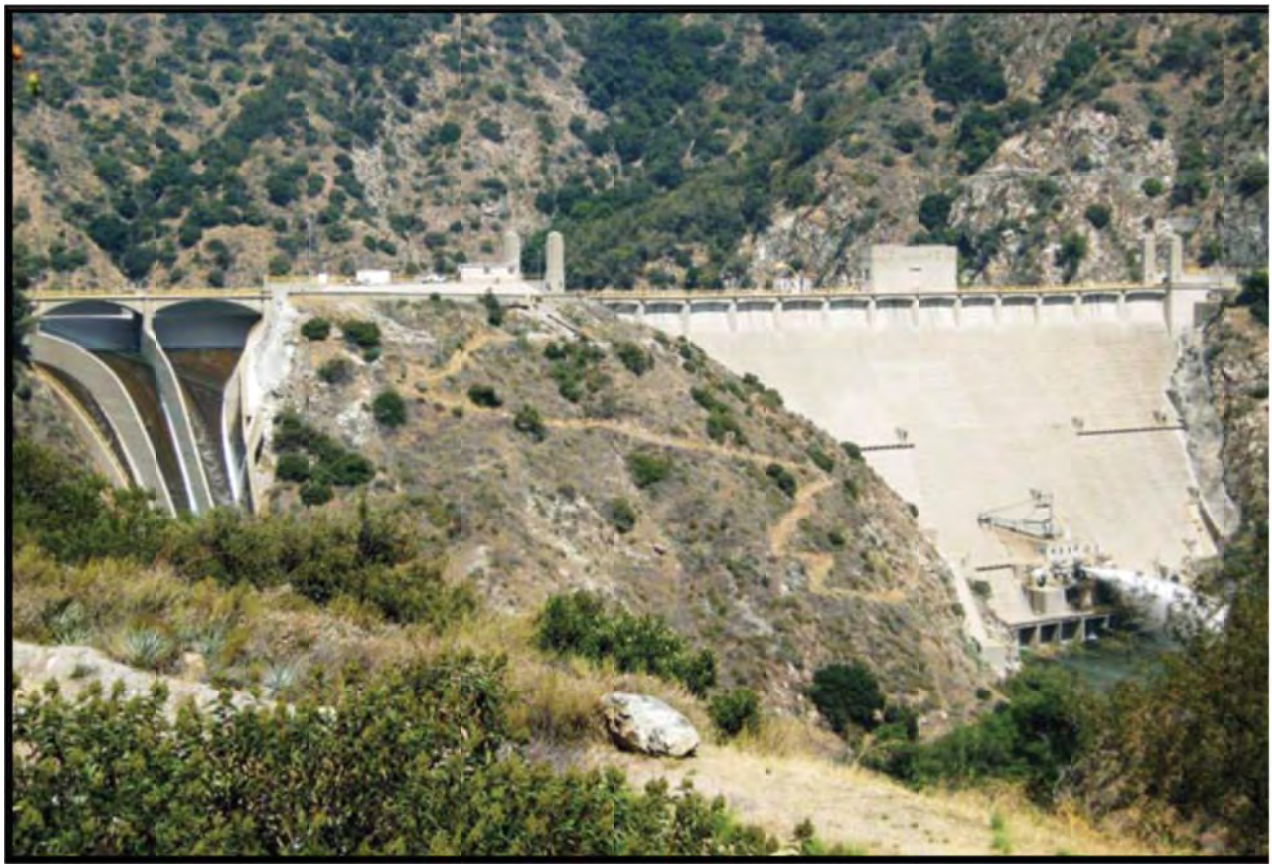
RECLAMATION

Managing Water in the West

Los Angeles Basin Stormwater Conservation Study

Plan of Study



U.S. Department of the Interior
Bureau of Reclamation
Southern California Area Office

Los Angeles County
Flood Control District
Alhambra, California

County of Los Angeles
Department of Public Works
Alhambra, California

February 2013

Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest o f the American public.

The mission of the County of Los Angeles Department of Public Works is to provide public infrastructure and municipal services to protect and enrich the daily lives of over 10 million people in Los Angeles County.

Los Angeles Basin Stormwater Conservation Study

Plan of Study

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Table of Contents

Tables

Abbreviations and Acronyms

Basin Study	Watershed-level study authorized by the Secure Water Act, Public Law 111-11 to assess the risk of climate change to water resources in the west's major river basins.
CA DWR	California Department of Water Resources
DB	Debris Basin
DRI	Debris Retention Inlet
ELT	Executive Leadership Team
Gateway	Gateway Water Management Authority
GLAC	Greater Los Angeles County
GWAM	Groundwater Augmentation Model
HSPF	Hydrologic Simulation Program-Fortran
IPRP	Independent Peer Review Panel
IRWM	Integrated Regional Water Management
IRWMP	Integrated Regional Water Management Plan
LACDPW	Los Angeles County Department of Public Works
LACFCD	Los Angeles County Flood Control District
LADWP	City of Los Angeles Department of Water and Power
Master Plan	Stormwater Capture Master Plan
MWD	Metropolitan Water District of Southern California
PM	Project Manager(s)
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
SG	Spreading Grounds
STAC	Stakeholder Technical Advisory Committee
STT	Study Technical Teams
ULARA	Upper Los Angeles River Area
USACE	U.S. Army Corps of Engineers
WAS	Los Angeles Basin Water Augmentation Study

Watersheds	The Los Angeles River, San Gabriel River, Ballona Creek, South Santa Monica Bay, North Santa Monica Bay, and Dominguez Channel/Los Angeles Harbor watersheds
WMMS	Watershed Management Modeling System

Executive Summary

Imported water supplies to Los Angeles County, California, are uncertain due to periodic droughts in northern California and the Colorado River Basin, court decisions related to endangered species in the Bay Delta, and potential allocations of Colorado River water. Changing demographics, climate variability, and the competing interest for available water present additional long-term risks to the stability and reliability of imported water. Accordingly, various Los Angeles area agencies with water management authority, such as the Los Angeles County Flood Control District (LACFCD),[1] are actively pursuing a strategy aimed at achieving water independence by developing local water resources such as stormwater. The LACFCD is the primary agency for conducting groundwater replenishment operations in Los Angeles County. In typical years, the LACFCD infiltrates more than 270,000 acre-feet of captured stormwater, imported water, and recycled water into the various groundwater basins in Los Angeles County. In wetter years, that number can exceed 700,000 acre-feet and, in drier years, may be little more than 150,000 acre-feet.

LACFCD partnered with the U.S. Department of the Interior, Bureau of Reclamation's (Reclamation) Southern California Area Office to study long-term flood control and water conservation impacts from projected population and climate conditions. The Los Angeles Basin Stormwater Conservation Study (Basin Study) will recommend potential changes to the operation of stormwater capture systems, modifications to existing facilities, and development of new facilities that could help resolve future flood control and water supply issues.

The Los Angeles River, San Gabriel River, Ballona Creek, South Santa Monica Bay, North Santa Monica Bay, and Dominguez Channel/Los Angeles Harbor watersheds (Watersheds) are the focus of this Basin Study (figure 1). This study incorporates the entire watershed boundaries, including where they extend outside Los Angeles County. The Watersheds share attributes such as overlapping municipal and water agency boundaries, an interconnected flood control system, and a common planning purpose with major ongoing planning efforts like the Greater Los Angeles County Integrated Regional Water Management Plan (IRWMP), Gateway IRWMP and the Metropolitan Water District Integrated Resources Plan.

[1] The Los Angeles County Flood Control Act of 1915. The Act established the Los Angeles Flood Control District and empowered it to provide flood protection, water conservation, recreation, and aesthetic enhancement within its boundaries. The Flood Control District is governed, as a separate entity, by the County of Los Angeles Board of Supervisors.

Figure 1. Watersheds included in the Basin Study: Los Angeles River, San Gabriel River, Ballona Creek, South Santa Monica Bay, North Santa Monica Bay, Dominguez Channel/Los Angeles Harbor.

The Basin Study watersheds include more than 9 million people and encompass 1,900 square miles and 6 major groundwater basins. According to the California Department of Finance, the State's population as a whole is projected to increase by more than 35 percent while Los Angeles County's is projected to increase by approximately 18 percent by 2050. Projected larger population growth rates outside of Los Angeles County portends enormous pressure and competition for import sources of water and the need for increased development of local water supply sources. At

present, Los Angeles County accounts for the largest amount of water demand of any urbanized county in California. Water usage in the Los Angeles County portion of the Metropolitan Water District of Southern California service area (an area wholly served by the LACFCD) exceeded 1.68 million acre-feet in water year 2010–2011.

The effects of climate change in California present water supply challenges and unknowns. Water supply sources likely are to be impacted by warmer winter storms, reduced winter snowpacks, increased winter and spring runoff, and more extreme hydrologic variability between drier drought periods and wetter winter periods. Rainfall patterns locally are also likely to change with heavier rainfall periods and events that potentially could overwhelm the LACFCD system, leading to less conserved stormwater, more property damage, and greater maintenance and operational demands. Localized climate projections will be developed, analyzed, and incorporated in the recommendations of this Basin Study.

1.0 Introduction

The Los Angeles County Flood Control District (LACFCD) submitted a Los Angeles Basin Stormwater Conservation Study (Basin Study) proposal to the Bureau of Reclamation (Reclamation) in February 2012 for a $2.4-million study. Reclamation funding was awarded in the amount of $1 million, with a LACFCD cost share of $1,364,666 and a local partner cost share of $59,960. This Plan of Study outlines the study description, management, tasks, schedule and milestones, and budget.

1.1 Study Purpose

The purpose of the Basin Study is to study long-term flood control and water conservation impacts from projected population and climate conditions in the Los Angeles Basin. The Basin Study will recommend potential changes to the operation of stormwater capture systems, modifications to existing facilities, and development of new facilities that could help resolve future flood control and water supply issues. The recommendations will be developed through identifying alternatives and conducting trade-off analyses.

1.2 Study Objectives

The Basin Study has two objectives:

1. To evaluate the response of existing LACFCD flood control dams, reservoirs, spreading grounds, and other interrelated facilities to projected future conditions.

2. To develop and recommend a suite of alternatives, including new or modified facilities and operational changes, to address the projected future conditions.

Each objective will be met through detailed scientific, engineering, and economic analyses.

1.3 Description of Basin Study Area

The Los Angeles River, San Gabriel River, Ballona Creek, South Santa Monica Bay, North Santa Monica Bay, and Dominguez Channel/Los Angeles Harbor watersheds (Watersheds) are the focus of this Basin Study (see figure 1 in the Executive Summary). This study incorporates the entire watershed boundaries, including where they extend outside Los Angeles County. The Basin Study watersheds include more than 9 million people and cover approximately 1,900 square miles. More than 95 percent of the Los Angeles County's population resides within the Basin Study area. This population concentration also accounts for more than one-fourth of the State's population. California's population presently exceeds 37 million people, and Los Angeles County's

population nearly 10 million people with each projected to reach 51 million and nearly 12 million, respectively, by 2050. According to the California Department of Finance, the State's population as a whole is projected to increase by more than 35 percent, while Los Angeles County's is projected to increase by approximately 18 percent.[2] Projected larger population growth rates outside of Los Angeles County portends enormous pressure and competition for imported sources of water and the need for increased development of local water supply sources. At present, Los Angeles County accounts for the largest amount of water demand of any urbanized county in California. Water usage in the Los Angeles County portion of the Metropolitan Water District of Southern California (MWD) service area (an area wholly served by the LACFCD) exceeded 1.68 million acre-feet in water year 2010–2011.[3]

The Basin Study area includes several large groundwater basins including the Central Basin, Main San Gabriel Basin, Raymond Basin, San Fernando Valley Basin, Six Basins, and West Coast Basin. The LACFCD's dams and reservoirs are located in the front ranges of the San Gabriel Mountains stretching more than 40 miles from the San Fernando Valley to the eastern edge of the San Gabriel Valley. The largely undeveloped watershed area upstream of the LACFCD dams is approximately 400 square miles, and the majority of it is within the Angeles National Forest. Spreading grounds are located in areas of high permeability downstream from the LACFCD dams.

[2] See http://www.dof.ca.gov/research/demographic/reports/projections/interim/view.php.
[3] MWD Calculations, Integrated Resources Plan Simulation Model Projection 20a2, January 2012.

2.0 Study Description

This Basin Study will utilize the latest climate science, hydrologic, and hydrogeologic modeling tools to create a vision of the near-term and long-term future of stormwater capture in Los Angeles County. The Basin Study will offer the opportunity for multiple water management agencies to participate in a collaborative process to plan for future local water supply scenarios. The Basin Study will examine opportunities to enhance existing LACFCD and Basin Study partner facilities and operations and develop new facilities to demonstrate direct benefits to water agencies and local communities.

The Basin Study will utilize, to the greatest extent practicable, existing information on the availability and suitability of various open space and underdeveloped parcel opportunities as infiltration sites. The Basin Study will evaluate potential infiltration sites for soil characteristics, groundwater basin condition, conveyance/diversion/outlet requirements, site remediation requirements, property valuation and availability, environmental impact, regulatory requirements, community impact, multiuse potential, and other factors deemed necessary to assess a site's potential. The Basin Study will consider technical viability of implementing innovative facility concepts that show potential for increasing infiltrative capacity.

A trade-off analysis will be conducted to evaluate the regional impacts and the economic costs and benefits of the various stormwater capture alternatives. Additionally, we will look at the costs of attaining different goals through a cost-effectiveness analysis. The final outcome and recommendations of the Basin Study concept development and trade-off analyses will serve as a guiding document for further local water supply development planning, financing strategy, and policy adoption at the LACFCD and other Basin Study partners.

2.1 Project Background

LACFCD staff has been considering the possibility of large-scale enhancement of LACFCD's water conservation capabilities through the study of long-term projected needs and future climatic conditions. Coincidentally, informal discussions have occurred between LACFCD management and counterparts at several major water agencies on the same subject. This interest was the impetus for exploring a partnership between the LACFCD and Reclamation under the Basin Studies Program and LACFCD's eventual submittal of a proposal to Reclamation in Federal fiscal year 2012.

2.2 Previous Work and Available Data and Models

2.2.1 Integrated Regional Water Management Planning

The Greater Los Angeles County (GLAC) Integrated Regional Water Management Plan (IRWMP) of 2006 addressed the subject of increasing capture and reuse of stormwater runoff largely in the context of reducing urban stormwater runoff to reduce pollutant loading and impairment to water bodies and streams in the greater Los Angeles area. The 2006 GLAC IRWMP set a 20-year target of reducing and reusing 220,000 acre-feet of stormwater runoff. The 2006 GLAC IRWMP did not specifically address a planning target for increasing stormwater capture from the undeveloped watersheds of the GLAC planning area—in particular, the upper watershed areas of the San Gabriel Mountains where the overwhelming majority of rainfall occurs in the region and where LACFCD facilities are used for water conservation operations. GLAC is updating its IRWMP to conform to the latest State requirement that the IRWMP addresses climate change. The Gateway Water Management Authority (Gateway) is the State-recognized Integrated Regional Water Management (IRWM) planning entity for the southeast portion of Los Angeles County. Gateway is presently in the process of developing its first IRWMP with the State-required climate change planning component. Information developed throughout the course of the Basin Study will be made available to both GLAC and Gateway.

2.2.2 Climate Change

The effects of climate change in California are projected to include changes to the patterns and distribution of rainfall, relative intensities of rainfall, and temperature variability of storm events unlike what is historically known to date. Existing variable storm patterns could become more extreme with climate change, including larger, more intense storms during wet periods and longer, hotter drought periods. The Basin Study seeks to conduct scientific investigation into the weather effects brought on by climate change with specific relationship to the geographic subareas of Los Angeles County—mountains, valleys, and coastal plain. The LACFCD will use climate projection scenarios specific to the Los Angeles County study area developed from the Bias Corrected and Downscaled WCRP CMIP3 Climate and Hydrology Projections. These 112 projections were developed through the West-wide Climate Risk Assessment, a complementary activity to the Basin Study and the Landscape Conservation Cooperative programs within the WaterSMART Initiative.[4] These projections are a comprehensive and peer-reviewed effort by a multiagency collaboration.[5] This 12-kilometer gridded, high resolution data will be reviewed by the Basin Study team to determine the appropriate ensemble of scenarios to use in LACFCD's watershed model discussed below.

2.2.3 Hydrologic Modeling

Using rainfall estimates from the climate projections, the LACFCD will use its recently-developed Watershed Management Modeling System (WMMS) software to calculate runoff projections under a variety of weather and land-use conditions for the major watersheds and subwatersheds of the study area. WMMS is based on Hydrological

[4] See http://www.usbr.gov/WaterSMART/wcra/index.html.

[5] See http://gdo-dcp.ucllnl.org/downscaled_cmip3_projections/dcpInterface.html#About.

Simulation Program - Fortran (HSPF), a continuous hydrologic simulation model that was peer-reviewed by the U.S. Environmental Protection Agency, internally at LACFCD, and by local stakeholders. WMMS results have been published nationwide. The WMMS software has the capability of running multiple combinations of runoff scenarios that will be based on the projected changes in rainfall patterns and varied watershed conditions.

The WMMS will simulate operational characteristics and capabilities of the LACFCD system utilizing the runoff projections developed as part of this Basin Study. The WMMS will determine operability of the system for flood protection and water-conserving purposes with projections of volumes of water conserved. The WMMS output will be analyzed to determine the potential for capacity enhancements or changes in operations at existing LACFCD reservoirs and other facilities. The WMMS output also will be used to evaluate expansion opportunities of existing LACFCD spreading grounds and for potential development of new infiltration sites including, but not limited to, parks, playing fields, school playgrounds, utility rights-of-way, structure-free parcel spaces (public and private), and various other open spaces.

2.2.4 Groundwater Modeling

This groundwater portion of the Basin Study will leverage the recently completed Water Augmentation Study (WAS), a partnership between the Council for Watershed Health (formerly the Los Angeles & San Gabriel Rivers Watershed Council) and Reclamation's Southern California Area Office. The 10-year WAS included development of the Groundwater Augmentation Model (GWAM) by Reclamation's Technical Services Center. GWAM estimates the recharge potential of infiltration sites capable of conducting deep percolation. The Basin Study will apply GWAM to sites that will be identified in the facility concept planning portion of the study to evaluate deep percolation potential. This Basin Study will work with the local watermasters to develop data to use in their groundwater modeling efforts.

2.3 Current Local Stormwater Activities

The GLAC IRWM Leadership Committee, of which LACFCD is the chair, has begun to prepare an update to its IRWM plan as required by the California Department of Water Resources (CA DWR). GLAC IRWM has begun coordinating its efforts with those anticipated to be undertaken in the study to incorporate results into the IRWMP update. GLAC IRWM seeks a more comprehensive treatment of stormwater as a resource in the updated IRWMP.

The LACFCD has a number of projects that recently have been completed or are under development to enhance capacity and efficiency of operations of the water conservation function of its facilities. Most notably, the Big Tujunga Dam Seismic Retrofit project, in which the City of Los Angeles Department of Water and Power (LADWP) was a funding partner, was dedicated in July 2011. Due to seismic safety restrictions, Big Tujunga Dam was limited to a water surface elevation at which only 1,500 acre-feet of

water could be stored. The Big Tujunga Dam project restored the storage capacity of the dam to 6,000 acre-feet. Other projects that improve water conservation operations are under construction, such as the Morris Dam Inlet/Outlet Works Rehabilitation project, which will upgrade valves and gates and automate some operations, thereby improving delivery of water for groundwater recharge. Various spreading grounds improvement projects have been undertaken to improve operational capacity and flexibility such as the Rio Hondo/San Gabriel Spreading Grounds Interconnecting Drain. This project, where the Water Replenishment District of Southern California was a funding partner, creates a hydraulic interconnection between two separate spreading grounds facilities to maximize efficiency of operations.

LADWP is developing their Stormwater Capture Master Plan (Master Plan). Work on the Master Plan is scheduled to begin in 2012. With more than 85 percent of Los Angeles' water supply sources coming from imported water, LADWP recognizes the need to explore enhancing local supply sources such as groundwater and stormwater used for recharge. The Master Plan will investigate and create potential strategies for implementation of stormwater capture and watershed management programs and projects within Los Angeles. The Basin Study process will include close coordination between LACFCD, Reclamation, and LADWP to synergize production of results for each respective effort.

2.4 Resource Availability

The County of Los Angeles Department of Public Works (LACDPW) acts on behalf of LACFCD providing staffing and material resources for carrying out the mission of LACFCD. With more than 3,000 employees, LACDPW is the largest municipal public works agency in the United States with multidisciplinary engineering capabilities covering a wide range of civil works and utilities responsibilities. LACDPW will mobilize the necessary resources within the organization to provide dedicated support to the Basin Study as determined in this plan of study. The contribution of LACFCD will be a minimum of 50 percent in in-kind services or cash.

This Basin Study received Reclamation funding in fiscal year 2012 in the amount of $1,000,000, with a match of $1,364,666 from LACFCD and $59,960 from a local partner.

2.5 Interested Parties

Los Angeles Basin water agencies are actively developing local water supplies to reduce reliance on imported water supplies from northern California and the Colorado River. The Study Project Managers worked with local water agencies and secured numerous letters of support with commitments to provide in-kind services as part of the overall non-Federal cost-share participation in the Basin Study. Table 1 provides a summary of parties that submitted letters of support.

Table 1. Summary of Letters of Support and Contributors

Agency/Organization	In-Kind Services Dollar Amount	Service Contribution
Arroyo Seco Foundation	$5,000	Technical review and comment on study reports, attend meetings
Council for Watershed Health	TBD	Technical review and comment on study reports, attend meetings
Crescenta Valley Water District	$3,000	Technical review and comment on study reports, attend meetings
Foothill Municipal Water District	$5,000	Technical review and comment on study reports, attend meetings, coordination with stakeholders
Heal the Bay	$900	Technical review and comment on study reports, attend meetings
Long Beach Water Department	TBD	Technical review and comment on study reports, attend meetings
Los Angeles Department of Water and Power	$8,560	Technical review and comment on study reports, attend meetings
Metropolitan Water District of Southern California	$7,500	Technical review and comment on study reports, attend meetings, coordination with stakeholders
Pomona Valley Protective Association	TBD	Technical review and comment on study reports, attend meetings, coordination with stakeholders
Raymond Basin Management Board/Main San Gabriel Basin Watermaster/San Gabriel Valley Protective Association	TBD	Technical review and comment on study reports, attend meetings, coordination with stakeholders
Six Basins Watermaster	TBD	Technical review and comment on study reports, attend meetings
Southern California Water Committee	TBD	Technical review and comment on study reports, attend meetings
Three Valleys Municipal Water District	$10,000	Technical review and comment on study reports, attend meetings, coordination with stakeholders
Tree People	TBD	Technical review and comment on study reports, attend meetings
U.S. Army Corps of Engineers (USACE)	TBD	Technical review and comment on study reports, attend meetings
U.S. Department of Agriculture, Forest Service	TBD	Information

Table 1. Summary of Letters of Support and Contributors (continued)

Agency/Organization	In-Kind Services Dollar Amount	Service Contribution
Upper Los Angeles River Area Watermaster	TBD	Technical review and comment on study reports, attend meetings
Upper San Gabriel Valley Municipal Water District	TBD	Technical review and comment on study reports, attend meetings, coordination with stakeholders
Water Replenishment District of Southern California	$10,000	Technical review and comment on study reports, attend meetings, coordination with stakeholders
West Basin Municipal Water District	$10,000	Technical review and comment on study reports, attend meetings, coordination with stakeholders
TOTAL	**$59,960**	

3.0 Study Organization and Public Involvement

The purpose of the Basin Study organization and public involvement is to ensure completion of the Basin Study in an effective, cost-efficient, and timely manner. The Basin Study structure is designed to facilitate direct communication among participating agencies and the public to provide efficient decisionmaking and document reviews. In addition to the Project Managers (PMs), the Basin Study organization structure includes (1) an Executive Leadership Team (ELT), (2) Stakeholder Technical Advisory Committee (STAC), (3) Independent Peer Review Panel (IPRP), and Study Technical Teams (STT). Public involvement and outreach opportunities will occur throughout the Basin Study process.

3.1 Basin Study Structure

3.1.1 Executive Leadership Team

The ELT is composed of one policy-level representative each from Reclamation and LACFCD. The ELT determines all key and advanced policy issues (as may be elevated by the PM) that may not be able to be resolved at the project management level. The ELT also provides guidance on sensitive key political issues and interpretation of existing policies of participating agencies. This structure provides a direct link for the project managers to present Basin Study information to the ELT for advanced policy decisions and direction.

Table 2. ELT Representatives

Representation	Agency	Representative	Alternates
Federal Lead Agency	Bureau of Reclamation	William Steele	Jack Simes
Non-Federal Lead Agency	LACFCD	Gary Hildebrand	Terri Grant

3.1.2 Project Managers

The PMs are responsible for the day-to-day management of the Basin Study and are the primary Basin Study coordinators within the study management structure. The PMs duties and responsibilities include the following:

- Serve as the project's lead representatives from Reclamation and the LACFCD.
- Provide information to the ELT for use in determining policy direction regarding complex Basin Study issues.

- Coordinate Study participation with agencies, cost-share partners and the general public.

- Facilitate communication among members of the Basin Study team, the ELT and IPRP.

- Provide guidance and oversight for the STTs in the conduct of each Basin Study task.

- Maintain regular communication with the STAC to provide project status and get agency feedback at regular intervals.

- As the various tasks of the Basin Study are completed, the PM will have primary review and approval for the associated interim reports as well as the Basin Study Final Report.

Project Managers

Lee Alexanderson, LACFCD
Amy Witherall, Reclamation

3.1.3 Stakeholder Technical Advisory Committee

The STAC is comprised of technical-level individuals from water agencies, nongovernmental organizations, State and local government, Reclamation, and LACFCD (table 3). The STAC will provide technical support and input to the PM throughout the Basin Study. This will include review and comment on this plan of study, the scope of all Basin Study tasks prior to implementation, and all Basin Study deliverables. The STAC will meet as determined by the PM.

Table 3. STAC Representatives

Representation	Agency	Representative
Regional Water Supply Planning	Metropolitan Water District	Kathleen Kunysz Matt Hacker Peter Louie
Upper Los Angeles River Watershed	LADWP	Andy Niknafs Johanna Chang
	Upper Los Angeles River Area (ULARA) Watermaster	Richard Slade
	City of Burbank	Bill Mace
	City of Glendale	Peter Kavounas
	City of Pasadena	Brad Boman
	City of San Fernando	Ron Ruiz
	Crescenta Valley Water District	David Gould

Table 3. STAC Representatives (continued)

Representation	Agency	Representative
Upper San Gabriel River Watershed	Main San Gabriel Basin Watermaster	Tony Zampiello Wendy La
	Raymond Basin	Tony Zampiello Wendy La
	Upper San Gabriel Valley MWD	Reymundo Trejo
	Three Valleys MWD	Mario Garcia
	San Gabriel Valley MWD	Darin Kasamoto
	Pomona Valley Protective Association	Alison Loukeh
Lower Los Angeles/San Gabriel River Watersheds	Water Replenishment District	Ted Johnson Cathy Chang
	Central Basin MWD	David Hill Ana Ananda
	City of Compton	Kambiz Shoghi
Ballona Creek Watershed	City of Santa Monica	Neil Shapiro
South Santa Monica Bay Watershed	City of Torrance	Robert Beste
North Santa Monica Bay Watershed	Las Virgenes MWD	Randal Orton
Dominguez Channel/Los Angeles Harbor Watershed	City of Torrance	Robert Beste
Regulatory/Environmental/ Research/Community Organizations	Arroyo Seco Foundation	Tim Brick
	Ballona Creek Renaissance	Jim Lamm
	California Department of Fish and Game	Ed Pert
	CA DWR	Lauma Jurkevics
	Council for Watershed Health	Nancy Steele Mike Antos
	Heal the Bay	Kirsten James
	Los Angeles Regional Water Quality Control Board	Shirley Birosik
	San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy	Mark Stanley Marybeth Vergara
	Santa Monica Bay Restoration Commission	Shelley Luce
	Santa Monica Mountains Conservancy	Joe Edmiston
	The River Project	Melanie Winter
	Tree People	Rebecca Drayse
	USACE	Josephine Axt Ed Demesa
	U.S. Environmental Protection Agency	John Kemmerer
	U.S. Fish and Wildlife Service	Jesse Bennett
	U.S. Forest Service	Thomas Contreras

3.1.4 Study Technical Teams

The Study will be implemented by specialty Study Technical Teams organized by the Study task subject areas of climate science/hydrology, engineering, and economics. The Study Technical Teams will perform a range of duties beyond their respective and specific scientific and technical expertise areas to include data review and analysis, technical guidance, providing comments and edits on draft reports. The composition of each Study Technical Team is proposed in table 4. The Project Managers will have, in addition to their aforementioned responsibilities, a support role in the conduct of the Study by providing basic research support to the Study Technical Teams such as data collection, document searches and retrieval, and resource acquisition.

Table 4. Study Technical Teams

Subject Area	Agency	Key Personnel
Water Supply/Demand	LACFCD	Lee Alexanderson Adam Walden
	Reclamation	Scott Tincher Subhrendu Gangopadhyay
Climate Science/Hydrology	LACFCD	Iraj Nasseri Martin Araiza Andrew Ross Daniel Bradbury
	Reclamation	Subhrendu Gangopadhyay Karen Weghorst
Infrastructure Response/ Concepts	LACFCD	Ken Zimmer Adam Walden Sterling Klippel
	Reclamation	Scott Tincher Phil Mann Bob Talbot
Trade-off Analysis/ Recommendations	LACFCD	Pat Wood
	Reclamation	Steve Piper Susan Black Todd Gaston

3.1.5 Independent Peer Review Panel

The IPRP is comprised of recognized researchers from the fields of civil engineering, hydrology/climatology, and environmental/economics. The IPRP may provide initial feedback during scoping and will provide a “best available science” perspective and expert-level peer review of Basin Study methodology and work products. The IPRP makes recommendations directly to the PM and the STAC. The IPRP will meet on an “ad hoc” basis when the PM or the STAC determines that peer review or recommendations are needed. Membership on the IPRP will be determined and finalized in consultation with the ELT and in accordance with Basin Study program requirements.

3.2 Public Involvement Plan

The Basin Study's public involvement will be directed at continued outreach to the larger community of water agencies, the general public, non-water agency stakeholders, and environmental organizations with an interest in the study area. Various stakeholder agencies and publics that are not direct or active participants in developing the Basin Study will be updated on the progress and status of the Basin Study through periodic email and personal communications and invitation to outreach meetings. The general public and other interested organizations will be approached through outreach meetings to be conducted at key Basin Study milestones, beginning with an early "kickoff" meeting to announce the Basin Study and concluding with a meeting in the closing weeks of the study to announce Basin Study results. Documentation will be kept on input provided at the public meetings, and reasonable efforts will be made to address questions and suggestions. See Appendix 5, Public Involvement Plan.

4.0 Study Tasks

The following is a description of major Basin Study milestones and the primary work tasks for each major milestone. It is important to note that a basin study under the Secure Water Act has a legislative requirement stipulating that a report will be provided to the Commissioner within 2 years of initiation of the Basin Study. The Basin Study will begin on December 31, 2012, and complete on May 31, 2015 with a report submitted to the Commissioner. Final study public meetings and cost share accounting will be completed by December 31, 2015. The final documentation for the Basin Study will be a Basin Study report with appropriate technical attachments and other support materials developed over the duration of the Basin Study.

The preparation of the Basin Study will follow a planning process that addresses required legislative elements and objectives in the Secure Water Act and are consistent with existing Reclamation policies, procedures, and other requirements. The proposed approach to the Basin Study follows a typical plan formulation process for Federal water resources studies and consists of the following major steps:

- Inventory existing basin-wide water supplies and resources.
- Identify and inventory potential new basin supplies and water sources.
- Identify existing water resource demands and use.
- Develop and identify climate change scenarios to be used in the Basin Study.
- Identify anticipated climate changes to water supplies, demands, and in flood volumes and frequencies.
- Project future water resource demands and use.
- Establish hydrologic benchmarks for determining existing system risk and reliability.
- Develop projections of future system risk and reliability.
- Develop and identify nonstructural options to resolve projected imbalances.
- Develop and identify structural options to resolve projected imbalances.
- Prepare recommendations consisting of both structural and nonstructural responses to projected climate change effects.
- Prepare draft and final reports.

Completion of each major task will culminate with the preparation of an interim report. In general, each task builds on the information developed in the preceding tasks. The interim reports for each task will be revised as necessary and aggregated together into the final Basin Study report.

Incorporated into each major task is an integrated program of partner communications and public outreach at specific intervals (also refer to Appendix 5, Public Involvement Plan). In the following sections, the anticipated major tasks and subtasks for the Basin Study are identified under each of the major task sections.

As the Basin Study progresses to the final task, the accumulated information is used to develop and support the Basin Study's recommendations for a range of proposed climate change response strategies culminating in a series of adaptive responses. The adaptive responses will include both structural and nonstructural recommendations.

4.1 Description of Tasks

The Basin Study tasks include: project management, water supply and demand projections, downscaled climate change and hydrologic modeling, existing infrastructure response and operations guidelines analysis, infrastructure and operations concepts, trade-off analysis and recommendations, and final report. The tasks are sequential and dependent upon one another. The tasks described below are in conformance with the requirements of the Basin Study program.

4.1.1 Task 1 – Project Management

1. **Conduct project coordination and meetings with ELT, STAC, IPRP, and the public.**

2. **Conduct project management and coordination between LACFCD and Reclamation Study Technical Teams.**

3. **Oversee production of Basin Study report materials.**

4.1.2 Task 2 – Water Supply and Water Demand Projections

The first major task of the Basin Study is to identify and provide an inventory of all the various water supply and demand data throughout the Los Angeles Basin, including the role of stormwater as a component of the overall supply picture. This assessment primarily will use existing information. Where known quantifications are not available, estimates of supply and demand volumes will be provided with supporting rationale. This task will assess the magnitude and variability of water supplies derived from stormwater in conjunction with the other supply sources.

1. **Water Supply**
    a. Literature review of current water supply portfolio
        i. Imported and local potable supplies
        ii. Recycled water
        iii. Desalination
        iv. Water conservation

v. Current groundwater volumes
vi. All other sources

b. Literature review of future water supply projections
i. Imported and local potable supplies
ii. Recycled water
iii. Desalination
iv. Water conservation
v. Current groundwater volumes
vi. All other sources

2. Water Demand

a. Literature review of current water demand
i. Municipal
ii. Industrial
iii. Agricultural
iv. All other demands

b. Literature review of future water demand
i. Municipal
ii. Industrial
iii. Agricultural
iv. All other demands

3. Supply Analysis

a. Assess current water supply analysis
b. Assess future water supply analysis
c. Next steps and recommendations

4. Assess LACFCD Water Conservation System Contributions

a. Overall supply
b. Water agency needs
c. Groundwater basin management

5. Prepare Draft Interim Report

6. Stakeholder Document Review

7. Revise Report

8. Peer Review

9. Prepare and Publish Interim Report

Deliverable: Water Supply and Demand Analysis Report

4.1.3 Task 3 – Downscaled Climate Change and Hydrologic Modeling

The second major task includes the selection of a set of down-scaled climate models for the greater Los Angeles Basin. These models will be used throughout the Basin Study to develop benchmark climate change scenarios for current and future supply and demand assessments that incorporate predicted climate change effects. Theoretical data sets will be derived from the climate models to conduct hydrologic modeling throughout the Basin Study area that will produce runoff projections out to 2099. The study team will then select a planning horizon for use in Tasks 4, 5, and 6.

1. **Climate Change**
   a. Evaluate existing projections of climate change in the Basin Study area
   b. Determine appropriate climate scenarios for use in the hydrologic modeling
   c. Determine storm event frequency for planning purposes
   d. Prepare data for input into LACFCD hydrologic model
2. **Hydrologic Modeling**
   a. Model current hydrology
      i. Determine baseline scenario modeling assumptions
      ii. Prepare model to simulate baseline scenario
      iii. Perform model simulations
      iv. Synthesize and analyze model results
      v. Summarize model results
   b. Model projected hydrology
      i. Determine future scenario modeling assumptions incorporating selected climate change scenarios
      ii. Prepare model to simulate future scenarios
      iii. Perform model simulations
      iv. Synthesize and analyze model results
      v. Summarize model results
3. **Prepare Draft Interim Report**
4. **Stakeholder Document Review**
5. **Revise Report**
6. **Peer Review**
7. **Prepare and Publish Interim Report**

Deliverable: Downscaled Climate Change and Hydrologic Modeling Report

4.1.4 Task 4 – Existing Infrastructure Response and Operations Guidelines Analysis

Building on the climate change and hydrologic modeling results developed in Task 3, Task 4 involves assessing the response of existing infrastructure and analyzing operations

guidelines for current and future climate conditions. This analysis will include an assessment of both current and future stormwater volumes conserved or discharged and impacts to the flood control and water conservation system.

1. **Response to Current Climate**
   a. Analyze stormwater volumes conserved or discharged
      i. Low and high extremes
      ii. Annual average
      iii. 20 year average
      iv. 50 year average
   b. Analyze infrastructure response and operations guidelines
      i. Flood control system
      ii. Water conservation system
2. **Response to Future Climate**
   a. Analyze stormwater volumes conserved or discharged
      i. Low and high extremes
      ii. Annual average
      iii. 20-year average
      iv. 50-year average
   b. Analyze infrastructure response and operations guidelines
      i. Flood control system
      ii. Water conservation system
3. **Prepare Draft Interim Report**
4. **Stakeholder Document Review**
5. **Revise Report**
6. **Peer Review**
7. **Prepare and Publish Interim Report**

Deliverable: Existing Infrastructure Response and Operational Plans Analysis Report

4.1.5 Task 5 – Infrastructure and Operations Concepts

Task 5 will identify and develop structural and nonstructural concepts to manage stormwater under future conditions. Concepts will be developed by the Study Technical Team, the STAC, and the public and will undergo a preliminary analysis to determine that they meet a minimum set of criteria. Under Task 5, concepts will be evaluated by the following: minimum storage criteria and minimum infiltration capacity criteria. Concepts that meet the minimum criteria will be further evaluated and refined. A detailed tradeoff analysis for finalist concepts will be performed in Task 6.

As opportunities are refined, an iterative modeling process will be used to determine future system reliability under conditions where selected opportunities are assumed to be developed and/or implemented.

Opportunities include but are not limited to: Operational changes, legal and institutional changes, conjunctive use, upgrades, rehabilitation or replacement of existing facilities, water recycling and reuse, development of new conveyance and storage facilities, development of new surface and subsurface recharge facilities, vegetation and sediment management, groundwater remediation, urban runoff management, and importation projects. Major tasks and subtasks include:

1. **Develop Concepts**
   a. Identify range of opportunities and options
      i. LACFCD Staff
      ii. Study Technical Team
      iii. STAC
      iv. Public
   b. Determine preliminary concepts for further evaluation
      i. Minimum storage criteria
      ii. Minimum infiltration capacity criteria
2. **Evaluate and Refine Concepts for Technical Analysis**
   a. Technical Analysis of concepts
      i. Storage capacity
      ii. Infiltration capacity
      iii. Groundwater recharge potential
      iv. Groundwater quality
      v. Conveyance/diversion/outlet requirements
      vi. Site modification requirements
      vii. Property valuation and availability
   b. Selection of concepts for appraisal-level concept planning
3. **Appraisal-Level Facility Concept Planning**
   a. Dams
      i. Evaluate potential operational changes to dams
      ii. Evaluate existing information on the seismic safety of LACFCD dams for projected long-term structural upgrades
      iii. Develop capacity enhancement concepts, with cost estimates
   b. Spreading basins
      i. Evaluate potential operational changes to spreading basins
      ii. Develop capacity enhancement concepts, with cost estimates
   c. Decentralized storage, infiltration and/or reuse facilities

i. Develop concepts, with cost estimates

d. ASR well injection sites
   i. Develop concepts, with cost estimates
e. Debris basin
   i. Evaluate potential operational changes to debris basins
   ii. Develop capacity enhancement concepts, with cost estimates

4. **Prepare Draft Interim Report**
5. **Stakeholder Document Review**
6. **Revise Report**
7. **Peer Review**
8. **Prepare and Publish Interim Report**

Deliverable: Infrastructure and Operations Concepts Report

4.1.6 Task 6 – Trade-Off Analysis and Recommendations

The trade-off analysis will evaluate the trade-offs between the concepts that were developed in Task 5. This trade-off analysis will include a well defined no action alternative, including the costs of any actions/programs/unmet demands that reasonably would be expected to occur under no action. The no action alternative serves as the baseline for estimating benefits, costs, and regional impacts.

1. **Conduct Economic Analysis**
   a. Flood control
   b. Water supply
   c. Water quality
   d. Recreation
   e. Habitat
   f. Endangered species
   g. Regional impacts
   h. Permitting requirements
   i. Partnership/funding opportunities
2. **Conduct Non-Economic Analysis**
   a. Flood control
   b. Water supply
   c. Water quality
   d. Recreation
   e. Habitat
   f. Endangered species
   g. Regional impacts

   h. Permitting requirements
   i. Partnership/funding opportunities
3. **Develop Trade-Off Matrix**
4. **Cost Effectiveness**
   a. Water supply
   b. Flood control
   c. TBD
5. **Develop Recommendations**
6. **Prepare Draft Interim Report**
7. **Stakeholder Document Review**
8. **Revise Report**
9. **Peer/Technical Advisory Panel Review Interim Report**
10. **Prepare and Publish Interim Report**

Deliverable: Trade-off Analysis and Recommendations Report

4.1.7 Task 7 – Final Report

1. **Prepare Final Report**
2. **Review Process**
   a. Peer review
   b. Internal review
   c. Public review
3. **Finalize Report**
4. **Publish and Distribute Report**

Deliverable: Los Angeles Basin Stormwater Conservation Study Report

5.0 Schedule and Milestones

Major study milestone tasks were identified in section 4. These study tasks and their corresponding major milestone deliverable products include the following:

Basin Study Task	Milestone Deliverables	Date
Water Supply and Water Demand Projections	Draft Water Supply and Water Demand Projections Report	September 2013
Downscaled Climate Change and Hydrologic Modeling	Draft Climate Change and Hydrology Report	September 2013
Existing Infrastructure Response and Operations Guidelines Analysis	Draft Existing Infrastructure Response and Operations Guidelines Analysis Report	February 2014
Infrastructure and Operations Concepts	Draft Infrastructure and Operations Concepts Report	October 2014
Trade-Off Analysis and Recommendations	Draft Trade-Off Analysis and Recommendations Report	February 2015
Final Report	Los Angeles Basin Stormwater Conservation Study Report	May 2015

6.0 Budget

Task	Task Description	LACFCD	Local Partners	Reclamation	Total Budget
1.0 Project Management					
1.1	Stakeholder Coordination and Meetings	$60,000	$0	$40,000	$100,000
1.2	Study Team Coordination and Meetings	$60,000	$0	$40,000	$100,000
1.3	Study Administration	$90,000	$0	$100,000	$190,000
	Subtotal	**$210,000**	**$0**	**$180,000**	**$390,000**
2.0 Water Supply and Demand Projections					
2.1	Water Supply				
2.1.a	Literature Review of Current Water Supply Portfolio	$24,000	$0	$5,000	$29,000
2.1.b	Literature Review of Future Water Supply Portfolio	$24,000	$0	$5,000	$29,000
2.2	Water Demand				
2.2.a	Literature Review of Current Water Demand	$24,000	$0	$5,000	$29,000
2.2.b	Literature Review of Future Water Demand	$24,000	$0	$5,000	$29,000
2.3	Gap Analysis				
2.3.a	Assess Current Water Supply Gap	$12,000	$0	$5,000	$17,000
2.3.b	Assess Future Water Supply Gap	$12,000	$0	$5,000	$17,000
2.4	Prepare Draft Interim Report	$12,000	$0	$7,000	$19,000
2.5	Stakeholder Document Review	$0	$7,000	$0	$7,000
2.6	Revise Report	$3,000	$0	$2,000	$5,000
2.7	Peer Review	$3,333	$3,333	$2,000	$8,666
2.8	Prepare and Publish Interim Report	$5,000	$0	$5,000	$10,000
	Subtotal	**$143,333**	**$10,333**	**$46,000**	**$199,666**

Task	Task Description	LACFCD	Local Partners	Reclamation	Total Budget
3.0 Downscaled Climate Change and Hydrologic Modeling for the Los Angeles Basin					
3.1	Climate Change				
3.1.a	Evaluate Existing Projections of Climate Change	$5,000	$0	$20,000	$25,000
3.1.b	Determine Appropriate Climate Change Scenarios for Use in Hydrologic Modeling	$5,000	$0	$6,000	$11,000
3.1.c	Determine storm event frequency for planning purposes	$35,000	$0	$50,000	$85,000
3.1.d	Prepare data for input into LACFCD hydrologic model	$15,000	$0	$25,000	$40,000
3.2	Hydrologic Modeling				
3.2.a	Model Current Hydrology	$70,000	$0	$20,000	$90,000
3.2.b	Model Projected Hydrology	$130,000	$0	$30,000	$160,000
3.3	Prepare Draft Interim Report	$25,000	$0	$10,000	$35,000
3.4	Stakeholder Document Review	$0	$7,000	$0	$7,000
3.5	Revise Report	$7,000	$0	$5,000	$12,000
3.6	Peer Review	$3,333	$3,333	$4,000	$10,666
3.7	Prepare and Publish Interim Report	$6,000	$0	$5,000	$11,000
	Subtotal	**$301,333**	**$10,333**	**$175,000**	**$486,666**
4.0 Existing Infrastructure Response					
4.1	Response to Current Climate	$55,000	$0	$30,000	$85,000
4.2	Response to Future Climate	$120,000	$0	$50,000	$170,000
4.3	Prepare Draft Interim Report	$40,000	$0	$10,000	$50,000
4.4	Stakeholder Document Review	$0	$4,000	$0	$4,000
4.5	Revise Report	$3,000	$0	$3,000	$6,000
4.6	Peer Review	$3,333	$3,334	$4,000	$10,667
4.7	Prepare and Publish Interim Report	$6,000	$0	$5,000	$11,000
	Subtotal	**$227,333**	**$7,334**	**$102,000**	**$336,667**

Task	Task Description	LACFCD	Local Partners	Reclamation	Total Budget
5.0 Infrastructure and Operations Concepts					
5.1	Develop Concepts	$60,000	$10,000	$30,000	$100,000
5.2	Evaluate and Refine Concepts				
5.2.a	Siting	$36,000	$6,000	$10,000	$52,000
5.2.b	Technical Feasibility	$36,000	$0	$17,000	$53,000
5.3	Appraisal-Level Facility Concept Planning				
5.3.a	Dams	$40,000	$0	$35,000	$75,000
5.3.b	Existing Spreading Basins	$64,000	$0	$12,000	$76,000
5.3.c	New Infiltration Sites	$64,000	$0	$15,000	$79,000
5.3.d	Debris Basin Modification	$40,000	$0	$30,000	$70,000
5.4	Prepare Draft Interim Report	$25,000	$0	$15,000	$40,000
5.5	Stakeholder Document Review	$0	$8,000	$0	$8,000
5.6	Revise Report	$10,000	$0	$8,000	$18,000
5.7	Peer Review	$11,667	$0	$20,000	$31,667
5.8	Prepare and Publish Interim Report	$10,000	$0	$5,000	$15,000
	Subtotal	**$396,667**	**$24,000**	**$197,000**	**$617,667**
6.0 Trade-Off Analysis and Recommendations					
6.1	Conduct Trade-Off Analysis				
6.1.a	Economic Analysis	$5,000	$0	$65,000	$70,000
6.1.b	Other trade-off analyses	$10,000	$0	$60,000	$70,000
6.2	Develop Recommendations	$5,000	$0	$20,000	$25,000
6.3	Prepare Draft Interim Report	$3,000	$0	$15,000	$18,000
6.4	Stakeholder Document Review	$0	$3,960	$0	$3,960
6.5	Revise Report	$3,500	$0	$3,000	$6,500
6.6	Peer Review	$14,000	$2,000	$4,000	$20,000
6.7	Prepare and Publish Interim Report	$10,000	$0	$5,000	$15,000
	Subtotal	**$50,500**	**$5,960**	**$172,000**	**$228,460**

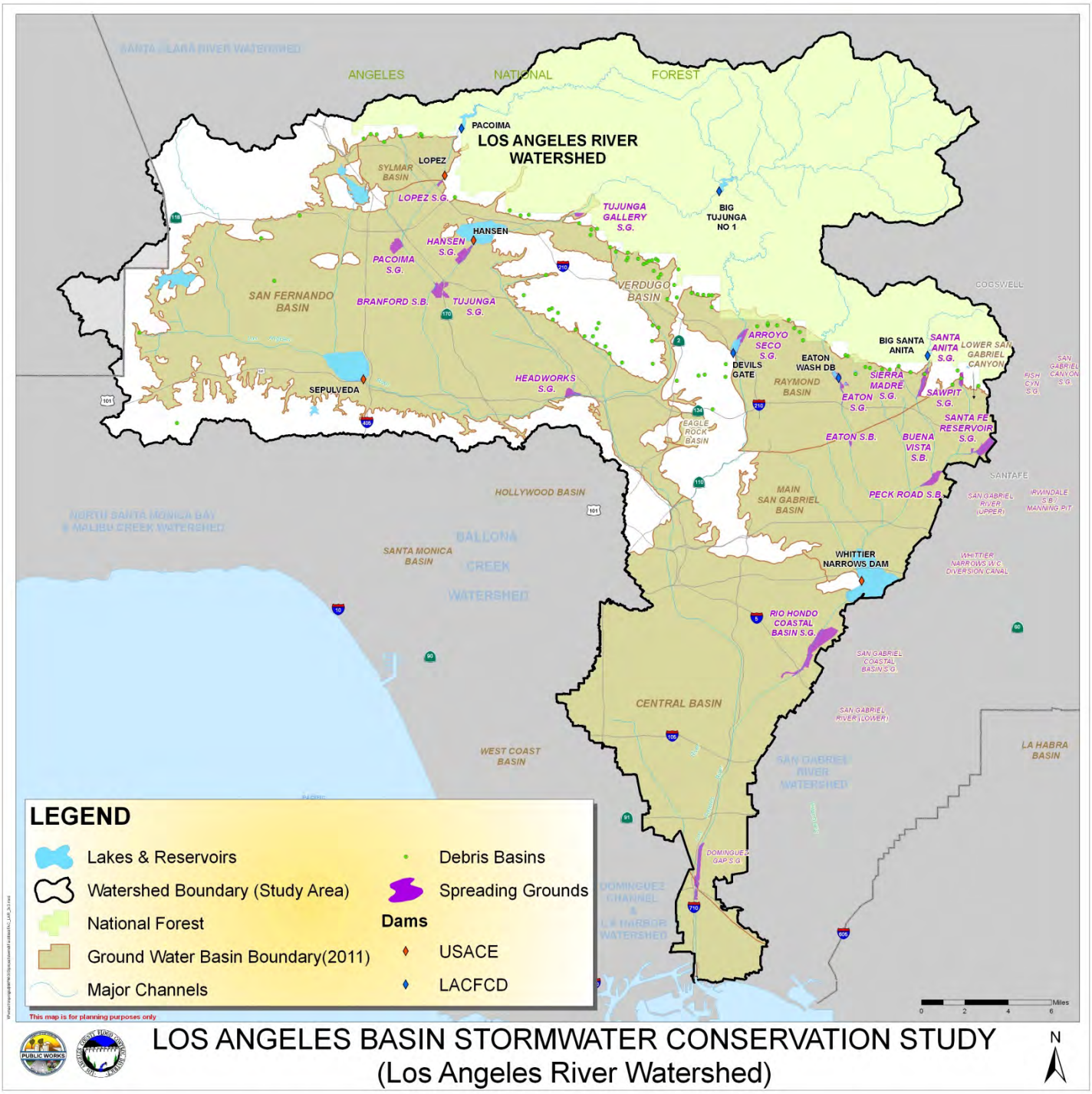
Task	Task Description	LACFCD	Local Partners	Reclamation	Total Budget
7.0 Final Report					
7.1	Draft Final Report	$15,000	$0	$10,000	$25,000
7.2	Review Process	$1,000	$2,000	$8,000	$11,000
7.3	Finalize Report	$10,000	$0	$5,000	$15,000
7.4	Publish and Distribute Report	$7,500	$0	$5,000	$12,500
	Subtotal	**$33,500**	**$2,000**	**$28,000**	**$63,500**

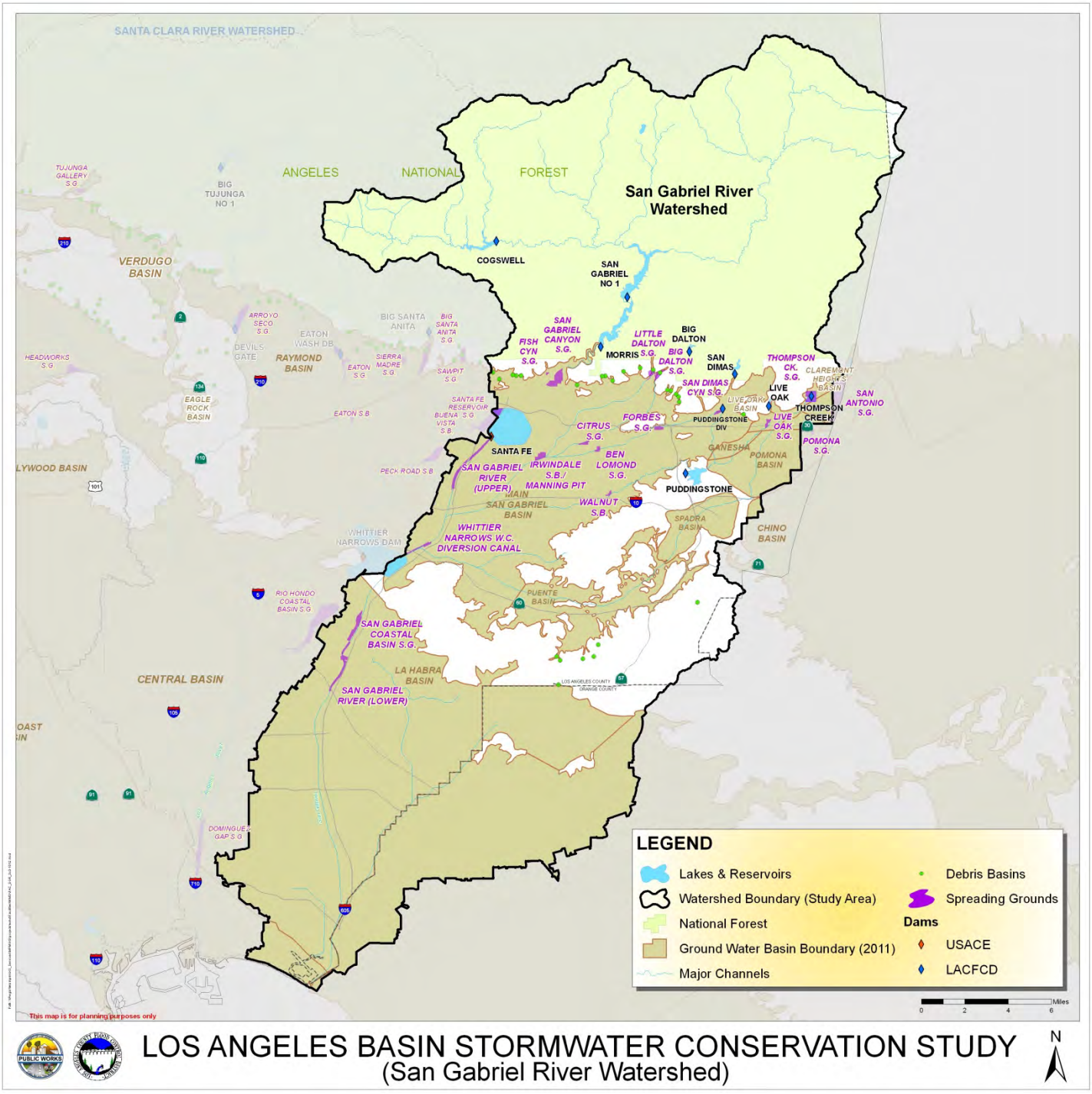
	Contingency			**$100,000**	

STUDY TOTAL		**$1,362,666**	**$59,960**	**$1,000,000**	**$2,322,626**

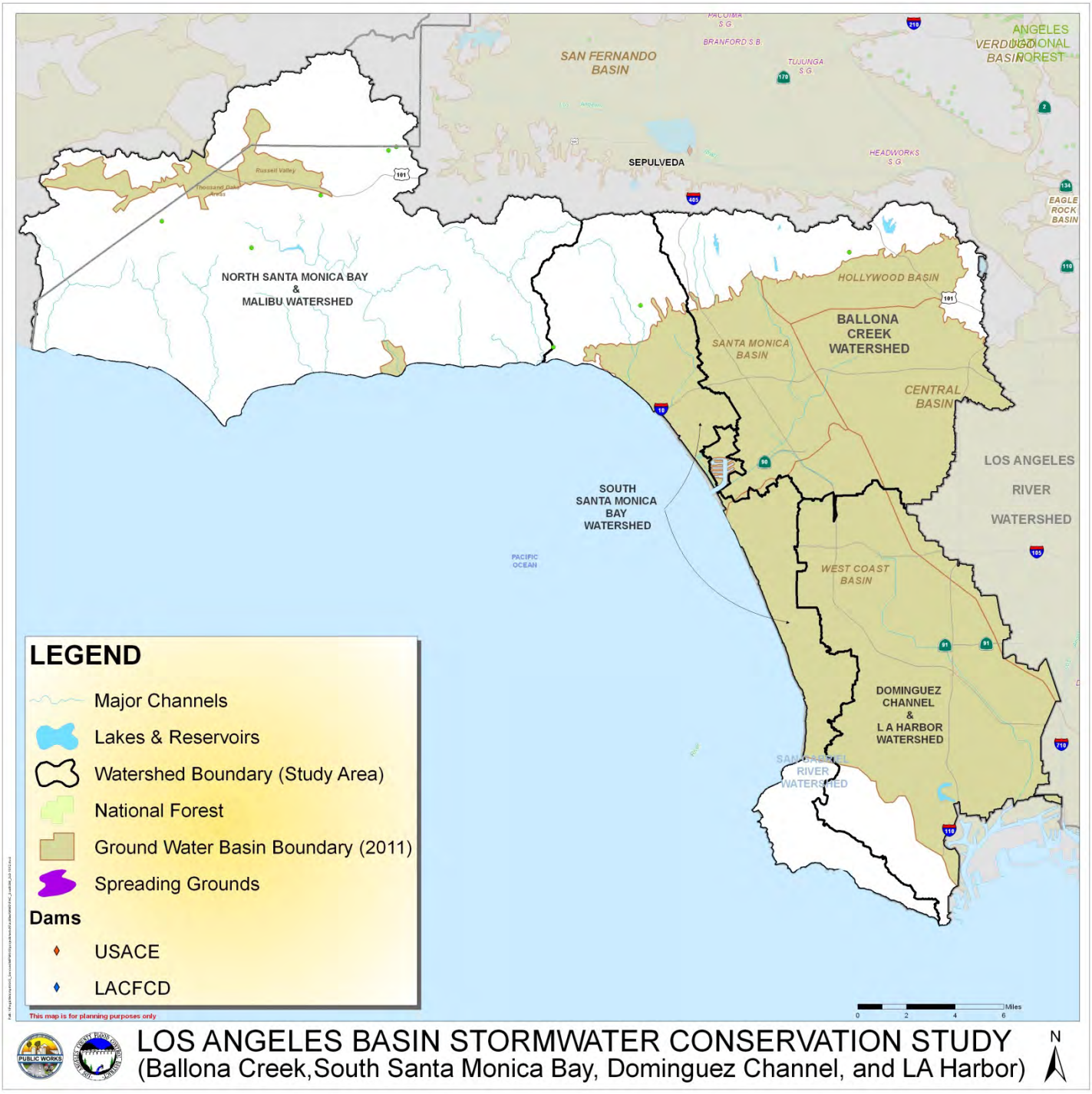
Federal	43%
Non-Federal	61%

Appendix 1 – Map Figures





LOS ANGELES BASIN STORMWATER CONSERVATION STUDY
(San Gabriel River Watershed)


SAN FERNANDO BASIN
SEPULVEDA
ANGELES NATIONAL FOREST
EAGLE ROCK BASIN
HOLLYWOOD BASIN
BALLONA CREEK WATERSHED
SANTA MONICA BASIN
CENTRAL BASIN
LOS ANGELES RIVER WATERSHED
NORTH SANTA MONICA BAY & MALIBU WATERSHED
SOUTH SANTA MONICA BAY WATERSHED
WEST COAST BASIN
DOMINGUEZ CHANNEL & L A HARBOR WATERSHED
PACIFIC OCEAN
LEGEND
Major Channels
Lakes & Reservoirs
Watershed Boundary (Study Area)
National Forest
Ground Water Basin Boundary (2011)
Spreading Grounds
Dams
USACE
LACFCD
This map is for planning purposes only
Miles
LOS ANGELES BASIN STORMWATER CONSERVATION STUDY
(Ballona Creek,South Santa Monica Bay, Dominguez Channel, and LA Harbor)
N

Appendix 2 – Groundwater Basin and Water Agency Relationships

Los Angeles River Watershed

Groundwater Basin	Groundwater Administrator	Water Agency Stakeholders[1]
San Fernando Valley	Upper Los Angeles River Area Watermaster	• Metropolitan Water District of Southern California • City of Los Angeles Department of Water and Power • City of Burbank Department of Water and Power • City of Glendale Department of Water and Power
Sylmar	Upper Los Angeles River Area Watermaster	• Metropolitan Water District of Southern California • City of Los Angeles Department of Water and Power • City of San Fernando
Verdugo	Upper Los Angeles River Area Watermaster	• Metropolitan Water District of Southern California • City of Los Angeles Department of Water and Power • City of Glendale Department of Water and Power • Crescenta Valley Water District
Eagle Rock	Upper Los Angeles River Area Watermaster	• Metropolitan Water District of Southern California • City of Los Angeles Department of Water and Power
Raymond	Raymond Basin Management Board	• Metropolitan Water District of Southern California • Foothill Municipal Water District • City of Pasadena Department of Water and Power • City of San Marino (Cal American Water Company) • San Gabriel Valley Municipal Water District • Upper San Gabriel Valley Municipal Water District
Main San Gabriel	Main San Gabriel Basin Watermaster	• San Gabriel River Water Committee (“Committee of Nine”) • San Gabriel Valley Protective Association • Metropolitan Water District of Southern California • San Gabriel Valley Municipal Water District • Upper San Gabriel Valley Municipal Water District
Central Basin	California Department of Water Resources (CA DWR, watermaster), Water Replenishment District of Southern California	• Metropolitan Water District of Southern California • Central Basin Municipal Water District • Long Beach Water Department • City of Compton

[1] Water agency stakeholders with service areas in the groundwater basin.

San Gabriel River Watershed

Groundwater Basin	Groundwater Administrator	Water Agency Stakeholders
Main San Gabriel	Main San Gabriel Basin Watermaster	• Metropolitan Water District of Southern California • San Gabriel Valley Municipal Water District • Upper San Gabriel Valley Municipal Water District • Three Valleys Municipal Water District
Canyon	Six Basins Watermaster	• Metropolitan Water District of Southern California • Three Valleys Municipal Water District • Pomona Valley Protective Association
Lower Claremont Heights	Six Basins Watermaster	• Metropolitan Water District of Southern California • Three Valleys Municipal Water District • Pomona Valley Protective Association
Pomona	Six Basins Watermaster	• Metropolitan Water District of Southern California • Three Valleys Municipal Water District • Pomona Valley Protective Association
Live Oak	Six Basins Watermaster	• Metropolitan Water District of Southern California • Three Valleys Municipal Water District • Pomona Valley Protective Association
Ganesha	Six Basins Watermaster	• Metropolitan Water District of Southern California • Three Valleys Municipal Water District • Pomona Valley Protective Association
Spadra	None	• Metropolitan Water District of Southern California • Three Valleys Municipal Water District
Puente	Puente Basin Watermaster	• Metropolitan Water District of Southern California • Upper San Gabriel Valley Municipal Water District • Three Valleys Municipal Water District
Central	CA DWR (watermaster), Water Replenishment District of Southern California	• Metropolitan Water District of Southern California • Central Basin Municipal Water District

Ballona Creek Watershed

Groundwater Basin	Groundwater Administrator	Water Agency Stakeholders
Hollywood	City of Beverly Hills (unadjudicated)	• Metropolitan Water District of Southern California • City of Los Angeles Department of Water and Power • West Basin Municipal Water District
Santa Monica	City of Santa Monica (unadjudicated)	• Metropolitan Water District of Southern California • City of Los Angeles Department of Water and Power • West Basin Municipal Water District

North Santa Monica Bay Watershed

Groundwater Basin	Groundwater Administrator	Water Agency Stakeholders
		• West Basin Municipal Water District
		• Las Virgenes Municipal Water District

South Santa Monica Bay Watershed

Groundwater Basin	Groundwater Administrator	Water Agency Stakeholders
Santa Monica	City of Santa Monica (unadjudicated)	• Metropolitan Water District of Southern California • City of Los Angeles Department of Water and Power • City of Santa Monica
West Coast Basin	CA DWR (watermaster), Water Replenishment District of Southern California	• Metropolitan Water District of Southern California • City of Los Angeles Department of Water and Power • West Basin Municipal Water District • City of Torrance

Dominguez Channel and Los Angeles Harbor Watersheds

Groundwater Basin	Groundwater Administrator	Water Agency Stakeholders
West Coast Basin	CA DWR (watermaster), Water Replenishment District of Southern California	• Metropolitan Water District of Southern California • City of Los Angeles Department of Water and Power • West Basin Municipal Water District • City of Torrance • Long Beach Water Department

Appendix 3 – Stakeholders Outreach List

Water Agency Stakeholders	Other Stakeholders and Interested Parties
California Department of Water Resources (CA DWR, watermaster)	Audubon Society
CA DWR (climate change)	Arroyo Seco Foundation
Central Basin Municipal Water District	Arroyos and Foothills Conservancy
City of Beverly Hills	Ballona Creek Renaissance
City of Burbank Department of Water and Power	California Department of Fish and Game
City of Compton	Council for Watershed Health
City of Glendale Department of Water and Power	County of Los Angeles Department of Regional Planning
City of Los Angeles Department of Water and Power	Friends of the Los Angeles River
City of Pasadena Department of Water and Power	Glendora Community Conservancy
City of San Fernando	Heal the Bay
City of San Marino (Cal American Water Company)	Los Angeles Regional Collaborative for Climate Action and Sustainability (University of California at Los Angeles Institute of the Environment and Sustainability)
City of Santa Monica	Los Angeles Regional Water Quality Control Board
City of Torrance	Public Policy Institute of California
Foothill Municipal Water District	Resources Legacy Fund
Las Virgenes Municipal Water District	San Gabriel and Lower Los Angeles Rivers and Mountains Conservancy
Long Beach Water Department	San Gabriel Valley Water Association
Main San Gabriel Basin Watermaster	Santa Monica Bay Restoration Commission
Metropolitan Water District of Southern California	Santa Monica Mountains Conservancy
Pomona Valley Protective Association	Sierra Club
Puente Basin Watermaster	Southern California Water Committee – Stormwater Task Force
Raymond Basin Management Board	The River Project

Water Agency Stakeholders	Other Stakeholders and Interested Parties
San Gabriel River Water Committee ("Committee of Nine")	Tree People
San Gabriel Valley Municipal Water District	United States Army Corps of Engineers
San Gabriel Valley Protective Association	U.S. Fish and Wildlife Service
Six Basins Watermaster	U.S. Forest Service
Three Valleys Municipal Water District	
Upper Los Angeles River Area Watermaster	
Upper San Gabriel Valley Municipal Water District	
Water Replenishment District of Southern California	
West Basin Municipal Water District	

Appendix 4 – Watershed Facilities Study List

Los Angeles River Watershed

Dams	Debris Basins (DB)	Spreading Grounds (SG)
Upper Los Angeles River Area (ULARA) Basins		
Pacoima Dam	Dry Canyon-South Fork DB	Pacoima SG
Big Tujunga Dam	Bell Creek Debris Retention Inlet (DRI)	Lopez SG
	Wilbur DB	Hansen SG
Hansen Dam (owned by U.S. Army Corps of Engineers [USACE])	Limekiln DB	Branford SB
Sepulveda Dam (owned by USACE)	Aliso DB	Tujunga SG (owned by City of Los Angeles Department of Water and Power [LADWP])
Lopez Dam (owned by USACE)	Stetson DB	Tujunga Wash
	Sombrero DB	Headworks SG (owned by LADWP)
	Hog DB	
	Schoolhouse DB	
	Wilson DB	
	May No. 1 DB	
	May No. 2 DB	
	Lopez Canyon DB	
	Cassara DB	
	Oliver DB	
	Schwartz DB	
	Denivelle DB	
	Zachau DB	
	Rowley DB	
	Rowley (Upper) DB	
	Blue Gum DB	
	Blanchard DB	
	Skyridge DRI	
	Cooks DB	
	Cooks M1-A DB	
	Dunsmuir DB	
	Ward DB	
	Oak DB	
	Cloud Creek DB	
	Pinelawn DB	
	Shields (Upper) DB	

Los Angeles River Watershed (continued)

Dams	Debris Basins	Spreading Grounds
ULARA Basins (continued)		
	Starfall DB	
	Shields DB	
	Goss Inlet DRI	
	Eagle DB	
	Snover DB	
	Pickens DB	
	Halls DB	
	La Tuna DB	
	Chandler DB	
	Brace Mar DB	
	Brace DB	
	Haven Way DB	
	Irving Drive DB	
	Sunset (Lower) DB	
	Sunset (Upper) DB	
	Stough DB	
	Montana DB	
	Elmwood DB	
	Childs DB	
	Brand DB	
	Hillcrest DB	
	Mountbatten DB	
	Deer DB	
	Oakmont View Drive DB	
	Verdugo DB	
	Contento DRI	
	Golf Club Drive DB	
	Linda Vista DB	
Raymond Basin		
Devils Gate Dam	Winery DB	Arroyo Seco SG (owned by Pasadena Department of Water and Power)
Eaton Wash Dam	Hay DB	Eaton SG
Santa Anita Dam	Bigbriar DB	Eaton SB
	Harter Lane DRI	Sierra Madre SG (owned by City of Sierra Madre)
	Gould DB	Santa Anita SG
	Gould (Upper) DB	
	Inverness DB	
	Chamberlain DB	
	West Ravine DB	
	Lincoln DB	

Los Angeles River Watershed (continued)

Dams	Debris Basins	Spreading Grounds
Raymond Basin (continued)		
	Fern DB	
	Fair Oaks DB	
	Devonwood DB	
	Las Flores DB	
	Rubio DB	
	Gooseberry DB	
	Kinneloa West DB	
	Kinneloa East DB	
	Sierra Madre Villa DB	
	Carriage House DB	
	Sunnyside DB	
	Bailey DB	
	Lannan DB	
	Santa Anita DB	
Main San Gabriel Basin		
	Ruby (Lower) DB	Sawpit SG
	Oak Glade DB	Peck Road SB
	Sawpit DB	
	Buena Vista DB	
Central Basin		
		Rio Hondo Coastal SG
		Dominguez Gap SG

San Gabriel River Watershed

Dams	Debris Basins	Spreading Grounds
Main San Gabriel Basin		
Cogswell Dam	Bradbury DB	Santa Fe SG
San Gabriel Dam	Spinks DB	Buena Vista SB
Morris Dam	Maddock DB	San Gabriel River (Upper) (owned by USACE)
Big Dalton Dam	Crestview DB	Fish Canyon SG (owned by Cal American Water Co.)
San Dimas Dam	Las Lomas DB	San Gabriel Canyon SG
Puddingstone Diversion Dam	Beatty DB	Irwindale SB/ Manning Pit
Puddingstone Dam	Hook West DB	Walnut SB
	Hook East DB	Ben Lomond SG
	Westridge DB	Citrus SG

San Gabriel River Watershed (continued)

Dams	Debris Basins	Spreading Grounds
Main San Gabriel Basin (continued)		
Santa Fe Dam (owned by USACE)	Harrow DB	Forbes SG
Whittier Narrows Dam (owned by USACE)	Englewild DB	Little Dalton SG
	Big Dalton DB	Big Dalton SG
	Little Dalton DB	San Dimas Canyon SG
	Gordon DB	
	Mull DB	
	Morgan DB	
	Crescent Glen DB	
	Oak Park DB	
	Emerald West DB	
	Emerald East DB	
Six Basins		
Live Oak Dam	Live Oak DB	Live Oak SG
Thompson Creek Dam		Thompson Creek SG (owned by Pomona Valley Protective Association)
Puente Basin		
	Fullerton DB	
	Harbor Blvd DB	
	Fieldbrook DB	
	Bramhall DB	
	Hillman DB	
Central Basin		
	Turnbull DB	San Gabriel Coastal SG
		San Gabriel River (Lower)

Ballona Creek Watershed

Dams	Debris Basins	Spreading Grounds
Hollywood		
	Nichols DB	
Santa Monica		
	Sullivan DB	

North Santa Monica Bay Watershed

Dams	Debris Basins	Spreading Grounds
	Caitlyn Circle DB	
	Hazel Nut #2 DB	
	Calle Robleda DRI	
	Thousand Oaks DB	
	Sloan DRI	

South Santa Monica Bay Watershed

Dams	Debris Basins	Spreading Grounds
	Cloudcroft DB	

Dominguez Channel and Los Angeles Harbor Watersheds

Dams	Debris Basins	Spreading Grounds
None	None	None

Appendix 5 – Public Involvement Plan

Introduction

The Bureau of Reclamation (Reclamation) Southern California Area Office and the Los Angeles County Flood Control District (LACFCD) submitted a Proposal and Plan of Study in February 2012 to fund a Basin Study (Basin Study) Program to conduct the Los Angeles Basin Stormwater Conservation Study. The Basin Study will be conducted over a 2-year period and consists of seven tasks.

The purpose of the Basin Study is to study long-term flood control and water conservation impacts from projected population and climate conditions in the Los Angeles Basin. The Los Angeles River, San Gabriel River, Ballona Creek, Santa Monica Bay, Dominguez Channel, and Los Angeles Harbor watersheds (Watersheds) are the focus of this Basin Study. The Basin Study will recommend potential changes to the operation of stormwater capture systems, modifications to existing facilities, and development of new facilities that could help resolve future flood control and water supply issues. The recommendations will be developed through identifying alternatives and conducting trade-off analyses.

The Basin Study partners will facilitate public involvement to solicit and incorporate stakeholder input throughout the study. This Public Involvement Plan provides the framework for that effort.

Approach

Several communication methods will be employed to effectively maintain communication with all interested stakeholders and to provide, seek, and receive information. A response will be provided for all comments received. All information received regarding technical aspects of the Basin Study will be considered, and feedback regarding that consideration will be provided.

All outreach materials, information received, and feedback provided will be archived in a centralized electronic filing system. As the Basin Study progresses, the effectiveness of the public involvement will be assessed periodically, and adjustments will be made as necessary to ensure that appropriate communication and feedback is occurring.

Communication Methods

Effective communication is essential for the ongoing success of the Basin Study. The methods of communication that will be used to disseminate information and accept input during the course of this Basin Study include the following:

- Study Web site will be maintained to provide up-to-date, online information.
- An email address list will be established and maintained to ensure that all interested stakeholders receive information.
- Points-of-contact will be established to facilitate additional information exchange.
- News releases and informational mailings will be provided as appropriate.
- Public meetings will be held at strategic points throughout the Basin Study
- Additional meetings with interested stakeholders groups will be held as appropriate.

Additional information on each of these methods is provided below.

Web Site

Reclamation's Basin Study Web site will be used to post up-to-date information. Web site content will be updated periodically, particularly at major milestones and prior to public meetings. In addition, the Web site will be used as a tool for soliciting input from stakeholders.

Email

Reclamation will establish a Basin Study email address to disseminate information regarding the Basin Study and to receive input.

Points-of-Contact

For additional information, questions, or comments on the Basin Study, Reclamation has designated two Study Points of Contact:

- Lee Alexanderson at 626-458-4370 or LABasinStudy@usbr.gov
- Amy Witherall at 951-695-5310 or LABasinStudy@usbr.gov

News Releases

News releases will occur near major milestones throughout the Study to inform stakeholders and the public of the Study status, provide opportunities for input, and

provide meeting information including dates and locations of the public meetings. News release content will be coordinated with LACFCD's newsletters and informational emails.

Public Meetings

Public meetings will be held at strategic points throughout the Basin Study, beginning with an initial meeting in January 2012. Additionally, prior to completion of each Basin Study phase, public meetings will be held to provide a summary of the results of the previous phase and to seek comments on the upcoming phase of the Basin Study, thereby allowing consideration of information and suggestions by the public for incorporation in the Basin Study. Public meetings also will be noticed and advertised by the LACFCD as part of their public outreach effort.

Six public meetings are currently envisioned as follows:

1. January 2012 – Meeting to present the Basin Study proposal and plan of study.

2. July 2012 – Meeting to present final draft plan of study incorporating feedback from January 2012 meeting.

3. February 2013 – Kickoff meeting for Basin Study. Discussion of study tasks and final plan of study.

4. Targeted for Summer 2013 – Meeting to discuss current and future water supply and demand projections.

5. Targeted for Fall 2013 – Meeting to discuss results of climate change, hydrology analysis, and system response.

6. Targeted for Fall 2014 – Meeting to discuss the results of strategies and options and scenario planning and implement planning.

7. Targeted for May 2015 – Meeting to review the final Basin Study report.

Additional Meetings with Interested Stakeholder Groups

During the course of the Basin Study, additional meetings may be held with interested stakeholder groups to solicit additional input, expertise, data, and information. As appropriate, representatives of interested stakeholder groups may participate in specific Basin Study tasks to facilitate incorporation of such input into the Basin Study.

Interested stakeholder groups may include, but are not limited to, Federal agencies, Native American tribes and communities, water districts, scientific research groups, representatives of the energy industry, environmental groups, and representatives of the

recreational industry. An initial email was sent in November 2011 to a list of interest groups who were involved in similar prior studies to gauge their interest and capability for participating in the Basin Study. Other interest groups are encouraged to provide their contact information via one of the communication methods listed above.