

ORIGINAL

DUPLICATE ORIGINAL

NO. R14-MU-35-0035

MEMORANDUM OF UNDERSTANDING
NO. R14-MU-35-0035
BETWEEN THE
UNITED STATES DEPARTMENT OF INTERIOR,
BUREAU OF RECLAMATION
AND
THE CITY OF SAN DIEGO

TO PROVIDE FUNDS TO SUPPLEMENT AVAILABLE APPROPRIATED FEDERAL FUNDS FOR THE **SAN DIEGO BASIN STUDY**

THIS AGREEMENT for the San Diego Basin Infrastructure Study (Basin Study) is made and entered into this 2 day of April, 2015, by the City of San Diego (City) and The United States Department of the Interior, Bureau of Reclamation (Reclamation), hereinafter collectively referred to as the "**Partners**".

I. Purpose of the Agreement

The Partners agree to work collaboratively to perform the Basin Study. This Agreement establishes the terms for funding the Basin Study and the terms that will guide the performance of the Study.

II. Definitions

- A. Non-Federal Cost Share Partner means the City of San Diego.
- B. Cooperating Agency means any entity that is not Reclamation or a Non-Federal Cost Share Partner that may provide input, data, comments, or participate in the public involvement process related to the Study. Reclamation and the Non-Federal Cost Share Partner may invite Cooperating Agencies to Study-related meetings where their input and expertise is desired. A Cooperating Agency may become a Non-Federal Cost Share Partner and signatory to this agreement with the approval of the Partners.
- C. Confidential Information means trade secrets or commercial or financial information that is privileged or confidential under the meaning of 5 U.S.C. §552(b)(4). However, this Agreement and the documents that are shared pursuant to this Agreement must comply with relevant Freedom of Information Act (FOIA) and State open records act laws.
- D. Term of Agreement means that period set forth under Section X, Article A.

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Filed APR 08 2015
Office of the City Clerk
San Diego, California

- E. Subject Invention means any invention or discovery, which is or may be patentable under Title 35 of the United States Code, conceived or first actually reduced to practice in the performance of work under this Agreement.

III. Purpose of the Study

The purpose of the Study is to determine potential climate change impacts on water supplies and demands within the San Diego IRWM Program planning region, and analyze structural and non-structural concepts within the San Diego Basin that can assist the region in adapting to the uncertainties associated with climate change. The Study will recommend potential changes to existing structural (i.e. dams, reservoirs, conveyance facilities, and treatment and reclamation plants) operations, modifications to existing facilities, and development of new facilities that could optimize the reservoir systems, and additional new water supply options including desalination and indirect potable reuse options. Non-structural concepts will address regulatory challenges and delivery setbacks related to advanced purified recycled water distribution. The recommendations will be developed through identifying alternatives and conducting trade-off analyses.

The Non-Federal Cost Share Partner acknowledges that Reclamation may utilize this Study to meet portions of the Secure Water Act (42 U.S.C. § 10363).

Background:

The Basin Study will analyze structural and non-structural concepts within the San Diego basin that can assist the region in adapting to the uncertainties associated with climate change and determine the potential climate change impacts on water supplies and demands within the San Diego Integrated Regional Water Management (IRWM) Program planning region. The structural concepts will focus on optimizing the reservoir systems within the San Diego basin and consider the development of indirect potable reuse with reservoir augmentation. Stakeholder input from the San Diego IRWM Regional Water Management Group and other stakeholders within the San Diego basin will be critical to the success of the Basin Study.

The two primary objectives of the Basin Study are summarized below:

1. Determine how climate change will impact the current and future water supply portfolio for the San Diego region; and
2. Develop structural options and non-structural concepts within the San Diego basin that can serve as adaptation strategies to manage climate change impacts focusing on optimizing the reservoir systems and furthering development of new water supply sources.

The Basin Study area will encompass the San Diego IRWM region. The San Diego Watershed is the largest basin within the San Diego IRWM region and is comprised of six sub-hydrologic units (HU) they are: San Dieguito (HU 905), Peñasquitos (HU

906), San Diego (HU 907), Pueblo (HU 908), Sweetwater (HU 909), and Otay (HU 910).¹ The San Diego Watershed covers an area of 217.5 square miles and is home to 1,819,074 people. The majority of City's reservoirs and facilities are located within the San Diego Watershed basin; therefore, the infrastructure concepts that will be evaluated in the Basin Study will be located within this basin. The reservoirs and facilities being evaluated may include, but are not limited to:

- San Vicente Reservoir: Located in the San Diego HU 907, this reservoir has a maximum water storage capacity of 90,230 acre-feet (AF) of water. Through an agreement between the Water Authority and City, San Vicente Dam is in the process of being raised approximately 117 feet to provide an additional capacity of 152,000 AF to supplement emergency storage in the region. The dam raise will be complete in the summer of 2014.
- Murray Reservoir: Located in the San Diego HU 907, this reservoir has a water storage capacity of 4,684 AF. The Murray Reservoir is located at the site of the Alvarado Water Treatment Plant, a critical juncture for raw water pipelines in the CITY drinking water system.
- El Capitan Reservoir: Located in the San Diego HU 907, this reservoir has a water storage capacity of 112,806 AF. El Capitan currently has the largest storage capacity in City's reservoir system.
- Lower Otay Reservoir: Located in the Otay HU 910, this reservoir has a water storage capacity of 49,848 AF. The Lower Otay Reservoir is the terminus of the second San Diego Aqueduct.
- City Reclamation Facilities: Located in the Peñasquitos HU 906, the North City Water Reclamation Plant is the first large-scale water reclamation plant in San Diego. This facility has the capacity to treat up to 30 million gallons of wastewater per day. Also located here is the Advance Water Purification Facility where City is using the most advanced technologies to demonstrate the feasibility of purifying one million gallons of recycled water per day. Located in the Tijuana HU 911, the South Bay Water Reclamation Plant provides local wastewater treatment services and reclaimed water to the South Bay. The plant opened in May 2002 and has a wastewater treatment capacity of 15 million gallons a day.

IV. Study Approach, Expected Outcomes and Deliverables

- A. The Basin Study assessment for water supply and demand projections will primarily use existing information where known quantifications are not available, estimates of supply and demand volumes will be provided with supporting rationale. This activity will assess the magnitude and variability of water supplies derived from local and imported sources in conjunction with other supply sources. Reclamation will prepare and publish an Interim Water Supply and Demand Analysis Report.

¹ As defined by the U.S. Environmental Protection Agency (Cataloguing Unit #18070304)

- B. The Basin Study will use the latest climate change modeling tools to perform a quantitative analysis of the uncertainties associated with climate change impacts on the San Diego Basin's local and imported fresh water supplies. 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. It will use the results of the climate change modeling to update projections of the future IRWM planning region water supply portfolio. Reclamation will provide a Draft Interim Climate Change and Hydrology Report.
- C. The Basin Study will build upon the climate change and hydrological modeling results developed and will use reservoir optimization modeling software to assess responses of both existing structural and operational plans. This will assess the projected climate change impacts to local and imported water supplies and analyze operational guidelines for current and future climate conditions. Reclamation will provide a Draft Interim Existing Structural Response and Operational Plans Analysis Report.
- D. The Basin Study will identify and develop structural and nonstructural concepts to manage drinking water 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. Concepts will be evaluated by minimum storage criteria and minimum infiltration capacity criteria. Concepts that meet the minimum criteria will be further evaluated and refined. 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. Reclamation will develop a Draft Interim Structural and Operations Concepts Report.
- E. A trade-off analysis will be conducted to evaluate the regional impacts and the economic costs and benefits of the various infrastructure concepts and new supply alternatives. Reclamation will produce a Draft Interim Trade-Off Analysis and Recommendations Report. 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 City.
- F. Management of the Study will be accomplished through the Program Manager (PM) and designated teams and committees. 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 Study process. One PM will be

designated from Reclamation and one PM will be designated from the City. The PMs are responsible for the day-to-day management of the Study and are the primary 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 SDPUD.
- Provide information to the ELT for use in determining policy direction regarding complex Study issues.
- Coordinate Study participation with agencies, cost-share partners and the general public.
- Facilitate communication among members of the Study team, the ELT and STT's.
- Provide guidance and oversight for the STTs in the conduct of each 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 Study are completed, the PM will have primary review and approval for the associated interim reports as well as the Study Final Report.
- Steer and guide the efforts of the Basin Study such that the objectives of the Basin Study are met in an effective, efficient manner, and within the Basin Study's financial and time constraints.

V. Plan of Study

The Plan of Study of the Basin Study is attached and includes a prepared task, schedule and budget developed and outlined in Exhibit B. All Partners acknowledge that as the Basin Study progresses, additional detailed tasks and sub-tasks will be determined by the Project Team(s) and approved by the PMs. If the PMs determine that substantial changes or modifications to the Plan of Study are necessary, the Partners may amend Exhibit B by mutual written agreement.

VI. Study Cost and Funding

- A. The Basin Study will have two major tasks, project administration and planning/design/engineering. The first task (project administration) has a total cost estimated to be \$326,428. The second task (planning/design/engineering) has a total cost estimated to be \$1,779,178. The total estimated project cost will be \$2,105,606.
- B. In May of 2013, Reclamation's Basin Study Program made available \$1,000,000 for the San Diego Basin Study. The City will contribute a cost share of \$300,000. The remaining balance (\$749,460) will be funded through Proposition 50, the State's Integrated Regional Water Management Grant Program and \$46,146 will be from other non-federal funds. .

- C. If necessary, a Cooperating Agency brought in as a Non-Federal Cost Share Partner will coordinate with the existing Non-Federal Cost Share Partner on a cost-share allocation.
- D. In the event a Non-Federal Cost Share Partner is unable to participate due to lack of funding, that Non-Federal Cost Share Partner shall immediately withdraw from this Agreement in accordance with Section X, Article C.
- E. The expenditure or advance of any money or the performance of any obligation by the United States under this MOU shall be contingent upon appropriation or allotment of funds by Congress. Interruption of funds available to Reclamation shall relieve the Non-Federal Cost Share Partner from any obligation under this MOU. No liability shall accrue to the United States in the case that funds are interrupted.
- F. In the event that any funds advanced to Reclamation by the Non-Federal Cost Share Partner is not required to complete the work under the Study, such excess funds shall be returned by Reclamation to the Partner without interest, upon completion of the work defined by the Study; provided, however, that in the event the Partners agree on additional work consistent with the direction of this Agreement, such excess funds may be retained by Reclamation.
- G. Reclamation will invoice the Non-Federal Cost Share Partner per an agreed upon schedule (example: annual, semi-annual or quarterly) once the Agreement is signed by all Partners.

VII. Authorities

- A. Nothing in this Agreement alters the statutory authorities or any other authorities of the Non-Federal Cost Share Partner or Reclamation. This Agreement is intended to facilitate cooperative efforts for mutual provision of services and support and technical assistance by both Partners in the conduct of meeting the objectives and scope of the Study. This Agreement does not supersede or void existing agreements between the Partner(s) and Reclamation.
- B. Reclamation's authority to enter into this Agreement:
 - 1. Reclamation Act of June 17, 1902 (ch. 1093, 32 Stat. 388; 43 U.S.C. §372, et seq.) and acts amendatory thereof and supplementary thereto.
 - 2. The Sundry Civil Expenses Appropriations Act, March 4, 1921, 43 U.S.C. §395 (Contributed Funds Act).
 - 3. The Omnibus Public Land Management Act of 2009, Public Law 111-11, Sec. 9003
- C. City's authority to enter into this Agreement:

1. This MOU is executed by the City of San Diego, acting by and through its Mayor or his designee, pursuant to San Diego Municipal Code Section §22.3210 in order to further the sustainability of the City's water supplies.
2. Resolution Number R-300517, Adopted on June 13, 2005 authorizing that the City Manager, Water Department Director, or designee enter into a Memorandum of Understanding between the City of San Diego, the County of San Diego and the San Diego County Water Authority for the Integrated Regional Water Management Grant Program [MOU] and all necessary actions to implement the MOU and secure Program grant funding, including conducting negotiations and executing documents necessary for receipt, expenditure, and/or distribution of funds awarded as a result of participating in the Program.

VIII. Anti-Deficiency Act

The expenditure or contribution of any funds for the performance of any obligation of any Party under this Agreement shall be contingent upon appropriation or allotment of funds for the payment of such obligation. No liability shall accrue to any Party in case funds are not appropriated or allotted. No provision herein shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. §1341.

IX. Reports and Confidentiality

- A. Freedom of Information Act (FOIA) Disclosures: The Partners understand and agree that all communications, including this Agreement, may be disclosed to the public in accordance with the FOIA, unless protected under any FOIA exemptions. Similarly, there are State open records act requirements that the Partners understand may require disclosure to the public in accordance with those State laws, unless protected under those State laws.
- B. Final Reports: The results of this Agreement and the science, engineering, and technology data that are collected, compiled, and evaluated under this Agreement shall be shared and mutually interchanged by the Non-Federal Cost Share Partner and Reclamation. A final report summarizing all data and findings shall be prepared by Reclamation and the Non-Federal Cost Share Partner. Reclamation and the Non-Federal Cost Share Partner shall have 60 days to review the manuscript prior to submission for publication. The report shall acknowledge this Agreement and the contribution of each Party's personnel and any Stakeholders contributions that are requested by Reclamation and/or the Non-Federal Cost Share Partner. The final content of the Report will be determined by Reclamation and the Non-Federal Cost Share Partner.
- C. Confidentiality:

1. Any Confidential Information used in this Agreement shall be clearly marked confidential or proprietary by the submitter and shall not be disclosed by the recipient without permission of the submitter. To the extent any Party orally submits its Confidential Information to another Party, the submitting Party will prepare a document marked "CONFIDENTIAL" embodying or identifying in reasonable detail such orally submitted Confidential Information and provide the document to the other Party within thirty (30) days of disclosure.
2. No Party shall be bound by confidentiality if the Confidential Information received from another Party:
 - a. Already is available to the public or known to the recipient;
 - b. Becomes available to the public through no fault of the recipient; or
 - c. Is non-confidentially received from another Party legally entitled to it.
3. It shall not be a breach of this Agreement if the recipient is required to disclose the Confidential Information by a valid order of a court or other government body, or as otherwise required by law, or as necessary to establish the rights of any Party under this Agreement; PROVIDED THAT the recipient shall provide prompt prior notice thereof to the submitting Party to enable the submitting Party to seek a protective order or otherwise prevent such disclosure, and PROVIDED FURTHER THAT the Confidential Information otherwise shall continue to be confidential.

X. Term and Termination

- A. Term: This Agreement shall take effect upon the approval of the Partners and, unless earlier terminated by the Partners, will expire on September 30, 2016, unless amended.
- B. Amendment: If a Party desires to modify this Agreement, all Partners shall confer in good faith to determine the desirability of such modification. Such modification shall not be effective until a written amendment is signed by all Partners.
- C. Withdrawal: The Non-Federal Cost Share Partner may withdraw from this Agreement at any time, with or without cause, and without incurring liability by providing notice to Reclamation at least ninety (90) calendar days prior to withdrawing from this Agreement. The withdrawing Non-Federal Cost Share Partner shall forfeit any funds obligated by it prior to the date on which the notice of withdrawal occurs.

XI. Key Personnel

- A. Each Party shall designate key personnel for receipt of notices and other purposes under this Agreement ("Key Personnel"). The Key Personnel for each Party are listed in Exhibit A, which is attached hereto and incorporated herein.

- B. Should a Party designate new Key Personnel during the term of this Agreement, the Party shall provide the other Party with notice of the name of its new designated Key Personnel in accordance with Section XII.
- C. The Key Personnel are not authorized to change or interpret with authority the terms and conditions of this Agreement.

XII. Notices

Notices, requests, demands, or other communications between the Partners under this Agreement, including copies of any correspondence among the scientific and/or technical representatives of each Party that interpret or may have a bearing on the legal effect of this Agreement's terms and conditions, shall be sent to the Key Personnel listed in Exhibit A. Notice will be sufficiently given for all purposes as follows:

- A. Personal Delivery: When delivered to the recipient, notice is effective upon delivery.
- B. United States Mail: When mailed, postage prepaid, by first class mail, notice is effective three business days after the date the notice is mailed by the sender. When mailed, postage prepaid, by certified mail, return receipt requested, notice is effective on receipt, if a return receipt confirms delivery.
- C. Overnight Delivery: When delivered by an overnight delivery service such as Federal Express, charges prepaid or charged to the sender's account, notice is effective on delivery, if delivery is confirmed by the delivery service.

XIII. Mutual Indemnification

- A. The Non-Federal Cost Share Party shall defend, indemnify, and hold harmless their elected officials, officers, agents, employees, and attorneys from and against any and all claims asserted or liability established for damages or injuries to any person or property (hereinafter collectively referred to as "Claims") related to or arising out of this Agreement or the work performed pursuant to this Agreement, but only to the extent such Claims arise directly or indirectly from any negligent act, error, or omission of the Non-Federal Cost Share Party, their officials, employees or agents, and not including Claims caused by the concurrent negligent act, error or omission or by the sole negligence or willful misconduct of the Non-Federal Cost Share Party.
- B. Any costs of compliance with the California Environmental Quality Act ("CEQA") shall be absorbed by the Non-Federal Cost Share Partner.

XIV. General Provisions

- A. Limitations: This Agreement sets out the Partners' intentions and objectives and does not direct or apply to any person besides the Non-Federal Cost Share Partner and Reclamation. This Agreement is not intended to, and does not create, any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity, by anyone against the United States, its agencies, its officers, or any person.
- B. Subcontracting Approval: A Party hereto desiring to obtain and use the services of a third party via contract or otherwise shall give prior notice to the other Party, including details of the contract or other arrangement. This requirement is to assure that confidentiality is not breached and rights in Subject Inventions are not compromised.
- C. Assignment: No Party has the right to assign this Agreement or any of its responsibilities hereunder.
- D. Endorsement: This Agreement and/or the results of the Study funded under this Agreement are not to be construed as an endorsement of the results of the Study by the Federal government or the Non-Federal Cost Share partner, except as may be explicitly stated by an authorized representative of the Federal government or by an authorized representative of the Non-Federal Cost Share Partner.
- E. Disputes: Any dispute arising under this Agreement, which cannot be readily resolved, shall be submitted jointly to the Key Personnel, identified in Exhibit A, Key Personnel. Each Party agrees to seek in good faith to resolve the issue through negotiation or other forms of nonbinding dispute resolution processes mutually acceptable to the Partners. Pending the resolution of any dispute or claim, each Party agrees that performance of all obligations shall be pursued diligently.
- F. Force Majeure: No Party shall be liable for any unforeseeable event beyond its reasonable control not caused by the fault or negligence of such Party:
1. Which causes the Party to be unable to perform its obligations under this Agreement; and
 2. Which it has been unable to overcome by the exercise of due diligence.
 3. This includes, but is not limited to, flood, drought, earthquake, storm, fire, pestilence, lightning and other natural catastrophes, epidemic, war, riot, civil disturbance or disobedience, strikes, labor dispute, failure or sabotage of any Party's facilities or any order or injunction made by a court or public agency.
- G. Governing Law: The construction, validity, performance, and effect of this entire Agreement shall be governed by the laws applicable to the Government of the United States of America in accordance with applicable Federal Law as interpreted by Federal Courts.

- H. Waiver: The failure of any Party to enforce any term hereof shall not be deemed a waiver of any rights contained herein.
- I. Severability: In the event any provision of this Agreement is determined to be invalid or unenforceable under any controlling law, the invalidity or unenforceability of that provision shall not in any way affect the validity or enforceability of the remaining provisions of this Agreement.
- J. Entire Agreement: The terms and conditions contained in this Agreement constitute the entire Agreement and understanding by and among the Partners and shall supersede all other communications, negotiations, arrangements and agreements either oral or written, with respect to the subject matter herein.
- K. Counterparts: This Agreement may be executed in duplicate and each original shall be equally effective.
- L. Sovereign Immunity: The Partners do not waive their sovereign immunity by entering into this Agreement, and each fully retains all immunities and defenses provided by law with respect to any action based on or occurring as a result of this Agreement.
- M. Third Party Beneficiary Rights: The Partners do not intend to create in any other individual or entity the status of third party beneficiary. The rights, duties, and obligations contained in this Agreement shall operate only among the Partners and shall inure solely to the benefit of the Partners to this Agreement.
- N. All contractors shall strictly comply with all applicable federal and State laws, rules, and regulations in effect or hereafter established, including, without limitation, laws applicable to discrimination and unfair employment practices.
- O. Drafting Considerations: Each Party has participated fully in the drafting, review and revision of this Agreement, each of whom is sophisticated in the matters to which this Agreement pertains, and no Party shall be considered to be the sole drafter of this Agreement.
- P. Officials Not To Benefit: No Member of or Delegate to the Congress, or Resident Commissioner, shall benefit from this Agreement other than as a water user or landowner in the same manner as other water users or landowners.

IN WITNESS WHEREOF, the Partners hereto have caused this Agreement to be executed.

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
LOWER COLORADO REGION

By: William J. Steele
William J. Steele, Area Manager

Dated this 2nd day of April, 2015

THE CITY OF SAN DIEGO
Mayor or Designee

By: W. Downs Prior
W. Downs Prior
Principal Contract Specialist
Public Works Contracts

Dated this 19th day of March, 2015

APPROVED the form of this Agreement
this 29 day of March, 2015.

Jan I. Goldsmith, City Attorney

By: Raymond C. Palmucci
Raymond C. Palmucci
Deputy City Attorney

**Exhibit A.
Key Personnel**

Table A-1: City of San Diego Key Personnel

Organization	Primary Contact	Contact Information
City of San Diego	Goldy Herbon	(619) 533-4120

Table A-2: U.S. Bureau of Reclamation Key Personnel

Region	Primary Contact	Contact Information
Southern California Area Office	Leslie Cleveland	(951) 695-5310
Engineering Services Office	Scott Tincher	(702) 293-8553

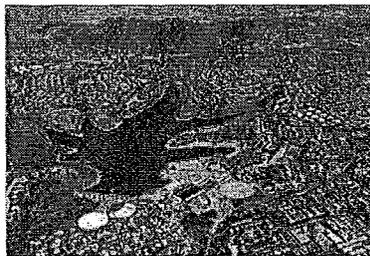
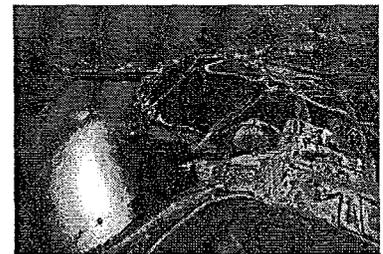
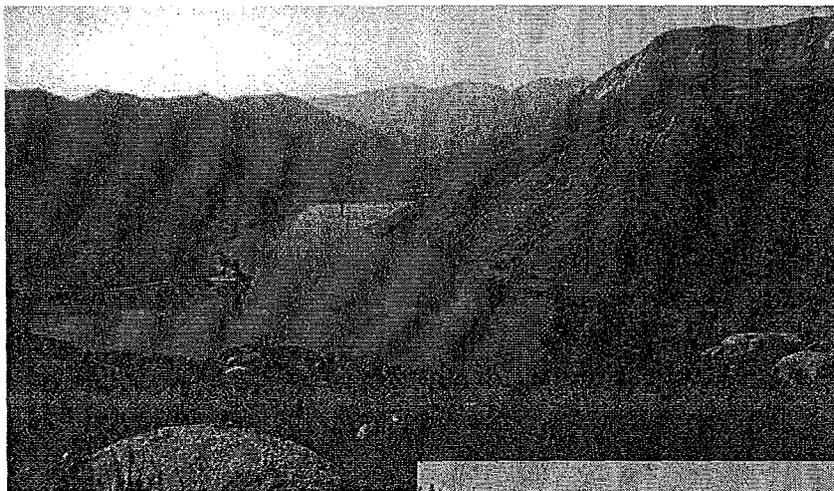
Exhibit B.
PLAN OF STUDY
August 21, 2014 (Approved)

RECLAMATION

Managing Water in the West

Plan of Study

San Diego Watershed Basin Study



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



City of San Diego
Public Utilities Department

August 2014

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

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 of the American public.

Plan of Study

San Diego Watershed Basin Study

Prepared by:

**Leslie Cleveland
Water Resources Specialist
Southern California Area Office
Bureau of Reclamation**

**Goldy Herbon
Senior Water Resources Specialist
Public Utilities Department
City of San Diego**

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Abbreviations and Acronyms

AF	acre-feet
AFY	acre-feet per year
AWP	Advanced Water Purification
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.
CVP	Central Valley Project
DAC	Disadvantaged Community
DWR	California Department of Water Resources
ELT	Executive Leadership Team
ESO	Reclamation's Engineering Services Office
FACC	Funding Area Coordinating Committee
IID	Imperial Irrigation District
IPRP	Independent Peer Review Panel
IRWM	Integrated Regional Water Management
IRWMP	Integrated Regional Water Management Plan
JPA	Joint Powers Authority
LRPWR	Long Range Planning and Water Resources
Metropolitan	The Metropolitan Water District of Southern California
MOU	Memorandum of Understanding
mgd	million gallons per day
NGO	Non-Governmental Organization
PIP	Public Involvement Plan
PM	Project Manager(s)
RAC	Regional Advisory Committee
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RWVG	Regional Water Management Group
SANDAG	San Diego Association of Governments
SCAO	Reclamation's Southern California Area Office
SDCWA	San Diego County Water Authority
SDPUD	San Diego Public Utilities Department

San Diego Watershed Basin Study
Plan of Study

STAC	Stakeholder Technical Advisory Committee
STT	Study Technical Teams
SWP	State Water Project
Study	San Diego Basin Study
TSC	Reclamation's Technical Service Center
USACE	U.S. Army Corps of Engineers
Watersheds	San Juan Creek, Santa Margarita River, San Luis Rey River, Carlsbad, San Dieguito River, Los Peñasquitos Creek, San Diego River, Pueblo, Sweetwater River, Otay River and Tijuana River
WPDP	Water Purification Demonstration Project

Executive Summary

For more than 60 years, the San Diego area has relied on imported water as the primary source of supply for the region. Unlike other large metropolitan areas within southern California, such as those located within the Los Angeles or Santa Ana watersheds, San Diego County does not have large productive groundwater basins within its borders. This is due to a number of factors including: the limited geographic extent of the more productive sand and gravel (alluvial) aquifers; the relatively shallow nature of most existing alluvial aquifers; lack of rainfall and groundwater recharge; and degraded water quality resulting from human activities.

Prior to the introduction of imported water supplies to the region, surface water reservoirs, such as the City of San Diego's El Capitan and San Vicente Reservoirs, served as the primary source of water supply for the region. Local surface water supplies remain an integral part of the region's supply portfolio and its largest source of local supply. The San Diego Public Utilities Department (SDPUD) now owns and operates nine surface water reservoirs, with Sutherland Dam being the reservoir most recently constructed (completed in 1954).

With a strong military presence before, during, and after World War II, San Diego's growing population was in desperate need of water supply solutions. The Bureau of Reclamation (Reclamation) was tasked with constructing the San Diego Project, two large diameter pipelines that connected the area to The Metropolitan Water District of Southern California's (Metropolitan) infrastructure system, to bring in supplemental supplies from the Colorado River. The first pipeline was completed in 1947 and the second in 1954 (together known as the 'First Aqueduct'), which the San Diego County Water Authority (SDCWA) now owns and operates along with three additional large diameter pipelines (collectively, the 'Second Aqueduct') that deliver imported supplies into the region. Imported supplies from the Colorado River and State Water Project remain the region's predominant source of supply, comprising approximately 70% to 90% of the supplies utilized within the region. These imported supplies now consist of water purchases from Metropolitan in addition to long-term transfers of up to 200,000 acre-feet per year (AFY) of conserved water from the Imperial Irrigation District (IID) and an additional 78,000 AFY of conserved water as a result of canal lining projects. Both the IID transfer water and the canal lining water are wheeled through Metropolitan's conveyance facilities.

The reliability of imported water deliveries to the San Diego region is uncertain and supplies could be limited for a number of reasons, including periodic droughts in northern California and the Colorado River Basin, regulatory restrictions related to endangered species in the Bay-Delta that limit State Water Project deliveries, and the potential for catastrophic events, such as earthquakes. While SDPUD, and SDCWA and its member agencies have taken steps, through the development of local supplies, to diversify the region's supply portfolio, the region remains highly reliant on imported supplies. To meet current and future water supply reliability goals, it is essential that the region optimize its existing reservoir system to improve the ability to store imported and local water supplies when available - making the region more resistant to drought and water delivery service interruptions.

A 1993 U.S. Army Corps of Engineers (USACE) reconnaissance study assessed the San Diego region's reservoir system and concluded that a reservoir intertie system was a cost effective means to improve system reliability. The intertie concept was proposed again in 2007 as part of the California Department of Water Resources' (DWR) Proposition 50 Integrated Regional Water Management (IRWM) program and awarded \$782,244 for an initial project conceptual design. A grant proposal modification expanding the regional nature of the project proposal and increasing the climate change analysis has been submitted to CA DWR. Once approved, the award will be applied as local cost-share towards completing this Basin Study.

In 2004, San Diego initiated a study to evaluate options to increase the use of recycled water produced at SDPUD's two water reclamation plants. Water Reuse Study stakeholders identified indirect potable reuse with reservoir augmentation as the preferred strategy. The Water Purification Demonstration Project (WPDP), which was partially funded with grants from Reclamation and Proposition 50 Integrated Regional Water Management (IRWM) Program, evaluated the feasibility of conveying 15,000 acre-feet per year (AFY) of purified water (tertiary treated recycled water that is further treated with ultra-filtration, reverse osmosis and advanced disinfection treatment) to SDPUD's San Vicente Reservoir where it would be blended with local runoff and imported water prior to being sent to drinking water treatment plants for additional treatment and distribution as potable water. As part of its Emergency Storage Program, the SDCWA has constructed new conveyance facilities that allow San Vicente Reservoir to serve water treatment plants operated by several water agencies throughout the region. A separate study, SDPUD's 2012 Recycled Water Study, identified two additional projects that, together with the WPDP, could represent a total of up to 83 million gallons per day (mgd) of purified water for the City of San Diego.

In 2013, the SDPUD partnered with Reclamation's Southern California Area Office to study the potential utilization of local reservoirs within the San Diego Basin for optimal storage of local, imported and purified water, as conceptualized in its 2012 Recycled Water Study.

The San Diego Basin Study (Study) will assess the potential climate change impacts on water supplies and demands within the San Diego IRWM Program planning region and analyze structural and non-structural concepts within the San Diego Basin that can assist the region in adapting to the uncertainties associated with climate change. These structural concepts focus on optimizing the reservoir systems within the Basin and assessing alternative source supply options (e.g., indirect potable reuse, stormwater, etc.) through reservoir augmentation. These non-structural concepts will address regulatory challenges and delivery setback related to advanced purified recycled water distribution. Stakeholder input from the San Diego IRWM Regional Water Management Group (RWMG) and other stakeholders within the San Diego Basin will be critical to success of the study.

In addition to regulatory pressure, drought and the ever present potential for seismic catastrophe on Bay-Delta and Colorado River water deliveries, climate change presents California with long-term water supply reliability challenges and uncertainty. Warmer winter storms could result in reduced winter snowpack in the Sierra and Rocky Mountain ranges that supply the Central Valley Project (CVP), State Water Project (SWP) and Colorado River systems, resulting

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 flood events that potentially could overwhelm the capacity of the SDPUD system, leading to less conserved stormwater. This Basin Study is of vital importance to the San Diego region in assessing supply-demand issues, developing localized climate projections, analyzing adaptation strategies, and making recommendations on how best to proceed.

1.0 Introduction

The San Diego Public Utilities Department (SDPUD) submitted a San Diego Basin Study (Study) proposal to the Bureau of Reclamation (Reclamation) in March 2013 for a \$2.1 million study. Reclamation funding was awarded in the amount of \$1 million, with a SDPUD cost share of \$1,105,606 of which is provided by the State of California under a Proposition 50 grant and SDPUD. This Plan of Study outlines the study description, management, tasks, schedule and milestones, and budget.

1.1 Study Purpose

The purpose of the Study is to determine potential climate change impacts on water supplies and demands within the San Diego IRWM Program planning region, and analyze structural and non-structural concepts within the San Diego Basin that can assist the region in adapting to the uncertainties associated with climate change. The Study will recommend potential changes to existing structural (i.e. dams, reservoirs, conveyance facilities, and treatment and reclamation plants) operations, modifications to existing facilities, and development of new facilities that could optimize the reservoir systems, and additional new water supply options including desalination and indirect potable reuse options. Non-structural concepts will address regulatory challenges and delivery setbacks related to advanced purified recycled water distribution. The recommendations will be developed through identifying alternatives and conducting trade-off analyses.

1.2 Study Objectives

The Study's two primary objectives are:

1. Determine how climate change will impact the current and future water supply portfolio of the San Diego region; and
2. Develop structural options and non-structural concepts within the San Diego Basin that can serve as adaptation strategies to manage climate change impacts, focusing on optimizing the reservoir systems and furthering development of new water supply sources.

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

1.3 Description of Basin Study Area

The San Juan, Santa Margarita, San Luis Rey, Carlsbad, San Dieguito, Los Peñasquitos, San Diego, Pueblo, Sweetwater, Otay and Tijuana watersheds (Watersheds) are the focus of this

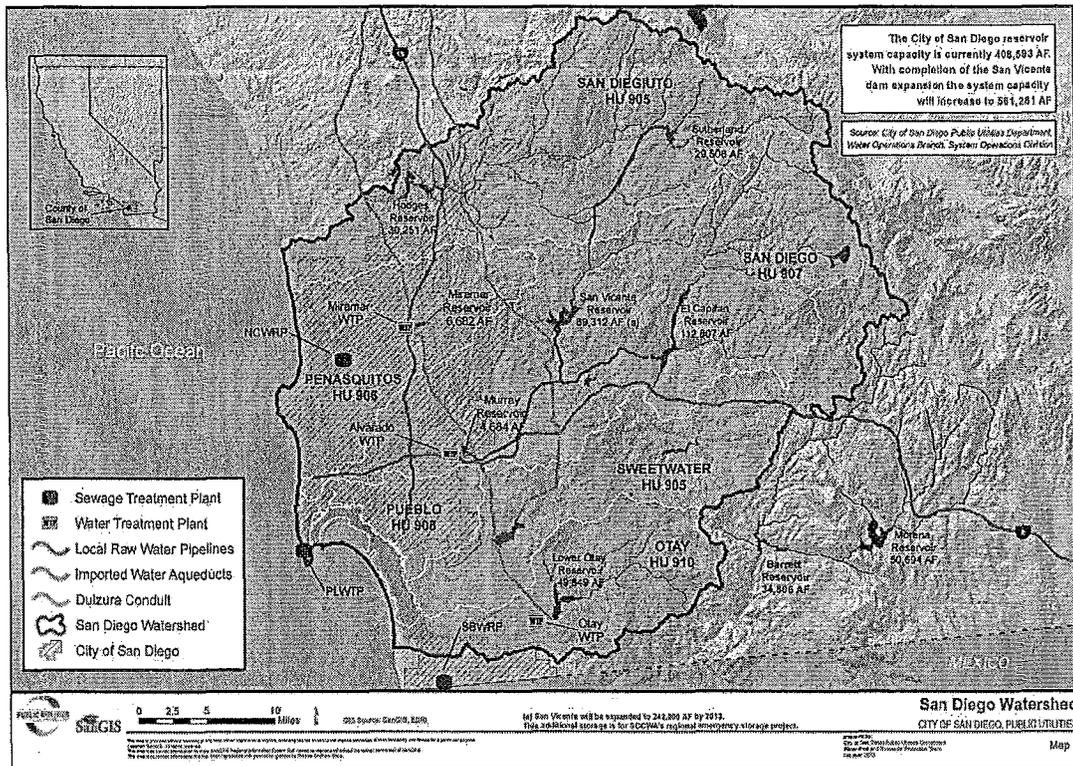


Figure 2: San Diego Region Sub-Basins

1.4 Study Area Population and Water Demand Projections

The Study Watersheds include 3.1 million people and encompass 2,900 square miles. Most of the people within the region inhabit the urbanized coastal areas, and the population of these areas is expected to increase by 30 percent by 2035, to over 4.0 million, according to the San Diego Association of Governments (SANDAG) 2010 forecast.

SANDAG, a regional public planning organization, gathers and provides information on a broad range of topics that influence regional decision-making, including population changes and land use planning. Under the terms of a 1992 memorandum of agreement between the SDCWA and SANDAG, SDCWA uses SANDAG's official regional growth forecasts, which are based on local land use jurisdictions' general plans and policies, to project consumptive water demands for the region. SANDAG forecast models encompass the SDCWA planning area, which also includes San Diego's IRWM Program planning region. Below is the SDCWA Service Area water demand forecast through 2035 based on the 2010 SANDAG data.

Table 1: Normal Year Water Demand Forecast for the SDCWA Service Area

Demand Parameter	Projected Water Demand (acra-feet per year)				
	2015	2020	2025	2030	2035
M&I Baseline Forecast ²	590,731	661,415	728,574	788,174	839,417
Estimated Conservation Savings	6,737	46,951	72,234	97,280	117,528
M&I Forecast Reduced by Conservation	583,994	614,464	656,340	690,894	721,889
Agricultural Forecast	55,358	49,534	48,350	47,279	46,178
Total Projected Demand	639,352	663,998	704,720	738,173	768,067
Total Projected Demand with Pending Annexations and Additional Anticipated Growth	647,285	675,089	717,995	753,619	785,685

1 From 2010 Urban Water Management Plan (Water Authority, 2011a). Water demand estimates for the portion of the Region outside the Water Authority service area are not available.
2 Includes M&I demands for Camp Pendleton area customers.

2.0 Study Description

The San Diego Watershed Basin Study will use the latest climate change modeling tools to perform a quantitative analysis of the uncertainties associated with climate change impacts on the San Diego Basin’s local and imported fresh water supplies. The Basin Study will offer multiple water management agencies the opportunity to participate in a collaborative process to plan for future local water supply scenarios. It will use the results of the climate change modeling to update projections of the IRWM planning region water supply portfolio.

The Study will use the latest modeling tools to develop and evaluate alternative structural concepts intended to optimize existing regional surface storage reservoir systems and assess new water supply sources in the Basin. The Study will develop non-structural concepts that will address regulatory challenges and delivery setbacks related to advanced purified recycled water distribution.

A trade-off analysis will be conducted to evaluate the regional impacts and the economic costs and benefits of the various infrastructure concepts and new supply alternatives. 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 for SDPUD and other Study partners. Accomplishment of the Study objectives could assist water agencies serving the Basin and IRWM Planning region in adapting to climate change-related uncertainties and accomplishing the following:

1. Improve the efficiency and effective use of existing structural systems, including reservoirs, and conveyance, treatment and reclamation facilities,
2. Increase water supply reliability and resilience,
3. Address anticipated climate change impacts,
4. Increase accessibility of locally developed, advanced treated purified water, and
5. Take advantage of potential energy management opportunities.

The San Diego Basin Study will utilize the projected water supply information from the Colorado River Basin Study to inform adaptation and mitigation strategies, as well as the trade-off analysis. It should be noted, however, that the Colorado River Basin Study used CMIP-3 climate projections, and a scenario modeling approach was used to model demands. Typically in California, water management entities have developed their respective demand projections in their urban water management plans. There will be an effort to put in context the projected demands between this and the Colorado River Basin Study demands to adjust, if necessary, supplies projected in the Colorado River Basin Study.

2.1 Project Background

Water agencies serving Southern California, including SDPUD, SDCWA, and Metropolitan have long recognized that the supply of fresh water available to an increasing Southern California population is limited. The available fresh water supply for the San Diego Basin includes local sources and imported water from the San Francisco Bay-Delta and the Colorado River.

Water agencies serving Southern California have also recognized that significant climate change-related impacts on water supplies have been documented in scientific literature and that scientists are forecasting changes in hydrologic cycles. Regional plans have provided a qualitative description of climate change impacts on the water supply mix. The Basin Study will provide a quantitative analysis of the uncertainties associated with those climate change impacts on the local and imported San Diego Basin water supplies.

Imported water represents approximately 70-90% of the total fresh water supply for the San Diego IRWM planning region. Diversification of the fresh water supply would help make the Basin more resistant to drought and imported water delivery service interruptions. Local water agencies serving the area have been encouraged to develop local sources of supply to ease the burden on the imported water sources. For every acre-foot of runoff captured and stored locally, the need for imported water is reduced by nearly the same amount. Available local sources of supply include stormwater runoff from within the San Diego Basin and reuse of advanced treated purified water. Indirect potable reuse of advanced treated purified water is broadly recognized as a key part of the region's water supply diversification strategy.

Development and optimization of these local sources includes improved mechanisms for capture and storage of these resources when available. Reservoirs are used for capture and storage of fresh water supplies from stormwater runoff from the San Diego Basin and for storage of supplies from other sources. The same reservoirs may also be used for blending and storage of advanced treated purified water for indirect potable reuse. Optimization of the existing reservoir systems may require new conveyance infrastructure. Similarly, development of indirect potable reuse will require new conveyance infrastructure to transport advanced treated purified water supplies to the most economically available reservoir system(s).

2.2 Previous Work and Available Data and Models

2.2.1 Integrated Regional Water Management Planning

The San Diego IRWM Program began when the Regional Water Management Group (RWMG) was formed in 2005 in accordance with provisions of the California Water Code (§79570 et seq.). The RWMG manages the development and implementation of the IRWM Plan and oversees the San Diego IRWM program. The recently adopted 2013 San Diego IRWM Plan summarizes several key challenges the region faces related to water management, most notably, water supply reliability. The main purpose of the plan is to make the region eligible for DWR IRWM grant funding.

During the 2013 IRWM Plan development process, four planning studies were conducted by stakeholder workgroups on regulatory, land use, climate change, and flood management issues. Each study developed recommendations to address regional issues related to its associated topic that were then integrated into the final IRWM Plan document(s). For example, the San Diego IRWM Climate Change Planning Workgroup convened various water resources and planning representatives to perform a climate change vulnerability assessment to help the Region assess its water resource sensitivity to climate change and prioritize climate change vulnerabilities. The Climate Change Planning Study provided recommendations to aid decisions on which strategies and projects would most effectively adapt to and mitigate for climate change in the region. With such well researched information, the IRWM Plan could provide valuable up-to-date water supply-demand, demographic, land use, and climate change data for this Basin Study.

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. This Basin Study seeks to conduct scientific investigation into the weather effects brought on by climate change with specific relationship to the geographic subareas of San Diego County – mountains, valleys, and coastal plain. SDPUD will use climate projection scenarios specific to the San Diego 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 Department of the Interior's Basin Study and the Landscape Conservation Cooperative programs within the WaterSMART Initiative.¹ These projections are a comprehensive and peer-reviewed effort by a multiagency collaboration.² This 12-kilometer gridded, high resolution data will be reviewed by the Study team to determine the appropriate ensemble of scenarios to assess. Additional climate change analysis has been completed by the U.S. Geological Survey, Scripps Institute of Oceanography, San Diego Foundation, SDCWA, and the California Energy Commission. All San Diego-related climate change studies will provide valuable input to this Basin Study's climate change scenarios and modeling.

¹ See <http://www.usbr.gov/WaterSMART/wcra/index.html>

² See http://gdo-dcp.ucllnl.org/downscaled_cmip3_projections/dcpInterface.html#About.

The goal of the San Diego Basin Study is to use existing climate information to support the Basin Study objectives. Even at current spatial scales, for example, at approximately 12-km resolution, the hydroclimate information is fairly coarse. Water supply projections will be developed specific to the watersheds in the San Diego Basin Study area to quantify how local water supplies in the watersheds of the study area will be impacted. Furthermore, a new set of climate projections from the Coupled Model Intercomparison Project Phase 5 (CMIP-5) will be available through the Reclamation downscaled climate and hydrology projections website. The choice of using CMIP-3 versus CMIP-5 projections will be evaluated in consultation with the study partners as this has implications specifically in the context of the Colorado River Basin, which was conducted using the CMIP-3 projections. The choice of either set of climate projections, however, will not impact the overall climate impacts assessment methodology proposed here.

As part of the decision support and impact assessment, the following questions will be addressed:

1. How might climate change impact the reliability and volumes of imported water supplies to the region? Currently the region is 80% dependent on imported water.
2. How will changes in local weather patterns impact the ability to capture and use local surface and groundwater supplies? How will they impact water quality of local sources?
3. How will changed local weather patterns impact water demands in the region?
4. How can local water supply infrastructure be used/optimized to support adaptations that are needed to ensure supply reliability in the wake of changed weather patterns?
5. What is the magnitude of water supply fluctuations on the watershed level?
6. What watershed(s) in San Diego County will be impacted most by climate change?

2.2.3 Reservoir Intertie System Studies

In 1993, following a severe and protracted 6-year drought, the USACE conducted a Reconnaissance Study of the best methods to ensure water reliability in San Diego County. The study concluded that a Reservoir Intertie System was the most cost effective means available of producing water in excess of 10,000 AF annually by improving operational efficiencies in capturing stormwater and reducing flood risk, and met other USACE evaluation criteria.

The reservoir intertie concept was submitted in 2007 to the San Diego IRWM Plan process for a Proposition 50 grant award. The proposal received a \$782,244 award. The reservoirs identified for this proposed study are all located within the San Diego basin. The proposal provided for initial design and a work plan for a conveyance system that could increase the capability to manage and store water in the existing reservoirs. Connecting the reservoirs would create an enhanced and integrated reservoir system to more efficiently use existing storage, increase water supply reliability, more efficiently supply water at the lowest possible cost, more effectively use imported water aqueducts, potentially increase accessibility to approximately 100,000 AF of surface storage without creating new reservoirs or new storage capacity, and consider potential

energy management opportunities. In 2009, Congress authorized Reclamation to proceed with the San Diego Water Storage and Efficiency Feasibility Study. Initial federal appropriations co-funded a Reservoir Intertie Pre-Feasibility Study. The Pre-Feasibility Study evaluated Reservoir Intertie System components in sufficient detail to enable the early elimination or modification of those that were not likely to be cost-effective.

With the recent conceptual approval of SDPUD's potable reuse project, it is important for the Basin Study to take into consideration the systemic impacts that potable reuse will have on the operation of the reservoirs and treatment plants. Since potable reuse may be able to supply as much as 30% of San Diego's water demands, it is essential that the Basin Study take inventory of all potential conveyance issues for conveying purified water to the reservoirs and the conveyance capacity for drawing water from the reservoirs to the treatment facilities.

2.2.4 San Diego Water Reuse Study, Water Purification Demonstration Project and Recycled Water Study

In 2005, the San Diego Water Reuse Study was released and evaluated options to increase the use of recycled water produced at SDPUD's two water reclamation plants. The Water Reuse Study identified indirect potable reuse with reservoir augmentation as a preferred strategy. In 2007, the San Diego City Council voted to accept the Water Reuse Study and directed the Mayor and SDPUD to implement actions to demonstrate the feasibility of indirect potable reuse with reservoir augmentation.

With San Diego City Council approval, SDPUD proceeded with the construction and operation of a one-million-gallon-per-day (mgd) Advanced Water Purification (AWP) Facility which was partially funded with grants from Reclamation and the Proposition 50 IRWM Program. The AWP Facility was operated and monitored for one year using the same process components that would be used in a full-scale AWP facility. The operation of the AWP Facility was one of many components of the Water Purification Demonstration Project (WPDP) and enabled the

SDPUD to identify recommendations for design of a full-scale AWP facility. Another WPDP component evaluated the feasibility of conveying 15,000 acre-feet per year (AFY) of purified water (tertiary treated recycled water that is further treated with ultra-filtration, reverse osmosis and advanced disinfection treatment) to SDPUD's San Vicente Reservoir where it would be blended with local runoff and imported water prior to being sent to drinking water treatment plants for additional treatment and distribution as potable water (Figure 3).

In August 2009, SDPUD and key stakeholders initiated the Recycled Water Study intended to help policy leaders make important decisions regarding water reuse and the region's water and

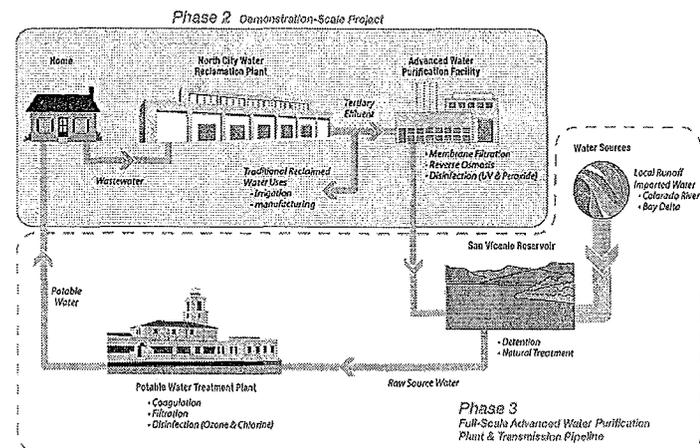


Figure 3: Water Purification Demonstration Project

wastewater infrastructure. In the Recycled Water Study, five Integrated Reuse Alternatives were developed based on an extensive stakeholder process. Each alternative includes 83 mgd of new indirect potable reuse and 3 mgd of new non-potable reuse. The Recycled Water Study found that the future water reuse target for SDPUD was approximately 80 to 120 mgd. Water reuse targets will be achieved via the construction or expansion of several plants by SDPUD. The proposed plants that will produce purified water for reservoir augmentation include North City Reclamation Plant (anticipated production will be 27 mgd), Harbor Drive Plant (anticipated production will be 41 mgd) and South Bay Reclamation Plant (anticipated production will be 15 mgd). SDPUD staff is currently studying the phasing and timing of the construction and operation of these plants. These studies and new potential water supplies will be evaluated in the supply-demand sections and adaptive strategies developed in this San Diego Watershed Basin Study.

2.2.5 San Vicente Reservoir Dam Raise

The San Vicente Dam Raise Project is part of SDCWA's more than \$1 billion Emergency Storage Project, which is creating new emergency water storage and pipeline connections to deliver water throughout the region if the imported water supply is disrupted. When complete, the reservoir will be able to store an additional 152,000 AF of water. The San Vicente Reservoir Dam Raise will also help improve the efficiency of the region's water supply systems. Information from the Emergency Storage Project and Dam Raise will be used in developing and evaluating structural concepts and adaptive strategies.

2.3 Existing Infrastructure

The Study will use the latest modeling tools and the results of climate change modeling to develop and evaluate conceptual conveyance structural designs that can optimize existing regional surface storage reservoir systems and further the development of indirect potable reuse. Those conveyance structural improvements may assist water agencies serving the region in adapting to climate change-related uncertainties.

Optimization of existing reservoir systems will require appropriate mechanisms for maximizing the use of available storage capacity. These mechanisms include conveyance structural with sufficient capacity to move and store water during times of relative excess or during periods when no or minimal environmental damage would occur.

The reservoir systems to be included in the Basin Study Conceptual Designs for evaluation include San Vicente Reservoir, Murray Reservoir and El Capitan Reservoir. All these reservoirs are located in the San Diego River watershed and are described below:

1. El Capitan Reservoir is owned by the City of San Diego and is the largest reservoir in the system, with nearly 113,000 AF of capacity. El Capitan Reservoir is currently underutilized due to limitations to the imported water system. It has filled only four times since its construction in 1934.
2. San Vicente Reservoir is owned and operated by the City of San Diego and is currently capable of storing up to 90,230 AF of water. Through an agreement with SDCWA, San

Vicente Dam has been raised approximately 117 feet to provide additional capacity to supplement emergency storage in the Region.

3. Murray Reservoir is owned and operated by the City of San Diego and is located at the site of the Alvarado Water Treatment Plant. Water from Alvarado serves a large central portion of San Diego, the City of Coronado, and a number of Navy bases.

These existing reservoir systems may also be used to blend and store advanced treated purified water for indirect potable reuse. Indirect potable reuse will also require conveyance infrastructure to transport advanced treated purified water from City of San Diego water reclamation facilities to the appropriate reservoir system(s). These water reclamation facilities are owned and operated by the SDPUD and include the North City Water Reclamation Plant and the South Bay Water Reclamation Plant. The North City Water Reclamation Plant is the first large-scale water reclamation plant in San Diego and can treat up to 30 million gallons of wastewater per day. The South Bay Water Reclamation Plant began operating in May 2002 and can treat up to 15 million gallons per day.

Other existing surface storage reservoir systems located in the Study Area that may also be considered in the Basin Study Conceptual Designs include:

- Olivenhain Reservoir is a part of the SDCWA Emergency Storage Project, which is a system of reservoirs, interconnected pipelines and pumping stations designed to make water available to the San Diego region in the event of an interruption in imported water deliveries. The reservoir has a capacity of 24,000 AF.
- Miramar Reservoir is owned by the City of San Diego and is part of the second San Diego Aqueduct project. Miramar Reservoir receives imported water from both the Colorado River Aqueduct and the California Aqueduct. The Reservoir has a water storage capacity of 6,682 AF.
- Dixon Reservoir is located in the northern Escondido hills and owned by the City of Escondido. It has a water storage capacity of 2,352 AF.
- Lower Otay Reservoir is owned by the City of San Diego and has a water storage capacity of 49,849 AF. It was connected to the City's water system in 1906 via the Bonita Pipeline.
- Hodges Reservoir is operated and maintained by the City of San Diego and has a water storage capacity of 30,251 AF. It currently serves the San Dieguito Water District and Santa Fe Irrigation District.
- Ramona Reservoir was built by and is operated by the Ramona Municipal Water District. It was completed in 1988 and can impound as much as 12,000 AF of water, all of which (treated and untreated) is purchased from SDCWA.

- Poway Reservoir is owned by the City of Poway and has a water storage capacity of 3,330AF. It receives imported water from both the Colorado River and State Water Project.
- Lake Jennings Reservoir is owned and operated by the Helix Water District and has a storage capacity of 9,790 AF behind Chet Harrit Dam. It has a watershed with negligible runoff and stores only imported water.

2.4 Alternative Structural Concepts

Alternative conceptual designs will be developed and evaluated for conveyance structural improvements to transport fresh water or new supplies to and between reservoir systems (structural changes). Structural concept development can serve as adaptation strategies to manage climate change impacts focusing on optimizing the reservoir systems and furthering development of indirect potable reuse. This will be accomplished through the following steps:

- a. Evaluate existing reservoir systems and operations within the Basin and their relationships with the imported water aqueduct system.
- b. Develop alternative structural concepts that would provide for an integrated conveyance system that would improve the reservoirs' ability to store imported and local water supplies when available, making the region more resistant to drought and water delivery service interruptions.
- c. Develop structural concepts for the delivery of advanced purified recycled water to the reservoir systems, evaluating both existing reservoir conveyance systems and construction of new conveyance facilities.

Investigation and evaluation of multiple alternatives, including non-structural alternatives (non-structural changes), are necessary to provide a robust collection of options that can be screened for economic effectiveness. Non-structural changes to improve operational efficiencies, institutional challenges, and climate change and drought resiliency will be examined. This will be accomplished through the following steps:

- a. Review implementation actions for regional priorities established in the 2013 IRWM plan and evaluate actions that can be undertaken to address institutional challenges and climate vulnerabilities.
- b. Develop alternative operational enhancement concepts that would provide greater efficiencies in the system to improve conservation, interties and transfer opportunities, conjunctive use and drought preparedness.
- c. Develop non-structural concepts that will address regulatory challenges and delivery setbacks related to advanced purified recycled water distribution.

2.5 Interested Parties

SDPUD represents the City of San Diego as one of the three Regional Water Management Group (RWMG) agencies (along with the County of San Diego and SDCWA) that have actively managed San Diego's Integrated Regional Water Management Program since 2005. A Memorandum of Understanding (MOU) among the three RWMG agencies establishes each as an equal managing partner. The same MOU establishes a formal relationship with a Regional Advisory Committee (RAC) that is currently made up of 28 voting members and 6 non-voting members. Reclamation maintains a seat on the RAC as a non-voting member.

The RAC (**Appendix 1**) fully endorsed the inclusion of the Basin Study in its recommendation for State grant funding through the IRWM Program. As such, the RAC and any other interested parties that participate via the IRWM Program are identified as interested parties.

As a result of the RAC's endorsement of the project, \$782,844 of State grant funds has been dedicated to the completion of the Basin Study.

3.0 Study Organization and Public Involvement

The Study is organized and includes a public involvement process to ensure completion of the Study in an effective, cost-efficient, and timely manner. The Study structure is designed to facilitate direct communication among participating agencies and the public to provide efficient decision-making and document reviews. In addition to the Project Managers (PMs), the Study organization structure includes an: (1) 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 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 SDPUD. 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 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	SDPUD	Marsi A. Steirer	Goldy Herbon

3.1.2 Project Managers

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

- Serve as the project's lead representatives from Reclamation and SDPUD.
- Provide information to the ELT for use in determining policy direction regarding complex Study issues.
- Coordinate Study participation with agencies, cost-share partners and the general public.
- Facilitate communication among members of the Study team, the ELT and STTs.
- Provide guidance and oversight for the STTs in the conduct of each 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 Study are completed, the PM will have primary review and approval for the associated interim reports as well as the Study Final Report.

Project Managers

Goldy Herbon, SDPUD

Leslie Cleveland, Bureau of 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 SDPUD (Table 3). The STAC will provide technical support and input to the PMs throughout the Study. This will include review and comment on this plan of study, the scope of all Study tasks prior to implementation, and all Basin Study deliverables. The STAC will meet as determined by the PMs.

Table 3: STAC Representatives

Representation	Agency	Representative(s)*
Regional Water Supply Planning	San Diego County Water Authority	Dana Frieauf
Water Supply	San Diego Public Utilities Department	Jeff Pasek Rosalva Morales Goldy Herbon Michael Williams
	Helix Water District	Mark Umphres
	City of Poway	Leah Browder
	Olivenhain Municipal Water District	Joey Randall
	Santa Fe Irrigation District	Cor Shaffer
Water Resource/Environmental Expert	San Diego Audubon Society	Jim Peugh
Watershed/NGO	N/A	N/A
Wastewater Collection & Disposal	N/A	N/A
Water Reuse	N/A	N/A
Regulatory/Environmental/ Research/Community Organizations	Scripps Institute of Oceanography	Daniel R. Cayan
	San Diego Foundation	Emily Young
	United States Geological Survey	Flints Danskin

*Membership is subject to change.

3.1.4 Study Technical Teams

The Study will be implemented by specialty Study Technical Teams organized by the task subject areas of climate science/hydrology, engineering, and economics. The Study Technical Teams will provide data review and analysis, technical guidance, and comments and edits on draft reports. The composition of each Study Technical Team is proposed in Table 4. The Project Managers will provide 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	SDPUD	Long-Range Planning and Water Resources Division (LRPWR)
	Reclamation	ESO, TSC
Climate Science/Hydrology	SDPUD	LRPWR
	Reclamation	TSC
Structural Response/ Concepts	SDPUD	LRPWR
	Reclamation	ESO, SCAO
Trade-off Analysis/ Recommendations	SDPUD	LRPWR
	Reclamation	ESO, TSC, SCAO

3.2 Public Involvement Plan

The Study process and findings will be available to the community of water agencies, Tribal communities, the general public, non-water agency stakeholders, and environmental organizations within the study area via the San Diego IRWM Program. Various stakeholder agencies and public entities that are not direct or active participants in developing the Study will be updated on the progress and status of the Study through periodic emails, personal communications, and outreach meetings. The general public and other interested organizations can participate in outreach meetings to be conducted at key Study milestones, beginning with an “kickoff” meeting to announce the Study and concluding with a meeting in the closing weeks of the study to announce Study results. Input provided at the public meetings will be documented, and reasonable efforts will be made to address questions and suggestions. See **Appendix 2: Public Involvement Plan**.

4.0 Study Tasks

The a Basin Study report will be provided to the Reclamation Commissioner within two years of initiation of the Study. The Study will begin on the date of the signing of the Memorandum of Agreement and completed no later than April 30, 2016. Final study public meetings and cost share accounting will be completed by June 2016. The final documentation for the Study will be a report with appropriate technical attachments and other support materials developed over the duration of the Study.

The preparation of the 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 Study follows a typical plan formulation process for Federal water resources studies and consists of the following activities:

- 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 and demands.
- 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 activity will culminate with the preparation of a draft interim report. In general, each activity builds on the information developed in the preceding activities. The findings and data for each activity will be revised as necessary and gathered and documented in the final Study report.

Incorporated into each major activity is an integrated program of partner communications and public outreach at specific intervals (also refer to Appendix 2: Public Involvement Plan). As the Study progresses to the final task, the accumulated information will be used to develop and support the 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 Study includes two major tasks: project administration and planning/design/engineering. The tasks described below are in conformance with the requirements of the Basin Study program.

4.1.1 Task 1 – Project Administration

This task involves project management activities such as project coordination to include minutes and agendas, technical team meetings, and review of project tasks, budget management, and production of Basin Study report materials.

4.1.2 Task 2 – Planning/Design/Engineering

The second major task of the Basin Study will include all activities associated with planning, design and engineering. Activities will include: identifying and providing an inventory of the various water supply and demand data throughout the San Diego Basin, including the role of indirect potable reuse and desalination as components of the overall supply picture; selection of a set of down-scaled climate models for the greater San Diego Basin; employing reservoir optimization modeling software to assess responses of both existing infrastructure and operations to projected climate change impacts; identifying and developing structural and nonstructural concepts to manage drinking water under future conditions; evaluating the trade-offs between the concepts that were developed; and, preparing a Final Report. More details related to Task 2 can be found in **Appendix 3**.

5.0 Schedule and Milestones

Major study milestone activities are described in Appendix 3. These milestone activities and their corresponding deliverable products and estimated due dates are illustrated below. (All assume a September 2014 start date).

Table 5: Major Milestones (Sub-tasks of Task 2.0)

Basin Study Activity	Milestone Deliverables	Completion Date
2.1 Water Supply and Water Demand Projections	Draft Interim Water Supply and Water Demand Projections Report	March 2015
2.2 Downscaled Climate Change and Hydrologic Modeling	Draft Interim Climate Change and Hydrology Report	January 2016
2.3 Existing Structural Response and Operations Guidelines Analysis	Draft Interim Existing Structural Response and Operations Guidelines Analysis Report	January 2016
2.4 Structural and Operations Concepts	Draft Interim Structural and Operations Concepts Report	January 2016
2.5 Trade-Off Analysis and Recommendations	Draft Interim Trade-Off Analysis and Recommendations Report	February 2016
2.6 Final Report	San Diego Basin Study Report	April 2016

6.0 Budget (estimated)

San Diego Basin Structural Study Proposal					
Task	Task Description	SDPUD	Non-Fed	Reclamation	Total Budget
1.0 Project Administration					
1.1	Study Team Coordination and Meetings	\$40,000	\$0	\$50,000	\$90,000
1.2	Stakeholder Coordination and Meetings	\$75,000	\$0	\$35,000	\$110,000
1.3	Study Administration	\$45,000	\$16,428	\$65,000	\$126,428
Subtotal		\$160,000	\$16,428	\$150,000	\$326,428
2.0 Planning/Design/Engineering					
2.1 Water Supply & Demand Projections					
2.1.1	Literature review of existing and projected water demands	\$0	\$5,632	\$10,000	\$15,632
2.1.2	Literature review of existing and projected water supplies	\$0	\$10,000	\$10,000	\$20,000
2.1.3	Literature review on uncertainty scenarios and future supply gap analysis	\$0	\$20,000	\$10,000	\$30,000
2.1.4	Assess future supply gap analysis and provide recommendations on analysis (water conservation system, overall supply, agency needs, groundwater basin management)	\$20,000	\$25,000	\$30,000	\$75,000
2.1.5	Prepare Draft Water Supply & Demand Projections Interim Report	\$0	\$0	\$7,500	\$7,500
2.1.6	Stakeholder Document Review	\$0	\$0	\$5,000	\$5,000
2.1.7	Revise Report	\$0	\$0	\$2,500	\$2,500
2.1.8	Peer Review	\$0	\$0	\$2,500	\$2,500
2.1.9	Prepare and Publish Interim Water Supply & Demand Projections Report	\$0	\$0	\$2,500	\$2,500
Subtotal		\$20,000	\$60,632	\$80,000	\$160,632
2.2 Downscaled Climate Change and Hydrologic Modeling					
2.2.1	Evaluate existing climate change modeling efforts and projections for San Diego Region	\$15,000	\$0	\$30,000	\$45,000
2.2.2	Determine appropriate climate/hydrology models and scenarios for San Diego Region	\$15,000	\$0	\$15,000	\$30,000
2.2.3	Determine how climate change impacts San Diego region's local supply availability (surface water, groundwater, recycled water and seawater desalination)	\$0	\$30,000	\$25,000	\$55,000
2.2.4	Determine how climate change impacts San Diego region's imported supply availability (Colorado River and State Water Project) 1- Determine baseline/future scenario modeling assumptions incorporating selected climate change scenarios 2- Prepare model to simulate baseline/future scenarios 3- Perform model simulations 4- Synthesize and analyze model results 5- Summarize model results	\$0	\$30,000	\$25,000	\$55,000

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2.2.5	Update future supply gap analysis based on climate change evaluation	\$0	\$0	\$30,000	\$30,000
2.2.6	Prepare Draft Interim Report	\$0	\$0	\$7,500	\$7,500
2.2.7	Stakeholder Document Review	\$0	\$0	\$5,000	\$5,000
2.2.8	Revise Report	\$0	\$0	\$2,500	\$2,500
2.2.9	Peer Review	\$0	\$0	\$2,500	\$2,500
2.2.10	Prepare and Publish Interim Report	\$0	\$0	\$2,500	\$2,500
Subtotal		\$30,000	\$60,000	\$145,000	\$235,000
2.3 Existing Structural Response and Operations Guidelines Analysis					
2.3.1	Response to current Climate	\$0	\$16,646	\$0	\$16,646
2.3.2	Response to future Climate	\$0	\$17,000	\$0	\$17,000
2.3.3	Prepare Draft Interim Existing Structural Response and Operations Guidelines Analysis	\$0	\$2,500	\$0	\$2,500
2.3.4	Stakeholder Document Review	\$0	\$2,500	\$0	\$2,500
2.3.5	Revise Report	\$0	\$2,500	\$0	\$2,500
2.3.6	Peer Review	\$0	\$2,500	\$0	\$2,500
2.3.7	Prepare and Publish Interim Existing Structural Response and Operations Guidelines Analysis Report	\$0	\$2,500	\$0	\$2,500
Subtotal		\$0	\$46,146	\$0	\$46,146
2.4 Structural and Operations Concepts					
2.4.1	Review of existing drinking water reservoir systems within San Diego basin	\$10,000	\$25,000	\$25,000	\$60,000
2.4.2	Review of existing imported aqueduct system	\$5,000	\$10,000	\$10,000	\$25,000
2.4.3	Review of existing studies and projects related to regional desalination, water recycling, and potable reuse 1- Storage capacity 2- Potable reuse 3- Desalination (ocean, brackish)	\$10,000	\$10,000	\$10,000	\$30,000
2.4.4	Develop concepts to optimize use of existing reservoirs through integrated conveyance systems	\$10,000	\$50,000	\$45,000	\$105,000
2.4.5	Develop concepts to deliver treated (desalinated or advanced tertiary) water to reservoirs within the basin	\$10,000	\$50,000	\$50,000	\$110,000
2.4.6	Evaluate, refine and potentially integrate concepts in 2.4.4 and 2.4.5 for technical analysis 1- Conveyance/diversion/outlet requirements 2- Site modification requirements 3- Operations	\$10,000	\$35,000	\$32,000	\$77,000
2.4.7	Conduct appraisal-level facility concept planning 1- Evaluate operational changes to dams 2- Develop capacity enhancement concepts 3- Evaluate potential supply and operational changes to reservoirs 4- Other	\$5,000	\$240,000	\$240,000	\$485,000
2.4.8	Prepare Draft Interim Report	\$0	\$5,000	\$7,500	\$12,500
2.4.9	Stakeholder Document Review	\$0	\$0	\$5,000	\$5,000
2.4.10	Revise Report	\$0	\$5,000	\$2,500	\$7,500
2.4.11	Peer Review	\$0	\$0	\$5,000	\$5,000
2.4.12	Prepare and Publish Interim Structural and Operations Concepts Report	\$0	\$5,000	\$3,000	\$8,000
Subtotal		\$60,000	\$435,000	\$435,000	\$930,000

2.5 Trade-off Analysis and Recommendations					
2.5.1	Conduct Economic/Non-economic Analysis	\$0	\$65,000	\$45,000	\$110,000
2.5.2	Develop Trade-off Matrix			\$15,000	\$15,000
2.5.3	Evaluate Cost Effectiveness 1- Water Supply 2- Flood Control 3- Other			\$25,000	\$25,000
2.5.4	Develop Recommendations	\$10,000	\$30,000	\$25,000	\$65,000
2.5.5	Prepare Draft Interim Report	\$0	\$30,000	\$20,000	\$50,000
2.5.6	Stakeholder Document Review	\$10,000	\$10,000	\$10,000	\$30,000
2.5.7	Revise Report			\$5,000	\$5,000
2.5.8	Peer Review			\$5,000	\$5,000
2.5.9	Prepare and Publish Interim Trade-off Analysis and Recommendations Report	\$10,000	\$10,000	\$10,000	\$30,000
Subtotal		\$30,000	\$145,000	\$160,000	\$335,000
2.6 Final Report					
2.6.1	Draft Final Report	\$0	\$10,000	\$10,000	\$20,000
2.6.2	Review Process	\$0	\$10,000	\$10,000	\$20,000
2.6.3	Finalize, Publish, and Distribute San Diego Basin Study Report	\$0	\$22,400	\$10,000	\$32,400
Subtotal		\$0	\$42,400	\$30,000	\$72,400
STUDY TOTAL		\$300,000	\$805,606	\$1,000,000	\$2,105,606

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Appendix 1: San Diego IRWM Program's Regional Advisory Committee

RAC Member Composition

Blue = Invited to assume 4-year terms
Red = 2-year terms already determined
Black = RWG members



Regional Water Management Group (3)

1. City of San Diego – Marsi Steirer
2. County of San Diego – Troy Bankston
3. San Diego County Water Authority – Ken Weinberg

Water Supply (5)

Agencies and entities tasked with supplying water to homes, businesses, and agriculture

1. Retail (North County - Inland) – Bill Hunter/SFID
2. Retail (North County - Coastal) – Cari Dale/Oceanside
3. Retail (East County) – Mark Umphres/Helix
4. Retail (South County) – Jennifer Sabine/Sweetwater
5. Retail (At Large) – Kim Thorner/Olivenhain

Water Quality (6)

Agencies and entities tasked with managing storm runoff, both quantity and quality, in man-made conveyances and/or collecting and disposing of wastewater, including water recycling

1. Stormwater Management (North County) – Crystal Najera/Encinitas
2. Stormwater Management (South/East County) – Joe Kuhn/City of La Mesa
3. Water Quality (NGO) – Travis Pritchard/CoastKeeper
4. Water Quality (NGO) – Leigh Johnson/University of California Cooperative Extension
5. Wastewater/Recycled Water (Metro JPA) – Bob Kennedy/Otay
6. Wastewater/Recycled Water (Non-Metro JPA) – Mike Thornton/San Elijo JPA

Natural Resources and Watersheds (5)

Agencies and entities tasked with preserving, enhancing, and managing natural resources and watersheds

1. Water Conservation (NGO) – Patrick Crais/California Landscape Contractors Association
2. Protection and Restoration (NGO) – Rob Hustel/San Diego River Park Foundation
3. Protection and Restoration (NGO) – Ronald Wooton/Buena Vista Lagoon Foundation
4. Recreation – Al Lau/Padre Dam
5. Coastal Ecosystems (Bays, Estuaries, Lagoons) – Kimberly O'Connell/UCSD Clean Water Utility

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DAC/Environmental Justice (2)

Agencies and entities who represent disadvantaged communities and/or environmental justice concerns

1. Urban DAC – Jennifer Hazard/Alter Terra
2. Rural DAC – Dave Harvey/Rural Community Assistance Corporation

Other Members (7)

Other agencies and entities with interest in and/or impact on water resource management

1. Flood Management – Dennis Bowling/Floodplain Management Association
2. Business Community – Anne Bamford/Industrial Environmental Association
3. Agriculture – Eric Larson/San Diego County Farm Bureau
4. Tribal – open
5. Land Use Planning – Katie Levy/SANDAG
6. At Large* – Linda Flournoy/Sustainability
7. At Large* – Robyn Badger/Zoological Society of San Diego

** For At Large seats, consideration will be given but not limited to the following criteria: academia, climate change, energy/water nexus, solid waste/water nexus, sustainability.*

Total voting members: 28

Non-Voting Members (6)

State, federal, and regional agencies who are interested parties

1. Regional Water Quality Control Board (staff)
2. Bureau of Reclamation
3. Military Community
4. Tri-County FACC (Upper Santa Margarita RWMG)
5. Tri-County FACC (South Orange County RWMG)
6. State Coastal Conservancy

Appendix 2: Public Involvement Plan

Introduction

Reclamation's Southern California Area Office and the SDPUD submitted a Proposal in February 2012 to the U.S. Department of the Interior to fund the San Diego Basin Study. The Basin Study will be conducted over a 2-year period and consists of two major tasks:

1. The Study will help determine the potential climate change impacts on water supplies and demands within the San Diego IRWM Program planning region and analyze structural concepts within the San Diego Basin that can assist the region in adapting to the uncertainties associated with climate change.
2. The Study will also recommend potential changes to existing structural (i.e., dams, reservoirs, treatment plants, and conveyance facilities) operations, modifications to existing facilities, development of new facilities that could optimize the reservoir systems, and additional new water supply options including desalination and indirect potable reuse through reservoir augmentation. 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:

1. Study web site will be maintained to provide up-to-date, online information.

2. An email address list will be established and maintained to ensure that all interested stakeholders receive consistent and timely information.
3. Points-of-contact will be established to facilitate additional information exchange.
4. News releases and informational mailings will be provided, as appropriate.
5. Public meetings will be held at strategic points throughout the Basin Study.
6. 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 site will be used as a tool for soliciting input from stakeholders.

E-mail

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

Points-of-Contact

For additional information, questions, or comments on the Basin Study, two Study Points of Contact are designated. They are Project Managers:

Goldy Herbon at 619-533-4120 or GHerbon@sandiego.gov
Leslie Cleveland at 951-695-5310 or LCleveland@usbr.gov

News Releases

News releases or media advisories will be distributed 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 SDPUD's newsletters and informational emails.

Public Meetings

Public meetings will be held at strategic times throughout the Basin Study, beginning with an initial meeting in January 2015. 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 SDPUD as part of their public outreach effort.

Five public meetings are currently envisioned as follows:

1. Winter 2015 – Meeting to present the Basin Study proposal and plan of study.
2. Targeted for early Winter 2015/Spring 2016 – Meeting to discuss current and future water supply and demand projections.
3. Targeted for Winter 2015/Spring 2016 – Meeting to discuss results of climate change, hydrology analysis, and system response.
4. Targeted for Winter 2015/Spring 2016 – Meeting to discuss the results of strategies and options and scenario planning and implement planning.
5. Targeted for Spring 2016 – 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.

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. Other interest groups are encouraged to be involved by providing their contact information via one of the communication methods listed above.

Potential Stakeholder Groups

1. Department of Agriculture
 - a. U.S. Forest Service
 - b. Natural Resources Conservation Services Rural Development
2. Department of Commerce
 - a. National Marine Fisheries Service Southwest Regional Office
3. Department of Defense
 - a. Department of the Navy
 - b. U.S. Marine Corps
 - c. U.S. Coast Guard
 - d. Department of the Army
 - e. U.S. Air Force
4. Department of Homeland Security

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- a. Federal Emergency Management Agency
5. Department of the Interior
 - a. Bureau of Indian Affairs
 - b. Bureau of Reclamation
 - c. U.S. Fish and Wildlife Service
 - d. U.S. Geological Survey
 - e. National Park Service
6. U.S. Army Corps of Engineers
7. U.S. Environmental Protection Agency
8. Tribes
 - a. Barona
 - b. Campo
 - c. Capitán Grande
 - d. Cuyapaipe
 - e. Inaja-Cosmit
 - f. Jamul
 - g. La Jolla
 - h. La Posta
 - i. Los Coyotes
 - j. Manzanita
 - k. Mesa Grande
 - l. Pala
 - m. Pauma and Yuima
 - n. Pechanga
 - o. Rincon
 - p. Santa Ysabel
 - q. San Pasqual
 - r. Sycuan
 - s. Viejas
9. California State Agencies
 - a. Office of Emergency Services
 - b. Environmental Protection Agency (State Water Resources Control Board)
 - c. Department of Toxic Substances Control
 - d. Natural Resources Agency
 - e. Department of Fish and Wildlife
 - f. Department of Forestry and Fire Protection
 - g. Department of Water Resources (Southern Region)
 - h. Department of Parks and Recreation
 - i. State Parks Office of Historic Preservation
 - j. Department of Public Health

- k. Public Utilities Commission
 - l. Department of Transportation
10. Regional Water Districts, Sanitation Districts, Conservation Districts, City Governments, and all other potential stakeholders that are not on the San Diego IRWMP list (Appendix 1)

This list is not all inclusive.

Appendix 3: Planning/Design/Engineering Details (as described in Section 6.0: Budget)

2.1 Water Supply and Demand Projections

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 activity will assess the magnitude and variability of water supplies derived from local and imported sources in conjunction with other supply sources.

Task 2.1 activities are anticipated to include the following:

2.1.1 Water Demand Projections

- a. Literature review of current water demand 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 demand projections
 - i. Imported and local potable supplies
 - ii. Recycled water
 - iii. Desalination
 - iv. Water conservation
 - v. Current groundwater volumes
 - vi. All other sources

2.1.2 Water Supply Projections

- a. Literature review of current water supply
 - i. Municipal
 - ii. Industrial
 - iii. Agricultural
 - iv. All other demands
- b. Literature review of future water supply
 - i. Municipal
 - ii. Industrial
 - iii. Agricultural
 - iv. All other demands

2.1.3 Supply Gap Analysis

- a. Assess current water supply analysis
 - b. Assess future water supply analysis
 - c. Next steps and recommendations
- 2.1.4 Assess future supply of SDPUD Water Conservation System Contributions
- a. Overall supply
 - b. Water agency needs
 - c. Groundwater basin management
- 2.1.5 Prepare Draft Interim Water Supply and Demand Analysis Report
- 2.1.6 Stakeholder Document Review
- 2.1.7 Revise Report
- 2.1.8 Peer Review
- 2.1.9 Prepare and Publish Interim Water Supply and Demand Analysis Report

Deliverable: Water Supply and Demand Analysis Report

2.2 Downscaled Climate Change and Hydrologic Modeling

There will be a selection of a set of down-scaled climate models for the greater San Diego Basin. These models will be used throughout the 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 Study area that will produce precipitation projections out to 2050.

Task 2.2 activities are anticipated to include the following:

- 2.2.1 Evaluate existing climate change modeling efforts and projections in the Study area
- 2.2.2 Determine appropriate climate scenarios for use in the hydrologic modeling
- 2.2.3 Determine how climate change impacts the regional supply availability
 - a. Storm event frequency for planning purposes
 - b. Prepare data for input into SDPUD hydrologic model
- 2.2.4 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
- 2.2.5 Update future supply gap analysis based on climate change evaluation
- 2.2.6 Prepare Draft Interim Downscaled Climate Change Hydrologic Modeling Report
- 2.2.7 Stakeholder Document Review
- 2.2.8 Revise Report
- 2.2.9 Peer Review
- 2.2.10 Prepare and Publish Downscaled Climate Change Hydrologic Modeling Interim Report

Deliverable: Downscaled Climate Change and Hydrologic Modeling Report

2.3 Existing Structural Response and Operations Guidelines Analysis

Building on the climate change and hydrologic modeling results developed, this activity involves reservoir optimization modeling using either Reservoir System Simulation software developed by the USACE Hydraulic Engineering Center (HEC-ResSim) or Prescriptive Reservoir Model software also developed by the Hydraulic Engineering Center (HEC-ResPRM). The reservoir optimization modeling software will be used to assess responses of both existing structural and operations to projected climate change impacts to local and imported water supplies and to analyze operations guidelines for current and future climate conditions.

Task 2.3 activities are anticipated to include the following:

- 2.3.1 Response to Current Climate
- 2.3.2 Response to Future Climate
- 2.3.3 Prepare Draft Interim Existing Structural Response and Operational Plans Analysis Report
- 2.3.4 Stakeholder Document Review
- 2.3.5 Revise Report
- 2.3.6 Peer Review
- 2.3.7 Prepare and Publish Interim Existing Structural Response and Operational Plans Analysis Report

Deliverable: Existing Structural Response and Operational Plans Analysis Report

2.4 Structural and Operations Concepts (Adaptation Strategies)

This activity will identify and develop structural and nonstructural concepts to manage drinking water 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. Concepts will be evaluated by minimum storage criteria and minimum infiltration capacity criteria. Concepts that meet the minimum criteria will be further evaluated and refined. 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.

Task 2.4 activities are anticipated to include the following:

- 2.4.1 Review of existing drinking water reservoir systems
- 2.4.2 Review of existing imported aqueduct system
- 2.4.3 Review of existing studies and projects related to regional desalination, water recycling, and potable reuse
- 2.4.4 Develop concepts to optimize use of existing reservoirs through integrated conveyance systems
- 2.4.5 Develop concepts to deliver treated (desalinated or advanced tertiary) water to reservoirs within the basin
 - a. Identify range of opportunities and options
 - i. SDPUD Staff
 - ii. Study Technical Team
 - iii. STAC
 - iv. Public
 - b. Determine preliminary concepts for further evaluation
- 2.4.6 Evaluate, refine and potentially integrate concepts for Technical Analysis
 - a. Technical Analysis of concepts
 - i. Storage capacity
 - ii. Potable reuse
 - iii. Ocean desalination
 - iv. San Diego Formation
 - v. Conveyance/diversion/outlet requirements
 - vi. Site modification requirements
 - vii. Operations
 - b. Selection of concepts for appraisal-level concept planning

- 2.4.7 Conduct Appraisal-Level Facility Concept Planning
 - a. Dams
 - i. Evaluate potential operational changes to dams
 - ii. Develop capacity enhancement concepts, with cost estimates
 - b. Indirect Potable Reuse – Reservoir Augmentation
 - i. Evaluate potential supply and operational changes to reservoirs
 - ii. Develop capacity enhancement concepts, with cost estimates
 - c. Desalination (Ocean and Brackish)
 - i. Evaluate potential supply and operational changes to reservoirs
 - ii. Develop capacity enhancement concepts, with cost estimates
 - d. Other
- 2.4.8 Prepare Draft Interim Structural and Operations Concepts Report
- 2.4.9 Stakeholder Document Review
- 2.4.10 Revise Report
- 2.4.11 Peer Review
- 2.4.12 Prepare and Publish Interim Structural and Operations Concepts Report

Deliverable: Structural and Operations Concepts Report

2.5 Trade-Off Analysis and Recommendations

The trade-off analysis will evaluate the trade-offs between the concepts that were developed in the structural and operations concepts activity. 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.

Task 2.5 activities are anticipated to include the following:

- 2.5.1 A. 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
- B. 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
- 2.5.2 Develop Trade-Off Matrix
- 2.5.3 Cost Effectiveness
- a. Water supply
 - b. Flood control
 - c. TBD
- 2.5.4 Develop Recommendations
- 2.5.5. Prepare Draft Interim Trade-off Analysis and Recommendations Report
- 2.5.6 Stakeholder Document Review
- 2.5.7 Revise Report
- 2.5.8 Peer/Technical Advisory Panel Review Interim Report
- 2.5.9 Prepare and Publish Interim Trade-off Analysis and Recommendations Report

Deliverable: Trade-off Analysis and Recommendations Report

2.6 Final Report

The final activity will be the preparation of a final report.

Task 2.6 activities are anticipated to include the following:

- 2.6.1 Prepare Final Report
- 2.6.2 Review Process
 - a. Peer review
 - b. Internal review
 - c. Public review
- 2.6.3. Finalize, publish and distribute Report

Deliverable: San Diego Basin Study Report