LOS ANGELES COUNTY
PUBLIC WORKS
Public Service That Works

County of
Los Angeles
Department of Public Works

May 2004

Final

Sun Valley Watershed Management Plan

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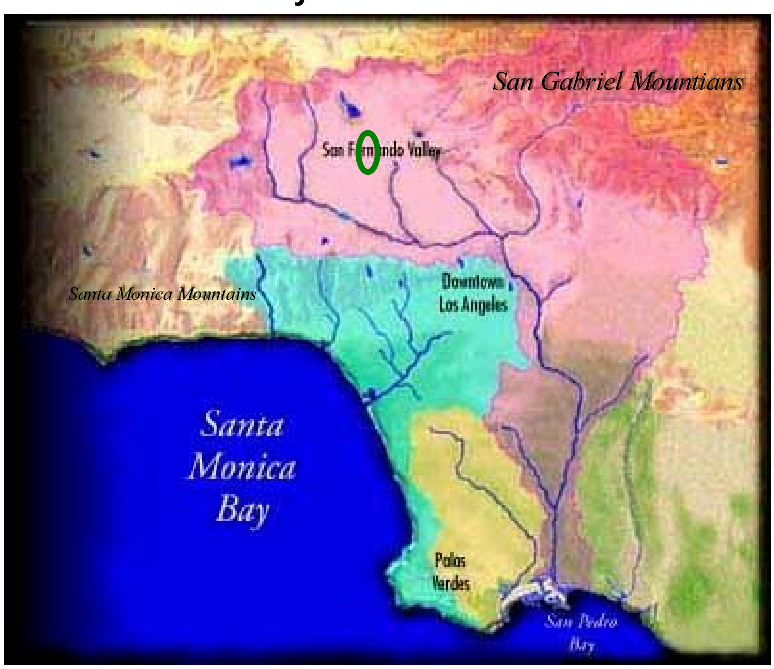
EXECUTIVE SUMMARY

The primary objective of the Sun Valley Watershed Management Plan (WMP) is to solve the chronic local flooding problem with a multipurpose solution, acknowledging that rainfall is a significant component of our water supply in this semi-arid region. The Sun Valley Watershed Stakeholders Group (Stakeholders) has been meeting since late 1998 to address the flooding problem in Sun Valley under the leadership of the Watershed Management Division, County of Los Angeles Department of Public Works (LACDPW). The Watershed Management Division was formed in recognition that integrated solutions can address flood protection, water supply and stormwater quality needs of the County. The Stakeholders defined a mission for the Sun Valley watershed that is consistent with this philosophy. The mission of the Stakeholders is:

> *"…to solve the local flooding problem while retaining all stormwater runoff from the watershed, increasing water conservation, recreational opportunities, wildlife habitat, and reducing stormwater pollution."*

The Sun Valley Watershed is located in the San Fernando Valley, about 14 miles northwest of Downtown Los Angeles. It is a subbasin of the Los Angeles River Watershed. The green oval in **Figure ES-1** shows the location of the Sun Valley Watershed in the Los Angeles River Watershed. The Sun Valley area is not served by a major flood control system and is highly developed. Consequently, stormwater runoff causes flooding of city streets during even minor rainfall events, and has caused property damage during heavy rainfall events.

Figure ES-1
Sun Valley Watershed Location



The purpose of the Sun Valley Watershed Management Plan project is to meet the multiple objectives of the Stakeholders. The watershed management planning process is based on an organized methodology for development and evaluation of alternatives. The process includes the following steps:

- Define project objectives
- Define Best Management Practice (BMP) elements
- Evaluate opportunities and constraints
- Assemble into alternatives
- Evaluate and refine alternatives
- Select and evaluate four final sample alternatives.

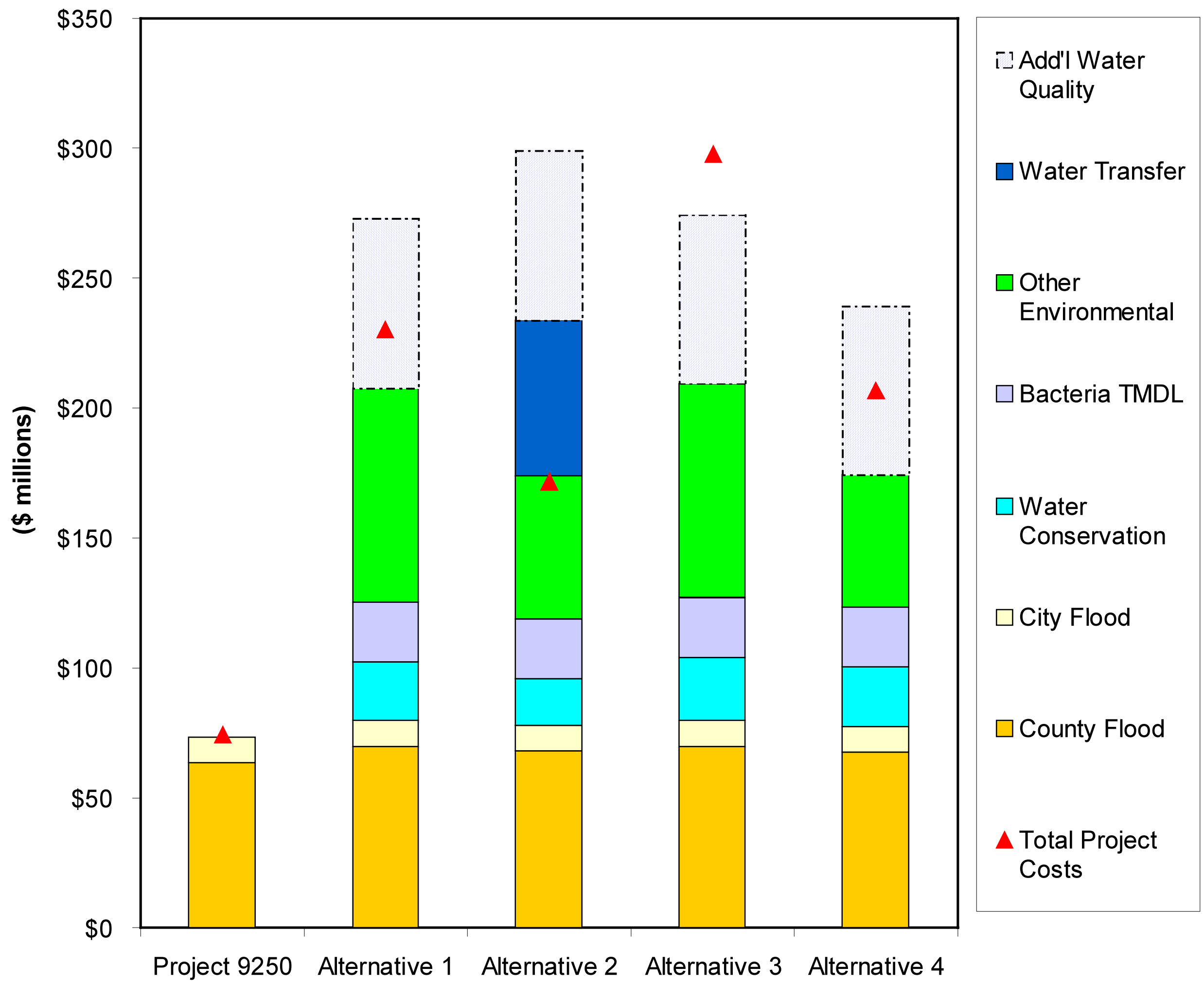
Technical Memoranda completed as part of the project explain the details of each step of the process. This Watershed Management Plan gives an overview of the process and explains the results. The results include four final sample alternatives. The four final sample alternatives are each a system of components that, when combined, meet the project objectives. Examples of project components are infiltration basins, constructed wetlands, tree planting, and storm drains. Many of the components include benefits in addition to flood control. The four final sample alternatives all provide significant water conservation, recreation, water quality, habitat, and other benefits. The components are spread across the watershed to meet the County flood control criteria at all locations.

Detailed analysis of the four final sample alternatives is complete. The analysis includes water balances, conceptual designs, hydraulic models, and benefit/cost analysis. The benefit/cost ratio for each sample alternative and Project 9250 (the County designed storm drain) is shown in **Table ES-1.** A graphical summary of the benefits and costs for each alternative is presented in **Figure ES-2**. The benefit/cost ratios compare the present value of the costs and the benefits of each alternative. The cost includes the present value of the total project cost and O&M over a 50-year evaluation period. The benefits use the present value of the summed benefits over the same evaluation period.

Table ES-1
Benefit/Cost Ratio for Each Alternative

	Alternative				
	9250	**1**	**2**	**3**	**4**
Present Value of All Benefits (in $ million)	$73.44	$270.47	$295.39	$274.93	$239.95
Present Value of Capital and O&M Costs (in $ million)	$74.46	$230.40	$171.58	$297.90	$206.61
Benefit/Cost Ratio	**0.99**	**1.17**	**1.72**	**0.92**	**1.16**

Figure ES-2
Benefits of the Sun Valley Alternatives



Alternative 2, Water Conservation, has the highest benefit-to-cost ratio of 1.72. This is due to the combination of higher overall benefits and lower total project costs. The higher benefits are associated with the water transfer component from Tujunga Wash to Sheldon Pit, which provides almost four times the groundwater recharge provided by any other alternative. If the water transfer component were included in the other alternatives, their benefit-to-cost ratios would also increase. The lower cost results from implementing fewer retention projects, and releasing water from the watershed outlet during large storm events.

Figure ES-3 is a graphical representation of sample Alternative 2. It depicts how the different project components are distributed geographically across the watershed.

Figure ES-3
Alternative 2 Diagram

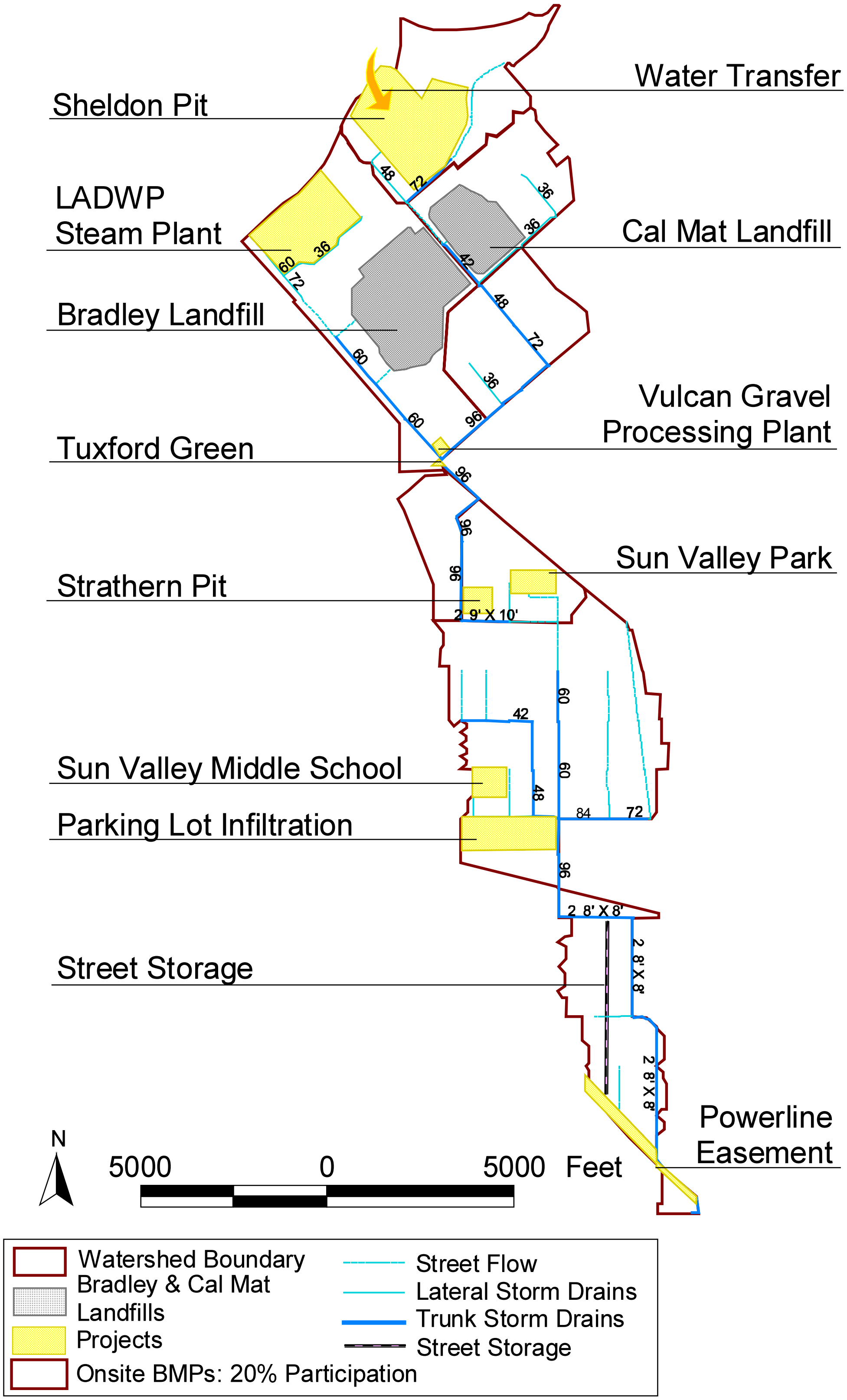


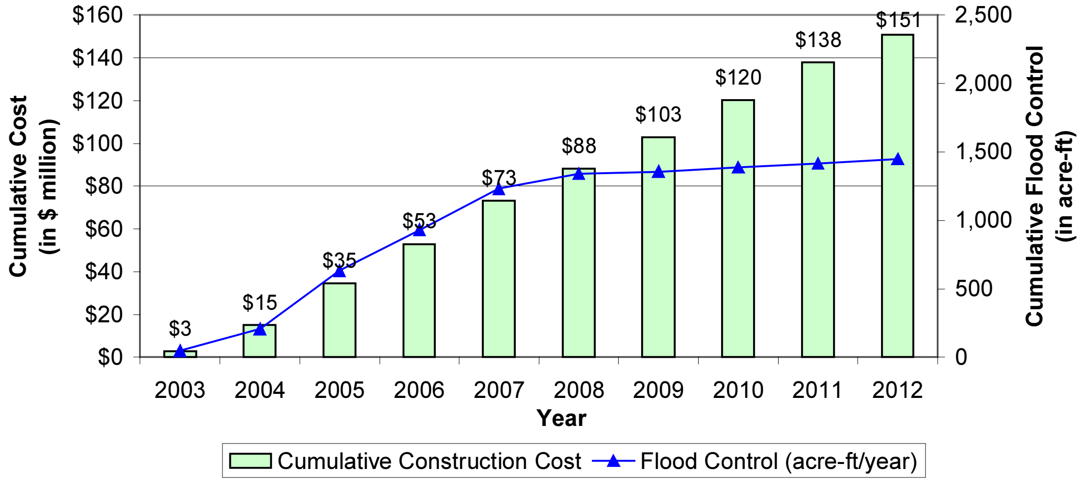
Table ES-2 lists the components included in Alternative 2 and the amount of water that will be conserved by the components in an average year. Table ES-2 also lists the estimated capital cost for each component. The total estimated cost of Alternative 2 is $151 million. Due to the multiple benefits of Alternative 2, there are a number of agencies and funding sources likely to participate in project funding.

Table ES-2
Sample Alternative 2 Design, Water Conservation, and Cost Summary

Project Component	Average Annual Water Conservation (acre-ft)	Capital Cost
LADWP Steam Plant	184	$4,539,000
Vulcan Gravel Processing Plant	45	952,000
Tuxford Green	Mostly Conveyance – Negligible Conservation	4,350,000
Sun Valley Park	38	2,800,000
Sun Valley Middle School	25	3,033,000
Tree Planting and Mulching	Negligible	2,200,000
Tujunga Wash Diversion	6,000	650,000
Sheldon Pit	303	16,850,000
Strathern Pit	649	15,500,000
Parking Lot Infiltration	57	15,300,000
Street Storage	113	17,643,000
Onsite BMPs	113	16,407,000
Powerline Easement	596	7,500,000
Trunk Storm Drains	Conveyance Only	36,816,000
Lateral Storm Drains	Conveyance Only	6,362,000
Total	8,123	**$150,902,000**

The implementation plan for the sample project covers ten years with annual costs ranging between $9 and $19 million. **Figure ES-4** depicts the cumulative costs and flood protection of Alternative 2. The flood control curve shows that projects with a large flood protection benefit are scheduled for construction in the first five years of implementation. When all proposed flood control structures are completed, the Sun Valley Watershed will be in compliance with the County Flood Control requirements.

Figure ES-4
Cumulative Construction Cost and Flood Protection of Sample Alternative 2



Note: Flood protection data is based on structures that retain water and ignores flood protection provided by storm drains. The measure of flood protection from storm drains cannot be measured in acre-feet.

Section 1
Introduction

AUTHORIZATION

LACDPW retained MWH to develop a Watershed Management Plan for the Sun Valley Watershed under Contract Number PW12456 approved by the Los Angeles County Board of Supervisors and dated December 4, 2001.

PROJECT BACKGROUND AND SCOPE OF WORK

The Sun Valley Watershed Plan project scope of work consists of three (3) reports, a Watershed Management Plan (WMP), a Program Environmental Impact Report (EIR), and a Funding Report. This document is the WMP. The Funding Report was completed and submitted under separate cover. The Draft Program EIR is complete. As part of the scope of work associated with the WMP, MWH prepared five (5) technical memoranda intended to present interim progress at key schedule milestones. MWH also completed five (5) Phase 1 site concept reports along with a Phase 1 Site Monitoring Plan. The technical memoranda and Phase 1 reports have been incorporated into the WMP.

PROJECT OBJECTIVES

The primary objective of the Sun Valley Watershed Management Plan is to solve the chronic local flooding problem with a multipurpose solution, acknowledging that rainfall is a significant component of our water supply in this semi-arid region. The Sun Valley Watershed Stakeholders Group (Stakeholders) has been meeting since late 1998 to address the flooding problem in Sun Valley under the leadership of the Watershed Management Division, County of Los Angeles Department of Public Works (LACDPW). The Watershed Management Division was formed in recognition that integrated solutions can address flood protection, water supply, and stormwater quality needs of the County. The Stakeholders defined a mission for the Sun Valley watershed that is consistent with this philosophy. The mission of the Stakeholders is:

> *"…to solve the local flooding problem while retaining all stormwater runoff from the watershed, increasing water conservation, recreational opportunities, wildlife habitat, and reducing stormwater pollution."*

The Stakeholders also developed a list of detailed project objectives that expand on the mission statement. The project objectives are:

- Reduce Local Flooding
- Increase Water Conservation
- Increase Recreational Opportunities in the Watershed
- Increase Wildlife Habitat
- Improve Water Quality

- Provide Additional Environmental Benefits
- Increase Multiple Agency Participation

PROJECT PROCESS

The watershed management planning process is based on an organized methodology for development and evaluation of alternatives. The process includes the following steps:

- Define project objectives
- Define BMP elements
- Evaluate opportunities and constraints
- Assemble into alternatives
- Evaluate and refine alternatives
- Select and evaluate final alternatives.

This process was developed in order to select a final set of cost-effective solutions from the range of potential solutions available. The process was successfully applied to narrow the range of options available to a final set of four feasible sample alternatives. In this case, they are termed “sample” alternatives, because the individual components of the watershed plan may vary, which would cause significant variation in project costs and schedule. The process also included extensive input from the community and other stakeholders. Stakeholder involvement and public outreach in the watershed management planning process are briefly discussed below.

Stakeholder Involvement and Public Outreach

The project framework included an organized approach to stakeholder involvement and public outreach in order to assure that the final alternatives were acceptable to the community. The ultimate aim was to assure that a solid base of community support was developed for the final set of components that are likely to be constructed.

A stakeholders group with individuals who either hold a stake in the project outcome or have some ability to influence project decisions has been meeting since 1998. Monthly stakeholder meetings are open to the public. **Table 1-1** provides a list of individuals and organizations that have been involved in the stakeholder process to date.

Table 1-1
Organizations involved in Sun Valley Stakeholder Process to Date

A-Mehr, Inc.	David Evans and Associates, Inc.
American Society of Civil Engineers	Enartec, Inc.
California Coastal Coalition	Fresh Creek Technologies
California Department of Fish and Game	LA Byproducts, Inc.
California Department of Parks and Recreation	Land Design Consultants, Inc
California Department of Transportation	Los Angeles Regional Water Quality Control Board
California Native Plant Society	Los Angeles Unified School District
California State Assemblymember Cindy Montañez	Los Angeles/San Gabriel Rivers Watershed Council
California State Senator Richard Alarcon	Los Cerritos Wetland Stewardship, Inc.
California Wildlife Conservation Board	Lynne Dwyer & Associates
City of Burbank	MWH
City of Burbank Department of Public Works	North East Trees
City of La Cañada Flintridge	Rick Goacher Planning, Inc.
City of Los Angeles Department of Public Works	San Gabriel & Lower LA Rivers & Mount. Conservancy
City of Los Angeles Department of Recreation and Parks	Southern California Association of Governments
City of Los Angeles Department of Water and Power	San Gabriel Valley Mosquito and Vector Control District
City of Los Angeles Councilmember Greuel's Office	Sun Valley Chamber of Commerce
City of Los Angeles Councilmember Padilla's Office	Sun Valley Neighborhood Improvement Organization
City of Los Angeles Councilmember Cardenas' Office	Targhee Inc.
City of Los Angeles Councilmember LaBonge's Office	TreePeople
City of San Fernando	Upper Los Angeles River Area Watermaster
Civiltec Engineering, Inc.	U.S. Army Corps of Engineers
Congressman Brad Sherman	U.S. Department of the Interior National Park Service
Congressman Howard Berman	U.S. Environmental Protection Agency
County of Los Angeles Department of Public Works	Vulcan Materials Company
County of Los Angeles Sanitation Districts	Vulcan Solution Strategies, Inc.
County of Los Angeles Supervisor Zev Yaroslavsky	

These stakeholders have played a critical role in decision-making at key points throughout the process of defining and selecting specific project components and final alternatives.

DATA SOURCES

Rainfall Data

The County provided rainfall data for the Sun Valley area (station 14). Rainfall data for downtown Los Angeles is obtained from the National Weather Service.

Hydrologic Data

The final four sample Sun Valley Watershed management plan alternatives, discussed in the Alternatives Evaluation Process section, are simulated using LACDPW's F0601 program with the Watershed Modeling System (WMS) graphical interface. The WMS base model is created using a file provided by LACDPW from a study completed for the Watershed Management Division on May 23, 2002. The GIS database provided by LACDPW is used to support development of the F0601 model.

Water Quality Data

LACDPW provided water quality data gathered as part of the Sun Valley Watershed Storm Water Runoff Monitoring Program. Water quality data does not represent a statistically complete set at this time.

REPORT OUTLINE

This report is organized in the following sections:

Section 1 – Introduction
Section 2 – Existing Conditions of the Sun Valley Watershed
Section 3 – Description of Potential Improvement Projects
Section 4 – Alternatives Evaluation Process
Section 5 – Implementation Approach

ABBREVIATIONS

acre-ft	acre-feet
acre-ft/yr	acre-feet per year
BCA	Benefit/Cost Analysis
BMP	Best Management Practice
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
chromium-6	hexavalent chromium
CO	carbon monoxide
CWA	Clean Water Act
DHS	California Department of Health Services
DTSC	California Department of Toxic Substance Control
EIR	Environmental Impact Report
GIS	geographic information system
LACDPW	County of Los Angeles Department of Public Works
LADoT	Los Angeles Department of Transportation
LADWP	City of Los Angeles Department of Water and Power
LARWQCB	Los Angeles Regional Water Quality Control Board
MPN	most probable number
MRZ-2	Mineral Resource Zone 2
MWDSC	Metropolitan Water District of Southern California
NO_2	nitrite
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
O_3	ozone
OU	operable units
PCE	perchloroethylene
PM_{10}	particulate matter 10 microns or less in diameter
RAP	City of Los Angeles Department of Recreation and Parks
ROW	right-of-way
RWQCB	California Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
SFGB	San Fernando Groundwater Basin
SO_2	sulfur dioxide
SWRCB	State Water Resources Control Board
TCE	trichloroethylene
TDS	total dissolved solids
TMDL	Total Maximum Daily Load
ULARA	Upper Los Angeles River Area
USEPA	Environmental Protection Agency
VOC	volatile organic compounds
WMP	Watershed Management Plan
WMS	Watershed Modeling System

Section 2
Existing Conditions of the Sun Valley Watershed

STUDY AREA AND WATERSHED BOUNDARIES

The project area is defined as the Sun Valley Watershed, an urban watershed that drains into the Los Angeles River. The Sun Valley Watershed is located in the San Fernando Valley, about 14 miles northwest of downtown Los Angeles. It encompasses the communities of Sun Valley and North Hollywood in the City of Los Angeles. **Figure 2-1** presents a map of the watershed. The watershed is approximately 2,800 acres (4.4 square miles) in area and is approximately 6 miles in length from north to south. The watershed is divided into eight subareas as shown in Figure 2-1. Subareas 1 through 4 are known as the upper watershed. Subareas 5 through 8 are known as the lower watershed. Tujunga Wash borders the watershed on the west, Burbank-Glendale-Pasadena Airport on the east, Hansen Dam on the north and Burbank Boulevard on the south.

Freeways that provide access to the area include Interstate 5 (Golden State Freeway), State Highway 170 (Hollywood Freeway), and Interstate 210 (Foothill Freeway). Metrolink's Antelope Valley Line runs along San Fernando Road and intersects the project area near Tuxford Street.

GEOGRAPHIC SETTING

The study area is located within the northeastern portion of the San Fernando Valley, which is bounded on the north by the San Gabriel Mountains, on the east by the Verdugo Mountains, on the west by the Simi Hills and on the south by the Santa Monica Mountains. These features are located within the Transverse Ranges geomorphic province of California, which are a series of east/west-trending mountains and sediment-filled valleys. **Figure 2-2** is a photograph of the San Gabriel Mountains that border the watershed to the north.

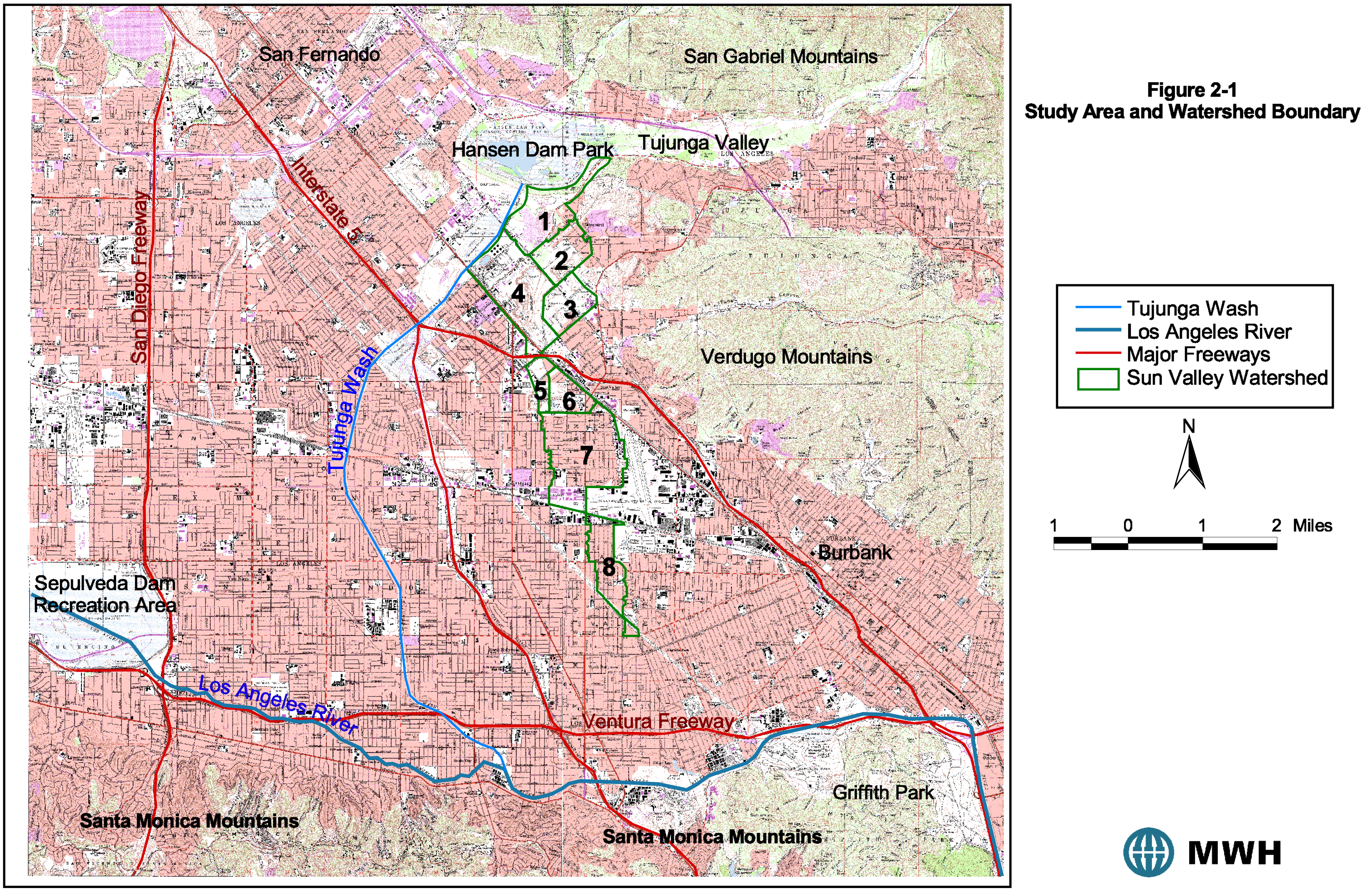
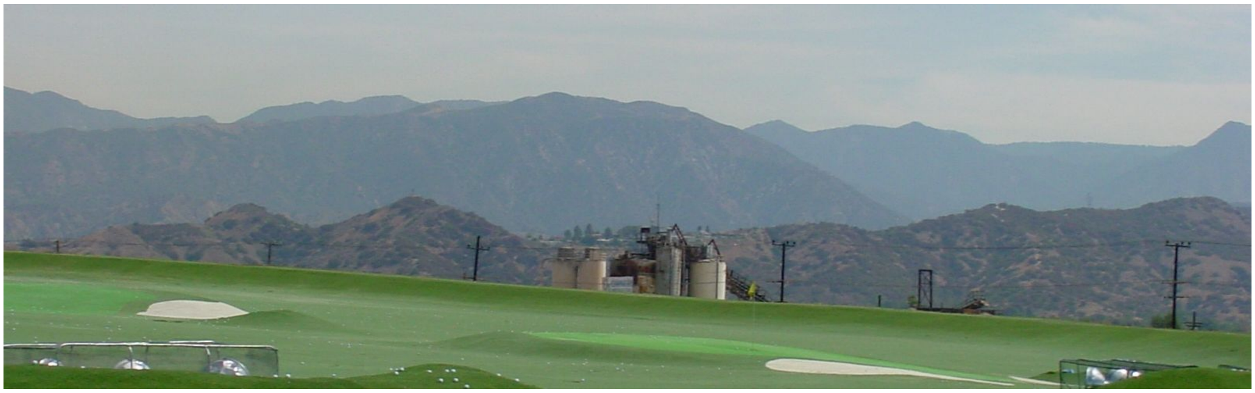


Figure 2-1
Study Area and Watershed Boundary

Figure 2-2
Photograph of San Gabriel Mountains from Golf Range



According to the California Geological Survey (2002), the study area is located outside of areas identified as active fault traces within the Alquist-Priolo Earthquake Fault Zones. However, there are numerous active faults in the area, the closest of which is the Verdugo Fault.

Portions of the Sun Valley Watershed are located within Mineral Resource Zone 2 (MRZ-2) as designated by the California Geological Survey (formerly California Division of Mines and Geology). The MRZ-2 zone designation indicates an area where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood of their presence exists.

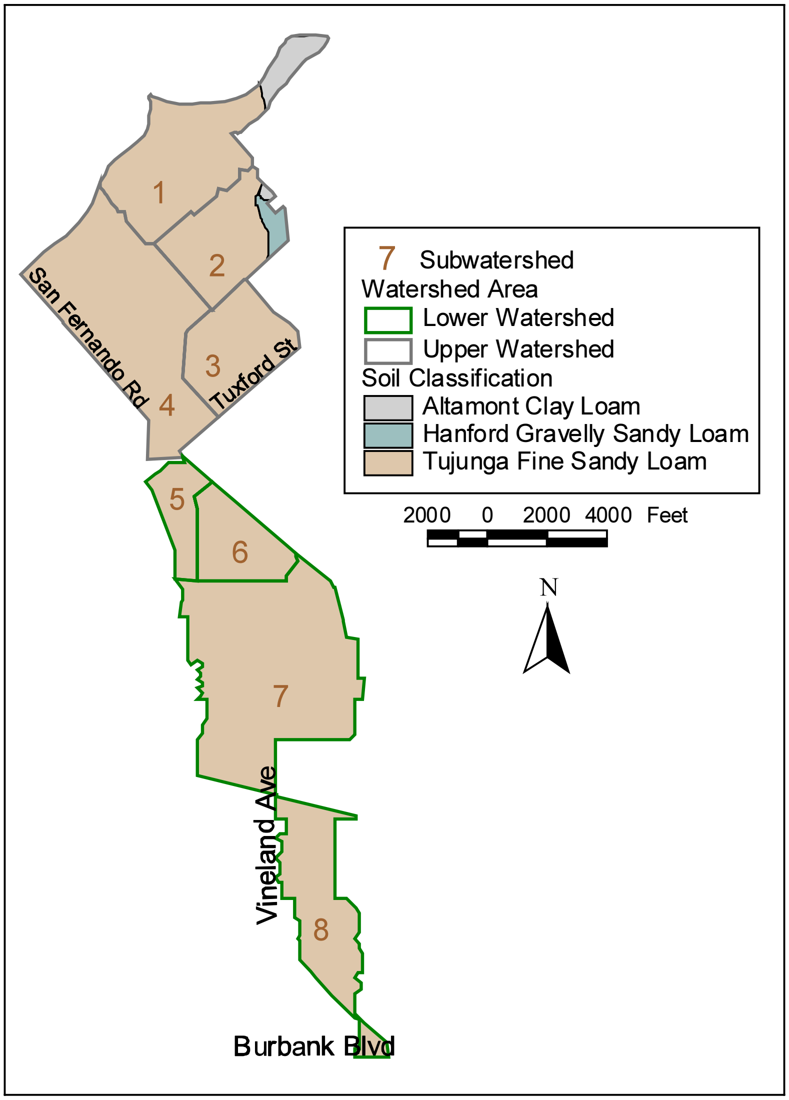
SOILS

The San Fernando Valley is a broad, flat, alluvium-filled basin that trends east to west. The alluvium is comprised of a broad alluvial fan derived from sedimentary, metamorphic, and granitic bedrock within the San Gabriel Mountains. The alluvial deposits in the area are primarily medium to coarse-grained sand, gravel, and boulders, with scattered deposits of fine-grained materials. The depth of the alluvial materials is estimated to range from a few hundred feet near the intersection of Tuxford and Glenoaks Boulevard to approximately 1,000 feet or more near the southern end of the watershed/study area.

There are three soil types in the Sun Valley Watershed. The soil types include Tujunga fine sandy loam, Altamont clay loam, and Hanford gravelly sandy loam. The majority of the soil is Tujunga fine sandy loam. The sandy soils allow significant amounts of water to infiltrate to the groundwater basin. **Figure 2-3** is a map of the soil types in the Sun Valley Watershed.

Possible hazardous waste sites have been identified in the watershed. These sites are the Sun Valley Middle School and the Costco parking lot. Sun Valley Middle School is listed on the Cortese List for two cases of leaking underground storage tanks, both involving diesel fuel (EDR, 2002). Remedial actions were taken and completed for one case, which was closed in 1996. The Costco case involved soil contamination. It appears to be currently under review.

Figure 2-3
Soil Types in Sun Valley Watershed



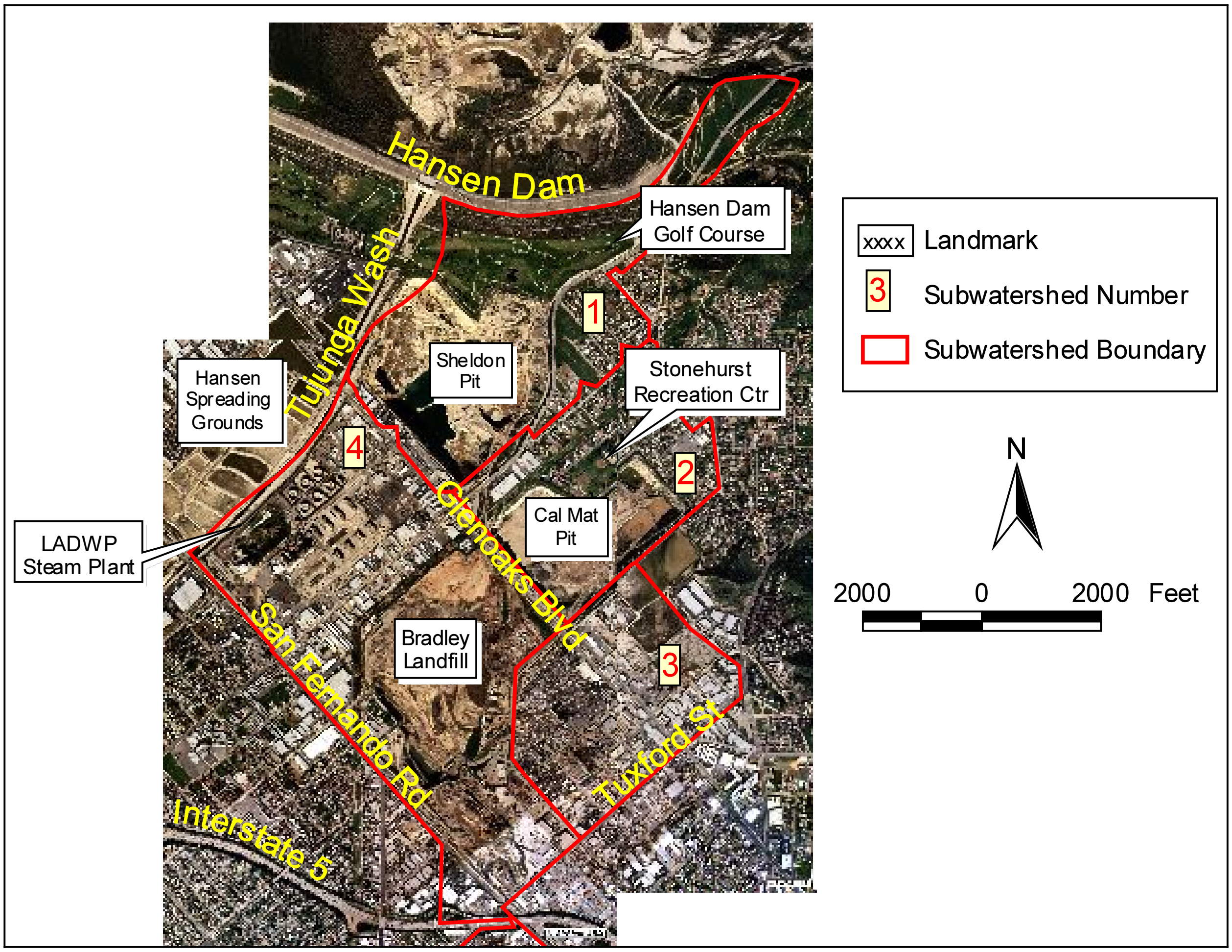
LAND USE

The Sun Valley Watershed is in an urban area consisting of industrial, commercial, and residential uses. The upper watershed and the lower watershed each have different characteristic land uses as described below.

The upper watershed is located north of the intersection of Tuxford Street and San Fernando Road, and is about 1,500 acres in size. It is primarily developed with industrial uses. These uses include several actively mined and exhausted gravel pits, an electric power generating facility (Valley Generating Station), a Class III landfill (Bradley Landfill), the Vulcan gravel processing plant, and various auto dismantling operations. **Figure 2-4** shows an aerial photograph including Bradley Landfill and the Sheldon and Cal Mat pits. The Hansen Spreading Grounds are located immediately to the northwest of the Valley Generating Station, just outside of the watershed boundary. In addition, the upper watershed contains a portion of the Hansen Dam Golf Course.

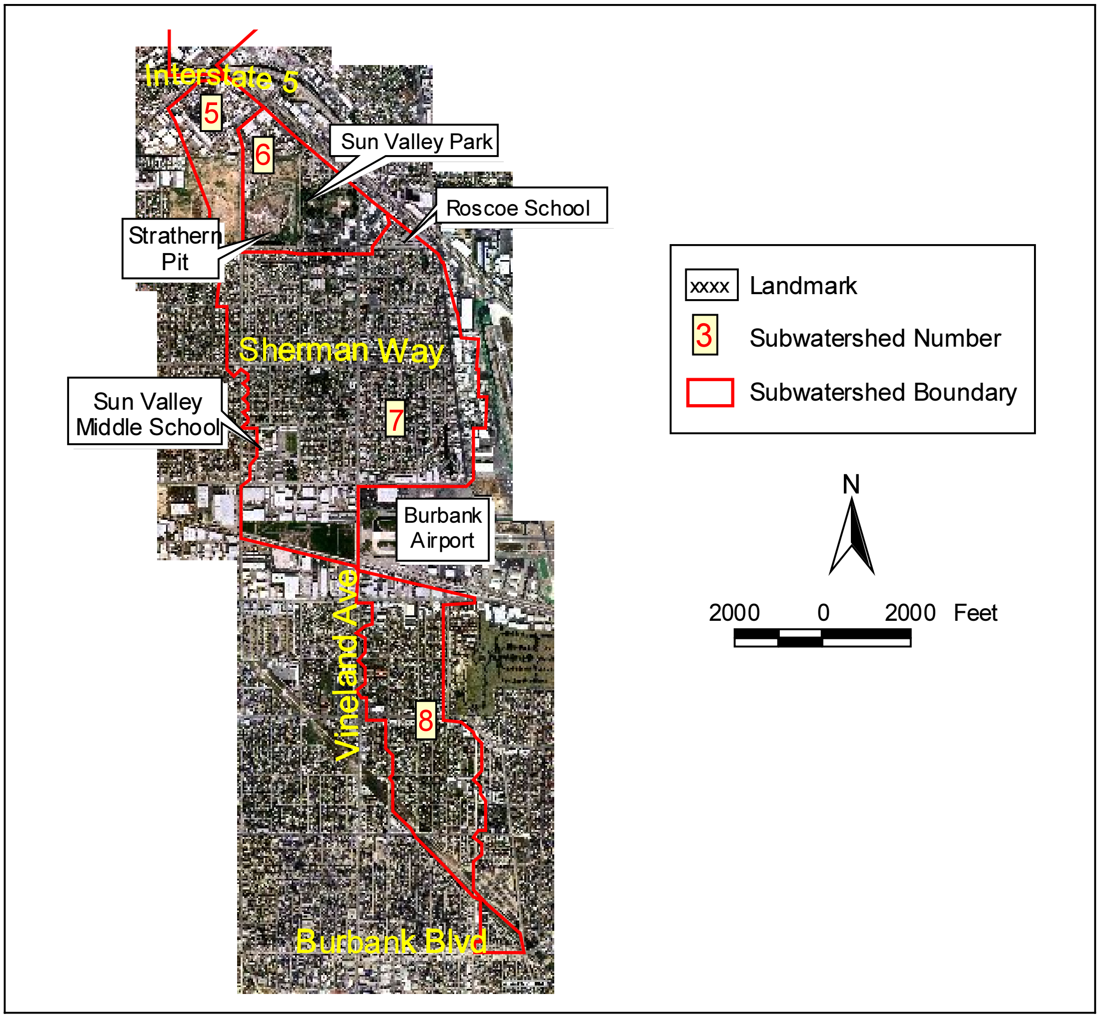
This golf course is owned by the City of Los Angeles and is located at the north end of the watershed near other open spaces including Hansen Dam Park. Low density residential uses, including the Stonehurst Recreation Center, and the Stonehurst Elementary School (grades K-5), are located in the northeastern portion.

Figure 2-4
Aerial Photograph of Land Uses in the Upper Watershed



The lower watershed is located south of the Tuxford-San Fernando intersection and Interstate 5 as shown in **Figure 2-5**. It encompasses about 1,300 acres. It is primarily developed with low to medium density residential uses. Sun Valley Park and Recreation Center, Sun Valley Middle School (grades 6-8), and Roscoe Elementary School (grades K-5) are located within this part of the watershed.

Figure 2-5
Aerial Photograph of Land Uses in the Lower Watershed



According to the Sun Valley Community Plan (City of Los Angeles, 1999), the Sun Valley-La Tuna Canyon Community area contains the highest concentration of mineral processing facilities in Los Angeles. Mineral processing includes rock and gravel mining operations as well as cement and concrete processing. Gravel pits are proposed in the WMP as part of a multi-objective solution to the flooding problems in the Sun Valley Watershed. The three gravel pits considered for use as components are Cal Mat Pit (Figure 2-4), Sheldon Pit (Figure 2-4), and Strathern Pit (Figure 2-5). These locations are exhausted gravel pits where gravel extraction operations have ceased. Cal Mat Pit and Strathern Pit are currently used as landfills for inert wastes such as construction debris. Vulcan Materials Company, current owner of Sheldon Pit, uses exposed groundwater in Sheldon Pit for gravel processing and then as a disposal site for wash water and sediment. The Boulevard Pit is located just west of the lower watershed and is an actively mined gravel pit. According to the Sun Valley Community Plan (1999), existing gravel resources are anticipated to be exhausted by the year 2008.

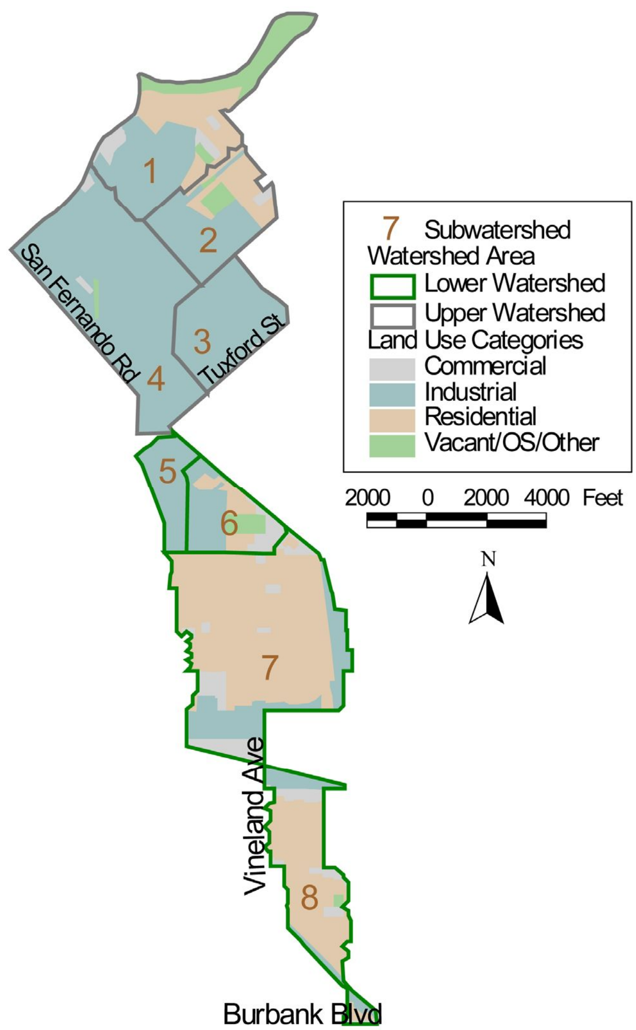
Table 2-1 summarizes land use in the Sun Valley Watershed. The majority of the area is reserved for industrial purposes. Roughly one third is residential land use. **Figure 2-6** shows the geographic distribution of land use in Sun Valley.

Table 2-1
Sun Valley Land Use Summary

Land Use	Upper Watershed (acres)	Lower Watershed (acres)	Total Area (acres)	Percentage of Total Area
Residential	191	803	994	35%
Commercial	42	136	178	6%
Industrial	1157	337	1494	53%
Open Space/Vacant	121	23	144	5%
Total	**1,511**	**1,300**	**2,811**	**100%**

Source: LACDPW, 1989 – ArcView coverages associated with the project

Figure 2-6
Land Use in Sun Valley Watershed

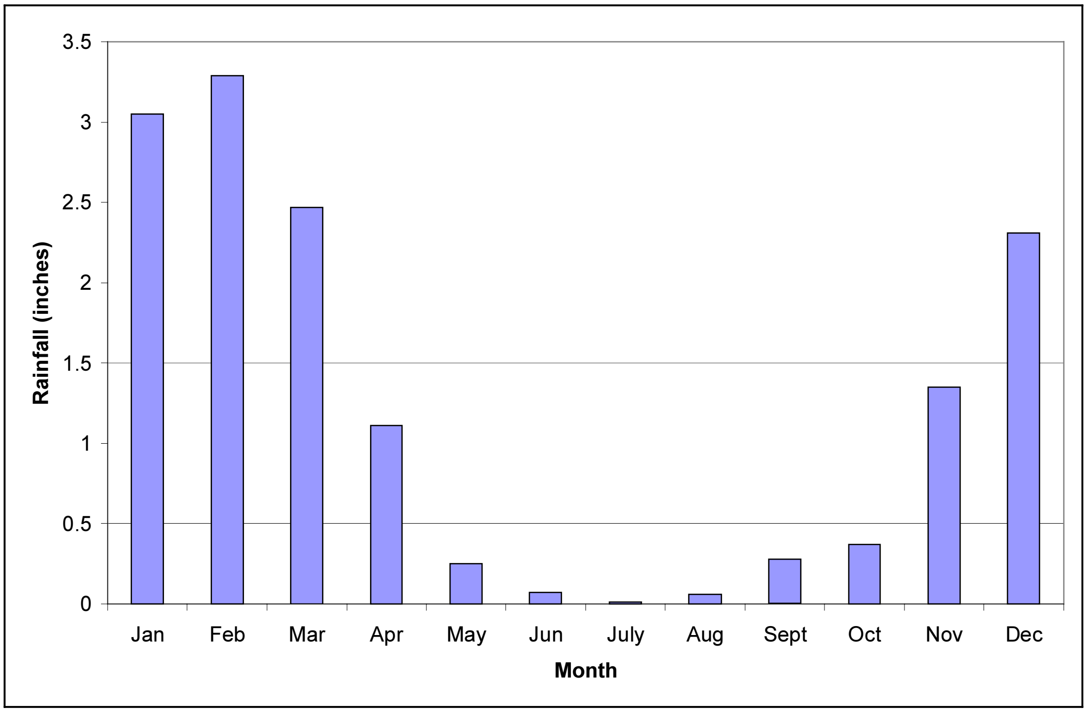


SURFACE WATER

Rainfall and Runoff

Sun Valley's climate can be characterized as Mediterranean-type. It consists of long hot summers and shorter, cooler winters. Most of the precipitation occurs in the months of November through April. **Figure 2-7** depicts the annual average rainfall pattern in the Los Angeles area based on data from 1921 to 2002 (NWS, 2002). Monthly and yearly rainfall totals are extremely variable. According to LACDPW Annual Hydrologic Report (2002), the San Fernando Valley receives a seasonal average of 17.6 inches.

Figure 2-7
Average Monthly Rainfall in Downtown Los Angeles



Source: NWS, 2002

The Sun Valley Watershed has a relatively moderate slope with drainage patterns flowing in a southerly direction. Because the watershed is developed and is covered by impervious surfaces, much of the water that would have naturally percolated to replenish groundwater is now conveyed out of the watershed on street surfaces. MWH estimates that nearly 66 percent of the rainfall in the watershed becomes runoff (based on impervious area according to land use data). Runoff contributes to flooding, especially in the sump locations in the watershed. Runoff eventually flows south along streets and out of the watershed to the Los Angeles River. In an average year, it is estimated that over 2,000 acre-feet (acre-ft) of runoff flows south out of the watershed.

Flood Control

This section presents a summary of LACDPW flood control policy and existing conditions in the Sun Valley Watershed.

Relevant Policy

LACDPW has established flood control design criteria in the document entitled, "Hydrology/Sedimentation Manual of the Los Angeles County Department of Public Works" (1991) as follows:

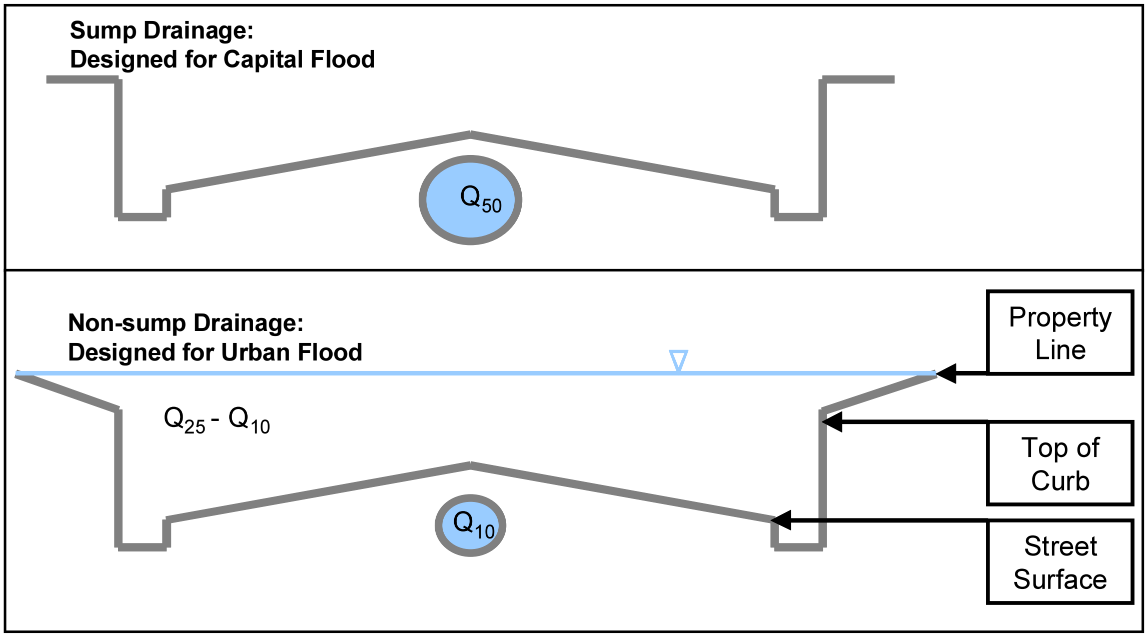
> Under Urban Flood conditions, in the upstream end of a developed watershed, allow Urban Flood runoff to flow in the street to the point where the flow reaches the street capacity at the property line. At this point, split the flow to be conveyed both in the street and in a drain below the street. The drain should have enough capacity to carry at least the flow from the 10-yr frequency design storm. The street or highway should have enough capacity up to the property line to convey at least the balance of the Urban Flood. The drain may also carry more flow in order to lower the water surface in the street to below the private property line, or to lower the water surface level for other requirements such as vehicular or pedestrian traffic.

The Urban Flood is runoff from a 25-year frequency design storm falling on a saturated watershed. A 25-year frequency design storm has a four percent (1/25) probability of occurring in any year. A second part of the design criteria that applies to certain areas of the Sun Valley Watershed is as follows:

> "The Capital Flood level of protection applies to all facilities that are constructed to drain natural depressions or sumps."

The Capital Flood is runoff from a 50-year frequency design storm falling on a saturated watershed. The flood control design criteria are summarized in **Figure 2-8**.

Figure 2-8
LACDPW Flood Control Policy



Sun Valley Conditions

The watershed is highly developed and is not currently served by any comprehensive underground storm drain system. Stormwater is primarily conveyed by gravity on street surfaces with relatively flat slopes. As a result, light rainfall leads to moderate to severe flooding. Street flooding above the top of curb causes traffic congestion, pedestrian inconvenience, and property damage during storms throughout the basin. Even light rainfall causes flooding of Sheldon Street, Tuxford Street, Glenoaks Boulevard, Penrose Street, Tujunga Avenue, and Cahuenga Boulevard (LACDPW, 1989). **Figure 2-9** shows historic pictures of flooding in Sun Valley. Resident complaints about flooding were documented in LACDPW's 1989 storm drain proposal. According to the report, 94 percent of the residents interviewed by the County feel flood protection is needed (LACDPW, 1989).

Figure 2-9
Photos of Sun Valley Flooding January 17, 1988


Looking SE at intersection of Glenoaks Boulevard and Tuxford Street.

Looking NW from south side of San Fernando Road just east of Tuxford Street


Looking south from west side of Sheldon Street toward intersection of San Fernando Road and Sheldon Street.

Looking north from Penrose Street just south of Tujunga Avenue.

Source: LACDPW, 1989

Numerous projects have been proposed to relieve the flooding in the watershed. The most recent proposed project is LACDPW's Project 9250. It encompasses a regional relief drain with diameters ranging from 33 inches to double 8.5 foot wide by 9 foot high reinforced concrete boxes that provide flood protection consistent with LACDPW design criteria (LACDPW 1989). This project was most recently proposed in 1989, but has not been implemented.

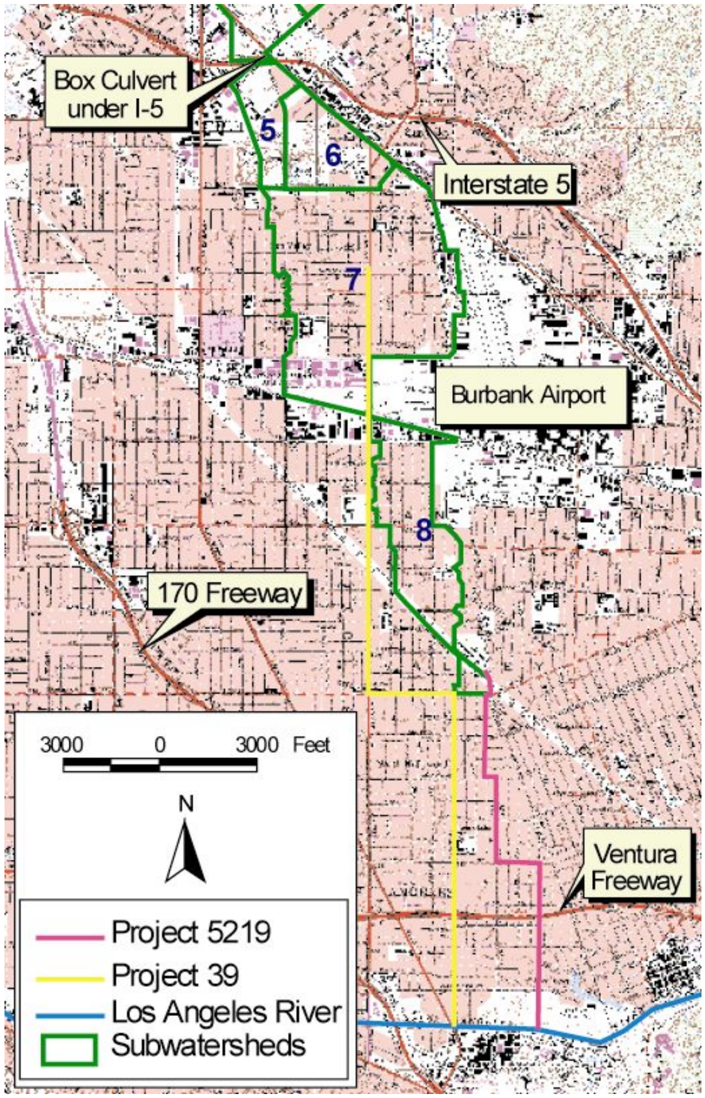
Existing flood control structures in the watershed are consolidated at the south end of the watershed, in or near Subareas 7 and 8. Although the storm drains convey water to the Los Angeles River, the existing storm drains are too far from the northern part of the watershed to provide flood control for Subareas 1 through 4. The locations of the storm drains are shown in **Figure 2-10** and described as follows:

- Bond Issue Project No. 5219 – storm drain extending from an upstream inlet located west of the intersection of Clybourn Avenue and Whitnall Highway, south of the watershed to a downstream outlet at the Los Angeles River . Project 5219 has a capacity of 2,510 cubic feet per second (cfs). Project 5219 is the proposed connection between project 9250 and the Los Angeles River.

- Bond Issue Project No. 39 – storm drain extending from an upstream inlet at the intersection of Saticoy Street and Vineland Avenue in Subarea 7 to a downstream outlet at the Los Angeles River.

The runoff from the upper watershed collects at a sump located in the intersection of San Fernando Road and Tuxford Street, north of the Golden State Freeway (Interstate 5). There is a box culvert at the south side of the intersection, which allows some water to flow under Interstate 5. The culvert is maintained by Caltrans. This structure is at a critical point where the stormwater runoff from Subareas 1 through 4 converges. The box culvert is 7.5 feet wide and 2.5 feet high (see **Figure 2-11**). This structure is not effective at transferring water out of the upper watershed due to the design of the intersection. The intersection is configured with low points north of the box culvert, causing water to pond in the intersection before it enters the box culvert. When water does pass through the culvert, it discharges directly onto the north end of Tujunga Avenue and continues to flow on city streets through Subarea 5.

Figure 2-10
Existing Flood Control Structures near Sun Valley Watershed



Source: LACDPW, 1998

Figure 2-11
Inlet of Box Culvert on San Fernando Road under Interstate 5

Water Quality

This section presents a summary of relevant water quality policy and existing conditions related to the Sun Valley Watershed.

Relevant Policy

The Los Angeles Regional Water Quality Control Board (LARWQCB), State Water Resources Control Board (SWRCB), and United States Environmental Protection Agency (USEPA) share responsibilities for the development and implementation of various water quality protection programs in the Los Angeles region. The Federal Water Pollution Control Act, also known as the Clean Water Act (CWA), is the driving force behind water quality policy. The primary objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's surface waters. The CWA regulates both point and non-point discharges.

The Water Quality Control Plan, Los Angeles Region (Basin Plan) establishes water quality standards (WQS) for the Los Angeles Region, which define beneficial uses for surface and groundwater and define numerical objectives necessary to support beneficial uses. Section 303(d) of the CWA requires each state to conduct an assessment of its waters, and identify those waters that are not achieving WQS. The resulting list is referred to as the 303(d) list. The CWA requires States to develop and implement total maximum daily loads (TMDLs) for the waters on the list. A TMDL specifies the maximum amount of a pollutant that a water body can receive and still meet the water quality standard. TMDLs allocate the acceptable pollutant load to point and non-point sources (LARWQCB, 2002).

The National Pollutant Discharge Elimination System (NPDES) Program (CWA §502) controls direct discharges into waters of the United States. NPDES permits contain industry-specific, technology-based limits and may also include additional water quality-based limits, and establish pollutant-monitoring requirements.

On June 13, 1994, the LARWQCB adopted an updated Basin Plan. The Basin Plan incorporates by reference the SWRCB water quality control plans, significant SWRCB policies that are applicable to the Los Angeles Region, and the State antidegradation policy.

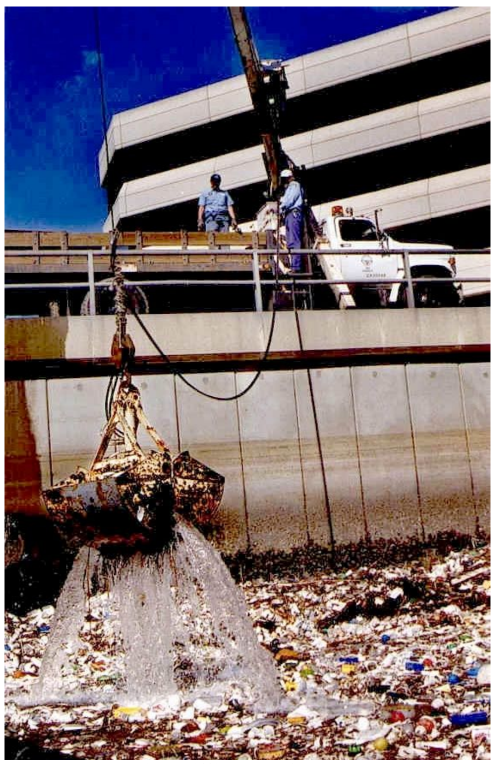
Pursuant to the CWA and its implementing regulations (40 CFR Parts 122, 123, and 124), the SWRCB adopted a general NPDES permit to regulate stormwater discharges associated with industrial activity in California. Stormwater discharges from power plants operating in California are subject to requirements under this general permit.

The existing NPDES framework was expanded in 1987 to regulate stormwater runoff (discharges) originating from municipal and industrial sources. The LARWQCB is authorized to implement a municipal stormwater permitting program as part of its general NPDES authority, as an agent of the SWRCB. Municipal permits typically require permittees to develop an areawide stormwater management plan, implement best management practices (BMPs), and perform stormwater monitoring. The City of Los Angeles is a co-permittee under the County of Los Angeles municipal permit.

Sun Valley Conditions

The Los Angeles River is an impaired water body included on the 303(d) list. The Los Angeles River is impaired due to both point sources and non-point sources. One non-point source of concern is urban runoff. Urban runoff from the Sun Valley Watershed eventually reaches the Los Angeles River between the Tujunga Wash and the Burbank Western Channel. This reach of the Los Angeles River is impaired for nitrogen, ammonia, pH, algae, scum, odors, Coliform, trash, and metals (SWRCB, 2002). The only TMDL adopted to date for the Los Angeles River addresses trash. The Los Angeles River Trash TMDL was adopted in January, 2001. It gives the 53 municipalities along the Los Angeles River 14 years to eliminate trash that reaches the river through municipal storm drains (see **Figure 2-12**). The Los Angeles River Nutrient TMDL has been developed and is awaiting approval. The remaining Los Angeles River TMDLs are scheduled for development in 2004 (SWRCB, 2002).

Figure 2-12
Trash Removal From Los Angeles River in Long Beach



source: Lisa Billings, February 17, 2000

LACDPW's 1994-2000 Integrated Receiving Water Impacts Report (2001) summarized runoff water quality data for Los Angeles County. The report presented results that demonstrated runoff exceeded California Department of Health Services bacterial indicator standards at every monitoring station in the County each year. Other than bacterial indicators, there are currently no numerical standards for stormwater quality. However, the stormwater results indicated that the following constituents might also be of concern countywide:

- Total and dissolved copper,

- Bis (2-ethylhexyl) phthalate,
- Turbidity,
- Total zinc, and
- Total lead.

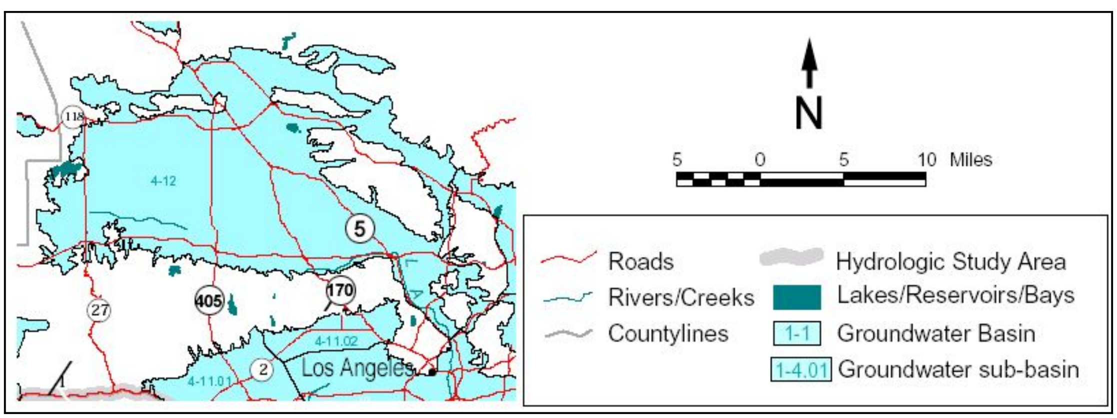
Data for Sun Valley water quality was gathered by LACDPW in 2001. The data is not statistically complete but suggests a pattern of the conditions in Sun Valley. The data indicate that along with contaminants generally expected in stormwater, metals concentrations may be slightly elevated in the lower watershed.

Elevated metal concentrations are often attributable to industrial and automotive land uses. In the County's study (2000), auto dismantling is identified as a critical source of zinc, copper and suspended solids. Auto dismantling is highly concentrated within the Sun Valley Watershed, particularly along Tuxford Street in Subarea 4 and along Sheldon Street in Subareas 1 and 2. These operations may have an impact on stormwater quality if stormwater is not retained on-site at these facilities.

GROUNDWATER

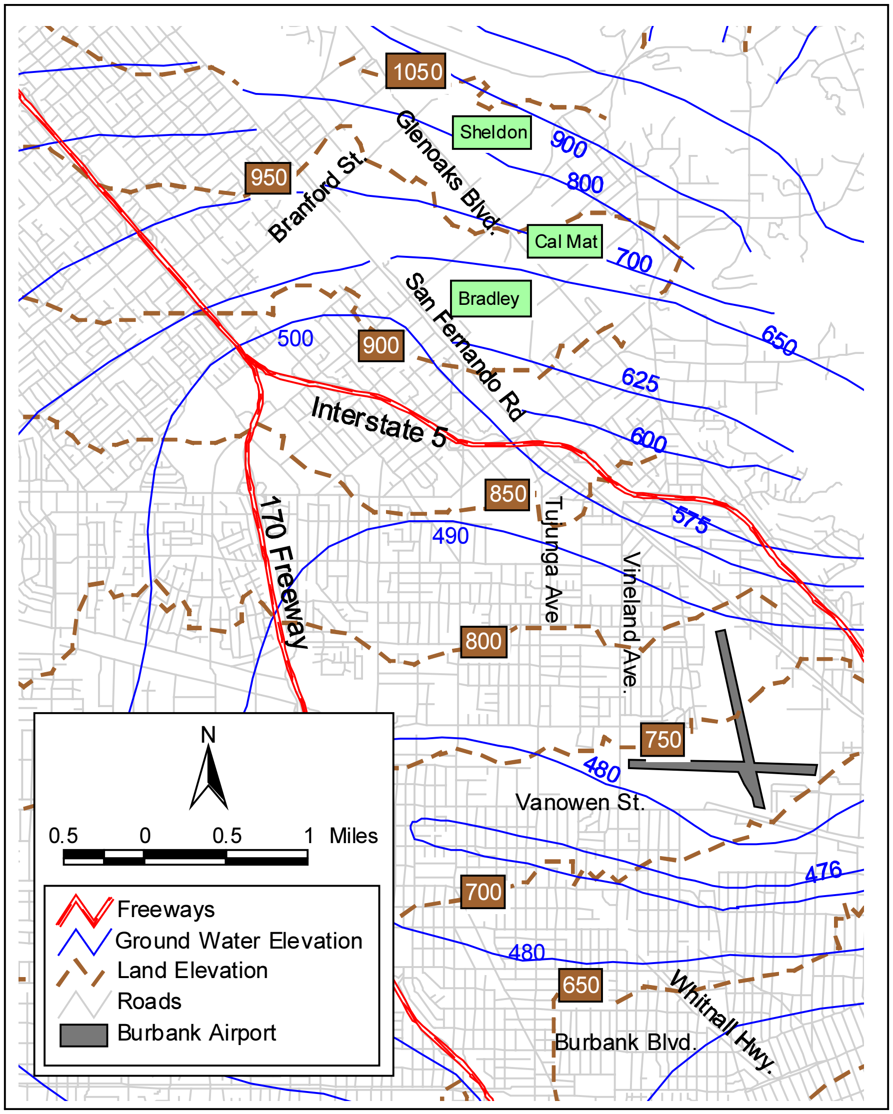
The study area is located within the San Fernando Groundwater Basin (SFGB). The SFGB covers 112,000 acres. It is designated as Basin 4-12 by the California Department of Water Resources as shown in **Figure 2-13**. It is an unconfined aquifer composed of alluvial deposits. It is bounded on the east and northeast by the San Rafael Hills, Verdugo Mountains, and San Gabriel Mountains, on the north by the San Gabriel Mountains and the eroded south limb of the Little Tujunga Syncline that separates it from the Sylmar Basin. It is bounded on the northwest and west by the Santa Susana Mountains and Simi Hills and on the south by the Santa Monica Mountains. The general direction of groundwater flow is from the north and west to the southeast. Groundwater and land elevations in Sun Valley compared to mean sea level as of Spring 1991 (USEPA, 2002) are shown in **Figure 2-14**. The total groundwater storage capacity of the SFGB is estimated to be approximately 3,200,000 acre-ft (ULARA Watermaster, 2002).

Figure 2-13
San Fernando Groundwater Basin



Source: Modified from DWR, 2003

Figure 2-14
Groundwater Levels Compared to Surface Elevations



Water Supply

Groundwater from the SFGB is an important source of drinking water for the Los Angeles region, including the cities of Los Angeles, Glendale, and Burbank. Approximately 15 percent of the water consumed by the City of Los Angeles is from the SFGB (LADWP, 2000).

SFGB is an adjudicated groundwater basin. This means that the rights to use the basin's groundwater have been allocated to various users by a court order. The court order established the groundwater extraction rights for SFGB based on a "safe yield" operation. The safe yield operation requires that the amount of water extracted from the basin is equal to the amount of native, imported, and recycled water that recharges the basin (LADWP, 2000).

Table 2-2 provides a summary of SFGB extraction rights for the 2001-2002 Water Year and stored water credit as of October 1, 2001, for the cities of Los Angeles, Burbank, and Glendale.

Table 2-2
San Fernando Groundwater Basin Allowable Pumping for 2001-2002 Water Year

City	Native Safe Yield Credit (acre-feet)	Import Return Credit (acre-feet)	Total (Native + Import) (acre-feet)	Stored Water Credit (acre-feet) [1]	Allowable Pumping (acre-feet)
Los Angeles	43,660	43,941	87,601	234,270	321,871
Burbank	0	5,124	5,124	37,265	42,389
Glendale	0	5,760	5,760	73,254	79,014
Total	**43,660**	**54,825**	**98,485**	**344,789**	**443,274**

Source: ULARA Watermaster, 2002.
1 – As of October 1, 2001

Water naturally leaves the SFGB through surface outflow. The ULARA Watermaster reported that surface outflow from SFGB for the 2000-2001 water year was 188,860 acre-ft. Higher groundwater levels lead to more surface outflow out of the basin (ULARA, 2002).

Groundwater in the SFGB is replenished through:

- Natural infiltration from precipitation
- Infiltration of return flows from human uses (e.g. excess irrigation water, septic tanks)
- Artificial recharge of stormwater in spreading grounds

Urban development has decreased the amount of water that naturally infiltrates to the SFGB. To partially offset this decrease, several spreading grounds are used to provide artificial recharge of runoff water. The Tujunga and Hansen Spreading Grounds border the Sun Valley Watershed (see Figure 2-1). The Pacoima and Hansen Dams, originally built for flood control, are utilized to capture some of the surface runoff during storms. The collected stormwater is then recharged into the groundwater at the spreading grounds downstream whenever possible (ULARA Watermaster, 2002). Spreading of imported water is done only in very wet years when there is a surplus, or when the Metropolitan Water District of Southern California (MWDSC) offers a financial incentive (LADWP, 2000).

The use of spreading grounds in the San Fernando Valley has been significantly limited in recent years because of environmental issues associated with methane gas migration from nearby landfills. This has resulted in lower groundwater levels in the northern portion of the SFGB, specifically near the Hansen Spreading Grounds. A consultant is finalizing a characterization study, and has recently proposed a pilot study to install additional methane collection points and to spread water while operating the gas collection system under a variety of controlled conditions (ULARA, 2002).

Water Quality

Groundwater in the SFGB is generally within the recommended limits of drinking water standards although there are some water quality impairments. The basin is composed of alluvial fill and does not have continuous confining layers above groundwater. As a result, groundwater quality has been impacted by various industrial and non-industrial activities. Elevated levels of the following constituents have been found in the SFGB:

- Volatile organic compounds (VOCs) and nitrates in the eastern SFGB compared to California Title 22 and federal drinking water standards (ULARA Watermaster, 2002).
- Sulfate and total dissolved solids (TDS) in the western SFGB compared to Title 22 drinking water standards (ULARA Watermaster, 2002).
- Hexavalent chromium (chromium-6) in the eastern SFGB, but not exceeding any published standards.

Figure 2-15 provides the location of the chromium-6 and VOC plumes in relation to the Sun Valley Watershed (depicted as a red outline). The plumes are discussed in detail as follows.

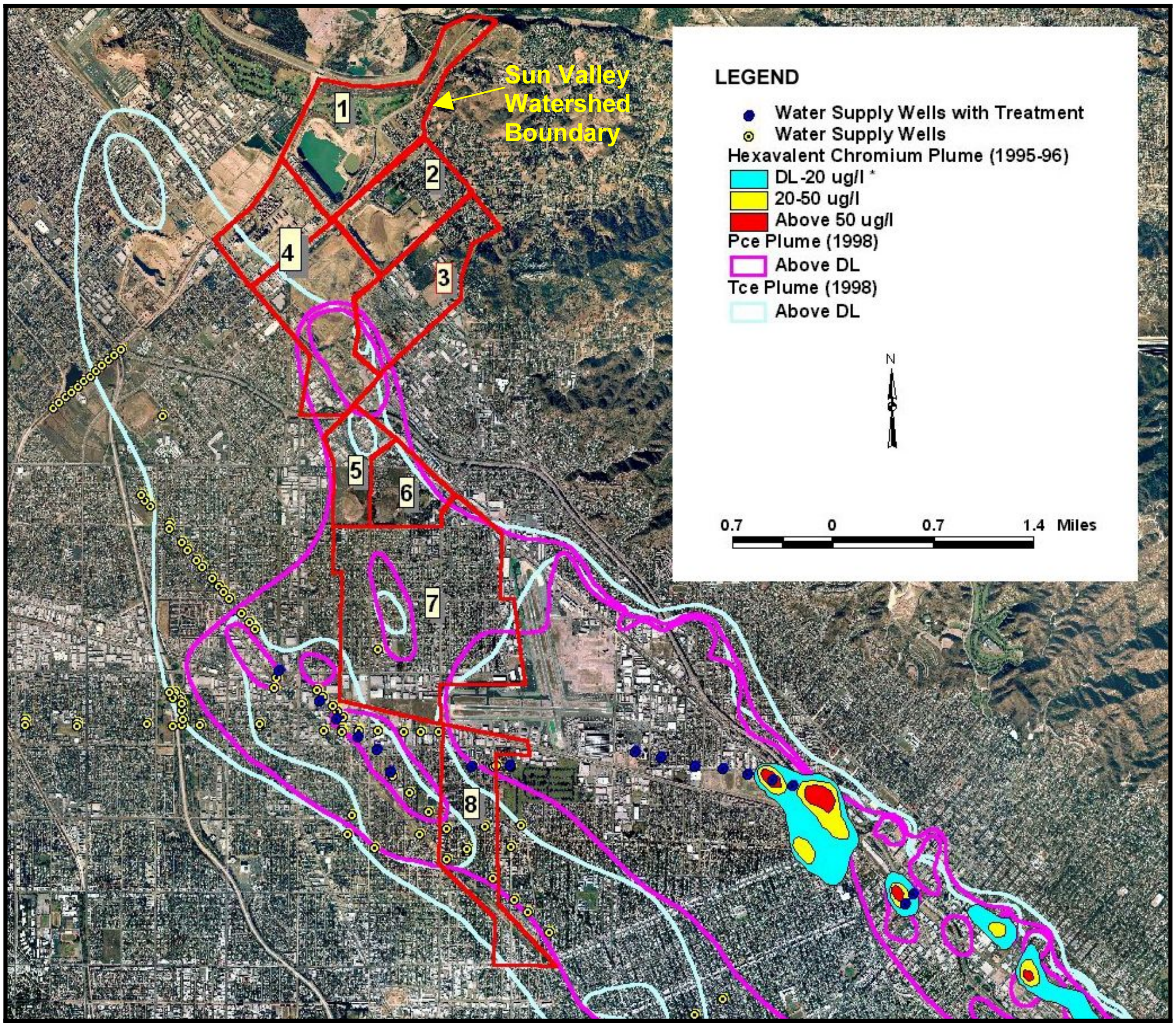
In 1980, concentrations of two chlorinated VOCs, trichloroethylene (TCE) and perchloroethylene (PCE), were found to be above federal and state drinking water standards in many drinking water wells located in eastern SFGB. TCE and PCE are associated with adverse health effects such as liver problems and increased risk of cancer. Both compounds were widely used as solvents in a number of industries including aerospace and defense manufacturing, machinery degreasing, dry-cleaning, and metal plating (USEPA, 2000).

Nitrate has also been detected in the groundwater in the San Fernando Valley, consistently at levels in excess of the state and federal drinking water standards. Nitrate contamination may be the result of past agricultural practices and/or septic system or ammonia releases (USEPA, 2002 – *San Fernando Valley (All Areas*)).

In response to the public health threat, the cities were forced either to shut down their wells and provide alternate sources of drinking water or blend contaminated well water with water from clean sources. In 1986, San Fernando Valley was listed on the National Priorities List (NPL) under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund. The NPL is a list of sites with known or potential releases of hazardous substances, pollutants, or contaminants that have been determined to warrant further investigation by USEPA. The contaminated areas of SFGB have been subdivided into four discrete Superfund sites (San Fernando Valley Areas 1, 2, 3 and 4) for clean up and management (USEPA, 2000).

The Sun Valley Watershed is located in the northern part of the San Fernando Valley Superfund Area 1. Area 1 covers approximately 4 square miles and includes portions of Sun Valley, North Hollywood, and Burbank. Results of a groundwater monitoring program conducted from 1981 to 1987 revealed that over 50 percent of the water supply wells in the eastern portion of SFGB were contaminated.

Figure 2-15
Chromium-6, PCE, and TCE Plumes in SFGB near Sun Valley



Source: LADWP, 2002

USEPA coordinates the cleanup effort in cooperation with state, regional, and local agencies. Within Area 1, USEPA has established two operable units (OUs) – the Burbank OU and the North Hollywood OU – to facilitate the investigation and clean up of the contamination. Since the late 1980s, USEPA has been extracting groundwater at these two OUs and treating the water using aeration and granular activated carbon filtering units to remove the VOCs. The water from the North Hollywood OU and Burbank OU is disinfected and delivered to the public water supply distribution systems of the City of Los Angeles and the City of Burbank (USEPA, 2000).

In 1998, the ULARA Watermaster notified the USEPA and SWRCB that elevated levels of chromium-6 were being detected in SFGB wells, especially along the eastern portion. Monitoring wells, but no drinking water wells, have exceeded the state or federal Maximum Contaminant Levels (MCL) (LARWQCB, 2000). Chromium-6 is a known carcinogen when inhaled, but it is not clear if the risk is similar when it is ingested in drinking water (ULARA

Watermaster, 2002). Although it may occur naturally in very small concentrations, the existence of chromium-6 in the environment is generally associated with industrial waste from metal plating operations, making of steel and other alloys, bricks in furnaces, dyes and pigments, chrome plating, leather tanning, and in wood preserving (LARWQCB, 2000).

USEPA has charged LARWQCB with the task of locating the sources of chromium-6 contamination in the soil and groundwater. LARWQCB has identified over 210 chromium users from a database developed under the San Fernando Valley Superfund investigation. In addition, the California Department of Toxic Substance Control (DTSC) has identified over 260 suspected chromium users from their Burbank and Glendale databases (LARWQCB, 2000). LARWQCB began inspections of these sites in November 2000 (ULARA Watermaster, 2002). The DHS has been monitoring chromium-6 in public drinking water supplies, and will be performing a health risk assessment in consultation with the Office of Environmental Health Hazard Assessment. Based on the results of the risk assessment, DHS is scheduled to adopt a MCL for chromium-6 by January 1, 2004 (DHS, 2002).

RECREATION

There are a number of areas with open space and recreation facilities in the Sun Valley Watershed (see Figure 2-6). The City of Los Angeles Department of Recreation and Parks (RAP) manages public parks and recreation areas in the watershed. Public parks and recreation areas include:

- Stonehurst Recreation Center – basketball courts, baseball and soccer fields, play area, picnic tables and barbecues along with a variety of youth and adult recreational programs (13 acres).
- Sun Valley Park and Recreation Center – swimming pool, baseball fields, tennis courts and a variety of youth and adult recreational programs (17 acres).
- Hansen Dam Golf Course – 18-hole golf course with driving range and putting green. Hansen Dam Golf Course is owned and operated by the City of Los Angeles and is approximately 110 acres. The eastern part of the golf course is within the Sun Valley Watershed.

There are over 90 miles of equestrian trails within the City of Los Angeles (City of Los Angeles, 2001). Trails north of the watershed include the Rim of the Valley Trail that can be reached from Hansen Dam Park and connects to both the Angeles National Forest and the Verdugo Mountains. South of the watershed there are trails along the Los Angeles River and the Griffith Park trail system. East of the watershed, trails connect between Wildwood Canyon Park and Brand Park in the Verdugo Mountains.

There is substantial equestrian activity in and around the watershed. Hansen Dam has a 40-acre equestrian center with several hundred boarding stalls. Gabrielino Equestrian Park in the Hansen Flood Control Basin has staging areas and allows for overnight use. This area is connected by trails to the Angeles National Forest and the Rim of the Valley Corridor trail system.

The John Wells Golf Driving Range is located on Strathern Boulevard between Lankershim Boulevard and Tujunga Avenue. It is partially within the watershed.

WILDLIFE HABITAT

The Sun Valley Watershed is nearly completely urbanized and/or developed and has been for many decades. Therefore, existing land uses have modified many of the habitats that historically supported native species of plants and animals. Land uses such as residential and commercial have virtually eliminated the potential for special status species to occur. Land uses such as golf courses and gravel pits have the potential to contain substrates or habitats that may support populations of candidate, sensitive, or special status species of plants or animals. There are approximately 120 acres of recreational space in the watershed including part of Hansen Dam Golf Course, part of the driving range, and the two public parks. There are approximately 290 acres of gravel pits in the watershed. Approximately 23 acres of Burbank Airport's open space are in the watershed, but wildlife is discouraged in this area.

BonTerra Consulting, Costa Mesa, California, evaluated biological resources in the project area. The evaluation included a review of available literature and records, and field surveys of individual project component sites that were accessible during the project timeframe. BonTerra found that the potential exists for the following special status plant species to occur in the Sun Valley Watershed area (common names only):

- Nevin's barberry,
- Davidson's bushmallow,
- Slender-horned spineflower,
- San Fernando Valley spineflower,
- Plummer's mariposa lily,
- Lewis' eveningprimrose,
- Southern tarplant,
- Los Angeles sunflower, and
- Mesa horkelia.

Based on the same methods as above, the potential exists for the following animal species to occur:

- Western pond turtle,
- Silvery legless lizard,
- San Diego coast horned lizard,
- Orange-throated whiptail, and
- Least Bell's vireo.

Based on the same methods as above, the potential exists for the following habitats to occur in the Sun Valley Watershed area:

- Mule fat scrub,
- Southern willow scrub,
- Riversidean alluvial fan sage scrub,
- Southern cottonwood-willow riparian forest,

- Riversidean sage scrub,
- Coastal sage scrub, and
- Non-native grassland.

AIR QUALITY

Due to its meteorological and climate characteristics, including light winds, abundant sunlight, and low vertical mixing, the Los Angeles region is conducive to the accumulation of air pollutants. The South Coast Air Basin is a non-attainment area for ozone (extreme), particle matter of less than 10 microns (PM_{10}) (serious), and carbon monoxide (serious) (USEPA, 2002).

Ozone (O_3), a photochemical oxidant, is formed when reactive organic compounds and nitrogen oxides, both byproducts of the internal combustion engine, react in the presence of ultraviolet sunlight. High levels of ozone can cause respiratory problems.

PM_{10} consists of extremely small particles (10 microns or less in diameter) that can lodge in the lungs, contributing to respiratory problems. PM_{10} arises from sources such as road dust, diesel soot, combustion products, abrasion of tires and brakes, construction operations, and wind storms. It is also formed in the atmosphere from nitrogen dioxide (NO_2) and sulfur dioxide (SO_2) reactions with ammonia.

Carbon monoxide (CO) is a colorless and odorless gas, which can, in high concentrations, cause physiological and pathological changes sometimes resulting in death by interfering with oxygen transport by the red blood cells. Primary sources of CO are the automobile and other types of motor vehicles.

The South Coast Air Quality Management District (SCAQMD) monitors levels of various criteria pollutants affecting the project area at the East San Fernando Valley monitoring station (Station Number 69). **Table 2-3** summarizes air quality monitoring data obtained from this station. Data are for the years 1997 through 2000 for ozone, CO, SO_2, NO_2, and PM_{10}.

These data indicate that the region surrounding the project area, as represented by the East San Fernando Valley monitoring station, is in compliance with both federal and state air quality standards for CO, NO_2, and SO_2. State ozone and PM_{10} air quality standards were exceeded at the East San Fernando Valley monitoring station on several days each year. The federal ozone standard was also exceeded over the period of record.

Table 2-3
Background Air Quality Data for the East San Fernando Valley Station
(1997 - 2000)

Pollutant	Number of Days Federal/State Standards Were Exceeded			
	1997	1998	1999	2000
	Federal/State	Federal/State	Federal/State	Federal/State
Carbon Monoxide (CO)	0/0	0/0	0/0	0/0
Ozone (O_3)[1]	2/15	7/34	0/13	3/16
Nitrogen Dioxide (NO_2)	0/0	0/0	0/0	0/0
Sulfur Dioxide (SO_2)	0/0	0/0	0/0	0/0
Particulate Matter less than 10 microns in diameter (PM10)[2]	0[3]/17 (30.4)	0/9 (15.3)	0/21 (35)	0/14 (23)

Source: 2000 data from SCAQMD, 2000. 1997-1999 data from SCAQMD, 2002.
1. Federal 1-hour standard considered.
2. Ten samples collected every 6 days; percentage of days exceeding standard shown in parenthesis.
3. Less than 12 full months of data. May not be representative.

WATER CONSERVATION

Both the City of Los Angeles and County of Los Angeles promote water conservation on a number of levels ranging from household conservation of potable water to countywide recharge of groundwater basins through the use of spreading grounds. There are also a number of locations in the county where treated wastewater and/or stormwater are reused for irrigation and industrial purposes. Some of the local water conservation programs are discussed below.

LADWP offers incentives for citizens to use water-conserving appliances such as ultra low flush toilets and high efficiency clothes washers. The city has an ordinance (Los Angeles Municipal Ordinance No. 172075) that requires showerheads and toilets to be replaced with water conserving models at the time of sale.

There are a number of water conservation facilities in the greater Los Angeles area that permit percolation to the groundwater basins. LACDPW's policy is to conserve the maximum possible amount of stormwater consistent with runoff quantity and quality, capacities of the spreading facilities, and groundwater conditions. According to LACDPW, there are 3,361 acres of spreading ground in Los Angeles County. The Hansen Spreading Grounds and Tujunga Spreading Grounds are in the vicinity of the Sun Valley Watershed.

The Hansen Spreading Grounds are operated by LACDPW. It is located just north of the Sun Valley Watershed and encompasses 156 acres (105 wetted acres). It currently recharges water from controlled releases from Hansen Dam. In 2000-2001, over 11,000 acre-ft of water were infiltrated in the Hansen Spreading Grounds (ULARA, 2002).

The Tujunga Spreading Grounds are west of the watershed. It spans the Hollywood Freeway (State Route 170) just north of Roscoe Blvd. The spreading grounds are operated by LACDPW in cooperation with the City of Los Angeles. In 2000-2001, over 1,600 acre-ft of water were infiltrated in the Tujunga Spreading Grounds (ULARA, 2002). The use of this spreading ground is limited due to methane gas migration from nearby landfills.

In 1990, the City of Los Angeles adopted water reuse goals, including the target of 250,000 acre-ft per year, or 40 percent of the City's wastewater, by 2010. LADWP set a goal to replace ten percent of the City's potable water use with the use of recycled water by 2010, with an interim goal of utilizing 32,000 acre-ft per year by 2000 (LADWP, 2000). Water recycling presently provides a source of water for irrigation, industrial, and recreational uses in the basin, but is not a source of groundwater recharge (ULARA, 2002).

Title 22 of the California Code of Regulations applies to the reuse of wastewater but has been applied in some circumstances as a water quality standard for reuse of stormwater. Title 22 sets maximum allowable concentrations of total Coliform bacteria. The standards are different for applications such as school yard and golf course irrigation versus freeway landscaping irrigation based on the potential for public contact. Title 22 also requires signage to notify the public of the reuse of recycled water.

SUMMARY OF EXISTING CONDITIONS

The Sun Valley watershed is highly urbanized. Localized flooding occurs frequently due to a lack of underground storm drains. The Sun Valley watershed offers some unique opportunities for multipurpose projects because existing land uses such as gravel pits that can be developed into solutions consistent with the stakeholders' mission. These opportunities are discussed in detail in the next section.

Section 3
Description of Potential Improvement Projects

This section has two parts:

- Project Objectives
- Description of Project Components

In this WMP, each of the sample alternatives are a collection of project components. The project components function together as a system to form a "sample alternative." Project components are designed to meet at least the flood reduction objectives and usually meet other stated objectives. The project components described later in this section are included in at least one of the final four sample alternatives. Some of the components have such beneficial impact that they are proposed in each of the final four sample alternatives.

The alternatives evaluation process narrowed down the variety of possibilities for meeting the project objectives into the final four sample alternatives. The alternatives evaluation process is described in detail in Section 4. The alternatives are termed "sample alternatives" in recognition that actual project components of the completed project may vary, which could have a significant effect on overall cost and schedule.

PROJECT OBJECTIVES

The development of detailed project objectives was conducted to refine the goals stated in the Stakeholders' mission statement. The detailed objectives are used in the selection of the most suitable alternative. Detailed objectives were required to meet the following criteria:

- Is it consistent with the overall goal of the project?
- Is it specific enough to allow for detailed evaluation?
- Is it measurable?
- Is it feasible or obtainable?
- Is it flexible enough to allow more than one alternative to meet the objective?
- Is it achievable with sources of funding that can reasonably be expected to contribute to possible solutions?

Preliminary draft objectives were submitted to the Stakeholders on January 17, 2002 and feedback was solicited from them. Based upon the comments and feedback received, the project objectives are further refined.

Seven project objectives were identified. Many are taken directly from the mission statement of the Stakeholders. Each of the objectives is consistent with the primary objective for the project to reduce flooding in the Sun Valley area. Each objective provides additional basis for evaluating various potential alternatives. The detailed objectives developed through this process are described as follows.

Objective 1: Reduce Local Flooding

The overall objective for the Sun Valley Watershed Management Plan is to reduce the existing and projected future flooding to levels consistent with County standards. This objective includes short-term objectives (i.e. those that can be implemented in 1 to 2 years) and long-term objectives (i.e. those that can be implemented in 6 to 8 years) for the project.

The short-term objective is:

- Reduce flooding occurrences at the following key intersections and neighborhoods during the one-year, 24-hour storm:
  - San Fernando and Tuxford
  - Tujunga and Strathern
  - Neighborhood downstream of Tujunga and Strathern

The long-term objectives include:

- Reducing flooding occurrences throughout the Sun Valley Watershed to meet LACDPW level of protection policy (described in Section 2).
- Retaining all stormwater within the watershed generated from the 50-year frequency storm
- Reducing flooding at the intersection of San Fernando and Tuxford during 50-year frequency storm to meet LACDPW standards for sump areas.

This objective does not imply that all streets will be dry for all storm events.

Objective 2: Increase Water Conservation

Much of the runoff from the Sun Valley Watershed is currently lost to the Los Angeles River as a result of the large amount of urbanization in the watershed. Capturing this runoff can increase local water supplies by groundwater recharge. The captured runoff can be used for nonpotable purposes reducing the demand for potable water. The Stakeholders have acknowledged water conservation as an important aspect of solving the flooding problem. For example, solutions such as stormwater infiltration facilities, stormwater recycling, or greenwaste mulching can help solve the flooding problems while conserving water. Increasing the amount of water conserved is an important objective for the project. Specific objectives include:

- Maximizing opportunities for infiltration BMPs where feasible with capacity to recharge up to 1,000 acre-ft/year (e.g. recharge basins, dry wells, etc.)
- Replacing existing uses of potable water with stormwater runoff (e.g. gravel processing wash water, landscape irrigation, etc.) where feasible

Objective 3: Increase Recreational Opportunities in the Watershed

Increased recreational opportunities consistent with the overall flood control objective can be multi-purpose projects. Access to public recreation facilities is an important measure of the quality of life in a community. In addition, public recreation projects have the benefit of attracting multiple funding partners and leveraging other financial resources. The watershed management plan evaluates alternatives that increase recreational opportunities. This objective specifically includes:

- Increasing acreage of parks and open space for recreation in watershed
- Increasing public access to parks and open space
- Increasing the portion of green areas within public and private properties

Objective 4: Increase Wildlife Habitat

Many solutions to flooding, particularly stormwater retention facilities can be designed to provide opportunities for the creation of wetlands or other wildlife habitat. Because the Sun Valley Watershed currently lacks substantial habitat for birds and animals, the Stakeholders have identified the improvement of wildlife habitat as an important objective for the watershed management plan. This objective includes:

- Increasing habitat acreage for wildlife
- Improving the quality of habitat for wildlife

Objective 5: Improve Water Quality

Stormwater runoff from urban land uses can contribute significant quantities of pollutants to downstream surface waters such as the Los Angeles River. Therefore, if the amount of stormwater runoff in Sun Valley were reduced, the amount of pollutants moving downstream will subsequently be reduced. The Stakeholders have acknowledged the reduction in the pollutant discharge to the Los Angeles River as an important objective for the project. Therefore water quality, both in terms of surface water quality and groundwater quality, is an important benchmark for a successful project. Specific water quality objectives include:

- Eliminating the pollutant load entering Los Angeles River from Sun Valley stormwater runoff
- Improving the quality of urban runoff within Sun Valley Watershed through installation of water quality BMPs
- Proactively enforcing regulations on illegal discharge by controlling pollution at its source
- Educating the public on responsible watershed management practices (residential, commercial, and industrial)
- Maintaining or improving existing groundwater quality

Objective 6: Provide Additional Environmental Benefits

Implementation of various BMPs to help reduce flooding or accomplish other objectives described above can have many additional environmental benefits. For example, tree planting may help reduce urban runoff while at the same time provide shade to buildings, resulting in significant reductions in energy costs for air-conditioning. Trees also cleanse the air, thereby improving air quality. Placing of mulch may help reduce runoff and improve groundwater infiltration, in addition to helping reduce the solid waste stream. Reduction of the solid waste stream has secondary benefits including significantly reduced energy costs due to a reduced number of trips required by trash trucks and reduced air pollution generated by those trucks. This objective includes maximizing these types of benefits. They include:

- Reducing solid waste stream
- Reducing energy costs
- Improving air quality

Objective 7: Increase Multiple Agency Participation

Multiple agency participation can provide many benefits to the County and the Sun Valley community. Benefits include, but are not limited to, additional funding sources, a more involved government and community, and creation of a model for future projects. Specific objectives include:

- Attracting multiple funding partners through development of multi-purpose solutions
- Working with schools within the watershed to improve the aesthetics of their campuses and provide secondary benefits
- Increasing community involvement and literacy on watershed issues
- Developing the project as a model that can be replicated in other watersheds

The project also includes various secondary objectives that should also be considered. These include increasing the awareness of the public's impact on water supply and water quality, increasing interaction between the community and government, improving effective use of resources, and creating an opportunity to improve the economic climate for the Sun Valley residents. Although these objectives are not specifically defined by the Sun Valley Stakeholders, they will likely be benefits of a successful plan that meets the aforementioned primary objectives.

DESCRIPTION OF PROJECT COMPONENTS

The alternatives evaluation process started with a broad range of possible approaches to meet the project objectives. The range of possibilities was narrowed down into four final sample alternatives. This section describes each of the components of the final four sample alternatives. Each alternative is a collection of project components. Each of the final four sample alternatives utilizes a subset of the available project components. **Figure 3-1** shows the location and relative size of every component that is included in at least once in the final four sample alternatives. **Figure 3-2** depicts only the components included in sample Alternative 2. Figure 3-2 shows how a subset of the components in Figure 3-1 may be assembled into a sample alternative. A figure of each of the final four sample alternatives is included in **Appendix B**.

FIGURE 3-1
All Components in Final Four Alternatives

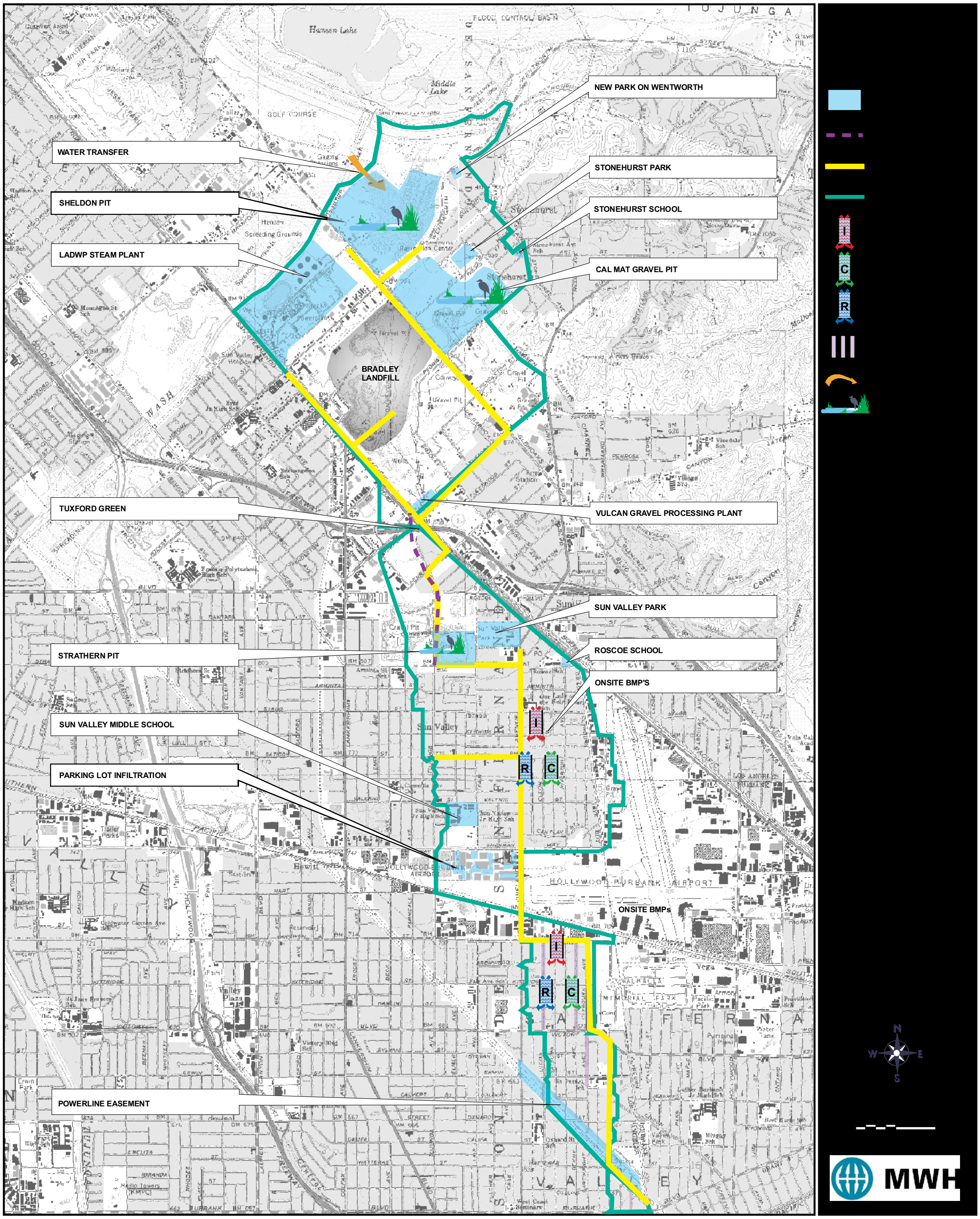
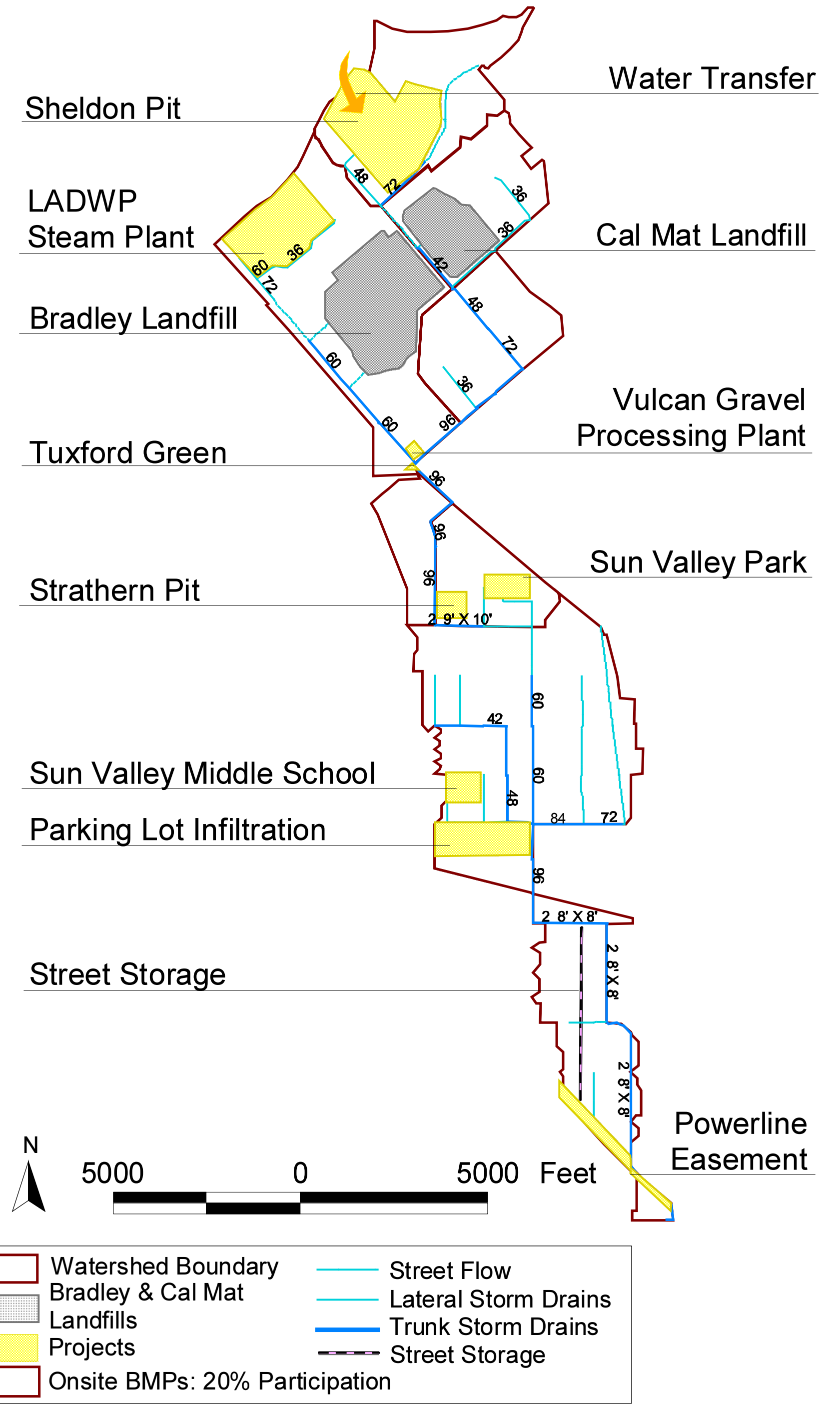


Figure 3-2
Example of Component Assembly into an Alternative (Alternative 2)



Many of the components are used in more than one alternative. **Table 3-1** shows the list of components included in each of the final four sample alternatives. The same component may have a different size or capacity in different alternatives. Different capacities are needed because components are assembled like puzzle pieces in order to meet the requirements of a particular alternative. The size or inclusion of one component in an alternative affects the size of the other components in that alternative.

Table 3-1
Components Included in Final Four Sample Alternatives

Component	Infiltration (Alternative 1)	Water Conservation (Alternative 2)	Stormwater Reuse (Alternative 3)	Urban Storm Protection (Alternative 4)
LADWP Steam Plant	Yes	Yes	Yes	Yes
Vulcan Gravel Processing Plant	Yes	Yes	Yes	Yes
Tuxford Green	Yes	Yes	Yes	Yes
Sun Valley Middle School	Yes	Yes	Yes	Yes
Sun Valley Park	Yes	Yes	Yes	Yes
Tree Planting and Mulching	Yes	Yes	Yes	Yes
Lateral Storm Drains	Yes	Yes	Yes	Yes
Trunk Storm Drains	Yes	Yes	Yes	Yes
Street Storage	Yes	Yes	Yes	Yes
Onsite BMPs	Yes	Yes	Yes	Yes
Water Quality BMPs	Yes	Yes	Yes	Yes
Powerline Easement	Yes	Yes	Yes	Yes
Strathern Pit	Yes	Yes	Yes	Yes
Stonehurst School	Yes	No	No	No
Stonehurst Park	Yes	No	No	No
Roscoe School	Yes	No	No	No
Park on Wentworth	Yes	No	No	No
Sheldon Pit	No	Yes	No	No
Cal Mat Pit	No	No	Yes	Yes
Parking Lot Infiltration	Yes	Yes	No	Yes

The combination of components that is eventually constructed may not be one of the four final sample alternatives. Component feasibility and component site availability may change over the 10-year implementation timeline. Therefore, project components may interchange between alternatives, creating a mix of components implemented, different than each of the final four sample alternatives.

The capacity of a component, such as a retention basin or a BMP, is sometimes described by a frequency storm, such as the 50-year storm. A frequency storm has a specific depth of rainfall for every location based on a probability analysis. This rainfall depth multiplied by the tributary area determines the volume of a component. According to LACDPW's Hydrology / Sedimentation Manual (1991), the County chose a rainfall recurrence interval of 50 years as the economic limit for designing its Comprehensive Plan facilities considering needs, financing, and efficiency. Many of the elements of the Sun Valley alternatives are based on a 50-year, 96-hour storm, known as the Capital Storm. However, as part of this feasibility evaluation, some of the project components are analyzed based on smaller storm sizes that occur more frequently. The storm sizes used in this evaluation include the 10-year and the 2-year frequency, 96-hour storms. Smaller storms are commonly used when implementing BMP devices such as residential cisterns and neighborhood sized retention ponds. These projects are generally smaller in size and capital cost.

The hydrologic modeling of the four alternatives provides the intake flow rate and storage volume information presented in **Table 3-2**.

Table 3-2
Capital Flood Volumes and Flow Rates of Project Components

	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
Description	**Storage Volume (acre-ft)**	**Peak Flow into Project (cfs)**	**Storage Volume (acre-ft)**	**Peak Flow into Project (cfs)**	**Storage Volume (acre-ft)**	**Peak Flow into Project (cfs)**	**Storage Volume (acre-ft)**	**Peak Flow into Project (cfs)**
Pilot or Phase 1 Project								
Cal Mat Pit					270	151	175	61
Vulcan Gravel Processing Plant	65	18	66	18	67	19	36	10
LADWP Steam Plant	234	417	234	417	234	417	139	47
Tuxford Green		1020		844		878		1336
Sun Valley Middle School	35	93	35	93	35	93	20	7
Sun Valley Park	49	22	48	21	48	21	35	12
Project Component								
Sheldon Pit			199	332				
Stonehurst School	7	2						
Stonehurst Park	16	34						
Roscoe School	5	2						
Park on Wentworth	8	2						
Strathern Pit	736	1151	569	984	499	982	363	145
Parking Lot Infiltration	129	36	52	14			80	22
Powerline Easement	455	938	170	54	381	942	350	141
Onsite BMPs								
Infiltration, Reuse, Street Storage	137	79	75	22	351	113	75	44
Watershed Outflow	21	44	426	978	8	42	598	1811

Note: Flows vary between alternatives due to implementation of different combinations of project components upstream.

Each component is described in detail below. The components are grouped in the following categories:

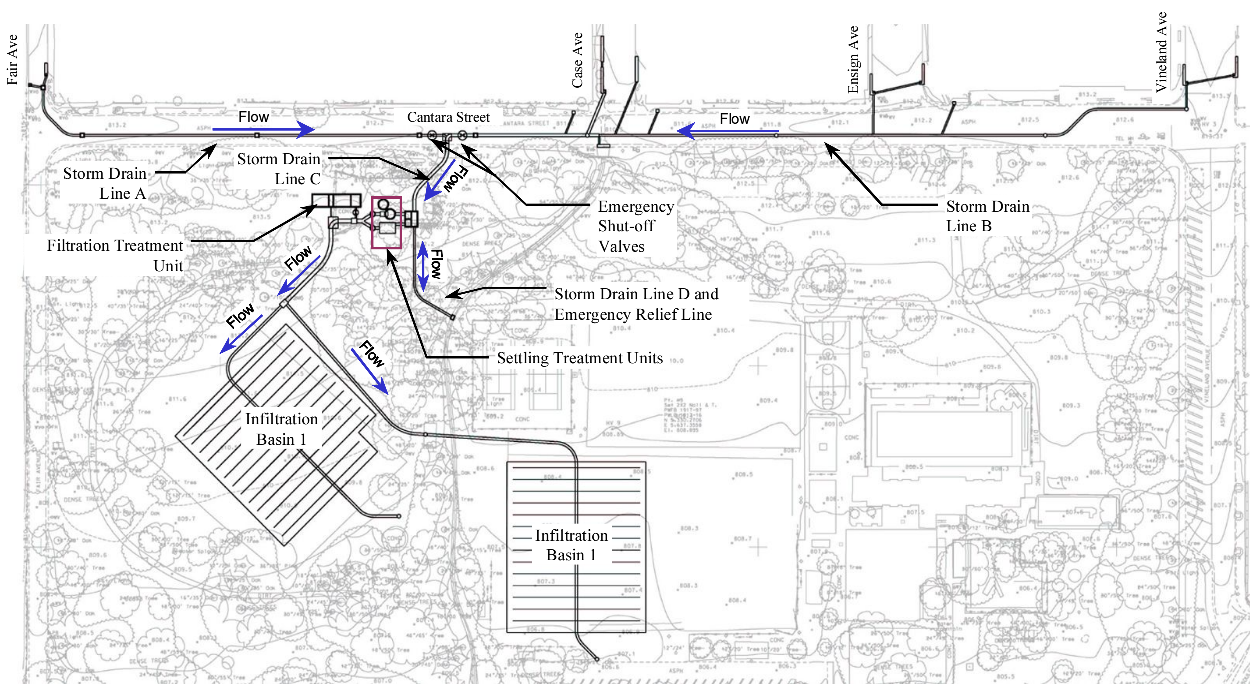
- Pilot project
- Phase 1 projects
- Project components
- Long term community involvement projects
- Water quality BMPs

SUN VALLEY PARK PILOT PROJECT

A detailed concept design of the Sun Valley Park Pilot Project was prepared in a Concept Report Technical Memoranda prepared by the LACDPW. The Sun Valley Park Pilot Project proposes to manage stormwater runoff and associated surface street flooding via infiltration. When implemented, the project is expected to remedy existing stormwater flooding issues in the vicinity of the park, provide for the beneficial use of stormwater via infiltration to the regional groundwater system, and ensure protection and/or improvement of regional groundwater resources. The project also includes habitat enhancements, additional recreational opportunities, and educational benefits.

The proposed project facilities would be designed to capture and infiltrate flows generated from up to a 50-year frequency design storm (approximately 33 cfs). The facilities collect and convey stormwater flows from the local drainage Subarea (approximately 25 acres of residential property and 20 acres of park) to infiltration basins located in Sun Valley Park. In a Capital Storm, the park will capture approximately 48 acre-ft of water. Prior to infiltration, the design flows are routed through settling treatment units that will remove suspended solids in the flow as well as oil, grease, and other floating debris. The first flush flow will also be routed through another treatment unit to remove heavy metals. All facilities are underground to minimize disturbance to existing recreational features of the park. **Figure 3-3**, provided by LACDPW, depicts the project design.

Figure 3-3
Sun Valley Park Pilot Project



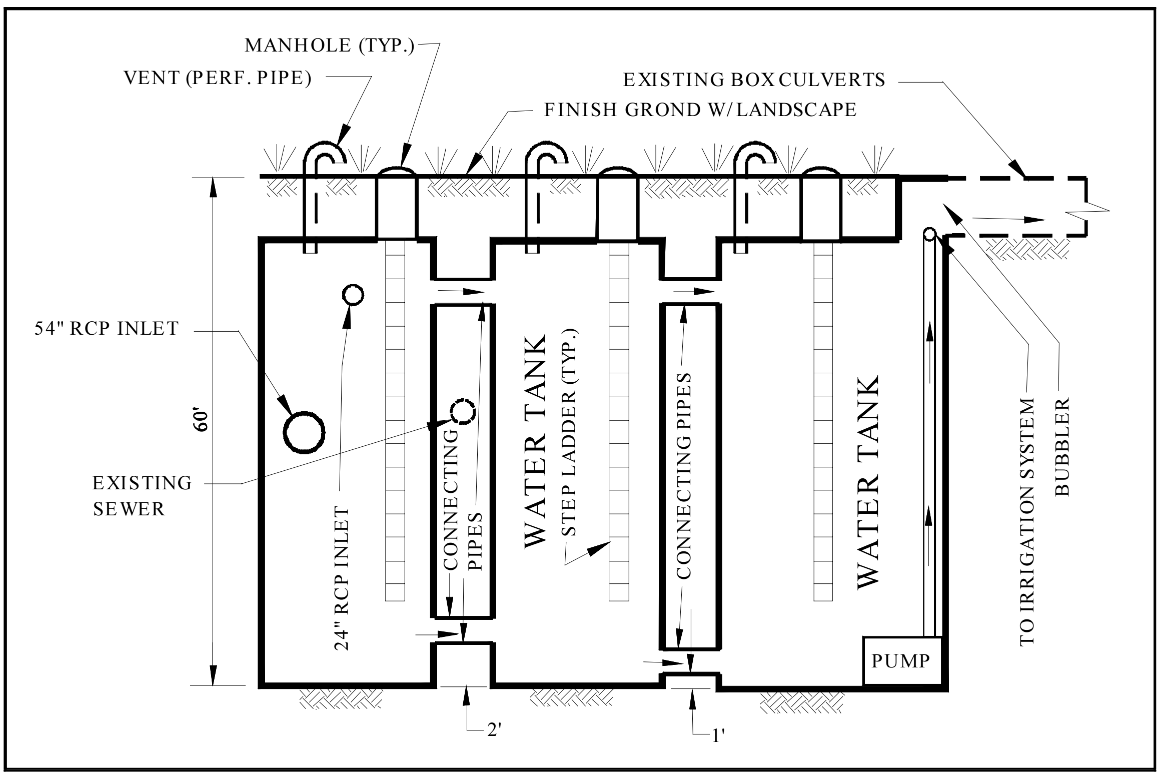
PHASE 1 PROJECT COMPONENTS

The Phase 1 project components are described below. Phase 1 components are expected to be constructed at the beginning of the WMP implementation. The location of each Phase 1 component is depicted in Figure 3-1.

Tuxford Green

The proposed Tuxford-Green project would decrease flooding at the Tuxford Street and San Fernando Road intersection. This project is particularly significant in that flooding at this intersection has been a chronic problem in the community for many years. The Phase 1 project would mitigate this flooding problem. The Phase 1 site would improve stormwater quality through the use of large-scale stormwater separation devices that remove trash, debris, oil and grease, and suspended pollutants. The project would also provide irrigation supply to proposed landscaping improvements at the intersection. The project is proposed in two phases. Phase 1 focuses on the flooding problem at the intersection itself. Phase 2 eliminates flooding upstream in San Fernando Road and Tuxford Street by installing collector drains in each street upstream of the intersection and includes improved conveyance under the intersection as well as an underground cistern. Table 3-2 shows the expected peak flow rate of stormwater to be conveyed through Tuxford Green for each alternative, assuming implementation of upstream project components. **Figure 3-4** shows a potential design of the underground cistern.

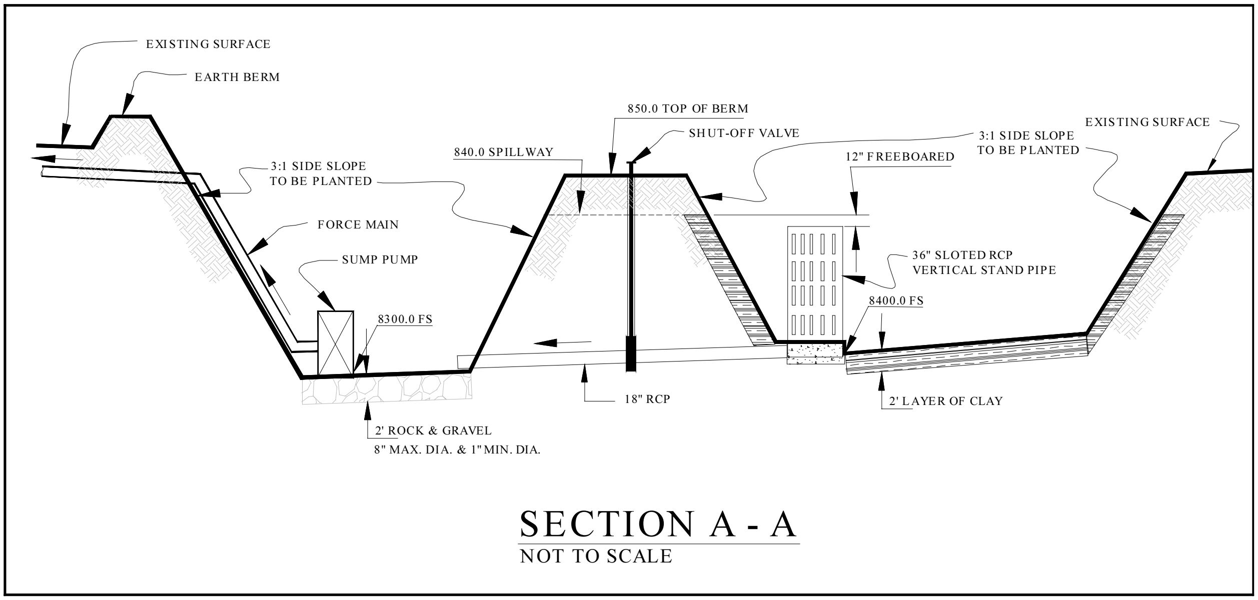
Figure 3-4
Tuxford Green – Underground Cisterns



Vulcan Gravel Processing Plant

The Vulcan Materials Company Gravel Processing Plant is located just north of the intersection of Tuxford Street and San Fernando Road. Flooding at this intersection has been a chronic problem in the community for many years. The proposed Phase 1 project retains and treats stormwater from the site in a retention basin. Water flows to an infiltration basin where treated stormwater can either percolate to the groundwater or be pumped to a storage tank for reuse (see **Figure 3-5**). Table 3-2 shows the expected volume of stormwater to be retained at the gravel plant for each alternative, as well as the intake flow rates. The Vulcan Gravel Processing Plant component is sized to capture the 50-year, 96-hour storm in Alternatives 1-3, and the 10-year, 96-hour storm in Alternative 4.

Figure 3-5
Vulcan Gravel Processing Plant – Cross-Section of Retention and Infiltration Basins



LADWP Steam Plant

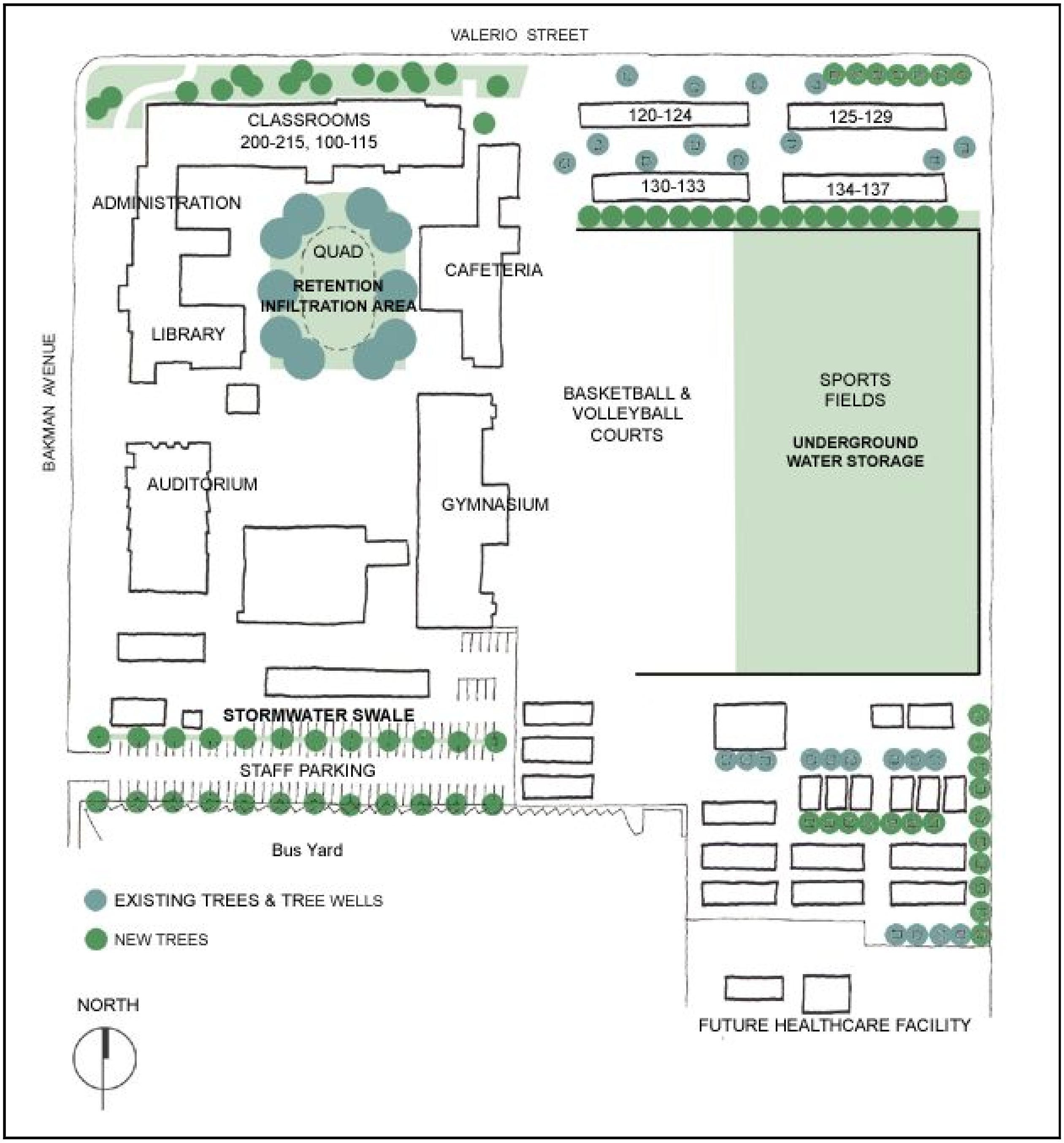
The LADWP Valley Generating Station (Steam Plant) and surrounding streets contribute significant runoff to San Fernando Road. The proposed solution creates retention and infiltration basins in underutilized areas of the Steam Plant in order to capture runoff from the Steam Plant itself and surrounding areas during rainfall events up to and including the 50-year storm. The Phase 1 project uses a number of BMPs to improve water quality for reuse and infiltration. The plan also includes landscaping concepts that increase wildlife habitat, and add recreation opportunities for employees and (see **Figure 3-6**). Table 3-2 shows the expected volume of stormwater to be retained at the Steam Plant for each alternative, as well as the intake flow rates. Alternatives 1 – 3 are sized to capture the 50-year, 96-hour storm, while Alternative 4 is sized for the 10-year, 96-hour storm.

Figure 3-6
Steam Plant Infiltration Basin for Plant Runoff

Sun Valley Middle School

The sports area of Sun Valley Middle School is proposed as a detention and infiltration area to manage runoff from the school grounds and nearby upstream neighborhood to alleviate flooding problems. The proposed recommendations include excavation and depression of the sports area (grass playing field and paved basketball/volleyball courts) to create a drainage basin, treatment of stormwater pollutants utilizing stormwater treatment devices and sedimentation tanks, storage of runoff in underground tanks for irrigation uses, and infiltration of excess runoff. Additional flood control, stormwater pollution control, and infiltration would be provided in the school parking lot with landscaped grassy swales and dry wells. The school quad would depressed and dry wells added for retention and infiltration. Trees would be strategically planted to lower energy cost and reduce air pollution (see **Figure 3-7**). Project benefits include flood control, stormwater pollution control, groundwater augmentation, decreased energy and water costs, additional landscaping, and aesthetic improvements to the school. Table 3-2 shows the expected volume of stormwater to be retained at Sun Valley Middle School for each alternative. Alternatives 1 – 3 are sized to capture the 50-year, 96-hour storm, while Alternative 4 is sized for the 10-year, 96-hour storm.

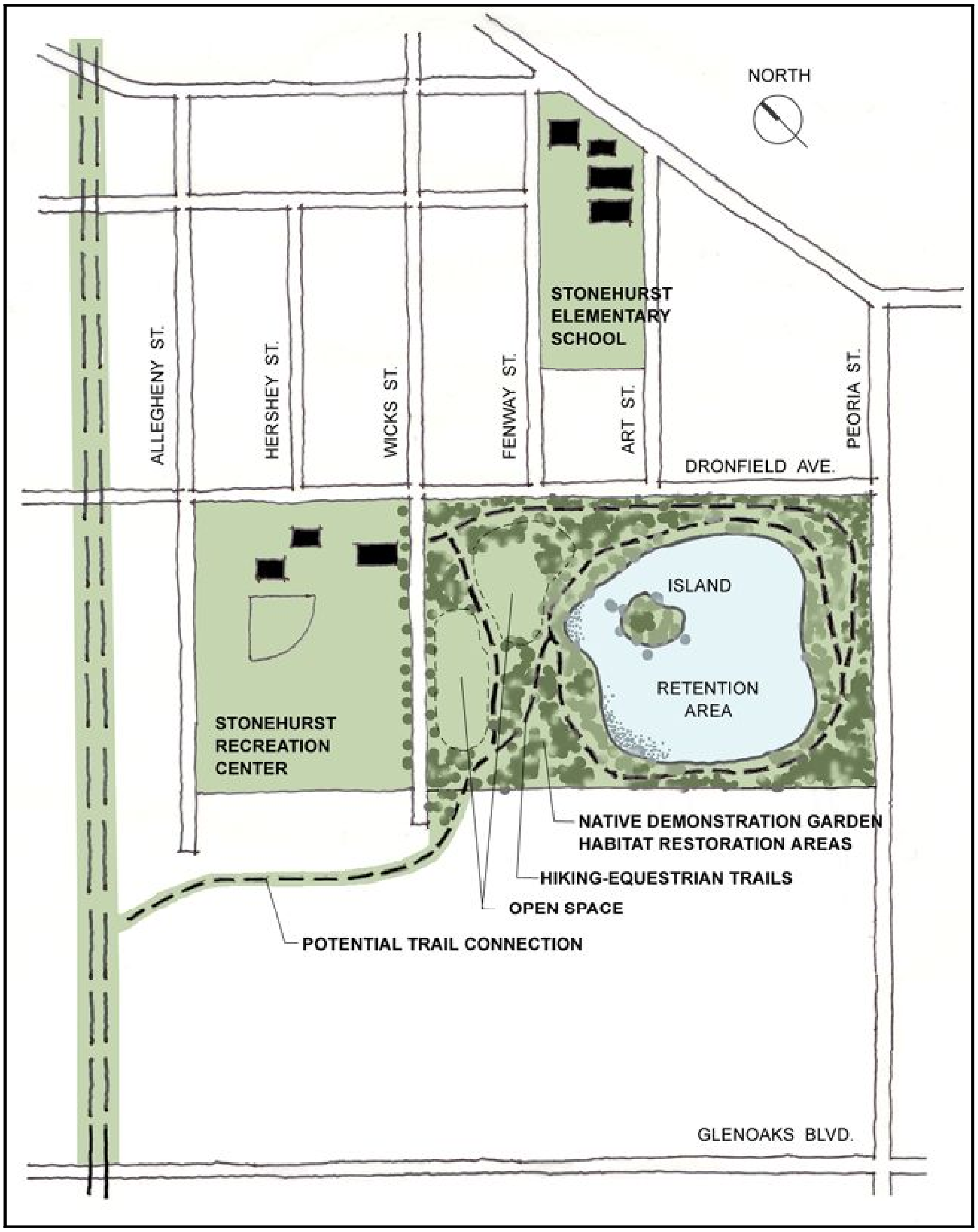
Figure 3-7
Sun Valley Middle School



Cal Mat Pit

The landfill operations at Cal Mat Pit currently include a 30-acre site for stormwater retention. The proposed solution utilizes this area to capture the runoff from 200 acres of surrounding residential area. The solution is proposed in a phased approach that would provide flood control and other benefits at the pit's current depth and continue those benefits as the pit is filled to street level. Eventually, access from the Stonehurst Recreation Center would be provided for recreational use. This phased approach is designed to allow filling of the pit with inert debris similar to the existing facility to offset the cost of the project. Project benefits include significant flood protection, water reuse, infiltration, habitat creation, and recreational uses linked to the existing green space at Stonehurst Recreation Center. Table 3-2 shows the expected volume of stormwater to be retained at Cal Mat Pit for Alternatives 3 (designed for the Capital Flood) and 4 (designed for the 10-year, 96-hour storm). **Figure 3-8** is a landscape architect's rendering of the completed Cal Mat Pit Phase 1 project.

Figure 3-8
Proposed Cal Mat Pit Project



PHASE 2 PROJECT COMPONENTS

The Phase 2 project components are generally expected to be constructed after the Phase 1 components. There are 11 project components in this category. The location of each Phase 2 component is depicted in Figure 3-1.

Sheldon Pit

Site Description

Sheldon Pit is an exhausted gravel pit owned by Vulcan Materials Company near the north end of the Sun Valley Watershed and south of the Hansen Dam Golf Course. The surface area is approximately 138 acres, and the maximum depth is about 160 feet. According to conversations with Vulcan plant manager Gary Goelner, at this depth, groundwater is exposed most of the time in some portions of the pit (Goelner 2002, personal conversation).

The Boulevard Pit is proposed as an alternate site for this project component. The design of the component would have to be altered to meet the configuration of the Boulevard Pit.

Description of Project Elements and Operation

The proposed Sheldon Pit component covers 102 acres of the current gravel pit area. In recognition of the importance of establishing a vadose zone between the highest historical groundwater elevation and any proposed infiltration facilities, approximately 25-feet of clean fill is proposed on top of any areas of exposed groundwater. The component includes the following land uses:

- Stormwater retention
- Stormwater treatment wetland
- Transfer and retention of water in excess of spreading capabilities from Tujunga Wash
- Infiltration of treated stormwater and excess Tujunga Wash water
- Berming and access roads
- Park space

The remaining area would allow Vulcan to continue their operations of groundwater pumping and wash water and sediment disposal.

The layout shown in **Figure 3-9** is one possible layout for the hydrologic elements. This layout is intended to take advantage of the current grading of the site. It uses gravity flow where possible, and uses existing excavation areas for retention basins. The layout also facilitates public access from the residential area on the east side of Wentworth Street. The project site will remain below street level, but will be filled to a level so that groundwater is only exposed in the area utilized by Vulcan. The east side of the site, along Wentworth Street, is proposed as a park with some areas of gradual slope toward the stormwater retention pond and the wetland area. The characteristics of the hydrologic elements of the Sheldon Pit project are summarized in **Table 3-3**.

Figure 3-9
Sheldon Pit Schematic

Table 3-3
Sheldon Pit Sizing Summary

Sheldon Pit Component	Area (acres)	Volume (acre-ft)	Average Depth (feet)
Stormwater Retention Basin	8	286	29
Transfer Retention Basin	13	736	43
Wetland	30	n/a	n/a
Infiltration Basin	26	n/a	n/a
Total	**77**	n/a	n/a

Note: 30 acres of wetland includes berms and peripheral areas.

Despite its location, upstream in the watershed, the stormwater retention area would still reduce flows to the critical San Fernando/Tuxford intersection. In the Capital Storm, 199 acre-ft of runoff are conveyed to the retention basin. The retention basin is sized with an additional 25 percent volume of freeboard. The retention basin has an average depth of 29 feet with a maximum depth of 47 feet. It will contain a permanent pool providing recirculation water for the wetland. The basin would cover approximately 8 acres and would be terraced to provide recreational use of the dry areas during annual average conditions. Catch basins would prevent local flooding and divert flows from the surrounding development into the retention basin. A 2,000-foot collector pipe would carry flows from the intersection of Glenoaks Boulevard and Sheldon Street via gravity to the stormwater retention basin. A 400-foot collector pipe would carry flows from Wentworth Street directly west to the retention basin.

Stormwater captured in the stormwater retention basin would be pumped to a free water surface wetland to be designed according to USEPA's guidelines for stormwater treatment wetlands (USEPA, 1999). The required area for the wetland treatment system is based on guideline depths for different wetland segments. Specifically, guideline depths are suggested of less than 0.5 feet for shallow marsh, 0.5 to 1 foot for wetland sections of medium depth, and 2 to 3 feet of depth for deep wetland sections (USEPA, 1999). Most of the wetland area is proposed as shallow ponds of less than one-foot depth. The wetland is sized to treat the required treatment volume in a period of two to three months (see Water Quality BMPs discussion). Therefore, with such shallow ponds and a large volume of water to treat, the wetland would require approximately 30 acres, including 6 acres for dikes, buffer and peripheral structures. The large wetland area is an opportunity to involve outdoor education and recreation activities.

The wetland system would be operated in two modes: wetland recirculation and infiltration. The wetland recirculation mode is the expected dry weather operation mode. It would occur when the amount of water stored in the retention basin is dwindling. This mode is a safety mode that would maintain water levels in the wetland. Treated water exiting the wetland would be pumped back to the wetland inlet for recirculation. No water flows to the infiltration basin during this mode. In water infiltration mode, treated water exiting the wetland would flow by gravity to the infiltration basin.

A diversion structure is proposed to convey excess stormwater from Tujunga Wash into a retention basin with a volume of 500 acre-ft. This water would be infiltrated in the 26-acre recharge basin. Flow from the Tujunga Wash does not require treatment in the wetland since it is runoff from a rural area and is assumed to be of high quality. Reduction of Capital Flood flow and volume in Tujunga Wash would allow an equal flow and volume to be released from Sun Valley with no detrimental net impact on flood hydrology in the Los Angeles River. Daily flows from a USGS steam flow gage (number 11097000) in Tujunga Wash are analyzed to determine that an average of 6,000 acre-ft of water per year could be conserved through the diversion of excess flows.

Strathern Pit

Site Description

Strathern Pit is a gravel pit currently being used as a landfill by LA Byproducts. The 30-acre site is located on the northeast corner of Strathern Street and Tujunga Avenue. The pit currently has a maximum depth of about 80 feet and a storage volume of about 2,000 acre-ft. This pit/landfill facility has the potential to be converted to a multi-purpose park that includes a retention basin and a constructed wetland.

Description of Project Elements and Operation

This project would consist of acquiring the Strathern Pit site and converting the existing landfill area to an area dedicated to stormwater retention, treatment, and reuse. This project component is sized differently for each alternative based on the requirements of each alternative.

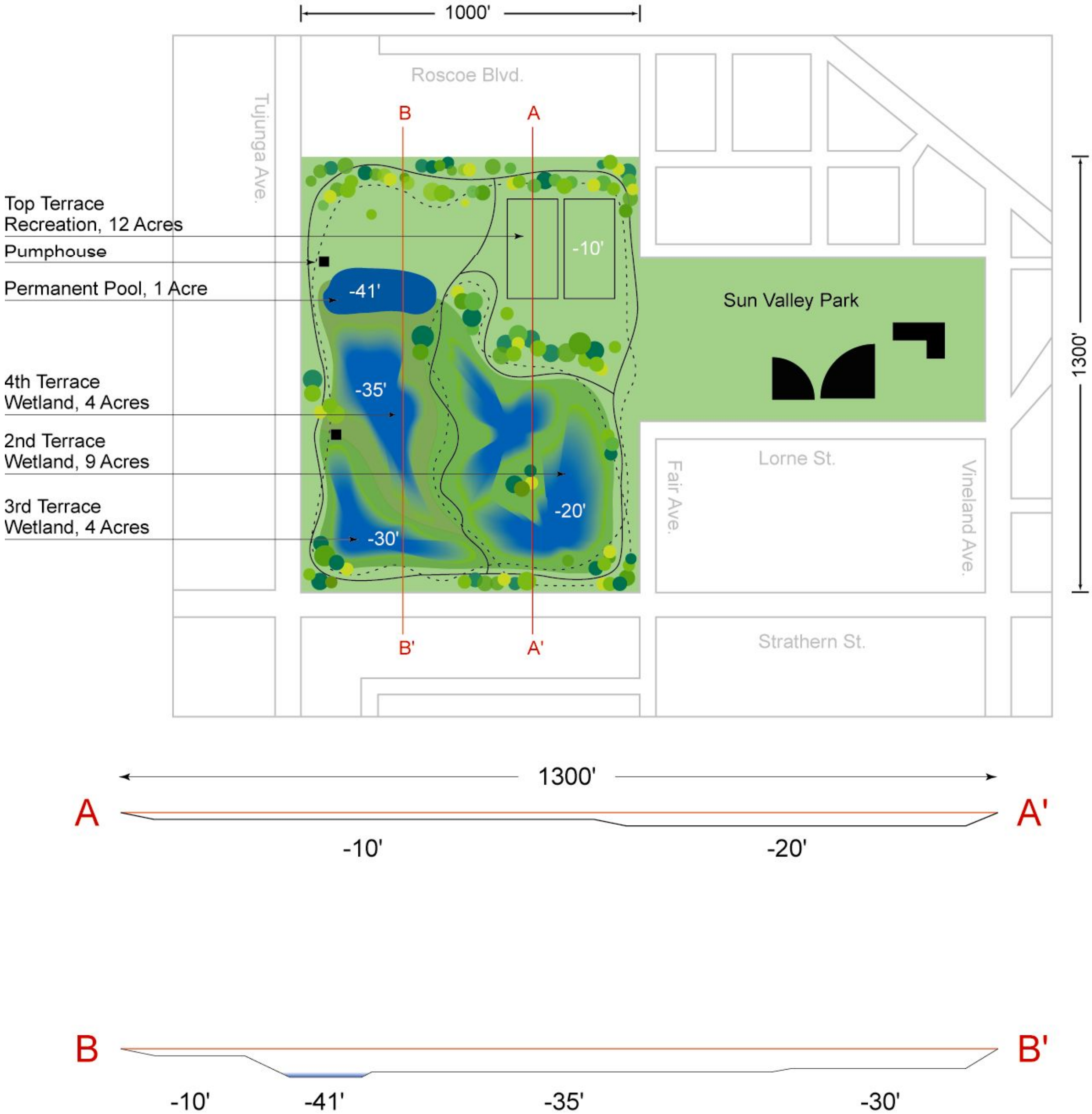
Table 3-4 depicts the required retention basin sizes of each alternative. The sizes differ due to the variation in combinations of upstream project components and the size of the design storm. Specifically, Alternatives 1 – 3 are designed to capture the Capital Flood volume, while Alternative 4 would capture the 10-year, 96-hour storm event. **Figure 3-10** depicts a conceptual design of the project. Under annual average conditions, there would be a permanent pool of water in a relatively deep section of the project area. The rest of the site would include terraces of different depths so that dry land would be available for other uses. Terraces with low elevations would be populated with flora requiring wet conditions, and higher terraces would be planted with vegetation for drier conditions. The top terraces would be dry except in very large rain events and could be used for recreation and wildlife habitat. After 10 to 50-year frequency storms, most of the site would be temporarily under water. The numbers on Figure 3-10 depict the proposed depth below street level of the different areas of the park. Sections A-A' and B-B' are drawn to scale to show that the excavated areas of the park can be gradually sloped to for a natural terrain look.

Table 3-4
Strathern Pit Sizing Options

Alternative	Capital Flood Inflow Volume	Required Retention Volume [1]	Maximum depth below street	Wetland Area
1	736 acre-ft	916 acre-ft	51 feet	17 acres
2	569 acre-ft	706 acre-ft	41 feet	13 acres
3	499 acre-ft	633 acre-ft	40 feet	12 acres
4	363 acre-ft	470 acre-ft	42 feet	11 acres

1. Includes 25% freeboard

Figure 3-10
Concept Design of Strathern Multi-use Park



Note: sizes depicted in Figure 3-10 are for Alternative 2. Terrance sizes are larger than the total wetland area due to peripherals such as dikes and buffers.

Stormwater captured in the retention basin would be circulated through a free water surface wetland to be designed according to USEPA's guidelines for stormwater treatment wetlands. The Strathern Pit wetland concept is similar to the wetland proposed in Sheldon Pit. The wetland is sized to treat the required treatment volume in a period of two to three months (see Water Quality BMPs discussion). Therefore, with such shallow ponds and a large volume of water to treat, the wetland would take up a sizeable area on the site. Table 3-4 lists the acreage needed for the wetland in each alternative. The wetland requires a constant flow of water to keep vegetation alive. A recirculation system with a pump is proposed to transport water from the deepest pit, where there would be water year-round, to the higher terraces requiring irrigation.

The remaining open space on the 30-acre site can be used for recreational and habitat purposes. The areas and land uses of each terrace are shown in **Table 3-5**. The area of each terrace is based on the required stormwater retention and wetland size to retain and treat stormwater from tributary areas of different sizes.

Table 3-5
Strathern Pit Terrace Summary

Terrace	Land Use	Area (acres)			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Top Terrace	Recreation	6	12	13	14
2nd Terrace	Wetland	11	9	8	7
3rd Terrace	Wetland	6	4	4	4
4th Terrace	Wetland	6	4	4	4
5th Terrace	Permanent Pool	1	1	1	1
Total		30	30	30	30

Note: Terrance sizes shown are larger than the total wetland area due to peripherals such as dikes and buffers.

After treatment in the wetland, treated stormwater would be pumped offsite for reuse. In Alternatives 1, 2, and 4, water would be reused in the Tujunga Spreading Grounds. In Alternative 3, the water would be reused at the Vulcan Gravel Processing Plant.

An extensive non-potable water distribution system is presented in Technical Memorandum 4. An inventory of potential non-potable water users throughout Sun Valley is compiled and their average annual demands are estimated based on typical landscape requirements for irrigation and discussions with owners for industrial users. Vulcan's water demand is approximately 3,500 acre-ft per year (acre-ft/yr) and accounts for more than 80 percent of the potential non-potable water use in Sun Valley. Vulcan uses the water for irrigation, dust control, and gravel washing. As Vulcan's water demand is greater than the average annual capture volume of stormwater in the Strathern Pit retention basin, all runoff captured can be used at Vulcan. In addition, Vulcan is the closest potential non-potable water user to Strathern Pit with a demand greater than 50 acre-ft/yr. Given this information, the improved non-potable water distribution system, selected for use in Alternative 3, delivers water from the retention basin at Strathern Pit to the Vulcan gravel processing plant only.

The Strathern Pit system would be operated in two modes: wetland recirculation and water reuse. The wetland recirculation mode is the expected dry weather operation mode. It would occur when the amount of water stored in the retention basin is dwindling. This mode is a safety mode that would maintain water levels in the wetland. Treated water exiting the wetland would be pumped back to the wetland inlet for recirculation. Water quality testing is recommended during recirculation to test for a buildup of salts. No water would be pumped to the spreading grounds or the gravel plant during this mode. In water reuse mode, treated water exiting the wetland would be pumped to one of the reuse locations described above.

Powerline Easement

Site Description

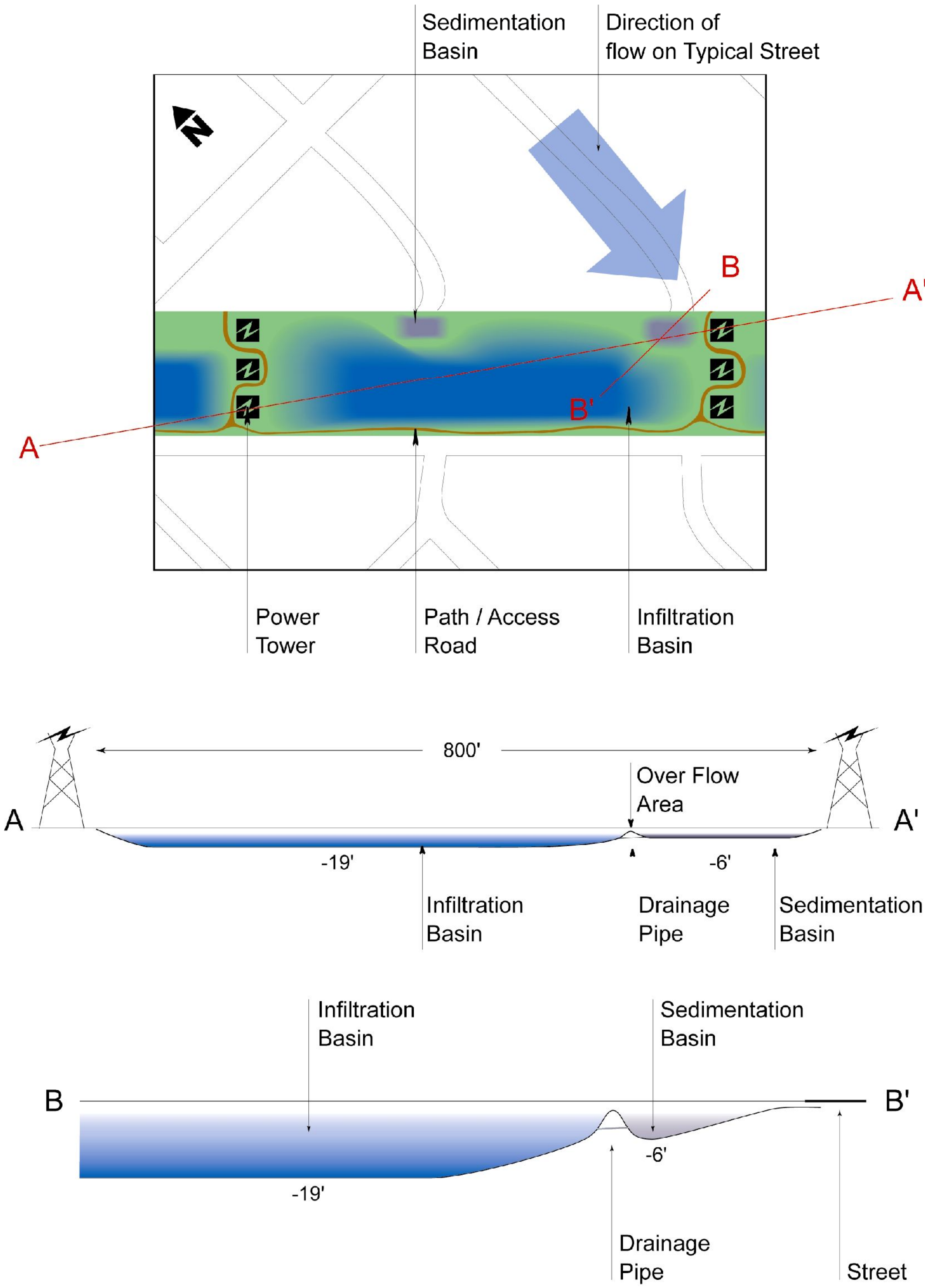
A LADWP powerline easement passes through the downstream end of the Sun Valley Watershed. The easement within the Sun Valley Watershed boundary is approximately 300 feet wide and 0.7 miles long. This easement extends beyond the watershed boundary into other portions of Los Angeles to the west and Burbank to the east. It provides an opportunity to capture stormwater from areas downstream of Strathern Pit where open spaces are otherwise not available.

Description of Project Elements and Operation

A series of sedimentation and infiltration basins would be constructed in the powerline easement to capture, treat, and infiltrate runoff. The distance between the powerline towers is approximately 800 feet, which provides space to construct sedimentation infiltration basins without hindering the existing towers or maintenance access. The natural direction of flow of stormwater in the streets is to the south. Where the street ends at or crosses the powerline easement, the water would flow in a swale, culvert, or pipe to the sedimentation basin. These sedimentation basins would provide pretreatment by settling out debris such as trash, suspended solids, and pollutants associated with solids such as heavy metals, prior to infiltration. The first flush of each storm would be captured in the sedimentation basins where debris can settle. After sedimentation, runoff water would spill over from the sedimentation basins to the infiltration basins, which are proposed as open depressed areas within the powerline easement. **Figure 3-11** depicts the conceptual design of the powerline easement based on Alternative 2 sizes. The blue arrow in Figure 3-11 shows the direction of water flow from north to south down the street. **Figure 3-12** depicts a possible configuration of the powerline easement in Sun Valley based on Alternative 2 sizes.

Swales or catch basins and pipes could direct runoff from the streets to the sedimentation basins. Required facility sizes for each alternative are shown in **Table 3-6**. The sedimentation basins are relatively small, approximately 1,500 square feet in area and six (6) feet in depth. The infiltration basins would take up most of the free space between the towers and surrounding the access road. The infiltration basins would have a maximum depth of 19 feet with side slopes of 4:1 (as shown in Figure 3-11).

Figure 3-11
Conceptual Design of the Powerline Easement



Note: Numbers on Figure 3-11 indicate depths

Figure 3-12
Possible Configuration of Powerline Easement

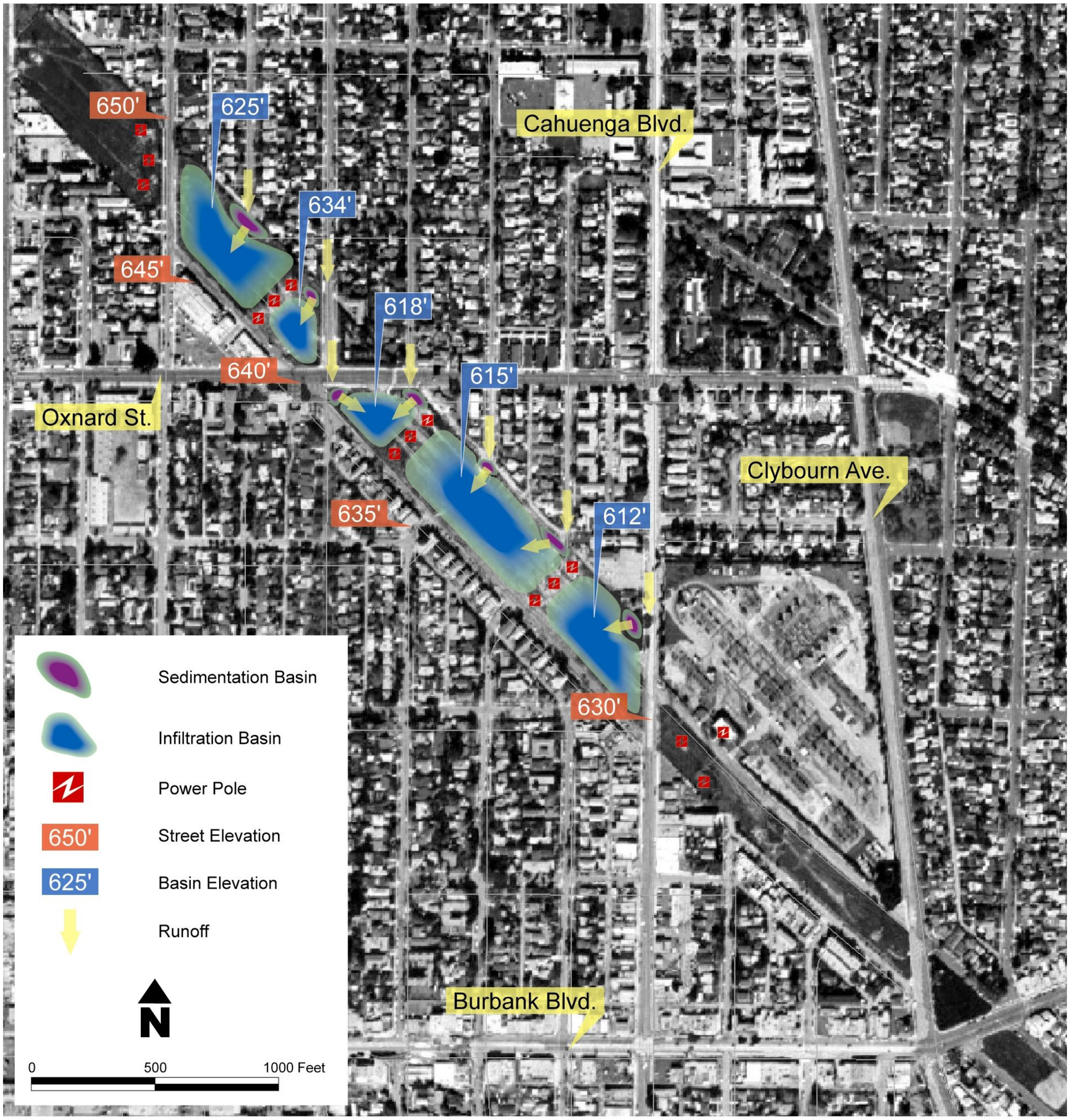


Table 3-6
Powerline Easement Facility Sizes per Alternative

Alternative	Capital Flood Runoff Volume	Sedimentation Facility Size	Infiltration Facility Size	Total Length (miles)
1	455 acre-ft	4 basins, 39’ x 39’, average depth 6’	16 acres, 7 powerline segments	1.1
2	170 acre-ft	2 basins, 34’ x 34’, average depth 6’	6 acres, 3 powerline segments	0.5
3	381 acre-ft	4 basins, 37’ x 37’, average depth 6’	14 acres, 6 powerline segments	0.9
4	350 acre-ft	4 basins, 40’ x 40’, average depth 6’	12 acres, 5 powerline segments	0.8

Note: Volumes captured vary due to different combinations of upstream project components and variation in design storm.

Street Storage

Site Description

Street storage is proposed throughout the southern portion of Sun Valley to augment the volume of runoff captured in this densely urbanized area where space for components is limited. Street storage is used in all four alternatives to capture and infiltrate varying quantities of water.

Description of Project Elements and Operation

Street storage consists of large, underground storage tanks and infiltration galleries. Each unit of street storage is 6 feet deep with a variable length and width. The actual width of street storage at a particular location should be based on a width that does not require extensive relocation of utilities. Underground storage could be provided using a number of methods provided that they are able to support street loads, including concrete vaults, buried corrugated metal pipe (CMP) or high density polyethylene (HDPE) systems, or fields of pre-fabricated cisterns. **Figure 3-13** depicts the concept design of street storage. Early applications of this BMP could include pilot testing of different approaches. Cost estimates at this planning level have been based on construction of concrete vaults, which would be the most expensive but the most reliable alternative. A stormwater separator (described under Water Quality BMPs) would be placed at each inlet to provide treatment before the water enters the infiltration gallery. The runoff reduction capacity during the Capital Flood is the storage volume available plus the volume of water infiltrated over the four-day storm (limited to the amount of rainfall during each day). For each 100 lineal feet of street storage, the runoff reduction is equal to approximately 1 acre-ft over four days.

Figure 3-13
Concept of Street Storage Cross Section

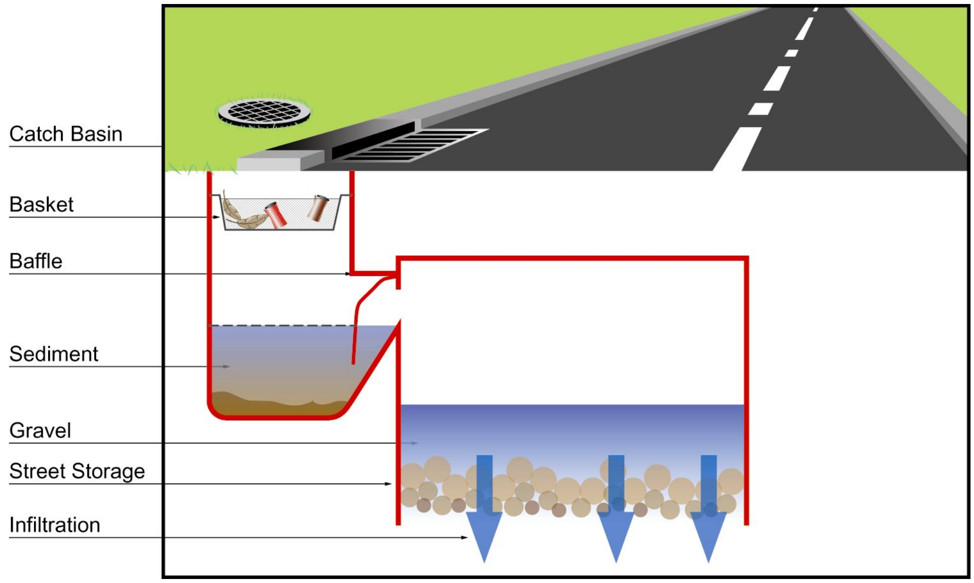


Table 3-7 shows the volumes captured by the street storage in each alternative as well as the length of street required.

Table 3-7
Street Storage Summary

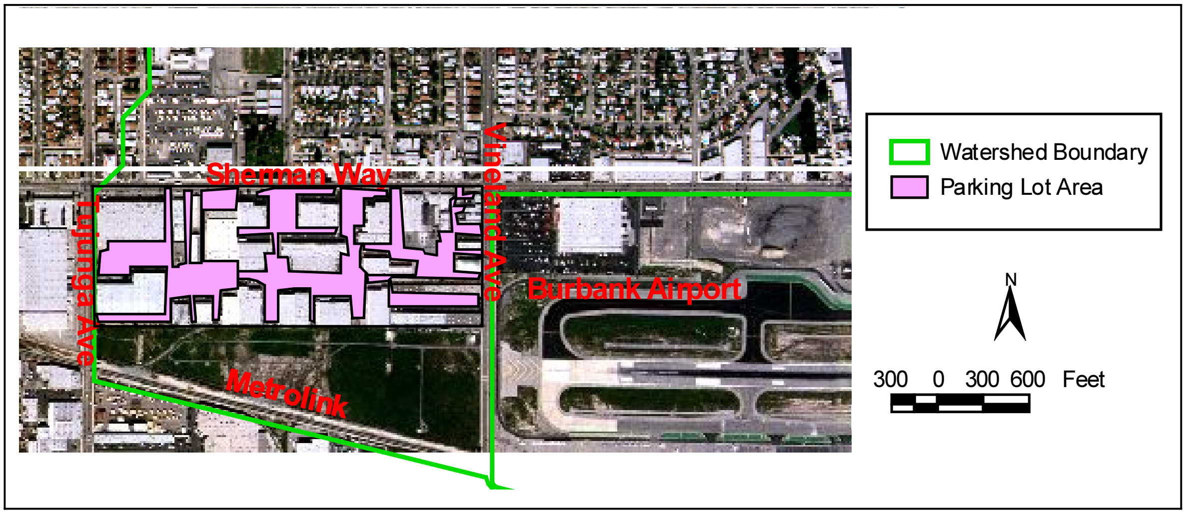
Alternative	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Capital Flood Runoff Volume	62 acre-ft	37 acre-ft	276 acre-ft	38 acre-ft
Total Length of Street Storage	1.2 Miles	0.7 Miles	5.5 Miles	0.7 Miles

Parking Lot Infiltration

Site Description

The proposed project site for parking lot infiltration is a commercial area of Subarea 7 and is bounded on the north by Sherman Way and on the east by Vineland Avenue. The site consists of a number of buildings and warehouses surrounded by paved parking areas and access roads. **Figure 3-14** shows the site location. The total parking lot area of these buildings is estimated to be 18 acres based on aerial photography.

Figure 3-14
Parking Lot Infiltration Location



Description of Project Elements and Operation

The project would involve installing subsurface infiltration devices beneath the parking lots to infiltrate runoff from the parking lots and buildings as well as adjacent upstream tributary areas. A collector main and distribution pipes would convey stormwater from the tributary area to infiltration locations. The stormwater would flow through stormwater separation devices for removal of sediments and debris prior to infiltration. **Figure 3-15** depicts the type of infiltration devices that could be used for parking lot infiltration. The tributary areas, volume of water to be infiltrated, and number of infiltration sections needed vary by alternative due to different combinations of upstream project components and variations in design storm. **Table 3-8** provides a summary of this information for each alternative.

Figure 3-15
Subsurface Infiltration Devices

Table 3-8
Sizing of Parking Lot Infiltration System

Alternative	Tributary Area (acres)	Number of Infiltration Sections	Area of underground Infiltrators (acres)	Infiltrator Volume (cubic feet)	50-year storm volume (acre-ft)
1	149	70,000	28	1,610,000	129
2	68	28,000	12	644,000	52
4	137	42,000	17	966,000	80

Note: Each infiltration section has an assumed volume of 23 cubic feet.

Park on Wentworth

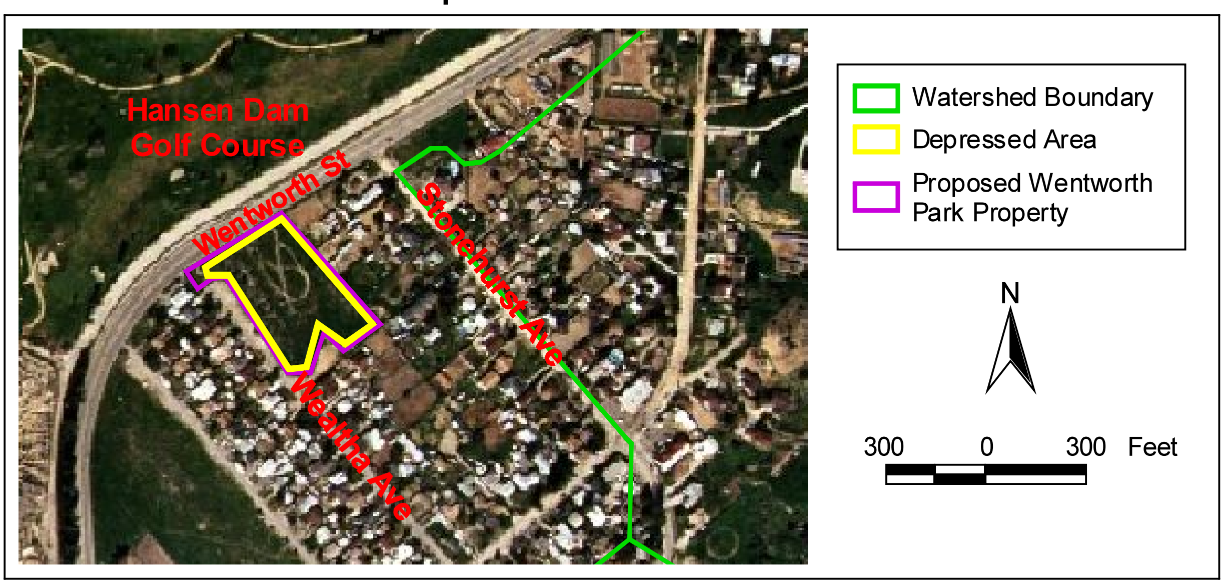
Site Description

The proposed project site is currently a vacant lot on the south side of Wentworth Street in the northern part of the watershed. The site is approximately 3 acres. This component is only proposed in Alternative 1.

Description of Project Elements and Operation

Approximately 80 percent of the project area would be depressed by an average of 2 feet for a storage capacity of 4.6 acre-ft (see **Figure 3-16**). The park would capture runoff from a tributary area of 14 acres. The tributary area is mainly open space with expected high quality runoff. The depressed area would be completely flooded in the 50-year storm event. The park is expected to quickly infiltrate and be dry within two days of average storm events. Catch basins would capture stormwater and a pipeline would lead to a stormwater separation device to remove trash and suspended material. The stormwater would then flow into the depressed area where it would be allowed to infiltrate. The park is expected to be dry most of the time.

Figure 3-16
Proposed Park on Wentworth



Stonehurst Park

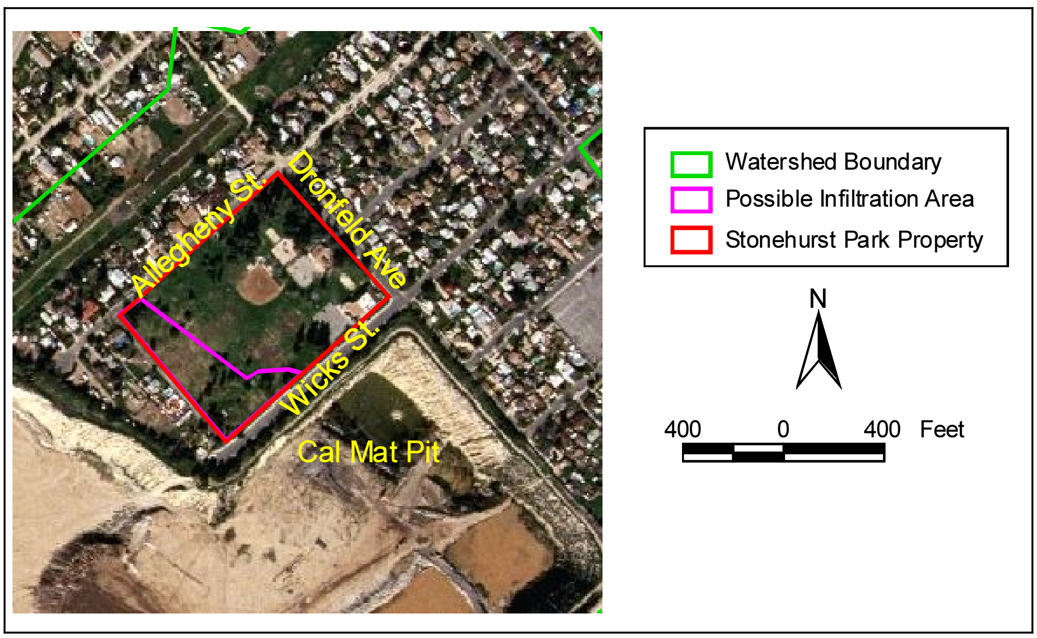
Site Description

The proposed project site is a park located in Subarea 2. It is situated south of Allegheny Street and Dronfield Avenue and north of the Cal Mat Pit. The site is approximately 13 acres. This component is only proposed in Alternative 1 (Infiltration).

Description of Project Elements and Operation

Approximately 20 percent of the 13-acre site would be depressed by an average of 2 feet for a storage capacity of 4.3 acre-ft (see **Figure 3-17**). The park would capture runoff from a tributary area of 49 acres. The depressed area would be completely full of water in the 50-year storm event. The park is expected to quickly infiltrate and be dry within two days of any storm event. The tributary area is mainly open space and residential with expected high quality runoff. Catch basins would capture stormwater and a pipeline would lead to a stormwater separation device to remove trash and suspended material. The stormwater would then flow into the depressed area of the park where it would be allowed to infiltrate. The park is expected to be dry most of the time.

Figure 3-17
Stonehurst Park Proposed Infiltration Area



Stonehurst School

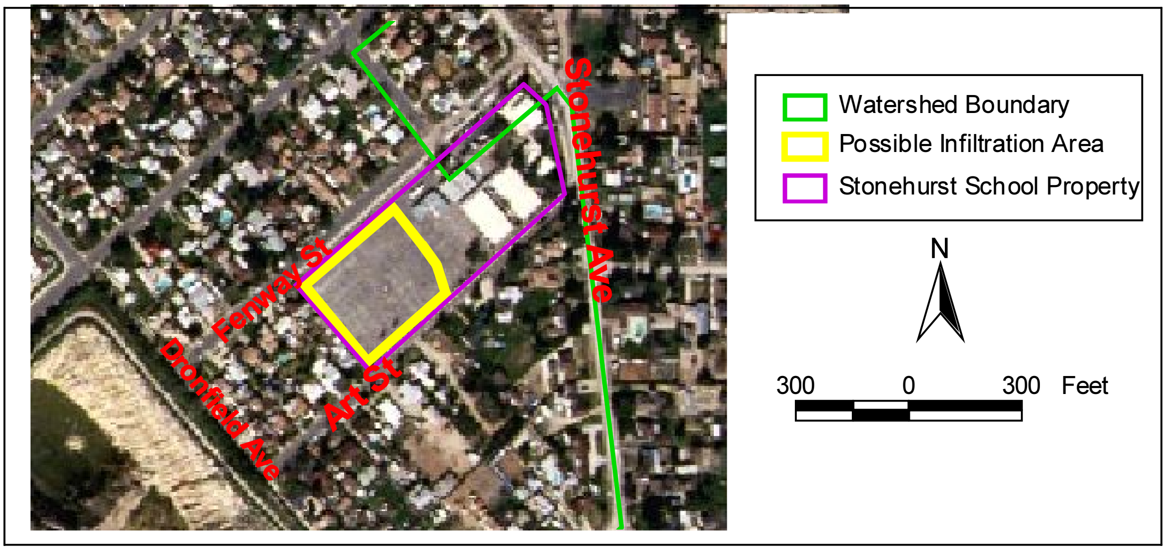
Site Description

The Stonehurst School is located in Subarea 2. The open area of the site is approximately 3 acres and is situated at the corner of Art Street and Stonehurst Avenue. This component is only proposed in Alternative 1 (Infiltration).

Description of Project Elements and Operation

It is estimated that there are nearly 3 acres of open space, including paved and grassy areas, at the school. Approximately 60 percent of the open area would be excavated to place roughly 4,200 infiltration sections (96,600 cubic feet capacity) (see **Figure 3-18**). The open areas would then be repaved or landscaped as desired by the school. The infiltration devices would infiltrate the 50-year storm volume from a tributary area of 7 acres for a total of 7 acre-ft.

Figure 3-18
Stonehurst School Proposed Infiltration Area



The infiltration devices are not expected to interfere with usage of the school's open spaces. Figure 3-15 (in Parking Lot Infiltration description) shows the typical operation and installation of such infiltration devices. The project may be an opportunity for the school to make some beneficial configuration and landscaping changes.

The tributary area is primarily open space and residential; therefore, high quality runoff is expected. Catch basins would capture stormwater and a pipeline would lead to a stormwater separation device to remove trash and suspended material. The stormwater would then flow to the infiltrators below the surface.

Roscoe School

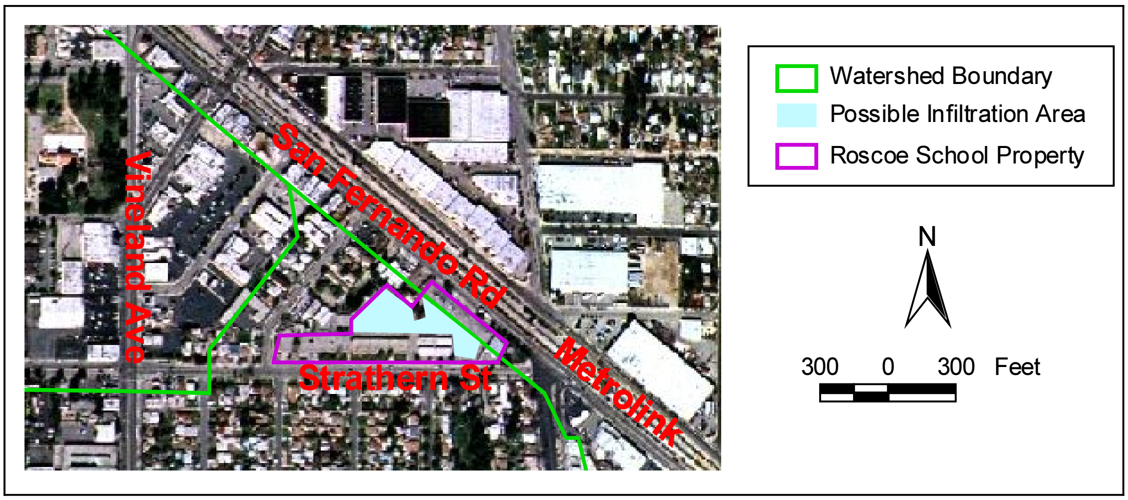
Site Description

The open area at Roscoe School is a 2.5-acre site located in Subarea 7. It is situated at the corner of San Fernando Road and Strathern Street. This component is only proposed in Alternative 1 (Maximize Infiltration).

Description of Project Elements and Operation

It is estimated that there are nearly 2.5 acres of open space, including paved and grassy areas, at the school. It is estimated that approximately 60 percent of the open area can be excavated to place roughly 3,800 infiltration sections (87,400 cubic feet capacity) (see **Figure 3-19**). The open areas would then be repaved or landscaped as desired by the school. The infiltration sections would infiltrate the 50-year storm volume from a tributary area of 8 acres for a total of 5 acre-ft. The infiltration sections are not expected to interfere with usage of the school's open spaces. The project may be an opportunity for the school to make some beneficial configuration and landscaping changes.

Figure 3-19
Roscoe School Proposed Infiltration Location



The tributary area is mainly residential with expected high quality runoff. Catch basins would capture stormwater and a pipeline would lead to a stormwater separation device to remove trash and suspended material. The stormwater would then flow to the infiltrators below the surface.

Trunk Storm Drains

Site Description

A trunk storm drain is needed in the Sun Valley Watershed to convey storm flow from the streets to the project components. The location of the pipelines would be similar to LACDPW's proposed Project 9250, but the pipe sizes are generally smaller. The alignment of the trunk line, the laterals, and major street flow is shown above in Figure 3-2 for the Alternative 2. The other alternatives are depicted in **Appendix B**. The alignment for the pipelines and street flow is the same for Alternatives 1-3, although the pipe sizes and exact segments of street flow vary among the alternatives.

Description of Project Elements and Operation

The trunk storm drain would provide a 10-year frequency storm protection by collecting flows from the watershed and delivering them to either a regional storm retention project or to the watershed outlet for conveyance to the Los Angeles River. Flows in excess of the 10-year storm would be carried in the streets. With this project, sump areas would be protected from a 50-year storm by drains sized for the 50-yr peak flow. The receiving drain, Project 5219, has enough capacity to accept the maximum flow rate of 2,490 cfs. This flowrate would occur in a 50-year storm event when the Sun Valley Watershed has a conveyance system only, and regional storage facilities are not implemented.

The primary storm drain has a total length of approximately 7 miles. The size of the drain ranges from 54-inch diameter reinforced concrete pipe (RCP) to double 10 ft wide by 10 ft high reinforced concrete box culverts, and varies depending on the alternative and the other retention projects proposed. The trunk line would be accompanied by four main laterals, designated Laterals A through D in the Project 9250 documentation, in the following locations:

- Sherman Way (Lateral A)
- Saticoy Street (Lateral B)
- San Fernando Road (Lateral C)
- Sheldon Street (Lateral D)

These main laterals are equivalent to those specified by Project 9250. The diameters and lengths of the trunk line and main laterals for Alternatives 1 through 3 are shown in **Table 3-9**. Alternative 4 incorporates Project 9250 for runoff collection and transport. The details of Project 9250 and laterals A through D can be found in Technical Memorandum 5 as provided by LACDPW.

Table 3-9
Trunk Storm Drain with Laterals A through D

Alternative 1		Alternative 2		Alternative 3	
Diameter (inches)	Length (feet)	Diameter (inches)	Length (feet)	Diameter (inches)	Length (feet)
36	-	36	1,400	36	1,400
42	5,300	42	4,100	42	4,100
48	2,000	48	3,400	48	2,900
60	7,100	60	7,200	60	7,200
72	6,000	72	6,700	72	5,800
84	3,800	84	1,400	84	2,100
96	10,500	96	10,700	96	15,800
11 feet	7,900	11 feet	6,500	11 feet	2,800
12 feet	1,900	12 feet	1,300	12 feet	1,300
13 feet	1,700	13 feet	-	13 feet	-
14 feet	-	14 feet	-	14 feet	-
15 feet	-	15 feet	1,300	15 feet	-
16 feet	1,300	16 feet	-	16 feet	1,300
Total	**47,500**	**n/a**	**44,000**	**n/a**	**44,700**

Note: This table does not include the remaining laterals described in the next section, called Lateral Storm Drains

Lateral Storm Drains

Site Description

Lateral storm drains are proposed for Sun Valley in order to provide additional subsurface transport for storm flows, up to the 10-year storm flow. The streets would carry remaining flows. These laterals are smaller in diameter than the trunk line and collect runoff from streets throughout the watershed. After collection, the flow is conveyed to the trunk line or to a regional retention project. The alignment of the laterals and the trunk line is shown in Figure 3-2 for the Alternative 2 and Appendix B for the other alternatives.

Description of Project Elements and Operation

Lateral storm drains are proposed in every alternative with varying diameters. The total length of laterals is estimated to be 8.5 miles with pipeline diameters ranging from 30 to 78 inches. The specific lengths and diameters of the laterals for each alternative are shown in **Table 3-10**. The diameters shown here were originally generated by the hydrologic model, but are rounded up to the nearest available pipe size for the purpose of producing a realistic cost estimate.

Table 3-10
Lateral Storm Drains

Alternative 1		Alternative 2		Alternative 3		Alternative 4	
Diameter (inches)	Length (feet)	Diameter (inches)	Length (feet)	Diameter (inches)	Length (feet)	Diameter (inches)	Length (feet)
30	1,300	30	-	30	-	30	-
36	7,500	36	9,300	36	9,300	36	6,500
42	6,100	42	4,100	42	2,500	42	6,500
48	3,800	48	1,500	48	3,200	48	4,700
60	2,900	60	3,300	60	3,300	60	7,400
72	2,700	72	2,300	72	2,300	72	-
84	-	84	-	84	-	84	3,900
Total	**24,300**	**n/a**	**20,500**	**n/a**	**20,600**	**n/a**	**29,000**

Note: This table does not include Laterals A through D, which are discussed in the previous section, called Trunk Storm Drains.

LONG TERM COMMUNITY INVOLVEMENT PROJECTS

The long term community involvement projects are described below.

Onsite BMPs

Site Description

BMPs are used in every alternative for onsite retention of stormwater. They are implemented in the lower portion of the watershed where open space is limited. The participation rates of landowners and storage capacities of the BMPs vary between the alternatives. The details for the BMP implementation for each alternative are summarized in **Table 3-11**. The participation rates are estimates based surveys conducted by TreePeople. TreePeople recommended participation rates of 20 and 40 percent to reflect average and high rates of homeowner participation. Alternatives 1 and 3 are modeled using 40 percent participation. Alternatives 2 and 4 are modeled using 20 percent participation.

Table 3-11
Onsite BMP Capacity Summary

Alternative	Participation Rate	Design Storm	Runoff Volume (acre-ft)
Alternative 1	40%	2-year	75
Alternative 2	20%	2-year	37
Alternative 3	40%	50-year	75
Alternative 4	20%	2-year	38

It should be noted that the retention volumes provided by onsite BMPs in Alternatives 1 and 3 are the same, although the design storm is different. This is because there is a limit to the number of BMP devices that will fit on a given parcel. The excess stormwater not captured by BMPs will be captured by the street storage component. The volume in street storage for Alternative 3 is much greater than Alternative 1 since the design storm in Alternative 3 is significantly greater.

Description of Project Elements and Operation

BMPs are generally classified into two types: *structural* and *non-structural*. Structural BMPs are typically designed and constructed which capture and/or treat runoff. A structural method may be as simple as disconnecting downspouts or as complex as an infiltration facility that manages several million gallons per day. Non-structural BMPs are management practices and programs designed to limit the generation of runoff and/or prevent pollutants from entering runoff (such as public outreach) (USEPA, 1999).

BMPs proposed for Sun Valley include both structural and non-structural types. The specific types of BMPs and the parcel types where they may be utilized are summarized in **Table 3-12**.

Table 3-12
Summary of Selected Onsite BMPs

BMP Type	BMP Description	Parcel Type
Structural BMPs	Cisterns	Residential Industrial
	Drywells	Residential Commercial
	Infiltrators	Residential Commercial
	Retention Grading	Residential
Non-Structural BMPs	Tree Planting	Residential Commercial Industrial
	Mulching	Residential Commercial Industrial

Structural BMPs on industrial and commercial properties should be designed with a small sedimentation basin or other form of pretreatment prior to the BMP inlet.

Cisterns. Stormwater cisterns are large storage tanks that retain runoff for later reuse by the property owner. Cisterns can be above ground, for collecting rooftop flows, or below ground to receive both rooftop flows and runoff from paved land surfaces such as driveways and parking lots. Cisterns installed above ground can be designed to be minimally invasive. For example, a storage tank up to 3-feet wide, 4- to 6-feet tall that extends along the property boundary line can replace a fence at the property line. An example of a fence-line cistern that has been implemented at TreePeople's demonstration project, the Hall House, is shown in **Figure 3-20.**

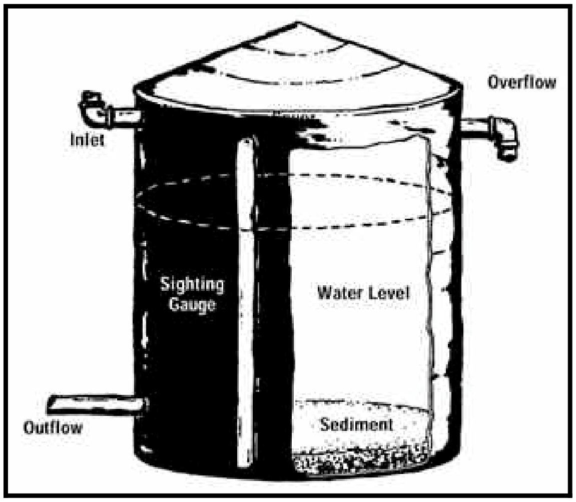
Runoff enters through a settling chamber where a portion of suspended solids is removed and spills over into the storage tank. Above-ground cisterns can be drained by gravity through a small outlet at the bottom of the tank and the water can be used for irrigation or industrial processes that do not require potable water. Underground cisterns require pumping to transport the runoff from the tank to the surface for reuse.

Figure 3-20
Fenceline Cistern at the Hall House

Source: TreePeople

Cisterns are proposed on residential properties primarily to help reduce discharge of stormwater pollutants to the street, and to provide a nonpotable supplement to the water supply. Cisterns are proposed for use on industrial properties to help reduce discharge of stormwater pollutants to the street and in order to prevent infiltration of industrial runoff into the groundwater. An example of a cistern for use on any parcel type is shown in **Figure 3-21**.

Figure 3-21
Above-Ground Cistern for Stormwater Retention

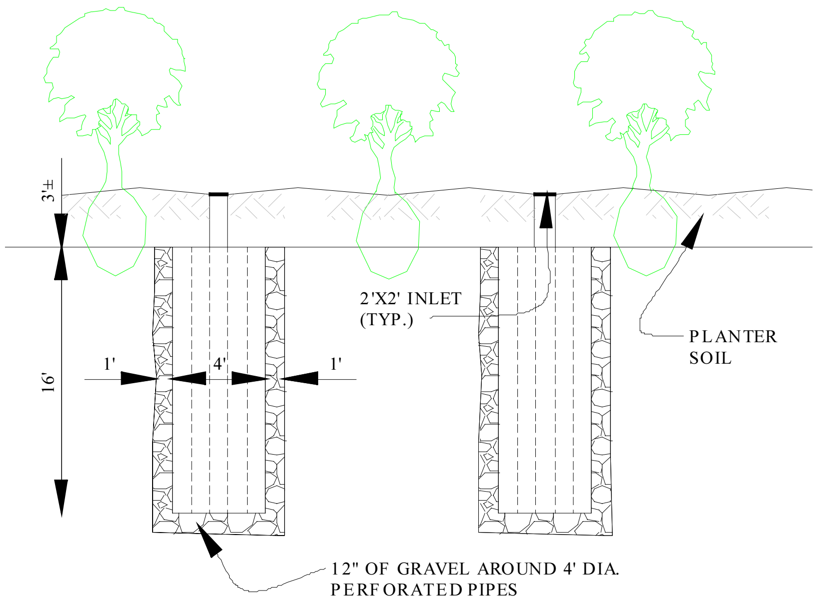


Drywells. Drywells provide groundwater recharge by infiltrating stormwater over the entire surface area of a well. Runoff enters through a settling chamber where a portion of suspended solids is removed before entering the drywell. For this evaluation, each well has a diameter of 2 feet and a depth of up to 80 feet. The depth is limited to 80 feet to preserve a 20-foot buffer between the bottom of the drywell and the groundwater table, which is approximately 100 feet below ground or deeper throughout the Sun Valley Watershed. This layer of soil and the pre-treatment help to protect the groundwater from contaminants that may be found in urban runoff. Drywells are proposed for use on residential and commercial properties where water quality is expected to be adequate. The runoff reduction provided by each drywell is approximately 2,200 cubic feet over the four-day Capital Flood. An example of drywells used in a parking lot planter is shown in **Figure 3-22**. The dimensions shown in the figure do not reflect the actual dimensions used for onsite BMP estimation purposes.

Infiltrators. High capacity infiltrators are installed below grade on a site to create a zone of increased infiltration. Some typical dimensions for these devices are 1.33 feet in height, 2.83 feet in width, and a length of 6.25 feet. Storage is available within the infiltrator chambers as well as the underlying supportive gravel network, which has 35 percent void ratio. Runoff is collected in a settling chamber and is pre-treated before entering the infiltration zone. Infiltrators are proposed for use on residential and commercial properties where water quality is expected to be adequate. The runoff reduction provided by each infiltrator is 107 cubic feet over the four-day Capital Flood. An example of an infiltrator system is shown in the description of parking lot infiltration, Figure 3-15.

Retention Grading. Retention grading creates a bermed off area on a parcel that retains stormwater that eventually infiltrates. Typical dimensions for berming are estimated at 30 feet by 25 feet with an average depth of two feet, creating an average volume of 1,500 cubic feet.

Figure 3-22
Example of Trees and Drywells in Parking Lot Planter



Tree Planting and Mulching

Site Description

Mulching and tree planting are proposed throughout the Sun Valley Watershed. Landowner participation would be equivalent to the proposed levels of participation in onsite BMP initiatives (see Table 3-11). Based on a community survey and knowledge of the Sun Valley neighborhood, TreePeople recommended participation rates of 20 and 40 percent to reflect average and high rates of homeowner participation. Alternatives 1 and 3 are modeled using 40 percent participation. Alternatives 2 and 4 are modeled using 20 percent participation.

Description of Project Elements and Operation

Mulching. The mulching component of the Sun Valley project would utilize all greenwaste generated onsite at participating sites, reducing the waste stream to landfills and reducing the irrigation requirements for a given site. The mulching program would be operated in conjunction with an agency, possibly the City of Los Angeles Bureau of Sanitation. Through the agency, a training and licensing program for professional landscapers and gardeners would be created to train and certify landscapers and gardeners on watershed-friendly landscape management. With this certification process, these gardeners would carry the necessary equipment, such as a chipper, to properly process greenwaste and utilize it for a property. With this additional qualification, these businesses could charge their clients an additional fee to cover their increased expenses for training, additional time needed to process the greenwaste and the associated additional equipment, providing an economic benefit for becoming certified. To make this economically beneficial for landowners, a rebate or reimbursement, perhaps on their stormwater or trash fee, would be created, providing fiscal incentives.

It is anticipated that this would reduce flooding, however the sizing of structural flood control improvements is not based on the flood reduction provided by mulching, as this benefit is hard to quantify.

Tree Planting. The tree planting component would plant strategic and non-strategic trees on participating properties. Strategic trees are planted to shade buildings and reduce the amount of solar energy that enters buildings. These trees are planted to provide window and wall shading as well as shading air-conditioning units. This directly reduces the summer air-conditioning demand. The reduction of summer air conditioning loads saves electricity and thus has a monetary benefit. Non-strategic trees provide an indirect effect by contributing the reduction in the ambient temperature in an urban environment via evapotranspiration. The ambient cooling by trees, in turn, reduces the demand for air conditioning and again saves electricity. The objective of the tree planting component is to plant trees on properties to provide decreased energy consumption, improved air quality, and provide aesthetic value and wildlife habitat. Organized tree planting events are shown in **Figure 3-23**. The number of properties involved and trees planted are shown below in **Table 3-13**.

Figure 3-23
Tree Planting

Non-strategic tree planting at Hansen Dam

Strategic tree planting at Arminta School

Source: TreePeople

Table 3-13
Tree Planting Participation Details

	Single Family	Multi-Family	Commercial	Industrial
Number of Properties				
20% participation	1,698	546	131	142
40% participation	3,395	1,165	263	284
Number of Trees Planter per Property				
Strategic	4	8	10	12
Non-Strategic	1	0	3	3
Number of Trees Planted				
20% participation	8,490	4,368	1,703	2,130
40% participation	16,975	10,920	3,419	4,260

WATER QUALITY BMPS

The water quality BMPs proposed for Sun Valley are described below. Water quality BMPs are included as part of most of the project components already described. For instance, Sheldon Pit and Strathern Pit both contain stormwater treatment wetlands and the powerline easement contains detention basins.

The water quality BMPs are not required to treat the entire 50-year or even 10-year storm flow. LACDPW determined that treatment of 90 percent of the stormwater runoff is sufficient to meet their water quality needs for gross pollutants but that trash and visible pollutants must be removed from all stormwater flows (Bapna, 2002). This treatment design volume criteria is conservative when compared to treatment design volume criteria recently published by the Los Angeles Regional Water Quality Control Board (0.75 inches of rainfall) and in other parts of the country such as Denver, CO (ASCE, 1998). All treatment devices included in the cost estimates are sized to meet the requirement of treating 90 percent of runoff volume. Ninety percent of the runoff volume is equal to the runoff generated by the first 1.7 inches of rainfall in every storm. The volume to be treated (i.e., runoff) varies between the projects based on the amount of impervious area tributary to the project. For instance, in a highly industrialized and impervious area, the runoff may be as much as 80 percent of the rainfall, or 1.4 inches. In a residential area, the runoff may be closer to 40 percent of the rainfall, or 0.7 inches. A runoff coefficient was calculated for each project tributary area in order to determine the 90 percent treatment volume for that component.

Stormwater Treatment Wetlands

Where space and an adequate supply of water are available, stormwater captured in a retention basin is circulated through a free water surface wetland. These types of wetlands were briefly described as part of the Sheldon Pit and Strathern Pit projects. The wetlands are to be designed according to USEPA's guidelines for stormwater treatment wetlands. Most of the wetland is in the shallow areas of less than one-foot depth. Therefore, with such shallow ponds and a large volume of water to treat, the wetland areas will take up a sizeable area on the project sites. Wetlands require a constant flow of water to keep vegetation alive. In most cases, a recirculation system with a pump is proposed in order to maintain a constant supply of water. **Figure 3-24** is an example of a treatment wetland combined with recreation and educational purposes.

Figure 3-24
Wetland Interpretive Center

Source: City of Los Angeles
Design Concept Report for the Constructed Wetlands at Sepulveda Basin

Well-constructed and maintained wetlands have removal rates comparable to many of the proprietary devices available on the market. USEPA estimates of pollutant removal rates for stormwater treatment wetlands are shown in **Table 3-14**. As wetlands have additional benefits and are cost-effective, this pretreatment technique is chosen for the projects where space and a regular supply of water are available.

Table 3-14
Performance of Stormwater Wetlands

Pollutant	Removal Rate
Total Suspended Solids	67%
Total Phosphorus	49%
Total Nitrogen	28%
Organic Carbon	34%
Petroleum Hydrocarbons	87%
Total Cadmium	36%
Total Copper	41%
Total Lead	62%
Total Zinc	45%
Bacteria	77%

Source: USEPA, 1999

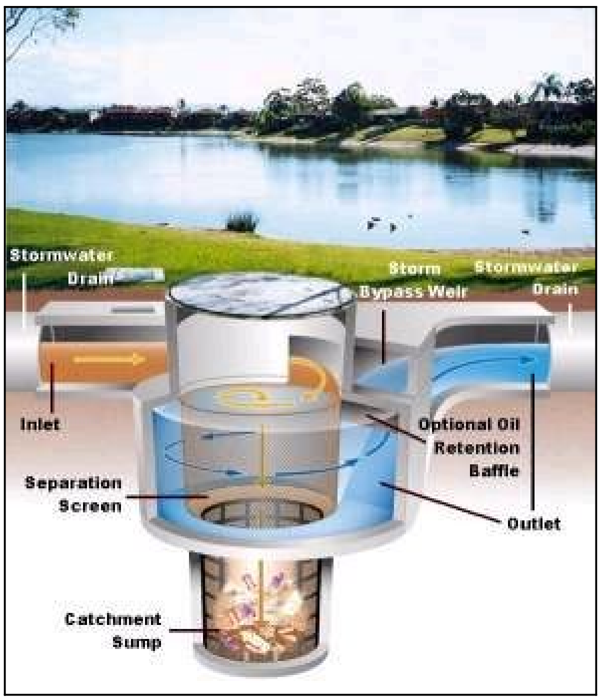
Retention/Detention Basins

Detention ponds are probably the most common management practice for the control of stormwater runoff (Pitt, 1996). Retention/detention basins can both control pollutants and reduce peak runoff flow rates. The major mechanism for treatment in basins is sedimentation, where pollutants associated with particles sink to the bottom of the basin. The basins will require periodic cleaning to remove sediments.

Stormwater Separation Devices

Stormwater separation devices are proposed at the majority of the project components. These devices are designed to be in-line treatment systems to remove trash and suspended solids. There are a variety of manufacturers of separation devices whose cost and designs vary based on design flow. The majority of the devices use gravity and/or centrifugal force to remove suspended solids and hydrocarbons. All separation devices will require regular maintenance to remove accumulated debris and sediment. **Figure 3-25** is an example of a stormwater separation device.

Figure 3-25
CDS Technologies Stormwater Separation Device



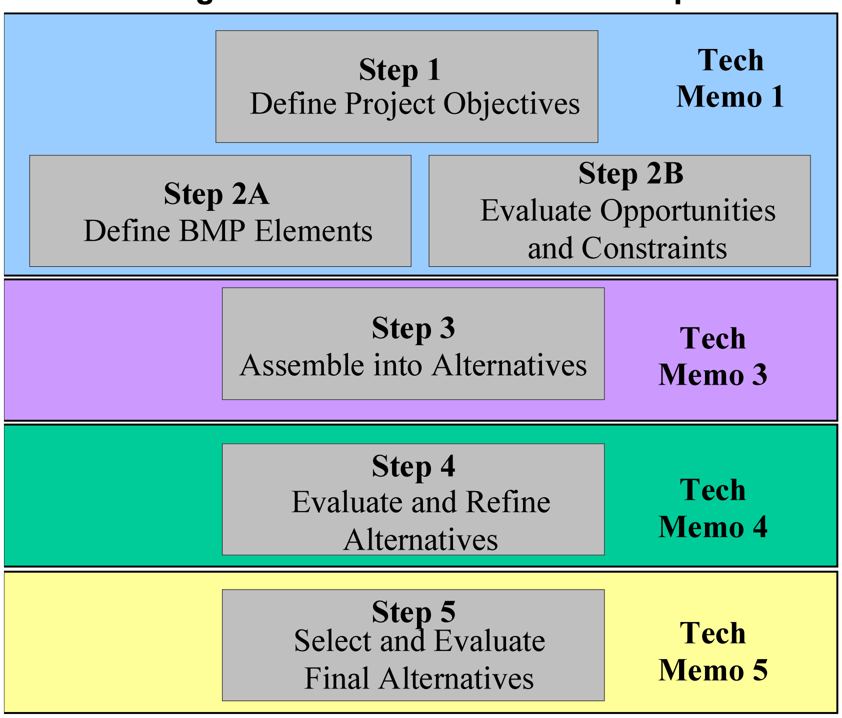
Source: CDS Technologies

Section 4
Alternatives Evaluation Process

ALTERNATIVE SELECTION PROCESS

The framework for determining final sample alternatives was established collaboratively by the County and MWH. The process is depicted graphically in **Figure 4-1**. Four of the technical memoranda prepared to date summarize the results of the alternative development process. Technical Memorandum No. 1 (Tech Memo 1) summarized the detailed project objectives, defined BMP elements, and evaluated opportunities and constraints. Technical Memorandum No. 3 (Tech Memo 3) described 22 alternatives that are identified to meet the project objectives. Technical Memorandum No. 4 (Tech Memo 4) refined the results of Tech Memo 3 by further detailing six (6) alternatives. Technical Memorandum No. 5 (Tech Memo 5) evaluated four final sample alternatives.

Figure 4-1
Watershed Management Plan Alternative Development Process



Technical Memorandum No. 2 summarizes model modifications, baseline model results and methodologies for linking of the models. It is not considered part of the alternative development process.

This section summarizes what occurred in Step 4, Evaluate and Refine Alternatives, and Step 5, Select and Evaluate Final Alternatives. A summary table of the 22 alternatives developed in Step 3, Assemble into Alternatives, is located in Appendix C.

EVALUATE AND REFINE ALTERNATIVES (FINAL SIX ALTERNATIVES)

Description

Development of the final six alternatives consists of the following three steps:

1. Review the results of Tech Memo 3.
2. Define general strategies for the six alternatives.
3. Formulate new alternatives that include the selected strategies.

Each of these steps is described below.

Review the results of Tech Memo 3

Several general strategies are identified in Tech Memo 3 for achieving the project objectives. These strategies involve maximizing either a particular type of flood control solution, such as storage or conveyance, or one of the defined project objectives. One or more specific alternatives are then developed within each general strategy. This approach is used to assure that at least one alternative attempts to optimize the benefits that could be derived in each major project objective category. A total of 22 alternatives are evaluated in Tech Memo 3. These alternatives are not fully developed or modeled. These alternatives are listed in Appendix C.

Based on a ranking of the 22 alternatives, 12 alternatives are selected for further consideration (see Appendix C). The information provided by this selection process is used to evaluate how each general strategy contributes to a successful solution for the Sun Valley Watershed.

Define general strategies for the six alternatives

Based on the analysis provided in Tech Memo 3, several general strategies are prevalent in the selected 12 alternatives. These are:

- Infiltration
- Stormwater reuse
- Onsite, non-regional BMPs
- Subsurface conveyance systems, such as tunnels or storm drains

Formulate new alternatives

The general strategies listed above are used to develop six alternatives. For each general strategy, one alternative is developed to focus on maximizing that strategy. The sixth alternative combines the best of these five strategies. The six alternatives are:

1. Maximize use of onsite and regional infiltration projects
2. Maximize use of onsite and regional stormwater reuse projects
3. Maximize stormwater transfer opportunities where stormwater from outside of the Sun Valley Watershed can be utilized within the Watershed.
4. Maximize use of onsite, non-regional BMPs
5. Maximize use of subsurface conveyance systems
6. Combination of Alternatives 1-5

Each of these six alternatives is developed such that the following four specific requirements are met:

- All alternatives must provide Capital Storm (50-year storm with ultimate land use) flood protection. When specific regional flood control projects such as gravel pit storage are not able to achieve that level of protection throughout the watershed, it is assumed that onsite, non-regional BMPs will be applied to reduce flows and volumes.
- Because of the need to protect groundwater quality, all infiltration projects are assumed to require pre-treatment of some kind to reduce loads of pollutants such as sediment, nutrients, industrial compounds, and heavy metals.
- It is assumed that all alternatives include application of basic pollution prevention activities in the watershed as required by the current NPDES stormwater discharge permit held by the City of Los Angeles.
- All alternatives will include the application of tree planting, mulching, and similar practices that are not dependent on the specific components of the alternative.

The components of the six alternatives are summarized in **Table 4-1**. As shown in this table, all alternatives include all five Phase 1 projects, with the exception of Alternative 4 (Maximize BMPs), which does not include the Cal Mat Pit Phase 1 project.

Some of the project components listed in Table 4-1 are not part of the final four sample alternatives. These components are not discussed in detail in this report, but are described in Tech Memo 4. These components are:

- San Fernando/Tuxford – Cal Mat Pit Tunnel
- Vineland Avenue Pump Station and Force Main
- Burbank Airport Retention Basin
- Non-Potable Water Distribution System

Table 4-1
Summary of Alternative Characteristics

Number	Description	Alternative 1 Maximize Infiltration	Alternative 2 Maximize Reuse	Alternative 3 Water Transfer	Alternative 4 Maximize Onsite, Non-regional BMPs	Alternative 5 Tunnel/Force Main	Alternative 6 Combination
Included Project Components							
1	Sheldon Pit	No	Yes	Yes	No	No	No
2	Tujunga Wash Diversion[2]	No	No	Yes	No	No	No
3	Bradley Landfill	Yes	Yes	Yes	Yes	Yes	Yes
4	San Fernando/Tuxford – Cal Mat Pit Tunnel	No	No	No	No	Yes	No
5	Strathern Pit	Yes	Yes	No	No	Yes	Yes
6	Vineland Avenue Pump Station and Force Main	No	No	No	No	Yes	No
7	Burbank Airport Retention Basin	Yes	Yes	No	Yes	No	No
8	Powerline Easement	Yes	Yes	No	No	No	Yes
9	Non-Potable Water Distribution System	No	Yes	No	No	No	Yes - Limited
10	Sun Valley Park	Yes	Yes	Yes	Yes	Yes	Yes
11	Trunk Storm Drains	No	No	Yes - South of I-5	No	No	No
12	Lateral Storm Drains	Yes - South of I-5	Yes - South of I-5	Yes - South of I-5	No	Yes - South of I-5	Yes - South of I-5
Phase 1 Projects							
1	LADWP Steam Plant	Yes - Phases 1 & 2	Yes - Phases 1 & 2	Yes - Phases 1 & 2	Yes - Phase 1	Yes - Phases 1 & 2	Yes - Phases 1 & 2
2	Cal Mat Gravel Pit	Yes - Phases 1 & 2	Yes - Phases 1 & 2	Yes - Phases 1 & 2	No	Yes - Phases 1 & 2	Yes - Phases 1 & 2
3	Vulcan Gravel Processing Plant	Yes	Yes	Yes	Yes	Yes	Yes
4	Tuxford Green	Yes	Yes	Yes	Yes	Yes	Yes
5	Sun Valley Middle School	Yes	Yes	Yes	Yes	Yes	Yes
Onsite, Non-regional BMPs							
1	Municipal Cisterns	No	Yes - 20% Participation	Yes - 20% Participation	Yes - 100% Participation	Yes - 20% Participation	Yes - 40% Participation
2	Infiltrators on Residential Property	Yes - 20% Participation	No	Yes - 20% Participation	Yes - 100% Participation	Yes - 20% Participation	Yes - 40% Participation
3	Infiltrators on Commercial Property	Yes - 20% Participation	No	Yes - 20% Participation	Yes - 100% Participation	Yes - 20% Participation	Yes - 40% Participation
4	Infiltrators on Industrial Property[1]	Yes - 20% Participation	No	No	No	No	No
5	Street Storage	Yes	Yes	Yes	Yes	Yes	No

1 - Pretreament would be required for infiltration of runoff from industrial properties to comply with RWQCB standards.
2- Tujunga Wash Diversion is now included as part of the Sheldon Pit component

Evaluation

The six alternatives are evaluated by comparing the benefits, constraints, and cost. **Figure 4-2** diagrams the alternative creation and evaluation process. The six alternatives are compared according to the evaluation criteria is summarized in **Table 4-2**. This table also provides a summary of the primary lessons learned from each alternative.

Figure 4-2
Alternative Development and Evaluation Process

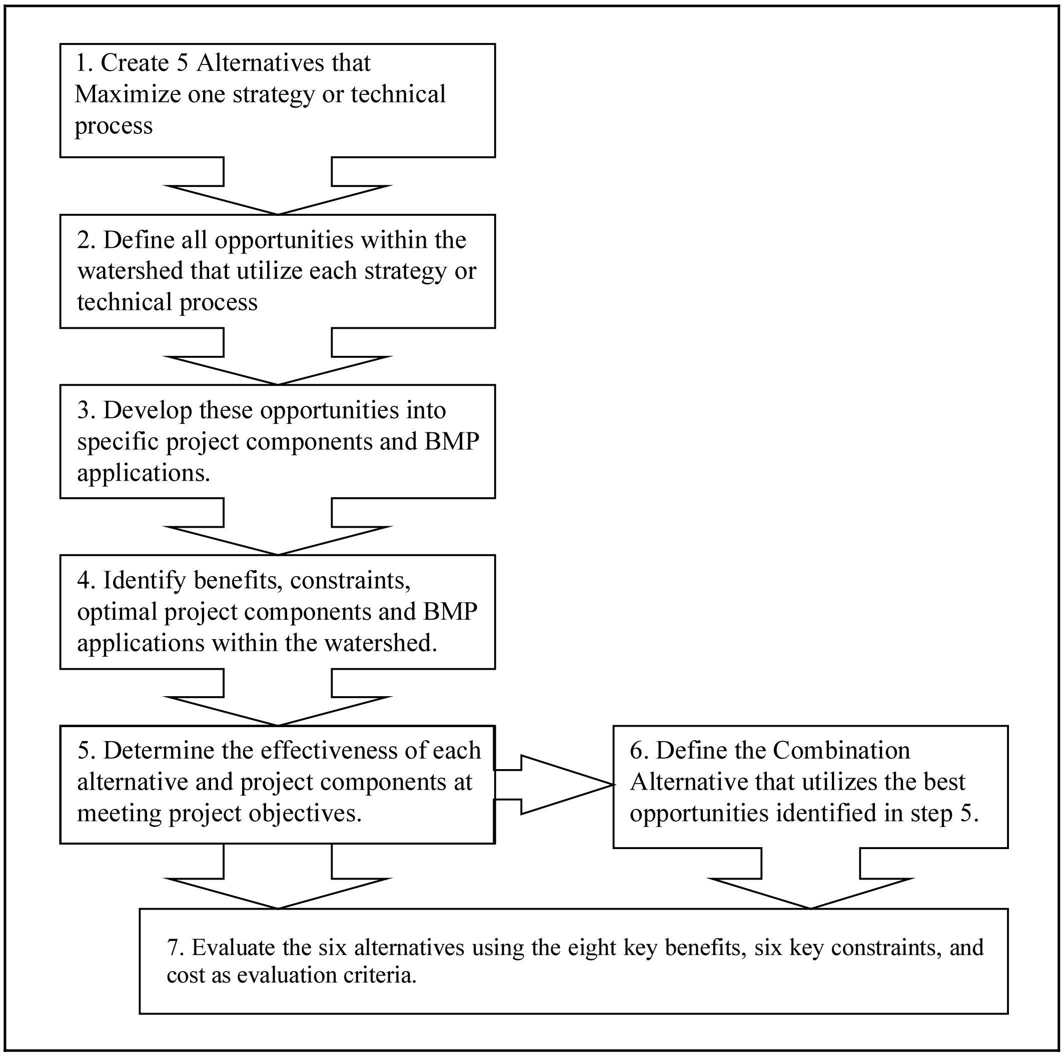


Table 4-2
Evaluation of Six Alternatives

Description	Alternative 1 Maximize Infiltration	Alternative 2 Maximize Reuse	Alternative 3 Water Transfer	Alternative 4 Maximize Onsite, Non-regional BMPs	Alternative 5 Tunnel/Force Main	Alternative 6 Combination
Benefits						
Flood Control	Effective	Effective	Effective	Effective	Effective	Effective
Remaining Flooded Areas	None per HEC-1 analysis	None per HEC-1 analysis	None per HEC-1 analysis	None per HEC-1 analysis	None per HEC-1 analysis	None per F0601 analysis
Pollution Reduction	Pretreatment and Infiltration	Settling at Retention Sites	More pollutant load is likely discharged from downstream end of SV watershed due to cleaner water transferred from Tuj. Wash	Pretreatment and Infiltration	Settling, Pretreatment, Infiltration	Settling, Pretreatment, Infiltration
Water Conservation: Infiltrated	2,152 acre-ft	52 acre-ft	6,655 acre-ft	1,507 acre-ft	1,280 acre-ft	2,417 acre-ft
Water Conservation: Reused	284 acre-ft	2,384 acre-ft	905 acre-ft	929 acre-ft	1,156 acre-ft	1,083 acre-ft
Water Conservation: Total	2,436 acre-ft	2,436 acre-ft	7,560 acre-ft	2,436 acre-ft	2,436 acre-ft	1,334 acre-ft
Reduction of Energy Costs	Mulching & tree planting reduces energy and waste management cost.	Mulching & tree planting reduces energy and waste management cost.	Mulching & tree planting reduces energy and waste management cost.	Reduced pumping costs at Bradley Landfill due to reuse. Mulching & tree planting reduces energy and waste mgmt cost.	Mulching & tree planting reduces energy and waste management cost.	Mulching & tree planting reduces energy and waste management cost.
Active and Passive Recreation	Additional active recreation at Cal Mat Pit, Strathern Pit, and the Powerline Easement	Additional active recreation at Sheldon Pit, Cal Mat Pit, Strathern Pit, and the Powerline Easement	Additional active recreation at Sheldon Pit, Cal Mat Pit	Minimal additional active recreation	Additional active recreation at Cal Mat Pit, Strathern Pit, and the Powerline Easement	Additional active recreation at Cal Mat Pit, Strathern Pit, and the Powerline Easement
Wildlife Habitat	Additional wildlife habitat at Cal Mat Pit, Strathern Pit, and the Powerline Easement	Additional wildlife habitat at Sheldon Pit, Cal Mat Pit, Strathern Pit, and the Powerline Easement	Additional wildlife habitat at Sheldon Pit, Cal Mat Pit	Minimal additional wildlife habitat	Additional wildlife habitat at Cal Mat Pit, Strathern Pit, and the Powerline Easement	Additional wildlife habitat at Cal Mat Pit, Strathern Pit, and the Powerline Easement
Improved Air Quality	Mulching & tree planting improves air quality	Mulching & tree planting improves air quality	Mulching & tree planting improves air quality	Mulching & tree planting improves air quality	Mulching & tree planting improves air quality	Mulching & tree planting improves air quality
Constraints						
LA City water rights need to be addressed	Only at Bradley Landfill	In all major projects	At Bradley Landfill - probably offset by increase in groundwater recharge from Tujunga Wash	At Bradley Landfill and Industrial Cistern BMPs throughout watershed	At Bradley Landfill, Cal Mat Pit, Strathern Pit, and Industrial Cistern BMPs in Lower WS	At Bradley Landfill and Vulcan Gravel Processing Plant
Major Pipeline Construction Required	City Laterals south of I-5	Stormwater Reuse Distribution Line	County Project 9250 south of I-5 City Laterals south of I-5	None	Tunnel and Force Main/Pump Station	City Laterals south of I-5
Pumping Required	Groundwater pumping required due to large volume of water infiltrated	Pumping required to deliver reuse water to non-potable customers.	Groundwater pumping required due to large volume of water infiltrated	Groundwater pumping required due to large volume of water infiltrated	Extremely large stormwater pump station required.	Pumping required to deliver reuse water to non-potable customer.
High level of participation in Onsite, Non-regional BMPs	Low: 20%	Low: 20%	Low: 20%	High: 100%	Low: 20%	Moderate: 40%
Impact on Groundwater Remediation Efforts	Possibly Significant	None	None - Infiltration in Upper Watershed only	Possibly Significant	Insignificant	Possible impacts at Powerline Easement
Acquisition of Gravel Pits	Strathern, Cal Mat	Sheldon, Strathern, Cal Mat	Sheldon, Cal Mat	None	Cal Mat with current bottom elevation, & Strathern	Cal Mat & Strathern
Total Cost	**$ 493 million**	**$ 324 million**	**$ 138 million**	**$ 746 million**	**$ 409 million**	**$ 231 million**
Lessons Learned	Infiltration on a large scale is effective at meeting many project goals	Reuse on an abbreviated scale is effective at meeting many project goals	Water transfer provides massive water conservation benefits at a low cost, but does not eliminate the need for storm drains	BMPs are expensive and meet only the flood control, water conservation, and reduced pollution goals, but fail to provide regional parks/habitat	The tunnel and force main are expensive and don't eliminate the need for storm drains	The combination of down-sized water transfer, reuse, and infiltration systems is effective at meeting many project goals

SELECT AND EVALUATE FINAL ALTERNATIVES

This section summarizes Step 5 as shown in Figure 4-1.

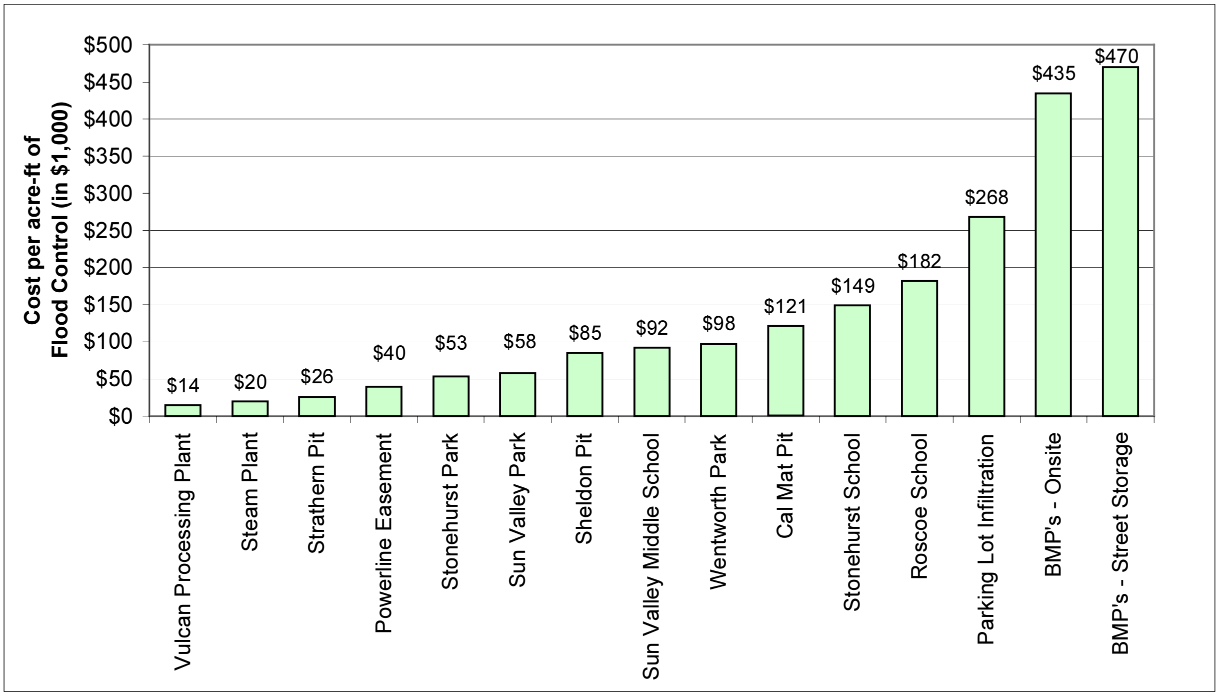
The four final sample alternatives were developed from the six alternatives described in Tech Memo 4. The six alternatives created in Tech Memo 4 were evaluated using the costs and key benefits and constraints developed at that time. Two of the six alternatives, "Maximize Onsite BMPs" and "Maximize Tunnels and Force Mains", are discarded because their constraints and costs are high, and their qualitative benefits are low. The remaining four alternatives are refined to produce the final four sample alternatives based on additional information on costs and benefits. Tech Memo 5 presents refined cost estimates and quantification of benefits for each of the four final sample alternatives. The process of refinement of the sample alternatives is described in the following steps:

1. **Select four alternatives from Tech Memo 4 to serve as the basis for the final four sample alternatives.**

2. **Finalize the concept designs and costs of each project component.** Each project component developed in Tech Memo 4 is reexamined and the concept designs refined. Some project components are not considered further, such as the Burbank Airport Retention. Some project components are added, such as Roscoe School, Stonehurst School, and Stonehurst Park. The costs are recalculated after the designs are refined.

3. **Develop unit costs for flood control in dollars per acre-foot for each project component.** The volume of flood control for each project component calculated using a mass-balance that produces the volume of retention as a function of tributary area and hydrologic factors such as subbasin area and land use. The project component cost is divided by this volume to produce the unit cost for flood control in dollars per acre-foot. The unit costs are shown in **Figure 4-3**.

Figure 4-3
Average Unit Cost of Flood Control per Project Component



4. **Develop a qualitative assessment of all of the remaining key benefits for each project component.** The key benefits examined qualitatively are:

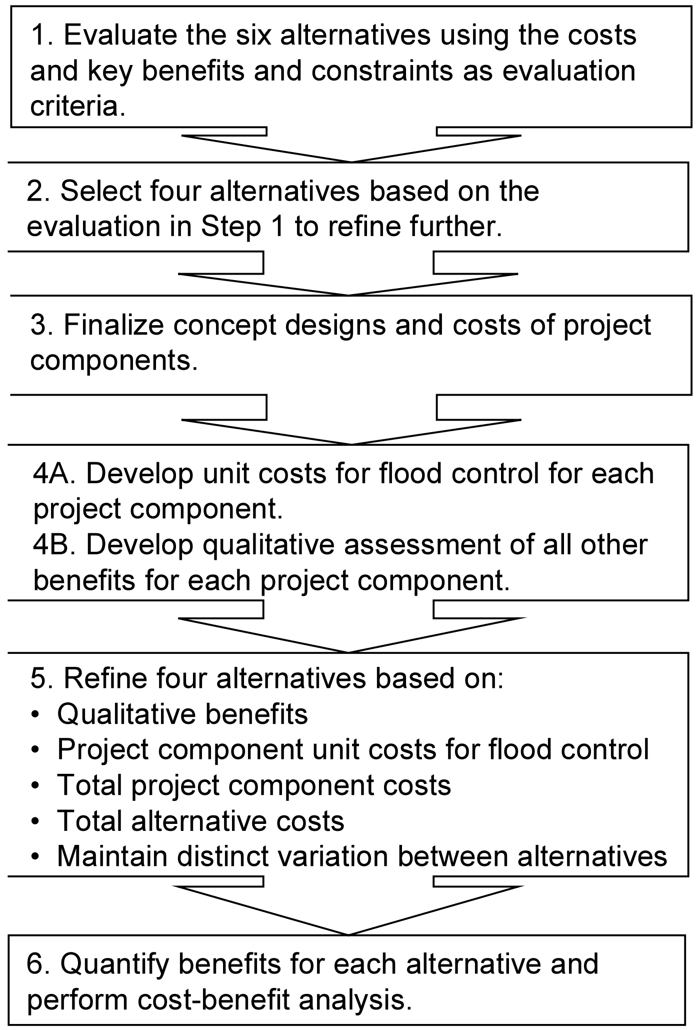
- Water conservation
- Improve water quality
- Reduce energy consumption
- Increase active and passive recreational areas
- Increase wildlife habitat
- Improve air quality

5. **Refine the four alternatives from Tech Memo 4 using the following criteria:**

- Provide high qualitative benefits
- Use components with a low unit cost for flood control
- Use components with low total project component costs
- Consider the impact of certain combinations of projects on the total alternative costs
- Maintain a distinctive variation between the alternatives

Each alternative is modified to produce combinations of project components that better meet the objectives and keep the costs as low as possible. The alternatives changed from maximizing specific processes, such as infiltration or reuse, to emphasizing those processes and complementing them with other project components. The process of developing the final four sample alternatives (described above) is shown in **Figure 4-4**.

Figure 4-4
Alternative Development and Evaluation Process



A summary of the final four sample alternatives is presented in **Table 4-3**. The alternative descriptions and the hydrologic conditions for each alternative are presented in the first rows of the table. The second portion of the table includes the "baseline components" which are those project components and Pilot and Phase 1 projects that are included in all alternatives. The remaining projects are listed as differentiating components.

Table 4-3
Summary of Alternatives

Alternative	1 - Infiltration	2 - Water Conservation	3 - Stormwater Reuse	4 - Urban Storm Protection
Description	Widely Distributed Small Projects	Maximizes Wildlife Habitat	Maximizes Stormwater Reuse for Industry	Full Conveyance with Regional BMPs
Retention Basin Size	50-Year	50-Year: Subareas 1-6 10-Year: Subareas 7-8	50-Year	10-Year
Net Volume Discharged to Los Angeles River in Capital Storm	21 acre-ft	0 acre-ft	8 acre-ft	598 acre-ft
Baseline Components				
LADWP Steam Plant	Yes	Yes	Yes	Yes
Vulcan Gravel Processing Plant	Yes	Yes	Yes	Yes
Tuxford Green	Yes	Yes	Yes	Yes
Sun Valley Middle School	Yes	Yes	Yes	Yes
Sun Valley Park	Yes	Yes	Yes	Yes
Tree Planting and Mulching	Yes	Yes	Yes	Yes
Lateral Storm Drains	Yes	Yes	Yes	Yes
Trunk Storm Drains	Yes	Yes	Yes	Yes
Differentiating Components				
Stonehurst School	Yes	No	No	No
Stonehurst Park	Yes	No	No	No
Roscoe School	Yes	No	No	No
Park on Wentworth	Yes	No	No	No
Sheldon Pit	No	Yes	No	No
Cal Mat Pit	No	No	Yes	Yes
Strathern Pit	Yes	Yes	Yes	Yes
Parking Lot Infiltration	Yes	Yes	No	Yes
Street Storage	Yes – 1.5 miles	Yes – 0.6 miles	Yes – 5.1 miles	Yes – 0.4 miles
Onsite BMPs	Yes - 2-yr Storm, 40% Participation	Yes - 2-yr Storm, 20% Participation	Yes - 50-yr Storm, 40% Participation	Yes - 2-yr Storm, 20% Participation
Powerline Easement	Yes – 1.1 miles	Yes – 0.5 miles	Yes – 0.9 miles	Yes – 0.8 miles

Note: Water quality BMPs are not listed in the table because they are part of the listed components

COMPARISON OF FINAL SAMPLE ALTERNATIVES

The four final sample alternatives are evaluated using three primary criteria:

- Results of the benefit-cost analysis
- Ability to meet project objectives
- Consistency with guiding principles applicable to any watershed planning

These criteria are discussed below.

Benefit/Cost Analysis

This section provides a summary of the benefits and costs of the final four sample alternatives, and also describes the methodology for developing the value for each category of benefit. The full benefit/cost analysis (BCA) can be found in Technical Memorandum 5. In addition, the costs and benefits of the final alternatives are compared with the costs and benefits of the proposed single-purpose flood control project (Project 9250).

Categories of benefits are developed based on the detailed project objectives identified by the Stakeholders as well as an understanding of future potential funding partners. While the results of the BCA will likely have significant value in attracting additional funding partners, it is not intended to serve as the basis for allocating costs among potential funding partners at this time. Potential funding partners were not asked to confirm the assumptions regarding valuation of benefits during this preliminary BCA and therefore may not agree with the results. For example, the Department of Water and Power is not asked to confirm the assumptions about the value of developing a local water supply to offset the costs of importing water from outside the region. This BCA can be used as an initial point of discussion with potential funding partners, but should be viewed as a very preliminary first draft that is intended to open a dialog about appropriate assumptions to be used in a formal BCA agreed to by all partners.

Methodology

The following section presents a summary of the general assumptions used in developing the BCA and provides a discussion of the specific methodology utilized to value each of the ten categories of defined benefits. Various methods are used to evaluate the benefits including cost avoidance, willingness to pay, and valuation pricing. Where practicable, the BCA incorporates the methodologies described in the benefit/cost analysis model developed by TreePeople.

General Assumptions

The following general assumptions are made for the BCA:

- The BCA quantifies both the benefits and the costs of each alternative over a 50-year time horizon.
- The costs used in the model include all capital facilities costs, land acquisition costs, and expected O&M costs over the 50-year evaluation period.
- Annual benefits and O&M costs are assumed constant from year to year.
- A 4 percent discount factor net of inflation is used to determine the present value of the benefits and costs over the 50-year evaluation period. The net 4 percent discount rate is based on a 7 percent discount rate with an assumed 3 percent inflation rate. Actual inflation is not included in the analysis.
- All capital costs are incurred in year one. Capital cost assumptions are developed based on costs obtained from industry manufacturers, MWH's experience on similar planning projects, and data provided by LACDPW. All estimates have been adjusted to an Engineering News Record (ENR) Construction Cost Index (CCI) of 7572 (Los Angeles, March, 2003) and are consistent with the American Association of Cost Engineers guidelines for developing reconnaissance-level estimates which should range between 50 percent above and 30 percent below actual capital expenditures. A 50 percent contingency is included in the cost

estimates. The engineering, administration, and legal costs are estimated to be 25 percent of construction costs. The engineering, administration, and legal costs also include typical services such as inspection, materials testing, and construction management.
- O&M costs are a total annual amount starting in year two.
- All valuations in the model are presented in 2002 dollars.

A ratio of benefits to cost is ultimately calculated based on the assumptions presented above and the methodologies described below. A ratio greater than 1 indicates an alternative with greater benefits than cost. A ratio less than 1 indicates an alternative with costs greater than benefits.

Specific Methodology

The project benefits for each of the four final sample alternatives have been disaggregated into the categories summarized below. The methodology for valuing each of the following categories of benefit is summarized briefly below. Methodology details for each category are available in Technical Memorandum 5. The BCA categories are:

- Flood Control – assess the avoided cost of facilities needed to provide comparable local and downstream flood protection.
- Water Quality Improvement – assess the avoided cost of the removal of bacteria and other listed pollutants from waters that contribute to the Los Angeles River.
- Water Conservation – assess the benefit of using stormwater for groundwater recharge and associated water supply augmentation instead of purchasing imported water.
- Energy – assess the reduction of energy consumption by planting shade trees and decreasing the amount of energy used to pump imported water into the Los Angeles Basin.
- Air Quality Improvement – assess the benefits of absorption of pollutants by the tree canopy, pollution reduction by reducing the amount of emissions related to greenwaste hauling, and reduced emissions from power plants from decreased energy consumption.
- Greenwaste Reduction – assess the cost avoidance of hauling and tipping for landfill disposal of greenwaste.
- Ecosystem Restoration – assess the benefits of increased habitat and open space.
- Recreation – assess the value of parkland and recreation for the area.
- Property Values – assess the value of project components to nearby property values.

BCA Summary

The results of the BCA are summarized in the following tables. The capital cost and O&M cost estimates for each alternative are shown in **Table 4-4** and **Table 4-5**. **Table 4-6** presents a summary of the benefits of the project on an annual basis while **Table 4-7** presents a summary of the present value of each benefit over the 50-year evaluation period.

Table 4-4
Summary of Capital Costs for Each Alternative

Project Component	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Lateral Storm Drains	$7,469,000	$6,362,000	$6,450,000	$10,006,000
Trunk Storm Drain	44,145,000	36,816,000	34,996,000	57,824,000
LADWP Steam Plant	4,539,000	4,539,000	4,539,000	2,852,000
Vulcan Gravel Processing Plant	952,000	952,000	952,000	346,000
Tuxford Green	4,350,000	4,350,000	4,350,000	4,350,000
Sun Valley Park	2,800,000	2,800,000	2,800,000	2,800,000
Sun Valley Middle School	3,033,000	3,033,000	3,033,000	2,535,000
Tree Planting and Mulching	4,400,000	2,200,000	4,400,000	2,200,000
Stonehurst School	1,077,000	n/a	n/a	n/a
Stonehurst Park	833,000	n/a	n/a	n/a
Roscoe School	975,000	n/a	n/a	n/a
Park on Wentworth	816,000	n/a	n/a	n/a
Water Transfer in Sheldon Pit	n/a	650,000	n/a	n/a
Sheldon Pit	n/a	16,850,000	n/a	n/a
Cal Mat Pit	n/a	n/a	27,480,000	26,400,000
Strathern Pit	17,450,000	15,500,000	12,800,000	11,000,000
Parking Lot Infiltration	33,100,000	15,300,000	n/a	21,300,000
Street Storage	29,177,000	17,643,000	129,758,000	17,643,000
Onsite BMPs	32,811,000	16,407,000	32,811,000	16,407,000
Powerline Easement	18,100,000	7,500,000	14,900,000	13,300,000
Total	**$206,027,000**	**$150,902,000**	**$279,269,000**	**$188,963,000**

Table 4-5
Summary of O&M Costs for Each Alternative

Project Component	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Bradley Landfill	n/a	n/a	n/a	n/a
Sun Valley Park	16,000	16,000	16,000	16,000
LADWP Steam Plant	71,000	71,000	71,000	71,000
Vulcan Gravel Processing Plant	10,000	10,000	10,000	10,000
Tuxford Green	18,000	18,000	18,000	18,000
Sun Valley Middle School	6,000	6,000	6,000	6,000
Tree Planting	98,000	33,000	98,000	33,000
Mulching	0	0	0	0
Water Transfer	n/a	206,000	n/a	n/a
Stonehurst School	70,000	n/a	n/a	n/a
Stonehurst Park	78,000	n/a	n/a	n/a
Roscoe School	66,000	n/a	n/a	n/a
New Park in Subarea 2	30,000	n/a	n/a	n/a
Sheldon Pit	n/a	100,000	n/a	n/a
Cal Mat Pit	n/a	n/a	71,000	71,000
Strathern Pit with Transport to TSG/Vulcan	239,000	208,000	194,000	151,000
Parking Lot Infiltration (Subarea 33)	35,000	17,000	n/a	20,000
Street Storage	21,000	13,000	57,000	28,000
Onsite BMPs	91,000	46,000	91,000	46,000
Powerline Easement	54,000	25,000	49,000	44,000
Storm drain - Trunklines	171,000	139,000	131,000	236,000
Storm drain - Laterals (City + County)	64,000	57,000	58,000	73,000
Total	**1,135,000**	**963,000**	**867,000**	**821,000**

Table 4-6
Annual Benefits in $ Million

Benefit	Alternative				
	9250	1	2	3	4
County Flood Control					
Regional damage avoidance	$3.00	$3.00	$3.00	$3.00	$3.00
Change in downstream flooding	($0.05)	$0.25	$0.17	$0.25	$0.15
City Flood Control	$0.47	$0.47	$0.47	$0.47	$0.47
Water Quality					
Bacteria TMDL	$0.00	$1.07	$1.07	$1.07	$1.07
Additional water quality	$0.00	$3.03	$3.03	$3.03	$3.03
Water Conservation					
Water transfer	$0.00	$0.00	$2.80	$0.00	$0.00
Avoided cost of imported water	$0.00	$1.04	$0.83	$1.12	$1.05
Energy Reduction	$0.00	$0.20	$0.08	$0.20	$0.08
Air Quality	$0.00	$0.95	$0.38	$0.95	$0.38
Greenwaste	$0.00	$0.93	$0.47	$0.93	$0.47
Ecosystem Restoration	$0.00	$0.09	$0.19	$0.21	$0.21
Recreation	$0.00	$1.09	$1.09	$1.09	$1.09
Property Values	$0.00	$0.47	$0.18	$0.47	$0.18
Total Annual Benefits	**$3.42**	**$12.59**	**$13.75**	**$12.80**	**$11.17**

Table 4-7
Present Value of the Total Annual Benefits in $ Million

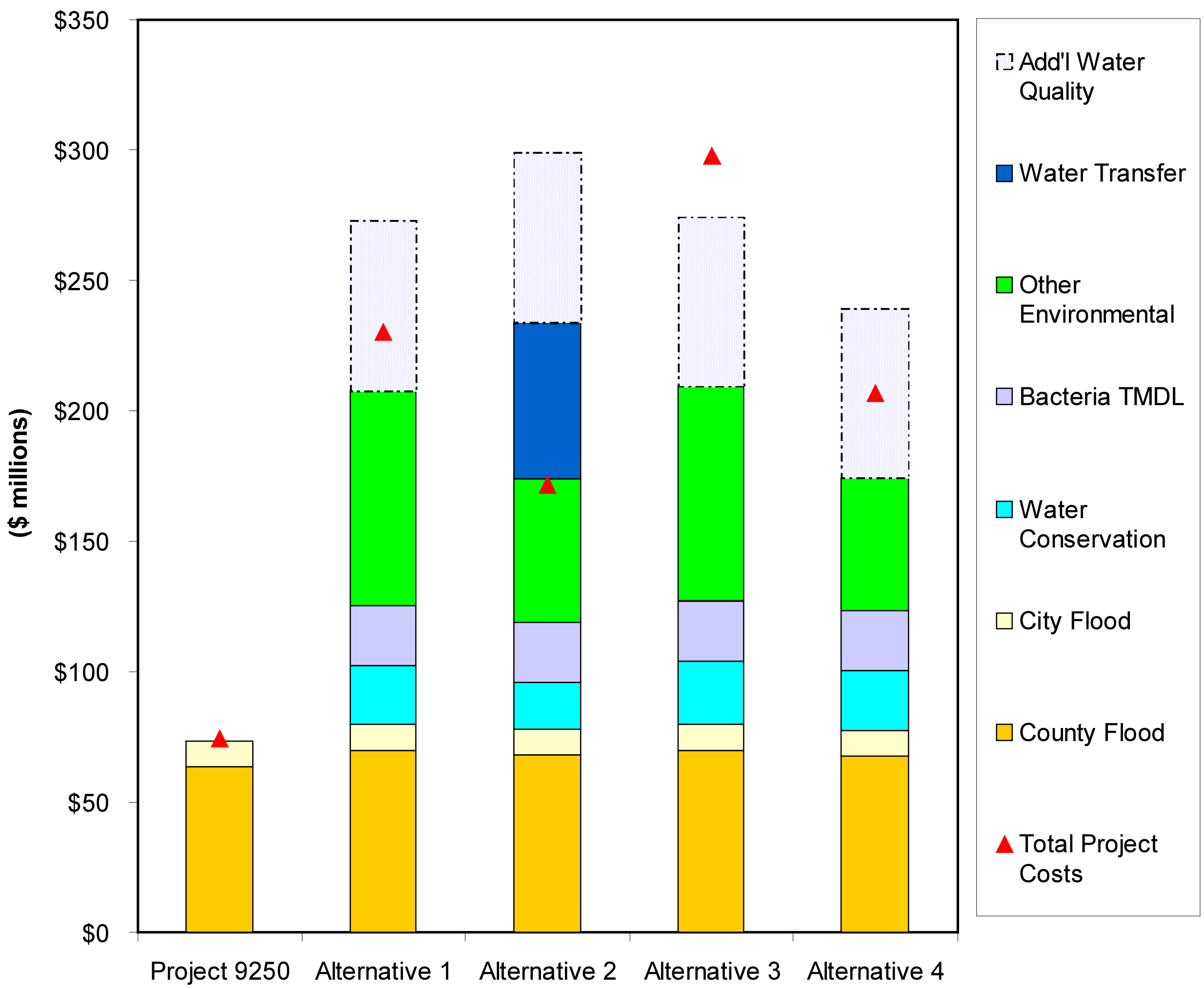
Benefit	Alternative				
	9250	1	2	3	4
County Flood Control					
Regional damage avoidance	$64.46	$64.46	$64.46	$64.46	$64.46
Change in downstream flooding	($1.03)	$5.37	$3.65	$5.37	$3.22
City Flood Control	$10.01	$10.01	$10.01	$10.01	$10.01
Water Quality					
Bacteria TMDL	$0.00	$22.95	$22.95	$22.95	$22.95
Additional water quality	$0.00	$65.15	$65.15	$65.15	$65.15
Water Conservation					
Water transfer	$0.00	$0.00	$60.21	$0.00	$0.00
Avoided cost of imported water	$0.00	$22.35	$17.89	$24.07	$22.65
Energy Reduction	$0.00	$4.30	$1.70	$4.30	$1.70
Air Quality	$0.00	$20.50	$8.10	$20.50	$8.10
Greenwaste	$0.00	$20.00	$10.00	$20.00	$10.00
Ecosystem Restoration	$0.00	$1.86	$4.04	$4.58	$4.48
Recreation	$0.00	$23.34	$23.34	$23.34	$23.34
Property Values	$0.00	$10.20	$3.90	$10.20	$3.90
Total Benefits	**$73.44**	**$270.47**	**$295.39**	**$274.93**	**$239.95**

The Benefit/Cost ratio for each alternative is shown in **Table 4-8**. A graphical summary of the benefits and costs for each alternative is presented in **Figure 4-5**. The ratios use the present value of the total project cost including O&M over the 50-year evaluation period and the summed benefits over the same evaluation period.

Table 4-8
Benefit/Cost Ratio for Each Alternative

Benefit	Alternative				
	9250	**1**	**2**	**3**	**4**
Present Value of All Benefits (in $ million)	$73.44	$270.47	$295.39	$274.93	$239.95
Present Value of Capital and O&M Costs (in $ million)	$74.46	$230.40	$171.58	$297.90	$206.61
Benefit/Cost Ratio	**0.99**	**1.17**	**1.72**	**0.92**	**1.16**

Figure 4-5
Benefits of the Sun Valley Alternatives



Alternative 2, Water Conservation, has the highest benefit-to-cost ratio of 1.72. This is largely due to the combination of 1) higher overall benefits and 2) lower total project costs. The higher benefits are associated with the water transfer from Tujunga Wash to Sheldon Pit, which provides almost four times the groundwater recharge provided by any other alternative. If this component were included in the other alternatives, their benefit-to-cost ratios would also increase. The lower cost results from implementing fewer retention projects to accomplish flood control for Sun Valley and releasing water from the watershed outlet during large storm events. In the Capital Flood, Alternative 2 releases 426 acre-ft of water from the bottom of the watershed, and it transfers more than 500 acre-ft into the watershed from Tujunga Wash, reducing the total flow to the Los Angeles River.

Sample Alternative 2 has the highest benefit-to-cost ratio. Due to circumstances out of the control of LACDPW, the components that are ultimately implemented may vary from those of sample Alternative 2. It should be noted that although Alternative 2 provides numerous benefits at a relatively low cost, it is not the optimal solution because of the criteria to make each alternative distinct from one another. Based on information developed in this analysis, improvements could be made to Alternative 2 to boost the benefits and further lower the cost. While these improvements would tend to make this alternative less distinct from the others, they would optimize the alternative, which is the ultimate goal. Some possible improvements include:

- Replace Parking Lot Infiltration with an extended Powerline Easement project. The powerline easement has an opportunity to meet many project goals efficiently, while Parking Lot Infiltration only provides flood control, water conservation, and water quality improvement. Parking Lot Infiltration is also significantly more expensive per acre-foot of flood control than the Powerline Easement project.
- Include Stonehurst Park and the Park on Wentworth as projects that highly visible in the community and provide cost-effective flood control.
- Propose low-tech onsite BMPs at each participating parcel, such as retention grading and disconnection of downspouts to drain to the lawn rather than the street. While these less expensive BMPs provide limited storage for flood control, if they are used in combination with drywells, infiltrators, or cisterns, the total cost per acre-foot of flood control may be reduced.

It is recommended that these and other potential improvements to sample Alternative 2 be investigated before project designs are initiated.

Ability to Meet Project Objectives

Each alternative's ability to meet the detailed project objectives was evaluated. These objectives, agreed upon by the stakeholders at the inception of the Sun Valley Watershed Management Project, are the following:

- Reduce local flooding
- Improve water quality
- Increase water conservation
- Provide additional environmental benefits
- Increase recreational opportunities
- Increase wildlife habitat

Each of the final four sample alternatives is consistent with the detailed project objectives.

Guiding Principles Applicable to Any Watershed

General guiding principles that are applicable to any watershed become apparent when refining the alternatives to meet the stated project objectives. These principles are described below with examples of how the sample alternatives implement each principle:

1. Components should include multiple benefits whenever feasible.

   Example a) The powerline easement concept meets the objectives of flood control, water quality, and recreation.

2. Components should be designed in consideration of the other components as a system in order to meet objectives in the most efficient manner.

   Example a) The amount of water captured in an upstream component affects the amount of water that a downstream component must capture. The two can be designed together so that the flood control objective is met in the most efficient manner.

   Example b) Two project components with habitat benefits may be designed so that they are linked by green space. Linkages between components increase the overall habitat benefit.

3. The project should consider the regional setting along with existing and future opportunities to extend project benefits beyond the watershed to the region.

   Example a) The water quality components in Sun Valley will actually improve the water quality of the Los Angeles River, approximately 3.5 miles south of the watershed.

   Example b) Recreational and habitat opportunities in Sun Valley may connect with existing and future recreation and habitat opportunities in the regional system.

Each of the final four sample alternatives developed in the Sun Valley Watershed Management Plan is consistent with the principles presented above.

Section 5
Implementation Approach

COMMUNITY INVOLVEMENT

The community must be involved to make the WMP a reality. The involvement is needed at many levels including making project design decisions as a group, and on a household and individual level for tree planting, mulching, and utilizing BMPs. The strategy to involve the community in these efforts is broken into the following steps:

1. Educate
2. Develop interest
3. Facilitate implementation

Progress is already well underway in educating and developing interest in the community. TreePeople and LACDPW staffs have made presentations at many community events. The project website, sunvalleywatershed.org, is actively used and maintained. Monthly stakeholder meetings are an opportunity for community members to provide ideas and feedback on project elements. Stakeholders who receive information at the meetings disseminate information in the community. The process of actively involving the community in the project must continue through the duration of the project especially when implementing the tree planting and mulching, and BMP components of the plan. Community involvement for each of these two components is discussed below.

Tree Planting and Mulching

Tree planting must be an organized effort to achieve the level of participation needed for the WMP. Free trees are available to households through the Green LA program. TreePeople has a Citizen Foresters program where community members take ownership of tree planting and maintenance efforts. After the first trees are planted, education and develop interest efforts should be continued to bring in new community members. Ongoing efforts should include maintenance information and outreach to new members of the community.

The mulching effort will require education and licensing of mulching gardeners for watershed management friendly gardening and public outreach to inform residents of the opportunity to use the gardeners. A rebate for using licensed watershed management gardeners could be established for households falling below a certain income level.

BMP Installation

Incentives for household involvement with BMPs are in the process of being evaluated. Possible sources for incentives being considered are LADWP and California Department of Water Resources who already have incentive programs.

Distribution and installation of BMPs must be coordinated on a household basis. The installation of BMPs will require the completion of agreements for construction and maintenance. The mulching gardener program may be extended to include certification for BMP maintenance. This would remove the issues of public workers maintaining equipment of private land.

FUNDING OPPORTUNITIES

Table 5-1 provides a summary of near-term priority grant opportunities. **Table 5-2** provides a summary of on-going grant opportunities. The near-term grant opportunities target grants available in the next two to three years to fund projects identified to start in 2004 and 2005 in the prioritization of projects. The grants available in the longer-term are recently approved bonds, such as Proposition 50, or grant programs such as the City of Los Angeles Proposition K, which is scheduled to provide grants over 25 years.

Table 5-1
Near Term Sources of Funding

Funding Source	Purpose of Fund and Applicability to Project	Geographic Area	Who is eligible to apply	Maximum amount	Matching funds required	Amount available	Deadline / Grant Cycle	Additional Information Source
Prop 13 Watershed Protection	Develop local watershed management plans and/or implement projects consistent with watershed plans	CA	Nonprofits, local government agencies incl. special districts, Indian Tribes, and educational institutions	$200,000	Yes	$32.8 million to SoCal Counties	Cycle begins in March. FY 2003/2004 funding cycle expected	http://www.swrcb.ca.gov/prop13/index.html
Prop 13 Nonpoint Source	Reduce, eliminate, or prevent water pollution resulting from polluted runoff and to enhance water quality in impaired waters	CA	Nonprofits, local government agencies incl. special districts, Indian Tribes, and educational institutions	$5 million	Yes	$5-6 million annually	Cycle begins in March. FY 2003/2004 funding cycle expected	http://www.swrcb.ca.gov/prop13/index.html
Prop 13/CALFED Watershed Program	Development of watershed management or restoration programs and implementation of projects consistent with watershed plans.	CA	Nonprofits, local government agencies incl. special districts, Indian Tribes, and educational institutions	$5 million	Yes	$32.8 million	RFCP published	http://www.swrcb.ca.gov/funding/docs/2003rfcp.doc
Prop 13 Urban Water Conservation Capital Outlay	Finance feasible, cost effective water conservation capital outlay projects, or programs to improve water use efficiency	CA	Public agencies and mutual water companies	Unknown	Yes	$18 million	Applications due in December	http://www.owue.water.ca.gov/finance/grants_2003/grants.cfm
MWD Local Resources Program	Provide financial assistance for new sources of water that reduce MWD's demand for imported water	CA	Public or private water agencies	Up to $250/acre-foot of water developed. Min of 100 acre-feet/yr.	No	Varies by RFP cycle	December 1, 2003	http://www.mwdh2o.com/mwdh2o/pdf/business/RFPforLRPApril302003Final.pdf
AB303 Local Groundwater Management Assistance Act of 2000	Help agencies better understand how to manage groundwater resources effectively to ensure the safe production, quality, and proper storage of groundwater	CA	Local public agencies	Maximum of $250,000	No	$5 million	Applications due in October	http://www.dpla2.water.ca.gov/grants-loans/ab303/
319 Program – Nonpoint Source Implementation	Implement nonpoint source projects and programs in accordance with section 319 of the Clean Water Act	CA	States and tribes	Unknown	No	$5-6 million	Applications due in May 2004. FY 2003/2004 funding cycle expected	Applicant must contact RWQCB or SWRCB prior to applying. http://www.swrcb.ca.gov/nps/docs/fldpl319.doc
Prop 40 – Murray-Hayden	Funding for capital projects including parks, park facilities, environmental enhancement projects, youth centers, and environmental youth service centers	CA	Counties, parks districts, and nonprofit organizations	$2.5 million	No	$46 million	Applications due November 17, 2003	http://www.parks.ca.gov/pages/1008/files/MH_Draft.PDF

Table 5-1 con't.
Summary Near Term Funding Sources

Funding Source	Purpose of Fund and Applicability to Project	Geographic Area	Who is eligible to apply	Maximum amount	Matching funds required	Amount available	Deadline / Grant Cycle	Additional Information Source
Prop 40 – Roberti-Z'berg-Harris	Funds are for urgent park and recreation needs, funding supplements for local expenditures, and block grants	CA	Counties, parks districts, and nonprofit organizations	$3 million	Yes –3/7 of funds must be non-state funds	$130 million for FY 2003 funding cycle	December 15, 2003. Similar cycle expected for future cycles	http://www.parks.ca.gov/default.asp?page_id=22329
Prop 40 – Urban Park Act	Finance acquisition and development of parks, recreation areas, and facilities in neighborhoods least served by parks and recreation providers	CA	Counties, parks districts, and nonprofit organizations	$3 million	No – but more competitive with additional funding	$131 million for FY 2003 funding cycle	December 15, 2003. Similar cycle expected for future cycles	http://www.parks.ca.gov/pages/1008/files/UPA_Draft.PDF or http://www.parks.ca.gov/default.asp?page_id=22294
Los Angeles City Prop K	Funds are for acquisition, development, and protection of recreational, cultural, and natural areas. Funds are for capital improvement only.	City of Los Angeles	Nonprofit organizations, government entities, and City departments	Depends on the grant category applied to	No – but applicant must demonstrate financial ability to complete project	$25 million annually until 2022	Expected to be April annually	http://www.ci.la.ca.us/cyf/cyfpt1.htm or contact (213) 978 – 1840 for more information

Table 5-2
Summary of Long-Term Funding Sources

Funding Source	Purpose of Fund and Applicability to Project	Geographic Area	Who is eligible to apply	Maximum amount	Matching funds required	Amount available	Deadline / Grant Cycle	Additional Information Source
Prop 50	Water Quality, Supply and Safe Drinking Water Projects, Coastal Wetlands Purchase and Protection Bonds	CA	Unknown	Unknown	Unknown	$3.44 billion for total bill	Unknown	http://wwwdwr.water.ca.gov/grants-loans/
USACE Challenge 21	Focuses on identifying sustainable solutions to flooding problems by examining nonstructural solutions in flood-prone areas	National	Flood control entities, state and local government entities	$75 million Corps per project cap	.Projects cost-shared 65%/35% Federal/non-Federal	$20 –50 million annually	Unknown	Currently unfunded. Stay in contact with local US Army Corps of Engineers planning office
Caltrans Environmental Enhancement Mitigation Program	Projects must have direct or indirect connection to environmental impacts of a transportation program	CA	Local, state or federal agency or nonprofit entity	$250,000	No	$10 million annually	September	http://www.caltrails.org/trailfunding.html#eemp or EEMP coordinator 916-653-5656
Clean Water Revolving Fund	Address water quality problems associated with discharges from wastewater and water reclamation facilities, as well as from nonpoint source discharges and for estuary enhancement	CA	Public and private entities	Approximately $25 million. Will vary annually	Yes – 20% state match	Varies	Priority list from Regional Board approved in June	http://www.swrcb.ca.gov/cwphome/mss/srf1.htm and contact the Regional Water Quality Control Board to apply for priority list
USDA Cooperative Forestry	Achieve ecosystem health and sustainability through forestry stewardship	National	Forestry agencies, local and tribal governments, and the private sector	Varies as funding changes from Prop. 12 to Prop. 40	Yes – 25%	$3.3 million annually	Applications due in March	http://www.fs.fed.us/cooperativeforestry/ucf_general.htm or http://www.ufei.org/. Local contact is John Melvin 909-320-6124
DWR Flood Control Project Subventions Program	Ensure construction of flood control and watershed management projects through assistance to local agencies	CA	Local agencies	Varies	Yes – 50% with additional 20% for meeting stated objectives	Unknown	May	http://www.fcpsubventions.water.ca.gov
MWD Local Resources Program	Provide financial assistance for new sources of water that reduce MWD's demand for imported water	CA	Public or private water agencies	Up to $250/acre-foot of water developed. Min of 100 acre-feet/yr.	No	Varies by RFP cycle	Varies by RFP cycle	http://www.mwdh2o.com/mwdh2o/pages/business/business01.html
USBR Water Reclamation and Reuse Program	Sets aside federal funds to support up to 25% of a water recycling project's capital costs	National	Local, state or federal agency or nonprofit entity	Up to 25% of the capital costs or $20 million.	Yes	USBR must request funding for projects annually	Funding cycle begins in October	http://www.usbr.gov/tcg/guidelines/ or http://www.lc.usbr.gov/scao/titlexvi.htm
WateReuse Variable Rate Loan Program	Provides loans to advance capital projects, reduce financing costs, and avoid delays due to processing requirements	CA	State or local agencies	$50 million	Yes	Varies annually	Projects must contact California WateReuse Finance Authority	http://www.watereuse.org/Pages/financenew.html

Table 5-2 con't.
Summary of Long-Term Funding Sources

Funding Source	Purpose of Fund and Applicability to Project	Geographic Area	Who is eligible to apply	Maximum amount	Matching funds required	Amount available	Deadline / Grant Cycle	Additional Information Source
California State Parks – Land and Water Conservation Fund	Provides funds for statewide planning, and acquiring and developing outdoor recreation areas and facilities with 60/40 split for Southern/Northern CA	CA	Cities, counties, and districts	Unknown	Yes – dollar for dollar	Varies annually. $12 million anticipated in FY 2003/2004 cycle	Applications due in May until 2015	http://www.nps.gov/ncrc/programs/lwcf/ or http://www.parks.ca.gov/default.asp?page_id=21360
California State Parks – Recreational Trails Program	Funds for recreational trails and trails-related projects	CA	Cities, counties, districts, state agencies, and nonprofit organizations	Unknown	Yes	$3.2 million	October 1, 2003 Similar cycle expected for future cycles	http://www.parks.ca.gov/default.asp?page_id=21362
Department of Water Resources – Flood Protection Corridor	Provides funds to acquire easements and other interests in real property from willing sellers	CA	Local agencies or nonprofit organization	$5 million	Yes	Funding expected through Prop 50	Applications due in February	http://www.dfm.water.ca.gov/fpcp/index.cfm
California State Parks – Habitat Conservation Fund	Looks to bring urban residents into park and wildlife areas and increase awareness and appreciation for parks and wildlife	CA	Cities, counties, or districts as defined by Subdivision (b) of Section 5902 of the Public Resources Code	Unknown – average is $100,000	Yes – dollar for dollar	$2 million	Applications due October 1 annually	http://www.parks.ca.gov/default.asp?page_id=21361 or http://www.parks.ca.gov/pages/1008/files/hcfguide.pdf

AGENCY INVOLVEMENT

Implementation of the proposed project in Sun Valley will likely result in many benefits for many agencies. Many agencies have been actively participating in the stakeholder process and have provided input to the alternatives described in Section 4. Agencies that could be involved in the project funding and the applicable benefit include:

Flood Control
County of Los Angeles Department of Public Works
City of Los Angeles Department of Public Works
U.S. Army Corps of Engineers

Water Quality Improvement
LARWQCB
California Coastal Conservancy
California Resources Agency – Department of Water Resources
DHS
USEPA
ULARA Watermaster

Water Conservation/Supply
LADWP
California Department of Water Resources
USEPA
U.S. Bureau of Reclamation
Metropolitan Water District of Southern California

Energy Conservation
LADWP

Air Quality Improvements
SCAQMD

Greenwaste Reduction
City of Los Angeles Bureau of Sanitation
Los Angeles County Sanitation Districts

Ecosystem Restoration
Santa Monica Mountains Conservancy
CDFG
U.S. Fish and Wildlife Service
California Coastal Conservancy– Southern California Wetlands Recovery Project
California Resources Agency – Department of Conservation
California Wildlife Conservation Board
Caltrans
California Department of Forestry and Fire Protection – Urban Forestry
USEPA
U.S. Army Corps of Engineers

Tree Planting
LADWP
TreePeople

Recreation
City of Los Angeles Department of Recreation and Parks
Los Angeles County Department of Parks and Recreation
California Department of Parks
National Park Service

ENVIRNOMENTAL DOCUMENTATION

As the initial step in California Environmental Quality Act (CEQA) compliance, a Notice of Preparation and Initial Environmental Study for the Watershed Management Plan were filed with the State Clearinghouse in November 2002 and distributed to responsible agencies and interested parties for a 30-day review and comment period. A Scoping Meeting on the content of the EIR was also conducted on November 20, 2002 as a part of the Town Hall meeting held for the Watershed Management Plan.

The Environmental Impact Report (EIR) for the WMP was prepared as a program document (Program EIR). A Program EIR is an EIR prepared on a series of related actions that can be characterized as one large project. The Draft Program EIR is complete and will be distributed in to responsible agencies and interested parties for a 45-day review and comment period, during which a public hearing on the document will be held. Agency and public comments received will be incorporated into the Final Program EIR to be published in late 2003. Following publication, the Final Program EIR will be certified by the County Board of Supervisors along with adoption of the WMP.

In the future, as individual project components are proposed for implementation, the County will evaluate whether the Program EIR adequately evaluates the environmental effects of that component. For some components, an Initial Environmental Study may be prepared. Based on the results of the Initial Environmental Study, a Negative Declaration or a site-specific "second-tier" EIR may be prepared. The Program EIR will serve as the foundation for any future Negative Declarations or second-tier EIRs.

REGULATORY REQUIREMENTS

The following section details the primary regulatory requirements and other policies that may be applicable to the proposed project. **Table 5-3** shows regulatory requirements that may be applicable to project components or the project as a whole.

Table 5-3
Possible Regulatory Requirements for All Project Types

Permit/Document	Agency	Level	Conditions when required
National Environmental Policy Act (NEPA)		Federal	Federal involvement in project.
National Historic Preservation Act		Federal	Historic archaeological sites identified.
ESA Section 10(a) Incidental Take Permit	U.S. Fish and Wildlife Service	Federal	Potential for endangered and threatened species in the vicinity of the project.
Wetland and Riparian Restoration and Creation Activities (#27)	U.S. Army Corps of Engineers	Federal	Existing wetlands are affected, or new wetlands are created.
Safe Harbor	U.S. Fish and Wildlife Service	Federal	Endangered species are present.
Intake Structures	U.S. Army Corps of Engineers and/or California Regional Water Quality Control Board	Federal/ State	Maintenance of regulated intake structures.
National Pollutant Discharge Elimination System (NPDES) Permit	SWRCB	State	Creation of or modification to a water of the State.
California Environmental Quality Act (CEQA)		State	Components of the project require further analysis than provided in the PEIR.
Section 2081 Incidental Take Permit	California Department of Fish and Game (CDFG)	State	Potential for endangered and threatened species in the vicinity of the project.
	South Coast Air Quality Management District (SCAQMD)	Local	Construction BMPs consistent with air quality standards for ozone, carbon monoxide and PM_{10}
Construction Permits	Los Angeles Department of Transportation (LADoT)	Local	Coordination required for work in County or City streets.
Municipal Code, Chapter XI, Noise Reduction	City of Los Angeles	City	Compliance with regulated noise levels during construction.

In addition to the above regulatory considerations, the following agencies and organizations should be contacted for project input:

- City of Los Angeles, Bureau of Engineering, Valley District
- Union Pacific Railroad
- Southern Pacific Railroad
- Southern California Regional Rail Authority (Metrolink)

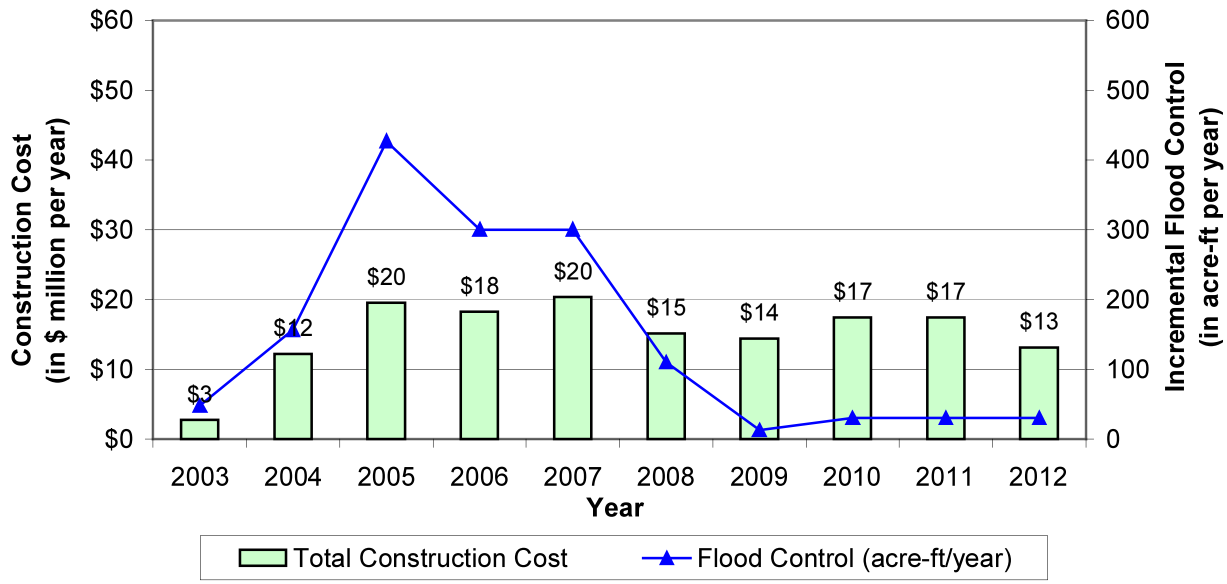
- LADWP
- Caltrans, District 7
- Metropolitan Transit Authority
- City of Los Angeles, Department of Recreation and Parks
- Greater Los Angeles County Vector Control District
- County of Los Angeles Sanitation Districts

IMPLEMENTATION PLAN

The potential prioritization of components that are part of sample Alternative 2 is summarized in **Figure 5-2**. This figure also indicates the implementation period for each of the components. The Pilot component, Phase 1 components, and components with long construction/community involvement timelines are initiated first. Sheldon Pit, Strathern Pit, and the powerline easement are implemented next due to their flood control efficiency and multiple benefits. Actual construction times may vary based on the time required to fill the pits to the desired depth.

Based on the project prioritization, estimated construction duration and the construction cost estimates, the annual capital costs are presented in **Figure 5-1**. This figure also shows the average annual flood control achieved with the project components per year. The annual cost ranges between $9 Million and $19 Million

Figure 5-1
Annual Capital Cost and Incremental Flood Control – Sample Alternative 2



The cumulative construction cost in Year 2002 dollars and the cumulative flood control benefit are presented in **Figure 5-3.** Sample Alternative 2 has a total construction cost $151 million and provides approximately 1,450 acre-ft of flood protection.

Figure 5-2
Potential Prioritization of Projects – Sample Alternative 2

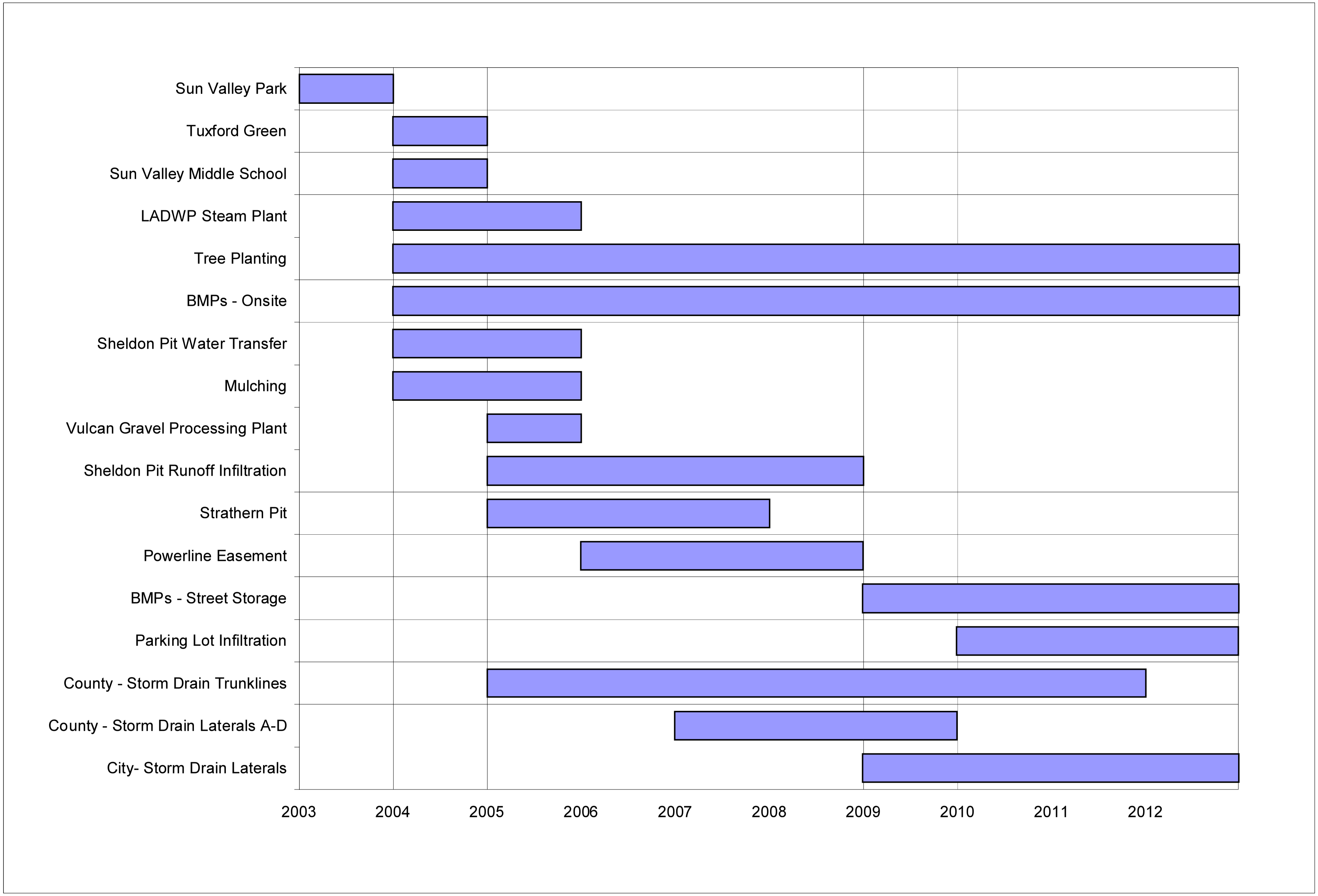
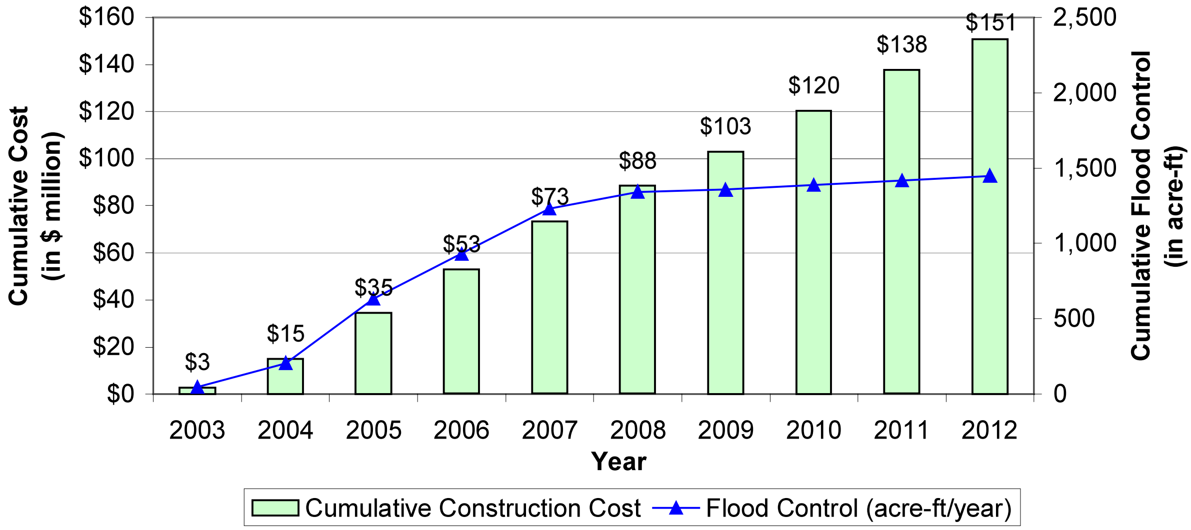


Figure 5-3
Cumulative Capital Cost and Flood Protection of Sample Alternative 2



COMPARISON OF THE PLAN WITH PROJECT OBJECTIVES

A key step in implementation is to check that the final product meets the original project objectives. The section provides a quantitative assessment that demonstrates the degree to which full implementation of the watershed strategy fulfills the detailed objectives identified by the Sun Valley Stakeholder group.

For some of the detailed objectives developed by the Stakeholders, there are obvious metrics available, such as the County's flood control requirements. In some cases, there are not clear metrics. In this comparison of the plan with the project objectives, an effort was made to use reasonable, relevant metrics. The goals developed for this report are based on documented goals of agencies and organizations in the region whenever possible. Organizations included:

- LACDPW
- City of Los Angeles
- SCAQMD
- Sun Valley Watershed Stakeholders Group

The goals can be used to track progress from existing conditions through project completion. In some cases, the recommended project in the WMP does not completely fulfill the goal, but does make significant progress toward it. This section describes the goal, the existing conditions, and the final WMP conditions for each objective. It is recommended that the following set of values be presented to the Stakeholders for their input.

Reduce Local Flooding

Goal

There is a clear metric for the reduce local flooding objective. This metric is LACDPW's flood control guidelines that are discussed in detail in Section 2. LACDPW's guidelines can be summarized by the following three criteria:

1. Drains for sumps must be designed for the 50-year storm.
2. Streets carry the difference between the 25-year and 10-year flow up to the property line.
3. Pipelines must carry the 10-year storm and any additional flow necessary to keep the flow below the property line (LACDPW, 1991).

Existing Conditions

Existing conditions can be compared to the LACDPW criteria as follows:

1. The sump at the intersection of San Fernando Road and Tuxford Street is not drained in the 50-year storm.
2. The sump on Vineland Avenue between Sherman and Vanowen is partially drained by Project 39. Project 39 has insufficient capacity to drain the sump.
3. There is some flood protection for property owners due to the space between the street invert and the top of the curb.

The existing flood control structure, Project 39, provides a degree of flood protection, as does the height of the curb above the street invert. However, there is still significant property damage and inconvenience in even minor storms. Therefore, for the purpose of defining an existing condition for this metric, the existing condition level will be set at 33 percent.

Conditions After Implementation of the Project

The WMP project has been designed to meet LACDPW's flood control guidelines. Therefore, when the project is fully implemented, 100 percent of the flood control goal will be achieved.

Increase Water Conservation

Goal

LACDPW set the goal of retaining all stormwater up to the 50-year storm within the watershed.

Existing Conditions

There are currently no known active water conservation measures being implemented within Sun Valley. The County's runoff coefficient formula is used to determine how much stormwater is currently retained in the watershed. The runoff coefficient of the watershed is based on the amount of impervious land use. The calculated runoff coefficient is 0.66, indicating that 66 percent of the rainfall runs off due to impervious surfaces. Therefore, approximately 34 percent of the rainfall is retained in the watershed. Therefore, existing conditions achieve 34 percent of the goal.

Conditions After Implementation of the Project

When the project is fully implemented most of the water conservation goal will be reached. As am example, Alternative 2 is designed to retain the 50-year, 4-day storm in Subareas 1 through 6. In Subareas 7 and 8, the components are designed to retain the 10-year, 4-day storm. The volume of the 50-year storm is 2,375 acre-ft. Alternative 2 will retain all but 426 acre-ft of this storm. Therefore, when the project is fully implemented, 82 percent of the water conservation goal will be reached. Although 426 acre-ft of water will flow out of the watershed, the Water Transfer element of the Sheldon Pit component actually conserves 500 acre-ft of water from outside of the watershed in an average year. Thus, the Alternative 2 results in a flow reduction to downstream receiving waters.

Increase Recreational Opportunities in the Watershed

Goal

There are a number of ways to increase recreational opportunities including increasing the acreage of parks, increasing the number of sports fields, extending equestrian and bike trails, and increasing public access to parks. A clearly quantifiable measure of increased recreational opportunities in Sun Valley is to measure the area of park space. According to the City of Los Angeles General Plan, the City should have six (6) acres of regional park land for every 1,000 residents. According to the Public Recreation Plan, which is a portion of the Service Systems Element of the General Plan, the City should have four (4) acres of community and neighborhood parkland for every 1,000 residents. According to year 2000 census data, there are 70,723 residents in the Sun Valley Watershed. Therefore, the watershed should have approximately 424 acres of regional park space and 283 acres of community and neighborhood park space. On a regional basis, the watershed is near Hansen Dam Park and the Angeles National Forest. Therefore, the goal is set for neighborhood and community park space of 283 acres.

Existing Conditions

The Sun Valley Watershed currently has only 30 acres of park space including the following:

- Stonehurst Recreation Center – 13 acres
- Sun Valley Park and Recreation Center – 17 acres.

The existing conditions represent 11 percent of the goal. The portion of the Hansen Dam Golf Course in the watershed has not been considered because it is a single purpose facility that requires a significant fee for use.

Conditions After Implementation of the Project

As an example, Alternative 2 includes the development of park space at the following projects for a total of 84 acres of new parks:

- Powerline easement: 13 acres
- Strathern Pit: 18 acres
- Sheldon Pit: 52 acres
- Tuxford Green: 1 acre

The implementation of the project would bring the amount of park space in the watershed up to 114 acres, 40 percent of the goal.

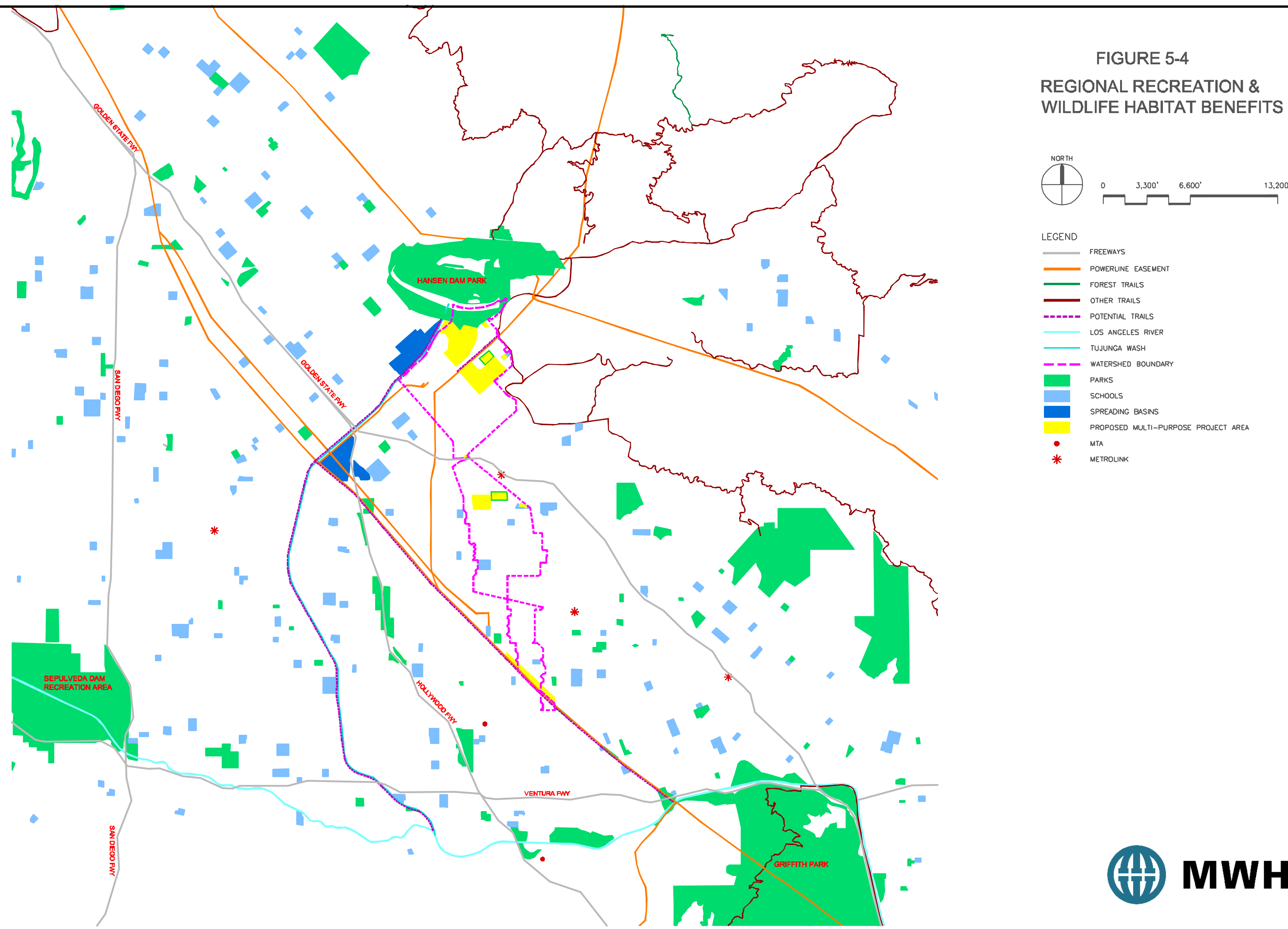
Many of the recreational benefits are difficult to quantify. In addition, recreational benefits can often increase exponentially when they are considered on a regional scale. **Figure 5-4** depicts regional opportunities for recreation and connections to trail systems, parks, schools, and commuter stations and destinations.

There are two major opportunities to connect the regional trail system shown in Figure 5-4. The first major opportunity is the DWP powerline easement. The easement crosses both the top and the bottom of the watershed and also extends to the Griffith Park area, through the Angeles National Forest (to the north and to the east), and into the Verdugo Mountains. Trails along the DWP corridor could potentially provide access to recreation in the following existing parks near or adjacent to the corridor:

- Hansen Dam Golf Course & Recreation Area
- Sunland Park
- Roger Jessup Recreation Center
- Victory Vineland Recreation Center
- Valley Park
- Whithall Highway Park North
- Whithall Highway Park South
- Verdugo Park
- Johnny Carson Park
- Buena Vista Park
- Griffith Park
- Los Angeles Equestrian Center

FIGURE 5-4

REGIONAL RECREATION & WILDLIFE HABITAT BENEFITS



MWH

Trails along the corridor could potentially provide opportunities for safe connections to the following schools and commuter stations:

- Providence High School
- Stevenson School
- American Lutheran School
- Roosevelt School
- Oxnard Street School
- St. Patrick School
- Fair Avenue School
- North Hollywood MTA Redline Station at Lanksershim Blvd. and Chandler Blvd.
- Metrolink Station at San Fernando Road and Olinda Street

The second potential connection is the Tujunga Wash. The Tujunga Wash borders the west side of the watershed and continues south to the Los Angeles River. Trails along the Tujunga Wash could potentially provide access to recreation at the following existing parks near or adjacent to the corridor:

- Hansen Dam Golf Course
- Fernangeles Park
- Branford Park
- Hartland Mini Park
- Kittridge Mini Park
- Studio City Recreation Center
- Moorpark Park
- Erwin Park

Trails along the Tujunga Wash could potentially provide opportunities for safe connections to the following schools and commuter stations:

- Campbell High School
- St. Jane Frances School
- Grant High School
- Monlux School
- Metrolink Station at Van Nuys Blvd. and Keswik Street

Increase Wildlife Habitat

Goal

Quantifying habitat improvement is a challenging task. Development of data often involves intensive study of a particular site or organism (Galizio, 2003). Regional planning documents in Los Angeles encourage habitat development but do not provide quantitative goals. The City of Los Angeles General Plan (2001) includes the objective, "Protect and promote the restoration, to the greatest extent practical, of sensitive plant and animal species and their habitats." Examples of additional qualitative goals for habitat development are as follows:

- Increase the number of species on a parcel,
- Increase the ratio of native to non-native species on a parcel,
- Increase the diversity of native habitat types,
- Connect existing significant habitat areas with other significant habitat areas to allow for intermixing and increased genetic diversity (Galizio, 2003).

The most significant habitat benefits in urban areas are provided by connections made between the significant wildlife areas including the Angeles National Forest (Galizio, 2003). Wildlife corridors link together areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance. The fragmentation of open space areas by urbanization creates isolated "islands" of wildlife habitat. In the absence of habitat linkages that allow movement to adjoining open space areas, various studies have concluded that some wildlife species, especially the larger and more mobile mammals, will not likely persist over time in fragmented or isolated habitat areas. The fragmentation of open space areas prohibits the infusion of new individuals and genetic information (MacArthur and Wilson 1967; Soule 1987; Harris and Gallagher 1989; Bennett 1990).

Corridors mitigate the effects of this fragmentation through the following:

- allowing animals to move between remaining habitats, thereby permitting depleted populations to be replenished and promotes genetic exchange
- providing escape routes from fire, predators, and human disturbances, thus reducing the risk that catastrophic events (such as fire or disease) will result in population or local species extinction, and
- serving as travel routes for individual animals as they move in their home ranges in search of food, water, mates, and other needs (Noss 1983; Farhig and Merriam 1985; Simberloff and Cox 1987; Harris and Gallagher 1989).

It is recommended that the qualitative goals for habitat improvement described above be used for analyzing progress in the heavily urbanized Sun Valley watershed rather than any quantifiable goals at this time. Additional information on wildlife corridors is provided in Appendix B.

Existing Conditions

In general, the Sun Valley Watershed area has been almost completely urbanized and/or developed for decades. Virtually all of the viable wildlife movement that historically occurred through the area is constrained by existing land uses and development. Land uses such as golf courses and gravel pits may contain habitats with the potential support wildlife movement in the project area. Gravel pits and golf courses currently cover approximately 410 acres of the watershed.

Conditions After Implementation of the Project

Restoration of some of the gravel pits in the Sun Valley Watershed, the development of new parks, and trail creation have the possibility of enhancing wildlife movement in the region. **Figure 5-5** depicts potential regional wildlife corridors and linkages that either currently exist, or have the potential to exist, within the plan area. **Figure 5-6** illustrates how project components in sample Alternative 2 could be utilized by wildlife utilizing the potential wildlife corridors.

Tujunga Wash and its tributaries provide potential linkages between the project components and regional habitat areas, such as: the Angeles National Forest, Verdugo Hills, Hollywood Hills, and the Los Angeles River. Other potential wildlife linkages include utility and public works easements or right-of-ways (ROWs).

Utility and public works easements and ROWs generally include electric transmission, pipeline, and flood-control channels that consist of real property owned by the utilities or public works agencies as well as easements purchased or rented from the underlying real property owner. These easements and ROWs may serve as a foundation for the creation or enhancement of wildlife linkages between Sun Valley Watershed project alternatives and regionally significant wildlife habitat areas (e.g., Angeles National Forest, Verdugo Hills and the Hollywood Hills, and Los Angeles River). Additional information on the benefits and constraints of the habitat development in Sun Valley is included in Appendix B.

The analysis of habitat opportunities is similar to the recreation analysis because the benefits significantly increase when planning is done on a regional scale.

Figure 5-5
Existing and Potential Wildlife Corridors

Figure 5-6
Potential Wildlife Corridors and Relationship to Plan Components

Increase Water Quality

Goal

According to the stakeholder objective, reducing pollutant load to the Los Angeles River is a major part of the water quality objective. Because the pollutant load delivered to the Los Angeles River is measurable, it will be used as the water quality goal. The goal is to remove 100 percent of the average annual pollutant load that is generated from stormwater the Sun Valley Watershed.

Existing Conditions

Stormwater runoff carries urban pollutants to the Los Angeles River. As discussed in the water conservation section, approximately 66 percent of the rain that falls on Sun Valley stormwater that leaves Sun Valley flows untreated out of the to the Los Angeles River. Therefore, 34 percent of the average stormwater runoff is retained in the watershed. Existing conditions, therefore, achieve 34 percent of the goal.

Conditions After Implementation of the Project

When sample Alternative 2 is fully implemented, the annual average runoff will be retained in the watershed along with the annual average pollutant load, and therefore 100 percent of the water quality goal will be reached.

Provide Additional Environmental Benefits

Goal

The stated goals of providing additional environmental benefits are to reduce energy costs, improve air quality, and reduce the solid waste stream. There is a clear metric for the improve air quality goal. That metric is attainment of the state ozone and PM_{10} air quality standards.

Existing Conditions

As shown in Table 2-3, the State ozone standard was exceeded at the East San Fernando Valley monitoring station 78 times since 1997. The State PM_{10} standard was exceeded 61 times (SCAQMD, 2000 and SCAQMD, 2002). Using the ozone criteria, which has the most exceedences, 95 percent of the days in the four year period met the state standard. Therefore, the existing conditions achieve these air quality standards 95 percent of the time.

Conditions After Implementation of the Project

Tree planting is expected to improve air quality conditions in the Sun Valley area. However, the Sun Valley Watershed is a very small part of the airshed impacting air quality. It is not expected that the project will significantly affect the number of exceedence days at the East San Fernando Valley monitoring station. Therefore, the WMP implementation benchmark will be set at 95 percent, equal to existing conditions.

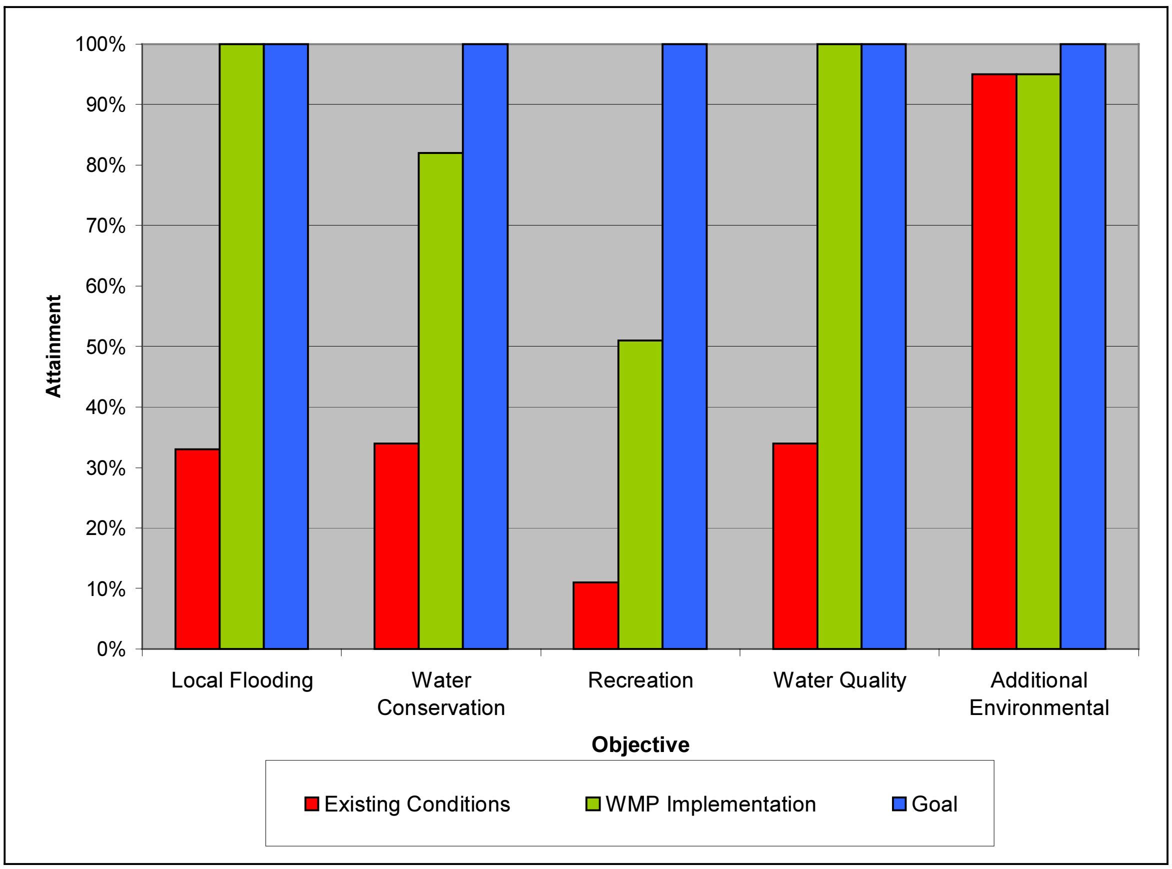
Increase Multiple Agency Participation

It is inappropriate to develop a measurable goal for multi-agency participation at this time, because there have been no specific meetings with other agencies on this topic. While multiple agency participation is desirable, it is recommended that representatives of key agencies participate with the County in defining appropriate metrics for measuring success with this goal.

Goal Summary

Figure 5-7 summarizes existing conditions, WMP implementation conditions, and goals for each objective. In summary, the implementation of the WMP will provide for significant progress towards achieving each of the goals described above for the Sun Valley Watershed. Implementation of the project will satisfy the Sun Valley Stakeholders' mission statement and provide a model to other multipurpose watershed planning efforts throughout the Country.

Figure 5-7
Comparison of Existing Conditions with Goals of the Plan



Appendix A
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Appendix B
Alternative Figures

Figures start on next page.

Figure B-1
Alternative 1 - Infiltration

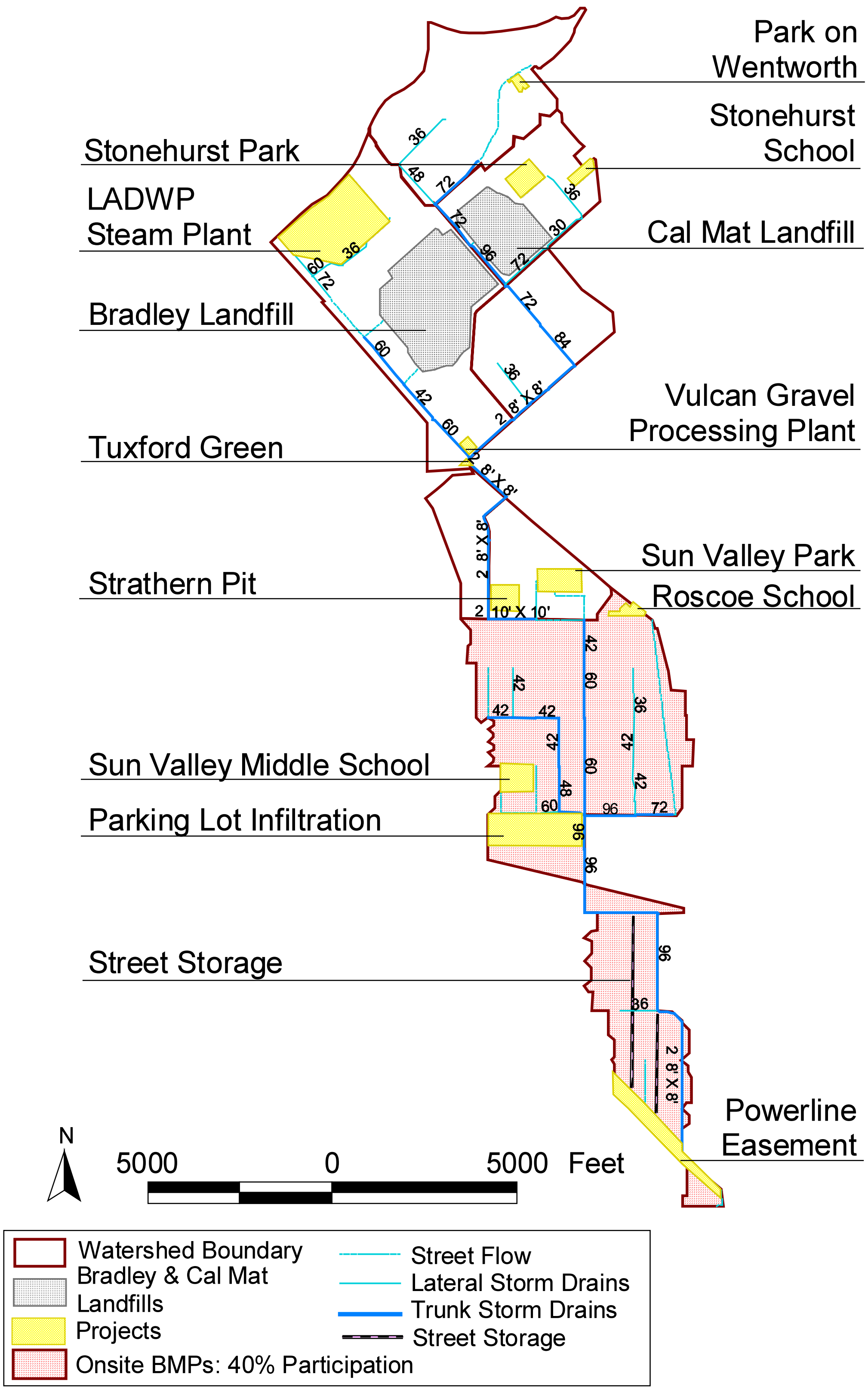


Figure B-2
Alternative 2 – Water Conservation

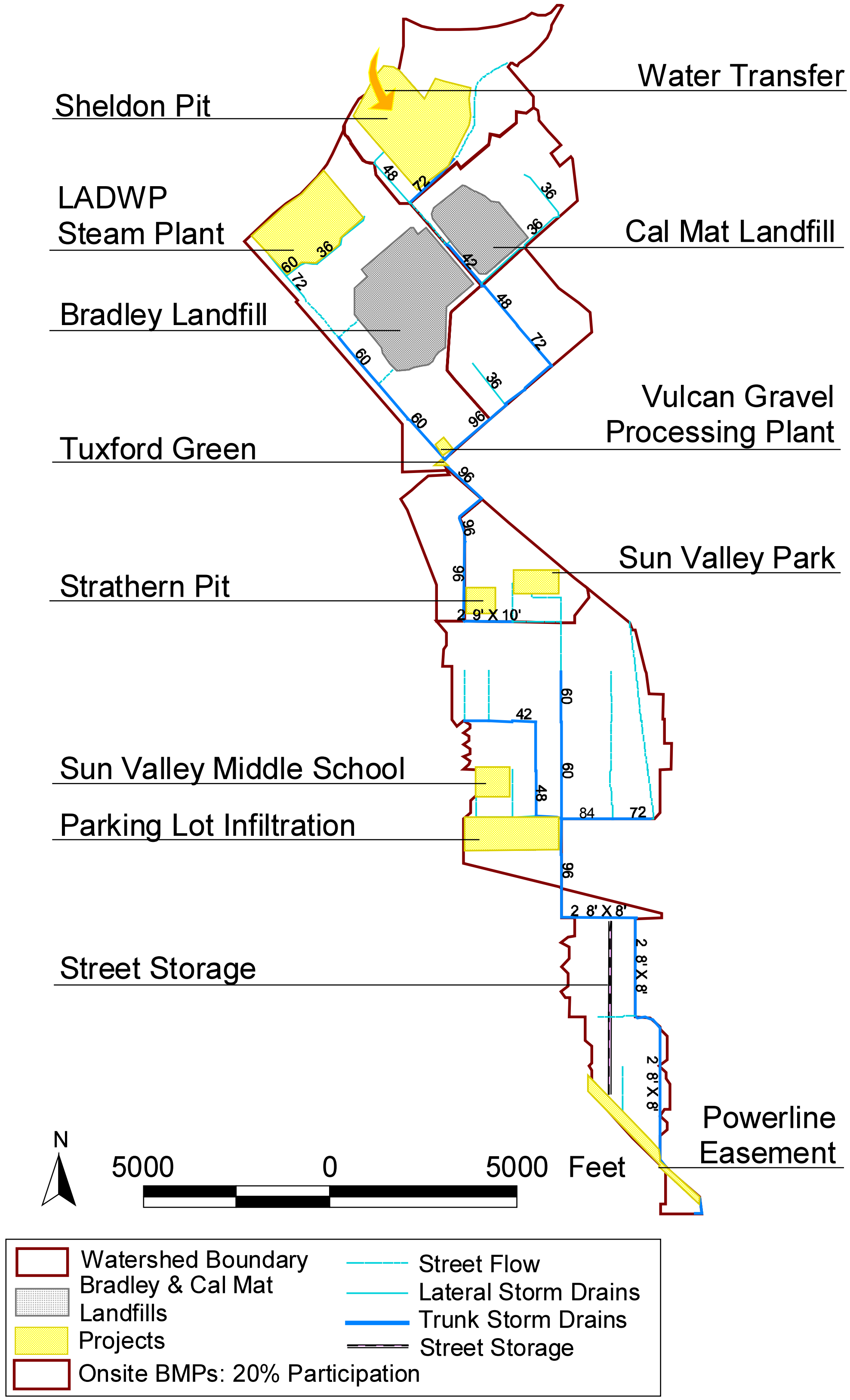


Figure B-3
Alternative 3 – Stormwater Reuse

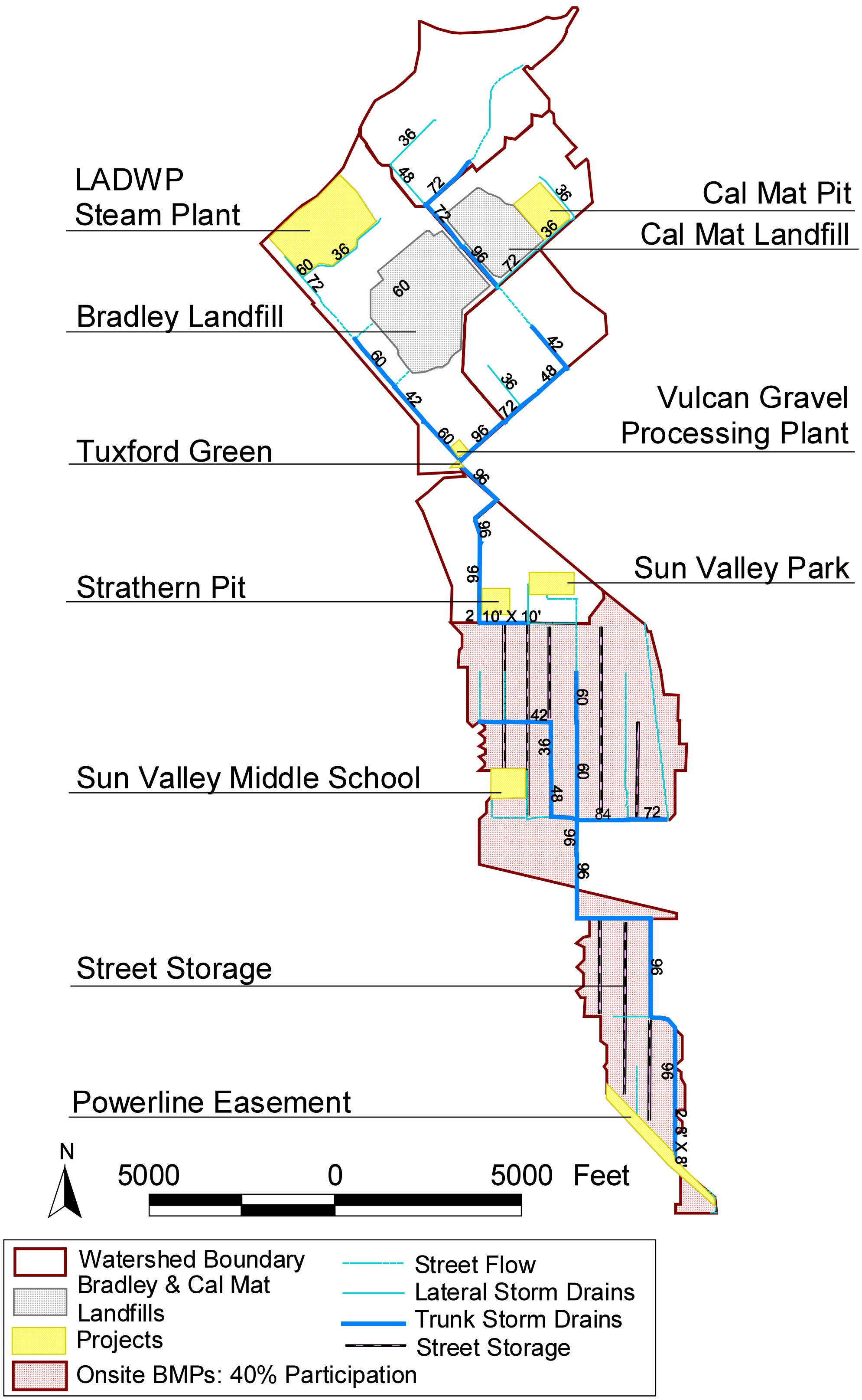
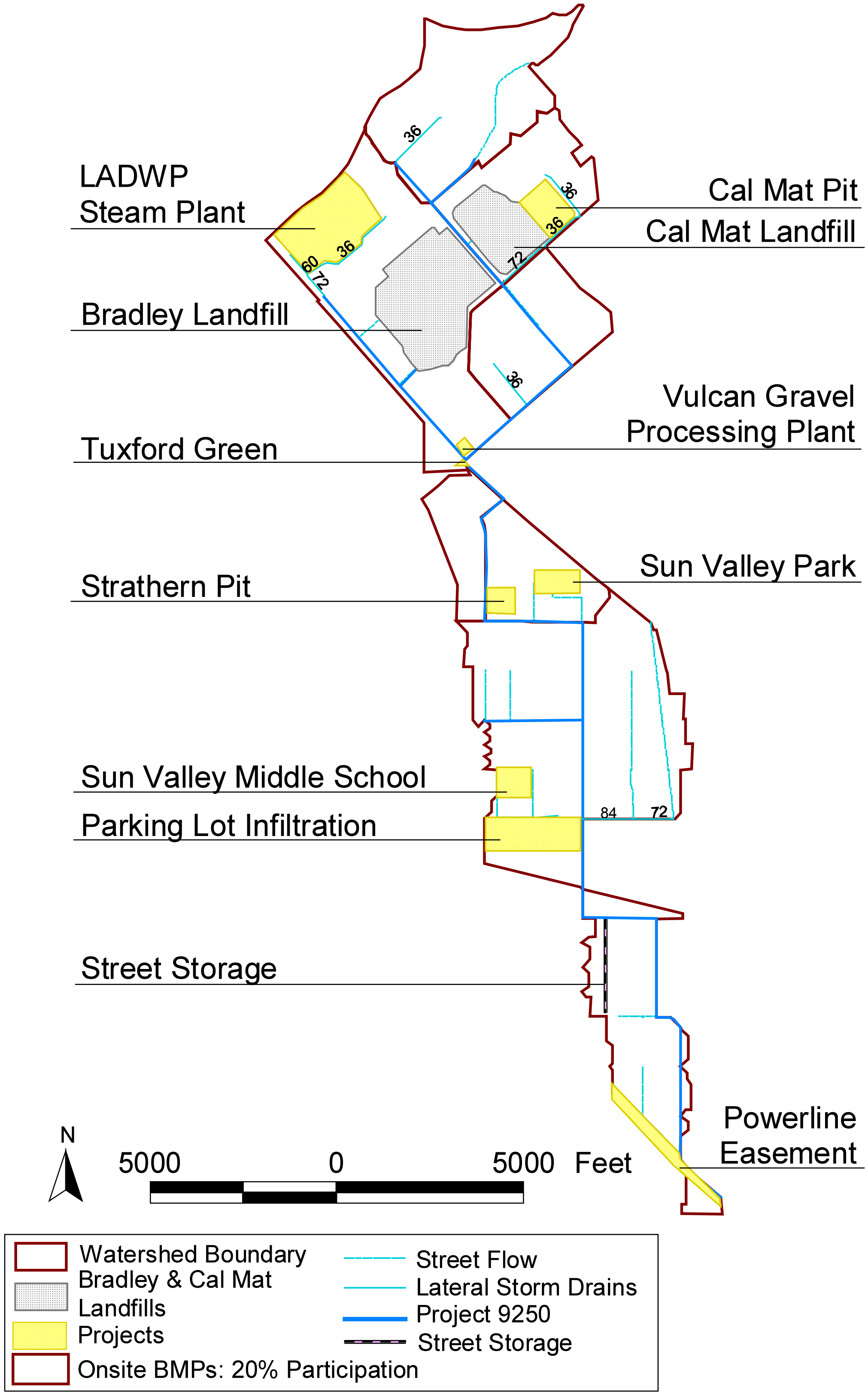


Figure B-4
Alternative 4 – Urban Storm Protection



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Appendix C
Summary of Tech Memo 3 Alternatives Analysis

Bold face type indicates alternatives that were considered further in Tech Memo 4.

Alternative	Description	Considered in Tech Memo 4	Explanation
1	Detention with gravel pits	No	Detention alone does not meet flood control objective
2	Detention with gravel pits (no Sheldon)	No	Detention alone does not meet flood control objective
3	**Infiltration with gravel pits (no Sheldon)**	**Yes**	**Achieves a significant portion of the project objectives and lends itself to being combined with other alternatives**
4	**Regional non-potable reuse with Cal-Mat Pit**	**Yes**	**Achieves a significant portion of the project objectives and lends itself to being combined with other alternatives**
5	**Onsite non-potable reuse without pits in Upper Watershed**	**Yes**	**Achieves a significant portion of the project objectives and lends itself to being combined with other alternatives**
6	Detention without gravel pits	No	Detention alone does not meet flood control objective
7	**Infiltration with all gravel pits**	**Yes**	**Achieves a significant portion of the project objectives and lends itself to being combined with other alternatives**
8	**Infiltration with tunnel to pits and maximize private property**	**Yes**	**Achieves a significant portion of the project objectives and lends itself to being combined with other alternatives**
9	Infiltration with no pits or residential BMPs	No	Infiltration on industrial or commercial properties is unlikely due to water quality concerns
10	**Regional non-potable reuse with all gravel pits**	**Yes**	**Achieves a significant portion of the project objectives and lends itself to being combined with other alternatives**

Alternative	Description	Considered in Tech Memo 4	Explanation
11	**Onsite non-potable reuse without gravel pits**	**Yes**	**Achieves a significant portion of the project objectives and lends itself to being combined with other alternatives**
12	**Regional potable and non-potable reuse with gravel pits**	**Yes**	**This alternative scored higher than any alternative**
13	Maximize use of public properties	No	Components of this alternative can be combined into any alternative
14	Maximize water transfers	No	Components of this alternative can be combined into any alternative. This alternative scored lowest of all alternatives.
15	Maximize recreation and wildlife opportunities	No	Components of this alternative can be combined into any alternative
16	**Project 9250**	**Yes**	**This alternative will be evaluated to provide a comparison for other alternatives**
17	Minimize Cost	No	Alternative by itself does not meet flood control objective. Components of this alternative can be combined into any alternative
18	Maximize funding partners	No	Components of this alternative can be combined into any alternative
19	County Scenario 1	No	This alternative was the third lowest scoring alternative.
20	**County Scenario 5**	**Yes**	**Previous qualitative analysis and results of original Runoff Model are inconclusive; additional quantitative analysis is necessary**
21	**County Scenario 7**	**Yes**	**Previous qualitative analysis and results of original Runoff Model are inconclusive; additional quantitative analysis is necessary**
22	**County Scenario 8**	**Yes**	**Previous qualitative analysis and results of original Runoff Model are inconclusive; additional quantitative analysis is necessary**

Appendix D
Additional Wildlife Habitat Information

BACKGROUND

A number of terms have been used in various wildlife movement studies, such as "wildlife corridor", "travel route", "habitat linkage", and "wildlife crossing" to refer to areas in which wildlife move from one area to another. To clarify the meaning of these terms and facilitate the discussion on wildlife movement in this analysis, these terms are defined as follows:

Travel Route–a landscape feature (such as a ridgeline, drainage, canyon, or riparian strip) within a larger natural habitat area that is used frequently by animals to facilitate movement and provide access to necessary resources (e.g., water, food, cover, den sites). The travel route is generally preferred because it provides the least amount of topographic resistance in moving from one area to another. It contains adequate food, water, and/or cover while moving between habitat areas and provides a relatively direct link between target habitat areas.

Wildlife Corridor–a piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Wildlife corridors are usually bounded by urban land areas or other areas unsuitable for wildlife. The corridor generally contains suitable cover, food, and/or water to support species and facilitate movement while in the corridor. Larger, landscape-level corridors (often referred to as "habitat or landscape linkages") can provide both transitory and resident habitat for a variety of species.

Wildlife Crossing–a small, narrow area, relatively short in length and generally constricted in nature, that allows wildlife to pass under or through an obstacle or barrier that otherwise hinders or prevents movement. Crossings typically are manmade and include culverts, underpasses, drainage pipes, and tunnels to provide access across or under roads, highways, pipelines, or other physical obstacles. These often represent "choke points" along a movement corridor.

It is important to note that, in a large open space area in which there are few or no man-made or naturally occurring physical constraints to wildlife movement, wildlife corridors as defined above may not yet exist. Given an open space area that is both large enough to maintain viable populations of species and provide a variety of travel routes (canyons, ridgelines, trails, riverbeds, and others), wildlife will use these "local" routes while searching for food, water, shelter, and mates, and will not need to cross into other large open space areas. Based on their size, location, vegetative composition, and availability of food, some of these movement areas (e.g., large drainages and canyons) are used for longer lengths of time and serve as source areas for food, water, and cover, particularly for small- and medium-sized animals. This is especially true if the travel route is within a larger open space area. However, once open space areas become constrained and/or fragmented as a result of urban development or construction of physical obstacles such as roads and highways, the remaining landscape features or travel routes that connect the larger open space areas can "become" corridors as long as they provide adequate space, cover, food, and water, and do not contain obstacles or distractions (e.g., man-made noise, lighting) that would generally hinder wildlife movement.

CONSTRAINTS

Utility and public works entities are required by state and local regulators to perform regular maintenance within their easements in order to protect public health and safety. As an example, flood control and electric utilities are mandated to remove or clear vegetation from within floodways or to maintain certain clearances from electric conductors (or other devices such as a capacitors, transformers, etc.) in order to maintain flood capacity or to prevent power outages and/or fires that may result from direct vegetation contact with electric utility infrastructure. It is anticipated that implementation of the Sun Valley Watershed Management Plan would permit existing utilities and public works entities, as well as residential, commercial, and industrial development, within the project area to continue with their mandated operation and maintenance activities consistent with all applicable rules, regulations, and codes.

Based on the size, location, vegetative composition, and availability of food, urban development or construction of physical obstacles such as roads and highways, wildlife habitat enhancement within the project area would have the potential to facilitate the establishment of wildlife corridors or wildlife crossings. Due to the urban nature of the project area, it is anticipated that the availability of adequate space, cover, food, and water relative to anthropogenic obstacles or distractions would limit use of these enhanced areas to small mammal, reptiles, and birds. Larger mammals, such as mountain lions and bears would not be expected to utilize any areas enhanced, though carnivores such as coyotes would be expected due to their ability to adapt to urbanized settings. Furthermore, because wildlife habitat enhancement would likely occur conjunctively within utility or public works easements, there would be some level of separation from local neighborhoods due to fencing and other access controls already implemented to protect the easements from intrusion by local residents or the local residents from wildlife using the easements.

Potential "take" or impacts to endangered, threatened, or other special status plants, animals or habitats are not anticipated to occur during initial project implementation. However, if it is subsequently documented that special status plant or animal species have established themselves in the Sun Valley Watershed Management Plan area, then any potential impacts to those species would occur consistent with federal, state or local regulations or policies.

Landfills and mineral extraction facilities, though not considered significant habitat areas while operational, may provide the most viable locations for future wildlife habitat enhancement or restoration upon the cessation of their operational life. Portions of landfills and mineral extraction facilities within the plan area that are either no longer in use, or have been inactive for years, may provide the most viable locations for wildlife habitat enhancement or restoration.

RECOMMENDATIONS

Restricting further unnecessary development within the utility or public works easements, while allowing mandated maintenance to continue, would allow for the opportunity to enhance or restore habitat within these areas. Furthermore, locations within the area where other land uses occur, such as parking, landfills, and mineral extraction, may also provide wildlife habitat enhancement and linkage opportunities in the project area. This may be accomplished by working with utilities, public works, businesses, or real property owners to manage their easements or property conjunctively for wildlife through habitat enhancement, habitat restoration, or the granting of biological easements that would allow these activities to occur in the future.