Los Altos

Stormwater Master Plan

April 2016

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City of Los Altos

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EXECUTIVE SUMMARY

Master planning has been undertaken to help guide the City of Los Altos (City) in establishing a prioritized capital improvement program to mitigate the impacts of stormwater runoff. The last comprehensive City-wide stormwater master plan was conducted in 1966. The City has grown substantially in the past 50 years and there have been significant changes to runoff characteristics, drainage systems and regulatory requirements.

Background

A study background including hydrologic and environmental settings, flood protection facilities, historic flooding and regulatory floodplain mapping efforts within the City are described in Chapter 1 of this report. A brief synopsis of the history of flooding analysis conducted prior to this master plan is provided below.

City of Los Altos Master Storm Drainage Plan, 1966

Conducted by Eugene R. Mastin, this study analyzed the existing storm drainage system in the City of Los Altos and recommended additional pipe networks to be installed along with proposed sanitary sewer construction projects to provide a 10-year level of service. Not all recommended improvements have been constructed.

FEMA Flood Insurance Study, 2009

The Federal Emergency Management Agency (FEMA) prepared a Flood Insurance Study (FIS) Report for the City of Los Altos and Santa Clara County in 2009. The FIS concentrated on 100-year flooding from rainfall runoff, including portions of Hale Creek, Permanente Creek, Adobe Creek, and Stevens Creek. This report is an update of the 1998 FIS and does not use new hydraulic analyses.

Sources of Flooding

Local runoff is the major source of flooding that Los Altos faces, further complicated by creek influences at each outlet point. This master plan focuses on how that runoff is conveyed by major conveyance facilities. The City plans to work with local agencies and property owners to develop a regional system of major conveyance facilities which will contain storm flows to prevent damage to property and threats to public safety. Namely the Santa Clara Valley Water District (SCVWD), the agency responsible for flood protection and healthy creeks throughout the entire valley.

Runoff generated within the City's boundary is conveyed through the City owned stormwater system that outfalls to SCVWD's four creeks (Hale, Permanente, Adobe, and Stevens) and then to the San Francisco Bay. Portions of the City's watersheds drain directly to creek channels while a portion of the runoff ponds along rural streets. Conveyance and capacity deficiencies within the City's stormwater system can contribute to flooding within the City. One key objective of the Stormwater Master Plan is to address this risk. Because the City of Los Altos is located at the toe of the Santa Cruz Mountains, the capacity of these drainage systems is linked to the slope of the land and influence of the creek channels.

Work Products

This master plan is intended to function as a multifaceted resource for the City of Los Altos. City planners and engineers responsible for capital improvements should find that this document contains sufficient background information and data to serve as a basis for storm drainage Capital Improvement Projects (CIP) implementation and/or modification. For the City and other parties interested in a more in-depth examination of stormwater facilities within Los Altos, the companion Geographic Information System

(GIS)-based Environmental Protection Agency Storm Water Management Model (EPA SWMM5) hydraulic computer model is available. The following information is available via the GIS:

1. ***Inventory of Drainage Facilities.*** City-owned drainage pipes at least 12 inches in diameter in the study area are entered into the stormwater model. There are only a few (1%) City-owned drainage pipes smaller than 12 inches in diameter. Information pertaining to each system component may be accessed graphically or through database spreadsheets which have been provided on a CD and attached to this report.
2. ***Tributary Drainage Areas.*** Land areas used to generate local runoff are also available graphically in the stormwater model. Tributary areas, factors related to land use and soil conditions and other basin morphology, are included.
3. ***Stormwater Flows.*** Stormwater flows are documented in the model. For each drainage system, component peak discharge and maximum hydraulic grade line are computed. Based on hydraulic grade calculations, the degree of surcharge and depth of water in the street are also determined. This determination is then used to assign priorities for system remediation.

This master plan does not include improvements for the four local creeks (Hale, Permanente, Adobe, and Stevens) in which the City's stormwater system flows into as mentioned in the previous section. These creeks and related culverts are the responsibility of the SCVWD, which as the local public agency, focuses their resources on flood protection and upkeep of healthy creeks in all of Santa Clara County. However, the City will coordinate with the SCVWD on creek flooding to ensure the safety and integrity of the City's complete stormwater system.

Study Findings

Several conclusions have been reached regarding Los Altos' storm drainage systems. From these conclusions, improvements are recommended for the system's performance so as to reduce the risk of flooding. While there are many areas within the City of Los Altos that provide adequate stormwater conveyance for a 10-year event, there are also known areas within each subsection of the City where flooding occurs and will continue to flood. There are also regions of the City that lack a formal drainage system and require improvements. Complying with the Municipal Regional Permit (MRP) will require additional O&M and Engineering staff services. The improvements recommended in this Master Plan should be considered a comprehensive Capital Improvement Program within the study area.

Master Plan Costs and Benefits

Capital projects are needed to provide the benefits of reduced flood risk and relief from economic impacts during heavy stormwater runoff events. Failure to provide capital improvements or maintain the stormwater systems could interrupt daily commerce throughout the City affecting all residents who receive a benefit from a functional stormwater system regardless of whether their property is directly affected by said improvements and maintenance. Table ES-1 summarizes recommended capital improvement costs for existing and future stormwater within the City including the extension and upsizing of existing stormwater pipelines. Refer to Chapters 3 and 4 for figures detailing the stormwater deficiencies and recommended improvements.

Table ES-1: Summary of Stormwater Plan Costs

Project Priority	Construction Allowance with Contingencies
High Priority	$3,800,000
Moderate Priority	$11,500,000
Low Priority	$13,800,000

All cost estimates for total allowance with contingencies include an additional 20% for design and administration and 20% contingency.

Regulatory Compliance

The City is required by the State of California to administer the Construction General Permit (CGP) for storm water, while the US EPA requires the City to comply with the National Pollutant Discharge Elimination System (NPDES) permit. These two programs improve the quality of storm water runoff and protect local creek channels and the San Francisco Bay. The NPDES permit includes trash as a pollutant to be regulated. The City's Trash Capture Plan (Appendix C) fulfills the requirements set forth in the permit, Provision C.10, for the 2016 goals and comprises a combination of methods, strategies, and scheduling designed to work together to provide the City with a flexible strategy for compliance. Further devices may be required to meet the 2017 and 2022 requirements.

The annual costs associated with regulatory compliance are as follows; $200,000 for engineering staff, $170,000 for maintenance staff, $100,000 for permit and fees, and $20,000 for equipment. This totals about $490,000.

Financial Analysis

Though historically supported predominantly by General Fund resources, the scale and projection of expenditures in the Stormwater Program in a time of competing demands on constrained General Fund revenue necessitates pursuit of dedicated revenue streams for the Stormwater Program. Furthermore, the Program should seek to be a self-sustained operation, actively maintaining a structure of reserves to segregate dedicated revenues and capital proceeds for the purpose they were collected. Fully funding the amount and pacing of the capital improvement program within a smoothly phased revenue strategy with the lowest cost burden to property owners may require debt-financing and the accumulation and use of cash reserves.

With these requirements and associated financing strategy, the City may expect an annual cost to property owners. Establishing this property-based levy under existing California law will require some degree of direct property owner and/or voter approval, ranging from a majority of responding property owners to 2/3 of the electorate, depending on the mechanism pursued. A critical next action item in the implementation of this Plan will be the City's study of the political feasibility of achieving community approval.

Recommendations

Improving the quality of storm water runoff and reducing local flood risks by improving the City's storm drainage systems is a necessity. This Master Plan provides a tool for Los Altos citizens and officials to use in their efforts to reduce the risk of serious local flood hazards — whether nuisance flooding or real hazards to property — by completing the identified capital improvement projects. Providing a reliable funding source will insure compliance with the new water quality permit and support healthier creeks and a cleaner San Francisco Bay. Increasing engineering and operations efforts will assure that this storm water program will be a high-quality benefit to the citizens of Los Altos.

CHAPTER 1
INTRODUCTION

This chapter provides a general background of flood management issues currently affecting the City of Los Altos, criteria used to evaluate stormwater system performance, and a summary of data acquired as part of the City's Stormwater Master Plan (SWMP). Hydrologic and environmental settings are described, along with flood protection and stormwater facilities. Historic flooding, a summary timeline of regulatory floodplain mapping efforts within the City, and Master Plan objectives are discussed herein.

Setting

The City of Los Altos is on the southern end of the San Francisco Peninsula in Santa Clara County. It is bordered by Los Altos Hills, Sunnyvale, Mountain View, Palo Alto, Cupertino, and Unincorporated Santa Clara County. Los Altos is relatively flat, with elevations ranging from 50 feet National Geodetic Vertical Datum (NGVD), to about 450 feet NGVD.

Soils

The Natural Resources Conservation Service (NRCS) has classified soils into four hydrologic soil groups (A, B, C, and D) according to their infiltration rates. Appendix E shows Los Altos has mostly moderate to slow draining soils with very little D soils (very slow infiltration rate).

Climate

Los Altos' climate is marine-influenced with an average summertime high temperature of 78°F and an average low of 57°F, dropping to an average winter nighttime low temperature of 41°F and an average high of 60°F. Mean annual precipitation ranges from 15 to 22 inches, with the majority of that precipitation falling from November through April. Precipitation occurs entirely as rainfall. Snowmelt is not a hydrologic process that significantly affects runoff in the City.

Flood Protection Facilities

Precipitation that falls within the City of Los Altos generates stormwater runoff. This runoff is conveyed in a number of mostly manmade flood protection systems that discharge to creeks. Most of these systems do not interact with one another, and potential improvements to one system should not impact the performance of other systems. The total study area is roughly 6.3 square miles (4,000 acres). To create a rural aesthetic, many of the streets in Los Altos do not have traditional suburban curb and gutter lined streets. This layout provides some attenuation before runoff reaches a catch basin and enters a formal drainage system.

In addition to storm drains, flood protection is provided to the City of Los Altos by four creeks, (Hale, Stevens, Adobe, and Permanente), that convey storm-generated runoff north to the San Francisco Bay. These creeks are maintained by the Santa Clara Valley Water District (SCVWD), the agency responsible for maintaining these channels[1]. In addition, the SCVWD has a flood protection program with the intention of "protecting homes, businesses, and transportation networks from devastating effects of floods[2]." Figure 1-1 shows the location of the four creeks.

1 http://www.valleywater.org/Services/HealthyCreeksandEcoSystems.aspx
2 http://www.valleywater.org/Services/FloodProtection.aspx

Stormwater Network

Figure 1-1 delineates the City's five major drainage areas based on the existing City pipe network, all of which are tributaries feeding in to the creeks or neighboring community stormwater systems. The study area is defined as the existing Los Altos pipe network and each network's tributary area. Refer to Appendix A for labeled catchments within each drainage area. The tributary areas (Los Altos and other communities) for each drainage sub-area serviced by the Los Altos drainage network (Figure 1-1) and the total length of stormwater pipes (12 inches and larger) within each area are shown in Table 1-1.

Table 1-1: Watershed Areas and Length of Stormwater Pipe

Drainage Area	Area (square miles)	Pipe (miles)
Hale Creek	2.3	17.6
Adobe Creek	1.8	18.6
Permanente/Stevens Creek	1.5	14.3
Permanente Creek	0.4	2.9
Stevens Creek	0.3	1.7
TOTAL	**6.3**	**55.0**

History of Flooding within Los Altos

Heavy rainfalls in the winter months can produce flood situations in the City of Los Altos. 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 City employees. The most common local flooding occurs as a result of leaf litter in the system which can plug inlets and significantly reduce the effectiveness of the system, obstructed outlets due to vegetation, and tree roots interfering with gutter or culvert flow. Areas of known drainage issues are highlighted on the map in Figure 1-2 and are detailed in Chapters 3 and 4, and Appendix I.

Flooding locations during a 100-year storm event are identified in the *2009 FEMA Flood Insurance Study* (FIS) for the City of Los Altos. Zones A, AE, AO and AH are 100-year floodplains. The largest area of 100-year flooding in Los Altos is the Zone AO spill from the Permanente Creek Diversion. Figure 1-3 shows the FEMA flood zones in Los Altos.

The SCVWD is currently planning and designing large scale flood control improvements for Hale Creek, Permanente Creek, and the Permanente Creek Diversion with the City of Los Altos. The SCVWD also has plans for channel improvements for portions of Adobe Creek. These improvements should improve conveyance through Los Altos and decrease flood risk.

Recent Flood Protection Measures Taken

The City of Los Altos recognizes inadequacies in the existing stormwater system. These inadequacies are detailed in Chapter 3. In an effort to alleviate problems, the City has made some system improvements. Recent City activity has focused on:

Maintenance activities to keep stormwater inlets and outlets clear of vegetation and debris.
Documentation and evaluation of problem areas within the stormwater network.
Permanente Creek Flood Protection Project starting in 2016.

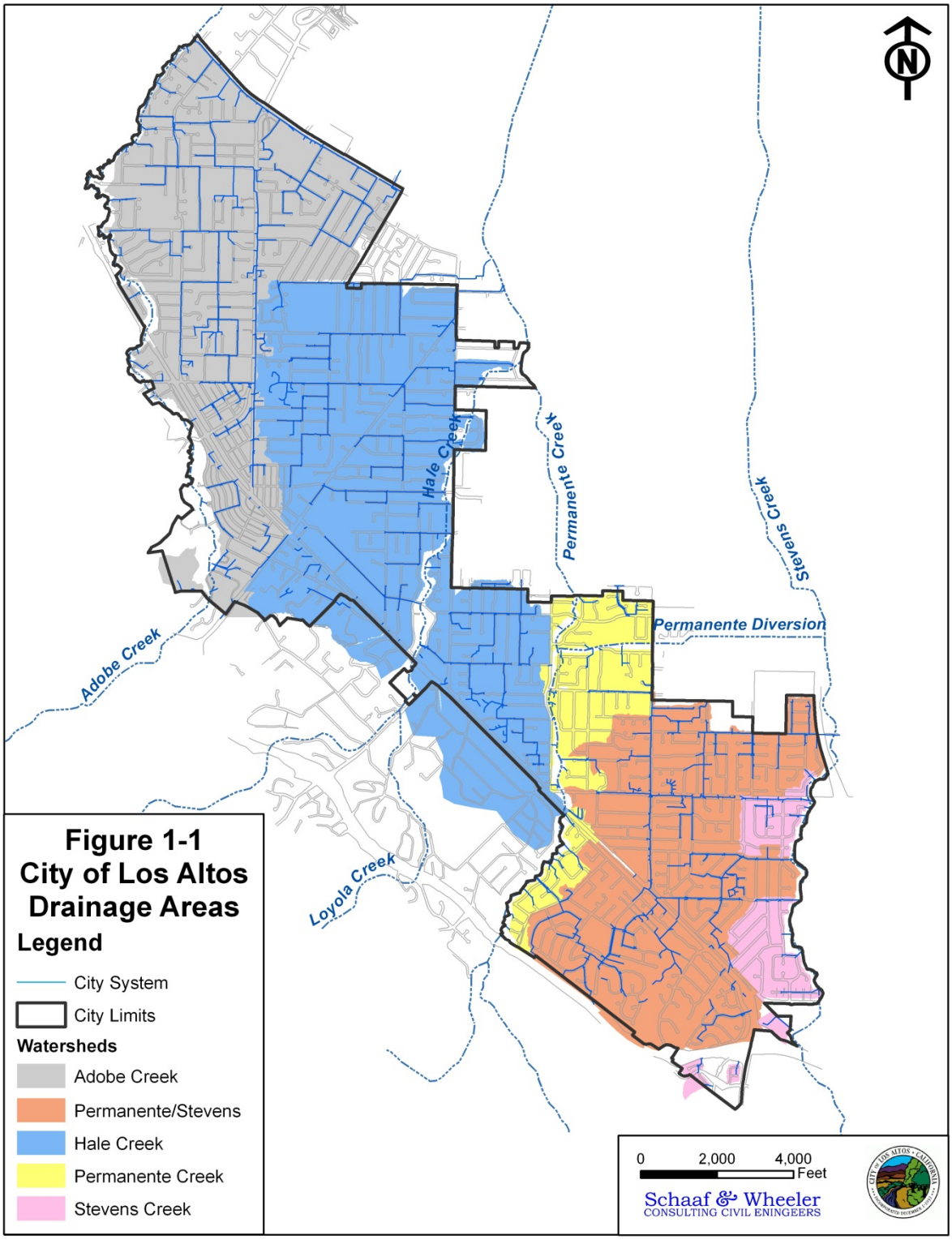

Figure 1-1: City of Los Altos Drainage Areas

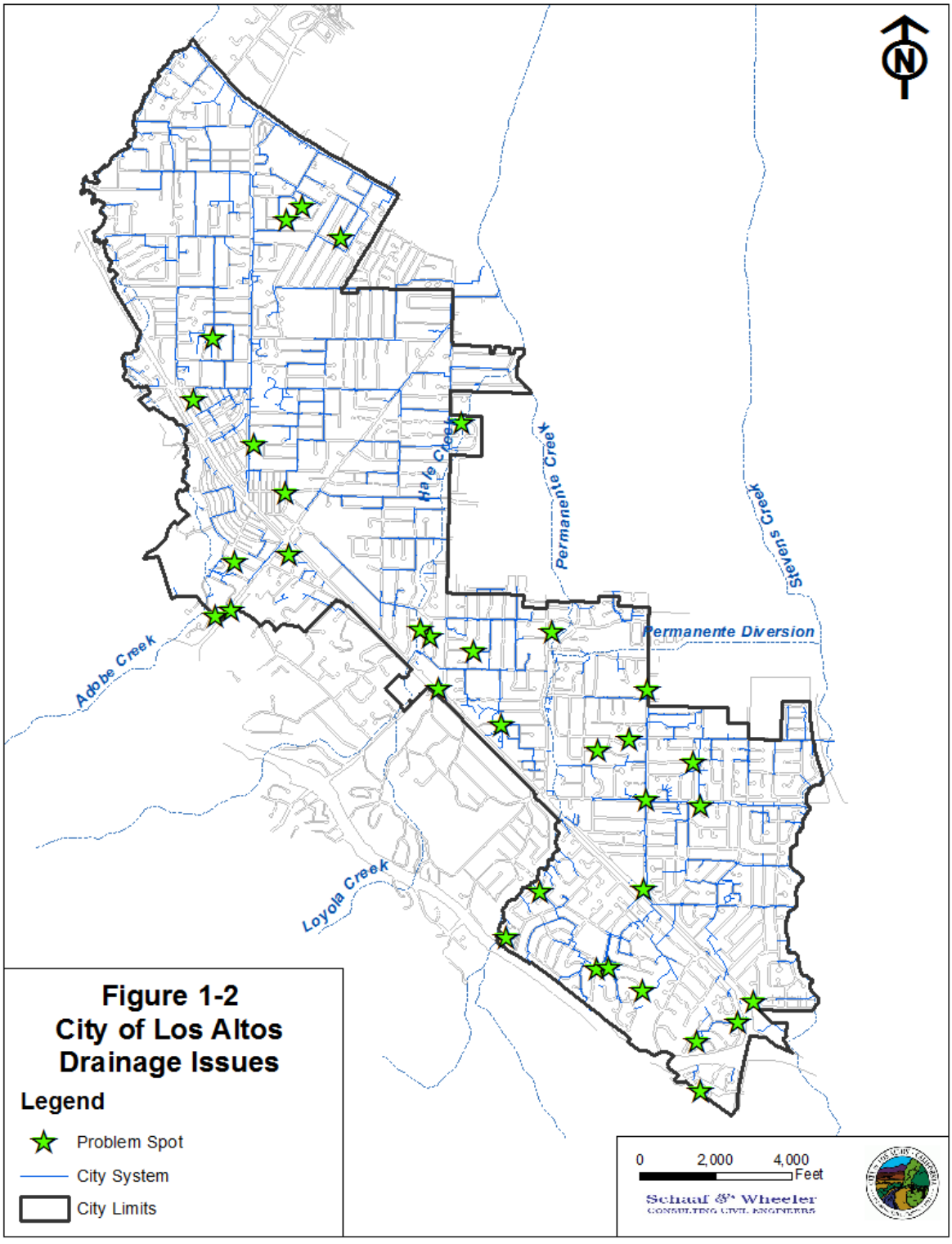

Figure 1-2: City of Los Altos Known Drainage Issues

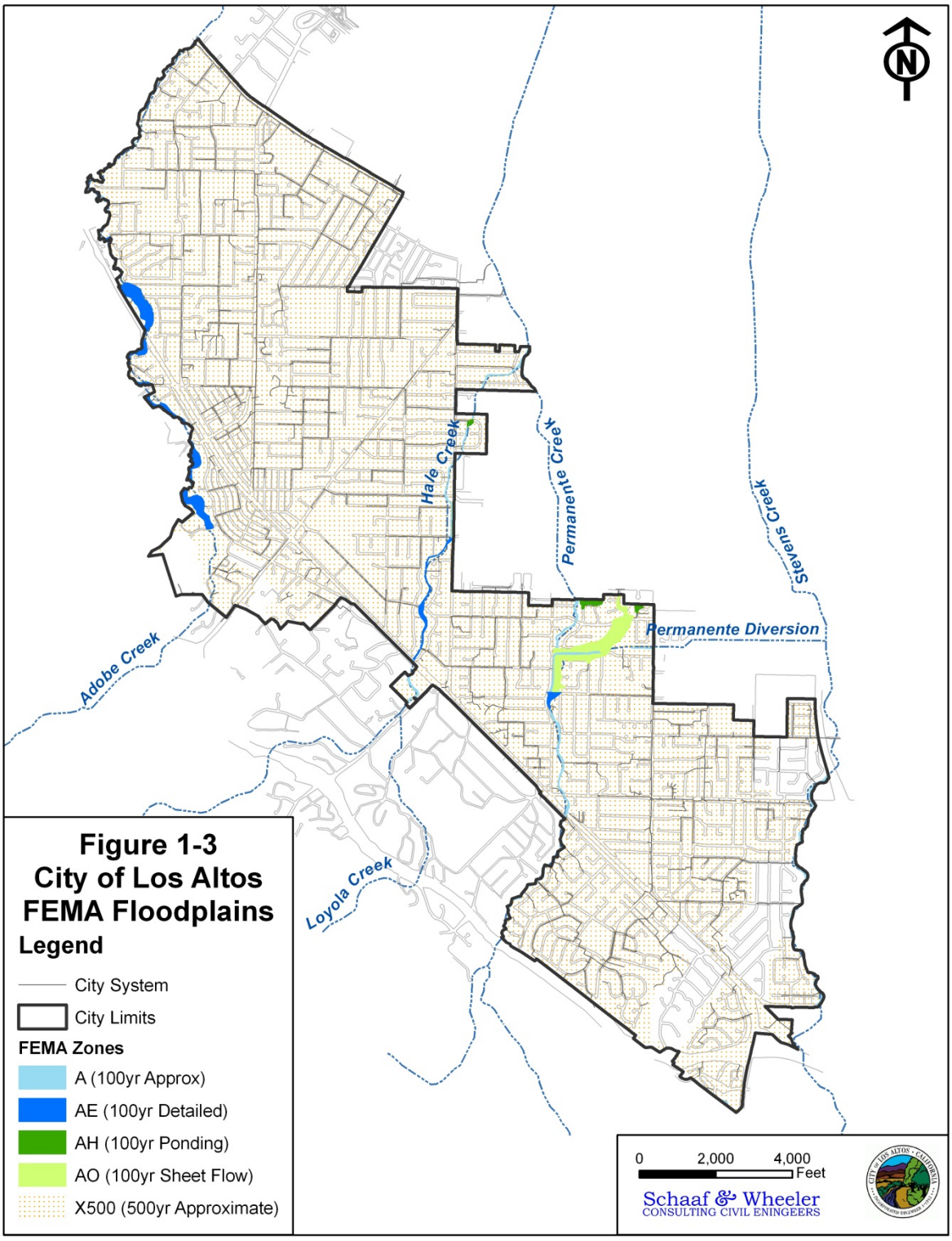

Figure 1- 3: City of Los Altos FEMA Flood Plains

Master Plan Process

The basic process to complete this master plan document is to analyze the current City stormwater system and operations procedures and determine necessary improvements. Several tasks were completed to reach this goal. The following list is a summary of steps taken:

1. A geographical information system (GIS) stormwater system model for the City was built. This model includes: pipe and manhole invert and rim elevations, pipe material and diameter, and watershed runoff characteristics.
2. Established stormwater analysis methodologies and criteria with City staff.
3. A cursory assessment of the condition of the stormwater system was performed.
4. The City's operations and maintenance (O&M) activities were reviewed and changes are recommended.
5. The City's regulatory requirements were reviewed and proposed actions are outlined.
6. A hydraulic analysis of the existing stormwater facilities throughout Los Altos was performed. System deficiencies during a 10-year storm event are categorized in terms of the risk to public safety.
7. Projects that will improve stormwater performance are identified.
8. A prioritized Capital Improvement Program (CIP) is outlined.
9. Projected capital improvement costs are summarized.
10. Summarized Operations and Engineering staff requirements to meet regulatory standards.
11. A financial analysis and fee structure has been developed.

Data

Schaaf & Wheeler reviewed readily available stormwater system data within the City of Los Altos. Data limitations, assumptions and impacts to the SWMP are summarized in this section and Appendix E. All project data and results are in NAVD88 (feet). Most of the data provided by the City is on the NGVD vertical datum, which is converted to NAVD using the following equation:

NGVD29 + 2.76 feet = NAVD88

Topography and Aerial Imagery

Santa Clara County 1-foot contour LiDAR topography data (NAVD) with half foot accuracy (plus or minus 0.5 foot) was utilized for ground surface information. The City provided projected color digital aerial imagery for the entire study area. This imagery was used to validate land use assumptions, confirm utility locations, and identify runoff characteristics.

AutoCAD and GIS

The City provided AutoCAD and GIS files to the Schaaf & Wheeler team for use on this project. The City GIS attribute information includes: stormwater pipes, stormwater manholes and inlets, existing land use and zoning, City limits, and parcel data. The City's AutoCAD and GIS data were missing a large quantity of information critical to accurately modeling the stormwater system. See Appendix E for a list of missing information and how that information was added.

Regulatory Compliance

Key documents for the regulatory review are the California Regional Water Quality Control Board San Francisco Region Municipal Regional Stormwater NPDES Permit, Order R2-2015-0049, NPDES Permit No. CAS612008, November 19, 2015 and the 2014-2015 Work Plan developed by SCVURPPP. Construction activity is subject to the General Permit for Discharges of Storm Water Associated with Construction Activity Construction General Permit Order 2012-0006-DWQ.

Operations and Maintenance

The City's Operations and Maintenance (O&M) section provided numerous documents, logs and worksheets. These were used in determining labor hours to complete various required tasks.

Land Use Data and Runoff Characteristics

The City GIS data shows the land use in Los Altos is roughly 68% residential, 3% commercial, 3% parks and open space, 21% street right-of-way (ROW) and 5% schools and institutions. Based on values published in the Santa Clara County Drainage Manual (2007, Schaaf & Wheeler) and validated with aerial photography, the average percent impervious for each land use type is listed in Table 3-1.

Data Quality

The quality and accuracy of the data collected for the City of Los Altos SWMP varies greatly. Because this is a master planning exercise it is important that all data sources and assumptions be documented. The City's GIS appears to be spatially accurate but limited in attributed data. The GIS has more than 99% of pipe diameters identified; however, pipes with unknown dimensions were assigned diameters of 12-inches. See Appendix E for more detailed information on Data Quality.

References

- *Los Altos Master Storm Drainage Plan*. Eugene R. Mastin. (1966).
- *General Construction Permit*. State Water Resources Control Board: Division of Water Quality. (order 2012-0006-DWQ)
- *Municipal Regional Stormwater NPDES Permit No. CAS612008.* California Regional Water Quality Control Board: San Francisco Bay Region. (Order R2-2009-0074). (2009).
- *Municipal Regional Stormwater NPDES Permit No.* CAS6122008. California Regional Water Quality Control Board: San Francisco Bay Region. (Order R2-2015-0049). (2015).
- *Santa Clara County Drainage Manual*. Santa Clara County Department of Planning and Development Services. Prepared by: Schaaf & Wheeler Consulting Civil Engineers. (2007).
- *Municipal Code (Supp. No. 17, Revision).* City of Los Altos, California (Ordinance No. 2011-366). (2011).

CHAPTER 2
REGULATORY REQUIREMENTS

The most significant regulatory requirements for the City's stormwater management are found in the State's Construction General Permit (CGP) and the San Francisco Municipal Regional Permit (MRP) under the National Pollutant Discharge Elimination System (NPDES) permit framework. This chapter provides a general outline of the various legal and regulatory requirements of these permits. The cost to comply with these permits is summarized.

Construction General Permit

The State of California requires Los Altos property owners whose projects disturb one or more acres of soil or whose projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, to obtain coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity Construction General Permit (CGP) Order 2012-0006-DWQ. Construction activity subject to this permit includes clearing, grading, and disturbances to the ground such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility.

The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP should contain a site map(s) which shows the construction site perimeter, existing and proposed buildings, lots, roadways, storm water collection and discharge points, general topography both before and after construction, and drainage patterns across the project. The SWPPP must list Best Management Practices (BMPs) the property owner or contractor will use to protect storm water runoff and the placement of those BMPs. Additionally, the SWPPP must contain a visual monitoring program, a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs, and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. It is the City's responsibility to conduct a construction site inspection program, per Section C.6 of the MRP and ensure that projects submit a Notice of Intent to the State for coverage under the CGP. For public works projects greater than one acre, as the owner, the City will be required to obtain coverage under the CGP.

NPDES Permit

The City of Los Altos is part of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP), an association of fifteen agencies, (thirteen cities and towns in Santa Clara Valley, the County of Santa Clara, and the Santa Clara Valley Water District), that share a common MRP to discharge stormwater to San Francisco Bay. The City is required to meet all stormwater management practices required by the MRP; however, many of the activities are completed at the countywide level by SCVURPPP for the benefit of its member agencies. The City funds all stormwater regulatory practices with the City's General Fund.

2001 Permit

Prior to the 2009 updated MRP, SCVURPPP members were permitted under Permit No. CAS029718, Order No. 01-024 (February 21, 2001), amended by Orders 01-119 (October 17, 2001) and 05-0035 (July 20, 2005), specific to the portions of Santa Clara County in the San Francisco Bay watershed. These permit amendments focused on enhancing the performance standards for new development and significant redevelopment projects. Throughout this chapter, '2001 permit' refers to the complete CAS029718 permit, including both amendments.

2009 Permit

The 2009 MRP, Permit No. CAS612008, was adopted October 14, 2009 (Order no. R2-2009-0074), and was effective as of December 1, 2009. It was amended by Order No. R2-2011-0083 (November 28, 2011). The 2009 MRP was the first Bay Area Phase I regional permit and was more prescriptive than the previous amended permit and contained more pollutant-specific requirements. Permit requirements impacted and will impact City budgets and operations.

2015 Permit

The 2015 MRP, Permit No. CAS612008, was adopted by the Water Board on November 19, 2015 (Order No. R2-2015-0049) with an effective date of January 1, 2016.

The specific requirements of the MRP are outlined in Section C of the permit; with each 'C' section (i.e. C3) considered a provision.

MRP Provisions

Each of the provisions in the effective 2015 MRP is generally described in Table 2-1 and detailed in Appendix B. Activities already conducted by the City or SCVURPPP under the 2001 and 2009 Permits are generally not described in detail herein, although they may be included for reference. Note that the implementation and compliance of the activities conducted by the City must be reported in each Annual Report, submitted September 30 of each year, prepared by the City.

Trash Capture Plan

Starting in 2009, the MRP included trash as a pollutant to be regulated. The Trash Capture Plan (Appendix C) fulfills the requirements set forth in MRP Provision C.10. This plan comprises a combination of methods, strategies, and scheduling designed to work together to provide the City with a flexible strategy for compliance. Trash capture devices and suggested locations along with a variety of options to meet the Permit's 2014, 2017 and 2022 trash reduction requirements are listed. The location of one required device is on View Street. This device was installed during summer 2012. Current trash capture activities are expected to continue, altering only with the added data collection element. In order to meet the Permit's future trash reduction requirements, the City will potentially need to install a second trash capture device that is estimated to cost around $400,000. This is a high priority project.

Green Infrastructure Plan

The 2015 MRP requires that every Co-permittee (cities and agencies under the 2015 MRP) develop a Green Infrastructure (GI) Plan by 2019. Achieving this requirement will entail a significant effort from the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) and its Co-permittees. The City will need to begin green infrastructure planning in the near future to determine how best to meet these requirements. This is a high priority project that is estimated to cost approximately $150,000. The City will need to complete actions and specific tasks related to the Green Infrastructure Plan that will need to be reported for the FY15-16 Annual Report and subsequent reports. By the second year of the permit, permittees will need to adopt a GI plan framework and identify mechanisms for beginning the prioritization process.

According to the MRP, the four main objectives of each GI plan are the following:

1. Provide "reasonable assurance" that Total Maximum Daily Load (TMDL) wasteload allocations for PCBs, mercury and other pollutants will be met;

2. Describe a Permittee-specific GI program that will, over the long term, retrofit and replace gray infrastructure and impervious surfaces with green infrastructure systems and that will reduce the adverse water quality impacts of urbanization and urban runoff on receiving waters;

3. Identify means and methods to prioritize implementation of GI in particular areas and prioritize in a timely manner within the Permittee's jurisdictional area; and

4. Consider fiscal challenges and leverage funding opportunities for the GI program.

Cost of Compliance

The City will need to apply a significant amount of technical staff to comply with these permits. Table 5-7 summarizes the annual anticipated engineering and inspection workload for compliance. An hourly rate of $172 is assumed and included in Table 5-7.

Summary

The current municipal NPDES permit is significantly more detailed and prescriptive than the previous permit. Instead of general water quality goals, the effective permit contains both required performance standards and, in many cases, prescribed methods to meet those standards. The majority of activities performed by the City under the previous 2001 and 2009 permits must still be completed under the effective permit.

As stated previously, the effective NPDES permit refers to actions which must be accomplished by 'Permittees'. The City of Los Altos is a participating member of the SCVURPPP, which will undertake some of these activities on behalf of its members, while the City is responsible for other activities. A 2015-2016 Work Plan developed by SCVURPPP (April 2015) provides detailed information regarding which required actions of the permit will be implemented at the Program level, co-permittee (i.e. City) level, or on a regional level.

In general, the City is anticipated to assist with actions which are implemented by the Program or on a regional level, and the Program is anticipated to assist with actions undertaken by the City. Assistance is described by SCVURPPP as participation in ad hoc task groups or committees, and/or review and approval of products.

Table 2-1: Municipal Regional Permit Provisions

MRP Provision	Description
C1: Compliance with Discharge Prohibitions and Receiving Water Limitations	Describes the process by which Permittees must respond to a determination that discharges are causing or contributing to an exceedance of an applicable WQS.
C2: Municipal Operations	Sets forth requirements which Permittees must meet for municipal projects and property, including activities such as street and sidewalk repair and maintenance.
C3: New Development and Redevelopment	Requires Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment in all development projects to address stormwater runoff pollutant discharges.
C4: Industrial and Commercial Site Controls	Sets forth requirements for industrial and commercial site control implementation including inspections, annual reporting, and follow-up of non-compliance.
C5: Illicit Discharge Detection and Elimination	Sets forth the requirements to detect and control illicit discharges.
C6: Construction Site Control	Sets forth the requirements for a construction site inspection and control program, including follow-up and enforcement, at construction sites to prevent construction site discharges of pollutants to receiving waters.
C7: Public Information and Outreach	Sets forth requirements for public information and outreach to reduce and mitigate impacts of stormwater pollution on receiving waters.
C8: Water Quality Monitoring	Sets forth the requirements for water quality monitoring.
C9: Pesticides Toxicity Control	Sets forth the requirements for the development of a pesticides toxicity control program that address both City and other users of pesticides within the City jurisdiction.
C10: Trash Load Reduction	Sets forth the requirements for trash load reduction.
C11: Mercury Controls	Outlines notable activities specific to Mercury controls required in the effective NPDES permit.
C12: PCB Controls	Outlines notable activities specific to PCB controls required in the effective NPDES permit.
C13: Copper Controls	Outlines notable activities specific to Copper controls required in the effective NPDES permit.
C14: City of Pacifica and San Mateo County Fecal Indicator Bacteria Controls	Not applicable to SCVURPPP.
C15: Exempted and Conditionally Exempted Discharges	Provides information for the exemption of non-stormwater discharges from Discharge Prohibition A.14 and conditionally exempts non-stormwater discharges that are potential sources of pollutants.
C16: Annual Reports	Sets forth the annual report requirements for Permittees.

Drywells

There are approximately 25 existing drywells, also called French drains, within Los Altos. These drywells are intended to percolate storm runoff in isolated areas not serviced by formal pipe networks. Many of these structures were built during construction of the original developments or by the County before the City's formal drainage networks where installed. There is growing concern across the nation that deep drywell devices negatively impact groundwater quality. The Regional Water Quality Control Board (RWQCB), the US EPA, and the Santa Clara Valley Water District (SCVWD) all have programs to inventory and reduce water quality impacts from certain types of drywells. Currently there is not enough available information (depth, area, fill type) on the drywells within the City to determine if they require registration. The City should develop a program to identify which locations could require compliance with local, state and federal guidelines. Appendix K contains documents and forms from various agencies with regards to drywells. Chapter 3 identifies capital projects to remove the drywells and tie these locations into the existing City stormwater network.

CHAPTER 3
STORMWATER COLLECTION SYSTEMS

Analyzing Los Altos' stormwater collection system performance forms the essential core of this master plan. For each sub-basin area, this chapter describes major stormwater facilities, any historic problem areas and known drainage issues. Within each basin, areas requiring system improvements are identified and prioritized. For the purposes of conciseness and readability, this Chapter presents only the 10-year SWMM predicted flooding depths and those projects required to alleviate or minimize flooding based on the 10-year standard. A 10-year storm refers to rainfall totals that have a 10% probability of occurring any given year. Conversations and meetings with City staff, along with Operations and Maintenance (O&M) records, form the basis of the 'Historic Problem Areas' sections of this chapter.

Evaluation of Stormwater Capacity

Hydraulic Model

The MIKE-URBAN (SWMM) model is utilized to model the City of Los Altos stormwater because it is tested and reliable software with a GIS interface. SWMM is a software program designed by the US Environmental Protection Agency (EPA) for the analysis, design, and management of sanitary sewer and storm drainage systems.

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. The rainfall distribution pattern for the Los Altos Storm Water Master Plan was obtained from the Santa Clara County Drainage Manual (Schaaf & Wheeler, 2007). Analysis methodologies are detailed in Appendix D.

Direct runoff is estimated by subtracting soil infiltration and other losses from the rate of rainfall. The Curve Number (CN) methodology uses the uniform loss rate to account for the various potential land uses and soil types within a basin. The CN values for pervious surfaces are taken from the County Drainage Manual and are shown in Table 3-1.

Criteria

Each collection system has been analyzed for existing land use based on the City GIS to determine its runoff condition during the design 10-year storm. Areas of significant potential drainage problems are recognized herein and necessary improvements to restore system performance are summarized. Additional flow capacity requirements are determined by upsizing existing pipes in the SWMM model until flooding is reduced to acceptable levels. SWMM model results are used to identify potential regions where the pipe network could be extended to provide additional protection.

This chapter describes the major stormwater facilities, historic problem areas, and known drainage issues in each of the watershed areas. Within these drainage areas, four main categories of issues have been identified to clarify the necessary capital improvements in the stormwater plan to ensure a safe, working system.

Table 3-1: Land Use, Pervious Curve Number and Impervious Values for Los Altos

City Land Use Designation	City Assigned Land Use Type	Estimated Percent Impervious	Assigned Curve Number		
			Soil Group B	Soil Group C	Soil Group D
Neighborhood Commercial	Commercial/Industrial	95%	58	71	74
Open Space	Urban Recreational	5%	58	71	74
Parks	Urban Recreational	10%	58	71	74
Planned Community	Commercial/Industrial	50%	58	71	74
Public & Institutional	Commercial/Industrial	70%	58	71	74
Private School	Commercial/Industrial	60%	58	71	74
R1	Low Density Residential	50%	58	71	74
R1-40	Low Density Residential	40%	58	71	74
R2	Low Density Residential	50%	58	71	74
R3	High Density Residential	50%	58	71	74
R4	High Density Residential	60%	58	71	74
R6	High Density Residential	60%	58	71	74
S (Schools)	Commercial/Industrial	60%	58	71	74
Thoroughfare Commercial	Commercial/Industrial	85%	58	71	74
Streets	Transportation	85%	68	78	79
Downtown Commercial	Commercial/Industrial	95%	58	71	74

Stormwater System Improvement Categories

Conveyance

The hydraulic models analyzed the complex stormwater piping system throughout all five watersheds. In areas where the current stormwater pipe does not have the capacity to meet system demand, it is recommended that the undersized pipe be replaced with a larger diameter pipe. This chapter will detail specific stormwater pipes that are recommended for replacement.

System Extensions

The hydraulic models developed for this master plan provide indicators where the City's system may need to be extended. A system extension is recommended where the hydraulic model indicates a 10 year peak water level more than 6 inches above the street level at the furthest upstream manhole. System extensions are also recommended in problem areas without an existing pipe network system. These improvements do not significantly impact the capacity of the existing systems, although they are expected to lessen street flooding in the locations recommended. Network extension costs are included in the CIP and are low priority projects. Because much of the City stormwater system was originally financed by assessments, additional assessments may be required to build these projects.

Drywells

Existing drywells, or French drains, are spaced throughout the City of Los Altos. Over the years they have become less efficient due to siltation and sedimentation which increases the risk of flooding at drywell locations. This risk, along with the regulatory concerns discussed in Chapter 2, provides justification for replacing ineffective drywells with formal drainage systems or effective percolation structures that meet regulatory requirements. Individual drywells have varying replacement priorities; some locations appear to have drainage or flooding issues, in others standing water is evident days after minor storm events. Drywell replacement priorities are shown in Figures 3-1 to 3-5.

Problem Areas

As stated previously, after much discussion with the City of Los Altos and the O & M staff, 16 local problem spot capital improvements and 16 local problem spot annual maintenance improvements have been identified. These areas are of great concern to the local neighbors. These problem areas are in general not due to conveyance issues, but rather from condition or maintenance related issues.

Prioritizing Deficiencies and Needed Improvements

Los Altos' stormwater system is broken into five drainage sub-areas: Adobe Creek, Hale Creek, Permanente Creek, Stevens Creek, and Permanente/Stevens (Figure 1-1). The sub-areas are organized around natural topographic boundaries and drainage facility boundaries or watersheds. It should be noted that neither private drainage systems nor site-specific drainage characteristics have been analyzed. Future refinement of the model could more precisely account for these site-specific drainage characteristics and more accurately represent the local drainage conditions.

Recommended master plan improvements, derived from model results, are shown in Figures 3-1 to 3-5. In some locations, the flooding predicted by the model at individual nodes in the system may be greater than actual potential flooding. This is due to limitations and assumptions inherent in the modeling software. In order to 'ground truth' predictive model results, Schaaf & Wheeler discussed model results with City staff, conducted field observations, and considered surrounding topography. Locations for recommended system improvements are based on the results of this complete process, not solely on model results. As such, some locations predicted to have flooding surcharge based on model results alone are not recommended for improvements. The recommended improvements were then 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. Problem areas and recommended master plan improvements are shown in additional figures in Appendices B and C. The following color code is used to highlight project prioritization within each drainage area:

Pipe Color	Improvement Priority
Red	High Priority
Orange	Moderate Priority
Green	Low Priority

Priority Definitions

The City of Los Altos defines the improvement priority levels based on four main criteria; life safety risk, regulatory compliance, property damage risk, and high maintenance needs. In addition, Schaaf &

Wheeler considered the hydraulic properties of the entire stormwater system to pin-point specific areas that have higher priority than others.

High Priority	Projects needed to remedy recurring or significant drainage problems identified by the City and confirmed through modeling. Property may be at risk on a frequent basis and at the least, commerce is regularly interrupted during the winter months.
Moderate Priority	Local drainage projects necessary to reduce less significant flood risks during more extreme runoff events.
Low Priority	Projects that would eliminate local flooding that presents a nuisance but is not considered to significantly threaten property.

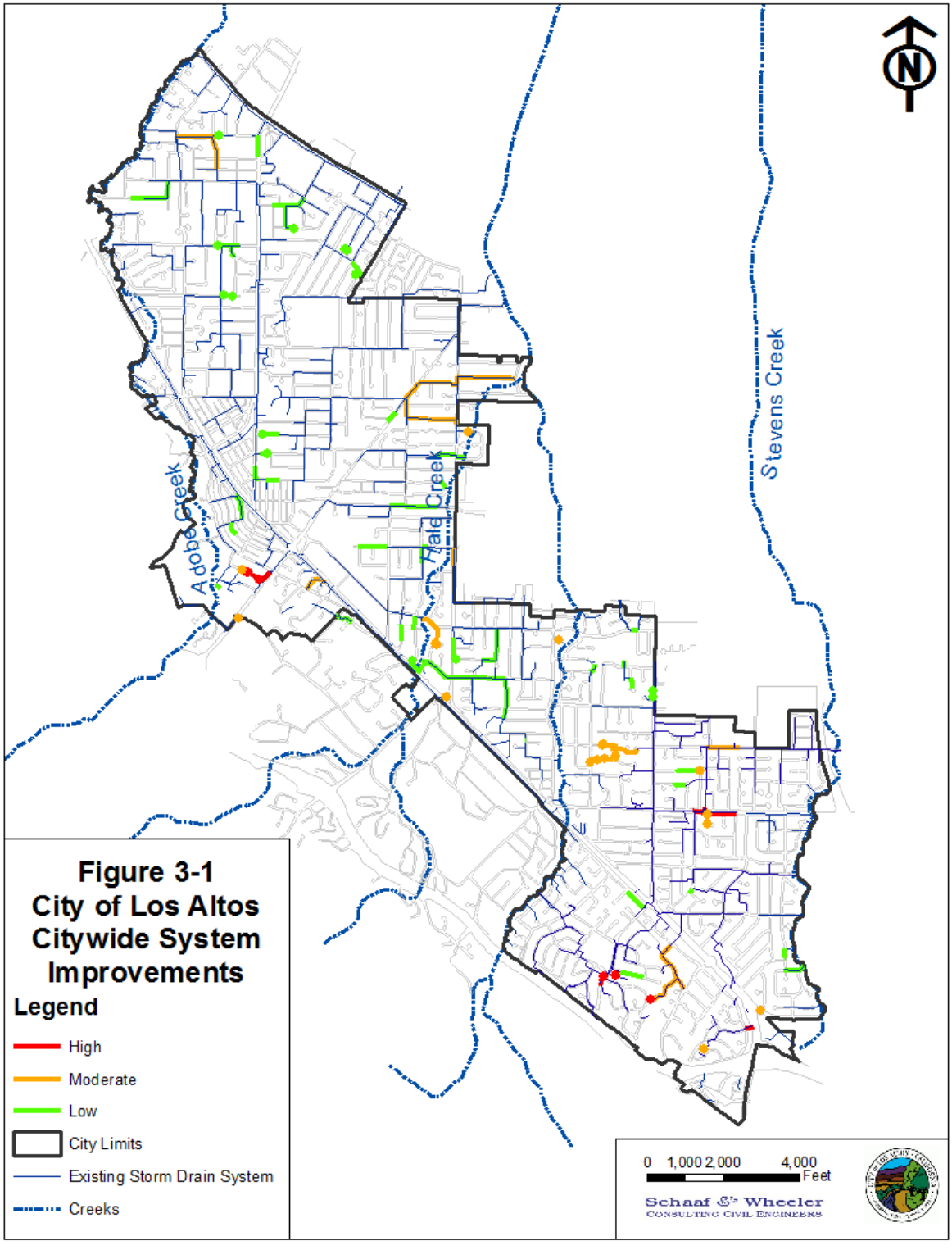

Figure 3-1: Citywide System Improvements

Los Altos Systems

This section outlines the ultimate improvements needed to achieve a 10-year level of service by alleviating or minimizing predicted flooding within each of the five sub-areas. A complete CIP with figures depicting stormwater network improvement pipes including pipe location, size requirements, and costs for each improvement is available in Chapter 4.

Adobe Creek

Overview

The Los Altos Adobe drainage area is approximately 1.8 square miles. The trunk lines of the Adobe collection system consist of 504 nodes with 29 outlets. The Adobe area has a total (including lateral lines) of 18.6 miles of connecting stormwater pipes equal to or greater than one foot in diameter. In general, the Adobe area drains north and west to Adobe Creek.

Historic Problem Areas

According to the City, historical flooding problems have been documented at seven particular locations in the Adobe sub-area. Between the south end of Cherry Avenue and Mt. Hamilton and Bridgton Courts there are redwood tree roots blocking stormwater lines. At Milverton Road there are poorly functioning drywells. At Shasta Street there is a bubbler that does not function as intended. On Summerhill Avenue at El Monte Road there is a large amount of rocks and debris entering the drainage system. Delphi Circle and Distel Drive experience blocked inlets due to debris. Catalina Court has problems with both debris and toys blocking flows.

Identified Deficiencies

SWMM analysis of the Adobe systems for the 10-year storm event shows flooding (HGL above the rim elevation of the node) occurring at 46 of the 504 nodes. Of these, SWMM predicts a flooding depth of less than 0.5 foot at 27 nodes, depths of between 0.5 and 1.0 foot above the street occur at 5 of the nodes, with the remaining 14 nodes experiencing flooding depths greater than one foot. A map of the 10-year flooding depths predicted by SWMM with the existing stormwater network is presented in Appendix F.

Prioritized Improvements

The Adobe sub-area prioritized improvements that are required to alleviate or minimize flooding during a 10-year storm event are shown in Figure 3-2, which include storm drainage piping capacity improvements and new storm drains. The Loucks improvements include a 48-inch pipe on Mercedes Avenue between Del Monte and Loucks, a 48-inch pipe on Loucks between Mercedes and Los Altos Avenue and an 18-inch pipe at the intersection of Loucks and Mercedes. This is a moderate priority improvement project. Jordan Avenue, between Delphi and Catalina, experiences flooding during the modeled 10-year event requiring a 24-inch pipe along Jordan between E. Portola and Delphi and an 18-inch pipe between Delphi and Catalina. An 18-inch pipe on Catalina Way and Catalina Court is also recommended. Both Jordan and Catalina improvements are low priority.

Projects to replace existing drywells with catch basins and connecting to the existing pipe network are a mixture of high and low priority. High priority drywells within the Adobe watershed include a project on Milverton. Low priority drywells within the Adobe watershed include projects on Distel, Pine, Loucks, Alicia, Yerba Santa, and Pepper.

The other four improvement projects are low priority. The Van Buren improvements include an 18-inch pipe on Van Buren and Santa Rita to West Portola. A 24-inch pipe is required between the Alma line and Cherry. The Lyell improvements include a 21-inch pipe on San Antonio between Lyell and the existing 21-

inch line and an 18-inch pipe on Lyell between Tyndall and San Antonio. The Palm improvements consist of a 24-inch line between Sheridan and Foothill Expressway.

Additionally, localized improvements on Summerhill, Cherry, Shasta, O'Keefe, Pepper, and Delphi will improve the system reliability. The Summerhill and El Monte intersection requires two additional inlets and piping to increase roadway drainage. Routine hydro-jetting of the lines will help assure system conveyance. Routine root cutting will assure conveyance in the Cherry system. The bubbler on Shasta should also be maintained or replaced with an inlet and pipe. O'Keefe, Pepper, and Delphi all require routine maintenance. These are low to moderate priority projects and are summarized in Tables 4-8 and 4-9.

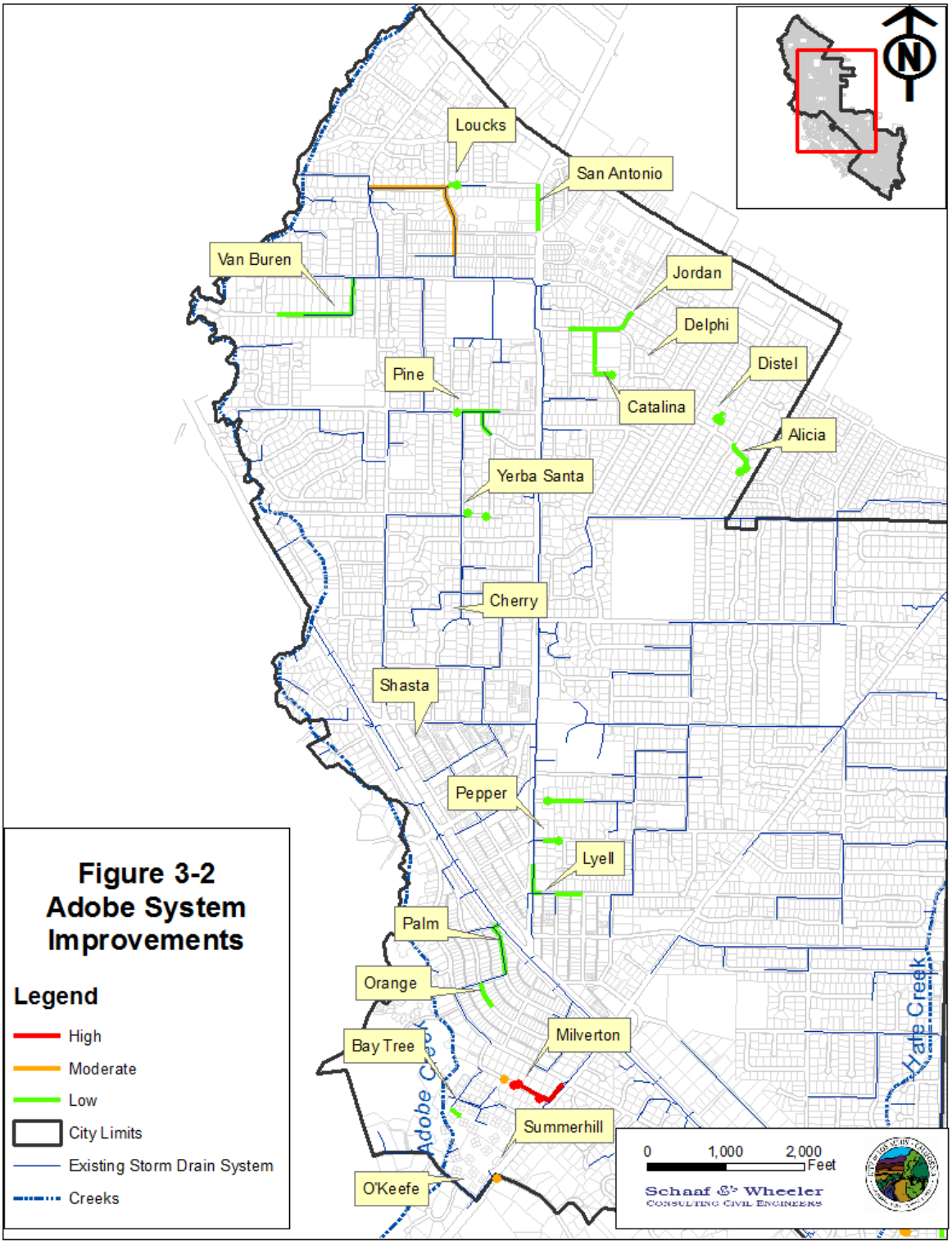

Figure 3-2: Adobe System Improvements

Hale Creek

Overview

The Hale drainage area is approximately 2.3 square miles, and is bounded by Hale Creek on the east, the Adobe sub-area on the west, Los Altos Hills on the south and Mountain View on the north. The trunk lines of the Hale collection system consist of 413 nodes with 24 outlets. The Hale area has a total (including lateral lines) of 93,000 linear feet (17.6 miles) of connecting stormwater pipes equal to or greater than one foot in diameter. In general, the Hale area drains north and easterly to Hale Creek.

Historic Problem Areas

According to the City of Los Altos historical flooding problems have been documented at 8 locations in the Hale sub-area. Viola Place and Sunshine Drive experience blocked inlets due to debris. The Woodland Library has problems due to a sag in the roadway near the parking lot entrance. Springer Road, Cuesta Drive, and Manor Way have poor local drainage. Cleaning the inlets seems to fix a majority of flooding problems at these locations. Oakwood Court requires a drywell replacement. Edge Lane requires a manhole lid replacement.

Identified Deficiencies

SWMM analysis of the Hale systems for the 10-year storm event showed flooding (HGL above the rim elevation of the node) occurring at 94 of the 413 nodes. Of these, SWMM predicts a flooding depth of less than 0.5 foot at 43 nodes, depths of between 0.5 and 1.0 foot above the street occur at 18 of the nodes, with the remaining 33 nodes experiencing flooding depths greater than one foot. A map of the 10-year flooding depths predicted by SWMM with the existing stormwater network is presented in Appendix F.

Prioritized Improvements

The Hale area prioritized improvements that are required to alleviate or minimize flooding during a 10-year storm event are shown in Figure 3-3, which includes storm drainage piping capacity improvements and new storm drains. The Edith and Border improvements are moderate priorities. Edith improvements consist of a 24-inch pipe on Clark, 30-inch pipes on El Monte and Springer Terrance, a 36-inch line on Mills and a 42-inch pipe on Raymundo to Hale Creek. The Border improvement requires a 24-inch pipe between Stagi Lane and Anita. The remaining improvement projects have a low priority classification. The Giralda improvements include 27-inch and 30-inch pipe replacements along Giralda to Hale Creek. Cuesta improvements call for a 30-inch pipe on Cuesta Drive. Parma requires a 24-inch line while Springer has an 18-inch replacement. The Edge improvement has an 18-inch line to Covington. Berry calls for a 30-inch pipe from Clinton to Berry and a 36-inch line from there to Hale Creek. Finally, Renetta requires an 18-inch line on Carnation Court and a 24-inch pipe to Foothill.

Projects to replace existing drywells with catch basins and connecting to the existing pipe network are a mixture of moderate and low priority. Oakwood Court requires the replacement of one drywell and is a moderate priority. Low priority drywells within the Hale watershed include projects on Edge Lane, Hawthorne Avenue, and Parma Way.

Additionally, localized improvements on Viola, Springer, Manor, and Sunshine will improve the system reliability. In many cases hydro-jetting the lines will assure system conveyance. A new manhole lid is needed on Edge Lane. Sunshine Drive requires inlet improvements and a flap-gate. These are low to moderate priority projects and are summarized in Tables 4-8 and 4-9.

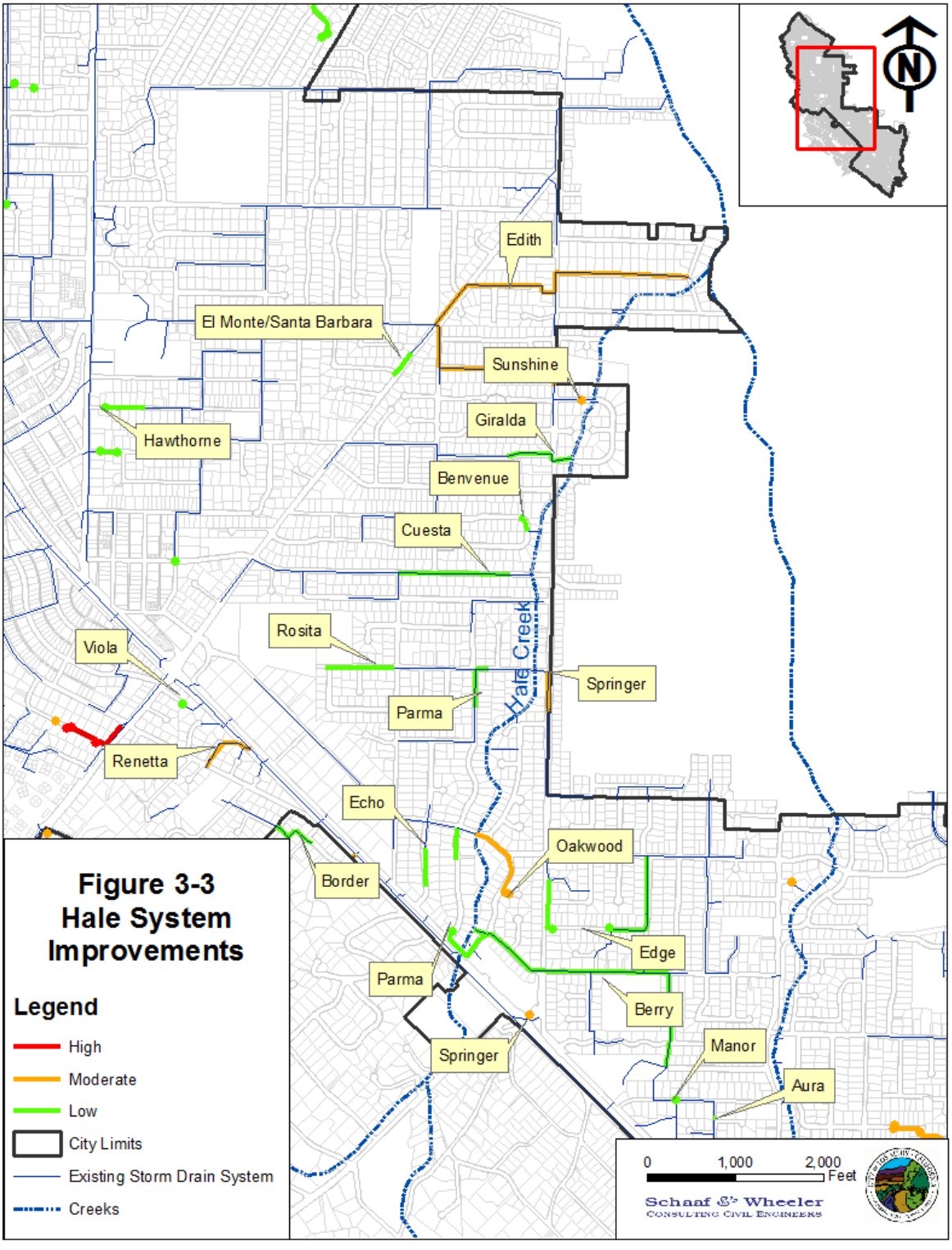

Figure 3-3: Hale System Improvements

Permanente Creek

Overview

The Permanente drainage area is approximately 0.4 square miles, and is bounded by Permanente Creek on the west, the Permanente/Stevens sub-areas on the east and the City of Mountain View on the north and Los Altos Hills to the south. The trunk lines of the Permanente collection system consist of 123 nodes with 32 outlets. The Permanente area has a total (including lateral lines) of 15,000 linear feet (2.9 miles) of connecting stormwater pipes equal to or greater than one foot in diameter. In general, the Permanente area drains west to Permanente Creek.

Historic Problem Areas

According to the City of Los Altos historical flooding problems have been documented at a three locations in the Permanente sub-area. Loma Prieta Court has an inlet that appears to be too high, Madelaine Court backs up from the creek and Robinhood Drive has sediment at the outfall which limits conveyance.

Identified Deficiencies

SWMM analysis of the Permanente systems for the 10-year storm event showed flooding (HGL above the rim elevation of the node) occurring at 18 of the 123 nodes. Of these, SWMM predicts a flooding depth of less than 0.5 foot at 13 nodes, depths of between 0.5 and 1.0 foot above the street occur at three of the nodes, with the remaining two nodes experiencing flooding depths greater than one foot. A map of the 10-year flooding depths predicted by SWMM with the existing stormwater network is presented in Appendix F.

Prioritized Improvements

The Permanente sub-area prioritized improvements that are required to alleviate or minimize flooding during a 10-year storm event are shown in Figure 3-4, which includes storm drainage piping capacity improvements and new storm drains. There are two low priority projects in this area of Los Altos. Buckingham should be replaced with an 18-inch pipe between Suffolk Way and the Permanente Bypass. Altamead should be replaced with a 24-inch line from Altamead Drive to the bypass channel. Flap-gates should be added to the outlets of both of these systems.

Payne Drive requires the replacement of several drywells of moderate priority. This involves replacing existing drywells with catch basins and connecting with the existing pipe network.

Additionally, localized improvements on Loma Prieta, Madelaine and Robinhood will improve the system reliability. Hydro-jetting the lines will assure system conveyance on Robinhood Drive. Lowering the inlet on Loma Prieta will reduce nuisance ponding. The Madelaine Court system may benefit by adding a flap-gate and maintaining the sediment at the outlet. These are low to moderate priority projects and are summarized in Tables 4-8 and 4-9.

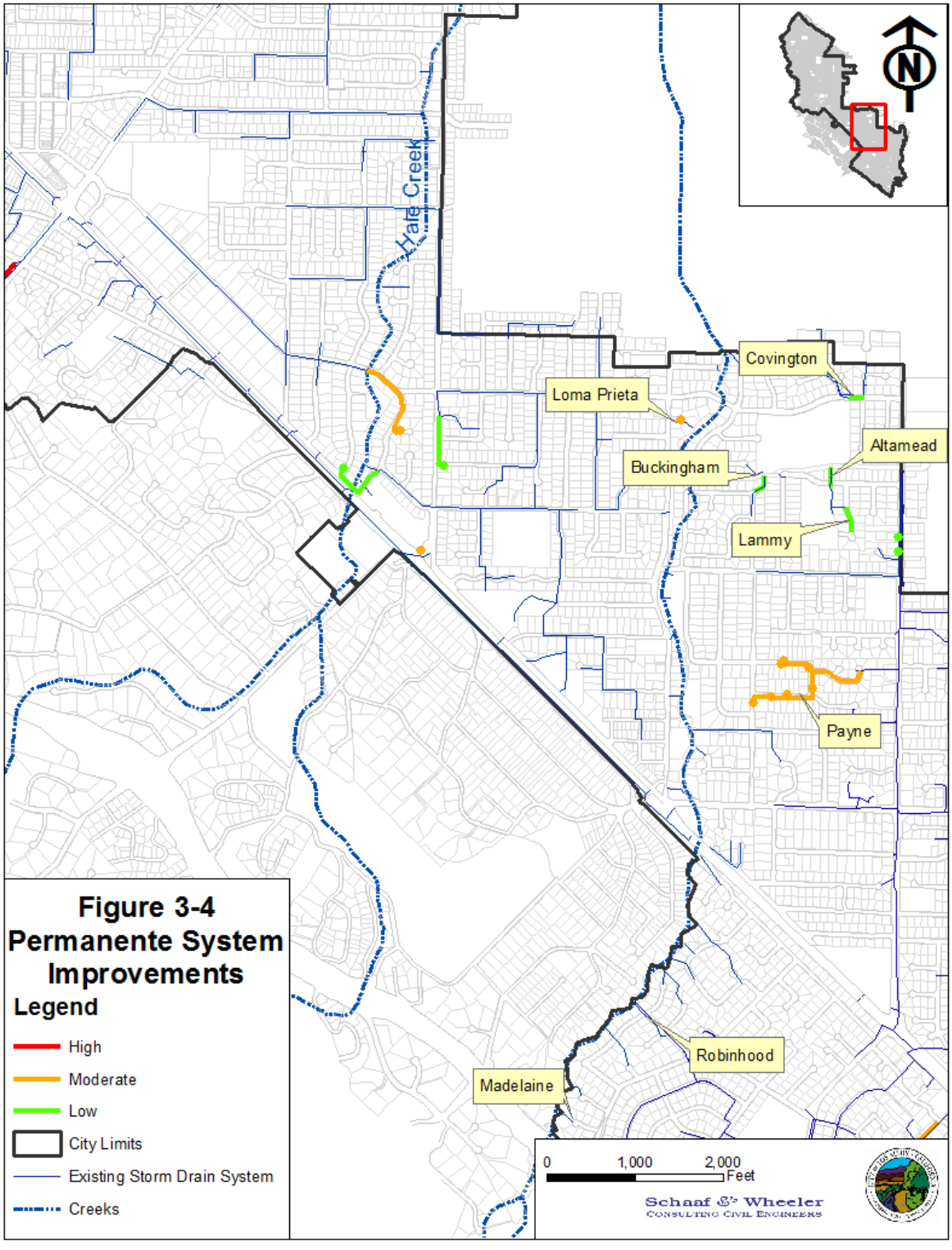

Figure 3-4: Permanente System Improvements

Permanente/Stevens

Overview

The Permanente/Stevens drainage area is approximately 1.5 square miles, and is bounded by Permanente sub-area on the west, Stevens Creek sub-area to the east, Los Altos Hills on the south and the City of Mountain View to the north. The trunk lines of the Permanente/Stevens collection system consist of 414 nodes with 4 outlets. The Permanente/Stevens area has a total (including lateral lines) of 75,000 linear feet (14.3 miles) of connecting stormwater pipes equal to or greater than one foot in diameter. The Permanente/Stevens system is complex with many bypasses and major trunk lines down Grant and Oak.

Historic Problem Areas

According to the City of Los Altos historical flooding problems have been documented at 8 locations in the Permanente/Stevens sub-area. McKenzie Avenue and Dallas Court have low spots that pond perpetually, there are debris problems at Heritage Court and Woods Lane, the Stonehaven ditch routinely overflows at the existing headwall, the Windimer ditch does not operate as intended, Ranchita Drive has an inlet that is too high, there is poor drainage at Grant Road and Fremont Avenue, and there are issues with the ditch along Foothill Expressway near Vineyard.

Identified Deficiencies

SWMM analysis of the Permanente/Stevens systems for the 10-year storm event showed flooding (HGL above the rim elevation of the node) occurring at 68 of the 414 nodes. Of these, SWMM predicts a flooding depth of less than 0.5 foot at 37 nodes, depths of between 0.5 and 1.0 foot above the street occur at 15 of the nodes, with the remaining 16 nodes experiencing flooding depths greater than one foot. A map of the 10-year flooding depths predicted by SWMM with the existing stormwater network is presented in Appendix F.

Prioritized Improvements

The Permanente/Stevens area prioritized improvements that are required to alleviate or minimize flooding during a 10-year storm event are shown in Figure 3-5, which includes storm drainage piping capacity improvements and new storm drains. The Fremont, Deodara and Stonehaven improvements are high priority. Stonehaven improvements consist of a new 36-inch culvert and headwall from the channel to the weir structure at Stonehaven and Sierra Ventura. The stormwater improvements in Fremont include a 24-inch pipe between Parkhill and Dallas, a 36-inch line from Dallas to Austin and a realigned diversion pipe to the Oak line. The Deodara improvements include a 30-inch replacement pipe between the intersection of Deodara and Vineyard to the Foothill ditch. The Oak and Arboretum improvements are moderate priorities. Oak improvements consist of a 30-inch pipe replacement from Chelsea to the existing 30-inch pipe upstream of Truman. The Arboretum improvements include an 18-inch line along Woods Lane, a 24-inch pipe on Farm Road and a 30-inch trunk line to Deodara.

Replacing existing drywells with catch basins and connecting to the existing pipe network are low to moderate priority projects. Drywells within the Permanente/Stevens watershed include projects on Oakhurst and Dallas.

Additionally, localized improvements will improve the system reliability. In many cases hydro-jetting drainage lines will increase conveyance. Adding a trash rack to the Stonehaven improvements will reduce debris and increase the system reliability. Rebuilding the Windimer ditch and outlet pipe will prevent runoff from spilling out of the ditch into neighboring yards. Reconfiguring the inlets on Ranchita will reduce ponding. The addition of a trash rack on the Woods Lane system, along with routine maintenance, will increase the system reliability. The ditches and culverts along Foothill Expressway need regular debris removal and repair. The Windimer and Stonehaven projects are high priority. The

remaining improvements are low to moderate priority projects and are summarized in Tables 4-9 and 4-10. The Woodland Library drainage issues can be reduced by improving drainage on Foothill Expressway (County right-of-way) and maintaining the inlets on Grant Road.

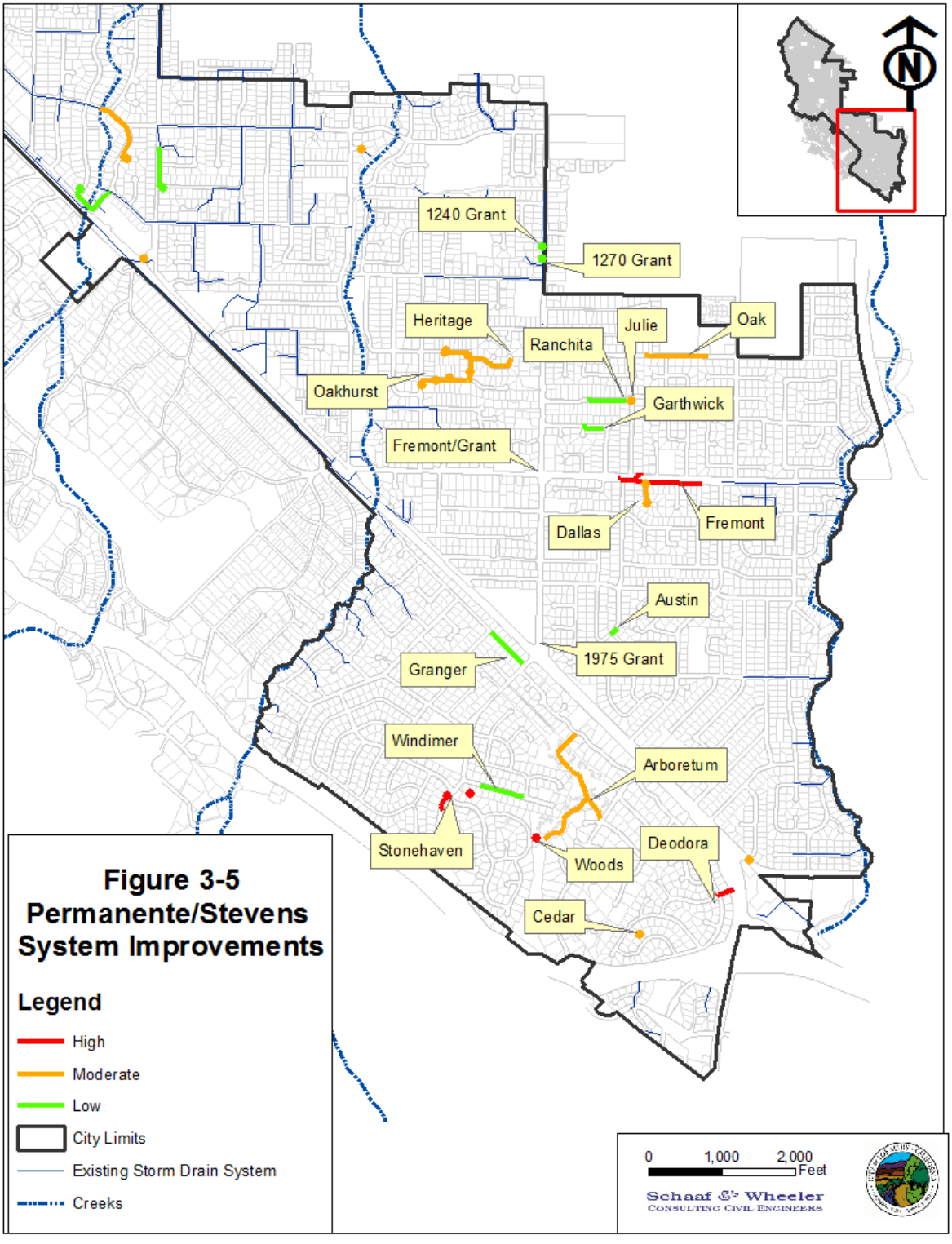

Figure 3-5: Permanente/Stevens System Improvements

Stevens Creek

Overview

The Stevens drainage area is approximately 0.3 square miles, and is bounded by Stevens Creek on the east, Mountain View to the north, Cupertino on the south and the Permanente/Stevens sub-area to the west. The trunk lines of the Stevens collection system consist of 56 nodes with 12 outlets. The Stevens Creek area has a total (including lateral lines) of 9,200 linear feet (1.7 miles) of connecting stormwater pipes equal to or greater than one foot in diameter. In general, this area drains east to Stevens Creek.

Historic Problem Areas

According to the City of Los Altos historical flooding problems have been documented at two locations in the Stevens sub-area. The off ramp from northbound Foothill Expressway toward Homestead Road has perpetual flooding problems. There are also drainage problems at Cristo Rey Drive and Kring Way that can limit access to the water tanks during storm events.

Identified Deficiencies

SWMM analysis of the Stevens systems for the 10-year storm event showed flooding (HGL above the rim elevation of the node) occurring at 5 of the 56 nodes. Of these, SWMM predicts a flooding depth of less than 0.5 foot at three nodes, depths of between 0.5 and 1.0 foot above the street occur at only one node, with the remaining nodes experiencing flooding depths greater than one foot. A map of the 10-year flooding depths predicted by SWMM with the existing stormwater network is presented in Appendix F.

Prioritized Improvements

The Stevens area prioritized improvements that are required to alleviate or minimize flooding during a 10-year storm event are shown in Figure 3-6, which includes storm drainage piping capacity improvements and new storm drains. The conveyance in the Fallen Leaf system needs to be increased. Replacing the existing system with an 18-inch pipe to Stevens Creek is recommended. This is a low priority improvement.

Additionally localized improvements will improve system reliability. Adding inlets on the Foothill off-ramp and connecting to the system on Homestead will dramatically improve the flood protection at that busy intersection. Improving the access to the easement on Kring and routine debris removal will improve conditions in that area of Los Altos. These are low to moderate priority projects and are summarized in Tables 4-9 and 4-10.

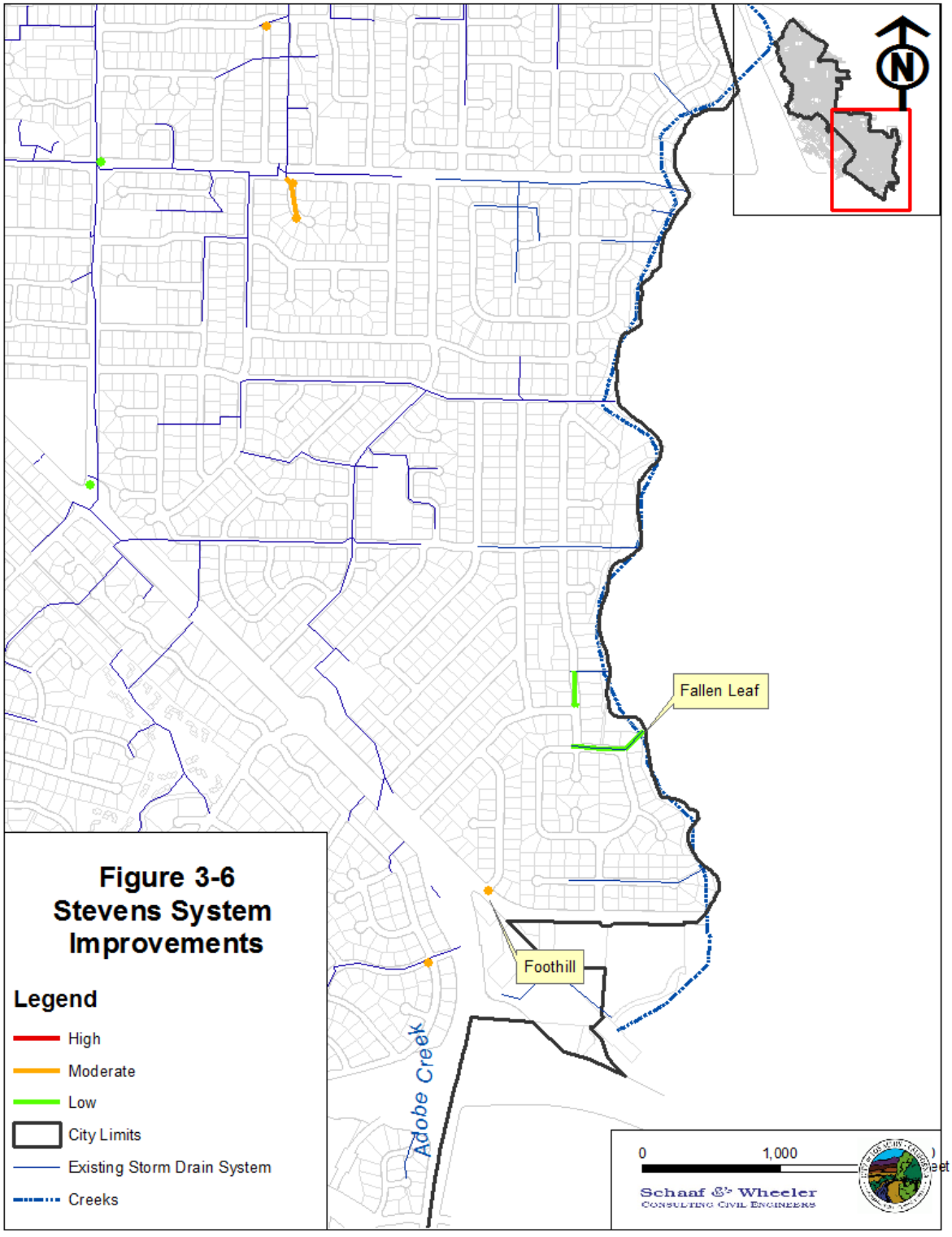

Figure 3-6: Stevens System Improvements

Stormwater Tie-Ins

There are several connections between the City of Los Altos' storm drainage network and surrounding communities. These are listed in Table 3-2 and mapped in Appendix E. The City's system discharges to the City of Mountain View's system at eight locations. The City of Los Altos Hills discharges into the Los Altos system at El Monte Road near Highway 280. The Los Altos system ties into the Los Altos Hills System near Quinnhill Road and Stagi Lane. There is a discharge to Stevens Creek through to the City of Cupertino.

Table 3-2: Connections with Neighboring Communities

Location	Connecting Community
Clark Ave near Jardin Dr	Mountain View
El Camino Real near Rengstoff Ave	Mountain View
Hollingsworth Dr near El Monte Rd	Mountain View
Leonello Ave near Lincoln Dr	Mountain View
Seena Ave near Lincoln Dr	Mountain View
Russell Ave near Polk Ct	Mountain View
Thatcher Dr near O'Dell Way	Mountain View
Oak Ave near Brookmill Dr	Mountain View
Stagi Ln near Quinnhill Rd	Los Altos Hills
El Monte Rd near O'Keefe Ln	Los Altos Hills
Foothill Expressway near Homestead Rd	Cupertino

CHAPTER 4
CAPITAL IMPROVEMENTS

Chapter 3 evaluates Los Altos' stormwater collection system and recommends prioritized capital improvements to address deficiencies. This chapter provides a Capital Improvement Program (CIP) that recognizes these priorities. The CIP provides an overall guideline for the City to use in preparing annual budgets. Exigent circumstances and future in-field experiences may necessitate deviations from the Stormwater CIP. A master plan is intended to be a tool for planning, priorities are not intended to be unchangeable.

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 would be constructed as part of the new developments, and are not included in the CIP.

Capital Improvement Priorities

The proposed CIP for storm drainage in Los Altos is broken into three priority levels for funding and implementation. These levels are based on both the criteria of the City of Los Altos, as well as Schaaf & Wheeler's hydraulic analysis.

Priority Definitions

The City of Los Altos defines the improvement priority levels based on five main criteria; life safety risk, regulatory compliance, property damage risk, arterial and collector street flooding risk, and high maintenance needs. In addition, Schaaf & Wheeler considered the hydraulic properties of the entire stormwater system to pin-point specific areas that have higher priority than others.

High Priority	Projects needed to remedy recurring or significant drainage problems identified by the City and confirmed through modeling. Property may be at risk on a frequent basis and at the least, commerce is regularly interrupted during the winter months. This portion of the CIP is intended to be completed first as funding allows.
Moderate Priority	Local drainage projects necessary to reduce less significant flood risks during more extreme runoff events. This portion of the CIP should be addressed after all high priority projects are completed and funding allows.
Low Priority	Projects that would eliminate local flooding that presents a nuisance but is not considered to significantly threaten property. This portion of the CIP should be addressed after all moderate priority projects are completed and funding allows.

CIP Cost Summary

The total cost summary for all CIP projects is shown for each priority level in Table 4-1. These costs reflect the total amount required to complete all CIP projects, including regulatory compliance projects. Chapter 4 discusses four main categories of CIP projects consisting of pipeline conveyance, system extensions, drywells, and local problem areas.

Table 4-1: Summary of CIP Costs Based on Priority Level

Priority Level	Cost
High Priority Capital Improvements	$3,800,000
Moderate Priority Capital Improvements	$11,500,000
Low Priority Capital Improvements	$13,800,000
Total Capital Improvement Program	**$29,100,000**

Table 4-1 costs include a 40% increase in construction cost estimates for design, administration, and contingency costs. The costs in the above summary table are detailed in Tables 4-3 to 4-9 which reflect specific costs in each of the four project categories. Note that the annual maintenance for the CIP projects is not included in Table 4-1.

Cost of Improvements

Costs have been estimated using information from other projects, cost estimating guides (2015 Current Construction Costs, Saylor Publications, Inc.), and engineering judgment and are in 2015 dollars. The costs per linear foot of improvement used for the cost estimates are given in Table 4-2. (Note that these costs do not include the 40% increase for design, administration, and contingency included in all other tables). Connection (manhole or catch basin) replacement cost estimates ranged from $13,145 to $15,180 depending on diameters. Drywell replacements are estimated at $5,000 per well plus 18-inch pipe to nearest existing system. All estimates are based on the ENR June 2015 index of 11155. Costs include open trenching in roadway up to ten feet in depth. Only projects with creek outfalls include permitting and environmental documentation costs. Most of the remaining improvement projects are expected to qualify for negative declarations from permitting agencies.

Table 4- 2: Stormwater Unit Costs

Diameter (inches)	2015 Dollar per Linear foot of Pipe	2015 Dollar per Connection
12	$255	$13,145
15	$280	$13,260
18	$300	$13,345
21	$335	$13,435
24	$365	$13,515
27	$390	$13,600
30	$420	$13,680
33	$450	$13,765
36	$475	$13,850
42	$530	$14,020
48	$590	$14,185
54	$645	$14,355

Diameter (inches)	2015 Dollar per Linear foot of Pipe	2015 Dollar per Connection
60	$700	$14,510
66	$755	$14,680
72	$810	$14,845
78	$875	$14,945
84	$930	$15,180

Capital Improvement Program

This chapter systemically identifies all Capital Improvement Projects by focusing on one watershed at a time. In each watershed, all four categories of CIP projects and relative costs are detailed. All cost estimates for total allowance with contingencies include an additional 20% for design and administration and 20% percent contingency. Maps of the improvement priorities are shown on Figures 3-1 through 3-6 in Chapter 3. Maps of the proposed improvements showing pipe diameters are shown in Figures 4-1 through 4-6. Appendix G includes detailed maps of each improvements and Appendix H details the cost estimate for each project.

CIP Project Categories

As stated previously, the four main project categories are pipeline conveyance, system extensions, drywells, and specific problem areas. Pipeline conveyance improvements are recommended for areas where the stormwater pipe does not have sufficient capacity to meet system flows and needs to be upsized. System extensions are recommended in several locations in each of the watersheds in order to accommodate additional flow in areas without an existing pipe network. Several existing drywells are identified and specified for either replacement or decommissioning depending on circumstance. Improvements for specific problem areas mitigate areas identified by City of Los Altos staff. In some cases, the specific problem location overlaps with another category. If this is the case, the primary problem area category absorbs all the CIP project costs associated with that area. This is detailed in Appendix J specific problem area project sheets. Refer to Chapter 3 for more information concerning the four main project categories.

This chapter discusses each of the five sub-areas separately and breaks down the applicable CIP projects in all four categories to each of the watersheds. Figure 4-1 below shows all of these projects.

Project Identifier

Each CIP has been assigned a project identifier. The format is as follows: XX_YYY_###.

1. XX= Sub-area
2. YYY= Type of CIP
3. ###= number identifier

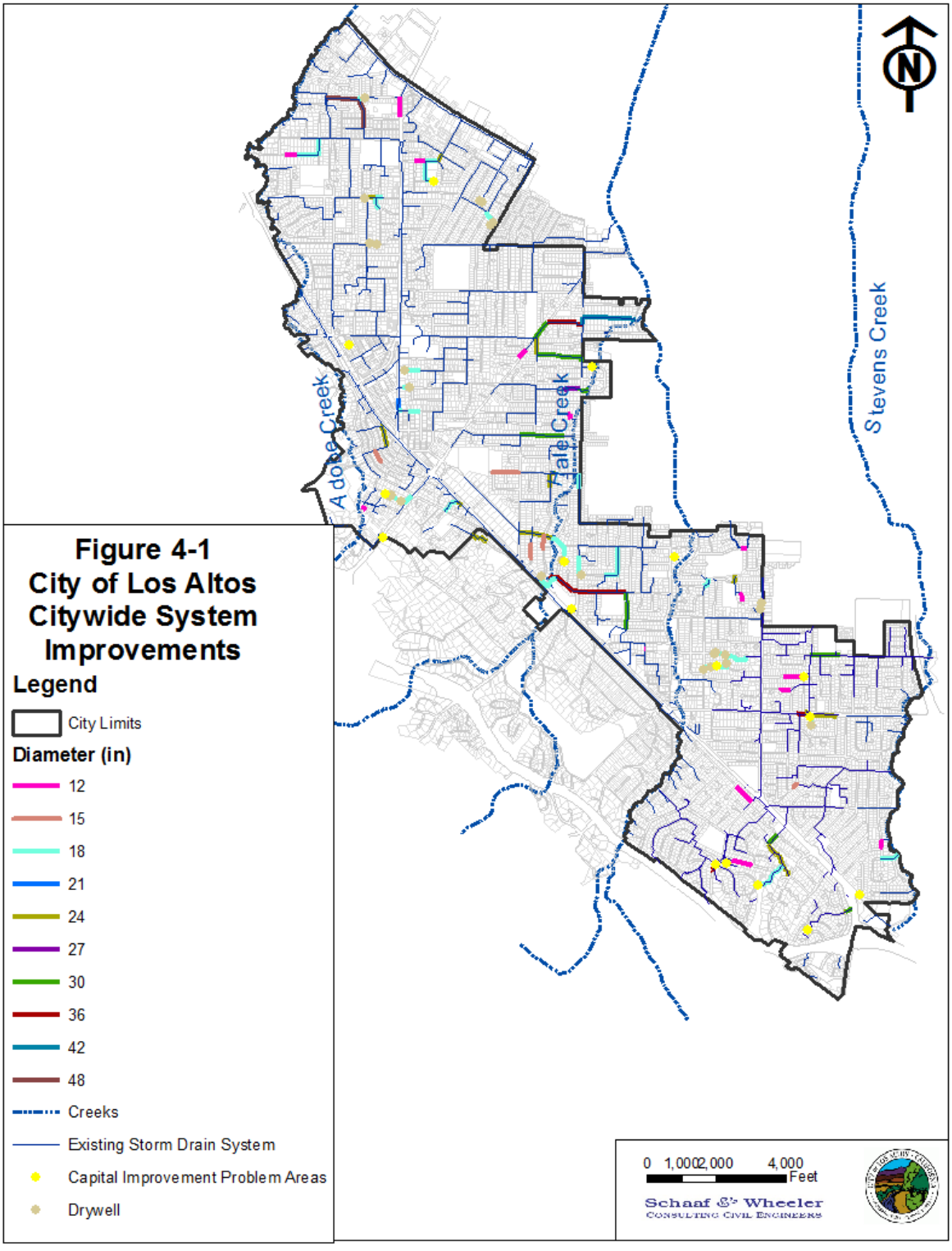

Figure 4-1: Citywide Stormwater System and Pipe Sizes

Adobe Watershed

Table 4-3 outlines the project category specific costs for the Adobe watershed. Five pipe replacement improvements are recommended: Loucks, Lyell, Palm, Pine, and Van Buren that total $3,520,000. Network extensions total $1,430,000, drywells total $660,000, and problem areas total $1,350,000. The total cost of CIP projects for the Adobe watershed is $6,960,000. For a more detailed breakdown of problem area costs and priorities see Table 4-8. Figure 4-2 displays the location of the conveyance pipeline improvements.

Table 4- 3: Adobe Creek Area 10-Year Storm Protection CIP

Improvement Name	Project Identifier	Priority Level	Pipe Length	Construction Allowance	Total Allowance w/ Contingencies
Loucks	AD_CNV_001	Moderate	1,923	$1,230,000	$1,720,000
Lyell	AD_CNV_002	Low	536	$230,000	$320,000
Palm	AD_CNV_003	Low	720	$330,000	$460,000
Pine	AD_CNV_004	Low	807	$330,000	$460,000
Van Buren	AD_CNV_005	Low	1,103	$400,000	$560,000
Extensions	AD_EX_010-AD_EX_15	Low (AD_EX_010 – AD_EX_014) Moderate (AD_EX_015)	1,216	$600,000	$1,430,000
Drywells*	AD_DW_100-AD_DW_105	Low	1,047	$480,000	$660,000
Problem Areas	AD_PA_1000 - AD_PA_1002	See Table 4-8	-	$950,000	$1,350,000

***** Note: Milverton drywells are high priority and categorized under Problem Areas

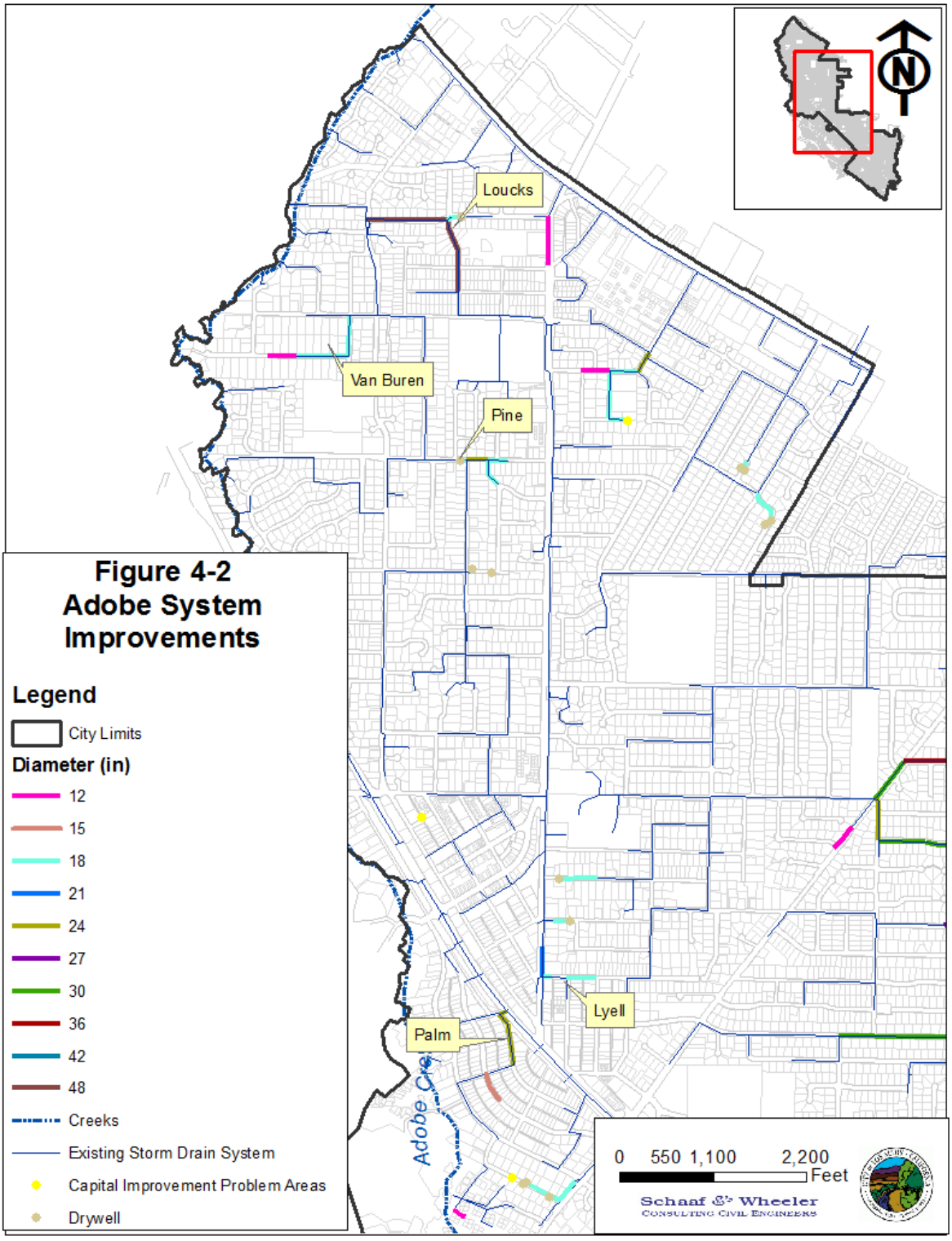

Figure 4-2: Adobe System Improvements

Hale Creek Watershed

Table 4-4 outlines the project category specific costs for the Hale Creek watershed. Eight pipe replacement improvements are recommended: Border, Edith, Cuesta, Parma, Renetta, Edge, Giralda, and Berry that total $9,760,000. Watershed pipeline extensions total $1,020,000, drywells total $940,000, and problem areas total $880,000. The total cost of CIP projects for the Hale Creek watershed is $12,600,000. For a more detailed breakdown of problem area costs and priorities see Table 4-8. Figure 4-3 displays the location of the conveyance pipeline improvements.

Table 4- 4: Hale Creek Area 10-Year Storm Protection CIP

Improvement Name	Project Identifier	Priority Level	Pipe Length	Construction Allowance	Total Allowance w/ Contingencies
Border	HA_CNV_001	Moderate	531	$290,000	$410,000
Edith	HA_CNV_002	Moderate	5,345	$2,770,000	$3,880,000
Cuesta	HA_CNV_003	Low	1,266	$590,000	$830,000
Parma	HA_CNV_004	Low	582	$240,000	$340,000
Renetta	HA_CNV_005	Low	711	$320,000	$450,000
Edge	HA_CNV_006	Low	1,230	$460,000	$640,000
Giralda	HA_CNV_007	Low	820	$440,000	$620,000
Berry	HA_CNV_008	Low	3,453	$1,850,000	$2,590,000
Extensions	HA_EX_010-HA_EX_015	Low	2,205	$730,000	$1,020,000
Drywells*	HA_DW_100-HA_DW_102	Low	1,777	$670,000	$940,000
Problem Areas	HA_PA_1000 - HA_PA_1002	See Table 4-8	-	$630,000	$880,000

***** Note: Oakwood Ct drywells are moderate priority and categorized under Problem Areas

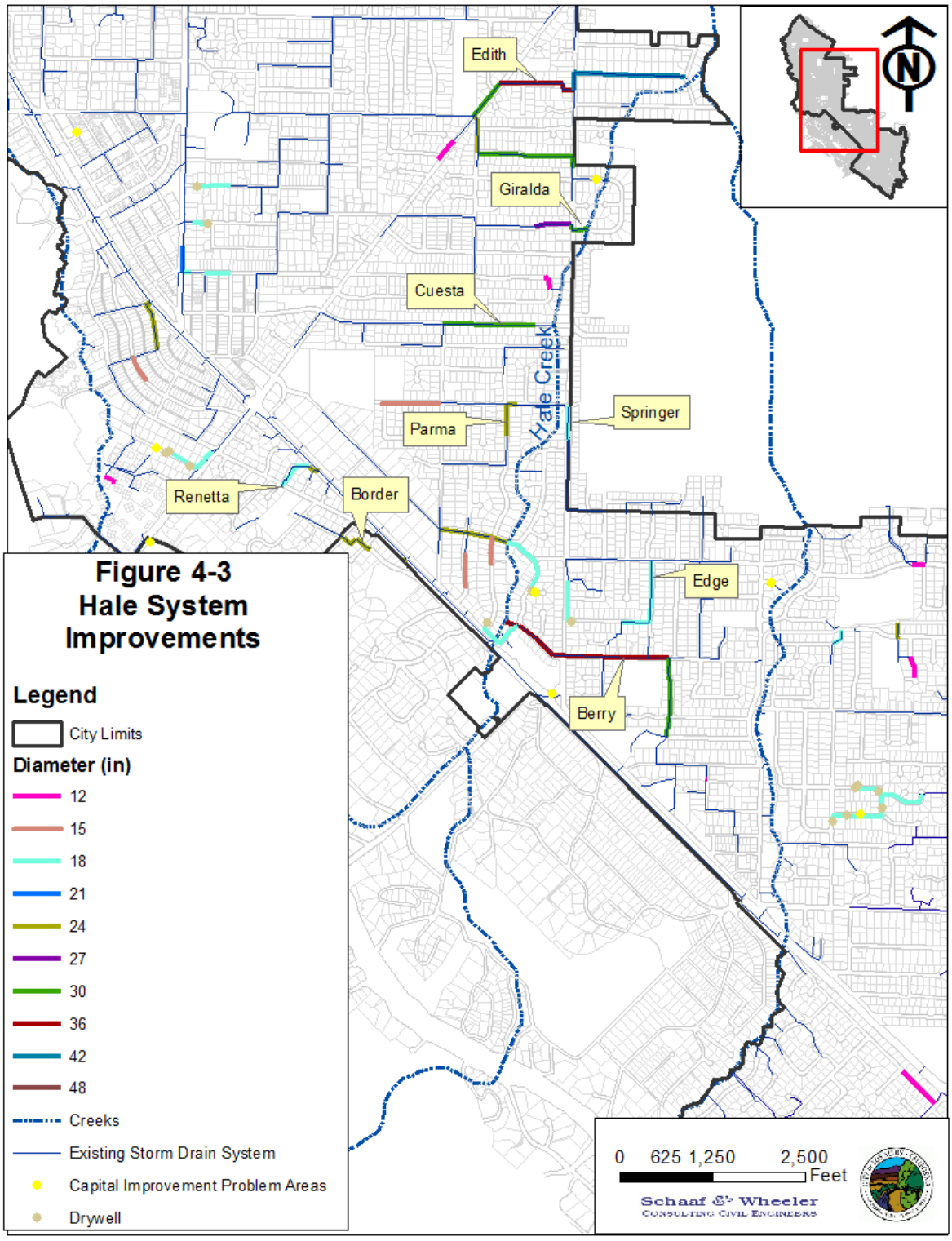

Figure 4-3: Hale System Improvements

Permanente Creek Watershed

Table 4-5 outlines the project category specific costs for the Permanente Creek watershed. Two pipe replacement improvements are recommended: Buckingham and Altamead that total $420,000. Watershed pipeline extensions total $250,000 and problem areas total $1,140,000. There are no drywell recommendations in this area. The total cost of CIP projects for the Permanente Creek watershed is $1,810,000. For a more detailed breakdown of problem area costs and priorities see Table 4-8. Figure 4-4 displays the location of the conveyance pipeline improvements.

Table 4-5: Permanente Creek Area 10-Year Storm Protection CIP

Improvement Name	Project Identifier	Priority Level	Pipe Length	Construction Allowance	Total Allowance w/ Contingencies
Buckingham	PM_CNV_001	Low	244	$140,000	$200,000
Altamead	PM_CNV_002	Low	218	$160,000	$220,000
Extensions	PM_EX_010-PM_EX_011	Low	480	$180,000	$250,000
Drywells*	-	-	-	-	-
Problem Areas	PM_PA_1000-PM_PA_1001	See Table 4-8	-	$810,000	$1,140,000

* Note: Payne drywells are moderate priority and categorized under Problem Areas

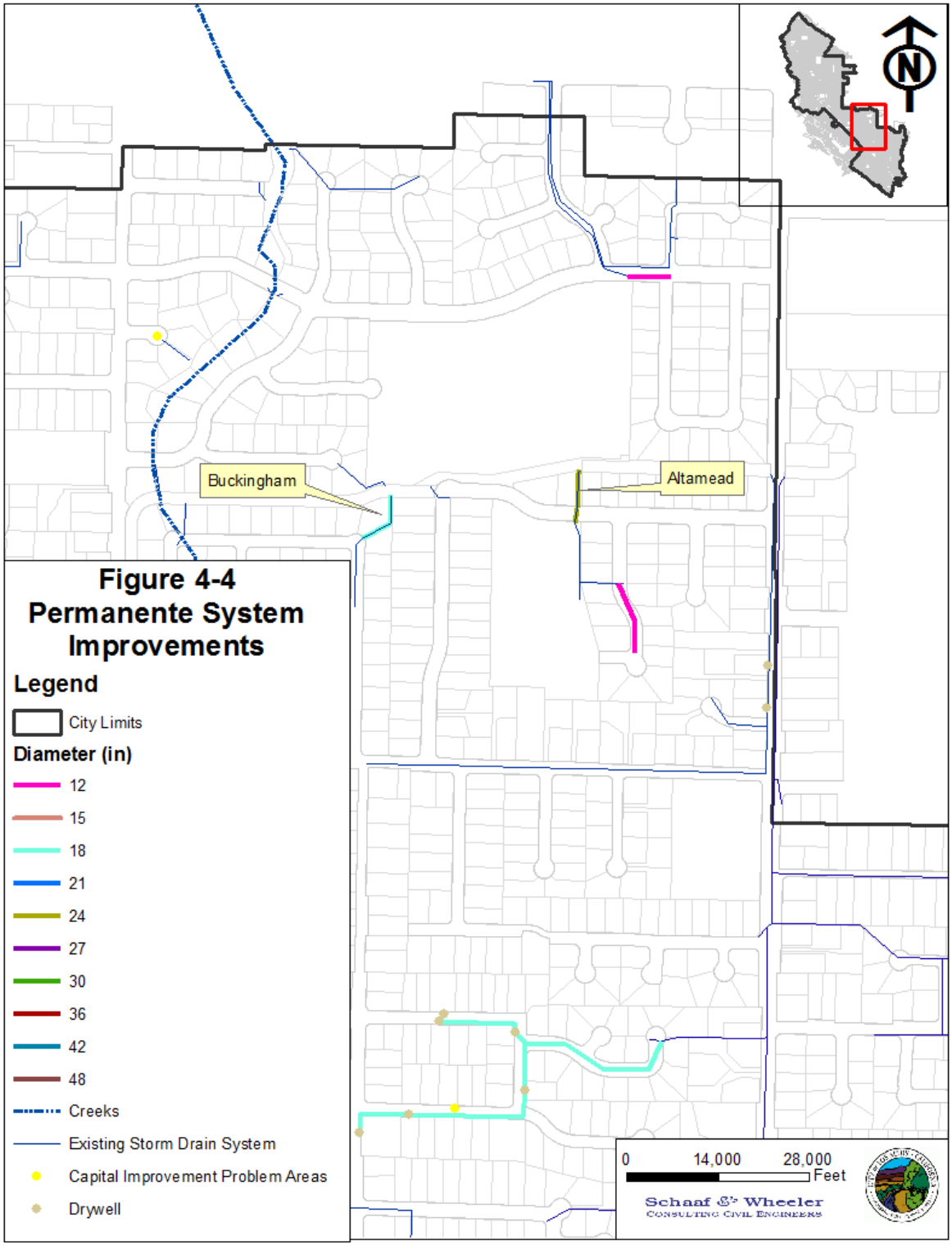

Figure 4-4: Permanente System Improvements

Permanente/Stevens Watershed

Table 4-6 outlines the project category specific costs for the Permanente/Stevens watershed. Five pipe replacement improvements are recommended: Deodora, Fremont, Stonehaven, Arboretum, and Oak that total $3,600,000. Watershed pipeline extensions total $960,000, drywells total $60,000, and problem areas total $1,900,000. The total cost of CIP projects for the Permanente/Stevens Creek watershed is $6,520,000. For a more detailed breakdown of problem area costs and priorities see Table 4-8. Figure 4-5 displays the location of the conveyance pipeline improvements.

Table 4-6: Permanente/Stevens Area 10-Year Storm Protection CIP

Improvement Name	Project Identifier	Priority Level	Pipe Length	Construction Allowance	Total Allowance w/ Contingencies
Deodora	PS_CNV_001	High	242	$160,000	$220,000
Fremont	PS_CNV_002	High	1,323	$680,000	$950,000
Stonehaven	PS_CNV_003	High	276	$170,000	$240,000
Arboretum	PS_CNV_004	Moderate	2,368	$1,110,000	$1,550,000
Oak	PS_CNV_005	Moderate	878	$460,000	$640,000
Extensions	PS_EX_010-PS_EX_015	Low	3,179	$690,000	$960,000
Drywells*	PS_DW_100	Low	12	$40,000	$60,000
Problem Areas	PS_PA_1000-PS_PA_1005	See Table 4-8	-	$1,360,000	$1,900,000

* Note: Dallas Ct drywells are moderate priority and categorized under Problem Areas

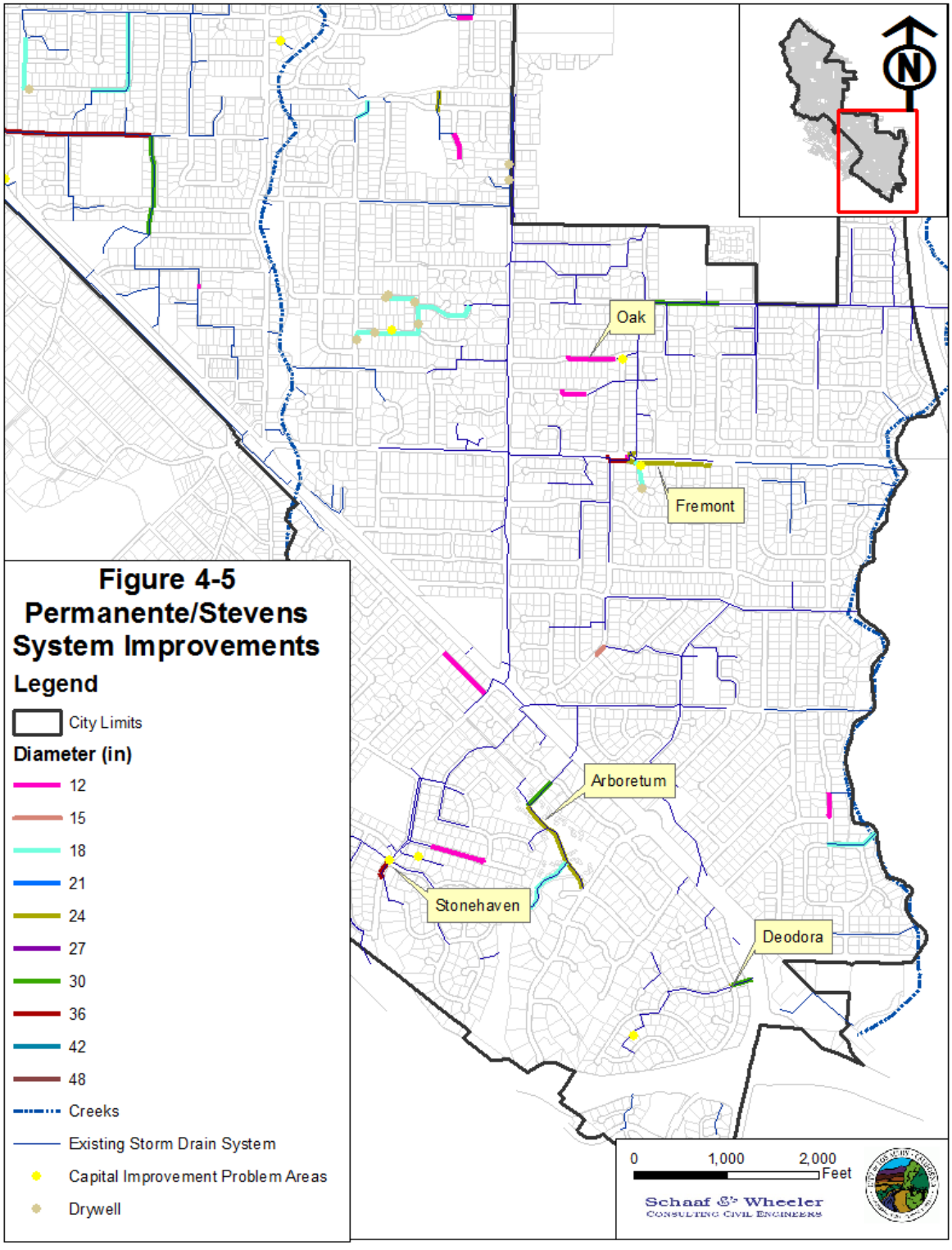

Figure 4-5: Permanente/Stevens System Improvements

Stevens Creek Watershed

Table 4-7 outlines the project category specific costs for the Stevens Creek watershed. One pipe replacement improvement is recommended: Fallen leaf that totals $350,000. Watershed pipeline extensions total $160,000 and problem areas total $150,000. No drywell improvements are recommended in this area. The total cost of CIP projects for the Stevens Creek watershed is $660,000. For a more detailed breakdown of problem area costs and priorities see Table 4-8. Figure 4-6 displays the location of the conveyance pipeline improvements.

Table 4-7: Stevens Creek Area 10-Year Storm Protection

Improvement Name	Project Identifier	Priority Level	Pipe Length	Construction Allowance	Total Allowance w/ Contingencies
Fallen Leaf	ST_CNV_001	Low	577	$250,000	$350,000
Extensions	ST_EX_010	Low	295	$110,000	$160,000
Drywells	-	-	-	-	-
Problem Areas	ST_PA_1000	See Table 4-8	-	$110,000	$150,000

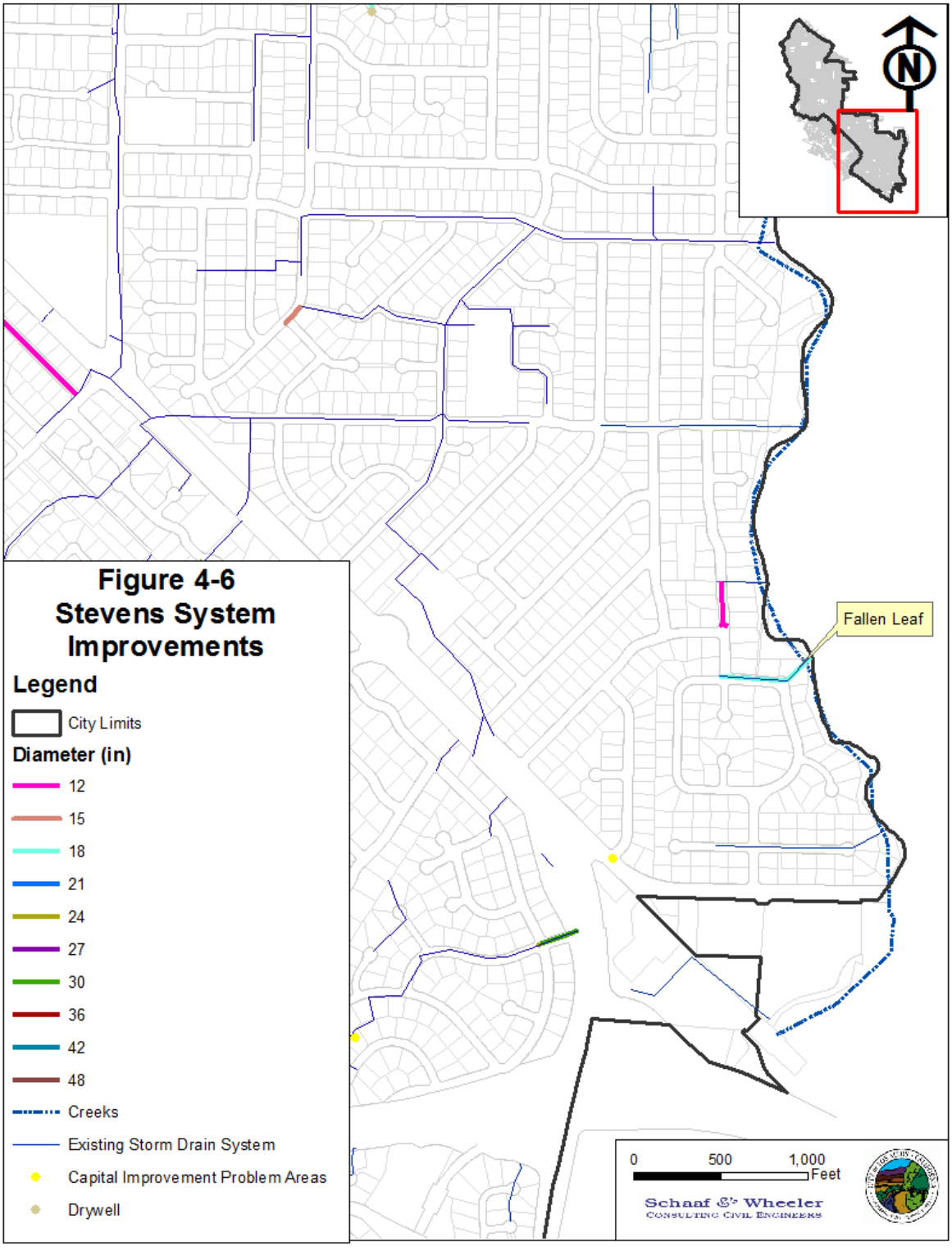

Figure 4-6: Stevens System Improvements

Problem Area Improvements

Tables 4-3 to 4-9 summarize the overall costs in each of the five watersheds. This section focuses on the specific problem areas in each of those watersheds. These recommended local upgrades do not necessarily increase capacity, but add important reliability to mitigate issues brought to the attention of the City of Los Altos. Tables 4-8 and 4-9 present the total allowance recommendations for these improvements, which include contingencies. Note that several of the local problem areas specified below also capture CIP projects in the other categories; reference Appendix J for further details. Also, maps of the improvement locations are shown on Figures 4-7 and 4-8 and most are detailed in Appendix J.

Table 4-8: Local Problem Spot Capital Improvements

Watershed	Location	Improvement	Cost	Priority
Adobe	Summerhill Ave at S El Monte	Install 2 CBs: one on Summerhill and one on El Monte	$200,000	Moderate
	Catalina Ct	Re-shape pipe outlet in basin	$740,000	Low
	Milverton Rd	Replace drywells	$410,000	High
Hale	Springer Rd	Install 370 LF RCP and 5 new MH	$240,000	Moderate
	Sunshine Dr	Remove CMP in basins. Hydro jet pipes. Install 12" aluminum flap gate	$150,000	Moderate
	Oakwood Ct	Replace Drywell	$490,000	Moderate
Permanente	Payne Dr	Replace drywells	$340,000	Moderate
	Loma Prieta Ct	Lower inlet grating to be below gutters	$30,000	Moderate
Permanente/ Stevens	1640 Dallas Ct	Replace drywell	$200,000	Moderate
	Woods Ln at Citation Dr	Install trash rack at inlet	$220,000	High
	Trash Rack at 2100 Stonehaven	Improve channel. New trash rack. Remove asphalt over weir structure.	$770,000	High
	Ditch Windimer and Sierra Ventura	Install gabion rock wall	$460,000	High
	Ranchita at Julie	Add sump to CB J6C-225. Add CB and 160 LF RCP.	$110,000	Moderate
	Cedar Pl and Redwood Dr	Install 2 new CBs and 240 LF RCP	$140,000	Moderate
Stevens	Foothill Exp at El Sereno Ave	Install new CB on off-ramp	$150,000	Moderate

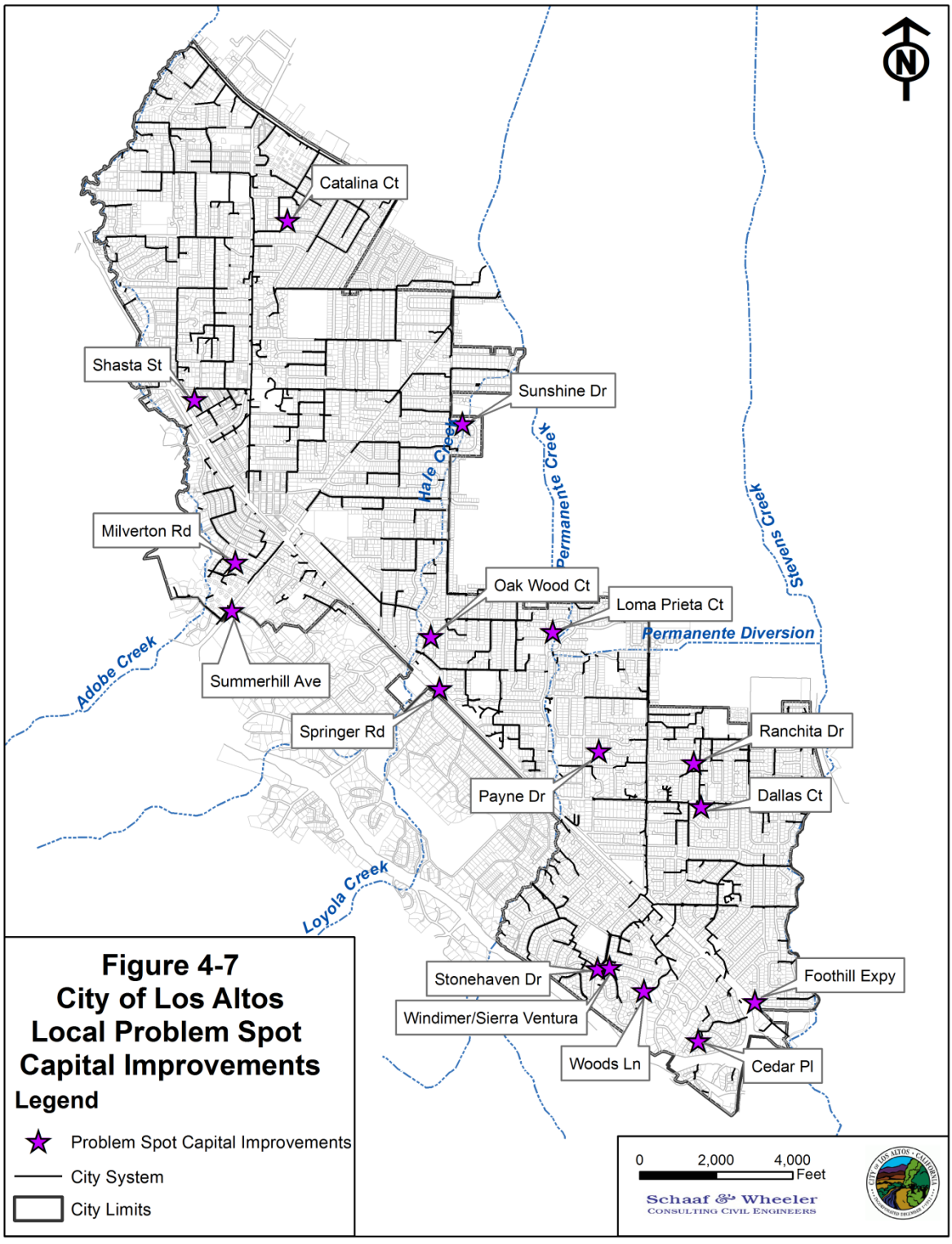

Figure 4-7: City of Los Altos Local Problem Spot - Capital Improvements

Table 4-9: Local Problem Spot Annual Maintenance

Watershed	Location	Improvement	Cost	Priority
Adobe	Distel Dr	Hydro jet pipes (annually). Remove mortar dam.	$3,000	Low
	Cherry Ave	Routine maintenance (annually)	$550	Low
	Portola Ct at Delphi Cr	Hydro jet lines (annually)	$550	Low
	Shasta St	Routine maintenance (annually)	$550	Low
	Okeefe Ln	Routine maintenance (annually)	$550	Low
	Pepper Dr	Routine maintenance (annually)	$550	Low
Hale	Viola Pl	Clean gate and hydro jet pipe (annually)	$550	Low
	Cuesta Dr and Gabilan St	Routine maintenance (annually)	$550	Low
	Manor Way	Routine maintenance (annually)	$550	Low
	Edge Ln	Replace concrete MH lid with cast iron lid	$1,000	Low
Permanente	Madelaine Ct	Clean L4D-606 (annually)	$550	Low
	Robinhood Dr	Hydro jet pipes (annually)	$550	Low
Permanente/ Stevens	Fremont Ave at Grant Rd	Hydro jet pipes (annually)	$550	Low
	Vineyard Dr at Deodara Dr	Clear/channelize outfall (annually)	$1,100	Moderate
	1975 Grant Rd at Woodland Library	Continue routine maintenance (annually)	$550	Low
	Heritage Ct	Hydro jet pipes (annually)	$550	Low
Stevens	Cristo Rey Dr and Kring Wy	Clear CB of debris (annually). Improve outlet near drainage ditch	$550	Low

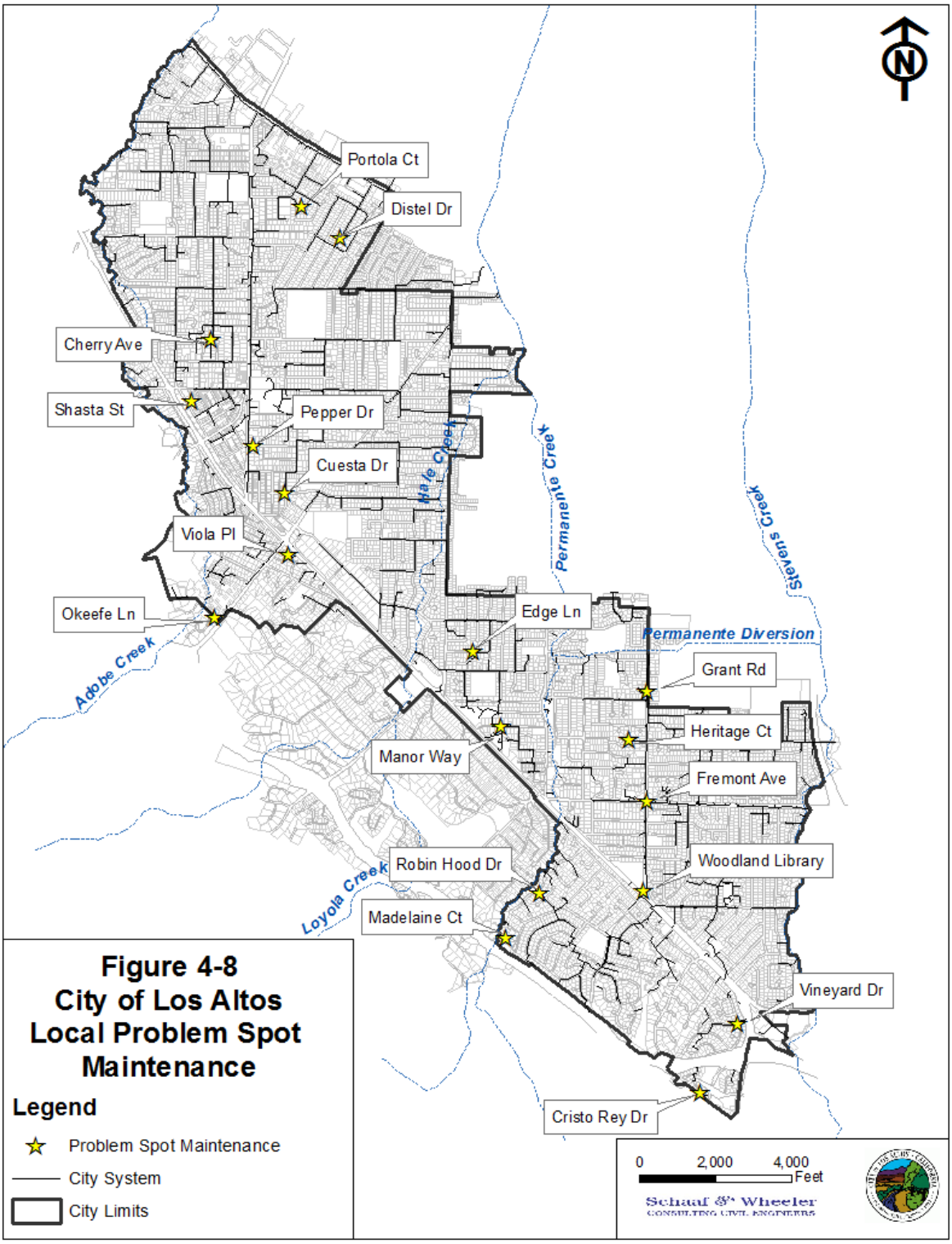

Figure 4-8: City of Los Altos Local Problem Spot Maintenance

Table 4-10 summarizes each improvement project discussed in Chapter 4.

Table 4-10: CIP Project Summary Table

				Priority		
	Location	**Project Identifier**	**Description**	**High**	**Moderate**	**Low**
Adobe Watershed	Loucks	AD_CNV_001	Install 1900 feet of 48" pipe, 70 feet of 18" pipe, and 8 manholes		$1,720,000	
	Lyell	AD_CNV_002	Install 180 feet of 18" pipe, 360 feet of 21" pipe, and 4 manholes			$320,000
	Palm	AD_CNV_003	Install 720 feet of 24" pipe and 5 manholes			$460,000
	Pine	AD_CNV_004	Install 550 feet of 18" pipe, 260 feet of 24" pipe, and 5 manholes			$460,000
	Van Buren	AD_CNV_005	Install 1100 feet of 18" pipe and 5 manholes			$560,000
	Bay Tree	AD_EX_010	Add 2 inlets, 1 manhole, and 170 feet of 12" pipe			$90,000
	Lyell	AD_EX_011	Add 2 inlets, 1 manhole, and 360 feet of 12" pipe			$160,000
	Orange Ave	AD_EX_012	Add 2 inlets, 3 manhole, and 350 feet of 12" pipe			$190,000
	Van Buren	AD_EX_013	Add 2 inlets, 1 manhole, and 340 feet of 12" pipe			$150,000
	San Antonio	AD_EX_014	Add 1 inlet, 1 manhole, and 590 feet of 12" pipe			$240,000
	Jordan Avenue	AD_EX_014	Add 2 inlets, 1 manhole, and 340 feet of 12" pipe			$150,000
	Shasta St	AD_EX_015	RCP and manholes		$450,000	
	501 and 486 Alicia Way	AD_DW_100	Replace 4 inlets, 3 manholes, and 480 feet of 18" pipe			$270,000

	Location	Project Identifier	Description	Priority		
				High	Moderate	Low
	624 and 625 Distel Drive	AD_DW_101	Replace 2 drywells: install 2 inlets, 1 manhole, and 160 feet of 18" pipe			$100,000
	50 Pepper Drive	AD_DW_102	Replace drywall: install 1 inlet, 1 manhole, and 200 feet of 18" pipe			$110,000
	160 Pine Lane	AD_DW_103	Replace drywell: install 1 inlet, 1 manhole, and 50 feet of 18" pipe			$40,000
	100 and 123 Yerba Santa Ave	AD_DW_104	Replace 2 drywells: install 2 inlets, 2 manholes, and 50 feet of 18" pipe			$70,000
	Loucks	AD_DW_105	Replace drywell: install 1 inlet, 1 manholes, and 110 feet of 18" pipe			$70,000
	Summerhill Ave at S El Monte	AD_PA_1000	Install 2 catch basins and 200 feet of 18" RCP		$200,000	
	Catalina Ct	AD_PA_1001	Re-shape catch basins, install a new catch basin (if needed), upsize pipe on Catalina Ct to 18" RCP, and replace bubble system with 18" underground system			$740,000
	650, 651, and 690 Milverton Road	AD_PA_1002	Replace 2 drywells: install 6 inlets, 3 manholes, and 770 feet of 18" pipe	$410,000		
Hale Watershed	Border	HA_CNV_001	Install 530 feet of 24" pipe and 7 manholes			$2,590,000
	Edith	HA_CNV_002	Install 520 feet of 24" pipe, 2000 feet of 30" pipe, 1090 feet of 36" pipe, 1660 feet of 42" pipe, and 20 manholes		$410,000	
	Cuesta	HA_CNV_003	Install 1270 feet of 30" pipe and install 4 manholes			$830,000

	Location	Project Identifier	Description	Priority		
				High	Moderate	Low
Hale Watershed	Parma	HA_CNV_004	Install 580 feet of 24" pipe and 2 manholes			$640,000
	Renetta	HA_CNV_005	Install 530 feet of 18" pipe and 3 manholes		$3,880,000	
	Edge	HA_CNV_006	Install 180 feet of 24" pipe and 4 manholes			$620,000
	Giralda	HA_CNV_007	Install 510 feet of 27" pipe, 310 feet of 30" pipe, and 6 manholes			$340,000
	Berry	HA_CNV_008	Install 2370 feet of 36" pipe, 1090 feet of 30" pipe, and 18 manholes			$450,000
	Benvenue	HA_EX_010	Add 2 inlets, 2 manholes, and 250 feet of 12" pipe			$140,000
	El Monte/ Santa Barbara	HA_EX_011	Add 2 inlets and 340 feet of 12" pipe			$130,000
	Aura Way	HA_EX_012	Add 2 inlets and 30 feet of 12" pipe			$20,000
	Rosita Ave	HA_EX_013	Add 3 inlets, 1 manhole, and 780 feet of 15" pipe			$340,000
	Parma Way	HA_EX_014	Add 2 inlets, 1 manhole, and 380 feet of 15" pipe			$180,000
	Echo Dr	HA_EX_015	Add 2 inlets, 1 manhole, and 440 feet of 15" pipe			$210,000
	707 Edge Lane	HA_DW_100	Replace drywell: install 1 inlet, 3 manholes, and 600 feet of 18" pipe			$320,000
	40 Hawthorne Avenue	HA_DW_101	Replace drywell: install 1 inlet, 2 manholes, and 450 feet of 18" pipe			$240,000
	1868 Parma Way	HA_DW_102	Replace drywell: install 1 inlet, 4 manholes, and 720 feet of 18" pipe			$380,000
	Springer Road	HA_PA_1000	Replace 370 feet of 18" RCP along Marilyn Drive and tie into existing system and replace 5 manholes		$240,000	

	Location	Project Identifier	Description	Priority		
				High	Moderate	Low
	Sunshine Drive	HA_PA_1001	Reconstruct two catch basins by removing corrugated metal pipe section protruding into basin, replace CMP pipes as needed, hydro jet pipes, and install flap gate on one of the basins		$150,000	
	Oakwood Court	HA_PA_1002	Replace drywell: Add 50 feet of new 18" RCP along Oakwood Ct., 430 feet of new 18" RCP along Riverside Dr., 450 feet of new 18" RCP along Covington Rd and tie into existing system, construct 1 new inlet, 4 new catch basins, 4 new manholes, and replace 1 existing manhole		$490,000	
Permanente Watershed	Buckingham	PM_CNV_001	Install 240 feet of 18" pipe and 3 manholes			$200,000
	Altamead	PM_CNV_002	Install 220 feet of 24" pipe and 4 manholes			$220,000
	Lammy Place	PM_EX_010	Add 2 inlets, 3 manholes, and 300 feet of 12" pipe			$180,000
	Covington Road	PM_EX_011	Add 2 inlets and 180 feet of 12" pipe			$80,000
	Payne Dr	PM_PA_1000	Replace 6 drywells: install 6 inlets, 9 manholes, and 2130 feet of 18" pipe		$1,100,000	
	Loma Prieta Ct	PM_PA_1001	Lower inlet grading below the surrounding gutters		$30,000	

	Location	Project Identifier	Description	Priority		
				High	Moderate	Low
Permanente / Stevens Watershed * Includes Camino and Grant System Extensions	Deodora	PS_CNV_001	Install 20 feet of 24" pipe, 220 feet of 30" pipe, and 1 manhole	$220,000		
	Fremont	PS_CNV_002	Install 60 feet of 12" pipe, 1000 feet of 24" pipe, 270 feet of 36" pipe, and 1 manhole	$950,000		
	Stonehaven	PS_CNV_003	Install 280 feet of 36" pipe and 3 manholes	$240,000		
	Arboretum	PS_CNV_004	Install 90 feet of 18" pipe, 1100 feet of 24" pipe, 370 feet of 30" pipe and 21 manholes		$1,550,000	
	Oak Ave	PS_CNV_005	Install 880 feet of 30" pipe and 7 manholes		$640,000	
	Ranchita	PS_EX_010	Add 2 inlets and 540 feet of 12" pipe			$210,000
	Julie Ln	PS_EX_011	Add 2 inlets			$10,000
	Garthwick	PS_EX_012	Add 2 inlets, 1 manhole, and 310 feet of 12" pipe			$140,000
	Austin	PS_EX_013	Add 2 inlets and 130 feet of 12" pipe			$60,000
	Windimer	PS_EX_014	Add 2 inlets, 1 manhole, and 660 feet of 12" pipe			$270,000
	Granger	PS_EX_015	Add 2 inlets, 2 manholes, and 620 feet of 12" pipe			$270,000
	1240 and 1270 Grant Road	PS_DW_100	Replace 2 drywells: install 2 inlets, 2 manholes, and 12 feet of 18" pipe			$60,000
	1640 Dallas Ct	PS_PA_1000	Restore manhole and install new catch basin		$200,000	
	Woods Ln at Citation Dr	PS_PA_1001	Install 36" trash rack at check dam or inlet to storm water pipe	$220,000		

	Location	Project Identifier	Description	Priority		
				High	Moderate	Low
	Trash Rack at 2100 Stonehaven Dr	PS_PA_1002	Improve creek channel approach to storm drain headwall and inlet, install new trash rack, and remove asphalt over gate structure and bring hatch up to grade	$770,000		
	Ditch between Windimer and Sierra Ventura Dr	PS_PA_1003	Install gabion rock wall along ditch, rebuild ditch with constant slope, repair fence, and replace pipe between ditch and manhole with 18" RCP	$460,000		
	Ranchita Dr at Julie Ln	PS_PA_1004	Replace inlet		$110,000	
	Cedar Pl and Redwood Dr	PS_PA_1005	Add 240 feet of 18" RCP along Cedar Pl and tie into existing system, 3 new manholes, 240 feet of 18" RCP, and 2 catch basins		$140,000	
Stevens Watershed	Fallen Leaf	ST_CNV_001	Install 580 feet of 18" pipe and 4 manholes			$350,000
	Fallen Leaf	ST_EX_010	Add 2 inlets, 2 manholes, and 300 feet of 12" pipe			$160,000
	Foothill Exp at El Sereno Ave	ST_PA_1000	Install a new catch basin alongside the Foothill Expressway off-ramp, near the Chevron station		$150,000	
Regulatory Compliance	2017 Trash Capture Requirement	RC_01	Install trash capture device to meet the Permit's 2017 requirements	$400,000		
	Green Infrastructure Plan	RC_02	Implement green infrastructure plan	$150,000		

CHAPTER 5
OPERATIONS AND MAINTENANCE

This chapter provides a review of the City of Los Altos' stormwater standards, specifications, and operations and maintenance practices used to comply with the San Francisco Bay Region Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit, number CAS612008, dated November 19, 2015. NPDES permit compliance begins during project planning and permitting, is inspected during construction, and continues through on-going operations and maintenance.

The previous Stormwater NPDES Permit, CAS029718, issued on April 21, 2001, applied only to Santa Clara County. Earlier permits carried requirements to develop specific programs to address stormwater quality and reduce pollutants entering receiving waters. These programs were developed by the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) and corresponding programs in Alameda, San Mateo and Contra Costa Counties. The new Municipal Regional Stormwater Permit formalizes many of the requirements enacted in the county programs, and adds new regional requirements for monitoring of specific pollutants of concern. As described in Chapter 2, the most notable change is increasingly proscriptive language, including an increase in required site inspections and an increase in information to track and report. Stormwater regulations are implemented and enforced by multiple departments and divisions of the City of Los Altos (see Figure 5-1). The roles of the various departments and divisions are discussed throughout this chapter.

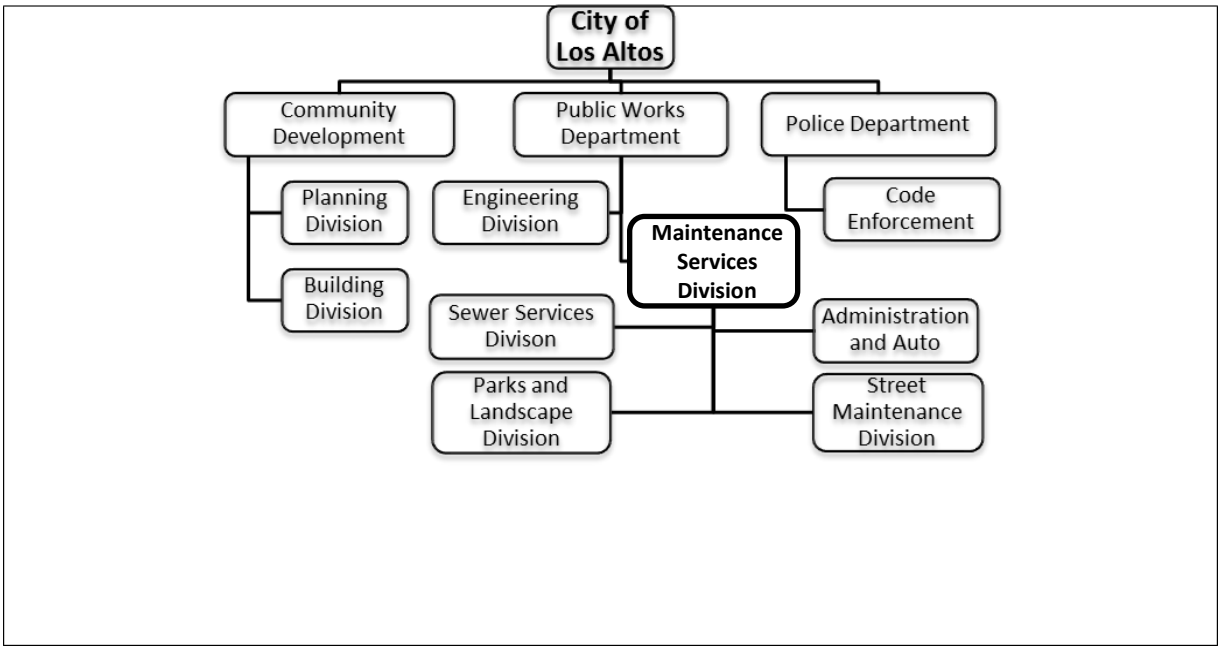

Figure 5-1: City Departments/Divisions Affecting Stormwater

Published Stormwater Standards

The City of Los Altos has published standards for work by the City and work within the City. The City's requirements are codified in Ordinances, and further refined in published plan and procedure documents.

Municipal Code

The Municipal Code of Ordinances establishes the City standards and grants the authority to enforce the standards.

Table 5-1: Description of Municipal Code of Ordinances

Municipal Code	Description
Section 6.32	Watercourse Protection Regulations
Section 10.08	Sewer System Protection Regulations
Section 10.16	Stormwater Pollution Prevention Measures
Section 13.20	Design Standards and Improvements

Planning Division Documents

The Los Altos General Plan is used by the Planning Division when reviewing proposed development. The Infrastructure and Waste Disposal element addresses the NPDES permit in broad terms, and establishes goals and responsibilities for implementation. The Natural Environment and Hazards element addresses a portion of the NPDES pollution prevention requirements. The General Plan does not go into specific elements of the NPDES permit, so the update of the NDPES permit does not affect the General Plan as written.

The Planning Division requires new residential construction and renovations to meet the national Green Building Standards, with a minimum score of 50 points. The Green Building Standards include some stormwater BMPs, but they are not mandated by the City. The City is nearly built out, so it may be impractical to require infill or replacement homes to incorporate features significantly different than the neighboring properties. However, there are several planned development areas on the perimeter of the City where additional stormwater requirements may be addressed in the project specific plans.

Building Division Documents

The Building Division reviews projects prior to the issue of construction permits, and provides inspection during and after construction.

Table 5-2: Requirements for Building Division Documents

Building Division Document	Requirements
Residential Permit	Grading and Drainage Plan, Green Building score sheet, Blueprint for a Clean Bay sheet, Erosion Control Plan, and Stormwater Pollution Prevention Plan.
Commercial Building Permit	Green Building score sheet, Blueprint for a Clean Bay sheet, and Erosion Control Plan.
Demolition Permit	Stormwater Pollution Prevention Plan for areas greater than one acre or as deemed necessary.
Erosion Control Plan	Best Management Practices in 6 categories: Erosion Control, Run-on and Run-off Control, Sediment Control, Active Treatment Systems, Good Site Management, and Non-Stormwater Management.
Blueprint for a Clean Bay	Required in all residential and commercial plan sets.
Foundation Inspection	Performed by the Building Division.

Engineering Division Documents

The Engineering Division prepares and maintains documents that pertain to work performed by or for the City. The standard details and specifications developed by the Engineering Division are used for both Capital Improvement Projects and for planned development. The Engineering Division submits the Stormwater report annually.

Table 5-3: Description of Engineering Division Documents

Engineering Division Document	Description
General Provisions Section 7-1.01G	Contains sufficient detail on Water Pollution Prevention to give guidance without conflicting with the technical specification for stormwater pollution control or the governing regulations.
Technical Specification Section 20	Stormwater Pollution Prevention Plan procedures are outlined for mitigating certain construction activities.
Technical Specification Sections 9 and 10	Address the construction standards for Storm and Sanitary Sewers.
Standard Details SD-1 through SD-9	Address the design of specific Stormwater Facilities.
Standard Details EC-1 through EC-4	Contain typical details related to Erosion Control.

Operations and Maintenance

Stormwater maintenance is performed by the City's Maintenance Services Division. The City budgets one full-time equivalent position (0.5 Engineer and 0.5 Maintenance Worker I). In practice the work is performed by several members of the maintenance, planning, and engineering staffs.

Shoulder Maintenance

The City's current shoulder paving standard includes a three foot wide drainage swale along each side of the street. A copy of the City's design standard is included in Appendix M. City crews have traditionally maintained these facilities on a complaints based approach. Maintenance activities include: top sealing, repairs, and debris removal. As the system ages these activities have potential for increasing. The City should amend its maintenance policies to include 283 labor hours for routine inspection and repair of the shoulder swales to assure the system is reliable in providing drainage protection. This effort is included under Task C2 in Table 5-7.

Operations and Maintenance (O&M) Standard Procedures

Los Altos operates its stormwater collection system using procedures developed under the latest SCVURPPP Urban Runoff Management Plan (URMP). The City has adopted the following performance standards as part of that plan:

- Illicit Connection and Illegal Dumping Elimination Activities
- Industrial/Commercial Discharger Control Programs
- Public Streets, Roads and Highways Operations and Maintenance
- Stormwater System Operations and Maintenance
- Planning Procedures for new Development and Redevelopment
- Construction Inspection
- Pest Management

The performance standards refer to the California Stormwater Quality Association (CASQA) *Stormwater BMP Handbooks* and the SCVURPPP *Stormwater Handbook*. Responsibility for performance of these tasks is shared across the City staff. The primary activities performed by Maintenance Services are shown in Table 5-4.

Table 5-4: Performance Standards

Task	Responsibilities
Street Sweeping	All residential streets are swept once a month (scheduled by zone). The civic center, downtown plazas and major streets are swept weekly.
Litter and Trash Removal	Daily (Monday through Friday) litter pick up in downtown. Contracted weekend litter removal and downtown trash receptacle services. Biweekly litter collections in non-contracted portions of the City.
Annual Inspection and Cleaning of Inlets and Outfalls	Inspection and cleaning of all the stormwater inlets, catch basins and outfalls before the winter rain season begins. Check for the NO DUMPING storm drain markers.
Shoulder Maintenance	Inspect and repair roadway shoulder swales.
Heavy Leaf Pick-Up	Scheduled residential heavy leaf pick-up days in the fall, collecting leaves before they reach the storm drains.
Training	Required training conducted annually to ensure staff is kept current on Permit Requirements, BMPs and required skills (safety, equipment use, etc.).
On-Call Response	O&M staff responds to service calls from the public concerning trees and limbs down in the streets and drainage structures.
Corporation Yard Maintenance	Maintenance Services sweep the yard and maintain the BMPs in accordance with the City's Corporation Yard SWPPP.

Equipment

As with personnel, stormwater maintenance equipment is shared with the Street Maintenance Division. The City provided a listing of equipment shared between the Streets and Storm Drainage cost centers, listed in Table 5-5. Brush chippers, which may be used during on-call response activities, are located in the Parks and Street Landscaping cost center. The City recently replaced their fleet of service trucks in 2008-2009. The estimated useful life listed was provided by Maintenance Services. The lifespan of the major items (Dump Truck and Loader) can be extended to 15 years through a program of preventive maintenance and services, which the City practices.

The Sewer Services Division has a closed circuit television/video system and a combination flushing/vacuum truck which, in theory, could be used for routine inspection and maintenance of the

stormwater pipes. However, these assets cannot be shared by other Divisions because sanitary sewer is a separate enterprise fund. A recommendation to lease or purchase similar equipment for stormwater maintenance appears in the last section of this report.

Table 5-5: Stormwater Maintenance Equipment

Item	Year Purchased	Use	Estimated Useful Life	Estimated Remaining Life
Dump Truck (F650)	2009	Hauling debris/trash	10	3
Service Truck (F350)	2004	Crew service truck	10	0
Trailer - single axle	1997	Hauling materials / debris	10	0
Trailer - double axle	2006	Hauling materials / debris	10	0
Wheeled Loader	2001	Ditch cleaning, debris loading	10	0

Annual Work Plan

Under the Urban Runoff Management Plan, the City is required to submit an annual work plan to the SCVURPPP. The format of the plan follows the NPDES permit and the Management Plan. The updated permit includes all but one of the requirements of the previous permit (monitoring for Nickel was removed), and added additional contaminants to be monitored (PCB, PBDE/flame retardant, selenium and legacy pesticides). A draft Work Plan is included in Appendix L that renumbers the work plan elements to match the new permit, adds the new requirements and incorporates the changes listed above.

Record Keeping

Maintenance Services maintains records of annual training and annual inspections using Microsoft Excel spreadsheets. Listings of sites to inspect are printed and distributed to work crews, who collect field notes on the sheets and return them. Completed sheets are filed in hard copy and scanned for digital filing. The City uses the Order Processing and Requisition Accelerator (OPRA) computerized work order system to track all scheduled and on-call maintenance work. As public and private trash capture and stormwater quality devices are added to the system, they can be entered into the OPRA system for routine inspection and cleaning (public devices) or annual inspection (private devices).

Annual Reports are prepared for the Urban Runoff Management Program, meeting the reporting requirements of the NPDES permit. The report follows the Annual Work Plan for the year, annotating completed activities, on-going actions and items of concern. The Work Plan is structured by permit requirement, so the current Annual Report format addresses all of the required items in the permit.

Tasks Under Permit CAS162008

The newly adopted NPDES permit incorporates the existing work items under the 2004 Urban Runoff Management Plan and adds additional design review, inspection and reporting tasks. The complete list of work items are summarized in Table 5-6.

Table 5- 6: Operations Tasks Under Permit CAS162008

Provision	Description
C.2: Municipal Operations	Ensure development and implementation of appropriate BMPs by all Permittees to control and reduce non-stormwater discharges and polluted stormwater to stormwater systems and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure.
C.3: New Development and Redevelopment	Allows permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects
C.4: Industrial and Commercial Site Controls	Each Permittee shall implement an industrial and commercial site control program at all sites which could reasonably be considered to cause or contribute to pollution of stormwater runoff, with inspections and effective follow-up and enforcement to abate actual or potential pollution sources consistent with each Permittee's respective Enforcement Response Plan (ERP), to prevent discharge of pollutants and impacts on beneficial uses of receiving waters
C.5: Illicit Discharge Detection and Elimination	Permittees shall develop and implement an illicit discharge program that includes an active surveillance component and a centralized complaint collection and follow-up component to target illicit discharge and non-stormwater sources.
C.6: Construction Site Control	Each Permittee shall implement a construction site inspection and control program at all construction sites, with follow-up and enforcement consistent with each Permittee's respective Enforcement Response Plan (ERP), to prevent construction site discharges of pollutants and impacts on beneficial uses of receiving waters
C.7: Public Information and Outreach	Each Permittee shall increase the knowledge of the target audiences regarding the impacts of stormwater pollution on receiving water and potential solutions to mitigate the problems caused; change the waste disposal and runoff pollution generation behavior of target audiences by encouraging implementation of appropriate solutions; and involve various citizens in mitigating the impacts of stormwater pollution.
C.8: Water Quality Monitoring	Each Permittee shall comply with its stormwater countywide program, contribute to a regional collaborative effort, and complete monitoring requirements within its own jurisdictional boundaries so that all applicable requirements are fulfilled.
C.9: Pesticides Toxicity Control	Permittees shall implement a pesticide toxicity control program that addresses their own and others' use of pesticides within their jurisdictions that pose a threat to water quality and that have the potential to enter the municipal conveyance system.
C.10: Trash Load Reduction	Permittees shall demonstrate compliance with Discharge Prohibition A.2 and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems (MS4s) by 40% by 2014, 70% by 2017, and 100% by 2022.
C.11: Mercury	Permittees shall perform the control measures and provide reporting on those control measures according to urban runoff requirements of the San Francisco Bay

Provision	Description
Controls	Mercury Total Maximum Daily Loads (TMDL).
C.12: Polychlorinated Biphenyls (PCBs) Controls	Permittees shall perform the control measures and provide reporting on those control measure according to urban runoff requirements of the PCBs TMDL.
C.13: Copper Controls	Permittees shall implement the control measures and accomplish the reporting on those control measures according to the Basin Plan amendment necessary to support the copper site-specific objectives in San Francisco Bay.
C.14:	Not applicable
C.15: Exempted and Conditionally Exempted Discharges	Permittees must identify appropriate BMPs, monitor the non-stormwater discharges where necessary, and ensure implementation of effective control measures to eliminate adverse impacts to waters of the State consistent with the discharge prohibitions of the Order.

Notes:

1. Definitions from the Municipal Regional Stormwater Permit CAS612008.

Staffing and Budget

Los Altos current stormwater staffing is 0.5 Engineer and 0.5 Maintenance Worker (part of Maintenance Services). It is estimated that the total workload as 1,167 engineer/inspector hours per year, or 0.7 of one full time equivalent position, and 1,632 maintenance worker hours per year, or 1.0 of a full time equivalent position, bringing the required total to 1.7 full time equivalent positions. Hourly rates are assumed at $104/hour for Maintenance and $172/hour for Engineering. The stormwater annual workload is in Table 5-7. The total stormwater management cost is approximately $470,000 annually.

Table 5-7: 2015/16 Stormwater Annual Workload

Task	Engineering Work Hours	Maintenance Worker Hours	Contracted Services/ Fees
General Requirements	717	315	$92,712
C.2 Municipal Operations	0	407	$7,500
C.3 New Development	88	40	
C.4 Industrial and Commercial Site Controls	44	0	-
C.5 Illicit Discharge Detection and Elimination	24	728	-
C.6 Construction Site Control	106	4	-
C.7 Public Information and Outreach	48	0	-
C.8 Water Quality Monitoring	24	0	-
C.9 Pesticide Toxicity Controls	8	31	-
C.10 Trash Load Reduction	60	107	-
C.11 Mercury Controls	8	0	-
C.12 PCBs Controls	12	0	-
C.13 Copper Controls	12	0	-
C.14 Not Applicable	0	0	-
C.15 Exempted and Conditionally Exempted Discharges	16	0	-
TOTAL HOURS:	**1,167**	**1,632**	**-**
TOTAL COST:	**$200,000**	**$170,000**	**$100,000**

Within the City budget, the Stormwater budget does not contain a Capital Outlay component, and only the Capital Projects budget includes an Equipment Replacement Fund. The estimated replacement costs for the major equipment used for stormwater maintenance are shown in Table 5-8. The annual replacement cost is approximately $21,100.

Table 5-8: Stormwater Equipment Costs

Item	Estimated Useful Life	Replacement Cost, $	Target Replacement Year	Estimated Replacement Cost (4)	Annual Replacement Cost	*
Dump Truck	15	76,000	2029	107,000	7,000	1,3
Service Truck (F350)	10	35,000	2019	40,000	4,000	1
Trailer - single axle	10	11,000	2016	10,000	1,000	2
Trailer - double axle	10	14,000	2021	20,000	2,000	1
Wheeled Loader	15	96,000	2021	110,000	7,000	1,3

Notes*:

1. Original purchase cost provided by City in June 2015.
2. Replacement cost estimated from other sources.
3. Useful life extended to 15 years.
4. Future replacement cost based on 10-year average inflation rate of 2.53%.

CHAPTER 6
FINANCIAL ANALYSIS AND FUNDING STRATEGIES

This chapter presents the funding strategies and their implications that are available to the City to fund capital projects for the Stormwater system. The findings presented in this chapter represent a high-level overview of the financial condition of the City's Stormwater Program and potential impacts to the General Fund and/or property owners. Financial plans and levy/fee options should not be implemented without the specific analysis and justification required by statutory obligations for the revenue mechanism the City selects.

Summary of Findings

This chapter finds:

- The City of Los Altos, like many California cities, faces increasing expenditures to fulfill mandated obligations and community expectations associated with its Stormwater Program.
- The Stormwater Program has historically been supported by the General Fund; however, the projected cost of these expenditures in a time of increasing demands on the City's General Fund warrants the consideration of a dedicated revenue stream.
- Over the next 10-years, the Stormwater program could invest approximately $8.7 million to improve or construct capital infrastructure. These investments, while scheduled in a prioritized manner, occur in an uneven pattern from year to year.
- Over this 10-year period, the Stormwater Program is also projected to spend approximately $13,000 annually (in 2015 values) on maintenance in problem spots in the system.
- The City's operation and maintenance and permit compliance costs are expected to be approximately $470,000 on an annual basis (in 2015 values).
- To minimize the financial burden on the community and smooth out the capital expenditures, debt financing is recommended for a portion of the capital program.
- Fully funding the capital improvement program recommended by this Stormwater Master Plan over the next thirty years with a smooth, property-based revenue stream will require at least $17.6 million in debt-financing.
- To fund the annual problem-spot maintenance costs, cash reserves, capital program needs, and annual debt service payments requires an annual revenue stream ranging from approximately $310,000 in Year One increasing to approximately $1.2 million by Year 10.

- This annual revenue stream can be generated through an annual levy on properties ranging from an estimated $25.39 per equivalent dwelling unit3 in Year One increasing to $102.41 by Year 10.

- While multiple levy/fee mechanisms are available to create a dedicated revenue stream from properties in the City, some form of direct property owner or voter approval of the fee will be required. The City will need to determine the political feasibility of this new funding source, in addition to preparing the formal justification and documentation of the selected levy/fee mechanism.

- Other minor revenue streams may also be developed which would reduce the annual levy on property owners. These might include fees for specific operational or regulatory tasks and/or mitigation fees from new development or redevelopment that impact the Stormwater infrastructure.

Introduction

This chapter has been prepared following a "revenue requirements" analytical methodology common to financial analyses underlying most utility rates and charges imposed by traditional utilities, similar to the City's sewer system. While California law does not enable municipalities to impose "utility rates" for stormwater management services, the Stormwater Program shares similarities to traditional utilities and will likely require a primary, dedicated revenue source akin to rates.

The Stormwater Program includes long-term capital financing requirements to fund equipment, infrastructure, and problem-spot maintenance projects and will eventually have ongoing operations, maintenance, administration, and regulatory obligations to fund. Properly managing the Program will also require establishing reserves and using debt financing. Therefore, the following analyses have been prepared:

- Evaluation of financing strategies for the capital improvement program.
- Projected debt proceeds and debt service payments.
- Analysis of cash and reserve requirements.
- Determination of net annual revenue requirements for the program.

Please note that all figures are presented in future dollars (i.e., inflation[4] has been applied to the cost estimates presented in earlier chapters). Therefore, revenue streams also represent forecasted dollar amounts needed in future years.

Finally, the financial analysis examined revenue requirements over a 30-year period corresponding to fiscal years 2016/17 through 2045/46. The full financial analysis is documented in more detail, in the appendices to this chapter.

3 An equivalent dwelling unit is equal to a typical single family residential parcel.

4 A 3% inflation factor has been applied to problem-spot maintenance costs and to the capital project costs, based on the average annual change in the Construction Cost Index, per the Engineering News Record.

Potential Revenue Sources

In establishing a dedicated revenue stream for the Stormwater Program, the City will likely want to pursue a property-related fee or a special tax. The political feasibility of these mechanisms will likely be critical factors in determining which one the City implements.

Property-Related Fee

A property-related fee is a fee for service attributable to the parcel being charged. A fee for stormwater services is levied upon the County tax roll and is imposed as an incident of property ownership. As such, it would be subject to the substantive and procedural requirements of California Constitution Article XIII D (known commonly by its enacting ballot measure: Proposition 218). The fee must be submitted and approved by a majority vote of the property owners or by a two-thirds vote of the electorate. The amount charged to each parcel must be proportional to the cost of service attributable to that parcel. Due to this proportionality requirement, the costs attributable to public parcels should be paid by City revenues (e.g., General Fund appropriation) or by individual City departments.

For a property owner election, each parcel generally receives one ballot, and each ballot has one vote regardless of the potential levy amount, although the City may also have the power to provide for weighted voting. In one-parcel-per-vote elections, a large commercial parcel with a calculated levy that is an order of magnitude greater than that of a smaller parcel would have the same, single vote as the smaller parcel.

The revenue stream from a property-related fee may be used for capital, annual operating and maintenance costs. This revenue stream could also be pledged as credit support for a revenue bond issued to fund major capital improvements.

Special Tax

A Community Facilities District (CFD) can be formed pursuant to the Mello-Roos Community Facilities Act of 1982. A CFD can fund capital projects as well as ongoing maintenance. Bonds would be issued to pay for capital costs secured by a special tax levy. The same CFD can also fund ongoing maintenance costs through a special tax levy.

There is great flexibility in both the geographic area to be levied and the formula by which to levy when using a CFD. A CFD may include non-contiguous geographic areas. There is no requirement that the special tax be apportioned on the basis of benefit to any property. Property owned by a public entity is generally exempt from the CFD special tax, ensuring no lingering obligation of other City revenues.

Successful creation of a CFD requires approval of two-thirds of the registered voters voting in an election (or approval of the landowners if less than 12 persons are registered to vote within the CFD boundary). With a voter election, each voter has one vote, regardless of their weighted share of the proposed special tax levy. In a landowner election, the vote is one vote per acre or portion thereof.

Other Sources of Revenue

Although the revenue strategy introduced in this chapter has estimated the full cost to property owners of funding the entire Stormwater Program, there are at least two other additional revenue sources that, if justifiable and collectible on a substantive scale, would reduce that final levy amount needed from the community, or in other words, the total revenue requirement. The chief benefit of examining the viability of these revenue sources is that both may be approved by consensus of the City Council alone after proper public noticing and public hearing processes.

Development Impact Fees

A development impact fee is a one-time fee imposed as a condition of approval on new development, infill, or redevelopment that creates new, unmitigated impermeable surface area. Development impact fees are authorized by Government Code 66000 et seq., created by the Mitigation Fee Act and commonly referred to as "AB 1600" fees.

A development impact fee may be justifiable for the Stormwater Program under one of two conditions:

- The City has previously invested in Stormwater infrastructure which has remaining value and is available and/or sized to meet impacts caused by future development/redevelopment.
- The capital projects documented in this Stormwater Master Plan are sized to meet stormwater related impacts caused by future development/redevelopment and not just the demands of existing development.

An impact fee may be based on (1) a "buy-in" to existing infrastructure, or (2) the "incremental" costs of new facilities necessary to serve new development that will create additional impermeable surface areas. A combination of these two impact fees may also be used to repay existing customers for historical capital investments. However, they cannot be used to fund operating or maintenance costs, which must be met through the Stormwater Program's annual fees.

Regulatory Fees

Regulatory fees are imposed to recover costs associated with the City's constitutional and statutory power to govern activities, such as development and construction. For example, within the Stormwater program, the City provides services/activities which may be eligible for recovery in a regulatory fee. These services/activities may include:

- Plan review and site inspection of development/construction that must meet Stormwater program regulations. (A common area for stormwater program activity is grading and drainage permitting/oversight.)
- Review of maintenance plans for, and periodic site inspection of onsite stormwater management/mitigation facilities.
- Inspection of properties documented under the municipal permit as high-pollution risk operations requiring onsite management and/or facilities to mitigate risk to the environment and public rights-of-way.

The statutory limit in imposing these fees is that they may not exceed the estimated reasonable cost of service. Most regulatory fees like these have historically been implemented by consensus of the City Council alone.[5] Data used to justify fee amounts must be prepared and made available to the public in advance of the public hearing.

5 The November 2010 passage of Proposition 26 calling for voter approval of "regulatory fees" has raised some questions about the City Council's authority to set some fees. While prevailing industry consensus is that the fee examples listed here are exempt from the requirements of Proposition 26 due to the direct link between individual action and resulting regulation, the City should be aware of, and seek legal counsel regarding the ongoing debate in this area before proceeding. In establishing any regulatory fee for the Stormwater Program, the City should ensure that the broader costs of the Program – those with broader community benefits – are explicitly excluded from the cost of service calculation. Those costs must be borne by the Program's primary revenue source.

Benefit-Assessment District

A benefit-assessment district assigns project costs in direct proportion to the benefits received. Benefit assessment districts are often formed for specific projects within a specific watershed. The only properties assessed are those that directly benefit from the projects and in direct proportion to that benefit.

Funding Requirements

Though historically supported by other City funds, the City has maintained a Stormwater Program Enterprise Fund. This analysis presumes the City will use and manage a dedicated enterprise fund for the Stormwater Program. In addition to ongoing operations and maintenance, implementing the Stormwater Master Plan will require capital expenditures and, in the future, funds to repair, rehabilitate, or replace new and existing capital assets.

Currently, the largest Stormwater Program expense is capital improvements. Regardless of the mechanism(s) chosen to finance these improvements, the costs will likely be funded by issuing some type of debt. Since the City is in the early stages of evaluating its options, three alternative financing schedules were prepared. Assumptions were made in the analysis with regard to the terms of potential debt financing. The three financing options prepared are as follows:

- Alternative #1: complete high-priority projects in five-years and fund the costs over 20-years.
- Alternative #2: complete high-priority projects in five-years, medium-priority projects over the following fifteen-years and fund all costs over 30-years.
- Alternative #3: complete high-priority projects in five-years, medium-priority projects over the following fifteen-years, low-priority over following ten years and fund all costs over 30-years.

This analysis also assumes the Stormwater Enterprise fund will establish and maintain operating and capital reserves. Specific reserve fund targets should be established and adopted by the City when the funding mechanism for the Stormwater Program is established. For purposes of this analysis, the following reserve fund targets are used:

- Operating Reserve - The Stormwater Program should target a year-end Operating Reserve equal to 50% of annual operating requirements, or 6-months of normal operations. In this analysis, there is only about $13,000 in annual maintenance costs (in 2015 values); therefore this reserve is a fairly small amount. If the system operation and maintenance and permit compliance program costs are also funded, the operating reserve should be increased to account for those additional annual expenses.
- Debt Reserve - When required by debt-financing, the Stormwater Program will maintain a Debt Reserve consistent with the covenants established by each issuance. The financial analysis assumed that the City would maintain a debt reserve equal to the annual debt service payment for each debt issue.
- Capital Reserve - The minimum targeted balance in the Capital Reserve is equal to 3% of net assets based on an assumed 33-year infrastructure replacement cycle typical of similar utilities. However, this is normally considered the starting point for addressing long-term capital needs; the City should regularly review this reserve policy and adjust as needed.

Revenue Requirements and Projected Financing

Operating Expenditures

Forecasted operating expenditures are minor and are only intended to cover the cost of problem spot maintenance projects. Costs are projected at approximately $13,000 per year, in 2015 values and are expected to continue on an annual basis for the forecast period.

System Operation and Maintenance and Permit Compliance Costs

The projected annual cost for system operation and maintenance and permit compliance is approximately $470,000, in 2015 values. It is assumed that costs will rise by approximately 3% per year and will continue on an annual basis for the forecast period. Figure 6-1 shows the total projected annual cost of the system operation and maintenance and permit compliance program and the estimated cost per EDU to property owners.

Figure 6-1 NPDES Program Costs

Timeframe	NPDES Cost per EDU Calculation		
	Assumed Annual Inflation		3%
	Annual Cost	No. EDU's	Cost per EDU
Year 1	$ 470,000	12,210	$38.49
Year 2	$ 484,100	12,210	$39.65
Year 3	$ 498,623	12,210	$40.84
Year 4	$ 513,582	12,210	$42.06
Year 5	$ 528,989	12,210	$43.32
Year 6	$ 544,859	12,210	$44.62
Year 7	$ 561,205	12,210	$45.96
Year 8	$ 578,041	12,210	$47.34
Year 9	$ 595,382	12,210	$48.76
Year 10	$ 613,243	12,210	$50.22
Year 11	$ 631,641	12,210	$51.73
Year 12	$ 650,590	12,210	$53.28
Year 13	$ 670,108	12,210	$54.88
Year 14	$ 690,211	12,210	$56.53
Year 15	$ 710,917	12,210	$58.22
Year 16	$ 732,245	12,210	$59.97
Year 17	$ 754,212	12,210	$61.77
Year 18	$ 776,838	12,210	$63.62
Year 19	$ 800,144	12,210	$65.53
Year 20	$ 824,148	12,210	$67.50
Year 21	$ 848,872	12,210	$69.52
Year 22	$ 874,338	12,210	$71.61
Year 23	$ 900,569	12,210	$73.76
Year 24	$ 927,586	12,210	$75.97
Year 25	$ 955,413	12,210	$78.25
Year 26	$ 984,076	12,210	$80.60
Year 27	$ 1,013,598	12,210	$83.01
Year 28	$ 1,044,006	12,210	$85.50
Year 29	$ 1,075,326	12,210	$88.07
Year 30	$ 1,107,586	12,210	$90.71

1. Annual cost per equivalent unit is the total revenue required divided by the number of equivalent units in the City of Los Altos, of 12,210.

Capital Expenditures

Figure 6-2 illustrates the projected capital improvement program expenditures recommended in this master plan. Figure 6-3 summarizes total forecasted capital investments for the 30-year planning period. The specific capital projects are detailed in the Appendices to this chapter.

Figure 6-2: Annual Capital Improvement Program Expenditures (Future Values)

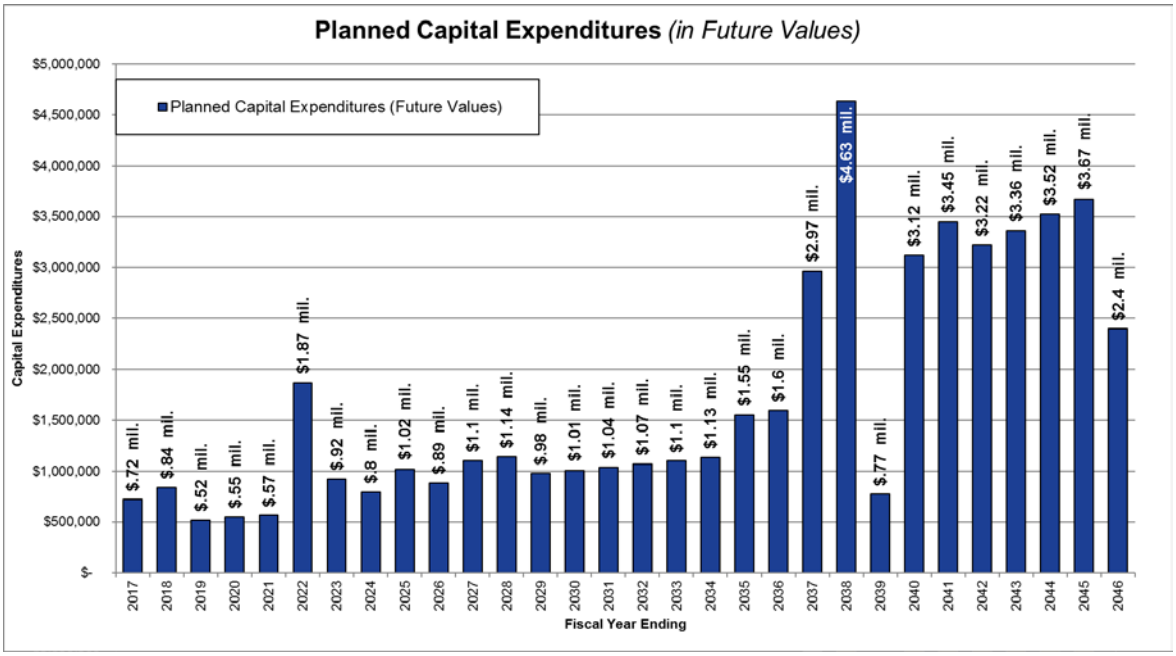

Figure 6-3: Total Capital Improvement Program Expenditures

Time Frame	Capital Improvement Program Expenditures
Years 1 - 5	$3.2 MM
Years 6 - 10	$5.49 MM
Years 11 - 15	$5.26 MM
Years 16 - 20	$6.45 MM
Years 21 - 25	$14.94 MM
Years 26 - 30	$16.17 MM
Total	**$51.51 MM**

Funding capital infrastructure projects is the dominant factor in the Stormwater Program's revenue strategy. Cities facing intense capital investment programs are often forced to balance infrastructure needs against levels of affordability, and smoothing out the annual revenue requirements typically requires the use of debt-financing.

Use of Debt Financing

The ultimate objective of debt financing is to provide even and predictable costs to property owners compared to an entirely cash-funded program, particularly when program expenditures are uneven. This point is a key driver of the financing strategy. The three alternatives evaluated projected rate increases and debt financing for the purpose of developing the most palatable option for the residents and businesses paying the fees. However, due to project timing, the amount of capital expenditures planned

and the desired debt repayment period, in Alternatives #1 and 2 there are decreases in the annual costs to property owners projected in the last ten years of the planning period, due to debt issues retiring. Figure 6-4 summarizes the planned debt issuances (i.e., the net proceeds) and the corresponding debt service payments.

Figure 6-4: Planned Debt Financing – Net Proceeds and Annual Debt Service

Timeframe	Alternative #1	Alternative #2	Alternative #3
Year 1 Issuance Amount	$3.2 mil.	$3.2 mil.	$3.2 mil.
Annual Debt Service Payment	$285,000	$285,000	$285,000
Year 6 Issuance Amount	--	$4 mil.	$4 mil.
Annual Debt Service Payment[1]	$285,000	$677,000	$677,000
Year 11 Issuance Amount	--	$10 mil.	$10 mil.
Annual Debt Service Payment[2]	$285,000	$1,570,000	$1,570,000

1. *Represents total debt service payment for both debt issues.*
2. *Represents total debt service payment for all three debt issues.*

It should be noted that this analysis assumes a conservative debt financing approach that uses a 20-year repayment period, interest rate of 5%, issuance costs of 2% of the net proceeds, and a debt service reserve equal to one year's principal and interest payment. The City may also be required to maintain a specific "coverage requirement," which is a financial test requiring that the agency demonstrate its annual revenues, net of operating expenses, equal to the annual debt-service payment plus an added cushion, typically 25% of the annual payment (i.e., a "1.25 coverage ratio"). However, since this is a preliminary analysis, no specific debt coverage requirement was assumed in the analysis. As the City implements its capital program, lower-cost alternative financing may be available, such as state/federal loans, or a loan from other City funds if available. Details of planned debt obligations are provided in the Appendices to this chapter.

Annual Revenue Requirement

Figure 6-5 lists the annual revenue requirements which fully fund the three alternative capital financing strategies described earlier.

Figure 6-5: Annual Revenue Required to Fund the Stormwater Program[6]

Timeframe	Revenue Required to Fund the Stormwater Program		
	Alternative #1	Alternative #2	Alternative #3
Year 1	$310,000	$310,000	$310,000
Year 2	$310,000	$356,500	$356,500
Year 3	$310,000	$409,975	$409,975
Year 4	$310,000	$471,471	$471,471
Year 5	$310,000	$542,192	$542,192
Year 6	$310,000	$623,521	$623,521
Year 7	$310,000	$735,754	$741,990
Year 8	$310,000	$868,190	$882,968
Year 9	$291,400	$1,024,465	$1,050,732
Year 10	$291,400	$1,208,868	$1,250,371
Year 11	$291,400	$1,426,464	$1,487,941
Year 12	$291,400	$1,683,228	$1,770,650
Year 13	$291,400	$1,733,725	$1,859,182
Year 14	$291,400	$1,785,737	$1,952,141
Year 15	$291,400	$1,785,737	$2,049,748
Year 16	$291,400	$1,785,737	$2,152,236
Year 17	$291,400	$1,785,737	$2,259,848
Year 18	$291,400	$1,785,737	$2,372,840
Year 19	$291,400	$1,785,737	$2,491,482
Year 20	$291,400	$1,785,737	$2,616,056
Year 21	$0	$1,196,443	$2,746,859
Year 22	$0	$1,196,443	$3,021,545
Year 23	$0	$1,196,443	$3,323,699
Year 24	$0	$1,196,443	$3,589,595
Year 25	$0	$1,196,443	$3,876,763
Year 26	$0	$777,688	$4,186,904
Year 27	$0	$777,688	$4,270,642
Year 28	$0	$777,688	$4,356,055
Year 29	$0	$777,688	$4,356,055
Year 30	$0	$777,688	$4,356,055

These annual revenue requirements are comprised of the three major components listed below, the details of which are shown in the appendices to this chapter:

- Annual debt service for the capital financing strategy.
- Annual problem-spot maintenance expenditures.

6 Annual impact of the City's system operation and maintenance and permit compliance cost are excluded from this table.

- Contributions to cash reserves to fund future capital expenditures and maintain minimum year-end targets.

Annual Cost to Property Owners

The annual Stormwater Program costs are recovered from property owners as an amount per equivalent dwelling unit. For purposes of this analysis, equivalent dwelling units have been approximated by applying both parcel area and a runoff coefficient which, together measure the proportionate level of likely impact on the Stormwater system7.

Single family residential parcel data has been aggregated, creating the metric of one single-family residential parcel. Using equivalent units to link the individual parcels creates the nexus required by law for adopting the levy/fee mechanism.

Figure 6-6 lists the approximate annual levy amount associated with the total revenue requirement for each alternative. The annual levy is $25.393 per equivalent dwelling unit in the first year of the planning period. No increases will be needed in Alternative #1, while Alternatives #2 and #3 will need increases in the following years. Since Alternatives #1 and #2 only fund a portion of the Stormwater capital projects, decreases in the annual levy are projected in later years for these alternatives. Details of the annual revenue requirements are provided in the Appendices to this chapter. Figure 6-6 also shows the estimated annual levy amount needed to fund the City's NPDES Program, which would be in addition to the annual cost under the three alternatives.

7 This runoff coefficient is the "Curve Number" discussed in Chapter 4 (see Table 4-1 and page 4-6 discussion).

Figure 6-6: Estimated Annual Charges to Property Owners

Timeframe	Annual Cost Per Equivalent Unit and Annual % Change[1]						NPDES Cost per EDU[2]
	Alternative #1		Alternative #2		Alternative #3		
	Annual Cost	% Change	Annual Cost	% Change	Annual Cost	% Change	
Year 1	$25.39	--	$25.39	--	$25.39	--	$38.49
Year 2	$25.39	0%	$29.20	15%	$29.20	15%	$39.65
Year 3	$25.39	0%	$33.58	15%	$33.58	15%	$40.84
Year 4	$25.39	0%	$38.61	15%	$38.61	15%	$42.06
Year 5	$25.39	0%	$44.41	15%	$44.41	15%	$43.32
Year 6	$25.39	0%	$51.07	15%	$51.07	15%	$44.62
Year 7	$25.39	0%	$60.26	18%	$60.77	19%	$45.96
Year 8	$25.39	0%	$71.11	18%	$72.32	19%	$47.34
Year 9	$23.87	-6%	$83.91	18%	$86.06	19%	$48.76
Year 10	$23.87	0%	$99.01	18%	$102.41	19%	$50.22
Year 11	$23.87	0%	$116.83	18%	$121.87	19%	$51.73
Year 12	$23.87	0%	$137.86	18%	$145.02	19%	$53.28
Year 13	$23.87	0%	$142.00	3%	$152.27	5%	$54.88
Year 14	$23.87	0%	$146.26	3%	$159.89	5%	$56.53
Year 15	$23.87	0%	$146.26	0%	$167.88	5%	$58.22
Year 16	$23.87	0%	$146.26	0%	$176.27	5%	$59.97
Year 17	$23.87	0%	$146.26	0%	$185.09	5%	$61.77
Year 18	$23.87	0%	$146.26	0%	$194.34	5%	$63.62
Year 19	$23.87	0%	$146.26	0%	$204.06	5%	$65.53
Year 20	$23.87	0%	$146.26	0%	$214.26	5%	$67.50
Year 21	$0.00	-100%	$97.99	-33%	$224.98	5%	$69.52
Year 22	$0.00	0%	$97.99	0%	$247.47	10%	$71.61
Year 23	$0.00	0%	$97.99	0%	$272.22	10%	$73.76
Year 24	$0.00	0%	$97.99	0%	$294.00	8%	$75.97
Year 25	$0.00	0%	$97.99	0%	$317.52	8%	$78.25
Year 26	$0.00	0%	$63.69	-35%	$342.92	8%	$80.60
Year 27	$0.00	0%	$63.69	0%	$349.78	2%	$83.01
Year 28	$0.00	0%	$63.69	0%	$356.77	2%	$85.50
Year 29	$0.00	0%	$63.69	0%	$356.77	0%	$88.07
Year 30	$0.00	0%	$63.69	0%	$356.77	0%	$90.71

1. *Annual cost per equivalent unit is the total revenue required divided by the number of equivalent units in the City of Los Altos, of 12,210.*
2. *NPDES year 1 cost of $470,000 with a 3% annual inflation factor. This cost per EDU would be in addition to the annual costs for each alternative.*

Next Steps

Implementing the financing plan and creating a new revenue stream for the Stormwater Master Plan requires the City to take the following steps:

- Adopt the Stormwater Master Plan and the related recommendations.
- Confirm and adopt a policy of self-sufficiency for the Stormwater Program.
- Confirm willingness to use debt-financing for the prioritized capital improvement program.
- Consider working with a political consultant to conduct a political feasibility analysis related to establishing a levy/fee for its Stormwater Program. Within this process, the political consultant will also be able to determine themes and issues useful in communications surrounding any subsequent ballot measure.
- Assuming the political feasibility analysis supports moving ahead with establishing a new Stormwater Program levy/fee, the City should prepare a fee justification report for the formation of the proposed levy.
- Upon City Council approval to proceed to balloting or election, the City will initiate the public approval procedures. Subsequent procedures will depend upon the selected revenue mechanism and prevailing legal guidance related to that mechanism.

References:

City of Los Altos Stormwater Master Plan, November 2015 Draft, prepared by Schaaf & Wheeler (referenced for Capital Improvement and Problem Spot Maintenance Costs).

City of Los Altos, Draft 2015-2033 Housing Element