# APPENDIX G: TECHNICAL REPORT-WATER QUALITY

Arroyo Seco Watershed Restoration Feasibility Study

# Technical Report:
# **Water Quality**

Prepared by:

Mountains Recreation & Conservation Authority

# Arroyo Seco Watershed
# Water Quality

## Introduction

As described in the project's goals and objectives, Goal 4 includes: Improve Water Quality. To meet this goal, four objectives were proposed:

| | |
|---|---|
| Objective 2.2: | Improve quality of surface water for aquatic habitat and safe for human contact |
| Objective 2.4: | Control erosion |
| Objective 2.5: | Increase ground water percolation |
| Objective 2.7: | Restore the quality and quantity of water recharge to the Raymond Basin Aquifer |

To study ways to meet these objectives, the technical study for water quality studied data regarding water quality and its regulation and monitoring.

The water quality of the Arroyo Seco Watershed is directly impacted from the surrounding land use. With nearly half of the watershed (22.3 sq mi. – 48%) in the Angeles National Forest, the upper watershed tends to be free of human-generated pollutants, but with steep slopes and natural cycles of fire, drought, and flooding, the upper watershed can generate fine suspended solids to major debris flows. Moving south in the watershed, horse corrals and golf courses may contribute nutrients (nitrogen, phosphate, ammonia) from manure and fertilizers. In the lower watershed, water quality is affected by urbanization and industrialization. Runoff from roads, industry, and residences can load the system with trash and a mixture of petrochemicals.

Figure F-1 details information about the existing water resources of the Arroyo Seco. Mapped are annual precipitation, exposed streams, storm drains, dams, and the three flood zones identified in the Hydrology study. Figure F-2 shows the groundwater basins of Los Angeles, with the Arroyo Seco watershed near the center. The upper portions of the watershed lie within the Raymond Basin, while the lower portion lies within the Central Basin. Directly west is the edge of the San Fernando Basin.

## Regulatory Environment

The California Water Resources Control Board (State Board) sets statewide policies and develops regulations for the implementation of water quality control programs mandated by state and federal water quality statutes and regulations. The agency charged with protection of water quality in the region, including the Arroyo Seco Watershed, is the California Regional Water Quality Control Board, Los Angeles Region, hereinafter referred to as the Regional Board. Regional Boards develop and implement Water Quality Control Plans (*Basin Plans*) that consider regional beneficial uses, water quality characteristics, and water quality problems (*Basin Plan* 1994).

An important distinction to make is that the Regional Board is responsible for water *quality*, not water quantity. Water quantity and delivery are the responsibility of other agencies including the California Department of Resources, the Metropolitan Water District, Los Angeles Department of Water & Power, and Pasadena Water & Power.

## Current Conditions

Drinking water standards are regulated by the Safe Drinking Water Act (SDWA) of 1996 (Note: Surface water standards are described in the following section). Initially passed in 1974, the SDWA names the EPA as the regulatory body to set national standards for drinking water quality. Together with the EPA, states and water purveyors are responsible for meeting the standards. After identifying contaminants that may adversely affect public health, the EPA sets two kinds of standards: Maximum Contaminant Level Goal (MCLG) and Maximum Contaminant Level (MCL).

### Los Angeles Department of Water & Power

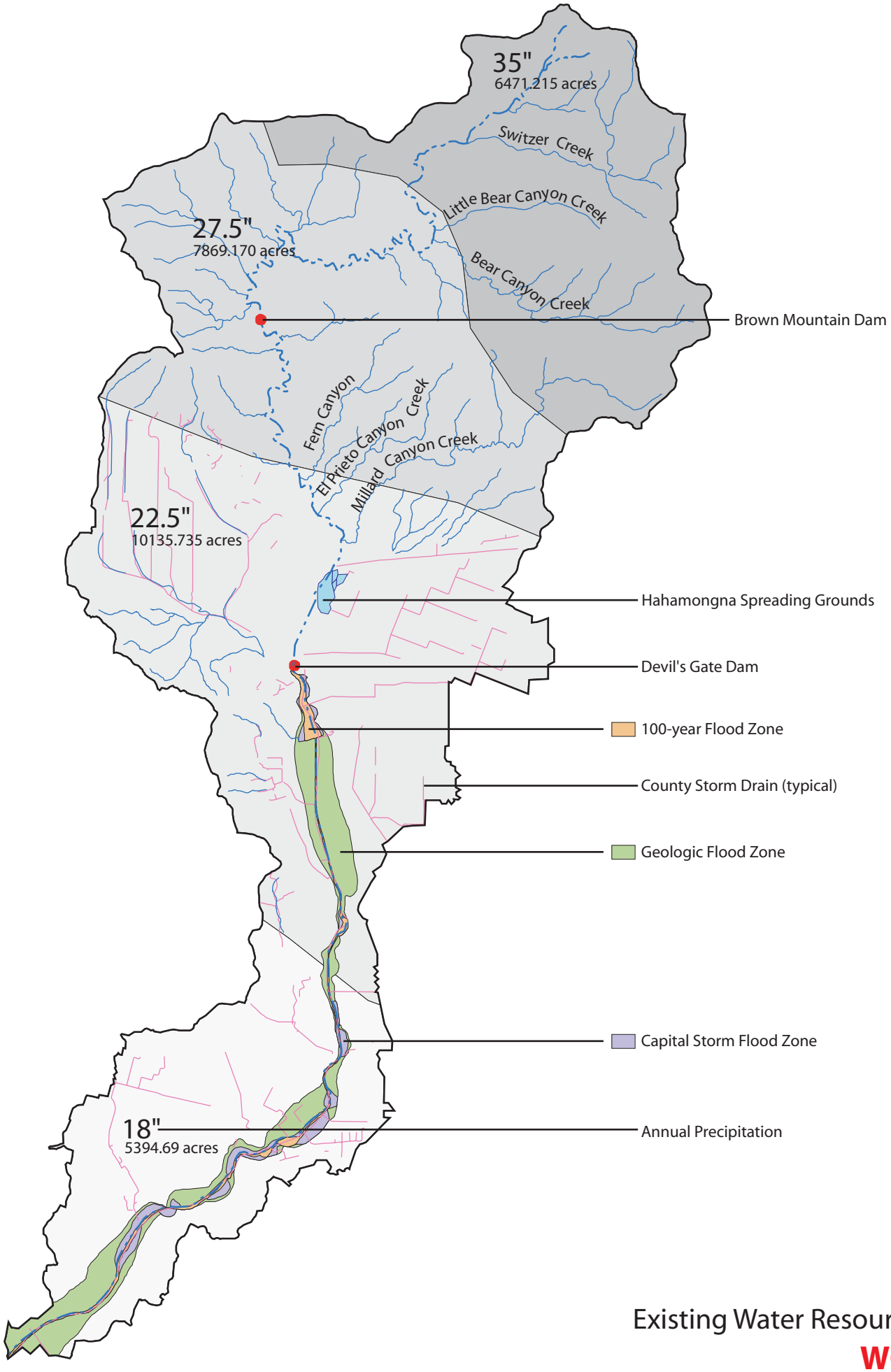
The Los Angeles Department of Water & Power's *1999 Annual Water Quality Report, Central and Eastern Los Angeles*, lists constituents found in the drinking water supply. The Central and Eastern areas include the following communities in the Arroyo Seco Watershed: Eagle Rock, Glassell Park, Highland Park, Lincoln Heights, Los Angeles, Monterey Hills, Mount Washington, parts of South Pasadena. The sources of drinking water tested include the Upper and Lower Hollywood Reservoirs, MWD Weymouth Plant, and River Supply Conduit. Three categories of constituents were reported: Primary Constituents, Secondary Constituents, and Unregulated Constituents. These constituents are measured after raw water has been treated to become drinking water supply.

All of the detected Primary Constituents were measured below the state and federal MCL (Maximum Contaminant Level). Detected Constituents are compared to another set of standards, the MCLG (Maximum Contaminant Level Goal) and/or the PHG (Public Health Goal). These standards establish a level of a contaminant below which there is no known or expected risk to health. The following Primary Constituents were detected at levels that exceed the PHG/MCLG : Trichloroethene (TCE), Coliform Bacteria, Total Trihalomethanes (TTHM), Lead (at-the-tap), and Copper (at-the-tap).

All of the detected Secondary Constituents were measured below the state and federal MCL. These include chloride, color, conductivity, corrosivity, pH, sulfate, total dissolved solids and turbidity. No PHG or MCLG is given for Secondary Constituents. Detection levels of Unregulated Constituents are reported, but no MCL, MCLG, or PHG is established.

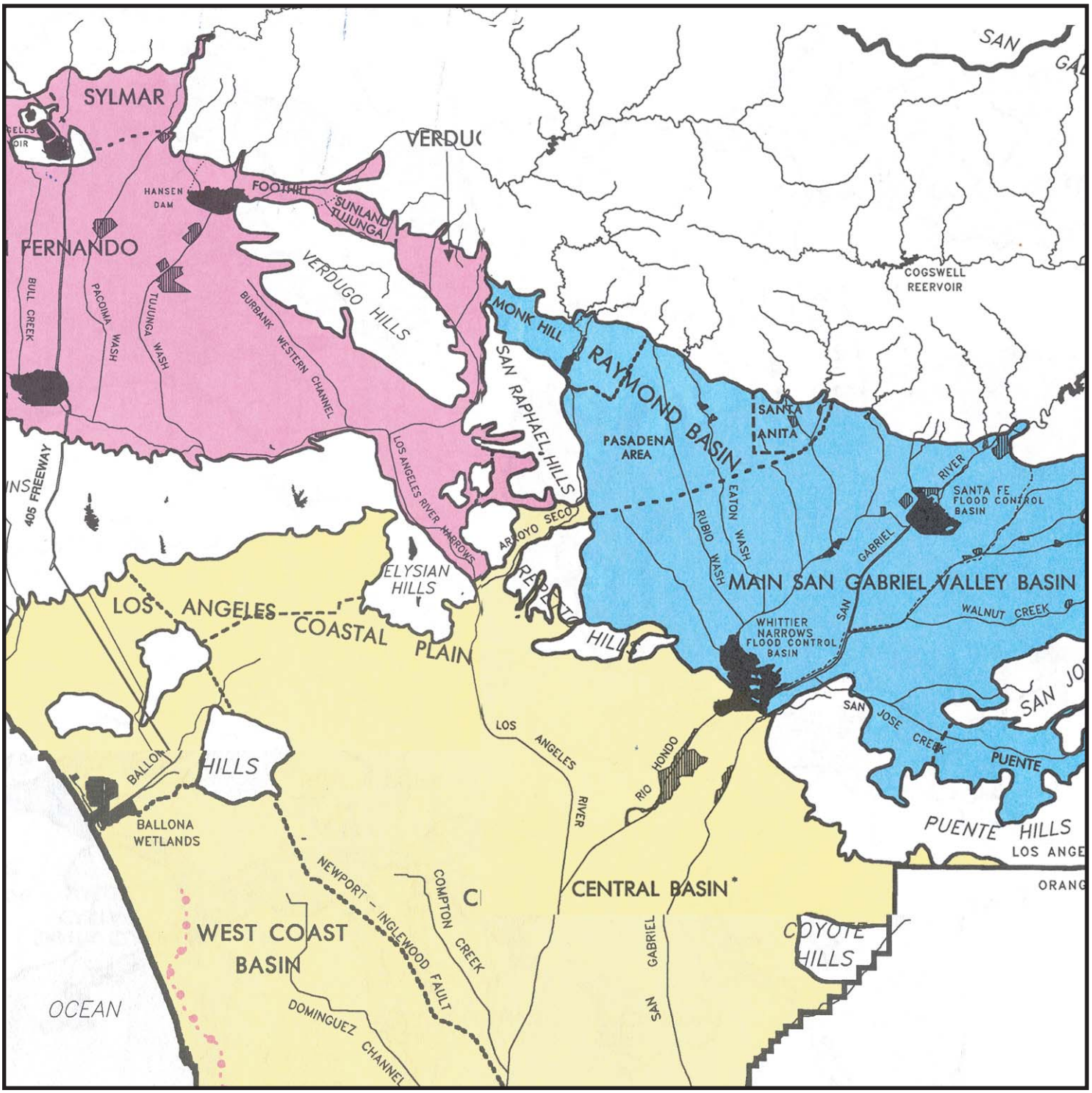
### Pasadena Water & Power

The City of Pasadena's Water & Power Department's *Annual Drinking Water Quality Report, June 2001*, lists constituents found in the City of Pasadena Groundwater and the Metropolitan Water District (MWD) Treated Surface Water. The water is supplied from two sources – Raymond Basin groundwater (38%) and MWD (62%). Three categories of constituents were reported: Primary Constituents, Secondary Constituents, and Unregulated Constituents.




Existing Water Resources

**WQ2**




Groundwater Basins of Los Angeles

adapted from the California Regional Water Quality Control Board

**note: north is skewed**

**WQ3**

For the City of Pasadena Groundwater, all detected Primary Constituents were measured below the MCL. Fluoride, Coliform, and Copper (at-the-tap) were measured at levels above the PHG. Lead (at-the-tap) was detected at a level exceeding the Action Level at 1 out of 56 samples. The Action Level is the concentration of a contaminant that, if exceeded, triggers treatment. All detected Secondary Constituents were measured below the MCL. No PHG or MCLG is given for Secondary Constituents. Detection levels of Unregulated Constituents are reported, but no MCL, MCLG, or PHG is established.

For the MWD Treated Surface Water, all detected Primary Constituents were measured below the MCL and PHG. Detected Secondary Constituents were measured below the MCL. No PHG is given for Secondary Constituents. Detection levels of Unregulated Constituents are reported, but no MCL, MCLG, or PHG is established.

**Arroyo Seco Watershed Sanitary Survey**

The *Arroyo Seco Watershed Sanitary Survey (ASWSS)*, published in 1996 by the City of Pasadena Water & Power Department, describes the potential contaminant sources in the watershed. The report focuses on the domestic water supply of Pasadena, so the watershed boundaries extend south only as far as Devil's Gate Dam.

The *ASWSS* denotes the status of twenty-one types of potential water pollution sources, with a somewhat detailed description of the occurrence of each type in the watershed. The report identifies that fires, concentrated animal facilities, unauthorized activities, and recreational use pose the most danger to water quality. Others that occur but were not seen as a serious threat include waste water discharge, urban and industrial runoff, pesticide/herbicide use, wild animals and geologic hazards. The report does not predict any likely change in the level of contaminants in the water supply.

The risk from fires comes from the resulting loss of vegetative cover and increase in erosion. Sediments after a fire will include ash as well as topsoil. The Angeles National Forest contains large areas of dense vegetation, trees and chaparral which has not burned in many years, making this area susceptible to fire.

The risk from concentrated animal facilities comes from the location of a single horse boarding facility in the watershed. At the time of the survey, the animal waste was retained on site, on land that drains directly into nearby El Prieto Creek.

Unauthorized activities pose many different kinds of threats to water quality in the Arroyo Seco Watershed. These activities include illegal dumping, illegal bodily contact with water, and vehicle abandonment. Materials that are commonly dumped in the watershed include yard waste, construction materials, paint and oil, most often along Highway 2. Illegal bodily contact is common in the recreational areas of the National Forest. Visitors use the Arroyo Seco and its tributaries for bathing, wading, swimming, fishing, and as a toilet facility. The *ASWSS* notes that some of the camping and picnicking areas lack restrooms, which contributes to the illegal uses of the water. Abandoned vehicles may contribute to water quality contamination due to leaks of oil, gasoline, or other fluids, and from ongoing rust and oxidation.

Recreational use can adversely affect water quality in several ways, and the popularity of the Angeles National Forest and its streamside trails multiplies the effects. Illegal bodily contact, already discussed, is one source of contamination. These activities are often accompanied by

water contact with domestic dogs, another source of wastes. Hikers who venture off trails may increase erosion. Finally, recreational use is a large source of trash in the water supply.

Other portions of the *ASWSS* deal with the description of domestic water production and the existing policies for water quality protection.

**SCCWRP Sampling Results**

Surface water sampling activities on the Los Angeles River in September 2000 yielded samples from the Arroyo Seco at its confluence with the Los Angeles River. The following constituents were detected: Coliform bacteria, *e. coli*, *enterococcus*, DOC, total organic carbon, ammonia-N, TKN, TSS, and nitrate-N. The samples will be used to create a model of the flows and water quality of the Los Angeles River and its impaired tributaries, including the Arroyo Seco. Samples were taken again in July 2001, and will be used to improve the accuracy of the flow / water quality model.

**Spatial Analysis**

In addition to research into measured water quality, mapping of the watershed was also performed. A methodical process, based on geographic information, was used to identify potential sources of water pollution. Potential sources of sedimentation, urban runoff, nitrification, and groundwater contamination were mapped, resulting in the following five criteria:

Steep slopes (sedimentation) – Figure F-3

Southwest facing slopes (sedimentation)

Known sources of volatile organic compounds (VOCs, groundwater contamination)

Land uses known to have high fertilizer & pesticide use (nitrification)

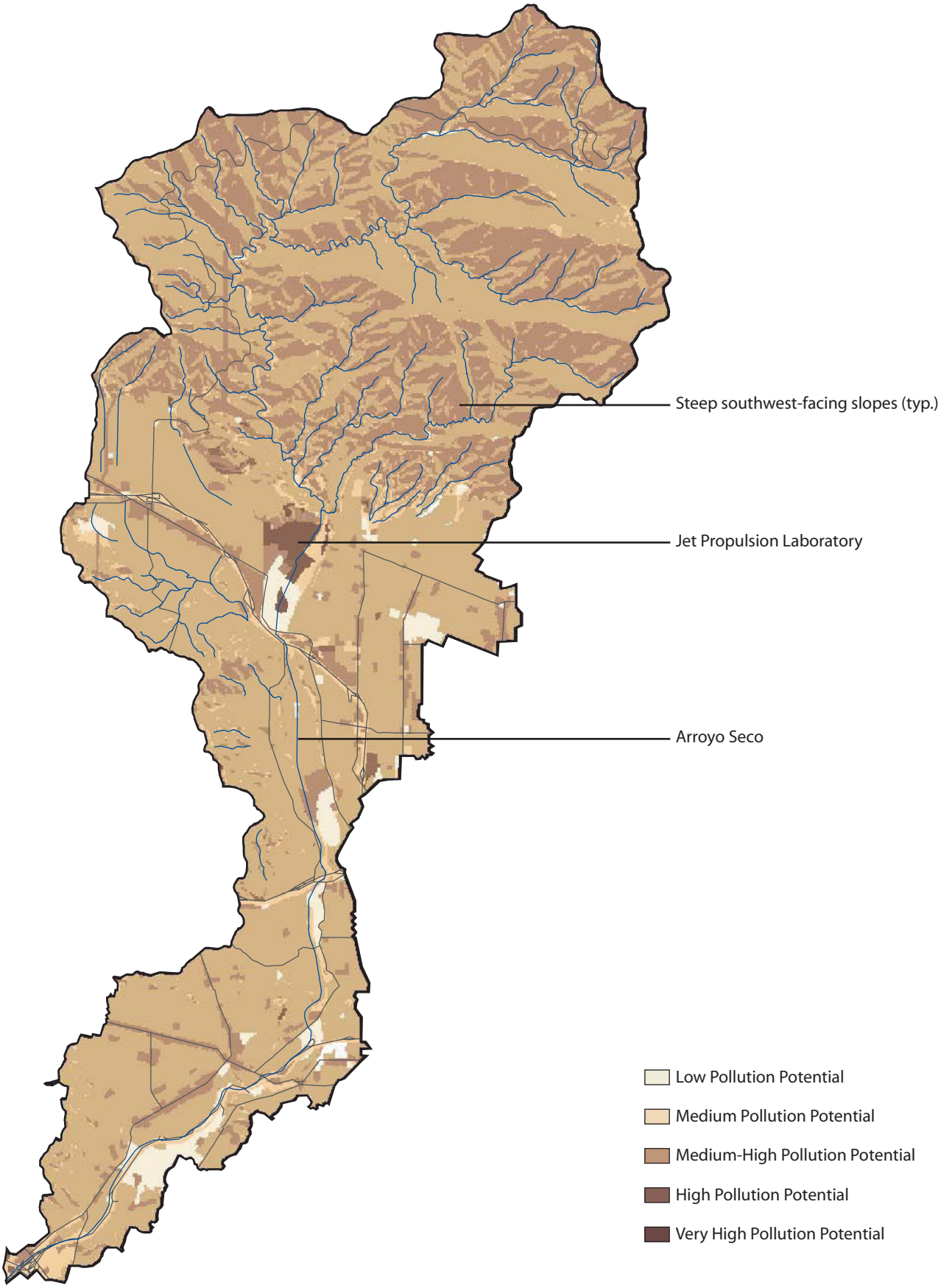
Land uses know to have little or no percolation (paved areas, contributing to urban runoff)

All areas of the watershed were mapped for each criterion, as a range of less likely to more likely. The most likely areas for each of the criteria were then given equal weighting and combined to produce Figure F-4, which shows the distribution of potential sources of water pollution within the watershed. Areas that meet one or more criteria are shown as the darker browns.

The majority of the watershed ranks as medium-high, reflecting the urbanized quality of the area. The southwest facing slopes of the San Gabriels are clearly visible, showing their erosion potential. Areas of recent burns (within three years) are also susceptible to increased erosion, though these were unable to be mapped. Parks and open space rank as having low potential for pollution, reflecting their tendency to be unpaved and vegetated. Commercial corridors are visible, reflecting the tendency of these areas to be paved and to generate trash.

Paved areas contribute highly to water pollution because water does not infiltrate the surface, and as it moves toward drains, it tends to pick up oil, grease, and trash generated by urban activities.

Unpaved, non-vegetated areas contribute highly to water pollution because erosion occurs very easily off these areas. Southwest-facing slopes are particularly high contributors because they




Potential Sources of Water Pollution

**WQ1**

tend to have very little vegetation, and as erosion begins at the top of the slope, it picks up speed and debris on the way down. Residential areas also contribute to water pollution because the use of chemical fertilizers and pesticides is widespread, and these items may tend to be overused by homeowners.

It is important to note that Figure F-4 presents merely a theoretical picture of water pollution trends. The spatial analysis performed does not represent a measured condition of the watershed's water quality, nor can it be used to name specific point sources of water pollution.

## Clean Water Act

### Background

Enacted by Congress in 1972, the Federal Water Pollution Control Act (FWPCA) addressed pollution of the nation's lakes, rivers, aquifers and coastal areas. The Clean Water Act was enacted as an amendment to the FWPCA in 1977, and gave authority to the EPA to regulate effluent standards. The 1977 Clean Water Act "...makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit (NPDES) is obtained..." (www.epa.gov). In 1987, the Clean Water Act was reauthorized by Congress. In 1998, federal agencies developed the Clean Water Action Plan, which identifies more than 100 key actions to improve water quality.

As described on the EPA website:

> "The Clean Water Act's primary objective is to restore and maintain the integrity of the nation's waters. This objective translates into two fundamental national goals:
> - eliminate the discharge of pollutants in to the nation's waters, and
> - achieve water quality levels that are fishable and swimmable. "

Section 303 of the Clean Water Act requires that each State identify waters where the quality is impaired for applicable standards. The list of impaired waters, called the §303(d) list, evaluates water bodies in terms of pollution levels, the severity of pollution, and the beneficial uses. Where quality is impaired, a total maximum daily load (TMDL) is required to be established for each pollutant. To comply with the Clean Water Act, states must first identify beneficial uses, then impaired waters, and finally establish needed TMDLs.

### Beneficial Uses

The term *beneficial uses* refers to the various ways water can be used. The Regional Board designates beneficial uses for surface and groundwater. Together with water quality objectives, these form the basis of developing water quality standards. Taken directly from the Basin Plan, the beneficial uses (potential, existing, and intermittent) for the Arroyo Seco Watershed are as follows:

*Municipal and Domestic Supply (MUN)*

Uses of water for community, military, or individual water supply systems, including, but not limited to, drinking water supply.

*Industrial Service Supply (IND)*

Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.

*Industrial Process Supply (PROC)*

Uses of water for industrial activities that depend primarily on water quality.

*Ground Water Recharge (GWR)*

Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting saltwater intrusion into freshwater aquifers.

*Water Contact Recreation (REC1)*

Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water skiing, skin and scuba diving, surfing, white water activities, fishing or use of natural hot springs.

*Non-Contact Water Recreation (REC2)*

Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

*Warm Freshwater Habitat (WARM)*

Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

*Cold Freshwater Habitat (COLD)*

Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

*Wildlife Habitat (WILD)*

Uses of water that support terrestrial ecosystems including, but not limited to, preservation or enhancement of terrestrial habitats, vegetation, wildlife (e.g. mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

*Rare, Threatened, or Endangered Species (RARE)*

Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

*Wetland Habitat (WET)*

Uses of water that support wetland ecosystems, including, but not limited to, preservation or enhancement of wetland habitats, vegetation, fish, shellfish, or wildlife, and other unique wetland functions which enhance water quality such as providing flood and erosion control,

stream bank stabilization, and filtration and purification of naturally occurring contaminants.

The following chart outlines the beneficial uses for the Arroyo Seco' surface water, noting whether the use is existing, potential, or intermittent for each reach and tributary:

| Watershed / Reach | Hydro Unit # | MUN | IND | PROC | GWR | REC1 | REC2 | WARM | COLD | WILD | RARE | WET |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arroyo Seco S. of Devil's Gate (L) | 405.15 | P | | | | I | I | P | | P | | |
| Arroyo Seco S. of Devil's Gate (U) | 405.31 | P | | | | I*m* | I | P | | P | E | |
| Devil's Gate Reservoir (lower) | 405.31 | I | | | I | I*m* | I | I | | E | | |
| Devil's Gate Reservoir (upper) | 405.32 | E | | | I | I | I | I | | E | | |
| Arroyo Seco | 405.32 | E | E | E | E | E*m* | E | E | E | E | | E |
| Millard Canyon Creek | 405.32 | I | E | E | E | E | E | E | | E | E | E |
| El Prieto Canyon Creek | 405.32 | P | I | I | I | I | I | I | | E | | E |
| Little Bear Canyon Creek | 405.32 | P | | | | I | I | I | I | E | | |

*E: Existing beneficial use*
*P: Potential beneficial use*
*I: Intermittent beneficial use*
*E, P, and I shall be protected as required*
*m: Access prohibited by Los Angeles County DPW in concrete-channelized areas.*

Five beneficial uses are defined for ground water in the Arroyo Seco watershed, including two uses that are not defined for surface water:

*Agricultural Supply (AGR)*
Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

*Aquaculture (AQUA)*
Uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.

The designated uses apply to all of the ground water basins that overlap the Arroyo Seco Watershed; however, not all of the designated uses exist within the watershed. The following chart outlines the beneficial uses for the Arroyo Seco's ground water, noting whether the use is existing, potential, or intermittent:

| Basin | MUN | IND | PROC | AGR | AQUA |
|---|---|---|---|---|---|
| Raymond Basin | E | E | E | E | |
| Monk Hill sub-basin | E | E | E | E | |
| Santa Anita area | E | E | E | E | |
| Pasadena area | E | E | E | E | |

*E: Existing beneficial use*

**§303(d) list**

Two segments of the Arroyo Seco can be found on California's §303(d) list, both downstream of Devil's Gate Dam. Reach 1 of the Arroyo Seco (Los Angeles River to West Holly Ave) is named on the §303(d) list for the following non-point source contaminants: Trash, Algae, and High Coliform. This reach is a high priority for TMDL development.

Reach 2 of the Arroyo Seco (West Holly Ave to Devil's Gate Dam) is named on the §303(d) list for the following non-point source contaminants: Trash, Algae, and High Coliform. This reach is also a high priority for TMDL development. The high coliform levels in Reaches 1 and 2 make these areas unsafe for human contact.

The §303(d) list can be found on the EPA's website, www.epa.gov.

**Total Maximum Daily Load**

Total Maximum Daily Loads are developed for contaminants in impaired waterbodies. The EPA describes them as "A TMDL or Total Maximum Daily Load is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources." TMDLs take into account point sources, non-point sources and naturally occurring sources of pollution. A TMDL includes the following components: problem statement, numeric target for the pollutant, source analysis, loading capacity, allocations, a monitoring plan and implementation elements.

TMDLs are enforced upon groups with National Pollutant Discharge Elimination System (NPDES) permits. In the Arroyo Seco Watershed, NPDES permits are regulated by the Regional Board. The NPDES program regulates point sources of pollution. Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. A common discharge method in the Arroyo Seco is storm sewer pipes that empty directly into the channel. For the Los Angeles River watershed, TMDLs are to be established for the following pollution sources: nitrogen, coliform, trash, metals, pesticide, historic pest, PCBs, oil and VOCs.

The Southern California Coastal Water Research Project Authority (SCCWRP) *FY 2000/2001 Research Plan* identifies the need to develop these TMDLs over the next decade. To address this need, SCCWRP began a project to develop a fate and transport model that will support TMDL development. The project is being continued in the *FY 2001/2002 Research Plan*.

*Trash TMDL*
In January 2001, the Regional Board established a Total Maximum Daily Load (TMDL) for trash in the Los Angeles River Watershed. The Arroyo Seco lies within this watershed. The TMDL is a 14-year plan to reduce the amount of trash discharged to the River, and ultimately to the ocean. Following two years of monitoring, the final waste load allocation is zero trash in year 10 (2012-13). By 2014-25, the three-year average must also equal zero.

The federal Clean Water Act provides the basis for the trash TMDL, requiring TMDLs to be established for impaired water bodies. Assessments conducted by the Regional Board in 1996 and 1998 determined that the amount of trash in the Los Angeles River was detrimental to its water quality and beneficial uses.

The TMDL defines trash as man-made litter, as defined in California Government Code Section 68055.1(g), of a size that is retained by a 5-mm screen. The primary source of trash in the watershed is urban runoff. Commercial areas tend to have the most contaminated runoff, followed by residential and industrial land uses. Trash impacts the following beneficial uses: REC-1*, REC-2*, WARM*, WILD*, EST, MAR, RARE*, MICR, SPWN, COMM, SHELL, WET*, and COLD* (note: * denotes beneficial uses of the Arroyo Seco).

Compliance with the trash TMDL can be achieved through an array of best management practices. The TMDL document categorizes the practices as end-of-pipe full capture structural controls, partial capture control systems, and institutional controls.

## Cleanup Operations

### Jet Propulsion Laboratory

The Jet Propulsion Laboratory (JPL) is a 177-acre campus in Pasadena that is operated by the National Aeronautics and Space Administration (NASA) and the California Institute of Technology (Caltech). Established in the 1930s, activities today at JPL are centered on robotic space exploration. Early projects focused on the design and testing of rockets, missiles, and aircraft. As part of the testing and experiments, many types of chemicals were used and disposed of on-site. In 1992, the site was placed on the Federal EPA's Superfund list.

The EPA's description of the contamination is as follows:

> "Sources of contamination at the site include approximately 35 seepage pits where liquid and solid wastes were reportedly disposed of, a settling chamber in the JPL storm drain system, contaminated soil excavated from part of that system, and an area where waste solvents were dumped into three separate holes. Hazardous substances located at JPL include waste solvents, solid rocket fuel propellants, cooling tower chemicals, sulfuric acid, freon, mercury, and chemical laboratory wastes. In 1990, JPL detected significantly elevated levels of contaminants in the groundwater underneath and down-gradient of the site. Due

to volatile organic compound (VOC) contamination in the groundwater, four municipal wells were shut down between 1989 and 1990 and two Lincoln Avenue Water Company wells were shut down in 1987. NASA installed a treatment system, and municipal wells began operating again in October of 1990. The Lincoln Avenue Water Company also has installed a treatment system on its wells, which are again operational. Approximately 120,840 people live within 4 miles of the site; an estimated 68,000 people obtain drinking water from municipal wells within 4 miles of the site.

THREATS AND CONTAMINANTS

The groundwater contamination from the JPL has traveled off site and has affected several drinking water wells, including four municipal drinking wells belonging to the city of Pasadena and two drinking water wells belonging to the Lincoln Avenue Water Company. The contaminants are primarily VOCs including trichloroethylene and carbon tetrachloride. People who ingest contaminated groundwater could be at risk. " (*www.epa.gov*)

Cleanup operations at JPL are on-going. In February 2001, the ASWRFS team heard a report on the cleanup from Peter Robles, Remedial Project Manager for the Superfund cleanup. The cleanup effort involves three operable units: onsite water, onsite soils, and offsite groundwater. A draft proposed plan for groundwater cleanup will be prepared by summer 2002. For onsite water, JPL will install remedial wells onsite to pump the water up, treat it and reinject it into the Raymond Basin. This will require coordination with Raymond Basin administration and their permission.

Investigations of the groundwater around JPL show a very complex hydrogeology. There are four commingled strata of groundwater, as well as a fault line that runs through the property. JPL has observed reverse flows of groundwater, as well as a 50' drop in their wells when the City of Pasadena draws water.

Chemicals of concern in the groundwater are perchlorate, carbon tetrachloride, and TCE. PCE has not been found in JPL's onsite water, but it was observed in a large plume northwest of JPL. This may be caused by the number of dry cleaners and septic tanks in the La Cañada-Flintridge area.

**SUSMP**

The Standard Urban Storm Water Mitigation Plan (SUSMP) was created as part of the NPDES permit process. The NPDES permits regulate storm water discharge, and required that a SUSMP be created for Los Angeles County. The SUSMP contains a number of best management practices (BMPs) that are to be enforced on certain development projects. The aim of the BMPs in the SUSMP is to reduce the amount of storm water runoff and improve its quality.

Types of projects where this is enforced include commercial developments, auto repair shops, restaurants, gas stations, large residential developments, parking lots, and hillside residences. Each category has specific BMP requirements; following is a list of requirements for all eligible projects:

- Peak storm water runoff discharge rates (no increase)
- Conserve natural areas
- Minimize storm water pollutants of concern
- Protect slopes and channels
- Provide storm drain system stenciling and signage
- Properly design outdoor material storage areas
- Properly design trash storage areas
- Provide proof of ongoing BMP maintenance
- Design standards for structural or treatment control BMPs

**Caltrans**

In 1997, the California Department of Transportation (Caltrans) began testing structural BMPs on their freeways, interchanges, park and rides, and maintenance stations. Many types of structural BMPs were tested, including Extended Detention Basins, Drain Inlet Inserts, Oil/Water Separators, Media Filters, Multi-chambered Treatment Trains, Continuous Deflection Separators, and Wet Basins. At Caltrans' Altadena Maintenance Station, two types of structural BMPs were installed: a Biofiltration Strip and an Infiltration Trench. Each drains an area of 1.7 acres that ultimately drains to the Arroyo Seco.

**Grassroots efforts**

Friends of the Los Angeles River holds an annual clean-up day on the Los Angeles River and tributaries, including the Arroyo Seco.

## Opportunities to Improve Water Quality

To improve the water quality in the Arroyo Seco watershed, several things are needed. First, accurate, complete and timely data is needed regarding constituents in all surface and ground waters. Capturing these data and completing analyses requires on-going, steady funding for data collection and planning efforts. Water quality testing should occur at different times, including immediately after the first storm of the season (called the "first flush"), during dry weather, and at other times of the year. On-going clean up efforts must continue as well, especially with regard to trash.

**Water Quality Objectives**

The *Basin Plan* lists the Water Quality Objectives for inland surface waters, wetlands, ground waters, and ocean waters. Along with beneficial uses, the development of water quality objectives is a requirement of the Clean Water Act, §303. Together, beneficial uses and water quality objectives comprise the water quality standards for a region. The *Basin Plan* lists the two purposes of water quality objectives: to protect the public health and welfare and to maintain or enhance water quality in relation to the designated existing and potential beneficial uses of the water.

A number of water quality objectives for surface water are described in narrative form. Summarized here are the objectives for the Arroyo Seco's impaired constituents: coliform and

nitrogen (related to algae). The third impaired constituent, trash, is further described in the TMDL section.

The water quality objective for coliform (bacteria) is related to the beneficial uses of REC-1 and REC-2. For REC-1 listed waters, "the fecal coliform concentration shall not exceed a log mean of 200/100ml, nor shall more than 10% of total samples during any 30-day period exceed 400/100ml". For waters listed for REC-2 and not REC-1, "the fecal coliform concentration shall not exceed a log mean of 2000/100ml, nor shall more than 10% of samples collected during any 30-day period exceed 4000/100ml."

The water quality objective for nitrogen is as follows: "Waters shall not exceed 10mg/L nitrogen as nitrate-nitrogen plus nitrite-nitrogen, 45mg/L as nitrate, 10 mg/L as nitrate-nitrogen, or 1mg/L as nitrite-nitrogen."

Other selected constituent objectives are listed in numeric form only. The following table shows the numeric descriptions for the upper Arroyo Seco (other reaches are not listed):

| Water Quality Objectives for Selected Constituents in Inland Surface Waters | | | | | | |
|---|---|---|---|---|---|---|
| **Watershed / Stream reach** | **TDS (mg/L)** | **Sulfate (mg/L)** | **Chloride (mg/L)** | **Boron (mg/L)** | **Nitrogen (mg/L)** | **SAR (mg/L)** |
| Arroyo Seco above spreading grounds | 300 | 40 | 15 | g | f | g |

*f. Site-specific objectives have not been determined for these reaches at this time.*

*g. Agricultural supply is not a beneficial use of the surface water in the specified reach.*

As with surface water, the objectives for ground water are listed both narrative and numerically. The following table shows the numeric descriptions for the basins serving the Arroyo Seco watershed:

| Water Quality Objectives for Selected Constituents in Regional Ground Waters | | | | |
|---|---|---|---|---|
| **Basin** | **TDS** | **Sulfate** | **Chloride** | **Boron** |
| Central Basin | 700 | 250 | 150 | 1.0 |
| Raymond Basin: Monk Hill sub-basin | 450 | 100 | 100 | 0.5 |
| Santa Anita area | 450 | 100 | 100 | 0.5 |
| Pasadena area | 450 | 100 | 100 | 0.5 |

**Monitoring**

The *Basin Plan* describes the need for water quality monitoring and assessment. "Monitoring is necessary to assess existing water quality conditions, examine long-term trends, and ensure the attainment and maintenance of beneficial uses consistent with state and federal standards. Monitoring is also necessary to assess the effectiveness of clean-up programs."

The State Board is the lead agency for monitoring of water quality. Their objectives for a monitoring program are as follows:

**Objectives of an Adequate State Surveillance and Monitoring Program**

- Measure the achievement of water quality objectives specified in the Basin Plans
- Measure effects of water quality changes on beneficial uses
- Measure background conditions of water quality and determine long-term trends
- Locate and identify sources of water pollution that pose an acute, accumulative, and/or chronic threat to the environment
- Provide information needed to relate receiving water quality to mass emissions of pollutants by waste dischargers
- Provide data for determining discharger compliance with permit conditions
- Measure waste loads discharged to receiving waters and identify their effects in order to develop waste load allocations
- Provide the documentation necessary to support the enforcement of permit conditions and waste discharge requirements
- Provide data needed for the continuing planning process
- Measure the effects of water rights decisions on water quality, and to guide the State Board in its responsibility to regulate unappropriated water for the control of quality
- Provide a clearinghouse for water quality data gathered by other agencies and private parties cooperating in the program
- Report on water quality conditions as required by federal and state regulations or requested by others.

The State Board has created a number of monitoring programs, though they have not funded all the programs in the Los Angeles area. The Regional Board also conducts water quality monitoring programs. Their monitoring network consists of 60 stations on watercourses throughout the region, where samples are collected at least once/year. Other monitoring activities by the Regional Board include conducting intensive surveys, coordinating with other agencies, and beginning to develop biological criteria.

The Friends of the Los Angeles River conducts water quality monitoring through its RiverWatch program.

SCCWRP, along with several agency partners, is in the second year of a water quality sampling program, where volunteers take samples throughout the Los Angeles River and its impaired tributaries at the same time. This provides a complete snapshot of water quality for that day. Among other uses, this data is being used to develop an accurate model of the flows and inputs in the Los Angeles River. The model will be used to examine and predict pollution levels under different flow and water quality conditions.

**Arroyo Seco Watershed Sanitary Survey**

The Arroyo Seco Watershed Sanitary Survey, 1996, describes the current policies and new recommendations for watershed control and management practices. Recommendations include suggestions for the operation of the water treatment plant, personnel and legislative items.

The following recommendations deal with contaminant reduction:

- Develop an investigative/analysis procedure that determines the condition of septic tank vaults and determines the contamination potential from the leach fields.
- Coordinate a monitoring system with Caltrans that identifies and measures runoff pollutants from Highway 2.
- Coordinate with the appropriate enforcement agency to ensure that proper disposal procedures are being employed at the stables.
- Determine what was stored in the abandoned underground tanks on Gould Mesa and verify that they are empty.
- Prohibit the use of herbicides within the watershed.

Additional recommendations in the study for watershed control and management include, among others:

- Establish an Arroyo Seco Watershed stakeholders association.
- Encourage and assist Caltrans and the USFS to create turn-out barriers that would prevent 'over the side' illegal dumping in the watershed.
- Establish a joint raw water quality monitoring program with the USFS.
- Remove all water supply equipment no longer in use.

## Recommendations

Improving the quality of ground and surface water in the Arroyo Seco watershed can be achieved through actions by all stakeholders in the watershed. In addition to the recommendations cited above, the following recommendations, if implemented, will improve the water quality of the Arroyo Seco watershed.

### Restoration goals for water quality

*Implement Best Management Practices (BMPs) to reduce water pollutants flowing into the Arroyo Seco and its tributaries.*

Best Management Practices are defined in the Los Angeles County's NPDES permit: "… a Best Management Practice is defined as a storm water quality management practice that has been demonstrated to reduce storm water / urban runoff constituents of concern in studies in the United States and elsewhere, or a storm water / urban runoff management practice that can significantly control storm water / urban runoff pollution." Several references in the bibliography define specific BMPs.

*Develop source protection measures.*

The natural springs and streams of the watershed should be managed so that they do not become degraded. Pollution occurring at a water source will travel downstream through the entire watershed. Making the land at the watershed's water sources a protected area will aid in source protection. Placing the land under protection will prevent new development that could damage the water quality. Additionally, these areas should be tested for environmental quality and cleaned up, if necessary.

*Develop ongoing water quality monitoring programs and public education of water quality issues.*

The restoration of the watershed and improvement of the Arroyo Seco's water quality cannot be fully realized until a large portion of the watershed's population is informed and supportive of

the effort. On-going public education programs can be used to "spread the word" about the water quality issues and goals, and expand the number of people who are involved and supportive. In addition, the improvement of water quality needs to be documented on a scientific basis. On-going water quality monitoring programs will produce the data needed to measure the effectiveness of projects. As these programs expand, they will also serve to expand the number of people aware of and involved with improving the Arroyo Seco's water quality.

*Reduce non-point sources of pollution.*
Urban runoff is a common problem throughout the developed portions of the watershed. This polluted runoff cannot be attributed to a single source, and is composed of many different constituents. Implementation of the other goals and projects listed here will help to reduce the amount of polluted urban runoff. In addition, programs designed to address such pollutants as oil, grease, auto chemicals, sewer wastes, and illegal dumping of hazardous wastes can significantly increase the water quality in the watershed.

*Monitor and clean out structures and plantings designed to reduce pollutants in surface water.*
Both wetland plantings and structures such as catch basin filters have a limited capacity to collect pollutants, and need to be replaced on a regular basis. For example, consider a wetland that has been replanted with plants that will uptake chemical pollutants. The plants cannot uptake chemicals for an indefinite period of time, and should be replaced at appropriate times. The plants that are removed must be disposed of according to hazardous waste regulations, because they will necessarily contain high concentrations of pollutants.

*Evaluate existing point sources of pollution for monitoring compliance on a regular basis.*
Community organizations, local agencies and governments, and individual can inform themselves about known polluters. These point source polluters are usually required to clean up their operations and maintain the legal standards. Through watchdog efforts and public interest, interested parties can ensure that these polluters are meeting the standards.

**Projects**
Specific projects, described below, can be implemented within the watershed to work toward achieving better water quality. Most of these projects are not site-specific, and can be implemented in any area of the watershed, as appropriate.

*Trash Reduction*
Implement volunteer programs, educate visitors, and modify maintenance methods to reduce the amount of trash / waste left by humans and their pets. Many things have been found in our rivers and streams, ranging from candy wrappers to automobiles to animal feces. Local communities, cities and land-owning agencies can reduce the wastes in the Arroyo Seco by implementing trash reduction programs. Activities may include additional trash cans, more frequent street sweeping, more frequent catch basin cleaning, and the implementation of Best Management Practices. Our public parks and streets are frequently used by pet owners. All of these public areas should have facilities readily available for the proper disposal of pet wastes. The campgrounds in the local mountains, both public and private can implement more vigorous enforcement of litter laws, as can local cities.

*Golf Course best management practices*

Golf courses are known to be a source of polluted runoff, due to their high usage of chemical pesticides and fertilizers. Many golf courses do not have any vegetated buffers that could absorb the runoff. However, the use of an Integrated Pest Management program will allow golf course managers to incorporate non-toxic alternatives to chemicals, as well as reduce the use of pesticides and fertilizers to the lowest possible level. In addition, while planning for future upgrades and re-grading of the course, mangers can create a course layout that will enhance water quality and water resources and be compatible with planned stream restoration projects. The new elements can be incorporated along with regular maintenance.

*Horse Stable best management practices*

Horse stables are known to be a source of polluted runoff, due to the high volume of animal wastes produced. Stable owners and operators can implement Best Management Practices to lessen environmental impacts of stables. The BMPs can be both structural and non-structural, implemented by both policy and constructed elements. Stable owners and operators should have an understanding of their proximity to the Arroyo Seco and its tributaries, and the relationships between them.

*Jet Propulsion Laboratory cleanup oversight*

Through watchdog efforts, ensure that cleanup is achieved with minimal negative impacts to habitat, water quality and visual quality. As a known source of pollution, the cleanup of JPL should be given a high priority in watershed activities.

*Sediment management and erosion control*

The San Gabriel mountains are a source of sediments, as the soil and rocks erode during storm events. Construction areas are also large source of sediments, as they typically have large areas of exposed soil. Exposed soil may erode during storm events and land in the urban sewer system; it can also erode due to high winds. Many hills in the watershed have very steep slopes, making them vulnerable to erosion as well. While Best Management Practices can reduce the amount of sediments flowing in the Arroyo Seco, they cannot prevent all erosion. With this in mind, it is recommended to develop a management program for sediment control and removal.

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