INTRODUCTION TO THE ULARA GROUNDWATER BASINS

TECHNICAL MEMORANDUM NO. 1 (TM-1)

FOR THE

SALT NUTRIENT MANAGEMENT PLAN

FOR THE

UPPER LOS ANGELES RIVER AREA LOS ANGELES COUNTY, CALIFORNIA

Prepared for:

The California Regional Water Quality Control Board
Los Angeles Region

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TABLE OF CONTENTS

Section Name **Page No.**

Figures:

Tables:

Appendices

ACRONYMS AND ABBREVIATIONS

AFY	Acre-feet per year
AL	Action Level
BP	Basin Plan = RWQCB-LA Water Quality Control Plan
BSPO	Basin Specific Plan Objective
BMP	Best Management Practice
BOU	Burbank Operable Unit
BWP	Burbank Department of Water and Power
CASGEM	California Statewide Groundwater Elevation Monitoring Program
CDPR	California Department of Pesticide Regulation
CEQA	California Environmental Quality Act
Cl	Chloride
CWA	Clean Water Act
CECs	Constituent of Emerging Concern
COCs	Constituents of Concern
CWH	Council for Watershed Health
Cr^6	Hexavalent Chromium
CVWD	Crescenta Valley Water District
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
ERB	Eagle Rock Groundwater Basin
GOU	Glendale Operable Unit
GAMA	Groundwater Ambient Monitoring and Assessment Program
GRIP	Groundwater Reliability Improvement Project
GWPA	Groundwater Protection Agency
LAA	Los Angeles Aqueduct
LABOS	City of Los Angeles Bureau of Sanitation
LACDPW	Los Angeles County Department of Public Works
LACFD	Los Angeles County Flood Control District
LADWP	City of Los Angeles, Department of Water and Power
LAWPD	City of Los Angeles, Bureau of Sanitation Watershed Protection Division
LUST	Leaking Underground Storage Tank
LID	Low Impact Development
MCL	Maximum Contaminant Level
MF	Microfiltration
mg/L	milligrams per liter
µg/L	micrograms per liter
MWD	Metropolitan Water District of Southern California
NHOU	North Hollywood Operable Unit
NL	Notification Level
NO_3-N	Nitrate as nitrogen
NDMA	n-Nitrosodimethylamine
NPDES	National Pollutant Discharge Elimination System
O&M	Operation & Maintenance
PCA	Potentially Contaminating Activity
PCE	Tetrachloroethene
QA/QC	Quality Assurance/Quality Control
RWP	Recycled Water Policy

RO	Reverse Osmosis
RWQCB-LA	Regional Water Quality Control Board – Los Angeles Region
SB	Sylmar Groundwater Basin
SFB	San Fernando Groundwater Basin
SNMP	Salt/Nutrient Management Plan
S/Ns	Salts/Nutrients
SDLAC	Sanitation Districts of Los Angeles County
SMCL	Secondary Maximum Contamination Level
SO_4	Sulfate
SWRCB-DDW	California State Water Resources Control Board – Division of Drinking Water
TDS	Total dissolved solids
TON	Threshold Odor Number
TMDLs	Total Maximum Daily Loads
ULARA	Upper Los Angeles River Area
USGS	United States Geological Survey
VB	Verdugo Groundwater Basin
VOCs	Volatile organic compounds
WMA	Watershed Management Area
WRCC	Western Regional Climate Center
WRP	Water Reclamation Plant
WY	Water Year (October 1 of one year to September 30 of the following year)

I. Introduction

This document, Technical Memorandum No. 1 (TM-1), has been prepared by the court-appointed Watermaster for the adjudicated Upper Los Angeles River Area (ULARA) as the initial submittal to eventually meet the requirements of developing a Salt and Nutrient Management Plan for the four groundwater basins within ULARA. Specifically provided in this TM-1 for the ULARA groundwater basins are the following:

- The background and the regulatory framework of the SNMP process.
- The basic purposes and goals of the SNMP process.
- The Salt and Nutrient target constituents for the ULARA basins.
- An overview of ULARA, its Court trial, and Final Judgment.
- A description of ULARA, including: its boundaries; land use; climate and rainfall; surface water drainage characteristics; sources of water and exported supplies; local groundwater supplies and rising water; information on local ongoing artificial recharge operations; water reclamation plants and treated wastewater; basic geologic conditions; basic hydrogeologic conditions, including information on water-bearing sediments and nonwater-bearing rocks; groundwater flow directions; terminology used by the California Department of Water Resources (DWR) and the final ULARA Judgment to define the groundwater basins in ULARA; and the locations, ownerships and descriptions of the water-supply wells in each groundwater basin in ULARA.

The SNMPs are required for all groundwater basins identified by DWR in California (approximately 515). Preparation of a SNMP itself represents one of the main requirements of the Recycled Water Policy (RWP) that was promulgated by the State Water Resources Control Board (SWRCB), effective May 14, 2009. Among the stated purposes of the RWP are to "establish uniform requirements for recycled water use"…and…"to develop sustainable water supplies throughout the State." Importantly, the RWP encourages the use of recycled water generated by municipal wastewater treatment plants as a safe alternative source of water supply within all groundwater basins. In fact, a stated goal of the RWP is to increase the state-wide use of recycled water over 2002 levels by at least one million acre feet per year (AFY) by the year 2020 and to at least two million AFY by 2030.

The SNMP for each groundwater basin in the State is to be submitted to and approved by the respective RWQCB. For ULARA, the SNMP process is being conducted for the RWQCB-Los

Angeles Region (RWQCB-LA) by the court-appointed Watermaster, with the technical assistance of the following sub-consultants:

1. Nellor Environmental Associates of Austin, Texas, which is responsible for Basin Management Plan Elements, and Strategies, and Basin Plan Amendment process;
2. RMC Water and Environment of Santa Monica, California, which is conducting the Stakeholder Process, Technical Review, Implementation Measures, and Support portions of the work; and
3. Todd Groundwater of Alameda, California, which is providing the groundwater modeling efforts.

Also for the ULARA SNMP, the salts and nutrients of concern are the basic salts of total dissolved solids (TDS) and chloride (Cl), and the nutrient known as nitrate (NO_3). Excessive amounts of such salts and nutrients can impact the beneficial uses of groundwater and adversely affect it as a water supply source.

Lastly, the RWP provides guidelines for preparing SNMPs for all groundwater basins. These guidelines include:

- Allowing the plan to be a locally-funded and collaborative process that is open to all stakeholders in a basin;
- Ensuring that the plan includes salt/nutrient source identification, and estimates of the assimilative and loading capacity of the basin;
- Providing implementation measures to help manage the salt/nutrient loading on a sustainable basis for each basin;
- Incorporating in the plan compliance with the California Environmental Quality Act (CEQA) and participation by RWQCB-LA staff.

Groundwater is an important resource for the water purveyors within the ULARA region. Although water quality impairments exist in the ULARA groundwater, significant efforts exist that currently allow beneficial use of the groundwater as a source of potable water supply. Further, many ongoing efforts exist within the ULARA groundwater basins to further address those water quality impairments to expand the use of groundwater within ULARA.

II. Background

A. Introduction

Four separate groundwater basins were identified by the Court within the region known as ULARA. Figure 1, "Upper Los Angeles River Area Vicinity and Location Map" illustrates the locations of these four groundwater basins which include, from largest to smallest, the following:

- San Fernando Groundwater Basin (SFB).
- Sylmar Groundwater Basin (SB).
- Verdugo Groundwater Basin (VB).
- Eagle Rock Groundwater Basin (ERB).

For over 50 years, local agencies have been collaborating and implementing critical measures, such as water reclamation and reuse, water conservation, improved maintenance of supply and delivery infrastructure, and the capture and use of stormwater, in order to help prevent groundwater overdraft and to replenish the local aquifer systems. Further, the relatively recent use of recycled water in the ULARA groundwater basins has increased the reliability and sustainability of the region's overall water supply.

B. Regulatory Framework

The basic requirements for preparing a SNMP were promulgated in the SWRCB RWP, which was initially adopted by the State Board on February 3, 2009 and ultimately became effective on May 14, 2009, included the following required elements (see Section 6.b.3 of the RWP):

- A basin/subbasin-wide monitoring plan that includes an appropriate network of monitoring locations.
- A provision for annual monitoring of Constituents of Emerging Concern (CECs), such as endocrine disrupters, personal care products, and pharmaceuticals.
- Water recycling and stormwater recharge/use goals and objectives.
- Salt and nutrient source identification.
- Basin/subbasin assimilative capacity.
- Loading estimates for salts and nutrients.
- Fate and transport of those salts and nutrients.
- Implementation measures to manage salt and nutrient loading in the basin on a sustainable basis.
- An anti-degradation analysis demonstrating that the projects included within the plan will, collectively, satisfy the requirements of SWRCB Resolution No. 68-16,

"Statement of Policy with Respect to Maintaining a High Quality of Waters in California"

Within the Introduction and Plan Adoption portions of the SWRCB RWP, the following are noteworthy:

- "Some groundwater basins in the state contain salts and nutrients that exceed or threaten to exceed water quality objectives established in the applicable Water Quality Control Plans (Basin Plans), and not all Basin Plans include adequate implementation procedures for achieving or ensuring compliance with the water quality objectives for salts or nutrients. These conditions can be caused by natural soils/conditions, discharges of waste, irrigation using surface water, groundwater or recycled water and water supply augmentation using surface or recycled water. Regulation of recycled water alone will not address these conditions."
- "It is the intent of this Policy that salts and nutrients from all sources be managed on a basin-wide or watershed-wide basis in a manner that ensures attainment of water quality objectives and protection of beneficial uses. The State Water Board finds that the appropriate way to address salt and nutrient issues is through the development of regional or sub-regional salt and nutrient management plans rather than through imposing requirements solely on individual recycled water projects."
- "It is the intent of this Policy for every groundwater basin/sub-basin in California to have a consistent salt/nutrient management plan. The degree of specificity within these plans and the length of these plans will be dependent on a variety of site-specific factors, including but not limited to size and complexity of a basin, source water quality, stormwater recharge, hydrogeology, and aquifer water quality. It is also the intent of the State Water Board that because stormwater is typically lower in nutrients and salts and can augment local water supplies, including a significant stormwater use and recharge component within the salt/nutrient management plans is critical to the long-term sustainable use of water in California."
- "Salt and nutrient plans shall be tailored to address the water quality concerns in each basin-/-sub-basin and may include constituents other than salt and nutrients that impact water quality in the basin-/sub-basin… Such plans shall address and implement provisions, as appropriate, for all sources of salt and/or nutrients to groundwater basins, including recycled water irrigation projects and groundwater recharge reuse projects."
- Such plans may be developed or funded pursuant to the provisions of Water Code sections 10750 et seq. or other appropriate authority.
- "Salt and nutrient plans shall be completed and proposed to the Regional Water Board within five years from the date of this Policy [i.e., May 14, 2009] unless a Regional Water Board finds that the stakeholders are making substantial progress towards completion of a plan. In no case shall the period for the completion of a plan exceed seven years."

In response to the newly-developed regulations of the SWRCB and in order to address the above topics, the Court-appointed Watermaster for the Upper Los Angeles River Area has developed this SNMP. This SNMP represents a basic plan to help manage the salts and nutrients within the boundaries of the four ULARA groundwater basins.

C. Purposes and Goals of the SNMP Process

The stated purpose of the SNMP for ULARA is to develop a process whereby management of salts and nutrients can effectively be carried out. The ultimate goal of the process and the management is to reduce the degree of groundwater degradation in the aquifer systems within the 4 ULARA groundwater basins. In conducting this task, the existing Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (RWQCB, 1995, and herein referred to as the "Basin Plan") is used; the Basin Plan mentions water quality objectives for many constituents in the San Fernando Valley Groundwater Basin (the overall name given by DWR for all four Court-designated groundwater basins in ULARA) and serves as a basis for targeting specific salts and nutrients for management.

D. Salts & Nutrients Target Constituents

The existing Basin Plan provides guidance with regard to the salts and nutrients that can be evaluated for the purposes of planning. In that Basin Plan, total dissolved solids (TDS), chloride (Cl), sulfate (SO_4) and nitrate as nitrogen (NO_3-N) were selected as appropriate constituents to represent salts and nutrients for local planning purposes. The Basin Plan also describes different TDS, Cl, SO_4 and NO_3-N water quality objectives for the four groundwater basins in ULARA. Table 3-10 of the Basin Plan provides numerical objectives for each of the above-listed constituents for the DWR-defined San Fernando Valley Groundwater Basin. Table 1, "California Regional Water Quality Control Board, Selected Basin Water Quality Objectives, Upper Los Angeles River Area," lists the targeted salts and nutrients for the existing Basin Plan, along with basin objectives, as outlined in Table 3-10 of the Basin Plan.

III. Overview of Upper Los Angeles River Area (ULARA) and Basin Adjudication

A. General Description of ULARA

ULARA encompasses the four groundwater basins and the entire watershed of the Upper Los Angeles River and its tributaries above (north of) a point in the river designated by the Los Angeles County Department of Public Works (LACDPW) as Gaging Station F- 57C-R; this gage lies near the junction of the Los Angeles River and the Arroyo Seco (see section “E.1” below for the location of stream gage F-57C-R). Using this definition, the ULARA watershed encompasses an approximate total of 328,500 acres of hill and mountain areas and the four intervening valley fill areas (i.e., these comprise the four groundwater basins). Of this total watershed area, approximately 122,800 acres of valley fill form the ground surface in each of the four ULARA groundwater basins, whereas the remaining 205,700 acres are comprised by the tributary hills and mountains in the watershed. Basic ULARA boundaries include: the Santa Susana Mountains on the north and northwest; the San Gabriel Mountains on the north and northeast; the San Rafael Hills on the east; the Santa Monica Mountains on the south; and the Simi Hills and Chatsworth Hills on the west.

- As noted above, the valley fill areas of ULARA constitute the four distinct groundwater basins identified by the Superior Court. The Final ULARA Judgment, which is dated January 26, 1979, recognizes these 4 groundwater basins (SFB, SB, VB, and ERB) to be separate from one another.

A groundwater basin can generally be defined as a three-dimensional area that has reasonably-definable surface and subsurface boundaries and that contains layers and lenses of potentially water-bearing sediments which are capable of yielding groundwater in useable quantities and of acceptable quality for beneficial use. Thus, a groundwater basin could be considered to represent an area underlain by permeable sediments capable of storing and yielding a substantial supply of potable groundwater to water-supply wells. Directly underlying the groundwater basin below the base of the water bearing sediments, and also forming the lateral ground surface boundaries of the groundwater basins, are geologically older, well consolidated and/or cemented sedimentary rocks, or crystalline igneous or metamorphic rocks.

The groundwater reservoir comprising each of these basins is considered to be replenished by the following sources:

- deep percolation of direct rainfall;
- infiltration of surface water runoff;
- infiltration of a portion of the water that is delivered for use within these basins; and
- underflow from adjoining groundwater basins.

In addition, artificial recharge has historically occurred and continues to occur in existing spreading basins located in the northeastern portion of the SFB whenever excess rainfall and runoff are available.

Figure 2, "ULARA Conceptual Flow Model" shows a generalized flow chart of the movement of water through the ULARA groundwater basins. This chart generally categorizes the inflows and outflows of each basin, and also identifies the flow that occurs between the ULARA basins in the subsurface. Note that there is no underflow of groundwater into the ULARA groundwater basins from non-ULARA basins, as the ULARA includes the headwaters of the entire portion of the Upper Los Angeles River. Groundwater underflow does occur between the four ULARA groundwater basins themselves, as reflected on Figure 2. Also, groundwater extractions occur in each of the four groundwater basins.

Potentially water-bearing sediments in the four ULARA groundwater basins are comprised of the following:

- various young and old alluvial fan-type deposits in the VB and ERB; and
- similar young and old alluvial fan-type sediments that are directly underlain by potentially water-bearing strata within the Saugus Formation in the SFB and SB.

Exposed at ground surface in all of the hill and mountain watershed areas of ULARA, and also known to directly underlie all potentially water-bearing sediments that comprise the four ULARA groundwater basins, are geologically older sedimentary rocks (i.e., sedimentary bedrock) and even older metamorphic and granitic-type rocks (i.e., crystalline basement rock). These geologically older rocks are either well-lithified and cemented, and/or crystalline in nature, and as such, are considered to display only secondary porosity; their permeability is low to very low. Because of their well-lithified and/or cemented and/or crystalline character, these rocks do not and cannot contain water in the interstices between the individual sand or gravel grains. Instead, groundwater is contained solely within open and interconnected fractures, joints, and/or along bedding planes in these rocks. Hence, the groundwater storage capacity of these rocks is low and their long-term sustained yield is unpredictable; only limited quantities of water are available to wells. For these reasons, these rocks are classified as nonwater-bearing for municipal-supply purposes in ULARA, and none of these older sedimentary rock formations or crystalline rocks are considered to be part of the four groundwater basins within ULARA.

B. Court Trial and Final ULARA Judgment

Water rights in ULARA were established by the JUDGMENT AFTER TRIAL BY COURT in Los Angeles County Superior Court Case No. 650079, entitled The City of Los Angeles, a Municipal Corporation, Plaintiff, vs. City of San Fernando, et al., Defendants, signed March 14, 1968, by the Honorable Edmund M. Moor, Judge of the Superior Court. Numerous pre-trial conferences were held subsequent to the filing of the action by the City of Los Angeles in 1955 and also before the trial commenced on March 1, 1966.

A Final Report of Referee was approved on July 27, 1962 and filed with the Court. The main, 2-volume Report of Referee provided the results of a major geologic and engineering evaluation of the surface and subsurface geology, the occurrence and movement of groundwater, aquifer characteristics, and the surface hydrology. In addition, investigations were made of the history of: the channels of the Los Angeles River and its tributaries; the general directions of groundwater flow within the area; the groundwater quality; the historic extractions of groundwater from the four basins; and all known sources of water, whether they be diverted, extracted, or imported within the ULARA basins. The Report of Referee served as the principal basis for the geological, hydrogeological and hydrological facts for the original Trial Court Judgment in 1968, the Decision of the Supreme Court in 1975 (14 Cal 3d 199, 123 Cal Rept 1), and the Trial Court Final Judgment on remand dated January 26, 1979.

On May 12, 1975, the California Supreme Court filed its opinion on the then-current 20 year-long San Fernando Groundwater Basin litigation. This opinion, which became final on August 1, 1975, upheld the Pueblo Water Rights of the City of Los Angeles to all groundwater in the SFB derived from precipitation (infiltration of direct rainfall plus surface water runoff) within ULARA. The Pueblo Water Rights of Los Angeles were not allowed to extend to and/or include the groundwater in the Sylmar, Verdugo or Eagle Rock basins. However, all surface water and groundwater underflows from these adjoining groundwater basins were considered to be a part of the Pueblo Water Rights of the City of Los Angeles.

The California Superior Court opinion also provided the City of Los Angeles with rights to all groundwater in the SFB that was derived from water imported by the City from outside ULARA that was eventually spread or delivered within the SFB. Two of the other defendants, the Cities of Glendale and Burbank, were also given rights to all SFB groundwater delivered from outside and within ULARA. On March 22, 1984, the cities of Los Angeles and San Fernando stipulated that the City of San Fernando would be given no return flow rights because it was not a member of MWD until the end of 1971 and had never imported water prior to that year.

The California Supreme Court reversed the principal judgment of the March 15, 1968 Trial Court opinion and remanded the case back to the Superior Court. On remand, the case was assigned to the Honorable Harry L. Hupp, Judge of the Superior Court of Los Angeles County. The Final Judgment (Judgment), signed by Judge Hupp, was entered on January 26, 1979 (copies of this Judgment are available from the ULARA website (www.UlaraWatermaster.com). In addition, the January 26, 1979 Final Judgment included provisions and stipulations regarding water rights, storage of water, stored water credits, and arrangements for physical solution water for certain parties as recommended by the Supreme Court.

A separate stipulation was filed in Superior Court on January 26, 1979 appointing Mr. Melvin L. Blevins as the original ULARA Watermaster under the Judgment. On September 1, 2003, Mr. Mark G. Mackowski was appointed ULARA Watermaster by the Superior Court, succeeding Mr. Blevins after his 24 years of service. On January 1, 2009, Mr. Richard C. Slade of Richard C. Slade and Associates LLC, Consulting Groundwater Geologists, was appointed as the first completely independent ULARA Watermaster, thereby succeeding Mr. Mark Mackowski after his 5 years of service.

In September 2007, the cities of Burbank, Glendale, and Los Angeles entered into a 10-year Stipulated Agreement to address the long-term decline in groundwater in storage in the San Fernando Basin. This 10-year interim agreement was intended to restrict the pumping of Stored Water Credits, help account for basin losses, and provide for the support of Los Angeles for enhancing the recharge of native water within this basin.

On August 26, 1983, the original ULARA Watermaster (Mr. Blevins) reported to the Court, pursuant to Section 10.2 of the Judgment, that the Sylmar Basin was in a condition of overdraft. In response to the Watermaster's letter and a Minute Order of the Court, the cities of Los Angeles and San Fernando responded by letter to the Court, agreeing with the Watermaster's report on overdraft in SB. On March 22, 1984, Judge Hupp signed a stipulation ordering, effective October 1, 1984, that the cities of Los Angeles and San Fernando would be limited in their pumping from SB in order to bring their total groundwater extractions within the safe yield of this basin, including any rights exercised by private parties.

Pursuant to Judgment Section 8.2.10, the then-current Watermaster increased the safe yield of SB on a temporary basis in 1996, from 6,210 acre-feet per year (AFY) to 6,510 AFY. On October 1, 2005 this temporary increase expired, and the then-current Watermaster again re-evaluated the safe yield of SB. Based on that re-evaluation, a recommendation was made by that Watermaster in 2006 to increase the total safe yield of this basin to 6,810 AFY (3,405 AFY each for the cities of Los Angeles and San Fernando). This recommendation was subject to certain conditions and a requirement, including the possible construction of as many as four new groundwater monitoring wells to help determine groundwater outflow from the SB into the SFB to the south. The Court approved the new stipulation after its hearing on December 13, 2006.

An updated, 5-year re-assessment of the safe yield of SB was provided in a report dated July 31, 2012 by the current Watermaster, and filed with the Court in June 2013. This report provided for an increase in the safe yield of SB to 7,140 AFY, which is to be divided equally between Los Angeles and San Fernando, for a 5-year period (for Water Year 2011-12 through 2016-17). That updated reassessment provided for several provisions which are to be adhered to in the future by those two cities, including the method of groundwater credit calculation for the SB. Groundwater storage credits can no longer be carried over for more than 5 years by either Party in the SB, and therefore credit calculation is now consistent with the Judgement. To address the potential loss of credits accumulated over time via the previous method of credit calculation, groundwater credits that existed for each Party previous to the re-assessment are "frozen" and available for use by the Party that owns the credits.

C. Key Results of Judgment

1. San Fernando Basin

The extraction rights under the January 26, 1979 Final ULARA Judgment for the San Fernando Basin are as follows:

a. Native Water

The City of Los Angeles has an exclusive right to extract and utilize all the native safe yield water in the SFB. This native safe yield, which was originally determined to be an average of 43,660 AFY, represents the Pueblo Water Right of the City of Los Angeles under the Judgment. Section 8.2.10 of the ULARA Judgment provides provisions for recalculation of the safe yield of any basin within ULARA upon request of the ULARA Administrative Committee, or on any motion of any Party and subsequent Court Order. Further, as stated in Section 8.2.10, if a material long-term change in storage has occurred over a base period, not including the effects of stored water, the safe yield of the SFB shall be adjusted by making a corresponding change to the native safe yield of the SFB.

b. Import Return Water

The cities of Burbank, Glendale, and Los Angeles each have a right to extract the following amounts of groundwater from the SFB.

- Burbank: 20.0 percent of all delivered water, including recycled water, to the valley fill land of the SFB and all of its tributary hill and mountain areas.
- Glendale: 20.0 percent of all delivered water, including recycled water, to the valley fill land of the SFB and all of its tributary hill and mountain areas.
- Los Angeles: 20.8 percent of all delivered water, including recycled water, to the valley fill land of the SFB, (excluding water delivered to hill and mountain areas).

c. Stored Water

Each of the cities of Burbank, Glendale, and Los Angeles has a right to store groundwater within and the right to extract equivalent amounts of groundwater from the SFB.

2. Sylmar Basin

a. Native and Import Return Water

The March 22, 1984 Stipulation assigned the cities of Los Angeles and San Fernando equal rights to the then-current total safe yield value of 6,210 AFY for the Sylmar Basin (see basin boundaries on Plate 1B). On July 16, 1996, the original Watermaster (Mr. Blevins) re-evaluated this safe yield value and established a temporary increase (for a 10-year period) in the safe yield of this basin from 6,210 AFY to 6,510 AFY. This temporary 10-year period ended on October 1, 2005, and triggered a re-evaluation of the safe yield of this basin by the then-current Watermaster (Mr. Mackowski). This re-assessment work was once again performed to be consistent with Section 8.2.10 of the Judgment. That re-assessment by the Watermaster (Mr. Mackowski) and by the special Consultant to the Watermaster (Mr. Blevins) resulted in a new Stipulation which was approved by the Court on December 13, 2006. This updated safe yield assessment permitted a temporary increase in the safe yield of the Sylmar Basin to 6,810 AFY, beginning October 1, 2006. That Stipulation also noted that the safe yield of the Sylmar Basin "shall be re-evaluated within 5 years after adoption of the Stipulation."

As stated previously, the current safe yield re-assessment of Sylmar Basin, subject to various conditions, is 7,140 AFY; this value is to be equally divided between the cities of Los Angeles and San Fernando.

The only other potentially active, but private, party with overlying rights within the Sylmar Basin is Santiago Estates, a successor to Meurer Engineering, M.H.C. Inc. Any future pumping by Santiago Estates would be deducted from the total safe yield of this basin and the cities of Los Angeles and San Fernando would then be permitted to equally divide the remainder of the safe yield value of this basin. However, for many years, no deductions have been needed because Santiago Estates has not pumped any groundwater from Sylmar Basin since the 1998-99 Water Year.

b. Stored Water

Each of the cities of Los Angeles and San Fernando has a right to store groundwater by in-lieu practices and also a right to extract equivalent amounts of groundwater from the Sylmar Basin.

3. Verdugo Basin

a. Native Water

The City of Glendale and the Crescenta Valley Water District (CVWD) have appropriative and prescriptive rights to extract 3,856 and 3,294 AFY of groundwater, respectively, from Verdugo Basin; refer to Plate 1C for the boundaries of this basin.

b. Import Return Water

The City of Los Angeles may have a right to recapture its delivered (imported) water in this basin upon application to the Watermaster and on subsequent order after a hearing by the Court pursuant to Section 5.2.3.2 of the Judgment.

c. Stored Water

There are no storage rights for any party in the Verdugo Basin based on the Judgment.

4. Eagle Rock Groundwater Basin

a. Native Water

The Eagle Rock Basin has only a limited native safe yield. Plate 1D provides the approximate boundaries of this small groundwater basin.

b. Imported Return Water

The City of Los Angeles delivers imported water to lands overlying this groundwater basin, and return flow from this delivered water is considered to constitute the majority of the safe yield of this small groundwater basin. Los Angeles has the right to extract, or to allow to be extracted, the entire safe yield of this basin.

c. Physical Solution Water

DS Waters (successor to Sparkletts and Deep Rock water companies) has a physical solution right to extract groundwater from Eagle Rock Basin pursuant to a stipulation with the City of Los Angeles, and as provided for in Section 9.2.1 of the Judgment.

d. Stored Water

There are no storage rights for any party in the Eagle Rock Basin, based on the Judgment, dated January 26, 1979.

IV. Description of ULARA Conditions

A. ULARA Boundaries

The Boundaries of ULARA are represented by the watershed boundary that is tributary to the Upper Los Angeles River. This watershed boundary completely surrounds the entire San Fernando Valley, the Verdugo, and Tujunga canyons (including the Verdugo Hills) along the northeastern side of the valley and Bell and Dry canyons on the west side of the valley. Figure 3, "Upper Los Angeles River Area, Components Map" illustrates the boundaries of ULARA and each of its four groundwater basins.

B. Cities within ULARA

Four major cities occur within the ULARA boundaries and/or share the same watershed area. These cities include:

1. The City of Los Angeles overlies most of the SFB, all of ERB, and portions of the SB and VB. The numerous communities and neighborhoods within Los Angeles in the SFB include:

    - Arleta
    - Chatsworth
    - Canoga Park
    - Eagle Rock
    - Encino
    - Granada Hills
    - Hidden Hills
    - Lake Balboa/Sepulveda Basin
    - Lake View Terrace/Hansen Dam
    - Mission Hills
    - North Hills
    - North Hollywood
    - Northridge
    - Pacoima
    - Panorama City
    - Porter Ranch
    - Reseda
    - Shadow Hills
    - Sherman Oaks
    - Studio City
    - Sunland/Tujunga
    - Sun Valley
    - Sylmar
    - Tarzana
    - Toluca Lake/Universal City (the latter being unincorporated)
    - Valley Glen/Valley Village

- Van Nuys
- West Hills
- Winnetka
- Woodland Hills

2. The City of San Fernando overlies most of the SB and extends southward into a small portion in the northern corner of SFB.
3. The City of Burbank overlies a portion of the eastern part of the SFB.
4. The City of Glendale overlies a portion of the eastern and southeastern portion of the SFB and also a portion of the VB.
5. The unincorporated communities of La Crescenta and Montrose lie within a portion of the VB.
6. The City of Calabasas overlies a small area in the western edge of the SFB.

C. Physiography and Land Use

The four groundwater basins and their watershed areas encompass a total surface area of approximately 513 square miles (328,500 acres). The lateral or ground surface boundaries of SFB are formed by non-water-bearing bedrock and/or crystalline basement rock in the adjoining hills/mountains, as follows: on the east and northeast by the San Rafael Hills, the Verdugo Mountains, and the San Gabriel Mountains; on the north by the San Gabriel Mountains and the eroded south limb of the Little Tujunga syncline which separates it from the SB on the north; on the northwest and west by the Santa Susana Mountains, Simi Hills and Chatsworth Hills; and on the south by the Santa Monica Mountains.

All valley areas of ULARA are highly urbanized and land use is predominantly commercial/residential. According to the Southern California Association of Governments database, the groundwater basin areas of ULARA are 93% urbanized (no distinction is made in the data set with respect to commercial versus residential properties), based on data from the year 2000. There are two airports in SFB; Van Nuys Airport on the west and the much larger Bob Hope Airport in Burbank on the east. There remains only minor agricultural land in the western portion of SFB (e.g., Tapia Farms). The remaining land uses are flood control basins (e.g., Sepulveda), reservoir storage (e.g., Van Norman Lake) and five spreading basins (Hansen, Pacoima, Lopez, Tujunga and Bradford spreading grounds) which are operated by the Los Angeles County Department of Public Works and/or the City of Los Angeles Department of Water & Power (LADWP). A historic spreading area, Headworks, is no longer in operation, and a reservoir is being built at that site for use by the City of Los Angeles. The watershed areas to the east-northeast of SFB consist of a National Forest (in the San Gabriel Mountains), whereas the hill and mountain areas on the south and west sides of ULARA are predominantly residential and covered by native vegetation, with occasional but small interspersed park areas.

D. Climate and Rainfall

Precipitation within ULARA varies considerably on a seasonal basis and also from year to year, depending on such local factors as topography and elevation. Mean annual precipitation ranges from about 14 inches at the western end of the SFB to 33 inches within the higher elevations of the watershed in the San Gabriel Mountains in the easterly portion of ULARA. Approximately 80 percent of the annual rainfall in ULARA occurs from December through March. Table 2, "Raingage Data for the ULARA," provides rainfall data for several rain gages on the valley floor areas and in the hill and mountain areas, whereas Figure 3, "Components Map," illustrates the locations of these rain gages (stations).

Table 2 shows that during the 2012-13 Water Year, the weighted average rainfall from all rainfall stations on the valley floor areas was 7.71 inches (47 percent of the 100-year mean), whereas the weighted average annual rainfall from all rainfall stations in the hill and mountain areas was 9.35 inches (43 percent of the 100-year mean). The weighted average from all rainfall stations on the valley floor and in the hill and mountain areas in the 2012-13 Water Year was 8.72 inches (44 percent of the 100-year mean). It is clear from these data that the several-year-long drought continues in the region.

Because rainfall has a significant impact on groundwater levels and, hence, on the availability and recharge of groundwater to the four ULARA groundwater basins, the Watermaster acquired additional rainfall data available from a local raingage, the City of Burbank Valley Pump Plant gage, whose database extends from 1946 to 2014. This rainfall data was accessed through the Western Regional Climate Center (WRCC) website. As shown in the Annual Watermaster Report, the long-term average annual rainfall for the period of record for this Burbank gage has been 15.88 inches.

E. Surface Water Drainage

The drainage system in ULARA is made up of the upper reaches of the Los Angeles River and its tributaries. Natural flow in the river and its tributaries in ULARA occurs strictly on an ephemeral basis, that is, solely during and immediately after a rainfall event. Surface water flow in ULARA originates as: runoff from the hills and mountains; runoff from the impervious areas of the valley floor; industrial and sanitary waste discharges; domestic irrigation runoff; and rising groundwater.

Industrial discharges and irrigation runoff upstream of Gage F-57C-R are relatively small but cumulatively contribute a moderate amount of surface flow to the Los Angeles River. Field inspection by others in 1998-99 confirmed (but did not quantify) year-round unmetered flows of domestic irrigation runoff from residential areas, golf courses and industrial sites at this gage.

A majority of the drainages within ULARA are concrete lined, which inhibits interaction between surface water with groundwater. Figure 4, “Surface Water Channels” shows a map of the “open” surface water channels of the Los Angeles River system within the ULARA groundwater basins, as adapted from data compiled by the LACDPW. These data are freely available from the online LA County GIS Data Portal. Figure 4 shows which of those channelized reaches are concrete lined and which have open bottom; the map also shows the locations of natural (non-channelized) drainages. Of the natural and channelized drainages shown on the map, 83% have cement-lined bottoms, whereas the remaining 17% are unlined (natural bottom).

1. Stream Gages

A number of stream gaging stations are maintained throughout ULARA, either by the Los Angeles County Department of Public Works (LACDPW) or the United States Geological Survey (USGS). For the Annual Watermaster Report, six key gaging stations have been utilized over the years to identify the annual surface water runoff from the main tributary areas of the ULARA watershed. From upstream to downstream, these six gaging stations (the locations for which are shown on Figure 3) include:

a. Station F-118B-R, which registers all releases from Pacoima Dam. Runoff below this point flows to the Los Angeles River through lined channels, or can be diverted to the Lopez and Pacoima spreading grounds when excess rainfall has occurred.

b. Station F-168-R, which records all releases from Big Tujunga Dam. This dam collects runoff from the watershed which lies in the hill and mountain area to the northeast. Runoff below this point flows to Hansen Dam and then to the Los Angeles

River. These releases can be diverted to the Hansen or Tujunga spreading grounds for use in artificial recharge.

c. Station F-300-R, which registers all flow in the main channel of the Los Angeles River west of Lankershim Boulevard, and which includes the outflows from Pacoima and Hansen dams which are not otherwise diverted to the spreading grounds. These records also include flow through the Sepulveda Dam and releases of reclaimed wastewater discharged by the City of Los Angeles from its nearby Donald C. Tillman Water Reclamation Plant (WRP).

d. Station E-285-R, which monitors flow from the westerly slopes of the Verdugo Mountains and tributary areas of the watershed located east of Lankershim Boulevard. This station also records releases of reclaimed wastewater discharged by the City of Burbank from its WRP.

e. Station F-252-R, which registers flow from Verdugo Canyon including flows from Dunsmore and Pickens canyons.

f. Station F-57C-R, which lies in the main channel of the Los Angeles River and records all surface water outflows from ULARA (see location on Figure 3).

   Table 3 summarizes the monthly runoff for these six stations for Water Years 2011-12 and 2012-13.

Surface flow of the Los Angeles River at Station F-57C-R consists of:

a. Treated wastewater from the Donald C. Tillman, Burbank, and Los Angeles-Glendale WRPs;

b. Industrial discharges and domestic irrigation runoff; and,

c. Rising groundwater from the thin alluvial-type sediments that overlie no water-bearing bedrock along this narrow reach of the River.

Storm flows are typically the largest component of the total surface flow recorded at Gage F-57C-R, and these storm flows occur principally in the winter months (Table 3).

F. Sources of Water Supply

1. Imported Water Supplies

Water is imported into ULARA from three major sources: from northern California via the Sacramento/San Joaquin Delta; from the Colorado River via MWD; and from the Owens Valley and Mono Basin on the eastern side of the Sierra Nevada via the Los Angeles Aqueduct. Specifically, imports to ULARA include: MWD imports river water from both northern California (the State Water Project) and from the Colorado River, within its 242-mile long Colorado River Aqueduct; LADWP imports to the City of Los Angeles (including those portions of the city in ULARA) via the City-owned Los Angeles Aqueduct.

The continued growth of residential, commercial, and industrial developments has necessitated an increase in the annual volume of water imported to ULARA to supplement the local groundwater supplies over time. Table 5, “ULARA Water Imports and Exports,” provides a summary of ULARA imports and exports for the time period of Water Years 2011-12 through 2012-13.

2. Exported Water Supplies

Exports from ULARA include imported Los Angeles Aqueduct water and MWD water (pass-through water), and groundwater extracted by LADWP from the SFB that is transmitted to other portions of Los Angeles outside of ULARA. Exports of wastewater not treated and released into the Los Angeles River are sent by pipeline directly to the Hyperion Treatment Plant near the Playa Del Rey area of the City of Los Angeles. Recent constraints on water supply sources in the Eastern Sierra Nevada and Owens Valley have reduced the availability of water from these sources for import into ULARA; however, the Parties have tried to manage this water supply challenge, in part, by enacting water conservation measures thereby reducing local demands for water.

3. Local Groundwater Supplies and Rising Water

A significant portion of water supply for the cities within the ULARA is derived primarily from water-supply wells owned and operated by the five municipal-supply Parties to the Judgment (the cities of Burbank, Glendale, Los Angeles and San Fernando and the Crescenta Valley Water District). Figure 5, “Municipal Wellfield Locations,” shows the location of the various wellfields owned by these Parties in ULARA. The groundwater pumped by these wellfields is mainly derived from natural recharge to the local aquifer systems from rainfall runoff, and also to a much lesser extent by artificial recharge of stormwater and, more recently, imported water in local spreading basins.

Rising groundwater is a constant source of water loss from the Verdugo and San Fernando groundwater basins. Rising groundwater occurs above the Verdugo Narrows Wash, and in the unlined reach of the Los Angeles River immediately upgradient from Gage F-57C-R (this narrow reach of the river is commonly known as the Los Angeles Narrows). Outflow at Gage F-57C-R includes rising groundwater leaving VB past Gage F-252-R (Table 3).

In the Report of Referee (1962, Volume II, Appendix O), procedures were developed for the calculation of rising groundwater for the original base period for that study of 1928 to 1958. Rising groundwater within ULARA occurs as groundwater that leaves the groundwater basins and becomes surface flow within the Los Angeles River. Some of the important factors of that study are no longer significant, and include: releases of Owens River water; operation of the Chatsworth Reservoir; and operation of the Headworks Spreading Grounds. As shown on Figure O-2 of the Report of Referee (1962), excess rising groundwater was considered to have declined to essentially zero by the late-1950s. The January 1993 report by Brown and Caldwell, "Potential Infiltration of Chlorides from the Los Angeles River Narrows into the Groundwater Aquifer," assessed groundwater levels along the course of the Los Angeles River; the then-current Watermaster provided the data for that 1993 evaluation. As of the end of the drought period in 1977, groundwater levels in the Los Angeles River Narrows were very low, with very little potential for creating excess rising groundwater at that time. However, increased rainfall and runoff occurred during the 1978-83 period, which, combined with reduced pumping by the Los Angeles-owned Crystal Springs, Grandview, and Pollock wellfields, induced large rises in groundwater levels in the Los Angeles River Narrows. Such elevated groundwater levels that follow periods of heavy rainfall and decreased groundwater pumping also tend to increase the amounts of rising groundwater.

Finally, the methodology used to calculate rising groundwater, shown in Table 4, "Estimated Separation of Surface Flow at Stations F-57C and F-252-R," needs to be improved. Over the years, many of the gaging stations in the Los Angeles River and its tributaries have been lost or abandoned. Actual data from these gaging stations have been replaced by estimates, and the LADWP-operated groundwater flow model for the SFB has been used to check the results. Although the current methodology provides an approximation, it is considered to be less accurate than using actual gage data. To improve the calculation of rising groundwater, the abandoned or lost gaging stations need to be identified, and then these stations should be either rehabilitated or replaced entirely. The current Watermaster, along with staff from the LACDPW, are taking steps to repair/replace some of these gages.

G. Groundwater Recharge Facilities

1. Spreading Basins

Precipitation has a direct influence on groundwater recharge and, ultimately, on the amount of groundwater in storage in the four local groundwater basins. Urban development in ULARA over time has resulted in a significant portion of the rainfall being collected and routed into lined channels that discharge directly and/or ultimately into the Los Angeles River. To partially offset the increased runoff due to urbanization, Pacoima, Big Tujunga and Hansen dams, originally built for flood control, are now being utilized to regulate and permit recapture of a portion of the storm flows for eventual discharge into downstream spreading basins which are located on the northeast side of the SFB; the spreading basins are owned/operated by the LACDPW and/or the City of Los Angeles.

The LACDPW operates the Branford, Hansen, Lopez, and Pacoima spreading grounds, whereas the LACDPW, in cooperation with the City of Los Angeles, operates the Tujunga spreading grounds (see Figures 3 and 5). These spreading grounds are primarily used for the artificial recharge of native water (stormwater runoff). Table 6, “Annual Spreading Operations in the San Fernando Basin,” summarizes spreading operations at all spreading basins since the 1968-69 Water Year.

2. Low Impact Development (LID) Projects

For LID projects, the current ULARA Watermaster continues to review the recharge-related elements of any proposed development and/or re-development project in the portion of the City of Los Angeles that lies in the San Fernando Valley portion of ULARA. In regard to stormwater infiltration, the RWQCB promulgated its National Pollutant Discharge Elimination System (NPDES) permit process in 1990 to help minimize the impacts of stormwater and urban runoff on the receiving water bodies in its sphere of influence (i.e., the Los Angeles River and the Pacific Ocean). The goal of their NPDES process was to minimize the impacts on the river, and ultimately to the ocean, by reducing the volume and improving the quality of surface water runoff from storm events. All local rainfall and surface water runoff from any proposed new developments and/or redevelopments located within the ULARA watershed boundary would normally drain into the Los Angeles River and eventually to the ocean.

Several years after the implementation of the NPDES process, the City of Los Angeles, Department of Public Works, Bureau of Sanitation, Watershed Protection Division (LAWPD), promulgated a series of guidelines intended to increase the capture and onsite infiltration of stormwater at all proposed developments and redevelopments throughout the City. These guidelines established the requirements and limitations for utilizing onsite stormwater infiltration and also specified an order of preference, via a set of Best Management Practices (BMPs) for providing Low Impact Development (LID) improvements at each development and/or redevelopment site in the City. In the early years of this effort, the LID program was known as the Standard Urban Stormwater Management Program (SUSMP).

The specific order of the BMP preference list was established by the LAWPD to collect and provide basic “treatment” of onsite stormwater runoff, and to help increase the amount of infiltration (i.e., deep percolation) from the initial ¾-inch of rainfall from each storm event at all new development and redevelopment sites in the City. The end result is intended to reduce the volumes of contaminated stormwater runoff that enter the storm drain system (from each new storm event) and simultaneously help reduce the volume and enhance the quality of the runoff that enters the Los Angeles River and ultimately the Pacific Ocean. Turbidity and potential urban-derived contaminants in the captured runoff could be reduced by the “treatment” effects of the various stormwater infiltration systems proposed via the BMPs. From a hydrogeologic perspective, and in the opinion of this Watermaster, whenever and wherever (with certain exceptions) deep percolation (infiltration) of stormwater can be appropriately enhanced, then recharge to the underlying groundwater reservoir (in this case, the San Fernando Groundwater Basin) can be beneficially increased.

On a case-by-case basis, the current ULARA Watermaster provides his opinion regarding the acceptability of the possible infiltration of stormwater that is to be captured by the LID improvements that are recommended for each new development and/or redevelopment in the City portion of the San Fernando Valley. The cities of Burbank and Glendale provide their own reviews of local LID projects. Figure 6, “Low Impact Development Locations,” shows the locations of the numerous LID project sites that have been evaluated by the current Watermaster since 2009 for onsite infiltration of collected stormwater.

H. Water Reclamation Plants

A significant factor affecting surface water runoff in the Los Angeles River has been the releases of treated wastewater over time by the three local WRPs mentioned above. Specifically, releases from the Los Angeles-Glendale WRP, the Burbank WRP, and the Donald C. Tillman WRP appear to have begun in 1976-77, 1967, and 1985, respectively. Figure 3 shows the approximate locations of each of these WRPs.

Releases of treated wastewater also have an influence on rising groundwater. These large year-round releases tend to keep the alluvium beneath the Los Angeles River saturated, even in dry years. Nevertheless, there is some opportunity for continuing percolation in the unlined reaches of the river, both upstream and downstream of the lined section near the confluence of the Verdugo Wash and the Los Angeles River. Water percolating in the unlined reach is thought to percolate through the shallow alluvial zones and to re-appear as rising groundwater at a location downstream from Los Feliz Boulevard.

Water recycling presently provides a source of water for irrigation, industrial, and recreational uses. In ULARA, recycled water has many uses, including: urban landscape irrigation; agricultural irrigation; industrial and commercial process water; recreational facilities (such as golf courses); wildlife habitat maintenance; and green belts along major roads and freeways. In the future, water recycling could provide additional water for groundwater recharge in the SFB at existing and/or new spreading basins, and/or at new injection wells wherein the recycled water could be injected directly into the local aquifer systems. Also, future regulations in the State may allow the direct potable reuse of recycled water; studies to determine the feasibility of such reuse are ongoing. Upcoming Technical Memorandum 4 for the ULARA SNMP will include a detailed list and description of possible future projects within ULARA that could use recycled water for groundwater replenishment purposes.

Four WRPs are in operation in the ULARA, including the Donald C. Tillman, Los Angeles-Glendale, Burbank, and the Las Virgenes Municipal Water District Tapia plants; the latter facility is located west of the southwestern boundary of ULARA, but some of the water treated at this facility is used in ULARA. Table 7, “Water Recycling Plants and Water Use,” summarizes the operations at these four WRPs in Water Year 2012-13, whereas Plate 5 of the Annual Watermaster Report in the Appendix shows the locations of these facilities.

I. General Geologic Conditions

The ULARA boundaries include a complex and varied set of geological conditions consisting of: sedimentary deposits (younger, stream deposited alluvium, generally older alluvial fan deposits, and/or the Saugus Formation – depending on basin) in the valley areas; and geologically older sedimentary bedrock and/or crystalline basement rocks in the hill and mountain areas. These older rocks also underlie all potentially water-bearing deposits that comprise each of the four groundwater basins in ULARA. Faulting is prevalent throughout ULARA with the San Gabriel fault extending from east to northeast along the base of the entire San Gabriel Mountains. Movement along the Pacoima section of this fault in 1971 resulted in the San Fernando Valley earthquake event. The subsequent Northridge event in 1994 occurred along the less well known Northridge fault in the northern portion of SFB. Another fault, the Verdugo fault, traverses in a northwesterly direction across the eastern side of SFB; this fault appears to create a partial barrier to groundwater flow.

For the four ULARA groundwater basins, the potentially water-bearing sediments are comprised by various young and old alluvial fan-type deposits. In the San Fernando and Sylmar basins, the potentially water-bearing sediments also include various strata of the Saugus Formation that directly underlie the geologically younger and older alluvial-type deposits. Exposed at ground surface in all of the hill and mountain watershed areas of ULARA, and also known to directly underlie all potentially water-bearing sediments within the four ULARA groundwater basins, are geologically older sedimentary rocks and even older metamorphic and crystalline basement rocks. These geologically older rocks are either well-lithified, cemented and/or crystalline in nature, and therefore the groundwater storage capacity of these rocks is low and their long-term sustained yield is unpredictable; only limited quantities of water can be yielded to wells. Figure 7, “General Geologic Map,” illustrates the local geologic conditions in the ULARA region. Also shown on Figure 7 are the faults in the region as mapped by others.

V. Basic Hydrogeologic Conditions

A. Potentially Water-Bearing Materials

Potentially water-bearing sediments within the ULARA consist of, from geologically youngest to oldest, Pleistocene- and Holocene-aged alluvium, and the lower Pleistocene Saugus Formation (SWRCB 1962). Groundwater in the alluvial-type sediments occurs principally under unconfined (water table) conditions whereas groundwater in the somewhat older Saugus Formation is considered to occur under semi-confined to confined conditions. The average specific yield for deposits within the basin varies from about 14 to 22 percent (LADPW, 1934). Yields in typical wells in SFB are on the order of 1,200 gpm and have a maximum of about 3,500 to 4000 gpm. In the SB and VB, typical well yields are in the range of ±500 gpm and 150 gpm, respectively.

Groundwater flow and groundwater in storage in the alluvial sediments and the Saugus Formation occur in the pore spaces between the individual sediment grains and is controlled by its permeability, which is a measure of the ability of the sediments to transmit water. As such, these sediments have primary porosity and permeability. Such primary porosity and permeability tends to differ laterally and vertically depending on the grain size, orientation of these grains, roundness and sorting of the grains, and the degree of compaction of the sediments. For example, the smaller the grain size, the larger the porosity tends to be, but permeability tends to be lower. Silts and clays fall into this category, whereas coarse-grained sand and gravel tend to have lower porosity but much greater permeability.

1. Alluvial-type Sediments

The alluvial sediments within the ULARA groundwater basins consist primarily of coarse-grained unsorted gravel and sand deposited by coalescing alluvial fans emanating from the surrounding hill and mountain areas. The amount of clay in these alluvial deposits increases from about 20 percent in the east, to about 70 percent on the west side of the SFB. The lower clay content results in higher permeability and specific yield in the central to eastern parts of the SFB (SWRCB 1962; ULARA 1995). Based on recent, unpublished work by the ULARA Watermaster, the maximum thickness of these alluvial deposits in the SFB ranges from about 100 feet on the north and west, to perhaps 200 to 300 feet on the east side of the SFB. In ULARA, the alluvium generally consists dominantly of highly permeable, unconsolidated coarse-grained alluvial fan deposits interspersed with lower permeability paleosols (SWRCB 1962). A series of geologic cross sections of each of the ULARA groundwater basins are included in the Original Report of Referee, Plates 5, and 5A through 5J. Those figures are included herein in the Appendix.

2. Saugus Formation

The Saugus Formation is composed of continental and shallow marine deposits which consist of conglomerates, sands, silts, and clays; its porosity and permeability is less than that of the overlying alluvium (SWRCB 1962). The shallow marine portion of this formation is known as the Sunshine Ranch Member, and it is considered to occur in the lower (older) part of the formation. The Saugus Formation has a maximum thickness of ± 1,000 ft in the eastern part of SFB, but this formation becomes thinner and eventually pinches out roughly near White Oak Blvd in the western portion of SFB. The entire Saugus Formation reportedly may attain a maximum thickness of 12,000 feet in the northern part of the SB.

B. Non-water-Bearing Rocks

Non-water-bearing rocks in ULARA generally consist of massive granitic and metamorphic basement complex rocks that occur primarily in the foothill and mountain areas. Groundwater in these types of rocks tend to be present and stored within fractures, joints and along faults and permeability is controlled by these structures. Primary porosity and permeability in these rocks play a minor role in the flow of groundwater through these types of rock. These crystalline rocks are represented by outcrops of granitic rocks diorite gneiss, serpentine, anorthosite-gabbro complex, and the Santa Monica Slate, among others.

In addition to the crystalline rocks, portions of the hill and mountain areas within ULARA are underlain by fine-grained, sedimentary rocks. While these sedimentary rocks may be able to yield small amounts of groundwater to wells for the purposes of single-family domestic supply, these rocks do not represent a significant source of groundwater within ULARA. Typical sedimentary formations that are exposed in the foothill and mountain areas of ULARA are represented by several geologic formations, including: the Calabasas Formation; the Chatsworth Formation; the Modelo Formation; the Pico Formation; the Topanga Formation; the Towsley Formation; and the Trabuco Formation.

C. Impact of Geologic Structure on Groundwater Flow

There are certain geologic structures in the ULARA that tend to influence the flow of groundwater. For example, a step in the basement rock complex resulting from movement on the Verdugo fault and/or the Eagle Rock fault causes groundwater to “cascade” down to the south occurs near the mouth of Verdugo Canyon (SWRCB 1962). To the north, the Verdugo fault is considered to be a partial barrier to flow that causes a change in water levels in the vicinity of the Bradley Landfill and the Hansen Spreading Grounds.

Differences in rock types along the Raymond fault create a barrier to groundwater flow from the Eagle Rock area toward the Los Angeles River Narrows and appear to cause rising water conditions (SWRCB 1962). Other unnamed faults may cause changes in groundwater in the Sunland, Chatsworth, and San Fernando areas and at the mouths of the Little Tujunga and Big Tujunga Canyons (SWRCB 1962). The Little Tujunga syncline affects groundwater movement in the northern part of the basin and folds associated with the Northridge Hills, Mission Hills and Lopez faults also affect groundwater movement (SWRCB 1962). Old subsurface dams constructed many decades ago in Pacoima Wash and Sylmar Wash near Pacoima and also in Verdugo Canyon may also still be partial barriers to groundwater flow (SWRCB1962).

VI. Groundwater Basins Within ULARA

A. DWR Terminology

Reports prepared by the Department of Water Resources (DWR, 2003, 2004) provide basic descriptions and the names and approximate boundaries of the ±515 groundwater basins in the State. According to DWR, only a single groundwater basin has been identified in ULARA. This basin is known by DWR as the San Fernando Valley Groundwater Basin (SFVGWB). The DWR (2004) designates the SFVGWB as Basin No. 4-12 within the South Coast Hydrologic Region. The DWR cites the SFVGWB as consisting of 145,000 acres (226 square miles).

B. ULARA Terminology

A system of names for each of the groundwater basins in the ULARA has been developed as part of the original adjudication of the region and is based on distinct geological/hydrogeological characteristics that provide for separation of these basins. As such, the Court-adjudicated system of ULARA basin names is different from that developed by DWR. Figures 1 and 2 illustrate the location of each groundwater basin in ULARA, as identified in the 1979 Judgment. The following provides a short description of each of the four Court-adjudicated groundwater basins in ULARA.

1. San Fernando Groundwater Basin

The SFB, the largest of the four basins within the ULARA, consists of 112,000 acres, or 91.2% of the total valley fill area in ULARA. This groundwater basin generally consists of an unconfined alluvial aquifer system that lies between the Santa Monica Mountains on the south, the Simi Hills on the west, the Santa Susana Mountains on the northwest, and the San Gabriel

Mountains and Verdugo Hills on the northeast, with a relatively thin finger extending eastward into the Tujunga Canyon between the San Gabriel Mountains and the Verdugo Hills. Underlying those alluvial deposits in SFB are potentially water-bearing sediments of continental and marine origin that are assigned to the Saugus Formation.

2. Sylmar Groundwater Basin

SB is a confined aquifer system separated from the SFB by the Sylmar fault zone. It lies in the north-central portion of the ULARA, contains approximately 5,600 acres and comprises only 4.6% of the total valley fill area of the ULARA. It is bounded on the north and east by the San Gabriel Mountains, on the west by a topographic divide in the valley fill between Mission Hills and the San Gabriel Mountains, on the southeast by Mission Hills, on the east by the Saugus Formation along the east bank of Pacoima Wash, and on the south by the eroded south limb of the Little Tujunga syncline, separating it from the SFB to the south Report of Referee, 1962). Potentially water-bearing sediments in SB include the alluvial-type deposits and the strata of the Saugus Formation.

3. Verdugo Groundwater Basin

VB is located in Crescenta Valley, a down-dropped block between the San Gabriel Mountains to the northeast, and the Verdugo Mountains to the southwest; this basin lies east of the groundwater divide that separates it from the finger of the SFB that extends along Tujunga Canyon. In contrast to the other nearby groundwater basins, the VB is relatively small in area and relatively steeply sloping. It is comprised by alluvial deposits that are relatively thin and have relatively low hydraulic conductivity (Geomatrix, 2005). This groundwater basin has an area of 4,400 acres and comprises only 3.6% of the total valley fill area of ULARA.

4. Eagle Rock Groundwater Basin

The ERB is the smallest basin within the ULARA and least significant in terms of groundwater supply and groundwater in storage. It is located in the extreme southeastern edge of the ULARA. Consisting only of approximately 800 acres, it comprises only 0.6% of the total valley fill area in ULARA.

VII. WATER WELLS AND WELLFIELDS

Each of the five municipal-supply Parties to the 1979 Judgment have established water rights to which they must conform when actively pumping groundwater from their own water wells. In addition to those parties to the Judgment, there are several dewatering wells and sumps that are used to control groundwater seeping into subterranean garages and structures. In addition, there are a number of cleanup wells at various sites within ULARA that are being pumped to remediate hazardous waste sites. Each of these two latter types of pumpers do not have any water rights, and they must reimburse the local City for the amount of water they extract on a per acre-foot basis. Figure 5 and Figure 8, "General Locations for Other Groundwater Producers," illustrate the general locations of municipal-supply wellfields, dewatering well/sump sites and sites that have cleanup wells. In this section, only municipal-supply water wells are discussed.

A. San Fernando Groundwater Basin

In the SFB, three parties have rights to pump groundwater, namely the cities of Burbank, Glendale and Los Angeles. The following sections discuss the wells that these cities use to pump groundwater from the basin, for the 2012-13 Water Year.

1. City of Burbank

The City of Burbank currently pumps 8 wells in the Burbank Operable Unit (BOU), defined as part of the U.S. Environmental Protection Agency (EPA) Superfund area in the eastern portion of SFB. These wells are known as VO-1 through VO-8. There are also seven other inactive wells owned by the Burbank Department of Water & Power (BWP) namely; Well Nos. 6A, 7, 12, 13A, 15, 11A and 12. Thus, Burbank has a total of 15 wells in this groundwater basin.

2. City of Glendale

The City of Glendale actively pumps a total of eight wells in its Glendale Operable Unit (another part of the EPA's Superfund area in the eastern portion of SFB). This GOU previously was comprised by a Glendale North OU (which currently has 4 active wells, GN-1 through GN-4), and by a Glendale South OU (which currently also has 4 active wells, GS-1 through GS-4). Two other wells, known as STPT 1 and STPT 2 are used to pump groundwater from the SFB.

3. City of Los Angeles

The City of Los Angeles has several wellfields that are used to pump groundwater from the basin; Figure 5 shows the approximate locations of the following LADWP-owned wellfields:

- Aeration Wellfield located in the North Hollywood Operable Unit (NHOU); three active wells consisting of Well Nos. A-6 through A-8.
- Erwin Wellfield; no currently-active wells.
- Headworks Wellfield; no currently-active wells.
- North Hollywood Wellfield,;13 active wells consisting of Well Nos. NH-4, NH-22, NH-23, NH-25, NH-26, NH-32, NH-33, NH-34, NH-36, NH-37, NH-43A, NH-44, and NH-45.
- Pollock Wellfield; three active wells consisting of Well, Nos. P-4 and P-6.
- Rinaldi-Toluca Wellfield, 8 active wells consisting of Well Nos. RT-2 through R-9.
- Tujunga Wellfield; 10 active wells consisting of Well Nos. TJ-1 through TJ-9, and TJ-12.
- Verdugo Wellfield; no currently-active wells.
- Whitnall Wellfield; no currently-active wells.

B. Sylmar Groundwater Basin

Three parties have rights to pump in the SB: the City of Los Angeles, the City of San Fernando, and Santiago Estates; however, the private party known as Santiago Estates has not pumped any groundwater from Sylmar Basin since the 1998-99 Water Year. Each city has one wellfield within SB; the San Fernando wellfield is located near the southeastern boundary of the basin, whereas Los Angeles's Mission wellfield is located in Mission Hills, along the southwest boundary of this basin. In Water Year 2013-14, no wells were active in Los Angeles's Mission Wellfield, although the City was preparing to drill and test some new possible well sites in the basin. Wells 2A and 4, owned by the City of San Fernando, were active in Water Year 2013-14.

C. Verdugo Groundwater Basin

1. City of Glendale

The City of Glendale has four active wells in VB in Water Year 2013-14, namely Glorietta Well Nos. 3, 4, and 6, and the Foothill Well. Verdugo Wells A & B are currently offline pending well rehabilitation. In 2010 Glendale drilled the new Rockhaven well and in 2014 it entered into an Agreement with Crescenta Valley Water District (CVWD) for the operation of the Rockhaven Well.

2. Crescenta Valley Water District

Crescenta Valley Water District (CVWD) has a total of 12 active wells in VB, including numbers 1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 14, and 15. In addition, CVWD obtains some of its supply from the Pickens Tunnel, which is located within Pickens Canyon in the foothills of the San Gabriel Mountains on the north side of VB. CVWD has also recently entered into a water purchase and land lease agreement with the City of Glendale to pump the new Rockhaven well in the La Crescenta-Montrose area, and will soon begin active groundwater production from this well.

D. Eagle Rock Groundwater Basin

There is only one pumper in the ERB, namely DS Waters, which produces groundwater for its commercial bottled water plant. Three water-supply wells have been used at its Eagle Rock facility for this purpose. DS Waters compensates the City of Los Angeles for the groundwater it pumps from this basin.

VIII. References

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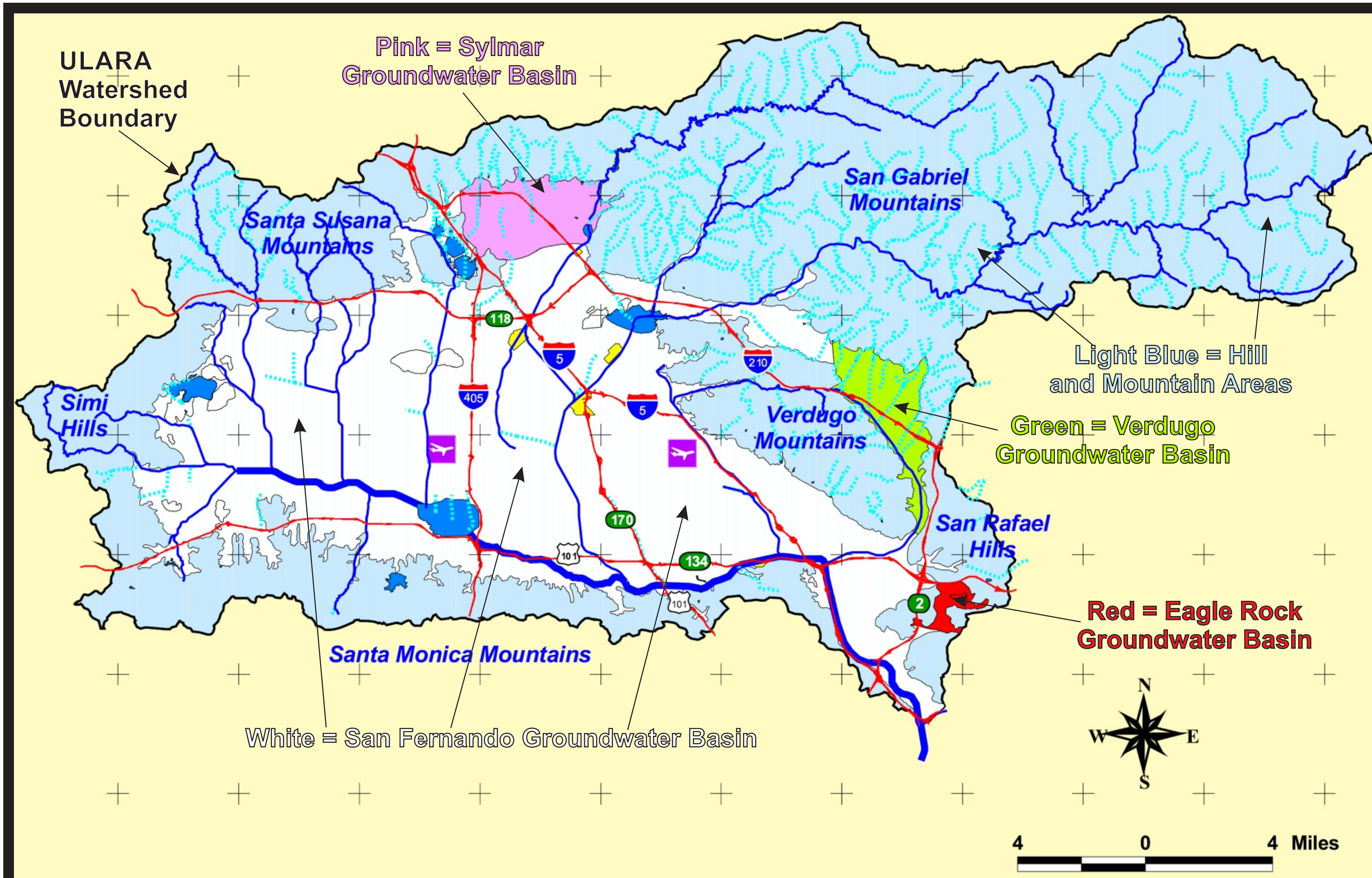

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FIGURE 1
ULARA LOCATION MAP

Job No. 500-LAS12

July 2016

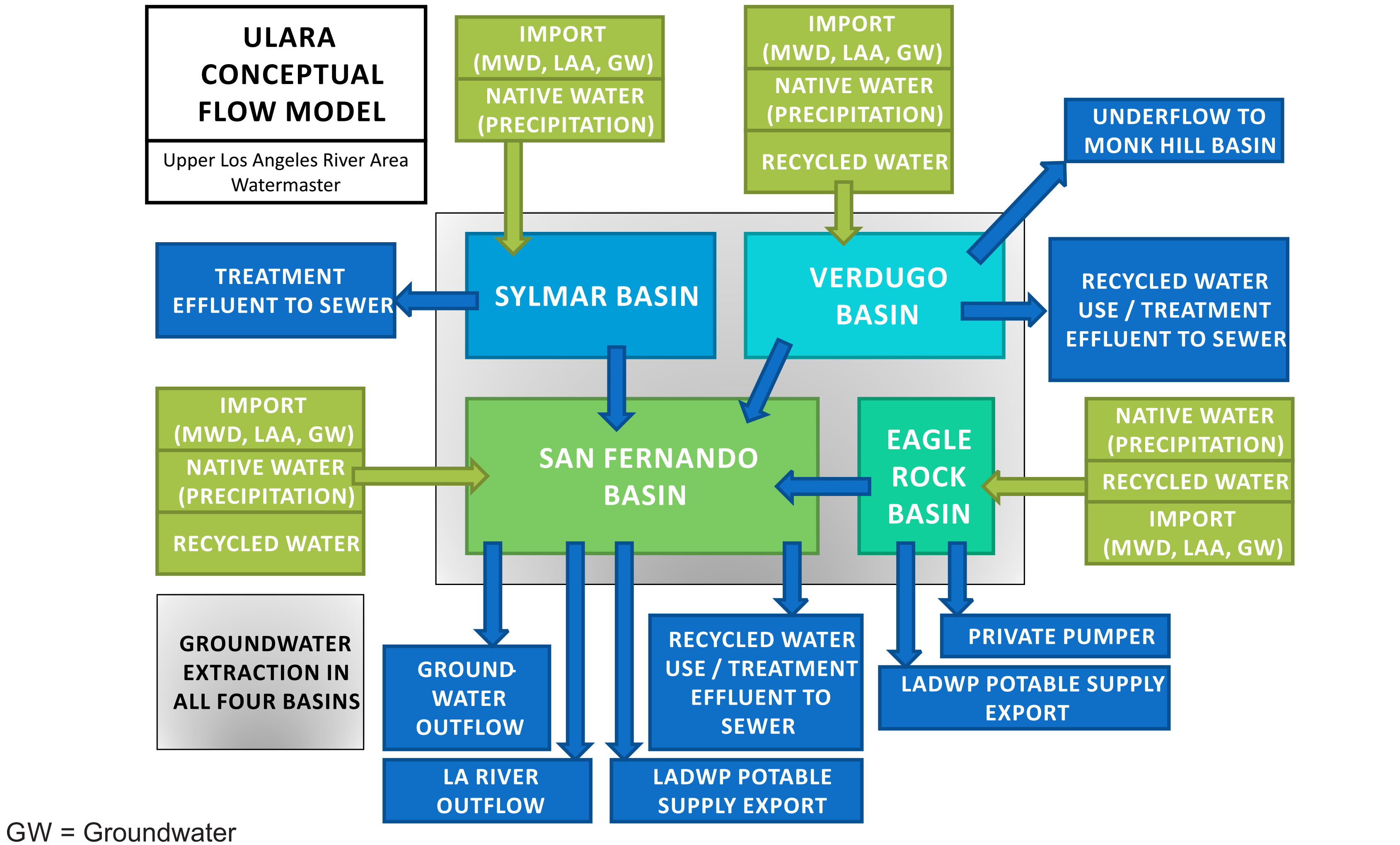

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FIGURE 2
ULARA CONCEPTUAL FLOW MODEL

Job No. 500-LAS12 **July 2016**

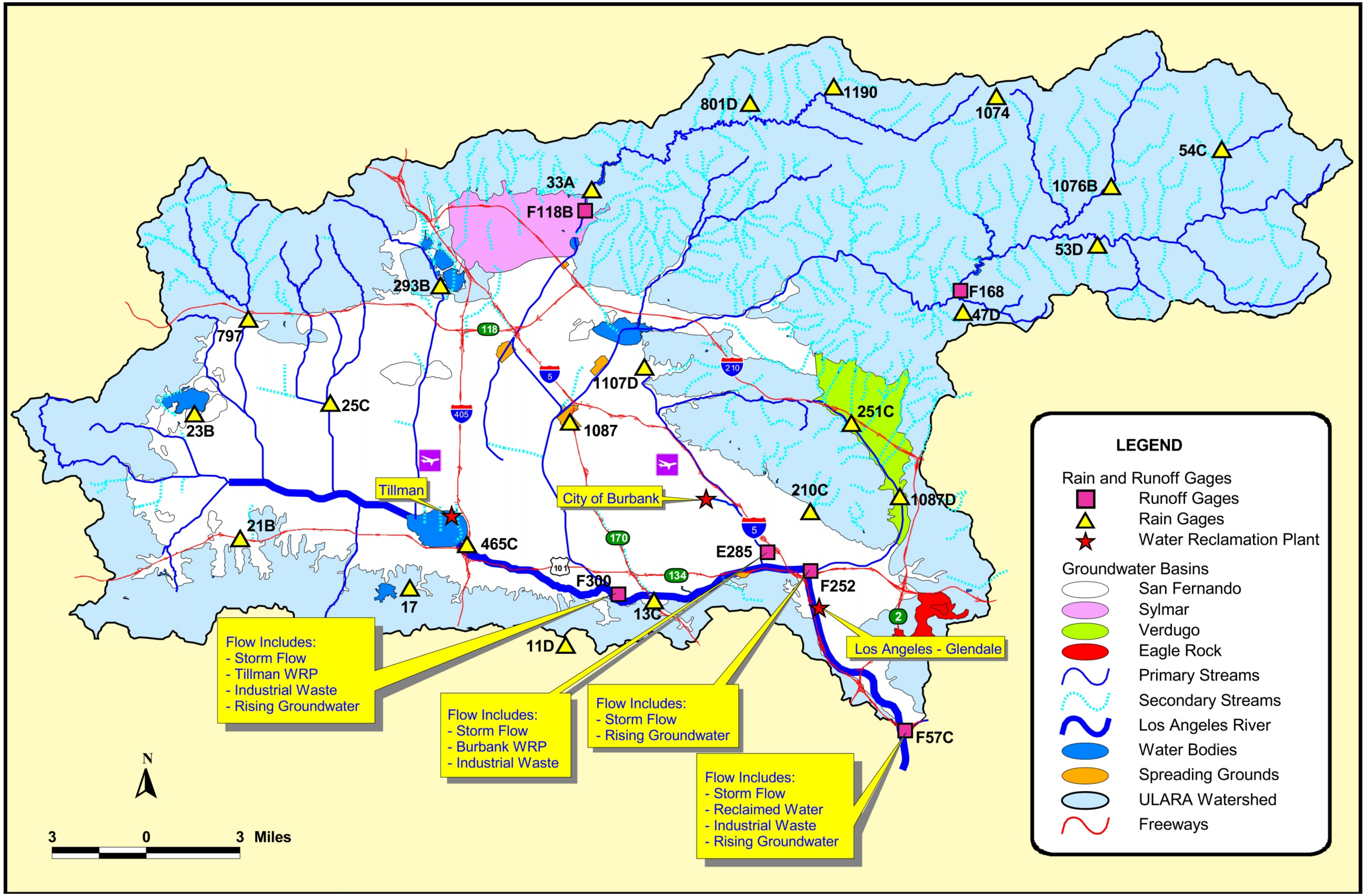

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FIGURE 3
COMPONENTS MAP

Job No. 500-LAS12

July 2016

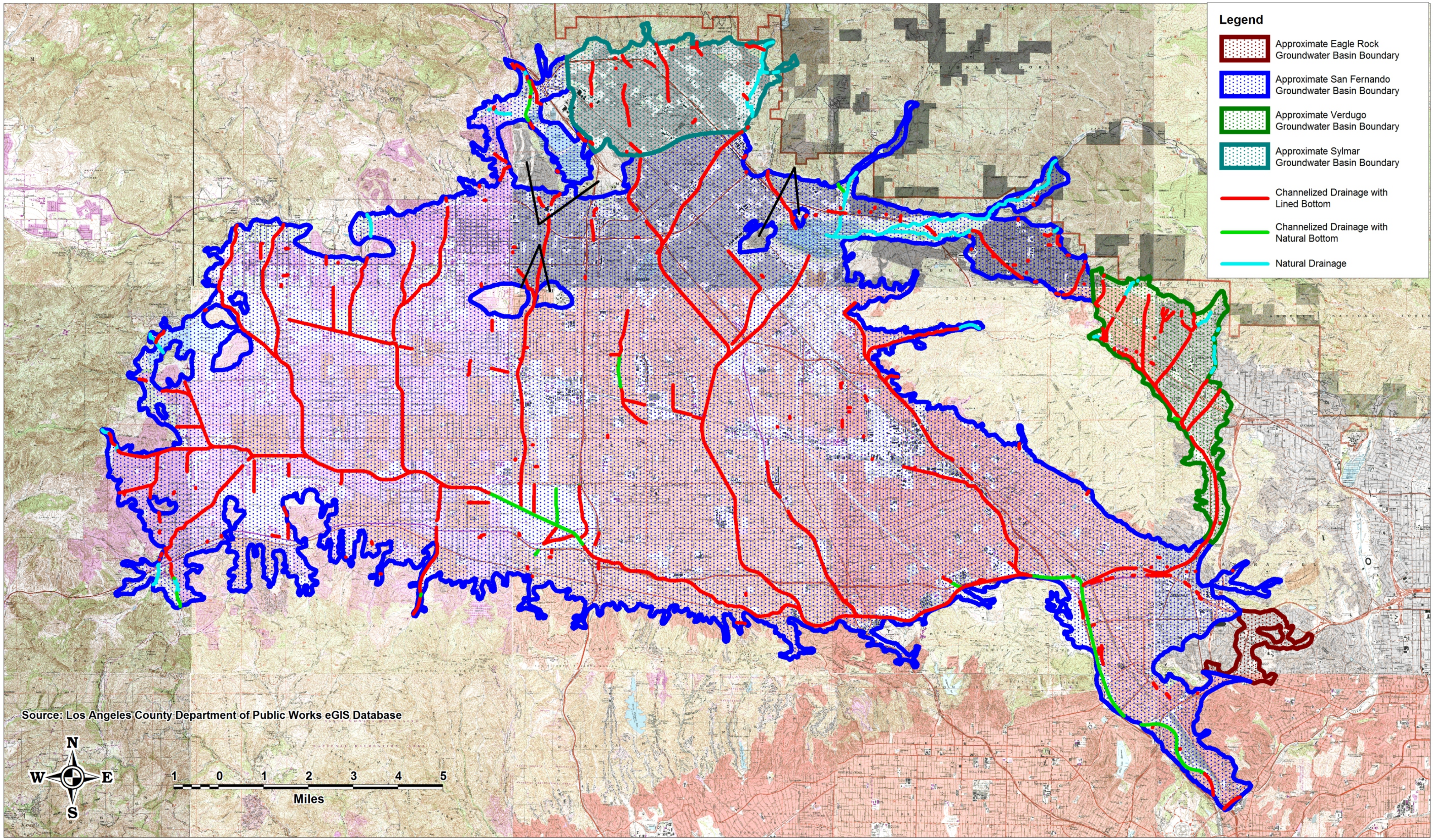

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FIGURE 4
SURFACE WATER CHANNELS

Job No. 500-LAS12

July 2016

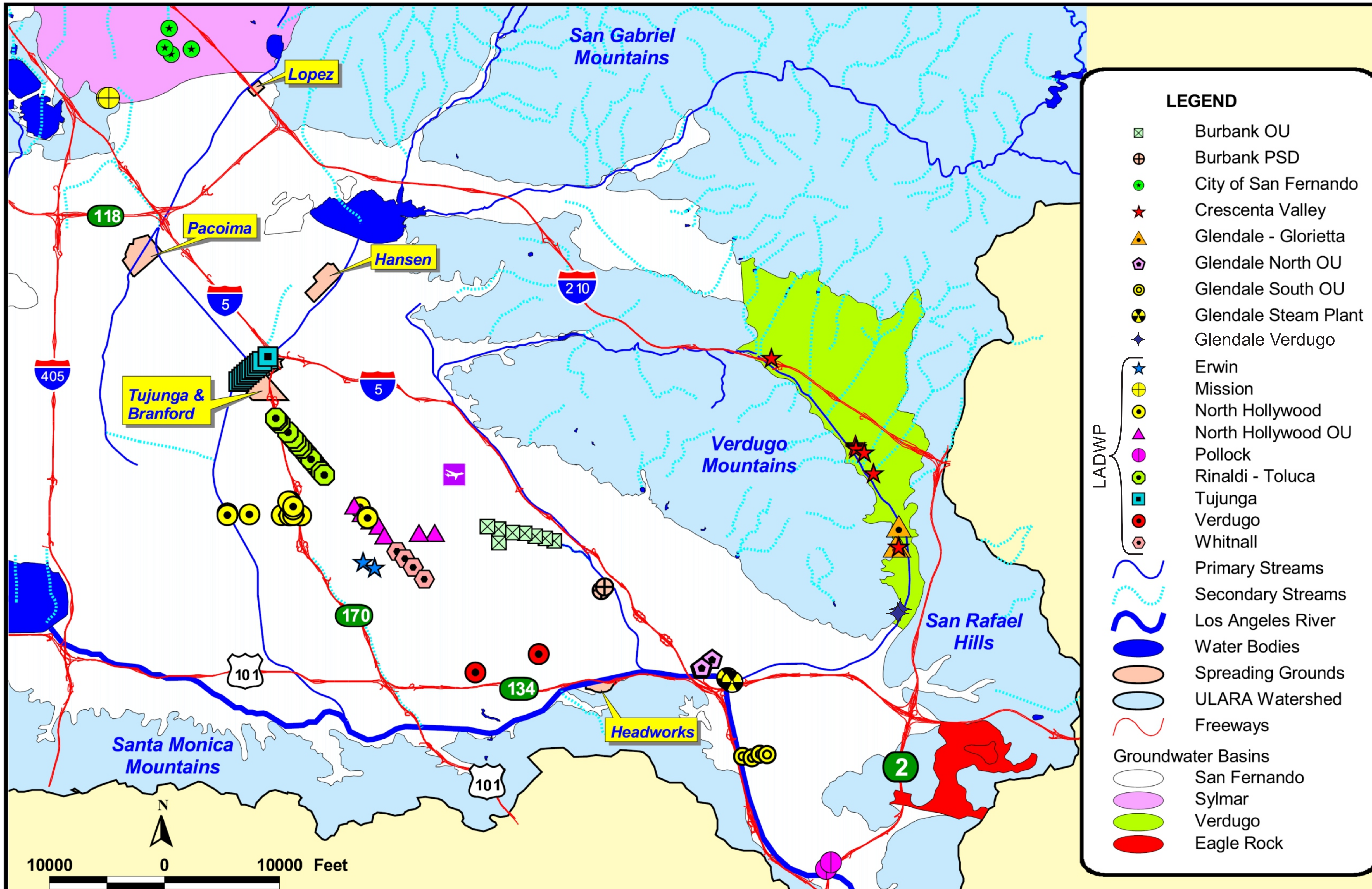

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FIGURE 5
MUNICIPAL WELL FIELD LOCATIONS

Job No. 500-LAS12

July 2016

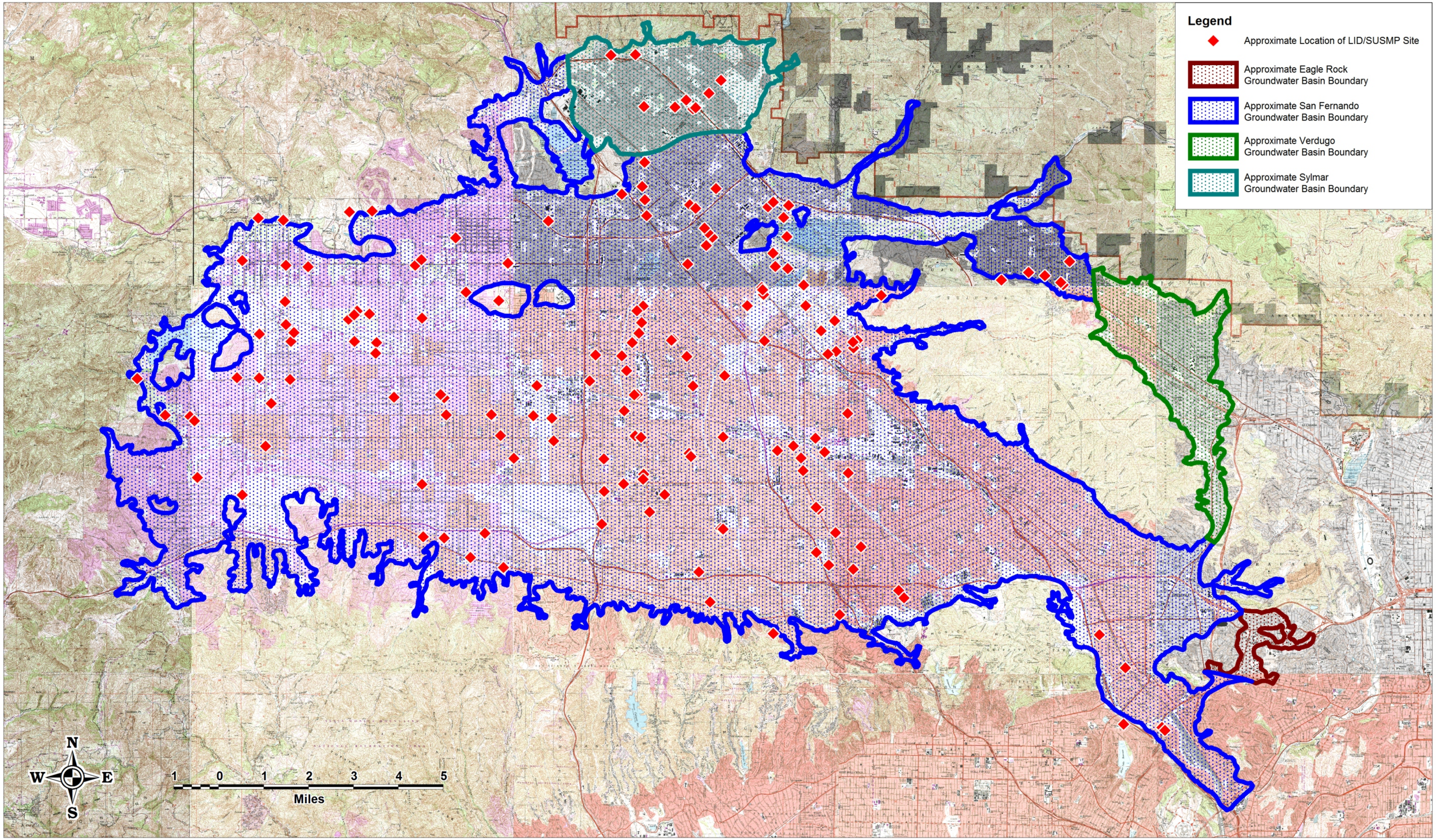

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FIGURE 6
LOW IMPACT DEVELOPMENT LOCATIONS

Job No. 500-LAS12

July 2016

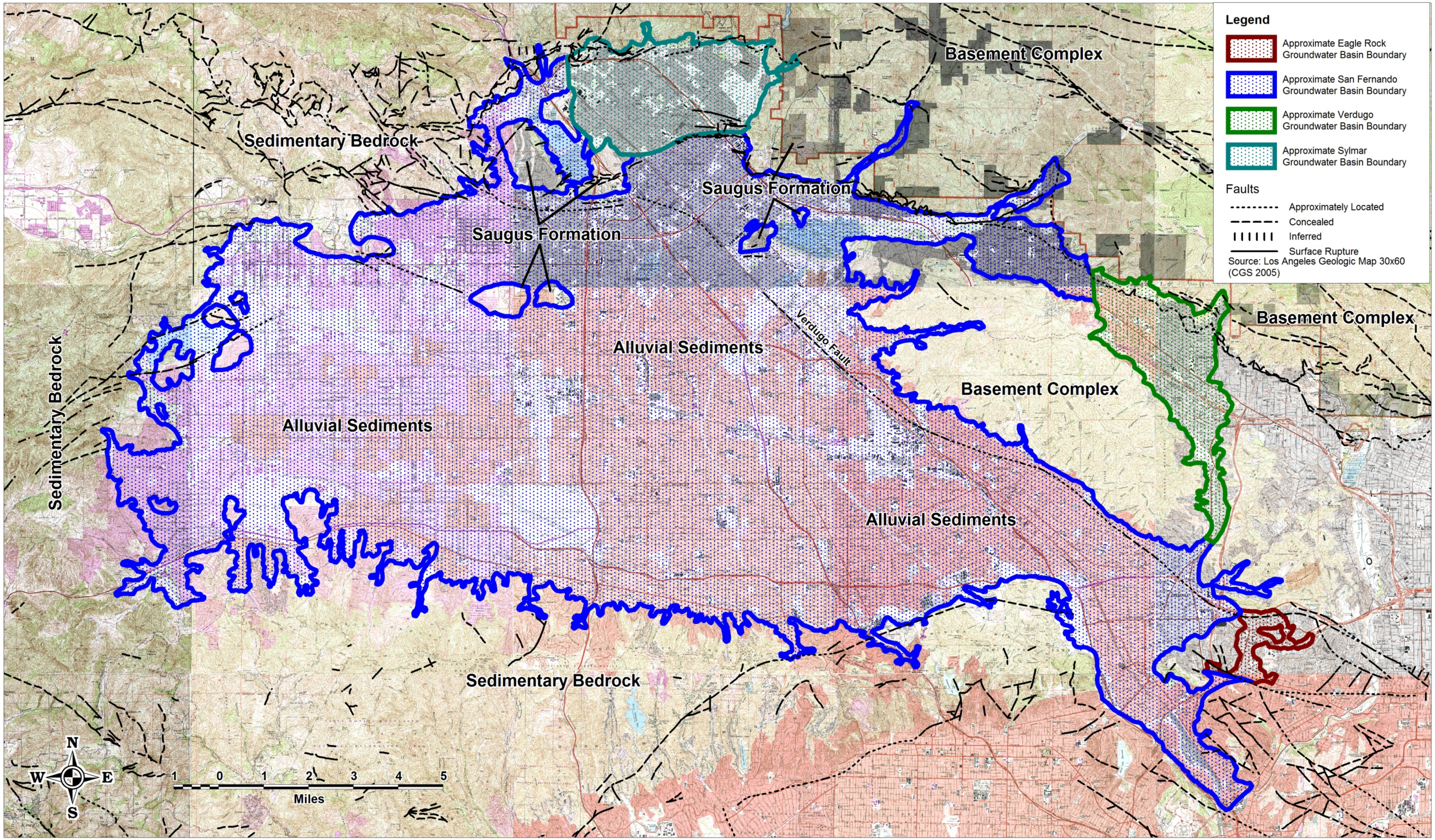

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FIGURE 7
GENERAL GEOLOGIC MAP

Job No. 500-LAS12

July 2016

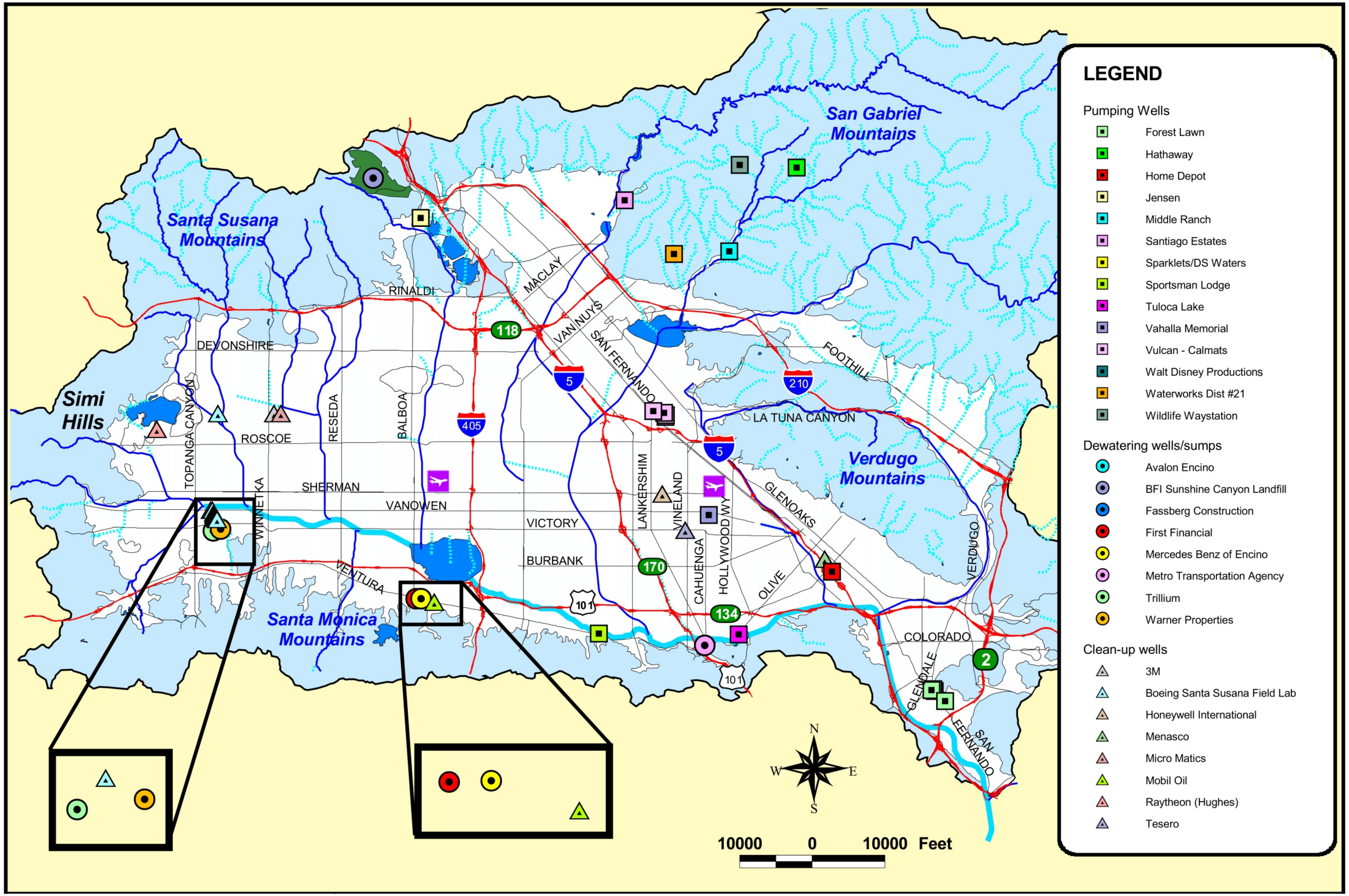

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FIGURE 8
GENERAL LOCATIONS FOR OTHER GROUNDWATER PRODUCERS

Job No. 500-LAS12 **July 2016**

TABLE 1
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SELECTED BASIN WATER QUALITY OBJECTIVES
UPPER LOS ANGELES RIVER AREA

GROUNDWATER BASIN	TDS	Cl	SO_4	NO_3-N
Sylmar Basin	600	150	100	10
Verdugo Basin	600	150	100	
San Femando Basin				
West of Highway	800	300	100	10
East of Highway 405 (overal)	700	300	100	
Sunland-Tugunga area	400	50	50	
Foothill area	400	100	50	
Area encompassing RT-Tujunga-Erwin-N. Hollywood-Whithaii-LA-Verdugo-Crystal Springs-N. Hollywood-Whithaii-LANerdugo-Crystal Springs-Headworks-Giendale/Burbank Well Fields	600	250	100	
Narrows area (below confluence of Verdugo Wash with the LA River)	900	300	150	
Eagle Rock Basin	800	150	100	10

TABLE 2
RAINGAGE DATA FOR ULARA

Gage No.	LACDPW Rain Gage Stations	2012-13 Precipitation	100-Year Mean (1881-1991)	Percent of 100-Year Mean
Valley Floor Stations				
13C	North Hollywood-Lakeside	5.83	16.63	35%
1107D	La Tuna Debris Station	5.75	14.98	38%
465C	Sepulveda Dam	7.16	15.30	47%
21B	Woodland Hills	5.82	14.60	40%
735H	Chatsworth Reservoir	4.49	15.19	30%
25C	Northridge-LADWP	4.80	15.16	32%
251C	La Crescenta	9.07	23.31	39%
AL464	Pacoima Wash Spreading Grounds	7.15	17.32	41%
	Weighted Averages[1]	**6.30**	**16.48**	**38%**
Hill & Mountain Stations				
10A	Bel Air Hotel	6.54	18.50	35%
17	Sepulveda Canyon at Mulholland	7.72	16.84	46%
33A	Pacoima Dam	7.74	19.64	39%
47D	Clear Creek - City School	16.50	33.01	50%
53D	Colby's Ranch	11.06	29.04	38%
54C	Loomis Ranch-Alder Creek	7.50	18.62	40%
210C	Brand Parks	5.12	19.97	26%
AL301	Brown's Canyon	7.01	17.52	40%
1074	Tujunga-Mill Creek	12.21	21.79	56%
	Weighted Averages[1]	**9.03**	**21.76**	**42%**
Weigted Averages Valley/Mountain Areas[1]		**7.98**	**19.64**	**41%**

Note 1 Weighted Average calculations performed according to Report of Referee-7/62. Mountain Station Weighted Average estimated due to incomplete data.

TABLE 3
MONTHLY RUNOFF AT SELECTED GAGING STATIONS
UPPER LOS ANGELES RIVER AREA

RAINGAGE STATION	WATER YEAR	MONTHS OF WATER YEAR												TOTAL
		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	
F-118C-R Pacoima Dam	2011-12	0	3	0	259	334	0	811	631	404	0	0	0	**2,442**
	2012-13	6	0	0	0	0	0	6	0	0	416	0	0	**427**
F-168B-R Big Tujunga Dam	2011-12	ND	ND	ND	ND	ND	ND	ND	ND	630	611	678	623	**2,542**
	2012-13	486	615	278	343	217	138	73	108	88	102	254	246	**2,948**
F-300-R L.A. River-Tujunga Ave.	2011-12	3,150	12,010	7,230	8,490	4,490	13,750	10,930	2,310	2,740	3,270	3,240	3,100	**74,710**
	2012-13	3,820	7,290	12,300	11,600	5,930	8,180	4,420	6,790	4,630	4,860	4,390	4,170	**78,380**
E-285-R Burbank-Storm Drain	2011-12	900	1,240	994	1,050	796	1,600	1,010	651	621	697	502	891	**10,952**
	2012-13	698	907	1,310	1,300	735	1,220	621	1,460	1,250	857	599	631	**11,588**
F-252-R Verdugo Wash	2011-12	703	757	400	365	178	1,040	830	184	75	52	76	76	**4,736**
	2012-13	238	306	440	312	202	253	156	206	133	117	102	90	**2,555**
F-57C-R L.A. River-Arroyo Seco	2011-12	8,450	11,170	8,780	13,910	5,540	15,910	17,010	5,270	5,410	5,380	6,060	5,960	**108,850**
	2012-13	7,800	8,460	11,440	12,970	6,820	9,770	6,540	7,160	6,210	6,880	7,270	6,000	**97,320**

NOTE: Values are in acre-ft

TABLE 4
ESTIMATED SEPARATION OF SURFACE FLOW AT STATIONS F-57C and F-252-R

Water Year	F-57C-R				F-252-R		
	Rising Groundwater[1]	Waste Discharge	Storm Runoff	Total Outflow[2]	Rising Groundwater[3,4]	Storm Runoff [4]	Total Outflow
2012-13	1,754	67,865	27,711	97,330	1,156	1,098	2,254
2011-12	3,121	69,176	36,603	108,900	2,068	2,662	4,730
2010-11	6,588	88,541	135,815	230,945	2,397	18,023	20,420
2009-10	5,814	74,736	75,150	155,700	2,394	11,936	14,330
2008-09	2,698	73,983	66,882	142,563	2,097	7,808	9,905
2007-08	3,905	76,287	96,548	176,740	1,212	8,700	9,912
2006-07	1,720	72,544	21,236	95,500	1,272	6,668	7,943
2005-06	5,441	74,256	77,063	156,760	1,414	12,717	14,131
2004-05	6,309	70,828	423,293	500,430	5,198	31,874	37,072
2003-04	3,330	90,377	42,153	135,860	2,468	2,851	5,319
2002-03	3,869	75,159	106,862	185,890	3,167	5,183	8,350
2001-02	2,126	74,737	43,937	120,800	1,819	5,721	7,540
2000-01	3,000	91,795	94,065	188,860	1,500	6,370	7,870
1999-00	1,980	78,009	62,202	142,190	824	4,243	8,470
1998-99	2,000	72,790	39,110	113,900	1,000	2,534	7,250
1997-98	4,000	97,681	245,079	346,730	4,000	12,140	16,140
1996-97	3,000	75,827	76,485	155,312	3,000	13,860	16,860
1995-96	3,841	86,127	61,188	151,156	2,577	10,946	13,523
1994-95	4,900	66,209	367,458	438,567	4,809	28,881	33,696
1993-94	2,952	60,594	73,149	136,695	1,387	6,156	7,543
1992-93	4,900	77,000	478,123	560,023	3,335	20,185	23,520
1991-92	3,000	120,789	197,040	320,829	1,412	13,209	14,621
1990-91	3,203	75,647	117,779	196,629	1,157	6,865	8,022
1989-90	3,000	76,789	55,811	167,639	1,182	2,938	4,120
1988-89	3,000	80,020	56,535	136,843	1,995	4,453	6,448
1987-88	3,000	81,920	74,074	156,204	3,548	10,493	14,041
1986-87	3,000	64,125	19,060	83,295	2,100	1,690	3,790
1985-86	3,880	48,370	102,840	155,090	2,470	6,270	8,740
1984-85	3,260	21,600	46,300	71,160	2,710	3,970	6,680
1983-84	3,000	17,780	49,090	69,870	4,000	n/a	n/a
1982-83	3,460	17,610	384,620	405,690	5,330	21,384	26,714
1981-82	1,280	18,180	80,000	99,460	3,710	5,367	9,077
1980-81	4,710	19,580	51,940	76,230	5,780	2,917	8,697
1979-80	5,500	16,500	n/a	n/a	5,150	7,752	12,902
1978-79	2,840	16,450	119,810	139,100	2,470	n/a	n/a
1977-78	1,331	7,449	357,883	366,663	1,168	23,571	24,739
1976-77	839	7,128	58,046	66,013	1,683	2,635	4,318
1975-76	261	6,741	32,723	39,725	2,170	2,380	4,550
1974-75	427	7,318	56,396	64,141	1,333	4,255	5,588
1973-74	2,694	6,366	79,587	88,878	1,772	5,613	7,385
1972-73	4,596	8,776	100,587	113,959	1,706	7,702	9,408
1971-72	---	---	---	---	2,050	2,513	4,563
Averages	**3,257**	**56,919**	**117,256**	**182,372**	**2,476**	**8,913**	**11,530**

1. Includes the influence of treated waste water discharged to the Los Angeles River from the Los Angeles-Glendale Water Reclamation Plant (as of Water Year 1976-77) and the Donald C. Tillman Water Reclamation Plant (as of September 1985).
2. Gage F-57, the major measurement point of discharge to the Los Angeles River, is estimated due to erroneous readings.
3. Includes the influence of declining capacity at Verdugo Park Treatment Plant.
4. Includes influence of dry weather runoff and perennial stream flow.

Note: Tabulated values are in acre-ft

TABLE 5
ULARA WATER IMPORTS AND EXPORTS

Source and Agency	Water Year	
	2011-12	2012-13
Gross Imported Water		
Los Angeles Aqueduct City of Los Angeles	213,043	85,408
MWD Water		
City of Burbank [1]	9,973	14,210
Crescenta Valley Water District	1,534	1,682
City of Glendale	17,284	19,195
City of Los Angeles	237,686	369,214
La Canada Irrigation District [2]	1,090	1,150
Las Virgenes Municipal Water District [2]	7,092	8,133
City of San Fernando	106	82
MWD Total	**274,765**	**413,666**
Grand Total	**274,765**	**413,666**
Exported Water (Pass-Through)		
Los Angeles Aqueduct City of Los Angeles	93,638	34,991
MWD Water City of Los Angeles	120,547	167,236
Total	**120,547**	**167,236**
Net Imported Water	**154,217**	**246,430**

1. Total includes water imported for potable use and for groundwater replenishment (spreading).
2. Deliveries to those portions of these agency service areas that are within ULARA.

Note: Table values are in acre-ft

TABLE 6
ANNUAL SPREADING OPERATONS IN THE SAN FERNANDO BASIN

Water Year	Los Angeles County Department of Public Works (Native + Imported[1])						City of Los Angeles			GRAND TOTAL	City of Burbank (Imported)[1]	Rainfall (inches) Weighted Average Valley/Mtns.
	Branford	Hansen	Lopez	Pacoima	Tujunga	TOTAL	Headworks	Tujunga	TOTAL		Pacoima	
2012-13	570	1,758	501	7,015	927	**10,771**	0	11	11	**10,782**	6,703	8.72
2011-12	529	9,357	104	3,482	101	**13,573**	0	4	4	**13,577**	1,371	11.55
2010-11	690	19,064	3,922	24,164	31,476	**79,316**	0	4	4	**79,320**	11,187	25.21
2009-10	535	16,766	274	9,080	12,849	**39,504**	0	7,509	7,509	**47,013**	34	20.55
2008-09	706	0	1	2,000	7,233	**9,940**	0	0	0	**9,940**	---	12.58
2007-08	570	10,517	634	5,025	4,892	**21,638**	0	0	0	**21,638**	---	17.27
2006-07	532	5,762	44	436	1,200	**7,974**	0	0	0	**7,974**	---	5.36
2005-06	576	20,840	958	7,346	14,895	**44,615**	0	0	0	**44,615**	---	17.42
2004-05	1,448	33,301	940	17,394	21,115	**74,198**	0	0	0	**74,198**	---	45.66
2003-04	444	6,424	144	1,731	1,322	**10,065**	0	0	0	**10,065**	---	12.21
2002-03	932	9,427	518	3,539	1,914	**16,330**	0	0	0	**16,330**	---	21.22
2001-02	460	1,342	0	761	101	**2,664**	0	0	0	**2,664**	---	6.64
2000-01	562	11,694	172	3,826	1,685	**17,939**	0	0	0	**17,939**	---	22.29
1999-00	468	7,487	578	2,909	2,664	**14,106**	0	0	0	**14,106**	---	16.77
1998-99	547	8,949	536	696	3,934	**14,662**	0	0	0	**14,662**	---	10.83
1997-98	641	28,129	378	20,714	11,180	**61,042**	0	77	77	**61,119**	---	38.51
1996-97	415	9,808	724	5,768	6,406	**23,121**	0	51	51	**23,172**	---	17.65
1995-96	345	8,232	363	4,532	7,767	**21,239**	0	0	0	**21,239**	---	14.48
1994-95	585	35,137	1,086	14,064	18,236	**69,108**	0	0	0	**69,108**	---	33.08
1993-94	462	12,052	182	3,156	4,129	**19,981**	0	0	0	**19,981**	---	11.86
1992-93	389	26,186	1,312	17,001	19,656	**64,544**	114	0	114	**64,658**	---	41.26
1991-92	653	15,461	1,094	12,914	9,272	**39,394**	230	0	230	**39,624**	---	32.39
1990-91	509	11,489	241	3,940	2,487	**18,666**	52	0	52	**18,718**	---	7.69
1989-90	327	2,029	90	1,708	0	**4,154**	0	0	0	**4,154**	---	9.55
1988-89	255	3,844	308	1,306	0	**5,713**	0	0	0	**5,713**	---	9.72
1987-88	352	17,252	1,037	4,520	0	**23,161**	0	0	0	**23,161**	---	21.36
1986-87	0	7,311	141	467	0	**7,919**	0	33	33	**7,952**	---	7.70
1985-86	290	18,188	1,735	6,704	0	**26,917**	0	1,433	1,433	**28,350**	---	23.27
1984-85	244	13,274	104	3,375	0	**16,997**	0	5,496	5,496	**22,493**	---	13.31
1983-84	213	10,410	0	3,545	0	**14,168**	0	24,115	24,115	**38,283**	---	11.18
1982-83	883	35,192	1,051	22,972	10,580	**70,678**	10	32,237	32,247	**102,925**	---	46.07
1981-82	345	14,317	243	5,495	0	**20,400**	3,853	0	3,853	**24,253**	---	20.16
1980-81	245	14,470	335	3,169	0	**18,219**	4,652	9,020	13,672	**31,891**	---	12.89
1979-80	397	31,087	1,097	15,583	0	**48,164**	5,448	19,931	25,379	**73,543**	---	33.66
1978-79	295	24,697	1,018	12,036	0	**38,046**	2,463	31,945	34,408	**72,454**	---	24.07
1977-78	2,142	28,123	445	20,472	12,821	**64,003**	3,200	18,247	21,447	**85,450**	---	44.84
1976-77	377	2,656	63	1,943	0	**5,039**	3,142	16	3,158	**8,197**	---	16.02
1975-76	470	3,128	562	1,308	0	**5,468**	3,837	5,500	9,337	**14,805**	---	14.20
1974-75	681	5,423	915	2,476	0	**9,495**	4,070	9,221	13,291	**22,786**	---	---
1973-74	672	6,287	946	2,378	0	**10,283**	6,205	0	6,205	**16,488**	---	---
1972-73	1,271	9,272	0	6,343	2,274	**19,160**	5,182	0	5,182	**24,342**	---	---
1971-72	161	1,932	0	1,113	0	**3,206**	7,389	0	7,389	**10,595**	---	---
1970-71	507	11,657	727	4,049	0	**16,940**	6,804	399	7,203	**24,143**	---	---
1969-70	674	11,927	0	1,577	2,380	**16,558**	11,021	0	11,021	**27,579**	---	---
1968-69	461	32,464	893	14,262	13,052	**61,132**	6,698	3,676	10,374	**71,506**	---	---
AVG.	552	13,647	587	6,851	5,034	**26,671**	1,653	3,754	5,407	**32,078**	4,824	

1. Water imported by Burbank beginning in 2009-10 spread in Pacoima and Lopez by LA County Burabnk's spreading. Prior to 2009, all spreading by LA County was considered to be Native Water and not imported water

TABLE 7
WATER RECLAMATION PLANTS
AND WATER USE
UPPER LOS ANGELES RIVER AREA

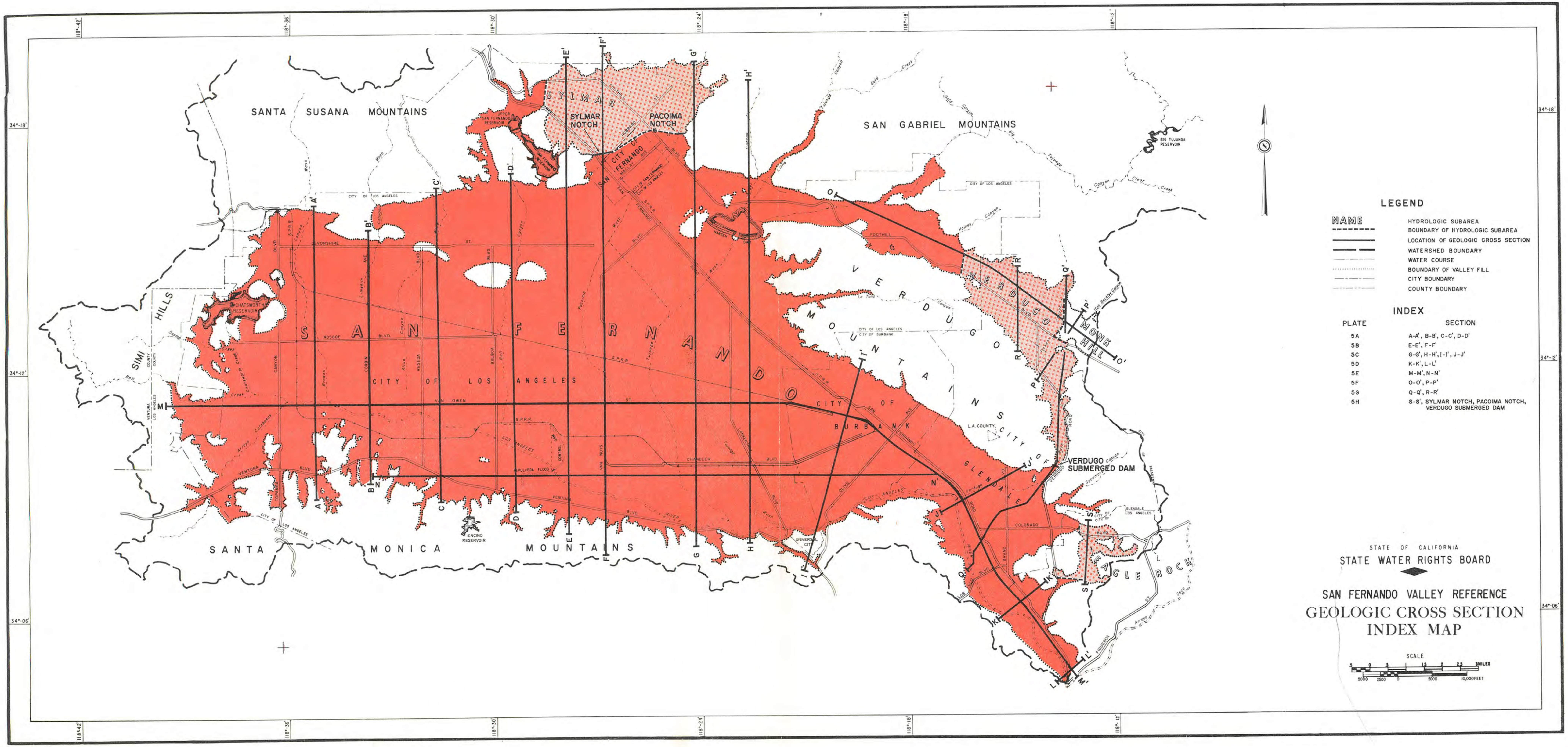
Plant/Agency	Plant Influent[1]	Effluent to L.A. River	Flow to Hyperion	Recycled Water Use	Recycled Water Use[8] (%)	Recycled Water Delivered to SFGWB
City of Burbank	9,306	7,422	276	1,608 [4]	17%	1,608
Los Angeles-Glendale	21,553 [2]	12,898	2,356	5,170	24%	
Los Angeles				3,296 [5]		338
Glendale				1,874 [6]		1,571
Donald C. Tillman	57,018	35,961 [3]	19,239	5,715 [7]	10%	1,770
Las Virgenes MWD				1,732		1,732
Total	**87,877**	**56,281**	**21,871**	**14,225**		**7,019**

Note: Values are in acre-ft

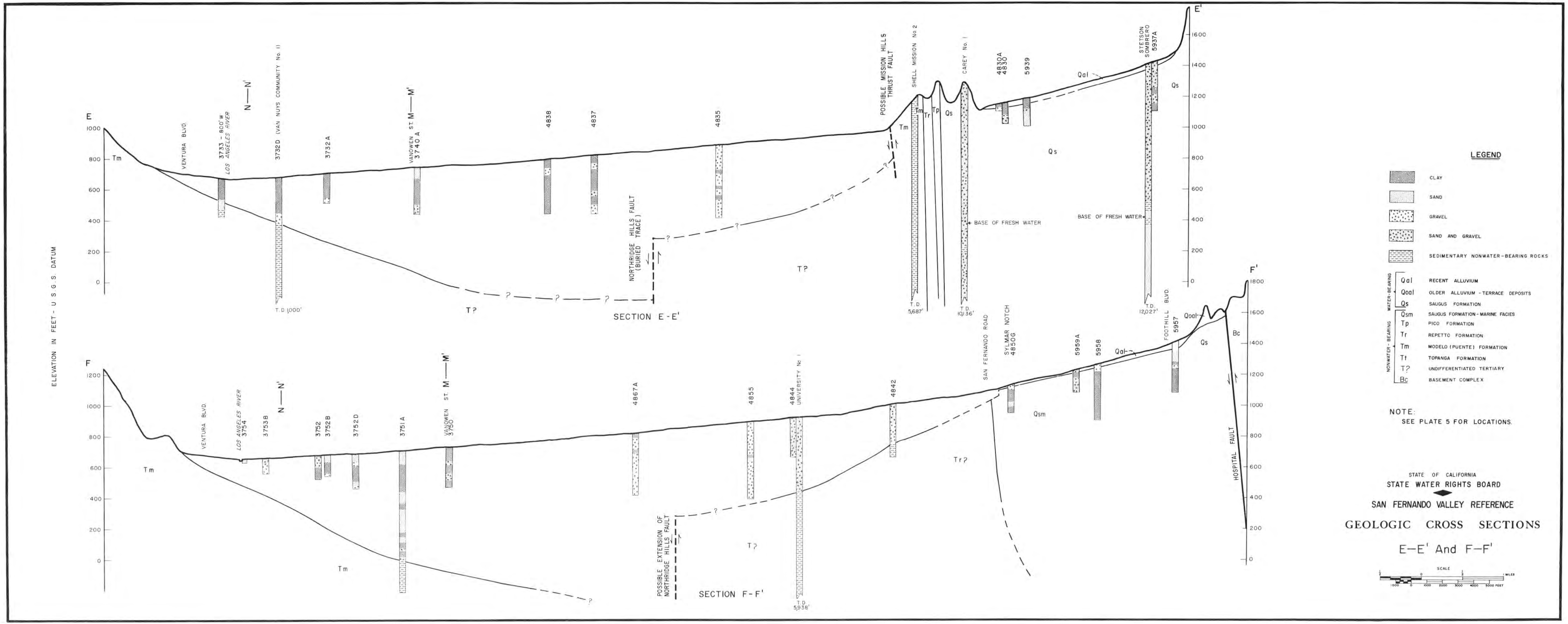
1. Does not include plant overflow/ by pass.
2. Plant influent does not equal to the effluent due to metering error and/or plant use.
3. Total effluent to LA River includes 18,432 AF supplied to Balboa Lake; 5,507 AF supplied to Wildlife Lake; 4,442 AF supplied to the Japanese Garden; discharged to LA River after beneficial re-use, in addition to 5,912 AF plant effluent discharged directly to the L.A. River.
4. Erroneous meter readings show a negative flow from Burbank to Los Angeles Hyperion; the parties are aware of the problem and exploring a solution.
5. Of the total recycled water (2,000 AF), 1165 AF was delivered to the Burbank power plant, 835 AF was used by CalTrans, Media City Center, landfill, DeBell Golf Course, Muir School, McCambridge Park, Burbank High School, AMC theater complex, Costco, Empire Center, Chandler Bikeway, Robert Gross Park, Empire landscape, Airport, M. David Paul, BWP Landscape, Castaway, Stough Park, Starlight Bowl, 5-Points Park, Wildwood Canyon Park, Northeastern extension, Northern extension, Valhalla extension, Studio District extension, and water trucks.
6. Total includes 937 AF for in-plant use; 855 AF delivery to Griffith Park for irrigation; 1,166 AF deliveries to CalTrans, Lakeside, Mt. Sinai Memorial Park, Forest Lawn H.H., and Universal City for irrigation; 250.6 AF delivery to former Headworks Spreading Grounds for construction dust control; and 65.3 AF exported from ULARA delivered to Taylor Yard for irrigation.
7. Of the total recycled water delivered, 1,284 AF was delivered to Glendale for use in Glendale's Power Plant and for irrigation water for CalTrans, Forest Lawn Memorial Park, miscellaneous usage by Galndale Public Works, and other recycled water users in the City of Glendale.
8. Includes deliveries of 1,638 AF of recycled water by Los Angeles to valley fill for irrigation, 3,050 AF of Tillman in-plant use discharged to Hyperion, and 2,146 AF delivered to Valley Generation Station discharged to Hyperion.
9. Recycled water use is calculated as a percentage (%) of plant effluent.

APPENDIX

Cross Sections from the ULARA Report of Referee


SANTA SUSANA MOUNTAINS
SAN GABRIEL MOUNTAINS
SANTA MONICA MOUNTAINS
SIMI HILLS
SYLMAR NOTCH
PACOIMA NOTCH
SAN FERNANDO
CITY OF SAN FERNANDO
CITY OF LOS ANGELES
CITY OF BURBANK
CITY OF GLENDALE
VERDUGO MOUNTAINS
VERDUGO
MONK HILL
EAGLE ROCK
VERDUGO SUBMERGED DAM
CHATSWORTH RESERVOIR
ENCINO RESERVOIR
BIG TUJUNGA RESERVOIR
UNIVERSAL CITY
L.A. COUNTY
LEGEND
NAME
HYDROLOGIC SUBAREA
BOUNDARY OF HYDROLOGIC SUBAREA
LOCATION OF GEOLOGIC CROSS SECTION
WATERSHED BOUNDARY
WATER COURSE
BOUNDARY OF VALLEY FILL
CITY BOUNDARY
COUNTY BOUNDARY
INDEX
PLATE
SECTION
5A A-A', B-B', C-C', D-D'
5B E-E', F-F'
5C G-G', H-H', I-I', J-J'
5D K-K', L-L'
5E M-M', N-N'
5F O-O', P-P'
5G Q-Q', R-R'
5H S-S', SYLMAR NOTCH, PACOIMA NOTCH, VERDUGO SUBMERGED DAM
STATE OF CALIFORNIA
STATE WATER RIGHTS BOARD
SAN FERNANDO VALLEY REFERENCE
GEOLOGIC CROSS SECTION
INDEX MAP
SCALE


SECTION A-A'
SECTION B-B'
SECTION C-C'
SECTION D-D'
ELEVATION IN FEET - U.S.G.S. DATUM
VENTURA BLVD.
LOS ANGELES RIVER
VANOWEN ST.
DEVONSHIRE ST.
MULLHOLLAND No. 1 - 2400' E
SUNRAY W.P. SMITH
NORTHRIDGE HILLS FAULT
FAULT
T.D. 4,375'
T.D. 6,669'
T.D. 2,100'
LEGEND
CLAY
SAND
GRAVEL
SAND AND GRAVEL
SEDIMENTARY NONWATER-BEARING ROCKS
WATER-BEARING
NONWATER-BEARING
Qal RECENT ALLUVIUM
Qoal OLDER ALLUVIUM - TERRACE DEPOSITS
Qs SAUGUS FORMATION
Qsm SAUGUS FORMATION - MARINE FACIES
Tp PICO FORMATION
Tr REPETTO FORMATION
Tm MODELO (PUENTE) FORMATION
Tt TOPANGA FORMATION
T? UNDIFFERENTIATED TERTIARY
Bc BASEMENT COMPLEX
NOTE:
SEE PLATE 5 FOR LOCATIONS.
STATE OF CALIFORNIA
STATE WATER RIGHTS BOARD
SAN FERNANDO VALLEY REFERENCE
GEOLOGIC CROSS SECTIONS
A-A', B-B', C-C', And D-D'
SCALE



STATE OF CALIFORNIA
STATE WATER RIGHTS BOARD

SAN FERNANDO VALLEY REFERENCE

GEOLOGIC CROSS SECTIONS

E—E' And F—F'


SECTION G-G'
SECTION H-H'
SECTION I-I'
SECTION J-J'
ELEVATION IN FEET - U.S.G.S. DATUM
VENTURA BLVD.
LOS ANGELES RIVER
CHANDLER BLVD.
LANKERSHIM BLVD.
VANOWEN ST.
SAN FERNANDO RD.
FOOTHILL BLVD.
PACOIMA CREEK
VERDUGO FAULT
PACOIMA HILLS FAULT
TUJUNGA WASH
GRAVEL PIT
HANSEN DAM
BARTHOLOMAUS FAULT
LOPEZ FAULT
TOLUCA LAKE
BRAND BLVD.
EAGLE ROCK FAULT
LEGEND
CLAY
SAND
GRAVEL
SAND AND GRAVEL
SEDIMENTARY NONWATER-BEARING ROCKS
WATER-BEARING
Qal RECENT ALLUVIUM
Qoal OLDER ALLUVIUM - TERRACE DEPOSITS
Qs SAUGUS FORMATION
NONWATER-BEARING
Tp PICO FORMATION
Tr REPETTO FORMATION
Tm MODELO (PUENTE) FORMATION
Tt TOPANGA FORMATION
T? UNDIFFERENTIATED TERTIARY
Bc BASEMENT COMPLEX
NOTE:
SEE PLATE 5 FOR LOCATIONS.
STATE OF CALIFORNIA
STATE WATER RIGHTS BOARD
SAN FERNANDO VALLEY REFERENCE
GEOLOGIC CROSS SECTIONS
G-G', H-H', I-I', And J-J'
SCALE

STATE OF CALIFORNIA
STATE WATER RIGHTS BOARD

SAN FERNANDO VALLEY REFERENCE

GEOLOGIC CROSS SECTIONS
K-K' And L-L'

SCALE
200 0 200 400 600 FEET

PLATE 5E


SECTION ALONG VANOWEN STREET
SECTION M - M'
SECTION ALONG SOUTHERN PACIFIC RIGHT OF WAY
POSSIBLE EXTENSION OF EAGLE ROCK FAULT
ELEVATION IN FEET - U.S.G.S. DATUM
MATCH LINE
SECTION ALONG SOUTHERN PACIFIC RIGHT OF WAY
SECTION M - M'
(CONTINUED)
INFERRED RAYMOND FAULT
SECTION N-N'
SECTION ENDS AT M-M'
LEGEND
CLAY
SAND
GRAVEL
SAND AND GRAVEL
SEDIMENTARY NONWATER-BEARING ROCKS
WATER-BEARING
Qal RECENT ALLUVIUM
Qoal OLDER ALLUVIUM - TERRACE DEPOSITS
Qs SAUGUS FORMATION
NONWATER-BEARING
Tp PICO FORMATION
Tr REPETTO FORMATION
Tm MODELO (PUENTE) FORMATION
Tt TOPANGA FORMATION
Bc BASEMENT COMPLEX
NOTE:
SEE PLATE 5 FOR LOCATIONS.
STATE OF CALIFORNIA
STATE WATER RIGHTS BOARD
SAN FERNANDO VALLEY REFERENCE
GEOLOGIC CROSS SECTIONS
M-M' And N-N'
SCALE

462

PLATE 5F

LEGEND

	CLAY
	SAND
	GRAVEL
	SAND AND GRAVEL
	GRANITIC NONWATER-BEARING ROCKS
WATER-BEARING: Qal	RECENT ALLUVIUM
Qoal	OLDER ALLUVIUM - TERRACE DEPOSITS
Qs	SAUGUS FORMATION
NONWATER-BEARING: Tp	PICO FORMATION
Tr	REPETTO FORMATION
Tm	MODELO (PUENTE) FORMATION
Tt	TOPANGA FORMATION
Bc	BASEMENT COMPLEX

NOTE:
SEE PLATE 5 FOR LOCATIONS

STATE OF CALIFORNIA
STATE WATER RIGHTS BOARD

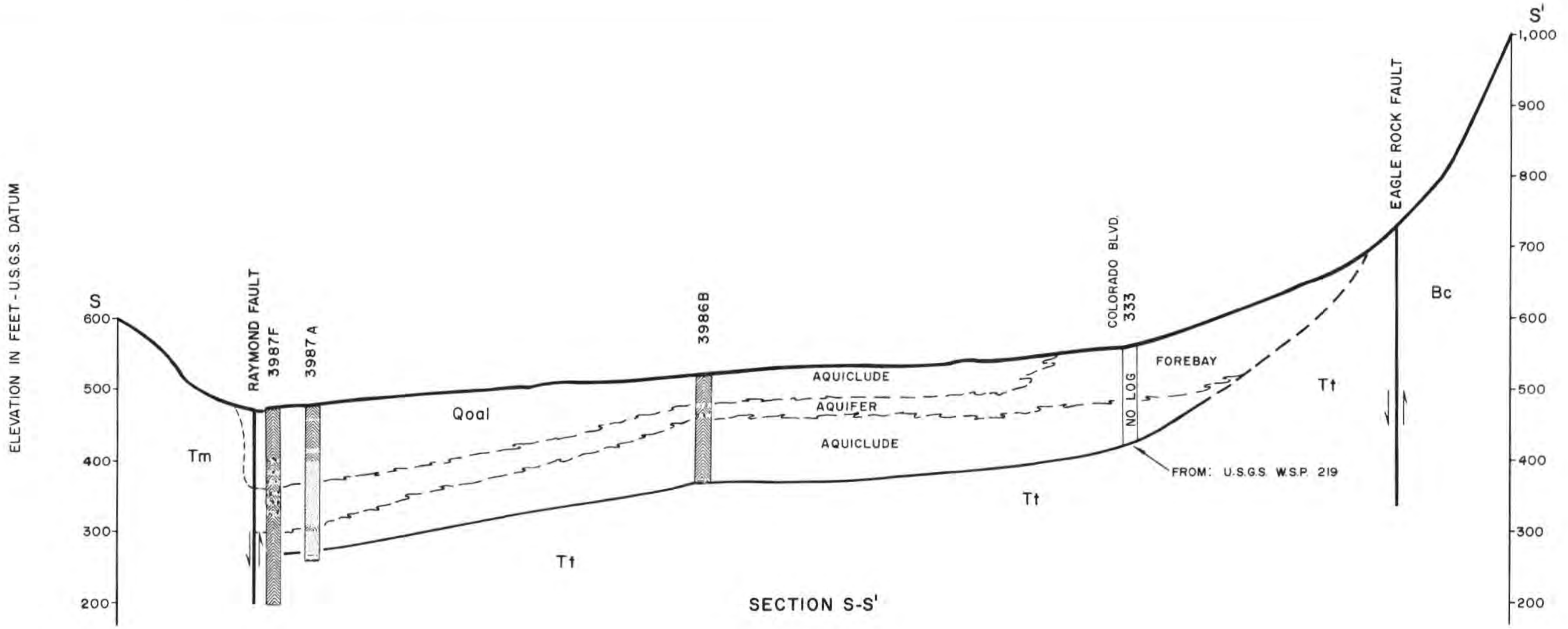
SAN FERNANDO VALLEY REFERENCE

GEOLOGIC CROSS SECTIONS
O-O' And P-P'

SCALE 1000 0 1000 2000 3000 FEET

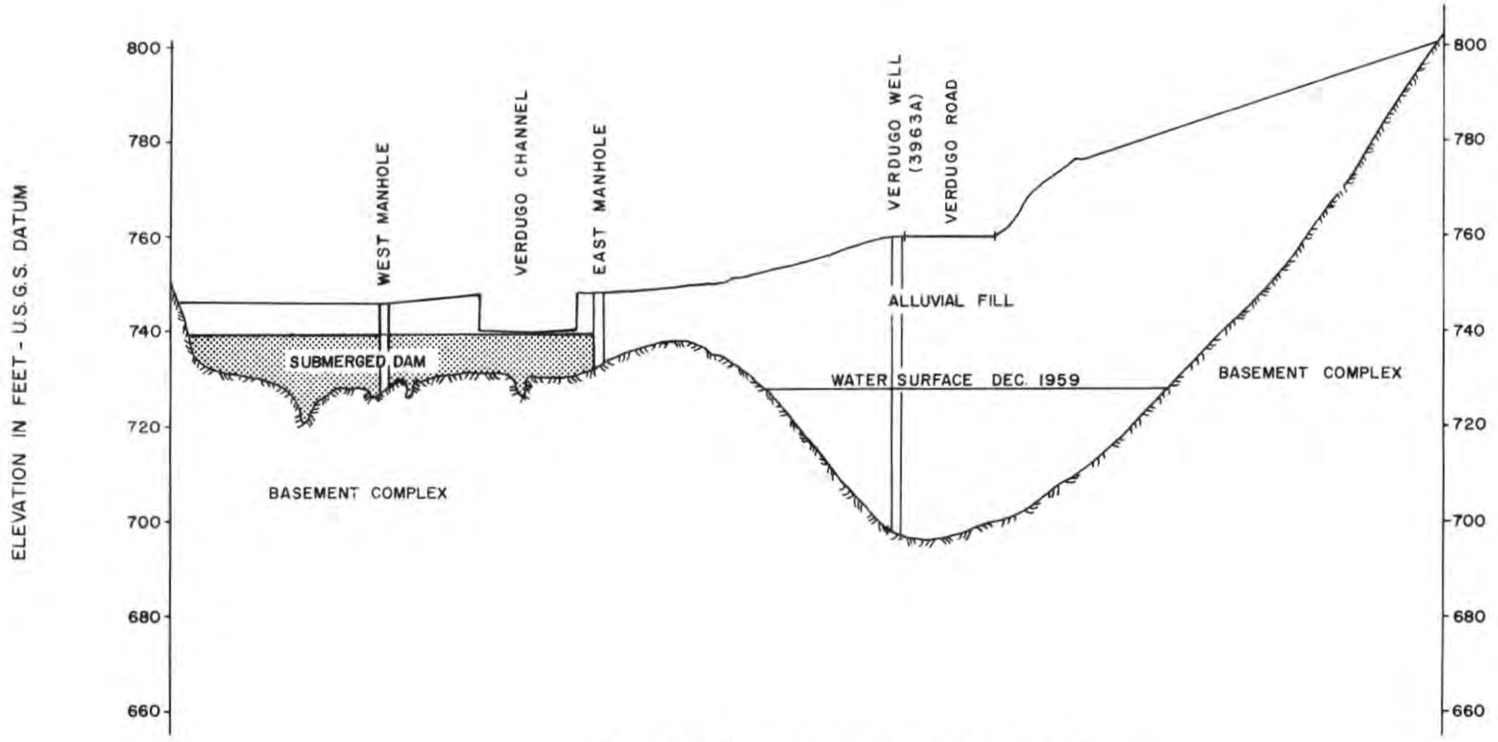
183


Q
Q'
R
R'
ELEVATION IN FEET — U.S.G.S. DATUM
LOS ANGELES RIVER
SAN FERNANDO ROAD
BRAND BLVD.
MATCH LINE
EAGLE ROCK FAULT
3927A
3926 C
3956
3935-1500'N
3945-1750'N
3954
Tm
Tm?
Tt?
NO LOG
VERDUGO FAULT
3963
SUBMERGED DAM
3971
3971 C
3970
INFERRED LA CRESCENTA VALLEY FAULT ZONE
VERDUGO ROAD
5069H-1500' W
5079-450'E
FOOTHILL BLVD.
5078 C
5077-650' W
INFERRED SIERRA MADRE FAULT ZONE
PICKENS CANYON
5076-750' W
P—P'
O—O'
Bc
SECTION Q-Q'
VERDUGO WASH
5058H
5057
FOOTHILL BLVD.
5056
300' W
SECTION R-R'
LEGEND
CLAY
SAND
GRAVEL
SAND AND GRAVEL
SEDIMENTARY NONWATER-BEARING
GRANITIC NONWATER-BEARING ROCKS
WATER-BEARING
Qal RECENT ALLUVIUM
Qoal OLDER ALLUVIUM - TERRACE DEPOSITS
Qs SAUGUS FORMATION
NONWATER-BEARING
Tp PICO FORMATION
Tr REPETTO FORMATION
Tm MODELO (PUENTE) FORMATION
Tt TOPANGA FORMATION
Bc BASEMENT COMPLEX
NOTE:
SEE PLATE 5 FOR LOCATIONS.
STATE OF CALIFORNIA
STATE WATER RIGHTS BOARD
SAN FERNANDO VALLEY REFERENCE
GEOLOGIC CROSS SECTIONS
Q-Q' And R-R'
SCALE



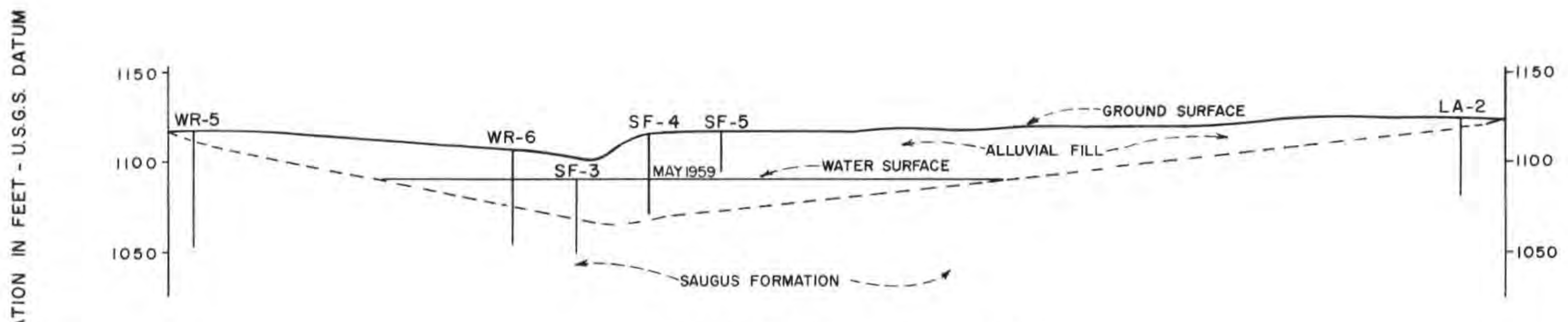
SECTION S-S'

HORIZONTAL SCALE 0 500 1,000 FEET



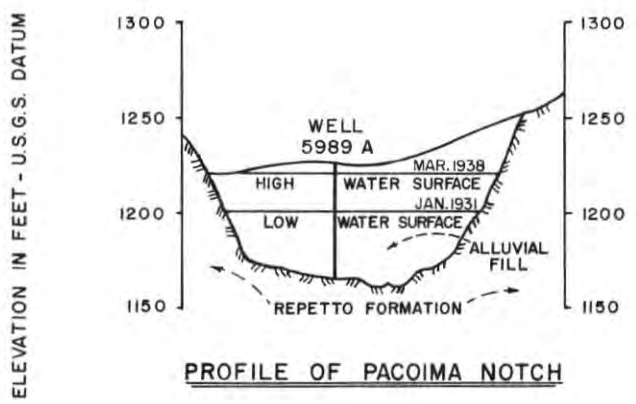
PROFILE AT VERDUGO SUBMERGED DAM

HORIZONTAL SCALE 0 80 100 FEET



PROFILE OF SYLMAR NOTCH

HORIZONTAL SCALE 0 200 400 FEET



PROFILE OF PACOIMA NOTCH

HORIZONTAL SCALE 0 200 400 FEET

LEGEND

- CLAY
- SAND
- GRAVEL
- SAND AND GRAVEL

WATER-BEARING
- Qal RECENT ALLUVIUM
- Qoal OLDER ALLUVIUM - TERRACE DEPOSITS
- Qs SAUGUS FORMATION

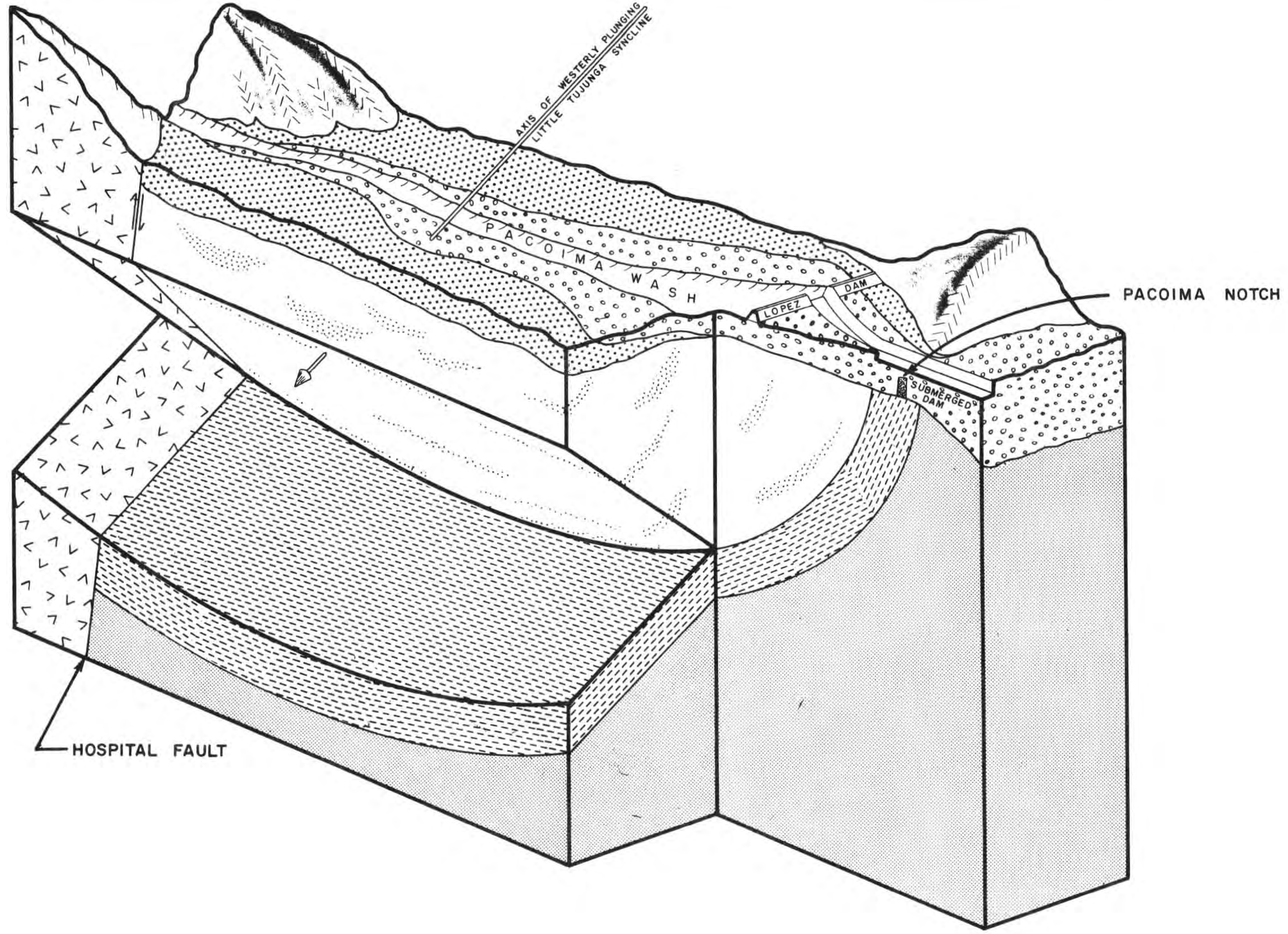
NONWATER-BEARING
- Tp PICO FORMATION
- Tr REPETTO FORMATION
- Tm MODELO (PUENTE) FORMATION
- Tt TOPANGA FORMATION
- Bc BASEMENT COMPLEX

NOTE:
SEE PLATE 5 FOR LOCATIONS

STATE OF CALIFORNIA
STATE WATER RIGHTS BOARD

SAN FERNANDO VALLEY REFERENCE

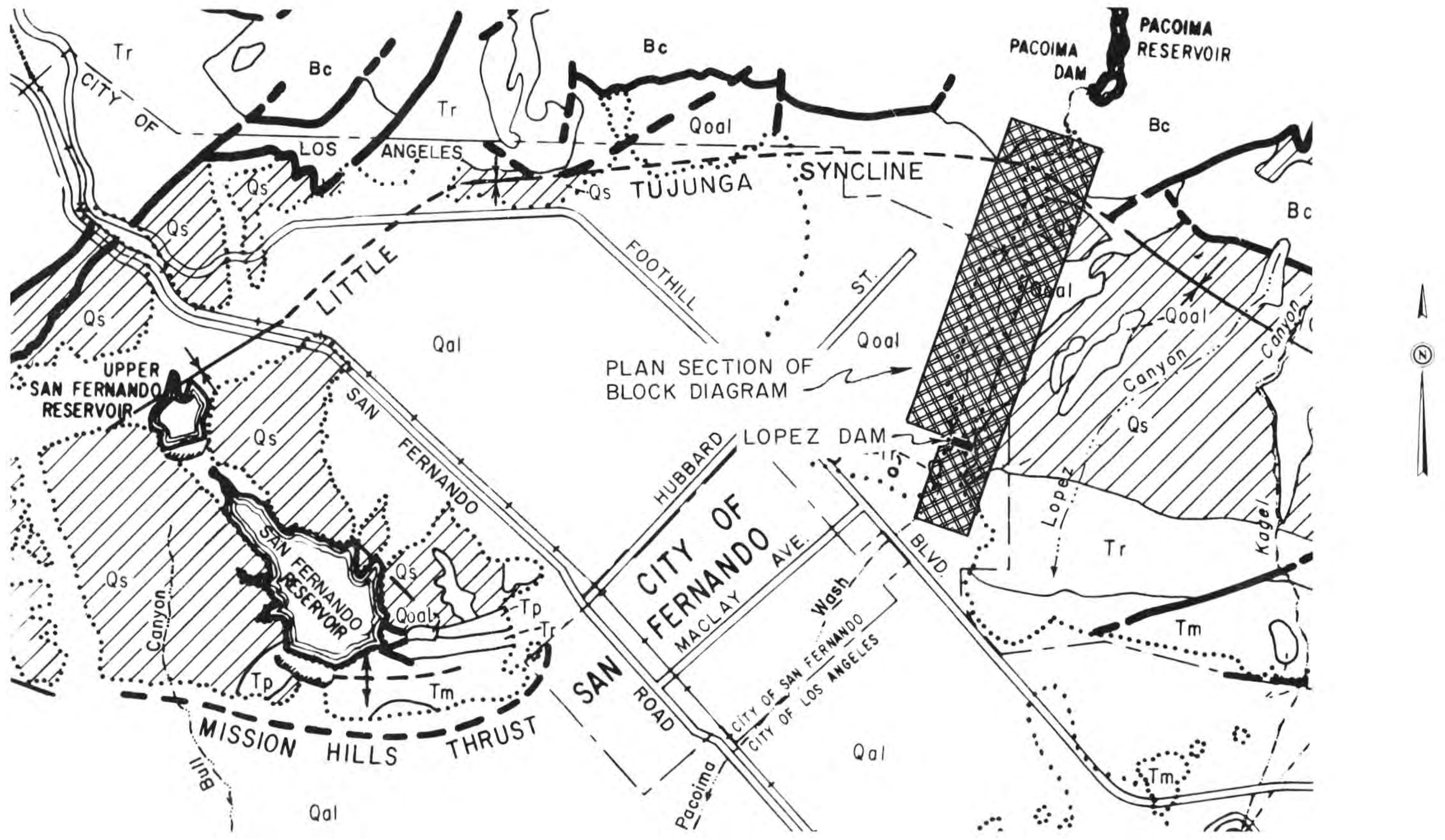
GEOLOGIC CROSS SECTIONS
S-S', VERDUGO SUBMERGED DAM, SYLMAR NOTCH & PACOIMA NOTCH



DIAGRAMMATIC BLOCK DIAGRAM ILLUSTRATING THE LITTLE TUJUNGA SYNCLINE
IN SYLMAR HYDROLOGIC SUBAREA

GEOLOGIC LEGEND

Qal	RECENT ALLUVIUM STREAM DEPOSITS.	WATER-BEARING
Qoal	OLDER ALLUVIUM FAN DEPOSITS.	
Qs	SAUGUS FORMATION CONTINENTAL ALLUVIAL DEPOSITS COMPOSED OF AQUICLUDES AND LENTICULAR AQUIFERS.	
Tr	REPETTO FORMATION MARINE SILTSTONE, SHALE, AND CONGLOMERATE.	NONWATER-BEARING
Tm	MODELO FORMATION SHALE AND SANDSTONE.	
Bc	BASEMENT COMPLEX GRANITIC AND METAMORPHIC ROCKS.	



LOCATION MAP

SCALE

0 1 2 Miles

0 5,000 10,000 Feet

NOTE: FOR IDENTIFICATION AND DECRIPTION OF GEOLOGIC SYMBOLS SHOWN ON THE LOCATION MAP SEE "GEOLOGIC LEGEND" ON PLATE 4.

STATE OF CALIFORNIA
STATE WATER RIGHTS BOARD

SAN FERNANDO VALLEY REFERENCE

GEOLOGIC CROSS SECTION

BLOCK DIAGRAM
of
LITTLE TUJUNGA SYNCLINE

APPENDIX

ULARA Watermaster Report, WY 2012-13, December 2014

ANNUAL REPORT

Upper Los Angeles River Area Watermaster

Re: City of Los Angeles vs. City of San Fernando, et al.

Superior Court Case No. 650079 – County of Los Angeles

WATERMASTER SERVICE

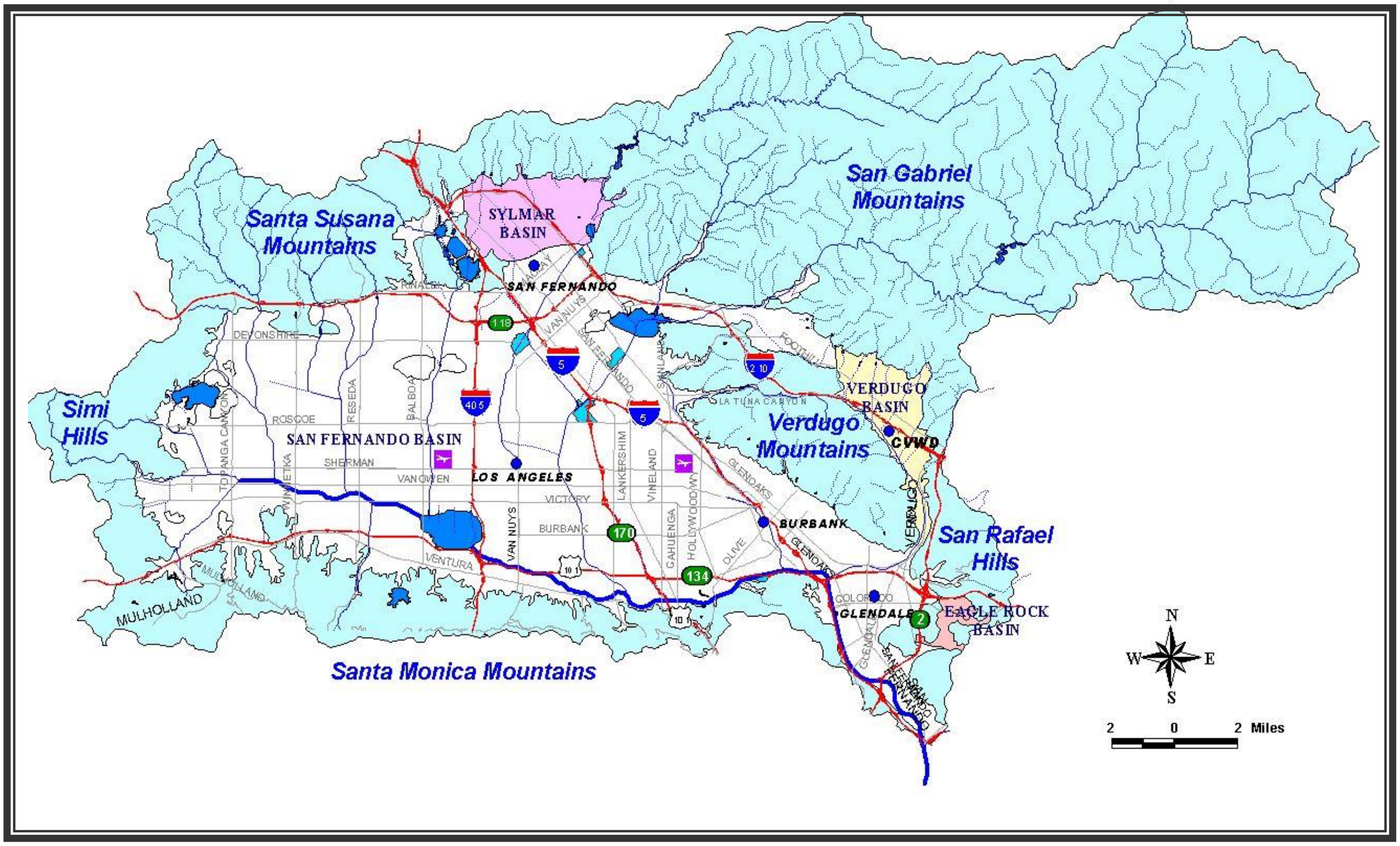
IN THE

UPPER LOS ANGELES RIVER AREA

LOS ANGELES COUNTY, CALIFORNIA

2012-13 WATER YEAR

OCTOBER 1, 2012 – SEPTEMBER 30, 2013



DECEMBER 2014

ANNUAL REPORT
UPPER LOS ANGELES RIVER AREA WATERMASTER

RE: CITY OF LOS ANGELES VS. CITY OF SAN FERNANDO, ET AL.
CASE NO. 650079 - COUNTY OF LOS ANGELES

WATERMASTER SERVICE
IN THE
UPPER LOS ANGELES RIVER AREA (ULARA)
LOS ANGELES COUNTY, CALIFORNIA

2012-13 WATER YEAR
OCTOBER 1, 2012 - SEPTEMBER 30, 2013

ULARA WATERMASTER
Richard C. Slade, PG
Richard C. Slade & Associates LLC

ASSISTANT WATERMASTER
Anthony Hicke, CHG
Richard C. Slade & Associates LLC

GROUNDWATER HYDROLOGY/MODELING STAFF
Hadi Jonny, PE
LADWP

WATERMASTER STAFF AT LADWP

Gregory Reed, PE	Waterworks Engineer
Fatema Akhter	Civil Engineering Associate
Sarah Lacombe	Civil Engineering Associate
Billie Washington	Clerk Typist

Copies of this report may be viewed and downloaded from the ULARA Watermaster website located at http://ularawatermaster.com/

December 2014

FOREWORD

As Watermaster, I am pleased to present the Annual Watermaster Report for the Upper Los Angeles River Area (ULARA) for the 2012-13 Water Year (i.e., from October 1, 2012 through September 30, 2013). Please note that this Annual Watermaster Report is being submitted to the Court later than its anticipated May 2014 filing date. Due to various technical and personnel issues at the Watermaster's office, the report was provided to the Court in April 2015. However, to avoid confusion with the submittal to the Court later this year of the Annual Watermaster Report for Water Year 2013-14, this current report has been purposely dated December 2014.

This report has been prepared by Watermaster staff and myself in general accordance with the provisions of the Judgment, dated January 26, 1979, in regard to the Court-defined water rights case of the Superior Court for the County of Los Angeles (i.e., City of Los Angeles vs. City of San Fernando, et al, Case No. 650079). Four distinct groundwater basins and their adjoining hill and mountain watershed areas comprise ULARA. From largest to smallest in surface area, these four groundwater basins are known as the San Fernando, the Sylmar, the Verdugo and the Eagle Rock basins.

Described in this Annual Watermaster Report are the water rights of each Party in each of the four ULARA groundwater basins, and the volume of groundwater in storage to the credit of each Party, as of October 1, 2013. This report also provides basic background information on the history of the San Fernando case and information regarding the four ULARA groundwater basins such as their: respective locations and basin boundaries; local geologic conditions; local water supply; groundwater extractions; changes in groundwater levels over time; estimates of the change in groundwater in storage; imported water use; recharge operations; water quality; and other pertinent information for the 2012-13 Water Year.

Based on available information, key challenges in ULARA over the long-term will continue to be: the accumulation of stored water credits in the San Fernando Basin; new and/or ongoing contamination of groundwater in the San Fernando, Verdugo and Sylmar basins; and the need to increase recharge into the local groundwater basins by different methods, at different locations and depths, and by using different sources of water. This need for increased recharge is particularly important for the San Fernando Basin.

In late-2007, the cities of Glendale, Burbank, and Los Angeles entered into a 10-year agreement which was oriented to help reverse the long-term decline of groundwater in storage and the concurrent accumulation of a large quantity of unsupported stored water credits in the San Fernando Basin. That agreement contains several important provisions, including: restrictions on pumping of stored water credits; the joint efforts of the City of Los Angeles and the County of Los Angeles Department of Public Works to rehabilitate existing facilities and/or construct new facilities to help increase recharge of stormwater runoff; and working to reduce future losses from the basin due to rising groundwater and underflow out of ULARA.

Groundwater contamination from volatile organic compounds (VOCs), hexavalent chromium, and certain other contaminants continues to be a serious problem for water-supply in ULARA, but particularly in the eastern portion of the San Fernando Basin. The cities of Burbank, Glendale and Los Angeles continue to enlist the assistance of key regulatory agencies including the United States Environmental Protection Agency (USEPA), the California Department of Toxic Substances Control (DTSC) and the Regional Water Quality Control Board – Los Angeles (RWQCB-LA) to help further characterize and expedite the cleanup of the contaminated soils and aquifers within San Fernando Basin. Pumping of excessive concentrations of chromium by certain wells and limitations of existing treatment facilities to treat those excessive concentrations have also become more recent problems. In addition, various gasoline components have impacted and/or have threatened one or more municipal-supply water wells owned by the Crescenta Valley Water District in the Verdugo Basin. In the Sylmar Basin, nitrate concentrations have been increasing in recent years in wells operated by the City of San Fernando; Los Angeles has one or more wells that have been impacted by TCE in this basin. A number of the municipal-supply water wells have had to be removed from active service due to excessive concentrations of various contaminants, mainly in the San Fernando Basin, but also in the Sylmar and Verdugo basins.

An ongoing activity of the Watermaster continues to be the review and the approval/denial of the plans for the possible infiltration of stormwater collected at all new development and/or redevelopment projects within the San Fernando Basin portion that lies within the City of Los Angeles. These stormwater collection plans, as prepared by the engineer for the developer, have been part of the Standard Urban Stormwater Mitigation Plan (SUSMP) program of the

RWQCB-LA. Recently, this SUSMP program has been re-named as the Low Impact Development (LID) program by the RWQCB-LA.

To provide ongoing groundwater management within the four ULARA groundwater basins, the Watermaster and the Administrative Committee continued to meet on a quarterly basis during 2012-13. The Watermaster continued to provide updates of key ULARA issues at occasional status conferences with Judge Susan Bryant-Deason, Judge of the Los Angeles County Superior Court.

On July 1, 2014, the California Department of Public Health (CDPH) Drinking Water Program transferred from CDPH to the State Water Resources Control Board (SWRCB). The transferred program is now known as the Division of Drinking Water (DDW). For the purpose of this report, any references herein to CDPH should be understood as referring to the new DDW.

For this current Annual Watermaster Report, I want to acknowledge and personally thank the Watermaster Support Staff at LADWP for their continued efforts in creating many of the data tables, figures and maps, and for conducting computer model simulations that continue to be vital to the preparation and submittal of this report to the Court on a timely basis. Among those at LADWP whose efforts continue to be particularly notable are: Ms. Sarah LaCombe, Ms. Fatema Akhter, Mr. Hadi Jonny, and Mr. Gregory Reed.

Respectfully submitted

Richard C. Slade
ULARA Watermaster

TABLE OF CONTENTS

TABLES

FIGURES

PLATES

APPENDICES

1. INTRODUCTION

1. INTRODUCTION

1.1 Background

The Upper Los Angeles River Area (ULARA) encompasses the entire hill and mountain watershed and the topographically-lower and intervening valley floor areas of the Los Angeles River and its tributaries above (north of) a point in the river designated by the Los Angeles County Department of Public Works (LACDPW) as Gaging Station F-57C-R; this gage lies near the junction of the Los Angeles River and the Arroyo Seco (see Plate 1, "ULARA Location Map"). The entire ULARA region encompasses an approximate total of 328,500 acres of hill and mountain areas and intervening valley fill areas. Of this total watershed area, there are approximately 122,800 acres of valley fill that form the four groundwater basins, whereas the remaining 205,700 acres are comprised by the tributary hills and mountains in the watershed. ULARA is bordered on the north and northwest by the Santa Susana Mountains; on the north and northeast by the San Gabriel Mountains; on the east by the San Rafael Hills; on the west by the Simi Hills; and on the south by the Santa Monica Mountains.

Four distinct groundwater basins were defined within the valley fill areas by the ULARA Judgment of 1979; these include, from largest to smallest, the San Fernando, Sylmar, Verdugo and Eagle Rock basins (refer to Plate 1). The groundwater reservoir comprising each of these basins is separated from the others, but each basin is considered to be replenished (recharged) by the following sources: deep percolation from direct rainfall; infiltration of surface water runoff; and infiltration of excess irrigation of a portion of the water that is delivered for use within these basins. Artificial recharge also occurs in the San Fernando Basin via the ongoing use of existing spreading basins whenever excess rainfall and runoff are available.

The basic characteristics of the four ULARA groundwater basins are briefly described in the paragraphs below. Noteworthy is that Bulletin 118 Update 2003, prepared by the California Department of Water Resources (DWR, October 2003) defined a groundwater basin as: "an alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and having a definable bottom." This Watermaster, as a result of a large number of prior groundwater projects, has used the following as a more detailed definition of a typical groundwater basin: a three dimensional region that has reasonably-definable surface and subsurface boundaries and that contains layers and lenses of potentially water-bearing sediments which are capable of yielding groundwater in useable quantities and of acceptable quality for beneficial use. In short, a groundwater basin could be considered to typically represent an area underlain by permeable sediments capable of storing and yielding a substantial amount of groundwater to water-supply wells. For the four ULARA groundwater basins, the potentially water-bearing sediments are comprised by various young and old alluvial fan-type deposits. In the San Fernando and Sylmar basins, the potentially water-bearing sediments also include various strata within the Saugus Formation that is known to underlie the geologically younger and older alluvial-type deposits within these groundwater basins.

Exposed at ground surface in all of the topographically-elevated hill and mountain watershed areas of ULARA, and also known to directly underlie all potentially water-bearing sediments beneath the four ULARA groundwater basins, are geologically older sedimentary rocks (i.e., sedimentary bedrock) and even older crystalline, metamorphic and igneous rocks (i.e., crystalline basement rock). These geologically older rocks are either well-lithified, cemented and/or crystalline in nature, and as such, they are considered to display only secondary porosity; their permeability is low to very low. Because of their lithified and/or cemented and/or crystalline character, these rocks do not contain water in the interstices between the individual sand or gravel grains (as occurs in the potentially water-bearing deposits), but rather the groundwater is contained solely within fractures, joints, and/or along bedding planes in the rocks. Hence, the groundwater storage capacity of these rocks is low and their long-term sustained yield is unpredictable; as a result, only limited quantities of water can be yielded to wells. For these reasons, these rocks are classified as nonwater-bearing for municipal-supply purposes in ULARA, and none of these older sedimentary or crystalline rocks are considered to be part of the four groundwater basins within ULARA.

THE SAN FERNANDO BASIN (SFB), the largest in surface area of the four basins, directly underlies the San Fernando Valley, and has a surface area of approximately 112,000 acres and a maximum thickness of potentially water-bearing sediments of ±1200 ft. The surface area of SFB represents 91.2 percent of the total surface of all four groundwater basins (i.e., the total of all valley fill areas) within ULARA. The lateral or ground surface boundaries of this basin are formed by nonwater-bearing bedrock and/or crystalline basement rock in the adjoining hills/mountains, as follows: on the east and northeast by the San Rafael Hills, the Verdugo Mountains, and the San Gabriel Mountains; on the north by the San Gabriel Mountains and the eroded south limb of the Little Tujunga syncline which separates it from the Sylmar Basin on the north; on the northwest and west by the Santa Susana Mountains and Simi Hills; and on the south by the Santa Monica Mountains. Plate 1A, “San Fernando Groundwater Basin Map,” illustrates the approximate ground surface boundaries of the SFB (as originally interpreted for the Report of Referee and/or by prior Watermasters, and as subsequently converted to GIS format by LADWP personnel); also shown on Plate 1A are the general locations of key wellfields owned by the cities of Burbank, Glendale and Los Angeles in this basin.

THE SYLMAR BASIN (SB) lies just northeast of SFB, and its surface area of approximately 5,600 acres makes it the second largest groundwater basin in ULARA. SB may have a maximum thickness of potentially useable water-bearing sediments of at least 1000 ft. According to the Report of Referee (1962), Sylmar Basin is bounded by the nonwater-bearing bedrock and/or basement rock in the adjoining hills/mountains, as follows: on the north and east by the San Gabriel Mountains; on the west by a topographic divide in the valley fill between the Mission Hills and the San Gabriel Mountains; on the southwest by the Mission Hills; on the east by the older portion of the Saugus Formation along the east bank of Pacoima Wash; and on the south by the eroded south limb of the Little Tujunga syncline, which separates it from the SFB to the south. Plate 1B, “Sylmar Groundwater Basin Map,” illustrates: the approximate ground surface boundaries of Sylmar Basin (as originally interpreted for the Report of Referee and/or by prior Watermasters, and as subsequently converted to GIS format by LADWP personnel). Also shown on this plate are the approximate locations of water-supply wells owned by the cities of Los Angeles and San Fernando in SB.

THE VERDUGO BASIN (VB), which lies north and east of the Verdugo Mountains, has an approximate surface area of 4,400 acres and a maximum thickness of potentially water-bearing sediments of perhaps 250 to 300 ft. The surface area of this basin comprises 3.6 percent of the total valley fill area in ULARA. VB is bounded on the north by nonwater-bearing basement rock in San Gabriel Mountains; by a groundwater divide on the northwest which separates VB from the SFB; by a groundwater divide separating it from the Monk Hill Subarea of the Raymond Groundwater Basin to the east; on the southeast by sedimentary bedrock in the San Rafael Hills; and on the south and southwest by the crystalline basement rock within the Verdugo Mountains. Plate 1C, "Verdugo Groundwater Basin Map," shows the boundaries of Verdugo Basin (as originally interpreted for the Report of Referee and/or by prior Watermasters, and as subsequently converted to GIS format by LADWP personnel); also illustrated are the approximate locations of the water-supply wells owned by the City of Glendale and the Crescenta Valley Water District.

THE EAGLE ROCK BASIN (EB), lies in the extreme southeast corner of ULARA. The 800-acre surface area of this basin makes it the smallest basin in ULARA (it comprises only 0.6 percent of the total valley fill in ULARA). Within EB, the maximum thickness of potentially water-bearing sediments may be on the order of only ±200 ft. The approximate ground surface boundaries of this small basin (as originally interpreted for the Report of Referee and/or by prior Watermasters, and as subsequently converted to GIS format by LADWP personnel) are shown on Plate 1D, "Eagle Rock Groundwater Basin Map"; note that there are no existing municipal-supply water wells in this basin.

1.2 History of Adjudication

Water rights in ULARA were finally established by the JUDGMENT AFTER TRIAL BY COURT in Los Angeles County Superior Court Case No. 650079. Results of this case (known as The City of Los Angeles, a Municipal Corporation, Plaintiff, vs. City of San Fernando, et al., Defendants), were originally determined and signed on March 14, 1968 by the Honorable Edmund M. Moor, Judge of the Superior Court. Numerous pre-trial conferences were held subsequent to the filing of the action by the City of Los Angeles in 1955 and also before the trial commenced on March 1, 1966.

On March 19, 1958, an Interim Order of Reference was entered by the Court directing the State Water Rights Board (now known as the State Water Resources Control Board, SWRCB) to determine the availability of all public and private records, documents, reports, and data relating to a proposed Order of Reference in the case. On June 11, 1958, the Court subsequently entered an "Order of Reference to State Water Rights Board to Investigate and Report upon the Physical Facts” (Section 2001, Water Code).

A Final Report of Referee was approved on July 27, 1962 and filed with the Court. The Report of Referee provided the results of a detailed study of the surface and subsurface geology, the occurrence and movement of groundwater, aquifer characteristics, and the surface hydrology. In addition, investigations for that report were made regarding the history of: channels of the Los Angeles River and its tributaries; the general directions of groundwater flow within each of the four ULARA groundwater basins; the groundwater quality and the historic extractions of groundwater in each of the four groundwater basins; and all sources of water, whether they be diverted, extracted, imported, etc within those four basins. The Report of Referee served as the principal basis for the geological, hydrogeological and hydrological facts for the original Trial Court Judgment in 1968, for the Decision of the Supreme Court in 1975 (14 Cal 3d 199, 123 Cal Rept 1), and for the Trial Court Final Judgment on remand dated January 26, 1979.

The Trial Court issued its opinion on March 15, 1968. The City of Los Angeles filed an appeal from the Judgment of the Trial Court with the Court of Appeal, whereafter the City of Los Angeles participated in a hearing on November 9, 1972 conducted by the Court of Appeal. The opinion prepared by Judge Compton, was issued on November 22, 1972, and was concurred with by Judges Roth and Fleming. It provided a reversal, with direction, of the original Judgment handed down by Judge Moor on March 14, 1968. In essence, this reversed opinion gave rights to the City of Los Angeles for all water in ULARA, including the use of the groundwater in the local groundwater basins, along with some limited entitlements to other waters. The defendants, however, were given the right to capture "import return water", which was considered to be that portion of the treated surface water purchased and imported to the area by the City of Los Angeles from the Metropolitan Water District of Southern California (MWD) that could percolate back into the local groundwater basin.

A petition for rehearing was filed on December 7, 1972, but this petition was denied by the Court of Appeal. On January 2, 1973, the defendants filed a petition for hearing with the State Supreme Court. The State Supreme Court, on March 2, 1973, advised the parties it would hear the case, and the appeals hearing began on January 14, 1975.

On May 12, 1975, the California Supreme Court filed its opinion on the then-current 20 year-long San Fernando Groundwater Basin litigation. This opinion, which became final on August 1, 1975, upheld the Pueblo Water Rights of the City of Los Angeles to all groundwater in the SFB derived from precipitation (infiltration of direct rainfall plus surface water runoff) within ULARA. The Pueblo Water Rights of Los Angeles were not allowed to extend to and/or include the groundwater in the Sylmar, Verdugo or Eagle Rock basins. However, all surface and groundwater underflows from these adjoining groundwater basins were considered to be a part of the Pueblo Water Rights of the City of Los Angeles.

The California Superior Court opinion also provided the City of Los Angeles with rights to all groundwater in the SFB that was derived from water imported by the City from outside ULARA that was eventually spread or delivered within the SFB. The Cities of Glendale and Burbank were also given rights to all SFB groundwater derived from water that each imports from outside ULARA and delivered within ULARA. Because the City of San Fernando was not a member of MWD until the end of 1971, and because that city had never imported any water from outside ULARA prior to 1971, the City of San Fernando was given no return flow rights based on a March 22, 1984 stipulation between the cities of Los Angeles and San Fernando.

The California Supreme Court reversed the principal judgment of the March 15, 1968 Trial Court opinion and remanded the case back to the Superior Court for further proceedings consistent with the Supreme Court's opinion. On remand, the case was assigned to the Honorable Harry L. Hupp, Judge of the Superior Court of Los Angeles County. The Final Judgment (Judgment), signed by Judge Hupp, was entered on January 26, 1979; copies of this Judgment are available from the ULARA Watermaster website. Importantly, the water rights set forth in the Judgment are generally consistent with the opinion of the Supreme Court as described above, with the exception of a provision regarding the calculation of Import Return Credit. That is, contrary to the Supreme Court opinion, the cities of Burbank, Glendale and Los Angeles in 1978 agreed to use all delivered water, instead of only imported water, in the calculation of their Import Return Credit. This agreement among these cities has had a significant but adverse impact on groundwater in storage in the San Fernando Basin, as discussed later in this report.

In addition, the January 26, 1979 Final Judgment includes provisions and stipulations regarding water rights, storage of water, stored water credits, and arrangements for physical solution water for certain parties as recommended by the Supreme Court.

A separate stipulation was filed in Superior Court on January 26, 1979 appointing Mr. Melvin L. Blevins of LADWP as the original ULARA Watermaster under the Judgment. On September 1, 2003, Mr. Mark G. Mackowski, also of LADWP, was appointed as the second ULARA Watermaster by the Superior Court, succeeding Mr. Blevins after his 24 years of service. On January 1, 2009, Mr. Richard C. Slade, Principal Groundwater Geologist for Richard C. Slade and Associates LLC, Consulting Groundwater Geologists, was appointed as the first completely independent ULARA Watermaster, thereby succeeding Mr. Mackowski after his 5 years of service.

On August 26, 1983, the original ULARA Watermaster (Mr. Blevins) reported to the Court, pursuant to Section 10.2 of the Judgment, that the Sylmar Basin was in a condition of overdraft. In response to that Watermaster's letter and a Minute Order of the Court, the cities of Los Angeles and San Fernando responded by letter to the Court, agreeing with the Watermaster that overdraft existed in the Sylmar Basin at that time. On March 22, 1984, Judge Hupp signed a stipulation ordering, effective October 1, 1984, that the cities of Los Angeles and San Fernando would be limited in their pumping from the Sylmar Basin in order to bring their total groundwater extractions within the safe yield of this basin, including any rights exercised by private parties.

Pursuant to Judgment Section 8.2.10, the original Watermaster (Mr. Blevins) increased the safe yield of the Sylmar Basin on a temporary basis in 1996, from 6,210 acre-feet per year (AFY) to 6,510 AFY. On October 1, 2005 this temporary increase expired, and the then-current Watermaster (Mr. Mackowski) conducted his re-evaluation of the safe yield of the Sylmar Basin. Based on that re-evaluation, a recommendation, along with certain conditions, was made by that Watermaster in 2006 to increase the total safe yield of this basin to 6,810 AFY (3,405 AFY each for the cities of Los Angeles and San Fernando). The Court approved the new Stipulation after its hearing on December 13, 2006.

A new and updated re-assessment of the safe yield of Sylmar Basin was conducted by the current Watermaster in 2012 and this recent re-assessment resulted in the following conclusions: Sylmar Basin is not in a current state of overdraft; the new safe yield of this basin can be temporarily and conditionally increased to 7,140 AFY (3,570 AF each for the cities of Los Angeles and San Fernando); and these pumping amounts may continue for the five Water Years of 2011-12 through 2015-16, unless in-progress data evaluation by the Watermaster reveals that Sylmar Basin is being adversely affected by the increased pumping by these Parties. This recent reassessment of the safe yield of Sylmar Basin by the current Watermaster was filed with the Court in June 2013.

In September 2007, the cities of Burbank, Glendale, and Los Angeles entered into a 10-year Stipulated Agreement to address the long-term decline in stored groundwater in the San Fernando Basin (see Section 2.9 of this report and Appendix G). This 10-year interim agreement restricted the pumping of Stored Water Credits, helped account for basin losses, and provided for the support of Los Angeles for enhancing the recharge of native water within this basin. It also provided for a re-evaluation of the safe yield of the San Fernando Basin, but that project was never completed.

Table 1-1, "Judges of Record," lists the judges (and their respective date of appointment) who have succeeded the original Superior Court Judge (Judge Hupp, who signed the Final Judgment in this case as Judge of Record for the San Fernando Judgment dated January 26, 1979).

TABLE 1-1: JUDGES OF RECORD

Judge	Date Appointed
Vernon G. Foster	April 30, 1985
Miriam Vogel	January 16, 1990
Sally Disco	May 25, 1990
Jerold A. Krieger	April 16, 1991
Gary Klausner	December 9, 1991
Ricardo A. Torres	January 1, 1993
Susan Bryant-Deason	January 1, 1999

1.3 Extraction Rights

The extraction rights under the January 26, 1979 Final Judgment for the four ULARA groundwater basins and the separate August 26, 1983 (and subsequent) Sylmar Basin Stipulations are as follows:

1.3A San Fernando Groundwater Basin

Native Water

The City of Los Angeles has an exclusive right to extract and utilize all of the native safe yield water in the San Fernando Basin; refer to Plate 1A for the boundaries of this basin. This native safe yield, which was originally determined to be an average of 43,660 AFY, represents the Pueblo Water Right of the City of Los Angeles under the Final Judgment dated January 26, 1979.

Import Return Water

The cities of, Burbank, Glendale, and Los Angeles each have a right to extract the following amounts of groundwater from the SFB.

Burbank:	20.0 percent of all delivered water, including recycled water, to the valley fill lands of the SFB and all of its tributary hill and mountain areas.
Glendale:	20.0 percent of all delivered water, including recycled water, to the valley fill lands of the SFB and all of its tributary hill and mountain areas.
Los Angeles:	20.8 percent of all delivered water, including recycled water, to the valley fill lands of the SFB and all of its tributary hill and mountain areas.

Physical Solution Water

Several private entities have been granted limited entitlement to extract groundwater from the SFB but each such entitlement is chargeable by the Watermaster to the rights of the respective Party; that specific entity must then pay that Party for the resulting costs of the pumped water. Table 1-2 "Physical Solution Parties," lists the various private pumping entities and their maximum physical solution pumping volumes per year.

TABLE 1-2: PHYSICAL SOLUTION PARTIES

Chargeable Party	Pumping Party	Allowable Pumping (acre-feet)
City of Burbank	Valhalla	300
	Lockheed-Martin	25
City of Glendale	Forest Lawn	400
	Angelica Healthcare[1]	75
City of Los Angeles	City of Glendale	5,500
	City of Burbank	4,200
	Middle Ranch	50
	Hallelujah Prayer Center[2]	60
	Van de Kamp[3]	120
	Toluca Lake	100
	Sportsmen's Lodge	25
	Water Licenses	83

1. Angelica Healthcare no longer pumps its physical solution rights
2. Formerly Hathaway-Sycamore Children's Home
3. Van de Kamp has never pumped its physical solution right.

Stored Water

Each of the cities of Burbank, Glendale, and Los Angeles has a right to store groundwater and the right to extract equivalent amounts of groundwater from the SFB.

1.3B Sylmar Groundwater Basin

Native Water

The March 22, 1984 Stipulation assigned the cities of Los Angeles and San Fernando equal rights to the then-current total safe yield value of 6,210 AFY for the Sylmar Basin (see basin boundaries on Plate 1B). On July 16, 1996, the original Watermaster (Mr. Blevins) re-evaluated this safe yield value and established a temporary increase (for a 10-year period) in the safe yield of this basin from 6,210 AFY to 6,510 AFY. This temporary 10-year period ended on October 1, 2005, and triggered a re-evaluation of the safe yield of this basin by the then-current Watermaster (Mr. Mackowski). This re-assessment work was once again performed to be consistent with Section 8.2.10 of the Judgment. That re-assessment by the Watermaster (Mr. Mackowski) and by the special Consultant to the Watermaster (Mr. Blevins) resulted in a new Stipulation which was approved by the Court on December 13, 2006. This updated safe yield assessment permitted a temporary increase in the safe yield of the Sylmar Basin to 6,810 AFY, beginning October 1, 2006. That Stipulation also noted that the safe yield of the Sylmar Basin “shall be re-evaluated within 5 years after adoption of the Stipulation.”

A recent 2012-dated safe yield re-assessment of Sylmar Basin by the current Watermaster, indicates: there is currently no overdraft in Sylmar Basin; the current safe yield, subject to various conditions, is 7,140 AFY; this value is to be equally divided between the cities of Los Angeles and San Fernando; and another safe yield update of this basin may be performed in 5 years (during or immediately following the 2016-17 Water Year). A new Stipulation was filed with the Court in June 2013 for this updated safe yield re-assessment of the Sylmar Basin.

The only potentially active, but private, party with overlying rights within the Sylmar Basin is Santiago Estates, a successor to Meurer Engineering, M.H.C. Inc. Any future pumping by Santiago Estates would be deducted from the total safe yield of this basin and the cities of Los Angeles and San Fernando would then be permitted to equally divide the remainder of the safe yield value of this basin. However, for many years, no deductions have been needed because Santiago Estates has not pumped any groundwater from Sylmar Basin since the 1998-99 Water Year.

Stored Water

Each of the cities of Los Angeles and San Fernando has a right to store groundwater by in-lieu practices and also a right to extract equivalent amounts of groundwater from the Sylmar Basin.

1.3C Verdugo Groundwater Basin

Native Water

The City of Glendale and the Crescenta Valley Water District (CVWD) have appropriative and prescriptive rights to extract 3,856 and 3,294 AFY of groundwater, respectively, from Verdugo Basin; refer to Plate 1C for the boundaries of this basin.

Import Return Water

The City of Los Angeles may have a right to recapture its delivered (imported) water in this basin upon application to the Watermaster and on subsequent order after a hearing by the Court pursuant to Section 5.2.3.2 of the Judgment.

Stored Water

There are no storage rights for any party in the Verdugo Basin based on the Judgment.

1.3D Eagle Rock Groundwater Basin

Native Water

The Eagle Rock Basin has only a limited native safe yield. Plate 1D provides the approximate boundaries of this small groundwater basin.

Imported Return Water

The City of Los Angeles delivers imported water to lands overlying this groundwater basin, and return flow from this delivered water is considered to constitute the majority of the safe yield of this groundwater basin. Los Angeles has the right to extract, or to allow to be extracted, the entire safe yield of this basin.

Physical Solution Water

DS Waters (successor to Sparkletts and Deep Rock water companies) has a physical solution right to extract groundwater from Eagle Rock Basin pursuant to a stipulation with the City of Los Angeles, and as provided for in Section 9.2.1 of the Judgment.

Stored Water

There are no storage rights for any party in the Eagle Rock Basin, based on the Judgment, dated January 26, 1979.

1.4 Watermaster Service and Administrative Committee

In preparing this Annual Watermaster Report, the Watermaster support staff at LADWP continued to collect and record a large amount of information relating to the water supply, water use and disposal, groundwater levels, water quality, and the ownership and location of all new water-supply wells within ULARA. Groundwater pumpers are required to report their extractions on a monthly basis to the Watermaster. This allows the Watermaster staff at LADWP and the Assistant Watermaster to update all required water production accounts on a monthly basis, from which the allowable pumping by each Party for the remainder of the year can be determined by the Watermaster.

Section 8.3 of the Judgment established an Administrative Committee for the purpose of advising the Watermaster in the administration of his duties. As of April 17, 2013, the duly appointed members of the Committee are:

CITY OF BURBANK
Bill Mace (Committee Chair)
Matt Elsner (Alternate)

CITY OF GLENDALE
Ramon Abueg
Raja Takidin (Alternate)

CITY OF SAN FERNANDO
Ron Ruiz
Tony Salazar (Alternate)

CITY OF LOS ANGELES
David Pettijohn
Greg Reed (Alternate and Committee Vice-Chair)

CRESCENTA VALLEY WATER DISTRICT
Dennis Erdman
David Gould (Alternate)

The Watermaster may convene the Administrative Committee at any time in order to seek its advice although, typically, meetings are held each year on an approximate quarterly basis. The Watermaster met with the Administrative Committee on October 24, 2012, and also on January 16, April 17, and July 24, 2013 of the 2012-13 Water Year. Each year the Administrative Committee is also responsible for reviewing and approving a Draft of the proposed Annual Report prepared by the Watermaster. As discussed in this report's "Foreword," the Administrative Committee approved this current 2012-13 Watermaster Report on April 20, 2015, even though the report is dated December 2014.

1.5 Significant Events through April 2014

Groundwater System Improvement Study (GSIS)

Since 2009, the Los Angeles Department of Water and Power (LADWP) has been moving forward with a $34 million Groundwater System Improvement Study (GSIS) to fully characterize the groundwater basin as necessary to develop conceptual plans for short- and long-term strategies for remediation, containment, clean-up and removal of the contaminated groundwater. As a part of the GSIS, the LADWP is in the process of drilling an additional 25 monitoring wells necessary to complete the raw water quality characterization. The drilling of the monitoring wells is expected to be completed in March 2014. An on-going parallel activity is the conceptual planning of potential remediation facilities for the groundwater cleanup. A high-level concept plan and cost estimate was developed for the remediation facilities necessary to clean-up 123,000 acre-feet (AF) of contaminated groundwater per year. A very preliminary estimate is on the order of $600-900 million. LADWP will be refining this estimate as the information from the GSIS is finalized, and as the remediation facility projects progress through the final planning and design phases.

Burbank Operable Unit (BOU)

The BOU, operated by Burbank under a contract with TerranearPMC, LLC and funded by Lockheed-Martin, removes volatile organic compounds (VOCs) from the local groundwater. The City of Burbank, in cooperation with the United States Environmental Protection Agency (USEPA) and Lockheed-Martin, continued with design improvements and operational changes to make the facility more mechanically reliable at its design capacity of 9,000 gallons per minute (gpm). During the 2012-13 Water Year, a total of 11,387 AF of groundwater were pumped and treated at the BOU; this volume is about 1,394 AF more than the volume treated in the prior Water Year. As a requirement of the Consent Decree, Burbank also reduces the concentrations of nitrate in its pumped groundwater through its blending facility using imported supplies from MWD before delivery to customers in the City of Burbank.

Montgomery Watson Harza (MWH) was retained by Burbank to perform a Well Field Performance Attainment Study that evaluated the BOU wellfield and related facilities in an effort to increase groundwater extractions to 9,000 gpm. As a part of this work, a 60-day "stress test" was requested by the EPA, and completed in summer, 2010. A total combined discharge rate of 9,000 gpm was pumped from six BOU wells for a period of 60 days. EPA used observations from this pumping test to update values for hydraulic conductivity, transmissivity and storativity in the aquifer systems beneath the BOU for use in the EPA basin-wide groundwater model.

Glendale Operable Unit (GOU)

The GOU was designed to remove VOCs in the local groundwater and it has the capacity to treat up to a total of ±5,000 gpm from its two existing wellfields: the Glendale North Wellfield; and the Glendale South Wellfield. Pumped groundwater is treated and then blended with imported MWD supplies to reduce the concentrations of nitrate and hexavalent chromium. The GOU treated 6,969 AF of pumped groundwater during the 2012-13 Water Year.

As reported by Glendale, one of the biggest challenges in operating the GOU is maintaining the capacities of the 8 total wells in (4 wells in each of two local wellfields). While the wells are intended to operate full-time (i.e., 24 hours a day, 365 days a year), they are in their 12th year of operation. As a result of declining production, a few of these wells have recently been subjected to re-development operations to help restore their original capacity. Also, issues with power and communications reliability in the GOU wellfield have resulted in additional interruptions to well production.

In an effort to control hexavalent chromium levels in the local groundwater, the GOU operates under a modified pumping plan approved by the USEPA that varies from the original Consent Decree. The modified pumping plan allows reduced pumping from certain GOU wells containing high concentrations of chromium, and increased pumping from other GOU wells displaying lower chromium concentrations. The previous Consent Decree expired in November 2012. Once a new Interim Remedy is issued by the EPA, then a new Consent Decree can be negotiated. In April 2012, the Final version of the Remedial Investigation Work Plan for the Glendale Chromium Operable Unit (GCOU) was issued. Remedial investigation work will include the construction of ground water monitoring wells that will allow EPA to obtain additional data to continue to evaluate the nature and extent of hexavalent chromium in groundwater in the GCOU.

On February 28, 2013, Glendale released the Final version of the "Hexavalent Chromium Removal Research Project" Report to the California Department of Public Health (CDPH). That report details Glendale's research efforts to identify viable treatment technologies for the removal of hexavalent chromium in its local groundwater. Glendale also continues to serve on the American Water Research Foundation (AWRF) technical advisory committee on chromium.

The wellhead treatment system at Well GS-3 (one of the wells in the South Wellfield), known as the Weak-Base Anion Exchange (WBA) Chromium Removal Demonstration facility, has been effective at removing chromium from the local groundwater to concentrations below 5 micrograms per liter (μg/L, where 1 μg/L is equivalent to 1 part per billion).

North Hollywood Operable Unit (NHOU)

Since the 1980 discovery of volatile organic compounds (VOCs) in the groundwater in San Fernando Basin, LADWP has worked with state and federal agencies to help contain and remediate the high-concentration plumes in the North Hollywood area. With 90 percent funding provided by the USEPA and 10 percent funding provided by the California Department of Public Health Drinking Water Program (now known as the Division of Drinking Water), the NHOU was designed and implemented to contain and remove the VOC contamination at a total groundwater pumping rate of 2,000 gpm. LADWP operates and maintains the facility under the direction of USEPA pursuant to a Cooperative Agreement between the two agencies. This system originally consisted of seven extraction wells and an air-stripping tower with vapor-phase granular activated carbon for control of air emissions. An eighth extraction well has become dry (e.g., the local groundwater surface is below the total depth of this well) and, hence, it has never been pumped as part of the remedy. Unfortunately, this existing NHOU remedy has failed to fully contain the VOC plumes, resulting in contaminants escaping the containment areas and forcing the closure of other nearby LADWP water-supply wells.

Newly emerging constituents have also been detected in the NHOU extraction wells; these include hexavalent chromium (Cr^6) and 1,4-dioxane, for which the remedy was not designed to remove. Concentrations of hexavalent chromium in excess of 400 parts per billion (ppb) have forced the closure of extraction well NHE-2 and, since 2009, the groundwater pumped by this well has been diverted to the sanitary sewer.

Concentrations of this contaminant have also recently spiked in NHE-3 and now exceed the maximum contaminant level (MCL) of 50 micrograms per liter (µg/L) set by the California regulatory agencies for total chromium. NHE-3 has been inactive as a result of the Cr^6 pending additional direction from USEPA and the Regional Water Quality Control Board – Los Angeles (RWQCB-LA). The remedy has also become increasingly unreliable due to equipment failures and deteriorating infrastructure, resulting in numerous plant shutdowns.

As a result of these problems, a new remedy is required that is able to address the emerging contaminants, adequately contain the plumes, and prevent contaminants from escaping to other areas outside the containment zones. USEPA's 15-year Consent Decree expired on December 31, 2004 and LADWP is working with this agency on the new remedy. The Record of Decision (ROD) for the NHOU Second Interim Remedy (NHOU2IR) was issued during September 2009. It is expected that this new remedy will include the construction of additional extraction wells, and a new treatment facility designed to remove VOCs, chromium, 1,4 dioxane and other contaminants of concern.

To address the increasing levels of Cr^6 in NHE-2, the RWQCB-LA issued a Cleanup and Abatement Order (CAO) to the responsible party, Honeywell Inc. Under this CAO, Honeywell took over operating NHE-2 to contain the plume by pumping the water and discharging the effluent to the local sewer system while evaluating remedial alternatives. During the 2012-13 Water Year, 176 AF of groundwater were discharged to the sanitary sewer.

Pollock Wells Treatment Plant

LADWP's Pollock Wells Treatment Plant treats groundwater pumped from two extraction wells using four liquid-phase granular activated carbon (GAC) vessels, at a total design flow of 3,000 gpm. The Pollock Wells Treatment Plant was designed to absorb trichloroethylene (TCE) and perchloroethylene (PCE). The original purpose of this facility was to prevent the loss of groundwater through the Los Angeles River Narrows due to rising groundwater outflow. An evaluation of basin discharge through the Los Angeles River Narrows area demonstrated in 1990 that, on average, approximately 2,000 AFY of groundwater were rising into the unlined portion of the Los Angeles River and leaving the basin. Much of this groundwater is lost from the SFB when a sufficient volume is not extracted by the Pollock wells.

Temporary Tujunga Wellfield Treatment Study Project

The Temporary Tujunga Wellfield Treatment Study Project has restored the use of two of the 12 production wells in this wellfield and 12,000 AF per year (AFY) of pumping capacity that have been unavailable due to water quality constraints.

The project utilizes liquid-phase GAC vessels on Tujunga Well Nos. 6 and 7 to process extracted groundwater and remove certain VOCs like TCE, PCE, carbon tetrachloride, and 1,1 dichloroethene (DCE). The treated water has been discharged into the distribution system since May 2010. Approximately 11,000 AF of groundwater were pumped and treated for VOC removal during the current water year.

Verdugo Park Water Treatment Plant

The City of Glendale Verdugo Park Water Treatment Plant (VPWTP) treats groundwater pumped from the Verdugo Basin for turbidity and bacteria, but has been operating significantly below its expected rate of 700 gpm; methods to increase the treatment rate are still being investigated. The City of Glendale is not able to attain the treatment capacity for its VPWTP due to the lack of production capacity from its two Verdugo wells that were constructed in 1992. A total of 88 AF were treated at the VPWTP in the 2012-13 Water Year.

Glenwood Nitrate Removal Plant

The Glenwood Nitrate Removal Plant uses ion exchange to remove nitrate from groundwater pumped by CVWD-owned water wells. CVWD increased its utilization of this plant to increase the amount of groundwater produced. The facility treated 488 AF of groundwater during the 2012-13 Water Year, an increase of 41 AF from the volume treated in the 2011-12 Water Year. In addition, the treatment plant has occasionally been taken out of service to replace the ion exchange resin. Use of the newer resin typically permits longer batch runs, and a lower overall salt content of the wastewater, which ultimately results in a lower volume of wastewater to be discharged to the Los Angeles sewer system.

Plans to Increase Glendale's Pumping Capacity from Verdugo Basin

Glendale has never pumped its full water right of 3,856 AFY from the Verdugo Basin. In the past few years, Glendale has been actively trying to identify possible new water well sites to increase its groundwater production capacity from this basin. Currently, a majority of Glendale's groundwater extractions are from its eight GOU wells in SFB. In 2007, Glendale drilled two pilot boreholes in the Verdugo Basin and conducted isolated aquifer zone testing in each borehole. Due to the poor results of the zone tests (i.e., low flow rates), one of the boreholes was permanently destroyed in March 2008.

Glendale also drilled a third pilot hole in the Montrose area in February 2009. In October 2007, Glendale initiated the rehabilitation of its Foothill Well and this work was completed in 2010. Currently, the Foothill well is online, and produces groundwater at a rate of approximately 130 gpm. Drilling and construction of the City's Rockhaven well, located at the Rockhaven Sanitarium site, was completed in April 2011; However, the nitrate concentration in the wellblend from this new well exceeds the Primary MCL of 45 mg/L for this constituent. Glendale and CVWD are currently exploring options for a cooperative effort to address the elevated nitrate concentrations in this well. The Watermaster appreciates Glendale's effort in drilling and testing exploratory boreholes and in rehabilitating existing wells to increase its pumping from the Verdugo Basin; the Watermaster also appreciates the proposed cooperation between the two Parties in trying to negotiate a successful joint resolution to the nitrate in the Rockhaven well.

City of San Fernando Nitrate Removal

Elevated nitrate concentrations are a problem in some wells operated by the City of San Fernando in Sylmar Basin. Specifically, at least two of its four wells have had to be shut-down over time due to elevated nitrate concentrations. San Fernando issued an RFP and selected a consultant to design a nitrate removal system and a new transmission line. Engineering and construction of the treatment plant are near completion, and are awaiting final permitting before placing the facility online.

Mission Wellfield Rehabilitation

LADWP is continuing to pursue capital improvements at its Mission Wellfield, in order to restore the capacity needed to fully utilize its water rights to groundwater in the Sylmar Basin. These improvements will address the decline in pumping capacity caused by mechanical deterioration and water quality problems that have restricted use of this wellfield. Phase 1 of the project included the replacement of a water storage tank and related control systems. LADWP is now planning Phase 2, which will provide for the: construction of three new water-supply wells; destruction of two deteriorated/older water wells; and the construction of additionally-required infrastructure.

Mission Wellfield Groundwater Remediation

LADWP is pursuing the construction of groundwater monitoring wells near but offsite from its existing Mission wellfield to investigate contamination affecting this local area of Sylmar Basin. Currently, the primary contaminant of concern is the VOC known as trichloroethylene (TCE). Based on the extent of contamination present in the groundwater, LADWP may expedite the development of facilities to remediate, cleanup, and remove the contamination and prevent further loss of Sylmar Basin groundwater. Information gained from the new monitoring wells will be provided to environmental regulators to support their investigation of potentially responsible parties who may be held responsible for the eventual cleanup costs.

Pacoima B-6, MWD Foothill Feeder Replenishment Project

The MWD Foothill Feeder connection enables the City of Burbank to import surplus water from the State Water Project into the San Fernando Basin for artificial recharge at the Pacoima Spreading Grounds. This relatively new source of water offers Burbank flexibility to purchase MWD water for spreading as opposed to purchasing physical solution water. The first delivery of MWD water occurred on April 26, 2010 through the new Pacoima B-6 MWD connection; at that time, 33.6 AF of water were delivered for groundwater recharge into the Pacoima Spreading Grounds. During this 2012-13 Water Year, a total volume of 6,703 AF of MWD water was spread by Burbank in the Pacoima Spreading Grounds.

LADWP Water Recycling Programs in the San Fernando Valley

LADWP's Recycled Water Master Planning (RWMP) documents are a series of draft reports that identify opportunities to use recycled water for groundwater replenishment (GWR) and non-potable reuse. The RWMP documents are comprised of several reports, including:

- Groundwater Replenishment Master Planning Report
- Groundwater Replenishment Treatment Pilot Study
- Non-Potable Reuse Master Planning Report
- Terminal Island Water Reclamation Plant Barrier Supplement, and Non-Potable Reuse Concepts Report
- Long-Term Concepts Report

LADWP's most recent Urban Water Management Plan (2010 UWMP) established a goal of increasing recycled water use to 59,000 AFY by 2035. Of the 59,000 AFY, LADWP expects to deliver as much as 29,000 AF of recycled water annually for non-potable reuse within the City of Los Angeles, which includes 5,212 AFY to customers within the SFB originating from the Donald C. Tillman (DCT) and the Los Angeles-Glendale (LAG) water reclamation plants. This system currently provides 3,788 AFY of recycled water for irrigation and 1,424 AFY for industrial cooling.

Distribution facilities are also being designed to deliver approximately 200 AFY and 500 AFY of recycled water to Woodley Park and to the Hansen Dam Golf Course, respectively. Woodley Park began irrigating with recycled water in 2012, and the facilities for Hansen Dam Golf Course will be constructed and estimated to be in service by June 2014.

For the period from October 1, 2012 to September 30, 2013 the following highlights are noted:

- LADWP Signed a Memorandum of Understanding with the City of Los Angeles Department of Recreation and Parks to provide capital funds and design assistance to retrofit Elysian Park with recycled water.
- The recycled water line originating from the City of Burbank is anticipated to be extended through Los Angeles to serve Woodbury University, with the conversion expected to be completed by September 2014. This project has an expected yield of 32 AFY.
- The City of Glendale's recycled water mainline has been tapped and LADWP expects to have Chevy Chase Park, The Bond Park, and Los Feliz Golf Course on recycled water during the 2013-2014 Water Year.

- LADWP expects to connect the following customers to recycled water during the 2013-2014 Water Year: Hansen Golf Course, Delano Park, Woodley Park Phase II, and Branford Park.

Headworks Reservoir Project

The former Headworks Spreading Grounds is currently the site of a multi-objective project to improve water quality, provide the community with an opportunity for passive recreation, and restore a portion of the wetlands along the Los Angeles River. The primary objective of this project is to comply with the Long Term 2 Enhanced Surface Water Treatment Rule and the Stage 2 Disinfectants and Disinfection Byproducts Rule; these regulations were recently promulgated by the USEPA.

LADWP's Silver Lake and Ivanhoe Reservoirs located within the Central Basin will be removed from service, thereby removing two sources of open reservoir storage from the water distribution system due to their vulnerability to surface runoff contamination. The regulatory storage provided by these two reservoirs will be replaced by buried (underground) reservoirs located at the former Headworks Spreading Grounds site, providing a storage capacity of 110 million gallons. The underground reservoir, which will be divided into two (an east and a west reservoir), is currently under construction. The east reservoir is scheduled to begin operation as early as November 2014.

The Headworks Reservoir Project, which is located between the 134 Freeway on the north and the Los Angeles River on the south, and just west of the Victory Blvd exit from the 134 Freeway, includes a hydroelectric power plant that will generate approximately four megawatts of green power. LADWP is also working jointly with the United States Army Corps of Engineers to develop wetlands on a portion of the site.

Projects to Enhance Recharge Capacity in the San Fernando Groundwater Basin

LADWP along with the Los Angeles County Flood Control District (LACFCD), the City of Los Angeles Department of Public Works Bureau of Sanitation (BOS), Bureau of Engineering (BOE) and Bureau of Street Services (BSS) are cooperating on several projects to enhance recharge of native water at existing spreading grounds along the eastern side of the SFB. These projects include: Sheldon-Arleta–Cesar Chavez Recreational Complex Project, Big Tujunga Dam Seismic Retrofit Project; Hansen Spreading Grounds Enhancement Project, Tujunga Spreading Grounds Enhancement

Project, Lopez Spreading Grounds Enhancement Project, Pacoima Spreading Grounds Enhancement Project, Branford Spreading Basin Enhancement Project, Rory M. Shaw (formerly Strathern) Wetlands Park Project, Big Tujunga Dam Sediment Removal Project, Pacoima Dam Sediment Removal Project, Van Norman Stormwater Capture Project, and other LADWP's distributed recharge efforts to implement non-traditional flood control measures that provide the added benefit of stormwater capture and groundwater recharge. A brief discussion of each of the above-mentioned projects is provided below.

- *Sheldon-Arleta – Cesar Chavez Recreational Complex Project*

  The Sheldon-Arleta Project is located at the Sheldon-Arleta Landfill adjacent to the Tujunga Spreading Grounds. During stormwater spreading operations within the Tujunga Spreading Grounds, the potential exists for the recharged water to displace the methane gas produced within the nearby landfill. Approximately 25 years ago, methane gas migrated offsite and elevated concentrations of this gas were detected at a nearby school. To avoid such occurrences, limitations were previously placed on the amount of stormwater that can be spread at the Tujunga Spreading Grounds. These limitations have reduced the capacity of the spreading grounds by approximately 20 percent of their original capacity.

  To mitigate the displacement of methane gas, LADWP, and the Los Angeles Bureau of Sanitation and Los Angeles Bureau of Engineering collaborated on a project to replace the existing methane gas collection system at the Sheldon-Arleta Landfill. This new gas collection system will enhance the containment of the methane gas within the landfill and allow for resumption of the historic spreading flow capacity of 250 cubic feet per second; an additional benefit is to bring some of the spreading basins closest to the landfill back into operation. Construction of the gas collection system was completed in 2009 and an evaluation to determine the maximum recharge capacity of the improved facility is being planned. It is expected that the project will increase average annual stormwater capture by 4,000 AFY.

- *Big Tujunga Dam Seismic Retrofit Project*

  The project was developed to seismically retrofit the existing dam and to increase its spillway capacity. In addition to preventing flood damage and impacts to public safety associated with a dam failure, the project provides for the conjunctive management of stormwater runoff at the dam that is expected to increase average stormwater capture by 4,500 AFY.

LADWP and the LACFCD entered into a cooperative agreement in September 2007, with LADWP providing $9 million in funding toward construction of the $105 million project. The project was completed in July 2011.

- *Hansen Spreading Grounds Enhancement Project*

The Hansen Spreading Grounds is a 156-acre parcel located adjacent to the Tujunga Wash Channel and just downstream from the Hansen Dam. Phase 1, which allows for basin re-construction to enlarge and deepen the spreading basins, was completed in November 2009. Phase 2, the retrofit and automation of the existing intake structure on Tujunga Wash, was completed in January 2013. LADWP and LACFCD shared equally in the $8.4 million cost for constructing this project, and it is expected that the project will increase average stormwater capture by 2,100 AFY.

- *Tujunga Spreading Grounds Enhancement Project*

Owned by LADWP and operated by LACFCD, the Tujunga Spreading Grounds is a 188-acre parcel located along the Tujunga Wash Channel at its confluence with the Pacoima Wash Channel. Plans are underway to enhance the facility by relocating and automating the current intake structure on Tujunga Wash, installing a second automated intake to receive flows from the Pacoima Wash, and reconfiguring the existing spreading basins. Other enhancements include constructing and/or improving recreational walking trails, native habitat, and educational facilities on property not needed for the primary function of stormwater capture. These improvements will greatly increase stormwater capture and subsequent groundwater recharge while improving flood protection, water quality, and open space attributes.

Design of this project is scheduled to be completed by Spring 2014, whereas construction is to occur from 2015 through 2017. It is expected that this project will increase annual stormwater capture by 8,000 AFY. LADWP will provide $27.2 million to the Los Angeles County Flood Control District to construct the project.

- *Lopez Spreading Grounds Enhancement Project*

  The 73-acre Lopez Spreading Grounds, owned and operated by LACFCD, is located just downstream of Lopez Dam adjacent to Pacoima Wash in the northeast portion of the San Fernando Valley. LADWP and LACFCD are currently working cooperatively to improve stormwater capture by upgrading and automating the intake facility and revitalizing the recharge basins.

  This project is expected to increase average annual stormwater capture by 500 AFY. Final designs are scheduled to be completed by summer 2015, and are to be followed by construction in 2016 through 2018. LADWP will provide up to $2 million for design and construction of the $4 million project.

- *Pacoima Spreading Grounds Enhancement Project*

  The 169-acre Pacoima Spreading Grounds, owned and operated by LACFCD, is located on both sides of the old Pacoima Wash Channel downstream of the Pacoima Dam and Reservoir. LADWP and LACFCD are currently working cooperatively to improve stormwater capture by upgrading and automating the intake facility and revitalizing the recharge basins.

  This project is expected to increase average annual stormwater capture by 10,500 AFY. Final designs are scheduled to be completed by early 2015, and are to be followed by construction in 2016 through 2019. LADWP will provide up to $15 million for design and construction of the $30 million project.

- *Branford Spreading Basin Enhancement Project*

  The total wetted area of the spreading grounds is 7 acres with a maximum intake of 1540 cfs and storage capacity of 137 AF. Average annual recharge for the facility is approximately 550 AF based on LACFCD historical records. A maximum recharge volume of 2,142 AF occurred in 1977-78.

  Branford Spreading Basin has significantly lower percolation rates compared to those at Tujunga Spreading Grounds. The current project proposes to install a pump at the spreading basin, a pipeline bridge across the Tujunga Wash Channel, and an outlet into Tujunga Spreading Grounds. These changes will improve groundwater recharge, flood protection, and water quality. This project is expected to increase average annual stormwater capture by 650 AFY. Final designs are scheduled to be completed by summer 2015, and are to be followed by construction in 2016 through 2019. LADWP will provide up to $2 million for design and construction of the $4 million project.

- *Rory M. Shaw (formerly Strathern) Wetlands Park Project*

  The Rory M. Shaw (formerly Strathern) Wetlands Park Project is led by LACFCD and consists of constructing stormwater capture and treatment facilities within the bounds of a 46-acre site formerly used as a gravel pit. This project has the potential to provide groundwater recharge, flood protection, water quality enhancements, habitat restoration, and recreational opportunities. LADWP provided $600,000 for design of the project which is currently at 60% completion. Construction is expected during 2017 through 2020. This project is expected to increase average annual stormwater capture by 590 AFY.

- *Big Tujunga Dam Sediment Removal Project*

  Big Tujunga Dam Sediment Removal Project will remove approximately 2.3 to 4.4 million cubic yards of sediment accumulated behind the dam which resulted from the 2009 Station Fire in the Angeles National Forest. This project, led by the Los Angeles County Flood Control District (LACFCD), will enhance the reservoir capacity by 4,500 AFY for flood control and stormwater capture. Construction is expected during 2016 through 2021. LADWP will provide $10 million for design and construction of the $33 million project.

- *Pacoima Dam Sediment Removal Project*

  Pacoima Dam Sediment Removal Project will remove a minimum of 2.4 to 5.2 million cubic yards of the accumulated sediment behind the dam which resulted from the Marek, Sayre, and Station fires. This project, led by the LACFCD will enhance the reservoir capacity by 3,224 AFY for flood control and stormwater capture. Construction is expected during 2017 through 2022. LADWP will provide $10 million for design and construction of the $85 million project.

- *Van Norman Stormwater Capture Project*

  This project will include design and construction of a pipeline from Van Norman Complex (VNC) to Pacoima Spreading Grounds. It will allow for stored and captured stormwater at the VNC to be conveyed to the Pacoima Spreading Grounds and other downstream spreading facilities via the Pacoima Diversion Channel for recharge into the San Fernando Groundwater Basin.

This project will provide up to 4,200 AFY of additional recharge at the Pacoima Spreading Grounds and other downstream spreading facilities, including Tujunga Spreading Grounds and Branford Spreading Basin. The project design is 30 percent complete. Construction is estimated to begin in 2019; LADWP will provide the estimated cost of $8.6 million.

- *LADWP's Distributed Recharge Efforts*

  Within the San Fernando Valley, urban stormwater runoff from impervious surfaces enters the storm drain system and eventually flows into the ocean. LADWP is exploring partnerships, projects, and programs that promote infiltration of rainfall runoff close to its point of origin.

  Several partnerships that LADWP continues to develop are with the City of Los Angeles Department of Public Works, the LACFCD, TreePeople, the Council for Watershed Health, Hollywood/Los Angeles Beautification Team (LABT), The River Project, and MWD. Some of the projects and programs already constructed or being developed include facility retrofits, neighborhood retrofits, and local recharge projects such as along medians, rain gardens, power line easements, and parkways. The following is a list of distributed recharge projects, along with their potential recharge benefit:

  - Elmer Ave Neighborhood Retrofit – 16 AFY (completed)
  - Garvanza Park Infiltration – 16 AFY (completed)
  - North Hollywood Alley Retrofit – 29 AFY (completed)
  - Woodman Ave Stormwater Capture Project – 65 AFY (completed)
  - Elmer Paseo Stormwater Capture Project – 6 AFY
  - Glenoaks – Sunland Stormwater Capture Project – 28 AFY
  - Glenoaks – Nettleton Stormwater Capture Project – 37 AFY
  - Laura Canyon Stormwater Capture Project – 40 AFY
  - LABT Stormwater Capture Project – 6 AFY
  - Whitnall Highway Power Line Easement – 113 AFY
  - Valley Generating Station Stormwater Capture - 113 AFY
  - Rain Barrels and Rain Gardens Incentives – 5 AFY

- Stormwater Capture Master Plan

Integrated Resources Plan (IRP)

The City of Los Angeles' Water Integrated Resources Plan (Water IRP), which began in 1999, represented a new way of managing the City's water infrastructure and resources in a more sustainable and holistic manner through the year 2020. By the time the Water IRP was adopted by the City Council in 2006, it included detailed facilities plans for the City's wastewater and stormwater systems and recommendations for projects and policies to maximize water conservation and recycled water use, increase stormwater capture, improve the City's wastewater system, and implement multi-purpose/multi-benefit stormwater management — in short, managing all water as "One Water."

Building on the great success of the Water IRP, which had a planning window ending in 2020, and in consideration of evolving environmental, social and sustainability factors, the City is now embarking on developing the "One Water Los Angeles 2040" Plan.

As with the Water IRP, One Water LA will be coordinated by the Bureau of Sanitation and will be developed in partnership with other City Departments which manage water-related functions, programs and facilities that have the potential for integration, including water conservation, recycled water, stormwater capture, watershed protection, and wastewater,

The One Water LA plan will be developed in collaboration with stakeholders, with a goal of expanded public involvement representing LA's diverse geography, demographics, and interests. Stakeholder workshops are scheduled to begin in Spring of 2014.

Strategies adopted as a result of the Water IRP process include a facilities plan that identified immediate upgrades, capital improvements triggered by targeted changes in demographics, and a set of 25 policies covering the following four items: recycled water; conservation; dry-weather runoff; and wet-weather runoff. The Water IRP also directed LADWP to study the feasibility of using recycled water for groundwater replenishment, to increase recycled water use in certain parts of the City, and to continue water conservation efforts. LADWP is the lead agency in the further development of these water strategies.

The Water IRP stipulates that progress must be reported annually to the City Council and that its findings must be updated every five years. An interdepartmental City team collaborated with stakeholders to review the further development of these programs that have been developed as a result of the plan's policies. This 5-year review was completed in 2012 and the report was presented to the LADWP Board of Commissioners and the Los Angeles Board of Public Works in October 2012.

The Water IRP has made important strides towards integrated water planning and management, and the benefits include reduced dependence on imported water supplies, putting more recycled water to beneficial uses, recharging more stormwater runoff, and increased conservation of local drinking water.

The following are the major reported accomplishments related to the recycled water strategies of the Water IRP:

- *Recycled Water Master Planning (RWMP) Documents:*

  Completed in March 2012, these documents outline strategies to meet the City's goal of achieving 59,000 AFY of recycled water delivered by 2035, along with identifying future opportunities to maximize recycled water use beyond the 59,000 AFY goal.

- *Groundwater Replenishment (GWR) Master Planning Report:*

  As part of the RWMP documents, the GWR Master Planning report defines a project to replenish the SFB with purified recycled water, originating from the Donald C. Tillman Water Reclamation Plant. This project would spread 15,000 AFY of advanced treated water by 2022 and up to 30,000 AFY by 2035.

- *GWR Project:*

  The City studied the concept of a Groundwater Replenishment Project as part of the Recycled Water Master Planning process. The Groundwater Replenishment Master Planning Report was completed in 2012 as a collaboration between LADWP and Los Angeles Bureau of Sanitation, with significant input from community stakeholders. As part of the City's key stakeholder engagement strategies during the planning process, a Recycled Water Advisory Group (RWAG) was assembled in 2009 to solicit input from stakeholders. The City is currently pursuing the implementation of the GWR project to replenish up to 30,000 AFY of highly purified recycled water at existing spreading basins and new injection wells in the San Fernando Basin to supplement drinking water supplies. The environmental analysis was launched in September 2013 and outreach efforts will continue to involve the general public in the process.

- *Non-Potable Reuse Master Planning Report:*

  The Non-Potable Reuse Master Planning Report outlines potential opportunities to expand the City's non-potable reuse (NPR) systems to provide recycled water to more LADWP customers for irrigation and industrial applications. The existing recycled water distribution system delivers approximately 8,000 AFY. The expanded infrastructure will enable delivery of an additional 11,350 AFY of NPR, with total NPR deliveries of 19,350 AFY by 2015, or as funding becomes available.

- *Recycled Water Advisory Group (RWAG) and Stakeholder Engagement:* Formed in December 2009, the RWAG consists of approximately 60 stakeholders representing diverse interests and demographics throughout the City of Los Angeles, and this group provided input during the development of the Recycled Water Master Planning Documents. The RWAG continues to provide input as the RWMP strategies, including GWR, are implemented. In addition, stakeholder engagement efforts have included recycled water forums for the general public, elected official briefings, and presentations to Neighborhood Councils and community groups.

In addition to recycled water and water conservation, the Water IRP identifies policies for runoff management. Several projects have been identified, planned, designed and/or constructed as a result of the Water IRP's dry weather and wet weather runoff goals. Much of this effort is being pursued within the scope of the distributed recharge projects in the San Fernando Basin.

Low Impact Development (LID) Stormwater Mitigation Plans

Resulting from the municipal stormwater National Pollution Discharge Elimination System Permit (NPDES Permit No. CAS004001) issued by the LARWQCB on December 13, 2001, the County of Los Angeles and 84 cities that are subject to the region-wide permit developed and adopted Low Impact Development (LID) Stormwater

Mitigation Plans (formerly referred to as Standard Urban Stormwater Mitigation Plans, or SUSMPs) policies or ordinances within their respective jurisdictions to address stormwater. Under LID ordinances, all new privately-owned development and redevelopment projects within the City of Los Angeles may be required to implement certain Best Management Practices and/or stormwater mitigation measures to contain or treat the first ¾- inch of rainfall runoff from every storm, and to implement on-site stormwater infiltration. The City of Los Angeles-Watershed Protection Division refers projects to the Watermaster that are undergoing a LID evaluation within the City-portion of the San Fernando Basin. The Watermaster reviews the LID mitigation measures and provides his approval or denial of the infiltration portion of each LID. The Watermaster encourages infiltration of collected stormwater whenever feasible, but is concerned about encouraging recharge in areas having known soil contamination and/or plumes of groundwater contamination, and/or any areas having ongoing groundwater remediation.

Dewaterers

Depths to groundwater in a few portions of the SFB (particularly along Ventura Blvd on the south side of the basin) are close to ground surface. As a result, permanent dewatering is common for certain types of building foundations or structures with deep underground parking, and active dewatering helps to artificially lower and maintain groundwater levels at depths that are several feet below the building foundations and/or the bottoms of the subterranean parking structure. Wherever such dewatering is needed, the building owner (i.e., the “dewaterer”) is required to meter the extracted groundwater (i.e., the rates and volumes of discharge), report those extractions to the Watermaster, and enter into an agreement with the affected Party for payment for this extraction. The Watermaster requires and regularly receives groundwater production reports from several dewaterers in the SFB (see Table 2-5).

The Watermaster has participated in a few meetings with the City’s Department of Building and Safety to explore ways in which the Watermaster can be notified when any new dewatering project might begin in ULARA in the future. The goal of those meetings has been to develop a mechanism at the plan check counter at the Department of Building and Safety by which the owners or agents of new temporary or permanent dewatering operation is/are required to notify the Watermaster before dewatering begins.

Water Licenses

Portions of ULARA located in unincorporated portions of Los Angeles County are without water service. Working in cooperation with the County Department of Public Health and the County Planning Department, prior Watermasters and LADWP have tried to develop a process oriented to identify and monitor water usage through a water license agreement (see Table 2-5). Those agreements allow the use of groundwater on overlying property until a water service becomes available to the property owner. The agreements also establish maximum annual groundwater usage, and require the monthly reporting of groundwater production to the Watermaster and annual payment to the City of Los Angeles (the owner of the water rights in these unincorporated areas).

Salt and Nutrient Management Plan Development

The State Water Resources Control Board adopted a Recycled Water Policy in February 2009. That Recycled Water Policy requires that Salt and Nutrient Management Plans (SNMP) be developed for groundwater basins in the state to "facilitate basin-wide management of salts and nutrients from all sources in a manner that optimizes recycled water use while ensuring protection of groundwater supply and beneficial uses, agricultural beneficial uses, and human health." In accordance with the Recycled Water Policy, a SNMP is being developed for the ULARA Groundwater Basins; this effort is being led by the ULARA Watermaster.

A public information meeting regarding the development of the SNMP for the ULARA groundwater basins was held on November 19, 2013 at the LADWP Valley Center in the Van Nuys area of the City of Los Angeles. Information presented and distributed at that meeting can be accessed through the ULARA Watermaster website via www.ULARAwatermaster.com/SNMP. Information on the ongoing plan development will be distributed periodically via that website throughout the SNMP Development process.

1.6 Summary of Water Operations in ULARA

Highlights of all elements of water operations within ULARA for the 2011-12 and 2012-13 Water Years are summarized in Table 1-3. Details of the 2012-13 operations and hydrologic conditions are provided in Section 2. Locations of the groundwater basins, water service areas of the parties and individual producers, and other pertinent hydrologic facilities that measure precipitation, runoff, and water levels are shown on Plates 1 through 8.

Average Rainfall

Average precipitation determined for all listed raingages (stations) on all valley floor areas during the 2012-13 Water Year in ULARA was 7.71 inches; this value represents 47 percent of the calculated 100-year mean (16.48 inches) for the original safe yield calculations for all of these stations. Average precipitation for all listed stations in the hill and mountain areas within ULARA in the 2012-13 Water Year was 9.35 inches; this value is 43 percent of the calculated 100-year mean (21.76 inches) for all of these stations. The weighted average of 8.72 inches of precipitation for all stations throughout ULARA was 44 percent of the 100-year mean (19.64 inches).

Spreading Operations

A total of 10,782 AF of water was spread in ULARA in Water Year 2012-13; of this amount, 6,703 AF was water imported into ULARA. The average annual spreading of water during the period 1968 through 2013 was 32,078 AF.

Groundwater Extractions

Total groundwater extractions in 2012-13 in all four groundwater basins were 83,419 AF. Specific extractions were: 73,529 AF in San Fernando Basin; 4,952 AF in Sylmar Basin; 4,757 AF in Verdugo Basin; and 181 AF in Eagle Rock Basin. This current total represents an increase of 4,105 AF compared to the total extractions from these 4 groundwater basins in Water Year 2011-12, but is less than the long-term (1968-2013) average of 99,334 AFY. Of the total production for the 2012-13 Water Year, 1,045 AF of groundwater were pumped for non-consumptive use. The Groundwater Extractions Report provided in Appendix A summarizes the groundwater extractions for the 2012-13 Water Year by all pumpers.

Imports

Gross imports (including pass-through water) for 2012-13 totaled 499,074 AF; this represents an increase of 11,266 AF from the 2011-12 total. Net imports used within ULARA in 2012-13 amounted to 296,847 AF (an increase of 23,224 AF from the volume in the 2011-12 Water Year).

Exports

A total of 248,003 AF of water was exported from ULARA. Of these total exports, 45,776 AF were from groundwater extractions, whereas the remaining 202,227 AF were from imported supplies (pass-through water).

Treated Wastewater

A total of 87,877 AF of wastewater was treated in ULARA in the 2102-13 Water Year. The majority of this treated water volume, 56,281 AF, was discharged to the Los Angeles River. A portion of this treated water was exported from ULARA and delivered to the Hyperion Treatment Plant located in Playa Del Rey. The remaining portion of the annual total (approximately 14,225 AF) was used as recycled water, as discussed below.

Recycled Water

Total recycled water used in Water Year 2012-13 in ULARA was 14,225 AF. This represents a decrease of 830 AF from the value in the 2011-12 Water Year. The recycled water is used for landscape irrigation, golf course irrigation, in-plant use, power plant use (i.e. cooling), and other industrial uses.

Groundwater in Storage

Groundwater in storage in the SFB decreased by 12,157 AF during Water Year 2012-13. This modest decrease is similar to the decrease in storage of 10,338 AF that occurred in the 2011-12 Water Year, and is attributed to below-average rainfall and the resulting decrease in stormwater spreading. Compared to the groundwater in storage in 2011-12, the estimated increases in groundwater in storage for the Sylmar and Verdugo basins were 1933 AF and 2,483 AF, respectively, for Water Year 2012-13. For Eagle Rock Basin, a decrease in storage of 87 AF is estimated for Water Year 2012-13.

Construction/Destruction of Water Wells

Two wells were destroyed by LADWP in Water Year 2012-13. Mission Well 2, located in the Sylmar Basin, was destroyed on June 19, 2013. Mission Well 4, also located in the Sylmar Basin, was destroyed on September 25, 2013. No other water wells were constructed or destroyed in any of the four groundwater basins in ULARA in Water Year 2012-13

TABLE 1-3: SUMMARY OF OPERATIONS IN ULARA

Item	Water Year 2011-12	Water Year 2012-13
Active Pumpers (parties and nonparties)	36	36
Inactive Pumpers (parties)[1]	7	7
Annual Weighted Average Rainfall, in inches		
Valley Floor	10.83	7.71
Mountain Area	12.01	9.35
Total ULARA	11.56	8.72
Spreading Operations, in acre-feet	13,577	10,782
Extractions, in acre-feet	79,314	83,419
Gross Imports, in acre-feet		
Los Angeles Aqueduct Water	213,043	85,408
MWD Water	274,765	413,666
Total	**487,808**	**499,074**
Exports, in acre-feet		
Los Angeles Aqueduct Water	93,638	34,991
MWD Water	120,547	167,236
Groundwater	44,035	45,776
Total	**258,220**	**248,003**
Net Groundwater Used in ULARA, in acre-feet	35,279	37,643
Net Imports Used in ULARA, in acre-feet	273,623	296,847
Recycled Water Used, in acre-feet	15,055	14,225
Total Water Used in ULARA, in acre-feet [2]	323,957	348,715
Treated Wastewater, in acre-feet [3]	83,513	87,877

1. The seven inactive pumpers are Van de Kamp, Disney, Angelica, Santiago Estates, Greeff, Sears, and Waste Management.
2. Extractions used in ULARA plus Net Imports and Recycled Water.
3. Most treated wastewater is discharged to the Los Angeles River, whereas a portion is delivered to the Hyperion Plant or to other locations utilizing recycled water.

1.7 Allowable Pumping for the Forthcoming 2013-14 Water Year

Table 1-4 provides a summary of the groundwater extraction rights in each of the three major groundwater basins in ULARA for the forthcoming 2013-14 Water Year and the Stored Water Credit (as of October 1, 2013), for the cities of Los Angeles, Burbank, Glendale and San Fernando, and for the CVWD. The determination of these values is provided in more detail in Section 2.

TABLE 1-4: ALLOWABLE GROUNDWATER EXTRACTION RIGHTS
2013-14 WATER YEAR - ULARA
(Acre-feet)

	Native Safe Yield Credit [1]	Import Return Credit [2]	Total Native + Import	Available Stored Water Credit [3, 4] (as of Oct. 1, 2013)	Allowable Pumping 2013-14 Water Year[5]
San Fernando Basin					
City of Burbank	---	4,096	4,096	3,660	7,756
City of Glendale	---	5,074	5,074	14,160	19,234
City of Los Angeles	43,660	42,162	85,822	175,806	261,628
Total	43,660	51,332	94,992	193,626	288,618
Sylmar Basin					
City of Los Angeles	3,570	---	3,570	9,014	12,584
City of San Fernando	3,570	---	3,570	404	3,974
Total	7,140	---	7,140	9,418	16,558
Verdugo Basin					
CVWD	3,294	---	3,294	---	3,294
City of Glendale	3,856	---	3,856	---	3,856
Total	7,150	---	7,150	---	7,150

1) Native Safe Yield extraction right per page 11 of the Judgment.
2) Import Return extraction right per page 17 of the Judgment.
3) There is no Stored Water Credit assigned in Verdugo Basin.
4) See Table 2-11A for calculation of SFB Totals and Stored Water Credits in reserve; See Table 2-11B for Sylmar Basin credit calculation.
5) Allowable pumping in Sylmar Basin must not exceed the native safe yield by more than 1,200 AF in any given year. Pumping in excess of the Safe Yield must be reported to Watermaster as soon as reasonably practicable.

2. WATER SUPPLY, OPERATIONS, AND HYDROLOGIC CONDITIONS

2. WATER SUPPLY, OPERATIONS, AND HYDROLOGIC CONDITIONS

2.1 Precipitation

Precipitation varies considerably throughout ULARA depending on such local factors as topography and elevation. Mean annual precipitation ranges from about 14 inches at the western end of the San Fernando Valley to 33 inches near the highest elevations of the watershed in the San Gabriel Mountains in the easterly portion of ULARA. Approximately 80 percent of the annual rainfall in ULARA occurs from December through March.

During the 2012-13 Water Year, the weighted average rainfall from all rainfall stations on the valley floor areas was 7.71 inches (47 percent of the 100-year mean value that was calculated for the original safe yield determination), whereas the weighted average annual rainfall from all rainfall stations in the hill and mountain areas was 9.35 inches (43 percent of the 100-year mean). The weighted average from all rainfall stations on the valley floor and in the hill and mountain areas in the 2012-13 Water Year was 8.72 inches (44 percent of that 100-year mean). Table 2-1 provides rainfall data for several raingages on the valley floor areas and in the hill and mountain areas; Plate 5 illustrates the locations of these raingages (stations). Figure 2.1 shows the monthly rainfall totals on the valley floor and in the hill and mountain areas in ULARA for 2012-13 for the raingages mentioned above.

Because annual rainfall totals have a very important impact on groundwater levels and, hence, on the availability of and recharge to the groundwater in the four ULARA groundwater basins, the Watermaster acquired additional rainfall data available from the local City of Burbank Valley Pump Plant raingage (Gage No. 041194); the database for this gage extends from 1940 to the present. These rainfall data were accessed through the website of the Western Regional Climate Center (WRCC). The resulting data for this gage are shown as a bar graph of rainfall for each Water Year (i.e., October 1 through September 30) of available gage data on Figure 2.1A, “Yearly Rainfall Totals, Burbank Valley Pump Plant Gage”. As shown thereon, the long-term average annual rainfall for the period of record for this gage is 15.88 inches.

To help identify possible trends in annual rainfall for each water year at this raingage, the Watermaster further created the graph shown on Figures 2.1B, “Accumulated Rainfall Departure Curve”. This graph illustrates the accumulated departure of annual rainfall for each water year from the long-term average annual rainfall at this gage. On this graph, the accumulated rainfall departure values have been plotted for each rainfall year relative to the long-term average annual rainfall for this Burbank raingage. The zero line on the accumulated departure curve represents the long-term average rainfall points; data points above this zero line represent years of excess precipitation whereas points below that line represent years of deficient precipitation, relative to the long-term average. The basic purpose of the accumulated departure curve is to illustrate temporal trends in the rainfall data over time.

To prepare this accumulated departure curve of annual rainfall, the following steps are taken:

1. Calculate the average annual rainfall for the period of record.
2. Begin with the initial year of rainfall in the period of record, and subtract that value from the long-term average rainfall.
3. Divide that difference by the long-term average annual rainfall. This quotient represents the value for the initial year of rainfall; it may be a negative or positive number, depending on whether the total rainfall in the initial year was less than, or greater than, respectively, the long-term average annual rainfall.
4. The percentage of departure from the long-term average is then calculated in a similar manner for each successive water year and this value is algebraically added to the result for the prior water year, and so on, through the final year of available data.

Interpretation of the accumulated departure curve presented on Figure 2.1B is as follows:

- Whenever the accumulated departure curve descends over time to the right, the total rainfall in each water year during that period was generally at or below the long-term average annual rainfall. Hence, such a period displayed generally deficient rainfall; in essence, a dry period or drought had been occurring. Examples of such dry periods on Figure 2.1B are: 1944-45 through 1976-77 and 1983-84 through 1991-92.

- In contrast, whenever the accumulated departure curve ascends over time to the right, the total rainfall in each water year during that period was generally at or above the long-term average annual rainfall. Thus, such a period displayed generally excess rainfall. In essence, a wet period had been occurring. Examples of such wet periods on Figure 2.1B are 1977-78 through 1984-85, and 1992-93 through 1998-99.

TABLE 2-1: 2012-13 PRECIPITATION

(inches)

Gage No.	LACDPW Rain Gage Stations	2012-13 Precipitation	100-Year Mean (1881-1981)	Percent of 100-Year Mean
	Valley Floor Stations			
13C	North Hollywood-Lakeside	7.00	16.63	42%
1107D	La Tuna Debris Station	6.54	14.98	44%
465C	Sepulveda Dam	6.52	15.30	43%
21B	Woodland Hills	7.72	14.60	53%
735H	Chatsworth Reservoir	5.35	15.19	35%
25C	Northridge-LADWP	7.39	15.16	49%
251C	La Crescenta	12.25	23.31	53%
293B	LA Reservoir	9.45	17.32	55%
	Weighted Average[1]	**7.71**	**16.48**	**47%**
	Hill & Mountain Stations			
10A	Bel Air Hotel	7.64	18.50	41%
17	Sepulveda Canyon at Mulholland	7.87	16.84	47%
33A	Pacoima Dam	9.70	19.64	49%
47D	Clear Creek - City School	13.39	33.01	41%
53D	Colby's Ranch	7.32	29.04	25%
54C	Loomis Ranch-Alder Creek	5.55	18.62	30%
210C	Brand Parks	5.63	19.97	28%
AL301	Brown's Canyon	11.57	17.52	66%
1074	Tujunga-Mill Creek	11.66	21.79	54%
	Weighted Average[1]	**9.35**	**21.76**	**43%**
	Weighted Average Valley/Mountain Areas[1]	**8.72**	**19.64**	**44%**

1. Weighted Averages calculated using methodology provided in the Report of Referee-July 1962. Hill & Mountain Station Weighted Average estimated due to incomplete data sets that exist in the 100-year period for which the average is calculated.

FIGURE 2.1: 2012-13 MONTHLY WEIGHTED AVERAGE RAINFALL

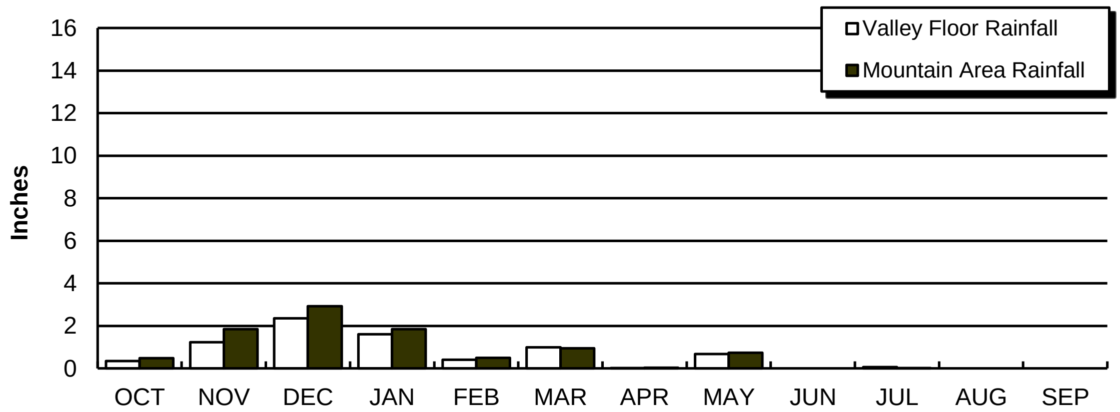
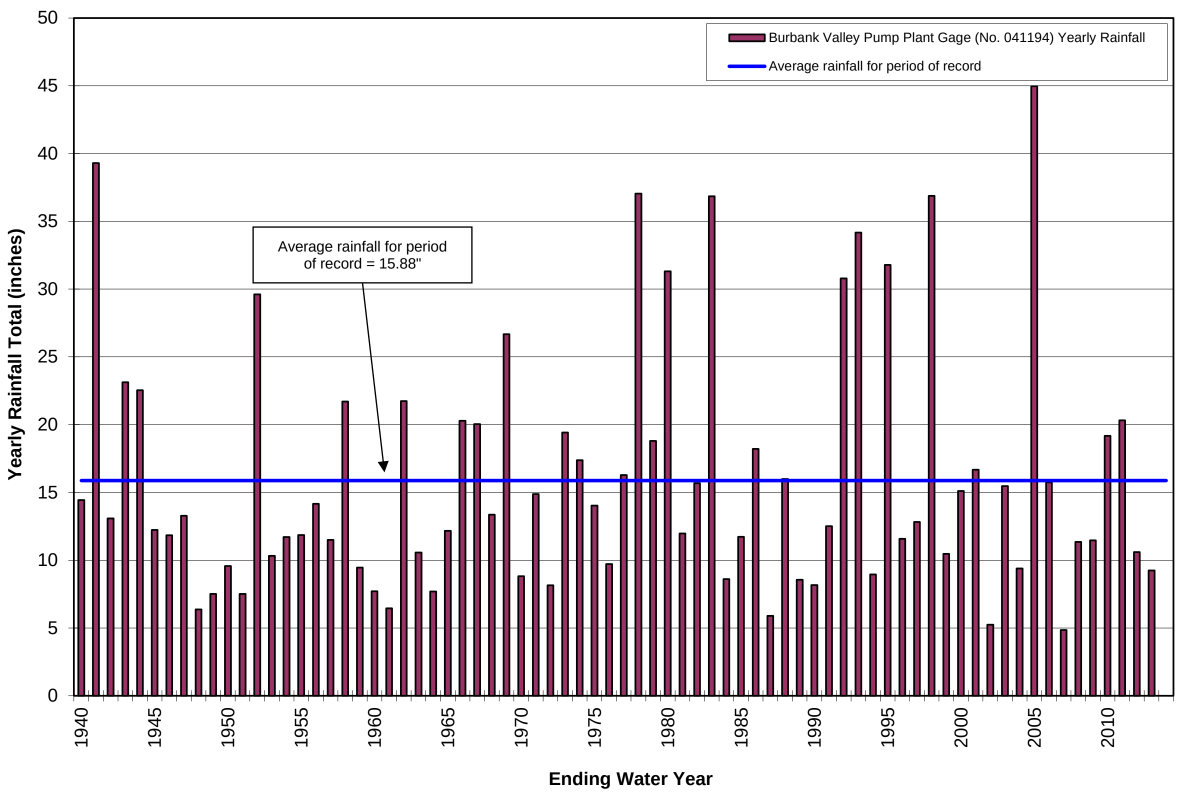
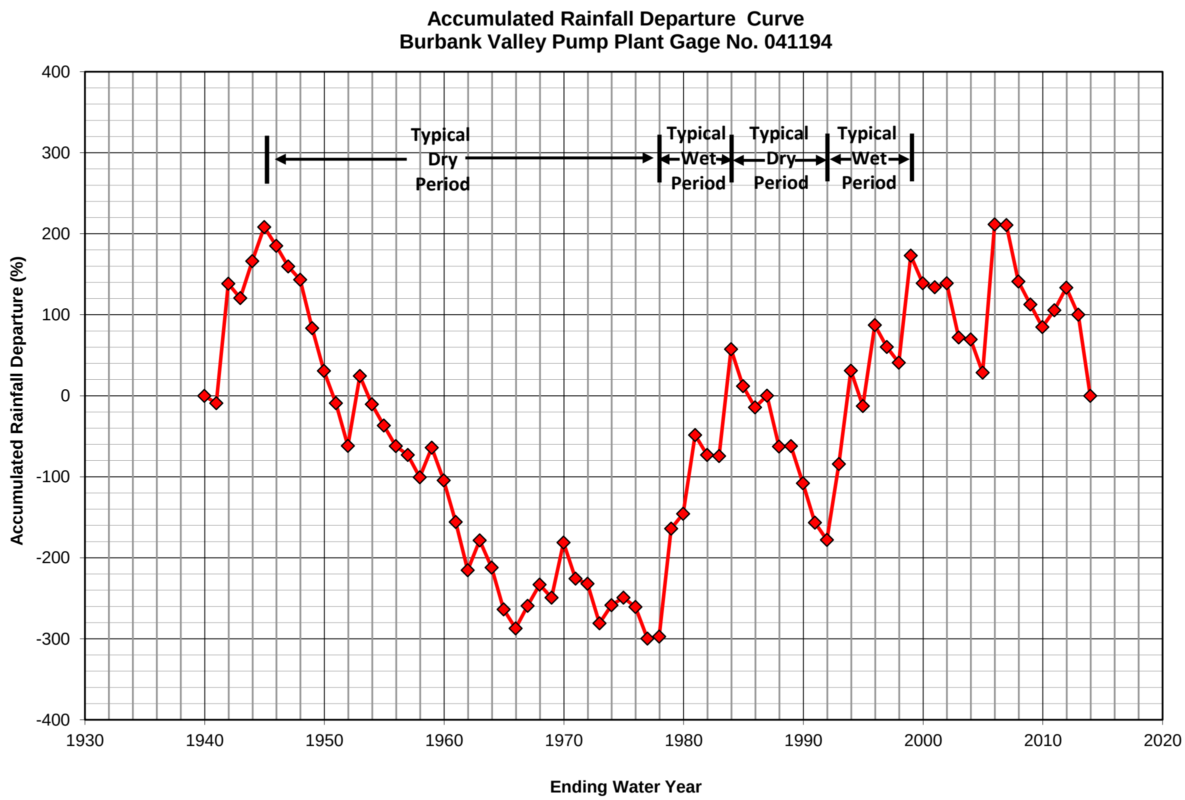


FIGURE 2.1A: YEARLY RAINFALL TOTALS, BURBANK VALLEY PUMP PLANT GAGE



1. Yearly Rainfall Data compiled from Western Regional Climate Center (WRCC)
2. Major divisions are equal to 5 years; minor divisions are equal to 1 year

FIGURE 2.1B: ACCUMULATED RAINFALL DEPARTURE CURVE, BURBANK VALLEY PUMP PLANT GAGE



2.2 Runoff and Outflow from ULARA

The entire watershed of ULARA (including the surface areas of its four groundwater basins) contains 328,500 acres. Of this total, 205,700 acres lie within the tributary hill and mountain areas, whereas the remaining 122,800 acres represent the combined surface areas of the four groundwater basins within ULARA. The drainage system in ULARA is made up of the Los Angeles River and its tributaries. Surface flow in ULARA originates as: runoff from the hills and mountains; runoff from the impervious areas of the valley floor; industrial and sanitary waste discharges; domestic irrigation runoff; and rising groundwater.

A number of stream gaging stations are maintained throughout ULARA, either by the Los Angeles County Department of Public Works (LACDPW) or the United States Geological Survey (USGS). For the Annual Watermaster Report, six key gaging stations have been utilized over the years to illustrate surface water runoff from the main tributary areas of the ULARA watershed. From upstream to downstream, these six gaging stations (see locations on Plate 5) are as follows:

1. Station F-118C-R, which monitors all releases from Pacoima Dam. Runoff below this point flows to the Los Angeles River through lined channels, or it can be diverted to the Lopez and Pacoima spreading grounds for artificial recharge purposes. Note that new downstream Station F-118C-R replaced Station F-118B-R beginning in June 2012.

2. Station F-168B-R, which records all releases from Big Tujunga Dam. This dam collects runoff from the watershed which lies in the hill and mountain areas to the northeast. Runoff below this point flows to Hansen Dam and then to the Los Angeles River. These releases can be diverted for artificial recharge purposes to the Hansen or Tujunga spreading grounds. Note that Station F-168B-R replaced Station F-168-R beginning in June 2012.

3. Station F-300-R, which monitors all flow in the main channel of the Los Angeles River west of Lankershim Boulevard, and which includes the outflows from Pacoima and Hansen dams which are not otherwise diverted to the spreading grounds. These records also include flow through the Sepulveda Dam and releases of reclaimed wastewater discharged by the City of Los Angeles.

4. Station E-285-R, which monitors flow from the westerly slopes of the Verdugo Mountains and tributary areas of the watershed located east of Lankershim Boulevard. This station also records releases of reclaimed wastewater discharged by the City of Burbank.

5. Station F-252-R, which monitors flow from Verdugo Canyon which includes flows from Dunsmore and Pickens canyons.

6. Station F-57C-R, which lies in the main channel of the Los Angeles River and records all surface outflows from ULARA (see location also on Plates 1A and 5).

Table 2-2 summarizes the monthly runoff for these six stations for Water Years 2011-12 and 2012-13. The daily mean discharge volumes for the Water Year 2011-12 for these six stations are summarized in Appendix B.

TABLE 2-2: MONTHLY RUNOFF AT SELECTED GAGING STATIONS

(Acre-feet)

Station	Water Year	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
F-118C-R	2011-12	0	3	0	259	334	0	811	631	404	0	0	0	**2,442**
Pacoima Dam	2012-13	6	0	0	0	0	0	6	0	0	416	0	0	**427**
F-168B-R	2011-12	ND	ND	ND	ND	ND	ND	ND	ND	630	611	678	623	**2,542**
Big Tujunga Dam	2012-13	486	615	278	343	217	138	73	108	88	102	254	246	**2,948**
F-300-R	2011-12	3,150	12,010	7,230	8,490	4,490	13,750	10,930	2,310	2,740	3,270	3,240	3,100	**74,710**
L.A. River Tujunga Ave.	2012-13	3,820	7,290	12,300	11,600	5,930	8,180	4,420	6,790	4,630	4,860	4,390	4,170	**78,380**
E-285-R	2011-12	900	1,240	994	1,050	796	1,600	1,010	651	621	697	502	891	**10,952**
Burbank Storm Drain	2012-13	698	907	1,310	1,300	735	1,220	621	1,460	1,250	857	599	631	**11,588**
F-252-R	2011-12	703	757	400	365	178	1,040	830	184	75	52	76	76	**4,736**
Verdugo Wash	2012-13	238	306	440	312	202	253	156	206	133	117	102	90	**2,555**
F-57C-R	2011-12	8,450	11,170	8,780	13,910	5,540	15,910	17,010	5,270	5,410	5,380	6,060	5,960	**108,850**
L.A. River Arroyo Seco	2012-13	7,800	8,460	11,440	12,970	6,820	9,770	6,540	7,160	6,210	6,880	7,270	6,000	**97,320**

ND = No Data

2.3 Components of Surface Flow

The surface flow of the Los Angeles River at Gaging Station F-57C-R consists of:

1. Storm water runoff;
2. Treated wastewater from the Tillman, Burbank, and Los Angeles-Glendale water reclamation plants (WRPs);
3. Industrial discharges and domestic irrigation runoff; and,
4. Rising groundwater.

Storm flows are typically the largest component of the total surface flow recorded at Gage F-57C-R, and these storm flows occur principally in the winter months (Table 2-3 and Appendix B).

A significant factor affecting surface water runoff in the Los Angeles River has been the releases of treated wastewater over time by the 3 local WRPs mentioned above. Specifically, releases from the Los Angeles-Glendale WRP, the Burbank WRP, and the Tillman WRP appear to have begun in 1976-77, 1967, and 1985, respectively.

Industrial discharges and irrigation runoff upstream of Gage F-57C-R are relatively small but cumulatively contribute a moderate amount of surface flow to the Los Angeles River. Field inspection during 1998-99 confirmed year-round unmetered flows of domestic irrigation runoff from residential areas, golf courses and industrial sites.

Rising groundwater is a constant source of loss from the Verdugo and San Fernando groundwater basins. Rising groundwater occurs above the Verdugo Wash Narrows, and in the unlined reach of the Los Angeles River immediately upgradient from Gage F-57C-R. Outflow at Gage F-57C-R includes rising groundwater leaving the Verdugo Basin past Gage F-252-R (Table 2-3). In Water Year 2012-13, rising groundwater was estimated to be 1,156 AF at Gage F-252-R and 1,754 AF at the downstream Gage F-57C-R.

Releases of treated wastewater also have an influence on rising groundwater. These large year-round releases tend to keep the alluvium beneath the Los Angeles River saturated, even in dry years. Nevertheless, there is some opportunity for continuing percolation in the unlined reaches of the river, both upstream and downstream of the lined section near the confluence of the Verdugo Wash and the Los Angeles River. Water percolating in the unlined reach is thought to percolate through the shallow alluvial zones and to re-appear as rising groundwater along the river at a location downstream from Los Feliz Boulevard. Also, there are up to 3,000

AF of recharge per year from delivered water within the Los Angeles Narrows-Pollock Wellfield area that contributes to the rising groundwater condition.

In the Report of Referee (1962, Volume II, Appendix O), procedures were developed for calculating the volume of rising groundwater for the original base period of 1928-1958. Some of the important factors of that study that have been discontinued include: releases of Owens River water; operation of the Chatsworth Reservoir; and operation of the Headworks Spreading Grounds. As shown on Figure O-2 of the Report of Referee (1962), excess rising groundwater was considered to have declined to essentially zero by the late-1950s. The January 1993 report by Brown and Caldwell, "Potential Infiltration of Chlorides from the Los Angeles River Narrows into the Groundwater Aquifer" assessed groundwater levels along the course of the Los Angeles River; the then-current Watermaster provided the data for that 1993 evaluation. As of the end of the drought period in 1977, groundwater levels in the Los Angeles River Narrows were very low; hence, there was very little potential for creating excess rising groundwater at that time. However, increased rainfall and runoff occurred during the 1978-83 period, which, combined with reduced pumping by the Los Angeles-owned Crystal Springs, Grandview, and Pollock wellfields, induced large rises in groundwater levels in the Los Angeles River Narrows. Such elevated groundwater levels that follow periods of heavy rainfall tend to increase the amounts of rising groundwater.

Finally, the methodology used to calculate rising groundwater (Table 2-3) needs to be improved. Over the years, many of the gaging stations along the Los Angeles River and its tributaries have been lost or abandoned. Actual data from these gaging stations have been replaced by estimates, and the LADWP-operated groundwater flow model has been used to check the results. Although the current methodology provides an approximation, it is considered to be less accurate than using actual gage data. To improve the calculation of rising groundwater, the abandoned, lost or inaccurate gaging stations need to be identified, and then these stations should be either rehabilitated or replaced entirely. The first step to be taken by the Watermaster would be a field visit to these types of facilities.

The first such visit occurred in March 2014, when the Watermaster made an initial visit to gage site F-57C with representatives from the Los Angeles County Flood Control District, (LACFCD) and LADWP. It was determined from this site visit that, beginning in 2005, LACFCD field monitoring staff began experiencing problems in obtaining accurate measurements of low flows in the bottom of the lined river channel at Gage F-57C. Some of these problems were also a result of vandalism and even theft of copper wires required for electrical supply to the gage. High flows (resulting from storm events) have been and continue to be collected by LACFCD using a staff gage on the vertical concrete sides of the lined river channel. In 2011, the City of

Los Angeles Bureau of Engineering began construction on the Riverside Drive Viaduct Replacement Project (including a new bridge) (located immediately above and surrounding the gage location) that further impacted the operation of Gage F-57C. Project construction, which is principally due to seismic concerns for the original (existing) bridge, is expected to be completed in early-2016.

In an effort to help ensure accurate measurements of low flows at Gage F-57C, the Watermaster participated in several meetings with all parties involved. The Watermaster requested and obtained written status reports from both LACFCD and the City of Los Angeles in order to better understand the issues concerning Gage F-57C. Through this collaborative effort, both short- and long-term solutions have been developed to allow the ongoing collection of low flow measurements at the location of Gage F-57C. For the remaining duration of the construction project, battery-power instrumentation has been installed by LACFCD to provide the necessary electrical supply to the gage, and LACFCD has committed to make labor-intensive, semi-monthly manual readings when construction activities impede collection of measurement data. After completion of the construction project, LACDPW will install a permanent electrical source and be responsible for the continued long-term maintenance and security of the Gage to ensure accurate measurements are recorded.

As a result of the work described above, the Watermaster is satisfied that the low flow stream measurements now being recorded at Gage F-57C by LACFCD are sufficiently accurate for ULARA Watermaster purposes, and that this gage will be maintained in the future to continue providing accurate measurements. The Watermaster updated the Court on this matter in a Special Hearing on April 25, 2014.

TABLE 2-3: ESTIMATED SEPARATION OF SURFACE FLOW AT STATIONS F-57C-R & F-252-R

(Acre-feet)

Water Year	F-57C-R Rising Groundwater[1]	F-57C-R Waste Discharge	F-57C-R Storm Runoff	F-57C-R Total Outflow[2]	F-252-R Rising Groundwater[3,4]	F-252-R Storm Runoff [4]	F-252-R Total Outflow
2012-13	1,754	67,865	27,711	97,330	1,156	1,098	2,254
2011-12	3,121	69,176	36,603	108,900	2,068	2,662	4,730
2010-11	6,588	88,541	135,815	230,945	2,397	18,023	20,420
2009-10	5,814	74,736	75,150	155,700	2,394	11,936	14,330
2008-09	2,698	73,983	66,882	142,563	2,097	7,808	9,905
2007-08	3,905	76,287	96,548	176,740	1,212	8,700	9,912
2006-07	1,720	72,544	21,236	95,500	1,272	6,668	7,943
2005-06	5,441	74,256	77,063	156,760	1,414	12,717	14,131
2004-05	6,309	70,828	423,293	500,430	5,198	31,874	37,072
2003-04	3,330	90,377	42,153	135,860	2,468	2,851	5,319
2002-03	3,869	75,159	106,862	185,890	3,167	5,183	8,350
2001-02	2,126	74,737	43,937	120,800	1,819	5,721	7,540
2000-01	3,000	91,795	94,065	188,860	1,500	6,370	7,870
1999-00	1,980	78,009	62,202	142,190	824	4,243	8,470
1998-99	2,000	72,790	39,110	113,900	1,000	2,534	7,250
1997-98	4,000	97,681	245,079	346,730	4,000	12,140	16,140
1996-97	3,000	75,827	76,485	155,312	3,000	13,860	16,860
1995-96	3,841	86,127	61,188	151,156	2,577	10,946	13,523
1994-95	4,900	66,209	367,458	438,567	4,809	28,881	33,696
1993-94	2,952	60,594	73,149	136,695	1,387	6,156	7,543
1992-93	4,900	77,000	478,123	560,023	3,335	20,185	23,520
1991-92	3,000	120,789	197,040	320,829	1,412	13,209	14,621
1990-91	3,203	75,647	117,779	196,629	1,157	6,865	8,022
1989-90	3,000	76,789	55,811	167,639	1,182	2,938	4,120
1988-89	3,000	80,020	56,535	136,843	1,995	4,453	6,448
1987-88	3,000	81,920	74,074	156,204	3,548	10,493	14,041
1986-87	3,000	64,125	19,060	83,295	2,100	1,690	3,790
1985-86	3,880	48,370	102,840	155,090	2,470	6,270	8,740
1984-85	3,260	21,600	46,300	71,160	2,710	3,970	6,680
1983-84	3,000	17,780	49,090	69,870	4,000	n/a	n/a
1982-83	3,460	17,610	384,620	405,690	5,330	21,384	26,714
1981-82	1,280	18,180	80,000	99,460	3,710	5,367	9,077
1980-81	4,710	19,580	51,940	76,230	5,780	2,917	8,697
1979-80	5,500	16,500	n/a	n/a	5,150	7,752	12,902
1978-79	2,840	16,450	119,810	139,100	2,470	n/a	n/a
1977-78	1,331	7,449	357,883	366,663	1,168	23,571	24,739
1976-77	839	7,128	58,046	66,013	1,683	2,635	4,318
1975-76	261	6,741	32,723	39,725	2,170	2,380	4,550
1974-75	427	7,318	56,396	64,141	1,333	4,255	5,588
1973-74	2,694	6,366	79,587	88,878	1,772	5,613	7,385
1972-73	4,596	8,776	100,587	113,959	1,706	7,702	9,408
1971-72	---	---	---	---	2,050	2,513	4,563
Average	3,257	56,919	117,256	182,372	2,476	8,913	11,530

1. Includes the influence of treated waste water discharged to the Los Angeles River from the Los Angeles-Glendale Water Reclamation Plant (as of Water Year 1976-77) and the Donald C. Tillman Water Reclamation Plant (as of September 1985).
2. Gage F-57-C, the major measurement point of discharge to the Los Angeles River, is estimated beginning with the 2010-11 Water Year through the current Water Year due to measurement inaccuracies and/or disruptions.
3. Includes the influence of declining capacity at Verdugo Park Treatment Plant.
4. Includes influence of dry weather runoff and perennial stream flow.

2.4 Groundwater Recharge

Precipitation has a direct influence on groundwater recharge and, ultimately, on the amount of groundwater in storage in the local groundwater basins. Urban development in ULARA over time has resulted in a significant portion of the rainfall being collected and routed into stormdrains and/or lined channels that discharge directly into the Los Angeles River. To partially offset the increased runoff due to urbanization, Pacoima, Big Tujunga and Hansen dams, originally built for flood control, are now utilized to regulate storm flows and to allow recapture of a portion of the flow in downstream spreading basins operated by the LACDPW and the City of Los Angeles.

The LACDPW operates the Branford, Hansen, Lopez, and Pacoima spreading grounds. The LACDPW, in cooperation with the City of Los Angeles, operates the Tujunga Spreading Grounds (TSG). These spreading grounds are primarily used for the artificial recharge of native water (stormwater runoff). Table 2-4 summarizes the spreading operations at all spreading basins for the 2012-13 Water Year, and Table 2-4A summarizes recharge since the 1968-69 Water Year. Plate 8 shows the locations of these spreading grounds.

As shown on Table 2-4 below, spreading of MWD water by Burbank began in the 2009-10 Water Year following completion of the Burbank MWD connection. It is important to note that the volume of water spread by Burbank has been inadvertently “double counted” in spreading operation totals reported on Table 2-4 and Table 2-4A since the commencement of Burbank’s spreading operations (this “double counting” affects Tables 2-4 and 2-4A in the Annual Watermaster reports for Water Years 2009-10, 2010-11, and 2011-12). This error arose because LACDPW reported the volume of water spread by Burbank in their reports, and the Watermaster added that value again from the separate reports prepared by Burbank. Prior to 2009, all spreading volumes reported by LACDPW were considered to be native water and not imported water The error has been corrected for prior water years in Table 2-4A in this report for Water Year 2012-13.

TABLE 2-4: 2012-13 SPREADING OPERATIONS IN THE SAN FERNANDO BASIN

(Acre-feet)

Agency	Spreading Facility	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
LACDPW														
	Branford	25	82	126	85	39	69	23	46	23	27	11	14	570
	Hansen	160	0	311	464	394	406	19	4	0	0	0	0	1,758
	Lopez [1]	355	75	0	0	0	0	71	0	0	0	0	0	501
	Pacoima [1]	1,660	2,420	2,100	79	25	88	424	42	0	177	0	0	7,015
	Tujunga	110	412	65	23	0	0	120	99	60	34	4	0	927
	Total	**2,310**	**2,989**	**2,602**	**651**	**458**	**563**	**657**	**191**	**83**	**238**	**15**	**14**	**10,771**
City of Los Angeles														
	Tujunga [2]	9.80	0.00	0.00	0.02	0.00	0.00	0.17	0.09	0.08	0.26	0.11	0.22	11
	Headworks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
	Total	**9.80**	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.17**	**0.09**	**0.08**	**0.26**	**0.11**	**0.22**	**11**
Basin Total		**2,320**	**2,989**	**2,602**	**651**	**458**	**563**	**657**	**191**	**83**	**238**	**15**	**14**	**10,782**
City of Burbank [1]		2,045	2,400	1,757	0	0	0	501	0	0	0	0	0	**6,703**

1. MWD water imported by Burbank & spread at Pacoima and/or Lopez Spreading Grounds is accounted for in the totals reported by LACDPW; the separate “City of Burbank” total reported below the “Basin Total” is for information purposes, and should not be added to the “Basin Total” as it is already accounted for.
2. This water derived from backwashing of the Tujunga GAC vessels and discharged into Tujunga spreading basin.

TABLE 2-4A: ANNUAL SPREADING OPERATIONS IN THE SAN FERNANDO BASIN

1968-69 through 2012-13
(Acre-feet)

Water	Los Angeles County Department of Public Works (Native + Imported[1])						City of Los Angeles			GRAND	City of Burbank (Imported)[1]	Rainfall (inches)
Year	Branford	Hansen	Lopez	Pacoima	Tujunga	TOTAL	Headworks	Tujunga	TOTAL	TOTAL	Pacoima	Weighted Average Valley/Mtns.
2012-13	570	1,758	501	7,015	927	10,771	0	11	11	10,782	6,703	8.72
2011-12	529	9,357	104	3,482	101	13,573	0	4	4	13,577	1,371	11.55
2010-11	690	19,064	3,922	24,164	31,476	79,316	0	4	4	79,320	11,187	25.21
2009-10	535	16,766	274	9,080	12,849	39,504	0	7,509	7,509	47,013	34	20.55
2008-09	706	0	1	2,000	7,233	9,940	0	0	0	9,940	---	12.58
2007-08	570	10,517	634	5,025	4,892	21,638	0	0	0	21,638	---	17.27
2006-07	532	5,762	44	436	1,200	7,974	0	0	0	7,974	---	5.36
2005-06	576	20,840	958	7,346	14,895	44,615	0	0	0	44,615	---	17.42
2004-05	1,448	33,301	940	17,394	21,115	74,198	0	0	0	74,198	---	45.66
2003-04	444	6,424	144	1,731	1,322	10,065	0	0	0	10,065	---	12.21
2002-03	932	9,427	518	3,539	1,914	16,330	0	0	0	16,330	---	21.22
2001-02	460	1,342	0	761	101	2,664	0	0	0	2,664	---	6.64
2000-01	562	11,694	172	3,826	1,685	17,939	0	0	0	17,939	---	22.29
1999-00	468	7,487	578	2,909	2,664	14,106	0	0	0	14,106	---	16.77
1998-99	547	8,949	536	696	3,934	14,662	0	0	0	14,662	---	10.83
1997-98	641	28,129	378	20,714	11,180	61,042	0	77	77	61,119	---	38.51
1996-97	415	9,808	724	5,768	6,406	23,121	0	51	51	23,172	---	17.65
1995-96	345	8,232	363	4,532	7,767	21,239	0	0	0	21,239	---	14.48
1994-95	585	35,137	1,086	14,064	18,236	69,108	0	0	0	69,108	---	33.08
1993-94	462	12,052	182	3,156	4,129	19,981	0	0	0	19,981	---	11.86
1992-93	389	26,186	1,312	17,001	19,656	64,544	114	0	114	64,658	---	41.26
1991-92	653	15,461	1,094	12,914	9,272	39,394	230	0	230	39,624	---	32.39
1990-91	509	11,489	241	3,940	2,487	18,666	52	0	52	18,718	---	7.69
1989-90	327	2,029	90	1,708	0	4,154	0	0	0	4,154	---	9.55
1988-89	255	3,844	308	1,306	0	5,713	0	0	0	5,713	---	9.72
1987-88	352	17,252	1,037	4,520	0	23,161	0	0	0	23,161	---	21.36
1986-87	0	7,311	141	467	0	7,919	0	33	33	7,952	---	7.70
1985-86	290	18,188	1,735	6,704	0	26,917	0	1,433	1,433	28,350	---	23.27
1984-85	244	13,274	104	3,375	0	16,997	0	5,496	5,496	22,493	---	13.31
1983-84	213	10,410	0	3,545	0	14,168	0	24,115	24,115	38,283	---	11.18
1982-83	883	35,192	1,051	22,972	10,580	70,678	10	32,237	32,247	102,925	---	46.07
1981-82	345	14,317	243	5,495	0	20,400	3,853	0	3,853	24,253	---	20.16
1980-81	245	14,470	335	3,169	0	18,219	4,652	9,020	13,672	31,891	---	12.89
1979-80	397	31,087	1,097	15,583	0	48,164	5,448	19,931	25,379	73,543	---	33.66
1978-79	295	24,697	1,018	12,036	0	38,046	2,463	31,945	34,408	72,454	---	24.07
1977-78	2,142	28,123	445	20,472	12,821	64,003	3,200	18,247	21,447	85,450	---	44.84
1976-77	377	2,656	63	1,943	0	5,039	3,142	16	3,158	8,197	---	16.02
1975-76	470	3,128	562	1,308	0	5,468	3,837	5,500	9,337	14,805	---	14.20
1974-75	681	5,423	915	2,476	0	9,495	4,070	9,221	13,291	22,786	---	---
1973-74	672	6,287	946	2,378	0	10,283	6,205	0	6,205	16,488	---	---
1972-73	1,271	9,272	0	6,343	2,274	19,160	5,182	0	5,182	24,342	---	---
1971-72	161	1,932	0	1,113	0	3,206	7,389	0	7,389	10,595	---	---
1970-71	507	11,657	727	4,049	0	16,940	6,804	399	7,203	24,143	---	---
1969-70	674	11,927	0	1,577	2,380	16,558	11,021	0	11,021	27,579	---	---
1968-69	461	32,464	893	14,262	13,052	61,132	6,698	3,676	10,374	71,506	---	---
AVG.	552	13,647	587	6,851	5,034	26,671	1,653	3,754	5,407	32,078	4,824	

1. Spreading by Burbank began in 2009-10 Water Year following completion of the Burbank MWD connection. These volumes are reported by LACDPW spreading data, and are therefore included in the "Grand Total" column.

2.5 Groundwater Extractions

The original Trial Court adjudication of groundwater rights in ULARA, effective October 1, 1968, restricted all groundwater extractions to a total maximum safe yield value of approximately 104,040 AFY for the four ULARA groundwater basins. This value amounted to a reduction of approximately 50,000 AF from the average groundwater extractions by all Parties for the six years prior to 1968. The State Supreme Court's opinion, as implemented on remand in the Judgment dated January 26, 1979, further restricted groundwater pumping from each groundwater basin, and by each Party within each basin.

Figure 2.2 illustrates the imported water used in ULARA and annual groundwater extractions, beginning with the 1954-55 Water Year. It can be noted that for the 14 years prior to pumping restrictions (1954-55 to 1967-68), imported water volumes exceeded annual groundwater extractions by 50,000 to 90,000 AFY. In contrast, annual imported water volumes exceeded extractions by approximately 100,000 AFY to 255,000 AFY in the past 44 years (1968-69 to 2012-13).

A total of 83,419 AF of groundwater was pumped from the four ULARA groundwater basins during the 2012-13 Water Year, as follows: 73,529 AF from the SFB; 4,952 AF from the Sylmar Basin; 4,757 AF from the Verdugo Basin; and 181 AF from the Eagle Rock Basin. The respective extraction rights for the forthcoming 2013-14 Water Year for each basin are: 93,655 AF [Native Safe Yield of 43,660 AF plus an import return credit (or "return water extraction right") of 51,327 AF] for the SFB; 7,140 AF for the Sylmar Basin; and 7,150 AF for the Verdugo Basin. The Groundwater Extractions Report provided in Appendix A summarizes the groundwater extractions by each Party during Water Year 2012-13. Plate 8 shows the general locations of the various wellfields owned by the five principal Parties in ULARA, whereas Plate 11 displays the computer-simulated changes in groundwater elevations in the local groundwater basins; these simulated groundwater elevations have resulted from changes in groundwater extractions and annual rainfall and recharge during the 2012-13 Water Year.

Of the total amount of groundwater pumped in ULARA (83,419 AF in 2012-13), the majority was extracted by the Parties to the Judgment; 1,048 AF are considered a non-consumptive use or minimal consumption; and 1,341 AF were pumped for physical solutions, groundwater cleanup, water well development and testing, and dewatering activities by other parties (Appendix E). Table 2-5 summarizes private party pumping in the SFB for Water Year 2012-13, whereas Plate 3 shows the locations of the individual producers.

FIGURE 2.2 - YEARLY IMPORTS USED IN ULARA AND TOTAL ULARA EXTRACTIONS

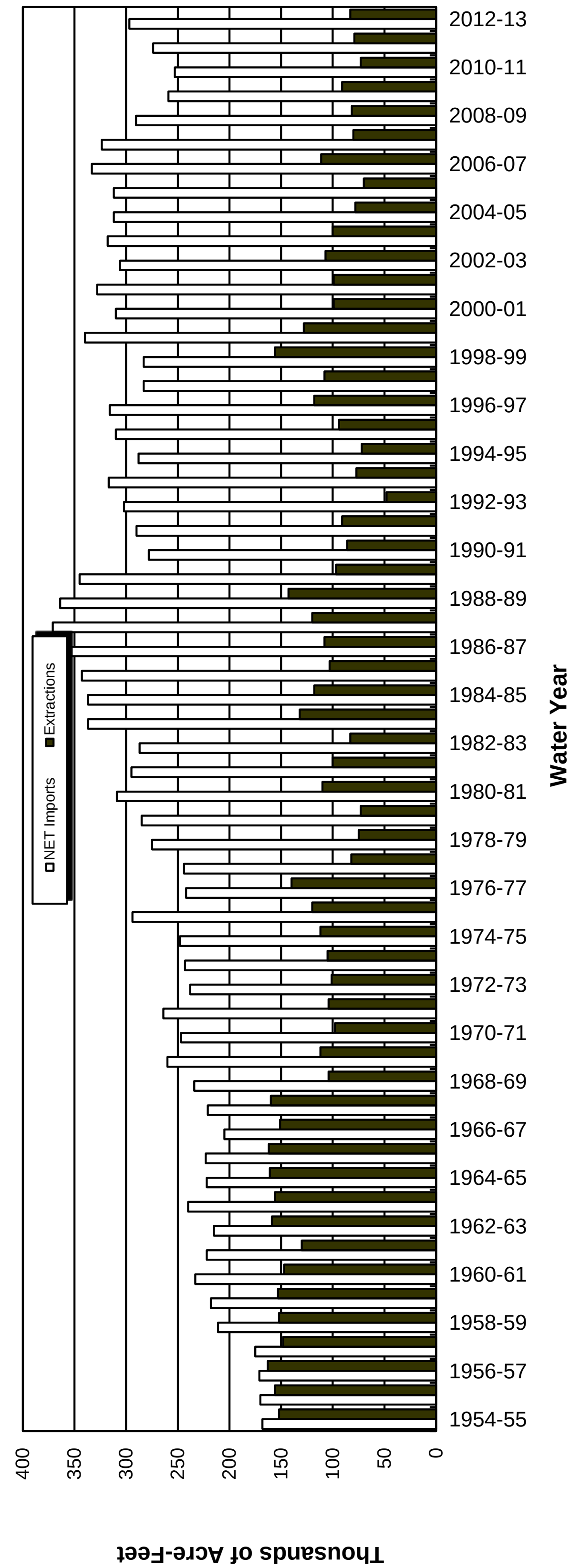


TABLE 2-5: 2012-13 PRIVATE PARTY PUMPING – SAN FERNANDO BASIN

(Acre-feet)

Nonconsumptive Use or Minimal Consumption		**Groundwater Dewatering**	
Sears, Roebuck and Company	0.00	*Charged to Los Angeles' water rights*	
(Air Conditioning; well disconnected 2000)		Avalon Encino	0.00
Sportsmens' Lodge	5.08	BFI Sunshine Canyon Landfill	79.03
Toluca Lake Property Owners	0.00	Glenborough Realty (First Financial)	10.62
Vulcan (CalMat) [1]	1,042.87	Mercedes Benz Encino (formerly known as Auto Stiegler)	2.45
(Gravel washing)			
Walt Disney Productions	0.00		
(3 wells inactive/ Not abandoned)		Metropolitan Transportation Agency	35.02
		Metropolitan Water District	138.20
		Trillium Corporation	29.53
		Warner Properties Plaza 6 and 3	15.76
Total	**1,047.95**	**Total**	**310.61**
Groundwater Cleanup		**Physical Solution**	
Charged to Burbank's water rights		*Charged to Burbank's water rights*	
B.F.Goodrich (Menasco/Coltec)	0.04	Valhalla Memorial Park	434.89
Home Depot U.S.A. Inc.	0.00	*Subtotal*	*434.89*
Subtotal	*0.04*		
		Charged to Glendale's water rights	
Charged to Los Angeles' water rights		Forest Lawn Cemetery Assn.	329.60
3M-Pharmaceutical	41.62	*Subtotal*	*329.60*
Boeing Santa Susana Field Lab	5.71		
Honeywell International, Inc.	175.95	*Charged to Los Angeles' water rights*	
Micro Matics USA, Inc.	0.00	Hallelujah Prayer Ctr (Hathaway/deMille)	9.33
Tesoro	0.00	Middle Ranch (deMille)	4.17
Subtotal	*223.28*	Toluca Lake Property Owners	24.39
		Water Licenses	2.59
		Wildlife Waystation	1.60
		Subtotal	*42.08*
Total	**223.32**	**Total**	**806.57**
Total Extractions	**2,388.45**		

1. Water pumped by Vulcan (Calmat) excludes 123.99 AF of water lost through evaporation.

2.6 Imports and Exports of Water

The continued growth of residential, commercial, and industrial developments has required that more water be imported to supplement the local groundwater supplies in ULARA over time.

Imported supplies to ULARA are from the Los Angeles Aqueduct and from MWD. Imported water in the Los Angeles Aqueduct consists of runoff from the Eastern Sierra Nevada and groundwater from Owens Valley. The imported MWD supplies consist of State Water Project and water from the Colorado River Aqueduct.

Exports from ULARA include imported Los Angeles Aqueduct water and MWD water (pass-through water), and groundwater extracted from the San Fernando Basin by LADWP. Exports of wastewater not treated and released into the Los Angeles River are delivered via pipeline to the Hyperion Treatment Plant in the Playa Del Rey area of the City of Los Angeles.

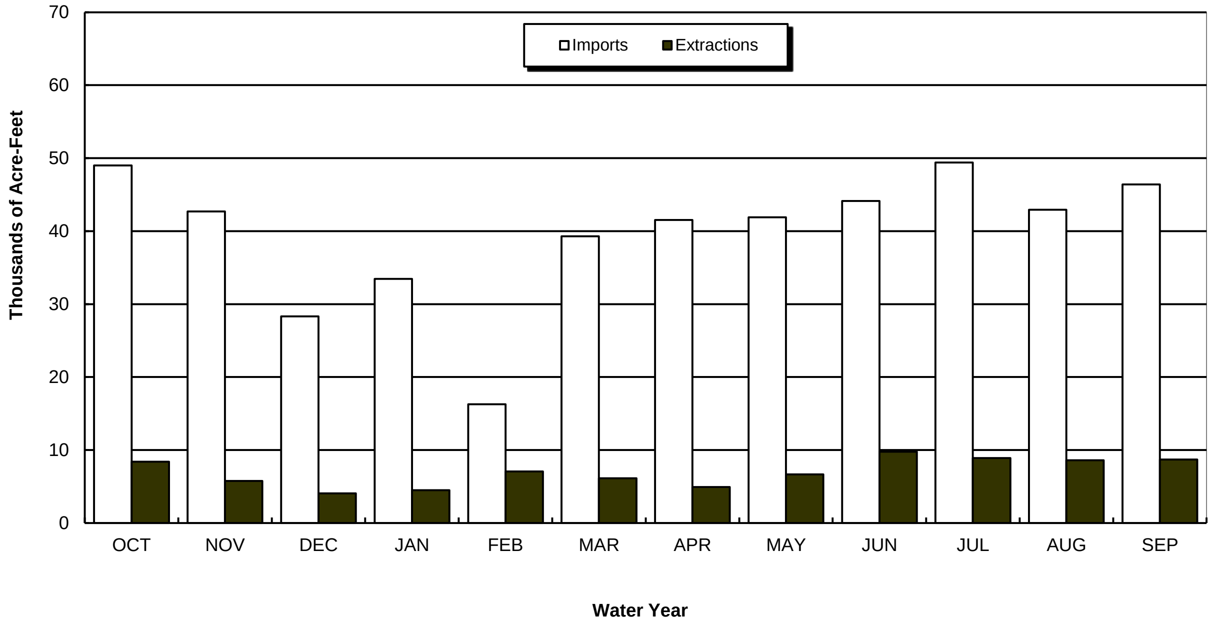
Table 2-6 summarizes the imports and exports from ULARA during the 2011-12 and 2012-13 Water Years, whereas Figure 2.3 shows the monthly extractions and gross imports for 2012-13. Constraints on water supply sources available to Los Angeles from the Eastern Sierra Nevada and Owens Valley have reduced the amounts of water from these sources that can be imported into ULARA; however, the Parties have tried to manage this water supply challenge, in part, by enacting water conservation measures to help reduce the overall water demand.

TABLE 2-6: ULARA WATER IMPORTS AND EXPORTS
(Acre-feet)

Source and Agency	Water Year 2011-12	Water Year 2012-13
Gross Imported Water		
Los Angeles Aqueduct		
City of Los Angeles	213,043	85,408
MWD Water		
City of Burbank [1]	9,973	14,210
Crescenta Valley Water District	1,534	1,682
City of Glendale	17,284	19,195
City of Los Angeles	237,686	369,214
La Canada Irrigation District [2]	1,090	1,150
Las Virgenes Municipal Water District [2]	7,092	8,133
City of San Fernando	106	82
MWD Total	**274,765**	**413,666**
Grand Total	**487,808**	**499,074**
Exported Water (Pass-Through)		
Los Angeles Aqueduct		
City of Los Angeles	93,638	34,991
MWD Water		
City of Los Angeles	120,547	167,236
Total	**214,185**	**202,227**
Net Imported Water	**273,622**	**296,847**

1. Total includes water imported for potable use and for groundwater replenishment (spreading).
2. Deliveries to those portions of these agency service areas that are within ULARA.

FIGURE 2.3 – TOTAL MONTHLY EXTRACTIONS AND GROSS IMPORTS



Note – “Imports” includes water imported for potable use and for groundwater replenishment (spreading).

2.7 Wastewater Recycling

Wastewater recycling currently provides an additional source of water for irrigation, industrial, and recreational uses. In the future, wastewater recycling should be able to provide additional water for groundwater recharge at existing and/or new spreading basins, and/or at new aquifer storage and recovery wells (ASR wells, a method to inject water directly into the aquifer systems). Four water reclamation plants (WRPs) are currently in operation in ULARA: the Tillman, Burbank, Los Angeles-Glendale, and the Las Virgenes Municipal Water District plants. The latter facility is located west of the southwestern boundary of ULARA but a part of the water treated at this facility is used in ULARA. Table 2-7 summarizes the operations at these four WRPs in Water Year 2012-13 whereas Plate 5 shows the locations of these facilities.

TABLE 2-7: 2012-13 WASTEWATER RECYCLING OPERATIONS

(Acre-feet)

Plant/Agency	Plant Influent [1]	Effluent to L.A. River	Flow to Hyperion	Recycled Water Use	Recycled Water Use [8] (%)	Recycled Water Delivered to SFB
City of Burbank	9,306	7,422	276	1,608 [4]	17%	1,608
Los Angeles-Glendale	21,553 [2]	12,898	2,356	5,170	24%	
Los Angeles				3,296 [5]		338
Glendale				1,874 [6]		1,571
Donald C. Tillman	57,018	35,961 [3]	19,239	5,715 [7]	10%	1,770
Las Virgenes MWD				1,732		1,732
Total	**87,877**	**56,281**	**21,871**	**14,225**		**7,019**

1. Does not include plant overflow/ by pass.
2. Plant influent does not equal to the effluent due to metering error and/or plant use.
3. Total effluent to LA River includes 16,652 AF supplied to Balboa Lake; 5,265 AF supplied to Wildlife Lake; 4,092 AF supplied to the Japanese Garden; discharged to LA River after beneficial re-use, in addition to 9,951 AF plant effluent discharged directly to the L.A. River.
4. Of the total recycled water (1,608 AF), 719 AF was delivered to the Burbank power plant, 889 AF was used by CalTrans, Media City Center, landfill, DeBell Golf Course, Muir School, McCambridge Park, Burbank High School, AMC theater complex, Costco, Empire Center, Chandler Bikeway, Robert Gross Park, Empire landscape, Airport, M. David Paul, BWP Landscape, Castaway, Stough Park, Starlight Bowl, 5-Points Park, Wildwood Canyon Park, Northeastern extension, Northern extension, Valhalla extension, Studio District extension, and water trucks.
5. Total includes 990.4 AF for in-plant use; 917.4 AF delivery to Griffith Park for irrigation; 1,318 AF deliveries to CalTrans, Lakeside, Mt. Sinai Memorial Park, Forest Lawn H.H., and Universal City for irrigation; 19.3 AF delivery to former Headworks Spreading Grounds for construction dust control; and 50.5 AF exported from ULARA delivered to Taylor Yard for irrigation.
6. Recycled water was delivered to Glendale for use in Glendale's Power Plant and for irrigation water for CalTrans, Forest Lawn Memorial Park, Oakmont Country Club, Sports Complex, and miscellaneous usage by Glendale Public Works, and other recycled water users in the City of Glendale.
7. Includes deliveries of 1,769.6 AF to valley fill for irrigation, 2,968 AF of Tillman in-plant use discharged to Hyperion, and 977.2 AF delivered to Valley Generation Station discharged to Hyperion.
8. Recycled water use is calculated as a percentage (%) of plant effluent.

2.8 Groundwater Elevations and Hydrographs

The simulated groundwater elevation contour maps for the Spring (April) and the Fall (September) of 2013 for the San Fernando Basin were created by the ULARA Watermaster Support Staff at LADWP using the SFB Groundwater Flow Model. The SFB model was initially developed during the Remedial Investigation (RI) study of groundwater contamination in the eastern portion of the San Fernando Valley in the early-1990s, and was funded through the USEPA's Superfund program.

The model is comprised of up to four hydrostratigraphic layers established by others in the deepest portion of the eastern SFB, and includes 6,883 cells, ranging in size from 1,000 by 1,000 feet to 3,000 by 3,000 feet. The model parameters were calibrated by matching the simulated hydraulic-head fluctuations with the historical water level fluctuations measured at selected key monitoring wells for a 10-year period. The simulated 2013 contours for San Fernando Basin were estimated by incorporating the actual monthly recharge (e.g., the amount of spread water, precipitation, etc.) and groundwater extraction values for the 2012-13 Water Year as model input. The model was then run to simulate the actual operations in the San Fernando Basin during the period October 2012 to September 2013. The simulated head values (simulated groundwater elevations) at the end of the months of April and September of the 2012-13 Water Year for SFB were then plotted by utilizing groundwater contouring software.

The simulated Groundwater Elevation Contour Maps for Spring and Fall 2013 are shown on Plates 9 and 10, respectively, to depict the regional direction of groundwater flow within the San Fernando Basin during these periods, as simulated by the LADWP flow model. Current groundwater elevations in different portions of the four ULARA groundwater basins may be obtained by contacting the Watermaster Support Staff at LADWP at (213) 367-2117. Additional water level data may also be available from Los Angeles County via http://gis.dpw.lacounty.gov/wells/viewer.asp.

Plate 11 has been prepared to illustrate the simulated change in groundwater elevations from Fall 2012 to Fall 2013 for the San Fernando Basin. The decrease in the elevations of simulated groundwater in this one-year period ranged between 9 feet and 13 feet in the portion of the SFB near the Hansen, Pacoima, and Tujunga spreading grounds. This decrease is attributed to the relatively low volume (4,607 AF) of native runoff water that was able to be artificially spread at these spreading grounds during that time period. In addition, Burbank spread 6,702 AF of imported water from MWD at the Pacoima spreading grounds. The long-term average annual volume of native runoff water spread within SFB has been on the order of 22,000 AF.

Simulated groundwater elevations decreased by 5 ft to 8 ft from Fall 2012 to Fall 2013 near the LADWP-owned Rinaldi-Toluca and North Hollywood wellfields due to: the increase in total extractions from these two LADWP-owned wellfields; and the decreased volume of water that was able to be artificially spread and recharged at the spreading basins that lie upgradient from these wellfields. Specifically, pumping at these major wellfields during this same period was increased by 6 percent, from 18,915 AF in 2011-12 to 20,178 AF in 2012-13. The amount of recharge at these upgradient spreading basins decreased by about 28 percent, from 14,948 AF in 2011-12 to 10,781 AF in 2012-13.

Similarly, due to decreased recharge at the Tujunga and other upgradient spreading grounds, the simulated groundwater elevations near the LADWP-owned Tujunga Wellfield (TWF) decreased as much as 13 feet during the same one-year period.

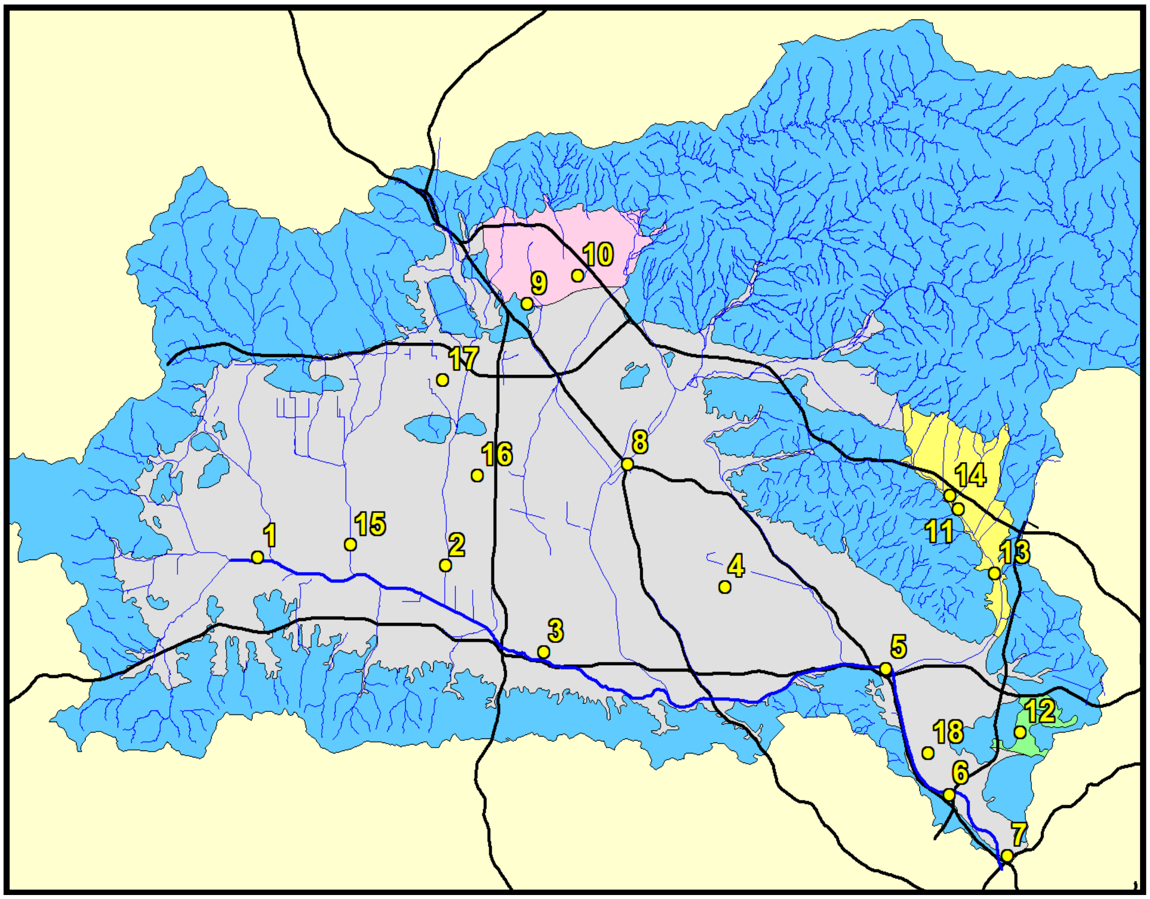
In general, simulated groundwater elevations decreased in most areas of the SFB, mainly due to the significant decrease in the artificial recharge at the spreading grounds, the below-average rainfall, and the minor increase in municipal-supply groundwater extractions by the purveyors in Water Year 2012-13.

Over the years, the water level data collected from 11 wells within the valley fill areas of ULARA have been used to create hydrographs; these graphs illustrate the fluctuations in water levels in these wells on a seasonal basis for each year and also on a year to year basis in response to variations in seasonal/annual groundwater extractions and annual recharge. Actual water levels for each well are plotted on the hydrographs as depth to water for each available data point; the ground surface elevation (GSE) of each well is listed on each respective hydrograph. Starting with the Annual Report for the 2009-2010 Water Year, the Watermaster began to collect water level data for another ±20 wells in ULARA, as available from LADWP and the Los Angeles County Department of Public Works – Water Resources Division. Using available location data for each of those ±20 wells, the Watermaster staff plotted their locations and their respective period of available water level data on a map for in-house use; well depth and casing perforation records were also listed, if available, for each well. The locations and water level database for those ±20 additional wells were then reviewed and compared to the locations of the 11 original wells for which hydrographs have been presented for many years in the prior Annual Watermaster reports.

As a result, the Watermaster has begun including the hydrographs for 7 additional wells (a total now of 18 wells) in the ULARA groundwater basins, beginning with the Annual Report for the 2009-10 Water Year. One of these additional and newly-plotted wells (shown as No. 12 on Figure 2.4) provides the fluctuations in water levels in the Eagle Rock Groundwater Basin.

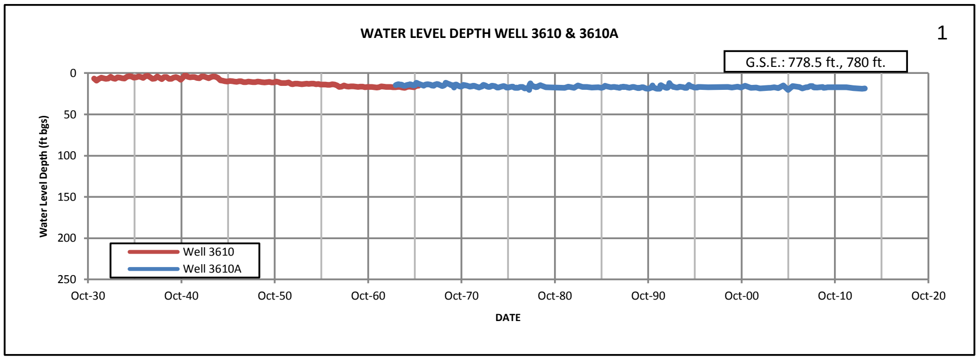
Figure 2.4 illustrates the locations of the 18 wells for which hydrographs are now being prepared, whereas the hydrographs for each respective well are shown on the ensuing pages.

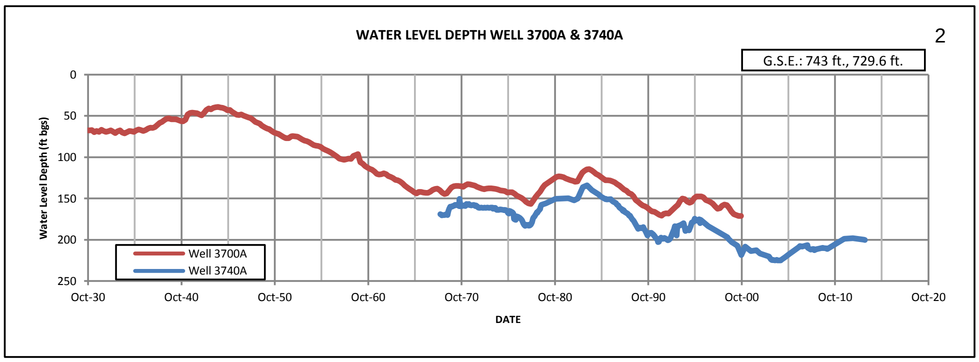
FIGURE 2.4 LOCATIONS OF WELLS WITH HYDROGRAPHS

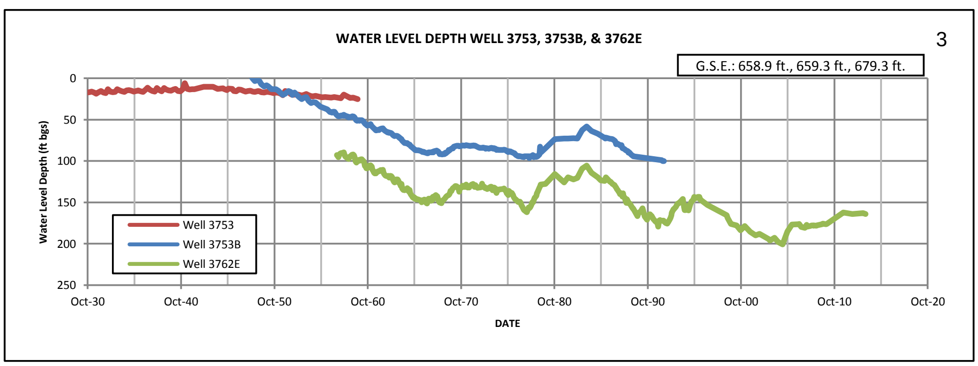


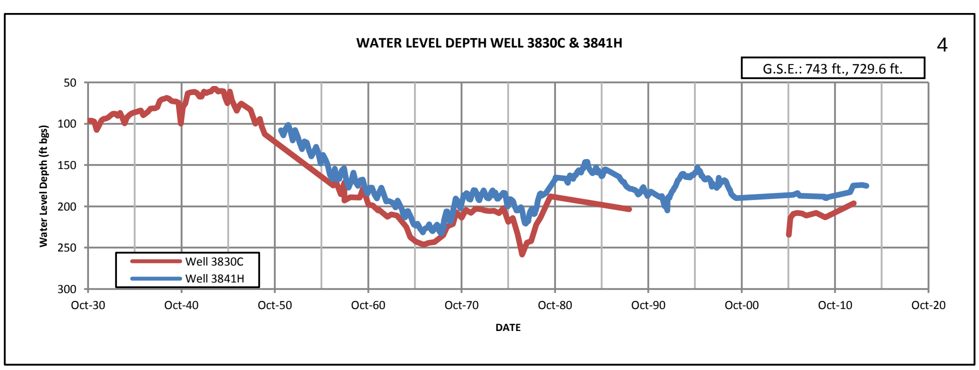
NOTE: See Hydrographs for each well shown above in the accompanying figures.

SAN FERNANDO BASIN

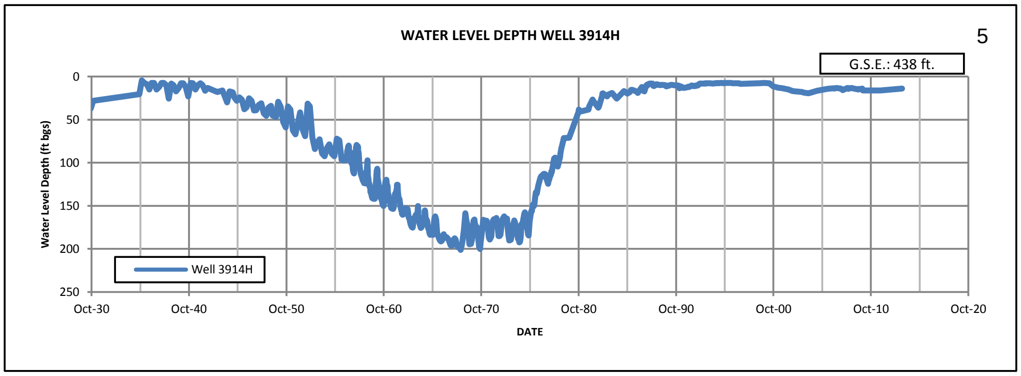


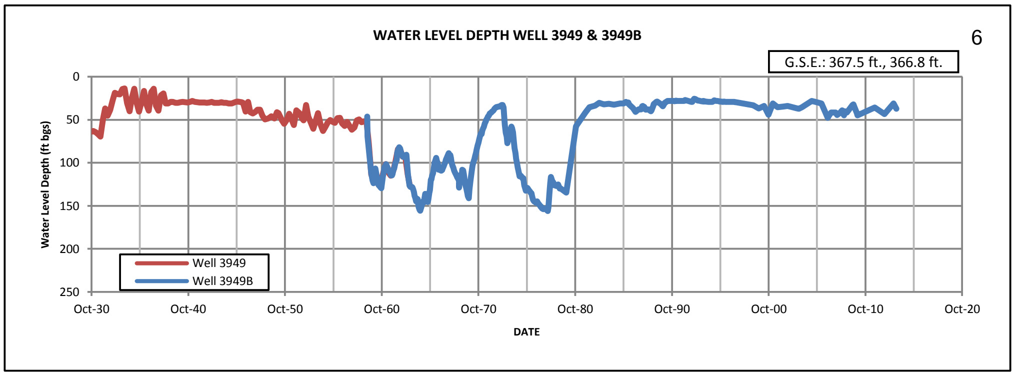


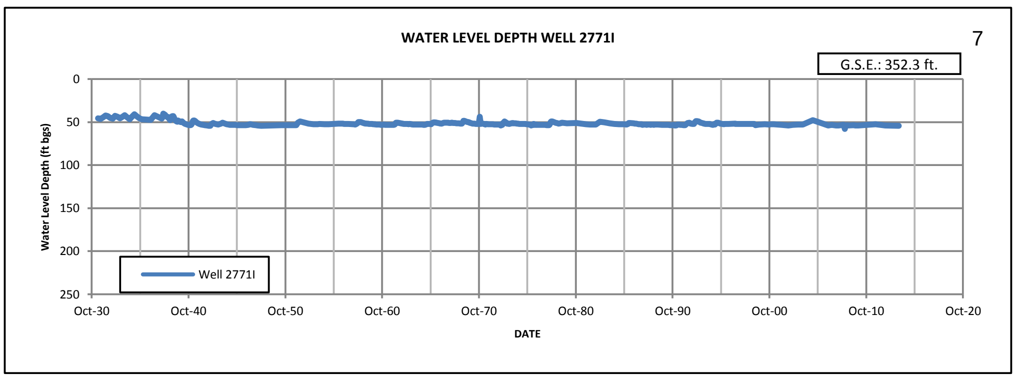


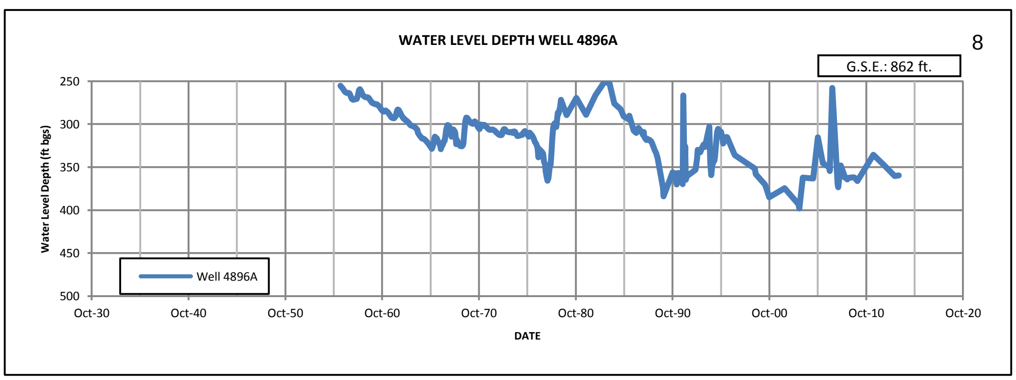


SAN FERNANDO BASIN









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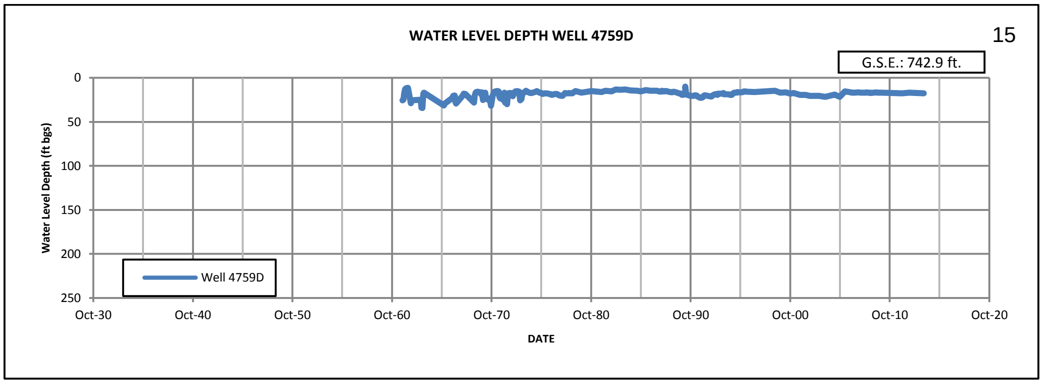
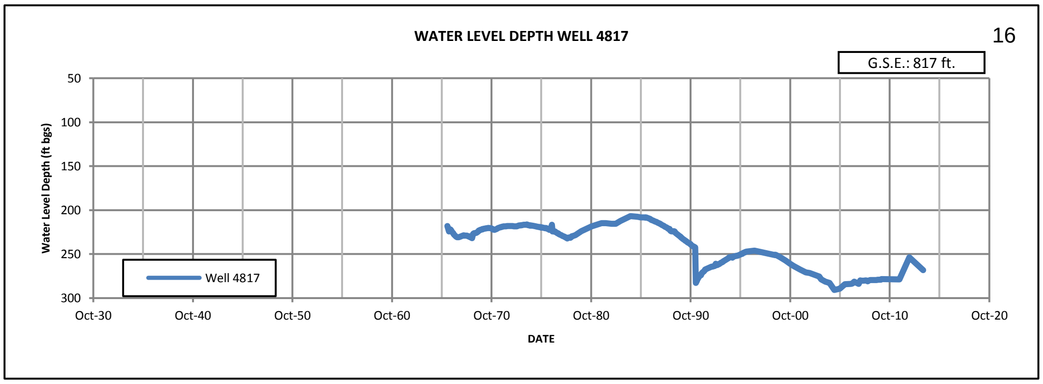
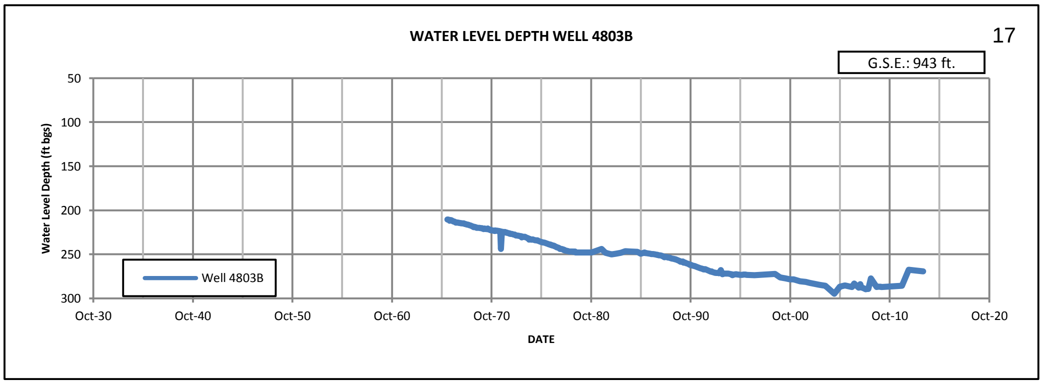
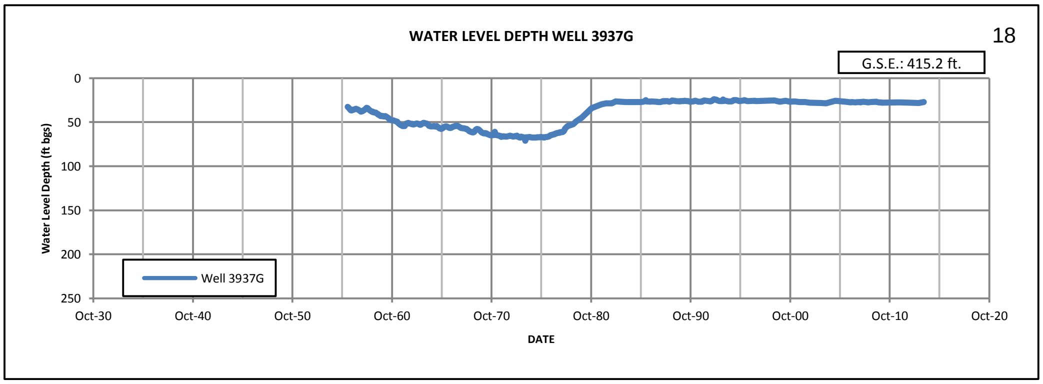
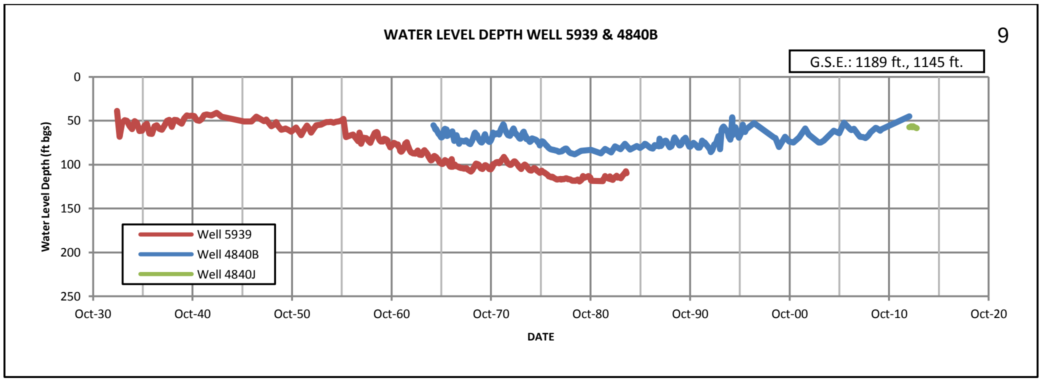


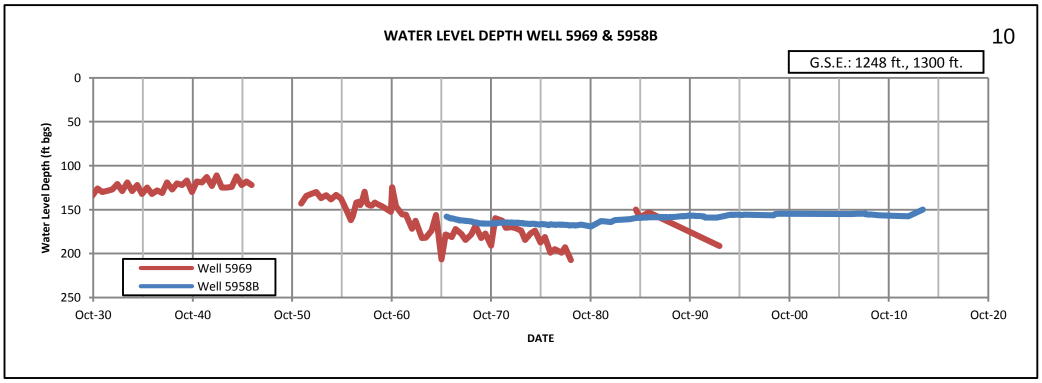




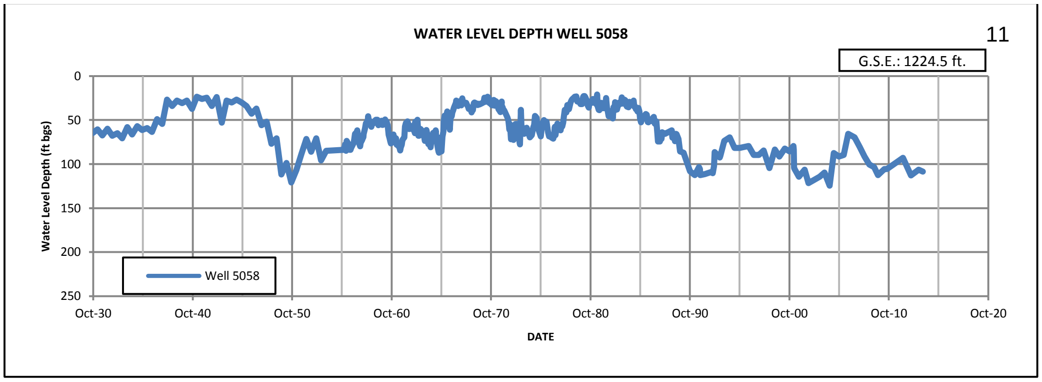


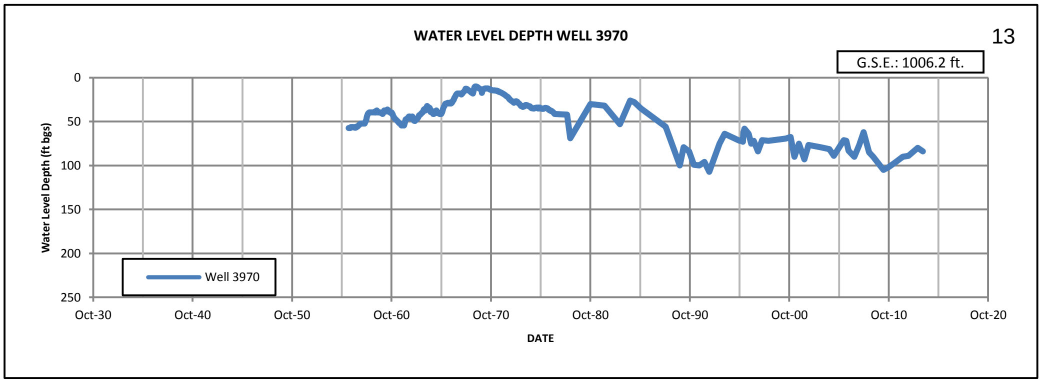
SYLMAR BASIN

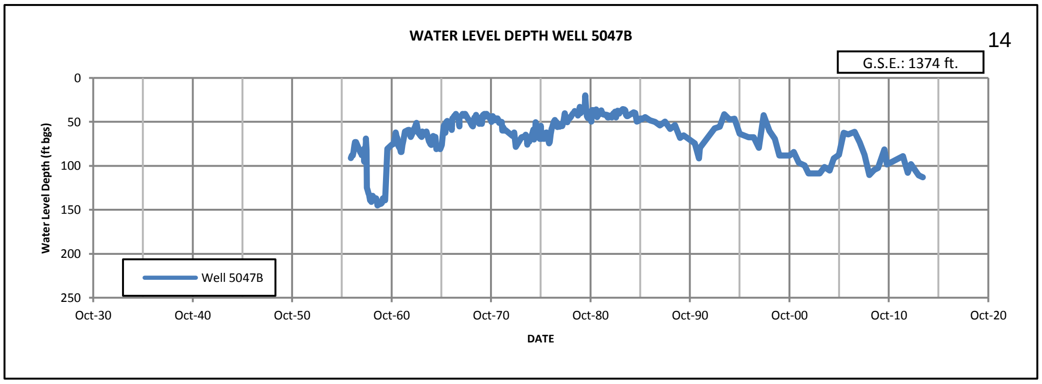




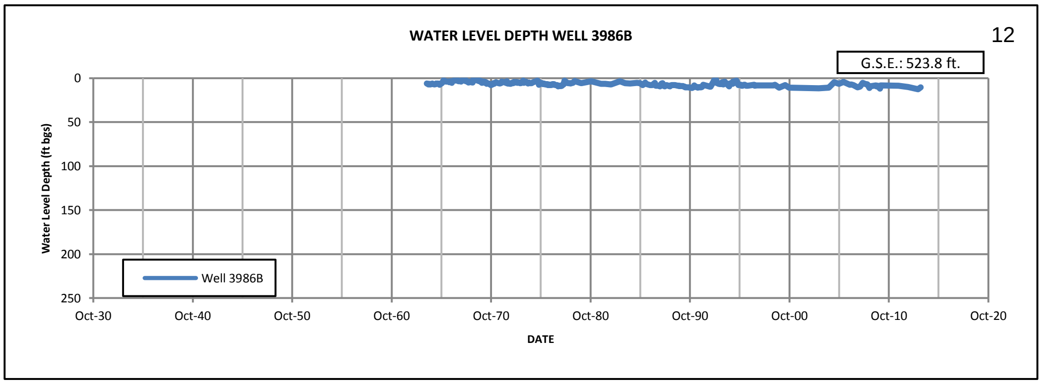
VERDUGO BASIN







EAGLE ROCK BASIN



2.9 Groundwater In Storage

San Fernando Basin

Each year, the change in the amount of groundwater stored in the San Fernando Basin is evaluated in three ways: between the current water year and the previous water year; for the cumulative change since Safe Yield Operation began in 1968; and, for the cumulative change since 1928, the date at which sufficiently detailed records are considered to have become available for the calculation.

In Fall 1968, following the Trial Court decision, Safe Yield Operation was implemented by the Court in an effort to halt the overdraft of the San Fernando Basin that began in 1954 (refer to the blue-colored line on Plate 13). Methodology established by the State Water Rights Board, also referenced in Appendix R of the 1962 Report of Referee, was used to derive a regulatory requirement for groundwater in storage of 360,000 AF for the SFB that considered normal wet-dry cycles, operational flexibility, and annual pumping based on the calculated safe yield. The upper regulatory storage limit of 210,000 AF above the 1954 storage volume was established to help prevent excess rising groundwater from leaving the basin, whereas the lower regulatory storage limit of 150,000 AF below the 1954 storage level was established to help provide additional storage space for groundwater in wet years. It was determined that the amount of stored groundwater should be kept between the upper and lower limits of the regulatory storage range (indicated on Plate 13 by the horizontal-dashed red line). As shown on Plate 13, and with only a few brief exceptions, the San Fernando Basin has rarely been operated within the regulatory storage range after 1968.

Plate 13 illustrates two important items:

1. The estimated change in groundwater in storage within the San Fernando Basin is presented graphically by the blue line on Plate 13, and in tabular form on Table 2-8. Each year, groundwater levels are measured in numerous wells throughout the SFB and these groundwater levels are used to calculate the overall increase or decrease in the volume of groundwater stored in this basin; the resulting change in storage is plotted annually on the graph. This blue line on Plate 13 depicts the fluctuations in the calculated change in groundwater storage beginning in approximately 1980; the very slight but overall declining trend from 1980 to 2012-13 has occasionally been reversed during years of above-average rainfall and/or years of above-average spreading operations, and/or periods of decreased groundwater extractions. The long-term decline in groundwater in storage since 1944 (see Plate 13) has been caused by more water leaving the basin than has been recharged on a long-term average annual basis. Causes of this decline include: pumping in excess of long-term recharge; reduced

natural recharge caused by increased urbanization and runoff leaving the basin; additional amounts of groundwater underflow and rising groundwater leaving the basin; and reductions in the volumes of artificial recharge due to restrictions at the spreading grounds located on the northeastern side of SFB.

2. For the San Fernando Basin, the Judgment provides a right to the cities of Burbank, Glendale, and Los Angeles (the “Parties”) to reduce their pumping and to store, or “carry over”, any unused water rights into future years. These “un-pumped” water rights are accounted for as Stored Water Credits. The red line on Plate 13 represents the calculated change in storage minus the total combined Stored Water Credits that these three Parties have accumulated over time in San Fernando Basin. In other words, the red line illustrates what the change in storage would have been in this basin had these Parties fully pumped their annual water rights each year beginning in 1968. As depicted by this scenario, groundwater levels in the SFB would be far below the level at which the Court declared Safe Yield Operation in 1968. This concept clearly demonstrates that the San Fernando Basin cannot supply the total amounts of groundwater to which these Parties are entitled under the Judgment, and that there is a significant shortfall between water rights and actual hydrologic conditions.

Compounding this problem is the fact that the Judgment does not limit either the amount of Stored Water Credits that a Party can accumulate or the time period over which those Stored Water Credits are allowed to accumulate in SFB. As of October 1, 2013, the three Parties had accumulated a total of 591,932 AF of Stored Water Credits in SFB. If the Parties were to have pumped their full water rights beginning in 1968, the San Fernando Basin (as of October 1, 2013) would be 398,306 AF below the 1968 level at which the Court imposed Safe Yield Operation (Plate 13, red line); this would return SFB to a condition of overdraft. Clearly, basin recharge is not keeping up with the pumping rights defined in the 1979-dated Judgment. Because more than about 398,306 AF of these Stored Water Credits are below the level at which Safe Yield Operation was mandated by the Court in 1968, it has been the opinion of each Watermaster over time that this groundwater does not actually exist in the San Fernando Basin. These Stored Water Credits in question currently represent about 67% of the total credits accumulated over time by the cities of Burbank, Glendale, and Los Angeles.

The challenges facing the three Parties, the Watermaster, and the Court for the San Fernando Basin continue to be the following: a long-term decline in the actual volume of stored groundwater; and an accumulation of a large quantity of Stored Water Credits for which there is an insufficient volume of “real” groundwater in storage in this basin. The three Parties and the

Watermaster continue to work proactively together on potential strategies for preserving the SFB water supplies.

Furthermore, in September 2007, the three Parties entered into a 10-year Stipulated Agreement entitled "Interim Agreement for the Preservation of the San Fernando Basin Water Supply" ("Agreement") to begin to address the problems and to develop solutions to those issues where agreement had been attained. The Agreement, importantly, contained several key provisions designed to help address the imbalance between the decline in stored groundwater and the large accumulation of Stored Water Credits (a copy of this Stipulated Agreement is in Appendix G). Three key provisions of the Stipulated Agreement are the following:

- First, the Agreement, which is for 10 years, segregates total Stored Water Credits into "Available Credits" and "Reserved Credits". Reserved Credits are the amounts of Stored Water Credits that lie below the 1968 storage level (represented on Plate 13 by the horizontal-dashed brown line). Reserved Credits are not supported by actual groundwater in storage and, with the exception of the EPA OUs, emergencies, or operational events, such credits may not be pumped until stored water within the SFB recovers sufficiently to allow their use. Conversely, Available Credits are the amount of Stored Water Credits that lie above the 1968 storage level, and may be pumped by the Parties without restriction.
- Second, the Agreement memorializes the support of the City of Los Angeles to work closely with Los Angeles County to restore and enhance artificial recharge of stormwater runoff within the SFB. This program provides a benefit toward helping to increase water in storage and works toward possible future use of the stored water credits.
- Third, beginning October 1, 2007, an estimated volume of the loss from the SFB due to rising groundwater and underflow is being debited on an annual basis from the Stored Water Credits of each Party, in accordance with Section 8.2.9 of the Judgment. The importance of this provision of the Stipulated Agreement is to help bring the water rights of each Party back into balance with basin hydrology. These losses from the basin are estimated to be 1% of the total Stored Water Credits and the Stipulated Agreement provides that this amount is to be subtracted each year from all Stored Water Credits until the determination of the volume of rising groundwater is better defined.

Fortunately, in recent years, the City of Los Angeles (through LADWP) and the LACDPW have been working together to seismically retrofit and/or enlarge the reservoir capacity of certain dams and to rehabilitate and/or enlarge the existing spreading basins in the eastern portion of ULARA; refer to Chapter 1 of this report for additional details. These projects are oriented, in part, to capture and store additional amounts of surface water runoff in the eastern portion of the

San Fernando Basin. Those agencies are also considering additional plans, such as optimizing the methods and/or timing for operating those reservoirs and spreading basins, to further enhance recharge opportunities.

Current programs already in progress between these two agencies and the respective annual volume of increased recharge at each facility are as follows:

Project	LADWP's Project Partner	Construction Start Date	Expected End Date	Expected Increase in Recharge (AFY)
Big Tujunga Dam Seismic Retrofit Project[1]	LACFCD	2007	2016[1]	4,500[2]
Hansen Spreading Grounds Enhancement	LACFCD	2008	2013	2,100
Tujunga Spreading Grounds Enhancement	LACFCD	2015	2017	8,000
Pacoima Spreading Grounds Enhancement	LACFCD	2016	2019	10,500
Sheldon-Arleta Project[3]	LACFCD	2007	Nov 2009	4,000
LADWP's Distributed Recharge Efforts	LACFCD	2009	Ongoing	200

1. Seismic retrofit work was completed in July 2011. Future work includes removal of sediment fill from behind dam.
2. This volume includes volume regained by removing sediment fill from behind dam.
3. Construction completed, remaining task includes facility performance testing.

The volume of groundwater in storage in San Fernando Basin is estimated to have decreased by 12,157 AF between Water Years 2011-12 and 2012-13; this is a slightly larger decrease in storage compared to that in the prior water year. This is due, in part, to the below-average rainfall, a decrease in stormwater spreading, and an increase in groundwater extractions in the Water Year 2012-13. Based on the 2012-13 calculation for change in storage, there remains approximately 461,753 AF of groundwater storage space available in the SFB. This space can be used to capture and store additional native water or imported water supplies during wet (above-average rainfall) years. Basin storage space is a valuable resource, and it has been the opinion of the former and current ULARA Watermasters that the use of this storage space should be available for use by the Parties.

TABLE 2-8: CHANGE IN GROUNDWATER IN STORAGE
SAN FERNANDO BASIN

Water Year	Valley Floor Precipitation (in)	Artificial Recharge (acre-feet)	Change in Storage (acre-feet)	Cumulative Change in Storage (acre-feet)	Groundwater Extractions (acre-feet)
2012-13	7.71	10,780	(12,157)	193,640	73,710
2011-12	10.81	14,944	(10,338)	205,797	69,764
2010-11	24.44	90,502	71,081	216,135	64,313
2009-10	19.08	47,013	17,856	145,054	80,487
2008-09	11.64	9,940	(15,750)	127,198	72,140
2007-08	15.10	21,638	9,443	142,948	67,228
2006-07	4.39	7,974	(33,693)	133,505	94,430
2005-06	16.46	44,615	16,303	167,198	59,375
2004-05	42.64	74,198	66,476	150,895	67,865
2003-04	9.52	10,065	(22,367)	84,419	89,346
2002-03	19.41	16,330	(15,835)	106,786	95,431
2001-02	5.95	2,664	(27,094)	122,621	87,992
2000-01	19.52	17,939	(6,930)	149,715	86,946
1999-00	14.84	14,106	(31,044)	156,645	116,357
1998-99	9.81	14,662	(82,673)	187,689	141,757
1997-98	37.04	61,119	44,113	270,362	94,682
1996-97	15.17	23,172	(35,737)	226,249	105,899
1995-96	12.03	21,239	(49,223)	261,986	82,862
1994-95	33.36	69,108	79,132	311,209	58,121
1993-94	10.19	19,981	(22,238)	232,077	62,990
1992-93	36.62	64,658	106,317	254,315	36,419
1991-92	30.05	39,624	411	147,998	76,213
1990-91	14.38	18,718	(14,122)	147,587	71,065
1989-90	8.20	4,154	(29,941)	161,709	81,466
1988-89	9.12	5,713	(30,550)	191,650	127,973
1987-88	18.62	23,161	(5,000)	222,200	105,470
1986-87	5.99	7,952	(31,940)	227,200	91,632
1985-86	20.27	28,350	(7,980)	259,140	86,904
1984-85	11.00	22,493	(31,690)	267,120	101,591
1983-84	9.97	38,283	(63,180)	298,810	115,611
1982-83	39.64	102,925	121,090	361,990	68,394
1981-82	17.18	24,253	(530)	240,900	84,682
1980-81	11.04	31,891	(32,560)	241,430	92,791
1979-80	30.25	73,543	99,970	273,990	58,915
1978-79	21.76	72,454	78,080	174,020	59,843
1977-78	35.43	85,450	136,150	95,940	66,314
1976-77	14.19	8,197	(50,490)	(40,210)	125,445
1975-76	9.90	14,805	(30,090)	10,280	103,740
1974-75	14.74	22,786	(22,580)	40,370	95,830
1973-74	15.75	16,488	(21,820)	62,950	88,017
1972-73	20.65	24,342	17,020	84,770	82,004
1971-72	8.10	10,595	(17,090)	67,750	84,140
1970-71	15.57	24,143	15,340	84,840	79,010
1969-70	10.50	27,579	(9,740)	69,500	88,856
1968-69	29.00	71,506	79,240	79,240 [1]	84,186
45 Year Average	**17.71**	**32,357**	**4,303**		**85,071**

1. Accumulation of Storage commenced as of October 1, 1968.

Sylmar Basin

The groundwater storage capacity of the Sylmar Basin has been previously calculated by others to be approximately 310,000 AF. The volume of groundwater in storage in this basin is estimated to have increased by 1,933 AF between Water Year 2011-12 and 2012-13.

Verdugo Basin

The groundwater storage capacity of the Verdugo Basin, as previously determined by others, is approximately 160,000 AF; the volume of groundwater in storage in this basin is estimated to have increased by 2,483 AF between Water Year 2011-12 and 2012-13.

Eagle Rock Basin

The volume of groundwater in storage is estimated to have decreased by 87 AF from Water Year 2011-12 to 2012-13.

2.10 Water Supply and Disposal - Basin Summaries

Tables 2-9A, 2-9B, 2-9C, and 2-9D summarize water supply and disposal activities in the San Fernando, Sylmar, Verdugo, and Eagle Rock basins, respectively. Outflows are based on computations originally made by the State Water Rights Board in the 1962 Report of Referee.

TABLE 2-9A: SUMMARY OF 2012-13 WATER SUPPLY AND DISPOSAL, SAN FERNANDO BASIN

(Acre-feet)

Water Source and Use	City of Burbank	City of Glendale	City of Los Angeles	City of San Fernando	All Others	Total
Extractions						
Municipal Use	11,387	7,005	52,751	---	0	71,143
Basin Account	---	---	---	---	0	0
Physical Solution	---	---	---	---	807 [1]	807
Cleanup/Dewaterers	---	---	---	---	534	534
Non-consumptive Use	---	---	---	---	1,045	1,045
Total	**11,387**	**7,005**	**52,751**	**0**	**2,386**	**73,529**
Imports						
LA Aqueduct Water	---	---	85,408	---	---	85,408
MWD Water	7,507 [2]	19,195	339,467	75	8,133 [3]	374,377
Groundwater from						
Sylmar Basin	---	---	1,673	2,984	---	4,657
Verdugo Basin	---	588	---	---	---	588
Total	**7,507**	**19,783**	**426,548**	**3,059**	**8,133**	**465,030**
Delivered Recycled Water [4]	1,608	1,571	2,108 [5]	0	1,732 [3]	7,019
Exports						
LA Aqueduct Water						
out of ULARA	---	---	34,991	---	---	34,991
to Verdugo Basin	---	---	124	---	---	124
to Sylmar Basin	---	---	1,909	---	---	1,909
to Eagle Rock Basin	---	---	401	---	---	401
MWD Water						
out of ULARA	---	---	139,076	---	---	139,076
to Verdugo Basin	---	2,539	492	---	---	3,031
to Sylmar Basin	---	---	7,589	---	---	7,589
to Eagle Rock Basin	---	---	1,594	---	---	1,594
Groundwater	23 [6]	451 [6]	45,121	---	---	45,595
Total	**23**	**2,990**	**231,297**	**0**	**0**	**234,310**
Delivered Water						
Hill & Mountain Areas	---	---	47,408	---	---	47,408
Total - All Areas	20,479	25,369	250,110	3,059	12,251	311,268
Water Outflow						
Storm Runoff (F-57C-R)	---	---	---	---	27,711	27,711
Rising Groundwater (F-57C-R)	---	---	---	---	1,754	1,754
Subsurface	---	---	---	---	391	391
Recycled Water to the LA River	7,422	3,926	44,140	---	141 [3]	55,629
Wastewater to Hyperion	276 [8]	862 [7]	20,733 [7]	---	---	21,871

1. Includes pumping from Hill and Mountain areas tributary to SFB.
2. Does not include water imported for groundwater replenishment (spreading)
3. Las Virgenes Municipal Water District.
4. Referred to as "Reclaimed Water" in previous reports.
5. LA total recycled water is 10,883 AF of which 2,108 AF were delivered to valley fill and 8,775 AF were delivered to the hill and mountain areas and for other industrial uses.
6. Groundwater treated at the Glendale OU and Burbank OU is discharged to the Los Angeles River or the sewer.
7. Water discharged from Tillman and LA-Glendale plants. Annual cities' portion from LAG based on proportion of reclaimed water.
8. Erroneous meter readings show a negative flow from Burbank to Hyperion. The Parties are aware of the problem and are seeking a solution. The value shown here is calculated as the difference between the reported BWRP influent and effluent (including recycled water), as shown on Table 2-7.

TABLE 2-9B: SUMMARY OF 2012-13 WATER SUPPLY AND DISPOSAL SYLMAR BASIN

(Acre-feet)

Water Source and Use	City of Los Angeles	City of San Fernando	All Others	Total
Total Extractions	1,673	3,279	0 [1]	4,952
Imports				
LA Aqueduct Water	1,909	--	--	1,909
MWD Water	7,589	7	--	7,596
Total	**9,498**	**7**	**0**	**9,505**
Exports - Groundwater to San Fernando Basin	1,673	2,984	0	4,657
Total Delivered Water	9,498	302	0	9,800
Water Outflow				
Storm Runoff	5,000 [2]	--	--	5,000
Subsurface	250 [3]	--	--	250
Total	**5,250**	**0**	**0**	**5,250**

1. Pumping for landscape irrigation by Santiago Estates. The well was capped in 1999.
2. Surface outflow is not measured. Estimate based on Mr. F. Laverty – SF Exhibits 57 and 64.
3. Estimated in the Report of Referee, and later revised by the Watermaster.

TABLE 2-9C: SUMMARY OF 2012-13 WATER SUPPLY AND DISPOSAL VERDUGO BASIN

(Acre-feet)

Water Source and Use	Crescenta Valley Water District	City of Glendale	La Canada Irrigation District	City of Los Angeles	Other	Total
Total Extractions	2,917	1,830	---	---	10 [1]	4,757
Imports						
LA Aqueduct Water	---	---	---	124		124
MWD Water	1,682	2,539	1,090	492		5,803
Total	1,682	2,539	1,090	616		5,927
Exports to San Fernando Basin	0	588	0	0		588
Delivered Recycled Water [2]		302				302
Total Delivered Water	4,599	4,083	1,090	616	10	10,398
Water Outflow						
Storm Runoff (Sta. F-252) [3]					1,098	1,098
Rising Groundwater (Sta. F-252)					1,156	1,156
Subsurface to:						
Monk Hill Basin	---	---	---	---	300 [4]	300
San Fernando Basin	---	---	---	---	80 [4]	80
Total	**0**	**0**	**0**	**0**	**2,634**	**2,634**

1. Private party extractions.
2. Referred to as “Reclaimed Water” in previous reports.
3. Includes rising groundwater
4. Estimated in the Report of Referee

TABLE 2-9D: SUMMARY OF 2012-13 WATER SUPPLY AND DISPOSAL EAGLE ROCK BASIN

(Acre-feet)

Water Source and Use	City of Los Angeles	DS Waters	Total
Total Extractions	0	181 [1]	181
Imports			
LA Aqueduct Water from SFB	401	--	401
MWD Water (LA25+LA35) [3] from SFB	1,594		1,594
MWD Water (LA17) [3]	29,747		29,747
Groundwater from SFB	0	--	0
Total	**31,742**	**0**	**31,742**
Exports			
LA Aqueduct Water out of ULARA	0		0
MWD Water (LA17) [3] out of ULARA	28,160		28,160
MWD Water (LA25_LA35) [3] out of ULARA	0		0
Groundwater	0	181	181
Total	**28,160**	**181**	**28,341**
Total Delivered Water	3,582	0	3,582
Water Outflow			
Storm Runoff	--	--	--
Subsurface	50 [2]	--	50
Total	**50**	**0**	**50**

1. DS Waters (formed by the merger of Suntory/Deep Rock Water Co. and McKesson/Danone Water Products) is allowed to pump as successor to Deep Rock and Sparkletts, under a stipulated agreement with the City of Los Angeles and export equivalent amounts.
2. Estimated in Supplement No. 2 to Report of Referee.
3. LA25, LA35, and LA17 are connections between the MWD and LADWP water systems where MWD imported water is supplied to Los Angeles.

2.11 Extraction Rights and Stored Water Credits - Basin Summaries

San Fernando Basin

Tables 2-10A and 2-11A show the calculation of extraction rights for SFB for the 2013-14 Water Year and for Stored Water Credits (as of October 1, 2013), respectively, for the cities of Burbank, Glendale, and Los Angeles. All rights are based on the Judgment in City of Los Angeles vs. City of San Fernando, et al., dated January 26, 1979 and the "Interim Agreement for the Preservation of the San Fernando Basin Water Supply, 2008" (provided in Appendix G).

Sylmar Basin

Tables 2-10B, 2-11B and 2-11C show the calculation of Sylmar Basin extraction rights for the 2012-13 Water Year and Stored Water Credits (as of October 1, 2013), respectively, for the cities of Los Angeles and San Fernando. These rights are based on: the March 22, 1984 Stipulation between the City of San Fernando and the City of Los Angeles; and the action by the Administrative Committee on July 16, 1996 to temporarily increase the safe yield of this basin from 6,210 AFY to 6,510 AFY. The 1996 temporary increase expired on October 1, 2005 but the safe yield was re-evaluated by the former Watermaster in 2006. Another stipulation, dated December 13, 2006, increased the safe yield of the Sylmar Basin to 6,810 AFY (effective October 1, 2006), subject to certain conditions and currently provides the basis for these water rights.

In July 2012, the Watermaster prepared a new re-assessment of the safe yield of this basin titled "Final Report – Sylmar Basin Safe Yield, 5-Year Re-assessment"; the resulting document was filed with the Court in June 2013. A copy of that document is included in Appendix L of this report. In this recent re-assessment, the Watermaster temporarily and conditionally increased the total safe yield of Sylmar Basin from 6,810 AFY to 7,140 AFY.

In addition to the increase in the safe yield value, the method of groundwater credit calculation has also been revised by the Watermaster in his July 2012 report. Specifically, groundwater credits in Sylmar Basin will now begin to be calculated according to the Judgment; that is, credits can no longer be carried over for more than 5 years (Judgment, January 26, 1979; Subsection 5.2.2.3, p. 19-20). Table 2-11C shows the new method of groundwater credit calculation for this basin.

To address the potential loss of credits accumulated over time via the method of credit calculation utilized in the past, and as described in the July 2012 re-evaluation report (see Appendix L), each Party will remain credited with "frozen" groundwater credits (9,014 AF and 404 AF for the City of Los Angeles and the City of San Fernando, respectively); the initial accounting of these "frozen credits" is shown on Table 2-11B. Both Parties will be able to exercise their right to use those accumulated but now "frozen" groundwater credits. However, neither City will be able to exercise its 5-year credits (shown on Table 2-11C), even if they do not or cannot pump their new safe yield value, until such time as their individual, newly "frozen" credits are used entirely. Note that, at any time, either Party may permanently abandon its "frozen" credits and begin accessing its stored water credits accrued via the 5-year credit calculation method.

Verdugo Basin

Glendale and CVWD have rights to extract 3,856 and 3,294 AFY, respectively, from this basin. Los Angeles has a right to extract its Import Return water in the Verdugo Basin, but has never exercised this right. No Stored Water Credits are currently permitted by the Judgment in the Verdugo Basin.

Eagle Rock

Los Angeles has the right to extract, or cause to be extracted, the entire safe yield of this basin. This safe yield consists mostly of return flows of delivered water by Los Angeles. Neither Los Angeles nor any other Parties pump groundwater from the Eagle Rock Basin. DS Waters, as successor to the Sparkletts and the Deep Rock water companies, has a physical solution right to extract groundwater to supply its bottled drinking water facility in this basin. DS Waters pumped 181 AF in the 2012-13 Water Year from this basin.

TABLE 2-10A: CALCULATION OF 2013-14 EXTRACTION RIGHTS SAN FERNANDO BASIN

(Acre-feet)

	City of Burbank	City of Glendale	City of Los Angeles
Total Delivered Water, 2012-13.	20,479	25,369	250,110
Water Delivered to Hill and Mountain Areas, 2012-13	---	---	47,408
Water Delivered to Valley Fill, 2012-13	20,479	25,369	202,702
Percent Recharge Credit	20.0%	20.0%	20.8%
Return Water Extraction Right	4,096	5,074	42,162
Native Safe Yield Credit	---	---	43,660
Annual Extraction Right for the 2013-14 Water Year[1]	**4,096**	**5,074**	**85,822**

TABLE 2-10B: CALCULATION OF 2013-14 EXTRACTION RIGHTS SYLMAR BASIN

(acre-feet)

	City of Los Angeles	City of San Fernando	All Others
Annual Extraction Right for the 2013-14 Water Year[1]	3,570	3,570	--- [2]

1. Does not include Stored Water Credit and Physical Solution.

TABLE 2-10B: CALCULATION OF 2013-14 EXTRACTION RIGHTS SYLMAR BASIN

(Acre-feet)

	City of Los Angeles	City of San Fernando	All Others
Annual Extraction Right for the 2013-14 Water Year[1]	3,570	3,570	--- [2]

1. Does not include Stored Water Credit. The safe yield of the Sylmar Basin was increased to 7,140 AFY effective October 1, 2012. Effective October 1, 1984 safe yield less pumping by Santiago Estates is equally shared by Los Angeles and San Fernando.
2. Santiago Estates (Home Owners Group) capped well in 1999.

TABLE 2-11A: CALCULATION OF STORED WATER CREDITS SAN FERNANDO BASIN

(Acre-feet)

Item Number and Description	City of Burbank	City of Glendale	City of Los Angeles
1. Stored Water Credit (as of Oct. 1, 2012)	12,305	46,224	511,501
1a. Credits and Debits	0		2 [1]
1b. Prior Year Adjustments	0	(61) [2]	61 [2]
2. Extraction Right for the 2012-13 Water Year	4,117	4,898	84,641
3. 2012-13 Extractions			
Party Extractions	11,387	7,005	52,751
Physical Solution Extractions	435	330	42
Clean-up/Dewaterers	0	0	534
Total	11,822	7,335	53,327
4. Spread Water 2012-13 Water Year	6,703	0	4
5. Stored Water Credits [3] per City (as of Oct. 1, 2013)	11,303	43,726	542,882
6. 1% Basin Loss Factor [4]	113.03	437.26	5,428.82
7. **Stored Water Credits** (less Basin Loss) **for each City** (as of Oct. 1, 2013)	**11,190**	**43,289**	**537,453**
8. **Total Stored Water Credits** (less Basin Loss)		**591,932**	
9. **Total Available Stored Water Credits** [4] (from Plate 13)		**193,626**	
10. Percentage of Total Credits per City	1.890%	7.313%	90.796%
11. **Available Stored Water Credits for each City** (as of Oct. 1, 2013) (Item 9 x Item 10)	**3,660**	**14,160**	**175,806**
12. **Total Reserved Stored Water Credits** [4] (Item 8 - Item 9)		**398,306**	
13. **Reserved Stored Water Credits for each City** (as of Oct. 1, 2013) (Item 7 - Item 11)	**7,530**	**29,129**	**361,648**

1. The 2011-12 WY report showed Mercedes Benz of Encino dewatering to be 8.65 AF. Recent data shows that the dewatering volume was actually 6.63 AF. Therefore a credit of 2.02 AF is applied to correct that discrepancy.
2. An exchange of 61.09 AF of stored water credits between Glendale and Los Angeles for groundwater pumping at Los Angeles County Waterworks District No. 21, Kagel Canyon in Water Year 2011-12.
3. Item 5 = 1 +1a + 1b + 1c + 1d + 2 – 3 + 4.
4. Basin Loss Factor, Available and Reserved Stored Water Credits are determined pursuant to Interim Agreement for the Preservation of the San Fernando Basin Water Supply, 2008 (see Appendix G)

TABLE 2-11B: CALCULATION OF "FROZEN" STORED WATER CREDITS SYLMAR BASIN

(Acre-feet)

	City of Los Angeles	City of San Fernando
1. "Frozen" Water Credit (as of Oct. 1, 2013)	9,014	404
2. Extraction Right for the 2012-13 Water Year [1]	3,570	3,570
3. Total 2012-13 Extractions	1,673	3,279
Santiago Estates[2]	0.0	0.0
4. Total Extractions Less Extraction Right (= Item 3 - Item 2)	(1,897)	(291)
5. Remaining "Frozen" Water Credits[3] (as of Oct. 1, 2014)	**9,014**	**404**

1. The total safe yield of the Sylmar Basin was increased to 7,140 AFY as of 10/1/12.
2. Santiago Estates pumping is subtracted equally from the rights of San Fernando and Los Angeles. Santiago Estates capped well in 1999.
3. If Item 4 > 0, then Item 4 is deducted from "Frozen" Water Credits, otherwise, "Frozen" Water Credits remain unchanged. Per the Sylmar Basin Safe Yield re-evaluation, "Frozen" Stored Water Credits no longer accumulate, and can only be consumed (See Appendix L)

TABLE 2-11C: CALCULATION OF STORED WATER CREDIT, 5-YEAR METHOD SYLMAR BASIN

(Acre-feet)

Party	Water Year	Annual Extraction Right (AF)	Total Extractions (AF)	Credits Consumed Due to Previous Year Overpumpage	Annual Volume of Accrued Credits (AF)	Remarks
City of Los Angeles	2008-09	3405	868	0	2537	Total extraction was less than annual extraction right.
	2009-10	3405	2544	0	861	Total extraction was less than annual extraction right.
	2010-11	3405	964	0	2441	Total extraction was less than annual extraction right.
	2011-12	3570	1093	0	2477	Total extraction was less than annual extraction right.
	2012-13	3570	1673	0	1897	Total extraction was less than annual extraction right.
		STORED WATER CREDITS (as of Oct. 1, 2014) =		10213		
City of San Fernando	2008-09	3405	3473	(256)	0	Total extraction exceeded annual extraction right by 68 AF.
	2009-10	3405	3143	(68)	262	Total extraction was less than annual extraction right.
	2010-11	3405	3082	0	323	Total extraction was less than annual extraction right.
	2011-12	3570	3202	0	368	Total extraction was less than annual extraction right.
	2012-13	3570	3279	0	291	Total extraction was less than annual extraction right.
		STORED WATER CREDITS (as of Oct. 1, 2014) =		920		

Note: Stored water credits in Table 2-11C are calculated by summing the "Annual Volume of Accrued Credits" column and subtracting the sum of the "Credits Consumed due to Previous Year Overpumpage" column.

3. WATER QUALITY, TREATMENT, AND REMEDIAL INVESTIGATION ACTIVITIES

3. WATER QUALITY, TREATMENT, AND REMEDIAL INVESTIGATION ACTIVITIES

3.1 Water Quality

Imported Water

1. *LOS ANGELES AQUEDUCT* water has a sodium bicarbonate character and is the highest quality water available to ULARA. Total Dissolved Solids (TDS) concentration in this water source typically averages about 210 milligrams per liter [mg/L; equivalent to parts per million, ppm]. The highest TDS value on record for Aqueduct water was 320 mg/L and this occurred in April, 1946. The average TDS concentration for Fiscal Year 2012-2013 was 224 mg/L.

2. *COLORADO RIVER* water is predominantly sodium-calcium sulfate in character, but this water supply changes to a sodium sulfate character after it has been treated to reduce total hardness. Samples taken at the MWD Burbank Turnout between 1941 and 1975 showed that TDS concentrations ranged from a high of 875 mg/L in August 1955, to a low of 625 mg/L in April 1959. The average TDS concentration over this 34-year period was approximately 740 mg/L. Tests conducted of Colorado River water at the Eagle Rock Reservoir showed an average TDS concentration of 548 mg/L for Fiscal Year 2011-12.

3. *NORTHERN CALIFORNIA* Water (delivered via the State Water Project) is sodium bicarbonate-sulfate in character. It generally contains lower concentrations of TDS and is softer than either local groundwater or imported Colorado River water. Since the time that State Project water was first imported to southern California in 1972, the TDS concentrations of this water have ranged from a high of 410 mg/L to a low of 247 mg/L. Laboratory tests of this water conducted at the Joseph Jensen Filtration Plant showed an average TDS concentration of 290 mg/L during Fiscal Year 2012-13.

4. *COLORADO RIVER/NORTHERN CALIFORNIA* waters were first blended at the Weymouth Plant beginning in mid-1975. Blending ratios have varied over time, and laboratory tests conducted at the Weymouth Plant after treatment and blending processes during Fiscal Year 2012-13 showed an average TDS concentration of 530 mg/L.

Surface Water

Surface runoff contains salts dissolved from sediments and rocks in the tributary areas of ULARA and is considered to generally display a sodium-calcium to sulfate-bicarbonate water character. Laboratory testing of water samples collected in September 1995 from flows in the Los Angeles River at the Arroyo Seco showed a TDS concentration of 666 mg/L and a total hardness (TH) of 270 mg/L. These values also reflect the inclusion of rising groundwater in the Los Angeles River between Los Feliz Blvd and Gage F-57C-R.

Chlorides in Surface Water

In 1997 the Los Angeles Regional Water Quality Control Board (RWQCB-LA) adopted Resolution No. 97-02 in order to help develop a long-term solution to the chloride compliance problems stemming from elevated concentrations of chloride along the Los Angeles River in the SFB. These increased chloride concentrations were likely caused by drought conditions and the use of water softeners in water imported into the Los Angeles region. Water Quality Objectives for chloride within the reach of the Los Angeles River between Sepulveda Flood Control Basin and Figueroa Street (including Burbank Western Channel only) have been raised from 100 mg/L to 190 mg/L; chloride concentrations are reported in Appendix D.

Nitrogen in Surface Water

As part of a Total Maximum Daily Load (TMDL) program, the RWQCB-LA ordered the cities of Burbank and Los Angeles to determine the source of nitrogen in the Los Angeles River Narrows. The resulting studies, which included laboratory testing for nitrogen from rising groundwater into the Los Angeles River, were completed in 2007 by an outside consultant. The 2007 report concluded that nitrogen levels present in groundwater rising into the Los Angeles River were well below the target loadings for the receiving water and may be considered a *de minimus* source with no loading allocation necessary.

Groundwater

Total hardness in the groundwater in ULARA is considered to be moderately hard to very hard. The character of groundwater from the major water-bearing formations is of two general types, each reflecting the composition of the sediments and the surface runoff in each area. In the western part of the San Fernando Basin, the groundwater is generally calcium sulfate-bicarbonate in character, whereas in the eastern part of SFB (and also the Sylmar and Verdugo basins), groundwater generally displays a calcium bicarbonate character.

The overall quality of the groundwater in ULARA is generally within the recommended limits of the California Title 22 Drinking Water Standards, except for:

- areas in the eastern SFB which display high concentrations of trichloroethylene (TCE), perchloroethylene (PCE), hexavalent chromium, nitrate as NO_3, and 1,4-dioxane;
- areas in the western portion of the SFB which tend to have high concentrations of naturally-occurring sulfate and TDS;
- areas within the Verdugo Basin that have shown elevated concentrations of a gasoline additive, methyl-tertiary-butyl-ether (MTBE), and nitrate as NO_3, and
- areas within the Sylmar Basin that have elevated concentrations of nitrate as NO_3 and certain VOCs.

In each area, the pumped groundwater is being treated or blended to meet State Drinking Water Standards, or the impacted wells in each specific basin have been temporarily removed from active service.

A summary of the TDS concentrations and the general mineral analyses of imported water, surface water and groundwater are contained in Appendix D.

3.2 Groundwater Quality Management Plan

A report titled "Groundwater Quality Management Plan - San Fernando Valley Basins" was issued in July 1983, in part to protect and improve the quality of stored water within the ULARA groundwater basins. Special emphasis on the overall management of these basins in that report was placed on monitoring and removing the VOCs (TCE and PCE), along with hexavalent chromium; these contaminants have been encountered in the local groundwater. Table 3-1 summarizes the number of ULARA wells that are currently considered to be contaminated; also shown are the concentrations of TCE and PCE that are above their common Primary MCL of 5 micrograms per liter (µg/L; where 1 µg/L is equivalent to one part per billion, ppb).

TABLE 3-1: NUMBER OF WELLS IN THE ULARA WELLFIELDS EXCEEDING STATE MCL FOR TCE AND PCE – 2012-13 WATER YEAR

	Number of Wells													
	City of Los Angeles[3]									Sub-	Others[2]			Grand
Wellfield	**NH**	**RT**	**P**	**HW**	**E**	**W**	**TJ**	**V**	**AE**	**Total**	**B**	**G**	**C**	**Total**
Total No. of Wells[2]	**14**	**15**	**2**	**0**	**2**	**3**	**12**	**2**	**7**	**57**	**14**	**14**	**12**	**97**
No. of Active Wells	**14**	**15**	**2**	**4**	**2**	**3**	**12**	**2**	**7**	**61**	**8**	**14**	**12**	**95**
No. of Wells Sampled	**12**	**15**	**2**	**0**	**2**	**3**	**11**	**1**	**7**	**53**	**8**	**14**	**12**	**87**
Number of Wells Exceeding Maximum Contaminant Level[1]														
TCE Levels ppb														
5-20	2	4	1	-	0	0	6	0	4	**17**	1	0	0	**18**
20-100	1	3	0	-	1	0	2	0	1	**8**	5	2	0	**15**
>100	0	0	0	-	0	0	0	0	2	**2**	2	5	0	**9**
Total	3	7	1	-	1	0	8	0	7	**27**	8	7	0	**42**
PCE Levels ppb														
5-20	2	0	1	-	0	0	1	0	4	**8**	0	2	0	**10**
20-100	0	0	0	-	0	0	2	0	1	**3**	2	2	0	**7**
>100	0	0	0	-	0	0	0	0	0	**0**	6	2	0	**8**
Total	2	0	1	-	0	0	3	0	5	**11**	8	6	0	**25**

1. Wells were included in these categories based upon the maximum concentrations of TCE and PCE measured during the 2012-13 Water Year.
2. Includes active, inactive, and standby wells
3. Wellfields:

NH	-	North Hollywood	V	-	Verdugo
P	-	Pollock	AE	-	LADWP Aeration Tower Wells
HW	-	Headworks	B	-	City of Burbank
E	-	Erwin	G	-	City of Glendale
W	-	Whitnall	C	-	Crescenta Valley Water District
RT		Rinaldi Toluca			
TJ	-	Tujunga			

3.3 Underground Tanks, Sumps, and Pipelines

The City of Los Angeles Fire Department (LAFD) continues to implement the State-mandated Underground Storage Tank (UST) Program and is actively conducting a program to bring the large number of underground tanks in the San Fernando Valley into compliance with current law. During Water Year 2012-13, a total of 30 sites were remediated under the direction of the

LAFD. Currently, the Environmental Unit of the LAFD is monitoring the remediation of 38 other sites.

The main focus of the LAFD UST Program in the Upper Los Angeles River Area (ULARA) has been the monitoring and removal of gasoline, diesel, and their related constituents from the soil to help prevent contamination of the underlying groundwater. If a site investigation indicates contamination of the underlying groundwater, then the site is referred to the RWQCB-LA for further action. During Water Year 2012-13, 26 sites have been reassigned from the Underground Tank Plan Check Unit to the RWQCB-LA in the City of Los Angeles.

3.4 Private Sewage Disposal Systems (PSDS)

On September 17, 1985, in order to reduce the potential for groundwater contamination from septic tanks, the City of Los Angeles enacted Ordinance No. 160388, Los Angeles Municipal Code Section 64.26 [LAMC Section 64.26]. This ordinance is entitled “Mandatory Abandonment of Private Sewage Disposal Systems (PSDS).”

LAMC Section 64.26, requires all owners of industrial, commercial, and multiple dwelling residential [five or more units] properties, to connect to the public sewer, when the sewer becomes available, and discontinue use of their PSDS within one year of the date of the issuance of a "Notice to Connect" by the City of Los Angeles. In addition, LAMC Section 64.26 requires the Director of the Bureau of Sanitation (Director) to issue a "Reminder Notice" and a "Final Notice to Connect" to the owner of the property four (4) months and one (1) month, respectively, prior to the compliance deadlines. LAMC Section 64.26 further requires the Director to take the following actions whenever a property is found to be in violation of the Code requirements:

a) Request the City's Department of Water and Power to discontinue water service to the subject property,
b) Request the Superintendent of Buildings to order any building(s) on the subject property to be vacated; and,
c) Request the City Attorney to take the necessary legal action(s) against the property owner.

In June 2005, the Wastewater Engineering Services Division (WESD) identified a list of approximately 840 properties owning and operating a PSDS that had access to a City sewer. These properties were subsequently referred to the Bureau’s Industrial Waste Management

Division (IWMD) for further investigation and to determine applicability of the provisions of the LAMC 64.26 to these properties.

IWMD staff conducted its own investigation before requiring the referred properties to be connected to the City sewer. Investigations included contacting the property owner or tenant, site visits and if necessary, “dye tests” to ensure that each of the properties in question did own and operated a PSDS; and, further verify that the property had access to a City sewer.

Following IWMD investigations, of the 840 properties referred, 413 were found to fit the criteria such as being an industrial, a commercial or a multiple dwelling residential building [with five or more units] subject to the LAMC 64.26 provisions. Of the 413 properties subject to LAMC 64.26, 234 properties were found to be already connected to the City sewer, leaving 179 properties not connected to the City sewer. In 2012, IWMD received referrals from the Financial Management Division (FMD) and WESD to investigate 25 properties owning and operating a PSDS that had access to a City sewer. In 2013, IWMD did not receive any referral from FMD and WESD.

As of October 2013, IWMD issued 204 “Notice to Connect to the City Sewer and Abandonment of the PSDS” (NTC) letters to those properties subject to LAMC 64.26. Of the 204 properties that were issued a NTC letter, 184 have already connected to the City sewer. Twenty (20) NTC letters were returned to IWMD for various reasons including change of business ownership, incorrect property owners, foreclosure of property, and refusal to accept the certified letter containing the NTC letter. These properties are being investigated further by IWMD.

3.5 Landfills

The Solid Waste Assessment Test (SWAT) reports for major SWAT Rank 1 to Rank 4 landfills in the Los Angeles area have all been completed and previously submitted to the RWQCB-LA for approval. The reports reviewed by the RWQCB-LA are listed in Table 3-2. As stipulated by Article 5 of Title 27, a follow-up sampling program under an Evaluation Monitoring Plan was required for certain landfills due to the presence of VOCs in the underlying groundwater. Further updates to the SWAT would be triggered by post-closure land use. Landfill locations in ULARA are shown on Plate 6.

Bradley Landfill closed in April 2007 and construction of its final cover was completed in the summer of 2010. Waste Management, Inc., the owner of that landfill, is currently operating a green waste composting facility at the site. Furthermore, several groundwater monitoring wells at this landfill are actively monitored for water levels and water quality data in conformance with the existing RWQCB-LA Monitoring and Reporting Program No. 6434 for this facility.

TABLE 3-2: LANDFILLS WITH SWAT INVESTIGATIONS

Name	Rank	Current Owner	Location	SWAT Report Completed	Final SWAT Submitted	Phase II SWAT Req.	Approved by RWQCB	Site Leak -1	Type of Emission -2	Further Monitoring
Open										
CalMat (Sun Valley #3)	2	CalMat Properties	Sun Valley District, NE of Glenoaks Blvd	Jul-88	Nov-90		Jun-92	N	Inert site	N,7
Scholl Canyon	1	City of Glendale	San Rafael Hills, 1 mile West of Rose Bowl	Jul-87	Apr-88		Aug-90	G	NHA (I/O)	3
Stough Park	2	City of Burbank	Bel Air Drive & Cambridge Drive	Jun-88	Dec-88		Apr-90	G	NHA Inert Site	3
Sunshine Cyn. LA City/LA County	2	Browning - Ferris Industries	SE Santa Susana Mtns W of Golden State Fwy	Jul-88	Jul-89		Apr-94		MSW	6
Closed										
Bradley East	2	WMDSC	SE of Sheldon St	Jun-87	Nov-90		Apr-92	G	NHA (I/O)	4, 8
Bradley West	1	WMDSC	Sun Valley, SE of Sheldon St.	Jun-87	Nov-90		Apr-92	G	NHA (I/O)	3
Bradley West Extension	3	WMDSC	Near Canyon Blvd & Sheldon St	Jul-88	Jul-89		Apr-92	G	MSW	3, 8
Branford	2	City of Los Angeles Bureau of Sanitation	Sun Valley District, NW of Tujunga Wash	Jul-88	Oct-90	X	Jun-92		MSW	4,7
Gregg Pit/Bentz	2	CalMat Properties	Between Pendleton St & Tujunga Ave	Jul-89	Jul-89		Feb-90	G	NHA	4
Hewitt Pit	2	CalMat Properties	North Hollywood District Hollywood Fwy, Laurel	Jun-88	Jul-89		May-91	G	NHB (I)	N
Lopez Canyon	2	City of Los Angeles Bureau of Sanitation	N of Hansen Dam near Lopez and Kagel Cyn	Jun-88	Jun-88	X				8
Newberry	3	Los Angeles (LA By-Products Co.)	N of Strathern St, Tujunga Ave	Jun-88	Jul-89		Sep-89	G	NHB (I/O)	4
Pendleton St.	4	City of Los Angeles Bureau of Sanitation	Sun Valley, Pendelton St & Glenoaks Blvd	Jul-90	May-91		Jun-92	N	Inert Site	5
Penrose	2	Los Angeles (LA By-Products Co.)	N of Strathern St, Tujunga Ave	Jun-88	Jul-89		Sep-89	G	NHB (I/O)	4
Scholl Canyon	2	City of Glendale	San Rafael Hills, 1 mile West of Rose Bowl	Jul-87	Aug-90		Dec-93	G	NHA	5
Sheldon-Arleta	1	City of Los Angeles Bureau of Sanitation	Sun Valley District near Hollywood & Golden State Fwys	May-87	May-87		Feb-90	G	MSW	4,7
Sunshine Cyn. LA City	2	Browning - Ferris Industries	SE Santa Susana Mtns W of Golden State Fwy	Jul-88	Jul-89		Apr-94	G	MSW	6
Toyon Canyon	2	City of Los Angeles Bureau of Sanitation	Griffith Park	Jun-88	Mar-89		Apr-91	L	NHA (I/O MSW)	3
Tuxford Pit	2	Aadlin Bros. (LA By-Products Co.)	Sun Valley District, SW of Golden State Fwy & Tujunga Ave	Jun-88	Dec-90		Jun-92		MSW	4, 8, 9
Incomplete										
Strathern		Never completed. Application 12/88.	Strathern St. & Tujunga Ave							10

1. G – Gas, L – Liquid.
2. MSW – Municipal Solid Waste
   NHA - Non-Hazardous but above state drinking water regulatory levels
   NHB - Non-Hazardous but below state drinking water regulatory levels
   I – Inorganic, O – Organic; N-No, Y-Yes
3. Under Title 27 Corrective Action Program (CAP), after completion of EMP.
4. Closed landfills with groundwater monitoring required under Title 27. Monitoring results are submitted to the LARWQCB periodically.
5. Subject to SWAT requirements. Further monitoring may be required under Title 27.
6. All open landfills are required to have groundwater monitoring under Title 27. Monitoring results are submitted to the LARWQCB quarterly or semi-annually.
7. Semi-annual groundwater monitoring.
8. Groundwater contamination Evaluation Monitoring Program (EMP) required under Title 27.
9. USEPA involved in evaluation.
10. Under permit as Inert Landfill.

3.6 San Fernando Valley Remedial Investigation Activities

A remedial investigation (RI) was initiated in July 1987 by the USEPA to characterize groundwater conditions and groundwater quality in the San Fernando and the Verdugo groundwater basins due to the presence of TCE and PCE contamination in the soils and/or groundwater. The LADWP was selected by the USEPA to serve as the lead agency in conducting the RI and they entered into a cooperative agreement that has provided over $22 million in federal funding to LADWP beginning July 1987. In August 1987, the LADWP selected James M. Montgomery, Consulting Engineers (JMM), to serve as its original consultant to perform various RI tasks.

The resulting JMM report, "Remedial Investigation of Groundwater Contamination in the San Fernando Valley," (December 1992) is a comprehensive, five-volume report that presented the findings and hydrogeologic characterization of the San Fernando and Verdugo basins with regard to their geologic and hydrogeologic conditions, and to the nature and possible extent of contamination known at that time. The RI report also provided: a description, along with the documentation, of the SFB Groundwater Flow Model; a summary of the RI field investigation activities; and an evaluation of potential risks to human health and the environment.

The existing SFB Groundwater Flow Model was developed as a part of the San Fernando Valley RI and is a comprehensive, three-dimensional, regional-scale model, which was developed using the MODFLOW (version 2005) software package. A three-dimensional mass transport model has also been developed for the SFB. The model has been utilized for various groundwater projects to help analyze the storage and physical characteristics of groundwater in the SFB. The main purposes for the development of the basin-wide model include:

- Helping to forecast the potential consequences of changes in groundwater management in the SFB (pumping and recharge regimes) by the major water purveyors.
- Assessing the potential for contaminated groundwater to impact production and extraction wells in SFB.
- Aiding in predicting groundwater elevation contours for projected basin-wide withdrawal and recharge (i.e., as a planning tool for LADWP and the Watermaster).

USEPA's existing consultant, CH2M HILL, continues to periodically sample the 87 groundwater monitoring wells that were originally installed as part of the RI. CH2M HILL also obtains groundwater quality and groundwater elevation data from the various municipalities and from the various facilities in the San Fernando Valley to update the SFV Basinwide database in electronic format. CH2M HILL utilizes the data to produce contaminant plume maps for the USEPA.

The RI Report and the semi-annual sampling reports are available for public review at the Superfund Primary Information Repositories, which are located in the following local libraries: City of Glendale; City of Burbank; LADWP; California State University-Northridge; and the University of California at Los Angeles. Data are also available from the USEPA Region 9 Superfund website (http://www.epa.gov/region9/superfund/superfundsites.html).

The LADWP also maintains a current SFB database for use with the SFB groundwater flow model and continues to generate simulated groundwater elevation contour maps and contaminant plume maps for the SFB. CH2M HILL continues to provide updated groundwater quality data for incorporation into the LADWP database. The Watermaster has established a program to collect and scan geologic logs, driller's logs and electric logs of all groundwater monitoring wells constructed in ULARA, and also to collect and scan the electric logs of the numerous wildcat and producing oil wells drilled in the San Fernando Valley over the years. These scanned documents are to be eventually incorporated into a new electronic database for subsurface data within the ULARA groundwater basins.

3.7 Water Treatment

USEPA Operable Units

The USEPA is proceeding with enforcement actions against Potentially Responsible Parties (PRPs) as part of their overall, long-term groundwater remediation activities in the SFB. Below is a brief summary of the various Operable Units (OUs) in SFB:

1. *North Hollywood Operable Unit (NHOU)* - NHOU construction was funded by the USEPA, CDPH, and LADWP; operations and maintenance activities of the constructed facilities in the NHOU are funded by the USEPA and LADWP.

   LADWP continues to operate some of its water wells in the NHOU under the direction of the USEPA pursuant to the Cooperative Agreement between these two agencies. Whereas the facility was designed to contain and remediate highly- concentrated VOC plumes, the remedy has failed to achieve this primary objective. High concentrations of VOC contaminants have been encountered in other LADWP water-supply wells, forcing their closure. Additional contaminants have also emerged, such as hexavalent chromium and 1,4-dioxane which are not removed by the existing air stripping process at the NHOU.

The nearby hexavalent chromium plume has reached the NHOU facility. In the fall of 2006, chromium levels began to increase in NHOU Aeration Well No. 2, forcing the closure of this OU extraction well. Suspected of being a major contributor to this chromium plume is the former Honeywell site in North Hollywood. Under a Cleanup and Abatement Order of the RWQCB-LA, Honeywell resumed operating NHE-2 in 2009 to contain the plume while discharging the highly contaminated effluent to the sanitary sewer. Unfortunately this approach did not provide effective containment of the hexavalent chromium plume. In the fourth quarter of 2012, the concentrations of hexavalent chromium in NHE-3 rose and then exceeded the 50 ppb (50 µg/L) for total chromium established by DDW. This has now forced the closure of NHE-3 and requires further attention by the RWQCB-LA and the other state and federal regulators on this growing problem. Steps taken by Honeywell to address the hexavalent chromium problem include submitting a remedial action plan to the RWQCB-LA and constructing additional groundwater monitoring wells to further characterize the water quality and hydrogeology in the eastern area of the SFB. A total of 13,232 AF of groundwater was treated in 2012-13.

The 15-year EPA Consent Decree for the NHOU expired at the end of 2004. USEPA conducted a Focused Feasibility Study and issued its Record of Decision (ROD) for the NHOU Second Interim Remedy (NHOU2IR) in September 2009. This new remedy will replace the existing facility by perhaps modifying certain existing OU extraction wells, adding new OU extraction wells, and providing groundwater remediation facilities that will treat the VOC's along with other emerging contaminants of concern, including hexavalent chromium and 1,4-dioxane. The ROD also calls for construction of additional monitoring wells to further characterize the water quality and hydrogeology of the area. In January 2014, the ROD was amended to include the option of re-injecting the treated water back into the local aquifer system(s).

It appears that the current remedy needs to be replaced on an expedited basis with the NHOU2IR. The new remedy should provide extractions at a substantially higher flow rate to help ensure plume containment and to allow for extractions from deeper regions of the aquifer systems to address the entire vertical extent of the contaminant mass. This, in combination with additional strategically-located extraction wells, should broaden the containment area and help to prevent the continuing escape of contaminants to other nearby LADWP wellfields.

2. *Burbank Operable Unit (BOU)* - The BOU, funded by Lockheed-Martin under a USEPA Consent Decree and operated by the City of Burbank, uses air stripping and liquid-phase GAC to remove VOCs from groundwater (local groundwater also contains elevated concentrations of nitrate and chromium), and then blends the treated water with imported water from the MWD for delivery within the City of Burbank.

   Burbank assumed operation and maintenance of the BOU in 2001. Initially, the facility had difficulty in sustaining operation at the designed treatment rate of 9,000 gpm. Burbank, Lockheed-Martin, and the USEPA cooperated in efforts to determine the cause(s) of the reduced production. Over the past few years, several process enhancements and repairs have been made to the liquid-phase GAC vessels and to the vapor-phase GAC vessels at the factory.

   As part of the requirement to close the first consent decree, USEPA required the City of Burbank to demonstrate that the BOU would operate at its design capacity. In the summer of 2010, Burbank successfully completed a 60-day performance test at the BOU by pumping the wells at a combined rate of 9000 gpm. To ensure the effectiveness of the remedy EPA monitored drawdown and the extent of the cone of depression by conducting a multi-well pumping test for 30 days during the demonstration time frame. EPA used water levels and pumping rate data monitored during this pumping test to update its values for the hydraulic conductivity, transmissivity, and storativity of the aquifers within the BOU area for the Basinwide Groundwater Model.

   The City of Burbank is also concerned about hexavalent chromium in groundwater produced at the BOU and has been blending its pumped groundwater with imported water to keep the concentration of total chromium at or below the City's goal of 5 µg/L; the BOU treatment facility was not designed to treat chromium.

A total of 11,387 AF of contaminated groundwater was treated by the BOU in the 2012-13 Water Year, an increase of 1,394 AF over the prior year's volume of groundwater treated by this facility.

3. *Glendale North and South Operable Units (now referred to as one single "GOU")* – Construction of the GOU was completed and this allowed for treated water to be available for delivery in August 2000. The system includes four Glendale North OU extraction wells (with a total pumping capacity of 3,300 gpm) and four Glendale South OU extraction wells (with a total capacity of 1,700 gpm). The treatment process uses aeration and liquid-phase GAC to treat VOC-contaminated groundwater and then blends the treated water with imported MWD water at the Grandview Pump Station. A total of 6,969 AF of contaminated groundwater was treated in 2012-13.

4. *Glendale Chromium Operable Unit* – Established in 2007, the GCOU was created to help characterize the extent of chromium contamination in groundwater in the Glendale area, and to determine appropriate remedial action. The USEPA is working with the California Department of Toxic Substances Control and the RWQCB-LA to identify and clean up sources of chromium contamination. Remedial investigation of chromium contamination in groundwater in the GCOU began in 2011. During 2012, field work began to construct as many as 30 new groundwater monitoring wells to help evaluate the location and extent of the chromium contamination in the area.

Other Treatment Facilities

1. *Verdugo Park Water Treatment Plant (VPWTP)* – Glendale's VPWTP serves as a filtration and disinfection facility. A total of 316 AF of groundwater was treated in the 2012-13 Water Year.

2. *Glenwood Nitrate Water Treatment Plant* - CVWD's Glenwood Nitrate Water Treatment Plant, which uses an ion-exchange process for nitrate removal, treated 588 AF in the 2012-13 Water Year.

3. *Pollock Wells Treatment Plant* (PWTP) – The 3,000-gpm PWTP was dedicated on March 17, 1999. This treatment plant uses four liquid phase GAC vessels to remove VOCs from Pollock Well Nos. 4 and. 6. The operation of these production wells helps reduce the amount of groundwater lost to the Los Angeles River by reducing the amount of groundwater rising

into the unlined reaches of the drainage channel. To respond to the emergence of hexavalent chromium near the Pollock Wellfield, LADWP will construct groundwater monitoring wells in the nearby areas to help characterize the horizontal and vertical extent of this and other contaminants of concern. Findings of this study may warrant an urgent response to augment the current treatment systems to provide additional technology that will remove hexavalent chromium from the Pollock Wells groundwater. A total of 333 AF of groundwater was treated in 2012-13.

4. *BURBANK GAC TREATMENT PLANT* - The City of Burbank GAC system (Lake St. wells) was shut down in March 2001 due to the elevated concentrations of hexavalent chromium in the groundwater and remained out of service through the 2007-08 Water Year. The plant saw limited use for non-potable purposes in Water Year 2008-09, whereas in Water Years 2009-10, 2010-11, 2011-12, and 2012-13 the plant was used only when necessary to obtain water quality data from the wells. No water was treated at the Lake Street GAC during the 2012-13 Water Year. The City of Burbank has a goal of accepting a maximum of 5 µg/L of total chromium after blending for distribution within its water system. If the plant is returned to service, production may be considered as part of the average pumping goal of 9,000 gpm for the Burbank OU.

5. *TEMPORARY TUJUNGA WELLFIELD TREATMENT STUDY PROJECT* – This project, which restored 12,000 AFY of pumping capacity that had become unavailable due to water quality constraints, provided for treatment of the two most contaminated production wells at the Tujunga wellfield with liquid-phase granular activated carbon. Each production well has five pairs (trains) of granular activated carbon treatment vessels. Approximately one-fifth of the produced groundwater flows through the first vessel (lead vessel) and then the second vessel (lag vessel) of each train. The treatment process removes VOCs like TCE, PCE, carbon tetrachloride, and 1,1 dichloroethene. Operational testing began in November 2009 and the CDPH permit for conveying treated groundwater into the distribution system was issued in May 2010. A total of approximately 11,000 AF of groundwater was treated by this project during the recent water year.

3.8 Groundwater Quality Investigations

There are numerous ongoing groundwater quality investigations in ULARA, particularly in the SFB. Some of the major sites and related activities are briefly summarized below. The reader can obtain current information and more details for the sites mentioned below, which are regulated by the RCQCB-LA, via that agency's Geotracker website.

http://geotracker.waterboards.ca.gov/

Boeing/Rocketdyne Santa Susana Field Lab, Simi Hills

This 2,850-acre former rocket engine and nuclear research facility, which was operated until the 1980s, is located in the hills above the western end of the San Fernando Valley. As a result of past site activities/operations, soil, bedrock and groundwater became contaminated; key constituents of concern include VOCs, perchlorate, and radionuclides. A large number of groundwater monitoring wells have been constructed and these are monitored for water levels, and groundwater samples from these wells are collected and tested for key water quality constituents on a regular basis. Contaminated soil and groundwater are also being remediated at select locations throughout the 2,850-acre site. Soil and groundwater characterization efforts are ongoing throughout the entire site, along with treatment of surface water runoff. Treatability testing for the In-Situ Chemical Oxidation (ISCO) for the treatment of VOCs in bedrock is ongoing as well.

For more details regarding the Santa Susana Field Lab, visit the website of the RWQCB-LA. The current contact at the RWQCB is Mr. Peter Raftery.

CVWD-MTBE Investigation

In February 2004, MTBE was detected in CVWD Well No. 5 during the annual VOC water quality sampling program of all CVWD active water-supply wells. MTBE is a gasoline additive that was used from 1990 to 2003; gasoline containing MTBE has reportedly leaked from underground storage tanks and over time, it has contaminated local soils and groundwater in portions of the Verdugo Basin.

For more information regarding this MTBE contamination problem, the reader may contact the RWQCB-LA; reportedly, Mr. Magdy Baiady, listed on the RWQCB website, is the main contact at the Board office for this site. Mr. David Gould, District Engineer, CVWD, is also very knowledgeable of the contamination problem and the results of recent litigation in Verdugo Basin involving this and other gasoline-related contaminants.

DriLube, 711 W. Broadway and 718 W. Wilson, Glendale

DriLube Company, a plating facility located in Glendale, was initially issued a Cleanup and Abatement Order (CAO) by the RWQCB-LA in 2002. DriLube was named a Responsible Party by the USEPA as a source responsible for discharging contaminants from its site into the groundwater within the Glendale South Operable Unit. The results of subsurface investigations over time have detected chlorinated solvents, petroleum hydrocarbons, PCBs, and heavy metals (including chromium) within the underlying soils and groundwater to date.

Although previously considered to be a single site, the two reported addresses for the property have been separated for cleanup management purposes. USEPA, which previously managed the entire site, returned the 711 W. Broadway site back to the LARWQCB; this site has been determined to have no metals contamination, and is reportedly contaminated with VOCs only. Management of the 718 W. Wilson site remains within the purview of the USEPA due to chromium contamination; VOC contamination also exists at this site.

Based on information on the RWQCB-LA website, the key contact for additional information for this site is Ms. Jillian Ly.

PRC-DeSoto (formerly Courtaulds Aerospace), 5430 San Fernando Road, Glendale

The RWQCB-LA issued a Cleanup and Abatement order (CAO) to PRC-DeSoto (formerly Courtaulds Aerospace) in August 2002. This facility has been named a responsible party and was identified by USEPA as a source for releasing chlorinated organic solvents within the groundwater in the Glendale South Operable Unit; this facility is considered a PRP for the Glendale Operable Unit. Historically, the facility's principal industrial activities involved chemical formulation of adhesives and sealants used by the U.S. Department of Defense for various aerospace applications. Trichloroethane (1,1,1-TCA), dichloroethane (DCA), TCE, PCE, chromium, hexavalent chromium, and nickel have been found in soil and groundwater beneath the facility. Groundwater monitoring continues on a quarterly basis as part of the CAO.

Cleanup operations regarding chromium and VOCs in soil have been completed. Work toward closure of the site in regard to soils contamination will begin with the LARWQCB. Work regarding chromium contamination of the local groundwater will be transferred to the USEPA. PRC DeSoto has been identified as a PRP for the Chromium Operable Unit (CrOU).

Mr. Larry Moore of the RWQCB-LA is listed as the main contact at the Board office for more information regarding this site.

Excello Plating, 4057 Goodwin Ave., Los Angeles

The RWQCB-LA issued a CAO to Excello Plating in June, 2003, and was revised and re-issued in June, 2005. The facility's owners were identified under CERCLA as having responsibility for releasing VOCs, hexavalent chromium, nickel, cadmium, zinc and lead into the subsurface. The purpose of this CAO was to ensure that Excello Plating completes the onsite and offsite assessment to help delineate the lateral and vertical extent of heavy metal contamination (specifically chromium) and, as necessary, undertake remediation. Additionally, the USEPA considers this site as a source of the contaminants that impact the GOU.

Updates on activities and cleanup operations at this Excello facility are available via the RWQCB-LA website; Mr. Larry Moore is listed as the key contact at the Board office.

B.F. Goodrich (formerly Menasco/Coltec Industries, Inc.) 100 E. Cedar Ave., Burbank

The RWQCB-LA issued a CAO to Coltec Industries, Inc in July 2002. This facility was identified as a Responsible Party by the USEPA as a source of discharging contaminants to the groundwater, and affecting the original Glendale North Operable Unit (i.e., the GNOU, now a part of the GOU). Additionally, the USEPA considers this site to be a Principal Responsible Party for the Glendale Chromium Operable Unit. The facility's former industrial activities involved machining, manufacturing, metal plating, and anodizing of parts and equipment used by the U.S. Department of Defense for various aerospace applications. Volatile organic compounds including TCE, PCE, 1,1-dichloroethylene (1,1-DCE) 1,1,1-trichloroethane (1,1,1 TCA) and hexavalent chromium have been detected in the soil and in the groundwater underlying the site. Groundwater monitoring wells are being sampled on a quarterly basis. A risk assessment report was previously prepared and the results have been approved by OEHHA and the RWQCB-LA; groundwater monitoring continues on a semi-annual basis. Currently the soil clean-up operations are managed by the LARWQCB. Once complete, the site will be turned over to the USEPA for groundwater remediation purposes. Specifically, this site has been identified as a PRP for chromium contamination.

For more information on this B.F. Goodrich site, the reader may contact Clarita Qudilla at the RWQCB-LA.

ITT/Home Depot, 1200 S. Flower St., Burbank

A few years ago, Home Depot completed construction of its large store and parking lot on the site of this former ITT Aerospace Controls property. By agreement between Home Depot and ITT, Home Depot is responsible for the soil assessment and remediation from ground surface down to the depth of an underlying continuous clay layer. The contamination beneath the clay layer, which includes the saturated zone (i.e., groundwater), has been the responsibility of ITT

Aerospace Controls, a former parts manufacturer and metal finisher and plater. Groundwater contamination at the site consists of VOCs, petroleum hydrocarbons, nickel, and hexavalent chromium. In 2004, Home Depot built a slurry wall around the site to help prevent lateral migration of groundwater contamination. A naturally occurring low-permeability zone located 50 feet below ground surface has been expected to reduce vertical migration of the contaminants. ITT is responsible for cleanup of the area below the Home Depot's slurry wall barrier. Groundwater monitoring continues on a semi-annual basis; the USEPA considers this site to be a source of contamination affecting the GOU.

For more information concerning this ITT site, Mr. Larry Moore is listed as the key contact at the RWQCB office in Los Angeles.

Honeywell (formerly Allied Signal/Bendix) 11600 Sherman Way, North Hollywood

Honeywell was issued a Cleanup and Abatement Order (CAO) on February 21, 2003 and an amended CAO followed in September 2004. The facility was directed to prepare a work plan for additional onsite and offsite subsurface assessment of soil and groundwater. This work plan was submitted and approved, and the field work has been completed. A final report has been submitted and is presently undergoing review by the RWQCB-LA. The facility prepared and submitted a Remedial Action Plan (RAP) for in-situ chromium remediation. The RAP has been approved and is being implemented in conjunction with the facility's General WDR permit. Construction of additional offsite groundwater monitoring wells was approved by the USEPA and RWQCB-LA, and these new monitoring wells have been constructed.

The facility was required to submit a wellhead treatment work plan for treating hexavalent chromium and 1,4-dioxane at LADWP's extraction well NHE-2. This well was shut down by the LADWP because elevated concentrations of total chromium (Cr) were detected in the pumped groundwater. Honeywell's work plan was approved as well as their short-term remediation plan. Recently, Honeywell submitted their long-term remediation plan for the NHE-02 wellhead treatment to the RWQCB-LA for their review and comment/approval. However, the long-term remediation plan was not approved or implemented, because Honeywell entered into negotiations with the USEPA, LADWP, and CDPH regarding the proposed remediation approach and its association with the USEPA's NHOU interim remedy approach. In January 2013, a second NHOU extraction well (NHE-3) was shut down by the LADWP because of elevated concentrations of total Cr and hexavalent chromium.

In September 2008, Honeywell began pumping NHE-2 and processing the groundwater through a wellhead treatment system to remove VOCs before discharging the effluent to the sanitary sewer system. Because the VOC and other contaminant concentrations were below the limits identified in the sewer discharge permit, Honeywell was allowed to remove the wellhead treatment system, and to discharge the effluent from well NHE-2 directly into the sanitary sewer. Honeywell is currently working with LADWP and CDPH to comply with CDPH Policy Memorandum 97-005 by preparing a Source Water Assessment and Treatment Report. This would recommend installation of a wellhead treatment system to remove VOCs and chromium such that the treated effluent is Title 22 compliant and the groundwater can then be distributed by LADWP.

Honeywell utilized its consultant (MWH Global, Inc.) in the past 2 to 3 years to site, design and construct 31 groundwater monitoring wells to further characterize the water quality and hydrogeology in the eastern portion of the SFB.

Mr. Larry Moore of the RWQCB-LA Region is listed on the Board's website as the contact person for additional information for this site.

Price Pfister site, 13500 Paxton St, Pacoima, California

The Price Pfister site was previously used for manufacturing plumbing fixtures involving casting, machining, and chrome plating. Since 2002, the RWQCB-LA has been the lead agency overseeing the investigation, monitoring and remediation of the soil and groundwater contamination at the former Price Pfister, Inc. site, located at 13500 Paxton Street. Current soil remediation activities include a soil vapor extraction system, and removal of free hydrocarbon products. This Brownfield site was redeveloped in 2010 into a Costco, Lowe's, and a Best Buy shopping center.

Hexavalent chromium concentration of 8,300 µg/L was detected in the groundwater beneath the Price Pfister site on August 19, 2010. During the same period, 1,4-dioxane levels were at/near 85 µg/L (950 µg/L of 1,4-dioxane was detected in August 2007). The RWQCB-LA issued a letter dated January 17, 2014 commenting on and conditionally approving Price Pfister's Revised Preliminary Design Report/Pre-Design Investigation Workplan of Hydraulic Control System dated December 16, 2013. The letter also approved a time extension to submit a report on its 1,4-Dioxane Microcosm Study from January 17, 2014 to July 31, 2014. The onsite and offsite hexavalent chromium concentrations reported in the 4th Quarter 2013 General WDR Monitoring Report dated January 2014, were 1,610 and 56.9 µg/L, respectively. The onsite and offsite 1,4-dioxane concentrations reported in the 3rd Quarter 2013 Groundwater Monitoring Report dated October 2013, were 7.2 and <1.0 µg/L, respectively.

Additional information for this former Price Pfister site may be obtained from the RWQCB-LA website; Mr. Mohammad Zaidi is listed as the key Board contact.

General Electric (formerly Pacific Airmotive), 2940 and 2960 North Hollywood Way, Burbank

The site was formerly occupied by Pacific Airmotive (PAC) and is currently owned by General Electric. Activities conducted by PAC at the site included testing, maintenance, repair and overhaul of commercial and military aircraft engines, which resulted in VOC impacts to soil and groundwater. Contaminants at the site include PCE, TCE and 1,1,1-TCA. A soil vapor extraction system has been removing PCE soil vapor from underneath an adjacent property (2960 No. Hollywood Way). Confirmation sampling has not yet been completed at this site. The Regional Board is overseeing the soil cleanup of the site; the groundwater cleanup is overseen by the USEPA. As of September 2011, PAC water quality data are now included in the Lockheed-Martin semi-annual groundwater report for the BOU.

On the RWQCB-LA website, Ms. Gloria Pak is listed as the current contact for information concerning this site.

Raytheon (formerly Hughes Missile Systems Company), 8433 Fallbrook Avenue, Canoga Park

Contaminants at the site reportedly included 1,1-DCE, TCE, PCE, 2,4,6 trichloroanisole (TCA), benzene, toluene, ethyl benzene and zylene (BTEX), and 1,1-dichloroethane (DCA). Raytheon has expanded the Enhanced In-Situ Bioremediation program to continue treating the contaminants in the shallow groundwater beneath the site.

Additional information is available for this property via Ms. Emily Wong, the current contact person listed on the RWQCB-LA website.

3M Pharmaceuticals (formerly Riker Lab), 19901 Nordhoff St, Northridge

Contaminants at this site include chloroform, 1,2-DCE, 1,2-DCA, and Freon 11. A groundwater treatment system has been in operation since 1997. At least 15 groundwater extraction wells and two air-stripping towers in series capable of treating 60,000 gallons per day have been in operation at the site. In March 2005, 3M and its consultant, Weston Solutions, Inc. completed installation of a system to re-use the discharged portion of the treated groundwater for landscape irrigation. All of the treated groundwater is now beneficially used onsite for the cooling towers and landscape irrigation. Contaminants appear to be hydraulically controlled by the extraction wells and contaminant concentrations in groundwater are generally declining.

More current and detailed information regarding this 3M Pharmaceuticals site is available via the RWQCB-LA website and its current contact person, Mr. Peter Raftery.

Micro Matics USA Inc, 19791 Bahama St., Northridge

The soil and groundwater beneath a portion of the Micro Matics property have been contaminated with PCE and 1,1,1-TCA. One or more contaminant plumes have moved offsite to the west beneath a portion of the former 3M property, and also to the south beneath Bahama Street. The 3M parcel contaminated by Micro Matics was sold to a developer, Nordhoff Industrial, in December 2004.

Soil vapor extraction (SVE) was initiated in 2006 to remediate the VOC-impacted soil beneath the site and was continued for at least 29 months. Soil closure was requested in 2009 from the LARWQCB.

Interim groundwater remediation included pump and treat activities and injection of the hydrogen-donating compound (HRCTM) between 1999 and 2005. In October 2007, a containment treatment line using ozone gas was operating on the north side of Nordhoff Street. In April 2009, a full-scale groundwater treatment system using ozone gas began operation. The full-scale system includes numerous ozone sparge points in the source area, and several treatment lines downgradient of the source area. Groundwater treatment continues using an expanded ozone gas injection system. Contaminant concentrations appear to be declining both onsite and offsite.

More current and detailed information for this site may be obtained via Mr. Peter Raftery, the contact person listed on the website of the RWQCB-LA.

Tesoro Petroleum (former Fast Fuel, 11051 Victory Blvd., N. Hollywood)

Tesoro Petroleum was the owner of a gasoline station in North Hollywood. A large, leaking underground tank caused a plume of gasoline hydrocarbons containing MTBE to move downward into the local groundwater. Over time, this contamination plume has migrated offsite toward several municipal-supply wells in LADWP's Whitnall Wellfield. Tesoro and its consultants continued to perform soil remediation using soil vapor extraction, etc.

In September 2011, the RWQCB-LA granted a low-risk closure for the site. During the entire process of the site investigation and cleanup, approximately 43 million gallons of contaminated groundwater and approximately 235,000 pounds of vapor hydrocarbon and/or oxygenates (such as MTBE) were reportedly removed from the site. All water treatment equipment has been decommissioned and removed from the site. Some of the groundwater monitoring wells have been destroyed and/or will be destroyed in the near future.

The RWQCB-LA file for Tesoro Petroleum at 11051 Victory Blvd lists this site as “closed” as of October, 2011. Further details are available via the listed contact at the RWQCB-LA site (Mr. Magdy Baiady).

Taylor Yard (Los Angeles River Narrows Area)

Taylor Yard is located on San Fernando Road between the Glendale Freeway (Route 2) and the Harbor Freeway (Route 110). The 243-acre Taylor Yard site (Site) is divided into two areas: 1) the 174-acre Sale Parcel, formerly used mainly to classify and hook up rail cars, and 2) the 69-acre Active Yard, so named because it continues to be used for locomotive service and maintenance. These areas have been contaminated with petroleum hydrocarbons, organic solvents and metals. The Sale Parcel soil has been cleaned and acquired by the California Department of Parks and Recreation. Several types of activities have been performed on the Active Yard to remove contaminated soil. Spills have been cleaned up by using absorbent blankets or pumps to collect the liquid, or by excavating the contaminated soil. Remediation is under the jurisdiction of the DTSC. A Draft Remedial Action Plan (RAP) has been submitted and is currently being reviewed by DTSC. Implementation of the RAP is scheduled for April 2014 and is anticipated to be completed by September 2014.

Jessy Fierro is listed as the current contact person on the RWQCB-LA website for additional information concerning Taylor Yard.

Status on the Existence of Hexavalent Chromium in the San Fernando Basin

In January 2003, the original ULARA Watermaster published a report on hexavalent chromium contamination in the SFB. Later, the RWQCB-LA published a report based on its four-year investigation of hexavalent chromium. The presence of this contaminant threatens the use of SFB groundwater as a reliable source of water for Burbank, Glendale and Los Angeles, and also jeopardizes the remedy (i.e., the cleanup plan) and the treatment plants which had been constructed to only clean up VOCs on a regional basis; none of the treatment plants that treat VOCs in the groundwater in the SFB were originally designed to treat chromium.

On July 1, 2014, a new Primary MCL for hexavalent chromium of 10 µg/L (or 10 ppb) was established in California by DDW. The Federal and State drinking water MCLs for total chromium are currently 100 µg/L and 50 µg/L, respectively. There are no separate Federal standards for hexavalent chromium at this time.

Hexavalent chromium affects the operation of the treatment plants, because, as noted above, they were designed to treat only for VOCs. The Consent Decrees between the USEPA and the responsible parties require that certain pumping rates be maintained in the OUs to control VOC plume migration and to provide contaminant removal. As these OU wells are pumped, the chromium plumes tend to migrate toward the wells, likely at a slower rate than the VOCs. Hexavalent chromium has now been detected in all of the OUs in the SFB. High hexavalent chromium concentrations have caused several wells to be pumped at reduced rates (particularly in the GOU), and one or more wells in the NHOU have been shut down.

For more information on hexavalent chromium, the reader is directed to the USEPA's website (www.epa.gov/region9/superfund/chromium/index.html) and the SWRCB website

(http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Chromium6.shtml).

Former Chase Chemical/Holchem Site, 13546 Desmond Street, Pacoima

A significant VOC contaminant plume was identified in the Pacoima area near the intersection of the Simi Valley Freeway (118 Freeway) and San Fernando Road; this area is approximately 3 miles upgradient of LADWP's Tujunga wellfield.

The former Chase Chemical/Holchem site is located on an approximate two-acre site. Chase Chemical Company reportedly used the site from 1967 to 1987 to store industrial chemicals in underground storage tanks, aboveground storage tanks and other containers for packaging and resale. Holchem, Inc. leased the property in 1987, purchased it in 1999, and continued the storage and re-sale of industrial chemicals; site operation ended in 2001. Quarterly groundwater monitoring is ongoing; PCE and TCE have been two of the main VOCs detected at the site. Additional VOCs, such as cis-1,2-DCE, 1,1, DCE and 1,4-dioxane, also continue to be detected.

Ms. Stephanie Lewis of DTSC is currently listed on the RWQCB-LA website as the contact person for more information regarding this former Chase site.

3.9. EPA Shallow Zone Contamination Maps

The EPA typically provides the Watermaster with contamination "plume" maps for the Shallow aquifer zone in the eastern portion of the San Fernando Groundwater Basin. Plates 14, 15, 16, and 17 show the generalized two-dimensional approximation of contaminant contours within the Shallow Aquifer Zone in SFB, as interpreted by EPA and/or their subcontractors, for the contaminants TCE, PCE, NO_3, and total chromium, respectively. Typically, these maps have been updated annually by the EPA. However, at the time of this current Watermaster Report, the updated plume maps have not yet been received from the EPA. Hence, the contour data shown on Plates 14, 15, 16, and 17 in this report are still based on the EPA contour maps dating from 2010; these are the same maps that were published in the 2010-11 and 2011-12 Water Year Annual ULARA Watermaster Reports.

3.10. LID Projects (Formerly SUSMP)– San Fernando and Sylmar Basins

Since becoming ULARA Watermaster in January 2009, this Watermaster has been reviewing information and reports from various private engineers and/or owners in regard to Standard Urban Stormwater Mitigation Plan (SUSMP) requirements for all proposed developments and re-developments of existing properties within those portions of the City of Los Angeles that overlie the San Fernando and Sylmar basins. Note that, in May 2012, the City of Los Angeles implemented a Low Impact Development (LID) Ordinance that expanded/revised the original SUSMP requirements; hence, SUSMP projects are now referred to as LID projects. Plate 18, “Locations of LID Projects – San Fernando & Sylmar Basins”, illustrates the approximate locations of the ±200 such LID properties that have been reviewed by the Watermaster to date. The background of LID projects and the basic role of the Watermaster in the LID approval process are described below. LID projects in the cities of Burbank, Glendale and San Fernando have not been reviewed to date by this Watermaster, but rather only by representatives of those cities.

The RWQCB-LA promulgated its National Pollutant Discharge Elimination System (NPDES) permit process in 1990 to help minimize the impacts of stormwater and urban runoff on the receiving water bodies in its sphere of influence (i.e., local rivers and the Pacific Ocean). The goal of their NPDES process was to minimize the impacts on local rivers, and ultimately to the ocean, by reducing the amount and improving the quality of surface water runoff from each storm event. For the ULARA region, the main receiving waters are the Los Angeles River and the Pacific Ocean.

Several years after the implementation of the NPDES process, the City of Los Angeles, Department of Public Works, Bureau of Sanitation – Watershed Protection Division (LAWPD), promulgated a series of guidelines intended to increase onsite infiltration of stormwater at all proposed developments and re-developments throughout the City. These guidelines established the requirements and limitations for infiltration (and recharge) of onsite stormwater and also specified an order of preference (via a set of Best Management Practices---BMPs) for providing LID improvements at each development and/or re-development site in the City.

The specific order of the BMP preference list was established by the LAWPD to collect and provide basic “treatment” of onsite stormwater runoff, and to help increase the amount of infiltration (i.e., deep percolation) from the initial ¾-inch of rainfall from each storm event at all new development and re-development sites in the City. The end result is intended to reduce the volumes of stormwater runoff that enter the storm drain system (from each new storm event) and simultaneously help reduce the volume and enhance the quality of the runoff that enters the Los Angeles River and ultimately the Pacific Ocean. Potential urban-derived contaminants and turbidity in the captured runoff could be reduced by the “treatment” effects of the various stormwater infiltration systems proposed via the BMPs. From a hydrogeologic perspective, and in the opinion of this Watermaster, whenever and wherever deep percolation (infiltration) of “treated” stormwater can be appropriately enhanced, then recharge to the local groundwater basin may be beneficially increased.

Per the LID Information Guidelines of the LAWPD, the five BMP options, in order of preference, are:

1. Infiltration Systems (design based on the volume of stormwater);
2. Bio-Filtration/Retention Systems (design based on flow of stormwater);
3. Stormwater Capture and Re-Use (optional; subject to County Health Department approval);
4. Mechanical/Hydrodynamic Units;
5. Combination of any of the above.

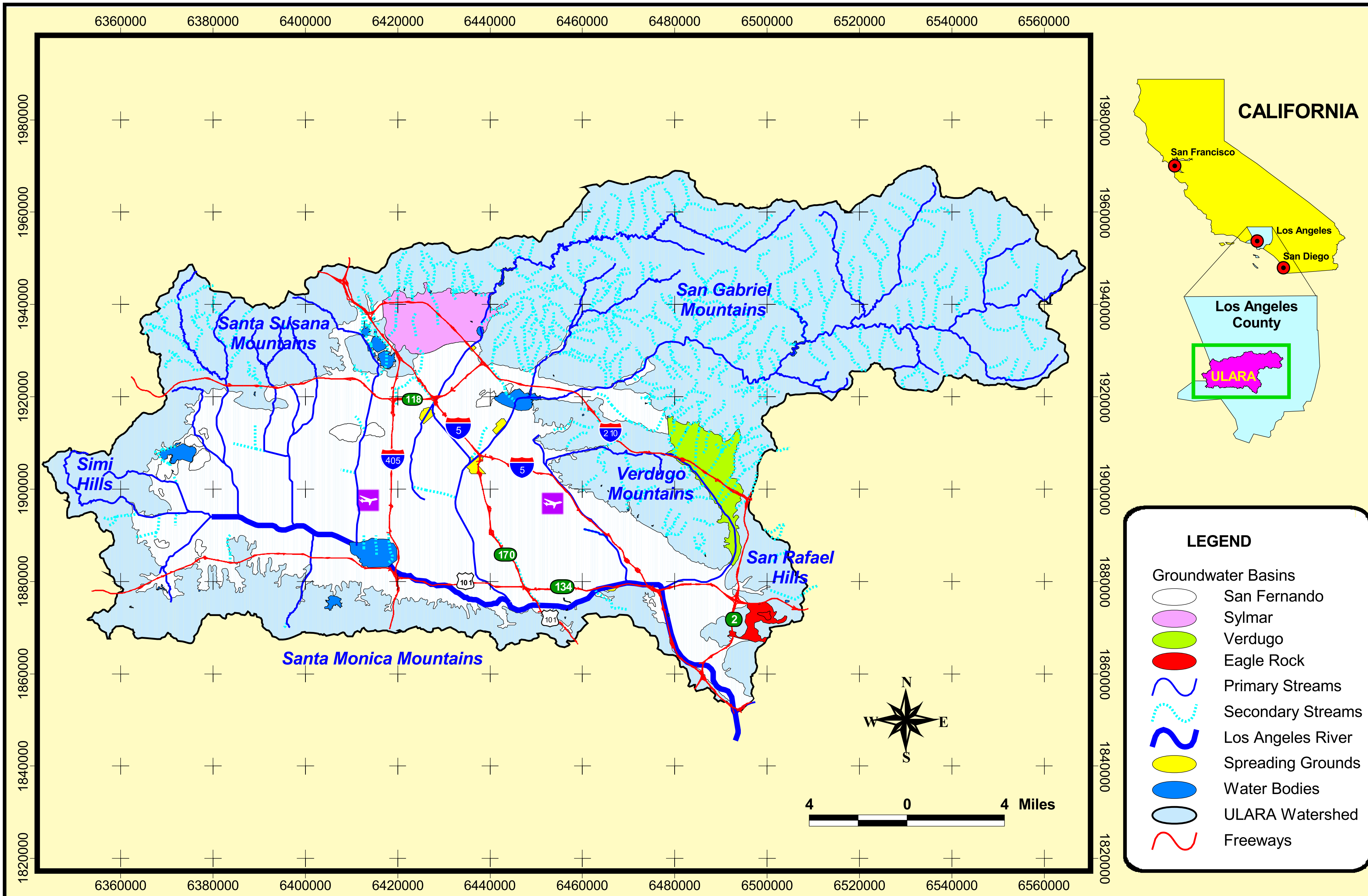
As a result, this Watermaster has been working with Mr. Ammar Eltawil of the LAWPD as part of the LID approval process for each new development/redevelopment site in those portions of the City of Los Angeles that overlie the San Fernando and Sylmar groundwater basins. Plate 18, as noted above, shows the approximate locations of the ±200 such LID sites reviewed to date by this Watermaster within those two groundwater basins. As part of the LID permit application process, Mr. Eltawil of LAWPD also provides each applicant with a 2-page Memorandum prepared by the Watermaster (current Watermaster version is dated December 18, 2012) that lists the types of data and reports requested by the Watermaster from each LID applicant. The approval process is basically as follows:

a. Applicant provides reports, data and LID-defined runoff calculations to the LAWPD.
b. LAWPD provides applicant with the current 2-page Watermaster data request Memorandum.

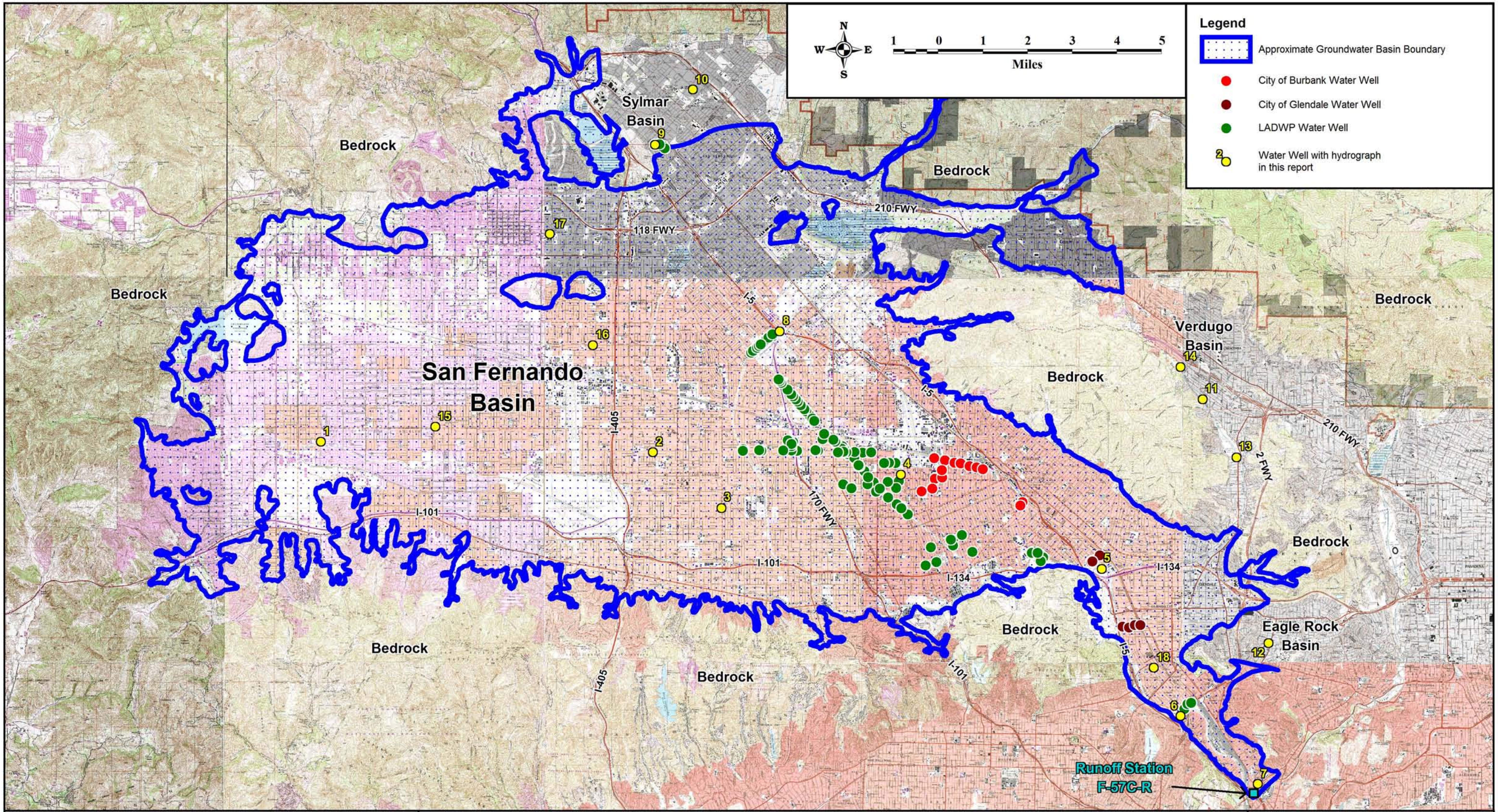
c. LAWPD reviews, evaluates and provides approval or denial of the specific LID and the runoff calculations provided by the applicant.

d. The Watermaster reviews the information on subsurface conditions, etc, as provided by the applicant, and provides an opinion letter with his approval or denial of the LID based on the potential of the infiltration potential of the LID to enhance recharge to the local groundwater basin without interfering with local groundwater quality, proximal area(s) of groundwater contamination and/or area(s) of groundwater remediation.

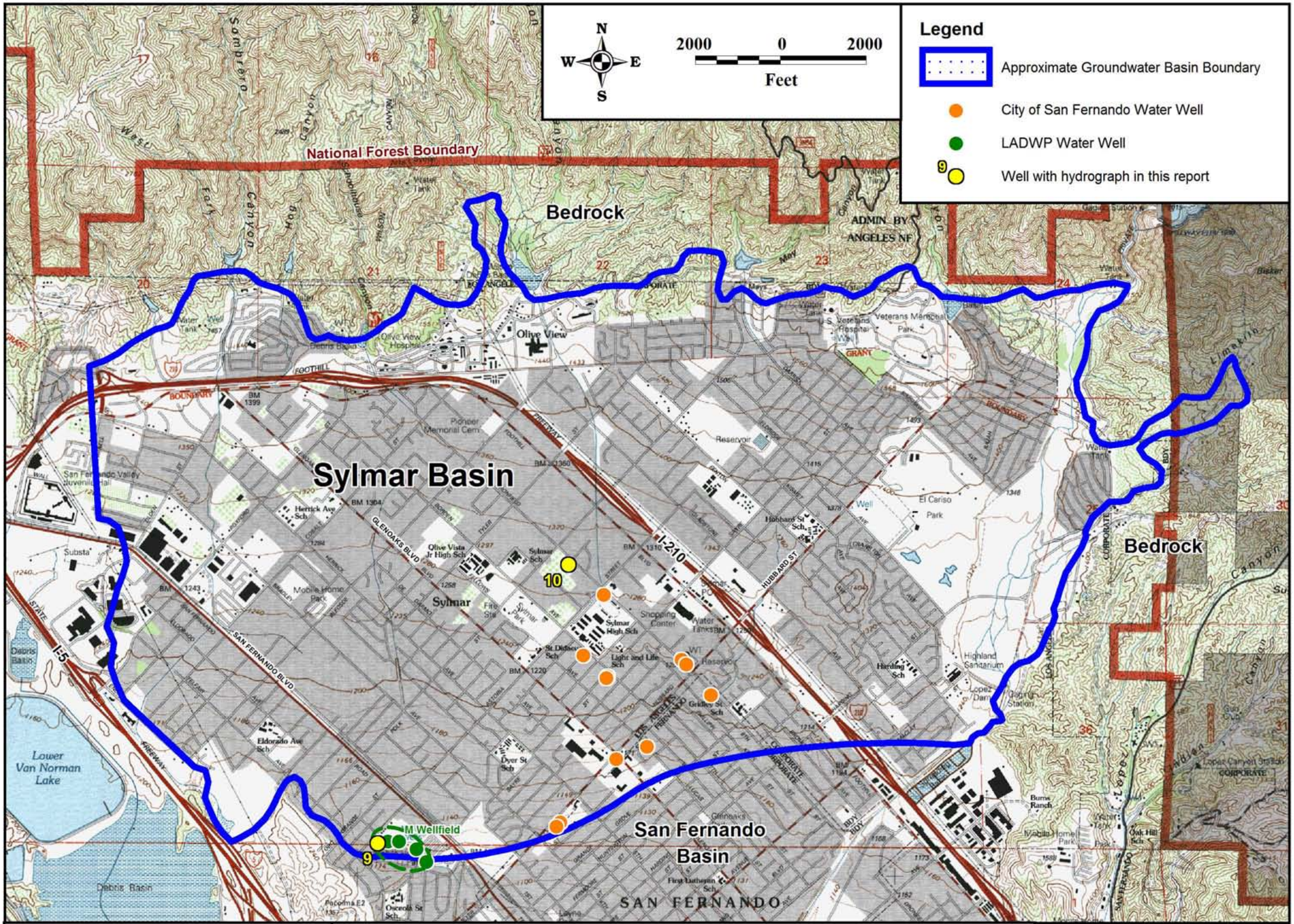
PLATES



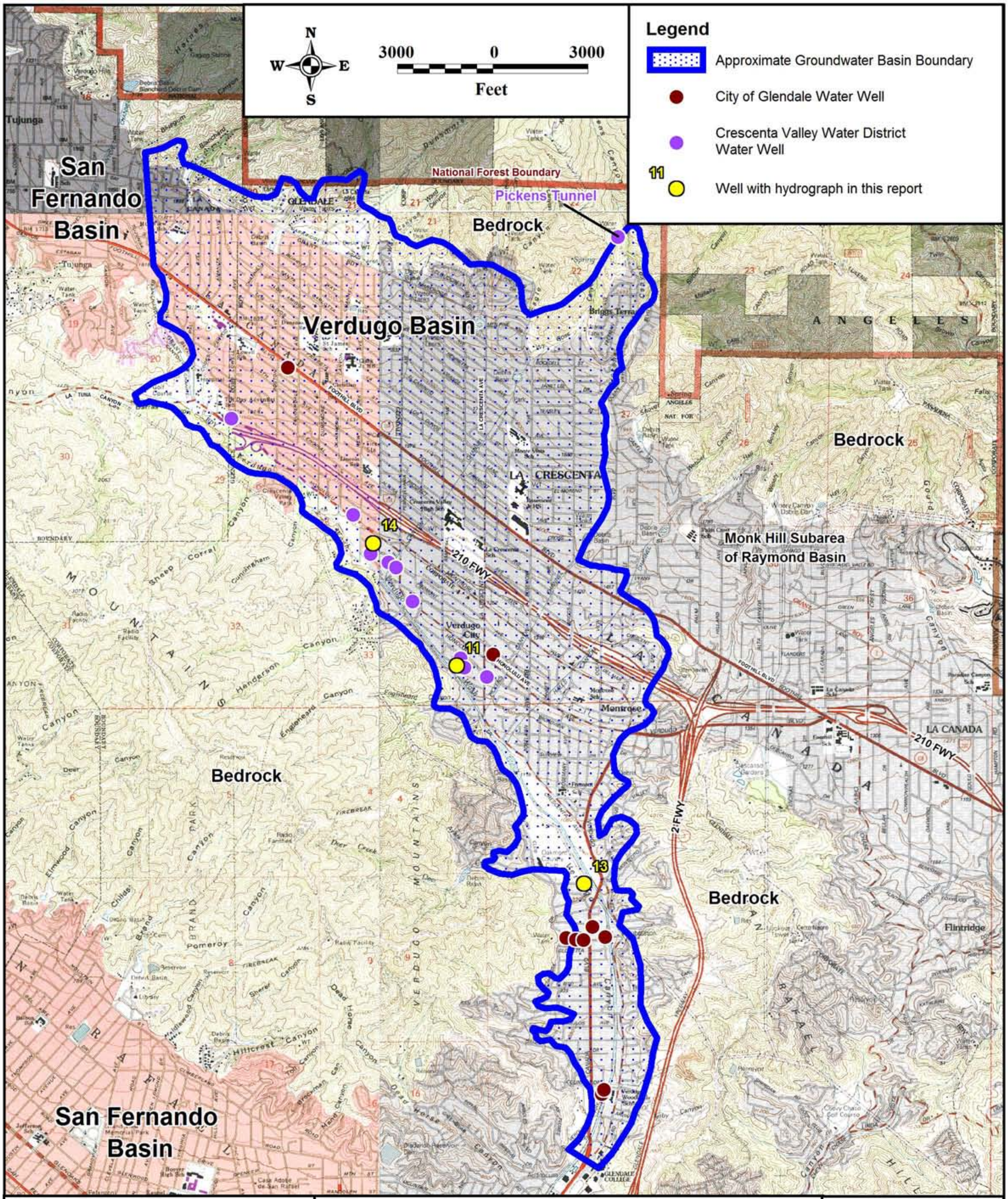
2012-13 Water Year ULARA Watermaster Report	Upper Los Angeles River Area: Vicinity and Location Map	PLATE 1



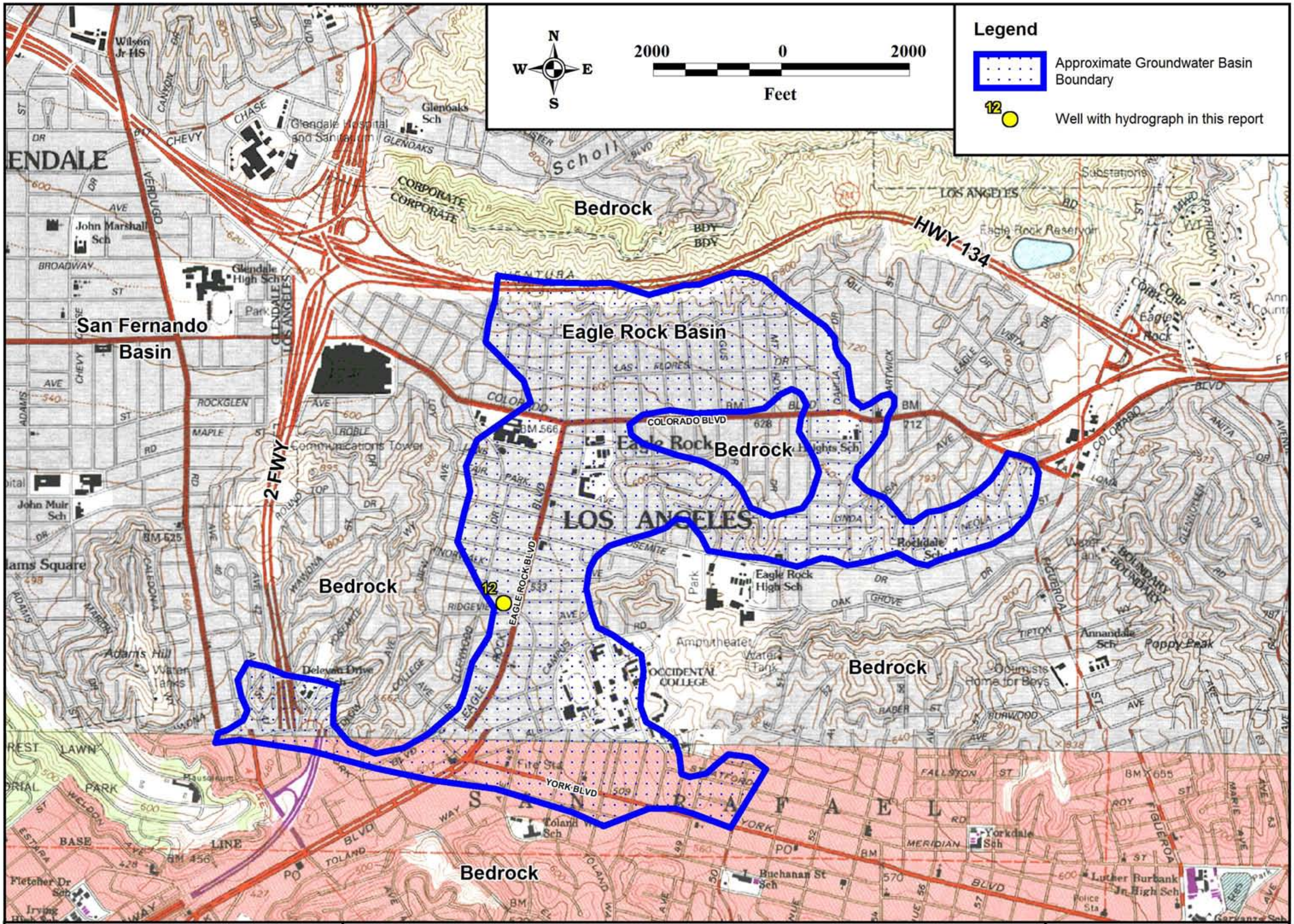
2012-2013 Water Year ULARA Wastermaster Report	Upper Los Angeles River Area: San Fernando Groundwater Basin	PLATE 1A



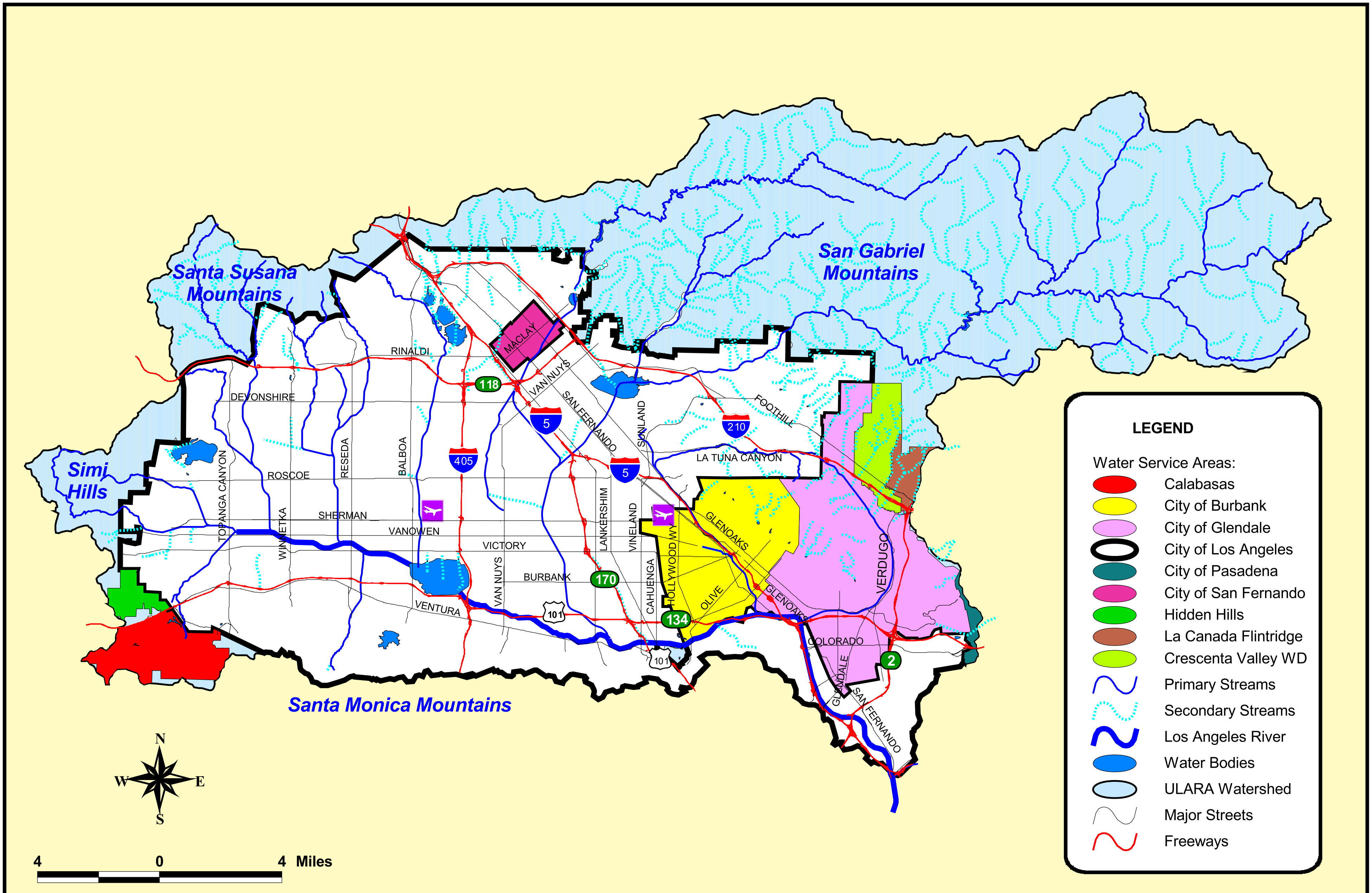
2012-2013 Water Year ULARA Watermaster Report	Upper Los Angeles River Area: Sylmar Groundwater Basin Map	PLATE 1B



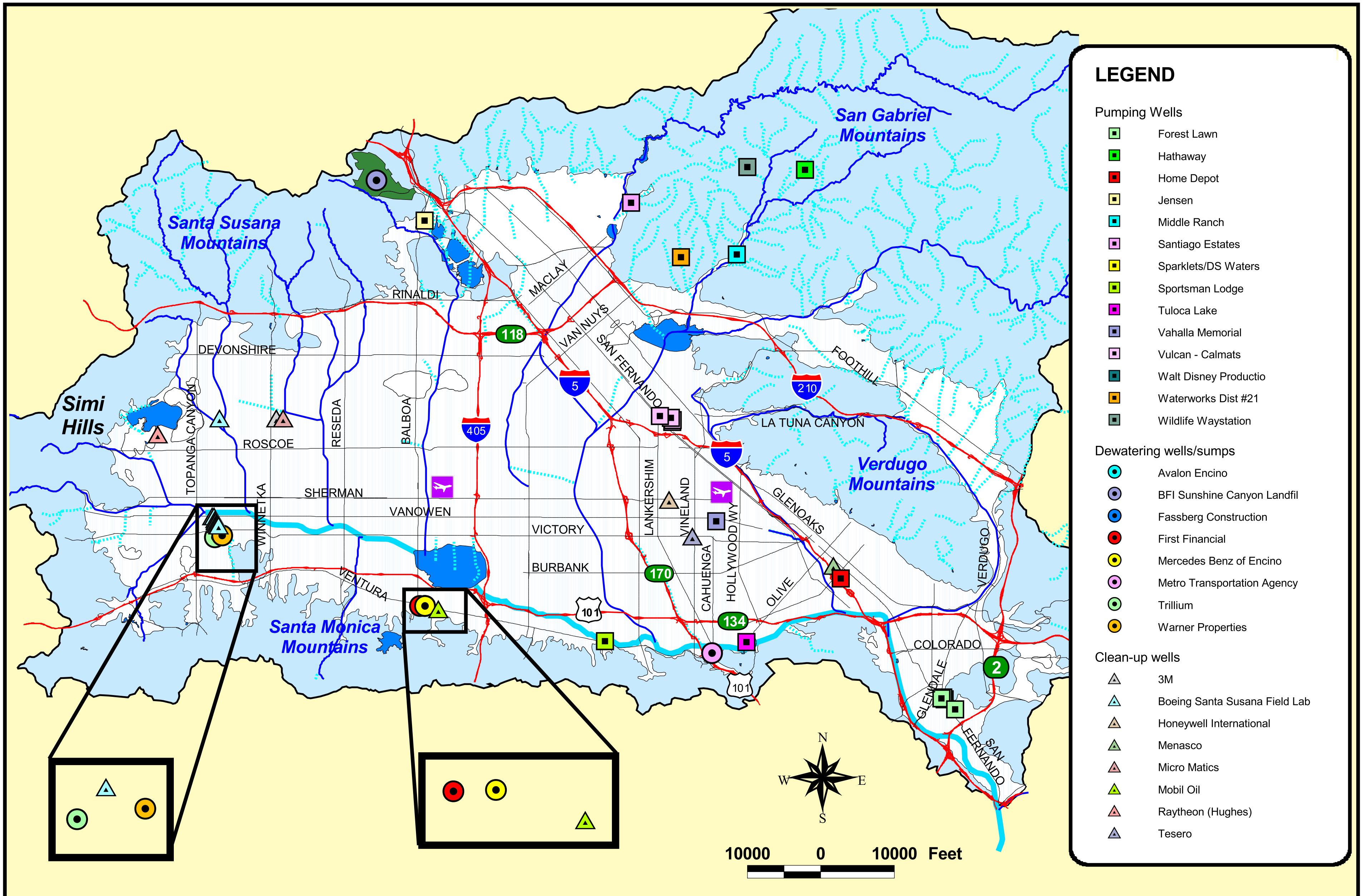
2012-2013 Water Year ULARA Watermaster Report	Upper Los Angeles River Area: Verdugo Groundwater Basin Map	PLATE 1C



2012-2013 Water Year ULARA Watermaster Report	Upper Los Angeles River Area: Eagle Rock Groundwater Basin Map	PLATE 1D



2012-13 Water Year ULARA Watermaster Report	Upper Los Angeles River Area: Water Service Areas of Public Agencies	PLATE 2



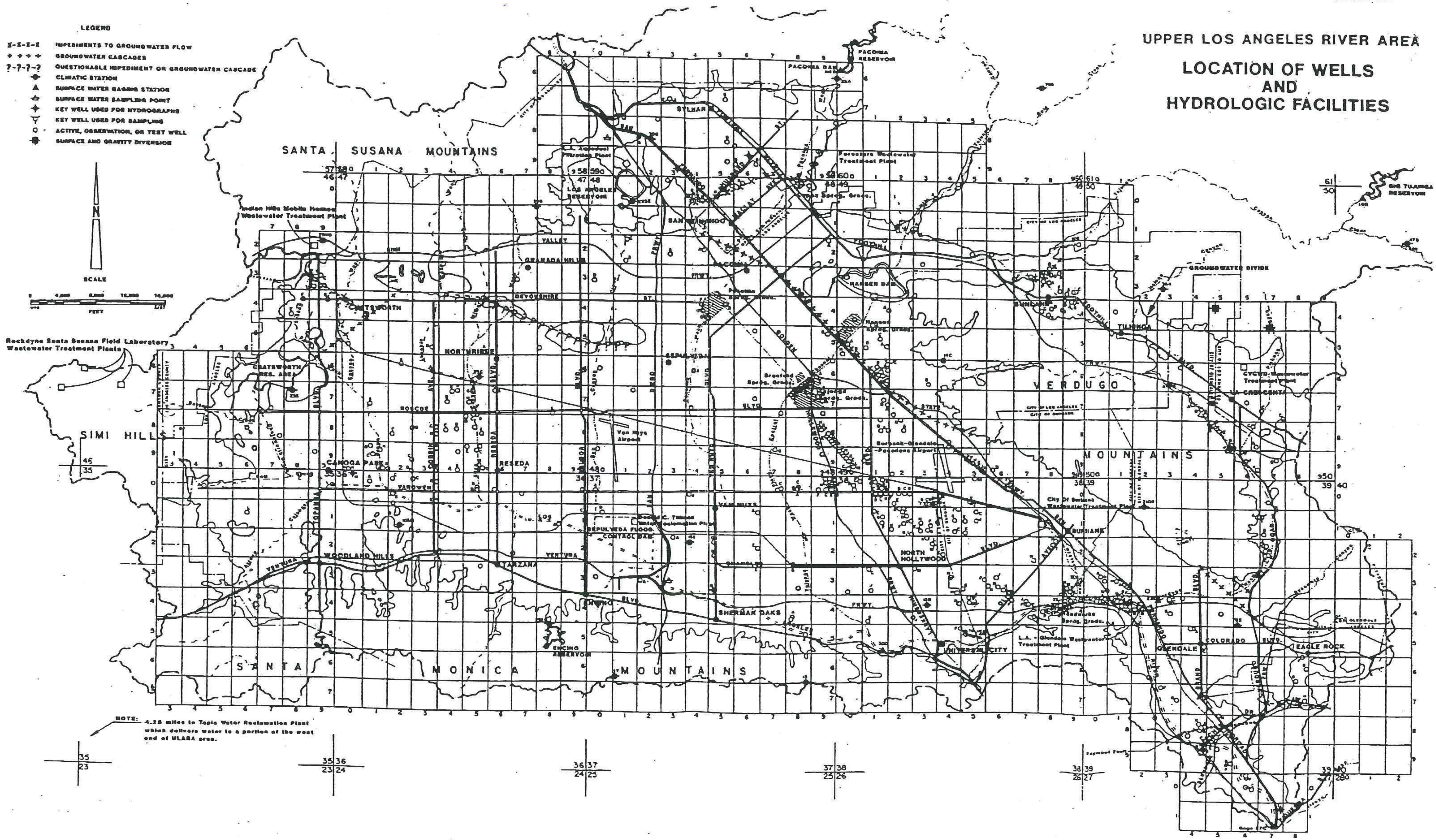
2012-13 Water Year
ULARA Watermaster
Report

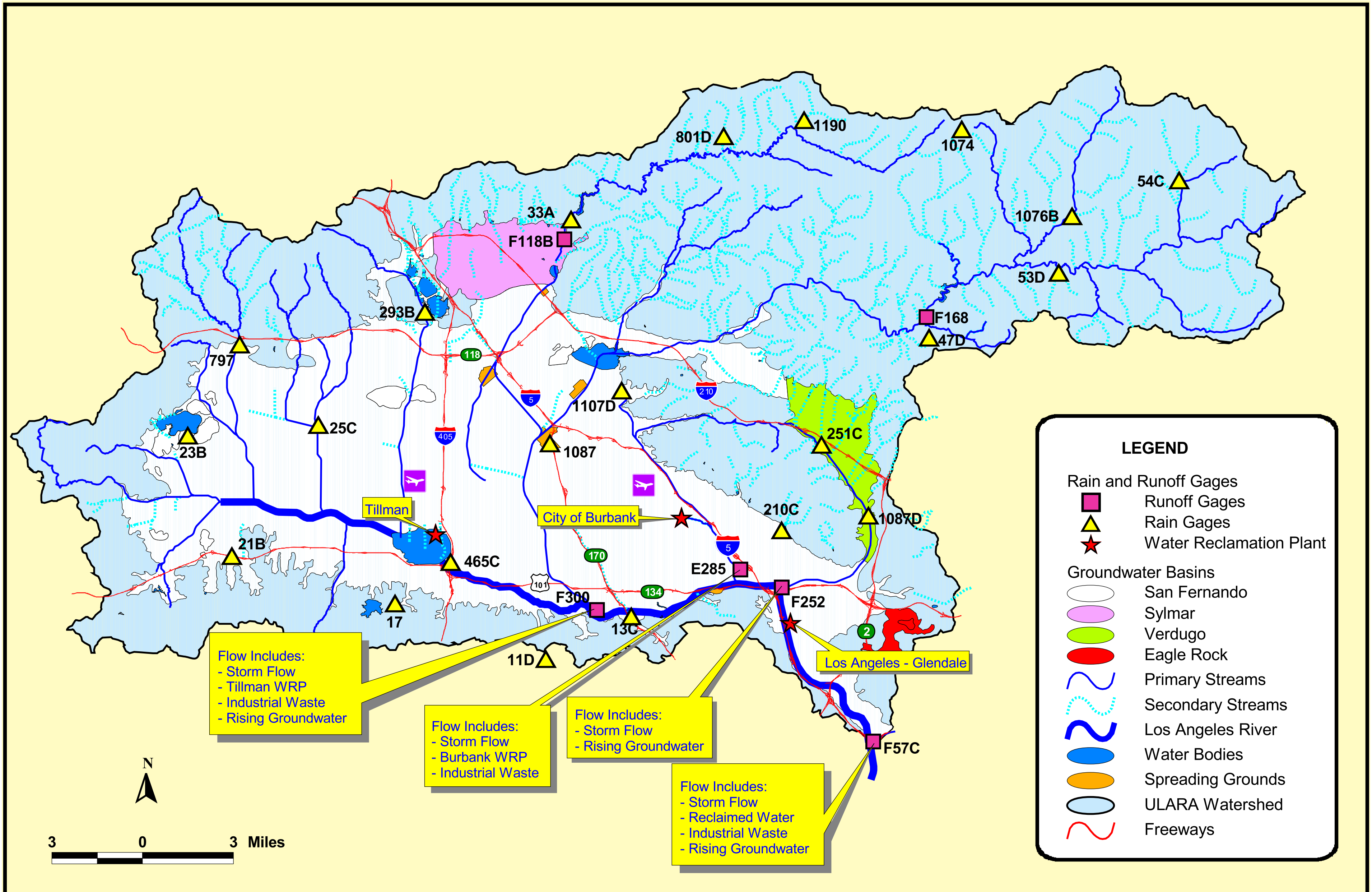
Upper Los Angeles River Area: Location of Individual Producers

PLATE
3

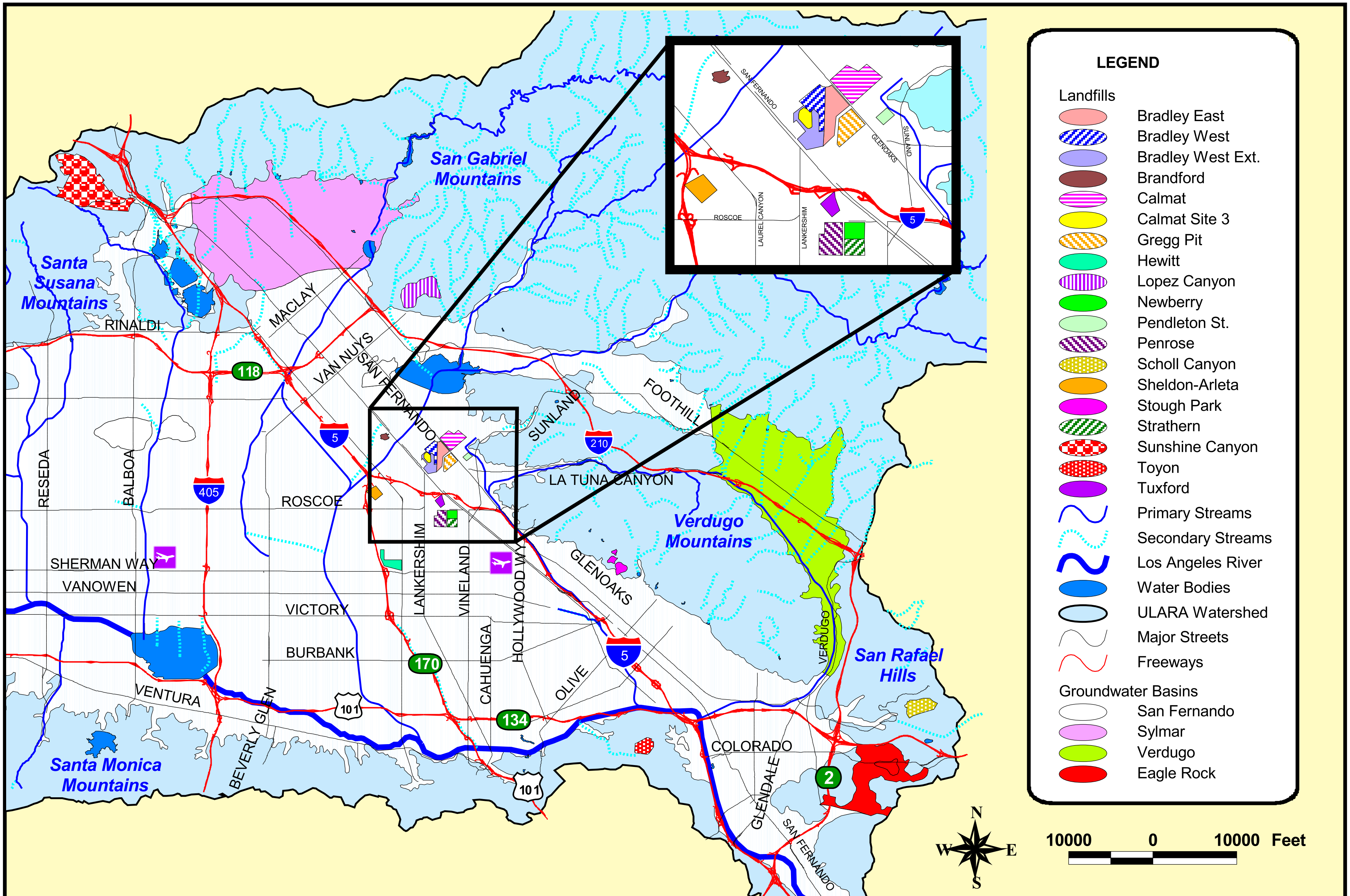
UPPER LOS ANGELES RIVER AREA

LOCATION OF WELLS AND HYDROLOGIC FACILITIES

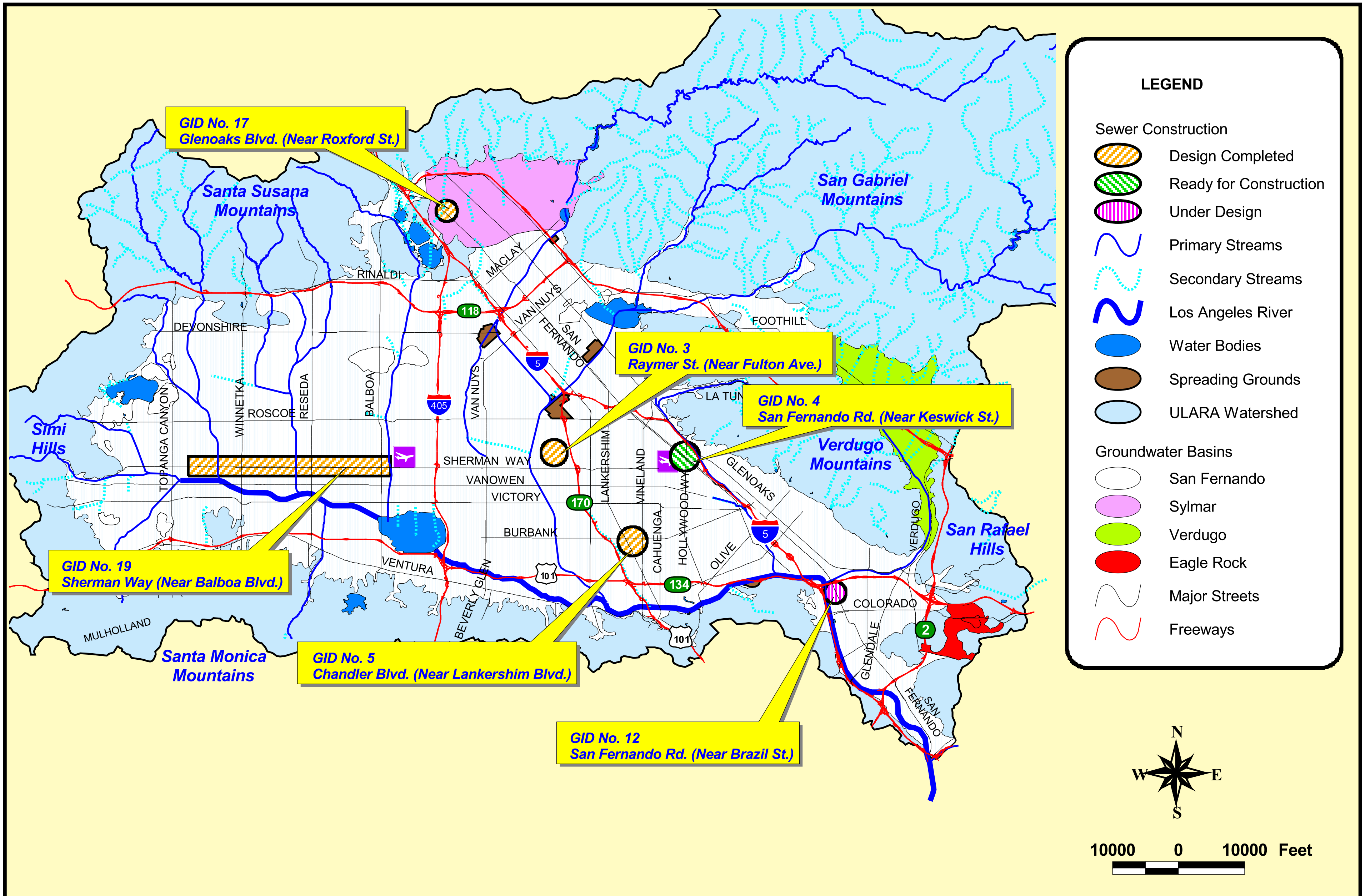




2012-13 Water Year ULARA Watermaster Report	**Upper Los Angeles River Area: Components of Los Angeles River**	**PLATE 5**



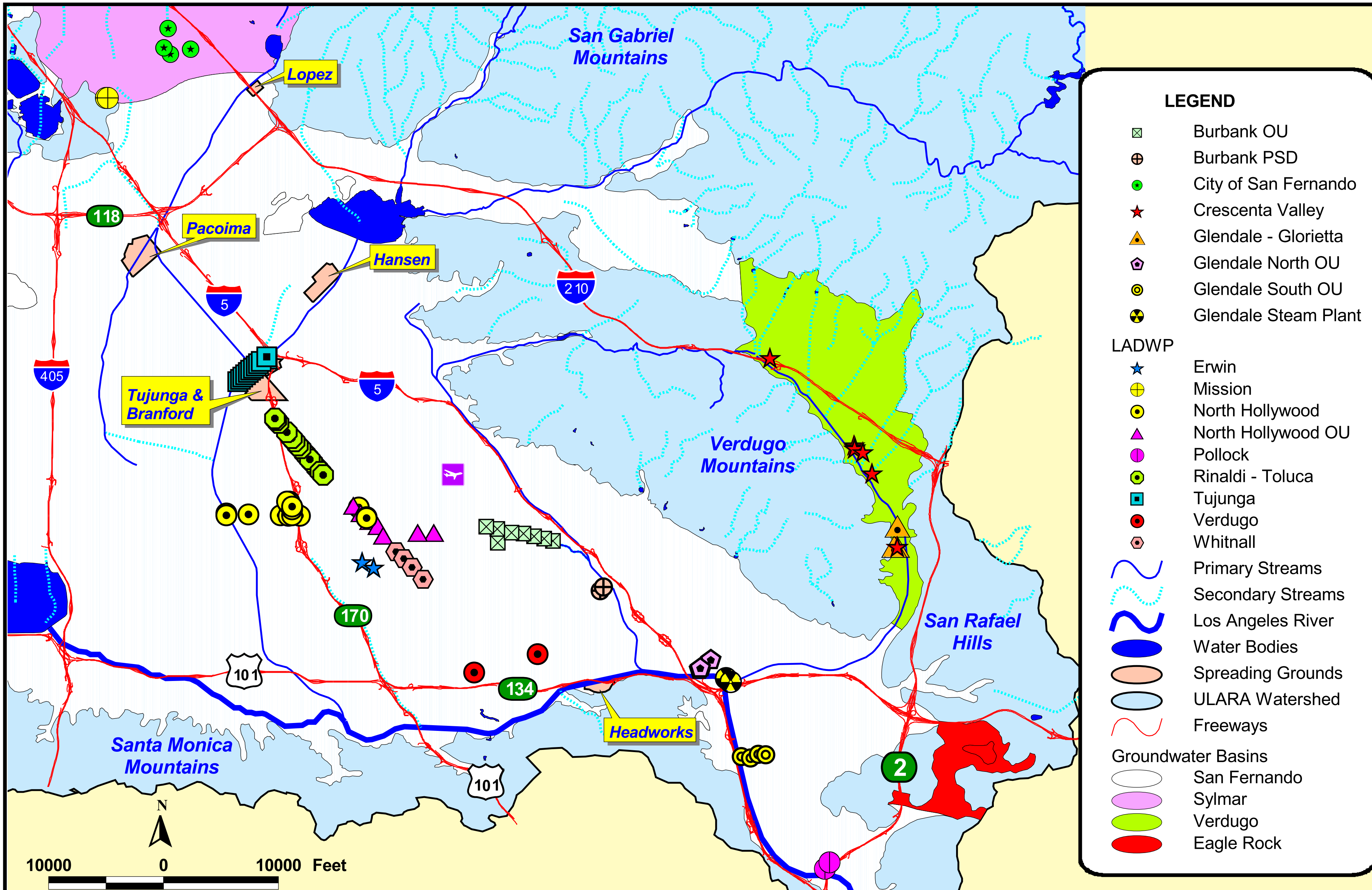
2012-13 Water Year ULARA Watermaster Report	**Upper Los Angeles River Area: Landfill Locations**	**PLATE 6**



20012-13 Water Year
ULARA Watermaster
Report

Upper Los Angeles River Area:
Los Angeles Bureau of Sanitation Sewer Construction Program for Commercial Parcels

PLATE 7



2012-13 Water Year
ULARA Watermaster
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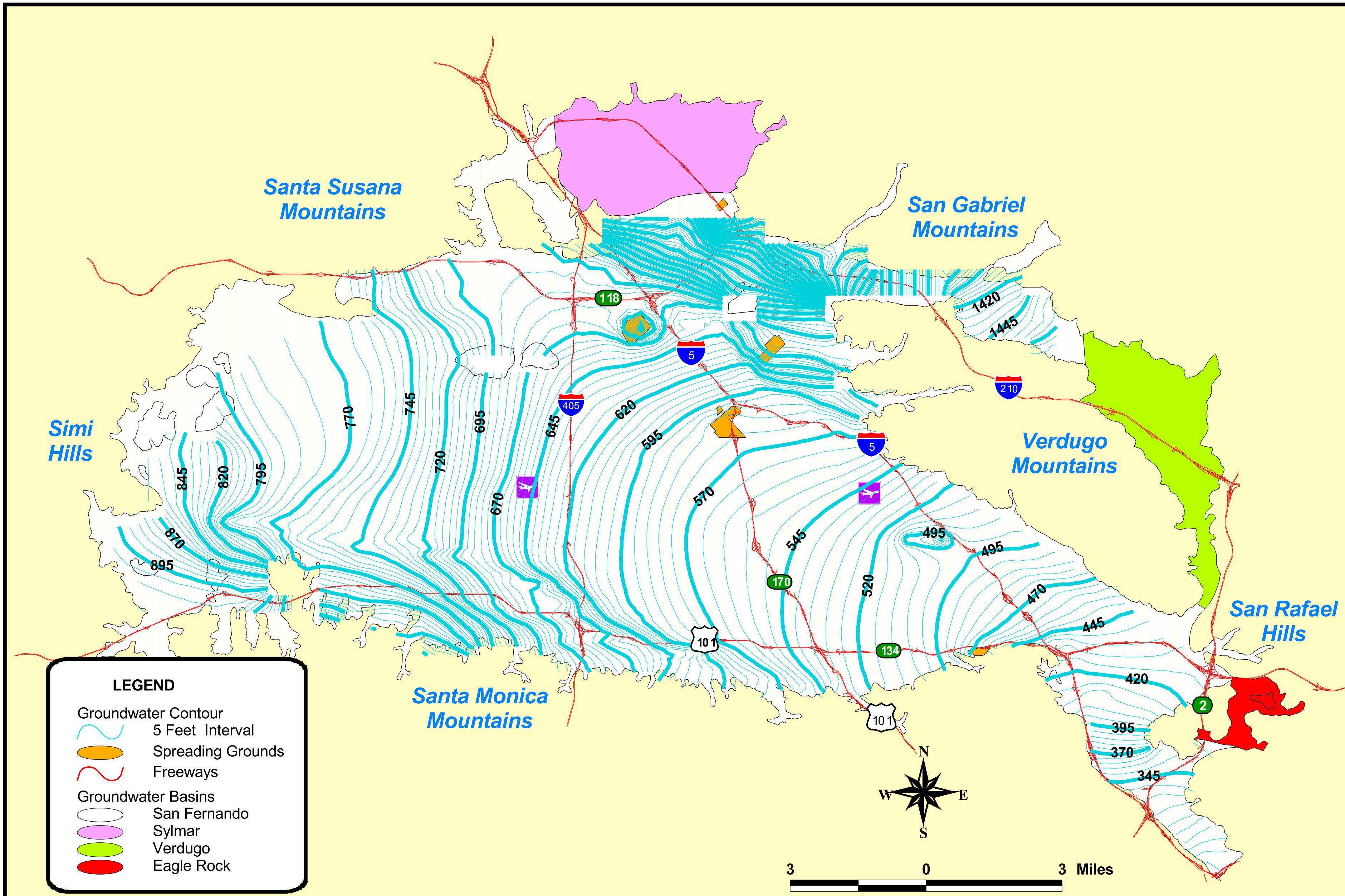
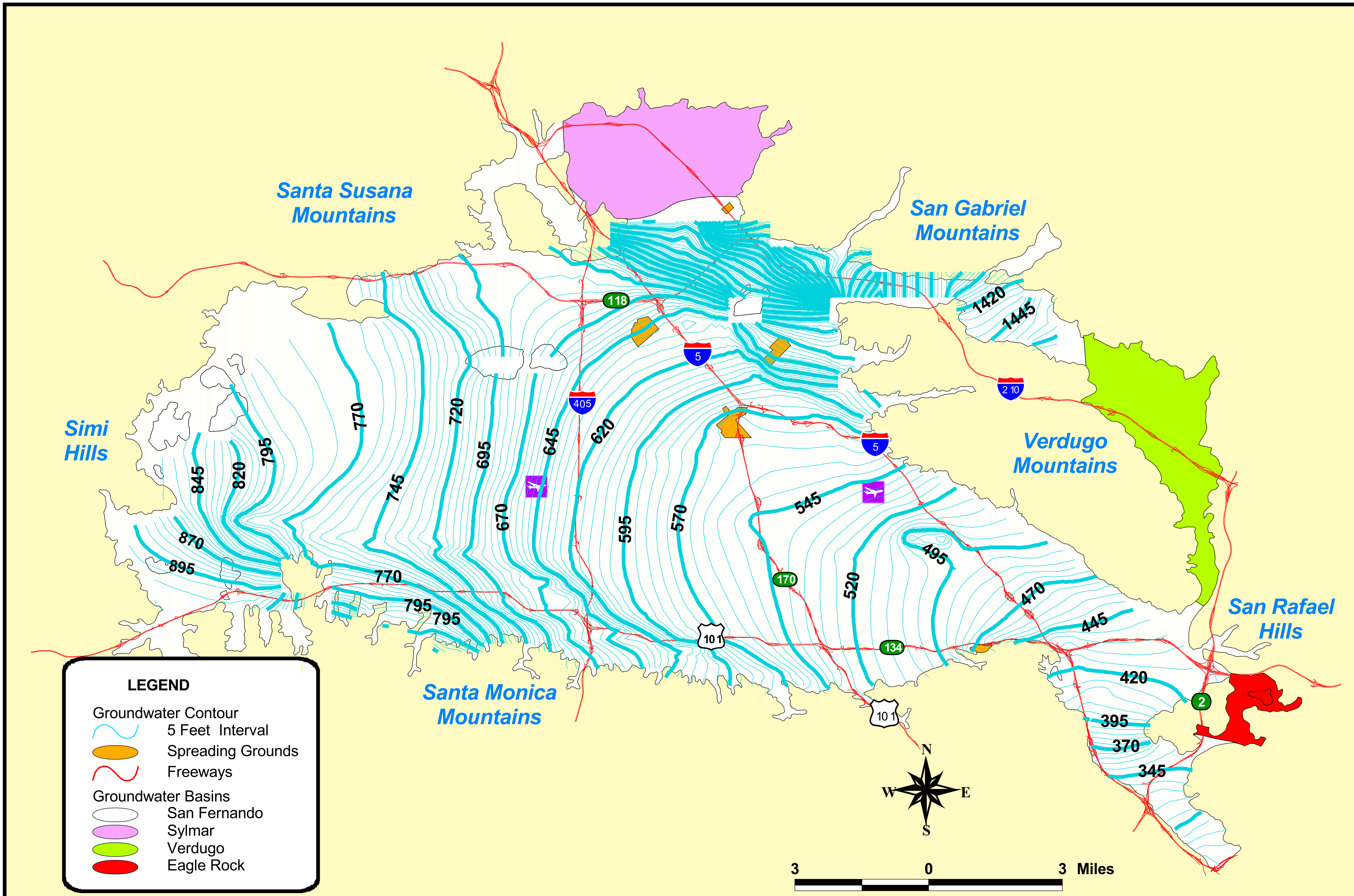
Upper Los Angeles River Area: Major Wellfields and Spreading Grounds

PLATE
8



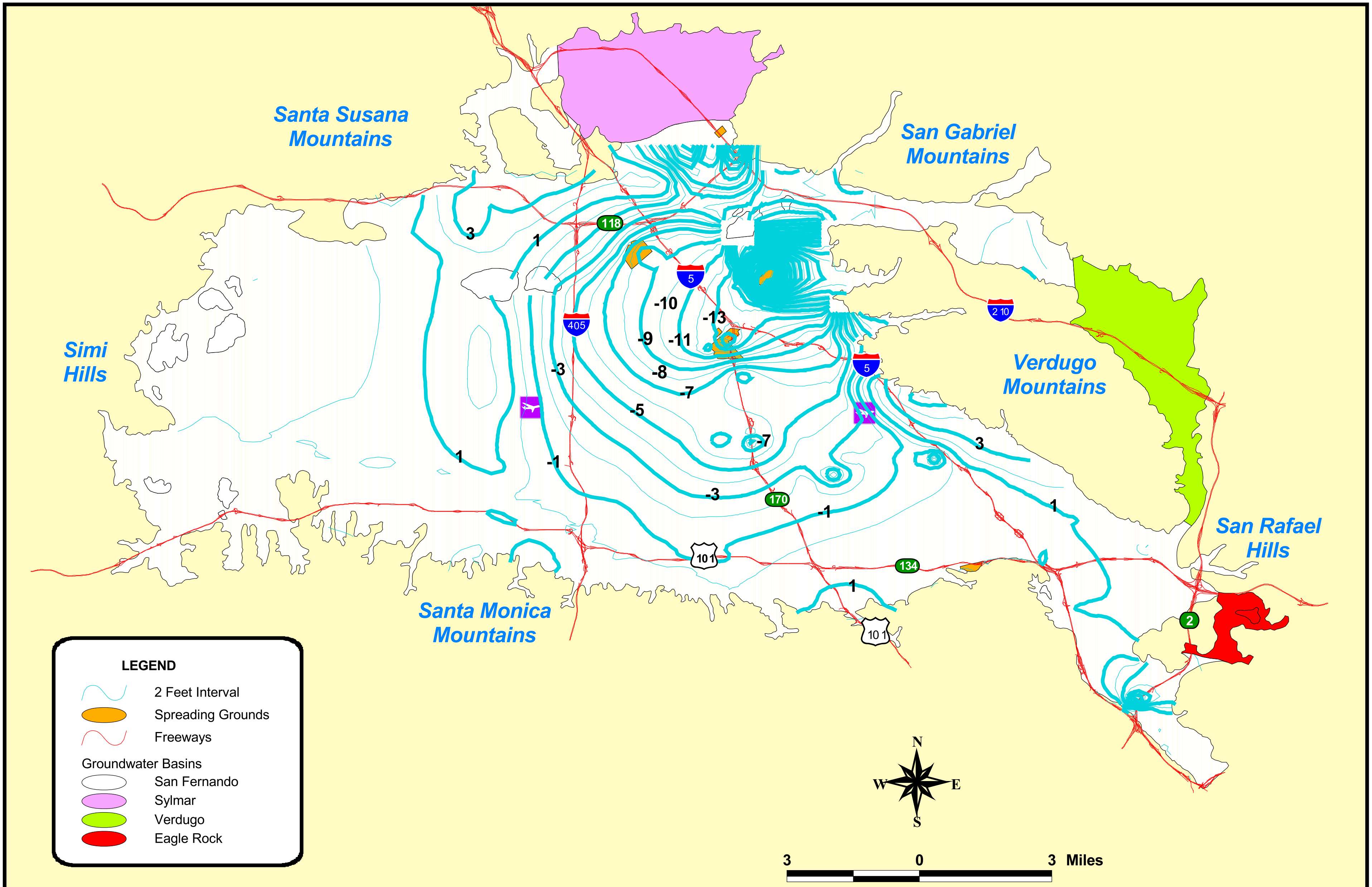
2012-13 Water Year ULARA Watermaster Report	Simulated Groundwater Elevation Contours Spring (April) 2013	PLATE 9



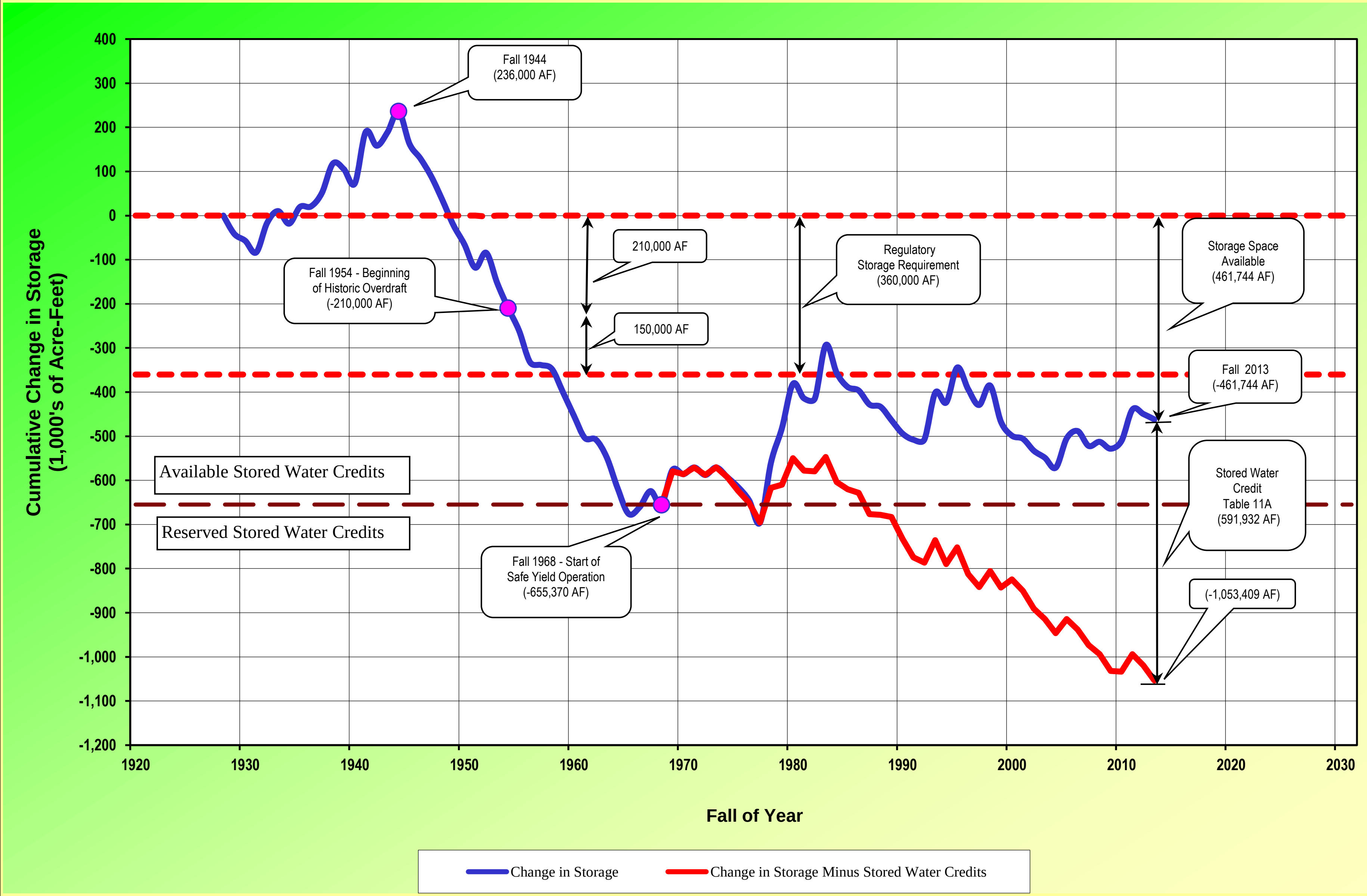
2012-13 Water Year
ULARA Watermaster Report

Simulated Groundwater Elevation Contours Fall (September) 2013

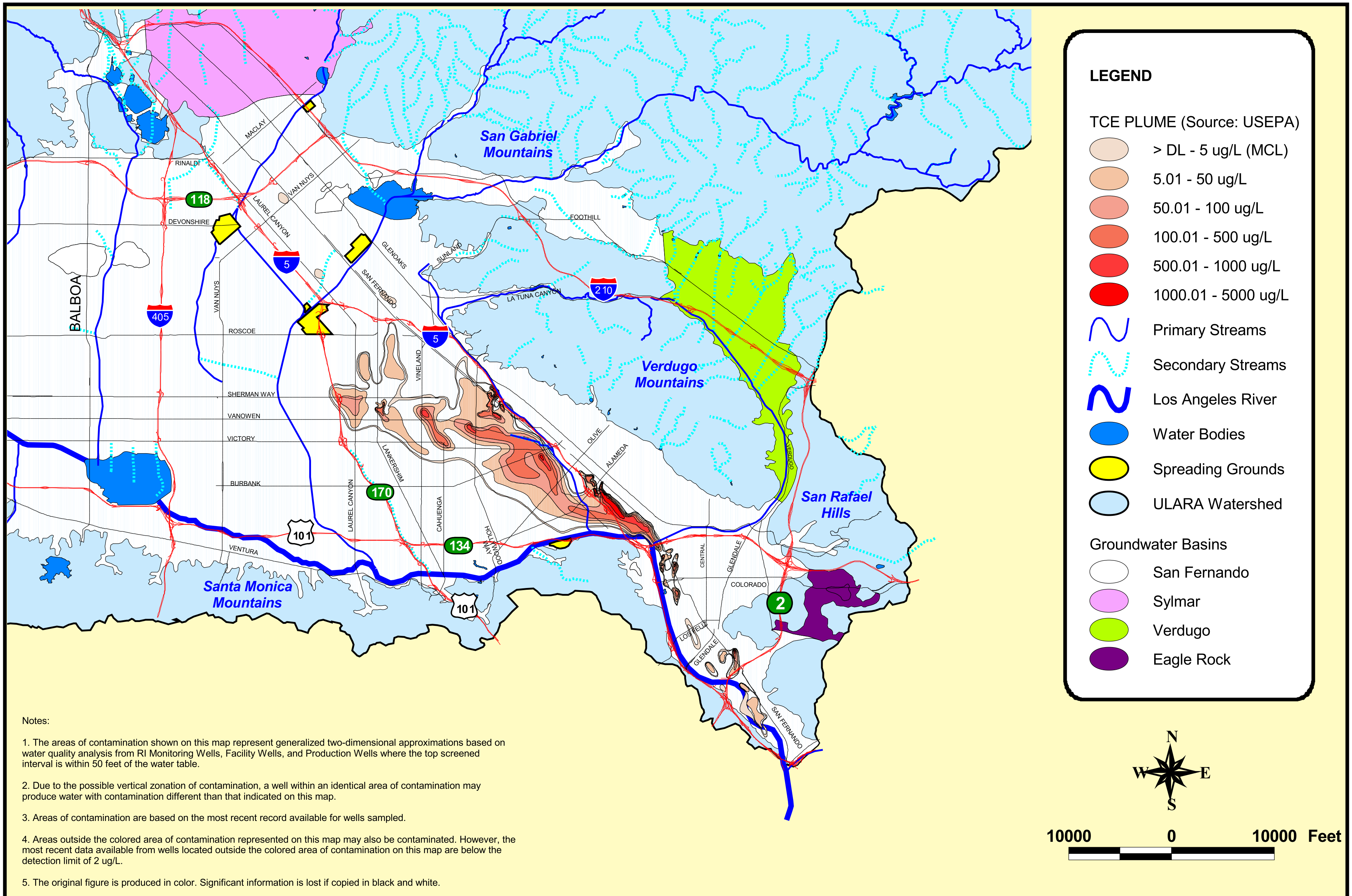
PLATE 10



2012-13 Water Year ULARA Watermaster Report	Simulated Change in Groundwater Elevations Fall 2012 - Fall 2013	PLATE 11



2012-13 Water Year ULARA Watermaster Report	San Fernando Basin: Cumulative Change in Groundwater Storage	PLATE 13



Notes:

1. The areas of contamination shown on this map represent generalized two-dimensional approximations based on water quality analysis from RI Monitoring Wells, Facility Wells, and Production Wells where the top screened interval is within 50 feet of the water table.

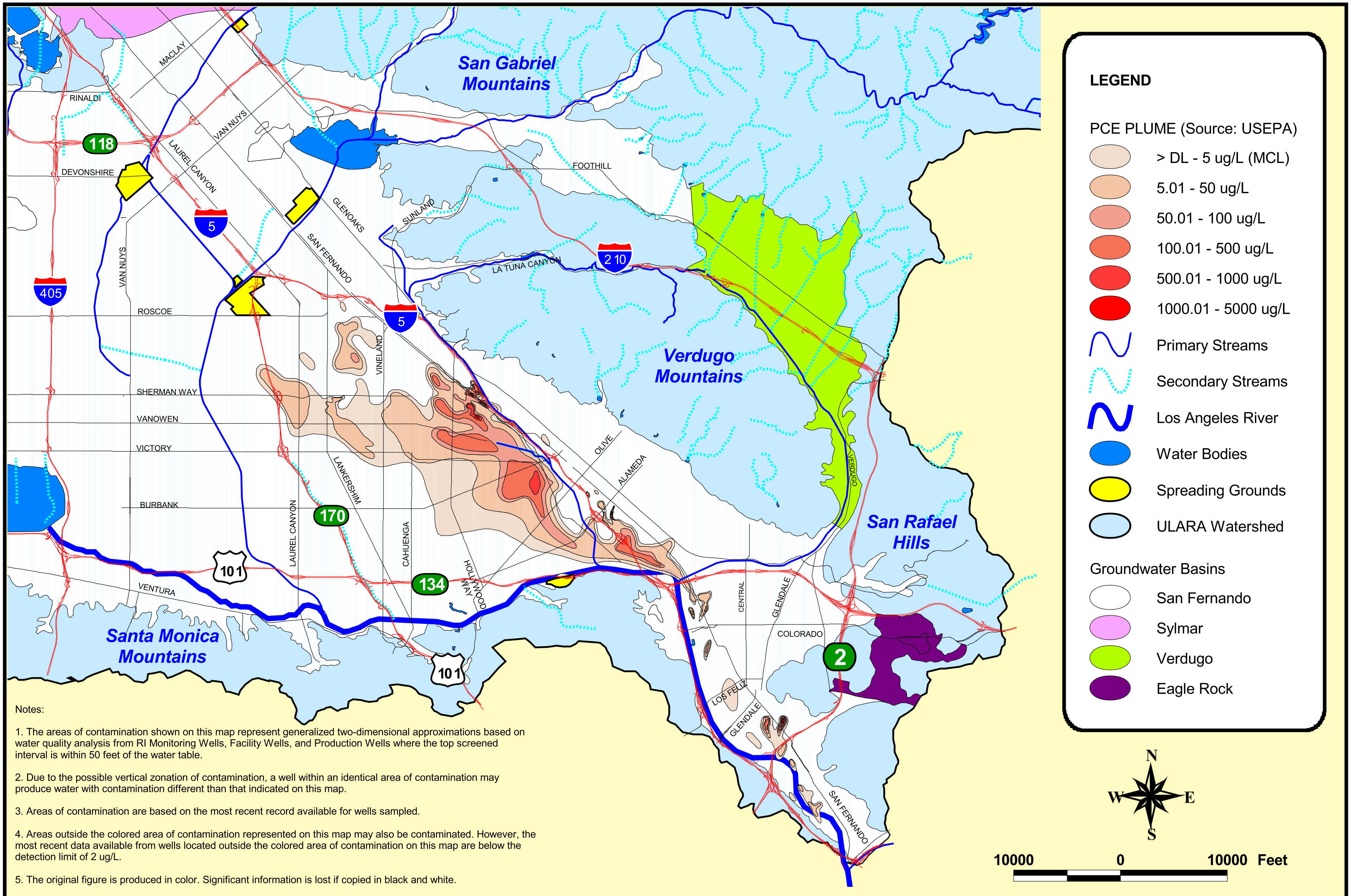
2. Due to the possible vertical zonation of contamination, a well within an identical area of contamination may produce water with contamination different than that indicated on this map.

3. Areas of contamination are based on the most recent record available for wells sampled.

4. Areas outside the colored area of contamination represented on this map may also be contaminated. However, the most recent data available from wells located outside the colored area of contamination on this map are below the detection limit of 2 ug/L.

5. The original figure is produced in color. Significant information is lost if copied in black and white.

2012-13 Water Year ULARA Watermaster Report	Upper Los Angeles River Area: TCE Contamination (ug/L) in Shallow Zone in 2010	PLATE 14



Notes:

1. The areas of contamination shown on this map represent generalized two-dimensional approximations based on water quality analysis from RI Monitoring Wells, Facility Wells, and Production Wells where the top screened interval is within 50 feet of the water table.

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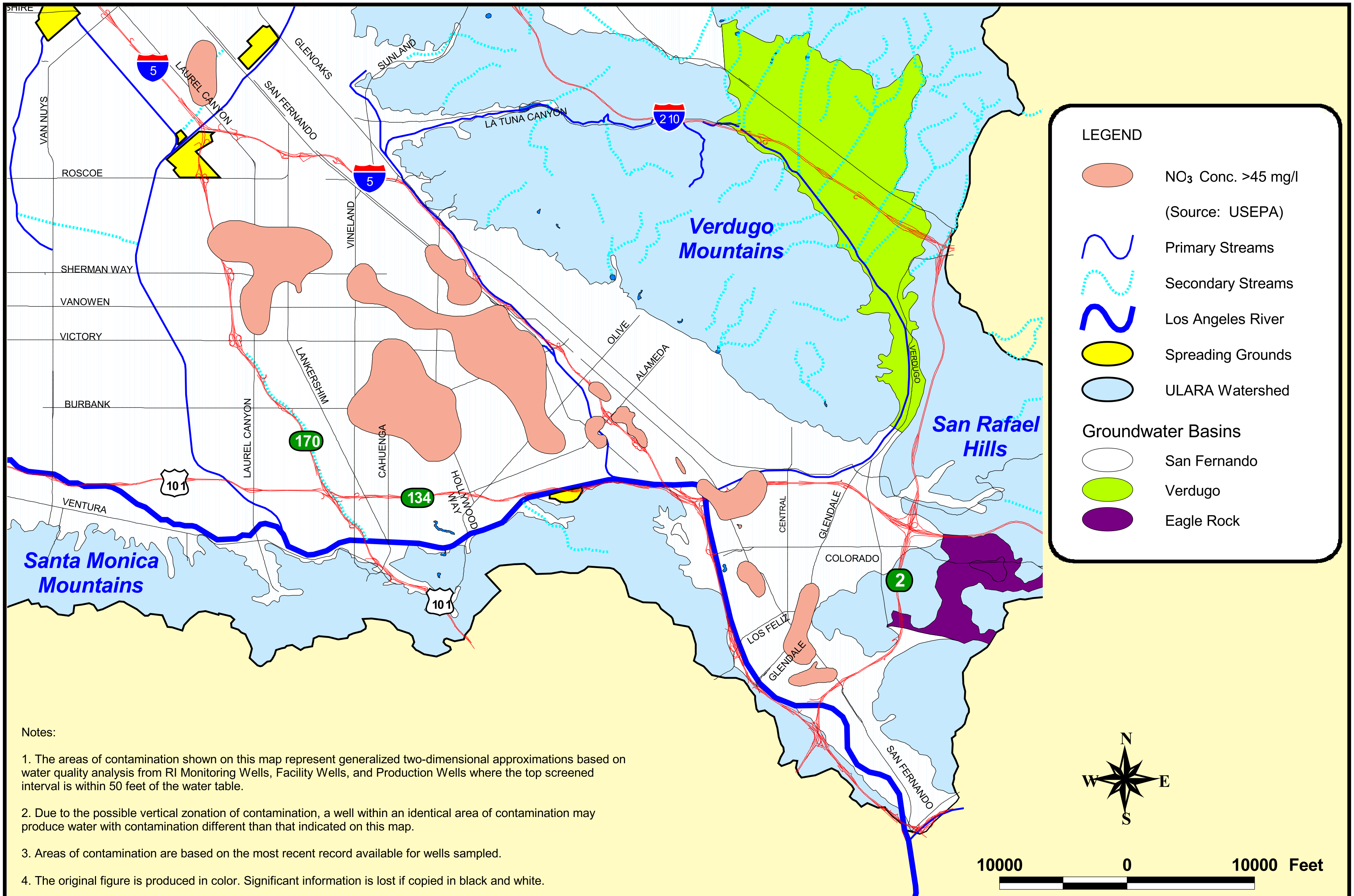
5. The original figure is produced in color. Significant information is lost if copied in black and white.

2012-13 Water Year ULARA Watermaster Report	Upper Los Angeles River Area: PCE Contamination (ug/L) in Shallow Zone in 2010	PLATE 15



Notes:

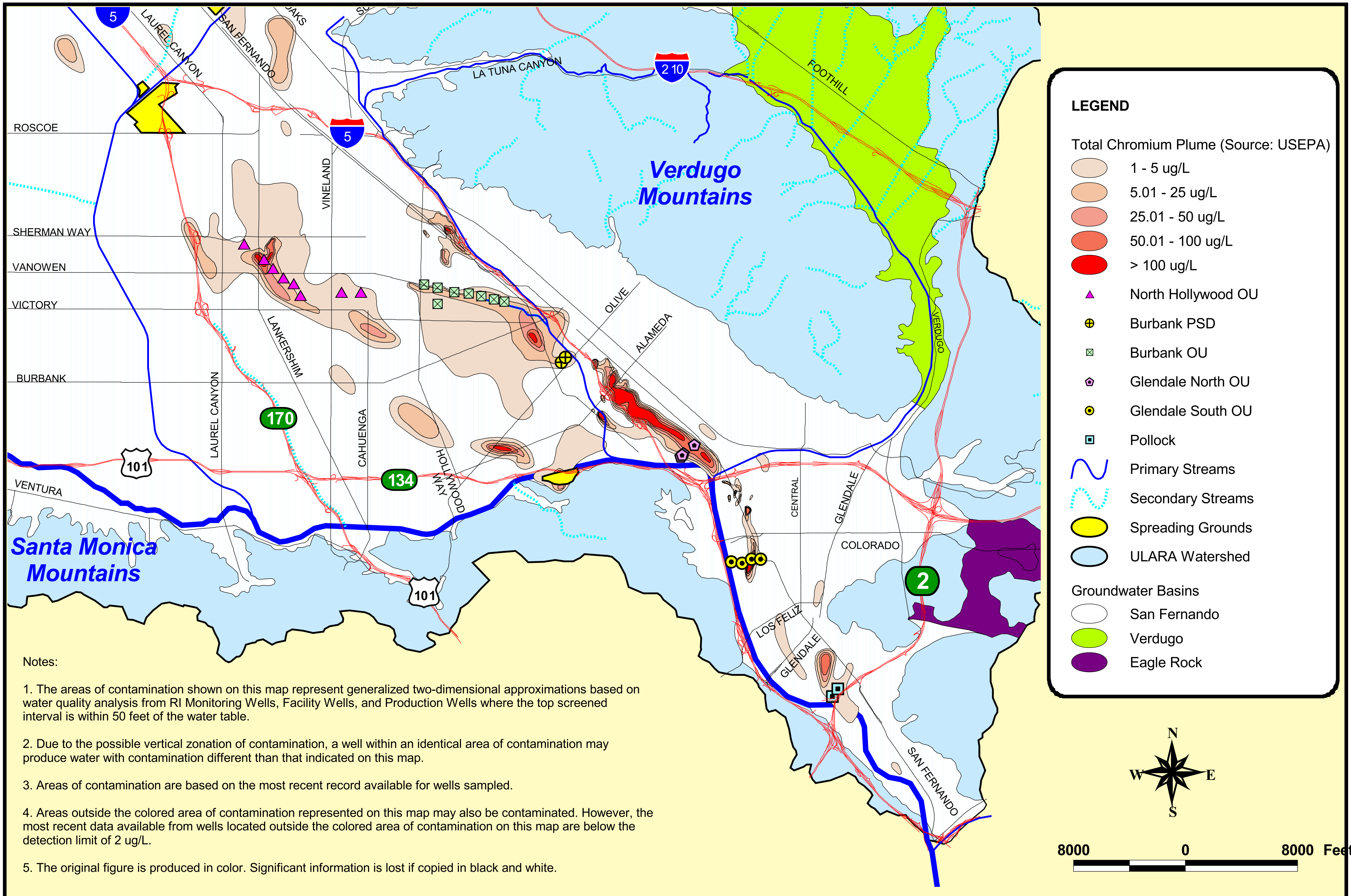
1. The areas of contamination shown on this map represent generalized two-dimensional approximations based on water quality analysis from RI Monitoring Wells, Facility Wells, and Production Wells where the top screened interval is within 50 feet of the water table.

2. Due to the possible vertical zonation of contamination, a well within an identical area of contamination may produce water with contamination different than that indicated on this map.

3. Areas of contamination are based on the most recent record available for wells sampled.

4. The original figure is produced in color. Significant information is lost if copied in black and white.

2012-123 Water Year ULARA Watermaster Report	Upper Los Angeles River Area: NO_3 Contamination (mg/L) in Shallow Zone in 2010	PLATE 16



Notes:

1. The areas of contamination shown on this map represent generalized two-dimensional approximations based on water quality analysis from RI Monitoring Wells, Facility Wells, and Production Wells where the top screened interval is within 50 feet of the water table.

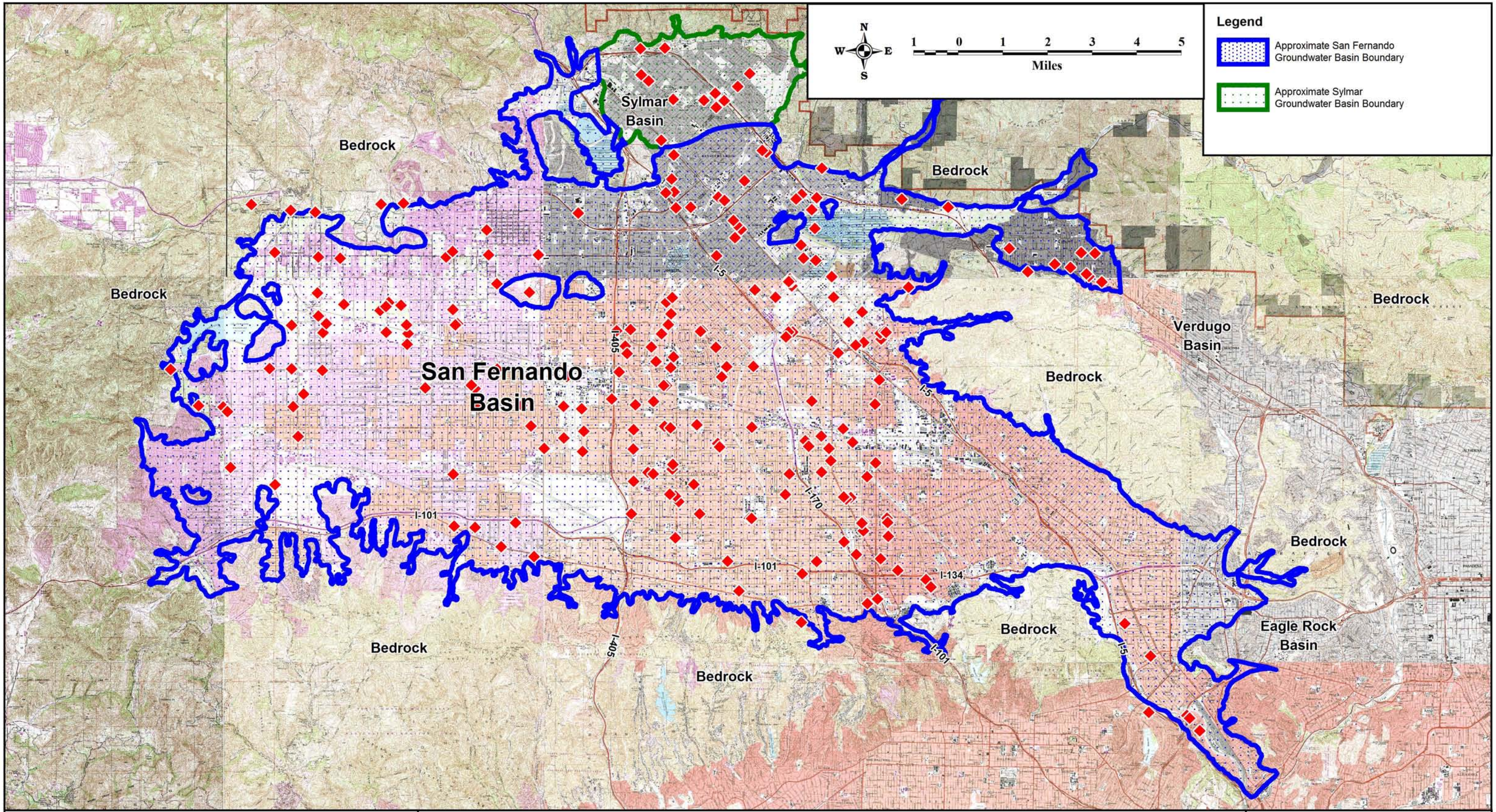
2. Due to the possible vertical zonation of contamination, a well within an identical area of contamination may produce water with contamination different than that indicated on this map.

3. Areas of contamination are based on the most recent record available for wells sampled.

4. Areas outside the colored area of contamination represented on this map may also be contaminated. However, the most recent data available from wells located outside the colored area of contamination on this map are below the detection limit of 2 ug/L.

5. The original figure is produced in color. Significant information is lost if copied in black and white.

2012-13 Water Year ULARA Watermaster Report	Upper Los Angeles River Area: Total Dissolved Chromium Contamination (ug/L) in Shallow Zone in 2010	PLATE 17



2012-2013 Water Year ULARA Wastermaster Report	Locations of LID Projects San Fernando & Sylmar Basins	PLATE 18

APPENDIX A
GROUNDWATER EXTRACTIONS

2012-13 WATER YEAR
(acre-feet)

LACDPW Well No.	Owner Well No.	2012 Oct.	Nov.	Dec.	2013 Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	TOTAL
							San Fernando Basin							
A. W. Warner Properties														
Plaza Six		0.70	0.67	0.76	0.81	0.81	0.79	0.72	0.80	0.64	0.68	0.61	0.65	8.64
A. W. Warner Properties														
Plaza Three		0.60	0.54	0.62	0.66	0.57	0.69	0.61	0.62	0.59	0.56	0.51	0.55	7.12
Angelica Healthcare Services		(abandoned 12/97)												
3934A	M050A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Avalon Encino														
---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bally, Nico														
---	---	0.06	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.07	0.07	0.07	0.61
BFI Sunshine Canyon Landfill														
---	---	5.98	5.45	6.44	8.05	7.03	7.69	8.43	7.16	5.55	5.19	5.38	6.68	79.03
Boeing (Rockwell International)														
---	E-1 to E-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Boeing Santa Susana Field Laboratory														
Delta	WS-09A	1.11	0.20	0.04	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.41
	RD-24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	RD-10	0.00	0.00	0.01	0.02	0.09	1.53	2.65	0.00	0.00	0.00	0.00	0.00	4.30
	Total:	1.11	0.20	0.05	0.08	0.09	1.53	2.65	0.00	0.00	0.00	0.00	0.00	5.71
Burbank, City of														
3841C	6A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3882P	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3851E	12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3851K	13A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3882T	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3841G	18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Burbank Operable Unit														
3871L	VO-1	0.00	0.00	6.50	78.83	80.36	101.96	84.62	148.76	144.66	144.24	95.54	88.51	973.98
3861G	VO-2	137.24	112.87	121.57	90.21	76.74	94.07	51.91	0.00	0.00	37.57	113.08	116.85	952.11
3861K	VO-3	117.14	128.95	90.46	77.46	94.83	107.21	113.58	143.87	123.22	120.34	117.33	79.19	1,313.58
3861L	VO-4	162.08	134.51	111.05	142.22	96.02	108.80	126.99	155.45	152.63	149.87	121.08	145.66	1,606.36
3850X	VO-5	153.01	82.47	79.16	55.45	73.88	124.67	102.51	139.22	91.74	112.06	101.87	120.10	1,236.14
3850Z	VO-6	126.89	159.73	65.87	54.26	42.32	208.28	153.58	135.18	139.21	176.20	203.20	165.16	1,629.88
3850AB	VO-7	183.03	157.02	79.89	99.29	90.56	114.64	134.72	102.14	152.33	116.20	154.03	144.46	1,528.31
3851C	V0-8	203.52	189.80	173.64	210.55	184.27	53.83	197.33	184.71	197.07	203.37	160.08	188.75	2,146.92
	Total:	1,082.91	965.35	728.14	808.27	738.98	913.46	965.24	1,009.33	1,000.86	1,059.85	1,066.21	1,048.68	11,387.28
Douglas Emmett Management, LLC (Trillium)														
Well #1	---	0.70	1.90	1.73	1.73	1.73	1.73	1.73	1.73	2.38	1.83	2.29	1.27	20.75
Well #2	---	1.84	1.04	0.49	0.49	0.49	0.49	0.49	0.49	0.35	0.36	1.44	0.81	8.78
	Total:	2.54	2.94	2.22	2.22	2.22	2.22	2.22	2.22	2.73	2.19	3.73	2.08	29.53
Fassberg Construction														
N/A		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
First Financial Plaza Site														
N/A	F.F.P.S.	0.91	0.91	0.91	0.72	0.93	1.00	0.99	1.05	0.83	0.88	0.87	0.62	10.62
Forest Lawn Memorial Park														
3947B	3	0.00	0.00	0.00	0.24	0.00	0.00	0.06	14.66	16.35	14.54	20.78	0.00	66.63
3947C	4	0.00	0.00	0.00	0.00	0.04	5.92	3.28	12.55	17.95	15.81	23.19	0.00	78.74
3947M	8	0.00	0.00	0.00	0.49	0.00	0.00	0.00	38.26	64.14	17.62	63.70	0.00	184.21
	Total:	0.00	0.00	0.00	0.73	0.04	5.92	3.34	65.47	98.44	47.97	107.67	0.00	329.58

2012-13 WATER YEAR
(acre-feet)

LACDPW	Owner	2012			2013									
Well No.	Well No.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	TOTAL
							San Fernando Basin (cont'd)							
Glendale, City of														
3924N	STPT 1	3.98	5.29	1.34	2.21	0.10	18.90	1.16	0.00	0.00	1.45	0.30	0.62	35.35
3924R	STPT 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
GVENT	GVENT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total:	3.98	5.29	1.34	2.21	0.10	18.90	1.16	0.00	0.00	1.45	0.30	0.64	35.37
Glendale North/South														
	GN-1	86.05	67.96	97.72	86.92	69.55	77.71	86.05	103.59	96.37	81.70	78.80	92.80	1,025.22
	GN-2	85.16	68.52	62.49	85.86	69.85	78.29	85.16	104.07	86.52	67.61	77.53	93.40	964.46
	GN-3	53.22	20.68	29.80	45.55	37.78	26.81	53.22	6.92	28.08	11.01	42.79	50.18	406.04
	GN-4	227.11	220.41	225.77	224.68	152.24	229.55	227.11	0.69	25.45	135.59	216.06	205.96	2,090.62
	GS-1	53.36	49.95	34.69	54.84	36.12	47.13	53.36	16.86	37.63	13.67	54.06	50.92	502.59
	GS-2	67.53	59.08	71.51	63.65	51.91	53.50	67.53	33.77	77.92	80.14	68.62	69.67	764.83
	GS-3	61.79	60.44	54.58	59.66	47.29	51.90	61.79	13.73	57.03	58.75	59.65	57.51	644.12
	GS-4	64.23	59.28	71.73	64.76	53.10	55.35	64.23	21.12	74.44	77.48	68.19	69.19	743.10
	Total:	698.45	606.32	648.29	685.92	517.84	620.24	698.45	300.75	483.44	525.95	665.70	689.63	7,140.98
Greeff Fabrics														
----	-----	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grigsby, Wood														
----	-----	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.05	0.05	0.05	0.36
Hallelujah Prayer Center of USA (Hathaway - successor to deMille)														
----	1	0.58	0.28	0.18	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	2.19
	2	0.70	0.21	0.48	0.72	0.50	0.50	0.94	1.22	0.40	0.00	1.90	0.34	9.91
	3	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.23
	Total:	1.51	0.49	0.66	0.77	0.55	0.55	0.94	1.22	0.40	0.00	1.90	0.34	9.33
Home Depot U.S.A., Inc.														
----		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Honeywell International, Inc.														
----		17.51	10.18	14.26	17.81	15.32	14.28	20.20	14.82	9.07	9.76	15.01	17.73	175.95
Jose Diaz (010022)														
---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khatcher Atamian (010006)														
----		0.08	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.19
Lopez-Zamarripa (010007T)														
---	---	0.07	0.04	0.04	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.12	0.12	0.79
Menasco/Coltec Site														
---	---	0.01	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.04
Mercedes Benz of Encino (Auto Stiegler)														
---	---	0.26	0.32	0.33	0.33	0.30	0.14	0.11	0.11	0.10	0.15	0.15	0.15	2.45
Metropolitan Transportation Authority														
---	1065	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
---	1075	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
---	1130	0.32	0.36	0.36	0.51	0.27	0.27	0.30	0.30	0.30	0.21	0.27	0.34	3.81
---	1140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
---	1150	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
---	1070	1.85	1.77	1.77	2.64	1.67	1.67	3.42	3.42	3.42	2.43	3.37	3.78	31.21
---	1133	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total:	2.17	2.13	2.13	3.15	1.94	1.94	3.72	3.72	3.72	2.64	3.64	4.12	35.02

2012-13 WATER YEAR
(acre-feet)

LACDPW	Owner	2012			2013									
Well No.	Well No.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	TOTAL
						San Fernando Basin (cont'd)								
Metropolitan Water District														
	Jensen	12.40	12.00	12.20	12.50	11.10	12.30	11.90	12.00	10.50	10.70	10.50	10.10	138.20
Micro Matics														
JEW	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JEW	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Middle Ranch (Successor to deMille)														
4931 x	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4940-1	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
new	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4940-3	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4940-2	7	0.78	0.30	0.02	0.13	0.07	0.07	0.08	0.06	0.14	0.33	0.56	0.57	3.11
new	8	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.65	0.76
Spring 1&2		0.02	0.01	0.02	0.01	0.01	0.02	0.03	0.03	0.04	0.04	0.04	0.03	0.30
	Total	0.81	0.32	0.04	0.15	0.09	0.10	0.13	0.10	0.19	0.38	0.61	1.25	4.17
Mobil Oil Corporation														
---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(NEIS) Northeast Interceptor Sewer City of LA BOS														
---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Raytheon (Formerly Hughes Missile Systems)														
----	-----	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Quaranto, John (010004)														
----	----	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00
Sears Roebuck & Co. (Well disconnected 10/2000)														
3945	3945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sportsmen's Lodge														
3785A	1	0.43	0.42	0.43	0.43	0.39	0.43	0.42	0.43	0.42	0.43	0.43	0.42	5.08
Stallcup, Jackosn & Susan (010021)														
---	---	0.01	0.02	0.00	0.01	0.01	0.05	0.05	0.10	0.04	0.09	0.14	0.07	0.60
3M-Pharmaceuticals														
---	---	4.25	4.06	3.66	3.47	3.56	4.02	3.08	3.39	2.94	3.17	3.06	2.96	41.62
Tesoro Petroleum Corporation														
---	MW-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Toluca Lake Property Owners Association														
3845F	3845F	0.55	1.99	1.12	0.40	0.33	0.52	3.79	1.81	3.73	5.08	3.33	1.74	24.39
Valhalla Memorial Park and Mortuary														
3840K	4	34.84	22.98	3.43	13.81	13.70	19.80	31.15	44.41	64.54	67.05	64.56	54.62	434.89
Vulcan Materials														
4916A	3	20.65	14.93	12.63	15.28	14.59	13.91	15.93	10.55	9.89	10.37	13.64	12.84	165.21
4916	2	32.57	25.71	20.56	25.64	29.46	25.20	25.72	16.94	15.63	14.38	15.49	12.48	259.78
4916(x)	1	29.55	22.63	1.03	7.43	21.51	22.38	24.80	18.24	17.06	18.79	23.37	21.37	228.16
Sheldon Pond		68.43	6.20	27.26	23.69	16.83	13.77	19.64	18.28	37.00	44.22	57.95	56.45	389.72
	Total:	151.20	69.47	61.48	72.04	82.39	75.26	86.09	64.01	79.58	87.76	110.45	103.14	1,042.87

2012-13 WATER YEAR
(acre-feet)

LACDPW Well No.	Owner Well No.	2012 Oct.	2012 Nov.	2012 Dec.	2013 Jan.	2013 Feb.	2013 Mar.	2013 Apr.	2013 May	2013 June	2013 July	2013 Aug.	2013 Sept.	TOTAL
							San Fernando Basin (cont'd)							
Waste Management Disposal Services of Calif.														
4916D		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Walt Disney Pictures and Television														
3874E	EAST	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3874F	WEST	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3874G	NORTH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Walt Disney Riverside Building														
---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Waterworks District No. 21														
---	---	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wildlife Waystation														
Rehab Canyon		0.08	0.08	0.08	0.08	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.40
Foreman Hill Spring		0.18	0.18	0.18	0.18	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	1.20
	Total:	0.26	0.26	0.26	0.26	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	1.60
Los Angeles, City of														
Aeration (A)														
3800E	A-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810U	A-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810V	A-3	4.32	5.81	3.28	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	13.45
3810W	A-4	6.66	7.90	5.05	0.00	0.00	7.37	0.00	0.00	8.33	3.58	0.00	0.00	38.89
3820H	A-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3821J	A-6	11.94	0.00	0.00	0.00	0.00	13.91	0.00	0.00	0.00	8.59	0.00	0.00	34.44
3830P	A-7	19.70	23.35	14.76	0.00	0.00	9.78	0.00	0.00	21.90	28.76	0.00	0.00	118.25
3831K	A-8	20.43	24.10	15.45	0.00	0.00	24.13	0.00	0.00	23.39	30.10	0.00	0.00	137.60
	A Total:	63.05	61.16	38.54	0.00	0.00	55.21	0.00	0.00	53.62	71.05	0.00	0.00	342.63
Erwin (E)														
3831H	E-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3821I	E-2A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3831G	E-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3821F	E-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3831F	E-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3821H	E-6	0.83	0.14	0.00	0.00	0.18	0.25	0.00	0.00	0.14	0.16	0.11	0.16	1.97
3811F	E-10	1.81	0.23	0.00	0.00	18.18	0.23	0.00	0.00	0.23	0.21	0.18	0.18	21.25
	E Total:	2.64	0.37	0.00	0.00	18.36	0.48	0.00	0.00	0.37	0.37	0.29	0.34	23.22
Headworks (H)		Inactive Well Field												
3893Q	H-27A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3893R	H-28A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3893S	H-29A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3893T	H-30A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	H Total:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2012-13 WATER YEAR
(acre-feet)

LACDPW	Owner	2012			2013									
Well No.	**Well No.**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**June**	**July**	**Aug.**	**Sept.**	**TOTAL**
						San Fernando Basin (cont'd)								
North Hollywood (NH)														
3800	NH-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3780A	NH-4	0.00	1.10	0.00	0.00	145.52	126.70	0.00	74.43	170.32	127.57	180.95	34.55	861.14
3770	NH-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810	NH-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810A	NH-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810B	NH-14A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3790B	NH-15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3820D	NH-16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3820C	NH-17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3820B	NH-18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3830D	NH-19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3830C	NH-20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3830B	NH-21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3790C	NH-22	1.08	0.21	39.30	0.00	0.18	1.33	0.00	115.27	247.13	185.56	261.41	204.87	1,056.34
3790D	NH-23	0.00	2.20	0.00	0.00	0.30	0.28	0.00	0.34	0.34	0.32	0.28	0.00	4.06
3800C	NH-24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3790F	NH-25	203.97	99.82	0.00	0.00	88.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	392.22
3790E	NH-26	360.93	168.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	529.30
3820F	NH-27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810K	NH-28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810L	NH-29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3800D	NH-30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3770C	NH-32	266.18	132.35	0.00	0.00	116.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	514.74
3780C	NH-33	0.00	0.00	0.00	0.00	138.34	141.83	0.00	83.31	190.66	142.81	202.57	38.68	938.20
3790G	NH-34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3830N	NH-35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3790H	NH-36	1.19	0.34	0.00	43.73	322.87	93.50	0.00	171.51	334.39	247.45	339.14	264.88	1,819.00
3790J	NH-37	0.83	0.25	0.00	0.00	189.81	184.39	0.00	114.97	278.67	205.60	284.30	229.25	1,488.07
3810M	NH-38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810N	NH-39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810P	NH-40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810Q	NH-41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3810R	NH-42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3790K	NH-43A	2.23	0.48	0.00	0.00	25.64	0.51	0.00	0.39	0.37	0.00	0.44	0.53	30.59
3790L	NH-44	1.63	0.57	0.00	0.00	309.30	106.50	0.00	154.25	376.88	282.21	380.69	232.67	1,844.70
3790M	NH-45	676.65	337.95	0.00	0.00	398.71	366.37	0.00	199.93	487.03	364.26	508.49	414.58	3,753.97
	NH Total:	1,514.69	743.64	39.30	43.73	1,735.31	1,021.41	0.00	914.40	2,085.79	1,555.78	2,158.27	1,420.01	13,232.33
Pollock (P)														
3959E	P-4	165.64	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	165.68
3958H	P-6	167.62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	167.62
3958J	P-7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	P Total:	333.26	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	333.30

2012-13 WATER YEAR
(acre-feet)

LACDPW	Owner	2012			2013									
Well No.	Well No.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	TOTAL
						San Fernando Basin (cont'd)								
Rinaldi-Toluca (RT)														
4909E	RT-1	1.65	0.73	0.00	0.00	0.67	0.48	0.00	0.69	0.46	0.57	0.57	0.41	6.23
4898A	RT-2	0.67	0.83	0.00	0.00	20.25	0.73	0.00	0.44	0.78	0.64	0.60	6.04	30.98
4898B	RT-3	0.62	0.87	0.00	0.53	0.99	0.53	0.00	0.37	0.48	0.73	0.51	4.59	10.22
4898C	RT-4	0.55	0.55	0.00	0.62	0.87	1.58	0.00	0.62	0.55	0.62	0.55	3.24	9.75
4898D	RT-5	466.18	6.38	0.00	0.00	0.00	0.00	0.00	0.23	0.34	0.46	0.48	0.67	474.74
4898E	RT-6	469.74	351.58	0.00	63.84	475.28	391.00	0.00	179.52	472.06	408.88	423.85	402.18	3,637.93
4898F	RT-7	0.85	0.55	0.00	0.44	0.53	0.76	0.00	0.39	0.37	0.62	0.37	4.20	9.08
4898G	RT-8	1.38	0.53	0.00	0.00	0.92	0.69	0.00	0.32	0.39	0.41	0.67	3.58	8.89
4898H	RT-9	480.88	0.62	0.00	66.69	97.20	0.55	0.00	190.22	509.44	446.97	472.77	459.32	2,724.66
4909G	RT-10	5.03	0.53	0.00	0.00	0.83	0.73	0.00	0.57	0.87	0.76	0.57	0.55	10.44
4909K	RT-11	0.80	0.64	0.00	0.00	0.71	0.53	0.00	0.83	1.10	0.69	0.48	0.55	6.33
4909H	RT-12	0.62	1.31	0.00	0.00	0.48	1.15	0.00	0.71	0.55	0.62	0.44	0.60	6.48
4909J	RT-13	0.60	1.24	0.00	0.00	0.44	0.64	0.00	0.64	0.51	0.57	0.55	0.53	5.72
4909L	RT-14	0.64	0.87	0.00	0.00	0.55	0.34	0.00	0.51	0.51	0.53	0.37	0.32	4.64
4909M	RT-15	0.11	0.09	0.00	0.00	0.07	0.05	0.00	0.07	0.05	0.05	0.07	0.07	0.63
	RT Total:	1,430.32	367.32	0.00	132.12	599.79	399.76	0.00	376.13	988.46	863.12	902.85	886.85	6,946.72
Tujunga (T)														
4887C	T-1	603.67	500.02	418.60	441.62	90.86	0.57	119.83	582.05	567.79	608.88	399.68	636.78	4,970.35
4887D	T-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4887E	T-3	659.37	543.43	454.52	480.42	583.43	534.89	413.41	0.00	0.00	0.00	0.00	0.00	3,669.47
4887F	T-4	0.71	0.00	0.71	0.71	0.71	1.40	99.06	573.23	560.58	100.46	0.00	0.00	1,337.57
4887G	T-5	2.18	2.18	2.18	18.18	211.64	0.00	0.00	0.00	0.00	128.01	370.91	594.90	1,330.18
4887H	T-6	443.16	525.90	432.78	463.04	563.73	529.20	550.64	619.56	596.07	678.44	384.71	619.26	6,406.49
4887J	T-7	407.28	491.85	412.01	434.39	528.63	486.25	505.21	560.51	532.60	596.99	335.65	532.07	5,823.44
4887K	T-8	2.30	2.00	1.65	0.67	0.00	0.96	0.60	1.22	1.35	0.48	1.31	1.06	13.60
4886B	T-9	0.78	0.00	0.78	2.30	1.54	0.78	0.78	0.78	0.78	1.54	0.00	0.78	10.84
4886C	T-10	4.45	1.49	0.73	1.49	1.49	0.00	1.49	0.73	0.73	1.49	0.00	0.73	14.82
4886D	T-11	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.69	0.69	0.69	0.67	0.69	4.12
4886E	T-12	2.23	0.73	0.73	16.37	558.59	512.49	535.54	607.69	593.55	661.25	380.07	612.14	4,481.38
	T Total:	2,126.13	2,067.60	1,724.69	1,859.19	2,540.62	2,066.54	2,227.25	2,946.46	2,854.14	2,778.23	1,873.00	2,998.41	28,062.26
Verdugo (V)														
3863H	V-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3863P	V-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3863J	V-4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3863L	V-11	0.62	0.32	0.00	0.00	0.00	0.32	0.00	0.00	261.91	211.98	205.07	209.16	889.38
3853G	V-13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3854F	V-22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3844R	V-24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	V Total:	0.62	0.32	0.00	0.00	0.00	0.32	0.00	0.00	261.91	211.98	205.07	209.16	889.38

2012-13 WATER YEAR
(acre-feet)

LACDPW	Owner	2012			2013									
Well No.	Well No.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	TOTAL
						San Fernando Basin (cont'd)								
Whitnall (W)														
3820E	W-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3821B	W-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3821C	W-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3821D	W-4	0.21	1.97	0.00	0.00	26.84	0.39	0.00	0.94	432.02	347.89	332.02	343.53	1,485.81
3821E	W-5	0.62	0.25	0.00	0.00	15.47	0.30	0.00	0.30	294.21	244.86	233.88	241.78	1,031.67
3831J	W-6A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3832K	W-7	0.41	0.14	0.00	0.00	0.00	0.00	0.00	0.44	157.62	127.57	117.01	0.18	403.37
3832L	W-8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3832M	W-9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3842E	W-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	W Total:	1.24	2.36	0.00	0.00	42.31	0.69	0.00	1.68	883.85	720.32	682.91	585.49	2,920.85
Los Angeles, City of														
Total:		5,471.95	3,242.77	1,802.53	2,035.04	4,936.39	3,544.41	2,227.25	4,238.71	7,128.14	6,200.85	5,822.39	6,100.26	52,750.69
San Fernando Basin Total:		7,495.56	4,955.23	3,291.41	3,669.95	6,334.89	5,246.45	4,072.84	5,772.43	8,896.68	8,033.04	7,887.47	8,046.75	73,702.70

						Sylmar Basin								
Los Angeles, City of														
Plant	Mission													0.00
4840J	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4840K	6	158.03	158.49	172.38	172.38	152.50	160.70	155.81	162.70	154.50	157.32	41.69	24.08	1,670.58
4840S	7	0.16	0.30	0.03	0.32	0.37	0.34	0.25	0.25	0.23	0.25	0.00	0.00	2.50
		158.19	158.79	172.41	172.70	152.87	161.04	156.06	162.95	154.73	157.57	41.69	24.08	1,673.08
Santiago Estates														
5998	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
						Sylmar Basin (cont'd)								
San Fernando, City of														
5969D	2A	255.30	213.23	172.10	190.96	178.57	222.98	247.21	271.22	264.21	286.60	287.86	280.31	2,870.55
5959	3	0.10	0.00	0.00	0.09	0.00	0.00	0.08	0.08	0.00	0.08	0.07	0.00	0.50
5969	4	38.29	33.49	30.08	32.89	27.62	29.28	28.43	32.26	41.29	41.29	40.28	37.76	412.96
5968	7A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total:	293.69	246.72	202.18	223.94	206.19	252.26	275.72	303.56	305.50	327.97	328.21	318.07	3,284.01
Sylmar Basin Total:		451.88	405.51	374.59	396.64	359.06	413.30	431.78	466.51	460.23	485.54	369.90	342.15	4,957.09

2012-13 WATER YEAR
(acre-feet)

LACDPW Well No.	Owner Well No.	2012 Oct.	2012 Nov.	2012 Dec.	2013 Jan.	2013 Feb.	2013 Mar.	2013 Apr.	2013 May	2013 June	2013 July	2013 Aug.	2013 Sept.	TOTAL
Verdugo Basin														
Crescenta Valley County Water District														
5058B	1	15.23	12.50	4.04	4.39	4.04	13.13	15.05	18.16	20.12	16.78	18.74	13.48	155.66
5036A	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5058H	5	52.28	49.38	49.67	49.03	46.74	50.19	42.49	42.75	42.16	42.40	41.42	39.30	547.81
5058	6	12.49	11.70	11.79	2.36	0.02	1.47	5.63	0.22	0.33	1.36	9.82	8.43	65.62
5047B	7	33.06	28.15	13.29	17.28	21.94	38.63	35.97	38.40	35.85	38.85	39.57	37.31	378.30
5069J	8	30.62	29.49	30.29	28.52	26.25	29.24	27.36	28.83	26.70	27.81	27.73	25.25	338.09
5047D	9	17.11	14.33	7.37	9.66	12.37	20.16	18.26	18.80	17.00	16.75	15.39	14.78	181.98
5058D	10	37.83	32.00	34.28	26.23	21.85	27.21	20.11	21.78	17.99	18.98	20.80	26.86	305.92
5058E	11	27.83	25.96	26.52	25.93	24.79	27.21	24.02	25.02	24.12	24.20	22.36	19.43	297.39
5058J	12	0.00	0.00	5.12	27.82	27.40	25.56	18.96	30.41	29.82	26.63	3.86	6.64	202.22
5069F	14	38.45	36.92	37.85	35.77	31.34	33.79	31.27	30.87	25.58	31.73	28.51	20.30	382.38
	15	3.95	1.94	3.36	1.35	0.01	0.56	0.10	0.01	0.00	0.00	0.00	0.00	11.28
	PICKENS (CVWD)	4.26	4.09	4.21	4.05	3.71	4.02	4.29	4.43	4.36	4.42	4.39	4.21	50.44
	Total:	273.11	246.46	227.79	232.39	220.46	271.17	243.51	259.68	244.03	249.91	232.59	215.99	2,917.09
Knowltons														
	PICKENS	0.80	0.80	0.96	0.82	0.74	0.96	0.96	0.96	0.80	0.82	0.82	0.82	10.26
Glendale, City of														
3961-397	GL3-4	60.43	58.30	61.27	61.79	56.03	62.44	57.04	60.86	60.01	27.13	0.00	0.00	565.30
3970	GL-6	43.72	44.15	44.28	44.01	28.61	45.65	41.07	42.42	39.27	45.24	44.61	39.41	502.44
---	VPCKP	36.13	27.14	35.49	41.34	39.18	43.81	37.97	35.04	41.29	36.78	35.05	20.83	430.05
---	MM-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FHM	16.00	15.37	15.68	15.64	14.05	15.19	14.85	14.90	14.57	1.14	18.35	16.40	172.14
	Total:	156.28	144.96	156.72	162.78	137.87	167.09	150.93	153.22	155.14	110.29	98.01	76.64	1,669.93
Verdugo Basin Total:		430.19	392.22	385.47	395.99	359.07	439.22	395.40	413.86	399.97	361.02	331.42	293.45	4,597.28
Eagle Rock Basin														
Sparkletts														
3987A	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3987B	2	2.95	4.18	3.08	3.93	3.22	3.92	4.83	4.45	4.04	4.85	4.44	3.98	47.87
3987F	3	1.17	3.02	2.31	2.86	2.48	2.95	3.63	3.11	2.44	1.80	2.91	3.63	32.31
3987G	4	7.26	8.46	6.37	8.06	6.98	8.34	8.40	10.00	8.19	9.33	9.12	9.93	100.44
	Total:	11.38	15.66	11.76	14.85	12.68	15.21	16.86	17.56	14.67	15.98	16.47	17.54	180.62
Eagle Rock Basin Total:		11.38	15.66	11.76	14.85	12.68	15.21	16.86	17.56	14.67	15.98	16.47	17.54	180.62

ULARA Total:	8,389.01	5,768.62	4,063.23	4,477.43	7,065.70	6,114.18	4,916.88	6,670.36	9,771.55	8,895.58	8,605.26	8,699.89	83,437.69

1. Quaranto, John did not report any extractions for the 2012-13 Water Year despite numerous attempts at contact. Further, for Khatcher Atamian and Stallcup, Jackosn & Susan, the shaded cells represent estimations of production based on historic use.

APPENDIX B
KEY GAGING STATIONS OF SURFACE RUNOFF

Los Angeles County Dept of Public Works USDAY V91 Output 10/29/2013

Summary Report

Site: F57C Los Angeles River Above Arroyo Seco
USGS #:
Beginning Date: 10/01/2012
Ending Date: 09/30/2013

Daily Mean Discharge in Cubic feet/second Water Year Oct 2012 to Sep 2013

JL 11/6/13.

Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	94.3	109	226	104	105	108	98.4F	117	110F	102F	125F	99.6F
2	94.5	107	314	106	103	107	101F	116	109F	102F	125F	97.1F
3	94.0	106	406	106	102	109	106F	110F	109F	102F	125F	94.6F
4	94.4	104	140	107	102	109	110	114F	108F	102F	125F	92.1F
5	95.1	102	100	107	107	110	111	116F	108F	102F	125F	90.0F
6	96.1	101	108F	128	106	111	112	118F	107F	102F	125F	91.5F
7	96.2	99.3	106	109	105	132	112	120F	107F	102F	125F	93.9F
8	96.3	97.7	104	109	140	1740	112	122F	107F	102F	124F	96.4F
9	96.5	96.2	108	112	195	115	112	124F	106F	102F	122F	98.9F
10	98.7	94.7	113	134	101	108	112	124F	106F	102F	118F	101F
11	851F	93.2	118	108	103	95.3	112	123F	105F	102F	115F	104F
12	94.4*	91.7	203	106	104	97.5	112	122F	105F	102F	113F	106F
13	97.7*	90.2	211	106	104	102	112	121F	104F	102F	111F	106F
14	101*	88.9	150	106	106	107	112	120F	104F	102F	109F	104F
15	103*	87.7	143	106	107	113	113	120F	103F	102F	108F	103F
16	105	86.5	120	105	107	123	112	119F	103F	102F	109F	101F
17	107	366	117	108	109	116	112	118F	102F	102F	112F	99.8F
18	107	372	134	115	109	117	112F	117F	102F	110F	115F	98.4F
19	107	106F	130	125	204	115	106F	116F	102F	125F	119F	97.1F
20	107	95.5F	109	137	382	120	102F	116F	102F	125F	124F	97.8F
21	107	89.1	107	145	106	113	106F	115F	102F	125F	129F	99.2F
22	107	91.8	108	156	103	111	106F	114F	102F	125F	133F	101F
23	107	94.6	118	166	103	109	105F	114F	102F	125F	130F	102F
24	107	96.3	1050	2350	102	96.0	95.1F	114F	102F	125F	125F	103F
25	108	96.7	116	472	104	93.5	109F	113F	102F	125F	121F	105F
26	110	93.5	397	199	104	87.5F	113	113F	102F	125F	116F	106F
27	110	88.9	112	360	106	89.2F	116	112F	102F	125F	113F	107F
28	110	113	106	136	107	90.8F	120	112F	102F	125F	110F	109F
29	110	191	283	103	------	92.5F	120	111F	102F	125F	107F	110F
30	110	817	108	104	------	94.3F	117	111F	102F	125F	105F	112F
31	110	------	105	105	------	96.1F	------	110F	------	125F	102F	------
Total	3932.2	4266.5	5770	6540	3436	4927.7	3298.5	3612	3129	3469	3665	3026.4
Mean	127	142	186	211	123	159	110	117	104	112	118	101
Max	851	817	1050	2350	382	1740	120	124	110	125	133	112
Min	94.0	86.5	100	103	101	87.5	95.1	110	102	102	102	90.0
Acre-Ft	7800	8460	11440	12970	6820	9770	6540	7160	6210	6880	7270	6000

GA

Wtr Year 2013	Total	49072.3	Mean	134	Max	2350	Min	86.5	Inst Max	2350	Acre-Ft	97330
Cal Year 2012	Total	54531.4	Mean	149	Max	2680	Min	46.1	Inst Max	2680	Acre-Ft	108200

area under construction station blocked JL

Los Angeles County Dept of Public Works USDAY V91 Output 10/21/2013

Summary Report

Site: F118C Pacoima Creek below Pacoima Dam
USGS #:
Beginning Date: 10/01/2012
Ending Date: 09/30/2013

10/22/13

Daily Mean Discharge in Cubic feet/second Water Year Oct 2012 to Sep 2013

Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0*	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	27.1	0	0
23	0	0	0	0	0	0	0	0	0	53.3	0	0
24	0	0	0	0	0	0	0	0	0	53.1	0	0
25	0	0	0	0	0	0	0	0	0	48.7	0	0
26	0	0	0	0	0	0	0	0	0	27.6	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	------	0	0	0	0	0	0	0
30	0	0	0	0	------	0	2.98	0	0	0	0	0
31	2.79	------	0	0	------	0	------	0	------	0	0	------
Total	2.79	0	0	0	0	0	2.98	0	0	209.8	0	0
Mean	.090	0	0	0	0	0	.099	0	0	6.77	0	0
Max	2.79	0	0	0	0	0	2.98	0	0	53.3	0	0
Min	0	0	0	0	0	0	0	0	0	0	0	0
Acre-Ft	5.5	0	0	0	0	0	5.9	0	0	416	0	0

GA

Wtr Year 2013	Total	215.57	Mean	.59	Max	53.3	Min	0	Inst Max	53.3	Acre-Ft	428
Cal Year 2012	Total	2.79	Mean	.015	Max	2.79	Min	0	Inst Max	2.79	Acre-Ft	5.5

Los Angeles County Dept of Public Works USDAY V91 Output 10/15/2013

Summary Report

Site: F300 Los Angeles River at Tujunga Avenue
USGS #:
Beginning Date: 10/01/2012
Ending Date: 09/30/2013

10/22/13

Daily Mean Discharge in Cubic feet/second Water Year Oct 2012 to Sep 2013

Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	59.8	51.4	142	79.0	81.5	75.1	83.6	65.3	91.3	76.2	66.5	72.0
2	59.9	53.1	221	77.5	79.9	74.5	77.5	72.4	80.7	71.5	66.0	70.1
3	60.4	54.5	671	79.2	77.7	76.8	76.8	63.4	82.4	76.2	69.6	67.2
4	60.5	52.3	83.8	79.4	78.6	79.2	77.2	61.7	86.3	72.3	70.1	67.6
5	62.0*	51.9	78.2	78.0	95.3	79.0	78.0	62.8	78.0	73.7	70.6	66.1
6	62.3*	49.4	74.5	81.2	94.5	79.4	77.0	743	75.8	72.7	68.6	69.3
7	63.0*	50.3	73.9	80.9	90.6	84.7	75.9	310	78.2	72.6	70.5	69.5
8	63.7*	57.2	79.2	79.2	171	1790	76.2	94.6	82.9	73.2	70.7	71.7
9	64.4*	62.7	78.5	84.3	226	107	76.3	96.2	80.7	70.1	70.8	70.0
10	65.1*	55.3	78.6	83.9	85.7	81.5	76.7	91.1	80.7	77.3	71.4	72.5
11	246*	53.9	75.6	80.7	90.6	77.4	72.8	83.5	78.5	101	71.5	69.4
12	71.0	60.0	78.3	79.7	93.1	79.1	73.3	80.7	82.4	106	72.6	69.7
13	56.9	76.1	462	78.7	91.7	77.9	71.9	82.6	77.3	93.3	68.9	69.3
14	55.4	51.7	82.3	77.8	91.4	73.4	73.1	80.1	79.7	100	68.5	68.6
15	44.8	51.6	112	77.9	92.0	73.8	75.2	79.5	82.9	94.5	65.4	68.5
16	33.3	78.8	89.3	76.4	87.0	76.3	73.9	82.1	77.9	88.8	70.9	68.9
17	32.0	642	115	77.4	85.6	74.4	72.6	86.2	76.9	91.3	71.7	69.5
18	49.6	188	622	77.4	88.2	74.8	74.3	84.0	79.9	89.4	73.2	68.7
19	51.0	63.5	78.6	80.6	197	76.0	73.9	82.6	80.1	89.4	79.3	58.4
20	57.4	70.5	73.9	82.2	388	80.5	73.1	82.9	79.2	92.2	92.0	71.1
21	58.4	68.5	74.7	81.1	84.7	76.0	73.4	82.8	78.2	92.0	80.4	76.9
22	62.4	72.0	75.1	81.9	81.4	75.3	74.9	89.8	77.1	88.3	73.1	72.4
23	66.6	74.0	104	83.5	76.7	75.7	73.8	87.7	71.4	74.5	73.3	70.8
24	56.5*	68.1	1550	1760	66.7	61.1	75.9	83.8	74.9	64.9	72.5	70.8
25	53.4	67.9	101	788	71.6	74.7	73.1	83.5	74.7	61.2	74.8	72.0
26	53.2	68.8	468	528	70.2	76.4	71.9	80.7	72.7	61.9	70.3	71.5
27	51.3	72.2	93.1	526	76.6	79.2	68.9	84.5	72.4	58.3	68.3	74.0
28	51.4	69.6	81.5	158	76.6	79.0	70.7	85.3	72.6	64.3	68.0	71.0
29	53.2	465	106	83.7	------	77.9	70.8	85.2	70.9	65.9	65.8	72.7
30	51.6	777	94.1	84.0	------	78.2	65.8	87.8	59.3	67.0	67.5	71.4
31	51.6	------	82.8	83.2	------	82.1	------	90.0	------	71.5	70.5	------
Total	1928.1	3677.3	6200.0	5848.8	2989.9	4126.4	2228.5	3425.8	2336.0	2451.5	2213.3	2101.6
Mean	62.2	123	200	189	107	133	74.3	111	77.9	79.1	71.4	70.1
Max	246	777	1550	1760	388	1790	83.6	743	91.3	106	92.0	76.9
Min	32.0	49.4	73.9	76.4	66.7	61.1	65.8	61.7	59.3	58.3	65.4	58.4
Acre-Ft	3820	7290	12300	11600	5930	8180	4420	6790	4630	4860	4390	4170

GA

Wtr Year 2013	Total	39527.2	Mean	108	Max	1790	Min	32.0	Inst Max	1790	Acre-Ft	78400
Cal Year 2012	Total	38182.8	Mean	104	Max	2540	Min	25.5	Inst Max	2540	Acre-Ft	75730

Los Angeles County Dept of Public Works USDAY V91 Output 10/02/2013

Summary Report

Site: F168B Big Tujunga Creek below Big Tujunga Dam
USGS #:
Beginning Date: 10/01/2012
Ending Date: 09/30/2013

Daily Mean Discharge in Cubic feet/second Water Year Oct 2012 to Sep 2013

10/2/13

Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10.4	8.33	3.96	5.25	4.22	3.70	1.24	1.47	1.71	1.32	3.76	3.87
2	10.2	8.42	3.97	5.31	4.23	3.63	1.17	1.48	1.70	1.25	3.63	3.93
3	10.2	8.56	4.02	5.43	4.23	3.59	1.03	1.32	1.90	1.27	3.82	4.18
4	10.2	8.70	3.95	5.49	4.11	3.74	.88	1.20	1.96	1.23	3.85	4.59
5	9.92	9.01	3.97	5.50	4.01	3.89	.94	1.19	1.83	1.34	4.14	4.52
6	9.76	9.31	3.97	5.59	4.10	3.99	1.07	1.70	1.74	1.21	4.39	4.61
7	9.68	9.62	3.97	5.65	4.16	4.49	1.21	5.24	1.65	1.22	4.40	4.48
8	9.59	21.4	3.99	5.68	4.34	5.37	1.33	1.67	1.64	1.30	4.22	4.15
9	9.35	35.2	4.01	5.69	4.09	4.20	1.32	1.61	1.60	1.44	4.07	4.58
10	9.16	34.5	4.02	5.28	3.94	4.16	1.45	1.56	1.64	1.58	4.04	4.43
11	9.00	33.9	4.14	5.79	3.92	4.36	1.53	1.57	1.52	1.67	4.05	4.60
12	8.75	33.2	4.41	5.81	3.86	3.93	1.48	1.61	1.52	1.57	4.00	4.24
13	8.65	21.6	5.06	5.80	3.81	2.56	1.49	1.63	1.43	1.43	4.00	4.27
14	8.43	6.61	4.67	5.90	3.80	.82	1.42	1.69	1.34	1.44	4.04	4.19
15	8.38	3.67	4.55	5.85	3.77	.83	1.43	1.88	1.27	1.43	4.21	4.20
16	8.21	3.71	4.43	5.81	3.78	.88	1.35	1.95	1.26	1.36	4.24	4.00
17	5.05	3.84	4.52	5.96	3.74	.93	1.30	1.85	1.22	1.30	4.19	3.93
18	5.28	3.81	4.56	5.94	3.68	1.19	1.26	1.91	1.33	1.26	4.18	3.91
19	5.56	3.78	4.42	6.05	3.87	1.28	1.21	1.53	1.23	1.23	4.21	3.82
20	5.84	3.77	4.43	6.22	3.87	1.19	1.02	1.45	1.31	1.26	4.16	3.96
21	5.93	3.76	4.50	6.29	3.67	1.08	1.00	1.53	1.30	1.25	4.41	3.84
22	6.24	3.77	4.61	6.36	3.70	.88	1.15	1.64	1.32	1.26	5.92	3.82
23	6.25	3.79	4.80	6.24	3.75	.61	1.29	1.67	1.39	.89	6.00	3.91
24	6.20	3.85	4.89	6.32	3.80	.30	1.45	1.66	1.51	.54	3.81	3.80
25	6.43	3.90	4.79	5.16	3.78	.09	1.21	1.68	1.41	1.14	3.78	3.97
26	6.65	3.96	5.22	4.94	3.78	.66	1.14	1.69	1.36	2.97	3.78	3.98
27	6.75	3.98	4.93	5.39	3.83	2.22	1.11	1.72	1.36	2.83	3.71	4.02
28	6.93	3.97	5.02	5.01	3.77	1.30	1.20	1.79	1.25	3.19	3.66	4.06
29	7.21	3.97	5.42	4.57	------	1.32	1.24	1.76	1.29	3.31	3.70	4.06
30	6.75	4.06	5.59	4.34	------	1.30	.90	1.78	1.26	3.49	3.75	3.95
31	8.32	------	5.47	4.20	------	1.23	------	1.79	------	3.69	3.83	------
Total	245.27	309.95	140.26	172.82	109.61	69.72	36.82	54.22	44.25	51.67	127.95	123.87
Mean	7.91	10.3	4.52	5.57	3.91	2.25	1.23	1.75	1.48	1.67	4.13	4.13
Max	10.4	35.2	5.59	6.36	4.34	5.37	1.53	5.24	1.96	3.69	6.00	4.61
Min	5.05	3.67	3.95	4.20	3.67	.09	.88	1.19	1.22	.54	3.63	3.80
Acre-Ft	486	615	278	343	217	138	73	108	88	102	254	246

Wtr Year 2013	Total	1486.41	Mean	4.07	Max	35.2	Min	.09	Inst Max	66.3	Acre-Ft 2950
Cal Year 2012	Total	2189.44	Mean	9.48	Max	35.2	Min	3.67	Inst Max	39.9	Acre-Ft 4340

Los Angeles County Dept of Public Works   USDAY V91 Output 10/21/2013

Summary Report

Site: E285 Burbank-Western Storm Drain
USGS #:
Beginning Date: 10/01/2012
Ending Date: 09/30/2013

10/22/13

Daily Mean Discharge in Cubic feet/second Water Year Oct 2012 to Sep 2013

Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.61	9.56	23.5	13.5	9.59	16.8	9.69	12.5	18.2	20.9	7.40	10.2
2	13.1	9.56	27.5	16.2	9.78	15.8	10.3	12.9	18.1	22.3	7.52	8.66
3	13.3	9.56	47.2	15.9	10.2	17.7	9.11	11.3	18.5	20.3	8.43	10.3
4	14.2	9.56	22.0	16.3	10.2	17.7	9.69	11.7	18.5	19.8	9.19	9.34
5	13.1	10.3	18.7	16.7	10.3	18.6	8.03	10.9	18.2	19.2	10.7	8.93
6	12.6	10.3	18.2	19.9	10.7	18.7	7.41	23.1	19.4	19.1	10.3	9.21
7	13.0	11.1	18.2	17.1	10.4	23.0	8.06	139	19.8	18.1	11.8	8.13
8	13.5	11.8	18.2	17.7	18.9	203	9.05	126	19.9	18.5	10.7	9.34
9	13.2	12.8	18.9	17.9	9.79	14.4	9.05	49.6	20.3	18.5	8.74	10.2
10	11.5	10.9	20.8	18.2	9.81	12.8	8.77	12.5	20.8	16.5	8.20	11.9
11	36.4	10.4	19.7	18.6	12.0	12.7	8.81	12.9	20.3	19.2	7.78	7.24
12	9.73	10.9	20.9	18.7	16.0	12.8	8.77	12.6	20.3	16.8	8.56	8.89
13	6.73	11.7	40.0	19.0	10.5	12.5	8.40	12.4	20.0	16.5	8.44	10.9
14	9.56	12.0	19.7	19.7	15.5	14.7	9.05	15.0	20.6	15.4	9.58	10.7
15	9.56	12.9	22.4	20.7	13.1	13.8	9.05	14.8	21.1	15.4	9.37	11.0
16	9.56	15.4	17.8	20.8	13.5	13.5	9.05	15.2	21.1	15.5	9.71	12.8
17	9.56	35.3	17.7	21.8	14.7	13.4	7.99	15.5	20.8	12.9	8.66	13.1
18	9.56	18.7	28.1	21.9	14.2	13.1	8.18	14.7	22.1	12.5	10.4	12.1
19	9.56	14.7	15.0	22.0	22.9	11.6	8.25	15.5	21.4	12.5	10.5	12.0
20	9.56	16.0	15.6	23.1	14.0	11.0	8.47	15.1	21.5	11.6	10.7	12.6
21	9.56	14.9	15.6	22.9	12.8	11.9	9.53	16.0	21.5	10.6	11.1	12.2
22	9.56	15.5	13.9	23.0	13.3	12.4	11.2	15.7	24.0	9.58	10.3	12.3
23	9.56	15.9	13.7	14.4	12.6	10.6	14.1	15.9	23.8	8.88	11.6	12.3
24	9.56	14.5	42.4	116	14.2	11.4	16.4	16.0	24.0	7.86	10.0	11.8
25	9.56	16.5	13.4	18.6	15.0	11.3	16.4	15.6	24.4	7.01	10.8	9.44
26	9.56	17.9	28.7	9.53	15.8	11.7	15.7	16.2	22.9	8.44	10.6	9.45
27	9.56	20.1	14.4	32.0	15.3	12.2	14.9	14.9	23.7	7.30	10.2	10.3
28	9.56	20.2	13.3	15.7	15.6	12.8	14.1	17.7	21.3	8.05	10.4	10.1
29	9.56	24.3	29.7	9.61	------	12.2	12.5	16.9	21.5	7.19	10.3	10.8
30	9.56	34.1	13.6	8.11	------	10.0	12.9	17.6	21.4	8.13	10.1	11.7
31	9.56	------	13.2	8.47	------	10.9	------	18.0	------	7.72	10.0	------
Total	352.05	457.34	662.0	654.02	370.67	615.0	312.91	733.7	629.4	432.26	302.08	317.93
Mean	11.4	15.2	21.4	21.1	13.2	19.8	10.4	23.7	21.0	13.9	9.74	10.6
Max	36.4	35.3	47.2	116	22.9	203	16.4	139	24.4	22.3	11.8	13.1
Min	6.73	9.56	13.2	8.11	9.59	10.0	7.41	10.9	18.1	7.01	7.40	7.24
Acre-Ft	698	907	1310	1300	735	1220	621	1460	1250	857	599	631

GA

Wtr Year 2013	Total	5839.36	Mean	16.0	Max	203	Min	6.73	Inst Max	203	Acre-Ft	11580
Cal Year 2012	Total	5412.95	Mean	14.8	Max	333	Min	4.09	Inst Max	333	Acre-Ft	10740

Los Angeles County Dept of Public Works USDAY V91 Output 11/06/2013

Summary Report

Site: F252 Verdugo Wash At Estelle Avenue
USGS #:
Beginning Date: 10/01/2012
Ending Date: 09/30/2013

11/6/13

Daily Mean Discharge in Cubic feet/second Water Year Oct 2012 to Sep 2013

Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.69	1.91	6.92	2.45	2.27	1.81	2.11	2.57	2.30	1.98	3.27	1.58
2	1.46	2.37	16.3	2.20	2.02	1.64	2.29	2.40	1.81	2.06	1.52	1.67
3	1.61	2.42	35.4	1.98	1.98	1.46	2.57	2.30	2.03	1.98	1.56	1.72
4	1.50	1.96	3.48	1.81	1.98	1.59	2.37	2.15	2.03	2.00	1.46	1.71
5	1.48	4.55	4.21	1.46	1.98	1.43	2.02	2.05	2.76	1.98	1.46	1.59
6	1.68	1.98	3.15	7.82	1.74	2.31	2.24	32.3	3.49	1.98	1.46	1.48
7	1.95	1.83	3.93	2.17	1.28	9.10	2.57	20.2	3.39	1.98	1.50	1.49
8	2.02	7.70	3.44	1.49	13.2	54.1	2.99	2.26	2.28	2.01	2.06	1.46
9	1.98	3.30	2.57	1.60	4.44	2.79	3.26	4.09	2.24	2.48	1.75	1.46
10	1.98	2.85	2.87	7.17	2.57	2.57	2.72	2.40	2.23	1.98	1.74	1.52
11	52.1	1.61	2.67	3.66	2.33	2.57	2.65	1.65	2.05	4.25	1.60	1.96
12	2.21	1.77	2.79	2.57	1.98	2.58	2.52	1.46	1.98	1.80	1.74	2.08
13	2.70	1.54	13.5	1.99	1.98	3.42	2.33	1.60	1.83	1.72	1.75	1.46
14	2.82	1.84	5.80	2.00	1.76	2.32	2.65	.86	1.73	1.49	1.51	1.61
15	3.25	1.66	6.40	2.71	2.20	1.98	6.79	.63	1.72	1.46	2.23	1.52
16	2.23	5.66	2.44	2.57	3.25	1.98	2.59	.63	1.77	1.51	1.74	1.56
17	1.83	23.7	2.45	3.23	4.01	2.00	2.66	3.14	1.68	1.46	1.49	1.46
18	1.83	8.63	34.2	4.29	5.81	1.81	2.34	1.80	1.51	1.57	1.88	2.02
19	1.59	2.06	.92	1.98	12.7	1.64	2.37	1.62	1.97	1.46	1.51	1.46
20	1.41	3.30	.81	1.98	11.2	2.02	2.35	1.70	2.27	1.46	1.46	1.46
21	5.83	3.06	.78	1.98	5.94	1.82	2.17	1.68	2.81	1.46	1.46	1.46
22	2.48	2.97	.76	1.98	2.75	2.17	2.19	1.73	2.35	1.87	1.60	1.46
23	6.31	3.23	.73	1.98	3.17	2.73	2.32	1.36	2.09	1.58	1.68	1.46
24	2.36	2.93	25.7	34.8	1.83	2.83	2.59	1.23	2.19	1.46	1.46	1.28
25	1.05	2.58	1.73	15.8	1.95	2.50	2.45	1.01	2.55	1.23	1.46	1.22
26	2.96	2.45	14.1	6.37	1.46	2.08	2.28	1.52	2.31	4.81	1.54	1.45
27	1.98	2.31	1.90	17.2	2.10	2.23	2.45	1.55	2.25	1.80	1.48	1.29
28	1.98	2.39	1.81	12.7	1.99	2.44	2.57	1.66	2.18	1.69	1.62	1.23
29	1.98	15.5	14.9	2.57	------	2.57	2.24	1.39	3.21	1.55	1.52	1.18
30	1.98	34.0	2.85	2.38	------	2.61	2.83	1.12	1.98	1.58	1.46	1.12
31	1.98	------	2.09	2.37	------	2.44	------	1.71	------	1.22	1.67	------
Total	120.21	154.06	221.60	157.26	101.87	127.54	78.48	103.77	66.99	58.86	51.64	45.42
Mean	3.88	5.14	7.15	5.07	3.64	4.11	2.62	3.35	2.23	1.90	1.67	1.51
Max	52.1	34.0	35.4	34.8	13.2	54.1	6.79	32.3	3.49	4.81	3.27	2.08
Min	1.05	1.54	.73	1.46	1.28	1.43	2.02	.63	1.51	1.22	1.46	1.12
Acre-Ft	238	306	440	312	202	253	156	206	133	117	102	90

GA

Wtr Year 2013	Total	1287.70	Mean	3.53	Max	54.1	Min	.63	Inst Max	54.1	Acre-Ft	2550
Cal Year 2012	Total	1944.57	Mean	5.31	Max	239	Min	.61	Inst Max	239	Acre-Ft	3860

APPENDIX C
COMPONENTS OF LOS ANGELES RIVER FLOW

UPPER LOS ANGELES RIVER AREA: COMPONENTS OF LOS ANGELES RIVER FLOW

2012-13 WATER YEAR

F-57C-R: Storm, Reclaimed, Industrial, Rising Ground Water
F300-R: Storm, Tillman, Industrial Waste, and Rising Water
E285-R :Storm, Burbank WRP, Industrial Waste
F252-R: Storm, Rising Water

TOTAL FLOW AT GAGE F-57C-R		
Total:	97,330	
I. RECLAIMED WATER DISCHARGED TO L.A. RIVER IN ULARA		
Tillman:	35,961	: Record
L.A.-Glendale:	12,898	: Record
Burbank WRP:	7,422	: Record
Total:	**56,281**	
II. INDUSTRIAL WATER and STORM FLOWS DISCHARGED TO L.A. RIVER IN ULARA		
Upstream of F300-R		
Industrial Water	92	: From F300-R separation of flow
F168	2,950	
F118	428	
Storm Flows @300	22,648	Storm flows less F168 and F118
	26,119	
Between F300-R and E-285		
Burbank OU	23	Burbank Operable Unit
MTA	35	
Storm Drains and Unaccounted water	3,370	: 4.7 cfs assumes 3,370
Headworks:	0	: pilot project record
Western Drain:	2,658	: From E285-R separation of flow
Storm Flows @285	1,686	
	7,772	
Between E-285 and F57C-R		
Storm Flows, DryWeather Flow, perennial stream flow, VPWTP @ 252	1,098	: From F252-R separation of flow
Glendale Operable Unit	451	
Eagle Rock Blow Off	0	
Pollock Treatment	0	
Sycamore Canyon	1,100	Estimated from historic flows
Storm Drains and Unaccounted water	2,757	: 3.8 cfs assumes 2757
	5,405	
Total Part II	**39,296**	
III. RISING WATER IN L.A. RIVER IN ULARA		
Total:	1,754	: See Section 2.3 of the Watermaster's Report

APPENDIX D
WATER QUALITY DATA

REPRESENTATIVE MINERAL ANALYSES OF WATER

Well Number or Source	Date Sampled	Spec. Cond. µS/cm	Mineral Constituents in milligrams per liter (mg/l) pH	Ca	Mg	Na	K	CO_3	HCO_3	SO_4	Cl	NO_3	F	B	TDS mg/l	Hardness as $CaCO_3$ mg/l
							Imported Water									
Colorado River Water at Eagle Rock Reservoir	2011/12 FY	548	7.9	49	19	65	3.6	-	117	152	71	1.5	0.9	0.1	435	198
State Water Project at Joseph Jensen Filtration Plant (effffluent)	2012/13 FY	870	8.3	24	12	58	2.6	-	-	48	76	2.2	0.8	0.2	290	110
Colorado River/ State Water Project Blend Point at the Weymouth Treatment Plant	2012/13 FY	870	8.1	58	22	82	4.2	-	-	180	88	2.2	0.8	150	530	240
LA Aqueduct No 1. Influent	2012/13 FY	354	8.5	33	21.0	26	12.0	15	131	26	28	0.5	0.7	0.5	224	98
LA Aqueduct Filtration Plant Influent	2012/13 FY	393	8.0	25	12.4	54	3.1	0.0	111	38	49	1.6	0.3	0.3	196	78
							Surface Water									
Tillman Rec. Plant Discharge to LA River	2012/13 FY	-	7.3	-	-	-	-	-	-	91	123	6	0.8	0.5	550	154
Los Angeles River at Arroyo Seco	9/95	981	8.0	68	24	97	9.8	ND	171	191	108	7.4	0.3	0.6	666	270
LA/Glendale Rec. Plant Discharge to LA River	2012/13 FY	-	7.3	-	-	-	-	-	-	119	140	5.5	0.6	0.4	635	229
							Groundwater									
							(San Fernando Basin - Western Portion)									
4757C (Reseda No. 6)	10/13/83	944	7.8	115	31	43	2.1	-	301	200	33	2.6	0.31	0.24	595	416
							(San Fernando Basin - Eastern Portion)									
3800 (No. Hollywood No. 33)	5/19/2004	-	7.6	82	27	134	4.9	-	204	336	66	3.3	0.4	0.5	781	317
3851C V0-8/Burbank No. 10	2012/13 FY	720	7.8	88	24	32	4.6	<2.0	290	74	28	23	0.5	0.2	470	320
Glendale OU GN-1	2012/13 FY	910	7.6	110	28	47	5.0	<2	260	140	-	37	0.3	0.2	580	380
							(San Fernando Basin - L.A. Narrows)									
3959E (Pollock No. 6)	11/19/2013	624	7.6	-	-	-	-	<2	227	76	37	14	0.3	0.1	378	240
							(Sylmar Basin)									
4840K (Mission No. 6)	2011/12 FY	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-
5969 (San Fernando No. 4A)	2011/12 FY	500	7.7	54	10	33	4.3	ND	180	50	21	22	0.3	-	320	180
							(Verdugo Basin)									
3971 (Glorietta No. 3)	2012/13 FY	980	7.0	94	35	46	3.2	ND	207	140	-	32	0.2	-	650	220
5069F (CVWD No. 14)	2/5/2013	802	7.8	88	31	32	3.2	ND	200	110	71	39	0.3	ND	520	350

APPENDIX E
DEWATERING AND REMEDIATION PROJECTS

DEWATERING PROJECTS

No.	Company	Contact	Address	Start Date
	Permanent Dewatering Required			
1	A H Warner Properties Plaza 3	Bernier, Dave	21650 Oxnard	June 4, 1997
2	A H Warner Properties Plaza 6	Bernier, Dave	21700 Oxnard	June 4, 1997
3	BFI Sunshine Canyon Landfill	Dave Hauser	14747 San Fernando Rd.	October 1, 2006
4	Brent & Miller	Brent, Stanley	4328 Mammoth Ave	January 13, 2000
5	Commercial Project	Helfman, Haloosim & Assoc.: Varadi, Ivan	5550 Topanga Canyon	June 19, 1989
6	Encino Spectrum Project	Helfman, Haloosim & Assoc.: Varadi, Ivan	15503 Ventura Blvd.	June 14, 1989
7	Glenborough Realty (First Financial)	Slade, Richard	16830 Ventura Blvd.	October 9, 1987
8	Home Savings of America	Eli Silon & Associates	13949 Ventura Blvd.	June 14, 1989
9	LAMCO	O'Neil, John	21300 Victory Blvd	April 27, 1988
10	La Reina Fashion Plaza	Blumenfeld, Dolores	14622 Ventura Blvd.	April 27, 1988
11	Mercedes Benz of Encino (formerly Auto Stiegler)	Bucnis, Mark	16721 Ventura Blvd.	October 31, 1987
12	Metropolitan Transportation Authority	Laury, Victor	Metro Red Line	April 1, 1995
13	Park Hill Medical Plaza	Anjomshoaa, Mahmoud	7303 Medical Center Dr.	December 27, 1989
14	Trillium	Arnold, Daryl	6310 Canoga Ave.	April 27, 1988
15	Warner Center Ent. Complex	Tsuchiyama and Kaino	5955 Owensmouth Ave.	June 26, 1989
	Potential for Future Dewatering			
1		Carter, Dennis	4547 Murietta Ave	
2		Eccleston, C. W.	22020 Clarendon St.	
3		Henkin, Doug	8806 Etiwanda Ave.	
4		Marks, Ronald	5348 Topanga Canyon	
5	Danalex Engineering		12050 Ventura Blvd.	
6	Danalax Engineering Corp.	Krell, Alex	11239 Ventura Blvd.	
7	Delta Tech. Engineering	Abbasi, Z. A.	12800 Ventura Blvd.	
8	Ellis Plumbing Co.	Ellis, Chris	4235 Mary Ellen Ave.	
9	Ellis Plumbing Co.	Ellis, Chris	19951 Roscoe Blvd.	
10	Helfman, Haloosim & Assoc.	Varadi, Ivan	21820 Burbank Blvd.	
11	Helfman, Haloosim & Associates	Varadi, Ivan	5350 White Oak Ave.	
12	Sherway Properties	Vasquez, Rodney	4477 Woodman Ave.	
13	Tarzana Office Plaza	Varadi Engineering	18701 Burbank Ave.	
14	T Violes Construction Company	Viole, Tim, Jr.	15840 Ventura Blvd.	
	Temporary Dewatering			
1	Avalon Bay	Rob Salkovitz	16350 Ventura Blvd	January 26, 2006
2	Eagle Rock Interceptor Sewer	Baron Miya	Bureau of Engineering	May 8, 2003
3	Fassberg Construction [2]	Jeff Hawthorne	16710 Ventura Blvd	May 1, 2009
4	Glendale Sewer Project	Andre Haghverdian	800 Air Way	October 17, 2007
5	MTA Underground Pedestrian Crossing	Tim Lindholm	MTA	November 1, 2001
6	MWD Sepulveda Feeder Pipeline Const.	David Dean	Jensen Plant	August 1, 1998
7	Northeast Interceptor Sewer	Nick Demos	Bureau of Engineering	October 1, 2001

Notes:

1) Start Date - Date project was brought to the attention of the ULARA Watermaster.
2) Fassberg Construction ended temporary dewatering operations during the 2010-11 Water Year

APPENDIX F
WHITE PAPER – "Is the San Fernando Groundwater Basin Undergoing a Long – Term Decline in Storage?"
(ATTACHMENTS ON FILE IN ULARA WATERMASTER OFFICE)

NOSSAMAN, GUTHNER, KNOX & ELLIOTT, LLP
Frederic A. Fudacz (SBN 050546)
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Attorneys for Upper Los Angeles River Area Watermaster

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

THE CITY OF LOS ANGELES, Plaintiff, v. CITY OF SAN FERNANDO, et al., Defendants.	Case No. C650 079 **NOTICE OF LODGING OF WATERMASTER WHITE PAPER RE: QUARTERLY STATUS CONFERENCE** <u>Conference:</u> Date: April 27, 2007 Time: 8:30 a.m. Dept: 52 Before the Hon. Susan Bryant-Deason

NOTICE IS HEREBY GIVEN that the court-appointed Watermaster hereby lodges with the Court the attached White Paper in connection with the quarterly Upper Los Angeles River Area Watermaster status conference scheduled for April 27, 2007, in Department 52 of the above-entitled Court.

DATED: March 23, 2007

NOSSAMAN, GUTHNER, KNOX & ELLIOTT, LLP
Frederic A. Fudacz
Alfred E. Smith

By: ______________________
Alfred E. Smith
Attorneys for Upper Los Angeles River Area Watermaster

PROOF OF SERVICE

The undersigned declares:

I am employed in the County of Los Angeles, State of California. I am over the age of 18 and am not a party to the within action; my business address is c/o Nossaman, Guthner, Knox & Elliott, LLP, 445 S. Figueroa Street, 31st Floor Los Angeles, California. 90071-1602.

On March 23, 2007, I served the foregoing **NOTICE OF LODGING OF WATERMASTER WHITE PAPER RE: QUARTERLY STATUS CONFERENCE** on parties to the within action by placing ( ) the original (x) a true copy thereof enclosed in a sealed envelope, addressed as shown on the attached service list.

(XX) (By U.S. Mail) On the same date, at my said place of business, said correspondence was sealed and placed for collection and mailing following the usual business practice of my said employer. I am readily familiar with my said employer's business practice for collection and processing of correspondence for mailing with the United States Postal Service, and, pursuant to that practice, the correspondence would be deposited with the United States Postal Service, with postage thereon fully prepaid, on the same date at Los Angeles, California.

( ) (By Facsimile) I served a true and correct copy by facsimile pursuant to C.C.P. 1013(e), to the number(s) listed on the attached sheet. Said transmission was reported complete and without error. A transmission report was properly issued by the transmitting facsimile machine, which report states the time and date of sending and the telephone number of the sending facsimile machine. A copy of that transmission report is attached hereto.

( ) (By Overnight Service) I served a true and correct copy by overnight delivery service for delivery on the next business day. Each copy was enclosed in an envelope or package designated by the express service carrier; deposited in a facility regularly maintained by the express service carrier or delivered to a courier or driver authorized to receive documents on its behalf; with delivery fees paid or provided for; addressed as shown on the accompanying service list.

Executed on _March 23, 2007.

(XX) (STATE) I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

( ) (FEDERAL) I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Charlyn Jones

ATTORNEYS OF RECORD

Name	Party
Ms. Julie Conboy Assistant City Attorney Office of the City Attorney Department of Water and Power 111 N. Hope Street, Suite 340 P.O. Box 5111 Los Angeles, CA 90051-5700 Telephone: 213-367-4579	Los Angeles
Mr. Dennis Barlow City Attorney 275 East Olive Avenue Burbank, CA 91502 Telephone: 818-238-5700	Burbank
Mr. Scott Howard City Attorney 613 East Broadway Glendale, CA 91205 Telephone: 818-548-2080	Glendale
Steven R. Orr, Esq. Richards, Watson & Gershon 355 South Grand Avenue, 40th Floor Los Angeles, CA 90071 Telephone: 213-626-8484	San Fernando
Mr. H. Jess Senecal, Special Counsel Lagerlof, Senecal, Swift and Bradley 301 North Lake Avenue - 10th Floor Pasadena, CA 91101 Telephone: 626-793-9400	Crescenta Valley, Vulcan-CalMat

ADMINISTRATIVE COMMITTEE AND ALTERNATES

Name	Party
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Mr. Mario Acevedo (Alternate) Groundwater Group Manager Department of Water and Power 111 North Hope Street, Room 1450 P. O. Box 51111 Los Angeles, CA 90051-5700 Telephone: 213-367-0932	Los Angeles
Mr. William Mace (Member) Assistant General Manager Water System Burbank Water and Power 164 West Magnolia Boulevard P. O. Box 631 Burbank, CA 91503 Telephone: 818-238-3550	Burbank
Mr. Bassil Nahhas (Alternate) Burbank Water and Power 164 West Magnolia Boulevard P. O. Box 631 Burbank, CA 91503	Burbank
Mr. Peter Kavounas (Member) Water Services Administrator City of Glendale 141 North Glendale Avenue Glendale, CA 91206-4496 Telephone: 818-548-2137	Glendale

Name	Party
Mr. Raja Takidin (Alternate) City of Glendale 141 North Glendale Avenue Glendale, CA 91206-4496 Telephone: 818-648-3906	Glendale
Mr. Tony Salazar (Member) Operations Manager City of San Fernando 117 Macneil Street San Fernando, CA 91340 Telephone: 818-898-7350	San Fernando
Mr. Dennis Erdman (Member) General Manager Crescenta Valley Water District 2700 Foothill Boulevard La Crescenta, CA 91214 Telephone: 818-248-3925	Crescenta Valley Water District
Mr. David Gould (Alternate) District Engineer Crescenta Valley Water District 2700 Foothill Boulevard La Crescenta, CA 91214 Telephone: 818-248-3925	Crescenta Valley Water District

UPPER LOS ANGELES RIVER AREA WATERMASTER

CITY OF LOS ANGELES VS. CITY OF SAN FERNANDO, ET AL
CASE NO. 650079 – COUNTY OF LOS ANGELES

MARK G. MACKOWSKI – WATERMASTER

OFFICE LOCATION:
111 North Hope Street, Room 1450
Los Angeles, CA 90012
TELEPHONE: (213) 367-0896
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MAILING ADDRESS:
ULARA WATERMASTER
P.O. Box 51111, Room 1450
Los Angeles, CA 90051-0100

March 22, 2007

The Honorable Susan Bryant-Deason
Judge of the Los Angeles County Superior Court
111 N. Hill Street, Dept. 52
Los Angeles, CA 90012

Dear Judge Bryant-Deason:

Subject: Meeting on April 27, 2007 to discuss the Decline in Storage in the San Fernando Groundwater Basin (basin)

At our last meeting with the Court on December 13, 2006 you generously offered to spend some time with the Watermaster and the Cities of Los Angeles, Burbank, and Glendale (Cities) to discuss the decline in groundwater storage in the basin during our next meeting on April 27.

As Watermaster for the Upper Los Angeles River Area (ULARA), I have been regularly informing the Court and the Cities regarding my growing concern over declining water levels and accumulating groundwater pumping credits in the basin.

In July 2005, I distributed a DRAFT White Paper to the Cities titled "Is the San Fernando Groundwater Basin Undergoing a Long-Term Decline in Storage?" describing the problems, causes, and some possible solutions. Since then, we have been meeting with the Cities in an attempt to resolve these issues.

In preparation for the April 27 meeting, I feel it is appropriate to share the enclosed White Paper with the Court so that you may become more familiar with the background and details regarding the decline in storage.

We look forward to meeting with you at 8:30 a.m. on April 27, 2007 to explore the challenges we face regarding the decline in groundwater storage in the basin.

If you have any questions or comments, please call me at (213) 367-0896.

Sincerely,

MARK G. MACKOWSKI
ULARA Watermaster

MGM:mm

c:
Mr. Bill Mace, City of Burbank
Mr. Peter Kavounas, City of Glendale
Mr. Thomas Erb, City of Los Angeles
Mr. Dennis Erdman, Crescenta Valley Water District
Mr. Ron Ruiz, City of San Fernando

<u>Watermaster Staff</u>
Mr. Mark G. Mackowski, Watermaster
Ms. Patricia T. Kiechler, Assistant Watermaster
Mr. Fred Fudacz, Special Counsel
Mr. Melvin Blevins, Consultant

Is the San Fernando Groundwater Basin Undergoing a Long-Term Decline in Storage?
by
Mark Mackowski, ULARA Watermaster
March 2007

Executive Summary

This report addresses the long-term decline in storage in the San Fernando Groundwater Basin (hereinafter SFB or "basin") caused by over-pumping due to an excessive allocation of water rights; reduced natural and artificial recharge; unaccounted underflow and rising groundwater leaving the basin; and unaccounted or under-accounted pumping by third parties. It also addresses the large accumulation of stored water credits for which there is insufficient actual water in storage, and makes recommendations to reverse these trends.

The Watermaster has discussed this issue in the Annual Watermaster Report for the last four years; has informed and updated the Court during the last two years; and in July 2005 presented a draft of this paper to the Cities of Los Angeles, Burbank, and Glendale (hereinafter "parties"). Subsequently, several workshops were held with the parties to answer their questions and discuss potential solutions.

The parties have responded by proposing to study several projects to increase long-term artificial recharge of the basin. The Watermaster fully supports those studies, but does not believe that the current proposed projects will be either timely enough or adequate to completely address the serious and ongoing decline in storage and avoid the potential for the basin to re-enter overdraft.

Introduction

This paper addresses the question: "Is the San Fernando Groundwater Basin undergoing a long-term decline in storage?"

Plate 13 (Attachment 1) of the 2004-05 Annual Watermaster Report illustrates the change in storage in the SFB between 1928 and Fall 2005.

It is clear that the SFB has experienced a progressive decline of real water in storage (Plate 13 blue line) since 1928. The decline began in 1944, and overdraft was eventually declared beginning in 1954 when water in storage had reached 210,000 acre-feet (AF) below the 1928 level. Litigation over water rights commenced in 1955, and continued until 1979 when the Judgment was entered. Section 4.2.6.1 of the Judgment states that the SFB **"...remained in overdraft continuously until 1968, when an injunction became effective. Thereafter, the basin was placed on safe yield operation."** (Safe yield operation means that extractions from the basin do not exceed recharge on a long-term average.) When safe yield operation was ordered by the Court in 1968 the basin was 655,370 AF below the 1928 level.

From 1968 until 1977, the amount of real water in storage (Plate 13 blue line) declined an additional 40,210 AF, to 695,580 AF below the 1928 level, despite the fact that the basin was supposedly under safe yield operation. Fall 1977 was the historically lowest level of basin storage.

Plate 13 shows a sharp increase in stored water beginning in 1977, suggesting that the basin began to recover. However, a large portion of the increase was due to water imported by Los Angeles to the SFB from outside sources such as the Owens Valley and spread at Tujunga Spreading Grounds, and was not part of the safe yield of the basin. Table 2-22 from Watermaster Relevant Data (Attachment 2) shows spreading from 1968-2005. Under the column "City of Los Angeles – Tujunga", 142,457 AF were spread from 1977-1987. Therefore, because Plate 13 (blue line) does not differentiate between various water sources that recharge the basin, the water level increase beginning in 1977 *does not* represent a significant recovery of the basin.

Furthermore, beginning in the late 1970s, groundwater extractions began to decline as a result of the decision in San Fernando that restricted pumping, especially by Glendale and Burbank, followed in the early 1980s by the discovery of widespread groundwater contamination that affected all the parties' ability to pump their full adjudicated rights (Relevant Data Table 2-1, Attachment 3). As a result, stored water credits began to accumulate rapidly, and continue to accrue whenever a party does not pump its full right. As of October 1, 2005 a combined total of 410,033 AF of stored water credits in the SFB belonged to Los Angeles, Burbank, and Glendale.

Section 8.2.10 of the Judgment requires the effects of stored water to be excluded from consideration when evaluating the safe yield. Judgment Section 8.2.10 states, **"Upon request of the Administrative Committee, or on motion of any party and subsequent Court order, Watermaster shall recalculate safe yield of any basin within ULARA. If there has been a material long-term change in storage over a base period (excluding any effects of stored water) in San Fernando Basin the safe yield shall be adjusted by making a corresponding change in native safe yield of the basin."**

The graph shown in red on Plate 13 is the result of subtracting stored water credits from the change in storage shown in blue, as required by Judgment Section 8.2.10. When stored water credits are subtracted from the change in storage, the basin is 914,508 AF below the 1928 level, and 259,138 AF below the 1968 level when safe yield operation was required to be implemented.

In summary, Plate 13 clearly shows that the SFB is undergoing a long-term decline in storage that is temporarily interrupted during above-normal rainfall or below-normal pumping. However, spread imported water from 1977-1987 and an ongoing large accumulation of stored water credits obscures this decline.

Import Return Credits

Import return water is defined by the Judgment as "Ground water derived from percolation attributable to delivered imported water."

The Judgment allows the parties to recapture a portion of delivered imported water based on the reasonable assumption that some of it percolates into the aquifer and is available for pumping once it reaches the groundwater table. This water accrues to the parties as import return credits using formulas provided in Section 5.2.1.3 of the Judgment.

The California Supreme Court decision (1975, Vol. 14-3d, p. 261-262, Attachment 4) states, **"Defendants contend that if any party is given rights to a return flow from delivered *imported* water, it is 'obvious' and 'axiomatic' that the same rights should be given to the return flow from delivered water derived from all other sources, including native water extracted from local wells. This argument misconceives the reason for the prior right to return flow from imports. Even though all deliveries produce a return flow, only deliveries derived from imported water add to the ground supply...Returns from deliveries of extracted native water do not add to the ground supply but only lessen the diminution occasioned by the extractions."**

Despite the unequivocal language in the Supreme Court decision, the Cities of Los Angeles, Burbank, and Glendale negotiated an agreement to use *all* delivered water in the formulas for calculating import return credits. In the "Memorandum re Proposed Settlement with Cities of Glendale and Burbank, City of Los Angeles v. City of San Fernando, et al., and Damage Cases" dated November 22, 1978, Item 4 on page 5 (Attachment 5) states, **"A fixed formula for determining Glendale and Burbank rights to return flow from delivered imported water, including recirculation rights, as being equivalent to 20% of all delivered water in the immediate watershed of the San Fernando Basin. This has been determined to be a better administrative method than the method based on 20.8% of delivered imported water to valley-fill lands, which method was presented to the Supreme Court and approved by that Court in this case. Los Angeles' return flow rights will be determined by a comparable fixed formula, also somewhat a [sic] variance with the Supreme Court language, but consistent with simple future administration."**

Furthermore, the language in the Judgment addressing import return credits is contradictory and appears to have been influenced by the aforementioned agreement. Section 5.2.1.1 states, **"Each of said parties has a right to extract from San Fernando Basin that portion of the safe yield attributable to such import return waters."** Section 5.2.1.3 states, **"The extraction rights of Los Angeles, Glendale, and Burbank...shall only extend to the amount of any accumulated import return water credit of such party by reason of imported water delivered after September 30, 1977."** The foregoing language is consistent with the Supreme Court decision, and implies that only delivered waters that are imported from outside the basin (such as from the Los Angeles/Owens Valley Aqueduct and the Metropolitan Water District) would qualify for import return credits. However, the formulas in Judgment Section 5.2.1.3 for calculating import return credits apparently contradict the Supreme Court decision, namely, "**Los Angeles: 20.8% of all delivered water...Burbank: 20.0% of all delivered water...Glendale: 20.0% of all delivered water...**"

Since 1979 the Watermaster Office has used the latter, more generous interpretation of the Judgment, giving the parties import return credits for *all* water delivered to their applicable service areas regardless of its source. This has caused the pumping of groundwater that would not have been allowed under the Supreme Court decision, and has also contributed to the accumulation of a large amount of stored water credits that are not supported by actual water in storage.

Thus, the Supreme Court decision and the technical issues related to basin hydrology were misunderstood, or not fully considered, in an effort to simplify the administration of the parties' rights, resulting in excessive groundwater pumping and an accumulation of pumping credits for which there is insufficient actual water in storage.

Changed Conditions in the SFB

Probable causes of the decline in storage also include changes in land and water use in the SFB.

The Report of Referee (1962) was accepted as prima facie evidence in San Fernando. Data for the Report of Referee was obtained in the late 1950s and early 1960s, which was used to calculate the safe yield of the SFB.

At that time, a significant portion of the land in the San Fernando Valley was still being used for agricultural purposes, or had not yet been developed. Rainfall runoff and irrigation water had a much better opportunity to percolate and re-enter the groundwater basin compared to the present, when much of the land has subsequently been developed and covered by rooftops, sidewalks, streets, and other "hardscape".

In addition, at the time the Report of Referee was prepared sewers had not yet been installed in much of the San Fernando Valley, and overflow from cesspool/septic systems was a significant source of recharge to the basin aquifer. During the 1956-57 Water Year, the Report of Referee estimated that 16,750 acre-feet per year (AF/Y) re-entered the groundwater basin from septic systems located in the SFB west of Burbank (Appendix N, Table N-7, p. N-32). Nearly everywhere in the SFB septic systems have been replaced by sewers, with a resulting decrease in recharge from this source. This has had the beneficial effect of eliminating a significant source of nitrate contamination, but has also contributed to the decline in storage. We have observed a similar phenomenon in the Verdugo Basin.

Present-day land and water use have changed in the intervening 40-50 years since the Report of Referee was researched and written, but provisions in the Judgment require the basin to be managed as if those conditions still exist.

Reduced Artificial Recharge

Artificial recharge capacity has declined in the basin during the past 20-25 years. 'Artificial recharge' means collecting rainfall runoff or imported water and percolating it into the groundwater basin at spreading grounds designed for that purpose.

Headworks Spreading Grounds (Headworks) is located on the Los Angeles River near Griffith Park. Headworks was operated until the early 1980s, when volatile organic compound (VOC) contamination was discovered in the underlying groundwater, and treated sewage effluent began to be discharged from Tillman Treatment Plant into the Los Angeles River. Headworks has not been used as a spreading ground since approximately 1982.

In the late 1990s, methane gas was detected at a school adjacent to the Sheldon-Arleta Landfill (SAL) and Tujunga Spreading Grounds (TSG). When stormwater is spread heavily at TSG, it compresses the air within the underlying vadose zone. Some of this air moves laterally and displaces methane gas from the adjacent SAL. The methane migrates out of the SAL, and some of it surfaces in the nearby neighborhood. To control this methane migration, spreading at TSG has been restricted to less than 100 cubic feet per second (cfs), or about 40% of the historic spreading capacity of 250 cfs. When storms produce runoff in excess of 100 cfs in the adjacent Tujunga Wash, this extra water cannot be diverted into TSG and is instead wasted to the ocean.

In addition, during past wet years, the Los Angeles County Department of Public Works (LACDPW) has curtailed spreading at Hansen Spreading Grounds (HSG) to prevent rising groundwater from inundating trash in the nearby Bradley Landfill. Alert levels were established nearby monitoring wells to monitor groundwater levels near the landfill. During the exceptionally wet winter of 2004-05 these alert levels were reached and spreading at HSG was stopped for a while, resulting in additional runoff being wasted to the ocean.

As a result of the elimination of Headworks and reduced spreading at TSG and HSG, a significant amount of stormwater runoff cannot be recharged into the SFB and is wasted to the ocean, especially during above-average rainfall years.

Safe Yield and Native Safe Yield

Safe Yield is defined by the Judgment as "The maximum amount of water which can be extracted annually from a ground water basin under a given set of cultural conditions and extraction patterns, based on the long-term supply, without causing a continuing reduction of water in storage."

Safe yield in the SFB consists of two parts: the aforementioned import return credits, and the native safe yield consisting of "native water", which the Judgment defines as "Surface and ground waters derived from precipitation within ULARA". The Judgment affirmed Los Angeles' exclusive Pueblo water right to all native groundwater in the SFB.

The safe yield and native safe yield of the basin were determined to be 90,680 AF/Y and 43,660 AF/Y, respectively, in 1964-65 (Judgment Section 4.2.4) but have not been re-evaluated since then.

Each year, the Judgment gives Los Angeles a native safe yield pumping credit of 43,660 AF/Y based on studies performed for the Report of Referee. In dry years, it is doubtful whether 43,660 AF actually recharge the SFB. In wet years the amount can be substantially larger. The long-term average native recharge is unknown. However, as previously mentioned, the hydrologic conditions that existed when the Report of Referee was written may no longer be present in the SFB today.

If the long-term native safe yield is lower than 43,660 AF/Y; it would contribute proportionally to the decline in storage we observe on Plate 13 (blue line) and an increase in stored water credits (Plate 13 red line) for which there is insufficient water in storage.

Basin Losses from Rising Groundwater and Underflow

Groundwater constantly flows out of the basin in two ways: via underflow in the Los Angeles River Narrows area, and through groundwater rising into the Los Angeles River channel that subsequently leaves the SFB as surface flow. (The City of Los Angeles recognized this, and constructed the Pollock Wells Treatment Plant to reduce the amount of excess rising groundwater leaving the basin by pumping and treating groundwater in the Narrows that is contaminated with VOCs.)

The average annual loss due to rising groundwater was approximately 3,442 AF/Y from 1979-2005. The average annual loss due to underflow through the Narrows area was approximately 400 AF/Y. The total average loss from the basin was therefore approximately 3,842 AF/Y from 1979-2005.

Although Judgment Section 8.2.9 requires the Watermaster to "...record and verify additions, extractions and losses..." there is no clear mechanism in the Judgment to debit the parties for groundwater that leaves the basin in ways other than through pumping. With the exception of minor losses debited from Los Angeles due to under-pumping at the Pollock Wells, losses due to rising groundwater and underflow have never been debited from the parties.

In summary, stored water credits accumulate indefinitely until they are pumped by the parties, but a portion of the actual groundwater is constantly leaving the SFB unaccounted through underflow and rising groundwater.

Hill and Mountain Pumping

Unauthorized pumping in the hill and mountain areas tributary to the SFB reduces the amount of underflow from these regions to the basin. The City of Los Angeles claims this native water as part of its Pueblo water right, and the Watermaster has begun a program to identify these pumpers, quantify their water use, and require them to enter a water license agreement with Los Angeles. Under the license agreement, licensees report their pumping to the Watermaster Office and pay Los Angeles for the amount pumped, and the Watermaster debits Los Angeles. There are unauthorized pumpers who do not have license agreements and who do not report their pumping to the Watermaster Office.

Dewatering

There are areas within the SFB that have a high water table. Projects within these areas sometimes pump groundwater to maintain dry excavations during construction. In addition, there are some dewatering operations that keep subterranean parking and other below-ground structures dry on a permanent basis. This water is typically discharged to the storm drain or sewer, and is thereby lost from the basin. The Watermaster has identified several permanent dewatering systems, and the owners of these properties report their pumping monthly to the Watermaster Office. However, our efforts to institute a reliable program to account for temporary construction dewatering within the basin have not been effective.

Conclusions

The Watermaster has historically calculated import return credits based on all delivered water. This is clearly inconsistent with the Supreme Court decision, and in the Watermaster's opinion is the single largest contributor to the imbalance between actual water in storage and the parties' stored water credits. The 1978 agreement among all three parties with respect to import return credits departed from the Supreme Court decision (Attachment 5) and, as applied under today's circumstances, is seemingly inconsistent with Section 5.2.1.1 of the Judgment.

Furthermore, import return credits of 20% may have been appropriate for hydrologic conditions in the late 1950s and early 1960s, but may now be too high considering the urbanization that has occurred in the San Fernando Valley during the last 40-50 years. However, Section 7.1 of the Judgment explicitly precludes the Watermaster, or even the Court, from modifying these formulas.

Although real water in storage has increased by 150,895 AF since safe yield operation was declared in 1968, stored water credits have accumulated to 410,033 AF since 1978. When stored water credits are subtracted from real storage (Plate 13 red line), the SFB is more than 914,000 AF below the 1928 level.

In other words, if the parties had pumped their full adjudicated rights, the basin would be more than 259,000 AF below the 1968 level at which safe yield operation was supposed to begin (Plate 13).

This clearly indicates that groundwater rights in the SFB are significantly "oversubscribed", and the basin is undergoing a long-term decline in storage that is effectively masked by the accumulation of stored water credits. An argument could be made that the basin re-entered a condition of overdraft in the late 1980s when the red line fell below the 1968 level.

The general downward trend of the change in real storage (Plate 13 blue line), beginning in the early 1980s and interrupted only temporarily during wet years, is also disturbing. Although we observed a significant rebound in basin storage in the 2004-05 Water Year due to above-normal rainfall and below-normal pumping by Los Angeles, similar occurrences in the past suggest that this effect will be temporary and short-lived.

The downward trend in real storage coincides with the cessation of spreading at Headworks Spreading Grounds in the early 1980s and has accelerated with a significant reduction of spreading capacity at Tujunga Spreading Grounds due to the migration of methane gas from the nearby Sheldon-Arleta Landfill. The decline in actual storage due to reduced basin recharge has been exacerbated because the parties have received pumping rights since their negotiated settlement in 1978 that the basin cannot support.

Recommendations

The Watermaster recommends that the safe yield of the SFB be re-evaluated. The 1979 San Fernando Judgment was based on a safe yield study conducted in 1964-65, more than 40 years ago. At that time, the SFB safe yield was calculated to be 90,680 AF/Y. However, basin hydrology can change significantly over time, and we do not know the existing safe yield of the SFB. If we are to resolve this problem and manage the basin properly in the future it is imperative that we re-evaluate the safe yield of the SFB, and continue to re-evaluate it periodically.

As a component of the safe yield, the native safe yield of 43,660 AF/Y may be too large, which would contribute to a continuing decline in stored water and exacerbate the imbalance between actual water in storage and stored water credits. A safe yield study, as recommended above, would determine whether the existing native safe yield is appropriate for current hydrologic conditions in the SFB.

The parties and the Watermaster could agree to allocate pumping rights consistent with the language and intent of the Supreme Court decision, namely, giving the parties import return credits only for the amount of *imported* water served to their customers.

Or, following a safe yield re-evaluation, the Watermaster could implement Judgment Section 8.2.10 to correct any imbalance in the basin by adjusting the native safe yield of the SFB. This solution would affect only Los Angeles' water rights, since it has the exclusive right to the entire native safe yield of the SFB under its Pueblo right. However, it is the Watermaster's opinion that implementing Section 8.2.10 of the Judgment in this manner would fail to address the major hydrologic cause of the current imbalance, and that the parties would continue to be given rights to water that are inconsistent with the Supreme Court decision.

A hydrologic study should be performed in the Narrows area to determine the actual amount of water lost due to underflow and excess rising groundwater, and the Watermaster and the parties should consider ways to account for this lost water. To that end, in March 2007 the ULARA Administrative Committee requested the Watermaster to conduct a study to determine ways to improve the methodology for the calculation of losses from the basin due to rising groundwater and underflow. While it is not practical to stop all rising groundwater and underflow, keeping water levels low in the Narrows through diligent pumping and monitoring would minimize these losses. As a related matter, Los Angeles should operate the Pollock Wells Treatment Plant at least 2,000 AF/Y to reduce the amount of rising groundwater that leaves the basin.

Tujunga Spreading Grounds should be restored to its full capacity without delay. Additional spreading and/or storage facilities, such as Boulevard Pit, should be acquired whenever possible. They may not be needed during dry-to-normal rainfall years, but their additional capacity would be invaluable during years when runoff exceeds our ability to store it using existing infrastructure.

Modernizing and upgrading facilities and operations at the spreading grounds might result in increased basin recharge. The Watermaster, LADWP, and LACDPW have begun to explore these opportunities within the framework of the Basin Recharge Task Force.

The parties and Watermaster should take advantage of opportunities such as the upcoming Los Angeles River Revitalization Master Plan to build projects that enhance basin recharge.

Hill and mountain pumping should be fully accounted. It may not be politically feasible to restrict it, but it is probably a component, albeit a small one, of the decline in stored water in the basin.

Likewise, permanent and temporary construction dewatering should be fully accounted. The Watermaster and the cities of Los Angeles, Burbank, and Glendale should develop a program to more closely track water lost from the basin due to dewatering.

It is the duty of the Watermaster to inform the parties and the Court about issues affecting the groundwater basins in ULARA. We look forward to working closely with the parties to reverse the decline in storage and ensure the long-term reliability of the SFB.

APPENDIX G
INTERIM AGREEMENT FOR THE PRESERVATION OF THE SAN FERNANDO BASIN WATER SUPPLY, 2008

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IF THE PARTY BECOMES A JUDGMENT CREDITOR.

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

THE CITY OF LOS ANGELES, Plaintiff, vs. CITY OF SAN FERNANDO, et al., Defendants.	CASE NO. **C 650 079** Assigned for All Purposes to the Honorable Susan Bryant-Deason **STIPULATION AND ~~[PROPOSED]~~ ORDER RE. INTERIM AGREEMENT FOR THE PRESERVATION OF THE SAN FERNANDO BASIN WATER SUPPLY**

This Stipulation re. Interim Agreement for the Preservation of the San Fernando Basin Water Supply ("Stipulation") is entered into this 19th day of Sept., 2007, by and among the City of Los Angeles, the City of Glendale and the City of Burbank (individually, "Party," and collectively, the "Parties"), all of whom are parties to this action, with reference to the following facts:

WHEREAS, on September 20, 2007, the Parties have entered into the *Interim Agreement for the Preservation of the San Fernando Basin Water Supply* ("Agreement"), a true and correct copy of which is attached hereto as Exhibit A.

WHEREAS, the Agreement is consistent with the 1979 judgment entered by stipulation in this action ("Judgment").

NOW, THEREFORE, the Parties hereby stipulate as follows and respectfully request that the Court enter the proposed Order submitted herewith:

The Parties stipulate that they have entered into the Agreement, the terms of which are hereby adopted and incorporated by this reference as though fully set forth herein.

The Parties further stipulate that the terms of the Agreement shall be judicially enforceable.

The Parties further stipulate to, and request that, the Court enter an order the terms of which are the same as the Agreement.

IN WITNESS WHEREOF, this Stipulation is entered into as of the first date set forth above.

Dated: Sept. 20, 2007

HATCH & PARENT, A LAW CORPORATION

BY Amy Steinfeld FOR:
SCOTT S. SLATER
STEPHANIE OSLER HASTINGS
ATTORNEYS FOR DEFENDANTS, CITY OF BURBANK AND CITY OF GLENDALE

Dated: Sept 24, 2007

CITY OF BURBANK

By:
Carolyn A. Barnes

Dated: Sept. 24, 2007

CITY OF GLENDALE

By: Christine Godinez
Christine A. Godinez

Dated: 24 Sept., 2007

CITY OF LOS ANGELES

ROCKARD J. DELGADILLO, City Attorney
RICHARD M. BROWN, General Counsel, Water and Power
JULIE CONBOY RILEY, Deputy City Attorney

By: Julie Conboy Riley
Julie Conboy Riley

INTERIM AGREEMENT
FOR THE PRESERVATION OF THE SAN FERNANDO BASIN WATER SUPPLY

This Interim Agreement for the Preservation of the San Fernando Basin Water Supply (Agreement) is entered into as of ________________ , 2007 between and among the City of Los Angeles acting by and through the Los Angeles Department of Water and Power (Los Angeles), the City of Glendale, a municipal corporation (Glendale) and the City of Burbank, a municipal corporation (Burbank) (each a Party and collectively, the Parties), with reference to the following facts and intentions, which the Parties agree are true and correct to the best of their knowledge and belief:

RECITALS

A. The Parties are parties to the 1979 judgment entered by stipulation in *City of Los Angeles v. City of San Fernando* (California Superior Court Case No. 650079) (the Judgment). Each Party holds rights in and to the San Fernando Basin (Basin), one of the several groundwater basins subject to the Judgment, as set forth in the Judgment. The Parties are also all of the voting members of the Administrative Committee of the Basin, which is authorized by Section 8.3 of the Judgment.

B. The Basin has been, and continues to be, operated in accordance with the terms and conditions of the Judgment. The Superior Court of the County of Los Angeles (Court) retains continuing jurisdiction over the Judgment and the parties to it.

C. On March 23, the Upper Los Angeles River Area Watermaster (Watermaster), which is authorized by Section 8 of the Judgment to assist the Court in its administration and enforcement of the provisions of the Judgment, filed a White Paper with the Court expressing two concerns that the Parties seek to redress by agreement: (i) a reduction in the stored water in the Basin; and (ii) the accumulation of Stored Water credits, as that term is defined in Section 5.2 of the Judgment, by the Parties in excess of the quantity of water available to be pumped by them.

D. The Parties wish to enter into this Agreement to promote a physical solution to the observed falling groundwater levels by promoting artificial replenishment of the Basin in a manner that ensures the viability of the Basin as a long-term reliable water supply. The Parties also wish to enter into this Agreement to provide interim guidelines on the Parties' exercise of their Stored Water credits so as to avoid harm to the Basin.

E. The Parties wish to coordinate their actions to circumvent unnecessary and potentially protracted litigation over the meaning and implementation of the Judgment.

AGREEMENT

NOW, THEREFORE, in consideration of the foregoing recitals, which are incorporated into the operative provisions of this Agreement by this reference, and for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the **PARTIES HERETO AGREE** as follows:

1. **Purpose.** The purpose of this Agreement is to address two issues: (a) reduction in the stored groundwater in the Basin; and (b) the accumulation of Stored Water credits by the Parties in excess of the quantity of water available to be pumped by them. By entering into this Agreement, and by undertaking the actions described herein, the Parties seek to ensure that necessary long-term improvements are made to capture and recharge sufficient quantities of rainfall whenever available to correct declining water levels and to guard against any short-term deficiencies in Basin replenishment as might be associated with drought conditions. In the interim, while these Projects are being implemented, the Parties also agree that some guidelines must be established to avoid harm to the Basin and all Parties.

2. **Term.** The term of this Agreement shall be ten years and shall commence with the 2007-08 Water Year (beginning October 1, 2007). The 2007-08 Water Year shall be Year 1; the 200 8-09 Water Year shall be Year 2, and so on. At the conclusion of the term of this Agreement, on or about September 30, 2017, the Parties, in coordination with the Watermaster, will evaluate the effectiveness of this Agreement including, but not limited to, the status of the Projects, and determine whether this Agreement shall be extended.

3. **Enhancement of Recharge Capacity.** Los Angeles has previously expressed its support for several artificial recharge projects. The Parties acknowledge that if implemented as planned, these projects, individually and collectively, will augment replenishment of the Basin in a manner that arrests the observed decline in groundwater levels. The projects presently being pursued include, but are not limited to: the Sheldon-Arleta Project, the Big Tujunga Dam Seismic Restoration Project, the Hansen Spreading Grounds Project, and the Tujunga Spreading Grounds Project (collectively, the Projects).

3.1 By the conclusion of Year 10, Los Angeles, in collaboration with the Los Angeles County Department of Public Works (a separate public agency which is not a party to this Agreement), intends to support and contribute resources towards the design, construction and implementation of the Projects in a manner that increases the Basin's total artificial recharge capacity over conditions existing as of the date of this Agreement. By taking these actions, Los Angeles anticipates that the long-term average native replenishment of the Basin may be increased by at least 12,000 acre-feet per year. Although the exact quantity of additional recharge that will be derived from these Projects, when completed, is unknown and is dependent ultimately on the quantity and variability of precipitation, it is reasonable to assume the additional recharge of the Basin made possible by these Projects will be substantial. While Los Angeles may also elect to contribute funding towards these Projects, this Agreement does not obligate Los Angeles to fund any of the Projects either in part or in whole.

3.2 Mutual Cooperation. Burbank and Glendale agree to coordinate and cooperate with Los Angeles and the Los Angeles County Department of Public Works as may be necessary to increase the likelihood of timely implementation of the Projects.

3.3 Reporting. Within 60 days of the conclusion of each Water Year during the term of this Agreement, Los Angeles shall file a report with the Administrative Committee, the Watermaster and the Court documenting the status of the Projects, including but not limited to the extent by which the Projects have increased the Basin's total artificial recharge capacity.

4. Pumping Limitation. For the term of this Agreement, the Parties agree not to pump their pro-rata share of the total Stored Water credits held by the Parties collectively that, if pumped, would cause the total quantity of water in storage to fall below -655,370 acre-feet (the 1968 level). The quantity of water that the Parties otherwise could have pumped pursuant to their respective Stored Water credits shall be placed in a reserve, and not lost, until such time as there is sufficient water in storage to permit the pumping of those credits without causing the quantity of water in storage to fall below the 1968 level.

4.1 Calculation of Available Stored Water Credits and Reserved Stored Water Credits. The Parties authorize the Watermaster to calculate, annually, the quantity of Stored Water credits available to be pumped by each Party (Available Stored Water credits) and the quantity of Stored Water credits reserved for later use by each Party (Reserved Stored Water credits), as agreed upon herein.

(a) For purposes of making this calculation, the Watermaster shall: (1) compute each Party's Stored Water credits as of the first day of each Water Year for the term of this Agreement, including the one percent (1%) loss described in Section 5 below; (2) assign a percentage to each Party that reflects the relative proportion of each Party's Stored Water credits to the total quantity of credits available to all Parties; (3) determine the quantity of Stored Water available to be pumped by all Parties and calculate each Party's relative proportion of that total quantity; and (4) calculate the quantity of Stored Water Credits not available to be pumped in that Water Year and reserved for later use. For the 2006-07 Water Year (beginning October 1, 2006), which is not subject to this Agreement, the calculation would be as follows:

Party	Stored Water Credits (AF), Minus 1% Losses	Percentage of Total Quantity of Stored Water Credits for Each Party	Available Stored Water Credits (AF)	Reserved Stored Water Credits (AF)
Los Angeles	370,350	83.146%	139,018	231,334
Glendale	61,215	13.743%	22,978	38,236
Burbank	13,859	3.111%	5,202	8,656
Total	**445,424**	**100%**	**167,198**	**278,226**

4.2 Exception to Satisfy Consent Decree Obligations. Nothing herein shall be construed as causing Burbank or Glendale to pump less groundwater from the Basin than required by the United States Environmental Protection Agency's Consent Decrees for the Burbank Operable Unit [Civil Action 91-4527-MRP (Tx), dated 06-22-1998] and the Glendale North and South Operable Units [CV99-00552 MRP (ANx), dated 05-17-2000], respectively, all of which are incorporated by this reference as if fully set forth herein, and as may be modified or amended from time to time during the term of this Agreement (collectively, Consent Decrees). In the event that the pumping limitations set forth in Section 4 above are triggered by a decline in storage, Burbank and Glendale may pump Reserved Stored Water credits to meet their Consent Decree obligations subject to the following conditions:

(a) In the event Los Angeles is able to produce the full quantity of its Extraction Right to meet the water requirements of its inhabitants for the Water Year in which Glendale's or Burbank's Available Stored Water Credits are not sufficient to meet that Party's Consent Decree obligations, Glendale or Burbank shall be required to purchase Physical Solution water pursuant to Section 9.4 of the Judgment as necessary to meet their respective Consent Decree obligations. For purposes of this Agreement, "Extraction Right" shall mean the total quantity of Los Angeles' Return Water Extraction Right plus Native Safe Yield Credit, as set forth in Table 2-1 1A of the Watermaster's most recent annual report prepared pursuant to section 8.2.11 of the Judgment.

(b) In the event the conditions of paragraph 4.2(a) above are not satisfied, Los Angeles may elect to exchange water or stored water credits with the Party requiring additional water to meet its Consent Decree obligations upon such terms and conditions as the affected Parties may agree upon. In the event an agreement to exchange water or stored water credits sufficient to permit either Glendale or Burbank to satisfy their Consent Decree obligations cannot be reached, Glendale or Burbank may pump Reserved Stored Water credits as necessary to meet their Consent Decree obligations, subject to Paragraph 4.2(c) below.

(c) Any pumping by Glendale and Burbank of Reserved Stored Water credits pursuant to this exception shall not exceed a maximum combined total of 2,000 acre-feet per year over the term of this Agreement. Any pumping in excess of a combined total of 2,000 acre-feet per year over the term of this Agreement shall be pursuant to Section 9.4 of the Judgment.

4.3 Exception for Unforeseen Circumstances. Additionally, to the extent that any Party is required to pump water in excess of that Party's Available Stored Water credits and in reliance upon that Party's Reserved Stored Water credits, to meet presently unspecified federal or state regulatory obligations that may be established in the future or unforeseen material changes in the Parties' operations or Basin conditions, the affected Party(ies) shall coordinate with the Administrative Committee and the Watermaster to determine whether and to what extent additional quantities of groundwater may be extracted in a manner that does not cause harm to the Basin or any other Party.

5. Account for Groundwater Losses. The Parties acknowledge that Stored Water losses may occur from the Basin. The Parties further acknowledge that Section 8.2.9 of the Judgment requires the calculation of such losses from Stored Water. The Parties estimate that as much as one percent (1%) of all Stored Water is lost from the Basin annually.

5.1 For the term of this Agreement, or until such time as the Basin loss calculation is re-evaluated, the Parties authorize Watermaster to deduct one percent (1%) annually from each Parties' respective Stored Water credits account.

6. Basin Safe Yield Study. The Parties acknowledge that, from time to time, it may be appropriate to study information regarding the hydrology of the Basin, including the Basin's Safe Yield, as that term is defined in the Judgment.

6.1 Within six months of the date of execution of this Agreement, the Parties, in coordination and consultation with the Watermaster, will develop a proposal for conducting a study of the Basin's Safe Yield. The proposal will include each of the following elements: (1) timing for designing, conducting and implementing the study and each of its phases, (2) trigger(s) and parameters for implementing the study, or any part or phase, (3) procedures for managing and allocating costs and for authorizing expenditures during and throughout the study; (4) methods and manner for conducting the study; and (5) anticipated goals or outcomes of the study. Thereafter, the Parties will commence a study of the Basin's Safe Yield that is consistent with the proposal required by this Section, as may be agreed upon by the Parties.

6.2 In the event the Parties are unable to agree to a proposal for studying the Basin's Safe Yield within six months of the date of execution of this Agreement, the Parties, individually or collectively, shall lodge their respective proposals, if any, with the Court. The Court, upon at least 30 days notice thereof and after a hearing, shall make such further or supplemental orders as may be necessary or appropriate and consistent with the Judgment.

7. Recalculation of Safe Yield. Regardless of any information collected or reports made pursuant to Section 6 above, the Parties agree to forebear from exercising any and all rights they may have arising under or related to Section 8.2.10 of the Judgment for the term of this Agreement, except as may be necessary to respond to, support or oppose any Watermaster recommendation or action that may be inconsistent with this Agreement, the provisions herein, or any Party's respective rights, remedies and defenses arising under the Judgment or applicable law. After the expiration of this Agreement, the rights of any and all Parties arising under or related to Section 8.2.10 will not be prejudiced by the existence of this Agreement or their agreement to forebear pursuant to its terms.

8. Annual Accounting by Watermaster. Watermaster will collect, record and verify, or otherwise arrange for the collection, recordation and verification of, any and all data and information as may be required or generated by this Agreement and as may be otherwise directed by the Administrative Committee or the Court. Upon written request by any Party, all such data and information shall be made available to the Parties. The

Watermaster shall include such data and information in its annual Watermaster Report, prepared pursuant to Section 8.2.11 of the Judgment, a copy of which is filed with the Court.

9. Administrative Committee and Watermaster Authority. Watermaster and the Administrative Committee are not Parties to this Agreement. This Agreement is made among the Parties and nothing herein shall be construed as a limitation on the powers and responsibilities of the Administrative Committee or the Watermaster arising under the Judgment.

10. Reservation of All Rights. Subject to Section 7 above, neither this Agreement, nor any provision herein, shall be construed as a waiver or limitation on any Party's respective rights, remedies and defenses arising under the Judgment or applicable law including, but not limited to, the right to respond to, support or oppose further Watermaster recommendations.

11. Consistency with Judgment and Continuing Jurisdiction. The actions contemplated by this Agreement, if implemented, facilitate a physical solution and are intended as measures that arise under, are consistent with, and in furtherance of, the Judgment. Accordingly, this Agreement shall be subject to the Court's continuing jurisdiction as provided by Section 7 of the Judgment.

12. Further Actions. The Parties contemplate that additional opportunities may arise to further augment the available yield of the Basin during the term of this Agreement. Upon a request by any Party, the Watermaster or the Administrative Committee, the Parties will exercise good faith to fairly evaluate opportunities to exchange water, enhance recharge, evaluate a replenishment program and conserve water. Further, Burbank is actively pursuing an inter-connection with the Metropolitan Water District of Southern California to permit the delivery of replenishment water to Burbank for storage in the Basin. Burbank will file annual status reports with the Watermaster, the Administrative Committee and the Court in a manner similar to Los Angeles' reporting as provided in Section 3.3 above.

13. General Provisions.

13.1 Assignment. This Agreement shall not be assigned by any Party.

13.2 Attorneys' Fees. Should legal action be instituted by any Party to this Agreement, to enforce or interpret any provision of this Agreement, each Party shall bear its own attorneys' fees.

13.3 Authorizations. All individuals executing this Agreement on behalf of the respective Parties certify and warrant that they have the capacity and have been duly authorized to so execute this Agreement on behalf of the entity so indicated.

13.4 Construction. The provisions of this Agreement shall be liberally construed to effectuate its purposes. The language of this Agreement shall be construed simply according to its plain meaning and shall not be construed for or against any Party, as each Party has participated in the drafting of this Agreement.

13.5 Counterparts. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

13.6 Entire Agreement and Amendment. In conjunction with the matters considered herein, this Agreement contains the entire understanding and agreement of the Parties and there have been no promises, representations, agreements, warranties or undertakings by any of the Parties, either oral or written, of any character or nature binding except as stated herein. This Agreement may be modified, altered or amended only by an instrument in writing, executed by the Parties to this Agreement and by no other means. Each Party waives its right to claim, contest or assert that this Agreement was modified, canceled, superseded or changed by any oral agreement, course of conduct, waiver or estoppel.

13.7 Good Faith. The Parties agree to exercise their reasonable best efforts and utmost good faith to effectuate all the terms and conditions of this Agreement and to execute such further instruments and documents as are necessary or appropriate to effectuate all of the terms and conditions of this Agreement.

13.8 Notices. All notices, approvals, acceptances, demands and other communication required or permitted under this Agreement, to be effective, shall be in writing and delivered in person or by U.S. Mails (prepaid postage, certified, return receipt requested) or by overnight delivery service to the Party to whom the notice is directed at the addresses identified below:

To Los Angeles:

Director of Water Resources
Los Angeles Department of Water and Power
111 N. Hope Street, Room 1460
Los Angeles, CA 90012

With copy to:

Julie Conboy Riley, Deputy City Attorney
Office of the City Attorney
City of Los Angeles
111 N. Hope Street, Room 340
Los Angeles, CA 90012

To Glendale:

Peter Kavounas, Water Services Administrator
Glendale Water and Power
City of Glendale
141 North Glendale Ave., 4th Level
Glendale, CA 9 1206-4496

With copy to:

Christine Godinez, Assistant City Attorney
City of Glendale
613 East Broadway, Suite 220
Glendale, CA 91206-4394

To Burbank:

William Mace, Assistant General Manager
Burbank Water and Power
City of Burbank
164 West Magnolia Boulevard
P.O. Box 631
Burbank, CA 91503-063 1

With copy to:

Carolyn Barnes, Senior Assistant City Attorney
City of Burbank
275 East Olive Avenue
Burbank, CA 91510-6459

To the Watermaster:

Mark Mackowski
Upper Los Angeles River Area Watermaster
111 N. Hope Street, Room 1450
Los Angeles, CA 90012

To the Court:

The Honorable Susan Bryant-Deason
Judge of the Los Angeles County Superior Court
111 N. Hill Street, Dept. 52
Los Angeles, CA 90012

Any written communication given by mail shall be deemed delivered two (2) business days after such mailing date. Any communication given by overnight delivery service shall be deemed delivered one (1) business day after the dispatch date. Either Party may change its address by giving the other Party written notice of its new address as provided above.

13.9 Recitals. The recitals set forth at the beginning of this Agreement of any matters or facts shall be conclusive proof of the truthfulness thereof and the terms and conditions set forth therein shall be deemed a part of this Agreement.

13.10 Successors and Assigns. This Agreement shall be binding on and shall inure to the benefit of the Parties and their respective successors.

13.11 Court Approval. The Parties hereto shall seek Court approval of this Agreement prior to September 30, 2007.

14. Waiver. No waiver of any provision or consent to any action shall constitute a waiver of any other provision or consent to any other action, whether or not similar. No waiver or consent shall constitute a continuing waiver or consent or commit a Party to provide a waiver or consent in the future except to the extent specifically stated in writing. No waiver shall be binding unless executed in writing by the Party making the waiver, based on a full and complete disclosure of all material facts relevant to the waiver requested.

[continued on next page]

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement.

DEPARTMENT OF WATER AND POWER OF
THE CITY OF LOS ANGELES BY
BOARD OF WATER AND POWER COMMISSIONERS
OF THE CITY OF LOS ANGELES

Date: 9/19/07 By: ______________________
ROBERT K. ROZANSKI
Acting General Manager

And: Barbara E. Moschos
Secretary

AUTHORIZED BY RES. 008 048
SEP 04 2007

APPROVED AS TO FORM AND LEGALITY
ROCKARD J. DELGADILLO, CITY ATTORNEY

AUG 22 2007

BY ______________________
JULIE CONBOY RILEY
Deputy City Attorney

CITY OF GLENDALE

Date: 9/13/07

James E. Starbird, City Manager

Approved as to Form:

By

City Attorney

CITY OF BURBANK

Date: 9/13/07

Ronald E. Davis, General Manager,
Burbank Water and Power

Attest:

By Margarita Campos
Margarita Campos, City Clerk

Approved as to Form:

By ________________
Carolyn Barnes, Senior Assistant City Attorney

SB 440012 v1:011538.0001

ORDER

Having read and reviewed the foregoing stipulation, **IT IS HEREBY ORDERED** that the terms of the *Interim Agreement for the Preservation of the San Fernando Basin Water Supply*, dated September 20, 2007 ("Agreement"), which is entered into by and between the City of Los Angeles, the City of Glendale and the City of Burbank, all of whom are parties to this action, a copy of which is attached hereto and incorporated herein by this reference, shall be the Order of the Court. The Parties are hereby ordered to comply with the terms of the Agreement.

DATED: October 2, 2007 Judge Susan Bryant-Deason
JUDGE OF THE SUPERIOR COURT

PROOF OF SERVICE

I am employed in the County of Los Angeles; I am over the age of eighteen years and am not a party to the within entitled action; my business address is 111 North Hope Street, Suite 340, Los Angeles, California 90012-2694. On September 25, 2007, I served the within documents:

STIPULATION AND [PROPOSED] ORDER RE. INTERIM AGREEMENT FOR THE PRESERVATION OF THE SAN FERNANDO BASIN WATER SUPPLY

[ ] by transmitting via facsimile the document(s) listed above to the fax number(s) set forth below on this date.

[X] by placing the document(s) listed above in a sealed envelope with postage thereon fully prepaid, in the United States mail at Los Angeles, California addressed as set forth below.

[ ] by personally delivering the document(s) listed above to the person(s) at the address(es) set forth below.

PLEASE SEE THE ATTACHED LIST.

I am readily familiar with the firm's practice of collection and processing correspondence for mailing. Under that practice it would be deposited with the U.S. Postal Service on that same day with postage thereon fully prepaid in the ordinary course of business.

I declare under penalty of perjury under the laws of the State of California that the above is true and correct.

Executed on September 25, 2007, at Los Angeles, California.

Lillian M. Catena

Lillian M. Catena

THE CITY OF LOS ANGELES v. CITY OF SAN FERNANDO, ET AL.
LASC CASE NO. C 650 079

SERVICE LIST

SCOTT S. SLATER, ESQ. STEPHANIE OSLER HASTINGS, ESQ. **HATCH & PARENT** 21 E. Carillo Street Santa Barbara, California 93101 Telephone: (805) 963-7000 Facsimile: (805) 965-4333	Attorneys for Defendants CITY OF BURBANK and CITY OF GLENDALE
CITY OF GLENDALE SCOTT H. HOWARD, City Attorney CHRISTINE A. GODINEZ, Assist. City Attorney 613 East Broadway, Suite 220 Glendale, California 91206-4394 Telephone: (818) 548-2080 Facsimile: (818) 547-3402	Attorneys for Defendants CITY OF BURBANK and CITY OF GLENDALE
CITY OF BURBANK DENNIS BARLOW, City Attorney CAROLYN BARNES, Senior Assist. City Attorney 275 East Olive Avenue Burbank, California 91510-6459 Telephone: (818) 238-5700 Facsimile: (818) 238-5724	Attorneys for Defendants CITY OF BURBANK and CITY OF GLENDALE
Julie Conboy Riley Deputy City Attorney Office of the City Attorney Department of Water and Power P. O. Box 5111- Room 340 (Mailing) 111 N. Hope Street, Room 340 Los Angeles, CA 90051-0100	Attorneys for Plaintiff, THE CITY OF LOS ANGELES, acting by and through the DEPARTMENT OF WATER AND POWER
Kisag Moordigian 15224 El Caseo Street Sylmar, California 91342	MHC Santiago Estates LP (Successor-In-Interest to Meurer Engineering, Inc.) 13691 Gavina Avenue Sylmar, CA 91342-2655
MHC Santiago Estates LP (Successor-In-Interest to Meurer Engineering, Inc.) 2 N. Riverside Plaza, Ste. 800 Chicago, IL 60606	Thomas Bunn, Special Counsel Lagerlof, Senecal, Swift & Bradley 301 North Lake Avenue - 10th Floor Pasadena, CA 91101 Tel. (626) 793-9400

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Lockheed-California Corporation
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Burbank, CA 91505
Tel. (818) 847-0197

James Biby
Valhalla Memorial Park
10621 Victory Boulevard
North Hollywood, CA 91606
Tel. (818) 763-9121

Patrick Holleran, Gen. Manager
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Fritz Tegatz
Middle Ranch
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Lake View Terrance, CA 91342

Thomas M. Erb (Member)
Director of Water Resources, DWP
111 North Hope Street, Rm. 1463
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Los Angeles, CA 90051-5700
Tel. (213) 367-0873

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Groundwater Group Manager
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Burbank, California 91503
William Mace, Asst. Gen. Mgr.
Burbank Water and Power
164 West Magnolia Boulevard
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Burbank, California 91503
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Peter Kavbounas (Member)
Water Services Administrator
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Operations Manager
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Raja Takidin (Alternate)
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Tel. (818) 648-3906

David Gould (Alternate)
District Engineer
Crescenta Valley Water District
2700 Foothill Boulevard
La Crescenta, California 91214
Tel. (818) 248-3925

Dennis Erdman (Member)
General Manager
Crescenta Valley Water District
2700 Foothill Boulevard
La Crescenta, California 91214
Tel. (818) 248-3925

NOSSAMAN, GUTHNER, KNOX & ELLIOTT, LLP
Frederic A. Fudacz (SBN 050546)
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445 South Figueroa Street
Thirty-First Floor
Los Angeles, California 90071
Telephone: (213) 612-7800
Facsimile: (213) 612-7801
ffudacz@nossaman.com
asmith@nossaman.com

Attorneys for
Upper Los Angeles River Area Watermaster

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

THE CITY OF LOS ANGELES, Plaintiff, v. CITY OF SAN FERNANDO, et al., Defendants.	Case No. C650 079 **WATERMASTER STATEMENT RE: INTERIM AGREEMENT FOR THE PRESERVATION OF THE SAN FERNANDO BASIN WATER SUPPLY** Before the Hon. Susan Bryant-Deason

The court-appointed Watermaster hereby submits the following statement regarding the Stipulation and [Proposed] Order re: Interim Agreement for the Preservation of the San Fernando Basin Water Supply, submitted by the Cities of Los Angeles, Glendale and Burbank ("Agreement").

The Watermaster supports this Court's approval of the Agreement. The Watermaster appreciates the efforts on the part of the Cities of Los Angeles, Glendale and Burbank to reach a negotiated solution to the complex issues affecting the declining stored groundwater levels in the San Fernando Basin. The Watermaster believes the Agreement represents significant progress in addressing the issues set forth in the Watermaster White Paper lodged with this Court on March 23, 2007. The Agreement contains many elements that will help restore the long-term sustainability of the Basin, and the Agreement expressly provides for the preservation of all Watermaster authority under the Judgment.[1]

While the Watermaster supports approval of the Agreement, and while the Watermaster is hopeful that the Agreement will facilitate improved storage levels in the Basin, the Watermaster is obligated to raise several issues that may materialize in the future.

First, the Watermaster believes that a Basin Safe Yield Study is a critical component of understanding the true and correct hydrologic conditions in the Basin. It has been over 40 years since a Basin Safe Yield Study has been performed. Section 6 of the Agreement provides that the Parties will develop a proposal for a Basin Safe Yield Study. This paragraph further provides that if the Parties do not come to an agreement on a single proposal, then the Parties will submit their separate proposals to this Court. The Agreement therefore has the potential to delay the Basin Safe Yield Study. The Watermaster agrees that a six month period is ample time for the Parties to agree upon the proposal for the Basin Safe Yield Study. Indeed, the Parties should endeavor to commence the study prior to the time allocated by the Agreement. In any case, the Safe Yield Study should begin no later than the completion of the six month study period.

Second, the Watermaster believes that actual losses must be calculated, not merely estimated. Section 5.1 of the Agreement provides that for the 10-year term of the Agreement, the Parties authorize Watermaster to deduct one-percent annually from each Party's respective Stored Water Credit, or until such time as the Basin loss calculation is re-evaluated. The Watermaster believes the one-percent estimate is reasonable on an interim basis. However, Section 8.2.9 of the Judgment requires that Watermaster shall calculate and

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1 Paragraph 9 of the Agreement provides: "Watermaster and the Administrative Committee are not Parties to this Agreement. This Agreement is made among the Parties and nothing herein shall be construed as a limitation on the powers and responsibilities of the Administrative Committee or the Watermaster arising under the Judgment."

account for stored water losses.[2] It is therefore imperative that Watermaster calculate the true and correct Basin losses from rising groundwater and underflow. Upon obtaining the necessary data to accurately perform that calculation, Watermaster believes it is necessary and appropriate to deduct actual losses, not estimated losses, from the Parties' Stored Water Credits. Therefore, the Watermaster will recommend that the calculation for determining Basin losses be re-evaluated as part of the Basin Safe Yield Study, and implemented upon completion of the Study.

Third, Section 4.2.6.1 of the Judgment states that the San Fernando Basin "...remained in overdraft continuously until 1968, when an injunction became effective. Thereafter, the basin was placed on safe yield operation." The Parties anticipate that the actions required of them under the Agreement will forestall the Basin's decline and prevent groundwater levels from slipping below the 1968 benchmark. However, if progress does not materialize as anticipated and groundwater levels fall below the 1968 level, the Watermaster may be obligated to declare overdraft and consider further options consistent with the Judgment to protect the Basin.

The Watermaster is hopeful that the Parties will reach consensus on the implementation of a Basin Safe Yield Study, the calculation of losses, and conjunctive use projects to replenish the Basin. In that regard, the Watermaster hopes that the reservations expressed herein will not need to be addressed by this Court. Nonetheless, in light of the Agreement's dependence on additional action by the Parties over the next 10 years, and in particular the next six months, the Watermaster is obligated to inform this Court of the aforementioned issues.

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[2] Section 8.2.9, in relevant part, provides: "Watermaster shall record and verify additions, extractions and losses and maintain an annual and cumulative account of all (a) stored water and (b) import return water in San Fernando Basin."

The Watermaster expresses its appreciation to the Parties and this Court for their attention in developing solutions to enhance the long-term sustainability of the San Fernando Basin.

DATED: September 25, 2007

NOSSAMAN, GUTHNER, KNOX & ELLIOTT, LLP
Frederic A. Fudacz
Alfred E. Smith

By: ______________________
Alfred E. Smith
Attorneys for Upper Los Angeles River Area Watermaster

PROOF OF SERVICE

The undersigned declares:

I am employed in the County of Los Angeles, State of California. I am over the age of 18 and am not a party to the within action; my business address is c/o Nossaman, Guthner, Knox & Elliott, LLP, 445 S. Figueroa Street, 31st Floor Los Angeles, California 90071-1602.

On September 25, 2007, I served the foregoing **WATERMASTER STATEMENT RE: INTERIM AGREEMENT FOR THE PRESERVATION OF THE SAN FERNANDO BASIN WATER SUPPLY** on parties to the within action by placing ( ) the original (x) a true copy thereof enclosed in a sealed envelope, addressed as shown on the attached service list.

(X) (By U.S. Mail) On the same date, at my said place of business, said correspondence was sealed and placed for collection and mailing following the usual business practice of my said employer. I am readily familiar with my said employer's business practice for collection and processing of correspondence for mailing with the United States Postal Service, and, pursuant to that practice, the correspondence would be deposited with the United States Postal Service, with postage thereon fully prepaid, on the same date at Los Angeles, California.

( ) (By Facsimile) I served a true and correct copy by facsimile pursuant to C.C.P. 1013(e), to the number(s) listed on the attached sheet. Said transmission was reported complete and without error. A transmission report was properly issued by the transmitting facsimile machine, which report states the time and date of sending and the telephone number of the sending facsimile machine. A copy of that transmission report is attached hereto.

( ) (By Overnight Service) I served a true and correct copy by overnight delivery service for delivery on the next business day. Each copy was enclosed in an envelope or package designated by the express service carrier; deposited in a facility regularly maintained by the express service carrier or delivered to a courier or driver authorized to receive documents on its behalf; with delivery fees paid or provided for; addressed as shown on the accompanying service list.

Executed on September 25, 2007.

(X) (STATE) I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

( ) (FEDERAL) I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Charlyn Jones

ATTORNEYS OF RECORD

Name	Party
Ms. Julie Riley Deputy City Attorney Office of the City Attorney Department of Water and Power 111 N. Hope Street, Suite 340 P.O. Box 5111 Los Angeles, CA 90051-5700 Telephone: 213-367-4579	Los Angeles
Mr. Dennis Barlow City Attorney 275 East Olive Avenue Burbank, CA 91502 Telephone: 818-238-5700	Burbank
Mr. Scott Howard City Attorney 613 East Broadway Glendale, CA 91205 Telephone: 818-548-2080	Glendale
Steven R. Orr, Esq. Richards, Watson & Gershon 355 South Grand Avenue, 40th Floor Los Angeles, CA 90071 Telephone: 213-626-8484	San Fernando
Mr. H. Jess Senecal, Special Counsel Lagerlof, Senecal, Swift and Bradley 301 North Lake Avenue - 10th Floor Pasadena, CA 91101 Telephone: 626-793-9400	Crescenta Valley, Vulcan-CalMat
Greg Chafee, Esq. 5660 New Northside Drive, Suite 500 Atlanta, GA 30328 Telephone: 770-933-1447	DS Waters

ATTORNEYS OF RECORD (CONT'D)

Name	Party
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Mr. Gene Matsushita Lockheed-California Corporation 2950 North Hollywood Way, Suite 125 Burbank, CA 91505 Telephone: 818-847-0197	Lockheed
Michael C. Martinez, Esq. Haight, Brown & Bonesteel LLP 6080 Center Drive, Suite 800 Los Angeles, CA 90045-1574 Telephone: 310-215-7715	Valhalla Memorial Park
Mr. Patrick Holleran General Manager 12833 Ventura Boulevard Studio City, CA 91604 Telephone: 818-984-0202	Sportsmen's Lodge
Mr. Fritz Tegatz Middle Ranch 11700 No. Little Tujunga Canyon Road Lake View Terrance, CA 91342	Middle Ranch Parties

ADMINISTRATIVE COMMITTEE and ALTERNATES

Name	Party
Mr. Thomas M. Erb (Member) Director of Water Resources Department of Water and Power 111 North Hope Street, Room 1463 P. O. Box 51111 Los Angeles, CA 90051-5700 Telephone: 213-367-0873	Los Angeles
Mr. Mark J. Aldrian (Alternate) Groundwater Group Manager Department of Water and Power 111 North Hope Street, Room 1450 Los Angeles, CA 90012 Telephone: 213-367-0932	Los Angeles
Mr. William Mace (Member) Assistant General Manager Water System Burbank Water and Power 164 West Magnolia Boulevard P. O. Box 631 Burbank, CA 91503 Telephone: 818-238-3550	Burbank
Mr. Peter Kavounas (Member) Water Services Administrator City of Glendale 141 North Glendale Avenue Glendale, CA 91206-4496 Telephone: 818-548-2137	Glendale
Mr. Raja Takidin (Alternate) City of Glendale 141 North Glendale Avenue Glendale, CA 91206-4496 Telephone: 818-648-3906	Glendale

ADMINISTRATIVE COMMITTEE and ALTERNATES (CONT'D)

Mr. Ronald Ruiz (Member) Director of Public Works City of San Fernando 117 Macneil Street San Fernando, CA 91340 Telephone: 818-898-1237	San Fernando
Mr. Daniel Wall (Alternate) City of San Fernando 117 Macneil Street San Fernando, CA 91340 Telephone: 818-898-1299	San Fernando
Mr. Dennis Erdman (Member) General Manager Crescenta Valley Water District 2700 Foothill Boulevard La Crescenta, CA 91214 Telephone: 818-248-3925	Crescenta Valley Water District
Mr. David Gould (Alternate) District Engineer Crescenta Valley Water District 2700 Foothill Boulevard La Crescenta, CA 91214 Telephone: 818-248-3925	Crescenta Valley Water District

APPENDIX H
WELLS DRILLED, REACTIVATED, ABANDONED, OR DESTROYED

ACTIVITIES INVOLVING THE CONSTRUCTION, REHABILITATION, AND/OR DESTRUCTION OF WATER WELLS

2012-13 WATER YEAR

Two wells were destroyed by LADWP in Water Year 2012-13. Mission Well 2, located in the Sylmar Basin, was destroyed on June 19, 2013. Mission Well 4, also located in the Sylmar Basin, was destroyed on September 25, 2013. No other water wells were constructed or destroyed in any of the four groundwater basins in ULARA in Water Year 2012-13

APPENDIX I
ACTION ITEMS 2013-14 WATER YEAR

ACTION ITEMS

WATERMASTER ACTIVITIES FOR 2013-14 WATER YEAR

1. Continue the work needed for the four ULARA groundwater basins to be in conformance with the new DWR regulations regarding the California Groundwater Elevation Monitoring (CASGEM) program.

2. Continue work efforts on developing a Salt and Nutrient Management Plan (SNMP) for the 4 groundwater basins within ULARA.

3. Continue to support ways to maximize the spreading of native water and increase the infiltration of urban runoff in the SFB.

4. Continue to work with the City of Los Angeles Department of Water and Power--Watershed Protection Division and their Low Impact Development Ordinance (formerly known as "Standard Urban Stormwater Mitigation Program", or SUSMP) for the proposed development and/or the re-development of properties within the City portion of the San Fernando Valley.

5. Collect, organize, convert to electronic format, and correlate the driller's logs, geologic logs and electric logs for new water wells and groundwater monitoring wells in the ULARA groundwater basins.

6. Collect, organize, convert to electronic format, and correlate electric logs of wildcat and/or producing oil wells in the San Fernando and Sylmar groundwater basins.

7. Collect, scan, and convert to electronic format all prior Annual Watermaster Reports and 5-year Pumping and Spreading Plans, the ULARA Judgment and the 2-volume set of the Report of Referee; post all to the ULARA website.

8. Continue to work with the Parties and regulatory agencies, such as the USEPA and RWQCB – Los Angeles, to enforce chromium cleanup in the SFB.

9. Continue to attend meetings of technical groups, such as the Association of Groundwater Agencies (AGWA) and the Groundwater Resources Association (GRA), to exchange ideas and information regarding water quality and groundwater basin management.

10. Conduct field visits to selected contamination sites and meet with regulators and site owners and/or their consultants in an effort to help accelerate the time schedules and effectiveness of cleanup activities at these sites.

11. Continue to attend meetings with community and civic groups focused on "revitalization" of the Los Angeles River.

APPENDIX J
WATER EQUIVALENTS

WATER EQUIVALENTS

Volume

1 gallon* …………………………….	= 3.7854 liters (L)	= 231** cubic inches (in^3)
…………………………….	= 0.003785 cubic meters (m^3)	= 0.132475 cubic feet (ft^3)
100 cubic feet (HCF)**** ……….....	= 748 gallons (gal)	= 2.83317 cubic meters (m^3)
……….....	= 2,832 liters (L)	= 3.70386 cubic yards (yd^3)
……….....	= 6,230.8 pounds of water (lb)	= 2,826.24 kilograms (kg)
1 acre-foot (AF)*** ………………..	= 43,560** cubic feet (ft^3)	= 1233.5 cubic meters (m^3)
………………..	= 325,851 gallons (gal)	= 1,233,476.3754 liters (L)
………………..	= the average amount of water used by two families for one year.	

Flow

1 cubic foot per second (cfs) …	= 448.83 gallons per minute (gpm)	= 0.028317 cubic meters/sec (m^3/s)
…	= 646,317 gallons per day (gal/day)	= 1.70 cubic meters/min
…	= 1.98 AF/day	= 2446.6 cubic meters/day
1,000 gallons per Minute(gpm) …	= 2.23 cubic feet per second (cfs)	= 0.063 cubic meters/sec (m^3/s)
...	= 4.42 AF/day	= 5452.6 cubic meters/day
...	= 11,613.01 AF/year	= 1.99 million cubic meters/yr
1 million gallons per day (mgd) …	= 3.07 AF/day	= 3785 cubic meters/day
...	1,120.14 AF/year	= 1.38 million cubic meters/yr

Concentration

…	= 1.0 milligrams per liter (mg/L)	= 1.0 part per million (ppm)
…	= 1.0 micrograms per liter (μg/L)	= 1.0 part per billion (ppb)

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* U.S. gallons
** Exact Value
*** An acre-foot of water covers one acre of land one foot deep
**** This is a billing unit of DWP

APPENDIX K
LIST OF ABBREVATIONS

LIST OF ABBREVIATIONS

AF	Acre-feet
AF/Y	Acre-feet per Year
BOU	Burbank Operable Unit
BTEX	Benzene, tolulene,ethylbenzene,and total xylene
CVWD	Crescenta Valley Water District
Cal-EPA	California Environmental Protection Agency
DCA	Dichloroethane
DCE	Dichloroethylene
CDPH	California Department of Public Health
DTSC	California Department of Toxic Substances Control
DWP	Department of Water and Power (see also LADWP)
EPA	Environmental Protection Agency (see also USEPA)
EVWRP	East Valley Water Recycling Project
LAFD	Los Angeles Fire Department
GAC	Granular Activated Carbon
GOU	Glendale Operable Unit
GNOU	Glendale North Operable Unit
GSOU	Glendale South Operable Unit
gpm	Gallons Per Minute
LACDPW	Los Angeles County Department of Public Works
LADWP	Los Angeles Department of Water and Power
MCL	Maximum Contaminant Level
mg/L	Milligrams per Liter, same as PPM
MTA	Metropolitan Transportation Authority
MWD	Metropolitan Water District of Southern California
NHOU	North Hollywood Operable Unit
OEHHA	Office of Environmental Health Hazard Assessment
OU	Operable Unit
PCE	Tetrachloroethylene
PHG	Public Health Goal
PPB	Parts Per Billion, same as micrograms per liter
PPM	Parts Per Million, same as milligrams per liter
PSDS	Private Sewage Disposal Systems
RAW	Removal Action Workplan
RI	Remedial Investigation
RWQCB	Regional Water Quality Control Board
SFB	San Fernando Basin
SUSMP	Standard Urban Stormwater Mitigation Plan
SWRCB	State Water Resouces Control Board
SWAT	Solid Waste Assessment Test
TCA	1,1,1- Trichloroethane
TCE	Trichloroethylene
TDS	Total Dissolved Solids
TSG	Tujunga Spreading Grounds
µg/L	Micrograms per Liter, same as PPB
ULARA	Upper Los Angeles River Area
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound

LIST OF ABBREVIATIONS

VPWTP	Glendale-Verdugo Park Water Treatment Plant
USGS	United States Geological Survey