CHAPTER 9
INFRASTRUCTURE

9.1 CONTENTS OF CHAPTER

The Infrastructure chapter contains the following sections:

9.2 PURPOSE OF CHAPTER

The chapter reviews the current condition of the sewer, water, storm drainage and storm water quality systems. This overview of some of the most recent studies commissioned by the City provides general information on the material, current functionality and future capacity of the sewer, water and storm drainage facilitates. Engineering judgment is provided on how the proposed changes to the General Plan will affect the local sewer, water and storm drainage facilities along with the applicability of the existing studies. Additional discussion of the City's infrastructure systems can be found in Chapter 12 Environmental Resources.

This chapter was prepared by Sandis, LSA Associates, Raimi & Associates, and MIG.

The following sections of the Infrastructure Chapter will:

- Describe the current water, sewer, and storm drainage facilities;
- Review studies analyzing the existing and future capacity of these facilities; and
- Discuss how land use changes will affect the future capacity of the systems.

9.3 DRAFT HIGHLIGHTS AND OBSERVATIONS

These represent key observations, issues and highlights noted by City staff and the consultant team related to Infrastructure.

- All three major infrastructure systems in Mountain View - sanitary sewer, water distribution and storm drain - are adequate for the current population and land uses with only minor deficiencies in localized areas.

- Only four percent of the pipes in the City's sewer system need to be upgraded to provide capacity through 2030 based on the existing land use pattern, and could change significantly if the land use pattern is updated through the General Plan Update. The water system functions well during normal usage. For periods of high demand, localized upgrades are needed to provide additional fire fighting capacity. The storm drain system works adequately. There is only minor flooding in the storm drain system. Many of the problems are in the Downtown area and known to the City.

- The City of Mountain View has a diversified supply of potable water. A recycled water system is under construction, and will have the potential capacity to offset ten percent of potable water use.

- Mountain View imports over 90 percent of its water from outside the service area. There is a finite supply statewide and as California's population grows, managing the resource is paramount. The California Department of Water Resources and other agencies allocate water based on forecasting to manage the resource.

- The City's National Pollutant Discharge Elimination System (NPDES) permit with the San Francisco Regional Water Quality Control Board (SFRWQCB) allows storm water discharge into the Bay and requires the City to implement a comprehensive storm water management program. A new Municipal Regional Permit which covers Santa Clara County and several other counties and cities in the Bay Area is under review. The new permit has new requirements and additional pilot studies and monitoring.

- Provision C-3 of the National Pollutant Discharge Elimination Systems (NPDES) municipal storm water permit requires installation of post-construction storm water treatment controls as a part of new development and redevelopment projects. Landscape-based measures are highlighted, such as vegetated swales, bio-retention planters and rain gardens.

- The City is tasked with meeting regulatory requirements and needs the resources to meet these requirements and for oversight and reporting compliance.

9.4 RECENT AND CURRENT INFRASTRUCTURE PLANNING EFFORTS

The City of Mountain View is the owner of the storm drain system and sanitary system for the entire City and of the water distribution system for most of the City. Portions of Moffett Field are not served by the City and that the California Water Service Company (Cal Water) serves some areas of the City. The City has invested large amounts of time and capital in construction, maintenance and study of these systems. To help evaluate these utilities and to prioritize capital improvement projects, the City has commissioned multiple studies throughout the years, followed recommendations from Master Planning efforts and consistently enforced design criteria.

The Public Works Department for Mountain View has a significant library of commissioned studies, such as the Sanitary Sewer Master Plan, the Urban Water Management Plan, and the Mountain View Pump Station Evaluation Report. Other recent studies include the current state of the systems, future capacity analysis and suggestions for capital improvements. Current reports include:

- Water Systems and Sewer System Master Plan, Wastewater Master Plan – 1st Draft, Infrastructure Engineering Corporation, January 2009;
- Water Systems and Sewer System Master Plan, Water Master Plan – 1st Draft Infrastructure Engineering Corporation, January 2009;
- City of Mountain View Storm Drainage Master Plan, Nolte, 2005;

Every other fiscal year the City prepares a Five-Year Capital Improvement Program (CIP). During the off year, (every other fiscal year), the Council adopts a four-year CIP. Every year, projects in the first fiscal year of the program are funded by the City Council. Annual projects such as the Water Main Replacement and Sanitary Sewer Main Replacement are important to keep the systems in good condition and to reduce on-going maintenance issues such as blockages, breaks and overflows.

The City of Mountain View's Public Works Department plans, designs, reviews, constructs, operates, maintains and improves the City's infrastructure, facilities, utilities, property and equipment and provides other services, include solid waste management and recycling, traffic engineering and private development permits. The Transportation and Property Services Division consists of Transportation Planning, Property Management and Solid Waste Management. The Engineering Division consists of Construction Engineering, Design Engineering, Capital Projects, Traffic Engineering and Land Development Engineering. The Public Services Division manages, operates and maintains the water distribution, wastewater and storm systems, streets, street lights, vehicles and equipment, and landfill closure. The Business and Internal Services Division consists of Facilities Maintenance, Fleet Services, Administration, Safety, and Geographic and Management Information Systems.

For the fiscal year 2008-09 the City of Mountain View's Public Works Department currently consists of 122 Full-Time, 0.5 Part-Time and 1.0 Limited Time employees. The budget for the fiscal year 2008-09 was $37,566,211 for salaries wages and benefits, supplies and other services, capital outlay and interfund expenditures. The total revenue from permits, utility charges, leases, etc was $39,778,395. The Public Works Department is also funded by fees on new development for new connections for sanitary sewer, water and storm drain connections and water service installations.

9.5 SANITARY SEWER

The City's sanitary sewer system is a gravity system that discharges to the Palo Alto Regional Water Quality Control plant in Palo Alto. The system serves a population of approximately 74,000 in a 12 square mile area. It consists of over 150 miles of pipe that range in diameter from four inches to 48 inches. Built mostly in the 1950s and 1960s, the system contains 89 percent vitrified clay pipe (VCP), with the remaining pipe constructed of high density polyethylene (HDPE), polyvinyl chloride (PVC), reinforced concrete (RCP) and welded steel (WSP). There are approximately 16,000 sanitary sewer laterals in the City. Maintenance and repair of the sanitary sewer laterals within the City are the responsibility of the property owner; however, the City provides maintenance and repair services for laterals located within the public right of way upon request, as a courtesy service to the residents of Mountain View.[1] The Sewer Lift Station, constructed in 1959 with improvements in 1969 and 1997, is located on North Shoreline Boulevard and has three variable frequency drive pumps and one driven by a natural gas engine and mechanical drive.[2]

Design and Modeling of the Sanitary Sewer System

An updated study of the sanitary sewer system is currently being completed by Infrastructure Engineering Corporation with a draft version available at this time. The entire system was modeled incorporating base wastewater flows (BWF), ground water infiltration, and rainfall dependent infiltration/inflow for current flow rates along with projections for 2010, 2020 and 2030 (see Table 9-1). The result was that of the 4000 pipes modeled, fewer than 150 pipes, or approximately four percent of the system, were found to have insufficient capacity for the design criteria currently, in 2010, 2020 or 2030. The specific pipes needing replacement are detailed in the Draft Wastewater Master Plan.[2] (This number includes those pipes that have insufficient capacity with existing flows, and those pipes that are projected to have insufficient capacity in 2010, 2020 and 2030. The small percentage of pipes requiring upsizing to meet design criteria, even in the future, is a testament to the capacity that has been proactively built and maintained by the City through the years.

Table 9-1 Average Dry Weather Flow Projections

	Existing Average Dry Weather Flows	2010 Average Dry Weather Flows	2020 Average Dry Weather Flows	2030 Average Dry Weather Flows
Base Wastewater Flow (MGD[3])	7.01	7.6	8.6	8.87
Outside Flow (MGD)	0.17	0.18	0.19	0.20
Groundwater Pumping (MGD)	0.25	0.25	0.25	0.25
Base Infiltration (MGD)	1.15	1.15	1.15	1.15
Total Flow to Pump Station (MGD)	**8.58**	**9.18**	**10.19**	**10.47**

1 City of Mountain View Sewer System Management Plan, August 2008.

2 Infrastructure Engineering Corporation, January 2009, Water Systems and Sewer System Master Plan, Wastewater Master Plan – 1st Draft.

3 Millions of Gallons per Day (MGD).

Source: Infrastructure Engineering Corporation, January 2009, Water Systems and Sewer System Master Plan, Wastewater Master Plan – 1st Draft.

The total cost of the sewer capital improvements can be seen grouped by timeframe in Table 9-2. An overview of the CIP projects and their locations can be found in the Wastewater Master Plan.

Table 9-2 CIP Cost by Timeframe

Timeframe	Length (ft)	Planning Project Cost
Existing	16,586	$1,908,242
2010	6,132	$643,860
2020	4,073	$427,665
2030	0	$0
Monitor	5,334	$1,093,401
Total	**32,125**	**$4,073,168**

Source: Infrastructure Engineering Corporation, January 2009, Water Systems and Sewer System Master Plan, Wastewater Master Plan – 1st Draft.

Along with the CIP, a replacement program was included in the Wastewater Master Plan to determine an overall annual cost to maintain existing facilities. The replacement program incorporated the installation date and material of sewer collection system pipe assets with the City of Mountain View to determine total age and remaining useful life of pipes throughout the system. Based on Replacement Cost New (RCN) and assuming the system is to be replaced entirely by new VCP or PVC, it was calculated that the pipes in the sewer collection system require approximately $0.74 million reinvested per year in order to keep pace with depreciation. Using RCN the total value of the City's entire sewer collection system including approximately 150 miles of pipe and the Sewer Lift is estimated to be $71 million. The Replacement Cost New Less Depreciation using straight depreciation shows that approximately $35 million remains in monetary value of the City's sewer collection systems with a yearly depreciation of approximately $0.9 million. A cost summary of the City's entire sewer collection system can be found below.

Table 9-3 Sewer System Cost Summary

Type	Replacement Cost New ($)	Replacement Cost New Less Depreciation ($)	Yearly Depreciation ($/yr)
Pipes	$67,486,764	$35,172,956	742,028.08
Sewer Lift Station	$3,189,000	$0	159,450
Total	**$70,675,764**	**$35,172,956**	**$901,476**

Source: Infrastructure Engineering Corporation, January 2009, Water Systems and Sewer System Master Plan, Wastewater Master Plan – 1st Draft.

Sewer System Management Plan

The City of Mountain View has prepared a Sewer System Management Plan SSMP, which is a compendium of the policies, procedures, and activities for the planning, management, operation, and maintenance of the City's sanitary sewer system. The SSMP is intended to meet the requirements of the San Francisco Bay Regional Water Quality Control Board and the State Water Resources Control Board.

The goals of the City of Mountain View SSMP are to:

- Properly manage, operate, and maintain the wastewater collection system;
- Maintain design construction standards and specifications for the installation of the new wastewater systems;
- Verify the wastewater collection system has adequate capacity to convey sewage during peak flows;
- Respond to sanitary sewer overflows quickly and mitigate the impact of the overflow;
- Provide training on a regular basis for staff in collection maintenance and operations;
- Encourage and support participation in the California Water Environment Association's voluntary Wastewater Certification Program and on-going training programs;
- Maintain a Fats, Oil, and Grease (FOG) program to limit fats, oils, grease and other debris that may cause blockages in the sewage collection system;
- Develop a closed-circuit televising (CCTV) program for the sewer collection system;
- Identify and prioritize structural deficiencies and implement short-term and long-term maintenance and rehabilitation actions to address each deficiency;
- Meet all applicable regulatory notification and reported requirements; and
- Provide excellent customer service.

9.6 WATER AVAILABILITY AND USE[4]

Potable water is a finite natural resource, both locally and globally. Water use has direct impacts on ecological systems, and it can become a constraint on development and human activity, especially in a semi-arid climate like Mountain View. Water availability is dependant on meteorological conditions and can become more extreme during years of lower-than-average precipitation. Additional information about Mountain View's water system can be found in Chapter 12 Environmental Resources.

Water Supply

Like many Peninsula cities, Mountain View is highly reliant on Hetch Hetchy, which is sourced from Sierra Nevada snowmelt. The City of Mountain View serves as the retailer for most water customers in the City, and receives its wholesale water supply from three sources: the San Francisco Public Utility Commission (88-89 percent of water used), the Santa Clara Valley Water District (nine percent of water used) and municipally operated groundwater wells (one percent of water used). Most San Francisco Public Utility Commission (SFPUC) water comes from the Hetch Hetchy Regional Water System.

The Hetch Hetchy system operated by SFPUC provides some of the cleanest water of any public utility in the United States. However, current and future decreases in Sierra snowpack as a result of climate change and drought will diminish the SFPUC supply. Reduction in water demand requested by SFPUC or other water providers will be increasingly likely throughout the time horizon of the updated Mountain View General Plan, as water supplies dwindle or become more erratic because of climate change. Already, water suppliers throughout the San Francisco Bay Area have implemented various levels of water conservation during the droughts of the past three years. The Hetch Hetchy system is also aging and will require future infrastructure repairs, which may increase the cost of water as well. Finally, Hetch Hetchy is vulnerable to natural disaster, since it crosses four major earthquake faults between its source in the Sierra Nevada and water customers on the Peninsula. A disruption of the Hetch Hetchy system would severely impact the availability of water throughout Mountain View, since it provides nearly 90 percent of the City's water.[5] Santa Clara Valley Water District (SCVWD) water is imported from the Sacramento-San Joaquin Delta, which may also be affected by levels of Sierra snowpack.

Supply Assurance

In contrast to some other peninsula cities, Mountain View has the advantage of multiple contractually assured sources of water. It is currently not expected to exceed the supply assured under these contracts. However, calculated supply and therefore Supply Assurance is based on historical rates of supply, which could change based on drought and a decrease in snowpack as a result of climate change. This, in turn, could affect water suppliers' ability to deliver the entire Supply Assurance to every city that demands it, so current Supply Assurance is not a reason to discontinue water conservation and efficiency efforts.

4 Unless otherwise noted, all data on water supply, supply assurance, and water use in section 12.4 is from the City of Mountain View 2005 Urban Water Management Plan, pp i-v.

5 The Mountain View 2005 Urban Water Management Plan, p. v, describes the City's contingency plan for extreme drought due to a natural distaster, and involves severe and enforced cutbacks across most sectors.

Currently, the City uses around 11.3 million of its 13.6 million gallons per day contracted Supply Assurance from the SFPUC, and 1.2 million of its 2.0 million gallons per day Supply Assurance from the SCVWD. Though municipal wells only provide around 125,000 gallons of water per day, they have a potential capacity of 6.7 million gallons per day. In sum, Mountain View has a relatively reliable water supply, though increasing drought could affect its suppliers' ability to deliver, and efforts to use less water can save money and reduce other environmental impacts. Decreased water use through conservation and efficiency would put less strain on the existing water supply and provide additional capacity for the future. It is also significantly less expensive than developing new sources of water.

Water Use

The City consumes an average of 12.5 million gallons of water per day.[6] Of this total, 25 percent is used for direct irrigation, five percent for industrial use, 15 percent for commercial use and 55 percent for residential use (a significant portion of which is residential irrigation). Approximately two percent of water used in the City is ingested, but potable water is currently used for every type of water consumption in the City, including direct irrigation, residential irrigation, indoor toilets, and industrial/commercial uses.[7] This means there are significant opportunities for water conservation, including strategies such as recycled water and graywater use. There are also several large parks throughout the City and a municipal golf course in the North Bayshore Area, all of which require irrigation and currently use potable water. There are several other large landscape areas in the City that require irrigation, such as corporate campuses in the North Bayshore Area.

Recycled water

In April 2009, the City anticipates completion of a recycled water, or "purple pipe," system from the Palo Alto Regional Water Quality Control Plant to the North Bayshore Area. The system is not currently envisioned to expand beyond the North Bayshore Area. The recycled water system will be 4.5 miles long and capable of carrying 1.2 million gallons of recycled water per day, enough to offset ten percent of the City's potable water use. Recycled water will initially be used only on municipal property, though the City has discussed expansion of the system with large private users. This effort will also contribute to the draft Environmental Sustainability Action Plan's Fiscal Year 2009-10 action to "Implement State-Mandated Landscape Water Conservation Program." Targeting large landscape projects for water reduction is a common and proven way for cities to reduce their water use.

6 Data is a daily average as of 2005, cited in the Mountain View 2005 Urban Water Management Plan, p. iii.

7 City of Mountain View, Mountain View Environmental Sustainability Task Force Final Report, September 2008, p. 41. Nationally, the U.S. Geological Survey estimates that less than 1% of water used within the United States is for domestic purposes of any sort. This is lower than the average for most cities, including Mountain View, because a large amount of water is used for irrigation and thermoelectric power production, which is less prevalent within cities. Data from USGS, *Estimated Water Use in the United States in 2000*, "Total Water Use," released 2004, accessed at http://water.usgs.gov/watuse/.

Water conservation and efficiency
Indoor residential, commercial and industrial water use makes up the majority of water use in Mountain View. The City currently implements various water conservation programs, including tiered pricing where water rates increase with consumption, a limited number of turf and residential water audits, subsidized plumbing retrofits, and rebates for purchasing high-efficiency washing machines. The City expects to reduce its total water demand by five to eight percent over the next 25 years as a result of these existing efforts.

On a municipal operations level, the City has completed three water efficiency audits on its own buildings to identify opportunities for efficiency and conservation. It has also installed low-flow faucet aerators, dual-flush toilets, waterless or low-flow urinals, and solar-powered automatic faucets in various municipal buildings.

In the future, the City is likely to make additional efforts at water conservation and efficiency throughout the community. The draft *Environmental Sustainability Action Plan* proposes re-designing the City water bill during Fiscal year 2008-2009 – making it easier for City water customers to understand the amount they use and how it changes over time – as well as recruiting and training water conservation advocates that will promote conservation in the community. The green building standards and retrofits proposed in the draft *Environmental Sustainability Action Plan* have the potential to decrease Mountain View's overall water use, especially if they address water efficiency in toilets, which use the most water of any single fixture in a building. The Public Works, Community Development and Community Services Departments have also been anticipating the adoption of a mandated water conservation landscaping ordinance as proposed by the State department of Water Resources. However, the state Office of Administrative Law disapproved the proposed ordinance on April 1, 2009, so it is uncertain if the City will proceed with its own ordinance or continue under current regulation and wait for state action.

Water and energy
Water transportation, delivery and treatment is a major cause of energy use and greenhouse gas emissions in the State of California. However, the energy intensity of Mountain View's water is less than many other California cities, since the Hetch Hetchy system largely relies on gravity to convey water from the Sierra Nevada. By contrast, many other water systems pump water over long distances from sources such as the Sacramento-San Joaquin Delta or the Colorado River, or from underground wells. Within the City itself, municipal delivery, treatment and pumping of water consumes 8.83 million kWh annually.[8] The percentage of total municipal energy use (and greenhouse gas emissions) that this represents will not be known until the municipal greenhouse gas emissions inventory is finalized in May 2009, but there will likely be opportunities for emissions reductions from improved equipment energy efficiency. Additional information about energy use and state emissions reductions targets contained in AB 32 can be found in Chapter 13 Sustainability.

8 Cited from 2008 ESTF Final Report, p. 41

Table 9-4 Key Indicator Data for Water Availability and Use

	Measure
2005 Water consumption per capita[9]	176 gallons per day
2005 Water consumption[10]	12.5 million gallons per day
Total Supply Assurance, not including municipal sources[11]	15.6 million gallons per day
Total Supply Assurance, including municipal sources[12]	22.3 million gallons per day

Source: City of Mountain View, 2005, Urban Water Management Plan.
Note: Water use data is a daily average as of 2005. Per capita figure assumes a 2005 Mountain View population of 70,900.

Municipal Water Distribution and Supply

The City's system consists of approximately 170 miles of pipe that range in diameter from two inches to 48 inches. Built mostly in the 1950s and 1960s, the system contains 46 percent cast iron pipe (CIP), 29 percent asbestos-concrete pipe (ACP), and 12 percent polyvinyl chloride (PVC), with the remaining pipe construction of ductile iron (DIP), cast concrete (CCP), steel, and high density polyethylene (HDPE). The recycled water pipes are not currently envisioned to expand beyond the North Bayshore Area.

The City's pump stations include the Whisman Pump Station, the Miramonte Pump Station and the new Graham Pump Station. The City's reservoirs include the 6 million gallon Whisman Reservoir, the 3 million gallon Miramonte Reservoir (2.3 million gallons from the new reservoir and 0.7 million gallons from the original reservoir) and the new 8.0 million gallon Graham Reservoir.[13]

An updated study of the water system is currently being completed by Infrastructure Engineering Corporation (IEC) with a Draft version available at this time. The water billing records for two years along with land use categories were used to develop the existing average daily water demands, maximum day and peak hour water demands. IEC created a model which evaluated the daily, peak hour and fire flow demands on the system for existing conditions, 2010, 2020 and 2030 projected conditions. The results of the analysis indicate that the City distribution system generally performs well and meets the established design criteria during maximum day and peak hour conditions. However, during maximum day plus fire flow conditions, the existing system does not meet the established design criteria at approximately 1.5 percent of the junctions in the model. IEC created a prioritized list of proposed water pipeline improvements and other infrastructure improvements based on the 2030 projected conditions.

The City has developed an Urban Water Management Plan which details the City's wholesale water use, retail water demand, conservation programs, wastewater generation and plans to use recycled water. The current plan was adopted in 2005 and is available on the City's website.

9 Mountain View 2005 Urban Water Management Plan, pp iii. Water use data is an aggregate of the stated daily average as of 2005. Per capita figure assumes a 2005 Mountain View population of 70,900.

10 Ibid.

11 Ibid..

12 Ibid.. Total for additional supply assurance from municipal sources (6.7 MGD) is from p. i and is added to SFPUC and SCVWD data on p. iii.

13 Infrastructure Engineering Corporation, January 2009, Water Systems and Sewer System Master Plan, Water Master Plan – 1st Draft.

9.7 STORM DRAINAGE

The City's storm drainage system consists of a combination of an undergrounded gravity piping network, cross culverts, drywells, a detention pond, and five pump stations. Runoff throughout most of the City is collected via inlets into small diameter pipes that convey the flows to 24-inch diameter and larger mains. The system drainage generally flows from south to north toward the Bay. Over 80 percent of the storm drain system discharges to Stevens Creek and Permanente Creek. Less than 20 percent of the City's storm drain system discharges to the Permanente Diversion Channel, Adobe Creek, and various sloughs that drain to the Bay.[14] The Permanente Diversion Channel discharges to Stevens Creek. Adobe Creek collects runoff from the portion of the City upstream of Central Expressway between Permanente Creek, El Camino Real and Adobe Creek.

In the Central Neighborhoods Area, where storm drain mains are absent in the streets, cross culverts are used to convey runoff to the nearest inlets. Cross culverts are typically used in areas where storm mains are not installed and runoff is conveyed along roadway gutters. Relatively small capacity cross culverts are installed just below the road grade and allow storm water to cross under the road and emerge in the opposing gutter without cresting the road bed.[15] In the North Bayshore Area, the pipe network typically carries the storm runoff to Charleston Storm Drainage Detention Pond or various pump stations for final discharge to Stevens Creek, Permanente Creek, and the San Francisco Bay.[16] The Charleston Detention Pond is located east of North Shoreline Boulevard between Charleston Road and Stierlin Court. The main function of the pond is to regulate large peak flows from a 360-acre commercial zone in the North Bayshore Area (north of Highway 101) to enable the use of smaller pumps to discharge the large peak flows into Stevens Creek. In this area, storm drain mains are below the water level in the creeks and Bay, and pump stations are used to convey the runoff to Stevens Creek, Permanente Creek, or the Palo Alto Baylands Slough. The Coast-Casey retention pond is located along the Bay, north of Highway 101, and at the end of San Antonio Road. The Coast-Casey retention pond regulates peak storm water flows from an area bounded by Rengstorff Avenue to the east, Central Expressway to the south, and San Antonio Road to the west. Storm water that drains to the Coast-Casey retention pond is pumped directly to the slough and does not flow through local creeks.

In areas south of Highway 101, the underground piping network system collects surface runoff via inlets and discharges the runoff to Stevens Creek, Permanente Diversion Channel, Permanente Creek and Adobe Creek which drains to the San Francisco Bay. In this region of the City, five drywells on three streets annexed from the County and in Cooper Park are still in use to receive surface runoff and let the runoff percolate underground.

The City of Los Altos contributes flows that are conveyed in the City of Mountain View's storm drain system. Los Altos contributes flows to pipes along Grant Road that

14 City of Mountain View. (2005). *Citywide Storm Drainage Master Plan*, prepared by Nolte Associates.

15 US Dept. of the Interior, 1984. *Drainage Manual, A Water Resources Technical Publication*, Bureau of Reclamation.

16 Nolte, 2005. City of Mountain View *Storm Drainage Master Plan*.

ultimately drain to Stevens Creek. In addition, Los Altos has many streets without inlets and these streets drain to the piped systems in the City of Mountain View.

The August 2005 *Storm Drainage Master Plan* by Nolte Associates is a comprehensive study of the existing 24 inch and large diameter pipe storm drainage systems. There are many areas of the City with less than 24 inch diameter storm drain mains that may need to be improved and extended that were not evaluated in the Master Plan due to the project budget constraints. It confirms the efficiency of existing City design practices and storm drainage design features and provides recommendations for improvements in the form of a 10-year improvement plan. The *Storm Drainage Master Plan* indicates that the City's storm drain system is performing adequately, although there are some minor deficiencies in the system, primarily associated with localized flooding.[17] However, a program was recommended to address those minor deficiencies before they become major problems, to maintain the health of the systems, and to replace facilities that do not meet current standard practice. One of the known areas of flooding is in Old Mountain View where cross culverts at various intersections are old and require significant maintenance to prevent flooding. Other areas of flooding known to the City include:[18]

- Gilmore Street and Todd Street. Only one small drain inlet to collect Storm Water.
- Marilyn Drive and Cuesta Drive. Flap gates do not operate correctly when creek is full due to heavy silt build up.
- Marich Way/Karen Way Intersection. Flat grates limit flow into storm drain.
- Landels School. Removal of a dry well resulted in maintenance of a swale to prevent ponding.
- Crittenden Pump Station. South side floods during heavy rain; flow travels through private property to the creek.

The Master Plan identifies capital improvements that are needed to correct deficiencies found in the system, with a 10-year implementation schedule (see Tables 9-5 and 9-6). Identified projects are prioritized as Tier 1 through Tier 3 (with Tier 3 not having a designated implementation schedule). For example, in older neighborhoods, the cross culverts and dry wells do not comply with current storm drain standard practices. The equipment (pumps and motors) in two of the five pump stations are nearing the end of their lifecycle (based on a 25-year regular replacement schedule). The Mountain View Pump Station Evaluation report summarizes the replacement schedule and costs for the five pump stations.[19] With these deficiencies corrected, under current land use conditions, the City's storm water drainage system should be able to accommodate the projected growth, build out, and development of vacant parcels.[20]

17 City of Mountain View. (2005). *Citywide Storm Drainage Master Plan*, prepared by Nolte Associates.

18 Ibid.

19 Schaaf & Wheeler. (2008). *Storm Drain Pump Station Evaluation*. City of Mountain View, CA.

20 City of Mountain View. (2005). *Citywide Storm Drainage Master Plan*, prepared by Nolte Associates.

Table 9-5 Summary of Anticipated Project Cost for 10-year Capital Improvement Program

	Year 1 2005/06	Year 2 2006/07	Year 3 2007/08	Year 4 2008/09	Year 5 2009/10	Year 6 2010/11	Year 7 2011/12	Year 8 2012/13	Year 9 2013/14	Year 10 2014/15
Tier 1 Projects										
Permanente Creek East - System H Study	$ 30,000									
Stevens Creek West - System L Study	$ 20,000									
Citywide Pipeline Condition Asseement Study	$ 40,000									
Storm water Pump Station Assessment Study	$ 50,000									
Tier 2 Projects										
Permanente Creek East - System H: Design					$ 90,000					
Permanente Creek East - System H: Construction						$ 1,243,000				
Stevens Creek West - System L: Design							$ 48,000			
Stevens Creek West - System L: Construction								$664,000		
Pipeline Replacement Program 3										
Pump Mechanical/electrical equipment replacement: Design									$ 6,000	
Pump Mechanical/electrical equipment replacement: Construction										$ 80,000
Cross Culvert Removal Construction		$ 362,000	$365,000	$460,000	$345,000	$ 464,000	$370,000	$253,000	$299,000	$305,000
Study Budget	$140,000									
Design Budget					$ 90,000	$ 36,000	$ 48,000		$ 6,000	
Construction Project Budget 2		$ 362,000	$365,000	$460,000	$345,000	$ 1,707,000	$870,000	$917,000	$299,000	$385,000
Total Cost	$140,000	$ 362,000	$365,000	$460,000	$435,000	$ 1,743,000	$918,000	$917,000	$305,000	$385,000

Source: Nolte Associates, 2005, *Citywide Storm Drainage Master Plan*

Notes:
All costs are in 2004 dollars.
The Construction Subtotal line item includes 15% Contingency, 10% City Project Manager, 7% Inspection amd 6.5% City Administration costs. This line item does not include land acquisition costs.
Cost of Pipeline Replacement Program will be developed as part of the Citywide Pipeline Assessment Study
See Appendices D, G and H for more detailed cost estimates.

Table 9-6 Summary of Anticipated Project Cost for Tier 3 Projects

	Priority 1	Priority 2	Priority 3	Priority 4	Priority 5	Priority 6	Priority 7	Priority 8	Priority 9	Priority 10
Tier 3 Projects (Unscheduled)										
Parallel Pipe Systems:										
Parallel Pipe Systems Study	Study									
Stevens Creek West-System J Design & Const		(2) Design	Const-ruction							
Permenente Creek East - System J Design & Construction				(2) Design	Const-ruction					
Stevens Creek West-System G Design & Const						(2) Design	Const-ruction			
Stevens Creek East-System E Design & Const						(2) Design	Const-ruction			
Bay - System B Design & Construction								(2) Design	Const-ruction	
Replacement of Dry Wells and Storm Drain System Deisgn & Const									(3) Design	Const-ruction
Further Studies										
Stevens Creek East - System A	Study									
Stevens Creek East - System B	Study									

Source: Nolte Associates, 2005, *Citywide Storm Drainage Master Plan*

The City has also contracted with HDR to conduct a pipeline condition assessment that recommends a capital improvement program (CIP) based on analyses of the City's GIS, CCTV, inspection data, operations and maintenance (O&M) records, staff interviews, and other available data[21]. The CIP provides the City with the information necessary to effectively plan and budget for rehabilitation or replacement of the City's storm drainage system. Data provided by the City of Mountain View was reviewed in an effort to identify problem areas in the City's storm drainage system and establish and annual capital improvement program (CIP) budget that will ensure future reliable performance. The available data provided by the City was dated and does not include the entire storm drainage system. The recommended CIP program included the following items:

- Repair and rehabilitation of pipes rated in poor condition. The estimated cost is $126,000.
- Related to Staff Recommended Improvements. The estimated cost is $2.79 million. (This will change upon the completion of the condition assessment for the storm drainage system.)
- Removal and replacement of understreet cross culverts with storm drains whenever adjacent street reconstruction occurs. The estimated cost is $3.55 million.

21 Storm Drainage CIP Technical Memorandum, December 2007, HDR

- Master plan various Tier 2 projects. The estimated cost is $2.29 million.
- Update the City's GIS system to include all relevant data. The estimated cost is $10,000 plus an annual maintenance budget of $11,000.
- CCTV inspection of entire system over 5 years as noted in the Infrastructure Repair and Replacement Manual. The estimated cost is $609,000 plus $18,000 annually.
- Assess the condition of 2,000 manholes and 3,000 drain inlets. The estimated cost is $183,000 plus $5,000 annually for fair condition rating and miscellaneous re-inspections as needed.
- The CIP will require regular operations and maintenance. The estimated cost is still to be determined.

The SCVWD has jurisdiction over the Stevens Creek, Permanente Diversion Channel, Permanente Creek and Adobe Creek which flow through the City. SCVWD has modified their methods of flood protection over the years from straightening creeks and lining them with concrete to a more natural approach of using natural materials and vegetation to stabilize creek beds, where possible. Refer to section 12.5 Hydrology and Flooding in Chapter 12 for more information on the drainage basins and condition of the creeks within the City.

Changes in the land use will only have minor effects on the state of the storm drain system. The vast majority of the City is built out with a high percentage of impervious surfaces currently covering the ground. Changes from lower percentages of impervious cover (open space, underdeveloped land, low density residential) to higher percentages of impervious cover (high density residential, zero lot line commercial / industrial) have the potential to increase the peak rate of storm water runoff from the area and therefore increase the load on the storm drain system. Current City guidelines require developers to inform the City of changes in the amount of impervious surface and changes to the peak rate of runoff before plans are approved.

9.8 STORM WATER QUALITY

The City of Mountain View, along with twelve other cities and towns in the Santa Clara Valley, and the County of Santa Clara and the Santa Clara Valley Water District, is a member of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP). In 2001, the California Regional Water Quality Control Board, San Francisco Bay Region, issued National Pollutant Discharge Elimination Systems municipal storm water permit to SCVURPPP allowing storm water discharges to South San Francisco Bay. This permit requires the City to implement a comprehensive storm water management plan to improve the quality and quantity of the storm water discharge. Elements of the storm water management plan include municipal operations, new development storm water treatment controls, industrial and construction site inspections, illicit discharge detection and elimination, public education and trash reduction.

Provision C.3 of the Permit requires installation of storm water treatment controls as a part of new development and redevelopment projects. Storm water runoff from impervious surfaces must be treated to filter out many of the pollutants picked up from the surfaces. Landscape-based measures such as vegetated swales, bio-retention planters and rain gardens are preferred. During design, the landscape plan is coordinated between the engineer and the landscape architect to determine the best location to discharge the water. With an integrated design, the proposed measures are not immediately noticed by the public, but work to cleanse the water before it enters the storm drain. Mechanical cleansing units are allowed, but only where landscape-based measures can not be used. The mechanical units are often housed in underground storm drain manholes or vaults and do not affect the visible layout of the development.

SCVURPPP along with the programs from Alameda County, Contra Costa County, San Mateo County, Fairfield, Suisun City and Vallejo have applied for a joint permit (Municipal Regional Permit) from the Regional Water Quality Control Board to supersede the existing permits. The permit is currently under public review and a vote on the final adoption of the Municipal Regional Permit is expected during the summer of 2009. Major changes include requiring landscape-based measures with exceptions for mechanical units limited to specific projects with extensive justification, significantly increased trash controls, and additional pilot studies and monitoring required by the municipalities. It is anticipated that the new permit will have greater impact on the design and layout of all types of developments. With a greater emphasis on landscape-based measures, the determination of the location of these measures will need to be addressed earlier in the design of a commercial, retail, industrial or residential projects. Greater public awareness of landscape-based measures may also lead to more interest in the use of bio-retention planters, swales and rain gardens outside of shopping centers or their front yards. The City will mostly likely have additional responsibilities to review the design, inspect the construction and monitor the long-term viability of these storm water cleansing measures. Additionally, within the permit there is an emphasis on developing public projects such as ‘green streets’ that cleanse the water from public impervious surfaces.

The City is committed to protecting the water not only after construction is complete, but also during the construction of new projects. All projects are required to meet Section 7-1.01G, Water Pollution of the Standard Specifications. These specifications help prevent sediment from entering the storm drain system during construction. In particular, the contractor is required to take specific measures, including having erosion and sediment controls in place during construction occurring in the rainy season, providing an area for trucks to remove dirt from their tires before leaving the site, street sweeping and, if necessary, monitoring water exiting the construction site.

Supplemental Comments submitted for Chapter 9: Infrastructure

July 21, 2009

The following are supplemental comments for Chapter 9: Infrastructure of the *Mountain View General Plan Update Draft Current Conditions Report* (April 2009). These comments have not been incorporated into the report, but should be considered for future planning decisions.

Page 281:

- Suggest discussion or list of regulatory requirements and City's need to comply, report and enforce as applicable.

Page 282:

- A suggested approach is to start with legislation and trends. Good urban planning will support goals such as to recognize the value of water resources, protection of watersheds and their environments through stewardship, encourage recycled water acceptability and support other water planning efforts.

Page 284:

- Define the type of pipe that is most durable and efficient.

Page 287:

- This section should include discussion of water planning agencies such as CA Department of Water Resources, USBR (US Bureau of Reclamation), etc.
- Rewrite the second paragraph, the author did not refer to published documents concerning the SFPUC. Consult the website http://sfwater.org/mc_main.cfm/MC_ID/13 "The San Francisco Public Utilities Commission manages a complex water supply system stretching from the Sierra to the City and featuring a complex series of reservoirs, tunnels, pipelines, and treatment systems. Two unique features of this system stand out: the drinking water provided is among the purest in the world; and the system for delivering that water is almost entirely gravity fed, requiring almost no fossil fuel consumption to move water from the mountains to your tap."
- Also information that the SFPUC described from the website with respect to Global warming http://sfwater.org/detail.cfm/MC_ID/18/MSC_ID/113/MTO_ID/369/C_ID/3187/Keyword/global%20warming "As President Sklar explained the issues surrounding water supply and storage, he brought up increasing additional water storage capacity to make up for the loss of the reservoir equivalency of the snowpack. He stated the SFPUC must look at all surface water storage options …
- The second paragraph also needs to more accurately depict the SFPUC awareness of vulnerability of the system. SFPUC is actively managing a Water Supply Improvement Plan. "The WSIP is one of the largest water infrastructure programs in the nation and the largest infrastructure program ever undertaken by the City of San Francisco." A full description of the plan can be found http://sfwater.org/mc_main.cfm/MC_ID/35

Page 289:

- There are contradictory statements concerning the major water use. One page references irrigation as 55% use and 2% ingested, and the first paragraph states that indoor use is the majority water user.
- The water conservation program description is incomplete and inaccurate. There is not a "limit" for water audits. The terms "subsidized plumbing retrofits" is misleading, when referencing free showerheads and aerators.