790,000**
Main and Shluman										
IMP 46-MH21 x 46-MH22	10	18	78	$186	$23	$16,400	1	$12,134		
IMP 46-MH22 x 46-MH23	10	18	55	$186	$23	$11,500	1	$12,134		
IMP 46-MH23 x 46-MH24	12	24	121	$230	$23	$30,500	1	$12,398		
IMP 46-MH24 x 46-MH25	12	24	96	$230	$23	$25,400	1	$12,398		
IMP 56-MH44 x 57-MH23	30	42	290	$410	$44	$131,700	2	$26,380		
IMP 46-MH16 x 46-MH5	27	36	333	$349	$43	$135,400	1	$12,926		
IMP 46-MH25 x 46-MH16	27	36	180	$349	$43	$75,800	1	$12,926		
IMP 46-MH3 x 56-MH54	27	36	467	$349	$43	$183,200	1	$12,926		
IMP 46-MH5 x 46-MH3	27	36	224	$349	$43	$87,900	1	$12,926		
IMP 56-MH45 x 56-MH44	24	30	135	$291	$34	$44,000	1	$12,662		
IMP 56-MH46 x 56-MH45	24	30	117	$291	$34	$38,100	1	$12,662		
IMP 56-MH54 x 56-MH44	27	36	358	$349	$43	$140,500	1	$12,926		
Jack and Bore under RR										**$2,500,000**
			2,454			**$920,000**		**$165,000**	**$0**	**$3,590,000**
Manchester and Washington										
IMP 28-MH12 x 28-MH5	15	24	340	$230	$27	$94,700	1	$12,398		
IMP 28-MH19 x 28-MH12	15	24	264	$230	$27	$70,600	1	$12,398		
IMP 28-MH20 x 28-MH19	15	18	155	$186	$27	$34,600	1	$12,134		
IMP 28-MH22 x 28-MH19	15	18	106	$186	$27	$22,700	1	$12,134		
IMP 28-MH24 x 28-MH22	15	18	70	$186	$27	$15,000	1	$12,134		
IMP 28-MH25 x 28-MH24	15	18	154	$186	$27	$34,400	1	$12,134		
IMP 28-MH3 x 28-MH1	15	36	28	$349	$27	$11,200	1	$12,926		
IMP 28-MH4 x 28-MH3	12	24	28	$230	$23	$7,600	1	$12,398		
IMP 28-MH5 x 28-MH3	15	36	34	$349	$27	$13,800	1	$12,926		
IMP 27-MH15 x 28-MH25	15	21	277	$209	$27	$65,300	1	$12,266		
IMP 27-MH16 x 27-MH15	15	21	336	$209	$27	$79,400	1	$12,266		
IMP 27-MH17 x 27-MH16	12	18	321	$186	$23	$70,400	1	$12,134		
IMP 28-MH21 x 28-MH20	15	21	34	$209	$27	$8,000	2	$24,533		
IMP 28-MH25 x 28-MH21	15	21	133	$209	$27	$31,400	1	$12,266		
			2,281			**$559,000**		**$185,000**	**$0**	**$740,000**

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
Park and Bellomy										
IMP 28-MH11 x 38-MH111	15	21	374	$209	$27	$88,200	1	$12,266		
IMP 28-MH15 x 28-MH11	10	18	378	$186	$23	$79,400	1	$12,134		
IMP 28-MH16 x 28-MH15	10	18	154	$186	$23	$32,300	1	$12,134		
IMP 28-MH17 x 28-MH16	10	18	167	$186	$23	$35,100	1	$12,134		
IMP 29-MH7 x 28-MH17	10	15	414	$167	$23	$79,000	1	$12,002		
IMP 38-MH110 x 38-MH109	15	21	203	$209	$27	$51,900	1	$12,266		
IMP 38-MH111 x 38-MH110	15	21	127	$209	$27	$31,200	1	$12,266		
IMP 38-JCT2 x 38-MH107	18	24	136	$230	$27	$37,900	1	$12,398		
IMP 38-MH106 x 38-MH81	18	24	408	$230	$27	$118,400	1	$12,398		
IMP 38-MH107 x 38-MH106	18	24	86	$230	$27	$25,000	1	$12,398		
IMP 38-MH109 x 38-JCT2	18	24	48	$230	$27	$14,400	1	$12,398		
IMP 38-MH87 x 38-MH80	36	42	436	$410	$46	$242,100	2	$26,380		
			2,931			**$835,000**		**$161,000**	**$0**	**$1,000,000**
Royal and Cabrillo										
IMP 44-MH10 x 44-MH8	15	18	258	$186	$27	$57,500	1	$12,134		
IMP 44-MH7 x 44-OF2	18	42	173	$410	$27	$75,600	1	$13,190	1	
IMP 44-MH8 x 44-MH7	18	42	303	$410	$27	$132,400	1	$13,190		
IMP 44-MH9 x 44-MH8	15	42	282	$410	$27	$123,100	1	$13,190		
IMP 45-MH12 x 45-MH9	15	36	217	$349	$27	$84,700	1	$12,926		
IMP 45-MH14 x 45-MH12	15	36	330	$349	$27	$124,000	1	$12,926		
IMP 45-MH15 x 45-MH14	15	24	318	$230	$27	$81,600	1	$12,398		
IMP 45-MH16 x 45-MH15	15	24	273	$230	$27	$70,000	1	$12,398		
IMP 45-MH8 x 44-MH9	15	42	263	$410	$27	$114,900	1	$13,190		
IMP 45-MH9 x 45-MH8	15	42	54	$410	$27	$23,600	1	$13,190		
IMP 45-MH17 x 45-MH16	15	21	265	$209	$27	$62,500	1	$12,266		
			2,736			**$950,000**		**$141,000**	**$40,000**	**$1,130,000**
St Lawrence and Calabazas										
IMP 41-MH10 x 41-MH11	12	18	404	$186	$23	$84,800	1	$12,134		
IMP 41-MH11 x 41-MH12	12	18	256	$186	$23	$53,700	1	$12,134		
IMP 41-MH12 x 41-MH9	21	36	106	$349	$34	$40,700	1	$12,926		
IMP 41-MH22 x 41-MH23	18	24	125	$230	$27	$32,100	1	$12,398		
IMP 41-MH23 x 41-MH24	18	24	66	$230	$27	$16,900	1	$12,398		
IMP 41-MH24 x 41-MH25	21	30	219	$291	$34	$71,200	1	$12,662		
IMP 41-MH25 x 41-MH26	21	30	235	$291	$34	$76,500	1	$12,662		
IMP 41-MH26 x 41-MH27	21	36	308	$349	$34	$117,800	1	$12,926		
IMP 41-MH27 x 41-MH12	21	36	338	$349	$34	$129,200	1	$12,926		
IMP 41-MH28 x 41-MH24	18	24	242	$230	$27	$62,100	1	$12,398		
IMP 41-MH3 x 51-MH38	21	42	466	$410	$34	$206,800	1	$13,190		
IMP 41-MH5 x 41-MH3	21	36	287	$349	$34	$109,800	1	$12,926		
IMP 41-MH9 x 41-MH5	21	36	178	$349	$34	$68,100	1	$12,926		
IMP 51-MH38 x 51-MH39	30	42	159	$410	$44	$72,200	1	$13,190		
IMP 51-MH39 x 51-MH40	30	42	281	$410	$44	$127,600	1	$13,190		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 51-MH40 x 52-MH31	30	42	402	$410	$44	$182,400	1	$13,190		
IMP 52-MH31 x 52-MH32	33	42	459	$410	$46	$209,100	1	$13,190		
IMP 52-MH32 x 52-MH33	33	42	207	$410	$46	$94,200	1	$13,190		
IMP 52-MH33 x 52-OF4	33	42	61	$410	$46	$27,700	1	$13,190	1	
			4,798			**$1,783,000**		**$244,000**	**$40,000**	**$2,070,000**
High Priority Totals:			**32,995**			**$22,190,000**		**$2,155,000**	**$160,000**	**$24,510,000**

[1]Project subtotals do not include markups for traffic control, mobilization/demobilization, design and engineering, or contingency. See Table B-1 for total CIP costs.

Table B-4: Detailed moderate priority CIP subtotals

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
Bowers and Chromite										
IMP 53-MH23 x 53-MH22	42	54	25	$557	$58	$16,100	1	$14,559		
IMP 53-MH24 x 53-MH23	30	54	17	$557	$44	$10,600	1	$14,559		
IMP 53-MH26 x 53-MH24	30	54	320	$557	$44	$192,500	1	$14,559		
IMP 53-MH27 x 53-MH26	30	54	320	$557	$44	$192,500	1	$14,559		
IMP 53-MH28 x 53-MH27	30	54	170	$557	$44	$102,300	1	$14,559		
IMP 53-MH29 x 53-MH28	30	54	200	$557	$44	$120,300	1	$14,559		
IMP 53-MH30 x 53-MH29	30	54	32	$557	$44	$19,400	1	$14,559		
IMP 53-MH31 x 53-MH30	33	48	117	$476	$46	$60,900	1	$13,454		
IMP 53-MH32 x 53-MH31	33	48	340	$476	$46	$177,600	1	$13,454		
IMP 53-MH33 x 53-MH32	33	48	400	$476	$46	$208,900	2	$26,908		
			1,941			**$1,101,000**		**$156,000**	**$0**	**$1,260,000**
Bowers and Monroe										
IMP 43-MH10 x 43-MH2	24	36	482	$349	$34	$184,700	1	$12,926		
IMP 43-MH15 x 43-MH10	24	30	476	$291	$34	$154,900	1	$12,662		
IMP 43-MH16 x 43-MH15	24	30	191	$291	$34	$64,600	1	$12,662		
IMP 43-MH2 x 53-MH54	30	42	277	$410	$44	$125,600	1	$13,190		
IMP 43-MH21 x 43-MH22	21	30	238	$291	$34	$83,700	1	$12,662		
IMP 43-MH22 x 43-MH16	24	30	271	$291	$34	$95,300	1	$12,662		
IMP 53-MH48 x 53-MH49	30	42	245	$410	$44	$111,300	1	$13,190		
IMP 53-MH49 x 54-MH36	30	42	488	$410	$44	$221,700	1	$13,190		
IMP 53-MH53 x 53-MH48	30	42	347	$410	$44	$157,700	1	$13,190		
IMP 53-MH54 x 53-MH53	30	42	300	$410	$44	$136,400	1	$13,190		
IMP 54-MH36 x 54-MH37	36	42	429	$410	$46	$195,700	1	$13,190		
IMP 54-MH37 x 54-MH38	36	42	445	$410	$46	$203,000	1	$13,190		
IMP 54-MH38 x 54-MH39	36	42	275	$410	$46	$143,600	1	$13,190		
IMP 54-MH39 x 54-OF4	36	42	165	$410	$46	$75,300	1	$13,190	1	
			4,630			**$1,954,000**		**$182,000**	**$40,000**	**$2,180,000**

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
Caltrain and San Tomas										
IMP 53-MH10 x 53-MH9	36	54	90	$557	$46	$54,300	1	$14,559		
IMP 53-MH15 x 53-MH55	42	54	68	$557	$58	$41,600	1	$14,559		
IMP 53-MH55 x 53-MH10	42	54	179	$557	$58	$110,200	1	$14,559		
IMP 53-MH7 x 54-MH6	36	54	447	$557	$46	$297,000	1	$14,559		
IMP 53-MH9 x 53-MH8	36	54	56	$557	$46	$33,800	1	$14,559		
IMP 54-MH6 x 64-MH56	36	54	435	$557	$46	$288,700	1	$14,559		
IMP 64-CB1 x 64-MH49	48	60	277	$630	$59	$209,300	1	$14,860		
IMP 64-MH48 x 64-CB1	48	60	22	$630	$59	$15,800	1	$14,860		
IMP 64-MH49 x 64-MH50	48	60	268	$630	$59	$208,300	1	$14,860		
IMP 64-MH50 x 64-MH51	48	60	250	$630	$59	$194,200	1	$14,860		
IMP 64-MH51 x 64-FG3	48	60	153	$630	$59	$105,800	1	$14,860	1	
IMP 64-MH53 x 64-MH48	48	60	162	$630	$59	$118,400	1	$14,860		
IMP 64-MH54 x 64-MH53	48	60	198	$630	$59	$144,800	1	$14,860		
IMP 64-MH56 x 64-MH57	48	60	48	$630	$59	$36,200	1	$14,860		
IMP 64-MH57 x 64-MH54	48	60	136	$630	$59	$100,000	1	$14,860		
			2,789			**$1,958,000**		**$221,000**	**$40,000**	**$2,220,000**
Condensa										
IMP 63-MH31 x 63-MH32	54	72	400	$854	$62	$407,200	1	$16,510		
IMP 63-MH32 x 63-MH33	54	72	160	$854	$62	$166,900	1	$16,510		
IMP 63-MH33 x 63-MH34	54	72	310	$854	$62	$331,400	1	$16,510		
IMP 63-MH34 x 63-MH53	54	72	166	$854	$62	$177,400	1	$16,510		
IMP 63-MH35 x 64-MH36	54	72	505	$854	$62	$539,600	1	$16,510		
IMP 63-MH53 x 63-MH35	54	72	85	$854	$62	$93,400	1	$16,510		
IMP 64-MH36 x 64-MH37	54	72	150	$854	$62	$152,700	1	$16,510		
IMP 64-MH37 x 64-MH38	54	72	146	$854	$62	$152,300	1	$16,510		
IMP 64-MH38 x 64-MH39	54	72	205	$854	$62	$219,100	1	$16,510		
IMP 64-MH39 x 64-MH40	54	72	314	$854	$62	$343,600	1	$16,510		
IMP 64-MH40 x 64-FG2	54	72	137	$854	$62	$128,800	1	$16,510	1	
			2,578			**$2,712,000**		**$182,000**	**$40,000**	**$2,930,000**
De La Pena and Homestead										
IMP 25-MH10 x 25-MH9	24	48	53	$476	$34	$28,100	1	$13,454		
IMP 25-MH11 x 25-MH10	24	48	85	$476	$34	$45,200	1	$13,454		
IMP 25-MH12 x 25-MH11	24	48	97	$476	$34	$51,500	1	$13,454		
IMP 25-MH13 x 25-MH12	21	48	205	$476	$34	$108,300	1	$13,454		
IMP 25-MH20 x 25-MH64	21	48	70	$476	$34	$35,700	1	$13,454		
IMP 25-MH21 x 25-MH20	21	48	72	$476	$34	$36,800	1	$13,454		
IMP 25-MH22 x 25-MH21	12	21	393	$209	$23	$91,400	1	$12,266		
IMP 25-MH23 x 25-MH21	21	48	82	$476	$34	$42,100	1	$13,454		
IMP 25-MH34 x 25-MH23	21	48	371	$476	$34	$189,300	2	$26,908		
IMP 25-MH5 x 25-MH4	24	48	168	$476	$34	$85,700	1	$13,454		
IMP 25-MH6 x 25-MH5	24	48	200	$476	$34	$102,300	1	$13,454		
IMP 25-MH64 x 25-MH13	21	48	132	$476	$34	$67,500	1	$13,454		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 25-MH7 x 25-MH6	24	48	55	$476	$34	$28,100	1	$13,454		
IMP 25-MH8 x 25-MH7	24	48	286	$476	$34	$145,900	1	$13,454		
IMP 25-MH9 x 25-MH8	24	48	32	$476	$34	$16,400	1	$13,454		
IMP 26-MH3 x 25-MH22	12	21	294	$209	$23	$68,400	1	$12,266		
IMP 26-MH4 x 26-MH3	12	18	340	$186	$23	$74,500	1	$12,134		
IMP 26-MH5 x 26-MH4	12	18	373	$186	$23	$78,300	1	$12,134		
			3,310			**$1,296,000**		**$251,000**	**$0**	**$1,550,000**
El Camino Real and Calabazas										
IMP 41-MH49 x 41-MH50	24	30	382	$291	$34	$134,200	1	$12,662		
IMP 41-MH50 x 41-MH51	24	30	658	$291	$34	$231,300	1	$12,662		
IMP 41-MH51 x 41-MH52	24	30	265	$291	$34	$89,700	1	$12,662		
IMP 41-MH52 x 41-MH53	24	30	100	$291	$34	$33,700	1	$12,662		
IMP 41-MH53 x 42-MH35	24	30	196	$291	$34	$66,500	1	$12,662		
IMP 42-MH35 x 42-MH36	33	36	61	$349	$46	$24,100	1	$12,926		
IMP 42-MH36 x 42-MH37	33	36	475	$349	$46	$201,200	1	$12,926		
IMP 42-MH37 x 42-MH38	33	36	84	$349	$46	$34,300	1	$12,926		
IMP 42-MH38 x 42-MH40	33	36	707	$349	$46	$289,500	1	$12,926		
IMP 42-MH39 x 42-OF7	33	36	83	$349	$46	$33,800	1	$12,926	1	
IMP 42-MH40 x 42-MH39	33	36	39	$349	$46	$18,400	1	$12,926		
IMP 40-MH24 x 41-MH47	24	27	229	$267	$34	$71,700	1	$12,530		
IMP 41-MH47 x 41-MH48	24	27	192	$267	$34	$62,500	1	$12,530		
IMP 41-MH48 x 41-MH49	24	30	361	$291	$34	$126,700	1	$12,662		
			3,832			**$1,418,000**		**$179,000**	**$40,000**	**$1,640,000**
Forbes										
IMP 25-MH45 x 25-MH44	10	12	279	$149	$23	$50,100	2	$23,741		
			279			**$50,000**		**$24,000**	**$0**	**$74,000**
Harold and San Tomas Aquino										
IMP 24-MH16 x 24-MH15	27	60	14	$630	$43	$10,500	1	$14,860		
IMP 24-MH17 x 24-MH16	27	60	17	$630	$43	$12,600	1	$14,860		
IMP 24-MH18 x 24-MH17	24	60	36	$630	$34	$26,300	1	$14,860		
IMP 24-MH19 x 24-MH45	24	60	33	$630	$34	$21,900	1	$14,860		
IMP 24-MH20 x 24-MH19	24	60	238	$630	$34	$158,100	1	$14,860		
IMP 24-MH21 x 24-MH20	24	60	238	$630	$34	$158,100	1	$14,860		
IMP 24-MH36 x 24-MH21	24	60	433	$630	$34	$287,600	1	$14,860		
IMP 24-MH45 x 24-MH18	24	60	139	$630	$34	$95,400	1	$14,860		
IMP 15-MH1 x 15-MH7	21	54	219	$557	$34	$142,900	1	$14,559		
IMP 15-MH1 x 25-MH61	21	54	253	$557	$34	$154,900	1	$14,559		
IMP 15-MH10 x 15-MH8	18	54	255	$557	$27	$153,900	1	$14,559		
IMP 15-MH11 x 15-MH10	18	54	62	$557	$27	$36,100	1	$14,559		
IMP 15-MH12 x 15-MH11	12	54	54	$557	$23	$31,200	1	$14,559		
IMP 15-MH29 x 15-MH27	33	54	119	$557	$46	$71,400	1	$14,559		
IMP 15-MH30 x 15-MH29	33	54	181	$557	$46	$109,200	1	$14,559		
IMP 15-MH31 x 15-MH30	33	54	112	$557	$46	$67,500	1	$14,559		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 15-MH32 x 15-MH31	33	54	365	$557	$46	$219,900	1	$14,559		
IMP 15-MH8 x 15-MH7	18	54	278	$557	$27	$179,500	1	$14,559		
IMP 24-MH37 x 24-MH36	24	54	238	$557	$34	$145,500	1	$14,559		
IMP 25-MH41 x 24-MH37	24	54	239	$557	$34	$146,300	1	$14,559		
IMP 25-MH42 x 25-MH41	21	54	263	$557	$34	$155,500	1	$14,559		
IMP 25-MH48 x 25-MH42	21	54	137	$557	$34	$81,200	1	$14,559		
IMP 25-MH49 x 25-MH48	21	54	65	$557	$34	$39,700	1	$14,559		
IMP 25-MH58 x 25-MH49	21	54	198	$557	$34	$117,000	1	$14,559		
IMP 25-MH61 x 25-MH58	18	54	242	$557	$27	$141,400	1	$14,559		
NEW 15-MH27 x 15-MH12		54	1,220	$557	$0	$679,400	2	$29,118		
NEW 15-MH53 x 15-MH32		54	1,111	$557	$0	$641,400	2	$29,118		
			6,760			**$4,084,000**		**$425,000**	**$0**	**$4,510,000**
Halford and Tamarack										
IMP 40-MH10 x 40-MH9	18	21	156	$209	$27	$38,400	1	$12,266		
IMP 40-MH11 x 40-MH10	18	21	171	$209	$27	$42,100	1	$12,266		
IMP 40-MH7 x 41-MH14	21	24	478	$230	$34	$125,900	2	$24,796		
			805			**$206,000**		**$49,000**	**$0**	**$260,000**
Juanita and Saratoga										
IMP 25-MH54 x 25-MH52	15	24	27	$230	$27	$7,200	1	$12,398		
IMP 25-MH56 x 25-MH54	15	24	172	$230	$27	$44,200	1	$12,398		
IMP 26-CB67 x 26-MH42	12	18	225	$186	$23	$47,200	1	$12,134		
IMP 25-MH52 x 25-MH53	18	24	36	$230	$27	$9,700	1	$12,398		
IMP 25-MH53 x 25-MH60	18	24	338	$230	$27	$94,300	1	$12,398		
IMP 25-MH57 x 25-MH56	15	18	317	$186	$27	$67,700	1	$12,134		
IMP 25-MH60 x 25-MH63	18	24	226	$230	$27	$68,100	1	$12,398		
IMP 26-MH42 x 25-MH57	15	18	278	$186	$27	$59,400	1	$12,134		
IMP 26-MH43 x 26-CB67	12	15	27	$167	$23	$5,100	1	$12,002		
IMP 26-MH44 x 26-MH43	10	15	96	$167	$23	$18,300	1	$12,002		
IMP 26-MH45 x 26-MH44	10	15	70	$167	$23	$13,500	1	$12,002		
			1,813			**$435,000**		**$134,000**	**$0**	**$570,000**
Juliette										
IMP 74-CB1 x 74-MH6	27	48	46	$476	$43	$23,800	2	$26,908		
IMP 74-MH45 x 74-MH8	27	48	52	$476	$43	$27,000	1	$13,454		
IMP 74-MH6 x 75-MH9	27	48	70	$476	$43	$36,400	1	$13,454		
IMP 74-MH7 x 74-CB1	27	48	36	$476	$43	$18,800	1	$13,454		
IMP 74-MH8 x 74-MH7	27	48	63	$476	$43	$32,800	1	$13,454		
IMP 75-MH1 x 85-MH79	27	48	208	$476	$43	$119,400	1	$13,454		
IMP 75-MH14 x 74-MH45	27	48	144	$476	$43	$74,900	1	$13,454		
IMP 75-MH17 x 75-MH14	27	48	307	$476	$43	$159,800	1	$13,454		
IMP 75-MH3 x 75-MH1	27	48	125	$476	$43	$71,800	1	$13,454		
IMP 75-MH6 x 75-MH3	27	48	121	$476	$43	$67,300	1	$13,454		
IMP 75-MH7 x 75-MH6	27	48	162	$476	$43	$90,100	1	$13,454		
IMP 75-MH8 x 75-MH7	27	48	128	$476	$43	$68,900	1	$13,454		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 75-MH9 x 75-MH8	27	48	103	$476	$43	$53,700	1	$13,454		
IMP 85-MH78 x 85-MH73	27	48	205	$476	$43	$110,200	1	$13,454		
IMP 85-MH79 x 85-MH78	27	48	184	$476	$43	$102,600	1	$13,454		
			1,955			**$1,058,000**		**$215,000**	**$0**	**$1,270,000**
Kiely										
IMP 13-MH13 x 13-MH9	21	42	135	$410	$34	$64,300	1	$13,190		
IMP 13-MH16 x 13-MH13	21	42	64	$410	$34	$30,500	1	$13,190		
IMP 13-MH19 x 13-MH16	21	36	176	$349	$34	$75,100	1	$12,926		
IMP 13-MH21 x 13-MH19	21	36	244	$349	$34	$104,100	1	$12,926		
IMP 13-MH23 x 13-MH21	21	36	179	$349	$34	$76,400	1	$12,926		
IMP 13-MH28 x 13-MH23	21	36	242	$349	$34	$103,300	1	$12,926		
IMP 13-MH34 x 13-MH28	21	36	264	$349	$34	$116,700	1	$12,926		
IMP 13-MH7 x 23-MH32	27	42	553	$410	$43	$268,600	1	$13,190		
IMP 13-MH8 x 13-MH7	24	42	207	$410	$34	$98,900	1	$13,190		
IMP 13-MH9 x 13-MH8	24	42	368	$410	$34	$175,500	1	$13,190		
IMP 23-MH20 x 23-OF4	33	48	547	$476	$46	$285,400	1	$13,454	1	
IMP 23-MH21 x 23-MH20	30	48	45	$476	$44	$26,700	1	$13,454		
IMP 23-MH26 x 23-MH21	30	48	227	$476	$44	$130,700	1	$13,454		
IMP 23-MH29 x 23-MH26	30	48	365	$476	$44	$203,500	1	$13,454		
IMP 23-MH32 x 23-MH29	27	42	534	$410	$43	$259,600	1	$13,190		
			4,150			**$2,019,000**		**$198,000**	**$40,000**	**$2,260,000**
Lafayette and Laurelwood										
IMP 56-MH11 x 66-MH49	54	72	322	$854	$62	$320,000	1	$16,510		
IMP 56-MH12 x 56-MH11	48	72	92	$854	$59	$91,200	1	$16,510		
IMP 56-MH13 x 56-MH12	48	72	425	$854	$59	$420,800	1	$16,510		
IMP 56-MH14 x 56-MH13	48	72	484	$854	$59	$491,100	1	$16,510		
IMP 56-MH15 x 56-MH14	48	72	61	$854	$59	$62,300	1	$16,510		
IMP 56-MH21 x 56-MH22	36	42	416	$410	$46	$217,200	1	$13,190		
IMP 56-MH22 x 56-MH66	48	72	155	$854	$59	$141,400	1	$16,510		
IMP 56-MH23 x 56-MH22	42	72	60	$854	$58	$59,600	2	$33,020		
IMP 56-MH24 x 56-MH23	42	66	223	$724	$58	$195,400	1	$16,176		
IMP 56-MH25 x 56-MH24	15	66	112	$724	$27	$94,600	1	$16,176		
IMP 56-MH36 x 56-MH25	15	60	256	$630	$27	$185,000	1	$14,860		
IMP 56-MH65 x 56-MH21	36	42	120	$410	$46	$60,700	1	$13,190		
IMP 56-MH66 x 56-MH15	48	72	68	$854	$59	$62,000	1	$16,510		
IMP 57-MH22 x 56-MH36	15	60	338	$630	$27	$236,700	1	$14,860		
IMP 57-MH23 x 57-MH22	27	60	28	$630	$43	$19,100	1	$14,860		
IMP 57-MH25 x 57-MH23	27	33	211	$320	$43	$79,600	1	$12,794		
IMP 66-MH25 x 67-MH33	12	18	183	$186	$23	$43,500	1	$12,134		
IMP 66-MH27 x 66-MH22	54	72	230	$854	$62	$216,500	1	$16,510		
IMP 66-MH31 x 66-MH53	54	72	68	$854	$62	$66,200	1	$16,510		
IMP 66-MH32 x 66-MH51	54	72	202	$854	$62	$195,700	1	$16,510		
IMP 66-MH33 x 66-MH32	12	18	120	$186	$23	$30,800	1	$12,134		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 66-MH38 x 66-MH32	54	72	266	$854	$62	$263,800	1	$16,510		
IMP 66-MH38 x 66-MH42	54	72	33	$854	$62	$33,800	1	$16,510		
IMP 66-MH42 x 66-MH44	54	72	33	$854	$62	$33,800	1	$16,510		
IMP 66-MH45 x 66-MH44	54	72	351	$854	$62	$348,100	1	$16,510		
IMP 66-MH46 x 66-MH45	54	72	528	$854	$62	$510,600	1	$16,510		
IMP 66-MH46 x 66-MH48	54	72	124	$854	$62	$123,100	1	$16,510		
IMP 66-MH49 x 66-MH48	54	72	280	$854	$62	$277,900	1	$16,510		
IMP 66-MH51 x 66-MH31	54	72	284	$854	$62	$274,600	1	$16,510		
IMP 66-MH52 x 66-MH27	54	72	23	$854	$62	$22,200	1	$16,510		
IMP 66-MH53 x 66-MH52	54	72	193	$854	$62	$186,500	1	$16,510		
IMP 78-MH16 x 78-JS1	60	72	31	$854	$72	$28,500	1	$16,510		
IMP 78-MH18 x 78-MH16	60	72	247	$854	$72	$248,000	1	$16,510		
IMP 67-MH2 x 77-MH46	66	72	494	$854	$74	$483,400	1	$16,510		
IMP 67-MH3 x 67-MH2	66	72	97	$854	$74	$99,600	1	$16,510		
IMP 67-MH4 x 67-MH3	66	72	79	$854	$74	$83,400	1	$16,510		
IMP 67-MH5 x 67-MH4	66	72	114	$854	$74	$117,300	1	$16,510		
IMP 67-MH6 x 67-MH5	66	72	74	$854	$74	$74,500	1	$16,510		
IMP 77-MH39 x 78-MH23	66	72	511	$854	$74	$473,700	1	$16,510		
IMP 77-MH41 x 77-MH39	66	72	409	$854	$74	$379,500	1	$16,510		
IMP 77-MH42 x 77-MH41	66	72	376	$854	$74	$348,800	1	$16,510		
IMP 77-MH45 x 77-MH42	66	72	352	$854	$74	$335,100	1	$16,510		
IMP 77-MH46 x 77-MH45	66	72	222	$854	$74	$211,600	1	$16,510		
IMP 78-MH20 x 78-MH18	66	72	133	$854	$74	$130,200	1	$16,510		
IMP 78-MH21 x 78-MH20	66	72	329	$854	$74	$322,100	1	$16,510		
IMP 78-MH23 x 78-MH21	66	72	511	$854	$74	$487,200	1	$16,510		
NEW 66-MH22 x 67-MH6		60	200	$630	$0	$152,300	1	$14,860		
Jack and Bore Shaft										$3,200,000
			10,469			**$9,339,000**		**$766,000**	**$0**	**$10,110,000**
Lake Santa Clara PS										
IMP 84-MH10 x 84-MH11	18	48	371	$476	$27	$207,000	1	$13,454		
IMP 84-MH9 x 84-MH11	24	48	295	$476	$34	$167,100	1	$13,454		
IMP 84-MH9 x 84-PS2	24	48	79	$476	$34	$40,300	1	$13,454		
IMP 84-PS2 x 84-OF3	18	36	10	$349	$27	$3,800	1	$12,926	1	
IMP 85-MH53 x 85-MH54	15	48	180	$476	$27	$90,600	1	$13,454		
IMP 85-MH54 x 84-MH10	18	48	292	$476	$27	$157,900	1	$13,454		
IMP Link_9	18	36	10	$349	$27	$3,900	1	$12,926		
LakeSantaClara_New2		36	40	$349	$0	$14,000	1	$12,926		
LakeSantaClara-1		36	37	$349	$0	$13,000	1	$12,926		
NEW 85-MH52 x 85-MH53		48	75	$476	$0	$39,900	1	$13,454		
Pumps										$4,880,000
			1,390			**$738,000**		**$132,000**	**$40,000**	**$5,790,000**

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
Landeros and Gamblin										
IMP 14-MH19 x 14-OF2	33	36	218	$349	$46	$95,600	1	$12,926	1	
IMP 14-MH24 x 14-MH25	15	24	282	$230	$27	$81,700	1	$12,398		
IMP 14-MH25 x 14-MH26	15	30	281	$291	$27	$100,300	1	$12,662		
IMP 14-MH26 x 14-MH19	27	42	195	$410	$43	$101,000	1	$13,190		
IMP 14-MH28 x 14-MH24	12	18	364	$186	$23	$90,000	1	$12,134		
IMP 14-MH29 x 14-MH26	12	24	367	$230	$23	$109,100	1	$12,398		
IMP 14-MH30 x 14-MH29	12	18	148	$186	$23	$35,200	1	$12,134		
IMP 14-MH33 x 14-MH30	12	18	156	$186	$23	$35,600	1	$12,134		
			2,010			**$649,000**		**$100,000**	**$40,000**	**$790,000**
Los Padres										
IMP 25-MH14 x 25-MH3	24	48	86	$476	$34	$43,900	1	$13,454		
IMP 25-MH15 x 25-MH14	24	48	96	$476	$34	$49,000	1	$13,454		
IMP 25-MH25 x 25-MH15	24	48	261	$476	$34	$133,300	1	$13,454		
IMP 25-MH29 x 25-MH25	24	48	487	$476	$34	$248,700	1	$13,454		
IMP 25-MH39 x 25-MH29	24	42	373	$410	$34	$171,700	1	$13,190		
IMP 25-MH40 x 25-MH39	24	42	371	$410	$34	$170,800	1	$13,190		
IMP 25-MH43 x 25-MH40	24	42	320	$410	$34	$147,300	1	$13,190		
IMP 25-MH50 x 25-MH43	24	42	221	$410	$34	$105,500	1	$13,190		
IMP 25-MH55 x 25-MH50	24	42	237	$410	$34	$112,900	1	$13,190		
IMP 25-MH59 x 25-MH55	24	42	336	$410	$34	$160,500	1	$13,190		
IMP 25-MH62 x 25-MH59	24	42	160	$410	$34	$76,400	1	$13,190		
IMP 25-MH63 x 25-MH62	24	42	91	$410	$34	$45,000	2	$26,380		
			3,040			**$1,465,000**		**$173,000**	**$0**	**$1,640,000**
Machado										
IMP 51-MH35 x 51-MH36	15	21	259	$209	$27	$63,700	2	$24,533		
IMP 51-MH36 x 51-MH37	18	21	288	$209	$27	$71,000	1	$12,266		
IMP 51-MH37 x 51-MH38	15	21	43	$209	$27	$10,600	1	$12,266		
			590			**$145,000**		**$49,000**	**$0**	**$190,000**
Main										
IMP 55-MH40 x 56-MH57	18	30	309	$291	$27	$98,300	2	$25,324		
IMP 56-MH57 x 46-MH2	18	30	164	$291	$27	$52,300	1	$12,662		
IMP 55-MH39 x 55-MH40	12	18	118	$186	$23	$24,800	1	$12,134		
			591			**$175,000**		**$50,000**	**$0**	**$230,000**
Melody										
IMP 10-MH14 x 10-MH2	15	18	213	$186	$27	$45,400	1	$12,134		
IMP 10-MH2 x 10-MH3	15	18	41	$186	$27	$9,000	1	$12,134		
IMP 10-MH3 x 10-OF1	15	18	96	$186	$27	$22,200	1	$12,134	1	
IMP 10-MH8 x 10-MH14	12	15	160	$167	$23	$30,500	1	$12,002		
			509			**$107,000**		**$48,000**	**$40,000**	**$200,000**
Oakmead and Scott										
IMP 72-CB1 x 72-MH28	18	24	72	$230	$27	$19,200	1	$12,398		
IMP 72-MH28 x 73-MH21	18	24	321	$230	$27	$85,900	2	$24,796		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 72-MH30 x 72-CB1	15	21	103	$209	$27	$26,300	1	$12,266		
IMP 72-MH31 x 72-MH30	15	21	187	$209	$27	$51,800	1	$12,266		
			682			**$183,000**		**$62,000**	**$0**	**$240,000**
Patricia										
IMP 24-MH8 x 24-OF1	15	21	64	$209	$27	$18,900	2	$24,533	1	
IMP 24-MH9 x 24-MH8	15	21	133	$209	$27	$38,300	1	$12,266		
			197			**$57,000**		**$37,000**	**$40,000**	**$130,000**
Princeton and Homestead										
IMP 22-MH26 x 22-MH27	24	30	347	$291	$34	$135,300	2	$25,324		
IMP 22-MH32 x 22-MH24	15	21	119	$209	$27	$35,400	1	$12,266		
IMP 22-MH33 x 22-MH32	15	21	103	$209	$27	$29,600	1	$12,266		
IMP 22-MH34 x 22-MH33	15	21	270	$209	$27	$72,000	1	$12,266		
			839			**$272,000**		**$62,000**	**$0**	**$330,000**
Richard and Scott										
IMP 55-MH11 x 65-MH24	42	60	443	$630	$58	$324,000	1	$14,860		
IMP 55-MH14 x 55-MH11	21	36	368	$349	$34	$162,700	1	$12,926		
IMP 55-MH15 x 55-MH14	21	36	300	$349	$34	$132,300	1	$12,926		
IMP 55-MH17 x 55-MH15	21	36	86	$349	$34	$36,800	1	$12,926		
IMP 55-MH23 x 55-MH17	21	36	462	$349	$34	$176,700	1	$12,926		
IMP 55-MH24 x 55-MH23	12	30	266	$291	$23	$94,200	1	$12,662		
IMP 55-MH25 x 55-MH24	12	30	68	$291	$23	$23,900	1	$12,662		
IMP 56-CB3 x 56-MH16	12	42	29	$410	$23	$15,200	1	$13,190		
IMP 56-MH27 x 56-MH28	15	24	46	$230	$27	$14,300	1	$12,398		
IMP 56-MH28 x 56-CB3	30	42	408	$410	$44	$212,100	1	$13,190		
IMP 64-MH2 x 74-MH40	48	72	222	$854	$59	$225,300	1	$16,510		
IMP 64-MH3 x 64-MH2	48	72	161	$854	$59	$163,400	1	$16,510		
IMP 64-MH4 x 64-MH3	48	72	195	$854	$59	$202,500	1	$16,510		
IMP 64-MH6 x 64-MH4	48	72	261	$854	$59	$238,200	1	$16,510		
IMP 65-MH1 x 64-MH6	48	72	442	$854	$59	$414,700	1	$16,510		
IMP 65-MH11 x 65-MH9	48	60	321	$630	$59	$249,400	1	$14,860		
IMP 65-MH15 x 65-MH11	42	60	181	$630	$58	$124,500	1	$14,860		
IMP 65-MH18 x 65-MH15	42	60	181	$630	$58	$124,500	1	$14,860		
IMP 65-MH19 x 65-MH18	42	60	375	$630	$58	$274,000	1	$14,860		
IMP 65-MH2 x 65-MH1	48	72	153	$854	$59	$140,000	1	$16,510		
IMP 65-MH20 x 65-MH19	42	60	22	$630	$58	$15,900	1	$14,860		
IMP 65-MH21 x 65-MH20	42	60	402	$630	$58	$285,300	1	$14,860		
IMP 65-MH22 x 65-MH21	42	60	123	$630	$58	$87,400	1	$14,860		
IMP 65-MH23 x 65-MH22	42	60	117	$630	$58	$83,000	1	$14,860		
IMP 65-MH24 x 65-MH23	42	60	142	$630	$58	$103,900	1	$14,860		
IMP 65-MH5 x 65-MH2	48	72	638	$854	$59	$647,200	1	$16,510		
IMP 65-MH9 x 65-MH5	48	60	867	$630	$59	$635,500	1	$14,860		
IMP 74-MH40 x 74-FG5	48	72	45	$854	$59	$41,100	1	$16,510	1	

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
NEW 56-MH16 x 55-MH25		30	972	$291	$0	$346,200	1	$12,662		
			8,295			**$5,594,000**		**$424,000**	**$40,000**	**$6,060,000**
Salberg and Barcells										
IMP 24-MH31 x 24-MH32	12	48	224	$476	$23	$112,000	2	$26,908		
IMP 24-MH33 x 24-MH32	15	30	19	$291	$27	$6,300	1	$12,662		
IMP 24-MH34 x 24-MH33	15	30	67	$291	$27	$23,100	1	$12,662		
IMP 24-MH35 x 24-MH34	15	30	199	$291	$27	$63,400	1	$12,662		
IMP 14-MH1 x 24-MH40	12	18	544	$186	$23	$114,100	1	$12,134		
IMP 24-MH39 x 24-MH35	15	24	534	$230	$27	$142,900	1	$12,398		
IMP 24-MH40 x 24-MH39	15	21	532	$209	$27	$130,900	1	$12,266		
			2,119			**$593,000**		**$102,000**	**$0**	**$690,000**
Scott and Anna										
IMP 35-MH17 x 35-MH16	18	21	237	$209	$27	$58,300	1	$12,266		
IMP 35-MH18 x 35-MH17	18	21	215	$209	$27	$50,800	1	$12,266		
IMP 35-MH19 x 35-MH18	15	21	55	$209	$27	$13,000	1	$12,266		
IMP 35-MH26 x 35-MH19	15	21	195	$209	$27	$46,000	1	$12,266		
IMP 35-MH32 x 35-MH26	15	21	273	$209	$27	$64,400	1	$12,266		
IMP 35-MH33 x 35-MH32	12	18	293	$186	$23	$64,200	1	$12,134		
IMP 35-MH35 x 35-MH32	12	15	410	$167	$23	$78,300	1	$12,002		
IMP 35-MH42 x 35-MH35	12	15	390	$167	$23	$74,400	1	$12,002		
NEW 35-MH26 x 35-MH25		21	322	$209	$0	$67,300	2	$24,533		
			2,390			**$517,000**		**$122,000**	**$0**	**$640,000**
St Ignatius										
IMP 42-MH2 x 42-MH3	18	21	338	$209	$27	$79,800	1	$12,266		
IMP 42-MH3 x 42-MH1	18	21	328	$239	$27	$87,500	1	$12,266		
IMP NRV 42-MH1 x 42-OF1	18	21	29	$209	$27	$6,800	1	$12,266	1	
			695			**$174,000**		**$37,000**	**$40,000**	**$250,000**
Tahoe and Enochs										
IMP 60-CB8 x 60-MH13	15	18	55	$186	$27	$11,800	1	$12,134		
IMP 60-MH12 x 60-MH11	15	18	25	$205	$27	$5,800	2	$24,269		
IMP 60-MH13 x 60-MH12	15	18	153	$186	$27	$32,700	1	$12,134		
IMP 60-MH14 x 60-CB8	15	18	63	$186	$27	$13,400	1	$12,134		
			296			**$64,000**		**$61,000**	**$0**	**$120,000**
Tannery										
IMP 72-MH14 x 72-MH13	24	33	180	$320	$34	$63,800	2	$25,588		
			180			**$64,000**		**$26,000**	**$0**	**$90,000**
Victor										
IMP 78-MH10 x 78-MH7	21	30	143	$291	$34	$46,500	1	$12,662		
IMP 78-MH6 x 78-MH3	21	30	320	$291	$34	$104,100	2	$25,324		
IMP 78-MH7 x 78-MH6	21	30	249	$291	$34	$81,100	1	$12,662		
IMP 78-MH14 x 78-PVT1	18	21	122	$209	$27	$32,600	1	$12,266		
IMP 78-PVT1 x 78-MH10	18	24	47	$230	$27	$12,100	1	$12,398		
			882			**$276,000**		**$75,000**	**$0**	**$350,000**

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
Victoria										
IMP 42-MH16 x 42-MH15	15	21	254	$209	$27	$59,900	1	$12,266		
IMP 42-MH17 x 42-MH16	15	18	201	$186	$27	$42,900	2	$24,269		
			455			**$103,000**		**$37,000**	**$0**	**$140,000**
Walsh										
NEW 56-MH7 x 56-MH8		18	233	$186	$0	$43,500	2	$24,269		
			233			**$44,000**		**$24,000**	**$0**	**$68,000**
Walsh and De La Cruz										
IMP 57-MH2 x 57-MH3	15	66	547	$724	$27	$410,400	1	$16,176		
IMP 57-MH3 x 57-MH4	15	66	73	$724	$27	$54,800	1	$16,176		
IMP 57-MH4 x 57-MH5	18	66	163	$724	$27	$122,400	1	$16,176		
IMP 57-MH5 x 57-MH6	18	66	153	$724	$27	$114,900	1	$16,176		
IMP 57-MH45 x 57-MH46	27	66	271	$724	$43	$207,900	1	$16,176		
IMP 57-MH46 x 57-MH9	27	66	224	$724	$43	$171,900	1	$16,176		
IMP 57-MH47 x 58-MH2	27	66	461	$724	$43	$353,800	1	$16,176		
IMP 57-MH6 x 57-MH7	27	66	17	$724	$43	$13,300	1	$16,176		
IMP 57-MH7 x 57-MH8	27	66	84	$724	$43	$64,300	1	$16,176		
IMP 57-MH8 x 57-MH45	27	66	54	$724	$43	$41,400	1	$16,176		
IMP 57-MH9 x 57-MH47	27	66	200	$724	$43	$153,500	1	$16,176		
NEW 57-MH2 x 56-MH11		66	385	$724	$0	$278,700	2	$32,352		
			2,632			**$1,987,000**		**$210,000**	**$0**	**$2,200,000**
Warburton and Nobili										
IMP 41-MH42 x 42-MH26	15	18	299	$186	$27	$63,800	2	$24,269		
			299			**$64,000**		**$24,000**	**$0**	**$88,000**
Moderate			**73,633**			**$45,780,000**		**$4,840,000**	**$440,000**	**$51,100,000**

[1]Project subtotals do not include markups for traffic control, mobilization/demobilization, design and engineering, or contingency. See Table B-1 for total CIP costs.

Table B-5: Detailed low priority CIP subtotals

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
Aldo and Woodward										
IMP 77-MH14 x 77-MH12	30	36	555	$363	$44	$226,400	2	$25,852		
IMP 77-MH15 x 77-MH14	30	36	190	$378	$44	$80,300	1	$12,926		
IMP 77-MH16 x 77-MH15	30	36	107	$349	$44	$42,100	1	$12,926		
IMP 77-MH17 x 77-MH15	15	21	537	$240	$27	$143,100	1	$12,266		
IMP 77-MH19 x 77-MH16	30	33	247	$375	$44	$103,700	1	$12,794		
IMP 77-MH21 x 77-MH17	15	18	194	$224	$27	$48,700	1	$12,134		
IMP 77-MH22 x 77-MH19	30	33	20	$362	$44	$8,100	1	$12,794		
IMP 77-MH24 x 77-MH21	15	18	283	$205	$27	$65,700	1	$12,134		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 77-MH26 x 77-MH22	30	33	294	$334	$44	$111,300	1	$12,794		
IMP 77-MH27 x 77-MH26	30	33	109	$320	$44	$39,700	1	$12,794		
IMP 77-MH28 x 77-MH27	27	30	208	$317	$43	$75,100	1	$12,662		
IMP 78-MH4 x 78-MH3	27	30	370	$317	$43	$133,300	1	$12,662		
			3,114			**$1,078,000**		**$165,000**	**$0**	**$1,240,000**
Barcells										
IMP 23-MH30 x 23-MH29	12	18	400	$205	$23	$91,400	2	$24,269		
IMP 23-MH31 x 23-MH30	12	18	246	$205	$23	$56,200	1	$12,134		
			646			**$148,000**		**$36,000**	**$0**	**$180,000**
Bassett										
IMP 86-MH19 x 86-MH18	12	18	116	$214	$23	$27,500	2	$24,269		
IMP 86-MH24 x 86-MH19	12	18	140	$186	$23	$29,400	1	$12,134		
			256			**$57,000**		**$36,000**	**$0**	**$93,000**
Bellomy and Newhall										
IMP 25-MH36 x 25-MH35	18	30	386	$291	$27	$123,000	1	$12,662		
IMP 26-MH16 x 26-MH17	10	12	280	$149	$23	$48,200	1	$11,870		
IMP 26-MH17 x 26-MH18	10	12	443	$149	$23	$76,300	1	$11,870		
IMP 26-MH19 x 26-MH25	15	18	509	$224	$27	$127,500	1	$12,134		
IMP 26-MH25 x 26-MH26	15	18	83	$233	$27	$21,500	1	$12,134		
IMP 26-MH29 x 26-MH28	15	24	31	$252	$27	$8,600	1	$12,398		
IMP 26-MH33 x 26-MH29	15	24	359	$252	$27	$100,000	1	$12,398		
IMP 26-MH34 x 26-MH33	15	24	220	$230	$27	$56,400	1	$12,398		
IMP 25-MH35 x 25-MH34	21	36	372	$349	$34	$142,400	2	$25,852		
IMP 25-MH37 x 25-MH36	18	24	312	$230	$27	$80,100	1	$12,398		
IMP 25-MH38 x 25-MH37	18	24	50	$230	$27	$12,800	1	$12,398		
IMP 26-MH26 x 25-MH38	18	24	64	$230	$27	$16,300	1	$12,398		
IMP 26-MH28 x 26-MH26	15	24	289	$241	$27	$77,400	1	$12,398		
IMP 26-MH35 x 26-MH34	12	18	218	$186	$23	$45,700	1	$12,134		
IMP 26-MH36 x 26-MH35	12	18	228	$186	$23	$47,900	1	$12,134		
IMP 26-MH37 x 26-MH36	12	18	258	$196	$23	$56,600	1	$12,134		
IMP 26-MH38 x 26-MH37	10	15	129	$184	$23	$26,800	1	$12,002		
IMP 26-MH39 x 26-MH38	10	15	51	$184	$23	$10,600	1	$12,002		
IMP 26-MH40 x 26-MH39	10	15	180	$184	$23	$37,400	1	$12,002		
			4,462			**$1,116,000**		**$246,000**	**$0**	**$1,360,000**
Benton										
IMP 32-MH28 x 32-MH27	18	24	298	$296	$27	$96,400	1	$12,398		
IMP 32-MH28 x 33-MH28	24	30	445	$330	$34	$162,000	1	$12,662		
IMP 33-MH28 x 33-MH29	24	36	354	$349	$34	$135,600	1	$12,926		
IMP 33-MH29 x 33-MH30	27	36	344	$349	$43	$134,900	1	$12,926		
IMP 33-MH30 x 33-MH31	27	36	156	$349	$43	$61,300	1	$12,926		
IMP 33-MH31 x 33-MH32	27	36	278	$349	$43	$109,200	1	$12,926		
IMP 33-MH32 x 33-MH33	27	36	336	$349	$43	$131,600	1	$12,926		
IMP 33-MH33 x 33-MH34	27	36	238	$349	$43	$93,300	1	$12,926		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 33-MH34 x 33-OF4	27	36	388	$378	$43	$163,600	1	$12,926	1	
			2,837			**$1,088,000**		**$116,000**	**$40,000**	**$1,240,000**
Benton and Calabazas										
IMP 30-MH10 x 30-MH11	18	30	183	$369	$27	$72,500	1	$12,662		
IMP 30-MH11 x 31-MH24	30	36	291	$467	$44	$148,600	1	$12,926		
IMP 30-MH12 x 30-MH11	18	21	325	$291	$27	$103,400	1	$12,266		
IMP 30-MH16 x 30-MH12	15	21	277	$270	$27	$82,400	1	$12,266		
IMP 30-MH18 x 30-MH19	12	15	163	$218	$23	$39,400	1	$12,002		
IMP 30-MH19 x 30-MH20	12	15	385	$218	$23	$93,000	1	$12,002		
IMP 30-MH20 x 30-MH21	15	18	146	$196	$27	$32,500	1	$12,134		
IMP 30-MH21 x 30-MH16	15	21	283	$260	$27	$81,200	1	$12,266		
IMP 30-MH7 x 30-MH8	12	18	105	$224	$23	$25,800	1	$12,134		
IMP 30-MH8 x 30-MH9	12	18	220	$233	$23	$56,500	1	$12,134		
IMP 30-MH9 x 30-MH10	18	24	363	$296	$27	$117,400	1	$12,398		
IMP 31-MH24 x 31-MH25	30	36	116	$467	$44	$59,200	1	$12,926		
IMP 31-MH25 x 31-MH26	30	36	120	$437	$44	$57,800	1	$12,926		
IMP 31-MH26 x 31-MH27	30	36	290	$422	$44	$135,400	1	$12,926		
IMP 31-MH27 x 31-MH28	30	36	129	$408	$44	$58,300	1	$12,926		
IMP 31-MH28 x 31-MH29	30	36	123	$393	$44	$53,800	1	$12,926		
IMP 31-MH29 x 31-MH30	30	36	60	$393	$44	$26,200	1	$12,926		
IMP 31-MH30 x 31-OF5	30	36	40	$349	$44	$15,700	1	$12,926	1	
			3,619			**$1,259,000**		**$226,000**	**$40,000**	**$1,530,000**
Benton and Sherman										
IMP 37-MH13 x 37-MH14	36	54	300	$557	$46	$181,100	2	$29,118		
IMP 37-MH14 x 37-MH16	36	54	45	$557	$46	$27,200	1	$14,559		
IMP 37-MH16 x 37-MH17	36	54	385	$557	$46	$232,300	1	$14,559		
IMP 37-MH17 x 37-MH18	36	54	365	$557	$46	$220,300	1	$14,559		
IMP 37-MH18 x 37-MH20	36	54	375	$557	$46	$226,200	1	$14,559		
IMP 37-MH19 x 37-MH20	24	42	27	$410	$34	$12,000	1	$13,190		
IMP 37-MH26 x 37-MH16	20	42	130	$443	$27	$61,100	1	$13,190		
IMP 37-MH27 x 37-MH26	20	42	27	$443	$27	$12,600	1	$13,190		
IMP 37-MH28 x 37-MH27	20	42	97	$443	$27	$45,600	1	$13,190		
IMP 37-MH29 x 37-MH28	20	42	31	$410	$27	$13,700	1	$13,190		
IMP 37-MH30 x 37-MH29	20	42	107	$410	$27	$46,700	1	$13,190		
IMP 37-MH31 x 37-MH30	20	42	14	$509	$27	$7,400	1	$13,190		
IMP 37-MH32 x 37-MH31	20	42	72	$443	$27	$33,800	1	$13,190		
IMP 37-MH36 x 37-MH32	20	42	134	$459	$27	$65,200	1	$13,190		
IMP 37-MH41 x 37-MH36	20	42	123	$443	$27	$58,000	1	$13,190		
IMP 36-MH32 x 37-MH13	36	42	398	$410	$46	$181,400	1	$13,190		
IMP 37-MH19 x 37-MH21	24	42	529	$443	$34	$252,100	1	$13,190		
IMP 37-MH21 x 38-JCT1	24	42	385	$509	$34	$209,200	1	$13,190		
IMP 38-JCT1 x 38-MH8	24	42	70	$443	$34	$33,300	1	$13,190		
IMP 38-MH7 x 38-MH4	24	42	194	$410	$34	$86,100	1	$13,190		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 38-MH8 x 38-MH7	24	42	152	$426	$34	$69,900	1	$13,190		
			3,959			**$2,075,000**		**$298,000**	**$0**	**$2,370,000**
Bowers 101 South Ramp										
IMP 73-MH10 x 73-MH4	48	54	239	$557	$59	$147,200	1	$14,559		
IMP 73-MH4 x 73-MH5	48	54	212	$557	$59	$130,500	1	$14,559		
IMP 73-MH5 x 73-MH6	48	54	411	$557	$59	$253,100	1	$14,559		
IMP 73-MH6 x 74-MH15	48	54	488	$617	$59	$330,000	2	$29,118		
			1,350			**$861,000**		**$73,000**	**$0**	**$930,000**
Bowers Overflow										
NEW 63-MH29 x 63-MH4		24	1,317	$263	$0	$346,200	2	$24,796		
			1,317			**$346,000**		**$25,000**	**$0**	**$370,000**
Brookdale and Calabazas Creek										
IMP 21-MH10 x 21-MH11	15	18	242	$196	$27	$53,900	1	$12,134		
IMP 21-MH11 x 21-MH4	21	24	244	$230	$34	$64,300	1	$12,398		
IMP 21-MH3 x 31-MH33	21	30	230	$304	$34	$77,800	1	$12,662		
IMP 21-MH4 x 21-MH3	21	30	40	$304	$34	$13,400	1	$12,662		
IMP 21-MH8 x 21-MH9	15	18	190	$196	$27	$42,200	1	$12,134		
IMP 21-MH9 x 21-MH10	15	18	149	$186	$27	$31,800	1	$12,134		
IMP 31-CB3 x 31-MH23	24	36	239	$363	$34	$95,100	1	$12,926		
IMP 31-MH23 x 31-OF3	24	36	338	$349	$34	$129,400	1	$12,926	1	
IMP 31-MH31 x 31-CB3	12	30	40	$291	$23	$12,700	1	$12,662		
IMP 31-MH32 x 31-MH31	21	30	271	$291	$34	$88,300	1	$12,662		
IMP 31-MH33 x 31-MH32	21	30	272	$291	$34	$88,500	1	$12,662		
			2,255			**$697,000**		**$138,000**	**$40,000**	**$880,000**
Bucher Overflow										
IMP 24-MH38 x 24-MH31	12	48	534	$476	$23	$266,900	2	$26,908		
NEW100 14-MH4 x 24-MH38		48	1,400	$476	$0	$667,100	1	$13,454		
			1,934			**$934,000**		**$40,000**	**$0**	**$970,000**
Cabrillo and UPRR										
IMP 46-MH11 x 46-MH15	21	24	353	$252	$34	$100,800	1	$12,398		
IMP 46-MH12 x 46-MH11	21	24	102	$230	$34	$26,900	1	$12,398		
IMP 46-MH12 x 46-MH13	21	24	29	$296	$34	$9,600	1	$12,398		
IMP 46-MH15 x 46-MH25	21	24	373	$263	$34	$110,700	1	$12,398		
IMP 46-MH19 x 46-MH13	21	24	239	$285	$34	$76,300	2	$24,796		
IMP 46-MH32 x 46-MH31	15	18	160	$186	$27	$34,100	1	$12,134		
IMP 46-MH34 x 46-MH32	15	18	70	$186	$27	$14,900	1	$12,134		
			1,326			**$373,000**		**$99,000**	**$0**	**$470,000**
Calabazas										
NEW100 42-MH1 x 52-MH33		54	514	$617	$0	$317,400	1	$14,559		
NEW100 42-MH9 x 42-MH1		48	1,000	$531	$0	$531,400	1	$13,454		
NEW100 52-MH27 x 52-		66	1,180	$819	$0	$965,700	1	$16,176		
NEW100 52-MH33 x 52-		66	769	$795	$0	$611,300	2	$32,352		
			3,462			**$2,426,000**		**$77,000**	**$0**	**$2,500,000**

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
Claremont										
IMP 11-CB5 x 11-OF4	18	21	187	$209	$27	$44,100	1	$12,266	1	
IMP 11-MH31 x 11-CB5	18	21	16	$219	$27	$3,900	1	$12,266		
IMP 11-MH39 x 11-MH31	18	21	310	$240	$27	$82,600	1	$12,266		
IMP 11-MH40 x 11-MH39	15	18	369	$196	$27	$82,200	1	$12,134		
IMP 1-MH1 x 11-MH40	15	18	285	$196	$27	$63,600	1	$12,134		
			1,167			**$276,000**		**$61,000**	**$40,000**	**$380,000**
Coronado and San Tomas										
IMP 64-CB9 x 64-CB8	12	15	43	$176	$23	$8,500	1	$12,002		
IMP 64-MH10 x 64-MH11	24	30	221	$291	$34	$71,900	1	$12,662		
IMP 64-MH11 x 64-MH12	24	30	90	$291	$34	$29,300	1	$12,662		
IMP 64-MH12 x 64-MH13	24	30	213	$304	$34	$72,000	1	$12,662		
IMP 64-MH13 x 64-MH14	24	36	129	$363	$34	$51,500	1	$12,926		
IMP 64-MH14 x 64-MH15	27	36	360	$349	$43	$141,300	2	$25,852		
IMP 64-MH16 x 64-MH9	15	24	124	$263	$27	$36,100	1	$12,398		
IMP 64-MH18 x 64-MH16	15	24	136	$263	$27	$39,300	1	$12,398		
IMP 64-MH19 x 64-MH13	18	21	285	$250	$27	$79,000	1	$12,266		
IMP 64-MH21 x 64-MH19	15	21	106	$260	$27	$30,400	1	$12,266		
IMP 64-MH22 x 64-MH21	15	18	91	$242	$27	$24,500	1	$12,134		
IMP 64-MH23 x 64-MH22	15	18	91	$252	$27	$25,500	1	$12,134		
IMP 64-MH26 x 64-MH18	15	21	441	$281	$27	$135,700	1	$12,266		
IMP 64-MH9 x 64-MH10	24	30	100	$382	$34	$41,600	1	$12,662		
			2,430			**$787,000**		**$187,000**	**$0**	**$970,000**
De La Cruz and Nelo										
IMP 77-MH12 x 77-MH9	33	36	358	$422	$46	$167,500	1	$12,926		
IMP 77-MH6 x 88-MH21	33	42	1,202	$459	$46	$607,200	2	$26,380		
IMP 77-MH9 x 77-MH6	33	36	362	$393	$46	$158,800	1	$12,926		
			1,922			**$934,000**		**$52,000**	**$0**	**$990,000**
Dolores and Saratoga										
IMP 15-MH3 x 25-MH63	18	30	208	$291	$27	$66,400	2	$25,324		
IMP 15-MH4 x 15-MH3	18	30	276	$330	$27	$98,600	1	$12,662		
IMP 15-MH5 x 15-MH4	18	30	244	$343	$27	$90,300	1	$12,662		
IMP 15-MH6 x 15-MH5	15	30	242	$291	$27	$77,000	1	$12,662		
IMP 16-MH1 x 15-MH6	15	30	244	$291	$27	$77,700	1	$12,662		
IMP 16-MH2 x 16-MH1	15	30	258	$291	$27	$82,200	1	$12,662		
IMP 16-MH3 x 16-MH2	15	30	135	$511	$27	$72,700	1	$12,662		
IMP 16-MH4 x 16-MH3	15	30	199	$317	$27	$68,500	1	$12,662		
IMP 16-MH5 x 16-MH4	15	30	125	$330	$27	$44,600	1	$12,662		
IMP 16-MH6 x 16-MH5	15	24	265	$230	$27	$68,000	1	$12,398		
IMP 16-MH7 x 16-MH6	15	24	131	$419	$27	$58,400	1	$12,398		
IMP 16-MH8 x 16-MH7	15	24	29	$274	$27	$8,700	1	$12,398		
IMP 16-MH9 x 16-MH8	15	24	400	$385	$27	$164,900	1	$12,398		
			2,756			**$978,000**		**$176,000**	**$0**	**$1,150,000**

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
Edward										
IMP 77-MH11 x 78-MH25	24	30	22	$330	$34	$8,200	2	$25,324		
IMP 78-MH12 x 78-MH25	18	24	256	$230	$27	$65,800	1	$12,398		
IMP 78-MH15 x 78-MH12	18	24	50	$230	$27	$12,800	1	$12,398		
			329			**$87,000**		**$50,000**	**$0**	**$140,000**
El Camino Real and Coleman										
IMP 47-MH23 x 48-JCT1	60	72	544	$879	$72	$517,900	1	$16,510		
IMP 47-MH39 x 48-MH25	42	60	304	$718	$58	$236,000	1	$14,860		
IMP 47-MH40 x 47-MH39	60	72	17	$981	$72	$17,800	1	$16,510		
IMP 47-MH42 x 47-MH40	60	72	55	$981	$72	$58,000	1	$16,510		
IMP 47-MH44 x 47-MH45	39	48	191	$513	$46	$107,100	1	$13,454		
IMP 47-MH44 x 47-MH46	39	48	244	$513	$46	$136,400	1	$13,454		
IMP 47-MH45 x 47-MH48	39	54	144	$577	$46	$89,900	1	$14,559		
IMP 47-MH46 x 47-MH53	39	48	261	$568	$46	$160,700	1	$13,454		
IMP 47-MH48 x 47-MH50	39	54	123	$638	$46	$83,900	1	$14,559		
IMP 47-MH49 x 47-MH42	48	54	186	$577	$59	$118,300	1	$14,559		
IMP 47-MH50 x 47-MH49	48	54	163	$577	$59	$103,500	1	$14,559		
IMP 47-MH56 x 47-MH53	39	48	253	$495	$46	$136,800	1	$13,454		
IMP 47-MH56 x 47-MH59	39	48	293	$513	$46	$164,000	2	$26,908		
IMP 48-JCT1 x 47-MH7	60	72	577	$930	$72	$578,700	1	$16,510		
IMP 48-MH24 x 48-MH23	42	60	197	$696	$58	$148,700	1	$14,860		
IMP 48-MH25 x 48-MH24	42	60	320	$652	$58	$226,800	1	$14,860		
IMP 48-MH38 x 47-MH42	60	72	540	$930	$72	$541,600	1	$16,510		
			4,413			**$3,426,000**		**$266,000**	**$0**	**$3,690,000**
Fremont and Lafayette										
IMP 36-MH27 x 36-MH28	12	18	362	$214	$23	$86,100	1	$12,134		
IMP 36-MH28 x 36-MH29	12	18	22	$196	$23	$4,800	1	$12,134		
IMP 36-MH29 x 36-MH30	12	18	348	$214	$23	$82,800	1	$12,134		
IMP 36-MH30 x 36-MH31	14	24	275	$252	$23	$75,700	1	$12,398		
IMP 36-MH31 x 37-MH4	14	24	115	$241	$23	$30,400	1	$12,398		
IMP 37-MH10 x 37-MH11	24	36	363	$363	$34	$144,200	1	$12,926		
IMP 37-MH11 x 37-MH19	24	36	347	$363	$34	$138,000	2	$25,852		
IMP 37-MH4 x 37-MH5	15	24	357	$241	$27	$95,600	1	$12,398		
IMP 37-MH5 x 37-MH6	24	36	53	$363	$34	$21,000	1	$12,926		
IMP 37-MH6 x 37-MH7	24	36	327	$408	$34	$144,500	1	$12,926		
IMP 37-MH7 x 37-MH8	24	36	49	$393	$34	$20,900	1	$12,926		
IMP 37-MH8 x 37-MH9	24	36	152	$349	$34	$58,200	1	$12,926		
IMP 37-MH9 x 37-MH10	24	36	189	$363	$34	$75,200	1	$12,926		
			2,959			**$977,000**		**$177,000**	**$0**	**$1,150,000**
Garrett Overflow										
IMP 72-MH20 x 72-MH19	15	24	210	$252	$27	$58,500	1	$12,398		
NEW100 72-MH24 x 72-		24	420	$230	$0	$96,400	2	$24,796		
			630			**$155,000**		**$37,000**	**$0**	**$190,000**

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
Glendenning and Pruneridge										
IMP 15-MH13 x 15-MH12	15	18	112	$224	$27	$28,100	2	$24,269		
IMP 15-MH16 x 15-MH13	15	18	280	$214	$27	$67,600	1	$12,134		
IMP 15-MH17 x 15-MH16	15	18	246	$205	$27	$57,100	1	$12,134		
IMP 15-MH21 x 15-MH17	12	18	212	$196	$23	$46,500	1	$12,134		
IMP 15-MH22 x 15-MH21	12	18	165	$196	$23	$36,200	1	$12,134		
			1,015			**$236,000**		**$73,000**	**$0**	**$310,000**
Glorietta										
IMP 13-MH35 x 13-MH34	18	21	72	$219	$27	$17,700	2	$24,533		
IMP 13-MH36 x 13-MH35	18	21	201	$219	$27	$49,500	1	$12,266		
IMP 13-MH37 x 13-MH36	18	21	312	$219	$27	$76,900	1	$12,266		
			585			**$144,000**		**$49,000**	**$0**	**$190,000**
Harvard and Saratoga Creek										
IMP 12-MH1 x 12-OF1	24	30	62	$330	$34	$22,700	1	$12,662	1	
IMP 21-MH34 x 22-MH43	24	30	277	$330	$34	$101,100	1	$12,662		
IMP 21-MH36 x 21-MH35	12	18	282	$205	$23	$64,400	1	$12,134		
IMP 21-MH37 x 21-MH38	18	21	245	$229	$27	$62,900	1	$12,266		
IMP 21-MH38 x 21-MH39	18	21	255	$219	$27	$62,900	1	$12,266		
IMP 21-MH39 x 21-MH40	21	24	292	$241	$34	$80,200	1	$12,398		
IMP 21-MH40 x 21-MH41	21	24	245	$230	$34	$64,500	1	$12,398		
IMP 21-MH41 x 21-MH34	21	24	285	$241	$34	$78,400	1	$12,398		
IMP 22-MH43 x 22-MH44	24	30	313	$317	$34	$110,000	1	$12,662		
IMP 22-MH44 x 22-MH45	24	30	271	$330	$34	$98,800	1	$12,662		
IMP 22-MH45 x 12-MH1	24	30	255	$343	$34	$96,400	1	$12,662		
			2,784			**$842,000**		**$137,000**	**$40,000**	**$1,020,000**
Howard										
IMP 10A-MHA-1 x 10-MH31	18	24	68	$230	$27	$17,500	2	$24,796		
IMP 10A-MHA-2 x 10A-MHA-	15	21	154	$229	$27	$39,500	1	$12,266		
IMP 10A-MHA-3 x 10A-MHA-	15	21	309	$209	$27	$72,900	1	$12,266		
IMP 10A-MHA-4 x 10A-MHA-	15	18	309	$242	$27	$83,200	1	$12,134		
			840			**$213,000**		**$61,000**	**$0**	**$270,000**
Hwy 101 PS										
IMP 74-MH14 x 74-FG1	60	48	234	$568	$72	$150,000	1	$13,454	1	
Pumps										$3,680,000
			234			**$3,830,000**		**$13,000**	**$40,000**	**$3,880,000**
Jackson										
IMP 37-MH41 x 37-MH43	12	18	35	$233	$23	$9,000	1	$12,134		
IMP 37-MH42 x 37-MH41	15	42	40	$492	$27	$21,000	2	$26,380		
IMP 37-MH43 x 37-MH44	15	18	184	$242	$27	$49,600	1	$12,134		
IMP 37-MH44 x 37-MH45	15	18	168	$233	$27	$43,700	1	$12,134		
IMP 37-MH45 x 37-MH46	15	18	32	$224	$27	$8,000	1	$12,134		
IMP 37-MH46 x 37-MH47	15	18	351	$186	$27	$74,900	1	$12,134		
IMP 37-MH50 x 37-MH42	15	36	346	$349	$27	$130,100	1	$12,926		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 37-MH63 x 37-MH50	15	30	371	$330	$27	$132,600	1	$12,662		
IMP 37-MH51 x 37-MH50	15	21	402	$250	$27	$111,300	1	$12,266		
			1,930			**$580,000**		**$125,000**	**$0**	**$710,000**
Jefferson and El Camino Real										
IMP 36-CB3 x 36-MH5	18	30	34	$304	$27	$11,400	2	$25,324		
IMP 36-CB4 x 36-CB5	18	30	117	$395	$27	$49,200	1	$12,662		
IMP 36-CB5 x 36-MH6	18	30	173	$356	$27	$66,400	1	$12,662		
IMP 36-MH4 x 36-CB3	18	30	94	$317	$27	$32,300	1	$12,662		
IMP 36-MH5 x 36-CB4	18	30	94	$291	$27	$29,900	1	$12,662		
IMP 36-MH6 x 46-CB4	18	30	97	$291	$27	$30,900	1	$12,662		
			609			**$220,000**		**$89,000**	**$0**	**$310,000**
Kaiser PS										
IMP 10-MH11 x 10-MH10	33	36	175	$378	$46	$74,000	1	$12,926		
IMP 10-MH12 x 10-MH11	33	36	336	$437	$46	$162,200	1	$12,926		
IMP 10-MH9 x 10-MH10	33	36	38	$408	$46	$17,200	1	$12,926		
NEW 10-MH9 x NEW 10-PS1		36	111	$452	$0	$50,300	1	$12,926		
NEW 10-PS1 x NEW 10-PS1		36	117	$422	$0	$49,500	1	$12,926		
NEW 10-PS1 x1 x NEW 10-		30	23	$382	$0	$8,800	1	$12,662	1	
Pumps										$1,080,000
			800			**$1,442,000**		**$77,000**	**$40,000**	**$1,560,000**
Kellogg and Pruneridge										
IMP 12-MH19 x 12-MH18	27	36	84	$393	$43	$36,800	2	$25,852		
IMP 12-MH20 x 12-MH19	24	30	208	$317	$34	$73,000	1	$12,662		
IMP 12-MH21 x 12-MH20	24	30	251	$317	$34	$88,200	1	$12,662		
IMP 12-MH22 x 12-MH21	24	27	251	$291	$34	$81,600	1	$12,530		
IMP 12-MH23 x 12-MH22	24	27	299	$303	$34	$100,800	1	$12,530		
IMP 12-MH25 x 12-MH19	15	21	468	$270	$27	$139,300	1	$12,266		
IMP 12-MH26 x 12-MH25	15	21	250	$260	$27	$71,800	1	$12,266		
IMP 12-MH33 x 12-MH26	15	18	246	$233	$27	$64,000	1	$12,134		
IMP 12-MH35 x 12-MH33	15	18	163	$233	$27	$42,400	1	$12,134		
IMP 12-MH42 x 12-MH35	15	18	228	$242	$27	$61,400	1	$12,134		
			2,449			**$759,000**		**$137,000**	**$0**	**$900,000**
Keystone										
IMP 4-MH3 x 4-MH4	15	21	307	$260	$27	$88,100	2	$24,533		
IMP 4-MH4 x 4-MH5	15	21	186	$209	$27	$43,900	1	$12,266		
IMP 4-MH5 x 4-MH6	15	21	84	$209	$27	$19,800	1	$12,266		
IMP 4-MH6 x 4-MH7	15	21	46	$209	$27	$10,900	1	$12,266		
IMP 4-MH7 x 4-MH8	15	21	269	$209	$27	$63,500	1	$12,266		
IMP 4-MH8 x 4-MH9	15	21	67	$209	$27	$15,800	1	$12,266		
			959			**$242,000**		**$86,000**	**$0**	**$330,000**
Kifer										
IMP 63-MH22 x 63-MH23	18	24	132	$230	$27	$33,900	1	$12,398		
IMP 63-MH23 x 63-MH24	18	30	225	$343	$27	$83,300	1	$12,662		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 63-MH24 x 63-MH26	24	30	152	$343	$34	$57,400	1	$12,662		
IMP 63-MH26 x 63-MH27	24	30	182	$343	$34	$68,700	1	$12,662		
IMP 63-MH27 x 63-MH28	24	30	36	$317	$34	$12,800	1	$12,662		
IMP 63-MH28 x 63-MH29	24	30	30	$330	$34	$11,000	2	$25,324		
			758			**$267,000**		**$88,000**	**$0**	**$360,000**
Las Palmas										
IMP 34-CB32 x 34-CB34	12	18	41	$214	$23	$9,700	1	$12,134		
IMP 34-CB34 x 34-CB37	12	18	204	$205	$23	$46,500	1	$12,134		
IMP 34-CB35 x 34-CB36	12	24	140	$241	$23	$36,900	1	$12,398		
IMP 34-CB36 x 34-OF6	12	24	26	$241	$23	$6,800	1	$12,398	1	
IMP 34-CB37 x 34-MH18	12	21	27	$219	$23	$6,600	1	$12,266		
IMP 34-MH18 x 34-CB35	12	21	23	$209	$23	$5,200	1	$12,266		
			460			**$112,000**		**$74,000**	**$40,000**	**$230,000**
Laurelwood										
IMP 76-MH51 x 76-MH50	15	18	236	$186	$27	$50,400	2	$24,269		
IMP 76-MH52 x 76-MH51	15	18	35	$186	$27	$7,500	1	$12,134		
IMP 76-MH53 x 76-MH52	15	18	212	$196	$27	$47,200	1	$12,134		
			483			**$105,000**		**$49,000**	**$0**	**$150,000**
Laurie and Kevin										
IMP 77-MH1 x 87-MH61	15	18	282	$196	$27	$62,800	1	$12,134		
IMP 87-MH58 x 87-MH57	18	21	250	$219	$27	$61,600	2	$24,533		
IMP 87-MH61 x 87-MH58	15	18	123	$196	$27	$27,400	1	$12,134		
			655			**$152,000**		**$49,000**	**$0**	**$200,000**
Lincoln and Winchester										
IMP 36-MH49 x 36-MH48	24	30	101	$304	$34	$34,200	2	$25,324		
IMP 36-MH55 x 36-MH49	24	30	168	$291	$34	$54,800	1	$12,662		
			269			**$89,000**		**$38,000**	**$0**	**$130,000**
Live Oak										
IMP 32-CB49 x 32-MH32	12	18	70	$186	$23	$14,800	2	$24,269		
IMP 32-MH31 x 32-MH25	12	18	51	$186	$23	$10,800	1	$12,134		
IMP 32-MH32 x 32-MH31	12	18	265	$196	$23	$58,100	1	$12,134		
			387			**$84,000**		**$49,000**	**$0**	**$130,000**
Madera										
IMP 34-MH10 x 34-MH11	15	18	120	$186	$27	$25,600	1	$12,134		
IMP 34-MH11 x 34-OF3	15	18	32	$224	$27	$7,900	1	$12,134	1	
			152			**$34,000**		**$24,000**	**$40,000**	**$98,000**
Main and Richard										
IMP 46-MH1 x 56-MH59	24	36	103	$349	$34	$39,300	1	$12,926		
IMP 46-MH2 x 56-MH58	24	30	162	$343	$34	$61,300	2	$25,324		
IMP 56-MH37 x 56-MH28	24	36	227	$363	$34	$90,400	1	$12,926		
IMP 56-MH39 x 56-MH37	24	36	233	$363	$34	$92,700	1	$12,926		
IMP 56-MH43 x 56-MH39	24	36	228	$349	$34	$87,300	1	$12,926		
IMP 56-MH47 x 56-MH43	24	36	230	$349	$34	$88,100	1	$12,926		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 56-MH58 x 46-MH1	24	30	250	$343	$34	$94,200	1	$12,662		
IMP 56-MH59 x 56-MH47	24	36	306	$349	$34	$117,300	1	$12,926		
			1,739			**$671,000**		**$116,000**	**$0**	**$790,000**
Mangrum										
IMP 95-MH49 x 95-MH40	18	21	333	$209	$27	$78,600	2	$24,533		
IMP 96-MH22 x 95-MH49	18	21	337	$229	$27	$86,400	1	$12,266		
			670			**$165,000**		**$37,000**	**$0**	**$200,000**
Martin										
IMP 58-MH13 x 58-MH10	30	33	410	$348	$44	$161,000	1	$12,794		
IMP 58-MH15 x 58-MH13	30	33	437	$320	$44	$159,300	1	$12,794		
IMP 58-MH18 x 58-MH15	30	33	574	$320	$44	$209,400	2	$25,588		
			1,422			**$530,000**		**$51,000**	**$0**	**$580,000**
Martin and VTA										
IMP 57-MH14 x 57-MH15	21	24	202	$230	$34	$53,200	2	$24,796		
IMP 57-MH15 x 57-MH16	21	24	38	$252	$34	$10,800	1	$12,398		
			240			**$64,000**		**$37,000**	**$0**	**$100,000**
McKinley										
IMP 2-CB1 x 2-MH2	12	15	24	$201	$23	$5,400	2	$24,005		
IMP 2-CB2 x 2-MH4	12	15	139	$184	$23	$28,800	1	$12,002		
IMP 2-CB3 x 2-MH7	12	15	19	$201	$23	$4,200	1	$12,002		
IMP 2-MH4 x 2-CB1	12	15	175	$184	$23	$36,400	1	$12,002		
IMP 2-MH7 x 2-CB2	12	15	30	$176	$23	$5,900	1	$12,002		
			386			**$81,000**		**$72,000**	**$0**	**$150,000**
Mead										
IMP 63-MH40 x 63-MH41	15	18	440	$224	$27	$110,300	1	$12,134		
IMP 63-MH41 x 63-MH42	21	24	440	$230	$34	$115,900	2	$24,796		
			880			**$226,000**		**$37,000**	**$0**	**$260,000**
Memorex										
IMP 56-MH49 x 56-MH50	12	18	230	$186	$23	$48,300	2	$24,269		
IMP 56-MH50 x 56-MH51	12	18	140	$186	$23	$29,400	1	$12,134		
			370			**$78,000**		**$36,000**	**$0**	**$110,000**
Mission and Montague										
IMP 75-JCT1 x 85-MH73	42	54	256	$577	$58	$162,800	1	$14,559		
IMP 75-MH10 x 75-MH4	42	54	452	$577	$58	$287,000	1	$14,559		
IMP 75-MH11 x 75-MH10	42	54	43	$577	$58	$27,200	1	$14,559		
IMP 75-MH12 x 75-MH11	42	54	142	$557	$58	$87,300	1	$14,559		
IMP 75-MH4 x 75-JCT1	42	54	51	$557	$58	$31,300	1	$14,559		
IMP 75-MH16 x 75-MH12		54	235	$577	$0	$135,600	2	$29,118		
			286			**$731,000**		**$102,000**	**$0**	**$830,000**
Mission College										
IMP 84-MH12 x 83-MH27	27	30	97	$291	$43	$32,500	2	$25,324		
IMP 84-MH13 x 84-MH12	27	30	281	$317	$43	$101,300	1	$12,662		
			378			**$134,000**		**$38,000**	**$0**	**$170,000**

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
Monroe										
IMP 46-MH9 x 46-CB1	12	18	40	$242	$23	$10,700	2	$24,269		
IMP 45-MH4 x 45-MH5	12	18	411	$242	$23	$109,300	1	$12,134		
			451			**$120,000**		**$36,000**	**$0**	**$160,000**
Monroe and Agate										
IMP 52-MH10 x 52-MH8	18	30	307	$395	$27	$129,600	1	$12,662		
IMP 52-MH12 x 52-MH10	15	24	256	$296	$27	$82,800	1	$12,398		
IMP 52-MH14 x 52-MH12	15	21	256	$240	$27	$68,200	1	$12,266		
IMP 52-MH22 x 52-MH14	15	21	245	$219	$27	$60,300	1	$12,266		
IMP 52-MH23 x 52-MH22	12	18	89	$186	$23	$18,700	1	$12,134		
IMP 52-MH8 x 52-MH6	18	36	213	$349	$27	$80,100	2	$25,852		
			1,366			**$440,000**		**$88,000**	**$0**	**$530,000**
Monroe and San Tomas Aquino										
IMP 54-CB1 x 55-MH34	21	30	269	$291	$34	$87,500	1	$12,662		
IMP 54-MH13 x 54-OF2	33	48	42	$476	$46	$22,100	1	$13,454	1	
IMP 54-MH16 x 54-MH13	33	48	352	$476	$46	$184,000	1	$13,454		
IMP 54-MH17 x 54-MH16	33	48	106	$476	$46	$55,200	1	$13,454		
IMP 54-MH25 x 54-MH17	33	48	449	$476	$46	$234,500	1	$13,454		
IMP 54-MH26 x 54-MH25	33	48	102	$476	$46	$53,400	1	$13,454		
IMP 54-MH54 x 54-MH50	18	21	239	$209	$27	$56,600	1	$12,266		
IMP 55-MH26 x 54-MH26	33	48	327	$476	$46	$170,900	1	$13,454		
IMP 55-MH27 x 55-MH26	33	48	154	$476	$46	$80,400	1	$13,454		
IMP 55-MH28 x 55-MH27	33	48	110	$476	$46	$57,300	1	$13,454		
IMP 55-MH29 x 55-MH28	33	48	57	$531	$46	$32,800	1	$13,454		
IMP 55-MH34 x 55-MH29	21	30	485	$330	$34	$176,700	1	$12,662		
IMP 55-MH30 x 55-MH29	33	36	234	$378	$46	$99,300	1	$12,926		
IMP 55-MH31 x 55-MH30	33	36	302	$363	$46	$123,500	1	$12,926		
IMP 55-MH32 x 55-MH31	30	36	281	$349	$44	$110,700	1	$12,926		
			3,511			**$1,545,000**		**$197,000**	**$40,000**	**$1,780,000**
Monroe Pump Station										
IMP 52-MH20 x 52-OF2	27	60	11	$674	$43	$7,800	1	$14,860	1	
New Pipe	27	72	39	$905	$43	$37,200	1	$16,510		
Pumps										$4,840,000
			50			**$4,885,000**		**$31,000**	**$40,000**	**$4,960,000**
Montague and De La Cruz										
IMP 86-CB54 x 86-MH65	18	21	88	$209	$27	$20,800	2	$24,533		
IMP 86-MH64 x 87-MH36	18	21	570	$209	$27	$134,600	1	$12,266		
IMP 86-MH65 x 86-MH64	18	21	317	$209	$27	$74,800	1	$12,266		
IMP 87-MH36 x 87-MH31	18	21	206	$209	$27	$48,600	1	$12,266		
			1,180			**$279,000**		**$61,000**	**$0**	**$340,000**
Norman										
IMP 76-MH11 x 76-MH10	48	66	113	$724	$59	$88,500	2	$32,352		
IMP 76-MH12 x 76-MH11	48	60	254	$674	$59	$186,400	1	$14,860		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 76-MH14 x 76-MH12	48	60	178	$630	$59	$122,700	1	$14,860		
IMP 76-MH19 x 76-MH14	48	60	488	$630	$59	$336,300	1	$14,860		
			1,033			**$734,000**		**$77,000**	**$0**	**$810,000**
Notre Dame and Monroe										
IMP 51-MH13 x 51-MH14	21	27	369	$267	$34	$110,900	1	$12,530		
IMP 51-MH15 x 52-MH17	27	36	249	$349	$43	$97,800	1	$12,926		
IMP 51-MH17 x 51-MH15	21	24	317	$241	$34	$87,200	1	$12,398		
IMP 51-MH18 x 51-MH17	21	24	222	$230	$34	$58,400	1	$12,398		
IMP 51-MH24 x 51-MH25	18	21	381	$209	$27	$90,000	1	$12,266		
IMP 51-MH25 x 51-MH26	18	21	380	$209	$27	$89,700	1	$12,266		
IMP 51-MH26 x 51-MH27	18	21	149	$270	$27	$44,400	1	$12,266		
IMP 51-MH27 x 51-MH18	18	21	257	$229	$27	$66,000	1	$12,266		
IMP 52-MH17 x 52-MH18	27	36	160	$349	$43	$62,700	1	$12,926		
IMP 52-MH18 x 52-MH19	27	72	130	$854	$43	$116,700	1	$16,510		
IMP 52-MH19 x 52-MH20	27	72	125	$930	$43	$121,700	2	$33,020		
			2,740			**$946,000**		**$162,000**	**$0**	**$1,110,000**
Orthello and Kiely										
IMP 32-MH13 x 32-MH9	18	21	310	$209	$27	$73,200	1	$12,266		
IMP 32-MH9 x 33-MH21	18	21	425	$209	$27	$100,500	1	$12,266		
IMP 33-CB63 x 33-MH13	21	30	139	$291	$34	$45,200	1	$12,662		
IMP 33-CB64 x 33-MH14	21	30	52	$291	$34	$16,900	1	$12,662		
IMP 33-MH10 x 33-MH6	24	36	109	$378	$34	$44,900	1	$12,926		
IMP 33-MH11 x 33-MH12	18	24	426	$230	$27	$109,400	1	$12,398		
IMP 33-MH12 x 33-CB63	21	24	104	$230	$34	$27,500	1	$12,398		
IMP 33-MH13 x 33-CB64	21	30	127	$291	$34	$41,300	1	$12,662		
IMP 33-MH14 x 33-MH10	24	36	185	$363	$34	$73,600	2	$25,852		
IMP 33-MH15 x 33-MH11	18	24	165	$230	$27	$42,400	1	$12,398		
IMP 33-MH19 x 33-MH15	18	24	310	$230	$27	$79,600	1	$12,398		
IMP 33-MH21 x 33-MH19	18	24	310	$230	$27	$79,600	1	$12,398		
			2,663			**$734,000**		**$163,000**	**$0**	**$900,000**
Peterson Overflow										
IMP 72-MH10 x 72-MH9	15	36	255	$378	$27	$103,300	1	$12,926		
IMP 72-MH4 x 72-MH3	24	42	75	$443	$34	$35,800	2	$26,380		
IMP 72-MH8 x 72-MH4	18	42	322	$426	$27	$146,200	1	$13,190		
IMP 72-MH9 x 72-MH8	15	36	250	$378	$27	$101,300	1	$12,926		
NEW100 72-MH14 x 72-		36	406	$363	$0	$147,500	2	$25,852		
			1,308			**$534,000**		**$91,000**	**$0**	**$630,000**
Phillips										
IMP 33-CB38 x 33-MH23	12	15	45	$176	$23	$8,900	1	$12,002		
IMP 33-MH23 x 33-MH24	12	15	265	$176	$23	$52,800	1	$12,002		
IMP 33-CB8 x 33-CB9	15	18	112	$186	$27	$23,900	1	$12,134		
IMP 33-MH24 x 33-MH25	15	18	180	$205	$27	$41,800	1	$12,134		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 33-MH25 x 33-CB8	15	18	109	$196	$27	$24,300	2	$24,269		
			711			**$152,000**		**$73,000**	**$0**	**$220,000**
Pomeroy										
IMP 32-MH12 x 32-MH8	24	36	235	$363	$34	$93,400	1	$12,926		
IMP 32-MH14 x 32-MH12	24	36	248	$363	$34	$98,700	1	$12,926		
IMP 32-MH20 x 32-MH14	24	36	290	$363	$34	$115,500	1	$12,926		
IMP 32-MH21 x 32-MH20	24	36	48	$363	$34	$18,900	1	$12,926		
IMP 32-MH22 x 32-MH21	24	36	85	$378	$34	$35,100	1	$12,926		
IMP 32-MH8 x 32-MH6	24	36	210	$363	$34	$83,500	1	$12,926		
IMP 32-MH29 x 32-MH22	21	27	241	$303	$34	$81,000	1	$12,530		
IMP 32-MH30 x 32-MH29	21	27	66	$303	$34	$22,300	1	$12,530		
IMP 32-MH34 x 32-MH41	21	27	76	$327	$34	$27,500	1	$12,530		
IMP 32-MH41 x 32-MH30	21	27	186	$315	$34	$65,000	1	$12,530		
IMP 32-MH6 x 32-MH4	27	36	120	$363	$43	$48,800	1	$12,926		
IMP NRV 32-MH4 x 32-OF2	27	36	50	$349	$43	$19,500	1	$12,926	1	
			1,856			**$709,000**		**$154,000**	**$40,000**	**$900,000**
Pomeroy Overflow										
IMP 42-MH23 x 42-MH21	15	36	312	$349	$27	$117,300	1	$12,926		
IMP 42-MH25 x 42-MH23	15	36	194	$349	$27	$72,900	1	$12,926		
IMP 42-MH27 x 42-MH25	15	36	265	$349	$27	$99,700	1	$12,926		
NEW100 42-MH37 x 42-		36	729	$378	$0	$275,600	2	$25,852		
			1,500			**$566,000**		**$65,000**	**$0**	**$630,000**
Pruneridge and Carlysle										
IMP 10-MH16 x 10-MH12	27	30	234	$291	$43	$78,300	2	$25,324		
IMP 10-MH16 x 10-MH17	27	30	252	$304	$43	$87,600	1	$12,662		
IMP 10-MH24 x 10-MH17	27	30	387	$317	$43	$139,600	1	$12,662		
IMP 10-MH29 x 10-MH24	21	24	303	$274	$34	$93,400	1	$12,398		
IMP 10-MH34 x 10-MH29	21	24	75	$285	$34	$23,800	1	$12,398		
IMP 10-MH35 x 10-MH34	15	21	247	$219	$27	$60,800	1	$12,266		
IMP 10-MH25 x 10-MH24	18	36	245	$363	$27	$95,700	1	$12,926		
IMP 10-MH51 x 10-MH25	15	36	153	$349	$27	$57,500	1	$12,926		
NEW 10-MH23 x 10-MH24		15	409	$193	$0	$78,800	1	$12,002		
			2,304			**$716,000**		**$126,000**	**$0**	**$840,000**
Pruneridge and Kerry										
IMP 15-MH36 x 15-MH35	27	30	137	$330	$43	$51,300	2	$25,324		
IMP 16-MH13 x 15-MH36	24	30	264	$343	$34	$99,500	1	$12,662		
IMP 16-MH14 x 16-MH13	24	30	265	$369	$34	$106,900	1	$12,662		
IMP 16-MH15 x 16-MH14	24	30	280	$369	$34	$112,800	1	$12,662		
			946			**$371,000**		**$63,000**	**$0**	**$430,000**
Pruneridge and Saratoga Creek										
IMP 11-CB1 x 11-MH16	21	36	225	$363	$34	$89,200	1	$12,926		
IMP 11-MH11 x 11-MH13	18	36	209	$349	$27	$78,700	1	$12,926		
IMP 11-MH13 x 11-MH14	18	36	257	$349	$27	$96,600	1	$12,926		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 11-MH14 x 11-MH15	21	36	167	$349	$34	$64,000	1	$12,926		
IMP 11-MH15 x 11-CB1	21	36	26	$349	$34	$10,100	1	$12,926		
IMP 11-MH16 x 11-OF1	21	36	45	$378	$34	$18,600	1	$12,926	1	
NEW 10-MH51 x 31-MH34		36	1,431	$349	$0	$499,000	1	$12,926		
			2,361			**$856,000**		**$90,000**	**$40,000**	**$990,000**
Pruneridge and Tanoak										
IMP 14-CB1 x 14-OF1	24	30	39	$317	$34	$13,700	1	$12,662	1	
IMP 14-MH12 x 14-MH11	18	42	261	$459	$27	$126,700	1	$13,190		
IMP 14-MH13 x 14-MH12	15	42	256	$459	$27	$124,500	1	$13,190		
IMP 14-MH2 x 14-CB1	24	30	37	$291	$34	$12,200	1	$12,662		
IMP 14-MH3 x 14-MH4	21	42	121	$459	$34	$59,500	1	$13,190		
IMP 14-MH4 x 14-MH5	24	30	109	$304	$34	$37,100	1	$12,662		
IMP 14-MH5 x 14-MH2	24	30	138	$291	$34	$45,100	1	$12,662		
IMP 14-MH6 x 14-MH3	21	42	173	$443	$34	$82,400	1	$13,190		
IMP 14-MH8 x 14-MH6	21	42	209	$443	$34	$99,600	1	$13,190		
IMP 14-MH11 x 14-MH8	21	42	249	$443	$34	$118,700	1	$13,190		
IMP 14-MH14 x 14-MH17	24	42	154	$443	$34	$73,400	1	$13,190		
IMP 14-MH17 x 14-MH18	24	42	200	$476	$34	$102,000	1	$13,190		
IMP 14-MH18 x 14-MH19	33	42	251	$492	$46	$135,200	1	$13,190		
NEW100 14-MH14 x 14-		42	258	$426	$0	$109,800	1	$13,190		
			2,455			**$1,140,000**		**$183,000**	**$40,000**	**$1,360,000**
Rip Miller and Monroe										
IMP 27-MH11 x 27-MH6	18	24	149	$241	$27	$40,000	2	$24,796		
IMP 27-MH12 x 27-MH11	15	24	19	$230	$27	$4,700	1	$12,398		
IMP 27-MH13 x 27-MH12	15	21	343	$219	$27	$84,400	1	$12,266		
IMP 27-MH5 x 27-MH2	10	12	397	$171	$23	$77,300	1	$11,870		
IMP 27-MH7 x 27-MH5	10	12	327	$164	$23	$61,300	1	$11,870		
			1,235			**$268,000**		**$73,000**	**$0**	**$340,000**
Russell										
IMP 75-MH13 x 75-MH15	21	24	366	$241	$34	$100,600	1	$12,398		
IMP 76-MH3 x 76-MH4	15	18	64	$186	$27	$13,700	1	$12,134		
IMP 76-MH4 x 76-MH5	21	24	144	$230	$34	$37,800	1	$12,398		
IMP 76-MH5 x 75-MH13	21	24	141	$241	$34	$38,700	2	$24,796		
			715			**$191,000**		**$62,000**	**$0**	**$250,000**
Santa Clara										
IMP 36-MH58 x 37-MH53	12	15	361	$184	$23	$75,000	1	$12,002		
IMP 36-MH60 x 36-MH58	10	12	216	$156	$23	$38,800	1	$11,870		
IMP 37-MH53 x 37-MH54	14	15	30	$184	$23	$6,200	1	$12,002		
IMP 37-MH54 x 37-MH55	14	24	35	$241	$23	$9,200	1	$12,398		
IMP 37-MH55 x 37-MH56	14	24	299	$230	$23	$75,700	1	$12,398		
IMP 37-MH56 x 37-MH57	14	24	19	$230	$23	$4,700	1	$12,398		
IMP 37-MH57 x 37-MH58	15	24	55	$230	$27	$14,200	1	$12,398		
IMP 37-MH58 x 37-MH59	15	24	305	$230	$27	$78,200	1	$12,398		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 37-MH59 x 37-MH60	15	27	22	$267	$27	$6,300	1	$12,530		
IMP 37-MH60 x 37-MH61	15	27	44	$267	$27	$13,000	1	$12,530		
IMP 37-MH61 x 37-MH62	15	27	309	$267	$27	$90,900	1	$12,530		
IMP 37-MH62 x 37-MH63	15	30	22	$291	$27	$7,000	2	$25,324		
IMP 37-MH73 x 37-MH54	15	18	385	$196	$27	$85,800	1	$12,134		
			2,103			**$505,000**		**$173,000**	**$0**	**$680,000**
Santa Cruz and Cabrillo										
IMP 43-MH1 x 43-MH2	21	30	166	$291	$34	$54,000	2	$25,324		
IMP 43-MH4 x 43-MH1	21	30	356	$291	$34	$115,900	1	$12,662		
IMP 43-MH5 x 43-MH4	21	30	315	$291	$34	$102,400	1	$12,662		
IMP 43-MH6 x 43-MH5	21	30	257	$304	$34	$86,900	1	$12,662		
IMP 43-MH12 x 43-MH9	12	15	224	$167	$23	$42,800	1	$12,002		
IMP 43-MH13 x 43-MH12	12	15	181	$167	$23	$34,500	1	$12,002		
IMP 43-MH7 x 43-MH6	15	18	21	$224	$27	$5,300	1	$12,134		
IMP 43-MH8 x 43-MH7	15	18	239	$214	$27	$57,700	1	$12,134		
IMP 43-MH9 x 43-MH8	15	18	256	$196	$27	$57,000	1	$12,134		
			2,015			**$557,000**		**$124,000**	**$0**	**$680,000**
Santa Maria and Chromite										
IMP 52-MH30 x 52-MH29	24	30	310	$291	$34	$101,000	1	$12,662		
IMP 52-MH34 x 53-MH50	21	30	256	$291	$34	$83,300	1	$12,662		
IMP 52-MH35 x 52-MH34	21	24	256	$230	$34	$67,400	1	$12,398		
IMP 53-MH35 x 53-MH33	24	30	131	$291	$34	$42,700	1	$12,662		
IMP 53-MH36 x 53-MH35	24	30	150	$291	$34	$48,800	1	$12,662		
IMP 53-MH44 x 52-MH30	24	30	123	$304	$34	$41,600	1	$12,662		
IMP 53-MH44 x 53-MH50	24	30	136	$304	$34	$46,000	1	$12,662		
IMP 52-MH26 x 53-MH34	30	42	360	$410	$44	$163,500	2	$26,380		
IMP 52-MH29 x 52-MH26	30	36	328	$349	$44	$129,000	1	$12,926		
IMP 52-MH36 x 52-MH35	18	21	257	$209	$27	$60,700	1	$12,266		
IMP 52-MH37 x 52-MH36	15	18	260	$186	$27	$55,500	1	$12,134		
IMP 52-MH38 x 52-MH37	15	18	252	$186	$27	$53,800	1	$12,134		
IMP 53-MH34 x 53-MH33	30	42	393	$410	$44	$178,500	1	$13,190		
			3,212			**$1,072,000**		**$177,000**	**$0**	**$1,250,000**
Scott and Bowers										
IMP 73-CB1 x 73-MH32	15	24	49	$230	$27	$12,500	1	$12,398		
IMP 73-MH25 x 73-MH24	24	30	485	$317	$34	$170,500	1	$12,662		
IMP 73-MH26 x 73-MH25	21	24	380	$241	$34	$104,300	1	$12,398		
IMP 73-CB21 x 73-MH31	12	18	36	$186	$23	$7,600	2	$24,269		
IMP 73-MH16 x 73-MH14	42	48	67	$495	$58	$37,000	1	$13,454		
IMP 73-MH17 x 73-MH16	42	48	29	$495	$58	$15,800	1	$13,454		
IMP 73-MH22 x 73-MH23	24	36	342	$363	$34	$135,900	1	$12,926		
IMP 73-MH23 x 73-MH24	27	36	183	$378	$43	$77,200	1	$12,926		
IMP 73-MH24 x 73-MH17	42	48	590	$513	$58	$336,600	1	$13,454		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 73-MH31 x 73-MH22	24	30	88	$291	$34	$28,600	1	$12,662		
			2,248			**$926,000**		**$141,000**	**$0**	**$1,070,000**
Scott and El Camino Real										
IMP 35-MH16 x 35-MH9	21	30	410	$317	$34	$144,000	2	$25,324		
IMP 35-MH51 x 35-MH6	21	30	148	$291	$34	$48,200	1	$12,662		
IMP 35-MH6 x 35-MH5	21	30	305	$291	$34	$99,200	1	$12,662		
IMP 35-MH7 x 35-MH51	21	30	211	$291	$34	$68,600	1	$12,662		
IMP 35-MH8 x 35-MH7	21	30	336	$304	$34	$113,700	1	$12,662		
IMP 35-MH9 x 35-MH8	21	30	25	$304	$34	$8,500	1	$12,662		
			1,435			**$482,000**		**$89,000**	**$0**	**$570,000**
Sherman										
IMP 38-MH123 x 38-MH45	48	60	59	$740	$59	$47,100	2	$29,719		
IMP 38-MH124 x 38-MH43	48	60	217	$762	$59	$177,800	1	$14,860		
IMP 38-MH22 x 38-MH30	48	60	85	$762	$59	$69,500	1	$14,860		
IMP 38-MH31 x 38-MH30	48	60	68	$783	$59	$57,300	1	$14,860		
IMP 38-MH32 x 38-MH31	48	60	54	$783	$59	$45,500	1	$14,860		
IMP 38-MH33 x 38-MH32	48	60	92	$783	$59	$77,800	1	$14,860		
IMP 38-MH34 x 38-MH33	48	60	27	$783	$59	$22,800	1	$14,860		
IMP 38-MH35 x 38-MH34	48	60	68	$783	$59	$57,100	1	$14,860		
IMP 38-MH36 x 38-MH35	48	60	95	$783	$59	$80,000	1	$14,860		
IMP 38-MH39 x 38-MH36	48	60	187	$805	$59	$161,600	1	$14,860		
IMP 38-MH40 x 38-MH39	48	60	16	$805	$59	$14,000	1	$14,860		
IMP 38-MH40 x 38-MH41	48	60	65	$805	$59	$56,200	1	$14,860		
IMP 38-MH42 x 38-MH41	48	60	60	$783	$59	$50,500	1	$14,860		
IMP 38-MH42 x 38-MH43	48	60	135	$783	$59	$113,700	1	$14,860		
IMP 38-MH44 x 38-MH124	48	60	44	$740	$59	$35,100	1	$14,860		
IMP 38-MH45 x 38-MH144	48	60	190	$740	$59	$151,700	1	$14,860		
IMP 38-MH6 x 38-MH22	48	60	374	$674	$59	$274,400	1	$14,860		
IMP 38-MH6 x 38-MH4	48	60	30	$718	$59	$23,100	1	$14,860		
IMP 38-MH70 x 38-MH123	48	60	371	$718	$59	$288,100	1	$14,860		
			2,237			**$1,803,000**		**$297,000**	**$0**	**$2,100,000**
Sherman and De La Cruz										
IMP 38-MH4 x 48-MH40	60	66	679	$890	$72	$653,500	1	$16,176		
IMP 48-MH40 x 48-MH38	60	72	63	$1,007	$72	$68,200	2	$33,020		
			742			**$722,000**		**$49,000**	**$0**	**$770,000**
South										
IMP 54-MH10 x 53-MH23	21	24	117	$263	$34	$34,700	2	$24,796		
IMP 54-MH11 x 54-MH8	18	21	320	$219	$27	$78,800	1	$12,266		
IMP 54-MH8 x 54-MH10	21	24	305	$252	$34	$87,100	1	$12,398		
			742			**$201,000**		**$49,000**	**$0**	**$250,000**
Sunlite and Benton										
IMP 35-MH39 x 35-MH38	12	24	320	$230	$23	$80,900	1	$12,398		
IMP 35-MH40 x 35-MH39	10	24	266	$230	$23	$67,300	1	$12,398		

Project/Pipes	Ex. Diam (in)	Imp. Diam (in)	Length (ft)	Pipe Unit Cost	Demo Unit Cost	Pipe Total	Manholes	MH Cost	Outfalls	Project Subtotal[1]
IMP 35-MH41 x 35-MH40	10	12	261	$156	$23	$46,900	1	$11,870		
IMP 35-MH38 x 35-MH37	15	30	267	$291	$27	$85,000	2	$25,324		
			1,114			**$280,000**		**$62,000**	**$0**	**$340,000**
The Alameda										
NEW 38-MH97 x 39-MH12		24	41	$285	$0	$11,800	2	$24,796		
			41			**$11,800**		**$24,800**	**$0**	**$37,000**
Thomas and Norman										
IMP 75-MH54 x 76-MH50	36	42	334	$426	$46	$158,000	1	$13,190		
IMP 75-MH31 x 75-MH30	48	60	80	$652	$59	$56,500	1	$14,860		
IMP 75-MH35 x 75-MH31	48	60	435	$630	$59	$299,700	1	$14,860		
IMP 75-MH36 x 75-MH35	48	60	58	$630	$59	$40,000	1	$14,860		
IMP 75-MH37 x 75-MH36	48	60	272	$652	$59	$193,400	1	$14,860		
IMP 75-MH40 x 76-MH43	48	60	94	$696	$59	$71,200	1	$14,860		
IMP 75-MH50 x 75-MH40	48	60	186	$696	$59	$140,200	1	$14,860		
IMP 76-MH42 x 75-MH37	48	60	285	$674	$59	$208,900	1	$14,860		
IMP 76-MH43 x 76-MH42	48	60	162	$674	$59	$119,000	2	$29,719		
			1,906			**$1,287,000**		**$147,000**	**$0**	**$1,430,000**
Warburton										
IMP 44-CB3 x 44-FG1	15	18	35	$186	$27	$7,500	1	$12,134	1	
IMP 44-MH13 x 44-MH14	12	15	217	$184	$23	$45,100	1	$12,002		
IMP 44-MH14 x 44-MH15	12	15	276	$184	$23	$57,300	1	$12,002		
IMP 44-MH15 x 44-MH16	15	18	261	$205	$27	$60,600	1	$12,134		
IMP 44-MH16 x 44-CB3	15	18	130	$186	$27	$27,800	2	$24,269		
			919			**$198,000**		**$73,000**	**$40,000**	**$310,000**
Warburton and Barkley										
IMP 43-MH19 x 43-MH20	18	24	389	$230	$27	$99,800	2	$24,796		
IMP 43-MH20 x 43-MH21	18	24	221	$241	$27	$59,200	1	$12,398		
IMP 43-MH24 x 43-MH19	18	24	288	$230	$27	$74,100	1	$12,398		
IMP 43-MH29 x 43-MH24	15	18	286	$196	$27	$63,600	1	$12,134		
			1,180			**$297,000**		**$62,000**	**$0**	**$360,000**
Winchester										
IMP 26-MH1 x 36-MH61	12	24	88	$296	$23	$28,200	1	$12,398		
IMP 26-MH12 x 26-MH6	18	21	292	$260	$27	$84,000	1	$12,266		
IMP 26-MH6 x 26-MH1	18	24	360	$285	$27	$112,400	2	$24,796		
			740			**$225,000**		**$49,000**	**$0**	**$270,000**
Low Priority Totals:			**118,350**			**$55,860,000**		**$7,640,000**		**$64,070,000**

[1]Project subtotals do not include markups for traffic control, mobilization/demobilization, design and engineering, or contingency. See Table B-1 for total CIP costs.

Table B-6: Pump station improvement summary

Pump Stations	Priority	Imp. Capacity (cfs)	Subtotal	Cost of Outfalls	Project Subtotal[1]
Lake Santa Clara PS	Moderate	120	$4,840,000	$40,000	$4,880,000
Hwy 101 PS	Low	90	$3,640,000	$40,000	$3,680,000
Kaiser PS	Low	25	$1,040,000	$40,000	$1,080,000
Monroe PS	Low	120	$4,840,000	$40,000	$4,880,000
Total		**355**	**$14,360,000**	**$160,000**	**$14,520,000**

[1]Project subtotals do not include markups for traffic control, mobilization/demobilization, design and engineering, or contingency. See Table B-1 for total CIP costs.

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Table C-7: Pipe installation cost per linear foot.

Pipe Diam (in)	Pipe Cover Depth (ft) 3	4	5	6	7	8	9	10	11
12	$149	$156	$164	$171	$179	$186	$194	$202	$209
15	$167	$176	$184	$193	$201	$210	$218	$227	$235
18	$186	$196	$205	$214	$224	$233	$242	$252	$261
21	$209	$219	$229	$240	$250	$260	$270	$281	$291
24	$230	$241	$252	$263	$274	$285	$296	$307	$319
27	$267	$279	$291	$303	$315	$327	$339	$351	$363
30	$291	$304	$317	$330	$343	$356	$369	$382	$395
33	$320	$334	$348	$362	$375	$389	$403	$417	$431
36	$349	$363	$378	$393	$408	$422	$437	$452	$467
42	$410	$426	$443	$459	$476	$492	$509	$525	$542
48	$476	$495	$513	$531	$550	$568	$586	$605	$623
54	$557	$577	$597	$617	$638	$658	$678	$698	$718
60	$630	$652	$674	$696	$718	$740	$762	$783	$805
66	$724	$748	$771	$795	$819	$842	$866	$890	$914
72	$854	$879	$905	$930	$956	$981	$1,007	$1,032	$1,058
84	$1,201	$1,230	$1,260	$1,289	$1,318	$1,347	$1,376	$1,405	$1,434
96	$1,448	$1,481	$1,514	$1,546	$1,579	$1,612	$1,644	$1,677	$1,710

Pipe Diam (in)	Pipe Cover Depth (ft) 12	13	14	15	16	17	18	19	20
12	$217	$224	$232	$239	$247	$254	$262	$269	$277
15	$243	$252	$260	$269	$277	$286	$294	$302	$311
18	$270	$280	$289	$298	$308	$317	$326	$336	$345
21	$301	$311	$321	$332	$342	$352	$362	$373	$383
24	$330	$341	$352	$363	$374	$385	$396	$408	$419
27	$375	$387	$399	$411	$423	$435	$447	$459	$471
30	$408	$421	$434	$447	$460	$472	$485	$498	$511
33	$445	$458	$472	$486	$500	$514	$528	$541	$555
36	$481	$496	$511	$525	$540	$555	$570	$584	$599
42	$558	$575	$591	$608	$624	$641	$658	$674	$691
48	$641	$660	$678	$696	$715	$733	$751	$770	$788
54	$738	$758	$778	$798	$819	$839	$859	$879	$899
60	$827	$849	$871	$893	$915	$937	$959	$981	$1,003
66	$937	$961	$985	$1,008	$1,032	$1,056	$1,080	$1,103	$1,127
72	$1,084	$1,109	$1,135	$1,160	$1,186	$1,211	$1,237	$1,262	$1,288
84	$1,463	$1,492	$1,521	$1,551	$1,580	$1,609	$1,638	$1,667	$1,696
96	$1,742	$1,775	$1,808	$1,841	$1,873	$1,906	$1,939	$1,971	$2,004

Table C-8: Pipe connection / manhole structure cost.

Pipe Diam (in)	Pipe Cover Depth (ft)								
	3	4	5	6	7	8	9	10	11
12	$11,870	$12,057	$12,244	$12,431	$12,618	$12,805	$12,992	$13,179	$13,366
15	$12,002	$12,189	$12,376	$12,563	$12,750	$12,937	$13,124	$13,311	$13,498
18	$12,134	$12,321	$12,508	$12,695	$12,882	$13,069	$13,256	$13,443	$13,630
21	$12,266	$12,453	$12,640	$12,827	$13,014	$13,201	$13,388	$13,575	$13,762
24	$12,398	$12,585	$12,772	$12,959	$13,146	$13,333	$13,520	$13,707	$13,894
27	$12,530	$12,717	$12,904	$13,091	$13,278	$13,465	$13,652	$13,839	$14,026
30	$12,662	$12,849	$13,036	$13,223	$13,410	$13,597	$13,784	$13,971	$14,158
33	$12,794	$12,981	$13,168	$13,355	$13,542	$13,729	$13,916	$14,103	$14,290
36	$12,926	$13,113	$13,300	$13,487	$13,674	$13,861	$14,048	$14,235	$14,422
42	$13,190	$13,377	$13,564	$13,751	$13,938	$14,125	$14,312	$14,499	$14,686
48	$13,454	$13,641	$13,828	$14,015	$14,202	$14,389	$14,576	$14,763	$14,950
54	$14,559	$14,820	$15,080	$15,341	$15,602	$15,863	$16,124	$16,385	$16,645
60	$14,860	$15,121	$15,381	$15,642	$15,903	$16,164	$16,425	$16,685	$16,946
66	$16,176	$16,503	$16,829	$17,155	$17,482	$17,808	$18,134	$18,461	$18,787
72	$16,510	$16,836	$17,163	$17,489	$17,815	$18,142	$18,468	$18,794	$19,121
84	$18,849	$19,276	$19,703	$20,130	$20,557	$20,984	$21,411	$21,838	$22,265
96	$20,721	$21,203	$21,684	$22,166	$22,648	$23,130	$23,611	$24,093	$24,575

Pipe Diam (in)	Pipe Cover Depth (ft)								
	12	13	14	15	16	17	18	19	20
12	$13,553	$13,740	$13,927	$14,114	$14,301	$14,488	$14,675	$14,862	$15,049
15	$13,685	$13,872	$14,059	$14,246	$14,433	$14,620	$14,807	$14,994	$15,181
18	$13,817	$14,004	$14,191	$14,378	$14,565	$14,752	$14,939	$15,126	$15,313
21	$13,949	$14,136	$14,323	$14,510	$14,697	$14,884	$15,071	$15,258	$15,445
24	$14,081	$14,268	$14,455	$14,642	$14,829	$15,016	$15,203	$15,390	$15,577
27	$14,213	$14,400	$14,587	$14,774	$14,961	$15,148	$15,335	$15,522	$15,709
30	$14,345	$14,532	$14,719	$14,906	$15,093	$15,280	$15,467	$15,654	$15,840
33	$14,477	$14,664	$14,851	$15,038	$15,225	$15,412	$15,599	$15,785	$15,972
36	$14,609	$14,796	$14,983	$15,170	$15,357	$15,544	$15,731	$15,917	$16,104
42	$14,873	$15,060	$15,247	$15,434	$15,621	$15,807	$15,994	$16,181	$16,368
48	$15,137	$15,324	$15,511	$15,698	$15,884	$16,071	$16,258	$16,445	$16,632
54	$16,906	$17,167	$17,428	$17,689	$17,949	$18,210	$18,471	$18,732	$18,993
60	$17,207	$17,468	$17,729	$17,989	$18,250	$18,511	$18,772	$19,033	$19,293
66	$19,113	$19,440	$19,766	$20,093	$20,419	$20,745	$21,072	$21,398	$21,724
72	$19,447	$19,773	$20,100	$20,426	$20,753	$21,079	$21,405	$21,732	$22,058
84	$22,692	$23,119	$23,545	$23,972	$24,399	$24,826	$25,253	$25,680	$26,107
96	$25,057	$25,539	$26,020	$26,502	$26,984	$27,466	$27,947	$28,429	$28,911

Appendix D. Capital Improvement Program Project Sheets

A. Project ID: 1 | **B. Project Name: Anna**

C. Project Location: Anna Dr. east of San Tomas Aquino Creek

D. Storm Drain Block Book Location: 35-MH11 to 34-OF4

E. Priority: Highest

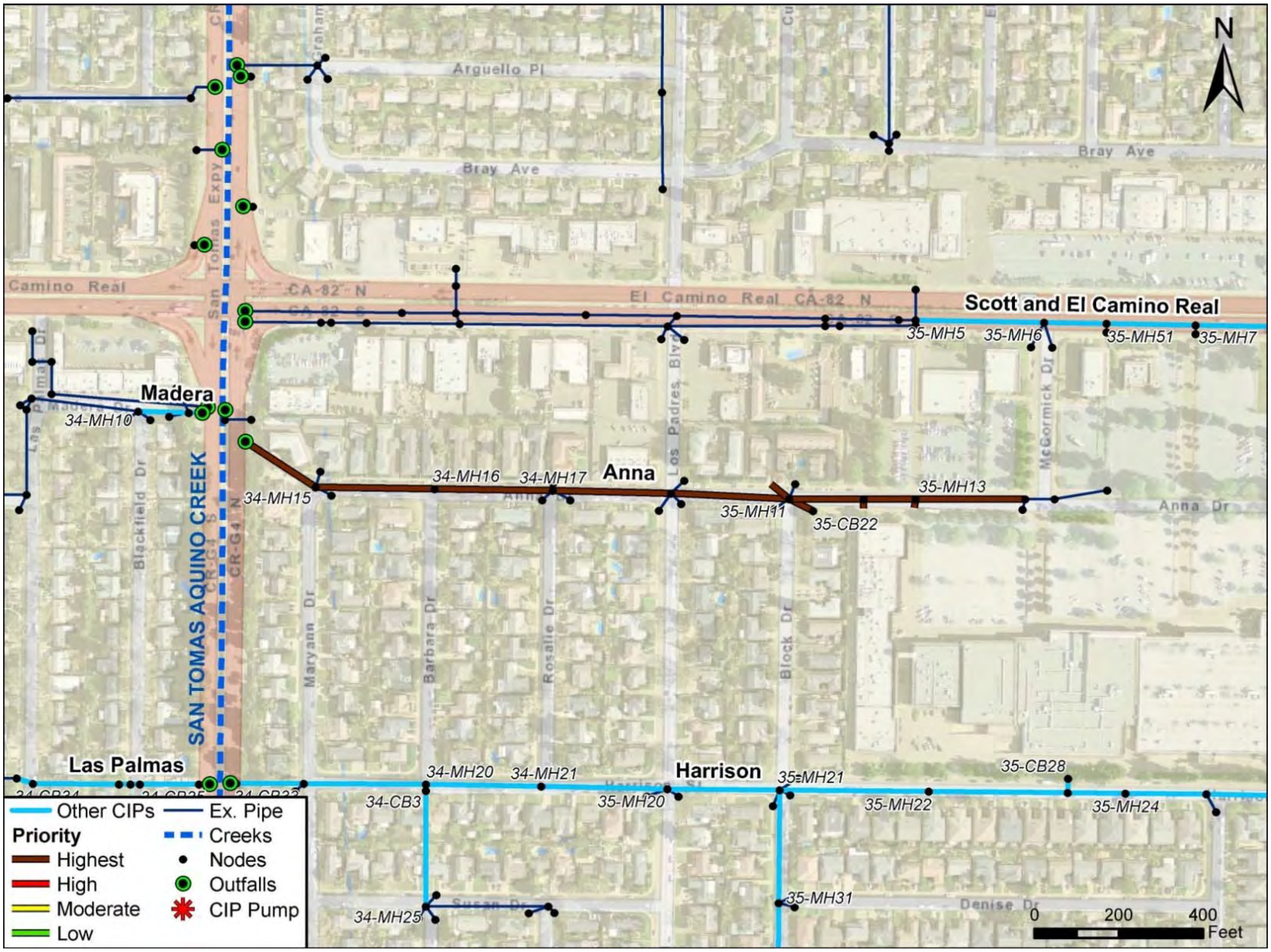
F. Type: Capacity

G. Project Description: Significant flooding occurs north of Anna Dr. and Block Dr. Upsizing these pipes and adding three standard catch basins at Block Dr. and Anna Dr. is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	18	15	60
15	24	21	380
15	30	27	180
15	48	42	260
18	48	42	860
21	48	42	200
-	12	-	100

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 1 | **B. Project Name: Anna**

C. Project Location: Anna Dr. east of San Tomas Aquino Creek

D. Storm Drain Block Book Location: 35-MH11 to 34-OF4

E. Priority: Highest

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$54,000**
35-CB22 to 35-MH11	12	1	60	LF	$23	$7,000
35-MH14 to 35-MH10	15	2	820	LF	$27	$1,000
35-MH10 to 34-MH15	18	2	860	LF	$27	$24,000
34-MH15 to 34-OF4	21	1	200	LF	$34	$22,000
Pipe Construction						**$795,000**
35-CB1 to 35-MH11, 35-CB2 to 35-MH13, 35-CB3 to 35-MH12	12	2	100	LF	$149	$15,000
35-CB22 to 35-MH11	18	2	60	LF	$186	$12,000
35-MH14 to 35-MH12	24	2	380	LF	$230	$88,000
35-MH12 to 35-MH11	30	2	180	LF	$291	$51,000
35-MH11 to 34-OF4	48	3	1,320	LF	$412	$630,000
Structures						
Manholes						$160,000
Catch Basins						$0
Outfalls						$40,000
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$1,050,000**
Mobilization/Demobilization					10%	$110,000
Traffic Control					5%	$50,000
Contingency					40%	$420,000
CONSTRUCTION COST TOTAL						**$1,630,000**
Engineering/Inspection					20%	$320,000
CIP TOTAL						**$1,950,000**

A. **Project ID: 2**	B. **Project Name: Harrison**

C. Project Location: Harrison St. east of San Tomas Aquino Creek, Barbara Dr., and Block St.

D. Storm Drain Block Book Location: 35-MH34 to 34-OF7

E. Priority: Highest

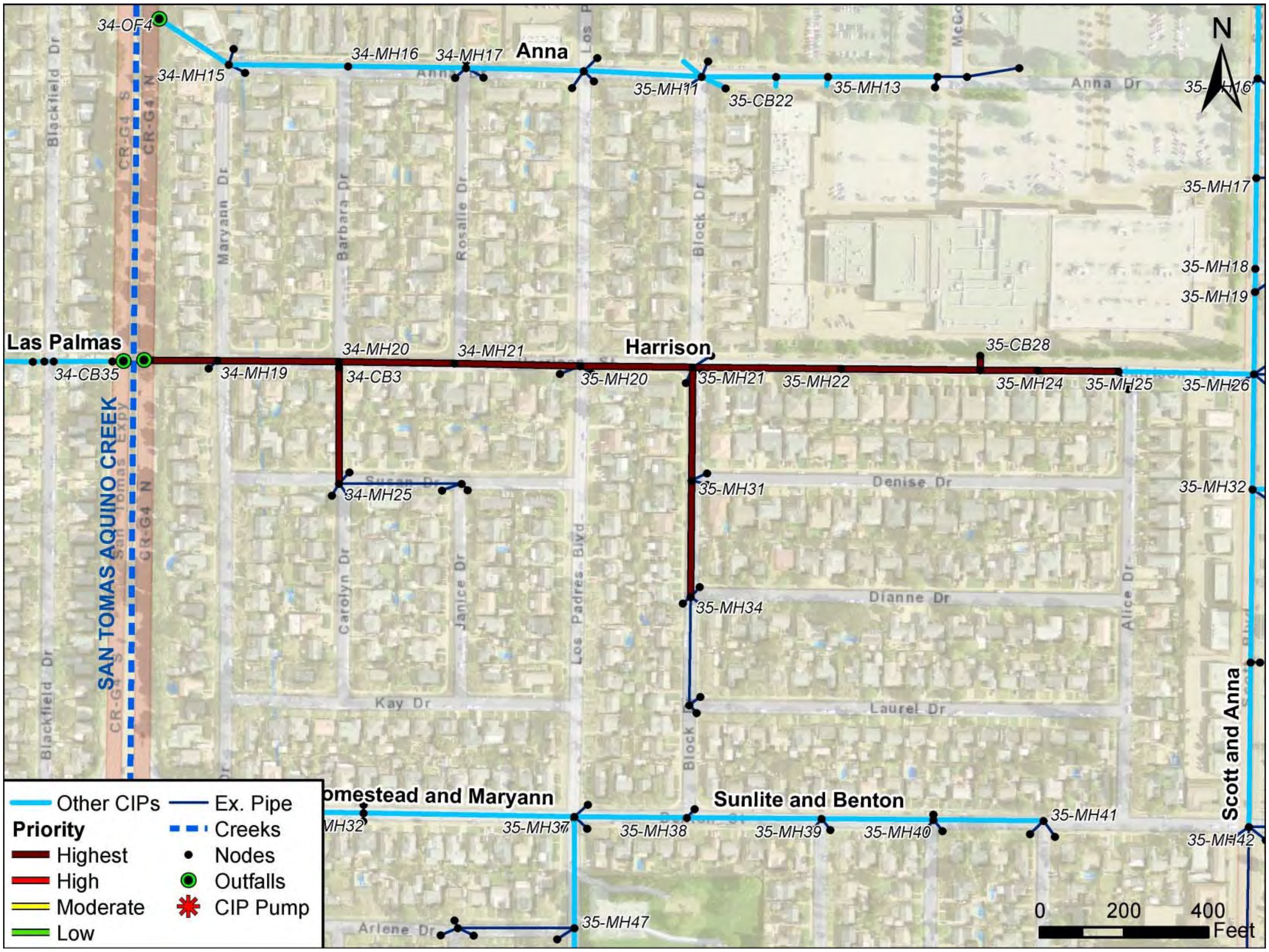
F. Type: Capacity

G. Project Description: Significant flooding occurs north of Harrison St. in commercial and residential development. Upsizing existing pipes is recommended to reduce significant 2-year and 10-year flooding

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	18	15	870
15	24	21	330
15	30	27	680
18	42	39	1,130
21	42	39	180

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 2	**B. Project Name: Harrison**

C. Project Location: Harrison St. east of San Tomas Aquino Creek, Barbara Dr., and Block St.

D. Storm Drain Block Book Location: 35-MH11 to 34-OF4

E. Priority: Highest

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$84,000**
34-MH25 to 34-MH20, 35-CB28 to 35-MH23, 35-MH34 to 35-MH21	12	4	870	LF	$23	$20,000
35-MH24 to 35-MH21	15	3	1,010	LF	$27	$27,000
35-MH21 to 34-MH21	18	3	1,130	LF	$27	$31,000
34-MH19 to 34-OF7	21	1	175	LF	$34	$6,000
Pipe Construction						**$981,000**
34-MH25 to 34-MH20, 35-CB28 to 35-MH23, 35-MH34 to 35-MH21	18	4	870	LF	$192	$167,000
35-MH25 to 35-MH23	24	3	330	LF	$230	$75,000
35-MH23 to 35-MH21	30	2	680	LF	$291	$200,000
35-MH21 to 34-OF7	42	2	1,300	LF	$412	$539,000
Structures						
Manholes						$190,000
Catch Basins						$0
Outfalls						$40,000
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$1,290,000**
Mobilization/Demobilization					10%	$130,000
Traffic Control					5%	$60,000
Contingency					40%	$520,000
CONSTRUCTION COST TOTAL						**$2,000,000**
Engineering/Inspection					20%	$390,000
CIP TOTAL						**$2,390,000**

A. Project ID: 3 | **B. Project Name: Homestead and Maryann**

C. Project Location: Enright Ave. and Serra Ave. to Homestead Rd. outfall to San Tomas Aquino Cr.

D. Storm Drain Block Book Location: 25-MH17 to OF11

E. Priority: Highest

F. Type: Capacity

G. Project Description: The area around Los Padres Blvd has experienced frequent flooding. Upsizing pipes between the neighborhood southeast of Homestead and Los Padres and the outfalls on Benton St and Maryann Dr.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
10	15	-	280
10	30	-	560
15	24	21	200
15	36	33	490
15	42	39	310
24	66	60	310
27	66	60	750
33	72x72	-	740
36	72x72	-	1,060

H. Special Considerations: N/A

I. Alternatives: N/A

A. Project ID: 3 | **B. Project Name: Homestead and Maryann**

C. Project Location: Enright Ave. and Serra Ave. to Homestead Rd. outfall to San Tomas Aquino Cr.

D. Storm Drain Block Book Location: 25-MH17 to OF11

E. Priority: Highest

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$173,000**
25-MH33 to 25-MH32	10	3	280	LF	$23	$6,000
25-MH32 to 25-MH26	10	2	560	LF	$23	$13,000
25-MH19 to 25-MH4	15	2	1,000	LF	$27	$27,000
25-MH4 to 25-MH3	24	2	310	LF	$34	$11,000
25-MH3 to 24-MH15	27	4	750	LF	$43	$33,000
24-MH15 to 24-MH1	33	4	740	LF	$46	$34,000
24-MH3 to 34-OF11	36	2	1,060	LF	$46	$49,000
Pipe Construction						**$3,275,000**
25-MH33 to 25-MH32	15	3	280	LF	$167	$47,000
25-MH19 to 25-MH18	24	2	200	LF	$230	$46,000
25-MH32 to 25-MH26	30	2	560	LF	$291	$162,000
25-MH18 to 25-MH16	36	2	490	LF	$349	$170,000
25-MH16 to 25-MH4	42	3	310	LF	$410	$128,000
25-MH4 to 24-MH15	66	4	1,060	LF	$724	$779,000
24-MH1 to 34-OF11	72x72	3	1,060	LF	$1,080	$1,945,000
Structures						
Manholes						$320,000
Catch Basins						$0
Outfalls						$40,000
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$3,810,000**
Mobilization/Demobilization					10%	$380,000
Traffic Control					5%	$190,000
Contingency					40%	$1,520,000
CONSTRUCTION COST TOTAL						**$5,900,000**
Engineering/Inspection					20%	$1,140,000
CIP TOTAL						**$7,040,000**

A. Project ID: 4 | **B. Project Name: Los Padres and Warburton**

C. Project Location: Warburton Ave. and Long St. to San Tomas Aquino Creek

D. Storm Drain Block Book Location: 45-MH35 to 44-OF4

E. Priority: Highest

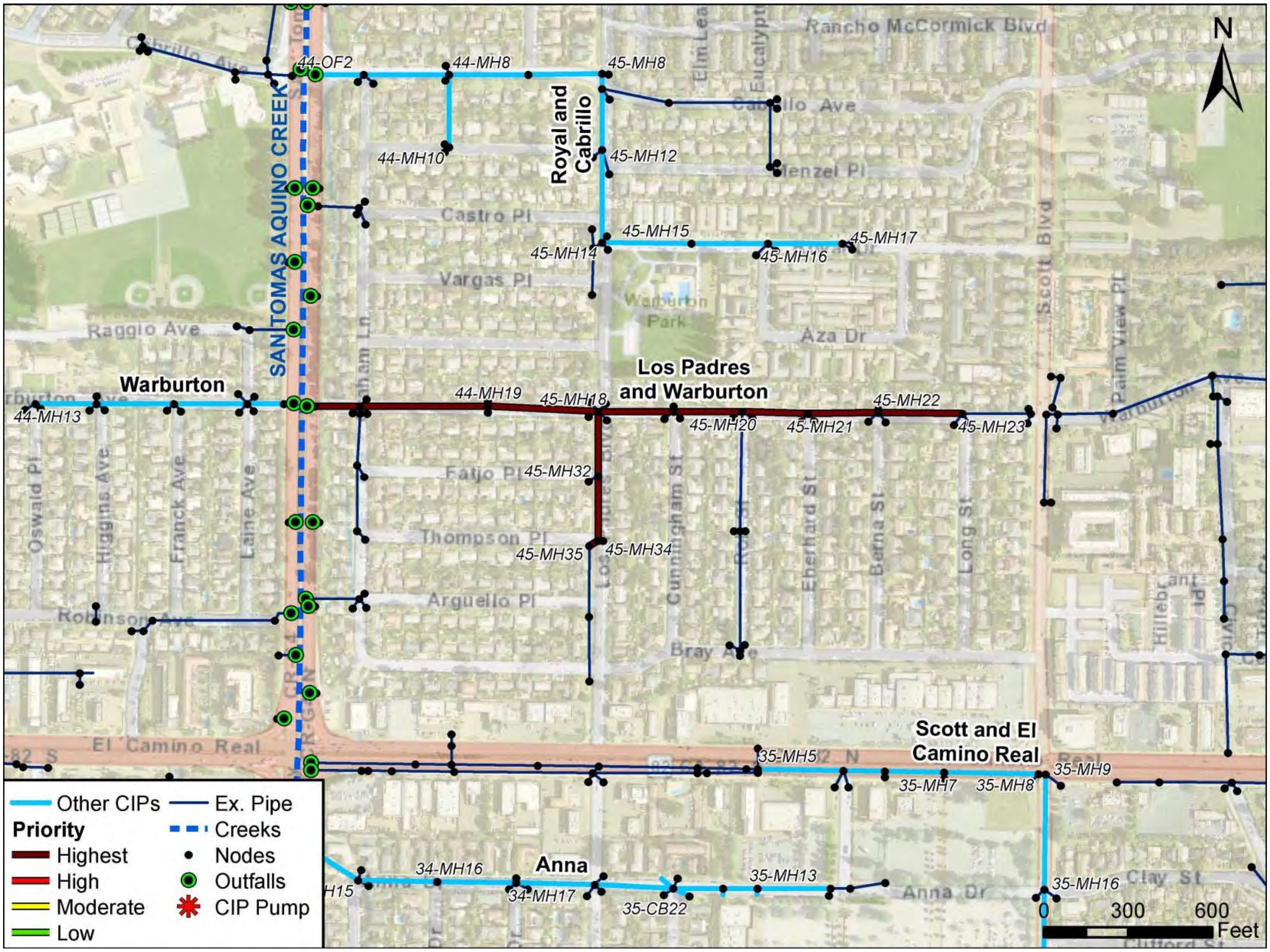
F. Type: Capacity

G. Project Description: Flooding occurs on Warburton Ave. east of San Tomas Expressway. Upsizing existing 10" to 18" pipes is recommended to reduce significant 2-year flooding.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
8	18	-	40
10	18	-	460
12	18	15	790
15	21	16	510
18	24	18	1,040

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 4

B. Project Name: Los Padres and Warburton

C. Project Location: Warburton Ave. and Long St. to San Tomas Aquino Creek

D. Storm Drain Block Book Location: 45-MH35 to 44-OF4

E. Priority: Highest

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$72,000**
45-MH35 to 45-MH34	8	3	40	LF	$23	$1,000
45-MH34 to 45-MH18	10	3	460	LF	$23	$11,000
45-MH23 to 45-MH20	12	5	790	LF	$23	$18,000
45-MH20 to 45-MH18	15	4	510	LF	$27	$14,000
45-MH18 to OF4	18	3	1,040	LF	$27	$28,000
Pipe Construction						**$619,000**
45-MH35 to 45-MH20	18	4	1,280	LF	$197	$256,000
45-MH20 to 45-MH18	21	4	510	LF	$224	$115,000
45-MH18 to 44-OF4	24	3	1,040	LF	$235	$248,000
Structures						
Manholes						$150,000
Catch Basins						$0
Outfalls						$40,000
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$880,000**
Mobilization/Demobilization					10%	$90,000
Traffic Control					5%	$50,000
Contingency					40%	$340,000
CONSTRUCTION COST TOTAL						**$1,360,000**
Engineering/Inspection					20%	$260,000
CIP TOTAL						**$1,620,000**

A. Project ID: 5

B. Project Name: Washington and Santa Clara

C. Project Location: Santa Clara St. from Washington St. to Jackson St.

D. Storm Drain Block Book Location: 37-MH65 to 37-MH63

E. Priority: Highest

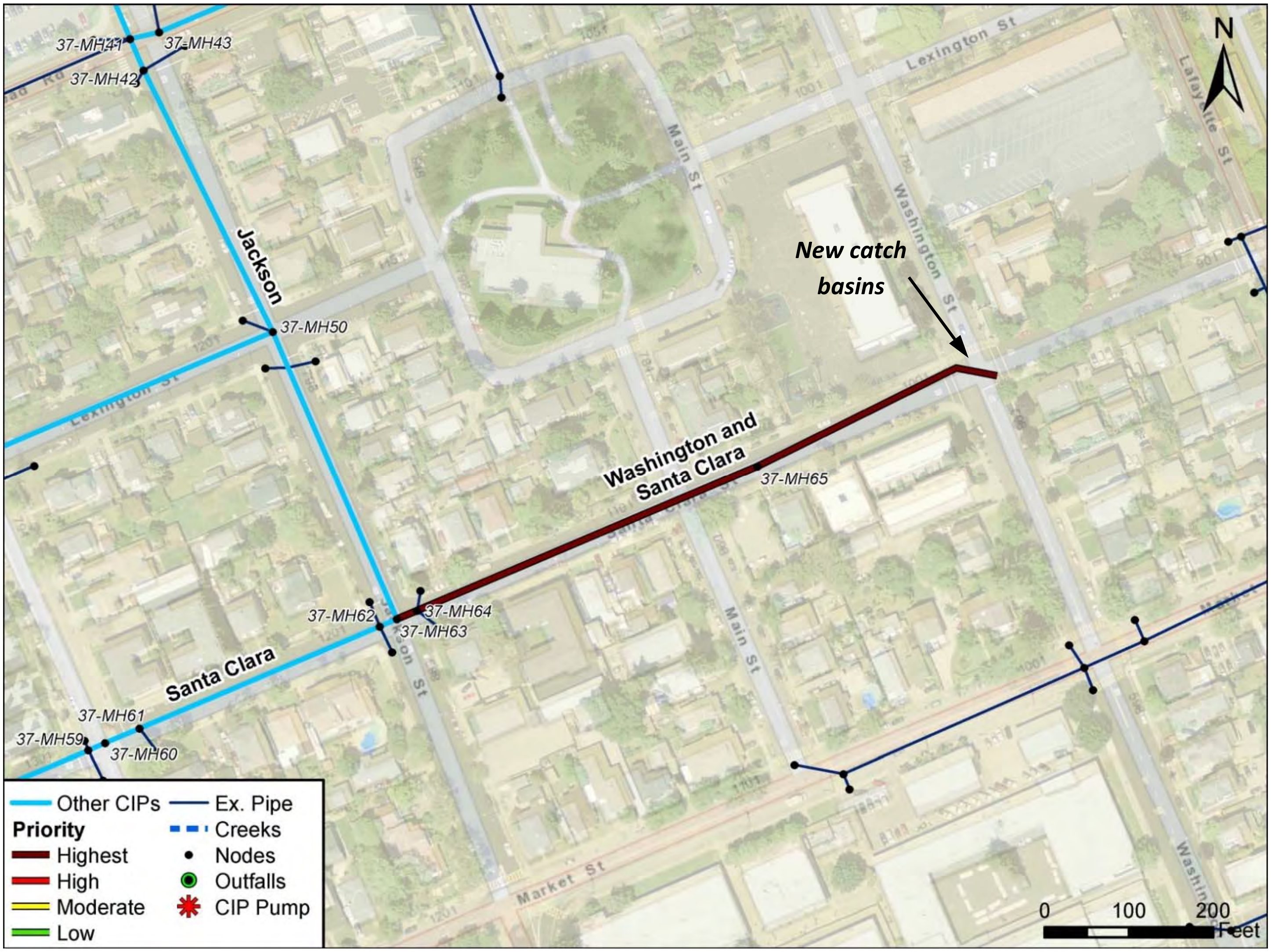
F. Type: Capacity

G. Project Description: Frequent flooding occurs near St Clare School. Adding catch basins and connecting to the nearby storm main is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	18	-	470
N/A	18	-	230

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 5 | **B. Project Name: Washington and Santa Clara**

C. Project Location: Santa Clara St. from Washington St. to Jackson St.

D. Storm Drain Block Book Location: 37-MH65 to 37-MH63

E. Priority: Highest

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$11,000**
37-MH65 to 37MH-63	12	3	470	LF	$23	$11,000
Pipe Construction						**$129,000**
New Catch Basins to 37-MH63	18	3	700	LF	$186	$129,000
Structures						
Manholes						$40,000
Catch Basins						$10,000
Outfalls						$0
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$190,000**
Mobilization/Demobilization					10%	$19,000
Traffic Control					5%	$9,000
Contingency					40%	$76,000
CONSTRUCTION COST TOTAL						**$290,000**
Engineering/Inspection					20%	$60,000
CIP TOTAL						**$350,000**

A. Project ID: 6	**B. Project Name: Agate and Bowers**

C. Project Location: From Agate Dr., across UPRR to Bowers Ave. and Kifer Rd.

D. Storm Drain Block Book Location: 52-MH4 to 53-MH4

E. Priority: High

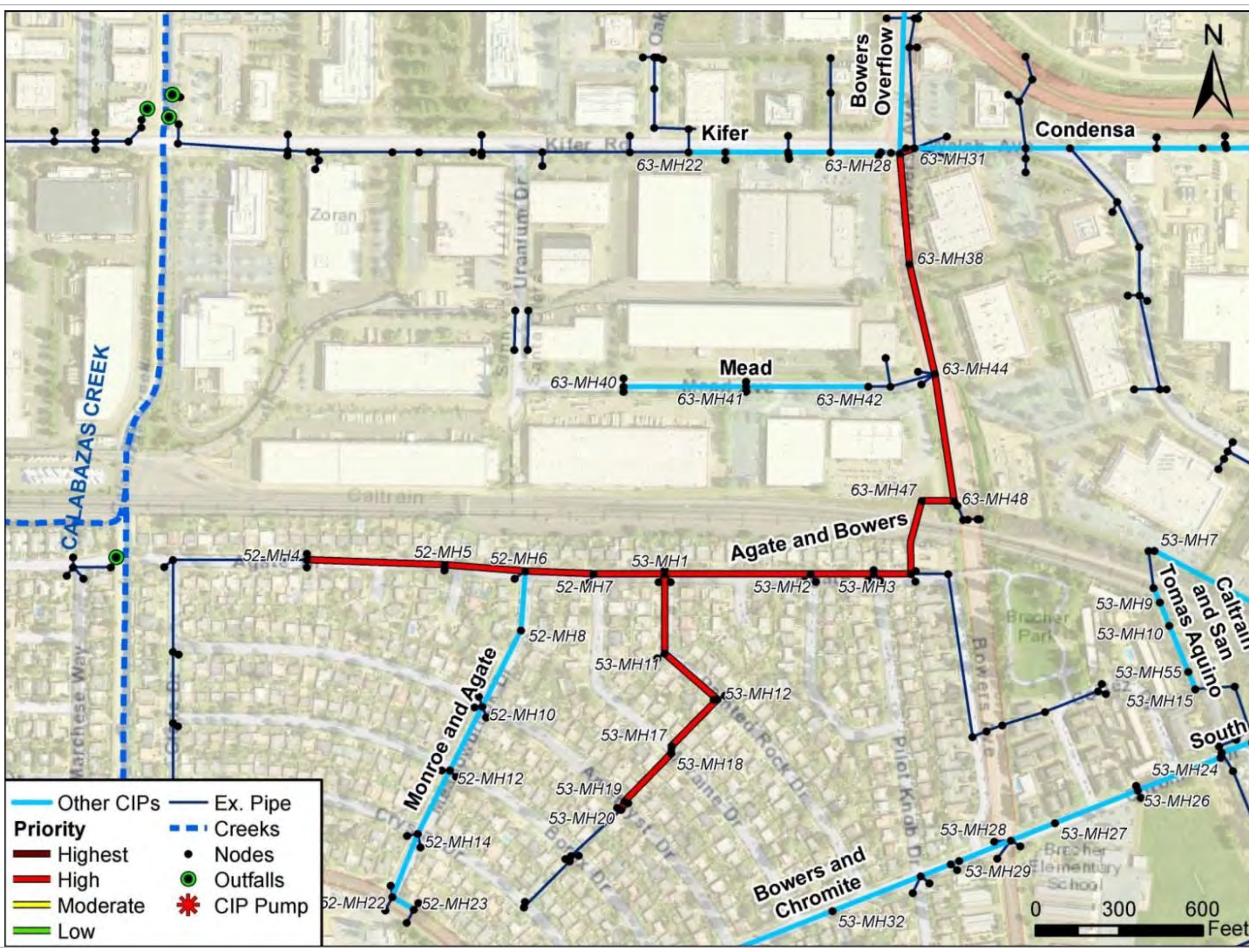
F. Type: Capacity

G. Project Description: Significant 2-year flooding occurs in the neighborhoods south of Agate Dr. Upsizing existing pipes in the neighborhood and on Bowers Ave. is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	18	15	300
12	48	42	520
15	18	12	230
15	27	24	540
15	30	27	790
21	36	30	250
21	48	54	260
30	54	48	360
36	60	48	390
42	60	42	1260
48	72	48	60

H. Special Considerations: Pipe runs underneath UPRR tracks. Jack and bore cost included.

I. Alternatives: N/A



A. Project ID: 6 | **B. Project Name: Agate and Bowers**

C. Project Location: From Agate Dr., across UPRR to Bowers Ave. and Kifer Rd.

D. Storm Drain Block Book Location: 52-MH4 to 53-MH4

E. Priority: High

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$189,000**
53-MH20 to 53-MH17, 53-MH1 to 53-MH2	12	3	820	LF	$23	$19,000
53-MH12 to 53-MH1, 52-MH4 to 52-MH6	15	3	1,560	LF	$27	$42,000
52-MH6 to 53-MH1	21	2	500	LF	$34	$17,000
53-MH2 to 53-MH4	30	1	360	LF	$44	$16,000
53-MH4 to 63-MH48	36	3	390	LF	$46	$18,000
63-MH48 to 63-MH29	42	6	1,270	LF	$58	$73,000
63-MH29 to 63-MH31	48	6	60	LF	$59	$3,000
Pipe Construction						**$2,297,000**
53-MH20 to 53-MH12	18	3	530	LF	$186	$100,000
53-MH12 to 53-MH1	27	3	540	LF	$267	$143,000
52-MH4 to 52-MH6	30	2	790	LF	$291	$229,000
52-MH6 to 52-MH7	36	2	250	LF	$349	$86,000
52-MH7 to 53-MH2	48	2	780	LF	$476	$372,000
53-MH2 to 53-MH4	54	1	360	LF	$557	$202,000
53-MH4 to 63-MH29	60	5	1,270	LF	$670	$1,114,000
63-MH29 to 63-MH31	72	6	60	LF	$930	$53,000
Structures						
Manholes						$270,000
Catch Basins						$0
Outfalls						$0
SITE SPECIFIC COSTS						
Utility Relocation						$0
Pipe Under Railroad						**$2,600,000**
SUBTOTAL						$2,760,000
Mobilization/Demobilization					10%	$280,000
Traffic Control					5%	$140,000
Contingency					40%	$1,100,000
CONSTRUCTION COST TOTAL						**$4,280,000**
Engineering/Inspection					20%	$830,000
CIP TOTAL						**$7,700,000**

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

A. Project ID: 7	**B. Project Name: Alviso**

C. Project Location: Alviso St. from Hilmar St. to Poplar St.

D. Storm Drain Block Book Location: 28-MH27 to 38-MH115

E. Priority: High

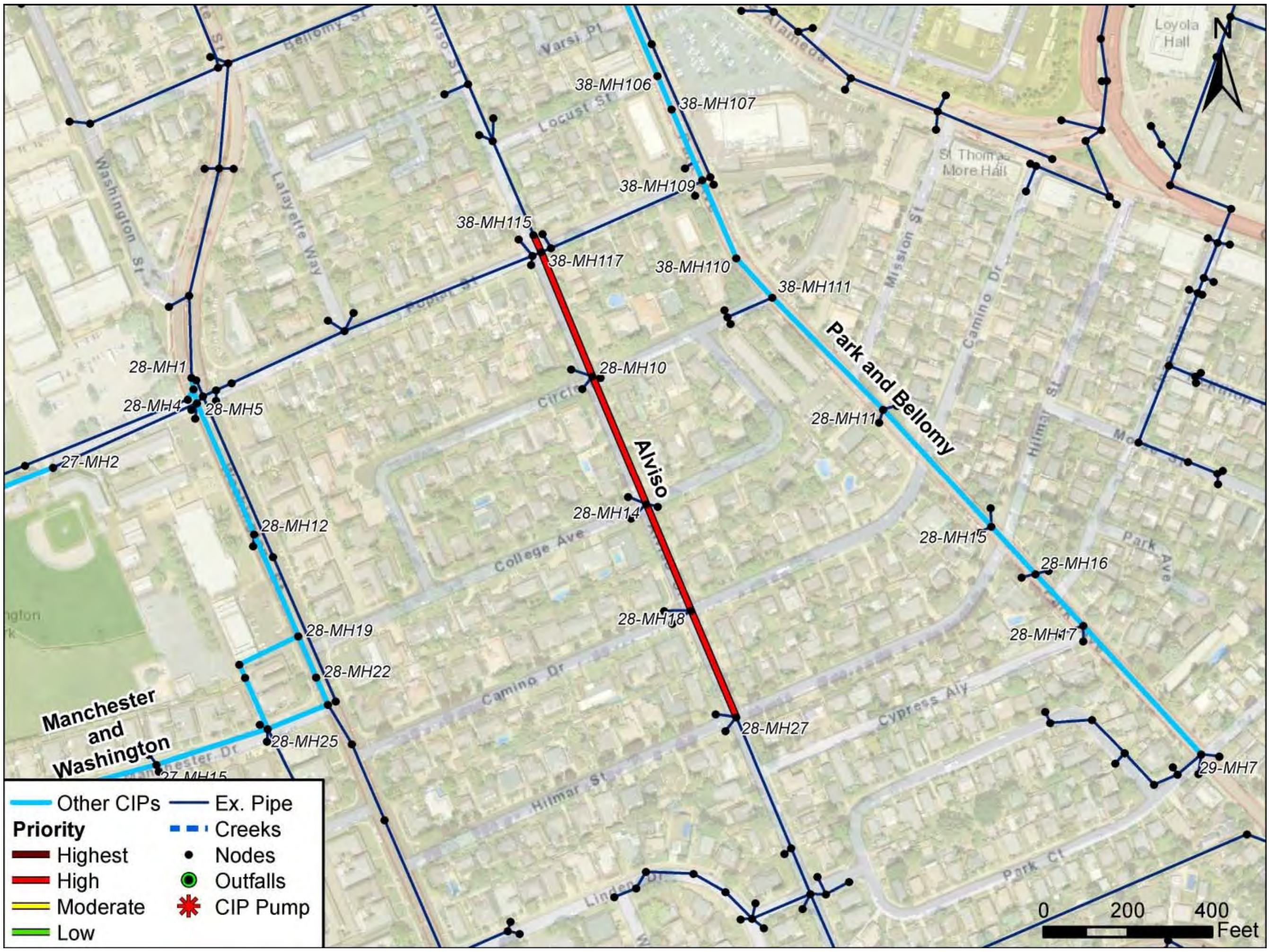
F. Type: Capacity

G. Project Description: 2-year flooding occurs on Alviso Street. Upsizing existing 10" to 18" pipe to 24" pipe is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
10	18	18	280
10	24	24	600
12	48	24	320
18	18	24	50

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 7	B. Project Name: Alviso
C. Project Location: Alviso St. from Hilmar St. to Poplar St.	
D. Storm Drain Block Book Location: 28-MH27 to 38-MH115	
E. Priority: High	

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$29,000**
28-MH27 to 28-MH18	10	3	280	LF	$23	$6,000
28-MH18 to 28-MH10	10	3	600	LF	$23	$14,000
28-MH10 to 38-MH117	12	3	320	LF	$23	$7,000
38-MH117 to 38-MH115	18	4	50	LF	$27	$1,000
Pipe Construction						**$274,000**
28-MH27 to 28-MH18	18	3	280	LF	$186	$52,000
28-MH18 to 38-MH115	24	3	970	LF	$232	$222,000
Structures						
Manholes						$74,000
Catch Basins						$0
Outfalls						$0
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$380,000**
Mobilization/Demobilization					10%	$38,000
Traffic Control					5%	$19,000
Contingency					40%	$150,000
CONSTRUCTION COST TOTAL						**$590,000**
Engineering/Inspection					20%	$110,000
CIP TOTAL						**$700,000**

A. Project ID: 8	**B. Project Name: Burton**

C. Project Location: Burton Dr. near Mission College Blvd and Montague Expwy.

D. Storm Drain Block Book Location: 85-MH73 to 85-MH52

E. Priority: High

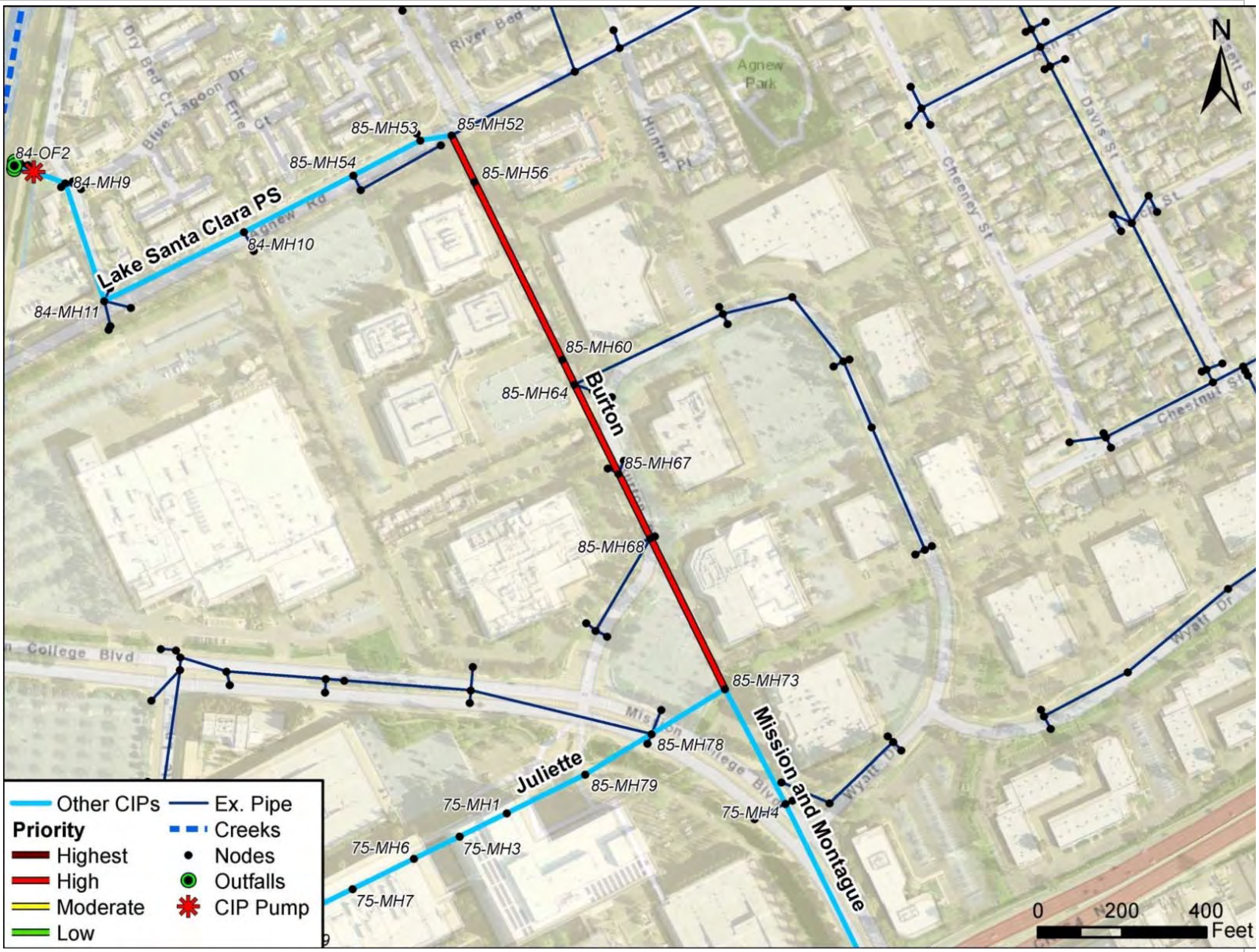
F. Type: Capacity

G. Project Description: 2-year and significant 10-year flooding occurs in the commercial development on Juliette Lane. Upsizing pipes on Burton Dr to alleviate the system on Juliette is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
48	72	48	1,470

H. Special Considerations: Pipe runs through parking lots

I. Alternatives: Redirect flow along streets



A. Project ID: 8	**B. Project Name: Burton**

C. Project Location: Burton Dr. near Mission College Blvd and Montague Expwy.

D. Storm Drain Block Book Location: 85-MH73 to 85-MH52

E. Priority: High

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$87,000**
85-MH73 to 85-MH52	48	5	1,470	LF	$59	$87,000
Pipe Construction						**$1,333,000**
85-MH73 to 85-MH52	72	5	1,470	LF	$913	$1,333,000
Structures						
Manholes						$120,000
Catch Basins						$0
Outfalls						$0
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$1,530,000**
Mobilization/Demobilization					10%	$150,000
Traffic Control					5%	$77,000
Contingency					40%	$610,000
CONSTRUCTION COST TOTAL						**$2,370,000**
Engineering/Inspection					20%	$460,000
CIP TOTAL						**$2,830,000**

A. Project ID: 9 | **B. Project Name: Carmel and Harrison**

C. Project Location: Harrison St. from Carmel Way to Chapel Dr.

D. Storm Drain Block Book Location: 36-MH22 to 35-MH28

E. Priority: High

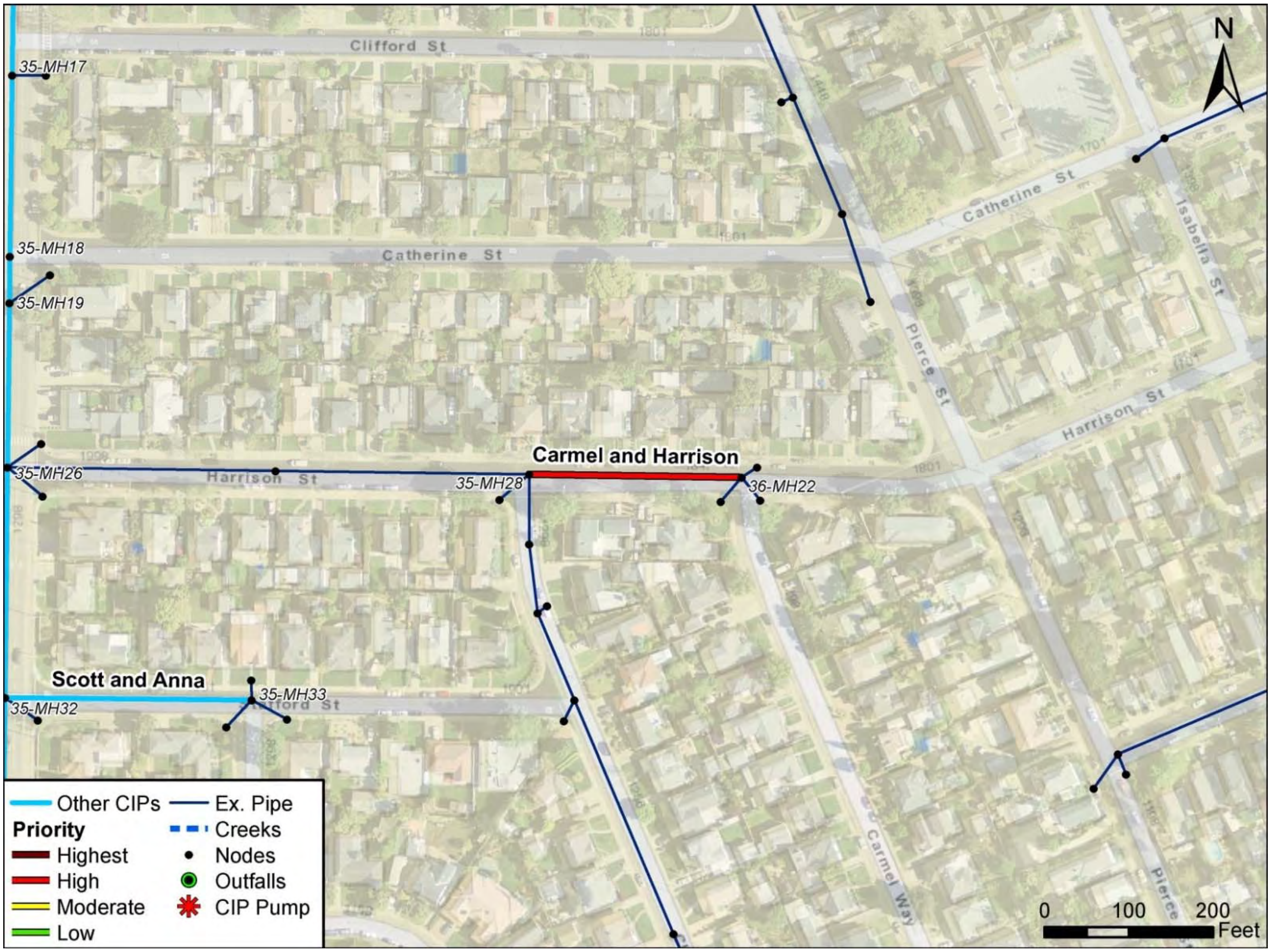
F. Type: Capacity

G. Project Description: The existing pipes between Mission College Blvd. and Agnew Rd. lack the capacity required to convey 10-year storm runoff. Upsizing these pipes to achieve a 10 year level of service and reduce 100 year flooding is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
10	15	12	250

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 9	**B. Project Name: Carmel and Harrison**
C. Project Location: Harrison St. from Carmel Way to Chapel Dr.	
D. Storm Drain Block Book Location: 36-MH22 to 35-MH28	
E. Priority: High	

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$5,900**
36-MH22 to 35-MH28	10	3.4	250	LF	$23	$5,900
Pipe Construction						**$42,000**
36-MH22 to 35-MH28	15	3.4	250	LF	$167	$42,000
Structures						
Manholes						$24,000
Catch Basins						$0
Outfalls						$0
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$72,000**
Mobilization/Demobilization					10%	$7,000
Traffic Control					5%	$4,000
Contingency					40%	$29,000
CONSTRUCTION COST TOTAL						**$110,000**
Engineering/Inspection					20%	$20,000
CIP TOTAL						**$130,000**

A. Project ID: 10 | **B. Project Name: De La Cruz and Guadalupe**

C. Project Location: Matthew St. to De La Cruz and Walsh Ave.

D. Storm Drain Block Book Location: 57-MH32 to 58-MH1

E. Priority: High

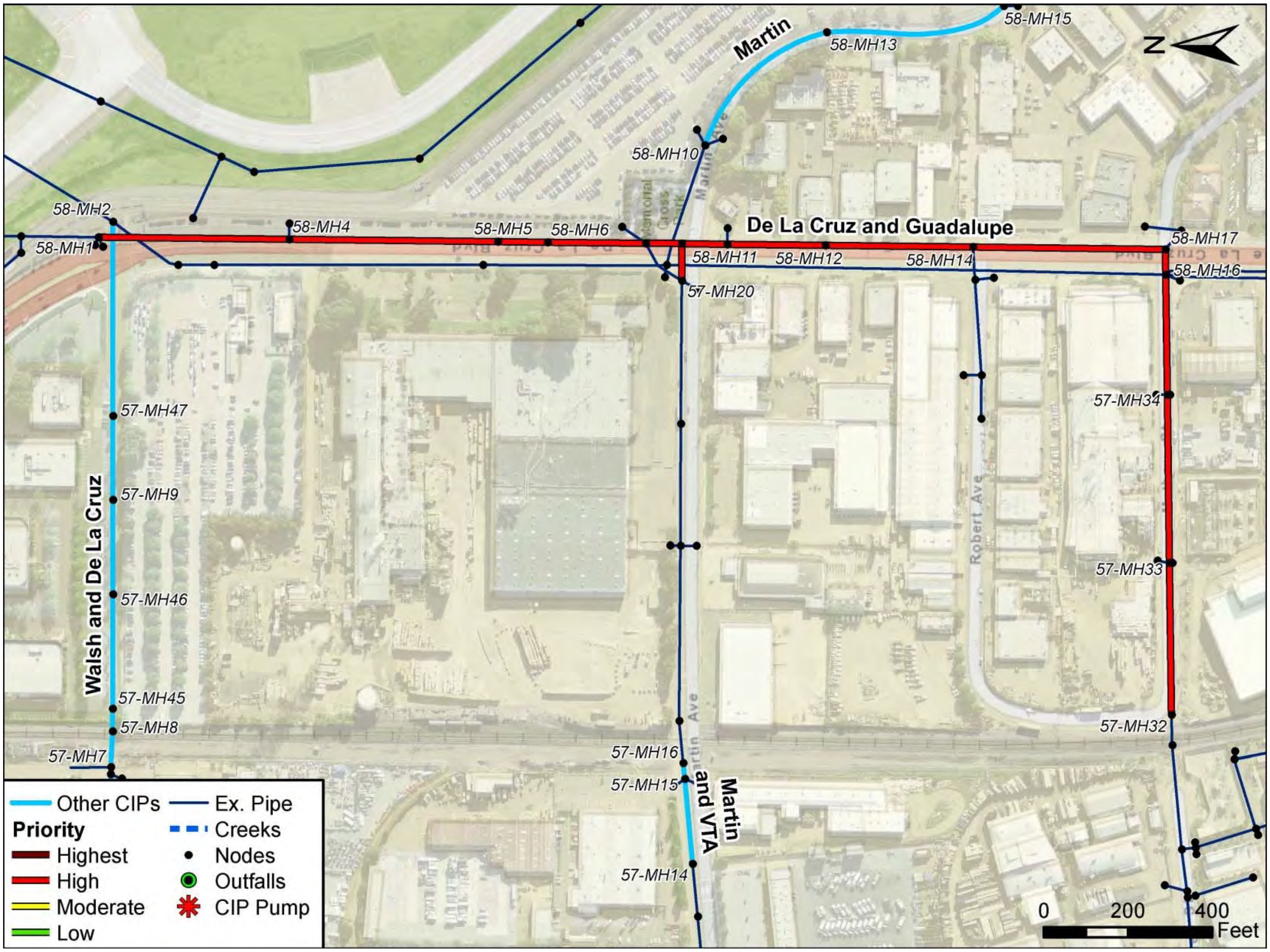
F. Type: Capacity

G. Project Description: 2-year and 10-year flooding occurs on Martin Avenue and in the system upstream of Martin Avenue. Upsizing existing 33” pipes on De La Cruz to 72” is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	18	12	40
33	42	33	360
33	54	48	690
33	72	72	2,780
72	78	42	40

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 10

B. Project Name: De La Cruz and Guadalupe

C. Project Location: Matthew St. to De La Cruz and Walsh Ave.

D. Storm Drain Block Book Location: 57-MH32 to 58-MH1

E. Priority: High

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$179,000**
67-MH24 to 67-MH23	15		40	LF	$27	$1,000
57-MH32 to 58-MH1, 58-MH9 to 68-MH14	33		3,820	LF	$46	$175,000
58-MH16 to 58-MH8	72		40	LF	$88	$3,000
Pipe Construction						**$2,940,000**
67-MH24 to 67-MH23	18	5	40	LF	$205	$8,000
57-MH32 to 57-MH33	42	3	360	LF	$410	$148,000
57-MH33 to 58-MH16	54	2	680	LF	$557	$382,000
58-MH17 to 68-MH14	72	1	2,780	LF	$854	$2,372,000
58-MH16 to 58-MH8	78	2	40	LF	$854	$31,000
Structures						
Manholes						$270,000
Catch Basins						$0
Outfalls						$0
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$3,390,000**
Mobilization/Demobilization					10%	$340,000
Traffic Control					5%	$170,000
Contingency					40%	$1,360,000
CONSTRUCTION COST TOTAL						**$5,260,000**
Engineering/Inspection					20%	$1,020,000
CIP TOTAL						**$6,270,000**

A. Project ID: 11	**B. Project Name: Fowler and Calabazas**

C. Project Location: Fowler Ave. to Calabazas Creek outfall at Cabrillo Ave.

D. Storm Drain Block Book Location: 42-MH21 to 42-OF2

E. Priority: High

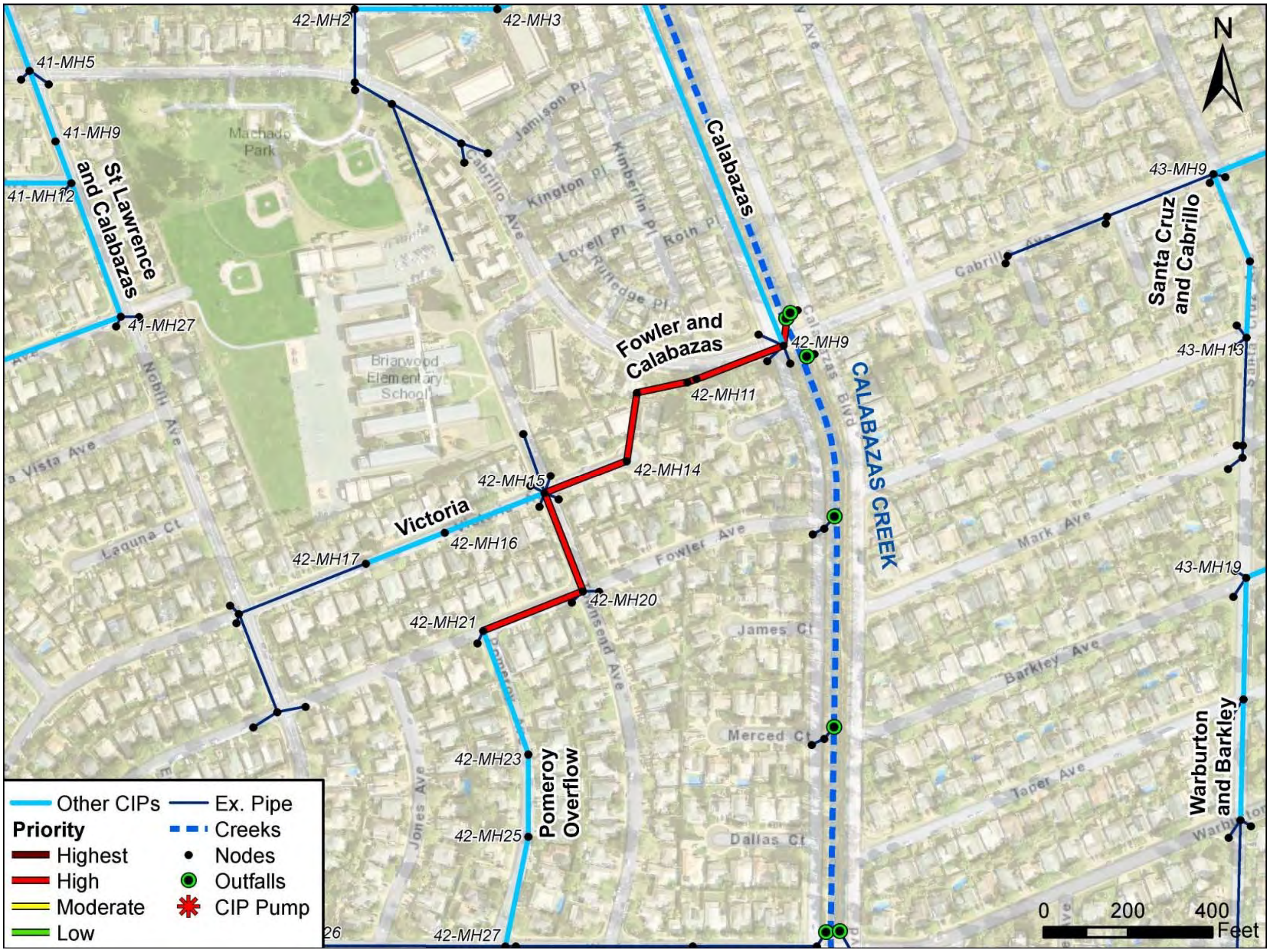
F. Type: Capacity

G. Project Description: Some flooding occurs between Calabazas Creek and Nobili Ave. due to undersized pipes. Upsizing these pipes is recommended to eliminate 2-year flooding and reduce 10-year flooding.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	36	33	260
18	42	39	250
18	48	42	500
21	24	15	60
21	48	42	240

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 11 | **B. Project Name: Fowler and Calabazas**

C. Project Location: Fowler Ave. to Calabazas Creek outfall at Cabrillo Ave.

D. Storm Drain Block Book Location: 42-MH21 to 42-OF2

E. Priority: High

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$37,000**
42-MH21 to 42-MH20	15	3	300	LF	$27	$7,000
42-MH20 to 42-MH11	18	2	750	LF	$46	$20,000
42-MH11 to 42-OF2	21	2	300	LF	$88	$10,000
Pipe Construction						**$563,000**
42-MH9 to 42-OF2	24	5	60	LF	$252	$15,000
42-MH21 to 42-MH20	36	3	260	LF	$349	$89,000
42-MH20 to 42-MH15	42	4	250	LF	$426	$106,000
42-MH15 to 42-MH9	48	1	740	LF	$480	$356,000
Structures						
Manholes						$119,000
Catch Basins						$0
Outfalls						$40,000
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$760,000**
Mobilization/Demobilization					10%	$76,000
Traffic Control					5%	$38,000
Contingency					40%	$310,000
CONSTRUCTION COST TOTAL						**$1,180,000**
Engineering/Inspection					20%	$230,000
CIP TOTAL						**$1,410,000**

A. Project ID: 12

B. Project Name: Homestead and Layton

C. Project Location: Layton St. to San Tomas Aquino Creek outfall on Homestead Rd.

D. Storm Drain Block Book Location: 24-MH32 to 24-OF2

E. Priority: High

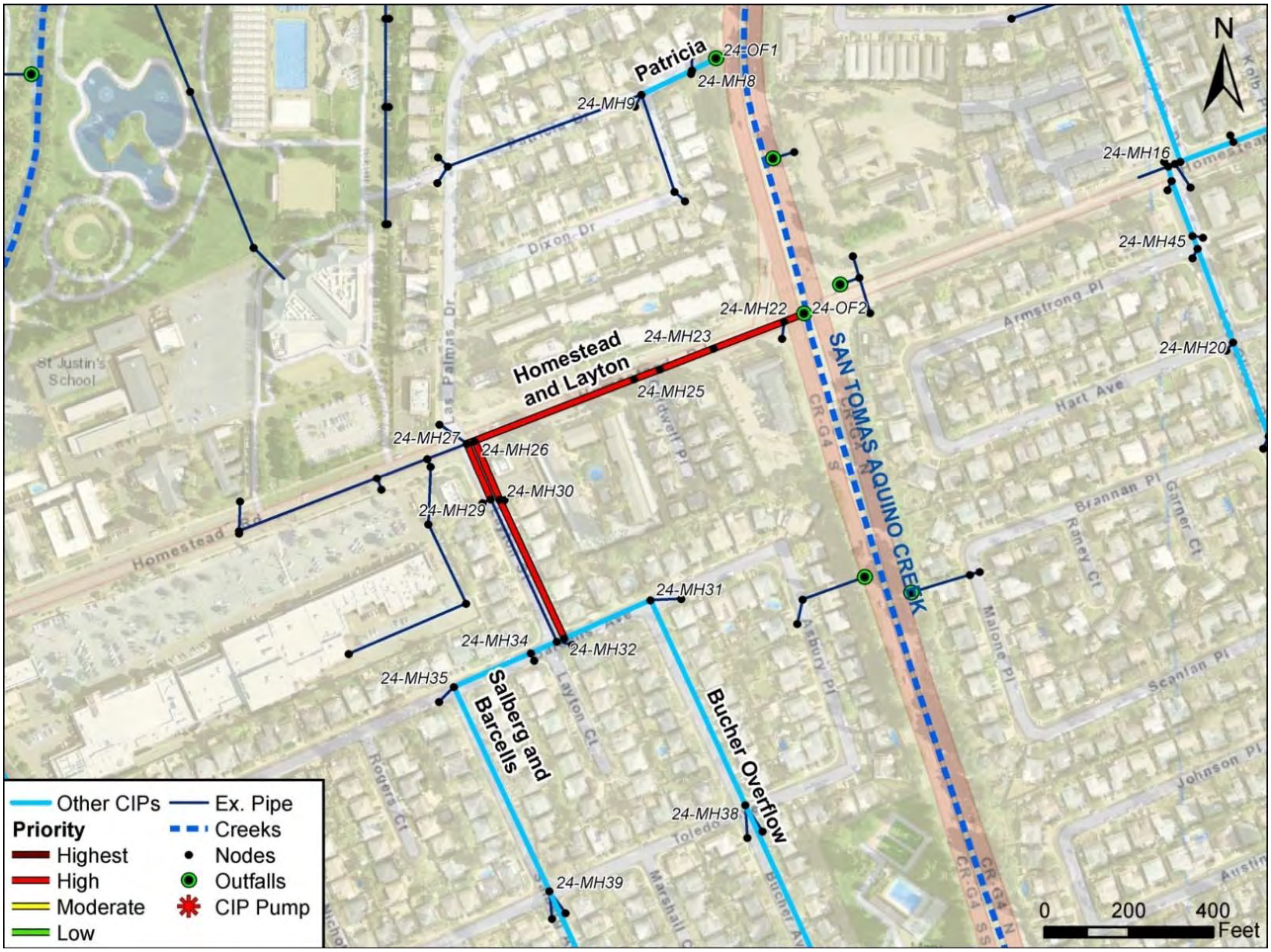
F. Type: Capacity

G. Project Description: Some 2-year and significant 10-year flooding occurs around Homestead Road, west of San Tomas Expressway. Upsizing existing pipes on Layton Ct. and Homestead Rd. is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	24	21	20
18	24	18	140
18	54	48	520
30	60	54	840

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 12 | **B. Project Name: Homestead and Layton**

C. Project Location: Layton St. to San Tomas Aquino Creek outfall on Homestead Rd.

D. Storm Drain Block Book Location: 24-MH32 to 24-OF2

E. Priority: High

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$56,000**
24-MH27 to 24-MH26	15	5	20	LF	$27	$23,500
24-MH32 to 24-MH26, 24-MH29 to 24-MH27	18	3	660	LF	$27	$6,700
24-MH26 to 24-OF2	30	3	840	LF	$34	$0
Pipe Construction						**$856,000**
24-MH26 to 24-OF2	24	5	160	LF	$252	$42,000
24-MH32 to 24-MH26	54	2	520	LF	$557	$287,000
42-MH20 to 42-MH15	60	3	840	LF	$630	$528,000
Structures						
Manholes						$140,000
Catch Basins						$0
Outfalls						$40,000
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$1,090,000**
Mobilization/Demobilization					10%	$110,000
Traffic Control					5%	$60,000
Contingency					40%	$440,000
CONSTRUCTION COST TOTAL						**$1,700,000**
Engineering/Inspection					20%	$330,000
CIP TOTAL						**$2,020,000**

A. Project ID: 13	**B. Project Name: Leith**

C. Project Location: Leith Ave. from Lafayette St. to Clyde Ave. and De La Cruz Blvd.

D. Storm Drain Block Book Location: 76-MH10 to 87-MH24

E. Priority: High

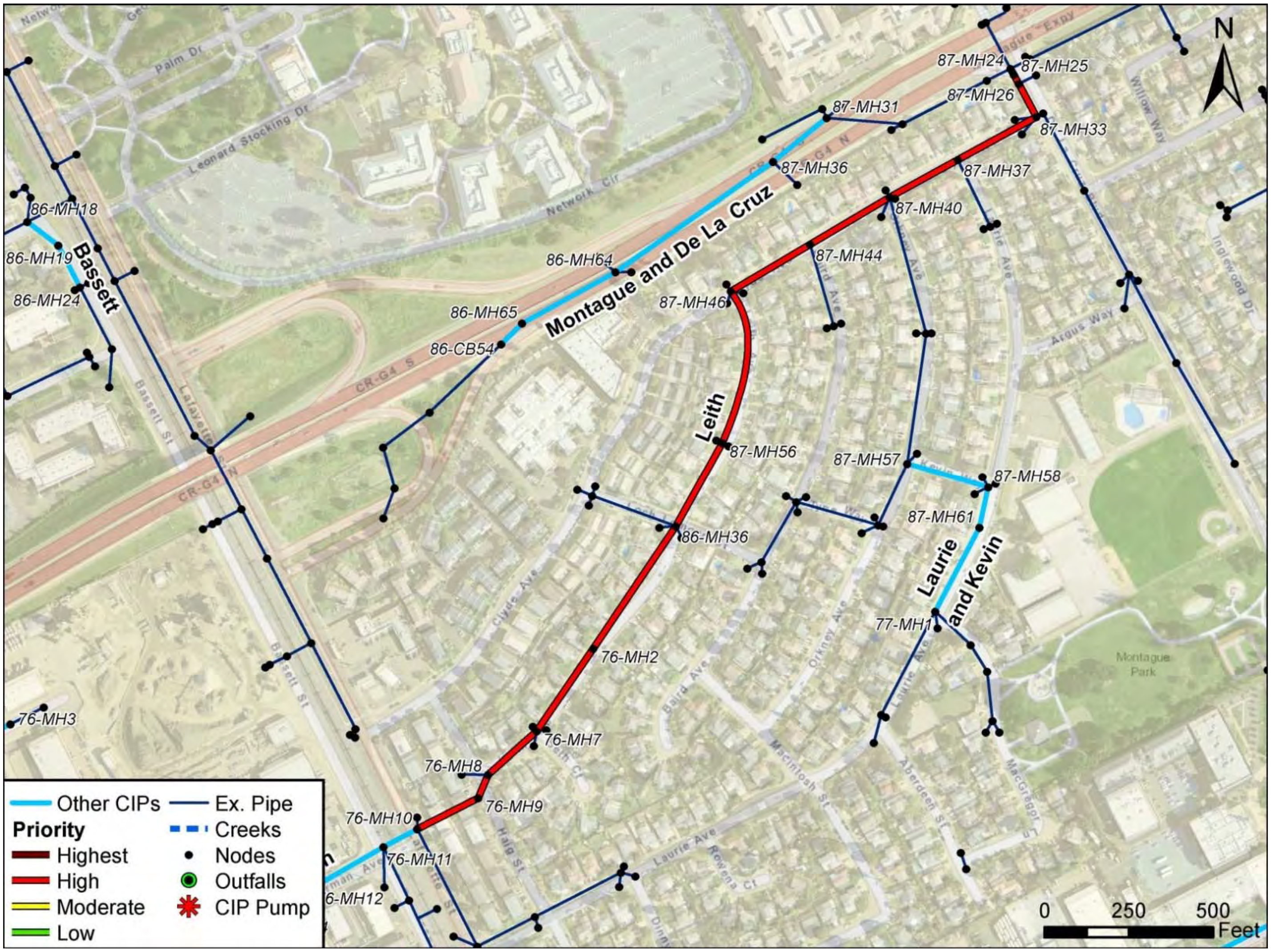
F. Type: Capacity

G. Project Description: 2-year and significant 10-year flooding occurs upstream of Lafayette St. in the commercial development around Norman Ave. Upsizing existing 48" pipes in Leith Ave. is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
48	66	54	3,170

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 13	**B. Project Name: Leith**
C. Project Location: Leith Ave. from Lafayette St. to Clyde Ave. and De La Cruz Blvd.	
D. Storm Drain Block Book Location: 76-MH10 to 87-MH24	
E. Priority: High	

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$187,000**
76-MH10 to 87-MH24	48	4	3,170	LF	$59	$187,000
Pipe Construction						**$2,360,000**
76-MH10 to 87-MH24	66	4	3,170	LF	$753	$2,360,000
Structures						
Manholes						$240,000
Catch Basins						$0
Outfalls						$40,000
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$2,790,000**
Mobilization/Demobilization					10%	$280,000
Traffic Control					5%	$140,000
Contingency					40%	$1,120,000
CONSTRUCTION COST TOTAL						**$4,330,000**
Engineering/Inspection					20%	$840,000
CIP TOTAL						**$5,160,000**

A. Project ID: 14 | **B. Project Name: Main and Shluman**

C. Project Location: Main St., under UPRR tracks to Lafayette St. and Shulman Ave.

D. Storm Drain Block Book Location: 46-MH21 to 56-MH44

E. Priority: High

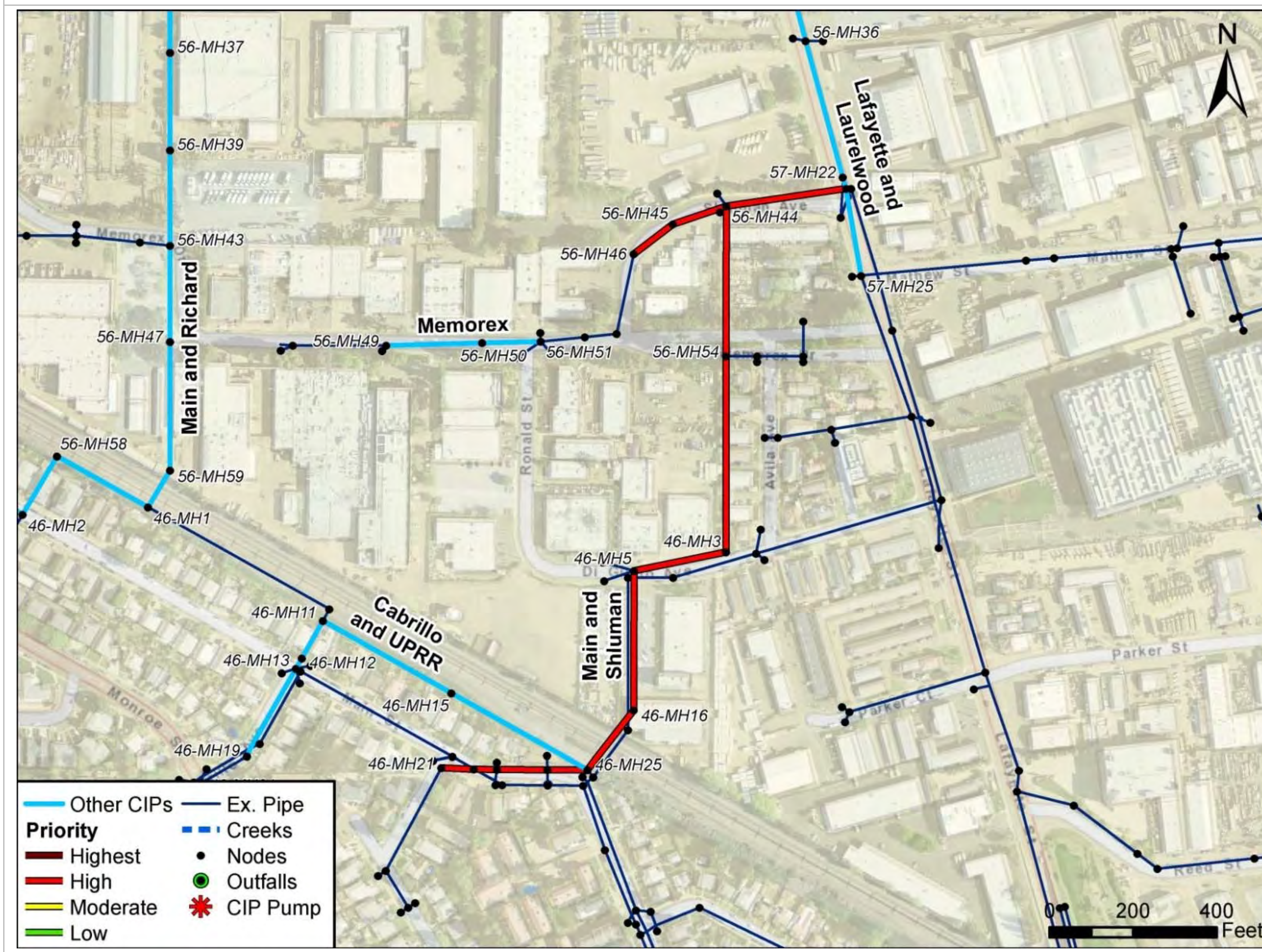
F. Type: Capacity

G. Project Description: 2-year and significant 10-year flooding occurs in residential development south of the UPRR on Main Street. Upsizing existing pipes connecting Main St. to the large line on Lafayette St. is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
10	18	-	130
12	24	21	220
24	30	21	250
27	36	28	1,560
30	42	33	290

H. Special Considerations: Pipe runs under UPRR tracks. Jack and bore cost included.

I. Alternatives: N/A



A. Project ID: 14	B. Project Name: Main and Shluman

C. Project Location: Main St., under UPRR tracks to Lafayette St. and Shulman Ave.

D. Storm Drain Block Book Location: 46-MH21 to 57-MH23

E. Priority: High

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$98,000**
46-MH21 to 46-MH23	10	3	130	LF	$23	$3,000
46-MH23 to 46-MH24	12	3	220	LF	$23	$5,000
56-MH46 to 56-MH44	24	1	250	LF	$34	$9,000
46-MH25 to 46-MH3, 56-MH54 to 56-MH44	27	3	1,560	LF	$43	$68,000
56-MH44 to 57-MH23	30	2	290	LF	$44	$13,000
Pipe Construction						**$823,000**
46-MH21 to 46-MH23	18	3	130	LF	$186	$25,000
46-MH23 to 46-MH25	24	3	220	LF	$235	$51,000
56-MH46 to 56-MH44	30	1	250	LF	$291	$73,000
46-MH25 to 56-MH44	36	3	1,560	LF	$358	$555,000
56-MH44 to 57-MH23	42	2	290	LF	$410	$119,000
Structures						
Manholes						$170,000
Catch Basins						$0
Outfalls						$0
SITE SPECIFIC COSTS						
Utility Relocation						$0
Pipe Under Railroad						$2,500,000
SUBTOTAL						**$1,090,000**
Mobilization/Demobilization					10%	$110,000
Traffic Control					5%	$55,000
Contingency					40%	$430,000
CONSTRUCTION COST TOTAL						**$1,680,000**
Engineering/Inspection					20%	$330,000
CIP TOTAL						**$4,510,000**

A. Project ID: 15 | **B. Project Name: Manchester and Washington**

C. Project Location: Manchester Dr. and Monroe St. to Washington St. and Poplar St.

D. Storm Drain Block Book Location: 27-MH17 to 28-MH1

E. Priority: High

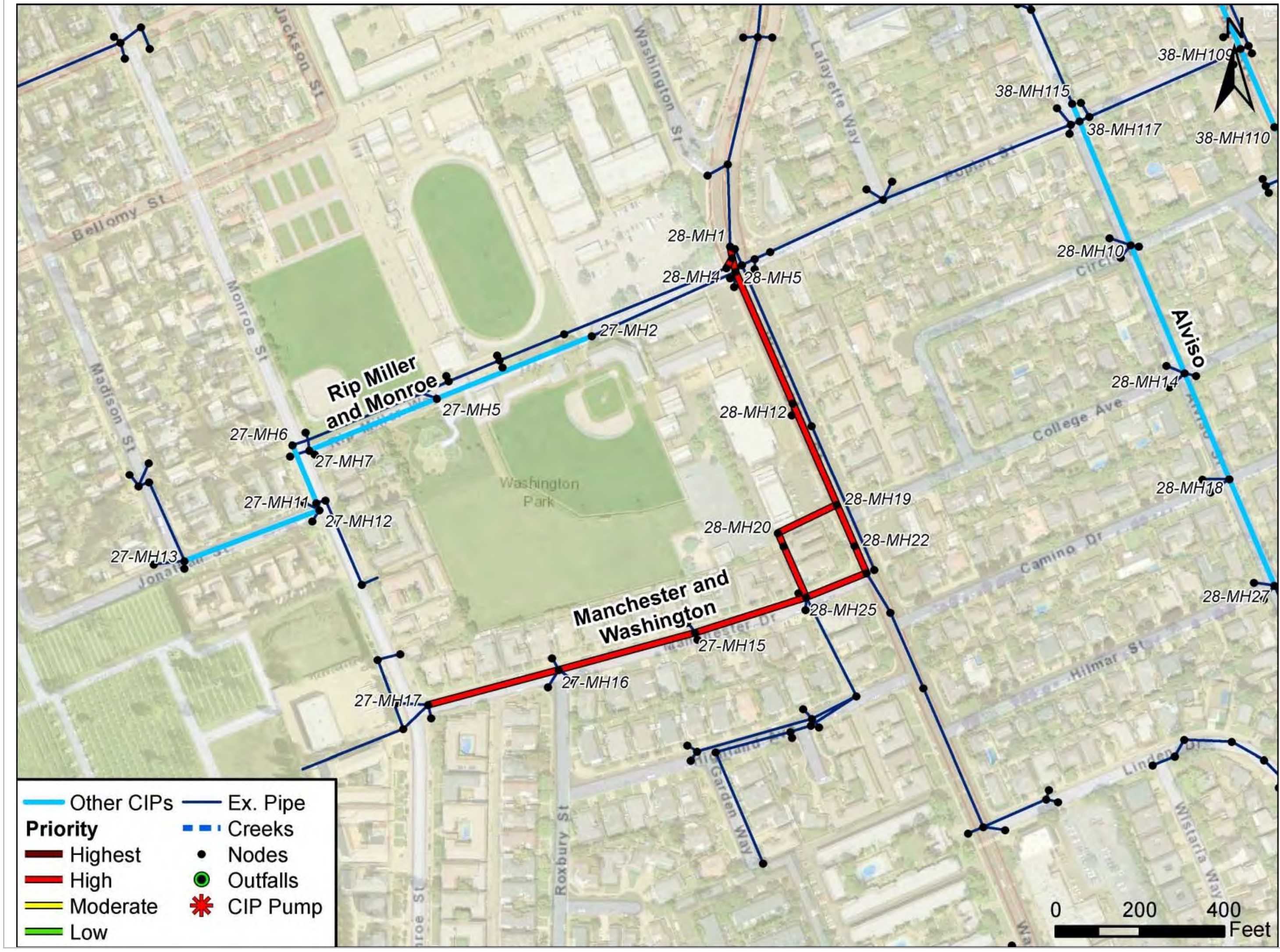
F. Type: Capacity

G. Project Description: 2-year and 10-year flooding occurs on Roxbury St. and Manchester Dr. and affects the nearby Elementary School campus. Upsizing pipes in Manchester St. and Washington St. is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	18	15	320
12	24	21	30
15	18	12	490
15	21	16	780
15	24	21	600
15	36	33	60

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 15

B. Project Name: Manchester and Washington

C. Project Location: Manchester Dr. and Monroe St. to Washington St. and Poplar St.

D. Storm Drain Block Book Location: 27-MH17 to 28-MH1

E. Priority: High

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$60,000**
28-MH4 to 28-MH3, 27-MH17 to 27-MH16	12	4	350	LF	$23	$8,000
27-MH17 to 28-MH1	15	4	1,930	LF	$27	$52,000
Pipe Construction						**$499,000**
28-MH25 to 28-MH19, 28-MH20 to 28-MH19, 27-MH17 to 27-MH16	18	4	810	LF	$192	$156,000
27-MH16 to 28-MH20	21	3	780	LF	$209	$163,000
28-MH19 to 28-MH5, 28-MH4 to 28-MH3	24	5	630	LF	$248	$156,000
28-MH5 to 28-MH1	36	5	60	LF	$378	$23,000
Structures						
Manholes						$190,000
Catch Basins						$0
Outfalls						$0
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$740,000**
Mobilization/Demobilization					10%	$74,000
Traffic Control					5%	$37,000
Contingency					40%	$300,000
CONSTRUCTION COST TOTAL						**$1,150,000**
Engineering/Inspection					20%	$220,000
CIP TOTAL						**$1,380,000**

A. Project ID: 16	B. Project Name: Park and Bellomy

C. Project Location: Park Ave. and Idaho St. to Bellomy St. and Lafayette St.

D. Storm Drain Block Book Location: 29-MH7 to 38-MH81, 38-MH87 to 38-MH80

E. Priority: High

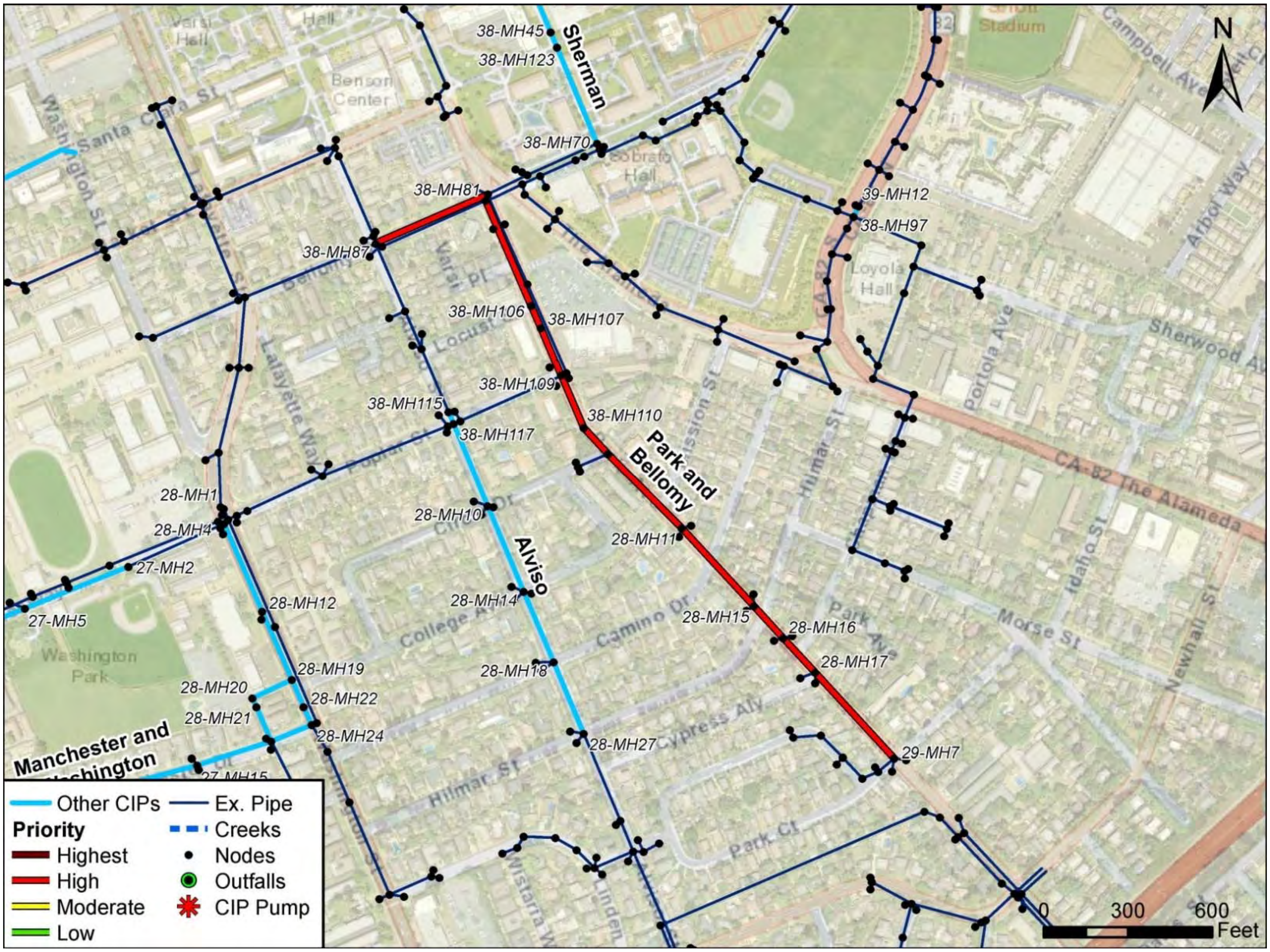
F. Type: Capacity

G. Project Description: 2-year flooding occurs on Park Avenue. Upsizing existing 10", 15", and 18" pipe downstream of the connection to San Jose's system is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
10	15	-	410
10	18	18	700
15	21	16	700
18	24	18	680
36	42	24	440

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 16 | **B. Project Name: Park and Bellomy**

C. Project Location: Park Ave. and Idaho St. to Bellomy St. and Lafayette St.

D. Storm Drain Block Book Location: 29-MH7 to 38-MH81, 38-MH87 to 38-MH80

E. Priority: High

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$84,000**
29-MH7 to 28-MH17	10	3	410	LF	$23	$10,000
28-MH17 to 28-MH11	10	3	700	LF	$23	$16,000
28-MH11 to 38-MH109	15	4	700	LF	$27	$19,000
38-MH109 to 38-MH81	18	6	680	LF	$27	$18,000
38-MH87 to 38-MH80	36	9	440	LF	$46	$20,000
Pipe Construction						**$751,000**
29-MH7 to 28-MH17	15	3	410	LF	$167	$69,000
28-MH17 to 28-MH11	18	3	700	LF	$186	$131,000
28-MH11 to 38-MH109	21	4	700	LF	$219	$152,000
38-MH109 to 38-MH81	24	6	680	LF	$263	$178,000
38-MH87 to 38-MH80	42	9	440	LF	$509	$222,000
Structures						
Manholes						$160,000
Catch Basins						$0
Outfalls						$0
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$1,000,000**
Mobilization/Demobilization					10%	$100,000
Traffic Control					5%	$50,000
Contingency					40%	$400,000
CONSTRUCTION COST TOTAL						**$1,550,000**
Engineering/Inspection					20%	$300,000
CIP TOTAL						**$1,840,000**

A. Project ID: 17	**B. Project Name: Royal and Cabrillo**

C. Project Location: Royal Drive and Joan Way to San Tomas Aquino Creek outfall at Cabrillo Ave.

D. Storm Drain Block Book Location: 45-MH17 to 44-OF2

E. Priority: High

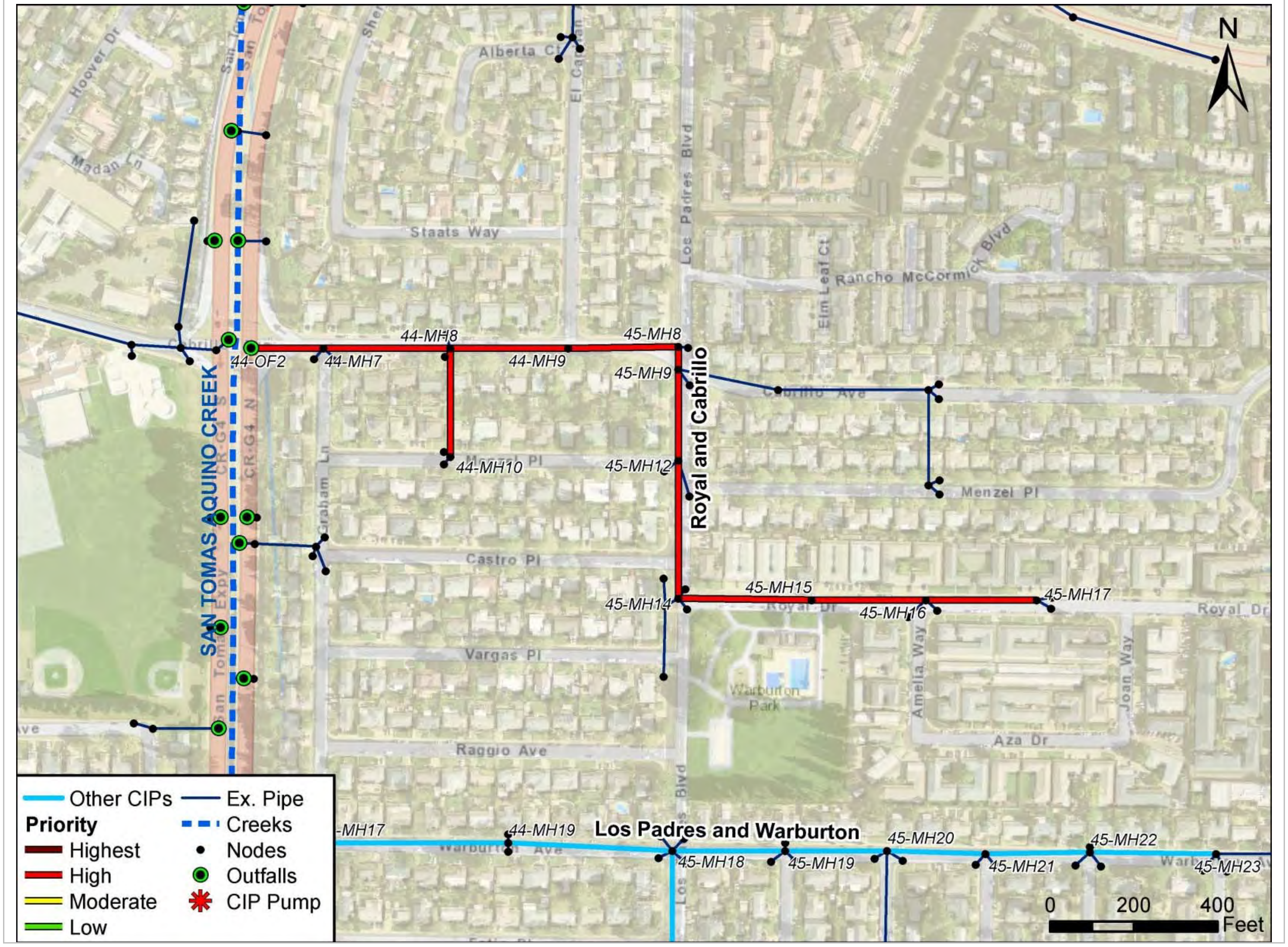
F. Type: Capacity

G. Project Description: Some 2-year flooding remains between Harrison and the railroad after installing the four highest priority projects. Upsizing existing pipes from Royal Dr. to San Tomas Aquino is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	18	12	260
15	21	16	270
15	24	21	590
15	36	33	550
15	42	39	600
18	42	39	480

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 17 | **B. Project Name: Royal and Cabrillo**

C. Project Location: Royal Drive and Joan Way to San Tomas Aquino Creek outfall at Cabrillo Ave.

D. Storm Drain Block Book Location: 45-MH17 to 44-OF2

E. Priority: High

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$74,000**
44-MH8 to 44-OF2	15	3	2,270	LF	$27	$61,000
45-MH17 to 44-MH8	18	3	480	LF	$27	$13,000
Pipe Construction						**$876,000**
44-MH10 to 44-MH8	18	4	260	LF	$196	$51,000
45-MH17 to 45-MH16	21	3	270	LF	$209	$56,000
45-MH16 to 45-MH14	24	3	590	LF	$230	$136,000
45-MH14 to 45-MH9	36	4	550	LF	$356	$194,000
45-MH9 to 44-OF2	42	3	1,080	LF	$410	$441,000
Structures						
Manholes						$140,000
Catch Basins						$0
Outfalls						$40,000
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$1,130,000**
Mobilization/Demobilization					10%	$100,000
Traffic Control					5%	$57,000
Contingency					40%	$450,000
CONSTRUCTION COST TOTAL						**$1,750,000**
Engineering/Inspection					20%	$340,000
CIP TOTAL						**$2,100,000**

A. Project ID: 18 | **B. Project Name: St Lawrence and Calabazas**

C. Project Location: Bella Vista Ave and St Lawrence Dr., north along Nobili Ave, east along Machado Ave. to Calabazas Creek outfall.

D. Storm Drain Block Book Location: 41-MH27 to 52-OF4

E. Priority: High

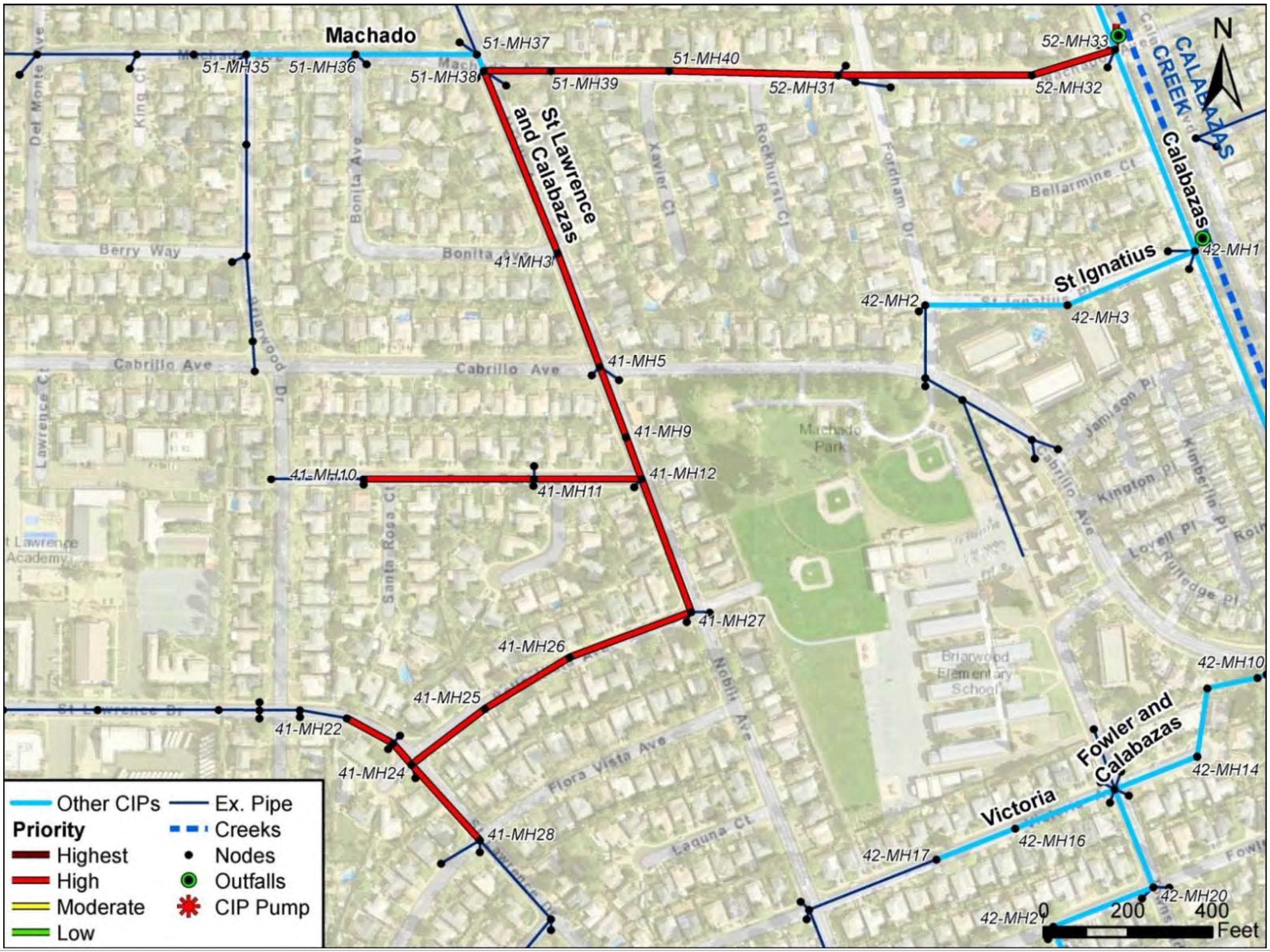
F. Type: Capacity

G. Project Description: Some 2-year flooding occurs on Fowler Ave. Upsizing pipes on Fowler Ave and Townsend Ave. is recommended to eliminate minor 2-year flooding and reduce 10-year flooding.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	18	15	660
18	24	18	430
21	30	24	450
21	36	30	1,220
21	42	39	470
30	42	33	840
33	42	33	730

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 18

B. Project Name: St Lawrence and Calabazas

C. Project Location: Bella Vista Ave and St Lawrence Dr., north along Nobili Ave, east along Machado Ave. to Calabazas Creek outfall.

D. Storm Drain Block Book Location: 45-MH17 to 52-OF4

E. Priority: High

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$170,000**
41-MH10 to 41-MH12	12	3	660	LF	$23	$15,000
41-MH22 to 41-MH24, 41-MH28 to 41-MH24	18	2	430	LF	$27	$12,000
41-MH12 to 51-MH38	21	3	2,140	LF	$34	$72,000
51-MH48 to 52-MH31	30	2	840	LF	$44	$37,000
52-MH31 to 52-OF4	33	2	730	LF	$46	$33,000
Pipe Construction						**$1,613,000**
41-MH10 to 41-MH12	18	3	660	LF	$186	$124,000
41-MH28 to 41-MH24, 41-MH22 to 41-MH24	24	2	430	LF	$230	$99,000
41-MH24 to 41-MH26	30	3	450	LF	$291	$133,000
41-MH26 to 41-MH3	36	3	1,220	LF	$349	$425,000
41-MH3 to 51-MH38	42	2	2,040	LF	$410	$833,000
Structures						
Manholes						$240,000
Catch Basins						$0
Outfalls						$40,000
SITE SPECIFIC COSTS						
Utility Relocation						$0
ROW Acquisition						$0
SUBTOTAL						**$2,070,000**
Mobilization/Demobilization					10%	$210,000
Traffic Control					5%	$100,000
Contingency					40%	$830,000
CONSTRUCTION COST TOTAL						**$3,210,000**
Engineering/Inspection					20%	$620,000
CIP TOTAL						**$3,820,000**

A. Project ID: 19 | **B. Project Name: Bowers and Chromite**

C. Project Location: Chromite Dr. from Amethyst Dr. to Cortex Dr.

D. Priority: Moderate

E. Storm Drain Block Book Location: 53-MH32 to 53-MH22

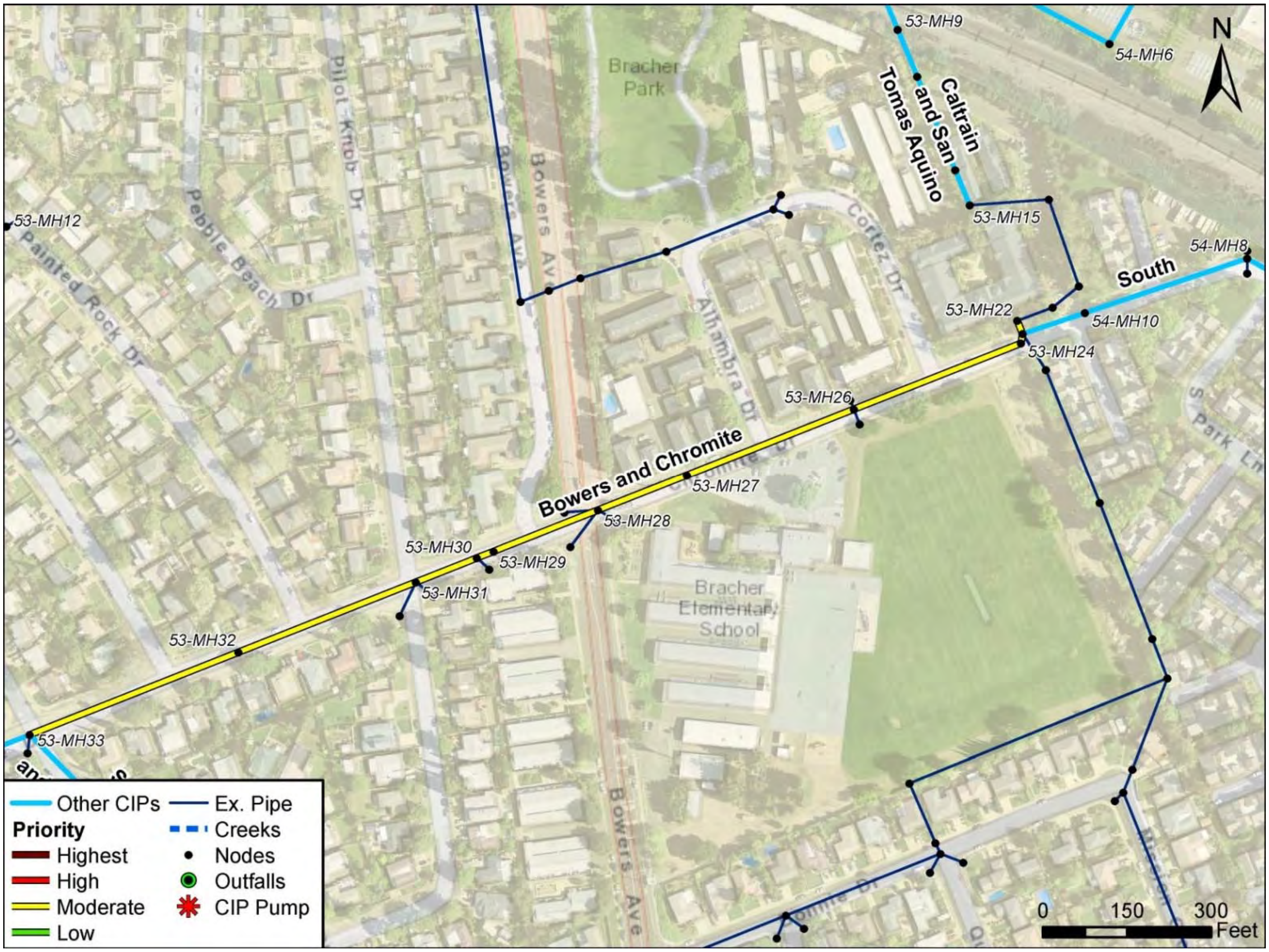
F. Type: Capacity

G. Project Description: Some flooding in the neighborhood south of Agate Dr. is caused by flooding from the system on Chromite Dr. Upsizing the existing pipes on Chromite Dr. is recommended. Prior construction of the Caltrain and San Tomas Aquino project is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
30	54	48	1,060
33	48	42	860
42	54	36	30

H. Special Considerations: Prior construction of Caltrain and San Tomas Aquino project recommended.

I. Alternatives: N/A



A. Project ID: 19 | **B. Project Name: Bowers and Chromite**

C. Project Location: Chromite Dr. from Amethyst Dr. to Cortex Dr.

D. Priority: Moderate

E. Storm Drain Block Book Location: 53-MH32 to 53-MH22

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$88,000**
53-MH30 to 53-MH23	30	2	1,060	LF	$44	$47,000
53-MH33 to 53-MH30	33	1	860	LF	$46	$39,000
53-MH23 to 53-MH22	42	4	30	LF	$58	$1,000
Pipe Construction						**$1,010,000**
53-MH33 to 53-MH30	48	1	860	LF	$476	$408,000
53-MH30 to 53-MH22	54	2	1,090	LF	$563	$605,000
Structures						
Manholes						$160,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$1,260,000**
Mobilization/Demobilization					10%	$130,000
Traffic Control					5%	$63,000
Contingency					40%	$500,000
CONSTRUCTION COST TOTAL						**$1,950,000**
Engineering/Inspection					20%	$380,000
CIP TOTAL						**$2,330,000**

A. Project ID: 20 | **B. Project Name: Bowers and Monroe**

C. Project Location: North from Bowers Ave. and Barkley St., east from Monroe St. to San Tomas Aquino Creek outfall

D. Priority: Moderate

E. Storm Drain Block Book Location: 43-MH21 to OF-4

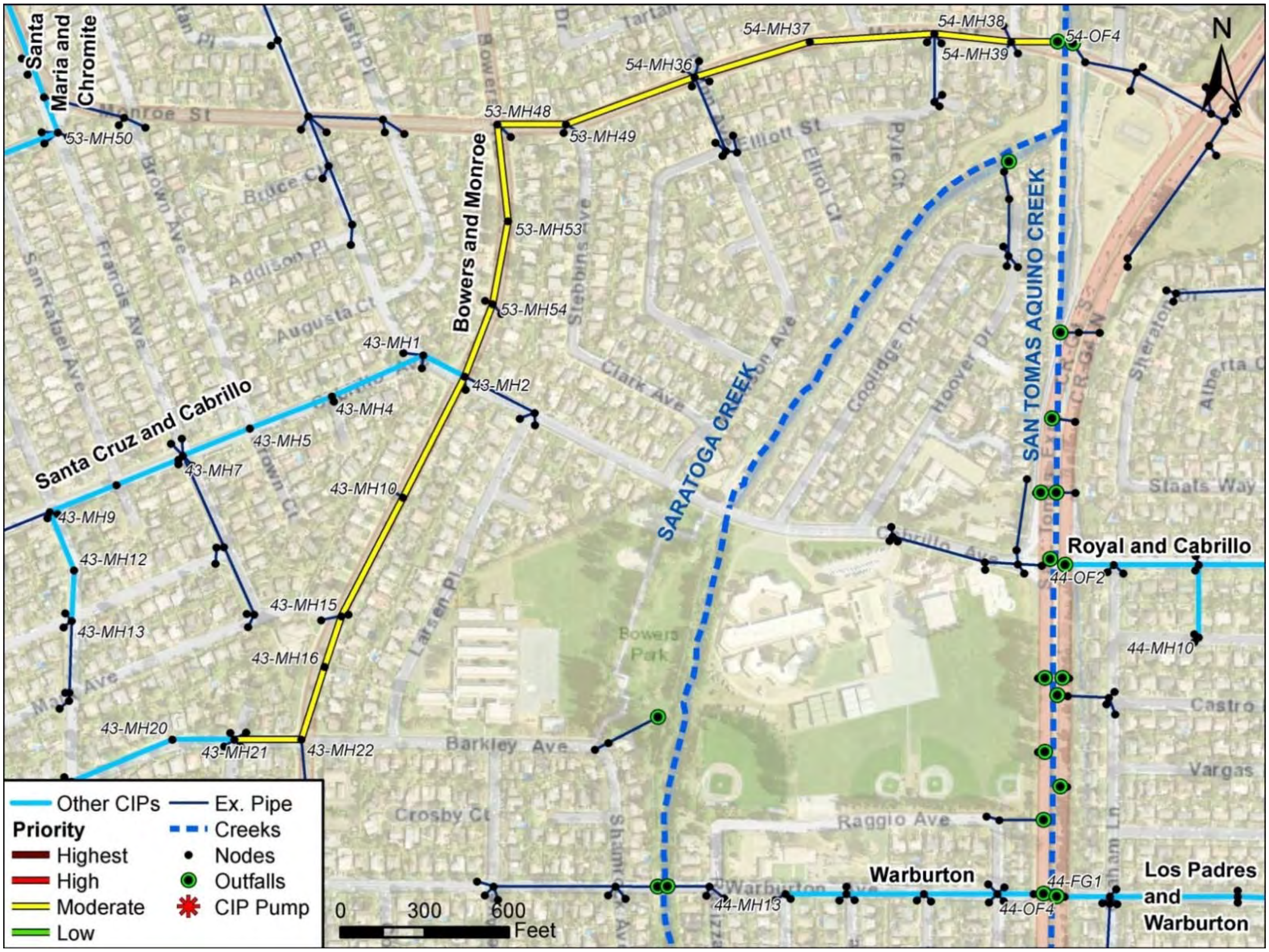
F. Type: Capacity

G. Project Description: Some 10-year flooding occurs on Bowers Ave. downstream of Mark Ave. Upsizing existing pipes on Bowers Ave. and Monroe St. is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
21	30	24	240
24	30	21	940
24	36	30	480
30	42	33	1,660
36	42	24	1,310

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 20 | **B. Project Name: Bowers and Monroe**

C. Project Location: North from Bowers Ave. and Barkley St., east from Monroe St. to San Tomas Aquino Creek outfall

D. Priority: Moderate

E. Storm Drain Block Book Location: 43-MH21 to OF-4

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$191,000**
43-MH21 to 43-MH22	21	5	240	LF	$34	$8,000
43-MH22 to 43-MH2	24	4	1,420	LF	$34	$49,000
53-MH54 to 54-MH36	30	2	1,660	LF	$44	$74,000
54-MH36 to 54-OF4	36	3	1,310	LF	$46	$61,000
Pipe Construction						**$1,762,000**
43-MH21 to 43-MH10	30	4	1,180	LF	$308	$359,000
43-MH10 to 43-MH2	36	3	480	LF	$349	$168,000
43-MH2 to 54-OF4	42	3	2,970	LF	$417	$1,235,000
Structures						
Manholes						$180,000
Catch Basins						$0
Outfalls						$40,000
SUBTOTAL						**$2,180,000**
Mobilization/Demobilization					10%	$220,000
Traffic Control					5%	$110,000
Contingency					40%	$870,000
CONSTRUCTION COST TOTAL						**$3,380,000**
Engineering/Inspection					20%	$650,000
CIP TOTAL						**$4,020,000**

A. Project ID: 21

B. Project Name: Caltrain and San Tomas Aquino

C. Project Location: From South Dr., under UPRR tracks to the San Tomas Aquino Creek outfall east of Northwestern Parkway.

D. Priority: Moderate

E. Storm Drain Block Book Location: 53-MH7 to FG3

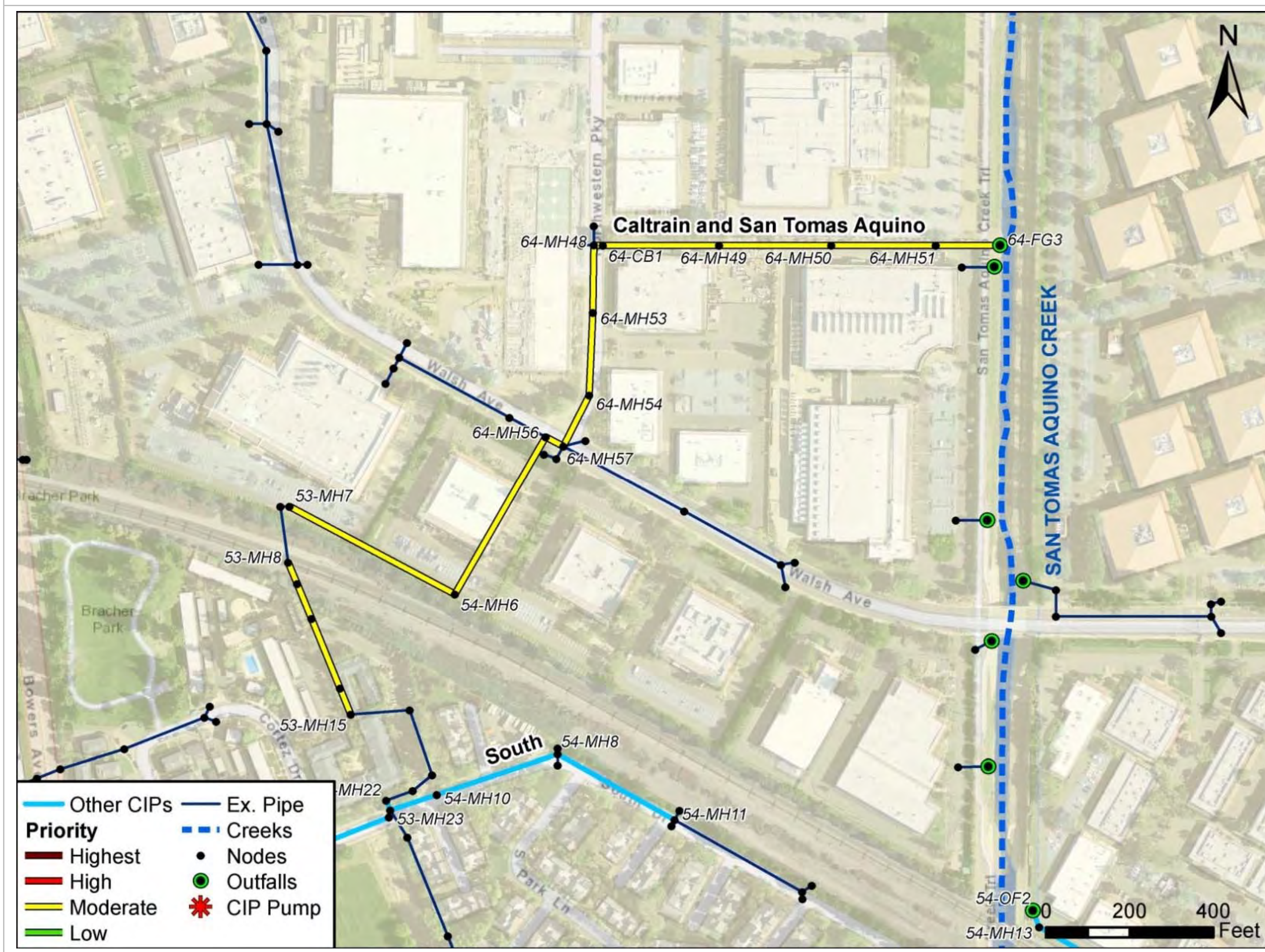
F. Type: Capacity

G. Project Description: Some flooding in the neighborhood south of Agate Dr. is caused by flooding from the system on Chromite Dr. Upsizing pipes around the railroad to the outfall near Northwestern Pkwy is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
36	54	39	1,030
42	54	36	250
48	60	36	1,510

H. Special Considerations: Pipes under UPRR tracks may need to be upsized. Manhole was inaccessible to confirm diameters.

I. Alternatives: N/A



A. Project ID: 21

B. Project Name: Caltrain and San Tomas Aquino

C. Project Location: From South Dr., under UPRR tracks to the San Tomas Aquino Creek outfall east of Northwestern Parkway.

D. Priority: Moderate

E. Storm Drain Block Book Location: 53-MH7 to FG3

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$151,000**
53-MH10 to 53-MH8, 53-MH7 to 64-MH56	36	4	1,030	LF	$46	$48,000
53-MH15 to 53-MH10	42	3	250	LF	$58	$14,000
64-MH56 to 64-FG3	48	5	1,510	LF	$59	$89,000
Pipe Construction						**$1,807,000**
53-MH7 to 64-MH56, 53-MH15 to 53-MH8	54	4	1,280	LF	$577	$764,000
64-MH56 to 64-FG3	60	5	1,510	LF	$684	$1,044,000
Structures						
Manholes						$220,000
Catch Basins						$0
Outfalls						$40,000
SUBTOTAL						**$2,220,000**
Mobilization/Demobilization					10%	$220,000
Traffic Control					5%	$110,000
Contingency					40%	$890,000
CONSTRUCTION COST TOTAL						**$3,440,000**
Engineering/Inspection					20%	$670,000
CIP TOTAL						**$4,110,000**

A. Project ID: 22	**B. Project Name: Condensa**

C. Project Location: Condensa St. from Bowers Ave. to San Tomas Aquino Creek

D. Priority: Moderate

E. Storm Drain Block Book Location: 63-MH31 to 64-FG2

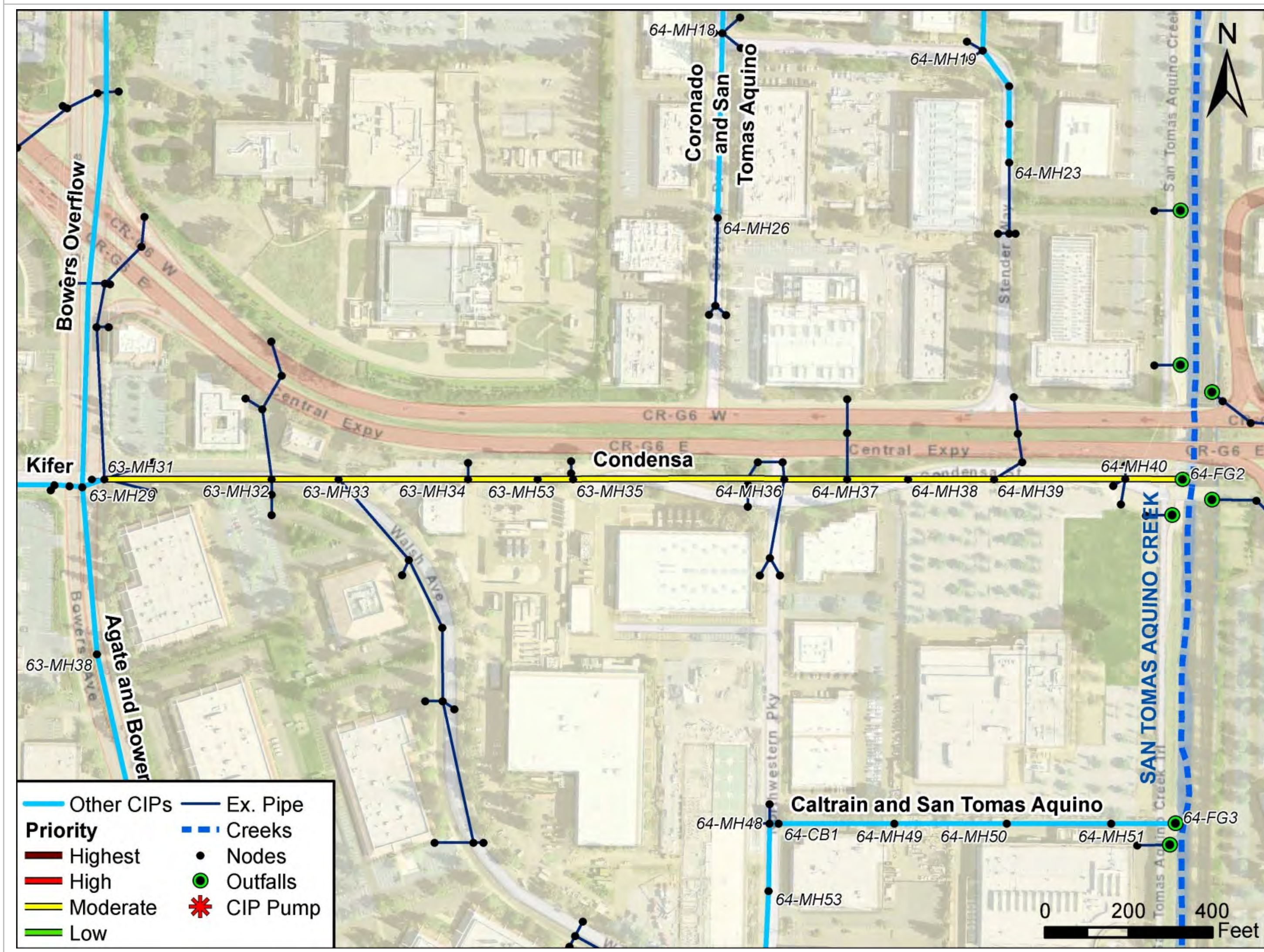
F. Type: Capacity

G. Project Description: 10-year flooding occurs around Kifer Rd. and Bowers Ave. Upsizing existing 54" pipe to 72" pipe is recommended. This project is intended to address flooding issues that remain after constructing the Agate and Bowers project.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
54	72	36	2,580

H. Special Considerations: Easements through commercial development between Condensa and Walsh

I. Alternatives: N/A



A. Project ID: 22 | **B. Project Name: Condensa**

C. Project Location: Condensa St. from Bowers Ave. to San Tomas Aquino Creek

D. Priority: Moderate

E. Storm Drain Block Book Location: 63-MH31 to 64-FG2

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$160,000**
63-MH31 to 64-FG2	54	8	2,580	LF	$62	$160,000
Pipe Construction						**$2,550,000**
63-MH31 to 64-FG2	72	8	2,580	LF	$986	$2,550,000
Structures						
Manholes						$180,000
Catch Basins						$0
Outfalls						$40,000
SUBTOTAL						**$2,930,000**
Mobilization/Demobilization					10%	$290,000
Traffic Control					5%	$150,000
Contingency					40%	$1,170,000
CONSTRUCTION COST TOTAL						**$4,540,000**
Engineering/Inspection					20%	$880,000
CIP TOTAL						**$5,430,000**

A. Project ID: 23 | **B. Project Name: De La Pena and Homestead**

C. Project Location: De La Pena Ave. and Fallon Ave. to Homestead Rd. and Armanini Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 25-MH34 to 25-MH4

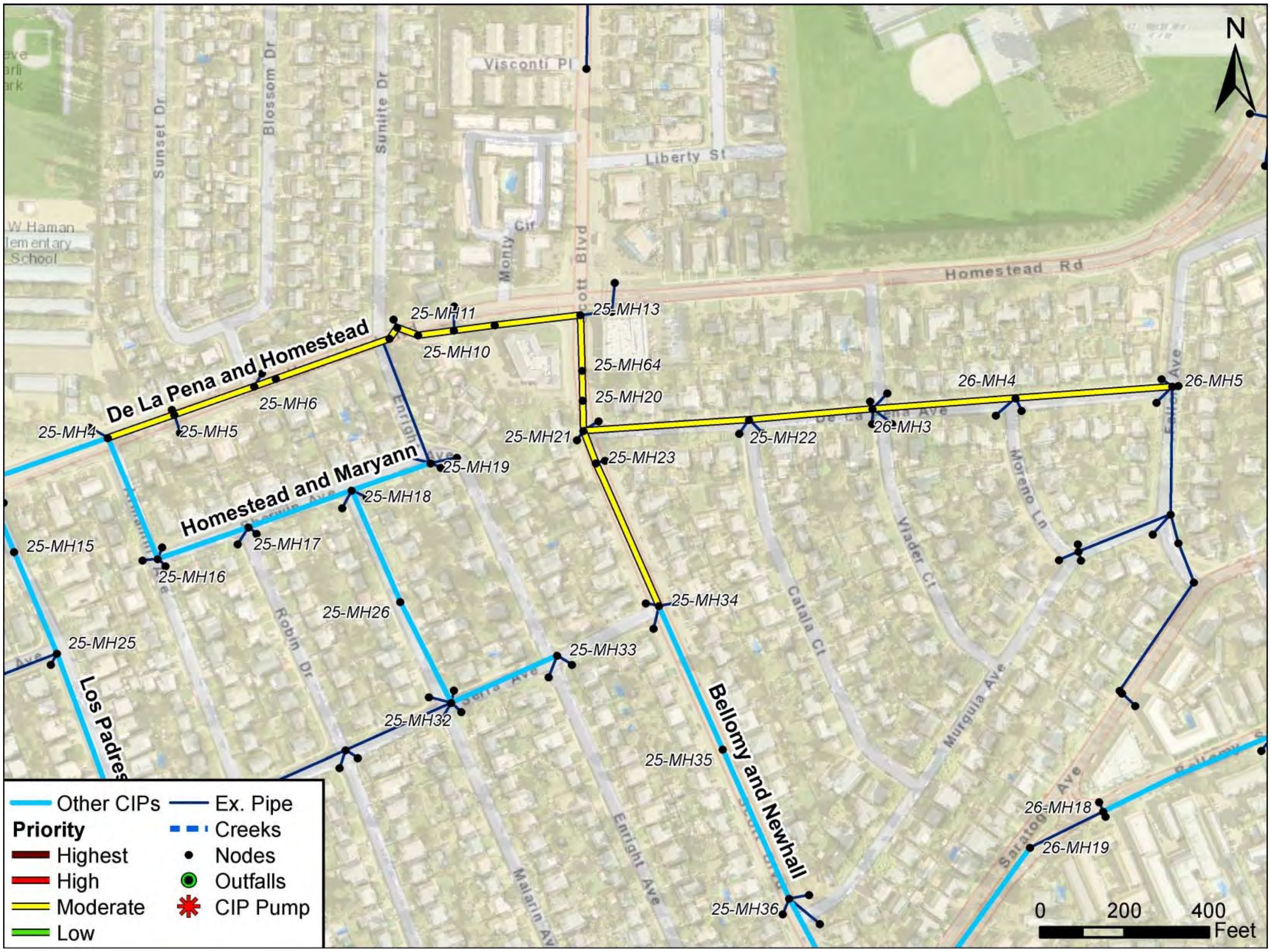
F. Type: Capacity

G. Project Description: 10-year flooding occurs in the neighborhood southeast of Homestead Rd. and Los Padres Blvd. Upsizing existing pipes on Homestead Rd. and De La Pena Ave. is recommended. Prior construction of the Homestead and Maryann project is required.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	18	15	710
12	21	18	690
21	48	42	930
24	48	39	980

H. Special Considerations: Prior construction of Homestead and Maryann project is required

I. Alternatives: N/A



A. Project ID: 23

B. Project Name: De La Pena and Homestead

C. Project Location: De La Pena Ave. and Fallon Ave. to Homestead Rd. and Armanini Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 25-MH34 to 25-MH4

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$98,000**
26-MH5 to 25-MH21	12	3	1,400	LF	$23	$33,000
25-MH34 to 25-MH12	21	2	930	LF	$34	$32,000
25-MH12 to 25-MH4	24	3	980	LF	$34	$33,000
Pipe Construction						**$1,198,000**
26-MH5 to 26-MH3	18	3	710	LF	$191	$136,000
26-MH3 to 25-MH21	21	3	690	LF	$209	$144,000
25-MH34 to 25-MH4	48	3	1,910	LF	$482	$918,000
Structures						
Manholes						$250,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$1,550,000**
Mobilization/Demobilization					10%	$150,000
Traffic Control					5%	$77,000
Contingency					40%	$620,000
CONSTRUCTION COST TOTAL						**$2,400,000**
Engineering/Inspection					20%	$460,000
CIP TOTAL						**$2,860,000**

A. Project ID: 24	**B. Project Name: El Camino Real and Calabazas**

C. Project Location: El Camino Real from Lawrence Expressway to Calabazas Creek outfall

D. Priority: Moderate

E. Storm Drain Block Book Location: 40-MH24 to 42-OF7

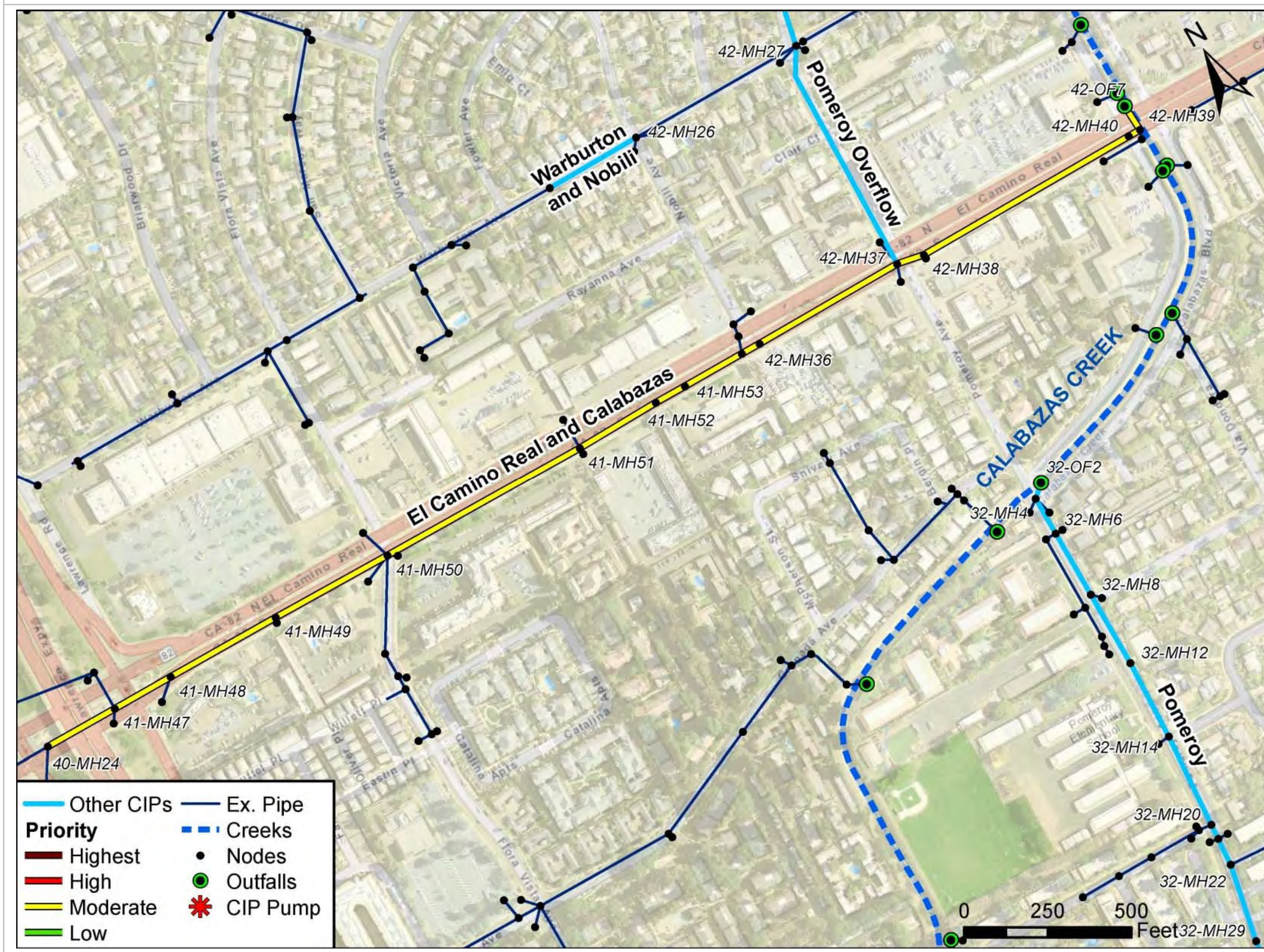
F. Type: Capacity

G. Project Description: Significant 10-year flooding occurs around El Camino Real. Upsizing pipes in El Camino Real that drain to Calabazas Creek is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
24	27	18	420
24	30	21	1,960
33	36	21	1,450

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 24	**B. Project Name: El Camino Real and Calabazas**

C. Project Location: El Camino Real from Lawrence Expressway to Calabazas Creek outfall

D. Priority: Moderate

E. Storm Drain Block Book Location: 40-MH24 to 42-OF7

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$148,000**
40-MH24 to 42-MH25	24	4	2,380	LF	$34	$82,000
42-MH35 to 42-OF7	33	5	1,450	LF	$46	$66,000
Pipe Construction						**$1,270,000**
40-MH24 to 41-MH48	27	5	420	LF	$285	$120,000
41-MH48 to 42-MH35	30	4	1,960	LF	$311	$615,000
42-MH35 to 42-OF7	36	5	1,450	LF	$373	$535,000
Structures						
Manholes						$180,000
Catch Basins						$0
Outfalls						$40,000
SUBTOTAL						**$1,640,000**
Mobilization/Demobilization					10%	$160,000
Traffic Control					5%	$82,000
Contingency					40%	$650,000
CONSTRUCTION COST TOTAL						**$2,530,000**
Engineering/Inspection					20%	$490,000
CIP TOTAL						**$3,030,000**

A. Project ID: 25 | **B. Project Name: Forbes**

C. Project Location: Forbes Ave from Robin Dr. to Armanini Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 25-MH45 to 25-MH44

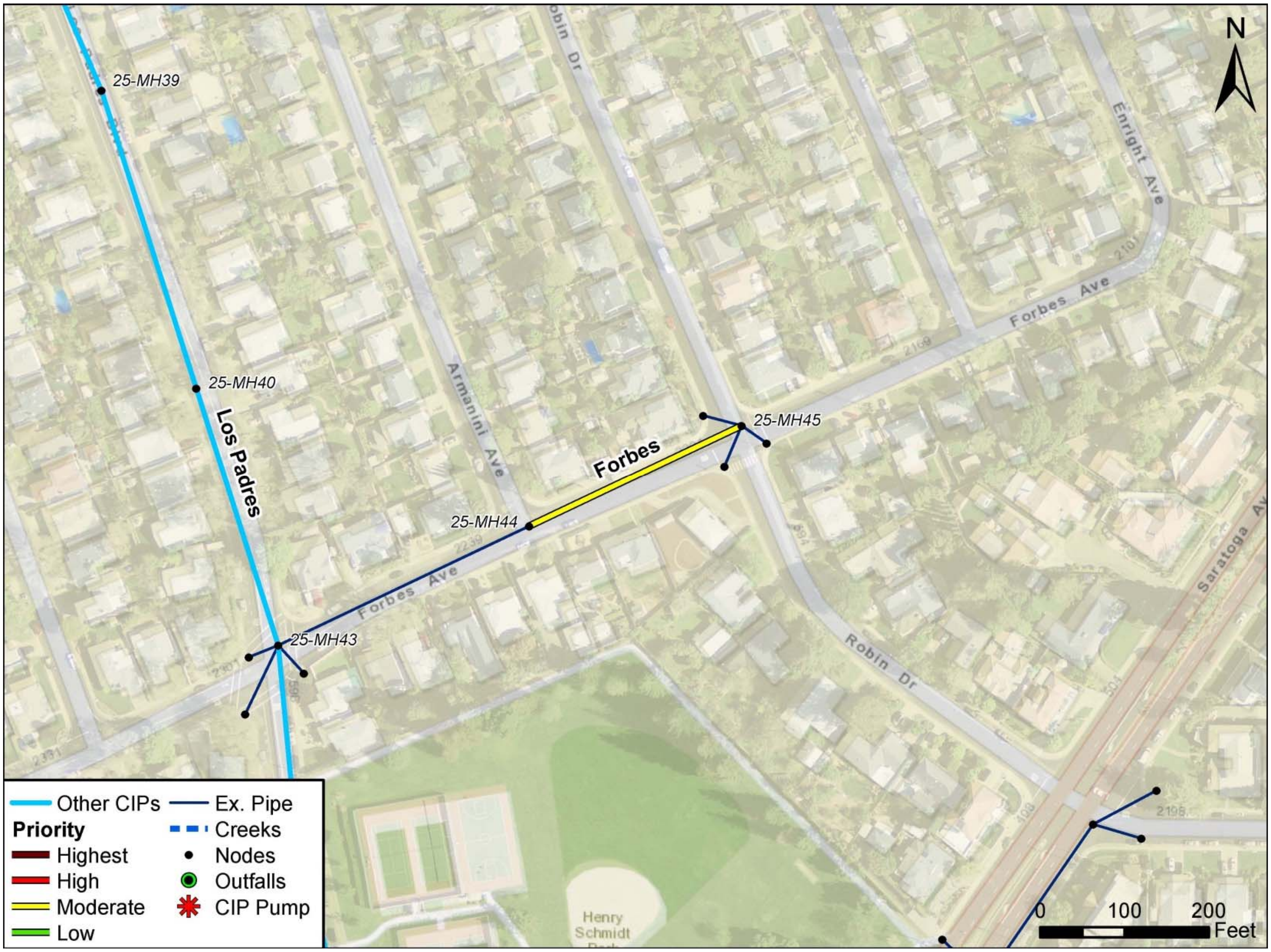
F. Type: Capacity

G. Project Description: 10-year flooding occurs around Forbes Ave. due to an undersized pipe constricting flow into the system on Los Padres Blvd. Upsizing existing 10" pipe to 12" pipe is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
10	12	-	280

H. Special Considerations: Prior or concurrent construction of Las Padres project is recommended

I. Alternatives: N/A



A. Project ID: 25 | **B. Project Name: Forbes**

C. Project Location: Forbes Ave from Robin Dr. to Armanini Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 25-MH45 to 25-MH44

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$7,000**
25-MH45 to 25-MH44	10	4	280	LF	$23	$7,000
Pipe Construction						**$43,000**
25-MH45 to 25-MH44	12	4	280	LF	$156	$43,000
Structures						
Manholes						$24,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$74,000**
Mobilization/Demobilization					10%	$7,000
Traffic Control					5%	$4,000
Contingency					40%	$30,000
CONSTRUCTION COST TOTAL						**$120,000**
Engineering/Inspection					20%	$20,000
CIP TOTAL						**$140,000**

A. Project ID: 26 | **B. Project Name: Halford and Tamarack**

C. Project Location: Halford Ave. and Poinciana Dr. near Lawrence Expwy.

D. Priority: Moderate

E. Storm Drain Block Book Location: 40-MH11 to 40-MH10

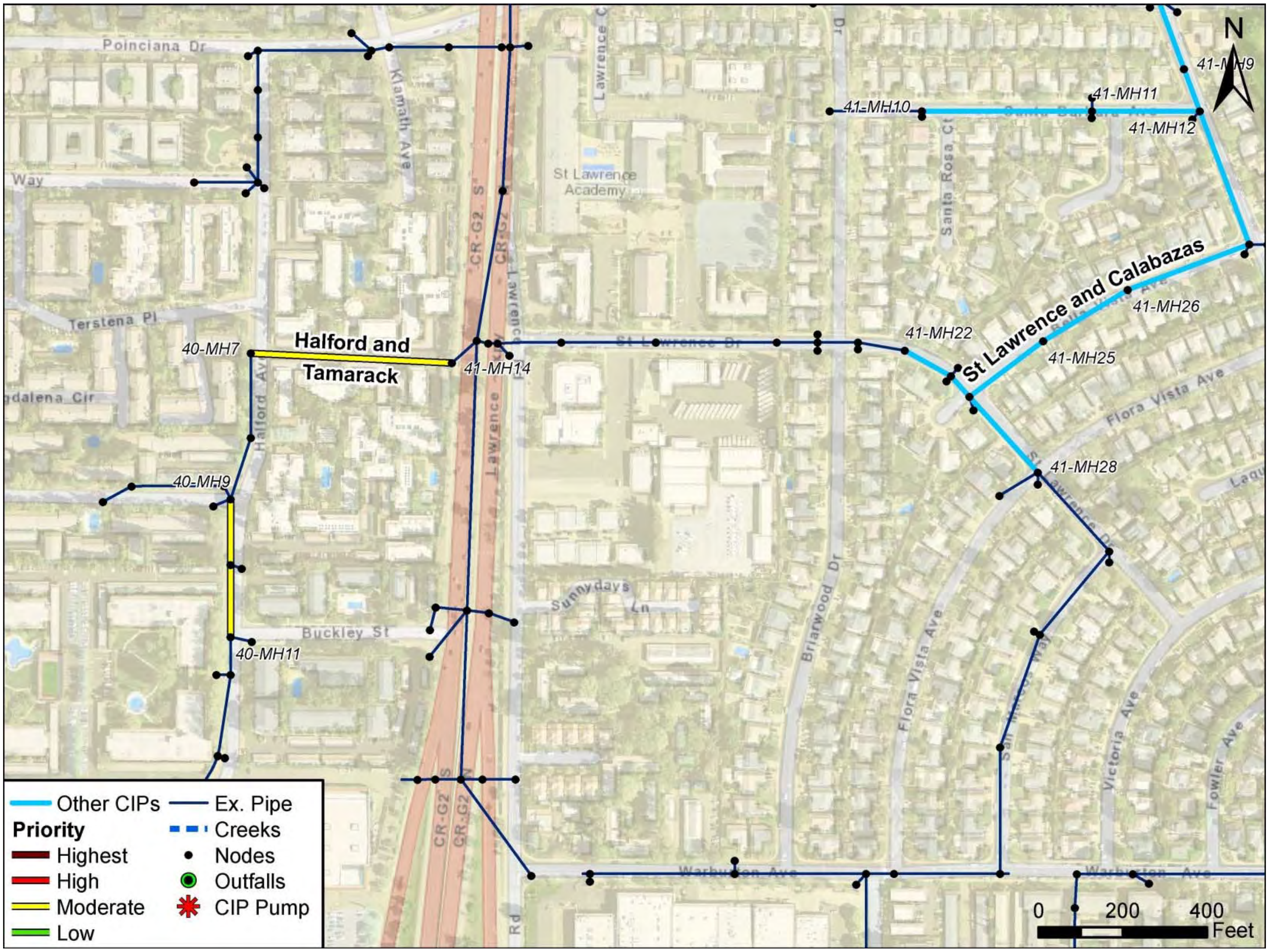
F. Type: Capacity

G. Project Description: 10-year flooding occurs west of Lawrence Expressway on Halford Ave. Upsizing pipes on Halford Ave. is recommended

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
18	21	14	330
21	24	15	480

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 26 | **B. Project Name: Halford and Tamarack**

C. Project Location: Halford Ave. and Poinciana Dr. near Lawrence Expwy.

D. Priority: Moderate

E. Storm Drain Block Book Location: 40-MH11 to 40-MH10

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$25,000**
40-MH11 to 40-MH9	18	4	330	LF	$27	$9,000
40-MH7 to 41-MH14	21	2	480	LF	$34	$16,000
Pipe Construction						**$181,000**
40-MH11 to 40-MH9	21	4	330	LF	$219	$72,000
40-MH7 to 41-MH14	24	2	480	LF	$230	$110,000
Structures						
Manholes						$49,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$260,000**
Mobilization/Demobilization					10%	$26,000
Traffic Control					5%	$13,000
Contingency					40%	$100,000
CONSTRUCTION COST TOTAL						**$400,000**
Engineering/Inspection					20%	$80,000
CIP TOTAL						**$480,000**

A. Project ID: 27	B. Project Name: Harold and San Tomas Aquino

C. Project Location: From Harold Ave. and Forest Ave. to Homestead Rd. via Los Olivos Dr.

D. Priority: Moderate

E. Storm Drain Block Book Location: 15-MH1 to 24-MH15

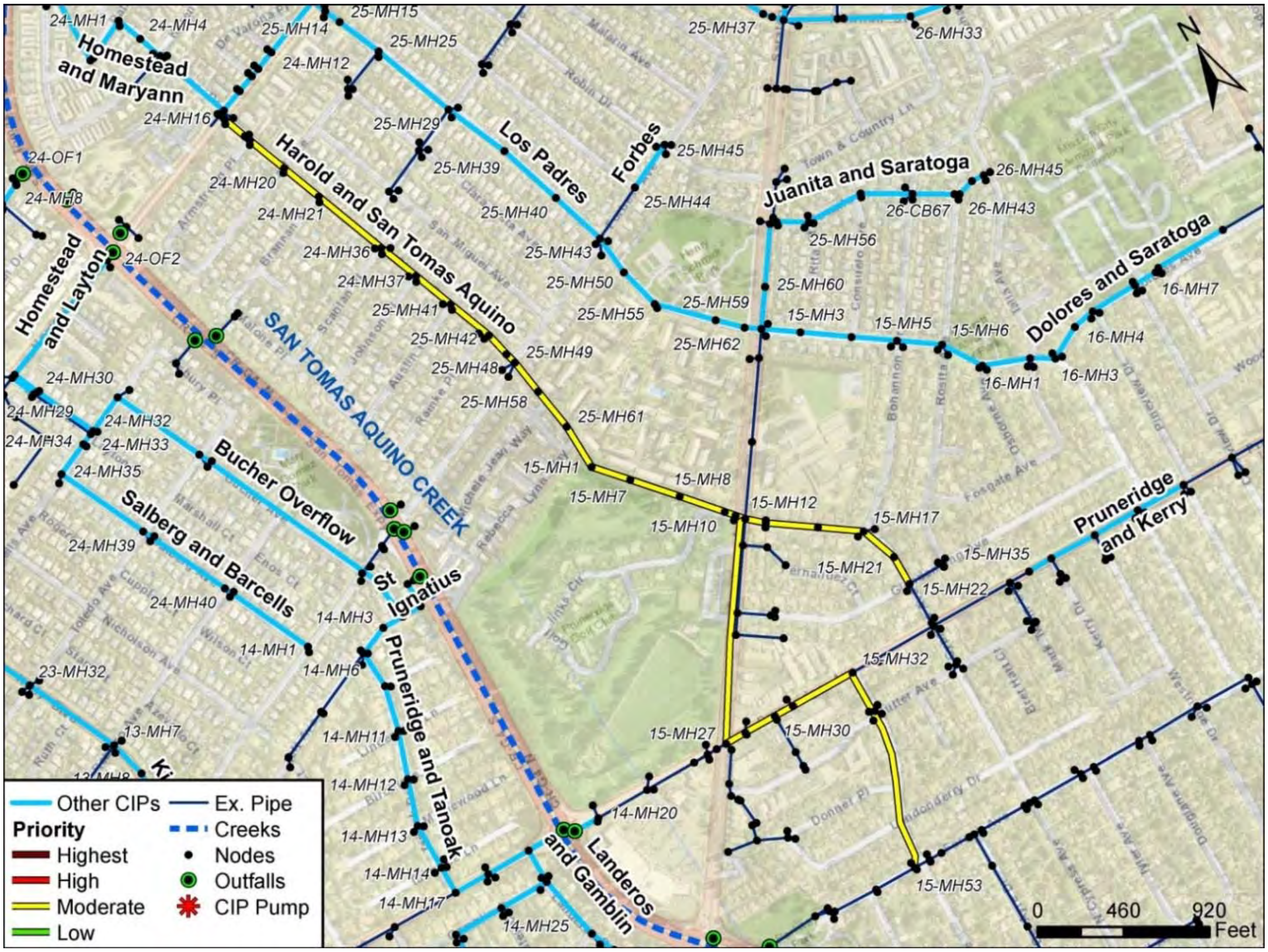
F. Type: Capacity

G. Project Description: Significant 10- and 100-year flooding occurs at Pruneridge Golf Club and in the neighborhoods southwest of Pruneridge Ave. and Saratoga Ave. due to high stage in San Tomas Aquino. Connecting systems on Forest Ave., Pruneridge Ave., and Saratoga Ave. with new pipes and upsizing existing pipes from Harold Ave. to Los Olivos Dr. and Homestead Rd. is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	54	48	50
18	54	48	840
21	54	48	1,140
24	54	48	480
24	60	54	1,120
27	60	60	30
33	54	48	780
-	54	-	2,330

H. Special Considerations: Prior construction of Homestead and Maryann project is required. Potential impacts to San Tomas Aquino Creek should be analyzed in detail

I. Alternatives: N/A



A. Project ID: 27

B. Project Name: Harold and San Tomas Aquino

C. Project Location: North from Harold Ave. and Forest Ave., west on Pruneridge Ave, northwest along Saratoga Ave., following Los Olivos Dr. to Homestead Rd.

D. Priority: Moderate

E. Storm Drain Block Book Location: 15-MH1 to 24-MH15

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION						
Pipe Demo/Disposal						**$154,000**
15-MH12 to 15-MH11	12	2	50	LF	$23	$1,000
15-MH11 to 15-MH7, 25-MH61 to 25-MH58	18	4	840	LF	$27	$23,000
25-MH58 to 25-MH41, 15-MH1 to 25-MH61, 15-MH1 to 15-MH7	21	4	1,140	LF	$34	$39,000
25-MH41 to 24-MH17	24	4	1,600	LF	$34	$55,000
24-MH17 to 24-MH15	27	6	30	LF	$43	$1,000
15-MH32 to 15-MH27	33	2	780	LF	$46	$36,000
Pipe Construction						**$3,931,000**
15-MH53 to 25-MH61	54	3	5,600	LF	$570	$3,200,000
24-MH36 to 24-MH15	60	4	1,150	LF	$657	$731,000
Structures						
Manholes						$425,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$4,510,000**
Mobilization/Demobilization					10%	$450,000
Traffic Control					5%	$230,000
Contingency					40%	$1,800,000
CONSTRUCTION COST TOTAL						**$6,990,000**
Engineering/Inspection					20%	$1,350,000
CIP TOTAL						**$8,340,000**

A. Project ID: 28

B. Project Name: Juanita and Saratoga

C. Project Location: Juanita Dr. and Bohannon Dr. to Saratoga Ave. and Los Padres Blvd.

D. Priority: Moderate

E. Storm Drain Block Book Location: 26-MH45 to 25-MH63

F. Type: Capacity

G. Project Description: Significant 10-year flooding depths occur on Juanita Dr. Upsizing existing pipes on Juanita Dr. and Saratoga Ave. is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
10	15	12	170
12	15	12	30
12	18	15	230
15	18	12	600
15	24	21	200
18	24	18	600

H. Special Considerations: Prior construction of Las Padres project is recommended

I. Alternatives: N/A

A. Project ID: **28**	**B. Project Name**: **Juanita and Saratoga**

C. Project Location: **Juanita Dr. and Bohannon Dr. to Saratoga Ave. and Los Padres Blvd.**

D. Priority: **Moderate**

E. Storm Drain Block Book Location: **26-MH45 to 25-MH63**

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$48,000**
26-MH45 to 26-MH43	10	2	170	LF	$23	$4,000
26-MH43 to 26-MH42	12	2	260	LF	$23	$6,000
26-MH42 to 25-MH52	15	2	800	LF	$27	$21,000
25-MH52 to 25-MH63	18	6	600	LF	$27	$16,000
Pipe Construction						**$387,000**
26-MH45 to 26-CB67	15	2	200	LF	$167	$32,000
26-CB67 to 25-MH56	18	2	830	LF	$186	$153,000
25-MH56 to 25-MH63	24	4	800	LF	$247	$202,000
Structures						
Manholes						$130,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$570,000**
Mobilization/Demobilization					10%	$57,000
Traffic Control					5%	$28,000
Contingency					40%	$230,000
CONSTRUCTION COST TOTAL						**$890,000**
Engineering/Inspection					20%	$170,000
CIP TOTAL						**$1,050,000**

A. Project ID: 29	B. Project Name: Juliette

C. Project Location: Juliette Ln. through commercial development to Mission College Blvd.

D. Priority: Moderate

E. Storm Drain Block Book Location: 75-MH17 to 75-MH1

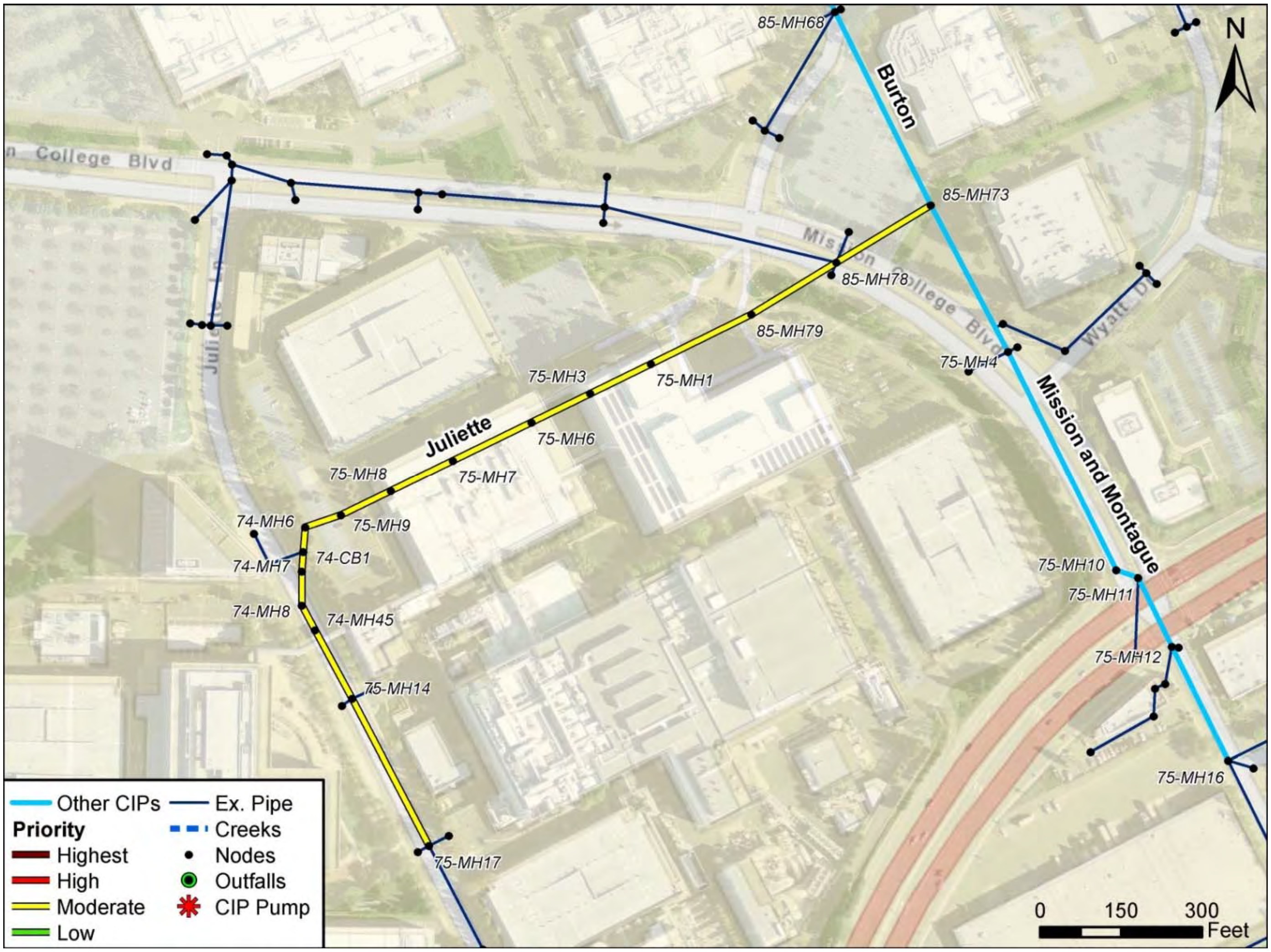
F. Type: Capacity

G. Project Description: Upsizing existing pipes in the commercial development around Juliette Ln. is recommended to reduce significant 10-year flooding is recommended. Prior construction of the Burton project is required.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
27	48	42	1,960

H. Special Considerations: Easement through commercial development. Prior construction of Burton project is recommended

I. Alternatives: Connect to system further north on Juliette Ln and upsizing pipes on Mission College



A. Project ID: 29 | **B. Project Name: Juliette**

C. Project Location: Juliette Ln. through commercial development to Mission College Blvd.

D. Priority: Moderate

E. Storm Drain Block Book Location: 75-MH17 to 75-MH1

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$85,000**
75-MH17 to 85-MH73	27	4	1,960	LF	$43	$85,000
Pipe Construction						**$975,000**
75-MH17 to 85-MH73	48	4	1,960	LF	$494	$975,000
Structures						
Manholes						$220,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$1,270,000**
Mobilization/Demobilization					10%	$130,000
Traffic Control					5%	$64,000
Contingency					40%	$510,000
CONSTRUCTION COST TOTAL						**$1,970,000**
Engineering/Inspection					20%	$380,000
CIP TOTAL						**$2,350,000**

A. Project ID: 30 | **B. Project Name: Kiely**

C. Project Location: Kiely Blvd. from Glorietta Cir. To Saratoga Creek outfall

D. Priority: Moderate

E. Storm Drain Block Book Location: 13-MH34 to 23-OF4

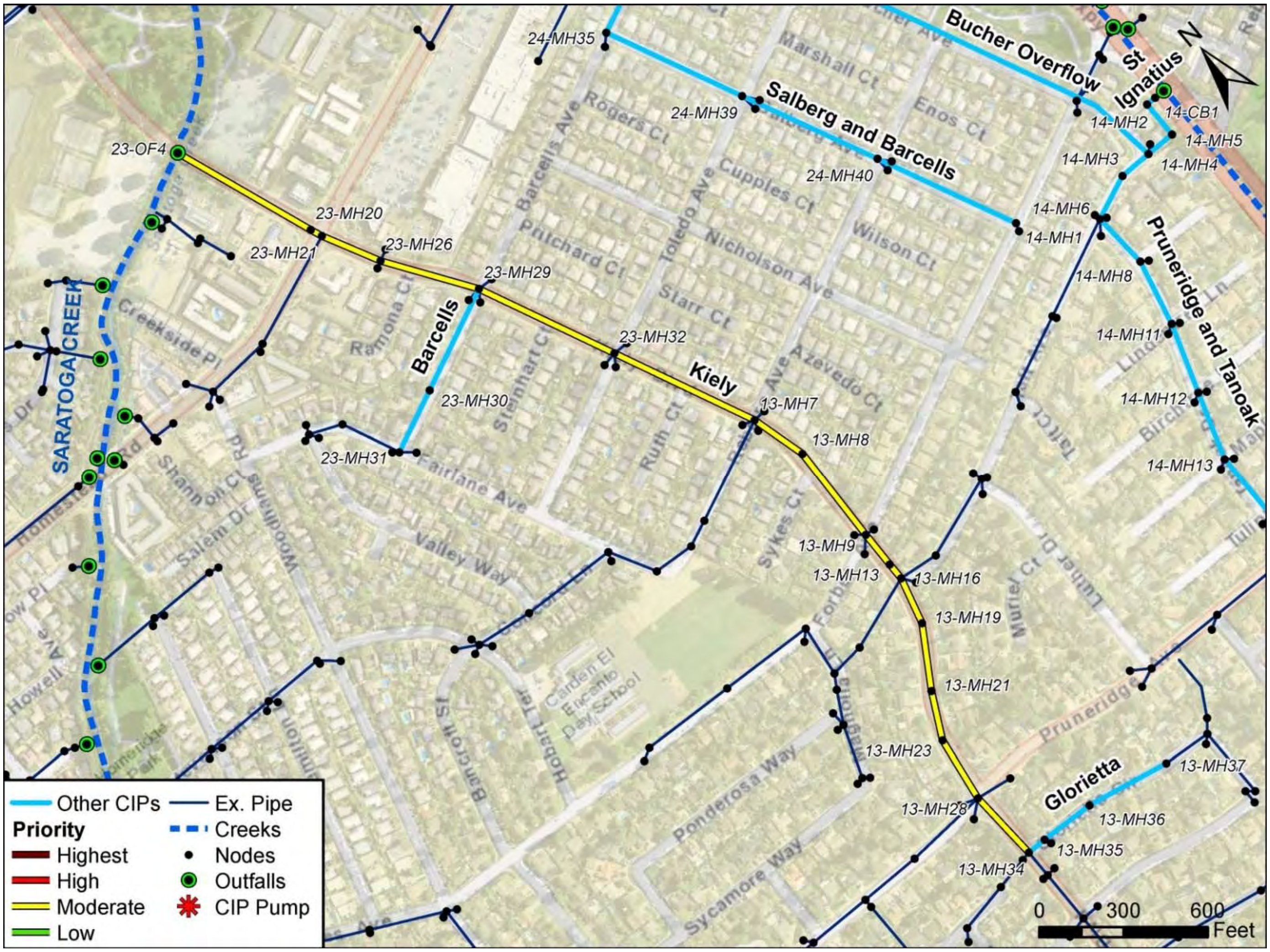
F. Type: Capacity

G. Project Description: Pipes along Kiely Blvd. are undersized to convey the 10-year event. Upsizing existing 21" to 30" pipes is recommended to alleviate flooding in this drainage area and San Tomas Aquino drainage area.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
21	36	30	1,110
21	42	39	200
24	42	36	580
27	42	36	1,090
30	48	36	640
33	48	42	550

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 30 | **B. Project Name: Kiely**

C. Project Location: Kiely Blvd. from Glorietta Cir. To Saratoga Creek outfall

D. Priority: Moderate

E. Storm Drain Block Book Location: 13-MH34 to 23-OF4

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$164,000**
13-MH34 to 13-MH9	21	6	1,310	LF	$34	$44,000
13-MH9 to 13-MH7	24	5	580	LF	$34	$20,000
13-MH7 to 23-MH29	27	5	1,090	LF	$43	$47,000
23-MH29 to 23-MH20	30	6	640	LF	$44	$28,000
23-MH20 to 23-OF4	33	3	550	LF	$46	$25,000
Pipe Construction						**$1,856,000**
13-MH34 to 13-MH16	36	6	1,110	LF	$396	$439,000
13-MH9 to 23-MH29	42	5	1,870	LF	$443	$824,000
23-MH29 to 23-OF4	48	5	1,190	LF	$518	$593,000
Structures						
Manholes						$200,000
Catch Basins						$0
Outfalls						$40,000
SUBTOTAL						**$2,260,000**
Mobilization/Demobilization					10%	$230,000
Traffic Control					5%	$110,000
Contingency					40%	$900,000
CONSTRUCTION COST TOTAL						**$3,500,000**
Engineering/Inspection					20%	$680,000
CIP TOTAL						**$4,180,000**

A. Project ID: 31 | **B. Project Name: Lafayette and Laurelwood**

C. Project Location: Lafayette St. from Shulman Ave. to Laurelwood Pump Station

D. Priority: Moderate

E. Storm Drain Block Book Location: 66-MH25 to 78-JS1

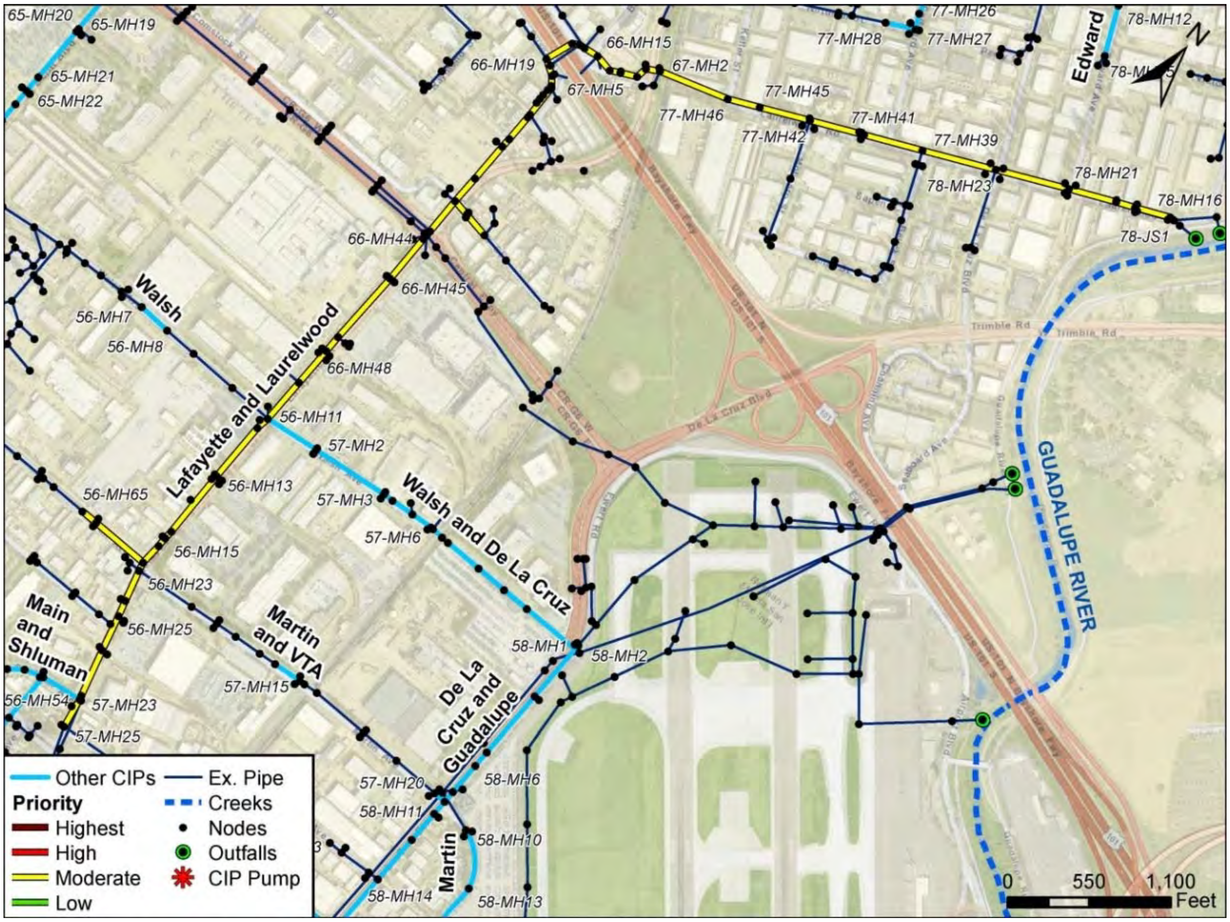
F. Type: Capacity

G. Project Description: An extensive length of pipe along Lafayette St. leading to Laurelwood pump station is undersized to convey 10- and 100-year events. Upsizing these pipes is recommended. While prior construction of the De La Cruz and Guadalupe project isn't required, it is recommended to address 2-year flooding initially.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	18	15	300
15	60	54	600
15	66	60	110
27	33	24	210
27	60	60	30
36	42	24	540
42	66	60	220
42	72	54	60
48	72	48	1,290
54	72	36	2,940
60	72	30	280
66	72	42	3,700
-	60	-	200

H. Special Considerations: Pipe crosses Highway 101. Jack and bore cost included.

I. Alternatives: N/A



A. Project ID: 31 | **B. Project Name: Lafayette and Laurelwood**

C. Project Location: Lafayette St. from Shulman Ave. to Laurelwood Pump Station

D. Priority: Moderate

E. Storm Drain Block Book Location: 66-MH25 to 78-JS1

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION						
Pipe Demo/Disposal						**$629,000**
66-MH25 to 67-MH33, 66-MH33 to 66-MH32	12	7	300	LF	$23	$7,000
57-MH22 to 56-MH24	15	6	710	LF	$27	$19,000
57-MH25 to 57-MH22	27	4	240	LF	$43	$10,000
56-MH65 to 56-MH22	36	7	540	LF	$46	$25,000
56-MH24 to 56-MH22	42	7	280	LF	$58	$16,000
56-MH66 to 56-MH11	48	5	1,290	LF	$59	$76,000
56-MH11 to 66-MH48, 66-MH46 to 66-MH48, 66-MH46 to 66-MH44, 66-MH38 to 66-MH44, 66-MH33 to 66-MH22, 66-MH38 to 66-MH32	54	5	2,940	LF	$62	$182,000
78-MH18 to 78-JS1	60	4	280	LF	$72	$20,000
66-MH22 to 78-MH18	66	5	3,700	LF	$74	$273,000
Pipe Construction						**$8,710,000**
66-MH25 to 67-MH32	18	7	300	LF	$224	$67,000
57-MH25 to 57-MH23	33	4	210	LF	$334	$71,000
56-MH65 to 56-MH22	42	7	540	LF	$468	$253,000
57-MH25 to 57-MH22, 56-MH36 to 56-MH25, 66-MH22 to 67-MH6	60	6	820	LF	$690	$576,000
56-MH25 to 56-MH23	66	7	340	LF	$819	$274,000
67-MH6 to 78-JS1, 66-MH38 to 66-MH22, 56-MH23 to 66-MH48, 66-MH46 to 66-MH48, 66-MH46 to 66-MH44, 66-MH42 to 66-MH44	72	5	8,260	LF	$911	$7,470,000
Structures						
Manholes						$770,000
Catch Basins						$0
Outfalls						$40,000

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
SITE SPECIFIC COSTS						
Pipe Under Hwy 101						$3,200,000
SUBTOTAL						**$10,110,000**
Mobilization/Demobilization					10%	$1,010,000
Traffic Control					5%	$510,000
Contingency					40%	$4,040,000
CONSTRUCTION COST TOTAL						**$15,670,000**
Engineering/Inspection					20%	$3,030,000
CIP TOTAL						**$21,890,000**

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A. Project ID: 32

B. Project Name: Lake Santa Clara PS

C. Project Location: Agnew Rd. and Lakeshore Dr. to Lake Santa Clara Pump Station

D. Priority: Moderate

E. Storm Drain Block Book Location: 84-MH9 to 84-OF3

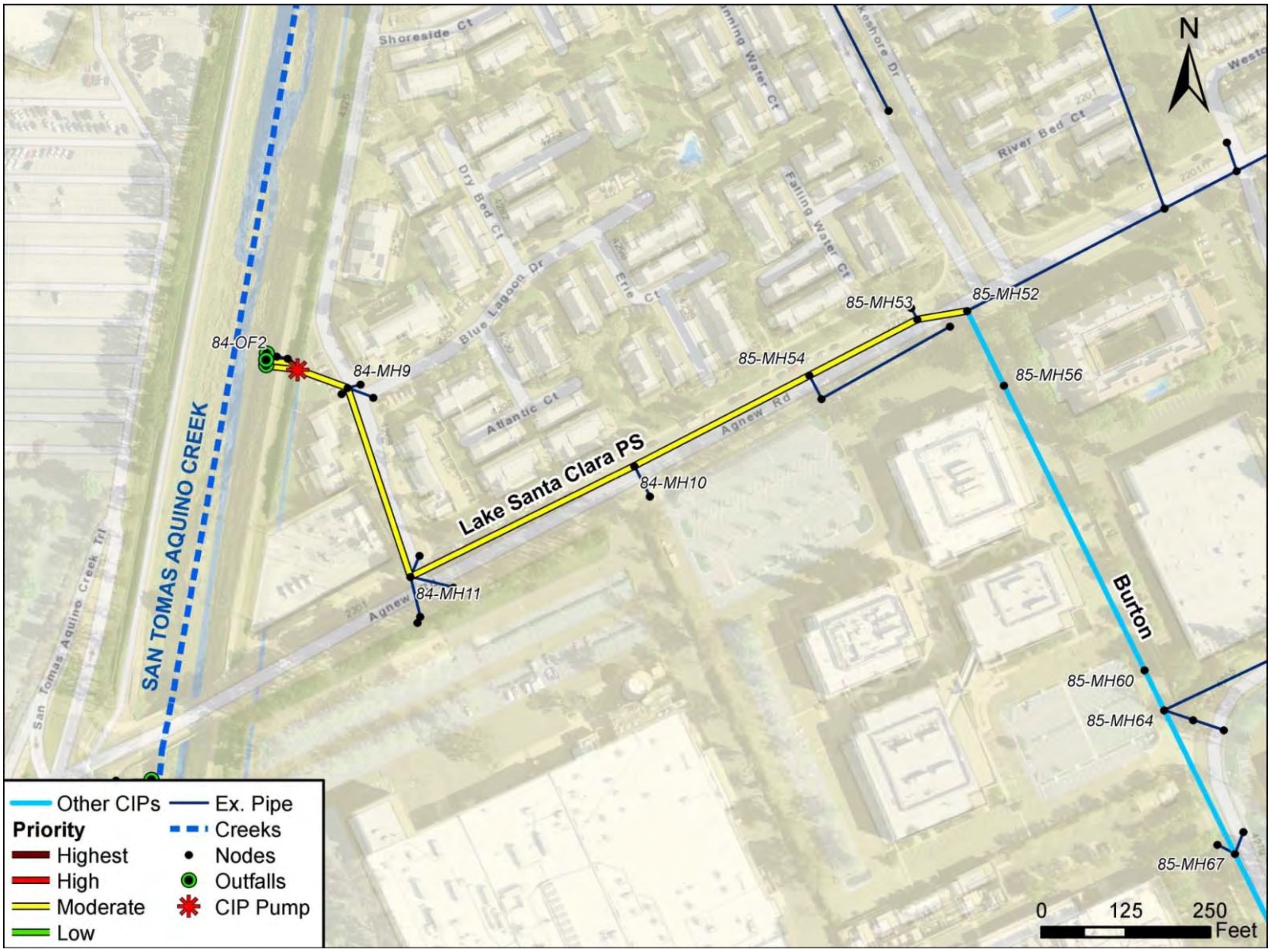
F. Type: Capacity

G. Project Description: Flows to the Rambo pump station are too high in the 10-year event. Connecting the Rambo PS system to the system leading to the Lake Santa Clara station on Agnew Rd. and upsizing the pumps is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	48	42	180
18	36	33	20
18	48	42	660
24	48	39	370
-	36	-	80
-	48	-	80

H. Special Considerations: Additional area may be required to upgrade ex. pump station

I. Alternatives: N/A



A. Project ID: 32 | **B. Project Name: Lake Santa Clara PS**

C. Project Location: Agnew Rd. and Lakeshore Dr. to Lake Santa Clara Pump Station

D. Priority: Moderate

E. Storm Drain Block Book Location: 84-MH9 to 84-OF3

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION						
Pipe Demo/Disposal						**$36,000**
85-MH53 to 85-MH54	15	3	180	LF	$27	$5,000
85-MH54 to 84-MH11, 84-PS2 to 84-OF3, Link_9	18	3	680	LF	$27	$19,000
84-MH9 to 84-MH11, 84-MH9 to 84-PS2	24	4	370	LF	$34	$13,000
Pipe Construction						**$702,000**
84-PS2 to 84-OF3, New Outfall Pipes	36	2	100	LF	$349	$34,000
85-MH52 to 84-PS2	48	5	1,290	LF	$510	$667,000
Structures						
Manholes						$10,000
Pumps						$4,880,000
Outfalls						$40,000
SUBTOTAL						**$5,790,000**
Mobilization/Demobilization					10%	$579,000
Traffic Control					5%	$289,000
Contingency					40%	$2,312,000
CONSTRUCTION COST TOTAL						**$8,970,000**
Engineering/Inspection					20%	$1,740,000
CIP TOTAL						**$10,710,000**

A. Project ID: 33	**B. Project Name: Landeros and Gamblin**

C. Project Location: Fontana Dr, and Landeros Dr. to the San Tomas Aquino Cr. outfall on Pruneridge Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 14-MH28 to 14-OF2

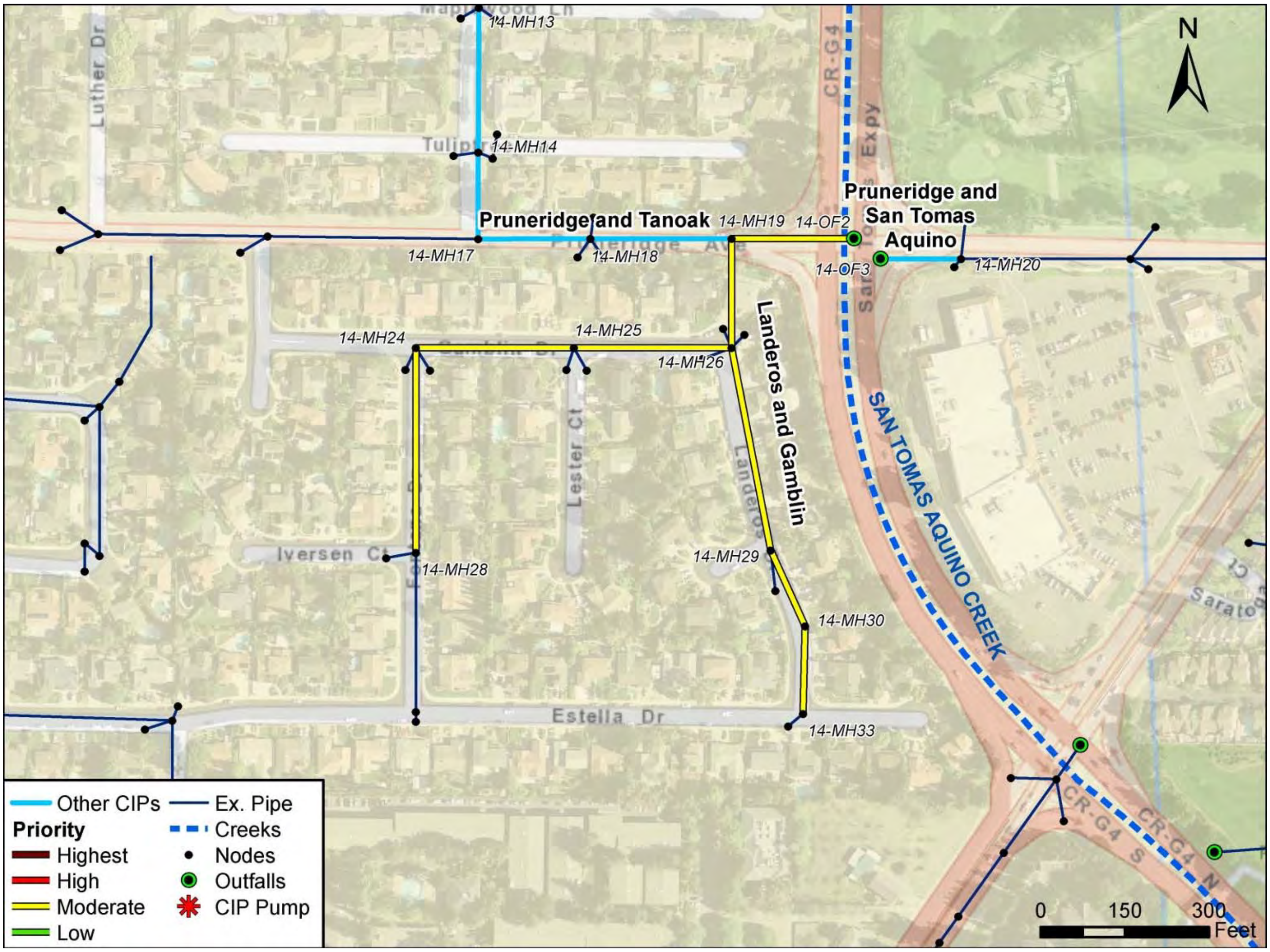
F. Type: Capacity

G. Project Description: 10-year flooding occurs in the neighborhoods around Landeros Dr. and Gamblin Dr. Upsizing existing pipes in this area is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	18	15	670
12	24	21	370
15	24	21	280
15	30	27	280
27	42	36	200
33	36	21	220

H. Special Considerations: Pipes from Landeros Dr. run under private residences

I. Alternatives: Install new pipe to connect to nearby system at Gamblin Dr. and Pruneridge Ave. , and upsize pipes on Pruneridge Ave.



A. Project ID: 33	**B. Project Name: Landeros and Gamblin**

C. Project Location: Fontana Dr, and Landeros Dr. to the San Tomas Aquino Cr. outfall on Pruneridge Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 14-MH28 to 14-OF2

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$58,000**
14-MH33 to 14-MH26, 14-MH28 to 14-MH24	12	6	1,040	LF	$23	$24,000
14-MH24 to 14-MH26	15	6	560	LF	$27	$15,000
14-MH26 to 14-MH19	27	7	200	LF	$43	$8,000
14-MH19 to 14-OF2	33	6	220	LF	$46	$10,000
Pipe Construction						**$591,000**
14-MH28 to 14-MH24, 14-MH33 to 14-MH29	18	6	670	LF	$214	$145,000
14-MH24 to 14-MH25, 14-MH29 to 14-MH26	24	7	650	LF	$268	$175,000
14-MH25 to 14-MH26	30	6	280	LF	$330	$92,000
14-MH19 to 14-OF2	36	6	220	LF	$393	$86,000
14-MH26 to 14-MH19	42	7	200	LF	$476	$93,000
Structures						
Manholes						$190,000
Catch Basins						$0
Outfalls						$40,000
SUBTOTAL						**$790,000**
Mobilization/Demobilization					10%	$79,000
Traffic Control					5%	$40,000
Contingency					40%	$320,000
CONSTRUCTION COST TOTAL						**$1,230,000**
Engineering/Inspection					20%	$230,000
CIP TOTAL						**$1,460,000**

A. Project ID: 34	**B. Project Name: Los Padres**

C. Project Location: Los Padres Blvd. from Saratoga Ave. to Homestead Rd.

D. Priority: Moderate

E. Storm Drain Block Book Location: 25-MH63 to 25-MH3

F. Type: Capacity

G. Project Description: 10-year flooding occurs around Los Padres Dr. upstream of Homestead Rd. Upsizing existing 24” pipe on Los Padres Dr. is recommended. Prior construction of the Homestead and Maryann project is required.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
24	42	36	2,110
24	48	39	930

H. Special Considerations: Prior construction of Homestead and Maryann project is required

I. Alternatives: N/A

A. Project ID: 34	**B. Project Name: Los Padres**

C. Project Location: Los Padres Blvd. from Saratoga Ave. to Homestead Rd.

D. Priority: Moderate

E. Storm Drain Block Book Location: 25-MH63 to 25-MH3

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$100,000**
25-MH63 to 25-MH3	24	4	3,040	LF	$34	$100,000
Pipe Construction						**$1,361,000**
25-MH63 to 25-MH29	42	5	2,110	LF	$439	$918,000
25-MH29 to 25-MH3	48	3	930	LF	$476	$443,000
Structures						
Manholes						$170,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$1,640,000**
Mobilization/Demobilization					10%	$160,000
Traffic Control					5%	$82,000
Contingency					40%	$660,000
CONSTRUCTION COST TOTAL						**$2,540,000**
Engineering/Inspection					20%	$490,000
CIP TOTAL						**$3,030,000**

A. Project ID: 35 | **B. Project Name: Machado**

C. Project Location: Machado Ave. from Briarwood Dr. to Nobili Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 51-MH35 to 51-MH38

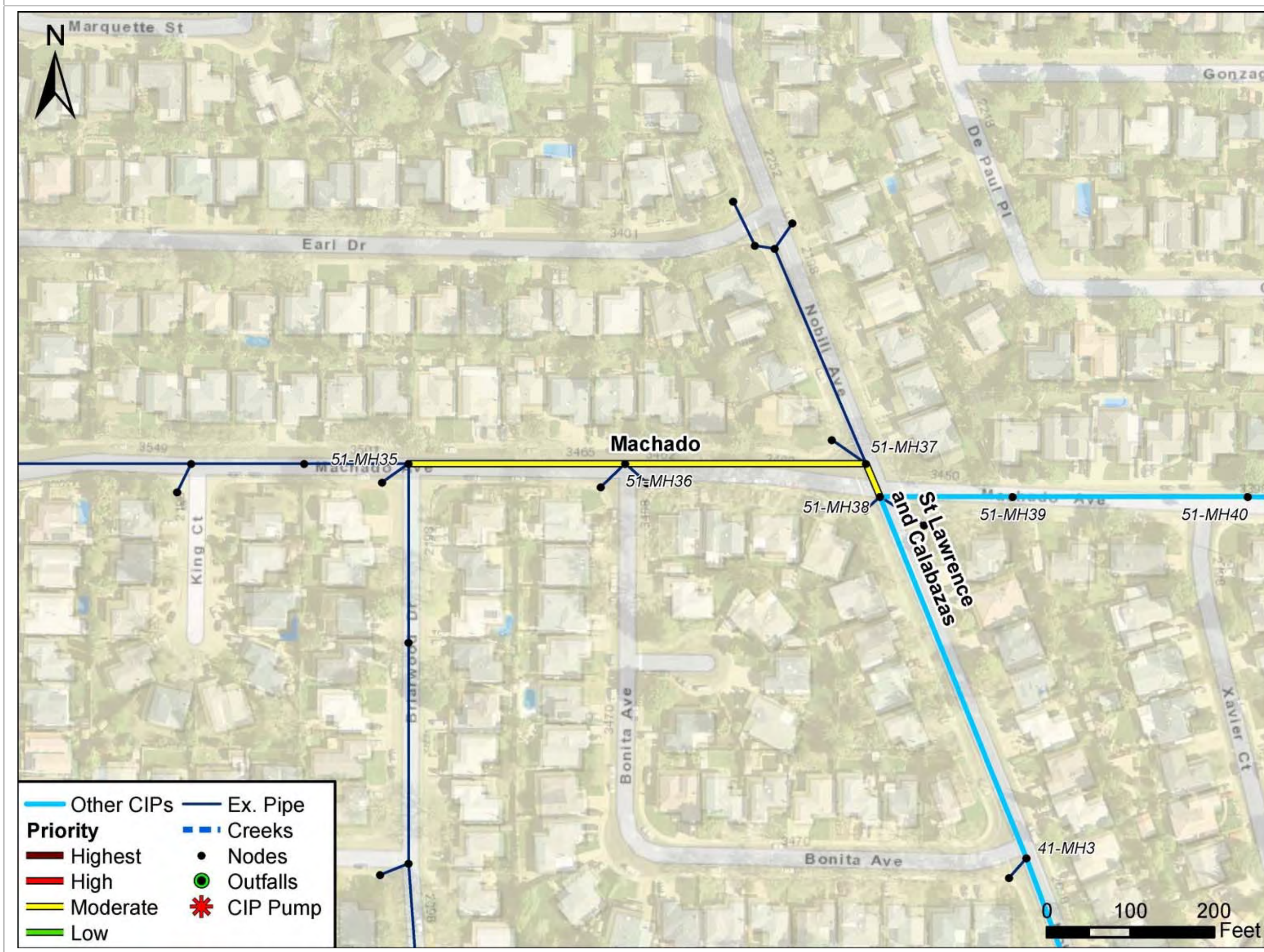
F. Type: Capacity

G. Project Description: Upsizing pipes on Machado Ave. to 21" further alleviates minor 10-year flooding. Prior completion of the St. Lawrence and Calabazas project must is required.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	21	16	300
18	21	14	290

H. Special Considerations: Prior construction of St Lawrence and Calabazas is recommended

I. Alternatives: N/A



A. Project ID: 35 | **B. Project Name: Machado**

C. Project Location: Machado Ave. from Briarwood Dr. to Nobili Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 51-MH35 to 51-MH38

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$16,000**
51-MH37 to 51-MH38, 51-MH35 to 51-MH36	15	4	300	LF	$27	$8,000
51-MH36 to 51-MH37	18	4	290	LF	$27	$8,000
Pipe Construction						**$123,000**
51-MH35 to 51-MH38	21	4	590	LF	$209	$123,000
Structures						
Manholes						$50,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$190,000**
Mobilization/Demobilization					10%	$19,000
Traffic Control					5%	$10,000
Contingency					40%	$78,000
CONSTRUCTION COST TOTAL						**$300,000**
Engineering/Inspection					20%	$60,000
CIP TOTAL						**$360,000**

A. Project ID: 36	**B. Project Name: Main**

C. Project Location: Main St. from Sahara Way to pipes crossing UPRR tracks

D. Priority: Moderate

E. Storm Drain Block Book Location: 55-MH39 to 56-MH57

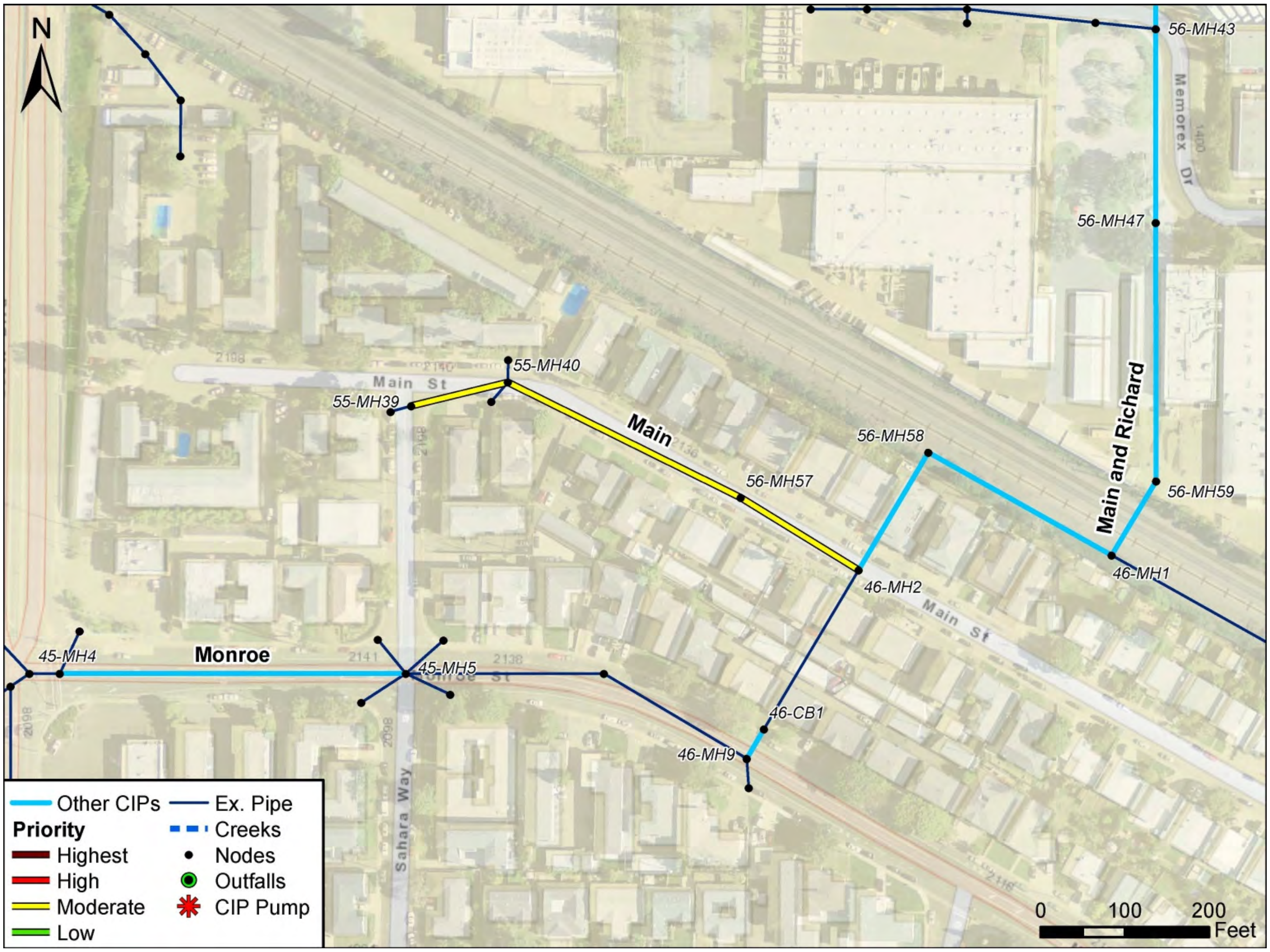
F. Type: Capacity

G. Project Description: Significant 10-year flooding occurs upstream of UPRR on Main Street. Upsizing existing 12" and 18" pipe is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	18	15	120
18	30	24	470

H. Special Considerations: Main and Richard must be constructed first.

I. Alternatives: N/A



A. Project ID: 36 | **B. Project Name: Main**

C. Project Location: Main St. from Sahara Way to pipes crossing UPRR tracks

D. Priority: Moderate

E. Storm Drain Block Book Location: 55-MH39 to 46-MH2

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$16,000**
55-MH39 to 55-MH40	12	2	120	LF	$27	$3,000
55-MH40 to 46-MH2	18	2	470	LF	$27	$13,000
Pipe Construction						**$159,000**
55-MH39 to 55-MH40	18	2	120	LF	$186	$22,000
55-MH40 to 46-MH2	30	2	470	LF	$291	$138,000
Structures						
Manholes						$50,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$230,000**
Mobilization/Demobilization					10%	$23,000
Traffic Control					5%	$11,000
Contingency					40%	$90,000
CONSTRUCTION COST TOTAL						**$354,000**
Engineering/Inspection					20%	$68,000
CIP TOTAL						**$420,000**

A. Project ID: 37 | **B. Project Name: Melody**

C. Project Location: Melody Lane to Hubbard Ave outfall to Calabazas Creek.

D. Priority: Moderate

E. Storm Drain Block Book Location: 10-MH8 to 10-OF1

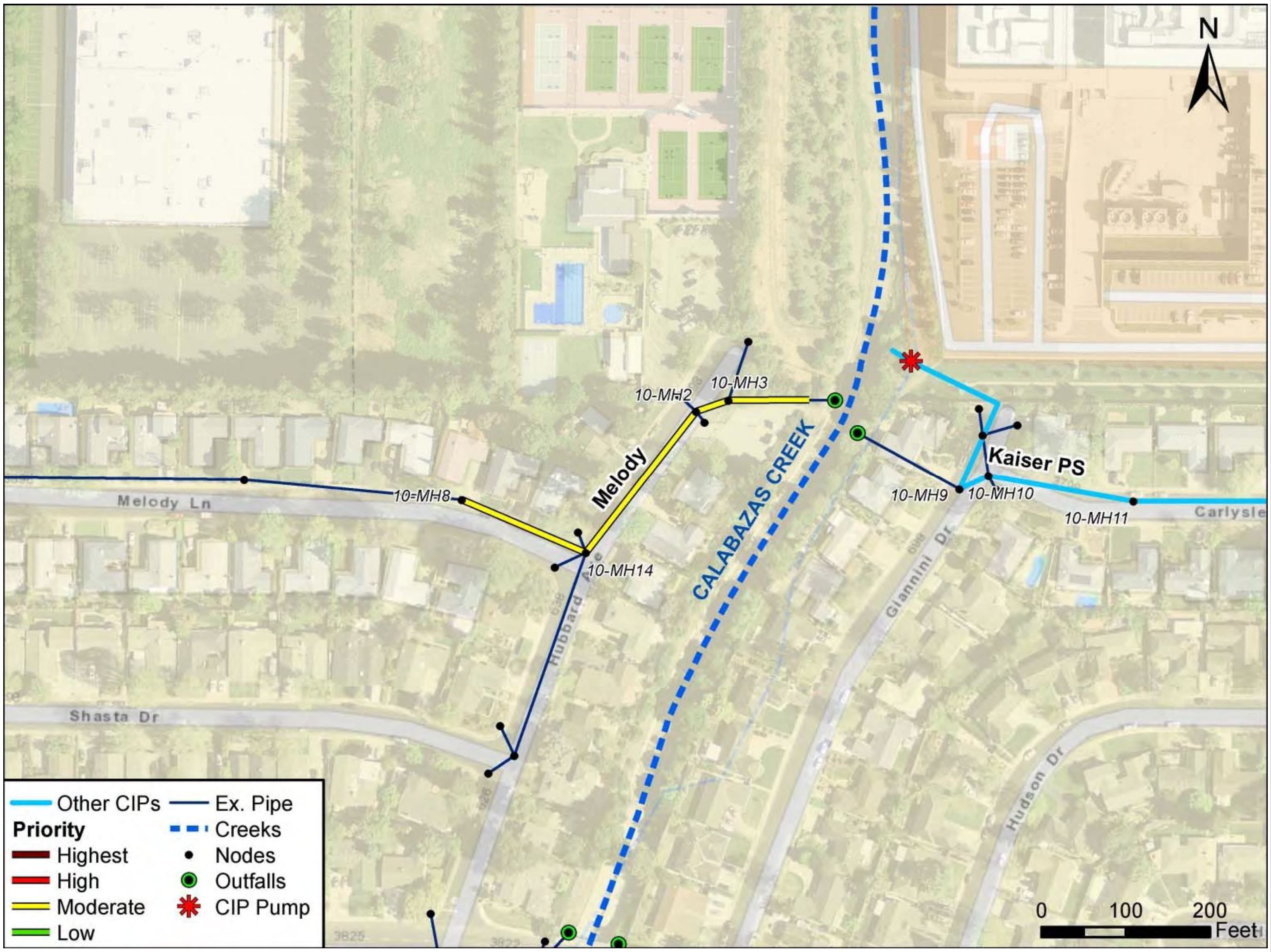
F. Type: Capacity

G. Project Description: 10-year flooding occurs near Calabazas Creek on Melody Ln. Upsizing pipes in this location to 18" is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	15	15	160
15	18	24	350

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 37 | **B. Project Name: Melody**

C. Project Location: Melody Lane to Hubbard Ave outfall to Calabazas Creek.

D. Priority: Moderate

E. Storm Drain Block Book Location: 10-MH8 to 10-OF1

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$13,000**
10-MH8 to 10-MH14	12	3	160	LF	$23	$4,000
10-MH14 to 10-OF1	15	4	350	LF	$27	$9,000
Pipe Construction						**$94,000**
10-MH8 to 10-MH14	15	3	160	LF	$167	$27,000
10-MH14 to 10-OF1	18	4	350	LF	$196	$68,000
Structures						
Manholes						$48,000
Catch Basins						$0
Outfalls						$40,000
SUBTOTAL						**$200,000**
Mobilization/Demobilization					10%	$20,000
Traffic Control					5%	$10,000
Contingency					40%	$78,000
CONSTRUCTION COST TOTAL						**$310,000**
Engineering/Inspection					20%	$60,000
CIP TOTAL						**$370,000**

A. Project ID: 38	**B. Project Name: Oakmead and Scott**

C. Project Location: Oakmead Rd. and Scott Blvd.

D. Priority: Moderate

E. Storm Drain Block Book Location: 72-MH31 to 73-MH21

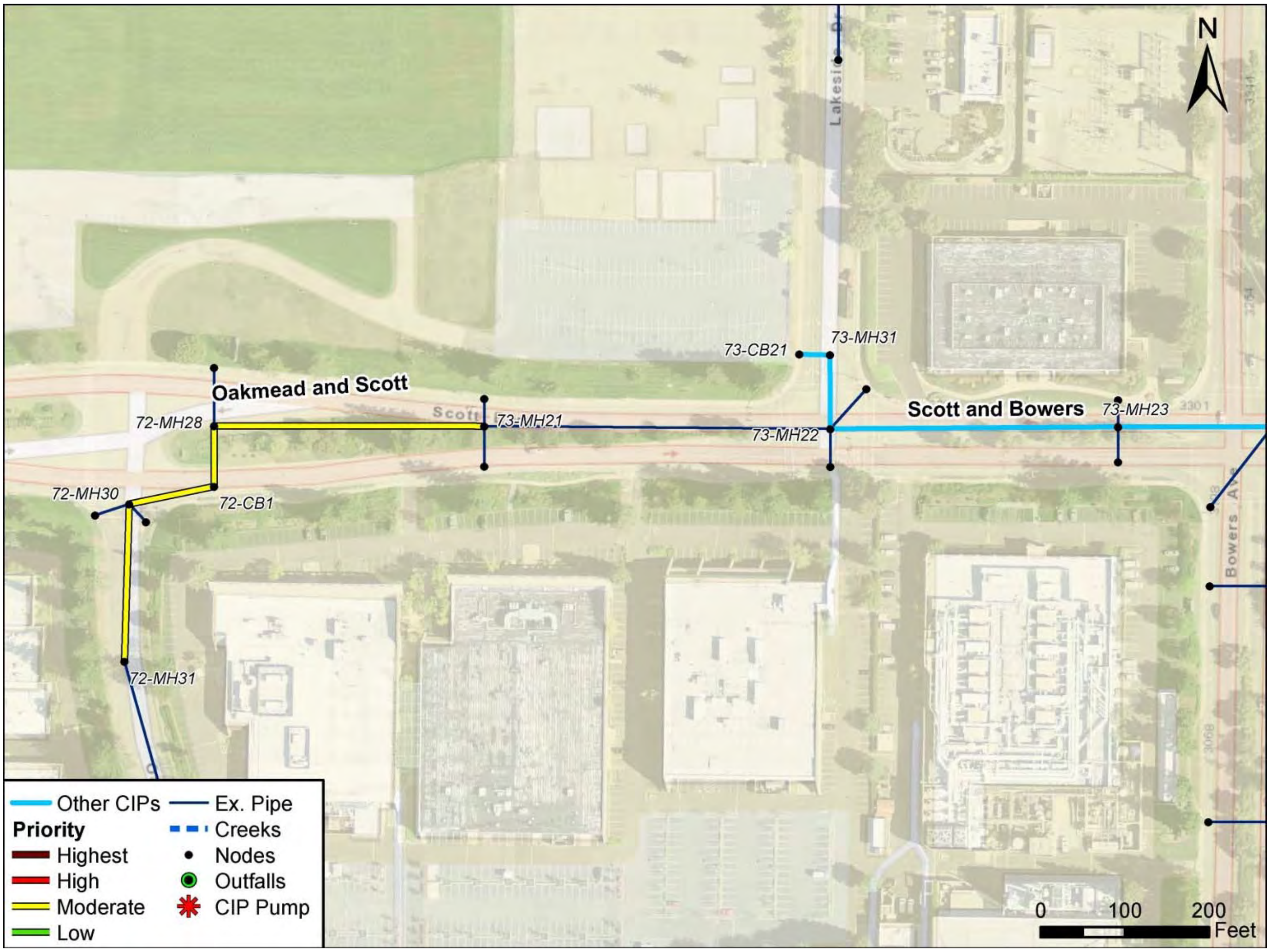
F. Type: Capacity

G. Project Description: Some 10-year flooding occurs on Scott in the adjacent Calabazas Creek drainage area. Upsizing existing pipes on Oakmead Village Dr and Scott Blvd is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	21	16	290
18	24	18	390

H. Special Considerations: Prior construction of Scott and Bowers is recommended

I. Alternatives: N/A



A. Project ID: 38 | **B. Project Name: Oakmead and Scott**

C. Project Location: Oakmead Rd. and Scott Blvd.

D. Priority: Moderate

E. Storm Drain Block Book Location: 72-MH31 to 73-MH21

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$19,000**
72-MH31 to 72-CB1	15	2	290	LF	$27	$8,000
72-CB1 to 73-MH21	18	4	390	LF	$27	$11,000
Pipe Construction						**$154,000**
72-MH31 to 72-CB1	21	2	290	LF	$209	$61,000
72-CB1 to 73-MH21	24	4	390	LF	$230	$93,000
Structures						
Manholes						$62,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$240,000**
Mobilization/Demobilization					10%	$23,000
Traffic Control					5%	$12,000
Contingency					40%	$90,000
CONSTRUCTION COST TOTAL						**$360,000**
Engineering/Inspection					20%	$70,000
CIP TOTAL						**$430,000**

A. Project ID: 39 | **B. Project Name: Patricia**

C. Project Location: Patricia Dr. from Dixon Dr. to San Tomas Aquino Creek

D. Priority: Moderate

E. Storm Drain Block Book Location: 24-MH9 to 24-OF1

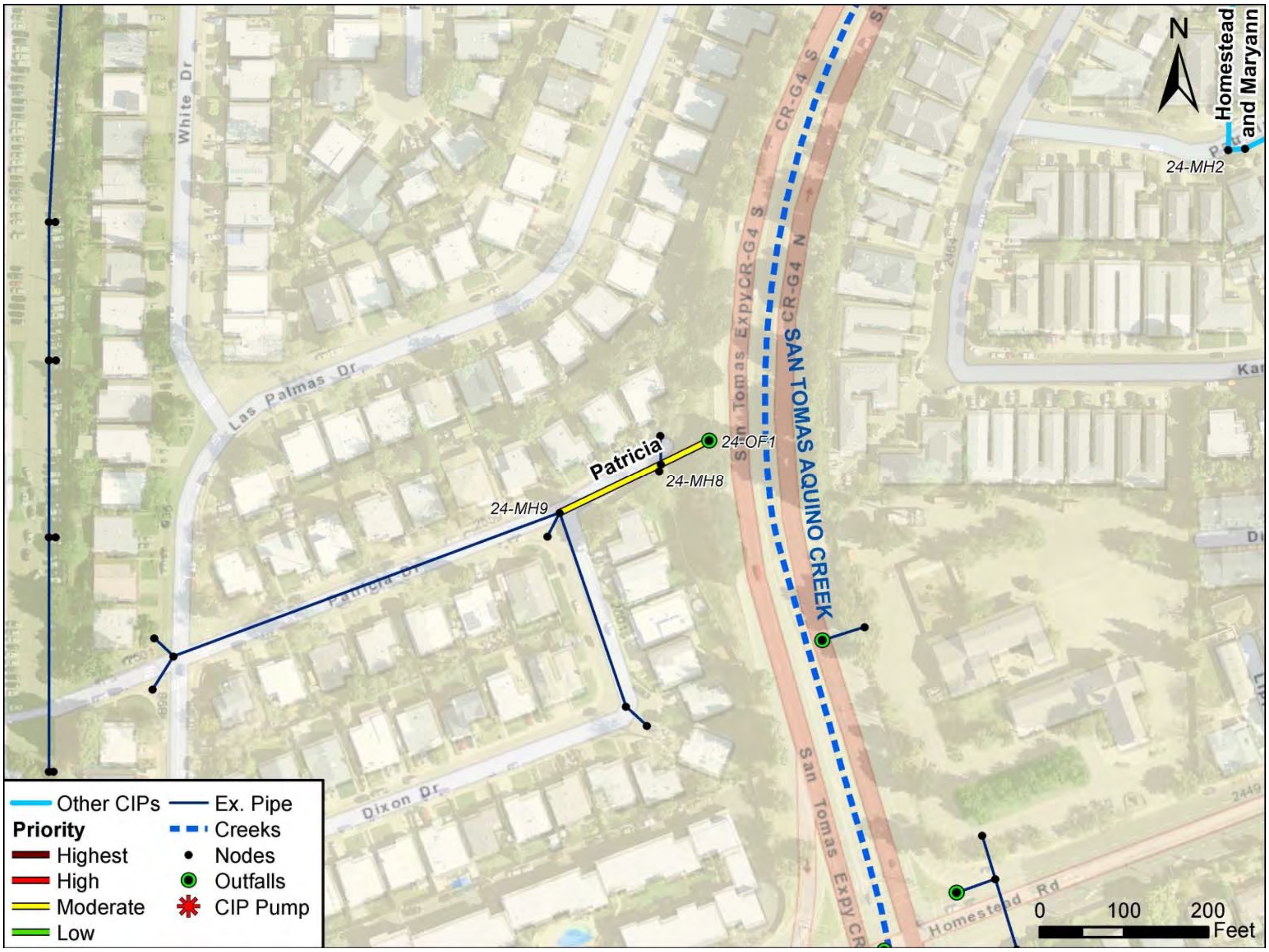
F. Type: Capacity

G. Project Description: The outfall pipe on Patricia Dr. is undersized for 10- and 100-year events. Upsizing this pipe from 15” to 21” is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	21	16	200

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 39 | **B. Project Name: Patricia**

C. Project Location: Patricia Dr. from Dixon Dr. to San Tomas Aquino Creek

D. Priority: Moderate

E. Storm Drain Block Book Location: 24-MH9 to 24-OF1

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$5,000**
24-MH9 to 24-OF1	15	2	200	LF	$27	$5,000
Pipe Construction						**$41,000**
24-MH9 to 24-OF1	21	2	200	LF	$209	$41,000
Structures						
Manholes						$37,000
Catch Basins						$0
Outfalls						$40,000
SUBTOTAL						**$120,000**
Mobilization/Demobilization					10%	$12,000
Traffic Control					5%	$6,000
Contingency					40%	$890,000
CONSTRUCTION COST TOTAL						**$190,000**
Engineering/Inspection					20%	$40,000
CIP TOTAL						**$230,000**

A. Project ID: 40 | **B. Project Name: Princeton and Homestead**

C. Project Location: Prineceton Way to Homestead Rd. and Ridge Rd.

D. Priority: Moderate

E. Storm Drain Block Book Location: 22-MH34 to 22-MH24

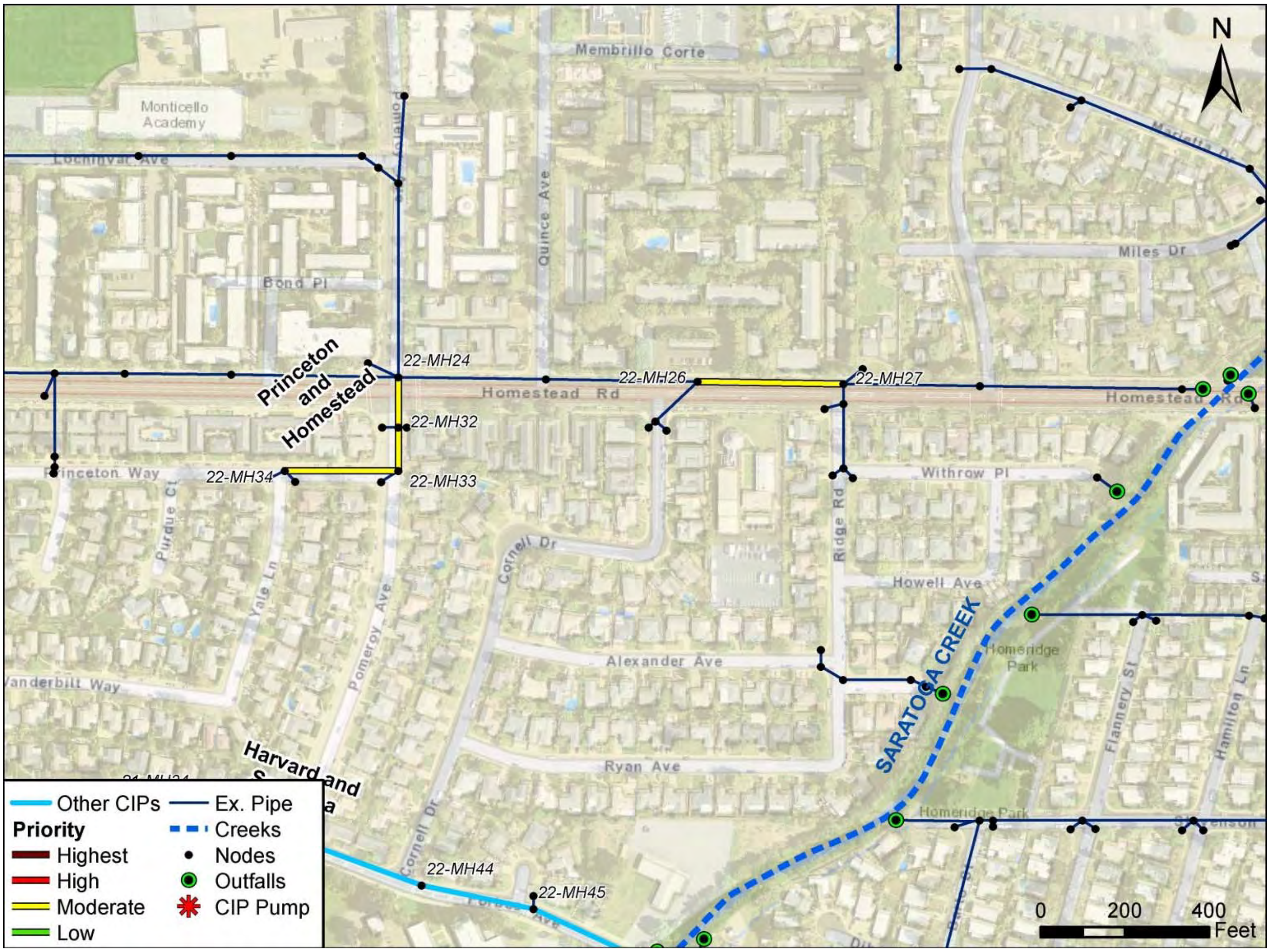
F. Type: Capacity

G. Project Description: Pipes on Princeton and Homestead are undersized to convey the 10-year event. Upsizing existing 15" and 24" pipes to 21" and 30" pipes is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	21	16	490
24	30	21	350

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 40	**B. Project Name: Princeton and Homestead**
C. Project Location: Prineceton Way to Homestead Rd. and Ridge Rd.	
D. Priority: Moderate	
E. Storm Drain Block Book Location: 22-MH34 to 22-MH24	

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$25,000**
22-MH34 to 22-MH24	15	4	490	LF	$27	$13,000
22-MH26 to 22-MH27	24	9	350	LF	$34	$12,000
Pipe Construction						**$233,000**
22-MH34 to 22-MH24	21	4	490	LF	$209	$106,000
22-MH26 to 22-MH27	30	9	350	LF	$291	$128,000
Structures						
Manholes						$62,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$320,000**
Mobilization/Demobilization					10%	$32,000
Traffic Control					5%	$16,000
Contingency					40%	$130,000
CONSTRUCTION COST TOTAL						**$500,000**
Engineering/Inspection					20%	$96,000
CIP TOTAL						**$590,000**

A. Project ID: 41	**B. Project Name: Richard and Scott**

C. Project Location: From Richard Ave, along Scott Blvd to San Tomas Aquino Creek

D. Priority: Moderate

E. Storm Drain Block Book Location: 56-MH27 to 74-FG5

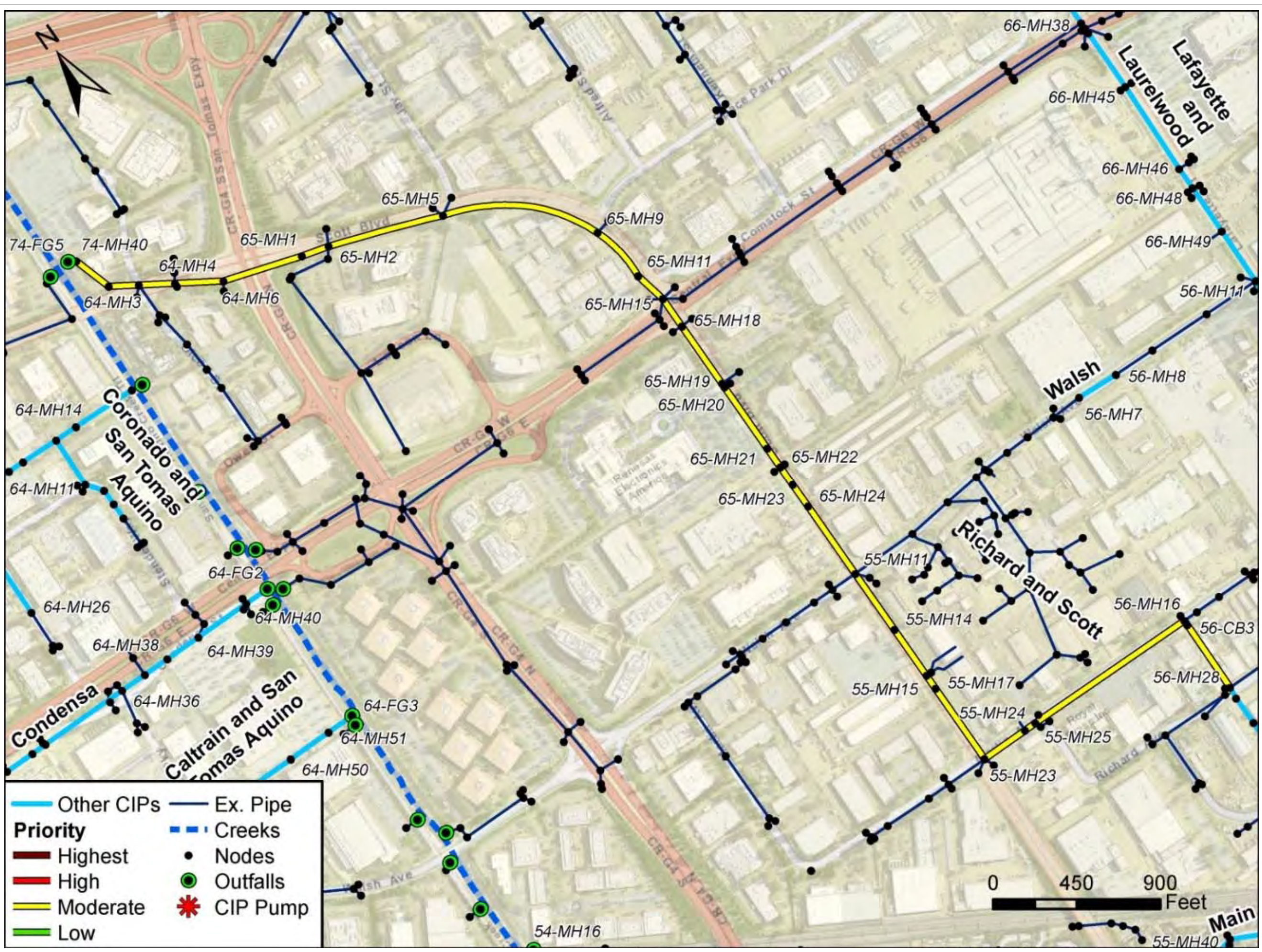
F. Type: Capacity

G. Project Description: 10- and 100-year flooding occurs in the development east of Scott Blvd. between Martin Ave. and Highway 101. Upsizing existing pipe on Richard Ave. and Scott Blvd. is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	30	27	330
12	42	39	30
15	24	21	50
21	36	30	1,220
30	42	33	410
42	60	42	1,990
48	60	36	1,190
48	72	48	2,120
-	30	-	970

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 41

B. Project Name: Richard and Scott

C. Project Location: From Richard Ave, along Scott Blvd to San Tomas Aquino Creek

D. Priority: Moderate

E. Storm Drain Block Book Location: 56-MH27 to 74-FG5

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$379,000**
55-MH25 to 55-MH23, 56-CB3 to 56-MH16	12	6	360	LF	$23	$8,000
56-MH27 to 56-MH28	15	5	50	LF	$27	$1,000
55-MH24 to 55-MH11	21	9	1,220	LF	$34	$41,000
56-MH28 to 56-CB3	30	4	410	LF	$44	$18,000
65-MH24 to 65-MH11	42	7	1,990	LF	$58	$115,000
65-MH11 to 74-FG5	48	5	3,310	LF	$59	$195,000
Pipe Construction						**$5,220,000**
56-MH27 to 56-MH28	24	5	50	LF	$260	$14,000
56-MH16 to 55-MH23	30	7	1,310	LF	$348	$457,000
55-MH23 to 55-MH11	36	9	1,220	LF	$384	$467,000
56-MH28 to 56-MH16	42	4	440	LF	$478	$210,000
65-MH24 to 65-MH5	60	5	3,170	LF	$669	$2,123,000
65-MH5 to 74-FG5	72	5	2,120	LF	$920	$1,950,000
Structures						
Manholes						$420,000
Catch Basins						$0
Outfalls						$40,000
SUBTOTAL						**$6,060,000**
Mobilization/Demobilization					10%	$610,000
Traffic Control					5%	$300,000
Contingency					40%	$2,420,000
CONSTRUCTION COST TOTAL						**$9,390,000**
Engineering/Inspection					20%	$1,820,000
CIP TOTAL						**$11,210,000**

A. Project ID: 42

B. Project Name: Salberg and Barcells

C. Project Location: Salberg Ave. and Forbes Ave. to Barcells Ave and Layton Ct.

D. Priority: Moderate

E. Storm Drain Block Book Location: 14-MH1 to 24-MH32

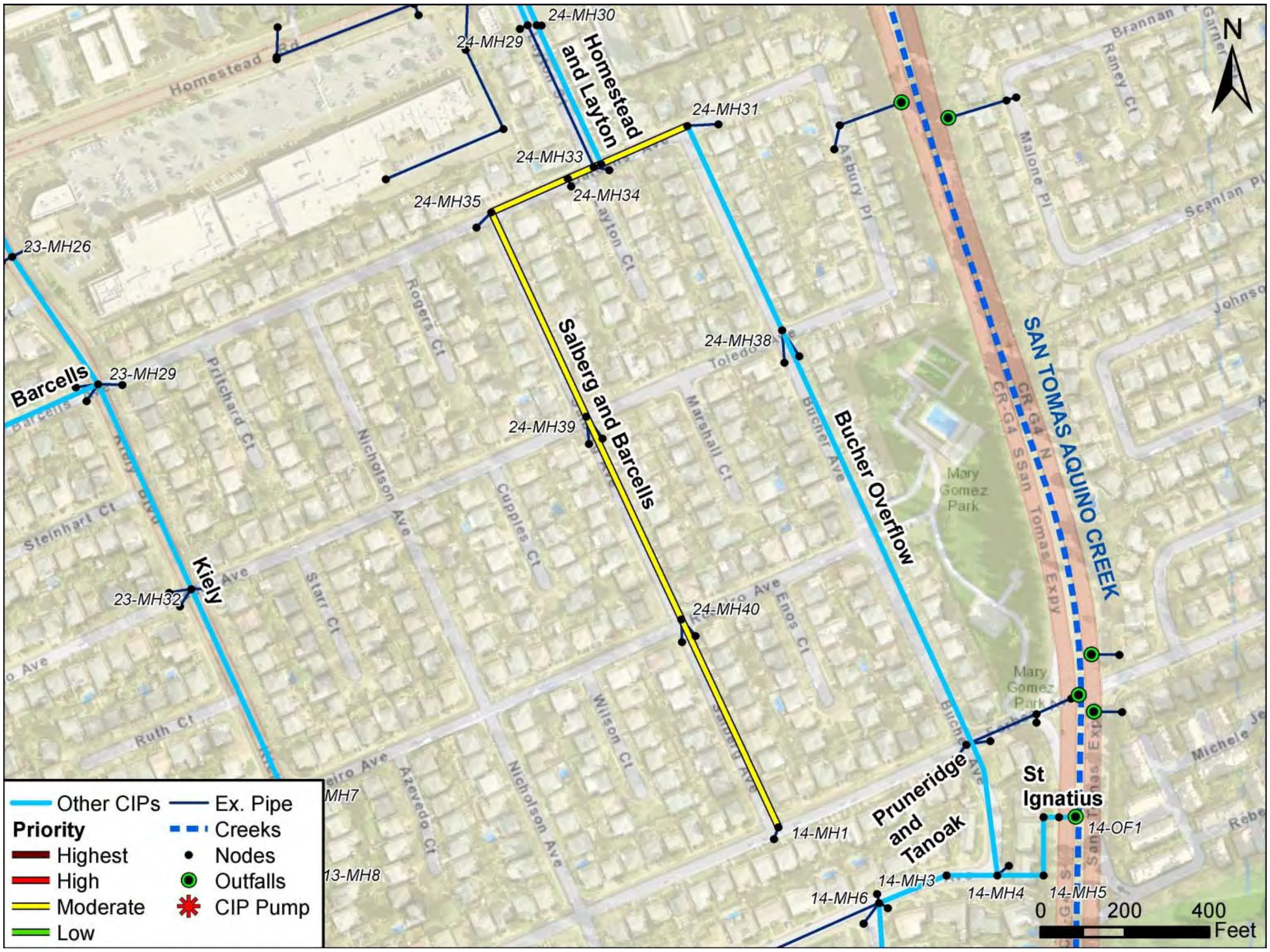
F. Type: Capacity

G. Project Description: 10-year flooding occurs on Salberg Ave. and Barcells Ave. Upsizing existing 12" and 15" pipe on Salberg and Barcells is recommended. Prior construction of the Homestead and Layton is required.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	18	15	540
12	48	42	220
15	21	16	530
15	24	21	530
15	30	27	290

H. Special Considerations: Prior construction of Homestead and Layton is required

I. Alternatives: N/A



A. Project ID: 42	**B. Project Name: Salberg and Barcells**
C. Project Location: Salberg Ave. and Forbes Ave. to Barcells Ave and Layton Ct.	
D. Priority: Moderate	
E. Storm Drain Block Book Location: 14-MH1 to 24-MH32	

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$54,000**
24-MH31 to 24-MH32, 14-MH1 to 24-MH40	12	4	760	LF	$23	$18,000
24-MH40 to 24-MH32	15	4	1,350	LF	$27	$36,000
Pipe Construction						**$539,000**
14-MH1 to 24-MH40	18	5	540	LF	$187	$101,000
24-MH40 to 24-MH39	21	5	530	LF	$243	$129,000
24-MH39 to 24-MH35	24	4	530	LF	$221	$117,000
24-MH35 to 24-MH32	30	4	290	LF	$293	$85,000
24-MH31 to 24-MH32	48	2	220	LF	$486	$107,000
Structures						
Manholes						$100,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$690,000**
Mobilization/Demobilization					10%	$69,000
Traffic Control					5%	$34,000
Contingency					40%	$280,000
CONSTRUCTION COST TOTAL						**$1,070,000**
Engineering/Inspection					20%	$210,000
CIP TOTAL						**$1,280,000**

A. Project ID: 43	**B. Project Name: Scott and Anna**

C. Project Location: Scott Blvd. from Benton St. to Clay St.

D. Priority: Moderate

E. Storm Drain Block Book Location: 35-MH42 to 35-MH16

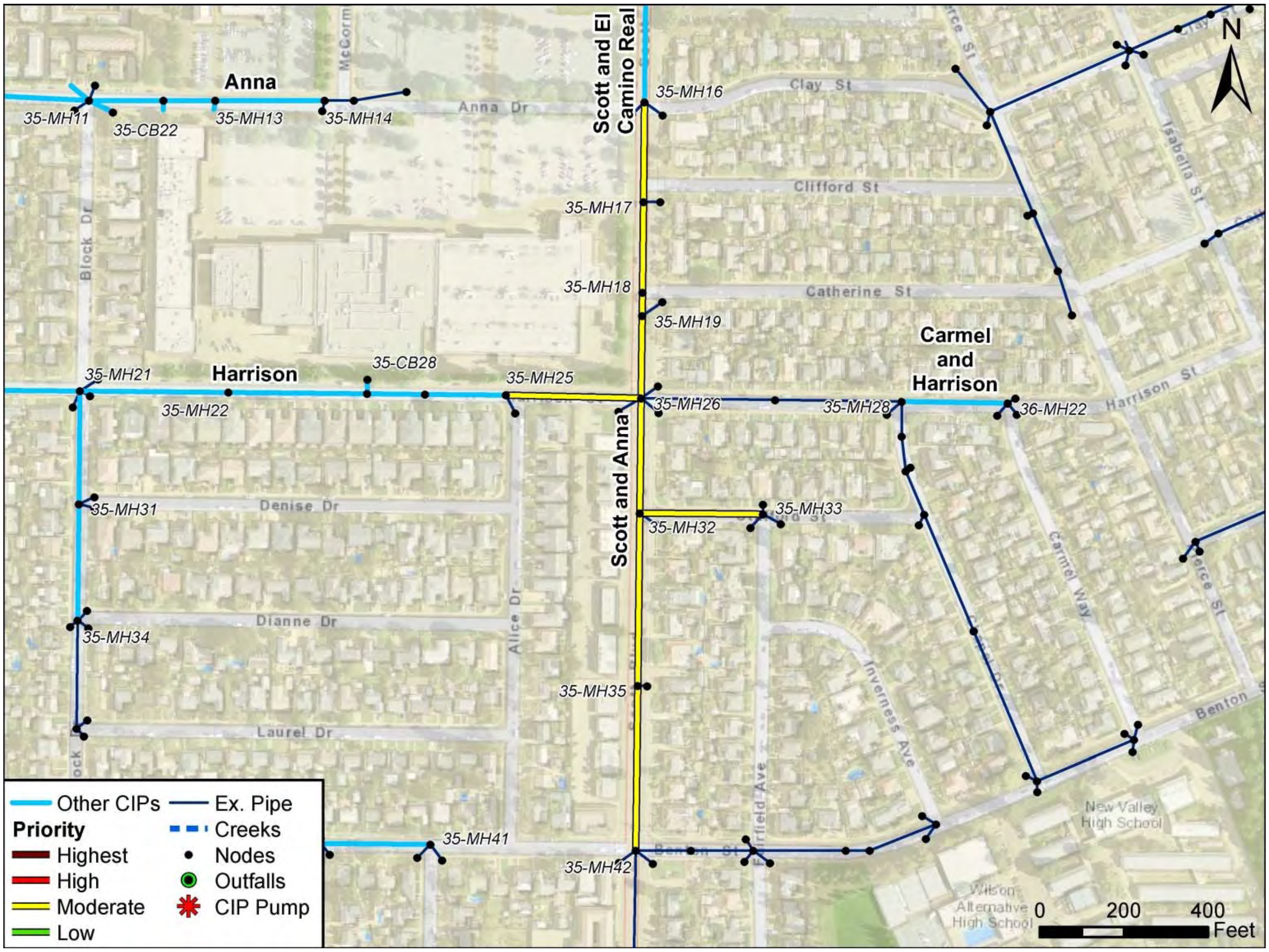
F. Type: Capacity

G. Project Description: 10-year flooding occurs east of Scott Blvd. near Anna Dr. upsizing existing 12" to 18" pipe on Scott and Anna is recommended. Prior construction of the Harrison project is required.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
12	15	12	800
12	18	15	290
15	21	16	520
18	21	14	450
-	21	-	320

H. Special Considerations: Prior construction of the Harrison project is required

I. Alternatives: N/A



A. Project ID: 43 | **B. Project Name: Scott and Anna**

C. Project Location: Scott Blvd. from Benton St. to Clay St.

D. Priority: Moderate

E. Storm Drain Block Book Location: 35-MH42 to 35-MH16

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$52,000**
35-MH42 to 35-MH32, 35-MH33 to 35-MH32	12	4	1,090	LF	$23	$26,000
35-MH32 to 35-MH18	15	4	520	LF	$27	$14,000
35-MH18 to 35-MH16	18	4	450	LF	$27	$12,000
Pipe Construction						**$489,000**
35-MH42 to 35-MH32	15	5	800	LF	$180	$144,000
35-MH33 to 35-MH32	18	2	290	LF	$186	$55,000
35-MH32 to 35-MH16, 35-MH26 to 35-MH25	21	5	1,290	LF	$226	$291,000
Structures						
Manholes						$120,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$660,000**
Mobilization/Demobilization					10%	$66,000
Traffic Control					5%	$33,000
Contingency					40%	$270,000
CONSTRUCTION COST TOTAL						**$1,030,000**
Engineering/Inspection					20%	$200,000
CIP TOTAL						**$1,230,000**

A. Project ID: 44 | **B. Project Name: St Ignatius**

C. Project Location: St Ignatius Rd. from Fordham Dr. to Calabazas Creek outfall

D. Priority: Moderate

E. Storm Drain Block Book Location: 42-MH2 to 42-OF1

F. Type: Capacity

G. Project Description: Significant 10-year flooding occurs south of St. Ignatius Pl. Upsizing these pipes to 21” is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
18	21	14	700

H. Special Considerations: N/A

I. Alternatives: N/A

A. Project ID: 44 | **B. Project Name: St Ignatius**

C. Project Location: St Ignatius Rd. from Fordham Dr. to Calabazas Creek outfall

D. Priority: Moderate

E. Storm Drain Block Book Location: 42-MH3 to 42-OF1

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$19,000**
42-MH3 to 42-OF1	18	4	700	LF	$27	$19,000
Pipe Construction						**$155,000**
42-MH3 to 42-OF1	21	4	700	LF	$221	$155,000
Structures						
Manholes						$37,000
Catch Basins						$0
Outfalls						$40,000
SUBTOTAL						**$250,000**
Mobilization/Demobilization					10%	$25,000
Traffic Control					5%	$12,000
Contingency					40%	$99,000
CONSTRUCTION COST TOTAL						**$390,000**
Engineering/Inspection					20%	$70,000
CIP TOTAL						**$460,000**

A. Project ID: 45

B. Project Name: Tahoe and Enochs

C. Project Location: Tahoe Way to Enochs St.

D. Priority: Moderate

E. Storm Drain Block Book Location: 60-MH14 to 60-MH11

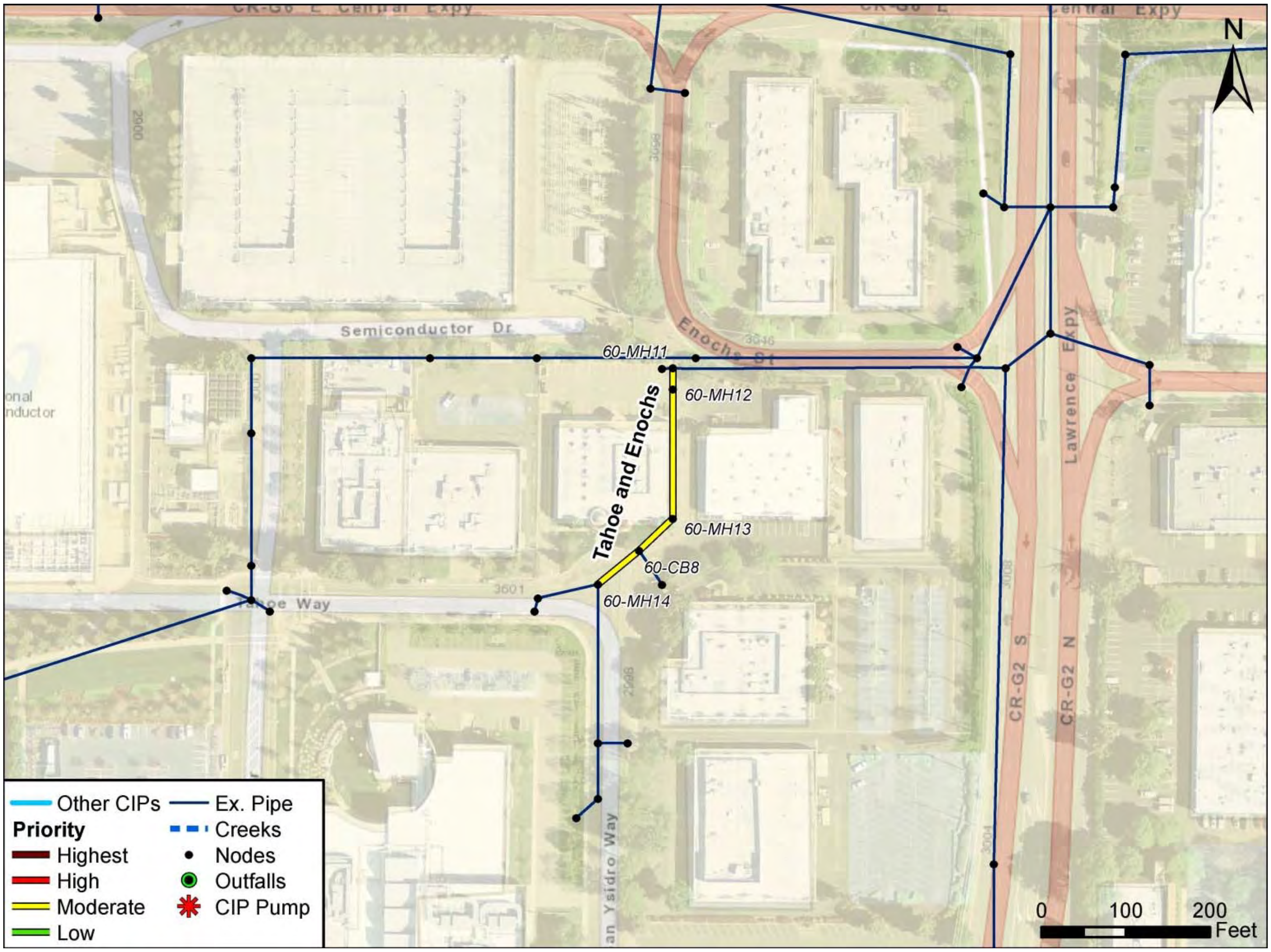
F. Type: Capacity

G. Project Description: 10-year flooding occurs near a critical facility on Semiconductor Dr. Upsizing pipes in Tahoe Way and Enochs St. is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	18	12	300

H. Special Considerations: Easement through commercial development

I. Alternatives: N/A



A. Project ID: 45 | **B. Project Name: Tahoe and Enochs**

C. Project Location: Tahoe Way to Enochs St.

D. Priority: Moderate

E. Storm Drain Block Book Location: 60-MH14 to 60-MH11

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$8,000**
60-MH14 to 60-MH11	15	3	300	LF	$27	$8,000
Pipe Construction						**$55,000**
60-MH14 to 60-MH11	18	3	300	LF	$186	$55,000
Structures						
Manholes						$61,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$120,000**
Mobilization/Demobilization					10%	$12,000
Traffic Control					5%	$6,000
Contingency					40%	$50,000
CONSTRUCTION COST TOTAL						**$190,000**
Engineering/Inspection					20%	$40,000
CIP TOTAL						**$230,000**

A. Project ID: 46	**B. Project Name: Tannery**

C. Project Location: Tannery Way near Calabazas Creek and Peterson Way

D. Priority: Moderate

E. Storm Drain Block Book Location: 72-MH14 to 72-MH13

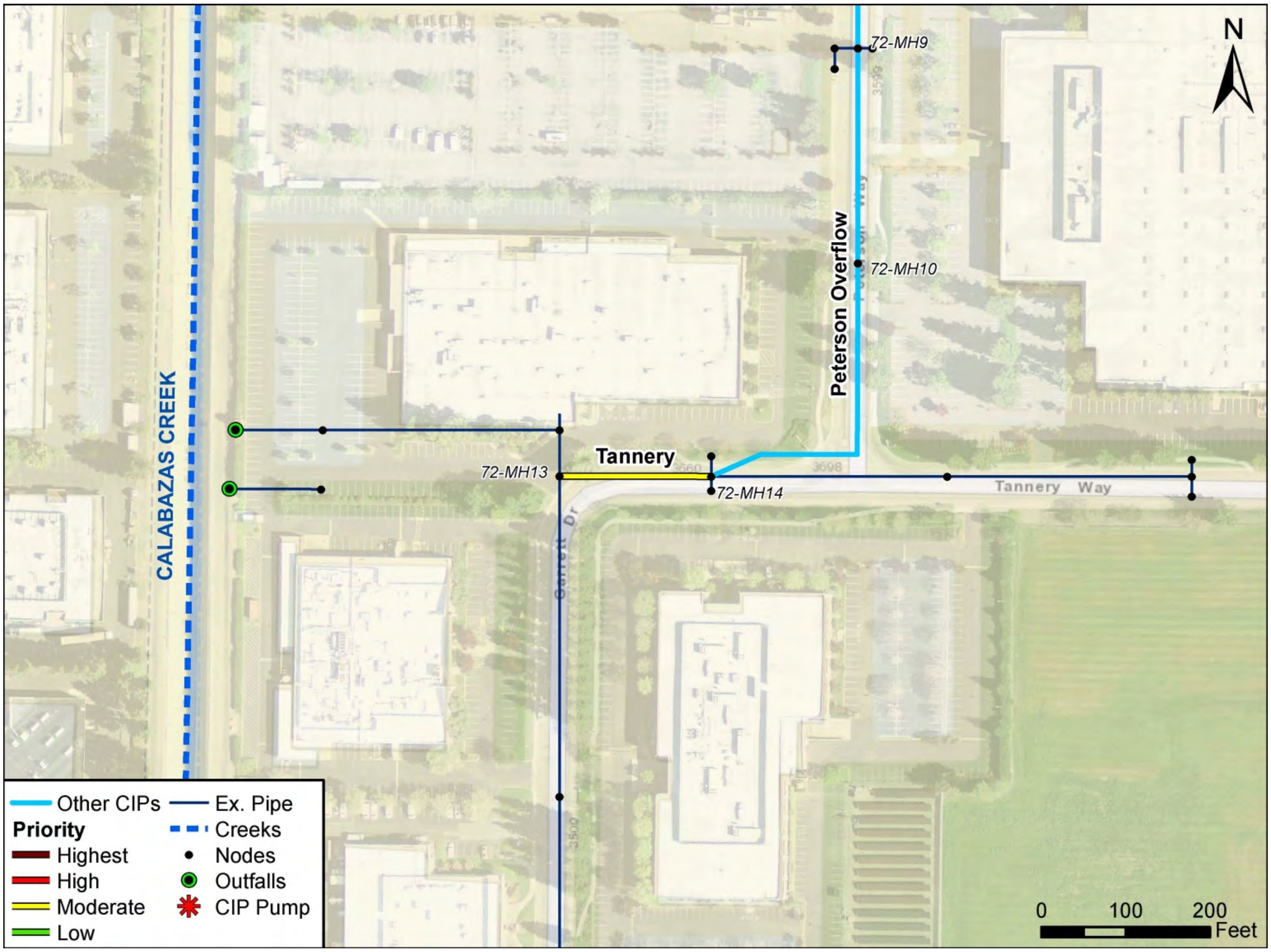
F. Type: Capacity

G. Project Description: 10-year flooding occurs upstream of Garrett Dr. on Tannery Way. Upsizing a short length of pipe at Tannery Way and Garrett Dr. to 18" is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
24	33	27	180

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 46 | **B. Project Name: Tannery**

C. Project Location: Tannery Way near Calabazas Creek and Peterson Way

D. Priority: Moderate

E. Storm Drain Block Book Location: 72-MH14 to 72-MH13

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$6,000**
72-MH14 to 72-MH13	24	4	180	LF	$34	$6,000
Pipe Construction						**$58,000**
72-MH14 to 72-MH13	33	4	180	LF	$320	$58,000
Structures						
Manholes						$26,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$90,000**
Mobilization/Demobilization					10%	$9,000
Traffic Control					5%	$5,000
Contingency					40%	$37,000
CONSTRUCTION COST TOTAL						**$140,000**
Engineering/Inspection					20%	$30,000
CIP TOTAL						**$170,000**

A. Project ID: 47 | **B. Project Name: Victor**

C. Project Location: Victor St. to Aldo Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 78-MH14 to 78-MH3

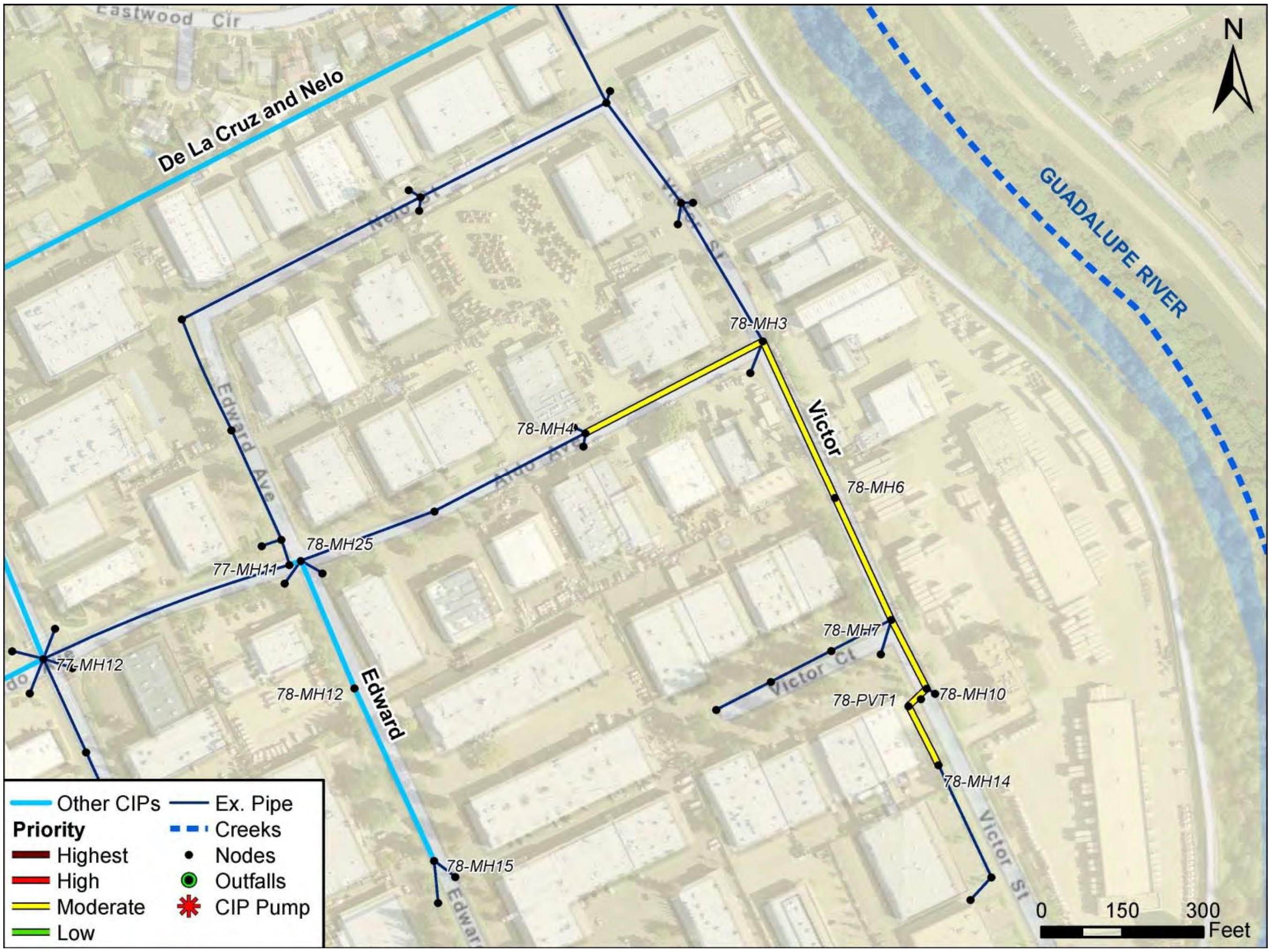
F. Type: Capacity

G. Project Description: 10-year event flooding occurs in the development on the east side of Victor Street. Upsizing existing pipes on Victor Street is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
18	21	14	120
18	24	18	50
21	30	24	710

H. Special Considerations: N/A

I. Alternatives: N/A



A. Project ID: 47 | **B. Project Name: Victor**

C. Project Location: Victor St. to Aldo Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 78-MH14 to 78-MH3

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$29,000**
78-MH14 to 78-MH10	18	2	170	LF	$27	$5,000
78-MH10 to 78-MH3	21	3	710	LF	$34	$24,000
Pipe Construction						**$247,000**
78-MH14 to 78-PVT1	21	2	120	LF	$209	$29,000
78-PVT1 to 78-MH10	24	2	50	LF	$230	$11,000
78-MH10 to 78-MH3	30	3	710	LF	$291	$208,000
Structures						
Manholes						$75,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$350,000**
Mobilization/Demobilization					10%	$35,000
Traffic Control					5%	$17,000
Contingency					40%	$140,000
CONSTRUCTION COST TOTAL						**$540,000**
Engineering/Inspection					20%	$100,000
CIP TOTAL						**$640,000**

A. Project ID: 48 | **B. Project Name: Victoria**

C. Project Location: Victoria Ave. to Townsend Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 42-MH17 to 42-MH15

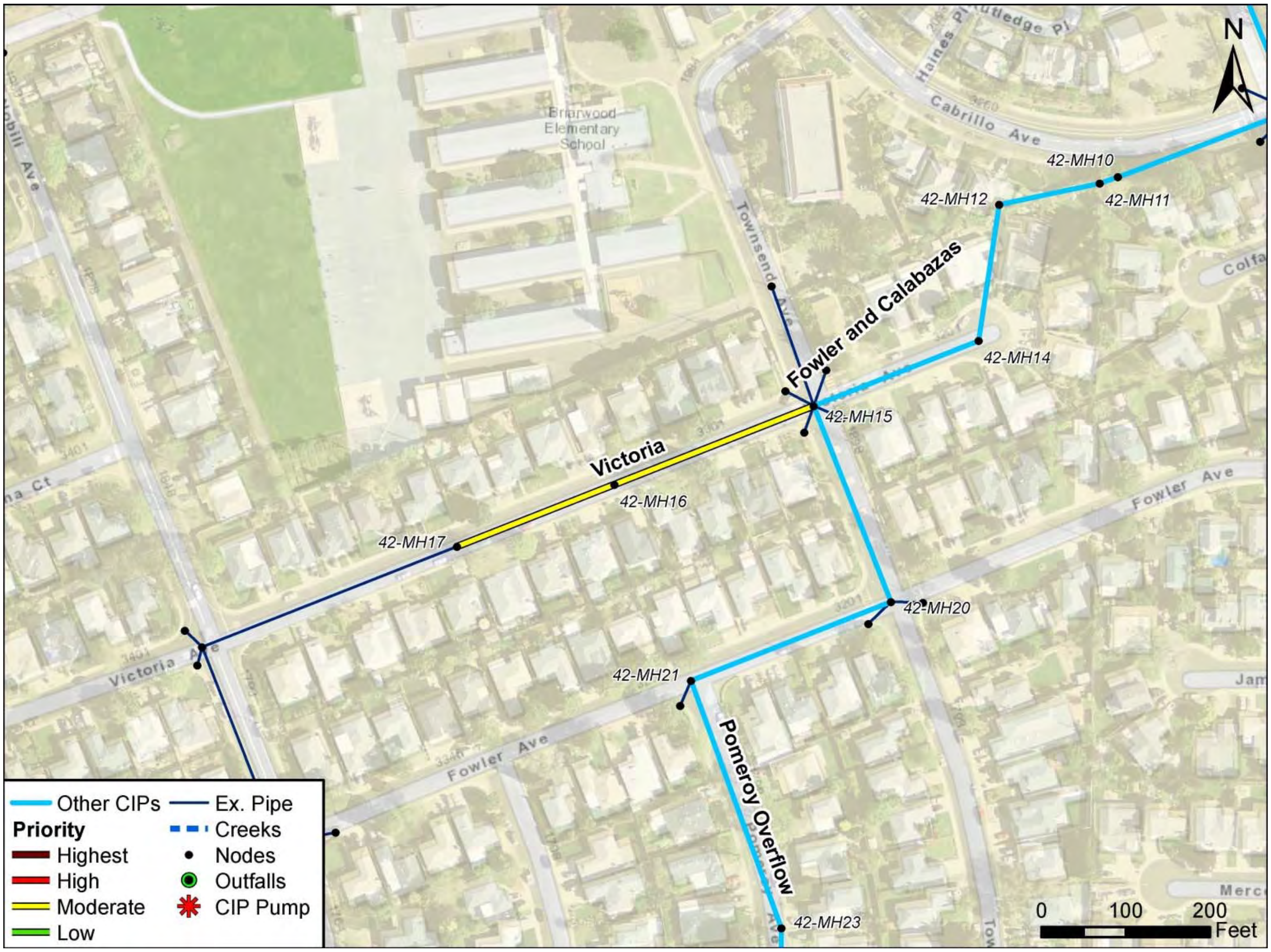
F. Type: Capacity

G. Project Description: 10-year flooding occurs north of Victoria Ave. upstream of Townsend Ave. Upsizing pipes in Victoria Ave. is recommended. Prior completion of the Fowler and Calabazas project is required.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	18	12	200
15	21	16	250

H. Special Considerations: Prior construction of Fowler and Calabazas project required

I. Alternatives: N/A



A. Project ID: 48 | **B. Project Name: Victoria**

C. Project Location: Victoria Ave. to Townsend Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 42-MH17 to 42-MH15

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$13,000**
42-MH17 to 42-MH15	15	5	450	LF	$27	$13,000
Pipe Construction						**$90,000**
42-MH17 to 42-MH16	18	5	200	LF	$186	$37,000
42-MH16 to 42-MH15	21	6	250	LF	$209	$53,000
Structures						
Manholes						$37,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$140,000**
Mobilization/Demobilization					10%	$14,000
Traffic Control					5%	$7,000
Contingency					40%	$60,000
CONSTRUCTION COST TOTAL						**$220,000**
Engineering/Inspection					20%	$40,000
CIP TOTAL						**$260,000**

A. Project ID: 49 | **B. Project Name: Walsh**

C. Project Location: Walsh Ave between existing pipe systems

D. Priority: Moderate

E. Storm Drain Block Book Location: 56-MH7 to 56-MH8

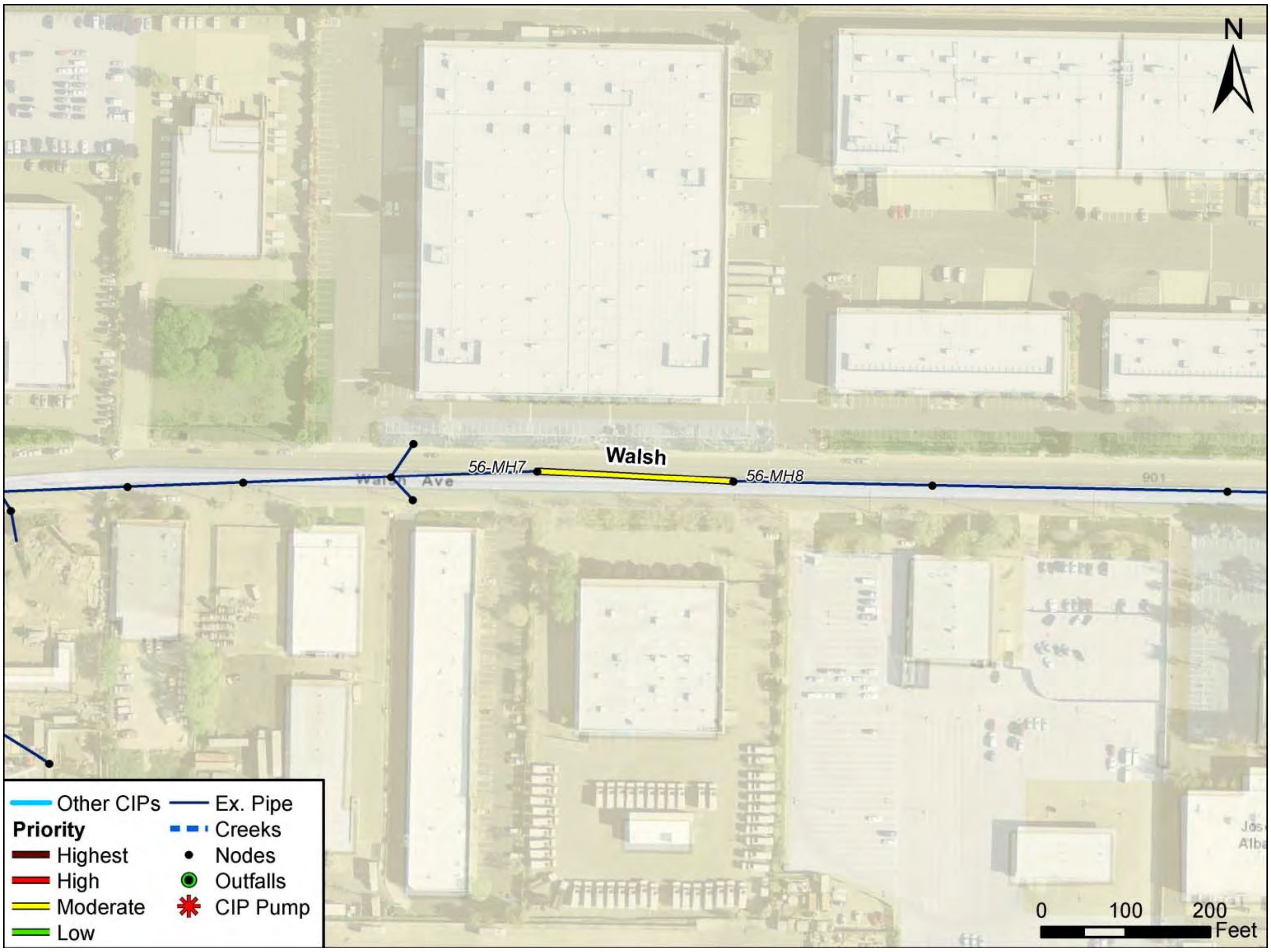
F. Type: Capacity

G. Project Description: Constructing a new overflow on Walsh Ave. connecting the system on Lafayette St. to the system on Scott Blvd. is recommended, as this will alleviate high flows to Lafayette pump station.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
-	18	-	230

H. Special Considerations: Prior construction of Lafayette and Laurelwood project recommended

I. Alternatives: N/A



A. Project ID: 49

B. Project Name: Walsh

C. Project Location: Walsh Ave between existing pipe systems

D. Priority: Moderate

E. Storm Drain Block Book Location: 56-MH7 to 56-MH8

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Construction						**$44,000**
56-MH7 to 56-MH8	18	3	230	LF	$190	$44,000
Structures						
Manholes						$24,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$68,000**
Mobilization/Demobilization					10%	$7,000
Traffic Control					5%	$3,000
Contingency					40%	$28,000
CONSTRUCTION COST TOTAL						**$110,000**
Engineering/Inspection					20%	$20,000
CIP TOTAL						**$130,000**

A. Project ID: 50 | **B. Project Name: Walsh and De La Cruz**

C. Project Location: Walsh Ave. between Lafayette St. and De La Cruz Blvd.

D. Priority: Moderate

E. Storm Drain Block Book Location: 57-MH2 to 58-MH2

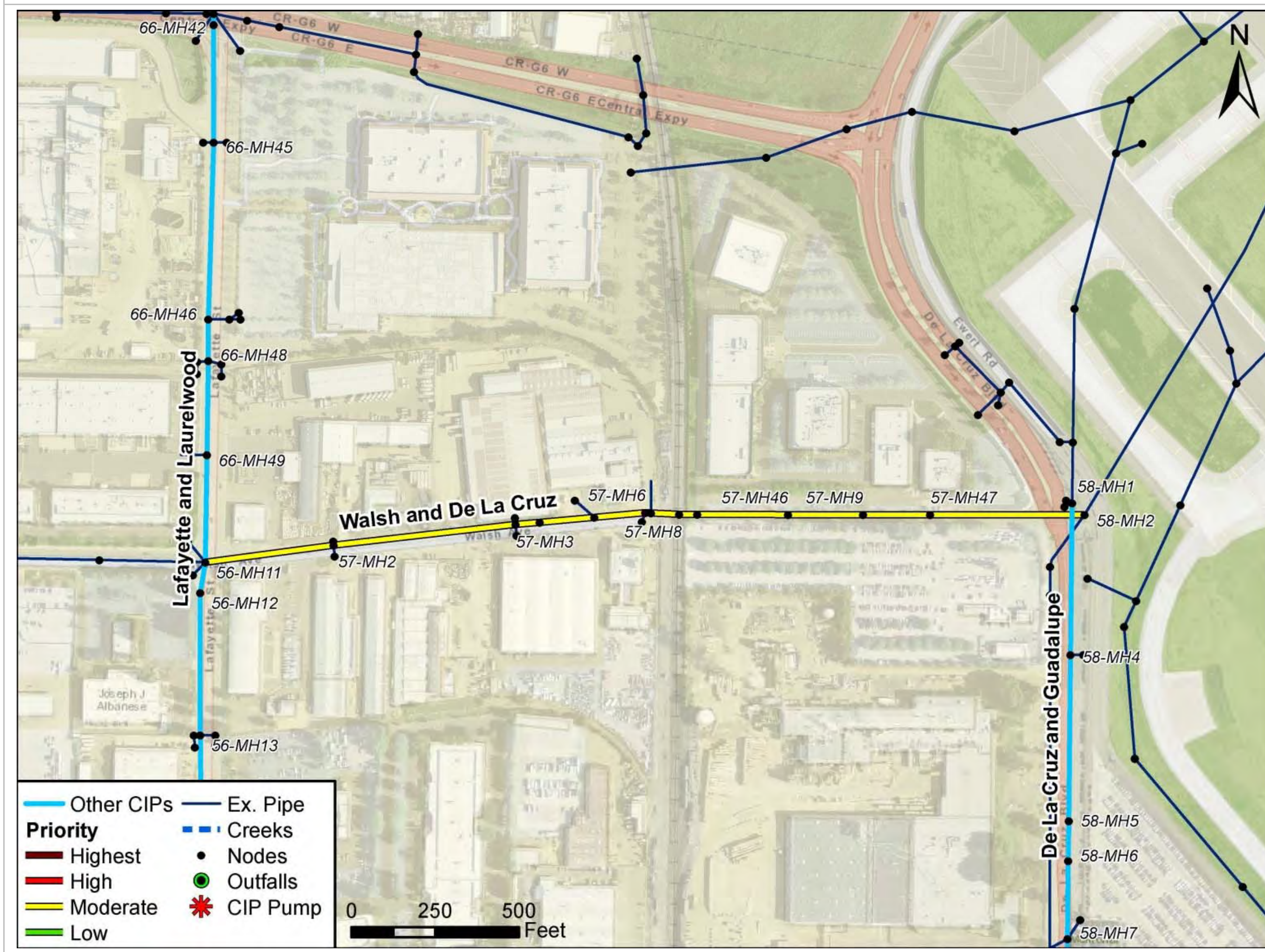
F. Type: Capacity

G. Project Description: Existing pipe downstream of Walsh Avenue on De La Cruz is undersized. Upsizing and regrading existing pipe on Walsh Avenue to redirect flows is recommended. Prior construction of the Lafayette and Laurelwood project is required.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	66	66	620
18	66	66	320
27	66	60	1,310
-	66	-	390

H. Special Considerations: Crosses VTA line. Prior construction of Lafayette and Laurelwood is recommended

I. Alternatives: N/A



A. Project ID: 50	**B. Project Name: Walsh and De La Cruz**
C. Project Location: Walsh Ave. between Lafayette St. and De La Cruz Blvd.	
D. Priority: Moderate	
E. Storm Drain Block Book Location: 57-MH2 to 58-MH2	

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$82,000**
57-MH2 to 57-MH4	15	1	620	LF	$27	$17,000
57-MH4 to 57-MH6	18	1	320	LF	$27	$9,000
57-MH6 to 58-MH2	27	1	1,310	LF	$43	$57,000
Pipe Construction						**$1,904,000**
57-MH2 to 58-MH2, 57-MH2 to 56-MH11	66	1	2,630	LF	$724	$1,904,000
Structures						
Manholes						$210,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$2,200,000**
Mobilization/Demobilization					10%	$220,000
Traffic Control					5%	$110,000
Contingency					40%	$880,000
CONSTRUCTION COST TOTAL						**$3,410,000**
Engineering/Inspection					20%	$680,000
CIP TOTAL						**$4,090,000**

A. **Project ID**: 51	B. **Project Name**: **Warburton and Nobili**

C. **Project Location**: **Warburton Ave. between Fowler Ave. and Nobili Ave.**

D. **Priority**: **Moderate**

E. **Storm Drain Block Book Location**: **41-MH42 to 42-MH26**

F. **Type**: **Capacity**

G. **Project Description**: 10-year flooding occurs around Warburton Ave. due to undersized pipes. Upsizing a short reach of pipes in this location to 18" is recommended.

Ex. Diameter (in)	Replacement Pipe Diameter (in)	Parallel Pipe Diameter (in)	Length (ft)
15	18	12	300

H. **Special Considerations**: N/A

I. **Alternatives**: N/A

A. Project ID: 51

B. Project Name: Warburton and Nobili

C. Project Location: Warburton Ave. between Fowler Ave. and Nobili Ave.

D. Priority: Moderate

E. Storm Drain Block Book Location: 41-MH42 to 42-MH26

F. Project Cost:

MAJOR ITEMS	DIAM. (in)	DEPTH (ft)	QTY.	UNIT	UNIT COST	COST
BASELINE CONSTRUCTION COST						
Pipe Demo/Disposal						**$8,000**
41-MH42 to 42-MH24	15	2	300	LF	$27	$8,000
Pipe Construction						**$56,000**
41-MH42 to 42-MH24	18	2	300	LF	$186	$56,000
Structures						
Manholes						$24,000
Catch Basins						$0
Outfalls						$0
SUBTOTAL						**$88,000**
Mobilization/Demobilization					10%	$9,000
Traffic Control					5%	$4,000
Contingency					40%	$35,000
CONSTRUCTION COST TOTAL						**$140,000**
Engineering/Inspection					20%	$30,000
CIP TOTAL						**$170,000**

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Appendix E. Hydromodification Map for City of Santa Clara