

## I. Work Plan Introduction

### Opening Statement

The Greater Los Angeles County Integrated Regional Water Management (IRWM) Region (Region) covers a vast urban landscape of more than 2,000 square miles with a population of over 10 million people. The projects submitted in this Proposal are as ambitious in scale and scope as their geographical setting. They combine to advance water supply reliability, protect and improve water quality, expand open space and recreation, and practice environmental stewardship – all objectives identified in the Region’s adopted IRWM Plan.

This Proposal directly addresses many of the water resource challenges facing the Region. Atop the list are the needs to reduce dependence on imported supplies, improve the quality of groundwater and urban runoff, and increase open space and recreational opportunities. Enhancing regional self-reliance looms as an immediate and immense challenge. Underscoring the scale of the challenge, the Metropolitan Water District of Southern California has estimated that southern California could face a potential gap between demand and supply of up to 1,300,000 acre-foot/year (AFY) supply shortfall by the year 2025 if new water supply projects are not developed. The adopted IRWM Plan estimates a potential water supply gap of 800,000 AFY for the Region.

Water quality advances also are essential and include protecting and cleaning up contaminated groundwater basins and impaired water bodies. The Region’s creeks, rivers, and water bodies have been placed on the State’s 303(d) list of impaired water bodies due to trash, bacteria, nutrients, metals, total dissolved solids, and other toxic pollutants. The adopted plan identifies ambitious targets for the reduction, capture, and treatment of both dry- and wet-weather runoff. Improving surface water quality creates opportunities to increase the recharge of runoff in local groundwater basins, thereby increasing regional self-reliance. The Proposal also includes projects that provide supply or quality benefits while increasing open space and/or recreational opportunities. This is a Region where the ratio of parkland and open space to population is far below the standards for parkland in urban environments.

Given the vast population and number of agencies required to manage the Region’s resources, the benefits achieved through implementation of one of the Proposal’s projects, can easily be multiplied. Dollars invested in an initial project can be leveraged to provide the basis for subsequent implementation of similar projects throughout the Region. The scale of the Region

provides greater opportunity to apply innovation on a scale that can reap impressive gains as evidenced by the following examples.

- **Increase Capture and Use of Stormwater:** The adopted IRWM plan established a target to reduce and reuse 150,000 AFY of dry-weather urban runoff and capture and treat an additional 170,000 AFY of urban runoff. The IRWM Plan also established a target to reduce and reuse 220,000 AFY of stormwater runoff from developed areas, and capture and treat an additional 270,000 AFY. A recent study estimated that local stormwater capture projects could add up to 150,000 AF of local supply (“Where Will We Get the Water,” LAEDC Consulting Practice, 2008) to the Region. The four stormwater capture projects (Hahamongna Basin Multi-Use Project, Tujunga Spreading Grounds Enhancements Project, San Antonio Spreading Grounds Improvements, and Whittier Narrows Conservation Pool Project) in this Proposal will work to increase the capacity to capture stormwater by approximately 25,535 AF. The implementation of projects such as these provide the technical and operational information that will allow the next generation of stormwater projects to be implemented more quickly and cost-effectively. Every acre-foot of stormwater captured reduces the need to import an equivalent amount from outside the region.
- **Increase Use of Recycled Water:** The IRWM Plan includes a target to reuse or infiltrate 130,000 AFY of recycled water (above current use of approximately 120,000 AFY). Additionally, it has been estimated that recycled water has the potential of yielding more than 450,000 AF of water within five years—doing more to increase regional self-sufficiency than any other potential water source in the Region. With the Leo J. Vander Lans Advanced Water Treatment Plant Expansion Project, the plant will produce an additional 4,000 AF per year of high quality advanced treated recycled water for use in the Alamitos Seawater Intrusion Barrier instead of imported supply. All three seawater barriers operating within the Region are seeking to use more recycled water supply in lieu of imported supply. Implementation of this project would support future projects to potentially reduce imported water use by over 11,000 AF per year. This proposal also contains the Phase 1 project from the Central Los Angeles County Regional Water Recycling Program that when fully developed could decrease the Region’s dependence on imported supplies by over 3,200 AFY.
- **Increase Water Conservation:** The IRWM Plan includes a planning target of 800,000 AFY for water supply, including both new supplies and continued aggressive

implementation of water conservation measures to reduce demand. West Basin Municipal Water District (MWD), as an imported water wholesaler in the Region, is seeking to double conserved supply within its service area. This Proposal includes a project to implement a project that will install 4,560 water and energy efficient devices resulting in an estimated 82 AF of water saved annually. That savings is the equivalent to water used by almost 30,000 households. West Basin MWD's project can be expanded and duplicated by agencies operating throughout the Region to provide further conserved imported water supplies. It is estimated that expanding urban water conservation in southern California could have the impact equivalent to adding 1 million AF of water to the regional supply (about 25 percent of current annual use).

This Proposal allows the Region to advance toward its objectives of increasing water supply reliability, protecting and improving water quality, and expanding open space and recreation – all while practicing environmental stewardship. The projects of this Proposal tackle regional challenges with projects that are cost-efficient, environmentally friendly, reliable, and likely to be implemented.

The Region's boundaries reflect the combined area of five Watershed Management Areas (WMA) identified in the Watershed Management Initiative chapter of the Basin Plan for Los Angeles and Ventura Counties, prepared by the Los Angeles Regional Water Quality Control Board. These are the Los Angeles River Watershed, the San Gabriel River Watershed, the Santa Monica Bay WMA, the Los Cerritos Channel/Alamitos Bay WMA, and the Dominguez Channel WMA.

## Goals and Objectives

The goals of the IRWM Plan are to improve water supply and water quality, enhance open space, recreation and habitat, and sustain local communities in the Greater Los Angeles County Region.

The Region has articulated seven objectives to meet these broad goals. All projects included in this proposal are multi-benefit projects that attain multiple IRWM Plan objectives. The objectives of the Greater Los Angeles County Region IRWM Plan are as follows:

- Improve Water Supply
  - Optimize local water resources to reduce the Region's reliance on imported water through demand reduction

- Improve Water Quality
  - Comply with water quality standards (including Total Maximum Daily Loads [TMDLs]) by improving the quality of urban runoff, stormwater, and wastewater
  - Protect and improve groundwater and drinking water quality
- Enhance Habitat
  - Protect, restore, and enhance natural processes and habitats
- Enhance Open Space and Recreation
  - Increase watershed friendly recreational space for all communities
- Sustain Infrastructure for Local Communities
  - Maintain and enhance public infrastructure related to flood protection, water resources, and water quality

#	Project	Meeting IRWM Plan Objectives					
		1 Optimize Local Water Resources	2 Improve Quality of Urban Runoff, Stormwater and Wastewater	3 Protect and Improve Groundwater and Drinking Water Quality	4 Protect, restore, and enhance natural processes and habitats	5 Increase watershed friendly recreational space for all communities	6 Maintain and Enhance Public Infrastructure
1	Hahamongna Basin Multi-Use Project	✓	✓	✓	✓	✓	✓
2	Citywide Smart Irrigation Control System and Recycled Water Improvements	✓	✓	✓	✓	✓	✓
3	Storm Drain Improvements and Installation of Infiltration Chambers on Hawthorne Blvd		✓	✓			✓
4	Penmar Water Quality and Runoff Reuse	✓	✓		✓	✓	✓
5	Model Equestrian Center		✓		✓	✓	

#	Project	Meeting IRWM Plan Objectives					
		1 Optimize Local Water Resources	2 Improve Quality of Urban Runoff, Stormwater and Wastewater	3 Protect and Improve Groundwater and Drinking Water Quality	4 Protect, restore, and enhance natural processes and habitats	5 Increase watershed friendly recreational space for all communities	6 Maintain and Enhance Public Infrastructure
6	16th St. Watershed Runoff Use Project	✓					✓
7	Surface Water Treatment Plant Improvements	✓	✓	✓			✓
8	Central LA County Regional Water Recycling Program	✓				✓	✓
9	Tujunga Spreading Grounds Enhancements Project	✓	✓	✓	✓	✓	✓
10	San Antonio Spreading Grounds Improvements	✓		✓	✓		✓
11	Leo J. Vander Lans Advanced Water Treatment Plant Expansion	✓	✓	✓	✓		✓
12	Whittier Narrows Conservation Pool Project	✓	✓	✓	✓	✓	✓
13	Water and Energy efficiency in the Multi- Family and Hotel Sectors	✓	✓				✓

## Purpose and Need

The purpose of the Greater Los Angeles County Region's Proposal is to seek State Proposition 84 funding to match local funding in order to implement projects that will advance regional IRWM Plan objectives. Those objectives are listed above in the Goals and Objectives section and include optimizing local water resources, complying with water quality standards, protecting and improving groundwater and drinking water quality, enhancing natural processes, expanding watershed friendly recreational space for all communities and habitats, and maintaining public infrastructure.

The need for the Proposal's projects is framed by challenges faced in the State as a whole, as well as challenges unique to the Region. The most significant challenge in the Region is the uncertainty of imported water supplies. Ecosystem concerns in the Bay-Delta resulted in legal and regulatory actions that have reduced imported State Water Project (SWP) supplies since 2008. Potential projects aimed at fixing these concerns and returning SWP supplies to their normal levels are not anticipated to be implemented for several years if at all. Recent drought in the State and protracted drought on the Colorado River watersheds have contributed to supply allocation reductions of up to 50 percent last year.

The Region is the most populous and urbanized in California. With this size and density come unprecedented local challenges to the security and reliability of its water supply. Groundwater has been and remains an important part of the water supply picture; however, groundwater basins have a history of overdraft and are heavily dependent upon groundwater replenishment supplies to maintain pumping demands. Groundwater quality continues to be threatened by the influence of contaminant plumes resulting from historical industrial and agricultural practices as well as from salinity due to seawater intrusion. However, groundwater basins can provide the region with an opportunity to further improve the reliability of supply by providing cost-effective long-term storage of surface supplies. Projects that contribute to the better management of the Region's basins are critical to the overall ability to meet ever increasing demands.

The quality of local surface waters is also threatened by multiple sources of contamination including wastewater and industrial discharges, urban runoff, and stormwater runoff. Poor water quality translates into higher treatment costs and the need for alternative sources of water supply. Therefore, regional needs include the following: reduce nutrient runoff into local water bodies; reduce water supply demand; increase use of non-potable and potable recycled water; expand the recycled water distribution system; expand conservation measures; increase the potential for groundwater recharge; improve groundwater quality; and expand

open space and recreational opportunities and surface water quality in Disadvantaged Communities (DACs).

To meet these challenges and needs, this Proposal presents an amalgam of projects that move the Region toward realizing each of the IRWM Plan objectives. Below, the objectives are matched with the general purpose of the projects.

- Local water resources are optimized with projects that expand groundwater recharge by increasing the ability to use stormwater and recycled water for replenishment supplies as well as increasing the offset of potable supplies through the use of non-potable recycled water and water use efficiency programs.
- Water quality standards are met with projects that improve the quality of stormwater runoff and wastewater effluent through natural and engineered improvements to treatment.
- Groundwater supplies are protected and improved with projects that increase the capacity to recharge stormwater and treat recycled water to advanced levels for use in seawater barriers.
- Natural processes and habitats are protected, restored, and enhanced with projects that increase open space use and recreational opportunities adjacent to groundwater recharge facilities, minimize quality impacts of recreational activities, ensure the ability to keep parks green through the use of non-potable supplies, and improve quality of stormwater runoff.
- Watershed friendly recreational space for all communities is expanded at stormwater capture and groundwater recharge facilities in both DACs and non-DAC areas.
- Public infrastructure is maintained and enhanced with projects that accomplish the following:
  - Add flood protection on city streets and maintain regional flood control objectives while providing enhanced water quality and recreational benefits
  - Expand recycled water treatment and distribution systems
  - Improve treatment levels at wastewater and surface water treatment plants that will allow for local supplies to be used at a higher beneficial use
  - Improve stormwater capture facilities

- Invest in innovative water efficiency devices to conserve both potable and non-potable supplies
- Improve the operational efficiency of an interconnected multi-agency recycled water system

**Project List**

The following table provides an overview of the Proposal projects that includes an abstract of each project, the current status of each project in terms of percent completion of design, and the agencies involved in implementing the project.

#	Project Short Name	Abstract	Design Status (%)	Implementing Agency
				(Project Partners)
1	Hahamongna Basin Multi-Use Project	The Hahamongna Basin Multi-Use Project will increase water storage capacity in the Hahamongna Basin. This multi-benefit project incorporates features such as restoration of riparian habitat, installation of a public restroom, improved aquatic connectivity, relocation of facilities to expand stormwater retention, expansion of open space, water quality improvements, and expansion of recreational opportunities.	30%	<b>Implementing Agency:</b> Arroyo Seco Foundation, <b>Project Partners:</b> <ul style="list-style-type: none"> <li>• City of Pasadena Department of Public Works</li> <li>• Los Angeles County Department of Public Works</li> <li>• Raymond Basin Management District</li> </ul>



#	Project Short Name	Abstract	Design Status (%)	Implementing Agency
				(Project Partners)
2	City-wide Smart Irrigation Control System and Recycled Water Improvements	This project will upgrade the City-wide irrigation system to produce a reduction in runoff and reduction in total water usage through the use of a central control station of operation for the entire system utilizing current evapotranspiration (ET) and wireless technology. During this upgrade the City would also like to expand its reclaimed water usage to the Irrigation System at several parks including Wild Walnut Park, De Anza Park, Grape Arbor Park and the Headwaters Corner.	30%	<b>Implementing Agency:</b> City of Calabasas <b>Project Partner:</b> Las Virgenes Municipal Water District
3	Storm Drain Improvements and Installation of Infiltration Chambers on Hawthorne Blvd	This project will incorporate stormwater improvement best management practices (BMPs) along a one-mile stretch of Hawthorne Boulevard, utilizing filtering devices and upgraded catch basins to enhance the quality of stormwater runoff. Further benefits of this project include improved management of stormwater runoff, which will help improve roadway conditions, including elimination of hydroplane instances, increasing regional economic activity, and improving the quality of life for residents in this area.	0%	<b>Implementing Agency:</b> City of Hawthorne

#	Project Short Name	Abstract	Design Status (%)	Implementing Agency
				(Project Partners)
4	Penmar Water Quality and Runoff Reuse Project	The Penmar Water Quality Improvement and Runoff Reuse Project will treat stormwater diverted from the 16th Street subwatershed. This project includes installation of hydrodynamic separators, an underground detention tank, a chlorination facility, a pump station, and overflow systems. The diverted runoff shall be treated/disinfected. The disinfected effluent will be pumped through a smart irrigation system to decrease the current landscaping irrigation demand.	50%	<p><b>Implementing Agency:</b> City of Los Angeles</p> <p><b>Project Partner:</b> City of Santa Monica</p>
5	Model Equestrian Center	The Model Equestrian Center project will create a demonstration site for environmentally sustainable horse-keeping practices while expanding opportunity for public recreation and improving stormwater quality from the existing Peter Weber Equestrian Center. A new barn and associated improvements will be constructed, key water quality features will include a covered horse wash area plumbed to the sanitary sewer and a cistern to collect rainfall from the roof for use in wetting down arenas for dust control. The existing equestrian facilities will be retrofitted to improve drainage and stormwater quality runoff. Both the new facility and the retrofit will be designed to demonstrate BMPs that can be easily replicated at private stables.	5%	<p><b>Implementing Agency:</b> City of Rolling Hills Estates</p> <p><b>Project Partners:</b></p> <ul style="list-style-type: none"> <li>• Sanitation Districts of Los Angeles County</li> <li>• Los Angeles County Dept. of Parks and Recreation</li> <li>• California Department of Toxic Substances Control</li> </ul>

#	Project Short Name	Abstract	Design Status (%)	Implementing Agency
				(Project Partners)
6	16th St. Watershed Runoff Use Project	The purpose of this project is to convey treated stormwater from the Penmar Water Quality Improvement Project and use it for irrigation at Marine Park. This project reduces demand for potable water, and in particular reduces reliance on imported water.	0%	<b>Implementing Agency:</b> <ul style="list-style-type: none"> <li>City of Santa Monica</li> <li>City of Los Angeles</li> </ul>
7	Surface Water Treatment Plant Improvements	Improvements to the Covina Irrigating Company (CIC) Surface Water Treatment Plant are needed to reduce the TTHM precursors and the recent formation of carcinogenic disinfection by-products (DBP). This project will include improvements to the existing filtration facility and the addition of the UV/chlorination equipment to control DBP formation and prevent pathogen contamination of finished drinking water. CIC operates the Temple Water Treatment Plant located in Glendora, CA. The existing Temple Water Treatment Plant is a conventional surface water treatment plant that can treat water from the San Gabriel River. However, the current treatment technology cannot sufficiently treat water diverted from the San Gabriel River to meet new water quality regulations and CIC must pump groundwater from the Main San Gabriel Basin. Should the plant not be improved, replacement groundwater supplies will increase the cost of water to the DACs and the region as well as lose a valuable local source of supply for these CIC served communities.	100%	<b>Implementing Agency:</b> Covina Irrigating Company <b>Project Partners:</b> <ul style="list-style-type: none"> <li>Main San Gabriel Basin Water Master</li> <li>Upper San Gabriel Valley Municipal Water District</li> <li>Three Valleys Municipal Water District</li> </ul>

#	Project Short Name	Abstract	Design Status (%)	Implementing Agency
				(Project Partners)
8	Central LA County Regional Water Recycling Program	<p>This Central Los Angeles County (CeLAC) Regional Recycled Water Program is comprised of two projects: the Griffith Park South Water Recycling Project (Griffith Park Project) and the Groundwater Replenishment (GWR) Facilities Planning Study (GWR Study) to expand recycled water use in the area. The Griffith Park Project will replace a imported water used for irrigation at the Roosevelt Golf Course with recycled water from the Plant. The Griffith Park Project will also improve the operational efficiency of the existing recycled water distribution system by adding 1 million gallons of storage. The GWR Study will determine the feasibility of storing recycled water from the Plant through groundwater recharge. If feasible, this recharge during periods of low recycled water demand will offset the need for an equal amount of imported water.</p>	90%	<p><b>Implementing Agency:</b> City of Los Angeles, Department of Water and Power</p> <p><b>Project Partner:</b> Pasadena Water and Power</p>

#	Project Short Name	Abstract	Design Status (%)	Implementing Agency
				(Project Partners)
9	Tujunga Spreading Grounds Enhancements Project	The Tujunga Spreading Grounds Enhancement Project will improve the existing system which diverts stormwater from the Tujunga Wash Channel using a rubber dam and is distributed through the facility using a canal system and flashboard structures. Proposed improvements will improve the intake facility, deepen and combine basins, modernize diversion facilities, and upgrade existing entrance/exit gates. These enhancements will increase the storage capacity and increase the estimated recharge volume. The project will also create open space enhancements, native habitat, and wetlands with passive recreational and educational opportunities.	60%	<p><b>Implementing Agency:</b> Los Angeles Department of Water and Power</p> <p><b>Project Partners:</b></p> <ul style="list-style-type: none"> <li>• Los Angeles County Flood Control District</li> <li>• City of Los Angeles Department of Recreation and Parks</li> </ul>
10	San Antonio Spreading Grounds Improvements	The San Antonio Spreading Grounds Improvement Project will extend an existing pipeline to spread surplus imported water for conjunctive use within the San Antonio Spreading Grounds. This will improve groundwater quality in Six Basins, lessen dependence on treated-firm import water supplies through CUP, allow better groundwater basin and local water supply management for the region, and maintain sensitive RAFSS habitat environment as open space.	95%	<p><b>Implementing Agency:</b> Three Valleys Municipal Water District</p>

#	Project Short Name	Abstract	Design Status (%)	Implementing Agency
				(Project Partners)
11	Leo J. Vander Lans Advanced Water Treatment Plant Expansion	<p>Expansion of the Leo J. Vander Lans Advanced Water Treatment Facility will supply an additional 3,000-5,000 AFY of recycled wastewater for injection at the Alamitos Seawater Barrier, fully replacing like amount of imported water demand at this seawater barrier. Recharge of advanced treated recycled water at the barrier (seawater intrusion best management practice) to protect against saltwater contamination and improve groundwater quality.</p> <p>Expand Water Recycling plant to double the capacity of existing treatment process (microfiltration, reverse-osmosis, and ultraviolet light) and add advanced oxidation. Deliver highly treated recycled water to Alamitos Seawater Intrusion Barrier, fully replacing imported water demand at the barrier. Existing facility was implemented with consideration for expansion.</p>	15%	<p><b>Implementing Agency:</b> WRD</p> <p><b>Project Partners:</b></p> <ul style="list-style-type: none"> <li>• U.S. Bureau of Reclamation</li> <li>• State Water Resources Control Board (SWRCB)</li> </ul>
12	Whittier Narrows Conservation Pool Project	<p>The Whittier Narrows Conservation Pool allows for the seasonal recharge of stormwater into the Central Basin using conservation capacity behind the Whittier Narrows Dam as temporary detention. An operational change to increase the dam’s conservation capacity by an additional 1,100 AFY will offset imported water use for groundwater recharge by a like amount. Additionally, the increased duration of seasonal inundation will support higher-quality habitat and open space.</p>	15%	<p><b>Implementing Agency:</b> WRD</p> <p><b>Project Partners:</b></p> <ul style="list-style-type: none"> <li>• U.S. Army Corps of Engineers</li> <li>• Los Angeles County Flood Control District</li> </ul>

#	Project Short Name	Abstract	Design Status (%)	Implementing Agency
				(Project Partners)
13	Water and Energy efficiency in the Schools and Hotel/Motel Sectors	This program will directly install both water and energy efficiency devices in schools and hotels/motels within the beachside communities of Malibu and Topanga. This 30-mile stretch of project area has 30 identified sites that could participate in the program. The efficient devices that will replace older, inefficient devices include: high-efficiency toilets (HETs; 1.28 gallons per flush replaces older 3 – 5 gallon toilets); high-efficiency urinals (HEUs); 13Watt twist compact-fluorescent light bulbs (CFLs); 1.5 gallons per minute (GPM) Low-Flow Showerheads, 1.5 GPM Kitchen Aerators and 1.0 GPM Bathroom Aerators and Smart Irrigation Controllers. The program will also disseminate conservation education literature, thus providing a “full service” water and energy efficiency program.	NA	<b>Implementing Agency:</b> West Basin Municipal Water District  <b>Project Partners:</b> <ul style="list-style-type: none"> <li>• Los Angeles County Waterworks District #29 (co-funder)</li> <li>• City of Malibu (assist with site identification and liaison to participants)</li> <li>• Southern California Edison and Gas Company (providing showerheads, aerators and compact-fluorescent lightbulbs)</li> <li>• Metropolitan Water District of Southern California (co-funder)</li> </ul>

### Integrated Elements of Projects

The following section describes the synergies or linkages between projects that result in added value or require coordinated implementation. This section will examine two specific approaches to adding value. The first approach identifies the synergies and integration of project elements that occur due to a very high level of cooperation between multiple agencies and entities. The coordination leverages the strengths and assets of each agency to add value to the project. Of the Proposal’s 13 projects, 11 are made possible by the cooperation of multiple agencies. The second approach explores the synergies that are developed by projects that achieve a common objective. The Region has identified its highest priorities in the IRWM Plan and is executing that Plan by focusing on objectives which include reducing dependence on imported supplies, improving the quality of stormwater and urban runoff, and increasing open space for recreation.

### Cooperation between Multiple Agencies and Entities

- The Central Los Angeles County Regional Water Recycling Program was developed through the four-agency collaboration between Glendale Water and Power, Los Angeles Department of Water and Power (LADWP), Pasadena Water and Power (PWP), and Foothill Municipal Water District to expand the existing regional non-potable distribution system, as well as develop the potential for a groundwater recharge project. The centrally located Los Angeles-Glendale Water Reclamation Plant (LAG) will benefit all four entities as the distribution system expands. This Proposal includes a Phase 1 project that involves development of non-potable supplies for LADWP and the further exploration of indirect potable supplies for PWP. Alone, these agencies and cities would not be able maximize the use of recycled supply generated at LAG in the most cost-effective and feasible manner. The Phase 1 Project when fully developed could decrease the Region's dependence on imported supplies by over 3,200 AFY.
- The Hahamongna Basin Multi-Use Project is supported by PWP in cooperation with the Arroyo Seco Foundation, Raymond Basin Management District, and the County of Los Angeles Department of Public Works. The entities will pool resources to remove sediment in the Hahamongna Flood Management Basin (beyond levels required for flood control) to increase water storage capacity while expanding open space and recreational opportunities. Each agency contributes to this ambitious project that could not be accomplished without the partnership forged by the four entities.
- The Surface Water Treatment Plant Improvements Project demonstrates the cooperative effort between the Covina Irrigation Company, Main San Gabriel Basin Water Master, Upper San Gabriel Valley Municipal Water District and Three Valleys Municipal Water District that will not only allow the Temple Water Treatment Plant to upgrade to meet federal water quality standards but provide better use of local resources by reducing the amount of groundwater pumped from the Main San Gabriel Basin.



- 16th Street Watershed Runoff Use Project and adjacent Penmar Water Quality Improvement Project spotlight the cooperation between the City of Los Angeles to treat dry- and wet-weather runoff and the City of Santa Monica that will use the supply for irrigation at Santa Monica's Marine Park.
- Leo J. Vander Lans Advanced Water Treatment Plant Expansion Project exhibits cooperation between the Water Replenishment District, Sanitation Districts of Los Angeles County (LACSD), U.S. Bureau of Reclamation and the State Water Resources Control Board that will result in the Plant producing an additional 4,000 AFY of high quality advanced treated water for use at the Alamitos Seawater Barrier. This will benefit the Region by reducing the amount of imported water used to recharge the groundwater basin and reducing the amount of effluent discharged to the Pacific Ocean by LACSD's at the Long Beach Water Reclamation Plant.
- The Citywide Smart Irrigation Control System and Recycled Water Improvements Project benefits from cooperation between the City of Calabasas and Las Virgenes Municipal Water District (MWD). Current recycled water produced by Las Virgenes MWD for use by Calabasas will be conserved to further offset imported water (also supplied by Las Virgenes MWD) at City parks and medians.
- The Whittier Narrows Conservation Pool Project is supported by the Water Replenishment District, the U.S. Army Corps of Engineers (Corps), and the Los Angeles County Flood Control District. These three agencies working together will increase the conservation capacity behind Whittier Narrows Dam by 1,100 AFY—the amount used by 4,000 people annually. This high level of cooperation enables this project to increase groundwater recharge reducing the need for imported water and reduce the amount of poor quality runoff flowing to local rivers and the ocean.
- The Water and Energy Efficiency in the Schools and Hotel/Motel Sectors Project fields cooperation between several agencies, each contributing to a project lifetime savings of 1,531 AF and 6,496,376 million kilowatt hours (kWh) annually. West Basin MWD is the Project sponsor, with Los Angeles County Waterworks District #29 and Metropolitan Water District of Southern California (Metropolitan) co-funding the Project, City of Malibu assisting with site identification and liaison to participants, and Southern California Edison (SCE) and Gas Company providing showerheads, aerators and compact-fluorescent light bulbs (as an additional energy saving companion benefit).

- The Model Equestrian Center brings together the City of Rolling Hills, The Sanitation District of Los Angeles County, Los Angeles County Parks and Recreation, and the California Department of Toxic Substances Control. All entities realize the importance of building a equestrian center that will serve as a demonstration site for environmentally sustainable horse-keeping practices that also improve the quality of stormwater runoff. This level of cooperation is likely to be replicated throughout the Region and State.
- The Tujunga Spreading Grounds Enhancement Project is supported by Los Angeles Department of Water and Power, Los Angeles County Flood Control District, and the City of Los Angeles Department of Recreation and Parks. The multiple benefits of improving groundwater quality, enhancing local groundwater supply, and providing open space to the surrounding disadvantaged community could not be achieved without the cooperation between these agencies.

#### Projects that Achieve a Common Objective

- Several projects assist the Region in optimizing local water resources to reduce the Region's reliance on imported water:
  - Citywide Smart Irrigation Control System and Recycled Water Improvements Project
  - Hahamongna Basin Multi-Use Project
  - Penmar Water Quality and Runoff Reuse
  - 16 St. Watershed Runoff Use Project
  - Surface Water Treatment Plant Improvements
  - Central Los Angeles County Regional Water Recycling Program
  - Tujunga Spreading Grounds (TSG) Enhancement Project
  - San Antonio Spreading Grounds Improvements
  - Leo J. Vander Lans Advanced Water Treatment Plant Expansion Project
  - Whittier Narrows Conservation Pool Project
  - Water and Energy Efficiency in Schools and Hotel/Motel Sectors Project

- Several projects help comply with water quality regulations (including TMDLs) by improving the quality of urban runoff, stormwater and wastewater:
  - City of Calabasas Citywide Smart Irrigation Control System and Recycled Water Improvements Project
  - Hahamongna Basin Multi-Use Project
  - Model Equestrian Center
  - Storm Drain Improvement and Install of Infiltration Chambers Hawthorne Boulevard
  - Penmar Water Quality and Runoff Reuse
  - 16 St. Watershed Runoff Use Project
  - Surface Water Treatment Plant Improvements
  - TSG Enhancement Project
  - Leo J. Vander Lans Advanced Water Treatment Plant Expansion Project
  - Whittier Narrows Conservation Pool Project
  - Water and Energy Efficiency in Multi-Family and Hotel Sectors Project
- Several projects protect and improve groundwater and drinking water quality:
  - Hahamongna Basin Multi-Use Project
  - Citywide Smart Irrigation Control System and Recycled Water Improvements Project
  - Storm Drain Improvement and Install of Infiltration Chambers Hawthorne Boulevard
  - Tujunga Spreading Grounds Enhancement Project
  - Whittier Narrows Conservation Pool Project
  - San Antonio Spreading Grounds Improvements
  - Leo J. Vander Lans Advanced Water Treatment Plant Expansion Project
- Several projects protect, restore, and enhance natural processes:
  - Hahamongna Basin Multi-Use Project
  - Citywide Smart Irrigation Control System and Recycled Water Improvements Project
  - Penmar Water Quality and Runoff Reuse
  - Model Equestrian Center
  - 16 St. Watershed Runoff Use Project

- Tujunga Spreading Grounds Enhancement Project
- San Antonio Spreading Grounds Improvements
- Leo J. Vander Lans Advanced Water Treatment Plant Expansion Project
- Whittier Narrows Conservation Pool Project
- Several projects increase watershed friendly recreational space for all communities:
  - Hahamongna Basin Multi-Use Project
  - Citywide Smart Irrigation Control System and Recycled Water Improvements Project
  - Penmar Water Quality and Runoff Reuse
  - Model Equestrian Center
  - Central Los Angeles County Regional Water Recycling Program
  - Tujunga Spreading Grounds Enhancement Project
  - Whittier Narrows Conservation Pool Project
- Several projects maintain and enhance public infrastructure related to flood protection, water resources, and water quality:
  - Hahamongna Basin Multi-Use Project
  - Citywide Smart Irrigation Control System and Recycled Water Improvements Project
  - Storm Drain Improvement and Install of Infiltration Chambers Hawthorne Boulevard
  - Penmar Water Quality and Runoff Reuse
  - 16 St. Watershed Runoff Use Project
  - Surface Water Treatment Plant Improvements
  - Central Los Angeles County Regional Water Recycling Program
  - Tujunga Spreading Grounds Enhancement Project
  - San Antonio Spreading Grounds Improvements
  - Leo J. Vander Lans Advanced Water Treatment Plant Expansion Project
  - Whittier Narrows Conservation Pool Project
  - Water and Energy Efficiency in Schools and Hotel/Motel Sectors Project

### Regional Maps

The following regional maps illustrate the proposed geographical location of the Greater Los Angeles County Region (Regional Map #1), affected surface water resources (Regional Map #2), affected ground water resources (Regional Map #3), project locations (Regional Map #4), disadvantaged communities (Regional Map #5-8), and disadvantaged community project locations (Regional Map #9).

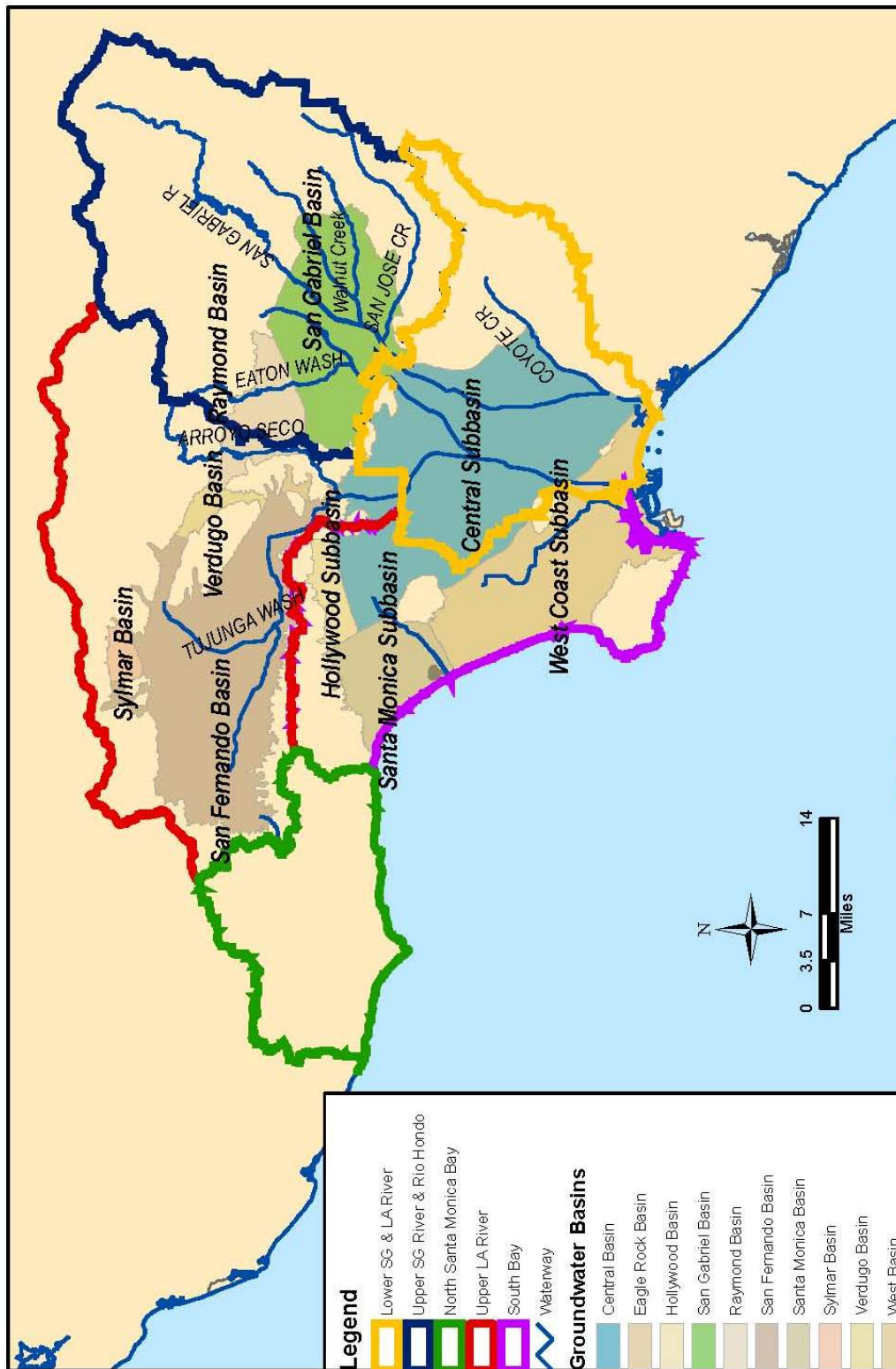
Regional Map #1: Greater Los Angeles County Region



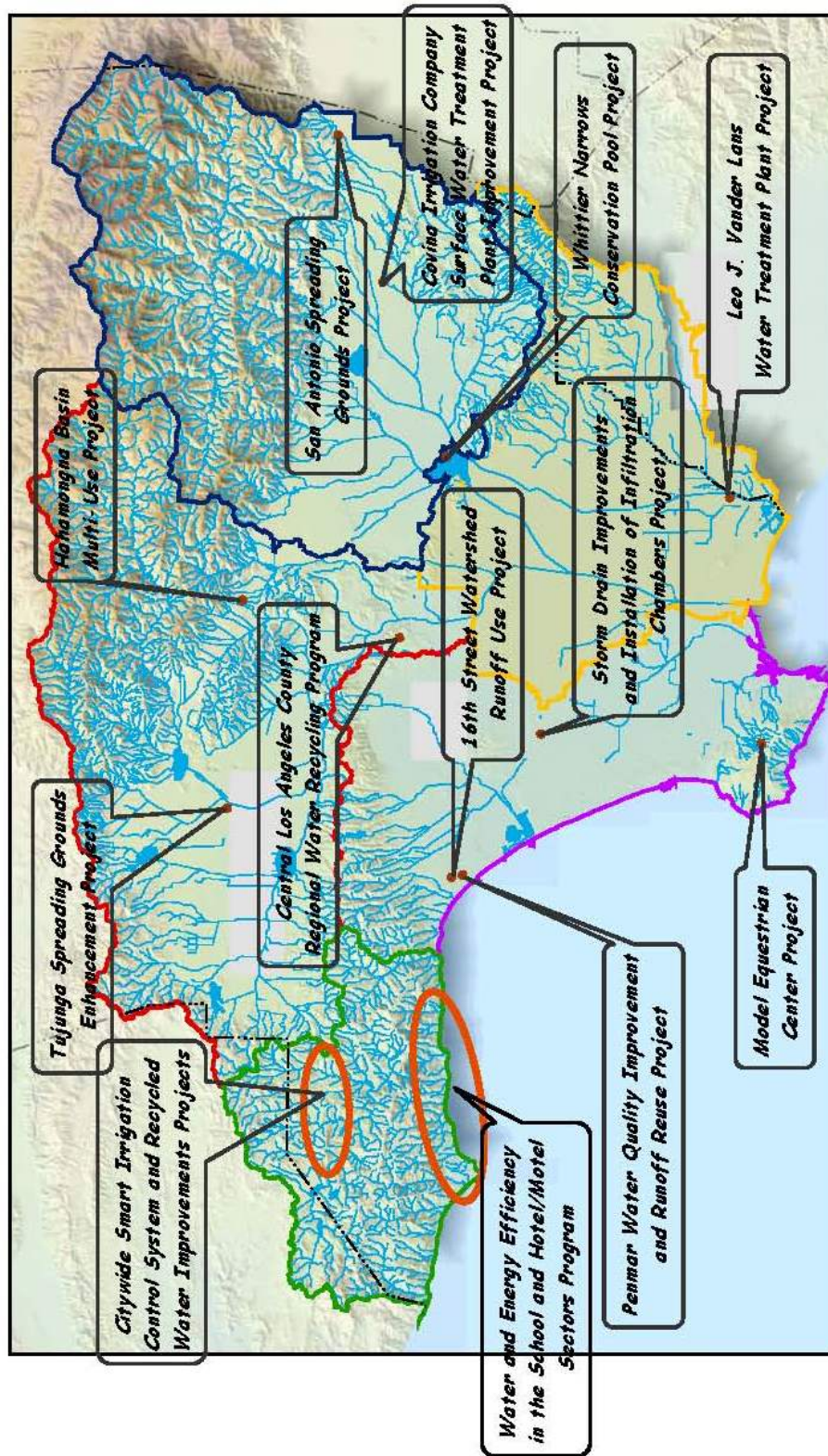
Regional Map #2: Affected Surface Water Resources



Regional Map #3: Affected Groundwater Resources



Regional Map #4: Project Locations



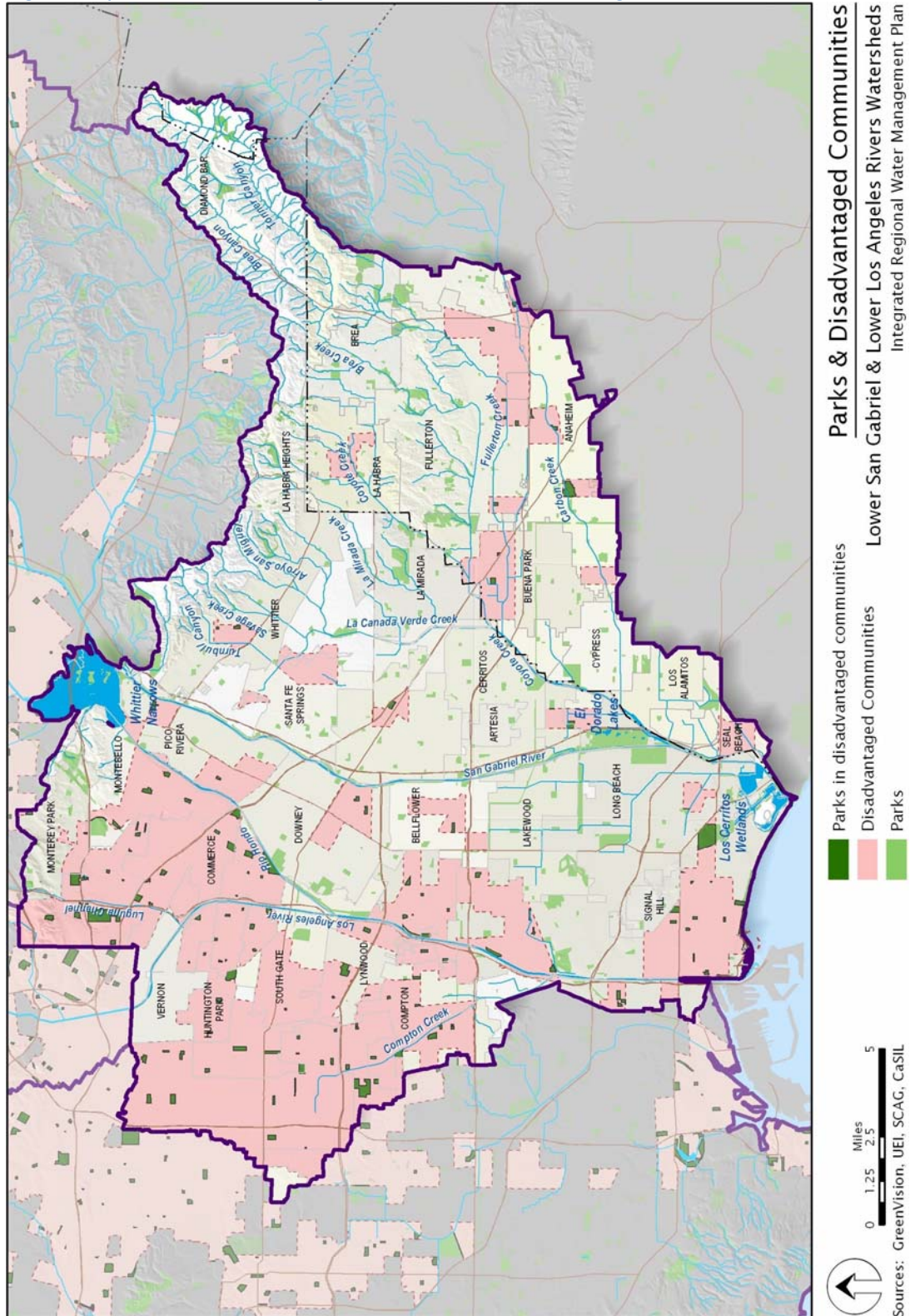
Project Locations

Greater Los Angeles County Region  
Integrated Regional Water Management Region

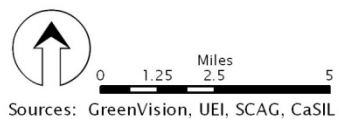
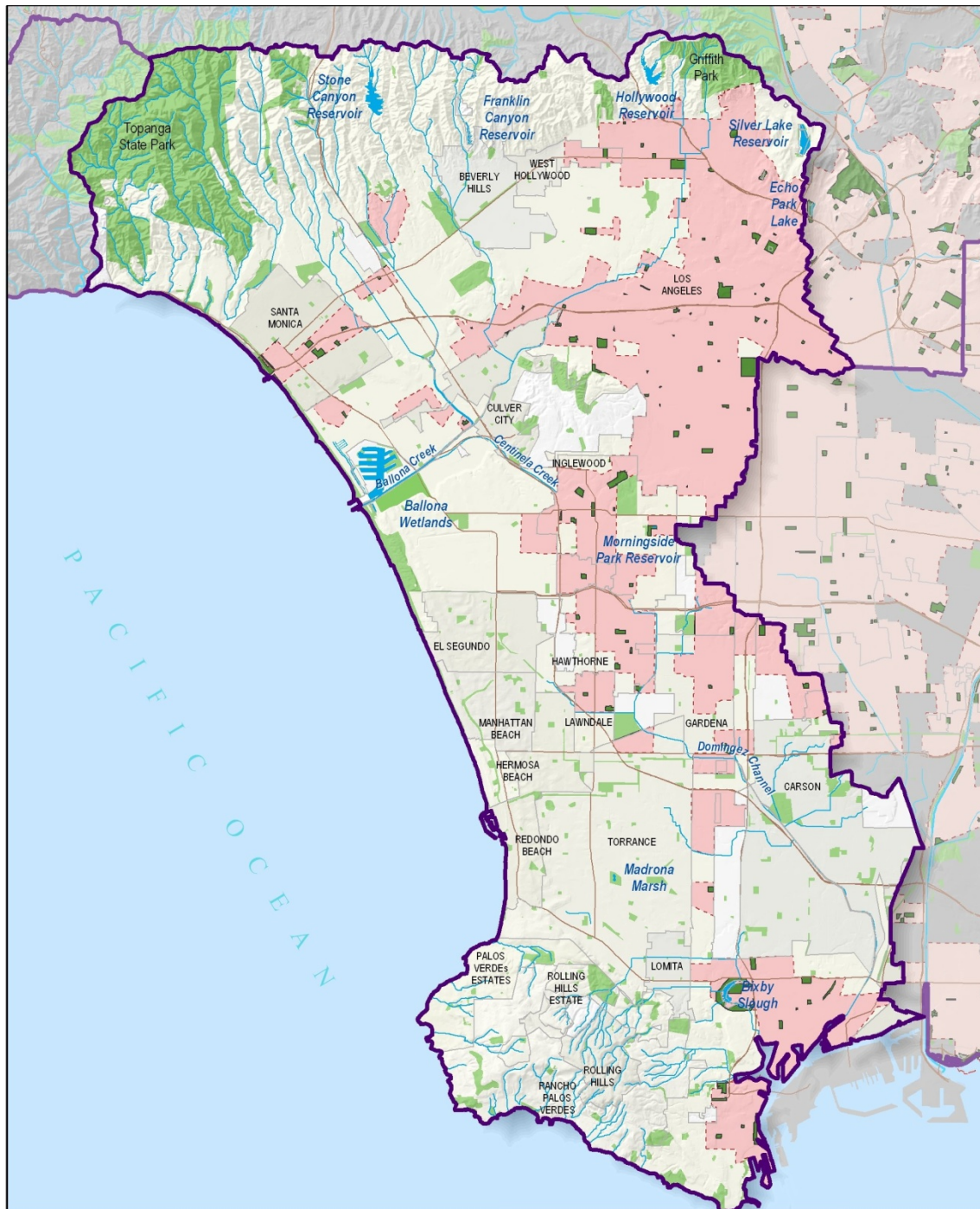




Regional Map #5: DACs within the Region—Lower San Gabriel and Los Angeles Rivers Watersheds



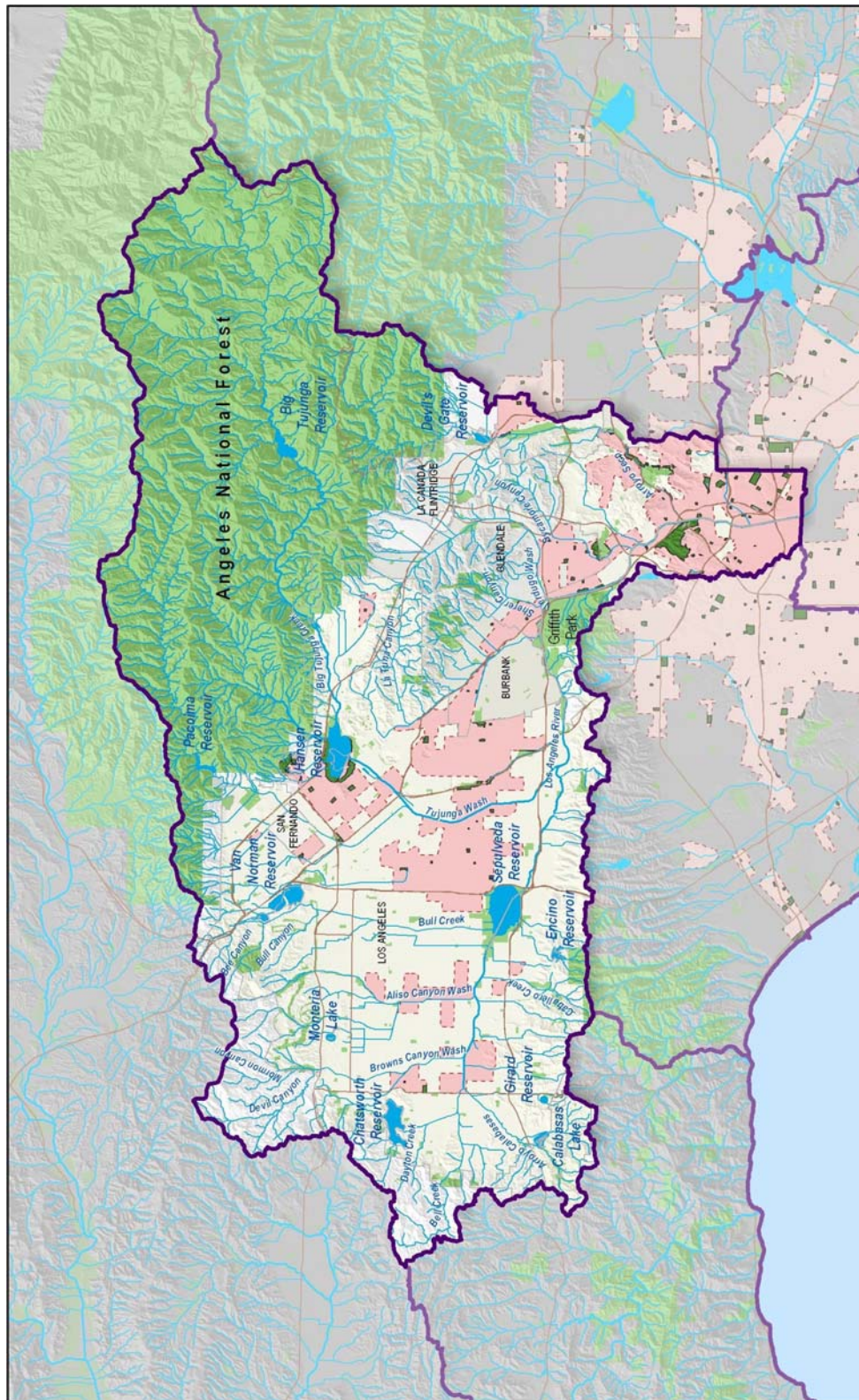
Regional Map #6: DACs within the Region—South Bay Watersheds



-  Parks in disadvantaged communities
-  Disadvantaged Communities
-  Parks

**Parks & Disadvantaged Communities**  
South Bay Watersheds  
Integrated Regional Water Management Plan

Regional Map #7: DACs within the Region—Upper Los Angeles River Watershed



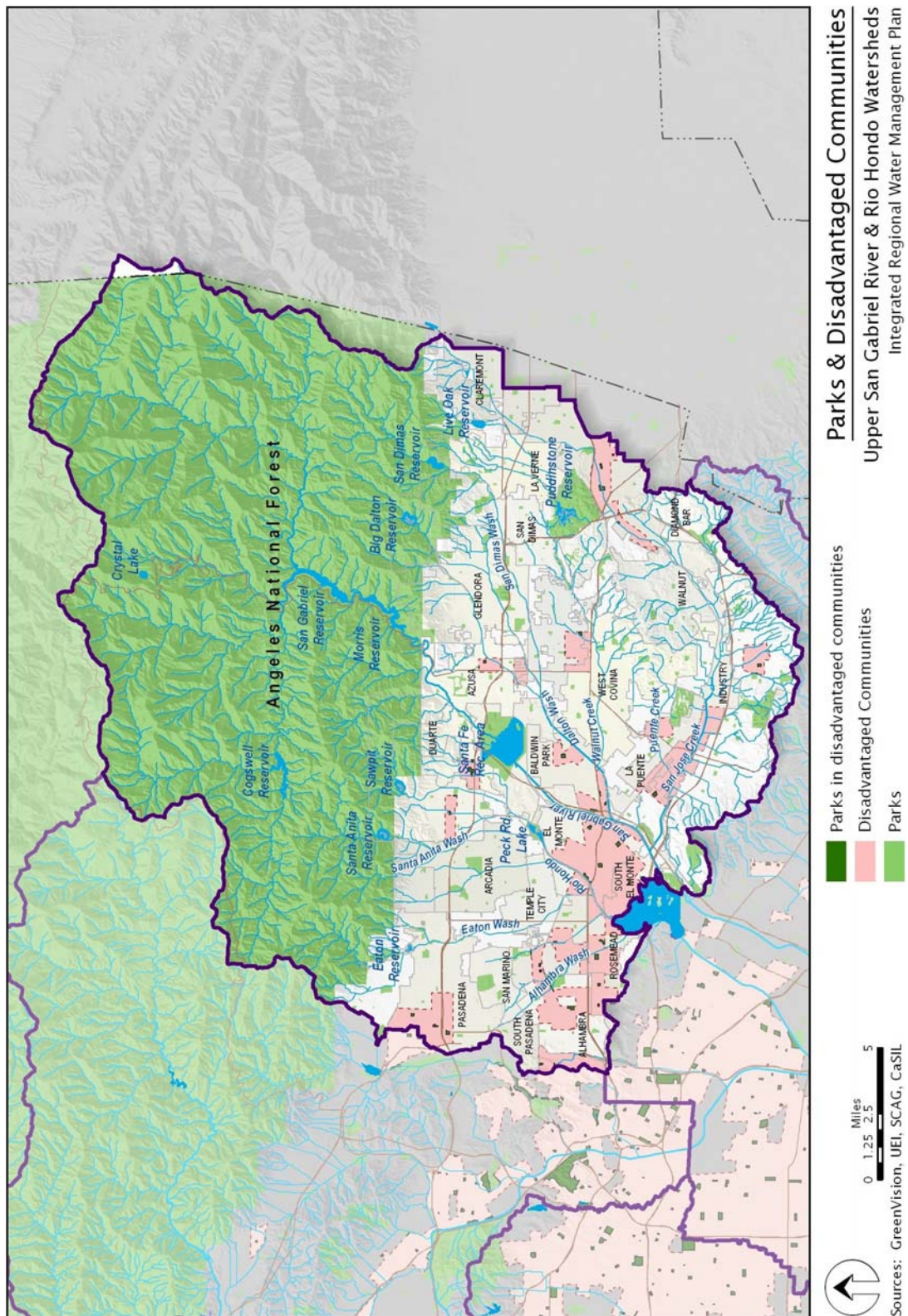
**Parks & Disadvantaged Communities**  
 Upper Los Angeles River Watersheds  
 Integrated Regional Water Management Plan

Disadvantaged Communities  
 Parks

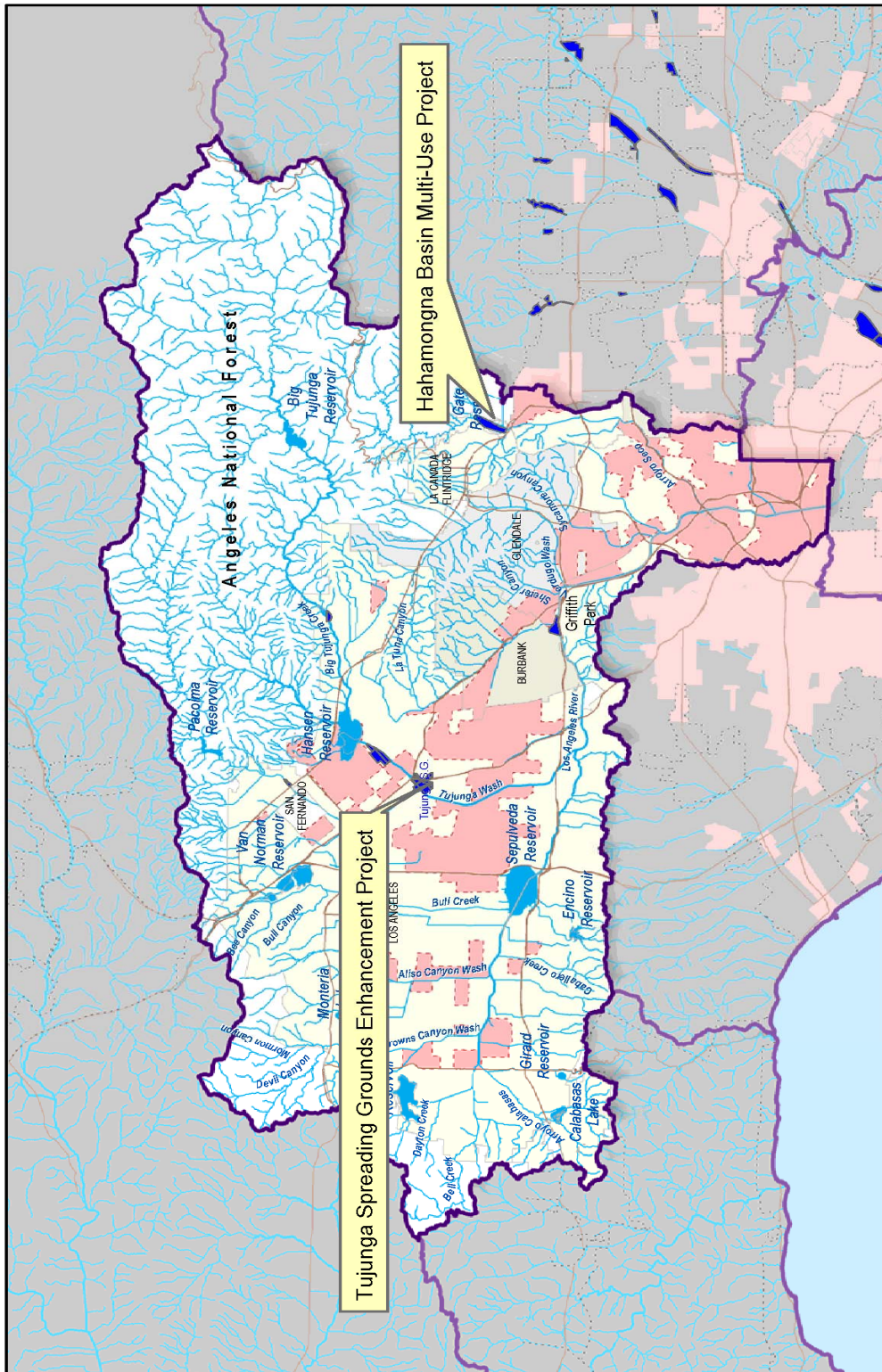
0 1.5 3 6 Miles

Sources: GreenVision, UEI, SCAG, CaSIL

Regional Map #8: DACs within the Region—Upper San Gabriel River and Rio Hondo Watersheds



Regional Map #9: DAC Project Map



Disadvantaged Community Project Locations  
Greater Los Angeles County  
Integrated Regional Water Management Region

Disadvantaged Communities

0 1.5 3 6 Miles  
Sources: GreenVision, UEI, SCAG, CaSIL

## Completed Work

Work that has been completed is included with the individual project information that follows and is labeled “Work Items through June 1, 2011.”

## Existing Data and Studies and Project Timing and Phasing

The table that follows details the existing data and studies and the timing and phasing for each project. This information is also provided with the individual project information that follows.

#	Project	Existing Data and Studies	Project Timing and Phasing
1	Hahamongna Basin Multi-Use Project	Soil Suitability Analysis completed in April 2009; Biological Resources Inventory and Focused Surveys in the Arroyo Seco Canyon completed in 2008; Biological Inventory and Directed Surveys completed in June 2009; City of Pasadena CEQA document to be completed in June 2011; CEQA document being developed by CoLADPW re: biological resources and sediment.	The Hahamongna Basin Multi-Use Project is part of the larger Arroyo Seco Master Plan (Pasadena) . Project phases have been intentionally broken into smaller Project components that can function independently. This multi-use Project is the first phase of the Master Plan and will be executed over four years with completion in 2014.
2	Citywide Smart Irrigation Control System and Recycled Water Improvements	The upgrading of the City of Calabasas Irrigation System to Smart Irrigation Control System Feasibility Study completed in June 2010; Master Plan (Plan) to be completed in March 2011	The Citywide Smart Irrigation Control System and Recycled Water Improvements project consists of two phases. The first phase will convert or replace the existing irrigation system with smart irrigation controllers. The second phase of the Project will improve the irrigation system by expanding recycled water lines to parks that currently are not connected to the smart irrigation network.
3	Storm Drain Improvements & Infiltration Chambers on Hawthorne Blvd	City of Hawthorne General Plan; City of Hawthorne Capital Improvement Plan completed in 2005; Hydrology Calculation Study completed in 2008; Storm Drain Capital Improvement Plan completed in 2009; Citywide Street Improvement Plan completed in 2009	Design for this Project will be completed and construction will start by the end of 2011. Construction is estimated to take approximately six months.
4	Penmar Water Quality and Runoff Reuse Project	Project Concept Report completed 2007; Preliminary Design Report completed 2008; Geotechnical Engineering Report completed 2008; Supplemental Geotechnical Recommendations completed 2009; Geology and Soils Report Correction Letter Response completed 2009;	The Project will be completed in two consecutive phases. Phase I consists of the construction of a stormwater diversion structure, a primary pump station system, a detention reservoir, a secondary pump system, three force mains for flow

#	Project	Existing Data and Studies	Project Timing and Phasing
		<p>Groundwater Quality Testing Report completed 2009; Dewatering Aquifer Testing completed 2010; Noise Impact Report Completed 2009; Air Quality Impact Assessment completed 2009; Traffic Study completed 2009; Cultural Resource Survey Report completed 2009</p>	<p>conveyance, and upgrade of four sanitary sewer segments west of the primary pump station. Phase II of the project includes stormwater beneficial use for landscape irrigation. Water quality bacterial standards are being established for reuse of the stormwater in the underground detention reservoir to irrigate Penmar Park, Penmar Golf Course, and other nearby park, which will be incorporated into the scope of the Phase II project.</p>
5	Model Equestrian Center	<p>Geotechnical Investigation Report, completed October 2010; Palos Verdes Peninsula Coordinated Monitoring Plan completed 2010; State of California Department of Toxic Substances Control (DTSC) Fact Sheet completed 1990; DTSC Fact Sheet #9 Five Year Review of Landfill Remediation Systems completed March 2004; DTSC Fact Sheet #13 Five Year Review completed November 2009</p>	<p>Feasibility planning and conceptual design are already complete for this project. Design is expected to be completed and construction is anticipated to begin prior to December 2011. This project is not part of a multi-phased project.</p>
6	16th St. Watershed Runoff Use Demo Project	<p>Penmar Water Quality Improvement Project CEQA Initial Study completed in May 2009; City of Santa Monica's Five Year Capital Improvement Plan completed in 2009</p>	<p>The 16<sup>th</sup> St. Watershed Runoff Use Demo Project is dependent upon the completion of Phase 1 and the implementation of Phase 2 of the Penmar Project.</p>
7	Covina Irrigating Company Surface Water Treatment Plant Improvements	<p>Tracer Study completed 2007; Supplemental Geotechnical Recommendations Report: GPS Survey completed 2008; Supplemental Geotechnical Recommendations Report: Geotechnical Study completed 2008</p>	<p>The project design was completed to 100% design status in December 2009 and construction is anticipated to begin in early 2012.</p>



#	Project	Existing Data and Studies	Project Timing and Phasing
8	Central LA County Regional Water Recycling Program	Central Los Angeles County Regional Water Recycling Program Technical Memorandum completed 2007; Groundwater Replenishment Technical Assessment completed 2010; Griffith Park South Water Recycling Project Scope of Work completed 2010	The CeLAC Regional Recycled Water Program has multiple phases which are comprised of separate projects to expand the existing recycled water infrastructure sourced by the Plant. This Project, including the Griffith Park Project and GWR Study, constitutes Phase 1a of the overall Program. The Program’s future phases will continue to expand non-potable recycled water service further downstream from the Plant as well as build upon other areas of the existing recycled water system independent of Phase 1a.
9	Tujunga Spreading Grounds Enhancements Project	<i>Feasibility Study of Imported Water Spreading at San Antonio Spreading Grounds (April 2005) (see Appendix D EIR) and Mitigation Alternatives to Rising Groundwater Study (March 2006)</i>	Project design is currently 95% complete and will be ready to implement soon after grant approval. This project is not a part of a multi-phased project.
10	San Antonio Spreading Grounds Improvements	Feasibility Study of Imported Water Spreading at San Antonio Spreading Grounds completed 2005, Appendix D; TVMWD Mitigation Alternatives to Rising Groundwater Study completed 2006	San Antonio Spreading Grounds Improvements project is part 1b of a multi-phased project. Part 1a involved construction of the first half of an imported water pipeline and is complete. Part 2 of the project involves management of the project after construction. This Project’s design is currently 95% complete and would be ready to implement soon after grant award.
11	Leo J. Vander Lans Advanced Water Treatment Plant Expansion	Studies to be completed after grant award date.	Leo J. Vander Lans Advanced Water Treatment Plant Expansion project design will be complete in December 2011, and construction will begin in March 2012.

#	Project	Existing Data and Studies	Project Timing and Phasing
12	Whittier Narrows Conservation Pool Project	Los Angeles County Drainage Area (LACDA) Water Conservation and Supply Santa Fe – Whittier Narrows Dams Feasibility Study completed 2000	This project is the first step in the process of altering dam operations. In parallel with the Feasibility Study revisions, USACE will complete a dam safety study. The USACE will use the recommended conservation project developed in the Feasibility Study to revise the Water Control Plan for the Dam. USACE has dedicated the financial resources necessary to complete the Water Control Plan portion through allocations in both FY 2010 and FY 2011.
13	Water and Energy efficiency in the Multi-Family and Hotel Sectors	West Basin Water Conservation Master Plan completed 2006; West Basin Water Conservation Master Plan Update completed 2010	Program site and cost research have been completed and the program is ready for implementation. Through the site identification process, West Basin MWD has personally contacted each identified site to determine each site’s interest in participating. In addition to contacting each potential site, West Basin MWD also faxed and e-mailed a Participant Interest Form and Project flyer. West Basin MWD will provide these to the selected Contractor. Implementation is contingent upon funding, thus no work will be performed until the grant has been awarded.

Project Maps

The project maps for the individual projects showing their geographical location and the surrounding work boundaries are included with the individual project work plans that follow.

## II. Hahamongna Basin Multi-Use Project – Arroyo Seco Foundation

### Detailed Project Description

#### Project Need

The Region has experienced significant reductions in imported water supplies due to recent drought conditions in northern California, ongoing drought conditions in the Colorado River watershed, and from regulatory actions and court decisions that have reduced exports from the Sacramento-San Joaquin Delta. In addition, the effects of climate change may make imported water supplies less reliable. Thus, the Region needs to increase the utilization of local water supplies and reduce dependency on imported water.

The Hahamongna Basin Multi-Use Project (Project) will serve a variety of water resource needs in the vicinity of Pasadena, Altadena, and La Cañada Flintridge. The Hahamongna Basin (Basin), previously called the Devil's Gate Basin, is a debris basin on the Arroyo Seco Stream, which collects runoff behind Devil's Gate Dam (Dam). The Arroyo Seco Stream is a tributary to the Los Angeles River.

Over the years, sediment from the highly erosive San Gabriel Mountain range above the Basin has built up behind the Dam and significantly reduced the Dam's ability to store stormwater and control flooding. The sediment accumulation has been exacerbated by the 2009 Station Fire, causing higher than normal sediment levels in the Basin. Erosion has impaired water quality, ecosystem vitality, and trail connectivity within the Project area. The Arroyo Seco Stream is listed under the Clean Water Act 303(d) of impaired water bodies for coliform bacteria and trash caused by nonpoint sources.

Currently, the City of Pasadena imports almost 70 percent of its drinking water and is striving to reduce its reliance on imported water supplies. To achieve this goal, the City of Pasadena plans to expand groundwater recharge to increase the reliability of local water supplies. As a result of sedimentation, the portion of the Basin within the City of Pasadena has been underutilized as a water storage area. Additional storage capacity in the Basin could be used to retain stormwater for subsequent recharge in downstream spreading grounds, thereby increasing the reliability of local water supplies.

Loss of native habitat, in both the Arroyo Seco Canyon and in the Basin, impairs natural processes, inhibits bio-diversity, and negatively impacts the local ecosystem. The current condition of the Project area also limits access to open space, recreational activities and stewardship learning opportunities for DAC members living in the adjacent neighborhood.

Improved sediment management practices would provide an opportunity to achieve an optimum balance among flood management, recreation, water conservation, and habitat restoration needs.

### Project Description

The Project is a cooperative effort between the Los Angeles County Flood Control District (LACFCD), the City of Pasadena, and the Arroyo Seco Foundation. This Project will increase water supply, improve water quality, and improve ecosystem health through enhancements to both the Basin and the adjacent Arroyo Seco Canyon. This multi-benefit Project incorporates features such as restoration of riparian habitat, installation of a public restroom, relocation of facilities to expand stormwater retention, enhancement of water quality, and expansion of open space and recreational opportunities. Project implementation will be divided into two components: the Hahamongna Basin (Basin component) and the Arroyo Seco Canyon (Canyon component).

Several improvements will be made to the Basin that will achieve the Project goals of increasing water supply, creating open space and enhancing recreational opportunities. The main work to be completed as part of the Basin component will be the removal of 250,000 cubic yards (CY) of accumulated sediment from the Basin to increase water storage capacity by 155 AF and stormwater retention by 1,435 AF. This sediment removal will take place after the Post Station Fire Emergency Sediment Removal Project, which is managed by the LACFCD. The 250,000 CY of sediment removed by this Project will create a flood/sediment management pool that will serve as the designated location for infrequent processing and removal of accumulated sediment.

A portion of the excavated sediment from this Project will be used to:

- Raise the base elevation of 11 SCE power poles on the west side of the Basin. This improvement will allow SCE year-round access to power lines without destruction to habitat.
- Create 23 acres of open space above and outside of the flood zone for restored riparian, sycamore woodland, and sage scrub habitat.
- Raise 3,000 linear feet (LF) of the primary Westside Perimeter Trail to an elevation above the level of frequent inundation to improve year round recreational opportunities.

The LACFCD is responsible for the periodic removal of sediment and debris from behind the Dam. The LACFCD will be implementing the Post Station Fire Emergency Sediment Removal Project to remove the sediment that has collected in the Hahamongna Basin after the 2009 Station Fire.

Fifteen acres of riparian habitat around the perimeter of the flood/sediment management pool will be restored by widening the straight stream channel to create a meandering stream channel. This will allow the southern willow scrub to establish itself in this newly restored area.

Three primary drainage ways on the west side of the basin, including Berkshire Creek, will also be restored to decrease sediment transport from these drainage ways into the Basin. The Basin will serve as a living classroom within the surrounding disadvantaged community that can be used to teach future generations the importance of healthy ecosystems and the value of natural resources. Enhanced open space and recreational opportunities will be created for the nearby communities. This Project will preserve historic plant communities increase bio-diversity, enhance habitat, and improve wildlife corridors and connectivity.

The Canyon component of the Project will include habitat restoration and trail enhancements, replacement of the Arroyo Seco Canyon intake dam, and installation of a public restroom.

The Arroyo Seco Canyon intake dam was originally built in 1937 to divert water for the City of Pasadena's domestic water supply. The intake dam is no longer used for this purpose; it is being used to divert water to the adjacent spreading grounds. This intake dam will be replaced with an inflatable dam and fish ladder for increased water diversion, restored stream hydrology, and improved aquatic connectivity.

This recreational area does not have a public restroom available. In an effort to dramatically decrease human bacteria in canyon water flows, a public restroom will be constructed at the entrance to the Arroyo Seco Canyon. This is expected to greatly improve water quality in the canyon. The restroom, which will be installed with a contained septic system, will serve an anticipated average of 150 people per day on weekdays and 1,000 people per day on weekends.

#### Consistency with IRWM Plan

The Project would be consistent with the following Plan objectives: optimize local water resources to reduce the Region's reliance on imported water; comply with water quality standards (including TMDLs) by improving the quality of urban runoff, stormwater, and wastewater; protect and improve groundwater and drinking water quality; protect, restore, and

enhance natural processes and habitats; and maintain and enhance public infrastructure related to flood protection, water resources, and water quality. In addition, the Project would contribute to the planning target for water supply (by increasing the capture of stormwater runoff and groundwater recharge) and stormwater capture (by expanding the runoff storage capacity of the Basin).

### Goals and Objectives

This Project addresses a number of Greater Los Angeles IRWM Plan (IRWM Plan) goals. By improving groundwater recharge within the Basin and increasing the Dam's capacity to hold additional stormwater for later recharge, the Project will help improve the local groundwater supply and reduce the Region's reliance on imported water. The Project improves the quality of stormwater, which, in turn, helps the Region comply with water quality regulations through the installation of the public restroom(s), erosion Best Management Practices (BMPs), and education. Natural habitats and stream hydrology will be restored. Watershed-friendly recreational space will be increased with the creation of open space as noted above. Public infrastructure related to flood protection is enhanced through the increased capacity of the Basin.

### Consistency with Program Preferences and Statewide Priorities

This multi-benefit Project is consistent with several Proposition 84 IRWM Program Preferences, including:

- **Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program**—including: 1) maximize use of available water supplies through conservation, water recycling, and water quality improvements; 2) increase the flexibility of water systems at the state, federal and local level through improvements in conveyance, storage and water project operations; 3) develop groundwater and surface water storage projects to boost flexibility and provide additional supplies for agriculture, urban and environmental use; and 4) promote collaboration and integration among community based watershed efforts.

The Project also addresses a number of IRWM Statewide Priorities including:

- **Drought Preparedness**—by effectively address long-term drought preparedness by contributing to sustainable water supply and reliability during water shortages.

- **Use and Reuse Water More Efficiently**—by implement water use efficiency, water conservation, recycling and reuse.
- **Expand Environmental Stewardship**—by improving watersheds, floodplains, and instream functions and to sustain water and flood management ecosystems.
- **Protect Surface Water and Groundwater Quality**—by protecting and restoring surface water and groundwater quality to safeguard public and environmental health and secure water supplies for beneficial uses.
- **Promote and practice integrated flood management**—by improving flood protection; enhancing the sustainability of flood and water management systems, and enhancing floodplain ecosystems.

### Resource Management Strategies

The Project would implement several Resource Management Strategies identified in the California Water Plan Update 2009, including:

- Conjunctive Management & Groundwater Storage, as expanded storage in the Basin would increased the volume of runoff stored for subsequent recharge;
- Ecosystem Restoration, by restoration of degraded riparian and upland habitats;
- Flood Risk Management, as expansion of the storage capacity in the Basin would increase flood management potential;
- Pollution Prevention, through installation of a public restroom; and
- Surface Storage (Regional/Local), by increasing the storage capacity of the Basin.

### Linkages and Synergies

This Project has the following linkages and synergies with other projects in this application:

- The ***Model Equestrian Center in Rolling Hills Estates Project*** presents a potential linkage for collaboration on fact-finding/best practices for the City of Pasadena's first public Equestrian Center planned in Hahamongna, immediately adjacent to this Project. BMPs from the Model Equestrian Center will serve as a planning model for Hahamongna.

- The ***Whittier Narrows Conservation Pool Project*** could have a strong link with the Project. Once the Project is implemented and water conservation is increased, LACFCD may be interested in transporting water collected in Hahamongna to Eaton Canyon to the east, where water could then be transported to Whittier Narrows for groundwater recharge in the Central Basin. This would be contingent on water remaining after recharge to the Eaton Basin.

#### Project Timing and Phasing

The Project area is vast, covering over 300 acres. Most of the Project components are part of the larger Arroyo Seco Master Plan developed by the City of Pasadena (provided in Appendix A). Project phases have been intentionally divided into smaller Project components that can be completed and function independently until additional Project phases are funded and implemented. This Project is the first phase of the Arroyo Seco Master Plan. The Project will be executed over the next four years, with completion scheduled in 2014.

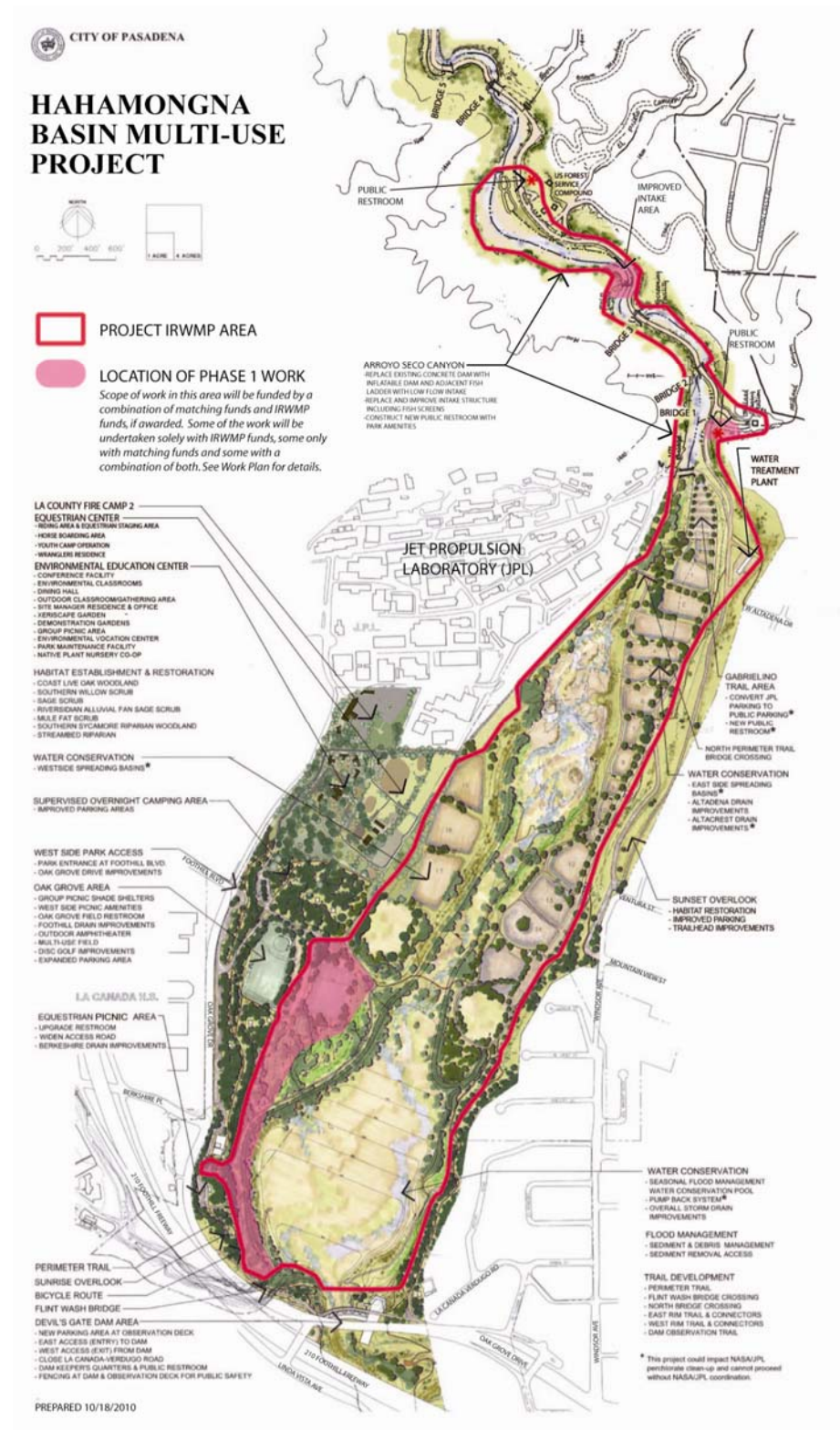
The Basin component of the Project will follow the Post Station Fire Emergency Sediment Removal Project.

#### Project Map

Project location and facilities are identified in Figure 3-1.



Figure 3-1. Hahamongna Basin Multi-Use Project Map



## Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed by June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

### (a) Direct Project Administration Costs

#### Task 1: Administration

Project administration activities will include: attending IRWM Regional meetings, serving as primary liaison between the IRWM Region's Leadership Committee and partner agencies, and preparing various deliverables. Partnering agencies will attend meetings and contribute to deliverables as necessary.

Partner agencies coordination will occur through scheduled meetings, regular phone and e-mail communications, and memorandums of understanding (MOUs) between partners.

#### Task 2: Labor Compliance Program

The City of Pasadena has contracted with a Third Party Program, Perceptive Enterprises, Inc., Labor Compliance Program (LCP) ID: 2003.00209, to provide Labor Compliance Program support as of August 25, 2010. In addition, the City of Pasadena's "in house" program enforces prevailing wage requirements for City public works projects.

Labor Compliance Submittals	Date
Labor Compliance Program	August 2010
Annual Report	Annually

#### Task 3: Reporting

Regular reports have been submitted to the City of Pasadena and various granting agencies as requested since 2008. Annual reports will also be submitted per Prop 84 requirements.

**(b) Land Purchase/Easement**

Not applicable. All land in question is owned in fee simple by the City of Pasadena. The LACFCD has a flood control easement over 80 percent of the subject project area.

**(c) Planning/Design/Engineering/Environmental Documentation****Task 4: Assessment and Evaluation**

A number of studies have been performed that support this Project.

The *Soil Suitability Analysis* completed in April 2009 is a geotechnical study completed by LACFCD to determine the suitability of sediment in Devil's Gate Basin (which encompasses the Hahamongna Basin) for use in this Project's components.

The *Biological Resources Inventory and Focused Surveys in the Arroyo Seco Canyon* completed in December 2008 provided a survey of threatened and endangered plant and animal species.

The *Biological Inventory and Directed Surveys* completed in June 2009 was conducted to provide a biological inventory of the area.

A California Environmental Quality Act (CEQA) document is currently being developed by LACFCD that examines biological resources and sediment volumes for the area for work in the Basin associated with the Post Station Fire Sediment Removal Project, to be completed by June 2011.

Assessment and Evaluation Submittals	Date
Soil Suitability Analysis	April 2009
Biological Resources Inventory and Focused Surveys in the Arroyo Seco Canyon	December 2008
Biological Inventory and Directed Surveys	June 2009
LACFCD CEQA document	June 2011

**Task 5: Final Design**

The 10 percent (Conceptual) Design will be done in-house with the City of Pasadena on the Basin component. Design assistance is provided by a consultant who is on contract with the City of Pasadena on an as-needed basis for design work.

LACFCD has completed the 10 percent Design for the Post Station Fire Emergency Sediment Removal Project.

A design solicitation Request for Proposals (RFP) is planned for specific project components, will be released in early 2011.

Design Submittals	Date
10% (Conceptual) Design – Basin component	Prior to June 2011

**Task 6: Environmental Documentation**

The Project is required to comply with CEQA documentation requirements. A Master Environmental Impact Report (EIR) for the Arroyo Seco Master Plan was prepared in 2003 for adoption of the City Park Master Plan. The City Park Master Plan establishes a vision for the Arroyo Seco and also provides a list of Projects to be implemented.

An EIR for the implementation of the portions of the Project included in the adopted Arroyo Seco Master Plan will be completed in June 2011.

An Initial Study and appropriate CEQA document for the implementation of the portions of the Project that are not included in the adopted Arroyo Seco Master Plan and that do not have any CEQA prepared to date also will be completed in June 2011.

A Mitigated Negative Declaration with an Associated Biological Survey was prepared in 2008 for the reconstruction of bridge #4 in the Arroyo Seco Canyon.

In addition, the LACFCD is embarking on the preparation of the environmental documents for the related Post Station Fire Sediment Removal Project within Devil’s Gate Basin.

Environmental Documentation Submittals	Date
Master EIR for the Arroyo Seco Master Plan	September 2003
EIR for the Implementation of Portion of the Project that is in the Arroyo Seco Master Plan	June 2011
Initial Study and Appropriate CEQA document	June 2011
Mitigated Negative Declaration with Associated Biological Survey	July 2008

**Task 7: Permitting**

Not applicable.

(d) [Construction/Implementation](#)

**Task 8: Construction Contracting**

Not applicable.

**Task 9: Construction**

Not applicable.

(e) [Environmental Compliance/Mitigation/Enhancement](#)

**Task 10: Environmental Compliance/Mitigation/Enhancement**

There may be environmental mitigation, actions or tasks implemented prior to June 2011 associated with the related Post Station Fire Sediment Removal Project within Hahamongna Basin being undertaken by LACFCD, but those are unknown at this time.

(f) [Construction Administration](#)

**Task 11: Construction Administration**

Not applicable.

Work Items after June 1, 2011

The following sections discuss work items that will be completed on or after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

(a) Direct Project Administration Costs

**Task 1: Administration**

Administration tasks will include general Project management and supervision, budget tracking, coordination with partnering agencies, preparation of progress reports and preparation of invoicing. These tasks will be completed by a number of staff to include: Lead Project Supervisor, Project Managers, Support Staff, Design/Plans, Specifications and Engineers Estimate (PS&E) teams, and CEQA compliance/regulatory permit teams.

Project partner coordination will be accomplished through MOUs between the City of Pasadena, the LACFCD, and the Arroyo Seco Foundation.

The Arroyo Seco Foundation would enter into a MOU regarding compliance with Proposition 84 Implementation Grant requirements and terms of reimbursement payments with the LACFCD who would serve as the grantee for the Proposition 84, Round 1 Implementation Grant Funding. This MOU between the Arroyo Seco Foundation and LACFCD would be completed by January 2012.

**Task 2: Labor Compliance Program**

The City of Pasadena has a contract with a Third Party Labor Compliance Program provider, Perceptive Enterprises, Inc., LCP ID: 2003.00209. The City of Pasadena also has an “in house” program that enforces prevailing wage requirements for City public works projects previously approved by the California Department of Industrial Relations (executed August 25, 2010; expires June 30, 2011, but can be renewed).

Labor Compliance Submittals	Date
Labor Compliance Program	June 2011
Annual Reports	Annually

**Task 3: Reporting**

Regular reports will be submitted to the State, as required.

Reporting Submittals	Date
Quarterly Reports	Quarterly
Final Project Report	December 2014

**(b) Land Purchase/Easement**

All land in question is owned in fee simple by the City of Pasadena. LACFCD, a Project partner, has a flood control easement over 80 percent of the subject Project area.

**(c) Planning/Design/Engineering/Environmental Documentation****Task 4: Assessment and Evaluation**

Several studies will be completed in preparation for the Project.

Various CEQA submittals will be completed in preparation for Project implementation:

- Air Quality and Health Risk Assessment to be completed in September 2011 for the Basin component, and in September 2012 for the Canyon component.
- Greenhouse Gas Impact Analysis to be completed in September 2011 for the Basin component, and in September 2012 for the Canyon component.
- Noise and Vibration Impact Assessment to be completed in September 2011 for the Basin component, and in September 2012 for the Canyon component.
- Traffic Analysis to be completed in September 2011 for the Basin component, and in September 2012 for the Canyon component.
- Biological Resources Assessment Report to be completed September 2011 for the Basin component, and in September 2012 for the Canyon component.

A Dam Design Assessment will be completed in September 2012 to provide a hydrological analysis of high and peak water flows at the dam.

A Dam Location Feasibility Study will be completed by September 2012 to determine the best location for the inflatable dam by studying the area's geology, soils, stream flows, turbidity, etc.

The City of Pasadena CEQA document to be completed in February 2012 provides an EIR for this Project.

Assessment and Evaluation Submittals	Date
CEQA submittals	September 2011 (Basin component) September 2012 (Canyon component)
Dam Design Assessment	September 2012
Dam Location Feasibility Study	September 2012
City of Pasadena CEQA document	February 2012

### Task 5: Final Design

The main portion of the Project design will be completed after June 1, 2011. A design team will be selected to complete the design submittals through an RFP process.

The 10 percent (Concept) Design for the Canyon component will be completed in April 2012.

The 30 percent (Concept) Design for the Basin component will be completed in April 2011, and for the Canyon component will be completed in June 2012 and will include a more detailed site analysis for the various Project components.

The 60 percent Design for the Basin component will be completed in September 2011, and for the Canyon component will be completed in September 2012. This will provide more details by design discipline, such as electrical and traffic control items. Standard details and outline specifications will be included. Technical studies will be underway at this stage.

The 90 percent (Pre-final) Design for the Basin component will be completed in March 2012, and for the Canyon component will be completed in December 2012. This will be the final, unstamped Project design.



The 100 percent (Final) Design for the Basin component will be completed in June 2012, and for the Canyon component will be completed in April 2013.

Design Submittals	Date
10% (Conceptual) Design – Canyon component	April 2012
30% (Concept) Design – Basin component	April 2011
30% (Concept) Design – Canyon component	June 2012
60% Design – Basin component	September 2011
60% Design– Canyon component	September 2012
90% (Pre-final) Design – Basin component	March 2012
90% (Pre-final) Design – Canyon component	December 2012
100% (Final) Design – Basin component	June 2012
100% (Final) Design – Canyon component	April 2013

#### Task 6: Environmental Documentation

The Project is required to comply with CEQA documentation requirements. An EIR for the implementation of the Basin component of the Project will be completed in February 2012. This EIR will be subsequent to the Certified Master EIR for the implementation of the portions of the Hahamongna Basin Multi-Use Project included in the adopted Arroyo Seco Master Plan.

An Initial Study and appropriate CEQA document for the implementation of the Canyon component of the Project will be completed in January 2013. The Initial Study is for portions of the Project not included in the adopted Arroyo Seco Master Plan and do not have any CEQA documents prepared to date.

LACFCD is just embarking on the preparation of the environmental document for the related Post Station Fire Sediment Removal Project within Devil's Gate Basin; it is anticipated the CEQA document will be a Categorical Exemption based on the Governor's declaration of the event as an emergency.

Environmental Documentation Submittals	Date
EIR (Basin component)	February 2012
Initial Study and Appropriate CEQA document (Canyon component)	January 2013

### Task 7: Permitting

Several permits will be required to implement this Project. Prior to the award date, permits will be applied for in preparation for Project construction by the City of Pasadena. A Section 404 permit will be applied for in order to acquire a Nationwide Permit (NWP) 31 for maintenance in existing flood control facilities and/or a NWP 27 for stream and wetland restoration activities. A Section 401 permit also will be applied for in order to obtain water quality certification from the Regional Water Quality Control Board B on the area of Project disturbance. Lastly, a Stream Alteration Agreement from the California Department of Fish and Game (CDFG) will be obtained in accordance with Section 1602 of State Fish and Game Code.

In addition, LACFCD is seeking necessary permits related to the Post Station Fire Sediment Removal Project within Hahamongna Basin, though the timing and type of permits is currently not known.

Permit	Approval Date
Section 404 – USACE	June 2012 (Basin component) June 2013 (Canyon component)
Section 401 – SWRCB	June 2012 (Basin component) June 2013 (Canyon component)
Section 1602 – California Department of Fish and Game	June 2012 (Basin component) June 2013 (Canyon component)

## (d) Construction/Implementation

**Task 8: Construction Contracting**

Construction contracting will include the following tasks for each of the Project components:

- Advertise for bids
- Pre-bid meeting
- Bid opening
- Bid review
- Contract award
- Contract approval/internal routing/insurance/etc.
- Notice to Proceed

Construction Submittals	Date
Notice to proceed – Basin component	February 2013
Notice to proceed – Canyon component	September 2013

**Task 9: Construction**

Construction will consist of the following:

**Subtask 9.1: Mobilization and Site Preparation**

1. The Basin component includes:
  - Moving the required equipment and materials onto the site; and
  - Developing haul roads, site clearing, disposal of non-natives, and native vegetation mulching and stockpiling for later soil preparation.
2. The Arroyo Seco Canyon (ASC) component has two locations (ASC-A and ASC-B). Both sites will include moving the required equipment and materials onto the sites.

- Site ASC-A will require the construction of two temporary bridges to span Bridge 1 and Bridge 3, providing high weight capacity during construction. Installation of a temporary coffer dam using material on site, and with low flow piping to bypass the new inflatable dam site during construction. Removal off site of sediment accumulated behind the existing dam to form the retention pool, and in the vicinity of the dam, removal of sediment to base rock. This site is located between two ridgelines which run down to the canyon bottom with the existing dam between, constructed on base rock. Demolition and removal off site (for re-cycling of concrete and steel per City contract specifications) of the existing concrete dam and diversion intake structure.
- Site ASC-B will have a new public restroom constructed adjacent to the AS Canyon access road. This will require clearing and removal off site, of native chaparral to five feet beyond the building footprint.

#### **Subtask 9.2: Project Construction**

The Basin component construction includes the following:

- Site survey will establish limits of excavation and placement of fill, as well as on going survey needed during the grading operation to establish cut and fill slopes, drainage flow center lines and structure control staking.
- Land Form Grading principals will be used and require additional survey during grading of the Flood & Sediment Control and Water Conservation Pool side slopes, and during the placement of fill on slopes above the flood inundation elevation on the Basin's west side.
- Existing trees on the perimeter or within the site grading footprint will be protected during the grading operation.
- A concrete storm water drop structure at the Berkshire Creek reinforced concrete pipe (RCP) storm drain outlet at the park boundary, will be constructed to reduce the energy of water discharged to the restored natural creek channel.
- This area has been severely eroded over the years due to upper watershed development. Placement of compacted fill after construction of the storm water drop structure will widen and improve the existing park road to allow two way

- traffic, and raise the upper section of creek bottom to lower the gradient and fill eroded areas.
- Very large boulders located adjacent to the Arroyo Seco site and a site within the park, but north of the Basin component area, will be transported to the creek site and strategically placed on the upper 200 lineal foot section of creek bottom and sides to form continuous slope and creek bottom protection during high intensity storm events.
  - Compacted fill will be placed on the next, or lower 200 lineal foot section of creek to fill a severely eroded area.
  - This Basin project area will then have very large to small boulders strategically placed at intermittent locations along the flow line to form natural grade control barriers and contain the width of the flow channel.
  - At the end of this stretch a boulder grade control structure will be constructed to control haircutting as the storm water enters the top of the graded flood control pool.
  - The storm water flow line down the 3:1 pool side slope will have boulder rip-rap to protect the slope when the empty pool is filling. Compacted fill will be placed south and north of the restored Berkshire Creek.
  - A minimum of 250,000 cubic yards will be placed to raise the elevation a minimum of 5 feet above what will be the frequent inundation elevation when water conservation measures are implemented. Currently, this area is under water if the gates in the dam are closed and water pools to the spillway floor elevation.
  - At the northern end of the 23 acres created with compacted fill to be above the inundation elevation, the existing parking lot will be expanded south to accommodate a total of 200 vehicles.
  - There will be a turn-around at the southern end and a landscaped median, centered the length of the lot.
  - Storm water retention basins will be incorporated in the design of the center median and surrounding landscaped areas.

- Adjacent to and to the east of this improved parking lot, the compacted fill will create a 4-acre level area, which will accommodate a future 2.4-acre multi-purpose athletic field. This open area will be surrounded by native Sycamore Woodland habitat, a part of this Project.
- At the northern end of this area a 3,000-linear-foot by 16-foot-wide dirt trail will be graded, heading south, around the eastern edge of the Sycamore Woodland, meeting a section of trail starting at the southern end of the expanded parking area, and continuing south, crossing the restored Berkshire Creek, and ending at a junction with the existing park paved road. This graded dirt trail will be surfaced with compacted Class 2 base topped with a blended layer of decomposed granite to give a compacted 5-inch section by 12-foot-wide trail. This trail will also be used for park maintenance, for SCE maintenance of their overhead transmission and distribution line, and for emergency access.
- The Foothill and Oak Grove drainage systems will be improved with BMP storm water discharge features, and graded with slope stabilization features constructed as they cross the compacted fill and enter the Flood Management Pool.
- Engineered RCP culverts with concrete headwalls, faced with arroyo stone, will be constructed where the drainage channels cross under the permeable paved trail.
- The 23-acre area, created with compacted fill to be above the inundation elevation, and the 3-acre area along the western edge of the Water Conservation Pool, will have the stockpiled mulch spread and blended with the top 6 inches of earth.
- The disturbed and graded fill areas above the 1,045 elevation will be restored with Coast Live Oak Woodland and Sycamore Woodland habitat.
- The disturbed and graded fill areas, between the 1,045 elevation and the top of the Water Conservation Pool at 1,030 elevation, will be restored with Southern Willow Riparian habitat.
- A domestic water line will be installed next to the 3,000 lineal feet of trail. This will serve drinking fountains and ten temporary solar activated irrigation systems to irrigate the three restored habitat plant communities, until the plants are established.

- Additional park amenities, including benches, traffic control gates and boulders, and interpretive and trail signage will be installed.

The ASC–A water intake site construction includes the following:

- Survey to establish horizontal and vertical control bench marks used during construction.
- Construct the inflatable dam concrete base and buttress to anchor the dam to the prepared base rock. The concrete base of the dam is designed to have the deflated dam hard exposed surface at an elevation and slope inline with the re-established natural stream channel grade.
- Construct the inflatable dam concrete abutments, and the concrete fish ladder with low flow inlet, between the dam’s western abutment and the canyon base rock face.
- Construct a concrete inlet fore bay with fabricated metal frames to house removable heavy duty metal grills and removable fish screen inserts. The metal grills are to protect the interior fish screens during high water debris flows when the dam is deflated. The fore bay is enlarged to accommodate fish screens engineered to pass 35 cubic feet per second (cfs) to the intake control valve. This is the maximum capacity of the existing infrastructure.
- Construct a concrete headwall between the new enlarged intake structure and the eastern inflatable dam abutment.
- Construct a small concrete building, a short distance downstream of the dam site, on the eastern side of the existing access road, in the vicinity of the existing traveling screen facilities. These existing facilities will be removed and/or modified as needed to provide space for this new structure, which will house the inflatable dam compressor and control equipment, including the electrical main and sub panels.
- Construct underground infrastructure between the Dam Operation Control Building and the inflatable dam base.
- Install the air compressor, control hardware, and inflatable dam.
- Install the protective metal grills and fish screens in the inlet forebay.
- Install the removable metal weirs in the concrete fish ladder.

The ASC–B restroom building site construction includes the following:

- Survey to establish the building location and finish grade.
- Excavate material to an off-site, within the park location, for the placement of the precast concrete sewage holding tank.
- Prepare the excavated hole for placement of the tank, per manufacturer's specifications.
- The precast restroom building with holding tank is delivered from the manufacturer in components to facilitate safe shipping and efficient erection.
- A crane is used for off loading and placement of the precast sewage holding tank.
- The remaining space outside the tank is back filled with pea gravel to within one foot of finish grade.
- The top edges of the holding tank are prepared for placement of the next component.
- The crane places the precast concrete floor with walls component on top of the holding tank.
- The top edges of the walls are prepared for placement of the roof section, and the remaining component is placed to finish the erection of the structure in one day.
- The building doors, hardware and fixtures are factory installed. Domestic water is developed off the existing water main located in the adjacent roadway, and connected to the structure's factory installed plumbing.
- Power is developed from the adjacent overhead lines and connected to the structure's factory installed electric service to provide exterior security lighting.
- All service trenches and the perimeter of the building are backfilled, compacted and finish graded.



**Subtask 9.3: Performance Testing and Demobilization**

At completion of construction at each of the three construction sites of the Project, remaining equipment and materials will be moved off the site, leaving all staging areas clean and restored to pre-construction condition.

Installation, pre-operation set-up, and performance testing of the Arroyo Seco water intake facility shall be as specified by the manufacturer of the inflatable dam, the compressor and control equipment, and the fish screens. The testing will comply with guarantee requirements. The safe operational procedure of deflating the dam and the controlled release of pooled water will be tested by the City Water Department operation and maintenance staff with the department safety officer on site to verify safe down stream conditions. The intake facility will be tested with water pooled behind the inflated dam. Corrective measures will be taken as necessary to meet all testing requirements. The fish ladder connectivity will be tested with the dam deflated, and with pooled water held behind the inflated dam. Corrective modification of the fish ladder low flow intake will be made if necessary for sustainable aquatic connectivity.

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

A Mitigation Monitoring Report was adopted as a part of the Master EIR for the Arroyo Seco and is applicable for a large portion of this Project. The subsequent CEQA documents required for the Project will include an additional Project specific Mitigation Monitoring and Reporting Program.

**(f) Construction Administration****Task 11: Construction Administration**

Construction administration tasks will be completed by City of Pasadena and PWP employees. These tasks will include construction Project management, finance management, and general office support.

**(g) Other**

The Project Monitoring Plan will be completed in August 2011 and will outline the monitoring, assessment and performance measures that will demonstrate that the Project meets its intended goals. The Performance Measures Table and discussion in Attachment 6

provides a preview of the information that would be included in the Project Monitoring Plan.

Assessment and Evaluation Submittals	Date
Monitoring Plan	August 2011

## Discussion of Standards and Merits

### Standards

During the development of PS&E, it will be specified that all building materials used for Project construction will meet or exceed standards set by governmental agencies and/or industry regulators, such as those set by the ASTM and the ACI.

The design and construction of this Project will be in compliance with all applicable codes, which govern the various work, materials, devices, equipment, systems, and procedures in effect at the time the Project is issued to bid by the City of Pasadena. These include, but are not limited to:

- Current City of Pasadena Building Code and Amendments
- Standard Specifications for Public Works Construction (SSPWC)
- CAC Title 24
- California Building Code (CBC)
- CAL/OSHA (Occupational and Safety Code)
- California State Architectural Barrier's Law (CAL/ABL)
- California State Fire Marshal requirements
- California Electrical, Plumbing and Mechanical Codes
- Pasadena City Fire Code
- State Energy Standards Title 24
- Americans with Disabilities Act (ADA)
- Current City Electrical, Plumbing and Mechanical Codes and Amendments
- All other Codes and Regulations that may be noted in the Technical Sections of the Project Manual
- All Rules and Regulations of the South Coast Air Quality Management District (SCAQMD) applicable to this Project

- All Rules and Regulations of the State Water Resources Control Board (SWRCB), including the National Pollution Discharge Elimination System (NPDES) requirements, which are applicable to this Project.

The special provisions in the Contract Documents are supplemented by the Standard Specifications for Public Works Construction, 2003 Edition, including Supplements to the Standard Specifications for Public Works Construction by the City of Pasadena, Department of Public Works.

### Merits

The Project work is located at two sites: The flood control basin (FCB) site and the ASC site with two locations (see Project Map); ASC–A the Intake Improvements site and ASC–B the new Public Restroom site.

- The FCB site includes three watersheds outside the park boundary. With two of the drainage systems, there are sub-watersheds within the park. These watersheds and sub-watersheds have been surveyed and mapped, design standards calculated by a licensed hydrologist, who has made preliminary BMP designs for an energy dissipation structure, culvert and headwall sizing, and stream/drainage course banks and channel invert stabilization to eliminate erosion and sediment transport.
- The FCB site utilizes 70 years of LACDPW storm water discharge data to establish flood control operating procedures, and in 1996 through 2008 the reconstruction of a lower and wider spillway with concrete headworks to control outflow. The dam was then recertified by DSOD, so it can now be used for water conservation. All of this, along with a geomorphology study of the flood control basin, established design criteria used to develop the HWP Master Plan projects.
- The ASC–A site has a concrete diversion dam constructed very early in the 20th century. Existing infrastructure can accommodate 35 cfs diversion. Years of data illustrate how infrequently the maximum adjudicated right to divert water (25 cfs by the Pasadena Water Department and 7 cfs by the Foothill Water Department), has been achieved. With years of sediment removal from behind the diversion dam for water to pool, or later in the 20<sup>th</sup> century, a secondary headworks up-stream to divert water and direct it to the intake; the daily data of cfs diverted clearly indicates the need to improve the site for greater quantity and quality of water diverted, as well as to prevent the intake of trout and other aquatic life. The use of an inflatable

- dam to hold storm water for diversion or ground water recharge is a proven technology, with several locations in the Region as examples studied. This design will eliminate the need to enter the stream course to remove sediment, because it restores stream geomorphology, as well as aquatic connectivity.
- The ASC-B site is located just after the canyon is entered, 2/3 of a mile from the trail-head. The public's use of the trails in the upper Arroyo Seco watershed has dramatically increased in the last 20 years. Both the United States Forest Service (USFS) and the PWP Parks and Natural Resources have done informal studies of the number of people entering the canyon daily. Additionally, the Water Department's frequent water quality tests, as well as information from the Forest Service residences up-stream of the canyon intake site, indicate that a public restroom with contained septic system is needed and will improve water quality.

### III. Citywide Smart Irrigation Control System and Recycled Water Improvements

#### Detailed Project Description

##### Project Need

Irrigation of landscaped areas in the City of Calabasas can result in dry-weather runoff, which may ultimately reach receiving water bodies, including Las Virgenes Creek, Malibu Creek, and Santa Monica Bay (Bay), or Dry Canyon Creek, McCoy Creek, Los Angeles River, and the Los Angeles Harbor. Runoff from landscaped areas can contain various contaminants, including nutrients from fertilizers, pesticides and trash, which reduce the quality of receiving waters. Santa Monica Bay is a 303(d) listed water body for DDT, debris, PCBs and sediment toxicity, designations caused by nonpoint and point sources. In addition, the Bay has a number of pollutants of concern, including heavy metals, pathogens, and nutrients/sediments. Similarly, the Los Angeles River and Los Angeles Harbor are also listed for many of the same contaminants.

The Region has experienced significant reductions in imported water supplies due to recent drought conditions in northern California, ongoing drought conditions in the Colorado River watershed, and from regulatory actions and court decisions that have reduced exports from the Sacramento-San Joaquin Delta. In addition, the effects of climate change may make imported water supplies less reliable. Thus, the Region needs to increase the utilization of local water supplies and reduce dependency on imported water. The City of Calabasas currently depends on imported water from the Sacramento-San Joaquin Delta, supplied by Las Virgenes Municipal Water District (LVMWD), for over 85 percent of its water needs.

In addition, this Project will reduce demand of potable water and use recycled water for irrigation more efficiently. Currently, the City facilities, including parks, use 80 percent recycled water and 20 percent potable water for irrigation. This Project will conserve 25 percent of all irrigation water, which, in turn, will reduce potable water demand and allow for the expanded use of recycled water for irrigation of City facilities. Through the installation of smart irrigation controllers, the City expects to save 57 AFY of both potable and recycled water supplied by LVMWD.

## Project Description

The City-wide Smart Irrigation Control System and Recycled Water Improvements Project (Project) will upgrade the city-wide irrigation system to reduce runoff and total water usage through the design and installation of a smart irrigation control system that provides real-time information on irrigation water demand for each of the many sub-areas delineated throughout the City. These sub-areas include City parks, parkways, and street medians (See Figure 3-2). Implementation of this Project will reduce dry-weather runoff, which carries pollution to sensitive ecosystems and water bodies.

Reduction of water use will be achieved through two phases. Phase 1 includes installation of a central irrigation control station for the entire irrigation system that will utilize evapotranspiration (ET) data and wireless technology to monitor and apply the appropriate amount of irrigation water. A total of 66 smart irrigation controllers will be installed at facilities that feed over 820 sprinkler valves. In addition, improvements including pipe replacement and repair will be made on existing water supply lines and deficient irrigation lines to reduce water losses in the system. Two weather stations will also be installed at two City parks, De Anza and Civic Center Park, to monitor the weather conditions within the two geographically distinct zones within the City. Data from the weather stations will automatically control the timing and volume of water to be applied for irrigation purposes.

Phase 2 of the Project would allow the City to expand its recycled water usage to irrigation systems at several parks, including Wild Walnut Park, De Anza Park, Grape Arbor Park, and the Headwaters Corner. Recycled water used by the City is produced at the Tapia Reclamation Facility by the LVMWD. This phase of the Project is possible because LVMWD has recently extended recycled water supply lines within the City (see Figure 3-3) for Existing Recycled Water Lines).

The City will also start a citywide public education campaign by preparing and mailing out educational brochures on water conservation measures and smart irrigation control systems to all residents and businesses. The City will distribute brochures at 54 gated communities and 12,000 residences in non-gated communities. The brochures are intended to encourage Home Owner Associations and homeowners to install or upgrade current irrigation controllers with smart irrigation controllers.

### Consistency with IRWM Plan

The Project would be consistent with two of the IRWM Plan objectives: optimize local water resources to reduce the Region's reliance on imported water; and comply with water quality standards (including TMDLs) by improving the quality of urban runoff, stormwater, and wastewater.

### Goals and Objectives

The objectives of the Project include:

- Reduce the volume of water used for irrigation in City parks, parkways, and street medians by 25 percent through installation of smart irrigation controllers that use real-time data on irrigation water demands to adjust the frequency and volume of water used for irrigation.
- Reduce runoff from irrigated areas by decreasing the frequency and volume of irrigation, thereby reducing potential water quality impacts associated with runoff from irrigated areas; and
- Expand utilization of recycled water to additional locations in the City, further reducing demand for potable water.

### Consistency with Program Preferences and Statewide Priorities

In addition, the Project also addresses several Statewide Priorities, including:

- **Drought Preparedness**—This Project promotes water conservation and water recycling to address long-term drought preparedness and long-term reduction of water use;
- **Use and Reuse Water More Efficiently**—This Project implements water use efficiency, water conservation, and water recycling to increase water supply reliability; and
- **Protect Surface Water and Groundwater Quality**—by protecting and restoring surface water and groundwater quality to safeguard public and environmental health and secure water supplies for beneficial uses



### Resource Management Strategies

The Project would implement several Resource Management Strategies (RMS) from the California Water Plan Update 2009, including:

- **Urban Water Use Efficiency**—The Project includes the installation of smart irrigation controllers throughout new and existing facilities that feed over 820 sprinklers with ET and wireless technology to reduce potable and recycled water demands.
- **Urban Runoff Management**—The Project includes the installation of smart irrigation controllers for better management of dry-weather runoff by preventing excess landscape irrigation water flows into storm drains and local water bodies.
- **Recycled Municipal Water**—The second phase of the Project includes the expanded the use of recycled water throughout its public park to offset the use of potable imported water for irrigation.
- **Matching Water Quality to Use**—The second phase of the Project includes the use of recycled water as a new source of water for irrigation purposes to substitute use of potable water.

### Linkages and Synergies between Projects

The Project, in combination with other projects in the Region, will help the Region reduce its dependency on imported water and optimize its local water resources. This Project, along with the West Basin Water and Energy Efficiency in the Multi-family and Hotel Sectors Project, will reduce the dependency on water through water use efficiency. In addition, the Project and the Central Los Angeles County Regional Water Recycling Program will expand the use of recycled water in the Region, reducing the need for imported water and optimizing the use of local water resources.

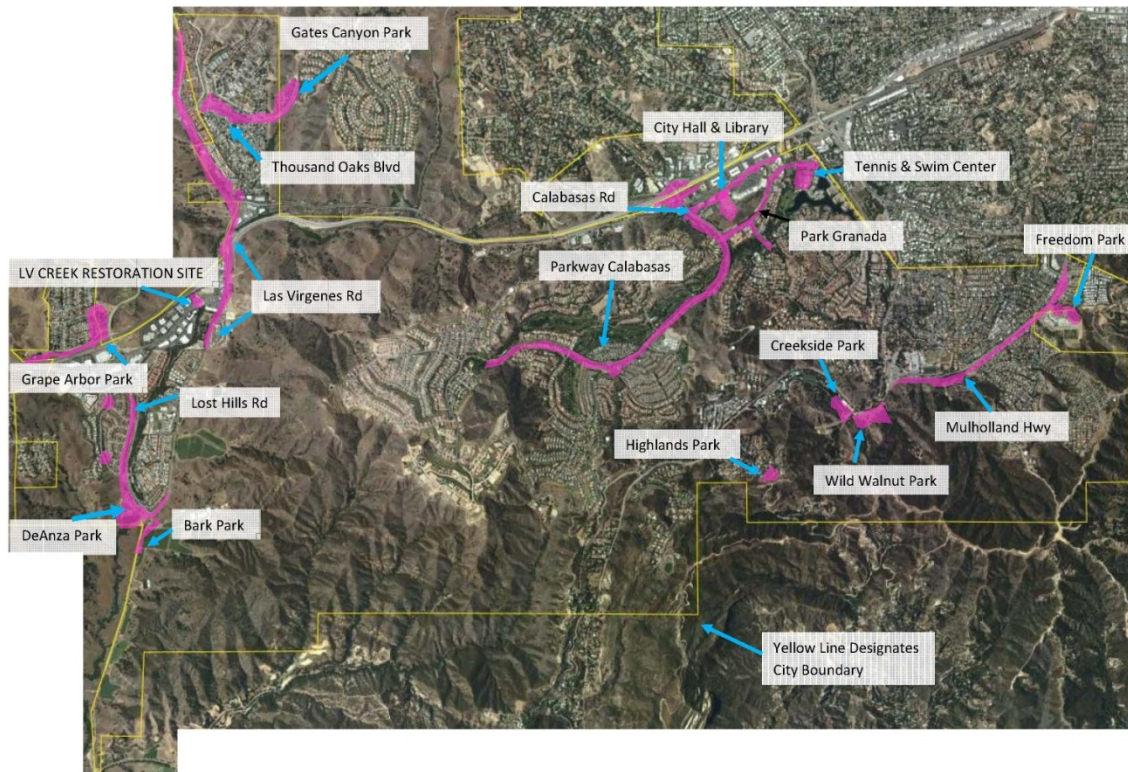
Project Timing and Phasing

The Project consists of two phases. The first phase will convert or replace the existing irrigation system with smart irrigation controllers. The second phase of the Project will improve the irrigation system by expanding recycled water lines to parks that currently are not connected to the smart irrigation network.

Project Map

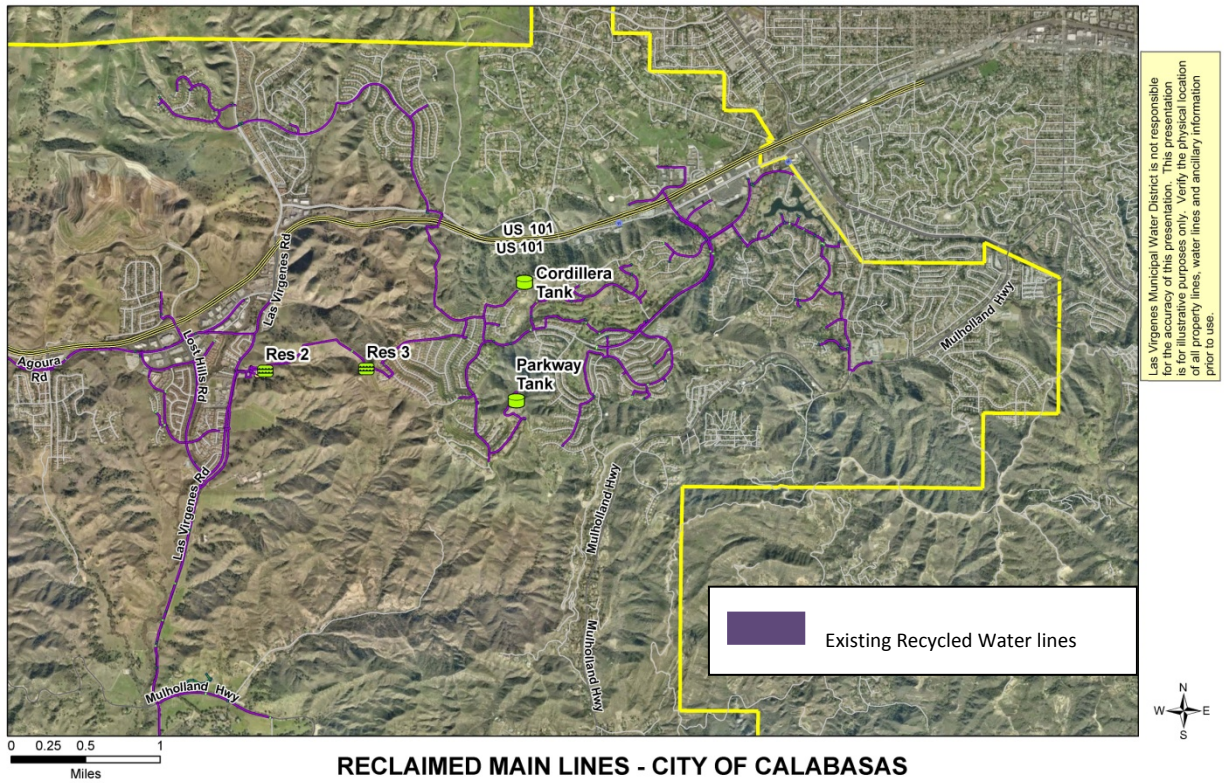
The Project location and the installation sites of New Smart Irrigation Controllers are shown in Figure 3-2. Areas in pink are the general installation areas for the new smart irrigation controllers. The existing recycled water lines in the City of Calabasas are identified in Figure 3-3.

Figure 3-2. Project Sub-Area Locations



	Installation Sites of New Smart Irrigation Controllers
--	--

Figure 3-3. Existing Recycled Water Lines—City of Calabasas



Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, page 32, of the Proposition 84 Implementation PSP.

(a) Direct Project Administration Costs

**Task 1: Project Administration**

A project manager and assistant project manager are in charge of Project administration. The project manager’s tasks include overseeing the Project’s conceptual proposal, implementation, and grant reporting. The project manager will also maintain communication with their project partner, LVMWD, during project implementation.

The assistant project manager will assist with research and implementation of the Project.

### **Task 2: Labor Compliance Program**

The Calabasas City Council adopted a Labor Compliance Program in 2008, which will be used for this Project.

Labor Compliance Submittals	Date
Labor Compliance Program	2008
Annual Reports	Annually

### **Task 3: Reporting**

Not applicable.

#### **(b) Land Purchase/Easement**

Not applicable.

#### **(c) Planning/Design/Engineering/Environment Documentation**

### **Task 4: Assessment and Evaluation**

The Upgrading the City of Calabasas Irrigation System to Smart Irrigation Control System Feasibility Study (Feasibility Study) was completed in June 2010. This Feasibility Study provides necessary information regarding site locations, recycled water line extensions, and necessary work needed to design and complete the Project. The Feasibility Study collected and used information from other cities that have already implemented similar irrigation systems.

An Irrigation Master Plan (Plan) will be completed by March 2011 by the City of Calabasas. This Plan will evaluate and compare different types of irrigation systems, including drip, recycled, and smart controllers. The Plan is intended to aid the City in choosing the most efficient and effective system.

Assessment and Evaluation Submittals	Date
Feasibility Study	June 2010
Irrigation Master Plan	March 2011

### Task 5: Final Design

The preliminary design (30 percent) was completed in December 2010. A contract will be awarded in January 2011 to a landscape architect for completion of the Project Design. The final design is expected to be completed by May 2011. The table below provides a description of each of the design stages and completion dates (See design documents, Appendix B).

Design Submittals	Date
10% (conceptual) Design	October 2010
30% (concept) Design	December 2010
60% Design	March 2011
90% (pre-final) Design	April 2011
100% (Final) Design	May 2011

### Task 6: Environmental Documentation

The City of Calabasas is preparing an initial CEQA study and is anticipating a Categorical Exemption. The City will be submitting documentation of the CEQA Categorical Exemption by the grant award date.

Environmental Documentation Submittals	Date
CEQA-Notice of Categorical Exemption	June 2011

**Task 7: Permitting**

All Project work will be completed on City-owned property and will not require permitting.  
Construction/Implementation

**Task 8: Construction Contracting**

Not applicable.

**Task 9: Construction**

Not applicable.

**(d) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

Not applicable.

**(e) Construction Administration****Task 11: Construction Administration**

Not applicable.

**Work Items after June 1, 2011**

The following sections discuss work items that will be completed on or after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

**(a) Direct Project Administration Costs****Task 1: Project Administration**

A project manager, assistant project manager, and grant manager will be in charge of Project administration. The project manager's tasks will remain the same as those prior to June 1, 2011. The assistant project manager will continue to assist the project manager with research and implementation of the Project as well as assist with any grant documentation, as needed. The grant manager will assist with preparing and archiving all documents, logging times, reviewing and submitting invoices.

The City would enter into a MOU regarding compliance with Proposition 84 Implementation Grant requirements and terms of reimbursement payments with the LACFCD who would serve as the grantee for the Proposition 84, Round 1 Implementation Grant Funding. This MOU between the City and LACFCD would be completed by January 2012.

Project Administration Submittals	Date
Invoices	Quarterly
MOU with LACFCD	January 2012

### Task 2: Labor Compliance Program

The Calabasas City Council adopted a Labor Compliance Program in December 2008, which will be used for this Project. Delivery of Labor Compliance Program documentation will be done by June 1, 2011 (see Appendix B for information on third party LCP).

Labor Compliance Submittals	Date
Labor Compliance Program	June 2011
Annual Reports	Annually

### Task 3: Reporting

Quarterly and annual reports will be prepared by the grant manager.

Reporting Submittals	Date
Quarterly Reports	Quarterly
Annual Reports	Annually
Final Report	May 2012

**(b) Land Purchase/Easement**

Not applicable.

**(c) Planning/Design/Engineering/Environment****Task 4: Assessment and Evaluation**

Not applicable.

**Task 5: Final Design**

All project designs will be complete by the grant award date.

**Task 6: Environmental Documentation**

Not applicable.

**Task 7: Permitting**

Not applicable.

**(d) Construction/Implementation****Task 8: Construction Contracting**

Solicitation efforts for the construction contract will begin after the grant award date. A bid packet will be prepared by the City of Calabasas in June 2011 and issued by July 2011. A bidder's meeting will be held to provide further information on the Project. The construction contract will be awarded to the lowest responsive bidder in a competitive bidding process. The contract for phase 1 of the Project will be awarded by August 2011 and for phase 2 of the Project by October 2011.

Solicitation Efforts	Date
Prepare Bid Packet	June 2011
Issue Bid Packet	July 2011
Award Construction Contract for Phase I	August 2011
Award Construction Contract for Phase II	October 2011



**Task 9: Construction****Subtask 9.1: Mobilization and Site Preparation**

Phase 1 site preparation will consist of clearing a total of 200 square feet of land for the construction of concrete pads for the installation of pedestals for the weather tracking stations. For Phase 2 of the project, the necessary site preparation will consist of clearing and grubbing for the installation of new irrigation systems in designated sub-areas shown in Figure 3-2

**Subtask 9.2: Project construction tasks will consist of:**

Construction of Phase 1 will begin August 2011 and end October 2011. Phase II construction will begin October 2011 and end February 2012. The construction activities are detailed below.

## Phase 1:

- Installation of a central irrigation control station for the entire City irrigation system
- Replacement of existing irrigation controllers with smart irrigation controllers
- Installation of new irrigation controllers for facilities without an irrigation controller
- Construction of building pads and fences for two weather tracking stations
- Installation of weather tracking stations
- Connection to SCE power supply for the new smart irrigation controllers and weather stations
- Setup of hardware and software for the smart controllers and weather stations

## Phase 2:

- Replacement or repair of existing water supply lines, as needed
- Installation of valves where needed and connection to recycled water main line in sub-areas that are not currently connected to the recycled water system

**Subtask 9.3: Project Performance Testing and Demobilization**

Project performance testing will be completed for both phases of the Project as they are completed. Performance testing associated with each phase is detailed below.

Phase 1:

- Establishing watering volume and frequencies for each valve
- Testing new irrigation controllers
- Testing the weather track stations
- Analyzing data collected

Phase 2:

- Testing water pressure and water supply

(e) [Environmental Compliance/Mitigation/Enhancement](#)

**Task 10: Environmental Compliance/Mitigation/Enhancement**

Not applicable.

(f) [Construction Administration](#)

**Task 11: Construction Administration**

A construction manager, landscape manager, and assistant landscape manager will be in charge of construction administration. The construction manager will oversee construction operations and inspect all installed irrigation systems. The landscape manager will oversee the selection of smart irrigation controllers and other necessary equipment, determine the irrigation needs for each location, and evaluate technical proposals. The assistant landscape manager will work with a private landscape contractor to ensure all irrigation systems and smart irrigation control systems are functional. The City of Calabasas contracts out all landscape maintenance work.

(g) [Other](#)

A Project Monitoring Plan will be completed in August 2011 and will outline the monitoring, assessment and performance measures that will demonstrate that the project meets its intended goals. The Performance Measures Table and discussion in Attachment 6 provides a preview of the information that would be included in the Project Monitoring Plan.

Assessment and Evaluation Submittals	Date
Monitoring Plan	August 2011

## Discussion of Standards and Merits

### Standards

All contracted labor will adhere to State, County and City of Calabasas health and safety standards. The construction work shall meet all Public Works and Water Quality Standards.

### Merits

The merits of the smart irrigation controllers will not be known until the design phase is completed.

## IV. Storm Drain Improvements and Installation of Infiltration Chambers – City of Hawthorne

### Detailed Project Description

#### Project Need

Hawthorne Boulevard is a primary north/south transportation artery and a major commercial and retail center in the South Bay area of Los Angeles County. This area, within the City of Hawthorne, is subject to frequent flooding due to the aging stormwater drainage system and the large quantities of litter and debris that reduce the capacity of storm drains create. During periods of intense rainfall, local residents and businesses experience flooded streets, sidewalks and driveways that result in major traffic congestion, delays to local and regional bus service delays, and negative economic impacts to businesses located along the boulevard.

The quality of stormwater runoff that reaches the Dominguez Channel contains various contaminants, particularly trash. The Dominguez Channel is a 303(d) listed water body for DDT, trash, PCBs and sediment toxicity. A reduction of trash and debris that enters the storm drain system would reduce the subsequent discharge of these materials to the Dominguez Channel and, ultimately, to Los Angeles Harbor.

The City of Hawthorne receives a portion of their potable water supply from the West Coast Groundwater Basin (Basin), which has historically been over drafted from competing uses. Enhanced groundwater recharge would reduce potential over drafting of the Basin.

#### Project Description

This Storm Drain Improvements and Installation of Infiltration Chambers Project (Project) will install drainage improvements in the City of Hawthorne along a one-mile stretch of Hawthorne Boulevard between El Segundo Boulevard and Rosecrans Avenue to improve flood management, enhance the quality of storm drain runoff and enhance groundwater recharge. The Project would serve an area of approximately 300 acres, 1,150 residents, and a substantial traffic artery along which approximately 50,000 vehicles travel on a daily basis.

BMPs, including hydrodynamic separators, trash screens and infiltration chambers would be installed, bringing this section of Hawthorne Boulevard into compliance with stormwater runoff quality requirements and reducing the potential for localized flooding during storm events. The BMPs will treat total suspended solids, soluble metals, oil, grease, trash, and suspended solids.

Drainage improvements will include installation of eight new catch basins, each of which is estimated to filter 15.5 cfs of stormwater flow through the use of StormFilter cartridges located within the basins. After the stormwater is filtered by the catch basins, the flows will be directed to new Subsurface Storm Water Management System infiltration chambers installed under the existing median to store up to 1.6 million gallons of stormwater for infiltration into the Basin at a rate of up to 9 million gallons per day (MGD). The layout of existing storm drains will be adjusted as necessary to reach the newly-installed infiltration chambers. The street also will be re-graded and new cross gutters will be constructed to better channel flow from the roadway to storm drains and infiltration chambers.

These facilities will improve the quality of the outflow to the ocean and improvement runoff management on the street surface, and reduce the traffic congestion and related hazards during storm events. Improved roadway conditions will enhance economic activity and quality of life for residents in this area. Water quality improvements resulting from the Project will benefit the Dominguez Channel and Los Angeles Harbor through the reduction of trash entering the storm drain system.

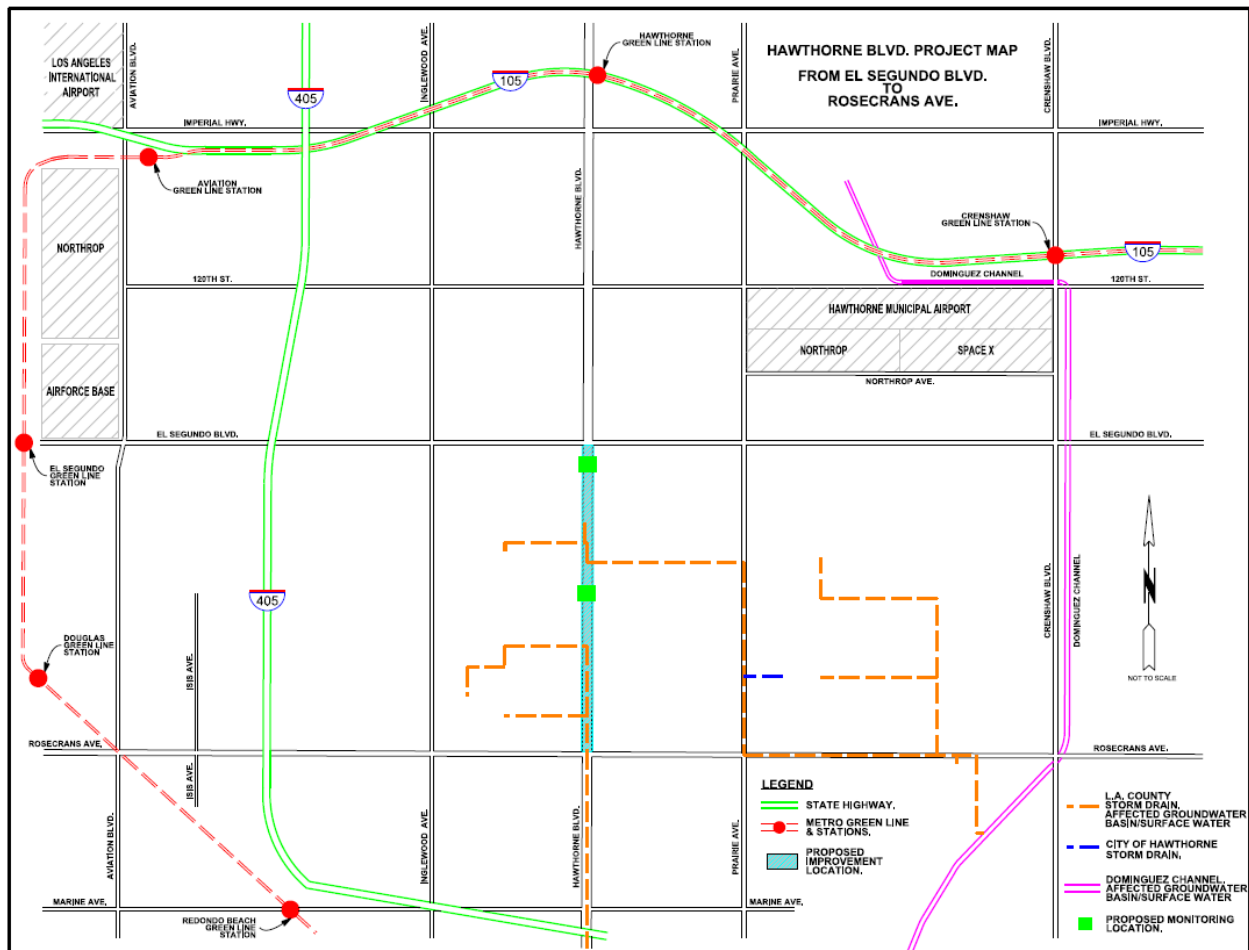
This Project is included in the City of Hawthorne Capital Improvement Plan (2005), Storm Drain Capital Improvement Plan (2009), and the Citywide Street Improvement Plan (2009), all three of which list the Project as a priority for improving flood control along arterial streets.

The general location of the Project, the West Coast Groundwater Basin, and the Dominguez Channel are shown in Figure 3-4.

Figure 3-4. General Area Map

Project location and facilities are identified in Figure 3-5 and shows the relationship between the Project and the existing stormwater system, which flows to the Dominguez Channel, a tributary to the Los Angeles Harbor.

Figure 3-5. Project Location



Consistency with Adopted IRWM Plan

The Storm Drain Improvements and Installation of Infiltration Chambers project is consistent with several objectives of the IRWM Plan, including: optimize local water resources to reduce the Region’s reliance on imported water; comply with water quality standards (including TMDLs) by improving the quality of urban runoff, stormwater, and wastewater; and to maintain and enhance public infrastructure related to flood protection, water resources, and water quality. The Project would contribute to the planning targets for water supply (by enhancing groundwater recharge and reducing demand for imported water) and stormwater capture and reuse (by filtering stormwater runoff and recharging the filtered runoff).

## Goals and Objectives

The objectives of this Project are to:

- Improve stormwater quality through the installation of runoff filtering devices;
- Enhance existing flood protection infrastructure in the area to reduce localized flooding during storm events; and
- Enhance groundwater recharge, through installation of stormwater infiltration galleries.

## Consistency with Program Preferences and Statewide Priorities

The Project addresses several IRWM Program Preferences, including:

- Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program, including: 1) maximize use of available water supplies through conservation, water recycling, and water quality improvements; and 2) develop groundwater and surface water storage projects to boost flexibility and provide additional supplies for agriculture, urban and environmental use.

In addition, the Project will address several Statewide Priorities, including:

- **Drought Preparedness**—by effectively addressing long-term drought preparedness by contributing to sustainable water supply and reliability during water shortages; and
- **Protect Surface Water and Groundwater Quality**—by protecting and restoring surface water and groundwater quality to safeguard public and environmental health and secure water supplies for beneficial uses.
- **Promote and practice integrated flood management**—by improving flood protection and enhancing the sustainability of flood management systems.

## Resource Management Strategies

This Project will implement three Resource Management Strategies identified in the California Water Plan Update 2009:

- **Conjunctive Management & Groundwater Storage**—through the installation of groundwater infiltration galleries;



- **Flood Risk Management**—through improvements to the local storm drain system and the inclusion of integrated flood management practices, including the groundwater infiltration galleries; and
- **Urban Runoff Management**—through the improvements to the local storm drain system and the installation of stormwater filtration BMPs.

### Linkages and Synergies

This Project is part of the larger Hawthorne Boulevard Improvement Project, which will first improve drainage and infiltration, then make other improvements such as replacement of driveways and sidewalks, ADA compliance, traffic control, and pavement replacement.

The Project also improves the quality of urban runoff in the Dominguez Channel Watershed and Los Angeles Harbor through the installation of the filtering devices.

### Project Timing and Phasing

Design for this Project will be completed and construction will start by mid-2013.

This Project is a part of the larger City of Hawthorne Citywide Street Improvement Plan; however, each targeted area in this plan can be improved independently of each other.

### Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed by June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, page 32, of the Proposition 84 Implementation PSP Planning/Design/Engineering/Environment.

#### (a) Direct Project Administration Costs

##### **Task 1: Administration**

Not applicable.

##### **Task 2: Labor Compliance Program**

Not applicable.

##### **Task 3: Reporting**

Not applicable.

(b) Land Purchase/Easement

Not applicable.

(c) Planning/Design/Engineering/Environmental Documentation

**Task 4: Assessment and Evaluation**

The City of Hawthorne General Plan, last updated in 2010, lists Hawthorne Boulevard as a potential area for redevelopment.

The City of Hawthorne Capital Improvement Plan (2005) lists Hawthorne Boulevard as a priority project.

A Hydrology Calculation Study was completed for the area in 2008, which provided information that will be used to complete the Project design in 2012.

The Storm Drain Capital Improvement Plan (2009) lists Hawthorne Boulevard as a target area for new storm drain installation.

The Citywide Street Improvement Plan (2009) looks at several projects for improvement of arterial streets in the city, one of which targets storm drain improvements to Hawthorne Boulevard. Copies of the supporting documentation are provided in Appendix C.

Assessment and Evaluation Submittals	Date
City of Hawthorne General Plan	Updated 2010
City of Hawthorne Capital Improvement Plan	2005
Hydrology Calculation Study	2008
Storm Drain Capital Improvement Plan	2009
Citywide Street Improvement Plan	2009

**Task 5: Final Design**

Not applicable.

**Task 6: Environmental Documentation**

Not applicable.

**Task 7: Permitting**

Not applicable.

**(d) Construction/Implementation****Task 8: Construction Contracting**

Not applicable.

**Task 9: Construction**

Not applicable.

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

Not applicable.

**(f) Construction Administration****Task 11: Construction Administration**

Not applicable.

**Work Items after June 1, 2011**

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, page 32, of the Proposition 84 Implementation PSP.

**(a) Direct Project Administration Costs****Task 1: Administration**

A City of Hawthorne Resident Engineer will oversee project administration, which will include planning and coordination, invoicing, and providing supporting documentation. The

Project does not have any partner agencies and will not require formal agreements between partnering agencies.

The City of Hawthorne will enter into a MOU regarding compliance with Proposition 84 Implementation Grant requirements and terms of reimbursement payments with the LACFCD who will serve as the grantee for the Proposition 84, Round 1 Implementation Grant Funding. This MOU between the City of Hawthorne and LACFCD will be completed by January 2012.

Project Administration Submittals	Date
Invoices	Monthly
MOU with LACFCD	January 2012

### Task 2: Labor Compliance Program

The City will have a California Department of Industrial Relations approved Labor Compliance Program in place by the grant award date. This program will be prepared by a Department of Industrial Relations approved third party.

Labor Compliance Submittals	Date
Labor Compliance Program	June 2011
Annual Report	Annually

### Task 3: Reporting

Quarterly reports on the Project's status and a final report will be submitted as required by the grant agreement.

Reporting Submittals	Date
Quarterly reports	Quarterly
Final report	Project completion

**(b) Land Purchase/Easement**

A land purchase/easement is not required for this Project.

**(c) Planning/Design/Engineering/Environmental Documentation****Task 4: Assessment and Evaluation**

Not applicable.

**Task 5: Final Design**

Project design will commence with the 10 percent (Conceptual) Design in the first quarter of 2012, which will include Project siting and layout of storm drains and infiltration chambers.

The 30 percent (Concept) Design will be completed in the first quarter of 2012 and will show detailed Project siting and all Project appurtenances. A rough listing of Project specifications will be provided.

The 60 percent Design also will be completed in the second quarter of 2012 and will add more detail to the plans by design discipline for items such as traffic control. If needed, foundation studies, lab testing, structural analysis, and/or modeling will be performed.

The 90 percent (pre-final) Design will be completed in the second quarter of 2012 and will be the final, un-stamped plans, including an itemized cost estimate.

The 100 percent (Final) Design will be completed by June of 2012.

Design Submittals	Date
10% (Conceptual) Design	1 <sup>st</sup> Quarter 2012
30% (Concept) Design	1 <sup>st</sup> Quarter 2012
60% Design	2 <sup>nd</sup> Quarter 2012
90% (Pre-final) Design	2 <sup>nd</sup> Quarter 2012
100% (Final) Design	June 2012

**Task 6: Environmental Documentation**

This Project is categorically exempt under CEQA. A Notice of Exemption will be filed prior to the grant award date and is expected to be in place by January 2012.

Environmental Documentation Submittals	Date
Notice of Exemption	January 2012

**Task 7: Permitting**

A traffic permit will be required during construction and will be obtained by the start of construction.

**(d) Construction/Implementation****Task 8: Construction Contracting**

Construction contracting activities will include a bid advertisement, a pre-bid contractors meeting, evaluation of bids, award of contract, and a pre-construction meeting.

Construction Submittals	Date
RFP for solicitation	April 2013
Notice to Proceed	May 2013

**Task 9: Construction****Subtask 9.1: Mobilization and Site Preparation**

Mobilization shall include:

- Provisions of the construction schedule;
- Site review;
- Insurance, and bonds;
- Equipment move-in; and

- Furnishing and erecting portable concrete plants, temporary buildings, and other construction facilities, all as required for the proper performance and completion of the work.

**Subtask 9.2: Project Construction**

Construction will involve the creation of new cross gutters and re-grading of the street pavement to better direct the flow of stormwater into the improved storm drain system. Filtering devices and infiltration chambers will be installed at various points determined during the design stage.

**Subtask 9.3: Performance Testing and Demobilization**

The City will use an independent testing laboratory for compaction, and inspection/testing.

All equipment and temporary structures will be removed at the completion of construction.

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

No environmental mitigation requirements are expected as this Project is Categorically Exempt.

**(f) Construction Administration****Task 11: Construction Administration**

Construction administration activities will include general management of the construction activities, general engineering services, traffic engineering services, technical support, Project coordination, inspection services and a final report.

**(g) Other**

The Project Monitoring Plan will be completed in June 2012 and will outline the monitoring, assessment and performance measures that will demonstrate that the Project meets its intended goals. The Performance Measures Table and discussion in Attachment 6 provides a preview of the information that would be included in the Project Monitoring Plan.

Assessment and Evaluation Submittals	Date
Project Monitoring Plan	June 2012

## Discussion of Standards and Merits

### Standards

Design and construction of the Project shall conform to the following standards:

- All work in the public right of way shall meet the Standard Plans for Public Works Construction and the Standard Specifications for Public Works Construction (Green Book).
- All work on site shall meet requirements of the 2010 California Building Code and the City of Hawthorne Municipal Code.
- All work shall be completed in conformance to CAL/OSHA regulations.
- All testing will meet American National Standards Institute and/or ASTM standards.
- Plumbing products shall meet American Water Works Association standards.

### Merits

The Hydrology Calculation Study completed in 2008 was conducted based on the 2006 Los Angeles County Department of Public Works Hydrology Manual.

Building material merits will be determined during the design phase.



## V. Penmar Water Quality and Runoff Reuse – City of Los Angeles, Bureau of Sanitation

### Detailed Project Description

#### Project Need

Santa Monica Bay is currently listed as a Clean Water Act 303(d) impaired water body, due to elevated bacteria concentrations in the surf zone. Cities in the Ballona Creek Watershed, including Los Angeles, must meet new stormwater NPDES permit requirements to reduce bacterial levels in the surf zone and assist in meeting the requirements of the Santa Monica Bay Beaches Dry & Wet Weather Bacteria TMDLs. Improvements in the quality of dry-weather runoff and stormwater runoff and reductions in the volume of runoff would help preserve beneficial and recreational uses of receiving water bodies, reduce risk to human safety and health, improve aquatic marine habitat, reduce beach closures and avoid potential impacts to tourism associated with such beach closures.

The Region has experienced significant reductions in imported water supplies due to recent drought conditions in northern California, ongoing drought conditions in the Colorado River watershed, and from regulatory actions and court decisions that have reduced exports from the Sacramento-San Joaquin Delta. In addition, the effects of climate change may make imported water supplies less reliable. Thus, the Region needs to increase the utilization of local water supplies and reduce dependency on imported water.

#### Project Description

The Penmar Water Quality Improvement and Runoff Reuse Project (Project) will capture urban dry-weather flows and a portion of the wet-weather flows generated from a 1,468 acre upstream area during storm events, then treat, store, and reuse the captured water for irrigation purposes in the City of Los Angeles' Penmar Recreation Center and Park and Penmar Golf Course. Treated runoff would also be used to irrigate Marine Park in the City of Santa Monica for the 16th Street Watershed Runoff Use Demonstration Project, which is also included in this Implementation Grant application.

The Project will be completed in two phases. The first phase will construct the facilities to capture and store stormwater and the second phase will provide for treatment and reuse of the captured stormwater.

Phase I consists of the construction of a stormwater diversion structure, a primary pump station system, a detention reservoir, a secondary pump system, three force mains for flow conveyance, and upgrade of four sanitary sewer segments west of the primary pump station (Figure 3-6). The Project will intercept and divert stormwater runoff and dry weather flows from the existing storm drain in Rose Avenue. Diverted flows will be conveyed to a pump station constructed in Frederick Street at Rose Avenue. As sewer capacity allows, all or a portion of the flow, including dry weather flow, will be diverted directly to the sanitary sewer via a force main from the proposed pump station and ultimately to the Hyperion Treatment Plant. Wet-weather flows will be diverted via a second force main to a 2.75-million-gallon reservoir that will be constructed beneath the Penmar Recreation Center fields. Stormwater stored in the reservoir will be held for 72 hours after a storm event passes and then discharged at a metered rate to the sanitary sewer through a combined gravity and pump system that will be constructed adjacent to the reservoir.

The Project also includes minor sanitary sewer upgrades on Oakwood Avenue, on Rialto Court south of Nowita Place, Crescent Place between Rialto Court and Palms Boulevard, and on Abbot Kinney Boulevard at Palms Boulevard. The upgrades of the sewer lines are necessary for the installation of a discharge line from the reservoir to the sanitary sewer system so that captured stormwater can be discharged to the Hyperion Wastewater Treatment Plant for treatment. Phase I of the Project will allow for the water quality benefits to be fully realized during times when the sanitary sewer system can accept all of the diverted flows.

Phase II of the Project consists of the design and construction of the facilities required for the beneficial use of captured stormwater for landscape irrigation at the Penmar Golf Course, Penmar Recreation Center and Park (and Marine Park in the City of Santa Monica). Phase II will include installation of hydrodynamic separators, a filtration and disinfection system, as well as the required infrastructure to integrate the treatment system into the existing irrigation system and the facilities installed as part of Phase I. Phase II will also include the installation of a surface pond on the Penmar Golf Course that will be used to provide additional storage of treated dry and wet weather flow diversions while providing an enhancement to the existing Penmar Golf Course. Installation of the pond will include all associated conveyances. A graphic representation of the Project after both phases have been completed is shown in Figure 3-7.

#### Consistency with IRWM Plan

The Project would be consistent with the following Plan objectives: optimize local water resources to reduce the Region's reliance on imported water; comply with water quality standards (including TMDLs) by improving the quality of urban runoff, stormwater, and

wastewater; and to maintain and enhance public infrastructure related to flood protection, water resources, and water quality. The Project would also contribute to two planning targets identified in the Plan; water supply (by reducing demand for potable water) and stormwater runoff treatment (by capturing and treating both dry- and wet-weather runoff).

### Goals and Objectives

The objectives of the Project include:

- Capture and treat dry- and wet-weather runoff from an area of 1,468 acres in the City of Los Angeles, thereby enhancing water quality in Santa Monica Bay;
- Treat the capture dry-weather runoff and a portion of stormwater runoff and store the treated water for subsequent reuse for irrigation of recreational spaces;
- Create regional benefits by providing a source of treated runoff for irrigation of Marine Park in the City of Santa Monica; and
  - Reduce utilization of potable water and decrease demand for imported water.

### Consistency with Program Preferences and Statewide Priorities

The Project is consistent with one of the IRWM Program Preferences:

- Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program: 1) maximize use of available water supplies through conservation, water recycling, and water quality improvements; 2) increase the flexibility of water systems at the state, federal and local level through improvements in conveyance, storage and water project operations; and 3) reduce water demand through “real water” conservation.

In addition, the project would be consistent with the following Statewide Priorities:

- **Drought Preparedness**—by effectively addressing long-term drought preparedness by contributing to sustainable water supply and reliability during water shortages;
- **Use and Reuse Water More Efficiently**—by implementing water use efficiency, water conservation, recycling and reuse;

- **Protect Surface Water and Groundwater Quality**—by protecting and restoring surface water and groundwater quality to safeguard public and environmental health and secure water supplies for beneficial uses; and
- **Promote and practice integrated flood management**—by improving flood protection and enhancing the sustainability of flood management systems.

#### Resource Management Strategies

The Project also incorporates the following Resource Management Strategies identified in the California Water Plan Update 2009 in meeting those priorities, including Urban Water Use Efficiency, Pollution Prevention, Urban Runoff Management and Matching Quality to Use:

- **Matching Quality to Use**—by utilizing treated runoff for landscape irrigation;
- **Urban Runoff Management**—by capturing and treated dry- and wet-weather runoff; and
- **Urban Water Use Efficiency**—by reducing demand for potable water through the use of treated runoff for landscape irrigation.

#### Linkages and Synergies between Projects

The Project is linked to the 16th Street Watershed Runoff Use Demonstration Project, which is also included in this Implementation Grant application, which would provide treated runoff for irrigation of Marine Park in the City of Santa Monica.

#### Project Timing and Phasing

The Project will be completed in two phases with construction of the phases being consecutive activities. Phase I of the Project has a completed design and all the required permits have been obtained. The contractor was authorized to begin work on construction activities in November 2010. The construction of Phase I of the Project is expected to be completed within two years. The design work for Phase II will begin in the summer of 2011 with the intention that the construction of Phase II will start at the conclusion of Phase I construction.

Project Map

Figure 3-6 illustrates the conceptual treatment train system used in scope development for the Phase I and II design contract.

Figure 3-6: Project Conceptual Treatment Train

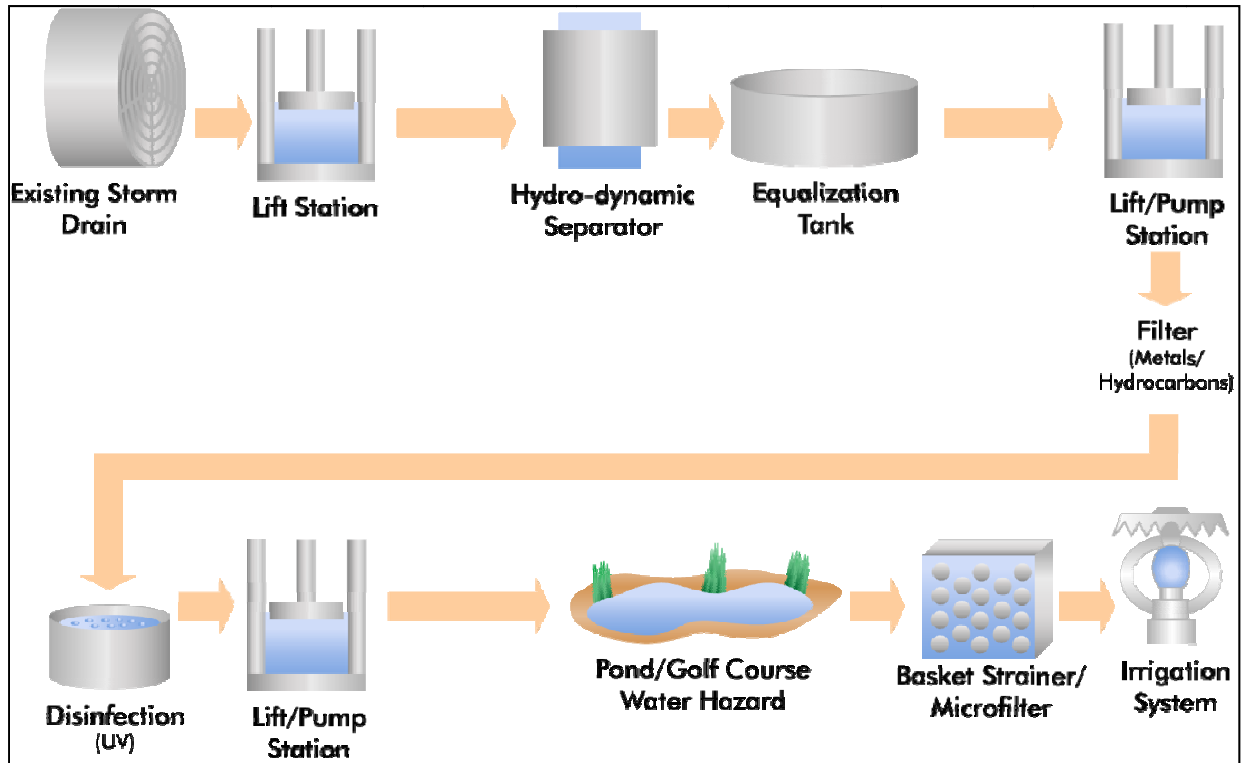
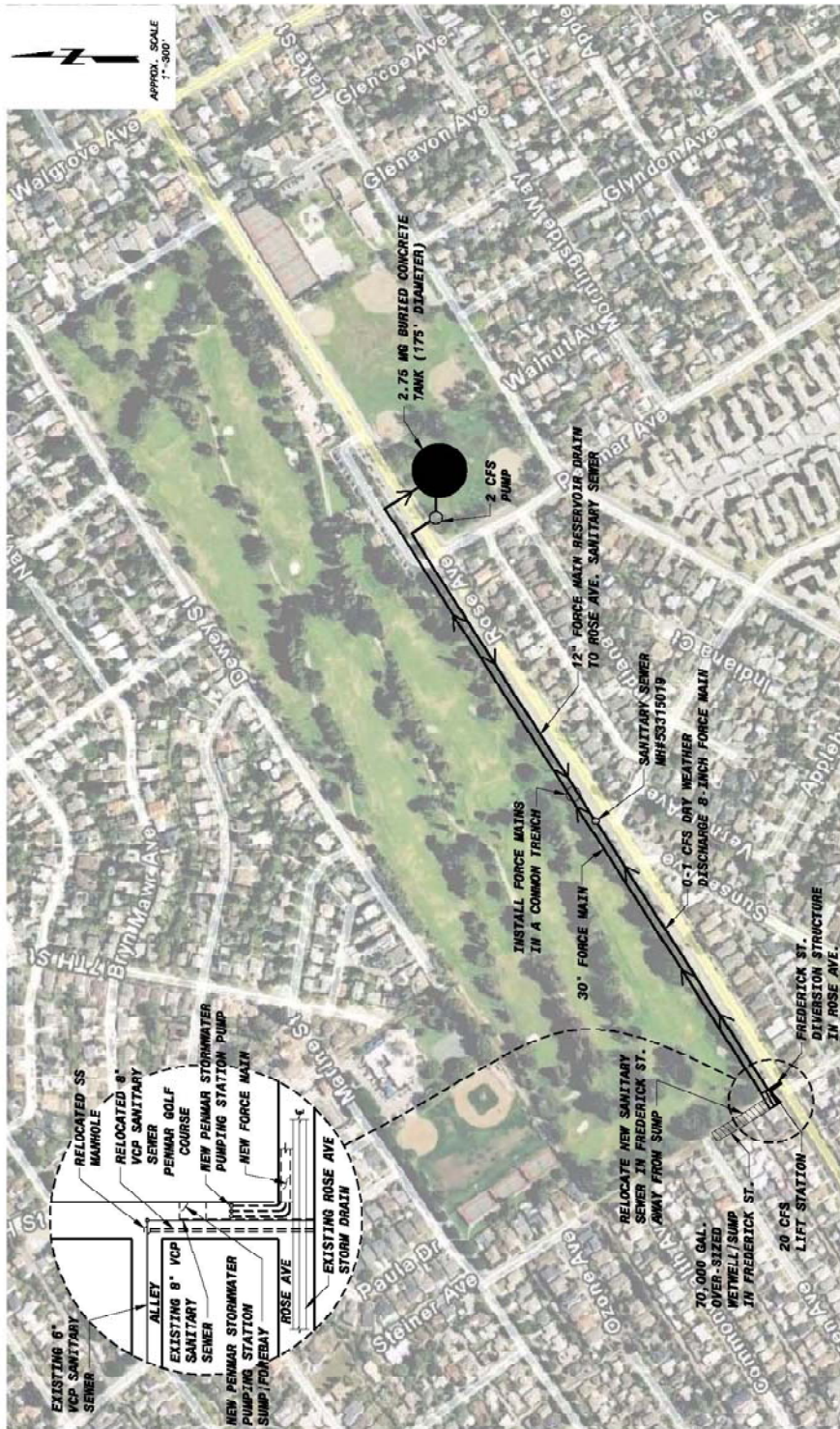


Figure 3-7 shows the area of the Project, illustrating the facilities that will be installed as part of Phase I. The open space surrounding the work area is the area where the treated runoff will be used for irrigation in Phase II of the Project.

Figure 3-7: Project Area Showing Phase I Improvements



**CITY OF LOS ANGELES**  
**PENMAR WATER QUALITY IMPROVEMENT PROJECT**  
 MODIFIED CONCEPT REPORT  
 SCENARIOS N OF P  
 GENERAL ARRANGEMENT  
 REV. 8/4/08

NOT SHOWN:  
 OFFSITE SANITARY SEWER  
 UPGRADES ON OAK WOOD AVE,  
 RIALTO COURT, CRESCENT PLACE,  
 AND ABBOT KUNNEY BLVD.

## Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed by June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

### (a) Direct Project Administration Costs

#### Task 1: Administration

Work completed under this task will consist of Project coordination and planning, invoicing coordination between the City of Los Angeles and City of Santa Monica as well as coordination with regulating agencies and stakeholder groups.

Project Administration Submittals	Date
Invoices	Monthly

#### Task 2: Labor Compliance Program

The City of Los Angeles currently has a Federal LCP approved by the California Department of Industrial Relations.

Labor Compliance Submittals	Date
Annual Report	Annually

#### Task 3: Reporting

The City of Los Angeles has continually submitted monthly Proposition O Clean Water Bond Program Reports.

Reporting Submittals	Date
Proposition O Clean Water Bond Program Monthly Reports	Monthly

**(b) Land Purchase/Easement**

This Project does not require acquisitions of land or rights-of-way.

**(c) Planning/Design/Engineering/Environmental Documentation****Task 4: Assessment and Evaluation**

The assessment and evaluation reports for the Project were completed as of May 2010. The report completion dates are presented in the table below. These reports cover assessment and evaluation of the entire Project (both Phases I and II). Copies of the supporting documentation are provided in Appendix D.

Assessment and Evaluation Documents	Date
Project Concept Report	March 2007
Preliminary Design Report	November 2008
Geotechnical Engineering Report	June 2008
Supplemental Geotechnical Recommendations	August 2009
Geology and Soils Report Correction Letter Response	August 2009
Groundwater Quality Testing Report	August 2009
Dewatering Aquifer Testing	May 2010

**Task 5: Final Design**

The design drawings for Phase I of the Project were completed as of February 2010. The design completion dates are presented in the table below.

Design Submittals	Date
Phase I 50% Design	October 2008
Phase I 90% Design	July 2009
Phase I 100% Design	February 2010



**Task 6: Environmental Documentation**

An environmental assessment conducted for the Project resulted in a finding that a Mitigated Negative Declaration was required. The Notice of Determination was issued August 2009. In support of the Mitigated Declaration, reports were developed documenting and assessing noise impacts, air quality impacts, traffic impacts and cultural resources.

Environmental Documentation Submittals	Date
Noise Impact Report	March 2009
Air Quality Impact Assessment	April 2009
Traffic Impact Study	April 2009
Cultural Resource Survey Report	May 2009
Notice of Determination – Mitigated Negative Declaration	August 2009
Coastal Development Permit Waiver	February 2010

**Task 7: Permitting**

The permitting for Phase I of the Penmar Water Quality Improvement and Runoff Reuse Project was completed as of October 2010. The report completion dates are presented in the table below.

Permit	Approval Date
Los Angeles County Flood Control District – Construction Permit for Crossing Over/Under Existing Storm Drain	July 2009
Los Angeles County Flood Control District – Construction Permit for Work Within Existing Storm Drain Channel	October 2009
City of Los Angeles, Bureau of Sanitation – Sewer Capacity Availability Request	October 2010
City of Los Angeles, Department of Building and Safety – Mechanical Permit	January 2011
City of Los Angeles, Department of Building and Safety – Structural Permit	January 2011
City of Los Angeles, Department of Building and Safety – Grading/Excavation Permit	January 2011

The permits listed with the approval date of January 2011 are “Ready to Issue” since they have passed the plan check review and approval process. The construction contractor is in the process of providing the required documentation and insurance to the permitting agency, after which the final permits will be issued. The January 2011 approval date is based on the construction schedule for the reservoir installation work for which the permits are required. Costs associated with acquisition of these permits are accounted for in Task 9.1.

#### (d) Construction/Implementation

##### **Task 8: Construction Contracting**

The following tasks were completed in the process of selecting and awarding the Phase I construction contract:

- Bid advertisement
- Pre-bid contractors meeting
- Bid evaluation
- Contract award

<b>Construction Contracting Submittals</b>	<b>Date</b>
Phase I Project Advertisement	June 2, 2010
Phase I Project Award	September 29, 2010
Phase I Notice to Proceed	November 12, 2010
Phase I Notice to Proceed	November 12, 2010

##### **Task 9: Construction**

###### **Subtask 9.1: Mobilization and Site Preparation**

Mobilization and Site Preparation for construction of Phase I was initiated in November of 2010 and will conclude prior to June 2011 as various construction activities are initiated and will consist of the following tasks:

- Finalize and submit all permits, licenses, insurance, and bonds;

- Conduct Pre-Construction Safety Conference (Injury and Illness Prevention Program and address hazard communication; safety communication; hazardous materials procurement, storage, and disposal; emergency plans; site specific safety programs; pedestrian and traffic safety issues);
- Establish lay-down area per project plan, set up trailer, install temporary construction power and wiring, and fence off work area in Penmar Park and Frederick Street; and
- Prepare project credit signs and traffic control devices (signs, barricades, and lights) to direct traffic and pedestrians through or around the construction area.

**Subtask 9.2: Project Construction**

Construction for Phase I occurring prior to June 1, 2011 will consist of the following tasks:

- Construction of a 2.75 million gallon underground reservoir; and
- Restoration of design flow capacity in 700 feet of sewer pipe.

The construction activities in Phase I will continue beyond June 1, 2011. Due to sequencing of construction activities and permit requirements that restrict construction on LACFCD storm drains to the summer months, some of the Phase I construction activities will be completed along with other work plan items after June 1, 2011. Those construction items are discussed in the work plan below.

**Subtask 9.3: Performance Testing and Demobilization**

Not applicable.

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

Based on the findings of the Noise Impact Report, Air Quality Impact Assessment, Traffic Study, and Cultural Resource Survey Report, the City of Los Angeles established required mitigation measures to comply with the Mitigated Negative Declaration issued in August 2009. These mitigation measures were incorporated into the General Requirements that were part of the specifications provided to the contractor in the bid documents. Compliance with the mitigation measures is required as part of the construction contract and the associated costs are included in the cost of construction provided in Task 9.

(f) [Construction Administration](#)

**Task 11: Construction Administration**

Construction administration will include general management of all construction activities and engineering services during construction. Required personnel will include: program manager, watershed coordinator, construction manager, administrative assistant, and inspector. Reporting regarding the construction administration will be incorporated into the Proposition O Clean Water Bond Program Monthly Reports.

[Work Items after June 1, 2011](#)

The following sections discuss work items that will be completed on or after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

(a) [Direct Project Administration Costs](#)

**Task 1: Administration**

Work to be completed under this task will consist of Project coordination and planning, invoicing, coordination between the City of Los Angeles and the City of Santa Monica as well as coordination with regulating agencies and stakeholder groups.

The City of Los Angeles would enter into a MOU regarding compliance with Proposition 84 Implementation Grant requirements and terms of reimbursement payments with the LACFCD who would serve as the grantee for the Proposition 84, Round 1 Implementation Grant Funding. This MOU between the City of Los Angeles and LACFCD would be completed by January 2012.

The City of Los Angeles and City of Santa Monica would enter into a formal agreement regarding the integrated operation of the treatment system and use of the captured dry and wet weather runoff. This formal agreement between the two agencies would be completed by January 2012.

Project Administration Submittals	Date
Invoices	Monthly
MOU with LACFCD	January 2012
Formal Agreement with City of Santa Monica	January 2012

### Task 2: Labor Compliance Program

The City of Los Angeles currently has a Federal LCP approved by the California Department of Industrial Relations.

Labor Compliance Submittals	Date
Annual Report	Annually

### Task 3: Reporting

Quarterly and Annual Reports will be submitted to the LACFCD for submittal to the State.

Reporting Submittals	Date
Quarterly reports	Quarterly
Annual reports	Annually

#### (b) Land Purchase/Easement

This project does not require acquisitions of land or rights-of-way.

#### (c) Planning/Design/Engineering/Environmental Documentation

### Task 4: Assessment and Evaluation

The Preliminary Design Report completed in November 2008 will be reviewed to validate the design criteria and updated as necessary by August 2011 to confirm the major design

considerations and constraints for the treatment system. The Updated Preliminary Design Report will confirm the selection of hydrodynamic separators, filtration system and ultra-violet (UV) disinfection system. In addition, the system layout and location of the treatment system within the City of Los Angeles' incorporation yard will be finalized along with the connection to the park irrigation system at the park pump station and the connection to and location of the surface storage pond on the first hole of the Penmar Golf Course. These elements of the Phase II Design were initially developed in the Project Concept Report from March 2007 and refined through design workshops conducted for the development of both phases of the project.

The Updated Preliminary Design Report will finalize the location of the pipeline connection to the City of Santa Monica's 16th Street Watershed Runoff Use Project for transmission of captured runoff.

Assessment and Evaluation Documents	Date
Updated Preliminary Design Report	August 2011

### Task 5: Final Design

The final design for Phase II of the Project will commence in August 2011 utilizing the approach and project siting and layout identified in the Penmar Project Concept Report from March 2007 and the Updated Preliminary Design Report completed as part of Task 4.

The 50 percent Design will be completed in February 2012 as a complete submittal covering all required disciplines.

The 90 percent Design will be completed in May 2012 and will be the pre-final, un-stamped submittal and will include an itemized construction cost estimate.

The 100 percent Design will be completed by August 2012.

Design Submittals	Date
Phase II 50% Design	February 2012
Phase II 90% Design	May 2012
Phase II 100% Design	August 2012

### Task 6: Environmental Documentation

The Notice of Determination issued in August 2009 will be reviewed based on the Updated Preliminary Design Report to determine if a revised version should be filed. If it is determined through the activities in Task 4 or Task 5 that a revised Mitigated Negative Declaration needs to be filed, that process would be completed by October 2012 before the project is advertised for bid.

Environmental Documentation Submittals	Date
Notice of Determination – Mitigated Negative Declaration	By October 2012 (If Required)

### Task 7: Permitting

The extent of the permitting required would be determined during the development of the Phase II design in Task 5. However, it is anticipated that the new construction would likely require approvals from the Los Angeles County Flood Control District and the City of Los Angeles, Department of Building and Safety.

The use of the treated runoff for irrigation may require approvals from either the Los Angeles Regional Water Quality Control Board or the Los Angeles County Department of Public Health. Those permitting requirements would be identified as part of the work in Task 4.

Efforts to obtain any required permit related approvals will be included as part of the cost in the design phase. Cost related to issuing permits will be included in the cost of construction in Task 9.

Permit	Approval Date
Los Angeles County Flood Control District – Construction Permit for Crossing Over/Under Existing Storm Drain	By October 2012 (If Required)
City of Los Angeles, Department of Building and Safety – Various Permits	By October 2012 (If Required)
Los Angeles Regional Water Quality Control Board OR Los Angeles County Department of Public Health	By October 2012 (If Required)

## (d) Construction/Implementation

**Task 8: Construction Contracting**

Tasks related to the advertisement and award of contracts will occur between August 2012 and March 2013 and include the following activities:

- Bid package preparation
- Bid advertisement
- Pre-bid contractors meeting
- Bid evaluation
- Contract award

Construction Contracting Submittals	Date
Phase II Project Advertisement	October 2012
Phase II Project Award	January 2013
Phase II Notice to Proceed	March 2013

**Task 9: Construction****Subtask 9.1: Mobilization and Site Preparation**

Mobilization and Site Preparation for construction of Phase II will be initiated after the Notice to Proceed in March 2013 and will consist of the following tasks:

- Finalize and submit all permits, licenses, insurance, and bonds;
- Pre-Construction Safety Conference (Injury and Illness Prevention Program and address hazard communication, safety communication, hazardous materials procurement storage and disposal, emergency plans, site specific safety programs, pedestrian and traffic safety issues);
- Establish laydown area per project plan, set up trailer, install temporary construction power and wiring, and fence off the established work area; and



- Prepare Project credit signs and traffic control devices (signs, barricades, and lights) to direct traffic and pedestrians through or around the construction area, as necessary.

### **Subtask 9.2: Project Construction**

The first part of project construction will consist of the completion of the following Phase I construction activities not completed before June 1, 2011.

- Construction of a stormwater diversion structure in the existing Lincoln Boulevard-Indiana Avenue Storm Drain that will connect to a 70,000-gallon pump station wet well with a primary and secondary pump system;
- Restoration of the Penmar Park Baseball Field above the reservoir including upgrading the field irrigation system using weather based irrigation controllers and water use efficient sprinklers; and
- Installation of 1,000 feet of 8-inch-diameter ductile iron pipe (DIP) force main, 1,200 feet of 12-inch-diameter DIP force main, and 2,200 feet of 30-inch DIP force mains.

The current construction schedule anticipates the construction on Phase I will be completed by November 2012.

Construction on Phase II will consist of the following activities occurring between March 2013 and August 2013:

- Installation of treatment systems including hydrodynamic separators, filtration units and UV disinfection system;
- Retrofit of irrigation systems at the Penmar Golf Course and Penmar Recreation Center and Park;
- Installation of a surface storage pond at Penmar Golf Course;
- Installation of infrastructure to support the treatment system and irrigation system including pipelines and power supplies; and
- Installation of infrastructure to connect to the City of Santa Monica's 16th Street Project.

**Subtask 9.3: Performance Testing and Demobilization**

At award of each phase of the project, the Contractor will appoint an operations engineer as a Quality Assurance Manager to coordinate and manage the Contractor's quality assurance program (testing, documentation, installed performance testing, calibration, of all instruments and mechanical/electrical and instrumentation). Upon completion of construction on each phase of the Project, performance testing and demobilization will consist of the following tasks:

- The contractor will submit a testing schedule for each item of mechanical, electrical and instrumentation equipment installed for this Project; and
- Once all testing has been completed and a final "punchlist" of items is approved, an acceptance report will be issued before the contractor can demobilize.
- The Phase I performance testing of individual facilities and associated demobilization will occur as the construction is completed. The Phase I system performance testing and final demobilization will occur after the completion of construction activities in November 2012 and will be completed no later than February 2013.
- The Phase II performance testing of individual facilities and associated demobilization will occur as the construction is completed. The complete Phase I and II total system performance testing and final demobilization will occur after the completion of Phase II construction activities in August 2013 and will be completed no later than October 2013.

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

The mitigation measures for the Phase I construction will continue as previously described.

The mitigation measures outlined in the existing Mitigated Negative Declaration will have been reevaluated as part of the development of the Phase II design. Any changes or modifications made to the required mitigation measures will be incorporated into the General Requirements as part of the specifications provided to the contractor in the bid documents for Phase II. Compliance with the mitigation measures is required as part of the construction contract and the associated costs are included in the construction cost provided in Task 9.

(f) Construction Administration

**Task 11: Construction Administration**

Construction administration will include general management of all construction activities and engineering services during construction. Required personnel will include: program manager, watershed coordinator, construction manager, administrative assistant, and inspector. Construction administration reporting will be incorporated into the Proposition O Clean Water Bond Program Monthly Reports.

(g) Other

The Project Monitoring Plan will be completed in August 2011 and will outline the monitoring, assessment and performance measures that will demonstrate that the project meets its intended goals. The Performance Measures Table and discussion in Attachment 6 provides a preview of the information that would be included in the Project Monitoring Plan.

Assessment and Evaluation Documents	Date
Project Monitoring Plan	August 2011

Discussion of Standards and Merits

Standards

Construction of the Project will conform to the following standards:

- CAL-OSHA, OSHA Regulations for Construction
- Standard Specifications for Public Works Construction, 2006 Greenbook and Brownbook (Amendments and Additions to the Greenbook) Standards
- Work Area Traffic Control Handbook (WATCH) Manual and California Manual on Uniform Traffic Control Devices
- City of Los Angeles, Department of Water and Power, Department of Public Works Standard Plans
- RWQCB-LA and/or the Los Angeles County Department of Public Health requirements.

## Merits

The proposed site structures include a 2.75-million-gallon prestressed concrete tank, the installation of a DIP Force Main, a 70,000-gallon wet well and pump station, and 700 feet of sewer rehabilitation that includes the use of pipe reaming for replacement. Any additional materials and merits will be determined in the Phase II design development.

## VI. Model Equestrian Center – City of Rolling Hills Estates

### Detailed Project Description

#### Project Purpose and Need

An estimated 1,000 horses are kept on residential properties within equestrian overlay zones and in equestrian centers on the Palos Verdes Peninsula. Runoff from these properties, which may contain nutrients and other materials, discharges via open channels and storm drains either to Machado Lake in the Dominguez Watershed or directly to the southern portion of Santa Monica Bay. A facility that utilizes BMPs such as native plant buffers (also known as bioswales) and drainage improvements is needed to protect water quality from equestrian land use. No such public facility for demonstrating implementation of BMPs for equestrian purposes currently exists either on the Palos Verdes Peninsula or in the Santa Monica Bay area. Since a significant portion of the drainage on the Palos Verdes Peninsula is conveyed through natural canyons, on-site BMPs and native plant buffers are the preferred methods of water pollution control commonly used in order to minimize adverse impacts on natural habitat and open space.

#### Project Description

The Model Equestrian Center project (Project) will adapt the existing municipal Peter Weber Equestrian Center, a 7.5 acre facility that houses 116 horses, as a public demonstration site for environmentally sustainable horse-keeping practices that improve the quality of storm water and other runoff from equestrian land uses. The general project location is shown in

Figure . A portion of the Peter Weber Equestrian Center is located on the decommissioned Palos Verdes Landfill, shown in Figure . Therefore, special measures will be required to control runoff from the site. This Project will be divided into two parts.

Part A of this Project will involve the retrofit of existing equestrian facilities to improve drainage and stormwater runoff quality. Drainage improvements will include downspout redirection, drainage correction from existing horse stalls, and drainage upgrades at existing horse arenas. Water quality will be improved by: 1) providing a cover for daily manure storage so that nutrients in the manure will not be carried to waterways; and 2) constructing bioswales that will provide stormwater treatment by filtering large particles in the swale and removing smaller particles and associated contaminants through bioretention by vegetation.

Part B of this Project involves new construction. Figure 3-10 shows the locations of existing facilities and the proposed new temporary facilities. A new 15,000-square-foot barn and associated improvements will be constructed on the 2.5-acre northwest portion of the site as shown in Figure . Key water quality features will include: 1) a covered horse wash area, which captures wash water that will be reused for dust control in arenas and/or subsurface irrigation to maintain appearance of adjacent landscaping and treatment bioswales; 2) manure management to control vectors, odors and runoff; and 3) a cistern or rain barrels to collect rainfall from the barn roof for use in wetting down arenas for dust control. In addition, the facility will utilize Low Impact Development (LID) and green building techniques, such as porous paving, integrated pest management through structural design, and equine-safe native and drought-proof plant buffers.

Both parts of the Project will be designed to demonstrate BMPs that can be easily replicated at private stables or other equestrian facilities in the Region. Interpretive signage will demonstrate and educate the equestrian community and visitors on how BMPs address the following pollutants: nutrients and bacteria in manure, urine, and bedding material; dust and sediment from stalls, corrals, and arenas; and pesticides from vector control. Environmentally sustainable horse-keeping practices will be incorporated into the educational curriculum held at the facility.

Although the scale of the impact of equestrian activities on receiving waters is not known at this time, monitoring plans will be put into place during this project will provide an estimate of the nutrient loading which equestrian activities contribute to downstream water bodies.

#### Consistency with IRWM Plan

The Model Equestrian Center Project is consistent with two of the Plan objectives: comply with water quality standards (including TMDLs) by improving the quality of urban runoff, stormwater, and wastewater; and protect, restore, and enhance natural processes and habitats. In addition, the Project would contribute to the planning targets for water supply (by capturing and reusing rainfall and wash water, thereby reducing demand for potable water) and for the reduction and/or capture and treatment of dry- and wet-weather runoff (by capturing runoff from the site for subsequent reuse for dust control and by directing runoff to bioswales for treatment via natural processes).

#### Goals and Objectives

The objectives of this Project are in line with four of the six goals of the Greater Los Angeles IRWM Plan. This Project will optimize use of local water resources by installing an on-site cistern and rain barrels to capture roof runoff for reuse on-site. The Project also improves the

water quality of urban and stormwater runoff, which will help the Region comply with water quality regulations. Natural processes and habitats are protected by maintaining open space and using native plants for landscaping.) Lastly, the Project increases watershed friendly recreational space for the community by providing an area for equestrian activities that reduces runoff from the site.

### Consistency with Program Preferences and Statewide Priorities

The Project is consistent with the following IRWM Program Preferences:

- Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program, by promoting collaboration and integration among community based watershed efforts (as a demonstration project for equestrian facilities).

In addition, the Project is consistent with a Statewide Priority:

- **Protect Surface Water and Groundwater Quality**—by protecting and restoring surface water and groundwater quality to safeguard public and environmental health and secure water supplies for beneficial uses.

### Resource Management Strategies

- The Project would implement several of the Resource Management Strategies identified in the California Water Plan Update 2009: Agricultural Lands Stewardship, by demonstrating water quality BMPs for equestrian land uses;
- Pollution Prevention, by implementing BMPs that reduce the discharge of contaminants into stormwater runoff; and
- Urban Runoff Management, by upgrading existing drainage systems and installation of new drainage systems that incorporate water quality BMPs.

### Linkages and Synergies

The objectives of this Project will contribute to the goals of the Machado Lake Total Maximum Daily Load (TMDL) Plan and the Santa Monica Bay Restoration Plan. Upon completion, the Project will contribute to the reduction objectives of the Machado Lake Nutrient TMDL Implementation Plan for the Palos Verdes Peninsula both directly through water quality impact reduction from the existing recreational facilities at the Peter Weber Equestrian Center, and also as a key educational tool in outreaching to private equestrian owners in the area. The

Project also supports the Implementation Plan for the Santa Monica Bay Beaches Bacteria TMDL for the Palos Verdes Peninsula.

### Project Timing and Phasing

Feasibility planning and conceptual design are already complete for this Project. Design is expected to be completed and construction is anticipated to begin prior to December 2011. This Project is not part of a multi-phased project.

### Project Map

Project location and facilities are identified on Figure 3-8, Figure 3-9, Figure 3-10, and Figure 3-11. In addition, the maps identify the proximity to Santa Monica Bay and Machado Lake, both of which are listed under the Clean Water Act 303(d) list of impaired water bodies.

Figure 3-8: Model Equestrian Center Project Location Map





Figure 3-9: Model Equestrian Center Project Site

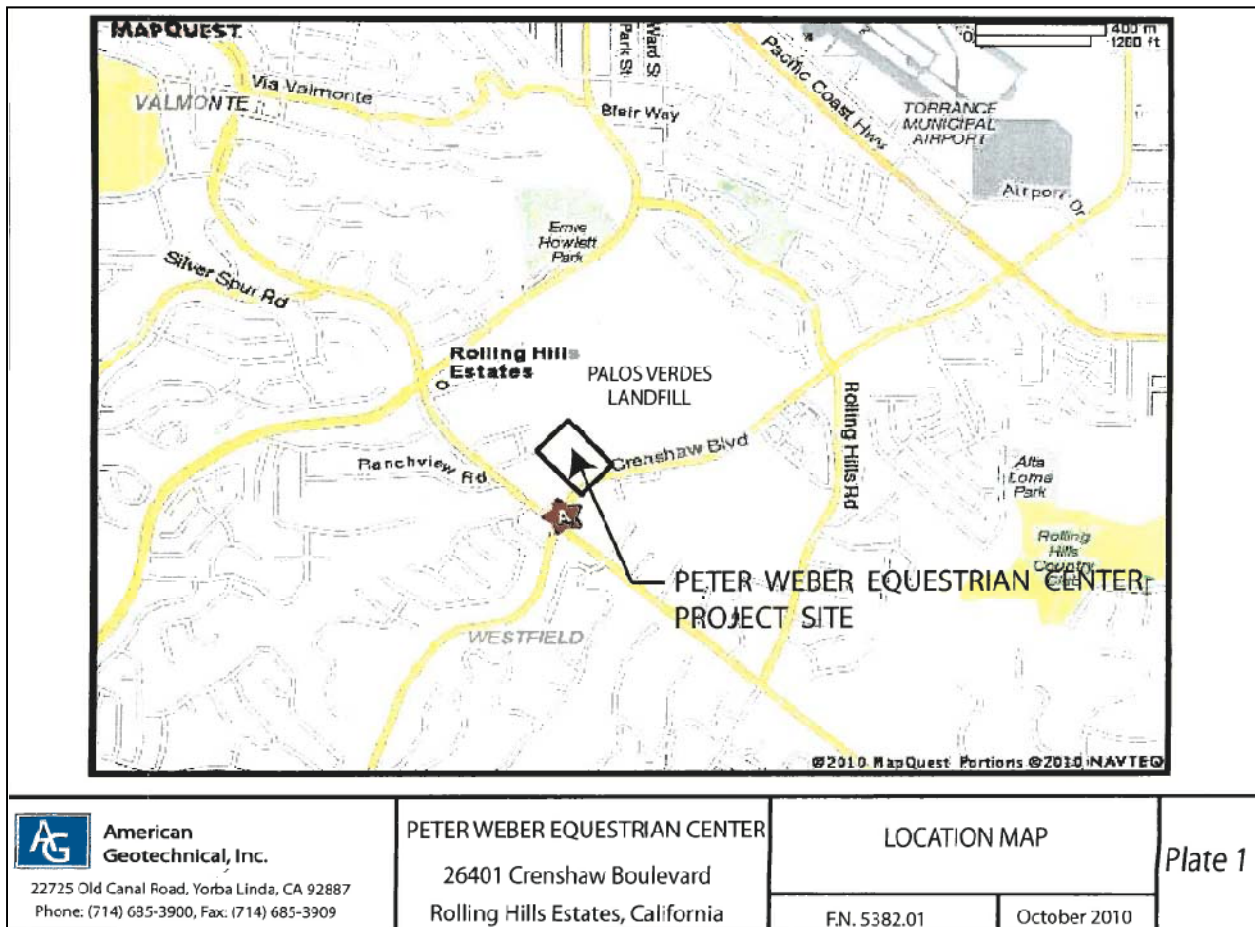
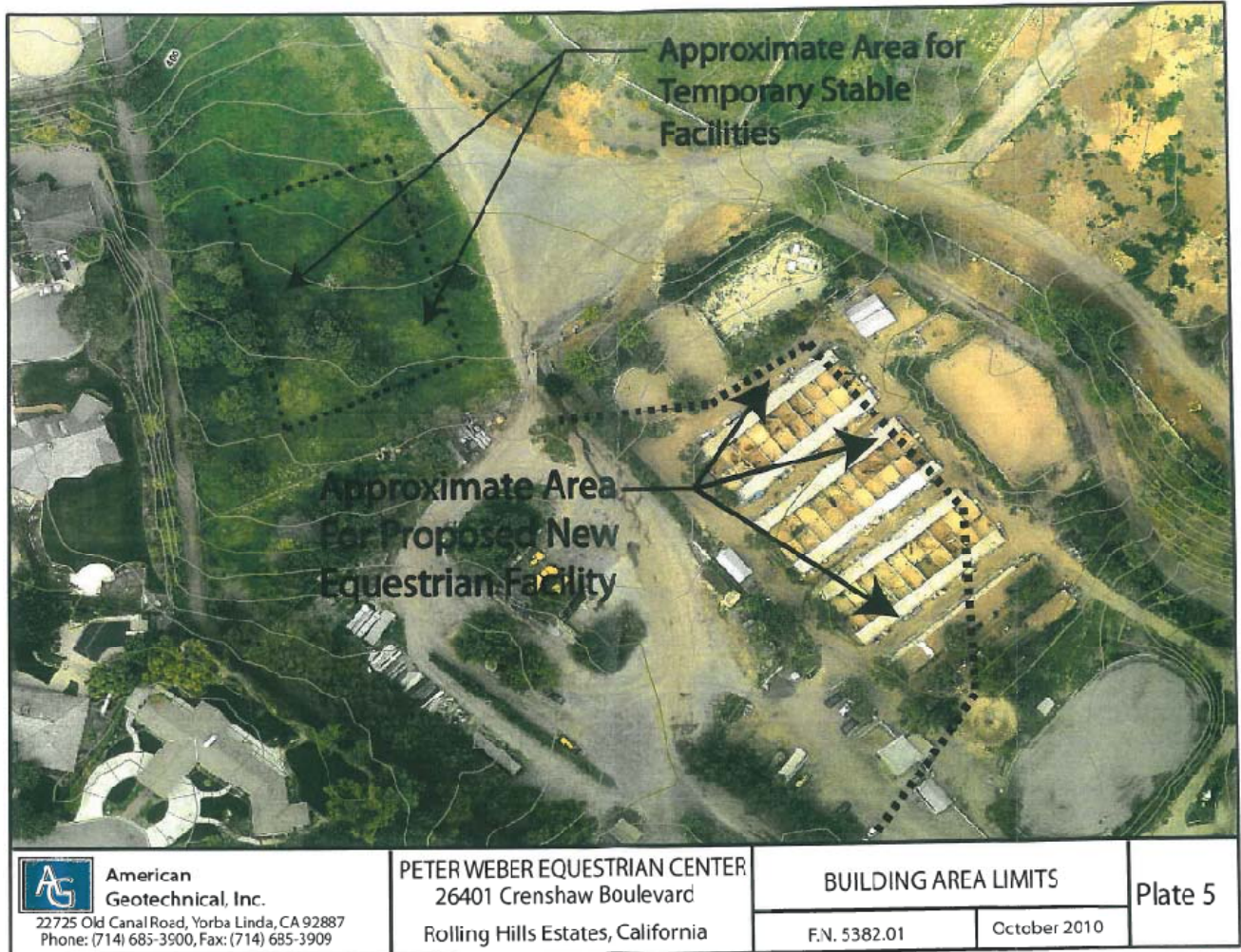
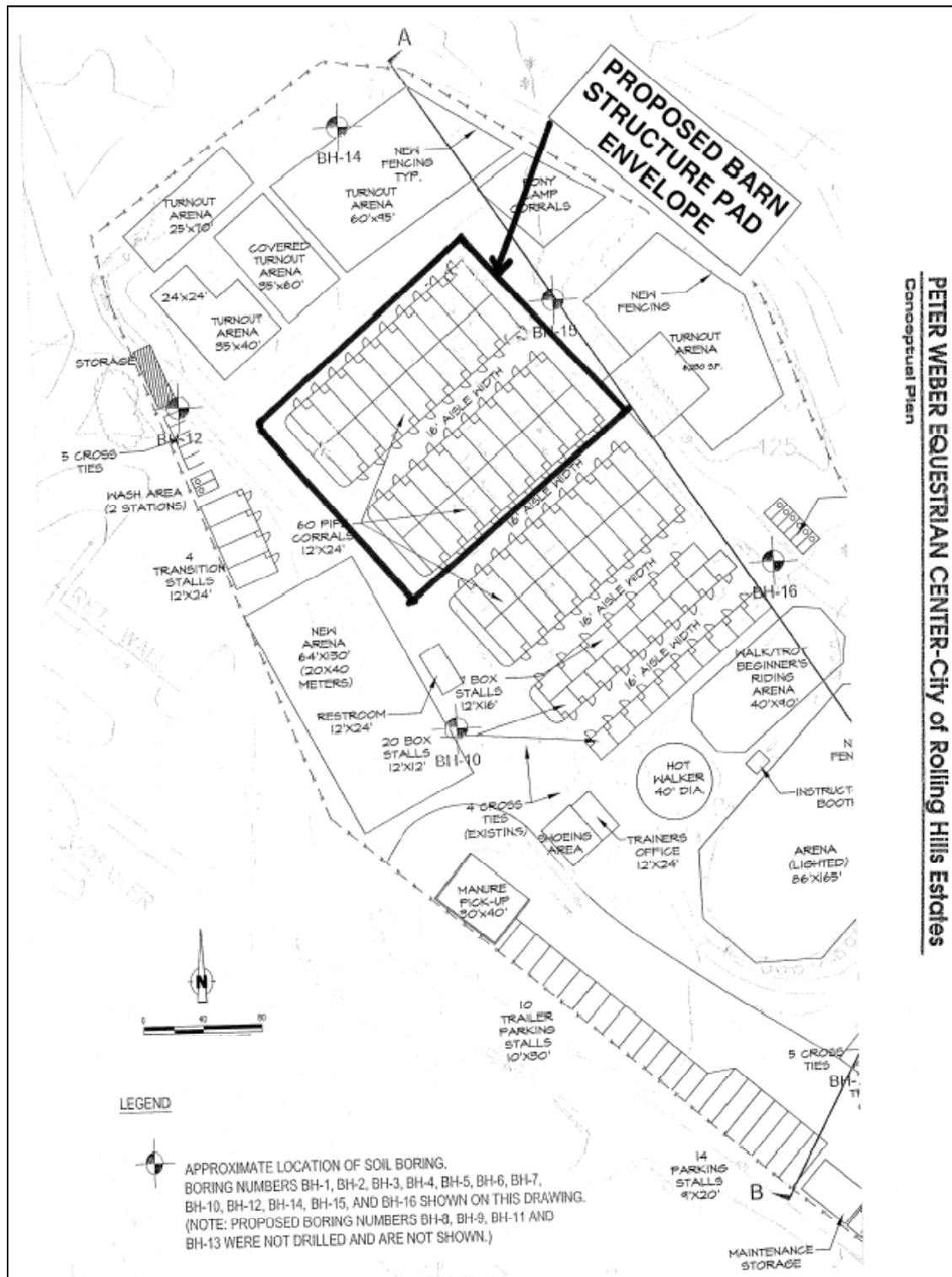


Figure 3-10: Model Equestrian Center Building Area Limits



*Note: The above referenced new equestrian facility includes both newly constructed facilities and facilities which will be retrofitted.*

Figure 11: Model Equestrian Center Project Map



Note: The envelope referenced in the above figure represents the planned barn footprint.

## Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed by June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, page 32, of the Proposition 84 Implementation PSP.

### (a) Direct Project Administration Costs

#### **Task 1: Administration**

Work completed under this task consists of project planning and coordination with respect to TMDL implementation planning and project monitoring. A stormwater consultant will provide a review of the project design.

#### **Task 2: Labor Compliance Program**

Not applicable.

#### **Task 3: Reporting**

Not applicable.

### (b) Land Purchase/Easement

No land purchase or easement is necessary.

### (c) Planning/Design/Engineering/Environmental Documentation

#### **Task 4: Assessment and Evaluation**

The site was selected because the facility housed a large population of horses, several BMPs could be feasibly implemented, and the management recognized the importance of employing sustainable practices and relevant BMPs. The Geotechnical Investigation Report, completed in October 2010 by American Geotechnical Inc., confirmed that the selected building site for the barn was suitable and provided design parameters for the project (provided in Appendix E).

The Palos Verdes Peninsula Coordinated Monitoring Plan, completed in March 2010 and currently in review by local Regional Water Quality Control Board staff, requires monthly dry weather and wet weather water quality sampling from representative locations in the watershed. This plan will ensure that the Project's water quality monitoring methods and

procedures will be consistent with the Machado Lake Nutrient TMDL. A wet-weather monitoring location downstream of the Project site will be proposed to be included in this plan. Monitoring under the plan will begin after RWQCB approval.

A portion of the Peter Weber Equestrian Center is located on the decommissioned Palos Verdes Landfill. The State of California Department of Toxic Substances Control (DTSC) Fact Sheet, completed in May 1990, serves as the Palos Verdes Landfill Remedial Investigation/Feasibility Study. This document studied multi-media soil, groundwater and air samples.

The DTSC Fact Sheet #9 Five Year Review of Landfill Remediation Systems was completed in March 2004 and found the site to be well maintained with remediation systems in good working order.

The DTSC Fact Sheet #13 Five Year Review was completed in November 2009 and provided a five year review on the status of the decommissioned Palos Verdes Landfill. This review also found the site to be well maintained with remediation systems in good working order.

Assessment and Evaluation Submittals	Date
Geotechnical Investigation Report	October 2010
Palos Verdes Peninsula Coordinated Monitoring Plan	March 2010
DTSC Fact Sheet #13	November 2009
DTSC Fact Sheet #9	March 2004
DTSC Fact Sheet (Palos Verdes Landfill Remedial Investigation/Feasibility Study)	May 1990

### Task 5: Final Design

Project design will be completed separately for Part A and Part B of the project. The 10 percent Conceptual Plans for the Part A retrofit of existing buildings will be completed in April 2011. The 80 percent Final Draft Plans for the Part A retrofit will be completed in June 2011.

The 10 percent Conceptual Design for the new facilities constructed under Part B will be completed in January 2011. The 30 percent Conceptual Design for Part B will be completed in April 2011.

Design Submittals	Date
10% Conceptual Plans Part A - Retrofit	April 1, 2011
80% Final Draft Plans Part A - Retrofit	June 1, 2011
10% (conceptual) Design Part B New Facilities	January 15, 2011
30% (concept) Design Part B-New Facilities	April 1, 2011

### Task 6: Environmental Documentation

This project will require compliance with CEQA. The Initial Study is in progress and is expected to be completed in April 2011. The Public Notice will be posted in June 2011 and the Public Review Period will begin.

Environmental Documentation Submittals	Date
Initial Study	April 1, 2011
Public Review Period begins	July 1, 2011

### Task 7: Permitting

Not applicable.

### (d) Construction/Implementation

#### Task 8: Construction Contracting

Not applicable.

#### Task 9: Construction

Not applicable.

### (e) Environmental Compliance/Mitigation/Enhancement

#### Task 10: Environmental Compliance/Mitigation/Enhancement

Not applicable.

## (f) Construction Administration

**Task 11: Construction Administration**

Not applicable.

## Work Items after June 1, 2011

The following sections discuss work items that will be completed on or after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

## (a) Direct Project Administration Costs

**Task 1: Administration**

The project manager will oversee all activities associated with the Project. The project manager will review all technical data, schedules, contractual, and financial information pertaining to the project. In addition, the project manager will coordinate with various agencies regarding permitting, environmental, design and construction issues, and will prepare quarterly invoices.

Project Administration Submittals	Date
Quarterly Invoices	Quarterly

**Task 2: Labor Compliance Program**

The City of Rolling Hills Estates contracts for labor compliance enforcement through a third party on a project specific basis and will have a program in place by the time the grant contract is awarded.

Labor Compliance Submittals	Date
Labor Compliance Program	June 2011
Annual Reports	Annually

**Task 3: Reporting**

Reports will be submitted as specified in the Grant Agreement to assess progress and accomplishments.

Reporting Submittals	Date
Quarterly Progress Reports	Quarterly
Annual Reports	Annually
Final Report	June 2013

**(b) Land Purchase/Easement**

This project does not require acquisitions of land or easements, since an existing facility is being utilized.

**(c) Planning/Design/Engineering/Environmental Documentation****Task 4: Assessment and Evaluation**

No additional work will be completed under Task 4.

**Task 5: Final Design**

Project design will be completed separately for Part A and Part B of the project. The 90 percent (Pre-Final) Plans for Part A - Retrofit will be completed in July 2011. The 100 percent (Final) Plans for Part A - Retrofit will be completed August 2011 and will include the complete design package that will be used to advertise the Project for construction. The 60 percent (Conceptual) Design for the Part B – New Facilities will be completed in August 2011. The 90 percent (Pre-Final) Design for Part B – New Facilities will be completed in October 2011. The 100 percent (Final) Design for Part B – New Facilities, which will consist of signed plans and specifications, will be completed in November 2011.

Design Submittals	Date
90% (Pre-Final) Plans Part A - Retrofit	July 2011
100% (Final) Plans Part A - Retrofit	August 2011
60% (Conceptual) Design Part B - New Facilities	August 2011



Design Submittals	Date
90% (Pre-Final) Plans Part B – New Facilities	October 2011
100% (Final) Plans Part B – New Facilities	November 2011

### Task 6: Environmental Documentation

The CEQA process will be continued and the Notice of Determination will be filed in August 2011. All CEQA documentation will be approved and adopted prior to construction.

Environmental Documentation Submittals	Date
Notice of Determination	August 2011

### Task 7: Permitting

Permits for construction of this Project will be obtained for both Part A and Part B. The permitting process was initiated with the completion of the preliminary geotechnical report. The DTSC construction approval process is in progress and will ensure that the final plans and specifications are consistent with the management of a closed landfill.

Los Angeles County Building Permits will be required for all building and grading.

A NPDES Stormwater General Construction permit will be required for stormwater pollution prevention during construction of Parts A and B of this Project. Compliance with this permit will include the completion of a Stormwater Pollution Prevention Plan (SWPPP).

Permit	Approval Date
DTSC construction approval	December 2011
Los Angeles County Building Permits	December 2011
NPDES Stormwater General Construction Permit and SWPPP	December 2011

## (d) Construction/Implementation

**Task 8: Construction Contracting**

Construction contracting tasks will include an advertisement for bids, a pre-bid contractors meeting, evaluation of bids, and award of contract.

Construction Contracting Submittals	Date
Part A – Retrofit: Advertisement for Bids	July 2011
Part A – Retrofit: Award Contract	September 2011
Part A – Retrofit: Notice to Proceed	September 2011
Part B – New Facilities: Advertisement for Bids	November 2011
Part B – New Facilities: Award Contract	January 2012
Part B – New Facilities: Notice to Proceed	January 2012

**Task 9: Construction****Subtask 9.1: Mobilization and Site Preparation**

For each part of the project (Part A and Part B), the contractors will have a construction trailer on-site for the convenience of managing the construction contract. Temporary utilities will be installed for the contractors. Construction site entrances and exits will be established early in the mobilization phase to efficiently manage construction vehicle and equipment traffic. Safety meetings will be arranged to make all the parties aware of the potential hazards during construction.

Site preparation for each part will entail clearing and grubbing and minor grading of the site with the aid of preliminary surveys. Part B will also include the dismantling of existing buildings. Materials that cannot be reused on-site will be recycled to the extent possible. Dust, erosion, and noise mitigation measures will be addressed to minimize adverse impacts to the neighboring community.

Also under Part B, temporary stables with temporary utilities will be constructed and the horses moved prior to construction.

**Subtask 9.2: Project Construction**

Project construction will commence with the retrofits planned under Part A of the project. Activities will involve downspout redirection, drainage correction to redirect runoff from existing stalls, bioswale installation, cover for daily manure storage, and improvement of drainage in existing arenas.

Construction under Part B will begin approximately four months later. This will involve construction of the new barn building and amenities, installation of rainwater cisterns, installation of electrical and water/wastewater utilities, and landscape installation. Once construction is complete, interpretive signage will be installed.

**Subtask 9.3 Performance Testing and Demobilization**

Performance Testing and Demobilization will include final inspections and permit approval, removal of temporary stalls and utilities, demobilization of the contractor once the Project construction is approved.

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

The environmental compliance measures required for this Project include installation of landfill gas/methane barriers and collection systems, which will be required beneath all new structures.

**(f) Construction Administration****Task 11: Construction Administration**

Construction administration will include general management of construction activities, certified payroll review and approval, and engineering services during construction.

**Discussion of Standards and Merits****Standards**

Project design and construction will be consistent with the preliminary findings of the Geotechnical Investigation Report. To ensure this consistency, consultation with the engineering geologist will take place during pre- and post-construction. In particular, the engineering geologist will be consulted during the following activities:

- Preconstruction meeting
- Grading
- Foundation excavation review
- Reinforcement placement for all foundations
- Slab subgrade presaturation
- Waterproofing
- Slab subgrade preparation including rock placement
- Slab steel placement in structures
- drain and rock placement behind retaining walls
- Backfill compaction behind retaining walls
- Compaction of utility trench backfill

Consistent with the DTSC requirements, any enclosed or partially enclosed structure for the project will be provided with a methane vapor barrier and collection system beneath the structure.

All work performed and equipment furnished shall meet the minimum requirements of the latest edition of the Los Angeles County Building Code, the Los Angeles County Fire Code, and the California Division of Industrial Safety Regulations (Title 8) in effect at the time of bid.

All contractor work practices that may have associated emissions, such as sandblasting, open field spray painting, demolition of asbestos-containing components or structures, etc., shall also comply with the appropriate Rules and Regulations of the SCAQMD.

The special provisions in the contract documents are supplemented by the Standard Specifications for Public Works Construction, 2003 Edition.

Construction work will be conducted in accordance with an approved Health and Safety Plan that addresses physical and environmental hazards associated with the work to be performed as well as site-specific safety protocols appropriate for work on a closed landfill.

### Merits

Design and implementation will be in accordance with Ahwahnee Water Principles for Resource-Efficient Land Use and Low Impact Development and green building practices.

The most suitable barn design and manufacturer will be selected to address the particular needs of the site, facility, neighborhood compatibility and project budget. Design and selection

of building materials for the barn will include: resource efficiency, indoor air quality, energy efficiency, water conservation, and affordability.

Resource Efficiency can be accomplished by utilizing materials that meet the following criteria:

- **Recycled Content**—Products with identifiable recycled content, including postindustrial content with a preference for postconsumer content.
- **Natural, Plentiful or Renewable**—Materials harvested from sustainably-managed sources and preferably having an independent certification (e.g., certified wood) a by an independent third party.
- **Resource Efficient Manufacturing Process**—Products manufactured with resource-efficient processes, including reducing energy consumption, minimizing waste (recycled, recyclable and or source reduced product packaging), and reducing greenhouse gases.
- **Locally Available**—Building materials, components, and systems found locally or regionally, saving energy and resources in transportation to the project site.
- **Salvaged, Refurbished, or Remanufactured**—Materials that are saved from disposal and renovated, repaired, restored, or generally improved in appearance, performance, quality, functionality, or value.
- **Reusable or Recyclable**—Materials that can be easily dismantled and reused or recycled at the end of their useful life.
- **Recycled or Recyclable Product Packaging**—Products enclosed in recycled content or recyclable packaging.
- **Durable**—Materials that are longer lasting or are comparable to conventional products with long life expectancies.

Indoor Air Quality (IAQ) is enhanced by utilizing materials that meet the following criteria:

- **Low or Non-toxic**—Materials that emit few or no carcinogens, reproductive toxicants, or irritants as demonstrated by the manufacturer through appropriate testing.

- **Minimal Chemical Emissions**—Products that have minimal emissions of Volatile Organic Compounds (VOCs). Products that also maximize resource and energy efficiency while reducing chemical emissions.
- **Low-VOC Assembly**—Materials installed with minimal VOC-producing compounds, or no-VOC mechanical attachment methods and minimal hazards.
- **Moisture Resistant**—Products and systems that resist moisture or inhibit the growth of biological contaminants in buildings.
- **Healthfully Maintained**—Materials, components, and systems that require only simple, non-toxic, or low-VOC methods of cleaning and facilitate integrated pest management, which minimizes pests through barriers and physical means first using least toxic chemicals to achieve necessary control.
- **Systems or Equipment**—Products that promote healthy IAQ by identifying indoor air pollutants or enhancing the air quality.

Energy Efficiency can be maximized by utilizing materials, components, and systems that help reduce energy consumption in buildings and facilities.

Roofing materials will be selected to be compatible with the collection of rainwater for use in dust control.

Interior stall walls will be selected to provide a lifetime kick thru and chew proof warranty.

Landscaping will be designed to be consistent with the City's Water Efficient Landscape and Water Conservation Ordinances and will utilize horse-safe and native and/or drought tolerant plants.

## VII. 16th Street Watershed Runoff Use Project – City of Santa Monica

### Detailed Project Description

#### Project Need

The Region has experienced significant reductions in imported water supplies due to recent drought conditions in northern California, ongoing drought conditions in the Colorado River watershed, and from regulatory actions and court decisions that have reduced exports from the Sacramento-San Joaquin Delta. In addition, the effects of climate change may make imported sources less reliable. Thus, the Region needs to increase the utilization of local water supplies and reduce dependency on imported water.

The City of Los Angeles' Penmar Water Quality Improvement and Runoff Reuse Project (Penmar Project) will generate an excess supply of treated runoff that could be used for irrigation at the City of Santa Monica's Marine Park. Use of local, treated stormwater for irrigation would reduce demand for potable water and dependence on imported water.

#### Project Description

The 16th Street Watershed Runoff Use Project (Project) will reduce the demand for imported water by utilizing treated stormwater for irrigation purposes. The Project will convey dry- and wet-weather runoff treated at the Penmar Project (included in this grant application) to the City of Santa Monica's Marine Park.

This Project includes the installation of 3,100-linear-feet of pipeline from Marine Park to the Penmar Recreation Center and Park to convey treated stormwater. A new cistern at Marine Park would provide storage of the treated water, and a pump system would deliver water from the cistern to the irrigation system. The Project will utilize approximately 1.15 million gallons/year of treated runoff generated by the Penmar Project in the City of Los Angeles from an upstream area of 1,468 acres.

This Project is included in the City of Santa Monica's Five Year Capital Improvement Plan and is consistent with the type of projects identified by the Santa Monica Bay Beaches Bacterial TMDL Implementation Plan. This Project would be constructed following completion of Phase II of the Penmar Project. The final design for Phase I of the Penmar Project has been completed, which will allow the design phase of this Project to remain on track and be completed by September 2012.

### Consistency with the IRWM Plan

The Project would be consistent with two of the Plan objectives: optimize local water resources to reduce the Region’s reliance on imported water; and maintain and enhance public infrastructure related to flood protection, water resources, and water quality. The project would also contribute to the water supply planning target in the Plan, by reducing demand for potable water.

### Goals and Objectives

The objectives of the Project include:

- Expand utilization of local water resources by using treated stormwater for irrigation of Marine Park; and
- Reduce use of potable water and decrease demand for imported water.

### Consistency with Program Preferences and Statewide Priorities

The Project will be consistent with the following IRWM Program Preferences:

- Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program: 1) maximize use of available water supplies through conservation, water recycling, and water quality improvements; 2) increase the flexibility of water systems at the state, federal and local level through improvements in conveyance, storage and water project operations; and 3) reduce water demand through “real water” conservation.

The Project will also address the following Statewide Priorities:

- **Drought Preparedness**—by effectively addressing long-term drought preparedness by contributing to sustainable water supply and reliability during water shortages; and
- **Use and Reuse Water More Efficiently**—by implementing water use efficiency, water conservation, and recycling and reuse.

### Resource Management Strategies

The Project will implement the following Resource Management Strategies identified in the California Water Plan Update 2009:



- Matching Quality to Use, by using treated runoff for irrigation purposes; and
- Urban Water Use Efficiency, by replacing potable water supplies with treated runoff.

#### Linkages and Synergies

This Project is linked to and is synergistic with the Penmar Project, since the Project will utilize a portion of the water collected and treated by the Penmar Project for irrigation at Marine Park.

#### Project Timing and Phasing

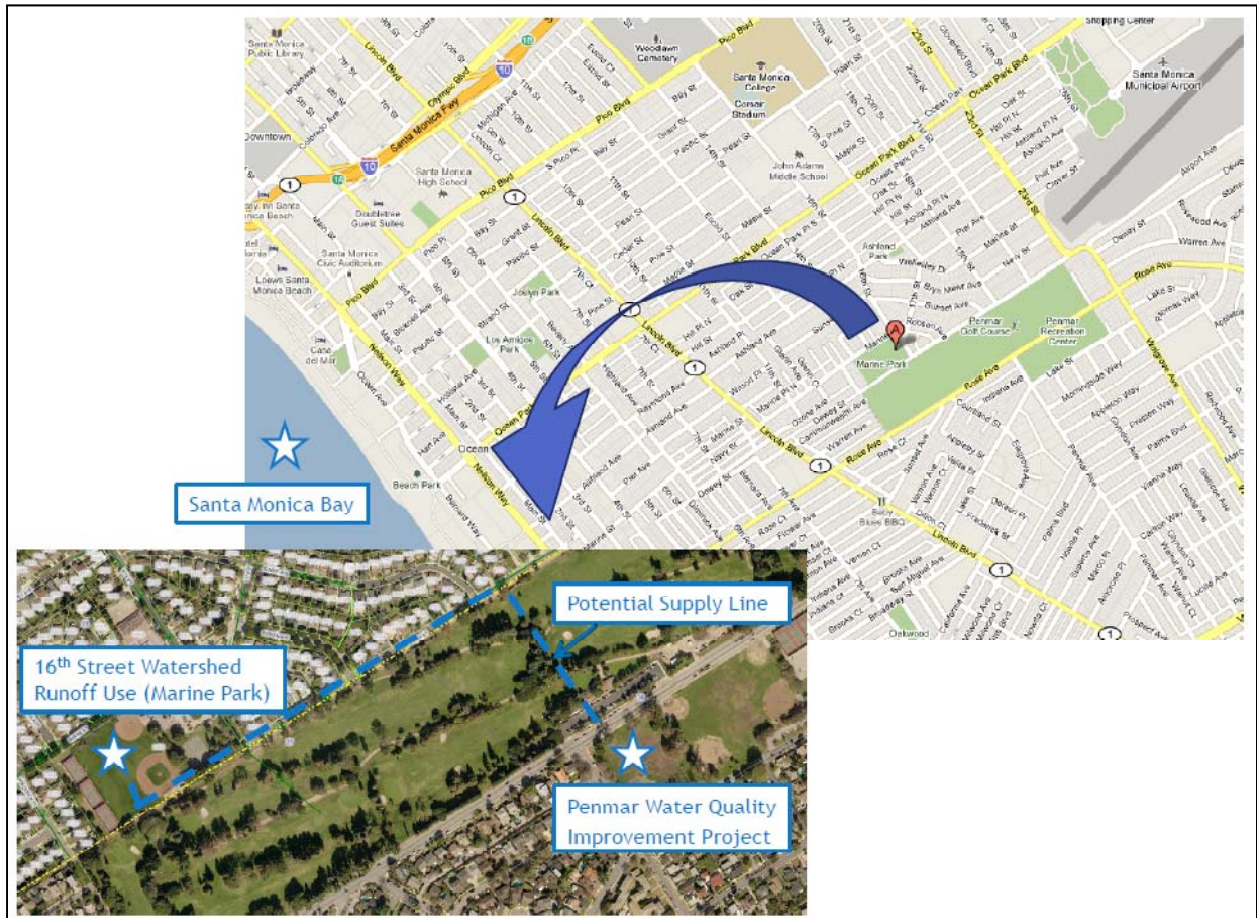
As previously discussed, this Project is dependent upon the completion and implementation of both Phases of the Penmar Project.

Phase I of the Penmar Project, which will capture the stormwater, is scheduled to be completed in November 2012. Phase II of the Penmar Project, which will treat the captured stormwater and make the water available for distribution, is scheduled for completion in August 2013.

#### Project Map

The Project location can be seen in Figure 3-12. In addition, the linkage to the Penmar Project and location of the Santa Monica Bay, a 303(d) listed water body, are shown.

Figure 3-12. Project Location Map



## Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed by June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

### (a) Direct Project Administration Costs

#### **Task 1: Administration**

The City of Santa Monica has utilized a program manager, watershed coordinator, and engineering consultant for cursory Project planning to determine Project feasibility for inclusion of the Project in the City's Capital Improvement Projects Program.

#### **Task 2: Labor Compliance Program**

Not applicable.

#### **Task 3: Reporting**

Not applicable.

### (b) Land Purchase/Easement

Not applicable.

### (c) Planning/Design/Engineering/Environmental Documentation

#### **Task 4: Assessment and Evaluation**

The Penmar Water Quality Improvement Project CEQA Initial Study completed in May 2009 lists Marine Park as a potential user of treated stormwater from the Penmar Project (See page 12 of the Initial Study in Appendix F). The City of Santa Monica's Five Year Capital Improvement Plan completed in 2009 identifies potential runoff mitigation projects, including the 16th Street Watershed Runoff Use Project (See page 13 of the Improvement Plan in Appendix F).

Assessment and Evaluation Documents	Date
Penmar Water Quality Improvement Project Initial Study	May 2009
Five Year Capital Improvement Plan	December 2009

**Task 5: Final Design**

Not applicable.

**Task 6: Environmental Documentation**

This Project is Categorically Exempt under CEQA, and was issued a Notice of Exemption in June 2004.

Environmental Documentation Submittals	Date
Notice of Exemption	June 2004

**Task 7: Permitting**

Not applicable.

**(d) Construction/Implementation****Task 8: Construction Contracting**

Not applicable.

**Task 9: Construction**

Not applicable.

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

Not applicable.

**(f) Construction Administration****Task 11: Construction Administration**

Not applicable.

## Work Items after June 1, 2011

The following sections discuss work items that will be completed on or after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

### (a) Direct Project Administration Costs

#### Task 1: Administration

Work to be completed under this task will consist of Project coordination and planning, invoicing, coordination between the City of Santa Monica and the City of Los Angeles, and coordination with regulating agencies.

The City of Santa Monica and the City of Los Angeles will finalize a MOU between the two agencies in 2011 regarding the integration of operations for the 16th Street Project and the Penmar Project.

Project Administration Submittals	Date
Invoices	Monthly
Memorandum of Understanding between City of Santa Monica and City of Los Angeles	2012
Memorandum of Understanding between City of Santa Monica and LACFCD	2011

#### Task 2: Labor Compliance Program

The City of Santa Monica currently has an approved Federal LCP in effect for Housing and Urban Development projects. The City will enter into a contract with a Department of Industrial Relations approved third party LCP by award of the grant.

Labor Compliance Submittals	Date
Labor Compliance Program	June 1, 2011
Annual Report	Annually

**Task 3: Reporting**

Quarterly and annual Project reports will be submitted to the LACFCD for submittal to the State. A final report will be submitted at the completion of the Project.

Reporting Submittals	Date
Quarterly reports	Quarterly
Annual reports	Annually
Final report	May 2014

**(b) Land Purchase/Easement**

An easement will be required from the City of Los Angeles and the Penmar Golf Course to construct and maintain treated stormwater supply pipes. This will be obtained during the design phase.

**(c) Planning/Design/Engineering/Environmental Documentation****Task 4: Assessment and Evaluation**

Not applicable.

**Task 5: Final Design**

Design for this Project will begin in October 2011 with the 10 percent (Conceptual) Design completed by October 2011 which will include general project location and layout.

The 30 percent (Concept) Design will be completed in November 2011 and will show detailed project location and all project appurtenances. A rough listing of Project specifications will be provided.

The 60 percent Design will be completed in March 2012 and will add more detail to the plans by design discipline. Specific disciplines will be determined as design is completed.

The 90 percent (Pre-final) Design will be completed in May 2012, and will be the final, un-stamped submittal, including an itemized cost estimate.

The 100 percent (Final) Design will be completed by August 2012.

Design Submittals	Date
10% (Conceptual) Design	October 2011
30% (Concept) Design	November 2011
60% Design	March 2012
90% (Pre-Final) Design	May 2012
100% (Final) Design	August 2012

#### Task 6: Environmental Documentation

This Project is Categorically Exempt under CEQA and was issued a Notice of Exemption in June 2004. No further environmental documentation will be necessary.

Environmental Documentation Submittals	Date
Notice of Exemption	June 2004

#### Task 7: Permitting

Permits from the City's Building and Safety Department will be required for the plumbing and electrical systems. These will be single trade permits for the systems and will be in place prior to the start of construction.

Permit	Approval Date
Building & Safety Permit	March 2013

#### (d) Construction/Implementation

#### Task 8: Construction Contracting

Tasks to obtain contractors and award contracts will include:

- Bid advertisement

- Pre-bid contractors meeting
- Bid evaluation
- Contract award

Construction Contracting Submittals	Date
Construction Contract Bid Opening	October 31, 2012
Award Date	January 10, 2013
Notice to Proceed	August 1, 2013

## Task 9: Construction

### Subtask 9.1: Mobilization and Site Preparation

Mobilization and Site Preparation will consist of the following tasks:

- Clearing and grubbing, disconnect existing irrigation systems;
- Set up staging area within the park; and
- Move-in of excavators, backhoes, and compactors.

### Subtask 9.2: Project Construction

Project construction will consist of the following tasks:

- Excavation and backfill of approximately 3,100-linear-feet of trench and installation of 4-inch PVC pipe. This pipe runs from the Penmar Recreation Center westerly along Rose Avenue, northerly along Frederick Street, easterly on Marine Street, and southerly into the Marine Park.
- Excavation of approximately 3,000 cubic yards to install the storage cistern under the baseball fields at Marine Park. It is anticipated that some of the excavated material will be used for backfill and the rest will be exported.
- Construction of the cistern will occur upon completion of excavation. Storage media (the storage chambers used to detain water) will be assembled, installed, and lined with an impervious membrane. A float switch will be installed to allow for irrigation with potable water when treated stormwater is not available in the cistern.



- Installation of a pumping system to pump water from the cistern through the irrigation system.
- Connection of influent plumbing from the 4-inch PVC pipe to the cistern.
- Installation of the irrigation system.
- Installation of electrical systems for pumps and irrigation control valves.
- Replacement of sod and miscellaneous landscape planting.
- Restoration of ball field facilities.

#### **Subtask 9.3: Performance Testing and Demobilization**

Performance testing and demobilization will consist of the following tasks:

- Dual irrigation system testing to ensure that the system switches to potable water supply for irrigation when cistern is empty.
- Flow test from Penmar Project to ensure that treated stormwater is available for irrigation use at Marine Park.

All equipment and materials will be removed at the completion of construction.

#### **(e) Environmental Compliance/Mitigation/Enhancement**

##### **Task 10: Environmental Compliance/Mitigation/Enhancement**

No environmental mitigation or enhancement is required. A Categorical Exemption from CEQA requirements was issued in June 2004.

#### **(f) Construction Administration**

##### **Task 11: Construction Administration**

Construction administration will include general management of all construction activities and engineering services during construction. Required personnel will include: City Engineer, program manager, watershed coordinator, construction manager, administrative assistant, and inspector.

**(g) Other**

The Project Monitoring Plan will be completed in August 2012 and will outline the monitoring, assessment and performance measures that will demonstrate that the Project meets its intended goals. The Performance Measures Table and discussion in Attachment 6 provides a preview of the information that would be included in the Project Monitoring Plan.

Assessment and Evaluation Submittals	Date
Project Monitoring Plan	August 2012

**Discussion of Standards and Merits****Standards**

Construction of the Project shall conform to the following standards:

- All work in the public right of way shall meet the Standard Plans for Public Works Construction and the Standard Specifications for Public Works Construction (Green Book).
- All work on site shall meet requirements of the 2010 California Building Code and the Santa Monica Municipal Code.
- All work shall be completed in conformance to CAL/OSHA regulations.
- All testing will meet American National Standards Institute and/or ASTM standards.
- Plumbing products shall meet American Water Works Association standards.

**Merits**

Not applicable.

## VIII. Surface Water Treatment Plant Improvements – Covina Irrigating Company

### Detailed Project Description

#### Project Need

The Region has experienced significant reductions in imported water supplies due to recent drought conditions in northern California, ongoing drought conditions in the Colorado River watershed, and from regulatory actions and court decisions that have reduced exports from the Sacramento-San Joaquin Delta. In addition, the effects of climate change could make imported supplies less reliable. Thus, the Region needs to increase the utilization of local water supplies and reduce dependency on imported water.

The Covina Irrigating Company (CIC) is a water wholesaler that operates the Temple Water Treatment Plant (TWTP), located in the City of Glendora as shown in Figure 3-13. The TWTP receives its water supply from a combination of local water from the San Gabriel River and imported water from the Metropolitan through its turnout, USG-3, located just below Morris Dam.

The CIC Surface Water Treatment Plant Improvement Project (Project) is needed to improve the TWTP's ability to meet new federal water quality standards. Current treatment technology at the TWTP cannot sufficiently treat water to meet new water quality regulations.

TWTP needed to cease operations during two recent periods because it could not meet the water quality regulations. After the fires in the local San Gabriel River Watershed in the summer of 2002, water supplies to the TWTP were significantly impacted by organic loading during the winter rainy season. The organic materials in the local water supply in combination with the free chlorine, which was used to disinfect the water, produced high levels of disinfectant-by-products (DBPs) resulting in the shutdown of the TWTP from July 1, 2003 to January 4, 2004. The second shutdown occurred during the first quarter of 2005, due to an inability to meet water quality regulations when treating the USG-3 blended San Gabriel River water. The USG-3 water is from the State Water Project, which usually contains higher Total Organic Carbon than local water.

Currently, the TWTP treats 12.5 MGD and has been utilizing free chlorine as a disinfectant to meet contact time requirements. The use of free chlorine at TWTP produces high concentrations of DBPs that exceed the maximum contaminant levels. The high concentrations

of DBPs makes it difficult for the TWTP to remain in compliance with the Stage 1 DBPs Rule set by the US EPA. The Stage 1 DBP Rule is the first in a staged set of rules to reduce the allowable levels of DBPs in treated drinking water. The Stage 2 DBP Rule is due to take effect in 2012 and requires all systems that deliver disinfected drinking water to meet the maximum contaminant levels as an average at each compliance monitoring location compared to a system-wide average in Stage 1. Currently, the TWTP struggles to meet the Stage 1 DBP Rule and CIC's customers, water retailers, face greater difficulty complying with the Stage 2 DBP Rule once it takes effect in 2012.

The TWTP on average operates at approximately 8 MGD, 60 percent of full capacity. The other 40 percent of CIC's water supplies comes from pumping groundwater wells. However, due to recent storm events the TWTP is currently offline due to high turbidity levels in surface water. The current TWTP technology cannot treat the highly turbid surface water to meet the DPH's water quality standards. Therefore, CIC at the moment is only supplying groundwater from its wells. Without water treatment improvements at the TWTP, compliance with water quality standards will continue to be difficult, if not impossible.

Due to TWTP shutdowns, customers have had to purchase water from other sources and pump groundwater from the Main San Gabriel Basin. In addition, CIC has pumped groundwater from the Main San Gabriel Basin to help replace interrupted TWTP water supplies. While some groundwater sources, such as the Main San Gabriel Basin, are occasionally activated by CIC to replace interrupted TWTP supplies, the majority of the replacement supply is from imported water purchased by either the Upper San Gabriel Valley Municipal Water District (USGVMWD) or Three Valleys Municipal Water District (TVMWD). Improvements to TWTP will allow the CIC to continue treating and supplying 12,000 AFY of local water diverted from the San Gabriel River by meeting new water quality regulations, thereby reducing current reliance on imported water supplies and groundwater.

### Project Description

The CIC operates TWTP, which is located in Glendora, approximately 23 miles east of downtown Los Angeles. TWTP, which is a conventional surface water treatment plant that treats San Gabriel River water, is the only treatment facility in the CIC system. As stated above, current plant technology cannot sufficiently treat local surface water to meet new and anticipated water quality regulations.

The Project consists of improvements to the TWTP, specifically the incorporation of UV reactors and chloramination equipment to control DBP formation and prevent pathogen contamination of finished drinking water. TWTP currently cannot reduce Trihalomethane precursors or carcinogenic DBPs to a level sufficient to meet Stage 1 and the future Stage 2 DBP Rules. The UV reactor and chloramination equipment is essential to keep the facility on-line and in compliance.

The Project will include construction of a UV facility, high service pump station, grit chamber, and containment areas for the chemical storage. The containment areas will be covered by a painted steel canopy and surrounded by privacy fencing. The UV facility will be an enclosed concrete masonry unit building with a flat built up roof.

Several DACs rely upon water from TWTP to meet their demands. When TWTP is unable to provide drinking water that meets regulatory standards, the use of groundwater and imported water increases the cost of water for DACs and other water users in CIC's service area. Improvements to the TWTP would avoid future increases in water supply costs to DACs and reduce the use of imported water and groundwater.

#### Consistency with Adopted IRWM Plan

The CIC Surface Water Treatment Plant Improvement Project is consistent with several of the objectives of the IRWM Plan, including: optimize local water resources to reduce the Region's reliance on imported water; protect and improve groundwater and drinking water quality; and maintain and enhance public infrastructure related to flood protection, water resources, and water quality.

#### Goals and Objectives

To address the Greater Los Angeles IRWM Plan goals, the objective of the Project is to improve the use of local water resources by upgrading the TWTP to comply with current and future water quality regulations.

The Project addresses two of the six water management goals identified in the Greater Los Angeles County IRWM Plan, these are: 1) optimizing the use of local water resources to reduce the Region's reliance on imported water; and 2) maintaining and enhancing public infrastructure related to water resources and water quality.

Groundwater pumping requires large amounts of energy; however by incorporating the UV reactors, chloramination equipment, and a new high service pump station, the Project will also reduce energy use by decreasing the amount of groundwater pumping currently necessary to replace interrupted TWTP water supplies. Pumping of groundwater in the CIC service area is far more expensive per acre foot compared to the cost of treating surface water per acre foot with UV treatment.

### Consistency with Program Preferences and Statewide Priorities

The Project addresses two IRWM Program Preferences:

- Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program, by maximizing use of available water supplies through conservation, water recycling, and water quality improvements.
- Address critical water supply or water quality needs of disadvantaged communities within the Region.

The Project also addresses several Statewide Priorities:

- Drought Preparedness, by effectively addressing long-term drought preparedness by contributing to sustainable water supply and reliability during water shortages;
- Protect Surface Water and Groundwater Quality, by protecting and restoring surface water and groundwater quality to safeguard public and environmental health and secure water supplies for beneficial uses; and
- Ensure Equitable Distribution of Benefits, by developing multi-benefit projects with consideration of affected disadvantaged communities.

### Resource Management Strategies

This Project addresses the following RMS identified in California Water Plan Update 2009:

- **Drinking Water Treatment and Distribution**—the Project will provide a reliable supply of safe drinking water by improving water quality treatment and thus preventing the continual shutdown of the TWTP.
- **Matching Quality to Use**—the Project will incorporate UV reactors and chloramination equipment at the TWTP to reduce DBPs in delivered drinking water.

Linkages and Synergies

The Project will provide regional benefits to other agencies by improving the availability of high quality water. Both Rowland Water District and Walnut Valley Water District are entirely dependent on treated water from MWD and would greatly benefit from a local treatment plant capable of delivering treated water when available. This project, along with all the 12 Los Angeles IRWM projects, will aid in reducing the region’s dependency on imported water supplies.

Project Timing and Phasing

The project design was completed to 100 percent design status in December 2009 and construction is anticipated to begin in early 2012.

Project Map

The project site location is shown in Figure 3-13. The DACs served by CIC are shown in Figure 3-14. Planned improvements to CIC’s surface water treatment plant are shown in Figure 3-15, 3-16, and 3-17.

Figure 3-13. The TWTP located near the City of Covina

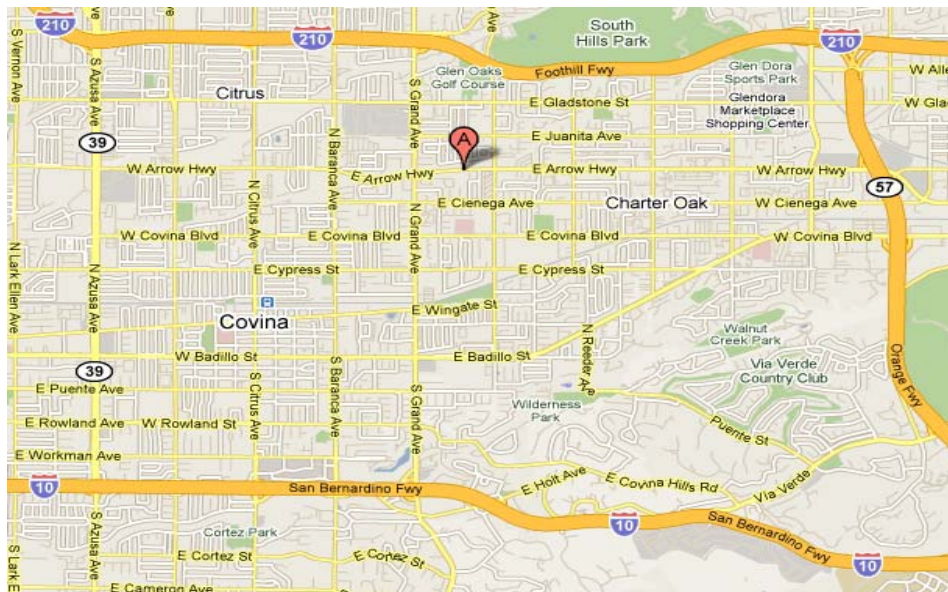
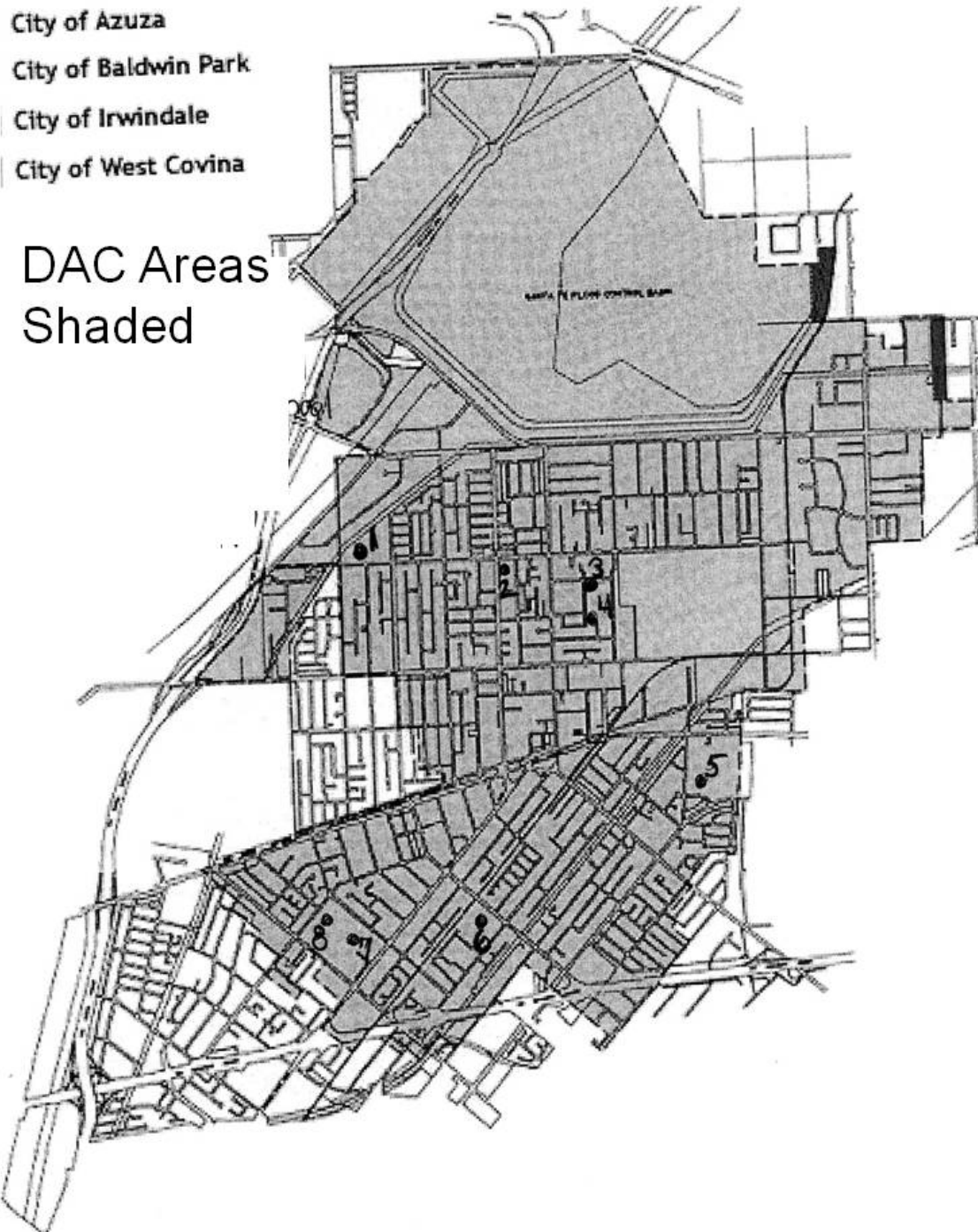


Figure 3-14. DACs in CIC Customers' Service Area











## Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed by June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

### (a) Direct Project Administration Costs

#### **Task 1: Administration**

Work completed under this task was done by the design consultants for the Project. Project coordination with partner agencies has primarily been through meetings and emails. See descriptions below for project coordination between CIC and each partner/supporting agency:

- **Main San Gabriel Basin Watermaster** has been the lead agency to qualify this Project and others for this application. Coordination has been largely through email; however, several phone conversations have taken place as well.
- **USGVMWD** has been the initial partner for the Project, committing over \$240,000 towards the design. The USGVMWD has expressed commitment to the construction phase as well. At least eight meetings have been held to date, either at USGVMWD's headquarters or at CIC's main offices with representatives from both agencies and the consultant.
- **TVMWD** has been supportive of the Project from the onset, since a significant portion of their service area overlies portions of the retail agencies served by CIC. Since the president of CIC is a director at TVMWD, they needed to withdraw from financial involvement to avoid any conflict of interest.

#### **Task 2: Labor Compliance Program**

Not applicable.

#### **Task 3: Reporting**

Not applicable.

**(b) Land Purchase/Easement**

Acquisitions of land or rights-of-way are not required, since the Project is being implemented at an existing facility.

**(c) Planning/Design/Engineering/Environmental Documentation****Task 4: Assessment and Evaluation**

The UV/Chloramine strategy was selected from a list of options, based on a strategy report developed for the project. Among other options considered were: Magnetic Ion Exchange resin treatment, Ozone/Chloramines, and additional groundwater well development. The UV/Chloramine strategy was clearly the best choice in terms of cost/benefit ratio. See Appendix G for strategy report.

Three studies/assessments have been completed for the Project. The first was a Tracer Study completed in October 2007 to: 1) increase the margin of safety that the TWTP achieves during disinfection of challenged source water; 2) demonstrate the capability of the TWTP to provide primary disinfection as a means of current and future DBP regulatory compliance using a chlorine/chloramines disinfection strategy; and 3) potentially reduce operating costs related to chemical addition. The results of this study are contained in the Preliminary Design Report. See Appendix G for Tracer Study.

The second study, a GPS Surveying Study was completed as part of a Supplemental Geotechnical Recommendations report in June 2008 to determine the exact location of all existing facilities at the site for development of construction plans. This consisted of on-site and aerial surveying of the subject property. See Appendix G for the GPS Surveying Study.

The third study, a Geotechnical Study that was also a part of the Supplemental Geotechnical Recommendations Report, was completed in November 2008. The Geotechnical Study provided information on soil composition at various depths at the site and neighboring properties. This included borings at various locations in and around the subject property. See Appendix G for Geotechnical Study.

Assessment and Evaluation Submittals	Date
Treatment Evaluation and Conceptual Cost Estimate Report	May 2006
Tracer Study	October 2007

Assessment and Evaluation Submittals	Date
GPS Survey Study	June 2008
Geotechnical Study	November 2008

### Task 5: Final Design

The Project design was completed in December 2009. The design completion dates are shown in the table below.

Design Submittals	Date
10% (conceptual) Design	June 2007
30% (conceptual) Design	April 2008
50% Design	April 2009
90% (pre-final) Design	November 2009
100% (final) Design	December 2009

### Task 6: Environmental Documentation

CIC is in the process of obtaining environmental compliance approval and adoption of CEQA documentation. The City of Covina, as a municipality and majority shareholder of the Company, has agreed to participate as the lead agency. The City of Covina anticipates completing the initial study by March 2011.

Environmental Documentation	Date
CEQA- Initial Study	March 2011

**Task 7: Permitting**

The City of Glendora exempted CIC from zoning and building code requirements on June 9, 2009. See Appendix G for exemption.

Permitting Submittals	Date
Building Permit Exemption	June 2009

(d) [Construction/Implementation](#)

**Task 8: Construction Contracting**

Not applicable.

**Task 9: Construction**

Not applicable.

(e) [Environmental Compliance/Mitigation/Enhancement](#)

**Task 10: Environmental Compliance/Mitigation/Enhancement**

Not applicable.

(f) [Construction Administration](#)

**Task 11: Construction Administration**

Not applicable.

[Work Items after June 1, 2011](#)

The following sections discuss work items that will be completed on or after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

## (a) Direct Project Administration Costs

**Task 1: Administration**

The project manager oversees all activities associated with the construction of the Project. The project manager reviews all technical data, schedules, contractual, and financial information pertaining to the Project. Also, the project manager coordinates with various agencies regarding permitting, environmental, design and construction issues. Project coordination between the CIC and each partner/supporting agency will remain the same as prior to June 1, 2011.

The CIC will enter into a MOU regarding compliance with Proposition 84 Implementation Grant requirements and terms of reimbursement payments with the LACFCD who are serving as the grantee for the Proposition 84, Round 1 Implementation Grant Funding. This MOU between the CIC and LACFCD will be completed by January 2012.

Administration Submittals	Date
Invoices	Monthly
MOU with LACFCD	January 2012

**Task 2: Labor Compliance Program**

The CIC will exercise due diligence to comply with all LCP Requirements. Once the Project is awarded funding, CIC will hire a third party firm to establish and oversee the LCP requirements.

Labor Compliance Submittals	Date
Labor Compliance Program	June 2011
Annual Reports	Annually

**Task 3: Reporting**

Regular Project reporting will be completed on a quarterly basis to report on the status of the project. A final report will be submitted after completion of the Project.



Reporting Submittals	Date
Quarterly Reports	Quarterly
Final Report	After completion

## (b) Land Purchase Easement

Not applicable.

## (c) Planning/Design/Engineering/Environmental Documentation

**Task 4: Assessment and Evaluation**

Not applicable.

**Task 5: Final Design**

Not applicable.

**Task 6: Environmental Documentation**

The City of Covina anticipates a Negative Declaration to be approved by September 2011.

Environmental Documentation Submittals	Date
CEQA- Negative Declaration	September 2011

**Task 7: Permitting**

The Project requires amending the September 2003 California Department of Public Health (DPH) Operating permit to receive authorization to operate new equipment such as UV reactors and chloramination equipment. DPH has reviewed the design plans and has authorized construction. CIC anticipates receiving the amended operating permit by June 2013.

Permitting Submittals	Date
DPH Operating Permit Amendment	June 2013

## (d) Construction/Implementation

**Task 8: Construction Contracting**

Construction contracting tasks will include submitting a RFP, submitting bid packages, and scheduling meetings to obtain competitive bids for construction of the Project. The CIC will then prioritize bids for project construction during November 2011 through December 2011. The contract will be awarded to the lowest and/or most qualified bidder at the discretion of the CIC by December 2011. Since the CIC is a private company, no approval on the selected contractor is required by a City Council.

Construction Contracting Submittals	Date
Bid Packages to Contractors & Pre-Bid Meeting	October 2011
Bid Submittals Due	November 2011
Awarding of Contract	December 2011
Notice to Proceed	January 2012

**Task 9: Construction****Subtask 9.1: Mobilization and Site Preparation**

Upon commencement of construction, the contractor will coordinate with the TWTP to complete work without impact on treatment plant operations except for temporary shutdowns allowed in the contract. Work will be performed such that the TWTP remains in continuous operation during the project and specifically does not: significantly affect TWTP's production of treated water, create potential hazards to operating equipment and/or personnel, or cause odors or other nuisances.

**Subtask 9.2: Project Construction**

The work to be performed under the contract includes, but is not limited to, constructing the items listed below, and any related appurtenances not specifically shown, as follows:

1. Construction of subsurface concrete UV facility and wet well.
2. Construction of above grade masonry electrical room.
3. Installation of UV reactors with associated piping and appurtenances.
4. Installation of five vertical turbine pumps with discharge piping and valves.

5. Relocation of an existing pump for temporary flow bypass.
6. Construction of a concrete chemical storage facility at grade.
7. Installation of chemical metering pumps in both existing and new chemical storage facilities.
8. Installation of fiber reinforced plastic (FRP) and steel chemical tanks for storage of aluminum chlorohydrate solution and ammonia solution, respectively.
9. Installation of chemical piping and valves with analyzers and sample connections.
10. Installation of self-priming backwash recycle pumps.
11. Construction of grit chamber upstream of backwash clarifier.
12. Connection to electrical service and transformer and installation of switchboard outside of electrical room.
13. Installation of control panels and electrical equipment inside new electrical room.

#### **Subtask 9.3: Performance Testing and Demobilization**

The Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) requires that UV reactors be validated to receive inactivation credit. It was assumed for the design of this facility that only pre-validated UV reactors would be purchased. The selected reactor must have been validated according to the November 2006 UV Disinfection Guidance Manual (UVDGM) requirements and recommendations. The DPH will not require testing of the equipment because the design called for pre-validated UV reactors and that piping configuration will adhere to strict requirements.

#### **(e) Environmental Compliance/Mitigation/Enhancement**

##### **Task 10: Environmental Compliance/Mitigation/Enhancement**

All BMPs will be observed during construction to mitigate negative impacts to the surrounding community and environment.

#### **(f) Construction Administration**

##### **Task 11: Construction Administration**

Under this task, a Project Manager will be contracted to oversee the project construction. The Project Manager will also be responsible for producing quarterly construction reports and a final report upon completion of the project.

### (g) Other

The Project Monitoring Plan will be completed in January 2012 and will outline the monitoring, assessment and performance measures that will demonstrate that the project meets its intended goals. The Performance Measures Table and discussion in Attachment 6 provides a preview of the information that would be included in the Project Monitoring Plan.

Assessment and Evaluation Submittals	Date
Project Monitoring Plan	January 2012

## Discussion of Standards and Merits

### Standards

The structural design for the UV facility, containment areas for the sodium hypochlorite and ammonia, and the canopy were designed to comply with the latest applicable building and material codes as follows:

- 2007 California Building Code and Applicable Local Building Codes
- Code Requirements for Reinforced Concrete (ACI 318-05)
- Code Requirements for Environmental Engineering Concrete Structures and Commentary (ACI 350-06)
- Code Requirements for Masonry Structures (ACI 530-05)
- Specification of Structural Steel Buildings (ANSI/AISC 360-05)
- Standard Specification of Open Web Steel Joists.

### Merits

Not applicable.

## IX. Central Los Angeles County Regional Water Recycling Program— Los Angeles Department of Water and Power

### Detailed Project Description

#### Project Need

The Region has experienced significant reductions in imported water supplies due to recent drought conditions in northern California, ongoing drought conditions in the Colorado River watershed, and from regulatory actions and court decisions that have reduced exports from the Sacramento-San Joaquin Delta. In addition, the effects of climate change may make imported water supplies less reliable. Thus, the Region needs to increase the utilization of local water supplies and reduce dependency on imported water. Recycled water has been identified by various studies, including the Los Angeles Department of Water and Power's Water Plan Update 2009, as a key local water resource with significant potential for expanded utilization. Maximizing the use of the Region's recycled water resources would reduce the use of imported supply with a local and more reliable source.

The Los Angeles-Glendale Water Reclamation Plant (Plant) currently produces approximately 20,000 AFY, which is equivalent to 17.8 MGD, of tertiary treated effluent. This effluent is available for use by the cities of Los Angeles, Glendale and Pasadena. Existing infrastructure allows use of only 4,500 AFY of the recycled water produced by the Plant. Further expansion of the recycled water distribution infrastructure is needed to expand utilization of the Plant's recycled water production.

#### Project Description

The CeLAC Regional Water Recycling Program (Program) was developed by a four-agency collaboration between Glendale Water and Power (GWP), LADWP, PWP, and Foothill Municipal Water District (FMWD) to expand the existing regional non-potable system as well as to develop a groundwater recharge project. The Program is intended to further decrease the Region's dependence on imported supplies by 450 AFY and, potentially, an additional 2,700 AFY while maximizing the beneficial use of the Plant's tertiary treated supply.

Phase 1a (Project) consists of two components (Figures 3-18 through 3-19): the Griffith Park South Water Recycling Project (Griffith Park Project) which will provide 450 AFY of recycled water used for irrigation at the Roosevelt Golf Course., and the Groundwater Replenishment

(GWR) Facilities Planning Study (GWR Study), which will determine the feasibility of using groundwater recharge to store up to 2,700 AFY of recycled water from the Plant.

The Griffith Park Project will expand the recycled water distribution system at Griffith Park, located five miles north of downtown Los Angeles. The Griffith Park Project will be implemented by the LADWP and includes planning, design, and construction/installation of a pump station, storage tank, and distribution system to deliver recycled water to the Roosevelt Golf Course. Existing recycled water distribution infrastructure will deliver recycled water from the Plant to a new pump station (installed with this project). The new pump station and new distribution pipelines will deliver water to a new one million gallon storage tank, which will be used to irrigate the Roosevelt Golf Course.

The GWR Study will determine the feasibility of using up to 2,700 AFY of recycled water to recharge the Raymond Basin at the Eaton Wash Spreading Grounds. PWP completed a Groundwater Replenishment Technical Assessment (Technical Assessment) in June 2010 that recommended conducting a GWR Study at Eaton Wash Spreading Grounds after other sites were evaluated and excluded from further consideration. The GWR Study, to be completed by PWP, will build upon the Technical Assessment and define conveyance, recharge, and extraction facilities necessary to implement a GWR project in the Raymond Groundwater Basin. The GWR Study will include groundwater and hydraulic modeling, and the collection and analysis of recharge water and groundwater quality data.

#### Project Map

The Griffith Park project and the GWR study site are both identified in Figure 3-18. The Griffith Park Project area and proposed construction are in Figure 3-19. The GWR Study project area is identified in Figure 3-20.

Figure 1. The Griffith Park South Water Recycling Project and the Groundwater Replenishment Facilities Planning Study.

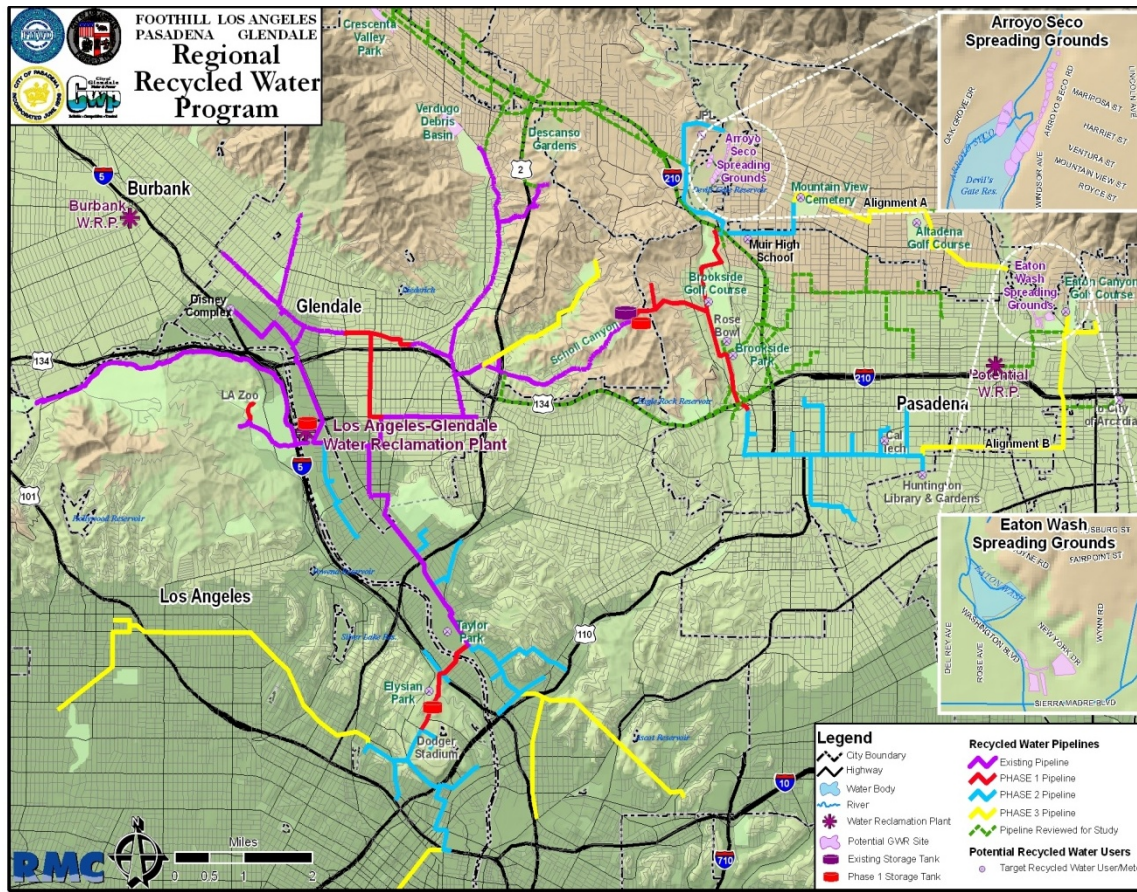


Figure 2. Griffith Park Project Area and Proposed Construction

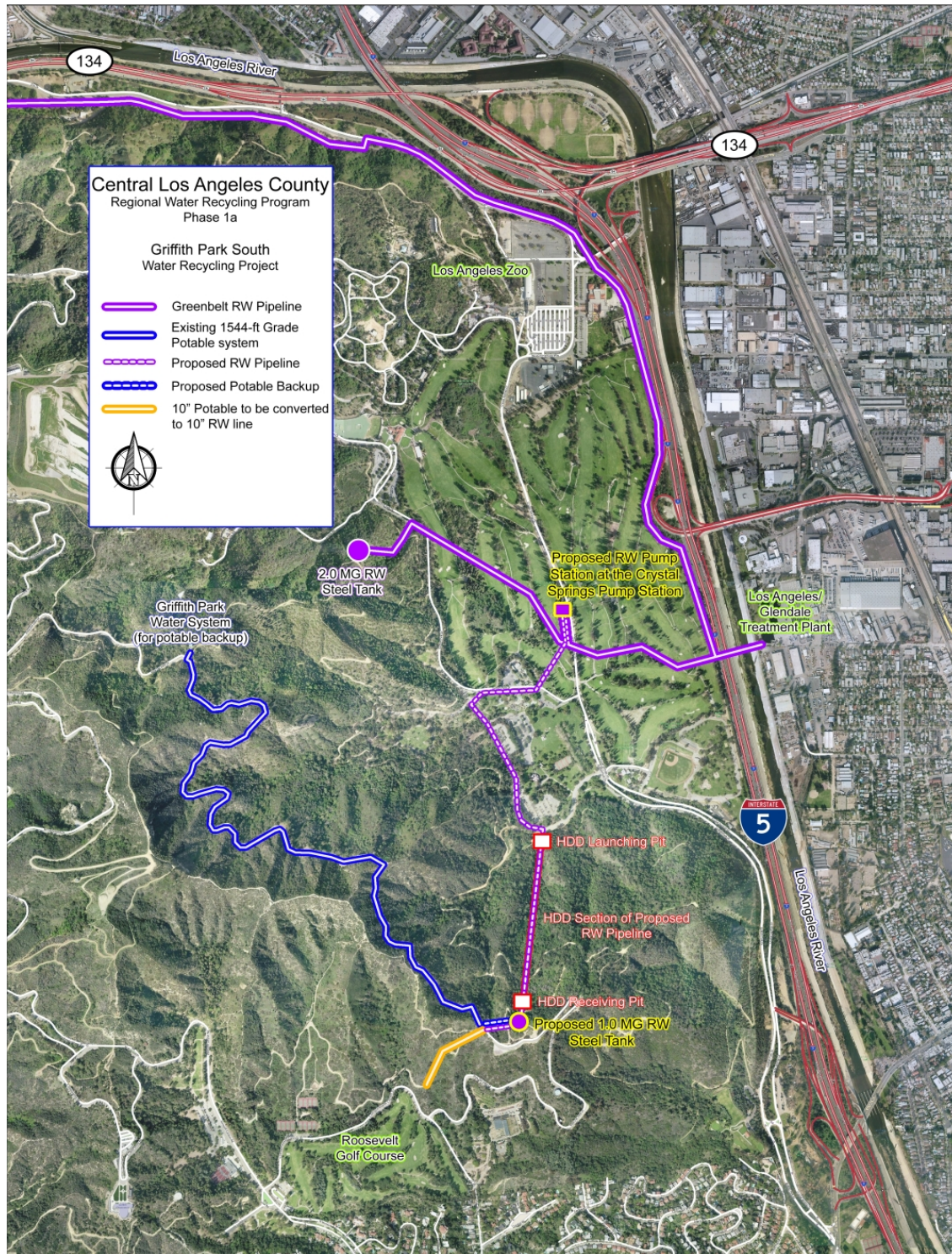
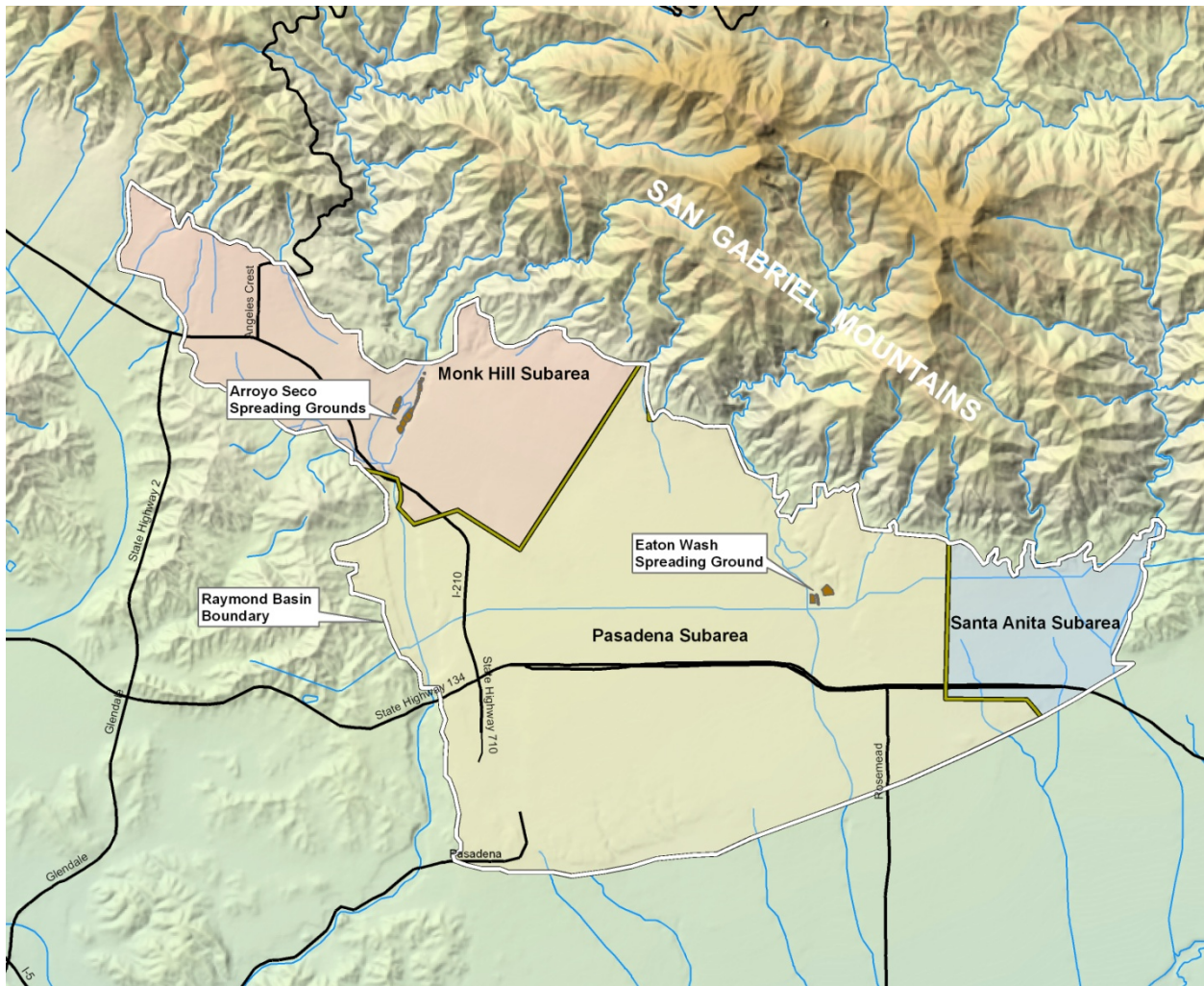




Figure 3-20. GWR Study Project Area



### Consistency with IRWM Plan

The Central Los Angeles County Regional Water Recycling Program would be consistent with two of the Plan objectives: optimize local water resources to reduce the Region's reliance on imported water; and maintain and enhance public infrastructure related to flood protection, water resources, and water quality. The Project would also contribute to the planning target for water supply (by replacing potable water supplies with recycled water and reducing demand for imported water).

### Goals and Objectives

The goal of the Project is to reduce imported water use by increasing the use of recycled water produced at the Plant directly through expansion of the current recycled water distribution system and indirectly through groundwater recharge. The Project objectives are to:

- Reduce the Region's reliance on imported water through a collaboration of four agencies to maximize the use of recycled water produced at the Plant;
- Improve the utilization of the effluent from the Plant by expanding the distribution system; and
- Determine the feasibility of using recycled water for groundwater recharge in the Raymond Basin.

### Consistency with Program Preferences and Statewide Priorities

The Project would be consistent with several IRWM Program Preferences:

- **Regional Project**—the Project is a regional partnership between the Cities of Los Angeles and Pasadena that will improve water supply reliability for the Region.
- **Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program**—by maximizing use of available water supplies through water recycling; and increasing flexibility of water systems through improvements in recycled water conveyance

In addition, the Project would be consistent with several Statewide Priorities:

- **Drought Preparedness**—by effectively addressing long-term drought preparedness by contributing to sustainable water supply and reliability during water shortages
- **Use and Reuse Water More Efficiently**—by implement water use efficiency, water conservation, recycling and reuse.

### Resource Management Strategies

The Project addresses the following resource management strategies identified by the California Water Plan – Update 2009:

- **Conjunctive Management & Groundwater Storage**—the Project will coordinate and manage both recycled water and groundwater resources to maximize the availability and reliability of water supplies for the Region.
- **Recycled Municipal Water**—the Project will add one million gallons of recycled water storage and expand the recycled water distribution system to help meet current and future regional water demands.
- **Matching Quality to Use**—the Project will use high quality recycled water that will be adequate for irrigation purposes and groundwater recharge.

### Linkages and Synergies between Projects

The Griffith Park Project is identified as a Tier 1 project in the City of Los Angeles Recycled Water Master Plan (LA RWMP), currently under development by LADWP. Drafts of technical memoranda prepared as part of the LA RWMP identify the Griffith Park Project as one of many projects that will need to be implemented to allow LADWP to reach their goal of eliminating 50,000 AFY of irrigation demand from the potable water system by 2019. The final Master Planning document will be completed by early 2011.

The Project is also related to the current City of Pasadena Recycled Water Project that is expanding the use of recycled water supplies from the Plant and providing feasibility planning for subsequent phases. The Pasadena Recycled Water Project included the completion of the Technical Assessment in June 2010 that provided the initial recommendation for developing this Project's GWR Study to further examine the feasibility of groundwater recharge at Eaton Wash Spreading Grounds.

### Project Timing and Phasing

The CeLAC Program has multiple phases that are comprised of separate projects to expand the existing infrastructure for distributing recycled water provided by the Plant. This Project, which includes the Griffith Park Project and GWR Study, constitutes Phase 1a of the overall CeLAC Program. The CeLAC Program's future phases will continue to expand non-potable recycled water service further downstream from the Plant as well as build upon other areas of the existing recycled water system independent of Phase 1a.

The Griffith Park Project planning is nearly complete and design work will be completed by November 2011. The Griffith Park Project could be a standalone project even if the future phases of the CeLAC Program or the GWR Study are not completed. The GWR Study will start once grant funds become available. The GWR Study could be a standalone project if the future phases of the CeLAC Program or the Griffith Park Project are not completed. If the GWR Study is not completed, future non-potable reuse phases of the CeLAC Program could still be constructed but groundwater replenishment projects in the Raymond Basin could not be constructed.

### Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed by June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

#### (a) Direct Project Administration Costs

##### Task 1: Project Administration

The implementing agencies for the Project are: the City of Los Angeles, Department of Water and Power for the Griffith Park Project and PWP for the GWR Study. Both agencies are working together to implement the CeLAC Program. Project administration tasks related to both components of the Project are being performed by an assigned project manager during the planning process through the end of the Project, which is scheduled for completion by July 2013.

Administration Submittals	Date
Invoices	Monthly

##### Task 2: Labor Compliance Program

The City of Los Angeles has a LCP currently in place. The LCP program is the Department of Public Works, Bureau of Contract Administration and Office of Contract Compliance LCP ID 009. This program has been approved by the California Department of Industrial Relations.

**Task 3: Reporting**

Not applicable.

**(b) Land Purchase/Easement**

An agreement was reached on the easement rights for LADWP in Griffith Park. Details on the easement agreement can be found in the *Reserve Easement Rights for LADWP* deed (see Appendix H).

**(c) Planning/Design/Engineering/Environmental Documentation****Task 4: Assessment and Evaluation**

The following three planning documents have already been completed under the CeLAC Program:

- ***Central Los Angeles County Regional Water Recycling Project Technical Memorandum (TM) (November 2007)***. This initial Project TM, was a cooperative effort between GWP, LADWP, PWP and FMWD to look at the potential for reducing the Region's reliance on imported water by maximizing the use of recycled water produced at the Plant. The TM collected existing and planned recycled water delivery data from the Plant and provided initial non-potable and indirect potable concepts for potential projects to distribute and use that supply.
- ***Groundwater Replenishment Technical Assessment (June 2010)***. The Technical Assessment further examined the regulatory, technical, and financial opportunities and challenges associated with indirect potable reuse (through groundwater recharge) options in the Raymond Basin. This Technical Assessment used data on hydrogeologic conditions, water availability, production wells, spreading basins, and treatment options to identify a potentially feasible project for further examination, which will be accomplished by the GWR Study component of this Project.
- ***Griffith Park South Water Recycling Project Scope of Work (Scope) (November 2010)***. This Scope was developed by collecting customer demand data, completing a pipeline route study, conducting an existing infrastructure inspection, and preparing a construction methodology study to provide recommendations for the Griffith Park Project component of this Project.

Assessment and Evaluation Submittals	Date
Central Los Angeles County Regional Water Recycling Project Technical Memorandum	November 2007
Groundwater Replenishment Technical Assessment	June 2010
Griffith Park South Water Recycling Project Scope of Work	November 2010

### Task 5: Final Design

The 30 percent (concept) design will be completed for the Project under this task by March 2011. The table below lists the two design submittals that will occur prior to the grant award date.

Design Submittals	Date
10% (conceptual) Design	January 2011
30% (concept) Design	March 2011

### Task 6: Environmental Documentation

The Project does not require an Environmental Impact Report. By MOU, LADWP took over the ownership, operation and maintenance of the current water system in Griffith Park from the City of Los Angeles Department of Recreation and Parks. A Categorical Exemption (Exemption) was issued in 1999 for a previous project called the Griffith Park South Water System Replacement Project, which included the construction of six water tanks and eight pump stations on the same system as the Griffith Park Project. Since the Griffith Park Project will replace one of the tanks (Tank 114) and will build a pump station at Crystal Springs listed in the Exemption no additional CEQA is needed for the Griffith Park Project.

The GWR Study does not require environmental compliance action.

Environmental Documentation Submittals	Submittal Date
Categorical Exemption CE 99-0889	9/30/1999

**Task 7: Permitting**

Not applicable.

**(d) Construction/Implementation****Task 8: Construction Contracting**

Not applicable.

**Task 9: Construction**

Not applicable.

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

Not applicable.

**(f) Construction Administration****Task 11: Construction Administration**

Not applicable.

**Work Items after June 1, 2011**

The following sections discuss work items that will be completed on or after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

**(a) Direct Project Administration Costs****Task 1: Administration**

Administrative tasks related to this Project will continue being performed by the assigned project manager. On June 1, 2011 the Griffith Park Project will be into the 60 percent design phase and the project manager will continue to perform administrative activities through the end of both components of the Project, scheduled for July 2013. The Project administrative activities will include the following tasks:

- Project status updates

- Budget updates
- Schedule updates
- Actual Project cost reporting

Once grant awards are received a formal letter or Memorandum of Agreement (MOA) would document the division of funding between LADWP and PWP.

LADWP would enter into an MOU regarding compliance with Proposition 84 Implementation Grant requirements and terms of reimbursement payments with the LACFCD who would serve as the grantee for the Proposition 84, Round 1 Implementation Grant Funding. This MOU between LADWP and LACFCD would be completed by January 2012.

Administration Submittals	Date
Invoices	Quarterly
MOA between LADWP and PWP	(Verifying with Proponent)
MOU with LACFCD	January 2012

### Task 2: Labor Compliance Program

The LCP that was established prior to the grant award date (LCP ID 009) will continue to be used throughout the entire Project.

Labor Compliance Submittals	Date
Annual Reports	Annually
Labor Compliance Program	2011

### Task 3: Reporting

Reporting for this Project will consist of generating quarterly progress, annual, and final reports that meet the requirements of the Grant Agreement.



Project Administration Submittals	Date
Quarterly Progress Reports	Quarterly
Annual Report	Annually
Final Report	July 2013

#### (b) Land Purchase/Easement

See Reserve Easement Rights for LADWP deed agreement (Appendix H).

#### (c) Planning/Design/Engineering/Environmental Documentation

##### Task 4: Assessment and Evaluation

Under this task, PWP's contractor will conduct the GWR Study to define conveyance, recharge and extraction facilities necessary to implement a GWR project in Raymond Basin. The GWR Study will conduct groundwater and hydraulic modeling, collect recharge water and groundwater quality data, and prepare an analysis of that data to determine GWR project feasibility. The GWR Study will be completed by June 2012.

Assessment and Evaluation Deliverables	Date
GWR Facilities Planning Study	June 2012

##### Task 5: Final Design

The Griffith Park Project 60 percent design will be completed by July 2011, the 90 percent (pre-final) design will be completed by October 2011, and the 100 percent (final) design of the Project will be completed by November 2011. The Griffith Park Project facilities that will be designed under this task include the following:

- **Pump Station**—A new recycled water pumping station located adjacent to the existing Crystal Springs Pump Station with a pumping capacity of 1,400 gallons per minute
- **Recycled Water Storage Tank**—A steel recycled water storage tank with a capacity of one million gallons that will store the water and provide the system pressure for use at Roosevelt Golf Course

- **Distribution System**

- *Pump Station Connection*—approximately 200 feet of 30-inch-diameter pipe to connect the existing Greenbelt Line to the new proposed pump station
- *Pump Station to Fern Canyon Nature Trail*—approximately 4,000 feet of 16-inch pipeline to route flows from the new pump station to the Fern Canyon Nature Trail
- *Fern Canyon Nature Trail to Storage Tank*—2,500-linear-feet of 16-inch pipeline from the foot of Fern Canyon Nature Trail to the new recycled water storage tank
- *Potable System Connection to Recycled Water Storage Tank*—700 feet of 10-inch pipeline from the potable water system to the new recycled water storage tank

Design Submittals	Date
60% Design	July 2011
90% (pre-final) Design	October 2011
100% (final) Design	November 2011

#### Task 6: Environmental Documentation

As previously discussed, this Project does not require an Environmental Documentation.

#### Task 7: Permitting

An Excavation Permit, Class 'A' Permanent Resurfacing Permit, and Grading, Electrical, Plumbing, and Mechanical Permits will be required for the Griffith Park Project. The required permits and descriptions are provided below.

- **Excavation Permit**—must be obtained for any trench excavation activities within public right-of-way. Plans will be submitted for permit approval at 100 percent design of pipeline to be installed by LADWP.
- **Class 'A' Permanent Resurfacing Permit**—must be obtained for excavations of pipeline construction and substructure investigation (potholing). Plans will be

submitted for permit approval at 100 percent design of pipeline to be installed by LADWP.

- **Grading, Electrical, Plumbing, and Mechanical Permits**—must be obtained for pump station and tank construction. Plans will be submitted for approval at 100 percent design of the tank and pump station to be installed by LADWP.

Additional permits that may be required for the Project are described below:

- **State Wide General Construction Activity Permit**—must be obtained for all construction sites of more than one acre with runoff. If required, plans will be submitted for permit approval at 100 percent design of the tank, pump station, and the horizontal direction drilling pipeline segment.
- **Mining/Tunneling Permit**—tunnel classifications are required for construction operations covered under Section 8400 through 8469, “Tunnel Safety Orders”, of the California Code of Regulations. The Tunnel Safety Orders are applicable only when human entry will occur during a construction operation at any of the following:
  - Boring and pipe-jacking operations 30 inches in diameter or greater
  - Shafts: Excavations where the depth is at least twice the greatest cross-sectional or exceeds 20 feet
  - Tunnels: Culverts greater than 30 inches in diameter
  - Underground chambers and premises appurtenant thereto

If the permit is required, plans will be submitted for permit approval at 100 percent design for the pipeline, tank, pump station, and horizontal direction drilling segment to be installed by LADWP.

- **NPDES Permit**—must be obtained for general construction runoff or construction dewatering discharges under the NPDES. Approval is needed for discharge of hydrostatic test water into any surface waters of the State of California. Section 402 of the Clean Water Act 1977, as amended (33 U.S.C. 1342 et seq.) requires a NPDES permit for groundwater discharges associated with construction activities to regulate discharges of treated groundwater from construction and other projects dewatering to surface waters in the region. If the permit is required, plans will be submitted for permit approval at 100 percent design for the pipeline, tank, pump station, and horizontal direction drilling segment to be installed by LADWP.

- **Discharge Permit**—must be obtained for construction dewatering and hydrostatic test water discharge into the storm system and channels. If the permit is required, plans will be submitted for permit approval at 100 percent design for the pipeline, tank, pump station, and horizontal direction drilling segment to be installed by LADWP.
- **Industrial Waste Permit**—must be obtained if pumped or chlorine water is discharged. If the permit is required, plans will be submitted for permit approval at 100 percent design for the pipeline, tank, pump station, and horizontal direction drilling segment to be installed by LADWP.
- **Tree Removal Permit**—must be obtained for the removal of more than three trees. If the permit is required, plans will be submitted for permit approval at 100 percent design for the pipeline, tank, pump station, and horizontal direction drilling segment to be installed by LADWP.
- **Traffic Control Plan and Traffic Signal Plan**—must be obtained for temporary lane closures and traffic/transportation related issues. If required, plans will be submitted for permit approval at 100 percent design of the pipeline to be installed by LADWP.

Permitting Submittals	Permit Agency	Date
Excavation Permit	LA DPW (BOE)	November 2011
Class 'A' Permanent Resurfacing Permit	LA DPW (BOE)	November 2011
Grading, Electrical, Plumbing, and Mechanical Permits	LA DBS	March 2012
State Wide General Construction Activity Permit	SWRCB (Water Quality)	November 2011
Mining/Tunneling Permit	Cal Dept Industrial Relations, Division of Occupations Safety and Health	November 2011
NPDES Permit	LA RWQCB	November 2011
Discharge Permit	County of LA DPW	November 2011
Industrial Waste Permit	LA DPW (Bureau of Sanitation)	November 2011
Tree Removal Permit	LA DPW (Bureau of Street Services)	November 2011
Traffic Control/Signal Plan	LA DOT	November 2011

## (d) Construction/Implementation

**Task 8: Construction Contracting**

Construction contracting task for the Griffith Park Project will include advertisement for bids, pre-bid contractors meeting(s), evaluation of bids, and awarding of contract.

Construction Contracting Submittals	Date
Notice to Proceed	7/13/2012

**Task 9: Construction****Subtask 9.1: Mobilization and Site Preparation**

Under this task, the Project will move the required equipment and materials on to the construction site.

**Subtask 9.2: Project Construction**

The Griffith Park Project pipeline will be installed by LADWP crews and is scheduled to start construction on November 28, 2011. Installation of the pipeline will be accomplished using open trench excavation (excavating, shoring, pipe installation, backfilling with slurry, and surface restoration). LADWP crews will install the following segments:

- Approximately 200 feet of 30-inch ductile iron pipe to tee off of the existing 30-inch Greenbelt Water Recycling Line and connect north to the proposed pump station at the existing Crystal Springs pump station site.
- From the proposed pump station approximately 4,000 feet of 16-inch ductile iron pipe to run underneath Wilson Golf Course, under fairways of holes 4 and 14. From the golf course, the pipeline will follow Griffith Park Dr., west then south to Fern Canyon Trail.

- Approximately 700 feet of 16-inch ductile iron pipe will connect the new recycled water storage tank to the existing 10-inch concrete pipe that services Roosevelt Golf Course. This existing 10-inch pipe begins at Vista Del Valle Drive and runs south-west, along Riverside Trail, to serve Roosevelt Golf Course. The existing 10-inch pipe is currently on the 1,544-foot grade potable system but will be separated from the potable system and be used to serve recycled water to Roosevelt Golf Course.
- A new 10-inch steel pipeline will be connected to the upstream portion of the severed existing 10-inch 1,544-foot grade potable water system and be extended approximately 700 LF to the proposed recycled water storage tank to serve as a potable water back-up to the tank. An air gap type backflow preventer will be installed.
- The grading and foundation work (reinforced concrete) for the one million gallon steel bolt-up tank will be completed by LADWP crews and is also scheduled to begin March 2012 and end July 2012.
- The fabrication and construction of the steel bolt-up tank will be off-site and contracted out, with fabrication scheduled to begin July 2012 and end December 2012. The delivery of the tank to the site is scheduled for December 2012. Erection of the steel tank is scheduled to commence December 2012 and end May 2013.
- At the Fern Canyon Trail Head, approximately 2,500 LF of 16-inch steel pipe will be installed underground to connect to the proposed one million gallon tank using the horizontal directional drilling method. The horizontal directional drilling will be contracted out and is scheduled to begin July 13, 2012 and end May 23, 2013.
- Construction of the new Griffith Park Project pump station will also be completed using LADWP crews and is scheduled to begin March 15, 2012. The pump station will be located adjacent to the existing Crystal Springs potable water pump station and will contain the following components: Three centrifugal pumps each sized at 700 gallons per minute, 310 feet and 150 horse power
- Appurtenant facilities and connectors (flow meter, pressure gauges, valves, steel pipe, reducer, elbow, flange, cap, and tees)
- Pump station will be housed in a reinforced concrete building, which will include a water closet, lavatory, and drinking fountain all connected to an existing potable water connection.

**Subtask 9.3: Performance Testing and Demobilization**

Factory and Field test will be performed during and after Project completion. Performance testing will primarily consist of pressure testing installed pipes in accordance with the LADWP Standard Specifications for Hydrostatic testing and Commissioning tests during the post construction schedule from May 23, 2013 to July 29, 2013. For details on all planned performance testing, see the Factory and Field Test procedures for the Project (see Appendix H).

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

No Environmental Compliance/Mitigation/Enhancement is required for this Project because the Project does not require any environmental documentation as previously discussed.

**(f) Construction Administration****Task 11: Construction Administration**

Construction activities for the Griffith Park Project will be overseen by a construction manager for the portion of the Project from July 2012 to May 2013. The construction manager will oversee the one million gallon Steel Tank installation and horizontal drilling as well as the pipeline, pump station, and tank foundation installed by LADWP crews.

A large amount of the construction administration will be done by the Project manager.

Construction Administration Submittals	Date
Contractor Invoices	June 2012 – May 2013

**Discussion of Standards and Merits****Standards**

All work performed for the Griffith Park Project will meet the minimum requirements of the LADWP Water Construction Manual and Standard Specification for Installation of Water Mains, Fire Hydrants and Water Works Facilities. All work will be performed in accordance with

accepted Construction Standards. The Safety Program of the LADWP Water Distribution Unit is based on the Injury and Illness Prevention Program manual.

All work performed and equipment furnished will meet the minimum requirements of the latest edition of the City of Los Angeles Building Code and the City of Los Angeles Fire Code, and the California Division of Industrial Safety Regulations (Title 8) in effect at the time of bid. The special provisions in the contract documents are supplemented by the Standard Specifications for Public Works Construction, 2006 edition.

Each facility design must comply with City of Los Angeles Standard Urban Stormwater Mitigation Plan (SUSMP) regulations and the forthcoming City of Los Angeles LID Ordinance to manage stormwater on-site. To comply with SUSMP and the LID Ordinance, projects will include measures to capture and infiltrate stormwater for groundwater recharge or for re-use on-site, by directing runoff into pervious areas and reducing impervious areas. In addition, landscaping will meet the forthcoming City of Los Angeles Landscape Ordinance by using native and/or climate adapted landscaping on-site to reduce imported water demand.

### Merits

The merits of the GPSWRP building materials include the following:

- The principal building material used in the construction of the pipeline is cement lined ductile iron pipe per AWWA Standard Specification C150.
- The principle building materials that will be used for tank and pump station development includes reinforced concrete and structural steel.
- All cement shall be type II Portland cement conforming to ASTM A-36 (plate, angle, and channels).
- Welders shall be certified by AWS or the City of Los Angeles.
- The bolted steel storage tank will be designed and factory powder coated in accordance with AWWA D103.
- Welding inspection shall be performed by AWS Certified Inspectors, who are also certified by the Los Angeles City Building Department.



## X. Enhancement Project – Tujunga Spreading Grounds – Los Angeles Department of Water and Power

### Detailed Project Description

#### Project Need

The TSG Enhancement Project (Project) is needed to increase stormwater capture at the TSG, to enhance local groundwater water supplies in the San Fernando Basin (Basin) and improve the quality of groundwater and downstream water. As imported water supplies from northern California and the Colorado River have become less reliable in recent years due to recent and ongoing drought conditions, regulatory actions and court decisions, the region will need to become more dependent on local supplies.

The recharge capacity of the TSG is constrained by the size and location of the intake structure on the Tujunga Wash, the lack of an intake structure on the Pacoima Wash, and the storage capacity of the recharge basins.

The segment of Tujunga Wash from Hansen Dam to the Los Angeles River (along which the TSG is located) is included on the State's 303 d list of impaired water bodies for coliform bacteria and trash, and the Los Angeles River below the confluence with Tujunga Wash is listed for trash. Reducing contaminant loads is needed to meet current and pending TMDL requirements.

The increase of stormwater capture will provide the added benefit of improving groundwater quality through dilution. A number of groundwater production wells are located within the bounds of the San Fernando Basin EPA Superfund site, which is contaminated with volatile organic compounds, trichloroethylene, tetrachlorethylene, and hexavalent chromium. It is estimated that 396 AF/day of groundwater production capacity has been removed from service due to elevated contamination levels in some of these wells. Increased groundwater recharge is needed to improve the Basin's overall water quality through dilution of contaminants.

#### Project Description

The TSG is owned by the LADWP and has been operated by the LACFCD since 1990. TSG consists of 17 shallow basins designed to recharge the Basin. The Basin's aquifer is contained by the Santa Monica Mountains to the south, the Simi Hills to the west, the Santa Susana Mountains to the northwest, and the San Gabriel Mountains and Verdugo Hills to the northeast. The Basin's aquifer is located within the Los Angeles River Watershed in Los Angeles County.

The TSG currently has a maximum intake of 250 cfs with a total water storage capacity of approximately 100 AF. The percolation rate is 140 cfs.

Stormwater is diverted from the Tujunga Wash Channel using an inflatable rubber dam and is distributed throughout the facility using a canal system and flashboard structures. This Project will include the following improvements:

- Improve the existing intake facility on the Tujunga Wash to capture dry weather low-flow urban runoff;
- Install new intake structures to accept large flows from both the Tujunga and Pacoima Wash Channels, thereby increasing intake capacity from 250 cfs to 450 cfs;
- Deepen and combine basins to increase storage capacity from 100 AF to 790 AF;
- Increase recharge rate capability from the current rate of 8,000 AFY to 16,000 AFY;
- Modernize diversion facilities, including the existing diversion facility (intake structure) located on the Tujunga Wash Channel approximately 125 feet from Laurel Canyon Boulevard in the low flow site;
- Upgrade existing entrance/exit gates to house the revamped remote telemetry system that will electronically operate the intake gates and inter-basin flashboards; and
- Upgrade and equip the existing flashboard manual gates that currently serve to convey water flows from one basin to another with remote operation capability.

The existing intake structure will be modified to accept dry-weather flows. These dry-weather flows originate primarily from residential irrigation, commercial washing on or near streets and other incidental flows. Dry season flows typically contain much higher concentrations of contaminants, since large volumes of water are not available to dilute them. The dry-weather flows will be diverted into the sediment basin for recharge, thereby preventing contaminants in those flows from reaching the Los Angeles River and, eventually, the Los Angeles Harbor.

In addition, the Project will create open space enhancements with passive recreational and educational opportunities. The enhancements will include walking trails, outdoor classrooms, drought-tolerant and native vegetation, and will provide much-needed open space for the neighboring DAC.

### Consistency with IRWM Plan

The Project would be consistent with all of the Plan objectives: optimize local water resources to reduce the Region's reliance on imported water; comply with water quality standards (including TMDLs) by improving the quality of urban runoff, stormwater, and wastewater; protect and improve groundwater and drinking water quality; protect, restore, and enhance natural processes and habitats; increase watershed friendly recreational space for all communities; and to maintain and enhance public infrastructure related to flood protection, water resources, and water quality. The Project would contribute to several of the planning targets in the Plan, including water supply (by enhancing utilization of local water supplies and reducing demand for imported water) and stormwater runoff capture (for both dry- and wet-weather runoff).

### Goals and Objectives

The goals of the Project are to enhance local water supplies and improve the groundwater and downstream water quality, while maintaining flood control and providing educational opportunities to local DACs. The Project objectives that address the Greater Los Angeles Regional IRWM Plan (IRWM Plan) goals are as follows:

- Enhance local water supplies through increased capture of stormwater and groundwater recharge to reduce the Region's dependence on imported supplies;
- Improve the quality of groundwater and downstream water and comply with water quality regulations by capturing and infiltrating stormwater;
- Continue implementing a watershed management approach that will emulate and preserve the natural hydrologic cycle by taking urban runoff and turning it into a valuable local resource for reuse;
- Enhance open space, and provide educational and recreational opportunities for the local DAC community to raise awareness of watershed issues and encourage environmental stewardship;
- Increase the TSG stormwater capture capability by 8,000 AF per year; and
- Install a new telemetry system to allow for the automated control and diversion of stormwater in TSG.

### Consistency with Program Preferences and Statewide Priorities

The Project is consistent with one of the IRWM Program Preferences:

- Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program: 1) maximize use of available water supplies through conservation, water recycling, and water quality improvements; 2) increase the flexibility of water systems at the state, federal and local level through improvements in conveyance, storage and water project operations; and 3) develop groundwater and surface water storage projects to boost flexibility and provide additional supplies for agriculture, urban and environmental use.

The Project would also be consistent with two Statewide Priorities:

- **Drought Preparedness**—by effectively addressing long-term drought preparedness by contributing to sustainable water supply and reliability during water shortages
- **Protect Surface Water and Groundwater Quality**—by protecting and restoring surface water and groundwater quality to safeguard public and environmental health and secure water supplies for beneficial uses
- **Promote and Practice Integrated Flood Management**—by improving flood protection and enhancing the sustainability of flood and water management systems.

### Resource Management Strategies

The Project would implement several Resource Management Strategies identified in the California Water Plan Update 2009:

- **Conjunctive Management & Groundwater**—The Project includes the management of stormwater by capturing and recharging the stormwater into the Basin, thereby increasing the availability and reliability of local water supplies in the Region.
- **Urban Runoff Management**—The Project will increase the management of stormwater and dry-weather runoff by increasing the capacity of the intake facility and capturing flows for groundwater recharge, thereby reducing pollutant loading and volumes of urban runoff discharged to surface waters.

- **Flood Risk Management**—The Project will increase the capacity of the existing intake facility and add new intake facilities, which will increase the volume of stormwater runoff diverted. The Project will increase public safety and reduce the risk of flooding and property damage.

#### Linkages and Synergies

This Project, the Penmar Water Quality Improvement and Runoff Reuse Project, and the Central Los Angeles County Recycled Water Program Project will all contribute towards greater sustainability and reliability of local water supplies for the Region. LADWP's 2008 Water Supply Action Plan calls for investments in long-term water management strategies, including: water recycling, stormwater capture, water conservation, groundwater remediation, and groundwater storage, in order to meet Los Angeles' water needs. This Project, along with the Whittier Narrows Conservation Pool and San Antonio Spreading Grounds Improvements Projects, will benefit from shared performance measurement tools and lessons learned that could be applied to similar centralized stormwater management projects in the Region.

#### Project Timing and Phasing

The Project design is being prepared by the LACFCD. Financing for design is in place and design is 60 percent completed. Environmental compliance and permitting will be completed as required.

The Project is not a multi-phased project.

#### Project Map

Project site and surrounding regions are identified on Figure 3-21.

Figure 3-21. Watershed and Project Site Map

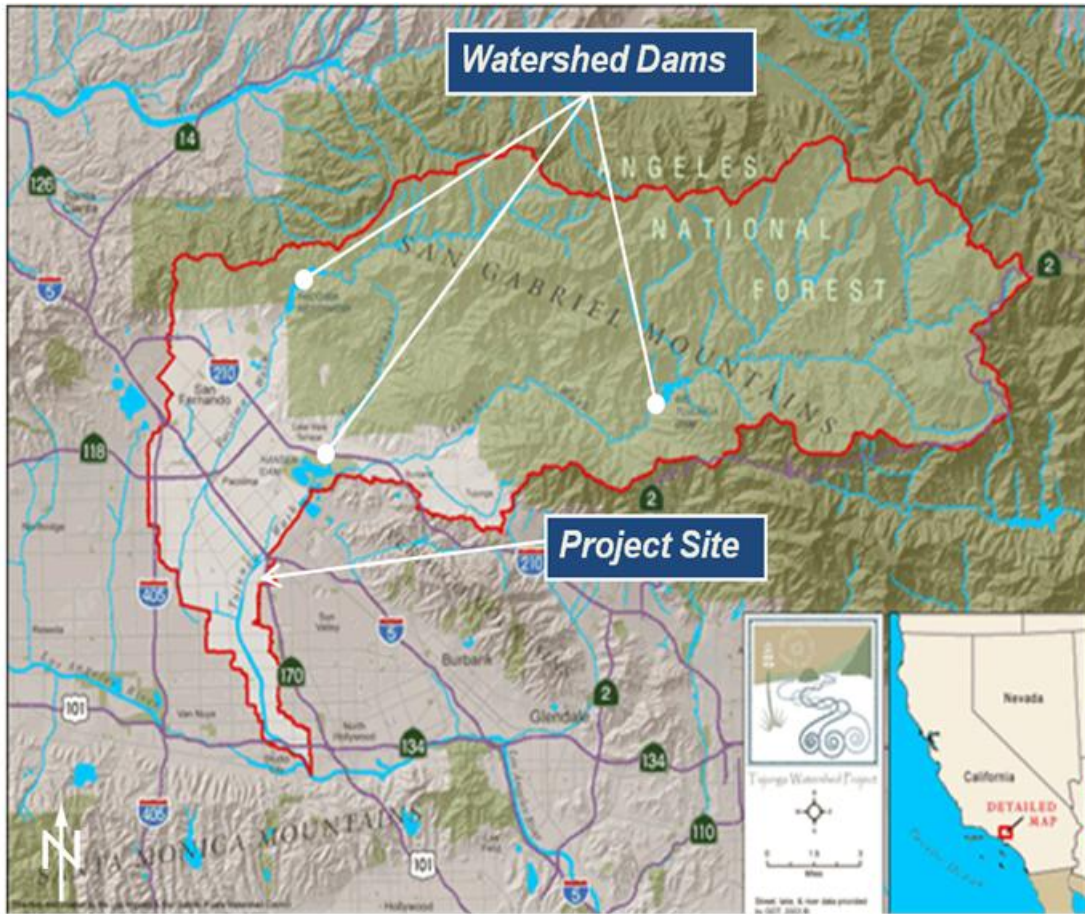


Figure 3-22. Project Site Map and Surrounding Region



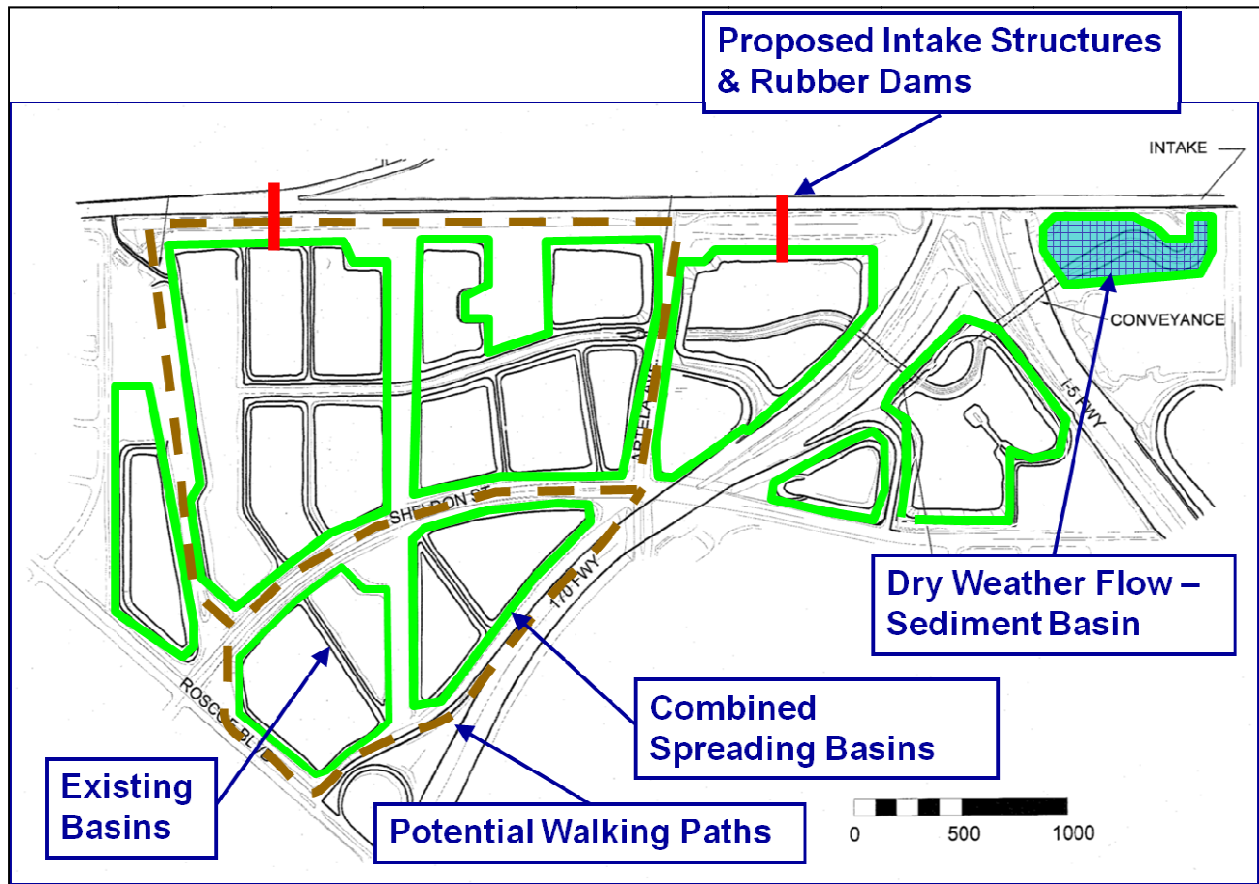
Figure 3-23. Detailed Project Map of Site



IRWMP Prop. 84 – Tujunga Spreading Grounds Site Map



Figure 3-24. Detailed Project Map



## Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed by June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, page 32, of the Proposition 84 Implementation PSP.

### (a) Direct Project Administration Costs

#### Task 1: Project Administration

Work to be completed under this task will be done by a Civil Engineering Associate II and III, and a Waterworks Engineer. The tasks of these disciplines will consist of managing the planning and design efforts with input from various agencies, local officials, and other stakeholders in the community. LADWP and LACFCD have entered into an agreement making LACFCD responsible for preparing the plans and designs for the Project (see Appendix I, LADWP-LACFCD Design Agreement).

The construction agreement will incorporate all of the bidding, awarding, and day-to-day construction operations over to the LACFCD. Currently a draft agreement is being viewed by both agencies.

Project Administration Submittals	Due Dates
Invoices	Quarterly
Construction Management Agreement	June 2011

#### Task 2: Labor Compliance Program

The LACFCD will serve as the construction manager of the Project. The LACFCD is in the process of approving its LCP. The consultant company, Solis Group, was hired to develop and finalize the LCP. The LCP will be completed and approved by June 1, 2011.

#### Task 3: Reporting

Not applicable.

**(b) Land Purchase/Easement**

This Project does not require acquisitions of land or rights-of-way.

**(c) Planning/Design/Engineering/Environmental Documentation****Task 4: Assessment and Evaluation**

The Tujunga Spreading Grounds Enhancement Project Geologic Subsurface Investigation Drilling and Sampling Data Report has been completed (see Appendix I). The LADWP Water Engineering and Technical Services Division conducted the study, which included the logging of 10 borings (depths of 170 to 300 feet), geotechnical laboratory testing, and preparation of geologic cross sections. The number, depth, and locations of the borings, as well as the cross section locations, were determined by the LACFCD in consultation with LADWP. The primary purpose of the investigation was to identify fine-grained soil layers that pose potential groundwater infiltration barriers (aquitar) and the continuity of these layers beneath the site.

Assessment and Evaluation Deliverables	Date
Tujunga Spreading Grounds Enhancement Project Geologic Subsurface Investigation Drilling and Sampling Data Report	May 2009

**Task 5: Final Design**

The Project 10 percent (conceptual) design was completed in July 2009, the 30 percent (concept) design was completed in November 2009, and the 60 percent design was completed in July 2010.

The 90 percent (pre-final) design will be completed by March 2011.

Design Submittals	Date
10% (conceptual) Design and Approval <ul style="list-style-type: none"> <li>• Project Design</li> <li>• Landscaping Plans</li> <li>• Low Flow Designs</li> </ul>	7/30/2009
30% (concept) Design Completion and Approval	11/30/2009
60% Design Completion and Approval	7/13/2010
90% (Pre-final) Design	3/08/2011

### Task 6: Environmental Documentation

The Project has completed a CEQA Initial Study to identify the site-specific impacts, evaluate their potential significance, and determine the appropriate documents needed to comply with CEQA.

Environmental Documentation Submittals	Date
CEQA Initial Study	February 2010

### Task 7: Permitting

Not applicable.

### (d) Construction/Implementation

#### Task 8: Construction Contracting

Not applicable.

#### Task 9: Construction

Not applicable.

(e) Environmental Compliance/Mitigation/Enhancement

**Task 10: Environmental Compliance/Mitigation/Enhancement**

Per Task 6 above, LADWP's Environmental Assessment Group is currently preparing the required EIR for the Project (see Appendix I; Environmental Agreement No. 47799). The EIR will identify all necessary environmental mitigation or enhancement action or tasks.

(f) Construction Administration

**Task 11: Construction Administration**

Not applicable.

Work Items after June 1, 2011

The following sections discuss work items that will be completed on or after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

(g) Direct Project Administration Costs

**Task 1: Administration**

Work to be completed under this task will be done by a project manager. The administration tasks will continue to consist of managing the planning and design efforts with input from various agencies, local officials, and other stakeholders in the community. This work will be completed July 1, 2011.

The project manager tasks also will consist of overseeing the implementation of the construction management agreement to ensure Project compliance, timely completion, and control of Project budgets and costs. In addition, the project manager will be tasked with resolving any issues that arise during construction with the multiple stakeholders involved in the Project. It is anticipated that the LADWP and LACFCD will have entered into an agreement giving the LACFCD responsibility for construction management, including preparation of construction documents, bid, award, and invoices.

LADWP would enter into a MOU regarding compliance with Proposition 84 Implementation Grant requirements and terms of reimbursement payments with the LACFCD who would serve as the grantee for the Proposition 84, Round 1 Implementation Grant Funding. This MOU between the LADWP and LACFCD would be completed by January 2012.

Project Administration Submittals (design and plans are submitted in other tasks)	Due Dates
Invoices	Quarterly
MOU with LACFCD	January 2012

### Task 2: Labor Compliance Program

The LCP will be approved by June 1, 2011.

### Task 3: Reporting

The LADWP staff will be tasked with submitting quarterly, annual, and final reports to LACFCD. The LACFCD will submit all quarterly, annual, and final reports to the State per Proposition 84 contract requirements.

Reporting Submittals	Due Dates
Quarterly Progress Reports	Quarterly
Annual Reports	Annually
Final Report	August 2013

## (h) Planning/Design/Engineering/Environmental Documentation

### Task 4: Assessment and Evaluation

Not applicable.

### Task 5: Final Design

The final Project design is expected to be completed by July 2011.

Design Submittals	Date
100% (Final) Design	July 2011

**Task 6: Environmental Documentation**

Based on the CEQA Initial Study, an additional evaluation of project-related impacts is required and an EIR is in the process of being prepared. The anticipated completion date is July 2011 (see Appendix I; Environmental Contract Task 1).

Environmental Documentation Submittals	Date
Environmental Impact Report	July 2011

**Task 7: Permitting**

Various permits will be required for the Project. The Project will require permits from the City of Los Angeles Department of Building and Safety for electrical, grading, plumbing, and demolition. The electrical permit will ensure proper installation of all electrical systems for the automated gates, telemetry systems, and lighting. The grading permit will ensure that proper safety specifications regarding retaining walls, soil benching, and soil compaction will be used. The plumbing permit will ensure the proper use and installation of proposed water conveyance systems to safeguard pipes from failures due to loading, excessive flow, and/or use of unsuitable material. The demolition permit will ensure that proper techniques will be followed during demolition.

A permit will be acquired from the City of Los Angeles Fire Department to establish procedures regarding how to properly prevent and/or respond to facility emergencies. The Project will require an excavation permit and a Class A permanent resurfacing permit from the City of Los Angeles Department of Public Works, Bureau of Engineering to allow for open trench construction on city streets. An industrial waste permit from the City of Los Angeles Department of Public Works, Bureau of Sanitation will be required to verify the proper disposal of any industrial waste. A conditional use permit from the City of Los Angeles Planning Department will be required to allow public access to the facility. An NPDES permit from the State of California, Los Angeles RWQCB will be required for construction dewatering and preventing stormwater runoff from the construction site by using specific BMPs. A discharge permit from the County of Los Angeles, Department of Public Works will be required to allow the Project under special conditions to discharge water into County controlled channels and storm drains. A list of all the permits that will be required for the Project are shown below.

Permitting Submittals	Date
City of Los Angeles Department of Building and Safety Permits: <ul style="list-style-type: none"> <li>• Electrical</li> <li>• Grading</li> <li>• Plumbing</li> <li>• Demolition</li> </ul>	June 2012
Los Angeles Fire Department <ul style="list-style-type: none"> <li>• Risk Management Plan</li> </ul>	June 2012
City of Los Angeles Department of Public Works, Bureau of Engineering <ul style="list-style-type: none"> <li>• Excavation and class A permanent resurfacing permit</li> </ul>	June 2012
City of Los Angeles Department of Public Works, Bureau of Sanitation <ul style="list-style-type: none"> <li>• Industrial Waste Permit</li> </ul>	June 2012
City of Los Angeles Department of Transportation <ul style="list-style-type: none"> <li>• Traffic Control Plan or WATCH Manual</li> </ul>	June 2012
City of Los Angeles Planning Department <ul style="list-style-type: none"> <li>• Conditional Use Permit</li> <li>• Cultural Affairs Permit</li> </ul>	June 2012
State of California, Los Angeles Regional Water Quality Control Board <ul style="list-style-type: none"> <li>• National Pollutant Discharge Elimination System Permit</li> </ul>	June 2012
County of Los Angeles, Department of Public Works <ul style="list-style-type: none"> <li>• Discharge Permit</li> </ul>	June 2012

(i) Construction/Implementation

**Task 8: Construction Contracting**

Construction contracting tasks will include an advertisement for bids, a pre-bid contractors' meeting, evaluation of bids, and award of contract. Construction Submittals	Date
Advertising For Bids	6/20/2011
Award Contract	12/13/2011
Issue Notice to Proceed	02/15/2012



## Task 9: Construction

### Task 9.1: Mobilization and Site Preparation

The contractor for the Project will have a construction trailer on-site for the convenience of managing the construction. Temporary utilities will be installed for the contractor. Construction site entrances and exits will be established early in the mobilization phase to efficiently manage construction vehicle and equipment traffic. Safety meetings will be arranged to make all the parties aware of the potential hazards during construction.

Site preparation will entail the rough grading of the site with the aid of preliminary surveys. Dust, erosion, and noise mitigation measures will be implemented to minimize adverse impacts to the neighboring community.

### Task 9.2: Project Construction

The Project construction will consist of modifying the existing intake structure, building new intake structures, deepening of basins, and installing a recreational and educational component. The details are provided below.

- **Modify Existing Intake Structure**—The existing intake structure will be altered to operate under low-flow conditions. The area immediately northeast of Interstate 5, currently used as conveyance, will be enhanced to treat low-flows prior to recharging the groundwater (See Appendix I, Figure 1-4, Basin No. 9). After treatment, the low-flows will pass under the Golden State Freeway (Interstate 5) utilizing the existing facility and will be released into currently dormant basins (see Appendix I, Figure 1-4, Basins 7 and 8) for groundwater recharge. This area will also be designed to readily accept direct runoff from the residential neighborhoods adjacent to Laurel Canyon and Interstate 5.
- **Build New Intake Structures**—Two new intake structures will be built to accept large flows from both the Tujunga and Pacoima Wash Channels. The first new intake will be located immediately southwest of the Interstate 5 and will divert 250 cfs into the upper portion of TSG. The second new intake will be located at the confluence of the Tujunga Wash Channel and Pacoima Diversion Channel and will divert a maximum of 200 cfs into the lower portion of TSG from either channel. Two 60-foot inflatable rubber dams will be installed adjacent to the new intake structures to optimize the recharge capacity based on the channel volumetric flows.

- **Deepen Basins**—The basins in the lower portion of TSG will be graded to receive water from either intake system. The basins will be interconnected using weir spillways and bypass gates. The lower-most basin will act as an overflow or bypass basin and will be equipped to readily accept a portable pump to drain the basins, if necessary, back into the lower basins.
- **Install Recreational and Educational Components**—Portions of TSG will be used for open space enhancements. The open space amenities under consideration include walking trails, and native habitat (drought-tolerant vegetation) as well as educational opportunities, including outdoor classrooms and interpretive signage. These improvements will also provide much-needed open space for the neighboring DAC. The open space amenities will be constructed by June 2013 (see Appendix I for preliminary designs).

### **Task 9.3: Performance Testing and Demobilization**

**Project Performance:** LADWP will measure the total amount of water captured and infiltrated by TSG to determine the performance of the Project. The Project will include major facility enhancements that will increase the recharge rate capability from 8,000 AF per year to 16,000 AF per year on average.

The instrumentation required to monitor stormwater flows into the improved facility include the WATERLOG H-355 “Smart Gas” unit and the WATERLOG Model H-350XL. This system will be interfaced with Data Loggers, chart recorders, GOES transmitters, remote displays, and telemetry systems which enable the operators to receive continuous data feeds translating channel depth measurements (stage height) into instantaneous flow rate measurements. This data will be recorded and compiled and performance reports will be readily available on a daily, monthly, and annual basis.

### [\(j\) Environmental Compliance/Mitigation/Enhancement](#)

#### **Task 10: Environmental Compliance/Mitigation/Enhancement**

The EIR required for the Project is anticipated to be complete by July 2011. LADWP will undertake all required environmental mitigation or mitigation tasks identified in the EIR and approved by the Board of Water and Power Commissioners.

**(k) Construction Administration****Task 11: Construction Administration**

LADWP and LACFCD will have entered into an agreement by June 1, 2011 giving LACFCD responsibility for construction management, including preparation of construction documents, bid, and award.

**(l) Other**

The Project Monitoring Plan will be completed in August 2011 and will outline the monitoring, assessment and performance measures that will demonstrate that the project meets its intended goals. Where applicable, the plan will include aspects of the City of Los Angeles's Bureau of Sanitation (BOS) monitoring program being implemented as part of TMDL compliance for trash, metals, and nitrogen in the Los Angeles River, which is the receiving water body downstream of the Project site.

The Performance Measures Table and discussion in Attachment 6 provides a preview of the information that would be included in the Project Monitoring Plan. At the conclusion of work outlined in this work plan, the Project Monitoring Plan will be implemented to track the performance measures outlined in Attachment 6.

Assessment and Evaluation Submittals	Due Dates
Monitoring Plan	August 2011

**Discussion of Standards and Merits****Standards**

Under this task, the Project will meet all the following construction standards, health and safety standards, laboratory analysis, and classification methods listed below:

- Standard specification of Public Works Construction 2009
- Standard Plans of the Los Angeles County Department of Public Works; 3080-2, 3090-1, 3091.1, 3093-1, and 6002-1
- Occupational safety and health administration

- Underwriters Laboratories, Inc
- Underwriters Laboratories Acceptance Testing Specifications
- American Society for Testing and Materials
- Uniform Building Code
- California Administrative Code Title 24, Energy Conservation Standards
- American National Standard Institute
- State Water Resources Control Board
- Construction Site Best Management Practices Manual
- American Water Works Association

#### Merits

The merits of the building materials or any computational merits have yet to be determined. The merits will be known once the project design has been completed.

## XI. San Antonio Spreading Grounds Improvements – Three Valleys Municipal Water District

### Detailed Project Description

#### Project Need

The Region has experienced significant reductions in imported water supplies due to recent drought conditions in northern California, ongoing drought conditions in the Colorado River watershed, and from regulatory actions and court decisions that have reduced exports from the Sacramento-San Joaquin Delta. In addition, the effects of climate change could make imported supplies less reliable. Thus, the Region needs to increase the utilization of local water supplies and reduce dependency on imported water.

TVMWD, a member agency of the MWD, serves drinking water to customers in eastern San Gabriel Valley (Figure 3-25). The *TVMWD Feasibility Study for the Multi-Agency Regional Groundwater Recovery Project* explored various alternatives for expanding the use of the groundwater basin through remediation of groundwater quality and recharge of surplus imported water. Surplus imported water is available from the Metropolitan when the supply of imported water exceeds the demands of MWD member agencies.

The San Antonio Spreading Grounds Improvements Project (Project) will provide an opportunity to expand recharge of surplus imported water from the Miramar Treatment Plant (Miramar) at the San Antonio Spreading Grounds (Figure 3-26), which will also dilute contaminants within the Six Basins groundwater basin (Figure 3-27).

Six Basins is an adjudicated groundwater basin located in eastern Los Angeles County and western San Bernardino County. Six Basins is comprised of the Canyon, Upper and Lower Claremont Heights, Pomona, Live Oak and Ganesha Sub-basins (Figure 3-28). These six sub-basins underlie the cities of Claremont, La Verne, Pomona and the northern portion of the City of Upland. According to the 2007 *Groundwater Assessment Study* conducted by the Metropolitan, this area has groundwater quality issues that include high levels of nitrate, total dissolved solids, and VOCs. Pumpers are required to treat a portion of their groundwater before use and often must blend the groundwater with either treated local surface water or imported water to dilute the constituents of concern.

In order to encourage the recharge of surplus imported water, TVMWD currently utilizes conjunctive use programs that are already in place through the MWD. Currently, the San

Antonio Spreading Grounds, which recharges water to the Six Basins, lacks sufficient facilities to spread the additional surplus imported water. With increased recharge capacity, constituents of concern in the Six Basins would be reduced in concentration, decreasing the need to blend groundwater with more expensive water supplies, including imported water.

### Project Description

The San Antonio Spreading Grounds are one of four sets of spreading grounds which recharge Six Basins, utilizing both imported and local surface water supply. Local surface water supply is obtained from San Antonio Creek, which runs past the San Antonio Spreading Grounds. The Pomona Valley Protective Association (PVPA) owns and manages the San Antonio Spreading Grounds and is responsible for recharging surplus water from San Antonio Creek.

TVMWD is permitted to recharge imported water at the San Antonio Spreading Grounds. Currently, TVMWD receives untreated imported water from MWD's Foothill Feeder and treats that water at the Miramar Treatment Plant. As the existing conveyance connection from the feeder has a capacity of 80 cfs, and the treatment plant has a capacity of 40 cfs, this Project would take advantage of the extra conveyance capacity and deliver the untreated imported water at the spreading grounds.

The treated imported water from the Miramar plant is distributed within the spreading grounds via an existing 4,771-foot pipeline, constructed in 2008/2009, which was sized to allow spreading operations during conditions of minimum pressure. This pipeline has two outlet structures extending east across San Antonio Channel to the existing Lower Mountain View Pits. Spreading additional imported water will be possible when the hydraulic grade line in the Foothill Feeder is relatively low.

The Project will extend the existing pipeline to spread additional surplus imported water within the San Antonio Spreading Grounds. The proposed pipeline extension will include approximately 5,800 LF of pipeline, five turnouts, and earthwork as needed to capture the additional water (Figure 3-29). The portions of the spreading basin to be used for the Project will require some rehabilitation to maximize infiltration through the clearing of silt, brush and boulders. Wildlife fencing will also be installed to limit wildlife entering the construction site.

### Consistency with IRWM Plan

The Project will be consistent with four Plan objectives, including: optimize local water resources to reduce the Region's reliance on imported water; protect and improve groundwater and drinking water quality; protect, restore, and enhance natural processes and

habitats; and maintain and enhance public infrastructure related to flood protection, water resources, and water quality. The Project will contribute to the water supply planning target (by creating the opportunity to augment regional water supplies when surplus imported water is available).

### Goals and Objectives

The objectives of the Project include:

- Recharge surplus imported water in the San Antonio Spreading Grounds to increase the supply of groundwater in Six Basins;
- Store the additional recharged water in Six Basins for subsequent use during drought conditions; and
- Increase recharge to Six Basins and thereby improve existing groundwater quality through dilution.

### Consistency with Program Preferences and Statewide Priorities

The Project will be consistent with two IRWM Program Preferences:

- Include Regional Projects or Programs, as benefits would accrue to multiple water agencies that depend on Six Basin for water supply; and
- Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program, as the Project would increase the flexibility of water systems at the state, federal and local level through improvements in conveyance, storage and water project operations; and develop groundwater and surface water storage projects to boost flexibility and provide additional supplies for agriculture, urban and environmental use.

The Project will also address two Statewide Priorities:

- **Drought Preparedness**—by effectively addressing long-term drought preparedness by contributing to sustainable water supply and reliability during water shortages; and
- **Protect Surface Water and Groundwater Quality**—by protecting and restoring surface water and groundwater quality to safeguard public and environmental health and secure water supplies for beneficial uses.

### Resource Management Strategies

The Project will implement the following Resource Management Strategies identified in the California Water Plan Update 2009:

- **Conjunctive Management & Groundwater Storage**—by installing new infrastructure to expand groundwater recharge when surplus imported water is available, and subsequent use of that recharged water during times of drought;
- **Groundwater Remediation/Aquifer Remediation**—by increasing recharge and diluting constituents of concerns; and
- **Recharge Area Protection**—by clearing and upgrading portions of the San Antonio Spreading Grounds.

### Linkages and Synergies

The Project does not require coordination with other IRWMP projects. It does, however, link to other water resource programs in the Region. The Project will contribute to the goals of the Six Basins Judgment to protect the rights of Six Basins' pumpers. This project will also contribute to the goals of MWD's Conjunctive Use Program by providing the infrastructure to recharge surplus imported water in wet years.

### Project Timing and Phasing

This Project's design is currently 95 percent complete and would be ready to implement soon after grant award. This Project is a part of the larger Imported Water Spreading at San Antonio Spreading Grounds Project to install imported water pipelines at the San Antonio Spreading Grounds, a production well, and a pump station if needed. As part of this larger project, 4,771 LF of pipeline to convey imported water to the San Antonio Spreading Grounds has already been constructed. The project discussed in this work plan completes will construct 5,800 LF of pipeline extending from the already constructed 4,771 LF of pipeline. The Project as described in this grant application will not depend on later phases of the larger project for achievement of the benefits described above.

### Project Map

The proposed Project location and facilities are shown on Figure 3-25, 3-26, 3-27, and 3-28.



Figure 3-25: Location of Project within Six Basins and TVMWD's boundaries



Figure 3-26: Location of Six Basins within TVMWD Boundaries

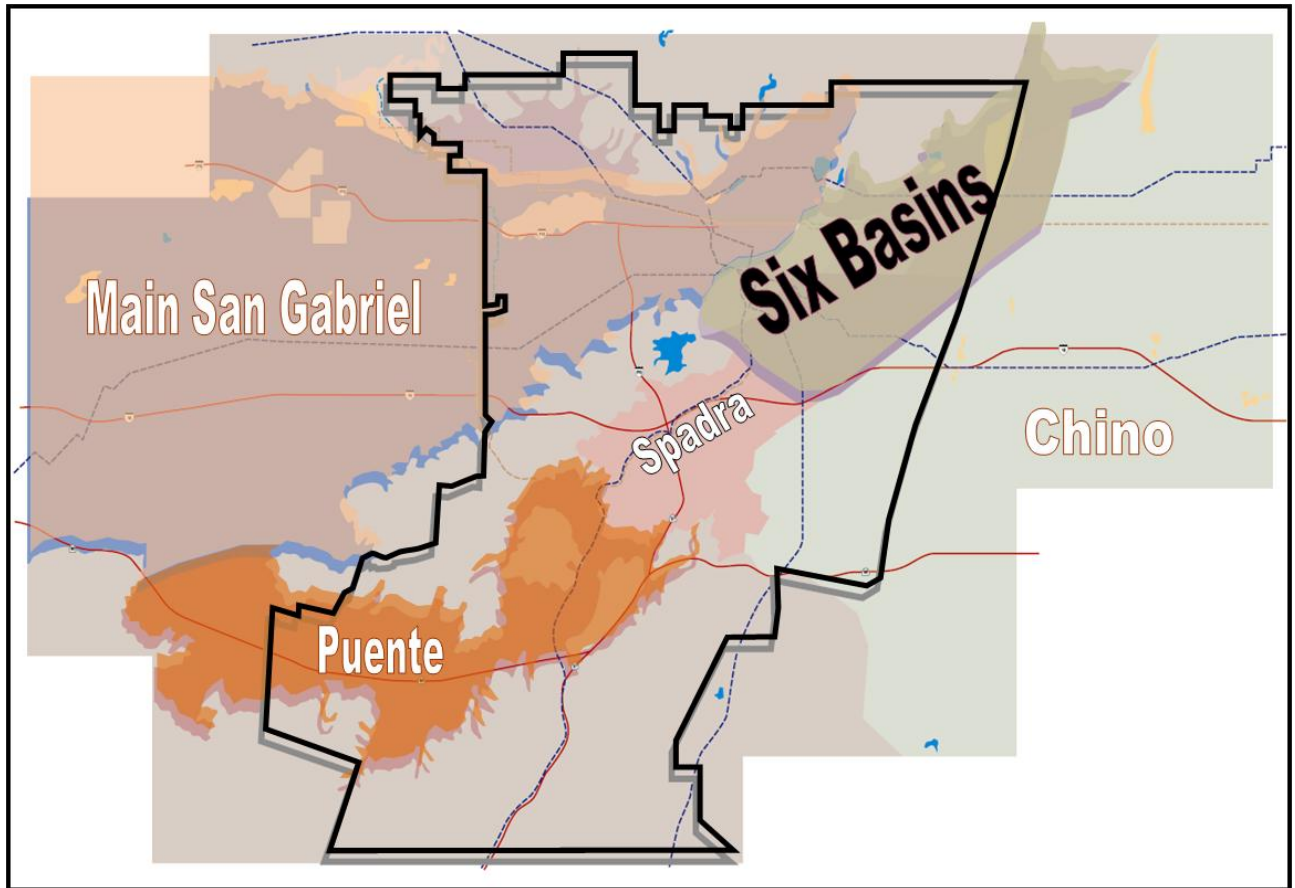
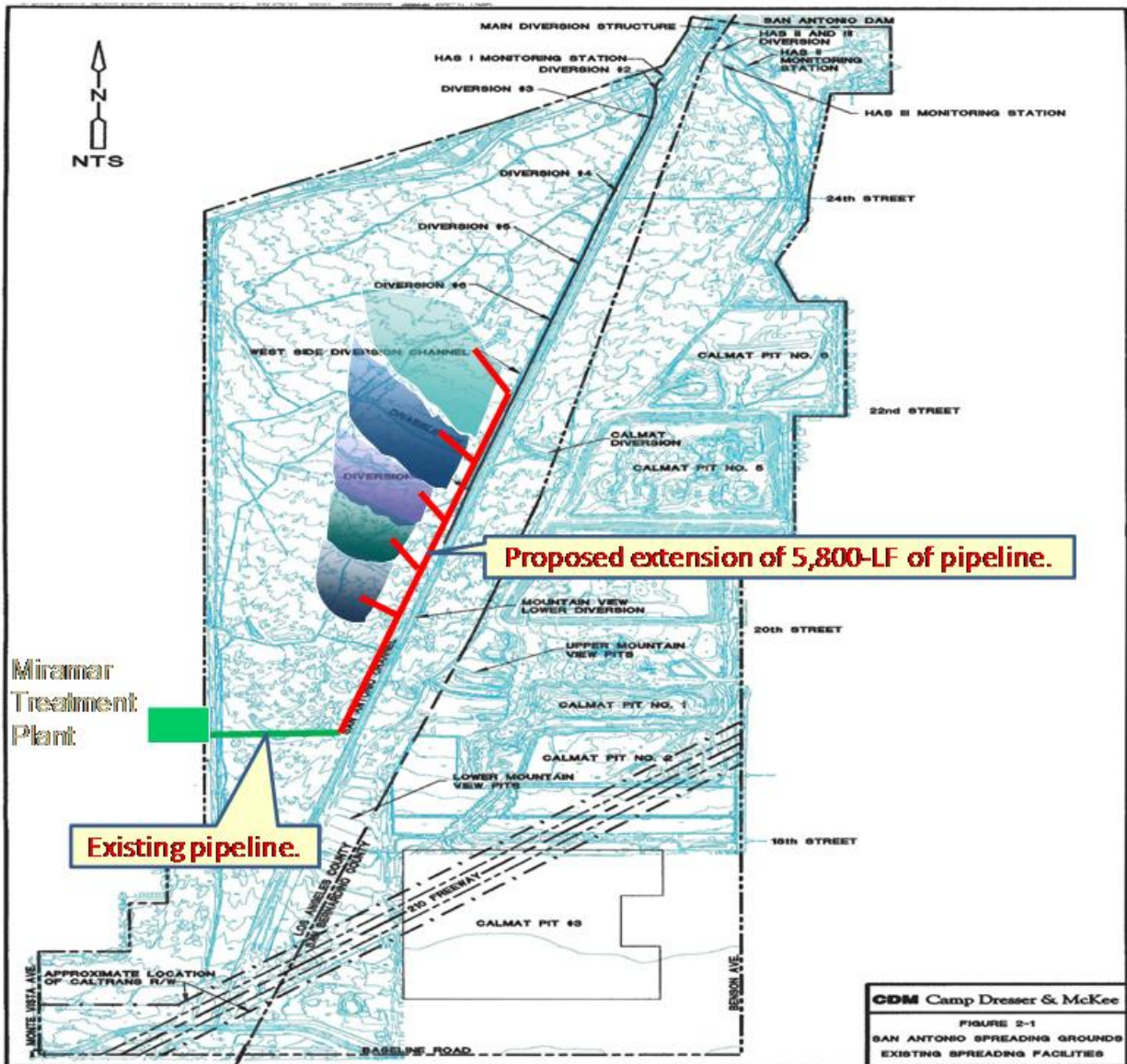


Figure 3-27: Six Basins Sub-basins and Location of San Antonio Spreading Grounds

Figure 3-28: Proposed Facilities



## Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed by June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

### (a) Direct Project Administration Costs

#### Task 1: Administration

Coordination between TVMWD and the Pomona Valley Protective Association is established through an MOU between these two agencies in 2008 allows for TVMWD's imported water pipeline construction work to take place on the property. TVMWD has permission to operate the additional pipeline on the property.

Permit	Date
MOU from Pomona Valley Protective Association	2008

#### Task 2: Labor Compliance Program

Not applicable

#### Task 3: Reporting

Not applicable

### (b) Land Purchase/Easement

A MOU and Easement between TVMWD and the landowner (PVPA) has been completed to allow for construction work to take place on the proper. TVMWD has permission to operate the additional pipeline on the property.

### (c) Planning/Design/Engineering/Environmental Documentation

#### Task 4: Assessment and Evaluation

The Foothill Feeder pipeline provides Miramar with imported water from MWD. The Foothill Feeder has an 80-cfs capacity and Miramar has an intake capacity of 40 cfs. The

remaining 40 cfs can supply the water that will be used for this Project. Detailed information on how the project was sized can be found on page 13 of the *Feasibility Study of Imported Water Spreading at San Antonio Spreading Grounds* (Feasibility Study), completed in April 2005.

The Feasibility Study can be found in Appendix D of the EIR for this Project. This Feasibility Study confirms the potential for spreading water within San Antonio Spreading Grounds.

The TVMWD Mitigation Alternatives to Rising Groundwater Study, completed in March 2006, evaluated the possibility of rising water conditions within Six Basins due to recharge at the spreading grounds. This study provides support that spreading additional water as planned in this project will not create issues with high groundwater levels.

Assessment and Evaluation Submittals	Date
Feasibility Study of Imported Water Spreading at San Antonio Spreading Grounds	April 2005
Mitigation Alternatives to Rising Groundwater Study	March 2006

#### Task 5: Final Design

This Project is at the 95 percent (Pre-Final) Design level as of 2006. This includes a Preliminary Design Report. Plans have been completed, specifications for the Project are prepared, and a detailed cost estimate has been completed.

Design	Date
95% (Pre-Final) Design	2006

#### Task 6: Environmental Documentation

A Notice of Preparation/Initial Study was prepared in 2005. The Initial Study found that the Project could potentially affect biological resources, mineral resources, hydrology/water quality, geology/soils and mandatory findings of significance. The CEQA process for the

Project, including the EIR, was complete as of July 2005. Environmental mitigation monitoring is ongoing.

Environmental Documentation	Date
Notice of Preparation/Initial Study	2005
EIR	2005

### Task 7: Permitting

A MWD Right-of-Way (ROW) permit is required for construction and was obtained in 2008.

Permit	Date
MWD ROW Permit	2008

### (d) Construction/Implementation

#### Task 8: Construction Contracting

Not applicable.

#### Task 9: Construction

Not applicable.

### (e) Environmental Compliance/Mitigation/Enhancement

#### Task 10: Environmental Compliance/Mitigation/Enhancement

Ongoing monitoring is taking place as required by the EIR for the section of pipe already constructed, as mentioned in the project description. Monitoring will expand to the Project area once construction commences.

(f) Construction Administration

**Task 11: Construction Administration**

Not applicable.

Work Items after June 1, 2011

The following sections discuss work items that will be completed on or after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

(a) Direct Project Administration Costs

**Task 1: Administration**

Administration of this project will be performed by TVMWD staff and by a consulting firm. The TVMWD Professional Engineer will perform project and construction management services throughout the anticipated construction period. The consultant Assistant General Manager (AGM) will oversee all CEQA documents, ongoing mitigation monitoring, compliance with the IRWMP, and coordination with regulatory agencies. The AGM will also oversee all coordination between TVMWD and PVPA as needed.

The TVMWD would enter into a MOU regarding compliance with Proposition 84 Implementation Grant requirements and terms of reimbursement payments with the LACFCD who would serve as the grantee for the Proposition 84, Round 1 Implementation Grant Funding. This MOU between the TVMWD and LACFCD would be completed by January 2012.

Project Administration Submittals	Date
MOU with LACFCD	January 2012

**Task 2: Labor Compliance Program**

TVMWD will hire a designated consultant from the approved list of third party labor compliance program providers, as required by the California Department of Industrial Relations, to develop and complete the LCP upon grant approval.



Project Administration Submittals	Date
Labor Compliance Program	June 2011
Annual Reports	Annually

### Task 3: Reporting

Regular project reporting will be completed on a quarterly basis to provide the status of the project. In addition, a final report will be submitted after completion of the project.

Reporting Submittals	Date
Quarterly Reports	Quarterly
Final Report	After completion

#### (b) Land Purchase/Easement

Not applicable.

#### (c) Planning/Design/Engineering/Environmental Documentation

### Task 4: Assessment and Evaluation

Not applicable.

**Task 5: Final Design**

The 100 percent design plans and specifications will be completed two months after grant award. This remaining 5 percent will show project pipeline alignment and layout of the five turnout facilities, and minor earthwork to capture spread-water. Detail drawings will be included for the various disciplines (such as geotechnical, civil, mechanical, electrical) as appropriate. Front-end and technical portion of specifications will be completed and provided as part of plans, specifications, and engineer's estimate deliverables. The 100 percent design is the design package that will be advertised for project award for construction/implementation of project. The package consists of the complete, signed, and "As-Advertised" plans and specifications.

Design Submittals	Date
100% (Final) Design	August 2011

**Task 6: Environmental Documentation**

The project's CEQA documentation has been approved and adopted. Mitigation monitoring is ongoing, and will continue up to two years after project completion. Existing monitoring data can be used as baseline data for project monitoring. Reporting associated with mitigation monitoring during construction will be completed under this task.

Environmental Documentation Submittals	Date
Mitigation Monitoring Reporting	Ongoing

**Task 7: Permitting**

No further permitting is required beyond the previously obtained MWD ROW permit.

## (d) Construction/Implementation

**Task 8: Construction Contracting**

Construction contracting will begin once design is complete with the commencement of bid solicitation. Tasks to secure the contractor and award the contract include: advertisement for bids, a pre-bid contractors meeting, bid opening, bid evaluations, selection of contractor, board approval, award of contract, and notice to proceed.

Construction Submittals	Date
Notice Request for Bids	August 2011
Bid-opening & Contract award	September 2011
Notice to Proceed	October 2011

**Task 9: Construction****Subtask 9.1: Mobilization and Site Preparation**

Construction will begin with mobilization and staging of the site. Clearing and grubbing of the site will be completed as needed for preparation of pipeline construction. Equipment will be brought in as needed.

**Subtask 9.2: Project Construction**

Construction of the pipeline and associated minor earthwork will take place in the Project Construction subtask. The earthwork discussed here is related to the installation of pipes, specifically: excavation, disposal of excess soil, stockpile soil/load and return to site, backfill and compaction, and restoration of paving. Some basin rehabilitation will be required to maximize infiltration in the existing basin which will be completed through the use of machinery capable of clearing large debris (e.g., boulders and shrubs) and silt.

The existing pipeline is connected to the Foothill Feeder pipeline. The proposed pipeline will extend north from the existing pipeline along the west side of the San Antonio Flood Control Channel with turnouts into the San Bernardino and Los Angeles County sides of the spreading basins. There will be five spreading outlets spaced evenly along this proposed alignment.

Outlet structures will be sized for the full capacity of their respective pipeline. The proposed outlet structures will be located consistent with the proposed improvements by PVPA. The earthwork mentioned above will be completed through the use of earthmoving equipment.

### **Subtask 9.3: Perform Testing and Demobilization**

The final construction subtask will include system integration of valve actuators and meters, and start-up testing. Construction equipment will be removed from the site.

#### **(e) Environmental Compliance/Mitigation/Enhancement**

##### **Task 10: Environmental Compliance/Mitigation/Enhancement**

Environmental mitigation monitoring will continue through construction, in particular during construction of the wildlife fence and during excavation work.

#### **(f) Construction Administration**

##### **Task 11: Construction Administration**

Construction administration activities will include general administration, construction management, and project management. The AGM will act as construction administrator, a task which includes budget control, supervisory duties, and grant and regulatory compliance. A TVMWD Project Engineer will serve as both the construction manager and project manager, as stated in Task 1.

#### **(g) Other Costs**

Other cost activities will include legal review of the project and completion of the Project Monitoring Plan. The Project Monitoring Plan will be completed in August 2012 and will outline the monitoring, assessment and performance measures that will demonstrate that the Project meets its intended goals. The Performance Measures Table and discussion in Attachment 6 provides a preview of the information that would be included in the Project Monitoring Plan.

Assessment and Evaluation Submittals	Date
Project Monitoring Plan	August 2012

## Discussion of Standards and Merits

### Standards

Construction of the San Antonio Spreading Grounds Improvements Project shall conform to the following standards:

- Construction material that will be used in the project shall conform to the standards and applicable codes of the State of California.
- Plans shall conform to the uniform design standards in the Standard Plans for Public Works Construction (SPPWC) prepared by the “Greenbook” Committee of Public Works Standards.
- Electrical equipment installations shall conform to National Electrical Manufacturers Association (NEMA) standards.
- Design, installation, and performance shall follow American Waterworks Association standards.
- All work shall be completed in conformance to CAL/OSHA regulations.
- All testing will meet American National Standards Institute and/or American Society for Testing and Materials standards.
- Permits will be required by Cal-OSHA for all excavations deeper than 5-feet. These permits are generally obtained by the construction contractor, and are specific to the contractors’ construction means and methods.

### Merits

Approved standard construction materials will be used for construction of the project.

## XII. Leo J. Vander Lans Advanced Water Treatment Plant Expansion – Water Replenishment District

### Detailed Project Description

#### Project Need

Groundwater provides a large portion of the drinking water supply for over four million residents in 43 cities in the southern Los Angeles County area. High demand has caused periodic groundwater overdraft, which has accelerated seawater intrusion. The Water Replenishment District of Southern California (WRD) is responsible for securing sufficient replenishment supply to meet the adjudicated groundwater pumping rights of the West Coast and Central groundwater basins as well as protecting the quality of those supplies from seawater or other potential contaminants. To help meet these responsibilities, WRD purchases both imported and recycled water for injection at three seawater intrusion barriers owned and operated by the County of Los Angeles Department of Public Works.

One of the three seawater intrusion barriers is the Alamitos Seawater Intrusion Barrier (Barrier), located south of the Central Groundwater Basin near the coast of the Pacific Ocean in the City of Long Beach, California. The Barrier's injection wells are currently supplied by advanced treated recycled water from WRD's Leo J. Vander Lans Advanced Treatment Plant (Plant), also located in Long Beach (Figure 3-30), as well as Metropolitan imported water purchased from the Central Basin Municipal Water District. Metropolitan's imported water supplies include water from the Colorado River and Sacramento-San Joaquin Delta that has become increasingly costly and unreliable due to recent and long-term droughts, regulatory actions and court decisions. In order to reduce reliance on imported water needed for the region, WRD intends to fully replace the imported supplies utilized for the Barrier with advanced treated recycled water.

#### Project Description

The Leo J. Vander Lans Advanced Water Treatment Plant Expansion Project (Project) proposes to expand the existing treatment capacity at the Plant to produce an additional 4,000 AFY of high quality advanced treated recycled water. The new supply will replace imported water currently injected into the Barrier. The Project will provide a sustainable and drought-resistant local water supply for groundwater recharge and will also increase the reuse of wastewater effluent in the Region, thereby decreasing the amount of effluent discharged into the Pacific Ocean.

Currently, the Plant uses microfiltration, reverse osmosis, and ultraviolet processes to further purify tertiary treated recycled water effluent produced at the Sanitation Districts of Los Angeles County's Long Beach Water Reclamation Plant. The Plant produces 2.7 MGD of advanced treated recycled water which is blended with imported water and pumped into the Barrier.

Expansion of the Plant will supply an additional 3.7 MGD of advanced treated recycled water for injection at the Barrier, enough to fully replace the amount of imported water currently used to minimize seawater intrusion and replenish groundwater supplies. The Project will more than double the current treatment capacity at the Plant by building upon basic infrastructure that was previously constructed in preparation for this proposed expansion. The capacity of the existing treatment processes at the Plant consisting of microfiltration, reverse-osmosis, and ultraviolet disinfection will be more than doubled and a new advanced oxidation process will be added. Similar to WRD's current barrier injection program, extensive monitoring of the water quality at several existing monitoring wells near the Barrier will continue to ensure that the highest quality standards are met and maintained.

Groundwater basin stakeholders support the concept of using 100 percent recycled water at seawater intrusion barriers, which this Project will achieve. The expansion of the Plant has been presented at numerous public meetings. The Project has obtained the conditional support of the District Technical Advisory Committee, which is composed of groundwater pumpers from the Central and West Basin Water Associations.

#### Consistency with IRWMP Plan

The Project is consistent with four of the Plan objectives, including: optimize local water resources to reduce the Region's reliance on imported water; protect and improve groundwater and drinking water quality; and maintain and enhance public infrastructure related to flood protection, water resources, and water quality. In addition, the Project will contribute to the planning targets for water supply (by increasing local water supply and decreasing demand for imported water) and stormwater capture (by increasing the volume of runoff captured and stored behind the Whittier Narrows Dam).

#### Goals and Objectives

The objectives of the Project include:

- Expand the Plant to supply additional advanced treated recycled water to fully replace imported water supplies used at the Barrier;

- Protect the Central Groundwater Basin from seawater intrusion, thereby improving groundwater quality;
- Develop local water infrastructure to sustain potable water supply and reliably protect water quality; and
- Reduce waste of recycled tertiary treated municipal water by decreasing discharges of effluent to the Pacific Ocean.

### Consistency with Program Preferences and Statewide Priorities

The Project will be consistent with the following IRWM Program Preferences:

- Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program: 1) maximize use of available water supplies through conservation, water recycling, and water quality improvements; 2) increase the flexibility of water systems at the state, federal and local level through improvements in conveyance, storage and water project operations; and 3) develop groundwater and surface water storage projects to boost flexibility and provide additional supplies for agriculture, urban and environmental use.

In addition, the Project will be consistent with the following Statewide Priorities:

- **Drought Preparedness**—by effectively addressing long-term drought preparedness by contributing to sustainable water supply and reliability during water shortages.
- **Use and Reuse Water More Efficiently**—by implementing water use efficiency, water conservation, recycling and reuse.
- **Protect Surface Water and Groundwater Quality**—by protecting and restoring surface water and groundwater quality to safeguard public and environmental health and secure water supplies for beneficial uses.

### Resource Management Strategies

The Project will implement the following Resource Management Strategies identified in the California Water Plan Update 2009:

- **Recycled Municipal Water**—The Project will expand the Plant to increase the supply of advanced treated recycled water. The recycled water can then be used to fully replace imported water currently used at the Barrier.



- **Matching Quality to Use**—The Project will implement water treatment technologies that convert wastewater to advanced treated recycled water. The quality of the advanced treated recycled water is appropriate for future use as an indirect source of potable water.
- **Salt and Salinity Management**—The Project will provide a more reliable groundwater supply by preventing degradation of the Region’s groundwater quality from seawater intrusion.

#### Linkages and Synergies between Projects

This Project and the Whittier Narrows Conservation Pool Project are part of WRD’s Water Independence Now (WIN) Program to remove the reliance on imported water from the Sacramento-San Joaquin Delta and the Colorado River by developing local water supplies. WIN will convert the Central and West Coast basins into self-sustaining, self-sufficient groundwater basins. WIN includes projects to increase the use of stormwater and recycled wastewater for indirect potable use by means of groundwater recharge and seawater intrusion prevention. These multi-benefit projects will use water that would otherwise be discharged to the ocean for beneficial uses, develop local water infrastructure to sustain potable supply, and protect water quality in the area basins.

#### Project Timing and Phasing

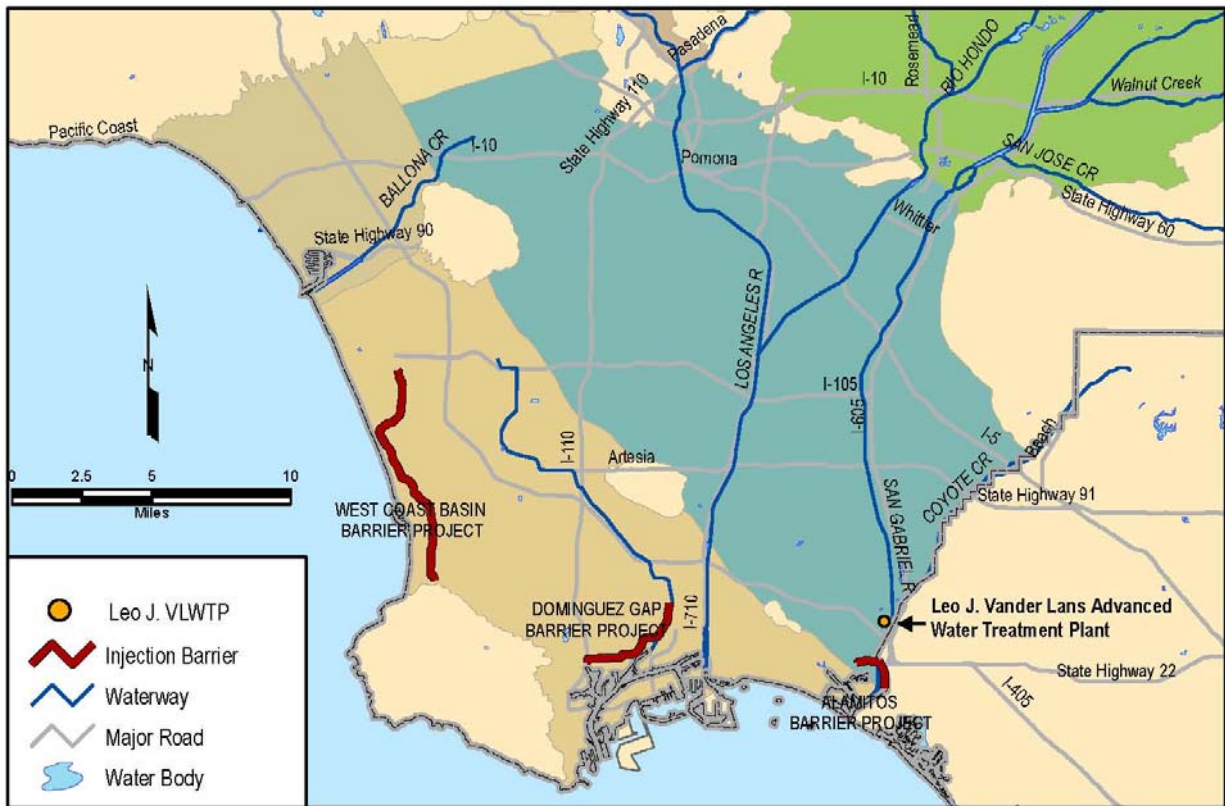
The Project design is 15 percent complete. The final design plans will be completed by January 2, 2012. Project construction will commence in March 2012 and will be completed by September 2013.

This is not a multi-phase project.

Project Map

The location of the Leo J. Vander Lans Advanced Water Treatment Plant in relation to the Alamitos Barrier of is identified in Figure 3-29. The Plant and its surrounding project area are identified in Figure 3-30. The existing Plant layout and the proposed improvements for expansion of production capacity are identified in Figure 3-31.

Figure 3-29. The Leo J. Vander Lans Advanced Water Treatment Plant in Relation to the Alamitos Barrier



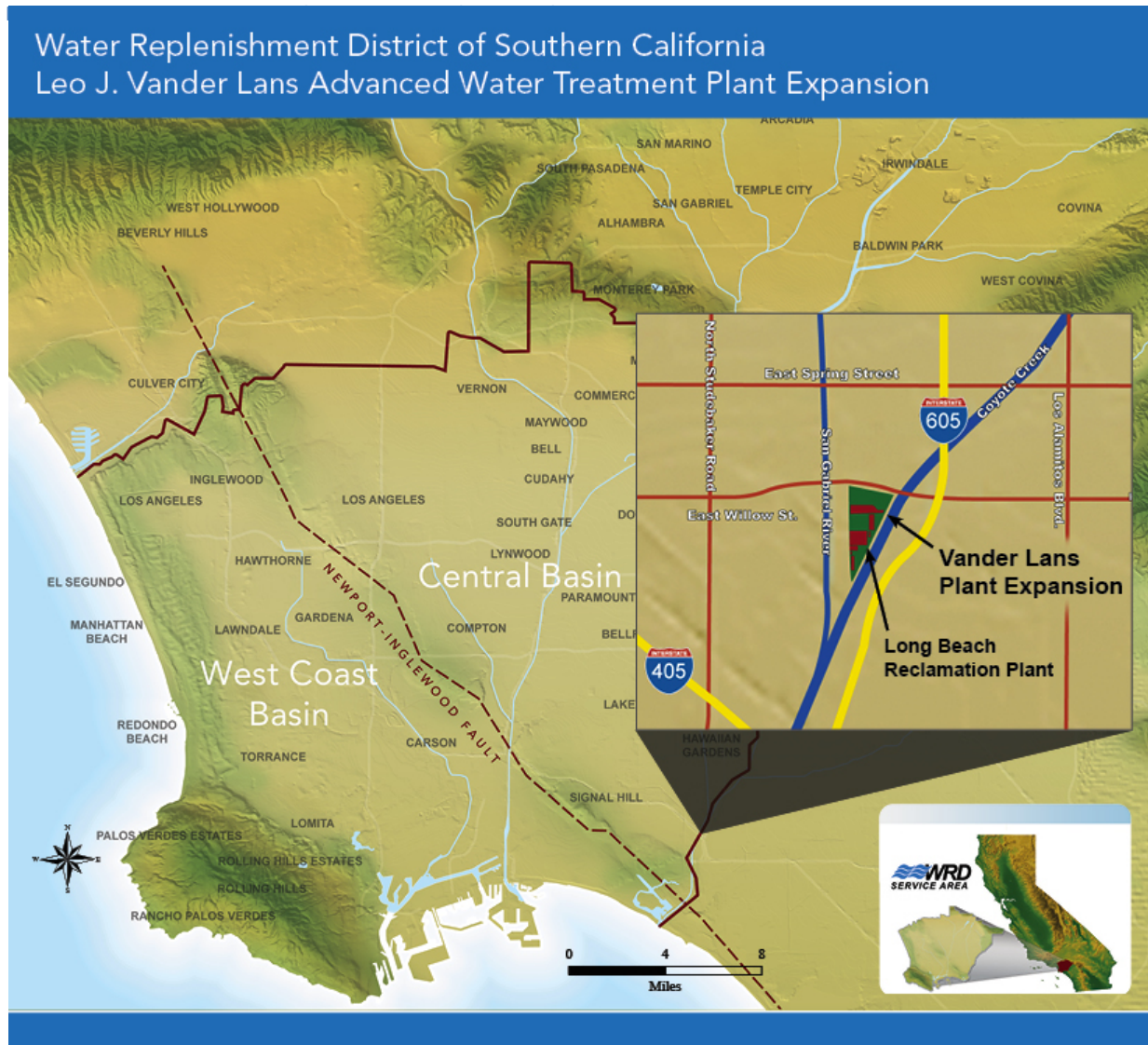
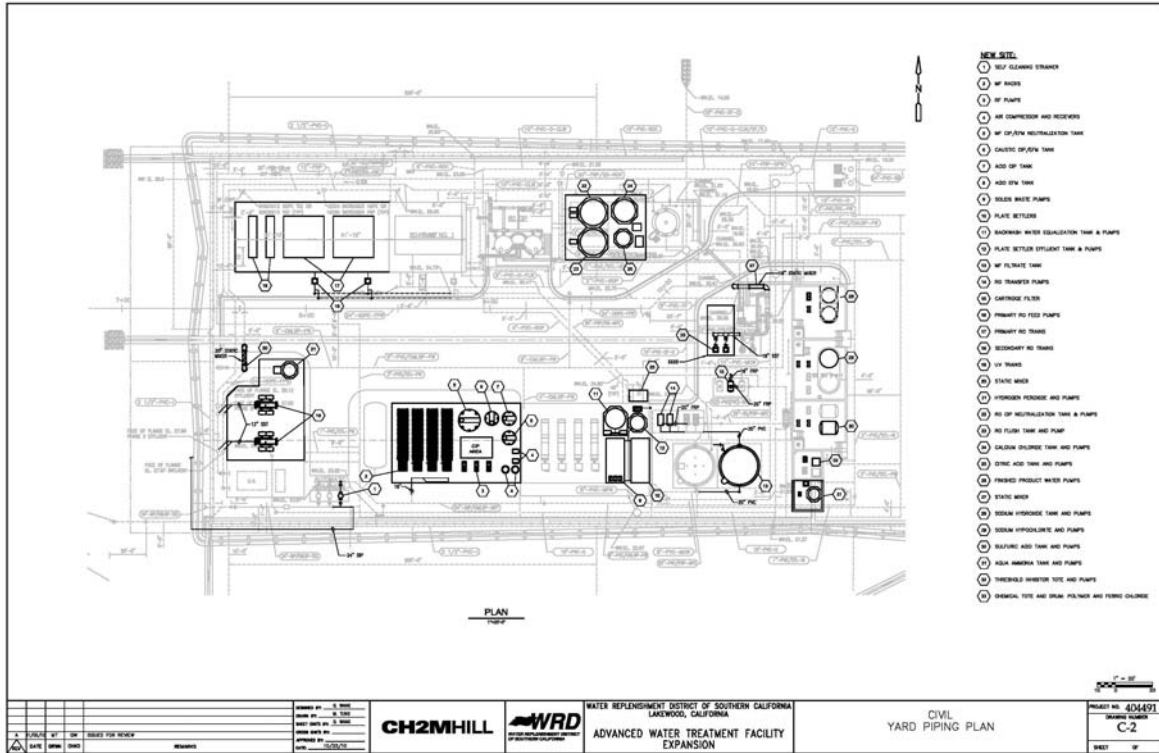


Figure 3-31. The Existing Leo J. Vander Lans Advanced Water Treatment Plant and Locations for Expansion of Production Capacity



## Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed by June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

### (a) Direct Project Administration Costs

#### Task 1: Administration

Not applicable.

#### Task 2: Labor Compliance Program

Not applicable.

#### Task 3: Reporting

Not applicable.

### (b) Land Purchase/Easement

Not applicable.

### (c) Planning/Design/Engineering/Environmental Documentation

#### Task 4: Assessment and Evaluation

A Feasibility Study for the Project was completed in October 1999 and a Preliminary Project Design Report was completed in November 2010. See Appendix K for a copy of the Feasibility Study.

Assessment and Evaluation Submittals	Date
Feasibility Study	October 1999
Preliminary Project Design Report	November 2010

**Task 5: Final Design**

WRD's conceptual design (30 percent design) will be completed by January 2011. Solicitation for a consultant to perform 60 percent through 100 percent design will be conducted between January and March 2011.

Design Submittals	Date
30% (conceptual) Design	January 2011

**Task 6: Environmental Documentation**

CEQA environmental compliance for project construction commenced September 2010. A mitigated negative declaration is expected by August 2011.

**Task 7: Permitting**

Not applicable.

**(d) Construction/Implementation****Task 8: Construction Contracting**

Not applicable.

**Task 9: Construction**

Not applicable.

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

Not applicable.

**(f) Construction Administration****Task 11: Construction Administration**

Not applicable.

## Work Items after June 1, 2011

The following sections discuss work items that will be completed on or after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

### (a) Direct Project Administration Costs

#### Task 1: Administration

The Project manager will be responsible for generating progress reports and project coordination with stakeholders. A grant manager will be designated upon grant award. The grant manager will manage the grant agreement, complete financial reports, and invoicing.

WRD will enter into a MOU regarding compliance with Proposition 84 Implementation Grant requirements and terms of reimbursement payments with the LACFCD. LACFCD will serve as the grantee for the Proposition 84, Round 1 Implementation Grant Funding. This MOU between WRD and LACFCD will be completed by January 2012.

Project Administration Submittals	Date
Invoices	Quarterly
MOU with LACFCD	January 2012

#### Task 2: Labor Compliance Program

WRD will hire a designated consultant from the approved list of third party LCP, as required by the California Department of Industrial Relations, to develop and complete the LCP upon grant approval.

Labor Compliance Submittals	Date
Labor Compliance Program (LCP)	June 1, 2011
Annual Reports	Annually

**Task 3: Reporting**

Quarterly progress reports and final reports will be produced for the Project.

Reporting Submittals	Date
Quarterly Reports	Quarterly
Final Report upon Completion of Construction	February 2014

**(b) Land Purchase/Easement**

This Project does not require acquisitions of land or rights-of-way because the Project will be constructed at an existing facility.

**(c) Planning/Design/Engineering/Environmental Documentation****Task 4: Assessment and Evaluation**

Not applicable.

**Task 5: Final Design**

A consultant will produce the final design plans by December 31, 2011. All construction documents will be available upon completion.

Design Submittals	Date
60% Design	July 2011
90% (Pre-final) Design	October 2011
100% (final) Design	January 2012

**Task 6: Environmental Documentation**

The Project requires CEQA environmental compliance for construction. The Mitigated Negative Declaration is expected to be approved and adopted by August 2011.



Permit	Approval Date
CEQA-Mitigated Negative Declaration	August 2011

### Task 7: Permitting

WRD will obtain a construction permit by March 2012 and all other necessary permits prior to construction as required.

Environmental Document Submittals	Date
Construction Permit	March 2012
Others as Needed	March 2012

### (d) Construction/Implementation

#### Task 8: Construction Contracting

Construction contracting task will include advertisement for bid, pre-bid contractors meeting, evaluation of bids, and awarding of contract. Notice to Proceed will be issued by March 2012 once all necessary construction permits have been acquired.

Solicitation Efforts	Date
Construction Contracting	March 2012

Construction Submittals	Date
Notice to Proceed	March 2012

**Task 9: Construction****Subtask 9.1: Mobilization and Site Preparation**

The contractor will mobilize and establish a field office and staging area at the existing project site. The construction activities will be performed within the existing property owned by WRD.

**Subtask 9.2: Project Construction**

The Project consists of expanding the existing treatment facility to add additional production capacity. The facilities to be added will include microfiltration, reverse osmosis, ultraviolet light disinfection, chemical storage systems, and miscellaneous piping, electrical work, structural work, and control systems. The Project will also add a new advanced oxidation process. For further details and design criteria on the advanced oxidation process, see Appendix K.

**Subtask 9.3: Performance Testing and Demobilization**

Upon completion of construction, the contractor will conduct performance tests to demonstrate that the facilities meet all performance requirements. The contractor will demobilize after WRD accepts the results of the performance tests.

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

CEQA compliance is in progress and will identify mitigation measures, if required. A Mitigated Negative Declaration is expected for this Project since construction will occur on WRD property.

**(f) Construction Administration****Task 11: Construction Administration**

A construction manager and field inspector will be contracted for this Project. The construction manager will be responsible for all construction management and the preparation of all construction documents. The field inspector will be responsible for overseeing the construction site, working with inspectors and officials on site, and working with the construction manager on all other aspects of the construction project.

(g) Other

A Project Monitoring Plan will be completed in August 2011 and will outline the monitoring, assessment and performance measures that demonstrate the Project meets its intended goals. The Performance Measures Table and discussion in Attachment 6 provides a preview of the information that would be included in the Project Monitoring Plan. Other tasks that may be required during the project are assessments during construction, legal services, and attainment of licenses.

Assessment and Evaluation Submittals	Date
Monitoring Plan	August 2011

Discussion of Standards and Merits

Not applicable.

## XIII. Whittier Narrows Conservation Pool Project

### Detailed Project Description

#### Project Need

The Region has experienced significant reductions in imported water supplies due to recent drought conditions in northern California, ongoing drought conditions in the Colorado River watershed, and from regulatory actions and court decisions that have reduced exports from the Sacramento-San Joaquin Delta. In addition, the effects of climate change may make imported water supplies less reliable. Thus, the Region needs to increase the utilization of local water supplies and reduce dependency on imported water.

The Whittier Narrows Conservation Pool Project (Project), sponsored by the WRD, will conserve and reuse stormwater currently discharged to the ocean for groundwater replenishment in the Central Groundwater Basin (Central Basin) by increasing the amount of seasonal detention behind the Whittier Narrows Dam (Dam). Historically, the Central Groundwater Basin (Central Basin) has had perennial overdraft problems, which resulted in wells going dry and sea water intrusion that contaminated coastal groundwater in the 1950's. The WRD was founded in 1959 to manage the basin and address these issues. WRD is responsible for replenishing the Central Basin and the adjacent West Coast Groundwater Basin (West Basin) to fulfill the rights of pumpers, and to protect and preserve the Basins' groundwater quality.

Over the last 30 years, replenishment through surface spreading in the two basins has averaged 130,000 AFY, of which 25,000 AFY, or 20 percent of the total spread, was imported water, according to the 2010 WRD Engineering and Survey Report. The Central Basin can be directly recharged by spreading water at the Rio Hondo and San Gabriel Coastal Spreading Grounds, located along the Rio Hondo and San Gabriel Rivers in the cities of Montebello and Pico Rivera southeast of downtown Los Angeles. Stormwater runoff stored in the Whittier Narrows Dam and Reservoir, owned and operated by the Corps, provides source water for recharge operations, but the total amount of water available for spreading is limited by the maximum elevation of the conservation pool, which is established in the Corps' Water Control Plan for the Dam.

The 2000 Los Angeles County Drainage Area (LACDA) Water Conservation and Supply Santa Fe – Whittier Narrows Dams Feasibility Study (Feasibility Study) proposed to increase the maximum conservation pool elevation behind the Dam from 201.6 feet (in elevation of above mean sea level) to 205.0 feet, which would increase the amount of water available for recharge by

approximately 1,100 AFY, increase the utilization of local water supplies, and decrease demand for imported water.

### Project Description

The Whittier Narrows Conservation Pool Project (Project) will develop a new, sustainable, and drought-resistant supply for groundwater recharge, increasing the quality and reliability of potable water supply for southern Los Angeles County. The additional water that could be captured as a result of the Project can provide water for approximately 4,000 people annually and reduce local reliance on expensive water imported into the area from the Sacramento-San Joaquin Delta and the Colorado River. The Project will reduce the amount of stormwater discharged to the ocean by conserving more water behind the dam for later recharge, improve the quality of the groundwater in the basins, and reduce dependence on imported water.

The Project will update the 2000 LACDA Water Conservation and Supply Feasibility Study to provide specific recommendations for the Corps to revise their Water Control Plan (Plan) for the Dam to increase the maximum conservation pool elevation behind the Dam from 201.6 feet to 205.0 feet. The operational change included in the Plan will increase the Dam's conservation capacity by 1,200 AF and provide an additional 1,100 AFY of stormwater that can be recharged into the Central Basin. The Corps has confirmed that it fully intends to move forward with the operational changes that will be recommended in the updated Feasibility Study, as shown by the letter of intent provided in Appendix L, and their dedication of funds through fiscal year 2011.

Concurrent with the update of the Feasibility Study, the Corps will complete a dam safety study to ensure that no improvements to the Dam will be needed in order for the Dam to seasonally store more water.

When complete, the Project will provide direct benefits to DACs in the WRD service area. The DACs in the area include all or portions of the cities of Bell, Bell Gardens, Commerce, Compton, Cudahy, Hawthorne, Huntington Park, Inglewood, Los Angeles, Lynwood, Maywood, Montebello, Paramount, and Vernon. These benefits include: (1) protection of local water resources available to DACs; and (2) maintaining a lower-cost water supply by reducing the need to rely on imported water.

### Consistency with IRWM Plan

The Project is consistent with four of the Plan objectives, including: optimize local water resources to reduce the Region's reliance on imported water; protect and improve

groundwater and drinking water quality; protect, restore, and enhance natural processes and habitats; and to maintain and enhance public infrastructure related to flood protection, water resources, and water quality. In addition, the Project will contribute to the planning targets for water supply (by increasing local water supplies) and stormwater capture and treatment (by capturing, storing, and infiltrating additional stormwater runoff).

### Goals and Objectives

The Project's objectives are:

- Change operations at the Dam and allow the capture of additional stormwater for recharge into the Central Basin;
- Enhance local water supply and protect groundwater quality; and
- Increase sustainability of local water supply in the southern Los Angeles County and reduce the Region's reliance on imported water.

### Consistency with Program Preferences and Statewide Priorities

The Project will be consistent with several IRWM Program Preferences, including:

- Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program: 1) increase the flexibility of water systems at the state, federal and local level through improvements in conveyance, storage and water project operations; and 2) develop groundwater and surface water storage projects to boost flexibility and provide additional supplies for agriculture, urban and environmental use; and
- Address critical water supply or water quality needs of disadvantaged communities within the Region.

The Project will also address the following Statewide Priorities:

- **Drought Preparedness**—by effectively addressing long-term drought preparedness by contributing to sustainable water supply and reliability during water shortages;
- **Expand Environmental Stewardship**—by improving watersheds, floodplains, and instream functions and to sustain water and flood management ecosystems;

- **Protect Surface Water and Groundwater Quality**—by protecting and restoring surface water and groundwater quality to safeguard public and environmental health and secure water supplies for beneficial uses; and
- **Ensure Equitable Distribution of Benefits**—by developing multi-benefit projects with consideration of affected disadvantaged communities.
- **Promote and Practice Integrated Flood Management**—by improving flood protection and enhancing the sustainability of flood and water management systems.

### Resource Management Strategies

The Project would implement the following Resource Management Strategies identified in the California Water Plan Update 2009:

- **System Reoperation**—The Project will recommend an operational change at the Dam to increase the Dam’s conservation capacity resulting in an additional 1,100 AFY of recharged stormwater.
- **Conjunctive Management and Groundwater**—The Project will result in changes to the planned use and management of additional surface water (captured stormwater) and groundwater resources (recharging stormwater into the Central Basin).
- **Surface Storage -Regional/Local**—The operational change resulting from this Project will increase the surface storage capacity behind the Dam to increase stormwater recharge into the heavily pumped Central Basin.
- **Urban Runoff Management**—The operational change resulting from this Project will allow for the capture and storage of an additional 1,200 AF of stormwater thereby increasing the capabilities of managing stormwater runoff

### Linkages and Synergies

This Project and the Leo J. Vander Lans Advanced Water Treatment Plant Expansion Project, which is also included in the Greater Los Angeles Region Proposition 84 Implementation Grant application, are part of WRD’s WIN Program. The goal of the WIN Program is to develop local replenishment water supply to fully replace imported water demand from the Sacramento-San Joaquin Delta and the Colorado River. WIN will convert the Central and West Coast Basins into

self-sustaining, self-sufficient groundwater basins. WIN includes projects to increase the use of stormwater and recycled wastewater for indirect potable use by means of groundwater recharge and seawater intrusion prevention. These multi-benefit projects will beneficially use water currently discharged to the ocean, develop local water infrastructure to sustain potable supply, and protect water quality in the area basins.

The WIN Program is one of six water conservation and recycling projects that were approved by the Federal Bay-Delta Leadership Committee in Washington, DC as “demonstration projects” suited to the objectives of the Interim Federal Action Plan (IFAP). The IFAP seeks to align Federal water conservation and recycling efforts with those of the State and impacted communities. The technical and selection committees are comprised of representatives from six Federal departments: Department of Interior, Council on Environmental Quality, Department of Commerce, Department of Agriculture, Environmental Protection Agency, and Department of Army. These Federal agencies are collaborating with State agencies, including the State Water Resources Control Board, Department of Water Resources, and the California Department of Public Health, on this plan

Groundwater replenishment projects are one of the most cost-efficient ways to develop local water supplies. Two additional projects in the application, the Hahamongna Project and the Groundwater Replenishment Facilities Planning Study, which is a part of the Central Los Angeles County Regional Water Recycling Program Project, have the objective of improving the reliability of the Region’s local water sources through groundwater recharge and reducing the dependency on imported water supply.

#### Status of Project

Planning for the Project’s operational change to the Dam has been under way since 2009. The Project will begin in January 2011.

#### Project Map

Project area and site are identified on Figure 3-32.



Figure 3-32. Project Area and Site Map



### Project Timing and Phasing

This Project is the first step in the process of changing operations at the Dam. Concurrent with the Feasibility Study update, the Corps will complete the dam safety study mentioned above. The next step will be for the Corps to use the recommended conservation pool developed in the Feasibility Study to revise the Water Control Plan for the Dam. The Corps has confirmed that it fully intends to move forward with the operational changes that will be recommended in the Feasibility Study, as shown by the letter of intent provided in Appendix L. The Corps has also dedicated the financial resources necessary to complete the Water Control Plan portion through allocations in both FY 2010 and FY 2011.

## Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed by June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, page 32, of the Proposition 84 Implementation PSP.

### (a) Direct Project Administration Costs

#### Task 1: Administration

Work under this task is performed by a designated project manager. The project manager coordinates with and updates partner agencies, including the Corps, via monthly conference calls. All other supplemental meetings, calls and emails are directed by the project manager.

#### Task 2: Labor Compliance Program

Not applicable.

#### Task 3: Reporting

The project manager has been and will continue to produce quarterly progress reports that will be submitted to WRD and the LACFCD.

Reporting Submittals	Date
Quarterly Progress Reports	July – October 2009; January 2011 – June 2011

### (b) Land Purchase/Easement

This project does not require acquisitions of land or rights-of-way.

### (c) Planning/Design/Engineering/Environmental Documentation

#### Task 4: Assessment and Evaluation

The original Feasibility Study was completed in August of 2000. This document laid out the original recommendation for operation of the Santa Fe Dam and the Whittier Narrows Dam.

Assessment and Evaluation Submittals	Date
LACDA Water Conservation and Supply Santa Fe – Whittier Narrows Dams Feasibility Study	August 2000

**Task 5: Final Design**

Not applicable.

**Task 6: Environmental Documentation**

The Corps will update environmental documents for increasing the conservation pool to 205 feet as part of the Project. This Project will require CEQA and NEPA updates to meet environmental compliance for the operational change. Updated CEQA documentation will be completed as follows:

- **CEQA**—The Corps will submit an Initial Study for public review in March 2011.

**Task 7: Permitting**

Not applicable.

**(d) Construction/Implementation****Task 8: Construction Contracting**

Not applicable.

**Task 9: Construction**

Not applicable.

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

Not applicable.

**(f) Construction Administration**

**Task 11: Construction Administration**

Not applicable.

**Work Items after June 1, 2011**

The following sections discuss work items that will be completed on or after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

**(a) Direct Project Administration Costs****Task 1: Administration**

The project manager will continue to coordinate with and update partner agencies via monthly conference calls. All other supplemental meetings, calls and emails will be directed by the project manager. The existing partnership agreement between USACE and LACFCD (and auxiliary agreement between LACFCD and WRD) will be updated prior to March 2011.

WRD would enter into a MOU regarding compliance with Proposition 84 Implementation Grant requirements and terms of reimbursement payments with the LACFCD who would serve as the grantee for the Proposition 84, Round 1 Implementation Grant Funding. This MOU between WRD and LACFCD would be completed by January 2012.

Administration Submittals	Date
Invoices	Monthly
Partnership Agreements	Verifying Date with proponent
MOU with LACFCD	January 2012

**Task 2: Labor Compliance Program**

Not applicable since this project does not include a construction task.

**Task 3: Reporting**

Quarterly reports will be submitted throughout the Project and a final report will be submitted upon Project completion in 2014.

Project Administration Submittals	Date
Quarterly Progress Reports	June 2011– December 2013
Final Report Upon Completion of Project	August 2014

#### (b) Land Purchase/Easement

This Project does not require acquisitions of land or rights-of-way.

#### (c) Planning/Design/Engineering/Environmental Documentation

##### Task 4: Assessment and Evaluation

The update to the Feasibility Study, started in January 2011, will continue through December 2013, and will be written by the Corps. The Feasibility Study will be amended to include an alternative for operating at the proposed 205-foot pool elevation.

Assessment and Evaluation Submittals	Date
Updated LACDA Water Conservation and Supply Santa Fe – Whittier Narrows Dams Feasibility Study	January 2011 – December 2013

##### Task 5: Final Design

No designs are required for the Project since the Project is a study, which will result in an operational change for the Dam.

##### Task 6: Environmental Documentation

The Corps will update environmental documents for increasing the conservation pool to 205 feet as part of the Project. This Project will require CEQA and NEPA updates to meet environmental compliance for the operational change. Updated CEQA and NEPA documentation will be completed as follows:

- **CEQA**—The Corps will complete a Mitigated Negative Declaration (MND) and obtain a Notice of Determination by December 2013.

- **NEPA**—The Corps anticipates that an EIS/EIR will not be required. The Corps will submit an Environmental Assessment as part of the Project. The Notice of Intent (NOI), Finding of No Significant Impact (FONSI), and Record of Decision (ROD) will be completed by December 2013.

Environmental Documentation Submittals	Date
CEQA: MND	December 2013
Environmental Assessment	December 2013
NEPA: NOI, FONSI, ROD	December 2013

**Task 7: Permitting**

No permits are anticipated for the Project.

(d) **Construction/Implementation**

**Task 8: Construction Contracting**

Construction contracting will not be necessary since this Project is a study that will result in an operational change to the Dam.

**Task 9: Construction/Implementation**

The Corps will implement the operational change at the Dam, but the implementation is not included as a part of this Project.

(e) **Environmental Compliance/Mitigation/Enhancement**

**Task 10: Environmental Compliance/Mitigation/Enhancement**

Environmental mitigation/enhancement work will be defined and completed by the Corps as identified in the Water Control Plan; however, this task is not included as a part of this Project.

(f) **Construction Administration**

**Task 11: Construction Administration**

Not applicable.

(g) Other

A Project Monitoring Plan will be completed in August 2011 and will outline the monitoring, assessment and performance measures that demonstrate the Project meets its intended goals. The Performance Measures Table and discussion in Attachment 6 provides a preview of the information that would be included in the Project Monitoring Plan. Other tasks that may be required during the project are assessments during construction, legal services, and attainment of licenses.

Assessment and Evaluation Submittals	Date
Monitoring Plan	December 2013

### Discussion of Standards and Merits

#### Standards

Not applicable.

#### Merits

Not applicable.

## XIV. Water and Energy Efficiency in the School and Hotel/Motel Sectors – West Basin Municipal Water District

### Detailed Project Description

#### Project Needs

The Region has experienced significant reductions in imported water supplies due to recent drought conditions in northern California, ongoing drought conditions in the Colorado River watershed, and from regulatory actions and court decisions that have reduced exports from the Sacramento-San Joaquin Delta. In addition, the effects of climate change could make imported supplies less reliable. Thus, the Region needs to increase the utilization of local water supplies and reduce dependency on imported water.

West Basin MWD provides imported water supplies, purchased through Metropolitan, to residents, industries, and businesses in the western portion of the Greater Los Angeles County Region (Region). West Basin MWD's service area (Area) includes the City of Malibu and the unincorporated Topanga area of the County of Los Angeles. This area is 100 percent dependent upon West Basin MWD's imported water supplies, as there are no local groundwater resources, surface water, or other water supplies available. Reducing water consumption and thereby demand for imported water would reduce energy consumption associated with the conveyance and treatment and reduce the emission of greenhouse gases associated with energy production.

Schools and Hotels/Motels in the Malibu and Topanga area provide opportunities to reduce water consumption through the replacement of inefficient water devices, the installation of smart irrigation controllers that reduce excess landscape irrigation, and the provision of educational materials that inform students, parents and teachers at the schools and visitors to the hotels/motels about the benefits of water and energy conservation. Malibu Creek and the Santa Monica Bay have been identified as impaired water bodies subject to Total Maximum Daily Loads (TMDLs) limits for bacteria. The sources of pollutants include failed septic systems and dry- and wet-weather runoff from landscaped areas. Reducing water consumption would reduce discharge of wastewater to septic systems, while smart irrigation controllers would reduce runoff from excess landscape irrigation.

#### Project Description



The Water and Energy Efficiency in the School and Hotel/Motel Sectors Project (Project) will replace inefficient water devices, such as older urinals, shower heads, and 3-5 gallon per flush toilets and provide smart irrigation controllers at 30 identified large-scale sites within a 30-mile stretch of the coast in the City of Malibu and the incorporated Topanga area. In addition, West Basin MWD has partnered with SCE and Southern California Gas Company to also provide energy efficient devices such as compact fluorescent light bulbs. The installation of energy efficient compact fluorescent light bulbs will be part of the Program but no Proposition 84 funding is requested for this component of the Program. The water-efficient devices that would be installed under the Program are presented in the table below.

Devices	Useful Life
HETs (1.28 gallons per flush)	20 years
HEUs	20 years
1.5 GPM low-flow showerheads	5 years
Smart irrigation controllers	10 years
0.5 GPM bathroom aerators	5 years

Approximately 5,060 water and energy efficient devices installed as a result of the overall program would result in an estimated savings of 85 AF of water, 4.2 kWh of electricity and 214,840 therms of natural gas annually. The overall lifetime savings of the program are estimated to be 1,490 AF of water, 28.4 million kWh of electricity and 1.1 million therms of natural gas. The estimate of total energy savings include the avoided conveyance and treatment costs of imported water supplies, as well as direct savings of kilowatt hours of electricity and therms of natural gas associated with the installation of high-efficiency water devices (and reductions in water consumption). The direct electricity and natural gas savings from light bulbs are not included in the energy savings estimates.

Conservation education literature will be disseminated at participating sites to provide a “full service” water and energy efficiency program. The water conservation literature will educate students, parents and teachers at the schools and visitors to the hotels/motels about reducing overall water and energy use. The distribution of educational literature will occur throughout the Program’s two-year duration as sites are contacted to participate in the Program. The Program contractor will be responsible for providing all education materials upon site visits. After completion of the Program, all conservation literature will be available on websites for West Basin MWD, the City of Malibu, and the Los Angeles County Waterworks District No. 29 (LACWWD No. 29).

The water and energy efficient device installations will be completed by the most competitive and qualified contractor selected by internal West Basin MWD staff and external industry professionals. The smart irrigation controllers will be provided to school and hotel/motel sites for self-installation to sites where the contractor determines existing controllers need to be replaced. The delivery and installation of all water and energy efficient devices will be completed by December 2013.

#### Consistency with IRWM Plan

The Project is consistent with the following objective of the Plan: optimize local water resources to reduce the Region's reliance on imported water. The Project would contribute to the water supply planning target, by reducing water demand through installation of water conservation devices.

#### Goals and Objectives

The goal of the Program is to reduce reliance on imported water supplies through water conservation. The Program objectives that address the IRWM Plan goals are as follows:

- Reduce the use of water in the Area which is currently served by 100 percent imported water;
- Reduce dry-weather runoff through the use of smart irrigation controllers provided to facility managers, landscape managers and maintenance staff at the schools, hotels and motels. The smart irrigation controllers apply only the necessary amount of water to the landscape;
- Provide water and energy efficient devices to large-scale settings (i.e., hotels, motels, and schools) for greater water/energy savings; and
- Reduce flow to septic systems through the installation of water efficient devices.

#### Consistency with Program Preferences and Statewide Priorities

The Project would be consistent with the following IRWM Program Preferences:

- Contribute to attainment of one or more of the objectives of the CALFED Bay-Delta Program: 1) maximize use of available water supplies through conservation, water recycling, and water quality improvements; and 2) reduce water demand through "real water" conservation.

In addition, the Project would be consistent with the following Statewide Priority:

- **Use and Reuse Water More Efficiently**—by implementing water use efficiency, water conservation, recycling and reuse.

#### Resource Management Strategies

The Project would implement the following Resource Management Strategies identified in the California Water Plan Update 2009:

- **Urban Water Use Efficiency**—through the installation of water efficient devices, and the distribution of educational literature.
- **Urban Runoff Management**—by installing smart irrigation controllers which will reduce excess landscape irrigation and the discharge of dry-weather runoff to storm drains.

#### Linkages and Synergies

Water conservation programs help to reduce the Region's reliance on imported water supplies from the Sacramento-San Joaquin Delta in northern California and the Colorado River Aqueduct. This Program is part of West Basin MWD's updated 2010 Water Conservation Master Plan aimed at achieving the SB7x7 20 percent reduction by the year 2020 target. The Area relies 100 percent on imported water supplies and there are no local water supplies available. Thus, water conservation is key for the Area to reduce reliance on imported supplies.

#### Project Timing and Phasing

This is not a multi-phased program. Program site and cost research have been completed and the Program is ready for implementation. During the site identification process, West Basin MWD personally contacted each potential site to determine their interest in participating in the Program. In addition to contacting each potential site, West Basin MWD also faxed and e-mailed a Participant Interest Form and Program flyer. West Basin will provide these completed forms to the selected contractor. Program implementation is contingent upon funding; therefore, no work will be performed until the grant has been awarded.

#### Project Map

The Area and selected sites are identified on

**Figure 3-33.** The map identifies the proximity of the sites to the Santa Monica Bay and local rivers that are impacted by dry-weather runoff.



## Work Items through June 1, 2011

The following sections discuss work items that are either: 1) complete as of application submittal; or 2) will be completed by June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

### (a) Direct Project Administration Costs

#### Task 1: Project Administration

Not applicable.

#### Task 2: Labor Compliance Program

Not applicable.

#### Task 3: Reporting

Not applicable.

### (b) Land Purchase/Easement

This Project does not require acquisitions of land or rights-of-way.

### (c) Planning/Design/Engineering/Environmental Documentation

#### Task 4: Assessment and Evaluation

The West Basin MWD 2006 Water Conservation Master Plan was completed in December 2006 and provides potential water savings, unit cost, benefit assessment, and cost-effectiveness data to review programs that will help West Basin MWD meet its water saving goals. The 2010 Water Conservation Master Plan has recently been updated. Supporting documentation is provided in Appendix M.

Assessment and Evaluation Submittals	Date
West Basin MWD 2006 Water Conservation Master Plan	December 2006
West Basin MWD Water Conservation Master Plan Update	December 2010

**Task 5: Final Design**

No designs are required for this Program.

**Task 6: Environmental Documentation**

No Environmental documentation is required for this Program.

**Task 7: Permitting**

No Permitting is required for this Program.

**(d) Construction/Implementation****Task 8: Construction Contracting**

Not applicable.

**Task 9: Construction****Subtask 9.1: Mobilization and Site Preparation**

The potential participants for this Program have already been identified using current GIS information. The schools, hotels, and motels targeted for this Program have already been mapped. Based on the sites identified, West Basin MWD has conducted preliminary research on the potential participation by contacting them directly via phone, fax, and email.

**Subtask 9.2: Project Construction**

Not applicable.

**Subtask 9.3: Performance Testing and Demobilization**

Not applicable.

**(e) Environmental Compliance/Mitigation/Enhancement****Task 10: Environmental Compliance/Mitigation/Enhancement**

Not applicable.

(f) Construction Administration

**Task 11: Construction Administration**

Not applicable.

Work Items after June 1, 2011

The following sections discuss work items that will be completed on or after June 1, 2011. The work items are divided into each of the six primary budget categories and associated tasks as shown on Table 6, Page 32, of the Proposition 84 Implementation PSP.

(a) Direct Project Administration Costs

**Task 1: Administration**

Administrative tasks related to this Program will be performed by Project Manager Elise Goldman, a Water Conservation Specialist with West Basin MWD. The administrative activities will include:

- Coordinating with the partner agencies to ensure all water and energy efficient devices are delivered on time and matching contributions are received. Each partner agency, including LACWWD No. 29, the City of Malibu, SCE, the Southern California Gas Company, and MWD, provide in-kind services, rebates, products, or matching funds towards this Program;
- Reporting with input from partner agencies for quarterly, annual, and final reports;
- Marketing the Program through established channels; and
- Preparing and submitting monthly invoices.

West Basin MWD would enter into a MOU regarding compliance with Proposition 84 Implementation Grant requirements and terms of reimbursement payments with the LACFCD who would serve as the grantee for the Proposition 84, Round 1 Implementation Grant Funding. This MOU between the West Basin MWD and LACFCD would be completed by January 2012.



Project Administration Submittals	Date
Invoices	Monthly
MOU with LACFCD	January 2012

### Task 2: Labor Compliance Program

This project is not a construction project and will not require a Labor Compliance Program.

### Task 3: Reporting

Program reporting will be submitted as specified in the Grant Agreement to assess progress and accomplishments. Reports will consist of quarterly and annual progress reports from the designated project manager. Additionally, a final report will be submitted after Program completion.

Reporting Submittals	Date
Quarterly Progress Reports	Quarterly
Annual Report	Annually
Final Report	March 2014

### (b) Land Purchase/Easement

This Project does not require acquisitions of land or rights-of-way.

### (c) Planning/Design/Engineering/Environmental Documentation

#### Task 4: Assessment and Evaluation

Not applicable.

#### Task 5: Final Design

Not Applicable.

**Task 6: Environmental Documentation**

Not applicable.

**Task 7: Permitting**

Not Applicable.

**(d) Construction/Implementation****Task 8: Construction Contracting**

Work to be performed under this task will consist of solicitation efforts for water and energy efficient device contractors. An RFP will be developed in July-August 2011 and by late September 2011 the contractors' procurement process will begin. Once proposals by each contractor have been submitted, West Basin MWD staff and external industry professionals will evaluate all proposals. After the evaluations, West Basin MWD will award a contract to the most competitive contractor by November 2011. The contractor award will be completed and the Program will begin in December 2011.

Solicitation Efforts	Date
Contractor Procurement Process	September 2011
Contractor Procurement Award	November 2011
Complete Contractor Award and Begin Program	December 2011

**Task 9: Construction****Subtask 9.1: Mobilization and Site Preparation**

Under this subtask, each identified site will be contacted to solicit their interest in the Program. This will include those sites that respond during the preliminary research conducted and those that did not. The Program will be free to schools and hotels/motels that were determined to be using inefficient water devices and not using smart irrigation controllers. If water devices are identified as inefficient, the schools and hotels/motels will be asked if they would like to receive free water and energy efficient devices. This subtask will occur throughout the duration of the Program assuming not all participation will be determined at the onset of the Program.

The contractor will contact each of the identified participating site to schedule installation of the devices. The contractor will coordinate with partner agencies to deliver the products to the selected sites at the agreed upon schedule.

**Subtask 9.2: Project Construction**

All the devices will be installed by the contractor with the exception of the weather-based smart irrigation controllers. The contractor will not be qualified to install the smart irrigation controllers. The smart irrigation controllers will only be delivered to the prescreened sites. Each site will be responsible for the installation of smart irrigation controllers.

The contractor will be responsible for ensuring the work is completed within the schedule agreed upon by the site owner. In addition, Customer Participation Agreements that explain the expectation of the contractor and the customer will be required to be completed for each participant before and after the installation of devices. This process will occur throughout the duration of the Program.

In addition, this subtask will entail recycling of all removed devices at designated recycling centers. The porcelain toilets and urinals, metal and plastic showerheads, glass light bulbs, plastic irrigation controllers, and any existing aerators will all be delivered to the appropriate recycling locations.

**Subtask 9.3: Performance Testing and Demobilization**

After completion of all water efficient installations and delivery of smart irrigation controllers at each site, water use will be monitored through water bills. The Contractor

will acquire water bills from either site owners or the LACWWD No. 29 to analyze between 30 percent and 50 percent of the site’s water bills before and after installation to determine the water savings resulting from the Program. The monitoring results will be compiled and analyzed by August 2013 and included in the final report (December 2013) to the State per the grant requirements.

(e) Environmental Compliance/Mitigation/Enhancement

**Task 10: Environmental Compliance/Mitigation/Enhancement**

Not applicable.

(f) Construction Administration

**Task 11: Construction Administration**

Administration activities under this subtask will include general management of the Program by West Basin MWD staff and the selected contractor.

(g) Other

After completion of all water efficient installations and delivery of smart irrigation controllers at each site, water use will be monitored through water bills. The Contractor will acquire water bills from either site owners or the LACWWD No. 29 to analyze between 30 percent and 50 percent of the site’s water bills before and after installation to determine the water savings resulting from the Program.

The Program Monitoring Plan will be completed in August 2011 and will outline the monitoring, assessment and performance measures that will demonstrate that the Program meets its intended goals. The Performance Measures Table and discussion in Attachment 6 provides a preview of the information that will be included in the Program Monitoring Plan.

Assessment and Evaluation Submittals	Date
Monitoring Plan	August 2011

Discussion of Standards and Merits

Not applicable.

# APPENDIX A

## Hahamongna Basin Multi-Use Project – Arroyo Seco Foundation

# ARROYO SECO MASTER PLANS



## Hahamongna Watershed Park Master Plan

Adopted September 29, 2003



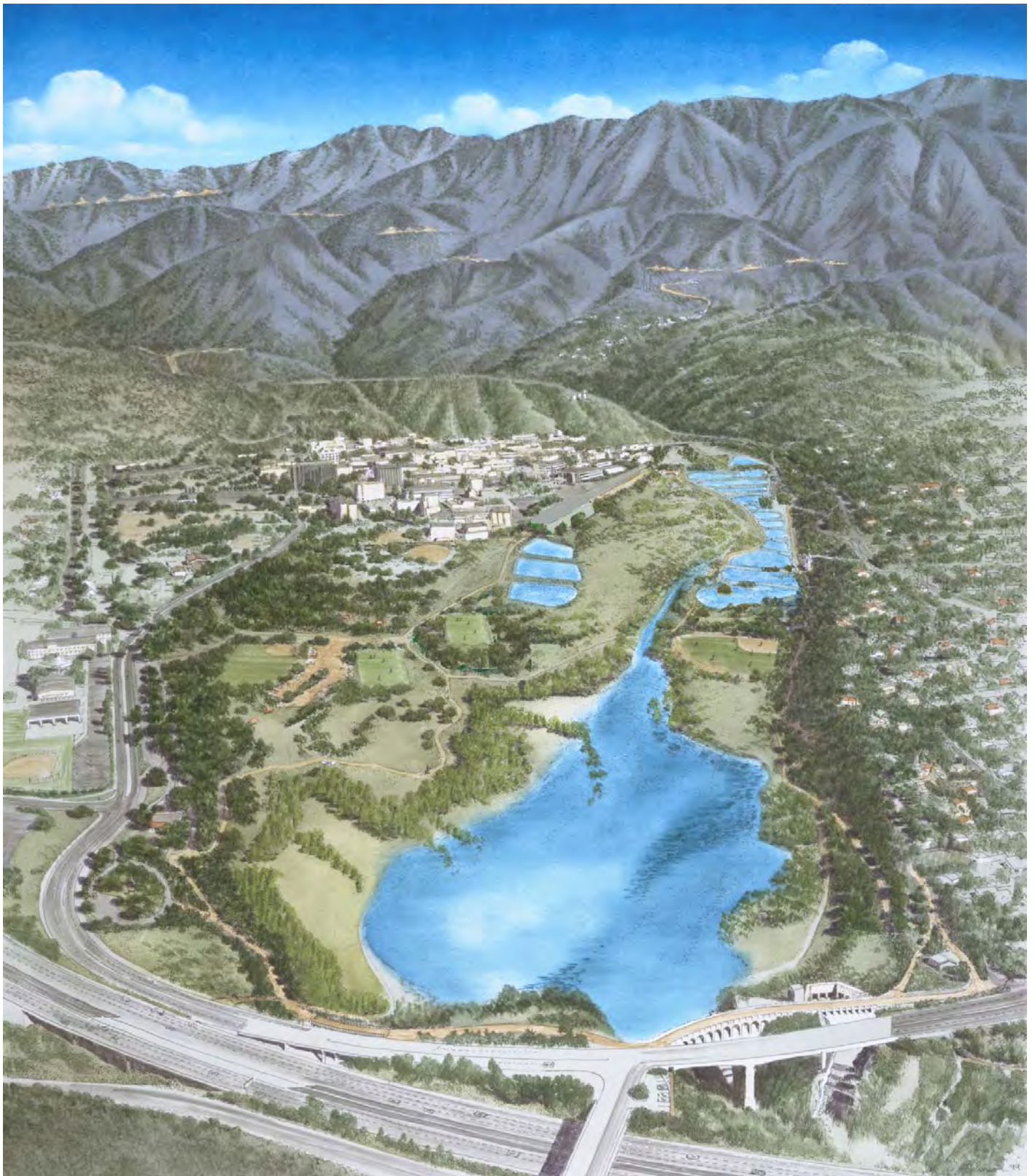
THE CITY OF PASADENA

# **HAHAMONGNA WATERSHED PARK MASTER PLAN**

Adopted: September 29, 2003

The Arroyo Seco Master Plans consist  
of the following:

*Hahamongna Watershed Park Master Plan*  
*Central Arroyo Master Plan*  
*Lower Arroyo Master Plan*  
*Rose Bowl Use Plan*  
*Arroyo Seco Design Guidelines*



*Hahamongna Watershed Park  
During the winter months with storm water held  
Behind Devil's Gate Dam*



## HAHAMONGNA WATERSHED PARK MASTER PLAN

### **Hahamongna Watershed Park Advisory Committee**

Tom Selinske, *Chair*

Gregor Edwards	Jody Gerstner	Frank S. Osen
Vannia de la Cuba	Michael Hurley	Elizabeth Pomeroy
Joe Feinblatt	Mildred Hawkins	Bill Ukropina
Anita Fromholz	Pixie Boyden	Maria Isenberger

### *Past Committee Members*

Denise Alvarado	Pam Garcia	Ramon Ocegüera
Roy Begley	Greg Jones	Tony Santilena
Eugene Brooks	Mark Nelson	Tom Seifert, <i>Former Chair</i>
Jarratt Brunson	Omel Nieves	Dr. Ron Williams
Jeffery Commons	Phil Novelly	Katherine Luna
Mary Freeman	Henreen Nunley	John Evans

### **City of Pasadena**

#### **Department of Public Works Parks and Natural Resources Division**

Martin Pastucha, *Director*

Robert C. Baderian, *Past Assistant to the City Manager*

Julie Gutierrez, *Past Director*

Kathy Woods, *Parks and Natural Resources Administrator*

Rosa Laveaga, *Arroyo Seco Park Supervisor, Project Manager*

John Cox, *Assistant Project Manager*

### **Pasadena Water & Power**

Phyllis Currie, *General Manager*

Rufus Hightower, *Past General Manager*

Brad Boman, *Principal Civil Engineer*

Gary Takara, *Civil Engineer*

Raul Garibay, *Civil Engineer*

### **Master Plan Consultant Team**

Takata Associates, *Landscape Architecture, Lead Consultant*

Philip Williams Associates, *Hydrology & Geomorphology*

Hintz & Balvin, *Community Outreach*

The Natelson Company, Inc., *Finance*

Miralles Associates, *Architecture*

Montgomery Watson, *Civil & Environmental Engineering*

Beth Thielen, *Artist*  
Parsons Engineering Sciences, *Biology*  
Hunt Design Associates, *Graphic Design*

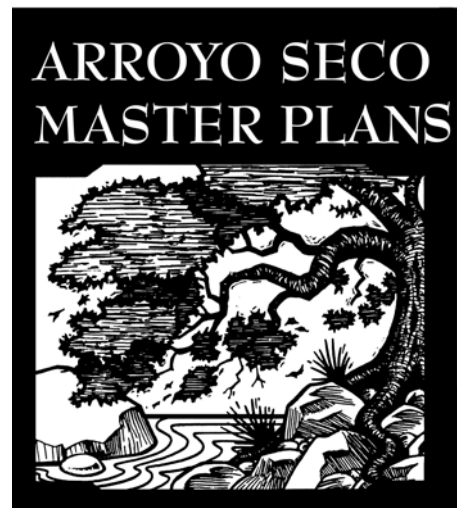
Cover art by: rhandi

## TABLE OF CONTENTS

<i>Section</i>	<i>Page</i>
<b>1.0 INTRODUCTION</b>	<b>1-1</b>
1.1 Regional Context .....	1-1
1.2 Relationship to the General Plan .....	1-5
1.3 Project History .....	1-5
1.4 Recent Planning .....	1-9
1.5 The Guiding Principles for the Arroyo Seco.....	1-11
1.6 Goals & Objectives of the Hahamongna Watershed Park Master Plan.....	1-12
1.7 Report Organization .....	1-16
<b>2.0 EXISTING CONDITIONS, ISSUES &amp; OPPORTUNITIES</b>	<b>2-1</b>
2.1 Ownership, Easements & Jurisdiction .....	2-2
2.2 Zoning & Land Use .....	2-6
2.3 Natural Environment .....	2-6
2.4 Flood Management .....	2-27
2.5 Sediment Delivery & Management .....	2-32
2.6 Water Conservation .....	2-34
2.7 Utilities .....	2-37
2.8 Circulation .....	2-48
2.9 Parking .....	2-54
2.10 Existing Recreation .....	2-56
2.11 Cultural & Archeological Resources .....	2-58
2.12 Summary of Community Outreach .....	2-61
2.13 Signage & Graphics .....	2-66
2.14 Issues & Opportunities .....	2-68
<b>3.0 HAHAMONGNA WATERSHED PARK MASTER PLAN</b>	<b>3-1</b>
3.1 Water Resources Management .....	3-1
3.2 Conceptual Grading Plan .....	3-11
3.3 Habitat Restoration .....	3-16
3.4 Recreation Trails .....	3-42
3.5 West Side & Oak Grove Area Improvements.....	3-49
3.6 East Side Park Improvements .....	3-55
3.7 Circulation & Parking .....	3-56
3.8 Utilities & Infrastructure .....	3-61
3.9 Safety, Security & Accessibility .....	3-68
3.10 Programs .....	3-70
<b>4.0 IMPLEMENTATION OF THE MASTER PLAN</b>	<b>4-1</b>
4.1 Implementation Plan .....	4-1
4.2 Water Resources Commission.....	4-8
4.3 Environmental Requirements.....	4-8

<b>APPENDIX A: Master Plan Concepts and Alternatives</b>	<b>A-1</b>
A.1 Master Plan Concepts .....	A-1
A.2 Disc Golf Alternative .....	A-4
A.3 Parking Structure Alternatives .....	A-6
A.4 Northern Bridge of Perimeter Trail Alternatives .....	A-6
A.5 Windsor/Ventura Entrance Alternatives.....	A-9
A.6 Berkshire Entrance Alternatives .....	A-11
A.7 Dam Keeper’s Quarters... ..	A-11
<b>APPENDIX B: Biological Inventories</b>	<b>B-1</b>
B.1 Vascular Plants Observed at Hahamongna Watershed Park .....	B-1
B.2 Terrestrial Vertebrate Animals of Hahamongna Watershed Park & Nearby Areas With Similar Habitats .....	B-11
B.3 References .....	B-23
<b>APPENDIX C: Plant Community Palettes</b>	<b>C-1</b>
C.1 Coast Live Oak Woodland .....	C-1
C.2 Southern Willow Scrub .....	C-2
C.3 Mule Fat Scrub .....	C-3
C.4 Riversidean Alluvial Fan Sage Scrub .....	C-4
C.5 Coastal Sage & Chapparral Scrub .....	C-5
C.6 Southern Sycamore Riparian Woodland .....	C-7
<b>APPENDIX D: Water Data: Needs &amp; Costs</b>	<b>D-1</b>
<b>APPENDIX E: Master Plan Project Descriptions</b>	<b>E-1</b>
<b>APPENDIX F: Technical Report on Athletic Fields</b>	<b>F-1</b>

# Section 1. Introduction



SECTION 1:

## INTRODUCTION

### 1.1 REGIONAL CONTEXT

The Arroyo Seco is a major tributary of the Los Angeles River. It flows out of the San Gabriel Mountains in the northwest corner of the City of Pasadena, forming a physical link between the San Gabriel Mountains and the Los Angeles River. Much of Pasadena's civic identity is linked to the Arroyo Seco. Numerous museums, cultural institutions, academic and research facilities, and historic sites are associated with the Arroyo Seco; and a series of regional and local parks still preserve its original natural beauty, providing the community with diverse recreational opportunities. See Exhibit 1-1, The Arroyo Seco Environment.

As the waters of the Arroyo Seco flow through the City of Pasadena, the streamcourse passes through three distinct geographical areas: Hahamongna Watershed Park (the southern portion of the upper Arroyo Seco), the Central Arroyo, and the Lower Arroyo. The City of Pasadena is currently developing Master Plans for each area of the Arroyo Seco that lies within the City limits. (See Exhibit 1-2, The Arroyo Seco in Pasadena.) The Pasadena City Council conceptually approved the Draft Lower Arroyo Master Plan (LAMP) in February of 1997. LAMP covers the Arroyo Seco from the southern boundary of the City to the Colorado Street Bridge near the 134 Ventura Freeway. The Central Arroyo Master Plan (CAMP) area extends from the Colorado Street Bridge to the 210 Freeway, just south of the Devil's Gate Dam. The planning process for the Central Arroyo started in 1999 and in January 2000 the Pasadena City Council conceptually approved CAMP. The Draft Hahamongna Watershed Park Master Plan was given conceptual approval in January 1999. The Arroyo Seco Master Plan is comprised of all three Master Plans, plus the Rose Bowl Operating Master Plan and the Arroyo Seco Design Guidelines.

Hahamongna Watershed Park (HWP) is located in Township 1 North, Range 12 West on the Pasadena, California 7.5' USGS quadrangle map. HWP is bounded on the south by the Devil's Gate Dam area and Oak Grove Drive. Oak Grove Drive and the Jet Propulsion Laboratory (JPL) of the California Institute of Technology bound HWP to the west in the City of La Cañada-Flintridge. To the east, HWP is bounded by the residential neighborhoods of Pasadena and Altadena. The study area extends as far north as the JPL Bridge, which connects the east parking lot to the main JPL campus on the west. See Exhibit 1-3, Study Area.

**Exhibit 1-1, The Arroyo Seco Environment**

Source: NorthEast Trees

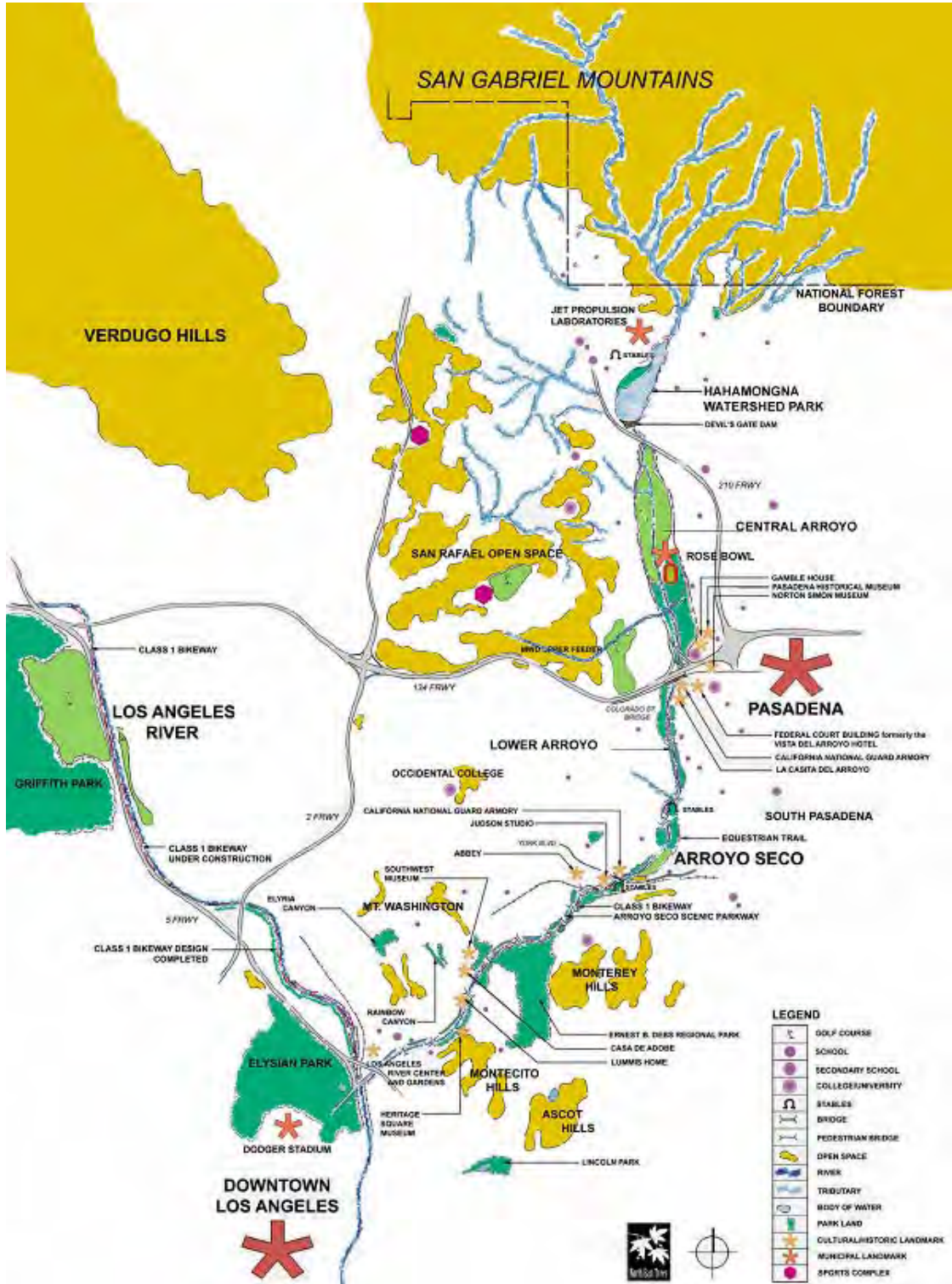
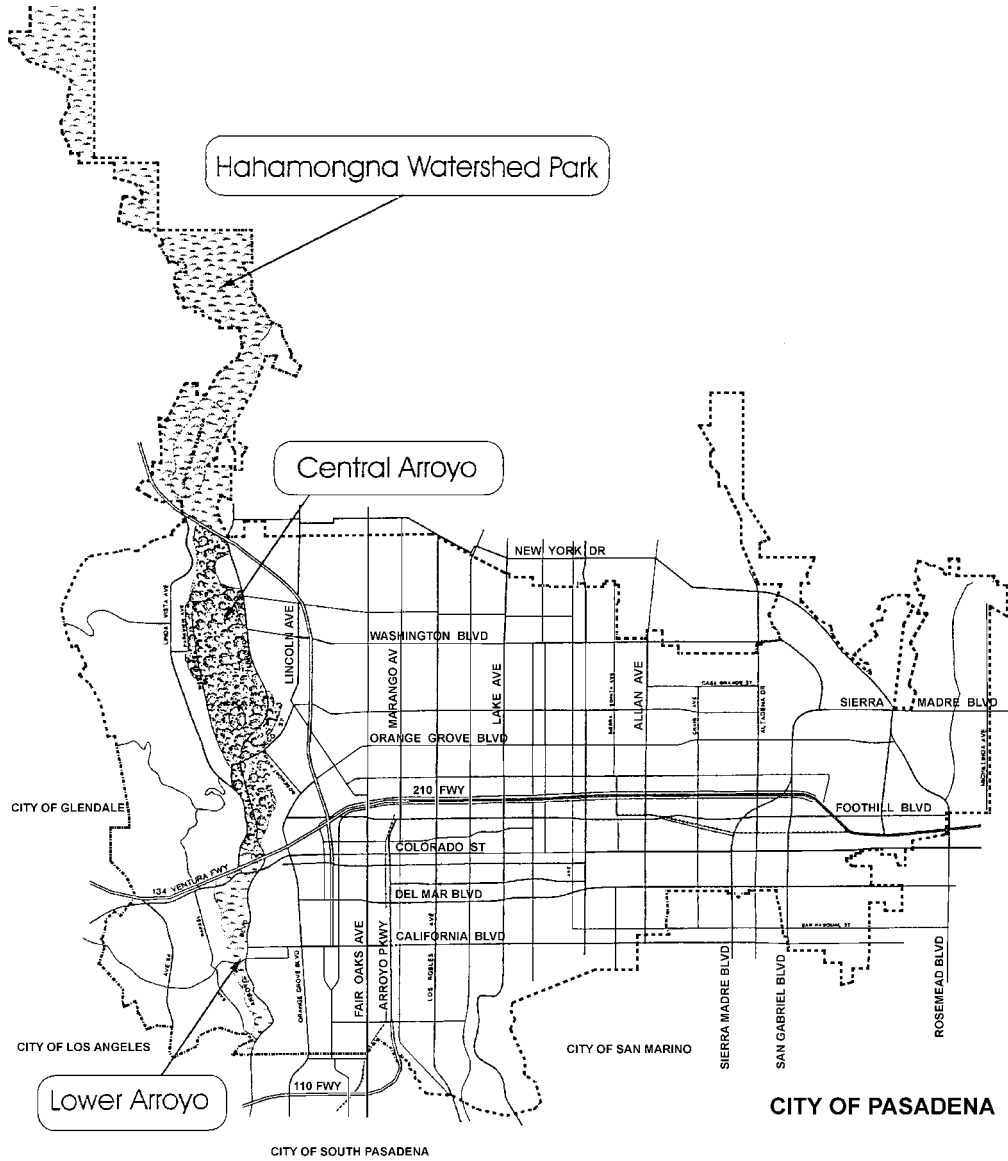
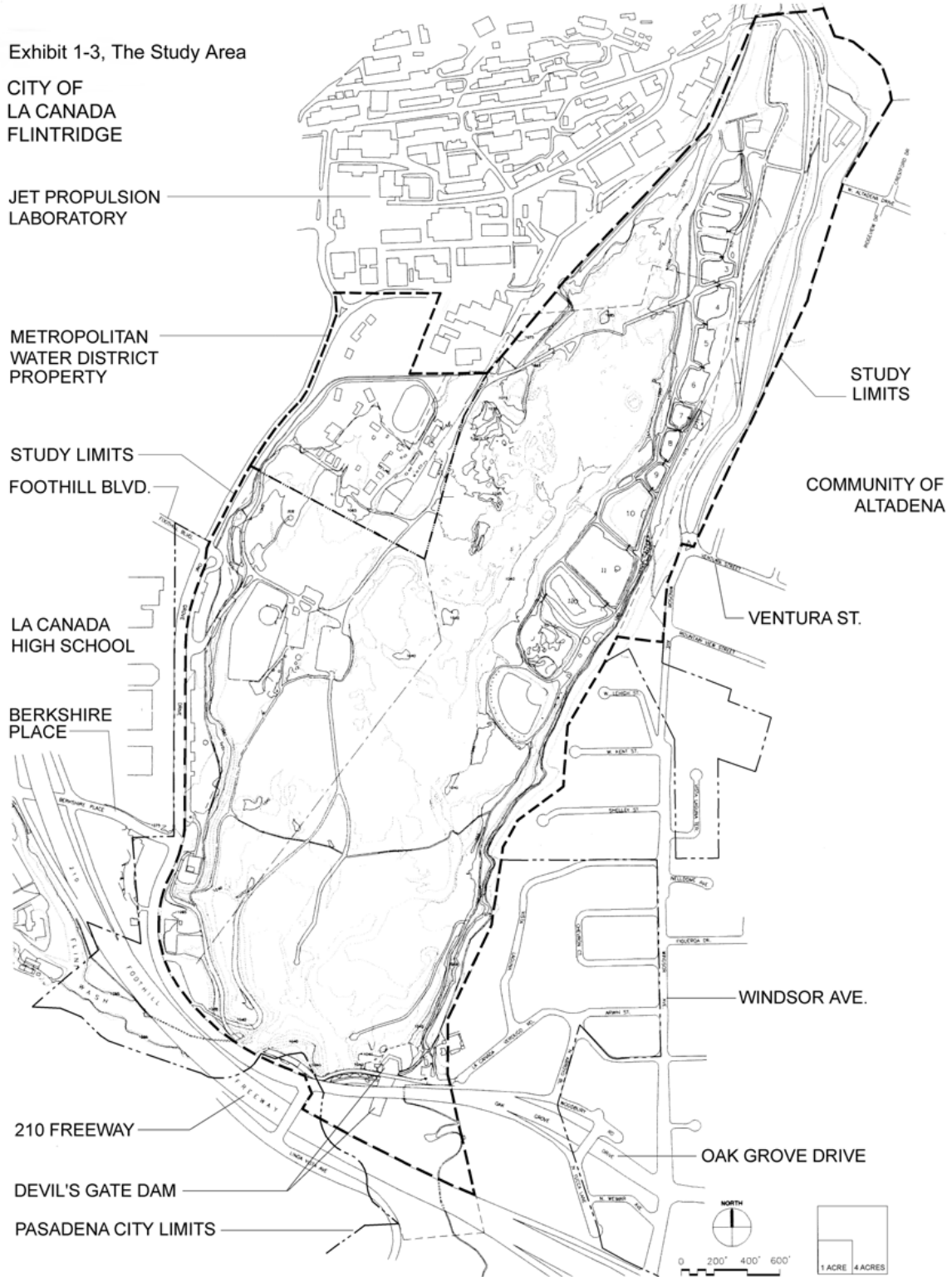


Exhibit 1-2, The Arroyo Seco in Pasadena





**CITY OF PASADENA / ARROYO SECO MASTER PLANS**  
*Hahamongna Watershed Park Master Plan*



In 1920, the Devil’s Gate Dam was constructed at the narrowest section of the Arroyo Seco for flood protection and as a water reservoir to recharge the Raymond Basin Aquifer. Hahamongna Watershed Park (HWP) is approximately 1,300 acres of open space extending up the Arroyo Seco Canyon from the Devil’s Gate Dam. The lower watershed, the 300 acres roughly defined as the flood plain and basin behind the dam, is the focus of this Master Plan.

## **1.2 RELATIONSHIP TO THE GENERAL PLAN**

This Master Plan has been completed in response to the policies and principles set forth in the City of Pasadena’s Comprehensive General Plan. The seven guiding principles of the General Plan are as follows:

1. Growth will be targeted to serve community needs and enhance the quality of life.
2. Change will be harmonized to preserve Pasadena’s historic character and environment.
3. Economic vitality will be promoted to provide jobs, services, revenues, and opportunities.
4. Pasadena will be promoted as a healthy family community.
5. Pasadena will be a city where people can circulate without cars.
6. Pasadena will be promoted as a cultural, scientific, corporate, entertainment, and educational center for the region.
7. Community participation will be a permanent part of achieving a greater city.

Pursuant to the second Guiding Principle, Objective 9, Open Space Preservation and Acquisition specifically identifies the Arroyo Seco for preservation. Policy 9.2 states “continue and complete comprehensive planning for, and implementation of, plans for the Arroyo, including restoration of the natural area of the Lower Arroyo and the development of the Hahamongna Watershed Park Plan.” This Master Plan directly complies with these mandates.

## **1.3 PROJECT HISTORY**

The Hahamongna Watershed Park Master Plan (Master Plan) report is a product of an analysis of existing conditions, a review of pertinent documents, and input from a wide variety of stakeholders and from the community through an extensive outreach program. Additional input was received from City officials and staff. Oversight of the entire project

was the responsibility of the Hahamongna Watershed Park Advisory Committee (HWPAC). The following summarizes the history of the area and the project.

- May 1919 The area north of what was commonly known as Devil’s Gate (and today encompasses the entire study area) was annexed to the City of Pasadena by popular vote. This area was referred to as the “Arroyo Addition.”
- The City of Pasadena entered into a lease agreement with the City of Los Angeles for the construction of Devil’s Gate Dam as well as for the maintenance of a reservoir capable of impounding waters of the Arroyo Seco for the purposes of water conservation and flood control.
- 1920 The County of Los Angeles completed construction of Devil’s Gate Dam at the narrowest portion of the Arroyo Seco for flood control and water conservation.
- Jan. 1931 “Arroyo Addition No. 2”, consisting of approximately 1,000 acres in the upper Arroyo Seco watershed was annexed to the City. Now known simply as the Upper Watershed area, it extends north from the JPL Bridge.
- 1948 The Los Angeles County Department of Public Works (LACDPW) constructs 13.1 acres of spreading grounds and a two-acre overflow basin (No.13) on the northeast edge of the flood basin.
- 1960 On the eastside of the basin, 9.6 acres were leased to the Jet Propulsion Laboratory (JPL) for parking. This resulted in an asphalt lot with 1,132 parking spaces.
- 1968 The City of Pasadena leased the operation and maintenance of Oak Grove Park to the County of Los Angeles.
- Jul. 1970 Approximately 30 acres (on the northwest side of the study area, most within the Los Angeles County easement and a portion of Oak Grove Park) was sold to the Metropolitan Water District (MWD).
- 1971 The County designed and implemented major improvements to Oak Grove Park including roadways, restrooms, maintenance facilities, and other infrastructure.
- 1978 The Division of Safe Operation of Dams (DSOD) imposed an operational restriction on Devil’s Gate Dam and officially declared the dam seismically unsafe. These actions were taken in part due to the 1971 Sylmar earthquake.

- May 1986 The City of Pasadena received a grant from the Santa Monica Mountains Conservancy for a study of the use of the Devil's Gate basin. A formal progress report for the Devil's Gate Multi-Use Project (DGMUP) was presented to the Pasadena City Council in March of 1988.
- Jan. 1987 The Devil's Gate Multi-Use Project Advisory Committee was established to further develop and design this plan. Preliminary economic, biological, and feasibility studies were conducted by outside consultants. The Devil's Gate Project was propelled by Pasadena's Strategic Planning Process, a citizen's planning project, which identified it as one of the most promising projects necessary to make Pasadena a great city in the year 2000 and beyond.
- Mar. 1987 On the west side of the basin, 1.21 acres were leased to JPL for parking. This resulted in an asphalt lot with 214 spaces.
- 1986-91 A series of public participation workshops were held which included exhibits by environmental artists Newton & Helen Harrison.  
  
The Devil's Gate Joint Power Planning Authority, made up of appointees representing Pasadena, La Cañada-Flintridge, Native Americans, and the Santa Monica Mountains Conservancy held a series of public meetings during an 18-month period. It also oversaw the development of the Preliminary Plan by Takata Associates, held three public workshops as part of the planning process, developed governance and funding recommendations, and obtained \$1.86 million in County Parks bond money through the November 1992 election.
- Dec. 1992 The Preliminary Park Plan was received and conceptually approved by the Pasadena City Council.
- 1993 The area was named Hahamongna Watershed Park
- Oct. 1993 The Pasadena City Council established a Creation Task Force to develop the legal structure for the Hahamongna Operating Company (HOC) which would implement, manage, and operate the project. When the transfer of the operation and maintenance responsibility of the Oak Grove Park portion was returned to the City of Pasadena, 500 people attended the dedication of Hahamongna Watershed Park.  
  
The HOC began monthly meetings starting in November of 1994. These meetings were open to the community. A 300-person mailing list was developed for meeting and event notification. During its operation, HOC participated in

numerous presentations and discussions before the Pasadena City Council and Business Enterprise Committee.

- Dec. 1994 All mining operations in the Hahamongna Watershed Park basin ceased. As many as eight mining operations had been in the basin and had been licensed to mine sand and gravel. They had contributed significantly to the dumping of concrete, asphalt, and other materials in the basin.
- Nov. 1995 The rehabilitation of Devil’s Gate Dam was initiated by the County of Los Angeles. HOC staff worked closely with the County and the contractor to minimize neighborhood impacts and begin habitat restoration in the flood basin. This project was completed in January of 1998.
- Jan. 1996 Los Angeles County Department of Public Works (LACDPW) began the seismic strengthening and spillway modification to Devil’s Gate Dam. This project was completed in the winter of 1998.
- Aug. 1996 The Pasadena City Council disbanded the Hahamongna Operating Company Board and transferred all responsibilities of the Hahamongna Watershed Park to the Department of Public Works.
- Nov. 1996 Hahamongna Watershed Park was allocated \$1 million for capital improvements as a result of the 1996 Los Angeles County Park Bond Act.
- Jan. 1997 The Pasadena City Council established the Hahamongna Watershed Park Advisory Committee (HWPAC) which was comprised of all members of the City’s Recreation and Parks Commission with two additional members representing the Northwest Commission and two members representing the Utility Advisory Commission.

In September and October, two public hearings on Hahamongna Watershed Park planning were hosted by the HWPAC to reaffirm the Preliminary Park Plan that had been completed nearly five years previous. More than 100 people representing community members, special interest groups, and regulatory agencies attended these meetings. From these meetings the “Park Elements” for HWP were established as the new framework for the final Master Plan.

- Dec. 1997 The “Park Elements” that reflected consensus towards the development of the Park’s Master Plan were presented to the City Council for review.

- Nov. 1998 The City Council reaffirmed its commitment to reinvestment and acquisition of parkland. The landscape architecture firm of Takata Associates was brought on board to develop the final Master Plan for Hahamongna Watershed Park.
- Dec. 1998 The Pasadena City Council, with the recommendation of the Recreation and Parks Commission, approved a motion to pursue the re-purchase of the 30-acre MWD property.
- 1999 Responsibility for operating and maintaining the 13.1 acres of spreading grounds on the northeast edge of the flood basin was turned over to the City of Pasadena. The City Council authorized the use of the JPL parking lot lease funds for the planning, maintenance, and operation (including security) of Hahamongna Watershed Park.

## **1.4 RECENT PLANNING**

In January of 1997, Pasadena City Council established the Hahamongna Watershed Park Advisory Committee (HWPAC) which was given the charge of overseeing the Master Plan process. Since a number of years had passed since the approval of the Preliminary Park Plan by City Council in December 1992, and the start of the Devil's Gate Dam renovation in 1996, the HWPAC held two community workshops to solicit input on the project. Based on this public input, a list of Park Elements was drafted and adopted by the HWPAC in 1997 as a bridge between the Preliminary Park Plan and the start of the Final Park Master Plan Process. The final Master Plan reflects these elements as they have evolved.

### **PARK ELEMENTS of 1997**

#### **Major Themes**

HWP should be a showcase for:

- Water and natural resources education and utilization
- The preservation of native plants and habitat
- Native American culture
- Passive and active recreation

### **Water Feature**

- Water and water resources are major functions of this area that must be protected and enhanced.
- An analysis of flood potential and sediment buildup in the basin should be pursued.
- Now that Devil's Gate Dam has been rehabilitated, Pasadena should coordinate with Los Angeles County on the possible development of a water feature to maximize water conservation and habitat restoration in HWP.

### **Recreation**

- Design children's play features to emphasize appreciation of the natural environment.
- Provide the opportunity to experience the natural outdoors by providing overnight camping, fishing, and nature study.
- West Athletic Field—upgrade this field in cooperation with youth sports leagues to promote usage.
- Johnson Field—integrate this venue into HWP by coordinating use and scheduling

### **Entrances**

- Create an entrance at Woodbury & Arroyo/Windsor with access to the dam.
- Create secondary entrances at Foothill Boulevard and Windsor/Ventura.
- Prohibit any entrance at La Cañada-Verdugo Road or through residential neighborhoods.

### **Parking**

- Renegotiate the leases for the Jet Propulsion Lab parking lots.
- Ensure adequate parking at multiple sites around the park and at the central parking area on the west-side Oak Grove area.
- Improve the parking area and intersection at Windsor/Ventura to promote safety and neighborhood protection.

### **Structures:**

- Minimize new structures and analyze costs and benefits related to maintenance and public safety.
- All facilities should emphasize the natural setting and use of natural materials.

### **Trails & Linkages:**

- Develop a major perimeter trail around the Hahamongna basin for walkers and joggers.
- Improve equestrian trails through the park and linkages to nearby trails. Provide a linkage for bicyclists outside of the basin to connect to the San Gabriel Mountain trails.
- Trails should be inclusive where possible; multiple uses can coexist.

**Signage & Nomenclature:**

- Tasteful signage should be used for interpretive and educational purposes rather than facilities that are expensive to build and maintain.
- Develop a standard nomenclature for all park signs.

**Design Standards for Entire Arroyo:**

- Consistent design standards for all Arroyo parks and nature areas should be developed that would cover entrances, signage, circulation, architecture, native landscaping, and the use of Arroyo materials and crafts (such as rockwork and tiles) to convey the unique character and beauty of the Arroyo Seco.

## **1.5 THE GUIDING PRINCIPLES FOR THE ARROYO SECO**

The Guiding Principles for the Arroyo Seco were developed to serve as the umbrella under which fall the specific goals and objectives for each of the Arroyo Seco Master Plans. These six Guiding Principles were developed collaboratively between members of the community, members of the Recreation and Parks Commission members of the Hahamongna Watershed Park Advisory Committee, and City staff. These Guiding Principles will also serve as a bridge between the Arroyo Seco Master Plans and the City's General Plan Update. The six principles are:

- To encourage and promote the stewardship and enjoyment of the Arroyo Seco in Pasadena.
- To balance and integrate the interrelated issues of water resources, recreation, natural resource preservation and restoration, and flood management in the Arroyo Seco.
- To provide a safe, secure and accessible Arroyo Seco for public enjoyment.
- To recognize the importance to Pasadena of the history, cultural resources and unique character of the Arroyo Seco, and to conserve and enhance these assets.
- To preserve and acquire open space in or adjacent to the Arroyo Seco.
- To recognize that the Arroyo Seco in Pasadena is comprised of distinct geographical areas that are interconnected by a number of resources and features including, but not limited to, water, habitat, geology, recreation, and culture; and that it is part of a larger watershed.



## **1.6 GOALS & OBJECTIVES OF THE HAHAMONGNA WATERSHED PARK MASTER PLAN**

**The following are the goals and objectives specific to Hahamongna Watershed Park:**

**Goal 1: Preserve, restore, and enhance the native habitats**

*Objectives:*

- Develop a habitat restoration plan for Hahamongna Watershed Park.
- Protect and enhance the Hahamongna Watershed Park wildlife corridor linkages to the upper watershed and the downstream reaches of the Arroyo Seco.
- Restore, enhance, and reestablish the historical native plant communities of the Arroyo Seco.
- Create wetland and aquatic habitats in HWP to increase the biodiversity.
- Locate new facilities in developed or disturbed areas so as to minimize impact to established habitats.
- Enhance the edges of the spreading basins with native trees and other appropriate plantings to blend these facilities with the riparian setting.
- Limit exterior lighting for security, safety, and operational purposes to lessen the impact on nocturnal wildlife.
- Relocate existing overhead power and communications lines to restore the natural environment and provide adequate, safe maintenance access.
- Develop dam maintenance and flood control procedures that promote preservation of native habitats.
- Repair the harmful impacts of the mining operations by regrading the highly disturbed, unnatural topography within the flood plain to allow for the successful planting of native plant communities to establish quality habitat.
- Establish a monitoring program to study runoff and sediment delivery in the flood basin to determine impacts on plant communities in HWP.
- Restore areas where erosion has occurred.

**Goal 2: The Devil’s Gate flood control basin will be managed to provide protection to the developed and natural downstream areas.**

*Objectives:*

- Facilitate the dam and reservoir maintenance operations in a manner that is compatible with the proposed features of the Master Plan and will result in minimal impacts to the surrounding area.
- Maintain or improve the flood capacity behind Devil’s Gate Dam.
- Develop a sediment removal plan that minimizes the impact to the basin and to the surrounding neighborhoods.
- Develop a grading plan that allows habitat restoration and recreational activities to co-exist with flood management and water conservation.
- Develop a multi-agency task force to review maintenance, sediment removal, dam operation, permit, and liability issues on a continual basis after this plan is adopted.
- Develop dam maintenance and flood control procedures that promote water conservation.
- Establish a monitoring program to study runoff and sediment delivery in the flood basin to determine impacts on flood management/water conservation capabilities.

**Goal 3: Conserve and protect the water resources of the Arroyo Seco.**

*Objectives:*

- Maximize groundwater recharge to minimize the amount of water purchased from outside sources.
- Develop a grading plan that allows habitat restoration and recreational activities to coexist with flood management and water conservation.
- Monitor water entering the basin from Flint Wash and various storm drains to ensure safe water quality.
- Develop a program to minimize and provide the means to control the inflow of trash from Flint Wash and various storm drains.
- Develop an alternative to the JPL eastside surface parking area for expanded spreading basins for groundwater recharge.

**Goal 4: Provide diverse recreation opportunities for the Pasadena community.**

*Objectives:*

- Balance the recreation needs for active, passive, and educational activities in HWP.
- Develop a grading plan that allows habitat restoration and recreational activities to co-exist with flood management and water conservation.
- Design children’s play areas to emphasize learning and connections to the natural environment.
- Distribute recreation facilities to allow equal access from the surrounding neighborhoods.
- Maintain the historic recreational uses within HWP.

**Goal 5: Enrich and promote the unique history and culture of Hahamongna Watershed Park.**

*Objectives:*

- Develop HWP as a “living laboratory” for local schools and environmental education programs.
- Preserve and encourage Native American use of HWP as a cultural resource.
- Explore the possibilities of a joint partnership with the U.S. Forest Service and Native Americans in developing an interpretive center and native-plant nursery at HWP.
- Develop design guidelines to ensure aesthetic compatibility and quality construction for any improvements made in HWP.
- Develop passive viewing areas with unique vantage points.
- Create programs that inform and educate the public about the natural processes, the history and the culture of the site.
- Underground or relocate the existing above-ground electrical transmission lines.

**Goal 6: Provide a safe and secure park.**

*Objectives:*

- Provide adequate water and sewage infrastructure where needed throughout HWP.
- Develop guidelines and delegate agency responsibilities for recreation, flood management, and water conservation liabilities.

- Retain and enhance, as needed, the recently reestablished Park Ranger Program to ensure compliance with municipal laws, codes, and regulations. Secure entrances and perimeter of HWP.
- Develop an all-weather perimeter trail/road for emergency and maintenance access as well as for passive recreation.

**Goal 7: Provide adequate circulation, access and parking**

*Objectives:*

- Provide public transportation and nonmotorized access to HWP.
- Provide adequate parking throughout the park for all proposed recreation activities and facilities.
- Maintain and restore the trail links to the Central Arroyo, the surrounding neighborhoods, and the Angeles National Forest.
- Develop separate trail systems for bicycles, hikers, and equestrians wherever possible.
- Comply with ADA (Americans with Disabilities Act) standards for a “natural park.”
- Develop a signage system that provides clear directional information and informs park visitors without being intrusive.
- Improve the east entrance for better access, circulation, and traffic safety.
- Protect residential neighborhoods from the nuisances related to maintenance equipment, traffic, and noise.
- Improve and enhance regional trail connections.
- Continue to assist JPL in meeting its parking needs.

The *Arroyo Seco Master Plans* were developed by the combined efforts of the Planning and Development Department and the Department of Public Works. The implementing department for the completed *Arroyo Seco Master Plans* will be the Department of Public Works. The projects identified in the *Arroyo Seco Master Plans* are described and listed to easily translate to the City’s capital improvement program.

## 1.7 REPORT ORGANIZATION

The HWP Master Plan report is the product of an analysis of existing conditions: A review of previous planning documents; meetings with user groups, neighborhood groups, regulatory agencies, environmental groups and other interested groups; three community workshops; and the guidance and direction given by the Hahamongna Watershed Park Advisory Committee.

The Hahamongna Watershed Park Master Plan report consists of four sections:

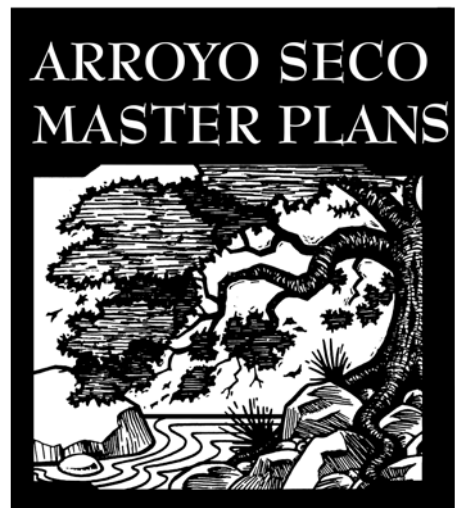
**Section 1 - Introduction:** This first section provides an overview of the Arroyo Seco and Hahamongna Watershed Park; regional context; history; recent planning efforts; goals and objectives; and scope and content of the Master Plan report.

**Section 2 - Existing Conditions, Issues, and Opportunities:** This section identifies HWP's existing natural and man-made setting. A summary of the park's issues and opportunities, based upon the technical analysis and community outreach, are discussed.

**Section 3 - Master Plan:** This section describes the recommended Master Plan elements.

**Section 4 - Implementation:** This section details the phasing of specific Master Plan projects and provides a summary of environmental requirements needed to implement the Master Plan.

## **Section 2. Existing Conditions Issues & Opportunities**



SECTION 2:  
**EXISTING CONDITIONS,  
ISSUES & OPPORTUNITIES**

This section of the Master Plan describes the current physical setting of Hahamongna Watershed Park (HWP) and its environment. Opportunities for improvement and issues that pertain to the various features of the park are reviewed.



***Hahamongna Watershed Park in 1988. Sediment removal and mining operations are evident throughout the flood basin.***

## **2.1 OWNERSHIP, EASEMENTS & JURISDICTION**

### **LAND OWNERSHIP**

Hahamongna Watershed Park (HWP) is located within the City of Pasadena. Other neighboring landowners within the basin include the Metropolitan Water District (MWD) and the Jet Propulsion Laboratory (JPL). The MWD property is within the master plan study area and although JPL is not a part of this park master plan, it is very much within the sphere of influence of HWP. The majority of the JPL campus is located in the City of La Cañada-Flintridge, northwest of HWP. Refer to Exhibit 2-1, Master Plan Area, for the major physical elements located within the study area.

JPL leases the two parking lots within HWP. The 30-acre MWD property was parkland purchased from the City of Pasadena in 1968. The current leaseholders on MWD property include the United States Forest Service (USFS), Los Angeles County Fire Camp 2, and the Rose Bowl Riders who sublet to the Tom Sawyer Camp. The study area also includes a small parcel of land between the mouth of Flint Wash and the dam, including an area southeast of the intersection of Linda Vista Avenue and Oak Grove Drive, which is currently within the La Cañada-Flintridge city limits (Exhibit 1-3, Study Area).

### **EASEMENTS**

#### **Los Angeles County Flood Control Easement**

Los Angeles County Department of Public Works (LACDPW) holds an easement granting the County the right to construct and maintain Devil's Gate Dam, its spillway, bypasses, tunnels and other support facilities as may be necessary or convenient for the construction and maintenance of a reservoir capable of impounding the waters of the Arroyo Seco for purposes of storage and control; and to control such waters as may be necessary in the prevention of damage by flood. The easement applies to land below the 1075' contour as determined from the benches of the United States Geological Survey (USGS) See Exhibit 2-5, Water Elevations later in this section.

Included in this granted easement, the City retained the right to the top of the dam as a public access way and utility corridor across the Arroyo Seco.

#### **Gabrielino Trail Easement**

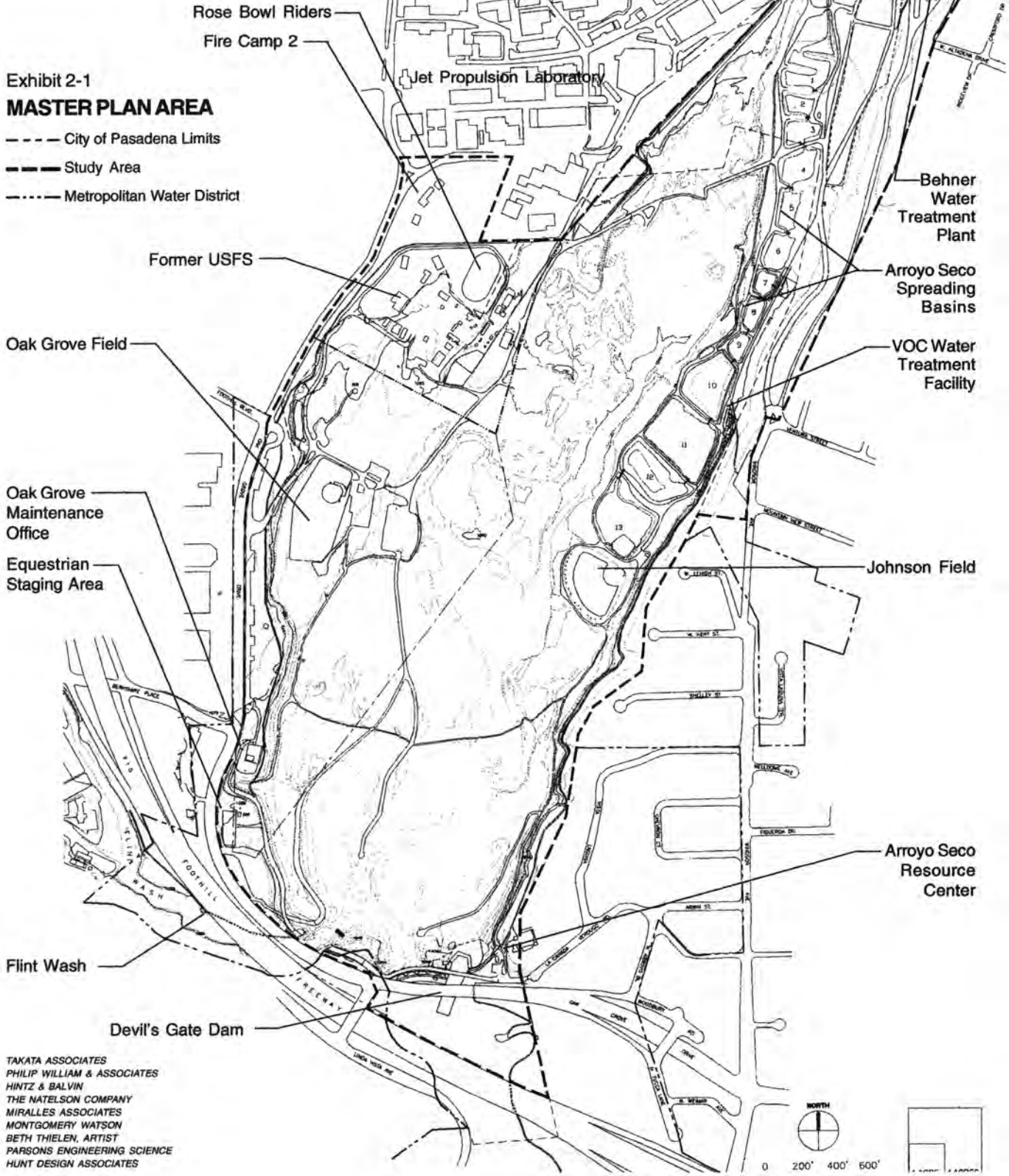
The U.S. Department of Agriculture / U.S. Forest Service (USFS) has been granted an easement by the City of Pasadena for the Gabrielino Trail. The Gabrielino Trail begins at the intersection of Windsor Avenue and Ventura Street and extends north for 1.5 miles into the



City of Pasadena  
**Hahamongna Watershed Park**  
**EXISTING CONDITIONS**

Exhibit 2-1  
**MASTER PLAN AREA**

- City of Pasadena Limits
- Study Area
- Metropolitan Water District



TAKATA ASSOCIATES  
 PHILIP WILLIAM & ASSOCIATES  
 HINTZ & BALVIN  
 THE NATELSON COMPANY  
 MIRALLES ASSOCIATES  
 MONTGOMERY WATSON  
 BETH THIELEN, ARTIST  
 PARSONS ENGINEERING SCIENCE  
 HUNT DESIGN ASSOCIATES

Arroyo Seco Canyon and then enters USFS lands in the Angeles National Forest. Two-thirds of a mile is within the HWP study area. This section of the trail from its beginning at the intersection of Windsor and Ventura, is a multi-use, paved trail and a maintenance/emergency roadway that follows the upper edge of the eastern slope of the basin. Bicyclists, hikers, and equestrians are all allowed access along the trail.

### **Utility Easements**

Southern California Edison and the Southern California Gas Company hold easements for their utility lines. See Section 2.6, Utilities, for further information on these lines. The Pasadena Department of Water and Power holds easements for utility lines within the MWD property.

## **JURISDICTIONS**

### **U.S. Army Corps of Engineers**

The U. S. Army Corps of Engineers has jurisdiction over the area of potentially impounded waters north of the dam (below the 1040.5 elevation). North of this area and above the 1040.5 elevation, the Corps' jurisdictional area includes the intermittent, meandering stream corridors at their high-water mark. Any impact to these areas will require the filing of an Army Corps of Engineers 404 Permit (See Environmental Requirements Technical Report).

### **California Department of Fish and Game (CDF&G)**

The CDF&G has jurisdiction over the entire Master Plan area:

- Should any project within the HWP Master Plan area change the natural flow or bed, channel or bank of any river stream or lake, a Section 1601/1603 Stream Alteration Agreement will be required. This same area of jurisdiction is shared with the Army Corps of Engineers.
- Should any project within the HWP Master Plan area impact any state-listed or endangered species or their habitat, then an MOU (Memorandum of Understanding) under the California Endangered Species Act will be required. Again, this jurisdiction is over the entire Master Plan area.

### **U.S. Fish and Wildlife Service (USFWS)**

If federally listed sensitive species were to be found in areas of the park that are to be disturbed, Federal Endangered Species Act (FESA) Section 7 or 10 consultations with the USFWS could be required.

Following the City Council's conceptual approval of the draft Hahamongna Watershed Park Master Plan, USFWS declared approximately half of HWP critical habitat for the Southwestern Arroyo Toad, a federally listed endangered species. On February 7, 2001, approximately 182,000 acres in California were designated critical habitat for the Arroyo Toad pursuant to the Endangered Species Act of 1973, as amended. The federal ruling designated six miles in Arroyo Seco Creek, from the Long Canyon confluence downstream to the central area of the Hahamongna Basin, as Arroyo Toad critical habitat area. On October 30, 2002, the U.S. District Court for the District of Columbia eliminated the current designation of critical habitats for the Arroyo Toad. The Building Industry Legal Defense Foundation sued the U.S. Interior Department to nullify the habitat designation. Under federal law, the costs to industry and the public of designating critical habitat for an endangered species must be considered, and if they outweigh the benefit to the species, then habitat need not be designated. The U.S. Fish and Wildlife Service (USFWS) has until July 30, 2004, to redo its economic impact analysis and the Interior Department will decide by 2005 which areas of critical habitat to re-designate. See Exhibit 2-3, Terrestrial Natural Plant Communities, for the limits of the critical habitat area and Section 3 for more detailed information on this topic.

Critical habitat identifies specific areas that are essential to the conservation of a listed species with respect to areas within the geographic range occupied by the species. The City of Pasadena completed focused biological protocol surveys of the Southwestern Arroyo Toad in December 2001, and the presence of the Southwestern Arroyo Toad was not indicated. (See *Focused Herpetological Surveys Conducted in Support of the Arroyo Seco Master Plan* by AMEC, December 2001.) A minimum of three consecutive years surveying for the Arroyo Toad is needed to establish their presence. Due to the extreme drought in the winter of 2002, the USFWS advised the City to not complete a survey started in 2002, but instead extend the surveys through 2004.

### **California Regional Water Quality Control Board (CRWQCB)**

Elements of the Park Master Plan may require a Section 401 Water Quality certification under the Clean Water Act if any project results in a discharge into a water body. The CRWQCB also has jurisdiction over the area for any construction project with grading of more than five acres; in this instance a National Pollution Discharge Elimination System (NPDES) program is required.

Either the County of Los Angeles and/or the City of Pasadena will review any alterations to storm drains, septic systems, sewer connections, power, communications systems, or fire suppression requirements.

## **2.2 ZONING & LAND USE**

### **ZONING**

Hahamongna Watershed Park is zoned as open space with the exception of a parcel zoned as Planned Development Districts (PD-16). This parcel, indicated in Exhibit 2-2, Zoning, is leased to JPL for its east parking area.

The adjacent land in Pasadena, Altadena, and La Cañada-Flintridge is zoned residential. All Pasadena areas are zoned RS-4, which permits four residential dwelling units per acre. The JPL parking lots are allowed under a conditional-use permit.

### **LAND USE**

The entire basin is designated open space by the City of Pasadena's General Plan. "Open Space" is defined by the Pasadena General Plan as follows: "This category is for a variety of active and passive public recreational facilities and for City-owned open space facilities. This includes natural open spaces and areas which have been designated as environmentally and ecologically significant. This category also applies to land which is publicly owned, though in some instances public access may be restricted. Most importantly, this designation only applies to lands owned by the City."

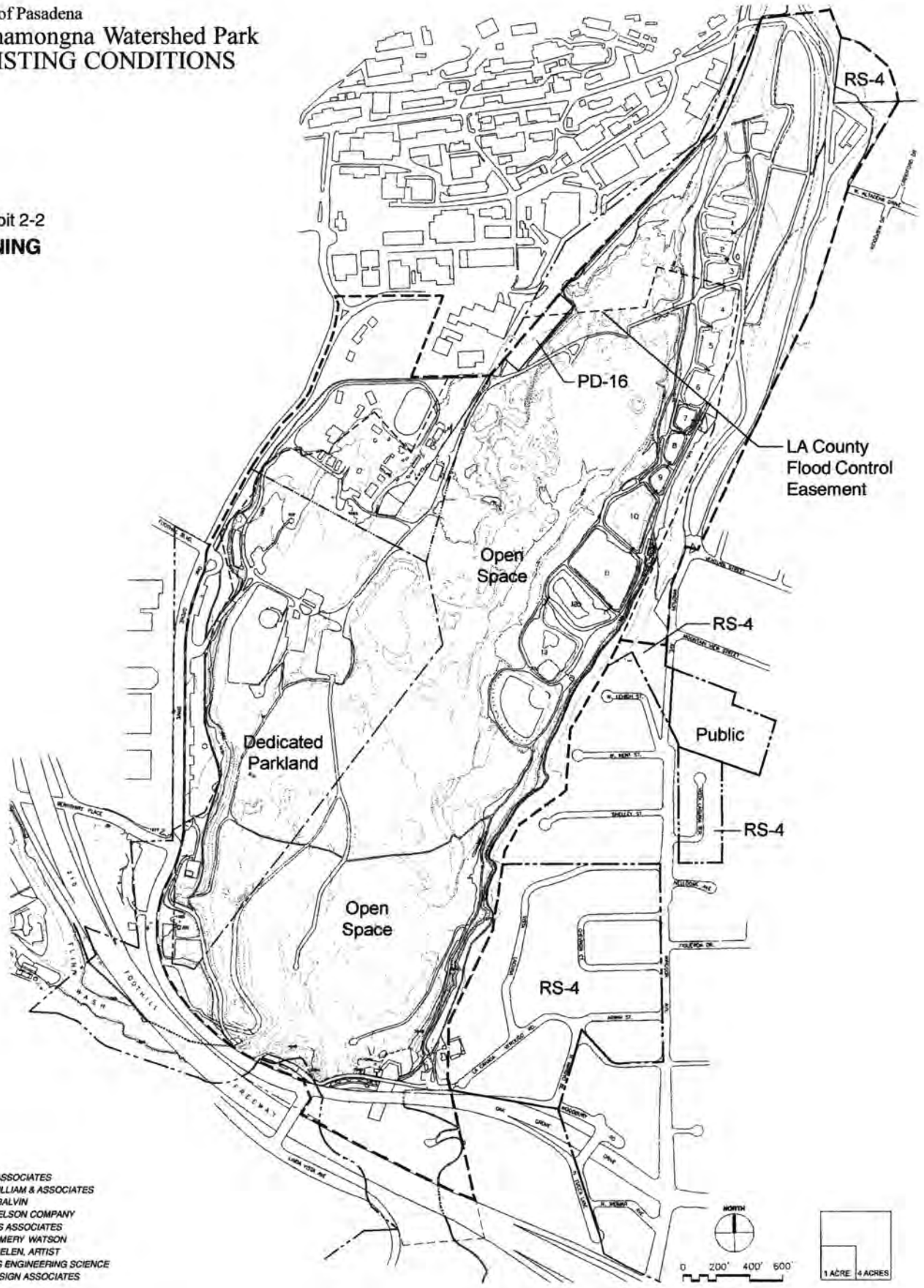
Within the LACDPW Flood Control Easement, Oak Grove was given the designation of parkland. This area was City-dedicated parkland at the time Los Angeles County assumed control of it; and this designation remains. Permitted uses of City-dedicated parkland include active and passive recreation. Under this permit the County first developed the recreation facilities at Oak Grove. Exhibit 2-2, Zoning, illustrates dedicated parkland and waterfund land. Waterfund land is City land maintained and used by the Pasadena Department of Water and Power for water conservation purposes.

## **2.3 THE NATURAL ENVIRONMENT**

Hahamongna Watershed Park (HWP) is located on the south flank or south-facing slopes of the San Gabriel Mountains, in the Arroyo Seco drainage. The San Gabriel Mountains are part of the Transverse Ranges physiographic province of southern California. HWP is situated in what was formerly the Arroyo Seco Canyon. After the dam was constructed, sediments from mountain runoff began to accumulate behind it. This deposition raised the ground surface in the reservoir area and created a broad plain between the canyon walls. Today, this flood sediment plain gently slopes from an upstream elevation of approximately 1100 at the JPL Bridge to a downstream elevation of approximately 986 at the dam face. The former canyon walls slope steeply up from the sediment plain at its edges.

City of Pasadena  
Hahamongna Watershed Park  
EXISTING CONDITIONS

Exhibit 2-2  
ZONING



TAKATA ASSOCIATES  
PHILIP WILLIAM & ASSOCIATES  
HINTZ & BALVIN  
THE NATELSON COMPANY  
MIRALLES ASSOCIATES  
MONTGOMERY WATSON  
BETH THIELEN, ARTIST  
PARSONS ENGINEERING SCIENCE  
HUNT DESIGN ASSOCIATES

The sediment plain itself is quite irregular due to erosion and historical excavation within the reservoir. Throughout the park, shallow ridgecrests, alluvial fan slopes, and riparian areas exist along the floor of the Arroyo Seco drainage. There are a few areas that are level, or have nearly level, terrain.

HWP is located approximately at the boundary between two different precipitation regions—The San Gabriel Mountains and the San Gabriel Valley. These two regions receive an average of 27.5" and 17.6" of rain per year, respectively. Most precipitation occurs during the winter months.

The upper reaches of the Arroyo Seco watershed cover an area of approximately 21.75 square miles and include runoff from Ladybug, Cloudburst, Daisy, Cloby, Little Bear, Bear, Long, Dark, Twin, Brown, Pine, Falls, Aqua, Fern, El Prieto, and Millard Canyons. Between the JPL Bridge and Devil's Gate Dam an additional 10.15 square miles drains directly into the basin primarily through municipal storm water culverts, but also through Flint Wash which drains into the southwest corner of the basin from the City of La Cañada-Flintridge. Three large drainages within and near HWP contain ephemeral or intermittent streams with surface water flow only during extended periods of sustained rain and runoff. Streams within these three drainages originate from the upper elevations of the Arroyo Seco, Millard Canyon, and El Prieto Canyon. All streams provide at least minimal surface flow to the JPL Bridge for a portion of their length throughout the year.

## THE ALLUVIAL FAN ENVIRONMENT

Erosion from the steep slopes of the San Gabriel Mountains is commonly deposited where there is a sudden reduction in streambed slope. There, the deposits form a roughly semi-circular arc referred to as an alluvial fan. HWP is situated at the opening of the Arroyo Seco canyon along the upper portion of an alluvial fan environment.

Alluvial fans are complex and potentially unstable environments, since they occur at the point between sediment supply and the beginning of extensive channel carving. Processes that have caused extensive damage on alluvial fans include lateral scour in existing channels, the formation of new channels by sudden redirection of flow at the top of the alluvial fan, and inundation by debris and sediment in the alluvial fan environment. These types of channel processes are common.

## THE BIOLOGICAL ENVIRONMENT

The plant communities, vegetation, and wildlife of HWP probably would not exist in their current array without man's influence. The altered and unnatural environmental conditions currently found there are due mainly to four factors. These are: (1) the presence of Devil's Gate Dam; (2) the requirements for necessary sediment and debris removal behind the dam; (3) the landscaping practices that have over time significantly changed the appearance and composition of HWP and nearby areas, including the MWD property, from that once familiar to the Native American Gabrielinos; and (4) the encroachment of invasive nonnative plants.

Field inventory surveys of biological resources in HWP and the MWD property were conducted over a twelve-month period. Both vegetation and wildlife resources were surveyed in a floristic and faunistic manner that ensured a complete and thorough identification of all species encountered during the fieldwork. The inventories also included the identification of existing natural plant communities, and landscaped and ruderal (non-native) vegetation in the park. The inventory information about biological resources in HWP helped to define the existing setting and to lay the foundation for the habitat establishment and restoration plan presented in Section 3 of this Master Plan.

More than 300 plant species and nearly 100 animal species were observed during the inventory surveys. These numbers demonstrate a high biodiversity in HWP. See Appendix B.1 & B.2 for an inventory of existing plants and animals observed. Only plants that were actually observed were placed on the plant species inventory list. However, the animal species inventory list includes both recently observed and historical records of animals known from HWP and nearby areas with similar habitats.

The vegetation classification of plant communities in the study area was taken mainly from Holland (1986) and Sawyer and Keeler-Wolf (1995).<sup>1</sup> Plant nomenclature followed that of Hickman (1993), Munz (1959, 1968, and 1974), Sunset (1995), and Bailey (1949). Animal species nomenclature followed that of Jameson and Peters (1968), Burt and Grossenheider (1980), Whitaker (1980), and Ingles (1995) for mammals; Peterson (1990) National Geographic Society (1983), Stokes and Stokes (1996), Udvardy (1988), and Garrett and Dunn (1981) for birds; and Stebbins (1985), and Behler and King (1979) for reptiles.

### **The Existing Setting**

HWP, as it exists today, represents a unique albeit somewhat unnaturally occurring set of plant and animal communities that largely would not be present in their current assemblage without Devil's Gate Dam. However, a mixture of California terrestrial natural plant communities (Holland, 1986), or vegetation series (Sawyer and Keeler-Wolf, 1995), continues to dominate the site.

Throughout the majority of the Arroyo Seco drainage in HWP, riparian scrub habitats and weedy nonnative grassland dominate the floor of the central portion of the drainage, and a portion of the MWD property. Oak woodland and other types of scrub habitats occupy large and small variable areas along the perimeter and/or side walls of the drainage. Segments of the survey sites (i.e., landscaped areas) are widely populated with introduced ornamental shrubs and trees, and exotic, ruderal weedy species of grasses and forbs (herbaceous, non-grass species). Several of these introduced species are from places other than California, and some of the plants are native to other regions and habitats of California but not to those in which HWP is located. Many of the introduced plant species generally used in landscaped settings are not from North America.

---

<sup>1</sup> See Appendix B.3 for a complete reference list of sources cited in this portion of the Master Plan.

Several terrestrial natural plant communities, that form a patchy mosaic of dominant vegetation types, occupy the survey areas. A particular plant community may fill an area forming relatively pure stands of the dominant species, or the site may contain transitional areas that possess elements of several plant communities, or vegetation series and associations, as the case may be.

### **The Plant Communities**

At least six native terrestrial natural plant communities exist in the survey areas with characteristics common to (1) coast live oak woodland, (2) southern willow scrub, (3) mule fat scrub, (4) riversidian alluvial fan sage scrub, (5) sage scrub, and (6) southern sycamore riparian woodland. Holland (1986) describes these communities in a document prepared for the California Native Diversity Database. See Exhibit 2-3, Terrestrial Natural Plant Communities.

One nonnative, terrestrial natural plant community is also present in large and small sections of the master plan study area survey sites, i.e., ruderal vegetation. In areas of the basin that have undergone considerable disturbance by man due to periodic flood management through sediment and debris removal upstream of Devil's Gate Dam, much of the vegetation is comprised of ruderal species. The majority of this ruderal vegetation is comprised of herbaceous forbs rather than nonnative grasses. However, certain small areas are dominated by introduced, nonnative grasses and fewer forbs. Holland (1986) refers to this community as nonnative grassland. Nonnative grassland is widely scattered depending on the history of site disturbance by man (e.g., repeated fires and grading).

It should be noted that a vegetation category termed "streambed riparian vegetation" is also described below. However, this is not a true terrestrial natural plant community or vegetation series. This vegetation category is used in this report to help depict those locales along the Arroyo Seco stream channel where riparian or wetland indicator species may occur in isolated areas and/or numbers of individual species. These sections of the stream channel are sparsely covered with vegetation since it is still in a state of primary succession due to ongoing disturbance by annual flooding and scouring from seasonal rainfall runoff and sediment deposition. These species may be present in greater numbers and distribution in other major terrestrial natural communities of HWP.

Under a more recent classification system of vegetation by Sawyer and Keeler-Wolf (1995), the terrestrial natural plant communities in HWP are more complex. Using Sawyer and Keeler-Wolf's approach, at least twelve different vegetation series are known from the surveyed areas of the Arroyo Seco and canyon slopes and sidewalls along the site boundaries. The vegetation that dominates the HWP survey sites include the following



Sawyer and Keeler-Wolf series: Coast live oak, arroyo willow, black willow, red willow, mule fat, scalebroom, California sagebrush-California buckwheat, California sagebrush-black sage, chamise-black sage, sumac, California sycamore series, and California annual grassland.

Descriptions of the terrestrial natural plant communities (Holland, 1986) and/or the related vegetation series (Sawyer and Keeler-Wolf, 1995) are given below. For ease of reading this report, information about a particular vegetation series is combined with that for the respective terrestrial natural community.

### **Coast Live Oak Woodland**

Coast live oak woodland is typically located on north-facing slopes and shaded ravines in southern California. In HWP and the MWD property, however, it occurs on the more level terrain of old terraces of alluvial fans on the west boundary of the site. There it integrates with southern willow scrub, mule fat scrub, and the ruderal vegetation in the central riparian corridor of the Arroyo Seco. On the drier, west-facing and south-facing sidewalls and slopes of the Arroyo Seco drainage to the east, coast live oak woodland patchily merges with sage scrub and ruderal communities.

The Oak Grove area, on the west side of HWP and portions of the MWD property represent an exquisite, remnant example of the sort of coast live oak woodland that used to cover much of the southern half of the state in the Coast, Transverse, and Peninsular ranges. In many Southern California foothill woodland areas, coast live oak (*Quercus agrifolia* var. *agrifolia*) is often codominant with toyon or Christmas berry (*Heteromeles arbutifolia*), or with southern California black walnut (*Juglans californica* var. *californica*) (Holland, 1986; Quinn, 1990). Sawyer and Keeler-Wolf (1995) refer to coast live oak woodland as coast live oak series.

Generally, coast live oak woodlands inhabit upland areas on slopes that are often very steep or on raised stream banks and terraces. Soils are well drained and are often sandstone or shale-derived but may also be granitic in composition. Coast live oak may be the sole or dominant tree in the canopy. These oaks reach heights as great as 100 feet (30 meters), and the canopy may be continuous, intermittent, or open. Shrubs are usually occasional or common in the understory and the terrestrial surface layer is grassy or absent (Holland, 1986; Sawyer and Keeler-Wolf, 1995).

Commonly associated shrub understory species in this plant community include black sage (*Salvia mellifera*), California blackberry (*Rubus ursinus*), California bay or laurel (*Umbellularia californica*), California redberry (*Rhamnus californica*), California sagebrush (*Artemisia californica*), chamise (*Adenostoma fasciculatum*), laurel sumac (*Malosma laurina*), western poison oak (*Toxicodendron diversilobum*), scrub oak (*Quercus berberidifolia*), toyon (*Heteromeles arbutifolia*), Mexican elderberry (*Sambucus mexicana*), bigleaf maple (*Acer macrophyllum*), box elder (*A. negundo*), hairy ceanothus (*Ceanothus oliganthus*), Engelmann oak (*Quercus engelmannii*), bush monkeyflower (*Mimulus*

City of Pasadena

# Hahamongna Watershed Park EXISTING CONDITIONS

One of the Arroyo Seco Master Plans

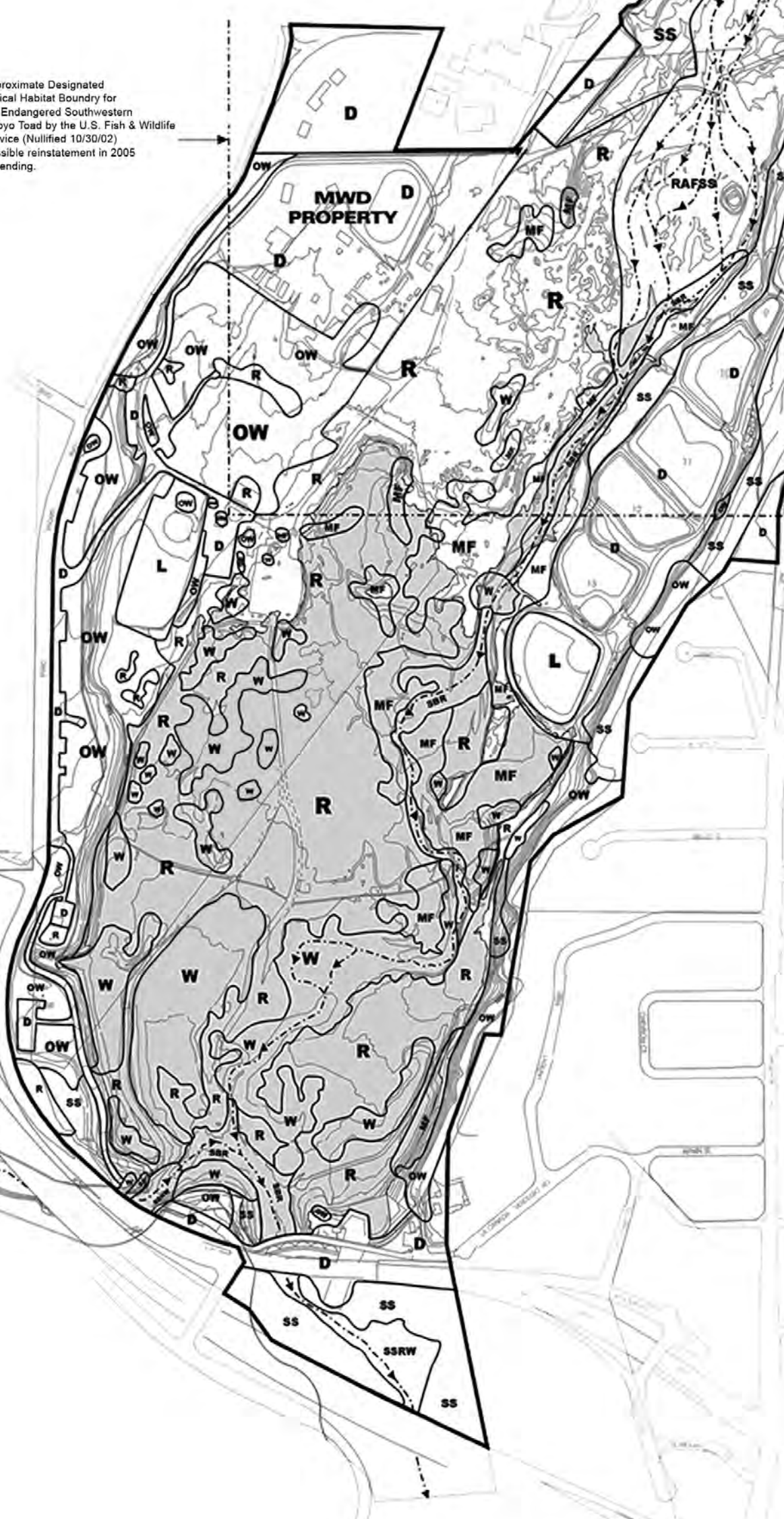
Exhibit 2-3

## TERRESTRIAL NATURAL PLANT COMMUNITIES

Approximate Designated  
Critical Habitat Boundary for  
the Endangered Southwestern  
Arroyo Toad by the U.S. Fish & Wildlife  
Service (Nullified 10/30/02)  
Possible reinstatement in 2005  
is pending.

Approximate Designated  
Critical Habitat Boundary for  
the Endangered Southwestern  
Arroyo Toad by the U.S. Fish & Wildlife  
Service (Nullified 10/30/02)  
Possible reinstatement in 2005  
is pending.

Approximate Designated  
Critical Habitat Boundary for  
the Endangered Southwestern  
Arroyo Toad by the U.S. Fish  
and Wildlife Service (Nullified 10/30/02)  
Possible reinstatement in 2005  
is pending.



AREA DESCRIPTION	ACREAGE
OW - Coast Live Oak Woodland	37.8
W - Southern Willow Scrub	25.5
SS - Sage Scrub	39.9
RAFSS - Riversidian Alluvial Fan Sage Scrub	17.2
MF - Mule Fat	19.5
SSRW - Southern Sycamore Riparian Woodland	2.6
R - Ruderal	75.4
SBR - Streambed Riparian	8.1
WA - Conservation Pool	0
L - Landscaped	5.8
D - Developed Area	76.4
Developed and Landscaped areas not shown within a Plant Community Polygon (trails, dirt roads, picnic & camping sites, disc golf fairways, and pole climbing areas)	10.6
<b>TOTAL PARK ACREAGE *</b>	<b>318.8</b>

\* Does not include areas of Flint Wash and below north side of 210 Freeway (Included in CAMP). Does include MWD property.

Land at Elevation 1040' and Below (may become frequently inundated) "Flood Management Pool" - 92 acres

Intermittent Stream Alignment

Study Area Boundary



0 100 200 300 600  
GRAPHIC SCALE IN FEET

CONTOUR INTERVAL IN FEET MSL  
TOPOGRAPHIC MAP PROVIDED BY TAKATA & ASSOCIATES, 1999

*aurantiacus*), and various currant or gooseberry species (*Ribes spp.*) (Holland, 1986; Sawyer and Keeler-Wolf, 1995). The herbaceous layer component is often continuous and dominated by ripgut (*Bromus diandrus*) and other introduced taxa such as common chickweed (*Stellaria media*) (Holland, 1986).



### ***Coast Live Oak Woodland***

Coast live oak woodland habitat is not considered sensitive by the State. However, southern coast live oak riparian forest, which is not present in the survey areas, is thought to be a sensitive natural community type (CNDDDB, 1996a and f). Forest habitats generally connote a greater geographical distribution and density of trees compared with woodlands along with differences in edaphic and hydrographic regimes. Trees growing close enough that their canopies touch and collectively cover more than 60 percent of the ground characterize forest vegetation. Woodland canopies, in contrast, cover 30 to 60 percent of the ground (Barbour et al., 1993; Pavlik et al., 1991). Sawyer and Keeler-Wolf (1995) note that coast live oak is not listed on the national inventory of wetland plants by Reed (1988). Coast live oak woodland is valuable habitat that supports a wide variety of wildlife species.

### **Southern Willow Scrub**

Southern willow scrub dominates the central riparian corridor of the Arroyo Seco drainage in HWP from just north of the dam, and continues upstream to the north in two large forked patterns to the west and east. On the west side of HWP, it merges with coast live oak woodland and ruderal vegetation. To the east, this terrestrial natural community integrates

with the ruderal vegetation and coastal sage-chaparral scrub. At the north end of its distribution in HWP, it is replaced by mule fat scrub. According to Holland (1986), southern willow scrub is an early seral or successional type that requires repeated flooding to prevent succession to southern cottonwood-sycamore riparian forest. Sawyer and Keeler-Wolf (1995) refer to southern willow scrub as a combination of arroyo willow series, black willow series, and red willow series.



**Hahamongna flood basin June 1998 and Aug 1998, willow scrub along drainage patterns in nonnative grassland**

This terrestrial natural community is comprised of dense, broad-leaved, winter-deciduous riparian thickets dominated by several willow species including arroyo willow (*Salix lasiolepis*), black willow (*S. gooddingii*), red willow (*S. laevigata*), shining willow (*S. lucida* ssp. *lasiandra*), and narrow-leaved willow (*S. exigua*) (Holland, 1986; Sawyer and Keeler-Wolf, 1995). This riparian scrub community occupies sites with loose, sandy or fine gravelly alluvium deposited along intermittent or perennial stream channels during flood flows. Habitats within this community are usually seasonally flooded and the soils are saturated. Southern willow scrub typically occupies sites on floodplains, or on low-gradient depositions along rivers and streams (Sawyer and Keeler-Wolf, 1995). Shrubs and trees in this community may reach 33 to 100 feet (10 to 30 meters) in height, and the canopy may be continuous. Most stands often are so dense that the understory vegetation layer of shrubs is sparse (Holland, 1986). In more slightly open willow scrub sites, the ground layer of grasses and forbs may vary from sparse to abundant (Sawyer and Keeler-Wolf, 1995).



***Southern willow scrub with black walnuts  
and western sycamores***

Also associated with this riparian scrub community are scattered emergent specimens of Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), black cottonwood (*P. balsamifera* ssp. *trichocarpa*), and western sycamore (*Platanus racemosa*). Other commonly associated species in southern willow scrub include mule fat (*Baccharis salicifolia*), coyote brush (*B. pilularis*), mugwort (*Artemisia douglasiana*), Mexican elderberry, and bigleaf maple.

Southern willow scrub is one of two terrestrial natural communities in the Park that are composed of vegetation that typify true wetland habitats. The other community is mule fat scrub. In a manual prepared for COE, National List of Plant Species that Occur in Wetlands: National Summary, Reed (1988), along with the collaborative efforts of many biologists, attempts to define the wetland flora of the United States and to assist in the field identification of wetlands. Plant species that occur in wetlands are those species that have shown an ability to achieve maturity and reproduce in an environment where all the soil, or portions of it, is periodically or continuously saturated. This inundation of the plant species root zone occurs during the growing season (Reed, 1988; COE, 1987).

Recently, CDFG (1997) has found the USFWS wetland definition and classification system (Cowardin et al., 1979) to be the most biologically valid of those definitions and classification systems presently used in California. The USFWS definition employs hydric soils, saturation or inundation, and vegetative criteria, and requires the presence of at least one of these criteria (rather than all three) in order to classify an area as a wetland (CDFG, 1997).

Reed (1988) considers black, red, and narrow-leaved willows to be in the obligate wetland regional indicator category (OBL) for the region of the United States that includes the state of California and the Park. OBL species occur almost always (estimated probability greater than 99 percent) under natural conditions in wetlands. Reed (1988) classifies arroyo willow, Fremont cottonwood, black cottonwood, western sycamore, mule fat, and mugwort in the facultative wetland indicator category (FACW). FACW species usually occur in wetlands (estimated probability 67-99 percent), but are occasionally found in non-wetlands (estimated probability 1-33 percent). Mexican elderberry shows a wetland condition preference under the facultative wetland indicator category (FAC). FAC species have a midrange wetland condition preference with an estimated probability of 34-66 percent occurrence of being found in wetlands or non-wetlands (Reed, 1988).

Southern willow scrub is comprised of a variety of wetland indicator species that offer a relatively wide range of preference and tolerance to fluctuating hydrologic regimes. In the Park, this community is abundant in the central riparian area of the Arroyo Seco, provides valuable cover for wildlife potentially including several rare animal species, and offers several opportunities for habitat restoration efforts as outlined in Section 3, Recommendations. Riparian and other wetland habitats, with their characteristic and unique species, are rare and declining in Southern California, and much of the state and nation, due to urban development and increased water use (Bowler, 1990; Faber, et al.; 1989; Latting, 1976).

HWP has several dominant and other less common native plant species that occupy its riparian habitats. As such, HWP contains a valuable source of wetland or riparian genetic information or gene pool for related species in other riparian habitats. These habitats also may contain isolated or disjunct populations that are geographically separated from the main population centers of a given riparian species (Latting, 1976; Faber, et al.; 1989; Conrad, 1987; Barbour and Major, 1988; Bowler, 1990). Although southern willow scrub is not considered sensitive by state regulatory agencies, it does meet at least one of three criteria needed to be defined as a wetland under the proposed acceptance by CDFG (1997) of the USFWS (1997). That criterion for a valid wetland definition is the presence of hydric vegetation (i.e., the above willow species) along the intermittent stream channel in HWP.

Wetlands and other riparian habitats are on the decline around the nation and are considered sensitive vegetation types (Faber et al., 1989) that warrant considerable regulatory agency oversight regarding their development (Federal Register, 1980 and 1982; COE, 1994; CDFG, 1997). Southern willow scrub in HWP is comprised of well-established, native wetland habitats that are important for wildlife. As such, it is worthy of applied conservation efforts during Park maintenance to the extent feasible. The Los Angeles County Department of Public Works (LACDPW) and the City are the two primary agencies responsible for the acquisition of the proper regulatory agency permits for the periodic removal of sediment and debris behind the dam. Of all the terrestrial natural communities found in HWP, southern willow scrub is the principal community that will be most affected by the ongoing maintenance requirements in HWP and yet, it offers opportunities for innovative habitat restoration planning. The present configuration of southern willow scrub along the Arroyo

Seco drainage has well-developed mature trees stands.

Southern willow scrub has established itself throughout the flood plain, from the JPL bridge to the dam in areas that have been highly disturbed by unnatural occurrences, such as dumping, mining, and flow diversion. Since 1971, when Devil's Gate dam was declared seismically unsafe to hold water, riparian corridors have established themselves in this flood-control, water conservation pool area. As a result of the rehabilitation of the dam in 1998, the holding capacity of this area is of critical concern for flood and sediment management as well as the management of water conservation; therefore, the plan proposes to create a larger conservation pool. The topography of this area has changed due to inflow of sediment as well as past mining and dumping operations

### **Mule Fat Scrub**

Mule fat scrub often occurs as relatively pure stands and is common in areas along the riparian stream corridor of the Arroyo Seco drainage in HWP just north of the southern willow scrub stands. This community continues its distribution north, bordering the ephemeral stream channel and extends into areas of riversidial alluvial fan sage scrub, coastal sage-chaparral scrub, and nonnative grassland near the spreading basins and Johnson Field. Holland (1986) notes that mule fat scrub is an early seral community that is maintained by frequent flooding. When such flooding conditions are absent, Holland (1986) believes that mule fat scrub stands would succeed to cottonwood- or sycamore-dominated riparian forests or woodland. Sawyer and Keeler-Wolf (1995) refer to mule fat scrub as mule fat series.

Mule fat scrub is typically characterized by depauperate, tall, herbaceous riparian scrub species dominated by *Baccharis salicifolia*. Mule fat is usually the sole or dominant shrub in the canopy along with narrow-leaved willow, and the plants may attain heights of 13 feet (four meters). The canopy often is continuous and the ground layer of vegetation is sparse (Sawyer and Keeler-Wolf, 1995). This terrestrial natural community is located along intermittent stream channels with fairly coarse substrate and moderate depth to the water table (Holland, 1986). Habitats within this community are also seasonally flooded and the ground is saturated (Sawyer and Keeler-Wolf, 1995). Other commonly associated species in mule fat scrub include arroyo willow, narrow-leaved willow, hoary nettle (*Urtica dioica* ssp. *holosericea*), Mexican elderberry, and sedges (*Carex* spp.).



***Mule fat scrub plant community adjacent to stream channel***

The heavy El Niño rains of 1998 caused prolonged flooded conditions behind the dam and killed many of the Mexican elderberry specimens in the mule fat scrub stands. Mule fat individuals were also adversely affected by the high water, but they appear to have survived from re-sprouting root systems. Mule fat is a FACW species with an estimated probability of 67-99 percent of occurring in wetlands (Reed, 1988). It has a higher preference for wetland conditions than does Mexican elderberry. The die-back of Mexican elderberry, a FAC wetland indicator category species with a 34-66 percent chance of occurring in wetlands (Reed, 1988), is indicative of its midrange wetland condition preference where the sustained floodwaters were beyond tolerance levels for this species.

**Riversidean Alluvial Fan Sage Scrub**

Riversidian alluvial fan sage scrub is found on old and younger alluvial fan terraces along the Arroyo Seco drainage, and it borders the western edges of most of the spreading basins in HWP. The existing spreading basins are largely situated upon what were originally riversidian alluvial fan sage scrub habitats. This community developed from the flow of water and sediment deposition during flooding as the Arroyo Seco stream emptied into the HWP flood basin from the narrow canyon mouth of the Arroyo Seco north of the JPL Bridge. Today, only remnants of this community remain in HWP. Historically, without the presence of the dam, alluvial fan terraces would have spread across most of the terrain that is now parkland, and gradually merged with upland areas covered with coast live oak woodland or



coastal sage-chaparral scrub. In this scenario without the dam, an ephemeral stream and channel would still be found in the basin along with riparian corridor communities of southern willow scrub and mule fat scrub beside the stream.

Holland (1986) states that this terrestrial natural community is very xeric (dry) with coarse soils and some finer soils that are slow to release stored moisture. Sawyer and Keeler-Wolf (1995) refer to riversidial alluvial fan sage scrub as scalebroom series, and note that it is located on upland sites that are rarely flooded with low-gradient deposits along ephemeral or perennial streams. Shrubs in this vegetation type are generally low in height at five feet (one and one-half meters) with the canopy continuous or intermittent, and the ground layer of vegetation variable with grasses and forbs (Sawyer and Keeler-Wolf, 1995).



**Riversidial Alluvial Fan Scrub at the northern end of Hahamongna Watershed Park**

Dominant species in riversidial alluvial fan sage scrub include scalebroom (*Lepidospartum squamatum*), California sagebrush, California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), black sage, white sage (*Salvia apiana*), brome grasses (*Bromus* spp.), western sycamore, Fremont cottonwood, southern California black walnut, brittlebush (*Encelia farinosa*), chaparral yucca (*Yucca whipplei*), chaparral mallow (*Malacothamnus fasciculatus*), hairy yerba santa (*Eriodictyon crassifolium*), laurel sumac, lemonadeberry (*Rhus integrifolia*), sugar bush (*R. ovata*) Mexican elderberry, mule fat, poison oak, birch-leaf mountain-mahogany (*Cercocarpus betuloides* var. *betuloides*), prickly pears (*Opuntia* spp.), deerweed (*Lotus scoparius*), bladderpod (*Isomeris arborea*), and four-wing saltbush (*Atriplex canescens*) (Holland, 1986; Sawyer and Keeler-Wolf, 1995).

Riversidian alluvial fan sage scrub is considered a sensitive habitat by California state regulatory agencies due to declining habitats lost to urban development and flood control. This sensitive terrestrial natural plant community is not previously recorded in the CNDDDB (1999a and f) information for the USGS Pasadena quadrangle in which HWP is located. Therefore, this community warrants consideration for the implementation of conservation efforts to help sustain it, as much as possible, with the ongoing maintenance needs of the City and other Park environmental stakeholders. Since the riversidian alluvial fan sage scrub community in HWP is very small and is only a remnant of what used to exist there, protection is a valid endeavor.

### **Sage Scrub**

At HWP the ranges of two bio-geographically distinct terrestrial natural plant communities overlap with characteristics common to Venturan coastal sage scrub and Riversidian coastal sage scrub (Westman, 1983; O'Leary, 1990). For convenience of description, these two terrestrial natural plant communities are combined in this report simply as "sage scrub" that also gradually merges in several places with elements of mixed chamise/ceanothus chaparral.

Sage scrub is found on slopes and sidewalls of the Arroyo Seco drainage, particularly on west-facing slopes along the east boundary of HWP. This terrestrial natural community forms patchy mosaics well removed from the drainage bottom that are dominated by southern willow scrub, mule fat scrub, riversidian alluvial fan sage scrub, and nonnative grassland. It also blends as indistinct borders with coast live oak woodland and ruderal/landscaped vegetation in developed areas of the Park. Elements of sage scrub exist in riversidian alluvial fan sage scrub in the Park, and in transitional areas of coast live oak woodland. Sage scrub probably was more widely distributed in the Park before the implementation of maintenance efforts.

Sage scrub is a mixture of fire-adapted, sclerophyllous (hard-leaved), woody chaparral species and drought-deciduous sage scrub species. This plant community apparently is post-fire successional that is found on dry, rocky, often steep, south-facing slopes and ridges with shallow or poorly differentiated soils (Holland, 1986). Often these soils are derived from rock detritus and soil accumulated at the foot of a slope (Sawyer and Keeler-Wolf, 1995). It may also be located on clay-rich soils that are slow to release stored water that favor the proliferation of California sagebrush over chamise (Holland, 1986). Generally, shrubs in sage scrub are less than six to ten feet (two to three meters) in height, although in some areas with associated emergent shrub or tree species the plants may attain heights up to 13 feet (four meters). The canopy is continuous or intermittent, and the ground layer is sparse or absent (Sawyer and Keeler-Wolf, 1995). Understory cover of forbs and grasses is often variable depending upon the fire history of a particular site. Sage scrub communities are sometimes referred to as "soft chaparral" by various botanists and plant ecologists (Mooney, 1988; Keeley and Keeley, 1988; O'Leary, 1990). Bare ground occurs frequently underneath and between shrubs. Growth season for this community generally happens following the start of winter rains with growth peaking in late winter and spring. Flowering period for most species is during spring but some species continue into summer (Holland, 1986; O'Leary,

1990). Under the Sawyer and Keeler-Wolf (1995) vegetation series classification of this sage scrub community mingling with elements of chamise/ceanothus chaparral, the Park's sage scrub community is a mixed combination of California sagebrush-California buckwheat series, California sagebrush-black sage series, chamise-black sage series, and sumac series. Distribution of dominant shrubs often forms a patchy mosaic pattern where areas may be populated by a single species or where sites may be covered by a mixed composition of different species.



***Coastal sage chaparral scrub on canyon walls***

Dominant species in this terrestrial natural community include California sagebrush, chamise, California buckwheat, black sage, white sage, laurel sumac, lemonadeberry, sugar bush, deerweed, chaparral yucca, bush monkeyflower, hoaryleaf ceanothus (*Ceanothus crassifolius*), other ceanothus or California-lilac species (*Ceanothus* spp.), scrub oak, birch-leaf mountain-mahogany, poison oak, holly-leaf cherry (*Prunus ilicifolia* ssp. *ilicifolia*), southern California walnut, California encelia, Mexican elderberry, toyon, Brazilian pepper (*Schinus terebinthifolius*), and Peruvian pepper (*S. molle*) (Holland, 1986; Sawyer and Keeler-Wolf, 1995).

### **Southern Sycamore Riparian Woodland**

Southern sycamore riparian woodland is very limited in its distribution within HWP boundaries. Currently, it is found bordering the natural stream channel just south of Devil's Gate Dam and the 210 Freeway, and this woodland continues southward (prior to the concrete stream channel) towards the Central Arroyo Seco and Brookside Golf Course. Here, surface flows of water that run past the dam help sustain the hydrologic regime needed by western sycamore trees. Holland (1986) actually refers to this terrestrial natural community as southern sycamore-alder riparian woodland. For purposes of use in this

report, only the name “southern sycamore riparian woodland” is used since (white) alder is largely absent but western sycamore is present in naturally occurring habitats of the Park’s southern reaches below the dam. Holland’s vegetation classification system has no “southern sycamore riparian woodland,” but this report utilizes the descriptions given to southern sycamore-alder riparian woodland. Western sycamore is frequently utilized as a landscape tree on properties in surrounding residential and other urban areas. There are other sites within HWP to the north where western sycamore trees have been used in landscape situations, but these trees do not constitute sycamore riparian woodland.

Southern sycamore-alder riparian woodland is a tall [ $<115$  feet (35 meters)], open, broad-leaved, winter-deciduous woodland dominated by western sycamore (*Platanus racemosa*), and by white alder (*Alnus rhombifolia*) (Holland, 1986) where more perennial water flows exist. These riparian tree stands rarely form closed canopy forests and often exist as trees scattered in shrubby thickets of sclerophyllous (hard-leaved) and deciduous species. Species of vines and brambles such as western poison oak, California blackberry (Holland, 1986), and Himalayan blackberry (*Rubus discolor*) (Sawyer and Keeler-Wolf, 1995) may tend to dominate the understory layer. Other commonly associated species often include arroyo willow, black willow, red willow, California bay, coast live oak, Fremont cottonwood, mule fat, Mexican elderberry, ash (*Fraxinus* spp.) big-leaf maple, mugwort, hoary nettle, wild oats (*Avena* spp.), brome grass (*Bromus* spp.), and smilo grass (*Piptatherum miliaceum*) (Holland, 1986; Sawyer and Keeler-Wolf, 1995).

Factors that favor the formation of sycamore-alder riparian woodlands include very rocky streambeds that are subject to seasonal high-intensity flooding such as those that occur in the Arroyo Seco. It is important to note that white alder increases in abundance on more perennial streams, while western sycamore prefers more ephemeral or intermittent stream conditions. The Arroyo Seco is typically an ephemeral stream rather than a perennial stream; hence the given Spanish name “arroyo seco” meaning “dry wash.” Sawyer and Keeler-Wolf (1995) refer to southern sycamore-alder riparian woodland as two different series, i.e., white alder series and California sycamore series. White alder series inhabit soils that are intermittently flooded and saturated with fresh water, while California sycamore series prefer soils that are permanently saturated at depth.

California (western) sycamore series is found in both wetland and upland site conditions. Sycamores occur as the sole or dominant species in the canopy as widely spaced trees. In wetlands, this series inhabits soils that are permanently saturated at depth with fresh water supplies. This tree species occupies riparian corridors; braided, depositional channels of intermittent streams; gullies; springs; seeps; stream and river banks; and terraces adjacent to floodplains that are subject to high-intensity flooding. Sycamores prefer substrates that are usually composed of alluvial soils with open cobbly and rocky conditions. On upland sites, sycamores are located on slopes that are commonly rocky (Sawyer and Keeler-Wolf, 1995). Reed (1988), in his national list of wetland species, places this sycamore as a facultative wetland indicator (FACW) species, i.e., a species that has a 67-99 percent chance of occurring in wetland conditions. At the survey areas, western sycamore is more abundant while white alder is very sparse immediately downstream of dam. Scattered thickets of

arroyo willow and mule fat are also present in the natural drainage channel below the dam and south into the Central Arroyo Seco prior to the concrete channel at the north end of the golf course.

The State considers southern sycamore-alder woodland to be a sensitive habitat (CNDDDB, 1999a and f).

### **Ruderal**

Ruderal vegetation dominates the central portion of the master plan study area along the drainage from west to east, and north to south within this central portion. Ruderal or weedy mustard and sunflower family members rather than grasses have dominated this community in recent years in the central riparian and graded areas of the basin. Other areas in HWP, such as coast live oak woodland and coastal sage-chaparral scrub, do have smaller, patchy mosaics of actual nonnative grassland and/or other ruderal vegetation scattered within their community boundaries. This nonnative terrestrial natural community, which has very little value to most native wildlife species, offers numerous opportunities for major habitat restoration planning efforts to help eliminate it from HWP. The eradication of ruderal vegetation species will be difficult to achieve since it is composed of introduced, invasive, and very aggressive species that are usually annual grasses and forbs. Weedy species are adapted to, and can thrive on, site disturbance conditions such as grading, clearing, burning, and even flooding that may exclude more desired native plants.



***Ruderal vegetation***

Ruderal vegetation (and/or nonnative grassland) may occur on fine-textured, usually clay soils that are moist or even waterlogged during the winter rainy season and become very dry during the summer and fall (Holland, 1986). Sites favored by this plant community are found on gentle slopes or on more level terrain where finer soil particles have a chance to collect

favoring the growth of ruderal annual species of grasses and showy-flowered forbs or wildflowers. At the biological inventory survey sites, ruderal vegetation occurs as small to large, patchy mosaics on drainage and side slopes, and it widely covers extensive areas in the central portion of the Arroyo Seco drainage. Sites that are occupied by ruderal vegetation and/or nonnative grassland are related to the fire history and/or mechanical disturbance from grading or clearing of a particular area. Areas with frequent, repeat occurrences of fire tend to lose the dominant shrub community and allow ruderal vegetation and/or nonnative grassland to become established. Once established, this plant community is sustained by repeated fire occurrences to the exclusion of shrubby species. Ruderal vegetation and/or nonnative grassland may occur on virtually any direction or aspect of level or sloping terrain where fire or conditions such as mechanical grading are present.

Nonnative, introduced, annual grass and forb species tend to dominate the understory or ground layer in this terrestrial natural community. These grasses and some forbs may reach heights as great as three feet (one meter) depending on the amount of rainfall received. They germinate with late-fall and winter rains; and grow, flower, and set seed during winter through spring months (Holland, 1986). Holland (1986) notes that with a few exceptions these weedy plant species are dead but persist as seeds through the summer and fall dry seasons. Shrub and tree species are usually absent or are very sparse, and the ground layer of vegetation is continuous or open (Sawyer and Keeler-Wolf, 1995).

Commonly observed species in ruderal vegetation and/or nonnative grassland community include slender wild oats, common wild oats, ripgut, red brome (*Bromus madritensis* ssp. *rubens*), soft chess (*B. hordeaceus*), black mustard (*Brassica nigra*), turnip or field mustard (*B. rapa*), shortpod mustard (*Hirschfeldia incana*), red-stem filaree (*Erodium cicutarium*), filaree (*E. botrys*), California poppy (*Eschscholzia californica*), gilies (*Gilia* spp.), tarweed (*Hemizonia fasciculata*), Italian ryegrass (*Lolium multiflorum*), lupines (*Lupinus* spp.), peppergrass (*Lepidium nitidum*), burclover (*Medicago polymorpha*), phacelias (*Phacelia* spp.), Mediterranean grass (*Schismus barbatus*), star-thistles (*Centaurea* spp.), and vulpias or annual fescues (*Vulpia* spp.) (Holland, 1986; Sawyer and Keeler-Wolf, 1995). During the inventory surveys, large areas of the nonnative grassland community covered with weedy annual bur-sage (*Ambrosia acanthicarpa*), horseweed (*Conyza canadensis*), and plantain (*Plantago ovata*) were observed.

Ruderal plants in the master plan study area are not only terrestrial but also are aquatic and are found immediately along the stream channel, and in and around the spreading ponds. Many of these aquatic ruderal species may be seen only when water is present and then wither and die back to surviving root systems if perennial, and/or may persist as seeds if they are annuals or perennials.

### **Streambed Riparian Vegetation**

As noted above, an additional vegetation category termed “streambed riparian vegetation” is also described. However, it is not a true terrestrial natural plant community or vegetation series. This vegetation category is used in this report to help depict those locales along the

Arroyo Seco stream channel within HWP where riparian or wetland indicator species may occur in isolated areas and/or numbers of individual species.

These species may be present in greater numbers and distribution in other major terrestrial natural communities of HWP. Often the majority of the channel indicated as streambed riparian habitat has few plants. These sections of the stream channel are sparsely covered with vegetation since it is still in a state of primary succession due to ongoing disturbance by annual flooding and scouring from seasonal rainfall runoff. Examples of streambed riparian vegetation may include dominant or less abundant plant species found in southern willow scrub, riversidian alluvial fan sage scrub, mule fat scrub, and southern sycamore riparian woodland. Representative species from each of these terrestrial natural communities are mentioned above. Other species examples may include sedges (*Carex* spp.), rushes (*Juncus* spp.), cattails (*Typha* spp.), spikerushes (*Eleocharis* spp.), bulrushes (*Scripus* spp.), willow weed (*Polygonum lapathifolium*), and willow herbs (*Epilobium* spp.).

### **Landscaped Vegetation**

Landscaped vegetation is largely composed of cultivated ornamental, horticultural plants that may be introduced or native tree, shrub, forb, and grass species. Landscaped plant species are usually aesthetically appealing and are moderately to extremely dependent on man for water, minerals and nutrients (from fertilizers and soil amendments), pruning and maintenance, pest and pathogen control, and for their establishment in an environmental setting. That setting often is in urban surroundings, such as near buildings, roads, parking areas, walls, developed parkland, and percolation ponds. Often landscaped plant species that are native to the part of California in which HWP is located may have existed prior to the development of the land for residential or other uses, or were planted expressly for their aesthetic value and/or ease of growing.

Many of the plant species that comprise landscaped vegetation are often drought-tolerant xerophytes that require little or no irrigation by man for their survival. Occasionally, landscaped plants escape from their intended setting and become established in the wild. Landscaped plants can become naturalized by virtue of adaptive dispersal mechanisms and strategies of their fruits, seeds, root systems, vegetative reproduction from plant parts, and animal transport. Ruderal, weedy plants are often annuals or biennials and, therefore, reproduce very rapidly and successfully in places and conditions that other native or even introduced perennial plants cannot.

In the master plan study area, the soil types and textures on the various survey sites of landscaped vegetation are characterized as urban land that historically consisted of native alluvial soils comprised of dry, dense, silty and occasionally gravelly sand, rocks and boulders. Several feet of introduced fill material of unknown origin and varying composition may cover the sites currently occupied by landscaped/ruderal vegetation.

This vegetation category was not surveyed to the extent and depth as were other native, natural terrestrial plant communities during the inventory surveys of biological resources.

However, this unnatural plant community type was mapped on the terrestrial natural community map of vegetation. The numbers and types of landscaped vegetation are too numerous and diverse to include in the scope of work for this project. Common landscape plants observed in the master plan study area included species of eucalyptus, pine, oak, acacia, western sycamore, fig, olive, pittosporum, cherry, pepper tree, maple, liquidambar, ash, juniper, cypress, pyracantha, walnut, hibiscus, oleander, privet, redwood, elm, palm, coral tree, periwinkle, lantana, ivy, plumbago, poplar, tree of heaven, agave, and many others.

## SENSITIVE HABITAT AND SPECIAL STATUS SPECIES

Examination for sensitive habitats and protected or other sensitive and special status species was conducted on CNDDDB (1999f) information for the USGS 7.5-minute series topographic quadrangle map for Pasadena in which the HWP survey sites are located. Supplementary information about protected and sensitive plant and animal species, and sensitive habitats was also taken from private sources (CNPS, 1994; Pasadena Audubon Society, 1994), and from other state or federal government publications (CNDDDB, 1999a, b, c, d, and e; and USFWS, 1992, 1995, 1996, 1997, and 1998). The RareFind 2 computer software program, (CNDDDB, 1999f) lists two sensitive natural plant communities (i.e., southern coast live oak riparian forest and southern sycamore-alder riparian woodland), six plant species, and two animal species as having the potential to occur in naturally existing habitats within the USGS Pasadena quadrangle boundaries. Today, there is no southern coast live oak riparian forest or southern sycamore-alder woodland within HWP boundaries. Southern sycamore-alder riparian woodland does exist, though, just one-third mile (one-half kilometer) north of HWP in nearby Millard Canyon. However, small areas of riversidial alluvial fan sage scrub, considered a sensitive habitat by California regulatory agencies, are present near the northern end of HWP but are not recorded in the CNDDDB information for the Pasadena quadrangle.

Special status or sensitive plant species information obtained from CNDDDB and CNPS records for the USGS Pasadena topographic quadrangle map include Nevin's barberry (*Berberis nevinii*), Plummer's mariposa lily (*Calochortus plummerae*), slender-horned spineflower (*Dodecahema leptoceras*), Los Angeles sunflower (*Helianthus nuttallii* ssp. *parishii*), southern tarplant (*Hemizonia parryi* ssp. *australis*), and Parish's gooseberry (*Ribes divaricatum* var. *parishii*). None of these sensitive plant species were observed within the Park boundaries.

CNDDDB and USFWS information about sensitive animal species potentially occurring in the USGS Pasadena quadrangle that contains the field survey sites and existing habitats, includes the southwestern pond turtle (*Clemmys marmorata pallida*) and the San Diego horned lizard (*Phrynosoma coronatum blainvillei*). Four other sensitive animal species, coastal western whiptail (*Cnemidophorus tigris multiscutatus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*A. cooperii*), and loggerhead shrike (*Lanius ludovicianus*) were observed by Parsons ES at HWP during the biological resources survey period. These animal species are listed in CNDDDB records (CNDDDB, 1999d) for other areas in California but not specifically



for the topographic quadrangle in which the field sites are located.

## **2.4 FLOOD MANAGEMENT**

HWP is located at the foot of one of the most geologically dynamic mountains in the world; the basin receives periodic high-intensity floods that carry very high sediment loads from the San Gabriel Mountains. Los Angeles County Department of Public Works (LACDPW) owns the Devil's Gate Dam and operates it for flood safety and sediment management. The 1919 lease agreement between LACDPW and the City of Pasadena designated an area easement for flood control, which encompasses approximately 80% of the master plan study area and roughly follows the 1075 elevation contour. Under the most extreme conditions, this area would be flooded for a short period of time.

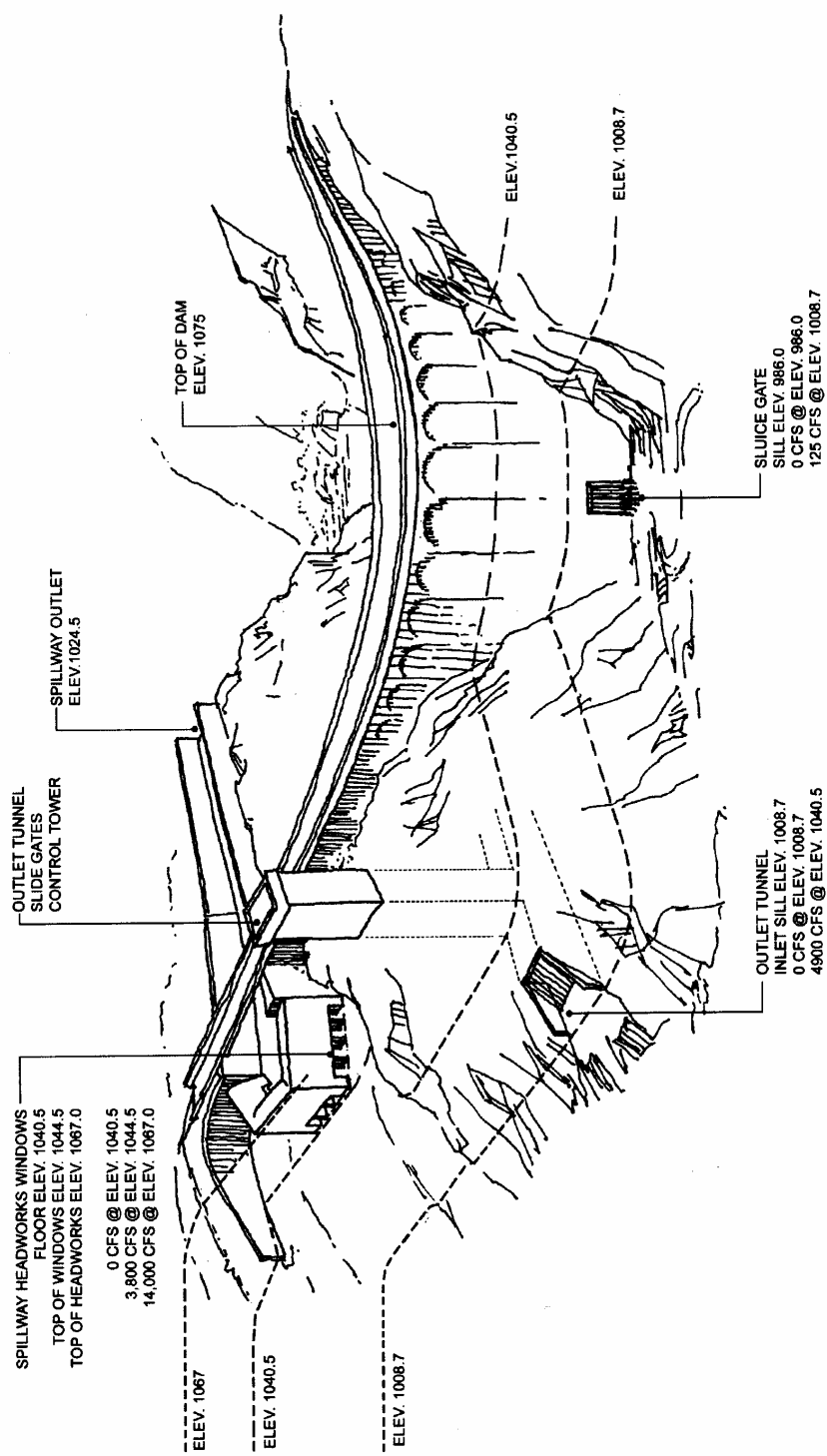
### **DAM OPERATIONS**

The dam operation at first appears relatively simple. Under all flow and sediment transport situations, the lowest elevation outlet, the sluice gate, is kept open until water levels behind the dam rise to either the outlet tunnel or the spillway floor. See Exhibit 2-4, Operation of Devil's Gate Dam. In this way, sediment sluicing through the dam is maximized, thereby reducing the amount of sediment accumulation and the subsequent excavation requirement in the reservoir. This method of reducing the amount of sediment accumulating behind the dam is referred to as the FAST Method—flow-assisted sediment transport method.

If the intensity and duration of the incoming storm event has more water and sediment entering the basin than can pass through the opening at the base of the dam (the sluice gate), then a pool will form behind the dam. As the water level of this pool rises above elevation 1008.7 and water begins to flow through the outlet tunnel, the sluice gate is closed. The formation of a pool and closing the sluice gate causes debris and sediment to settle out of suspension farther away from the dam, reducing the possible clogging of the sluice gate. Water with suspended sediment continues to flow through the open outlet tunnel.

Once water levels behind the dam reach elevation 1040.5, the spillway floor, the outlet tunnel gates are closed and water begins to flow through the spillway headworks openings. This method of operating the dam maximizes sediment outflow through the dam, but does nothing for water conservation. In addition, not holding water behind the dam has caused vegetation to establish itself below the 1040.5 elevation of the spillway floor. This greatly impedes sediment removal operations.

**Exhibit 2-4**  
**THE OPERATION OF DEVIL'S GATE DAM**



## WATER LEVELS

Critical to the understanding of the environment of the basin is the impact of the dam on flood elevations. The spillway floor elevation (1040.5), the top of the headworks (elevation 1067), and the top of the dam (elevation 1075) are mapped in Exhibit 2-5, Water Elevations.

At elevation 1040.5, accumulated waters will begin to flow through the spillway into the Central Arroyo flood-control channel. The openings of the spillway headworks are designed to limit the water flow so as not to overpower the capacity of the flood-control channel below the dam. The top of the spillway openings are at elevation 1044.5. If the storm event's intensity and duration causes water and sediment to flow into the basin faster than can exit through the spillway headworks openings, water will accumulate behind the dam—rising in elevation up the face of the spillway headworks and the dam. A capital storm event will cause water to rise up the face of the headworks and the dam to elevation 1067. The headworks acts as a control on the quantity of water released to the downstream channel. Should water continue to rise above the 1076 elevation, it will spill over the crest of the headworks and into the spillway. The top of the dam is set at elevation 1075.0, corresponding to the Los Angeles County Flood Control Easement of the basin.

As the flow into the basin equals and then lessens compared to the flow through the spillway,, the water level behind the dam descends. As the water elevation approaches the level of the floor of the spillway, the tunnel outlet is reopened. As the water level descends further, approaching the level of the outlet, the sluice gates are finally reopened and left to continue releasing all the water from behind the dam. Thus, there will be maximum capacity behind the dam for the next storm event. Since 1978, when the dam was declared seismically unsafe to hold water, the operation of the dam occurs as described.

Permanent park structures need to be located above the 1075.0 flood line or be designed to handle infrequent, short-term inundations. Trails, emergency/maintenance access, and recreation activities need to be located above elevation 1045 to avoid seasonal inundation.

The following most accurately summarizes the critical water levels and the effects on flow discharges associated with the operation of the dam:

- When water behind the dam is at elevation 1008.7 and the sluice gate (sill elevation 986.0) is fully opened, the discharge is 125cfs;
- When water level is at elevation 1040.5 and the outlet tunnel (sill elevation 1008.7) is fully opened and the sluice gate is closed, the discharge is 4,900cfs. This discharge can flow in the downstream channel at 25-30mph;
- When water level is at the top of the spillway headworks openings (elevation 1044.5) and the windows are flowing full and the outlet tunnel and sluice gate are closed, the discharge is 3,800cfs.

City of Pasadena  
**Hahamongna Watershed Park**  
**EXISTING CONDITIONS**

Exhibit 2-5  
**WATER ELEVATIONS**

Top of Dam  
 Elev. 1075.0

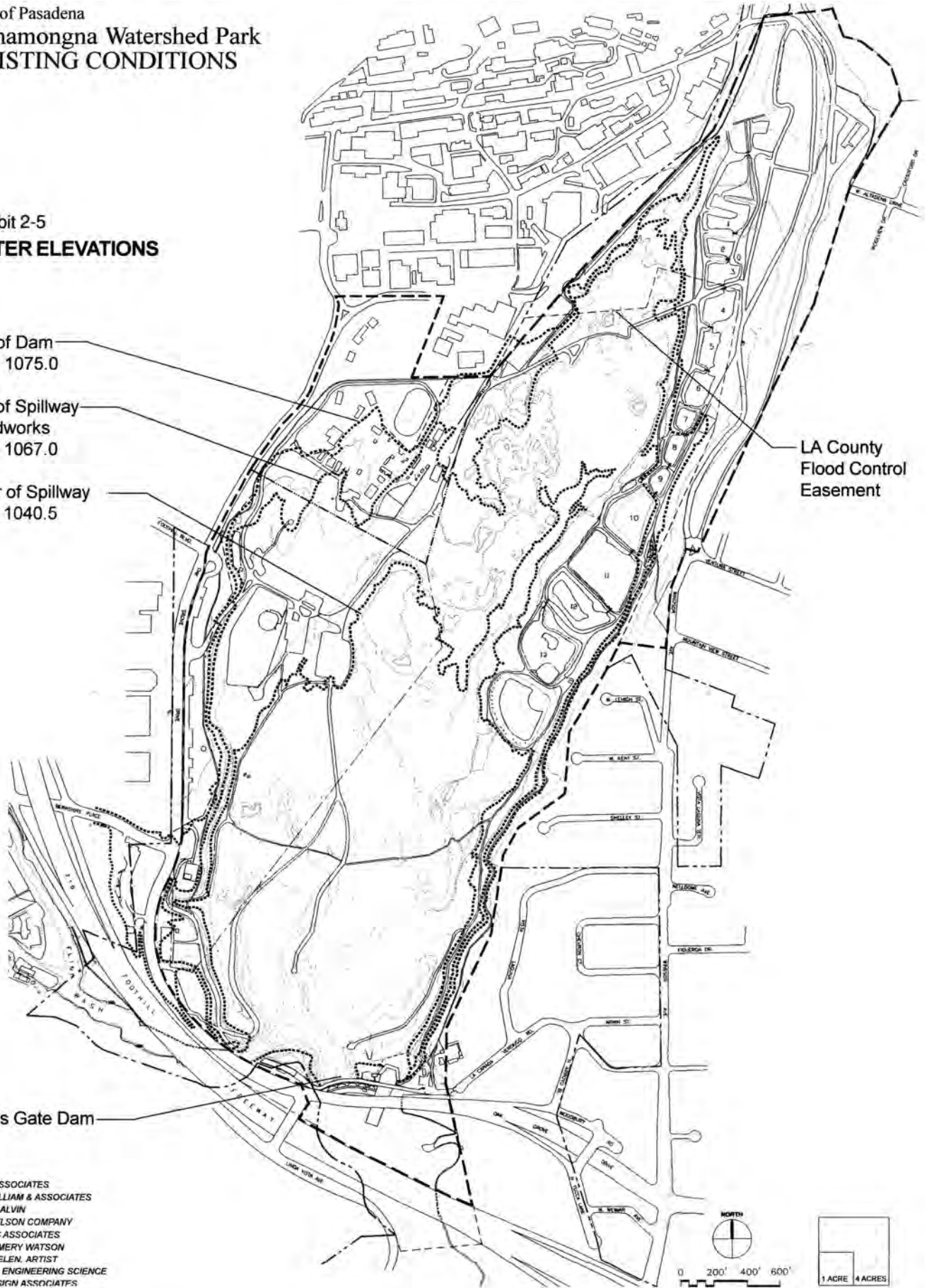
Top of Spillway  
 Headworks  
 Elev. 1067.0

Floor of Spillway  
 Elev. 1040.5

LA County  
 Flood Control  
 Easement

Devil's Gate Dam

TAKATA ASSOCIATES  
 PHILIP WILLIAM & ASSOCIATES  
 HINTZ & BALVIN  
 THE NATELSON COMPANY  
 MIRALLES ASSOCIATES  
 MONTGOMERY WATSON  
 BETH THIELEN, ARTIST  
 PARSONS ENGINEERING SCIENCE  
 HUNT DESIGN ASSOCIATES



This method of operation maximizes flood management safety at the dam, but does nothing for water conservation. In addition, by not holding water behind the dam vegetation has established itself below the 1040.5 elevation of the spillway floor, greatly impeding sediment removal operations.

## FLOOD MANAGEMENT

In 1914, a devastating flood occurred in Los Angeles County, primarily the result of floodwaters originating in the San Gabriel Mountains. The flood caused over \$10 million in property damage and claimed many lives. As a result, the Los Angeles County Flood Control District (LACFCD) was formed, later becoming part of the LACDPW. Their mandate was to provide flood protection for the County. To begin fulfilling this mandate, the LACFCD initiated construction of multiple dams in the San Gabriel Mountains. Devil's Gate Dam was the first of these and was completed in 1920. Devil's Gate Dam was built for the dual purposes of water conservation (increased yields from underground tunnels) and flood control. However, since the 1970's, flood control has been the only purpose since the dam was deemed unsafe to hold water. In December 1999, the State Division of Safe Operation of Dams (DSOD) certified Devil's Gate Dam to be safe to hold water once again.

When it was originally constructed, the dam created a reservoir with approximately 4,601 acre-feet of active storage capacity. Records indicate that approximately 20% of inflowing sediment passes through the dam when the FAST method is used. But even with a program of regular sediment removal over the years, sediment accumulation in the basin has gradually reduced the active storage capacity of the reservoir. In 1998, the dam was rehabilitated to meet the seismic stability capacity requirements of the State Department of Water Resources, Division of Safe Operation of Dams. Subsurface fractures were filled with concrete. A large, heavy concrete abutment was added to the base of the dam and a new spillway with headworks was constructed at a lower elevation (lowered 13.5 feet, from elevation 1054 feet to elevation 1040.5) to allow flood water to pass safely. At this new elevation, the current active storage capacity is 1424-acre feet. With a normal rainfall season, this storage capacity could be filled three times during a winter season, depending on watershed drought conditions.

Downstream of the Devil's Gate Dam, the Arroyo Seco flows through a short canyon section of natural channel and then emerges at the Brookside Golf Course where flows enter a concrete flood channel. The design capacity of this downstream channel is approximately 11,500 cfs for 500 linear feet. Then the channel size increases to accommodate the inflow from storm drains as the Arroyo Seco Channel continues south to the confluence of the Los Angeles River Channel. Devil's Gate Dam is operated such that downstream flows do not exceed this design capacity.

Since 1934, natural channel migration in the HWP basin has been disturbed by spatially variable sediment management activities (sediment removal and mining/dumping activities) within the reservoir. Virtually all land within the reservoir basin has been altered, removed,

or overturned by earth-moving equipment (Cotton/Beland/Associates, Inc. 1988). Historical photographs and topographic maps indicate that sediment management has occurred sporadically throughout the upper, middle, and lower basin areas. Thus, it is impossible to assess what aspects of channel migration are primarily fluvial in origin versus anthropogenically influenced.

It is apparent that the gross topography of the reservoir and bank protection along the perimeter of the reservoir has set some absolute limits to channel migration. Although the thalweg, or centerline of the stream, has more commonly been situated within the central portion of the reservoir, occasionally braids have extended into the broader region. In the upper half of the reservoir (upstream of percolation pond 13), Arroyo Seco is braided and has typically been contained within a 800-foot wide corridor within the past 65 years. Variations in migration of the active braided channel appear to be strongly linked to mining and water supply management. The widest active channel area (alongside ponds 6 through 9) coincides with an abandoned gravel pit apparent in the 1934 topographic map. Conversely, some time between 1942 and 1969, construction of the percolation ponds significantly encroached upon the active channel from the east along the present-day percolation ponds 10 through 13. In addition, the mining operators' expansion of processing, storage, and dumping significantly encroached upon the active channel from the west in the same reach of the channel.

## **2.5 SEDIMENT DELIVERY & MANAGEMENT<sup>2</sup>**

Flooding and sediment transport processes in the San Gabriel Mountains are extremely episodic. During some years the Hahamongna Watershed Park could experience no significant flooding or sediment delivery. During other years the basin could experience several large flood events, each of which could deliver more sediment than the long-term annual average delivery of 145,200 cubic yards (90 acre-feet). For example, based on regional data we might expect a 50-year storm (as calculated using USGS stream-gauge data) to deliver approximately 1,300 acre-feet (2,097,333 cubic yards) of sediment to the basin, equivalent to more than 14 times the long-term average annual delivery.

Sediment management records from the LACDPW for the Devil's Gate Reservoir were used to calculate long-term average annual sediment delivery to HWP. The long-term average annual sediment delivery to the basin since the construction of the dam in 1920 is approximately 145,200 cubic yards. This is the best estimate of the amount of sediment that would have to be removed annually from HWP to maintain current storage capacity behind the dam. However the current capacity of the dam with the new spillway height is 1,424 acre-feet. LACDPW has stated the minimum capacity for flood safety is 1400 acre-feet (or two debris events). Therefore, at this time, the minimum capacity has been reached and sediment must be removed or moved to above the 1040.5 elevation.

---

<sup>2</sup> Excerpted from "Flood Hazard, Sediment Management, and Water Feature Analyses, Hahamongna Watershed Park, Pasadena, CA" prepared by Philip Williams & Associates in the Technical Reports of this Master Plan.

Sediment transport modeling and limited debris flow modeling were conducted for several flood events in the Hahamongna Watershed Park. Debris flow modeling assumes extreme concentrations of sediment in floodwater entering the basin such that the physical properties of the flow (e.g., fluid density) are actually significantly different from plain water. Sediment transport modeling assumes lower concentrations of sediment such that the flow essentially behaves like plain water. Both types of flow occur at the Hahamongna Watershed Park. Modeling results also showed that much of the sediment entering the park tends to deposit in one of two locations: (1) adjacent to spreading ponds 2 through 9, or (2) adjacent to the dam. The precise limits of this debris zone are uncertain.



***Debris flow from the mouth of the Arroyo Seco Canyon  
photographed the summer of 1969***

Since the construction of the Devil’s Gate Dam, LACDPW has actively excavated sediment from the reservoir area upstream of the dam. During the summer of 1994, LACDPW excavated and removed 250,000 cubic yards of sediment. A pond has existed in this area since. Around the pond and north of it where material was excavated, willows have grown. In the seven years since this sediment removal operation, some of these willows are now thirty feet tall.

After the removal of the sand and gravel operations, LACDPW proposed a complete re-grading of the flood basin, i.e., all those areas within the 1075 elevation easement with the exception of Oak Grove Park, MWD property, and the spreading basins, to improve flood capacity and management of the sediment inflow. In practice, sediment has not been removed on a regularly scheduled basis but on an as-needed, as-funded basis. Additionally, the sediment removal sites have been those with minor associated permitting issues. The amount of sediment removed over the years was less than the amount of sediment deposited in the basin. This accounts for the overall decline in active storage capacity of the reservoir.

## **2.6 WATER CONSERVATION**

Hahamongna Watershed Park is situated over part of an unconfined groundwater aquifer known as the Monk Hill Basin. Together, the Pasadena sub-area aquifer and the Monk Hill Basin make up a larger unconfined aquifer called the Raymond Basin. The Raymond Basin aquifer is approximately 40 square miles in area and underlies much of the City of Pasadena. Average groundwater elevations in the vicinity of HWP are between 900 feet and 1,000 feet with significant seasonal fluctuations.

The first groundwater wells were drilled in the Raymond Basin in 1881. Water from these early wells was used for irrigated agriculture and for the municipal water supply. Beginning in 1891, the Pasadena Lake Vineyard Land and Water Company constructed several underground tunnels in the Hahamongna Watershed Park area that provided a significant amount of water which was sold to the City of Pasadena for the municipal water supply. In 1912, the City of Pasadena Water Department was formed that incorporated the Pasadena Lake Vineyard Land and Water Company along with the Devil's Gate tunnel network. Between 1913 and 1919, the tunnels yielded an average of 3,400 acre-feet of water per year (flowing an average of 4.7cfs).

Devil's Gate Dam was constructed for the joint purpose of increasing the water supply through the City's tunnels and providing flood control. In the dry years between 1920 and 1928, the tunnels yielded an average of 2,300 acre-feet of water per year. After 1929, the water yield steadily declined until 1938 when a large flood and debris event rendered the water percolating into the tunnels nonpotable due to changes in the upper watershed. Today the water yielded by the tunnels is not being used.

The City of Pasadena actively diverts water from the Arroyo Seco and the Millard Canyon streams. The City of Pasadena has a historic right to divert up to 25cfs for the domestic water supply. The City maintains two diversion intakes upstream of the JPL Bridge. An upgrade to the intake at Millard stream was recently completed. In decades past, diverted water was routed to the Behner Treatment Plant (near the northeastern end of the Hahamongna Basin), treated, and then received directly into the municipal water supply system. During this period, Los Angeles County Department of Public Works (LACDPW) operated a series of spreading basins along the east side of the park, used to recharge the over-pumped alluvial aquifer of the Raymond Basin. These basins are called the Arroyo Seco Spreading Grounds and historically received water when flow in the Arroyo Seco



exceeded the City's 25cfs diversion right. LACDPW historically would divert as much as 75cfs with the use of a breakaway dam located south of the JPL Bridge and north of the spreading basins. With the advent of more stringent water quality standards, the City's direct diversions to the municipal water supply system were discontinued. As a result, the City began diverting water into the spreading basins operated by LACDPW.

Since 1998, the City has taken over management, including the operations and maintenance of the Arroyo Seco Spreading Grounds from LACDPW and continues to use its 25cfs diversion right to route water through the spreading basins. The spreading basins utilize a total area of approximately 24 acres with a maximum water surface area of 13.1 acres. The 14 basins are identified by number in ascending order beginning with basin no.1 at the north. Total capacity of the ponds is approximately 30 acre-feet, with an estimated average percolation rate of 18cfs. This is equivalent to approximately 1.2 cfs per wetted acre. The City of Pasadena receives groundwater pumping credit equal to approximately 60% of their diversion by percolating water in this way.

Groundwater pumping and percolation in the Raymond Basin (an adjudicated groundwater basin) is overseen by the Raymond Basin Management Board (RBMB), comprising a sixteen- member board of various water purveyors including the City of Pasadena. The City of Pasadena operates the 13.1 surface acres of spreading for the Raymond Basin Management Board. The City currently obtains approximately 40% to 50% of their municipal water supply from groundwater pumping with most of the remaining municipal demand being met by water purchased from the Metropolitan Water District (MWD). One acre-foot of groundwater costs the City approximately \$91 per acre-foot while MWD water costs the City approximately \$431 per acre-foot.

Since groundwater is the City's most economical source of municipal water supply the City's Water and Power Department has the master planning objective of at least maintaining, and potentially expanding, the amount of groundwater recharge credit they receive from percolation in the Hahamongna Watershed Park. The City's maximum goal would be to expand percolation capacity in the park to accommodate a diversion of 32cfs. This increased diversion would include a purchased water right of 6.9cfs from the Lincoln Avenue Water Company. A more moderate goal for the City would be to expand spreading capacity to handle the 25cfs diversion right it currently owns. The City's minimum requirement is that a spreading capacity of 18cfs be maintained.

### **Operation of the Spreading Basins**

The accumulation of fine sediment particles in the percolation ponds tends to reduce percolation rates over time. Measures are taken to prevent this such as not diverting water during high-sediment transport flood events. Furthermore, the basins are cleaned and scarified annually to remove fine sediment and restore hydraulic conductivity of the soils. To carry out maintenance, access to each of the basins is required.

Each successive basin steps down following the descending elevation toward the dam. This progression of descending steps results in a 4-foot drop in elevation from the floor of each basin. The controlling weirs between each basin allow for a maximum depth of water of 4 feet.

At the present time, spreading basin nos. 13 and 14 are not in operation. Spreading basin nos. 13 and 14 were found to not percolate well due to the thick layer of accumulated fines at the floor of each pond. Therefore, basin no. 13 was converted to an overflow basin. When excessive water is diverted through basins 1 through 12, the excess overflows into basin no. 13, which has an outlet into the Arroyo Seco channel. Spreading basin no. 14 is the current site of Johnson Field, a softball field constructed by the employees of the City of Pasadena Water & Power Department as a volunteer project.

### **Stream Flows**

Should the combined flows of the Arroyo Seco stream and the Millard stream equal the amount allowed to be diverted, the City is not allowed to take that total amount which allows a percentage to flow in the existing riparian corridor toward the confluence of the Arroyo Seco and Millard streams. When the combined flows are greater than the City's right to divert (25cfs), then that which is not diverted flows toward the dam. When flows are small, they will percolate before reaching the dam. When flows are greater, a percentage will still percolate in its path toward the dam, but as the flow increases a greater amount will reach the dam. In the last 30 years, LACDPW has allowed these flows to pass through the dam. This practice has also allowed vegetation to establish itself along the course of the flow and below the 1040.5 elevation of the spillway floor. During high-sediment-transport flood events, water is not diverted and the flow races toward the dam. If the incoming flow to the basin is greater than what is passing through the dam, then a pool will form. As this flow reaches the pool and slows, the suspended particles of sediment will be deposited. In time, the sediment builds up and, if not removed, could cover any existing vegetation. This is currently the case behind the dam. Once vegetation is allowed to establish in this area, sediment removal operations are impeded.

Since the capacity of the basin is limited by the excessive amount of sediment currently present, LACDPW has typically allowed the pool that accumulates behind the dam to drain as quickly as possible through the dam in order to be ready for any oncoming large storm event.

Prior to the dam being declared unsafe to hold water and when LACDPW allowed water to accumulate behind the dam, it was observed to be ineffective for percolation due to the continual buildup of excessive fines in this highly sediment-laden area of the basin. For this reason LACDPW has considered plans to pump water from an accumulated pool behind the dam, via a pump back system, to the spreading basins within this basin and/or divert water to the Eaton Canyon spreading basins in east Pasadena to comply with the County's mandate for water conservation.

The streams flowing into the basin are intermittent and not perennial. Water in the streams varies depending upon the winter season. Flows can stop as early as late spring or could flow into the midsummer months but never year-round except for very minor urban runoff flows that enter the basin through storm drains.

## **2.7 UTILITIES**

The utility infrastructure within the master plan study area includes storm drains, water mains, water wells, overhead power and communications lines, natural gas, and sewage management systems.

The following section reviews utility locations and ownership, and identifies associated issues pertaining to the utility.

### **STORM DRAINS**

Field studies were conducted by the Pasadena Water and Power Department in May of 1996. The study identified storm drains discharging into the Hahamongna Watershed Park basin. The 23 identified storm drains originate primarily in the residential neighborhoods of Altadena and La Cañada Flintridge, and in the Jet Propulsion Laboratory. Storm water from the MWD property, and the portion of Oak Grove Drive to the west, collects as surface flow entering HWP at three locations on the southern boundary of the MWD property. There are no industrial-zoned areas draining into the basin.

Field studies undertaken as part of the Master Plan process assessed the condition of these drains. Many of the storm drains entering the basin are old and will require rehabilitation or repair to assure adequate storm runoff control. The existing configurations of a number of the storm drains have created downstream problems within the basin. Exhibit 2-6, Storm Drains, locates the outfalls of these drains. A description of each drain follows:

#### **Altadena Storm Drain No. 1**

The Altadena Drain (P-175) is a 7' square, concrete box culvert located west of the Los Angeles Flood Control District headworks and breakaway dam. It drains the foothill area of the San Gabriel Mountains south of Millard Canyon, north of Loma Alta Drive, and west of Las Flores Canyon in Altadena. Due to the length of the culvert undermining has occurred and a number of repairs have been attempted. Since the breakaway dam has been abandoned, the holes in the top of the culvert with slide gate barriers are no longer needed. Heavy runoff coming from this drain causes erosion on the downstream embankment during winter wet weather flow conditions.

### **Altacrest Storm Drain No. 2**

The Altacrest Drain consists of two 40" diameter reinforced concrete pipes located high on the basin slope east of spreading basin no.1. One exits above the Gabrielino Trail and flows down-slope to and under the trail. The second pipe exits below the trail. The flows merge and continue down-slope to the eastern edge of the JPL parking lot. The drainage pattern follows the edge of the parking lot to its south end, crossing the access road just north of the Arroyo Well and entering spreading basin no. 5. These two lines drain the residential area north of Altadena Drive and south of Loma Alta Drive.

### **Mariposa Street Storm Drain No. 3**

Storm drain no. 3 was not part of the 1996 study. A 30" corrugated metal pipe receives the flow from the end of Mariposa Street and carries it to the slope below the Gabrielino Trail. Flows from the residential area south of Mariposa Street enter another 30" pipe at the eastern edge of the Gabrielino Trail, crossing under and exiting down the slope to the west. Both flows join midslope and continue down to the JPL access road north of the Arroyo Well. This flow joins the flow from the Altacrest Drain, crossing the access road and entering spreading basin no. 5.

### **Sterling Place Storm Drain No. 4**

Water collected from the residential area along the top of the slope, west and north of Sterling Place, enters a 30" corrugated metal pipe at the eastern edge of the Gabrielino Trail and exits west below the trail. The flow continues down the slope to the edge of the JPL access road, where it flows north to join the flows from the Altacrest and Mariposa drains and crosses the road to spreading basin no. 5. Storm run-off from drains 2, 3, and 4 along with surface runoff from the 9.6-acre JPL parking lot periodically floods the JPL access road at this crossing.

### **Ventura Street Storm Drain No. 5**

This 42" concrete storm drain takes in water from Ventura Street and outlying areas. It discharges the water west of spreading basins no. 10 and no. 11 directly into the Arroyo Seco.

### **Lehigh Street Storm Drain No. 6**

This storm drain is a 20" corrugated metal pipe that empties at the base of the slope just south of the Johnson Field restrooms alongside the access road. The outfall may need to be extended past spreading basin no. 13 to avoid erosion damage to the access road and ball field.

City of Pasadena  
 Hahamongna Watershed Park  
 EXISTING CONDITIONS

Exhibit 2-6  
**STORM DRAIN OUTFALLS**

\*Not included in Watershed  
 Sanitary Study, 1996



TAKATA ASSOCIATES  
 PHILIP WILLIAM & ASSOCIATES  
 HINTZ & BALVIN  
 THE NATELSON COMPANY  
 MIRALLES ASSOCIATES  
 MONTGOMERY WATSON  
 BETH THIELEN, ARTIST  
 PARSONS ENGINEERING SCIENCE  
 HUNT DESIGN ASSOCIATES

### **Kent Street Storm Drain No. 7**

This storm drain is a 20" steel line that conveys storm water from the residential area of Kent St. and discharges at the base of the slope directly into the Arroyo Seco.

### **Shelly Street Storm Drain No. 8**

This storm drain is a 20" corrugated metal pipe that conveys storm water from the residential area of Shelly St. and discharges east of the dirt access road along the perimeter of the Arroyo Seco.

### **West Altadena Storm Drain No. 9**

The West Altadena Storm Drain is a 5' diameter concrete drain located at the base of the eastside service road leading into the water conservation pool. The drainage area is north of Figueroa Drive and west of Marengo Avenue in Altadena. The outfall for this storm drain is located at approximately elevation 1008, below the height of the dam spillway floor (elevation 1040.5). When floodwater crests at the spillway, significant backflow and trash buildup in the storm drain occur.

### **Oak Grove No. 9A**

This storm drain was not part of the 1996 study. The drain line runs along Oak Grove Drive near the dam and takes storm water from the street to the old access road of the dam. An open gutter runs down the center of the access road past the dam keeper's house, collecting storm water runoff from La Cañada-Verdugo Road and the discharge from the drain line; it carries the flow along the downstream side of Devil's Gate Dam and into the spillway. When La Cañada-Verdugo Road is closed (see Section 3, Recommendations), it may be necessary to collect the storm runoff in a catch basin and transport the flow via buried pipeline to the spillway.

### **Flint Canyon Channel Wash No. 10**

A system of storm drains and channels throughout La Cañada-Flintridge enter the Flint Canyon Channel. This channel discharges into Flint Wash near the Berkshire Place overcrossing, just outside the City of Pasadena. Flint Wash enters the basin at the extreme southwest corner of HWP under the Foothill Freeway and Oak Grove Drive, just west of Devil's Gate Dam.

### **Oak Drive Storm Drain No. 11 at the Equestrian Staging Area**

This 18" corrugated metal pipe discharges storm water at the southwest corner of the equestrian staging parking area. The flow then travels down a natural earthen channel to the park road, toward Flint Wash. This flow and storm water from the western roadway approach

to Flint Wash enter an 18" corrugated metal pipe, which crosses under the road and then enters the basin.

### **Berkshire Place Storm Drain No. 12**

The Berkshire Drain is a 5' concrete drain emptying into the Oak Grove area west of the service road that runs south of the Oak Grove Maintenance Office. The drain crosses under the service road as a 30" concrete drain. It drains a portion of the Foothill Freeway, Oak Grove Drive, Berkshire Place, the adjacent church parking lot and portions of the High School. The widening and realignment of Oak Grove Drive increased the number of drain inlets and surface area runoff resulting in excessive damage to conditions downstream of the outfall. This outfall location can be extended downstream and damage repaired.

### **Foothill Boulevard Storm Drain No. 13 at Oak Grove Drive**

The Foothill Drain is a 24" concrete drain located on the upper slope west of the Oak Grove field, just below the entry road leading to the lower Oak Grove area. The line drains areas west of Oak Grove Drive, east of Daleridge Road, south of Rupert Lane and north of Foothill Boulevard in La Cañada-Flintridge. The widening and realignment of Oak Grove Drive increased the number of drain inlets and surface area runoff, resulting in extensive erosion damage to conditions downstream of the outfall. This storm drain should be extended down-slope to prevent erosion damage and enhance the riparian corridor associated with the storm water runoff.

### **JPL Trunk Line No. 14**

Trunk Line no. 14 is a 24" concrete drain that daylights on the western slope of the basin, south of the JPL west parking lot. It collects surface runoff from the southeast corner of the JPL campus. There are an insufficient number of drain inlets in the drainage area to transport runoff directly into basin. The west parking lot drains toward the southeast directly into HWP. This storm drain may need to be enlarged and a catch basin installed in the parking lot to mitigate the runoff. Construction of the proposed westside spreading basins (see Section 3, Recommendations) will necessitate the extension of this drain line.

### **JPL Trunk Line Nos. 15 - 18**

The 48" concrete line collects surface runoff from the northwest side of the basin. These drains collect water from the residential areas west of JPL and inside the JPL campus. The flows are discharged towards the southeast directly into the basin.

### **JPL Trunk Line Nos. 19 - 23**

These 24" concrete lines collect surface runoff from the northern corner of the JPL campus and surface waters from the eastern side of the JPL campus, just south of the JPL Bridge, and transport runoff directly into the basin.

### **WATER WELLS & MONITORING FACILITIES**

The City of Pasadena owns and operates three wells in HWP: The Arroyo Well, Well 52, and the Ventura Well. Pasadena Water & Power has taken the Arroyo Well offline due to the presence of perchlorate. With the installation of new water treatment technology this well can be brought back online.

JPL has set up a series of monitoring test wells throughout the basin, on its campus, and in the western residential areas of Altadena to track contaminants in the groundwater. Exhibit 2-7, Wells, indicates the location of the many test wells in the vicinity of HWP.

### **WATER MAINS**

There are several water lines in the basin area that either cross the basin or run parallel to it. Three water lines owned by the City of Pasadena run along the east side of the basin. The first line is a 16" steel water main that leads from the Mountain View Reservoir to the VOC Water Treatment Plant midpoint along the east access road; see Exhibit 2-8, Water Mains.

The second water line is the 30" Hume water line that brings water from the Arroyo Seco stream diversion facility to the Mountain View reservoir. From this line there are taps to divert the water where it is needed, such as the 16" steel Behner bypass line used for recharging the spreading basins, starting at spreading basin no.1.

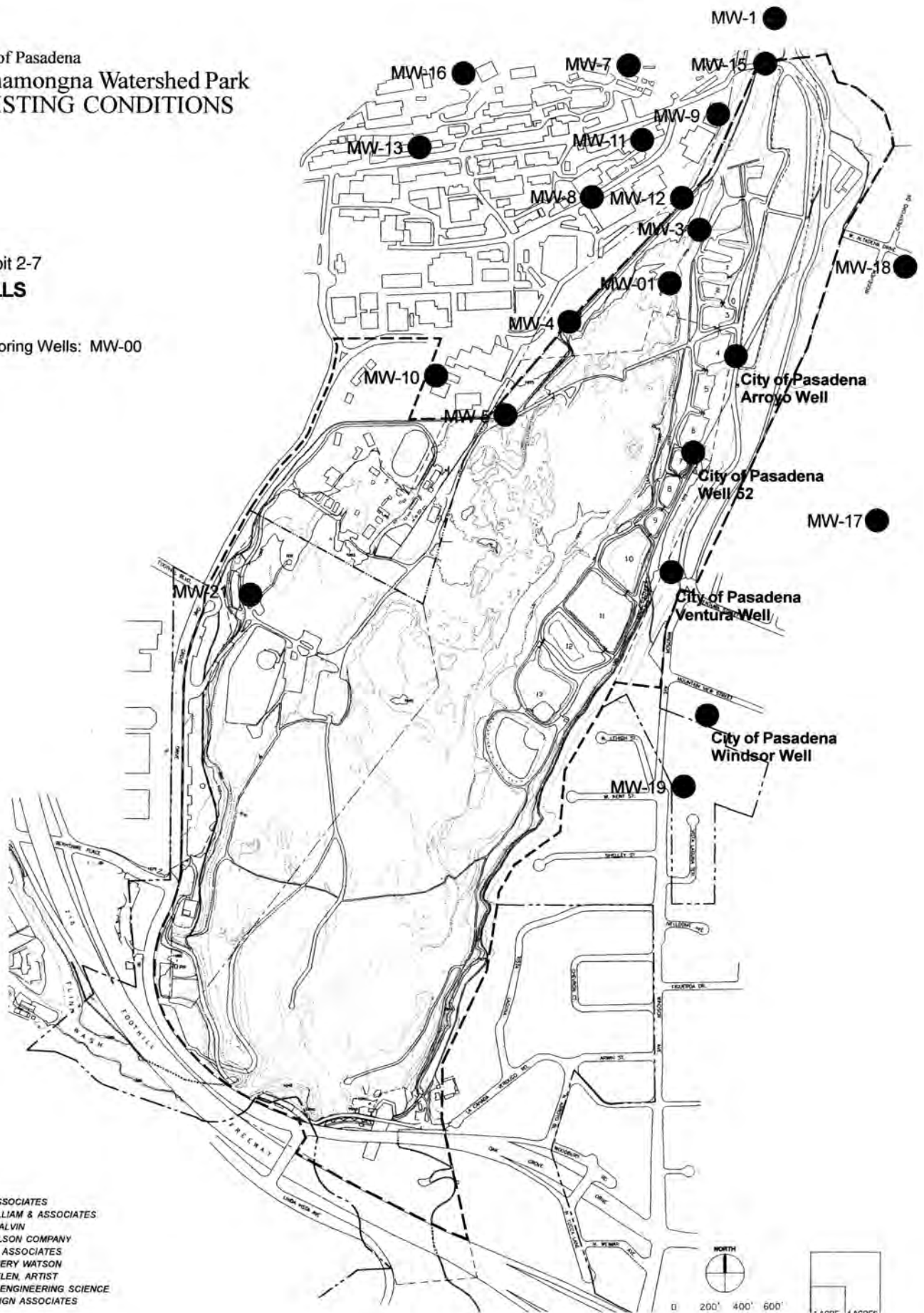
The third water line crossing the basin area is a 12" galvanized steel standard screw end pipeline known as the Calaveras Line. This water line enters the basin from the east at Kent Street, and runs down the slope of the basin to a pressure release valve at the base of the slope. At this point the water line is split up to run along the eastside of the basin and due west towards Foothill Boulevard where the water is used in the westside of HWP and leaseholders within the MWD property. The leaseholders who use this water are the U.S. Department of Forestry, the Rose Bowl Riders, and Tom Sawyer Camp. The section of line that runs along the eastside of HWP north to the JPL Bridge supplies the existing restroom, water and irrigation systems, and a small number of 1.5" fire hydrants.



City of Pasadena  
 Hahamongna Watershed Park  
 EXISTING CONDITIONS

Exhibit 2-7  
**WELLS**

Monitoring Wells: MW-00



TAKATA ASSOCIATES  
 PHILIP WILLIAM & ASSOCIATES  
 HINTZ & BALVIN  
 THE NATELSON COMPANY  
 MIRALLES ASSOCIATES  
 MONTGOMERY WATSON  
 BETH THIELEN, ARTIST  
 PARSONS ENGINEERING SCIENCE  
 HUNT DESIGN ASSOCIATES



## OVERHEAD POWER & COMMUNICATION LINES

Overhead power lines in the HWP area include Southern California Edison (SCE) and the Pasadena Water & Power Department (PWP). In some cases, the power poles in the basin are utilized by the General Telephone Company, now Verizon, and the local cable companies. The main power lines for transmission in the basin area belong to SCE. These lines follow the toe of the western slope, run the length of the basin from south to north and feed into and from JPL's main substation.

Some distribution lines in the basin belong to PWP and other distribution by SCE emanates from the JPL main substation, see Exhibit 2-9, Overhead Transmission Lines. SCE distribution to the west is at Foothill Boulevard and Berkshire Place; to the east the distribution is at Devil's Gate Dam, across the basin in line with Altadena drive and diagonally across the basin to Ventura Street. The PWP lines originate at Windsor/Ventura on the eastside of the basin and head west down the eastern slope; one line crosses the basin to the west and distributes power to the park and the MWD property and includes fiber optics to JPL. The other line heads north to the Arroyo well and south to Johnson field. The SCE north/south transmission and distribution lines, from Flint Wash to the lower Oak Grove parking area, have been inaccessible due to inundation during recent floods. PWP's power lines feed north on the Gabrielino Trail road from the intersection of Windsor Avenue and Ventura Street to the Behner Treatment Plant and JPL's east parking lot where JPL has erected lighting and communication overhead lines around the perimeter.

Along with the power lines there are communication lines which have been installed underground starting at Devil's Gate Dam. These lines travel along the east side of Oak Grove Drive to the JPL campus.

## NATURAL GAS



A 12" high-pressure natural gas line, owned by the Southern California Gas Company is buried from three to eight feet deep and traverses the basin underground from Kent Street to Foothill Boulevard; see Exhibit 2-10. The gas flow for the line is bi-directional but predominately from the Pasadena side (East) to Chatsworth (West). Existing drawings indicate that the 12" line is very near the 12" galvanized Calaveras water line. Due to this close proximity it may be prudent to have this gas line evaluated for corrosion mitigation.

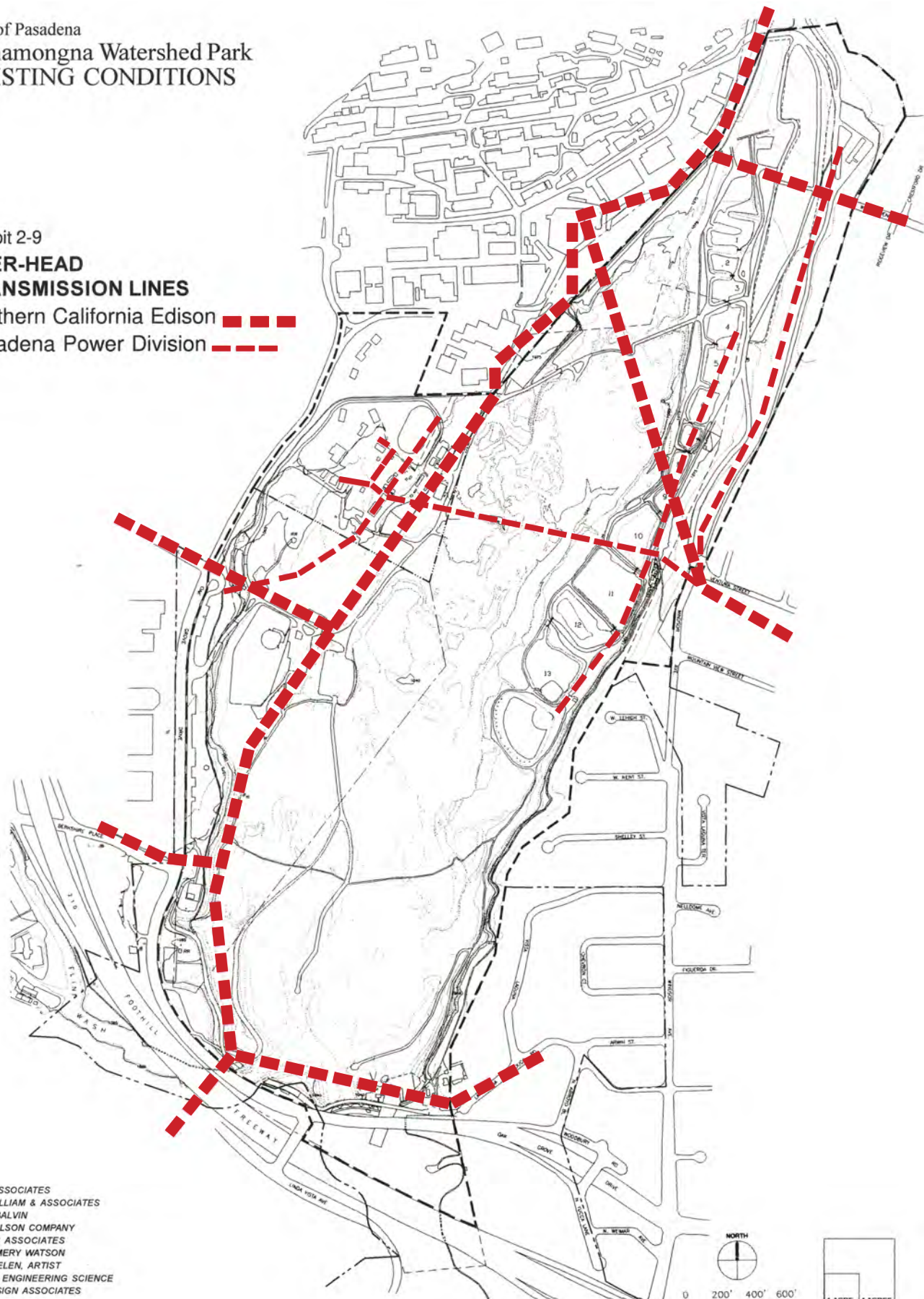
There is also a natural gas line leading from west end of La Cañada-Verdugo Road that supplies gas to the dam keeper's house and facilities. In Oak Grove, near the intersection of Oak Grove Drive and Berkshire Place, there is a natural gas line that runs north to south along Oak Grove Drive. This line connects to various structures requiring gas service such as the park maintenance building.

City of Pasadena  
Hahamongna Watershed Park  
EXISTING CONDITIONS

Exhibit 2-9

**OVER-HEAD  
TRANSMISSION LINES**

Southern California Edison   
Pasadena Power Division 



TAKATA ASSOCIATES  
PHILIP WILLIAM & ASSOCIATES  
HINTZ & BALVIN  
THE NATELSON COMPANY  
MIRALLES ASSOCIATES  
MONTGOMERY WATSON  
BETH THIELEN, ARTIST  
PARSONS ENGINEERING SCIENCE  
HUNT DESIGN ASSOCIATES



## SEWAGE MANAGEMENT SYSTEMS

The only major sewer system that runs near HWP is the Oak Grove Drive sewer main. This line starts from JPL and makes its way south toward Devil's Gate Dam along Oak Grove Drive where the line is mounted directly on the bridge crossing at Flint Wash. Just west of the dam, the line heads south, crosses the Foothill Freeway and continues south towards the Central Arroyo. The sewer has capacity for La Cañada-Flintridge as well as JPL. A recently completed sewer main was installed by the City of La Cañada-Flintridge on Foothill Boulevard which connects to the Oak Grove Drive line at this intersection. The line then continues south where it connects to the Pasadena system near the Rose Bowl, which is being repaired to be turned over to the Los Angeles County Sewer District (LACSD) system.

The upper Oak Grove restroom gravity-feeds to the main trunk line in Oak Grove Drive. The remaining three restrooms in the Oak Grove area utilize septic systems (the Equestrian Staging Area, the Oak Grove maintenance yard and the lower Oak Grove). In the area of Devil's Gate Dam, the LACDPW's facility and the Pasadena Arroyo Seco Resource Center have septic systems. On the eastside of the basin, the restroom at Johnson field has a septic system.

On the MWD property, all of the restrooms in the U.S. Forest Service area are connected by a gravity sewer system. Sewage is collected at a sewer lift station and pumped through a force main discharging into the nearby Oak Grove sewer main. In the Rose Bowl Riders and Tom Sawyer Camp areas the restrooms have septic systems.

## 2.8 CIRCULATION

### CIRCULATION AND VEHICULAR ACCESS

The regional connections to HWP are from the Foothill Freeway (210) with access from the Berkshire Place and the Foothill Boulevard exits on the west and the Windsor Avenue exit on the east. The arterial connections which service HWP include Oak Grove Drive and Foothill Boulevard on the west and Oak Grove Drive (Woodbury Road), Windsor Avenue, and Ventura Street on the east.

Arterial traffic near HWP is heavy during the early morning due to the simultaneous arrivals of JPL commuters and La Cañada High School students. Because the high school includes grades 7 through 12, drop-off traffic is as much an issue as the need for student parking in the area. Complaints from La Cañada residents north of the high school resulted in those residential streets being closed to student parking. This, coupled with inadequate parking at the high school as well as the close proximity of the park to JPL, has created a great parking demand in the upper Oak Grove parking areas. During a recent construction project at the school, students were permitted to use the upper Oak Grove parking areas.

As part of the 1992 Preliminary Plan for HWP, a traffic impact analysis was prepared.<sup>3</sup> Four intersections identified by the City of Pasadena Department of Public Works were studied. They included:

- Oak Grove Drive at Foothill Boulevard
- Oak Grove Drive at Berkshire Place
- Oak Grove Drive at Linda Vista Avenue
- Oak Grove Drive (Woodbury Road) at Windsor Avenue

In 1992, all four intersections were operating at an acceptable level of service (service level D or better) during the weekday morning and evening peak hours. Only the intersection at Oak Grove and Berkshire Drive had moderate congestion (service level D) during the weekday evening peak hour.

The City of Pasadena's Department of Public Works reported that the historic vehicular traffic growth in the area was at most 1.0 percent. The 1992 Traffic Impact Study developed a baseline projection assuming a 1.06 percent growth rate that indicated that by 1998 the intersection at Oak Grove Drive and Berkshire Place would be approaching an unacceptable level of congestion if there was no development of HWP.

The West entrance currently serves as the primary park entrance to HWP. The west entrance also provides access to some of the MWD lessors (USFS and Rose Bowl Riders with Tom Sawyer Camp). The roads and trails within this property were all originally a part of the Oak Grove Park but no longer provide public access or emergency access to the northwest portion of Hahamongna Watershed Park. The Los Angeles County Fire Camp #2 leases the northeast corner of the MWD property, but access to the site is through the JPL service road bordering their facility.

The east entrance at the intersection of Windsor Avenue and Ventura Avenue provides access to the east JPL leased parking lot, City and County maintenance vehicles and occasional users of Johnson Field. The 1992 Traffic Impact Report for the Preliminary Plan identified this intersection as confusing and dangerous. It was recommended that a further investigation of the intersection was necessary particularly if facilities were developed on the east side of HWP that would attract park users unfamiliar with the intersection.

## EMERGENCY AND MAINTENANCE VEHICLE ACCESS

On the west side, emergency and maintenance vehicle access is at the main entrance at Oak Grove Drive/Foothill Blvd. Limited maintenance access to Oak Grove Drive is provided by an unimproved road on the southwest portion of the park and west of Flint Wash. The road is used periodically to remove sediment from the basin for flood control purposes.

---

<sup>3</sup> Site Traffic Impact Analysis of the Proposed Devil's Gate Multi-Use Project, Barton-Ashman Associates, Inc. May 19, 1992.

On the east side emergency and maintenance vehicle access is at the Windsor Avenue and Ventura Street entrance. Limited access to the Devil's Gate Dam facility is provided at the terminus of La Cañada-Verdugo Road.

Emergency and maintenance vehicle access to the flood basin on the westside is via a north/south unimproved road, just east of the Oak Grove park area, which is accessible by its connection to the upper Oak Grove paved road at the south and in the middle, just east of the lower Oak Grove parking area. Emergency and maintenance vehicle access to the eastside of the flood basin is via a north/south road accessible at the southeast end of the Devil's Gate Dam facility and at the middle in the vicinity of the easterly JPL parking lot though the entrance at Windsor/Ventura.

Connections between the east and west sides require leaving and re-entering the park causing lost response time and inefficient maintenance routines. The lack of bridge crossings over Flint Wash and the upper portion of the site precludes an all-weather perimeter access road. The operation of heavy machinery and large trucks and unauthorized parking on La Cañada-Verdugo Road has affected the neighborhood adversely and raised the concerns of the neighbors.

## BICYCLE ROUTES

An existing Class II bicycle lane on Oak Grove Drive to Berkshire Place links Foothill Blvd. to Arroyo Boulevard. This route continues south on Arroyo Boulevard providing street access to the Central and Lower Arroyo. The Gabrielino Trail provides mountain bikers access to the steeper terrain in the Angeles National Forest. Street connections to the start of the Gabrielino Trail are Windsor Drive to the south and Ventura Street from the east. Neither of these streets is within Pasadena city limits.

In 2000, the City of Pasadena completed its first Citywide Bicycle Master Plan. The primary focus of the plan was to make the city streets more "bicycle friendly." Issues pertaining to recreational bicycle riding within City parkland were not addressed with the exception of the Rose Bowl loop. At the present time, bicycles are permitted on existing paved surfaces within HWP.

## TRAILS

### **Regional Trails**

The regional trail system is illustrated in Exhibit 2-11, Regional Trail Plan. Trail connections in HWP are part of the Rim of the Valley Trail Corridor that circles the San Fernando and La Crescenta valleys. Trail connections south through the Arroyo Seco link to the Los



Angeles River Trail System thus establishing links to the Santa Monica Mountains and the

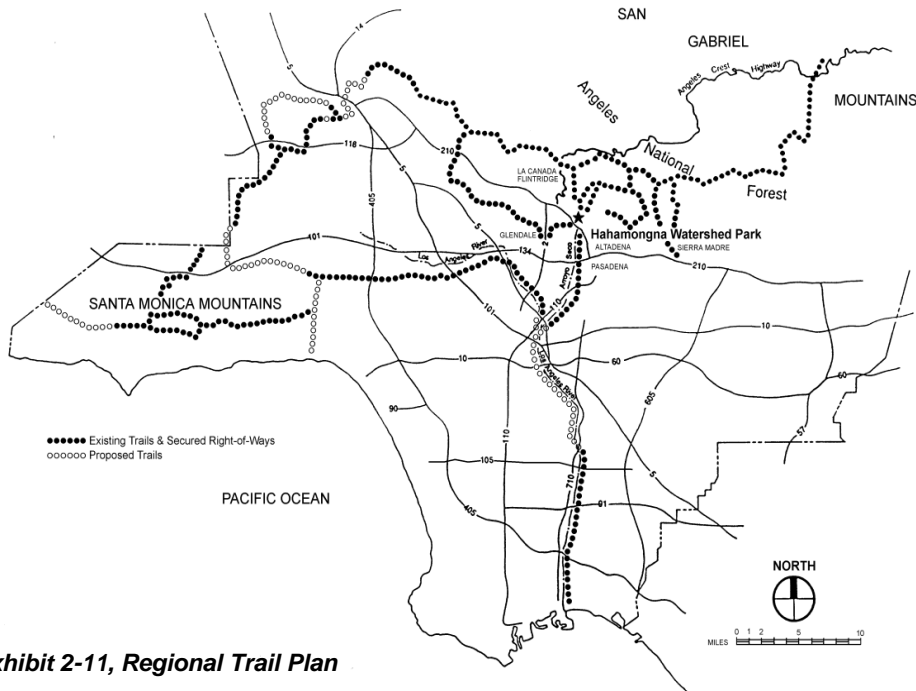


Exhibit 2-11, Regional Trail Plan

Pacific Ocean. Trail connections northward link to the network of trails in the Angeles National Forest including the Pacific Crest National Scenic Trail that extends the length of the State of California.

### Hahamongna Watershed Park Trails

Exhibit 2-12 illustrates the existing trails in HWP. There are six trailhead connections to HWP that link the area with regional and local trails; they include:

- Gabrielino Trail
- Arroyo Seco Trail
- Gould Canyon Trail
- Flint Wash Trail
- Altadena Crest Trail
- Mountain View Trail

*Gabrielino Trail:* This regional trail begins at the intersection of Windsor Avenue and Ventura Street and connects northward to the trail system in the Angeles National Forest. The trail within HWP follows the east boundary of the park north of Ventura Street. The trail is designated by the US Forest Service as a multi-use trail for equestrians, hikers, and bicyclists.

*Arroyo Seco Trail:* Linking all three sections of the Arroyo Seco is the Arroyo Seco Trail. The Arroyo Seco Trail is a series of parallel trails on both sides of the arroyo. Typically the east and west trails merge in the transition from one section of the Arroyo Seco to the next. Within each section of the Arroyo Seco, the trails are given local names.

The Arroyo Seco Trail is part of the Rim of the Valley Trail Corridor. To the west through La Cañada-Flintridge, the Arroyo Seco Trail follows trails that are part of the Los Angeles County riding and hiking trails systems. The trail continues south from HWP through Central Arroyo via the east tunnel of the Devil's Gate Dam.

Connections north to the Pacific Crest Trail in the Angeles National Forest can be made using the Gabrielino Trail. The Arroyo Seco Trail within HWP is currently restricted for equestrian and hiking use only.

*Gould Canyon Trail:* This trail connects the La Cañada trails system through an access tunnel under Foothill Boulevard to the West Rim Trail.

*Flint Wash Trail:* The Flint Wash trailhead is located in the southwest corner of HWP, starting at the confluence of Flint Wash and the HWP flood basin. The trail follows Flint Hiking & Equestrian Trails Wash under the 210 Freeway, connecting to the La Cañada trail system. This trail is part of the Rim of the Valley Trail.

Local trail access to the Altadena community is provided at the end of Altadena Drive and at the parking lot at the intersection of Windsor and Ventura. These trailhead connections lead to the Altadena Crest Trail and the Mountain View Trail.

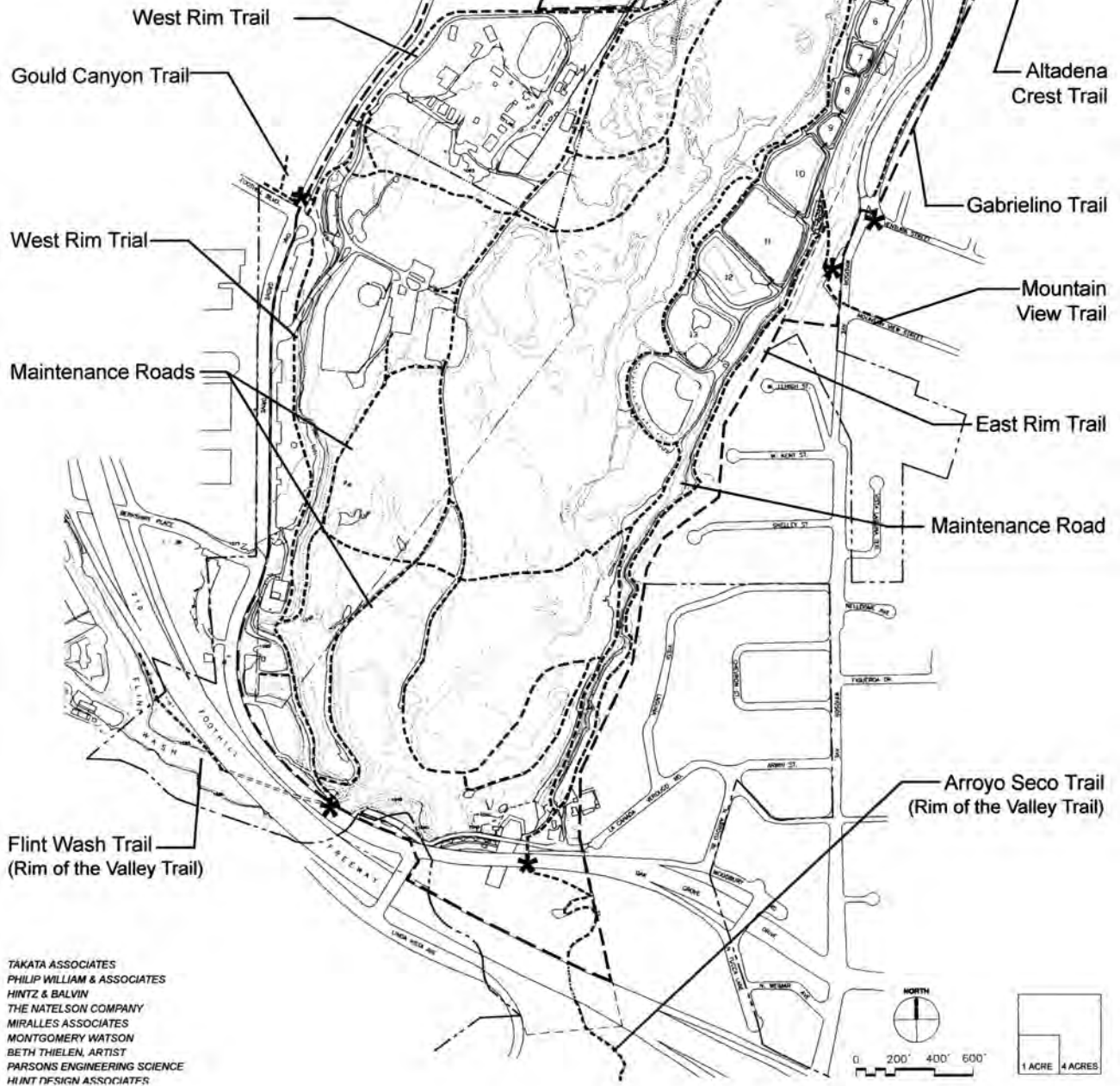
Equestrians and hikers use a combination of trails and maintenance roads within HWP. All of these trails can be considered as part of the Arroyo Seco Trail. Internal to the park, trails exist along portions of the upper slope of the basin. The West Rim Trail leads north from the Flint Wash trailhead connection to the Equestrian Staging Area. Following the crest of the basin slope through the upper terrace picnic area, the trail continues north around the MWD property.

At the northeast corner of the MWD property, the trail connects to the Angeles National Forest along the eastern edge of the JPL campus. At the JPL Bridge, the trail slopes down to the river bed, passes under the bridge, fords the stream, and connects to the Gabrielino Trail.

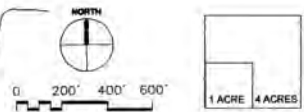
From the Devil's Gate Dam, the East Rim Trail follows the upper east crest of the basin slope northward to the VOC Water Treatment Plant. A linking trail connects the slope to the Windsor/Ventura Parking Lot and the Mountain View Trail.

City of Pasadena  
 Hahamongna Watershed Park  
 EXISTING CONDITIONS

Exhibit 2-12  
**HIKING & EQUESTRIAN TRAILS**  
 \*Trail Heads



TAKATA ASSOCIATES  
 PHILIP WILLIAM & ASSOCIATES  
 HINTZ & BALVIN  
 THE NATELSON COMPANY  
 MIRALLES ASSOCIATES  
 MONTGOMERY WATSON  
 BETH THIELEN, ARTIST  
 PARSONS ENGINEERING SCIENCE  
 HUNT DESIGN ASSOCIATES



Segments of the maintenance roads along the bottoms of the slopes serve as trails. Trail connections running east-west in HWP are established on an ad hoc basis during the dry summer months. There is no east-west connection at Devil’s Gate Dam due to the removal of the Flint Wash Bridge. No permanent all-weather east-west trails exist in HWP.

## 2.9 PARKING

Parking for visitors presently exists at HWP in the Oak Grove area, on the east side near Johnson Field, and near the intersection of Windsor Avenue and Ventura Street. The following table summarizes all the available parking in HWP:

<b>SUMMARY OF EXISTING PARKING</b>			
		<i>Park Visitor</i>	<i>JPL Employee</i>
<i>Westside</i>	Oak Grove-upper	54 spaces	
	Oak Grove-lower	110 spaces	
	Equestrian Staging Area	50 spaces	
	JPL-west lot		214 spaces
	Group Event ‘A’	30 spaces	
	Group Event ‘B’	20 spaces	
	Event Overflow Parking	110 spaces	
<i>Eastside</i>	JPL-east lot		1,132 spaces
	Johnson Field	200 spaces	
	Ventura Lot	50 spaces	
<b><i>Total Parking</i></b>		<b><i>624 spaces</i></b>	<b><i>1,346 spaces</i></b>

*Westside Parking:* Visitor parking on the westside is in the Oak Grove area. Dispersed parking is provided along the access road for the upper terrace picnic areas. Below, a larger 110-space parking area services the main portion of Oak Grove (disc golf, picnic area, and multipurpose play area). Just south of the upper picnic area is the equestrian staging area parking lot. Exhibit 2-13, Parking Areas, illustrates the existing parking areas on the west side.

*Eastside Parking:* The park visitor parking on the eastside consists of a one-acre triangular parking lot for 50 spaces at the Windsor Avenue and Ventura Street. This parking area is primarily used by hikers and bicyclists traveling up the Gabrielino Trail to the upper watershed and the Angeles National Forest. Additionally, there is informal space dispersed along the roadside that can accommodate up to approximately 200 vehicles along the southern end of the eastside maintenance road going to Johnson Field. At the present time, there is no formal parking arrangement for visitors of Johnson Field; parking is considered “informal,” meaning open dirt areas and shoulders of the road are used for parking.



## JPL PARKING

There are two City-owned parking lots, on the west and east sides of the park, currently leased by JPL for employee parking. The five-year lease generates \$450,000 per year, which is used for the planning, maintenance, and operations of HWP. The lease will expire in 2004.

The 1.2-acre west parking lot provides 214 parking spaces. Access to the west parking lot is through JPL property. The east parking lot is 9.6 acres and provides 1,132 parking spaces. Access to the east parking lot is from the Windsor /Ventura entry. JPL has a shuttle service from the parking area to the campus.

Both parking lots are gated when not in use; however, the current lease allows shared parking of the two lots with advance communication and when not in use by JPL.

JPL is currently completing its "down-sizing" from 7,000 employees to 5,000 employees—a reduction of 20% of its work force. This process includes the closure of off-site JPL facilities and the relocation of those employees to the JPL campus. Therefore, JPL parking needs at HWP will equal or slightly increase from current conditions in the future.

## 2.10 EXISTING RECREATION

Existing recreation facilities are located on the west and east sides of HWP. The majority of these facilities are located in the Oak Grove area.

### WESTSIDE (OAK GROVE)

The Oak Grove park facilities were developed in the early part of the 20<sup>th</sup> Century by the City of Pasadena. In 1971, during the period (1968-1993) when Oak Grove was operated as a Los Angeles County regional park, the Los Angeles County Department of Parks and Recreation made extensive improvements to the park. Oak Grove has two activity levels on an upper and a lower terrace separated by a steep slope.

#### Upper Terrace

The upper terrace is adjacent to the internal roadway from the west entry at Foothill Boulevard south to the Flint Wash. Facilities include picnic facilities, restrooms, a maintenance building, and the equestrian staging area.

*Picnic Facilities:* The upper terrace is primarily devoted to individual picnic facilities under mature oak trees. Dispersed parking off the access road services the picnic areas.

*Restroom:* There is one restroom in the upper picnic area. The facility needs renovation and

modifications to comply with disability standards (ADA).

*Equestrian Staging Area:* The equestrian staging area is located south of the picnic areas and the Oak Grove Maintenance Office. This area is open to the general public by permit only. Vehicle access is limited to a single lane around the maintenance office and over the Berkshire Drain. The staging area provides access to nearby trails, parking for cars and horse trailers, and a restroom. It is used for small group gatherings and by Tom Sawyer Camp as a venue for its younger campers. The restroom needs renovation and modifications to comply with disability standards (ADA).

### **Lower Terrace**

The lower terrace is situated along the base of the western slope of the basin and extends from the MWD property to the group picnic areas south of the existing play field. The lower terrace includes facilities for passive and active recreation; the facilities include group picnicking, a play field, restrooms, and disc golf course.

*Group Picnicking:* Group picnic facilities are located south of the play field. The facilities include picnic benches, barbecue pits, and a drinking fountain.

*Amphitheater:* There is a small rustic amphitheater at the base of the slope near the group picnic area adjacent to the play field. The amphitheater is constructed with telephone pole seating and in need of renovation.

*Oak Grove Field:* This play field is used for baseball, large group activities for Tom Sawyer Camp, and special events such as the recent statewide Police Activities Games. The field is also used as a staging area for major disasters in coordination with the USFS and Los Angeles County Fire Department.

*Restrooms:* There were two restrooms on the lower terrace of Oak Grove Park. The restroom near the group picnic area was destroyed by fire and needs to be replaced. The other restroom is located to the north of the playing field in an area with four camp sinks that was formerly used for overnight group camping. The remaining restroom does not meet current disability standards (ADA) and needs rehabilitation.

*Disc Golf:* The 18-hole disc golf course at HWP is the nation's first disc golf course. Since its inception in early 1970, disc golf courses have been constructed all over the world. The course is quite popular and provides recreation for all ages.

The disc golf course is currently located on both the north and south ends of the lower terrace. The front nine follows the perimeter of the play field, picnic area, and parking area. The back nine is located in the oak grove of the north portion of the lower terrace. The back nine weaves in and out of the oak trees impacting the trees due to heavy use.

## EASTSIDE RECREATION

Recreation facilities on the eastside of HWP are limited to Johnson Field. The field was constructed by the Department of Water and Power volunteers. It was used for informal softball games but is currently not available for public recreational usage. Facilities at this location include picnic tables, a barbecue pit, and a small restroom.

## 2.11 CULTURAL & ARCHAEOLOGICAL RESOURCES

### ARCHAEOLOGICAL RESOURCES

In 1987, a Preliminary Assessment of the Prehistoric Cultural Resources of the Devil's Gate Reservoir<sup>4</sup> (HWP) was undertaken. A record search was conducted of archival materials and a physical inspection of the site was performed. The assessment reports that "no prehistoric sites were found to be located on the property."

The record search looked for existing survey reports and recorded sites within the study area and within a one-mile radius of the study area. While there were no reports or recorded sites within the study area, three sites within the one-mile radius were surveyed and reported. They are as follows:

- Survey Area L-880: Located adjacent to the study area on JPL property. This 1980 survey concluded that there were "no known or recorded resources" within the survey area.
- Survey Area L-108: Located southeast of the Devil's Gate Dam between Oak Grove Ave. and the 210 Freeway was also negative.
- Survey Area L-1659: The study area, known as the La Vina property, is located .25 miles northeast of HWP. A prehistoric quartzite flake of cultural origin was recorded.

Within the one-mile radius there are also two recorded archaeological sites:

- CA-LAn-342: Located .33 mile north of HWP, the site consists of part of a village known as the Millard Canyon site.
- CA-LAn-26: The Sheldon Reservoir site is located southeast of the Devil's Gate Dam. In 1938, the Pasadena Water Company uncovered a burial ground during the excavation of the reservoir.

---

<sup>4</sup> Environmental Baseline Study, Devil's Gate Multi-Use Project, Cotton/Beland/Associates, Inc., February 1988.



The conclusion of the assessment was that the areas should be considered as archaeologically sensitive given the proximity of the two known archaeological sites.

## CULTURAL RESOURCES

The cultural resources, along with the natural environment make up the unique character of Hahamongna Watershed Park that is so appreciated today. The historical and continuing use of this environment by the community contributes significantly to the cultural heritage of the City of Pasadena as formally recognized in the City's Guiding Principles. What "has been in existence" in the Arroyo for years upon years takes many forms: natural and man-made, physical artifact, and human activity. Some have been present longer than others, but each has become a cultural resource that contributes to the heritage of the Arroyo Seco. These resources need to be enhanced and preserved.

The indigenous peoples have a long history as stewards of this landscape. Each year, following the seasons, they have collected botanical material for traditional spiritual, ceremonial, medicinal and utilitarian uses. As guardians of these natural resources, they understand how to collect in a way that does not impair the sustainability of a plant population. As custodians of their culture, individuals, families and tribal groups use sites throughout Hahamongna Watershed Park for spiritual, social, and ceremonial traditions. Although most of these events are traditionally very private, the public at times is welcomed.

A number of groups, in addition to the Native Americans, have had a historical presence in the Park and have contributed to its cultural identity. Since the early part of the 20<sup>th</sup> century, children of the region have had a memorable summer experience by attending Tom Sawyer Camp. A great number of camp attendees are second and even third generation and in many instances they return as camp counselors gaining leadership skills that serve the community.

The Oak Grove Disc Golf Course is the first disc golf course in the world. The course dates back to the early 1970's as a "Frisbee" course where play was started between two posts, throwing the Frisbee several times in turn toward a distant post. A Frisbee hitting the distant post completed that hole. In early 1976, the posts were replaced with a metal basket on a post and the tee became a small octagonal concrete pad which is unique to this course. In the early 80's, the Frisbee was replaced with a smaller thinner disc. As a result of the popularity of the Oak Gove Disc Golf Course, courses began springing up everywhere across the country and later around the world. Twice a year, the Oak Grove Course hosts a tournament. The tournament in the fall of 2001 brought contestants from as far away as Alaska, Hawaii, and even Sweden.

Hahamongna Watershed Park has a well-established equestrian community that regularly draws riders from Pasadena, Altadena, and La Cañada. Visitors bring their horses from as far away as San Diego and Santa Barbara counties to ride. HWP is the hub where many trails come together and spread out in all directions: north, south, east, and west. The equestrian groups actively work to maintain these trails that are used by many others—dog

walkers, hikers, and joggers. The Pasadena Mounted Police Unit stables its horses in the area and patrols the Arroyo Seco.

Additionally, many groups take advantage of this unique environment to support their broader missions. The Audubon Society hosts a monthly tour of the park for bird watching. The Armory Center for the Arts has a continuing program entitled, “Children Investigate the Environment,” in which various City departments collaborate to teach Pasadena Unified School District youth about the area’s natural resources. The plein-air painters use the Arroyo Seco, including HWP, as an open-air studio to create their scenes on canvas. JPL, a neighbor to the park, uses the rough landscape of the flood basin to test its planet-exploring robots. Instructors with the School of Self-Reliance teach survival skills, and provide information about edible and useful plants. Many organized groups have returned time and again to participate in competitive law enforcement training events, nature hikes sponsored by the Sierra Club, scout jamborees, and company picnics.

Just below the Devil’s Gate Dam, where the canyon narrows, is a unique rock formation that resembles the profile of a horned devil. In 1858, when Judge B.S. Eaton visited Rancho San Pasqual and this particular site in the Arroyo Seco, he named the location “the Devil’s Gate.” The original concrete gravity-arch dam at Devil’s Gate was dedicated in June of 1920; it is the first dam built for the Los Angeles County’s flood control and water conservation system. From 1920 to 1965, the top of the dam was the main road between Pasadena and La Cañada.

In 1998, when the Devil’s Gate Dam was reinforced to hold water, it was also architecturally restored to its original character. For years, Los Angeles County and Pasadena City fire departments, local law enforcement agencies, and other groups have used the dam to train personnel in disaster- and accident-rescue techniques; and numerous photographers and filmmakers have used the dam and spillway as a backdrop.

In this age of environmental awareness, it is more likely that the oak woodland that gives name to Oak Grove is recognized as “natural habitat” before it is considered a cultural resource. But the Oak Grove itself is a unique setting—a cool and shady respite with the distinctive arroyo stone walls edging the slopes and trails. Since the beginning of the 20<sup>th</sup> Century, people have enjoyed the splendor of this great stand of trees, picnicking under the broad canopy, exchanging wedding vows, and celebrating birthdays.

The preservation of Oak Grove over the years is testimony to the value the community places on it. From the narrow canyon, just below Devil’s Gate Dam, to the broad flood plain with its wooded and chapparal-covered slopes and up to the prominent points with their grand vistas, this cultural resource called Hahamongna Watershed Park should be enhanced and preserved.

## 2.12 SUMMARY OF COMMUNITY OUTREACH

### COMMUNITY OUTREACH

The Master Plan community outreach process was extensive. The process included three community meetings/workshops, site tours, numerous stakeholder meetings, and meetings with community organizations and neighborhood groups. The meetings were well attended by interested and enthusiastic participants.

The community expressed the desire that the focus of HWP should be on “keeping it natural” while balancing this concept with the objectives of water conservation, flood protection, and active recreation. The community meetings elicited ideas and reviewed two alternative concepts (see Appendix A). One alternative emphasized a natural park and the other concept emphasized active recreation, including soccer, baseball, and other field activities. Meeting attendees formed teams to discuss and suggest ways to resolve and balance these concepts.



#### ***The master plan community outreach process was extensive***

The community input confirmed the inherent conflict between those that desire to keep the park natural and those who seek to develop needed active recreation facilities. It was recognized that the need for active recreation, especially fields for soccer and baseball is a communitywide issue. The community input encouraged organized sports groups to work with the City of Pasadena and the public schools to identify other venues to meet the demands. Some have mentioned the Central Arroyo as a more appropriate location.

For Hahamongna Watershed Park, the community has expressed a desire to:

- Preserve the hiking and equestrian trails;
- Provide lakes or a water feature that will bring back birds and, perhaps, put HWP on the bird flyway that runs the length of the state;
- Promote those activities that will attract wildlife and protect and enhance native species;
- Balance recreation with habitat restoration and water conservation;
- Provide additional active multi-purpose fields;

- Provide a year-round perimeter trail for hikers and equestrians;
- Provide an interpretive center and venues for environmental education and Native American culture;
- Protect and buffer adjacent neighborhoods.

## SUMMATION OF THE COMMENTS FROM HAHAMONGNA WATERSHED PARK COMMUNITY MEETINGS

During the Master Plan process, three community workshops were held to solicit comments on the progress of the Master Plan. The following summation itemizes by topic both the verbal and written comments made during the workshops. In some cases similar comments, such as “keep it natural” were heard many times, but are not repeated here. As one can see, the list consists of comments from both ends of the spectrum on almost every issue. As the process proceeded, participants gravitated toward a balanced approach—not any one interest group getting everything it wanted, but instead agreeing to disagree and settling for a compromise.

### **Habitat**

- Keep it natural;
- Watershed area should be kept as natural as possible;
- Soften all facilities (parking, buildings) with natural vegetation;
- Most of park should be natural, not full of sports fields;
- Eliminate sports fields and disc golf course;
- Keep down the development and buildings in park;
- Advocate wildlife “rehabitation;”
- Stress Native American influence on area;
- Reintroduce native plants and safeguard protected species;
- Create an Engleman Oak monument;
- Organized sports are too intense for a wetlands or nature area;
- Protect the wildlife corridor in basin;
- Develop a plant nursery for endangered plants, trees, and plants used by “gatherers” – protect the plant gene pool at Hahamongna;
- No boating on lakes in order to bring back birds and wildlife;
- No motorized boating;
- The bridge at the north end of the Park should be in wood and kept natural and rustic for hikers and horses;
- The loop perimeter trail is essential for horses and hikers so we can access all the trails, hike, watch the birds and animals and enjoy the view of this restored natural habitat.

## **Recreation & Sports**

- Keep Disc Golf out of the floodplain to allow for year-round play;
- Make playing fields multipurpose (overlay)—baseball in summer and soccer the rest of the year;
- Eliminate baseball from Oak Grove field and designate it for soccer only;
- Establish one regulation-size soccer field at Oak Grove;
- Create more than four soccer fields; they are more important than lakes;
- Find other locations for soccer fields, not in this basin;
- Keep bicycles and horses separate;
- Allow only horses in Hahamongna basin and only allow bicycles north of Ventura;
- For equestrians, maintain perimeter trail and east-west trails, especially across JPL east parking lot & do something about blind spots on trails where collisions could occur;
- Be careful about placement of Native American activity area near equestrian staging area;
- No overnight camping except for supervised groups;
- Allow for fishing in one lake;
- Allow for practice rowing on flood conservation pool;
- Want playing fields on both eastside (Pasadena/Altadena side) and westside (La Cañada side);
- Stop trying to develop soccer fields in a natural area and instead look at school sites;
- Who pays for soccer fields and why should they get special attention;
- Sports fields mean pesticides and they are incompatible with a nature park;
- Make the disc golf ADA accessible and accessible to strollers;
- For a unique park, create unique recreational features compatible with nature.

## **Trails**

- Connect the trail in Altadena to the rest of the system;
- Maintain trail crossings and preserve horse trail linkages at south and north end of basin;
- Develop a complete trail loop going down east and west side and connecting at the south with the restoration of the Flint Wash bridge;
- Keep trails from Hahamongna up the canyon into Angeles National Forest;
- Keep ability to use trails to get from Hahamongna Park to and from Altadena Drive side of Arroyo using trail system;
- Keep ability to get from Hahamongna Park to Flintridge Riding Academy and Club and the trail system near Flintridge riding complex;
- Keep ability to get from Hahamongna to Cherry Canyon system of trails that run from Hahamongna to La Cañada;
- Keep ability to get from Hahamongna to trails that go south to Rose Bowl;
- Hahamongna is a hub for reaching a series of trails and that hub must be respected;
- Keep Rose Bowl Riders in the Park;
- Keep Tom Sawyer Camp in Oak Grove Park;
- Develop effluent control;
- Use school facilities and not park for soccer expansion;
- Have no soccer in Hahamongna. Impact of noise to eastside residents and impact on

wildlife is the reason. Also the impact on plant life. Keep it natural!!

- Hahamongna should not be made into a stadium;
- Loop/perimeter trail for hikers and horses is essential. No bikes on trails with horses and hikers. Bikes hit horses/hikers. Keep bikes separate;
- Make the bridge at the north end of wood so it is more natural. It will be easier for horses to cross because they will not slip. Wood will also not be so hot on the feet of dogs, horses, and hikers.

### **Water Features**

- Allow fishing in the proposed lakes;
- No fishing in proposed lakes;
- Allow practice rowing when storm water is held behind the dam;
- Keep lakes natural to attract birds and wildlife;
- Create “nature blinds” where people can observe wildlife on the water;
- Create a meandering stream into one of the lakes preferably on east side;
- Prefer a lake to a pond;
- Create islands in the lake for protected nesting of birds;
- Keep water behind dam as long as possible;
- Call lakes and ponds what they are, use simple language;
- Isolate some shoreline from human contact;
- Permanent water features (lakes) must be a part of the new Park Plan.

### **Noise**

- Add no new fields on east side because it will increase the noise for neighbors;
- Do not add parking on east side because of noise.

### **Security**

- Allow only supervised overnight parking for authorized groups;
- Enforce a “no bicycles on horse trails” ordinance in basin;
- Increase number of Park Rangers for security reasons;
- Develop a volunteer equestrian patrol like the one in Lower Arroyo;
- Provide year-round emergency/maintenance vehicle access and a trail loop for circulation which will require the restoration of the Flint Wash bridge;
- Create a landscaped berm at the end of La Cañada-Verdugo Road with a fence to protect eastside neighbors;
- Increase patrols on eastside to assist with security.

### **Enforcement**

- Keep up on graffiti removal;
- Make pet owners responsible for picking up after their animals;
- Keep dogs on leash;

- No pit bulls in the Park;
- Have regular security patrols.

### **Circulation**

- Keep main entrance on west side;
- Create a “turn around” area for horse trailers below staging area & widen the road;
- Don’t bring cars in at proposed Woodbury entrance; continue to use Oak Grove Drive;
- Keep the sediment removal trucks out of eastside neighborhoods;
- Find ways to reduce traffic on North Arroyo near Woodbury Avenue;
- Improve the Windsor/Ventura entrance to eliminate traffic congestion;
- Allow resident access if you install a cul-de-sac at end of La Cañada-Verdugo Road;
- Correct point above to read “Close off area to all ...Block Wall;”
- Eliminate vehicular/pedestrian access from La Cañada-Verdugo Road;
- Improve traffic circulation in and around park to eliminate congestion due to JPL & High School;
- Put traffic signal at the Windsor/Ventura intersection;
- Coordinate with the Flood Maintenance Division of L.A. County Department of Public Works regarding maintenance routes.

### **Parking**

- Provide adequate access for the disabled to recreation areas;
- Defray costs of park operation by renting parking lots on weekends;
- Make a parking area out of Rose Bowl motel;
- Improve parking at Woodbury (Oak Grove Drive) and at Windsor/Ventura which is now a traffic hazard;
- Create weekday parking because JPL now takes it all;
- Provide adequate parking for park use;
- Assist to obtain “resident only” parking for eastside residents;
- Create a No Parking area at the end of La Cañada-Verdugo Road;
- Keep the eastside or the bluff area the “low impact” part of Hahamongna;
- Rent one of JPL’s east lots for weekend parking.

### **Cultural Issues**

- Eliminate any thought of a museum because there is not enough space to accommodate one;
- Establish an Interpretive Center with a heavy emphasis on the contribution of Native Americans and the natural environment of the basin;
- If an Interpretive Center is established, give careful thought to staffing and maintenance through adequate funds and grants;
- Keep up with graffiti removal;
- Make pet owners responsible for picking up after their animals – all animals;
- Provide gathering places for basket weavers;

- In trying to balance interests, remember that the ecosystem, although silent, is one of them;
- The City of Pasadena should be clear about what it is willing to spend for an Interpretive Center and what educational programs will be included;
- Who will fund an Interpretive Center and keep it going. It makes no sense to start one if there is not careful consideration of future funding options and responsibilities provide more workshops and educational programs related to the environment and the Native American contribution to this land;
- Create an “out-of-the-way” ceremonial center which could be used by Native Americans;
- Take care to alert Native American “gatherers” of any spraying in Hahamongna;
- Create a communications system with “gatherers” to update them on conditions;
- Create some “off the beaten track” and therefore protected areas for plants used by “gatherers;”
- Work cooperatively with other institutions such as the Southwest Museum;
- Any Interpretive Center should involve native people in the planning;
- An Interpretive Center should deal not just with past Native American traditions but should relate to their current role and the future they hope to help shape – “We are a part of yesterday but also a part of today and tomorrow;”
- Create a system of permitting for Native American “gatherers” who will protect the plants so that they can regenerate and flourish;
- Allow no art work in park other than that which reflects the natural environment/colors.

## **2.13 SIGNAGE AND GRAPHICS**

Typically, the signs visitors encounter in a park can be categorized as either wayfinding, interpretive, or regulatory. Wayfinding signs are directional, site identification or amenity identification signs. Interpretive signs are informational.

### **WAYFINDING SIGNAGE & GRAPHICS**

#### **1. Park Identification Signs**

The existing temporary HWP park entrance sign on the west side is effective, but institutional; it does not reflect a natural look and is not especially inviting. The typeface and layout of the sign panel does not harmonize well with the stone monument structure; a better solution would be individual letters mounted directly onto the stone.

#### **2. Attractions**

Signs that identify the park’s many activities and destinations are inconsistent and generally not well executed. Identifiers such as the Disc Golf Course sign are generic metal panels supported by individual metal posts.



### **3. Trail Signage**

Signage identifying trails and providing information about directions and mileage is varied and inconsistent. Included are “Forest Service” type wood signs and metal in several kinds of mounting conditions.

### **4. Amenities Identification**

Identification for restrooms, water fountains, telephones, etc. is inconsistent and the signs poorly constructed. Restroom signs may be in nonconformance with ADA (Americans with Disabilities Guidelines).

### **5. Safety rules and Regulations**

Many existing signs in the park are the result of a need to limit or qualify visitor behavior. Many other signs have evolved to cover seemingly obvious safety issues. The unfortunate result is a preponderance of negative messages in an environment that is intended to be a carefree respite from the visitor’s daily life. The fact that many park signs are negative messages is ironic when viewed against the large amount of energy invested in enhancing this natural environment.

### **6. Code-Required Signage**

Similar to safety rules and regulations, there is a number of these signs within the park area. Signs that are truly required need to be identified and displayed in an appropriate manner. The remainder should be eliminated or be displayed in another way.

### **7. Vehicle – Directionals and Parking**

Signs for drivers are a diverse combination of standard road signs, “Forest Service” signs and painted metal panels. Inconsistent typography, wording, and layouts are found throughout.

### **8. Pedestrian – Directionals**

Pedestrian signs in the park suffer from the same inconsistent ad hoc appearance as the vehicle signs. The placement of signs in HWP has occurred on an ad hoc basis with the net result that important intersections within the park are littered with signs of differing style and materials.

## **INTERPRETIVE SIGNAGE & GRAPHICS**

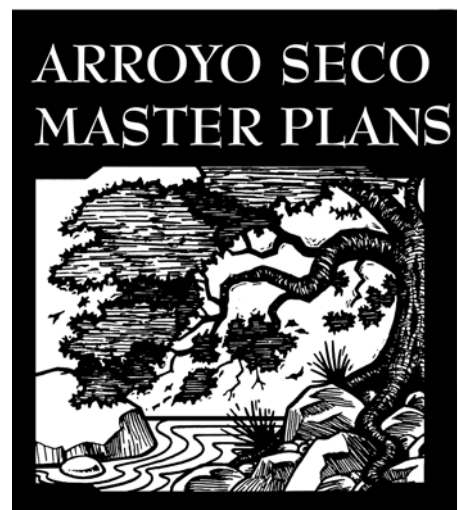
Very few examples of interpretation through signage and graphics exist in the park at the present time.

## **2.14 ISSUES & OPPORTUNITIES**

Based upon the analyses of the existing conditions and community outreach, specific issues and opportunities were identified to focus the Master Planning efforts; they include:

- Use of La Cañada-Verdugo Road for sediment removal;
- Improvements to eastside access at the Windsor/Ventura intersection;
- Oak Grove Drive traffic resulting from La Cañada High School and JPL;
- Multi-use conflicts between bicyclists, equestrians, and hikers as in the Central and Lower Arroyo;
- Disc Golf (back nine course) impact to the north Oak Grove area, that is, compaction and disturbance;
- Cultural resource opportunity to communicate the history of Native Americans, water resources, environmental education;
- Multi-use playing fields: organized sports to maximize facilities balance with habitat rehabilitation and water conservation needs;
- Water feature for recreation use and for habitat establishment;
- Habitat establishment and restoration;
- Devil's Gate Dam access for maintenance and sediment removal;
- Parking for JPL and the importance of the revenues generated from the parking lease;
- Public access to the dam area for observation point, bird watching and hiking;
- Flood Control issues: When and how the water is held, sediment and habitat removal;
- Water conservation issues include the ability to spread additional water to recharge the aquifer. Pump-back system will spread the water retained by the dam to replenish aquifer by pumping water to the spreading basins.

# **Section 3. Hahamongna Watershed Park Master Plan**



SECTION 3:

## HAHAMONGNA WATERSHED PARK MASTER PLAN

This section describes the Master Plan recommendations for the Hahamongna Watershed Park (HWP) as indicated and partially illustrated in Exhibit 3-1, Hahamongna Watershed Park Master Plan. The recommended Master Plan elements are firmly based upon the goals and objectives outlined in Section 1, as well as a rigorous community outreach process; an inventory and analysis of the natural and man-made environment of the HWP site; the discussion and direction from the Hahamongna Watershed Park Advisory Committee; and consultation with other public agencies that share responsibility for the area.

The Master Plan recommendations are presented and discussed as follows:

- Water Resources Management
- Conceptual Grading Plan
- Habitat Restoration Plan
- Recreation Trails
- Westside / Oak Grove Improvements
- East Side Improvements
- Circulation and Parking
- Utilities & Infrastructure
- Safety, Security & Accessibility
- Programs

### **3.1 WATER RESOURCES MANAGEMENT**

Issues pertaining to flood management, water conservation, sediment deposition and removal, as well as habitat restoration, are inextricably related. This fact is reflected in the number of public agencies that are stakeholders in HWP and whose cooperation and commitment are essential to the success of this element of the Master Plan. The conceptual framework for water resources management is outlined below, followed by the Conceptual

# HAHAMONGNA WATERSHED PARK MASTER PLAN

One of the Arroyo Seco Master Plans

Adopted 9/29/03

**HABITAT ESTABLISHMENT & RESTORATION**

- COAST LIVE OAK WOODLAND
- SOUTHERN WILLOW SCRUB
- SAGE SCRUB
- RIVERSIDIAN ALLUVIAL FAN SAGE SCRUB
- MULE FAT SCRUB
- SOUTHERN SYCAMORE RIPARIAN WOODLAND
- STREAMBED RIPARIAN

**WATER CONSERVATION**

- WESTSIDE SPREADING BASINS\*

**SUPERVISED OVERNIGHT CAMPING AREA**

- PARK RANGER STATION IMPROVEMENTS
- RESTROOM IMPROVEMENTS
- IMPROVED PARKING AREAS

**WEST SIDE PARK ACCESS**

- PARK ENTRANCE AT FOOTHILL BLVD.
- OAK GROVE DRIVE IMPROVEMENTS

**OAK GROVE AREA**

- GROUP PICNIC SHADE SHELTERS
- WEST SIDE PICNIC AMENITIES
- OAK GROVE FIELD RESTROOM
- FOOTHILL DRAIN IMPROVEMENTS
- OUTDOOR AMPHITHEATER
- MULTI-USE FIELDS ~ 3
- DISC GOLF IMPROVEMENTS
- EXPANDED PARKING AREA
- NATIVE PLANT NURSERY

**LA CANADA H.S.**

**EQUESTRIAN STAGING AREA**

- UPGRADE RESTROOM
- REALIGN AND WIDEN ACCESS ROAD
- BERKSHIRE DRAIN IMPROVEMENTS

**PERIMETER TRAIL**

**SUNRISE OVERLOOK**

**BICYCLE ROUTE**

**FLINT WASH BRIDGE**

**DEVIL'S GATE DAM AREA**

- NEW PARKING AREA AT OBSERVATION DECK
- EAST ACCESS (ENTRY) TO DAM
- WEST ACCESS (EXIT) FROM DAM
- CLOSE LA CANADA-VERDUGO ROAD
- DAM KEEPER'S QUARTERS & PUBLIC RESTROOM
- FENCING AT DAM & OBSERVATION DECK FOR PUBLIC SAFETY

TAKATA ASSOCIATES  
 PHILIP WILLIAMS & ASSOCIATES  
 HINTZ & BALVIN  
 THE NATELSON COMPANY  
 MIRALLES ASSOCIATES  
 MONTGOMERY WATSON  
 BETH THIELEN, ARTIST  
 PARSONS ENGINEERING SCIENCES  
 HUNT DESIGN ASSOCIATES



- GABRIELINO TRAIL AREA**
- CONVERT JPL PARKING TO PUBLIC PARKING\*
  - NEW PUBLIC RESTROOM\*

- WATER CONSERVATION**
- EAST SIDE SPREADING BASINS\*
  - ALTADENA DRAIN IMPROVEMENTS
  - ALTACREST DRAIN IMPROVEMENTS\*

**SUNSET OVERLOOK**

- EAST SIDE PARK ACCESS**
- NEW PARK ENTRANCE

- WATER CONSERVATION**
- SEASONAL FLOOD MANAGEMENT
  - WATER CONSERVATION POOL
  - PUMP BACK SYSTEM\*
  - OVERALL STORM DRAIN IMPROVEMENTS

- FLOOD MANAGEMENT**
- SEDIMENT & DEBRIS MANAGEMENT
  - SEDIMENT REMOVAL ACCESS

- TRAIL DEVELOPMENT**
- PERIMETER TRAIL
  - FLINT WASH BRIDGE CROSSING
  - NORTH BRIDGE CROSSING
  - EAST RIM TRAIL & CONNECTORS
  - WEST RIM TRAIL & CONNECTORS
  - DAM OBSERVATION TRAIL

\* This project could impact NASA/JPL perchlorate clean-up and cannot proceed without NASA/JPL coordination.

Exhibit 3-1, Hahamongna Watershed Park Master Pan

Grading Plan that details the physical reshaping of the flood basin to achieve the desired balance between all the issues associated with water resources management.

## FLOOD MANAGEMENT

The primary purpose of the Devil's Gate Dam is to provide flood protection to downstream communities. The dam must be able to contain an appropriate volume of water while a storm passes and then slowly release the water at a rate consistent with the capacity of the downstream flood channels. Floodwater, having risen to elevation 1040.5, can typically be accommodated by flowing out through the windows of the spillway headworks (see Section 2, Existing Conditions, for a detailed description of dam operations). Under the most extreme conditions, when the floodwater rises faster than it can flow through the windows in the spillway headworks, water will rise to the top of the dam. All areas of HWP situated below elevation 1075, the top of the dam, could become flooded. Park elements need to be designed with the following flood considerations: (1) The area that is most frequently inundated is below elevation 1040.5 (the floor of the spillway); (2) park elements sited between elevations 1040.5 and 1075 will need to be reviewed by all parties and designed for the possibility of several days of inundation.

The flood capacity below elevation 1040.5 should be as great as possible for flood management, water conservation, and sediment management. Currently, the area below this elevation covers 92 surface acres. When the water level is at spillway height (elev. 1040.5), much of the 92-acre area is covered with only a few feet of water. The conceptual grading plan, described later in this section, proposes to excavate material to create a deeper debris and sediment basin behind the dam. Excavated material will be placed both above and below the 1040.5 elevation. The material excavated will be used to raise areas identified for habitat restoration and recreation facilities to protect them from most annual inundations. The overall flood area will be reduced from 92 surface acres to 69 surface acres, so that an additional 23 acres of land will be gained for habitat restoration and recreation along with five acres of streambed riparian habitat. At the same time, the basin will have an increased holding capacity of 1,894 acre-feet of floodwaters, up from the current capacity of 1,424 acre-feet, measured at 1040 feet elevation. This would meet the County's desire to increase the capacity behind the dam for holding more storm water and for accumulating inflowing sediment.

## SEDIMENT AND DEBRIS MANAGEMENT

### **Seasonal Flood Management / Water Conservation Pool**

The flood management/water conservation pool, also referred to as the sediment and debris basin, directly behind Devil's Gate Dam, is maintained and operated by Los Angeles County Department of Public Works. LACDPW has identified 1,400 acre-feet as the *minimum* capacity needed for flood management. Therefore, the capacity below the spillway floor must be 1,400 acre-feet or greater. On average, this volume is equal to the deposition from one major debris event. The proposed grading plan creates a maximum capacity of 1,900 acre-feet. The proposed minimum capacity of 1,400 acre-feet behind the dam allows for 500 acre-feet (806,667 cubic yards) of capacity for inflowing sediment. Year after year, as stored sediment builds up toward the 500-acre-foot capacity, thereby decreasing the minimum capacity behind the dam, sediment must be removed. The difference between this maximum capacity and the minimum capacity equals 5½ years of the historical annual average inflow of 145,200 cubic yards of sediment.

Debris and sediment removal on an annual basis (approximately 3,000 cubic yards) will occur each summer to maintain the lowest opening in the dam, the sluice gate. This could allow for the continuing operation of the FAST (Flow Assisted Sediment Transport) program. This program has accounted for approximately 20% of the incoming sediment passing through the dam and not accumulating in the flood basin. See Section 2, Existing Conditions, for a detailed description of how the dam is operated.

Sediment removal operations will be needed on average every 5½ years to reestablish the full 1,900 acre-foot capacity. Given the unpredictable nature of Southern California rainfall, sediment should be removed from HWP on an "as needed" basis. This means that sediment removal could take place in consecutive years. A review of historical data indicates that it is more likely to occur within a range of three to seven years. The Master Plan recommends that procedural policies and specifications for processing and removal of sediment be cooperatively developed by the County and the City of Pasadena.

### **Sediment Removal Operations**

The conceptual grading plan proposes to shape the basin with 3:1 slopes. The grade of the slope balances the need to maximize capacity within a smaller area with safety, stability, and ease of maintenance. Below elevation 1030, newly deposited sediment, debris and emerging vegetation will be excavated. All sediment removal within the 1030 elevation will be done to maintain flood capacity, thereby minimizing the impacts to the rest of the flood plain and allowing opportunities for habitat restoration. The Master Plan recommends that a permitting process be established that allows for this excavation on an "as needed" basis.

The deposition of sediment entering the basin can be controlled by the elevation of water held behind the dam. When inflowing, sediment-laden waters meet the slower moving water behind the dam, sediment drops out. If water is held behind the dam at elevation 1030, incoming storms will deposit sediment on the northern edge of the pool away from the lower dam openings. The deposited sediment will be below the restored habitats (situated above elevation 1030) and will minimize the amount of annual sediment removal necessary to keep the sluice gate clear.

As a storm passes, water continues to enter the basin, but it becomes less sediment-laden. When this occurs, water should be allowed to accumulate to the maximum capacity inundating the established willow and riparian habitats around the edge of the basin. This will provide those habitats with the nutrients and water regime they require. It will also allow clearer water to rise to the intake level and be pumped back to the spreading basins (see section on “Pump-Back System” on pages 3-7).

For the safe operation of the dam and downstream floodwater structures, debris needs to be prevented from passing through the dam and obstructing openings in the dam or spillway headworks. Two areas on the eastside of the flood management/water conservation pool will be raised to elevation 1045, kept clear of vegetation, and used as staging areas for equipment to remove floating debris. One is located adjacent to Johnson Field, the other midway between Johnson Field and Devil’s Gate Dam.

Sediment removal operations will be staged from access roads on each side of the flood management/water conservation pool. Access to these roads will be via the proposed entrance and exit ramps to Oak Grove Drive (see Dam Access in this Section of the Master Plan) and via a permanent haul road on the west side of the Flood Management/Water Conservation Pool. The haul road will provide sediment removal trucks and maintenance equipment with direct access to the flood management/ water conservation pool and to all destinations via Oak Grove Drive and the Berkshire Place interchange on the 210 Freeway, without driving through the adjacent residential neighborhoods.

Sediment removal activities will occur every three to seven years and last for three to five months during the summer and early fall. To significantly reduce the cost, the sediment could be processed on-site. If it is processed on-site, the portable processing equipment will need to be state-of-the-art to minimize dust and noise. When all of this activity is occurring in the flood management/water conservation pool area and on the sediment removal haul roads, it will create a significant presence in the park. The Master Plan recommends installing interpretive signage and displays, along with the development of a community education and outreach program to explain the critical importance of sediment removal to flood management and to public safety.



### **Upper Channel Deposition Zone**

The alluvial fan that has formed at the mouth of the Arroyo Seco Canyon is by definition a deposition area. The uncompacted soils of this zone support the formation of riversidian alluvial fan sage scrub. Historic photographs indicate that extensive mining occurred throughout this area, resulting in a slight depression. This area will accumulate deposition from smaller storm events and erode during high-velocity events depending on the weather. Sediment removal would eventually need to be considered in order to protect the adjacent spreading basins from flooding. Sediment removal should be event and performance based. The level of deposition should not exceed elevation 1070 in this zone of the channel.

### **WATER CONSERVATION**

Water in Southern California is a valuable but fickle commodity. In an average rainfall year, Devil's Gate Dam with a minimum capacity of 1,400 acre-feet below the dam spillway height could fill with inflowing water 1-3 times, depending on the condition of the watershed. In a drought period the watershed could retain most of the rainfall and the dam would not fill up once. In the winter of 1992-93 the dam could have filled more than 40 times, if the water had been held. With such swings in available water, a sophisticated operating procedure needs to be developed to respond to the fluctuating supply of water within the flood basin.

Changing the existing method, area, and pattern of recharging groundwater could affect the NASA/JPL remediation activities for groundwater contaminants. Projects to improve water resource operations will require further environmental review and close coordination with NASA/JPL prior to any implementation.

### **Seasonal Flood Management/Water Conservation Pool**

The flood basin behind the dam has been filling with sediment. With an existing capacity of 1,424 acre-feet, the basin is approaching its minimum capacity of 1,400 acre-feet. Since 1978, when the dam was declared unsafe to hold water, vegetation has been allowed to grow in the 92-acre area that is below the 1040.5 elevation. When water conservation measures are implemented, the vegetation in this area will begin to die back since it is not adapted to inundation.

To create new and higher habitat quality above the spillway elevation, to increase the capacity behind the dam, and to allow for inflowing sediment accumulation, the Master Plan

recommends the creation of a seasonal pool. The pool will require the excavation of 378 acre-feet of material, to be redistributed on site. Of this total, 150 acre-feet will be placed below the 1040.5 spillway elevation and 228 acre-feet will be placed above. In addition, 243 acre-feet of material will be removed off-site to bring the capacity up to 1,900 acre-feet below spillway elevation. This deeper pool will have a reduced surface area (from 92 to 69 acres).that will be frequently inundated It will create a “flood management pool” that can better manage inflowing sediment and floating debris and a “water conservation pool” to allow the seasonal retention of floodwater to pump back to the upstream spreading basins.<sup>1</sup>

### **Pump-Back System**

The infrastructure needed to pump water at selected times from the flood management/water conservation pool will be installed behind the dam. The distribution system will carry water from a new inlet, located near the dam, along the bottom of the eastern slope adjacent to the other domestic water distribution lines. The storm water will be pumped north to the highest east side basins, continuing west across the North Bridge Crossing to gravity-feed metered water to both the proposed westside basins and existing improved eastside basins.

A bridge will be constructed across the stream in the vicinity of the Altadena Drain. This will provide the means for utilities and the water distribution system to cross to the proposed westside spreading basins as well as provide the northerly crossing of the perimeter trail to be used by park visitors, maintenance and emergency vehicles.

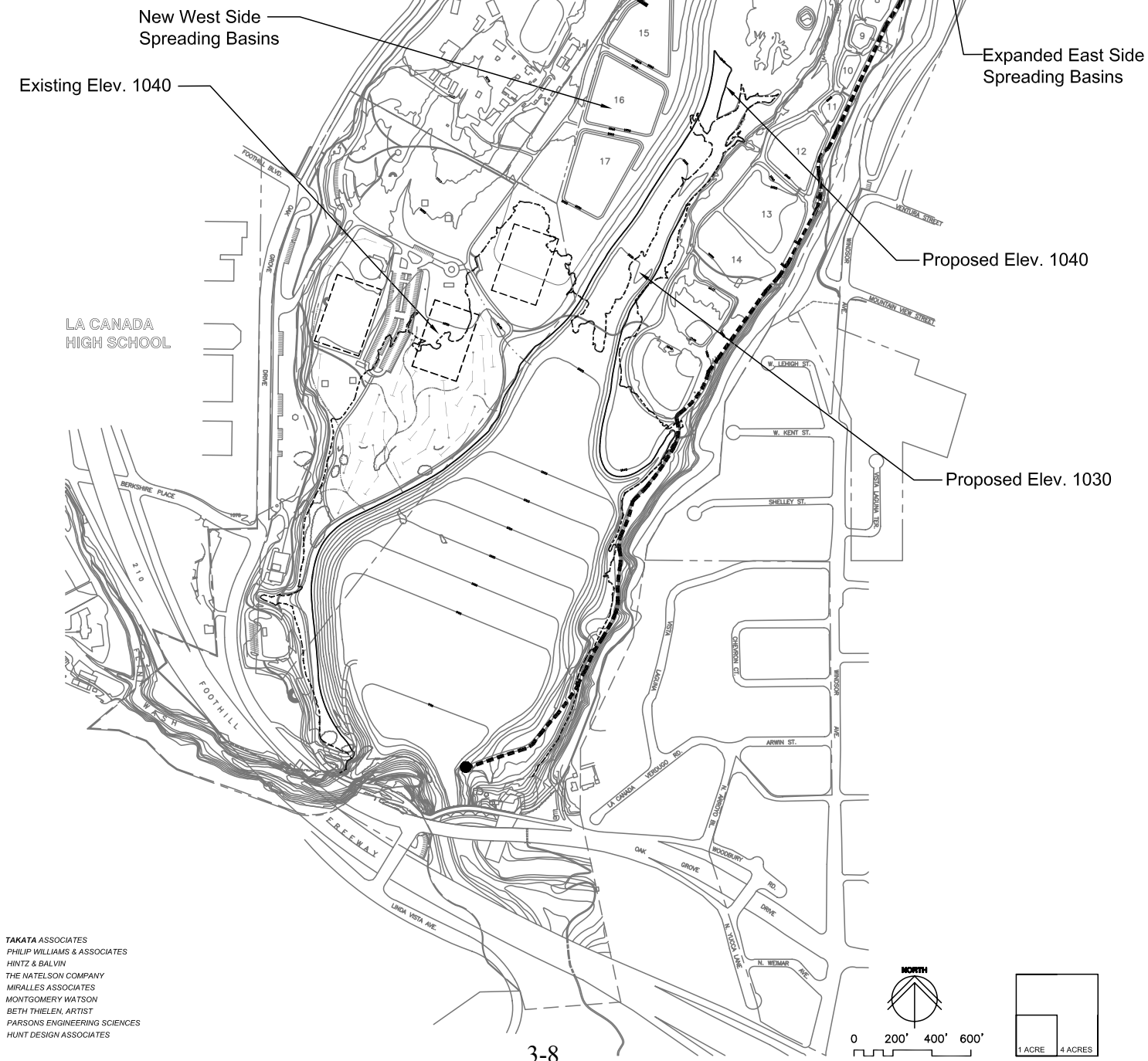
---

<sup>1</sup> See “*Flood Hazard, Sediment Management, and Water Feature Analyses, Hahamongna Watershed Park, Pasadena, CA*” prepared by Philip Williams & Associates, Ltd. In the Technical Reports of this Master Plan, The PWA alternative suggested that with further study it might be shown that increased groundwater recharge might be achieved in Hahamongna if natural flows are restored to the Arroyo Seco channel and if ponding were allowed to occur regularly adjacent to the dam. This alternative was not considered as a proposal for the master plan because it did not meet some basic master plan goals and objectives, nor did it adequately address the operation constraints of the involved water agencies. In this alternative, storm water that would have been diverted to the spreading grounds would instead ideally percolate into the groundwater during low flows along the Arroyo Seco. However, during higher flows water would not have the time or ability to percolate in the Arroyo Seco channel due to the grade and topography of the basin floor and would therefore flow to the dam. This added storm water, which would normally be diverted to the spreading basins, would result in the reservoir filling up more rapidly and since the seasonal incoming totals already exceed the limited capacity of the reservoir, even more storm water would be lost to the ocean, again, making the PWA alternatives a less favored alternative, as proposed.

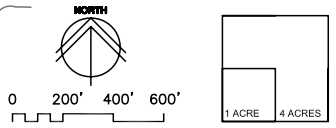
City of Pasadena  
**Hahamongna Watershed Park**  
**MASTER PLAN**  
 One of the Arroyo Seco Master Plans

Exhibit 3-2  
**WATER CONSERVATION**

- WATER DISTRIBUTION SYSTEM
- - - - PUMP BACK LINE



TAKATA ASSOCIATES  
 PHILIP WILLIAMS & ASSOCIATES  
 HINTZ & BALVIN  
 THE NATELSON COMPANY  
 MIRALLES ASSOCIATES  
 MONTGOMERY WATSON  
 BETH THIELEN, ARTIST  
 PARSONS ENGINEERING SCIENCES  
 HUNT DESIGN ASSOCIATES



## **Spreading Operations**

A primary goal of the Master Plan is to maximize the amount of water that is available to recharge the Raymond Basin Aquifer. Operation of the Arroyo Spreading Basins was recently taken over by the City of Pasadena from the County. The City is obligated to the 16-member Raymond Basin Water Board to continue operation of the 13.1 surface acres of spreading grounds. The Raymond Basin requires that any changes to the spreading area and average annual quantity of water spread be equal to or greater than currently exists/occurs. Pasadena Water and Power has estimated that 22-26 surface acres would be optimal to spread. The Master Plan dedicates a total of 26 surface acres to the spreading operation.

An additional eight acres will be created by the construction of three new spreading basins on the west side of the flood basin. On the east side, existing basins no.1 through no.4 will be expanded and two new basins constructed north of the existing basins, adding 4.9 acres to the existing 13.1 surface acres of spreading. An illustrated plan of the finished configuration of spreading basins is shown in Exhibit 3-3, Spreading Basins & Northeast Parking Area. Note that this exhibit indicates the new numbering of the basins. Expansion of these basins will require the relocation of the 1,200 parking spaces in the eastside JPL parking lot.

Changing the existing method, area and pattern of recharging groundwater could affect the NASA/JPL remediation activities for groundwater contaminants. Projects to improve water resource operations will require further environmental review and close coordination with NASA/JPL prior to any implementation.

The expanded spreading acres of water will allow the Cities of Pasadena and Altadena to increase domestic consumption capacity from 40% to 60%, once groundwater contaminants have been sufficiently remediated. This proposal will also provide a significant water cost savings by minimizing the need to purchase imported water. The Pasadena Water and Power Department has estimated that the additional spreading represents approximately \$500,000 per year in savings to the City.

The City's intent is to retain as much flood water and normal run-off water as possible for spreading and habitat enhancement. In this regard, it is currently under consideration to once again fully use the water from the network of tunnels underlying the eastern and southeastern edges of the basin (this water amounts to 4-7 cu. ft. per sec.). This water is derived from flood waters being retained behind the dam that charge the tunnels.

Exhibit 3-3, Spreading Basins & Northeast Parking Area



### **3.2 CONCEPTUAL GRADING PLAN**

The siting of all the master plan elements is ultimately determined by flood elevations as established by the reconstruction of Devil's Gate Dam and by the impacts of periodic inundation. The conceptual grading plan was developed to achieve a balance between flood management, water conservation, habitat restoration, and recreation. It attempts to resolve some long-standing problems within the basin, such as the remnant impacts of the historic mining operations and it also suggests spatial solutions for various long-term goals.

The intent of the Conceptual Grading Plan is:

- to improve flood capacity for the County
- to improve management of sediment inflow
- to increase water spreading capacity
- to improve native habitat quantity and quality
- to protect the proposed recreation elements
- to minimize costs and environmental impacts by moving material the shortest distance possible

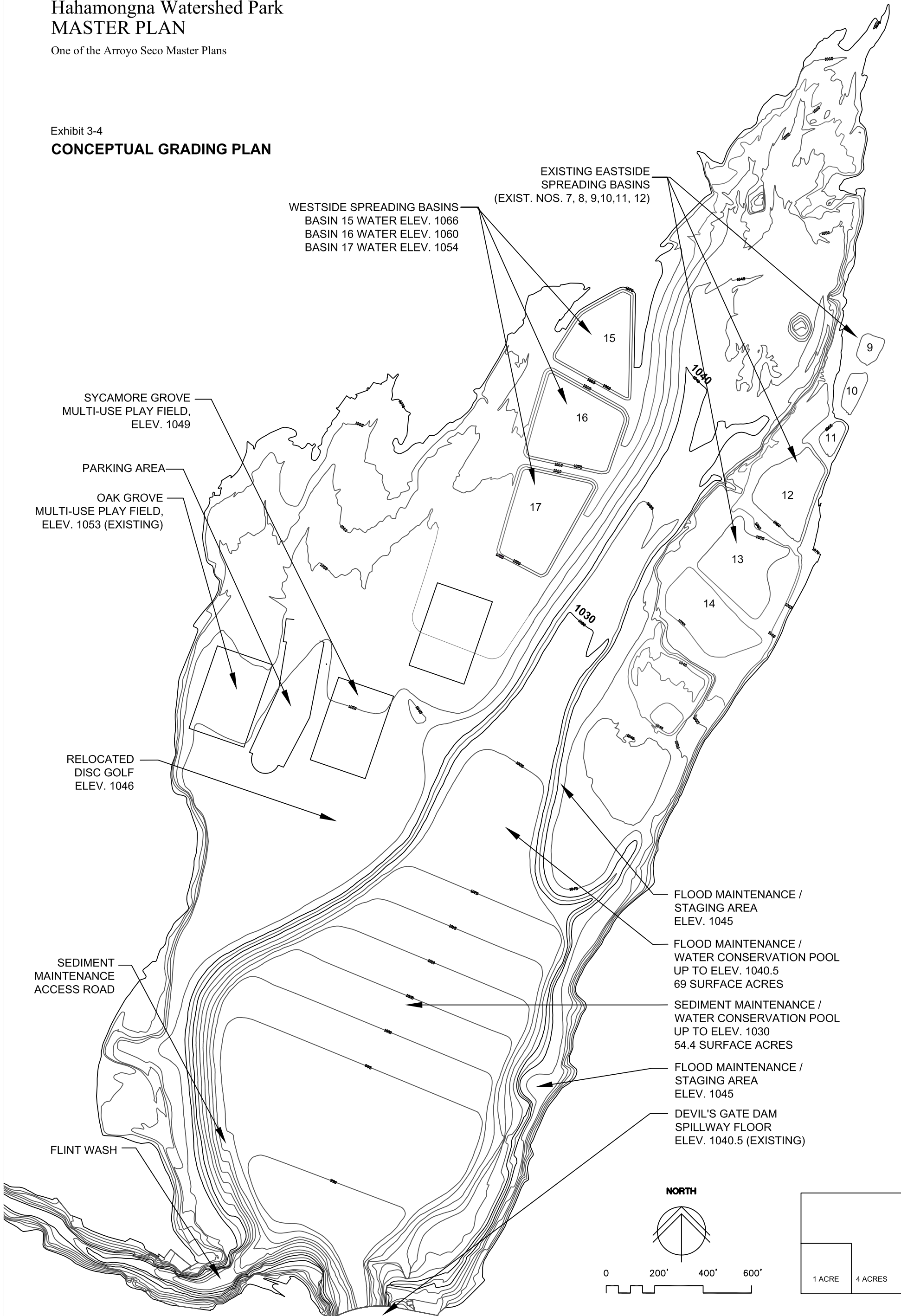
The Water Resources and Watershed Management Divisions of the Los Angeles County Department of Public Works assisted in the preparation and review of the proposed grading plan, illustrated in Exhibit 3-4, Conceptual Grading Plan.

### **SEASONAL FLOOD MANAGEMENT/WATER CONSERVATION POOL**

The 1040.5 elevation of the Conceptual Grading Plan will be the designated limit of the flood management/water conservation pool operated by the County. The banks of the flood management /water conservation pool will be maintained at a 3:1, or flatter, slope between elevation 1030 and 1040.5. Below elevation 1030 the banks will be maintained at a 3:1 slope. The proposed Perimeter Trail, circling HWP, will be constructed at or above elevation 1045. This dirt roadway, used by hikers and equestrians, will act as a boundary line that separates recreational uses of HWP from areas dedicated to flood control, water conservation and habitat restoration. There are no designated recreation trails inside this loop with the exception of one trail, just north of the flood management/water conservation pool, that crosses the widened stream corridor at elevation 1027 to connect the east and west recreational areas (see Exhibit 3-8, Trail Plan). The only access to the flood control/water conservation pool will be the County sediment removal road on the west side of the pool and the two staging areas on the eastside of the pool.

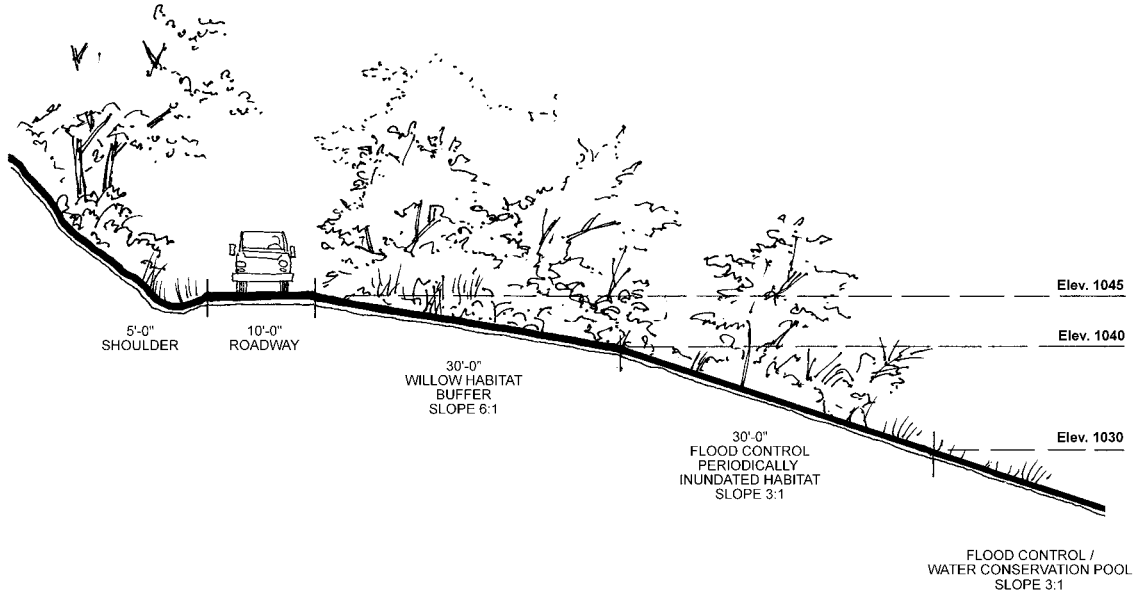
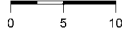
City of Pasadena  
**Hahamongna Watershed Park**  
**MASTER PLAN**  
 One of the Arroyo Seco Master Plans

Exhibit 3-4  
**CONCEPTUAL GRADING PLAN**



FLOOD CONTROL / WATER CONSERVATION  
**LOWER POOL**  
CONCEPTUAL BANK GRADING

SCALE: 1" = 1/8"



**Exhibit 3-5**

***The banks of the flood management/water conservation pool flatten out along the upper sections of the basin allowing for a wider section of restored willow habitat.***

From the Perimeter Trail (approximately elevation 1045) to elevation 1030, the southern willow scrub habitat will be reestablished around the pool. This dense, shrubby habitat will serve as a buffer between the operation of the flood management /water conservation pool and recreation uses of HWP. The health of the willow habitat will be maintained by the periodic inundation of areas between elevation 1030 to 1040.5 before the accumulated water in the flood management/water conservation pool is released or pumped back for spreading. The southern willow scrub habitat from elevation 1030 to 1045 and above will be maintained by extended periods of water holding at elevation 1030 and below. Within this area of intermittent inundation, southern willow scrub habitat may need to be reestablished, should it be impacted by sediment, based on the need for maintaining flood capacity. It is recommended that sediment removal within this area be managed through the combined consideration for habitat maintenance and flood control. This restoration project is further discussed in Section 3.3, Habitat Restoration.



## STREAM CHANNEL WIDENING

Directly upstream of the flood control/water conservation pool, the riparian stream channel will be widened. Years of dumping along the western edge of the stream course narrowed its width and raised the elevation. The conceptual grading plan recommends the widening of the channel to reestablish the braided stream course and improve and expand the streambed riparian habitat. See following Section 3.3, Habitat Restoration.

As indicated on the conceptual grading plan, recreation facilities and spreading basin embankments need to be raised to elevation 1045 or higher to protect them from annual inundation. Soil excavated from the stream channel widening can be used on-site to raise the grades for the proposed new habitats and facilities. Existing trails that traverse the embankments will be abandoned to limit access to restoration areas and to maintain an area dedicated as a wildlife corridor.

## OTHER PLAN ELEMENTS

The following plan elements will be significantly shaped by the Conceptual Grading Plan:

### **Spreading Basins**

The Preliminary Plan of 1994 proposed that the edges of the existing spreading basins be recontoured and landscaped to effect a natural setting. Based on further examination of the changes in elevation along the eastside and further discussion with Pasadena Water & Power Maintenance Department, the opportunities for developing a natural landscape are limited. Basins will be shaped for maintenance and functional considerations. Landscape and habitat improvements will be made to the tops of the dikes separating the basins, along the park access road to Johnson Field, and to the edge of the Perimeter Trail adjacent to the basins. Landscaping will not be extended down the inside of the basin slopes. See Section 3.3, Habitat Restoration.

To facilitate maintenance of the existing spreading basins, the Perimeter Trail will remain along the western edge of the spreading basins. Basin maintenance operations will be staged from this side. An opening in the habitat restoration will be left on the western edge of the existing basins for basin maintenance access.

### **Sycamore Grove Fields & Relocated Disc Golf Course**

In order to protect the proposed southern field and relocated fairways of the disc golf course from flood inundation, the grade along the western part of the basin will be raised above

elevation 1045. Material excavated to increase the capacity of the flood management/water conservation pool will be used to raise the site above inundation level. The small areas of existing willows, between and around the relocated fairways, will be linked and receive less fill to create a system of drainage courses between raised areas with mulefat scrub around the edges. The drainage courses will preserve and extend the existing drainage pattern.

The northern Sycamore Grove field will be located where past mining operations excavated a large depression (at elev. 1025), well below the flood inundation level (elev. 1040.5). Earthen material excavated to widen the stream channel will be used to raise the elevation of this adjacent multipurpose field site above elevation 1055.

## USE OF LANDFORM GRADING PRINCIPLES

The upper slopes of the flood management/water conservation pool, the widened edges of the stream channel, and the eastern slopes of the northern Sycamore Grove field and westside spreading basins will be graded using landform-grading principles. “Landform-grading” is an atypical form of grading that replicates the irregular shapes and gradients of natural, stable slopes.<sup>2</sup> The resulting landscape is more sculpted with concave and convex curves mimicking a pattern of drainage that would occur naturally. Re-vegetation of the slopes also follows a distinctly naturalistic pattern with groupings of trees and shrubs clustered in concave areas where the drainage pattern focuses runoff, and with woody and herbaceous scrub species planted on the drier convex slopes.

This method of grading seeks to minimize erosion and enhance plant sustainability, thus creating a functioning and evolving ecosystem that will sustain the wildlife that currently exists and the wildlife that one day may come to inhabit HWP. Although the contours indicated in the Conceptual Grading Plan are mechanically drawn, it is the intention of the Master Plan to create a landscape that mimics in as many ways as possible the natural undulations of the foothills using this methodology of grading.

## IMPLEMENTATION OF THE GRADING PLAN

Placement of excavated material to raise an area above the frequently flooded zone will affect the existing drainage and habitat associated with the specific project. Newly restored habitats in these raised areas will require time to become established. This mitigation needs

---

<sup>2</sup> Journal of Geotechnical Engineering, “Landform Grading and Slope Evolution” Horst J. Schor and Donald H. Gray, October 1995. (See the adopted Arroyo Seco Design Guidelines, Appendix C.)

to occur before other projects in the implementation sequence are started and the excavation and placement of needed material for the next project affects additional habitat.

The material excavated from the flood management area, to be used for new raised parkland, will affect flood debris and sediment management. Therefore, all projects where material is excavated to be used as fill within the Los Angeles County Department of Public Works (LACDPW) leased Flood Easement will require its review and approval. Because of the quantities of material involved, LACDPW may choose to engineer some of the proposed projects.

Projects requiring extensive grading that affect both existing and proposed habitats will need to be reviewed and approved by the appropriate State and Federal environmental agencies prior to the engineering of the project. This review process will impact the lead-time required for these projects. Additionally, the cost and efficiency of construction will be considered in how the projects are sequenced.

### **3.3 HABITAT RESTORATION**

Habitat establishment and restoration is proposed throughout the Hahamongna Watershed Park, as illustrated in Exhibit 3-7, Proposed Terrestrial Natural Plant Communities. For purposes of this Master Plan, “habitat establishment” is the creation of improved habitat quality<sup>3</sup> in areas where a particular native plant community is not present or it will involve adding area to an existing plant community where that community does not exist. “Habitat Restoration” is the improvement of the habitat quality, including increasing the plant and animal species diversity in an area where a plant community already exists. In general, all existing native plant communities that are not impacted by proposed projects including grading, removal of exotic species, or inundation, will be restored.

The areas designated on the Proposed Plant Communities map are specific plant communities where the specific species is dominant. Some areas can be small, but collectively make up a habitat of sufficiently large area to support diverse wildlife. The master plan includes a map illustrating the habitats and their associated plant communities, Exhibit 3-7A.

---

<sup>3</sup> “*Habitat Quality*” of a site can be defined in terms of a range of its assessed attributes, functions, and values. Excellent habitat generally refers to undisturbed areas that contain mostly native plants and composed of sustainable biodiversity (vegetation and wildlife). The ranking of habitat as excellent, good, fair, or poor is subjective and varies widely depending on physical condition, degree of biodiversity and species addressed. For example, biologists often generalize that riparian (streamside) habitat is of excellent quality if it provides dense cover, contains wildlife and plant species diversity, is composed of multiple strata of vegetation, is extensive in area, and contains surface water or saturated soils; the non-existence of any or some of these characteristics decreases the habitat quality.

The proposed habitats (Woodland, Upland Shrub, Alluvial, and Riparian) are broad categories based on physical conditions and associated plant communities supporting wildlife. This mosaic of contiguous plant communities is beneficial for habitat because of the diversity of native plant species and their physical structure. Open spaces as with Streambed Riparian and Riversidian Alluvial Fans Sage Scrub, combined with dense cover as with Mule Fat Scrub and Southern Willow Scrub is beneficial for a diverse wildlife.

A larger area of a particular plant community is best for certain wildlife species. The proposed relocated disc golf area has a mosaic of narrow willow scrub plant community surrounded by a band of mule fat scrub plant community. The edge between these two different plant communities is beneficial for wildlife; however, with the close human proximity on the disc golf fairways, this area will not be habitat of high quality for a diverse wildlife, but it will be better habitat than much of what is there now. The existing habitat over all has been heavily impacted by previous mining operations, resulting in an unnatural topography that is not optimum for this plant community. The area also has extensive ruderal areas, which do not support much diversity of wildlife. The USFWS, SDFG and the master plan biologist have commented on this specific area as fragmented habitat. They have suggested that the areas of willow scrub be wider; however, it is further suggested that during the specific project design phase wider bands of willow scrub plant community be created between the Perimeter Trail and the Water Conservation Pool. The area within the proposed Perimeter Trail is to have limited human activity.

The information within this section is presented in two parts. The first part is a listing of major, site-specific Habitat Establishment and Restoration Projects proposed by the Master Plan. Their listing is intended to help convey the location, intent and magnitude of the proposed habitat establishment and restoration projects. Some of these habitat projects involve the establishment and restoration of more than one plant community within the same project area and they have been organized to compliment the project area phasing (see Section 4).

The second describes the habitat establishment and restoration efforts for each plant community throughout HWP, linking the various projects previously described to proposed acreage goals for each community.

## HABITAT ESTABLISHMENT AND RESTORATION PROJECTS

In addition to general improvements to the existing plant communities, eleven specific sites have been identified for restoration. A description of each project follows, and their location is identified in Exhibit 3-6, Habitat Restoration Projects.

### **1. Realigned Stream Corridor, Restore and Establish Habitat at**

This project area includes the stream zone and banks from just south of the Altadena Storm Drain outfall north to the JPL Bridge. This portion of the stream has been channelized behind an area that used to contain an earthen breakaway dam built to divert water to the spreading basins. The Master Plan recommends discontinued use of the site as a diversion facility.

The area contains elements of degraded ruderal vegetation. In the past, the site probably was a combination of sage scrub and riversidian alluvial fan sage scrub. The higher elevations of the banks have high potential for restoration to sage scrub by using the recommended planting procedures and palette of species. Restoring the site to include riversidian alluvial fan sage scrub would be difficult because the natural dynamics needed for proper alluvial deposition of sediment are incompatible with the area's topographic constraints and its current and future uses.

Because of channelization, the stream zone has the potential for restoration of a native riparian corridor. This restoration would be a continuation of the same plant community immediately north of the JPL Bridge. Enhancing and diversifying the tree and shrub canopy overstories along the central and northern portion of the Arroyo Seco drainage in HWP is recommended. A strategy to accomplish this sort of habitat enhancement is presented in this habitat restoration plan. See information on the native plant palettes and installation methods for the southern willow scrub, mule fat scrub, and riversidian alluvial fan sage scrub communities. Increasing the native tree and shrub species diversity along the stream is possible using western sycamore, white alder, Fremont and black cottonwoods, Mexican elderberry, bigleaf maple, California bay/laurel, southern California black walnut, and several types of willow.

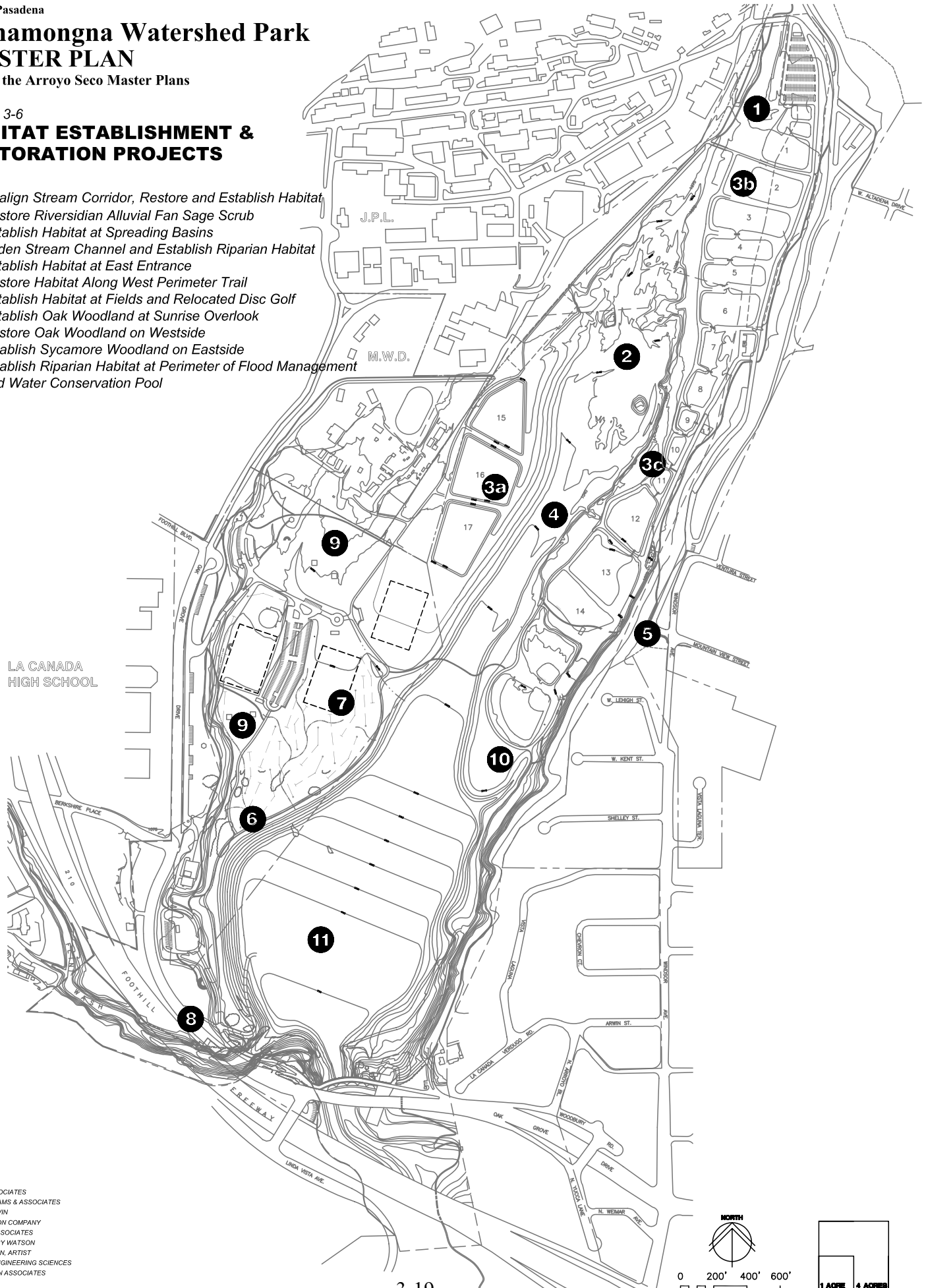
# Hahamongna Watershed Park MASTER PLAN

One of the Arroyo Seco Master Plans

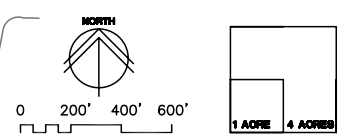
Exhibit 3-6

## HABITAT ESTABLISHMENT & RESTORATION PROJECTS

1. Realign Stream Corridor, Restore and Establish Habitat
2. Restore Riversidian Alluvial Fan Sage Scrub
3. Establish Habitat at Spreading Basins
4. Widen Stream Channel and Establish Riparian Habitat
5. Establish Habitat at East Entrance
6. Restore Habitat Along West Perimeter Trail
7. Establish Habitat at Fields and Relocated Disc Golf
8. Establish Oak Woodland at Sunrise Overlook
9. Restore Oak Woodland on Westside
10. Establish Sycamore Woodland on Eastside
11. Establish Riparian Habitat at Perimeter of Flood Management and Water Conservation Pool



TAKATA ASSOCIATES  
 PHILIP WILLIAMS & ASSOCIATES  
 HINTZ & BALVIN  
 THE NATELSON COMPANY  
 MIRALLES ASSOCIATES  
 MONTGOMERY WATSON  
 BETH THIELEN, ARTIST  
 PARSONS ENGINEERING SCIENCES  
 HUNT DESIGN ASSOCIATES



## **2. Restore Riversidian Alluvial Fan Sage Scrub**

Remnants of riversidian alluvial fan sage scrub are located south of the Altadena Storm Drain and the narrow mouth of the Arroyo Seco drainage as it opens into the basin. Periodic removal of sediment and debris from this area may be necessary in order to protect the spreading basins from inundation. Sediment removal in this area could mean the loss of much of the remaining riversidian alluvial fan sage scrub.

It is recommended that a compromise strategy be developed to help conserve as much as possible the sensitive riversidian alluvial fan sage scrub community. Creating several smaller cuts into the sediment deposits, parallel to the present stream flow course, would allow sediment debris removal, and would dissipate the energy from water flows into several drainage patterns. Rather than total removal of the sediment and consequential loss of much or all of the riversidian alluvial fan sage scrub, it would permit more of the alluvial fan sage scrub to remain intact. Such a strategy needs to be considered by the various parties involved with sediment management, and coordinated to develop a feasible design that would help conserve this sensitive community and yet accomplish some of the needed sediment removal.

This restoration project involves a number of smaller projects within a larger area. The larger area includes two plant communities: riversidian alluvial fan sage scrub and sage scrub, as shown on the plant community maps. The areas on either side of the stream corridor to the eastside spreading basins and to the westside JPL perimeter fencing and new westside spreading basins will be restored to these plant communities.

The current equestrian trail on the westside of the existing spreading basins traverses some of the best old alluvial fan sage scrub in the area, designated as sage scrub on the plant community maps. The proposal is to abandon the equestrian trail, relocate the trail on the spreading basins maintenance road (asphalt to be removed) and restore the existing trail with sage scrub.

Habitat restoration will also occur at the various drain outfalls along the JPL border, where exotic species need to be removed, debris and trash collected and disposed, and the riversidian alluvial fan sage scrub, sage scrub and southern willow scrub habitat restored.

Similarly, the old stream crossings (from both the east and west) have been covered over in asphalt by past mining operators. Most of this asphalt has been removed. The remaining asphalt needs to be removed and disposed, the stream allowed to take its course, and riversidian alluvial fan sage scrub and sage scrub habitat restored.

Additionally, this project establishes riversidian alluvial fan sage scrub at the southern end of this area where it transitions to a streambed riparian plant community. With the Stream

Channel Widening Project (Project 4) both the streambed riparian and the alluvial fan sage scrub plant community areas are enlarged.

### **3. Establish Habitat at Spreading Basins**

The Master Plan calls for construction of three new spreading basins (project 3a) on the west side of the basin in what is now a low-quality habitat of nonnative annuals. Part of this area has old sediment and debris material piled up above grade, covered with a thick layer of dead plant material. The dead plant material is like a thicket or thatch that inhibits many plants, including even weedy species, from becoming established. Most of the dead plant substance appears to be weedy species and willow branches.

This area is located in what historically was sage scrub and/or riversidian alluvial fan sage scrub. The dead plant matter will be removed and taken off-site to a disposal facility or treated on-site with solarization techniques (to help kill any living weeds) and ground into a mulch for later use. The embankments along the sides of the new spreading basins will be graded using landform contouring principles and planted with sage scrub species. Such plants require less water than those in a riparian or oak woodland and will not decrease the water infiltration and groundwater recharge rates of the spreading basins.

While maintenance regimes hinder the complete restoration of plant communities adjacent to the spreading basins, it is possible to add some native tree species that will establish themselves. However, installation of high numbers of these deep-rooted trees that are sustained by groundwater is at odds with the goals of water infiltration and groundwater recharge. A compromise strategy of using carefully selected and installed native riparian plants should be pursued (projects 3a,b, c) as is currently happening around the older eastside spreading basins.

### **4. Widen Stream Channel and Establish Riparian Habitat**

Prior to the construction of the dam, there would have been a more randomly meandering stream channel or number of channels in the large alluvial fan of the Arroyo Seco. Over time, mining and dumping practices greatly altered the stream course. A straighter, rather than meandering or braided, stream channel presently exists in HWP. The present stream channel, however, is stable due to the presence of the vegetation lining the drainage particularly in the mule fat scrub and southern willow scrub communities. Vegetation along the streambed is well established and helps direct predictable flow patterns toward the dam.

This stable vegetation and drainage course configuration will be preserved in the central portion of the basin. The western edge of the stream channel will be widened to at least



double its current width. The grading for this project will be done in conjunction with restoration projects no. 3a and no. 7.

### **5. Establish Habitat at East Entrance**

The Master Plan proposes that the existing Windsor/Ventura intersection be reconfigured for safety and other circulation improvements. This project would result in the removal and relocation of the existing 50-space parking lot located south of the intersection. This project will also allow for the enhancement of Sunset Overlook north of the intersection. The restoration site is located in what historically was sage scrub with scattered coast live oaks. Using native plants from the recommended palettes and installation methods for sage scrub and coast live oak woodland would aesthetically enhance the appearance of the area and benefit certain wildlife species.

### **6. Restore Habitat along Westside Perimeter Trail**

The new Perimeter Trail connection between the proposed disc golf area and the Flint Wash Bridge will be constructed along the raised edge of the flood management/water conservation pool. This trail will separate the recreation facilities and the activities in Oak Grove from the flood management/water conservation pool. The Master Plan proposes that the southern willow scrub plant community be restored along the trail in conjunction with an interpretive signage component.

Much of the trail area currently exists in southern willow scrub. This area is now prone to periodic flooding such as occurred during the 1997-1998 El Niño weather pattern due to the new dam spillway elevation (1040.5). Raising the grade along the trail to be above the average high water mark would increase the chances for successful establishment and survival of recommended trees and shrubs.

### **7. Establish Habitat at Sycamore Grove Fields & Relocated Disc Golf**

Establishment of southern sycamore woodlands in association with the new multi-use fields will be accomplished in areas where the grade is raised above elevation 1045. The small areas of existing willows will be linked and receive less fill to create a system of drainage courses between raised areas with mulefat scrub around the edges. The drainage courses will be extensions of the existing drainage pattern. Existing vegetation will be hand-cleared, leaving the willow trees that are taller than the depth of the fill. After the fill is placed, these willows will root at the higher elevation with the help of water conservation management practices. This along with other vegetation will create habitat of southern willow scrub of better quality than currently exists in the relocated disc golf area and along the eastern edge of the Perimeter Trail.

## **8. Establish Oak Woodland at Sunrise Overlook**

Sunrise Overlook is located at the southwestern corner of HWP along Oak Grove Drive and immediately northwest of Flint Wash. This area is now covered with a temporary cover of re-vegetated forb and grass species from an earlier seed mix application, as well as some non-native species. The oak woodland to the north will be extended into this area with random plantings of coast live oak to shade and protect the proposed amphitheater. Because the site exists in what formerly was sage scrub, components of this plant community should also be used.

## **9. Restore Oak Woodland on Westside**

The Master Plan proposes a supervised overnight camping area as well as two group picnic areas within the Oak Grove area on the west side of HWP. The existing oak woodland on the west side, including the slopes of the basin, is relatively devoid of immature oak trees and other native plants from this plant community. Once the back nine of the disc golf course is relocated, it is recommended that the plantings be diversified by utilizing native species from the plant palette and planting methods prescribed for coast live oak woodland restoration. Protection of oak and other restoration plantings at the camping and group picnic areas will be necessary.

## **10. Establish Sycamore Woodland on Eastside**

The existing mule fat scrub area south of Johnson Field is subject to periodic inundation. During the 1997-1998 El Niño weather pattern, this area was submerged for three weeks with a detrimental effect on the native plants. It is recommended that this area be raised to elevation 1045 and restored with plants associated with the southern sycamore riparian woodland. To the east and north of this area, western sycamores, black cottonwoods, and Mexican elderberry trees have naturalized and could spread to this area if it were protected from consistent flooding. Sycamore woodland is also suggested around the perimeter of the east and west spreading basins as well as around the edges of the multipurpose play areas (see proposed plant community map).

## **11. Establish Riparian Habitat at Perimeter of Flood Management & Water Conservation Pool**

The existing riparian southern willow scrub habitat below the 1040 elevation will degenerate and begin to die as soon as water conservation practices are implemented. These areas will be periodically inundated during the winter season. The habitat below the 1030 elevation will be completely submerged for varying lengths of time. The 1030 to 1040 elevation zone

around the water conservation pool will be habitat of a quality that could benefit from inundation several times a year. Below elevation 1030, emerging vegetation, debris, and sediment will need to be periodically removed from the newly graded flood management/water conservation pool per the sediment management guidelines that will be established by the County. This project proposes a phased operation that will permit the area elevated above the floodplain (elevation 1040) and the perimeter of the water conservation pool (elevation 1030 to 1040) to become established with southern willow scrub habitat. Once these areas are established and considered habitat of high quality, the existing riparian southern willow scrub areas (below elevation 1030) will be removed in a coordinated sediment and debris removal operation.

## HABITAT RESTORATION PLAN

The inventory of biological resources in HWP (see Section 2, Existing Conditions) helped to define the existing setting and lay the foundation for the habitat restoration plan. Exhibit 3-7, HWP Master Plan, Terrestrial Natural Plant Communities, illustrates the proposed spatial organization of the six identified plant communities currently present in HWP.

Inherent in the goals of the habitat plan are several criteria:

- The native species composition in the restoration efforts will be similar to the existing native plant communities found in HWP. Re-vegetation and restoration efforts are designed to promote habitat of high quality for wildlife and to also be appealing to humans and adapted to their activities. Planning and design must be biologically and ecologically conceived and sound in principle for these efforts to succeed. A sustained responsibility to maintenance of plantings and to the monitoring of their progress is required to accomplish the planned restoration efforts.
- Seed and other planting material (e.g., cuttings and container stock) will be collected from the project vicinity to the extent feasible, and/or, if necessary, will utilize plant stock material from reputable native-plant nurseries. Maintaining the integrity of the local gene pool composition of native vegetation currently found on-site and in nearby areas is a primary concern of this plan.
- Suitable planting techniques, monitoring, maintenance, and performance standards will be specified in order to maximize the opportunities for establishing viable, functional, and self-perpetuating native plant communities on restored sites.

City of Pasadena

# Hahamongna Watershed Park MASTER PLAN

One of the Arroyo Seco Master Plans

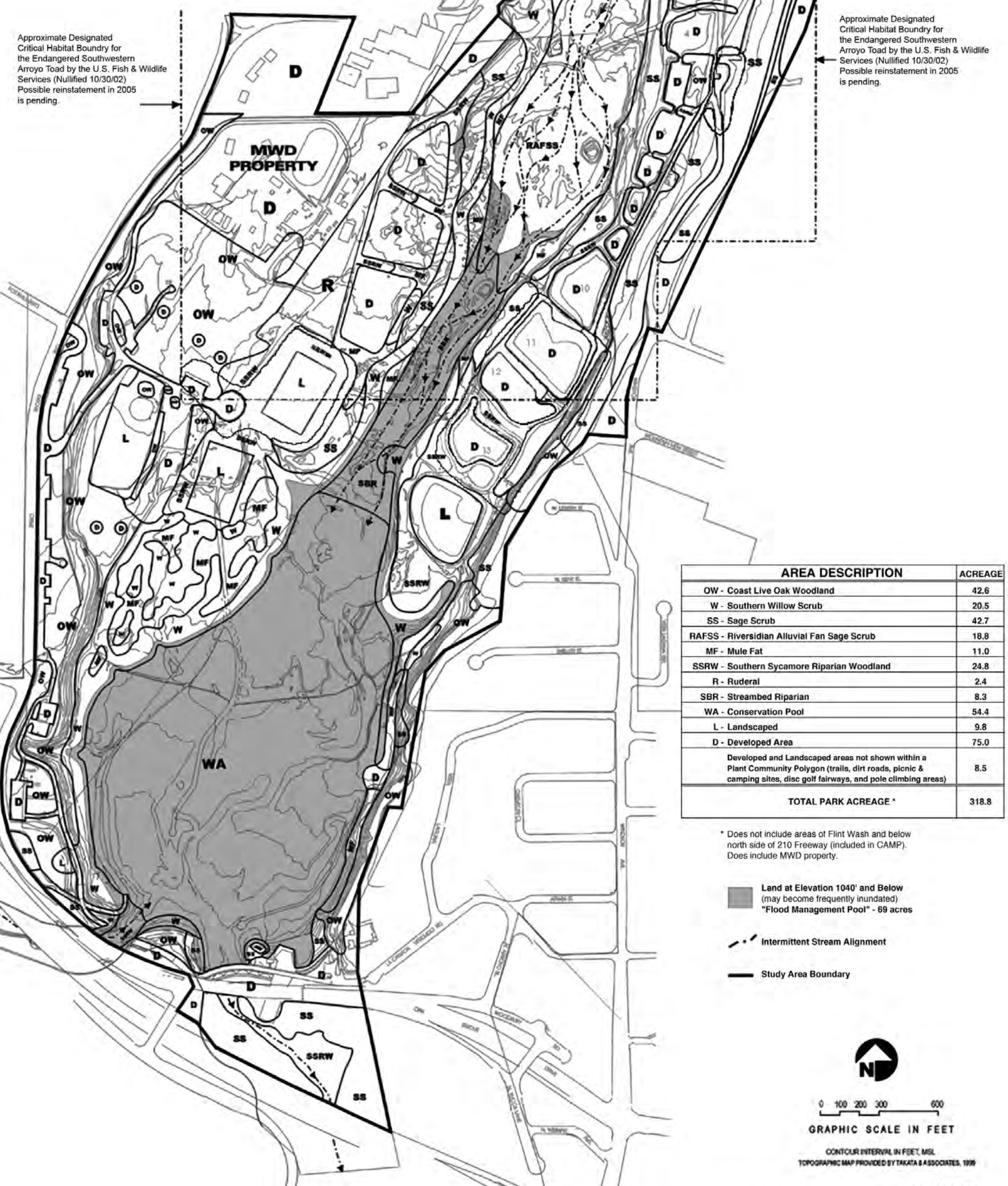
Exhibit 3-7

## PROPOSED TERRESTRIAL NATURAL PLANT COMMUNITIES

Approximate Designated Critical Habitat Boundary for the Endangered Southwestern Arroyo Toad by the U.S. Fish & Wildlife Services (Nullified 10/30/02) Possible reinstatement in 2005 is pending.

Approximate Designated Critical Boundary for the Endangered Southwestern Arroyo Toad by the U.S. Fish & Wildlife Service (Nullified 10/30/02) Possible reinstatement in 2005 is pending.

Approximate Designated Critical Habitat Boundary for the Endangered Southwestern Arroyo Toad by the U.S. Fish & Wildlife Services (Nullified 10/30/02) Possible reinstatement in 2005 is pending.



AREA DESCRIPTION	ACREAGE
OW - Coast Live Oak Woodland	42.6
W - Southern Willow Scrub	20.5
SS - Sage Scrub	42.7
RAFSS - Riversidian Alluvial Fan Sage Scrub	18.8
MF - Mule Fat	11.0
SSRW - Southern Sycamore Riparian Woodland	24.8
R - Ruderal	2.4
SBR - Streambed Riparian	8.3
WA - Conservation Pool	54.4
L - Landscaped	9.8
D - Developed Area	75.0
Developed and Landscaped areas not shown within a Plant Community Polygon (trails, dirt roads, picnic & camping sites, disc golf fairways, and pole climbing areas)	8.5
<b>TOTAL PARK ACREAGE *</b>	<b>318.8</b>

\* Does not include areas of Flint Wash and below north side of 210 Freeway (included in CAMP). Does include MWD property.

- Land at Elevation 1040' and Below (may become frequently inundated) "Flood Management Pool" - 69 acres
- Intermittent Stream Alignment
- Study Area Boundary



0 100 200 300 600

GRAPHIC SCALE IN FEET

CONTOUR INTERVAL IN FEET, MSL  
TOPOGRAPHIC MAP PROVIDED BY TAKATA & ASSOCIATES, 1999

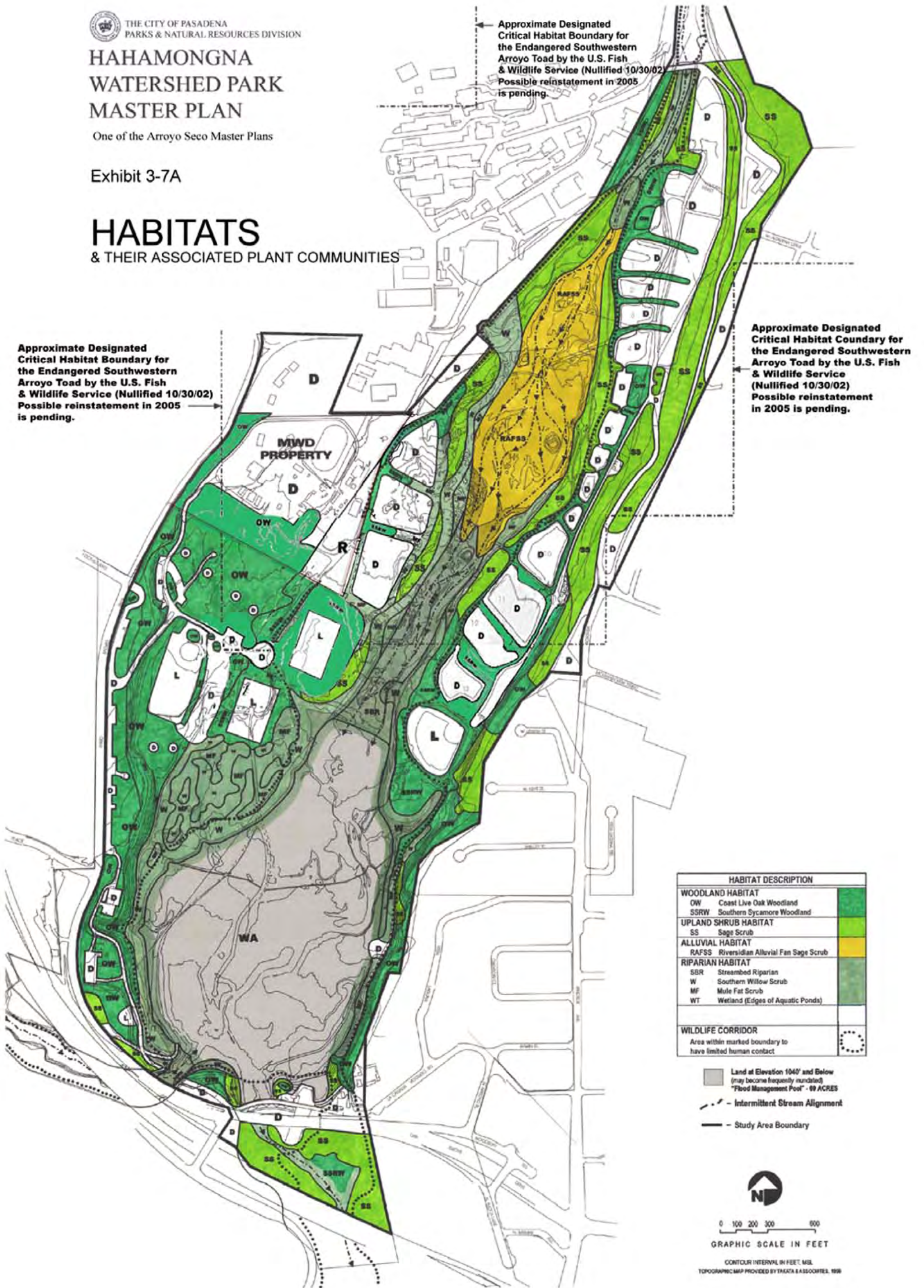
PREPARED BY:  
**PARSONS ENGINEERING SCIENCE, INC.**

# HAHAMONGNA WATERSHED PARK MASTER PLAN

One of the Arroyo Seco Master Plans

Exhibit 3-7A

## HABITATS & THEIR ASSOCIATED PLANT COMMUNITIES



All of the native plant communities are considered worthy of restoration efforts to enhance and/or increase their diversity, size, and distribution in HWP. The goal of this habitat restoration plan is to eliminate the ruderal areas within HWP, as much as possible, due to their low habitat value for wildlife and native plant diversity. Native plant species, common to virtually any or all six of the native terrestrial natural communities, will be used in the restoration efforts to potentially replace the widespread ruderal areas' weedy, invasive, and undesirable species compositions.

The types of native plant species to be used in the habitat restoration efforts have been selected to be compatible with the existing native plant communities and with current and proposed land uses in HWP. The majority of tree, shrub, forb, and grass species chosen for restoration and/or establishment purposes are mainly based on those native species already present in the various, existing on-site native plant communities. These native plant species are generally beneficial to wildlife's food and cover. They also add to the floral diversity of plants found in HWP.

Several of the plant species are of importance for their use in the spiritual, ceremonial, medicinal, and utilitarian traditions of Native Americans and in their arts and crafts. The native plants help increase educational and recreational use of the area. Many of the plants chosen provide an opportunity to study interesting, informative facts for people interested in the natural history of plants and their interrelationships with wildlife. Finally, the native plants selected for habitat restoration have various adaptive, genetic, morphological, and ecophysiological characteristics that enhance their chances of becoming a self-sustaining system and add to the biodiversity and health of the existing natural plant communities.

Since HWP exists in a dynamically fluctuating environment and has many visitors (both wildlife and humans), habitat restoration efforts will be subject to influences and impacts from many sources. The cooperation of public users and maintenance personnel will be important in helping achieve the goals of the habitat restoration plan. Protecting and restoring native plant communities located in floodplain areas are often in direct conflict with traditional flood plain management. Negotiation and cooperation are necessary among the various diverse interests and parties involved with current and proposed uses of HWP to achieve habitat restoration goals.

The following table summarizes the acreage of each natural plant community and landscaped/developed area within Hahamongna Watershed Park, both existing and proposed.

	<i>Area Description</i>	<i>Existing Acres</i>	<i>Proposed Acres</i>
OW	Coast Live Oak Woodland	37.8	42.6
W	Southern Willow Scrub	25.5	20.5
SS	Sage Scrub	39.9	42.9
RAFSS	Riversidian Alluvial Fan Sage Scrub	17.2	18.8
MF	Mule Fat Scrub	19.5	11.0
SSRW	Southern Sycamore Riparian Woodland	2.6	24.8
R	Ruderal	75.4	2.4
SBR	Streambed Riparian	8.1	8.3
WA	Water Conservation Pool	0.0	54.4
L	Landscaped	5.8	9.8
D	Developed	76.4	74.8
D&L	Developed and Landscaped areas not shown within a plant community polygon (such as a trail, dirt road, picnic & camping site, disc golf fairways and pole climbing area)	10.6	8.5
<b>TOTAL STUDY ACREAGE<sup>4</sup></b>		<b>318.8</b>	<b>318.8</b>

Within HWP there are landscaped and developed areas, that have been designated on the plant community maps. The “landscaped areas” within the HWP include predominantly non-native landscaping (turf) for playing fields and native plant landscaping for ornamental purposes. The “developed areas” within HWP include predominantly roads, parking, and buildings, with native landscaping for ornamental purposes.

## PLANT PALETTES OF SELECTED NATIVE SPECIES

Plant palettes for the six terrestrial natural communities in HWP are developed in this habitat restoration plan for: 1) coast live oak woodland, 2) southern willow scrub, 3) mule fat scrub, 4) riversidian alluvial fan sage scrub, 5) sage scrub, and 6) southern sycamore riparian woodland. The proposed plant palettes can be found in Appendix C, Master Plan Plant Community Palettes.

<sup>4</sup> Does not include the areas of Flint Wash and below the north side of the 210 freeway (included in CAMP). Both are within the Park property boundary but outside the study area. These areas total 10.7 acres. It does include the MWD property, 28 acres added + 2.4 acres already included = 30.4

The mix of native plant species that comprises the plant palettes for each respective plant community is based on the inventory surveys of biological resources conducted in HWP. The species chosen are representative of what currently exists in those communities. In some cases, others species are added to what was once known to exist there based on published historical information.

Planting guidelines are outlined in this section and fully presented in the Biological Technical Report that was prepared in support of the Master Plan process. Project descriptions in Appendix E provide a more detailed explanation of the habitat restoration projects and the enhancements suggested for each plant community.

### **Coast Live Oak Woodland**

The collection of coast live oak acorns for planting as acorns and for propagating to create oak seedlings is described in the Biological Technical Report. A mixture of other native, container-grown trees and shrubs will also be planted in the woodland. A hydroseed/hydro-mulch application procedure shall be used to deliver other native shrub, forb, and grass species in the seedmix at planned oak woodland restoration sites.

An assortment of native plant species will shape the tree canopy layer. Coast live oak trees that provide acorns for the local revegetation propagation will be planted in various sizes. Other trees and/or shrubs selected for restoration efforts include big leaf maple, Engelmann oak, California bay/laurel, boxelder, toyon, laurel sumac, California coffeeberry, and Mexican elderberry. Additional native floral plantings will include chamise, hairy-leaf ceanothus, bush monkeyflower, scrub oak, chaparral gooseberry or currant, California rose and blackberry, black sage, and western poison oak. All containerized specimens will be planted in natural looking combinations or groupings. All tree and shrub plantings in coast live oak woodland will be installed in natural looking groups.

The hydroseed/hydr mulch mix will consist of numerous shrub, forb, and grass species that are associated with this oak woodland type. Several of the shrub species are included as container plants and in the hydroseed mixture. The hydroseed combination uses chamise, California sagebrush, bush monkeyflower, black sage, California brome (*Bromus carinatus*), golden yarrow (*Eriophyllum confertiflorum*), California everlasting (*Gnaphalium californicum*), wild pea (*Lathyrus vestitus*), deerweed, deergrass (*Muhlenbergia rigens*), and purple needlegrass (*Nassella pulchra*).

Of the 37.8 acres of coast live oak woodland in the study area, 11.6 are within the MWD property. There are 26.2 acres of coast live oak woodland within HWP that will receive habitat restoration. The following list of projects is proposed for habitat establishment and restoration of coast live oak woodland:



*Westside of the Park:*

- Oak Woodland Restoration (Habitat Project #9): This element, which includes the upper Oak Grove Picnic Area and the Equestrian Staging Area, has been undergoing habitat restoration for eight years. After restoration of this area and the slopes down to the Lower Oak Grove Area, including the Oak Grove Field and the west half of the overnight camping area, there will be a net increase of 1.9 acres of oak woodland.
- Oak Woodland Restoration (Habitat Project #9\*\*):<sup>1</sup> The east half of the overnight area is within the critical habitat of the Arroyo Toad. This area is proposed to have an increase of 1.0 acre of oak woodland.
- Sunrise Overlook (Habitat Project #8): The Sunrise Overlook area, adjacent to the south perimeter of the Equestrian Staging Area, is proposed to have an increase of 0.9 acre of oak woodland.

*Eastside of the Park:*

- East Spreading Basins (Habitat Project #3b\*\*): Adjacent to and west of the new eastside spreading basin No. 2, it is proposed to increase the existing 0.1 acre of oak woodland by 0.2 acre for a total of 0.3 acre.
- East Spreading Basins(Habitat Project #3b\*\*): The area west of the Arroyo Well, adjacent to spreading basin 7, is proposed to have the existing 0.4-acre oak woodland increased by 0.3 acre for a total of 0.7 acre.
- East of Spreading Basin 14 and the Overflow Basin (Johnson Field)\*\*: This area is proposed to have the existing 1.1 acres of oak woodland increased by 0.5 acre for a total of 1.6 acres. This enhances the habitat adjacent to the East Rim Trail. It will convert 0.5 acre of sage scrub to oak woodland.

### **Southern Willow Scrub**

Dense, high-quality southern willow scrub habitat will be established around the edge of the flood management/water conservation pool. In those areas where southern willow scrub currently exists but must be removed for sediment and debris removal and maintenance purposes, the areas may be restored naturally on their own from surviving root systems. This community, compared to the others, probably endures the greatest impacts from ongoing

---

<sup>1</sup> Subsequent to the conceptual approval of the Hahamongna Watershed Park Master Plan, the U.S. Fish and Wildlife Service on February 7, 2001, designated critical habitat in HWP for the federally listed Southwestern Arroyo Toad. Those restoration projects that are wholly or partially located within designated critical habitat for the Southwestern Arroyo Toad are identified with \*\*. On October 30, 2002, the U.S. District Court for the District of Columbia nullified all the designated critical habitats for the Arroyo Toad. The USFWS will complete a new analysis of economic impacts and consider updated field survey information to refine where the Arroyo Toad exists. The Interior Department will decide by 2005 which areas of critical habitat to redesignate.

maintenance. However, replanting with community-specific native plant species will occur in riparian areas and adjacent sites where willow scrub species can be established and survive.

The restoration plan calls for upper and lower dense canopy layers comprised of arroyo, red, black, shining, and narrow-leafed willows along with occasional groupings of Fremont and black cottonwood, western sycamore, Mexican elderberry, California bay/laurel, and big leaf maple. The scattered cottonwoods, sycamores, elderberries, bay/laurels, and maples will be established in areas located approximately 6 to 12 feet above the elevation of groundwater and/or below the low-flow channel of the Arroyo Seco stream. The arroyo, red, black, shining, and narrow-leafed willows will be planted as rooted cuttings that are a minimum of 18" in length, 2' to 12' above the elevation of the groundwater and the low-flow channel. Tree and shrub plantings will be grouped and/or scattered in natural appearing groups.

The species comprising the shrub understory layer (e.g., mule fat, coyote brush, California blackberry, California rose, and desert grape (*Vitis girdiana*) will be established at elevations 4' to 12' above the low-flow channel. The sparse herbaceous understory layer of mugwort, western ragweed, hoary nettle, meadow barley (*Hordeum brachyantherum*), Santa Barbara sedge (*Carex barbarae*), and deergrass will be hydroseeded throughout the site. Seeds of the previously mentioned coyote brush and mule fat are also included in the hydroseed mixture.

There are currently 25.5 acres of southern willow scrub in the park, of which only 7.7 acres will receive habitat restoration. When water conservation measures are implemented, the remaining 17.8 acres of existing habitat will begin to die as the area is frequently inundated. An additional 12.8 acres of new habitat will be established along with the 7.7 acres of existing habitat to be restored. The following list of the projects are proposed for habitat establishment and restoration of southern willow scrub:

*Realigned Stream Corridor (Habitat Project #1)*: This project will keep the size of the habitat area unchanged, but will restore habitat found at the southern end of the project area.

*Westside Spreading Basins (Habitat Project #3a\*\*)*: There is currently no southern willow scrub habitat adjacent to the proposed Westside Spreading Basins. This habitat project proposes to establish 1.2 new acres of this plant community east of the spreading basins. The creation of the westside spreading basins will utilize "Landform Grading" principles to improve habitat for this and other plant communities.

*Widen Stream Channel (Habitat Project #4\*\*)*: The stream channel widening project will increase the existing 0.6 acre of southern willow scrub to 3.7 acres. This restoration project will widen the stream on its western edge for a new stream channel width total that will at least double its current width. Both the east and west embankments of the stream channel

will be restored with southern willow scrub to help stabilize and control erosion of the stream banks and to provide an appropriate habitat for native fauna.

*Westside Perimeter Trail (Habitat Project #6):* The Westside Perimeter Trail Project will increase the existing 0.6 acre of southern willow scrub to 1.9 acres. The restoration project proposes to raise the grade on this trail with fill excavated from ruderal areas below the 1030 elevation within the proposed conservation pool. Those willows that are taller than the depth of fill will remain to root at the higher elevation with the help of water conservation management practices. This and additional habitat restoration will create a larger area of southern willow scrub of higher quality than currently exists.

*Relocate Disc Golf (Habitat Project #7):* The Disc Golf Relocation project will increase the existing 4.5 acres of southern willow scrub to 5.2 acres. This component proposes to raise the elevation of an area that has small pockets of existing willow scrub habitat. The areas of existing willows will be linked to create drainage courses that will receive less fill than the terraced areas of this project. The drainage courses will be extensions of the existing drainage patterns from elevation 1050 down to elevation 1030, the edge of the water conservation pool. The existing vegetation in the area will be hand-cleared to leave willow trees taller than the depth of fill. After the fill is placed, these existing willows will root at the higher elevation with the help of water conservation management practices. This and additional habitat restoration will create a larger area of southern willow scrub of higher quality than currently exists.

*Flood Management/Water Conservation Pool (Habitat Project #11):* This project proposes a phased operation that will permit the areas elevated above the floodplain (elevation 1040.5) and the perimeter of the water conservation pool (elevation 1040.5 to 1030) to become established with southern willow scrub habitat. The Flood Management/Water Conservation Pool Project will add 4.5 acres of southern willow scrub in this zone for a new total of 5.7 acres of southern willow scrub. These 5.7 acres represent a wide band around the perimeter of the pool that, once established, will be habitat of higher quality. The existing southern willow scrub habitat below the 1040.5 elevation and in particular below the 1030 elevation will degenerate and begin to die as soon as water conservation practices are implemented and this zone is periodically inundated during the winter season. The next phase of the project will remove the 17.8 acres of existing southern willow scrub areas (below elevation 1030) in a coordinated sediment and debris removal operation once the new willow habitat has become established.

*Storm Drain Improvements-JPL\*\*:* This project will establish 2.0 acres of southern willow scrub at the drainage outfalls along the JPL border just north of the westside parking lot. Exotic species need to be removed and debris needs to be collected and disposed of. These particular drainage outfalls drain through existing sage scrub and some willows. Due to wet

conditions caused by urban runoff, this project proposes to transition this two-acre area from a sage scrub plant community to a southern willow scrub plant community of higher quality.

### **Mule Fat Scrub**

The mule fat scrub restoration area is designed to provide cover and foraging habitat in areas susceptible to high flows. The vegetation will be planted on the bottom and sides of the Arroyo Seco high-flow channel and on the banks of the low-flow channel and flood terraces to approximately ten feet above the bottom. Container plants and/or additional rooted cuttings of mule fat, and scattered plantings of rooted cuttings of arroyo willow will be installed in natural groupings to help stabilize the stream channel. Expansions of the existing mule fat habitat will occur to the north and south of its present distribution in HWP along the drainage bottom and low terraces.

Mexican elderberry, Fremont cottonwood, black cottonwood, western sycamore, white alder, California bay/laurel, and big leaf maple will also be installed. Installation shall occur in those sections of the mule fat community where the prolonged high water flooding behind the dam killed many elderberries during the rainy season of 1998-1999. The placement of the cottonwoods, sycamore, alder, bay/laurel, and maple trees is an effort to expand their distribution. These plants will be placed in the riparian area just north and south of the existing mule fat community in areas that are set back from the low-flow channel and that will be disturbed by sediment and debris removal maintenance. The upper canopy layer will be comprised primarily of occasional groupings of western sycamore, big leaf maple, white alder, Fremont and black cottonwoods, and California bay/laurel. These six tree species exist in limited distribution in HWP, though historically they were probably more common along the Arroyo Seco before construction of Devil's Gate Dam. Mexican elderberry, a species of high habitat value for local birds and other wildlife, will form the lower portion of the upper canopy layer. Arroyo willow will constitute the lower canopy. The shrub and herbaceous understory layers will be representative of the southern willow scrub community.

Mexican elderberries and the other six tall, upper canopy tree species will comprise approximately 60 percent of the tree plantings. Arroyo willows will constitute the remainder of the tree species. The upper canopy layer tree species will be established as container-grown plants in areas located approximately 6 to 12 feet above the elevation of groundwater and/or below the low-flow channel of the Arroyo Seco stream. The arroyo willows shall be planted as rooted cuttings that are a minimum of 18 inches in length, 2 to 12 feet above the elevation of the groundwater and the low-flow channel. The species comprising the shrub understory layer (i.e., mule fat, California rose, California blackberry, and desert grape) will be established as container plants in natural groupings at elevations 4 to 12 feet above the low-flow channel. The sparse herbaceous understory layer of mugwort, hoary nettle, western

ragweed, giant wild rye, Santa Barbara sedge, and deergrass will be hydroseeded throughout the site. Mule fat will be used in the hydroseed mixture for this community.

There are currently 19.5 acres of mule fat scrub in the park, of which only 7.1 acres will receive habitat restoration. When water conservation measures are implemented, 10.7 acres of existing habitat will begin to die as the area is frequently inundated. An additional 3.9 acres of habitat will be established along with the 7.1 acres of habitat to be restored. The following list of the projects is proposed for habitat establishment and restoration of mule fat scrub:

*Stream Corridor Alignment (Habitat Project #1\*\*)*: This restoration project will increase the existing 0.9 acre of mule fat scrub habitat by 0.2 acre for a total of 1.1 acres. The project will shorten the Altadena drain and realign the stream corridor to allow for a more natural stream flow.

*Westside Spreading Basins (Habitat Project #3a\*\*) and Stream Channel Widening (Habitat Project #4\*\*)*: There are currently 6.7 acres of mule fat scrub habitat within these two project areas. These habitat projects propose to eliminate 1.7 acres of this plant community along the upper banks of the stream and in the vicinity of the new spreading basins. The creation of the westside spreading basins and the widening of the stream channel will utilize “Landform Grading” principles to improve habitat for this and other plant communities.

*Relocate Disc Golf (Habitat Project #7)*: There is currently no mule fat scrub habitat at this location. The Disc Golf Relocation project is proposed to establish 3.7 new acres of mule fat scrub to this area of the park. This restoration project proposes to raise the elevation of the area that has small pockets of existing willow scrub habitat to create drainage courses. Raised terraces of mule fat scrub habitat, a very resilient plant community, will serve to border the fairways. The areas of existing willows will be linked to create drainage courses that will receive less fill than the terraced areas of this project.

*Northern Sycamore Grove Field (Habitat Project No.7\*\*)*: This project will eliminate the 1.5 acres of low quality mule fat habitat present on the site in order to receive fill material . The site is a predominantly ruderal and highly disturbed habitat due to past mining operations. There will be some debris removal of broken concrete that was dumped from previous construction projects. Until this project is implemented, the site will be flooded, and when water is pumped back or allowed to pass through the dam, the flooded mule fat will die and a pool of water will remain for some time.

*Flood Management/Water Conservation Pool (Habitat Project #11)*: When water conservation measures are implemented, an existing 10.7 acres of mule fat scrub will die as the area becomes frequently inundated. This project proposes a phased operation that will

permit the areas elevated above the floodplain (elevation 1040.5) and the perimeter of the flood management/water conservation pool (elevation 1040.5 to 1030) to become established with southern willow scrub habitat. The Flood Management/ Water Conservation Pool Project will not alter an existing 1.2 acres of mule fat scrub in this zone. The next phase of the project will remove the dying 9.2 acres of existing mule fat scrub areas (below elevation 1030) in a coordinated sediment and debris removal operation.

### **Riversidian Alluvial Fan Sage Scrub**

Another goal of the habitat restoration plan is to enhance the habitat quality of the small, existing remnant of the riversidian alluvial-fan sage-scrub community, and to eventually expand its distribution. This will be a formidable challenge due to the constraints of ongoing sediment and debris removal, and perhaps more significantly, the ability to simulate conditions that approximate the natural alluvial deposition processes inherent for development of this community.

As part of the strategy to enhance and diversify the floristic composition of riversidian alluvial fan sage scrub, several native tree species that are known from other alluvial fan sage scrub areas are included in the plant palette. Tree canopy layer species include big leaf maple, white alder, southern California black walnut, western sycamore, Fremont cottonwood, and Mexican elderberry. These species will be planted as 5- and 15-gallon container plants. The addition of the maple, alder, and sycamore is intentional to help increase the tree overstory diversity along the stream channel in this portion of the Arroyo Seco drainage. Big leaf maple, white alder, and western sycamore are common to abundant just one-half mile to the north in the Arroyo Seco north of the JPL bridge and in nearby Millard, El Prieto, and Fern canyons. Prior to the construction of the dam and maintenance practices, these tree species would have been more widely distributed in what is now within the HWP boundaries. The upper canopy layer tree species will be installed in areas located approximately 6 to 12 feet above the elevation of groundwater and/or below the low-flow channel of the Arroyo Seco stream.

The shrub understory layer will contain California sagebrush, four-wing saltbush, birchleaf mountain mahogany, brittlebush, hairy yerba santa, California buckwheat, bladderpod, scalebroom, laurel sumac, coastal prickly pear, lemonadeberry, sugar bush, white and black sages, poison oak, and chaparral yucca. These species will be planted as 1- and 5-gallon container sizes. The herbaceous understory layer will be hydroseeded and also will include several shrub species that are used as containerized plants. This layer will be composed of such species as California brome, California everlasting, deerweed, deergrass, California sagebrush, brittlebush, California buckwheat, scalebroom, and white and black sages.

There are currently 17.2 acres of riversidian alluvial fan sage scrub in the park. An additional 1.6 acres of habitat will be established for a new total of 18.8 acres of riversidian alluvial fan sage scrub habitat. Habitat establishment and restoration of this plant community is defined under Habitat Project #2\*\*.

A number of smaller habitat restoration projects within a larger area will occur:

- a) the Stream Channel Widening Project (Habitat Project #4\*\*) will add one acre of habitat;
- b) the Westside Spreading Basins Project (Habitat Project #3a\*\*) will eliminate ruderal weedy species and add 0.2 acre of habitat to the embankments of the spreading basins;
- c) the old east-to-west stream crossing has been abandoned and the asphalt roadway will be removed and disposed of, adding 0.2 acre of habitat; and
- d) the various drain outfalls along the JPL border will add another 0.2 acre of riversidian alluvial fan sage scrub.

### **Sage Scrub**

Sage scrub occupies sites on slopes along the east, south, and west perimeters of HWP. A goal of this habitat restoration plan is to enhance and increase the diversity and distribution of this scrub community in areas sited for sediment and debris removal. Another large location identified for planned restoration efforts consists of portions of the extensive non-native grassland community. In lieu of natural fire occurrence and/or controlled burning in sage scrub, it may be difficult to achieve success without the interactive, rejuvenating role and benefits of fire. It may be difficult to achieve any changes in the existing and mature status of sage scrub composition. Therefore, any areas scheduled for periodic sediment and debris removal, and/or areas of existing ruderal vegetation, will be desirable targets for sage scrub development through the restoration efforts.

As with the above terrestrial natural communities, the restoration plan calls for the use of trees, shrubs, forbs, and grasses that will be planted as container plants placed in natural-looking groups, and others that will be hydroseeded on the sites. A tree canopy layer of southern California black walnut and Mexican elderberry will utilize five- and 15-gallon container plant specimens. The shrub understory layer is diverse and uses one- and five-gallon-sized container plants. Species included on the palette for the shrub understory layer include chamise, California sagebrush, hoaryleaf ceanothus, birchleaf mountain mahogany, bush poppy, California encelia, California buckwheat, golden yarrow, toyon, goldenbush, heartleaf penstemon, Nevin's barberry (a federally and state-listed species that is commercially available), laurel sumac, bush monkeyflower, coastal prickly pear, hollyleaf cherry, lemonadeberry, sugar bush, white and black sages, scrub oak, and chaparral yucca.

The herbaceous understory layer will utilize numerous forb and grass species plus some previously mentioned containerized shrub species that will be used in the hydroseed/hydromulch mixture. This layer will include giant wild rye, deerweed, miniature lupine, foothill needlegrass, purple needlegrass, California figwort, chamise, California sagebrush, California encelia, California buckwheat, golden yarrow, goldenbush, coastal prickly pear, and white and black sages.

There are currently 39.9 acres of sage scrub in the park of which 36.3 acres of habitat will be restored. An additional 6.6 acres of habitat will be established for new total of 42.9 acres of sage scrub habitat. The following projects are proposed for habitat establishment and restoration of sage scrub:

*Stream Corridor Alignment (Habitat Project #1):* This project will keep the size of the habitat area unchanged and will restore habitat within the project area.

*Westside Spreading Basins (Habitat Project #3a):* There is currently no sage scrub habitat in the area of the proposed westside spreading basins. This existing area is mostly a ruderal plant community. This habitat project proposes to establish 3.0 new acres of sage scrub plant community along the slope east of the spreading basins.

*Eastside Spreading Basins (Habitat Project #2 and #3c):* The East Spreading Basins project will increase the existing 4.9 acres of sage scrub to a total of 6.0 acres. The equestrian trail on the west side of the existing spreading basins traverses some of the best old alluvial fan sage scrub in the area, designated as sage scrub on the plant community maps. Project 3c involves spreading basins 5 through 10 on the east side. The proposal is to abandon the equestrian trail, relocate the trail on the spreading basins maintenance road (asphalt to be removed) and restore the area occupied by the existing trail with sage scrub.

*Stream Channel Widening (Habitat Project #4):* There is currently no sage scrub habitat at this location of the stream channel. On the western slope of the stream channel project, 2.5 acres of sage scrub habitat will be established. This project will widen the stream on its western edge for a new total stream channel width of approximately 200 feet. Both the east and west sides of the stream channel will be restored with sage scrub habitat.

*Sunrise Overlook (Habitat Project #8):* There are currently 1.9 acres of sage scrub habitat in this project area, much of which was established by hydroseeding when the freeway access ramp was eliminated from this location. A total of 0.9 acre of this habitat will be converted to oak woodland habitat leaving one acre of sage scrub.

*Devil's Gate Dam Area:* This project area currently has 13.2 acres of sage scrub. Although the acreage of habitat will remain the same, 0.2 acre of this habitat will be removed as a



result of the spillway observation overlook project, but 0.2 acre will also be added as a result of habitat establishment on the slope adjacent to the dam spillway. The existing 13.0 acres remaining will receive habitat restoration.

*Eastside Park:* An acre of sage scrub will be eliminated due to the following projects:

- a) 0.5 acre will be converted to oak woodland east of basin 14 and the overflow basin (Johnson Field);
- b) 0.2 acre will be lost to the east rim trail extension project. The total remaining area in sage scrub within the Eastside Park Area will be 10.2 acres of restored habitat.

*JPL Storm Drain Improvements:* A total of 7.0 acres of sage scrub exists adjacent to JPL in the vicinity of the westside storm drains. This project will convert 2.0 acres of sage scrub to southern willow scrub at the drainage outfalls just north of the westside parking lot (Habitat Project #2) along JPL. These particular drainage outfalls drain through existing sage scrub and some willows. Due to wet conditions caused by urban runoff, this 2.0-acre area will be established with southern willow scrub. A total of 5.0 acres will remain in sage scrub in this area.

### **Southern Sycamore Riparian Woodland**

Southern sycamore riparian woodland currently occupies sites downstream and south of the dam in the southern reaches of HWP near the 210/Foothill Freeway. This plant community probably was more widely distributed in the park basin prior to flood control management practices (i.e., sediment and debris removal). The southern sycamore riparian woodland restoration areas are designed to provide cover and foraging habitat in areas presently susceptible to high flows, particularly on the east side of the basin south of Johnson Field. This area is now populated with mule fat and Mexican elderberry, much of which was destroyed during the 1998-1999 El Niño winter storm events. The planned sycamore restoration area will be raised with fill material to above elevation 1040.5.

The restoration plan calls for upper and lower canopy layers comprised of occasional groupings of western sycamore, Fremont and black cottonwood, white alder, bigleaf maple, California or foothill ash (*Fraxinus dipetala*), Mexican elderberry, California bay/laurel, coast live oak, black willow, arroyo willow, red willow, and shining willow. The scattered trees will be planted in five- and 15-gallon specimens. The arroyo, red, black, shining, and narrow-leaved willows shall be planted as rooted cuttings that are a minimum of 18 inches in length. Tree and shrub plantings will be grouped and/or scattered in natural appearing groups. Artificial (drip) irrigation will need to be used for approximately five to ten years to help sustain the plantings and help them develop into mature trees.

The species comprising the shrub understory layer, i.e., mule fat, California rose (*Rosa californica*), and California blackberry, will be planted as one-gallon container plants that will also need irrigation supplied to them. The sparse herbaceous understory layer of mugwort, meadow barley (*Hordeum brachyantherum*), deergrass (*Muhlenbergia rigens*), and hoary nettle will be hydroseeded throughout the site.

There are currently 2.6 acres of southern sycamore riparian woodland habitat in the park. An additional 22.2 acres will be established for a new total of 24.8 acres of southern sycamore riparian woodland habitat. The following list of projects is proposed for habitat establishment and restoration of southern sycamore riparian woodland:

*Westside*

Around proposed Southern Sycamore Grove Field (Project 7)	2.1 acres
Around proposed Northern Sycamore Grove Field (Project 7**)	4.7 acres
Adjacent to proposed Spreading Basins 15, 16 & 17 (Project 3a**)	1.4 acres
Stream Corridor Alignment (Project 1**)	1.4 acres

*Eastside*

South of and around Johnson Field (Project 10)	3.8 acres
Around existing overflow basin (Project 10)	3.2 acres
Around Spreading Basins 7–14 (existing nos. 5–12, Project 3c**)	2.6 acres
Around new Spreading Basins 1 & 2 and expanded Spreading Basins 3-6 (existing nos.1–4, Project 3b**)	3.0 acres

**Ruderal**

The existing 75.4 acres of ruderal habitat within the study area, includes 2.4 acres within the MWD property. The 73.0 acres of ruderal habitat within HWP will be completely replaced with other plant communities, as shown in the proposed plant communities map, or eliminated within the proposed water conservation pool which will be cleared of all vegetation below elevation 1030. The ruderal areas within the designated critical habitat for the federally listed endangered Southwestern Arroyo Toad will be graded using landform grading principles.\*\* The highly disturbed and unnatural topography will be improved and the poor quality habitat will be eliminated and instead quality habitat for the Arroyo Toad and other native flora and fauna will be restored.

**Streambed Riparian**

There are currently 8.1 acres of streambed riparian habitat in the park; of this total, 4.9 acres will be destroyed in the creation of the water conservation pool. This will be offset by the

creation of 5.1 acres of habitat upstream of the pool for a new total of 8.3 acres of streambed riparian habitat. Following is a list of the proposed projects.

*Inundated Areas (Habitat Project #11):* There are two areas below the existing 1030 elevation that will be inundated frequently when water conservation procedures are implemented. This will cause the existing 4.9 acres of streambed riparian habitat in these areas to die. These two areas will be cleared, excavated and graded for the water conservation pool (Habitat Project #11).

*Stream Channel Widening (Habitat Project #4\*\*):* The stream channel widening project will establish 5.0 additional acres of streambed riparian habitat. This restoration project will widen the stream on its western edge to approximately 200 feet. Landform grading principles will be utilized here to improve the habitat for several native plant communities and to create quality habitat for the federally listed endangered Southwestern Arroyo Toad and for other native fauna.

*Stream Corridor Alignment (Habitat Project #1\*\*):* This restoration project will increase the existing streambed riparian habitat by 0.1 acre as a continuation of the same habitat, immediately north of the JPL bridge. The project will shorten the Altadena drain and widen the stream corridor to allow for a more natural stream alignment.

### **Flood Management/Water Conservation Pool**

Since 1970, when the dam was declared unsafe to hold water, vegetation has been allowed to grow in the flood zone behind the dam (area below elev. 1040.5). The flood management/water conservation pool will be constructed in an area that is predominantly ruderal habitat. See Exhibit 2.3 (Existing Plant Communities).

### **PLANTING GUIDELINES**

As habitat restoration projects are implemented, collection of native plant seed and cuttings will be carried out for each community, and/or will be acquired from reputable native plant nurseries. Seeds that are gathered and/or purchased will be used in hydroseeding/hydro-mulching applications in each community. Final specifications for the seed mix for each plant community will be developed after tests for purity and seed germination are conducted. Not all of the species depicted on the plant palettes of the six plant communities will be installed because installation depends on the availability and number of species at the time of planting. It is the goal of this habitat restoration plan, however, to plant as many of the palette species as possible in the applied restoration efforts.

A nurse crop species, plantain (*Plantago ovata*), will be included in all five natural community hydroseed/hydromulch mixtures at the rate of 40 pounds per acre. This non-native, low-growing annual forb species is an excellent nurse plant that helps shade out potential weedy species, decreases evaporation rates at the ground surface, and helps control erosion during initial revegetation plant establishment for other newly germinating native species in the seed mixes. It is also useful because it does not reseed well. Included in the hydromulch is 2,000 pounds per acre of virgin cellulose wood fiber and 150 pounds per acre of organic soil stabilizer.

Detailed recommendations for soil preparation and tillage, soil analysis and testing, soil amendments including possible fertilizer use, pre-planting weed control and removal, and pest and disease control are included in the Technical Report. Highlights from the guidelines are summarized as follows:

- Controlling the growth of weedy plant species in the planned restoration areas will be the most significant and difficult task to accomplish. Weed control must be addressed at least one year in advance of revegetation. Mechanical removal of weeds is preferred over the use of herbicides. Herbicides should never be used near aquatic and wetland areas under any circumstances due to the sensitive nature of these habitats and the potential for further spreading of harmful chemicals through water-borne transport. Soil tilling, mechanical cutting, solarization, and spot herbicide treatments should all be considered.
- Salvage and reuse of native topsoil should be part of all restoration efforts. A top soil survey should be performed to determine areas where good quality soil exists prior to the start of grading operations.
- Soil preparation will include ripping and/or disking of the soil to create a seedbed for broadcast or hydro-seeded material, or to open spaces for easier installation of containerized plant stock. Ripping and disking permit better root development by breaking up compacted soil, and help promote better aeration and water infiltration into the soil. Gravel and/or bark mulch may be used to help retain soil moisture around plantings.
- Soil analysis will be conducted to evaluate whether adverse soil conditions exist. Soil tests will be conducted after final grading of each area to be revegetated is completed. A qualified agronomy or soils testing laboratory should analyze soil samples.
- Soil amendments may be added to a particular site if the soils testing laboratory results indicate low concentrations or absence of important minerals and/or nutrients.
- Pest and disease control will be an ongoing process. Only reputable native plant nurseries and their resources will be used. Sickly plant specimens from a nursery will not be used;

and should any planted specimens become infested or infected with pests or disease after planting, those specimens will be removed to prevent spreading to healthy stock.

Local native-plant nurseries with a large variety of stocked species and knowledge of the species-specific requirements concerning light, water, soil substrate, and growth rate are recommended. Local, on-site collection of plant materials is highly desirable in order to maintain the genetic diversity of the plant communities.

The implementation schedule for the installation of plants involves seasonal timing and coordination with the anticipated late fall, winter, and early spring rainy seasons. During the implementation phase for planting native species, this strategy is critical for attaining successful restoration.

The irrigation of containerized plantings at the time of field installation, regardless of the rainy season conditions, and documentation of the site preparation and installation techniques is recommended. In brief, irrigation efforts will ensure that the selected containerized plant stocks are well watered before, during, and after field installation, at least for a predetermined period of time. This effort also helps reduce loss of plant stocks due to transplant shock. Periodic, supplemental irrigation should continue even during a normal rainy season unless planting occurs within a few days of ample rainfall. If an ample rainfall pattern continues, supplemental watering may be discontinued. Should very low rainfall or drought occur for extended periods of time following planting, irrigation of the plants may be warranted. If establishment irrigation is required, it will be accomplished in such a manner as to encourage deep root growth (i.e., periodic, deep irrigation as opposed to frequent, light irrigation that promotes development of more shallow root systems).

### **3.4 RECREATION TRAILS**

#### **PERIMETER TRAIL**

An all-weather, permeable-surface roadway will loop around the entire basin providing hikers and equestrians an internal recreational trail with links to connecting trails in the Angeles National Forest, the Central Arroyo, and the County-maintained trails to the east and west of the park. This loop also provides internal access for emergency and maintenance vehicles. See following Exhibit 3-8, Trail Plan.

The Perimeter Trail will serve as a delineator, separating the stream and its associated restored habitats at the center of HWP from areas of concentrated recreation activity on the westside and water resources facilities on the east side. This delineation helps preserve the streambed and sloped banks as a wildlife corridor. Additionally, it will separate the sediment

and debris removal activities associated with the dam from those areas of the basin available for recreation.

The trail will maintain a minimum elevation of 1045 (4.5 feet above the 1040.5 spillway floor elevation), so that it will be accessible during most storm events. Segments of the trail will need to be raised and storm drains installed at critical cross-drainage points to minimize washouts and to maintain the existing drainage patterns. For example, this type of work will be necessary at the Berkshire Drain and the relocated disc golf area.

In large part, the Perimeter Trail utilizes existing trail routes such as the maintenance road along the edge of the spreading basins and Johnson Field down to the Devil's Gate Dam. New portions of the trail will wrap around the Southern Sycamore Grove Field and the relocated disc golf area.

To complete the loop, the Flint Wash Bridge must be reconstructed and a new bridge built at the northern end of the basin. A prefabricated bridge with wood flooring will be installed at each location, spanning approximately 150 feet each. An existing historic abutment will be reconstructed on the east side of Flint Wash and a new abutment on the west. At the North Bridge Crossing of the Perimeter Trail, new abutments will have to be constructed. The North Bridge Crossing will also serve as a utility crossing for the pump-back and diverted storm water distribution systems to the west side spreading basins. Appropriate signage will be posted. The recommended location of the bridge is at the northern end of the existing sloped concrete flood revetment on the east edge of the JPL campus and south of the current JPL bridge crossing.

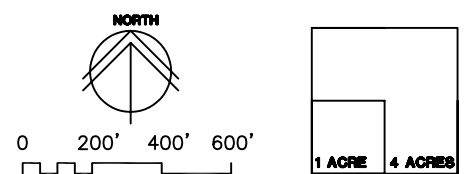
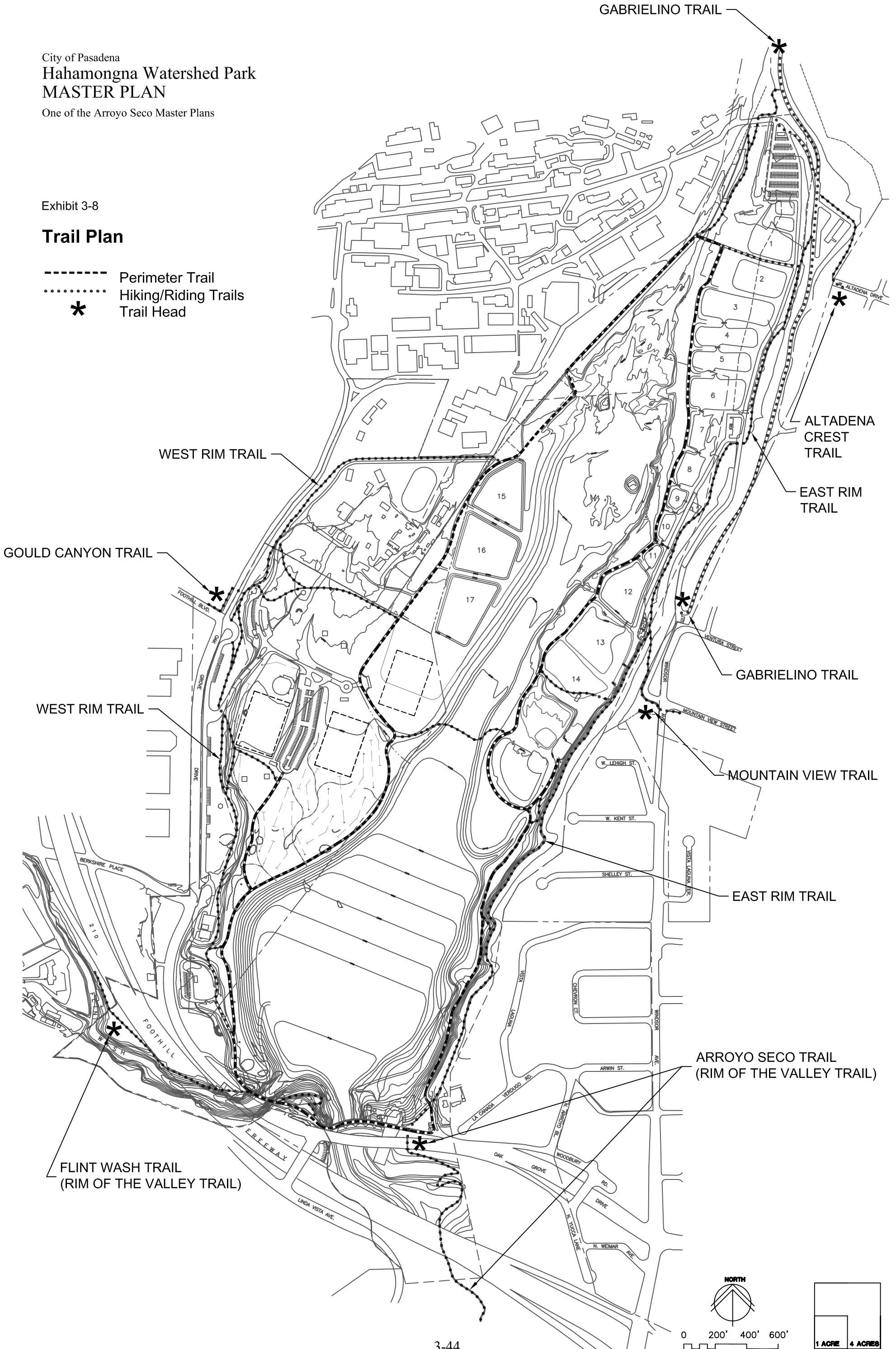
From the Devil's Gate Dam to Flint Wash Bridge, the Perimeter Trail will be used by equestrians, bicyclists, and hikers as well as maintenance and emergency vehicles. At Devil's Gate Dam, bicyclists entering the park via the proposed east access (entry) from Oak Grove Drive will cross the dam and Flint Wash, and continue north through the west side on the paved park roadway. (See the following section on the bicycle route for more detail.) Hikers and equestrians approaching the east side of the dam on the Perimeter Trail, the East Rim Trail or from the Arroyo Seco Trail (from the Central Arroyo) will likewise cross the dam and Flint Wash together with other park users. After crossing Flint Wash, the Perimeter Trail diverges from the paved road following the edge of the flood management/water conservation pool.

City of Pasadena  
 Hahamongna Watershed Park  
**MASTER PLAN**  
 One of the Arroyo Seco Master Plans

Exhibit 3-8

**Trail Plan**

- Perimeter Trail
- ..... Hiking/Riding Trails
- \* Trail Head



A paved bicycle trail will parallel the Perimeter Trail on top of the existing sloped concrete flood revetment adjacent to the west JPL parking area to the North Bridge Crossing. Equestrians, bicyclists, and hikers as well as maintenance and emergency vehicles will use the North Bridge Crossing to connect to the eastside of the park. After crossing the bridge, the bicycle route will separate from the Perimeter Trail with a paved bicycle trail connecting to the east side paved roads. See the following section on the Bicycle Route for more detail.

On the east side, park users will share the Perimeter Trail from Devil's Gate Dam to Johnson Field with LACDPW Flood Maintenance. For short periods of time during the summer, maintenance of the dam sluice gate will require use of the trail for maintenance vehicle access to the basin. During the winter months, removal of floating debris from the flood management/water conservation pool will necessitate access to the two staging areas located adjacent to the Perimeter Trail.

## HIKING AND EQUESTRIAN TRAILS

All trails in HWP will be for equestrians and hiking as shown in Exhibit 3-8, Trail Plan. All bridge surfaces will be wood to accommodate safe equestrian crossing. Trails will be made accessible throughout the year by constructing them at or above elevation 1045, out of the normal seasonal flood area.

Equestrian and hiking trails will have a minimum trail tread width and a minimum trail clearance to provide enough room for safe passage of horse and rider, and to allow hikers and equestrians room to move to the side as necessary. (See the Arroyo Seco Design Guidelines for further information on trail design standards.)

In addition to the Perimeter Trail, the following additional trail improvements are proposed as part of the Master Plan:

*East Rim Trail:* Improvements to the East Rim Trail include construction of a new trail from the VOC Water Treatment Plant to the Arroyo Well and the reconstruction of an old trail from the Arroyo Well to the Altadena Crest Trail. It will cross the entry access road close to the north side of the Arroyo Well, skirt the backside of the existing east JPL parking lot, and join with the Altadena Crest Trail and the Gabrielino Trail.

*Trail Connections from East Rim Trail to Perimeter Trail:* This project will create four trail connections along the east side linking the upper East Rim Trail to the lower Perimeter Trail. Each of the trail connections will accommodate pedestrians and equestrians. These connections will allow pedestrians and equestrians to access the East Rim Trail from the Perimeter Trail, so park users can avoid or bypass sediment/debris removal operations as necessary.



*West Rim Trail:* The West Rim Trail runs from Flint Wash Bridge through the upper Oak Grove area and the Metropolitan Water District (MWD) property where it converges with the Perimeter Trail south of the west side JPL parking lot. From the Gould Canyon Trail access tunnel to the Perimeter Trail, the West Rim Trail runs parallel to, but separate from, the paved inner park road used by vehicles and bicyclists.

Hikers and equestrians entering HWP from the Gould Canyon Trail access tunnel under Oak Grove Drive, and heading south on the West Rim Trail, must ride along the Park's main entry road at Foothill Boulevard. For improved safety, a portion of the trail will be moved east to a lower elevation to avoid conflicts with vehicle traffic. The new trail will connect to the existing trail just south of the "big bend" in the Park entry road.

*Trail Connections from West Rim Trail to Perimeter Trail:* This component replaces the existing stairs connecting the upper level of Oak Grove to the lower level. The stairs have deteriorated and are unsafe. This project element will grade a new trail linking the West Rim Trail near the upper terrace restroom to the south end of the Oak Grove Field and back up to the West Rim Trail via a reconstructed trail that once led to the Foothill Boulevard park entrance. From the lower level, a connection around the south end of Oak Grove Field ties to the trail connecting from the parking area south to the Perimeter Trail.

*Dam Observation Trail:* A loop will be constructed from the eastern end of the Flint Wash Bridge, along the top of an existing retaining wall to an observation point north of Devil's Gate Dam and back up to the western end of the dam. The observation point will be located on top of the west abutment of the original "Pasadena-La Cañada Bridge" (1893-1920). From the observation point, park users will have a clear view of the interior face of the dam and the water conservation pool area. This project will require cut and fill to be balanced on-site. This trail connection will be for pedestrians only and, for safety, include a railing the length of the trail.

Specific trail segments will be abandoned to allow for plant habitat restoration, improved safety, and to minimize erosion. These segments include:

- Informal trails in the sage scrub habitat adjacent to the existing spreading basins;
- Stairway connecting upper and lower terraces of Oak Grove;

- All trails below the Perimeter Trail elevation in the restored habitat and the flood management/water conservation pool areas. This includes at least five existing ad-hoc trails that cross the basin from east to west. Only one trail will remain north of the flood management/water conservation pool crossing the widened stream corridor at elevation 1027 to connect the east and west recreational areas.

## BICYCLE ROUTE

Bicycle use will be allowed on any existing or proposed paved surfaces within HWP. All major facilities and attractions will be accessible by bicycle. Bicycles will *not* be allowed on any designated trail or unpaved surfaces within the park nor on the existing JPL bridge crossing. The proposed route follows the perimeter of the park on existing vehicle roads, connecting to bikeways on Foothill Boulevard and Oak Grove Drive, to the JPL campus, the Kenneth Newell Bikeway, and southward to the Central Arroyo. JPL employees who bicycle to work will be able to reach the campus via the proposed internal bicycle route. See Exhibit 3-9, Bicycle Routes.

In order to provide access to the roadway across Devil's Gate Dam and the Flint Wash Bridge, bicyclists will enter HWP using the proposed east access (entry) to the dam. The new entry slip lane from Oak Grove Drive is part of the reconfiguration of access roads to the dam for maintenance and for sediment and debris removal. The control gate will be designed to allow bicycle access.

Bicycle access to the Gabrielino Trail from the east side of HWP will be via the yellow pipe gate entry at the Windsor/Ventura intersection and from the proposed new public parking at the northern quarter of the existing JPL east parking lot. These accesses will connect bicycle riders to the Gabrielino Trail via an existing paved road into the Angeles National Forest.

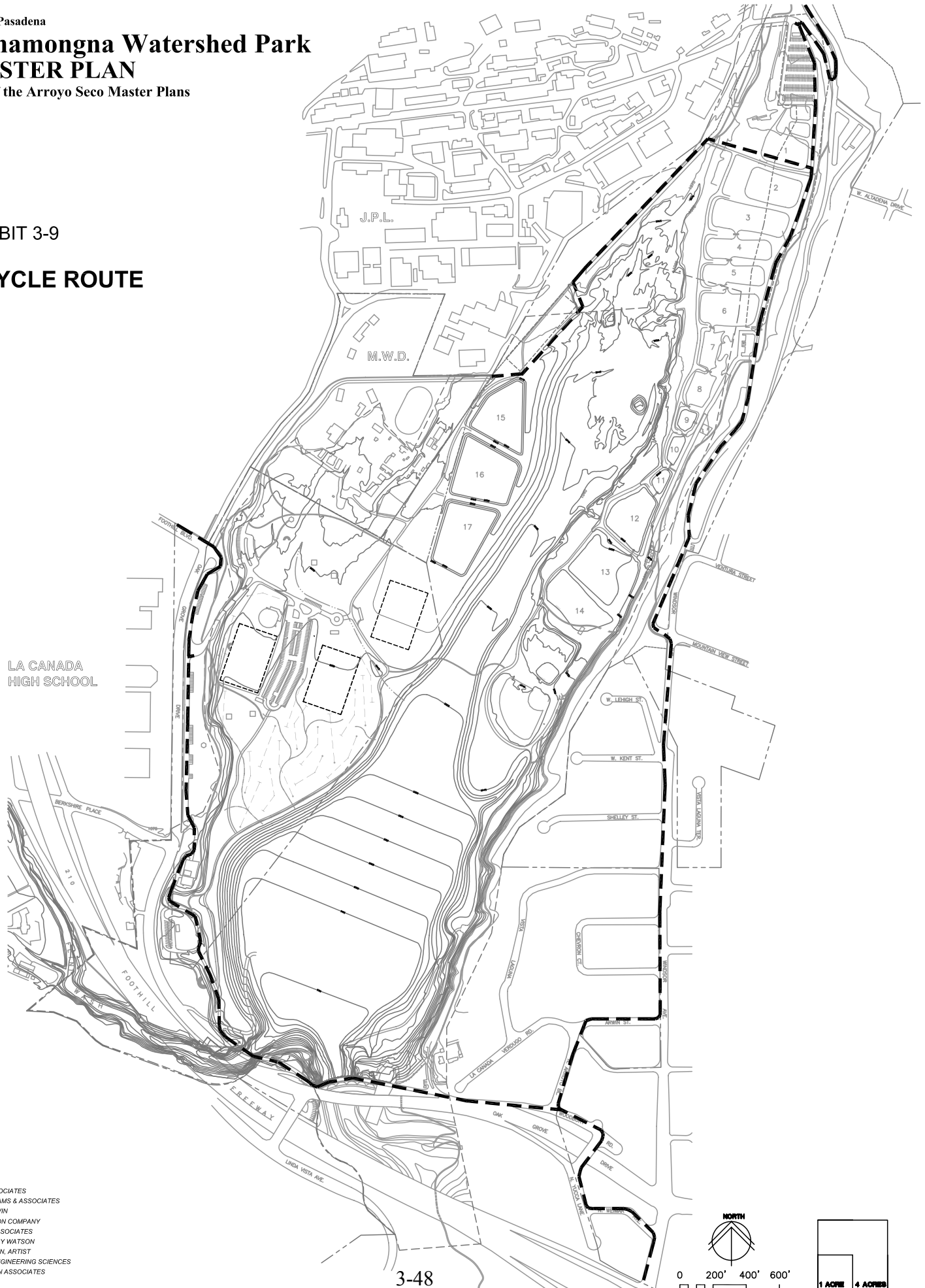
# Hahamongna Watershed Park

## MASTER PLAN

One of the Arroyo Seco Master Plans

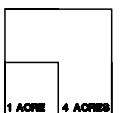
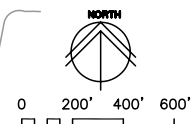
EXHIBIT 3-9

### BICYCLE ROUTE



LA CANADA  
HIGH SCHOOL

TAKATA ASSOCIATES  
 PHILIP WILLIAMS & ASSOCIATES  
 HINTZ & BALVIN  
 THE NATELSON COMPANY  
 MIRALLES ASSOCIATES  
 MONTGOMERY WATSON  
 BETH THIELEN, ARTIST  
 PARSONS ENGINEERING SCIENCES  
 HUNT DESIGN ASSOCIATES



### **3.5 WESTSIDE & OAK GROVE AREA IMPROVEMENTS**

#### **MULTI-USE PLAY FIELDS**

The Hahamongna Watershed Park Master Plan recommends the development of multi-purpose play fields on locations where land uses have a history of disturbance. There are two new multi-purpose fields proposed and illustrated in Exhibit 3-1, HWP Master Plan, at the beginning of this section. One is proposed on the westside, adjacent to the existing Oak Grove Field; this field is proposed to be called Sycamore Grove Field. The second new field will be north of Sycamore Grove Field and east of the supervised overnight camping area. The multi-use play fields consist of turf areas suitable for organized field sports, group events, and open play. All three fields will be maintained using the best management practices outlined in the Arroyo Seco Design Guidelines and in Appendix F, “Technical Report on Athletic Fields in Hahamongna Watershed Park,” so as to not have a detrimental affect on groundwater quality.

#### **Oak Grove Field**

The Oak Grove play field has already been upgraded to accommodate an overlaid youth-tournament soccer field as well as a Little League baseball field. This field configuration also allows the area to be divided into two practice fields for youth soccer. The existing mature oaks that surround Oak Grove Field will be preserved and new oaks planted. A detailed illustration of the area is shown in Exhibit 3-10, Oak Grove Improvements.

#### **Sycamore Grove Fields 1 & 2**

Two additional 2.4-acre, multi-use play fields are proposed. The southern site is currently used for temporary overflow parking just east of the existing parking lot. The northern site is located where past mining operations excavated a large depression. Both Sycamore Grove Fields will accommodate youth tournament soccer, open play, group picnics, and other group and individual activities. This field configuration allows each field to be converted into practice fields for youth soccer. This field will be surrounded by southern sycamore woodland plantings. Best management practices will be utilized for the maintenance of the athletic field turf areas to mitigate against any possible impacts to groundwater quality. Maintenance methods that consider natural solutions and the proper management of the natural resources will be given priority.

**Exhibit 3-10, Oak Grove Improvements**



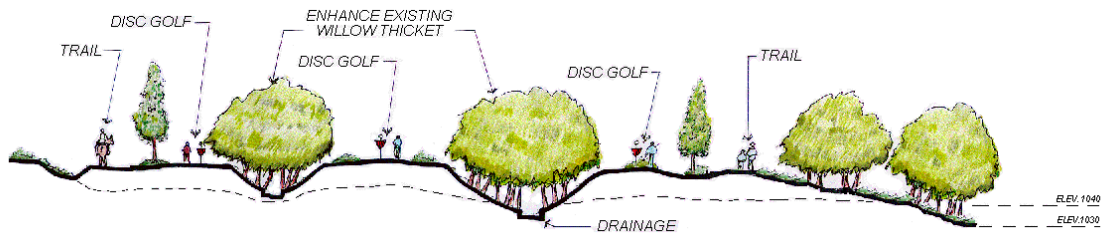
The existing Oak Grove parking area will be expanded to accommodate the abandoned overflow parking and a new Oak Grove Field restroom constructed before the Sycamore Grove Fields are constructed.

Under existing conditions, a portion of the Southern Sycamore Grove Field site is prone to flooding, therefore the area will be raised from its current average elevation of 1040 to elevation 1050. Under existing conditions, the proposed northern Sycamore Grove field site is prone to flooding, therefore the existing large depression at elevation 1025, well below the inundation 1040.5 elevation, will be raised above elevation 1055. During disaster emergencies, the Oak Grove area will continue to be used as a staging area for fire crews and other emergency support groups.

The perimeter trail to the east and north of the Southern Sycamore Grove Field is planned to provide a strong separation between this active recreational area and the habitat restoration area of the interior basin. This portion of the trail will be ADA-accessible.

### DISC GOLF COURSE

The disc golf improvements include relocation of the back nine from the north Oak Grove Area and pins 6-9 of the front nine to the area south and east of the new expanded parking lot and the Southern Sycamore Grove Field. The relocation of this portion of the disc golf course provides an opportunity for habitat restoration of the north Oak Grove area.



**Exhibit 3-11, Conceptual cross section of raised terraces for relocated disc golf course**

Portions of the new disc golf course will be raised utilizing excavated material from the water conservation pool area. The material will be placed between existing stands of willows, raising these portions to an average elevation of 1046, above the frequently inundated elevation of 1040.5. Drainage courses in this area will occur within the existing stands of native habitat.

The upper terraces will be planted to create mule fat scrub habitat along the fairways and southern willow scrub habitat as outlined in the plant restoration plan. The placement of the disc golf pins will be such to minimize conflicts with hikers and equestrians. A bench will be provided at every tee and designed in accordance with the Arroyo Seco Design Guidelines. The Master Plan recommends that the City formally recognize disc golf as a recreational use of HWP. Policies for the use of the course need to be established in a collaborative manner between the City and the disc golf community.

## OUTDOOR AMPHITHEATER

The existing amphitheater located just west of the Oak Grove field will be restored, but not expanded. The telephone pole seating will be rehabilitated for ease of maintenance and to make the area safe. Seating will be designed to prevent movement of the existing unsecured poles and the area will be fine-graded and surfaced with appropriate material to make the area ADA-accessible.

## WESTSIDE PICNIC AMENITIES

Both group picnic areas and smaller/individual picnic areas are planned for improvement. There are currently 52 picnic tables within the Oak Grove Area. This quantity has decreased over the past several years due to a loss of tables (breaking, etc.). It is estimated that the total number of tables will double to accommodate the use anticipated by the park improvements proposed for the Oak Grove Area.

Existing picnic tables will be moved to better positions and to also relieve the compaction on sites where they currently sit. A rotation program for the picnic tables should be considered, particularly in areas where the tables are within the drip line of an oak tree.

The upper Oak Grove Area will continue to have single picnic tables distributed throughout, while lower Oak Grove will serve as the location for two designated group picnic areas each with two shade structures. The first is south of the Oak Grove field; the second facility will be located in the overnight camp area. Each shelter will have four to six picnic tables. All group picnic areas will be provided with electrical outlets, sinks with running water and grey water drains, and group barbecues. The shade structures for the group picnic areas will be designed to fit the natural character of HWP, following the Arroyo Seco Design Guidelines. The floor of the group picnic areas will be graded level and surfaced with a permeable material such as decomposed granite blended with native soil and a binder. The group picnic areas will meet all ADA-accessibility requirements.

To support the picnic areas, the two existing restrooms, one in Upper Oak Grove and the other in the overnight camping area, will be renovated with new fixtures and ADA-accessible stalls. The abandoned restroom, which has been removed from the southwest corner of the Oak Grove play field, will be reconstructed near the southeast corner of the field, closer to the parking and to the new group picnic area. The replacement restroom will service group picnicking, multi-purpose play fields, and the disc golf course, and will include a storage area for park maintenance and field user group equipment.

## SUPERVISED OVERNIGHT CAMPING

Supervised overnight camping is proposed in the northern portion of the Oak Grove area. Overnight camping will only be available to organized groups, such as the Boy Scouts and Girl Scouts, with proper supervision. The facilities for group overnight camping to be provided include group-picnic shade structures, grey-water outdoor sinks, barbecues, drinking fountains and renovated rest room. A fire ring with seating for 30 youths and an amphitheater with seating for approximately 60 youths will be created as part of this project. The amphitheater will be constructed in the same style as the existing larger amphitheater adjacent to the Oak Grove field. Access to selected campsites will be provided for the disabled. During the day the site will be available to the general public.

The existing Los Angeles County trail maintenance building and storage area will be converted to provide accommodations and administrative space for the park staff. Parking for the overnight campers and trash bin storage will be provided adjacent to the staff building and across the inner park access road. See Section 3.7, Parking & Circulation for more detail.

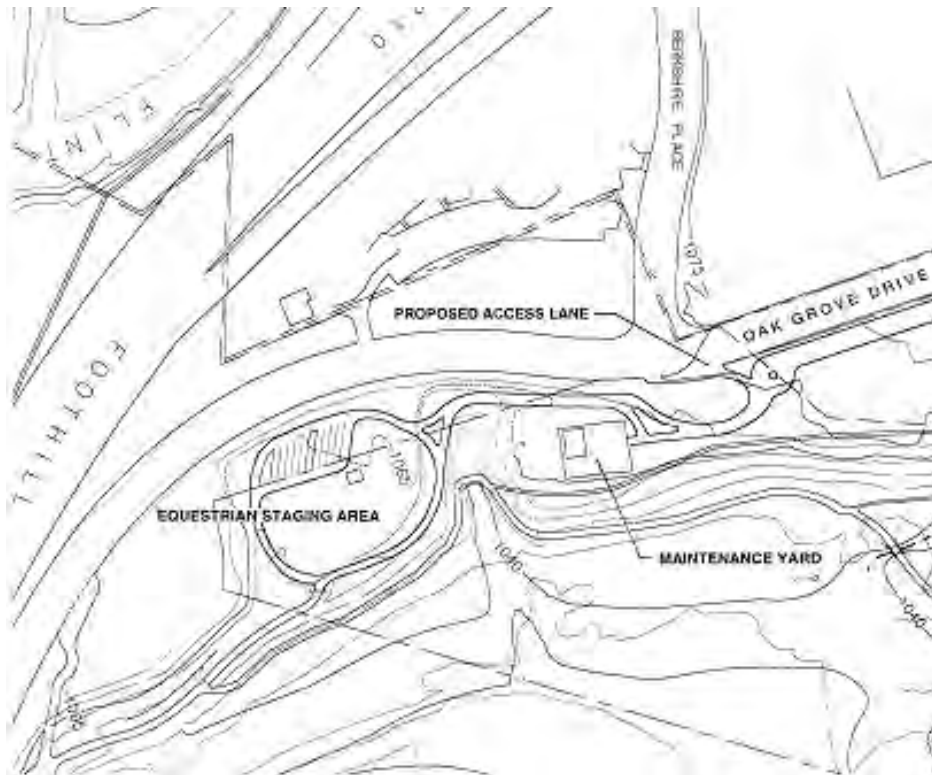
Selected areas of the overnight camping area will be restored to oak woodland. These areas will be identified as restoration areas and corded off. With the exception of the existing trail connecting the West Rim Trail and the Perimeter Trail via the existing restroom, equestrian trails through the oak woodland restoration areas will be removed. Hitching posts and a water trough will be provided at the southeast corner of the overnight camping area, near the vehicle turnaround between the Sycamore Grove Fields

## EQUESTRIAN STAGING AREA

Improvements to the equestrian staging area include improved vehicular access for school bus and horse trailer turnaround, upgrade of the existing restroom, improved trail connections, and picnic amenities for informal gatherings.



Access improvements will be in conjunction with the Berkshire drain improvements. (See Section 3.8, Utilities & Infrastructure.) The existing single-lane access road will be raised, realigned, and widened as it passes over the Berkshire Drain to allow two-way traffic. South of Berkshire Drain, a one-way loop will allow incoming traffic to enter the parking area on the northern edge. All vehicular traffic will exit via the southeast corner of the parking area, looping back along the old entry roadway. The softer, wider turns and one-way traffic flow will provide easy access for horse trailers, school buses, and camp vans (see Exhibit 3-12, Proposed Road Improvements to Equestrian Staging Area).



**Exhibit 3-12, Proposed Road Improvements to Equestrian Staging Area**

#### CALIFORNIA NATIVE PLANT NURSERY

A plant nursery will be established at the existing Oak Grove Maintenance Office (OGMO) to allow for the propagation of native plants indigenous to the watershed. These plants will be used for the restoration projects within HWP and other areas of the Arroyo Seco. An unused, open area adjacent to the office will be incorporated into the yard with new fencing. Improvements include propagation tables, interpretive signage, storage bins for soil and amendments, and a holding area for larger container stock. Environmental education programs and associated volunteer programs will have supervised access to the nursery.

## SUNRISE OVERLOOK

On an eastward-facing knoll, south of the Equestrian Staging Area, a hollow will be carved from the hillside creating a small amphitheater above the edge of an existing retaining wall. The rising sun and the San Gabriel Mountains form the backdrop to a view of the entire HWP basin. Rounded boulders and recycled historic granite curbs from Old Town Pasadena will be used to build the stepped terraces. Oak woodland will be established around the amphitheater to provide shade, further separation from Oak Grove Drive, and a sound barrier to the 210 Freeway. An existing trail leads from the Equestrian Staging Area to the site. ADA-access will be provided by new trail ramps from both the north and south along the top of the existing retaining wall.

## 3.6 EAST SIDE PARK IMPROVEMENTS

### SUNSET OVERLOOK

Just north of the Windsor/Ventura entrance to the park, on the crest of the west-facing canyon slope, a small picnic and interpretive area will be developed to take advantage of the broad views of the basin. The site will overlook the spreading basins and the water conservation pool to the south providing opportunities for education on water resources and habitat restoration. A small parking area, located near the intersection of Ventura and Windsor Avenues, will serve this area.

### GABRIELINO TRAIL AREA

A new trailhead at the north end of the existing eastside JPL parking lot will bring park users into this area of the park, up the Gabrielino Trail and into the upper Arroyo Seco watershed area. The Gabrielino Trail area will provide a new restroom, picnic tables, public parking and interpretive signage for area recreational users. When the northern quarter of the existing JPL parking lot becomes available for public parking, then the existing parking at Windsor Avenue and Mountain View Street can be used for a new park entrance.

A new restroom will be constructed at the north end of this remodeled parking lot and serve visitors to HWP as well as those headed into the Angeles National Forest. A small storage area and a public telephone will be provided at the structure.

## DEVIL'S GATE DAM AREA

### **Dam Keeper's Quarters and Public Restroom**

The existing dam keeper's quarters located on the east side of the dam will be demolished and a new public restroom constructed to serve park visitors. A new dam keeper's quarters will be built above the public restroom with sleeping quarters, a small kitchenette, and a private restroom. This second story will afford the dam keeper a view of the basin during storm events. On the ground level, connected to the public restroom, will be a storage area (single-car garage) for materials and equipment related to the operation and maintenance of the dam.

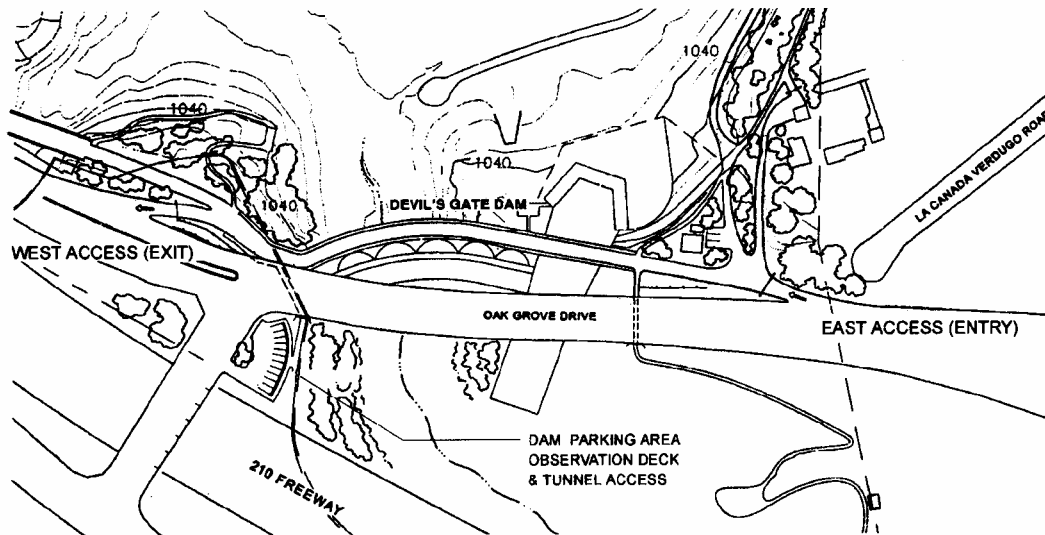
### **Dam and Observation Deck**

The City of Pasadena will work collaboratively with the County to enhance safety on the deck of the dam, at the observation deck south of the westside tunnel overlooking the spillway, and along the trail that leads down to the observation point overlooking the dam and the water conservation pool. Safety will be enhanced through the installation of ornamental fencing along the dam parapet walls and the spillway observation deck. Fencing will be similar to that installed by the City on the Colorado Street Bridge. Fencing will also be installed along the trail in order to restrict access to the flood management/water conservation pool.

## **3.7 CIRCULATION & PARKING**

### DEVIL'S GATE DAM AREA

At the present time, sediment removal trucks access the flood management/water conservation pool area through the cul-de-sac at the end of La Cañada-Verdugo Road. Use of this residential street for sediment removal has been highly disruptive to the neighborhood. The Master Plan proposes to close La Cañada-Verdugo Road and reroute truck traffic via a slip lane from Oak Grove Drive. The new East Access (entry) to the dam would be gated and provide one-way access to the dam area. The entry gate would be configured to accommodate bicyclists.



**Exhibit 3-13, Slip Lane Entry and Exit to Dam**

The new West Access (exit) from the dam area will allow exiting maintenance vehicles and equipment to cross the top of the dam and exit back onto Oak Grove Drive via another one-way slip lane. Exiting vehicles will be required to turn right on Oak Grove Drive and continue on to the Berkshire Place entrance to the 210 Freeway. This route across the top of the dam is part of both the Perimeter Trail and the bike route. Appropriate signage and attention to safety regulations during periods of sediment and debris removal will be necessary to maintain safe multi-modal access for all park visitors.

The East Access (entry) from Oak Grove Drive will require the removal of the existing dam keeper's quarters to raise the road bed and smooth the transition to the east-side haul road used for sediment and debris removal. A new public restroom and dam keeper's quarters will be constructed near the east end of the dam along with three parking spaces.

The existing pipe gate at the end of the cul-de-sac on La Cañada-Verdugo Road will be removed and the street curb restored, eliminating all vehicle access from this residential street. A landscaped berm will be created along the edge of the cul-de-sac to further buffer the adjacent residential neighborhood from park activities. Storm drains and perimeter fencing will be modified as needed.

### **New Dam Parking Area**

A small landscaped parking area is proposed at Oak Grove Drive and Linda Vista Drive for park visitors who wish to visit the Devil's Gate Dam area. This scenic overview is the only public-accessible location with a view of the south side of the dam. From this point the rock

formation for which “Devil’s Gate” is named, is visible, as is the floodwater cascading from the spillway onto the narrow canyon floor. Access to HWP and the top of the dam from this proposed parking area is accommodated through an existing pedestrian tunnel under Oak Grove Drive that leads to the dam. Visitors will be able to access the tunnel via a new ADA-accessible ramp. The chain-link fencing on the existing retaining wall at the entrance to the tunnel will be replaced with ornamental iron safety fencing, similar to that recommended for the dam’s parapet walls. A gate will be installed at the southern opening of the tunnel to provide a secured access at this location during the night when the Park is closed.

## WESTSIDE/OAK GROVE AREA

### **Park Entrances**

The main, west park entrance will remain at Oak Grove Drive and Foothill Boulevard. A new park entrance sign and lighting will be installed and the landscaping improved. This entrance will remain open to accommodate the tenants of the MWD property. The need for a traffic control gate or entry kiosk for security and dissemination of information will be assessed.

In order to provide safer and efficient access for park visitors during peak traffic hours (during arrivals and departures from La Cañada High School and JPL), a one-way access lane from Oak Grove Drive, north of the Berkshire Place intersection, is proposed to allow entry during park events and morning/afternoon high school student drop-off/pick-up. This project is indicated on Exhibit 3-1, HWP Master Plan under Oak Grove Drive Improvements. The access lane will be ingress only and will have a security gate and appropriate signage installed. See Exhibit 3-12, Proposed Road Improvements to the Equestrian Staging Area. The Foothill Boulevard entrance will continue to be both ingress and egress. Due to public safety concerns, a portion of this project has been temporarily implemented.

### **Circulation and Parking Improvements**

The main parking lot located on the lower terrace near the existing Oak Grove Field will be expanded. This expansion replaces the overflow parking area which is being converted to the Southern Sycamore Grove Field, therefore, the project will not increase the amount of parking in the area, but will consolidate the two existing lots. Due to current parking demand, this paved parking area needs to be expanded before the Southern Sycamore Grove Field is constructed. The access road will be extended and a turnaround constructed to accommodate fire and emergency vehicles. This project is indicated on Exhibit 3-1, HWP Master Plan, under Oak Grove Area improvements as Expanded Parking Area.

The existing parking area on the east side of the inner park access road and the north side of the overnight camping area will be upgraded to accommodate parking for buses and a drop-off area for vehicles or a bus. A small parking area, adjacent to the park ranger station, will be constructed with a new trash enclosure in the storage yard area currently used by the County Department of Parks and Recreation. This parking area will have a natural, permeable surface.

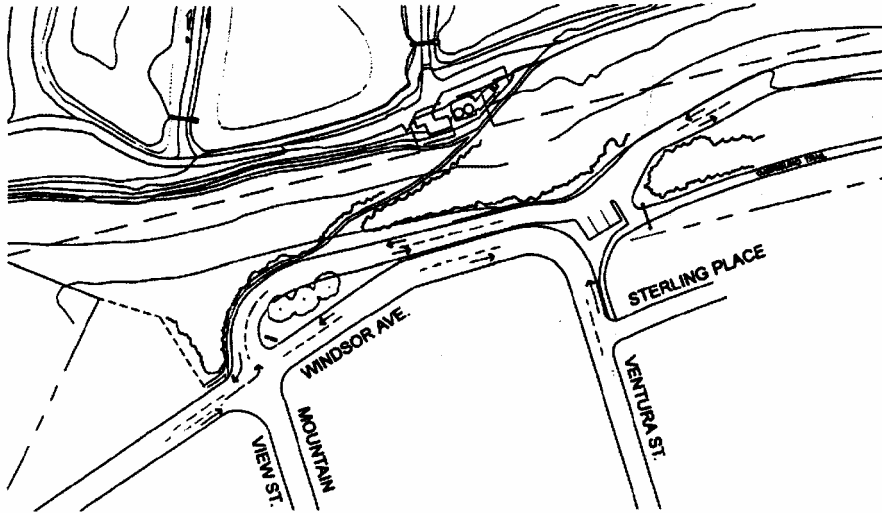
Improvements to the parking area at the equestrian staging area will include widening of the access road, realignment, and resurfacing. See Exhibit 3-12, Proposed Road Improvements to the Equestrian Staging Area. The existing access road will be widened from the upper Oak Grove turnaround and then raised to allow incoming traffic to drive over the new drainpipe that will be needed for the Berkshire drain upgrade. All vehicular traffic will enter the parking area on the northern edge and will exit via the southeast corner of the parking area, looping back along the old entry roadway. Pavement will be eliminated where possible from the existing roadway between the Berkshire drain and the Flint Wash Bridge. The softer, wider turns and one-way traffic flow will provide easy access for horse trailers, school buses, and camp vans. Ten pull-through parking spaces will be provided. These spaces will be used by no more than two buses, with the remainder of the spaces being designated for horse trailers and cars.

## EASTSIDE PARK AREA

### **Park Entrance**

In order to provide a safer entrance for park visitors and JPL employees, a new park entrance is proposed at Windsor Avenue and Mountain View Street. See Exhibit 3-14, Proposed Park Entry. The existing parking lot on Windsor Ave. would be demolished and park visitor parking made available in the Gabrielino Trail Area in what is now the north end of the existing JPL east parking lot. All eastside traffic will enter and exit HWP at a four-way intersection at Mountain View Street and Windsor Avenue. A designated left-hand turn lane will accommodate the stacking of rush-hour traffic into the new entrance without stopping through-traffic. If the County implements any improvements to the Windsor Avenue and Ventura Street intersection prior to the implementation of this proposed project, the intersection will be evaluated for traffic volume safety and whether any further improvements will be necessary.

**Exhibit 3-14, Proposed Park Entry at Windsor and Mountain View**



The proposed improvements will require the construction of a new retaining wall along the west edge of the park access road and at the end of Ventura Street. After construction is finished the entrance area will be relandscaped with native plants from the oak woodland and sage scrub palettes. A small parking area will be located near Sunset Overlook.

### **Circulation and Parking Improvements**

*Eastside Parking:* Park visitor parking in the northeast section of HWP (Gabrielino Trail Area) will consist of the northern portion of the existing JPL east lot (approximately 25% of the existing JPL parking lot). The remainder of the existing JPL lot will be used for the reconfiguration of the eastside spreading basins. This parking area will be for HWP park users and people connecting to trails in the Angeles National Forest and the upper watershed.

### **EMERGENCY & MAINTENANCE VEHICLE ACCESS**

Emergency and maintenance vehicle access to the interior of the park is by a proposed all-weather perimeter road/trail, see Exhibit 3-1, HWP Master Plan. Hikers and equestrians will also have use of this unimproved road for recreation. In order to complete the loop road, two bridges will need to be constructed—one bridge at Flint Wash and the other at the north end of the park. Emergency and maintenance vehicles will access the loop road through a system of locked gates at strategic locations throughout the park.

### **3.8 UTILITIES & INFRASTRUCTURE**

Following is a conceptual discussion of the impact to existing utilities and infrastructure along with the recommendations for new utilities that would be required to service the Master Plan proposals.

#### **STORM DRAINS**

The Master Plan does not have a direct impact on the existing storm drain systems that enter the park. However, discharge from the storm drains does have an impact on the park environment. Field studies undertaken as part of the Master Plan process assessed these drains. The 24 storm drains entering the park are shown in Exhibit 2-6, Storm Drains (See Section 2.7, Utilities). Modifications to certain storm drain outfalls are proposed to rectify erosion and habitat damage caused by increased runoff from urban development and to improve performance of the drain. Those drains include the Altadena Drain, Altacrest Drain, Berkshire Drain and Foothill/Oak Grove Drain. Modifications will be needed to JPL Trunk Line #14 because the existing outfall location is within the proposed Westside Spreading Basins. Additionally, there are recommended overall storm drain modifications that apply to all 24 existing storm drains. Other minor modifications to existing and new storm drains needed within HWP will be assessed during project implementation.

#### **Overall Storm Drain Modifications**

Storm water entering the flood management/water conservation pool from Flint Wash, from storm water runoff of adjacent lands, and from all storm drain outfalls will need to comply with state-mandated water quality standards including monitoring and cleanup of pollution from runoff. Runoff pollutants include horticultural fertilizers and pesticides, pathogens from animal manure (dogs and horses), hazardous substances in municipal waste including trash, oil, and grease from motorized vehicles. Remediation may occur at an outfall location in the Park, at the pollutant source, or at the inlet to the storm drain depending on the particular type of pollutant. Water quality becomes important because any water held behind the dam and pumped back for percolation in the spreading basins is a source of drinking water. A fiscally workable and scientifically proven solution to some of these pollution problems requires further investigation. Best management practices will be utilized to ensure TMDL's (Total Maximum Daily Loads) of pollutants are reduced and that natural/biological alternatives are considered first. Examples of such are bio-swales and the use of riparian systems that can function as biological filters and scrubbers for urban runoff contaminants.



### **Altadena Drain Improvements**

The Altadena drain extends into the stream channel north of the existing spreading basins. Its extended concrete box structure was utilized as part of an earthen breakaway dam, which would divert water to the eastside spreading basins. This site is no longer used as a diversion facility due to the environmental impacts from the breakaway dam and this diversion method. In order to widen the stream corridor, allowing for a more natural stream alignment (see habitat restoration project no. 1), the drain will be shortened and the embankment armored to prevent erosion from the runoff generated by this drain. The stream corridor will then be restored to a riparian habitat, similar to and as a continuation of the same plant community, immediately north of the JPL Bridge. This riparian habitat also exists due to urban runoff for a short stretch of the stream course south of the drain.

### **Extension of Altacrest Drain**

The discharge from the 40" reinforced concrete pipe (RCP) adjacent to the Gabrielino Trail and east of the JPL east parking lot (just south of the existing equestrian trail) will continue downslope in an extended enlarged single RCP. This underground drain line will run between the enlarged existing ponds and empty directly into the stream corridor. There would be an inlet to receive runoff from the eastside park road and the remaining northerly quarter of the existing parking lot.

### **Repair at Berkshire Drain**

The increased volume of runoff resulting from the widening of Oak Grove Drive and Berkshire Place has caused severe scouring of the downstream drainage swale within the park. The park road will be raised four feet and a new transition structure built with a new enlarged pipe running under the road and down the slope and exiting into the basin below the Perimeter Trail. The eroded areas on the upper slope will be filled and restored with oak woodland habitat. The area where the drain line crosses under the Perimeter Trail will be restored with southern willow scrub habitat. From the new outfall to the water conservation pool, the drainage swale will be stabilized with riparian willow habitat to prevent future erosion. The widening of the park road during this project will allow two lanes of traffic to pass safely to and from the Equestrian Staging Area.

### **Repair at Foothill Drain**

Increased runoff from the widening of Oak Grove Drive, Foothill Boulevard west of the park entrance, and urban development of a portion of the La Cañada-Flintridge area has caused severe erosion within the park on the slope above the existing Oak Grove play field. This project would extend the existing 24" concrete drain down the slope, make a turn south

parallel to the play field and discharge into the existing drainage swale. The existing swale that flows south along the toe of the oak grove slope needs to be improved. The new pipe would be covered over and the slope restored with oak woodland habitat.

## WATER MAINS

There are several water lines in the basin area that either cross the basin or run parallel to it. Improvements identified in the Master Plan will require a connection to the existing potable water distribution system. These include new restrooms, campsite sinks, drinking fountains, and the overnight-staff building. The Calaveras water line serves the Park effectively and will be used as the main supply for further improvements.

The existing domestic water distribution system will need to be evaluated as part of park improvements and for fire suppression needs. Fire hydrants at appropriate locations will need to be installed as improvements are made. Any utility relocation or new utilities that cross the basin floor are expected to be attached to the proposed North Bridge Crossing.

## OVERHEAD POWER AND COMMUNICATION LINES

Relocation of the power and communication lines is recommended. However, significant costs would be incurred and additional easements would need to be negotiated with the two electrical service providers as well as communication entities. Additional power and telephone lines are planned at the new restroom areas. Some upgrading of existing facilities may also be necessary at Johnson Field, the Oak Grove Maintenance Office, and the Equestrian Staging Area. It is recommended that new utility services be placed underground when inside the HWP boundary. There will be new electrical service to the pump-back facilities near the Devil's Gate Dam. Any relocated utilities or new utilities that cross the basin floor are expected to be either attached to the proposed North Bridge Crossing or within the adjacent overhead utility easement. Any utility relocation will be based on the Master Plan, its Environmental Impact Report (EIR), and a proposed utility design and cost estimate, all of which will be needed prior to permitting and easement negotiations.

### **Underground Pasadena's Eastside Overhead Power and Communication Lines**

This project would occur in two phases. The first phase would be to underground these overhead distribution lines from the VOC Water Treatment Plant to the Arroyo Well. The second would be to underground the existing Pasadena Water and Power overhead distribution lines from the VOC Water Treatment Plant to Johnson field (see Exhibit 3-15, Transmission & Communication Lines).

# Hahamongna Watershed Park

## MASTER PLAN

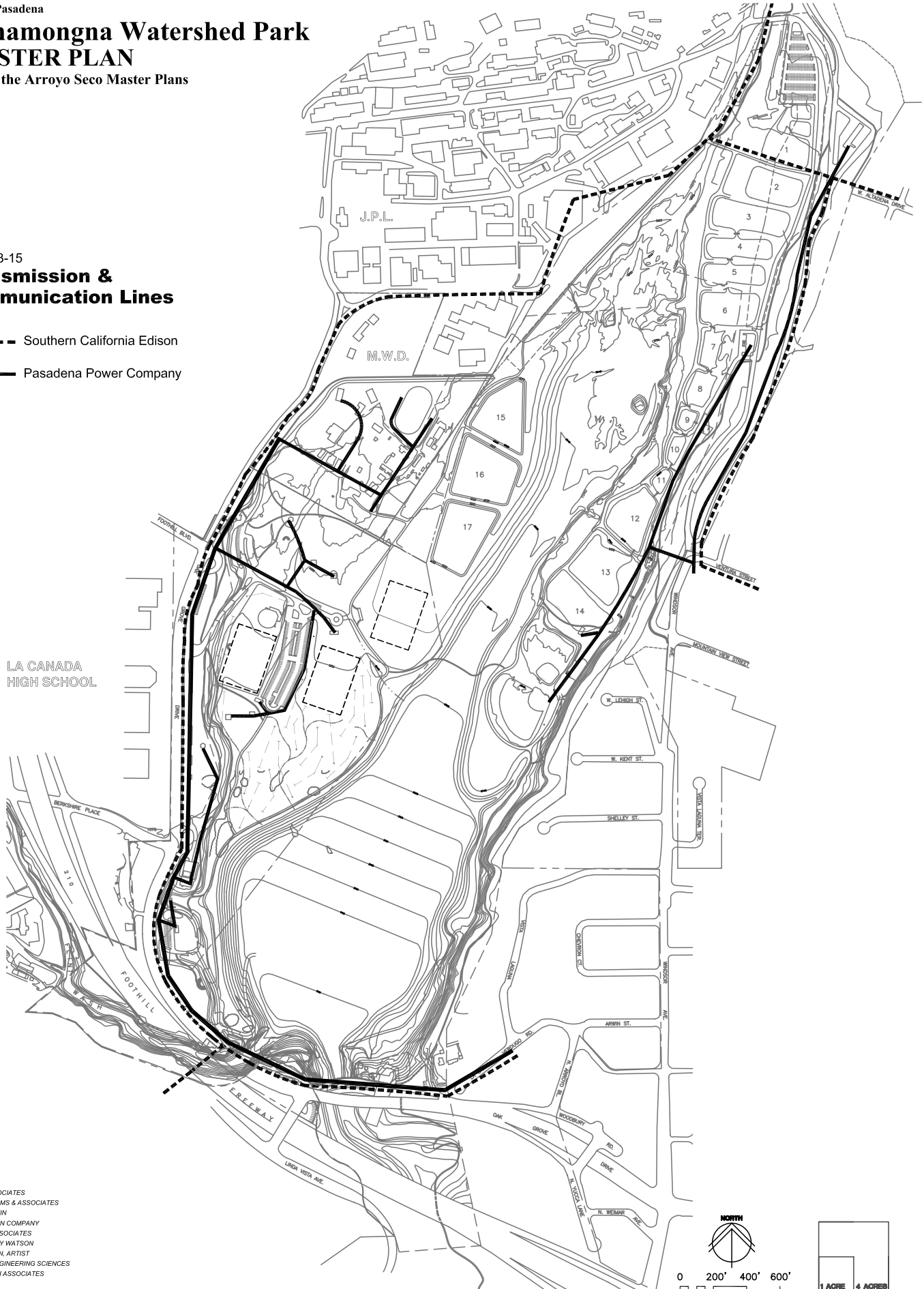
One of the Arroyo Seco Master Plans

Exhibit 3-15

### Transmission & Communication Lines

----- Southern California Edison

———— Pasadena Power Company



TAKATA ASSOCIATES  
PHILIP WILLIAMS & ASSOCIATES  
HINTZ & BALVIN  
THE NATELSON COMPANY  
MIRALLES ASSOCIATES  
MONTGOMERY WATSON  
BETH THIELEN, ARTIST  
PARSONS ENGINEERING SCIENCES  
HUNT DESIGN ASSOCIATES

### **Relocate the Existing Southern California Edison (SCE) Power Line in the Hahamongna Basin**

This project will minimize the number of overhead basin crossings as well as remove this line from the sensitive Riversidian Alluvial Fan Sage Scrub habitat, which restricts the maintenance of this utility. This overhead distribution line that runs diagonally across the basin from the JPL sub-station to the Windsor/Ventura intersection would be relocated. The new alignment would run north to the east/west distribution lines, adjacent to the North Bridge, crossing the basin with the existing lines, then running south to Ventura Street along the Gabrielino Trail, reconnecting to the distribution system at the Windsor/Ventura intersection.

### **Relocate the Existing Pasadena Power and Communication Line**

This project would relocate the existing Pasadena power and communication lines that traverse the basin from the VOC Water Treatment Plant to the MWD property and northern portions of the Oak Grove area. This utility will be relocated due to the undesirable aesthetics of these poles, the erosion of the pole bases, and their inaccessibility for maintenance in the project identified as the “Widen Stream Channel and Establish Riparian Habitat Project.” The communication portion of this line would be relocated to a new line that would run to JPL from the Windsor/Ventura intersection north along the Gabrielino Trail.

The power portion of this line will be relocated to the Pasadena grid that crosses the Devil’s Gate Dam to feed facilities in the westside portion of the park. This alignment would go from the dam to Foothill Boulevard (preferably underground) and provide a new feed to OGMO, the equestrian staging area restroom, the new restroom near the Oak Grove field, the group picnic shelters south of the Oak Grove field, the park ranger station, the existing restroom in the overnight area, and the group picnic shelters in the overnight camping area.

### **Relocate the SCE North/South Transmission and South Distribution Line**

These lines currently follow the toe of the western slope of the park, run the length of the basin from south to north, and feed into and from JPL’s main substation. The base of 11 of the 21 power poles will be frequently inundated during heavy storm events, when water conservation measures are implemented, making it impossible to access these poles. The poles either need to be relocated to an alignment in Oak Grove Drive or be raised to an appropriate height in their current location after the westside perimeter trail, relocated disc golf, and improved parking lot areas are raised above the seasonally inundated elevation of 1040.5 (spillway elevation). It is the preference of this Master Plan to have the poles relocated to Oak Grove Drive. Prior to implementing the proposed grading of the Flood

Management Water Conservation Pool, an analysis of alternative improvements or relocation of this utility will be completed for review and approval. This will guarantee the safety and stability of this critical utility. A mutual agreement between SCE and the City of Pasadena (and potentially other agencies such as JPL, MWD and the City of La Cañada-Flintridge) needs to be worked out.

## NATURAL GAS

City records indicate that the 12" high-pressure natural gas line that crosses the basin runs parallel to the 12" Calaveras water line. See Exhibits 2-8, Water Mains, and Exhibit 2-10, Natural Gas & Sewer, in Section 2, Existing Conditions. Due to their close proximity to each other, it would be prudent to have the condition of this gas line and the adjacent water line evaluated. Additionally, the depth of coverage will need to be reviewed when the streambed is widened to determine if it is adequate.

In the Oak Grove area near the intersection of the Oak Grove Drive and Berkshire, there is a natural gas line that runs north-south along the Oak Grove Drive. This line currently connects to various structures requiring gas service such as the park maintenance facility. It will also be used to service the overnight camping staff building. The gas line in La Cañada-Verdugo Road that services the Arroyo Seco Resource Center will be extended to the new dam keeper's quarters on top of the new public restroom at the east end of dam.

## SEWER SYSTEMS

Conforming to California EPA Water Quality Standards, all existing septic systems in HWP will be abandoned and new sewer collection and delivery systems constructed. The existing septic tanks will be pumped out, cleaned, back-filled with sand and abandoned in place. Before back-filling, the bottoms of the tanks will be broken through so that no seeping water will be allowed to stand in the abandoned tanks. Permits for the abandonment will be needed.

New sewer systems that include lift stations with force mains to the existing gravity sewer systems outside the Park are proposed; three on the westside and three on the eastside. At these six points of connection outside the Park, capacity will have to be studied and permits obtained with resulting associated fees.

The following is a summary of proposed projects that impact the sewage system:

### **Existing Restroom upgrades**

The two existing restrooms in Oak Grove (on the upper terrace and in the overnight camping area) are already approved to be upgraded with new fixtures and partitions under the City's Capital Improvement Program. The new partitions will be designed to accommodate ADA-access. The upper restroom is currently connected to the Oak Grove Drive gravity sewer main and does not need upgrading. The overnight camping area restroom will be connected to a new lift station and force main.

### **New Restroom at Oak Grove Field (replacement facility)**

The abandoned restroom at the southwest corner of the existing Oak Grove field will be reconstructed at the end of the new parking lot near the southeast corner of the existing field. The new replacement restroom will have one urinal and two stalls for men and three stalls for women as well as storage space (20' x 30' minimum) and will meet current ADA-accessibility standards. The restroom will have a sewage lift station and a force main to the gravity sewer main on Oak Grove Drive. Security lighting will be installed at this restroom.

### **Upgrade Restroom at Park Ranger Station (Overnight Camping Area)**

The existing building used by Los Angeles County Trails maintenance personnel will be converted to a park ranger station to supervise the overnight group camping area. The remodel will include adding a bathroom and kitchenette. A sewage lift station will be located between the existing lower restroom and this converted park building with gravity lines from each and a sewage lift station with force main to the gravity sewer main at Oak Grove Drive.

### **Upgrade and Improve Restroom at Equestrian Staging Area**

During the initial implementation phases of the Master Plan, this restroom will be renovated to meet ADA-accessibility standards and improve its physical appearance. Later, the restroom will be reconstructed to accommodate one urinal and two stalls for men and three stalls for women. This project will be combined with the sewer improvements needed at the Oak Grove Maintenance Office. A gravity feed will lead to a sewage lift station and a force main at a central location next to the Berkshire drain. Sewage will then be pumped up to the gravity sewer main in Oak Grove Drive.

### **Upgrade Oak Grove Maintenance Office (OGMO) Sewer**

The restroom facilities at the OGMO are adequate and do not need upgrading. The office is currently on a septic system that will be abandoned. A gravity sewer will connect to the proposed sewage lift station near the Berkshire drain and sewage will be pumped up to the gravity sewer main in Oak Grove Drive.

### **New Dam Keeper's Quarters with Public Restroom (replacement facility)**

On the eastside of the dam, the existing dam keeper's quarters would be demolished and rebuilt as a public restroom to serve park visitors at the dam. The restroom will have one urinal and one stall for men, two stalls for women, and will meet current ADA-accessibility standards. On the ground level, connected to the public restroom would be a storage area (single car garage) for materials and equipment related to the operation and maintenance of the dam. Dam keeper's quarters will be built above the public restroom with sleeping quarters, a small kitchenette and a private restroom. The second story will afford the dam keeper a view of the basin during storm events. The former dam keeper's house (the current Arroyo Seco Resource Center) will gravity feed to a sewage lift station adjacent to this facility, then a force main will connect to the City system servicing the houses on La Canada-Verdugo Road.

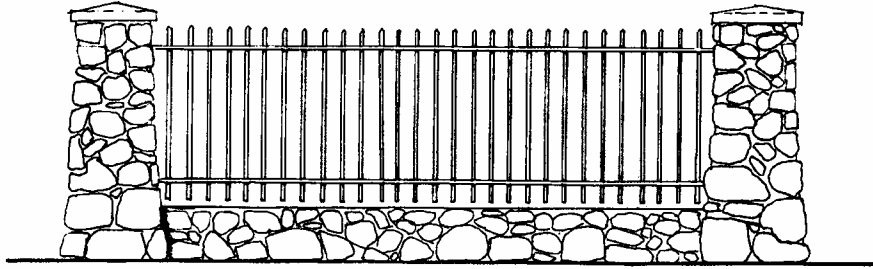
### **New Restroom at the Gabrielino Trailhead Area**

When the specific need is identified, a new restroom will be constructed at the north end of the proposed public parking lot (currently the existing JPL east parking lot) and serve park visitors using HWP as well as visitors headed into the Angeles National Forest. It will have one urinal and one stall for men and two stalls for women and meet current ADA-accessibility standards. A public telephone will be located at the structure. This restroom may need a sewage lift station with a force main to the JPL gravity lines across the JPL bridge.

## **3.9 SAFETY, SECURITY & ACCESSIBILITY**

For security and public safety, HWP will be closed at sundown. The park will be patrolled by the Pasadena Police Department. With the completion of the perimeter trail, the County and City personnel will be able to patrol the perimeter of the water/conservation pool during periods when rapidly flowing floodwater is entering the basin.

The existing chain link fencing along the perimeter will be upgraded to decorative iron and Arroyo stone reflecting the historic heritage of the Arroyo Seco in Pasadena. Additionally, the City will work with the Los Angeles County Department of Public Works to install fencing along the parapet wall of Devil's Gate Dam and along the scenic overlook south of the dam. The quality of work and design should resemble that installed on the Colorado Street Bridge.



***Decorative iron and Arroyo stone fencing for the perimeter edge***

Security gates will be constructed at vehicular entries and at the tunnel leading from the new dam parking lot under Oak Grove Drive. All new fences and gates will conform to the Arroyo Seco Design Guidelines.

Lighting will be provided on built structures and at major park entrances only. Many of the mammals that inhabit the basin are nocturnal. With the evening closure of the park, priority is given to these residents. All new lighting will conform to the Arroyo Seco Design Guidelines.

Public telephones will be provided where possible in association with the improved restrooms and recreation amenities.

## ACCESSIBILITY

All new construction will meet current ADA-accessibility standards. Developed state and national standards for natural park areas will be used where applicable.

The majority of the bicycle route will be ADA-accessible. Some new picnic site amenities, the new multi-use play fields, and portions of the disc golf area will be ADA-accessible where feasible.



### **3.10 PROGRAMS**

#### **ENVIRONMENTAL EDUCATION ELEMENT**

In many of the Stakeholder and Community Meetings, people from varied professions and backgrounds expressed the desire for an Interpretive Center somewhere in the Arroyo. Here, children and adults alike could come to study birds, wildlife, and plants. Some participants, such as the Native Americans, saw an Interpretive Center as a place where they could display and share their cultural heritage. Representatives of the Pasadena Unified School District and area science teachers see such a center as an opportunity to create a “living laboratory” where children could study wildlife and learn about the environment. From Native Americans to artists to science teachers, there is widespread support for an Interpretive Center which would be dedicated to ancient and modern indigenous cultures of the area together with the study of the environment and the opportunity to experience nature first-hand.

An Interpretive Center could be the main vehicle to communicate the importance of the Arroyo Seco, its history, and its environmental, cultural, and water resources. These resources will also be explained through environmental education programs and through interpretive signage in selected areas of HWP.

The environmental and cultural education programs at an Interpretive Center would support the habitat restoration of the park. The ability to plan the restoration effort in part to reflect plantings that are part of Native American culture provides opportunities for Native Americans to share their story. Plants gathered for ceremonies, medicine, basket weaving, musical instruments, and other native arts and crafts are part of the habitat restoration plan. Plant materials for the restoration projects can be grown at the California native plant nursery in partnership with interested groups.

To get this effort off the ground, the City of Pasadena should further explore possible locations for an Interpretive Center and involve interested members of the Community including but not limited to:

- Native American Community
- Armory Center for the Arts
- Pasadena Arts Commission
- Pasadena Unified School District
- John Muir High School Science Department
- Project Seed, Caltech
- St. Francis High School Science Department
- Local Conservancies
- Environmental Organizations

The following organizations are currently using the Arroyo and HWP for their programs. As current stakeholders, continued support for their programs may result in expanded opportunities for park users.

- The Armory Center for the Arts, Children Investigate the Environment Program
- Kidspace (soon to be located in Brookside Park)
- Jet Propulsion Laboratory (JPL), The Planetary Society
- Tom Sawyer Camps
- The Sequoia School
- The Audubon Society

The following programs are possible resources or potential users for HWP

- The Bay Institute Watershed Education Program
- The Center for Eco-literacy
- Pasadena Libraries
- City of Pasadena Cultural Affairs Division Gallery Space
- Pasadena Unified School District
  - Gifted and Talented Program and Community learning Centers
  - Wilson Middle School
  - Washington School
- The California Arts Council-Artist in Residency Program
- California Institute of Technology, Division of Geological and Planetary Sciences

An Interpretive Center could support the educational component and could offer the following:

- Programs relating to the Arroyo Seco environment
- Programs led by working artists, focusing on the traditions, arts and crafts of Native Americans. The intention would be to show to those interested, the plants used and gathering techniques that do not impair the sustainability of a plant population; and
- A communications program established to inform and update the public on habitat restoration, water quality, flood management, sediment removal, and water conservation issues and activities.

Programs offered at an Interpretive Center and educational information at interpretive sites throughout the park would stress the importance of a sustainable ecosystem. Specific topics would include the geology and hydrology of the San Gabriel Mountains and the Raymond

Basin Aquifer; the importance of a healthy watershed; how a watershed can be managed; management of flood water, debris and sediment; how to restore and preserve native plant habitat; why biological diversity is important to a sustainable ecosystem; which native plants, plant communities, and wildlife exist in the park; the importance of the Arroyo Seco as a wildlife corridor to a sustainable ecosystem; and which plants are used by the Native Americans in their traditions, arts and crafts.

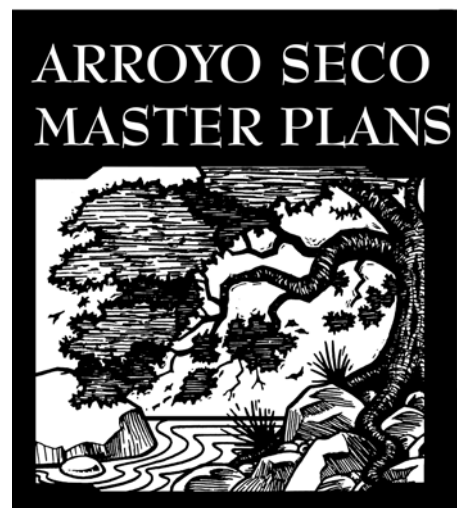
## INTERPRETIVE CENTER

The concept of an Interpretive Center will require further study since a likely location in the Arroyo Seco is not known at this juncture. At such time as a location becomes probable, it is recommended that the planning for such an undertaking becomes a joint effort between the City of Pasadena and organizations that would take an active role in this facility. An Interpretive Center could provide visitors opportunities to learn about the Arroyo Seco environment, water resources and conservation, flood management, and the Native American culture.

It is recommended that such a remodeled or newly constructed facility contain at a minimum the following features:

- A large flexible space dedicated to exhibits and demonstrations
- Classroom space for instruction
- Auditorium/conference space for up to 200 people
- Multipurpose covered patio for large groups
- Work area to prepare or repair exhibits
- Entrance lobby and gift shop
- Administrative offices
- Storage area and janitorial/sanitary facilities
- Expanded nursery facilities for plant propagation
- Large kitchen for group service
- Maintenance and storage yard

## **Section 4. Implementation of the Master Plan**



SECTION 4:

## IMPLEMENTATION OF THE MASTER PLAN

### 4.1 IMPLEMENTATION PLAN

The following is a list of the projects that are proposed in the Hahamongna Watershed Park Master Plan. The project planning for a new park is complex. Projects are listed sequentially within each area grouping, like stepping stones. Serious consideration was given to the order in which a project is listed within a group; the initiation of one leading to the ability to begin the next.

The projects listed first are suggested improvements to existing park facilities and features. This includes habitat restoration projects. Any improvements to park infrastructure will be made as necessary.

There is a considerable amount of grading and earthmoving associated with some of the projects in the HWP Master Plan area. Placement of excavated material to raise an area above the frequently flooded zone will affect the existing drainage as well as habitat associated with the specific project; therefore, newly restored habitats in these raised areas will require time to become established. This type of mitigation needs to occur before other projects in the implementation sequence begin and prior to the excavation and placement of needed material for the next project which may affect additional habitat.

The material excavated from the flood management area to increase capacity and to be used for newly raised parkland, will affect debris and sediment management. Therefore, all projects where material is excavated to be used as fill within the County's leased Flood Easement will require the County's review and approval. Because of the quantities of material involved, the County may choose to engineer some of the proposed projects within its easement.

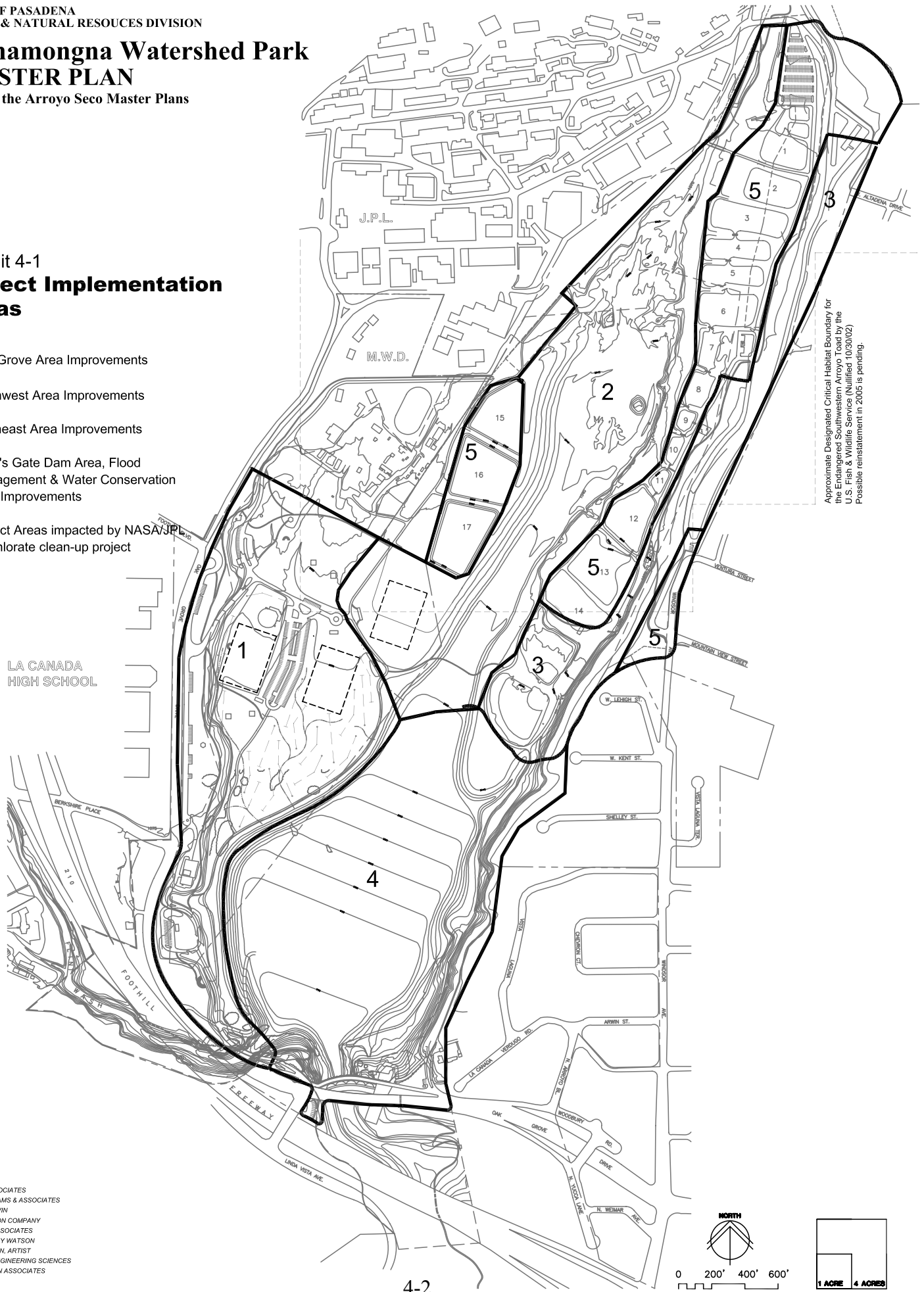
Projects requiring extensive grading that affect the existing and proposed habitats, and the sequence of these projects, will need to be reviewed and approved by the appropriate state and federal environmental agencies prior to the engineering of the projects. Therefore, the cost and efficiency of construction has been considered in how the following projects are sequenced.

# Hahamongna Watershed Park MASTER PLAN

One of the Arroyo Seco Master Plans

## Exhibit 4-1 Project Implementation Areas

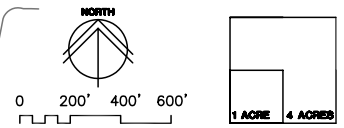
- 1: Oak Grove Area Improvements
- 2: Northwest Area Improvements
- 3: Northeast Area Improvements
- 4: Devil's Gate Dam Area, Flood Management & Water Conservation Pool Improvements
- 5: Project Areas impacted by NASA/JPL perchlorate clean-up project



Approximate Designated Critical Habitat Boundary for the Endangered Southwestern Arroyo Toad by the U.S. Fish & Wildlife Service (Nullified 10/30/02). Possible reinstatement in 2005 is pending.

LA CANADA HIGH SCHOOL

TAKATA ASSOCIATES  
PHILIP WILLIAMS & ASSOCIATES  
HINTZ & BALVIN  
THE NATELSON COMPANY  
MIRALLES ASSOCIATES  
MONTGOMERY WATSON  
BETH THIELEN, ARTIST  
PARSONS ENGINEERING SCIENCES  
HUNT DESIGN ASSOCIATES



## A: PRE-MASTER PLAN IMPROVEMENTS

- Upgrade the two existing restrooms in the Oak Grove Area, including Title 24 and ADA requirements.
- Upgrade existing Oak Grove Area picnic amenities and implement conservation of oak woodland.
- Remove asphalt from between and along the western edge of the existing spreading basins on the eastside of Hahamongna Watershed Park.

## AREA 1: OAK GROVE AREA IMPROVEMENTS

### **Group 1A**

- Construct turnaround and the expanded parking area to replace the overflow parking; install landscaping and irrigation.
- Construct gravity sewer lines and lift station with force main for improved water quality at the Oak Grove Field. Underground power and communication lines.
- Construct Oak Grove Field restroom replacement and two group-picnic shade structures.
- Construct the Foothill Drain improvements including improvements to the existing drainage swale.
- Construct two trail connections from the West Rim Trail to Oak Grove Field and the Perimeter Trail.
- Construct the West Rim Trail improvements and the realignment around the Foothill Boulevard park entrance.
- Implement the Oak Woodland Restoration Project including establishment of oak woodland on the slopes between the upper and lower Oak Grove areas.
- Improve the Outdoor Amphitheater at Oak Grove Field and provide picnic amenities when specific need and locations are identified.

### **Group 1B**

- Construct haul road and construction equipment entry at Oak Grove Drive for sediment removal access.
- Grade the west approach to the Flint Wash Bridge and the amphitheater at Sunrise Overlook.
- Grade the east approach to the Flint Wash Bridge and the southeast portion of the Perimeter Trail to create a uniform grade to the basin for flood management equipment and erosion control.
- Construct the Flint Wash Bridge, including abutments, retaining walls and approaches.
- Construct Sunrise Overlook and establish coast live oak woodland in this area.

### **Group 1C**

- Raise the grade above the flood plain for the Southern Sycamore Grove Field and the relocated Disc Golf Area.
- Construct the Southern Sycamore Grove Field and the Perimeter Trail, including the improved storm drainage and crossings.
- Implement the Southern Sycamore Grove Field and Disc Golf Habitat Establishment and Restoration Project.
- Relocate SCE transmission, distribution and communication lines to Oak Grove Drive or improve the existing SCE facilities to insure safety, stability, and operation.
- Relocate to Oak Grove Drive the Pasadena Power lines that cross sensitive habitat in the basin from the Windsor/Ventura intersection to the Oak Grove Area and MWD property.

### **Group 1D**

- Construct the Berkshire Drain improvements and restore the coast live oak woodland.
- Raise the grade above the flood plain for the Perimeter Trail from Flint Wash to relocated Disc Golf Area.
- Implement the Perimeter Trail Habitat Establishment and Restoration Project on the west side, including stabilizing the riparian stream corridor below the Berkshire Drain.
- In the Oak Grove Area, construct the overall storm drain modification improvements.
- Realign and widen the access road to the Equestrian Staging Area; improve the parking area and picnic amenities.
- Upgrade the existing restroom in the equestrian staging area, construct a gravity sewer to a lift station with a force main for improved water quality, and underground the power to the restroom and the lift station.
- Upgrade the Oak Grove Maintenance Office with a gravity sewer to the lift station for improved water quality, and establish the Native Plant Nursery.

### **Group 1E**

- Construct the park access improvements on the west side, including the park entrance at Foothill Boulevard and the Oak Grove Drive improvements, and an “enter-only” park access lane at Berkshire Avenue.
- Construct decorative perimeter fencing along Oak Grove Drive, from Flint Wash to the MWD property.
- Complete the Disc Golf Area improvements, relocating the disc golf course out of the Overnight Camping Area.
- Construct the Supervised Overnight Camping Area improvements, including day-use picnic amenities.
- Construct improvements to the existing parking areas and to an existing building for the Park Ranger Station.



- Construct gravity sewers from the Park Ranger Station and the Overnight Camping restroom to a lift station with force main located in the Overnight Camping vehicle pull-through, drop-off area. Underground the power in the overnight Camping Area.
- Implement the Oak Woodland Restoration and Habitat Establishment Project in the western half of the Overnight Camping Area.

### **Group 1F**

*Proposed improvements are within the Designated Critical Habitat for the Endangered Southwestern Arroyo Toad. This Designated Critical Habitat, established February 7, 2001, was nullified October 30, 2002. Refer to section 4.3 Environmental Requirements, U.S. Fish and Wildlife Service for details.*

- Complete the Supervised Overnight Camping Area improvements, including day-use picnic amenities.
- Construct two group-picnic shade structures (*one in the eastern half and one in the western half of the Overnight Camping Area*)
- Implement the Oak Woodland Restoration and Habitat Establishment Project in the eastern half of the Overnight Camping Area.

## **AREA 2: NORTHWEST AREA IMPROVEMENTS**

*Proposed improvements are within the Designated Critical Habitat for the Endangered Southwestern Arroyo Toad. This Designated Critical Habitat, established February 7, 2001, was nullified October 30, 2002. Refer to section 4.3 Environmental Requirements, U.S. Fish and Wildlife Service for details.*

### **Group 2A**

- Construct the Stream Channel Widening Project, using Land Form Grading principles, and restore and establish streambed riparian habitat.
- Fill and grade the eastern edge of the Overnight Camping Area for proper drainage.
- Construct the overall storm drain modification improvements in this area.
- Fill, grade, and construct the northern Sycamore Grove Field
- Implement the Habitat Establishment Projects from the west side Perimeter Trail, around the northern Sycamore Grove Field, to the stream corridor including the graded slopes.
- Implement the Riversidian Alluvial Fan Sage Scrub Habitat Establishment and Restoration Project.

### **Group 2B**

- Construct the Stream Corridor Realignment Habitat Project and restore and establish the streambed riparian, sage scrub, and southern sycamore riparian woodland habitats.
- Improve and realign the Altadena Drain outfall, and stabilize the streambed corridor.
- Construct the North Bridge Crossing completing the Perimeter Trail.

- Construct the northwest segment of the bicycle route to the North Bridge Crossing.
- Relocate the SCE diagonal cross basin distribution line out of sensitive habitat to a west-to-east alignment at the new bridge to insure safety, stability, and operation.
- Complete the Riversidian Alluvial Fan Sage Scrub Habitat Establishment and Restoration project, including relocation of the equestrian trail and restoration of the sage scrub habitat.

### AREA 3: NORTHEAST AREA IMPROVEMENTS

*Some of the proposed improvements are within, or are dependent on, listed projects that are within the Designated Critical Habitat for the Endangered Southwestern Arroyo Toad. This Designated Critical Habitat, established February 7, 2001, was nullified October 30, 2002.*

#### **Group 3A**

- Underground the eastside overhead power and communication lines from the Arroyo Well to Johnson Field.
- Construct the water conservation distribution system and the pump-back system from the Arroyo Well to Johnson Field and improve the domestic water distribution system.
- Construct the overall storm drain modification improvements on the eastside.
- Extend the East Rim Trail by reconstructing the trail from the Arroyo Well north to the Altacrest Trail.

#### **Group 3B**

- Construct the completing segment of the East Rim Trail from the VOC Treatment Plant north to the Arroyo Well.
- Construct the trail connections from the East Rim Trail to the Perimeter Trail.
- Construct Sunset Overlook, including interpretive signage and park amenities as needed.
- Implement the East Entrance Habitat Establishment project at the Sunset Overlook area.

### AREA 4: DEVIL'S GATE DAM AREA, FLOOD MANAGEMENT, AND WATER CONSERVATION POOL IMPROVEMENTS

#### **Group 4A**

- At Oak Grove Drive and Linda Vista Avenue, construct the new parking area, walks, and landscaping to the spillway overlook and the west side dam access tunnel.
- Construct ornamental fencing for public safety at Devil's Gate Dam and the Spillway Overlook Observation Deck.
- Fill and grade the existing entry to Devil's Gate Dam and construct new East Access (Entry) to the Dam from Oak Grove Drive.
- Construct West Access (Exit) from Dam to Oak Grove Drive and restore and establish habitat in this area.

- In the Devil's Gate Dam area, construct the overall storm drain modification improvements.
- Construct a gravity sewer from the Arroyo Seco Resource Center (existing dam keeper's house) and the new Dam Keeper's Quarters and public restroom to a lift station with force main to City sewers for improved water quality.
- Close access to the dam area from La Cañada-Verdugo Road at the cul-de-sac and establish habitat in this area.
- Construct the new Dam Keeper's Quarters and public restroom; landscape and provide picnic amenities at this location and at the park area between the dam and the Flint Wash Bridge when specific need and locations are identified.
- Construct the Dam Observation Trail, with safety railing, to the Water Conservation Pool Overlook.

#### **Group 4B**

- Raise the grade to above the flood plane and implement the Sycamore Woodland Habitat Project in the area south of Johnson Field.
- Grade the eastside of the flood management pool and construct sediment and debris management staging areas.
- Complete the sediment removal access haul road. Remove sediment below elevation 1040.5 (spillway floor) to increase capacity to 1,900 acre-feet in the flood management and water conservation pool area.
- Remove all vegetation below elevation 1030 in the water conservation pool area except where the widened stream corridor enters. Complete the Flood Management and Water Conservation Pool Habitat Project above elevation 1030.

### **AREA 5: WATER RESOURCE AND ASSOCIATED IMPROVEMENTS**

*Proposed improvements could impact or are dependent on listed projects that could impact the NASA/JPL remediation activities for groundwater contaminants and will require further environmental review and coordination with NASA/JPL.*

*Proposed improvements are within the Designated Critical Habitat for the Endangered Southwestern Arroyo Road. This Designated Critical Habitat, established February 7, 2001, was nullified October 30, 2002.*

#### **Group 5A**

- Remove the southern  $\frac{3}{4}$  of the east JPL parking lot.
- Relocate and improve water conservation distribution system (diverted and pumped-back storm water).
- Construct the Eastside Spreading Basins Project including expanded spreading basins 1 through 4, two new basins, and relocated sludge ponds 1 and 2.
- Complete the pump-back system from the dam area to the spreading basins.

- Construct the overall storm drain modification improvements, including the Altacrest Drain improvements and drainage improvements in the Interpretive Area.
- Implement the Habitat Establishment Project at the eastside spreading basins from the remaining northern parking lot south to Johnson Field.
- Convert the northern ¼ of the east JPL parking lot to public parking and restore and establish habitat in this area.
- Construct a sewer lift station and force main across the JPL bridge to JPL's sewer system and underground the power to the site for the new public restroom.
- Construct a new public restroom at the north end of the east lot; install eastside picnic amenities on the west side of the Stream Corridor Alignment Habitat Project and at the new public restroom. These improvements will be made when specific need and locations are identified.

#### Group 5B

- Construct the Westside Spreading Basins and implement the Habitat Establishment from the westside Perimeter Trail and around the spreading basins.
- Extend the water conservation distribution system (diverted and pumped-back storm water) across the North Bridge Crossing and south to the Westside Spreading Basins.
- Construct the New Park Entrance for the Northeast Area when the specific need is identified.
- Implement the East Entrance Habitat Establishment project.

## **4.2 WATER RESOURCES COMMISSION**

Interagency coordination will be necessary to effectively oversee the management of the Water Resources Element of the HWP Master Plan. The Master Plan proposes that as part of the ongoing management of the basin a joint agency commission be established. Representatives from the County, Pasadena Water & Power, Pasadena Department of Public Works, and the Raymond Basin Management Board would meet as needed to review and resolve in a timely manner pertinent water conservation and quality issues.

## **4.3 ENVIRONMENTAL REQUIREMENTS**

### **IDENTIFICATION OF AGENCIES AND ISSUES**

During the Master Plan process, 25 public and private agencies were identified from which permits or approvals will be sought for the Hahamongna Watershed Park. The primary permits that will need to be sought are summarized below for the Master Plan.

## SPECIFIC PERMITS AND APPROVALS FROM PUBLIC AGENCIES

### **Los Angeles County Department of Public Works**

Permits and approvals will be required for Hahamongna Watershed Park from several County Public Works divisions, including the Water Resources Division, Flood Maintenance Division, Land Development Division, Design Division, and Programs Development Division. These include facilities review and permits for encroachment or construction within the County flood control easement to modify ground surface or construct park facilities. To initiate review, the County will need topographic maps, plans, and specifications that show proposed facilities overlain on maps showing flood easement and other County facilities (roads, lands, etc.).

It is anticipated that a request for permit assistance will be made with the Watershed Management and Construction Divisions of County Public Works, and a meeting with the relevant divisions be set up to identify all approvals needed. A description of the project will be provided before the meeting to assist in identifying the appropriate groups within the County.

### **U.S. Army Corps of Engineers, Los Angeles District**

Some of the proposed projects will need a Clean Water Act Section 404 permit for filling or dredging in waters of the U.S., including wetlands, as applicable to bridge construction or other stream channel modification. Engineer Form 4345 initiates the review process. An Individual Permit may be issued as either ENG Form 1721, the standard permit, or as a Letter of Permission (LOP). The standard permit is processed through the typical review procedures, which include public notice, opportunity for a public hearing and receipt of comments. It is issued following a case-by-case evaluation of a specific activity. Most applications involving public notices are completed within four months, and many within 60 days. If work is minor or routine with minimum impact, and objections are unlikely, then it may qualify for a LOP. A LOP can be issued more quickly and public notice is not required. The District Engineer will notify the applicant if a LOP is appropriate.

Information required includes identification of the applicant, description of the activity (in writing and drawings—vicinity map, plan view, elevation or cross-section), names and addresses of property owners adjoining the water body, location of the site, and other approvals being sought or obtained.

The Corps will also need to review a jurisdictional wetland delineation for the park. The delineation will need to be completed for the Corps to evaluate wetland effects of proposed

activities in the Park and to complete the 404 permit process. A delineation was begun by the Corps, but at this writing (March 2002) it remains in draft form.

Corps permits will be required, at minimum, for the new northern perimeter bridge and reconstruction of the Flint Wash Bridge, construction or removal of pipelines across waterways, and construction within designated wetlands. The Environmental Impact Report (EIR) for the project is required to identify these specific impact areas, impact significance, and mitigation measures.

If significant potential impacts on jurisdictional wetlands are identified for proposed facilities or activities, mitigation will be required. These measures would include habitat enhancement or mitigation/habitat replacement at a ratio to be determined (often 3 to 1). The Corps has been asking applicants to justify proposed mitigation ratios by submitting a quantitative and qualitative functional analysis to demonstrate that the proposed mitigation will compensate for the lost functions of the area affected (habitat functions, biogeochemical functions, and hydrological functions). The EIR will include this analysis.

### **U.S. Forest Service**

Any proposed park facilities or activities on USFS land will require easements and/or Special Use Permits (per 36 CFR 251.54). Portions of the USFS Gabrielino Trail and Lower Brown Mountain Road lie within Pasadena City limits. The USFS Ranger Station adjacent to the project area is on land owned by the Metropolitan Water District.

The USFS will have vacated its facilities on the MWD property and will not be affected by relocation of the power supply serving this property. Prior to implementation of this project, PW&P and PPW will coordinate with MWD and the other tenants on the property so as to not interrupt the service.

The additional visitors to the park could increase traffic and impact areas served by the USFS. Additional visitors also increase the potential for fires on USFS land.

Beneficial effects of the park include provision of a perimeter road around the park, which improves access to greater areas of the park. Availability of water from the flood management water conservation pool for fire fighting is a second potential benefit. The conservation pool would need to be a minimum of 18 inches deep for a snorkel intake, and three to four feet deep for a bucket-type intake (helicopter mounted) for fire suppression supply (D. Feser, USFS, pers. comm. 1999). Beneficial and adverse impacts will be discussed together with mitigation measures in the Master Plan EIR. USFS compliance with the National Environmental Policy Act (NEPA), the federal counterpart of CEQA, would be incorporated into NEPA compliance associated with other federal approvals for the project through the Corps of Engineers' 404 process.

## **U.S. Fish and Wildlife Service**

If federally listed sensitive species are found in areas of the park that would be disturbed, Federal Endangered Species Act (FESA) Section 7 or 10 consultations with the U.S. Fish and Wildlife Service (USFWS) could be required. The need for these approvals was evaluated during the course of the Master Plan biological inventory. Subsequent to the conceptual approval of the Hahamongna Watershed Park master Plan (HWPMP), the U.S. Fish and Wildlife Service on February 7, 2001, designated critical habitat for the federally listed Southwestern Arroyo Toad. This included six miles of Arroyo Seco Creek from the Long Canyon confluence downstream to the upper end of Devil's Gate Reservoir. Those restoration projects and/or areas that are wholly or partially located within this designated critical habitat for the Southwestern Arroyo Toad are identified in the Habitat Restoration Section of this Master Plan.

On October 30, 2002, the U.S. District Court for the District of Columbia nullified all the designated critical habitats for the Arroyo Toad. Under federal law, the costs to industry and the public of designating critical habitat for an endangered species must be considered, and if they outweigh the benefit to the species, then habitat need not be designated. The USFWS will complete a new analysis of economic impacts and consider updated field survey information to refine where the Arroyo Toad exists. In the fall of 2003, they will propose new designated critical habitats for review and make a recommendation to the Interior Department by July 30, 2004. The Interior Department will decide by 2005 which areas of critical habitat to redesignate. FESA consultation will be required through the SFWS should critical habitat be designated within the park.

The USFWS will, however, coordinate with the Corps on 404 permits (discussed above) to determine whether the proposed project would significantly impact delineated jurisdictional wetlands or the designated critical habitat area, and identify acceptable mitigation measures.

## **California Department of Fish and Game, Region 5**

California Endangered Species Act (CESA) Memorandum of Understanding (MOU, formerly a Section 2081 Permit) will be required if the project has the potential to impact state-listed endangered or threatened species or their habitat. From the discussion under USFWS above, it is unlikely that this will be required.

A Section 1601/1603 Stream Alteration Agreement between the City and the CDFG will be required for modification of stream channels within the park. The agreement is needed for a project which will divert, obstruct, or change the natural flow or bed, channel or bank or any river, stream or lake. Information on the proposed action is provided on Form FG-2023,

which describes the proposed action, its location, impacts, and mitigations. The completed form and supporting information are submitted with a copy of the final certified CEQA document (EIR in this case) and copies of any other permits already obtained and as they become available, including 404, Regional Board, USFWS consultations, County/City Public Works and other approvals.

Project elements that may require 1601 agreements include reconstruction of the Flint Wash Bridge; the new northern perimeter trail bridge; and construction or removal of pipelines that cross waterways, as their construction would change the stream channel and banks and, depending on construction method identified during detailed design, involve temporary stream diversion. If the design for the new bridge does not require impacting the stream course or banks, a CDFG agreement may not be needed for this project.

Diversion of natural inflows greater than 25 cubic feet per second to new spreading basins on the west side of the basin will also require an agreement. Modifications to existing spreading basins may also be included.

These impacts will be identified in detail in the project EIR together with acceptable mitigation measures.

### **California Regional Water Quality Control Board, Los Angeles Region**

The project will require a National Pollution Discharge Elimination System (NPDES) stormwater discharge permit for construction areas larger than five acres. Grading proposed for the Park area as a whole will exceed five acres, although no single element will reach this figure. If simultaneous grading in the park involves less than five acres, a permit will not be required.

In addition, a Clean Water Act (CWA) section 401 Water Quality Certification could be required as part of the Corps of Engineers section 404 permit process. All projects which may result in discharge into a water body, such as the construction of the Flint Wash and perimeter trail bridges and storm drain modifications, must request State certification that the project will not violate State and Federal water quality standards. Based on the information provided in the application, the Regional Board may grant a 402 waiver, a certification, a denial, or Waste Discharge Requirements. The 401 application is submitted with a copy of the 404 application and a final EIR. The Regional Board has 60 days to respond.

Similarly, if site dewatering is required during construction, a temporary NPDES permit is required from the Regional Board. The supporting information includes the location of the proposed discharge, anticipated discharge water quality, and anticipated discharge volume, as



well as the expected duration of the discharge. Current plans do not indicate a need for dewatering for foundations of proposed facilities.

The Regional Board would also issue Waste Discharge Requirements should reclaimed water be used to irrigate the park in the future.

### **South Coast Air Quality Management District (AQMD)**

Permits to Construct and Operate will be required for applicable units (internal combustion engines, etc.). At present, all pump motors needed for sewage lift stations are proposed to be electric. In addition, a Fugitive Dust Control Plan and compliance with AQMD Rule 403 will be required.

### **City of Pasadena Planning and Development Department**

The project will require a Conditional Use Permit (CUP) from the City, although it is a City-sponsored project. Master Plan elements requiring a CUP in an Open Space Zone include restrooms, soccer fields, and power line relocation. Other potential elements triggering a CUP are construction of fences more than six feet high and new night lighting. It is recommended that one master CUP be obtained for all park elements. Conditions for times and types of uses of the site would be identified in the CUP. A public-notice period including a public hearing is part of the CUP process.

Conformance with the City's new tree protection ordinance will be required if the project involves removal or disturbance of oaks or construction activities within the trees' drip line. Supporting information includes tree location, configuration, health, and proposed project activities. Potential impacts could include construction of new water distribution pipelines to new outdoor sinks, water fountains and restrooms, and new power poles and power distribution to the USFS on the west side of the park.

## **ADDITIONAL APPROVALS FOR PROPOSED MASTER PLAN UTILITIES MODIFICATIONS**

### **Storm Drain Modifications**

The City will need to obtain a permit from the Los Angeles County Department of Public Works for modifications to County storm drains that enter the park. The County will need detailed information on the proposed locations, sizes and materials of the modified drains; how the existing and proposed drains would change drainage characteristics of the park; and evaluate operation and maintenance requirements.

### **Power Relocation**

Relocation of power lines will require coordination with Southern California Edison (SCE) and the Pasadena Water and Power Department involving a written description of the existing line, the need for relocation, the site of the relocated line, and the proposed new corridor. SCE has indicated that relocation costs would be borne by the City. Impacts of relocation will be identified in the project EIR. Impacts of relocation on USFS land will be evaluated by that agency, as described above.

### **Septic Systems to Sewer**

Connection of existing restrooms and new restrooms to the County Sanitation Districts of Los Angeles system, via the Oak Grove sewer, will require permission from that agency. The City will need to complete an application for sewer and treatment plant capacity, including the location of the discharge, anticipated water quality, and amount of flow. The County will also need to approve the engineering design of the connections. Per City of Pasadena Health Department practice, the septic tanks would be decommissioned by pumping out sludge and water and filling with sand or dirt (M. Lim, pers. comm. 1999).

New restrooms located in the floodplain will also be evaluated for protection from flooding to avoid water pollution.

### **Expand or modify telephone systems**

Provision of additional telephone service to the park will require a written request to the current service provider, SBC (formerly Pacific Bell). Now Verizon (formerly General Telephone) has utility easements that may be encroached upon; if so, permits for construction of park facilities would need to be formally requested.

### **Fire department of review of water system for fire suppression**

The City of Pasadena Fire Department will review project plans and specifications to ensure that sufficient fire suppression flow, hydrants, and emergency access are provided.

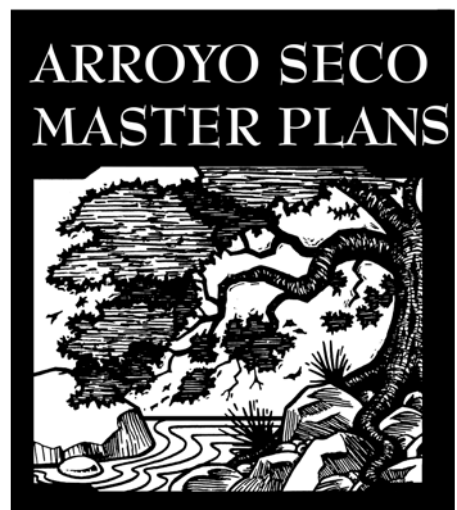
## **SCHEDULE FOR APPROVALS AND PERMITS**

The agencies identified have, by statute, 180 days to complete permit processing. While certain permit application materials indicate shorter periods, for planning purposes it is prudent to assume the longer time frame.

As indicated for individual agencies above, the permit review process begins with submittal of an application accompanied either by a completed EIR, or engineering design drawings, or both. Therefore, the permit applications are submitted with these documents as soon as they are available to begin a prescribed process.

Ideally, the permit process begins long before these documents are completed. The appropriate agencies are identified and contacted early in the project. The agencies' issues are considered and incorporated into the planning process, mitigation can be developed and agreed upon, and the project can be modified to minimize impacts and mitigation requirements. In this way, by the time the application is submitted it is merely a formality, because the agency is familiar with the project and can process the review expeditiously. The time-consuming, iterative requests for additional information to support the application and multiple additional agency contacts are minimized.

# Appendix A



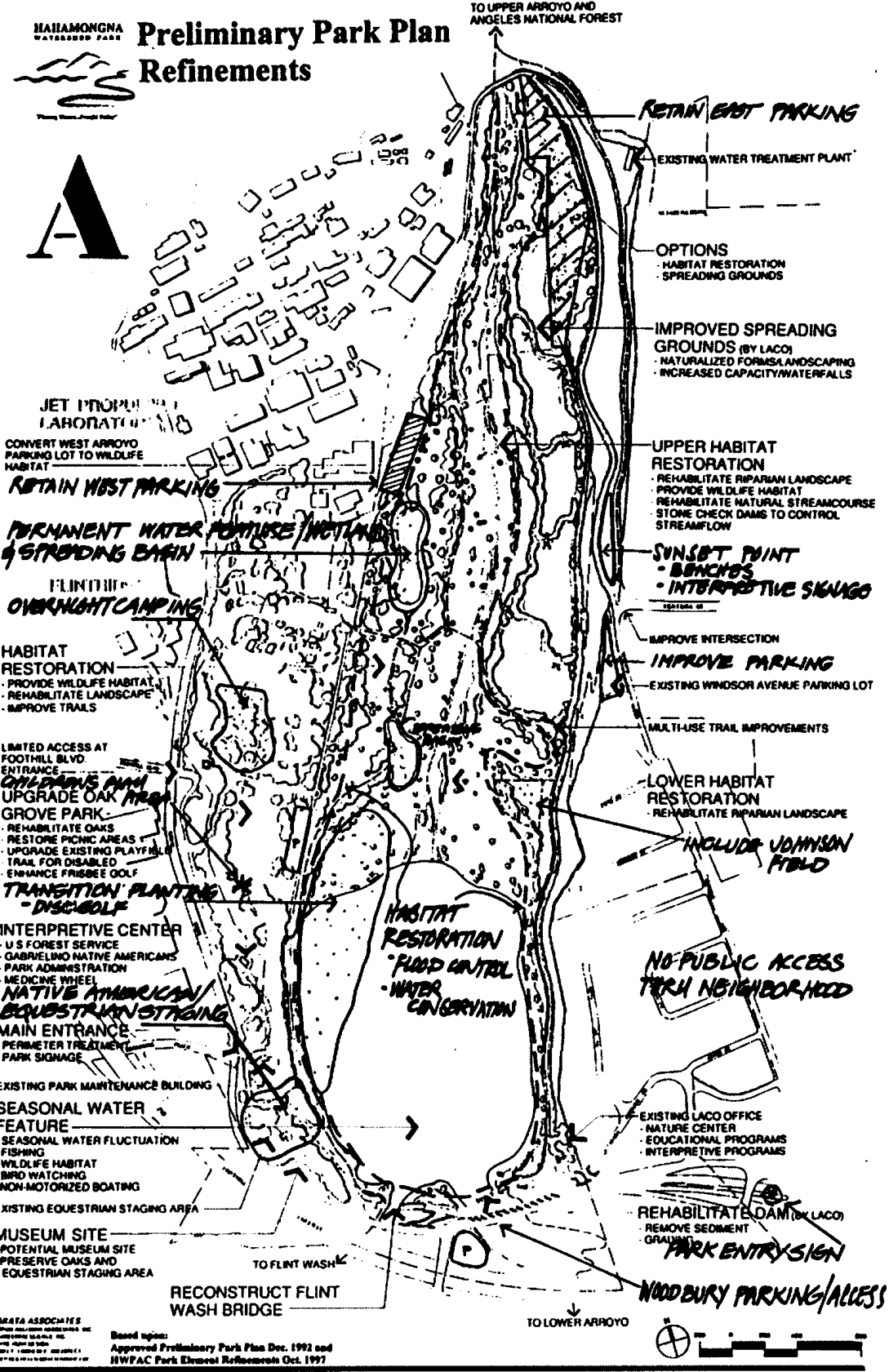
APPENDIX A:

## MASTER PLAN CONCEPTS AND ALTERNATIVES

During the Master Plan process, a number of concepts and alternatives were considered for a variety of situations within the park. This Appendix reviews those concepts and presents the several alternatives to various components of the plan prior to its adoption by City Council.

### A.1 MASTER PLAN CONCEPTS

In order to achieve a balance between habitat restoration, water conservation, and active recreation, two alternative concepts were reviewed during the second community workshop. One alternative (A) emphasized a natural park and the other (B) emphasized active recreation by including open lawn areas for soccer. These two plans are presented on the following pages.



ARATA ASSOCIATES  
 11/14/99

Based upon:  
 Approved Preliminary Park Plan Dec. 1992 and  
 HWPAC Park Element Refinements Oct. 1997

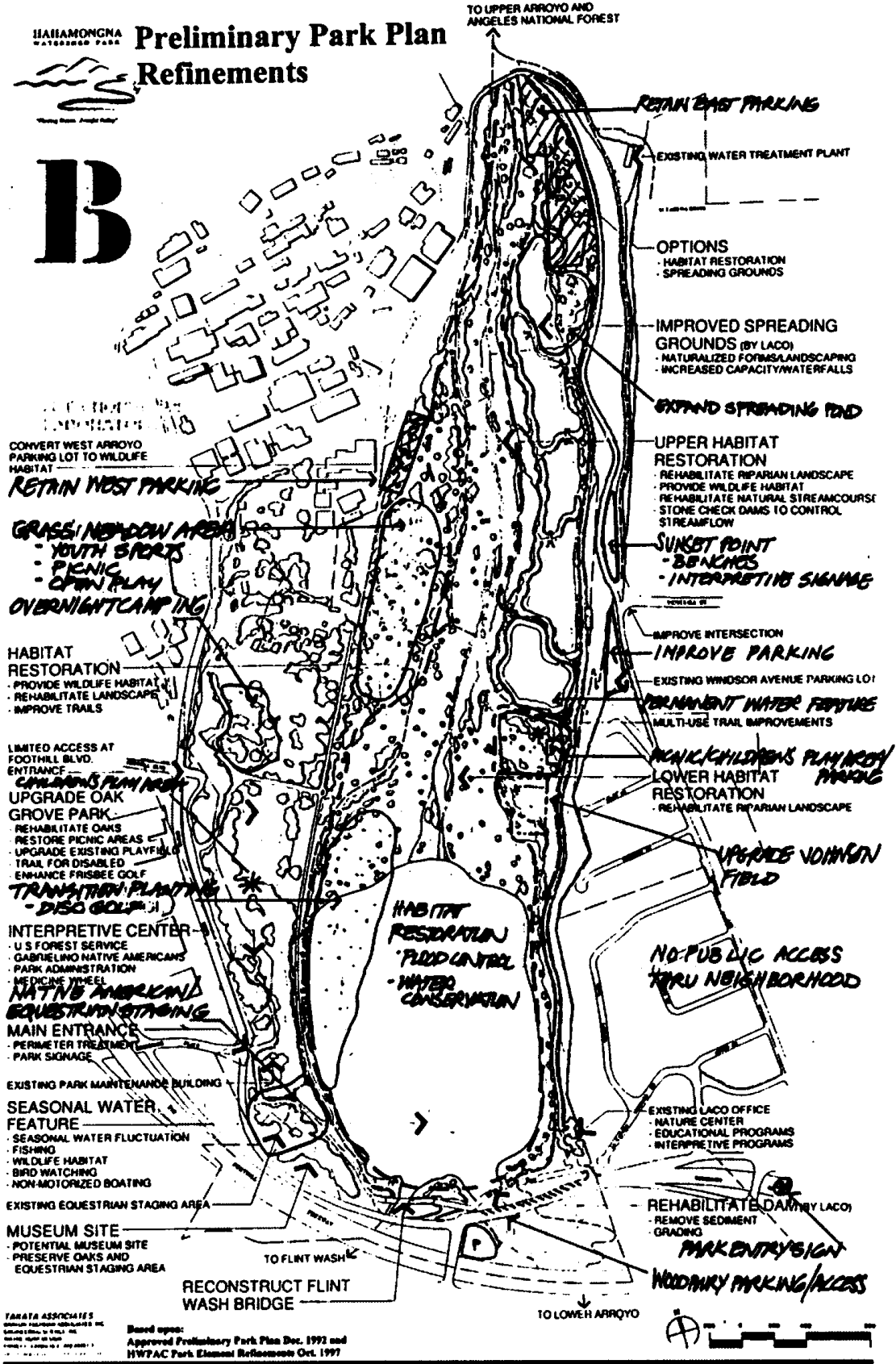


HAHAMONGNA  
 WATERSHED PARK

# Preliminary Park Plan Refinements



**B**



YANATA ASSOCIATES  
 10000 Foothill Blvd., Suite 100  
 Pasadena, CA 91104  
 Phone: (818) 797-1111  
 Fax: (818) 797-1112

Based upon:  
 Approved Preliminary Park Plan Dec. 1992 and  
 HWPAC Park Element Refinements Oct. 1997

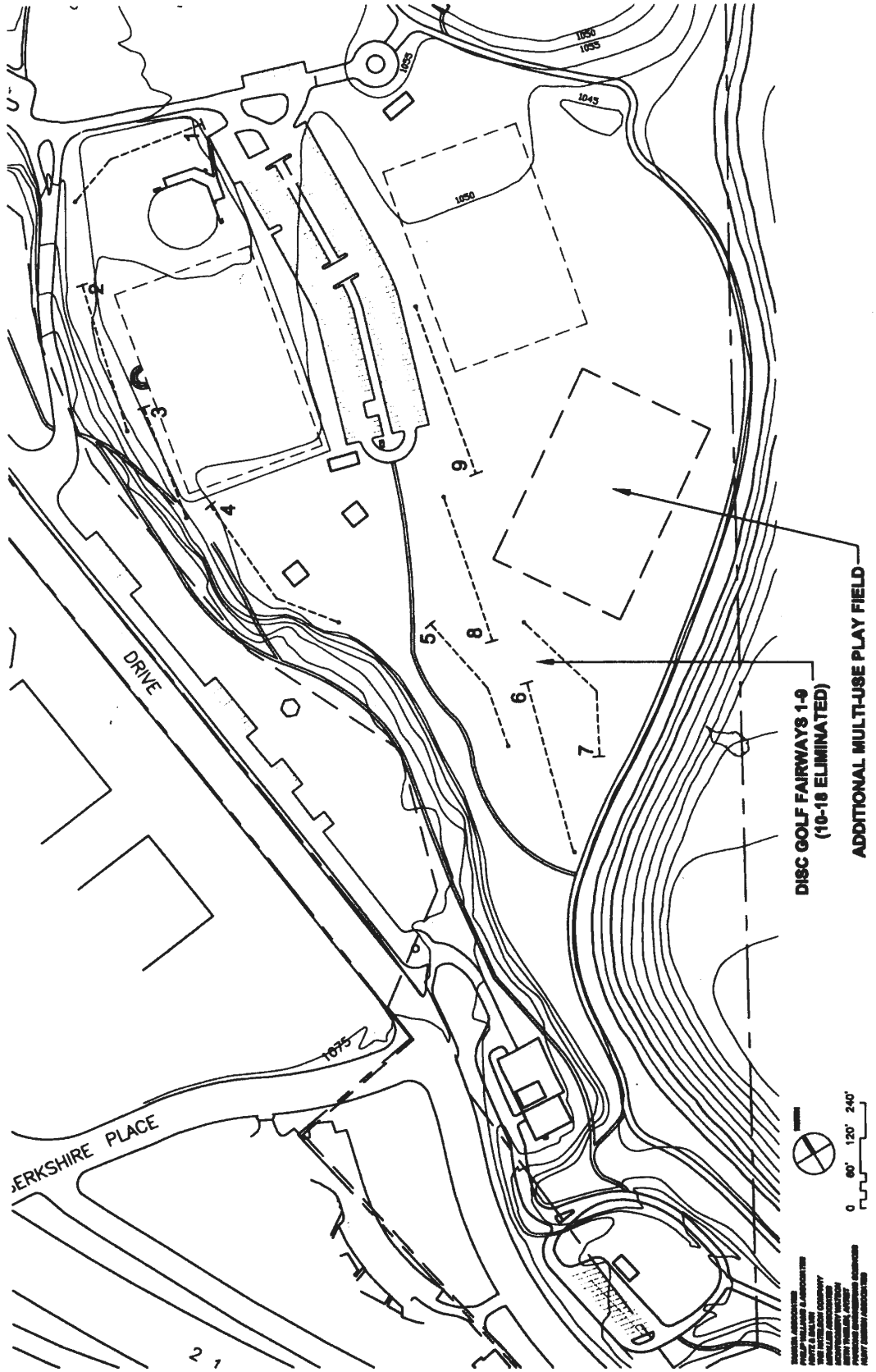


## **A.2 DISC GOLF ALTERNATIVE**

In February 2000, the Hahamongna Watershed Park Master Plan was conceptually approved by the Pasadena City Council. The Council also requested the evaluation of an alternative, which would take the relocated disc golf course proposal and consider a multipurpose athletic field on that site instead. This alternative is presented on the following page.



**Hahamongna Watershed Park**  
 City of Pasadena  
**Oak Grove**  
**Multi-Use Play Field Alternative**

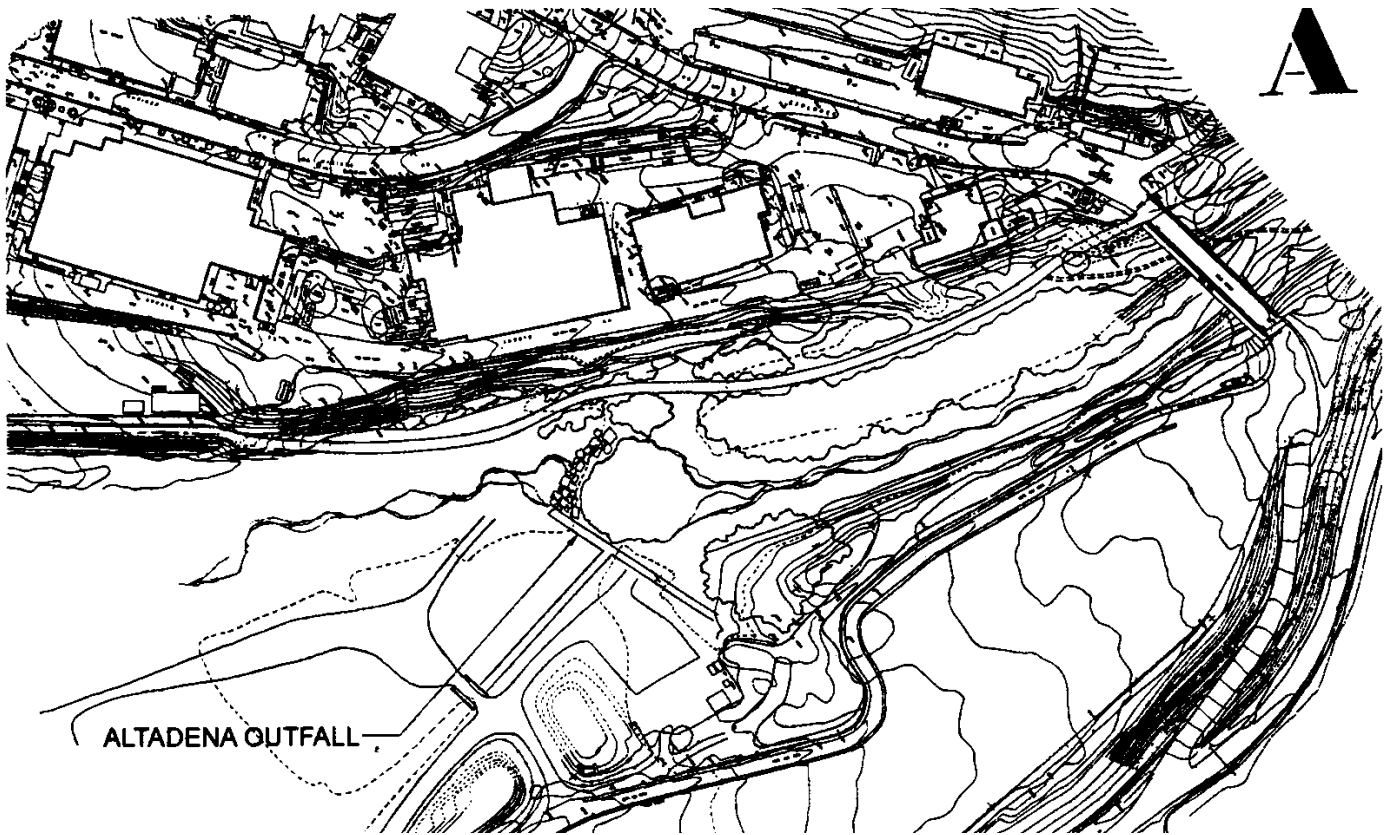


### **A.3 PARKING STRUCTURE ALTERNATIVES**

\* **The Parking Structure was not approved as part of the Council adopted plan.**

### **A.4 NORTH BRIDGE CROSSING OF THE PERIMETER TRAIL**

Three locations were considered as possible sites for the all-weather crossing of the northern basin: The existing JPL Bridge (A), the old bridge site (B), and the recommended site south of the Altadena Drain (C).



#### ***Existing JPL Bridge Alternative***

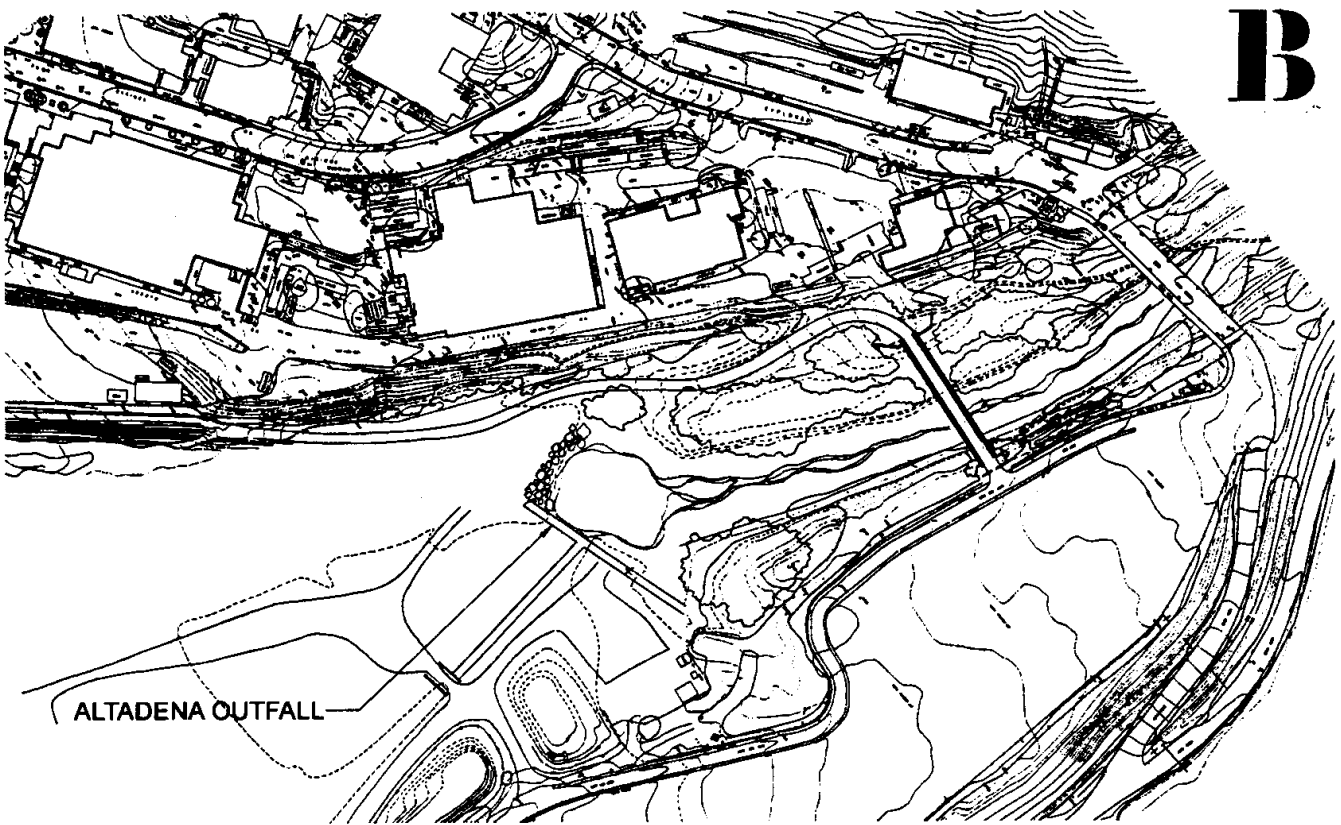
Use of the existing JPL Bridge would require the widening of the existing trail from the embankment north to the bridge. The trail adjacent to the bridge would require fill to reduce the grade leading up to the bridge. The gap between the bridge and the JPL perimeter fence would have to be widened to allow for a vehicle-turning radius. This would require cutting the concrete railing of the bridge.

*Pro*

Makes use of existing infrastructure by connection to the JPL Bridge  
Least-expense option

*Con*

Potential impact to restoration areas  
Internal loop requires two more locked gates  
Equestrians would use JPL Bridge during winter floods  
Could disturb sensitive EPA Monitoring Area  
Affects JPL security needs—fenced and gated roads & parking



**Old Road Alternative**

The historic crossing prior to the construction of the JPL Bridge was approximately 300• to the south. The abandoned bridge abutments are still visible. This location would require new construction and the widening of the existing trail from the west embankment north to the old abutments.

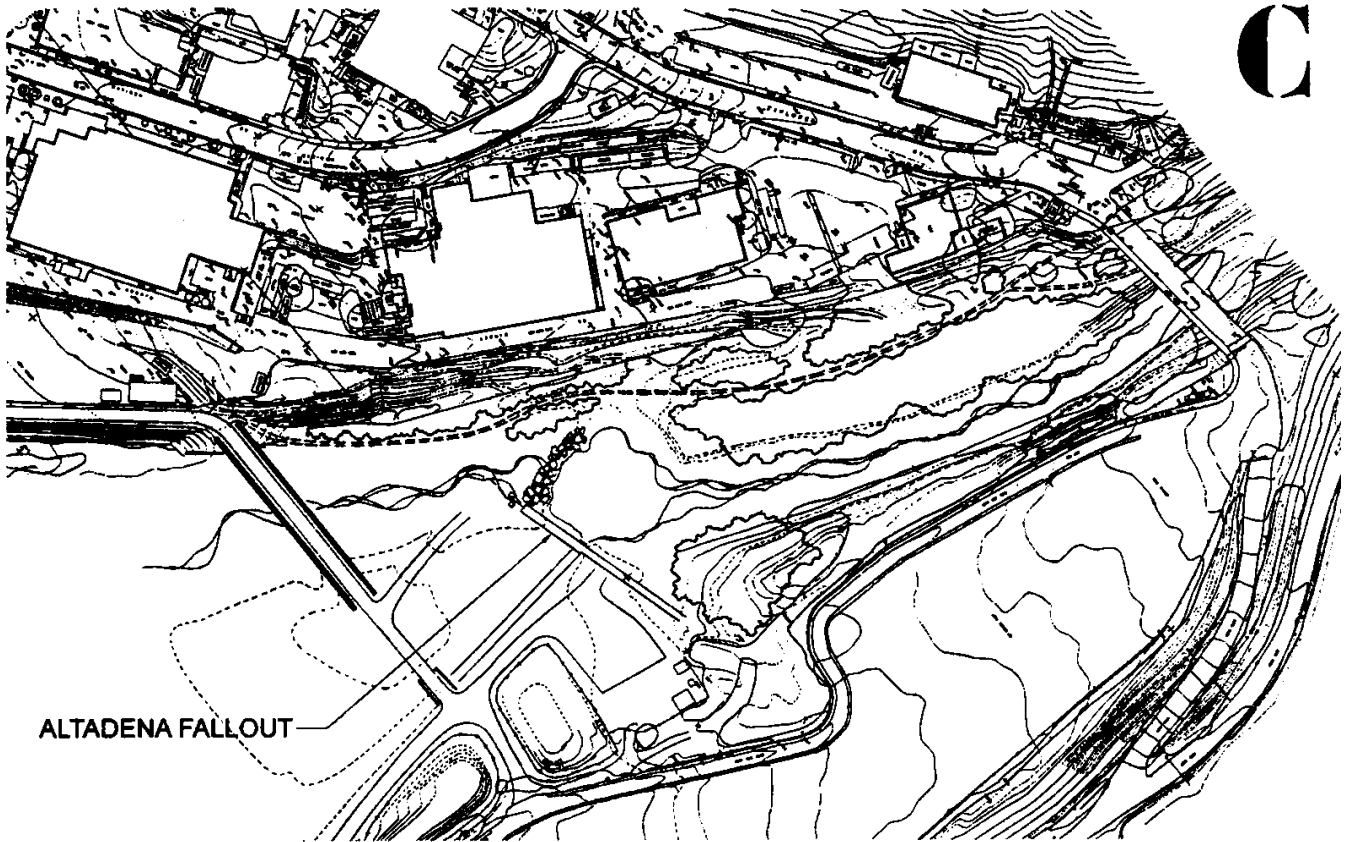
*Pro*

Makes use of available infrastructure by using existing footings  
Equestrians would have winter crossing

Allows for complete internal loop  
Avoids Altadena Storm Drain

*Con*

Requires new bridge span  
Potential impact to restoration areas  
Cost equal to Plan C—Grading road approaches with required habitat mitigation  
Could disturb sensitive EPA Monitoring Area



***South of the Altadena Drain – This alternative was selected and incorporated into the adopted plan.***

The recommended alternative crossing was for a location south of the Altadena Drain. The proposed span would cross the channel from the northern end of the embankment to the top of the existing spreading basin maintenance road. This alternative would require construction of a new bridge.

*Pro*

Avoids sensitive habitat

Allows for complete internal loop

Provides equestrians and other park users with winter crossing

Overhead electric power distribution line could be relocated using a bridge conduit crossing

Cost equal to Plan C—Grading road approaches with required habitat mitigation

*Con*

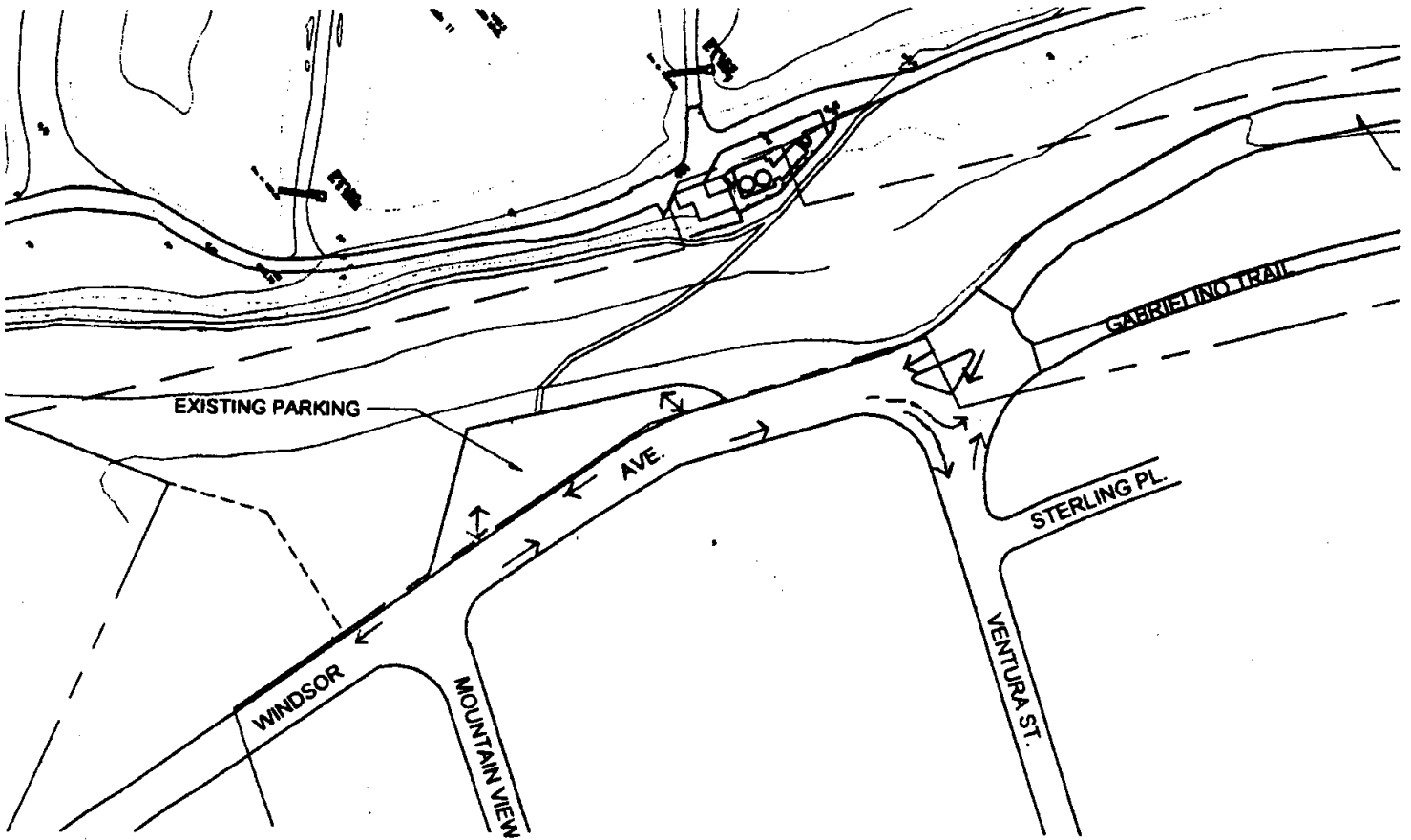
Close to Altadena Storm Drain

Longer bridge span

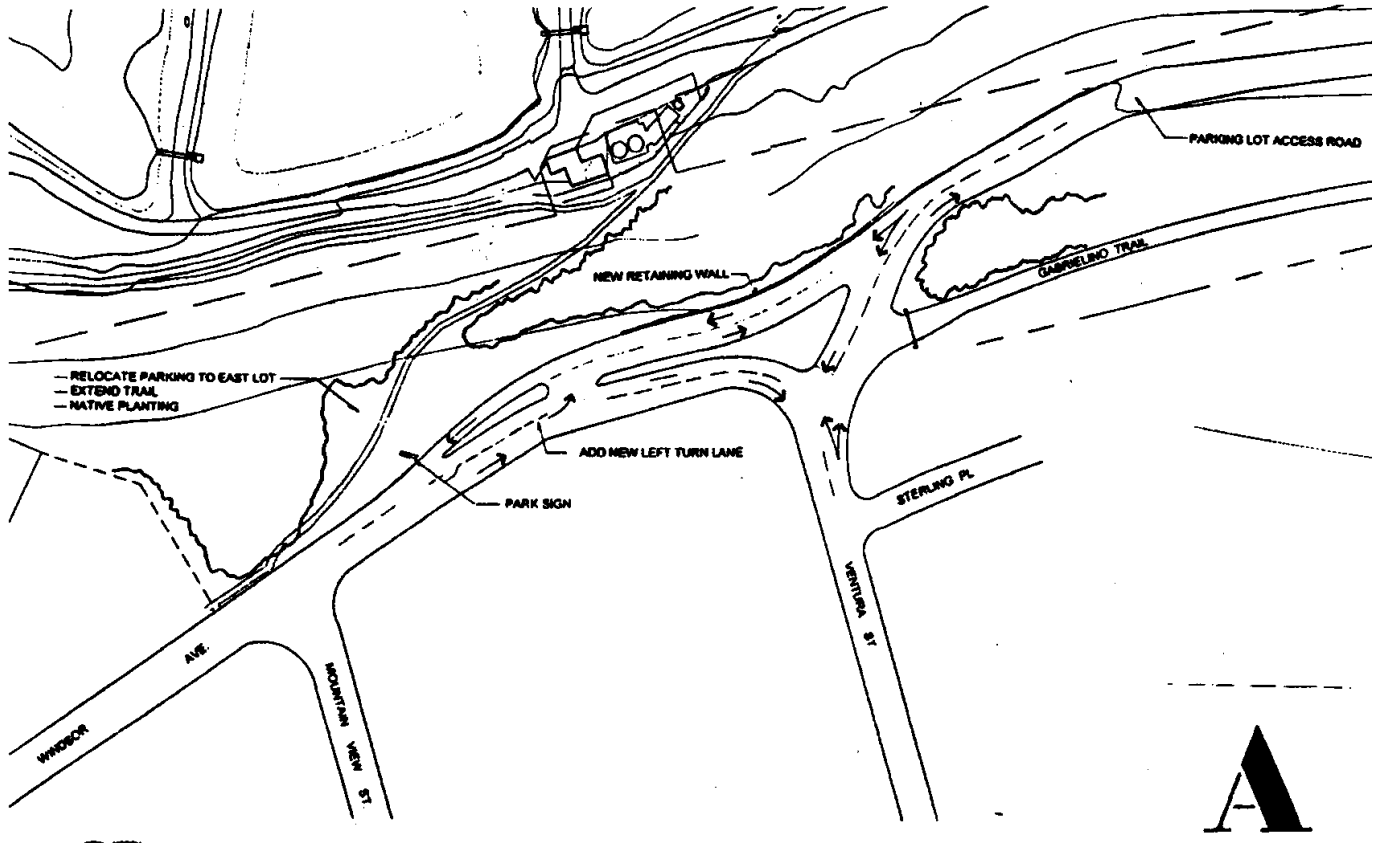
## A.5 WINDSOR / VENTURA ENTRANCE

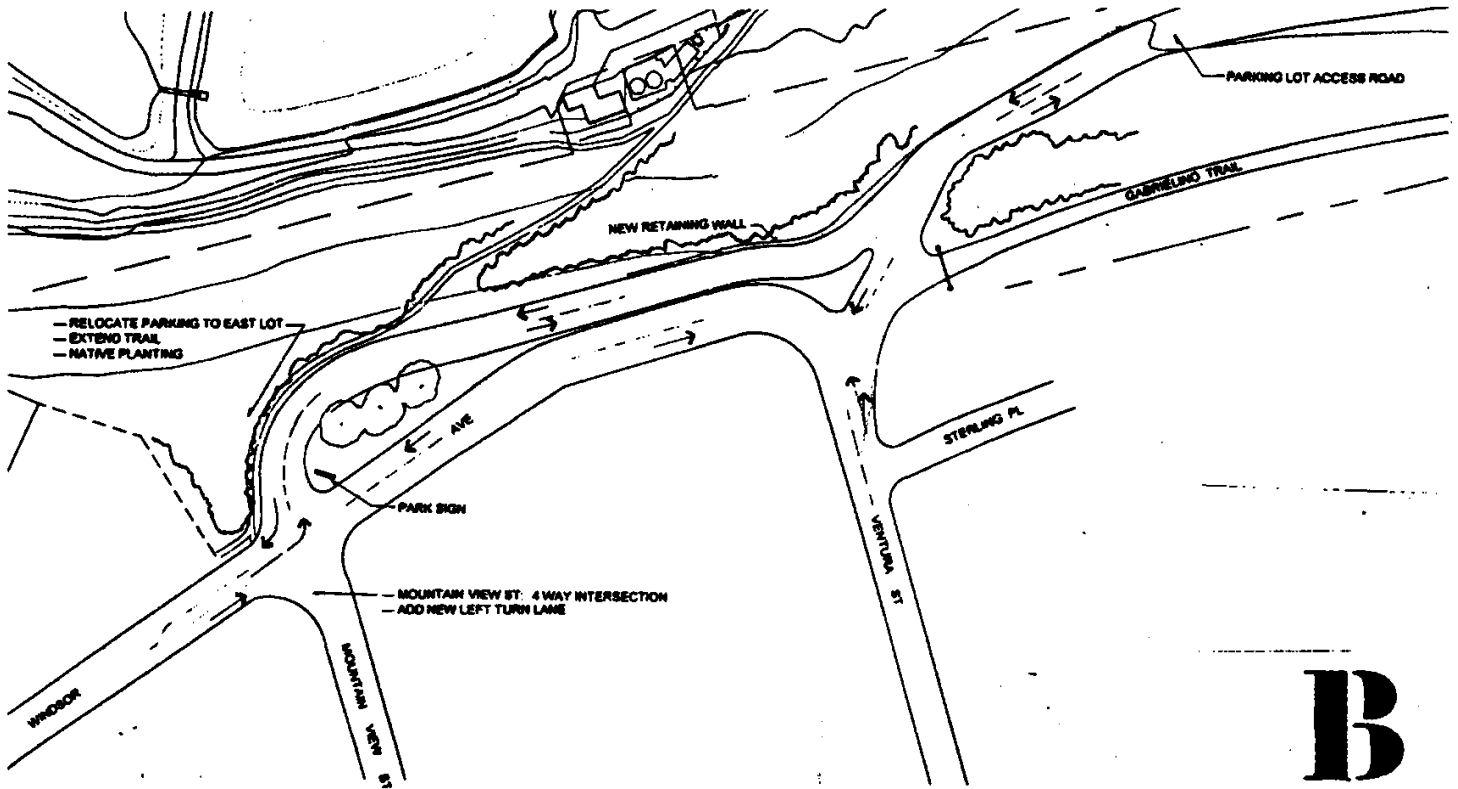
Two alternatives were considered to improve traffic flow and park user safety at the intersection of Windsor Road and Ventura Drive. Traffic impacts will be reviewed as part of the EIR process.

### *Existing Conditions*



**Left Hand Slip Lane Alternative**





**B**

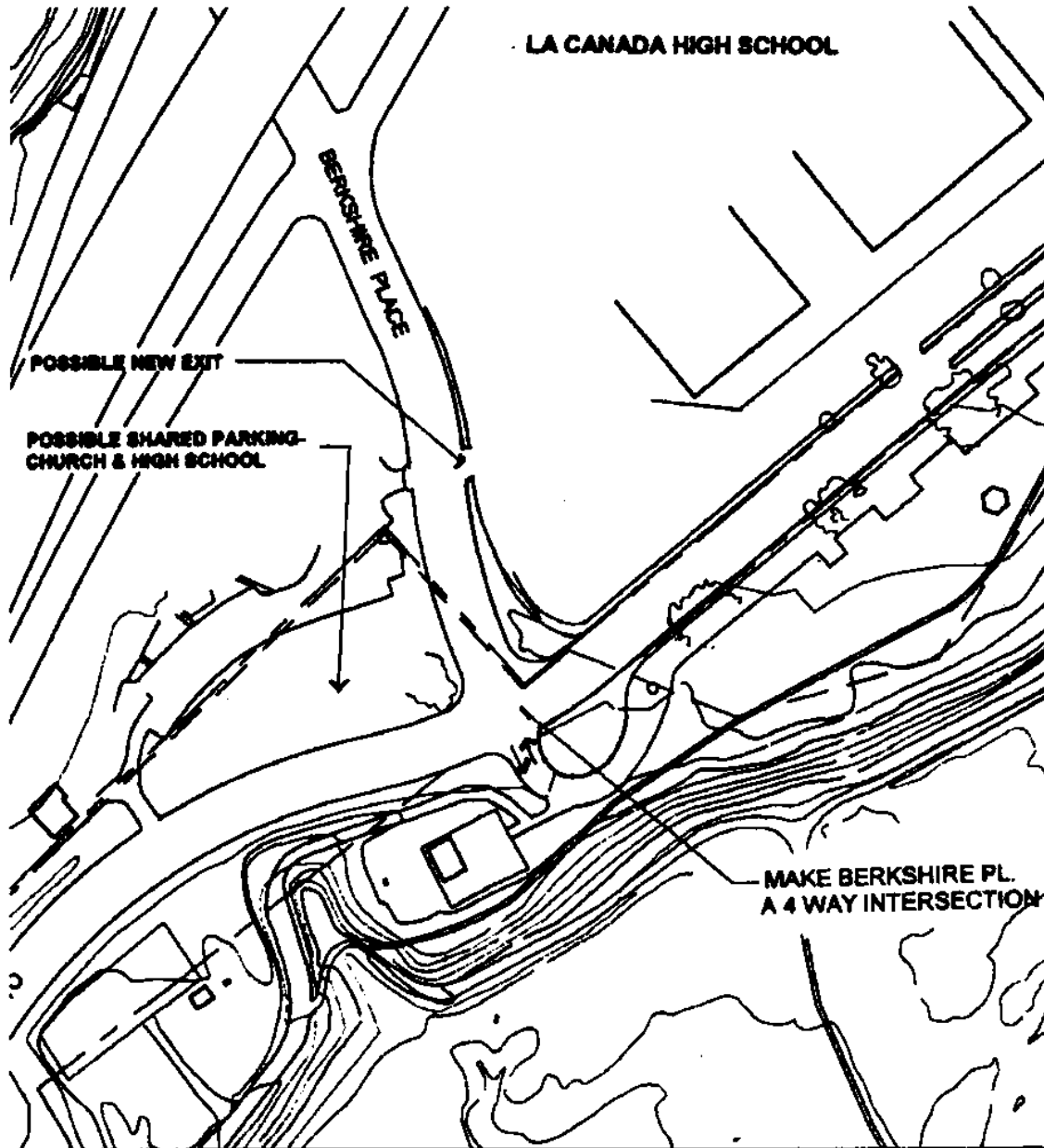
**Mountain View Intersection Alternative B—This alternative was selected as part of the adopted plan and will be implemented when and if conditions warrant.**



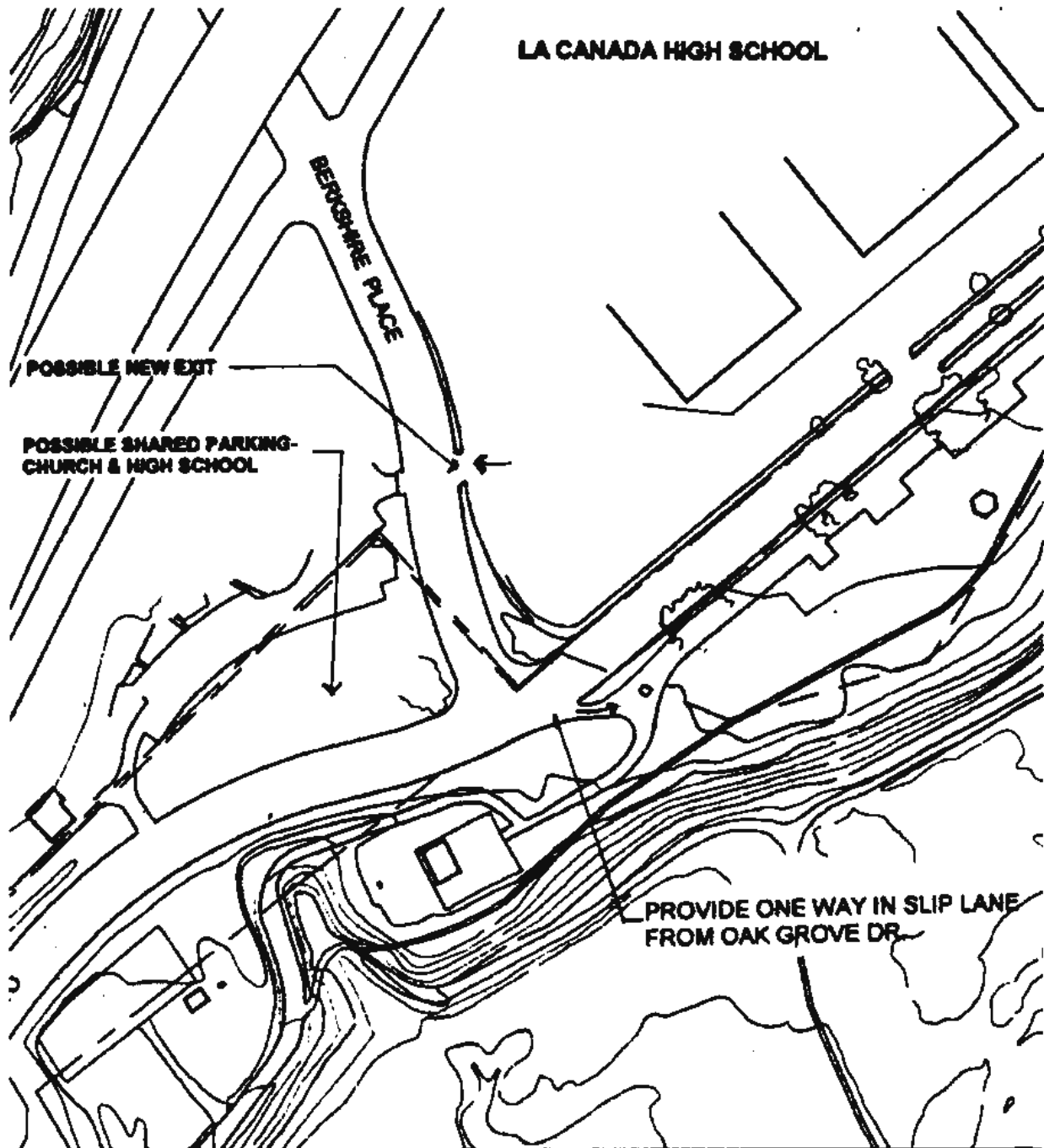
## A.6 BERKSHIRE ENTRANCE

Two alternatives were considered to improve the traffic flow and park user safety at the intersection of Berkshire Place and Oak Grove Drive.

### *Four-Way Intersection Alternative*



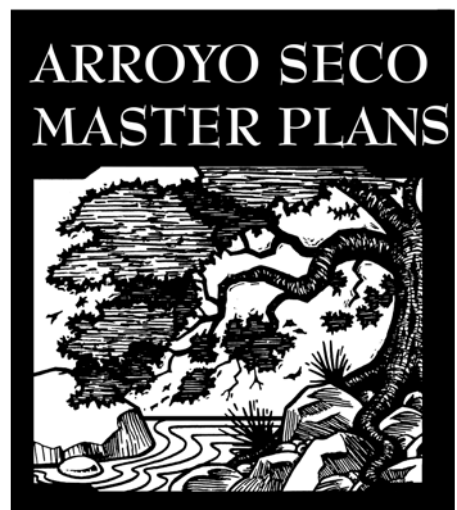
**Entry Slip Lane Alternative**  
**ADOPTED**



## **A.7 DAM KEEPER'S QUARTERS**

An alternative to constructing the proposed public restroom as a two-story structure at the eastern end of the Devil's Gate Dam was considered. This alternative would remodel the existing single family home currently being used as the Arroyo Resource Center. A dam keeper's quarters above the public restroom was included in the Council adopted plan.

# Appendix B



---

**APPENDIX B.1: BIOLOGICAL INVENTORIES**  
**VASCULAR PLANT SPECIES**  
**OBSERVED AT HAHAMONGNA WATERSHED PARK**

---

<b>Scientific Name<sup>1</sup></b>	<b>Common Name<sup>2</sup></b>
<b>DIVISION LYCOPHYTA</b>	
<b>SELAGINELLACEAE</b>	<b>SPIKE-MOSS FAMILY</b>
<i>Selaginella bigelovii</i>	spike-moss
<b>DIVISION PTEROPHYTA</b>	
<b>PTERIDACEAE</b>	<b>BRAKE FAMILY</b>
<i>Pellaea andromedifolia</i>	coffee fern
<b>POLYPODIACEAE</b>	<b>POLYPODY FAMILY</b>
<i>Polypodium californicum</i>	California polypody
<b>DIVISION CONIFEROPHYTA</b>	<b>CONE-BEARING PLANTS</b>
<b>CUPRESSACEAE</b>	<b>CYPRESS FAMILY</b>
<i>Calocedrus decurrens</i> *	incense cedar
<i>Cupressus arizonica</i> *	Arizona cypress
<i>Juniperus sp.*</i>	ornamental juniper
<b>PINACEAE</b>	<b>PINE FAMILY</b>
<i>Cedrus deodara</i> *	deodar cedar
<i>Picea sp.*</i>	spruce
<i>Pinus canariensis</i> *	Canary Island pine
<i>Pinus halepensis</i> *	Aleppo pine
<i>Pinus radiata</i> *	Monterey pine
<i>Pinus spp.*</i>	multiple pine species
<b>TAXODIACEAE</b>	<b>BALD CYPRESS FAMILY</b>
<i>Sequoia sempervirens</i> *	redwood
<b>DIVISION ANTHOPHYTA</b>	<b>FLOWERING PLANTS</b>
<b>CLASS DICOTYLEDONES</b>	<b>DICOTS</b>
<b>ACERACEAE</b>	<b>MAPLE FAMILY</b>
<i>Acer macrophyllum</i>	big-leaf maple
<i>Acer negundo</i>	box elder
<i>Acer saccharinum</i> *	silver maple
<b>AIZOACEAE</b>	<b>FIG-MARIGOLD FAMILY</b>
<i>Carpobrotus chilensis</i> *	ice plant, sea fig
<i>Carpobrotus edulis</i> *	ice plant
<b>AMARANTHACEAE</b>	<b>AMARANTH FAMILY</b>
<i>Amaranthus albus</i> *	tumbleweed
<i>Amaranthus blitoides</i>	pigweed , amaranth
<b>ANACARDIACEAE</b>	<b>SUMAC FAMILY</b>
<i>Malosma laurina</i>	laurel sumac
<i>Rhus integrifolia</i>	lemonadeberry
<i>Rhus ovata</i>	sugar bush
<i>Schinus molle</i> *	Peruvian pepper tree, California pepper tree
<i>Schinus terebinthifolius</i> *	Brazilian pepper tree

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>
<i>Toxicodendron diversilobum</i>	western poison oak
<b>APIACEAE</b>	<b>CARROT FAMILY</b>
<i>Conium maculatum</i> *	poison hemlock
<i>Daucus pusillus</i>	rattlesnake weed
<i>Foeniculum vulgare</i> *	fennel
<i>Tauschia arguta</i>	tauschia
<b>APOCYNACEAE</b>	<b>DOGBANE FAMILY</b>
<i>Nerium oleander</i> *	oleander
<i>Vinca major</i> *	periwinkle
<b>ARALIACEAE</b>	<b>GINSENG FAMILY</b>
<i>Hedera canariensis</i> *	Algerian ivy
<b>ASCLEPIADACEAE</b>	<b>MILKWEED FAMILY</b>
<i>Asclepias fascicularis</i>	narrow-leaf milkweed
<b>ASTERACEAE</b>	<b>SUNFLOWER FAMILY</b>
<i>Achillea millefolium</i>	yarrow
<i>Acourtia microcephala</i>	acourtia
<i>Ageratina adenophora</i> *	sticky eupatorium
<i>Ambrosia acanthicarpa</i>	annual bur-sage
<i>Ambrosia psilostachya</i>	western ragweed
<i>Anthemis cotula</i> *	mayweed, stinkweed, dog-fennel
<i>Artemisia californica</i>	California sagebrush
<i>Artemisia douglasiana</i>	mugwort
<i>Artemisia dracunculus</i>	tarragon
<i>Baccharis pilularis</i>	chaparral broom, coyote broom
<i>Baccharis salicifolius</i>	mule fat, seep-willow, water-wally
<i>Bidens frondosa</i>	sticktight
<i>Bidens pilosa</i> *	common beggar's tick, Spanish-needles
<i>Brickellia californica</i>	California brickellbush
<i>Centaurea melitensis</i> *	totalote
<i>Centaurea solstitialis</i> *	yellow star-thistle
<i>Chaenactis glabriuscula</i>	yellow pincushion
<i>Chamomilla suaveolens</i> *	pineapple weed
<i>Cirsium occidentale</i> var. <i>californicum</i>	California thistle
<i>Cirsium vulgare</i> *	bull thistle, red thistle
<i>Conyza bonariensis</i> *	horseweed
<i>Conyza canadensis</i>	horseweed
<i>Cotula australis</i> *	brass-buttons
<i>Encelia californica</i>	California bush sunflower
<i>Encelia farinosa</i>	brittlebush, incienso
<i>Ericameria pinifolia</i>	pine goldenbush, haplopappus
<i>Eriophyllum confertiflorum</i>	golden-yarrow
<i>Filago californica</i>	herba impia, California filago
<i>Gazania rigens</i> *	gazania daisy
<i>Gnaphalium bicolor</i>	cudweed, everlasting
<i>Gnaphalium californicum</i>	cudweed, everlasting
<i>Gnaphalium canescens</i> ssp. <i>microcephalum</i>	cudweed, everlasting
<i>Hazardia squarrosa</i>	saw-toothed goldenbush
<i>Helianthus annuus</i>	annual sunflower, common sunflower
<i>Hemizonia fasciculata</i>	tarplant, tarweed
<i>Heterotheca grandiflora</i>	telegraph weed

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>
<i>Heterotheca villosa</i>	goldenaster
<i>Hypochaeris glabra</i> *	smooth cat's-ear
<i>Isocoma menziesii</i> var. <i>menziesii</i>	goldenbush
<i>Lactuca serriola</i> *	prickly lettuce
<i>Lepidospartum squamatum</i>	scale broom
<i>Lessingia filaginifolia</i>	California-aster
<i>Madia gracilis</i>	tarweed, gumweed
<i>Malacothrix saxatilis</i>	cliff-aster
<i>Microseris</i> sp.	microseris
<i>Picris echioides</i> *	bristly ox-tongue
<i>Rafinesquia californica</i>	California chicory
<i>Senecio flaccidus</i> var. <i>douglasii</i>	groundsel, ragwort, butterweed, bush senecio
<i>Senecio mikanioides</i> *	German ivy
<i>Sonchus asper</i> *	prickly sow thistle
<i>Sonchus oleraceus</i> *	common sow thistle
<i>Stephanomeria cichoriacea</i>	stephanomeria, Tejon milk-aster
<i>Stephanomeria virgata</i>	stephanomeria, wand chicory
<i>Taraxacum officinale</i> *	dandelion
<i>Xanthium spinosum</i> *	spiny cocklebur
<b>BETULACEAE</b>	<b>BIRCH FAMILY</b>
<i>Alnus rhombifolia</i>	white alder
<b>BIGNONIACEAE</b>	<b>BIGNONIA FAMILY</b>
<i>Catalpa speciosa</i> *	western catalpa
<b>BORAGINACEAE</b>	<b>BORAGE FAMILY</b>
<i>Cryptantha intermedia</i>	cryptantha
<i>Pectocarya penicillata</i>	comb-bur
<b>BRASSICACEAE</b>	<b>MUSTARD FAMILY</b>
<i>Arabis</i> sp.	rock cress
<i>Brassica nigra</i> *	black mustard
<i>Brassica rapa</i> *	turnip, field mustard
<i>Capsella bursa-pastoris</i> *	shepherd's purse
<i>Cardamine oligosperma</i>	bitter-cress, toothwort
<i>Cardaria draba</i> *	heart-podded hoary cress
<i>Descurainia pinnata</i>	tansy mustard
<i>Hirschfeldia incana</i> *	short-pod mustard
<i>Lepidium lasiocarpum</i>	peppergrass, pepperwort
<i>Lepidium nitidum</i>	peppergrass, pepperwort
<i>Lobularia maritima</i> *	sweet alyssum
<i>Raphanus sativus</i> *	radish
<i>Rorippa nasturtium-aquaticum</i>	water cress
<i>Sisymbrium altissimum</i> *	tumble mustard, Jim Hill mustard
<i>Sisymbrium irio</i> *	London rocket
<i>Sisymbrium orientale</i> *	hedge mustard
<i>Thysanocarpus laciniatus</i>	lacepod, fringedpod
<b>BUXACEAE</b>	<b>BOXWOOD FAMILY</b>
<i>Buxus sempervirens</i> *	common boxwood, English boxwood
<b>CACTACEAE</b>	<b>CACTUS FAMILY</b>
<i>Opuntia ficus-indica</i> *	Indian-fig
<i>Opuntia littoralis</i>	coast prickly pear
<i>Opuntia ramosissima</i> *	pencil cactus, diamond cholla

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>
<b>CAPPARACEAE</b>	<b>CAPER FAMILY</b>
<i>Isomeris arborea</i>	bladderpod
<b>CAPRIFOLIACEAE</b>	<b>HONEYSUCKLE FAMILY</b>
<i>Lonicera subspicata</i>	chaparral honeysuckle, wild honeysuckle
<i>Sambucus mexicana</i>	blue elderberry, Mexican elderberry
<i>Symphoricarpos mollis</i>	creeping snowberry, trip vine
<b>CARYOPHYLLACEAE</b>	<b>PINK FAMILY</b>
<i>Cerastium glomeratum*</i>	mouse-ear chickweed
<i>Polycarpon tetraphyllum*</i>	four-leaved allseed, polycarp
<i>Silene gallica*</i>	common catchfly, campion
<i>Silene laciniata</i> ssp. <i>major</i>	catchfly, firewheel catchfly, Indian pink, campion
<i>Spergularia</i> sp.	spurrey
<i>Stellaria media*</i>	common chickweed
<b>CHENOPODIACEAE</b>	<b>GOOSEFOOT FAMILY</b>
<i>Atriplex canescens*</i>	four-wing saltbush
<i>Chenopodium album*</i>	pigweed, lamb's quarters, goosefoot
<i>Chenopodium ambrosioides*</i>	Mexican tea
<i>Chenopodium botrys*</i>	Jerusalem oak
<i>Chenopodium murale*</i>	goosefoot, nettle-leaved goosefoot
<i>Salsola tragus*</i>	Russian thistle, tumbleweed
<b>CISTACEAE</b>	<b>ROCK-ROSE FAMILY</b>
<i>Helianthemum scoparium</i>	peak rush-rose, wild rock-rose
<b>CONVOLVULACEAE</b>	<b>MORNING-GLORY FAMILY</b>
<i>Calystegia macrostegia</i>	wild morning-glory
<b>CRASSULACEAE</b>	<b>STONECROP FAMILY</b>
<i>Crassula connata</i>	pygmy-weed
<i>Crassula argentea*</i>	jade plant
<i>Dudleya lanceolata</i>	lance-leaved liveforever
<b>CUCURBITACEAE</b>	<b>GOURD FAMILY</b>
<i>Cucurbita foetidissima</i>	calabazilla, wild gourd, stinking melon
<i>Marah macrocarpus</i>	wild cucumber, man-root
<b>CUSCUTACEAE</b>	<b>DODDER FAMILY</b>
<i>Cuscuta californica</i>	dodder, witch's hair
<i>Cuscuta</i> sp.	dodder, witch's hair
<b>EUPHORBIACEAE</b>	<b>SPURGE FAMILY</b>
<i>Chamaesyce albomarginata</i>	rattlesnake weed
<i>Chamaesyce maculata*</i>	spotted spurge
<i>Chamaesyce serpyllifolia</i>	thyme-leafed spurge
<i>Eremocarpus setigerus</i>	turkey mullein, dove weed
<i>Ricinus communis*</i>	castor bean
<b>FABACEAE</b>	<b>LEGUME or PEA FAMILY</b>
<i>Acacia baileyana*</i>	Cootamundra wattle, acacia
<i>Acacia dealbata*</i>	silver wattle, acacia
<i>Acacia decurrens</i>	green wattle, acacia
<i>Acacia longifolia*</i>	Sydney golden wattle, acacia
<i>Albizia lophantha*</i>	plume acacia, plume albizia
<i>Ceratonia siliqua*</i>	carob, St. John's bread
<i>Cytisus striatus*</i>	broom
<i>Erythrina humeana*</i>	natal coral tree
<i>Genista monspessulana*</i>	broom



Scientific Name <sup>1</sup>	Common Name <sup>2</sup>
<i>Lathyrus vestitus</i> var. <i>alefeldii</i>	wild pea, wild sweet pea
<i>Lotus heermannii</i> var. <i>heermannii</i>	lotus
<i>Lotus scoparius</i>	deerweed
<i>Lupinus bicolor</i>	miniature lupine, dove lupine
<i>Lupinus concinnus</i>	bajada lupine
<i>Lupinus hirsutissimus</i>	stinging lupine
<i>Lupinus longifolius</i>	bush lupine
<i>Lupinus truncatus</i>	collar lupine
<i>Medicago polymorpha</i> *	California burclover
<i>Melilotus indica</i> *	sourclover
<i>Spartium junceum</i> *	Spanish broom
<i>Trifolium</i> sp.*	clover
<i>Vicia villosa</i> *	hairy vetch, winter vetch
<b>FAGACEAE</b>	<b>OAK FAMILY</b>
<i>Quercus agrifolia</i> var. <i>agrifolia</i>	coast live oak, encina
<i>Quercus berberidifolia</i>	scrub oak
<i>Quercus chrysolepis</i> *	canyon oak
<i>Quercus engelmannii</i>	Engelmann oak, mesa oak
<b>GERANIACEAE</b>	<b>GERANIUM FAMILY</b>
<i>Erodium cicutarium</i> *	red stem filaree, storksbill
<i>Erodium moschatum</i> *	white stem filaree, storksbill
<i>Geranium molle</i> *	geranium, cransebill
<i>Pelargonium x hortorum</i> *	common geranium, garden geranium
<b>GROSSULARIACEAE</b>	<b>GOOSEBERRY FAMILY</b>
<i>Ribes aureum</i>	golden currant
<i>Ribes malvaceum</i>	chaparral currant
<b>HAMAMELIDACEAE</b>	<b>WITCH-HAZEL FAMILY</b>
<i>Liquidambar styraciflua</i> *	American sweet gum
<b>HYDROPHYLLACEAE</b>	<b>WATERLEAF FAMILY</b>
<i>Emmananthe penduliflora</i>	whispering bells
<i>Eriodictyon crassifolium</i>	yerba santa
<i>Eucrypta chrysanthemifolia</i>	eucrypta
<i>Nemophila menziesii</i> var. <i>menziesii</i>	baby blue eyes, nemophila
<i>Phacelia cicutaria</i>	catepillar phacelia
<i>Phacelia distans</i>	fern-leaf phacelia
<i>Phacelia minor</i>	wild Canterbury bell
<i>Phacelia ramosissima</i>	branching phacelia
<b>JUGLANDACEAE</b>	<b>WALNUT FAMILY</b>
<i>Juglans californica</i> var. <i>californica</i>	southern California black walnut
<b>LAMIACEAE</b>	<b>MINT FAMILY</b>
<i>Lamium amplexicaule</i>	dead nettle
<i>Marrubium vulgare</i> *	horehound
<i>Salvia apiana</i>	white sage
<i>Salvia columbariae</i>	chia
<i>Salvia mellifera</i>	black sage
<i>Stachys ajugoides</i> var. <i>ajugoides</i>	hedge nettle
<b>LAURACEAE</b>	<b>LAUREL FAMILY</b>
<i>Umbellularia californica</i>	California bay, California laurel
<b>LOASACEAE</b>	<b>LOASA FAMILY</b>
<i>Mentzelia micrantha</i>	blazing star

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>
<b>LYTHRACEAE</b>	<b>LOOSESTRIFE FAMILY</b>
<i>Ammannia coccinea</i>	ammannia
<b>MALVACEAE</b>	<b>MALLOW FAMILY</b>
<i>Malacothamnus fasciculatus</i>	chaparral mallow
<i>Malva neglecta</i> *	common mallow, cheeses
<i>Malva parviflora</i> *	cheeseweed, little mallow
<b>MORACEAE</b>	<b>MULBERRY FAMILY</b>
<i>Ficus carica</i> *	edible fig
<b>MYOPORACEAE</b>	<b>MYOPORUM FAMILY</b>
<i>Myoporum laetum</i> *	myoporum
<b>MYRTACEAE</b>	<b>MYRTLE FAMILY</b>
<i>Eucalyptus camaldulensis</i> *	red gum, river red gum
<i>Eucalyptus cornuta</i> *	yate tree
<i>Eucalyptus ficifolia</i> *	red-flowering gum
<i>Eucalyptus globulus</i> *	blue gum, Tasmanian blue gum
<i>Eucalyptus leucoxylon</i> *	white ironbark
<i>Eucalyptus rudis</i> *	flooded gum
<i>Eucalyptus sideroxylon</i> *	red ironbark
<i>Eucalyptus spp.</i> *	multiple eucalyptus species
<b>NYCTAGINACEAE</b>	<b>FOUR O'CLOCK FAMILY</b>
<i>Bougainvillea spectabilis</i> *	bougainvillea
<i>Mirabilis californica</i>	wishbone plant, wishbone bush
<b>OLEACEAE</b>	<b>OLIVE FAMILY</b>
<i>Fraxinus velutina</i>	velvet ash, Arizona ash
<i>Fraxinus sp.</i> *	ash
<i>Ligustrum japonicum</i> *	Japanese privet
<i>Olea europaea</i> *	olive, European olive
<b>ONAGRACEAE</b>	<b>EVENING PRIMROSE FAMILY</b>
<i>Camissonia bistorta</i>	California sun cup, southern sun cup, camissonia
<i>Camissonia californica</i>	sun cup, camissonia
<i>Camissonia micrantha</i>	small-flowered evening primrose, camissonia
<i>Clarkia purpurea</i>	purple clarkia
<i>Clarkia unguiculata</i>	clarkia
<i>Epilobium canum</i> ssp. <i>canum</i>	California fuschia, zauschneria
<i>Epilobium ciliatum</i> ssp. <i>ciliatum</i>	willow herb
<i>Oenothera elata</i> ssp. <i>hookeri</i>	Hooker's evening primrose
<b>OXALIDACEAE</b>	<b>OXALIS FAMILY</b>
<i>Oxalis corniculata</i> *	oxalis
<i>Oxalis pes-caprae</i> *	Bermuda buttercup
<b>PAPAVERACEAE</b>	<b>POPPY FAMILY</b>
<i>Dendromecon rigida</i>	bush poppy
<i>Eschscholzia californica</i>	California poppy
<i>Romneya coulteri</i> *	matilija poppy
<b>PASSIFLORACEAE</b>	<b>PASSION FLOWER FAMILY</b>
<i>Passiflora caerulea</i> *	blue crown passion flower
<b>PITTOSPORACEAE</b>	<b>PITTOSPORUM FAMILY</b>
<i>Pittosporum tobirum</i> *	tobira, Japanese pittosporum
<i>Pittosporum undulatum</i> *	Victorian box
<b>PLANTAGINACEAE</b>	<b>PLANTAIN FAMILY</b>
<i>Plantago erecta</i>	California plantain

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>
<i>Plantago lanceolata</i> *	English plantain
<i>Plantago major</i> *	common plantain
<b>PLANTANACEAE</b>	<b>SYCAMORE FAMILY</b>
<i>Platanus racemosa</i>	western sycamore
<b>PLUMBAGINACEAE</b>	<b>PLUMBAGO or LEADWORT FAMILY</b>
<i>Plumbago auriculata</i> *	cape plumbago
<b>PODOCARPACEAE</b>	<b>PODOCARPUS FAMILY</b>
<i>Podocarpus macrophyllus</i> *	yew pine
<b>POLEMONIACEAE</b>	<b>PHLOX FAMILY</b>
<i>Gilia capitata</i>	gilia, blue-headed gilia
<i>Gilia</i> sp.	gilia
<i>Leptodactylon californicum</i>	prickly phlox
<i>Navarretia</i> sp.	navarretia
<b>POLYGONACEAE</b>	<b>BUCKWHEAT FAMILY</b>
<i>Eriogonum elongatum</i> var. <i>elongatum</i>	buckwheat, wand buckwheat
<i>Eriogonum fasciculatum</i> var. <i>foliolosum</i>	California buckwheat
<i>Eriogonum gracile</i> var. <i>gracile</i>	slender buckwheat
<i>Polygonum arenastrum</i> *	common knotweed, doorweed
<i>Polygonum lapathifolium</i>	willow weed
<i>Rumex crispus</i> *	curly dock
<b>PORTULACACEAE</b>	<b>PURSLANE FAMILY</b>
<i>Calyptridium monandrum</i>	pussypaws
<i>Portulaca oleracea</i> *	common purslane
<b>PRIMULACEAE</b>	<b>PRIMROSE FAMILY</b>
<i>Anagallis arvensis</i> *	scarlet pimpernel
<b>RANUNCULACEAE</b>	<b>BUTTERCUP FAMILY</b>
<i>Delphinium cardinale</i>	scarlet larkspur, cardinal larkspur
<b>RHAMNACEAE</b>	<b>BUCKTHORN FAMILY</b>
<i>Ceanothus crassifolius</i>	hoaryleaf ceanothus
<i>Ceanothus leucodermis</i>	chaparral whitethorn
<i>Ceanothus megacarpus</i>	bigpod ceanothus
<i>Ceanothus oliganthus</i>	hairy ceanothus
<i>Rhamnus californica</i>	California coffeeberry
<i>Rhamnus crocea</i>	spiny redberry
<i>Rhamnus ilicifolia</i>	holly-leaf redberry
<b>ROSACEAE</b>	<b>ROSE FAMILY</b>
<i>Adenostoma fasciculatum</i>	chamise
<i>Cercocarpus betuloides</i> var. <i>betuloides</i>	birch-leaf mountain-mahogany
<i>Cotoneaster pannosa</i> *	cotoneaster
<i>Heteromeles arbutifolia</i>	toyon, Christmas berry
<i>Prunus cerasifera</i> var. <i>atropurpurea</i> *	purple-leaf plum
<i>Prunus ilicifolia</i> ssp. <i>ilicifolia</i>	holly-leaf cherry, islay
<i>Prunus ilicifolia</i> ssp. <i>lyonii</i> *	Catalina cherry
<i>Pyracantha angustifolia</i> *	firethorn, pyracantha
<i>Rosa californica</i>	California rose, wild rose
<i>Rosa</i> spp.*	cultivated roses
<i>Rubus discolor</i> *	Himalayan blackberry
<i>Rubus ursinus</i>	California blackberry
<b>RUBIACEAE</b>	<b>MADDER FAMILY</b>
<i>Galium angustifolium</i>	narrow-leaved bedstraw, shrubby bedstraw

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>
<i>Galium aparine</i>	goose grass, bedstraw, cleavers
<b>SALICACEAE</b>	<b>WILLOW FAMILY</b>
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	black cottonwood
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood, alamo
<i>Populus nigra</i> *	Lombardy poplar
<i>Salix exigua</i>	narrow-leaved willow, sandbar willow
<i>Salix gooddingii</i>	Goodding's black willow, black willow
<i>Salix laevigata</i>	red willow
<i>Salix lasiolepis</i>	arroyo willow
<i>Salix lucida</i> ssp. <i>lasiandra</i>	shining willow
<b>SCROPHULARIACEAE</b>	<b>FIGWORT FAMILY</b>
<i>Keckiella cordifolia</i>	heart-leaf penstemon
<i>Mimulus aurantiacus</i>	sticky monkeyflower, orange bush-monkeyflower
<i>Mimulus cardinalis</i>	scarlet monkeyflower
<i>Penstemon spectabilis</i>	showy penstemon, beardtongue
<i>Scrophularia californica</i>	California figwort
<i>Verbascum blattaria</i> *	moth mullein
<i>Verbascum thapsus</i> *	mullein, great mullein
<i>Veronica americana</i>	American brooklime, speedwell
<i>Veronica persica</i> *	Persian speedwell
<b>SIMAROUBACEAE</b>	<b>QUASSIA or SIMAROUBA FAMILY</b>
<i>Ailanthus altissima</i> *	tree of heaven
<b>SOLANACEAE</b>	<b>NIGHTSHADE FAMILY</b>
<i>Datura wrightii</i>	jimson weed
<i>Nicotiana glauca</i> *	tree tobacco
<i>Solanum douglasii</i>	white nightshade
<i>Solanum xanti</i>	purple nightshade
<b>TAMARICACEAE</b>	<b>TAMARISK FAMILY</b>
<i>Tamarix</i> sp.*	tamarisk, salt cedar
<b>ULMACEAE</b>	<b>ELM FAMILY</b>
<i>Ulmus parvifolia</i> *	Chinese elm, evergreen elm
<i>Ulmus pumila</i> *	Siberian elm
<b>URTICACEAE</b>	<b>NETTLE FAMILY</b>
<i>Urtica dioica</i> ssp. <i>holosericea</i>	hoary nettle
<b>VERBENACEAE</b>	<b>VERVAIN FAMILY</b>
<i>Lantana montevidensis</i> *	lantana
<i>Verbena lasiostachys</i>	vervain
<b>VISCACEAE</b>	<b>MISTLETOE FAMILY</b>
<i>Phoradendron macrophyllum</i>	bigleaf mistletoe
<b>ZYGOPHYLLACEAE</b>	<b>CALTROP FAMILY</b>
<i>Tribulus terrestris</i> *	puncture vine, caltrop
<b>CLASS MONOCOTYLEDONES</b>	<b>MONOCOTS</b>
<b>ARECACEAE</b>	<b>PALM FAMILY</b>
<i>Washingtonia robusta</i> *	Mexican fan palm
<b>COMMELINACEAE</b>	<b>SPIDERWORT FAMILY</b>
<i>Tradescantia fluminensis</i> *	wandering Jew, spiderwort
<b>CYPERACEAE</b>	<b>SEDGE FAMILY</b>
<i>Carex</i> sp.	sedge
<i>Cyperus esculentus</i>	nutsedge, galingale

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>
<i>Cyperus</i> sp.	nutsedge, galingale
<i>Eleocharis acicularis</i>	spikerush
<b>IRIDACEAE</b>	<b>IRIS FAMILY</b>
<i>Sisyrinchium bellum</i>	blue-eyed grass
<b>JUNCACEAE</b>	<b>RUSH FAMILY</b>
<i>Juncus</i> sp.	rush
<b>LEMNACEAE</b>	<b>DUCKWEED FAMILY</b>
<i>Lemna</i> sp.	duckweed
<b>LILIACEAE</b>	<b>LILY FAMILY</b>
<i>Agave americana</i> *	agave, century plant
<i>Aloe</i> sp.*	aloe
<i>Calochortus</i> sp.	mariposa lily
<i>Yucca gloriosa</i> *	soft-tipped yucca
<i>Yucca whipplei</i>	chaparral yucca, our Lord's candle, Spanish bayonet
<b>POACEAE</b>	<b>GRASS FAMILY</b>
<i>Agrostis exarata</i>	bent grass
<i>Arundo donax</i> *	giant reed
<i>Avena barbata</i> *	slender wild oat
<i>Avena fatua</i> *	wild oat
<i>Bromus diandrus</i> *	ripgut
<i>Bromus hordeaceus</i> *	soft chess
<i>Bromus madritensis</i> ssp. <i>rubens</i> *	red brome, foxtail chess
<i>Bromus tectorum</i> *	cheatgrass, downy brome
<i>Cynodon dactylon</i> *	Bermuda grass
<i>Digitaria sanguinalis</i> *	crab grass
<i>Echinochloa crus-galli</i> *	barnyard grass
<i>Hordeum marinum</i> ssp. <i>gussoneanum</i> *	Mediterranean barley
<i>Hordeum murinum</i> ssp. <i>leporinum</i> *	foxtail barley
<i>Lamarckia aurea</i> *	goldentop
<i>Leptochloa uninervia</i>	sprangletop
<i>Leymus condensatus</i>	giant wild rye
<i>Lolium multiflorum</i> *	Italian ryegrass
<i>Melica imperfecta</i>	melic, oniongrass
<i>Nassella cernua</i>	nodding needlegrass
<i>Paspalum dilatatum</i> *	dallis grass
<i>Pennisetum setaceum</i> *	fountain grass
<i>Piptatherum miliaceum</i> *	smilo grass
<i>Poa annua</i> *	annual bluegrass
<i>Poa secunda</i> ssp. <i>secunda</i>	one-sided bluegrass
<i>Polypogon monspeliensis</i> *	annual beard grass, rabbit's foot
<i>Schismus barbatus</i> *	Mediterranean grass
<i>Setaria gracilis</i>	bristle grass
<i>Sorghum halapense</i> *	Johnson grass
<i>Vulpia microstachys</i>	vulpia, fescue
<i>Vulpia myuros</i> *	vulpia, fescue
<b>TYPHACEAE</b>	<b>CATTAIL FAMILY</b>
<i>Typha latifolia</i>	broad-leaved cattail

\*Indicates species that are **Introduced or Not Native** to California and/or the area of California in which Hahamongna Watershed Park is located.

<sup>1</sup>Scientific nomenclature follows that of Hickman (1993), Munz (1959, 1968, and 1974), Bailey (1949) Sunset (1995), and Muns (1986).

<sup>2</sup>Common names may vary by author and/or regionally in their usage.

This is not intended as an exhaustive listing of the vegetation occurring on the site or surrounding area; some species, particularly annual herbs or very uncommon species may not have been detected during the field surveys.

**APPENDIX B.2: BIOLOGICAL INVENTORIES**  
**TERRESTRIAL VERTEBRATE ANIMALS OF HAHAMONGNA WATERSHED PARK**  
**AND NEARBY AREAS WITH SIMILAR HABITATS**

**Recent Observations and Historical Records**

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>	Recent Observation	Historical Record
<b>CLASS AMPHIBIA</b>	<b>AMPHIBIANS</b>		
<b>FAMILY PLETHODONTIDAE</b>	<b>LUNGLESS SALAMANDERS</b>		
<i>Batrachoseps nigriventris</i>	black-bellied (California) slender salamander		X
<i>Batrachoseps pacificus major</i>	garden slender salamander		X
<i>Aneides lugubris</i>	arboreal salamander		X
<b>FAMILY BUFONIDAE</b>	<b>TRUE TOADS</b>		
<i>Bufo boreas halophilus</i>	California toad		X
<b>FAMILY HYLIDAE</b>	<b>TREE FROGS</b>		
<i>Pseudacris regilla</i>	Pacific tree frog or chorus frog		X
		X	
<b>CLASS REPTILIA</b>	<b>REPTILES</b>		
<b>FAMILY TESTUDINIDAE</b>	<b>WATER and BOX TURTLES, and TORTOISES</b>		
<i>Clemmys marmorata pallida</i>	southwestern pond turtle	X <sup>3</sup>	X
<b>FAMILY IGUANIDAE</b>	<b>IGUANIDS</b>		
<i>Sceloporus occidentalis biseriatus</i>	western or Great Basin fence lizard	X	X
<i>Uta stansburiana</i>	side-blotched lizard	X	X
<i>Phrynosoma coronatum blainvillei</i>	San Diego horned lizard		X
<b>FAMILY SCINCIDAE</b>	<b>SKINKS</b>		
<i>Eumeces skiltonianus skiltonianus</i>	western skink		X
<b>FAMILY TEIIDAE</b>	<b>WHIPTAILS</b>		
<i>Cnemidophorus tigris multiscutatus</i>	coastal western whiptail	X	X
<b>FAMILY ANGUIDAE</b>	<b>ALLIGATOR LIZARDS</b>		
<i>Elgaria multicarinatus webbi</i>	San Diego alligator lizard	X	X
<b>FAMILY ANNIELLIDAE</b>	<b>CALIFORNIA LEGLESS LIZARDS</b>		
<i>Anniella pulchra pulchra</i>	silvery legless lizard		X

**Recent Observations and Historical Records**

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>	Recent Observation	Historical Record
<b>FAMILY LEPTOTYPHLOPIDAE</b>	<b>SLENDER BLIND SNAKES</b>		
<i>Leptotyphlops humilis humilis</i>	western blind snake		X
<b>FAMILY COLUBRIDAE</b>	<b>COLUBRIDS</b>		
<i>Diadophis punctatus modestus</i>	San Bernardino ringnecked snake		X
<i>Masticophis flagellum piceus</i>	coast coachwhip, red racer		X
<i>Masticophis lateralis lateralis</i>	chaparral whipsnake, California striped racer	X	X
<i>Salvadora hexalepis virgulata</i>	coast patch-nosed snake		X
<i>Pituophis melanoleucus annectens</i>	San Diego gopher snake	X	X
<i>Lampropeltis getulus californiae</i>	California kingsnake		X
<i>Lampropeltis zonata</i>	California mountain kingsnake		X
<i>Hypsiglena torquata</i>	night snake		X
<i>Thamnophis hammondi hammondi</i>	two-striped garter snake		X
<i>Tantilla planiceps</i>	western black-headed snake		X
<b>FAMILY VIPERIDAE</b>	<b>PIT VIPERS, RATTLESNAKES</b>		
<i>Crotalus viridis helleri</i>	southern pacific rattlesnake	X	X
<b>CLASS AVES</b>	<b>BIRDS</b>		
<b>FAMILY PHALACROCORACIDAE</b>	<b>CORMORANTS</b>		
<i>Phalacrocorax auritis</i>	double-crested cormorant		X
<b>FAMILY ARDEIDAE</b>	<b>BITTERNs, HERONS, and EGRETS</b>		
<i>Ardea herodias</i>	great blue heron	X	X
<i>Ardea alba</i>	great egret	X	X
<i>Egretta thula</i>	snowy egret		X
<i>Butorides virescens</i>	green heron		X
<i>Nycticorax nycticorax</i>	black-crowned night heron		X
<b>FAMILY ANATIDAE</b>	<b>DUCKs, GEESE, and SWANS</b>		
<i>Branta canadensis</i>	Canada goose		X
<i>Anas crecca</i>	green-winged teal		X



CITY OF PASADENA / ARROYO SECO MASTER PLANS  
 Hahamongna Watershed Park Master Plan

**Recent Observations and Historical Records**

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>	Recent Observation	Historical Record
<i>Anas platyrhynchos</i>	mallard	X	X
<i>Anas acuta</i>	northern pintail		X
<i>Anas cyanoptera</i>	cinnamon teal	X	X
<i>Anas strepera</i>	gadwall		X
<i>Anas americana</i>	American wigeon	X	X
<i>Aythya valisineria</i>	canvasback		X
<i>Aythya americana</i>	redhead		X
<i>Aythya collaris</i>	ring-necked duck	X	X
<i>Aythya affinis</i>	lesser scaup		X
<i>Bucephala albeola</i>	bufflehead		X
<i>Oxyura jamaicensis</i>	ruddy duck	X	X
<b>FAMILY CATHARTIDAE</b>	<b>VULTURES and CONDORS</b>		
<i>Cathartes aura</i>	turkey vulture	X	X
<b>FAMILY ACCIPITRIDAE</b>	<b>KITES, HARRIERS, HAWKS, and EAGLES</b>		
<i>Pandion haliaetus</i>	osprey		X
<i>Elanus leucurus</i>	white-tailed kite		X
<i>Circus cyaneus</i>	northern harrier		X
<i>Accipiter striatus</i>	sharp-shinned hawk	X	X
<i>Accipiter cooperii</i>	Cooper's hawk	X	X
<i>Buteo lineatus</i>	red-shouldered hawk	X	X
<i>Buteo jamaicensis</i>	red-tailed hawk	X	X
<i>Aquila chrysaetos</i>	golden eagle		X
<b>FAMILY FALCONIDAE</b>	<b>FALCONS</b>		
<i>Falco sparverius</i>	American kestrel	X	X
<i>Falco columbarius</i>	merlin		X
<i>Falco mexicanus</i>	prairie falcon		X
<b>FAMILY PHASIANIDAE</b>	<b>TURKEYS, PHEASANTS, GROUSE, and QUAIL</b>		
<i>Callipepla californica</i>	California quail	X	X
<i>Oreortyx pictus</i>	mountain quail		X

CITY OF PASADENA / ARROYO SECO MASTER PLANS  
 Hahamongna Watershed Park Master Plan

**Recent Observations and Historical Records**

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>	Recent Observation	Historical Record
<b>FAMILY RALLIDAE</b>	<b>RAILS, SORAS, and COOTS</b>		
<i>Porzana carolina</i>	sora		X
<i>Fulica americana</i>	American coot	X	X
<b>FAMILY RECURVIROSTRIDAE</b>	<b>STILTS and AVOCETS</b>		
<i>Himantopus mexicanus</i>	black-necked stilt		X
<i>Recurvirostra americana</i>	American avocet		X
<b>FAMILY CHARADRIIDAE</b>	<b>PLOVERS and SANDPIPERS</b>		
<i>Charadrius vociferus</i>	killdeer	X	X
<i>Tringa melanoleuca</i>	greater yellowlegs	X	X
<i>Actitis macularia</i>	spotted sandpiper		X
<i>Calidris mauri</i>	western sandpiper		X
<i>Calidris minutilla</i>	least sandpiper		X
<i>Gallinago gallinago</i>	common snipe		X
<b>FAMILY LARIDAE</b>	<b>SKUAS, GULLS, TERNS, and SKIMMERS</b>		
<i>Larus delawarensis</i>	ring-billed gull		X
<i>Larus californicus</i>	California gull	X	X
<b>FAMILY COLUMBIDAE</b>	<b>PIGEONS and DOVES</b>		
<i>Columba livia</i>	rock dove	X	X
<i>Columba fasciata</i>	band-tailed pigeon	X	X
<i>Streptopelia chinensis</i>	spotted dove	X	X
<i>Zenaidura macroura</i>	mourning dove	X	X
<b>FAMILY CUCULIDAE</b>	<b>CUCKOOS, ROADRUNNERS, and ANIS</b>		
<i>Geococcyx californianus</i>	greater roadrunner		X
<b>FAMILY TYTONIDAE</b>	<b>BARN OWLS</b>		
<i>Tyto alba</i>	barn owl		X
<b>FAMILY STRIGIDAE</b>	<b>TRUE OWLS</b>		
<i>Otus kennicottii</i>	western screech owl		X
<i>Bubo virginianus</i>	great horned owl	X	X

CITY OF PASADENA / ARROYO SECO MASTER PLANS  
 Hahamongna Watershed Park Master Plan

**Recent Observations and Historical Records**

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>	Recent Observation	Historical Record
<i>Glaucidium gnoma</i>	northern pygmy owl		X
<b>FAMILY CAPRIMULGIDAE</b>	<b>POORWILL</b>		
<i>Phalaenoptilus nuttallii</i>	common poorwill		X
<b>FAMILY APODIDAE</b>	<b>SWIFTS</b>		
<i>Chaetura vauxi</i>	Vaux's swift		X
<i>Aeronautes saxatalis</i>	white-throated swift	X	X
<b>FAMILY TROCHILIDAE</b>	<b>HUMMINGBIRDS</b>		
<i>Archilochus alexandri</i>	black-chinned hummingbird		X
<i>Calypte anna</i>	Anna's hummingbird	X	X
<i>Calypte costae</i>	Costa's hummingbird		X
<i>Selasphorus sasin</i>	Allen's hummingbird	X	X
<b>FAMILY ALCEDINIDAE</b>	<b>KINGFISHERS</b>		
<i>Ceryle alcyon</i>	belted kingfisher	X	X
<b>FAMILY PICIDAE</b>	<b>WOODPECKERS</b>		
<i>Melanerpes lewis</i>	Lewis's woodpecker		X
<i>Melanerpes formicivorus</i>	acorn woodpecker	X	X
<i>Sphyrapicus nuchalis</i>	red-naped sapsucker		X
<i>Sphyrapicus ruber</i>	red-breasted sapsucker	X	X
<i>Picoides nuttallii</i>	Nuttall's woodpecker	X	X
<i>Picoides pubescens</i>	downy woodpecker	X	X
<i>Picoides villosus</i>	hairy woodpecker		X
<i>Picoides albolarvatus</i>	white-headed woodpecker		X
<i>Colaptes auratus</i>	northern (red-shafted) flicker	X	X
<b>FAMILY TYRANNIDAE</b>	<b>TYRANT FLYCATCHERS and KINGBIRDS</b>		
<i>Contopus borealis</i>	olive-sided flycatcher		X
<i>Contopus sordidulus</i>	western wood peewee	X	X
<i>Empidonax traillii</i>	willow flycatcher		X
<i>Empidonax difficilis</i>	Pacific-slope flycatcher	X	X
<i>Empidonax wrightii</i>	gray flycatcher		X

CITY OF PASADENA / ARROYO SECO MASTER PLANS  
 Hahamongna Watershed Park Master Plan

**Recent Observations and Historical Records**

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>	Recent Observation	Historical Record
<i>Sayornis nigricans</i>	black phoebe	X	X
<i>Sayornis phoebe</i>	eastern phoebe		X
<i>Sayornis saya</i>	Say's phoebe	X	X
<i>Myiarchus cinerascens</i>	ash-throated flycatcher		X
<i>Tyrannus vociferans</i>	Cassin's kingbird		X
<i>Tyrannus verticalis</i>	western kingbird	X	X
<b>FAMILY ALAUDIDAE</b>	<b>LARKS</b>		
<i>Eremophila alpestris</i>	horned lark		X
<b>FAMILY HIRUNDINIDAE</b>	<b>SWALLOWS</b>		
<i>Progne subis</i>	purple martin		X
<i>Tachycineta bicolor</i>	tree swallow		X
<i>Tachycineta thalassina</i>	violet-green swallow		X
<i>Stelgidopteryx serripennis</i>	northern rough winged swallow		X
<i>Hirundo pyrrhonota</i>	cliff swallow	X	X
<i>Hirundo rustica</i>	barn swallow	X	X
<b>FAMILY CORVIDAE</b>	<b>CROWS and JAYS</b>		
<i>Cyanocitta stelleri</i>	Steller's jay		X
<i>Amphelocoma californica</i>	western scrub jay	X	X
<i>Corvus brachyrhynchos</i>	American crow	X	X
<i>Corvus corax</i>	common raven	X	X
<b>FAMILY PARIDAE</b>	<b>CHICKADEES and TITMICE</b>		
<i>Parus gambeli</i>	mountain chickadee		X
<i>Parus inornatus</i>	plain titmouse	X	X
<b>FAMILY AEGITHALIDAE</b>	<b>BUSHTITS</b>		
<i>Psaltriparus minimus</i>	bush tit	X	X
<b>FAMILY SITTIDAE</b>	<b>NUTHATCHES</b>		
<i>Sitta canadensis</i>	red-breasted nuthatch	X	X
<i>Sitta carolinensis</i>	white-breasted nuthatch		X
<i>Sitta pygmaea</i>	pygmy nuthatch		X

CITY OF PASADENA / ARROYO SECO MASTER PLANS  
 Hahamongna Watershed Park Master Plan

**Recent Observations and Historical Records**

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>	Recent Observation	Historical Record
<b>FAMILY CERTHIIDAE</b>	<b>CREEPERS</b>		
<i>Certhia americana</i>	brown creeper		X
<b>FAMILY TROGLODYTIDAE</b>	<b>WRENS</b>		
<i>Campylorhynchus brunneicapillus</i>	cactus wren		X
<i>Salpinctes obsoletus</i>	rock wren	X	X
<i>Catherpes mexicanus</i>	canyon wren		X
<i>Thryomanes bewickii</i>	Bewick's wren	X	X
<i>Troglodytes aedon</i>	house wren	X	X
<i>Cistothorus palustris</i>	marsh wren		X
<b>FAMILY CINCLIDAE</b>	<b>DIPPERS</b>		
<i>Cinclus mexicanus</i>	American dipper		X
<b>FAMILY MUSCICAPIDAE</b>	<b>KINGLETS, GNATCATCHERS, and THRUSHES</b>		
<i>Regulus satrapa</i>	golden-crowned kinglet		X
<i>Regulus calendula</i>	ruby-crowned kinglet	X	X
<i>Polioptila caerulea</i>	blue-gray gnatcatcher	X	X
<i>Sialia mexicana</i>	western bluebird		X
<i>Myadestes townsendi</i>	Townsend's solitaire		X
<i>Catharus ustulatus</i>	Swainson's thrush		X
<i>Catharus guttatus</i>	hermit thrush	X	X
<i>Turdus migratorius</i>	American robin	X	X
<i>Ixoreus naevius</i>	varied thrush		X
<i>Chamaea fasciata</i>	wrentit	X	X
<b>FAMILY MIMIDAE</b>	<b>MOCKINGBIRDS and THRASHER</b>		
<i>Mimus polyglottos</i>	northern mockingbird	X	X
<i>Toxostoma redivivum</i>	California thrasher	X	X
<b>FAMILY MOTACILLIDAE</b>	<b>PIPITS</b>		
<i>Anthus rubescens</i>	American pipit		X
<b>FAMILY BOMBYCILLIDAE</b>	<b>WAXWINGS</b>		
<i>Bombycilla cedrorum</i>	cedar waxwing	X	X

CITY OF PASADENA / ARROYO SECO MASTER PLANS  
Hahamongna Watershed Park Master Plan

**Recent Observations and Historical Records**

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>	Recent Observation	Historical Record
<b>FAMILY PTILOGONATIDAE</b>	<b>SILKY FLYCATCHERS</b>		
<i>Phainopepla nitens</i>	phainopepla	X	X
<b>FAMILY LANIIDAE</b>	<b>SHRIKES</b>		
<i>Lanius ludovicianus</i>	loggerhead shrike	X	X
<b>FAMILY STURNIDAE</b>	<b>STARLINGS</b>		
<i>Sturnus vulgaris</i>	European starling	X	X
<b>FAMILY VIREONIDAE</b>	<b>VIREOS</b>		
<i>Vireo bellii pusillus</i>	least Bells' vireo		X
<i>Vireo solitarius</i>	solitary vireo		X
<i>Vireo huttoni</i>	Hutton's vireo	X	X
<i>Vireo gilvus</i>	warbling vireo		X
<b>FAMILY EMBERIZIDAE</b>	<b>WARBLERS, BLACKBIRDS, and SPARROWS</b>		
<b>Subfamily Parulinae</b>	<b>Warblers</b>		
<i>Vermivora celata</i>	orange-crowned warbler	X	X
<i>Vermivora ruficapilla</i>	Nashville warbler		X
<i>Dendroica petechia</i>	yellow warbler		X
<i>Dendroica coronata</i>	yellow-rumped (Audubon's) warbler	X	X
<i>Dendroica nigrescens</i>	black-throated gray warbler		X
<i>Dendroica townsendi</i>	Townsend's warbler		X
<i>Oporornis tolmiei</i>	MacGillivray's warbler		X
<i>Geothlypis trichas</i>	common yellowthroat		X
<i>Wilsonia pusilla</i>	Wilson's warbler		X
<i>Icteria virens</i>	yellow-breasted chat		X
<i>Piranga ludoviciana</i>	western tanager		X
<i>Cardinalis cardinalis</i>	northern cardinal		X
<i>Pheucticus melanocephalus</i>	black-headed grosbeak		X
<i>Guiraca caerulea</i>	blue grosbeak		X
<i>Passerina amoena</i>	Lazuli bunting		X

CITY OF PASADENA / ARROYO SECO MASTER PLANS  
Hahamongna Watershed Park Master Plan

**Recent Observations and Historical Records**

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>	Recent Observation	Historical Record
<b>Subfamily Emberizinae</b>	<b>Towhees, Sparrows, and Juncos</b>		
<i>Pipilo chlorurus</i>	green-tailed towhee		X
<i>Pipilo maculatus</i>	spotted towhee	X	X
<i>Pipilo crissalis</i>	California towhee	X	X
<i>Aimophila ruficeps canescens</i>	southern California rufous-crowned sparrow		X
<i>Spizella passerina</i>	chipping sparrow		X
<i>Spizella atrogularis</i>	black-chinned sparrow		X
<i>Chondestes grammacus</i>	lark sparrow		X
<i>Amphispiza belli</i>	sage sparrow		X
<i>Passerculus sandwichensis</i>	savannah sparrow	X	X
<i>Ammodramus savannarum</i>	grasshopper sparrow		X
<i>Passerella iliaca</i>	fox sparrow		X
<i>Melospiza melodia</i>	song sparrow	X	X
<i>Melospiza lincolnii</i>	Lincoln's sparrow	X	X
<i>Zonotrichia atricapilla</i>	golden-crowned sparrow	X	X
<i>Zonotrichia leucophrys</i>	white-crowned sparrow	X	X
<i>Junco hyemalis</i>	dark-eyed (Oregon, slate-colored) junco	X	X
<b>Subfamily Icterinae</b>	<b>Blackbirds and Orioles</b>		
<i>Agelaius phoeniceus</i>	red-winged blackbird		X
<i>Sturnella neglecta</i>	western meadowlark		X
<i>Xanthocephalus xanthocephalus</i>	yellow-headed blackbird		X
<i>Euphagus cyanocephalus</i>	Brewer's blackbird	X	X
<i>Quiscalus mexicanus</i>	great-tailed grackle		X
<i>Molothrus ater</i>	brown headed cowbird	X	X
<i>Icterus cucullatus</i>	hooded oriole		X
<i>Icterus bullockii</i>	Bullock's (northern) oriole	X	X
<b>FAMILY FRINGILLIDAE</b>	<b>FINCHES</b>		
<i>Carpodacus purpureus</i>	purple finch		X

CITY OF PASADENA / ARROYO SECO MASTER PLANS  
 Hahamongna Watershed Park Master Plan

**Recent Observations and Historical Records**

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>	Recent Observation	Historical Record
<i>Carpodacus mexicanus</i>	house finch	X	X
<i>Carduelis pinis</i>	pine siskin		X
<i>Carduelis psaltria</i>	lesser goldfinch	X	X
<i>Carduelis lawrencei</i>	Lawrence's goldfinch		X
<i>Carduelis tristis</i>	American goldfinch	X	X
<b>FAMILY PASSERIDAE</b>	<b>WEAVER FINCHES</b>		
<i>Passer domesticus</i>	house sparrow	X	X
<b>MAMMALIA</b>	<b>MAMMALS</b>		
<b>FAMILY DIDELPHIDAE</b>	<b>OPOSSUMS</b>		
<i>Didelphis virginiensis virginiensis</i>	Virginia opossum	X	X
<b>FAMILY SORICIDAE</b>	<b>SHREWS</b>		
<i>Sorex ornatus ornatus</i>	ornate shrew		X
<b>FAMILY TALPIDAE</b>	<b>MOLES</b>		
<i>Scapanus latimanus occultus</i>	broad-handed mole, California mole		X
<b>FAMILY PHYLLOSTOMIDAE</b>	<b>LEAF-NOSED BATS</b>		
<i>Macrotus californicus</i>	California leaf-nosed bat		X
<b>FAMILY VESPERTILIONIDAE</b>	<b>PLAIN-NOSED BATS</b>		
<i>Myotis yumanensis sociabilis</i>	Yuma myotis		X
<i>Myotis evotis evotis</i>	long-eared myotis		X
<i>Myotis volans interior</i>	long-legged myotis		X
<i>Myotis californicus californicus</i>	California myotis		X
<i>Pipistrellus hesperus hesperus</i>	western pipistrel		X
<i>Eptesicus fuscus bernardinus</i>	big brown bat		X
<i>Lasiurus cinereus cinereus</i>	hoary bat		X
<i>Lasiurus borealis teliotis</i>	red bat		X
<i>Corynorhinus townsendi pallescens</i>	pale (western) big-eared bat		X
<i>Antrozous pallidus pacificus</i>	pallid bat		X



CITY OF PASADENA / ARROYO SECO MASTER PLANS  
 Hahamongna Watershed Park Master Plan

**Recent Observations and Historical Records**

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>	Recent Observation	Historical Record
<b>FAMILY MOLOSSIDAE</b>	<b>FREE-TAILED BATS</b>		
<i>Tadarida brasiliensis mexicana</i>	guano bat, Mexican free-tailed bat		X
<i>Tadarida molossa</i>	big free-tailed bat		X
<i>Eumops perotis californicus</i>	western mastiff bat, greater mastiff bat		X
<b>FAMILY URSIDAE</b>	<b>BEAR FAMILY</b>		
<i>Ursus americanus</i>	black bear, cinnamon bear		X
<b>FAMILY PROCYONIDAE</b>	<b>RACCOONS, RINGTAILS, and COATIS</b>		
<i>Bassariscus astutus octavus</i>	ringtail		X
<i>Procyon lotor psora</i>	raccoon	X	X
<b>FAMILY MUSTELIDAE</b>	<b>WEASELS, SKUNKS, BADGERS, OTTERS, etc.</b>		
<i>Mustela frenata latirostra</i>	long-tailed weasel		X
<i>Taxidea taxus jeffersonii</i>	American badger		X
<i>Spilogale gracilis</i>	spotted skunk		X
<i>Mephitis mephitis holzneri</i>	striped skunk	X	X
<b>FAMILY CANIDAE</b>	<b>DOGS, WOLVES, and FOXES</b>		
<i>Canis latrans ochropus</i>	coyote	X	X
<i>Canis familiaris</i>	domestic dog	X	X
<i>Urocyon cinereoargenteus californicus</i>	gray fox	X	X
<b>FAMILY FELIDAE</b>	<b>CATS</b>		
<i>Felis concolor californica</i>	mountain lion, cougar, puma, catamount		X
<i>Lynx rufus californicus</i>	bobcat		X
<i>Felis catus</i>	feral cat	X	X
<b>FAMILY SCIURIDAE</b>	<b>SQUIRRELS</b>		
<i>Spermophilus beecheyi beecheyi</i>	California ground squirrel	X	X
<i>Sciurus griseus anthonyi</i>	California gray squirrel, western gray squirrel		X
<i>Sciurus niger</i>	eastern fox squirrel	X	X
<b>FAMILY GEOMYIDAE</b>	<b>POCKET GOPHERS</b>		
<i>Thomomys bottae bottae</i>	valley pocket gopher, Botta's pocket gopher	X	X

**Recent Observations and Historical Records**

Scientific Name <sup>1</sup>	Common Name <sup>2</sup>	Recent Observation	Historical Record
<b>FAMILY ARVICOLIDAE</b>	<b>VOLES</b>		
<i>Microtus californicus sanctdiegii</i>	California vole	X	X
<b>FAMILY HETEROMYIDAE</b>	<b>POCKET MICE, KANGAROO MICE, and KANGAROO RATS</b>		
<i>Chaetodipus californicus</i>	California pocket mouse		X
<i>Dipodomys agilis agilis</i>	Pacific kangaroo rat		X
<b>FAMILY CRICETIDAE</b>	<b>MICE, RATS, LEMMINGS, and VOLES</b>		
<i>Reithrodontomys megalotis longicauda</i>	western harvest mouse	X	X
<i>Peromyscus californicus insignis</i>	California mouse, parasitic mouse		X
<i>Peromyscus maniculatus gambelii</i>	deer mouse	X	X
<i>Peromyscus boylei rowleyi</i>	brush mouse		X
<i>Neotoma lepida intermedia</i>	San Diego desert woodrat		X
<i>Neotoma fuscipes macrotis</i>	dusky-footed woodrat	X	X
<b>FAMILY MURIDAE</b>	<b>MOUSE</b>		
<i>Mus musculus</i>	house mouse		X
<b>FAMILY LEPORIDAE</b>	<b>HARES and RABBITS</b>		
<i>Sylvilagus audubonii sanctdiegii</i>	desert cottontail, Audubon's cottontail	X	X
<i>Sylvilagus bachmani cinerascens</i>	brush rabbit	X	X
<b>FAMILY CERVIDAE</b>	<b>DEER</b>		
<i>Odocoileus hemionus californicus</i>	mule deer	X	X

<sup>1</sup> Scientific nomenclature follows that of:

- Stebbins (1985), and (Behler and King, 1979) for amphibians and reptiles;
- Peterson (1990), National Geographic Society (1983), Stokes and Stokes (1996), and Udvardy (1988) for birds; and,
- Jameson and Peeters (1988), Burt and Grossenheider (1980), Whitaker (1980), and Ingles (1965) for mammals.

<sup>2</sup> Commons names may vary by author and/or regionally in their usage.

<sup>3</sup> A dead southwestern pond turtle's intact carapace and plastron was found by John Cox of the City of Pasadena. This specimen apparently had been washed down into Hahamongna Watershed Park from farther up the Arroyo Seco drainage during the 1998 El Niño rains and floods.

This is not intended as an exhaustive listing of wildlife occurring on the site or surrounding area; some species, particularly for birds (i.e., winter migratory and/or summer visitor bird species) may not have been detected during the field surveys.

---

### B.3 REFERENCES

- Anderson, B.W, and R.D. Ohmart, 1982. *Revegetation for Wildlife Enhancement Along the Lower Colorado River*. United States Department of the Interior (USDI), Bureau of Reclamation, Lower Colorado Region, Office of Environment, Boulder City, Nevada. Contract No. 7-07-30-V0009. 215 pages.
- Anderson, B.W, 1988. Deep Tillage Aids Tree Establishment in Riparian Revegetation Projects in Arid Southwest. *Restoration and Management Notes* 6(2):84-87.
- Bailey, L.H., 1949. *Manual of Cultivated Plants*. MacMillan Publishing Company, New York, New York. 1,116 pages.
- Bainbridge, D.A., N. Sorensen, and R.A. Virginia, 1993. Revegetating Desert Plant Communities. In T.D. Landis (technical coordinator), *Proceedings, Western Forest Nursery Association, September 14-18, 1992*. USDA Forest Service, General Technical Report RM-221. Pages 21-26.
- Barbour, M.G. and J. Major (editors), 1988. *Terrestrial Vegetation of California*. California Native Plant Society (CNPS), Special Publication No. 9, Sacramento, California. 1,036 pages + Supplement.
- Barbour, M.G., B.M. Pavlik, F. Drysdale, and S. Lindstrom, 1993. *California's Changing Landscapes: Diversity and Conservation of California Vegetation*. Published by the California Native Plant Society, Sacramento, California. 244 pages.
- Behler, J.L. and F.W. King, 1979. *The Audubon Society Field Guide to North American Reptiles and Amphibians*. Alfred A. Knopf, Inc., New York, New York. 719 pages.
- Bowler, P.A., 1990. Riparian Woodland: an Endangered Habitat in Southern California. In A.A. Schoenherr (editor), *Endangered Plant Communities of Southern California*. Southern California Botanists Special Publication No. 3. Pages 80-97.
- Bradshaw, A.D., and M.J. Chadwick, 1980. *The Restoration of Land*. University of California Press, Berkeley and Los Angeles, California. 317 pages.
- Burt, W.H. and R.P. Grossenheider, 1980. *A Field Guide to the Mammals*. Houghton Mifflin Company, Boston, Massachusetts. 289 pages.
- CDFG (California Department of Fish and Game), 1997. *1997 Fish and Game Code*, Section 1600-1607, and policies pertaining to wetland definition. Law/Tech Publishing Company, Limited, San Clemente, California. 527 pages.
- CNDDDB (California Natural Diversity Data Base), 1999a. *List of California Terrestrial Natural Communities Recognized by the Natural Diversity Data Base*. CDFG, Natural Heritage Division, NDDDB (Natural Diversity Data Base), Sacramento, California. January. 65 pages.
- CNDDDB, 1999b. *State and Federally Listed Endangered, Threatened, and Rare Plants of California*. CDFG, Habitat Conservation Division, Wildlife and Habitat Data Analysis Branch, NDDDB, Sacramento, California. April. 15 pages.
- CNDDDB, 1999c. *Special Plants List*. CDFG, NDDDB, Biannual publication, Sacramento, California. June. 119 pages.
- CNDDDB, 1999d. *Special Animals*. CDFG, Wildlife and Habitat Data Analysis Branch, NDDDB, Sacramento, California. June. 42 pages plus appendices.
- CNDDDB, 1999e. *State and Federally Listed Endangered and Threatened Animals of California*. CDFG, Natural Heritage Division, NDDDB, Sacramento, California. July. 12 pages.
- CNDDDB, 1999f. *RareFind 2*, computer software program. United States Geological Survey (USGS) 7.5-minute Series Topographic Quadrangle Map of Pasadena, California. CDFG, Natural Heritage Division, NDDDB, Sacramento, California. July 1999 subscription update.
- CNPS (California Native Plant Society), 1994. *California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California*. Special Publication No. 1, Fifth Edition. Edited by M.W. Skinner and B.M. Pavlik, California Native Plant Society, Sacramento, California. 338 pages.

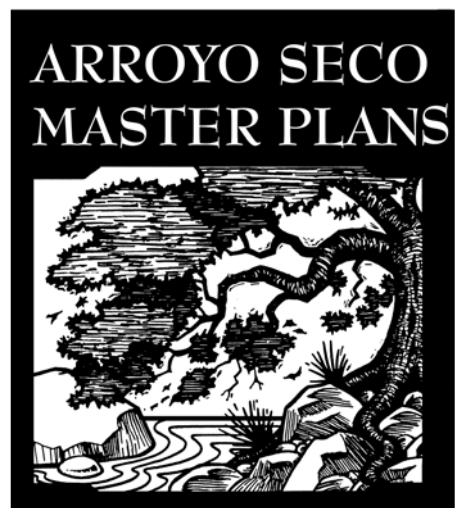
- 
- City of Pasadena, 1996. *Draft Master Plan for the Lower Arroyo Seco, City of Pasadena*. Prepared by the City of Pasadena Department of Recreation and Parks, and the City of Pasadena Department of Public Works and Transportation. 65 pages plus appendices.
- COE (US Army Corps of Engineers), 1987. *Corps of Engineers Wetlands Delineation Manual*. Technical Report Y-87-1. Environmental Laboratory, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS. 169 pages.
- COE, 1994. Regulatory Program of the U.S. Army Corps of Engineers, Section 401 and Section 404 of the Clean Water Act of 1972 and 1994 (as amended). The Code of Federal Regulations, January 24, 1994).
- Conrad, C.E., 1987. *Common Shrubs of Chaparral and Associated Ecosystems of Southern California*. General Technical Report PSW-99, Pacific Southwest Forest and Range Experiment Station, USDA Forest Service, Berkeley, California. 86 pages.
- Cotton/Beland Associates, Inc., 1988. *Devil's Gate Multi-Use Project, Environmental Assessment Baseline Studies*. Prepared for the City of Pasadena Water and Power Department.
- Cowardin, L.M., V. Carter, F. Golet, and E.T. LaRoe, 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Fish and Wildlife Service report, FWS/OBS 79/31. 103 pages.
- Cox, J., 1999. Employee with City of Pasadena Public Works and Transportation Department, Parks and Natural Resources Division. Personal communication with Jim Eckert, Parsons ES biologist, July.
- Faber, P.A., E. Keller, A. Sands, and B.M. Massey, 1989. *The Ecology of Riparian Habitats of the Southern California Coastal Region: a Community Profile*. Prepared for the U.S. Fish and Wildlife Service, Biological Report 85(7.27), Washington, D.C. 152 pages.
- Federal Register*, 1980. "40 CFR Part 230: Section 404(b) (1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material," Volume 45, Number 249, pages 85352-85353, U.S. Government Printing Office, Washington, D.C.
- Federal Register*, 1982. "Title 33: Navigation and Navigable Waters; Chapter II, Regulatory Programs of the Corps of Engineers," Volume 47, Number 138, page 31810, U.S. Government Printing Office, Washington, D.C.
- Garrett, K. and J. Dunn, 1981. *Birds of Southern California: Status and Distribution*. Los Angeles Audubon Society, Los Angeles, California.
- Griffin, J.R., 1988. Oak Woodland. In M.G. Barbour and J. Major (editors), *Terrestrial Vegetation of California*. California Native Plant Society (CNPS), Special Publication No. 9, Sacramento, California. Pages 383-415.
- Hanes, T.L., 1988. California Chaparral. In M.G. Barbour and J. Major (editors), *Terrestrial Vegetation of California*. California Native Plant Society (CNPS), Special Publication No. 9, Sacramento, California. Pages 417-469.
- Hickman, J.C. (editor), 1993. *The Jepson Manual: Higher Plants of California*. University of California Press, Berkeley and Los Angeles, California. 1,400 pages.
- Holland, R.F., 1986. *Preliminary Descriptions of the Terrestrial Natural Communities of California*. Nongame Heritage Program. California Department of Fish and Game, Sacramento, California. 156 pages.
- Ingles, L.G., 1965. *Mammals of the Pacific States*. Stanford University Press, Stanford, California. 506 pages.
- Jameson, E.W. and H.J. Peeters, 1988. *California Mammals*. University of California Press, Berkeley and Los Angeles, California. 403 pages.
- Keeley, J.E. and S.C. Keeley, 1988. Chaparral. In M.G. Barbour and W.D. Billings (editors), *North American Terrestrial Vegetation*. Cambridge University Press, Cambridge, England. Pages 165-207.
- Koebig & Koebig, Inc., 1974. *Phase Two Master Improvement Plan: Upper Arroyo Seco*. 32 pages plus appendices.
- Koler, J.A., 1993. *A Survey of the Mammals and Birds of the Lower Arroyo Seco Park, Pasadena, California*. Master of Science thesis, California State University, Los Angeles. 56 pages.

- 
- LACDPW (Los Angeles County Department of Public Works, Hydraulic/Water Conservation Division), 1995. *Final Negative Declaration for the Devil's Gate Dam Rehabilitation Project*, State Clearinghouse # 94121010. Alhambra, California.
- Latting, J. (editor), 1976. *Symposium Proceedings: Plant Communities of Southern California*. California Native Plant Society, Special Publication No. 2, Berkeley, California. 164 pages.
- Linhart, Y.B., 1995. Restoration, Revegetation, and the Importance of Genetic and Evolutionary Perspectives. In B.A. Roundy, E.D. McArthur, J.S. Haley, and D.K. Mann (compilers), *Proceedings: Wildland Shrub and Arid Land Restoration Symposium*. General Technical Report INT-GTR-315. Pages 271-287.
- McCreary, D.D., 1990. Native Oaks--The Next Generation. *Fremontia* 19(3):44-47.
- McCreary, D.D., 1991. Artificially Regenerating Native Oaks in California. *Oak's 'n Folks Newsletter*: December. Integrated Hardwood Range Management Program, University of California, Berkeley, California. Pages 3-4.
- Miller, R.M., 1985. Overview: Mycorrhizae. *Restoration and Management Notes* 3(1):14-20.
- Mooney, H.A., 1988. Southern Coastal Scrub. In M.G. Barbour and J. Major (editors), *Terrestrial Vegetation of California*. California Native Plant Society (CNPS), Special Publication No. 9, Sacramento, California. Pages 471-489.
- Mueller-Dombois, D. and H. Ellenberg, 1974. *Aims and Methods of Vegetation Ecology*. John Wiley & Sons, Inc., New York, New York. 547 pages.
- Muns, B., 1984. *Flora of Lower Eaton Canyon, San Gabriel Mountains: a Checklist of the Vascular Plants*. Arcadia, California. 24 pages.
- Muns, B., 1986. *Flora of the Arroyo Seco, San Gabriel Mountains*. Arcadia, California. 8 pages.
- Munz, P.A., 1959. *A California Flora*. In collaboration with D.D. Keck. University of California Press, Berkeley and Los Angeles, California. 1,681 pages.
- Munz, P.A., 1968. *Supplement to a California Flora*. University of California Press, Berkeley and Los Angeles, California. 224 pages.
- Munz, P.A., 1974. *A Flora of Southern California*. University of California Press, Berkeley and Los Angeles, California. 1,081 pages.
- National Geographic Society, 1983. *A Field Guide to the Birds of North America*. National Geographic Society, Washington, D.C. 464 pages.
- O'Leary, J.F., 1990. Californian Coastal Sage Scrub: General Characteristics and Considerations for Biological Conservation. In A.A. Schoenherr (editor), *Endangered Plant Communities of Southern California*. Southern California Botanists Special Publication No. 3. Pages 24-41.
- Pasadena Audubon Society, 1994. *Birds of Devil's Gate Basin, Hahamongna Oak Grove and Lower Arroyo Seco*. Pasadena, California. 2 pages.
- Pavlik, B.M., P.C. Muick, S.G. Johnson, and M. Popper, 1991. *Oaks of California*. Published by Cachuma Press and the California Oak Foundation, Los Olivos and Oakland, California. 184 pages.
- Peterson, R.T., 1990. *A Field Guide to Western Birds*. Houghton Mifflin Company, Boston, Massachusetts. 432 pages.
- Phillips, E.A., 1959. *Methods of Vegetation Study*. Holt, Rinehart, and Winston, Inc., New York, New York. 107 pages.
- Pillsbury, N.H., J. Verner, and W.D. Tietje (technical coordinators), 1997. *Proceedings of a Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues*; March 19-22, 1996; San Luis Obispo, California. General Technical Report PSW-GTR-160. Pacific Southwest Research Station, USDA Forest Service, Albany, California. 738 pages.
- Plumb, T.R., and M.D. De Lasaux, 1997. An Evaluation of Coast Live Oak Regeneration Techniques. In N.H. Pillsbury, J. Verner, and W.D. Tietje (technical coordinators), *Proceedings of a Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues*; March 19-22, 1996; San Luis Obispo, California. General Technical Report PSW-GTR-160. Pacific Southwest Research Station, USDA Forest Service, Albany, California. Pages 231-250.

- 
- Quinn, R.D., 1990. The Status of Walnut Forests and Woodlands (*Juglans californica*) in Southern California. In A.A. Schoenherr (editor), *Endangered Plant Communities of Southern California*. Southern California Botanists Special Publication No. 3. Pages 42-54.
- Raymond Basin Management Board, 1999. *Watermaster Service in the Raymond Basin: July 1, 1998-June 30, 1999*. Raymond Basin Management Board, La Cañada-Flintridge, California. 63 pages.
- Reed, P.B., Jr., 1988. *National List of Plant Species That Occur in Wetlands: National Summary*. U.S. Fish and Wildlife Service Biological Report 88 (24), Washington, D.C. 244 pages.
- Roundy, B.A., E.D. McArthur, J.S. Haley, and D.K. Mann (compilers), 1995. *Proceedings: Wildland Shrub and Arid Land Restoration Symposium*. General Technical Report INT-GTR-315. 384 pages.
- Rundel, P.W., 1995. Adaptive Significance of Some Morphological and Physiological Characteristics in Mediterranean Plants: Facts and Fallacies. In J. Roy, J. Aronson, and F. di Castri (editors), *Time Scales of Biological Responses to Water Constraints*. SPB Academic Publishing, Amsterdam, The Netherlands. Pages 119-139.
- Sawyer, J.O. and T. Keeler-Wolf, 1995. *A Manual of California Vegetation*. California Native Plant Society, Sacramento, California. 471 pages.
- Schaller, F.W., and P. Sutton (editors), 1978. *Reclamation of Drastically Disturbed Lands*. Published by the American Society of Agronomy, Inc., the Crop Science Society of America, Inc., and the Soil Science Society of America, Inc., Madison, Wisconsin. 742 pages.
- Schiechtl, H., 1980. *Bioengineering for Land Reclamation and Conservation*. The University of Alberta Press, Edmonton, Alberta, Canada. 404 pages.
- Schoenherr, A.A., 1992. *A Natural History of California*. University of California Press, Berkeley and Los Angeles, California. 772 pages.
- Society for Ecological Restoration (SERCAL), 1992. *Revegetation/Restoration Planning: The Basics*. Proceedings for workshop held November 13, 1992, Sacramento, California. Sponsored by SERCAL, California Chapter.
- St. John, T.V., 1988. Soil Disturbance and the Mineral Nutrition of Native Plants. In J.P. Rieger and B.K. Williams (editors), *Proceedings of the Second Native Plant Revegetation Symposium, San Diego, California*. Published by the Society for Ecological Restoration and Management, Madison, Wisconsin. Pages 34-39.
- St. John, T.V., 1993. The Importance of Mycorrhizal Fungi and Other Beneficial Microorganisms in Biodiversity Projects. In T.D. Landis (technical coordinator), *Proceedings, Western Forest Nursery Association, September 14-18, 1992*. USDA Forest Service, General Technical Report RM-221. Pages 99-105.
- St. John, T.V., 1996. Specifically-modified land imprinter inoculates soil with mycorrhizal fungi in California. *Restoration and Management Notes* 14:84-85.
- Stebbins, R.C., 1985. *A Field Guide to Western Reptiles and Amphibians*. Houghton Mifflin Company, Boston, Massachusetts. 336 pages.
- Stokes, D. and L. Stokes, 1996. *Stokes Field Guide to Birds: Western Region*. Little, Brown and Company, Boston, Massachusetts. 519 pages.
- Sunset, 1995. *Sunset Western Garden Book*. By the editors of Sunset Books and Sunset Magazine. Sunset Books, Inc., Menlo Park, California. 624 pages.
- Takata Associates, 1992. *Devil's Gate Park, Draft Staff Report for Devil's Gate Joint Powers Planning Authority*. South Pasadena, California.
- TOPO!, 1997. *TOPO! Interactive Maps on CD-ROM, Los Angeles, Santa Barbara, and Surrounding Recreational Areas*. Wildflower Productions, San Francisco, California. USGS 7.5 minute series topographic quadrangle map of Pasadena, California.
- Udvardy, M.D.F., 1977. *The Audubon Society Field Guide to North American Birds: Western Region*. Alfred A. Knopf, New York, New York. 854 pages.

- USDA Forest Service (United States Department of Agriculture Forest Service), 1979a. *User Guide to Vegetation, Mining and Reclamation in the West*. Surface Environment and Mining Program (SEAM), USDA Forest Service General Technical Report INT-64. Intermountain Forest and Range Experiment Station, Ogden, Utah. 85 pages.
- USDA Forest Service, 1979b. *User Guide to Soils, Mining and Reclamation in the West*. Surface Environment and Mining Program (SEAM), USDA Forest Service General Technical Report INT-68. Intermountain Forest and Range Experiment Station, Ogden, Utah. 80 pages.
- USDA Forest Service, 1995. *Negative Declaration and Finding of No Significant Impact for El Prieto Canyon Pipeline Replacement Project*. Prepared for USDA Forest Service, Angeles National Forest, by CM Engineering Associates, Inc., San Bernardino, California. 18 pages plus appendices.
- USFWS (United States Fish and Wildlife Service), 1992. *Endangered and Threatened Wildlife and Plants, Review of Plant Taxa for Listing as Endangered or Threatened Species, Notice of Review*. 50 CFR Part 17. U.S. Government Printing Office, Washington, D.C.
- USFWS, 1995. *Endangered and Threatened Wildlife and Plants*. 50 CFR 17.11 Chapter 1 (10-1-95 Edition). U.S. Government Printing Office, Washington, D.C. Pages 94-147.
- USFWS, 1996. *U.S. Fish and Wildlife Service Issues Revised List of "Candidates" for Endangered (and Threatened) Species List*. News release from USFWS, February 27, 1996, Washington, D.C.
- USFWS, 1997. *Endangered and Threatened Wildlife and Plants; Review of Plant and Animal Taxa that are Candidates or Proposed for Listing as Endangered or Threatened, Annual Notice of Findings on Recycled Petitions, and Annual Description of Progress on Listing Actions*. 50 CFR Part 17. U.S. Government Printing Office, Washington, D.C.
- USFWS, 1998. *Endangered and Threatened Wildlife and Plants*. 50 CFR 17.11 (November 1998). U.S. Government Printing Office, Washington, D.C.
- USGS (United States Geological Survey), 1966. 7.5-Minute Series Topographic Quadrangle Map of Pasadena, California (photorevised 1981). Reston, Virginia, and Denver, Colorado.
- Westman, W.E., 1983. Xeric Mediterranean-type Shrubland Associations of Alta and Baja California and the Community/Continuum Debate. *Vegetatio* 52:3-19.
- Whitaker, J.O., Jr., 1980. *The Audubon Society Field Guide to North American Mammals*. Alfred A. Knopf, Inc., New York, New York. 745 pages

# Appendix C





APPENDIX C: PLANT PALETTES FOR TERRESTRIAL NATURAL PLANT COMMUNITIES

Table C-1. Coast Live Oak Woodland Plant Palette

Scientific Name <sup>1</sup>	Common Name <sup>1</sup>	Occurrence	Minimum Density	Distribution <sup>2</sup>	Spacing <sup>3</sup> (feet)	Container Size (gal.)	lb./acre <sup>4</sup>
<b>Canopy Layer</b>							
<i>Acer macrophyllum</i>	Bigleaf maple	Occasional	25/acre	Groups: 2-3	20	5, 15	
<i>Quercus agrifolia</i>	Coast live oak	Dominant	100/acre	Groups: 3-6	20	1, 5, 15	
<i>Quercus engelmannii</i>	Engelmann oak	Occasional	15/acre	Groups: 2-3	20	5, 15	
<i>Umbellularia californica</i>	California bay/laurel	Occasional	15/acre	Groups: 2-3	20	5, 15	
<b>Shrub Understory Layer</b>							
<i>Acer negundo</i>	Boxelder	Occasional	20/acre	Groups: 2-4	4	5, 15	
<i>Adenostoma fasciculatum</i>	Chamise	Occasional	20/acre	Groups: 3-6	4	1, 5	2
<i>Artemisia californica</i>	California sagebrush	Occasional	30/acre	Groups: 3-6	4	1, 5	2
<i>Ceanothus oliganthus</i>	Hairyleaf ceanothus	Occasional	20/acre	Groups: 2-4	4	1, 5	
<i>Heteromeles arbutifolia</i>	Toyon	Subdominant	50/acre	Groups: 4-6	6	5, 15	
<i>Malosma laurina</i>	Laurel sumac	Occasional	20/acre	Groups: 6-8	6	5, 15	
<i>Mimulus aurantiacus</i>	Bush monkeyflower	Occasional	30/acre	Groups: 3-6	3	1	1
<i>Quercus berberidifolia</i>	Scrub oak	Subdominant	50/acre	Groups: 4-6	6	1, 5	
<i>Rhamnus californica</i>	California coffeeberry	Subdominant	50/acre	Groups: 4-6	6	5, 15	
<i>Ribes malvaceum</i>	Chaparral gooseberry	Occasional	25/acre	Groups: 2-4	4	1	
<i>Rosa californica</i>	California rose	Occasional	25/acre	Groups: 6-8	3	1	
<i>Rubus ursinus</i>	California blackberry	Occasional	25/acre	Groups: 4-8	4	1	
<i>Salvia mellifera</i>	Black sage	Occasional	30/acre	Groups: 4-8	4	1, 5	2
<i>Sambucus mexicana</i>	Mexican elderberry	Occasional	15/acre	Groups: 2-3	15	5, 15	
<i>Toxicodendron diversilobum</i>	Western poison oak	Occasional	10/acre	Groups: 2-3	15	1	
<b>Herbaceous Understory Layer</b>							
<i>Bromus carinatus</i>	California brome	Occasional					4
<i>Eriophyllum confertiflorum</i>	Golden yarrow	Occasional					3
<i>Gnaphalium californicum</i>	California everlasting	Occasional					1
<i>Lathyrus vestitus</i>	Wild pea	Occasional					6
<i>Lotus scoparius</i>	Deerweed	Occasional					6
<i>Muhlenbergia rigens</i>	Deergrass	Occasional					4
<i>Nassella pulchra</i>	Purple needlegrass	Occasional					4

<sup>1</sup> Plant species may be substituted with the concurrence of the project biologist/restoration specialist.

<sup>2</sup> Scattered distribution indicates that plantings should be distributed throughout the terrestrial natural community.

<sup>3</sup> Refers to distance between plants of the same species; category applies only to species planted in groups.

<sup>4</sup> Final specifications for the seed mix will be developed after tests for purity and seed germination of seed collected for each species.

**Table C-2. Southern Willow Scrub Plant Palette**

Scientific Name <sup>1</sup>	Common Name <sup>1</sup>	Occurrence	Minimum Density	Distribution <sup>2</sup>	Spacing <sup>3</sup> (feet)	Container Size (gal.)	lb./acre <sup>4</sup>
<b>Upper Canopy Layer</b>							
<i>Acer macrophyllum</i>	Bigleaf maple	Occasional	15/acre	Groups: 1-3	20	5, 15	
<i>Platanus racemosa</i>	Western sycamore	Occasional	20/acre	Groups: 2-4	20	5, 15	
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	Black cottonwood	Occasional	20/acre	Groups: 2-4	20	5, 15	
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood	Occasional	25/acre	Groups: 3-4	20	5, 15	
<i>Sambucus mexicana</i>	Mexican elderberry	Occasional	25/acre	Groups: 3-4	15	5, 15	
<i>Salix gooddingii</i>	Black willow	Subdominant	50/acre	Groups: 5-10	10		
<i>Umbellularia californica</i>	California bay/laurel	Occasional	15/acre	Groups: 1-3	20	5, 15	
<b>Lower Canopy Layer</b>							
<i>Salix exigua</i>	Narrow-leaved willow	Occasional	25/acre	Groups: 3-4	6		
<i>Salix laevigata</i>	Red willow	Subdominant	50/acre	Groups: 5-10	10		
<i>Salix lasiolepis</i>	Arroyo willow	Dominant	250/acre	Scattered			
<i>Salix lucida</i> ssp. <i>lasiandra</i>	Shining willow	Occasional	25/acre	Groups: 3-4	8		
<b>Shrub Understory Layer</b>							
<i>Baccharis pilularis</i>	Coyote brush	Occasional	50/acre	Groups: 3-4	6	1	1
<i>Baccharis salicifolia</i>	Mule fat	Dominant	200/acre	Groups: 5-15	4	1	1
<i>Rosa californica</i>	California rose	Dominant	150/acre	Groups: 5-10	3	1	
<i>Rubus ursinus</i>	California blackberry	Subdominant	100/acre	Groups: 4-8	4	1	
<i>Vitis girdiana</i>	Desert grape	Subdominant	100/acre	Groups: 4-8	4	1	
<b>Herbaceous Understory Layer</b>							
<i>Ambrosia psilostachya</i>	Western ragweed	Occasional					10
<i>Artemisia douglasiana</i>	Mugwort	Occasional					10
<i>Carex barbarae</i>	Santa Barbara sedge	Occasional					5
<i>Hordeum brachyantherum</i>	Meadow barley	Occasional					15
<i>Muhlenbergia rigens</i>	Deergrass	Occasional					8
<i>Urtica dioica</i> ssp. <i>holosericea</i>	Hoary nettle	Occasional					5

<sup>1</sup> Plant species may be substituted with the concurrence of the project biologist/restoration specialist.

<sup>2</sup> Scattered distribution indicates that plantings should be distributed throughout the terrestrial natural community.

<sup>3</sup> Refers to distance between plants of the same species; category applies only to species planted in groups.

<sup>4</sup> Final specifications for the seed mix will be developed after tests for purity and seed germination of seed collected for each species.

**Table C-3. Mule Fat Scrub Plant Palette**

Scientific Name <sup>1</sup>	Common Name <sup>1</sup>	Occurrence	Minimum Density	Distribution <sup>2</sup>	Spacing <sup>3</sup> (feet)	Container Size (gal.)	lb./acre <sup>4</sup>
<b>Upper Canopy Layer</b>							
<i>Acer macrophyllum</i>	Bigleaf maple	Occasional	20/acre	Groups: 1-3	20	5, 15	
<i>Alnus rhombifolia</i>	White alder	Occasional	25/acre	Groups: 2-4	20	5, 15	
<i>Platanus racemosa</i>	Western sycamore	Occasional	25/acre	Groups: 2-4	20	5, 15	
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood	Occasional	25/acre	Groups: 3-4	20	5, 15	
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	Black cottonwood	Occasional	20/acre	Groups: 2-4	20	5, 15	
<i>Sambucus mexicana</i>	Mexican elderberry	Subdominant	50/acre	Groups: 3-4	15	5, 15	
<i>Umbellularia californica</i>	California bay/laurel	Occasional	20/acre	Groups: 1-3	20	5, 15	
<b>Lower Canopy Layer</b>							
<i>Salix lasiolepis</i>	Arroyo willow	Dominant	250/acre	Scattered			
<b>Shrub Understory Layer</b>							
<i>Baccharis salicifolia</i>	Mule fat	Dominant	200/acre	Groups: 5-15	4	1	1
<i>Rosa californica</i>	California rose	Dominant	200/acre	Groups: 5-10	3	1	
<i>Rubus ursinus</i>	California blackberry	Subdominant	100/acre	Groups:4-8	4	1	
<i>Vitis girdiana</i>	Desert grape	Subdominant	100/acre	Groups:4-8	4	1	
<b>Herbaceous Understory Layer</b>							
<i>Ambrosia psilostachya</i>	Western ragweed	Occasional					10
<i>Artemisia douglasiana</i>	Mugwort	Occasional					10
<i>Carex barbarae</i>	Santa Barbara sedge	Occasional					5
<i>Leymus condensatus</i>	Giant wild rye	Occasional					20
<i>Muhlenbergia rigens</i>	Deergrass	Occasional					8
<i>Urtica dioica</i> ssp. <i>holosericea</i>	Hoary nettle	Occasional					5

<sup>1</sup> Plant species may be substituted with the concurrence of the project biologist/restoration specialist.

<sup>2</sup> Scattered distribution indicates that plantings should be distributed throughout the terrestrial natural community.

<sup>3</sup> Refers to distance between plants of the same species; category applies only to species planted in groups.

<sup>4</sup> Final specifications for the seed mix will be developed after tests for purity and seed germination of seed collected for each species.

**Table C-4. Riversidian Alluvial Fan Sage Scrub Plant Palette**

Scientific Name <sup>1</sup>	Common Name <sup>1</sup>	Occurrence	Minimum Density	Distribution <sup>2</sup>	Spacing <sup>3</sup> (feet)	Container Size (gal.)	lb./acre <sup>4</sup>
<b>Canopy Layer</b>							
<i>Acer macrophyllum</i>	Bigleaf maple	Occasional	10/acre	Groups: 1-2	20	5, 15	
<i>Alnus rhombifolia</i>	White alder	Occasional	10/acre	Groups: 1-2	20	5, 15	
<i>Juglans californica</i> var. <i>californica</i>	Southern California black walnut	Occasional	10/acre	Groups: 1-2	20	5, 15	
<i>Plantanus racemosa</i>	Western sycamore	Occasional	15/acre	Groups: 2-3	20	5, 15	
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood	Occasional	15/acre	Groups: 2-3	20	5, 15	
<i>Sambucus mexicana</i>	Mexican elderberry	Occasional	10/acre	Groups: 1-2	15	5, 15	
<b>Shrub Understory Layer</b>							
<i>Artemisia californica</i>	California sagebrush	Subdominant	30/acre	Groups: 2-4	4	1, 5	2
<i>Atriplex canescens</i>	Four-wing saltbush	Occasional	20/acre	Groups: 2-4	4	1, 5	
<i>Cercocarpus betuloides</i>	Birchleaf mountain-mahogany	Occasional	20/acre	Groups: 2-4	4	1, 5	
<i>Encelia farinosa</i>	Brittlebush	Occasional	20/acre	Groups: 2-4	4	1, 5	2
<i>Eriodictyon crassifolium</i>	Hairy yerba santa	Occasional	20/acre	Groups: 2-4	4	1, 5	
<i>Eriogonum fasciculatum</i>	California buckwheat	Subdominant	30/acre	Groups: 2-4	4	1, 5	3
<i>Isomeris arborea</i>	Bladderpod	Occasional	10/acre	Groups: 1-2	4	1, 5	
<i>Lepidospartum squamatum</i>	Scalebroom	Dominant	50/acre	Groups: 2-4	6	1, 5	1
<i>Malosma laurina</i>	Laurel sumac	Occasional	20/acre	Groups: 2-4	6	1, 5	
<i>Opuntia littoralis</i>	Coastal prickly pear	Occasional	20/acre	Groups: 1-2	4	1	
<i>Rhus integrifolia</i>	Lemonadeberry	Occasional	20/acre	Groups: 2-4	6	1, 5	
<i>Rhus ovata</i>	Sugar bush	Occasional	20/acre	Groups: 2-4	6	1, 5	
<i>Salvia apiana</i>	White sage	Occasional	20/acre	Groups: 2-4	4	1, 5	2
<i>Salvia mellifera</i>	Black sage	Subdominant	30/acre	Groups: 2-4	4	1, 5	2
<i>Toxicodendron diversilobum</i>	Western poison oak	Occasional	10/acre	Groups: 1-2	10	1	
<i>Yucca whipplei</i>	Chaparral yucca	Occasional	20/acre	Groups: 2-4	4	1	
<b>Herbaceous Understory Layer</b>							
<i>Bromus carinatus</i>	California brome	Occasional					4
<i>Gnaphalium californicum</i>	California everlasting	Occasional					1
<i>Lotus scoparius</i>	Deerweed	Occasional					6
<i>Muhlenbergia rigens</i>	Deergrass	Occasional					5

<sup>1</sup> Plant species may be substituted with the concurrence of the project biologist/restoration specialist.  
<sup>2</sup> Scattered distribution indicates that plantings should be distributed throughout the terrestrial natural community.  
<sup>3</sup> Refers to distance between plants of the same species; category applies only to species planted in groups.  
<sup>4</sup> Final specifications for the seed mix will be developed after tests for purity and seed germination of seed collected for each species.

**Table C-5. Coastal Sage-Chaparral Scrub Plant Palette**

Scientific Name <sup>1</sup>	Common Name <sup>1</sup>	Occurrence	Minimum Density	Distribution <sup>2</sup>	Spacing <sup>3</sup> (feet)	Container Size (gal.)	lb./acre <sup>4</sup>
<b>Canopy Layer</b>							
<i>Juglans californica</i> var. <i>californica</i>	Southern California black walnut	Subdominant	30/acre	Groups: 1-2	20	5, 15	
<i>Sambucus mexicana</i>	Mexican elderberry	Subdominant	30/acre	Groups: 1-2	15	5, 15	
<b>Shrub Understory Layer</b>							
<i>Adenostoma fasciculatum</i>	Chamise	Dominant	150/acre	Groups: 2-4	4	1, 5	2
<i>Artemisia californica</i>	California sagebrush	Dominant	150/acre	Groups: 2-4	4	1, 5	2
<i>Ceanothus crassifolius</i>	Hoaryleaf ceanothus	Occasional	20/acre	Groups: 2-4	4	1, 5	
<i>Cercocarpus betuloides</i>	Birchleaf mountain-mahogany	Occasional	30/acre	Groups: 2-4	4	1, 5	
<i>Dendromecon rigida</i>	Bush poppy	Occasional	20/acre	Groups: 2-4	4	1, 5	
<i>Encelia californica</i>	California encelia	Subdominant	75/acre	Groups: 2-4	4	1, 5	2
<i>Eriogonum fasciculatum</i>	California buckwheat	Subdominant	75/acre	Groups: 2-4	4	1, 5	8
<i>Eriophyllum confertiflorum</i>	Golden yarrow	Occasional	40/acre	Groups: 2-4	4	1, 5	2
<i>Heteromeles arbutifolia</i>	Toyon	Subdominant	50/acre	Groups: 2-4	4	1, 5	
<i>Isocoma menziesii</i> var. <i>menziesii</i>	Goldenbush	Occasional	20/acre	Groups: 2-4	4	1, 5	2
<i>Keckiella cordifolia</i>	Heartleaf penstemon	Occasional	20/acre	Groups: 2-4	4	1, 5	
<i>Mahonia nevinii</i>	Nevin's barberry	Occasional	20/acre	Groups: 2-4	4	1, 5	
<i>Malosma laurina</i>	Laurel sumac	Occasional	30/acre	Groups: 2-4	6	1, 5	
<i>Mimulus aurantiacus</i>	Bush monkeyflower	Occasional	50/acre	Groups: 2-4	6	1, 5	1
<i>Opuntia littoralis</i>	Coastal prickly pear	Occasional	30/acre	Groups: 1-2	4	1	
<i>Prunus ilicifolia</i> ssp. <i>ilicifolia</i>	Hollyleaf cherry	Occasional	30/acre	Groups: 2-4	6	1, 5	
<i>Rhus integrifolia</i>	Lemonadeberry	Occasional	30/acre	Groups: 2-4	6	1, 5	
<i>Rhus ovata</i>	Sugar bush	Occasional	30/acre	Groups: 2-4	6	1, 5	
<i>Salvia apiana</i>	White sage	Occasional	30/acre	Groups: 2-4	4	1, 5	2
<i>Salvia mellifera</i>	Black sage	Subdominant	50/acre	Groups: 2-4	4	1, 5	2
<i>Quercus berberidifolia</i>	Scrub oak	Occasional	30/acre	Groups: 2-4	6	1, 5	
<i>Yucca whipplei</i>	Chaparral yucca	Occasional	30/acre	Groups: 2-4	4	1	

**CITY OF PASADENA / ARROYO SECO MASTER PLANS**

*Hahamongna Watershed Park Master Plan*

*Coastal Sage-Chaparral Scrub Plant Palette, cont.*

<b>Herbaceous Understory Layer</b>							
<i>Leymus condensatus</i>	Giant wild rye	Occasional					6
<i>Lotus scoparius</i>	Deerweed	Occasional					8
<i>Lupinus bicolor</i>	Miniature lupine	Occasional					5
<i>Nassella lepida</i>	foothill needlegrass	Occasional					3
<i>Nassella pulchra</i>	Purple needlegrass	Occasional					3
<i>Scrophularia californica</i>	California figwort	Occasional					3

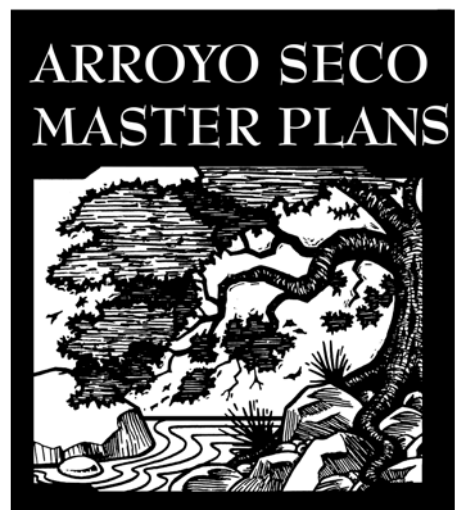
- <sup>1</sup> Plant species may be substituted with the concurrence of the project biologist/restoration specialist.
- <sup>2</sup> Scattered distribution indicates that plantings should be distributed throughout the terrestrial natural community.
- <sup>3</sup> Refers to distance between plants of the same species; category applies only to species planted in groups.
- <sup>4</sup> Final specifications for the seed mix will be developed after tests for purity and seed germination of seed collected for each species.

**Table C-6. Southern Sycamore Riparian Woodland Plant Palette**

Scientific Name <sup>1</sup>	Common Name <sup>1</sup>	Occurrence	Minimum Density	Distribution <sup>2</sup>	Spacing <sup>3</sup> (feet)	Container Size (gal.)	lb./acre <sup>4</sup>
<b>Upper Canopy Layer</b>							
<i>Acer macrophyllum</i>	Bigleaf maple	Occasional	10/acre	Groups: 1-3	20	5, 15	
<i>Alnus rhombifolia</i>	White alder	Occasional	15/acre	Groups: 1-3	20	5, 15	
<i>Fraxinus dipetala</i>	California ash	Occasional	10/acre	Groups: 1-3	20	5, 15	
<i>Platanus racemosa</i>	Western sycamore	Occasional	30/acre	Groups: 2-4	20	5, 15	
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>	Black cottonwood	Occasional	10/acre	Groups: 2-4	20	5, 15	
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood	Occasional	10/acre	Groups: 3-4	20	5, 15	
<i>Quercus agrifolia</i>	Coast live oak	Occasional	10/acre	Groups: 1-3	20	5, 15	
<i>Sambucus mexicana</i>	Mexican elderberry	Occasional	15/acre	Groups: 3-4	15	5, 15	
<i>Salix gooddingii</i>	Black willow	Subdominant	10/acre	Groups: 2-4	10		
<i>Umbellularia californica</i>	California bay/laurel	Occasional	10/acre	Groups: 1-3	20	5, 15	
<b>Lower Canopy Layer</b>							
<i>Salix laevigata</i>	Red willow	Subdominant	15/acre	Groups: 5-10	10		
<i>Salix lasiolepis</i>	Arroyo willow	Dominant	25/acre	Scattered			
<i>Salix lucida</i> ssp. <i>lasiandra</i>	Shining willow	Occasional	15/acre	Groups: 3-4	8		
<b>Shrub Understory Layer</b>							
<i>Baccharis salicifolia</i>	Mule fat	Dominant	25/acre	Groups: 5-10	4	1	1
<i>Rosa californica</i>	California rose	Dominant	30/acre	Groups: 5-10	3	1	
<i>Rubus ursinus</i>	California blackberry	Subdominant	25/acre	Groups: 4-8	4	1	
<b>Herbaceous Understory Layer</b>							
<i>Artemisia douglasiana</i>	Mugwort	Occasional					10
<i>Hordeum brachyantherum</i>	Meadow barley	Occasional					15
<i>Muhlenbergia rigens</i>	Deergrass	Occasional					8
<i>Urtica dioica</i> ssp. <i>holosericea</i>	Hoary nettle	Occasional					5

<sup>1</sup> Plant species may be substituted with the concurrence of the project biologist/restoration specialist.  
<sup>2</sup> Scattered distribution indicates that plantings should be distributed throughout the terrestrial natural community.  
<sup>3</sup> Refers to distance between plants of the same species; category applies only to species planted in groups.  
<sup>4</sup> Final specifications for the seed mix will be developed after tests for purity and seed germination of seed collected for each species.

# Appendix D





APPENDIX D:

## WATER DATA: NEEDS & COSTS

*The benefits from projects described in Section 3.1 Water Resources Management*

DIRECT BENEFITS:

- Pasadena Water & Power
- Lincoln Avenue Water Company

INDIRECT BENEFITS:

- Help maintain safe yield of the Raymond Basin
- Help maintain groundwater levels
- Reduce dependency on imported water
- Increase the amount of water that can be pumped back from the Water Conservation Pool

PERMANENT LAKE FEATURES EVAPORATION WATER NEEDS\*:

Evaporation from Aquatic and Wetland Habitats; each lake has a 0.3-acre island

East Lake	=	3.6 Acres	=	156,816 ft <sup>2</sup>
West Lake	=	4.8 Acres	=	209,088 ft <sup>2</sup>

Evaporation Rate	0.15 in/day	0.375 ft/month
Rainfall in Basin	22 in/year	<u>- 0.153 ft/month</u>
		0.222 ft/month

East Lake  $156,816 \text{ ft}^2 \times 0.222 \text{ ft/month} = 34,813 \text{ ft}^3/\text{month} = 348 \text{ billing units/month}$

West Lake  $209,088 \text{ ft}^2 \times 0.222 \text{ ft/month} = 46,418 \text{ ft}^3/\text{month} = 464 \text{ billing units/month}$

Average rate for domestic water is \$1.54/billing unit

$348 \text{ billing units/month} \times \$1.54/\text{billing unit} = \$536/\text{month} = \$6,432/\text{year}$  for East Lake

$464 \text{ billing units/month} \times \$1.54/\text{billing unit} = \$715/\text{month} = \$8,580/\text{year}$  for West Lake

TOURNAMENT YOUTH SOCCER FIELD IRRIGATION NEEDS:

A soccer field is  $245 \text{ ft} \times 380 \text{ ft} = 93,100 \text{ ft}^2 = 2.14 \text{ acres}$

Watering needs are  $52.5 \text{ in/year} = 4.375 \text{ ft/year} = 0.365 \text{ ft/month}$

$93,100 \text{ ft}^2 \times 0.365 \text{ ft/month} = 33,931.5 \text{ ft}^3/\text{month} = 340 \text{ billing units/month}$

$340 \text{ billing units/month} \times \$1.54/\text{billing units} = \$524/\text{month} = \$6,288/\text{year/field}$

Source: Pasadena Water & Power, September 2003.

*\*The lakes were not approved as part of the Council adopted plan.*

Appendix E:  
**SUMMARY OF PROPOSED PROJECTS**

Prepared by  
City of Pasadena Parks and Natural Resources Division

DEVIL'S GATE DAM AREA

*New Parking Area*

A small landscaped parking area will be constructed at the intersection of Linda Vista and Oak Grove Drive with an overlook to the Devil's Gate Dam spillway. An existing tunnel under Oak Grove Drive will allow pedestrian access to the western end of the dam. The parking area will be landscaped and located on the upper terrace; ADA accessible trail/ramp(s) will take visitors from the parking area to the lower observation area and the tunnel under Oak Grove Drive giving access to the dam area. An existing retaining wall along the observation area will need to have the existing chain link fencing replaced with ornamental iron safety fencing. This ornamental fencing will be similar to that recommended for the dam's parapet walls. A gate will be installed on the southern opening of the tunnel to allow for securing access at night.

*East Access (entry) to Dam*

In order to eliminate maintenance vehicle/equipment traffic in adjacent residential neighborhoods, a new entry slip lane allowing direct access to the dam and basin from Oak Grove Drive will be constructed. This project will retain the existing limited parking for County maintenance vehicles as well as dam and basin access roads that will allow maintenance vehicles and equipment better access to the flood management/water conservation pool and dam. The existing road bed at the eastern end of the Devil's Gate Dam area will be raised to accommodate the new slip lane, tapering off to meet the existing east side maintenance road/trail, which will be uniformly graded and descend to the flood maintenance staging area. This access will allow maintenance vehicles a one-way access to enter the area via a secured entry gate and to drive (westbound) across the dam or down into the debris/sediment basin. The entry gate will be configured to allow bicycle access to the dam from Oak Grove Drive.

*West Access (Exit) from Dam*

The (westbound) flow of maintenance vehicle traffic across the dam requires an exit on the west end of the dam. This one-way exit will be provided at the location previously used as a temporary access road during construction projects on the dam. Vehicles exiting the dam at this location will be required to turn right. Maintenance vehicles will be able to drive to the 210 Freeway on-ramps at Berkshire Place without driving through a residential neighborhood.

*Close La Canada Verdugo Road*

The existing pipe gate at the end of the cul-de-sac on La Canada Verdugo Road will be removed and the curb restored, eliminating vehicle access from this residential street. Vehicular access to the

dam will be through the proposed Oak Grove Drive Entry and Exit. A landscaped berm will be created along the edge of the cul-de-sac to further buffer the adjacent residential neighborhood from park activities. Storm drains and perimeter fencing will be modified as needed.

#### *Dam Keeper's Quarters and Public Restroom*

The existing dam keeper's quarters located on the east side of the dam will be demolished and rebuilt as a public restroom to serve park visitors in the dam area and as they enter/exit the Central Arroyo area. A new dam keeper's quarters will be built above the public restroom with sleeping quarters, a small kitchenette, and a private restroom. This second story will afford the dam keeper a view of the basin during storm events. On the ground level, connected to the public restroom, will be a storage area (single-car garage) for materials and equipment related to the operation and maintenance of the dam. The existing septic system at the former dam keeper's house (the current Arroyo Seco Resource Center) will be replaced with a gravity-feed sewer to a sewage lift station pumping sewage to the main sewer east of the La Cañada Verdugo Road cul-de-sac.

#### *Public Safety at Dam and Observation Deck*

The City of Pasadena (City) will work collaboratively with the Los Angeles County Department of Public Works (County) to enhance safety at the deck on the dam, at the observation deck south of the westside tunnel overlooking the spillway, and along the trails (see project, Dam Observation Trail) that lead down to an observation point overlooking the dam and the water conservation pool. Safety could be enhanced through the installation of ornamental fencing along the dam parapet walls and the spillway observation deck. Fencing will be similar to that installed by the City on the Colorado Street Bridge.

### WESTSIDE PARK ACCESS

#### *Park Entrance at Foothill Boulevard*

The main westside park entrance will remain at Oak Grove Drive and Foothill Boulevard. The entry will receive a new park entrance sign, landscaping, and entry area lighting. This entrance will be for egress, ingress, and unobstructed access to the Metropolitan Water District (MWD) property, including the Rose Bowl Riders and Tom Sawyer Camp tenants. As needed, the use of a traffic control facility/entry kiosk for security and dissemination of information will be assessed.

#### *Oak Grove Drive Improvements*

An access lane will make entry to the park safer and more efficient, as well as alleviate the Oak Grove Drive peak-hour traffic at La Canada High School and Jet Propulsion Laboratories (JPL). A one-way access lane from Oak Grove Drive, north of the Berkshire Place intersection is proposed to allow entry during park events and morning/afternoon high school student drop-off/pick-up. The access lane will be ingress only and will have a secure gate built into the perimeter fence with appropriate signage. Due to public safety concerns, a portion of this project has been temporarily implemented.

## EASTSIDE PARK ACCESS

### *New Park Entrance*

The new park entrance will be relocated to the intersection of Windsor Avenue and Mountain View Street. The existing parking lot on Windsor Avenue will be demolished and relocated to the north end of the existing Jet Propulsion Laboratory (JPL) parking lot, once and only when the project to convert JPL Parking to Public Parking is ready to be implemented. The widening of the roadway area at the intersection of Windsor Avenue and Ventura Street with the new park entrance road will require a new retaining wall to the west of the current entrance/intersection. After the new entrance roadway is constructed, the surrounding land will be landscaped with native vegetation including oak woodland species. If the County implements any improvements to the Windsor Avenue and Ventura Street intersection prior to the implementation of this proposed project, the intersection will be evaluated for traffic volume safety and whether any further improvements will be necessary.

## WATER CONSERVATION

Increasingly, water in southern California is becoming a valuable commodity. Allowing more water to recharge the Raymond basin for use and not to pass through the dam to the ocean is a major goal of the master plan. In an average rainfall year, Devil's Gate Dam, with a minimum capacity of 1,400 acre-feet below spillway height (current capacity is 1,424 acre-feet), will allow the basin behind the dam to fill with inflowing water one to three times, depending on the condition of the watershed. In a drought period, the watershed could retain all the rainfall and the dam could not even fill up once. The watershed, like a sponge, dries out during drought periods. It must reach a saturation point or have a storm of enough intensity before runoff flows to the basin. In the winter of 1992-93 (El Niño year), the basin could have filled over 40 times. Therefore, a sophisticated operating procedure needs to be developed to balance the goals of water conservation, flood control, and sediment management.

The City is obligated to the 16-member Raymond Basin Water Board to continue operation of 13.1 surface acres of spreading grounds. The Raymond Basin requires that any changes to the spreading area and annual quantity of water spread be equal to or greater than currently exists/occurs. Changing the existing method, area and pattern of recharging ground water could affect the NASA/JPL remediation activities for groundwater contaminants. Projects to improve water resource operations will require further environmental review and close coordination with NASA/JPL prior to any implementation.

### *Seasonal Flood Management Water Conservation Pool*

The flood basin behind the dam has been filling with sediment. With an existing capacity of 1,424 acre-feet, it is approaching the minimum capacity of 1,400 acre-feet. Since 1978, when the dam was declared unsafe to hold water, vegetation has been allowed to grow in the 92 acres that will be flooded now that the dam has been reconstructed. When water conservation measures are implemented, this vegetation will begin to die as it is frequently inundated. To create new quality habitat above the spillway elevation and increase the capacity to a maximum 1,900 acre-feet, to allow for 500-acre feet of inflowing sediment capacity, this project would move 378 acre-feet of material on site and remove 243 acre feet of material off-site. This would reduce the area frequently inundated to 69 acres and create 23 acres of new recreational and habitat area. It would also create a flood control pool to better manage inflowing sediment and floating debris and a water conservation pool to allow the retention of floodwater for pump-back to the spreading basins.

### *Pump-Back System*

This project involves the installation of the infrastructure needed to pump water at selected times from a seasonal flood management/water conservation pool behind the dam, north, to the existing improved spreading basins on the eastside the proposed spreading basins on the westside of the park. A new inlet structure with pump located near the dam would be created to pump water from the pool and into a new distribution system. The distribution system, including the size of piping and pump, will be designed to take water from the new inlet north along the eastside of the basin, at the bottom of the slope and adjacent to other domestic water distribution lines, to the highest eastside basins, continuing west across the North Bridge Crossing to gravity-feed both the proposed westside basins and existing improved eastside basins.

### *Overall Storm Drain Modifications*

Storm water entering the proposed Flood Management Water Conservation Pool from Flint Wash, from runoff of adjacent lands, and from all storm drain outfalls, will need to comply with state-mandated water quality standards including monitoring and cleanup of pollution from runoff. Runoff pollutants include horticultural fertilizers and pesticides, pathogens from animal manure (dogs and horses), and hazardous substances in municipal waste including trash, oil, and grease from motorized vehicles. Remediation may occur at the outfall location in the Park, at a pollutant source or at the inlet to the storm drain, depending on the particular type of pollutant. This becomes important due to the planned pumpback of water held behind the dam for percolation in the spreading basins to recharge the Raymond Basin aquifer, a source of drinking water. A fiscally workable solution to some of these pollution problems remains to be found, both technically and scientifically. Best management practices will be utilized to ensure that TMDL's (Total Maximum Daily Loads) of pollutants are reduced and that a natural/biological alternative is considered first in finding a solution.

### *Westside Spreading Basins*

This project creates three new basins (nos. 13, 14 & 15) totaling eight surface acres on the westside of the park and brings Pasadena's total spreading operation to 21 surface acres. The City has the right to divert a maximum of 25 cfs from the Arroyo Seco stream. The Water and Power Department has concluded that the optimum water surface acres for spreading, with diversion and pumpback, will be 22 to 26 acres. The master plan dedicates a total of 26 surface acres to the spreading operation. The maximum depth of the water in these ponds will be six feet. This project also involves extending the distribution system for the new spreading from two sources: a) the diversion of Arroyo Seco and Millard streams as well as from the new pumpback system infrastructure, along the eastside of the basin. This project is directly related to another project, Construction of the Northerly Perimeter Trail Bridge Crossing, described later. The bridge crossing is needed for the successful completion of the new westside spreading basins as it provides the means for a utility crossing including a water diversion and pumpback infrastructure crossings to the westside basins.

### *Eastside Spreading Basins*

Opportunities for spreading water will be enhanced through the expansion of existing and creation of new basins in the area now occupied by the JPL east parking lot. Testing has shown the rate of percolation of water into the Raymond Basin is greater in this area than in the existing basins. Existing basins nos. 1, 2, 3 and 4 will be expanded to the east. Two new basins will be created to the north of basin no. 1 and the existing east-to-west connecting trail. The City of Pasadena's two sludge basins will be relocated and expanded to the north of the new spreading basins. This expansion will

occupy approximately 75 percent of the current JPL east parking lot, and will add five surface acres on the eastside.

The City of Pasadena is required by the Raymond Basin Management Board to maintain and operate the existing total of 13.1 surface acres of spreading.

#### *Altadena Drain Improvements*

The Altadena drain extends into the stream channel north of the existing spreading basins. The extended concrete box structure was used as part of an earthen breakaway dam, which would divert water to the eastside spreading basins. This site is no longer used as a diversion facility due to the environmental impact from this diversion method. To widen the stream corridor, allowing for a more natural stream alignment, (see Habitat Project #1: Stream Corridor Alignment) the drain will be shortened and the embankment armored to prevent erosion. This stream corridor will be restored to a riparian habitat similar to, and as a continuation of, the same plant community immediately north of the JPL Bridge. Due to urban runoff, this riparian habitat also exists for a short stretch of the stream course south of the drain.

#### *Altacrest Drain Improvements*

The discharge from the forty-inch reinforced concrete pipe (RCP), adjacent to the Gabrielino Trail Road and east of the JPL east parking lot (just south of the equestrian trail), will continue downslope in an extended, enlarged single RCP. This underground drain line will run between the enlarged existing ponds and empty directly into the stream corridor. There will be an inlet to receive runoff from the eastside park road and the remaining northerly quarter of the existing parking lot.

### FLOOD MANAGEMENT

An important element of the HWP master plan is flood control or management of storm events for public safety. The 1919 Lease Agreement between the County and the City designates an area for flood control that encompasses approximately 80% of the HWP acreage. Under the most extreme conditions this area could be flooded. This includes all the area behind the dam below elevation 1075.

Park elements need to be designed with these flooding considerations: The area that is most frequently inundated is below an elevation of 1040.5 (the floor of the spillway). Park elements between the elevations of 1040.5 and 1075 will need to be reviewed by all parties and designed for the possibility of a short period of inundation (maximum of several days). The capacity below the elevation of 1040.5 should be as great as possible for water conservation, sediment management, and flood management. Currently, the area at this elevation of 1040.5 covers 92 surface acres. Much of this area is covered with only a few feet of water when the water level is at spillway height (1040.5). The conceptual grading plan proposes to excavate material, creating a deeper debris and sediment basin. This excavated material will be placed so that an additional 23 acres will then be above the elevation of 1040.5. This raised area will be infrequently inundated, and could be used for habitat restoration and recreation. The areas that are frequently inundated (at 1040.5 and below) are reduced to 69 acres (from 92 acres) according to the conceptual grading plan. An additional 243 acre-feet will be removed from the site to achieve the maximum capacity of the debris and sediment management basin as shown on the conceptual grading plan. This grading will achieve the following benefits:

- The floodwater and sediment capacity of the management basin will increase, because much of the material excavated from below the 1040.5 elevation will be placed above the 1040.5 elevation.
- The needed capacities for flood management could be met by not having to move graded material off-site for three to five years. By this time, the new willow habitat will be established, existing habitat could be removed, and more sediment will have accumulated, reducing the capacity.
- There will be an additional 23 acres for habitat establishment and recreation. The Streambed Riparian Habitat, which will be infrequently inundated, will gain five acres.

Most of the existing willow habitat will be inundated if this proposed grading does not occur (see Habitat Project #2\*\*). The habitat will begin to degenerate as more water conservation measures are taken and water is kept at the 1040.5 elevation for pump-back purposes. Water conservation measures can begin as soon as the City and the County resolve a number of liability issues.

#### *Sediment and Debris Management*

The minimum capacity for flood management is the volume below the spillway floor, which is 1,400 acre-feet (one debris event). This minimum capacity must be maintained. Therefore, as sediment inflow varies from year to year, and as the total volume of inflowing sediment decreases the capacity, to the minimum 1,400 acre-feet, sediment must be removed. The grading plan illustrates the proposed maximum capacity, which will be 1,900 acre-feet. This will inundate a 69-acre area at an elevation of 1040.5. The difference between this maximum and the minimum capacity (500 acre-feet or 806,667 cubic yards) equals 5.5 years of the historical annual average inflow of 145,200 cubic yards of sediment.

Debris and sediment removal of approximately 3,000 cubic yards will occur each summer to maintain and/or restore the dam's lowest opening, the sluice gate. This could permit the continuing operation of the flow-assisted sediment transport (FAST) program, which has accounted over the years for the removal of approximately 20% of the inflowing sediment.

Because drought years transport small amounts of sediment and large sediment transport events occur unpredictably, sediment should be removed from the park on an as-needed basis. Sediment removal could happen in consecutive years, but in reviewing historical data, it is more likely that this will only need to be done every three to seven years. Procedural policies and specifications for processing and removal of sediment need to be drafted by the City and the County.

The conceptual grading proposes to shape the basin with sides as steep as can be safe and stable (3:1 slope). This maximizes the capacity and allows the space to be easily maintained. At elevations of 1030 and below, newly deposited sediment, debris, and emerging vegetation will be excavated. One of the goals of the master plan is to establish a permitting process that will allow sediment removal to occur on an as-needed basis. This area below 1030, the debris and sediment basin (i.e., water conservation pool) will be shaped not only to facilitate the removal of deposited sediment, but also to influence where sediment is deposited. With an incoming storm event, it is ideal to have water at elevations of 1020 to 1030. This causes sediment-laden water to slow as it enters the water conservation pool, dropping out the sediment below the established habitat and upstream of the dam, thereby not affecting the dam's control features. If water is at 1040.5 (spillway height), then sediment will be deposited in the newly widened stream corridor and will inundate the streambed riparian plant community. As a storm event passes and water continues to enter the basin, it becomes less sediment

laden. When this occurs, water should be allowed to accumulate to the maximum capacity. This will inundate the established willow and riparian habitat with water and nutrients, and accumulate water for the proposed pumpback (See project, Pumpback System) for water conservation purposes.

Another aspect of this project element is debris removal. For the safe operation of the dam and downstream flood-control structures, debris needs to be prevented from passing through the dam, or obstructing openings in the dam, outlet tunnel, and spillway headworks. An area on the east side of the debris and sediment management basin (i.e., water conservation pool) will be raised to an elevation of 1045, and used as a staging area for equipment to remove floating debris.

#### *Sediment Removal Access*

A permanent haul road will be constructed on the west side of the Flood Management Water Conservation Pool. It will connect Oak Grove Drive with the bottom of the basin behind the dam. A secure gate built into the perimeter fence will provide sediment removal trucks and maintenance equipment with access to the sediment and debris management basin. The 210 Freeway on-ramps at Berkshire Place provide access to all destinations eliminating trucks driving through a residential neighborhood.

## OAK GROVE AREA

#### *Group Picnic Shade Structures*

Group picnic areas will accommodate four to six picnic tables. The shade structures, two south and two north of Oak Grove Field, will be designed to fit the natural character of the park and use indigenous materials as well as conform to the Arroyo Seco Design Guidelines. The floor of the group picnic area will be graded level and smooth and surfaced with a permeable material such as decomposed granite blended with native soil and a binder. Electricity will be provided to the structure, and amenities such as barbecues with counters, sinks with running water, and gray-water drains will be provided. A trash disposal area will also be provided to store multiple cans with lids. The group picnic areas will meet all ADA-accessibility requirements.

#### *Westside Picnic Amenities*

Both group picnic areas and smaller/individual picnic areas are planned for the westside park area. The Upper Oak Grove will continue to have a distribution of picnic tables within its use area. The Lower Oak Grove will serve as the location for two designated group picnic areas. The first is in the area south of the Oak Grove Field where two picnic shelters will be provided for group picnics. The other is the east end of the overnight camp area, which will also provide two picnic shelters. A minimum of two picnic areas within the westside park area will be ADA-accessible. There are currently 52 picnic tables within the westside park area. The number of picnic tables has steadily decreased over the past thirty-five years due to age, wear, and misuse. It is estimated that the total number of tables will double to accommodate the use anticipated by the park improvements proposed for the westside park area. Existing picnic tables will be moved to better positions, which will also relieve the compaction on sites where they currently sit. A program to rotate the picnic tables will be implemented, particularly in areas where a table is within the drip line of an oak tree.

#### *Oak Grove Field Restroom*

The burned-out restroom at the southwest corner of the existing Oak Grove Field has been removed and will be replaced by a new restroom facility that includes storage. The new restroom facility is



east of the former location and at the southeast corner of the renovated Oak Grove Field. A sewage lift station will be constructed. The sewage lift station will transport sewage west to the main sewer system on Oak Grove Drive. The new replacement restroom will be similar in size to the existing restrooms in the Oak Grove area. The facility will also have security/safety lighting installed.

#### *Foothill Drain Improvements*

Increased runoff from the widening of Oak Grove Drive, Foothill Boulevard west of the park entrance, and a portion of the La Canada-Flintridge area has caused severe erosion on the slope above the existing Oak Grove Field. The existing twenty-four-inch concrete drain will be extended down the slope and then turn parallel to the Oak Grove Field. The drain pipe will be covered over and the slope restored. The new end of the drain will discharge stormwater into an improved existing swale that flows south at the base of the slope.

#### *Outdoor Amphitheater*

The existing amphitheater located just west of Oak Grove Field will be restored. For public safety and ease of maintenance the seating will be designed to prevent movement of the existing unsecured poles. The area will be fine-graded and surfaced with the appropriate material to make the area ADA-accessible.

#### *Sycamore Grove Fields*

Two new, approximately 2.4-acre multipurpose fields will be constructed. This field size also allows the area to be converted into multiple practice fields for youth soccer. These multipurpose play areas will also accommodate youth tournament soccer, open play, group picnics, and other group and nongroup activities. The southern field will be adjacent to and east of the expanded parking lot. This area is currently used for temporary overflow parking. Under existing conditions, the southern portion of this field is prone to flooding; therefore, the area will be built up from its current elevation of 1040 to an elevation of 1050. Fill material for construction of the southern Sycamore Grove Field and disc golf course improvements will be provided by excavated material from the conservation pool. The northern field will be adjacent to and east of the Supervised Overnight Camping Area. Under existing conditions, this area is well below the flood inundation elevation of 1040.5. Due to past mining operations, a large depression exists with the bottom at elevation at 1025. Material excavated to widen the stream channel will be used to raise this area to above elevation 1055. During disaster emergencies, these areas will be used as a staging area for fire crews and other emergency support groups. Best management practices for turf maintenance will be utilized to avoid possible impacts to ground water quality. A natural/biological alternative will be considered first for turf maintenance.

#### *Upgrade Oak Grove Maintenance Office Sewer [Not on Map]*

The Oak Grove Maintenance Office (OGMO) is currently on a septic system. The restroom facilities do not need upgrading. The current septic system will be converted to a gravity-flow system that will flow to the proposed sewage lift station near the Berkshire drain, and then be pumped up to the existing sewer main in Oak Grove Drive.

### *Disc Golf Course Improvements*

The disc golf improvements include relocation of the back nine pins in the north Oak Grove area, and pins 6 through 9 of the front nine to the south and east of the existing parking lot. The relocation of the disc golf area provides the opportunity for habitat restoration of the north Oak Grove area. The relocated disc golf course will be developed by excavating material from the water conservation pool area (ruderal habitat areas) and placing the material in the area between the existing willow stands to an average elevation of 1046 which is above the frequently inundated elevation of 1040.5. Drainage of courses in this area will occur within the existing stands of native willow habitat. Amenities, including a bench at every tee, will be constructed in accordance with the Arroyo Seco Design Guidelines.

### *Expanded Parking Area*

This existing parking area, immediately east of the Oak Grove Field, will be expanded to accommodate the abandoned overflow parking area. The existing parking area will be accessed via the improved access road. This parking area is intended to replace the dirt overflow lot that is being converted to Sycamore Grove Field. This project could be done in conjunction with another element, i.e., the removal of existing asphalt paving in the basin (from past mining operations). The removed asphalt could be used as base fill for the new expanded parking area. As a part of this project, the existing access road with a small adjacent parking area will be extended and improved to allow for a turnaround for park users, buses, and emergency vehicles. The Arroyo Seco Design Guidelines will provide further guidance for this project.

### *Native Plant Nursery*

A plant nursery will be established at the existing Oak Grove Maintenance Office (OGMO). It will provide materials and equipment necessary to produce native stock for revegetation of Hahamongna Watershed Park and other areas of the Arroyo Seco. Such materials and equipment will include propagation tables, interpretive signage, storage bins for soil and amendments, and a holding area for larger container stock. An adjacent unused ruderal (weedy) area will be incorporated into the OGMO yard for this purpose, with new fencing to delineate the enhanced area.

## SUPERVISED OVERNIGHT CAMPING AREA

Supervised overnight camping is proposed in the northern portion of the Oak Grove area. The overnight camping area will be available for individuals and groups during the day but will only be available to organized groups with proper supervision, such as Boy Scouts, Girl Scouts, or church groups for camping during nighttime. The facilities for group overnight camping to be provided include shade structures as described under Project 6.1, Group Picnic Shade Structures, food preparation counters with sink, barbecues, drinking fountains and a renovated restroom. Selected campsites and access will be provided for the disabled. Two gathering areas will be created. A fire ring will provide seating for small groups. Seating will be provided by wooden poles or elevated planks for easy maintenance. An outdoor amphitheater will also be sited within the area. It will be a much smaller version of the amphitheater west of the Oak Grove Field but built in the same style and of the same materials.

The overnight camping area will be administered by park staff, scheduled around the clock when the area is reserved. The existing Los Angeles County Trail maintenance and storage area will be converted to provide accommodations and administrative space for park staff. Parking for staff and

overnight campers will be provided in this area. A trash-bin enclosure will be provided adjacent to the staff building. A sewage lift station will be located between the existing restroom and the converted County building (with an added bathroom and kitchenette) with gravity sewer lines from each and a force main to the gravity sewer main at Oak Grove Drive.

Selected areas of the overnight camping area will be restored to oak woodland. These areas will be identified as restoration areas and protected from human interference. With the exception of the existing trail(s) at the northernmost edge of the overnight camping area, horse trails through the oak woodland will not be allowed. Hitching posts in the central area of the overnight camping area will not be allowed. Hitching posts and a watering trough will be provided at the southeast corner of the overnight camping area near the turnaround and away from tree trunks.

#### *Park Ranger Station Improvements*

The existing building used by Los Angeles County Trail maintenance will be converted to a park ranger station to oversee the overnight group camping area. A sewage lift station will be located between the existing overnight area restroom and this converted park building (with an added bathroom and kitchenette) with gravity sewer lines from each, and a sewage lift station with force main to the gravity sewer main at Oak Grove Drive.

#### *Restroom Improvements*

The two existing restrooms in the Oak Grove area, on the upper terrace and in the overnight camping areas, will be upgraded with new fixtures, partitions, and other amenities to meet current ADA accessibility standards. This is already approved and underway as a CIP project.

#### *Improve Existing Parking Areas*

The existing dirt parking area adjacent to the ranger station will be developed as a new, decomposed granite, parking area to serve the overnight camping area. The parking area will provide overnight parking for campers west of the park road on the same side as the ranger station. A new masonry enclosure will be constructed to secure trash dumpsters at the rear of the parking area. The dirt parking area (east of park road) will be improved to accommodate a drop-off area for campers with space for buses to pull through.

### EQUESTRIAN STAGING AREA

Improvements to the equestrian staging area include the following: improved vehicular access and parking for school bus and horse trailer turnaround, restroom rehabilitation, improved observation area (Sunrise Overlook), trail connections, and picnic amenities for informal gatherings.

#### *Upgrade Existing Restroom*

This existing restroom will be renovated to provide access for maintenance, upgrade the accommodations, meet ADA-accessibility standards and improve the physical appearance. The septic system will be replaced with a gravity sewer to a sewage lift station with force main. This could be combined with the sewer improvements needed at the existing OGMO with gravity sewers from both, to a central location next to the Berkshire drain, where a sewage lift station will be located to pump sewage up to the main gravity sewer line in Oak Grove Drive.

*Realign and Widen Access Road*

The existing access road will be widened to safely accommodate two-way traffic from the upper Oak Grove turnaround and raised to pass over an improved drain line. (See project, Berkshire Drain Improvements.) South of the Berkshire Drain, a new one-way road would allow in coming traffic to enter the existing parking area on the northern edge. All vehicular traffic will exit via the southeast corner of the parking area, loop back along the old entry road and return to two-way traffic south of the new drain crossing. The softer, wider turns and one-way traffic flow will provide easy access for horse trailers and buses. Pavement will be eliminated where possible from the existing roadway between the Berkshire Drain and the Flint Wash Bridge.

*Berkshire Drain Improvements*

The increased volume of runoff from the widening of Oak Grove Drive and Berkshire Place has caused severe scouring of the downstream drainage swale within the park. The park road will be raised and a new transition structure built with a new enlarged, reinforced concrete pipe running under the road and down the slope, exiting into the basin on the east edge of the Westside Perimeter Trail. The trail will cross over the Berkshire Drain at this juncture. The erosion on the slope will be filled and the area restored with Coast Live Oak woodland habitat. The area where the drain line crosses under the Perimeter Trail and from the outfall to the Water Conservation Pool will have restored Southern Willow Scrub riparian habitat stabilized to prevent future erosion. The widening of the park road during this project will allow two lanes of traffic to pass safely from and to the Equestrian Staging Area.

SUNRISE OVERLOOK

This project is located on the knoll off Oak Grove Drive, between Flint Wash and the Equestrian Staging Area (See project Sunrise Overlook). The area will be cleared of all existing vegetation (including many non-native trees, weeds, and some existing native vegetation comprised of seeded sage scrub from the 1970's when the first Foothill Freeway (I-210) off-ramp was removed from this location) and a natural appearing hollow will be created that will accommodate a small group gathering area. The site provides a promontory overlook of the basin and the San Gabriel Mountain range in the backdrop. The site will allow groups to gather below the rim of the knoll that will create a sight and sound barrier from Oak Grove Drive and the nearby Foothill Freeway. The carved-out hollow will create an intimate gathering area that will be enhanced with planted Coast Live Oak woodland that will provide shade for the users of the site. Large boulders existing onsite will be used to form the edges of the hollow and contribute to the area's character. Boulders and historic carved, granite curbing (from Old Pasadena) will be used to create seating terraces. The stage or front of Sunrise Overlook will sit at the top of the existing retaining wall; access to the top of this area will be provided by the existing trail from the Equestrian Staging area. The site will be ADA-accessible from new trail ramps that will be provided both from the north and the south along the top of the existing retaining wall.

## SUNSET OVERLOOK

This project element is on the eastside of the park, immediately north of the Windsor/Ventura intersection. This area is at a great west-facing promontory outlook, providing an overview of the basin from this side of the park. The project element is largely a clean-up and restoration project. The area will be cleared of all weeds, brush, and dead trees. The area will be planted as specified in the habitat restoration plan. Seating and interpretive signage will be provided at this site for visitors to learn about the area and to understand what they are viewing from this location. The overlook is located at the main eastside park entrance. The project element will predominantly serve as an inspirational and educational opportunity. The site will overlook water conservation elements of the park, habitat restoration areas, and stream corridor restoration in the park. The site will provide a small area for parking.

## GABRIELINO TRAIL AREA

### *Convert JPL Parking to Public Parking*

This project proposes a new trailhead at the north end of the existing eastside JPL parking lot to bring park users into this area of the park, up the Gabrielino Trail and into the upper Arroyo Seco watershed area. This location will provide a new restroom, picnic tables, public parking, and interpretive signage for area recreational users. When the northern quarter of the existing JPL parking lot becomes available for public parking, the existing parking at Windsor Avenue and Mountain View Street can be used for a new park entrance.

### *New Public Restroom*

A new restroom will be constructed at the north end of this remodeled parking lot to serve visitors to the park as well as those headed into the Angeles National Forest. The size of this restroom will be determined to meet the needs of those who visit this area. A public telephone will be located at the structure. This restroom may need a sewage lift station with a force main to the JPL gravity lines across the JPL bridge.

## TRAIL DEVELOPMENT

### *Perimeter Trail*

Development of the Perimeter Trail will provide a complete loop of HWP for equestrians and hikers. This trail incorporates improved existing trails and will be completed through the addition of reconstructed trail on the west side below the Equestrian Staging and OGMO areas, and new trail in association with the new Sycamore Field and the Disc Golf Course on the west side. The Perimeter Trail will also be available for security, emergency responses, and maintenance vehicles.

The trail will have a minimum elevation of not less than 1045 (4.5 feet above the 1040.5 spillway elevation), so that it can be accessed during most storm events. Storm drains will be installed under the perimeter trail at critical cross-drainage points to eliminate trail washouts and to avoid disturbing the existing drainage patterns entering the basin.

The perimeter trail will serve as a habitat protection delineator; above and outside the perimeter trail, various improvements will be for human benefit. Below and inside the perimeter trail, habitat quality will be improved to contain plant and animal species diversity allowed to thrive by minimizing human interference.

The construction of the proposed perimeter trail requires a number of project elements to connect various junctures and crossings as well as segments of reconstructed and new trail. The trail begins at the west end of the dam and follows the proposed alignment in a clockwise pattern.

#### *Flint Wash Bridge Crossing*

The bridge will provide the perimeter trail system a critical, unifying link between the east and west sides of the park. The west end of the dam will be connected to the westside park via a bridge crossing over Flint Wash. This crossing will use a prefabricated metal bridge with 12-foot-wide wood decking to span approximately 150 feet across the wash. The crossing will utilize an existing abutment from a previous historical bridge in this same location. This crossing will be used by all visitors, including bicyclists, equestrians, and hikers. Bicyclists will come onto the dam via the proposed access off of Oak Grove Drive, cross the dam, cross Flint Wash Bridge and then ride into the Oak Grove area of the park via the paved park road. Equestrians and hikers will come onto the dam via the eastside perimeter trail, the east rim trail, or from the south via the Arroyo Seco Trail (part of the Santa Monica Mountains Conservancy's Rim of the Valley trail network), cross the dam, cross Flint Wash Bridge, and then travel west up Flint Wash Trail (part of the Rim of the Valley Trail network) or north on the westside perimeter trail. The dam and Flint Wash Bridge will be "shared" crossings for these various user groups along with emergency and maintenance vehicles.

The portion of the trail on the westside, in the vicinity of Berkshire drain between and below the Equestrian Staging and OGMO areas, will be reconstructed and raised to a 1045 elevation to ensure it is out of the frequent flood zone.

The portion of the trail at the south and east edge of the relocated disc golf area will need to be raised to a 1045 elevation to ensure it is out of the flood zone.

The portion of the perimeter trail east of the relocated disc golf area and the new "Sycamore Grove Field" will go north to the edge of the second new field, around the field on the south western edge and north on the existing trail, along the western edge of the field and the new westside spreading basins to the existing westside JPL parking lot.

From the southern end of the existing JPL westside parking all the way north to the North Bridge Crossing, a paved bicycle trail will parallel the Perimeter Trail.

#### *North Bridge Crossing*

The northerly Perimeter Trail bridge crossing will be made of a style and material similar to the Flint Wash Bridge crossing and will serve as the northerly connection between the westside and eastside parks. Hikers, equestrians, bicyclists, and maintenance/emergency vehicles will share the crossing. The bridge will span 150 feet and be 12 feet wide. The bridge will also serve as a utility crossing for water and power lines needed for eastside uses in which maintenance and emergency vehicles will share the crossing. Appropriate signage will be posted. This bridge will provide the missing link in the park perimeter trail system of all-weather, all-year access from the westside of the park to the eastside for park users, emergency and maintenance vehicles. After crossing the bridge, the bicycle route will separate from the Perimeter Trail with a paved bicycle trail connecting to the eastside paved roads.

The improved eastside segment of the perimeter trail is on the western edge of spreading basins 3 through 12 (new spreading basin numbers), and Johnson Field. This alignment will be shared as a flood maintenance access road as it extends south to the dam.

#### *East Rim Trail*

Development of the East Rim Trail for pedestrians and equestrians consists of constructing new trail from the VOC Water Treatment Plant to the Arroyo Well and reconstructing abandoned trail from the Arroyo Well to the Altacrest Trail. It will be graded to accommodate pedestrians and equestrians. Construction of the East Rim Trail will require cut and fill to be balanced onsite. This project will extend the existing trail that roughly follows the upper rim of the eastside slope. The new trail will be constructed parallel to the road leading from the Arroyo Well to the VOC. It will cross the entry access road close to the proposed Interpretive Area and skirt the eastside of the existing parking lot, joining up to the existing Altacrest Trail. To further clarify, this will be a new trail going from the VOC to the Arroyo Well and a reconstructed old trail from the Arroyo Well to the northern east/west connecting trail.

#### *Trail Connections from East Rim Trail to Basin Perimeter Trail*

This project will create four trail connections along the eastside linking the upper rim trail to the lower perimeter trail. Each of the trail connections will accommodate pedestrians and equestrians. It is anticipated that cut and fill can be balanced within the segments. These connections will allow pedestrians and equestrians to access eastside park features from the upper East Rim Trail and park users to avoid or bypass sediment/debris removal maintenance operations as necessary.

#### *West Rim Trail and Connectors*

The West Rim Trail starts at the west end of the Flint Wash Bridge, past the Equestrian Staging Area, heads north through the upper Oak Grove area on the westerly edge of the park, and then continues north through the MWD property where it converges with the basin perimeter trail. A portion of the West Rim Trail runs parallel with but is separated from the bike route; this occurs in the stretch from the Equestrian Staging Area to the Flint Wash Bridge. Pedestrians and equestrians traveling south from the Foothill Boulevard equestrian tunnel currently cross the main entry access road entering HWP from Foothill Boulevard. This component will reroute to a new constructed trail at a lower elevation to avoid conflicts with vehicle traffic at the Foothill Entrance. The new trail will connect to the existing trail just south of the big bend at the park entrance road.

#### *Trail Connections from West Rim Trail to Basin Perimeter Trail*

This component replaces the existing stairs connecting the upper level to the lower level, which is eroded and unsafe. This project element will grade a new trail linking the upper terrace restroom to the south end of the Oak Grove Field and back up to the West Rim Trail via the reconstructed old trail to the Foothill Boulevard park entrance.

#### *Dam Observation Trail*

The Dam Observation Trail establishes a trail loop from the eastern end of the reconstructed Flint Wash Bridge along the top of an existing retaining wall down to an elevation of 1045, west to an observation point, and back up to the western end of the Devil's Gate Dam. This loop trail will only be accessed by pedestrians. This will require cut and fill to be balanced onsite. From the top of the

old bridge abutment, park users have a clear view of the interior face of the dam and the water conservation pool area.

## BICYCLE ROUTE

Bicycles will be allowed to travel on any existing or proposed paved surface within the park. Bicycles will not be allowed on any designated trail or unpaved surface within the park. The bicycle routes are planned to allow bicyclists to utilize the perimeter of the park and to access bikeways outside of the basin, including the routes within the Angeles National Forest. The planned route also allows riders to access the nearby existing Class III Kenneth Newell Bikeway, the Central Arroyo Seco and the southern reaches of the Arroyo Seco in Pasadena and beyond. Access by bicycles across Devil's Gate Dam and Flint Wash Bridge by will be allowed. The paved bicycle route will parallel the segment of the perimeter trail on the westside of the park from the westside JPL parking lot, north to the North Bridge Crossing. This bridge will be shared by bicyclists, equestrians and hikers. A separate paved bike route will continue east, connecting to the eastside paved roads. At this point, riders will be able to continue on the Gabrielino Trail.

## HABITAT RESTORATION

Habitat establishment and restoration is proposed throughout the Hahamongna Watershed Park area, as illustrated in the comparison of the Existing and the Proposed Plant Communities Maps. Habitat establishment will be the creation of improved habitat quality in an area where a particular plant community is not present (in existing ruderal areas) or involves adding area to an existing plant community. Habitat restoration is the improvement of the habitat quality that includes increasing the plant and animal species diversity in an area where a plant community already exists. In general, all plant communities that are not impacted by proposed projects with grading, removal of exotic species, or destroyed by inundation, will be restored. Habitat quality of a site can be defined in terms of a range of its assessed attributes, functions and values as excellent, good, fair, or poor habitat. The ranking of habitat is subjective and varies widely depending on physical condition, degree of biodiversity, and the species addressed. The master plan includes a map illustrating the habitats and their associated plant communities (See Exhibit 3-7A).

The information within this section is presented in two parts. Part I is a listing of major habitat projects proposed by the plan. These projects are proposed for specific locations within the park. Some of these habitat projects involve the restoration of more than one plant community within the same project area and have been organized to complement the Park Project Areas phasing (See Section 4). Their listing is intended merely to help convey the location, intent, and magnitude of the proposed habitat establishment and restoration projects. Part II encompasses the goal of habitat establishment and restoration throughout the park and describes projects by Plant Community, linking the various projects previously described in this report to their proposed habitat establishment and/or restoration goals including an indication of the acreage affected. The projects in Part I are broken apart and listed in their appropriate plant community listing in Part II.

Subsequent to the approval of the Hahamongna Watershed Park (HWP) Master Plan the U.S. Fish and Wildlife Service, on February 7, 2001, designated critical habitat for the federally listed Southwestern Arroyo Toad. Those restoration projects and/or areas that are wholly or partially located within this designated critical habitat for the Southwestern Arroyo Toad are identified below with \*\*. On October 30, 2002, the U.S. District Court for the District of Columbia nullified all designated critical habitats for the Arroyo Toad. The USFWS will complete a new analysis of economic impacts and consider updated field survey information to refine where the Arroyo Toad exists. The Interior Department will decide by 2005 which areas of critical habitat to redesignate.



*Part I: Proposed Habitat Establishment and Restoration Projects*

1. *Realign Stream Corridor Restore and Establish Habitat* \*\*

This restoration project includes the area from just south of the Altadena Drain, north to the JPL bridge where the stream has been channelized. The Altadena drain extends into the Arroyo Seco stream corridor where at one time it was utilized as part of an earthen breakaway dam to contain water that was then diverted to the eastside spreading basins. This site is no longer used as a diversion facility due to the environmental impact from this diversion method. This project proposes to shorten the Altadena drain and widen the stream corridor to allow for a more natural stream alignment. For a short stretch, the stream course south of the Altadena Drain contains riparian habitat due to urban runoff. This stream corridor will be restored to a riparian habitat similar to and as a continuation of the same plant community immediately north of the JPL Bridge and south of the Altadena Drain.

2. *Restore Riversidian Alluvial Fan Sage Scrub*\*\*

This restoration project involves a number of smaller projects within a larger area. The larger area includes two plant communities: riversidian alluvial fan sage scrub and sage scrub, as shown on the plant community maps. The areas on either side of the stream corridor to the eastside spreading basins and to the westside JPL perimeter fencing and new westside spreading basins will be restored to these plant communities.

The current equestrian trail on the westside of the existing spreading basins traverses some of the best old alluvial fan sage scrub in the area designated as sage scrub on the plant community maps. The proposal is to abandon the equestrian trail, relocate the trail on the spreading basins maintenance road (asphalt to be removed) and restore the existing trail with sage scrub.

Habitat restoration will also occur at the various drain outfalls along the JPL border where exotic species need to be removed; debris and trash collected and disposed; and the riversidian alluvial fan sage scrub, sage scrub and southern willow scrub habitat restored.

The old stream crossing roadway from both the east and west was paved with asphalt by past mining operators. Most of this asphalt has been removed. The remaining asphalt needs to be removed and disposed, the stream allowed to take its course, and riversidian alluvial fan sage scrub and sage scrub habitat restored.

Additionally, this project establishes riversidian alluvial fan sage scrub at the southern end of this area where it transitions to a streambed riparian plant community. With the Stream Channel Widening Project (See Project #4), both the streambed riparian and the alluvial fan sage scrub plant community areas are enlarged.

3. *Establish Habitat at Spreading Basins*\*\*

The park master plan calls for the expansion and relocation of the existing spreading basins. There are three sites for this restoration project. Project 3a comprises nine surface acres of new spreading basins, to be numbered 13, 14, and 15, on the westside and will involve the removal of ruderal weedy species. The embankment of the new ponds will be planted with sage scrub species. Over-story tree species need to be considered because of the water they naturally draw for their establishment and growth, which could be contrary to the water conservation goal. If acceptable, sycamore woodland around the perimeter of the spreading basins is recommended. Project 3b involves two new basins north of basin 1 and the expansion of spreading basins 1 through 4 on the eastside. Project 3c involves

spreading basins 5 through 10 on the eastside. Both 3b and 3c would have habitat establishment as described in 3a, above.

4. *Widen Stream Channel and Establish Riparian Habitat \*\**

In this project, the stream channel will be widened on its western edge to at least double its current width. This project is located in the existing narrow riparian corridor between the existing riversidian alluvial fan sage scrub area and the area that will be graded for the water conservation and sediment management pool. As winter rains saturate the upper watershed, storm water begins to flow through this habitat over a larger area, increasing the groundwater recharge for the general benefit of the Raymond Basin as well as providing surface water, encouraging a riparian habitat of higher quality. The existing channel with established vegetation and drainage course configuration to the east will be preserved and the stream channel will be widened to the west. Embankments of the stream could be stabilized to help control erosion where further study indicates that it is necessary.

5. *Establish East Entrance Habitat \*\**

This project involves the reconfiguration of the existing Windsor/Ventura intersection as well as the enhancement of Sunset Overlook, situated north of this intersection. Landscaping adjacent to the new park entrance will total 0.3 acre and the Sunset Overlook will total 0.5 acre. It will consist of native plants from the sage scrub and coast live oak woodland plant communities to enhance the appearance of the area and to benefit certain wildlife species. The importance of this area as a park entrance and the absence of landscaping provide the opportunity for both a park project and a habitat establishment project.

6. *Restore Habitat along Westside Perimeter Trail*

This project proposes to raise the perimeter trail to an elevation of 1045 and create a graded slope of habitat from the westside perimeter trail down to the conservation pool rim elevation of 1030 for the reestablishment of southern willow scrub that will be infrequently inundated up to elevation 1040.5. Material for the proposed fill will be excavated from the ruderal areas within the proposed conservation pool below elevation 1030. The existing vegetation in the area will be hand-cleared to leave willow trees that are taller than the depth of fill. After the fill is placed, these existing willows will root at the higher elevation with the help of water conservation management practices that will provide a higher local water table. This and additional habitat restoration will create a larger area of southern willow scrub of higher quality than exists in this highly disturbed and eroded area.

7. *Establish Habitat at Sycamore Fields and Relocated Disc Golf (northern Sycamore Field \*\*)*

This portion of the project proposes to raise the elevation of the southern area (southeast of the existing parking lot) that has small pockets of willows with large expanses of ruderal habitat between them. The small areas of existing willows will be linked and receive less fill to create drainage courses with raised terraces of mule fat (disc golf fairways) between. The drainage courses will be extensions of existing drainage from elevation 1050 down to elevation 1030, the edge of the water conservation pool.

The perimeter trail at elevation 1045 will be on the eastern edge of this area. The relocated disc golf and the new southern Sycamore Grove field within this area slopes from elevation 1052 down to the perimeter trail and then down to the conservation pool rim elevation of 1030. Material for the proposed fill will be excavated from the ruderal areas within the proposed conservation pool, below elevation 1030. The existing vegetation in the area to be raised will be hand-cleared leaving willow trees that are taller than the depth of fill. After the fill is placed, these willows will root at the higher elevation with the help of water conservation management practices, which will provide a higher local water table. This and additional habitat restoration will create a riparian habitat area (above the

frequent inundation elevation) of higher quality. Southern Sycamore Riparian Woodland habitat will be established around this southern field.

This portion of the project proposes to raise the elevation of the northern area, east of the Supervised Overnight Camping Area, which was excavated by past mining operations that left a large depression. Fill material from the Stream Channel Widening project will be placed to raise this area to elevation 1055, above the frequent inundation elevation of 1040.5. After the fill is placed and the northern Sycamore Field is constructed, Southern Sycamore Riparian woodland habitat will be established around this northern field.

8. Establish Oak Woodland at Sunrise Overlook

This project is located at the southwestern corner of the park, along Oak Grove Drive and immediately northwest of Flint Wash. Coast live oak woodland borders the site to the north and is proposed to be expanded south into the overlook area. Sage scrub revegetation is also recommended.

9. Restore Oak Woodland on Westside (partially \*\*)

This project will increase the biological diversity of the Oak Grove area on the westside of the park by using native species prescribed for coast live oak woodland restoration. It will establish young oaks in the existing ruderal open areas to enhance the survival of this mature oak woodland community. Protection of oak and other restoration plantings at the camping area and the group activity areas in the park will be necessary.

10. Establish Sycamore Woodland on Eastside (partially \*\*)

Several sites fall within this project. One area that will encompass the creation of sycamore woodland is at elevation 1030 to 1040 and immediately south of Johnson field. This mule fat habitat will be periodically inundated every winter season. To improve habitat quality it is recommended to raise the grade in the area to elevation 1045 and create sycamore riparian woodland. The establishment of native tree species such as sycamores and cottonwoods is desirable for this area; to the east and north of this area are western sycamore, black cottonwoods, and Mexican elderberry, all of which have naturalized. Sycamore Woodland is also suggested around the perimeter of the east and west spreading basins as well as around the edges of the multipurpose play areas (See proposed plant community map).

11. Establish Riparian Habitat at Perimeter of the Flood Management/Water Conservation Pool

The existing riparian southern willow scrub habitat below the 1040.5 elevation will degenerate and begin to die as soon as water conservation practices are implemented; these areas are periodically inundated during the winter season. The habitat below the 1030 elevation will be completely submerged for varying lengths of time. The 1030 to 1045 elevation zone around the water conservation pool and below the Perimeter Trail will be established habitat of good to excellent quality, that could be subject to several inundations a year. Emerging vegetation, debris, and sediment will need to be periodically removed from the newly established Flood Management Water Conservation Pool per the sediment management guidelines that will be established by the County. This project proposes a phased operation that will permit the area elevated above the floodplain (elevation 1040.5) and the perimeter of the water conservation pool (elevation 1030 to 1040.5) to become established with southern willow scrub plant community. Once these riparian areas are established, the existing southern willow scrub and ruderal plant community areas, that are below elevation 1030, will be removed in a coordinated sediment and debris removal operation. In addition to pumping storm water retained in the Water Conservation Pool back to the spreading basins for

metered groundwater recharge, this storm water will provide a higher local water table, encouraging a riparian habitat of higher quality, and will provide groundwater recharge for the general benefit of the Raymond Basin.

*Part II: Habitat Establishment and Restoration Projects listed by Plant Community*

The following table summarizes the acreages of natural plant communities and landscaped/developed areas within Hahamongna Watershed Park, both existing and proposed.

Area Description		Existing Acres	Proposed Acres
OW	Coast Live Oak Woodland	37.8	42.6
W	Southern Willow Scrub	25.5	20.5
SS	Sage Scrub	39.9	42.9
RAFSS	Riversidian Alluvial Fan Sage Scrub	17.2	18.8
MF	Mule Fat Scrub	19.5	11.0
SSRW	Southern Sycamore Riparian Woodland	2.6	24.8
R	Ruderal	75.4	2.4
SBR	Streambed Riparian	8.1	8.3
WA	Water Conservation Pool	0.0	54.4
L	Landscaped	5.8	9.8
D	Developed	76.4	74.8
D&L	Developed and Landscaped areas not shown within a plant community polygon (such as a trail, dirt road, picnic & camping site, disc golf fairways and pole climbing area)	10.6	8.5
TOTAL STUDY ACREAGE <sup>1</sup>		318.8	318.8

Within the Hahamongna Watershed Park (HWP) there are Landscaped and Developed areas, which have been designated on the plant community maps. The Landscaped areas within the HWP include predominantly nonnative landscaping for playing fields and native landscaping for ornamental purposes. The developed areas within HWP include predominantly roads, parking, and buildings, with native landscaping for ornamental purposes.

Coast Live Oak Woodland

There are currently 37.8 acres of coast live oak woodland within the Hahamongna Watershed Park Master Plan (HWPMP) study area. The 26.2 acres within the park will receive habitat restoration. The following list of projects is proposed for habitat establishment and restoration of coast live oak woodland:

Project	Existing Acres	Acres Added or Subtracted	Proposed Acres
West Side Park Area	20.2	3.8	24.8
MWD property	11.6		
East Side Park Area	6.0	1.0	7.0
TOTAL	37.8	4.8	42.6

<sup>1</sup> Does not include the areas of Flint Wash and south of the 210 freeway (included in CAMP). Both are within the Park property boundary but outside the study area. These areas total 10.7 acres. Does include the MWD property, 28 acres added + 2.4 acres already included = 30.4`

*West Side Park Area:* The following three project areas total 3.8 acres of habitat establishment:

Oak Woodland Restoration (Habitat Project #9): This project area, which includes the upper Oak Grove Picnic area and Equestrian staging area, has been undergoing habitat restoration for eight years. This area and the slopes down to the Lower Oak Grove area, including the Oak Grove Field and the west half of the overnight area, are proposed to have an increase of 1.9 acres of oak woodland.

Oak Woodland Restoration (Habitat Project #9\*\*): The east half of the overnight area is within the critical habitat of the Arroyo Toad. This area is proposed to have an increase of 1.0 acre of oak woodland.

Sunrise Overlook (Habitat Project #8): The Sunrise Overlook area, adjacent to the south perimeter of the Equestrian Staging Area, is proposed to have an increase of 0.9 acre of oak woodland.

*Eastside Park Area:* The following three project areas total 1.0 acre of oak woodland habitat establishment:

Eastside Spreading Basins (Habitat Project #3b\*\*): Adjacent to and west of the new eastside spreading basin No. 2, it is proposed to increase the existing 0.1 acre of oak woodland by 0.2 acre for a total of 0.3 acre.

Adjacent to spreading basin 7 and west of the Arroyo Well, it is proposed to have the existing 0.4-acre oak woodland increased by 0.3 acre for a total of 0.7 acre.

East of spreading basin 14 and the overflow basin\*\*: This area is proposed to have the existing 1.1 acres of oak woodland increased by 0.5 acre for a total of 1.6 acres. This enhances the habitat adjacent to the East Rim Trail. It will convert 0.5 acre of sage scrub to oak woodland.

*Southern Willow Scrub*

There are currently 25.5 acres of southern willow scrub in the park, of which only 7.7 acres will receive habitat restoration. When water conservation measures are implemented, the remaining 17.8 acres of existing habitat will begin to die as the area is frequently inundated. An additional 13.3 acres of habitat will be established along with the 7.7 acres of habitat to be restored. The following list of the projects is proposed for habitat establishment and restoration of southern willow scrub:

Project	Existing Acres	Acres Added or Subtracted	Proposed Acres
Stream Corridor Alignment (Project 1**)	0.8		0.8
Westside Spreading Basins (Project 3a**)	0.0	1.2	1.2
Stream Channel Widening (Project 4**)	0.6	3.1	3.7
Westside Perimeter Trail (Project 6)	0.6	1.3	1.9
Relocate Disc Golf (Project 7)	4.5	0.7	5.2
Water Conservation Pool (Project 11)	1.2	4.5	5.7
Storm Drain Improvements ~ JPL**	0.0	2.0	2.0
TOTAL	7.7	12.8	20.5
Habitat lost due to inundation (water conservation)	17.8		
TOTAL	25.5		

Stream Corridor Alignment (Habitat Project #1\*\*): This project will keep the size of the habitat area unchanged, but will restore habitat found at the southern end of the project area.

Westside Spreading Basins (Habitat Project #3a\*\*): There is currently no southern willow scrub habitat adjacent to the proposed Westside Spreading Basins. This habitat project proposes to establish 1.2 new acres of this plant community east of the spreading basins. The creation of the westside spreading basins will utilize “Landform Grading” principles to improve habitat for this and other plant communities.

Stream Channel Widening (Habitat Project #4\*\*): The stream channel is proposed to have the existing 0.6 acre of southern willow scrub increased by 3.1 acres for a total of 3.7 acres. This restoration project will widen the stream on its western edge for a new, total stream channel width of at least double its current width. Both the east and west sides of the stream channel will be restored with this plant community. Southern willow scrub will be used on the embankments of the stream to naturalize this habitat for native fauna and to help stabilize and control erosion of the stream banks.

Westside Perimeter Trail (Habitat Project #6): The westside perimeter trail is proposed to have the existing 0.6 acre of southern willow scrub increased by 1.3 acres to a total of 1.9 acres. The restoration project proposes to raise the grade on this trail with fill excavated from ruderal areas below the 1030 elevation within the proposed conservation pool. Willows taller than the depth of fill will remain to root at the higher elevation with the help of water conservation management practices, which will provide a higher local water table. This and additional habitat restoration will create a larger area of southern willow scrub of higher quality than currently exists in this highly disturbed and eroded area.

Relocate Disc Golf (Habitat Project #7): The Disc Golf Relocation component is proposed to have the existing 4.5 acres of southern willow scrub increased by 0.7 acre to a total of 5.2 acres. This component proposes to raise the elevation of the area that has small pockets of existing willow scrub habitat. The areas of existing willows will be linked to create drainage courses that will receive less fill than the terraced areas of this project. The drainage courses will be extensions of the existing drainage patterns from elevation 1050 down to elevation 1030, the edge of the water conservation pool. The existing vegetation in the area will be hand-cleared to leave willow trees taller than the depth of fill. After the fill is placed, these willows will root at the higher elevation with the help of water conservation management practices, which will provide a higher local water table. This and additional habitat restoration will create a larger area of southern willow scrub of higher quality than exists in this highly disturbed area. However, with the close human proximity on the disc golf fairways, this area will not be habitat of a quality suitable for a diverse wildlife. It has been recommended that, during the specific project design phase, wider bands of willow scrub plant community be created within the relocated disc golf course and/or between the Perimeter Trail and the Water Conservation Pool.

Water Conservation Pool (Habitat Project #11): This project proposes a phased operation that will permit the areas elevated above the floodplain (elevation 1040) and the perimeter of the water conservation pool (elevation 1040 to 1030) to become established with southern willow scrub habitat. The Water Conservation Pool project will add 4.5 acres of southern willow scrub in this zone for a new total of 5.7 acres of southern willow scrub. These 5.7 acres, inside the Perimeter Trail, form a band around the perimeter of the pool that will provide a higher local water table, encouraging a riparian habitat of higher quality. The existing southern willow scrub habitat below the 1040 elevation, and in particular below the 1030 elevation, will degenerate and begin to die as soon as water conservation practices are implemented and this zone is periodically inundated during the winter season. The next phase of the project will remove the 17.8 acres of existing southern willow

scrub areas (below elevation 1030) in a coordinated sediment and debris removal operation once the new willow habitat has become established.

Storm Drain Improvements-JPL \*\*: This project will convert 2.0 acres of sage scrub to southern willow scrub plant community. This area is below the drainage outfalls, along the JPL border, just north of the westside parking lot, where exotic species need to be removed and debris needs to be collected. These particular drainage outfalls drain through a southern willow scrub plant community. Due to wet conditions caused by urban runoff, this project proposes to transition this 2-acre area from a sage scrub plant community to a plant community with willows as the dominant species.

Sage Scrub

There are currently 39.9 acres of sage scrub in the park of which 36.3 acres of habitat will be restored. An additional 6.6 acres of habitat will be established for a new total of 42.9 acres of sage scrub habitat. The following list of the projects is proposed for habitat establishment and restoration of sage scrub:

Project	Existing Acres	Acres Added or Subtracted	Proposed Acres
Stream Corridor Alignment (Project 1**)	1.7		1.7
Westside Spreading Basins (Project 2 & 3a**)	0.0	3.0	3.0
Eastside Spreading Basins (Project 2 & 3c**)	4.9	1.1	6.0
Stream Channel Widening (Project 4**)	0.0	2.5	2.5
Sunrise Overlook (Project 8)	1.9	-0.9	1.0
Dam Area ~ Spillway Observation -0.2 and Adjacent to the Spillway +0.2	13.2		13.2
Eastside Park Area ~ (Oak Woodland** -0.5)			
(East Rim Trail Extension** -0.2)	11.2	-0.7	10.5
Storm Drain Improvements ~ JPL**	7.0	-2.0	5.0
<b>TOTAL</b>	<b>39.9</b>	<b>3.0</b>	<b>42.9</b>

Stream Corridor Alignment (Habitat Project #1\*\*): This project will keep the size of the habitat area unchanged and will restore habitat within the project area.

Westside Spreading Basins (Habitat Project #3a\*\*): There is currently no sage scrub habitat in the area of the proposed Westside Spreading Basins. The existing area is mostly a ruderal plant community. This habitat project proposes to establish 3.0 new acres of sage scrub plant community along the slope east of the spreading basins. The creation of the westside spreading basins will utilize “Landform Grading” principles to improve habitat for this and other plant communities.

Eastside Spreading Basins (Habitat Project #2\*\* and #3c\*\*): The Eastside Spreading Basins project is proposed to have the existing 4.9 acres of sage scrub increased by 1.1 acre to a total of 6.0 acres. The equestrian trail on the west side of the existing spreading basins traverses some of the best old alluvial fan sage scrub in the area, designated as sage scrub on the plant community maps. Project 3c involves spreading basins 5 through 10 on the eastside. The proposal is to abandon the equestrian trail, relocate the trail on the spreading basins maintenance road (asphalt to be removed) and restore the area occupied by the existing trail with sage scrub.

Stream Channel Widening (Habitat Project #4\*\*): There is currently no sage scrub habitat at this location of the stream channel. On the western slope of the stream channel project, 2.5 acres of sage scrub habitat will be established. This project will widen the stream on its western edge for a new total stream channel width at least twice the current width. Both the east and west sides of the stream channel will be restored with sage scrub habitat.

Sunrise Overlook (Habitat Project #8): There is currently 1.9 acre of sage scrub habitat in this project area, much of which was established by hydroseeding when the freeway access ramp was eliminated from this location. A total of 0.9 acre of this habitat will be converted to oak woodland habitat leaving 1 acre of sage scrub.

Dam Area: This project area currently has 13.2 acres of sage scrub. Although the acreage of habitat will remain the same, 0.2 acre of this habitat will be removed as a result of the spillway observation overlook project, but 0.2 acre will also be added as a result of habitat establishment on the slope adjacent to the dam spillway. The existing 13.0 acres remaining will receive habitat restoration.

Eastside Park Area: A total of 11.2 acres of sage scrub make up the eastside park area. A total of 0.7 acre of sage scrub will be eliminated due to the following projects: (a) 0.5 acre\*\* will be converted to oak woodland east of basin 14 and the overflow basin; and (b) 0.2 acre\*\* will be lost to the east rim trail extension project. The total remaining area in sage scrub within the Eastside Park Area will be 10.2 acres of restored habitat.

Storm Drain Improvements-JPL \*\*: A total of 7.0 acres of sage scrub exists adjacent to JPL in the vicinity of the westside storm drains. This project will convert 2.0 acres of sage scrub to southern willow scrub plant community. This area is below the drainage outfalls, just north of the westside parking lot (Habitat Project #2\*\*) along the JPL border, where exotic species need to be removed, and debris needs to be collected. These particular drainage outfalls drain through a southern willow scrub plant community. Due to wet conditions caused by urban runoff, this 2.0 acre area will be transitioned to a plant community with willows as the dominant species. A total of 5.0 acres will remain in this area as sage scrub plant community.

#### *Riversidian Alluvial Fan Sage Scrub*

There are currently 17.2 acres of riversidian alluvial fan sage scrub in the park. An additional 1.6 acres of habitat will be established for a new total of 18.8 acres of riversidian alluvial fan sage scrub habitat. Habitat establishment and restoration for this plant community is defined under Habitat Project #2\*\*. A number of smaller habitat restoration projects within a larger area will occur: a) the Stream Channel Widening Project (Habitat Project #4\*\*) will add one acre of habitat; b) the Westside Spreading Basins Project (Habitat Project #3a\*\*) will eliminate ruderal weedy species and add 0.2 acre of habitat to the embankments of the spreading basins; c) the old east-to-west stream crossing has been abandoned and the asphalt roadway will be removed, adding 0.2 acre of habitat; and d) the various drain outfalls along the JPL border, where exotic species need to be removed and debris needs to be collected, will add another 0.2 acre of riversidian alluvial fan sage scrub.

#### *Mule Fat Scrub*

There are currently 19.5 acres of mule fat scrub in the park of which only 10.3 acres will receive habitat restoration. When water conservation measures are implemented, the remaining 9.2 acres of existing habitat will begin to die as the area is frequently inundated. An additional 3.9 acres of habitat will be established along with the 10.3 acres of habitat to be restored. The following list of the projects is proposed for habitat establishment and restoration of mule fat scrub:



Project	Existing Acres	Acres Added or Subtracted	Proposed Acres
Stream Corridor Alignment (Project 1**)	0.9	0.2	1.1
Westside Spreading Basins (Project 3a**) and Stream Channel Widening (Project 4**)	6.7	-1.7	5.0
Relocated Disc Golf (Project 7)	0.0	3.7	3.7
Northern Sycamore Field (Project 7**)	1.5	-1.5	0.0
Water Conservation Pool (Project 13)	1.2		1.2
TOTAL	10.3	0.7	11.0
Habitat Lost Due to Inundation (Water Conservation)	9.2		
TOTAL	19.5		

Stream Corridor Alignment (Habitat Project #1\*\*): This restoration project will increase the existing 0.9 acre of mule fat scrub habitat by 0.2 acre for a total of 1.1 acres in mule fat scrub. The project will shorten the Altadena drain and realign the stream corridor to allow for a more natural stream flow.

Westside Spreading Basins (Habitat Project #3a\*\*) and Stream Channel Widening (Habitat Project #4\*\*): There are currently 6.7 acres of mule fat scrub habitat within these two project areas. These habitat projects propose to eliminate 1.7 acres of this plant community along the upper banks of the stream and in the vicinity of the new spreading basins. The creation of the westside spreading basins will utilize “Landform Grading” principles to improve habitat for this and other plant communities. This project will widen the stream on its western edge for a new total stream channel width of approximately 200 feet.

Relocate Disc Golf (Habitat Project #7): There is currently no mule fat scrub habitat at this location. The Disc Golf Relocation project is proposed to establish 3.7 new acres of mule fat scrub to this area of the park. This restoration project proposes to raise the elevation of the area that has small pockets of existing willow scrub habitat to create drainage courses. Raised terraces of mule fat scrub habitat, a very resilient plant community, will serve to border the fairways. The areas of existing willows will be linked to create drainage courses that will receive less fill than the terraced areas of this project.

Northern Sycamore Field (Habitat Project No.7\*\*): This project will eliminate the 1.5 acre of mule fat present when fill is placed to raise the site above inundation level. The site is a predominantly ruderal and highly disturbed habitat due to past mining operations. There will be some debris removal of broken concrete that was dumped from previous construction projects. Until this project is implemented, the site will be flooded and when water is allowed to pass through the dam, the flooded mule fat will die and a pool of water will remain for some time.

Water Conservation Pool (Habitat Project #11): When water conservation measures are implemented, an existing 9.2 acres of mule fat scrub will die as the area is frequently inundated. This project proposes a phased operation that will permit the areas elevated above the floodplain (elevation 1040.5) and the perimeter of the water conservation pool (elevation 1030) to become established with southern willow scrub habitat. The Water Conservation Pool project will not alter the existing 1.2 acres of mule fat scrub above this zone. The next phase of the project will remove the dying 9.2 acres of existing mule fat scrub areas (below elevation 1030) in a coordinated sediment and debris removal operation.

Southern Sycamore Riparian Woodland

There are currently 2.6 acres of southern sycamore riparian woodland habitat in the park. An additional 22.2 acres will be established for a new total of 24.8 acres of southern sycamore riparian woodland habitat. Habitat Project No.10, as described in Section 3.3 of the HWP Master Plan, reflects the restoration planned for this plant community. The following list of projects is proposed for habitat establishment and restoration of southern sycamore riparian woodland:

Projects	Acres Added
Westside Area	
Around Southern Sycamore Field (Project 7)	2.1
Around Northern Sycamore Field (Project 7**)	4.7
Adjacent to Westside Spreading Basins 15,16 & 17 (Project 3a**)	1.4
Stream Corridor Alignment (Project 1**)	1.4
Eastside Area	
South of and around Johnson Field (Project 10)	3.8
Around existing overflow basin (Project 10)	3.2
Around Eastside Spreading Basins 7-14 (exist. No. 5-12 Project 3c**)	2.6
Around new Eastside Spreading Basins 1 & 2 and expanded Spreading Basins 3-6 (exist. No. 1-4 Project 3b**)	3.0
TOTAL ACRES TO BE ESTABLISHED	22.2

Ruderal

It is proposed to replace the total existing 75.4 acres, except the 2.4 acres within the MWD property, in ruderal species with other plant communities, as shown in the proposed plant communities map, or as area within the proposed water conservation pool, which will be cleared of all vegetation below elevation 1030 excavated and graded. The ruderal areas within the designated critical habitat for the federally listed endangered Southwestern Arroyo Toad are proposed to be graded using Land-form Grading principles and restored to eliminate the highly disturbed and unnatural topography, habitat of poor quality, and create habitat of good to excellent quality for native flora and fauna.

Streambed Riparian

There are currently 8.1 acres of streambed riparian habitat in the park, of which 4.9 acres will be destroyed and 5.1 acres of habitat will be established for a new total of 8.3 acres of streambed riparian habitat. The following list of the projects is proposed for habitat establishment and restoration of streambed riparian habitat:

Project	Existing Acres	Acres Added or Subtracted	Proposed Acres
Two areas inundated (Project 11)	4.9	-4.9	0
Stream Channel Widening (Project 4**)	2.4	5.0	7.4
Stream Corridor Alignment (Project 1**)	0.8	0.1	0.9
TOTAL	8.1	0.2	8.3

Two areas inundated (Habitat Project #13): There are two areas below the existing 1030 elevation that will be frequently inundated when water conservation procedures are implemented. This will cause the existing 4.9 acres of streambed riparian habitat in these areas to die. Therefore, these two areas are proposed to be cleared, excavated, and graded for the Water Conservation Pool (Habitat Project No.13).

Stream Channel Widening (Habitat Project #4\*\*): The stream channel widening project will establish 5.0 additional acres of streambed riparian habitat to an existing 2.4 acres for a total of 7.4 acres of streambed riparian habitat. This restoration project will widen the stream on its western edge for a new total stream channel width of at least double the existing width. Landform Grading principles will be utilized here to improve the habitat for several native plant communities on the western graded slopes. As winter rains saturate the upper watershed, storm water begins to flow through this habitat, over a larger area, increasing the groundwater recharge for the general benefit of the Raymond Basin, as well as providing surface water, encouraging a riparian habitat of higher quality.

Stream Corridor Alignment (Habitat Project #1\*\*): This restoration project will increase the existing 0.8 acre of streambed riparian habitat by 0.1 acre for a total of 0.9 acre. This area is contiguous with the same habitat, immediately north of the JPL Bridge. The project will shorten the Altadena drain and widen the stream corridor to allow for a more natural stream alignment.

Flood Management/Water Conservation Pool

The flood basin behind the dam has been filling with sediment. With an existing capacity of 1,424 acre-feet, it will soon reach the minimum safe capacity of 1,400 acre-feet. Since 1978, when the dam was declared unsafe to hold water, vegetation has been allowed to grow in the 92 acres that will be flooded now that the dam has been reconstructed. When water conservation measures are implemented and this area is inundated, as desired by the proposed plan, this vegetation will begin to die. A major goal of the proposed project is to create habitat of good to excellent quality wherever possible within this highly disturbed Hahamongna basin. To create new habitat above the spillway elevation and increase the capacity of the basin to a maximum of 1,900 acre-feet and to allow for 500 acre-feet of inflowing sediment capacity, this project will move 378 acre-feet of material on-site and remove 243 acre-feet of material off-site. This will reduce the area frequently inundated to 69 acres and create 23 acres of new recreational and habitat area and five acres of new streambed riparian habitat. Floodwater retained in the 69-acre flood management pool will be pumped back to the spreading basins located at higher elevations. The 69-acre flood management pool will include 14.6 acres of riparian habitat around the perimeter extending up the widened intermittent stream channel. This habitat could be inundated during storm events. This will leave a 54.4 acre Water Conservation Pool to better manage inflowing sediment and floating debris and to retain as much storm water as possible. In addition to pumping this water back for metered groundwater recharge, this water conservation pool will provide a higher local water table, encouraging a riparian habitat of higher quality, and will provide groundwater recharge for the general benefit of the Raymond Basin.

	Acres
Area of Flood Management Pool after increasing capacity (at elevation 1040)	69.0
<b>Habitat:</b>	
Willow habitat (elevation 1030 to 1040)	5.7
Streambed Riparian (elevation 1025 to 1040)**	7.4
Riversidian Alluvial Fan Sage Scrub (area below 1040 elevation)**	1.0
Southern Sycamore Riparian Woodland (inundated Flint Wash)	0.5
<b>TOTAL ACRES TO BE INFREQUENTLY INUNDATED</b>	<b>14.6</b>
<b>AREA OF WATER CONSERVATION POOL (no habitat)</b>	<b>54.4</b>

## UTILITIES

### *Underground Pasadena's Eastside Overhead Power and Communication Lines*

This project element will underground existing Pasadena overhead power and communication lines that run north and south on the east side of the park. The project will occur in two phases; the first phase will be to underground these overhead distribution lines from the VOC WTP to the Arroyo Well. The second will be to underground overhead distribution lines from the VOC WTP to Johnson Field.

### *Relocate the Existing Southern California Edison Power Line in the Hahamongna Basin*

This project will minimize the number of overhead basin crossings as well as remove this line from the sensitive Riversidian Alluvial Fan Sage Scrub habitat, which restricts the maintenance of this utility. This overhead distribution line that runs diagonally across the basin from the JPL substation to the Windsor/Ventura intersection would be relocated. The new alignment would run North to the east-west distribution lines, adjacent to the proposed North Bridge, crossing the basin with the existing lines, then running south, along the existing Gabrielino Trail, and reconnecting to the existing SCE power distribution line along Altadena Drive.

### *Relocate the Existing Pasadena Power and Communication Line*

This project will relocate the existing Pasadena power and communication line that traverses the basin from the VOC WTP to the MWD property and northern portions of the west side of the park. This utility will be relocated due to the undesirable aesthetics of these poles, the erosion of the pole bases, and the inaccessibility for maintenance in the Widen Stream Channel and Establish Riparian Habitat project area. The communication portion of this line will be relocated to a new line that will run to JPL from the Windsor-Ventura intersection north along the Gabrielino trail.

The power portion of this line will be relocated to the Pasadena grid that crosses the Devil's Gate Dam to feed facilities in the westside portion of the park. This alignment will go from the dam to Foothill Boulevard (preferably underground) and provide a new feed to OGMO, the Equestrian Staging Area restroom, the new restroom near the Oak Grove Field, the group picnic shelters south of the Oak Grove Field, the park ranger station, the existing restroom in the overnight area, and the group picnic shelters in the overnight camping area

### *Relocate the SCE North/South Transmission and South Distribution Line*

These lines currently follow the toe of the western slope of the park, run the length of the basin from south to north and feed into and from JPL's main substation. The bases of 11 of the 21 power poles are frequently inundated during heavy storm events, making it impossible to access these poles. The poles will either be relocated to an alignment in Oak Grove Drive or be raised to an appropriate height in their current location after the westside perimeter trail, relocated disc golf, and improved parking lot areas are constructed with fill to raise the area above the seasonally inundated elevation of 1040.5 (spillway elevation). Relocation of the poles to Oak Grove drive is the preferred solution. Prior to implementing the proposed grading of the Flood Management/Water Conservation Pool, an analysis of alternative improvements or relocation of this utility will be completed for review and approval. This will guarantee the safety and stability of this critical utility. A mutual agreement between SCE and the City of Pasadena (and potentially other entities such as JPL, MWD, and the city of La Cañada-Flintridge) will need to be worked out.

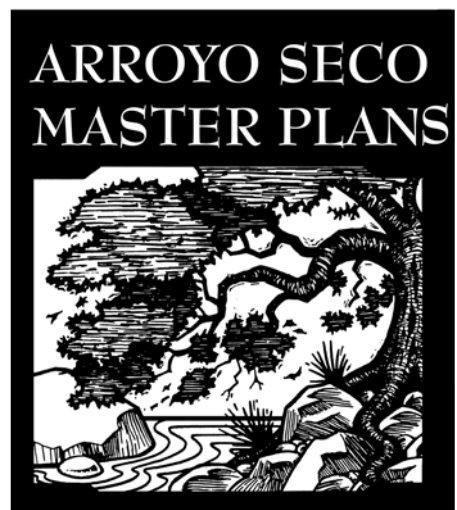
## SECURITY, SAFETY & ACCESSIBILITY

Two types of security fencing will be used. Decorative fencing consisting of some type of iron fencing with or without the use of Arroyo stone (as pillars or as a low wall on which an iron fence could be placed) will be used where appropriate and conform to the Arroyo Seco Design Guidelines. Chain link fencing will be used in areas where security fencing is needed but aesthetics are not an issue. Decorative security fencing is recommended at the following locations:

- At the south end of the park, from the west side of Flint Wash adjacent to Oak Grove Drive, north to the Gould Canyon Trail tunnel at Foothill Blvd.
- At the Windsor Avenue and Ventura Street entrance between Mountain View and Ventura Street, along the west side of Windsor Avenue.
- At the west end of Altadena Drive where a trail enters the park.

Gates will be needed at the westside tunnel entrance under Oak Grove Drive, to prevent entry onto the dam from the new parking lot at Oak Grove Drive and Linda Vista during park closure. Chain-link security fencing will be used at the end of La Canada Verdugo Road and Oak Grove Drive from the Woodbury on-ramp to Flint Wash.

# Appendix F



## **Appendix F:**

### **TECHNICAL REPORT ATHLETIC FIELDS AT HAHAMONGNA WATERSHED PARK**

prepared by  
Parks and Natural Resources Division - Department of Public Works

#### **Introduction**

The City of Pasadena has proposed the Arroyo Seco Master Plan for the restoration and enhancement of the Arroyo Seco. This plan is divided into three sections, which correspond to distinct geographical features and established uses of the Arroyo Seco within Pasadena's boundaries. The Upper Arroyo Seco constitutes the northern - most section of this plan, which includes 300 acres known as Hahamongna Watershed Park (HWP)

Located just north of Devil's Gate Dam, Hahamongna Watershed Park presents a unique environment as a sediment and debris basin used for flood control, water conservation, and recreation. Existing features include active spreading basins, athletic fields, paved parking lots for JPL, a disc golf course, public parking, and an oak woodland, formerly known as Oak Grove Park. Although highly disturbed by both man and natural occurrences over the years, the area is biologically extremely diverse. The Arroyo Seco Master Plan and Draft Environmental Impact Report identify at least six native terrestrial plant communities, with over 300 plant species and approximately 100 animal species observed in the area encompassing Hahamongna Watershed Park. Included in this list are state and federally listed sensitive plant and animal species as well as designated critical habitats.

Hahamongna Watershed Park is located over a portion of the unconfined groundwater aquifer known as Monk Hill Basin. This, along with the Pasadena Sub-area aquifer, is included in the larger aquifer known as the Raymond Basin. The Raymond Basin is approximately 40 square miles and supplies drinking water to the City of Pasadena and surrounding communities. Although there are great seasonal fluctuations, the average ground water levels under HWP are between 600 and 1000 ft. (Arroyo Seco Master Plan, Hahamongna Watershed Park Master Plan).

The Master Plan proposes the addition of two new athletic fields on the west side of the stream, as well as improvements to the existing athletic field (Oak Grove field). These fields will primarily be used for youth soccer and youth softball. The two proposed new fields on the west side of the park will be known as the Sycamore Grove fields. A portion of this site is currently used for temporary overflow parking and is adjacent to the existing parking for Oak Grove Park. The existing Oak Grove athletic field accommodates youth tournament soccer and little league softball. The two new Sycamore

Grove Fields will also accommodate youth tournament soccer and serve as multi-purpose fields.

Due to the biological diversity and native habitats adjacent to the proposed and existing athletic fields, and their proximity to groundwater aquifers and surface water flows, there has been public concern regarding the effects of fertilizers, herbicides and pesticides used in the maintenance of these fields on the environment. The purpose of this report is to investigate and recommend maintenance and management practices to sustain these fields in suitable condition for youth sports, while preserving the quality and biodiversity of the surrounding environment.

### **Turf management**

The most important element to minimize adverse effects to the environment is to apply proper horticultural practices to establish and maintain healthy turfgrass. Choosing the appropriate cultural practices, such as proper turf for the site and use, proper fertilization, aeration, irrigation and mowing practices will reduce or eliminate the need for chemical treatment of the turf. Well-maintained healthy turf with dense root systems can suppress the growth of weeds and the potential for disease, thus eliminating the need for pesticides. Although there is an obligation to maintain the best possible quality playing field, a few weeds or the mere presence of insects may not justify the use of chemical treatments. The turf manager needs to determine how much turf damage is acceptable before any treatment is needed.

In order to maintain a healthy turfgrass system the following cultural practices should be followed:

*Conduct a complete soil analysis to determine exact nutrient needs.* Healthy turf must have healthy soil. Determine nutrient and pH levels. Apply only nutrients that are necessary at times when they can be used most efficiently by the roots.

*Use slow-release organic fertilizer.* Studies have shown that regular applications of compost based organic fertilizers have been proven to significantly suppress the growth of most common turf weeds<sup>1</sup>. Nutrients released slowly into the soil maintain a more consistent level. Apply less fertilizer more often to maintain a more consistent level and reduce the potential for leaching and runoff by allowing the turf to utilize the nutrients. Organic fertilizer adds organic matter to the soil that is utilized by the soil microorganisms.

*Mowing.* There is a direct relationship between mowing height and the depth of the root system. Removal of more than 40% of the height of the blade in a single mowing stops root growth.<sup>2</sup> The larger percentage of the blade is removed, the longer the root

---

<sup>1</sup> Bio-Integral Resource Center (BIRC) IOM for Turfgrass in Schools [www.keyed.com/birc/ipmturf](http://www.keyed.com/birc/ipmturf)

<sup>2</sup> Cockerham, S. T. "Mowing Sports Fields" Feb. 2002



growth is halted, allowing the turfgrass to be more susceptible to disease and insect problems and the encroachment of weeds. Mow more often, cutting less. Mowing heights should be higher in warmer months. Higher blade heights shade the soil, conserve moisture and inhibit the development of weeds. Studies have shown that the minimum height for hybrid bermudagrass to survive in a high- traffic area, such as a sports field, is ½”.<sup>3</sup>

*Leave clippings on the ground.* Turf clippings are 85-90% water. As clippings decompose, nitrogen and other nutrients are returned to the soil, contributing to the organic matter. Shorter grass clippings will decompose faster. Leaving grass clippings can reduce the need for fertilizer by 1-3 applications per year. If mowed regularly at the proper height, there will be no build-up of thatch.

*Aeration* – compacted soil creates conditions for limited root development and increases the turf’s susceptibility to certain diseases. Athletic fields can become extremely compacted. To prevent this, fields should be aerated several times a year. This increases the ability of water to penetrate the soil, provides oxygen to microorganisms, and pushes the thatch layer into the soil, increasing the rate of decomposition and the organic matter in the soil. After aeration, a compost based organic amendment should be applied to further increase the amount of organic matter and provide nutrients to the soil. Composted organic amendments have been found to be among the most consistently effective in reducing the severity of turfgrass diseases, whether applied as a topdressing, or root zone amendment.<sup>4</sup>

*Control thatch layer.* Thatch is the accumulation of undecomposed roots and stems at the soil surface. If allowed to become too thick, this can prevent water and nutrients from entering the soil. All hybrid bermudagrass cultivars form thatch. Aeration pushes thatch into the soil, allowing for increased decomposition and increasing organic matter to the soil. Frequent mowing prevents build-up of thatch to unacceptable levels. The use of organic fertilizers also promotes thatch decomposition.

*Irrigation* - Proper irrigation and water management practices are crucial to healthy turf and will reduce the potential for leaching and runoff. Soil moisture levels should be tested and water should be applied only to replace water lost through evapotranspiration. Irrigation applications need to be adjusted according to weather and soil conditions.

## **Use of Fertilizers**

The primary concern regarding the use of fertilizers is the movement of nitrogen into ground water and surface runoff. In the past several years, numerous studies have been conducted at universities throughout the country regarding the effects of nitrogen and

---

<sup>3</sup> ibid

<sup>4</sup> Nelson, Eric B. “Enhancing turfgrass disease control with organic amendments” Turfgrass Trends, June 1996

nitrate on the environment. In 1991, the United States Golf Association (USGA) initiated a three-year study at various locations throughout the country to investigate the impact of golf courses on people and wildlife. This resulted in studies conducted by research scientists at 11 separate universities involving the fate of fertilizers and pesticides. Five of these studies, conducted at Iowa State University, Michigan State University, University of Nevada, Cornell University, University of California Riverside and Washington State University, specifically analyzed nitrogen leaching.<sup>5</sup> The results of these projects were published in the January/February 1995 *USGA Green Section Record*. In addition, independent studies (not part of this USGA project) have been conducted throughout the country, including the University of California, Riverside, involving nitrogen leaching.

All studies were conducted with test plots using various combinations of turf, soil types, fertilizers, and irrigation rates. The fertilizer application and irrigation rates ranged from standard rates to excessive rates in order to promote leaching. Both fast and slow-release fertilizers were tested on a variety of turf, including Kentucky bluegrass, tall fescue, and bermudagrass.

The results of all these studies came to an overwhelmingly consistent conclusion: *In mature, healthy, well-managed turf, nitrogen levels in leachate are insignificant.* The plants and associated soil microorganisms efficiently utilize nitrogen applied to healthy turf with a dense root system. Once established, healthy turf has such a fibrous root system that it filters the nitrogen and there is almost no movement beyond the roots. At the deepest level tested, four feet below the surface, less than .2% of the applied nitrogen was found in the leachate.<sup>6</sup> In one study, the turf (bermudagrass) was so efficient at utilizing the nitrogen that the nitrogen levels in the leachate were less than in the irrigation water applied<sup>7</sup>. The highest levels of nitrogen found in leachate were below the federal drinking water standards in all studies. There were, however, some variations found with differences in cultural and management practices. The least amount of nitrogen leaching resulted from the use of slow-release, natural organic fertilizers. An established turfgrass ecosystem supports a high level of biological activity that consumes nitrogen to support the growth of the microorganisms. In new turf that has not yet established a sufficient root system, the addition of organic matter significantly reduced nitrogen leaching<sup>8</sup>. Studies also indicate that more leaching occurred in newly planted

---

<sup>5</sup> USGA Green Section Record, Results from the USGA Environmental Research Program, United States Golf Association, January/February 1995

<sup>6</sup> Branham, Bruce, and Miltner, Eric and Rieke, Paul "Potential Groundwater Contamination from Pesticides and Fertilizers Used on Golf Courses", Michigan State University 1995

<sup>7</sup> Green, Robert, "Soil Type Affects NO<sub>3</sub>-N Leaching on Overseeded Bermudagrass Fairways" *BetterTurf Thru Agronomics*, June 2000

<sup>8</sup> Brauen, Stanton and Gwen K. Stahnke "Leaching of Nitrate from Sand Putting Greens", Washington State University, Puyallup Research and Extension Center

turf than in established turf<sup>9</sup> and that more leaching occurred during the dormant season of warm season grasses<sup>10</sup>.

### **Recommendations:**

Overall, the key to minimizing the effects of nitrogen on the environment is establishing and maintaining a healthy turfgrass system. Several management practices can be followed that have proven to be effective in reducing the movement of nitrogen and establishing healthy turf:

- Use slow-release organic fertilizer.
- Use smaller amounts of fertilizer more frequently so that the turfgrass can efficiently consume each application. Brauen and Stahnke reported significant differences in nitrogen in the leachate by applying slow-release fertilizer every 14 days vs. every 28 days.<sup>11</sup> Keeping grass clippings on the turf reduces fertilizer needs.
- Use foliar applications of fertilizer.
- Establish and maintain a dense, healthy root system. Apply organic matter to new turf to promote the rapid development of the root system.
- Irrigate lightly and less frequently after application of fertilizer. Christians reported that one 2" irrigation application resulted in 40% higher nitrogen levels in leachate than four 1" applications.<sup>12</sup>
- Water only as necessary. Irrigate at 100% evapotranspiration
- Apply fertilizer at appropriate times. Application prior to heavy rain increases the movement of nitrogen through leaching and runoff.
- Use turfgrass cultivar with a shorter dormant period to eliminate the potential of leaching during dormancy and maintain a dense root system year round.

### **Pesticides (including herbicides and insecticides)**

Pesticides have been the cause of concern of many health and pollution problems in the last few decades. The United States Geological Survey has completed extensive monitoring programs through its National Water-Quality Assessment program over the last 20 years. Their findings concluded that pesticides are abundant in ground-water

---

<sup>9</sup> Petrovic, Martin "The Impact of Soil Type and Precipitation on Pesticide and Nutrient Leaching from Fairway Turf" Cornell University 1995

<sup>10</sup> Green, Robert *ibid*

<sup>11</sup> Branham, etal.

<sup>12</sup> Christians, N. and Shea, P.J. and Horst, G.L. "Pesticide Degradation Under Golf Course Fairway Conditions" 1995

throughout the country. In 99% of urban streams tested, pesticides were found. Over 70% of those had more than five different kinds of pesticides.

The leaching potential of pesticides in turfgrass depends upon several factors. The main factors are the properties of the pesticide itself, which include the ability of the pesticide to adsorb to the soil, water solubility, and persistence, or the time it takes for the pesticide to degrade. These factors, in turn, are dependent upon soil properties, irrigation practices, and the application and handling of pesticides.<sup>13</sup> The properties of the pesticide must be carefully matched with the soil properties and cultural practices to minimize the potential for leaching. Numerous university and independent research studies indicate that, like nitrogen, the effect of pesticides on the environment through leaching or runoff can be minimized through proper cultural practices. Under ideal turfgrass conditions, the dense, fibrous turfgrass root systems are capable of adsorbing and absorbing applied pesticides.<sup>14</sup> Applying pesticides to turfgrass is not like agricultural applications, where chemicals are often applied to bare soil, increasing the potential for groundwater leaching and surface runoff. Many turfgrass pesticides are formulated as systemic materials designed to be absorbed by the roots. It has been found that most turfgrass pesticides will rarely penetrate more than 1-1 ½” into the soil.

The negative environmental effects of pesticides, however, are not limited to groundwater leaching. There is a worldwide decline in amphibian populations and an increase in amphibian deformities that has baffled scientists for years. Recent research has linked these deformities in frogs to chemical contaminants, specifically pesticides. Because of their thin skin, frogs are more susceptible to absorption of chemicals through the skin. Research now shows that even where contaminant levels are below EPA drinking water standards, the effect on amphibians is significant. The exposure to pesticides weakens their immune system sufficiently so that they become susceptible to infections that lead to severe limb deformities.<sup>15</sup>

There is great diversity in the type of pesticides and their impact on health and the environment. Those products labeled “organic” or natural are not necessarily non-toxic, as there are many toxic natural materials. Because of these variations, and the inability to control all conditions in which pesticides are used, the U.S. Federal law prohibits products to be labeled “safe if used as directed” because absolute safety cannot be guaranteed.

There are alternative products available for the control of many pests. Cultural controls are the first priority. A change in irrigation, mowing or fertilization could eliminate the

---

<sup>13</sup> Gan, Jay “How to Reduce Pesticide Leaching” PesticideWise , Spring 2002, Department of Environmental Sciences of the University of California, Riverside

<sup>14</sup> Cooper, Richard J. “Evaluating the Runoff and Leaching Potential of Turfgrass Pesticides” Golf Course Management February 1990

<sup>15</sup> Kiesecker, Joseph M. “ Synergism between trematode infection and pesticide exposure: A link to amphibian limb deformities in nature?” Proceedings of the National Academy of Science, USA, Vol 99, Issue 15, July 2002

need for further treatment. If additional treatment is needed, biological controls should be considered. Biological control is the deliberate use of natural enemies to suppress and maintain populations of pest species.<sup>16</sup> The advantages of biological controls are that only the target species is affected; there are no residual contaminants to humans or the environment; pests cannot develop a resistance to it; and it is usually more cost effective than chemicals. In order to effectively use biological controls, the exact pest species must be known so that the appropriate, host specific natural enemy is applied. The effect of biological controls cannot, however, be predicted or controlled, and may not completely eliminate the target pest. There is also a risk that the introduction of an exotic species to the environment may have an impact on the natural enemies of a beneficial species. Careful study into the use of the appropriate biological controls for the target pest and its potential impact on other species must be examined before any new species is introduced.

Another biological control method is a product that has been developed by Dr. Nick Christians, Professor of Horticulture at Iowa State University, specializing in turfgrass science. Dr. Christians discovered a corn gluten meal that has the ability to inhibit root formation of broadleaf weeds at the time of germination. Corn gluten meal is a naturally occurring plant protein. It is effective as a pre-emergent by inhibiting the formation of root tissues during seed germination. The shoots develop, but then die back due to lack of roots. It has no effect on established plants and must be applied 4-6 weeks prior to germination. Because the corn gluten meal also contains 10% nitrogen, this product also serves as a slow-release organic fertilizer, reducing need for additional fertilizer applications. Research on turfgrass indicates a 50-60% decrease in broadleaf weeds the first year of use, and by the second and third years the corn gluten meal was as effective as synthetic herbicides.<sup>17</sup> It is being used on golf courses and sports fields throughout the country. There are no residual affects or contaminants involved and no known hazardous ingredients or conditions related to this product

### **Recommendations:**

Due to the proximity of the proposed fields to natural areas and sensitive wildlife habitats, the use of chemical pesticides is not recommended. Although the amount of pesticides leaching into the groundwater could be minimized through appropriate cultural practices, the potential risk of pesticides to wildlife in HWP still exists. Cultural controls, biological controls, and new non-toxic methods should be utilized to maintain the HWP athletic fields in appropriate playing condition.

*The Arroyo Seco Master Plan – Hahamongna Watershed Park Master Plan, Planting Guidelines* states: “Herbicides should never be used near aquatic and wetland areas under

---

<sup>16</sup> Aliniazee, M.T. “The Economic, Environmental and Sociopolicial Impact of Biological Control”  
*Biological Controls in the Western United States*

<sup>17</sup> Christians, Nick “Using biological control strategies for Turf” *Grounds Maintenance* 34(3):28-32 March 1999

any circumstances due to the sensitive nature of these habitats and the potential for further spreading of harmful chemicals through water-borne transport. Soil tilling, mechanical cutting, solarization, and spot herbicide treatments should all be considered”...“mechanical removal of weeds is preferred over the use of herbicides” Although this clause refers to the native vegetation restoration areas of HPW it should be extended to include all of HWP for the protection of all wildlife in the park.

### **Rodent control**

Irrigated areas, such as well-maintained turf, provide optimal conditions for both squirrels and gophers to burrow, feed, and reproduce. Their burrows pose a safety hazard for athletes as well as provide opportunities for the invasion of weeds and the potential for erosion. Squirrels are also the most prevalent sources of plague and are associated with the spread of several other diseases. Effective control measures are necessary for public health and safety.

Gophers live in burrows ranging from 6 inches to 6 feet below the ground and can cover an area of several hundred to over a thousand square feet. They do not hibernate and are active year-round. They may also be active at any hour of the day. As they dig their burrows, the soil is pushed to the surface, creating a mound of fresh soil around the opening of the burrow. Feed holes, however, where gophers come to the surface to eat the surrounding vegetation will not have a mound.

In irrigated areas, gopher burrow building can take place year-round, as the soil is always soft and moist. Breeding can also take place year-round, producing up to 3 litters per year, with 5-6 young per litter. Breeding and burrowing activity is higher in irrigated areas than in non-irrigated areas.<sup>18</sup> Gophers feed on a wide variety of vegetation, but prefer herbaceous plants. They feed on stems and leaves above ground, as well as roots below ground. They can pull an entire plant into their tunnel.

California ground squirrels are a native species that can be found in valley and foothill environments, but prefer disturbed areas adjacent to natural areas such as occur at Hahamongna Watershed Park. In fact, due to the creation of optimum soil conditions and abundance of food and water, in disturbed and altered environments squirrel populations can be many times more than they would be in a natural environment.<sup>19</sup> Like gophers, ground squirrels also excavate extensive burrows, creating a safety hazard on playing fields. They feed on seeds, vegetation and are known to prey on eggs of ground nesting birds. They hibernate in the winter, are most active in spring and fall and can produce a litter of 4-13 in the spring.

---

<sup>18</sup>University of California Statewide Integrated Pest Management Program, UC Pest Management Guidelines, Pocket Gophers, published 1/02 [www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7433.html](http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7433.html)

<sup>19</sup> LA County Department of Agricultural Commissioner and Weights and Measures, Ground Squirrel Control

The most serious problem with ground squirrels is that they are the most prevalent animal carriers of plague. Plague is a highly infectious bacterial disease which primarily affects rodents. However, it can be transmitted from rodents to pets and humans through fleas. In humans, if detected early, antibiotics can successfully treat it. If not treated, it can lead to plague pneumonia, which is highly contagious and can be fatal.

The City of Pasadena Environmental Health Department inspects and tests for plague annually. LA County Vector Management inspects and tests for plague in the areas outside the city limits adjacent to Hahamongna, including Altadena and the Angeles National Forest. In the year 2000, coyotes have tested positive at Switzers campground, north of Hahamongna.<sup>20</sup> Developed areas adjacent to known infected natural areas are highly susceptible to the spread of the disease through animal movement. Although to date there have been no positive reported cases within the city.<sup>21</sup>

**Recommendation:**

Due to the potential for serious health and safety problems, squirrels and gophers on the proposed Hahamongna fields should be controlled as soon as they appear. Since irrigated turf areas provide optimal conditions for the breeding of squirrels and gophers, allowing them to remain and reproduce will only amplify the problem. Immediate eradication will result in fewer animals to be eliminated in the long run, maintain safe playing fields, and provide proper public health policies.

**Gopher control:**

Elimination of broadleaf vegetation from the turf and immediately adjacent areas will minimize the presence of gophers. Turfgrasses alone do not provide enough of a food source to raise their young<sup>22</sup>, so they will seek a location with a more ample food supply. Keeping the turf healthy and free of weeds, using cultural practices previously outlined in this report, should significantly limit gopher activity.

Encouraging natural predators to the area can also limit gopher activity, but it will not completely eliminate their presence. Although many natural predators of the gopher can be found in Hahamongna, including snakes and coyotes, these predators hunt for other prey as well, and will go where the food sources are abundant and easily obtained. Gophers can avoid capture by these predators by plugging up their burrow with dirt. There is also a public safety concern in encouraging predators to use areas of heavy human activity, such as youth sports fields, where there are expected to be large numbers of families with children and pets.

---

<sup>20</sup> Rood, Michael Environmental Health Specialist, Vector Management, LA County Health Dept. personal communication 9/23/02

<sup>21</sup> Mel Lim, City of Pasadena Environmental Health, personal communication 9/23/02

<sup>22</sup> University of California Statewide Integrated Pest Management Program, Pest Management Guidelines Pocket Gophers, Jan 2002 [www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7433.html](http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7433.html)

Attracting barn owls, another natural predator of gophers, has been used with limited success in agricultural areas to reduce rodents. Barn owls are cavity nesters, and placing nesting boxes in the area has been proven to be successful in attracting them to areas where there is abundant food. The more nesting boxes placed, the greater the likelihood that they will be used. In one study in which 10 nesting boxes were installed 100 feet apart, all boxes were used by the second year.<sup>23</sup> Mature barn owls can eat 10 rodents per night, and the grassy fields and natural areas of Hahamongna provide appropriate habitat for their prey. However, since they are not territorial, they hunt over large areas where food is available, and the placement of nesting boxes will not ensure they stay in the area. Barn owls and other natural predators may reduce, but not eliminate, the number of gophers on the proposed Hahamongna fields. Although they have not proven to be a reliable source of rodent control, the placement of nesting boxes would increase the potential for barn owls to reduce the gopher population.

Natural predators do not eliminate every animal, and a single gopher can cause extensive damage to a field and present a public safety hazard. A safe, effective, and reliable method of gopher control is trapping. The key to successful trapping is setting traps in the proper locations. Bait boxes are not effective and should not be used when attempting to control gophers. Proper trapping methods, types of traps, and proper placement can be obtained from the City's Pest Control Advisor, UC Pest Management Guidelines or the Los Angeles County Department of Agricultural Commissioner's office.

#### Squirrel control:

The least toxic method of reducing squirrel populations is by cultural practices. Squirrels are scavengers, and will find food where it is most easily obtained, which is often the area of high human activity, including picnic areas and athletic fields. Diligent litter control practices, providing covered trash containers at convenient locations, and keeping the area free of dense vegetation cover will reduce squirrel populations in these areas.

If squirrels become a problem, the options available for control are difficult to access, as each poses potential threat to other wildlife. The two methods available are the use of anticoagulant bait boxes and fumigants. Anticoagulant bait can be set in bait boxes, which the squirrel must enter to reach the bait. This option is considered safe for home use as children, pets and larger animals cannot get into the box, and there is a readily available and effective antidote. The squirrel needs to consume the bait for several feedings over a 4-5 day period. It may take 2-4 weeks for the anticoagulant to become effective in reducing the squirrel population. The box is placed in a location frequented by squirrels, such as near the entrance to the burrow, but needs to be hidden from public view and access. It should not be placed in the burrow. Smaller animals such as rabbits, snakes, mice and birds might also enter the bait box and be affected by the bait.

---

<sup>23</sup> Trapp, Douglas E. "International Barn Owl Restoration Project", 1996  
[ourworld.compuserve.com/homepages/DTrapp/barnowli.htm](http://ourworld.compuserve.com/homepages/DTrapp/barnowli.htm)



The other alternative to squirrel control is the use of a fumigant, aluminum phosphide, which can only be applied by a licensed pest control applicator. It is injected in table form directly into active burrows. The moisture in the soil mixes with the aluminum phosphide and produces a toxic gas, hydrogen phosphide. The gas quickly dissipates, leaving no toxic substances in the atmosphere or the soil. This method is more direct, effective, and reliable for the immediate reduction of squirrel populations. However, it is also highly toxic to wildlife. Many other animals often occupy squirrel burrows, and non-target species in the burrow would be affected.

The use of either of these controls must be carefully considered, as each may be an appropriate squirrel control method depending upon the severity of the problem and urgency to reduce the squirrel population.

## **Conclusion**

New products and technology are being tested and created to improve and ease the maintenance and management of turfgrass. Improved irrigation systems, new turfgrass cultivars, and new and creative application of fertilizers are constantly being developed. In order to provide the healthiest and most economical turfgrass system, the city needs to keep pace with these new products and ideas.

The City of Pasadena is currently in the process of installing a state-of-the-art water management system in its parks. This system measures evapotranspiration rates through remote sensors placed at key locations throughout the city, including Brookside Park and Oak Grove field at Hahamongna. These sensors can transmit evapotranspiration rates and/or soil moisture rates to a centralized computer system at the City's park maintenance yards. The computer automatically calculates evapotranspiration rates, and only the amount of water lost is applied to each location. The application rates automatically adjust to changes in soil and weather conditions. This system prevents over-watering and runoff. In addition, a flow sensor detects breaks in the system so that water flow can be turned off automatically to prevent runoff and erosion. This system will significantly increase the ability to apply proper turf management practices and minimize potential leaching and runoff of nutrients.

The University of California, Riverside, is currently conducting studies using green waste compost as a turf soil amendment. As mentioned in the cultural practices guidelines, compost based organic amendments are extremely effective in maintaining healthy turfgrass. The study used bermudagrass in a sandy loam soil and simulated heavy traffic, as would be found on a sports field, conditions similar to those at the proposed Hahamongna fields. Although only in the second year of this three-year study, the results so far indicate that with increased use of the green waste compost, there is an increase in water infiltration, softer surface of the turf, and increased organic matter. Increased traffic, however, reduced each of these conditions. As this study concludes in May 2003, this should be explored further. The use of green waste as an organic amendment on

sports fields would not only improve the quality of the field, but also assist the city in complying with AB939, the requirement to reduce the amount of waste going to landfills.

New cultivars are constantly being developed. The greatest risk of leaching and damage to the turfgrass system is during dormancy, which may also be the greatest demand for use. A cultivar with a shorter dormancy period would enable more available playing time and keep the turf healthy year-round. Even with new cultivars, however, scheduling down time to maintain the fields is vital. Providing time without heavy traffic for aeration and fertilization will keep the fields healthy and in better playing condition in the long run. These times should be scheduled with the user groups well in advance to avoid conflicts.

The research presented in this report indicates that the key to maintaining fields with minimal effect on the environment is diligent management with proper cultural practices. Maintaining a healthy turfgrass system on heavily used areas such as youth sports fields is not easily accomplished. Proper cultural practices will reduce the need for treatments that would be harmful to the environment. It is recognized that many of the studies cited in this report were conducted on golf-course quality turf under constant supervision and maintenance. Sports fields in a city park rarely have the luxury of such treatment. With appropriate management, however, it is possible to obtain high quality fields and protect the surrounding environment. In order to obtain this level of maintenance, an experienced turf manager, knowledgeable in sports turf best management practices and the use of non-toxic methods should be assigned to the management of these fields. This, of course, requires appropriate funding. In a recent University of California, Riverside survey of 305 turf managers, 58% stated that applying best management practices to sports fields was not difficult, but they were restricted by financial limitations. In the long run, however, the money spent on proper management practices will be offset by the reduction of fertilizers, pesticides, and reseeding, and increased public health and safety, as well as protection of the surrounding environment.

A long-term integrated park management plan should be established for HWP. Sports fields amidst natural areas present a unique management challenge. Typically, areas managed as natural areas, such as the U.S. Forest Service area and Los Angeles County Natural Area Parks, do not allow the use of chemical pesticides or toxic materials within their boundaries. These places, however, do not have sports fields. Based on the information presented here, it is possible to establish a non-toxic policy and still maintain sports fields. An integrated park management plan that specifically outlines management practices and policies should be developed for all of Hahamongna Watershed Park. This plan will help to ensure that best management practices are utilized in maintaining sports fields within the environment they are placed in and with consideration of all other factors and uses of Hahamongna Watershed Park.

## REFERENCES

Aliniazee, M.T. “The Economic, Environmental and Sociopolicial Impact of Biological Control” *Biological Controls in the Western United States*

Bio-Integral Resource Center (BIRC) IPM for Turfgrass in Schools  
[www.keyed.com/birc/ipmturf](http://www.keyed.com/birc/ipmturf)

Branham, Bruce, and Miltner, Eric and Rieke, Paul “Potential Groundwater Contamination from Pesticides and Fertilizers Used on Golf Courses”, Michigan State University 1995

Brauen, Stanton and Gwen K. Stahnke “Leaching of Nitrate from Sand Putting Greens”, Washington State University, Puyallup Research and Extension Center

Christians, Nick, Corn Gluten Meal Research Site [www.gluten.iastate.edu/home](http://www.gluten.iastate.edu/home)

Christians, Nick “Using biological control strategies for Turf” *Grounds Maintenance* 34(3): 28-32 March 1999

Christians, N. and Shea, P.J. and Horst, G.L. “Pesticide Degradation Under Golf Course Fairway Conditions” 1995

City of Pasadena, Arroyo Seco Master Plan, Hahamongna Watershed Park Master Plan, May 2002

City of Pasadena, Arroyo Seco Master Plan Environmental Impact Review, May 2002

Cockerham, S. T. “Mowing Sports Fields” University of California, Riverside Feb. 2002

Cooper, Richard J. “Evaluating the Runoff and Leaching Potential of Turfgrass Pesticides” *Golf Course Management* February 1990

Diegelman, Nathan “Poison in the Grass: The Hazards and Consequences of Lawn Pesticides” [www.eisc.ca/poison\\_in\\_the\\_grass](http://www.eisc.ca/poison_in_the_grass)

Deubert, Karl “Environmental Fate of Common Turf Pesticides, Factors Leading to Leaching” *USGA Green Section Record* July/August 1990

Gan, Jay, Assistant Professor, Water Quality Specialist, Department of Environmental Sciences, University of California, Riverside, personal communication 8/14/02

Gan, Jay “Understanding Pesticide Risks in Different Landscape Systems, Pesticides in the Urban Environment” [www.pw.ucr.edu.LandscapesJayGan-files](http://www.pw.ucr.edu/LandscapesJayGan-files)

Gan, Jay “Understanding Pesticide Risks in Different Landscape Systems, Pesticides in Groundwater” [www.pw.ucr.edu/leaching-lahontan-files](http://www.pw.ucr.edu/leaching-lahontan-files)

Gan, Jay “How to Reduce Pesticide Leaching” *PesticideWise*, Spring 2002, Department of Environmental Sciences of the University of California, Riverside

Gan, Jay “Pesticide and Groundwater Quality” *PesticideWise*, Winter 2002  
[www.pw.ucr.edu.textfiles/PesticideWiseWinter2002](http://www.pw.ucr.edu.textfiles/PesticideWiseWinter2002)

Gilliom, Robert J. “Pesticides in the hydrologic system, what do we know and what’s next?” *Hydrological Processes* 2001

Gibeault, Victor, Extension Environmental Horticulturist, University of California, Riverside, personal communication

Gibeault, Victor “Turfgrass Selection and Culture” University of California, Riverside

Gibeault, Victor; Marylynn Yates; Jewell Meyer; Mathew Leonard “Movement of Nitrogen Fertilizer in a Turfgrass System” *California Turfgrass Culture* vol 48, nos.1 &2, 1998

Green, Robert Department of Botany and Plant Sciences, University of California, Riverside, personal communication 7/15/02

Green, Robert, “Soil Type Affects NO<sub>3</sub>-N Leaching on Overseeded Bermudagrass Fairways” *BetterTurf Thru Agronomics*, June 2000

Hariyandi, Ali “Thatch, The Turf Manager’s Hidden Enemy”, *California Turfgrass Culture* vol 34, no.1, 1984

Hartman, Jim, LA County Dept. of Agricultural Commissioner and Weights and Measures, personal communication 8/27/02

Huddelston, J.H. “How soil properties affect groundwater vulnerability to pesticide contamination” Oregon State University Extension Service 1996

Kiesecker, Joseph M. “ Synergism between trematode infection and pesticide exposure: A link to amphibian limb deformities in nature?” *Proceedings of the National Academy of Science, USA*, Vol 99, Issue 15, July 2002

Klein, Grant J and Robert Green, “A Survey of Professional Turfgrass Managers in Southern California Concerning Their Use of Turfgrass Best Management Practices” University of California, Riverside, 1999

Lim, Mel, City of Pasadena Environmental Health, personal communication 9/23/02

Lind, Pollyanna “Preparing a Landscape Site without Chemicals” *Journal of Pesticide Reform* vol 19, no.4 1999

Lloyd, John; Daniel Herms; Benjamin Stinner; Harry Hoitink; “Organic Mulches Enhance Overall Plant Growth” *Turfgrass Trends*, April 1, 2002

Long, Mickey, Acting Administrator, LA County Natural Area Parks, personal communication, 7/15,02, 10/10/03

Los Angeles County, Environmental Health Vector Management Program “Facts About Plague in Los Angeles County”

Los Angeles County, Department of Agricultural Commissioner and Weights and Measures “Ground Squirrel Control”

McDade, Meliisa “Corn gluten meal and corn gluten hydrolysate for weed control” Masters thesis, Iowa State University, 1999

Monroe, Michael, City of Pasadena Parks Supervisor, Parks and Natural Resources personal communication, 9/17/02

Nelson, Eric B. “Enhancing turfgrass disease control with organic amendments” *Turfgrass Trends*, June 1996

Petrovic, Martin “The Impact of Soil Type and Precipitation on Pesticide and Nutrient Leaching from Fairway Turf” Cornell University 1995

Ransom, Viveka, “Corn Gluten Meal, byproduct to wonder Product” *The Iowa Horticulturist*

Rao, R.S. Mansell; L.B. Baldwin, M.F.Laurent, “Pesticides and Their Behavior in Soil and Water” *Florida Turf Digest*, vol2, no12, Dec. 1985

Rood, Michael Environmental Health Specialist, Vector Management, LA County Health Dept. personal communication 9/23/02

Trapp, Douglas E. “International Barn Owl Restoration Project”, 1996  
[www.ourworld.compuserve.com/homepages/DTrapp/barnowli.htm](http://www.ourworld.compuserve.com/homepages/DTrapp/barnowli.htm)

University of California Statewide Integrated Pest Management Program, *UC Pest Management Guidelines, Pocket Gophers*, published 1/02  
[www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7433.html](http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7433.html)

University of California, Division of Agriculture and Natural Resources, *UC Pest Management Guidelines, Turfgrass*, publication 3365T. July 2000

University of California, Division of Agriculture and Natural Resources *Biological Controls in the Western United States, Accomplishments and Benefits of Regional Research Project W-84 1964-1989*, publication 3361

University of California, Cooperative Extension, Division of Agriculture and Natural Resources, "Selecting the Best Turfgrass" leaflet 2589

USGA Green Section Record, Results from the USGA Environmental Research Program, United States Golf Association, January/February 1995

Weeden, C.R., A.M. Shelton, Y Li, M.P. Hoffmann, editors, "Biological Control, A Guide to Natural Enemies in North America", Cornell University April 2002

Young, Steve L. "Alternative Methods for Controlling and Maintaining Vegetation Along Roadsides: Annual Summary Report for Corn Gluten Meal, Year 1" UC Hopland Research and Extension Center

Zingiro, Ralph, Bio-Scape, Inc. personal communication 8/27/02